Contents

Utility Group

Window Group

Windows Menus

Basic Principles

Tools

Basic structure of **trueSpace**'s interface is quite simple and can be described by only three guiding rules:

1. Tools are grouped by function onto a horizontal strip.

All tools are represented on the screen as icons, grouped by function, and selectable with the mouse. The entire range, with the exception of the Window group fits on one line in 1024x760 resolution.

2. Many tools have *variants*, available from pop-up menus.

Click and hold on a tool to see the variants, then drag to the variant and release to select it.

3. Some tools open Control and Property panels.

 Many tools have control panels that open automatically when the tool is selected, and for further control, property panels that open when the tool is selected with the right mouse button:

That is it! There are no more "layers" to the interface, except for a few numeric entry requesters which can be opened by right click on some Control panel items.

Mouse Usage

Virtualy all trueSpace functions are mouse activated. Both mouse buttons are utilized but their operate diferently, based on whether a tool or a 3D object is underneath the cursor.

Related Topics:

With Tools:
In the Workspace:

With Tools:

Left-click: Selects tool, opens control panel

Right-click: Opens property panel

In the Workspace:

Left Click: Select the object underneath the cursor.

Left button drag: Controls X and Y axis for Move, Rotate or Scale simultaneously.

Right button drag: Controls Z axis.

Both button drag: Proportional scaling.

Interface Notes

Following is a summary of important points concerning the **trueSpace** interface:

• To select a tool, click on it with the left mouse button. If the tool uses control panels to adjust settings, etc., they automatically open. Right-click on a tool to open its property panel, if it has one. These panels automatically go away when another tool is picked with the left mouse button.

• If you select a tool, then decide not to use it, simply move the mouse away from the tool before releasing the mouse button.

• Active, highlighted tool icons and settings buttons appear *darker* than when not in use, and appear to be "pushed in."   Also, tool icons that are not currently available, for example because no object is selected, are "grayed" and cannot be selected.

• All tool groups except the Window group automatically open in a special left-to-right queue formation immediately above or below the menu bar, depending on whether the menu bar is at the bottom or the top of the screen. If there is no more room for new tool groups next to the menu bar, the queue is continued immediately above (or below) the previous row. If there are any panels there, they are moved up (or down) out of the way. When in the queue, if a tool group is closed, the remaining queued groups close ranks (that is, those following the removed group advance to fill in the gap). Tool groups, unlike panels, cannot be repositioned by the user.

• Control and property panels automatically open in a special left-to-right queue formation immediately above or below any displayed tool groups. If there is no more room for panels immediately next to the menu bar, the queue is continued immediately above (or below) the previous row. If a queued panel is closed or moved to a different part of the screen, the remaining panels close ranks (that is, those following the removed panel advance to fill in the gap).

• To place a panel at the end of the queue, drag it to within a few pixels of the menu bar or any groups thereon.

• To insert a panel at a specific location in the queue's first row, drag it to that location, placing the panel's bottom (or top) edge within a few pixels of the menu bar.

• To close a property panel manually, click the right mouse button on a button or blank gray area (not on a white area), then drag it outside the requester. When you see an X appear on the panel, release the button to close it. If the Titles option is active (via Settings), you can also close a panel by clicking on the Close box at the left end of the panel's title bar.

• To open or close a tool group, select it from the Group menu.

• A small mark in the upper left corner of a tool icon indicates that the tool has variants available from a pop-up graphic menu. A mark in the upper right corner indicates that there is a control panel associated with the tool for setting parameters.

• To access a variant menu for certain tools, click and drag slightly on the icon with the left mouse button, or simply click and hold for a moment. Keep the mouse button pressed down and drag to select a different item.

• To access a variant's property panel without invoking the variant (e.g., Sweep), use the right mouse button, and drag to display the pop-up menu.

• To move a non-maximized (smaller than full-screen) view window, click on the blue text box near the lower left corner and drag the mouse.

• Initially the menu bar appears at the bottom of the screen; you can position it at the top by selecting the Top Menu item in the Edit menu's Settings panel (see below). If the **trueSpace** window is not at full-screen width, you may not be able to see all menu headings.

- You can dock all displayed property panels, queuing them immediately above or below any displayed tool groups, with the Dock Panels tool, found near the right end of the Window group. Its variant tool lets you instantly close all panels.

- When multitasking **trueSpace** with other Windows programs, you may find upon returning to **trueSpace** that the screen colors have changed. To return to the default screen color scheme, simply click on any part of the screen except the menu bar.

- At the menu bar's right end are the standard Windows Minimize and Maximize/Restore gadgets.

Tools Overview

Edit Group

Undo/Redo: Undoes or redoes last action. Variants are Undo and Redo.

Erase: Deletes current object.

Copy: Instantly copies current object over itself.

Glue: Used to create and delete hierarchical relationships between objects. Variants are **Glue as Child, Glue as Sibling** and **Unglue.**

Libraries Group

Material Library: Gives access to a list of preset and user definable Materials.

Path Library: Gives access to a list of preset and user definable spline paths.

Primitives Panel: Used to add built-in primitive 3D shapes, including Sphere, Cylinder, Torus, Cone and Cube.

Navigation Groups

Navigation in **trueSpace** refers to moving, rotating and scaling different types of objects as well as the viewpoint. The viewpoint is the "eye" through which the view is seen when a window is not set to Camera View. It can be positioned, rotated and scaled (zoomed), but unlike camera objects it cannot be seen. There are different Navigation tool groups for objects, each window's view, point editing and deform.

The Object Navigation tool group is used for manipulating entire objects:

There are individual Navigation tool groups for each window, and for the Point Edit and Deform tools. Thus, the user can easily and quickly switch between manipulating different types of entities and views.

One of **trueSpace**'s special features is "modeless" navigation. For example, while editing points, you can rotate the object for a better view, then return to editing points seamlessly. One way in which this feature is implemented by providing different navigation groups for different tools.

Related Topics:

Coordinate Systems

Coordinate Systems

Each Navigation tool group has its own Coordinates Property panel, which is accessed by right-clicking on any Navigation tool. This lets you set the current coordinate system, and constrain transformations to certain axes.

Any of three different coordinate systems can be used for any manipulation: world, object and screen..With all three, the left mouse button controls transformation on or around the X axis by mouse movement parallel to the X axis, and transformation on or around the Y axis by mouse movement parallel to the Y axis. The right mouse button controls transformation on or around the Z axis. Use the Coordinates Property panel to set the coordinate system as well as disable and enable transformations on any and all of the three axes.

Model Group

Point Edit Tool: Used for editing part of an object. Variants are Edit points, Edit edges, Edit faces, and Edit Context, which lets you edit any and all of the three different types of entities simultaneously.

Sweep Tool: Used for creating 3D objects from outlines. Variants are Sweep, Tip, Lathe, Sweep Macro, and Bevel.

Deform Tool: Enables powerful object editing with free-form deformation lattices.

Text Tool: Used for creating text objects from TrueType fonts. Variants are Text Vertical and Text Horizontal.

Polygon Tool: Used for creating new polygons. Variants are free-form Polygon and Regular Polygon.

Spline Polygon Tool: Used for drawing rounded shapes using spline curves.

Render Group

Paint Tool: Used for creating new Materials and applying Materials to objects face-by-face or to the entire object at once. Variants are Paint Face, Inspect Face, Repaint Face   and Paint Object.

UV ProjectionTool: Used for setting the UV projection space for texture mapping.

Material Rectangle Tool: Used for creating special Material rectangles and applying them interactively to objects.

Light Tool: Used for adding lights and cameras to the 3D workspace. Variants are Infinite Light, Local Light (point source), Spotlight and Camera.

Animation Group

Animation: Opens the Animation property panel.

Path: Activates Path draw/edit mode and opens the Path property panel.

Constraints: Forces one of two specific alignments during animation. Variants are Look At Constraint and Look Ahead Constraint.

Project Editor: Opens the Project window.

Utility Group

Grid: Used to turn grid snap on and off.

Axes: Used to display and manipulate object axes.

Normalize: Used to return an object to its original state. Variants are Normalize Location, Normalize Rotation and Normalize Scale.

Extended Utilities: Used to subdivide objects, reverse objects, create hierarchies from imported objects, and divide polygons into triangles. Variants are Quad Divide, Smooth Quad Divide, Mirror, Decompose and Triangulate.

Window Group

This group consists of the standard View Navigation and Render tools found on all windows, plus special tools for adding windows, controlling panels and changing program settings.

Render: Used to render an image in solid mode. Variants include Render Object, Render Scene, Redraw Wireframe and Render Scene to Disk.

Eye Move Tool

Eye Rotate: Disabled in orthogonal views

Zoom

View Select Tool: Used to set the main view mode. Each window can be set to a different view, and with multiple cameras, each window can be set to show a different camera view. Variants are Perspective, Front, Left, Top and Camera.

New Window: Adds an auxiliary window over the main view. Variants are New Perspective, New Front, New Left and New Top.

Adjust Panels: Moves property panels to menu bar or closes all panels. Variants are Dock All Panels and Close All Panels.

Settings Panel: Opens a panel for adjusting various global settings.

Again, pop-up menus containing tool variants, as indicated by a small mark in the upper left corner of the tool icon, are accessed by holding for a moment or dragging the mouse slightly on the icon to distinguish from merely selecting that icon. Then, to select a different item, you must drag the mouse to it before releasing the button. If the Help function is on, the tool variant names are shown in the help bar as you drag.

Also, some tools can be clicked on with the right mouse button to access related property panels. For example, right-clicking on any Navigation tool opens a property panel for setting the coordinate system and constraining transformations to specific axes.

Using Hot Keys

Each of **trueSpace**'s tools can be activated by up to three different keyboard shortcuts. If the Help Bar option is active (see On-Line Help below), the help bar shows the first keystroke, if any, to the right of the description of the tool currently under the mouse pointer.

To add or change a keyboard shortcut for a tool, position the mouse pointer over the tool, then *press the Control and F1 keys* at the same time. The Key Shortcuts dialog box appears the tool's current key assignments, if any:

Related Topics:

New Key
Unset
Find

New Key

To create a new keyboard shortcut, click on the "New Key" button and then type the keystroke you want to use. You can use any combination of Control, Alt and Shift plus an alphanumeric, punctuation or function key.

Unset

To remove a keyboard shortcut, click the "Unset" button next to the key description.

Find

To find out what function is assigned to some key, click on the "Find" button and then type the keystroke you want to find the function of. If this keystroke has an assigned button then the dialog box will now display that button's description and any keyboard shortcuts defined for it.

