BODYPAINT 3D™

PAINTING • TEXTURING • MAPPING

Reference Manual

BODYPAINT 3D™

Reference Manual

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Friedrichsdorf
Germany

or for North and South America to:

MAXON Computer Inc.
566 St. Charles Drive, Suite 2
Thousand Oaks, CA 91360
USA

We also shall be glad to provide you with the address of your nearest supplier.

Contents

Hall of Honor

Programming

Tilo Kühn, Richard Kurz, Christian Losch, Philip Losch
Sven Behne, Wilfried Behne

Manuals

Paul Babb, Rick Barrett, Oliver Becker, Dirk Beichert
Chris Broeska, Michael Giebel, Jason Goldsmith, Jörn Gollob
David Link, Aaron Matthew, Janine Pauke, Harald Schneider
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Therapy

Conny Herbst, Ulrike Kurz, Beate Losch

Preface

Traditionally, a preface in a computer program's documentation is all about thanking the customer for her or his wise choice of purchase. Certainly, we are truly grateful for your purchase and we offer you our warmest thanks. But let's be honest, your fingers are already itching to turn the page to see what wonderful features await you. You want to know how BodyPaint 3D is going to revolutionize the way you work, and to this we now turn our attention.

Firstly, BodyPaint 3D is based on the highly-optimized, multi-award-winning program code of CINEMA 4D XL. This means that BodyPaint 3D shares the legendary speed and proverbial stability of its sister package. If you have used CINEMA 4D XL, you will feel at home right away, because you can integrate BodyPaint 3D with CINEMA 4D XL seamlessly - the new tools simply appear as extra managers in your usual layout.

Secondly, and just as importantly, BodyPaint 3D is for users of almost all 3D applications. This is made possible by BodyPaint 3D's numerous import and export filters. Also, BodyPaint 3D has a fully configurable GUI so that you can feel at home whatever your main 3D application.

The problem that BodyPaint 3D aims to address is easily defined. Imagine that you have spent many hours creating the most detailed of 3D objects. The modeling is done and all you need now is good texturing. However, try as you might, most of the textures show seams and distortions when mapped to the model. Only rarely can you get a texture to fit snugly onto its model. Or perhaps you are fed up of guessing where you should paint in your 2D paint package. All these difficulties and more come about because you cannot paint directly onto the 3D object.

With BodyPaint 3D, you *can* paint directly onto your 3D models in real-time, even if they number millions of polygons. Just load a model, grab a brush and a texture, then start painting. You can even paint to several material channels at the same time, using a MultiBrush.

One feature in particular makes BodyPaint 3D unique; its RayBrush technology enables you to paint to a rendered image in three dimensions — a world first! Not only can you paint color to the rendered image, you can also paint bump, transparency, reflection and other properties besides. For example, you might render a ship then paint welding with reflection and bump in a single brush stroke.

We have endeavoured to make BodyPaint 3D practical to use. For example, you can work with layers. In addition, BodyPaint 3D includes most popular image-editing and selection tools.

The powerful UV Editor is a highlight, an absolute star, of BodyPaint 3D. The UV Editor enables you to edit a texture's geometry without changing the object. You can move the UV coordinates freely so that your textures fit the object optimally. Above all, it is easy to place textures (or even parts of textures) with absolute pixel-point accuracy.

Your fingers are probably itching even more now, but before you go, please be aware that we will be delighted to receive your comments and improvement suggestions for BodyPaint 3D. To this end, please use the suggestion form in the Support area of our website (www.maxon.net). Only your comments and suggestions will enable BodyPaint 3D to remain *your* software.

We wish you every success in using BodyPaint 3D.

Team MAXON.

BODYPAINT 3D

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1. Getting to Know

1 Getting to Know BodyPaint 3D

Launching

There are several ways to start BodyPaint 3D:

- Double-click on the program icon.
- Double-click on a scene file.
- Use the Start menu (Windows).

Alternatively, you can drag-and-drop one or more BodyPaint 3D files from Explorer (Windows) or Finder (Macintosh) on to the BodyPaint 3D application icon or directly into the program.

Template.c4d

If the BodyPaint 3D root folder contains a scene named 'Template.c4d', this is loaded during startup and all the settings defined there become effective.

Quitting

File > Quit quits the program. If any unsaved changes are detected, a dialog asks you if you wish to save these before quitting.

Clicking on **Cancel** in this dialog returns you to the program.

Note

The layout can be saved automatically each time you quit the program - activate Save Layout at Program End on the General page of the General Settings.

Mouse Techniques

BodyPaint 3D offers enhanced mouse functionality. The features that go beyond conventional mouse control are:

- You can simulate the right mouse button on the Macintosh by clicking with the Ctrl key held down. Alternatively, use a two-button mouse with the appropriate driver.
- If you wish to drag an object on to a window displayed as a tab but the window is concealed, drag and hold the object over the window's tab. After a short delay, the window will be activated and you can drop the object on the target.
- If you are using a wheel mouse, you can use the wheel to scroll sliders (such as a material's color and brightness sliders). You can also use the wheel to increment/decrement numbers in numerical text boxes.
- Vertical window slider. Use this, for example, to scroll quickly in the Object manager.
- Increment arrows alongside some input boxes.

Graphics Tablet

BodyPaint 3D supports all graphics tablets that conform to the WinTab standard, such as the Wacom range. The pen pressure, pen tilt, pen direction and pen finger wheel are all supported. For details on how to link these input methods to your brush settings, please see Chapter 7, Brush Settings.

Hotkeys 1 to 7

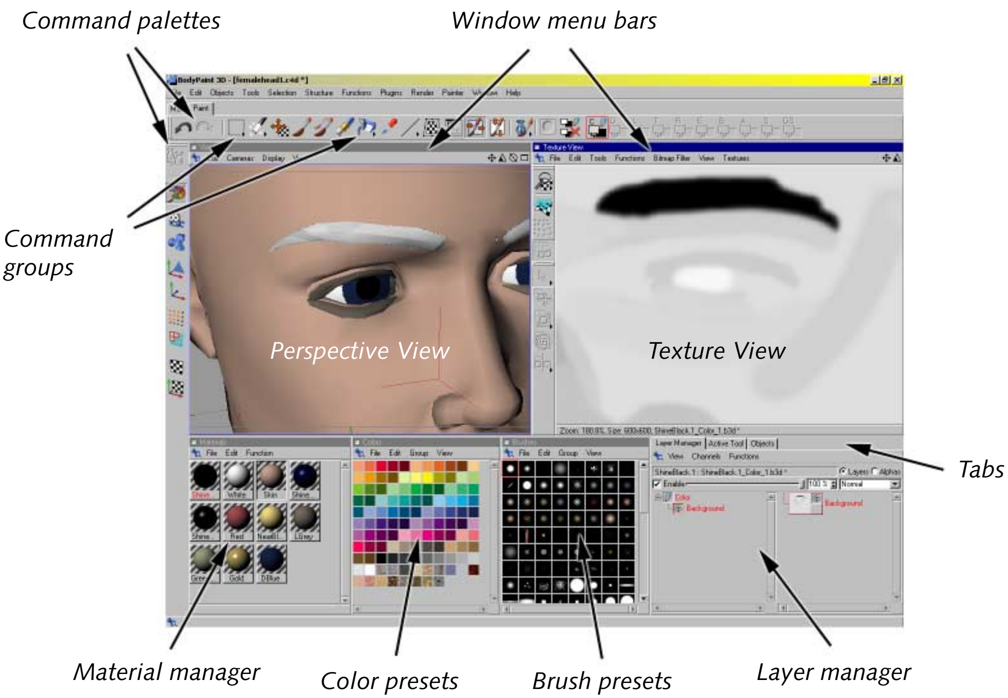
You can use the following hotkeys in the view panel:

1	move camera
2	zoom camera
3	rotate camera
4	move object
5	scale object
6	rotate object
7	scale model

The GUI

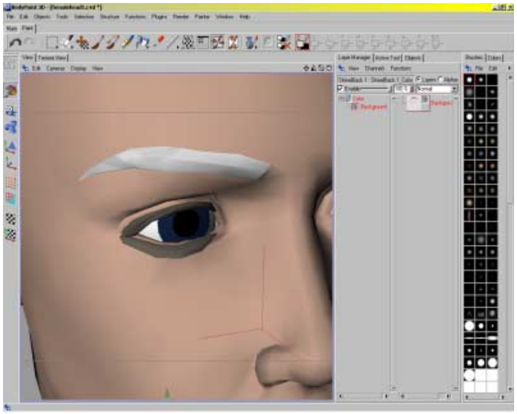
The BodyPaint 3D GUI offers features far in advance of the standard Windows/Macintosh GUI. For example, you may dock all windows into the main window.

When a docked window is moved, the surrounding windows adapt so that no overlapping occurs. Each window has its own menu bar. Windows can also be displayed as tabs and grouped together to conserve display space.

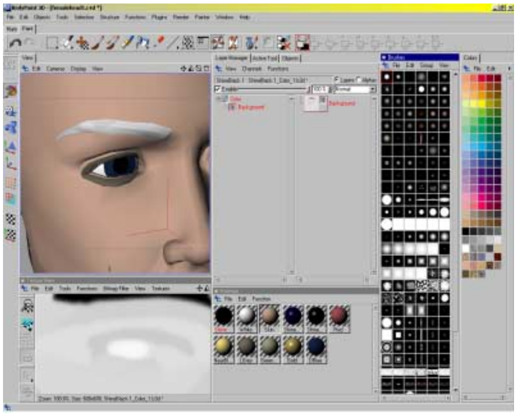


The GUI is freely configurable. You can create your own icon palettes (including folded icons) and you can even edit the menus.

You can define various layouts and switch between them at will.



Alternative layout with a large Perspective View



Alternative layout with the managers to one side

A Quick Tour

In this section we take a look at the individual program elements that appear on the screen the first time you launch BodyPaint 3D. This is merely a quick tour - the detailed descriptions come later in the corresponding chapters.

Managers

Managers are the main program elements in BodyPaint 3D. Each manager has its own window and runs parallel to the other managers. This means that each manager can operate independently (so that it is *multithreaded*) - something of a rarity for application software. For example, if you paint an object in the Perspective View, the bitmap in the Texture View is changed at the same time.

Although the managers operate independently, each manager reacts immediately to changes made in other managers that affect it. For example, if you move an object in the editor, the corresponding values in the Coordinate manager change.

Windows

Each manager has its own window. A window can be placed freely or it can be *docked* into BodyPaint 3D's main window.

In the default layout, almost all the managers are docked. If you change the size of a docked window, the surrounding windows are adjusted automatically to avoid an overlap.

If you wish to undock a window from the group, click on its pin icon and select **Undock**. To re-dock the window, drag-and-drop its pin icon onto the main window. A black line will indicate the insertion position.

To change a window's size, first move the mouse pointer to its border. The pointer will change into a double arrow to indicate the direction (either vertical or horizontal) in which you can drag the border. Drag the window as required. The other windows in the group will adapt to the change.

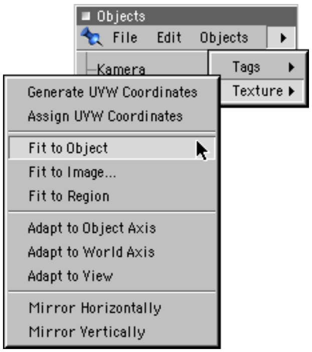
Menu Bars

Each manager has its own menu bar.

Menu bars have the following features:

- Submenus.
- Commands that cannot be selected are grayed out.
- Activated options are indicated with a tick.
- All shortcuts, including those you have allocated yourself, are displayed.

If there is insufficient space to display the entire menu bar, a black triangle appears. If you click on the triangle, the other menu entries appear on a popup menu.



Command Palettes

There are two command palettes (aka icon palettes) in the default layout to house the most frequently used commands.

Some of the icons have a small black triangle to their lower right. This indicates a folded group. If you click and hold down the left mouse button on the icon, hidden icons appear. Folded groups take up minimal space and are a convenient way to group similar commands. The visible icon is usually the last command that you used. For more information on command palettes see Command Palettes, page 32.

Tabs

You can display windows and command palettes as tabs. For example, the Object manager and Structure manager are displayed as tabs in the default layout. This saves display space and allows you to reach a manager or command palette quickly.

If there is insufficient display space for all the tabs, one of the tabs will be *torn*. You can use the small arrow icons to the top right of the window to scroll through the tabs.

For more information on tabs see Tabs, page 31. For details on the individual program managers, please see the corresponding chapters.

Context Menus

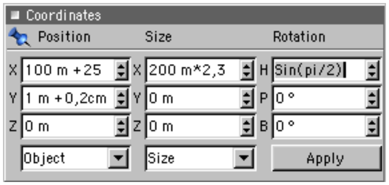
BodyPaint 3D supports context menus. To activate a context menu, press the right mouse button (or Command-click for the Macintosh).

Input Boxes

Input boxes with two small arrows (one pointing up, the other pointing down) offer the following features:

- Click on an arrow to increment or decrement the value by one.
- If you click on an arrow and move the mouse up/down, the value increases or decreases rapidly.
- The wheel mouse is supported - position the mouse pointer in a box with a numerical value, then move the wheel to increase/decrease the value.

BodyPaint 3D has a built-in expression evaluator which enables you to include mathematical operators in numerical boxes. See Appendix 1.



Perspective View

Here, you cab paint and render the object in three dimensions.

Texture View

This window is used for viewing and editing bitmaps in two dimensions. In addition, you can view and edit UV mesh.

Material Manager

The Material manager contains all the materials used in the scene. A double-click on a material opens its dialog so that it can be edited. You can apply a material by dropping it on to an object.

Color Manager

This manager contains ready-to-use color presets. You can add your own presets if you wish.

Brush Manager

Here, you can choose a predefined brush tool. You can also add your own brushes to the manager.

Layer Manager

This is where all two-dimensional bitmap layers are created and managed.

Active Tool Manager

This manager shows the settings for the active tool - the settings vary according to the tool. For a detailed description of the options, see the relevant tools chapter.

Object Manager

The Objects manager contains all the scene elements (objects). Objects can be grouped hierarchically. For example, a leaf will be the child of a branch, which in turn is the child of the trunk while the tree is the main (root) object.

An object can be selected by clicking on its name in the Objects manager. This activates the object in the view panel, from where it can be moved and so on. You can use tags to allocate certain properties to objects in the Objects manager. For example, you can use a texture tag to apply a texture

BODYPAINT 3D

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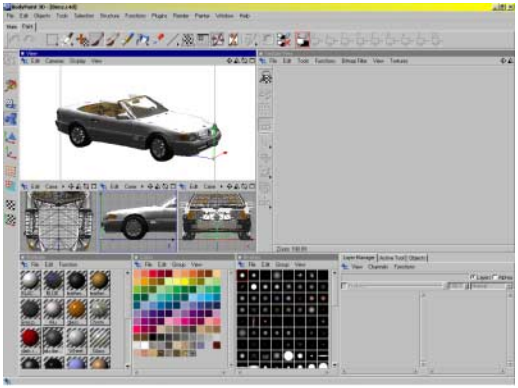
2. View Menu

2 View Menu

View Panels

You can open as many view panels as you like. Each view panel has its own display settings.



A view panel can show up to four views simultaneously. Each of these views has its own display settings.

View Icons

There are four icons at the top right of each view. The right-most icon toggles the active view (see Toggle Active View, page 24). The remaining icons move, zoom and rotate the camera (click-drag on the icon you require to see the effect).

Edit

Undo View/Redo View

Each view has its own **Undo View/Redo View** functions (the **Undo/Redo** functions of the main window do not affect editor cameras).

Note

The shortcut for Undo View is Ctrl+Shift+Z. For Redo View, use Ctrl+Shift+Y.

Frame

Frame Selected Elements

The camera will move so that the selected elements (e.g. objects, polygons) fill the view and are centred.

Frame Active Object

The camera will move so that the active object fills the view and is centred.

Frame Scene Without Camera/Light

The camera will move so that all objects (bar lights and cameras) fill the active view and are centred.

Frame Scene

The camera will move so that all objects, including lights and cameras, fill the active view and are centred.

Frame Default

This function resets the view to its default values.

Use as Render View

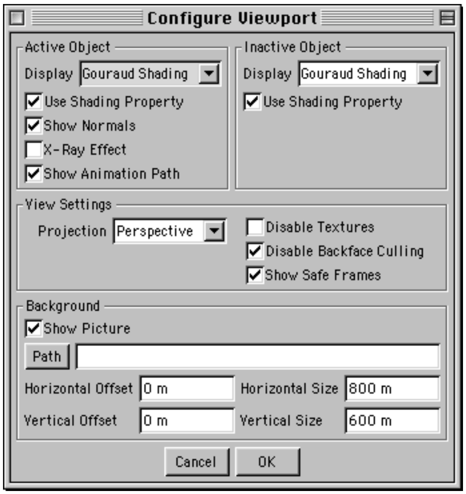
If this option is activated, the active camera of the active view is used for the rendering in the Picture Viewer.

Redraw

This function redraws the scene. This is useful when BodyPaint 3D has been unable to complete the Perspective View picture automatically. This may happen, for example, when you call functions in quick succession.

Configure

If you select **Configure**, the view's configuration dialog will open.



Active Object

Display

Display sets the display mode (e.g. Gouraud shading, wireframe) for the active object, although see **Use Shading Property** below.

Use Shading Property

If this option is activated, the active object will use the display mode defined in its display tag instead of the setting defined in this dialog.

Show Normals

If you enable this option, surface normals will be shown when you select polygons. The normals appear as small auxiliary lines which are perpendicular to their surface. By convention, the direction of a normal represents the direction of its surface. For example, *backface culling* checks the direction of each normal to determine whether its surface should be drawn - if the normal points away from the camera, the surface is not drawn (the surface is assumed to point away from the camera, just like its normal).

X-Ray Effect

To activate the X-ray mode, select this function. If the active object is a polygon object, it will become semi-transparent so that you can see its concealed points and edges.

Show Animation Path

If this option is selected, the active object's animation path will appear in the editor in the form of a yellow curve. If you want to edit the animation path, drag the curve's points to new positions and edit the tangents.

Inactive Object

Display

Display sets the display mode (e.g. Gouraud shading, wireframe) for the inactive objects in the scene.

Use Shading Property

If this option is activated, the inactive objects will use the display mode defined in their display tags instead of the setting defined in this dialog.

View Settings

Projection

You can use this setting to change the projection type (e.g. to Perspective, Bird, Dimetric).

Disable Textures

Select this option if you wish to switch off realtime texture mapping.

Disable Backface Culling

You can select this option to switch off backface culling.

Note

Backface culling merely hides an object's concealed points and edges. For example, if you are using the wireframe display mode, you can still see an object when it is behind another object.

Show Safe Frames

This activates the safe frames (Render Safe, Action Safe, Title Safe), although they must be activated in the General Settings as well in order for them to be displayed.

Show Picture

If you wish to place a background picture in a planar view (e.g. front, top, right), click on the **Path** box and use the dialog that opens to locate the picture. Next, activate the **Show Picture** option. You can use the horizontal and vertical offset and size boxes to move and scale the background picture freely. This background picture is a modeling aid - it is not intended for rendering. You can place a different picture in each planar view.

Cameras

Each view has its own camera. The editor camera is used by default, but you may create and use your own cameras via the Object manager.

Scene Cameras

You may activate your own camera (see page 314) by selecting it from this list.

Link Active Object

If you select this function, you will view the scene from the origin of the active object. This can be any type of object, even a light source. However, if the object has surfaces, the view may be obscured!

Editor Camera

This function activates the editor camera.

Projection

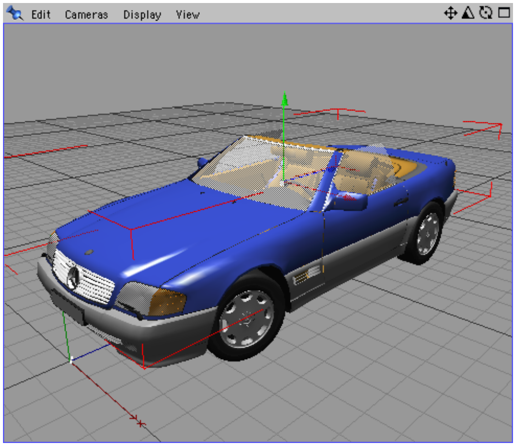
You can choose from over a dozen projection modes. A detailed technical explanation for each projection type is beyond the scope of this manual. However, the pictures highlight the key differences visually.

Warning!

The camera position may alter when you change the projection mode. You can avoid this by selecting the view (e.g. View 3) from the View menu.

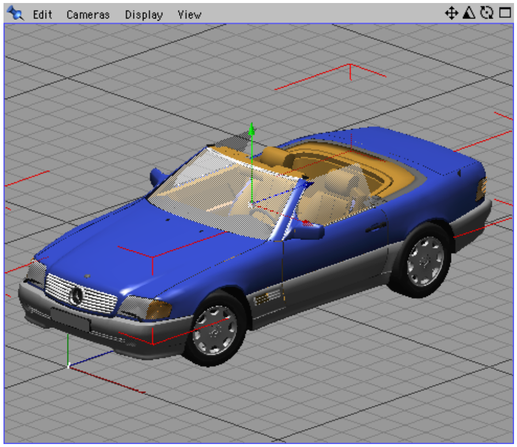
Perspective

This is the default projection mode for the view panel. It operates in a similar fashion to a real camera.



Parallel

With parallel projection, the vanishing point is infinitely distant. As a result, the picture appears to have no vanishing point and all lines are parallel.



Left

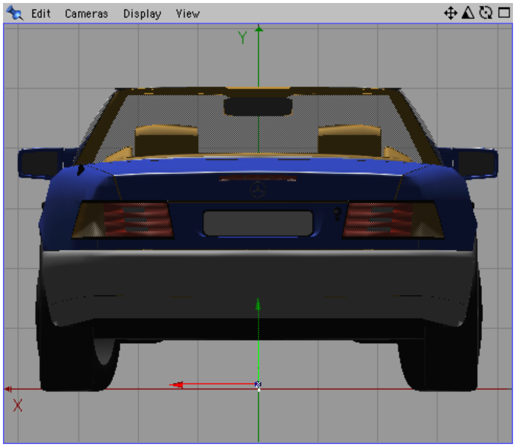
This function selects the YZ (left) view.

Right

This function selects the ZY (right) view.

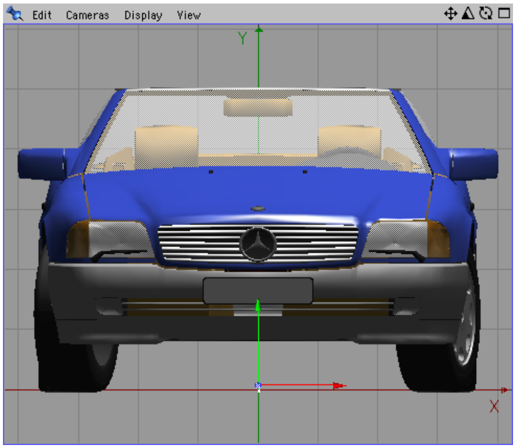
Back

This function selects the YX (back) view.



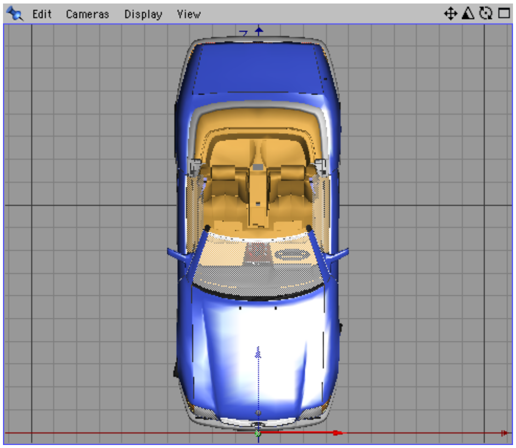
Front

This function selects the XY (front) view.



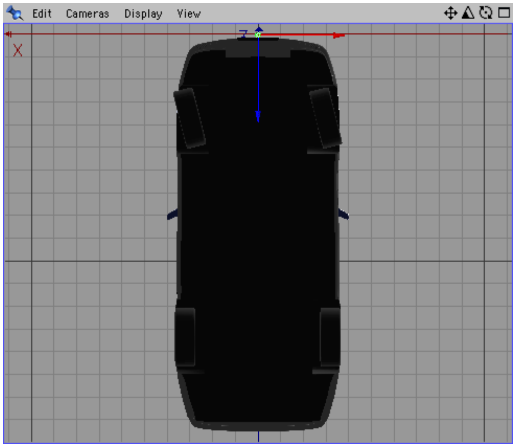
Top

This function selects the XZ (top) view.



Bottom

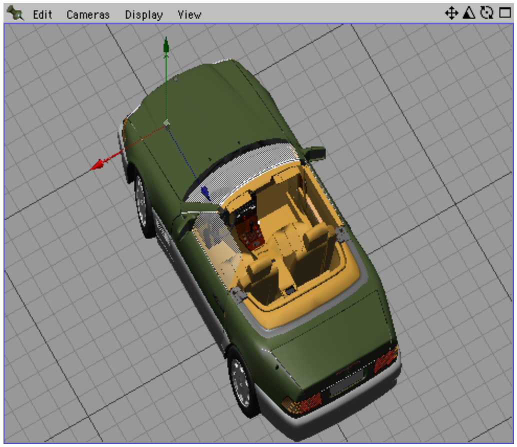
This function selects the ZX (bottom) view.



The following projection types all use parallel projection. They differ in the format and/or viewing angle.

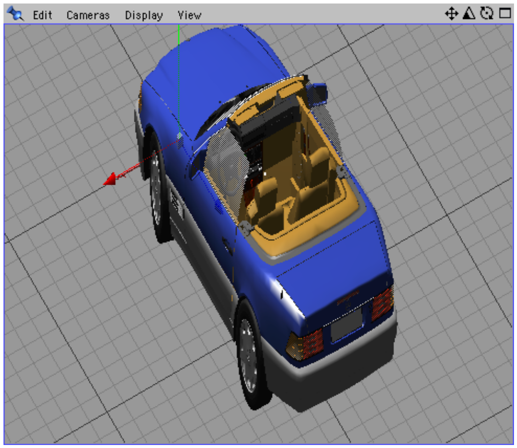
Military, Frog and Bird projection share the same viewing angle but use different formats…

Military



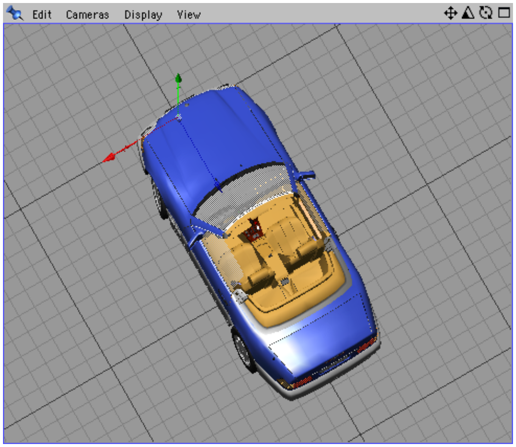
X:Y:Z = 1:1:1

Frog



X:Y:Z = 1:2:1

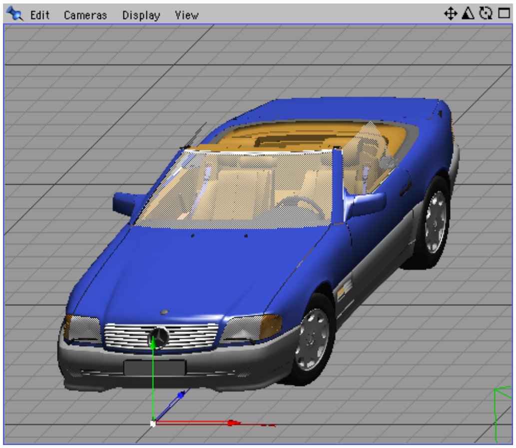
Bird



X:Y:Z = 1:0,5:1

Gentleman

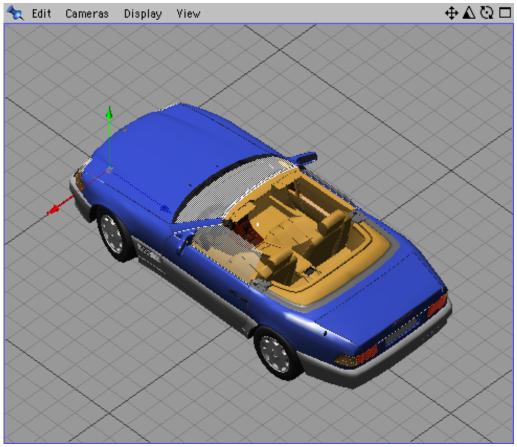
This is a popular choice for architecture.



X:Y:Z = 1:1:0,5

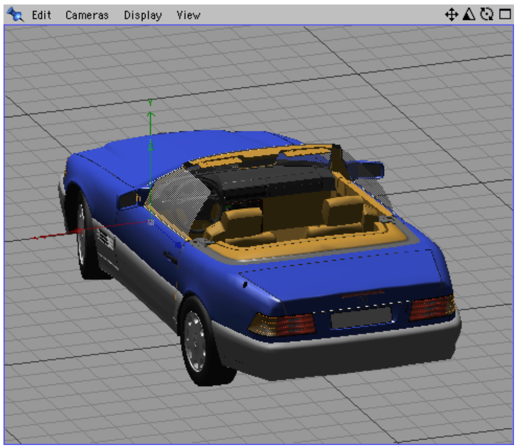
Isometric

This is a popular choice for technical subjects (e.g. machinery). The X:Y:Z format is 1:1:1.



Dimetric

This is similar to Isometric, but with an X:Y:Z format of 1:1:0.5.



Display

This sub-menu lists display options such as the shading mode. You can, in addition, activate realtime antialiasing from the Views tab of the General Settings - provided that you are using an OpenGL card which supports this feature.

Level Of Detail

Choose from **Low**, **Medium** or **High**. The setting affects the display detail of parametric objects; the lower the detail, the faster the display. This setting has no effect on polygon objects.

Gouraud Shading

Gouraud shading offers the highest quality display mode in the Perspective View. All objects are shaded with smoothing and light sources are evaluated for the shading.

The redraw rate is affected most by the processor speed and graphics card speed. If the display becomes too slow, try reducing the view size.

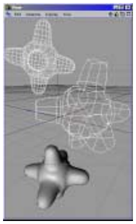
Quick Shading

Quick shading is almost identical to Gouraud shading (see above). The only difference is that the auto light (see page 416) is used to calculate the shading values - all lights in the scene itself are ignored. This can lead to a faster redraw rate, since only a single light source (the auto light) is evaluated.

Wireframe

If this mode is selected, objects are displayed as lines. This can be particularly effective for an overview of complex scenes, especially when used with backface culling (see page 22). This mode is drawn very quickly.

Isoparms



This mode displays isoparm lines for those objects which make use of them (e.g. HyperNURBS objects). Other objects, such as polygon objects, will be displayed in wireframe.

The isoparm display mode is very fast and is particularly suited to complex scenes.

Shaded Box

This mode displays each object as a shaded box. Each box has the same dimensions as the object it represents. This mode is drawn very quickly, even with complex scenes. It can be useful for characters or for navigation in large scenes.

Box

This mode displays each object as a wireframe box. Each wireframe box has the same dimensions as the object it represents. This mode is exceptionally fast, making it suitable for the most demanding scenes.

Skeleton

This is the fastest display mode of all, but it is only suited to hierarchical structures. Each object origin is shown as a small dot and these dots are connected with lines according to the hierarchy. This mode is particularly useful for characters, not only for its speed, but also because it removes all non-critical lines to expose the all-important skeleton.

Use Shading Property

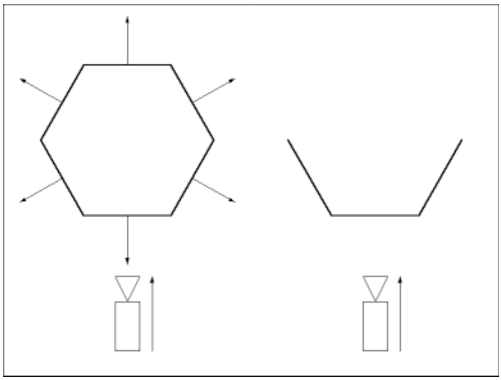
If this option is activated, objects will use the display mode defined in their display tags instead of the general display setting. Objects that do not have a display tag will continue to use the general setting.

Backface Culling

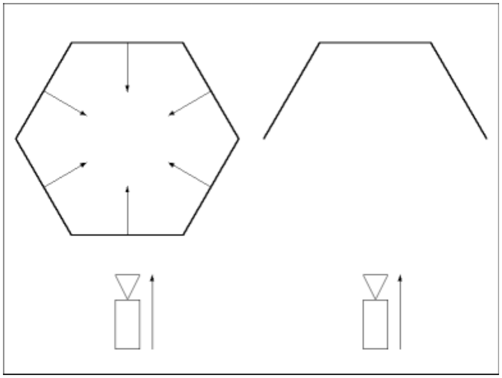
If you activate backface culling, backfaces are not drawn in the editor. This can speed up the display as well as hide concealed surfaces.

A backface is a surface which points away from the camera. BodyPaint 3D can tell in which direction a surface points by examining its surface normal.

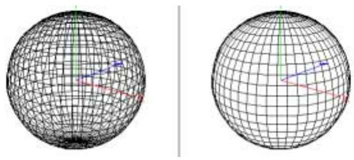
If the surface normal points towards the camera, the surface is a frontface. If the surface normal points away from the camera, the surface is a backface and is not drawn if this option is activated. The following picture demonstrates the backface principle:



By convention, the normals should point outwards from their surfaces. If your object has normals that point inwards on the object, display errors may arise. In this case, reverse the normals (see Structure Manager, page 389).



The following picture shows how backface culling hides concealed surfaces (backfaces). The object on the left does not use backface culling, the object on the right does.



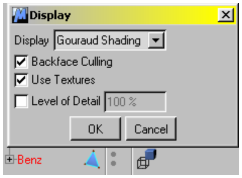
Textures

BodyPaint 3D's realtime texture mapping (RTTM) enables you to see textures in the Perspective View in realtime - even without an OpenGL card! To activate RTTM mode for a particular view, select the **Textures** option from its **Display** menu. The textures will only be visible with Gouraud shading or quick shading.

RTTM can display the following material properties:

- Color textures
- Highlights
- Bump map
- Alpha channel
- Transparency

You can use a display tag in the Object manager to activate or deactivate RTTM for each object (**File > New Tag > Display Tag**).



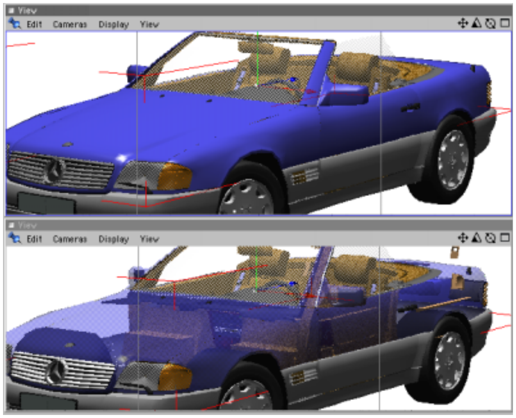
Activating and deactivating RTTM

RTTM is an approximation of the rendered result. RTTM may, under circumstances, differ substantially from the final result, especially for large surfaces which extend towards the horizon.

X-Ray

To activate the X-ray mode, select this function. If the active object is a polygon object, it will become semi-transparent so that you can see its concealed points and edges.

It enables you to see concealed surfaces in the Gouraud shading and quick shading modes.



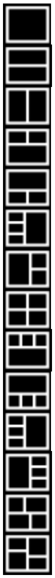
View

Each view panel can have up to four views. Each of these views may have its own:

- camera
- projection type
- display mode

View arrangement

You can choose a single-view mode or all-views mode. The arrangements on offer are:



Single-View
2 Views Stacked
2 Views Side by Side
3 Views Top Split
3 Views Bottom Split
3 Views Left Split
3 Views Right Split
4 Views
4 Views Top Split
4 Views Bottom Split
4 Views Left Split
4 Views Right Split
4 Views Stacked
4 Views Side by Side

Each view may have its own camera, projection type and display mode.

Note

These settings are saved automatically when you save the document.

Toggle Active View

This option toggles between the single-view mode and the all-views mode. When toggling from all-views to single-view, select the option from the target view (the view that you wish to see next).

View 1 - View 4/All Views

Here you can switch between the single-views and the all-view mode.

You can change each view's projection type via its **Cameras** menu. The default projections are:

View 1	F1	perspective
View 2	F2	top
View 3	F3	right
View 4	F4	front
All Views	F5	all views

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

3. Configuration

3 Configuration

We have taken great care during the entire development stage to ensure that BodyPaint 3D is easy to use despite its wealth of features.

You may configure many aspects of BodyPaint 3D. The downside of this flexibility is that there are, consequently, many settings. However, the settings are not bundled together in a giant, unfathomable settings dialog. Instead, we have placed the options where they most make sense. Not only does this hide their sheer number from you, they are also easier to find as a result.

This chapter provides you with an overview of the settings. There is also a detailed description for each setting or a reference to another chapter (some settings are best explained in other chapters, e.g. the render settings are documented in the Render Menu chapter).

Overview

The Configuration Dialogs

BodyPaint 3D's configuration dialogs are listed below. In each case we tell you where you can find the dialog and what, in general terms, the dialog controls.

General Settings

These are global settings that apply to the program as a whole. For example, you can use these settings to change the colors used in the Perspective View. The settings apply to all open documents.

The general settings can be accessed from the Edit menu of the main window. They will be saved when you quit BodyPaint 3D.

The general settings are described in detail later in this chapter. See page 40.

Viewport Settings

These are local settings that configure the viewport for the active scene. For example, you can use these settings to determine the shading mode for active objects and inactive objects.

The viewport settings can be accessed from the Edit menu of each viewport (select **Configure**). They are saved when you save the scene.

The viewport settings are described under Configure.

Render Settings

These are local settings that affect the output of the active scene. For example, you can use these settings to switch shadows on or off.

The render settings can be accessed from the Render menu of the main window. They are saved when you save the scene.

These settings are described in detail in Render Settings, page 404.

Import/Export Settings

These are global settings that affect the importing and exporting of files. For example, you can use these settings to scale objects that are imported in 3DS format.

The import/export settings can be accessed from the File menu of the main window. They are saved when you quit BodyPaint 3D.

The import/export settings are described in detail on page 292.

Browser Settings

These are global settings that relate to the display of thumbnails in the Browser. For example, you can use these settings to determine which file formats are shown.

The Browser settings can be accessed from the Edit menu of the Browser. They are saved when you save the scene. However, you can prevent the Browser from loading the settings by deactivating the **Load Manager Settings** option in the general settings.

The browser settings are described in detail on page 57.

The Configuration Managers

Command Manager

You can use this manager to edit the existing palettes, create your own palettes or define new short-cuts.

You can access the Command manager from the Window menu of the main window. The settings are saved when you quit BodyPaint 3D.

The Command manager is described in detail later in this chapter. See page 36

Note

The short-cuts will be saved when you quit BodyPaint 3D.

Menu Manager

You can use this manager to create your own menu structure for each manager.

You can access the Menu manager from the Window menu of the main window. The settings are saved when you click on the **Save All Changes** button in the Menu manager dialog. They are also saved when you quit BodyPaint 3D.

The Menu manager is described in detail later in this chapter. See page 38.

Other Settings

There are many settings in addition to those mentioned above. For example, you can change the size of the preview in the Material manager.

These settings are always saved in the scene file. However, you can prevent them from being loaded into the managers by deselecting the **Load Manager Settings** option in the general settings.

Each setting is described in detail in the chapter for the corresponding manager.

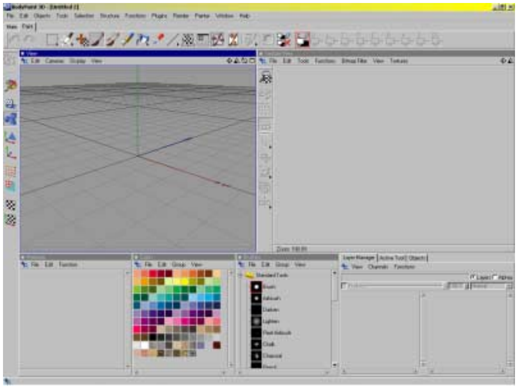
Graphical User Interface

The Main Window

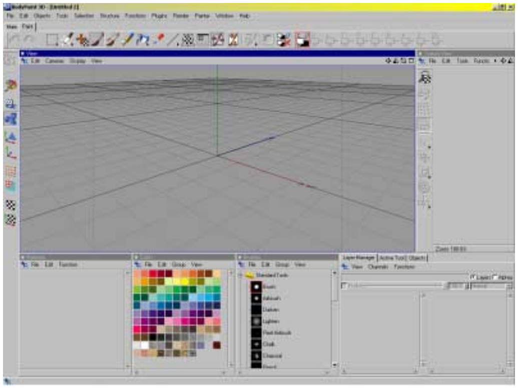
The main window in where the managers and command palettes meet each other. If the size of the main window or a docked window is changed, all the other windows in the group adapt to the change. The main window is simply a group of windows and palettes. You can create your own group to suit your needs (see Undocking below).

Changing The Size Of Windows

To change the width or height of a window, first move the mouse to a window border. The mouse pointer will change into a double arrow to indicate the direction (either vertical or horizontal) in which you can drag the border. Drag the window as required. The other windows in the group will adapt to the change.



Before moving the edge of the window

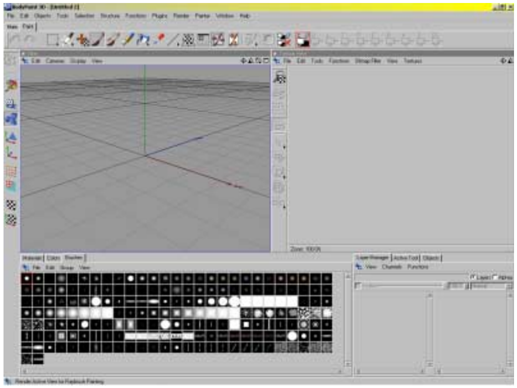


After moving the edge of the window

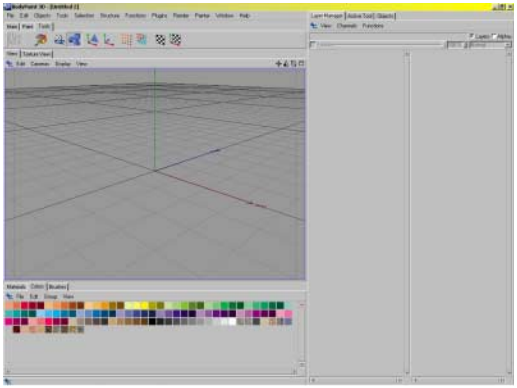
Changing The Window Order

To change the window order, drag the pin icon using the mouse. A dark line will appear to indicate the point at which insertion will take place.

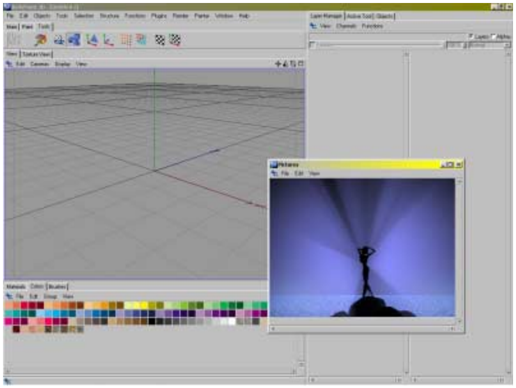
The following pictures illustrate just a few of the layouts that are possible.



This layout would be useful if you regularly need to find brushes quickly.



With a layout like this you can view a wider selection of colors at once.



A typical layout for using reference material, a scan of a photograph for example, to recreate it in BodyPaint 3D.

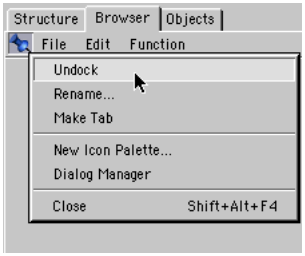
Why not move icon palettes close to where they will be used.

Note

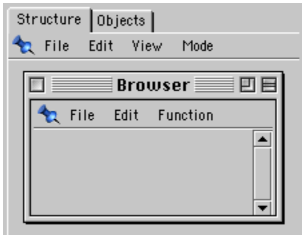
You can load a previously saved layout or revert to the default layout at any time. See Working With Layouts, page 55.

Undocking

You can undock a window to separate it from a group. To do this, click on the pin icon and select **Undock** from the menu. The window is removed from the group and becomes a separate window.



Click on Undock



Undocked window

Note

You can insert a window or a command palette into an undocked window to create a new group. This is particularly useful if you are using more than one monitor.

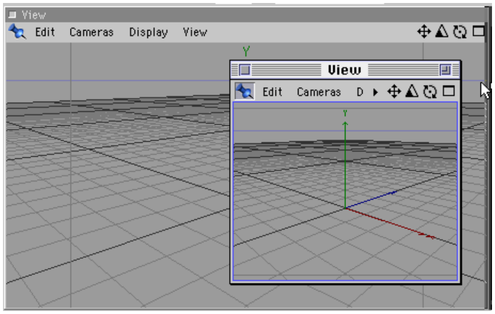
Undocked windows are fully functional, although you do lose the advantage of automatic justification.

Docking

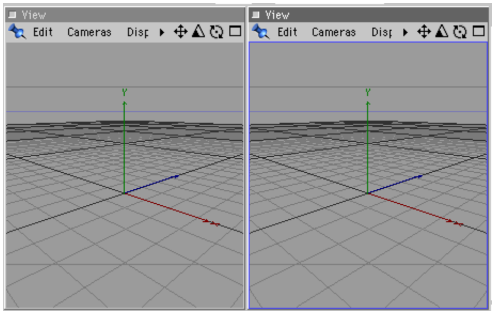
You can dock a new window (new windows are undocked by default) into a group at any time. To do this, click on the pin for the new window and drag it to the required position in the docking window. A dark line will indicate the insertion position.

Try adding a second Perspective View for practice: Select **Window > New View Panel** in the main window. Drag the pin for the new window and drop it wherever you like, e.g.

between the Object manager and the Coordinate manager (check that you can see the dark line before you release the mouse). You can remove the window by undocking it and then closing it (click on the pin to select the **Undock** and **Close** commands).



New view, still undocked



Here the new view is docked

Rename

This function in the pin's menu allows you to rename the window or command palette. The name of a command palette is visible in the interface only when it is defined as a tab.

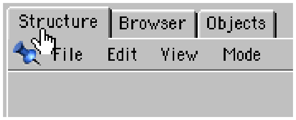
Tabs

Creating Tabs

You can display a window or command palette as a tab. To create the tab, click on the pin icon and select **Make Tab**.

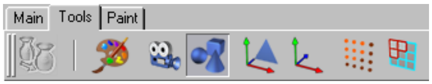
Grouping Tabs

You can remove a tab from one group and insert it into another group (the *target* group). To do this, drag the tab's pin and drop in on to a tab or pin in the target group. The mouse pointer will change into a hand to indicate when the insertion is possible.



If you drop the tab on to a pin, it will be inserted after the tab that the pin belongs to. If you drop the tab on to a tab, it will be inserted before it provided that the hand icon is released on the left half of the tab; otherwise, it will be inserted after the tab.

Do not forget about the command palettes — they make great tabs too!

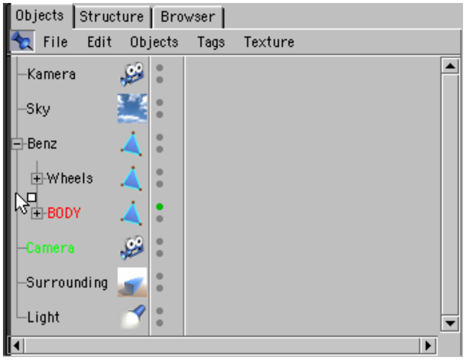


Note

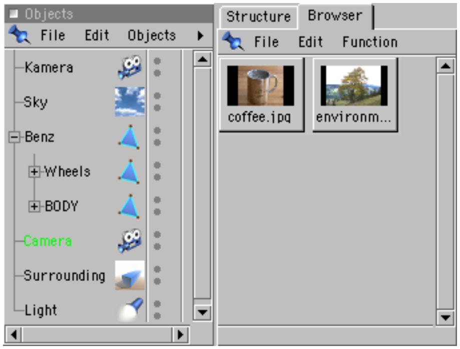
If you drop a pin on to another pin (the target), both will become tabs, even if the target was not a tab.

Converting Tabs into Windows

You can convert a window defined as a tab into a freestanding window. To do this, drag the tab's pin slightly to the left and release the mouse button.



Here the Object Manager gets undocked



The undocked Object Manager

Command Palettes

A command, or icon, palette can contain any command that can be selected from a menu. The command palette can show the commands as icons, text or as both icons and text.

Command palettes help you reach important commands quickly. You can edit the default palettes and create completely new palettes. You can dock new palettes into the layout.

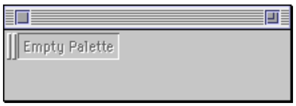
Note

An undocked palette is a window in its own right. For example, it can contain several command palettes and windows. This is particularly useful if you are using more than one monitor.

Creating a New Command Palette

To create a new (empty) command palette, either:

- select **Window > Layout > New Icon Palette** (main window)
- click on any pin icon and select **New Icon Palette** from the pin's menu
- click the right mouse button within an existing command palette (e.g. the default palette to the left of the main window) and select **New Icon Palette** from the context menu

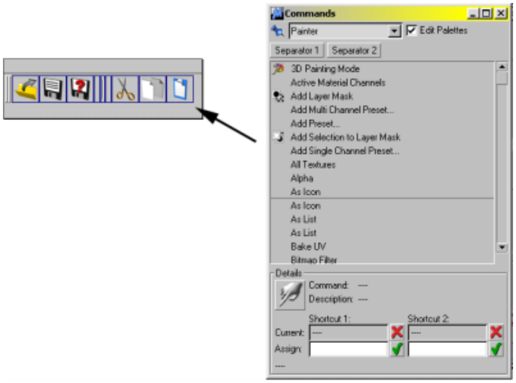


New command palette, still empty

There are two ways to add commands to the command palette. You can either drag-and-drop commands from an existing palette (e.g. the default palette to the left of the main window) or you can drag-and-drop commands from the Command manager (choose **Window > Command Manager**).

You must activate the **Edit Palettes** option in the Command manager before you can add commands. Once the **Edit Palettes** option is selected, drop the first command on to the empty palette box of the new command palette. When you drag-and-drop further commands on to the palette, a dark line will appear to demonstrate where the command will be inserted. To open the context menu for the command palette, position the mouse pointer on an icon and click the right mouse button.

The Command manager is described in detail later in this chapter.



This is the way a command is added to the new palette

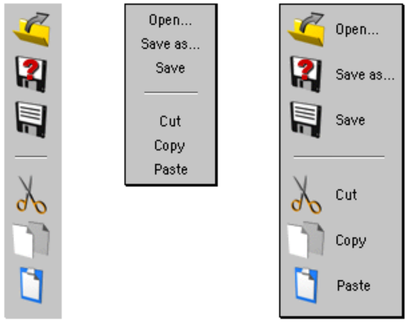
Changing the Sequence

To move a command to a different location in the palette, drag-and-drop the command to the new position (a dark line will indicate the insertion position).

Icons / Text

You can reach these two settings via the command palette's context menu (position the mouse pointer over a command and click the right mouse button).

If the **Icons** option is selected, icons will be shown for the commands. If the **Text** option is selected, text will be shown for the commands. If both options are selected, icons and text are shown for the commands.



Different combinations of command palettes

Vertical

You can reach this setting via the command palette's context menu (position the mouse pointer over a command and click the right mouse button).

If this setting is activated, text will be displayed below each icon instead of to the right (provided that **Icons** and **Text** are also activated).

Command Alignment (Horizontal vs Vertical)

You can reach this setting via the command palette's context menu (position the mouse pointer over a command and click the right mouse button).

Select **Transpose** to toggle the alignment of the commands between vertical and horizontal alignment.

Rows / Columns

You can reach this setting via the command palette's context menu (position the mouse pointer over a command and click the right mouse button).

The value you set here defines the number of rows or columns for commands. Think of this as the number of lines. For example, if you have 20 commands, setting this value to 2 will create 2 lines with 10 commands in each line. A value of 3 would create three lines (this time with 7 commands in the first two lines and 6 commands in the final line).

If you are using vertical command alignment, this setting refers to the number of columns. If you are using horizontal command alignment, this setting refers to the number of rows.

Alignment in rows or columns

Icon Size

You can reach this setting via the command palette's context menu (position the mouse pointer over a command and click the right mouse button).

You can use this setting to change the size of the command icons. The sizes you can choose from are:

Large	32 by 32 pixels
Medium	24 by 24 pixels
Small	16 by 16 pixels
Original	original icon size (see below)

The original icon sizes are defined in the icon resource file. The original sizes usually correspond to **Large** icons.

The different icon sizes

<u>Note</u>

If an icon is displayed at a different pixel size to its original size, it must be resampled. This may lead to a visible loss in picture quality.

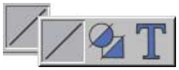
Creating Folded Palettes

You can group commands to form a *folded* palette. To do this, ensure that the **Edit Palettes** option is active, then position the mouse pointer over a command and click the right mouse button to open the context menu. Choose **Fold Palette**.

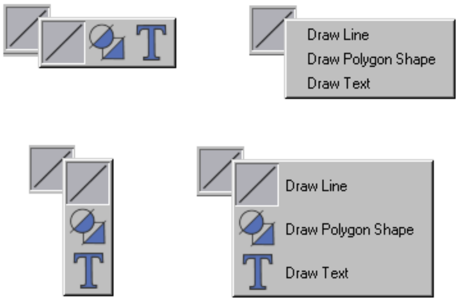
Now, only one command is visible. This is called the *visible* command. The little arrow towards the bottom right of the icon indicates that it contains a folded menu.

Next, deactivate the **Edit Palettes** option. Click and hold down the left mouse button on the visible command. The folded palette appears. You can either release the mouse button and then click on the required hidden command, or you can move the mouse pointer over the required command before you release the mouse button. Note that the visible command is also a *hidden* command.

If the **Lock Icon** command of the context menu is not selected, the visible icon will always be the last command that you selected. Hence, you can repeat the last command simply by clicking on the visible icon. You do not have to unfold the palette to reach it.

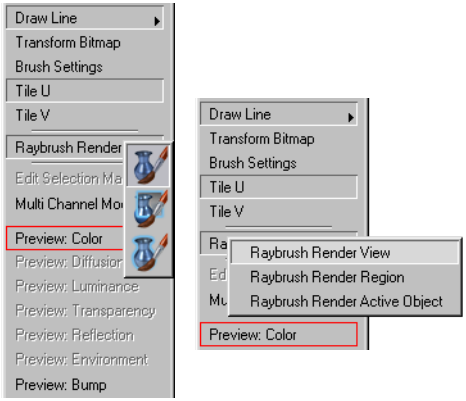


The order of the commands in the folded palette corresponds to their order before they were folded. You should arrange the commands before you fold them.



You can drag-and-drop a visible command on to another palette. This enables you to use several folded groups within the same palette. To create a palette with several folded command groups: Create two empty command palettes. Use the first palette to create a folded command group, then drag-and-drop the folded commands (i.e. the visible command) on to the second palette. Next, create the second folded group in the first palette, then drag-and-drop it on to the second palette, and so on. Once the process is complete, close the redundant palette.

You can also use text-only display with folded palettes.



Unfolding icons

You can unfold a folded group of commands into a palette of individual commands. To do this, select **Unfold** from the context menu (click the right mouse button on the visible command).

This command can be selected only when the **Edit Palettes** option is active.

Lock Icon

If this command of the context menu is not activated, the visible command for a folded group of commands will always be the last command that you selected.

If this command is activated, the current visible icon will be locked, meaning that no matter which tools you go on to use from the folded palette the visible command remains the same.

This command can be selected only when the **Edit Palettes** option is active.

Delete Command

You can delete a command from the palette. To do this, move the mouse pointer over the command that you wish to delete, then hold down the right mouse button and select **Delete Command** from the context menu.

This command can be selected only when the **Edit Palettes** option is active.

Edit Palettes

You must activate the **Edit Palettes** command before you can make changes to palettes. You can reach this setting via the context menu (right mouse button over a command).

Note

The palettes will be saved automatically when you save the layout. To save the layout, choose Save Layout As or Save as Default Layout from the Window > Layout menu (main window).

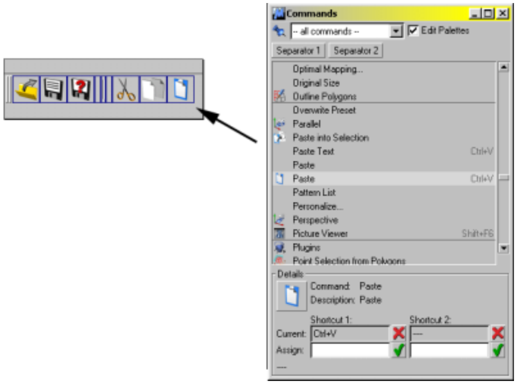
The Command Manager

The Command manager contains lists of all the commands in BodyPaint 3D. You can use this manager to drag-and-drop commands in order to create your own command palettes or submenus (see The Menu Manager, page 38). You can also use the Command manager to define short-cuts.

Inserting Commands in Palettes

First, select the **Edit Palettes** option. Next, drag-and-drop commands on to the palette. A dark line will indicate where a command will be inserted.

You can also drag-and-drop separators on to palettes to visually separate commands into logical groups. **Separator 1** is a line, **Separator 2** is a space. Simply drag-and-drop these separators on to the palette. Again, a dark line will appear to indicate the insertion point.



This is how you add separators to the new command palette

You can use the pop-up menu to the right of the pin to select which command category is displayed in the list. Each category refers to a particular menu or manager.

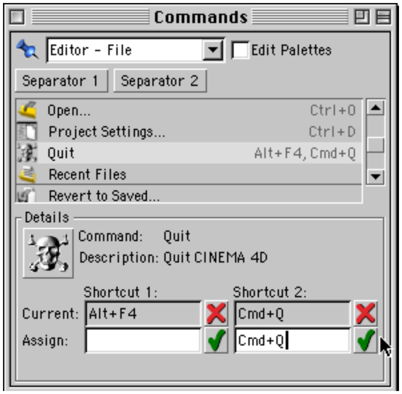
You will notice that some commands do not have icons. This is because these commands were difficult to represent as icons and we did not wish to cause undue stress to Joern, the icon designer.

Allocating Short-cuts

You can allocate a short-cut to any command so that you can press a simple key sequence to call the command rather than select it via a menu or palette.

For example, if you press Ctrl-B, the render settings dialog will open. You use the Command manager to allocate the short-cuts. You can also use the Command manager to define a second short-cut for the same command.

This can be useful when two keys are logical alternatives for a particular command. For example, the delete and backspace keys are both short-cuts for the **Delete** command. The second short-cut is also useful for standard commands which have different short-cuts under Windows and Mac OS.



To create a short-cut:

Select the command from the list in the Command manager by clicking on it with the left mouse button.

Next, click on the first text box to the right of **Assign:**. Press the key combination that you wish to assign to the command.

Click on the green tick to the right of the text box to activate it. The short-cut will appear in the **Current:** box. To remove the short-cut, click on the red cross icon.

Valid short-cuts are:

- a single key
- a key + Ctrl
- a key + Shift
- a key + Ctrl and Shift

Note

Some keys are reserved and cannot be allocated as short-cuts (e.g. left arrow, right arrow).

BodyPaint 3D's *hotkeys* are extremely useful. For example, if you hold down the 1 key you can move the camera, no matter which tool is active. The hotkeys come at a price - you cannot use them with short-cuts, even if you combine them with Ctrl and/or Shift.

If a short-cut has already been allocated, the command that uses the short-cut will be displayed below the text boxes. You should remove the short-cut before reallocating it (to remove the short-cut, select the command that it is currently allocated too, then click on the red cross icon).

It is not possible to predict the effect of pressing a short-cut that is applied to more than one command.

Note

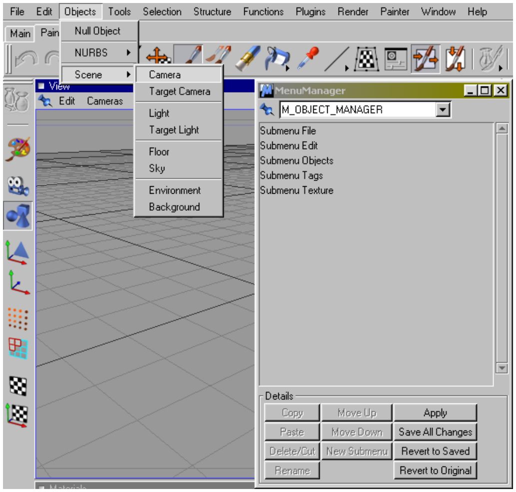
The short-cuts are saved in the layout.

Warning!

Do not attempt to allocate short-cuts that are used by OS commands, e.g. Ctrl-Alt-Del (Windows).

The Menu Manager

You can use the Menu manager to edit submenus and pop-up menus. You can also create your own submenus.



The menus in the manager and how they look in the program

The Menu manager and the Command manager allow you to configure your very own BodyPaint 3D interface, fine-tuned to the way you like to work.

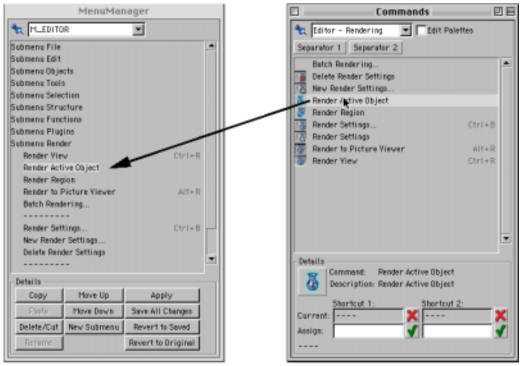
The Menus

BodyPaint 3D has more than 25 menus and pop-up menus. Use the pop-up menu at the top of the manager to determine which menu is shown in the list.

Submenus are prefixed with Submenu. To open or close a submenu, double-click on it.

Inserting Commands

The Command manager contains lists of all the BodyPaint 3D commands. You can drag-and-drop commands from the Command manager into the Menu manager.



The mouse pointer will change form to indicate the insertion mode.

Copy, Delete/Cut, Paste

You can use these commands to copy, delete or paste the selected command.

Move Up, Move Down

You can use these commands to move the selected menu entry one position up or one position down the list.

New Submenu

This will insert a new submenu above the selected entry. You can add commands or even further submenus to the submenu.

Rename

You can use this command to rename a submenu that you created.

You cannot rename the standard menus and commands.

Apply

The changes will be applied. You can test them immediately.

Save All Changes

All menu changes will be saved.

Revert to Saved

Discards all settings and reverts to the last menu definition that was saved.

Revert to Original

Reactivates the standard menu settings, which are permanently stored in the program (factory settings).

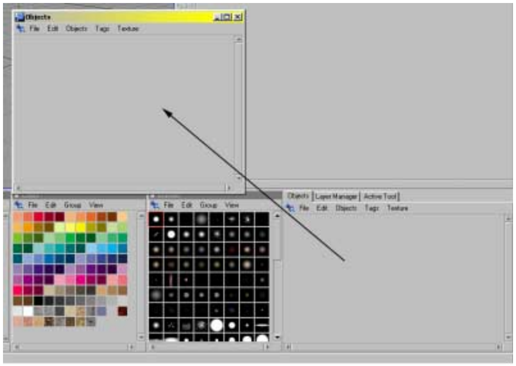
The Pin Menu

Each manager has a pin icon towards its top left corner.

Earlier in this chapter we explained how the pin is used to combine and arrange managers (see Graphical User Interface, page 28). The pin also has a menu, the functions of which are described below.

Undock

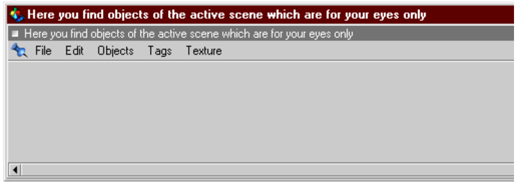
This function removes the current manager from the main window. The manager will be displayed in its own window.



Undock a tab to open a manager in a floating window

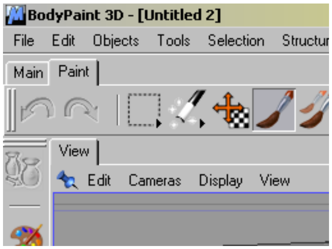
Rename

You can use this function to rename a window or a tab.



Make Tab

This function creates a tab for the active window/active manager.



New Icon Palette

This function creates an empty command palette. You can use the Command manager (see above) to add commands to the palette.

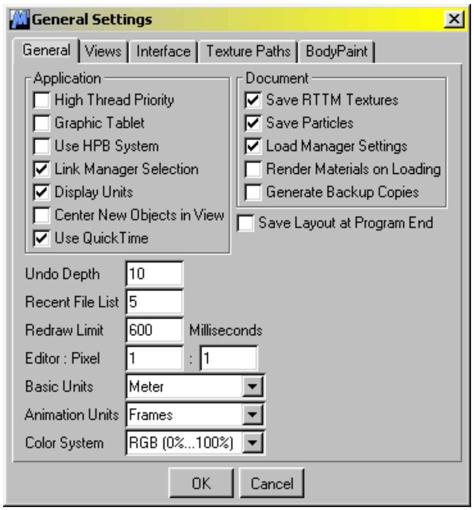
Close

This function closes the manager. To open the manager again, select it from the Window menu of the main window.

General Settings

These settings enable you to change the editor's appearance as well as influence the operation of functions. You can access this dialog from the Edit menu of the main window.

General



High Thread Priority

If you enable this option the system assigns a higher priority, i.e. more computing time, to BodyPaint 3D than to other running applications. If this option is enabled applications other than BodyPaint 3D which are running will execute more slowly than usual. So if you want to work in other applications while rendering in BodyPaint 3D, you may find it useful to disable this option.

Graphics Tablet

If you experience problems when using a graphics tablet with BodyPaint 3D, activate this option.

Use HPB System

If you select this option, the HPB system will be used for object rotation. Note that the heading, pitch and bank values refer to the object's parent system.

If the option is not selected, object rotation will take place about its local axes or the world axes.

For further details, please see World System, page 370.

Link Manager Selection

Only relevant if you are running BodyPaint 3D with CINEMA 4D XL. Please consult your CINEMA 4D reference manual for details.

Display Units

Values are displayed together with their unit of measurement by default.

If this option if deactivated, the unit of measurement will not be displayed.

Center New Objects in View

BodyPaint 3D creates all new objects at the origin of the world coordinate system by default. If the origin is not visible in the view, a newly created object may be out of sight.

If this option is activated, new objects will appear in the centre of the active view.

Use QuickTime

If you enable this option BodyPaint 3D uses QuickTime, if it is installed on your computer. A wider range of file formats is then available; you will have access to more textures.

If this option is disabled the speed of the Browser is increased slightly as it has to check fewer file formats.

Note

QuickTime can crash if you used damaged image files; this is not the fault of BodyPaint 3D, and it is for this reason that you can disable QuickTime through this option.

Save RTTM Textures

If you have activated realtime texture mapping (RTTM), small *editor textures* will be created so that you can see textures in the editor.

These editor textures take a while to create and they must be created each time you load the scene.

However, if **Save RTTM Textures** is activated, the editor textures will be saved in the scene file. This speeds up the loading process, but the file size will increase as a result.

Save Particles

Only relevant if you are running BodyPaint 3D with CINEMA 4D XL. Please consult your CINEMA 4D reference manual for details.

Load Manager Settings

We mentioned in the Other Settings section of the overview that each manager also contains settings that are not represented in the settings dialog (e.g. the size of preview icons).

You have the option either to load these settings when you load the scene or to use the current settings. If the option is activated, the settings that were last used in the saved scene will be activated in the corresponding managers.

Note

These settings are always saved in the scene file. Whether or not you use them is another matter.

Render Materials on Loading

When you save a scene, the material preview pictures are saved as well. When a scene is loaded, these pictures will be used and displayed. However, if you load a foreign 3D data format, only the base colors of the materials will be shown.

If this option is activated, BodyPaint 3D will create new preview pictures each time a scene is loaded. By necessity, this will slightly slow down the loading process.

Generate Backup Copies

When you save a scene with a filename that already exists in the destination folder, the original scene will be overwritten by default.

If this option is activated, BodyPaint 3D will rename the original file before the new file is created. The original file is appended with '.bak'. For example, 'Design.c4d' will become 'Design.bak'. If 'Design.bak' already exists, it will be overwritten.

Save Layout at Program End

If this option is activated, the current layout will be saved when you quit BodyPaint 3D. When you next start the program, the layout will be in the same state that you left it in.

This may possibly lead to unwelcome effects.

For example, perhaps your usual layout has the Perspective View and the Texture View side by side and of equal size. You decide to create a new layout with a larger Perspective View. You save the new layout under its own name and quit the program. If this option is activated, the new layout will overwrite your usual layout.

Note

Always save a new layout using a unique name, even if you intend for it to be your normal layout. To save the layout, choose Window > Layout > Save Layout As.

Undo Depth

You can use this value to determine the maximum number of editing steps that can be undone consecutively. (See Undo/Redo, page 303 for further details.)

Recent File List

You can use this value to determine the number of recent files that are listed in the File menu (see page 289).

Redraw Limit ... Milliseconds

Sometimes it is not possible to move an object smoothly in the editor with full shading due to hardware limitations such as processor speed.

BodyPaint 3D uses an ingenious system that estimates the time required for a redraw. If the estimated time exceeds the redraw limit specified here, a faster display mode will be used automatically. For example, **Quick Shading** will be reduced to **Wireframe**. If the wireframe mode is still to slow, **Box** will be used instead.

This process enables you to work smoothly in the Perspective View. You can configure the threshold value to suit your needs. The default value of 600 milliseconds means that a minimum of three pictures per second will be drawn.

If you do not want a faster display mode to be used, set the redraw limit to a very high value (e.g. 10000 milliseconds).

Editor : Pixel

These values specify the ratio of a pixel's on-screen width to its on-screen height. The pixel ratio for most monitors is 1:1.

However, some display media use a pixel ratio other than 1:1. This will lead to distortion unless the pixel ratio is adjusted accordingly. For example, circles will appear to be ellipses.

If you need to calculate the pixel ratio manually, expand the Perspective View so that it fills the entire screen. Select the side view and import a cube. Measure the width and height of the cube with a ruler and enter values in the corresponding boxes.

Basic Units

Here you determine the basic unit of measurement in BodyPaint 3D. You can choose from pixels, kilometres, metres, centimetres, millimetres, micrometres, nanometres, miles, yards, feet and inches.

For example, if you select **Centimetre** as the basic units, all position values will be stated in cm. Note that if you change units the numerical values will not be converted.

However, you can enter values in different units. For example, if the basic units are cm and you type '5 km' into a dialog, the value will be converted to 500000 cm.

If you set the basic units to **Pixel**, the unit of measurement will not be specified. It is then up to you to decide how to interpret the values.

You can use the following abbreviations for units when entering values:

Pixel	no units specified
Kilometres	km
Metres	m
Centimetres	cm
Millimetres	mm
Micrometres	um
Nanometres	nm
Miles	mi
Yards	yd
Feet	ft
Inches	in

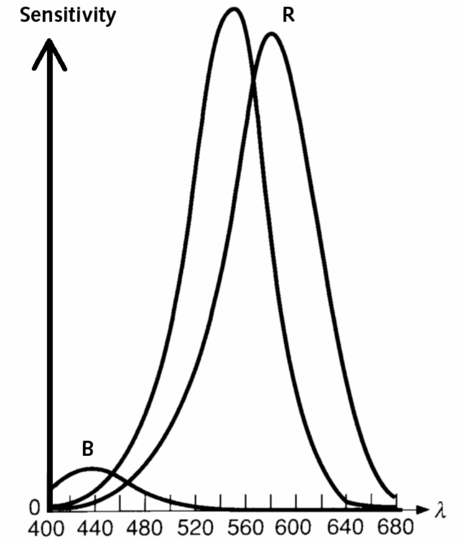
Animation Units

Only relevant if you are running BodyPaint 3D with CINEMA 4D XL. Please consult your CINEMA 4D reference manual for details.

Color System

You can choose between the RGB model and the HSV model. You can also choose whether the values should be specified as a percentage, or in steps ranging from 0 to 255, or in steps ranging from 0 to 65535.

A good choice of colors is essential for consistent photorealistic results. Photorealism is often a yardstick for programs such as BodyPaint 3D.



The human eye can see several hundred thousand colors in the spectral range between 400 nm (blue) and 700 nm (red). This color sensitivity is the result of many thousands of receptors on the retina. Not all of these are equally sensitive, and not all are sensitive to the same range of wavelengths.

Some of the receptors are particularly sensitive within the blue range, around 440 nm; others are far more sensitive in other ranges, while yet others are particularly receptive in the green range, around 540 or 580 nm.

The eye therefore has three different types of receptors for the primary colors red, green and blue. The spectral sensitivity and overlapping of the sensitive ranges make characterisation of colors extremely difficult.

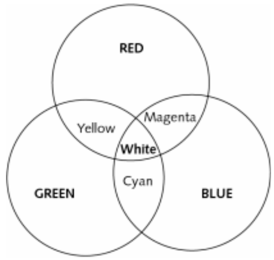
The color which the human eye perceives as white does not contain equal parts of red, green and blue light—this would be called *chromatic*—but must, in accordance with the overlapping sensitivity ranges, be made up of varying proportions of these colors. Only then does the eye see white. This is what we call *achromatic* light.

Typical output devices for color are printers, imagesetters and computer screens. The first two use the subtractive method of color mixing (CMY) and will not be part of our discussion here. Most important for BodyPaint 3D is the additive method of color mixing, which is the one used for representing colors on monitors. BodyPaint 3D characterises all colors by using three numerical values.

Two different color models are used, which you can easily toggle between. Probably the best known model is RGB, which is used by most graphics applications because it is best suited to the hardware components for image and color output. The most commonly used output device is the computer screen, which has a grid consisting of fine dots, made up from a red, a green and a blue point. These points can be addressed by an electron beam. By aiming the beam at not just one color dot, but for example the red and the green, the added color value is yellow.

The color pigments for the screen dots have been selected in such a way that when equal parts are added they result in a white which comes closest to what the human eye perceives as a pure white.

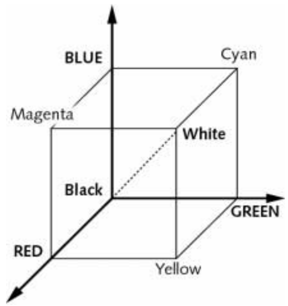
By beaming different intensities at the three dots it is possible not only to generate the eight basic colors (black, red, green, yellow, blue, magenta, cyan and white) which are the result of mixing the three primary colors, but many, many mixed colors.



The number of colors possible is determined by the number of gradations in the intensity of the electron beam.

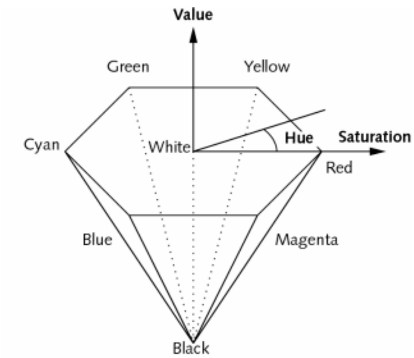
Using four gradations per primary color results in 4 x 4 x 4 = 64 colors. The standard is 256 gradations per primary color, which gives 256 x 256 x 256 = 16,777,216 colors.

These colors can be represented in a three-dimensional coordinate system.



The coordinate axes are formed by the three primary colors. Black is at the origin. Mixed colors between red and green form the base plane. Moving upward, more and more blue gets mixed in, until white is reached at the front corner of the cube. All white shades lie on the line connecting the origin with this corner.

Less technical, and therefore better suited for painters and artists, is the HSV model. H is the hue, S the saturation, V the color value. The illustration below shows what these mean.



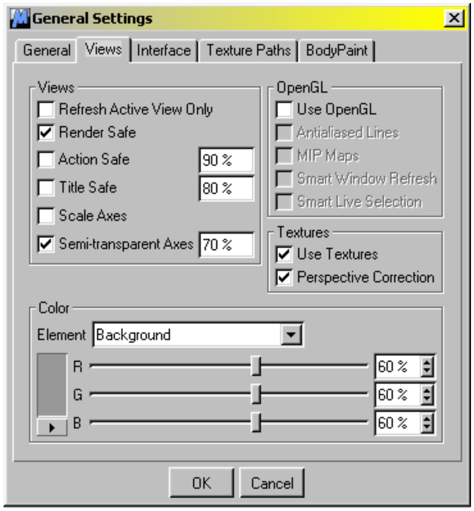
The six basic colors (red, yellow, green, cyan, blue, magenta) form a hexagon around the color white, together with black. The hue is the angle: starting with 0° for red, through 180° for cyan, to 270° for magenta. The saturation (S) is always measured radially towards the outside. On the inside, along the black/white axes, it has the value 0.0, outside, at the edge of the hexagon, it is 1.0. The greater the saturation, the more intensive the hue.

The value (V) is measured in the direction of the black/white axis. At the height of white it has the value 1.0; going downwards it decreases until it reaches the value 0.0 for black. The color value is used for darkening the hue.

Let's summarise this:

- Pure color pigments sit at the edge of the hexagon: V = 1.0 and S = 1.0.
- To add white, reduce the saturation.
- To add black, decrease the color value.

Views



View

Refresh Active View Only

BodyPaint 3D refreshes all views simultaneously by default. If you are working with a complex scene using a high level of shading (e.g. Gouraud Shading with RTTM mode activated), the Perspective View soon becomes sluggish.

If this option is activated, only the window in which you carry out an action will be redrawn in realtime. The other views will only be refreshed once the action has been completed (e.g. when you release the mouse button having dragged an object to a new position).

Render Safe

If this option is activated, the boundaries of the film format (see page 410) will be shown in the editor window.

Note

You can set this option separately for each view via the viewport settings (see Configure, page 14), which apply to the active view only.

Action Safe

Only relevant if you are running BodyPaint 3D with CINEMA 4D XL. Please consult your CINEMA 4D reference manual for details.

Title Safe

Only relevant if you are running BodyPaint 3D with CINEMA 4D XL. Please consult your CINEMA 4D reference manual for details.

Scale Axes

If this option is activated, an object's axes will be scaled whenever you scale the object itself.

You may find, however, that relatively large or relatively small axes make it difficult to perform quick actions (move, scale, rotate) by dragging on a particular axis.

If this option is deactivated, the object axes retain their size when the object is scaled.

Semi-Transparent Axes

If this option is activated, the object axes will be semi-transparent. You can enter the strength of the transparency in the box to the right.

If this option is deactivated, the object axes will be displayed at full brightness.

OpenGL

Use OpenGL

If the **Use OpenGL** option is activated, BodyPaint 3D will use its built-in OpenGL routines. You will be able to select further options provided that they are supported by your OpenGL implementation (see the documentation for your card/software).

If this option is deactivated, OpenGL support is turned off and BodyPaint 3D will use its internal shading routines instead.

Note

OpenGL can be installed on your computer as hardware or software. As a general rule, software-only implementations are much slower than their hardware counterparts.

Warning!

The OpenGL support has no effect on rendering speed. It affects editor shading only.

Antialiased Lines

If this option is activated, lines will be smoothed (antialiased) by the OpenGL implementation provided that it supports this mode.

MIP Maps

If this option is activated, the OpenGL implementation will use MIP maps for texturing in the Perspective View. You can only use this option if it is supported by your OpenGL implementation.

For more details on MIP mapping, see page 217.

Smart Window Refresh

When activated, this option accelerates window refresh under OpenGL if, for example, you move an undocked manager onto the Perspective View. If the option is inactive, OpenGL must refresh the entire screen each time.

Note

This function is not supported by all OpenGL cards. If display errors appear with the option active, your card does not support Smart Window Refresh.

Smart Live Selection

When this option is activated, the live selection under OpenGL is accelerated. Only the selected polygons or points are redrawn (as opposed to the entire screen).

Note

This function is not supported by all OpenGL cards. If display errors appear with the option active, your card does not support Smart Live Selection.

A Few Words on Acceleration

Many of us know that 3D computer games can be enhanced dramatically by using a 3D accelerator card. With this knowledge in mind, many users anticipate massive gains with professional software too. The reality is somewhat slower and the user is disappointed more often than not.

Simple graphics cards soon fall by the wayside because they do not have enough graphics memory to display complex objects in a reasonably large editor window. A screen that is 1000 by 1000 pixels in size with 24-bit color requires about 4MB of memory. Double this figure to allow for screen buffering. If you also take the depth buffer into account, the memory required is about 10MB. If insufficient graphics memory is available, the screen size must be reduced. (Our calculation doesn't even take editor textures into account!)

Even if your card has sufficient memory, there are other factors to consider:

3D objects are drawn on the screen as filled triangles. There are two main stages involved. First, BodyPaint 3D must calculate the triangles. Next, the triangles must be drawn. If no 3D accelerator card is present, BodyPaint 3D will draw the triangles itself using the CPU. The ratio of the time required to calculate the triangles to the time required to draw the triangles is about 1:1. Even if a 3D graphics card takes over the second stage (drawing the triangles), BodyPaint 3D must still use the CPU to first calculate the triangles.

For example, if a graphics card can draw triangles five times more quickly than BodyPaint 3D, the overall increase in shading speed is only 40%, not the 500% that you may have hoped for.

The assumed ratio of 1:1 depends on other factors:

1. Window size

   If you increase the size of the editor window, the time required by the 3D card barely increases (provided that the card has sufficient memory). The CPU, on the other hand, is slowed down to a far greater degree. For example, increasing the window size from 640 by 480 to 1280 by 960 will triple the time required by the CPU. As a result, the total shading time is doubled (3:1 instead of 1:1).

2. Number of polygons to be drawn

   If a scene contains many polygons in a small area, BodyPaint 3D can often draw them more quickly than the 3D card.

The Role Of The CPU

If you are not using a 3D graphics card, the display speed increases linearly with CPU speed. If you double the CPU speed, the display speed doubles as well.

If you double the CPU speed when a 3D card is already in use, the CPU accelerates the calculation of the triangles, but not the drawing of them. In this case, the display speed increases by a factor of 1.5 — the faster the CPU, the less difference (as a percentage) a 3D graphics card makes.

BodyPaint 3D and Other Programs

Some other 3D programs experience a more noticeable acceleration with 3D cards. The reason for this is quite simple. Such programs are naturally slow, whereas BodyPaint 3D is already highly optimised for speed.

BodyPaint 3D is exceptionally fast, even before you activate OpenGL.

Just because a 3D graphics card is used for shading, this does not mean that shading will be equally fast in all programs. The triangles must still be calculated by the program itself, and this is where BodyPaint 3D excels. The result is that, even though the same 3D card is used, BodyPaint 3D has faster shading than many other 3D programs.

The concept that makes this possible is *adaptive shading* (aka *adaptive blitting*). This means that BodyPaint 3D will only redraw those parts of the screen that have actually changed. OpenGL, on the other hand, does a complete redraw every time. The result is that BodyPaint 3D sometimes out-performs 3D cards. We told you that BodyPaint 3D is exceptionally fast!

Outlook

Until OpenGL is expanded to include adaptive technology, a faster processor is probably more effective than a 3D card.

A Word of Caution

Our testers have noticed that some 3D cards switch off their OpenGL support beyond certain resolutions and color depths. Some cards only support OpenGL up to 1024 by 768 pixels and 24-bits. Some even give up on OpenGL beyond 800 by 600 and 65535 colors. Perhaps the most alarming aspect is that in all cases the OpenGL was deactivated silently, leaving the user in the dark.

A Second Word of Caution

Acceleration is not always supported on multi-monitor systems (particularly under Windows 9x). Be sure to ask about any such OpenGL limitations before purchasing a multi-monitor system.

Textures

Perspective Correction

If this option is activated, the OpenGL implementation will correct the perspective of editor textures. This will enhance the quality of the display, although it can also slow down shading. You can only use this option if it is supported by your OpenGL implementation.

Use Textures

This option defines whether textures are displayed when the Gouraud Shading mode is activated. This setting is applied globally, i.e. it affects all views.

You can define this option separately for each view via the viewport settings (see Configure, page 14), which apply to the active view only.

Note

You can work more smoothly in the Perspective View if you deactivate this option.

Color

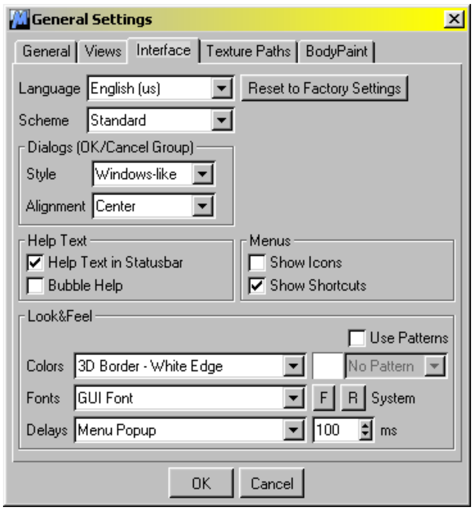
Here you can define the colors used in the editor. Select the element that you wish to change from the pop-up box and change its color using the sliders or the system color dialog.

You will see either three color sliders or a color table depending on the **Color System** setting on the General page. The default setting is the RGB model with values specified as percentages.

The resultant color is shown to the left of the sliders. If you click on this color box, the system color dialog will open.

If you click on the little triangle just below the color box, a hidden menu appears. You can use this menu to change the color model or switch over to the color table. This setting will be retained for as long as the dialog is open. As soon as you close the dialog, the setting on the general page will be used.

Interface



This tab allows you control over the look-and-feel of BodyPaint 3D's user interface.

Language

Here you can select a language for BodyPaint 3D's interface from the installed language sets. After quitting and re-launching BodyPaint 3D, all messages, menus and dialogs will change to use the new language.

Scheme

From this pop-up menu you can choose one of the installed schemes.

Reset to Factory Settings

Owing to the many ways that you can configure BodyPaint 3D to your needs, it can easily happen that you lose the plot! So if you click this button all your changes are reset to the original factory settings.

Dialogs (OK/Cancel Group)

Using the **Style** pop-up you can set the order of the OK and Cancel buttons within dialogs. Windows uses OK on the left and Cancel on the right, while the reverse is true under Mac OS. Choose whichever you feel comfortable with on your platform.

Using **Alignment** you choose how these OK and Cancel buttons are to be aligned in the dialogs; aligned left, centred or aligned right.

Help Text

If the **Help Text in Statusbar** option is enabled, a short explanation of the menu entries or icons will be displayed in the status bar (at the bottom of the screen) whenever you go to choose a menu item or hover over an icon.

If the **Bubble Help** option is enabled, some help information appears near the mouse pointer when you hover the mouse pointer over an icon.

Menus

Here you choose whether, in addition to the normal function descriptions for menu items, BodyPaint 3D should also display icons (**Show Icons** option enabled) and/or keyboard shortcuts (**Show Shortcuts** option enabled).

Look&Feel

In this part of the dialog you can modify the look-and-feel of the program interface to your own taste.

Colors

First choose from the pop-up menu the interface element you want to change. Then click in the color selection box to the right and choose the new color for this element from the system color chooser that appears. Note that backgrounds of windows, buttons, dialogs etc. can have patterns assigned to them. Select the **Use Patterns** box and then pick a pattern from the pop-up below it.

Note

You can use your own backgrounds in BodyPaint 3D. Just create a folder called 'Pattern' inside the BodyPaint 3D Resource folder (if this doesn't already exist) and place your own background image files in this 'Pattern' folder.

Fonts

Here you can choose the font BodyPaint 3D will use for displaying text in menus and dialogs, etc. Choose the font type from the pop-up menu and then click on the **F** button to the right. A dialog opens in which you can choose the font and its size.

Clicking the **R** button will change back to your active system font.

Note

The font changes will be effective only after you quit and restart BodyPaint 3D.

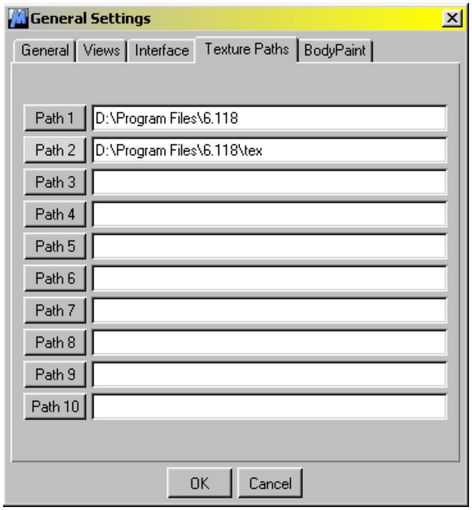
Delays

If you are a Windows user you may have noticed that windows and menus open quite slowly on your desktop but rather faster in BodyPaint 3D. Now, you can use the options under **Delays** to simulate this delayed reaction for various actions within BodyPaint 3D.

Choose the action from the pop-up menu. Then set the delay for this action in the box to the right.

Have some fun with this - it's not the most serious or useful option in BodyPaint 3D!

Texture Paths



BodyPaint 3D searches for textures in the following locations:

- in the same folder as the scene.
- in a folder named ‘tex’ which is inside the scene’s folder.
- in a folder named ‘tex’ inside the BodyPaint 3D folder.

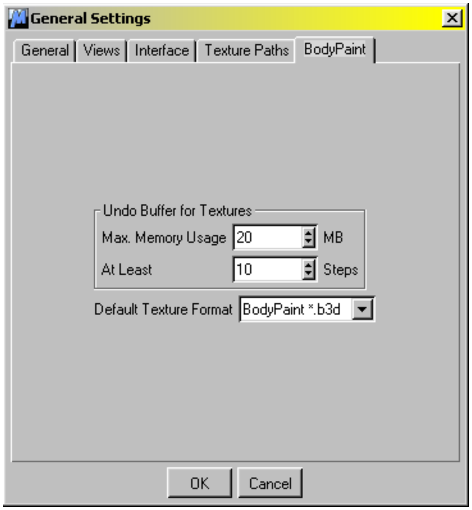
If a texture cannot be found in any of these folders, you can add the texture’s folder to the Texture Paths.

You can specify up to 10 Texture Paths and each is searched recursively, i.e. folders within folders will be searched too. If a texture still cannot be located after searching all of the Texture Paths, BodyPaint 3D will report an error.

You can type the path name directly into a text box. Alternatively, click on a text box and guide the dialog that opens to the folder in question.

Once you have located the folder, click on **Open** (Windows) or the box at the bottom of the dialog that contains the name of the folder (Mac OS). The path will be added to the text box of the settings.

BodyPaint



Max. Memory Usage

This is a number in megabytes (MB) that is used as a cut off point when undoing actions. This will take affect only if you have already exceeded the minimum number of steps specified in the **At Least** box.

At Least

You may wish to have a minimum number of undo steps when painting your textures, if this is the case then you can choose how many here. If the minimum number of undo steps has not been reached, but the **Max. Memory Usage** value has been, then more memory will be used until the minimum number of steps has been reached. Users who often find themselves running low on memory may wish to set this value to 1.

Note:

These undo options apply only to the textures. They will make no difference when undoing camera or object actions.

Default Texture Format

BodyPaint 3D is capable of working in layers, and indeed we recommend you do so. Of course you will want to be able to save your projects with all of this layer information intact, so you have several choices when saving.