On-Line Help

By enabling the Help Bar option from the Help menu, you can take advantage of **trueSpace**'s context-sensitive help mode while learning the program and using unfamiliar tools. When the mouse pointer is positioned over any tool icon, the help bar displays its description plus a keyboard shortcut, used for accessing the tool from the keyboard.

Also, when certain tools are active and the mouse pointer isn't over any other tools, the help bar displays brief directions for using the tool. For example, the Polygon tool's directions are: "Click to add points. Right-click to close polygon."

Quitting the Program

At the menu bar's left end is **trueSpace**'s Application Control menu box. Click on it once to open the Application Control menu. To quit the program, double-click on the box, click once on the box, then on Close.

You can also quit by using the File menu's Exit command.

Introduction

The Edit group implements the Edit menu's four most commonly used functions as tool icons.

Undo/Redo

This pop-up offers these functions as variants:

Undo

This tool reverses previous operations. Undo remembers not just the last operation, but several operations back. Repeated clicks on Undo let you continue to "back up" as far as you like.

Undo also works in conjunction with Redo to repeat operations automatically.

Redo

Redo repeats the last operation undone by Undo. Repeated clicking on Redo after an Undo causes the operation to be applied cumulatively as many times as the button is clicked on.

For example, move an object, then click on Undo. It moves back to its original position. Click on Redo. It moves back to where you placed it. Click on Redo again. It moves an equal distance past that point, and so on. The same is true for any transformation.

Erase

Normally, selecting this tool deletes the currently selected object. However, if you're working in Point Edit or Deform mode, Erase de-selects any selected entities, allowing you to select others.

Copy

This tool makes an identical copy of the currently selected object. A copy is wholly independent of the original object. The new copy initially occupies the same space as the original, and should be moved to distinguish the two.

Glue Tool

The Glue tool has three variants, two of which−Glue as Sibling and Glue as Child−allow you to combine objects into hierarchical objects while Unglue allows separation of previously glued objects. Hierarchical structure permits manipulation of an object as a unit while its parts can still move independently. This can be used in animation, for example, so that a humanoid's arms can swing as its walks, or so a helicopter's rotor can rotate as the chopper moves forward.

Related Topics:

How to Use Glue
Glue as Sibling
Glue as Child
UnGlue

How to Use Glue

Select an object, then select either Glue tool. When the Glue tool is active and the mouse cursor is in the workspace, the pointer resembles a small glue bottle. Select another object. The Glue tool remains active until another tool is selected. Thus, an unlimited number of objects can be combined by simply clicking on each in succession, while maneuvering through the hierarchy as necessary to create the desired relationships.

To move vertically through the hierarchy, click on the Navigation group's up and down arrow buttons or use the up and down keyboard cursor (arrow) keys. To move horizontally between different objects at the same hierarchical level, click on the different objects with the mouse or use the right and left cursor keys.

When gluing two simple objects together, the two gluing methods work identically. However, when combining hierarchical groups, it's important to be aware of the differences. In the following descriptions, *source* refers to the object selected before gluing, and *target* refers to the object glued to the source; that is, the object selected second in the gluing operation. In all cases the *top* level of hierarchy consists of *all* objects glued together, but the *first* level of hierarchy is reached by moving down one level, using the tool or the down arrow key.

Glue as Sibling

The two objects are glued together at the same level.

This tool is useful for grouping different objects together without any particular hierarchical arrangement so they can be manipulated together or separately.

Glue as Child

When the target is a hierarchical object, its entire hierarchy becomes a member of the source object's top level of hierarchy. A new hierarchical node is created whenever you use this tool to add hierarchy to any object. By moving down one level after doing so, you can select members of the source object's first level of hierarchy, as well as the entire target object for further maneuvering through its hierarchy.

This method is best for building a hierarchical object to be animated, such as a robot. Examine the hierarchical objects included with **trueSpace** for examples.

UnGlue

This button is active only if the current object is hierarchical. Select the sub-object or objects to be separated, then select UnGlue. The parts are no longer glued together .

Introduction

This group of tools gives access to **trueSpace's** library functions, of which there are three:

• The **Material library** lets you store any number of surface setting combinations and their graphic representations, including textures. You can then set the current Material to any in the library by clicking on it.

• The **Path library** lets you store spline paths and shapes created with the Spline Polygon and Macro/Sweep tools or in animation. You can use stored paths to create new spline polygons, extrude along paths and animate different objects.

• The **Primitives panel** gives access to six different built-in shapes that you can add to the workspace simply by clicking on the respective icon.

Material Library

Materials, once created, can be stored in a special graphic list called the Material Library, which can be saved to and loaded from disk. When the **trueSpace** program starts it automatically loads a Material Library named Simple.mlb if one exist. Otherwise the Material Library panel is empty when first opened.

Selecting this icon opens a Materials Library panel:

Related Topics:

Material Library Panel
File Functions

Material Library Panel

This panel displays up to eight of the current library's Materials in a horizontal graphic list as sample spheres. If there are more Materials in the library than can fit in the panel, use standard scrolling techniques with the scroll bar under the spheres.

• To set the current Material used by the Paint tools to any Material in the panel, select the Material from the panel with the mouse. Use the Add command (below) to add new Materials to the library.

• The currently selected Material in the panel is indicated by a thin horizontal line below the respective sphere.

• To rename a Material, select it, then enter a new name in the Material Name text box in the lower right corner. To effect the change, select a different Material with the mouse.

• To access Save and Load commands, click on the button labeled File Functions in the above illustration. See File Functions below for command descriptions.

Related Topics:

Add
Delete

Add

Clicking on this icon adds a new Material to the library using the current Material settings. The Material panels need not be open.

Delete

This tool deletes the currently selected Material from the Material library.

File Functions

If a Material library was loaded or saved previously during the current session, this box shows the file name of the current library. Click on the box to display a pop-up menu of file functions:

Related Topics:

New
Load
Save
Save As...

New

This tool clears any Materials from the current Material library. See Edit Menu: Materials below for details on Materials libraries.

Load

Permits loading of a Material library previously saved from **trueSpace**. When the Load Material Library file requester appears, select the file to load, then click on OK. If you don't see a Material library file you saved, select "All Files *.*" from the List Files of Type pop-up at the bottom left of the file requester.

Save

This command saves the Material library currently in memory to the file from which it was loaded or last saved. If no Material library was loaded or saved previously during the current session (that is, the File Functions box is blank), this command works the same way as Save As... below.

Save As...

Save As permits saving the current Material library to disk. When the Save Material Library file requester appears, select the file to save over, or enter a new file name, then click on OK. The default file name extension, ".mlb", isn't required, but the program does not add it to file names automatically.

Path Library

This function lets you build libraries of spline paths, and save and load them as disk files. Whenever a path or a spline polygon is selected in the workspace, you can store it in the Path library, or substitute any other preset path for the current one.

There are four ways to build paths in **trueSpace**:

• Paths can be created with the Model group's Spline Polygon tool. These shapes are splines only until another tool is selected, after which they become polygons and stay that way, losing all spline characteristics.

• You can also create open and closed spline paths with the Animation group's Path tool. The above two types of path originally contain only positional information, but rotation and scaling can be added via key frames.

• A third type of path can be created simply by setting key frames with the Animation tool. This type of path contains rotation and scaling information if those types of keys are set.

• The fourth type of path, created with the Model group's Sweep tool used repeatedly in conjunction with the Point Navigation tools, can also contain rotation and scaling information. In this case, the Sweep/Macro tool must be selected after the Sweep procedure to display the Sweep path. See the relevant sections above for details.

Selecting the Path Library tool opens the Path Library panel:

Related Topics:

Path Library Panel

Path Library Panel

The names of current stored paths, if any, are shown in a scrolling list at the top of the panel, with the current path's name highlighted. Use the arrows and slider at the right side to scroll through the list of names.

If a path is selected in the workspace, you can add it to the panel by clicking Add. Or you can replace it with another from the path library by clicking on the new path's name in the panel.

If no path is selected in the workspace, and you select a closed path from the library, it's added to the workspace as a spline polygon.

- To rename a path, select it, then enter a new name in the Path Name text box in the upper left corner. To effect the change, select a different path or tool with the mouse.

Related Topics:

Add
Delete
File Functions
New
Load
Save
Save As...

Add

First select a Sweep Macro, spline polygon, or animation path in the workspace. Then select Add to insert the current path in the path library. Sweep paths are automatically named Macro, animation paths are named Anim, and spline polygons are named Path. If a path already has one of those names, a comma and a sequence number (e.g., Macro,1, Macro,2, etc.) are appended to the default name.

To change a path name, select it from the library list, then click on the name in the white space to the left and enter a new name from the keyboard.

Delete

Deletes the current path from the library, not the workspace.

File Functions

If a Path library was loaded or saved previously during the current session, this box shows the file name of the current library. Click on the box to display a pop-up menu of file functions:

New

Clears any paths from the current paths library.

Load

Permits loading of a Path library previously saved from **trueSpace**. When the Load Paths Library file requester appears, select the file to load, then click on OK. If you don't see a paths library file you saved, select "All Files *.*" from the List Files of Type pop-up at the bottom left of the file requester.

If there is a path library named Basic.plb in the Calitemp directory, **trueSpace** automatically loads it when launched.

Save

Saves the Path library currently in memory to the file from which it was loaded or last saved. If no Path library was loaded or saved previously during the current session (that is, the File Functions box is blank), this command works the same way as Save As... below.

Save As...

Permits saving the current Path library to disk. When the Save Paths Library file requester appears, select the file to save over, or enter a new file name, then click on OK. The default file name extension, ".plb", isn't required, but the program does not add it to file names automatically.

Primitives Panel

Select this tool to open the Primitives panel with graphic representations of **trueSpace's** six built-in 3D shapes:

Select the desired shape to add a new wireframe object to the workspace. Primitive sizes are preset−of course they can be scaled after creation−but other parameters can be changed beforehand:

Related Topics:

<u>Primitives Parameters</u>

Primitives Parameters

Each of the primitives except Cube has a parameters panel, opened by right-clicking on the primitive icon of interest. Changing a parameter for a particular primitive affects all objects of that type added subsequently, but not existing objects.

In all cases, change numeric parameter settings by clicking on the double-headed arrow and dragging left to decrease or right to increase the value. Alternatively, click directly on the numeric setting and enter a new value from the keyboard, then press Enter.