*BodyPaint *.b3d*

This is BodyPaint's own custom file format (b3d) which is recommended for most users. Using this format will ensure all texture data is saved and that compatibility is retained for future versions.

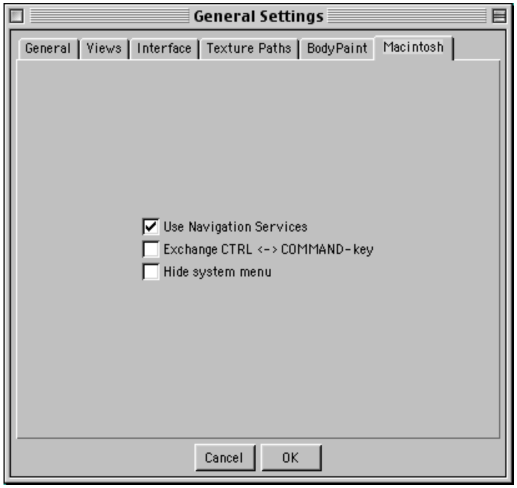
*Photoshop *.psd*

Users of Adobe Photoshop may wish to use this format when saving. This will allow you to load your textures into Photoshop should you wish to use its tools. You should note that only the first layer mask will be saved and that several of the BodyPaint 3D blending modes are not available in Photoshop.

*TIFF *.tif*

Saving you texture as a TIFF will flatten the image so that all layers are merged into one. These cannot be restored. Only use the TIFF format if you know that you no longer wish to edit individual layers or if your painting program does not support either of the above file formats.

Macintosh



This tab is available only under Mac OS.

Use Navigation Services

This option activates / deactivates the Navigation Services under Mac OS 9.

Exchange CTRL <-> COMMAND key

BodyPaint 3D uses the Ctrl (control) key as the default modifier key. The Command key is used for simulating the right mouse button (hold it down and click). If you would like it the other way around, select this option.

Hide System Menu

If selected, the Mac’s standard system menus are hidden while BodyPaint 3D is running.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

4. Workflow

4 Workflow

Introduction

Technical computer terms, despite their widespread usage, are slow to be recognised by dictionaries and perhaps that is why they often take on several meanings. *Workflow* is no exception. We define *workflow* to mean the performance of all the steps involved in achieving a task. If you can improve your workflow (i.e. go about things in a more efficient way), you can work more quickly as a result.

The purpose of this chapter is to raise your awareness of workflow issues.

Here To Help

There are many features in BodyPaint 3D that can help improve your workflow. We list just a few of the features below:

- If you need to move, zoom or rotate a camera, use the icons at the top right of the view (drag the right mouse button on the icon you require). The fourth, right-most icon toggles the active view between single-view and all-views (see Toggle Active View, page 24).
- Define short-cuts for the functions you use the most. Also, create an icon palette and fill it with the functions. In this way, you can reach high-frequency functions more quickly.
- Many commands can be performed with a quick drag-and-drop rather than a trek through the menus. For example, to allocate a material, drag it from the Material manager and drop it on to an object in the Object manager or View window.
- What if the Object manager is not the active tab (see page 31) when you drag-and-drop a material from the Material manager? Simply drag the material on to the Object manager's tab. After a short delay, the Object manager will become the active tab and you can drop the material on to the required object.
- There is no need to lock axes in order to move, scale or rotate an object in one direction only. There is a small arrow, cube or sphere at the end of each object axis (the exact form depends on the active tool). Click on the arrow/cube/sphere for the required axis and drag. Note that you can use this method to move/scale/rotate selected points and polygons as well as objects!
- When you need to select several adjacent points or polygons, do not click on them one by one. Instead, use the Live Selection tool and *paint* over the points/polygons to select them.

The text above covers only a few of the ways in which you can improve your workflow. Be sure to read the entire manual at the earliest opportunity, since many other workflow tips are described along the way.

Working With Layouts

BodyPaint 3D has a wealth of configuration possibilities. For example, you can define your own short-cuts, create your own layouts, set your own defaults and configure the Browser for a specific project.

The allocation of short-cuts is described in detail in Allocating Shortcuts, page 36. The Browser and default values are described later in this chapter. First, we consider working with layouts.

The golden rule for improving your workflow is to do it in stages. Make little changes at a time, then once they have become second nature, make further changes. If you attempt too much to soon, you may worsen your workflow. Begin with just a few (e.g. five) short-cuts. Once these short-cuts have become instinct, create and learn to use a few more short-cuts.

What's the big deal about being able to create your own layout?

Well, we admit that we are not omniscient - in particular, we cannot know your preferred way to work. For example, do you prefer icons or text in the command palettes? Should the Material manager be open or do you prefer a larger Perspective View?

Of course, we could activate everything, but this would help no-one. The sheer number of windows, icons, menus, functions and options would almost make your monitor sag. Anyone new to 3D would run a mile. As for workflow...

What is far more important is that you and your colleagues can create and use your very own layout settings. You will not have to deal with the seemingly bizarre changes a colleague has made to the layout, and vice versa. Anyone who has used a colleague's computer will know what we're getting at. ("Which folder did she say the word processor was in? I need to get home some time tonight...").

Not only are layouts good for office harmony, you can also create several layouts for your own use. For example, you may find it useful to create a layout biased towards painting in three dimensions (large Perspective View) and another layout biased towards editing UV mesh (large Texture View).

Start by using the default layout. As time passes by, keep track of which commands you use the most.

Is your mouse getting too much exercise? Is it constantly darting between a command on the bottom left and a command on the top right of your 21-inch, 1600x1200 res. monitor? If so, alter the layout! Put the commands next to each other, within easy reach.

Previously, we learnt how to use layouts. In the following, we take a look at the functions for layout management. You can reach all of these functions from the main menu bar under **Window > Layout**.

Load Layout

You can use this function to load a previously saved layout. Use the system dialog that opens to choose the layout file (with a '.l4d' extension).

Reset Layout

This function resets the layout to the factory settings. Use this function if you get in a muddle.

It is also very helpful if you reset the layout before contacting technical support. In that way, you and the technician will be using the same layout — it will be easier to help you locate the problem.

Note

Remember to save the layout if necessary before you reset it. You can save the layout with Save Layout As (see below).

Save As Default Layout

This function saves the current layout in a special file. The next time you launch BodyPaint 3D, the layout will load automatically as the new default.

Note

There is an option in the General Settings (Save Layout At Program End , page 42) that, when activated, will save the layout each time you quit the program.

Save Layout As

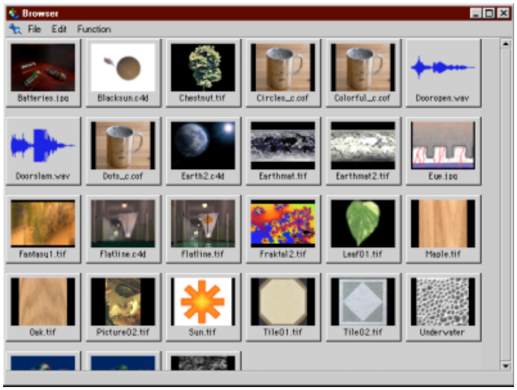
You can use this command to save the current layout. This enables you save several layouts, e.g. one for painting in three dimensions (large Perspective View) and another for editing UV mesh (large Texture View).

Layout files are given the extension '.l4d' automatically.

Further Menu Items

The **Window > Layout** submenu also lists all the layout files (extension '.l4d') in BodyPaint 3D's 'prefs' folder. To load a layout, select one from the list.

The Browser



A file catalog in the Browser

Working with the Browser

Introduction

Using the Browser, you can take a *snapshot* of all files produced by or used in BodyPaint 3D scenes. Many of these files can be viewed as thumbnails. So, for example, before loading a texture image into your scene you can view it, and any other possible textures you may need, directly within the Browser.

More accurately, using the Browser you can capture scenes, materials, textures, pictures, animations, sound, time curves and even C.O.F.F.E.E. programs (those files ending with the extension COF and COB e.g. UNDO.COF). A full list of all BodyPaint 3D supported file formats can be found in Appendix 3. This list is extended further through the picture and animation formats available when you have installed QuickTime on your system.

Note

The Browser will only recognize a movie file if its corresponding codec is installed on the system.

When used correctly the Browser is a very powerful control center and manager for your 3D development.

It makes sense to organize your scene information into various image catalogs (e.g. one for sunsets, one for floor tiles and so on...). You can then add notes to these archived files; these notes will aid in future archive searches. Using a search with certain criteria you could, for example, search for all of those files that are copyright free and are able to be distributed freely.

While working on a project you can load each of the required catalogs into the Browser, e.g. select suitable materials and load these directly into the scene. We will see how this works further on in this chapter. First, we need to create a catalog.

Creating A Catalog

- To start with, scan a folder for all BodyPaint 3D files.

From the File menu, select **Import Directory**. From the dialog you can choose your desired folder. For these first practice steps the ‘Tex’ or the ‘Sample’ folders in the root of BodyPaint 3D are recommended.

You may also limit the search to certain file types, perhaps only pictures or scenes. These criteria (and more options) can be defined in the Browser preferences.

- During the search the Browser automatically creates small preview pictures (slides). These give you a good idea of the actual appearance of a picture or a scene.

Tip

If the file read by the Browser contains only one single material (and nothing else, absolutely nothing at all different), then the Browser will display only material pictures as in the Material manager (see Material manager, page 207), In all other cases the raytracer renders a picture of the current view. (See also Save Material As on page 209.)

- Once the Browser has finished cataloging the data you are free to add personal notes, comments, copyright notices and similar things to the individual files.

Select a slide (click on it so that it is framed red) and choose **Info** from the Function menu. Enter your own text into the large box. Close the dialog with **OK**.

Now move your mouse pointer over the slide that you have added comments to and wait. After a short time the text appears under your mouse pointer.

- Lastly save your whole database as a catalog file with a meaningful name.

Choose **Save Catalog As** from the File menu. Again the system dialog appears. Enter a sensible name, such as Test, and the file 'Test.cat' will be created in the selected folder. This catalog can then be loaded into the Browser.

So far, we have seen the basic use of the Browser. The full potential of the Browser will become much clearer when it is used in combination with the various BodyPaint 3D managers. Depending on where you drag a thumbnail slide, you may create new materials, load scenes etc.

Simply click on a thumbnail and keep the (left) mouse button held down. Move the mouse pointer over a manager and release the button. This technique is known as *drag-and-drop*.

You may, of course, select several separate slides. Keep the Shift key pressed as you select your required slides. All selected slides are framed in red.

Drag-and-drop With The Browser

Pictures, Animations

- Pictures, animations in the Material manager:

  Creates a new material, containing the image, or animation, as a color texture.

- Picture, animation on an object in the Perspective View:

  Creates a new material, as above, but assigns this material directly to the selected object.

- Picture, animation on an object in the Object manager:

  Creates a new material, as above, using the picture or animation as the color channel but assigns this directly to the selected object.

- Picture on the Picture Viewer:

  The picture is displayed in the Picture Viewer window.

Tip

The texture must be located in the BodyPaint 3D Texture Paths, otherwise the preview image remains black in the Material manager (see Material manager, page 207).

Scenes

- Scene on the Material manager:

  All materials (if applicable) belonging to the scene are imported to the materials list of the current scene.

- Scene on the Perspective View:

  The selected scene is loaded.

- Scene on the Object manager:

  The selected scene is imported into the current scene.

Materials

- Material on the Material manager:

  The material is imported into the material list of the current scene.

- Material on an object in the Perspective View:

  The material is added to the material list and assigned immediately to the selected object.

- Material on an object in the Object manager:

  The material is imported into the material list and assigned immediately to the selected object in the Object manager.

Tip

If a texture that you use in the BodyPaint 3D Browser is located outside of the Texture Paths, the program asks whether you want to copy the file to the same location as the scene. This allows BodyPaint 3D to find textures automatically without user intervention.

If you have not yet assigned a name (and therefore a location) to your scene, textures are saved to the BodyPaint 3D startup folder.

Tip

Drag-and-drop with C.O.F.F.E.E. programs will have no effect.

Further Browser Functions

- Double-clicking on a picture file (usually a texture) opens the Pictures manager and displays the picture.
- Double-clicking on an animation file opens the animation player for your system and plays the animation.
- Double-clicking a scene file loads it into the editor.
- Double-clicking on a material imports and adds it to the current scene and the Material manager.
- Double-clicking on a C.O.F.F.E.E. program opens your system's default text editor (the default under Windows is NotePAD and under Mac OS is SimpleText) and loads the program, ready for editing.
- Right-clicking on a preview picture will open a context menu from which you can access information about the selected slide and this allows you to use the Search dialog.

Tip

To open the context menu on the Macintosh, hold down the Command key while you click the mouse button.

The Drawing Pin

Using this menu you can alter the layout of BodyPaint 3D to your own requirements. Further details are in The Pin Menu, page 39.

File Menu

New Catalog

Creates a new, empty catalog. Any existing catalog in the Browser will be replaced with the new one.

Open Catalog

Loads a previously saved catalog into the Browser.

Import File

Loads and adds a file (scene, picture, material...) to the current catalog. A preview picture is generated.

Import Directory

Loads and adds the contents of a folder to the current catalog. Depending on how the preferences are set up, subfolders will be searched or ignored.

Tip

It is advisable not to list the complete contents of a CD-ROM unless your computer has lots of memory. A quick calculation backs this up: a small thumbnail picture with a size of 80x60 pixels and a color depth of 24 bits needs around 15KB of memory. So 1,000 images on a CD would require a minimum 16MB of memory. And don't forget the extra few megabytes for the actual display of these images within the Browser. In such cases it is simple to create a number of smaller catalogs, which are easier to manage.

Save Catalog

Saves the current catalog. The catalog is saved using the name given in the Save Catalog As dialog. This name also appears in the Browser title bar.

If your catalog is still yet to be named (in which case the Browser title bar will show Untitled), the **Save** command acts in the same way as **Save Catalog As** (see below).

Save Catalog As

Save Catalog As always opens the File selector. The name you enter here will appear in the title bar of the Browser window.

BodyPaint 3D always adds the extension '.cat' to the catalog filename.

Making Catalog Paths Relative

Normally, when storing a preview image in a catalog, the exact location is also saved. This is essential when using the drag-and-drop technique to pass objects over to BodyPaint 3D for processing.

However, should you move, for example, a texture folder from your own system to the company's network server, the location of the files is no longer the same as that of the saved catalog. Therefore the Browser will not find the required files.

A similar situation may arise when you compile a catalog for a CD-ROM collection (textures, objects, scenes etc.). These collections would normally be created locally on a computer, using the computer's local path definitions and drive IDs (e.g. the drive could be D:\, or even X:\ under Windows, or possibly 2184: or 1601 under Mac OS). This system would be unusable for catalogs, as the Browser would look for the various devices and paths of the computer, rather than the CD-ROM.

The solution to this is to use relative paths. This option ensures that paths are not stored as complete path names, but instead as relative paths, starting from the catalog folder. Here, the location path of files is still used, but you are free to define where the system is to begin its search. This anchor folder can be anywhere on a hard disk or CD-ROM. But, starting from that anchor folder, and moving down, the same path hierarchy as that of the catalog folder must exist.

Here's an example of anchor folders. Let us imagine that you want to list your winter background pictures. These are located on the system hard drive in the following folder:

Disk1/Texture/Backgrounds/Winter/...

So we define Texture as the anchor folder, the relative path then reads:

Backgrounds/Winter/...

This (sub-) folder hierarchy can be now moved to any other location e.g. to the company server:

Server7/BP3D/Resources/Tex/
Backgrounds/Winter/...

The new anchor folder is now Tex. Starting from this location, the hierarchy sub-items now have the same path as before. To ensure that the Browser finds the required files requires one rule; the Browser catalog must always be in the anchor folder. In the above example the catalog would have been created in Texture and later copied to Tex.

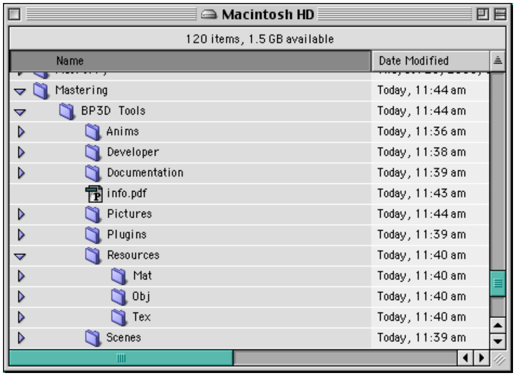
Let's see a more practical example:

You need to collect together and write all of your textures, materials, objects and finished pictures, and all other useful items, to a CD.

Firstly, a relevant catalog for the files is created. It is to contain all textures, objects and materials. In addition the catalog will be located in the root folder of the CD, so that you can view and archive it directly.

You now create the entire archive on your computer. On most systems you will have a reserved hard drive partition which was defined for such CD-ROM production. Only rarely should you require more than the 650MB limit of a CD-ROM for this work area.

A possible CD structure for your hard drive might look like the following illustration.



The CD-ROM structure in the Mastering folder

So this is how the structure could look. You have created and filled the folders with the relevant contents. As we are just concerned with browsing from here, only the three folders Mat, Obj, and Tex are of any interest to us. Or have we forgotten an important folder?

Of course ... we need to know where the anchor folder is located.

Let's look more closely. The CD will be called BP3D Tools. Thus the folder of the same name within the mastering partition forms the anchor. This is also where the catalog is to be located, making it easily accessible. So, proceed as follows:

1. Start BodyPaint 3D and open the Browser.
2. Open **File > Preferences**.

   Check the option **Recurse Folders** in the dialog (see above) as well as **Pictures**, **Movies** and **Scenes** (and, depending on personal preference, from the drop-down menu to the right of Scenes choose **Raytracer**, which will cause a delay in catalog creation, **Gouraud Shading** or **Wireframe**).
3. Select **File > New Catalog**.
4. Now each folder is added.

   Select **File > Import Directory**. In the dialog select, for example, the folder Mat. The catalog and the preview pictures are created. Use the **Import Directory** function twice more for the folders Obj and Tex.
5. Now Select **File > Save Catalog As**.

   In the system dialog define 'Disk3:Mastering: BP34D Tools' as the location and, say, 'BP3D Tools.cat' as the name. This is the most crucial (and also most difficult) step. Now (and only now) does the Browser know where it has to create relative paths.
6. Open the menu command **File > Make Catalog Relative...**, so that the Browser converts all information into relative paths.
7. Save the catalog with **File > Save Catalog**.

You are now ready to master the CD.

To summarize:

If **Make Catalog Relative...** is enabled, then complete paths are no longer saved, instead only the relative paths, starting from the catalog folder are used. From this location the current catalog folder and its sub-folders are scanned.

Tip

This method only works if you have named the catalog and assigned the path with the Save Catalog As *command (see above) prior to searching the catalog.*

Close

This command closes the Browser. The current catalog is removed from memory.

Edit Menu

Delete

Removes all selected pictures from the catalog. The originals on the system disk remain unaffected.

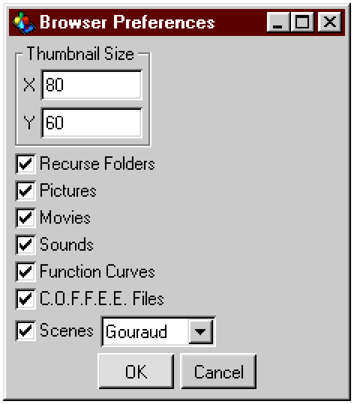
Select All

Selects all the preview pictures of the current catalog.

Deselect All

Deselects all the preview pictures of the current catalog.

Preferences



Thumbnail Size

This allows you to adjust (in pixels) the size of the preview images in the Browser. The changes are immediate, although actual recalculation does not occur until later. The images are simply scaled up or down.

The new calculation of all pictures is achieved by the use of **Render All** from the Function menu (see below).

Recurse Folders

If this option is checked, sub-folders are also scanned for scene elements and displayed in the Browser.

Pictures

If this option is active, pictures are displayed in the Browser. All image formats unknown to BodyPaint 3D are ignored.

Movies

If this option is checked, animations are displayed in the Browser. All animation formats unknown to BodyPaint 3D are ignored.

Sounds

If this option is active, the waveforms of the sound files are displayed in the Browser. All sound formats unknown to BodyPaint 3D are ignored.

Function Curves

If this option is activated, function curves are displayed in the Browser.

C.O.F.F.E.E. Files

If this option is activated, C.O.F.F.E.E. files are displayed in the Browser.

Scenes

If this option is activated, scenes are shown in the Browser. All scene formats that are not recognized by BodyPaint 3D are ignored.

You can use the pop-up menu to the right of this option to determine whether scenes are shaded in Wireframe or Gouraud or rendered with the Raytracer. If Raytracer is selected, shadows and refraction are not rendered and only the floor and sky can be reflected. However, each scene is antialiased.

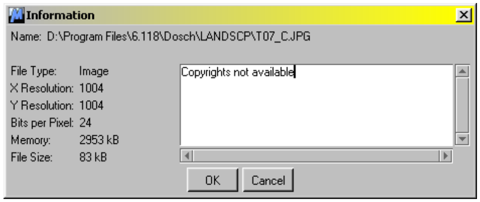
Function Menu

Render All

Recalculates all preview pictures that exist in the catalog.

This is necessary, for example, if you change the picture size in the preferences or add or change files in the directories. You can cancel the new calculation at any time with the ESC key.

Information



Opens an information window for the current preview and displays information, including the complete path, picture resolution and color depth.

Tip

This command is also accessible from within the context menu (right-click).

You may be surprised, when you are using relatively small textures in a scene, if the computer alerts you to a lack of memory. It's very easy to forget that images often need considerably more memory than their file size suggests.

For example a compressed JPEG picture, which on disk is just one megabyte in size, can quite often need 10 or more megabytes of memory to display. Using several such compressed files in the Browser, the existing memory of your computer melts like ice cream in a desert.

Using the information window of the Browser, you can easily monitor the relevant values (file size and actual memory requirement) and avoid unpleasant surprises while working on a project.

On the right-hand side of the information window is an area where you can enter your own comments e.g. copyright notes, latest changes etc.

These comments may run to many lines and up to 255 characters. A comment can be displayed from within the Browser itself. To do this, simply leave the mouse pointer over a preview picture for a couple of seconds. As with command palettes (see Command Palettes, page 32), an information box will open under the mouse pointer.

To begin a new text line, simply press the Enter or Return key. This dialog must be closed with the mouse by clicking on **OK** or **Cancel**.

Tip

The contents of the comment box can also be searched (see below). The Browser thus effectively becomes a small picture database.

Tip

If the Browser finds a text file with the name Readme.txt when scanning a folder, its contents will be automatically transferred to the information dialog of each thumbnail picture of the folder, space permitting.

Search For

Scans the name and/or comment boxes of the current database of the Browser for the text entered.

Tip

This command is also accessible from within the context menu (right-click).

You may use the Browser to scan for filenames and/or comments. Simply choose the criteria by checking the relevant box and enter the text or value you wish to search for in the box to the right. All thumbnails that match the find will be outlined in the catalog.

Sort By

Use the sub-entries of this menu to define the sort sequence of the current catalog in the Browser.

Alternatively you may sort according to filename or file size. Items are always sorted in ascending order, i.e. the list starts with the smallest images and ends with the largest.

Initialisation Files

BodyPaint 3D loads several initialisation files during startup. The content of these files is integrated into the layout.

Template.c4d

During startup, BodyPaint 3D checks its root folder for a file called 'Template.c4d'. If the file is present, its settings are loaded and are used as default values.

This can be very effective if you keep using the same scene-specific settings (e.g. several different render settings).

For an overview of all the settings which are saved with the scene file, see Overview, page 27.

New.c4d

When you create a new file (main menu **File > New**), BodyPaint 3D checks its root folder for a file called 'New.c4d'. If the file is present, its settings are loaded and are used as default values.

For example, to change the default render resolution, change the value in the Render Settings (Output tab) and save the file in BodyPaint 3D's root folder under the name 'New' (BodyPaint 3D will append the extension automatically).

Template.cat

During startup, BodyPaint 3D checks its root folder for a file called 'Template.cat'. If the file is present, it is loaded into the Browser automatically.

This can be useful, for example, when you are working on a large project and wish to have all the associated textures and/or scenes available immediately after startup. In this case, create a catalog which shows all the required files. Then, save the catalog in BodyPaint 3D's root folder with the name 'Template' (BodyPaint 3D will append '.cat' automatically). The Browser will contain the catalog the next time you launch BodyPaint 3D.

For more information on the Browser, see page 57.

Note

If the template catalog is very large (lots of preview pictures), expect a short delay during startup.

Template.l4d

During startup, BodyPaint 3D checks its root folder for a file called 'Template.l4d'. If the file is present, it is loaded and used as the active layout.

You can create this file in one of two ways:

- Activate the corresponding option in the General Settings (see page 40). The template layout will be created automatically when you quit BodyPaint 3D — *each* time you quit, for as long as the option is activated!
- Create the template layout manually using the function **Window > Layout > Create Default Layout** (main menu).

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

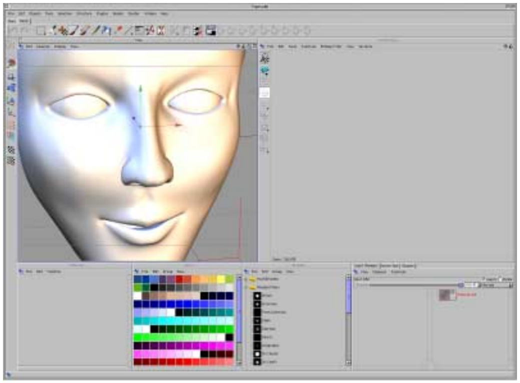
5. BodyPaint 3D Basics

5 BodyPaint 3D Basics

This tutorial shows you how to paint an imported object from scratch.

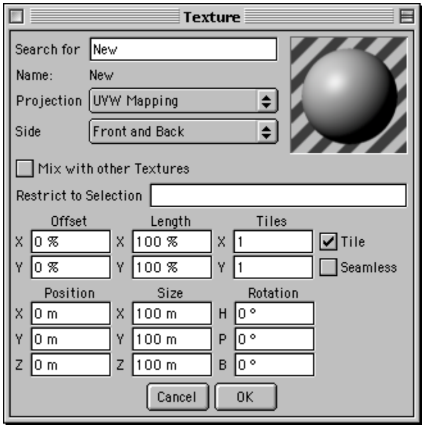
In preparation, load an unpainted object into BodyPaint 3D. If you like, use 'face.c4d' from the Examples folder on the BodyPaint 3D CD-ROM.

Step 1: Create the Material



The object is gray to begin with. This is because unpainted objects use the default material (gray color, specular channel active). Create your own material by choosing **File > New Material** in the Material manager.

The new material's preview appears. Notice how it is gray also. However, before you edit the material, apply it to the object in the following way: drag from the material preview until the mouse pointer is over the object in the Perspective View, then release the mouse button. The Texture dialog opens:

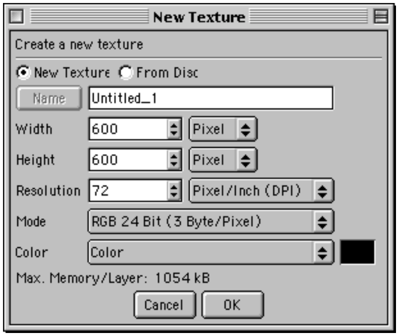


Set the **Projection** pop-up menu to **Flat**, then click on the **OK** button. This maps the texture to your object using flat mapping. To ensure that the projection covers the entire surface, choose **Texture > Fit to Object** in the Object manager.

Flat mapping is a good choice if you are using the face example, since you will paint to one side only. However, when you need to paint to all sides of an object, you should use Spherical or UVW mapping. For further details on texture projection, please see page 255.

Step 2: Create the Texture

You need to create a texture before you can paint the object, so select **Channels > Color** in the Layer manager. This creates a texture for the color channel.



The New Texture dialog opens. The parameters in this dialog are used to define the new texture. Leave all the parameters at their default settings with one exception: click on the color selection box to the right of **Color**. The color dialog for your operating system opens. Choose a background color for your texture (e.g. 255,216,178 RGB for skin) then click on **OK** to return to the New Texture dialog. Click on **OK** once more to create the texture.

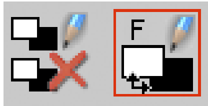
A texture with a background layer is created. The background layer is filled with the color you have just chosen, as can be seen in the Layer manager. Now, activate the **Enable** option so that you will be able to edit the texture.

The new texture has been mapped to the object automatically. The speculars are a little overpowering, so double-click on the material preview (Material manager) and deactivate **Specular** (click on the adjacent option field).

You are now ready to paint your object.

Step 3: Paint the Object

Click on a brush preset and a color preset to choose your brush and paint. You can also choose the painting color by clicking on the foreground color selector (front rectangle) for the color channel (C) in the multi-channel palette:



Choose the new foreground color using the color dialog that opens.

You can paint in two different windows (and, effectively, in two different ways):

1. Perspective View — paint directly onto your object in three dimensions.
2. Texture View — paint onto the bitmap in two dimensions.

Both the Perspective View and Texture View show your paint strokes in real-time.

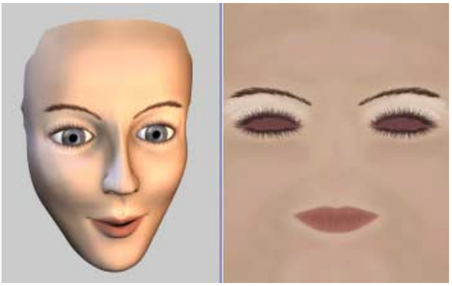
Tip:

If you have activated the Show UV Mesh option (Texture View: Tools > Show UV Mesh *) and the UV mesh is at a different angle to the texture plane, you can correct the angle by adjusting the* Rotation *settings in the Texture dialog. (To open the Texture dialog, double-click on the texture tag in the Object manager.)*

Tip:

To open the texture in the Texture View, double-click on the Background layer in the Layer manager.

Now, paint the object in an imaginative way. Try a variety of brush presets and, above all, experiment.



On the right is the painted face texture. The eyes were allocated their own texture.

We painted the eyes for this example.

If you want to save your artwork, use **File > Save Project** from the main menu.

The Save File dialog opens. Enter a name for the project folder. A 'tex' folder will be placed inside the project folder — this is where your textures will be saved. This method ensures that everything is saved.

Tip:

BodyPaint 3D saves the scene file separately to the textures.

The **Save as** command (main menu) saves the scene (i.e. the object) only. You can save individual textures using **File > Save Texture** in the Texture View. If you want to save all the textures, use **File > Save All Textures** (main menu).

Keep in mind that BodyPaint 3D can load the scene's textures only if they are in one of the following locations:

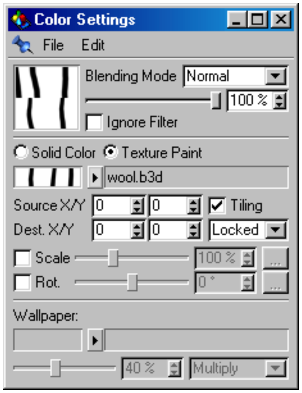
1. In the same folder as the scene file.
2. In a 'tex' folder inside the scene's folder.
3. In any folder specified as a texture path in the General Settings. See page 51 for details.

6. Color Manager

6 Color Manager

The Color Settings

General



The Color Settings dialog is the most important means for defining colors and patterns in BodyPaint 3D. In addition, it enables you to save the color/pattern as a color preset in the Color manager.

Blending Mode

The **Blending Mode** slider controls the strength (i.e. the opacity) of the color/pattern. The preview picture shows the current state of the color/pattern, which is the result of combining the blending mode settings with the wallpaper properties.

You can, if you prefer, enter the strength value numerically using the box to the right of the slider. You can set values from 0% to 100%. A value of 100% will apply the color/pattern with full opacity.

If **Texture Paint** is selected, the texture will be applied in the ratio of 1:1. The lower you set the strength value, the more transparent the color/pattern will be.

The pop-up menu on the right defines the blending mode itself. These modes, such as **Multiply** and **Darken**, have exactly the same effect as with 2D paint programs.

The following terms are used below to help describe the effect of the blending modes:

- background color — a pixel's original color, i.e. its color before you paint over it.
- painting color/pattern — the color or pattern with which you are painting.
- resultant color — the pixel's final color, i.e. its color once you have painted over it.

The blending modes you can choose from are:

Normal

Each pixel you paint over takes some or all of its color from the painting color/pattern according to the brush pressure value. The greater the brush pressure value, the more opaque your brush stroke becomes.

Dissolve

This mode uses a random function to generate an (almost) random distribution of the color/pattern while you paint. Dissolve depends on the brush pressure and it frays the edges.

Tip:

This mode is useful for simulating dirt effects.

Difference

With this mode, the resultant color of each pixel is the difference between its background color and the painting color. For example, if you paint red onto black, the result is red. This is because black's RGB values are 0,0,0, so the difference corresponds to the painting color (red). A more practical example is to paint onto a non-black background with a soft brush — this creates surreal edges.

Lighten

BodyPaint 3D compares the brightness values of the background color and the painting color (at the pixel level). If the background color is brighter, the pixel's color remains unchanged. If the background color is darker, the resultant color is the same as the painting color.

Darken

BodyPaint 3D compares the brightness values of the background color and the painting color (at the pixel level). Where the background color is darker, the pixel's color remains unchanged. Where the background color is brighter, the resultant color is the same as the painting color.

Multiply

The resultant color is obtained by multiplying the background color by the painting color, then dividing by pure white. The more often you paint over a pixel in this mode, the darker it becomes. The effect is always a darkening one. This can be useful for increasing tonal variation.

Screen

Screen has the opposite effect of Multiply. It multiplies the inverted values for the background and painting colors, then divides by pure white. (To invert a color, subtract it from pure white.) The more times you paint over a pixel in this mode, the brighter it becomes.

Add

The resultant color is obtained by adding the colour channels of the background color and the painting color. For example, if you paint red (255,0,0) onto a green background (0,255,0,), the resultant color is yellow (255,255,0).

Exclusion

This mode is similar to Difference, but it creates a softer effect.

Erase

This mode erases pixels in the active layer — the erased areas are transparent and the layer underneath shows through.

Note:

If the Background layer is active, the Erase mode paints white rather than transparency.

Ignore Filter

The Brush Settings dialog contains filters such as **Wet Edges** and **Smudge**. Use this **Ignore Filter** option to turn on or off the effect for the active material channel.

Solid Color

This is where you choose your color. There are seven different color modes. To change mode, click on the triangle below the small preview picture and select from the list that appears. You can define the color using either a color table or the four sliders and input boxes. The color is shown in the small preview picture to the left. If you click on the preview, you can define the color using the color dialog that is native to your operating system.

Color Table

This enables you to choose a color from a table of presets. Click on a color to pick it.

Sliders

The sliders relate to either the RGB color system or the HSV color system.

RGB: The color is defined by three color components: red, green and blue.

HSV: The color is defined in terms of hue, saturation and brightness.

Depending on the color mode chosen, you can set the slider values between the following ranges:

0%..100%

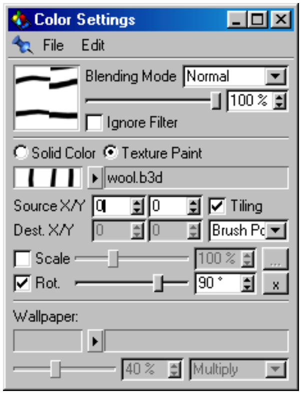
0..255

0..65535

The fourth slider defines the color's brightness.

The four sliders combined enable you to specify a color accurately.

Texture Paint



Activate this option if you want to paint textures onto the object. You can pick the texture using the eyedropper:

- Select the Eyedropper tool.
- Select **Texture** in the Active Tool manager.
- Click in the Texture View and the active layer will be used as the texture.

Note that you can use the eyedropper between all open scenes.

Preset Patterns

You can select a preset pattern by clicking on the triangle to the right of the material preview. You can add your own bitmaps to the list by placing them in BodyPaint 3D's 'pattern' folder (although see Reread Directory below). You can use any graphics format recognised by BodyPaint 3D, such as tif, bmp and jpg.

Often, you will use your own paint patterns, which you can pick using the eyedropper.

The pop-up menu contains two functions in addition to the pattern list:

Load From Disk — This enables you to load a texture from a storage medium. You will be asked if the texture should be copied to the 'pattern' folder. Click on **Yes** if you want the pattern to be made available permanently.

Refresh Folder — If you have copied any bitmaps to the 'pattern' folder during the current work session, select **Refresh Folder** to add the new patterns to the list.

Source X/Y

This defines the pixel in the texture that will be painted first. For example, if the values are set to 0 and 0, the top-left pixel in the texture will be painted first.

Tip:

If you picked the texture using the eyedropper, the values are set to the pixel position where you clicked.

Tiling

If this option is activated, the pattern will be tiled as you paint.

Dest. X/Y

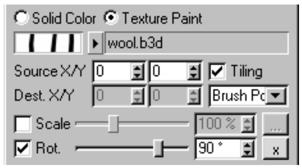
Dest. stands for Destination. You can enter values only if the painting mode is locked (see below); otherwise, the boxes are ghosted. If you set the **Dest. X/Y** values to the same values as **Source X/Y**, the pattern will be painted without an offset — enter different values to offset the texture. For example, to offset the texture 20 pixels lower, subtract 20 pixels from the second box.

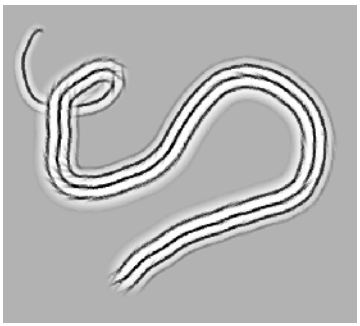
Painting mode

Locked — This mode paints the texture with an offset as defined by the **Source X/Y** and **Dest. X/Y** settings. This enables you to clone a texture and paint it to another position with an offset. For example, if you paint using the Fill Bitmap tool, the texture will be offset over the entire layer — or if you use a brush, the texture will be offset in the areas you paint.

Mouse Hit — This mode is similar to **Locked** but with the following difference: if you release the mouse button and begin to paint in a new position, the texture is painted starting from the texture pixel defined by **Source X/Y**. Many paint programs have a comparable tool called Rubber Stamp.

Brush Pos. — This stands for Brush Position. Each movement during the brush stroke paints the texture on top of all previous movements in the stroke. This tends to create fragments of the texture in close proximity. If you select rotation (select the **Rot.** option) and couple its effector (see below) with the **Draw Direction** method, the pattern will rotate according to the painting direction, helping you to create tricky textures such as fur and wool.

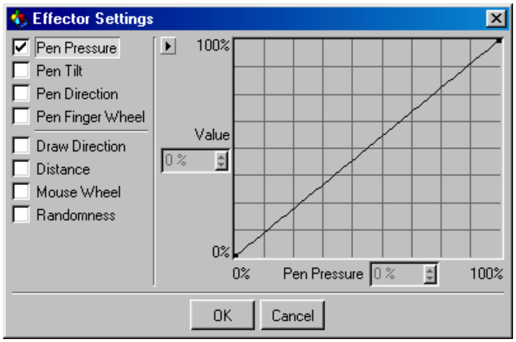




Scale — Select this option if you want to scale the painting pattern. For example, if the original texture size is 300x300 pixels, you can resize it to 150x150 pixels by entering a value of 50%. A value of 200% would resize 300x300 pixels to 600x600 pixels. Keep in mind that scaling up textures may lead to pixelation. You can enter any scale value from 1% to 1000%.

Rot. — This stands for Rotation. It lets you rotate the painting pattern by any angle from -180˚ to 180˚. This can be useful, for example, if you have imported a texture and picked it using the eyedropper tool — sometimes the texture is rotated by 90˚ in the process. In this case, use **Rot.** to correct the texture's direction.

Effectors



There are two buttons to the right of **Rot.** and **Scale**. Click on one of the buttons to access the effector for the corresponding setting.

An effector enables you to change the parameter dynamically by means of a specified input method. For example, you can use the mouse wheel to change the texture's **Scale** value while you paint.

Most of the input methods have a graph that you can edit to fine-tune their behaviour — please see Profile on page 89 for details on editing the curve.

Eight different input methods are available. You can assign as many of the methods as you wish to the same effector. For example, you can change the texture's **Scale** value using the mouse wheel as well as the draw distance. Also, you can use the same input method with more than one effector. For example, you can change the texture's **Size** and **Rot.** values using the mouse wheel.

Pen Pressure This adjusts the setting according to how hard you push down on the graphics tablet. The graph to the right defines exactly how this input method affects the setting (the graph is linear by default).

Pen Tilt This method adjusts the setting according to the pen's tilt. If the pen is at a right-angle to the graphics tablet, the tilt is 0˚. If the pen is resting on the tablet, the tilt is 90˚. The graph to the right defines exactly how this input method affects the setting (the graph is linear by default).

Pen Direction Adjusts the setting according to the pen's rotation. The graph to the right defines exactly how this input method affects the setting (the graph is linear by default).

Pen Finger Wheel This adjusts the setting according to finger wheel's angle. The graph to the right defines exactly how this input method affects the setting (the graph is linear by default).

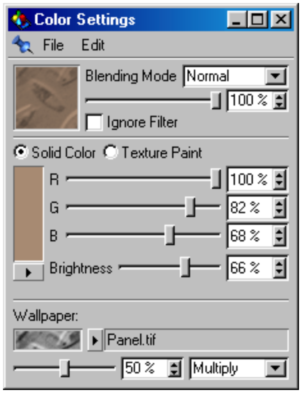
Draw Direction With this method, the setting is adjusted in relation to the direction in which you paint. For example, if you activate this input method for the **Rot.** effector, the texture will rotate automatically to follow your brush stroke. The graph to the right defines exactly how this input method affects the setting (the graph is linear by default).

Draw Distance The setting is adjusted in relation to the distance the mouse is dragged with the mouse button held down.

Mouse Wheel Here, the setting changes with reference to the angle of the mouse wheel. The graph to the right defines exactly how this input method affects the setting (the graph is linear by default).

Random — This adjusts the setting randomly. You can enter minimum and maximum values (**Min** and **Max**).

Wallpaper



Click on the triangle to choose a wallpaper from a list of patterns. These are the bitmaps in BodyPaint 3D's 'pattern' folder.

To blend a color with the wallpaper, define a color in the color pane and use the slider in the Wallpaper pane to set the blend strength.

Also, you can choose from the full complement of blending modes — see Blending Mode on page 75 for more details.

Tip:

Do not shy from experimenting with combinations of color, wallpaper and blending mode. A vast number of diverse effects can be achieved.

File Menu

These functions enable you to save your own colors/patterns to the Color manager.

Once you have saved a color preset, you can select it later by clicking on its icon in the Color manager.

Add Single Channel Preset

This saves the parameters in the Color Settings dialog as a color preset in the Color manager.

Add Multi Channel Preset

This function saves several colors/patterns and channels under one color preset. When you subsequently paint with the preset active, its colors/patterns and channels are painted simultaneously.

Overwrite Preset

Overwrites the active color preset with the current color settings.

Close

This closes the Color Settings dialog.

Edit Menu

Copy

Copies the active color to the clipboard.

Paste

Copies the color in the clipboard to the active material channel of the Multi Channel Palette.

The Multi Channel Palette

The Foreground and Background Colors

Click on the channel that you wish to manipulate. A red frame will appear to indicate that the channel is active.

Note the two overlapping rectangles. The front rectangle represents the foreground color, the rear one the background color.

If you click on the foreground color icon, the Color Settings dialog opens so that you can pick a new foreground color. Likewise, click on the background color icon to choose a new background color.

When using a brush, note that you can paint with either the foreground color (left mouse button) or the background color (right mouse button). This interchanging of the foreground and background colors applies to all the paint tools including Fill Bitmap, Draw Line and Draw Text.

The Edit Selection Mask Mode

The Edit Selection Mask mode enables you to edit a bitmap selection using the paint tools and filters by means of a temporary mask. There are three main steps involved:

- The Edit Selection Mask mode is activated — this changes the bitmap selection into a selection mask; the bitmap selection's dotted line is replaced by a red overlay (the selection mask).
- The selection mask is edited using the paint tools and filters (almost any paint tool can be used).
- The Edit Selection Mask mode is deactivated — this changes the selection mask back into a bitmap selection.

This raises the question: "If you start with a bitmap selection and you end up with a bitmap selection, what is the point of this mode?" The advantage of the edit selection mask mode is that you can call upon (almost) all the paint tools and filters, hence you can create more accurate selections than would be possible using the standard selection tools alone.

By convention, the selection mask appears as a red overlay. Selected areas are transparent, deselected areas are red. The red areas are slightly transparent so that you can still see the image underneath.

In spite of its red color, the selection mask is grayscale internally. This means that you should use white to paint a transparent (i.e. selected) region, or black to paint a red (i.e. deselected) region. Use grays for semi-transparency (i.e. partial selection).

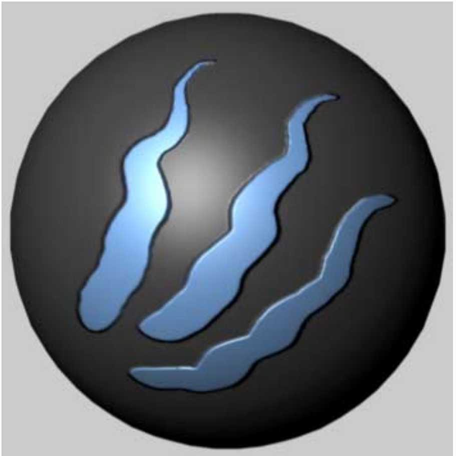
Once you have finished editing the selection mask, deactivate the mode and the mask will change back into a bitmap selection.

Tip:

You can still activate the mode if you haven't made a bitmap selection. In this case, the entire selection mask will be transparent (i.e. everything will be selected). Usually, though, it is more efficient to refine an existing selection.

Multi Channel Mode

This powerful mode enables you to paint to several material channels simultaneously. In addition, you can paint a different color/pattern to each channel.



For example, you can paint red to the color channel and black to the bump channel simultaneously. The black color in the bump channel causes an indentation effect, hence the red paint stroke appears to be indented. Were you to use white in the bump channel instead, the paint stroke would appear to be embossed.

If the Multi Channel Mode button is inactive:

the Brush (or any other painting tool) will paint to the active material channel only, which is indicated by a small pencil icon. Note that the Layer manager also uses a pencil icon to indicate the (same) active channel — the selection is linked.

The small rectangles show you the foreground and background colors/patterns.

If the Multi Channel Mode button is active:

you can paint to several channels at once.

The material channels in the Multi Channel palette are:

Color (C)
Diffusion (D)
Luminance (L)
Transparency (T)
Reflection (R)
Environment (E)
Bump (B)
Alpha (A)
Specular Color (S)
Displacement (DS)

For details on each material channel, please see Chapter 12, The Material manager, on page 207.

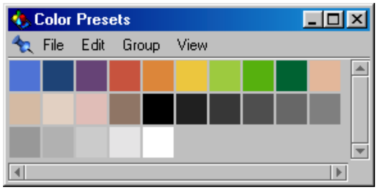
Active channels (i.e. the material channels that will be painted to) are marked by a pencil icon in the Multi Channel palette. To activate or deactivate a channel, click on the top right of the channel's icon.

Note that the Layer manager also uses a pencil icon to indicate the (same) active channels (provided that the Active Material Channels option is selected) — the selection is linked.

You can use a different color/pattern for each channel. To do this, click on each channel icon in turn and choose the color/pattern that you wish to assign it. Note that the active channel is indicated by a red frame.

Once you have activated all the channels you wish to use and assigned textures to them, you can paint to the channels simultaneously. A preview of each channel is shown in the Multi Channel Palette.

The Color Manager



You can use this manager to access predefined colors/patterns as well as any presets you have created and saved yourself.

Tip:

We recommend that you use the presets in the following way: whenever you have a color/ pattern that you feel may be useful later on, save it as color preset. When painting, have the Perspective View (including the object to be painted) in one window and the Color manager in another. Choose a brush, click on a preset color, then paint in the Perspective View.

When you want to change pattern, click on the icon for the new pattern in the Color manager and paint once more.

If you work in this way, you will move frequently and swiftly between the two windows and your object should be painted in minimal time.

Tip:

You can right-click on a color preset to define it as the background color.

File Menu

New Group

Over time, the number of color presets will grow as you add to them. This function enables you to create and name groups so that you can store your presets in a more organised manner.

Revert to Default

This function reverts the color presets to the default settings. As a precaution, you will be prompted for confirmation.

Save As Default

Imagine that you have created some presets. However, the next time you use BodyPaint 3D, the new presets are missing. This is because you neglected to use **Save As Default**, which saves the current presets (including their arrangement) as the default.

Do not worry if you are forgetful — BodyPaint 3D will give you a chance to save the presets when you quit.

Import

This function enables you to use BodyPaint 3D patterns created by other artists. The file selector will open. Choose any file exported from BodyPaint 3D to add its presets to your own.

Export Selection

This function saves your BodyPaint 3D patterns so that other artists can use them. The file selector will open. Choose a destination and a filename for the selected presets (or group of presets). The file takes the extension 'b3d'. In addition, a folder named 'pattern' is created for the textures used by the presets.

Tip:

You can only export patterns that are in BodyPaint 3D's 'pattern' folder. So, for example, you cannot export a color if the pattern was created in BodyPaint 3D and picked using the eyedropper.

Export Visible

This function exports all visible presets.

Close

This function quits the Color manager and closes its window.

Edit Menu

Rename

You can use this function to rename the active preset or active group.

Duplicate

This duplicates the active preset or the active group.

Delete

This function deletes the active preset or the active group.

Group

If you choose **All Presets**, all color presets are displayed.

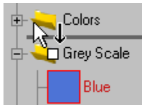
If, on the other hand, you choose a different group from the list, only the presets belonging to that group are displayed.

View

As List

If this option is activated, the icons are displayed as a vertical list and their names are specified. The active icon is indicated by a red frame.

To change the order of the icons, drag-and-drop within the list. While you drag, a dark line indicates where the icon will be moved to if you release the mouse button.



You can move presets into different groups to help organise them. For example, you may wish to create a group specifically for wood patterns. To move a preset to a new group, drag the preset's icon onto the center of the group icon. The mouse pointer should turn into an arrow pointing downwards before you release the mouse button.

The small + icon to the left of the group icon indicates that the group is closed. To open the group, click on the + icon. Once the group is open, a small - icon appears. Click on this icon to close the group.

As Icon

If this option is activated, the icons are displayed in rows and columns rather than as a vertical list. Note that in this mode the names of the presets are not shown. The active icon is marked with a red frame.

Small Icons

The preset icons are displayed small.

Medium Icons

The preset icons are displayed medium sized.

Large Icons

The preset icons are displayed large.

Tip:

You can drag-and-drop to change the order of the icons.

BODYPAINT 3D

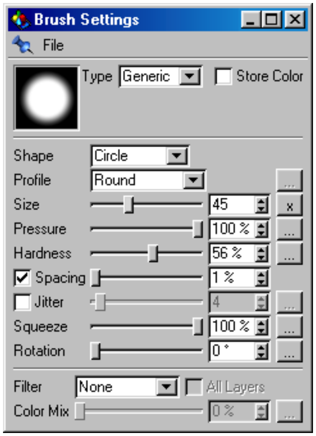
PAINTING • TEXTURING • MAPPING

7. Brush Manager

7 Brush Manager

Brush Settings

General



The Brush Settings dialog enables you to define brushes by setting parameters such as **Size** and **Pressure**. The current brush setting is previewed in the top left of the dialog. You can, if you wish, save the brush parameters at any time as a brush preset.

Many of the parameters have an effector, which enables you to change the parameter while you paint by means of an input method. For example, you might use the mouse wheel to change the brush size while you paint.

Store Color

If you activate this option, the color in the Color Settings is blended into the brush preview. If you then save the current brush settings as a brush preset, the color will be saved together with the brush parameters. If **Store Color** is not activated, only the brush parameters will be saved.

Tip:

This has implications for painting. Imagine you have picked a color in the Color Settings, then you pick a brush in the Brush manager. Suddenly, a different color replaces your chosen color in the Color Settings — here, the brush you picked used an active Store Color option, and so its color displaced your own choice. This option is intended for a brush that always paints with the same color.

Generic Brush Type

The **Type** pop-up menu (next to the brush preview) defines the brush type, which can be either **Generic** or **Bitmap**. First, the generic brush:

The tip of the generic brush is defined by means of options and sliders. These are:

Shape

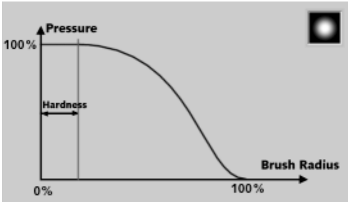
You have two basic brush shapes from which to choose: **Circle** and **Rectangle**. The settings below refine this basic shape.

Profile

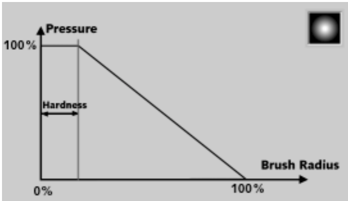
The profile defines the pressure gradient for the brush tip. The graphs below should help to clarify. Each graph describes the strength of the brush pressure over the brush radius.

You can choose from the following profiles:

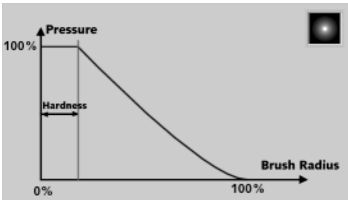
– Round



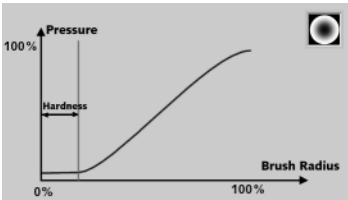
– Linear



– Needle

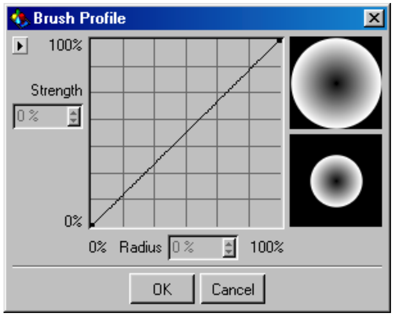


– Nozzle



– User-defined

If you select this option, you can create your own pressure gradient for the brush tip. Click on the button to the far right of the **Profile** pop-up menu to open the following window complete with graph:



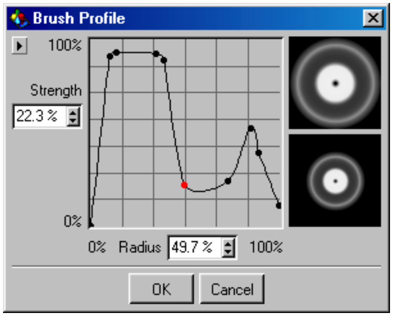
The Y axis corresponds to the brush strength (i.e. pressure) and the X axis represents the brush radius. The curve is linear by default. Click on the first point of the curve and notice how the point turns orange to indicate that it is selected. Drag the point and notice how the two real-time previews to the right of the graph change accordingly. The upper preview shows you the brush profile, the lower preview shows the brush itself.

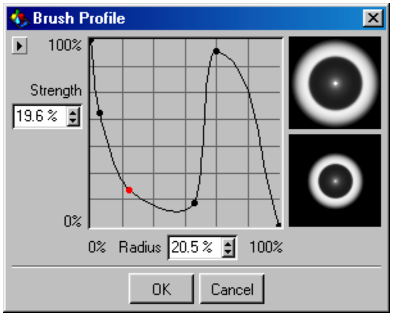
If you click anywhere inside the graph (i.e. other than on a point), a new point is created. The curve adjusts itself to run through the new point. You can add any number of new points.

You can delete points as well: click on the point you wish to delete, then press the backspace key.

You can use the **Strength** and **Radius** boxes to read or enter values for the active point.

Examples:





There is a small button in the top left of the window. If you click on this button, a menu opens with the following functions:

Copy Curve This copies the active curve to the clipboard. Once you have copied the curve, you can use the **Paste Curve** command to paste it into an effector's graph. An effector enables you to change a brush parameter dynamically by means of an input device. For example, if you have a graphics tablet, you can use the pen direction to change the brush size while you paint.

Paste Curve This command will appear in the menu list only once you have copied a curve to the clipboard. It pastes the clipboard's curve into the graph.

Reset to Default This restores the curve to its default shape (a straight line).

Flip Horizontal This command flips (mirrors) your curve horizontally.

Flip Vertical This command flips (mirrors) your curve vertically.

Size

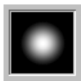
This defines the overall size of the brush. You can edit the value using the slider, or you can enter the value numerically in the box to the right of the slider. The value defines the brush diameter in pixels. You can set the value from 1 to 400 pixels.

Pressure

This slider defines the brush pressure. The lower you set this value, the more transparent the brush stroke becomes. The maximum value of 100% defines an opaque brush stroke.

Hardness

This determines the percentage of the brush that is hard. The lower you set this value, the softer the brush becomes at the edge and the more its edge will blend into the background color. If **Hardness** is set to its maximum value of 100% the brush stroke will not blend into the background color at all.



0% Hard

100% Hard

For example, you can create dirt textures using a low **Hardness** value with the **Dissolve** blending mode active in the Color Settings (see page 75).

Tip:

You cannot access the Hardness slider if the brush has a user-defined profile. In this case, the *transparent areas of the brush are defined by the profile curve itself.*

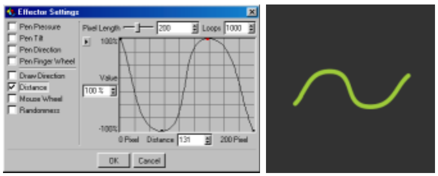
Spacing

If you select this option you can define the distance between brush marks in the stroke. A large value will result in a trace of brush marks that follow your mouse. A low value will produce the effect of a continuous paint stroke. Note that if **Spacing** is deactivated, the paint stroke depends on processor performance and may fragment during fast brush strokes.

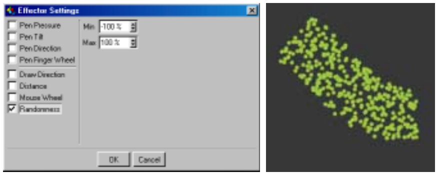
High Spacing value

Jitter

The Jitter function causes the paint to be applied at a certain distance from the brush tip. Please study the following examples:



Linear brush stroke with Jitter selected



Jitter and Randomness selected

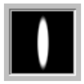
Tip:

The curve in the top picture was produced with a straight brush stroke.

Squeeze

Select this option if you want to squeeze (i.e. narrow) the brush tip. The minimum value of 0% leaves the brush tip in its original form (circular or rectangular). The higher you set the value, the narrower the tip becomes.

0% Squeeze

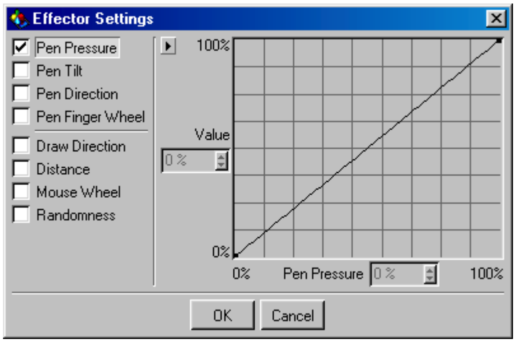


100% Squeeze

Rotation

You can rotate the brush tip by moving the slider or by entering a rotation angle in the input box.

Effectors



You can activate an effector for each of the following brush settings: **Size**, **Pressure**, **Hardness**, **Jitter**, **Squeeze** and **Rotation**. To open a setting's effector, simply click on the small icon to the far right of that setting. You will see one of two icons, depending on whether there is already an active effector or not.

not active

active

An effector enables you to change the parameter dynamically by means of a specified input method. For example, you can use the pen pressure to change the brush size while you paint.

Most of the input methods have a graph that you can edit to fine-tune its behaviour — see Profile above for details on editing the curve.

Eight different input methods are available. You can assign as many of the methods as you wish to the same effector. For example, you can change the brush size value using the pen finger wheel as well as the distance. Also, you can use the same input method with more than one effector. For example, you can change the brush **Size** and **Pressure** values using the pen pressure.

Pen Pressure

This adjusts the setting according to how hard you push down on the graphics tablet. The graph on the right of the dialog defines exactly how this input method affects the setting (the graph is linear by default).

Tip:

The pen pressure is the most popular input method with graphics tablet users. You may wish to assign it to the Size *or* Pressure *brush setting.*

Pen Tilt

This method adjusts the setting according to the pen's tilt. If the pen is at a right-angle to the graphics tablet, the tilt is 0°. If the pen is resting on the tablet, the tilt is 90°.

The graph on the right of the dialog defines exactly how this input method affects the setting (the graph is linear by default).

Pen Direction

The **Pen Direction** method adjusts the setting according to the pen's rotation. The graph on the right of the dialog defines exactly how this input method affects the setting (the graph is linear by default).

Tip

if you assign this method to the Rotation *brush setting, a narrow brush will paint a stroke similar to that of a calligraphy pen.*

Pen Finger Wheel

This adjusts the setting according to the finger wheel's angle. The graph on the right of the dialog defines exactly how this input method affects the setting (the graph is linear by default).

Tip

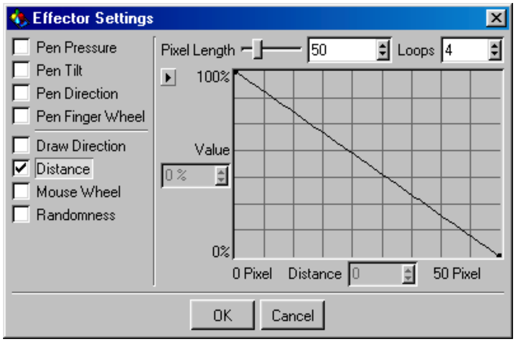
You may wish to assign this to the brush Pressure *so that you can adjust the setting comfortably while you paint.*

Draw Direction

With this method, the setting is adjusted in relation to the direction in which you paint. For example, if you activate this input method for the **Rot.** effector (in the Color Settings), the texture will rotate automatically to follow your brush stroke. The graph on the right of the dialog defines exactly how this input method affects the setting (the graph is linear by default).

You can create some interesting effects with this function, especially if you assign it to the **Rotation** brush setting. For example, choose a rectangular brush, set **Spacing** to about 130% and set **Rotation** to 90˚. Assign **Draw Direction** to the **Rotation** brush setting to create the following effect:

Distance



This function's speciality is fading brush strokes — assign **Distance** to the **Pressure** brush setting and your paint strokes will fade gradually.

The **Pixel Length** defines the effector's area of influence. For example, if the **Pixel Length** is set to 200 the curve will be evaluated over the first 200 pixels of the brush stroke. So, if the default (linear) curve is used with the example, the **Pressure** will be 100% at the start of the brush stroke and 0% by the time the stroke is 200 pixels long.

Tip:

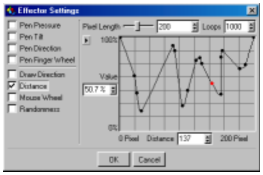
You can use Distance with large bitmaps too — you can enter values up to 100000 pixels.

You can also enter a value in the **Loops** box. This determines the maximum number of times the curve can be repeated should your brush stroke extend beyond the **Pixel Length** value.

The picture should help to clarify:

You can also use **Distance** to create wobbly lines. To add a wobble to your brush stroke, assign **Distance** to the **Size** brush setting and define a curve similar to the one shown below.

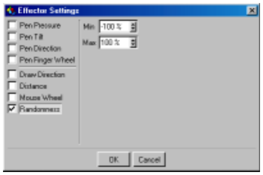
Note the large number of loops in the example. This lets you paint (almost) as long a stroke as you wish without the effect diminishing.



Mouse Wheel

Here, the setting changes with reference to the angle of the mouse wheel. The graph on the right of the dialog defines exactly how this input method affects the setting (the graph is linear by default). For example, if you assign this to the **Pressure** brush setting, you can use the mouse wheel to adjust the brush pressure while you paint with the mouse. Alternatively, you may prefer to use both hands: one hand paints with a graphics pen while the other uses the mouse wheel to adjust the **Size** or **Pressure** brush setting.

Randomness



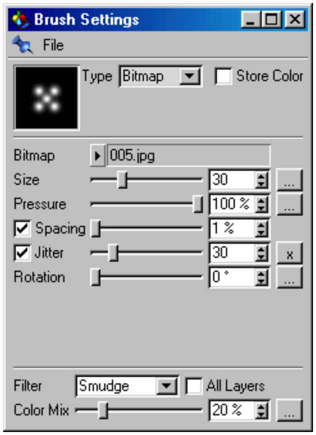
This function assigns random values to the setting. You can specify minimum and maximum values (**Min** and **Max**). For example, imagine that you have set **Size** to 50 pixels. In the effector for Randomness, you leave the **Min** and **Max** values set to 0% and 100% respectively. If you paint with this brush, the **Size** alters randomly between 0 and 50 pixels. If, on the other hand, you set **Min** to 50% and leave **Max** at 100%, the width of the paint stroke varies between 25 and 50 pixels.

The effect above was achieved by assigning **Randomness** to the **Size**, **Pressure**, **Hardness** and **Jitter** brush settings.

Tip

Randomness behaves differently when assigned to the brush's Rotation parameter. In this case the Randomness value is added to the base Rotation value.

Bitmap Brush Type



This mode enables you to use any bitmap in BodyPaint 3D's 'pattern' folder as the brush tip. Please keep the following in mind:

BodyPaint 3D handles all bitmaps in the 'pattern' folder as grayscale images. You can still use RGB Color bitmaps, but BodyPaint 3D will convert them (in memory) into grayscale for its own use. Black areas of the bitmap are transparent and white areas are opaque. Gray tones vary in transparency accordingly — tones closer to black are more transparent than tones closer to white.

Bitmap

If you click on the triangle, a menu opens with the items **Load From Disk** and **Reread Directory**, as well as a list of all bitmaps in BodyPaint 3D's 'pattern' folder.

> **Load From Disk** loads a bitmap from a storage medium. Once you have chosen the bitmap, BodyPaint 3D will ask if it should be saved to the 'pattern' folder. If you decline this request, the bitmap is loaded into memory temporarily and you can work with it in the usual way. However, the bitmap is lost the moment you quit BodyPaint 3D. To prevent this from happening, agree to the dialog's request instead.
>
> **Reread Directory** updates the list of bitmaps. This is useful is you have copied any bitmaps to the 'pattern' folder since launching the program, as they will appear in the list only once you have used this command.

Choose any bitmap in the list. It becomes the new brush tip (as confirmed by the preview) and its name is shown in the box to the right of the triangle.

The bitmap brush has fewer settings than the generic brush — **Shape**, **Profile**, **Hardness** and **Squeeze** are all absent. This is because these properties are defined by the bitmap itself.

The **Size**, **Pressure**, **Spacing**, **Jitter** and **Rotation** parameters have exactly the same effect as with the generic brush type — please see Generic Brush Type on page 89 for details.

Filter

Filters can add effects to the brush such as painting with watercolors and smudging.

The filters you can choose from are:

Wet Edges

This filter generates a watercolor effect. The paint stroke is slightly transparent and paint accumulates at the edges (i.e. the edges are less transparent than the center).

Smudge

If you activate **All Layers**, smudging takes all layers into account. However, note that only the active layer itself is altered. The **Color Mix** slider controls the extent to which the active color/ pattern (i.e. the one in the Color Settings) is applied to the smudge. If the slider is set to 0%, no new paint is applied, you smudge the existing colors only. As you increase the slider's value, so more and more of the active color/ pattern is applied to the smudge.

In addition, you can activate an effector for the **Color Mix** value.

Tip:

Set Spacing to a lower value if the smudge effect is too coarse. This will produce a softer effect.

File Menu

Add Preset

This saves the current brush settings as a brush preset in the Brush manager. Enter the name for the brush in the dialog that opens. Also, keep in mind that it will be easier to change the color used by the brush if **Store Color** is not activated.

Close

This closes the Brush Settings dialog.

The Brush Manager

You can use this manager to access predefined brushes as well as any brushes you have created and saved yourself.

Tip:

We recommend that you use the presets in the following way: whenever you create a brush that you feel may be useful later on, save it as a brush preset. Likewise, save your interesting colors/patterns as color presets.

When painting, have the Perspective View (including object to be painted) in one window and the Color manager in another. Choose a brush, click on a preset color, then paint in the Perspective View.

When you want to change pattern, click on the icon for the new pattern in the Color manager and paint once more.

If you work in this way, you will move frequently and swiftly between the two windows and your object should be painted in minimal time.

File Menu

New Group

The number of brush presets will grow over time as you add to them. This function enables you to create and name groups so that you can store your presets in a more organised manner.

New

This creates a new preset using the current parameters in the Brush Settings dialog.

Revert to Default

This function reverts the Brush manager to its default presets. As a precaution, you will be prompted for confirmation.

Save As Default

Imagine that you have created some presets. However, the next time you use BodyPaint 3D, the new presets are missing. This is because you neglected to use **Save As Default**, which saves the current presets (including their arrangement) as the default. Do not worry if you are forgetful, BodyPaint 3D will give you a chance to save the presets when you quit.

Import

This function enables you to use BodyPaint 3D brushes created by other artists. When the file selector opens, choose the BodyPaint 3D file to add its presets to the Brush manager.

Export Selection

This function enables you to save your BodyPaint 3D brushes so that other artists can use them. The file selector will open. Choose a destination and a filename for the selected presets (or group of presets). The file takes the extension 'b3d'. In addition, a folder named 'pattern' is created for any textures used by bitmap brushes.

Export Visible

This function exports all visible presets.

Close

This function quits the Brush manager and closes its window.

Edit Menu

Edit

This function opens the Brush Settings for the active preset. This has the same effect as double-clicking on the preset.

Tip:

This changes the active preset directly. This is in contrast to color presets, which can be changed without affecting the active preset itself.

Rename

You can use this function to rename the active preset or the active group.

Duplicate

This duplicates the active preset or the active group.

Delete

This function deletes the active preset or the active group.

Group Menu

If you choose **All Presets**, all brush presets are displayed.

If you choose a different group from the list, only the presets belonging to that group are displayed.

View menu

As List

If this option is selected, the icons are displayed as a vertical list and their names are specified. The active icon is indicated by a red frame.

To change the order of the icons, drag-and-drop within the list. While you drag, a dark line indicates where the icon will be moved to if you release the mouse button.

You can move presets into different groups to help organise them. To move a preset to a new group, drag the preset's icon onto the center of the group icon. The mouse pointer should turn into an arrow pointing downwards before you release the mouse button.

The small **+** icon to the left of the group icon indicates that the group is closed. To open up the group, click on the **+** icon. Once the group is open, a small **-** icon appears. Click on this icon to close the group.

As Icon

If this option is activated, the icons are displayed in rows and columns rather than as a vertical list. Also, the names are not shown. Once more, the active icon is indicated by means of a red frame.

Small Icons

The preset icons are displayed small.

Medium Icons

The preset icons are displayed medium sized.

Large Icons

The icons are displayed large.

Tip:

You can drag-and-drop to change the order of the icons.

Brush Groups

The Brush manager contains over a dozen groups offering a variety of brush presets. Note that you need to paint to several material channels at the same time for a realistic effect. A brush that paints to more than one material channel simultaneously is called a MultiBrush and you will find a selection of such brushes in the MultiBrushes folder.

Tip:

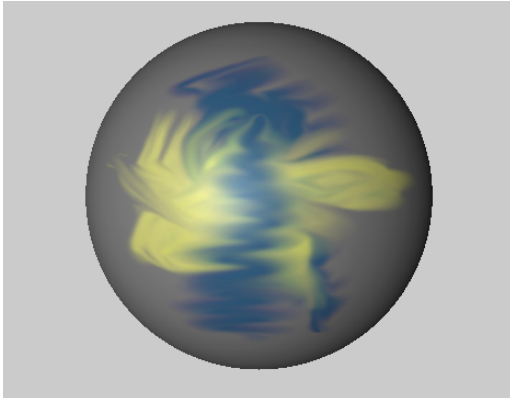
If you change any of the brush presets, a dialog will appear when you quit BodyPaint 3D to check if you want to save the current brush presets as the default — click on Yes if you want to overwrite the old settings. A more cautious approach is to change duplicates of the original brushes.

There are two types of brush presets:

- Brushes which paint to the active material channel only.
- Brushes which paint to several channels simultaneously (MultiBrushes).

The simplest way to judge the effect of a brush preset is to try painting with it. For this reason, only a small number of the presets are described below.

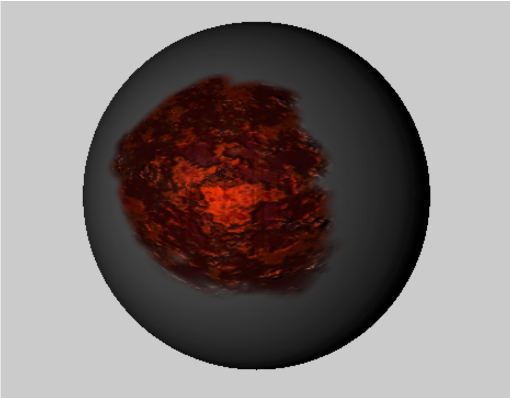
Oil (soft) [Standard Tools]



This brush simulates a thick oil pencil which smudges its own color into the existing colors. This pleasing effect is painted to the active channel only. The following settings were used to create the oil pencil:

- **Hardness** 0%. This creates a very soft transition between the color and the background.
- Small **Spacing** value.
- **Smudge** filter active. This means that the color being applied is smudged with the existing color.
- Low **Color Mix** value. This ensures that the oil has color (rather than smudge existing colors only).

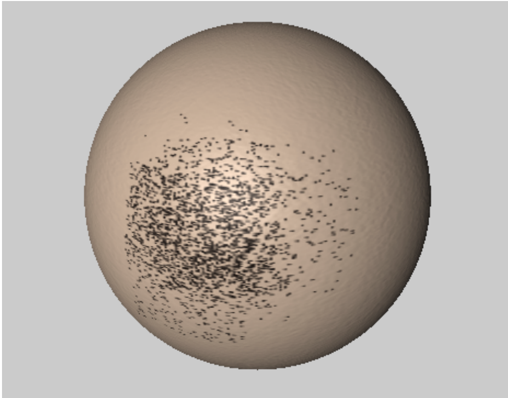
Metal 4 [MultiBrushes > Dosch Texture Brushes]



This MultiBrush paints to three material channels simultaneously: color, bump and specular. The result is similar to rusty metal.

To find out how this effect was achieved, please examine the individual channels in the multi channel palette. For example, if you click on the foreground color for the bump (B) channel, you will see a texture in the Color Settings dialog that opens. Click on a different foreground color (e.g. for the color channel), and you will see a different texture defined in the Color Settings. All three channels have their own texture, and this is what gives the MultiBrush its realistic quality.

Beard [MultiBrushes > Organic]



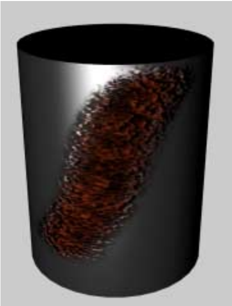
The **Organic** brush group contains a useful set of brushes for painting human faces. The **Beard** brush paints a beard stubble effect.

It is worthwhile examining the parameters for this brush: double-click on the **Beard** preset. The decisive factor here is the **Jitter** effector. This distributes the small brush tip (**Size**: 1 pixel) around the brush position using a randomise function.

This completes our short overview of the brush groups. We recommend that you test further brushes and examine their settings. Once you have done so, you may wish to create your own MultiBrush — please see the following section.

Creating your own MultiBrush

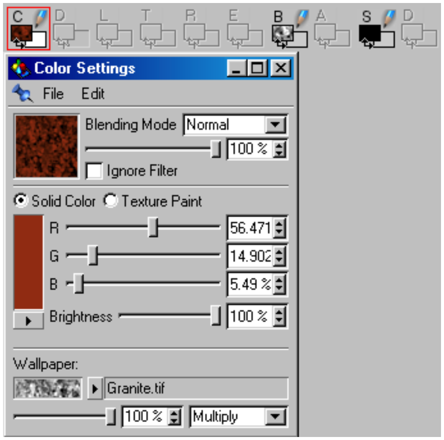
In this tutorial, you create a brush that paints as demonstrated in the example picture below:



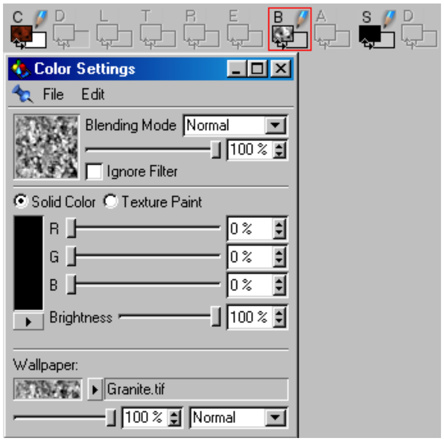
The brush paints a rusty red. Not only does it paint the rust color, it also creates a bumpy, rust-like surface by painting to the bump channel simultaneously. The brush itself should have a soft edge.

To create the brush:

- Open the Color Settings and select the multi channel mode in the Multi Channel Palette (the brush needs to paint to the color and bump channels simultaneously) — a green tick indicates that the mode is active.
- Check if there is a small pencil in the C (Color) channel icon. If you cannot see the pencil, click in the top right quarter of the icon to make it appear.
- Pick a reddish-brown color (RGB 145, 37, 15).
- Load the **Granite** texture into the Wallpaper pane using the triangle. (Granite is suitable since it has a rust-like structure.)
- Still in the Wallpaper pane, set the **Strength** to 100% and the **Blending Mode** to **Multiply**. This blends the granite pattern into the reddish-brown color.



- Now for a rusty bump channel: check for a small pencil in the B (bump) channel icon. If you cannot see the pencil, click in the top right quarter of the icon to make it appear. There are now two pencils in the Multi Channel Palette, meaning that you can use the current brush to paint to two channels simultaneously.
- Choose the granite pattern once again and set the **Strength** to 100%. This time, set the **Blending Mode** to **Normal**.



- Move into the Brush Settings and activate **Store Color**. The preview updates to incorporate the rust color and the granite pattern.
- Set **Hardness** to about 20% so that the brush is soft as planned.
- Choose any **Size** setting you like and set **Pressure** to 100%.
- The default **Spacing** value (20%) is fine.
- Choose **File > Add Preset** in the Brush Settings, enter a name for your new brush and then click on **OK**.

Congratulations! You've just created and stored your first multiple channel brush. Try painting with the new brush preset if you haven't already done so.

To use the brush at a later date, click on its icon in the Brush Presets and then paint.

Tip:

If the effect is less pronounced than in the picture above, access the Material manager and increase the material's Strength setting on the Bump page.

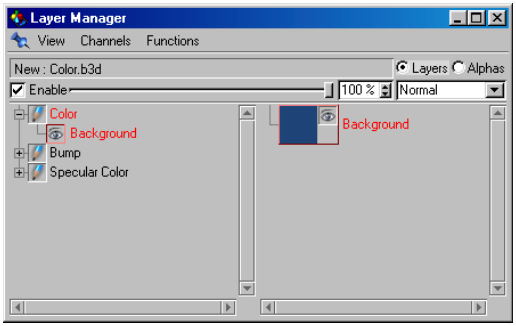
BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

8. Layer Manager

8 Layer Manager

The Layer manager is the control center for all your texture layers. Here, you can create new layers and layer masks, specify a blending mode and strength for each layer, change the layer order and control which layers are visible.



Tip:

Memory-permitting, you can create and use as many layers and layer masks as you wish.

Tip:

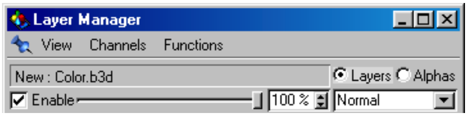
You can import Photoshop files with layers, layer masks and alpha channels preserved.

About Layers

A new material channel texture is made up of just one layer initially, which is called the Background layer. Think of the Background layer as your canvas. Just like a real canvas, you can paint onto the Background layer, and just like a real canvas, it can be difficult to remove unwanted effects that you painted some time ago. The solution to this problem is to use layers. Layers are like sheets of acetate stacked above the Background — you can paint onto each layer, and where there is no image on a layer, the layer below shows through. By painting an effect onto a layer other than the Background, the effect remains independent and can be removed at any time by deleting the layer. You can also select, transform and paint the layer independently of the Background and other layers. In addition, each layer has a Blending Mode and Strength setting, making it far easier for you to create and adjust effects than with a single layer.

Managing Layers

Top Area



Info

This box, which is on the left side of the manager, shows you the texture's name. This is the filename if you imported the file; otherwise, it is the name you gave to the texture when you created it. All the layers belonging to this texture are shown in the layers area which dominates the right half of the manager.

Enable

Select this option if you want to make the active material editable. All the textures belonging to the material will be loaded into RAM.

If you deactivate the option, a dialog will ask if you want to save the textures. Following this, the textures will be removed from RAM.

Tip:

The layers in the material channels are displayed only when Enable *is selected.*

Strength

You can adjust the active layer's opacity by using the slider or by entering the required value into the adjacent input box.

Tip:

You can create interesting blending effects by using various strength settings with multiple layers.

Layers / Alphas

These two buttons are mutually exclusive and they determine what is shown in the layers area below. Select **Layers** to show the layers and layer masks for the active material channel/ texture. If you select **Alphas**, any alpha channels in the active material channel/texture are displayed instead.

Blending Mode

This pop-up menu is located to the right of the strength setting. It determines how the pixels in the active layer are blended with the pixels in the layers below. You can set a different mode and strength for each layer, giving rise to many combinations and effects.

The modes you can choose from are:

Normal

This is the default mode. If the strength is set to 100%, the layer is opaque. The lower you set the value, the more transparent the layer becomes.

Dissolve

This creates a speckled effect by blending out small areas of the layer. These areas are chosen at random and the strength of the effect is determined by the strength setting.

Difference

With this mode, the resultant color of each pixel is the difference between the active layer and the layers below. For example, if the active layer is red and the layer below is black, the result is red. This is because black's RGB values are 0,0,0, so the difference corresponds to the active layer's color (red). You can create interesting effects by using layers with various colors.

Lighten

BodyPaint 3D compares the brightness values of the active layer and the layers below (at the pixel level). Where the active layer is brighter, there is no blending with the colors below. Where the active layer is darker, the resultant color corresponds to the layers below.

Darken

BodyPaint 3D compares the brightness values of the active layer and the layers below (at the pixel level). Where the active layer is darker, there is no blending with the colors below. Where the active layer is brighter, the resultant color corresponds to the layers below.

Multiply

The color values of the active layer and the layers below are multiplied, then divided by pure white. The effect is always a darkening one. This can be useful for increasing tonal variation.

Screen

This has the opposite effect of Multiply. Screen multiplies the inverted color values of the active layer and the layers below, then divides by pure white (to invert a value, you subtract it from pure white). Screen always results in a brighter color.

Add

The color values of the active layer and the layers below are added (at the pixel level). So, for example, if there are three layers containing red, green and blue, the resultant color is white (provided that the strength for each layer is set to 100%).

Exclusion

This blending mode is similar to Difference. However, it avoids high contrasts.

Tip:

Make a point of experimenting with the blending modes using a variety of strength settings. Many effects can be accomplished once you develop a personal feel for the modes.

Normal/Premultiplied

When you render a picture that includes an alpha channel, both the bitmap and the alpha channel are antialiased. If you load one such rendered bitmap complete with alpha channel into BodyPaint 3D, the bitmap and alpha channel will be multiplied in the normal mode. As a result, the transition from object color to background color is calculated twice, potentially leading to an unattractive discoloring at the edges. Activate the premultiplied mode to prevent this from happening. Note that this option is available only when you are working with alpha channels.

Tip:

If an asterisk is shown next to a material channel's name, changes have been made since the texture was last saved.

Textures Area (Left List)

This area shows a list of textures. There are two display modes for the list, which you can set from the Layer manager's **View** menu:

Active Material Channels

This mode lists all material channels relating to the active material. To open or close layers, click on the **+** or **-** icons respectively. If you click on a channel instead, all of its layers will appear in the layers area to the right. If you double-click on a channel name, the channel is shown in the Texture view.

All Textures

This lists all the textures stored in RAM, i.e. all the textures you have used during the current work session. Even textures belonging to closed scenes are shown. This mode is ideal for editing textures that have not yet been assigned to an object.

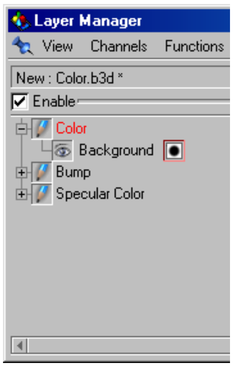
Tip:

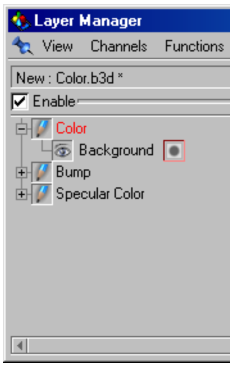
The Texture View shows the composite image of the layer stack. If you wish to see the active layer only, drag-and-drop the layer into the Texture View.

The active layer is indicated by a red frame and red text in both the textures area and the layers area. To activate a different layer, click on it. Note that you always paint to the active layer only.

There is a small eye to the left of each layer's name. Click on an eye to make its layer visible or invisible.

There is an option box to the left of each channel. If this box contains a pencil, the channel is active and can be edited. Activate the multi channel mode if you want to select more than one channel at a time. To activate or deactivate a channel, click on the box.





Any alpha channels that exist are represented by small icons to the right of the layer names. In the illustrations above, the left icon indicates an active alpha channel (black circle), the right an inactive alpha channel (gray circle).

If you activate the **Alphas** button (top right in the Layer manager), the alpha channels are shown as layers in the layers area (see below). These layers may be activated or deactivated separately by clicking on the small alpha channel icon.

Layers Area (Right List)

The layers area shows the layers of the active material channel as a list of icons. Each icon contains a preview of the layer — a checkerboard pattern represents transparent areas.

Any layer masks that exist are shown to the right of the layers. Note that layer masks use a small black circle rather than an eye to indicate their visibility status.

Drag-and-drop Functions

To change a layer's position in the stack, drag-and-drop it to the new position — a dark line appears while you drag to indicate where the layer will be placed. The following variations are possible:

- If you drag-and-drop the layer to a new position within the same channel, the layer is moved accordingly. However, if you drag-and-drop the layer to a different channel, the layer is copied to that channel.

- If you drag-and-drop the layer with Ctrl held down, the layer is always copied.

Tip:

To copy a layer quickly, hold down Ctrl, drag the layer a fraction up or down then release the mouse button. Alternatively, right-click on the layer and choose Duplicate Layer from the menu that appears.

You can drag-and-drop a layer or layer mask (see below) from the textures area to the layers area and vice versa.

The following variations are possible:

- Drag-and-drop a layer (or layer mask) from the layers area to the right of a material channel in the textures area. This defines an alpha channel for the material channel.
- Drag-and-drop a layer (or layer mask) from the layers area onto a material channel's name in the textures area. You can use this method to move layers from one material channel to another. If you want to move a copy of the layer instead, hold down Ctrl while you drag-and-drop. This is useful for creating similar channels. For example, you may wish to copy a layer from the color channel to the bump channel so that the color and bump match each other.
- When dragging from the textures area into the layers area, the variations are similar to those listed above: if you drag-and-drop to the right of a layer, a layer mask is created; if you drag-and-drop below a layer icon, the layer is inserted there; if you want to move a copy of the layer, hold down Ctrl while you drag-and-drop.

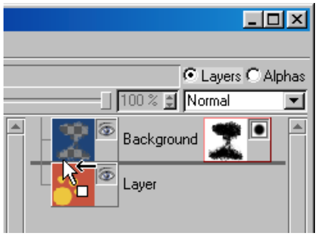
Layer Masks

A layer mask is a grayscale image that defines which areas of a layer are visible: white areas are visible, black areas are transparent and gray areas are semi-transparent.

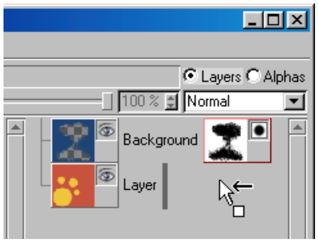
You can, if you wish, use an RGB image as a layer mask — BodyPaint 3D will convert it into a grayscale image internally.

Any layer masks that exist are shown to the right of the layer icons. You can use the mask icon on the right to activate or deactivate the layer mask.

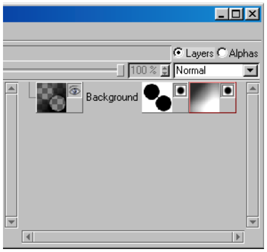
You can edit a layer mask in much the same way as you would a normal layer: click on the layer mask icon to activate it, then apply the paint tools in the Texture View or Perspective View.

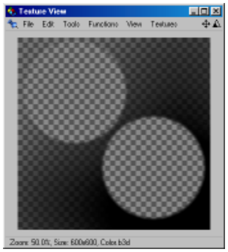


You can convert a layer mask into a layer. To do this, drag-and-drop the layer mask above or below a layer.



Likewise, you can convert a layer into a layer mask: drag-and-drop the layer to the right of another layer. Note that if you hold down Ctrl while you drag-and-drop, a copy of the layer becomes the layer mask.





You can use as many layer masks per layer as you wish — the grayscale values are added.

Alpha Channel

An alpha channel is, in principle, the same as a layer mask. However, an alpha channel affects the composite image (i.e. the channel) rather than one layer only. Black areas are transparent in the composite, white areas are completely opaque and gray areas are semi-transparent.

View Menu

Active Material Channels

This mode lists all the material channels used by the active material. To change the active material, click on the required preview in the Material manager.

All Textures

This displays all the textures stored in RAM, i.e. all textures you have used during the current work session. Even textures belonging to closed scenes are shown. This mode is suitable for editing textures that have not been assigned to an object yet.

Tip:

You can remove textures from the list by choosing File > Close Texture in the Texture View.

Left List (Textures Area)

No Icons

The list is displayed as text only. This mode produces the most compact list, hence it may be useful when you use a large number of layers.

Small Icons

The icons are displayed small.

Medium Icons

The icons are displayed medium sized.

Large Icons

The icons are displayed large.

Right List (Layers Area)

See Left List above.

Close

This function quits the Layer manager and closes its window.

Channels Menu

The Channels menu enables you to create new material channels and delete existing material channels.

If you want to create a new material channel, open the menu and choose from the list that appears. Once you have made your choice, a window opens in which you can define the channel's parameters (See New Texture on page 129). Once you have set the parameters and clicked **OK**, the window closes and a small tick appears next to the channel's name in the Channels menu.

To delete the channel, select it from the menu once more.

You can create and assign textures to the following material channels:

Color
Diffusion
Luminance
Transparency
Reflection
Environment
Bump
Alpha
Specular Color
Displacement

The RayBrush Mode supports the following material channels:

Color
Diffusion
Luminance
Transparency
Reflection
Bump
Specular Color

The remaining channels can still be edited, but you must render if you want to see their effect. For a description of each material channel, please see Chapter 12, Material Manager, on page 207.

<u>Tip:</u>

You can create new material channel textures using the Channels menu. Consider an unpainted object that you want to texture. First, create a new material in the Material manager. Next, choose the channel you want to assign the texture to from the Channels menu (Layer manager).

Functions Menu

New Layer

This inserts a transparent, visible layer above the active layer. The new layer is activated automatically. The maximum number of layers is limited only by available RAM.

Duplicate Layer

This function creates a copy of the active layer.

Delete Layer

This deletes the active layer.