Related Topics:

Longitude
Latitude
Inner Radius

Longitude

This setting applies to *all* primitives except Cube. In geography, the term *longitude* refers to the imaginary vertical reference lines that meet at the poles, dividing the earth's surface into vertical sectors. **trueSpace's** Longitude setting determines the number of divisions around a new primitive object's circumference. The higher this setting, the smoother the object's outline as seen from the top, but the longer it takes to redraw and render. The minimum setting is 3; there is no maximum.

The illustration below shows two cylinders, one with a low longitude setting and one with a high longitude.

Latitude

This setting applies to the Sphere and Torus primitives. In geography, the term *latitude* refers to imaginary horizontal reference lines that circle the globe parallel to the earth's equator. **trueSpace's** Latitude setting determines the number of latitudinal divisions in new primitive object. The higher this setting, the smoother the object's outline as seen from the front, but the longer it takes to redraw and render. The minimum setting is 2 for Sphere and 3 for Torus; there is no maximum.

Inner Radius

This setting applies only to the Torus primitive. As the Torus' outer radius size is fixed, this actually determines the Torus' cross-section size, the "thickness" of the "donut."   The maximum setting is 0.999.

Introduction

This section is concerned with tools for the movement, rotation and scaling of objects. The concept here is easy to grasp. If you, say, rearrange your living room, you might pick up a vase and place it in a different location, or you might turn a painting so it's not hanging crookedly. Moving and rotating of objects in **trueSpace's** 3D workspace isn't that different. To move an object to the side, you simply click on it with the mouse and drag the mouse sideways, and **trueSpace's** instant feedback lets you see what's happening without delay. Rotation and scaling movement is similarly intuitive.

One of the problems people have with 3D graphics programs is that there is no direct correlation between what you're doing with your hand and what's happening on the screen. With **trueSpace**, it takes practically no time to "get it," because what you do with your hand on the mouse directly relates to motion on the screen. When you use navigation tools to manipulate objects or the view, you can tailor movement to be natural, or to conform to strict parameters--it's up to you.

All such manipulation is fully interactive. With objects, you select what you want to manipulate, select the appropriate navigation tool, then click the mouse button or buttons in the view and drag.

Object Navigation Tools

The Object Navigation tools are used for exiting other editing modes such as Deform or Point Edit, and moving, rotating and scaling entire objects, hierarchical sub-objects, and the UV mapping space. There are also tools for navigating vertically through object hierarchies.

Related Topics:

Object Selection Tool
Object Navigation
Object Move
Object Rotate
Object Scale
Coordinates Property Panel
Hierarchy Navigation

Object Selection Tool

Select this tool, also called the Object tool, to enter object selection mode, thereby exiting any other editing mode, such as Point Edit or Deform, and return to editing entire objects. This tool *need not* be selected to edit different objects while in, for example, Point Edit mode.

While this tool is active you can select different objects for navigation, etc.   You can also select different objects by repeatedly pressing the left and right cursor keys on your keyboard. This can help when many objects are loaded into the workspace.

Related Topics:

Object Property Panel

Object Property Panel

When the object tool is active, select it with the *right* mouse button to open the Object property panel, with adjustable numarical entries for navigation and other settings. When the panel is open, using interactive navigation controls and selecting a different object updates the settings automatically.

Location

These three settings show the current object's position in **trueSpace's** world. The unit of measurement is a grid square. Change the position by clicking on the X, Y and Z boxes, entering a new value from the keyboard, and pressing Enter.

Rotation

These three settings show the current object's alignment in degrees. Change the alignment by clicking on the X, Y and Z boxes, entering a new value from the keyboard, and pressing Enter.

Scale

These three settings show the current object's scaling in multiples of the original size. For example, if the X Scale is 2.5, the object is scaled two and one-half times larger on the X axis than its original size. Change the scale by clicking on the X, Y and Z boxes, entering a new value from the keyboard, and pressing Enter.

Name

This shows the object's name and lets you change it. Objects are automatically called NoName when created, so it's a good idea to use this function to give them more descriptive names. Click on the box under Name and enter a new name from the keyboard, then press Enter.

Faces

This shows the number of faces or polygons in the current object. Since the only way to change this value is by interactive editing, it cannot be changed in the property panel.

Object Navigation

The three Object Navigation tools let you manipulate the currently selected object. They're also used to manipulate an object's UV projection space. Point editing, deform lattice manipulation and other tools have their own navigation tools. This gives the user a great deal of freedom while editing. For example, while using a deform lattice to change an object's shape, you can rotate an entire object to see a certain part better, then go back to the deform process with the same active selection.

To use an Object Navigation tool, select it, then select an object and drag the mouse to perform the operation. When selected, an object's wireframe turns white. If Dynamic Pick is on , you can select the object and perform the operation without releasing the mouse button. When you have more than one window open and manipulate an object, all open windows reflect changes in real time as you make them.

Note: As with all navigation tools, the way the object reacts to your mouse movement is determined by the coordinate system currently in effect. By right-clicking on any navigation tool, you can access the Coordinates property panel. This important tool lets you set the coordinate system for that tool to Object, World, or Screen, as well as constrain manipulation on individual axes.

Hint: If the object you want to manipulate is already selected, and is overlapped by other objects, and Dynamic Pick is on, to manipulate the object without inadvertently selecting an overlapping object, simply click on a spot *away* from any objects and proceed normally, as though you had clicked directly on the object.

Object Move

Click on this button to move the current object. The left button controls movement along the X axis by mouse movement parallel to the X axis, and movement along the Y axis by mouse movement parallel to the Y axis. Using only the right mouse button controls movement along the Z axis.

Object Rotate

Click on this button to rotate an object or objects in the current coordinate system. The left button controls rotation around the X axis by mouse movement perpendicular to the X axis, and rotation around the Y axis by mouse movement perpendicular to the Y axis. Using only the right mouse button controls rotation around the Z axis, by mouse movement perpendicular to the Z axis.

An object always rotates around its own center, but the effect of mouse movement during rotation depends on the coordinate system currently in use; see below.

Object Scale

Click on this button to scale an object or objects. The left button controls scaling on the X axis by mouse movement parallel to the X axis, and scaling on the Y axis by mouse movement parallel to the Y axis. Using only the right mouse button controls scaling on the Z axis. If both buttons are depressed, the scaling is uniform on all enabled axes   (see Coordinates Panel below).

Coordinates Property Panel

This panel is accessed by right-clicking on an object or view navigation tool. It contains two sets of controls:

• The top row consists of three "radio buttons" for setting the current tool's coordinate system. Only one can be active at a time.

• The second row is a set of toggle buttons for enabling and disabling movement on any or all of the three coordinate axes. Each can be selected or not, regardless of the other settings.

These controls are replicated as a pop-up menu for the coordinate system and X, Y and Z buttons at the right end of the Help Bar, as depicted below, when it is activated via the Help menu.

A good example of **trueSpace**'s versatility is the ability to perform view and object transformations in any of three different coordinate systems, depending on which is appropriate for the current situation. For example, the *Object* coordinate system is used primarily for rotation and scaling of sub-objects of hierarchical objects. The W*orld* coordinate system is used for moving entire objects. The *Screen* coordinate system, used with entire objects, gives you a virtual-reality feel of holding it in your hand.

Note: **trueSpace** automatically sets an appropriate default coordinate system, depending the tool you're using. For example, it uses   World coordinates for object movement, and Object coordinates for object rotation and scaling. You can change the default settings at any time.

The Coordinates panel gives you access to these controls. Right-click on any Navigation tool to open the panel (see above). The upper row of buttons determines the coordinate system in which a transformation is to occur. The lower row lets you constrain transformations to certain axes.

Alternatively, you can use the Coordinates panel at the right end of the Help Bar when it is active, as shown above. There are three buttons for enabling and disabling the X, Y and Z axes, and to the left of these, a pop-up for setting Object, World or Screen coordinates.

Both panels function identically: that is, they show and allow control of the settings for the navigation tool currently in use.

trueSpace's three coordinate systems are:

Related Topics:

Object Coordinates
World Coordinates
Screen Coordinates
X/Y/Z

Object Coordinates

When first loaded, an object's axis is aligned with the world axes. When this icon is selected, all transformations take place on or about the currently selected object's axis. So if, for example, a rocket were created pointing up, with its Y axis also pointing up, then no matter how it was tilted thereafter, movement along the object's Y axis would always make the rocket appear to go forward.

World Coordinates

When this icon is selected, all transformations take place on or about the world axes as shown on the grid. If, for example, the rocket in the previous example were to be moved straight up even though lying at some weird angle, you would move it on the Z axis in the World coordinate system.

Screen Coordinates

When this icon is selected, all transformations take place on or about the screen axes. Think of it as world axes, only the axes are automatically parallel to the screen. X is always left right, Y is always up-down, and Z is always in-out, no matter what the camera orientation. So, for example, an object in the center of the screen moved on the Z screen axis (that is, with the right mouse button) always moves directly toward or away from the camera, and in Perspective mode, changes apparent size.

X/Y/Z

These toggle buttons enable and disable movement, rotation, and scaling on any and all of the three axes simultaneously, regardless of the coordinate system in use. To disable transformation on or about an axis, click on its button.

Hint: To perform an operation equally on the X and Y axes, for example making a cylinder thinner, turn off the Z axis and use both mouse buttons.

Hierarchy Navigation

These tools, available from a pop-up, are used for navigating vertically through hierarchical objects. The up/down tools are only available if the relevant hierarchical movement is possible in the current object.

Use the up arrow for moving to higher levels, and the down arrow for moving to lower levels. Keyboard equivalents are the up and down cursor keys, usually marked as arrows. Selected sub-objects are drawn as white wireframes, while unselected sub-objects are drawn as brown wireframes.

While maneuvering through hierarchies, you can select siblings, or parts at the same level as the currently selected object, by clicking on them. You can also maneuver horizontally through hierarchy levels by pressing the left and right cursor keys.

Hint: You can save lots of time by using the keyboard cursor keys to move vertically and horizontally through hierarchical models.

Model Tools

The Model group includes tools for point editing, extrusion and lathing, free-form deformation, automatic text object creation, polygon creation, and adding built-in geometric primitives.

Point Edit Tool

The Point Edit tool variants let you select and manipulate individual points, groups of points, individual edges, groups of edges, individual faces and groups of faces. Selection can be context-sensitive, or you can limit selection to one type of entity (see Point Edit Selection Mode below). The pop-up menu lets you choose the selection mode. When one or more entities are selected, you can immediately move, rotate, and scale them using the Point Navigation controls.

When in Point Edit mode, a small "P" is attached to the cursor as an indication.