Merge Layer Down

This function merges the active layer with the layer below to form a single layer. This frees RAM and simplifies the layer stack, hence you should merge layers once you have finished editing them.

<u>Tip:</u>

You can select this function only if both the layers are visible.

<u>Tip:</u>

You can also merge layer masks with this function. There are two outcomes depending on whether the layer or the layer mask is active:

1. Layer Mask Active. The layer mask is merged with its layer — the masked areas in the layer become genuinely transparent (rather than masked) and the layer mask is deleted.

2. Layer Active. The layer mask is merged with the layer as described in 1. Layer Mask Active. Next, the layer down is merged with its layer mask — again, as described in 1. Layer Mask Active. Finally, the two resultant layers are merged to form a single layer.

Flatten Visible Layers

This function merges all the visible layers to form a single layer. Invisible layers remain unchanged.

Flatten Layers

This function merges all the layers to form a single layer. Invisible layers are deleted in the process and any transparent areas in the composite are filled with white. The new single layer is identical in appearance to the preceding composite in the Layer manager (with the exception that white will have replaced any transparent areas).

Add Layer Mask

This function creates a layer mask for the active layer. If there is no selection in the Texture View when you choose this function, the layer mask is filled with white; otherwise, the layer mask is white within the selection and black outside the selection. In this way, the selection defines which areas of the layer will be visible.

You can edit a layer mask in much the same way as you would a normal layer: click on the layer mask icon to activate it, then apply the paint tools in the Texture View or Perspective View.

If you want to apply the layer mask permanently, click on the layer mask with the right mouse button, then choose **Merge Layer Down** from the menu that appears. This crops the layer.

Tip:

A layer mask masks only the layer — the layer itself is not altered.

Add Selection to Layer Mask

This function paints the selection white in the layer mask. As a result, the corresponding areas of the layer will be visible.

Subtract Selection from Layer Mask

When you choose this command, the selection is filled with black in the layer mask. The corresponding areas of the layer will be transparent.

Selection from Layer

This creates a selection from the active layer.

The example above shows how the function was used to select the text. Everything that is non-transparent is selected.

Selection from Layer (Add)

This function adds all non-transparent areas to the existing selection.

Selection from Layer (Sub)

This command removes all non-transparent areas from the existing selection.

New Alpha Channel

If you choose this function, a new alpha channel is created for the material channel or texture based on an existing selection. If there is no selection, the alpha channel is filled with white — the entire channel will be visible.

Convert to Gray

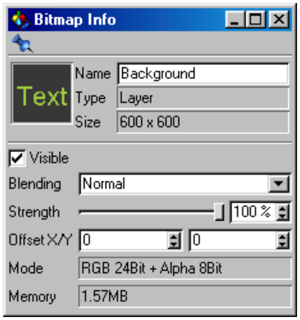
This converts the active channel or the active texture including all layers into Grayscale (8-bits).

Convert to RGB

You can use this function to convert the active channel or the active texture from Grayscale (8-bits) into RGB (24-bits). **Convert to RGB** will not restore color to a black-and-white image, but it does enable you to paint your own colors to the channel.

Bitmap Info

This dialog provides information relating to the active material channel or the active layer. In addition, it enables you to change the strength and blending mode of each layer. Furthermore, the manager provides information on the size, memory consumption and color mode employed.



To open the Bitmap Info dialog, choose **Window > Painter > Bitmap Info** (main menu). Alternatively, right-click on a material channel or layer, then choose **Bitmap Info** from the pop-up menu that appears.

If the Bitmap Info dialog is already open, you can change its contents by clicking on a different material channel or layer.

The Info Area

The small preview (top left) relates to the active layer and takes all parameters into account apart from the **Blending** mode.

Name

This displays the name of the texture or layer. If you have imported the file, this will be the filename; otherwise, it is the name you gave to the texture when you created it.

Photoshop files are an exception: BodyPaint 3D imports these files complete with layers and layer names. Any layers that are unnamed in the file are given the name 'Layer' or 'Background'.

Tip:

The Bitmap Info dialog enables you to rename layers — click on a layer, then type its new name into the Name box.

Size

This is the texture's size in pixels. If you wish to change this value, use **Painter > Functions > Texture Size** (main menu).

The Parameters Area

Visible

This option box controls the layer's visibility. Click on the box to make the layer invisible. Click once more, and the layer is visible again. This box has the same effect as clicking on the layer's eye in the Texture manager.

Blending

You can define a blending mode for each layer. This determines how the active layer influences the layers below. You can achieve a variety of effects by using different modes within the layer stack.

The modes from which you can choose:

Normal
Dissolve
Difference
Lighten
Darken
Multiply
Screen
Add
Exclusion

The blending modes themselves are described in Blending Mode on page 108.

Strength

The **Strength** setting defines the layer's opacity. You can set values from 0% to 100%. If you set the value to 0%, the layer will be completely transparent. If you set the value to 100%, the layer will be completely opaque. Intermediate values produce a semi-transparent layer. Exception: transparent areas within the layer itself do, naturally, remain transparent regardless.

Offset X/Y

These settings can be used to move the active layer. Enter offset values (in pixels) into **X** and **Y** — use negative values if you wish to reverse the direction of the offset.

Alternatively, you can move the layer using the Move Layer tool (**Painter > Tools > Move Layer**).

Tip:

One advantage of using Offset as opposed to the Move Layer tool is that you can move the layer back to its original position at any time by entering a value of zero into both boxes.

Mode

This displays the active layer's color mode. Note that you cannot change this value — it serves for information purposes only.

Tip:

The color mode is defined in the New Texture dialog when the texture is created. Exception: if you are using a file, the color mode is defined in the file itself.

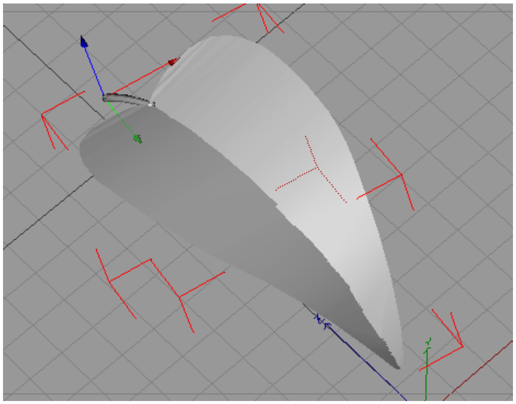
Memory

This box displays the amount of RAM used by the single layer or complete texture.

Working with Layers

The following tutorial describes how you might go about texturing the leaf of an exotic plant. Please keep in mind throughout that many alternative approaches are possible.

You will need an exotic leaf for this tutorial, so please load 'Leaf_1.c4d' from the Examples folder on the BodyPaint 3D CD-ROM.



Creating the Material

Create a material and allocate it to the leaf (if you need help, please see Chapter 5, BodyPaint 3D Basics). In the Texture dialog that opens, set **Projection** to Flat.

In the Object manager, activate the texture tag you've just created (i.e. click on it) and then choose **Texture > Fit To Object** (Object manager). This ensures that the texture covers the entire object. Since the leaf consists of two parts (the leaf itself and a stalk), a dialog opens to ask if you want sub-objects to be included — click on the **No** button.

Still in the Object manager, choose **Texture > Generate UVW Coordinates**. Again, click on **No** when the dialog asks if you want sub-objects to be included.

You have just created UV coordinates for the leaf — you will edit these coordinates later on in the tutorial.

Creating a Color Material Channel

To create the color material channel, activate the material you created, then choose **Channels > Color** in the Layer manager. The New Texture dialog opens so that you can define parameters for the new bitmap.

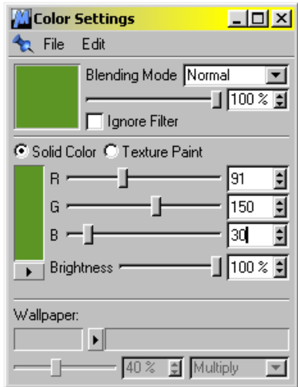
Set **Width** to 400 pixels, **Height** to 700 pixels and ensure that **New Texture** is active. Click on the **OK** button to create a 400x700 color channel bitmap with a gray background.

Filling the Layer

The next step is to turn the leaf green. First, double-click on the Background in the Layers manager. This opens the texture in the Texture View.

Now you need to define a green color.

In the multi channel palette, click on the foreground color icon (the top left rectangle) in the color (C) channel. The Color Settings dialog opens.



Ensure that the color mode is set to RGB 0..255 (to change the mode, click on the small triangle to the left of the **Brightness** slider and choose a mode from the list that appears). Set the color to RGB 91,150,30. Fill the Background layer with the green color by choosing **Edit > Fill Layer** (Texture View).

Note that the Fill Layer command fills the active layer with the color defined in the Color Settings. For example, you could have chosen the color by clicking on a preset color in the Color manager.

As you can see in the Perspective View, the leaf is now green. Green it may be, but it doesn't look particularly real. For one, real-world leaves do not have uniform color and tone. Your next task is to introduce some tonal variation.

Ensure that the Background layer is active (it should have a red frame; if not, click on it) then choose **Functions > New Layer** (Layer manager).

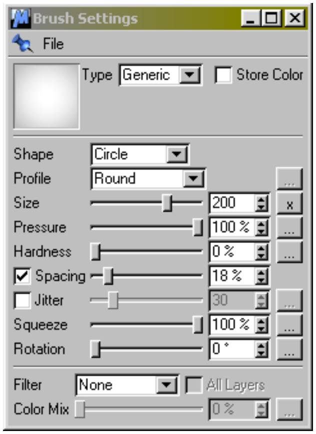
The new layer is activated automatically, as indicated by the red frame. So that you can see the texture in its entirety, choose **View > Fit To Screen** in the Texture View.

Painting the Layer

Next, you are going to paint several tones of green to the new layer using several brush sizes. First, click on the foreground color icon for the color channel once more (multi channel palette).

The Color Settings dialog opens — it should contain the green color still (RGB 91,150,30). To obtain a new tone, simply move the **Brightness** slider to about 95%.

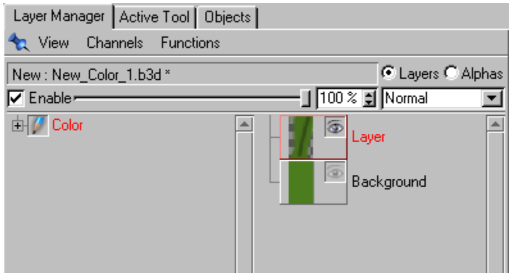
Now, in the Brushes manager, double-click on the icon named Brush.



In the Brush Settings dialog that opens, set **Size** to about 200.

Before you start to paint with your new brush, make sure that the Brush tool is active (main menu: **Painter > Tools > Brush**).

Add dabs of paint by clicking several times in the Texture View. Notice how soft the edges are. Try a few more brush sizes and green tones until your texture looks something like this:



The tones make a big difference, but the leaf is still rather bland, which is why you are going to add some yellow to it in just a moment. First, though, do some 'housekeeping' by merging the two layers:

Choose **Functions > Merge Layer Down** (Layer manager). This frees RAM and simplifies the layer stack as well.

Tip:

As it transpires, there was no need to create a second layer for the dabs of paint — you could have painted the dabs directly onto the Background layer. However, it is a good idea in general to use new layers during the creative process to keep your options open. For example, with the dabs on a separate layer, you were free to change their opacity and/or to specify a particular Blending Mode such as Darken.

Create a new layer (Layer manager: **Functions > New Layer**). Click on the foreground color icon for the color channel (multi channel palette) and set the color to RGB 204,201,115. Next, fill the new layer with the yellow color (Texture View: **Edit > Fill Layer**).

Once again, the layer is too bland because it is monotone. Introduce some tonal variation using the same procedure as before:

- Create a new layer; alter the color brightness; alter the brush size; apply several dabs; alter brightness and size several times, applying dabs each time.

Once you are satisfied with the result, merge the two yellow layers with Layer manager: **Functions > Merge Layer Down**.

Creating the Layer Mask

At this stage, there should be two layers in the Layer manager: a yellow layer above a green layer. The final leaf needs to be green but with yellow edges — this effect can be achieved with the help of a layer mask.

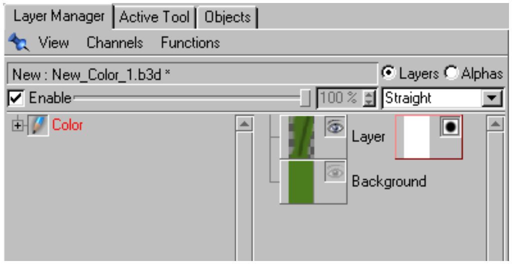
The layer mask will be applied to the green layer, which means the green layer must be the top layer:

Drag the green layer above the yellow layer in the Layer manager.

Next, you need to create a layer mask for the green layer based on a selection. Choose the Select Rectangle tool (main menu: **Painter > Bitmap Selection > Select Rectangle**). Click on the green layer if it isn't already active, then create a selection in the Texture View similar to the one depicted below:

Notice how the selection appears in the Perspective View as well. The selection is not quite in line with the leaf due to projection reasons. You will correct this discrepancy later using the UV tools.

For now, create the layer mask from the selection using **Function > Add Layer Mask** (Layer manager).



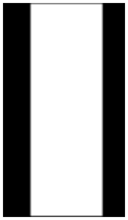
If you look to the right of the green layer in the Layer manager, you'll notice a new icon for the layer mask.

The purpose of making the selection before creating the mask was to define the visible area of the green layer. Consequently, the composite image is now a broad, green stripe on a yellow background.

Editing the Layer Mask

The transition between green and yellow looks anything but natural for a leaf. You can achieve a more realistic transition by editing the layer mask.

Drag the layer mask from the Layer manager into the Texture View so that you can edit it there. The Texture View displays the mask as an 8-bit grayscale image.

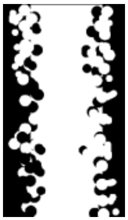


Now for the brush: double-click on the icon for Brush average in the Brushes manager. In the Brush Settings dialog that opens, set **Size** to 40 and **Hardness** to 100%.

Select a white color from the Color manager and paint several dabs in the transition area.

Now, change the brush size, pick a black color and paint several more dabs.

Continue applying black and white dabs of varying size until your layer mask looks something like this:



The transition area needs to be smoothed — a blur filter is called for. Ensure that the layer mask is active, then choose **Plugins > BitmapFilter > Gaussian Blur** from the main menu. Set both the radius values to 40 pixels, then click on **OK** to apply the blur effect. Your layer mask should look as follows:

As you can see in the Perspective View, the transition is now soft and irregular.

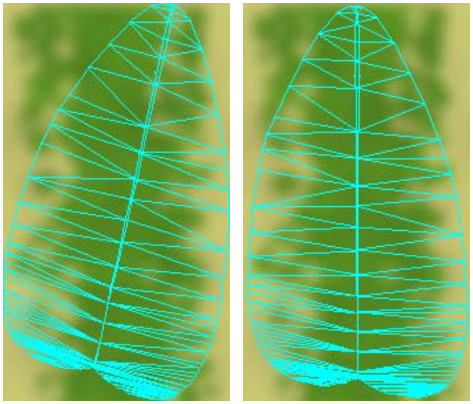
Unfortunately, the texture is slightly out of line with the leaf. You can correct this by editing the UV polygons.

Editing the UV Polygons

To make the UV mesh visible, choose **Tools > Show UV Mesh** (Texture View). The turquoise UV mesh should appear. If the mesh is white rather than turquoise, you have not created UV coordinates for the leaf.

Tip:

If your mesh is white (i.e. has no UV coordinates), click on the texture tag in the Object manager and choose Texture > Generate UV Coordinates (Object manager). The mesh will turn turquoise, indicating that it is a bona fide UV mesh ready for editing.



The UV mesh needs to be rotated in order to align the texture with the leaf. Make sure that you can see the entire texture in the Texture View (choose **View > Fit to Screen** if necessary).

Before you can rotate the UV mesh, you need to select all the UV polygons — choose **Tools > Rectangle Selection** (Texture View) then drag a rectangle over the entire texture.

Tip:

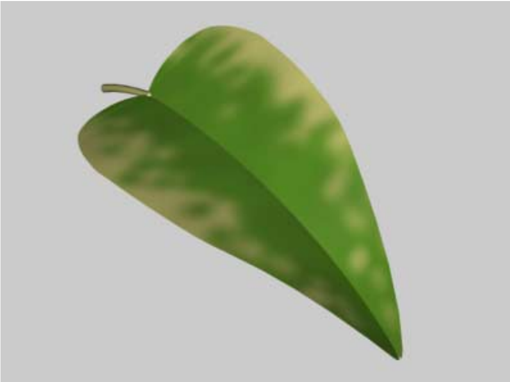
Do not confuse this selection tool with Select Rectangle (main menu: Painter > Bitmap Selection > Select Rectangle). One tool selects UV polygons, the other selects bitmap pixels.

The UV polygons are red, indicating that they are selected. Activate the Rotate tool (Texture View: **Tools > Rotate**) and drag to rotate the UV polygons until they line up with the texture. If one end of the UV mesh juts out over the texture, move the UV mesh into place with the Move tool (Texture View: **Tools > Move**).

The effect of editing the UV mesh can been seen in the Perspective View.

The leaf is looking better all the time, but it might benefit from some yellow at the tip.

Select a brush and change the **Size** to 50, **Pressure** to 40% and **Hardness** to 0%. Paint various shades of yellow directly onto the leaf in the Perspective View until it looks something like this:



Creating an Alpha Channel

The edges of the leaf are far too regular. In this section, you are going to use an alpha channel to snip at the edges.

First, you need a texture for the alpha channel, so choose **Channels > Alpha** (Layer manager). In the New Texture dialog that appears, set **Width** and **Height** to 400 and 700 respectively, then click on **OK** to create the alpha channel texture.

By default, the Background is filled with white so that the entire object is visible to begin with.

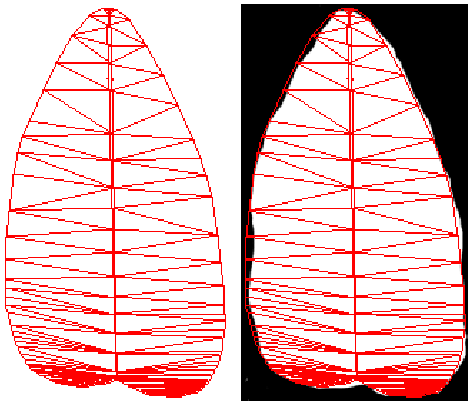
Tip:

Black areas in the alpha channel texture make the corresponding areas of the object surface transparent when rendered.

Tip:

Although you can paint to the alpha channel, the alpha channel itself is only evaluated when you render. Therefore, do not expect parts of the object to disappear when you paint the corresponding pixels black in the alpha channel — you must render to see the effect.

Double-click on the alpha channel in the Layer manager. The texture appears in the Texture View. Ensure that the UV mesh is visible (Texture View: **Tools > Show UV Mesh**).



Next, choose a black color and a brush (set **Size** to 35, **Hardness** to 70%) and paint along the outside of the UV mesh until the texture is comparable to the right-hand picture above.

Render the Perspective View (main menu: **Render > Render View**). This time, the alpha channel is evaluated and the edges of the leaf look much more natural.

To round off for now, allocate the material to the stalk. Click on **OK** as soon as the Texture dialog opens — the exact settings make little difference in this case.

You may wish to refine the leaf further. Keep in mind that several other channels can help enhance the realism. For example, a bump channel can be used to give the leaf a surface structure. After all, no leaf is completely smooth.

We would like to thank Frank Vitale for the article which inspired this tutorial.

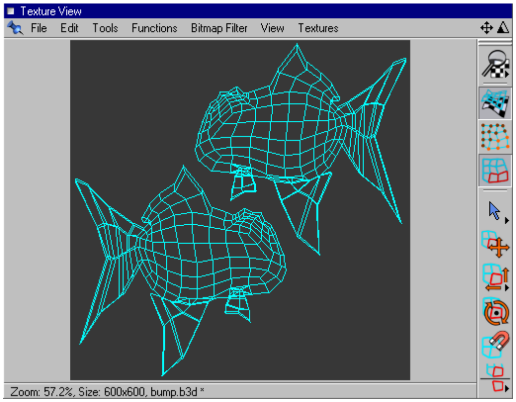
BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

9. Texture View

9 Texture View

General



In contrast to the Perspective View, the Texture View enables you to view and edit textures in two dimensions.

Painting an object in the Perspective View is not always the best option. Consider a sphere that you wish to embellish with a flower pattern around its entire equator. If you decide to paint the ring of flowers in the Perspective View, you'll need to rotate the sphere in the process, since you cannot see all of its surface from any one position. In this case, it is much easier to paint in the Texture View, where the texture can be shown in its entirety in two dimensions.

There are two ways to open a texture in the Texture View:

- You can create a new texture or load an existing texture via the Texture View's File menu.
- You can open an existing material channel by double-clicking on the channel in the Layer Manager. Alternatively, drag-and-drop the channel into the Texture View. If you wish to open a single layer instead of the entire channel, drag-and-drop the layer into the Texture View.

You can paint to the texture as soon as it appears in the window. Note that you paint exclusively to the active layers of the active channels — each active layer is indicated by a red frame in the Layer manager textures area (Left List); each active channel is indicated by a pencil icon in the Multi Channel Palette.

The Texture View can display only one channel at a time. Bear in mind when using a multi-channel brush (i.e. a brush that paints to more than one material channel) that you will be painting to channels in addition to the one shown in the Texture View.

Another reason for having a Texture View is the integrated UV Editor, which enables you to view and edit an object's UV mesh in two dimensions. See UV Editor on page 134 for details on this powerful module.

What are Textures?

The textures used by BodyPaint 3D are, without exception, bitmaps. A bitmap represents an image by means of a grid of small squares called pixels. Each pixel has its own color and its own position in the grid.

The bitmap’s picture quality and its size in bytes (i.e. how much storage space it requires) are affected by its dimensions, resolution, color depth and the data compression method employed.

The RGB color model is the most common way in which colors are defined in the computer world. The RGB color model defines colors in terms of red, green and blue brightness components. These components are combined to form a particular color.

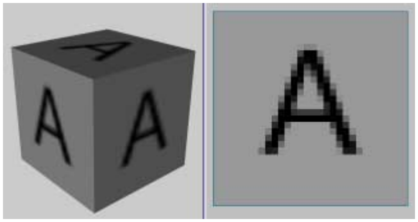
The term 'True Color' refers to 256 brightness values per color component. The value of 256 was not chosen at random. It arises because with True Color each color component is specified in a computer byte. Since a byte is composed of 8 bits, the total number of possibilities per color component is 2^8 bits = 256. Therefore, a color component may have any integer value between 0 (no brightness) and 255 (full brightness) inclusive.

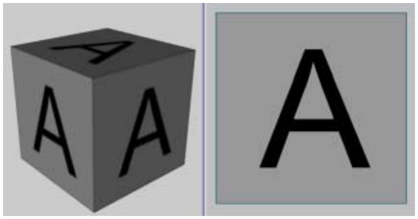
Each True Color pixel requires 24 bits of storage space (8 bits x 3 color components). It follows, then, that a True Color image of size 600 x 600 pixels requires 600 x 600 x 24 bits = 8,640,000 bits of storage space, which is about 1 MB (8640000 bits / 8 = 1080000 bytes / 1024 = 1054 KB / 1024 = 1.03 MB).

Compression formats such as JPEG enable the bitmap to be saved to a storage medium with a much-reduced file size. However, some image quality is lost in the process unless something called a 'non-lossy' compressor is used.

Compressed files may reduce the strain on your hard disk, but do not make the common mistake of thinking that a compressed file takes up less space in BodyPaint 3D than an equivalent uncompressed file. BodyPaint 3D always works with bitmaps and so a 600 x 600 JPEG takes up just as much RAM as, say, an uncompressed colour TIFF image of the same dimensions.

In addition to the three color components, bitmaps may also have an alpha channel. This is usually an integrated 8-bit grayscale image that is used for masking purposes. If you load such a bitmap into BodyPaint 3D, the alpha channel will be implemented as a layer mask.





Tip:

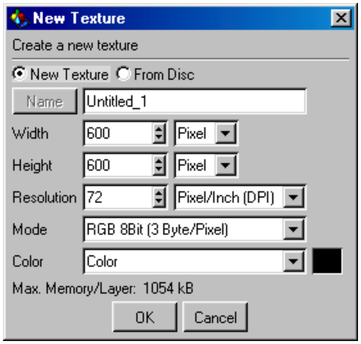
You can paint finer details to your object if you use a bigger texture (i.e. a texture with more pixels). Consider an animation which zooms in for a close-up of stubble on a chin — a relatively large texture is called for so that individual hair stubs can be shown.

The main disadvantage of larger textures is that they consume more RAM. The demand on RAM increases sharply if you use the RayBrush mode in conjunction with multiple material channels. Avoid encumbering your system — let the needs of the day dictate the size of your textures.

File Menu

New Texture

The following window opens when you choose **New Texture**:



You can now do one of two things: you can either create a new texture (specify the dimensions, color mode, etc.), or you can load an existing texture from a storage medium (e.g. hard disk).

New Texture

You can type a name for your texture into the top input box. This name will be used to refer to the texture in the Layer manager and it is also used to form the filename when you save the texture (although you may opt to specify a different filename at save time).

Width, Height

These fields define the width and height of your new texture. Select the unit of measurement using the pop-up menus to the right. You can choose between pixels (the default), inches and cm.

Resolution

In most cases, the default resolution of 72 pixels/inch (dpi) is appropriate, since this is the resolution used by most monitors.

Exception: you may need to change the default resolution if you wish to print out the texture and you have specified the dimensions (**Width** and **Height**) in inches or cm.

Mode

This is where you establish the color mode for the texture — either **RGB 24 Bit (3 Byte/Pixel)** or **Grayscale 8 Bit (1 Byte/Pixel)**.

Color

This defines the texture's background color. You can choose one of four options:

Background

The current background color is used.

Foreground

The current foreground color is applied.

Color

To choose any color you like, click on the color selector box to the right of the pop-up. The color dialog native to your operating system opens. Pick the color you wish to be used as the texture's background color. Note that the pop-up changes to **Color** automatically if it is not already selected — there is no need to set the pop-up manually.

Transparent

This allocates a transparent background to the texture.

The **Max. Memory/Layer** value, near the bottom of the window, informs you of the maximum amount of memory that will be required per layer.

Once you have set the parameters as required, click on **OK** to create the new texture. The window will close and the new texture will appear in the Texture View.

Allocating a Texture to a Material Channel

There are two ways to allocate a texture to a material channel:

- Double-click on the material in the Material manager. In the Material dialog that opens, activate the material channel you want to allocate the texture to. Next, click on the triangle to the right of the **Image** button. From the menu that opens, choose the texture from the **Bitmaps** sub-menu. Note that the bitmaps list shows all textures stored in RAM.
- When you create a new material channel in the Layer Manager, the New Texture dialog opens. Select the **From Disk** option, then enter the name of the texture into the box to the right of the **Name** button. Click on **OK**.

Open Texture

A dialog opens when you select this command. Use the dialog to select the bitmap file you wish to load. You can use the following formats as textures in BodyPaint 3D: B3D (the native BodyPaint 3D file format), PSD (Photoshop files including all layers), TIFF, PICT, BMP, JPEG, TARGA, IFF-ILBM. Please see the Appendices for further details.

Note:

Although you can open a QuickTime or AVI movie, you cannot paint it. Also, please note when editing loaded scenes: you cannot paint materials that contain animation (movies, picture sequences).

Revert to Saved

This function reverts the current texture to its last saved state. Any changes made to the texture since it was last saved will be lost, hence a dialog you ask you to confirm the action.

Close Texture

This removes the active texture from RAM. If the texture's current state has not been saved, a dialog will appear to offer you the chance to save the texture. This safety measure should ensure that you do not delete textures by accident.

Close All Textures

This command closes all textures and removes them from RAM. A dialog will request confirmation.

Tip:

As a precaution, you should use this command before you render to the Picture Viewer. This is because BodyPaint 3D can render to the Picture

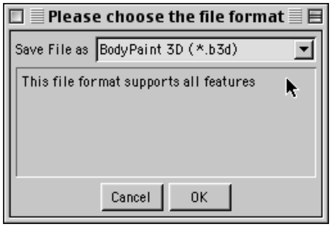
Viewer only if all of the scene's textures have been removed from RAM. For example, you cannot leave a texture open in the Texture View and have it rendered to the Picture manager as well.

Save Texture

This command will save your texture without a dialog appearing. That is, unless you are saving the texture for the first time, in which case a dialog opens so that you can specify the filename and the folder you wish to write the file to.

Save Texture as

A small window will open when you select this command.



Use the drop-down menu to specify the texture's file format. Your choice is:

B3D (BodyPaint 3D's native format)

PSD (Photoshop files complete with layers), TIFF, PICT, BMP, JPEG, TARGA, IFF as well as any formats installed on your system under QuickTime.

Once you have chosen the file format and clicked OK, a dialog will open so that you can specify the filename and the folder you wish to write the file to.

Tip:

Note that textures are saved separately from scenes in BodyPaint 3D. Ensure that you save the textures to the same folder as the scene they belong to, otherwise BodyPaint 3D will be unable to access the textures the next time you load the scene. The scene itself can be saved using File > Save as from the main menu.

For further details, see BodyPaint 3D Basics on page 69.

Save Texture as Copy

You can use this function to save a copy of the current texture. Note that the current texture's name in RAM and in the material channel is not changed in the process. This is in contrast to **Save Texture as**.

Save All Textures

Use this command to save all the textures in one go. However, if any of the textures are being saved for the first time, the following process is repeated for each *new* texture:

1. A small dialog opens. Use the dialog's pop-up menu to specify the file format for the texture and then click on OK.
2. A dialog will open so that you can specify the filename and the folder you wish to write the file to.

Close

This closes the Texture View window. The textures themselves remain in RAM and may still be accessed via the Layer manager. For example, if you double-click on a texture in the Layer manager, the Texture View will open again to display the texture.

Edit Menu

Undo

This command reverses the last change you made. You can select **Undo** repeatedly to reverse the changes one by one. By default, you can undo a maximum of 10 changes. You can, however, set your own **Undo Depth** value in the General Settings (choose **Edit > General Settings** from the main menu).

Tip:

The Edit > Undo (Texture) function on the main menu relates to texture changes, such as paint strokes and filter effects, only. Note that this command will not undo UV polygon movements.

Redo

Redo undoes an undo, i.e. it restores the last change that was undone (see Undo above). You can select Redo repeatedly to continue restoring the changes. You can redo up to 10 changes by default. Since you cannot redo more than you have undone, there is no separate setting for the redo depth in the General Settings.

Cut

If there is no selection in the Texture View, this function is ghosted and cannot be selected. Otherwise, it cuts the selected pixels from the active layer and copies them to the clipboard.

Copy

If you have made a selection in the Texture View, this function copies the selected pixels in the active layer to the clipboard.

Copy Merged

In contrast to Copy, this function merges all visible layers into a single layer internally. The selection is then applied to the merged layer and the resultant pixel selection is copied to the clipboard. Invisible layers are ignored in the process.

Paste

This command creates a new layer in the active material channel/texture. Next, the clipboard's contents are copied to the new layer in their original position when cut or copied to the clipboard (see Cut and Copy above).

Paste into Selection

When you choose this command, a new layer and layer mask is created. The clipboard's contents are pasted into the new layer and the selection is used to define the layer mask. The layer mask hides areas outside the selection so, in effect, you have pasted into the selection but you have the added benefit of an editable mask.

Delete

This deletes the selected contents of the current layer. In contrast to the similar Cut command, the contents are not copied to the clipboard in the process.

Fill Layer

If you choose **Fill Layer** the selection is filled with the active color in the Color Chooser. If, on the other hand, no pixels are selected at the time of the function call, the entire layer will be filled — again with the active color in the Color Chooser.

Select All

All the pixels in the current layer are selected when you choose this command.

Deselect All

This command ensures that all pixels are deselected.

Tip:

If, at any time, you are unable to paint to a layer for no apparent reason, try the Deselect All command. This may resolve the problem, since a selection may have escaped your attention; pixels outside a selection are masked automatically and hence cannot be painted to.

Invert Selection

When you choose Invert Selection, the selected pixels become deselected and, at the same time, deselected pixels become selected. In other words, the selection is inverted.

This can help to simplify the selection process at times, offering an indirect approach. For example, imagine that you wish to select a parachutist and, conveniently, the parachutist is surrounded by clear, blue sky. Simply select the sky with the Magic Wand and then invert the selection.

Tools Menu

The UV Editor - Introduction

The UV Editor enables you to adjust the way in which a texture is mapped to an object. For this to be possible, the object must have UV coordinates (BodyPaint 3D can generate them if required) and the texture must use UVW Mapping.

Two important advantages of UVW Mapping are:

1. UVW Mapping prevents *texture slippage* so that whenever you deform an object (e.g. a flag in the wind), the texture follows suit.
2. UVW Mapping, in conjunction with the UV Editor, offers the most advanced way to paint your textures. You can see and edit the UV mesh in two dimensions. You can select the UV polygons that constitute the UV mesh and move, scale and rotate them as required.

For example, imagine that you are using a relatively small texture for a male face. After deliberation, you decide to add a moustache.

However, the UV polygons are too small (i.e. cover too few texture pixels) to obtain the detail required for hair. One solution is to select the UV polygons in question, move them to an unused part of the texture and scale them up. The UV polygons will then cover more texture pixels, enabling you to paint more detail than you could in their previous position.

What is a UV Mesh?

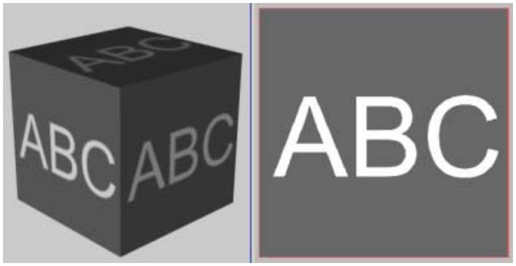
If your object has UV coordinates, a UV polygon is assigned to each object polygon. The UV polygons have their own independent coordinates and together they form a UV mesh.

What shall I do if the object has no UV coordinates?

1. First of all, ensure that your object is editable i.e. made of polygons (as opposed to parametric). If you have imported your object, this will always be the case but if you are using BodyPaint 3D with CINEMA 4D and have started, say, with a simple, parametric cube you will need to apply **Structure > Make Editable**.
2. Create a new material in the Material manager with a suitable texture.
3. Drag-and-drop the new material onto your object. The Texture dialog will open. Choose the most relevant **Projection** setting (see the Material manager chapter if you need help — if you're still not sure which type to use, opt for Spherical Mapping, which wraps the texture around the entire object in the shape of a sphere).
4. In the Object manager, click on the object's texture tag to activate the texture. Next, allocate UV coordinates to the object by selecting **Texture > Generate UVW Coordinates** from the Object manager menu.
5. Now that your object has UV coordinates, go to the Layer manager, with your material selected, and check Enabled. Move into the Texture View, choose your texture from the Textures menu and activate **Tools > Show UV Mesh**. The two-dimensional, turquoise UV mesh should appear.

When setting up a texture on an object, consider the projection mode quite carefully. The example pictures below show two cubes with UV coordinates. One UV mesh was derived from Spherical Mapping, the other from Cubic Mapping.

The Perspective View and the Texture View for a cube with spherical mapping and some selected object polygons



The Perspective View and the Texture View for a cube with cubic mapping and some selected object polygons

Note how each polygon is allocated its own UV polygon in the Spherical Mapping example. As a result, you can paint each side of the cube separately. In this respect, Spherical Mapping is the next best projection setting after **UVW Mapping**.

In the second picture (**Cubic Mapping**), you can see that there are no separate UV polygons; the sides cannot be painted separately, because the texture has been applied six times — once to each side. Any stroke that is applied to one side is applied to the other sides automatically.

However, one of the disadvantages of Spherical Mapping is all too apparent in the example: the UV mesh is particularly distorted near the top and bottom. These areas are at the *poles* of the spherical projection.

This distortion is caused by the fundamental principle of projection: a two-dimensional surface (texture) must be placed onto a 3D spatial object. Distortion is inevitable. Think of trying to wrap your child's favorite Pokemon™ sticker around a baseball!

Tip:

Maps of the world face the same problem. For example, Greenland appears to be larger than the United States on a map. In reality, the United States is more than three times larger than Greenland.

Distortion arises automatically when a sphere's surface (such as that of the Earth) is represented in two dimensions.

Nonetheless, you can paint your object free of distortion using **Functions > Optimal Mapping** (see page 147). This attempts an optimal fitting of the UV mesh.

Show UV Mesh

You can use this option to turn on or turn off the display of UV mesh in the Texture View. The UV mesh is usually turquoise in color, indicating that it can be edited.

If the UV mesh is white instead, it cannot be edited because the object lacks UV coordinates. In this case the UV mesh is merely a preview and, although you can select polygons, you will be unable to edit them. To obtain an editable UV mesh, select the texture's tag in the Object manager and choose **Texture > Generate UVW Coordinates** from the Object manager. The UV mesh should change color to turquoise.

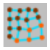
Tip:

The following rules apply when Show UV Mesh is active:

1. *If you select a UVW Coordinates tag in the Object manager, the UV mesh is shown and can be edited.*
2. *If you choose a Texture tag in the Object manager which uses a projection setting other than UVW Mapping, the corresponding UV mesh is shown in white and cannot be edited.*
3. *If you click on a Texture tag which uses UVW Mapping but for which there is no UVW Coordinates tag, no UV mesh is shown.*

There are two modes for editing a UV mesh: **Edit Points** and **Edit Polygons**.

Edit Points



With **Edit Points**, the UV coordinates are displayed as points which you can select and modify using the tools described in the following pages.

If you select points in the Perspective View, the corresponding points in the Texture View become selected as well. However, the converse does not apply; selecting points in the Texture View does *not* affect point selection in the Perspective View.

The reason why *points* are not linked is that UV polygons do not share points, whereas the object's polygons do. Each UV polygon has four independent points. As a result, UV polygons can be moved, scaled and rotated without affecting neighbouring UV polygons.

Edit Polygons

This is one of two modes for editing the UV mesh. The other mode, **Edit Points**, is described above.

Edit Polygons is the default mode and it enables you to select and modify UV polygons using the tools described in the following sections.

Selecting UV Points or UV Polygons

You must activate **Show UV Mesh** before you can make a selection.

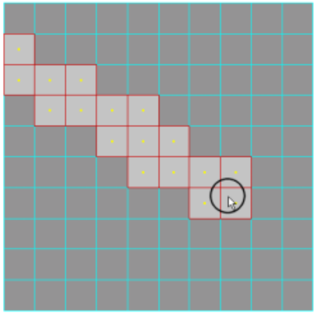
UV polygon selection is linked to polygon selection. In other words, if you select UV polygons in the Texture View, the object's associated polygons will be selected in the Perspective View (provided that the Polygons Tool is active). The reverse applies also.

With regard to all the selections tools: hold down Shift to add to an existing selection; hold down Ctrl to subtract from an existing selection.

Selected points or polygons are colored red.

The selection tools you can choose from are now discussed. Note that the icons for these are found to the right of the Texture View.

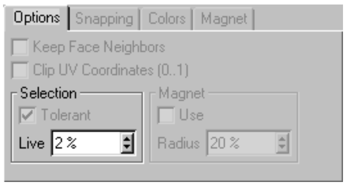
Live Selection



The Live Selection tool in action, with a large brush

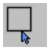
To use this selection tool, hold down the mouse button and drag over the UV points/polygons you wish to select. You may prefer to think of this tool as a brush which selects UV points/polygons by painting over them.

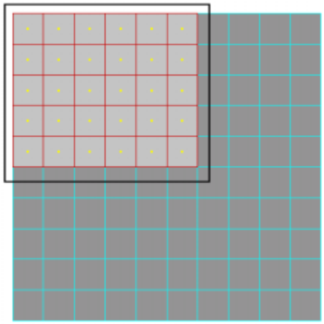
Options in the Active Tool manager



The **Live** setting determines the diameter of the Live Selection. Returning to the brush analogy above, it may help you to think of the Live setting as the brush diameter. You can set values between 0% and 10%.

Rectangle Selection

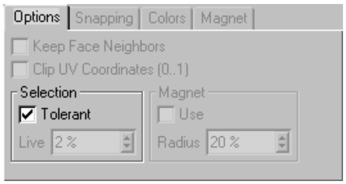




Rectangle Selection in action

To make a selection using this tool, hold down the mouse button and drag a rectangle over the UV points/polygons you wish to select.

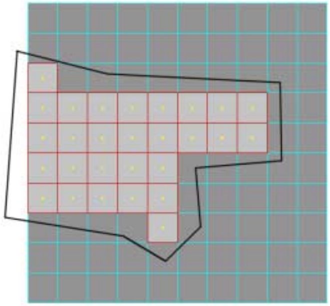
Options in the Active Tool manager



If **Tolerant** is active, all UV points/polygons that are inside the marquee or intersected by the marquee are selected.

If **Tolerant** is inactive, only the UV points/polygons that are fully enclosed by the marquee are selected.

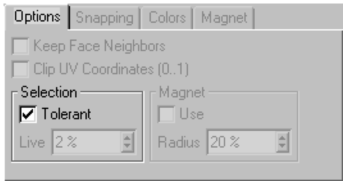
Polygon Selection



Polygon Selection in action

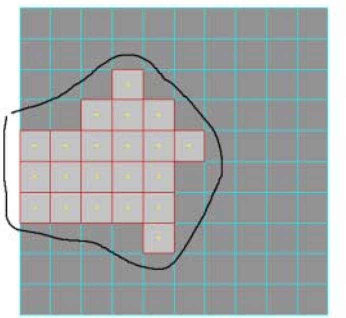
The Polygon Selection tool enables you to draw a polygon around UV points/polygons in order to select them. Your first mouse click creates the starting point and subsequent clicks create new corner points. To complete the selection, either click on the starting point or click the right mouse button (Macintosh: hold down the Command key while clicking).

Options in the Active Tool manager



The **Tolerant** option has the same effect as described for the Rectangle Selection tool, above.

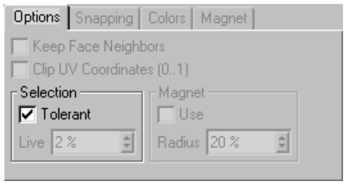
Free Selection



Free Selection in action

With this tool, you select UV points/polygons by holding down the mouse button while you draw a loop (a *lasso*) around the polygons. To complete the selection, release the mouse button. The two ends of the loop are joined automatically.

Options in the Active Tool manager



The **Tolerant** option has the same effect as described for the Rectangle Selection tool, above.

Editing UV Polygons

The key to editing UV polygons effectively is to understand how they relate to polygons of the object to which the texture is applied (termed *object polygons* below for reasons of clarity).

Each object polygon is represented by a UV polygon, so the number of UV polygons equals the number of object polygons. If you delete an object polygon, its UV polygon is also deleted.

A UV polygon determines which part of a texture is mapped to the object polygon it represents. The UV polygon is otherwise independent and can be moved, scaled and rotated.

In other words, no matter how you move, scale and rotate the UV polygon, the position, size and direction of the object polygon remains unchanged. All that changes is the part of the texture that is mapped to the object polygon.

For example, imagine that a UV polygon is currently over a black area of the texture. As a result, the object polygon it represents is black. Next you move the UV polygon to a red area of the texture. The object polygon itself is not moved, but it now receives the red part of the texture, and changes color.

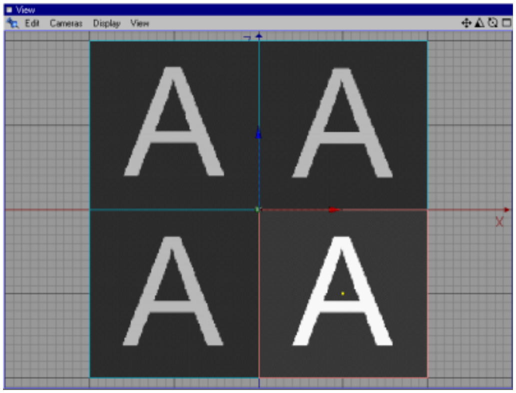
Tip:

To see textures directly in the Perspective View, activate the Textures option from the Display menu and choose a suitable shading mode (i.e. Gouraud Shading or Quick Shading).

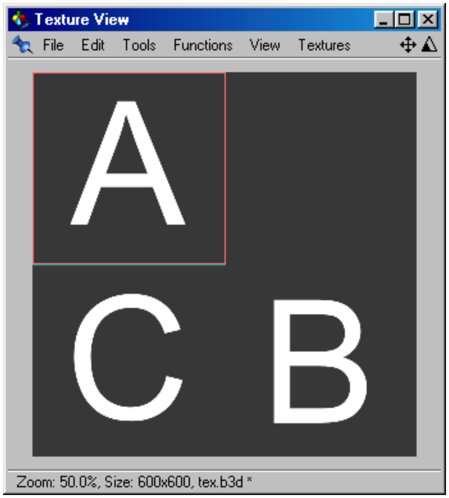
You can, if you wish, place UV polygons on top of one another. In theory, all UV polygons can occupy the same part of a texture. In this case, every object polygon would receive the same part of the texture.

This concept is explored in the following examples.

First consider a 2x2 plane which has a texture consisting of the letters A, B and C but with its UV polys edited so that they are all over the A.

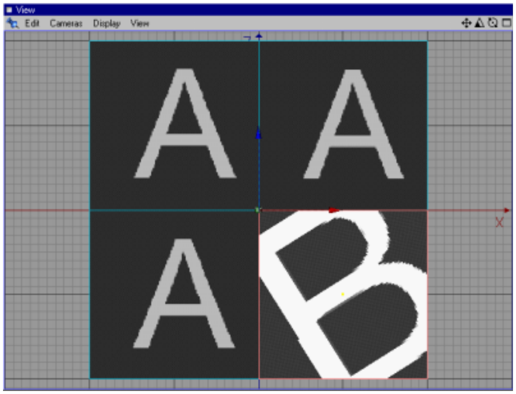


Perspective View: plane (2x2) with 4 polygons. Its texture contains letters A, B and C, but all the UV polys for the texture are over the A, as shown below. So the plane shows just As.

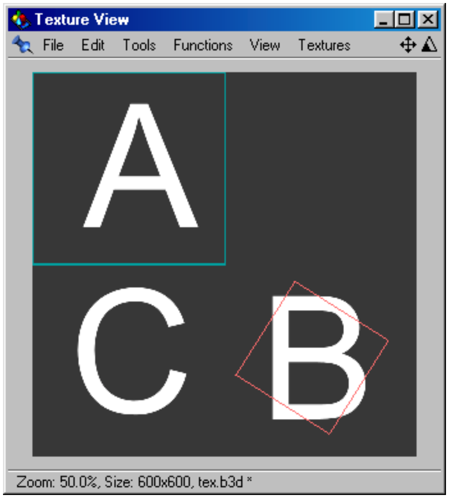


Texture View: The texture that is applied to the plane, above. A top left, B bottom right, C bottom left. All four UV polys are over the A.

To obtain the next example, all four UV polygons were placed over the A, then one of the UV polygons was scaled, rotated and moved over the B.

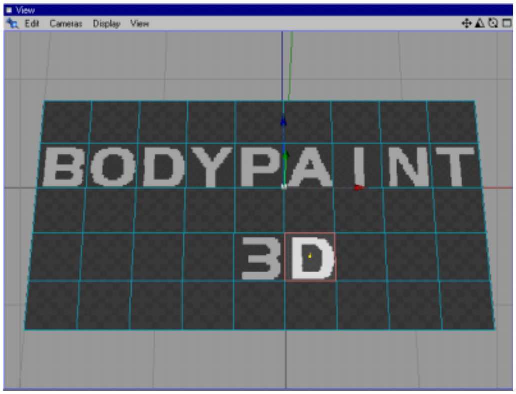


Perspective View: plane (2x2) with 4 polygons. Its texture contains the letters A, B and C. 3 UV polys are over the A. The fourth UV poly has been scaled, rotated and placed over the letter B.



Texture View: The texture that is applied to the plane, above. 3 UV polys over the A. The fourth UV poly has been rotated, scaled and placed over the B.

The next two pictures highlight the flexibility offered by UV editing.



Perspective View: a plane (9x5) showing "BODYPAINT 3D".

Texture View: the texture is the alphabet with its UV mesh edited so that 'BODYPAINT 3D' appears in the Perspective View. At the top right you can see the 'unused' UV polys.

The bottom picture shows how the UV mesh has been edited to arrive at the required result. First, the UV mesh, which originally covered the entire texture, has been scaled down and moved to an empty, black, area of the texture.

The UV polygons of the second row have each been scaled back up and placed over the required letter to spell out 'BODYPAINT' while two polys from the fourth row have been scaled up and placed over the '3' and the 'D'.

Other UV Tools

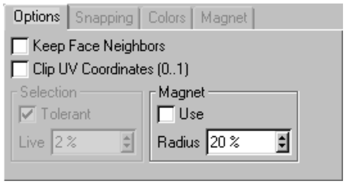
You can use the following UV tools to edit UV points *or* UV polygons. In the description of each tool, only the effect on UV polygons is described, for clarity. The effect on UV points is exactly the same unless otherwise stated.

Move

You can use this tool to move the selected UV polygons: click anywhere in the Texture View and hold down the mouse button while you move the mouse.

Options in the Active Tool manager

Options Tab



Keep Face Neighbors

If **Keep Face Neighbors** is active, the selected UV polygons remain attached to adjacent UV polygons (neighbors). You can still move the selection freely, but the adjacent UV polygons will distort to accommodate the move. This is, in principle, similar to moving object polygons in the Perspective View.

Clip UV Coordinates (0..1)

When active, this option prevents you from placing UV polygons outside the texture. This is achieved internally by restricting the UV coordinates to values between 0 and 1. If you try to move the UV polygons outside the texture, they will *squash* against the edge.

Magnet

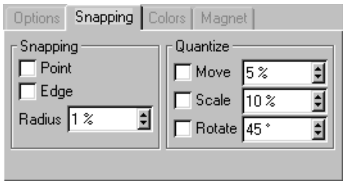
If the **Magnet** option is enabled, UV polygons outside the selection (but within the **Distance** value of the selection) are *pulled along* when the selection is moved. The further away a UV polygon is from the selection, the weaker the *pull*.

There is a **Magnet** tab to control this option.

Tip:

Do not confuse the Magnet option with the Magnet tool. The Magnet option relates to the Move tool, whereas the Magnet tool is a tool in its own right.

Snapping Tab



The Snapping options determine whether the UV polygons you move snap to other UV polygons. A cross will appear in a corner of one of the selected UV polygons according to where you click with the mouse. Keep the mouse button held down and move the cross to move the selection. If the **Point** option is active, the cross will snap to UV points. If **Edge** is enabled, the cross snaps to UV edges.

Tip:

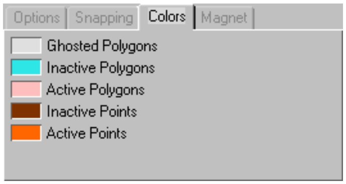
Point and Edge can be activated at the same time. Point snapping takes priority.

Radius determines how close the cross must be to a point or edge before it snaps to it. You can set **Radius** to a value between 0% and 10%. If you set it to the maximum value of 10%, free movement will be limited severely as the cross snaps from one point or edge to the next.

The **Quantize** options offer further ways to restrict movement. If you activate the **Move** option (or **Scale** or **Rotate** for the other tools), you will only be able to move the selected UV polygons in steps of the value entered. For example, if the value is set to 10%, the distance between each step corresponds to 10% of the texture's width or height.

Taking this example further, if the texture is 300 pixels wide and 500 pixels high, the UV polygons can be moved 30 pixels horizontally and 50 pixels vertically, in this case.

Colors tab



You can use this tab to assign any color you like to each of the following mesh elements:

- Ghosted Polygons
- Inactive Polygons
- Active Polygons
- Inactive Points
- Active Points

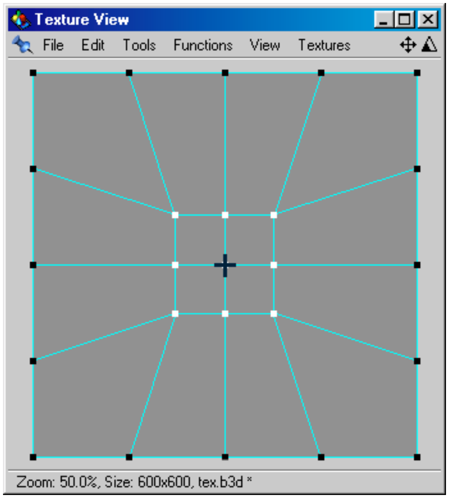
To change the color for an element, click on its color field and pick the color using the dialog that appears.

Uniform Scale

This function scales the selected UV polygons uniformly about their common centre, which is represented by a cross.

Tip:

If you have selected a single UV point instead of a UV polygon, you will be unable to scale since UV points have no spatial dimensions. You can only scale if at least two UV points are selected, in which case they will be scaled from their centre of gravity.



Scaling a grid of 5x5 points (showing the cross that represents the common centre)

Options in the Active Tool manager

The same options apply as for Move with one exception; the **Point** and **Edge** snapping options have no effect.

The **Scale** option under **Quantize** has the following advantage: you can scale a UV polygon safe in the knowledge that you can return it to its exact original size later on.

Non-Uniform Scale

Non-uniform scaling works as described above (for Uniform scaling), with the exception that scaling is not uniform and instead takes place in the direction in which you drag with the mouse button held down.

Options in the Active Tool manager

The same options apply as for Move with the exception that the **Point** and **Edge** snapping options have no effect.

Rotate

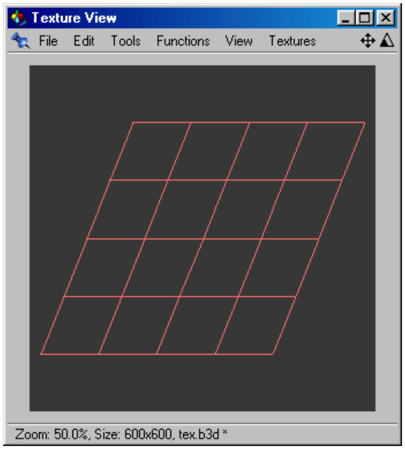
This tool rotates the selected UV polygons about their common centre: click anywhere in the Texture View and drag horizontally with the mouse button held down.

Options in the Active Tool manager

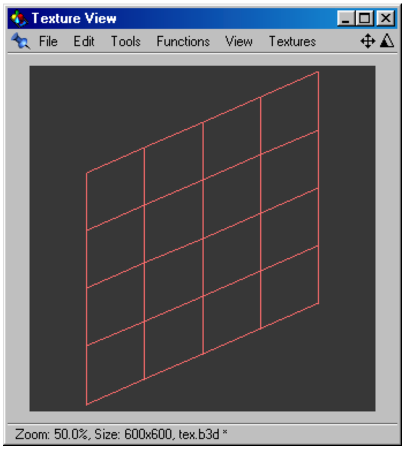
The same options apply as for Move with the exception that the **Point** and **Edge** snapping options have no effect.

Shear U, Shear V

Shear the selected UV polygons about their common centre. You can shear horizontally (Shear U) or vertically (Shear V).



An example of using Shear U.



An example of using Shear V.

Options in the Active Tool manager

The same options apply as for Move with the exception that the **Point** and **Edge** snapping options have no effect.

Magnet

This tool distorts the UV mesh. If a selection is active, only the selected UV polygons are distorted. If no UV polygons are selected, all UV polygons within the magnet's sphere of influence are distorted.

Click anywhere on the UV mesh and move the mouse with the mouse button held down. The UV coordinates follow the mouse pointer. The further away a UV coordinate is from the mouse pointer, the less the Magnet *pulls* on it.

Options in the Active Tool manager

Nearest Point Method

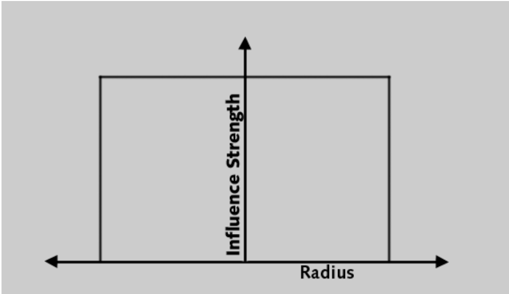
If this function is inactive (the default), the Magnet will only deform if you click directly on a UV polygon. If the option is active, the Magnet will deform no matter where you click. In this case, the nearest UV point is chosen as the centre of the deformation.

Radius

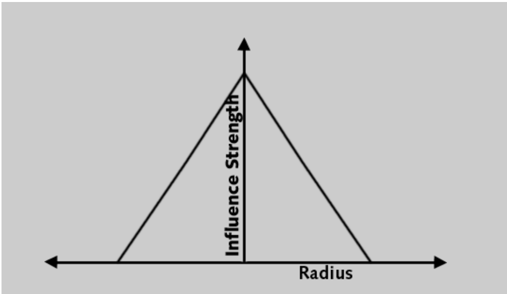
This is where you define the magnet's sphere of influence.

Type

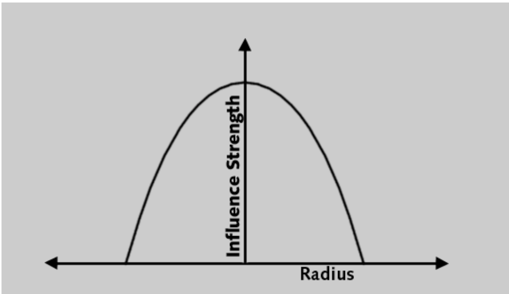
You can choose one of six fall-off functions, shown below.



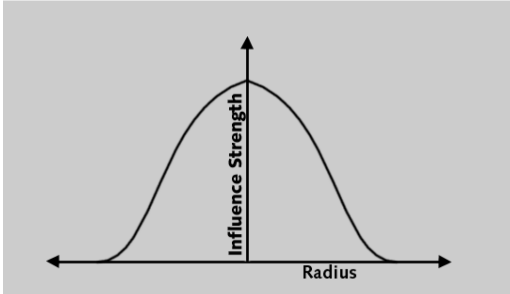
Constant



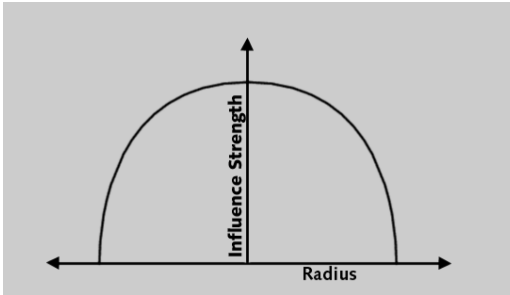
Linear



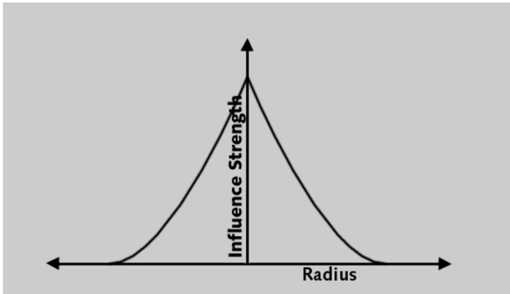
Dome



Bell



Circle



Needle

Width

This parameter determines how hard or soft the magnet's sphere of influence is.

Functions Menu

Bake UV

This function *bakes* the current UV coordinates. In other words, it saves the current positions of the UV coordinates. You can restore the baked coordinates at any time using **Restore UV** and **Remap**, which are described below.

Restore UV

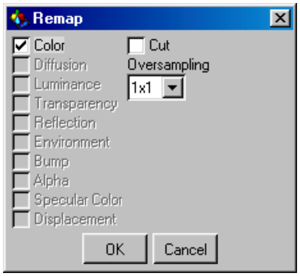
This restores the UV mesh to its last baked state, i.e. the UV coordinates are reset to their positions when **Bake UV** (see above) was last called. In this way, you can experiment with the UV mesh safe in the knowledge that you may revert to its original state at any time.

Remap

Until now, all you have edited in the UV Editor are UV polygons and UV points. This function allows you to edit the bitmap itself.

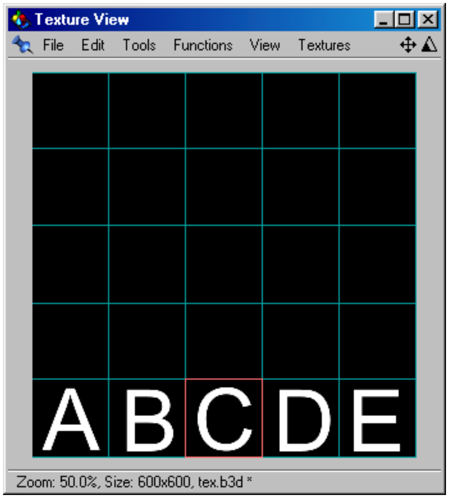
First, bake the UV coordinates (**Functions > Bake UV**). Next, select the UV polygons that are above the part of the texture you wish to move. Move the selected UV polygons to an empty part of the texture. If you call **Remap** now, the bitmap will be copied (or cut and pasted) from the original position of the UV polygons to their new position.

The following window opens when you select **Remap**:

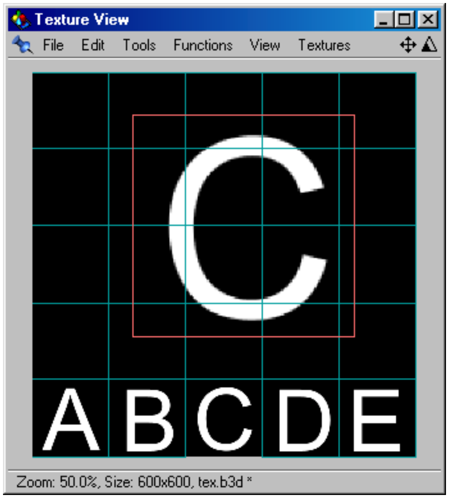


The list on the left side of the window represents all the material channels — activate the channels to which you wish the **Remap** function to be applied. If you activate the **Cut** option on the right side of the window, the bitmap will be cut rather than copied from the original position of the UV polygons.

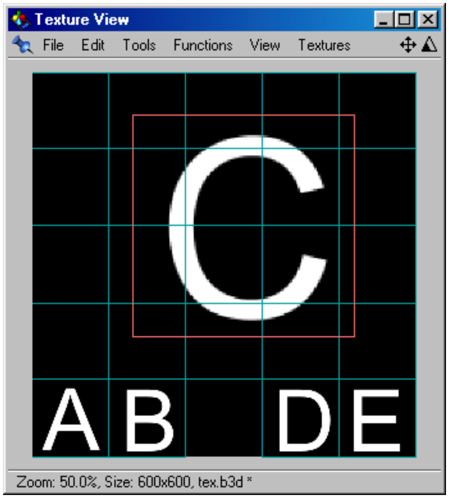
Finally, there is a pop-up menu called **Oversampling**. If you scale up a UV polygon before using **Remap**, the corresponding part of the bitmap is scaled up too and is interpolated according to the **Oversampling** value.



Perspective View with a polygon (over the ‘C’) selected.



The polygon has been moved and scaled up without the cut option.



The polygon has been moved and scaled up with the cut option active.

Tip:

Remap enables you to move and scale part of the texture so that finer details can be added.

Optimal Mapping

This is, without doubt, one of the Texture View's most advanced functions. It attempts to optimize the UV mapping with the help of the polygon object. It aims to prevent parts of the UV mesh from overlapping, which would soon be the case with complicated objects.

In addition, groups of UV polygons are placed a specified distance apart and are arranged so that they make full use of the texture surface.

In this section, polygons from a model are referred to as *object polygons* to help distinguish them clearly from UV polygons.

The function carries out the following steps on the selected UV polygons:

1. First, the algorithm attempts to sort the UV polygons into groups. This is achieved by comparing the surface normals of adjacent object polygons. Provided that the angle difference does not exceed a certain user-defined value, the associated UV polygons are defined as a group.

2. New UV coordinates are calculated for each group with the assistance of a flat projection projected from the common centre in the direction of the average surface normal.

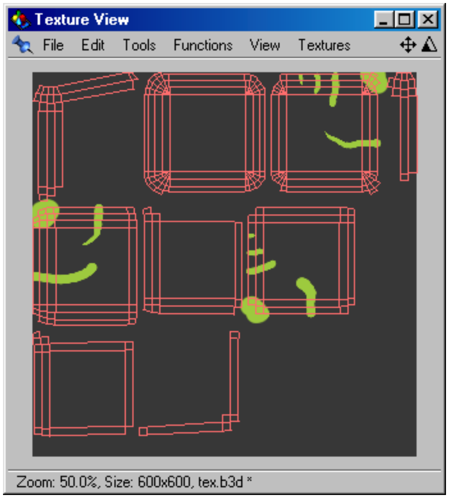
3. Each UV polygon group is rotated horizontally until it occupies the smallest amount of texture possible. This step can add noticeably to the processing time.

4. BodyPaint 3D tries to arrange the UV polygon groups by size, placing the largest groups in the top left of the texture and the smallest groups in the bottom right. In this way, as little texture space is wasted as possible.

This makes the painting process much easier, since the brush size will remain constant over all parts of the object.

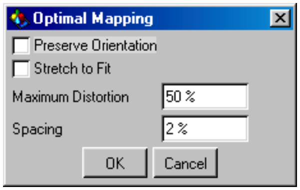
The example shows a cube with **Optimal Mapping** applied.

A cube in the Perspective View



The optimized mapping for the cube

A dialog opens when you select the Optimal Mapping command.



Preserve Orientation

If you activate this option, the algorithm does not attempt to arrange each UV polygon group in the optimum horizontal direction. This saves processing time.

Stretch to Fit

When this option is activated, the UV polygon groups are stretched in the U and V directions so that they cover the entire bitmap while taking the **Spacing** value into account.

Maximum Distortion

Remember that **Optimal Mapping** arranges the UV mesh into UV polygon groups based on the object polygons. If the difference in angle between the surface normals of two connected object polygons is less than or equal to the **Maximum Distortion** value, the associated UV polygons are placed into the same UV polygon group; otherwise, they are placed into different groups.

In general, enter a relatively small value in the field, otherwise the changes to the UV mapping will be minor. Lower values produce more UV polygon groups. The lowest value (0%) separates each UV polygon from its neighbors. A value of 100% corresponds to 90˚ difference in angle, 50% corresponds to 45˚ and so on.

Spacing

Spacing determines how far apart the UV polygon groups are placed from one another. In general, enter a relatively small value, otherwise the UV polygons will be scaled down to make space for the gaps.

Note:

Naturally optimal mapping can never be perfect, only an approximation. Do not lose heart if the first call to the function does not bring about the result you had in mind. Try different settings — even a small change to the Maximum Distortion value can have a dramatic effect on the UV mesh.

Fit Canvas To UV

When you move UV polygons in the Texture View, you are free to place them outside the texture. Exactly what is mapped to the associated polygons depends on the object's Texture tag: if **Tile** is active, the texture is tiled; otherwise, nothing (neutral gray) is mapped to the polygons.

More often than not, though, the reason you'll move UV polygons outside the texture is because you need extra texture space. In this case, choose **Functions > Fit Canvas To UV** — the texture's size will change accordingly. The new texture pixels will be filled with the background color.

Clear UV

This deletes the selected UV polygons. The associated object polygons will adopt the material's background color.

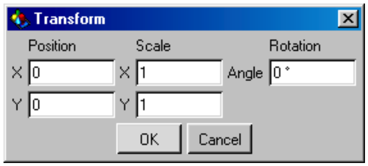
Mirror U

You can use this function to mirror the selected UV polygons horizontally. The mirror axis runs through the common centre of the UV polygons.

Mirror V

This function mirrors the selected UV polygons vertically. The mirror axis runs through the common centre of the UV polygons.

Transform



Transform enables you to move, scale and rotate the selected UV polygons with precision. When you select the function, the Transform dialog opens. Enter numerical values under **Position**, **Scale** and **Rotate** and the UV polygons will be adjusted accordingly.

The **X** and **Y** fields under **Position** specify the distance the UV polygons are to be moved in pixels. Enter negative values if you wish to move the selection in the negative U or V direction. **X** represents the horizontal movement (U), **Y** the vertical movement (-V!).

To scale the selection, set the required values in the **Scale** column. **X** scales in the horizontal direction, **Y** in the vertical direction. Set **X** and **Y** to the same value for uniform scaling. Values below 1 shrink the selected UV polygons, values above 1 enlarge them.

Finally, enter a value in the **Angle** field below **Rotation** to rotate the selection.

Tip:

Enter values under all three columns to move, scale and rotate the selected UV polygons in one function call.

Start Interactive Mapping

This function offers a simple way to alter the mapping for the selected UV polygons. For example, imagine that you wish to change the mapping for the left ear of a head mesh. First, select the UV polygons for the left ear. Next, select the **Start Interactive Mapping** function. The following happens:

- A Texture dialog opens which relates to either the active Texture tag or the Texture tag belonging to the active UVW tag. You can change any of the mapping parameters. By default, the projection changes from **UVW Mapping** to **Flat**. In most cases, this is the best setting. However, you can choose your own projection setting if you wish.
- Click on **OK** in the Texture dialog. The dialog closes and the chosen mapping method is applied. At the same time, the Texture Axis tool is activated. To move the texture axis, click in the Perspective View and drag with the mouse button held down. The texture is shown in real-time throughout, provided that your processor is fast enough; otherwise, only the texture envelope is displayed.

Move the texture axis until the texture is in a suitable position over the selected polygons. Now, finish the function by choosing **Functions > Stop Interactive Mapping**.

Note how the texture moves over the entire object in the Perspective View. Ignore this temporary effect — the new mapping affects the selected polygons only.

Tip:

This function offers nothing new, as such. You could carry out exactly the same steps using the tools individually. However, you save a few clicks and mouse movements in this way. In short, this function has been implemented to improve your workflow.

Stop Interactive Mapping

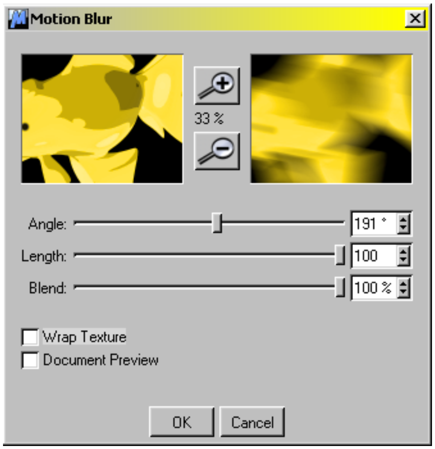
Select this function to signal the end of the interactive mapping process (see **Start Interactive Mapping** above). New UV coordinates will be assigned to the selected UV polygons and the tool that was active prior to the interactive mapping process will be activated once more.

Bitmap Filter Menu

Filters enable you to apply special effects to your textures — among other things, you can blur, emboss, sharpen and invert.

Filters affect the active layer only. If a bitmap selection exists, only the selected pixels are affected; otherwise, the filter is applied to the entire layer.

To use a filter, activate the layer to which you want to apply the effect, then choose the filter from the Texture View's **Bitmap Filter** menu. A dialog similar to the one pictured below opens. The exact contents of the dialog vary according to which filter you are using.



The left window shows an area of the original texture (the source texture). You can zoom in or out on the area by clicking on the corresponding magnify icon. To move the area, drag in the window.

The right window shows you the same area of the texture, but this time with the filter applied. This helps you to judge how the filter will affect the texture.

The sliders below the two windows enable you to adjust filter-specific parameters.

Most filter dialogs contain the following three options:

Blend

The **Blend** slider defines the intensity of the filter's effect. You can set a value between 0% and 100%.

Wrap Texture

Activate this option if you intend to tile the texture.

Imagine that you want to apply a blur filter to your texture with a blur radius of 20 pixels. What does the filter do at the edges of the texture? Usually, the edge pixel is repeated multiple times in the blur calculation to make up the numbers.

The resultant texture is likely to produce unattractive seams when tiled. However, when the **Wrap Texture** option is active, the filter uses the required pixels from the opposite side of the texture, thus helping to avoid seams.

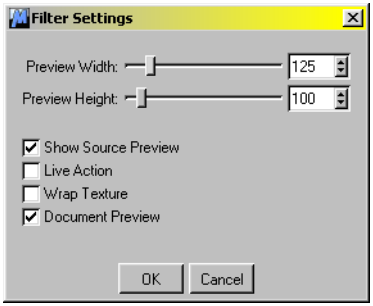
Document Preview

This option shows a preview of the filter in the Perspective View and Texture View. Note that the preview may take a few moments to appear.

Tip:

To reapply the last filter used, select Execute Last Plugin (first item in the Plugins menu).

Filter Settings



Preview Width

This defines the width of the preview in pixels.

Preview Height

This is the height of the preview in pixels.

Show Source Preview

Select this option to show a preview, as well as the original, in the filter dialogs.

Live Action

If this option is active, the filter is applied in real-time when you move the area in the preview window. Changes to the sliders are also applied in real-time. Deactivate this option if you need to speed up the preview.

Wrap Texture

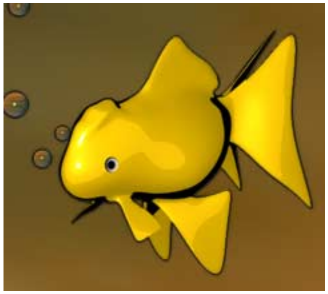
See the previous description of Wrap Texture, above.

Document Preview

See the previous description of Document Preview, above.

Filter Examples

The best way to learn about the filters is to try them. In this section, we avoid an in-depth mathematical analysis of each and every parameter. Instead, we provide example pictures to demonstrate the effects.



This is the original image. The remaining pictures in this section show you the effect of the relevant filter on the image.

Blur > Blur

This filter softens the texture by reducing the contrast between neighboring pixels.

Blur > Gaussian Blur

This blurs your textures. You can set the horizontal and vertical radii separately.

Gaussian Blur is particularly useful for removing color banding.

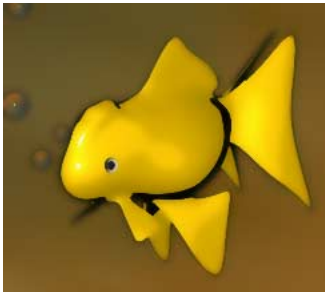
Blur > Motion Blur

This applies a motion blur effect to your image. You can set the angle and the length of the blur.

Blur > Radial Blur

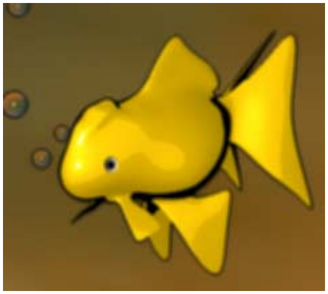
A filter which creates the impression that the texture is rotating quickly and is blurring in the process.

Blur > Selective Blur



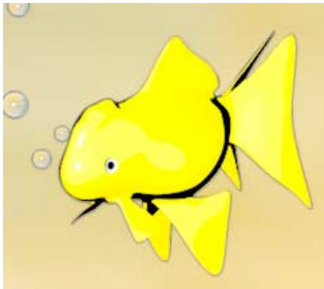
This is similar to the **Gaussian Blur** filter, except that it preserves more detail.

Blur > Smooth



A filter which smoothes your texture using various methods.

Color Correction > Gamma Correction

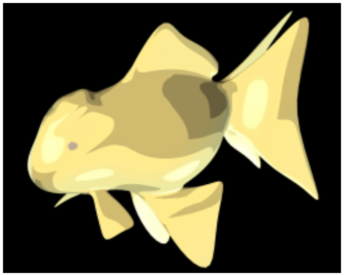


The **Gamma Correction** filter enables you to change the gamma value, contrast and brightness.

Tip:

If you change the gamma value, only the midtones are lightened or darkened. Highlights and shadows remain more or less unchanged. This means that black remains black, even after a gamma correction. White remains white.

Color Correction > Levels

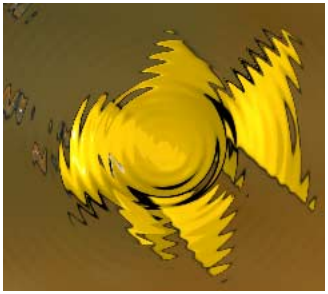


This filter enables you to correct the tone levels so that the darkest color in the layer is black and the lightest color is white. In addition, you can brighten the image, increase/reduce contrast and influence the tonal range in the image.

Distort > Magnifying Glass

This filter distorts the texture as though you were observing it through a magnifying glass. Define the effect using the **Refraction** parameter.

Distort > Waves

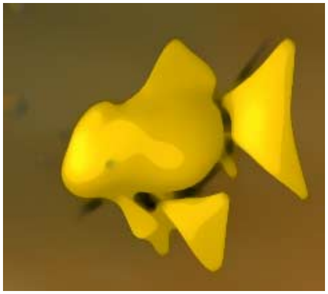


This filter simulates water waves. Think of your texture as being projected onto a water surface. You can define the waves of the surface using several parameters.

Distort > Whirl

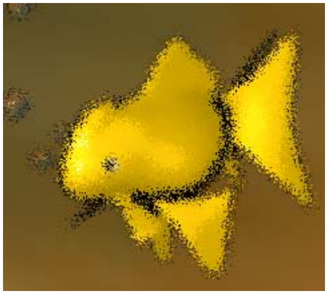
Choose this filter if you want to whirl your image. You can influence the rotation using several parameters.

Noise > Despeckle



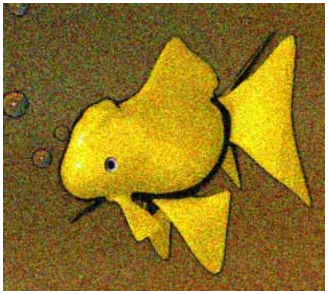
This filter levels out small irregularities in your texture. It attempts to blur noise yet preserve edges in the image in accordance with the **Radius** and **Feedback** settings.

Noise > Distribute Pixels



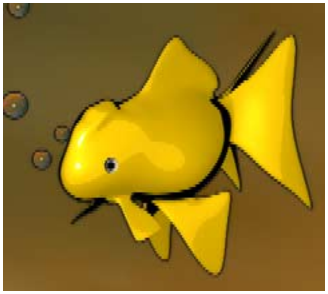
This filter jumbles pixels according to the **Radius** settings.

Noise > Noise



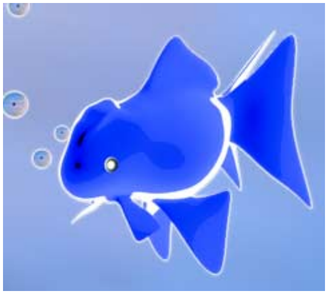
You can use this filter to add noise to your image, helping you to break up areas that are too regular.

Other > Deinterlace



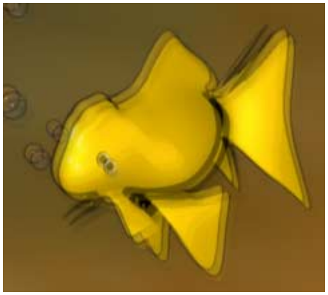
This is useful for video images — it can remove odd or even interlaced lines.

Other > Invert



This reverses the image. The result is the same as a photo negative of your texture.

Other > Matrix



A special filter that has entire books dedicated to it. The abridged version is that it enables you to define a matrix of up to 15 * 15 fields in size. You can create your own filter effects by entering values into the fields.

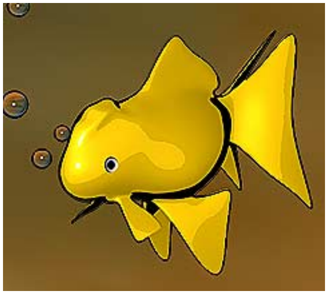
Other > Mosaic

Apply this filter to break down your image into blocks, Roman-style.

Other > Oil Painting

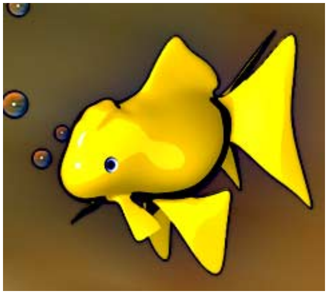
Photo textures look too real at times. This filter adds an artistic touch by giving the image an oil painting look.

Sharpen > Sharpen



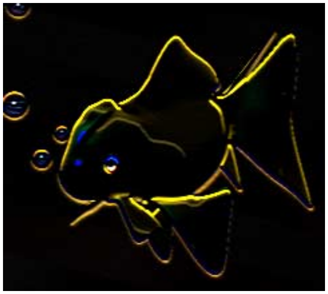
Use this filter if you want to sharpen your image. It works by increasing the contrast of neighboring pixels. You can choose from various methods using the **Filter Type** pop-up menu.

Sharpen > Unsharp mask



The **Unsharp Mask** filter uses three variables. **Radius**, **Amount** and **Threshold** influence one another, making exact modifications possible.

Stylize > Difference Operators



This filter offers a number of methods by which contrasts in the image may be increased.

Stylize > Emboss (Texture)

This creates a raised effect based on the brightness values of the texture's pixels.

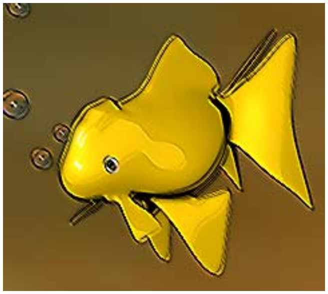
Stylize > Emboss (Matrix)

You can use this filter to raise or lower the brightness values of the pixels. Several preset matrices are available.

Stylize > Enhance Details

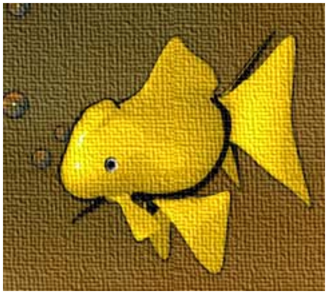
Enhance Details can enhance or reduce effects by increasing or decreasing contrasts in the texture. Choose the effect you require from the pop-up menu.

Stylize > Enhance Structures



Use this filter if you want to enhance structures. You can choose from diverse methods using the **Operator** pop-up menu.

Stylize > Texture Blend



This filter blends an image into the active layer.

Click on the **Texture Name** button and choose the image using the **Load File** dialog that appears. The image will be tiled and blended into the active layer.

Note that transparent pixels will remain transparent.

View Menu

Fit to Screen

This function zooms the texture so that it fills the Texture View window.

Zoom 100%

The texture is shown at its original size.

Zoom In

The texture is shown 25% larger.

Zoom Out

The texture is shown 25% smaller.

Set Zoom

Here you can enter the zoom factor manually or you can click on the small button to the right of the field to open a menu with the particular zoom settings.

Textures Menu

This menu shows a list of all the textures in RAM. If you choose a texture from the list, the texture will be displayed in the Texture View and the corresponding texture will be activated in the Layer manager.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

10. Painter Menu

10 Painter Menu

Bitmap Selection

The selection tools are more or less indispensable for your day-to-day work in BodyPaint 3D. They restrict the effect of tools to the selected pixels and are otherwise well suited to moving, cutting and copying areas of the bitmap.

BodyPaint 3D's selection tools are divided into three groups:

1. Polygon selection tools (Perspective View).

2. UV polygon selection tools (UV Editor).

3. Bitmap selection tools.

The bitmap selection tools, which are described in this chapter, select pixels in the bitmap. There are two types of bitmap selection tool:

1. Tools which you use to draw a shape (e.g. **Select Circle**, **Select Polylines**).

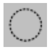
2. Tools which select according to color differences (e.g. **Magic Wand**, **Color Range**).

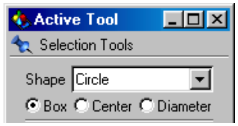
Bitmap selections appear as moving, dotted lines in both the Texture View and the Perspective View. To move a selection, move the mouse pointer inside the selection and drag it to the new position.

Tip:

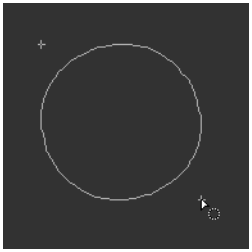
With the exception of Select Polylines *, you can use all of the bitmap selection tools in the Perspective View as well as the Texture View. Note that the selection outline may vary in appearance between the two views. For example, a single, circular selection outline in the Perspective View may correspond to several irregular outlines in the Texture View if the UV mesh is fragmented. (For details on UV mesh, please see UV Editor on page 134.)*

Select Circle



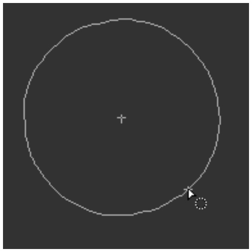


Select Circle enables you to create circular and elliptical selection outlines in one of three ways:



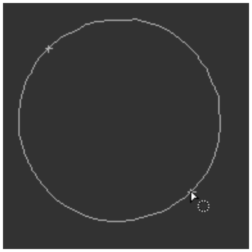
Box

Drag to define an imaginary rectangle inside which the circle or ellipse will be fitted.



Center

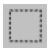
Click anywhere and drag to define the radius of the circle.

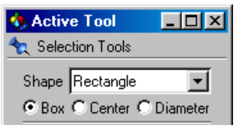


Diameter

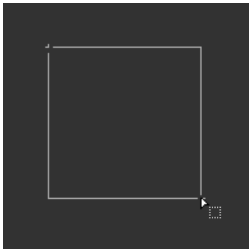
Drag to define the circle's diameter. In the process, you can rotate the circle about the point where you clicked.

Select Rectangle



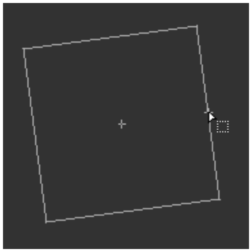


This tool creates rectangular selection outlines in one of three ways as specified in the Active Tool manager.



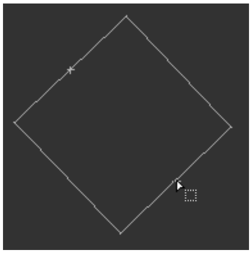
Box

Drag to create the top left corner and the bottom right corner respectively.



Center

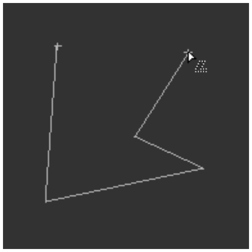
Drag to define the center and edge respectively. Note that you can rotate the rectangle in the process. The result is always a square outline.



Diameter

Drag to define the diameter of a square. You can rotate the rectangle while you drag.

Select Polylines

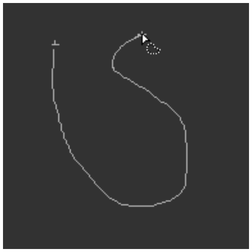


This tool draws a polygonal shape around pixels, to select them. Click to create the polygon's starting point. Continue clicking to create successive corner points. When you are ready to close the shape, double-click on the last point to connect it to the starting point.

Tip:

If you hold down Shift while you create the polygon outline, the lines will be constrained to multiples of 45˚ to each other.

Select Freehand



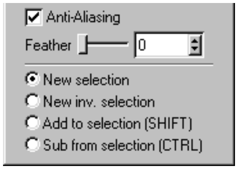
Select Freehand is the most flexible selection tool, yet potentially the least precise. This is because it relies upon a steady hand for accuracy. Drag to draw a freehand outline. The two ends of the outline will be connected by a straight line the moment you release the mouse button.

Tip:

If you hold down Shift during the freehand selection, straight lines will be drawn. These straight lines will, in addition, be constrained to multiples of 45˚ to each other.

Additional Options

The options described in this section apply to all the bitmap selection tools. The options are located in the Active Tool manager.



Anti-Aliasing

Activate the **Anti-Aliasing** option if you want to smooth the edges of the selection. The advantage of this option becomes apparent when you copy a selection to a new position on a different background color — anti-aliasing softens the color transition between the selection's edges and the background.

With anti-aliasing

Without anti-aliasing

Feather

Feather defines the size of the transition between the selection and the background.

A feather value of 20

New selection

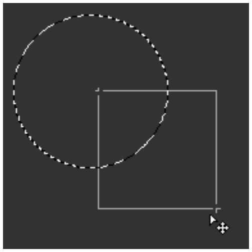
This creates a new selection. Existing selections are deleted in the process.

New inverse selection

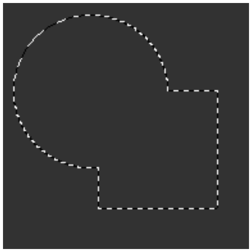
When this option is active, everything that you select is, in fact, *deselected*. This may seem paradoxical, but it can be useful. For example, imagine that you want to select a large area minus a small, unwanted region within that area. Using conventional methods, you would select the large area then remove the small region using **Subtract from selection** (see below). With **New inverse selection**, all you need do is *select* the small region.

Add to selection

This option, if enabled, will add the next selection you make to the existing selection. Alternatively, hold down Shift while you make the new selection.



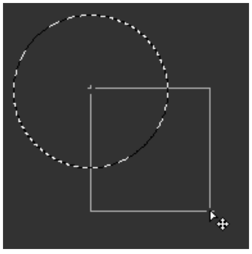
A circular selection exists and a square selection is being dragged out …



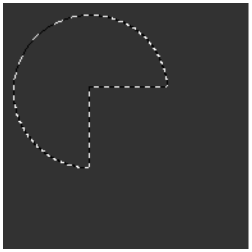
… to be added to the original selection

Subtract from selection

Activate the option if you want to subtract the next selection you make from the existing selection. Alternatively, hold down Ctrl as you make the new selection.



A circular selection exists and a square selection is being dragged out …



… to be subtracted from the original selection

Magic Wand

In contrast to the selection tools described in the previous section, the magic wand does not select pixels by drawing a shape around them. Instead, the magic wand selects pixels according to their color.

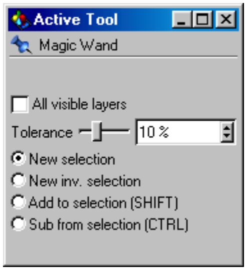
All contiguous pixels similar in color to where you click are selected. A **Tolerance** value (in the Active Tool manager) enables you to control just how similar the colors must be.

Select Color Range

This function is very similar to the magic wand with the key difference that the selected pixels do not have to be contiguous.

Click in the bitmap and all pixels of similar color to where you clicked will be selected. A **Tolerance** setting enables you to choose how similar the colors must be.

Magic Wand / Select Color Range options



All visible layers

If this option is activated, the selection will be based on the composite image of all visible layers. With the option deactivated, the selection will be based on the active layer only.

Tolerance

The **Tolerance** value defines how similar in color a pixel must be, compared to where you clicked, in order to be selected. You can set values between 0% and 100%. If you set **Tolerance** to 0%, only pixels of identical RGB color will be selected. With a **Tolerance** of 100%, all pixels will be selected.

The remaining options (**New Selection**, **New inverse selection**, **Add to selection** and **Subtract from selection**) have the same effect as described in the Additional Options section on page 166.

Select All

This command selects the entire texture area.

Deselect All

The entire texture area is deselected when you choose this command.

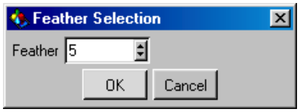
Invert All

This command inverts the existing selection — selected areas become deselected; deselected areas become selected.

Feather

Feather softens the edges of an existing selection.

A window appears when you select the function.



Enter the distance in pixels over which the selection should fade — you can enter values between 0 and 1000. Click on the **OK** button to apply the feathering.

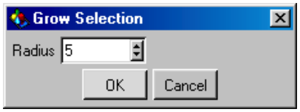
Tip:

This option applies feathering to an existing selection. To apply feathering at the same time as you create a selection, use the Feather setting in the Active Tool manager instead.

Grow Selection

This function expands the selection by a specified number of pixels.

A window opens when you select **Grow Selection**.

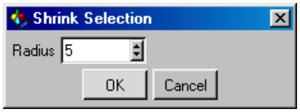


Enter a value between 1 and 100, then click on **OK** to expand the selection by that number of pixels. Note that you cannot expand the selection past the texture's edges.

Shrink Selection

Use **Shrink Selection** to contract the selection by a certain number of pixels.

A window opens when you select the command.



Enter a number between 1 and 100 to specify the number of pixels you want the selection to contract by, then click on **OK**.

Edit Selection Mask

This function activates the edit selection mask mode (see The Edit Selection Mask Mode on page 81).

Tools

You can use all the tools described in this section (except Magnify and Transform Bitmap) in the Perspective View as well as the Texture View.

Move Layer

This tool moves the active layer.

Drag in the Texture View to move the layer. Any parts of the layer outside the texture will be discarded.

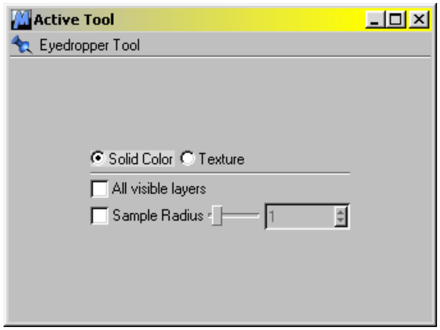
Magnify

Drag a rectangle with this tool selected to zoom in on its contents of the Texture View. To zoom out, hold down Shift or the right mouse key while you drag.

Eyedropper

You can use this tool to pick a color or a texture — click on the corresponding position in the Texture View to choose which. If you click with the left mouse button, the color/texture becomes the new foreground color. Click with the right mouse button to define the color/texture as the new background color.

Options in the Active Tool manager



Solid Color

This option loads the color you click on into the Color Settings.

Tip:

You can also pick the color by clicking on the object in the Perspective View.

Texture

If you activate this option, the texture you click on is loaded into the Color Settings. You can then paint the texture using a paint tool — for details on how to paint the texture, please see the Texture Paint section in the Color chapter, on page 77.

All visible layers

If this option is active, the color you click on in the Texture View is picked. With the option inactive, the color in the active layer is picked — this may be completely different from the composite color you see in the Texture View. With this in mind, keep the option active unless you have a specific reason to deactivate it.

Sample Radius

This option applies to the Solid Color option only. Rather than pick the color of the exact pixel that you click on, this option picks the average color of all pixels within the specified radius — you can enter values between 0 and 100 pixels.

Example: if you click on the border between a black column and a white column with a large **Sample Radius**, the color picked will be medium gray.

Brush

The brush is the single most important tool in BodyPaint 3D. Therefore, brushes are dealt with in a separate chapter of their own. Please see Chapter 7, Brushes for full details.

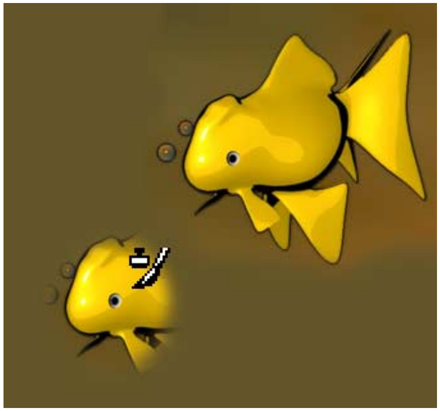
Clone

You can use this tool to clone parts of your texture. When you select the tool, the mouse pointer changes into a pipette. Move the pipette to the region you want to clone, then click the mouse button. The pipette changes into a brush and stamp. Now, drag anywhere you like to paint the clone.

To clone a new region, click on the **Clone Tool** icon. The pipette appears once more, ready for you to select the new region to be cloned.

Note that the Clone Tool uses the current Brush Settings for the **Generic** brush type. Brush effects such as **Spacing** and **Jitter** are evaluated — usually, you will want to deactivate these effects when cloning.

Finally, there is an **All visible layers** setting in the Active Tool manager. If the option is active, the composite image (i.e. the image you see in the Texture View) is cloned; otherwise, only the pixels in the active layer are cloned.



Cloning in action

Tip:

You can use the Clone Tool in the multi channel mode as well. Activate the mode. All the material channels that you activate in the Multi Channel Palette via pencil icons will be taken into account by the Clone Tool.

Eraser

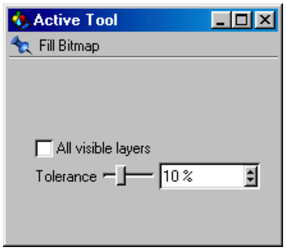
The Eraser erases pixels in the active layer by making them transparent with the exception that, if the Background Layer is active, the eraser paints the pixels white.

Note that the Eraser adopts the parameters in the Brush Settings, including effects. Deactivate all effects for a standard eraser.

Fill Bitmap

With Fill Bitmap, all contiguous pixels of similar color to where you click are filled with the color in the Color Settings. The **Tolerance** value determines how similar the colors must be.

Options in the Active Tool manager



All visible layers

Activate this option is you want to fill all like-colored pixels in the composite image. If the option is deactivated, only the like-colored pixels in the active layer are considered. Note that, even if this option is selected, the color is painted to the active layer only.

Tolerance

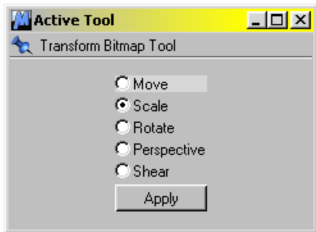
The tolerance, which can be set to values between 0% and 100%, defines how similar in color a pixel must be compared to where you clicked in order to be filled with the color in the Color Settings. A value of 0% will fill only those contiguous pixels of exactly the same RGB color. 100% will cause all pixels to be filled.

Transform Bitmap

This tool can add interest to your textures by rotating, scaling and shearing them among other things.

A rectangular frame will appear when you activate the tool. The frame has five handles: one in the center, and one in each corner. Each handle can be moved separately.

To move the entire frame, drag the center handle. The other handles affect the frame according to the option that is selected in the Active Tool window (**Move**, **Scale**, **Rotate**, **Perspective**, **Shear**).



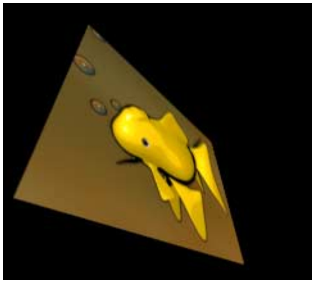
Note that only the frame is transformed in real-time — transform the frame as you intend the active layer to be transformed, then click on the **Apply** button to transform the active layer itself.

Also be aware that Transform Bitmap affects the active layer only. If you attempt to activate another layer (by clicking on it) while the frame is active, the following dialog opens.

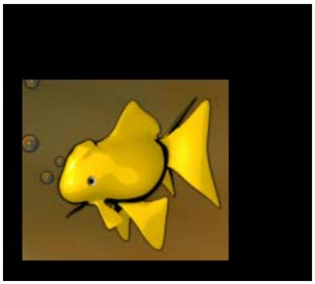
Click on the **Yes** button to apply the transformation, or click on **Cancel** to abort it.

You can transform in one of five ways:

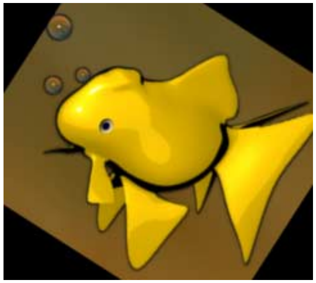
Move



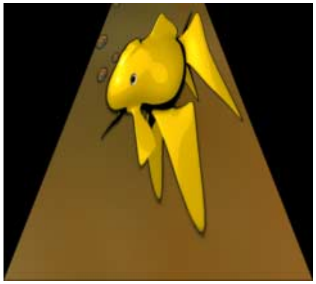
Scale



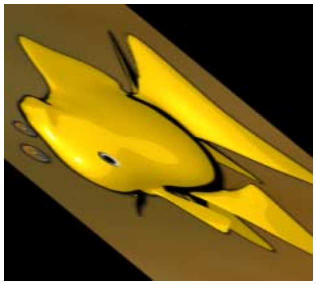
Rotate



Perspective



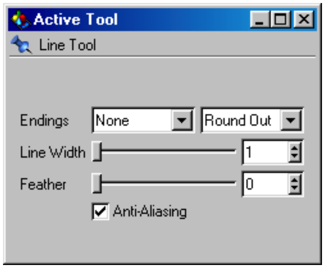
Shear



Draw Line

This tool draws straight lines. Drag in the Texture View to create the starting point and ending point respectively.

Options in the Active Tool manager



Endings

You can define different shapes for the starting point (left pop-up menu) and ending point (right pop-up menu).

Line Width

This is the line's width in pixels — enter any value between 1 and 100.

Feather

This setting determines the size of the transition between the line and the background — enter a value between 0 and 50 pixels.

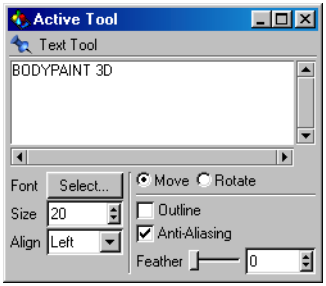
Anti-Aliasing

Activate this option to smooth the edges of the line. Anti-aliasing helps to avoid or reduce *staircasing* effects (jagged edges).

Draw Text

This tool paints text to the active layer. You can use any TrueType font installed on your system.

Options in the Active Tool manager



Type the text into the text box in the Active Tool manager. The text can span several lines and you can also paste text from the clipboard. Once you have entered the text, drag in the Texture View to move or rotate the text. As soon as you release the mouse button, the text is fixed in place.

Note:

Parts of the text that you place outside the texture will be discarded.

Font

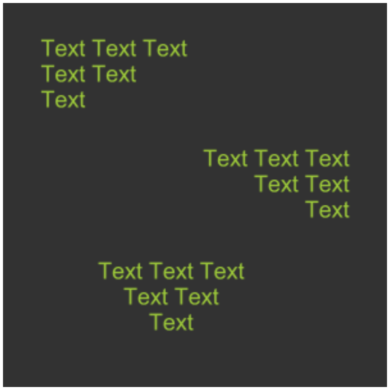
Click on this button to choose your font from the **Font** dialog. If you are using a PC, you can also set the font style here (e.g. Bold, Italic).

Size

This is where you define the size of the text. In theory, values may range between 1 and 1000.

Align

Set this pop-up menu to your favoured text alignment. Your choice is between Left, Center and Right. For example, if you set the pop-up to Left, your first mouse click defines the left edge of the text.



Some examples of aligned text

Move

If this option is selected, you can drag in the Texture View to create and move the text. Note that the text will be fixed in place as soon as you release the mouse button — a second drag will merely create and move a new copy of the text.

Rotate

When this option is active, drag in the Texture View to create and rotate the text about the point where you clicked. The text is fixed in position the moment you release the mouse button. The next time you drag, a new copy of the text will be created and rotated.

Outline

Activate this option if you want to stroke the text's outline with the current Brush Settings. The text will not be filled. You can achieve some interesting effects with this option — try it in conjunction with a slight **Jitter** effect.

Anti-Aliasing

Activate this option if you want the edges of your text to be smooth.

Feather

This function is more or less enhanced anti-aliasing. Enter a value between 0 and 50 pixels to specify the size of the blending region between the text and the background.

Draw Polygon Shape

This tool will assist you in drawing certain polygon shapes.

To draw a polygon shape, drag in the Texture View to set the position and size respectively (the shape itself is drawn automatically). You can rotate the preview while you drag — hold down Shift at the same time to constrain the rotation to multiples of 45°.

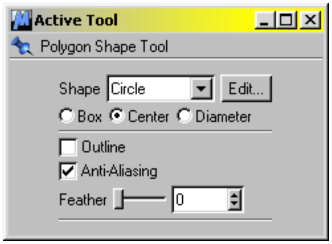
When you release the mouse button, the shape will be filled with either the foreground color (drag with left mouse button) or the background color (drag with right mouse button).

You can access parameters specific to your chosen shape by clicking on the **Edit** button. A window opens. Ignore all parameters that do not relate directly to the shape — this window originates from CINEMA 4D XL, the program on which BodyPaint 3D is based.

Tip:

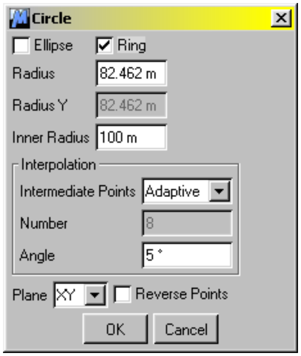
You can draw shapes directly onto your object in the Perspective View.

Options in the Active Tool manager



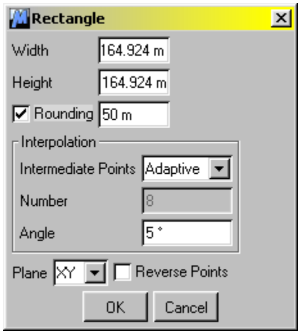
The shapes from which you can choose are:

Circle



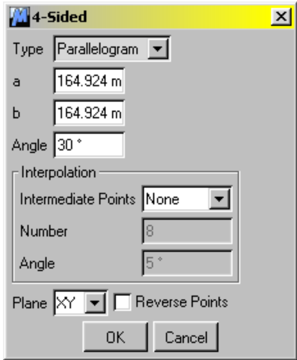
Use this shape to draw rings or circles. If **Ring** is activated, enter a value under **Inner Radius**. To draw the ring, drag to define the position and outer radius respectively (the inner radius is drawn automatically according to the value you entered).

Rectangle



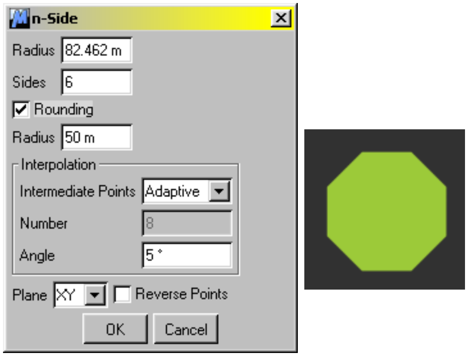
To round the corners of the rectangle, activate the **Rounding** option and type the size of the rounding in pixels into the adjacent box.

4-Sided



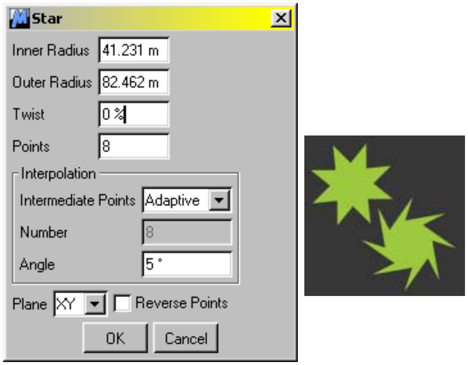
Select this shape if you want to draw a diamond, kite, parallelogram or trapezium — make your choice using the **Type** pop-up menu. If you set the **Type** to Parallelogram or Trapezium, you can also enter a value in the top **Angle** box.

n-Sided



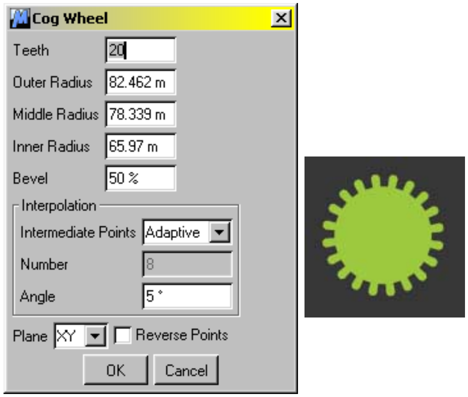
Enter the number of sides into the **Sides** box. If you want to round the corners, activate the **Rounding** option and type a value into the **Radius** box.

Star



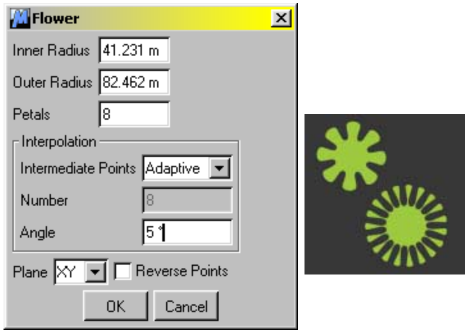
The **Twist** and **Points** parameters determine the star's appearance. Twist rotates the star's arms (see the star on the right in the picture above). **Points** defines the number of arms.

Cog Wheel



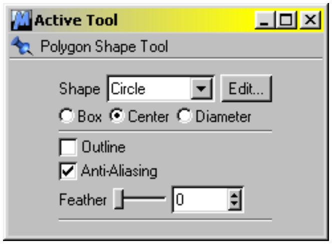
Enter the number of teeth into the **Teeth** box and type the degree of bevel into the **Bevel** box.

Flower



This shape draws flowers for you. Type the number of petals into the **Petals** box.

General Options



The following options apply to all shapes:

Box

Drag to define the top left and bottom right corners respectively of a temporary rectangle inside which the polygon shape will be drawn.

Center

Drag to define the center and radius respectively of a temporary circle inside which the polygon shape will be drawn.

Diameter

Drag to define the diameter of a temporary circle inside which the polygon shape will be drawn.

Outline

This option strokes the polygon shape's outline with the active color and the active Brush Settings.

Anti-Aliasing

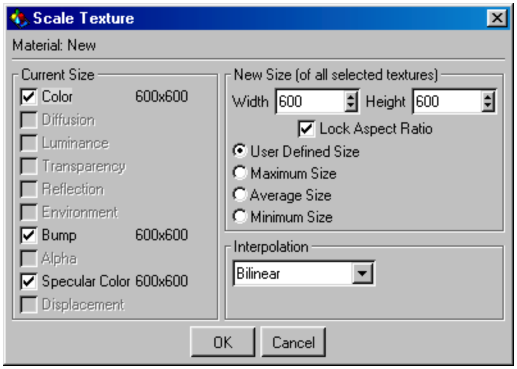
This option softens the edges of the polygon shape. This prevents a *staircasing* effect (jagged lines).

Feather

You can use the slider to alter the size of the blending region between the polygon shape and the background. This is more or less enhanced anti-aliasing.

Functions

Texture Size



You can use this function to scale the textures of the individual material channels.

When you select the function, the Scale Texture dialog opens. All material channels are listed on the left — unused channels are ghosted. Select the channels you want to scale from the list. The current texture size is listed next to each channel.

There are four scaling modes:

User Defined Size

Enter the new size into the **Width** and **Height** boxes. If **Lock Aspect Ratio** is selected, the width to height ratio is maintained. So, if you enter a new width value, the height value is changed automatically to maintain the original ratio. **Lock Aspect Ratio** is available only in this mode.

Maximum Size

This mode sets the **Width** and **Height** values to the values of the largest texture.

Average Size

This sets **Width** and **Height** to match the average size of the textures.

Minimum Size

In this mode, **Width** and **Height** are assigned the dimensions of the smallest texture.

Finally, define the way in which the pixels are interpolated using the **Interpolation** pop-up menu.

Interpolation

When bitmaps are scaled, pixels must be added or removed and new color values calculated. The new color values can be calculated using one of two interpolation types:

Bilinear

Bilinear maintains high image quality. However, it is relatively slow to calculate, especially if several material channel textures are being scaled at the same time.

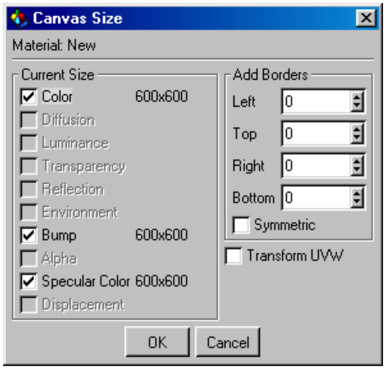
Nearest Neighbor

This is quick to calculate but low on image quality.

Tip:

Although you can assign different texture sizes to each material channel, you can only use a MultiBrush if the channels it paints to all have the same texture size. If this is not the case, a dialog will notify you when you attempt to use the MultiBrush.

Canvas Size



Select the channels you want to add borders to using the list on the left — channels not in use are ghosted. Use the top four boxes in the Add Borders pane to enter the size of the border (in pixels) to be added to each side. If **Symmetric** is active, any border value you enter is copied to the other three boxes.

Example: you want to add a border 100 pixels long to the top of the texture.

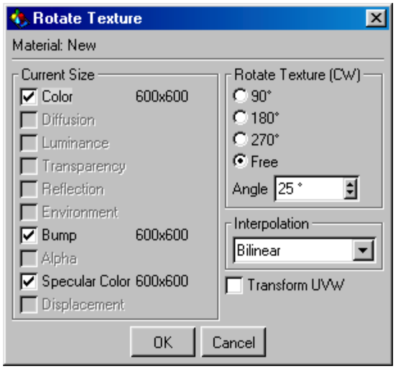
Deactivate **Symmetric**, enter 100 into **Top**, then click on **OK** to add the new border.

Activate **Transform UVW** if you want to *fix* the UV polygons to the canvas pixels they currently cover. This prevents the UV polygons venturing into the new border(s).

If you do not understand why a transformation is required, bear in mind that UV coordinates are specified as values between 0 and 1 relative to the texture's size.

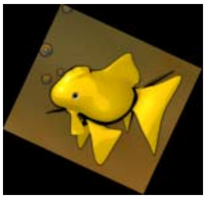
If you are not sure why you might want to create empty borders, please read The UV Editor – An Introduction on page 134.

Rotate Texture



This function rotates your texture by a specified angle. Note that the texture size will alter for rotations other than 90˚, 180˚ and 270˚, as demonstrated by the two example pictures.

Original texture



The same texture, rotated by 25˚

When you call the function, the Rotate Texture dialog opens (see above). Use the left list to select the channels you want to rotate — channels not in use are ghosted. You can select a rotation value of **90˚**, **180˚**, **270˚** or **Free**. If you choose **Free**, you can enter your own rotation value in the **Angle** box. Positive values rotate the texture clockwise, negative values rotate it anti-clockwise.

Interpolation

Textures must be recalculated during the rotation. Choose the interpolation type for the calculation from this pop-up menu. You can choose from two types:

Bilinear

This maintains high image quality, but it is relatively slow to calculate, particularly when several channel textures are rotated at once.

Nearest Neighbor

This is low on quality but quick to calculate.

Transform UVW

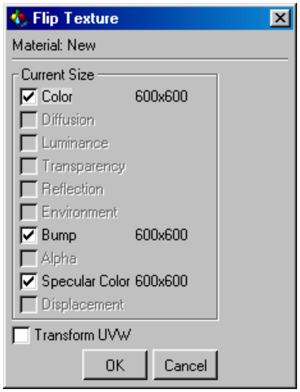
Activate this option if you want to rotate the UV polygons as well.

Tip:

You can only select Transform UVW if all channels to be rotated have the same texture size.

Flip Texture Horizontal/Vertical

When you call either of these functions, the following window opens:



Select the channels you want to mirror. Select **Transform UVW** if you want to mirror the UV mesh as well.

Tip:

You can only select Transform UVW if all channels to be rotated have the same texture size.

Fill Layer

The selection is filled with the color in the Color Settings. If no pixels are selected, the entire layer is filled.

Fill Polygons

This fills the selected UV polygons with the color/pattern in the Color Settings.

Tip:

Object polygon selection and UV polygon selection is linked. Sometimes it is easier to select object polygons. For example, if you want to fill a specific side of a six-polygon cube, it is easier to click on the object polygon in question rather than figure out which UV polygon you need to select. Note that you must activate the Polygons Tool in order to select object polygons.

Selected UV polygons (Texture View) and selected object polygons (Perspective View) are indicated by red edges.

Outline Polygons

This strokes the edges of the selected UV polygons with the current Brush Settings and the active color. This is useful for UV mesh visualisation on the texture.

Create Mask from Selection

This function creates a bitmap selection from an existing UV or object polygon selection.

Bitmap Filter

See Chapter 9, The Texture View, on page 127.

RayBrush Mode

The RayBrush mode enables you to paint in a pre-rendered view in real-time and in three dimensions. You can view the following channels simultaneously:

- Color
- Diffusion
- Luminance
- Transparency
- Reflection
- Bump
- Specular Color

The RayBrush mode is relatively close to rendering in terms of image quality. However, a few restrictions are made so that a reasonable display speed is maintained. Note that these restrictions apply to the RayBrush mode only. Also, some of the restrictions apply to imported CINEMA 4D XL scenes only. When you render proper, BodyPaint 3D uses the full power of CINEMA 4D's rendering engine (BodyPaint 3D is based on CINEMA 4D XL technology).

RayBrush Mode Restrictions

- CINEMA 4D's Sky, Foreground and Background objects cannot be painted.
- Post-processing effects such as glow, lens effects, depth of field and motion blur are not displayed.
- Anti-aliasing is not shown.
- Textures are not interpolated (e.g. there is no SAT and MIP interpolation).
- Only the raytracing mode can be used (e.g. you cannot use Cel-Render Color mode).
- Morphing materials are not displayed.
- You cannot paint over additively mixed materials. Consider an object A with materials X (base material) and Y (additively mixed material), and an object B with material Y (its only texture). You can paint material Z onto object B only.
- Objects with Visibility tracks in the Timeline cannot be displayed (only relevant when running CINEMA 4D XL with BodyPaint 3D).
- You cannot paint to sub-channels. For example, you cannot paint over a third-party shader which in turn uses textures.
- Imagine that you have assigned three materials to an object and you are editing the second material. Only the materials above this material are shown.
- Irregularities may appear at the edges of textures (e.g. if you tile them).
- Fresnel reflections with transparent objects are not shown.
- You cannot paint objects that are behind transparent, refractive objects.
- You can paint transparency and reflection, but only as a rough approximation of the rendered result. Also, double transparencies cannot be displayed. For example, consider a tin: if you paint transparency to the front and back of the tin, only the front will become transparent.
- Transparency and reflection are not taken into account when you paint to the bump channel.

Tip:

The more light sources you use, the more processing time is required when you paint to the bump channel. Likewise, the processing time increases with the use of Tube and Area lights.

RayBrush Render View

Choose this function to RayBrush render (i.e. pre-render) the active view. The RayBrush render will take a few moments. Once it has completed, you are in *RayBrush mode* and you can paint in the view.

The RayBrush mode is deactivated the moment you move, scale or in any way change the view or object.

RayBrush Render Active Object

Only the active object (including its child objects) is RayBrush rendered. All other objects are ignored.

RayBrush Render Region

After activating this function, drag a frame in the Perspective View (or a 2D view). Only the framed region will be RayBrush rendered, although you will be able to paint outside the region (in which case, the view's shading mode is used).

High Quality Shading

The high quality shading mode displays the mapped active material in high resolution. The following channels are evaluated: Color, Luminance, Diffusion, Reflection, Bump and Specular Color.

Tip:

The high quality shading mode is slower than the standard shading modes, but faster than the RayBrush mode.

Tip:

The following restrictions apply to the high quality shading mode: the Sky object cannot be painted. The bump channel is only a rough approximation, since only the first light source in the Object manager is considered.

Display Selected Channel

This mode displays the active channel only. In the process, the channel is evaluated as a color channel. For example, if you click on the bump channel to activate it, grayscale colors will be mapped to your object. You can then edit the channel in the usual way (e.g. by painting with a brush). This mode is available in the high quality shading mode only.

Tile U / V

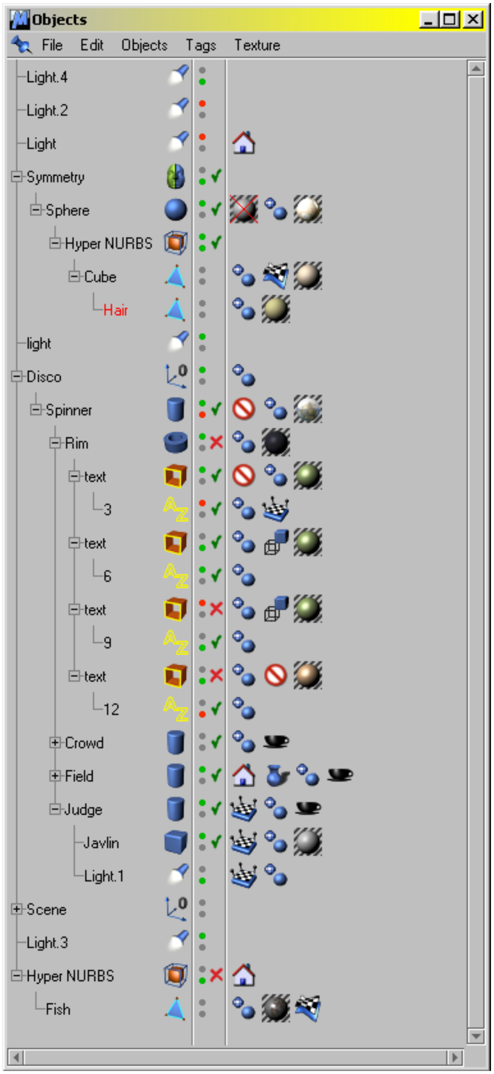
Activate these options so that if you paint over a texture's edge, the stroke will continue from the opposite edge. Activate **Tile U** to apply this feature horizontally, **Tile V** to apply the feature vertically.

Tip

In general, always work with Tile U *and* Tile V *activated — you can achieve texture continuity by painting over the edges, thereby helping to prevent seams where the texture edges meet on the 3D object.*

17. Object Manager

11 Object Manager



The Object manager is the center of object administration in BodyPaint 3D. You can use it to activate objects, change object hierarchies or manipulate tags.

On the left side of the manager is a list of all the objects in the scene. Hierarchies are shown as a tree structure. You can collapse and open hierarchies, just as you can on your computer desktop. You can use drag-and-drop to re-group or copy objects.

The narrow column running down the center of the Object manager contains up to three *switches* for each object. The switches are described in detail later in this chapter.

To the right of the switches are the object tags (e.g. texture tag, smoothing tag). You can use drag-and-drop to move or copy these tags to other objects. The tags are described in detail later in this chapter.

You can use context menus in the Object manager. To do this, click the right mouse button within the manager (Macintosh - hold down the Command key and click the mouse button to simulate the right mouse button).

When you select a command in the Object manager, it is applied to the active object.

Drag-and-drop in the Object Manager

Drag-and-drop is the technique of clicking on an object, holding down the mouse button and dragging the object to another position; when the target location is reached, you release the mouse button and this will drop the object there. Depending on the target location, this may have different results.

To re-arrange objects in the Object manager

There are many ways that you re-arrange objects in the Object manager and these are described below. The icon on the left shows what the mouse pointer will look like while you are doing the action described on the right.

Drag an object between two others or to the end of the list.

If you wish to move a duplicate, rather than the original, use Ctrl-drag.

To change the object hierarchy, drag the object on top of an existing one in the list. This makes the dragged object a child of the other.

If you wish to create a duplicate and make it a child of another object, use Ctrl-drag and move the mouse pointer over an object.

You can also drag-and-drop *tags*. To transfer a tag from one object to another, drag the tag icon on to the line of the other object.

If you wish to create a duplicate, use Ctrl-drag.

If an operation is not available, this icon appears.

Each object in BodyPaint 3D has a *type*, e.g. polygon object, light.

To open an object's dialog, double-click on its type icon. These dialogs are described in Chapter 18.

You can apply *tags* to objects (e.g. texture tag, smoothing tag). Double-click on a tag icon to open its dialog.

Mouse actions in the Object manager

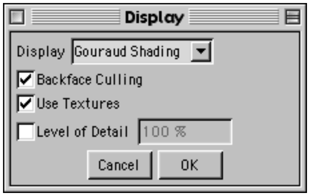
Function	**Action**
Activate object	Click on object
Rename object	Double-click on object name
Activate object type	Click on type icon
Activate tag	Click on tag
Edit tag	Double-click on tag
Move active object or tag	Drag-and-drop
Copy active object or tag	Drag-and-drop with Ctrl key
Open/close object hierarchy	Click on icon left of the object name
Activate previous / next object	Up / down cursor keys
Context menu	Right-click on name, type icon or tag (Macintosh: Command key and mouse button)

File Menu

New Tag

You can use this menu to select a tag. The tag will be added to the active object.

Display Tag



Display, Backface Culling, Use Textures

These settings have the same effect as their counterparts in the View menu (see Chapter 2), although the effect of a tag is limited to an object and any children it may have.

The display tags enable you to mix display modes within the editor. For example, some objects may use Gouraud shading, the others Wireframe. The main purpose of this is to reduce the strain on the processor so that the redraw rate remains fast.

If your scene is becoming sluggish in the editor, try a simpler display mode for objects of lesser importance.

Note that **Display > Use Display Property** must be activated in a view window for the display tags to have an effect there (the option is activated by default).

Level of Detail

You can use this to control the level of detail for generators and deformers.

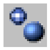
The tag's value is used in preference to the value in the project settings of CINEMA 4D. For example, you can set the **Level of Detail** in the project settings to 50% and allocate a display tag with **Level of Detail** set to 100% to the object that you are currently working on.

If the tag's **Level of Detail** option is activated, it is always used in a view window, even if **Use Display Property** is not selected there.

Protection Tag

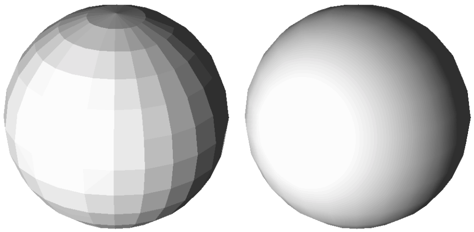
This tag does not have a dialog. An object with a protection tag cannot be moved, rotated or scaled. If you wish to make changes to a protected object, you must first remove its protection tag.

Smoothing Tag



Smoothing is an extremely important tag. It gives object surfaces a rounded appearance.

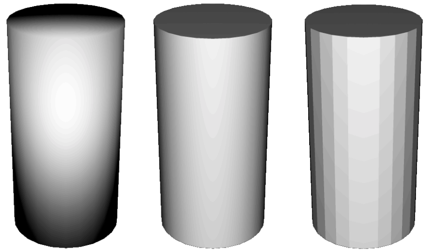
The picture below left shows a sphere before a smoothing tag is applied; on the right a smoothing tag has been applied.



If you look closely, you will see straight lines around the right sphere's silhouette. Smoothing does not increase the number of polygons. You can think of it as an illusion that loses its effect around the silhouette. If you wish to smooth the silhouette region, you must use more subdivisions.

You can use the dialog to specify the maximum smoothing angle. To do this, activate the **Angle Limit** option and type the required angle into the text box. Adjacent polygons equal to or below the angle will be smoothed.

The following pictures demonstrate the effect of the smoothing angle. The cylinder on the left has smoothing with no angle limit specified (i.e. all angles are smoothed), the middle cylinder has an angle limit of 89.5° and the cylinder to the right has no smoothing at all.



When BodyPaint 3D calculates the smoothing, it assumes that the surface normals are aligned. If this is not the case, shading anomalies may appear. All primitive objects are aligned by default.

Smoothing is a good way to reduce render time and save on memory. Without the smoothing tag, an object would require a far greater number of polygons in order to appear smooth. Note that smoothing can only take place across connected surfaces (surfaces that share points).

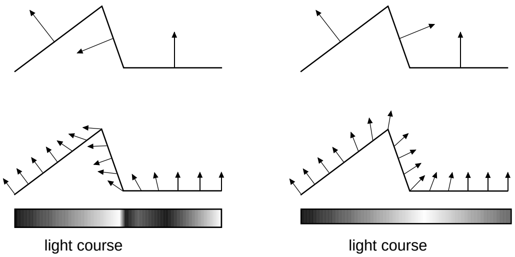
How smoothing works

During rendering, the program creates a normal for each surface. Each normal is perpendicular to its surface. The color and brightness of a point is determined by the angles which the normal forms with the rays of the camera and the light sources.

Without smoothing, two connected surfaces will have a hard transition, since each surface has its own normal. This will cause brightness bands.

If a smoothing tag is activated, the normals will be interpolated. There will be a soft transition between one normal and the next (provided that the surfaces are connected).

If a smoothing tag is not applied, there will be no interpolation.



The top-left picture shows three connected surfaces. The middle surface is not aligned to the other surfaces (you can tell by the normals). The bottom-left picture illustrates how the normals are interpolated for smoothing. The light bar shows the hard transition caused by the non-alignment.

The top-right picture shows the same three surfaces, but this time they are aligned. Notice how the interpolation (bottom-right picture) is much smoother this time. The light bar is smoother as a result.

These pictures illustrate why it is important for surfaces to be aligned. The convention for the alignment direction is that the normals should point outwards from the object. For example, if you have an apple, the normals should point outwards into the world, not inwards towards the core.

This convention does not matter for smoothing in BodyPaint 3D - the important point is that they must be aligned, i.e. point in a consistent direction. However, it is best to follow convention. For example, the normal direction plays an important part in decal mapping (see page 263).

Note

The normals are shown for selected polygons only. To see the normals, activate the Polygons tool. Next, select some polygons using a selection tool (or choose main menu: Edit > Select All).

To see the normals, select their polygons. For example, create a sphere, then choose Structure > Make Editable in the main window (this will convert the sphere into polygons). Next, activate the polygons tool and select some polygons using one of the selection tools (or choose Edit > Select All in the Selection menu).

To align normals, choose **Structure > Align Normals** in the main window.

Render Tag

This tag has several options that affect rendering.

Cast Shadows

Sometimes it is useful to prevent objects from casting shadows — especially for technical illustrations. To turn off shadow-casting, deactivate this option.

Receive Shadows

Sometimes it is useful to prevent shadows appearing on an object — especially for technical illustrations. To turn off shadow-reception, deactivate this option.

Seen by Camera, Seen by Rays

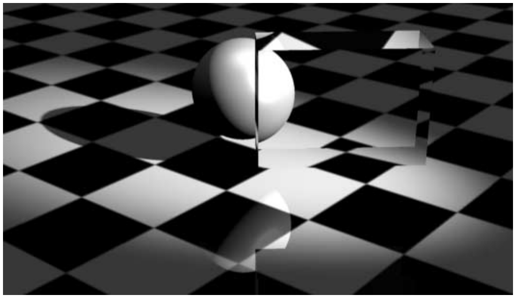
You can use these options to create vampires in your scene — according to legend, a vampire has no reflection. Joking apart, there are instances where it can be useful to make a visible object have no reflection. It can also be useful to make an object invisible yet have it cast a shadow.

If **Seen by Camera** is activated, the object will be visible in the render. If the option is deactivated, the object will be invisible.

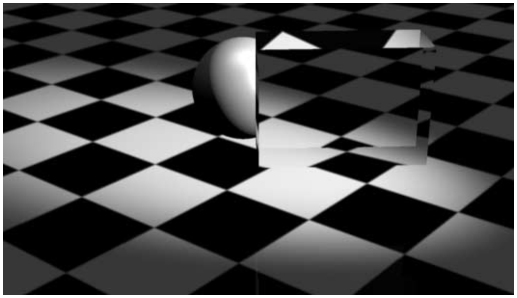
If **Seen by Rays** is activated, the reflection and refraction of the object will be visible in the render. If the option is deactivated, the reflection and refraction will be invisible.

You can combine these two options.

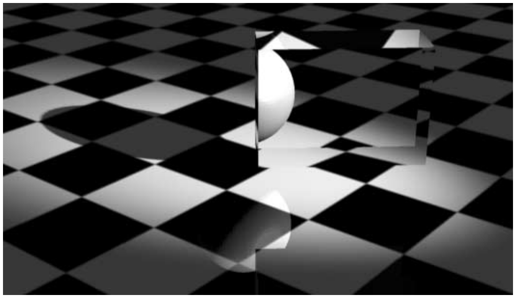
For example, you can create a visible object which casts no shadow, receives no shadows, has no reflection and cannot be seen behind glass; or perhaps an invisible object which casts a shadow, can be reflected and can be seen behind glass.



Normal object



Visible object



Invisible object

Compositing Background

This option will cause the object to be self-illuminated yet still receive shadows.

An example

You are creating a cartoon character for your website. Your website uses a white background and you need to render the character so that it appears to cast a shadow on to the webpage.

You import a large rectangle to serve as a floor and assign it a white material (with the RGB values matching the white color of the web page), but when you render the picture, the floor is not of the correct brightness.

To solve the problem, create a render tag for the floor and activate **Background Compositing**. The floor will now illuminate itself evenly and with full brightness yet it will still receive the character's shadow.

Note

The object in question (in our example, the floor) must have its own material.

Texture Tag

This command creates a new texture geometry. Initially, no material is assigned. To assign a material, type its name into the **Search for** text box. This dialog is described in detail on page 256.

Note

If you allocate a material to an object, a texture tag will be created automatically. As a result, you rarely need to use this menu item.

You can assign as many texture tags as you like to an object. This allows you to apply several *texture layers* to the same object. The texture priority increases to the right in the Object manager. This means that the right-most texture will be the top layer and the left-most texture will be the bottom layer. The top layer will cover the object completely unless it is limited in size or has an alpha channel activated.

Note

If a child object has no texture tags applied to it, it will use the texture tag(s) of its parent.

Warning

The note above does not apply to light sources i.e. if a light object has no texture tag and is a child of another object it will not inherit its parent's texture tags. This is to prevent child lights receiving gels automatically.

Stick Texture Tag

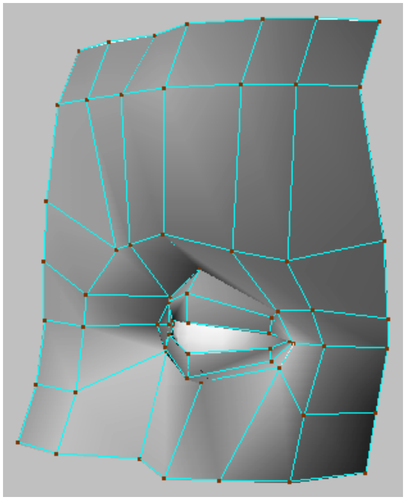
This function is relevant only if you are running BodyPaint 3D with CINEMA 4D because the Stick Texture tag is unique to CINEMA 4D. As soon as you export a scene or object from BodyPaint 3D in a foreign file format, any Stick Texture tag information will be lost.

The Stick Texture tag fixes all of an object's textures to its surface. You can use the tag with polygon objects and HyperNURBS as well as with parametric primitives and NURBS objects imported from CINEMA 4D.

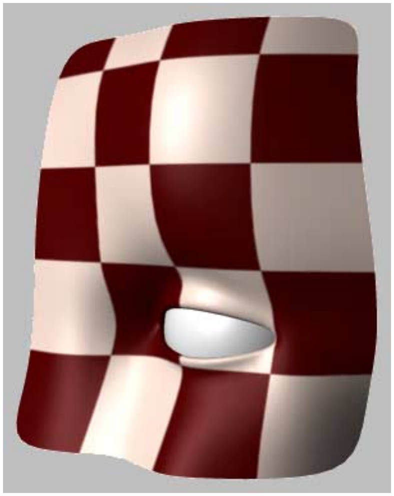
Once the tag has been applied, the textures remained fixed to the object when the object is deformed (e.g. using CINEMA 4D's Twist deformer).

The following pictures show part of a face including an eye. The object contains a relatively small number of points for a face — it is smoothed by the HyperNURBS object it is placed in.

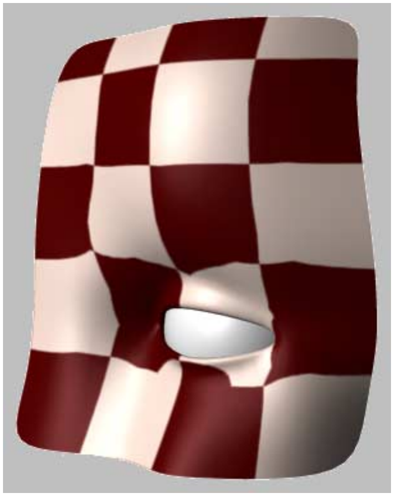
The pictures demonstrate a problem that can arise when UVW mapping is used with a HyperNURBS object.



A cage object. The point density is comparatively high in the eyelid area



Flat projection



Flat projection converted to UVW mapping. The texture is distorted where areas of high point density meet areas of low point density

There are not enough points to fix the texture to the object properly, so when the object is smoothed by the HyperNURBS, the texture is distorted.

The stick texture tag solves this problem. With the tag, you no longer need to use UVW mapping to fix textures. Instead, use a suitable projection type (e.g. Flat or Cylindrical for a head), then fit the texture to the object (Object manager: **Texture > Fit to Object**). Next, choose **File > New Tag > Stick Texture Tag** (Object manager).

If you deform the object now, the texture deforms along with the mesh. This enables you to avoid the problem of texture distortion with HyperNURBS.

The stick texture tag works in the following way:

If a texture tag is created, the program checks whether the object has a conventional projection type, i.e. not UVW or Frontal, and whether the object has been deformed in any way, e.g. using CINEMA 4D's Twist deformer.

If so, the texture projection is calculated by comparing the deformed object to its original state, the original state is stored in the stick texture tag. This enables the texture to be mapped taking the deformation into account and without the distortion mentioned earlier.

If you double-click on the Stick Texture tag, the following dialog opens:

Active

if you deselect this option, the stick function is disengaged. The original state is still stored in the tag — activate the option to resume the stick function.

Record

This button saves the object's current state to the texture tag.

Reset

Click on this button if you want to return the deformed object to its original state (as stored in the tag). This is useful, for example, if you want to reset an object that you have animated using CINEMA 4D's point-level animation (PLA).

Tip:

Only polygon objects can be recorded and reset.

Tip:

The point copy becomes invalid as soon as you add points to a polygon object. This is not a problem when using CINEMA 4D's deformation objects, because a new reference copy is stored in the stick texture tag automatically before each deformation. However, if you use PLA in CINEMA 4D, the copy stored in the tag as well as all PLA keys already created become unusable. Hence, you should finish modeling the object in CINEMA 4D, then create the Stick Texture tag, then create the PLA keys.

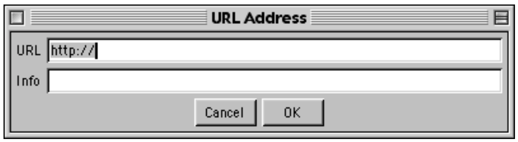
The Stick Texture tag has an interesting side effect:

If you put a polygon object inside CINEMA 4D's symmetry object and texture one half in BodyPaint 3D, the texture is mirrored to the other side automatically. So, for example, you can paint half of a face, project it using flat mapping, then let CINEMA 4D do the rest.

If you do want this behaviour (for example, not all faces are symmetrical), just put the texture onto the symmetry object itself.

URL Tag

You can assign a URL to an object. This is useful if you are creating VRML files for the Internet. These VRML files (.wrl) contain complete 3D scenes and can be viewed in web browsers provided that you have a corresponding VRML plug-in.

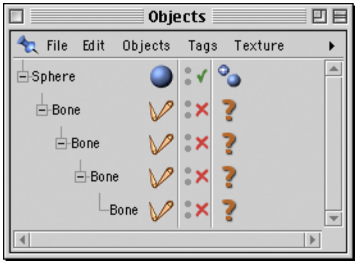


The viewer can click on a 3D object that has a URL tag in order to link to an Internet address.

URL contains the link address. Take care to enter the complete address (do not forget http://, ftp://, https://). You can use **Info** to define the text that will appear when the mouse pointer moves over the object in the web browser.

C.O.F.F.E.E. Error Tag

When loading a scene which includes tags created by plug-ins and, for whatever reason, BodyPaint 3D cannot find a plug-in, a question mark will be displayed instead of the tag icon. The same happens with C.O.F.F.E.E. errors. Please contact the plug-in author in such a case.



C.O.F.F.E.E.-Error-Tags

Restore Selection

In this submenu the point and polygon selections are displayed and can be activated by selecting them.

The selections are displayed only in point mode (see page 366) or polygon mode (see page 366). If you are working with a different tool this menu remains empty.

If your selections are unnamed they will be numbered and displayed as 'selection1', 'selection2', etc.. If you select one of the the selections displayed the points or polygons stored inside this selection are selected.

This function can also be accessed by clicking on each selection tag (see page 382).

Load Object

You can use this command to load a file containing object information (e.g. DXF, BodyPaint 3D, Illustrator path, etc.). The objects in the file will be loaded into the scene along with any material and animation data.

Save Object As...

This function saves the active object. The standard system dialog for saving files will open.

Display Tags

You can use this option to switch on or off tag display in the Object manager.

Close

This function closes the Object manager.

Edit Menu

Undo

This function reverses the last change (action) that you made, restoring the scene to its previous state. You can select **Undo** repeatedly to continue reversing the actions.

Redo

Redo restores the last action that was undone. You can select **Redo** repeatedly to continue restoring the actions.

Cut

This function deletes the active object and copies it (including its materials and animation data) to the clipboard. The object can be copied back from the clipboard with the **Paste** function (see below).

Copy

The **Copy** function copies the active object (including its materials and animation data) to the clipboard. The object can be copied from the clipboard to the active scene with the **Paste** function (see below). You can paste repeatedly to create additional copies.

Paste

This function inserts an object from the clipboard into the scene.

Delete

This function deletes the active object or the active tag without copying it to the clipboard.

Select All

You can use this function to group all the objects in the Object manager into a null object. The null object is selected, including its child objects.

Deselect All

This function deselects all active elements (e.g. objects, tags, etc.).

This function deletes the active object or the active tag without copying it to the clipboard.

Objects Menu

Object Display

The items on this menu control the editor and renderer visibility for the selected object. Alternatively, you can change the visibility using the *switches* in the middle column of the Object manager:

The two switches (we could call them traffic lights) are colored grey by default. Each can have one of three states: grey, green and red. These switches control the object's visibility.

The top switch controls editor visibility, the lower switch controls render visibility.

Editor Unchanged / top switch grey

The object adopts the editor visibility of its immediate parent. If the object is on the top hierarchy level (i.e. has no parent), it will be displayed as normal. Editor Unchanged is the default setting for new objects.

Editor On / top switch green

The object will be visible in the editor, even if the hierarchy parent is invisible (red).

Editor Off / top switch red

The object is not displayed in the editor, even if the hierarchy parent is visible (green).

Note

An object that is invisible in the editor will nonetheless be visible in the renderer.

Renderer Unchanged / bottom switch grey

The object adopts the renderer visibility of its immediate parent. If the object is on the top hierarchy level (i.e. has no parent), it will be rendered as normal. This is the default setting for a new object.

Renderer On / bottom switch green

The object will be visible in the renderer, even if the hierarchical parent is invisible (red).

Renderer Off / bottom switch red

The object is not displayed in the renderer, even if the hierarchical parent is visible (green).

Note

To apply a status to all child objects, Ctrl-click on the switch for the parent object. The status will be transferred to all child objects.

Object Activation

Two important object types that you can use in BodyPaint 3D are generators and deformers. These objects can be created only if you are using BodyPaint 3D with CINEMA 4D.

Exception

You can create the HyperNURBS generator directly in BodyPaint 3D.

Generators include most NURBS types imported from CINEMA 4D as well as BodyPaint 3D's HyperNURBS object. Deformers include CINEMA 4D's Twist and Melt objects.

All generators and deformers have the two standard visibility switches (see Object Display above) in the Object manager. In addition, they have a third switch for Object Activation.

The activation switch is represented as either a tick (activated) or a cross (deactivated).

You can use this switch to turn on or off the effect of the generator/deformer.

An example

You are editing the polygon cage of a HyperNURBS object. So that you can see the points more clearly, you turn off the HyperNURBS activation switch.

Note that the HyperNURBS is not invisible. Rather, it ceases to generate a mesh.

Note

If you have an object in the scene that uses deformers, you can increase the redraw rate by deselecting object activation for each deformer.

Edit Object

You can use this function to edit the object type. A dialog will appear. For a detailed description of the type dialogs, see Chapter 18, Objects Menu, on page 309. You can also call this function by double-clicking on the object's type icon.

If an object type cannot be edited (e.g. a polygon object), the Rename Object dialog will open instead.

Rename Object

You can use this function to change an object's name. You can also call this function by double-clicking on the object's name.

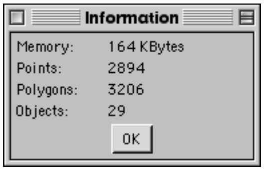
Group Objects

You can use this function to group several objects in the Object manager. When you select this function, the mouse pointer changes into crosshairs. Use the crosshairs to drag a box over the objects that you wish to group. Child objects will also be incorporated into the group — existing hierarchies will be preserved within the new group.

Expand Object Group

This function is the reverse of **Group Objects**. It removes all objects from the group and places them on the same hierarchy level as the group parent. Existing hierarchies within the group will be preserved.

Information (Object)

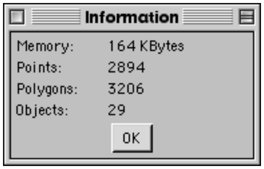


This function displays the following information about the active object (including its children): size in kilobytes, number of points, number of polygons and number of objects.

Note

Polygons that are created by generators will not be included in the number of polygons.

Information (Scene)



This function displays the following information about the scene: size in kilobytes, number of points, number of polygons and number of objects.

You are not required to select an object before calling this function.

Note

Polygons that are created by generators will not be included in the number of polygons.

Search Active Object

You can activate an object by clicking on it in the editor window. You may then wish to find the object in the Object manager. However, the object may be out of sight and nested deeply within a hierarchy, or perhaps there are thousands of objects in your scene. Searching for objects manually can be time-consuming.

If you call this function, the active object will be shown in the Object manager. The manager will scroll and the hierarchy tree will be opened if necessary.

Fold All

This command collapses all hierarchies in the Object manager. In this state, the objects take up the least amount of space in the Object manager.

Unfold All

This command is the reverse of **Fold All** (see above) — it expands all hierarchies. In this state, the objects take up the most space in the Object manager. The advantage is that all objects will be visible (although you may need to use the scroll bar).

Warning

Unfold with caution if your scene is very large. In this case, it may be wiser to unfold the hierarchies by hand. Large projects often have more than 1000 objects. The display speed will be just as slow as if 1000 files were to be displayed hierarchically in your operating system's window. You can query the number of objects in your scene by selecting the Objects > Information (Scene) command.

Tags Menu

Edit Tag

You can use this function to edit the active tag. The tag's dialog will open. You can also access this dialog by double-clicking on the tag.

Copy Tag to Children

If you select this function, the active tag will be copied to all child objects of the active object.

If a child object already has a tag of the same type, its tag will be overwritten with that of the parent. There is one exception, the texture tag. This tag is still copied, but the child will keep its own tag as well (an object can have more than one texture tag).

Proceed with caution when using this function with complex scenes.

Delete Tag from Children

This function does the reverse of **Copy Tag to Children** (see above). **Delete Tag from Children** will delete the active tag from the active object and its children.

Proceed with caution when using this function with complex scenes.

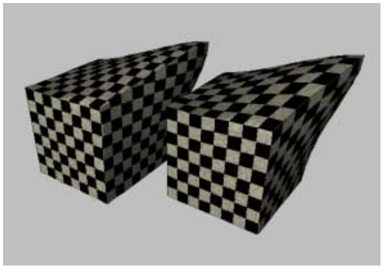
Texture Menu

Generate UVW coordinates

You can use this function to generate UVW coordinates. This is particularly useful for imported objects that do not have UVW coordinates. UVW coordinates prevent a texture from slipping when you deform the object.

Proceed as follows:

- Create a texture and allocate it to the object.
- Set the required projection type (e.g. spherical, cylindrical, etc.).
- Generate UVW coordinates.
- Deform the object.



The effect of UVW coordinates is shown in the picture above. The object to the left uses cubic mapping. The texture slips when the object is deformed. The texture for the object to the right does not slip since its original cubic mapping has been fixed with UVW coordinates.

You may use more than one UVW geometry to texture an object. To do this, give the object a new texture tag and set the required projection type, e.g. flat mapping for a label. Next, choose **Generate UVW coordinates**. A new UVW geometry will be created and the active texture tag will switch over to UVW mapping so that the texture is fixed to the object surface.

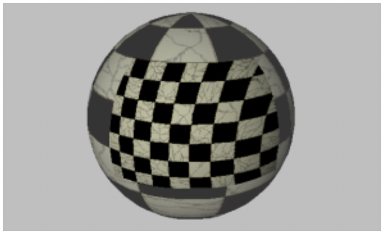
For more details on UVW mapping, see page 260.

Assign UVW coordinates

This function enables you to texture an object with several different projection types using a single UVW geometry and a single texture tag.

Proceed as follows:

- Import a polygon sphere.
- Create a new material with a texture, e.g. the Checkerboard shader, and allocate it to the sphere.
- Change the projection type from UVW Mapping to e.g. Flat.
- Activate the polygon tool and select several polygons.
- Select **Texture > Assign UVW Coordinates** in the Object manager.



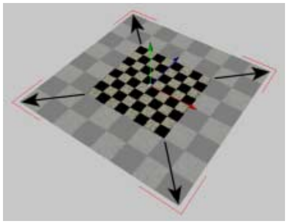
If you are in RTTM mode, you can see immediately that the selected polygons use flat projection while the unselected polygons continue to use the normal UVW mapping. If you deform the object later (e.g. using a twist function in your main 3D application), the texture will remain fixed in the selected region as well.

Note

Selective UVW mapping is intended for you to optimise projection for a single texture. If you wish to use more than one texture, use Restrict To Selection - see page 269.

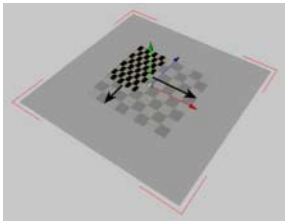
If the object has no UVW coordinates (i.e. no UVW tag), new coordinates are created automatically.

Fit to Object



If you select this function, the texture will be made to cover the object completely - the texture will have a length of 100% in both the X and Y directions.

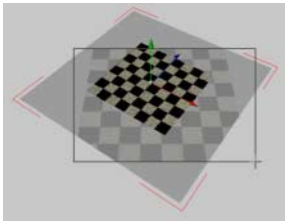
Fit to Image



You must apply your texture with flat projection if you wish to use this function. Type the name of an image into the dialog. BodyPaint 3D calculates the image's X and Y resolution and scales the texture image accordingly.

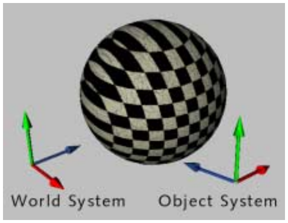
You can use this function to ensure that your texture uses the correct proportions, thereby avoiding distortion.

Fit to Region



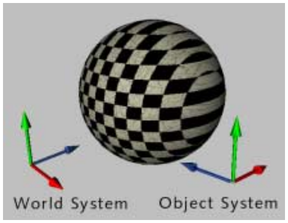
You must apply your texture with flat projection if you wish to use this function. Use the mouse to drag a box. BodyPaint 3D will set the projection so that the size of the texture matches the specified region exactly.

Adapt to Object Axis



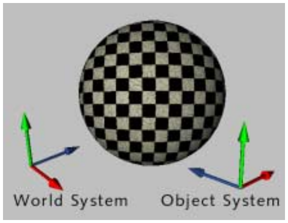
This function rotates the texture axes in such a way that they are parallel to the object axes.

Adapt to World Axes



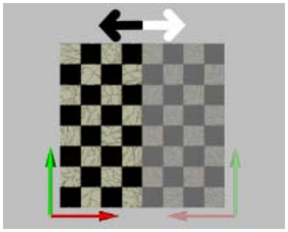
This function rotates the texture axes in such a way that they are parallel to the world axes.

Adapt to View



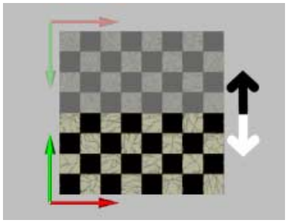
This command rotates the texture axes in such a way that the texture is perpendicular to the viewing perspective. For a 3D view this is the camera plane; for all other views it is the work surface.

Mirror Horizontally



This command flips the texture horizontally.

Mirror Vertically



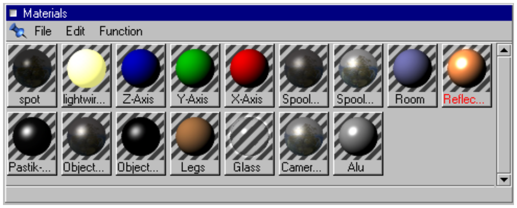
This command flips the texture vertically.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

12. Material Manager

12 Material Manager



You use the Material manager to create materials for the objects in your scene. Good materials and lighting are essential for photo-realistic images.

The Material manager contains all the materials and 3D shaders used in the active scene. A preview picture and a name is shown for each material. Names that are too long for the display space are shortened with a full-stop.

The material preview shows how the texture looks when placed on a sphere which is in front of a striped background. This helps you determine how the material will look when applied to an object. You can choose between three different preview sizes.

When an object is active, all the materials it uses are shown indented. This makes it easy for you to tell which materials an object uses.

If an individual texture tag (rather than the object itself) is active in the Object manager, only that corresponding material is shown indented.

You can apply a material to an object using drag-and-drop from the Material manager. You can drop the material on to the object in the Object manager, or you can even drop it directly on to the object in the Perspective View (see Applying a Texture, page 255).

If you drop a material on to a *texture tag* (aka texture geometry tag) in the Object manager, this material will replace the previous one and the existing texture geometry will be used.

If, instead, you drop a material on to an object name, a new texture geometry tag is created. Any existing texture tags remain intact so that you can layer textures. For details on layering, material administration and texture geometry see Texture Mapping, page 255.

If you click on a material preview, the material's name becomes red to indicate that it is the 'active material' (also known as the 'selected material'). Only one material can be selected at a time. You can also use the cursor keys to change which material is selected. All menu functions in the Material manager operate on the selected material.

If the Material editor is open, the active material's settings are displayed there. If the Material editor is closed, you can open it by double-clicking on the material you want to edit.

You can access many of the menu commands via the context menu. Please note that the context menu is accessible only if you have at least one material in the scene. If you are using a Windows operating system, you access the context menu by clicking the right mouse button in the Material manager. If you are using a Macintosh, hold down the Command key and click in the Material manager.

File Menu

New Material

This function creates a new material with the default material values (white with 80% brightness and a specular width and height of 20%). The new material will be placed at the start of the material list.

You can also access this function via the context menu.

New 3D Shader

New 3D Shader opens a submenu showing all the 3D shaders installed on your system. Select the name of a shader to add it to the material list.

Shaders, also known as procedural textures, are more sophisticated than conventional textures. Shaders are computed using mathematical formulae whereas conventional textures are pixel-based. One advantage of shaders is that they do not become pixelated when viewed close-up.

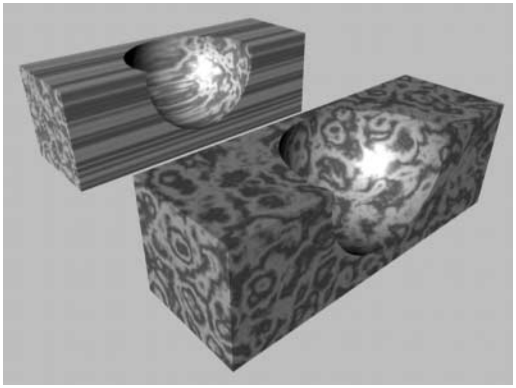
BodyPaint 3D recognizes two-dimensional and three-dimensional shaders.

2D shaders can be loaded in the Material editor in the same way you would load a conventional texture.

3D shaders cannot be loaded from the Material editor. This is because 3D shaders take an object's volume into account, whereas 2D shaders and standard textures are simply applied to the object's surface. 3D shaders are independent of the object's geometry and the texture projection type (an exception is that UVW projection can be applied to volume shaders).

The difference between conventional textures and 3D shaders is particularly apparent when applying them to an object with a section cut out. With conventional textures, you can see the edges of the cut very clearly. With 3D shaders, the cut is taken into account.

The following picture compares a 2D texture with a 3D shader. Note how the 3D shader seems to flow from the sides and into the hollow.



A 2D shader (top) in comparison with a 3D shader

3D shaders can do even more. For example, the Fog shader fills a volume with fog clouds. Shaders are often used with simple objects (such as a cuboid) to create computer-generated landscapes.

Please note that you cannot load 3D shaders *into* a material; they are materials in their own right.

Note

BodyPaint 3D computes 3D shaders using SAT Mapping (see page 217).

Note

The shaders can only be evaluated in CINEMA 4D or BodyPaint 3D. If you save an object or a scene in another file format, the shader information is lost.

For a detailed description of the 2D and 3D shaders supplied with BodyPaint 3D, please see page 238, The Shaders.

Load Materials

This function loads materials, adding them to any materials already in the scene. You can also import materials from another scene by loading the scene file.

A word of caution regarding textures: when BodyPaint 3D renders the scene, it must locate all the textures. BodyPaint 3D will look for the textures in the same folder as the scene, as well as in a sub-folder called 'Tex'. In addition, you can specify up to 10 alternative search paths (see Texture Paths, page 51). When the scene is to be used on another computer (perhaps by a colleague) we strongly advise that you save the scene using **Save Project** (see page 291). This will ensure that all of the textures are saved in a 'Tex' sub-folder along with the scene.

Save Material As

This function saves the active material. The standard system dialog for saving files will open. Once you have saved the material, you can reload it at a later date using **Load Materials**.

Save All Materials As

This saves all the materials in the active scene. You can use this function to create your own material libraries. Use **Load Materials** to import the materials at a later date.

Close

This function quits the Material manager and closes its window.

Edit Menu

Undo

Undo will undo the last change that you made to a material. Keep calling this function to continue undoing (multiple undo).

You can set the maximum number of undos using **Undo Depth** in the General Settings (see page 42).

Note

The functions Remove Duplicate Materials and Remove Unused Materials cannot be undone. If you delete a material, any objects which used that material will use the default material instead. Although it is possible to undo the deleted material, it will not be reapplied to the objects; you must do this manually.

Redo

Redo undoes an undo. You can set the maximum number of undos using **Undo Depth** in the General Settings (see page 42).

Cut

Cut removes the active material from the Material manager and copies it to the clipboard. You can use the **Paste** function to retrieve the material from the clipboard, even if you have changed the active scene (i.e. you can paste between scenes).

Copy

This copies the active material to the clipboard. Use the **Paste** function to retrieve the material from the clipboard. Note that you can paste more than one copy; each new copy is added to the start of the material list.

Note

To quick-copy materials, drag-and-drop with the Ctrl key held down. Drop the copy at the required position in the material list. The first copy will be called 'name.1', the second copy will be called 'name.2' and so on.

Paste

The **Paste** function inserts the last material that you copied (or cut) to the clipboard. The copy will be placed at start of the material list. The first copy will be called 'name.1', the second copy will be called 'name.2' and so on.

Delete

This function deletes the active material. Alternatively, press the Delete or Backspace key.

Small, Medium, Large Icons

Select one of these three settings to determine the size of the material previews (the default is small). Small icons are 45x45 pixels, medium icons 60x60 pixels, large icons 90x90 pixels. The preview pictures may be slightly pixelated with some graphics cards. Do not be concerned, there are technical reasons for this.

Function Menu

Render Material

This function redraws the preview picture of the active material.

When you create a new material, it is rendered automatically. Why, then, would you need to use this function?

When you save a scene, the preview pictures are compressed to reduce the file size. As a result, when you load a previously saved scene, you may notice artifacts with some materials.

Also, preview pictures are not rendered automatically when importing foreign formats such as DXF or 3D Studio R4.

If only the base color is shown after rendering the material, BodyPaint 3D was unable to find the texture(s).

When saving scenes for use on another computer, you can ensure that all textures are included by using **Save Project** (see page 291).

If you cannot find a texture, select an alternative texture or delete the name on the appropriate page of the Material editor.

You can also access this function via the context menu.

Render All Materials

This function redraws the preview pictures of all the materials.

When you create a new material, it is rendered automatically. Why, then, would you need to use this function?

When you save a scene, the preview pictures are compressed to reduce the file size. As a result, when you load a previously saved scene, you may notice artifacts with some materials.

Also, preview pictures are not rendered automatically when importing foreign formats such as DXF or 3D Studio R4.

You can cancel the render process with the Esc key. If you are using a Macintosh, you can also cancel with the standard Command-dot keypress.

If only the base color is shown after rendering the material, BodyPaint 3D was unable to find the texture(s).

When saving scenes for use on another computer, you can ensure that all textures are included by using **Save Project** (see page 291).

If you cannot find a texture, select an alternative texture or delete the name on the appropriate page of the Material editor.

You can also access this function via the context menu.

Sort Materials

This will arrange the material list into alphabetical order.

You can also sort materials manually using drag-and-drop. This lets you position the materials in any order you like. Drop the material in the position of your choice. The insertion is right-justified, which means it will appear to the right of the material that you drop it on.

If the target position of the material is outside the visible range of the Material manager, you can scroll by moving the mouse to the upper or lower edge of the window.

You can also access this function via the context menu.

Edit

This function opens the Material editor if it is not already open, and the Material editor will become the active window. You can use the Material editor to change the properties of the active material.

You can also open up the Material editor by double-clicking on a material's preview picture. For more details on the Material editor see below.

You can also access this function via the context menu.

Apply

Apply creates a texture geometry for the active object. The active material is applied to the texture geometry.

You can alternatively apply the material with drag-and-drop. If you drop the material on to an existing texture geometry tag...

...the previous material in the tag is replaced by the new one. If, however, you drop the material on to the object name, a new texture geometry is created for the material.

Texture geometry is described in detail on page 255 under Texture Mapping.

Note

Hold down the Shift key if you do not want the texture geometry dialog to open.

You can also access this function via the context menu.

Rename

Use this function to change the name of the active material.

It's also possible to rename a material by double-clicking on its name, which is just below its preview picture.

You can also access this function via the context menu.

Remove Unused Materials

This deletes all materials which have not been applied to objects in your scene.

This function is particularly helpful when using material libraries as it will remove the (possibly many) unused materials.

You can also access this function via the context menu.

Note

The Remove Unused Materials function cannot be undone.

Remove Duplicate Materials

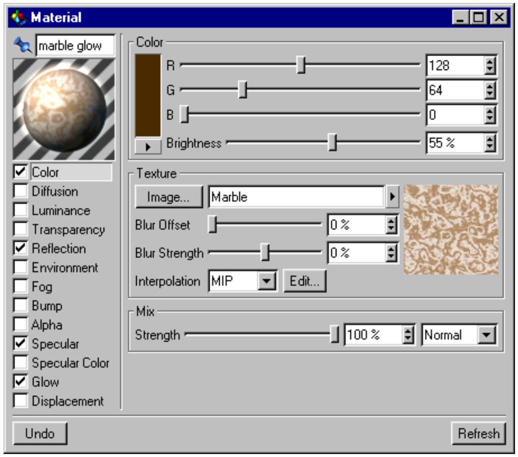
This deletes all materials of the same name which have identical parameters.

You can also access this function via the context menu.

Note

The Remove Duplicate Materials function cannot be undone.

The Material Editor



You use the Material editor to change a material's properties.

Open the Material editor by double-clicking on a preview in the Material manager. The Material editor is a non-modal window, which means that it does not have to be closed before you can edit another material. Simply click once on another material in the Material manager and it will appear in the Material editor. This helps speed up your workflow.

You do not have to close the window in order for the parameter changes to be remembered.

If you do not like the changes that you have made and wish to revert the material to its previous state, click on the **Undo** button. This function is for the active material only. You can restore other materials by using the **Undo** menu function.

Click on the **Refresh** button to reshade the objects in the Perspective View (an automatic refresh would take up too much CPU time).

The Material editor window is divided into as many as five panes. The material display is at the top-left.

There are also 13 parameter pages. The settings on the parameter pages combine to form an overall material property. The entire settings for a parameter page can be activated or deactivated using the corresponding checkmark below the material preview. Do not be daunted by the sheer number of settings! Each parameter page operates in a similar way and the control elements are located in the same place. To access a parameter page, click on the parameter name that you require, e.g. **Diffusion**.

Property	What it controls
Color	Surface color
Diffusion	Irregularities in surface color (works by lightening and darkening the color channel)
Luminance	Luminescent color (light-independent color)
Transparency	Transparency (including refraction index)
Reflection	Ability to reflect other objects
Environment	Environment reflection (simulates reflection)
Fog	Fog effect
Bump	Virtual bumps on a surface
Alpha	Localized texture invisibility
Specular	Highlight
Specular Color	Highlight color
Glow	Halo around an object
Displacement	Authentic bumps on a surface

The Color Pane

Most parameter pages have a color that you can adjust. Depending on your General Settings (see Color System, page 43), you will adjust the color using either a color table or sliders. The meaning of each slider also depends on the General Settings. You can use either the HSV color system or the RGB color system and you can choose whether the units should run from 0-100%, 0-255 bits, or 0-65535 bits.

Use the **Brightness** slider, which is below the three color sliders (**R** red, **G** green, **B** blue or **H** hue, **S** saturation, **V** value), to adjust the overall brightness of the color. Note that if you are using the HSV system, the **Brightness** slider has the same effect as the **V** slider (i.e. you do not have to use the **Brightness** slider; you can leave it at 100%).

The resultant color is shown just to the left of the sliders. Click on this color field if you want to open the color dialog for your system.

Earlier we said you can change the color system by using the General Settings. You can also change the color system by clicking on the small, right-facing triangle just below the color field. A popup menu will open for you to select your color system. The Material editor will use the new system (or color table) for as long as it is open. The moment you close the Material editor, it will revert to the color system that is selected in the General Settings.

The Texture Pane

Use the texture pane to select a two-dimensional picture, a 2D shader or a movie (QuickTime, AVI or a frame sequence). Your selection will be used as a texture. BodyPaint 3D recognizes these formats: JPEG, IFF (ILBM), TIFF, TGA, BMP, PICT, Photoshop PSD, MOV and AVI. All formats supported by QuickTime are also recognized, provided that QuickTime is installed on your system.

Note

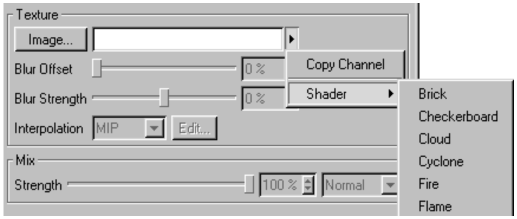
Avoid using numbers in picture filenames such as 'leaf01', 'leaf02'. This is because BodyPaint 3D tries to interpret files numbered in this way as a frame sequence. Unless you really are working with a frame sequence, use more descriptive names rather than numbers (e.g. 'leaf_maple', 'leaf_oak').

Note

You can load an animation into a material, but you cannot paint it. If you are editing CINEMA 4D scenes that contain animated textures, replace the textures if necessary.

The shader pop-up also contains submenus to provide a better overview. This makes it easy to find the shader you need. You can define the hierarchical structure yourself by arranging folders and subfolders inside the 'Plugins' folder. However this is possible only if the plug-in author has not defined the menu position for the plug-in; if so, you cannot change the menu position of the plug-in.

You can copy and paste shader settings from one material channel to another by using **Copy Channel** and **Paste Channel**. So it is just a few clicks to adjust, say, the bump channel to the color channel. Of course, this works only for channels which accept textures and shaders.



Shader submenu

Once you have selected a texture, its preview will appear to the right with three numbers immediately below. These numbers tell you the width, height and color depth of the texture. You can copy a color from the preview to the color pane by clicking within the texture preview; this acts like a color picker.

Image

Use the **Image** button to load a texture into the texture pane. Use the system dialog to load an image file from either your scene's folder, your scene's 'Tex' sub-folder, or a texture path that you have specified in the General Settings (see page 51). A dialog will warn you if the image file is not in a search path and you will be asked if you wish to copy the image to the document's folder or, if your scene does not have its own folder yet, to the BodyPaint 3D root folder.

Once you have loaded a texture, its path name appears in the text field. To the right you can see the texture's preview picture.

Note

BodyPaint 3D searches for textures in the 'BodyPaint 3D/Tex' folder, the scene's folder, the scene's 'Tex' sub-folder and the texture paths specified in the General Settings (including sub-folders).

If BodyPaint 3D cannot find a texture when rendering, a message will appear to tell you which textures are missing and which materials use these textures. You can still render the scene (just click on OK); the materials concerned will be used without the missing textures.

You can load a 2D shader into the texture pane by clicking on the small, right-facing triangle to the right of the image button. Select your shader from the popup menu.

You can also use the small, right-facing triangle to reload the image. This is useful if you have changed the texture in an imaging program and the preview is now out of date. Reload the image by selecting the top entry, **Reload Image**.

Note

You cannot reload a texture while it is in use (e.g. during rendering).

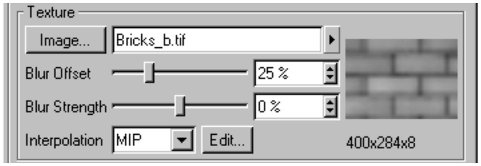
Note

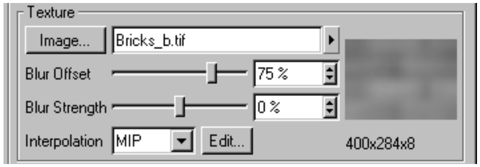
The shaders can only be evaluated in CINEMA 4D or BodyPaint 3D. If you save an object or a scene in another file format, the shader information is lost.

Blur Offset / Blur Strength

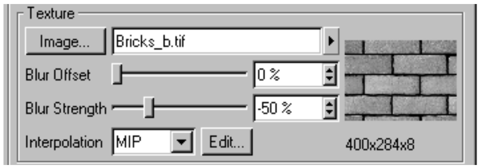
MIP and SAT mapping only approximate the optimum computation, since a precise computation would increase the render time greatly. SAT mapping is more accurate than MIP mapping. But sometimes these approximations can make a texture too blurred or too sharp. Hence the usefulness of these options.

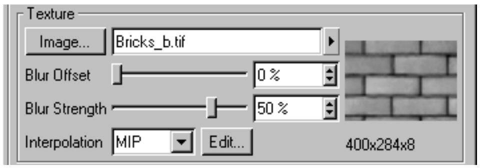
Blur offset softens a texture. The illustration below shows how you can use this setting to blur a texture.





Use **Blur Strength** to fine-tune the strength of the MIP/SAT mapping. A positive value increases the blur; a negative value weakens it.



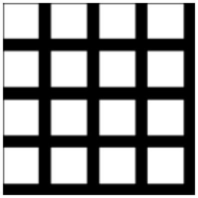


Interpolation

Use **Interpolation** to change the method by which a texture's pixels are interpolated.

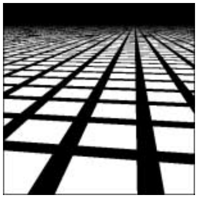
There are several interpolation types. Each type is explained below using an example picture. In particular, we pay special attention to MIP and SAT mapping.

The texture we used was a mere 16x16 pixels in size and was placed on to a floor object.



None

When the interpolation type is set to **None**, the original texture values are used without any interpolation. This method is very fast but often gives poor results. Textures tend to become pixelated.

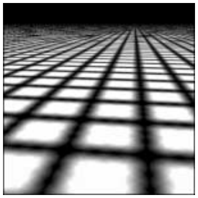


You can try to compensate for the pixelation by using a high antialiasing setting.

Generally, avoid using this interpolation type unless you are sure of what you are doing.

Circle

Circle interpolation uses a circle of texture pixels (those that surround the intermediate value). Textures that are enlarged at render time tend to look more natural than with the **None** interpolation type. However, as the picture below demonstrates, straight lines are a problem.

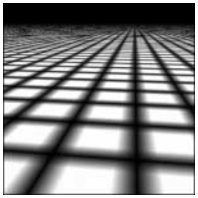


The lines seem to be frayed at the edges.

Circle interpolation is, however, well suited to very small textures (e.g. 3x3 pixels), since it helps the pixels to blend softly.

Square

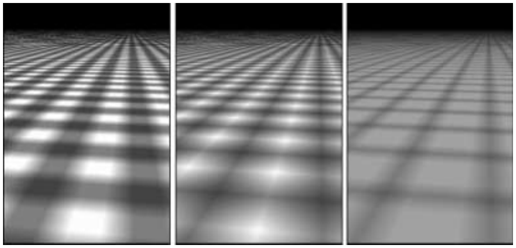
Square interpolation uses a square of texture pixels (those that surround the intermediate value). This leads to a softer transition between texture pixels than with the **None** interpolation type.



The image quality is good, although it deteriorates towards the horizon (especially with floor textures).

Alias 1, Alias 2, Alias 3

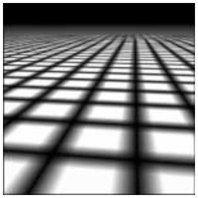
Alias 1, **Alias 2** and **Alias 3** interpolation blend the texture more strongly than with **Circle** and **Square** interpolation. **Alias 3** blends the most, **Alias 1** the least.



In the picture above, the texture is difficult to recognize with **Alias 3** because it is so small (16x16). **Alias 3** can give smoother results than **Alias 1**, but it also takes longer to calculate.

MIP

MIP stands for *multum in parvo*, which is Latin for many things in a small place. When many texture pixels effectively lie within a single screen pixel, an approximation is made based on the (known) texture pixel values.



This results in very smooth blending. **MIP** is the default mapping type.

SAT

SAT stands for *summed area tables* and it does an even better approximation than MIP mapping. As with MIP mapping, the approximation is based on the texture pixels that lie within a single screen pixel.

SAT is the highest-quality interpolation type.

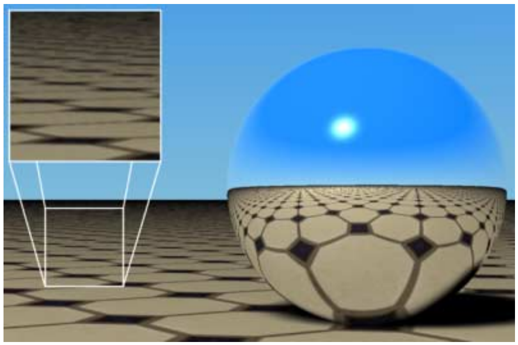
Note

SAT mapping works with textures up to 4000x4000 pixels. BodyPaint 3D will use MIP mapping automatically if you try to use SAT mapping with larger textures.

MIP/SAT mapping

MIP and SAT mapping are very important for top-quality rendering. MIP mapping is the default interpolation type.

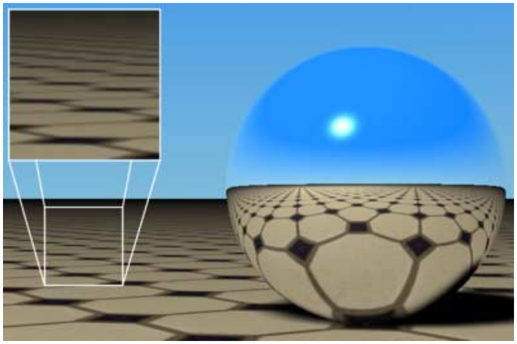
The next two pictures demonstrate MIP/SAT mapping. The top picture was rendered with the antialiasing set to **Always** and oversampling set to **2 x 2**. The tiled texture used **Circle** interpolation. Although the quality is relatively good, you can see how it falls apart near the horizon.



The texture breaks up near the horizon.

This effect is caused by perspective distortion. Each screen pixel representing the floor near the horizon contains perhaps hundreds or even thousands of texture pixels. MIP and SAT mapping approximate a value using these pixels. Only an approximation is made, since calculating the exact value would increase render time greatly.

The lower picture shows **Edge** antialiasing with **2 x 2** oversampling. The material used SAT interpolation. Now even the reflection in the sphere looks great.



A smooth horizon!

SAT and MIP mapping give you superb render quality. As with most things wonderful, there is a price to pay; MIP and SAT mapping *love* memory.

MIP mapping needs an extra byte of memory per texture pixel. SAT mapping is even greedier, consuming an extra 12 bytes per texture pixel.

So, although SAT mapping gives you higher render quality than MIP mapping, MIP mapping needs far less additional memory. Because of this, MIP mapping is BodyPaint 3D's default interpolation type.

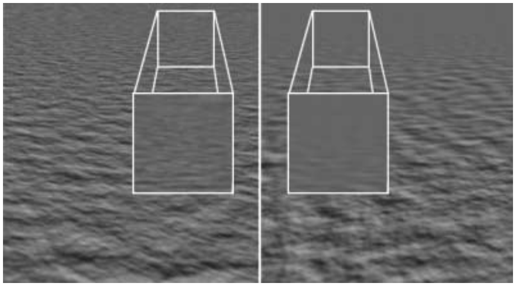
As a rule of thumb, use MIP mapping initially, then switch over to SAT mapping if required.

Interestingly, BodyPaint 3D's shaders use SAT mapping automatically without consuming additional memory.

MIP and SAT mapping will affect your render time. On the one hand, MIP and SAT mapping take longer to render. On the other hand, you may be able to reduce the antialiasing setting. Sometimes you can even work with just **Edge** antialiasing. In any case, the superior render quality more than makes up for a slight increase in render time.

MIP Falloff (Bump page)

Use **MIP Falloff** to help enhance the MIP/SAT mapping effect for bump maps. This will reduce the strength of the bump map with increasing distance from the camera.



Left, no falloff; right, MIP falloff active

Edit

If you have loaded a 2D shader into the texture pane, you can access its parameters by clicking on the **Edit** button.

If you are using the integrated version of BodyPaint 3D with CINEMA 4D, you can load a movie from the texture pane (QuickTime, AVI or a frame sequence) - click on the **Edit** button to access the time control for the movie. Please see your CINEMA 4D Reference manual for details.

Note

You can load an animation into a material, but you cannot paint it. If you are editing CINEMA 4D scenes that contain animated textures, replace the textures as necessary.

The Mix Pane

You use the Mix pane to mix the color and texture channels using one of four mixing modes. The default mixing mode is **Normal**, apart from the Environment page which uses **Multiply** as the preset.

Not all pages have a mixing pane.

If you load a texture or a 2D shader, it is placed on a *layer* above the color (i.e. the texture is placed on top of the color) and you can use the **Strength** slider to set the mixing proportion between the texture and color panes.

The Mixing Modes

Normal

In normal mode, **Strength** sets the opacity of the texture. If **Strength** is set to 100%, then you see the texture only (remember, the texture is the top layer, so if it is opaque, you will not see the color underneath). If **Strength** is set to 70%, the result is 70% of the texture and 30% of the color.

Let's take an example: if a texture pixel of RGB 255/0/0 (red) is used with a color value of RGB 255/255/0 (yellow) with **Strength** set to 50%, the resultant color is 255/128/0 (orange).

Add

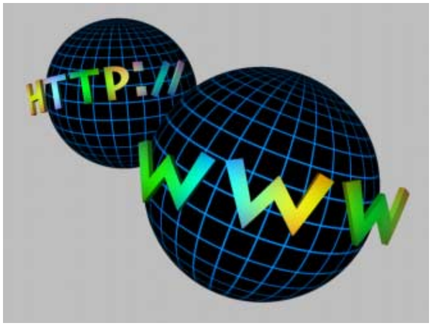
The texture's RGB value is added to the colour's RGB value. Color channel values cannot exceed the maximum of RGB 255. So if a texture pixel of RGB 0/255/255 (cyan) is added to a color value of 255/255/0 (yellow), the result is 255/255/255 (white).

Subtract

The colour's RGB value is subtracted from the texture's RGB value. Thus if a texture pixel is RGB 255/255/255 (white) and the color value is 255/0/0 (red), subtracting with 100% strength gives the result 0/255/255 (cyan).

Multiply

The RGB value of the texture is multiplied by the RGB value of the color. **Multiply** takes as its result the lowest R value, the lowest G value and the lowest B value of the texture and color. For example RGB 255/128/0 (orange) multiplied by RGB 0/255/0 (green) results in RGB 0/128/0 (dark green).

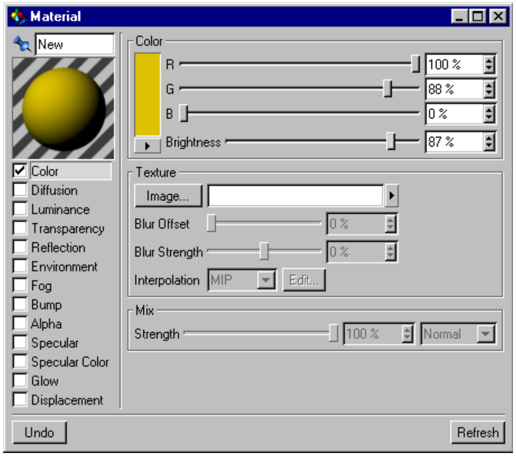


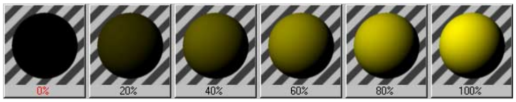
By layering textures over colors you can create some spectacular materials

The Material Editor Pages

Color

You use the Color page to set the basic color of the material, e.g. RGB 255/0/0 (red).





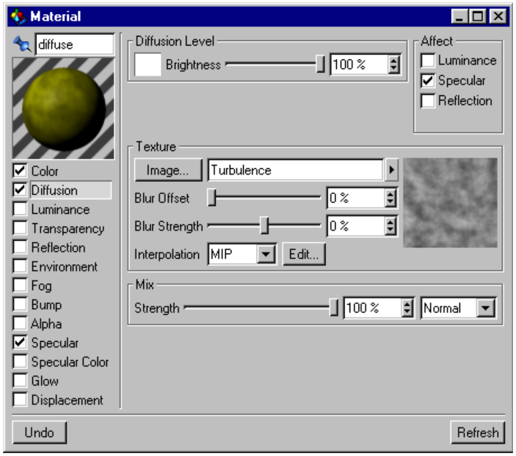
If you want to create a more complicated material (such as a chequered pattern using several colors), use the Texture pane. The texture is layered above the color. If you want to see the color only and not the texture, set the **Strength** slider in the Mix pane to 0%.

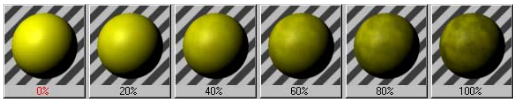
Note

If you set the Strength slider to 0%, the texture is not loaded into memory since no calculation is required.

Diffusion

The Diffusion page lets you darken and lighten the material in specific areas using a *diffusion map*. One reason why you might want to use a diffusion map is to add dust or dirt to the material, helping you achieve a more natural look. The diffusion property is a must for photorealistic results.



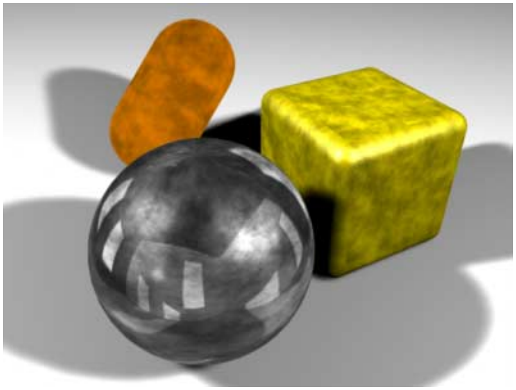


You use either a conventional texture or a 2D shader as the diffusion map. (If the texture is colored, it will still be treated as a grayscale map.) The darker a pixel in the diffusion map, the darker the corresponding region of the material.

You select the **Luminance** option if you want to use a diffusion map with the luminance property. The darker a pixel in the diffusion map, the darker the corresponding region of the luminance. This helps you add irregularities to the luminance to achieve a more natural look.

The **Specular** option applies the diffusion map to the specular property as well. This will reduce the material's specular values where the diffusion map is dark. This option is selected by default, since it enhances the realism considerably.