To select the first point, edge or face, select an object, select the Point Edit tool, then click on the desired entity. Selected entities are highlighted in green, and if Dynamic Pick is on, you can manipulate selected entities immediately by dragging the mouse. **trueSpace**'s revolutionary contextsensitive selection mode eliminates the extra step of choosing a selection mode – you can select faces, edges, and points at the same time. Or you can restrict the type of entity to be selected.

- To select a face, click near its center.

- To select an edge, click directly on it, away from any vertices.

- To select a vertex, click directly on the intersection of two or more edges.

To select multiple entities, hold down the *Control* key while clicking on the second, third, and so on. In Context mode, you can select different types of entities for simultaneous manipulation (for example, you can move points and faces at the same time). Also, you can create edges and, more importantly, select entire sections of objects using the Shift key and **trueSpace's** unique *dimensional promotion*.

To de-select all entities in preparation for selecting different ones, click *once* on the Erase tool from the Edit group. Careful!   A second immediate click on Erase deletes the object, which cannot be undone.

While in Point Edit mode, you can select *any* object for point editing by clicking on it. If Dynamic Pick   is on, you must still select the object before selecting any of its parts.

Hint: Because of the above capability, if object wireframes overlap in the current view, you may inadvertently select a different object while picking points, etc. To avoid this, move the conflicting object or objects out of the way first, or edit from a different view or angle.

Right-click on the Point Edit tool to open the Point Edit property panel with various options and special Slice and Separate tools.

To exit Point Edit mode and return to editing objects, select the Object tool.

Related Topics:

Point Edit Selection Mode
Group Selection
Point Edit Control Panel
Point Edit Property Panel

Point Edit Selection Mode

The Point Edit tool is a pop-up graphic menu−click and drag to access the menu. Following are descriptions of the different choices.

Context

In this default selection mode you can select faces, edges, and points depending on where you click. To select a face, click near its center, away from any edges. To select an edge, click directly on it, away from any vertices. To select a vertex, click directly on the intersection of two or more edges. To select multiple entities, hold down the Control key while clicking on the second, third, and so on. Selected entities change color.

Note: If two (or more) selected faces are connected with a single vertex (for example, one is to the upper left of the other), they cannot be swept. If a Sweep is attempted, an error message is displayed.

Face

Only faces can be selected.

Edge

Only edges can be selected.

Vertex

Only vertices can be selected.

Group Selection

It's very important to understand how **trueSpace** uses *dimensional promotion* for selecting entire parts of objects with just a few clicks. We described above how the Control key is used to select multiple faces, edges and vertices. Another method of selecting groups of entities employs the concept of dimensional promotion using the *Shift* key in conjunction with clicking on points.

You start by selecting a point (zero dimension), then select another point on the same face, selecting or creating an edge (one dimension) if one doesn't exist. Select a third point elsewhere on the object to pick or create a two-dimensional edge set, which is essentially a closed line of edges (defining a plane) girdling the object. Finally click on a fourth point on either side of the edge set to select three-dimensional set of polygons.

Here's a summary:

One Point   = 0 Dimension   = Vertex

Two Points   = 1 Dimension   = Edge

Three Points   = 2 Dimensions = Line of Edges

Four Points   = 3 Dimensions = Part of Object

How to Use Group Selection

.   Load or select an object.

.   Pick the Point Edit tool.

.   Pick a vertex, then hold either Shift key and pick another vertex on the same polygon. If the points aren't connected directly, a new edge is created between them. Of course, if the edge you want to start with already exists, you can save a step and simply start by picking it.

.   Still holding the Shift key, pick a vertex belonging to any polygon not adjacent to those containing the picked edge. This picks or creates a two-dimensional edge set. which is a continuous row of edges encircling the object.

.   Finally, pick a three-dimensional set of polygons by Shift-clicking on any vertex on either side of the edge set, highlighting all polygons on that side.

Group Selection Notes

With hierarchical objects that have several sub-objects at the same level of hierarchy, you can use the same method to select parts of several of the sub-objects at the same time. Just keep the Shift key held down the whole time.

Once you have part of an object selected by this method, you can apply standard Navigation functions, or you can detach it from the rest of the object with the Separate command.

Note: As you cannot undo the creation of new edges caused by group selection, you may want to save a copy of your object before using this method.

Point Edit Control Panel

When in Point Edit mode, an additional panel appears with three buttons for Point Navigation functions, and two for Slice and Separate functions. The Navigation buttons are used to move, rotate, scale selected points, point sets, etc., separately from entire objects, but in the same way. With this additional navigation tool, you can switch instantly between manipulating an object and manipulating its points. This makes it convenient to work in different areas of the object at the same time. In the following descriptions, "entities" refers to selected vertices, edges or faces.

Right-click on any Point Navigation tool to open the Coordinates property panel. This uses the same principles as the Object Navigation Coordinate property panel.

It's important to keep in mind that when using the Object coordinate system that each selected entity−point, edge, or face−has its own axes, which cannot be made visible. Each entity's axes' origin is at the entity's center, with the Z axis pointing out of the object perpendicular to the entity. Therefore, if you, for example, move several selected faces on the Z axis in the Object coordinate system, each moves perpendicularly in and out of the object.

Related Topics:

Point Move

Click on this button to move the current entities in the current coordinate system. The left button controls movement along the X axis by mouse movement parallel to the X axis, and movement along the Y axis by mouse movement parallel to the Y axis. Using only the right mouse button controls movement along the Z axis.

Point Rotate

Click on this button to rotate entities in the current coordinate system. The left button controls rotation around the X axis by mouse movement perpendicular to the X axis, and rotation around the Y axis by mouse movement perpendicular to the Y axis. Using only the right mouse button controls rotation around the Z axis.

An entity always rotates around its own center, but the effect of mouse movement during rotation depends on the coordinate system currently in use; see Coordinates Properties Panel above.

Point Scale

Click on this button to scale entities in the current coordinate system. The left button controls scaling on the X axis by mouse movement parallel to the X axis, and scaling on the Y axis by mouse movement parallel to the Y axis. Using only the right mouse button controls scaling on the Z axis. If both buttons are depressed the scaling is uniform in all three axes.

Slice

The Slice function lets you subdivide an object one or more times parallel to a cutting plane. Slice can also subdivide a polygon parallel to a cutting line, but this is less useful. The first application is handy for creating a series of cross-sections of an object parallel with each other or with one of the faces of the original object. Such cross-sections can be moved "through" the object's surface to any part of the object as part of the Slice operation.

You must be in Point Edit mode with at least one edge or face selected to be able to use Slice.

If using a cutting line, which can "slice" one polygon, select an edge, then select Slice from the Point Edit Tool property panel. Click either mouse button and drag the mouse in different directions to move a copy of the edge through the polygon or polygons adjoining the edge. Whenever you release the new mouse button, a new edge is formed at that location.

If using a cutting plane, select a polygon or edge set, then select Slice. Click either mouse button and drag the mouse in different directions to move a copy of the polygon edges or edge set through the object parallel to the original edge plane. Whenever you release the new mouse button, a new edge set is formed at that location. If you select a polygon smaller than the side of which it is a part, you can see it instantly enlarge to encompass the object's circumference as you drag it.

If you use the *right mouse button* while slicing, all newly created edges or edge sets remain selected, and available for transformation with the Point Edit navigation tools after slicing.

To abort the Slice operation, select Undo from the Edit menu or the Edit group.

To select a different entity for slicing, click on Slice to turn off the highlight, then select the new point(s), edge(s) or face, then click on Slice again. To accept the changes and go on to another operation, click on Object. To cancel the change, click on Undo before doing anything else.

Immediately after a new cross-section is created, it can be moved, rotated, and scaled as with any other object.

Separate

This function can be used to detach any selected entities from the object (or sub-objects in hierarchical objects) to which they belong. This should generally be done with *sections of objects* that have been selected with the Shift key using dimensional promotion−see Group Selection for details. While it's possible to separate individual selected points, edges and faces, in most cases it doesn't make sense. Also, in the latter case, the separated entities aren't actually removed from the object, but only duplicated as separate objects.

To detach part of an object or objects (as sub-objects of a hierarchical object), select the parts to detach, then select the Separate button. After separating the parts, the program exits Point Edit mode, leaving the remaining part of the object or objects selected.

Point Edit Property Panel

Access the Point Edit property panel by right-clicking on the Point Edit Tool. This gives access to a set of related settings and tools.

Related Topics:

Draw
(Dynamic) Subdiv(ision)

Draw

The pop-up menu to the right of "Draw" determines how the program redraws the wireframe when you're manipulating object parts while point editing. The choices are:

Object

If this is chosen, the program continually redraws the entire wireframe for the object you're editing as you work. While this gives you a better idea of what's going on, things can slow down with complex objects.

Edited

If this is chosen, the program continually redraws only selected entities and adjacent edges as you manipulate points, edges, and faces. The remainder of the object wireframe is invisible until you release the mouse. This gives much faster feedback when working with complex objects.

(Dynamic) Subdiv(ision)

NoSubDiv

Triangles

Quadrangles

Clicking on this button opens a pop-up with all three choices. Drag the mouse to the desired item and release the button to select.

Dynamic subdivision determines whether and how **trueSpace** automatically subdivides polygons that are made nonplanar during point editing. This tool is available because some editing operations such as point editing may cause a loss of planarity in polygons with more than three vertices. This is undesirable as it may result in rendering errors. In such cases, **trueSpace** can automatically break offending polygons down into smaller planar triangles or quadrangles if the user has selected the corresponding option. Alternatively, the user can opt for no subdivision during point editing.

Sweep Tool

The Sweep Tool variants provide a powerful and versatile array of functions for extruding and lathing faces. Entities suitable for sweeping include individual and multiple faces, and parts of objects (face sets selected with the Shift key), which should first be selected in Point Edit mode. If you create a polygon with the Draw tool or text with the Text tool, you can use Sweep immediately.

The Sweep tool variants are:

Sweep: Extrudes 2D and 3D shapes.

Tip: Sweeps polygons to a point.

Lathe: Sweeps along a modifiable circular path.

Macro: Remembers a set of sweeps and applies it to other polygons. Also sweeps along paths.

Bevel: Automatically bevels polygons − great for text.

The functions are discussed below, in the above order.

Note: All swept shapes except bevel can be modified extensively and intuitively with the Spline property panel. See Sweeps and Splines at the end of this section.

Related Topics:

Sweep Tool

This tool enables the user to repeatedly extrude 2D and 3D shapes with optional manipulation of interim stages. Sweep works by first copying selected polygons and edges, then moving them away from the original along the local Z axis (perpendicular to the polygon surface) or the specified path. Finally, it creates new polygons to connect the sides. This function is similar to Extrude in other 3D programs, but is superior in that multiple faces can be extruded in different directions simultaneously. Also, the extrusion can be done in any view, including Perspective.

To sweep using the default settings, select the entity or entities to sweep, then left-click on the Sweep tool. Newly created polygons and text objects are ready to be swept when they're created.

Each Sweep operation can result in a variable number of intermediate segments plus a *floor*, which is the outermost new polygon. After the Sweep operation, the new floor is selected and highlighted (in green). Also, the program is placed in Point Edit mode, which lets you immediately move, rotate, and scale the floor, then optionally re-sweep. You can also select previous floors, indicated by their dark green color, and transform them as well.

The program remembers all such transformations if performed and extrapolates them in subsequent Sweep operations on the same object. For example, any rotation is applied repeatedly and cumulatively. Also, spline-based editing techniques can be used with the floors to modify the object's entire shape after sweeping.

Related Topics:

Sweeping a Macro
Sweep Property Panel

Sweeping a Macro

When you sweep an object one or more times, with optional modification of any floors in between sweeps and optional final application of the Tip tool, **trueSpace** remembers the entire procedure as a macro. This macro can immediately be applied as an automatic multi-step sweep to the same and other objects, and can also be stored in a path library and saved to disk. See Macro below for details.

Sweep Property Panel

To change the default Sweep settings and access additional functions, right-click on the Sweep tool. (If the Sweep tool doesn't appear, right-click and drag or hold on the displayed Sweep variant, then access the Sweep tool from the pop-up):

Segment

This numeric value sets the number of subdivisions or intermediate segments created between floors during a Sweep operation. The default value is 1 segment. Change the value by clicking on the number and entering a new one from the keyboard, or clicking on the double-headed arrow and dragging left and right. The more subdivisions you use, the better definition you'll obtain for spline interpolation of segments (i.e., smoother transitions), at the cost of rendering time.

Move X - **Move Y**

These two settings let you specify horizontal offsets for the swept polygon. If you move the new floor interactively after sweeping, the amount is placed in these fields.

Move Z

As sweeping is always done perpendicular to the swept surface, the Z value sets the total sweep extent in grid square units. The default length is 0.5 units. Change the value by clicking on the number and entering a new one from the keyboard, or clicking on the double-headed arrow and dragging left and right. Of course, you can also change the selected polygon's Z position by dragging with the right mouse button in the workspace.

Tip Tool

Sweeps selected icons to a point, creating a cone-shaped object. The Tip tool uses the same property panel as the Sweep tool. After using the Tip tool, the polygon can no longer be swept.

Right-click to access the Sweep property panel.

Lathe Tool

This tool sweeps a shape along a modifiable circular or spiral path. Lathe is a true 3D tool because all parameters can be set by direct manipulation of the path. No numeric entry is required, although it is possible.

When you select this tool, a circular path of white line segments with a green segment at the end appears. At the end of this path is a perpendicular straight green line ("handle") and connected to that is a crossbar. The crossbar represents the lathing axis, around which the lathed outline is spun.

The path can be manipulated interactively in three dimensions by clicking and dragging on different parts. The illustration below indicates which Lathe settings, as described immediately below under Lathe Property Panel, are affected by clicking and dragging on the associated Lathe path part.

Right-click on the Lathe tool to open the Lathe property panel. Lathe settings can also be set from here by clicking on a number and entering a new value from the keyboard, followed by Enter. You can also click and drag horizontally on the arrow button next to the value to change. See the next section for details.

Clicking on the Lathe tool a second time executes the lathe procedure with the current settings.

As with the Sweep function, immediately after lathing, the program goes to Point Edit mode. Each copy of the swept polygon or polygons is outlined in green, meaning that they're now available for standard Point Edit navigation functions. Until another object is selected, the whole object consists of polygons connected by splines, so a change to any polygon affects the entire shape. Select a polygon by clicking on it, then use Point Move, Rotate or Scale functions.

Related Topics:

Lathe Property Panel

Segment

The number of path segments, which controls the smoothness of the path. This value can be changed interactively by clicking and dragging on the white part of the circular path.

Angle

Sets the extent or distance of the lathe in degrees, which normally ranges between 0 and 360 degrees. If Helix   is set to any value other than 0, Angle can be any amount. To set interactively, click on the handle, the perpendicular green line at the end of the curve, and drag the mouse.

Radius

Sets the distance from the curve's center (indicated by the crossbeam position) to its edge. Radius and Rotation can be set interactively by dragging the crossbeam at the end of the handle with the mouse. To change the radius only, click on the crossbeam's center point and drag. If the crossbeam is dragged near a polygon edge, it "snaps" to that edge, so the edge is used as the lathe axis.

To change Radius and Rotation at the same time, depending on which direction you drag the mouse, click anywhere on the handle between the center and ends.

Rotation

Sets the angle of the path to the polygon. To change the Rotation only, click on either of the crossbeam's endpoints and drag.

To change Rotation and Radius at the same time, depending on which direction you drag the mouse, click anywhere on the handle between the center and ends.

Helix

Lets you create a spiral path. Most effective with Angle settings above 360. Set interactively by clicking on the last segment of the circular path, which is green, and dragging.

Note: There is a "click stop" for interactive setting of Helix at the zero point. If you drag it near zero, it "catches," and you have to drag a bit farther to disengage the zero setting.

Macro/Sweep Tool

This tool permits access to and manipulation of a macro created by a Sweep and/or Tip procedure. It also allows sweeping of polygons along animation paths and spline polygons. You might think of this tool as a path extrusion function. However, its macro capabilities are quite powerful. You can use it to quickly and easily set up a macro, which is a remembered sequence of extrusion instructions, each of which specifies the number of segments, direction, rotation and scaling. A macro can subsequently be used to sweep any other shape, as well as for animation.

Related Topics:

Sweeping and Splines
Macro Property Panel

Sweeping and Splines

When you sweep an object, with optional manipulation of floors in between sweeps and optional final application of the tip tool, **trueSpace** automatically remembers the entire sequence as a macro. In this context, a macro is defined as an open spline path, each of whose spline vertices contains Tension, Continuity and Bias values for Moving, Rotation and Scaling. This macro can immediately be applied as an automatic multi-step sweep to other objects, and can also be stored in a paths library and saved to disk for later retrieval. Used in conjunction with the Paths Library, the Macro tool also allows objects to be swept along paths created as spline polygons and for animation. In fact, animation paths set up as key frames with rotation and scaling can be just as easily used as macros for sweeping, although there's less of a direct correlation between setup and results.

After selecting a polygon or polygons to be swept, the first click on the Macro tool displays the most recently stored or executed macro path, if any, connected to the last selected polygon. To store this in the paths library, click on the library panel's New button. To choose a different path for sweeping, select it from the Paths Library panel. Very complex objects can be created by sweeping a polygon along a succession of different paths.

To execute the macro sweep, click on the Macro tool a second time.

Before executing the macro, the user can apply various modifications. The path can be rotated around the polygon's vertical axis by clicking on it and dragging.

To store a new macro in the paths library, first define it by executing the sweep/modify sequence to be stored. Then select the Macro tool to display the path. Next select the Path Library tool from the Libraries group, then click on Add in the Paths Library panel. The macro is stored with the name Macro, plus a comma and an appended number if it's not the first.

To use a spline polygon or animation path as a Sweep path, create the path using the appropriate tool, store it in the paths library panel, create or select the polygon(s) to sweep, select Macro, select the path from the library, and select Macro again.

Right-click on the Macro tool to open the Macro property panel.

Rotation

This shows the current rotation of the macro path with respect to the polygon's vertical axis. The value can be changed in the requester by dragging on the double arrow and by clicking on the number and entering a new value from the keyboard. You can also change the Rotation value *interactively* with the mouse by clicking directly on the path and dragging.

Bend

When using Macro to sweep along a non-closed path, bend acts both as a toggle and a function. In some cases, sweeping shapes around a curve can cause unexpected results, such as partial flatness, because the shape isn't rotated while being swept. If Bend is on during a macro sweep, each subdivision and floor is rotated to be perpendicular to the current path direction. If Bend is off, the swept shape retains its original alignment throughout the sweep.

When using Macro to sweep along closed paths, the Bend function is performed automatically.

Bevel Tool

Bevel is a special form of the sweep function, which is most often used to give an angled edge to 3D text for extra visual interest. Select one or more polygons, then select the Bevel tool. This causes extrusion of a new polygon for each selected polygon. The new polygon is offset from the original by the current Bevel numeric setting, which defaults to 0. By clicking and dragging the right mouse button, thus moving the new polygon or polygons vertically, it is also automatically scaled smaller by a proportional amount, creating a beveled surface in front of the original polygon. Beveling is done properly, so that holes in the polygon are scaled larger.

Note: The user must ascertain that narrow beveled edges, such as those at the ends of certain serif characters (for example, the letter Y) **do not cross over each other** as trueSpace does not prevent the crossover.

To open a panel for setting the Bevel amount numerically, right-click on the Bevel tool:

The default setting is 0 or the most recently used value. Change the bevel amount by clicking on the number and entering a new one from the keyboard, or clicking on the double-headed arrow and dragging left and right.

Related Topics:

How to Use Bevel

How to Use Bevel

1   Select or create polygons to be beveled. If you've just created text or polygons, you can bevel them immediately. Generally, though, you'd use the Sweep tool first to give the text or polygons some depth.

2   Select the Bevel tool. This causes the selected polygons to be extruded immediately.

3   Adjust the beveled surface by holding the right mouse button and dragging the mouse vertically. This causes the beveled surface to be scaled down and moved away from the original at the same time, with real-time visual feedback.

4   To accept the bevel settings, select the Object tool .

Deform Tool

Free-form deformation is a powerful tool for modeling and animation. A three-dimensional lattice (like an oblong wire cage) is used to deform objects, that is to change their shape. By manipulating lattice points you modify the underlying object structure in a natural intuitive fashion. This process can be animated using key frames.

You can also create free-standing lattices for animating different objects. As an object passes through such a lattice, it changes shape constantly to conform to the lattice's shape. This can be used to create remarkable special effects, like an automobile or any large object squeezing through a keyhole.

Related Topics:

Attached Lattice
Free-Standing Lattice
Deform By
Stop Deformation
Lattice Subdivision
Deform Tool Control Panel
Deform Tool Property Panel

Attached Lattice

When you select the Deform tool after selecting an object, a deformation lattice appears as a wireframe box around the selected object. The lattice can be subdivided by dragging the mouse (see Lattice Subdivision below). Then parts of it can be selected and moved, rotated and scaled using the Deform Navigation tools, thus modifying the underlying object in an organic and intuitive process.