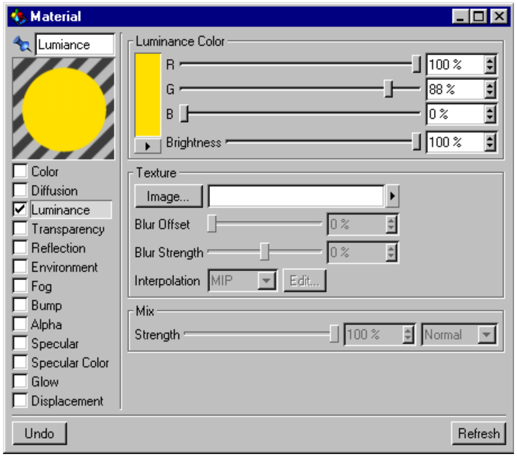
Select **Reflection** if you want to apply the diffusion map to the reflection and environment properties for an even more natural look. The darker a pixel in the diffusion map, the darker the corresponding region of the reflection.

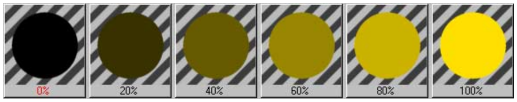


Luminance

A luminescent object can be seen even when there are no lights in the scene. It is self-illuminated.

You can use the **Image** button to load an image that is to act as a *luminance map*. The brighter a pixel in the luminance map, the more luminescent the corresponding region of the material.





If you have chosen a Luminance Color and loaded a texture (luminance map) as well, the color will be added at 100% strength to the texture. If you want to see the result without the chosen color you can set the **Mix** slider to 0%.

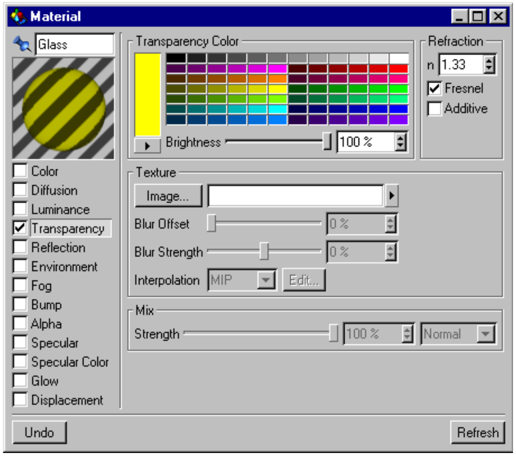
Luminescent materials are used to help simulate objects that seem to be self-illuminated in the real world, e.g. the windows of an office block late at night, or neon writing.

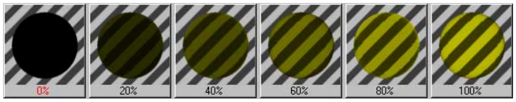
Note

The Luminance property does not emit light, i.e. an object with a luminescent material will not cast light on to other objects. If you want to simulate the light cast by luminescent objects, use light sources.

Transparency

You use this page to make a material transparent or semi-transparent.





If your material also has a color, the color is automatically reduced with increasing transparency.

The equation is: *color percentage + transparency percentage = 100%*.

So a white material with 0% transparency is white (100%). A white material with 50% transparency is 50% white (gray). A white material with 100% transparency has no color.

If you select the **Additive** option, the color strength is not reduced automatically and unless you take care the material will look unnatural.

Transparency is similar to a light filter; black lets no light through, white lets all light pass.

You can use a texture as a *transparency map*. The brighter a pixel in the transparency map, the more transparent the corresponding region of the material.

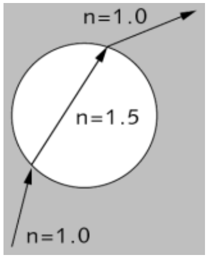
To control the transparency via the Transparency Color only, set the **Strength** slider in the **Mix** pane to 0%.

A transparency texture is similar to a photographic slide. Red parts of the slide allow only red light to pass through; white parts allow all the light through. With black, no light can pass through the slide.

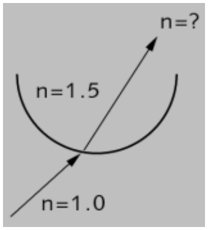
You can use a transparent material with a light source to create a *light map*. If a transparent texture is assigned to a light source, the light will be filtered according to the texture's coloration, just like a real slide. You can use this effect to simulate disco lights, light cast from a monitor and so on.

You can also simulate the refractive index of a material by setting the **n** value on the Refraction pane. There is, of course, no point setting the refractive index unless the material is transparent or semi-transparent.

Objects that are not closed (such as a hemisphere without a cap) can give unexpected results with refraction:

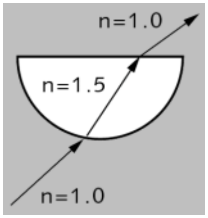


When a ray hits a surface with transparency and refraction, the ray is bent to simulate refraction. The bent ray is considered to be inside the object. When the ray reaches another surface of the object (the exit side), it is bent back as in real life. If, however, you are using an open object, the ray may not hit a second surface of the object.



The raytracer will think that the ray is still inside the object (e.g. the open hemisphere), because it never meets an exit surface (which would bend the ray back as in real life).

Avoid using open surfaces with refraction, otherwise you may get unexpected refraction results. In the example, you could effectively close the open hemisphere with a second wall or a cap; the important thing is to make sure there is an exit surface, otherwise the poor ray still thinks it is inside the object.



If you activate the **Fresnel** option, the viewing angle (i.e. the angle between the camera and the surface) will affect the transparency and reflection values. If in real life you look at a pane of glass with your eyes parallel to the pane (i.e. with a 90° viewing angle), you will notice that the pane barely reflects; almost all light passes through. However, look at the pane from a narrow viewing angle and you should see that it reflects much more of its surroundings. The transparency and reflection values are dependent on the viewing angle. The **Fresnel** option simulates this phenomenon for you.

For example, if you have transparency with RGB values 80%, 80%, 80%, the material is 80% transparent and 0% reflective with a viewing angle of 90°. With a very low viewing angle, the material is approximately 0% transparent and 80% reflective.

If you have entered a reflection value in addition to transparency, the reflection value is added to the angle-dependent reflection.

With Fresnel switched on, the water's reflectivity increases towards the horizon

If **Fresnel** is not selected, the transparency and reflection values are used as they are, irrespective of the viewing angle.

Note

If there are a large number of overlapping transparent objects in your scene, you may notice that some of the overlapping areas are black when rendered instead of transparent. In this case you need to increase the Ray Depth value on the Options tab of the Render Settings (see page 417).

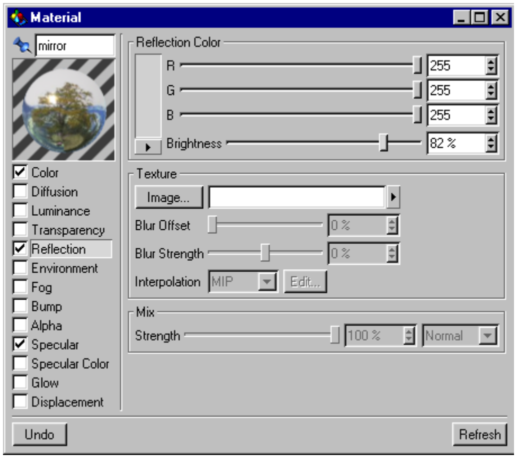
You may also encounter problems with the **Threshold** default value of 15% (see page 418). Try lowering the **Threshold** value to 0%.

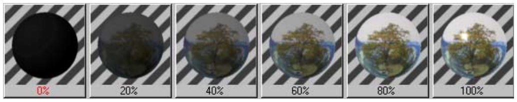
Some useful refraction values

Material	Refractive Index
Vacuum	1.000
Air	1.000
Ice (H_2O)	1.310
Water	1.333
Glass	1.440 – 1.900
Obsidian	1.480 – 1.510
Onyx	1.486 – 1.658
Acrylic glass	1.491
Benzene	1.501
Crown glass	1.510
Jasper	1.540
Agate	1.544 – 1.553
Amethyst	1.544 – 1.553
Common salt	1.544
Amber	1.550
Quartz	1.550
Sugar	1.560
Emerald	1.576 – 1.582
Flint glass	1.613
Topaz	1.620 – 1.627
Jade	1.660 – 1.680
Sapphire	1.760
Ruby	1.760 – 1.770
Diamond	2.417 – 2.419

Reflection

You use the Reflection page to set a material's ability to reflect. The color that you set determines the color of the reflection.





You can use a grayscale texture as a reflectivity map. The brighter a pixel in the reflectivity map, the more reflective the corresponding area of the material.

You can also use a coloured texture in the texture pane. The color of a pixel will affect the color that is reflected from the corresponding area of the material.

To control the transparency via the Reflection Color only, set the **Strength** slider in the **Mix** pane to 0%.

The picture above shows some reflectivity effects including a reflectivity map. The flask has a simple reflective material. Note how the reflection of the rod is distorted as you would expect in real life.

Look closely and you will see that the flask itself is reflected on the tiles.

Look even more closely and you should see that the flask is reflected on the tiles but not on the joints, even though the tiles and joints are part of the same tiled material.

This effect was created by using a grayscale reflectivity map. The reflectivity map was based on the original tile and joint texture. In the areas covered by a tile the reflectivity map is white. In the joint areas the reflectivity map is black. The resultant map means that only the tiled areas, not the joints, are reflective.

This is just one example of how you can combine several properties to create more realistic materials.

Note

If there are lots of reflective objects in your scene, you may notice that with some of them shadows do not appear in the reflections. To make the shadows appear, increase the Shadow Depth value on the Options tab of the Render Settings (see page 418).

Similarly, you may notice that subtle reflections are missing. In this case set the **Threshold** value in the Render Settings to 0 (see page 418).

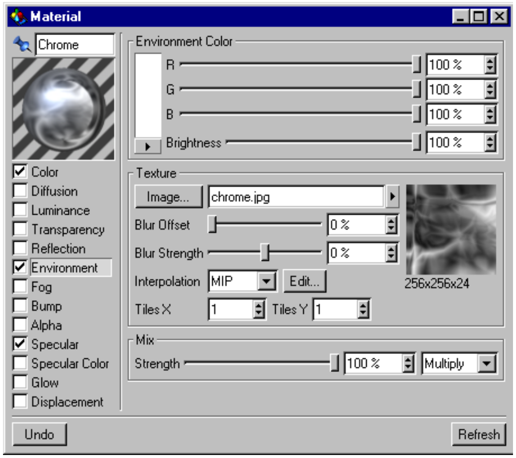
Environment

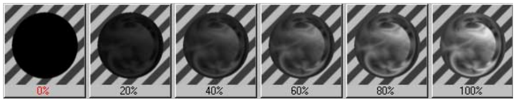
The Environment page uses a texture to simulate reflection. Here, in contrast to the other pages, the Color and Texture are *multiplied* in the Mix pane (i.e. not added).

Why would you want to use the environment property instead of reflection? One reason is that your scene may not have enough objects in it to produce good results with reflection. Another reason is that the environment property renders more quickly than the relatively sluggish reflection property.

However, the reflection property has a very important advantage: it can simulate the object reflecting itself. Just how important self-reflection is depends on the object.

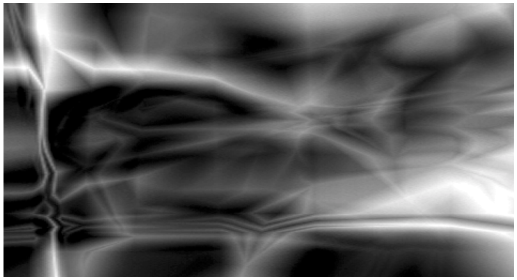
Imagine the handle of a gold carriage clock. The clock looks odd if the handle is not reflected on the top lid. With a metal ball-bearing, on the other hand, there is no self-reflection in real-life, so environmental reflections are fine.





In practice, sometimes you will use an environment map and reflection in the same material to get the best of both worlds (self-reflection and realistic reflection despite a lack of other objects to reflect).

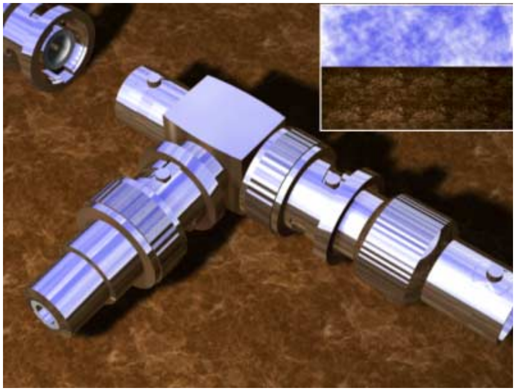
Environment reflections are very useful for simulating metal surfaces, which typically have soft transitions from black to white.



The environment property is independent of the projection type of the material. The environment is always placed spherically around the object, parallel to the world axis. Use **Tiles** to set the number of tiles in the X and Y directions. Note that these tile settings are used instead of the tile options in the texture geometry (see page 255). The latter settings are ignored for the Environment property.

Note

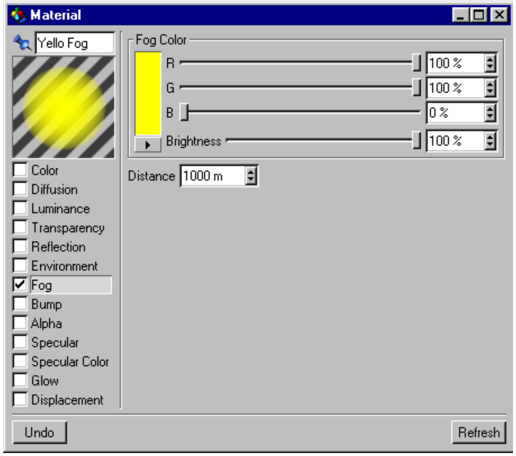
Environment reflections are rendered very quickly, since the raytracing mode is not required.

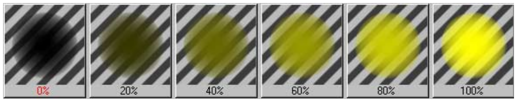


The reflections on the BNC connectors were simulated using the environment property only

Fog

With these parameters you can simulate fog or gas clouds. Objects with such materials are translucent but weaken the light that shines through them, depending upon their density.





If a light ray penetrates into the fog, it is weakened. You can control this weakening with **Distance**. The larger this value, the thinner the fog. **Distance** indicates at which distance a light ray is completely weakened.

You can also color the fog and this also affects its visibility. The further you look into the fog, the less the objects are visible and the more the fog color becomes visible.

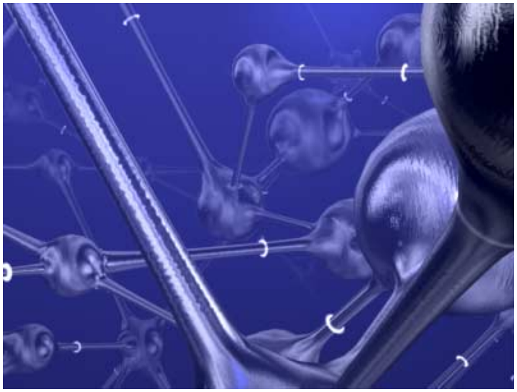
The fog color therefore also depends on the distance value. If you choose, say, a **Distance** of 500 units, a light ray of originally 100%

intensity has an intensity of 50% after a distance of 250 units while after a further 250 units it is extinguished completely.

The shorter the distance, the thicker the fog appears. In addition to this effect, after 250 units half the fog color is added to the light and after 500 units the full fog color is added.

You can use fog objects for the simulation of smoke and vapor in mountain valleys or for clouds, among many other things.

Fog objects should be always closed volume objects. Non-closed objects can lead to physically incorrect results since a light ray, having once entered the object never again emerges from the object. The raytracer then assumes that the light ray is still lost in the fog.



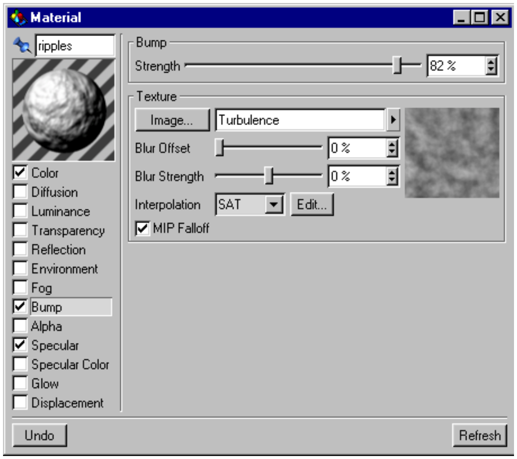
In the illustration above the scene was placed into a square filled with fog.

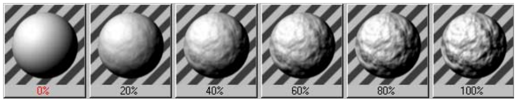
Note

Fog uses the refractive index defined in Transparency and deactivates the transparency. Fog and transparency are thus never rendered together, you can render either fog or transparency.

Bump

Activate this option to produce a bump map, or relief map, for your material.





When you select Bump you must always choose a texture since it is only from the greyscales in such an image that a bump map (a height or relief map) can be calculated.

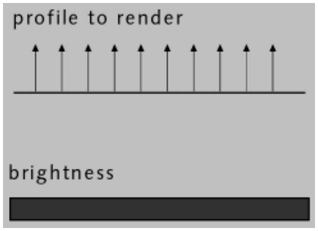
You can change the strength of the bump map with the **Strength** slider. This value controls how far the normal vectors of the object to which the material is applied change when the bump is calculated at render time. The higher the value, the rougher the surface.

However, apply large values carefully since a material can look unrealistic with high bump values due to the large jumps in lighting. If you move the slider to the left, you can choose negative values. If the strength is negative, the bump effect is reversed; bright pixels within the map cause the material surface to indent and darken while darker pixels elevate the height of the normals.

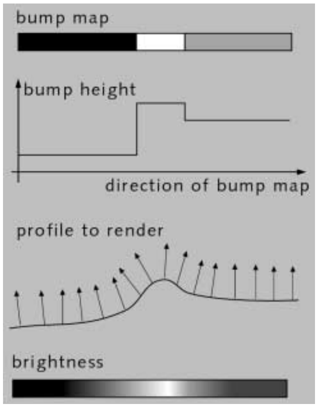
Note

You can type in values over 100% (up to 500%). This can be meaningful and useful if you are using MIP or SAT mapping since, in those cases, the bump map is rendered somewhat flatter than usual.

Here is an even surface, viewed from the side.



Since during the lighting of such an even surface the same normal vector is used, the surface shows a uniform brightness. But if you use a bump texture, BodyPaint 3D interprets the brightness values of the picture as height values for the surface, as you can see in the following picture.



These height values are converted into a profile, whose height affects the inclination of the normal vectors. Although the surface is actually smooth, through the change in the normal vectors an apparently three-dimensional surface with a bump-like structure is created at render time; this is shown in the picture below.

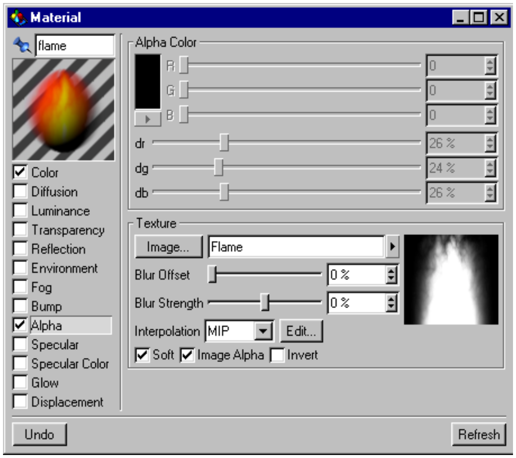
You can strengthen the MIP/SAT mapping effect when using bump mapping by selecting **MIP Falloff**. The bump mapping effect is then reduced more strongly with increasing distance from the camera.

Left without, right with MIP Falloff

Alpha

With the parameters of this page you can mask parts of a texture by selecting an image to apply to the material. There are two ways to do this:

- Use hard genlocking (so-called *clip mapping*) to mask particular areas with a color value.
- Use Alpha channels to mask areas softly and more accurately.



The idea is to define areas of your material that effectively become non-existent so that any underlying materials show through. The difference between the two modes is that with clip mapping color seams can be visible around the masked texture. Using alphas this can be avoided. Further, using alphas you can fade textures and materials softly from one to another, which gives you even more ways of creating realistic-looking objects.

If you switch off **Soft**, you can choose the color (using the RGB sliders) that is to be masked in the material.

Alternatively you can click on the texture preview picture and pick any particular color that exists in the material's color.

By setting values for **dr** (delta red), **dg** (delta green) and **db** (delta blue) you can define extra color deviations; in this way the color seam around the masked color can be adjusted.

Similarly, alpha/genlocking is often attempted with texture images that are antialiased; this produces a bright border around an object (caused by the antialiasing of colours between the main texture and the alpha color); by adjusting these deviation sliders you can remove this border.

With **Soft** enabled (the default setting) the color and delta sliders lose their meaning. The texture map is now used to decide which ranges should be faded. A white texture pixel within the image means that here the material is to be 100% opaque. If the texture pixel is black the underlying material shines through 100%.

With **Image Alpha** checked you can use any existing alpha channel of the loaded image. The following image formats support alpha channels: TIF, TGA, PICT and Photoshop. If you have installed QuickTime, additional formats may support the alpha channel. If no alpha channel is present, the **Image Alpha** option will be ignored.

Use the **Invert** function to invert the result of your genlock operation, without having to rework the texture in your image processor (e.g. Photoshop, PaintShop Pro).

Note

Many of the built-in shaders have built-in alpha channels (see Shaders below).

The simple clip mapping does not work with MIP and SAT mapping - only if you work with alpha channels can you use MIP and SAT mapping.

If many alpha materials are present on an object, it can happen that some underlying materials are not calculated at render time or are rendered partly with black areas. If this is the case, increase the **Ray Depth** option in the Render Settings (see page 417).

If clip mapping or alpha mapping affects a part of the surface, then the underlying material becomes visible. If the object does not have an underlying material, the object will be non-existent at this point.

An example

If you want to place, say, a scanned picture of a tree into a scene, you will create a material, activate the **Color** option, choose a picture of a tree as the color texture/image and then assign this material to, perhaps, a rectangular polygon.

If you render this scene now, you should see the tree on the rectangular polygon. However the area around the tree is probably not transparent but may well be blue (if the scanned picture has a blue sky background).

Now edit your tree material, check the **Alpha** option, switch to the Alpha page and load the tree texture there as well. Use the mouse to choose the color which you want to mask - in our case the blue sky around the tree.

BodyPaint 3D immediately sets the color sliders to this color and masks it according to the picture. You should now see only the tree without surrounding background (yes, in the Perspective View), assuming you have **Gouraud Shading** or **Quick Shading** on). You can now select a slightly different color on the Alpha page, click **Refresh** and see the effect immediately.

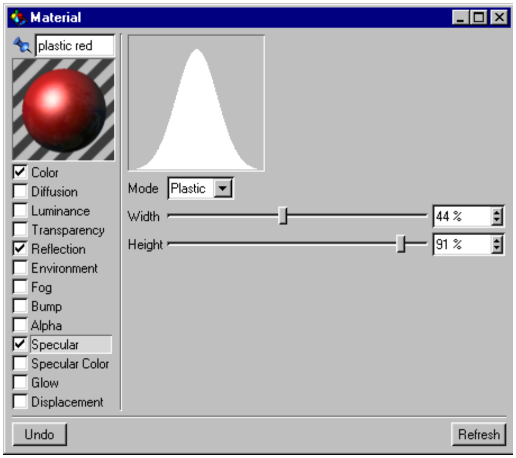
However it may happen that there is still some background left around the leaves, branches and the trunk. So the result is not quite right yet. To obtain a more accurate result, create an alpha channel in your favorite image processor (e.g. Photoshop, PaintShop Pro) and integrate this into your tree image - for details on how to do this consult your image processor manual. Then load that picture into the Alpha page and check **Soft** and **Image Alpha**. Now the texture is masked cleanly.

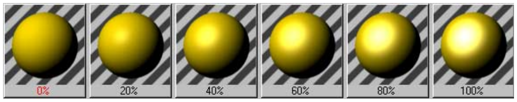
In the illustration below two materials have been used, a reflecting gold and a matt wood. To make the wood visible, one of the two colours was masked (i.e. genlocked) from a scanned black-and-white graphic.

The section on texture mapping describes the handling of several materials in detail, starting on page 255.

Specular

Here you can adjust the width and height of the specular, or highlight.

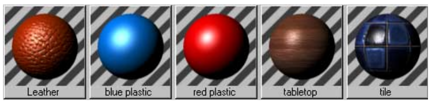




If you want a matt surface you should select broad and low specular values; for polished and shiny surfaces, however, narrower and higher values are appropriate.

You can also choose between two lighting models for the surface:

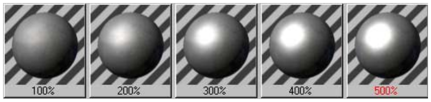
With **Plastic** the color of the specular is independent of the color of the material i.e. it will normally appear white. This mode is particularly useful for materials such as plastics, glass or wood.



With **Metal** the color of the specular is calculated from the material color. This lighting model is well suited to matt (i.e. not highly reflective) metal surfaces such as silver, brass and gold.

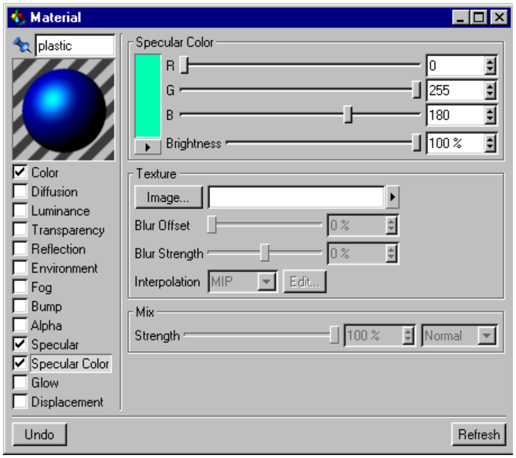
Note

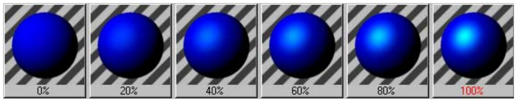
You can enter values over 100% (up to 1000%) for the height of the specular to achieve almost any result you want. To do this you must enter the values, numerically, into the box and not use the slider. High values can be very effective if you are using the Metal mode.



Specular Color

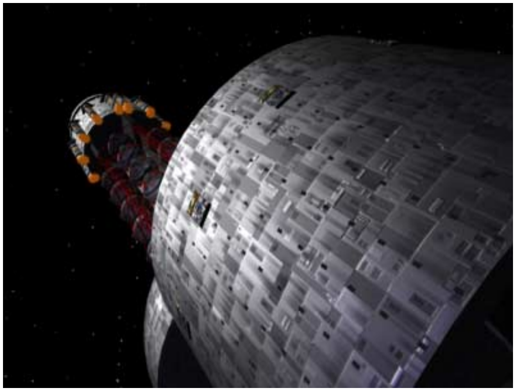
Here you can select the color of the specular. The strengths of the Color page and the Specular Color page are added together.





The total color here is multiplied with the normal color of the highlight. If, for example, you have a white plastic highlight, you can define its color here directly.

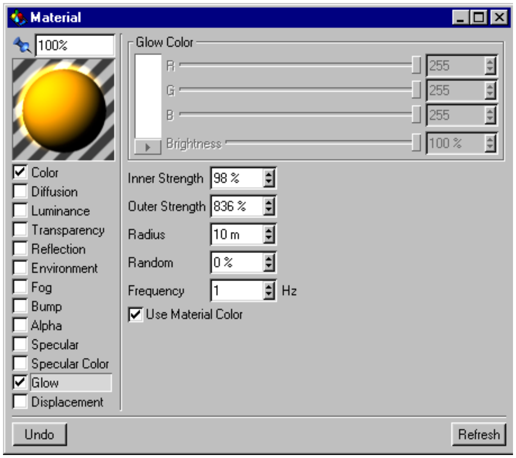
The intensity of the specular is affected by any chosen texture image (color or grayscale). The brighter a pixel in the image, the more evident the highlight is at that point.

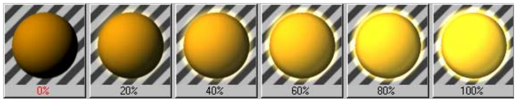


With metallic effects in particular, any highlight color other than white adds to the material's realism. The example above of a spaceship surface shows that quite clearly.

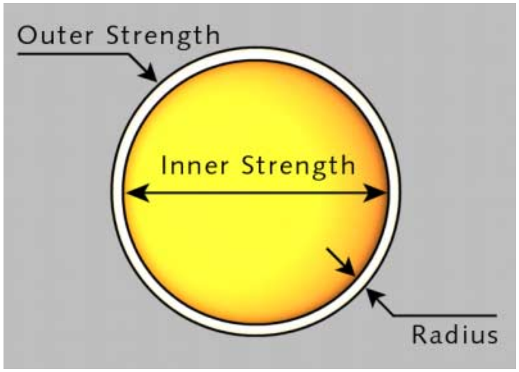
Glow

This property enables you to create a glow, a kind of halo that emanates from the object and surrounds it.





Inner Strength specifies the intensity of the glow above the material surface; **Outer Strength** is the intensity of the glow on the outside (at the edges).



The **Radius** determines how far the glow is to extend from the object. This value is rendered relative to the distance of the object from the camera. The further the object is, the smaller the glow and vice versa.

You can define a random factor as a percentage:

0%	No change
100%	Maximum change

Frequency (CINEMA 4D integrated version only) specifies how often you wish the glow to change. The amplitude of the change is given by the Random value.

1Hz	the glow reaches a new random value after 1 second
25Hz	the glow has a new value for each frame (for 30 fps), which causes a flicker

Selecting **Use Material Color** causes the glow to be calculated on the basis of the material color, rather than from the color specified here.

If this option is turned off, the object color and the glow color will be mixed; green objects, for example, will appear yellowish under a red glow.

Above are two examples of using glow. For the neon advertisement only an outer glow was used. For the coal the glowing areas were created with **Use Material Color**.

Notes

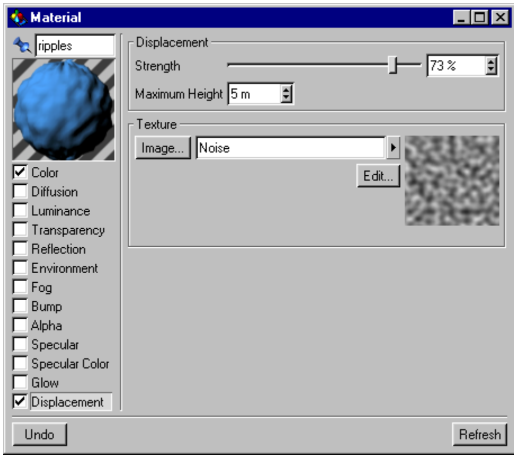
The glow you specify here does not act as a light. In other words, other parts of the scene will not be lit by the glow, nor will any shadows be cast.

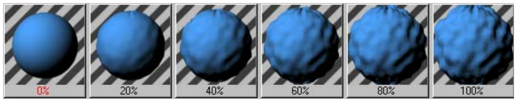
Glows cannot be seen through transparent objects, nor in reflections.

Glows are restricted to a maximum image resolution of 4,000 x 4,000 pixels.

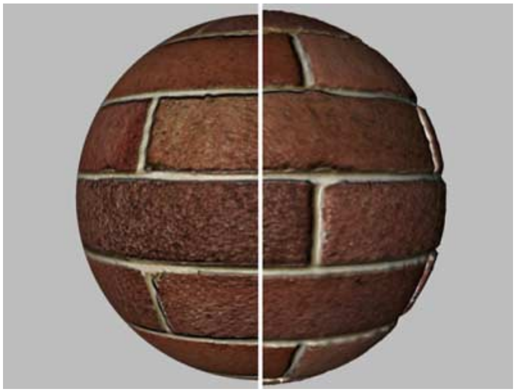
Displacement

Displacement is similar to Bump, the difference being that here the object is actually (not just apparently) deformed.



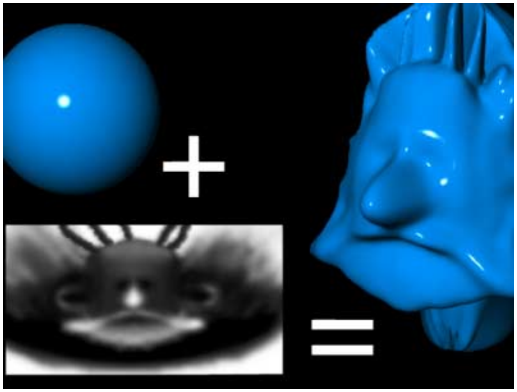


This difference is best seen at the edges of objects. Look carefully at the illustration below.



A bump texture has been applied to the left half of the sphere, a displacement texture to the right. The bump region is characterized by a smooth edge, the displacement region has distinct deformities; as a consequence of the actual deformation, the shadows on the inside of the sphere's surface have changed slightly.

You can adjust the strength of the displacement with the **Strength** slider. Under **Maximum Height** you specify a distance from the object surface, which may not be exceeded whatever the strength setting.



The illustration above illustrates that fairly complex models can be created using relatively simple means.

Note

It is in the nature of the displacement effect that objects must be finely subdivided for this effect to work.

The Shaders

Shaders are mathematically computed textures which can be two dimensional or three dimensional. The advantage of shaders is that they are always only as large (detailed) as necessary since they are computed on the fly. That means that you are able to zoom infinitely close to a shader without ever seeing a pixel.

You will find shaders in different places in BodyPaint 3D. There are native BodyPaint 3D shaders which are built into the program, and there are external shaders that are found within the 'Plugins' folder.

External shaders may be in C.O.F.F.E.E. format (extension '.cof' ASCII or '.cob' binary) or programmed natively in C for a particular platform (extension '.cdl').

All shaders are loaded when you start the program and can be invoked directly from the Material manager using **File > New 3D Shader** from the menu or from within the Material editor, directly from the **Texture** input field. Shaders cannot be invoked by directly typing their name.

Note

The shaders can only be evaluated in CINEMA 4D or BodyPaint 3D. If you save an object or a scene in another file format, the shader information is lost.

2D Channel Shaders

2D shaders are also known as *channel shaders* because they are only ever used for a single material channel in BodyPaint 3D lingo, i.e. for a particular material property such as Color or

Transparency. These shaders are always flat and are applied to an object using a particular type of projection (see page 258).

2D shaders are loaded in the Material editor in place of bitmap textures. To open a 2D shader click on the right-facing triangle, which is to the right of the texture input field in the texture pane. This opens a popup menu from which you can select the appropriate 2D shader.

To edit a 2D shader, click the **Edit** button in the Material editor.

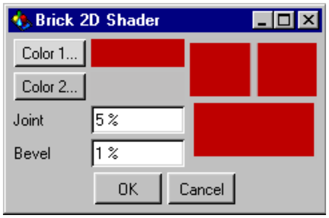
Note

There are three ways of changing the detail (i.e. the frequency) of the shading; adjust the length of the texture axes, change the actual frequency values in the shader dialog, or modify the tiling or texture lengths.

There follows a description of each built-in 2D shader, complete with a description of its parameters (accessible through the **Edit** button) and the effects of changing those parameters.

Brick

This shader generates brick patterns. The Brick shader has an alpha channel which you can use within the Material editor on the Alpha page.

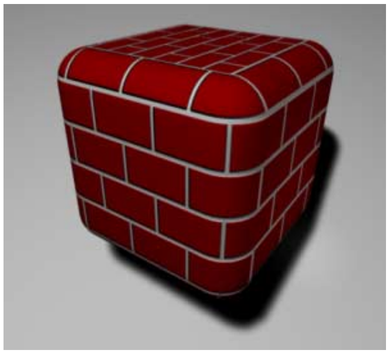


Color 1 determines the color of the brick.

Color 2 determines the color of the joints.

Joint is the width of the joint relative to the size of the brick.

Bevel defines the width of the sloping edge between joint and brick, as a percentage of the brick width; this gives a fuzzy edge to the brick.

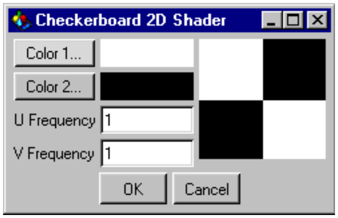


Note

You change the number of bricks using the texture tiling.

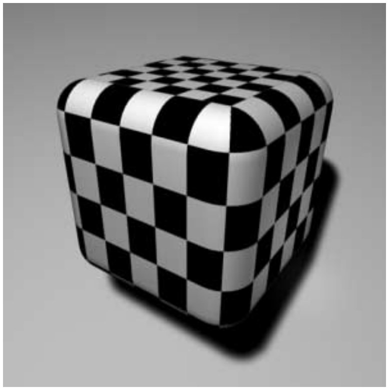
Checkerboard

This shader creates checkerboard patterns.



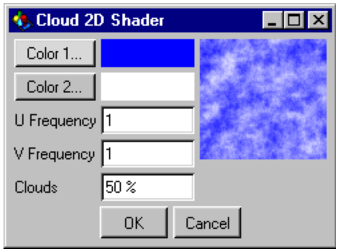
Color 1 and **Color 2** determine the colours of the two tiles.

U-Frequency and **V-Frequency** determine the size of tiling, the fineness of the structure, in two independent directions. Higher values result in a smaller tiles and vice versa. If you use unequal values such as 1/2, instead of square tiles you'll get rectangular ones.



Cloud

This shader simulates simple cloud structures. The Cloud shader has an alpha channel which you can use within the Material editor on the Alpha page.

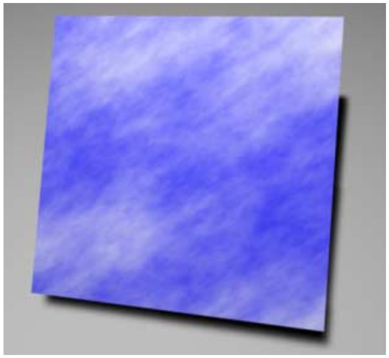


Color 1 determines the color of the sky.

Color 2 determines the color of the clouds.

U Frequency and **V Frequency** determine the fineness and shape of the structure. Thus 1/1 results in rather regular cloud structures, 1/0.25 rather oblong clouds and the higher the value, the finer (less wispy) the clouds.

Clouds affects the number of clouds in the sky.

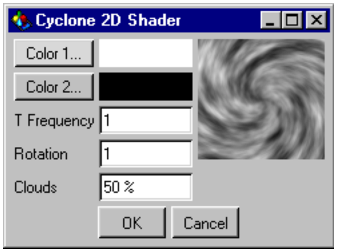


Note

Effective Cirrus-like clouds can be created with asymmetrical UV parameters (e.g. 0.25/1).

Cyclone

This shader simulates a cyclone. The Cyclone shader has an alpha channel which you can use within the Material editor on the Alpha page.

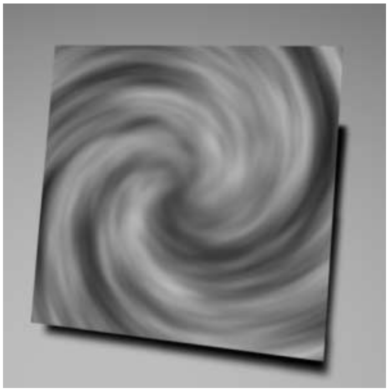


Color 1 and **Color 2** define the start and end colours for the color transition.

T Frequency (integrated version only) defines the timing of the cyclone rotation, the strength of the storm.

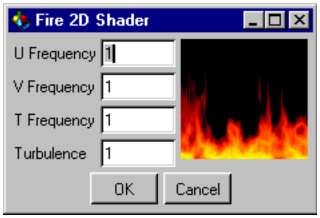
Rotation determines the effective density of the cyclone, the higher the value the more spirals in the storm.

Clouds affects the number of clouds (**Color 1** areas) in the cyclone.



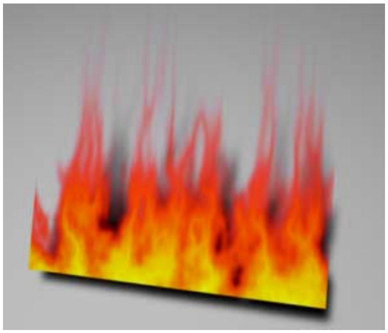
Fire

This shader simulates a wall of flame. The Fire shader has an alpha channel which you can use in the Material editor on the Alpha page.



U-Frequency and **V-Frequency** determine the fineness of the structure. Thus 1/1 results in regular flames, 1/0.25 rather elongated flames. **T-Frequency** (integrated version only) affects the speed of the flicker, how quickly the flames change - the higher the value, the higher the frequency of the flicker.

Turbulence (integrated version only) determines how violently the flames move around, or break up, in a notional wind. A setting of 2 doubles the speed of movement (i.e. the wind); a setting of 0 suppresses all wind.

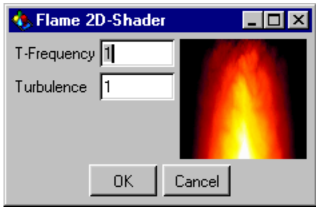


Note

The wall of flames stretches infinitely in the U direction. Good fire materials can be created by using this shader both in the Alpha channel and the Transparency channel (in the Alpha channel, dr/dg/db should be set relatively high, to approx. 30%).

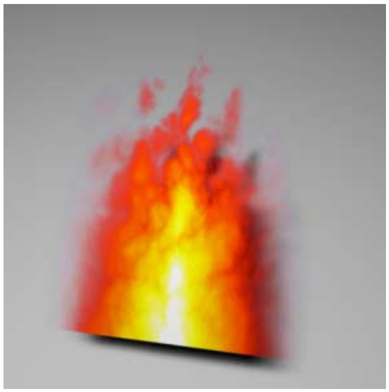
Flame

This shader simulates a single flickering flame, such as a candle. The Flame shader has an alpha channel which you can use within the Material editor on the Alpha page.



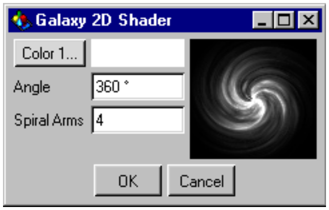
T-Frequency (integrated version only) is a scaling factor that affects the speed of flicker, how quickly the flame changes.

Turbulence (integrated version only) determines how violently the flame moves around, or breaks up, in a notional wind. A setting of 2 doubles the speed of movement (i.e. the wind); a setting of 0 suppresses all wind.



Galaxy

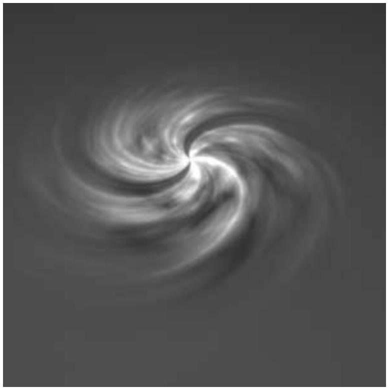
This shader simulates a galaxy with spiral arms. The Galaxy shader has an alpha channel which you can use within the Material editor on the Alpha page.



Color 1 is the color of the star clouds.

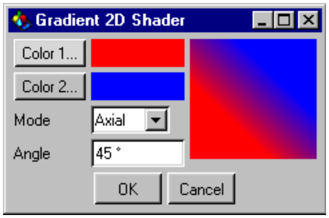
Angle is the degree of rotation of the spiral arms.

Spiral Arms is the approximate number of spiral arms.



Gradient

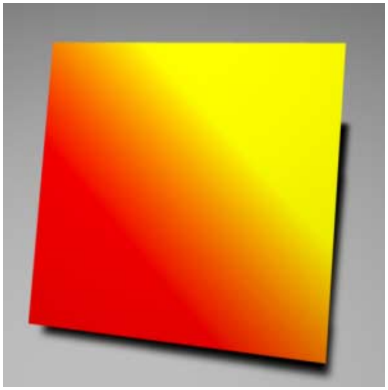
This shader creates a smooth gradient between two colours.



Color 1 and **Color 2** specify the start and the end colours for the transition.

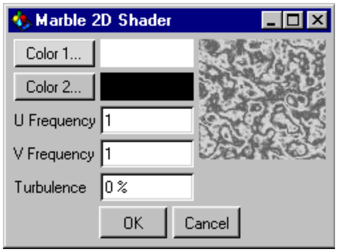
Mode gives the type of the gradient. Axial is color gradient along a line, the orientation of which is defined by **Angle** (see below). Radial is a radially expanding gradient starting from the center of the texture.

Angle gives the direction of the (axial) color gradient. 0° is the X axis, 90° is the Y axis, etc.



Marble

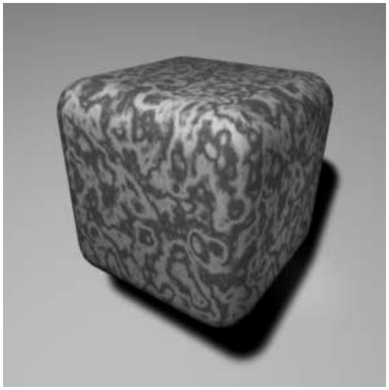
This shader creates marble structures.



Color 1 and **Color 2** determine the marble coloring.

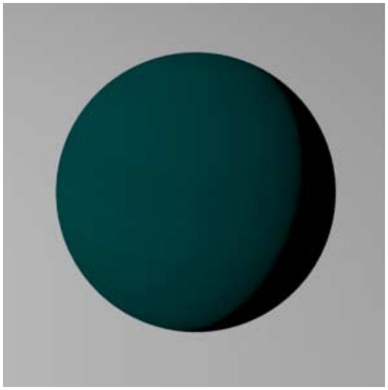
U-Frequency and **V-Frequency** determine the fineness and shape of the structure. Thus, for example, 1/1 results in a radial-like pattern, 1/0.25 rather elongated shapes. The higher the value, the higher the frequency, or detail, of the pattern.

Turbulence adds noise to the detail. 0% = no turbulence.



Neptune

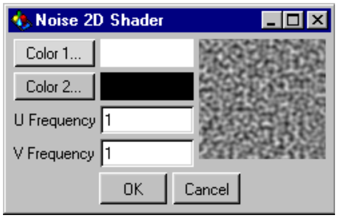
This shader has no dialog. It simulates the planet Neptune with its typical colouring and cloud structure.



Noise

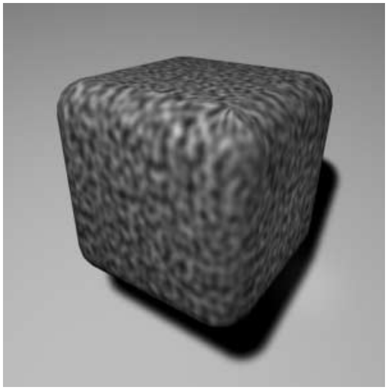
This shader creates a random pattern that can be used, for example, for sun surfaces and stone reliefs.

By overlapping several Noise shaders with different amplitudes and frequencies, you can create masses of interesting patterns (this is like signal synthesis).



Color 1 and **Color 2** determine the start and end colours of the transition.

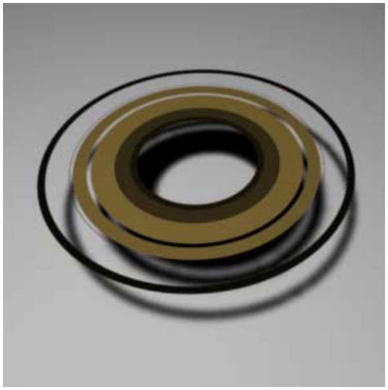
U-Frequency and **V-Frequency** determine the fineness of the structure. Thus, for example, 1/1 results in a radial-like pattern, 1/0.25 rather elongated shapes. The higher the value, the higher the level of detail in that direction.



Saturnring

This shader has no dialog. It creates, for use with the Saturn shader, an astronomically correct simulation of the rings around Saturn — the D, C, B, A, F and G rings, with the Cassini and Encke gap.

The Saturnring shader has an alpha channel which you can use within the Material editor on the Alpha page.



Notes

Saturn is approximately one third as wide as the width of the ring structure.

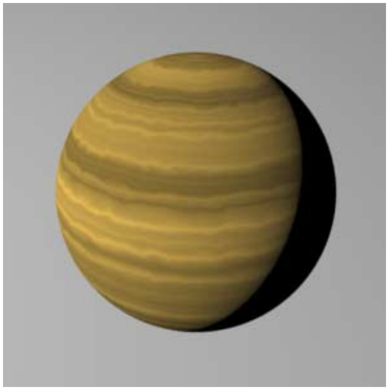
So that stars shine through between the rings, you should activate the alpha channel of any material to which this is applied.

You may want to make the rings quite transparent since in reality these rings are millions and millions of tiny rock and ice particles which allow the light from beyond to shine through.

Saturn

This shader has no dialog. It simulates the planet Saturn with its typical coloring and cloud structure.

The texture is cyclic in the U direction.



Note

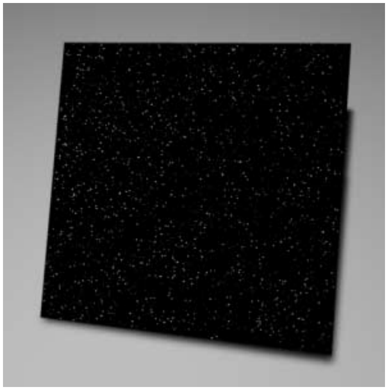
Because of its fast rotation speed (a mere 10 hours) Saturn has an elliptical shape. If you want an astronomically accurate representation of the planet, you will need to flatten any sphere to which this shader is applied — in other words its Y axis should be scaled by about 0.85.

Tip

If you mix the Saturn shader with, say, a brown color (50% shader/50% brown color) you can simulate many rock formations which you can then project on to a Landscape object.

Starfield

This shader has no dialog and simulates a starry night. The number of stars can be controlled by tiling the texture.

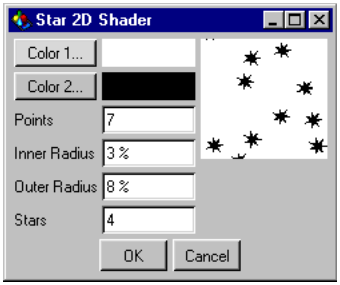


Note

The stars are always computed with a continually varying size. In addition, the brightness of the stars varies. Thus you should have the impression that some stars are closer than others.

Stars

This shader creates a star-filled wallpaper.



Color 1 is the color of the wallpaper.

Color 2 is the color of the stars.

Points is the number of star tips or points.

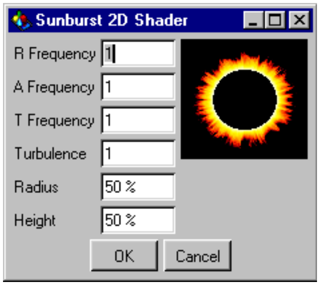
Inner Radius and **Outer Radius** determine the dimension of each star, given as a percentage of a U/V unit.

Stars is the average number of stars per UV unit.

Although we use the term *U/V unit* above accurately, you may want to think of the preview as an element that is one U/V unit in each direction - this will help you visualize the changes you make.

Sunburst

This shader generates sun flares and eruptions. The Sunburst shader has an alpha channel which you can use within the Material editor on the Alpha page.



R Frequency determines the radial frequency; a value of 0 yields a lovely aurora.

A Frequency gives the angular disturbance; 0 gives individual layers.

T Frequency (integrated version only) defines the speed of the sunburst; 2 doubles it, 0 suppresses all movement.

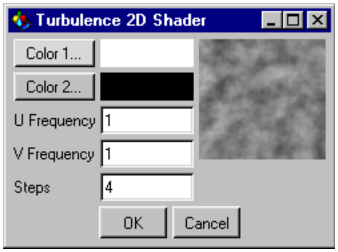
Turbulence changes the appearance of the eruption; the higher the value, the more fragmented this region appears.

Radius defines where the eruption begins, as a percentage of the overall size.

Height defines the width of the eruption region relative to the radius.

Turbulence

This shader creates colored, fractal turbulence.

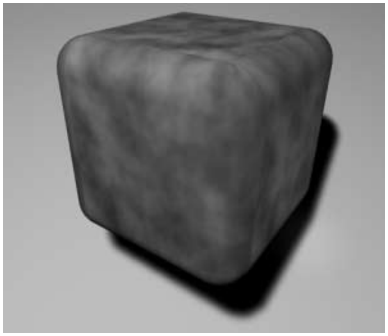


Color 1 and **Color 2** specify the ends of the color transition.

U Frequency and **V Frequency** determine the fineness of the structure. 1/1 creates a radial-like pattern, 1/0.25 elongated shapes. The higher these values, the greater the detail (or frequency) in the relevant direction.

Steps is the number of iteration steps for generating this fractal turbulence.

The more steps you have the more added detail you obtain. With a setting of 1 the Turbulence shader is almost identical to the Noise shader; there is no point in setting this value too high since only a certain amount of detail can be added.



An example of using the Turbulence shader on a cube

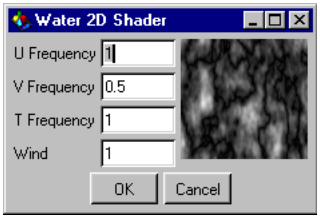
Uranus

This shader has no dialog.

It simulates the planet Uranus with its typical colouring and cloud structure.

Water

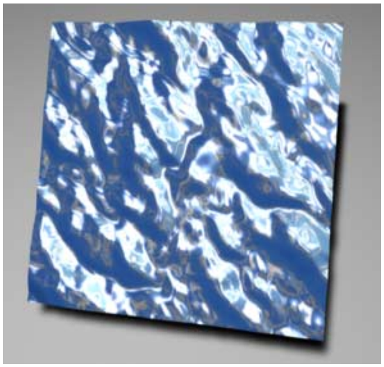
This shader generates water surfaces and is ideal for use in a material's Bump channel for simulating water surfaces perturbed by wind. It can simulate slight turbulences (ripples) and more significant ones (waves).



U Frequency and **V Frequency** determine the fineness of the structure. 1/1 creates radial-like wave patterns, 1/0.25 rather elongated wave fronts. The higher the values, the higher the effective wave detail in that direction.

T Frequency (integrated version only) is the speed at which the water moves in the U direction (0 means no movement, 2 doubles the speed of movement).

Wind specifies the amplitude of a notional wind that breaks up the water — the higher this value the more the wind disturbs the water surface.



3D Volume Shaders

3D shaders are also known as *volume shaders* because they penetrate the volume of the object and emerge on its surface. This means that they cannot be used as textures within the Material editor; instead, a 3D shader directly defines a material - or, in other words, a 3D shader *is* the material.

3D shaders are loaded in the Material manager in place of materials. To load such a shader go to the menu **File > New 3D Shader** and select a shader from the submenu.

3D shaders are edited, like all materials, by double clicking in the Material manager on their preview picture.

All volume shaders can be applied to a 3D object very precisely either by changing the values in the relevant Shader dialog or, often more simply, by adjusting the texture axes values (double-click on the texture attribute icon in the Object manager). By changing the length of the texture axes (in addition to modifying the shader settings) a change of the effect of the shader is possible.

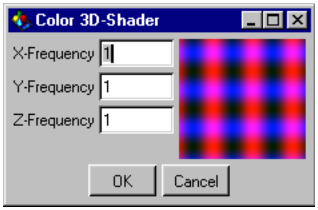
A 3D shader will always adapt to the size of (or *grow* on) the 3D object to which it has been applied. There will be no edges or seams. Since they exist throughout an object's volume, 3D shaders can give much more realistic results when applied to objects that have areas cut out.

Note

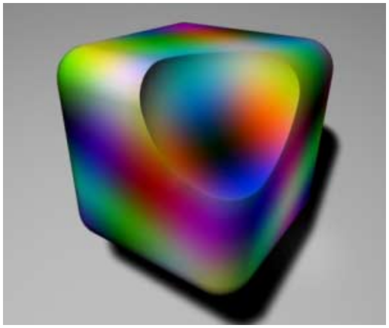
3D shaders cannot be combined, unlike normal textures.

Color

This colourful shader uses sine functions to cycle through the RGB color range.

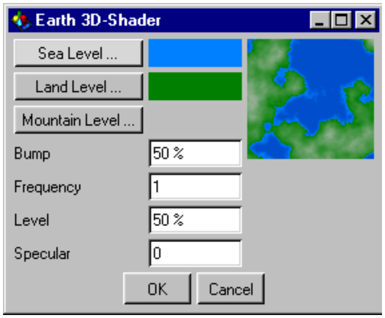


X-Frequency, **Y-Frequency** and **Z-Frequency** specify the behaviour of the colours: e.g. high values mean more detail in that direction, different values for X, Y and Z give asymmetrical behavior.



Earth

This simulates an Earth-like planet with mountains.



Sea Level determines the color for areas which have a height of less than zero.

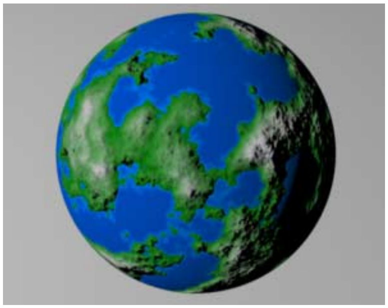
Land Level is the color for middle height terrain.

Mountain Level is the color for high terrain.

Bump gives the degree of bump mapping — 0% means a smooth surface with only patches of color. Note that water is always smooth; only land areas should be covered with a relief.

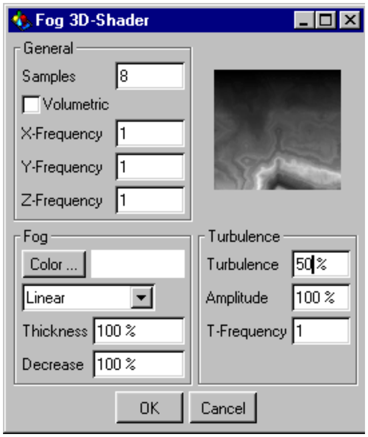
Frequency adjusts the level of land detail. 0% is practically all water; 50% is equal parts of land and water; 100% is practically all land.

Specular is the specular factor, which appears only on water surfaces. 0 is none; 1 is large; 50 is small; 150 is very small



Fog

This shader simulates volumetric fog.



General pane

Samples defines the average number of samples that need to be computed per raytracing ray. The higher this number, the greater the quality of the fog but the longer the calculation time.

Tip

Start with low numbers, say 6 or 8. Increase this value only if you get disturbing artifacts or if the detail is not good enough (e.g. in relation to visible shadows in fog). Note that after a certain point (depending on what's in the scene) higher sample values will not produce better images.

Volumetric is the ultimate performance killer. If the option is switched off, the basic color of the fog is all pervading. Light sources have no effect. This is normally sufficient to simulate fog in a fractal valley.

With **Volumetric** switched on, all light sources (including the type of the light source) will be taken into account. If the light sources cast soft shadows and there are objects in the beam, these will cast shadows even in fog.

Caution!

The Volumetric option costs a tremendous amount of computing time.

X-Frequency, **Y-Frequency** and **Z-Frequency** determine the appearance of the fog: double the values to get twice as much detail, use different values for X, Y and Z for asymmetry.

Fog pane

Color is the color of the fog.

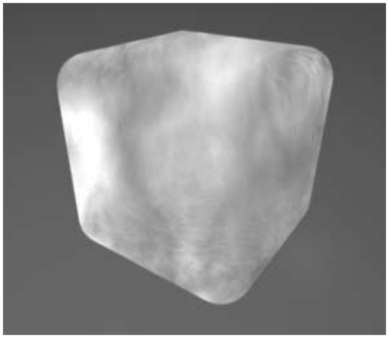
The popup allows you to control the fog intensity over distance. Linear decreases the fog intensity along the Y axis of the texture axes. Exponential decreases the fog intensity along the Y axis of the texture axes. None means constant fog density.

Thickness: the lower this value, the thinner the fog.

Decrease: the lower this value, the lower the volume (or depth) of fog that is generated.

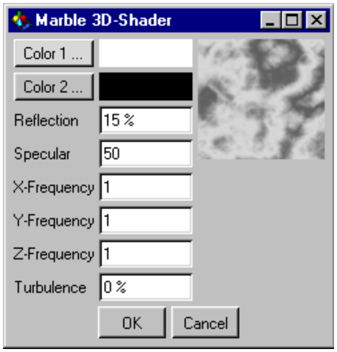
Turbulence pane

In addition to the above parameters you can also create turbulent fog patches. **Turbulence** specifies the degree of whirl within the fog (0 = no turbulence). **Amplitude** specifies the average size of the rotating turbulence cells (rolling fog). **T-Frequency** (integrated version only) controls the speed of the swirling fog (0 = no movement).



Marble

This shader generates 3D marble structures.



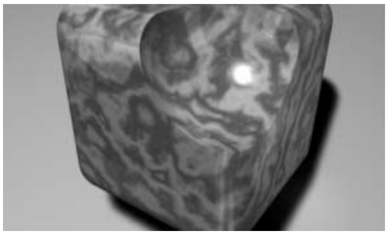
Color 1 and **Color 2** specify the marble coloring.

Reflection is the degree to which the environment is reflected in the marble. To see a weak reflection you will need to activate **Reflections** in the Render Settings and possibly reduce the **Threshold** from its default 15%.

Specular determines the factor for the specularity. 0 is none; 1 is large; 50 is small; 150 is very small, etc.

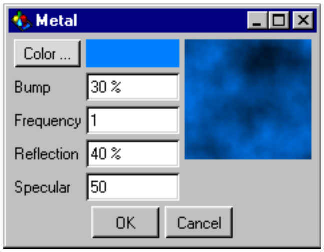
X-Frequency, **Y-Frequency** and **Z-Frequency** determine the detail of the marble in those directions (e.g. double values mean twice as much detail). Use different values for X, Y and Z for asymmetry.

Turbulence changes the overall complexity of the marble.



Metal

This shader simulates metallic surfaces.



Color specifies the color of the metal.

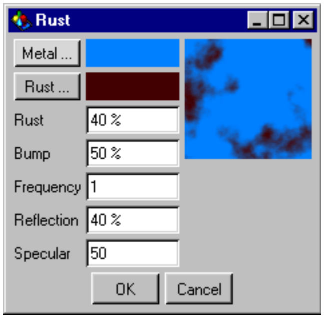
Bump and **Frequency** define the roughness of the surface. The surface is reflective and optionally takes a metallic specular.

The strength of the reflection is determined by the **Reflection** setting.

Specular is the strength of the specularity.

Rust

This shader simulates rust on metal surfaces.



You choose the colours for the metal and the rust using the color fields, **Metal...** and **Rust...**.

Rust specifies the percentage of rust on the metal surface.

The rust is initially flat. It can be raised by optionally using the **Bump** (relief) setting.

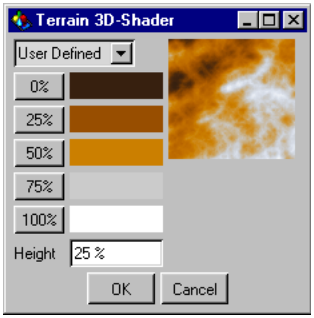
Frequency determines the degree of jaggedness of the rusty areas.

You define the degree of reflection of the clean part of the surface with the **Reflection** setting.

The rust-free areas are reflective and may be enhanced by an optional metallic specular. **Specular** defines the size of this specular.

Terrain

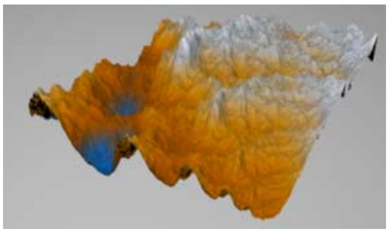
This shader generates virtual, fractal landscapes featuring mountains and valleys. The popup menu at the top allows you to select from a list of predefined types of terrain or to start from scratch with user-defined.



Using the buttons below the popup menu you can assign colors to different heights of terrain. The values are percentages of the fractal height.

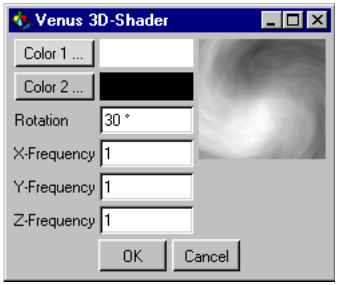
Height defines the vertical dimension of the fractal within a 3D object. With a value of 50 the fractal covers half the object (assuming the texture is adapted by size to the object).

The Terrain shader is not infinitely large. Its maximum size is determined by the size of the texture geometry. If this is smaller than the object on which the shader is used, the shader does not fill the object. If necessary adapt the size of texture geometry to the object.



Venus

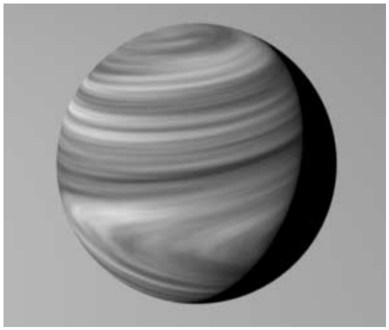
This shader simulates a gaseous planet with cloud structures whirled around by the Coriolis stream.



Color 1 and **Color 2** define the colours of the clouds and the background sky.

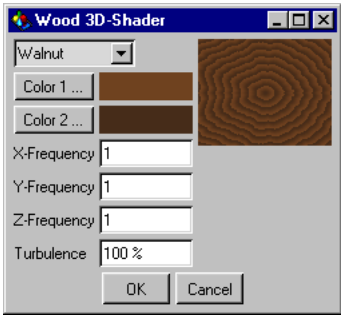
Rotation determines the degree of whirl or turbulence caused by the Coriolis stream.

X-Frequency, **Y-Frequency** and **Z-Frequency** determine the fineness of detail in those directions.



Wood

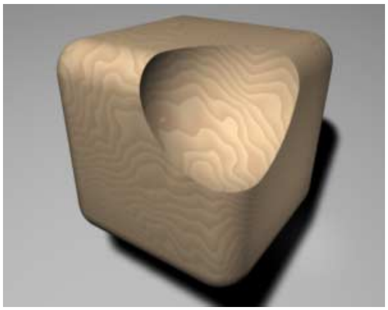
This shader simulates wood patterns. The popup menu at the top allows you to choose some pre-defined wood types (which you can then change) or go for a user-defined wood from the beginning.



Color 1 and **Color 2** change to color of the wood and its grain.

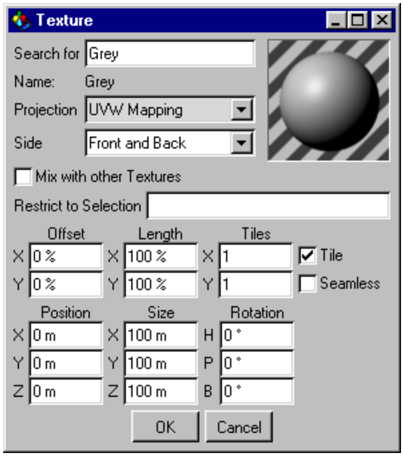
X-Frequency, **Y-Frequency** and **Z-Frequency** affect the look of the wood. X and Y change the frequency of the rings in those directions (high values lead to fine detail) while Z affects the grain — for example, values of X=0.5, Y=1 and Z=1 will produce elliptical rings.

Turbulence determines the degree of growth irregularity (0% = even concentric annual rings, 100% = a more natural, uneven ring appearance).



Texture Mapping

Texture geometry



The Texture geometry dialog opens when you allocate a material to an object. The settings in this dialog tell BodyPaint 3D how to apply the material. For example, you may want the texture to be tiled (i.e. repeated), or you may want to place the texture in a specific region of the object. You can also have the texture mapped on one side only (decal mapping). In this chapter we will explain all the options in the Texture geometry dialog.

Applying a texture

You can apply a texture to an object in the following way:

- First, make sure that you can see the object in the Object manager. Then, hold down the left mouse button while you drag the material from the Material manager and drop it on to the name of the object in the Object manager. The Texture geometry dialog will open for you to enter details of how to apply the texture. This dialog can be skipped if you hold down the Shift key while dragging the material on to the object.

The mouse pointer will change during this process to indicate the *add* state.

- You do not have to use drag-and-drop, you can also use the following method: first, activate the object in the Object manager, then activate the material in the Material manager. Now select **Function > Apply** in the Material manager. The Texture geometry dialog will open for you to enter details of how to apply the texture. This dialog can be skipped if you hold down the Shift key while dragging the material on to the object. Once this dialog is OK'd (or if the Shift key was held down), the active material will be allocated to the active object.
- You can drop a new material on to an existing texture geometry. The new material will replace the old one but will inherit the existing geometry settings.

If the material does not use texture maps (pure glass, for example) or if it a 3D shader, you will not need to change any settings in the Texture dialog; you can click on **OK** to close the dialog immediately. Such materials do not use the texture geometry settings.

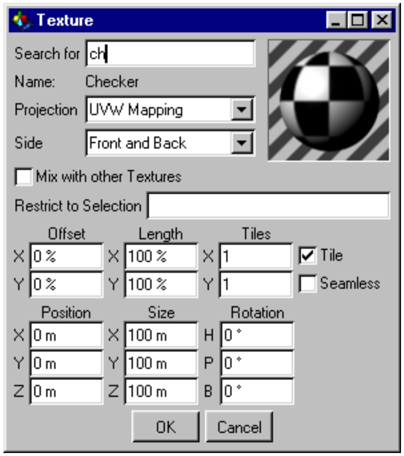
Note

Remember, to prevent the Texture geometry dialog opening hold down the Shift key when you apply the texture. This is particularly useful for 3D shaders or materials that do not use textures, since they do not use the texture geometry settings.

If, on the other hand, your material does use texture maps, you will need to set the Texture geometry dialog to specify the projection type, the position of the texture and so on.

Search For

The first text box contains the name of the material that is being applied. If you type in the name of a different material, BodyPaint 3D will use the new material instead of the previous one for this texture geometry. Also, note that you usually need type only the first few letters of the name, since BodyPaint 3D will complete the rest of the name for you in the area to the right of Name.



Comment

Perhaps you are wondering why you must type in the material name rather than select it from a list. Imagine that you have started a new project and you have loaded your standard material library, *which contains 100 woods, 50 marbles, 20 relief textures, 30 backgrounds and so on. You want to add one of the mahogany textures to an object. Up pops the selection window. Okay, it's down here. Down a bit more. Oops, missed it. Back a bit ... Once you have become accustomed to typing in material names (and giving your materials sensible names!), you should find this a much more efficient way to work.*

Offset, Length, Tiles

These settings are to be found towards the middle of the dialog. **Offset** and **Length** set the position and size of the texture respectively on the texture geometry. You can also change these values interactively in the Perspective View with the Texture tool active (see page 369).

Offset defines the position of the texture on the *texture envelope* (the texture geometry). You can use **Length** to increase or decrease the size of the texture on the texture envelope. The **Offset X** and **Offset Y** values are given as percentages, since the actual size is irrelevant. 100% for both means that the texture covers the envelope completely.

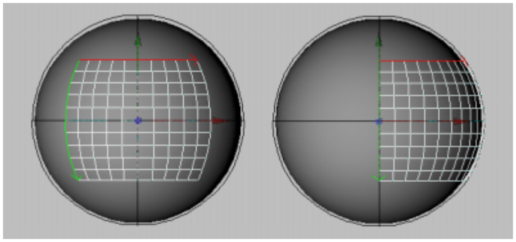
The **Tiles X** and **Tiles Y** values define how many times the texture fits on to the texture envelope in the X and Y directions. Hold on a moment, isn't that the same as changing the length? Yes, exactly. You can change the length either in terms of tiles (**Tiles**) or as a percentage of the texture envelope (**Length**). Either way, changing one will cause the other to change too.

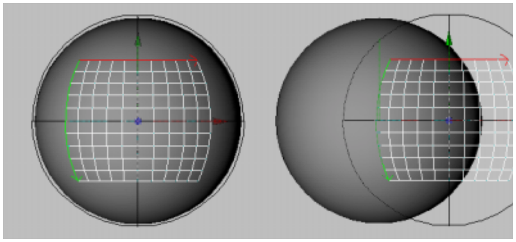
Using the **Tiles X** and **Tiles Y** settings does not mean that the texture will be repeated (tiled) automatically. This only happens if you activate the **Tile** option (which we will return to later).

Position, Size, Rotation

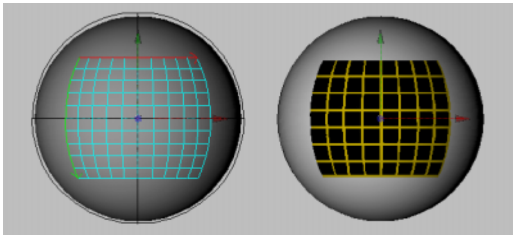
These settings appear near the bottom of the dialog window. You can also change these values interactively in the Perspective View with the Texture Axis tool selected (see page 369).

The following pictures show you the difference between the Texture tool and the Texture Axis tool. Both pictures demonstrate a movement in the X direction. In the first picture, the texture is moved about the texture envelope (Texture tool, **Offset**). In the second picture, the texture geometry itself is moved (Texture Axis tool, **Position**).





The texture geometry can be shown either as a texture grid or as a realtime texture. You can set this option globally (enable **Display > Textures** in the Perspective View), or you can give the object its own (local) display tag with this option on or off (see page 196).



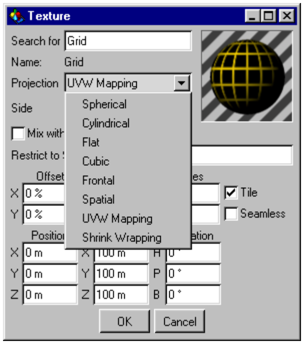
Projection (mapping types)

The **Projection** setting determines how the texture is projected on to a surface. The projection surface is independent of the real surface of the object, although often it has the same basic shape (e.g. flat, spherical, cubic…).

UVW mapping (which is explained in more detail later) fixes the projection on to the surface points of an object so that, when the object surface is deformed (like a flag would be in the wind), the texture deforms with it.

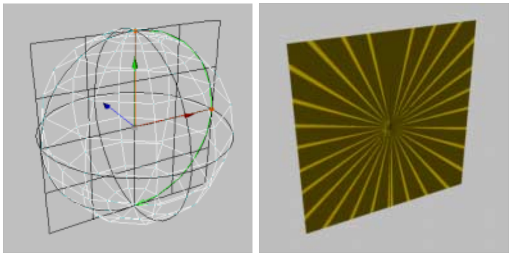
The best mapping type to use depends on the shape of the object to which you apply it. First let's take a look at some examples for the first three mapping types (spherical, cylindrical and flat) and then we'll describe the others with fewer examples.

You can change the mapping type using the **Projection** pop-up in the Texture dialog.

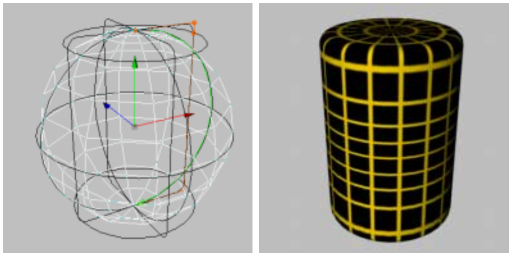


Spherical mapping

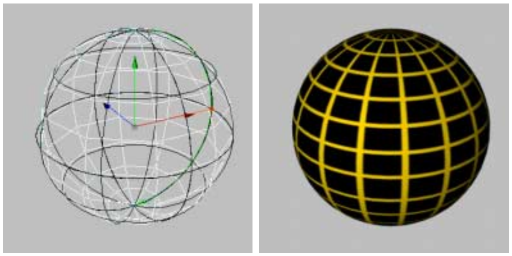
Spherical mapping projects the texture on to the object in a spherical form.



Spherical mapping applied to a plane



Spherical mapping applied to a cylinder

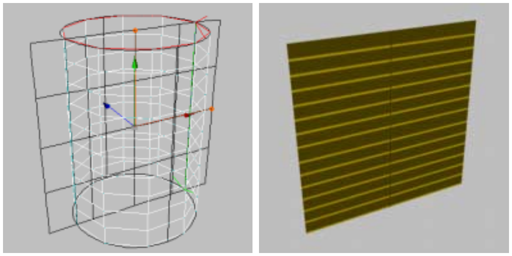


Spherical mapping applied to a sphere

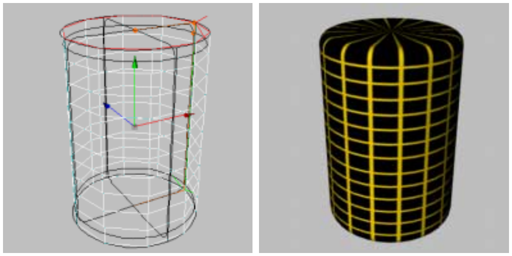
Spherical projection is rarely suitable for flat objects. There is distortion with cylindrical objects too.

Cylindrical mapping

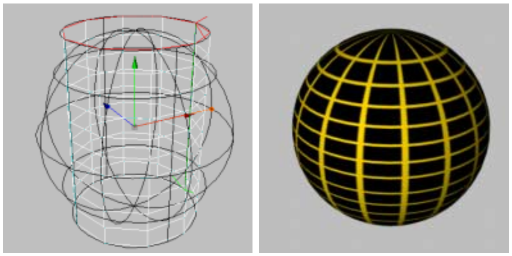
This mapping type projects the texture on to the object in a cylindrical shape.



Cylindrical mapping applied to a plane



Cylindrical mapping applied to a cylinder

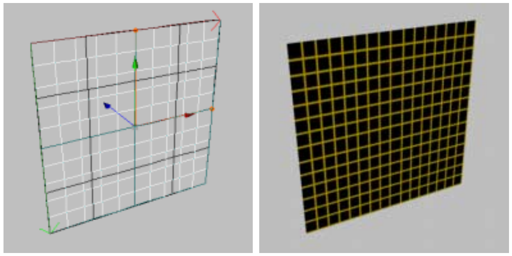


Cylindrical mapping applied to a sphere

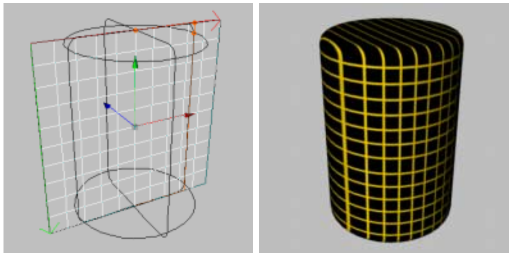
Cylindrical projection is rarely suitable for flat objects. It also leads to distortion when used with spherical objects. Notice how the pixels near the top and bottom of the texture map are pulled inwards on the caps. You should apply separate textures to the caps.

Flat mapping

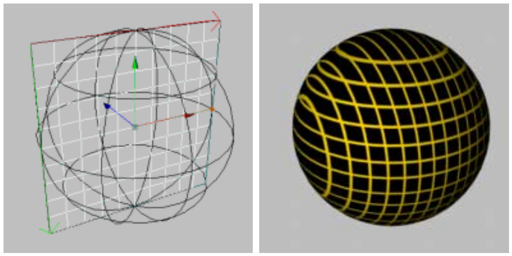
Flat mapping projects the texture on to the object in a planar direction.



Flat mapping applied to a plane



Flat mapping applied to a cylinder

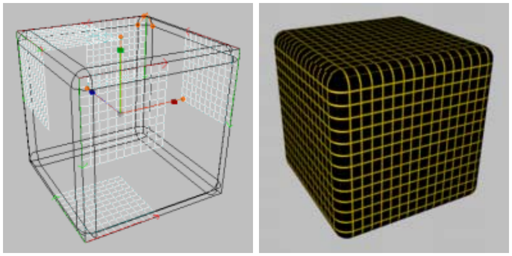


Flat mapping applied to a sphere

Flat projection tends to be used with flat objects only. The texture is soon distorted when applied to a sphere or cylinder, as the examples demonstrate.

Cubic mapping

Cubic mapping projects the texture on to all six sides of a texture cube.

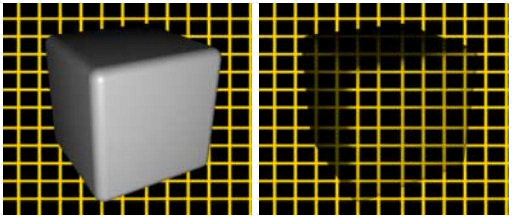


Cubic mapping applied to a cuboid

We have halved the size of the texture above left so that you can see the mapping more clearly. In the rendered picture the texture length has been restored to 100%.

Frontal mapping

The texture is projected from the camera position on to the object.

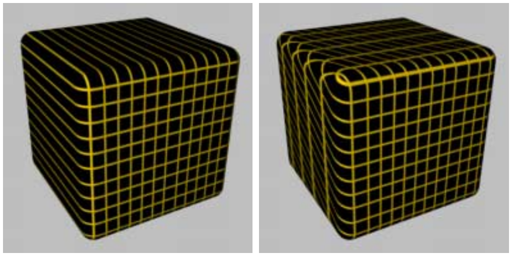


Frontal mapping applied to a cuboid

The picture above shows how the cube blends into the background using frontal mapping - only the cube's shadows are visible.

Spatial mapping

Spatial mapping is similar to flat projection. However, with spatial mapping, the texture is pulled up and to the right as it *passes through* the object.



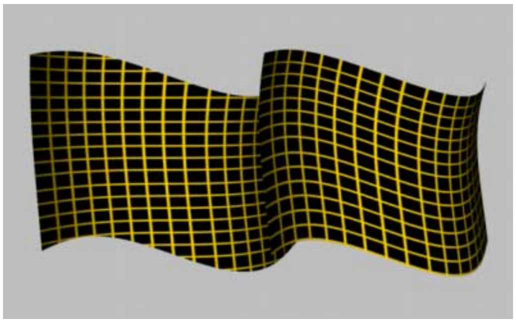
The difference between flat and spatial mapping

On the left, notice how flat projection can lead to unattractive stripes. The picture on the right shows how spatial mapping solves this problem.

Spatial mapping does, however, cause some distortion and as such it is not suitable for photographic images. Spatial mapping is more suitable for structure textures (e.g. marble, plaster, ...).

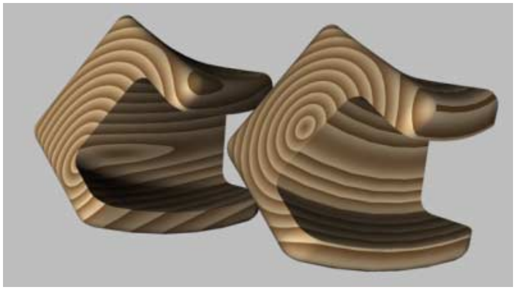
UVW mapping

If an object has UVW coordinates you can select them as the projection type. In this case the texture geometry is fixed to the object surface and is subject to all subsequent movement and deformation applied to the object.



All polygon objects with UVW coordinates display a UVW coordinates icon in the Object manager.

In the illustration below, flat projection was used for the object on the left, UVW mapping for the one on the right.



Notice how the UVW texture has been deformed along with the object.

You may be wondering why there are three coordinates (UVW). What is the third coordinate for?

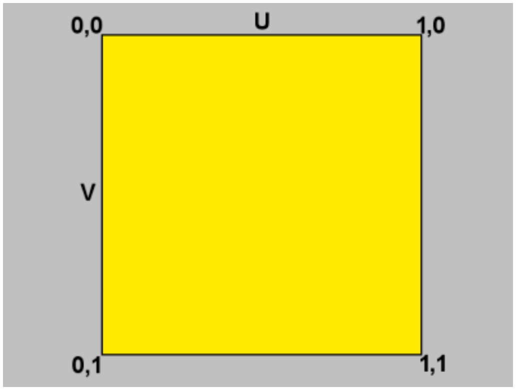
The third texture coordinate (W)

Conventional textures have two coordinates, one for the horizontal position X, and one for the vertical position Y. In order to make it clear that the coordinates refer to a texture, X is renamed U, and Y is renamed V. Two coordinates (U and V) would be sufficient were it not for 3D shaders. These are three dimensional textures (see The Shaders, page 238), and as such they require a third coordinate (W) in order to be fixed to the object.

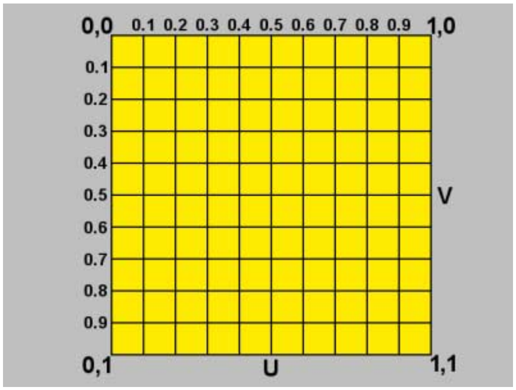
You can apply more than one UVW texture geometry to an object. Create a new texture geometry for the object, then set the projection you require, e.g. flat mapping for a label texture. Next, create new UVW coordinates for the active texture by selecting **Generate UVW Coordinates** in the Object manager. The active texture geometry will be set to UVW mapping and will deform together with the object.

The UVW coordinate system

What is the structure of UVW coordinates? Imagine a grid divided into a U direction and a V direction.



The UV range starts at 0,0 and ends at 1,1. For an upright polygon 0,0 describes the top left; 0,1 the bottom left; 1,0 the top right and 1,1 the bottom right. A texture is stretched out between these four coordinates.



But where is the W coordinate in this system? Recall that conventional textures are two-dimensional - the W coordinate is created only when it is needed. Once created, the W coordinate behaves in the same way as the UV coordinates.

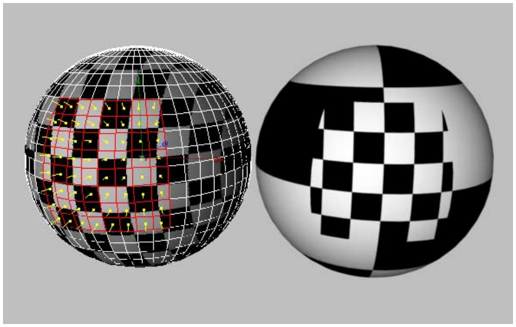
Selective UVW mapping

BodyPaint 3D has two ways of allocating texture projections to polygon selections (rather than to the whole object as described above). The first method is described below. The second method, **Restrict To Selection**, is described on page 269.

Selective UVW mapping allows you to apply a different projection type to several regions of the object using the same texture geometry.

Proceed as follows

- Import a sphere.
- Create a new material with a texture, e.g. the checkerboard shader.
- Set Projection to Flat.
- Activate the Polygons tool and select several polygons in various locations.
- Select **Generate UVW Coordinates** from the Texture menu (in the Object manager).



If you are in RTTM mode you can see immediately that the selected polygons use flat projection while the unselected polygons continue to use the normal UVW mapping. If you deform the object, the texture remains fixed in the selected region.

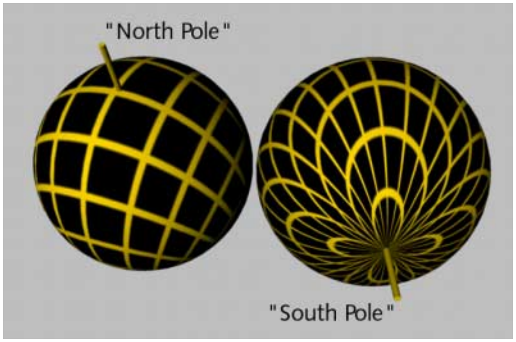
Note

Selective UVW mapping is designed to allow you to allocate an optimum projection type to specific areas. If you want to use different materials in these areas you should use Restrict To Selection - see page 269.

Shrink Wrapping

With this projection type the centre of the texture is fixed to the north pole of a sphere and the rest of the texture is stretched over it. The advantage of this mapping type is that the texture meets itself at the south pole only. This avoids a seam running between the poles.

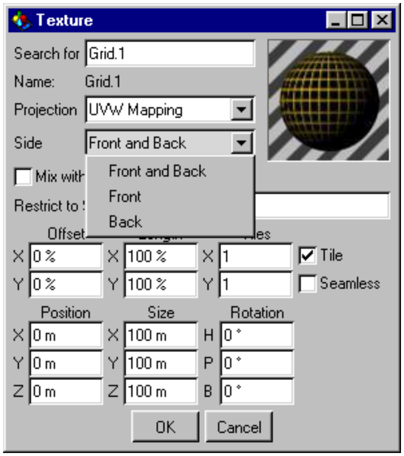
Only a circular section of the texture is used, with the centre of the circle corresponding to the centre of the picture. The remainder of the picture is discarded.



In the illustration above, notice how the texture meets itself at the south pole.

Decal mapping

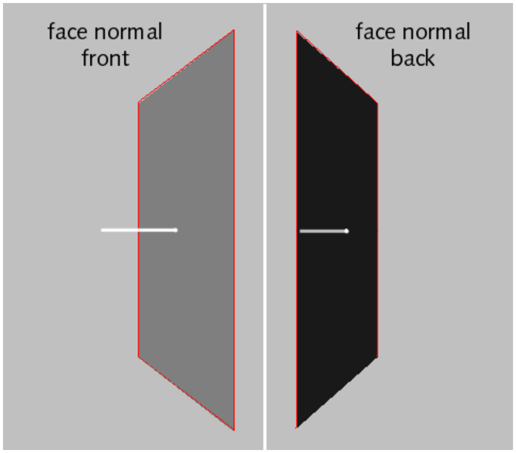
Unfortunately, the term *decal* means different things in different programs. Therefore we need to be clear on BodyPaint 3D's definition.



Imagine that you project a texture on to a rectangular polygon with flat mapping. If you move the camera around the rectangle to look at the other side of the surface, you will still see the texture, but it will be the wrong way round. You can solve the problem by using a *decal* - a material that is projected on one side of a polygon only.

It is very important for you to understand how decal mapping works, since guessing is not always enough. (You may find that, whatever you guess, you still cannot get the decal you require.)

The direction of the surface normals for each polygon (see page 14) plays a pivotal role in deciding to which side of the polygon the texture is mapped. **Front** is in the direction of the surface normals and **Back** means in the opposite direction to the surface normals.



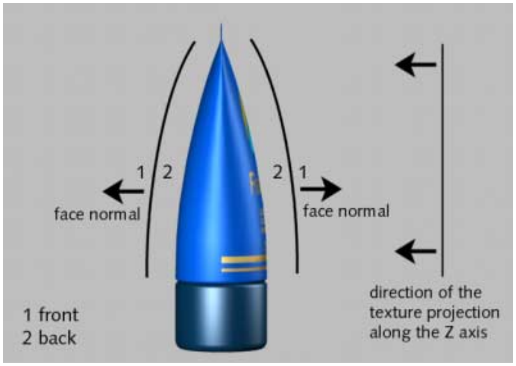
Example

You wish to place a label on a tube. With flat projection this ought to be simple enough. You have adjusted the settings (see Labels, page 267) and you render the tube. Hold on a moment, that's not right... the texture also appears on the reverse side of the tube:

What has happened? With flat projection a texture is projected from the front through to the back of an object. As a result, the texture is also visible where it is not wanted. Decal mapping comes to the rescue - change **Front and Back** in the texture geometry to **Front**. Now render the tube again. This time the label is visible on the front side only:

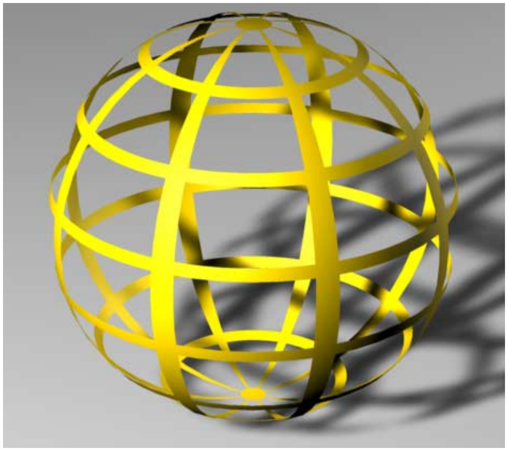
The explanation is simple. If the viewing angle (i.e. the camera angle) and the surface normal form an angle of less than 90° to each other, the polygon is a *front polygon*; otherwise it is a *back polygon*.

The only exceptions are for flat and spatial mapping. Here there is an additional criterion: the direction of the texture projection's Z axis. If the texture's Z axis points in the opposite direction to the surface normal, and if the viewing angle and surface normal form an angle of less than 90° to each other, the polygon is a front polygon; otherwise it is a back polygon.



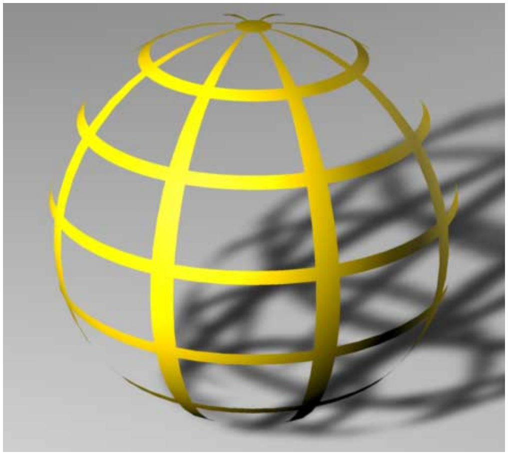
Front and Back

If you choose **Front and Back** the texture is projected in the direction of the surface normals and also in the opposite direction.



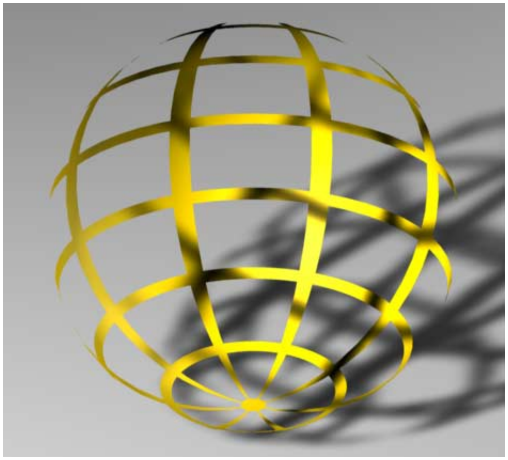
Front

If you have selected **Front** you see the texture where the surface normals point towards the camera, otherwise the material is invisible.



Back

If you project the texture from the back you will see the texture only where the surface normals point in the opposite direction to the camera. The material is otherwise invisible.

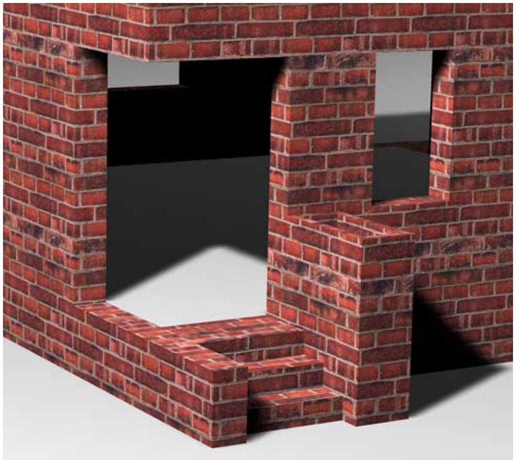


A practical example of decal mapping

Tiled Textures

Sometimes we need to do more than merely project the texture on to an object. Imagine you are texturing a brick wall. Do you really want to create a texture for an entire facade and four walls? There is a much easier way.

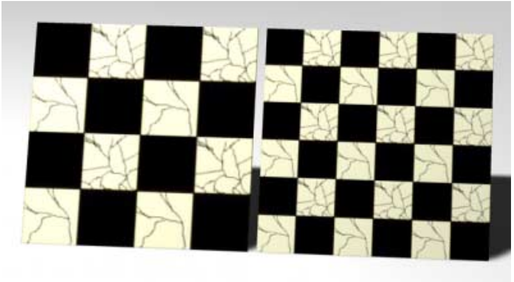
All you need is a seamless texture, which you project, perhaps with cubic mapping and a suitable number of tiles.



Tiles

You can use the **Tile X** and **Tile Y** settings to define how many times the texture picture is repeated, i.e. you use these settings to specify the number of tiles. BodyPaint 3D calculates the size of an individual tile from the current texture size. For example, if you have scaled the texture so that it has a length of 25% in the X direction and 50% in the Y direction, the texture fits four times in the X direction (1.0/0.25) and twice in the Y direction (1.0/0.5) on the surface.

If you change the **Tile X** or **Tile Y** settings, the **Length** settings change automatically. For example, if you change the number to 3, the texture shrinks from 50% to 33.33%. You can see this immediately if you leave the window by clicking on **OK**.



Tile

If you activate this option the texture picture will be repeated endlessly on the surface.

The effect becomes visible when you scale down the texture (see page 369), or when the texture geometry has not yet been fitted to the object (see Fit To Object, page 202). Otherwise, the texture map fills the entire texture geometry once.

If this option is not active, the texture map will not be repeated on the surface.

Any materials that are underneath (see Texture Layers, page 267) will show through in the parts not covered by the texture tile.

Note

If you select the Tile option for a 2D or 3D shader it is not, strictly speaking, tiled, but instead fills the entire object seamlessly. There may or may not be a repeating pattern depending on the programming of the shader.

Seamless

If the **Seamless** option is activated, tiles are mirrored to prevent visible seams. This is particularly useful for objects that are not seamless, although typically it generates a *butterfly* pattern.

Note

Seamless is generally of little use for photo textures (although you can generate some interesting patterns). This option is better suited to pictures with a pattern, such as wood, stone or marble.

Labels

By now you know how to apply textures, how to tile (or not tile) them, and how to prevent seams. How, though, can you put a label on a bottle?

This is what you need to do:

- Open the Texture geometry dialog.
- Deselect the **Tile** option.
- Check that only one tile is created in the X and Y directions.

Done. OK, the texture probably covers the entire object (that's one big label) but now you can scale it down.

Usually, the quickest way to scale (and for that matter position) your textures is to work in RTTM mode. Select the Scale tool, then select the Texture Axis tool. You can use the mouse to reduce the scale of the texture. Next, select the Move tool and place the texture wherever you like on the object surface.

The texture is often slightly out of proportion after scaling. However, we have a little trick for you. Open the texture geometry dialog and adjust the size of your texture in the length fields. Since the length cannot exceed 100%, you may need to divide both values.

For example, if your texture is 800 x 600 pixels, you might set the lengths as follow:

X	Y	Conversion Factor	
80	60	/ 10	
8	6	/ 100	
32	24	/ 100 x 4	etc.

Texture Layers

BodyPaint 3D lets you use as many materials and texture geometry tags on an object as you like. Think of a suitcase with travel stickers - there is a base material (e.g. the leather of the suitcase) and many materials on top (e.g. the stickers).

You cannot see the original suitcase material (leather) in those places where there are stickers. Also, when there are many stickers on the suitcase, they overlap each other. The stickers on top cover those underneath. Where several stickers share the same space, only the top sticker is visible. If you want to see one of the old stickers, you must either remove one of the newer ones or make a hole in it.

This analogy can be related closely to BodyPaint 3D's behaviour. Your object has a base material. You have additional materials on top of the base material. In order to see the base material, the overlying materials must be scaled down and not tiled. You can do this by scaling down the texture geometry and at the same time turning off the **Tile** option (see Labels above). If two materials overlap and you want to see the bottom one, you must make a hole in the top one. You can do this using alpha mapping or clip mapping (see page 231).

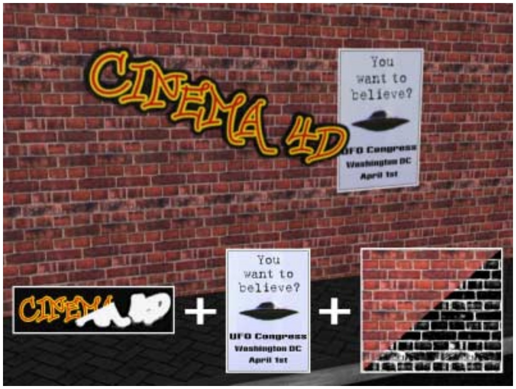
Only one question remains unanswered: how does BodyPaint 3D know which layer a material is on?

The answer is quite simple. When you apply several materials, each new material is placed on top of the previous one. The order of the texture tags in the Object manager (see pages 188 and 189) defines the layer - the right-most material is the top layer, the left-most is the bottom layer.

You can change the layering order simply by swapping the positions of the texture icons using drag-and-drop.

Note

The Transparency material property does not allow the next layer to show through. Instead, use alpha or clip materials.



In the example above T1 is a wall material, T2 is a plastic material (scaled down, no tiling) and T3 is graffiti (with alpha mapping to remove the non-graffiti parts of the texture).

The order of the materials in the Object manager (from left to right) is: T1-T2-T3.

The graffiti (T3) is the top material layer. However, it uses the alpha channel to remove the non-graffiti parts, thereby exposing the next layer down (the plastic material (T2). Even though the plastic material (T2) is on a layer above the bricks (T1), the bricks can still be seen because the plastic was scaled down and is not tiled (i.e. the plastic does not cover the entire surface).

Additive Textures

In the previous example a wall material was created using a color channel and a bump channel. The bump channel creates the illusion that the wall has joints. Now we want to add a second bump map to the wall without changing the texture itself. How can this be done?

The powerful function that makes this possible is called **Mix With Other Textures** and, no prizes for guessing, you can use it to mix textures together. The material properties are added together, hence the term *additive textures*.

For example, the sum of the colours 100/0/0 (red) and 0/100/0 (green) is 100/100/0 (yellow). If the green color has a brightness of 50%, then only 50% of the color is added. The result in this case would be 100/50/0 (orange).

However, the result cannot exceed the maximum color values. Adding 100/0/0 to 100/100/0 does not produce 200/100/0, but 100/100/0.

Some channels cannot be added meaningfully, e.g. two materials with a refractive index of 1 would result in a material with a refractive index of 2, which is probably not what you intended. So in such cases the value of the additive material is used (provided that the channel is active).

Notes

You can add together as many textures as you wish.

Only the following properties are additive: Color, Transparency, Reflection, Relief, Displacement and Luminance.

Only active properties are evaluated.

The alpha channel marks the parts of the additive material that should not be added.

3D shaders cannot be added.

An additive texture (option ticked) must be to the right of the texture to which it should be added in the Object manager.

All textures to the right of the first additive texture, up to but not including the next non-additive texture, are added.

The Transparency property does not expose the next material layer. Use alpha mapping instead.

It's time we returned to our example:

Now you can see the second bump map (T2) on the wall in addition to the original bump (T1).

Mixed Textures

By now you should know how to use several material layers and how to add materials together.

Let's combine these two techniques to place several materials on the same object and add some of them together.

Our example graffiti wall uses five materials. Their order in the Object manager (from left to right) is: T1-T2-T3-T4-T5. T1 (wall), T2 (poster) and T4 (graffiti) are normal materials. T3 (50% bump of T1) and T5 (100% bump of T1) are additive. T4 (graffiti) uses alpha mapping to remove the non-graffiti parts of the texture.

T3 is added to T2, giving it an additional bump texture. Since T2 is not tiled, T1 is visible. T5 is added to T4, giving it an additional bump map. T4 uses an alpha channel to expose the lower layers, hence you can see T1 and T2.

Restrict to Selection

The function enables you to use different materials on different parts of the same object. This is a convenient way to add, for example, labels to objects. First of all you need a selection tag.

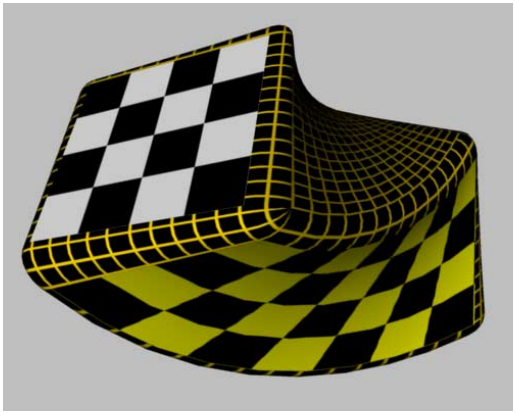
Proceed as follows

- Activate the object and select the Polygons tool.
- Select several polygons using the selection tool.
- Choose **Set Selection** from the selection menu.

A polygon selection tag appears in the Object manager to represent the selection.

See Chapter 20, Selection Menu, page 373 for more details on selections.

- Double-click on the polygon selection tag. Enter a name for the selection in the dialog that appears, then click on **OK** to close the dialog.



- If your object does not have a texture yet, apply a new texture (drag the material from the Material manager and drop it on to the name of the object in the Object manager). The Texture geometry dialog opens. Enter your settings (e.g. the projection type, tiles, etc.), then enter the name of the selection in the **Restrict To Selection** field. Close the Texture geometry dialog by clicking on **OK**.

Tip

When you are positioning a texture on a selection you may find it helpful to hide the unselected surfaces. You can hide them using Selection > Hide Unselected.

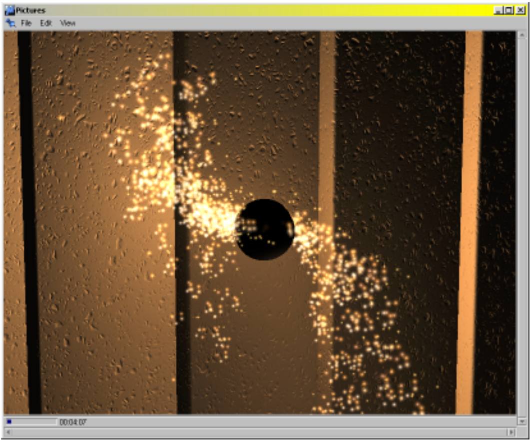
BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

13. Picture Manager

13 Picture Manager

The Picture manager (also known as the Picture Viewer) is the external output window of BodyPaint 3D. This is where the render is displayed if you have chosen **Render to Picture Viewer** from the Render menu (see page 402).

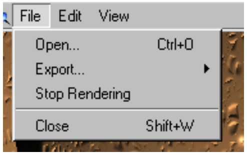


But the Picture manager is able to do more. For example, it displays textures if they have one of the known formats (TIFF, JPEG etc.). Other Picture manager functions are described below.

Note

You must use the Picture manager when rendering a scene to hard disk.

File Menu



Open

This function opens an image file and displays the image in the Picture manager. All 2D image formats supported by BodyPaint 3D can be loaded. For a list of these formats, please see page 439.

Export

With this function an image can be saved to hard disk in different formats. This enables you to use the Picture manager as an image format converter as well.

Stop Rendering

This stops the rendering of the scene. All picture data is lost in the process; you cannot restart from where you left off, hence you will need to start the next render from the beginning.

Note

Alternatively, you can stop rendering by pressing the ESC key.

Close

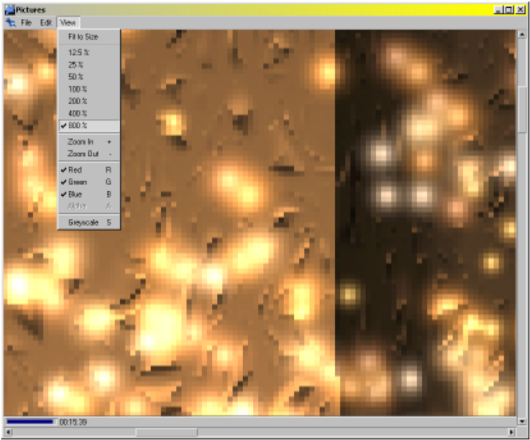
This closes the Picture Viewer.

Edit Menu

Copy

This copies the image in the Picture manager to the clipboard. You can then paste the image into another program, e.g. an image editor.

View Menu



Fit to Size

If **Fit to Size** is activated, the displayed image is scaled automatically to the size of the Picture manager window, assuming the window is smaller than the image itself. The aspect ratio is kept constant. **Fit to Size** is recommended if the Picture manager is docked to other parts of the BodyPaint 3D interface.

Zoom Factors

You can display the image in different predefined zoom factors from 12.5% to 800%. At 100% the image is displayed actual size.

Zoom In, Zoom Out

Use these to zoom in or out of the image, stepping through the predefined zoom factors.

Red, Green, Blue

BodyPaint 3D renders all images in the RGB color system. Using these three options you can filter out these separate colors. So you can save the red separation of a render without needing to launch a separate image editor.

Alpha

If this option is enabled the Picture manager displays the image's alpha channel instead of the image itself.

Note

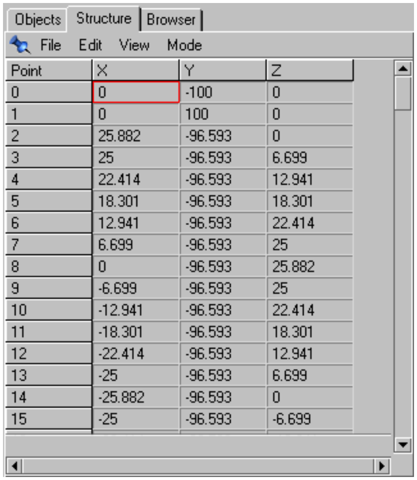
This option works only with images that have an integrated alpha channel.

Grayscale

If you enable this option, the image will be displayed not in color but in grayscale. This function is useful for checking certain aspects of the render, perhaps to evaluate the contrast of an image for monochrome printing.

14. Structure Manager

14 Structure Manager



Point	X	Y	Z
0	0	-100	0
1	0	100	0
2	25.882	-96.593	0
3	25	-96.593	6.699
4	22.414	-96.593	12.941
5	18.301	-96.593	18.301
6	12.941	-96.593	22.414
7	6.699	-96.593	25
8	0	-96.593	25.882
9	-6.699	-96.593	25
10	-12.941	-96.593	22.414
11	-18.301	-96.593	18.301
12	-22.414	-96.593	12.941
13	-25	-96.593	6.699
14	-25.882	-96.593	0
15	-25	-96.593	-6.699

The Structure manager resembles a spreadsheet; both can process data directly within cells which, in turn, are divided into lines and columns.

Within BodyPaint 3D's Structure manager, various attributes of the active object are displayed and can be edited directly in the cells. The points and polygons of an object and its UVW coordinates can all be displayed (if relevant) by selecting from the Mode menu; by default, an object's points are displayed.

Values in the cells can be edited directly, lines can be moved by means of drag-and-drop and cut, copy, paste is supported. Larger quantities of data can be processed rapidly, even if the object has a large number of points or polygons. The selection frame (a red frame around an active box) shows you which data you are working on; navigating around the table is thus very simple.

Navigation

Selection

Clicking on one of the line numbers to the left of the table selects this line and highlights it.

If you keep the Shift key pressed while clicking (known as Shift-clicking), several lines can be selected at the same time; Shift-clicking an already-selected line will deselect that line.

To select all the lines of a particular attribute (such as all the points) click directly in the relevant name field (e.g. Point). Shift-clicking a selected set will deselect the set.

Selection frame

When you first open the Structure manager, the selection frame is over the cell at the top left of the display (the first column of the first line). Single-clicking on a particular cell moves the selection frame to this cell i.e. makes it active. You can also move the selection frame with the cursor keys.

Using the TAB key moves the selection frame left-to-right and top-to-bottom over the cells; Shift-TAB reverses this.

The Home key moves the selection frame to the very first cell of the table whilst the End key moves it to the last cell.

Note

The Apple USB Keyboard does not have an End key. Please use the '+' key on the numeric keypad instead.

Page Up and Page Down move the selection frame a page at a time, back and forward respectively.

Double-clicking on a cell moves the selection box there and enters Edit mode, where you can modify the value of the cell. While in Edit mode you can use Tab and the cursor keys as explained above and you will remain in Edit mode.

The Return key acknowledges input and switches between editing and selection modes.

If you press the ESC key, the previous value of the cell is restored and you revert to selection mode; assuming, of course, that you have not already pressed Return!

Drag-and-drop

By means of drag-and-drop you can re-order one or more lines and thus modify, say, the point order. Click at the left of the display, over a line number, hold the mouse button down and drag; a red line appears to show where the selected row(s) will be moved. The row(s) will be inserted at the position of the red line and all rows above will be shuffled up.

Note that, if you change the order of points, the associated polygons will be deleted!

Additionally you can transfer the contents of an individual cell to another cell; simply click on a cell and move the mouse with the left button held down until you the pointer is over the target cell. Release the mouse button and the value of the original cell is copied here.

File Menu

New Line

A new line is inserted into the table, below the selection frame.

If you are in the point mode (default), a new point is added to the object. This is created at the world origin (X=0, Y=0, Z=0). By the input of suitable X, Y and Z coordinates, you can change the spatial position of the point.

If you are in the polygon mode, **New Line** adds a new polygon to the object. The new polygon will not be visible yet, since it has not been allocated suitable points (see Mode). You must do this point allocation by hand.

If you are in UVW mode, New line creates a new UVW coordinate. Since an entire UV mesh can be created easily (see Generate UVW Coordinates, page 201), you may find little use for this function.

Import ASCII Data

BodyPaint 3D is able to import point data, polygon data and UVW coordinates into the Structure manager. The data to be imported must be present as an ASCII file and have the following format:

```
Point X Y Z
1 <Coordinate> <Coordinate> <Coordinate>
2 <Coordinate> <Coordinate> <Coordinate>
3 <Coordinate> <Coordinate> <Coordinate>
```

Here's a real Point mode example for a cube:

```
Point   X   Y   Z
0   -100   -100   -100
1   -100   100   -100
2   100   -100   -100
3   100   100   -100
4   100   -100   100
5   100   100   100
6   -100   -100   100
7   -100   100   100
```

The ASCII file must start with a header (the 'Point X Y Z' in the example above) and the line numbering as shown is required. The values within each line may be separated with a TAB character, a comma, a semicolon or a combination of these. Each line must end with the ASCII LF (linefeed) character or the CR (carriage return) character, or a combination of both. Thus it does not matter whether the ASCII file was created on a Macintosh, Windows or Unix computer.

If data already exists in the Structure manager, the imported data is inserted before the line containing the selection frame.

Export ASCII Data

BodyPaint 3D can export the Structure manager data so that you can use it within, say, a text editor or some other 3D program or perhaps import it into a spreadsheet for analysis.

In Point mode, the X, Y and Z coordinate for each point is exported.

In Polygon mode, the coordinates of each three or four point polygon are exported.

In UVW mode the UVW coordinates of each polygon (defined so far) are exported.

Close

Exits the Structure manager, closing the window.

Edit Menu

Undo

This cancels the last action that changed the object and restores the previous values to the cells. The undo level (i.e. how many actions are remembered) is set in the General Settings (Undo Depth, see page 42).

Redo

Undoes or cancels the last undo. The redo level is the same as the undo level, set in the General Settings (**Undo Depth**).

Cut

Removes the selected line(s) from the table and copies to the clipboard. Use **Paste** to insert back into the table, below the selection frame.

Copy

Copies the selected line(s) from the table into clipboard, without deletion. **Paste** will insert line(s) from the clipboard back into the table, below the selection frame.

Paste

Insert any data already copied or cut into the clipboard back into the table, below the selection frame.

Delete

Deletes the selected line(s) from the table.

Select All

All lines within the table are selected.

Deselect All

All selected lines of the table are deselected.

Invert All

All the not-selected lines of the table are selected and the selected lines are deselected.

Select Area

The mouse pointer changes into a crosshair and you can now draw a selection area with the mouse. All lines within the area you draw are selected. If lines that you want to select are outside the visible area, move the mouse outside the Structure manager window in the direction that you want the window to scroll; the window will then scroll until you move the mouse back within the window.

View Menu

Jump Last Selection

The selection frame moves up to the last active line.

Jump Next Selection

Move the selection frame down to the next available line.

Jump Page Up

Display the previous page of information (if it exists) in the table and move the selection frame to the first column of the first line on the page.

Jump Page Down

Display the next page of information (if it exists) in the table and move the selection frame to the first column of the last line on the page.

Jump Home

The selection frame moves to the first column of the first line in the table.

Jump End

The selection frame moves to the first column of the last line in the table.

Mode Menu

Points (default)

In Point mode, the spatial coordinates of the individual points of the object are displayed in the Structure manager.

The display is organised as follows:

X Y Z

show the coordinates of the respective point in the world system. No unit is displayed; the unit of measurement is selected in the General Settings and is assumed here.

Polygons

If you are in Polygon mode, the number of each defining point is displayed, as follows.

A, B, C, D (which could be blank) correspond to the respective point numbers of the three (or four) corner points of the polygon.

Note

If C and D are identical, BodyPaint 3D interprets the polygon as a triangle.

UVW

If you are in UVW mode, the UVW Coordinates of the polygons of the object are displayed, as follows:

U[A], U[B], U[C], U[D]

are the U coordinates of the corner points of a polygon.

V[A], V[B], V[C], V[D]

are the V coordinates of the corner points of a polygon.

W[A], W[B], W[C], W[D]

are the W coordinates of the corner points of a polygon.

Note

Avoid changing the UVW coordinates unless you are sure of what you are doing. Otherwise, the object's mapped textures are likely to distorted.

BODYPAINT 3D

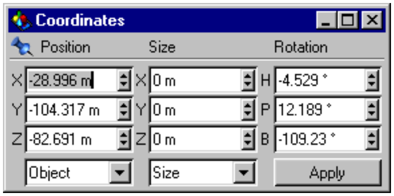
PAINTING • TEXTURING • MAPPING

15. Coordinate Manager

15 Coordinate Manager

The Coordinate manager allows you to manipulate objects numerically. It displays information relating to the tool you are using. For example, if you are using the move tool, the position, size and rotation values of the active element are shown; if the camera tool is active, you can enter the focal length for the lens instead of its size.

Once you have made changes to the values you can update the element by clicking on **Apply**.



You can use the pop-up menu at the bottom left to determine how the values are interpreted. If the menu is set to Object, all the values relate to the object's (immediate) parent system. If the menu is set to World, the position and rotation values are converted into world coordinates. The Rotation values always use the HPB System (see page 370).

The pop-up menu below the middle coordinates column (Size) specifies which object size is shown.

Size

This displays the size of the object, not including sub-objects.

Size +

This, on the other hand, shows the size of the active object *including* all sub-objects.

Scale

shows the axis length for each axis of the object coordinate system. The default values are 1/1/1.

World Coordinates

The size or scale is also specified in world coordinates, although along the local axes. For example, if a cube of length of 100 lies askew in 3D space, it still has a size of 100 units in world coordinates.

Relative Values

You can also enter relative values. BodyPaint 3D has a parser which enables you to include mathematical operators.

For example, you can append +100 to an existing position value. The active element will then move 100 units relative to its initial position. BodyPaint 3D supports many other functions - see the Appendices for a complete list of valid operators, functions and constants.

Some values must be entered as relative ones, e.g. for the rotation of points. This is because points do not have their own coordinate system, so the program cannot keep track of previous rotations.

Tip

Keep in mind that you may be changing the axes of sub-objects unintentionally when you change the axes of the parent.

16. File Menu

16 File Menu

Introduction

There are several ways of starting BodyPaint 3D:

- Double-click on the program icon.
- Double-click on a scene file.
- You can also drag one or more BodyPaint 3D files in the Explorer (Windows) or the Finder (Macintosh) on to the BodyPaint 3D icon.

The File ‘New.c4d’

In the BodyPaint 3D startup folder you may find a scene with the name ‘New.c4d’; if there, this is loaded into BodyPaint 3D *when you create a new file* (**File > New**). Thus, BodyPaint 3D does not use a separate preferences file, it uses whatever preferences have been set for this 'New.c4d' scene

In order to change, say, the default output resolution to 800x600, create a new file, change the value on the Output page of the Render Settings (main menu: **Render > Render Settings**) and save the file as ‘New.c4d’ into the BodyPaint 3D folder.

The File ‘Template.c4d’

In the BodyPaint 3D startup folder, there is also a scene with the name ‘Template.c4d’; this is loaded automatically *when BodyPaint 3D is launched*, thus enabling user-defined preferences to be set at startup.

New

This command opens a new document and makes it the active (current) document. All icons that are selected from the toolbar, and commands from any of the menus or managers then refer to this new document.

Until you save the new document and give it a name, the title bar of the document window will show ‘Untitled’.

If you have several documents open you can switch quickly between them using the Window menu on the main menu bar.

Open

This command loads a file (a scene, a material, etc.) from a storage device (such as a hard disk) into memory and opens it in a new document window. If the current document window is empty, this is used instead.

The following formats are understood by BodyPaint 3D:

- BodyPaint 3D scenes (‘.c4d’), catalogs (‘.cat’), preferences (‘.prf’)
- CINEMA 4D scenes (‘.c4d’)
- DXF to AutoCAD R12
- QuickDraw 3D (‘.3dm’) (binary only, not ASCII)
- VRML V1 and V2 (‘.wrl’)

- 3D studio R4 ('.3ds') (including materials, light sources and textures)
- Wavefront ('.obj')
- LightWave ('.lwo', '.lws') (including scene descriptions, light sources, and textures; with LightWave [6], UV coordinates and focal lengths as well)
- DEM scenery files ('.dem')
- Illustrator paths as polygons ('.ai', '.art', '.eps')

Recognition of these formats is automatic. Filename extensions (Windows) are superfluous, as are types and creators (Macintosh).

You can also use this command to view images, play animations or load other settings. If you open a QuickTime movie or an AVI animation, this will launch the default system movie player.

Alternatively, you can also open a new file by dragging it and dropping it into the Editor window.

Import

This command lets you add scenes, objects, materials etc. into the active document.

Revert to Saved

This command will load the last saved version from disk. Before this happens, a dialog opens asking for confirmation. You will lose any changes that were made to the current document after it was last saved.

Close

Closes the active document. If it contains any unsaved changes, a dialog opens asking if you want to save the scene before closing it.

Close All

Closes all open documents. If any documents contains unsaved changes, a dialog opens asking if you want to save the scene before closing it.

Close All Textures

This closes all the textures in RAM that are not used by any materials. If any of the textures have been changed since they were last saved, a dialog will check if you wish to save the changes.

Save

This command saves your document without first opening the file selector. The scene is saved using the name chosen when you selected the **Save As** command (i.e. the name that appears in the title bar). If this is the first time you are saving a new document and it does not have a name yet, then the **Save** command behaves just like **Save As**.

Save As

Save As always displays the file selector. The filename you enter here will be displayed in the title bar of the document window. BodyPaint 3D automatically appends the appropriate extension ('.c4d' for scenes) to the filename.

Save All

This function saves all open documents. If a scene has not yet been saved (and therefore is untitled), the appropriate system file selector appears for you to choose a name and folder.

Save All Textures

You can use this command to save all the textures. A dialog will appear for each texture that is being saved for the first time — specify the file format using the pop-up menu, then click on **OK**. Next, the Save dialog will open for you to choose name and folder.

Save Project

Transferring scenes from one computer to another is always particularly challenging for a project leader. When the question of missing textures for materials arises, you know that these can be found automatically in your own local search path (**Edit > General Settings > Paths**).

BodyPaint 3D helps you build complete scenes. Selecting this command opens the usual system file selector for saving files. Choose a folder here and enter a name. BodyPaint 3D creates a new folder in the specified path and saves the scene there. In addition, it creates a sub folder, named Tex, into which it copies all the pictures and textures necessary for rendering the scene.

There is now nothing to stop you moving the project to another system.

Export

A scene can also be exported to a foreign file format for subsequent work in other 3D software. The filetypes described below are available. BodyPaint 3D automatically adds the relevant file extension to the file.

In principle each 3D program works differently. Therefore it is not always possible to convert all information within a scene. Further, the result will always differ according to the materials and lighting used; so a manual re-working may often be necessary.

As well as the following built-in export formats, BodyPaint 3D can export in a variety of other formats via separate plug-ins (e.g. for exporting in LightWave format).

3D Studio R4 (.3DS)

Common data format under DOS/Windows. 3D Studio is the predecessor of 3D Studio MAX. The last freely available file format is release 4 and the MAX data format is not accessible to other manufacturers.

In principle the MAX format is not generally readable since MAX (like BodyPaint 3D) uses parametric objects, which are useless without their associated specific algorithm. For example a teapot is not saved with points and surfaces, but only with the dimensions and the subdivision rate. For re-creating the surfaces (to display the teapot on the screen) one needs to know the internal routines of MAX.

Therefore, because of this, there is also no external conversion tool for the MAX format.

Direct3D / DirectX (X)

Direct3D is a Microsoft specific 3D format, which is used by Windows 95/NT (provided DirectX is installed). This export module is particularly useful to game developers.

DXF (DXF)

The standard exchange format for graphics files. BodyPaint 3D splines are generally written as POLYLINEs, independent of the surface settings for polygons.

QuickDraw 3D (3DM)

The standard format for three-dimensional graphics on the Apple Macintosh.

VRML 1 (WRL)

The Virtual Reality Modeling Language enables you to produce platform-independent three-dimensional representation of objects and scenes on the Internet. It has also proved useful as an exchange format for CAD programs, since it contains more file information than the often-used DXF format.

VRML 2 (WRL)

Version 2 of the standard format for three-dimensional graphics files on the Internet. The advantages for data exchange with CAD software mentioned above also apply to VRML 2.

Wavefront (OBJ)

A common 3D data format in the UNIX world, developed by Alias.

Import / Export Settings

3D Studio R4

Factor

This is for specifying whether and to what degree 3D Studio files are scaled when they are loaded and saved.

Adapt Textures

3D Studio does not support as many graphics file formats for textures etc. as BodyPaint 3D. Its main format is TIFF.

If you enable this option, all texture filename extensions are changed to that which you have specified (for example ‘frame.jpg’ becomes ‘frame.tif’).

However, you will still have to do the actual conversion of the images yourself. This is very simple if you use one of the graphics programs that are provided with the package (PaintShop Pro or Graphics Converter).

Direct3D/DirectX

Factor

This is the scaling factor for saving the scene in this format. When exported, the scene is reduced by this factor.

Format

Direct3D is a text format. To facilitate manual editing of the file, this option formats the whole file automatically. This increases the file size somewhat.

Save Templates

When enabled, the template header is written to the file.

Export Textures

When enabled, all texture information is saved for all objects. This includes creating UV coordinates for each object.

Adapt Textures

DirectX uses mainly the 'ppm' (Portable-Pixel-Map) graphics format, but also '.bmp' (Windows-Bitmap). BodyPaint 3D does not recognise the former, which means that textures need to be converted. This can easily be done using the graphics programs PaintShop Pro or Graphics Converter, which are provided in the package. But what about adapting the names?

If you enable this option, all texture filename extensions of scene materials are automatically changed when they are imported (so that 'image.jpg' becomes 'image.ppm'). This has the benefit that you do not need to check for each material and for each attribute whether a change of name is required.

Note

This really does only change the name. You still need to convert the image!

Note that DirectX can only process graphics measuring 2^n pixels (i.e. textures need to be 2x2, 4x4, 8x8, 16x16, 32x32, 64x64, 128x128, 256x256, …).

Save Normals

If this option is enabled, normal vectors are created for all surfaces. If not, calculating the normals is left to Direct3D.

Generate Mesh

Direct3D works with two types of models; Frame and Mesh.

Frames, as with BodyPaint 3D, consist of objects arranged in a hierarchical structure. Objects remain encapsulated.

In a mesh, on the other hand, all objects are on the same level. The hierarchy disappears.

DXF

BodyPaint 3D can work with DXF files of all versions. It can correctly interpret the following elements: SOLID, 3DFACE, LINE, POLYLINE, CIRCLE, ARC, POINT and TRACE. All three-dimensional data is read in accurately.

All documented POLYLINE combinations as well as height and elevation data are supported. The same is true of element coordinate systems, layer names and various line thicknesses.

Factor

This specifies whether and to what extent DXF files are scaled during loading and saving.

Circle

This determines the number of polygon segments that are used for subdividing circle segments.

Frozen Layers

Enable this option if you want to convert frozen layers of a DXF file when loading. Many CAD programs offer the option of freezing (i.e. hiding) temporary or unused layers.

2D Elements

This specifies whether or not two-dimensional DXF elements should be converted when loading a file.

Align Normals

BodyPaint 3D assumes that all surfaces of an object are uniformly aligned. This is not necessarily the case with DXF files.

If adjacent surfaces are differently aligned, their normal vectors point in a different direction. During rendering, this can result in undesirable color jumps. BodyPaint 3D uses this option to re-align all adjacent surfaces in the same direction.

Triangulate Polygons

DXF files may contain three-dimensional polygons. BodyPaint 3D can triangulate these if this option is enabled. This means that the inscribed surface is generated as a 3D object. This is useful in most cases, and it is therefore the default setting.

Unless the option is disabled, polygon lines are converted as such, which is useful for further processing in BodyPaint 3D.

Layer

DXF files often consist of a great number of small elements. When this option is enabled, BodyPaint 3D attempts during a load to combine elements of the same color (**Connect by Color**) or of the same layer (**Connect by Layer**). If you wish to prevent this, use **Don't Connect**.

Export

The DXF standard offers several options for saving an object. Here you can choose the type into which the object is converted when being saved. The choices are **Polyline**, **Solid** and **3DFace**.

DEM

DEM files are used in geography and are often used for the description of landscapes. This format can be imported only.

Factor

Use this to determine whether and how much DEM files are scaled when they are loaded.

Illustrator

If you want a high-quality 2D vector graphic (e.g. a company logo) to be three-dimensional, then import it in the Illustrator format.

Also vector graphics from other programs, such as FreeHand or CorelDraw, can be imported if they were saved in Illustrator format.

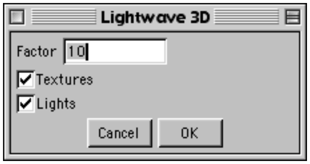
Please also read about how to export files in the relevant product manuals.

Factor

Use this to determine whether and how much Illustrator files are scaled when they are loaded.

LightWave

When you load a file in LightWave format, object geometries, lights, texture maps and the focal length are copied over.



Factor

This specifies whether and to what extent LightWave files are scaled during loading and saving. The default value is 100, since LightWave uses a smaller construction scale than BodyPaint 3D.

Textures

This lets you decide whether BodyPaint 3D should import a LightWave object's texture information.

Lights

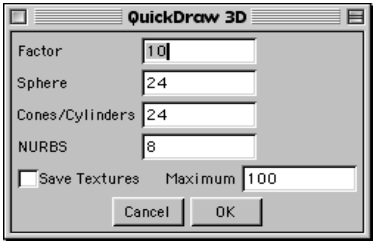
This lets you decide whether BodyPaint 3D should import a LightWave object's light source information.

Split selections

In LightWave 3D, it is possible to create objects with double-sided polygons. When you load such an object into BodyPaint 3D, each double-sided polygon is replaced by two polygons and this may lead to render anomalies.

If the scene you are importing contains double-sided polygons, select this option. Two object groups will be created — delete one of the groups if necessary.

QuickDraw 3D



Factor

Use this to determine whether and how much QuickDraw 3D files are scaled when they are loaded.

Sphere

Use this to specify whether and to what extent QuickDraw 3D spheres are triangulated during loading.

Cone/Cylinders

Use this to specify whether and to what extent QuickDraw 3D cones and cylinders are triangulated during loading.

NURBS

Use this to specify whether and to what extent QuickDraw 3D NURBS are triangulated during loading.

Save Textures

If this option is enabled, all objects are saved with their textures (including any UV coordinates).

If this option is disabled, objects are saved with their color information only (i.e. without textures).

Maximum

BodyPaint 3D allows you to use any size of texture — provided of course that you have plenty of memory. However, when viewing a scene it can be irritating to wait for textures which are very large to load.

This option lets you restrict the size of QuickDraw 3D files. The material images are scaled to the specified value (in pixels); the proportions remain intact.

Note

If imported QuickDraw 3D models contain textures you have the option when loading them to either ignore them or to save them separately.

VRML 1

Factor

This is for specifying whether and to what degree VRML files are scaled when they are loaded and saved.

Optimize Hierarchy

If **Optimize Hierarchy** is selected, the scene structure will be optimized once the VRML1 file has been loaded. Superfluous dummy objects will be removed and the object hierarchy will be optimized. This creates a clearer overview, helping you to work more quickly.

Format Text

VRML is a text format. To facilitate manual editing of the file, this option carries out automatic formatting on the entire text file during export.

Backface Culling

This option enables an attribute on all exported objects which switches off drawing of the non-visible sides of all objects in the www browser. This gives a much faster display.

Textures

This menu specifies the action BodyPaint 3D is to take when exporting textures.

None ignores the textures and saves only color information.

Referenced means objects are saved with the paths to the textures.

With File saves all textures directly in the VRML file (so-called *inline* textures). Any UV coordinates are also saved.

Maximum

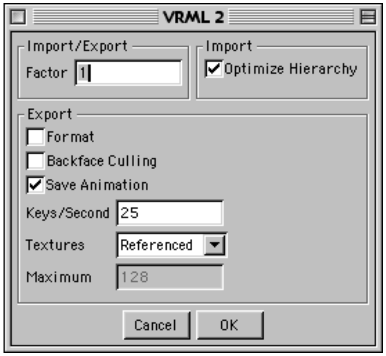
BodyPaint 3D allows you to use any size of texture — provided of course you have plenty of memory. However, when viewing a scene it can be irritating to wait for textures which are very large to load.

This option lets you restrict the size of VRML files. The material images are scaled to the specified value (in pixels); the proportions remain intact.

Note

If imported VRML models contain textures you have the option when loading them to either ignore them or to save them separately.

VRML 2



Factor

This is for specifying whether and to what degree VRML files are scaled when they are loaded and saved.

Optimize Hierarchy

If **Optimize Hierarchy** is selected, the scene structure will be optimized once the VRML2 file has been loaded. Superfluous dummy objects will be removed and the object hierarchy will be optimized. This creates a clearer overview, helping you to work more quickly.

Format Text

VRML2 is a text format. To facilitate manual editing of the file, this option carries out automatic formatting on the entire text file during export.

Backface Culling

This option enables an attribute on all exported objects which disables the drawing of the non-visible sides of all objects in the web browser. This gives a much faster display.

Save Animation

With this option enabled, it is possible to export animation sequences into VRML2 format.

Keys/Second

When animation export is enabled you choose the frequency with which the keys are being written.

Since VRML2 has only linear interpolation available you can increase the precision of the export by setting this value higher (expect a proportional increase in the file size).

Sensible values are in the range 5 to 25. More keys than frames per second does not seem particularly useful!

Textures

This menu specifies the action BodyPaint 3D is to take when exporting textures.

None ignores the textures and saves only color information.

Referenced means objects are saved with the paths to the textures.

With File saves all textures directly in the VRML file (so-called Inline textures).

Any UV coordinates are also saved.

Maximum

VRML-2 provides two options for making textures available to their objects:

The first option is identical to the one used in BodyPaint 3D; a reference to the texture file is saved along with the VRML scene. If you want to go with this option, specify the value 0.

The second option integrates the graphics data directly into the VRML2 file.

Since the texture is written uncompressed, in text format, a texture of 1000x1000 pixels quickly reaches a file size of 4MB. If you wish to avoid having such large files, you can specify a value (larger than 0), to restrict the size of textures. The materials are then scaled to that value (in pixels). The proportions remain intact.

If you have a texture of 800x600 pixels and you set a maximum value of 100, the texture is proportionally scaled down to a size of 100x75 pixels before being saved.

Note

If imported VRML models contain textures you have the option when loading them to either ignore them or to save them separately.

Wavefront

Factor

This specifies whether and to what extent Wavefront files are scaled during loading and saving.

Recent Files

BodyPaint 3D remembers the files opened last and lists them in this sub-menu for quick access. You can define the maximum number of remembered files in **Edit > General Settings**.

Recent Files

BodyPaint 3D remembers the files opened last and lists them in this sub-menu for quick access. You can define the maximum number of remembered files in **Edit > General Settings**.

Quit

This command quits BodyPaint 3D.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

17. Edit Menu

17 Edit Menu

The Edit menu contains some of the most important and most frequently used functions (like Undo) in the entire BodyPaint 3D program. We often take these functions for granted, but we would soon be lost without them. These functions are of such fundamental importance that you will find them in almost all managers (within a local Edit menu).

As we work through this chapter we will present you with a little theory. For example, we will explain how the internal buffers work. Please avoid any natural instinct to skip over the theory; it is very relevant to your everyday work because it helps you to understand and predict BodyPaint 3D's behavior.

Also, it helps you to solve problems. Little is more frustrating than knowing you are doing something wrong but not knowing what it is. Here is your chance to be well-prepared!

Undo/Redo

BodyPaint 3D has *multiple-undo*, which means that a single undo can reverse multiple actions that logically belong together. Confused? Here's the explanation:

Imagine you have 10 objects in the Object manager, then you use the **Group Objects** command to place them into a group. Internally, 12 actions are required: first a new (null) object is created, then 10 transfer actions place the objects into the null object, finally the null object is activated. BodyPaint 3D's intelligent undo recognizes that these 12 actions belong together and it will treat them as though they were one action, i.e. you can undo all 12 actions with a single undo command.

Not only does BodyPaint 3D have multiple undo, it also differentiates between memory-intensive actions and non-memory-intensive actions.

Examples of memory-intensive actions include the deletion of an object and the movement of an object's points. Non-memory-intensive actions include the activation of an object and the renaming of an object.

Non-memory-intensive actions can be recalled 10 times more than the **Undo Depth** value in the general settings.

For example, with an undo depth of 12 you can undo either 12 delete object actions or 120 activate object actions. You can also mix both types of action, e.g. you can undo 6 delete object actions and 60 select object actions.

The Undo Buffer

When you perform an action in BodyPaint 3D, information about that action is written to an area of memory referred to as *the undo buffer*. The **Undo** and **Redo** functions use the information in the undo buffer to revert the scene to a previous state.

An example

Imagine that you import an object and then change its scale to (400/400/400) units. Next, you move the object to coordinates (100/-300/0).

The undo buffer would then contain the following action history:

1 Import object
2 Scale object to (400/400/400) units
3 Move object to position (100/–300/0)

The buffer's current state is step 3, the move action. If you call the **Undo** function, BodyPaint 3D will undo the current state (move), then set the current state to step 2 (scale).

If you call the **Undo** function again, the scale action is undone and the current state is set to step 1 (import).

What particularly interests us here is that throughout the process the buffer content itself is not altered - nothing is deleted. As a result, you can restore the undone actions with the **Redo** function.

You can use **Undo** to move backwards through the undo buffer. **Redo** will advance you through the buffer.

Recall that nothing is deleted from the buffer. There must, however, be some constraint on the size of the buffer to prevent it taking up too much memory. This is the purpose of **Undo Depth** in the general settings - it specifies the maximum number of actions that can be undone (see Undo Depth, page 42).

Note

Some functions, such as Save and General Settings, are not recorded in the undo buffer and subsequently cannot be undone.

Undo (Undo View)

This function will reverse the last change you made, restoring the scene to its previous state. If, for example, you move an object by accident, **Undo** will put the object back into position.

You can select **Undo** repeatedly to continually reverse actions. By default, you can undo a maximum of 10 changes. We refer to the number of actions that you can reverse as *the undo depth*. You can set the undo depth in the program settings (see General Settings, page 42).

In the View window, **Undo View** operates exclusively on the editor camera. It will not affect camera objects. You can undo a maximum of 500 editor camera changes.

Redo (Redo View)

Redo will restore the last action that was undone (see **Undo**, above). You can select **Redo** repeatedly to continue restoring the actions.

You can traverse the recent development stages of your scene by using **Undo** to move backwards and **Redo** to move forwards.

Naturally, the number of steps you can redo cannot possibly be greater than the number of actions you have undone. Therefore, there is no separate setting for the redo depth in the program settings.

In the View window, **Redo View** operates exclusively on the editor camera. It will not affect camera objects. You can redo a maximum of 500 editor camera changes.

Undo (Texture)

This function differs from the conventional **Undo** function in that it only undoes texture changes. Hence you can use this function to undo paint strokes, filter effects and so on.

Although this function undoes texture changes only, it shares the same buffer as the standard **Undo** function. However, you cannot use this function to undo changes to e.g. UV polygons.

The Clipboard

When you use the **Cut** or **Copy** commands, the active object or element is copied into a structure in memory known as the *clipboard*. When you select the **Paste** command, the data in the clipboard is inserted into the current scene. For example, to copy an object from one scene to another scene: open both scenes, activate the scene that contains the object, copy the object, activate the other scene and then paste.

The clipboard can hold only one data element at a time. If you want to copy several objects, group the objects first, then copy the group.

The size of the clipboard is determined by the size of the data stored there. If, for example, you copy an 18MB object, the clipboard will use 18MB of memory. Naturally, you may want to purge the clipboard (e.g. before you render) to free up memory. You can purge the clipboard by cutting a null object (see Null Object, page 309) - the null object wastes only a few bytes.

Cut

This function deletes the active object or active element from the current scene and copies it (including its materials) to the clipboard. The object can be copied back from the clipboard with the **Paste** function (see below).

Copy

The **Copy** function copies the active object or element (including its materials) to the clipboard. The object can be copied from the clipboard to the active scene with the **Paste** function (see below). You can paste repeatedly to create additional copies.

Note

You can copy and paste objects using drag-and-drop in the Object manager. Keep the Ctrl key held down while you grab the object's name with the mouse and drop it elsewhere within the Object manager. The first copy takes the name of the original and appends '.1'. The first copy of 'Apple' will be called 'Apple.1', the second copy will be called 'Apple.2' and so on.

Paste

This function inserts the contents of the clipboard (i.e. the last object that was cut or copied there) into the active scene.

Note

You can cut and paste between scenes - use the copy command in the source scene, then activate the target scene and select the paste command.

The names of the inserted objects are appended with numbers to differentiate them from the original ('Name.1', 'Name.2', etc.).

The trio Cut, Copy and Paste are found in almost all programs. Sometimes they are referred to *collectively as cut-copy-paste, prompting instructions such as "Remove the item with cut-copy-paste". Only Cut removes the item - this has nothing to do with Copy and Paste.*

Delete

This function deletes the active object or element from the current scene without copying it to the clipboard (see below).

Selection

Select All

This function selects all the objects in the scene. If it is not possible to select all the objects directly, the objects will be placed in a group and the group will be selected.

If the Points tool is active (see Points, page 366) when you call **Select All**, all the points of the active object will be selected. Similarly, if the Polygon tool is active, all the polygons of the active object will be selected.

Deselect All

This function deselects all the active objects or elements. If the Points tool (see Points, page 366) is active when you invoke **Deselect All**, all the points of the active object will be deselected. Similarly, if the Polygon tool is active, all the polygons of the active object will be deselected.

Screen Refresh

Use Generators

If you turn off this option, any generators will stop generating mesh. This can help simplify the view and speed up the redraw rate.

Note

BodyPaint 3D's only built-in generator is the HyperNURBS object. If you are running BodyPaint 3D with CINEMA 4D XL6, you can use XL's generators as well (e.g. loft NURBS).

Use Deformers

If this option is switched off, any deformers imported from CINEMA 4D (e.g. twist) will stop deforming their associated objects. This can simplify the scene and improve the redraw rate.

Customisation

General Settings

The General Settings enable you to change the way BodyPaint 3D operates and the way the program looks.

The numerous options are explained in detail in General Settings, page 40.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

18. Objects Menu

18 Objects Menu

Null Object

With the null object one could say it's a "I cannot do anything, I'm nothing" object. And that's right ... well, almost.

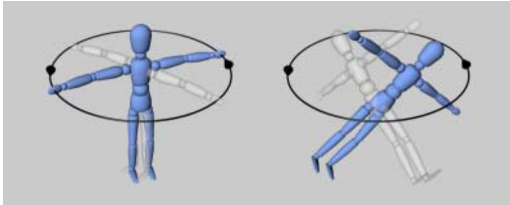
If you call this function, BodyPaint 3D creates only an empty axis system in the 3D space. The object contains neither points nor surfaces and cannot be edited in the normal way.

So why use a null object?

Well, the null object can have other objects placed within it. So it is useful for grouping matching elements of a scene. Null objects are also created by an automatic grouping in the Object manager (Group Objects, page 199).

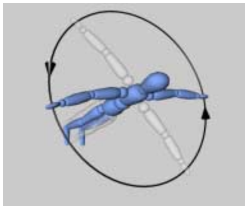
Let's not forget one of the most frequently used applications of the null object; its use as a dummy object for accurate rotation of previously rotated objects.

As long as the axes of an object lie parallel to those of its parent system (with newly created objects the parent is the world coordinates system), an object rotates around its Y axis (a heading rotation). However, if the object, or its local object coordinate system, is already rotated (so that its axes are not parallel to those of its parent), the result often astonishes even the most experienced 3D designers.



Left: rotation with parallel axes systems, Right: with an already rotated object system (in each case the final rotation is through 90°)

The use of a null object gives the desired result. Here the null object and the object which is to be rotated lie on top of each other. The axes of the two objects have the same direction and — quite importantly — the object in question is within the hierarchy of the null object.



Correct rotation behavior through the use of a null object

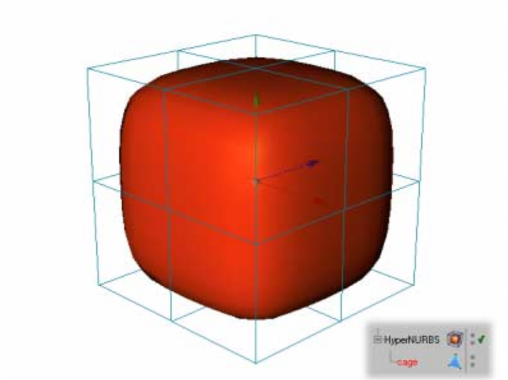
NURBS > Hyper NURBS

NURBS objects are *generators*, meaning that they use other objects to generate a new geometry. BodyPaint 3D's Hyper NURBS object uses a polygon object to generate a smooth, organic mesh.

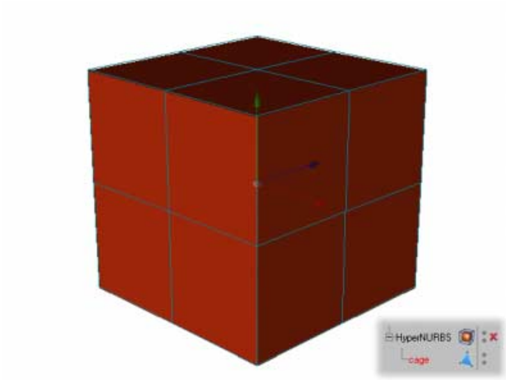
The Hyper NURBS object is interactive, which means that as you edit the polygon cage (the source object), the generated mesh changes automatically.

The Hyper NURBS object uses an algorithm to subdivide and round the object interactively - a process termed *subdivision surfaces*. This is an extremely quick and simple way to create organic forms.

To use the Hyper NURBS, make a polygon object a child of the Hyper NURBS object (drag-and-drop the polygon onto the Hyper NURBS in the Object manager).

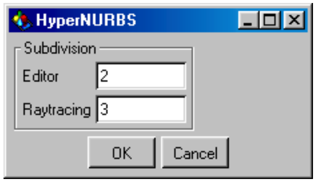


Both the Hyper NURBS object and the cage object are visible



Only the cage object is visible

Double-click the Hyper NURBS icon in the Object manager to change the appearance of the Hyper NURBS.



You can use the dialog to specify the subdivision level for shading in the editor and for raytracing. Normally the value you use for raytracing will be equal to or greater than the resolution for the editor. The higher you set the resolution, the smoother the object becomes, but also the more memory it uses and more slowly it renders.

Note

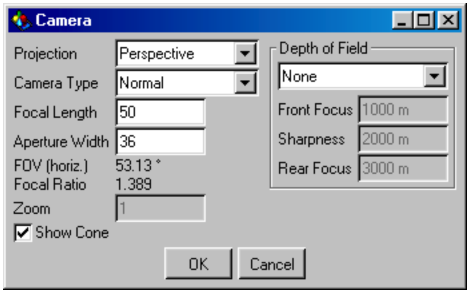
Each 3D program has different options and mechanisms for subdivision surfaces. You may find that BodyPaint 3D's implementation differs slightly from other 3D programs.

Scene > Camera

As well as the default camera in the Perspective View, you may add as many additional cameras as you need. Each camera can view your scene from a different perspective.

When you select this command a new camera is placed in the scene using the default position and focal length values of the current View.

To open the Camera dialog, double click on the camera's icon in the Object manager:



When placing and aligning a camera, BodyPaint 3D uses the camera coordinate system. This system behaves in such a way that the X and Y axes define the focal or film plane, and the Z axis indicates the direction that the camera is pointing and displays this view in the Perspective View.

In the Perspective View, the camera is shown as a cube with two spools of film and a lens:

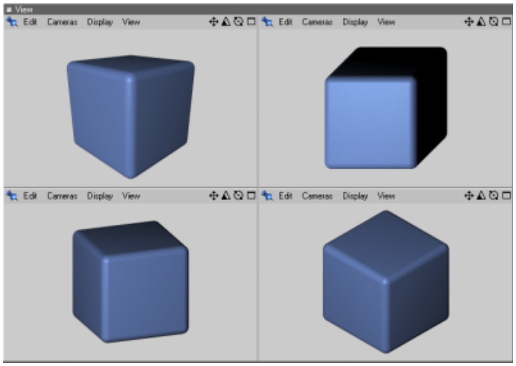
Additional camera parameters are described below.

Projection

To show all objects in a scene, BodyPaint 3D displays them using a central perspective projection. By default, objects are shown from the viewpoint of this virtual camera.

Alternatively you can select from a variety of other types of projection (e.g dimetric or isometric views, which are commonly used in technical applications).

Some examples follow: top left; central perspective, top right; gentleman projection, bottom left; dimetric and bottom right; isometric.



Camera Type

From this pop-up you may select from a list of typical types of camera lens with preset focal lengths:

Normal	36 mm
Telephoto	200 mm
Super-Telephoto	1000 mm
Wide Angle	18 mm
Fish Eye	10 mm
Super Telephoto	1000 mm

Zoom

For all camera projections except Perspective, by definition there is no focal length, so you may type a zoom factor into this box if required. Values from 0.1 to 10000 are acceptable.

Typing a number in this box is the same as zooming with the Camera tool selected.

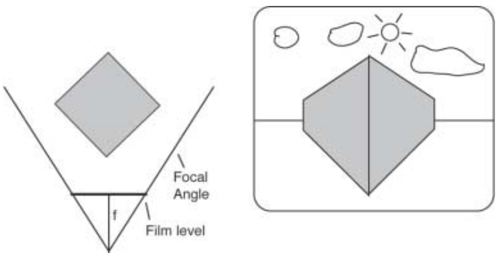
Focal Length

The BodyPaint 3D cameras, like their real world counterparts, use a lens system. You are free to choose from different lenses and to specify the focal length.

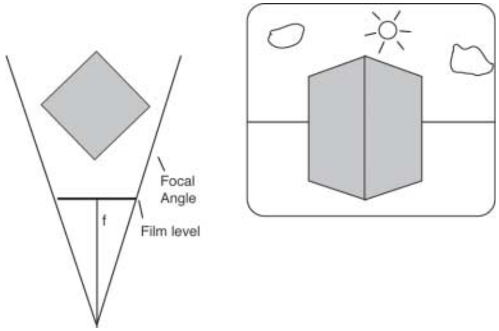
Note

The camera model used in computer graphic programs corresponds to a pinhole camera with infinite sharpness. Therefore CG focal length is to be understood only as a simulation and corresponds in no way to a physical model.

Short focal lengths give a wide-angle view and are ideal for a good overview of the whole scene. They do, however, distort objects in the scene - a particularly striking effect is that of a very short focal length such as a fisheye lens.



Large focal lengths correspond to a telephoto lens, they display a very small area of the scene since they can capture only a small spatial angle.



This is compensated by the fact that you can capture far more detail with hardly any distortion. With an extremely high value used as a focal length, the perspective depth is lost completely as the perspective projection changes into a parallel projection.

Aperture Width

You can manually adjust the field of vision (FOV) and focal ratio by typing an aperture width into this box and/or manually adjusting the focal length.

Depth of Field

BodyPaint 3D will also let you simulate the quality of the lens system, blurring with an increased aperture, which is known as depth of field.

Depth of Field lets you specify which part of a picture will be out of focus. You have a choice of **Front** or **Back**, depending on whether you require the objects at the front or the back to be displayed clearly.

You can also choose to have the central range in focus, in which case both the front and back of the scene will be out of focus. Selecting **None** will leave the settings unchanged and will display all objects in focus.

If you use depth of field in your scene, the following options will let you define the effect more precisely. Depending on the settings, not all options may be available to you.

Sharpness

Defines the distance from the camera at which the picture will be perfectly sharp. Depending on the **Depth of Field** values, the sharpness will decrease towards the front or the rear.

Front/Rear Focus

Determines the distance from the camera to the front and to the rear of the scene where objects will become completely out of focus.

Note

The contrast of the grayscale depth channel is controlled by the sharpness settings of the camera. You will get optimum contrast if Front Focus is set to immediately before the first object of the scene and Rear Focus set to immediately after the last object. The easiest way to control these values is to interactively adjust the camera's handles in the editor (see below - Interactive control of the camera).

Note

Remember that depth of field will appear less obvious at high resolutions.

Show Cone

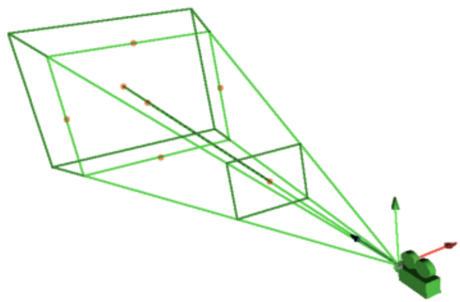
If you select this option the exact area seen by the camera will be displayed in the Perspective View.

Interactive control of the camera and its parameters

Cameras will be frequently used, so ease of use is important. To make things simple, you can adjust the camera parameters without having to open the dialog. Instead use the adjustable handles in the Perspective View. Follow this example to see how:

1. Create a new, empty document.
2. Create a camera object and set the **Depth of Field** Front and Rear values to 500 and 2000 respectively.
3. Now take a look at the camera object in the Perspective View.

Select the menu option **Edit > Frame Scene**. Zoom out until you can see the camera object completely. The camera symbol is now relatively small, similar to this illustration (you might want to switch to a Perspective View for a better view of the scene):



We will now describe the process in more detail.

A green line runs from the camera origin, ending in a single orange point. This is the target point of the camera. You can grab this point with the mouse, move it and align it to other objects, thereby rotating the camera around its origin.

At the same height as the target point there is a 4-sided plane with grab points. This is the focal length plane. At the center point of each side of this plane is an orange handle. These handles allow you to change the focal length interactively.

Switch to the Perspective View, activate the camera object and adjust the focal length. You can see the adjustments in real time in the editor.

There are two further, optional, planes that run parallel to the focal length plane, one in front and one at the back. These two planes (or just one of them) are only available if you select a depth of field. At the center of each plane you will see another orange handle. Use this handle to shift the depth of field plane interactively along the Z-axis of the camera. Again, you can see these real time adjustments in the editor.

You may also adjust the focal range i.e. the area that is shown in focus.

By holding down the Shift key while dragging the handles you will see that the entire plane, rather than just the focal length, can be moved along the Z-axis.

As you see, interactive control of the camera is very easy.

As mentioned earlier, you may create as many cameras in BodyPaint 3D as you wish. Keep in mind that it is always the active camera that is used for rendering.

Cameras Menu

Scene Cameras

Each view may have its own camera. The editor camera is used by default but you may create and use your own cameras. The Scene Cameras sub-menu will display a list of all the cameras you have placed in your scene, from which you may choose one for each view.

Link Active Object

After creating a camera, the view is not initially switched to the new camera. You can move the camera in the Perspective View and see your adjustments to the camera in the scene.

In order to view using your new camera you must activate the view by selecting **Link Active Object** from the Cameras menu of the appropriate Perspective View. Now the Perspective View will show the new camera view.

Note

With more than one camera in a scene, you may assign each of the respective camera views to your main Perspective View and very easily switch between different cameras and their views. Alternatively you can open and attach an individual Perspective View for each camera object and its view. Then you may control all the scene's cameras at the same time.

Editor Camera

To cancel the view from a selected camera, detach it using this command. This removes the view connection from a camera and shifts back to the editor camera view.

Note

Camera objects are not only used as cameras. You can also use a camera to help you align your scene elements and objects. This would make sense with a spotlight for instance (see page 319) when, like camera objects, the Z-axis is used as the line of sight.

Scene > Target Camera

A camera with a target is, in principle, no different to the camera described above. However, when you choose a target camera, a target expression tag is created. If you double-click on this tag in the Object manager, you can enter a name in the Object dialog that opens. Type in the name of an object, then click on **OK**. Now, the camera will track the object automatically.

Note that a null object is created at the same time as the camera. The camera aligns to this null until you define your own target object.

As you would expect, everything is interactive; if you move the camera in the Perspective View, it stays aligned to the target object; if you move the target object, the camera follows it.

Scene > Light

When starting a new scene in BodyPaint 3D, a default light is used. This light is positioned to the left of your initial perspective view.

If you wish to change the default lighting setup for all future scenes, build a new scene that contains only the lights that you require for your default lighting and save this scene as ‘new.c4d’. This setup will then be opened automatically each time you start a new BodyPaint 3D scene.

Note

You can also add settings such as the output resolution to your default scene setup in this way.

Displaying Lights in the Perspective View

The lighting within a scene can be easily previewed by turning on the Gouraud shading option. This option will update your lighting in real-time, even adjusting the lighting and updating your scene as you move the lights around.

If your scene is complicated and updates too slowly when moving your light with the Object tool, adjust your light’s position with the Model tool.

The Object tool and the Model tool

Name your light in the Object manager by double-clicking on its name.

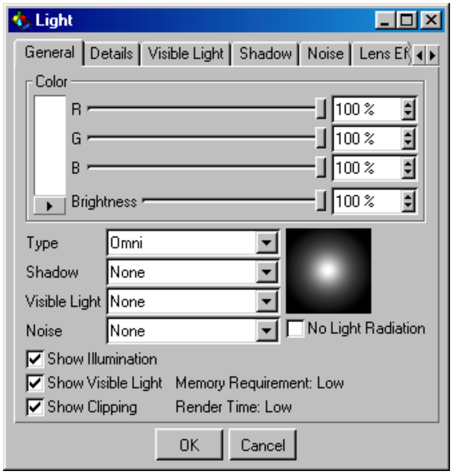
To change the properties of your light, double-click on its icon in the Object manager.

 This opens the Light settings dialog.

Light Settings

This dialog provides the details of each light source in your scene.

General



Many of the light attributes that you select here (such as **Noise**) have their own tab on which you can give more detail of the particular feature. We will give an overview of these features here; more detail can then be found in the section on the relevant tab, later in this chapter.

Color

You can adjust the color of each of your lights using the slider controls and the input boxes for each color element (R,G,B). You may change the color system (perhaps to HSV 0...255) using the pop-up menu below the color box.

The brightness of each light is independent of the light's color and can be controlled with the **Brightness** slider. By adjusting brightness values you can simulate any type of light from the small glow of a candle to the extreme flare of sunlight.

In most cases the maximum slider value of 100% will suffice, but in extreme cases a value of up to 1000% can be manually typed into the adjacent box.

It is also possible to use the color sliders to achieve *negative lighting* effects, which is discussed in detail below.

Type

You may change the type of light with this pop-up. Detailed explanations of each light type are given later in this chapter.

Shadow

Using this selector you may choose to have various shadows generated by your light source, or no shadows at all. Detailed explanations of the different shadow types are given in the Shadow section of this chapter.

Select **None** if your light is to cast no shadow. This is a helpful option in a scene with many lights, allowing you to turn on shadow-casting for the main lights only. Any real world photographer will envy you this option and its possibilities.

Visible Light

With this pop-up you can adjust the visibility of the light in your rendered scene.

In nature, light normally becomes visible only if small particles such as dust, insects, smoke or fog are present in the air. For example, if a car headlight shines in fog, you will see its cone of light quite distinctly. Detailed explanations of these various types of visibility are given later, in the Visible Light section of this chapter.

Noise

With this option you can make your lights exhibit irregularities in the visible light or on the surface lit by the light.

Note that noise will add to the render time.

No Light Radiation

If you need to see just the visible light and/or its lens effects without the light source actually casting light onto your objects, activate this option. Should you need your light sources for special effects check this box, otherwise the render time will increase.

Show Illumination

Selecting this option will show a wireframe approximation of the light's illumination range in the Perspective View. This range can then be adjusted by dragging the handles on the wireframe representation.

Show Visible Light

Selecting this option will display in the Perspective View an approximation of the light's visible range, not to be confused with the aforementioned *illumination range*. It may become confusing if both indicators are turned on in the Perspective View. For this reason, this option is turned off by default. Again, this range can be interactively adjusted with its handles.

Show Clipping

Selecting this option shows an approximation of the selected light's clipping range (restriction of the light range - see later) in the Perspective View. Again, the range can be adjusted using the wireframe's handles.

Memory

This indicator shows the amount of memory needed for the selected light sources in your scene.

Here is an overview of the memory requirements for light sources:

- Hard shadows and area shadows need memory-intensive raytracing calculations.

  As more objects are added to a reflection or refraction dependent scene, additional memory will be required.

- a soft-shadowed visible light will need a shadow map of at least 250KB X-resolution x 250KB Y-resolution
- Omni light sources require six times as much memory for their shadow maps.
- When used in combination with textured transparencies (Light Maps), up to 20 times more memory can be needed.

Render Time

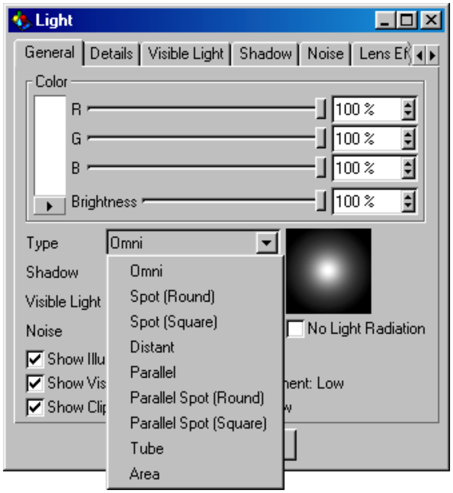
This indicator gives an approximate render time for the selected light source.

Here is a short overview of lighting render times.

- Soft shadows are calculated more quickly than hard shadows.
- Hard shadows are calculated far more quickly than area shadows.
- Making a light visible in a rendered scene adds a negligible amount to its render time.
- Using a volumetric light increases render time in inverse relation to the sample distance (i.e. the shorter the sample distance, the longer the render time).
- Noise adds to render time, with hard and soft turbulence requiring more calculations than basic noise, while wavy turbulence roughly doubles rendering time over that of standard noise.
- Using a high sample radius will increase the render time of soft shadows.
- Tube light and area light sources also increase render time, although not to the same extent as the processor-intensive volumetric light.

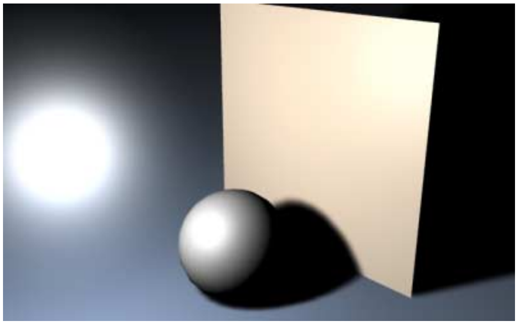
Types of Light

This section describes the kinds of light sources you can select from the **Type** pop-up on the General tab.



Omni

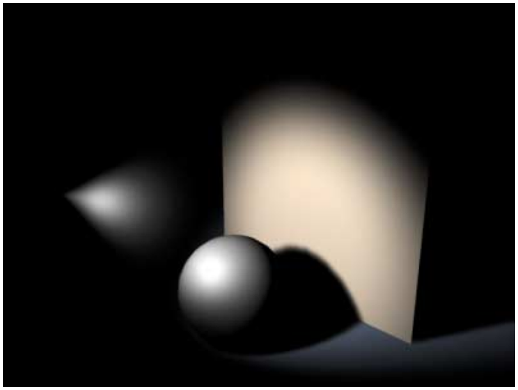
An Omni light acts like a real life light bulb — casting its rays in all directions.



Placing an Omni light into the center of your scene will illuminate your scene evenly.

Spot (round/square)

Spotlights cast their rays in just one direction, which is along their Z axis by default. Once created, they can be easily moved and rotated to light individual objects and certain areas of a scene. The spotlight source can project a round or a square cone of light.

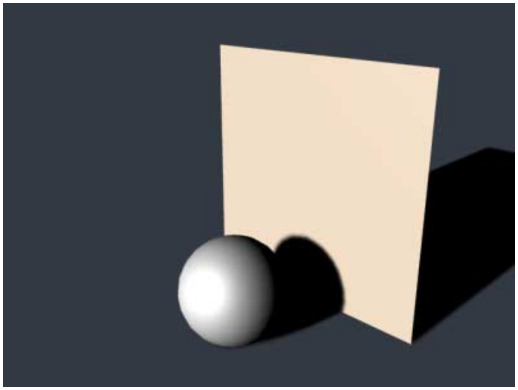


Square light cones are ideal for, among other things, the simulation of projectors which require a square picture to be cast onto a wall.

Some typical examples of round spotlights are car headlights, torches etc.

Distant

The Distant light type is so called because it mimics the light that is cast from an extreme distance. Using a Distant light would, for example, evenly illuminate the whole of a floor object in all directions.



Since a Distant light is effectively infinite, the light has no actual origin. Thus the exact placing of a Distant light, near or far, has no effect on your scene's objects. Only the actual direction in which the light is facing is important with this light source.

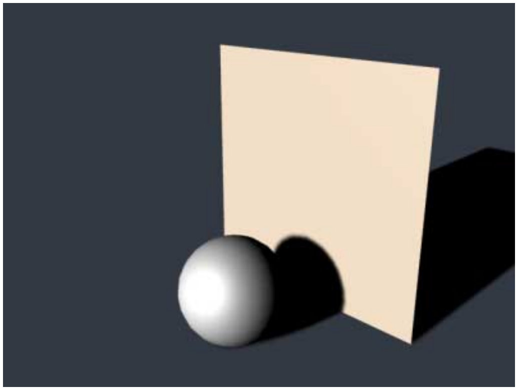
Distant light sources are very suitable for the simulation of sunlight.

Note

Owing to its characteristics, the Distant light source cannot radiate visible light.

Parallel

Parallel lights resemble a very distant light source. Unlike the Distant light source however, the Parallel light has an origin and simulates a large, single axis *wall* of light.



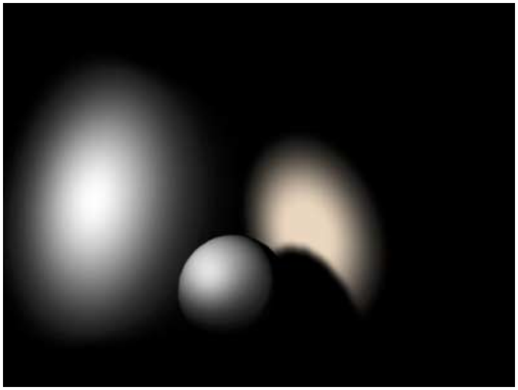
By default, all Parallel lights when created will radiate light rays along the Z-axis. These lights take the appearance of an infinitely large surface, radiating parallel light in a single direction; anything behind the point of origin will not be illuminated.

Note

Like the Distant light, Parallel lights cannot be rendered as a visible light.

Parallel spot (round/square)

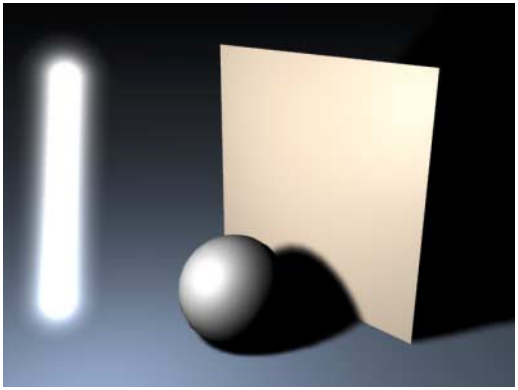
Parallel spotlights resemble the regular spotlight source object, but do not have light cones to define falloff or distance. Instead, light rays are cast along cylinders and/or bars.



The origin is important in defining which objects in a scene will be affected by this light. The radius of the spotlight can also be modified using the adjustment handles.

Tube

Tube lights do not have an exact point of origin, but a linear one. The Tube light is represented by a line, from which light is radiated in all directions. When used as a Visible light, this is a very quick and easy way to make neon tubes.



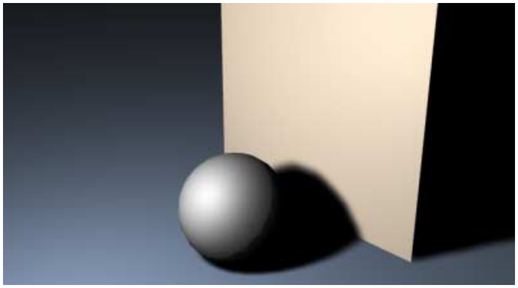
A classic example of the use of the Tube light is of course the laser sword.

Quick tip

Tube lights are a great way to produce long-drawn-out specular highlights, as on the vase in the illustration below.

Area

The light rays from an Area light expand from its origin outwards in all directions. A rectangular computer screen is a good example of such a light.



The resultant lighting and specular effects are somewhat different from those of an Omni light. Specular highlights are more angular and the surface illumination is richer (see illustration below). The closer the light source is to the object, the more apparent this becomes.

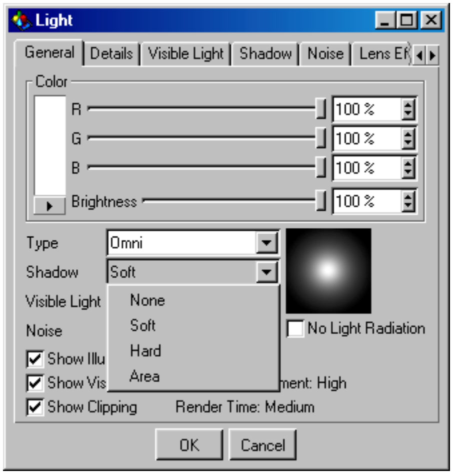
However, an Area light with a small radius that is placed far away in a scene will hardly seem to differ from an Omni light source.

Note

As with the Distant and Parallel lights, an Area light cannot be rendered as a visible light source.

Types of Shadow

This section describes the different types of shadow you can select from the **Shadow** pop-up on the General tab. The Shadow tab itself is described on page 333.



You can combine all light source types with all shadow types in BodyPaint 3D. For example an area light can cast not only area shadows, but hard shadows as well. And a parallel light can easily cast soft shadows.

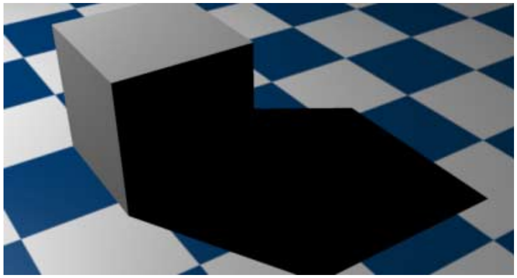
There are no restrictions to this mixing of lights and shadows, since the shadow is computed independently of the light source.

Hard shadow

Traditionally in raytracers, genuinely raytraced scenes contained hard shadows. As this technique needs to compute many more additional rays, this method increases the render time dramatically.

Hard shadows, because of their abrupt, sharp appearance (see illustration below), are of particular interest for technical illustrations.

However, in other more natural pictures they look rather unrealistic because such hard, sharp shadow borders are rarely found in real world environments.

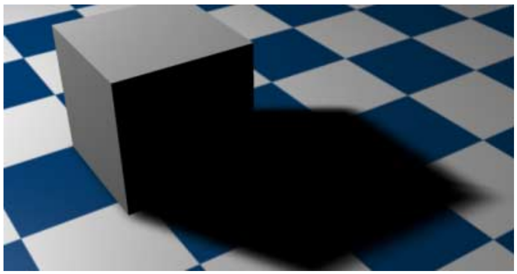


Soft shadow

In reality all objects, whether they are trees growing in the wild or a vase in a room, are lit by several partial light sources. The result of this is a gradual transition of light to shadow.

This soft edge, or *umbra*, can be simulated in BodyPaint 3D by using a so-called shadow map — the Soft shadow.

A shadow map is a grayscale picture of the scene seen from the view of the light source. Contained in this are all the objects lit by the light source. During the render calculation the renderer will determine exactly which objects will fall into this shadow of the light source.

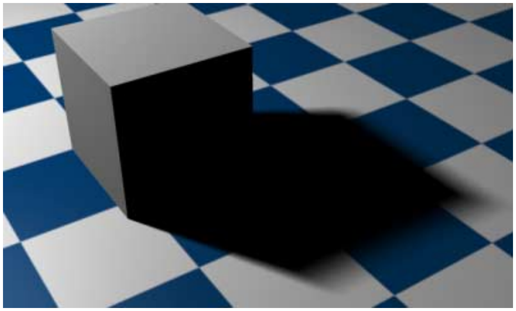


The major advantage of this method is the fast computing speed and the soft shadow's natural appearance.

However, the one disadvantage of soft shadows is the memory required to calculate them. Depending on the size of the shadow map, a great deal of additional memory may be needed. So be careful in your allocation of shadow maps or you may find your scenes wasting precious memory.

Area

Although soft shadows are more natural than hard shadows, they are still not perfectly natural. On careful examination you can see that the soft edge always has the same width. In nature this does not happen; the nearer an object is to a surface on which it casts its shadows, the sharper this edge will be. Area shadows simulate this effect perfectly.



Take a look at the above illustration. Where the shadow borders on the cube, it has a very hard look. As the shadow falls away from the cube it becomes softer.

How does this work? Quite simply really; BodyPaint 3D calculates the shadow at the origin of the light source outwards (for all lights, whether Omni, Spot or Area). Only a hard shadow is computed at this point. The softer area shadow is the result of a *virtual* area light source, which simulates the overlay of several light sources. This provides the natural scattering of light.

However, as usual, this method comes with a price; longer render times. Sometimes the result may not justify the length of render time as a soft shadow will almost always be sufficient. Carefully assigned Area shadows, however, can produce very impressive effects.

An example of a realistic shadow

Types of Visible Light

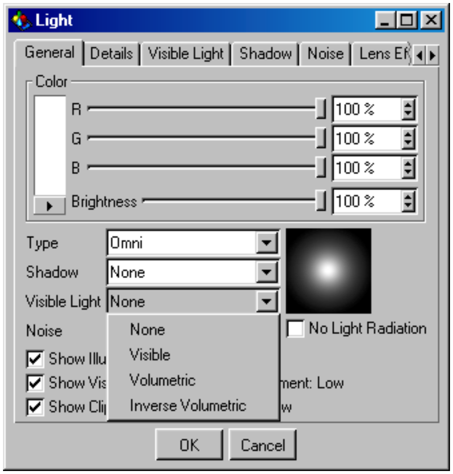
This section describes the different types of visible lights you can select from the **Visible Light** pop-up on the General tab. The Visible Light tab itself is described on page 338.

In BodyPaint 3D all light sources and/or the light cone can be made visible. This type of effect can be seen in a smoke-filled room.

This effect is comparable to fog, which does not diminish light, but rather adds to its brightness.

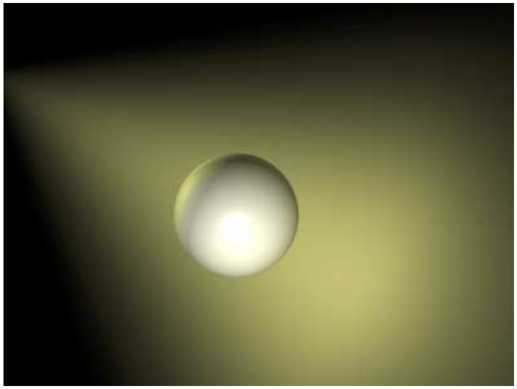
With visible light you can produce the most stunning computer graphic effects. Headlights, glowing and shimmering lights, laser beams and atmospheric effects to name just a few.

There follows a description of the various types of visible light, available from the **Visible Light** pop-up in the General tab.



Visible

If only the **Show Visible Light** option is activated (General tab), then the light source penetrates all objects, no shadows are cast by the objects. For example, you might place a visible light in the center of a sphere to simulate an atmosphere around a planet.



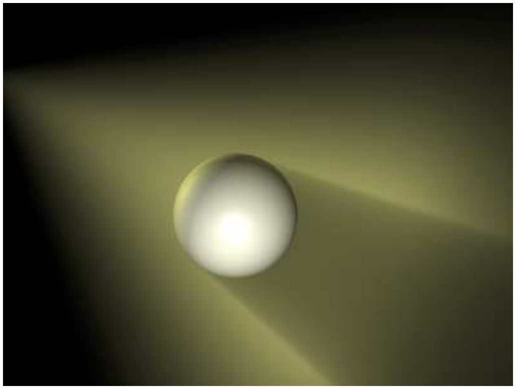
A simple example of visible light

Volumetric

If you have experimented with the visible light settings, you may already know that a visible light pays no attention to objects which lie in its cone of light. The light rays penetrate objects unhindered, casting no shadow in the light's beam.

In order for shadows to be cast in the visible light, volumetric lighting must be added.

The parameters for the visible volumetric light are taken from the light source's shadow map values, X-resolution, Y-resolution, parallel width and the sample radius. The algorithm for volumetric light is based on the shadow map and needs these parameters. (These shadow map parameters are covered in more detail in the Shadow section of this chapter.)

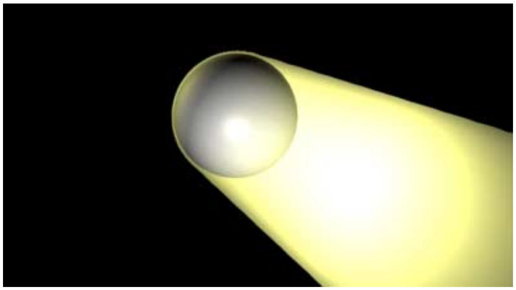


This is volumetric visible light; shadows can be cast within the light cone

Inverse Volumetric

Using the inverse volumetric function has the interesting effect of inverting your volumetric light — that is, the light is visible where the light cone would normally be in shadow (see the illustration below for an example).

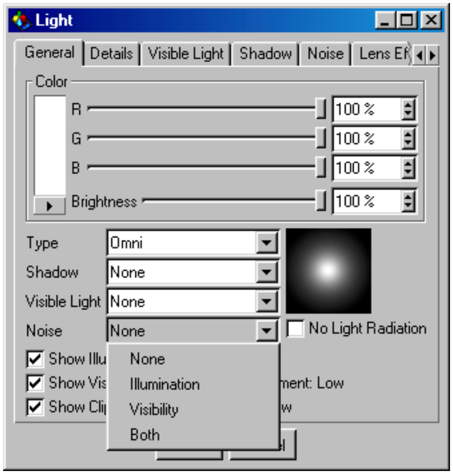
Imagine a company logo, behind which you have placed an inverse volumetric light source. This inverts the light's volumetric effect, giving the impression that the light is radiating from the logo itself.



With inverse volumetric lighting, the light appears to emanate from the object

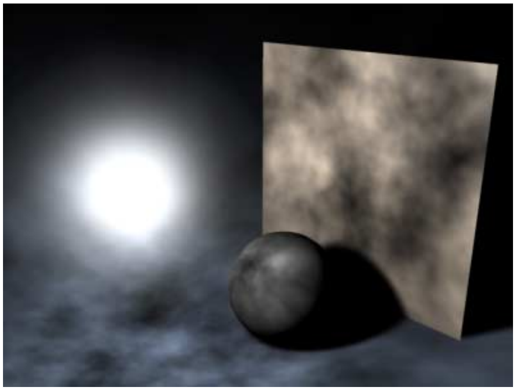
Types of Noise

This section describes the different types of noise you can select from the **Noise** pop-up on the General tab. The Noise tab itself is described on page 343.



Illumination

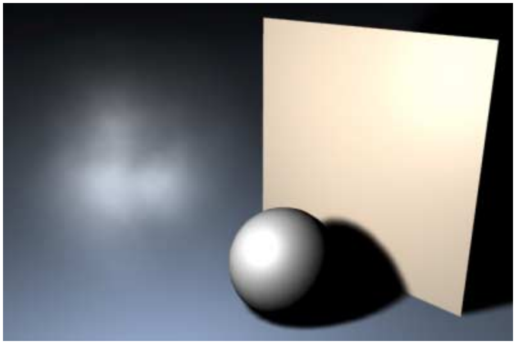
You can add irregularities to your light source in order to give it a realistic appearance.



A real-world surface is unlikely to be evenly lit, especially if dust or particles are in the air.

Visibility

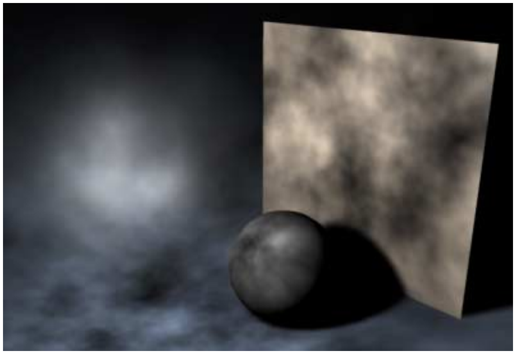
This option adds irregularities not to your lit surface, but to the visible light itself.



With this you can simulate for example the waving effect of fog, which is visible in the light cone.

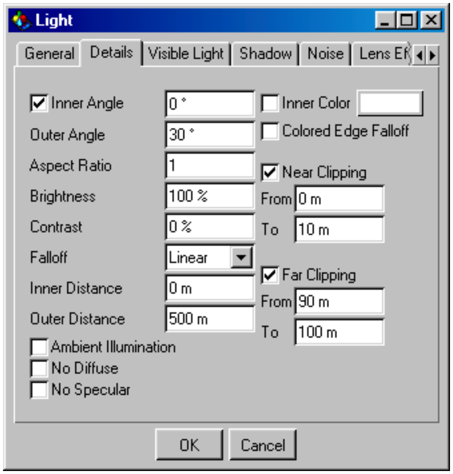
Here is an example: Using Noise you can produce very interesting effects, such as a supernova, simply by setting the internal and external colors of the visible light to yellow and red.

Both



Using this option will ensure that both the basic light and any visible light are provided with noise irregularities.

Details



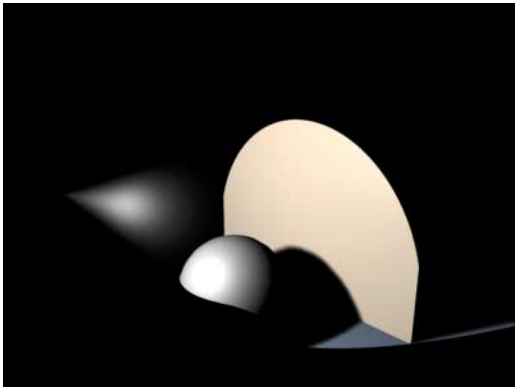
Using the options on the Details tab, you can access the individual properties of each of your light sources.

Inner Angle

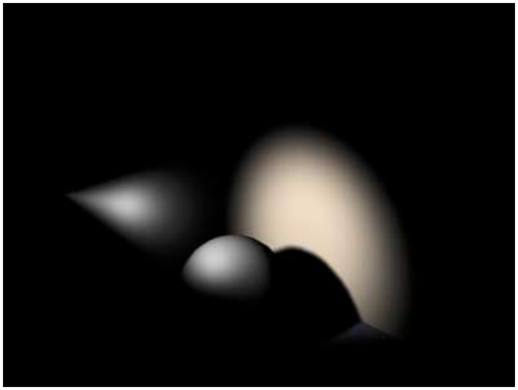
Depending on the type of light you use, this will adjust either the inner angle (for a standard spotlight) or the inner radius (for a parallel spotlight) of the light.