• The lattice can be separated from its object with the Detach command, explained in the section on the Deform control pane. This section also covers the navigation tools used with deform lattices.

• You can select any other object at any time while in Deform mode. If you do so, the newly selected object's lattice appears or is created.

• To animate a lattice, whether or not it's attached to an object, use the standard key frame method. Go to a frame in which a change in motion is to occur and manipulate the lattice or go to Deform mode and select lattice sections and manipulate them. Continue in subsequent key frames.

• If you select Erase with part or parts of a lattice selected, those parts are de-selected and you're returned to the point where you can change the lattice subdivision by again dragging the mouse. If, however, this lattice was deformed, changing the subdivision restores the lattice's original shape. If you select Erase with no parts of a lattice selected, the lattice is deleted.

• To exit Deform mode, select the Object Tool, whereupon the lattice disappears. If you later select the Deform tool with that object selected, the deform lattice appears exactly as you left it. Also, the modified deform lattice is automatically saved and loaded with the object.

Free-Standing Lattice

If you select the Standalone Lattice tool variant or use Detach (see below), a free-standing lattice appears. This lattice can be subdivided and deformed in Deform mode like any lattice. When in Object mode, it appears as a dark blue wireframe, and can be manipulated, saved and loaded just like any other object. It can also be set up to deform objects passing through it or over which it passes (or both) during animation with the Deform By command.

Note: Lattices only affect parts of objects *inside* them. If any part of an object exceeds a lattice's bounds, that part is not deformed.

Deform By

Creates a connection between an object and a free-standing lattice. First select either the lattice or the object, then select Deform By, then select the other. Then, when the object or any part of it is inside the lattice, it's subject to deformation by the lattice. This technique is very useful for special effects in animations, because objects continually change shape as they pass through the deformation lattice.

Free-standing lattices can be assigned to deform any number of different objects. These lattices can themselves be animated for even more unusual effects.

Stop Deformation

Breaks a connection created by the Deform By tool between an object and a free-standing lattice. First select either the lattice or the object, then select Stop Deformation, then select the other. Thereafter the lattice does not affect the object.

Lattice Subdivision

To subdivide the deform lattice around the world X axis, hold the left mouse button and drag horizontally:

To subdivide the lattice around the world Y axis, hold the left mouse button and drag vertically:

To subdivide the lattice around the world Z axis, hold the *right* mouse button and drag vertically:

To subdivide the lattice by the same amount on all three axes, hold *both* buttons and drag the mouse diagonally:

Once the lattice is subdivided, you can select and highlight lattice points and cross-sections (floors) by clicking on them, as in point editing. Similarly, select multiple lattice points and floors by holding down the Control key as you click. You then manipulate them using the Deform Navigation tools as any other object. Doing so manipulates the underlying object's wireframe structure in an organic-looking way, optionally employing intelligent subdivision and smoothing of the altered surface.

To cause a free-standing lattice to deform an object, use the Deform By command to connect the two. Then, when the object or any part of it is inside the lattice, it's subject to deformation by the lattice. Free-standing lattices can be assigned to deform any number of different objects.

Deform Tool Control Panel

When in Deform mode, a control panel appears. The top group contains navigation tools to move, rotate and scale lattice points, point sets, etc., separately from objects, but in the same way. With this additional navigation tool, you can switch instantly between manipulating an object and manipulating its deform lattice. This makes it convenient to work in different areas of the object at the same time.

The lower area contains the Detach tool for separating lattices from objects.

Related Topics:

<u>Move Lattice Points</u>
<u>Rotate Lattice Points</u>
<u>Scale Lattice Points</u>
<u>Detach</u>

Move Lattice Points

Click on this button to move the current entities in the current coordinate system. The left button controls movement along the X axis by mouse movement parallel to the X axis, and movement along the Y axis by mouse movement parallel to the Y axis. Using only the right mouse button controls movement along the Z axis.

Rotate Lattice Points

Click on this button to rotate entities in the current coordinate system. The left button controls rotation around the X axis by mouse movement perpendicular to the X axis, and rotation around the Y axis by mouse movement perpendicular to the Y axis. Using only the right mouse button controls rotation around the Z axis.

An entity always rotates around its own center, but the effect of mouse movement during rotation depends on the coordinate system currently in use.

Scale Lattice Points

Click on this button to scale entities in the current coordinate system. The left button controls scaling on the X axis by mouse movement parallel to the X axis, and scaling on the Y axis by mouse movement parallel to the Y axis. Using only the right mouse button controls scaling on the Z axis. If both buttons are depressed the scaling is uniform in all three axes.

Detach

Separates an object from its lattice. Select the object, then select Detach. The lattice is separated and selected, and the object is de-selected. This option is useful for creating a certain deformation with one object, then applying it to others with Deform By.

Deform Tool Property Panel

Right-click on the Deform tool icon to open the Deform Tool property panel. This offers several options for working with free-form deformation.

Related Topics:

> FFD DynDiv
> Deform
> Draw
> Display Option

FFD DynDiv

This means free-form deformation Dynamic Division.   With this option on, FFD manipulation resulting in loss of planarity in any polygons causes those polygons to be automatically subdivided into smaller polygons. For example, rotating a cube's top polygon in FFD causes the sides to be subdivided into many smaller polygons, maintaining smooth curvature of the surface. The user should keep in mind that this option creates new polygons only after the deformation has taken place, so the subdivision doesn't increase the object's resolution during the deformation.

Deform

Click on the box to the right of Deform to display pop-up menu for selecting the lattice picking method:

Sharp / Smooth

Here's the simple explanation: Given that the object being has sufficient resolution (that is, it has been subdivided enough), using Smooth creates smooth edges on object parts manipulated with lattices. Using Sharp creates sharp edges. You can switch between these while manipulating a lattice and see the results immediately.

Unless you're really interested in this, you can skip this paragraph. Every subdivided lattice "cube" is actually further subdivided into 3D mesh of 3 x 3 x 3 points, which can be viewed and manipulated using the Display option. Normally, when a lattice point or floor is manipulated, the neighboring points of the internal mesh are selected and move along with it. This is called "Smooth" picking. If an internal mesh point or floor is manipulated directly, no neighboring points come along. This is called "Sharp" picking.

Draw

Click on the button next to Draw to open the Object/Deformed pop-up menu. The Draw option determines how the object wireframe is redrawn while being manipulated by a deformation lattice.

Deformed

As lattice points are manipulated, the program redraws only the parts of the object that change – the rest of the wireframe is invisible. This provides for faster feedback with complex objects.

Object

As lattice points are manipulated, the entire object is continually redrawn. This gives you a better idea of the deformation's in the context of the entire object, but with complex objects feedback can be slowed down a great deal.

All

As lattice points are manipulated, the program continually redraws the entire object and lattice wireframes. This provides the best feedback with simpler objects.

Display Option

Every subdivided lattice oblong section or "chunk" is actually further subdivided into an internal 3D mesh of 3 x 3 x 3 points. Use this pop-up menu to select whether and how a lattice's internal mesh is displayed. When mesh points are displayed, they can be selected and manipulated like lattice points and floors, for an extra level of control.

NoMesh

This is the default mode, in which only the standard deformation lattice is shown.

Chunks

If a lattice is subdivided in at least two directions, this shows chunk corners inside the lattice.

Surface

Shows lines through the internal mesh points on the surface of each lattice section.

Internal

Shows lines through the internal mesh points throughout each lattice section.

Text Tool

The Text tool pop-up menu offers two variants: vertical text and horizontal text. Choose one with the left mouse button, then click anywhere in the workspace and start typing.

- To stop creating text, select a different tool.

- To change the cursor location and start a new text object, move the mouse and click the left mouse button.

- These polygons can be extruded with the Sweep tool to become three-dimensional text.

- Words are actually hierarchical groups of polygons, so each character can be animated, swept, etc., independently by moving down one level in the hierarchy. Press the down arrow key once, then press the left and right arrow keys to select different characters.

- If you use the Text tool, then use a different tool, and then switch back to the Text tool, you'll find the text cursor right where you left it.

- Change fonts by right-clicking on either variant.

Related Topics:

Vertical Text
Horizontal Text
Changing the Font

Vertical Text

The Vertical Text tool is used to create vertical 2D text objects for extrusion and beveling with the Sweep tools. Enter text from the keyboard, which instantly becomes polygons in the workspace. Vertical text stands at right angles to the ground plane. The text baseline is created at ground level, parallel to the current view plane.

Horizontal Text

The Horizontal Text tool is used to create horizontal 2D text objects for extrusion and beveling with the Sweep tools. Enter text from the keyboard, which instantly becomes polygons in the workspace. Horizontal text is created horizontal to the ground, at ground level. The text baseline is created at ground level, parallel to the current view plane.

Changing the Font

To change the font, right-click on Text tool. This opens a file requester listing all TrueType fonts currently installed in Windows:

Select a font, style and size by clicking on the desired selections. Use the Sample window as a guide. Then click on OK to close the requester. Click anywhere in the workspace and begin entering text from the keyboard. To finish, select another tool with the mouse. To enter a different text string while in this mode, click the mouse in another place on the screen and resume typing.

Hint: Larger font sizes tend to result in smoother character outlines.

Polygon Tool

This tool allows two different methods for the creation of flat multi-sided polygons. Freehand and Regular polygons are made of straight line segments, and can interact with each other using Boolean math. A related tool lets you create Spline polygons. See the next section for details.

New polygons may be drawn only in the Perspective and Top views, and are always created parallel to the ground plane. These polygons can be used as is, combined with other objects using Glue, manipulated with Deform, and can be extruded into three-dimensional shapes with the Sweep tool.

To change the type of polygon to be drawn, click on the tool, then drag the mouse slightly, whereupon a pop-up appears. Drag the mouse to the type of polygon desired on the pop-up, then release the mouse button. With freehand and regular polygons, you can also select the type of polygon from the Polygon property panel.

Selecting the Freehand or Regular Polygon tool automatically activates the Polygon property panel, which is fully documented in its own section below.

Related Topics:

Freehand Polygon
Regular Polygon
Polygon Control Panel

Freehand Polygon

To draw a freehand polygon, simply click the left mouse button on each vertex in turn. To finish the polygon, click the right mouse button, which connects the last point with the first.

Regular Polygon

This automatically creates a polygon all of whose sides are the same length and with the same angle between all sides. The more sides you use, the closer this shape approximates a circle.