Within the inner angle area, the luminosity value of the light source is 100%. From the inner to the outer angle the luminosity value falls from 100% to 0%.

If you switch off the **Inner Angle** option, the luminosity of the light source in the entire light cone amounts to 100%, resulting in a hard cone of light; the following picture illustrates this.



If **Inner Angle** has a value of 0, the light source will have a soft transition spreading from the center of the light to the light's edge, as illustrated below.



Outer Angle

Adjusting this value will define how large the light will be in total. The **Outer Angle** value indicates the limits of the light source's luminosity.

Aspect Ratio

This option allows you to stretch and shear the shape of the light's cone angle. The standard aspect ratio value is 1; increasing the value to 2, for example, will double the light cone's height relative to its width. Similarly, reducing the value to 0.5 will make the light cone only half as high as it is wide.

Note

This effect can also be achieved by scaling the axes of the light source using the Object tool and/or the Object Axis tool.

 Object tool

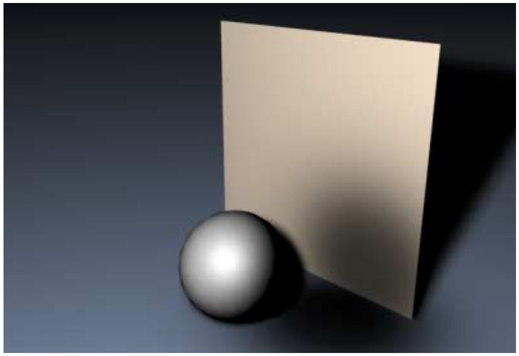
 Object Axis tool

Brightness

This value controls the overall brightness of the light source.

While this control may be seen as just a way of brightening or dimming your light source, it's also capable of another interesting, and very useful, effect. Using a negative value with this option results in *negative lighting*.

The color of your light source (set in the General tab) is important here. That color will not be added to the scene where a negative light source is in effect. With this technique you can artificially darken and shade specific areas of your scene.



This type of lighting works even better when used with carefully constructed environment lighting and falloff ranges. A good understanding of environment lighting is needed for this and this is covered later in this chapter.

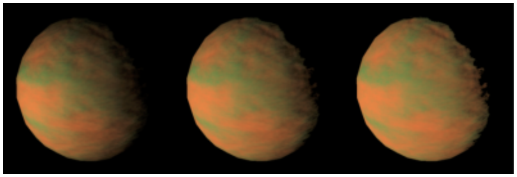
Contrast

The intensity of a light source on an object is not dependent on the distance of the light from the object (unless you explicitly adjust its falloff), but rather on the angle at which its rays hit the object.

If a ray hits a surface at an angle of 90°, the surface is illuminated with the light's maximum intensity (taking any falloff into account). As this angle (called the *angle of incidence*) decreases, the strength of the illumination decreases as well. Therefore, in an average scene, a soft transition is normally seen on any lit surfaces. The **Contrast** value controls this transition.

In the illustration below you can see a series of pictures of a planet, towards which a light is directed. You can clearly see how little the planet's front and sides are lit using 0%

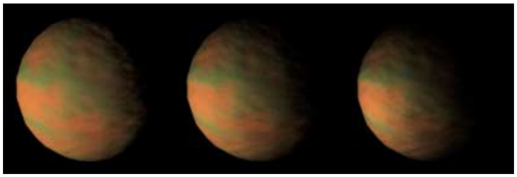
contrast. The transition on this lit surface is not very soft; this surface contrast is not natural for planets. If you look at photographs of a planet you will see that the transition of its lit surface to its shadowed edge is hard - as illustrated further to the right in the series of pictures.



0% 50% 100%

With the contrast control you can adjust how soft or hard you wish the lit surface transition to be.

If you need a special over-soft look to your objects you may even enter negative values, here's an example:



0% -50% -100%

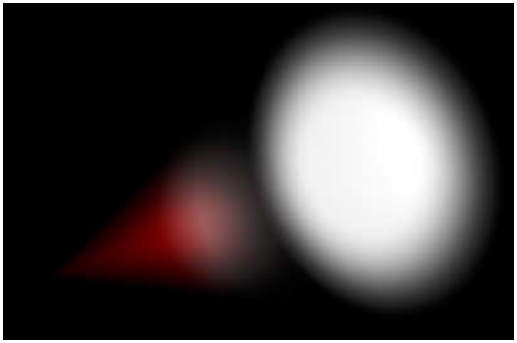
Inner Color

Independently of the light source's color, which was assigned in the General tab, you may assign another color to the internal range of the light.

When used, this **Inner Color** is the *core* color of the light source. Starting at 100% of its value, the inner color spreads outwards and gradually changes into the light source's general color. For the inner color to be used, the **Colored Edge Falloff** option (see below) must be activated.

The inner distance of the falloff determines the expansion of the inner color. Click on the color chooser to select the color properties of your inner color.

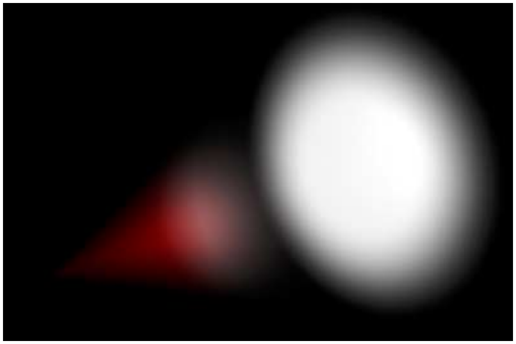
In this illustration the light source is yellow and the inner color is red. The light shows a gradual progress of color change from red to yellow.



Colored Edge Falloff

This option is available only when using a spotlight with an **Inner Color** option selected. The normal behaviour of the inner color is to spread in a linear direction along only the Z-axis of the spotlight, from its origin to the light source's color (selected in the General tab).

If you select **Colored Edge Falloff**, however, the inner color will also radiate outwards from the inner angle through to the light source's general color.



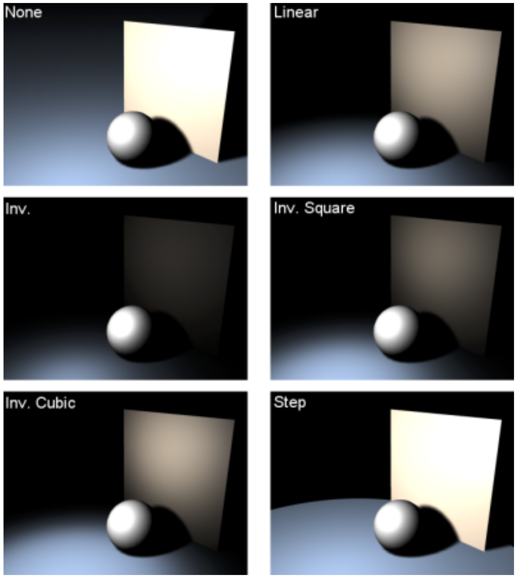
In this picture Colored Edge Falloff is deactivated.

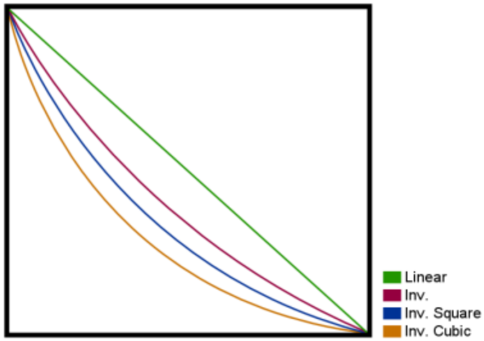
Here Colored Edge Falloff is on – you can see the inner color in the center of the light cone.

Falloff

A normal virtual light source will illuminate its surrounding environment with a continuous, linear brightness. However, this is not how all lights work in reality; real light sources will have their luminosity absorbed.

Just as in nature, BodyPaint 3D light sources are able to have their luminosity reduced over any distance. To achieve this, several falloff functions are available in this pop-up and are illustrated below.





Inner Distance

Within **Inner Distance** there is no falloff. Up to this point, the brightness of the light remains constant. Outside of this boundary is where the inner distance falloff begins.

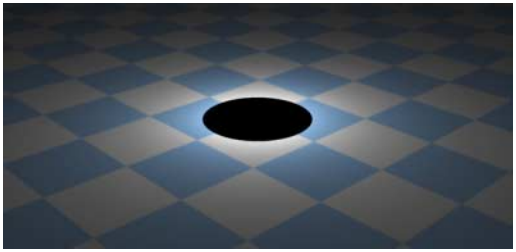
Outer Distance

The range between the inner distance and the outer distance is where the brightness of the source light changes from 100% to 0%. This **Outer Distance** value indicates the maximum range that will be illuminated by the source light.

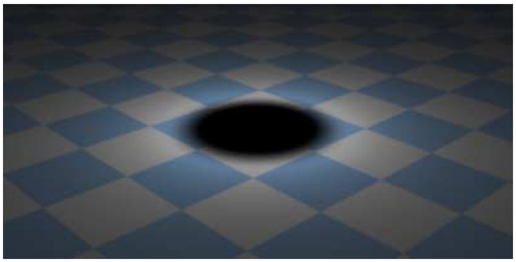
Near Clipping

You can use clipping to restrict the illumination and visible light (if present) radially with an Omni light and linearly with all other light types. This means your light source does not have to radiate light from its origin; the radiation may begin, for example, five meters from the light source's origin.

The two values used for this effect are **From** and **To** and signify, in metres, the distance for the clipping effect. The larger the difference in the two values, the softer the transition.



From = 90, To = 90



From = 90, To = 150

An example:

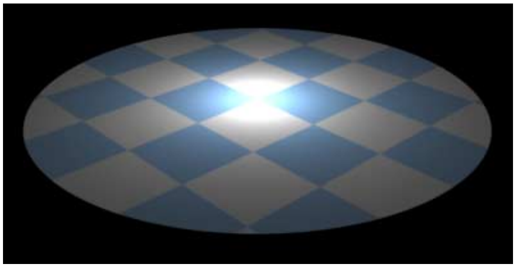
If values of 10m and 50m are used in the two boxes, it means that there will be no illumination from the light source between 0 and 10 meters; from 10 metres the luminosity begins, reaching full luminosity at 50 metres.

Far Clipping

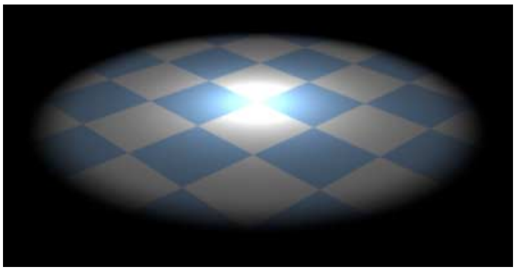
Far clipping can be used to cut off your light source's illumination abruptly.

To use far clipping, once again two values are needed. This time the **From** and **To** values denote where the cut off begins, and where the light source will fully vanish. Again, the larger the difference between these two values, the softer the transition.

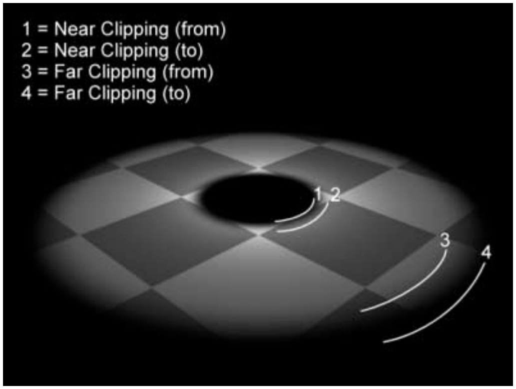
Examples of clipping with point and spotlights are shown below.



From = 300, To = 300



From = 220, To = 300

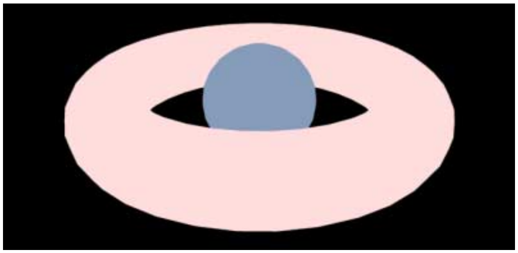


Schematic display of the individual clipping ranges using the example of an Omni light source

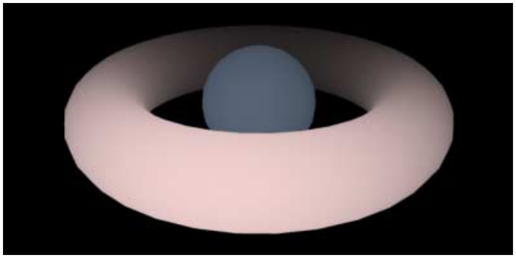
Ambient Illumination

Normally the brightness of a surface is determined by the angle at which a ray of light hits it. The greater the angle between the ray and a tangent to the surface, the more the surface will be lit by the light.

When **Ambient Illumination** is switched on, however, this physical law is waived. Here the angle does not matter. All surfaces are lit with the same intensity. Thus a much *flatter* look results. Only the material color is considered in the lighting calculations.



In the example picture above, the light's **Falloff** was also activated.



With both **Ambient Illumination** and **Falloff** activated for the light source, you can lighten certain regions of your scene in a similar way to how you darken them with negative lighting, explained earlier.

No Diffuse

When **No Diffuse** is selected, the color properties of an object are ignored by the light source; only specular surfacing is produced by the light. This can be useful for some objects e.g. a golden signature, where you would like some specular glints, but no lightening of the color properties.

Writing with No Diffuse off

Writing with No Diffuse on

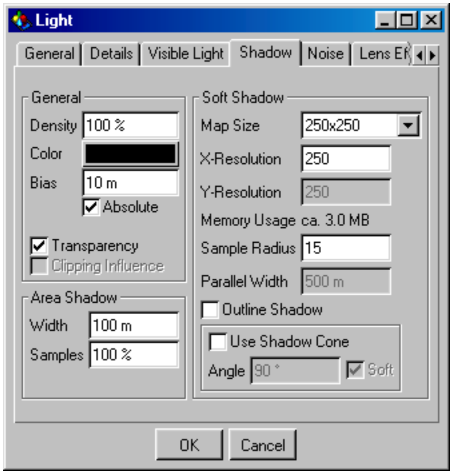
No Specular

When this option is selected, the light source produces no specular highlights on your scene's objects. Imagine you have a wineglass on a table with two or more light sources in the scene. Your wine glass may then show too many specular highlights, with the glass material looking too busy. To avoid this, turn on **No Specular** for some of your light sources.

The bottle below is lit by two light sources, causing several highlights to develop.

Below, the **No Specular** option has been activated for one of the light sources.

Shadow



This attributes tab is used for the fine-tuning of your scene's shadow maps.

Density

Adjusting this value will vary the intensity of your shadow. A value of 100% means the shadow has full intensity. With 50% your shadow will be semi-transparent, and at 0% the shadow is invisible.

Color

Here you can change the shadow's color. You may be asking yourself why you would ever need to do this. With a little thought, however, you may realise that in nature a shadow is hardly ever truly jet black. Coloring your shadow with a shade of brown, for example, could give a particular scene some natural, extra warmth.

Bias

Because of the particular principle involved in the calculation of shadow maps (shadows do not begin at the object's origin), you may at times find the need to adjust the shadow's position using the **Bias** value. Usually a value of 1m will suffice for most scenes. However, sometimes an adjustment may be necessary.

When zooming the camera in on extremely small objects, this distance between object and shadow will become apparent (see illustration 1).

Entering a lower value can correct this error (see illustration 2).

You may also at times have too small a **Bias** value (e.g. with very large objects), which can result in the object casting the shadow on to itself (see illustration 3). In a case like this, set the **Bias** value somewhat higher.

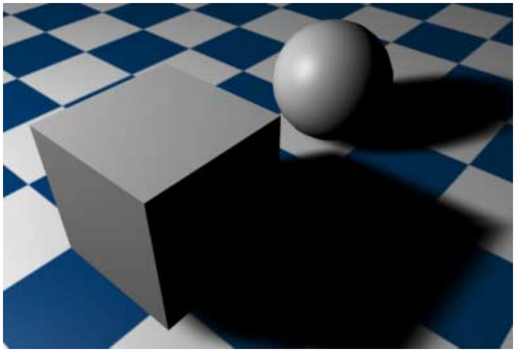


Illustration 1

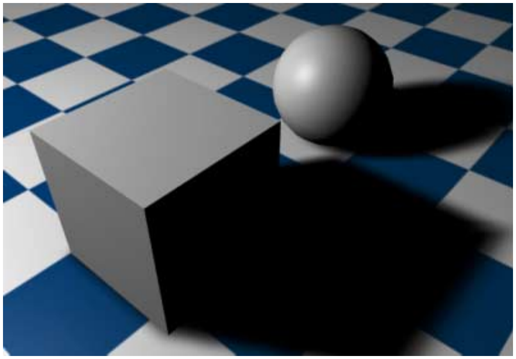


Illustration 2

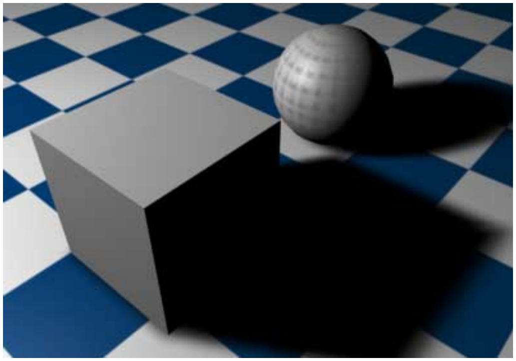


Illustration 3

Note

The smaller an object is and the more you zoom in on it with the camera, the smaller the bias value must be set. This ensures no gap between object and shadow is visible. If the object is excessively large and unwanted self-shadowing occurs, raise the bias value. Generally speaking, a value of 1m is adequate for all objects up to a size of 10000m.

Absolute

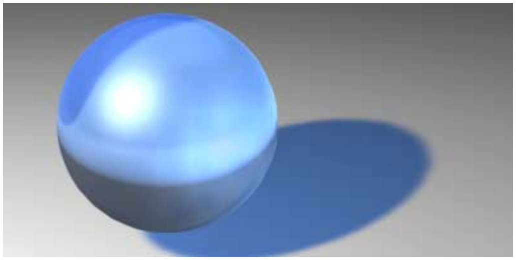
You should leave this option activated!

If you switch it off, the distance of the shadow from the object depends also on the distance of the light source from the object – so-called *relative bias*. With relative bias, the further the light source is from the object, the further the shadow will be from the object.

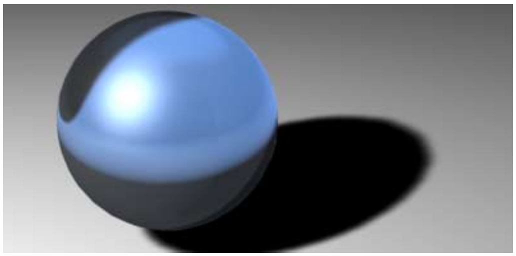
It can be useful to deactivate the option in cases of extreme scale.

Transparency

If you need your shadow maps to consider the transparent (alpha channel) properties of your objects, you should switch on this option. When activated, your shadows will take into account the transparent surfaces of your objects and render your shadows with the correct transparency. Transparencies can also be computed with all other shadow types.



The Transparency option is on



The Transparency option is off

Note

Transparent soft shadows use lots of memory during rendering. An Omni light source can sometimes use six times as much memory as a spotlight, as six shadow map calculations must be computed compared to the spotlight's single shadow map.

Clipping Influence

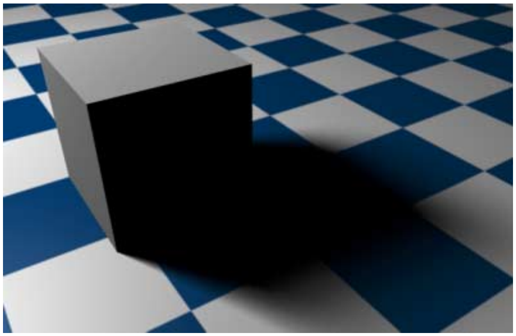
If you select this option, the clipping settings on the Details tab will be applied to shadow-casting as well.

Area Shadow

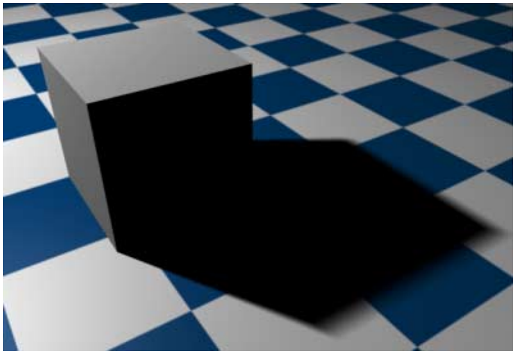
This value will set the parameter range for your area shadow.

Width

As described above, the area shadow is produced by a *virtual* area light source (independently of the actual light source). This **Width** value indicates the size of this surface. The larger you make this value, the more the light is scattered and the softer the shadow becomes. However, as the value is increased, so is the render time, sometimes substantially.



With large radius (300 m)



With small radius (50 m)

Samples

If you lower this value, the quality of the area shadow is reduced, but it is calculated more quickly.

Soft Shadow

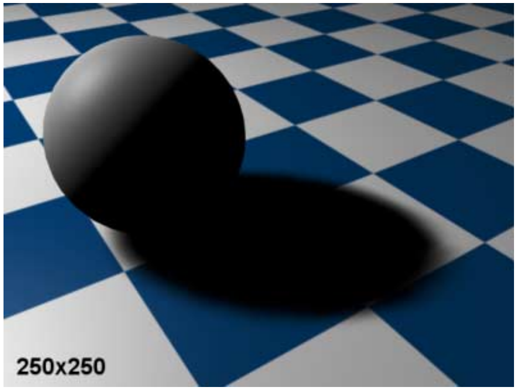
Use this for the finer details of your soft shadows.

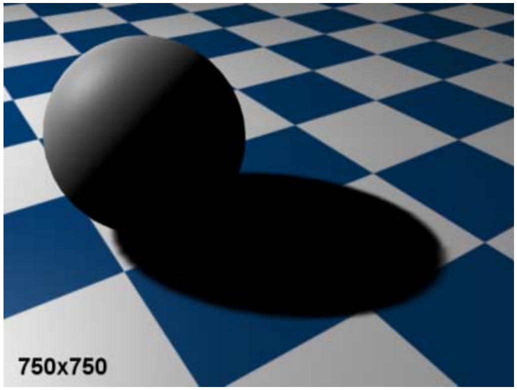
Map Size

When using soft shadows, BodyPaint 3D initially *sees* the scene from the point of view of the light source and calculates the complete scene from this view. All objects *seen* in this view are interpreted as shadows for the scene. This results in shadow maps being created.

Map Size assigns memory for each shadow map. The smaller the memory assignment, the more pixelated the shadow will appear. This can result in a shadow map with a jagged, staircase-like appearance at its edges. The more memory used for the map size, the smoother the shadow and its edges, but the higher the memory usage.

By default, a standard size of 250x250 is used for Map Size. Shadow map sizes are commonly set anywhere up to 1000x1000. Although you can define a larger map size, you should rarely need to do so.





You can see clearly that, in order to keep your shadow sharp and smoothly defined, your shadow map will need to increase in size.

If you simply need to keep your shadow edge soft, you can increase the **Sample Radius** (see below). Again, this will increase render time.

Note

Rather than use a map with a doubled map size, you can achieve an equivalent soft edge by doubling the sample radius.

Sometimes when you have a small shadow map created by a very distant light source, a problem may appear with spherical objects casting rectangular shadows.

You can check this by viewing the scene through your light source. A light source, like any other scene object, can be defined as a camera view. To do this make sure your light source is selected and from the Perspective View menu select **Cameras > Link Active Object**.

X-resolution

If the pre-set value of the map size is not giving you the desired result, you may optionally adjust the X-resolution manually. In general it is standard to set the manual X-resolution (width) to the same value as the Y-resolution (height)

Y-resolution

With a spotlight source, you can also provide a non-square shadow map by manually entering a value for the Y-resolution.

Memory Usage

BodyPaint 3D automatically calculates the maximum memory use for the shadow map, which is shown here. This can help you in estimating exactly how much memory will be allocated for your light sources shadow map calculations in your scene.

Sample Radius

The sample radius determines the accuracy of the shadow map. The higher the sample radius, the more accurate the shadow is, at the expense of a higher render time. If, for some reason, you must use a small shadow map, selecting a higher **Sample Radius** value will improve the shadow quality. So you can trade off render time against memory usage.

Parallel Width

This setting will only be active for distant and/or parallel lights.

Here we meet a visible light setting known as a *light cube* (more accurately, a *light cuboid*). This light cube has its length/width dimensions set to the **Parallel Width** value, the depth (z-axis) of the light cube being infinite. Importantly, only objects within this cube can cast shadows.

This boundary for shadow-casting is a necessity since the scope of parallel/distant light sources is infinite.

Outline Shadow

Using this option will result in your shadow being seen as just a thin outline, instead of a full, darkened surface.

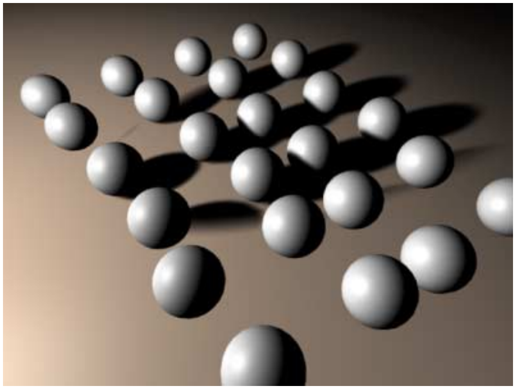
Note

With this option, it is recommended you use higher values for the shadow maps resolution and sample radius.

Use Shadow Cone

One of the main problems with Omni light sources is that six shadow maps must be computed in total, which can sometimes produce small artifacts at the shadow's edges. If the **Use Shadow Cone** option is activated, the shadow production is limited to a cone, thus generating a single shadow map without artefacts.

Additionally, producing these shadow maps only where necessary will save considerable render time.



Soft

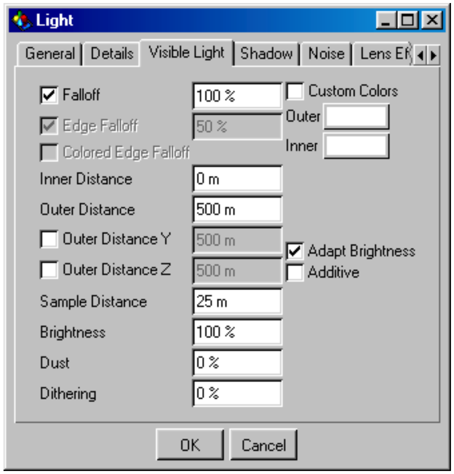
Activating this option will give the shadow cone a softer edge.

This option is used to ensure that any object which is only partially in the shadow cone area casts a soft, fading shadow.

Angle

This value changes the vertex angle of the shadow cone.

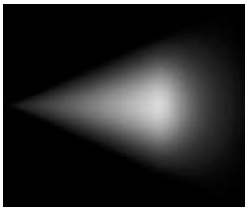
Visible Light



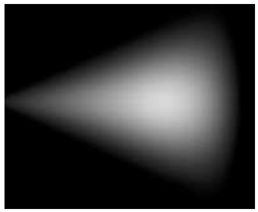
Falloff

This is the percentage reduction in the light's density. The axial falloff of the visible light is set to a standard 100%.

This means that from the origin of the light to its outer distance, the density of the visible light falls from 100% to 0%. So, if a value of 10% is entered, the outside edge will be at 90% visibility.



100% Falloff



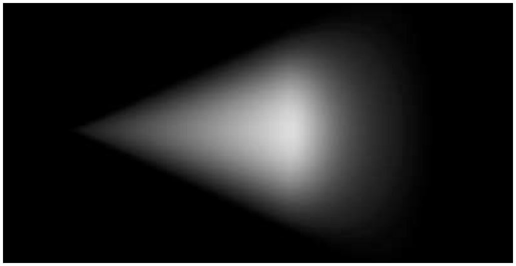
0% Falloff

Edge Falloff

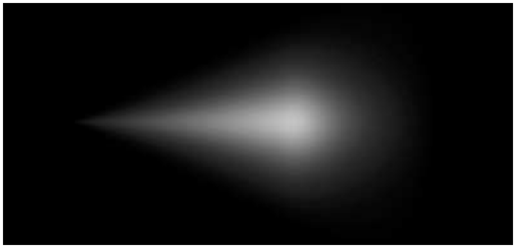
Edge falloff is relevant only with spotlight sources. The edge falloff determines how quickly the light's density decreases towards the edge of the light cone.

If you enter a value of 0% (or leave the option unselected), you will produce a very hard visible light.

A value of 100% gives a more gradual falloff from the inside of the light cone to its outer edge, until it reaches 0%.



0 % Edge Falloff



100 % Edge Falloff

Custom Colors

With this option you can assign your own colors to the visible light, independently of the actual color of the light source (General tab) and the inner color (Details tab).

Outer

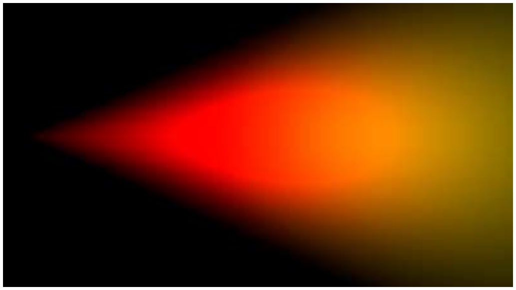
Use the color selector to define your light's outer color edge.

Inner

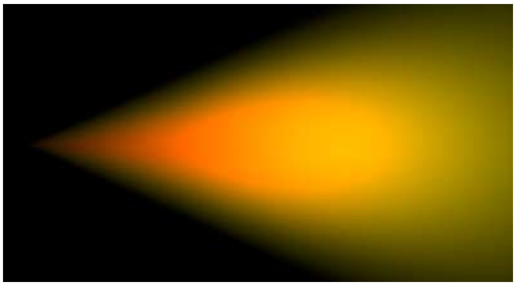
Use the color selector to define your light's inner color edge.

Colored Edge Falloff

This option is only available with spotlight sources and works with your selected custom colors. Normally the inner color behaves in such a way that it travels along the Z-axis of the spotlight source linearly to the outer color. However, selecting **Colored Edge Falloff** will cause the inner color to also spread outwards radially from the inner angle to meet the outer color.



In this picture Colored Edge Falloff is off



Here Colored Edge Falloff is on – you can see the inner color within the light cone

Inner Distance

Within this value, the density of the visible light is always a constant 100%. The falloff begins only outside of this distance.

Outer Distance

Between the inner distance and the outer distance the density of the visible light changes from 100% to 0%. This value thus gives the maximum visible range of the visible light.

Outer Distance Y

When using Omni light sources, you have the ability to set the falloff distance for both Y and Z axes. This option sets the distance of light falloff for the Y axis.

Outer Distance Z

This option sets the value for the Omni light's falloff along the Z-axis.

Sample Distance

The sample distance is relevant for only visible volumetric lights. Adjusting this value defines how finely the visible light's volumetric shadow will be computed.

Larger values lead to a somewhat rough (but swift) calculation, while smaller values lead to a much finer, but more time-consuming result.

The value of this sample distance is measured in world units. This value thus determines how finely the shadows within a visible light will be sampled. Values will usually be from 1/10th to 1/1000th of the light source radius.

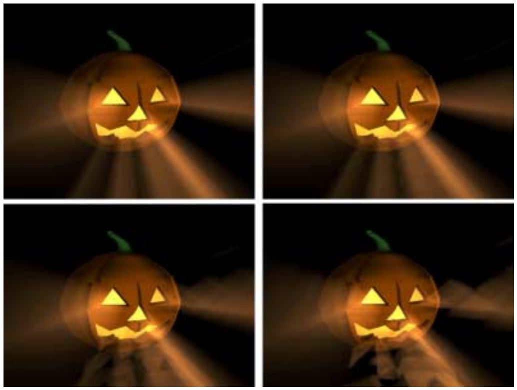
By increasing the value your scene will render noticeably quicker but certain parts of your scene will be sampled very roughly, resulting in sampling artifacts. To reduce these sampling artifacts requires a reduction in your sampling value too. The smaller the value, however, the higher the cost in rendering time.

BodyPaint 3D contains an integrated antialiasing technique for surface shine, ensuring even the roughest surfaces render smoothly, allowing you to set the **Sample Distance** value somewhat higher than without this feature.

Sample distance tips

If you want to create fine shafts of light, such as light beams radiating through cracks or from behind stone columns, set the sample distance to a relatively small value. On the other hand, a light that is completely covered and allows no beams of light to break through may be sampled using a much higher value.

The following example demonstrates this. The pumpkin in the picture has a radius of 150 units, the visible volumetric light a radius (outer distance) of 700 units.



top left
Sample Distance: 10 units
Render time: 105s
The pumpkin looks perfect.

top right

Sample Distance: 20 units

Render time: 60s

Here the rays emitting from the mouth and the right eye are showing the first signs of artifacts.

bottom left

Sample Distance: 40 units

Render time: 35s

You can clearly see now how the rays in the visible light are losing their fine edges.

bottom right

Sample Distance: 80 units

Render time: 23s

The picture has, quite literally, been rendered useless.

Why is volumetric lighting so render-intensive?

When a beam hits a light cone, it is not only the intensity of the light that needs to be computed. Additionally, for each part of the beam, the program needs to check for other objects within the light cone that might be casting shadows. So for every part of the beam of light, an extra raytracer ray needs to be initiated and emitted.

However, segments in the fog cannot be reduced below a certain length, and as a result, an approximation must be used - the length of the light cone is subdivided into equal parts.

Let's say the raytracer ray hits the light cone and the distance between the entry and the exit points of the light cone is 1,000 units. So a sample distance of 50 units will mean that an intensity value and a shadow beam will have to be calculated 20 times (1000 divided by 50).

The shorter the sample distance, the longer the calculation will take. Even if you have only five subdivisions (so a sample distance of 200 in the above example) this will require a five-fold increase per raytracer ray and per contact with the light cone than without volumetric lighting. Using progressively finer subdivisions, the processing time involved will very quickly become astronomical. Alas, this is an inherent problem with computer graphics which cannot be resolved or accelerated other than by throwing processor power at it.

So why can't you input a fixed value for the number of samples?

Well, if the raytracer beam hits the light cone at its beginning, the distance between the entry and exit points might be, for example, 100 units. But if the beam hits the cone further from the light source, this distance might grow to 5,000 units or more. So if you used a fixed number of samples, at the narrow end of the cone a lot of unnecessary calculations would be made and later too few (which would result in ugly artefacts).

Tips

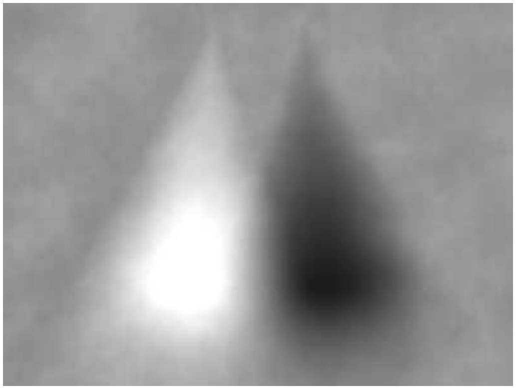
Volumetric lighting needs a lot of calculation time, therefore render such light sources only when it is absolutely necessary. If you choose to use a volumetric light as a particle (which is perfectly possible), then perhaps you should consider buying a second computer which you can leave to render that scene over a period of days. Take care with your sample distance values. Finding a happy medium (small for fine detail, but as large as possible for reducing render time) is the key here.

Brightness

This value gives the brightness of the visible light source.

Dust

With this option you can determine the *darkness* of the light cone. With a **Dust** value of more than 0% brightness is not added, but subtracted. To make sure you see the full effect of this, lower your light's brightness accordingly. The difference between a normal bright light and a dust-assigned light can be clearly seen in the following illustration. To the left is a bright, visible light. To the right a dark, dusty, somewhat sooty light.



Dithering

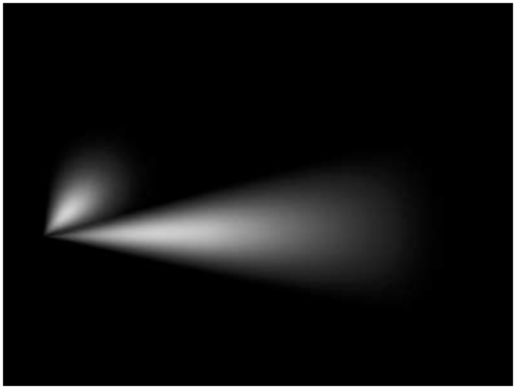
This produces small irregularities in the visible light which, in certain cases, can help prevent unwanted banding (aka contouring) in the visible light source.

Explanation

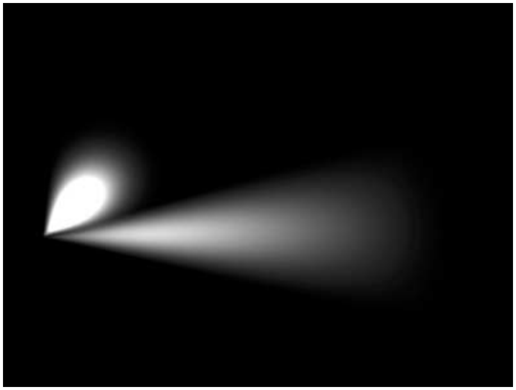
With certain light source combinations (e.g visible lights that overlap), you may find that the 24-bit picture depth of your output device is insufficient and it may display color gradients in large steps. This display problem is known as banding or contouring. To avoid this problem use the dithering option to give your visible light a certain irregularity and help to smooth the color graduations.

Adapt Brightness

This option prevents a light beam from being over-exposed. The brightness is reduced until the over-exposed effect disappears.



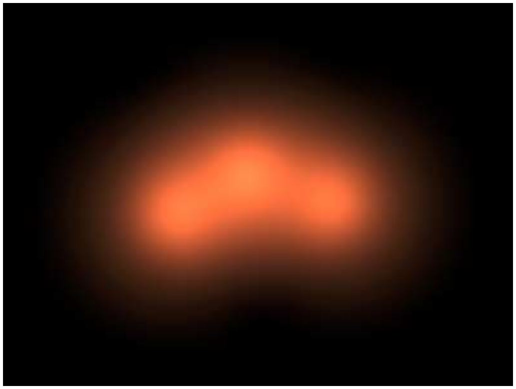
Adapt Brightness off



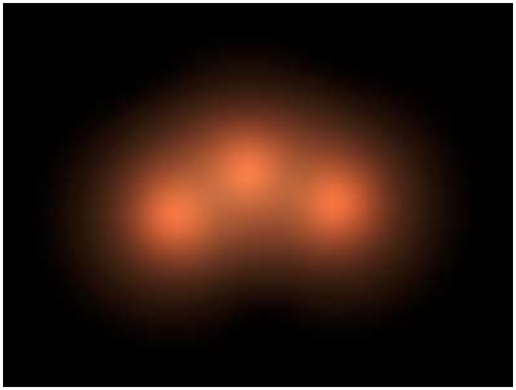
Adapt Brightness on

Additive

Select this option if you wish to mix the light beam additively with other light sources in your scene.

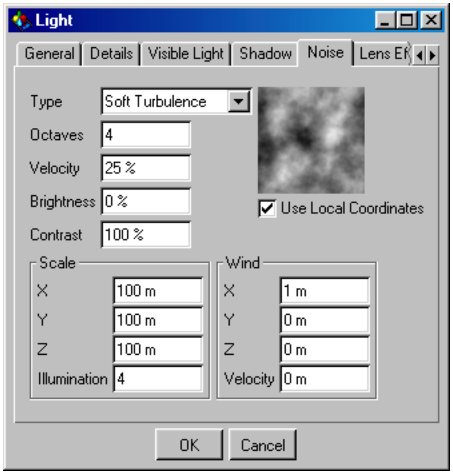


Additive on



Additive off

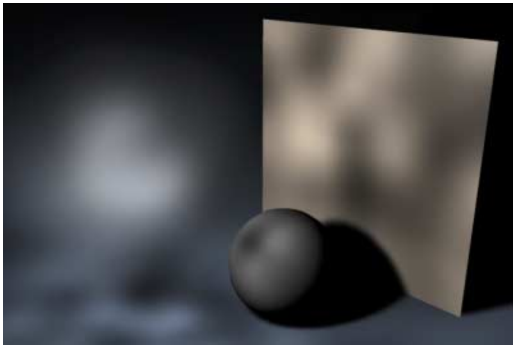
Noise Tab



Type

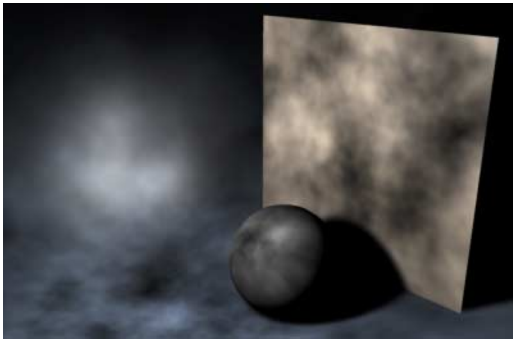
Select from four Noise types.

Simple Noise produces dark and bright areas:

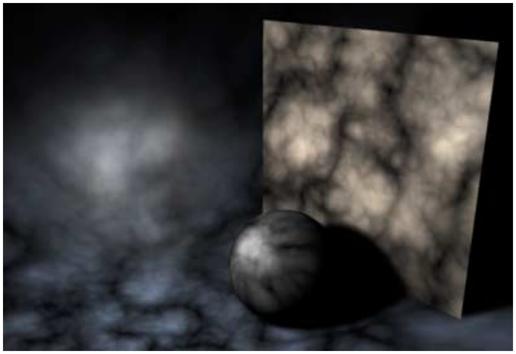


Then there are three types of turbulence that change the characteristics of the noise by adding cloud-like effects.

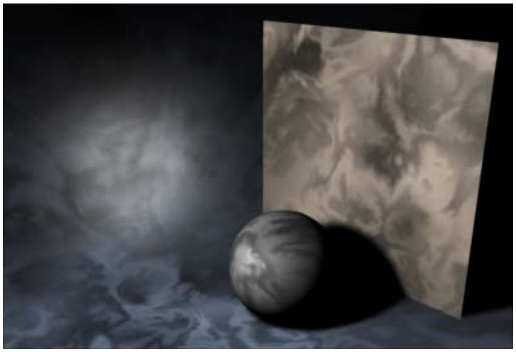
Soft Turbulence:



Hard Turbulence:



Wavy Turbulence:



Octaves

(Only relevant for the Turbulence types above)

The **Octaves** value determines the graininess of the noise. The higher the value, the more gritty the appearance.

Velocity

Indicates the speed at which the irregularities will move.

Brightness

Using this you can raise the overall brightness of the irregularities. You may also enter negative percentages and reduce the brightness.

Contrast

Changing this will allow you to adjust the contrast of the noise. Higher values increase the contrast, lower values reduce it.

Use Local Coordinates

Selecting this option will ensure that the local coordinates of the light source are nailed down. If the light source is moved now, the noise/ turbulence will move also.

In normal use you should leave this option off, as dust and particles in the real world move due to the forces of nature, not because the light itself moves.

Scale

This value will determine the size of the irregularities in relation to the scene's absolute Cartesian coordinates. If the noise effect is too severe, try reducing this value.

Illumination

This is where you set the general intensity of the noise.

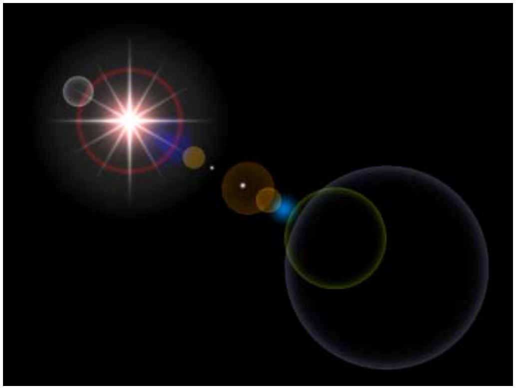
Wind

This is only relevant when you are using BodyPaint 3D in conjunction with CINEMA 4D; please see the CINEMA 4D reference manual for details of this function.

Lens Effects

BodyPaint 3D is a powerful tool when it comes to producing the aberrations of real-world camera lens systems and film material.

Basic sunbeams are brought to life with a solar corona or a halo. A lens reflection of a low-quality camera lens can be easily simulated, as rainbow colored circles develop and run diagonally across the screen. A welcome flaw in an otherwise too perfect virtual world.



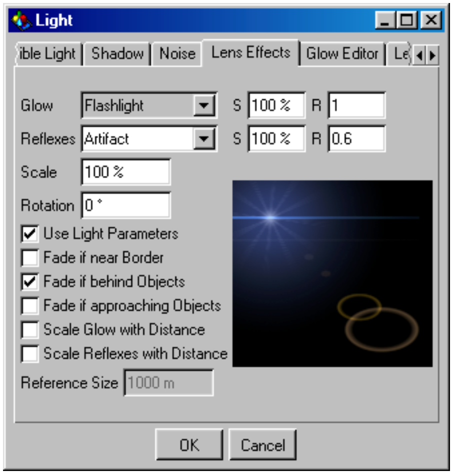
You may recall that the General tab has an option for turning off light radiation (**No Light Radiation**). If this option is chosen, the light source will no longer illuminate the scene but its lens effects will still be visible. This is useful, for example, if you are already satisfied with the lighting in your scene and you wish to add a lens flare but no further surface illumination.

The parameters for these lens effects are many and varied and take up three tabs of the Light settings dialog. But fear not, with a step-by-step approach you will soon be comfortable with all the effects and their various options.

On the main Lens Effects tab you can define your basic effect, choosing both reflexes and glows separately. Using the two related tabs (Glow Editor and Lens Editor) you may fine tune the finest details of the entire lens effect. To aid you in this, a preview window will constantly update the adjustments as you make them.

Tip

It's very easy to build yourself a light source library containing spectacular effects. You can produce many types of light sources with different effects that can then be saved as individual objects in the Object manager. When you require one of these specific lights for your scene you may simply load it from your source light library.



So to the details of the Lens Effects tab. From here you can quickly access a number of pre-defined glow and reflex examples. You can also change the basic properties of the lens aberration from here.

Glow

From this popup menu you can select, from a pre-defined library, the glow of the light source.

Reflexes

From this popup menu you can select the type of lens reflection from a pre-defined library.

You will find a detailed overview of all the effects at the end of this section.

S (brightness)

Adjusting this value will change the global brightness of the glow or reflex. Smaller values will reduce the effect, values of 100% or more will strengthen it.

R (aspect ratio)

Change the global aspect ratio of both glows and reflexes with this value. At the default value of 1, both will appear circular. Smaller or greater values will give you a squeezed/stretched ellipse.

Scale

This value will adjust the size of the whole lens effect (rays, glows and reflexes). This saves you from adjusting each effect individually.

Rotation

Use this value to rotate the lens effect to any angle.

Use Light Parameters

When this option is activated, the light source properties defined in the General tab will also affect the glow/reflex effects. So if the light source color is red then the glow/reflex effect will also appear red.

Fade if near Border

Using this option will make the lens effect fade the nearer it is to the edge of the image. When at the center of the screen, the lens effect will have maximum intensity. This corresponds to a light's physical behaviour in the real world.

Fade if behind Objects

Using this option will determine whether light sources that lie behind objects are still to produce their effects or not.

Lens flares do not occur if light sources are behind objects, but glows or radiation can produce attractive effects.

Fade if approaching Objects

Normally, if a light source with a lens effect disappears behind an object, the effects are still at maximum strength until the light source origin is fully behind the object. With this option enabled, the effect's strength will gradually fade as the light source approaches the object.

Note

The gradual fading of the sun behind a planet, complete with atmosphere, is a good example of this effect.

Scale Glow with Distance

This option will scale the glow effect according to its distance from the camera. The further the distance from the camera, the smaller the effect will be.

Scale Reflexes with Distance

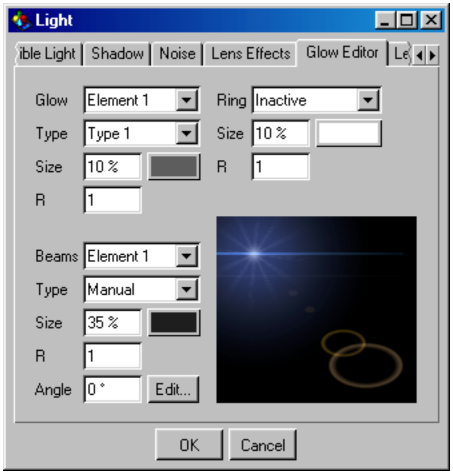
This option will scale the reflex effect according to the distance. The further the distance from the camera, the smaller the effect will be.

Reference Size

With this option you can adjust the distance value with which the glow and reflex effects are calculated. The smaller the value the more distant, thus smaller, the effect will appear. While increasing the value will make the effect appear closer, thus larger.

Normally lens reflexes have a constant size, no matter how far removed from the camera they are.

Glow Editor



With this tab you can tweak the lens glow to your exact requirements. This dialog is divided into three parts, the glow properties (top left), the ring properties (top right) and the beam properties (bottom left), which incorporates the Streak Editor.

Of major importance is the preview window that updates your effect as you modify it.

Glow properties

Glow

Select the required glow element from this menu of pre-defined light source glows, to change the overall shape of the light's glow.

Type

Selecting a glow type from this pre-defined set will change how the glow's brightness is distributed.

Size

Adjusting this value determines the size of the glow's element. The radius is shown as a percentage, where 100% is the distance from the center of the screen to the edge.

R (aspect ratio)

Modifying this value allows you to change the aspect ratio of the glow. At its default size of 1 the glow will appear circular. Smaller or larger values will shrink/stretch the glow's aspect, making it a horizontal or vertical ellipse.

Color

From this dialog (obtained by clicking the box to the right of **Size**) you can select the color of the surrounding outer glow.

Ring properties

Using these values will produce a ring, or halo, around the lens effect. Adjust this effect to your requirements by consulting the preview window.

Ring

From this drop-down menu you choose the halo type you require; Inactive, Ring or Rainbow Ring.

Size

Adjust the size of the ring from here, the value being a percentage.

R (aspect ratio)

Adjust the ring's aspect ratio with this value. Decreasing the default value of 1 will flatten the ring, while increasing it will stretch it into an ellipse.

Color

Choose the color for the ring from this color picker.

With this dialog you can define the *corona* of your lens effect — the rays of light that are cast in star-like fashion around the effect.

Change this effect until you see what you want in the preview window.

Beam properties

Choose your preferred beam/corona from this pre-defined, drop-down set.

Type

Choose the corona type from here. Depending on the type chosen, the pattern and number of beams cast will vary.

Size

Use this value to determine the size of the element. The radius is indicated as a percentage, where 100% is the distance from the center of the screen to the edge.

R (aspect ratio)

Adjust the aspect ratio of the corona with this value. At the default value of 1 it will appear circular. Smaller values will flatten the effect into a small horizontal ellipse, while increasing the value stretches it into a taller, vertical ellipse.

Color

Choose a color for your corona from this color picker (click to the right of **Size**).

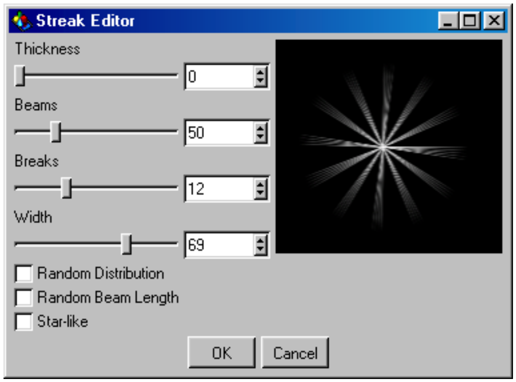
Angle

To rotate the beams of your star/corona to any angle you want, enter a new value here.

Edit

Still not satisfied? OK, there's more; click this **Edit** button to open the Streak Editor.

The Streak Editor



This dialog enables you to adjust the light that defines the appearance of the corona. These values are set with four sliders and three option boxes. As usual, a preview window is updated constantly to let you see your changes.

Thickness

Change this value to specify the width of the beam's rays. The smaller the value, the sharper the beam (or streak) appears.

Beams

You can choose the number of beams produced by your corona effect here. Up to 200 beams can be produced by each light source.

Breaks

With this option you can insert interruptions or breaks into your corona. These are added to the gaps which already exist between the beams.

Width

Adjust the size of the above breaks with this value.

Random Distribution

Activating this option ensures that the beams are arranged randomly, rather than in a symmetrical pattern.

Random Beam Length

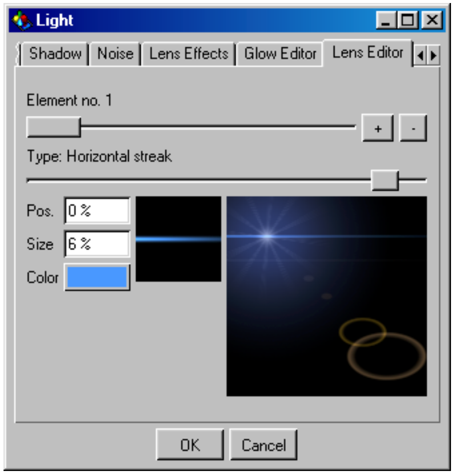
To ensure that all beams are not the same length, activate this option. All individual beams will then be different lengths.

Star-like

Once activated, this option will arrange the beams in a more star-shaped pattern, thickening the beams towards the center.

This effect is particularly effective when used with a small number of thick beams.

Lens Editor



The Lens Editor helps you to create and adjust those famous, often infamous, lens reflections (aka lens flares) to your specific needs. Once again, all changes are shown in the preview window.

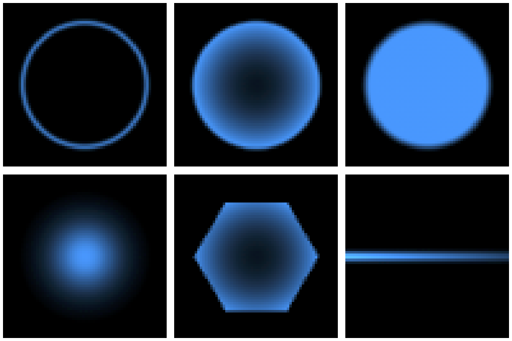
Element no.

Use this slider to select the reflection you wish to edit. You can add or remove extra reflections to and from the existing set by using the + and - buttons. A maximum of 40 reflections are at your disposal, enough to recreate any combination of light/lens flares or aberrations.

Type

Select the shape of your reflection with this slider. Only in the rarest case, if at all, should different reflection types be used in a scene. For example, apply only circular or only hexagonal types to the one scene. Remember, your scene is shot through one simulated real-world lens — these lens reflections depend upon that lens system, not on your existing scene lights.

Here are some examples:



Pos

This value sets the positioning of the element on the screen. The axis on which all reflections lie travels through two points; the light source and the center of the screen (which is also the centre of the lens).

Here the following values apply.

0% = light source
50% = screen center
100% = 2x distance light source center

Negative values place the reflections behind the light source.

Size

This value determines the size of the element. The radius is shown as a percentage, where 100% is the distance from the center of the screen to the edge.

Color

Select the color for the element.

Real World Glows, Halos and Reflexes

Glows

Glows are a type of over-exposure to light. When the light intensity is sufficient, this exposure *bloom* includes film grain in the areas surrounding a bright light, even though those areas are not illuminated at all.

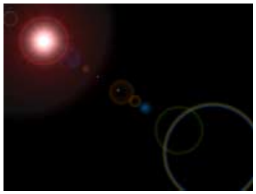
Halos

Halos are also caused by over-exposure, but with added color distortions caused by the diffraction of the film grain.

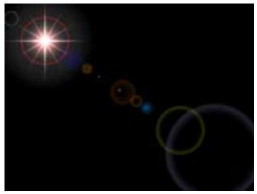
Reflexes

Lens reflections are caused by the focal image of poor quality lenses. The colored shape produced is an artifact of the lens surface, the shape resulting from the shape of the lens.

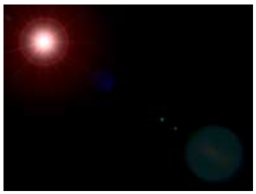
Large apertures produce small reflections, small apertures produce larger ones.



Default



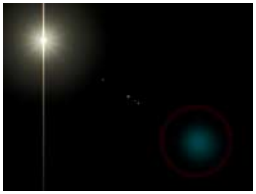
CINEMA 4D V4



Wide angle

Zoom

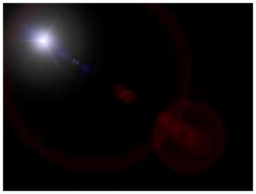
Hi-8



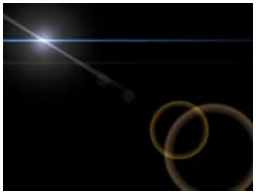
Camcorder

Flash 3

Sun 1



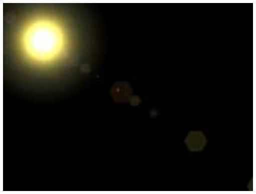
Floodlight



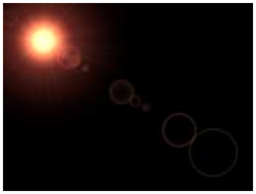
Artefact

Sun 2

Grey



Star 1



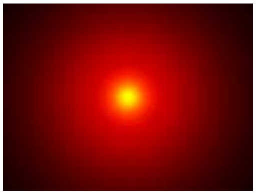
Star 2

Blue 1

Blue 2

Star 3

Violet



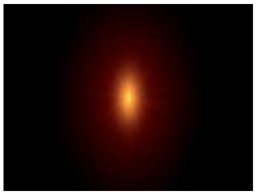
Red

Yellow-green 1

Flash 1

Flash 2

Yellow-green 2



Candle

Making Gels

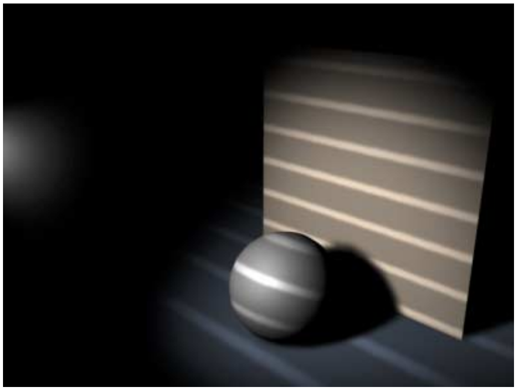
A gel is produced by assigning a material with a transparency map texture to a light source. The light's colored areas are then filtered by this texture and colored in exactly the same way as a slide projector will project a still picture.

You can assign as many gels as you wish to each light object. Thus you are able to produce many complex picture effects with ease.

For example, the striped-shadow effect of a venetian blind can be simulated, without the complicated and time-consuming shadow calculations normally associated with such an effect, simply by assigning a black-and-white striped gel (aka light map) to a light object.

Note

Lights do not take on the material properties of a parent object

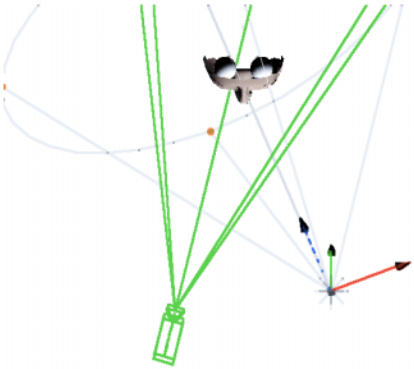


Three Point Lighting

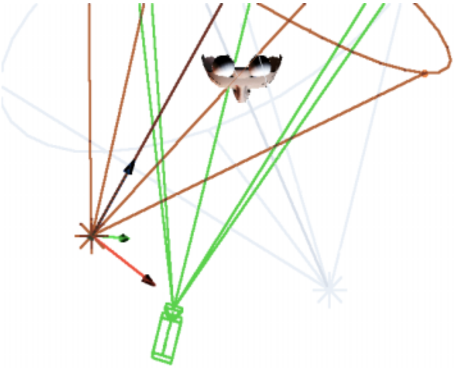
A simple and very common lighting principle is the three point lighting technique. This method is excellent for lighting individual objects correctly e.g. a character in a scene.

The object is illuminated by a main (key) light, a fill light and a third light from the rear, known as the backlight. Naturally all scenes and objects are unique and require individual setups, but this system is a good starting point for your scene's lighting properties.

The first light is the main light of the scene (the key light) – often a white spotlight with a soft shadow and the brightest light of the three. This light is placed to the right of the camera and aligned to your object. The radius is then adjusted to illuminate the whole of the object.

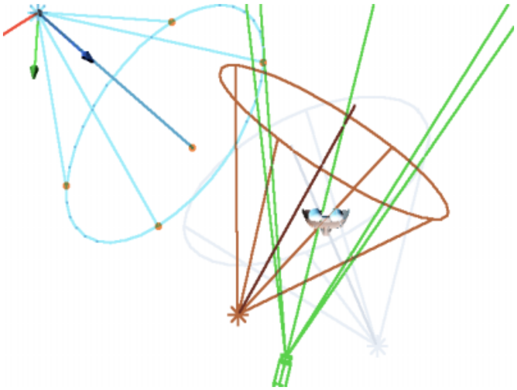


The second light is the fill light which complements the key light by illuminating the parts of the scene not reached by the key light. Changing this light to another color (e.g. yellow or red-brown) will make the scene appear softer and warmer. This fill light should be at roughly 50% brightness and placed to the left of the camera and key light.



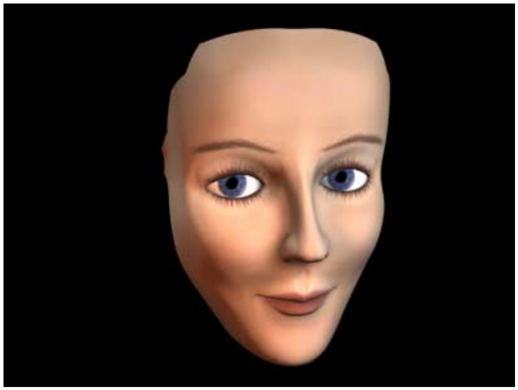
The third of these lights is the backlight. This spotlight provides lighting from the rear and above in order to emphasize the outline of your object against the background.

Blue is a suitable color here, as cooler colors are seen by the human eye as somewhat more distant than warmer colors, thus giving more apparent depth to your scene.



Here is an image lit with simple, one-source lighting ...

Now here is the same image lit with carefully-designed three-point lighting ...



The light sources do not have to be spotlights but the limited and more central spread of a spotlight's illumination means the objects won't become lost in a lighter, more evenly lit environment.

It is also preferable to have just one light (the key light) cast shadows. All three lights casting shadows can become confusing. One shadow-casting light is often more than sufficient.

Note that you should not place your light sources too close to your object, otherwise unwanted specularity may result. The further away the light source is from the object, the more evenly lit the object will be.

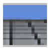
Target Light

When you choose **Objects > Scene > Target Light**, a null object is created, containing a light source and another null object. The latter is the target object to which the light is tied at all times.

The light source can be any light type of your choosing and you simply move objects into the hierarchy of the target object for the light to become aligned to them.

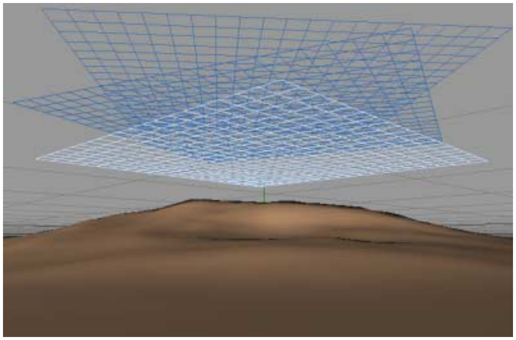
You can edit the whole structure interactively within the editor so, if you move the light source, it stays aligned to the target object and, conversely, if you move the target object the target light follows it.

Floor



This command creates a floor object. The floor always lies in the XZ plane of the world coordinate system, stretching to infinity in all directions.

You may create as many floors as you need and use them all at the same time in BodyPaint 3D. You could, for example, use multiple floors as pseudo skies on to which you can add cloud layers of differing transparency. In the following example four floors were used, one for the actual ground and three for the layers of cloud, each one situated higher than the other.



As you may have realized, floors can be moved and rotated relative to each other. This feature can help you avoid cloud layers appearing identical, by avoiding repeating textures.

Sky

This command will create a sky object which, to all intents and purposes, is an infinitely large sphere whose center is the origin of the world coordinate system.

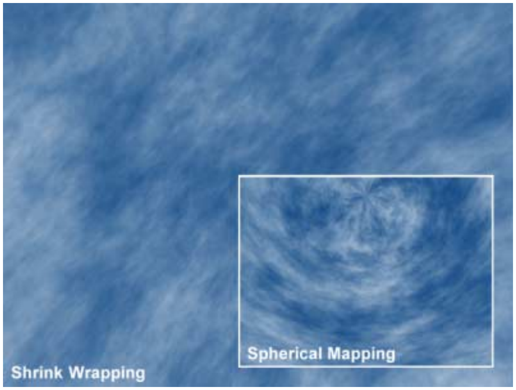
If you want to apply a texture (e.g the 2D cloud shader) to the sky, you should use Spherical or Cubic projection. If the clouds appear too large, increase the repetition of the texture's tiling and ensure you switch on **Seamless** (see Texture Mapping, page 255).

Do the clouds seem a little artificial? The possible reason for this is that the clouds have the same tiling in both the X and the Y direction. Adjusting the repetition of the tiling on the Y-axis, making them approximately twice as high as for the X-axis, ensures the clouds look somewhat stretched and they appear nearer and more natural.

Alternatively, you can use several floor objects for the simulation of cloud layers.

For simulating a starlit sky, Cubic projection is recommended as this will avoid unwanted distortions at the poles.

Aiming the camera directly up will display a problem — the cloud texture tends to gather at the zenith. You can fix this by assigning Shrink Wrapping (see page 262).



When rendering note that only one Sky object is taken into account. If you have several Sky objects in your scene, the uppermost one in the Object manager is used when rendering the scene.

Note

With environment fog switched on the sky object's visibility will be lost. How you create a sky to appear with environment fog is explained on page 228.

Environment

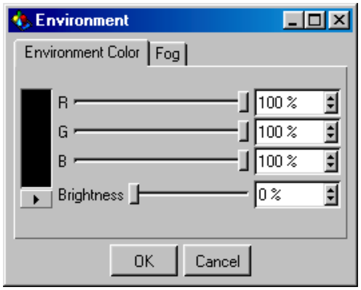
You can use the Environment object to define several global scene parameters.

Note

Only one environment object can be rendered.

Environment Color Tab

This is the color of the environment light (aka ambient light). The environment light illuminates the scene evenly from all sides and is meant to simulate the background light of a daytime sky or the indirect lighting of a room light.



The brightness slider is set to 0% by default. If you wish to simulate environment light, increase the value of the brightness slider to, say, 10% for architectural scenes.

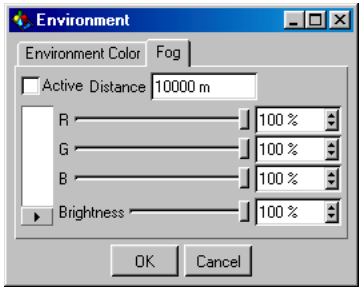
Be very careful when increasing the brightness, since it reduces the contrast in the scene; often you can get better results by adding omni lights that do not cast shadows.

Note

Environment color can be useful for increasing the color contrast. For example, you can use it to introduce complementary colors into the scene. Perhaps you will set a dark blue to contrast with a warm yellow window glow as well as to simulate night. Or imagine a moonlit scene; you can enhance the bright yellow moonlight by using a dark purple environment.

Fog Tab

Use environment fog for, among many other things, atmospheric autumn images or underwater scenes.



Environment fog fills the entire screen, stretching to infinity. Use this dialog to select the fog's color.

Distance

Distance refers to the fog's intensity by specifying the distance over which a light beam will lose its intensity completely. As the light loses intensity, the fog color is added.

If, for example, you have entered a value of 500 for **Distance**, a light beam that starts off with 100% intensity will reduce to 20% after travelling 400 units; at the end of a further 100 units, the light will have faded out completely, giving way to the fog color. The shorter the distance, the thicker the fog.

Beams that penetrate the fog beyond the limit defined in **Distance** are absorbed completely by the fog color — if you enable environment fog, you cannot see a sky or a background image.

Background

In order to render a background image, or to display one in the Perspective View, you may assign a textured material to a background object, just as you would to any other object. For transparent areas, assign an alpha channel to the material (see page 231).

The background picture might be a landscape, into which your scene will fit. For this you assign a material, with the required texture in its color channel, to the background object.

These images will be neither reflected by your scene's reflective objects nor lit in any way by the scene. Nor will they change with any change of camera settings.

The background image will show through transparent and refractive objects but will not change with altered camera settings.

You could compare it to a background layer generated by the alpha channel feature, on which the rendered image is then superimposed.

Note

As soon as you have applied a texture to a background object, it will be displayed in the Perspective View. If this display distracts you, you may turn it off by selecting the object in the Object manager and choosing Objects > Object Display > Editor Off (see page 198).

Note

Any background picture (see page 15) is normally displayed in the Perspective View only, so as not to distract you when working in the flat views. However, attaching the camera to the view in any Perspective View will make the background object appear in all view modes for that window. Any background picture already displayed will then be covered by the background object texture.

The background picture can also be tiled. For this effect, use the texture geometry dialog (see page 255).

The background picture is scaled to the film format during rendering (see Output Tab, page 410). Transparent sections of the background are ignored.

Note

Only one background object can be rendered.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

19. Tools Menu

19 Tools Menu

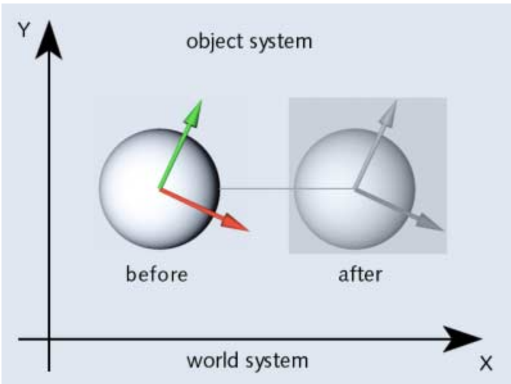
Move

This command will let you place the active object or element anywhere in the work area, subject to other options like snap, the mouse grid, whether certain axes are locked etc.

When moving objects, BodyPaint 3D distinguishes between the world coordinate system and the local object coordinate system.

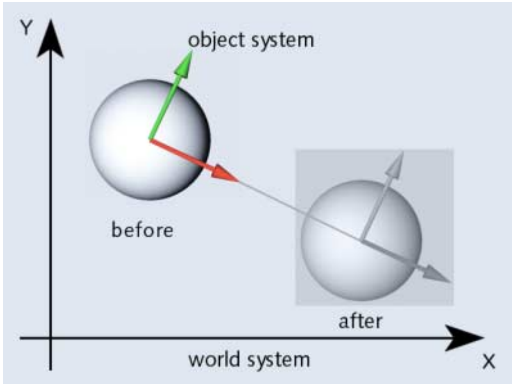
This distinction is particularly noticeable when movement takes place in different axial systems and only the X axis is activated, say.

Let's assume you are moving a cuboid which is positioned somewhat askew relative to the world coordinate system and you have locked the Y and Z axes for movement (see below). If you move within the world coordinate system the cuboid moves parallel to the X axis of the world system.



If, on the other hand, you select the object coordinate system, the cuboid moves along its own (the object's) X axis, which results in a quite different behavior as you can see.

Both can be useful but you should always be aware which you are currently using (check on the Tools menu).



The X, Y and Z symbols allow you to lock certain axes. This can be useful, for example, when you have constructed an object that is at floor level. If you now move it in one of the perspective views, it automatically changes its Y value and could, in the worst case, end up below the floor.

By taking the precaution of locking the Y symbol the object remains on the floor and moves only in the other directions.

A left/right movement of the mouse while holding down the mouse button moves the object horizontally on the screen.

An up/down movement moves it vertically. Keeping the right mouse button depressed (Macintosh users Command-click) while right/left moving the mouse moves the object *into* the screen and *out of it*.

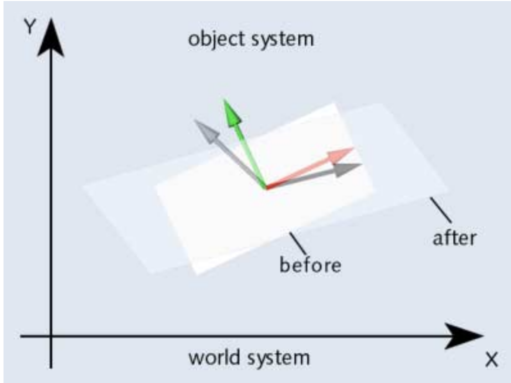
When editing textures, mouse movements have a somewhat different effect. A left/right movement of the mouse moves the texture along its X axis, an up/down movement moves the texture along its Y axis.

Scale

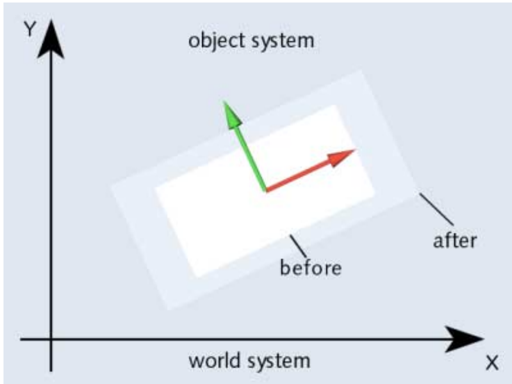
With this function you can resize the active object or element.

When in Scaling mode, BodyPaint 3D distinguishes between the world coordinate system and the local object coordinate system.

The difference between the systems becomes particularly clear if you activate only the X axis. Imagine you scale a cuboid, which lies inclined in the world coordinate system. If you choose the world coordinate system for scaling, the cuboid becomes larger/smaller parallel to the X axis of the world coordinate system and is therefore distorted.



If, on the other hand, you select the object coordinate system of the cuboid when scaling, the cuboid becomes larger/smaller along its own X axis and does not distort.



Scaling is performed by left/right movement of the mouse. You can hold down either mouse button.

When editing textures, mouse movements have a somewhat different effect. A left/right movement of the mouse resizes the texture along its X axis, an up/down movement rescales it along its Y axis.

The default size of any axis in the object system is 1.0. If for example you resize the X axis from 1.0 to 2.0, the object doubles its size along the X axis. This results in a distortion of the object system, making precise construction more difficult since all local positions are now also distorted and no longer correspond to the length units of the world system. We recommend therefore that you do not use scaling in combination with objects until the construction phase is completed.

Rotation

This command will rotate the active object or element.

When rotating objects, BodyPaint 3D distinguishes between the world coordinate system and the local object coordinate system and you can choose to rotate in either system. As long as the object lies parallel to the axes of the world coordinate system you will not notice a difference when you rotate in either system. But when the object is askew, there can be large differences between rotating in the world or object systems - see above for more details and consider carefully what you need.

A left/right movement of the mouse while holding down the left mouse button will rotate the object around its Y axis. An up/down movement rotates it around its X axis, while holding down the right mouse button causes rotation around the object's Z axis (Macintosh users use the mouse button with the Command key pressed to simulate a right mouse button).

The behavior of the rotation is totally different if, in General Settings, you have switched on the HPB system (see General Settings, page 40). A left/right movement will now change the heading, an up/down movement changes the pitch and holding down the right mouse button while moving left or right will change the bank (Mac users, remember the Command key). The HPB angles here refer to the object's parent system i.e. if the object which is to be rotated lies within a hierarchy, the parent object functions as the *world coordinate*.

Navigation with the Mouse and Keyboard

Moving, Scaling and Rotating with the Mouse

You can use the mouse for moving, scaling and rotating. A left/right movement manipulates the X axis while a back-and-forth movement controls the Y axis. For the Z axis you have to use the right mouse button.

Macintosh users; as usual, use the Command key to simulate the right mouse button.

You can toggle instantly between the left and right mouse buttons. If you are currently pressing the left button, press the right one before releasing the left and vice versa.

Moving, Scaling and Rotating with the cursor Keys

On the keyboard, use the directional (cursor) keys for moving, scaling and rotating:

Cursor right	+ X axis
Cursor left	- X axis
Cursor up	+ Y axis
Cursor down	- Y axis
Shift + cursor right or cursor up	+ Z axis
Shift + cursor left or cursor down	- Z axis

If you are working with the Edit Camera tool selected (see page 364), it is the camera that is affected. In all other cases the object currently selected is moved, scaled or rotated.

Moving, Scaling and Rotating with Quick Navigation

Using *Quick* navigation you can edit objects, the editor or the active object camera independently of the chosen tools. Use the following keys:

Key 1 - Move the view/camera

Key 2 - Scale (zoom) the view/camera

Key 3 - Rotate the view/camera (only in the central perspective view)

Key 4 - Move the active object

Key 5 - Scale the active object

Key 6 - Rotate the active object

Tip

If you want to zoom, in the central perspective view, onto an object, you can use the move tool instead of the scale tool. That has the advantage that you can zoom without perspective distortions.

Magnify

Use the Magnify command to zoom in on a particular region of the work area. To define that area, drag a rectangle around it.

Alternatively, click once using the left mouse button. This will magnify the work area by 25%. If you wish to reduce it, hold down the Ctrl key while clicking.

Using the Keyboard

These are the keyboard short-cuts for the Zoom function:

+ Zoom In (magnify)

- Zoom Out (reduce)

Camera

When you select this command you can edit the camera in the Perspective View. All subsequent actions affect this view. In two-dimensional views (XY, ZY, XZ) you can move and magnify the displayed area; in three-dimensional views you can change the Editor camera or the Object camera.

Using the mouse, you can move in the following ways.

Move

The camera always moves in the opposite direction to the mouse. For example, when you move to the left, this will shift the camera to the right, thus causing the objects to move left. This is the most intuitive method and easy to learn. Since mouse movement is restricted to two dimensions, BodyPaint 3D needs to make use of the right mouse button. This *modifier* allows you to control not only left/right and up/down movements, but also *depth* movements (backwards and forwards). If you hold down the right mouse button while moving left or right, this will be interpreted as going back and forth. It is possible to alternate between the left and right mouse buttons at any time.

Macintosh users; use the Command key to simulate the right mouse button.

Movements, scaling and rotation processes may be cancelled at any time by pressing the ESC key.

When moving objects you can choose which axis system you wish to use. Normally, this will have no effect, since the X, Y and Z symbols are all selected. However, if you switch certain axes on or off, you will observe that certain actions will show different results. If for example you have activated the X symbol only and you are working with the world coordinate system, the camera will move parallel to the X axis of the world system. If on the other hand the object system is selected, the camera will move left and right within its own camera coordinate system.

No grid is applied for the camera or the visible section of the document so that you can reach any position, even if a motion grid is active.

Scale

Using scale the visible section of the scene can be resized. You do this by moving the mouse left/right while holding the left or the right mouse button down (in this case it does not matter which).

In the two-dimensional views the zoom factor, (which initially is set to 1.0) is changed. In the perspective views it is the camera's focal length that changes. Its default value is 50mm. The shorter the focal length, the greater the distortion.

If you wish to avoid distorting your scene, do not change the focal length, instead move the camera further away from the scene. Do this by selecting Move and then right-dragging the mouse to the left. (Try it out to see the difference.)

Rotation

Rotation only makes sense if you are working with a perspective view. Two-dimensional views cannot be rotated.

When rotating the perspective view, certain mouse movements affect particular rotational axes. For example, if you hold down the left mouse button and move left or right, this results in a rotation around the Y axis of the camera's coordinate system. An up/down movement with the left mouse button held down rotates the camera around the X axis of the camera's coordinate system.

If on the other hand you hold down the right mouse button, the camera will rotate around its Z axis. What is special about this function is that the selected coordinate system (world or object) has a somewhat different meaning from that which you might expect: the rotation is always around the camera's axis and not around the world's axis.

Macintosh users: use the Command key to simulate the right mouse button.

If an object is active, the camera also changes its position while it rotates. This occurs in such a way that the centre of the active object remains in the same position on the screen. This feature is extremely useful when you wish to move around an object. If no active object exists, the rotation is around the world origin.

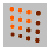
Object

Selecting this allows you to edit an object. For example, you can change the object's position and direction.

The current position of the active object in space is shown in the Coordinate manager. That is where you can change any of the values individually.

Changing objects is performed by manipulating their coordinate axes. Scaling, for example, does not scale the number of points of an object, it is the object axes that are scaled. If you want to know what this means or why this is the case, read the section at the end of the Model tool, below.

Points



By selecting this tool you can edit the points of an object. All subsequent actions will affect the points. In addition, the Delete function in the Edit menu now refers to the points of the object rather than to the object itself.

As soon as the tool is selected, all points of the object are represented by small squares. Selected points are highlighted in color.

It is possible to select individual points by clicking on them. If several points are visually on top of each other, only the topmost is selected. The selection may be extended by Shift-clicking. If you want to select several points use one of the four selection options (see page 375-378). To deselect points, select them again by Shift-clicking.

All points can be selected with the menu option **Edit > Select All**. With **Edit > Deselect All** the complete selection can be deselected again.

To move a point, grab it with the mouse and drag it to the new position.

To delete the active point, use the Delete command from the Edit menu or use either the Del key or the Backspace key.

You can also edit a point by double-clicking on it. A window opens in which you can change the position of the point.

Alternatively you can edit the points with the Structure manager (see Mode menu, page 281).

Polygons

There are polygons with three vertices (triangle polygons) and polygons with four vertices (rectangle polygons).

Editing polygons hardly differs from editing points. As soon as you activate the polygon tool, the polygons of the chosen object are displayed. Select a polygon by clicking on it with the mouse; selected polygons are shown in a brighter color.

You can select several polygons at once by holding down the Shift key while selecting a polygon. If you Shift-click on a polygon a second time, it is deselected. All other (active) polygons remain unchanged. Another way of selecting several polygons at once is to use one of the four selection options (see page 375-378).

To delete active polygons, use either the Delete command from the Edit menu, or the Del key or the Backspace key.

Object Axis

The Object axis tool modifies the axes of the active object.

The current position of the axes of the active object is shown in the Coordinate manager, where you can change all values individually.

Scaling object axes is a rather special case. Here, it is not only the axes that are resized, but also the points and the textures of the active object. In contrast, Model scaling changes points and textures, but does not resize the axes.

Model

Selecting this allows you to edit an object. For example, you can change the object's position and direction.

The current position of the active object in space is shown in the Coordinate manager. That is where you can change any of the values dynamically.

While the Model tool is selected, changing objects is achieved by scaling the object points rather than the object axes. If you want to know what this means or why it has to be this way, read on.

Tip

Note that if you scale an object to zero in any direction by using the Model tool, this operation cannot be undone.

If the active object contains sub-objects, these are also changed. If you wish to restrict the change to the active object, modify the action by holding down the Ctrl key.

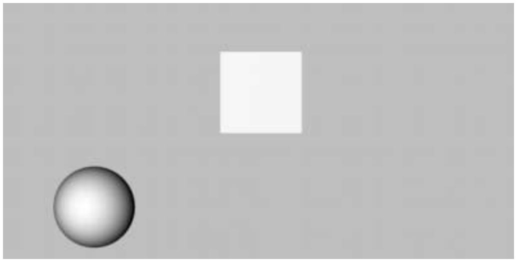
Use the Model tool during the modeling process.

The difference between the Object and the Model tool

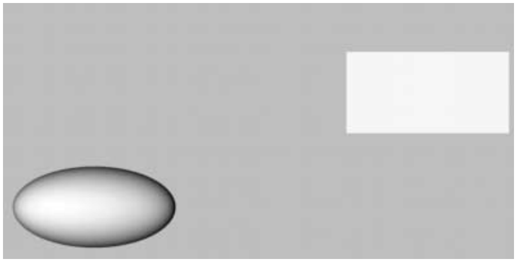
We strongly recommend that you read this section, otherwise you may be in for some unpleasant surprises when you create animations.

Let's start by clarifying the problem with the help of an example, then we'll tell how you avoid the problem altogether and how you can correct it if it does crop up.

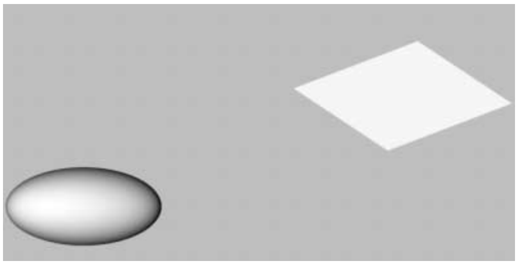
Consider a scene with two objects, a (polygon) sphere and a cube. The cube is a child (sub-object) of the sphere. The axial length of both objects is 1/1/1.



Now we choose the Object tool (**Tools > Object**) and scale the sphere with the Coordinate manager only in X direction to, say, 2/1/1 (ensure that **Size**, rather than **Scale**, is selected in the popup at the bottom of the Coordinate manager). As to be expected, sphere and cube are distorted.



Now rotate the cube around its Z axis (lock the X and Y axes and rotate the cube). During the rotation you will see an up and down pump-like distortion.

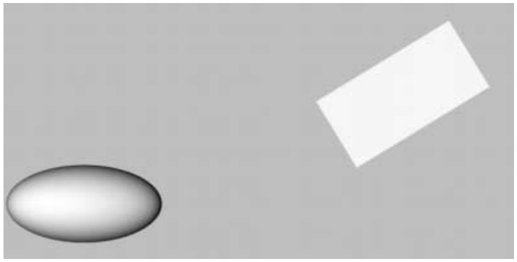


The points of the cube no longer obey a circular trajectory while they are rotated in the XY plane. Instead, the distorted parent system causes this movement to be elliptical.

And that is where the problem lies. It invariably occurs when objects exist in a distorted parent system.

Effects of this type are encountered by each and every 3D application, since it is a fundamental problem. Many resolve it by implementing separate editors for modeling and animation. In this way, you do not see the problem but, instead, you have to keep changing editors.

So how can we prevent the problem? Use the Model tool for scaling the sphere. You will then get the required result when rotating the cube:



Tip

If all this is a bit much to grasp, simply remember these rules:

Use the Model tool when constructing objects (modeling).

Use the Object tool when animating (integrated version only).

Texture

This allows you to edit the active texture. As soon as you choose this tool the texture of the object is represented by blue grid lines.

Or, if you have activated *Real Time Texture Mapping*, or RTTM, (**Display** > **Textures** on the editor Window menu), you will see the texture displayed on the object. The chosen projection type is taken into account (see Projection Mapping Types, page 258).

If the texture is displayed with grid lines, their axes are labelled in color (X and Y). Since the texture is in two dimensions only (the image has no depth information), there is no Z axis.

The grid lines are drawn according to the kind of chosen projection, e.g. spherical mapping is shown with a spherical blue grid.

An exception is UVW mapping. Here the blue grid is displayed over the entire editor window. The axes are not shown in RTTM mode.

The texture axes of the object are shown with an envelope on whose surface the texture can be moved by using the familiar Move and Scale functions. The texture itself cannot be rotated (but see Texture Axis below).

A left/right movement of the mouse will move the texture along its X axis, an up/down movement will move it along its Y axis.

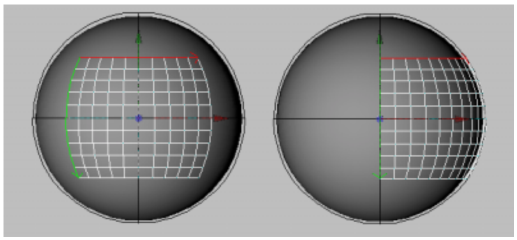
The Scale function uses the same principle, only here the texture does not get moved but resized.

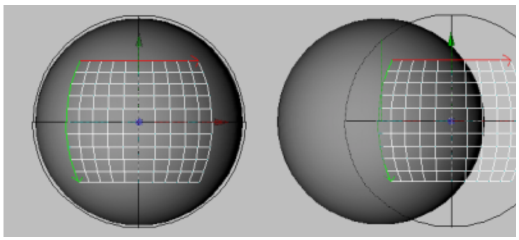
The data for X and Y referring to positioning and dimensions of the texture in the Coordinate manager are always given as percentages, since the actual size is not relevant. A size of 100% for both coordinates means that the texture covers the cylinder, the sphere or the area completely.

Texture Axis

This tool allows you to edit the texture axes of the active texture. As soon as you select this tool, the texture with its envelope is displayed. In RTTM mode you will see the texture itself. You can move, scale and rotate the envelope in the usual fashion.

The difference between Edit Texture and Edit Texture Axes is illustrated by the following two pictures. In both cases, the movement is along the X axis; in the upper picture using the Edit Texture tool (the texture is moved on its envelope) while in the lower picture by using Edit Texture Axes (the envelope itself is moved).





3D Painting Mode

This mode enables you to paint the object's active texture in the Perspective View using any of BodyPaint 3D's paint tools.

You can paint in the default High Quality Shading mode (see page 183) or in the RayBrush mode (see page 182).

Keep in mind that you always paint to the active material in the Material manager only.

The Axes

X Axis / Heading

Y Axis / Pitch

Z Axis / Bank

These three tools allow you to lock movement, scaling or rotation along certain axes.

With a rotation you have the option of locking each axis separately. If, in General Settings (see page 40), you have selected **Use HPB System**, the HPB designators apply. (The letters HPB stand for *Heading*, *Pitch* and *Bank*.)

For each type of operation, BodyPaint 3D remembers the state of the axes (locked or unlocked). If for example you have made a movement along the Y axis while X and Z were locked, and subsequently change to Rotate, all axes are unlocked again. When you change back to Move, the program remembers that only the Y axis was unlocked.

World System

Here you decide in which coordinate system an operation will take place.

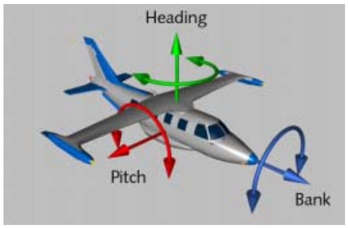
Not all options work with both systems. Scaling of object axes for example can occur only within the object coordinate system.

The object coordinate system is the local system of an object, shown in the editor by the coloured axes; X (red), Y (green) and Z (blue). Every BodyPaint 3D object has its own object coordinate system.

If you chose the HPB system in the settings (see page 40), HPB angles will be used for the rotation - independently of the chosen axis system.

Internally BodyPaint 3D works exclusively in the HPB system. HPB is an abbreviation for *Heading*, *Pitch* and *Bank*.

You may have come across the terms heading, pitch and bank in connection with flight simulators. An aeroplane turning left or right changes its heading; when it tilts upwards or downwards it changes pitch; when rolling it changes its bank.



So when you are changing angles you may find it helpful to think of a plane.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

20. Selection Menu

20 Selection Menu

With the tools from this menu you can select and deselect points and polygons in many different ways; in addition you can hide or reveal selected points/polygons.

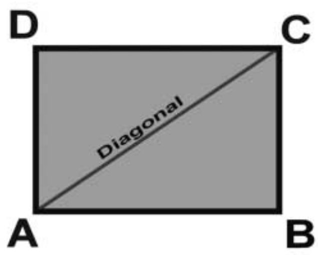
Fundamentals

BodyPaint 3D works with polygons (surfaces) and points. There are two types of polygons in BodyPaint 3D: triangles and quadrangles.

Polygons

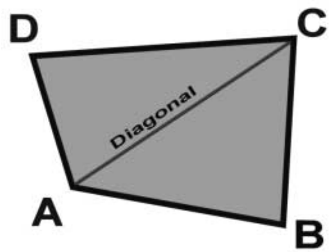
A polygon is a triangle or a quadrangle. A triangle has the points A, B and C; a quadrangle has the points A, B, C and D.

So-called *perfect* polygons, like the one shown below, are not that common, since the points may lie anywhere in 3D space...



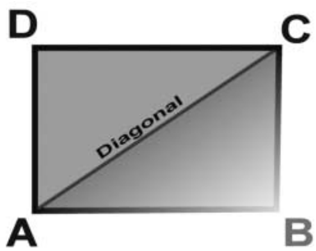
A 'perfect' polygon

This is not a problem if the points are *planar* - i.e. if they all lie on the same plane...



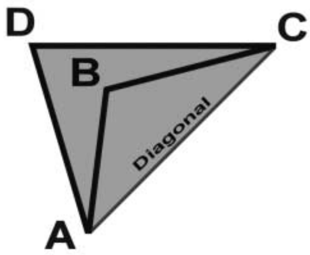
The quadrangle is no longer a rectangle. However, all the points are on the same plane - the quadrangle is still planar.

If the quadrangle's points are not on the same plane, the quadrangle is said to be *non-planar*. In the diagram below, point B has been moved into the depth plane. Now, BodyPaint 3D must render this polygon as two triangles. This is dealt with internally without any negative effects.



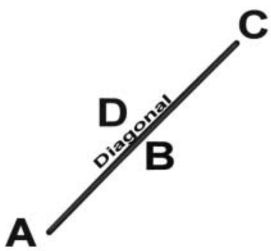
Point B has been moved into the depth plane. Now, the polygon is non-planar.

If the angle at points B or D is greater than 180°, problems can occur when rendering - this is because the polygon overlaps itself...



The angle at point B is greater than 180° - the polygon overlaps itself.

Another problem arises if all of the polygon's points are on the same line. In this case, a surface normal cannot exist and the polygon is called a *degenerated polygon*...



All the points for this polygon are on a line.

Selection Menu

You can use the tools in this menu to select the active object's points or polygons. The following applies:

- To select an element click the (left) mouse button.
- To remove an item from your selection, hold the Shift key down while left-clicking on the already selected item.
- To add to your selection, hold the Shift key down while left-clicking on a new, unselected item.
- To select points/polygons with the rectangle, freehand, polygon and live selection tool

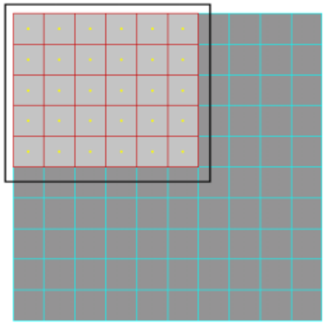
  Select with the (left) mouse button down and dragging.
- To add to your selection, hold the Shift key down while applying the relevant tool to your new, unselected items.
- To reduce the items in your selection, hold down the Ctrl key while applying the relevant tool to the already selected items.

The editor display

- In the polygon mode selected surfaces are framed in red and shown more brightly than unselected surfaces.
- In the point mode selected points are shown in light red while unselected ones are colored dark red.

Rectangle Selection

If you choose this selection tool you can frame polygons and points with a rectangle-shaped marquee. Hold the left mouse button down and drag; all items that are fully enclosed within the resulting rectangle will be included in your selection.



Active Tool Manager

Tolerant Selection

This option makes sense only in polygon mode. Enabling this option means that polygons are selected as soon as a corner point of the polygon is within the selection marquee. If this option is not active, a polygon is included only if all corner points of the polygon are within the marquee.

Only Select Visible Elements

If this option is active only items which are not hidden by other items are selected. For example, with a sphere you could select only points or polygons at the front of the sphere.

It does not matter whether the back of the sphere is visible in the screen mode or not. As soon as a polygon and/or point lies over another, the latter element is invisible as far as the selection tool is concerned.

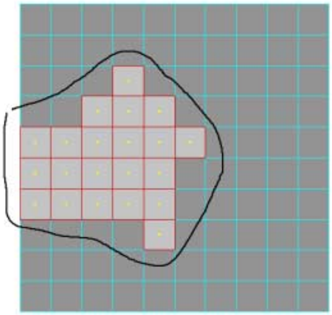
With backface culling on (see page 22) the backs of objects are always invisible and cannot be selected even if you turn off the **Only Select Visible Elements** option.

Of course, elements are also invisible if they have been made invisible with **Selection > Hide Selected** or **Selection > Hide Unselected** commands. Then again they cannot be selected even if you turn off the **Only Select Visible Elements** option.

The same applies to objects which have a red visibility switch (see page 198). Naturally, the polygons and points of such objects cannot be selected.

Freehand Selection

Freehand selection behaves like a lasso. Using the mouse with the left button pressed you pull a loop around all the elements that you want to select. The loop does not have to be closed.



Active Tool Manager

Tolerant Selection

This option makes sense only in polygon mode. Enabling this option means that polygons are selected as soon as a corner point of the polygon is within the selection marquee. If this option is not active, a polygon is included only if all corner points of the polygon are within the marquee.

Only Select Visible Elements

If this option is active only items which are not hidden by other items are selected. For example, with a sphere you could select only points or polygons at the front of the sphere.

It does not matter whether the back of the sphere is visible in the screen mode or not. As soon as a polygon and/or point lies over another, the latter element is invisible as far as the selection tool is concerned.

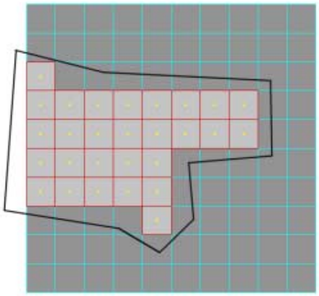
With backface culling on (see page 22) the backs of objects are always invisible and cannot be selected even if you turn off the **Only Select Visible Elements** option.

Of course, elements are also invisible if they have been made invisible with **Selection > Hide Selected** or **Selection > Hide Unselected** commands. Then again they cannot be selected even if you turn off the **Only Select Visible Elements** option.

The same applies to objects which have a red visibility switch (see page 198). Naturally, the polygons and points of such objects cannot be selected.

Polygon Selection

With this selection tool you set the corner points for an n-Side that frames the elements which are to be included. The first mouse-click defines the starting point of the n-Side. All further mouse clicks define further corner points.



The selection ends either with a right-click of the mouse (Macintosh: Command-click) or by clicking again on the starting point of the n-Side.

Active Tool Manager

Tolerant Selection

This option makes sense only in polygon mode. Enabling this option means that polygons are selected as soon as a corner point of the polygon is within the selection marquee. If this option is not active, a polygon is included only if all corner points of the polygon are within the marquee.

Only Select Visible Elements

If this option is active only items which are not hidden by other items are selected. For example, with a sphere you could select only points or polygons at the front of the sphere.

It does not matter whether the back of the sphere is visible in the screen mode or not. As soon as a polygon and/or point lies over another, the latter element is invisible as far as the selection tool is concerned.

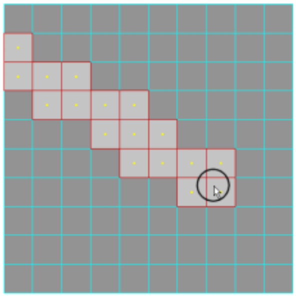
With backface culling on (see page 22) the backs of objects are always invisible and cannot be selected even if you turn off the **Only Select Visible Elements** option.

Of course, elements are also invisible if they have been made invisible with **Selection > Hide Selected** or **Selection > Hide Unselected** commands. Then again they cannot be selected even if you turn off the **Only Select Visible Elements** option.

The same applies to objects which have a red visibility switch (see page 198). Naturally, the polygons and points of such objects cannot be selected.

Live Selection

This selection tool behaves somewhat differently from the others. Live selection functions like a paint brush with which you can paint over your objects. The painted elements are included in the selection set.



You can choose a radius for this tool from the Active Tool manager. During the live selection you can increase this radius with the '+' key and make it smaller with the '-' key. With a trackball the radius can be changed with the wheel.

Active Tool Manager

Radius

This determines the radius of the "selection brush".

Only Select Visible Elements

If this option is active only items which are not hidden by other items are selected. For example, with a sphere you could select only points or polygons at the front of the sphere.

It does not matter whether the back of the sphere is visible in the screen mode or not. As soon as a polygon and/or point lies over another, the latter element is invisible as far as the selection tool is concerned.

With backface culling on (see page 22) the backs of objects are always invisible and cannot be selected even if you turn off the **Only Select Visible Elements** option.

Of course, elements are also invisible if they have been made invisible with **Selection > Hide Selected** or **Selection > Hide Unselected** commands. Then again they cannot be selected even if you turn off the **Only Select Visible Elements** option.

The same applies to objects which have a red visibility switch (see page 198). Naturally, the polygons and points of such objects cannot be selected.

Note

By its very nature the live selection tool has a high memory requirement when you turn off Only Select Visible Elements. Therefore you should switch off this option only if it is absolutely necessary.

Vertex Painting pane

The options in this pane apply to the integrated version with CINEMA 4D only - please consult the CINEMA 4D Reference manual for details.

Select All

With this command you can select all points or all polygons of an object. If you are in polygon mode only the polygons are selected; in point mode only the points are selected. Hidden elements are not selected.

Deselect All

With this command you can deselect all points or all polygons of an object. If you are in polygon mode, only the polygons are deselected; in point mode only the points are deselected.

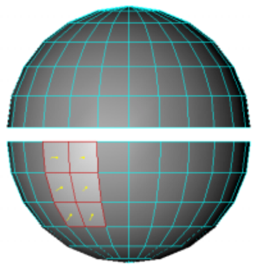
Invert

This command inverts a selection. All selected elements are deselected and all deselected elements are selected. If you are in polygon mode, only the polygon selection is inverted; in point mode only the point selection is inverted. Hidden elements are not inverted.

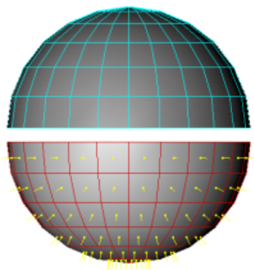
Select Connected

Polygon objects often consist of several segments that are not connected by polygons. If you wanted to select one of these individual segments completely you might encounter problems if this segment overlapped with other segments; it can be difficult to see which elements belong to this segment.

So BodyPaint 3D comes to the rescue; select just one point or polygon of the required segment and then choose the **Select Connected** command. All points or polygons which are connected to the selected element are then also selected. If you are in polygon mode, only connected polygons are selected; in point mode only connected points are selected.



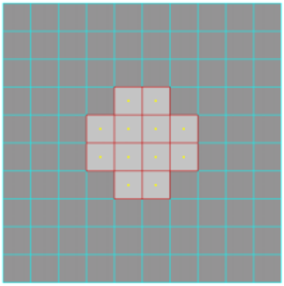
First some polygons, then Select Connected...



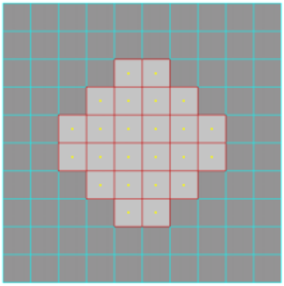
All connected polygons are now also selected

Grow Selection

With this command you can add to a selection. All adjacent points or polygons (depending on which mode you are in) are added to the current selection.



The initial selection

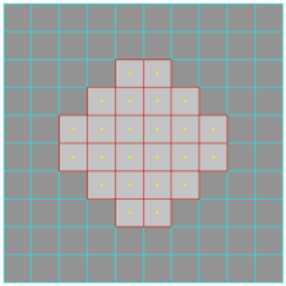


Adjacent polygons are now also selected

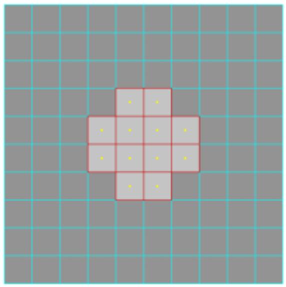
Shrink Selection

This command reduces the selection. All polygons or points (depending on which mode you are in) on the outside of the current selection are deselected.

If the polygon is closed (such as a sphere is) and you select all polygons, the selection cannot be made smaller because there is nowhere to start (there are no elements that can be considered to be on the outside).



The initial selection



The outside polygons deselected

Polygon Selection From Points

This selects the polygons which border on the points that are already selected. Polygon mode will then be entered automatically. Only polygons that have all their corner points selected are included.

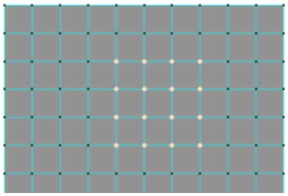
Point Selection From Polygons

This selects the points which belong to the polygons that are already selected. Point mode will then be entered automatically.

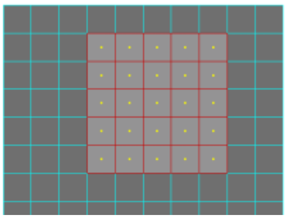
Select Adjacent Polygons

This command affects only polygons and only makes sense when you are in point mode. It selects polygons which directly border the existing chosen set of points.

You will be switched to polygon mode when you use this command.



The initial selection



The polygons bordering on the selected points are selected

Hide Selected

This makes all selected points or polygons invisible. If you hide selected polygons, the associated points are also hidden. However, in point mode, only the selected points are hidden, not the polygons attached to them.

Hiding of elements is useful if you want to concentrate on a particular area of an object while painting; hide the areas that you are not interested in.

Hide Unselected

This command hides all elements which are not selected. If you hide deselected polygons, the associated points are also hidden. However, in point mode, only the deselected points are hidden, not the polygons attached to them.

Unhide All

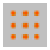
This command makes all hidden elements visible again. In polygon mode only hidden polygons are made visible, in point mode only the hidden points.

Invert Visibility

The visibility of all elements is inverted. Visible elements are hidden and hidden elements are made visible. In polygon mode only the visibility of all polygons is inverted whereas in point mode only the visibility of all points is changed.

Set Selection

Here you can freeze selections for the long term. You can freeze either polygon or point selections. You can then manipulate frozen selections at any time using these icons in the Object manager:



Frozen point selection

Frozen polygon selection

More information can be found below under Frozen Selections in the Object manager, below.

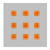
Warning

If a Polygon Selection tag is active in the Object manager (shown by a red frame) when you call this command, the tag is replaced with the new selection. If you do not want to lose your old selection tag in this way, make sure it is not active!

Information on how to apply separate material properties to these frozen selections is in Restrict To Selection, page 269.

Frozen Selections in the Object Manager

If you froze one or more selections (see the preceding section), some useful functions are now available to you in the Object manager. These are hidden behind particular small icons which are associated with the active object:

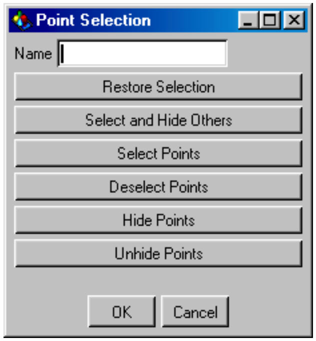


Frozen point selection

Frozen polygon selection

Frozen Point Selection

A double-click on this icon opens a dialog which contains the following choices:



All actions are performed as soon as you click on the relevant button.

Name

Enter a name for the selection; press **OK** to confirm or **Cancel** to lose the name change.

Restore Selection

This restores the frozen selection. All other elements of the object are deselected.

Select and Hide Others

Restores the frozen selection and makes all other points of the object invisible.

Select Points

The points of the frozen selection are added to the existing selection.

Deselect Points

All points of this frozen selection are deselected.

Hide Points

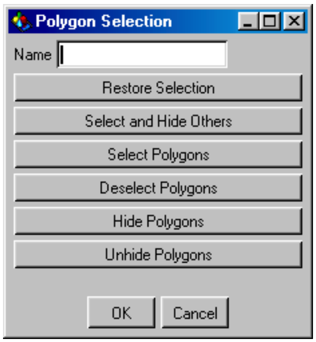
All points of this frozen selection become invisible.

Unhide Points

All hidden points of this frozen selection become visible.

Frozen Polygon Selection

Double-click on this icon to open a dialog which contains the following choices:



All actions are performed as soon as you click on the relevant button.

Name

Use this text box to enter a name for the selection; press **OK** to confirm or **Cancel** to lose the name change.

Restore Selection

This restores the frozen selection. All other elements of the object are deselected.

Select and Hide Others

Restores the frozen selection and makes all other polygons of the object invisible.

Select Polygons

The polygons of the frozen selection are added to the existing selection.

Deselect Polygons

All polygons of this frozen selection are deselected.

Hide Polygons

All polygons of this frozen selection become invisible.

Unhide Polygons

All hidden polygons of this frozen selection become visible.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

21. Structure Menu

21 Structure Menu

Functions selected from the Structure menu take effect on the selected object - any sub-objects remain unchanged.

With most functions the object is modified if a function can be applied to the current selection. However, some of these menu functions will not be available if you are not in Point or Polygon mode or if no elements are selected.

Hidden elements are therefore not modified (see Frozen Selections In The Object Manager, page 382).

Edit Surface

Disconnect

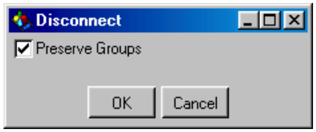
Surfaces, either individual or connected surfaces, can be split from an object. Select some polygons of an object and choose **Disconnect** to see the results. The separated polygons will still be at the same position, but physically they are no longer connected to the object. The original object still contains the points of these separated polygons, so the geometry is not destroyed.

The polygons mode must be active and a polygon selection must exist in order for you to use this tool.

A good example of using Disconnect would be to cut a hole into an object and keep the disconnected surface to use as a cap.

Note

At the seams of the disconnected polygons, the Phong shading disappears and a ridge appears, since now there are two edges. (See also Smoothing Tag, page 189.)



Preserve Groups

This option is selected by default. With this option the polygons are disconnected *in one piece* from the object (as long as they were connected to begin with). If this option is switched off then each active polygon is separated individually and independently from all other active polygons.

Explode Segments

This applies to the integrated version of BodyPaint 3D with CINEMA 4D only. Please consult the CINEMA 4D Reference manual for details.

Split

The Split function differs very slightly from the Disconnect function; the difference is that, when using Split, the disconnected polygons leave a separate object behind. The original object is not changed.

The polygons mode must be active and a polygon selection must exist in order for you to use this tool.

Note

If you wish to delete the separated part from the original object, you can choose Delete directly *after the split as the selection is still active (this works only if you are in polygons mode).*

Make Editable

This is relevant only if you are running BodyPaint 3D with CINEMA 4D. Please consult the CINEMA 4D reference manual for details.

Align Normals

When an object is created in a 3D modeling program, by convention the surface normals should point outwards from the object. However, it is quite possible that some of the normals point in the wrong direction (i.e. inwards). This can lead to rendering anomalies later on. Fortunately, the problem is easily rectified by choosing the Align Normals function, which re-aligns the offending surface normals so that they point in the correct direction.

BodyPaint 3D adjusts the orientation of the normals according to the normal direction of the first polygon in a polygon selection.

If no polygons are selected, all normals are aligned.

Note

BodyPaint 3D does not recognize an object's inner and outer surface. A sphere has an inner and an outer side, but only one surface level, which can be confusing. We need a better definition.

Let us define this single surface level to have an *Inner* and an *Outer* property. Outer designates, in principle, the direction in which the surface normals point and Inner is therefore the opposite direction. This plays a role with texture projection, where you have the possibility to project textures from only the front or the back (see Texture Mapping, page 255).

So, if there is an equal number of normals pointing one way as point the other way how do we decide which is the Outer surface? We could either choose randomly or, perhaps, look at the first polygon in the sequence and use its normal as the basis of our calculation - BodyPaint 3D does the latter.

Why exactly are these normals needed?

As described above, the direction of the normals defines the interior and the exterior of an object. This is important, among other things, for displaying an object in the Perspective View.

Occasionally, a situation can arise in which some polygons become invisible in the Perspective View. This can happen if Backface Culling is on and the reason is as follows.

To save on processor performance you may have, sensibly, enabled Backface Culling (see page 22) for your scene; this is where only the polygons visible from the front of an object are displayed in the Perspective View. The polygons positioned directly at the back of an object are not drawn.

When displaying a sphere and other volume objects in the Gouraud shading mode you may notice no difference, simply because you do not see the back of the sphere anyway. But should you select all the polygons of this sphere and reverse the normals (see next section), you will now see only the back of the sphere; the front is now transparent since you now have *inverted* the sphere. The inside is now the outside - and this becomes invisible because of the Backface Culling.

Should you find yourself inadvertently in a situation like this you should switch off Backface Culling and reverse the normals of these polygons.

Another important factor is smoothing with angle limit active (see Smoothing, page 189). BodyPaint 3D calculates whether edges are to be smoothed based on the angle of the polygons to each other. If two polygons with differently aligned normals lie next to each other, BodyPaint 3D calculates incorrect angle information, causing ghastly results when smoothing.

The angle of the normals to each other is also significant when using Displacement Mapping (see page 237).

Reverse Normals

This function is similar to Align Normals. Here, however, the normals are reversed. If no polygons are selected, all the normals of a selected object are reversed. With an active selection only the normals of the selected polygons are considered.

Note

Reversing the normals is achieved by changing the point sequence in a polygon.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

22. Functions Menu

22 Functions Menu

Connect

BodyPaint 3D's **Group Objects** command (see page 199) enables you to place objects into a group. The **Connect** command converts an object group into a single object.

For example, a fence consisting of hundreds of individual planks can be connected to form just a single fence object.

Connect requires an object group to be selected in the Object manager. Only use the command if you are certain that the object will not require separation later on; although you can split the object into its original parts manually, it is a time-consuming process.

Note

Only polygon objects can be connected. Other objects such as light sources will be ignored.

Tip

You can speed up render time by connecting any groups that contain lots of objects. The reason for this is that a single object can be rendered more quickly than a few hundred objects, even though they contain the same number of polygons.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

23. Plug-ins Menu

23 Plug-ins Menu

In general terms, plug-ins are auxiliary modules which extend the function range of a program. Within BodyPaint 3D, plug-ins are able, for example, to automate particular functions or to add new import and export filters.

For this purpose BodyPaint 3D includes an efficient programming language, C.O.F.F.E.E., available to both developers and end-users.

This is a completely object-oriented programming language whose syntax is closely related to C++ or Java. Further information on the development of plug-ins can be found in the C.O.F.F.E.E. SDK (Software Development Kit) on our website (www.maxon.net); there you will also find links to different plug-in vendors.

Note

Plug-ins can be developed freely by anyone and offered for sale. However, MAXON Computer, as the manufacturer of BodyPaint 3D, has no influence on the quality of these plug-ins and you should assure yourself as to the value-for-money and usefulness of a plug-in before purchase. Of course, we give as much support as possible to all vendors and developers of plug-ins - however, if a problem should arise with one of these products, please contact the manufacturer of the plug-in directly. Please understand that MAXON Computer can give no information on, or provide technical support for, third-party products.

As already mentioned, plug-ins can solve diverse tasks. Consequently, after installation, your new plug-in may appear in one of several places within BodyPaint 3D's menu structure. To this end, please consult the vendor's plug-in documentation. If no such information is supplied in the documentation, perhaps the plug-in is listed in the Plug-ins menu.

Execute Last Plug-in

This menu item on the **Plug-ins** menu executes the last plug-in that was used.

Compile File ...

Use this command (on the **Plug-ins** menu) to compile a C.O.F.F.E.E. program. A file requester opens for you to locate the file that you wish to compile.

Sub-folders

You can create sub-folders within the Plug-in menu structure to help you organize your plug-ins. To do this, use the Macintosh Finder or Windows Explorer to create a sub-folder of any name within the Plugins folder. Next, copy the associated plug-ins into the sub-folder, taking into account the naming conventions used by your operating system. The new structure will appear in the Plug-ins menu the next time you restart BodyPaint 3D.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

24. Render Menu

24 Render Menu

The Render menu contains all the options you need to render a picture. You can define several render presets, e.g. for preview and for final rendering. In this way, you do not have to change the settings constantly.

Note

BodyPaint 3D's RayBrush technology enables you to paint onto a rendered picture in three dimensions - see page 182.

Render View

This function renders the scene in the active editor window. If you are working in the all views mode, you can render each view one by one. To define the render mode and further render options, use the render settings (see below).

You may cancel rendering at any time by pressing the ESC key or by clicking the mouse. Once rendering commences, a render progress bar appears at the lower left of the editor window.

Missing textures

If BodyPaint 3D is unable to find the textures for any of the materials used in a scene, an alert will appear. If you choose to continue rendering, the materials will be used without the missing texture maps. BodyPaint 3D searches for textures and animation files in the following locations: in the scene folder, in the scene's 'Tex' folder, in the 'Tex' folder of the BodyPaint 3D folder, in the Texture Paths specified in the General Settings (including their sub-folders).

Render Active Object

This function renders the active object and its child objects in the active editor window. The other objects are ignored and will not appear in reflections or transparencies. To define the render mode and further render options, use the render settings (see below).

You may cancel rendering at any time by pressing the ESC key or by clicking the mouse.

Once rendering commences, a render progress bar appears at the lower left of the editor window.

Missing textures

If BodyPaint 3D is unable to find the textures for any of the materials used in a scene, an alert will appear. If you choose to continue rendering, the materials will be used without the missing texture maps. BodyPaint 3D searches for textures and animation files in the following locations: in the scene folder, in the scene's 'Tex' folder, in the 'Tex' folder of the BodyPaint 3D folder, in the Texture Paths specified in the General Settings (including their sub-folders).

Render Region

This function renders a region in the editor window. Once you have chosen the function, drag a box to define the region. To define the render mode and further render options, use the render settings (see below).

You may cancel rendering at any time by pressing the ESC key or by clicking the mouse. Once rendering commences, a render progress bar appears at the lower left of the editor window.

Missing textures

If BodyPaint 3D is unable to find the textures for any of the materials used in a scene, an alert will appear. If you choose to continue rendering, the materials will be used without the missing texture maps. BodyPaint 3D searches for textures and animation files in the following locations: in the scene folder, in the scene's 'Tex' folder, in the 'Tex' folder of the BodyPaint 3D folder, in the Texture Paths specified in the General Settings (including their sub-folders).

Render to Picture Viewer

This function renders the scene in the Picture Viewer. Once rendering commences, a render progress bar appears at the lower left of the editor window. The bar shows you the time that has elapsed since the render started.

The Picture Viewer includes some display options. For example, you can turn off color channels and change the viewing size. (See page 273.)

To define the render mode and further render options, use the render settings. You may cancel rendering at any time by pressing the ESC key or by clicking the mouse.

You *must* use the Picture Viewer as opposed to the editor if you wish to save the picture. Enter a filename in the render settings before you render. See page 412.

Missing textures

If BodyPaint 3D is unable to find the textures for any of the materials used in a scene, an alert will appear. If you choose to continue rendering, the materials will be used without the missing texture maps. BodyPaint 3D searches for textures and animation files in the following locations: in the scene folder, in the scene's 'Tex' folder, in the 'Tex' folder of the BodyPaint 3D folder, in the Texture Paths specified in the General Settings (including their sub-folders).

Render Settings

A project can have several render settings. This function opens the active settings (indicated by a tick on the Render menu).

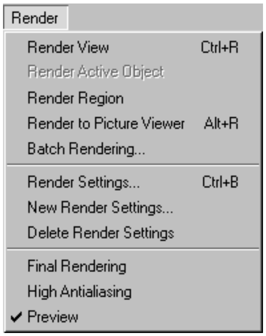
The default render settings are called 'New'. If you wish to add further default settings, create the settings and then save the otherwise empty scene in BodyPaint 3D's root folder under the name 'Template.c4d' (see Initialisation File, page 66). For a full description of all the render settings, see page 402.

New Render Settings

You can use this function to create new render settings. The render settings dialog opens.

Enter a name for the new settings under **Name** on the General page - choose a meaningful name (e.g. ‘Preview’) so that the new settings will be easy to distinguish from any other settings.

Once you have finished creating the settings, the new name will appear in the lower section of the Render menu.



You can create settings for a variety of purposes. Perhaps you will create settings with low antialiasing, no reflections and no shadows for preview rendering called ‘Preview’. You may also create settings with high antialiasing, reflections and shadows called ‘Final Rendering’. You can create as many settings as you like.

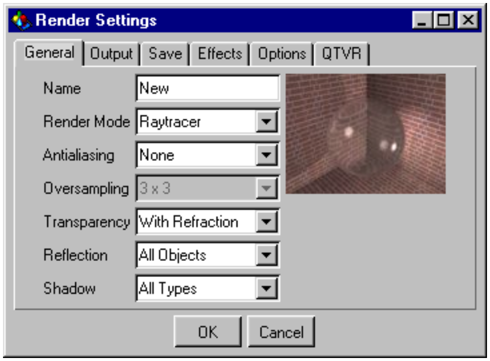
To choose which settings are active, click on the corresponding name in the Render menu. The active tick will then appear in front of that name.

Delete Render Settings

This function deletes the active render settings (indicated by a tick on the Render menu). The name of the settings will be removed from the Render menu.

Render Settings Dialog

General Tab



Name

This enables you to change the name of the settings (the default name is 'New'). Choose a meaningful name (e.g. 'Preview') so that the new settings will be easy to distinguish from any other settings.

Render Mode

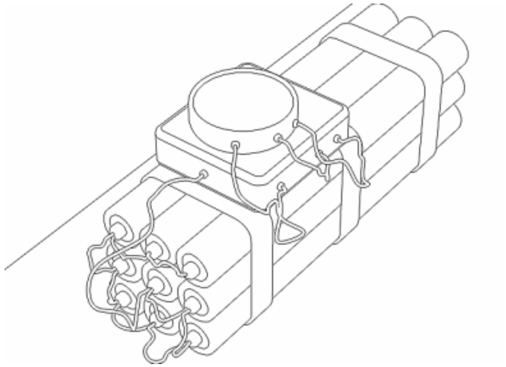
This setting defines the mode used to render the picture.

As Editor

If you select this mode, the renderer will use the editor window's active shading mode, e.g. wireframe, Gouraud shading.

Cel-Render B/W

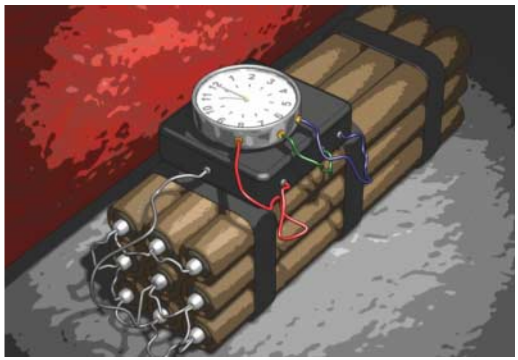
Cel-Render B/W renders all objects as black outlines on a white background. You can refine this mode using the Cel-Renderer options on the Options tab - see page 416.



The render time for the Cel-Render B/W mode increases linearly with the number of polygons, even though the mode is heavily optimized.

Cel-Render Color

Cel-Render Color renders all objects using a reduced color palette and black outlines on a black background. This gives the rendered subjects a cartoon-like feel. You can refine this mode using the Cel-Renderer options on the Options tab - see page 416.



The render time for the Cel-Render Color mode increases linearly with the number of polygons, even though the mode is heavily optimized.

Raytracer

This is a combination of two modes - scanline mode and raytracing mode. Raytracing mode is used only for those parts of the picture that cannot use scanline mode (e.g. transparent surfaces, hard shadows). Otherwise, scanline mode is used since it is faster. This automatic switching between modes (termed *adaptive raytracing*) accelerates rendering with zero loss in picture quality.

If you use the following settings, the scanline mode will be used:

Transparency	No Refraction
Reflection	Floor & Sky Only
Shadow	Soft Only

If you choose the following settings, scanline mode will be used as much as possible but raytracing mode will be used where required (e.g. transparent surfaces, hard shadows):

Transparency	With Refraction
Reflection	All Objects
Shadow	All Types

The two sample pictures below show the same scene.

The left-hand picture was rendered using the scanline mode only - there are no shadows, only the sky is reflected and, although the bottle and glass are transparent, there is no refraction. Raytracing mode was chosen for the right-hand picture. Now hard shadows are visible, the bottle is reflected in the mirror and the bottle and glass both refract light. Even so, all parts of the right-hand picture that do not use these effects used the faster scanline mode.

As you can see from the pictures, the effects offered by raytracing can make all the difference in rendering a realistic picture.

Note

You can speed up rendering by using a multi-processor system. BodyPaint 3D detects the extra processors automatically and distributes the render task accordingly. For example, if you are using four processors, the render speed can increase by up to a factor of 3.6.

Antialiasing

Images consist of pixels and are prone to staircase effects. This phenomenon is called *aliasing*. BodyPaint 3D equips you with powerful *antialiasing* modes to defeat these ugly pixels.

You can set the strength of your chosen antialiasing mode using the **Oversampling** setting — see page 407.

Antialiasing > None

If you select None, antialiasing is switched off. Expect a grainy image...

Antialiasing > Edge

If you select Edge, object edges will be antialiased. Shadows and textures will not be antialiased, though...

Antialiasing > Edge And Color

If you select Edge And Color, shadows and textures as well as object edges will be antialiased...

Antialiasing > Always

If the Always option is selected, each pixel in the image will be antialiased - even those pixels that do not require antialiasing...

The Always option should be considered an extreme measure - it causes a large increase in render time yet the image improvements are often negligible. Edge And Color with a high oversampling value gives high-quality rendering and is usually the better choice.

Oversampling

This value refers to the maximum number of additional rays that are calculated for a pixel requiring antialiasing.

The higher you set this value, the more accurate the antialiasing will be. However, increasing the oversampling value will increase the render time as well.

The render time is influenced greatly by the antialiasing and oversampling values. For example, Always antialiasing with 3 x 3 oversampling takes about four times longer to render than Edge And Color with the same oversampling, yet the difference in image quality is usually minor.

You should reserve Always for the very highest image quality.

Edge And Color provides almost identical results to Always and is rendered in a fraction of the time. It is often more effective to choose a higher oversampling value for Edge And Color rather than move up to Always. A good time vs. quality compromise for quality images is Edge And Color with 4 x 4 or 6 x 6 oversampling.

Transparency

Transparency > None

If you activate this option, transparency and alpha channels will not be rendered...

Transparency > No Refraction

No Refraction means that all transparent materials will be rendered but without refraction. If you are working with alpha channels, make sure you use No Refraction, otherwise the surfaces will be rendered opaque...

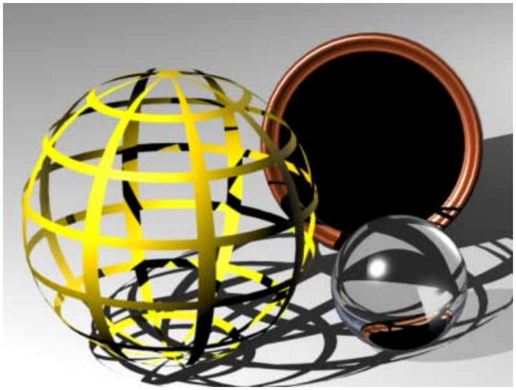
Transparency > With Refraction

Select this option if you wish transparent materials to refract as well. Refraction is often essential for realistic glass and water. Any refraction in the render will increase the render time. If there is no refraction in the render, the render time will not increase, even though this option is selected...

Reflection

Reflection > None

If None is selected, reflections will not be rendered.



Reflection > Floor & Sky Only

If Floor & Sky Only is selected, only the floor and sky objects in the scene will be reflected. This option is rendered very quickly and is a good compromise for time-critical projects...

Reflection > All Objects

If you select All Objects, all the objects in the scene can be reflected. If there are no reflective objects in the scene, the render time will not increase, even though this option is selected...

Shadow

Shadow > None

If None is selected, shadows will not be rendered. The scene may lack contrast and appear flat as a result...

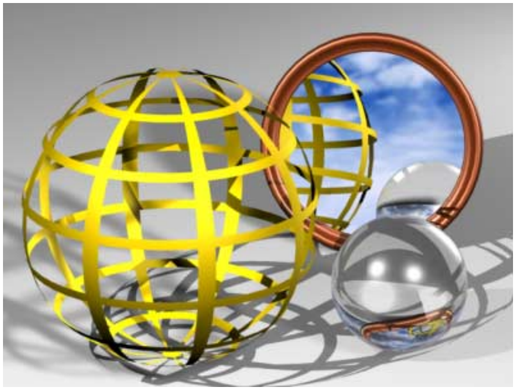
Shadow > Soft Only

If you have selected Soft Only, soft shadows will be rendered. Soft shadows render extremely quickly and look natural (often more natural than hard shadows, which take longer to render)...

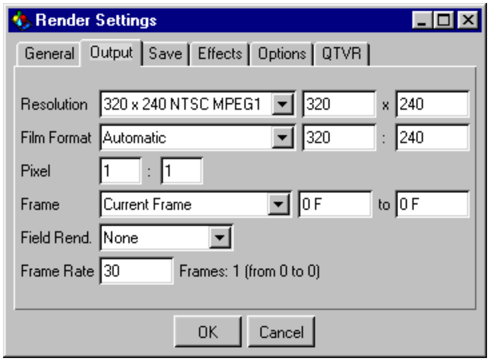
Note that BodyPaint 3D is one of the few programs that enable you to cast soft shadows from omni lights. See Omni, page 318.

Shadow > All Types

If All Types is activated, soft shadows, hard shadows and area shadows will be rendered. Additional rays must be calculated for hard shadows and area shadows...



Output Tab



The settings on the Output tab refer to rendering in the Picture Viewer only. These settings have no effect on rendering in the Perspective View. As a result, you must render to the Picture Viewer if you wish to save the rendered picture.

Resolution

You can use this setting to define the size of the image. You choose the resolution from the popup menu or enter your own values in the two text boxes to the right.

If you do the latter, the resolution popup menu setting will change to Manual automatically. (You do not have to select Manual yourself.) The popup menu lists common formats.

Film Format

The film format corresponds to an image's X:Y ratio.

You can choose the film format from the popup menu or enter your own values in the two text boxes to the right.

If you do the latter, the resolution popup menu setting will change to Manual automatically. (You do not have to select Manual yourself.) The popup menu lists common film formats.

The resolution and the film format are linked. If you change the film format, the resolution will be adjusted automatically in the Y direction. Try the following example for clarification.

> Select a resolution of 320 x 240. This is the same as a computer's 4:3 ratio. Change the film format to 70 mm (cine format) - the resolution changes to 320 x 145 automatically (it is scaled in the Y direction to match the format).

The default setting for the film format is Automatic. This means that images will be rendered in the specified resolution independent of any particular ratio.

Two lines will appear in the Perspective View to frame the area that will be rendered.

Pixel

The two values specified here define the ratio of a pixel's on-screen width (left box) to its on-screen height (right box). The pixel ratio for most monitors is 1:1, so usually you do not need to change this setting.

However, some display media use a pixel ratio other than 1:1 and the setting must be adjusted to avoid distortion such as circles appearing as ellipses.

If you need to calculate the pixel ratio manually, expand the editor window so that it fills the entire screen. Select the side view and import a cube. Measure the cube's width and height with a ruler and enter values in the corresponding pixel boxes.

Frame

This popup menu and the two fields to its right are valid for the integrated version with CINEMA 4D only - please see the CINEMA 4D Reference manual for details.

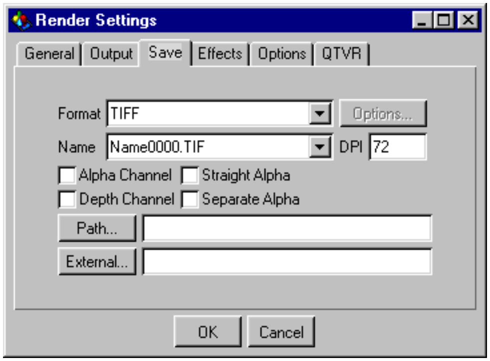
Field Rendering

This popup menu is valid for the integrated version with CINEMA 4D only - please see the CINEMA 4D Reference manual for details.

Frame Rate

This setting is valid for the integrated version with CINEMA 4D only - please see the CINEMA 4D Reference manual for details.

Save Tab



Format

BodyPaint 3D supports the following picture formats: TIFF, TARGA, BMP, PICT, IFF, JPEG, Photoshop PSD and any formats installed on your system under QuickTime.

QuickTime 4 upwards supports the following single picture formats: BMP, Photoshop PSD, SGI, JPEG, PICT, PNG, TIFF and QuickTime Image.

Note

If you are using Windows, you must install QuickTime to take advantage of the extra formats.

Options

This is relevant only if you are running BodyPaint 3D with CINEMA 4D. Please see the CINEMA 4D reference manual for details.

Name

This popup menu is valid for the integrated version with CINEMA 4D only - please see the CINEMA 4D Reference manual for details.

DPI

You can use this setting to choose the DPI for the following picture formats: BMP, TIF, PICT. The DPI affects a picture's print size.

An example

You render a picture that is 700x1000 pixels. If you save the picture with 72 DPI, the print size will be 24.7cm x 35.3cm. If you save the picture with 300 DPI, the print size will be 5.9cm x 8.5cm - assuming that the print program supports the DPI setting.

Alpha Channel

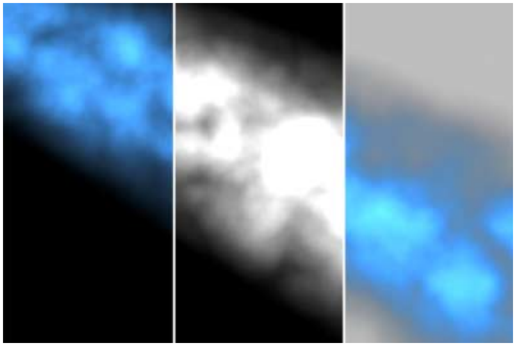
If you activate this option, a *pre-multiplied* alpha channel will be calculated during rendering.

The alpha channel uses the same resolution as the color picture. Pixels in the alpha channel are either white or black. A white pixel in the alpha channel indicates the presence of an object in the corresponding pixel of the color image. A black pixel in the alpha channel indicates no object in the corresponding pixel of the color image.

You can use the alpha channel for compositing in image editing programs.

Imagine that you have a scanned image of an airfield and you wish to render an aircraft in BodyPaint 3D and place it on the runway. You can render the aircraft with an alpha channel in BodyPaint 3D. Next, use the alpha channel in the image editing program to cut out the non-aircraft parts of your render so that the airfield shows though in those parts. The edges of the alpha channel picture are antialiased in grayscale so that there is a soft transition in the composited picture.

Pre-multiplied alphas have one particular shortcoming - please study the image below.



On the left the rendered image, in the middle the alpha channel and on the right the result

Can you see the dark seam caused by the alpha channel? This arises because both the picture and the alpha channel were rendered with antialiasing. By definition, the color picture and the alpha channel must be multiplied and so the black is calculated twice.

You can avoid this dark seam by using the Straight Alpha option. Note that straight alphas are only suitable for compositing programs - they are unusable as conventional pictures.

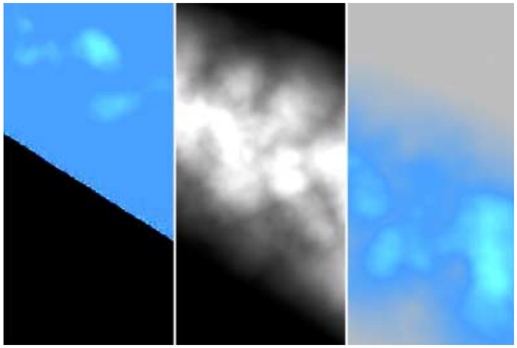
Warning!

The entire alpha channel will be masked if you use a sky, floor or background object in your scene! Do not use any of these objects if you need the alpha channel.

Alpha channels are integrated automatically for TARGA, TIFF, PICT and PSD. If you have activated Separate Alpha or if you have chosen a different picture format, the alpha channel is saved separately to the color picture. These files are indicated by an 'A_' before the filename, e.g. 'A_room.tif'. Separate alphas are saved in the TIF format.

Straight Alpha

You can use this option if straight alphas are supported by your compositing program. This avoids the dark seam associated with pre-multiplied alphas. Note that straight alphas are only suitable for compositing programs - they cannot be used as conventional pictures.



On the left the rendered image, in the middle the alpha channel and on the right the result

Activate the straight alpha only when you wish to post-edit the result. The picture is useless as direct output.

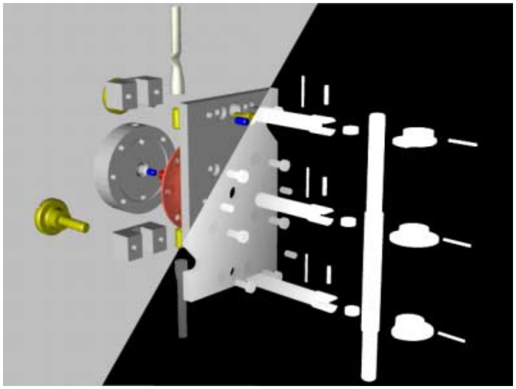
Warning!

The entire alpha channel will be masked if you use a sky, floor or background object in your scene! Do not use any of these objects if you need the alpha channel.

Alpha channels are integrated automatically for TARGA, TIFF, PICT and PSD. If you have activated Separate Alpha or if you have chosen a different picture format, the alpha channel is saved separately to the color picture. These files are indicated by an 'A_' before the filename, e.g. 'A_room.tif'. Separate alphas are saved in the TIF format.

Depth Channel

The depth channel contains grayscale pixels that indicate how distant objects are from the camera. The darker a pixel, the more distant that part of the object is.



On the left the rendered image and on the right the depth channel

Depth channels are often used in post-production to add effects such as depth of field and fog. The depth channel can also be used to insert objects within the picture.

Depth channels are integrated automatically for TARGA, TIFF, PICT and PSD.

If you have activated Separate Alpha or if you have chosen a different picture format, the depth channel is saved separately to the color picture. These files are indicated by a 'D_' before the filename, e.g. 'D_room.tif'. Depth channels are saved in the TIF format.

Separate Alpha

Alpha channels or depth channels are usually integrated automatically for TARGA, TIFF or PICT pictures. If you wish to save the alpha/ depth channel as a separate file, activate this option. In addition to your color picture (e.g. 'room.tif'), you will also have a file containing the alpha channel (e.g. 'A_room.tif') or depth channel (e.g. 'D_room.tif').

Note

If you have activated both Alpha Channel and Depth Channel, only the alpha channel will be integrated into the picture. The depth channel will be saved as a separate file.

Path

Choose the folder and filename so that the picture can be saved automatically after rendering.

You can type in the entire path if you wish. Alternatively, click on **Path** to open a system dialog so that you select the folder.

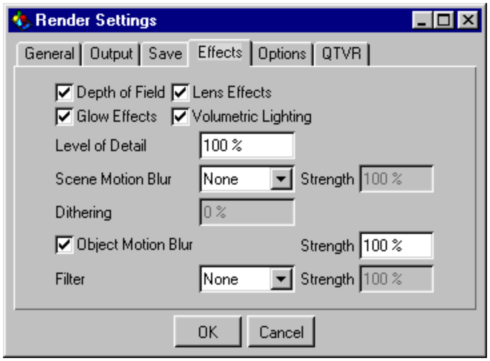
If you enter a name without a path, the picture will be saved in the active scene's folder.

External

You can use External to specify an application for the rendered picture to be passed on to. For example, you can redirect the picture to an image editing program for further processing. If you are using Windows, you can use a batch file with command parameters. If you use a Macintosh, you may use AppleScript.

Click on **External** to open a system dialog so that you can select the program.

Effects Tab



Depth of Field

If this option is activated, depth of field will be rendered if it is used by any of the cameras. You may wish to switch off depth of field for preview rendering.

Please note that this is a post-processing effect - it will not be visible until after the normal image has been rendered.

Lens Effects

If this option is activated, lens effects will be rendered if they are used in your scene. You may wish to switch off lens effects for preview rendering.

Please note that this is a post-processing effect - it will not be visible until after the normal image has been rendered.

Glow Effects

If this option is activated, glow effects will be rendered if they are used in your scene. You may wish to switch off glow effects for preview rendering.

Please note that this is a post-processing effect - it will not be visible until after the normal image has been rendered.

Note

Glow effects are like the lens effects. They are post processed effects (they are only taken into consideration after the actual picture is rendered), so you cannot see them in reflections and you cannot see them through transparent objects.

Volumetric Lighting

Volumetric lighting permits shadows in visible light. This can produce stunning effects, but it also increases render time significantly. Deselect this option if you want to turn off volumetric lighting.

Level of Detail (CINEMA 4D scenes only)

This value influences all CINEMA 4D objects in the active scene that support a reduction in detail, such as metaballs, primitives and NURBS. However, any objects that have their own Level of Detail setting (see Display Tag, page 196) will continue to use their setting.

If the value is set to 100%, the objects will be rendered with full detail. If the value is set to 50%, the objects will be rendered with only half their usual detail.

Note

If you render to the editor window, the editor's level of detail value (Display menu) will be used in preference. It is only when you render to the Picture Viewer that the value in the render settings is used.

Scene Motion Blur

This is relevant only if you are running BodyPaint 3D with CINEMA 4D. Please see the CINEMA 4D reference manual for details.

Dithering

This is relevant only if you are running BodyPaint 3D with CINEMA 4D. Please see the CINEMA 4D reference manual for details.

Object Motion Blur

This is relevant only if you are running BodyPaint 3D with CINEMA 4D. Please see the CINEMA 4D reference manual for details.

Filter

You can apply built-in post-processing filters to the rendered picture.

None

No filter is applied.

Soft

Each pixel is balanced with its neighbour to yield a softer transition. Use **Strength** to increase or decrease the effect.

Edges

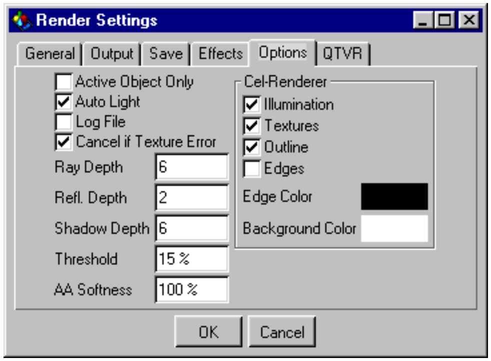
The Edges filter emphasizes transitions in the picture. This reinforces the edges. Use **Strength** to increase or decrease the effect.

You can use Edges to sharpen your pictures - for example, try using the filter with 30% strength for a still.

Medium

Medium filters out unattractive peaks in pixel color values. Use **Strength** to increase or decrease the effect.

Options Tab



Active Object Only

If this option is active, only the active object is rendered in the Picture Viewer.

Auto Light

If there are no lights in your scene, BodyPaint 3D will use the auto light (a standard light source) when rendering so that you can see the objects.

Log File

If this option is enabled, the render log will be recorded in 'Renderlog.txt' in the BodyPaint 3D folder.

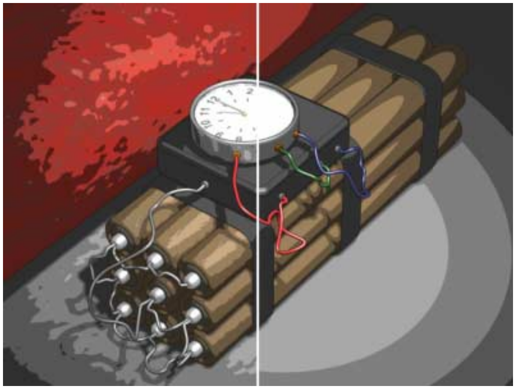
The render log contains a complete history of the render process including system resource information. In particular, you can check the log if you need to identify problems that occurred during rendering.

The information in the log file is not overwritten by subsequent renders. Rather, new log information is appended. As a result, this file can grow to a fair size over time. You may wish to delete the file manually from time to time - a new file will be created the next time the log is recorded. (You will not confuse BodyPaint 3D by deleting the file).

Textures

This option activates or deactivates textures for rendering. For example, you might deactivate textures for a test render or for cel-rendering.

If the option is activated, textures will be rendered. If **Textures** is deactivated, the average color value of the top texture layer (the right-most texture in the Object manager) will be rendered.



Cel-Render Color with and without the Texture option active

Cancel if Texture Error

If BodyPaint 3D cannot find a texture when rendering the scene, an alert dialog will appear. If this option is not selected and you confirm the alert, the rendering continues without the missing texture.

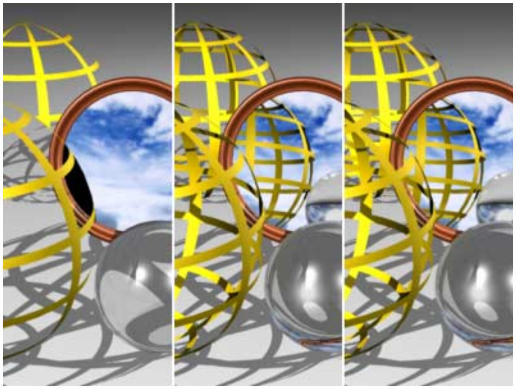
Ray Depth

The **Ray Depth** value determines how many transparent objects (or areas made invisible using the alpha channel) can be *penetrated* by the renderer. The lower you set the ray depth, the fewer the number of objects that can be seen through. Those areas that cannot be penetrated are rendered black.

A processing depth of 1 means that calculations are finished for that pixel once a ray hits something in the scene. Transparencies and alphas are therefore not visible.

A value of 2 means that, after a ray has hit a surface, a second ray is calculated for the transparency. The greater the processing depth, the further rays are followed into the scene and the results rendered.

The following scenes with transparencies and alphas were rendered with a ray depth of 2, 4 and 8.



Reflection Depth

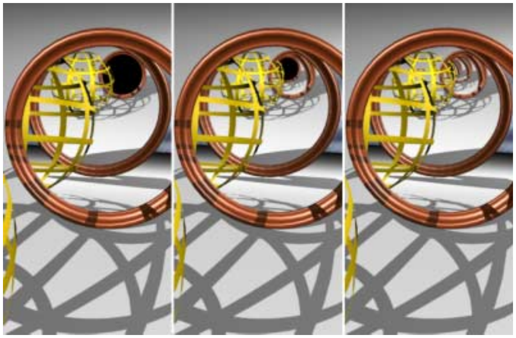
When a ray is sent into the scene, it can be reflected by reflective surfaces. With certain arrangements, e.g. two mirrors opposite each other, it is possible that a ray will be reflected endlessly - it is trapped between the mirrors and the raytracer would never finish rendering the picture. In order to prevent this, you can set the maximum number of reflected rays in **Reflection Depth**.

You can also use **Reflection Depth** to limit the render time for the picture. Often, only the first generation of reflection is important. Further rays tend to add very little to the image quality but increase the render time considerably.

A processing depth of 1 means that calculations for a pixel are finished once a ray hits something in the scene. Reflections are therefore not visible.

A value of 2 means that, after a ray has hit a surface, a second ray is calculated for the reflection. The greater the processing depth, the further rays are followed into the scene and the results rendered.

The following scenes with reflective objects were rendered with **Reflection Depth** set to 2, 4 and 8.



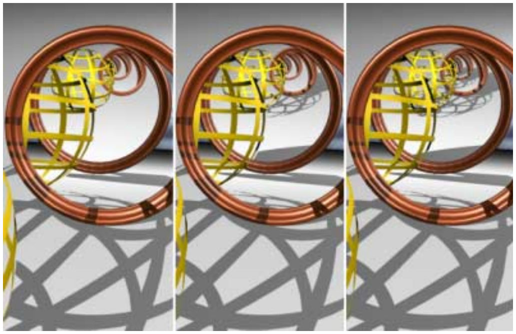
Shadow Depth

The shadow depth is analogous to the reflection depth. In this case, tests are carried out to see if a surface point lies in the shadow of another object.

This is tested for using additional shadow rays, which are sent from the surface in the direction of the light source.

The value you enter for this setting determines for which generation of camera rays shadows are calculated. For example, if you reduce the value to 2, shadows will not be rendered for reflected, transparent or refracted rays.

The following scenes with reflective and transparent objects were rendered with **Shadow Depth** set to 2, 4 and 8



Threshold

This value helps to optimize the render time. With complex scenes, particularly those containing many reflective and transparent surfaces, 90% of the processed rays contribute less than 10% to the general picture brightness and color. With a threshold value of, for instance, 15%, the rays stop their movement from the camera into the scene as soon as their brightness falls below this critical value.

What exactly does that mean?

When a ray hits a surface, the values for transparency and reflection are calculated. If, for example, the threshold is set to 15% and the surface has a material with 10% reflection (Brightness slider), the material will not reflect.

In order to render the reflection in this case, the threshold must be reduced to 9% or less (or the reflection of the material must be increased to 16%).

Sometimes it is useful to increase the threshold to prevent minor details being reflected. Although minor details are calculated correctly, too much detail in reflections can distract the viewer. However, if you wish to calculate all rays, set the threshold to 0%.

AA Softness

This stands for antialiasing softness and the option enables you to control how hard or soft the antialiasing is. You can use this to fine-tune the antialiasing to suit your picture.

For crisp pictures, set the value between 0 and 50%.

If your pictures should retain a soft look, use a value between 50 and 100%.

Note

As a rough guideline, use a value between 20-60%. This is only a rough guideline that depends on the subject matter - do not worry if your preferred setting differs.

Cel-Renderer

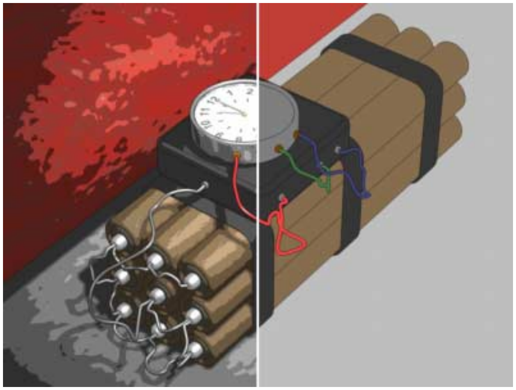
These options apply to the render modes Cel-Render B/W and Cel-Render Color.

Cel-Render B/W renders all objects as black outlines only on a white background. Cel-Render Color renders all objects with a reduced color palette and black outlines on a black background. This results in a classic cartoon style.

Illumination

If this option is activated, the shading of objects is affected by the illumination. Shadows will also be rendered. Note that this option only has an effect with Cel-Render Color.

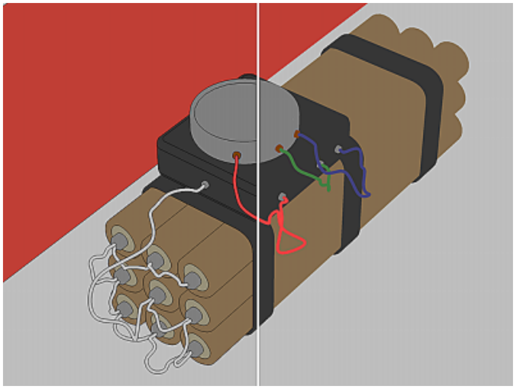
If **Illumination** is deactivated, the average color value of the top texture layer (the right-most texture in the Object manager) will be used to render the objects. As a result, each object has a monotone color. Also, shadows will not be rendered with the option deselected.



Outline

This option draws an outline around the silhouette of objects. This is critical with the Cel-Render B/W mode since if you deselect the option all you will see is the background color!

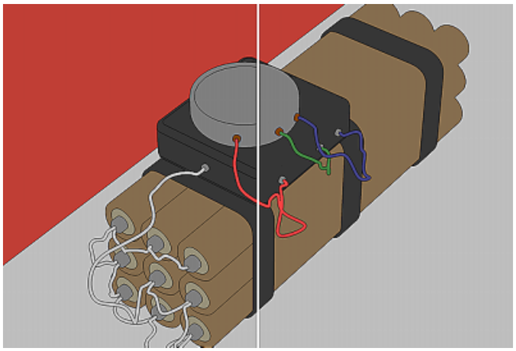
With Cel-Render Color, the outline helps to bring out the individual objects and give them a cartoon feel.



Note

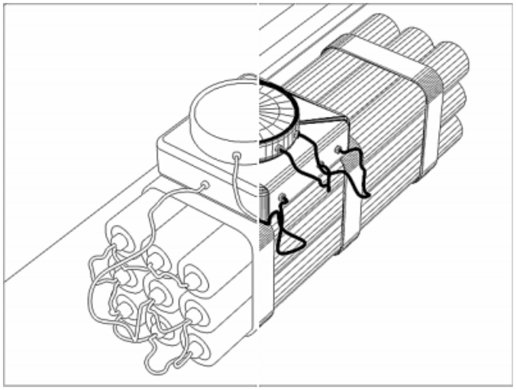
The outline is drawn around the silhouette of individual objects only. For example, if you have connected an object group to form an individual object, only the overall silhouette will be outlined, not the individual silhouettes.

You can change the color of the outline using Edge Color.



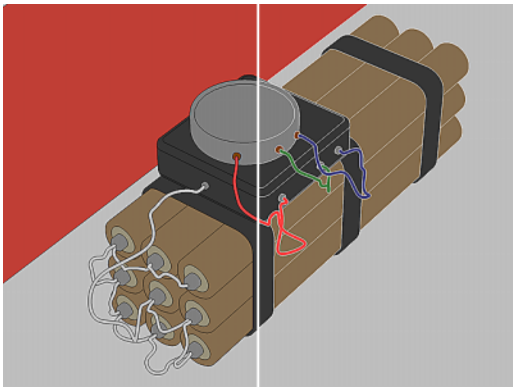
Edges

If this option is activated, all polygon edges are outlined in black. This creates a shaded wireframe feel. You can change the color of the edges using Edge Color.



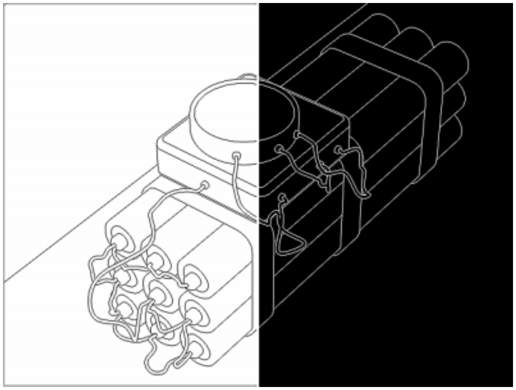
Edge Color

This option enables you to change the color used by the options Outline and Edges. This option affects both cel rendering modes (Cel-Render B/W and Cel-Render Color).



Background Color

This option allows you to change the background color for the Cel-Render B/W mode. The option has no effect on the Cel-Render Color mode.



25. Window Menu

25 Window Menu

425

25 Window Menu

Most of the following menu entries activate a window or a manager. If the particular window or manager is already present in the layout, but not in the foreground, the call will cause it to come to the front. If the selected item is not in the layout or if an additional view panel, icon palette or status bar is opened, this appears first in a new window. With the *drawing pin* (see page 60) this window can then be placed elsewhere within the layout.

Layout

Under this menu entry are some functions that allow you to modify your work environment to suit your own preference. More information on this can be found in Chapter 4, Workflow, page 55.

New Icon Palette

This opens a new, empty icon palette in its own window. You can then populate this palette with icons from the Command manager (see page 36).

Edit Palettes

If you choose this command, the **Edit Palettes** mode is activated and the Command manager opens. The icons are surrounded by blue frames, indicating that you may edit them - e.g. you can drag icons from the Command manager and drop them onto any of the palettes.

There are two ways to exit the **Edit Palettes** mode - either close the Command manager or deselect the check box.

Load Layout

If you have setup your working environment to your satisfaction and saved it (as a '.l4d' file), you can reload that configuration with this command.

Reset Layout

This instruction resets your BodyPaint 3D layout to the original, preset layout. This is particularly useful if you need to call our support team since you and they then have a common interface to work from. Your own customized layouts can increase your workflow enormously but when searching for an elusive problem a common, standardized layout is essential.

Save as Default Layout

Use this to save the visible working environment as the default layout. When you next start BodyPaint 3D this is the layout that will be used (remember that this only saves your BodyPaint 3D setup - you must clear up your desktop yourself!).

Note

In the General Settings you can choose to save the layout automatically when quitting the program.

However, if you have slaved for hours creating the perfect working environment and want to be sure that the layout is saved immediately, you should use Save as Default Layout. After all, power cuts have an uncanny knack of happening when you have not saved your work!

Save Layout as

This command lets you save your layout under its own name so that you can create as many named setups as you need; e.g. one for painting in the Perspective View, one for editing UV mesh in the Texture View.

Layout files have the extension '.l4d'.

Default Layouts

So that you can access different layouts quickly this command shows all the '.l4d' layout names that are present in the 'Prefs' folder within the 'BodyPaint 3D' folder.

Painter

This menu item enables you to open editors and managers that relate to painting.

Brush Settings

This opens the Brush Settings dialog. You can also open the dialog by double-clicking on a brush preset in the Brush manager.

In the dialog you adjust parameters for the active brush.

For details on the Brush Settings, please see page 89.

Color Settings

Opens the Color Settings dialog. You can also open the dialog by double-clicking on a color preset in the Color manager.

The dialog enables you to adjust parameters for the active color.

For details on the Color Settings, please see page 75.

Brush Presets

This opens the Brush manager. This manager gives you access to the default brush presets as well as your own brush presets.

For details on the Brush manager, see page 98.

Color Presets

This opens the Color manager. This manager gives you access to the default color and pattern presets as well as your own presets.

For details on the Color manager, see page 83.

Layer Manager

Opens the Layer manager. The Layer manager is the control center which gives you access to your textures. Not only can you select individual layers to edit them, you can also drag-and-drop to reorder the layer stack, create new layer masks or merge layers together.

For details on the Layer manager, please see page 107.

Bitmap Info

This opens the Bitmap Info manager. This manager provides you with information such as the size or memory consumption of the active layer or active material. You can also adjust the active layer's opacity.

For details on the Bitmap Info manager, please see page 115.

New View

BodyPaint 3D enables you to open as many views on a scene as you want and the perspective is always freely adjustable within each view (see View Menu, page 13).

This is where you create a new view; when it first appears it uses the standard 3D perspective.

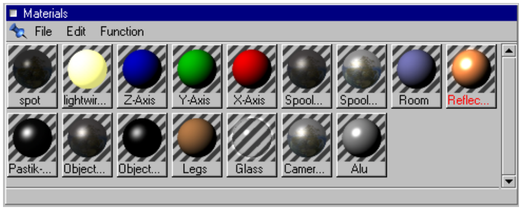
New Texture View

BodyPaint 3D enables you to open as many textures in their own view window as you wish. To open a texture in the view, either drag a texture into the view or double-click on the texture's name in the Layer manager.

Object Manager

This opens the Object manager. In this manager you can activate an object (even if it is not visible in the Perspective View), change the object hierarchy and manipulate the various properties of the objects. The Object manager is described in detail in Chapter 11, page 187.

Material Manager



This opens the Material manager which holds all the materials and textures present in a scene and also shows material previews. You can assign a material to an object using drag-and-drop; simply drag the material onto the appropriate object in the Object manager.

The Material manager is described in detail in Chapter 12, page 207 while the various texture projections are discussed on page 255.

Picture Viewer

This opens the Picture Viewer window, also known as the Picture manager. When you perform a final render, the picture appears in this output window (instead of in the Perspective View). Also, you can view image files (e.g. textures) directly in this window and you are even able to convert them to other formats.

Coordinate Manager

Use this to open the Coordinate manager. This is a universal tool for the numeric manipulation of elements within your scene.

The Coordinate manager is described in detail in Chapter 15, page 285.

Structure Manager

This opens the Structure manager. The Structure manager enables you to select and edit the active object's points, polygons and UVW coordinates. You can edit the coordinates numerically.

The Structure manager is described in detail in Chapter 14, page 277.

Browser

Here you open the Browser. The Browser is an enormously powerful tool for the administration of your project data and libraries. Whole directories can be scanned to create a catalog and can be saved with a preview as well as with further information. Instead of searching long and hard in the murky depths of your hard disk folders use the Browser to get your chosen textures, objects or scenes with just a few mouse clicks.

The Browser is described in detail on page 57.

Global Status Bar

This opens the Global Status Bar, which shows information such as the render time.

Active Tool Manager

The more complex tools (for example, the selection tools) within BodyPaint 3D have various parameters (such as the radius of selection) which are shown in the **Active Tool** window; here you can also adjust them as necessary.

The adjustable parameters are described within the appropriate chapters for the individual tools.

Console

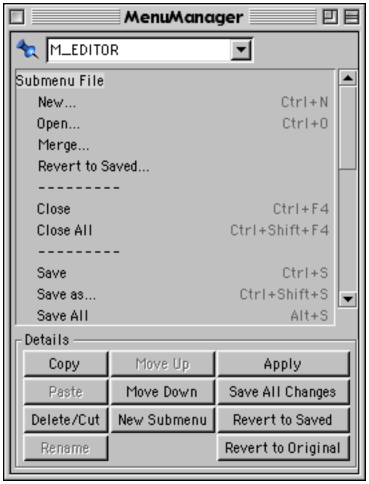
The Console window is used for the output and control of C.O.F.F.E.E. programs. C.O.F.F.E.E. print commands are displayed here, as are any errors. In the case of errors, the number and program position are shown.

Command Manager

This function opens the Command manager which contains a list of all the functions and commands that exist in BodyPaint 3D, including the various icons and keyboard short-cuts. Here you can arrange your own icon palettes or change the shortcuts to suit your own needs.

There is a more detailed description of the Command manager on page 36.

Menu Manager



You can use this manager to rearrange BodyPaint 3D's menu structure. The use of the manager is self-explanatory. If you get in a tangle, you can restore the structure with **Revert to Original**.

Other Entries

BodyPaint 3D is able to hold several scenes in memory at the same time.

At the bottom of the **Window** menu is a list of filenames for all the open scenes. Choose a filename to access that scene. The order of the list corresponds to the order in which the scenes were opened.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

26. Help Menu

26 Help Menu

Help (CINEMA 4D)

This menu item only appears if you are running BodyPaint 3D with CINEMA 4D. It opens the online CINEMA 4D 3D manual that was copied to your hard drive during the standard installation process for CINEMA 4D.

Help (BodyPaint 3D)

This opens the online BodyPaint 3D manual that was copied to your hard drive during the standard installation process.

MAXON Online

This menu item will open the MAXON homepage provided that you have an Internet browser installed. This is the place for the latest BodyPaint 3D information as well as service updates.

Personalize

This opens the Registration dialog so that you can enter your final serial number. You will receive your final serial number once you have returned your registration form to us or to your local Maxon contact.

Warning

The serial number that is included with the program will expire after six months of use, after which you will no longer be able to use the program. Please send in your registration form as soon as possible.

Info

This opens the same info screen that appears momentarily when the program loads. You can use this screen to check the version number of BodyPaint 3D, be sure to quote this number when contacting technical support. You can close the window by clicking on it.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

Appendices

Appendices

Appendix 1 Formulas

You can type in a formula wherever BodyPaint 3D accepts a value, e.g. in the Coordinate manager.

This appendix lists all the units, operators, functions and constants that you may use in your formulas.

Units

You may enter values using any of the units listed below (examples in brackets) - regardless of the basic units defined in the general settings (BodyPaint 3D will convert the units for you).

km *kilometres (23 km, 0.125km)*
m *metres (13.23 m, 1000m)*
cm *centimetres (11.5 cm, 328.275cm)*
mm *millimetres (14 mm)*
um *micrometres (678 um)*
nm *nanometres (3.867 nm)*
mi *miles (12.5 mi)*
yd *yards (17.9 yd)*
ft *feet (512 ft)*
in *inches (0.125 in)*
F *frame number (0 F)*

Note

If you change the basic units in the general settings, e.g. from metres to millimetres, only the measurement units are changed, not existing numerical values. For example, if an object has a width of 10 metres, but you then change the basic units to millimetres, the object will then have a width of 10 millimetres. If you wish to scale the objects to reflect the change in units, group all the objects and scale the group using the Coordinate manager.

Operators

The function parser has the most important arithmetic operators built in (examples in brackets):

+ *addition (144 + 14 = 158)*
- *subtraction (144 - 14 = 130)*
***** *multiplication (144 * 2 = 288)*
/ *division (144 / 12 = 12)*
MOD *modulus (123 mod 4 = 3)*
^ *power (12 ^ 2 = 144)*
(*open bracket (3 + (4 * 2) = 11)*
) *close bracket ((3 + 4) * 2 = 14)*

Functions
ABS *absolute value (abs(-123) = 123)*
SIN *sine (sin(30) = 0.5)*
COS *cosine*
TAN *tangent*
ASIN *arc sine*
ACOS *arc cosine*
ATAN *arc tangent*
SINH *sine hyperbola*
COSH *cosine hyperbola*
TANH *tangent hyperbola*
LOG10 *logarithm to base 10 (log10(100) = 2)*
LOG *logarithm to base e (log(e) = 1)*
EXP *exponential function (exp(5) = 148.413)*
SQRT *square root (sqrt(144) = 12)*
SQR *square (sqr(12) = 144)*

Note

Function arguments must be bracketed. The number of open brackets must equal the number *of close brackets. Functions may be embedded: sin(sqr(exp(pi)))*

*The argument of a trigonometric function is always interpreted in degrees. sin(2*pi) does not mean the computation of sin 180 degrees, merely approx. sin 6.283 degrees.*

Constants

BodyPaint 3D includes two important constants:

PI Pi (3.142)
E Euler's number (2.718)

With all the above you should be able to define even the most complex operations in a very precise way. You can combine them freely. For example:

```
2km+exp(sin(4mm*pi))/((sin(14cm))^2
     +(cos(14cm))^2)
```

Appendix 2 Programming Plug-ins

The C.O.F.F.E.E. Programming Language

C.O.F.F.E.E., BodyPaint 3D's plug-in language, is not based on macros or scripts but is a complete and powerful programming language in its own right. It closely resembles C++ and Java so that if you are already familiar with these languages you will immediately feel at home with C.O.F.F.E.E. You simply have to learn the various functions implemented by BodyPaint 3D.

Before you can start programming, you will need the SDK (Source Development Kit) from MAXON Computer - you can obtain this from MAXON Computer's web page at www.maxon.net.

What is the advantage of programming in C.O.F.F.E.E.?

Apart from the ease of integrating new functionality into BodyPaint 3D, BodyPaint 3D is a multi-platform program; BodyPaint 3D is available for the Apple Power Macintosh (Mac OS 8 and above) and Intel PC (Windows 9x and Windows NT/2000). Writing plug-ins in C.O.F.F.E.E. means that your new BodyPaint 3D function will work immediately on all these platforms; no re-compilation or reprogramming is required.

How do you create such a program?

Simply write your C.O.F.F.E.E. programs in any editor (perhaps that supplied with your computer) or word processor and save it as a regular ASCII text file; BodyPaint 3D will happily process regular text, with no high-ASCII characters.

So that BodyPaint 3D can find its C.O.F.F.E.E. programs and load them automatically, they must be placed in the Plug-ins folder which should be in the root BodyPaint 3D folder. If you check the contents of this folder, you should find some examples already there.

However, you can also store C.O.F.F.E.E. programs elsewhere on your hard disk. If you want to load such a program into BodyPaint 3D just use the **File > Open** menu command - such a file cannot be automatically integrated into BodyPaint 3D's menu structure.

The API

You can, if you wish, write your applications using any C/C++ compiler rather than the C.O.F.F.E.E. language. You can access BodyPaint 3D's functionality through pre-defined interfaces. These interfaces are in the form of an API (Application Programming Interface) library which is part of the SDK.

Note, however, that if you use an external compiler (as opposed to C.O.F.F.E.E.) this will be platform dependent and you will need to re-compile your program for each platform you want your plug-in to support. Your plug-ins may even require reprogramming.

C.O.F.F.E.E. Support

Support for BodyPaint 3D developers is available exclusively on MAXON Computer's website:

www.maxon.net

There you will find, among other things, the SDK. This contains the C.O.F.F.E.E. compiler and detailed descriptions of the programming language and the interface libraries. It is, of course, possible for commercial plug-in manufacturers to keep their source code secret and proprietary.

Our developer support is not static; the interfaces to BodyPaint 3D and their functionality are updated frequently. Therefore, please take note of announcements at www.maxon.net on a regular basis.

Appendix 3 File Formats

While working with BodyPaint 3D there will be occasions when a particular graphic format will not load or a 3D file will prove difficult to convert. There are so many formats and sub-formats for images and 3D files that BodyPaint 3D cannot even dream of coping with all of them.

The following sections contain summaries of all formats that BodyPaint 3D supports. If you need more detailed information, you should refer to the relevant technical information for that format.

Image Formats

TIFF

Bit depths

1, 4, 8, 24, 32

Compressions

Uncompressed, RLE compressed.

Notes

Only Baseline TIFF is supported. Exotic formats such as CMYK images are not supported, nor are files that have been LZW compressed (this is due to licence rights). It is of course not possible to give an exhaustive list of non-supported formats, since such a list in a sense could never be definitive.

With QuickTime installed LZW compressed images and other variants are also imported.

IFF

Bit depths

1, 4, 8, 16, 24

Compressors

Uncompressed, RLE compressed.

Notes

IFF images are read only if they conform to the Commodore/Electronic Arts specifications.

EHB, HAM-6 and HAM-8 modes are supported.

TARGA

Bit depths

24, 32

Compressors

Uncompressed.

Note

Only TGA-1 is supported. With QuickTime installed other variants are also imported.

PICT

Bit depths

4, 8, 16, 24, 32

Compressors

Uncompressed, RLE compressed.

Note

With QuickTime installed all PICT variants are imported (as long as the QuickTime compressors are available).

BMP

Bit depths

1, 4, 8, 16, 24

Compressors

RLE-4, RLE-8.

JPEG

Bit depths

24

Note

Grayscale JPEGs cannot be loaded.

PSD

Bit depths

1, 8, 24, 48

Color Formats:

Indexed Color, RGB, not CMYK.

Notes

For writing, multiple alpha channels are supported.

When importing, layers are preserved and will appear in the Layer manager.

With QuickTime installed, all QuickTime formats are supported i.e. PNG, SGI and QuickTime image.

3D Formats

DXF

BodyPaint 3D offers complete support for DFX files written by AutoCAD (up to and including version 12) or by the export filters of other applications, provided they are 100% compatible.

LightWave

BodyPaint 3D can convert LightWave Version 5 files and scene descriptions completely, although you may need to post-edit light source settings and texture placements. UV coordinates can be imported with LightWave Version 6

3D Studio Import

– These files are loaded:
  3DS (regular 3DS files)
  PRJ (3DS project files)
  MLI (3DS materials libraries)
– The object hierarchy is copied 1:1, referenced objects are duplicated in BodyPaint 3D.
– The following material channels are imported: environment light, specular color, specular settings (are recalculated), transparency, luminance, color texture, specular texture, transparency texture, environment texture, relief (bump) texture, luminance texture.

CAUTION!

The 3DS transparency texture is the exact opposite of the transparency mode in BodyPaint 3D. In 3DS materials are more transparent the darker a texture pixel, whereas in BodyPaint 3D they are more transparent the lighter the pixel.

– UV mapping is copied.

- Position, scaling, rotation and light sequences are adjusted to suit BodyPaint 3D.
- Textures can be renamed automatically on loading.
- So-called *target objects* loaded from 3DS (from cameras and light sources) become axes (null objects) and are given the extension 't', which is added to their object name.
- 3DS files are binary files and are not recognised by their extensions but by their identifier.

3D Studio Export

- All polygon objects, light sources and cameras are exported, Hyper NURBS objects are transformed into polygon objects.
- Material export:
  color, luminance, transparency, environment, specular, specular color, relief (bump), all with any defined textures. The mean value of the texture channel is exported with the shader.

Note

Regrettably, 3D Studio can cope only with filenames consisting of eight characters plus a three-letter extension. Therefore texture filenames will be truncated to conform with this restriction.

3D Studio accepts only one UV coordinate per point. Therefore texture mapping differ after exporting in this format.

QuickDraw3D Import

- Light source and camera information cannot be read.
- The following objects are ignored:
  Torus, TriMesh (new with QD3D v1.5); NURBS can cause problems in certain cases.
- References (both internal and external) are not read.
- UV coordinates are not read.
- Textures are not read.

QuickDraw3D Export

- Light source and camera information cannot be written.
- UV coordinate export is supported.
- Texture export is supported.
- ASCII 3DM files cannot be written, only binary.

Note

QuickDraw 3D accepts only one UV coordinate per point. Therefore texture mapping may appear different after exporting in this format.

Direct3D Export

- Typical extension *.x, ASCII Format, MESH and FRAME format.
- Zoom factor for entire scene, automatic indenting.
- Rename texture names to any extension.
- Texture information (UV coordinates and texture names)
- Texture channels:
  color, luminance, specular, specular color, transparency, environment.

Note

For all scenes to display properly with a Direct3D Viewer it is necessary for all textures to have an edge length of a power of 2 (i.e. 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, …).

VRML V1.0c and 2.0 Import

– ASCII format.
– Creating all basic objects (cuboid, sphere, cone, cylinder).
– Polygon objects of any size and number of vertices (n corners are triangulated).
– Perspective cameras, light sources (direct, point, spot).
– Material tags:
  ambient color, diffuse color, specular color, emissive color, shininess.
– WWW Links are created as a BodyPaint 3D attribute (WWW tag).

Note

*Object names in VRML files must not contain any special characters (not even +, –, *, /). This may be the only reason that BodyPaint 3D is refusing to load a file!*

VRM L 2.0 Import

– Inline scenes (references to scenes are automatically loaded).

VRML1.0c and 2.0 Export

– ASCII format (optionally formatted).
– Hierarchical saving of all objects: HyperNURBS are converted to polygon objects.
– Object names are converted, special characters are filtered/converted.
– Textures:
  If there are any textures, the program looks for the color texture, the luminance texture and the environment texture (in that order). Color textures, even inline textures, are saved as files.
– Materials:
  Color, luminance, specular, specular color, transparency, environment.
– WWW links/addresses are saved: when an object is selected in the web browser, the program branches to that link.

Wavefront OBJ Import

– The file to be imported must have the file extension ".OBJ". The file itself contains no information to suggest its origin. Without the extension, BodyPaint 3D cannot open the objects.
– ASCII format.
– Polygon objects are loaded.
– Objects are given a dummy material.
– UV mapping is supported.
– No object hierarchy can be created.

Wavefront OBJ Export

– ASCII format.
– Polygon objects; HyperNURBS are converted to polygon objects, UV coordinates.

DEM Landscape Import

– BodyPaint 3D does not support the more recent DEM-SDTS format.
– The VistaPro-DEM format is supported.
– The file to be imported must have the file extension ".DEM". The file itself contains no information to suggest its origin. Without the extension, BodyPaint 3D cannot open the file.

Appendix 4 Support

What can you do when you are stuck and the manual does not appear to help? - You may want to contact technical support.

MAXON Computer, and its distributors worldwide, will help you with any technical problems you encounter. So that we can help you as efficiently as possible, please keep in mind the following:

Please contact us (or your local distributor) in writing if possible, preferably by email.

We have telephone lines, of course, but problems with a package as complex as BodyPaint 3D may take time to solve - it is not always possible to solve the problem while you are on the phone. With email, however, our technicians can consult with colleagues for assistance — even the programmers if necessary — and get back to you as soon as possible. Email is also convenient for attaching an example of the problem and, likewise, it may be helpful for us to send you a scene.

Please keep support enquiries separate to other enquiries, orders etc.

Orders are dealt with by our busy Sales staff, so your support question is unlikely to be passed onto a support technician.

Please allow for a reasonable response time.

We operate on a queuing system basis only. Our customers are equally important and we will respond to you at the earliest opportunity.

Please supply your telephone number and times when we may contact you on that number.

Occasionally, we may need to contact you for further details.

Please send an example scene to demonstrate the problem, if applicable.

“When I paint, I get a mess”. It is difficult to solve problems with such limited detail and sometimes we need to examine the problem scene. After all, we and our hard-working beta testers, have tested the functions many-a-time without finding a fault.

Please keep any example scenes as small and as relevant as possible.

For example, if only an alloy wheel is required to demonstrate the problem, please delete the rest of the car - it merely gets in the way. This saves our time and in turn we can respond to your problem sooner.

Please supply us with a complete description of the relevant steps leading up to the problem.

Ideally, we would like a little ‘recipe’ that generates the problem consistently. Please keep the 'recipe' concise.

Include rendered images if relevant.

Please tell us which settings you used.

Please tell us which programs you have running at the same time as BodyPaint 3D. If you are using MacOS, please let us know which system extensions are loaded.

Sometimes, another program or a system extension (MacOS) may cause a problem indirectly.

Please include details of your hardware configuration.

“I have a Macintosh/PC” is of little help on its own. Also, please let us know which version (e.g. 6.00) of BodyPaint 3D you are using. If you have Internet access, please use the support form on our website (www.maxon.de). Tell us what other programs and system extensions you are running concurrently with BodyPaint 3D.

If the program crashes, it will display an error message. Please let us know the exact message.

If you are using Windows, you will see many other details listed. Please ignore these extra details - they are as enlightening as the infamous Macintosh message "Application Unknown has quit unexpectedly because of error -1"...

Please let us know BodyPaint 3D's message.

If you have Internet access, please check the FAQs on our website before you contact technical support.

Often, you will find the answer in the FAQs.

Our service is limited to technical support only. We cannot undertake subcontracting.

"Can you paint my spaceship model, please?"

We must concentrate our resources on helping customers with genuine problems that are within the bounds of technical support.

However, there are numerous web addresses where you can find additional help. Please visit our website (www.maxon.de) for links to these valuable resources.

Appendix 5 Glossary

Alpha channel, Alpha buffer

Used for blends with 2D images or movies. This channel determines at which points and to what extent an underlying picture will be visible. Alpha channels are usually grayscale images; the darker a pixel the more intensely the underlying picture comes through.

Ambient

This refers to the surrounding light which causes the scene to generally appear brighter. In BodyPaint 3D this property is set in the Environment object.

Antialiasing

Method for reducing the undesirable zig-zag effect along object and colour edges. It is achieved by generating intermediate points from colours of adjoining pixels. Images that have had antialiasing applied normally appear somewhat blurred.

Backup

Security copy of data or of files.

Bitmap

Two-dimensional pixel graphic.

Browser

Application that lets you manage and view files.

Bump Map

Relief texture. The surface is seemingly indented. Usually grayscale images. The darker a pixel, the more strongly the object is indented. BodyPaint 3D also lets you reverse this behaviour.

CAD

Computer Aided Design.

CPU

Central Processing Unit, the heart of the computer. Without it, nothing works.

Drag-and-drop

This is the technique of grabbing an object on screen with the mouse and keeping the mouse button depressed while moving it to another position. When the target is reached, the mouse button is released and the object 'dropped'. This may trigger other actions (like launching a program).

Gouraud Shading

This shading algorithm smooths the edges of objects. Without it, objects usually look faceted, i.e. the individual surfaces are visible.

Halo

Refractive and reflective effects around a light source.

HSV

One of the colour models—Hue-Saturation-Value.

Label

This is usually a non-tiled texture, analogous to the labels that you find on bottles.

Lens Flares

When photographing or filming light rays may fall into the lens, causing smaller or larger coloured rings on the exposed material. Such flares can be the result of air bubbles or lenses that are not completely tight. One normally tries to prevent this disturbing effect, however, in photorealistic computer graphics it is sometimes desirable to use them as a design element (this is sometimes overused).

Local Coordinates

Every object has its own origin, which is subordinate to the world coordinate system (or other objects that are higher in the hierarchy). Local coordinates are useful for determining positions of subordinate objects.

Mapping

The way in which a texture is projected onto an object. Also refers to the technique that is used, such as Bump Mapping, etc.

Mesh

Synonym for wireframe.

Model

Complex 3D structure consisting of one or many (hierarchically structured sub-) objects.

Multi processor system

Computers working with multiple central processors. This can be used to work on several processes simultaneously or to have several processors tackling one task. Applications need to support this type of processing in order to benefit from it.

OpenGL

The standard, developed by Silicon Graphics, for exchanging 3D data between applications and graphics cards.

Phong Shading

This Shading algorithm smooths the edges of an object. Without it, objects may look faceted, i.e. each individual surface is clearly visible.

Pixel

Picture element. The size of a pixel depends on the resolution of the output device. Monitors usually have 72 pixel per inch (dpi), laser printers 600.

Plug-in

Separate add-on which is integrated into the main application at launch and is then called from within it. Plug-ins are not normally autonomous, i.e. they do not work outside an application.

Polygon

3D models consist of (control) points and connecting lines. Each surface area that is formed is called a polygon.

Procedural textures

Mathematically generated textures (2D and 3D). Their advantage is that they are largely independent of the projection type and can, depending on their programming, be tiled seamlessly.

QuickTime

Apple graphics standard. There are QuickTime movies and images as well as the VR (virtual reality) walkthroughs.

RAM

Random Access Memory: Data may be read and written to this memory in a non-sequential manner. When you switch off the computer, the contents of this type of memory are deleted.

Raytracing

Computes the course of a light beam in space. In non-scientific computer geometry it is not light rays that are being traced but visual rays, i.e. rays that emanate from the viewer's eye rather than from a light source.

Rendering

Refers to the computing of images. The method used (raytracing, scanline ...) is irrelevant. The application of filters to 2D images (such as brightening and sharpening) is also called rendering.

RGB

The colour model Red/Green/Blue. Mixing varying parts of these three colours produces the intermediate colours.

Scanner

Device for reading images (from books, photos etc.) into the computer. Useful for creating realistic textures. With a 3D scanner it is even possible to capture three-dimensional objects and convert them into models.

Scene

Refers to the whole of a 3D computer model, consisting of objects, light sources, cameras, etc.

Seamless Textures

See Tile Textures.

Shadow buffer

Buffer for storing information which allows objects to cast a shadow. These buffers are used particularly for generating soft shadows.

Texture

Usually a 2-dimensional image, which can be used as a label, a tile, or in its full format for defining material attributes. There are also 3-dimensional textures, which are normally generated with the help of mathematical algorithms. These are normally referred to as procedural textures (see separate entry) or shaders.

Tile textures

These are textures which can be joined seamlessly (tiling). However, when looked at from a distance, distinct repetitions can be visible in the pattern, if you cover a large area with small tiles. If you want to avoid this, use a mathematically generated 'infinite' texture – see Procedural Textures.

User interface

Appearance of a program allowing interaction with the user. Includes all graphical elements, such as menus, popups, buttons, etc.

Vertex

A node. Vertices are the intersections of two lines in a wireframe model and of three edges in a surface model. In BodyPaint 3D vertices are edited in Point mode.

Virtual Reality

No widely accepted definition exists, but what is generally meant is an artificial, computer-generated three-dimensional world.

Volumetric Lighting

Special lighting technique, which calculates shadows within visible light.

Voxel

Volume element. Originally, the expression was used in medicine, in analogy to pixels, when scanners were able to read in three-dimensional objects. They were the smallest spatial unit that a medical scanner was able to resolve.

Wireframe

Most common way of representing objects in a 3D editor. Objects are shown as wire structures. Often, this is the only possible representation, but BodyPaint 3D also supports Gouraud Shading, Flat Shading, Cuboid, Skeleton and invisibility.

Z buffer

Is used for computing quick previews, that take no account of shadows or surface detail.

BODYPAINT 3D

PAINTING • TEXTURING • MAPPING

Index

Index

Symbols

A

C

D

J

K

L

M

O

P

Q

R

S