To change the number of sides in new regular polygons, use the numeric setting in the Polygon Control panel labeled Number of Sides in the illustration below

To draw the polygon, click the left mouse button on the work area, and drag outward to specify the polygon's maximum radius. Release the mouse button to finish the polygon.

Polygon Control Panel

This property panel appears automatically when the Freehand or Regular Polygon tool is selected. These controls do not apply to spline polygons. There are two settings here. The four buttons determine how new polygons interact with previously drawn polys, if at all. The numeric setting lets you set the number of sides for new regular polygons.

Related Topics:

Boolean Polygons
New Polygon
Union
Subtract
Intersect
Number of Sides

Boolean Polygons

The four buttons let you determine whether and how new polygons will interact with existing ones.

With NewPoly selected, a new polygon is simply added to the workspace. Otherwise, a Boolean operation takes place between the currently selected polygon (usually the previous drawn) and the newly drawn one:

New Polygon

Normally when you create a new polygon, it's a separate object. The remaining three options in the Polygon property panel give you different ways of combining new polygons with existing ones.

Union

New polygons add to the existing polygon. In this case, polygons don't have to overlap, although they can. You can have a single object consisting of a number of discrete, separate polygons.

Subtract

New polygons drawn in this mode actually subtract from or erase overlapping areas of existing polygons. Try drawing a polygon, then clicking on Subtract and draw another polygon that partially overlaps the first. When you close the second polygon, instead of a new polygon, you'll see the overlapping area eliminated from the first polygon. Then re-select New Polygon, draw a large polygon, and then in Subtract mode draw a smaller one inside the first. Click on to render it, and you'll see the hole.

Intersect

New polygons drawn subtract all but the overlapping areas. Try drawing a polygon, then clicking on Intersect and draw another polygon that partially overlaps the first. When you close the second polygon, you'll see the only overlap area between the two – all other areas are eliminated.

Number of Sides

Use the numeric setting to determine the number of sides of subsequently drawn regular polygons. To change the setting, click on the double-headed arrow and drag left and right, or click in the number box and enter a new number from the keyboard.

Spline Polygon Tool

A Spline polygon is created the same way as a freehand polygon, but the polygon has curved sides. To draw a spline polygon, select this tool, then click the left mouse button on each vertex in turn. Each point you click on sets a new spline for the polygon, with an intermediate number of interpolated points or "frames" determined by the Offset value.

•	To avoid creation of non-planar polygons, **trueSpace** only lets you place new vertices from the Top or Perspective views, and all points are placed at ground level.

•	While drawing a spline polygon, you can switch between adding new points and editing existing ones using the Draw and Edit controls in the Spline control panel.

•	To close a spline polygon with a spline, click the right mouse button, which connects the last point with the first. At this point, you can still edit the polygon, but you can't add new spline points.

•	An alternative method of closing the polygon with a straight edge, ideal for lathing, is to use the Spline control panel's New function. You can then immediately go on to draw more polygons.

•	A spline polygon can be added to the Path library at any time. Also, you can add a new spline polygon to the workspace by selecting a closed path from the Path library.

Related Topics:

Editing Spline Polygons
Spline Control Panel
Spline Property Panel
Spline Parameters Panel

Editing Spline Polygons

In Spline polygon Edit mode you can select any spline polygon vertex, indicated by a light green dot, by clicking on it, and then can move it in the X, Y and Z dimensions. You cannot rotate or scale spline polygon vertices.

When a spline polygon is visible its handles are also visible. Handles are the green lines emanating from spline vertices. Polygon endpoints have one handle, while intermediate points have two. Handles can be manipulated interactively with the mouse by clicking and dragging.

To control both of a vertex's handles as a unit, use the *left* mouse button and drag either of the handles' endpoints. By changing the position you're changing bias, and by changing the length you're altering the tension setting.

Drag the handles with the *right* mouse button to change continuity--you'll see the angle between them change.

If you hold the Ctrl key while dragging, tension is fixed and only the angle with respect to orientation is changed.

If you hold the Shift key, continuity is fixed with respect to bias. You can control tension by dragging left and right.

Spline Control Panel

When you select the Spline Polygon tool, the Spline control panel opens.

Edit

To move path points and spline handles, select this button. Draw and Edit are mutually exclusive.

Draw

If, before closing a spline polygon, you select Edit to modify spline points or handles, you can return to adding points by selecting this button.

New

Closes the existing polygon with a sharp edge and lets you immediately start placing points for a new polygon.

Segments

This setting determines the number of interpolated vertices between spline points when drawing a polygon. Click and drag on the arrow button to change, or click on the number and enter a new value from the keyboard. The higher this number, the smoother the outline, and the greater the number of resultant polygons if the polygon is swept.

Frames

This button toggles the display of individual frames, shown as blue hash marks along the path.

AllHandl

Handles are the green lines emanating from path control points. When a path is displayed, this setting determines which handles are visible.   With AllHandl on, all handles are drawn. Otherwise only the handles attached to the currently selected path vertex are displayed. As path vertices tend to be hard to see, this option helps locate the active vertex.

Spline Property Panel

Right-click on the Spline Polygon tool to open the Spline property panel. While drawing a spline polygon, before selecting any other objects, you can edit spline characteristics with the controls on this panel.

Spline Presets

The buttons in the top row contain preset combinations of spline settings for fast adjustment of all three settings at once. Also, you can access the Spline parameters panel for numeric settings by right-clicking on any of the preset buttons.

The first preset removes any smoothing, causing the spline segments to act like straight lines. The other two presets implement smoothing as described by their names.

Interpolated Value

The second row of buttons is for selecting whether the adjustments use location, rotation, or scaling values for interpolation. Normally when you edit the spline settings, you're changing how the program interpolates between the spline points' different location values. The spline points' rotation and scaling values are all the same, so no interpolation is possible. Therefore in this case changing settings with either of the two buttons active does not alter the polygon's shape.

When spline points do have different values for rotation and scaling, as in macro/sweep paths and animation paths with rotation and scaling key frames, you can vary those interpolations as well.

Local

By default this switch is on, which means only the current spline is affected by changing settings. To easily identify the current vertex, turn off AllHandl from the Path control panel (see above). Selecting Local turns off Global.

Global

All splines are affected by changing settings via the presets or the parameters panel. Selecting Global turns off Local.

Spline Parameters Panel

To open the Spline parameters panel, right-click on any of the Spline presets buttons in the Spline property panel. This allows numeric adjustment of path spline settings Tension, Continuity and Bias. Change values by clicking on the numbers and entering new values from the keyboard, or clicking on the double-headed arrows and dragging left and right. While any numbers can be set, the most useful values range between -1 and 1.

Tension

Controls how sharply the curve bends. When decreasing tension, not only does the curve sharpen, but frames from either side are pushed toward that vertex, causing deceleration into the curve and acceleration out of the curve. High tension decreases curve sharpness, while causing acceleration into the curve and deceleration out of the curve.

Bias

This effect helps the simulation of traditional animation effects such as following through after an action by overshooting (positive bias) and undershooting (negative bias). It helps create discontinuity in a curve, which Tension doesn't do.

Continuity

Affects curve sharpness like tension, but without changing speed.

Introduction

In **trueSpace**, a Material combines all of the different properties that define a surface's appearance. First there's *color*, a solid hue that can be chosen from a palette of 16 million different. Then there's *smoothing*, which determines whether and how the rendering operation creates the illusion of a smooth surface, or a more "truthful" faceted appearance. *Shading* at any point in a given image is a function of surface properties, surface orientation, and illumination. Surface properties include ambient light, shininess, specularity, transparency and index of refraction. *Textures* are images that can be mapped onto object surfaces in a number of ways, fully or partially overriding the basic color. *Bump* maps are images used to simulate surface indentations, extrusions or roughness. And *environment* maps can be used to simulate reflections without requiring extra calculation.

You can apply Materials to objects on a polygon-by-polygon basis, painting continuously with a brush-like tool. Or you can paint entire objects at once, rendering them in the new Material automatically. You can also create special Material rectangles, picture placeholders, and apply them anywhere on an object's surface by sliding them like a decal on a bottle.

Render Group

The Render group contains tools for setting the texture mapping projection space, creating Material rectangles and Materials and applying them to objects, controlling lighting and adding cameras to the workspace.

Paint Tool

The Paint tool variants let you create and modify Materials and apply them to objects, and set the current Material to any in the workspace. Materials partly determine how rendered objects' surfaces appear, along with the way light shines on the surface. Materials determine a surface's color, texture, shininess, transparency, bumpiness, and other attributes.

The Paint Face tool, one of **trueSpace**'s truly user-friendly features, lets you interactively paint objects' attributes face-by-face and let you see the results immediately, right there in the workspace. This click-and-drag procedure is very intuitive and the experience is remarkably similar to painting an actual sculpted object.

The variant tool Paint Object lets you paint an entire object at once, rendering it immediately, and the Inspect tool determines a surface's Material settings. Painting is done with the current Material, which consists of settings from the Color and Attribute property panels, which are covered immediately below.

When you select any Paint tool except Paint Object, all Materials panels−Sample Sphere, Color, Attributes and Shader Attributes−open automatically.

To select a different Paint tool variant, left-click on this icon and drag the mouse slightly to see the pop-up graphic menu. Drag the mouse to the desired icon and release the button.

Related Topics:

Paint (Object) Tool
Repaint Tool
Paint Face Tool
Inspect Tool
Changing Materials
Materials Library
Sample Sphere
Color Property Panel
Attributes Panel
Smoothing
Shaders
Shader Attributes
Texture Mapping
Bump Map
Environment Map

Paint (Object) Tool

This variant is for one-time usage only. When selected, it paints the entire current object with the current Material, then renders the object.

To abort rendering, press the Esc key or double click the right mouse button.

How to Use Paint

1. Select an object to which to apply the current Material.

2. Select Paint Object. The entire object is immediately painted with the new Material, then automatically rendered. The Paint tool then returns to the previous variant.

Repaint Tool

This tool works like Paint Face, below, in that it applies the current Material to object polygons by first selecting the tool, then clicking directly on polygons in the workspace. The difference is that one click converts *all* object polygons of the Material type clicked on to the new Material. For example, if you created several parallel rings of a particular Material going around an object by clicking on polygons, you can change all the rings instantly by selecting a new Material, then clicking anywhere on the rings.

Paint Face Tool

Use this tool to paint the current Material onto an object one face at a time, or a group of faces by dragging, much like in a paint program. You can thus paint a different Material on each of an object's faces, and see the changes right away. Material and texture settings can be changed while Paint is active – the new settings affect the next polygon clicked on.

To temporarily change the Paint Face tool to the Inspect tool, press and hold a Shift or Control key before clicking. The mouse cursor changes to a lens to indicate Inspect mode. Click on a face to make its Material settings current.

How to Use Paint Face

1. Select the Paint Face tool. When this tool is active, the mouse cursor resembles a small paint brush.

2. Click on any face belonging to any object to apply the current Material and Texture to the face. The face is immediately rendered with the new surface.

3. To paint more than one face, simply drag the mouse.

Inspect Tool

Like Paint Face, Inspect works on a polygon-by-polygon basis. But instead of applying color, it determines the face's color, attribute and texture values and sets them in the property panels. This is a convenient way of applying existing surfaces to new faces and objects.

How to Use Inspect

1.   Select the Inspect tool.

2.   Click on any object. The current Material is set to that of the polygon under the mouse pointer when you clicked. All Material panels change to show the new Material settings.

Changing Materials

Painting objects and faces uses the current Material, which is always defined even if you haven't set one. Newly created objects also use the current Material. Although the property panels used to set the Material open automatically when the Paint tool is picked, using the tool doesn't require that they be open. If they've been closed, click on the Paint tool icon to reopen them.

Important: Changing a Material doesn't change any objects to which it was previously applied, only objects to which it is applied with the Paint tool after the change, as well as new objects.

Materials Library

In addition to using the following controls, you can set the current Material from a list of preset Materials. Open the Materials Library by selecting the Show Materials Library tool from the Libraries group:

To set the current Material to any from the Library, simply click on the sample sphere in the Library panel.

Sample Sphere

This panel lets you instantly view the results of Material changes. Its single feature is a 3D sphere rendered in the current Material against a grouped background. Whenever you change a Material setting with the Color or Attribute property panels, this sample sphere is automatically rerendered with the new settings. This feature can save a great deal of time when experimenting with new Materials, by avoiding having to render larger, complex objects or special test objects.

Color Property Panel

trueSpace's visual color selection system uses the HSV model. HSV stands for Hue, Saturation and Value. It's commonly considered to be closest to the coloring system used by traditional media artists. In **trueSpace**'s HSV color property panel, the color spectrum ROYGBIV (red-orange-yellow-green-blue-indigo-violet) is spread around the sides of a hexagon. The colors around the edges represent hues at full saturation, with saturation decreasing as you travel toward the center. As saturation decreases, the amount of white added to the color increases.

When a color is selected from the spectrum or with the RGB sliders, its value range is immediately shown in the vertical Value color group to the right. The current value is indicated by the slider position, which can be adjusted vertically with the mouse. As value decreases, the amount of black added to the color increases. Any color with no value is black, and any color with no saturation and full value is white.

If the Attributes property panel   is open, color changes are reflected immediately in its example sphere, which is the currently active Material.

Thus you can select any color in your video display's range for the current Material's color by clicking on it in the color hexagon, then adjusting the value if a darker or lighter shade is required. The current color is shown on the Sample Sphere. If a Texture Map is used, its colors override the Material color anywhere on the surface that the image appears.

Related Topics:

RGB Color Selection

RGB Color Selection

An alternative method of color selection may be more familiar to those who have been using personal computer graphics programs for a while. Right-click on the color hexagon to open a property panel with sliders and number boxes for the current color's red, green, and blue components.

Each component's integer value ranges from 0, or all the way off, to 255, or all the way on. To change a color value, click on a slider and drag it, or click on the slider bar to the side of the slider to move in large increments, or click on the arrow at either end of a slider bar to move in small increments. Alternatively, click in a number box and enter a new value from the keyboard. If you try to enter an illegal value, such as a number over 255 or a decimal fraction, the setting is not changed.

Attributes Panel

The Attributes property panel lets you set Material properties other than color, such as shininess, and apply texture maps. The first column sets smoothing, the second sets the Shader type, and the third column lets you apply images as texture maps, transparency maps, bump maps, and environment maps.

Smoothing

Object surfaces in **trueSpace** are made up of interconnected flat polygons. Normally this causes rendered objects to have a facetlike appearance. While this may be preferable in some cases, such as with a cube, in most cases, such as with a sphere, a smoothed surface looks better. Part of a Material's specification includes whether the surface is to be faceted, fully smoothed, or auto-faceted.

The three smoothing choices, only one of which may be active (the current selection's icon is highlighted) are found in the leftmost column in the Attributes property panel.

Related Topics:

Faceted
AutoFacet
Smooth

Faceted

No smoothing is performed. However, shading of individual faces is performed. To see this, create a large polygon, set to Faceted, and render it with a single Local light source positioned near the surface.

AutoFacet

Smoothing is performed only when the angle between two polygons is less than a user-specified threshold, while faces that meet at a greater angle retain a sharp appearance. This works best when an object's surface contains smooth as well as faceted parts, such as beveled letters like S. As long as the object is constructed consistently, goodlooking results can be obtained without painstaking point-bypoint definition of sharp edges.

To change the threshold for AutoFacet, right-click on the AutoFacet icon. The default threshold, 40, is best for most purposes. Higher values produce more smoothing, and lower values produce less smoothing.

Smooth

Smoothing is performed on all polygon intersections. This works best if the object is built to closely approximate the final desired smoothed shape, without sharp edges. Smoothed 90 degree corners don't look good, especially in animation. Even beveled edges look unattractive when smoothed.

Shaders

When light falls on an object's surface, it can be absorbed, reflected, or transmitted, or some combination of these. **trueSpace** employs three basic shading models, found in the Attribute property panel's second column: Flat, Phong, and Metal. Used in conjunction with the Shader Attributes and other Material settings, these can simulate many different types of real-world and imaginary surfaces.

To select the Shader type for the current Material, select one of the three icons in the Attribute property panel's second column. To select further options for the current Shader type − Ambient light, Shininess, Specularity, Transparency and Specularity − use the Shader Attributes panel.

Related Topics:

Flat
Phong
Metal

Flat

Surfaces are rendered with no shading at all—the program simply copies the polygon's color and transparency to the display. The Flat Shader does not use the Ambient, Shininess or Specularity options.

The Flat Shader is useful for fast previewing. It is also useful for previewing texture placement, as it shows the texture exactly as it was digitized, rendered, or created in a paint program.

Phong

The Phong Shader is best for most surfaces. It produces smoothly shaded surfaces with attractive highlights.

Transparency and ambient illumination can be controlled by options. Diffuse illumination as well as highlight intensity can be controlled by the Shininess option, and highlight size can be controlled by the Specularity option. Practice helps.

Metal

The Metal Shader is used to model highly reflective surfaces, such as metal and glass. Note that when ray tracing reflective objects, there must be objects around them to reflect in order to see their reflectivity.

While the Flat and Phong Shaders can also use transparency, only the Metal Shader causes transparency to fall off near the edges, more closely simulating real-world glass.

Hint: Metallic and glass surfaces look best when illuminated with as many lights as possible. Specular highlights are important in obtaining a shiny look. Also, metal and glass objects' appearances are improved by environment mapping.

Shader Attributes

The Shader Attributes panel opens automatically along with the rest of the Material panels when a Paint tool is selected.

Each option is shown as a row of five spheres showing the range of effects available with that option. A vertical slider shows the current setting. To change the setting for any Shader option, simply click on the desired new setting. Alternatively, click on the slider and drag it to a new location.

Related Topics:

Ambient Light
Shininess
Specularity
Transparency
Refraction

Ambient Light

This setting simulates indirect lighting by setting the amount of illumination on an object not provided by actual light sources. It thus determines the degree of shading on the object's surface. Low ambient illumination is used for stark, dramatic shading effects. For most objects, about 10% ambient lighting, near the bottom end of the scale, is adequate. The bottom end of the scale represents 0% ambient lighting, and the top end of the represents 100% ambient lighting

Right-click on the scale to access a requester for setting the value numerically.

Shininess

This setting determines the intensity of specular reflections when used with the Phong and Metal Shaders. It also determines standard reflectivity when ray tracing or using environment maps. When used with the Phong Shader, it also determines diffuse illumination, or the amount by which light spreads out on the surface. The bottom end of the represents 0% shininess, and the top end represents 100% shininess. With Phong shading, the bottom end represents 100% diffuse, and the top end represents 0% diffuse.

Right-click on the scale to access a requester for setting the value numerically.

Specularity

This setting determines the relative size of specular highlights on Phong and Metal shaded faces. The bottom end of the scale represents low specularity with large highlights, and the top end of the scale represents high specularity with small highlights. The smaller the highlight, the glossier the surface appears.

Because a change in these settings is reflected immediately in the example sphere, it's easy to experiment and we strongly encourage you to do so, to learn about the many different surface combinations available in **trueSpace**.

Right-click on the scale to access a requester for setting the value numerically.

Transparency

This setting determines how much light passes through an object and how much is absorbed. Possible values range from fully transparent at the top to fully opaque at the bottom .

Right-click on the scale to access a requester for setting the value numerically.

Refraction

This refers to *index of refraction,* a property of curved transparent substances such as glass, crystal and liquids that causes light to bend as it passes through them. This creates visual distortions that can be accurately rendered in **trueSpace** by ray tracing the scene.

Right-click on the scale to access a requester for setting the value numerically.

If a transparent object is set to an index higher than 1 (at the bottom of the scale) and the scene is ray traced, refraction of part of the image transmitted through the transparent object occurs. To raise the index, drag the slider higher.

Texture Mapping

Materials can employ images for a number of different purposes. Images can be applied as texture (color) maps, bump maps to simulate uneven surfaces, such as an orange peel, and as transparency maps to make parts of an object invisible. In addition, images can be used as environment maps to simulate reflective objects.

The three texture mapping methods are, as shown in the Attributes property panel:

Texture Map (Transparency Map)

Bump Map

Environment Map

Before you can map an image onto an object, you should first select the UV mapping method – Planar, Cylindrical, or Spherical. UV mapping is a technique that lets you specify precisely how an image is to be projected onto the object's surface, and **trueSpace**'s intuitive interface for doing so makes it second nature on the first try. You can specify the shape of the mapping space, move or rotate the space, then interactively move and scale the image within that space.

Related Topics:

How to Use Texture/Transparency/Bump Mapping
Texture Map

How to Use Texture/Transparency/Bump Mapping

1. Select an object, then click on the UV tool in the Render Tools group.

2. The UV Map type panel appears with buttons for the three mapping types: Planar, Cylindrical, Spherical, plus the Apply button.   Select the mapping type that most closely resembles your object shape, using the onscreen wireframe representation of the UV space as a guide. At this time you can *rotate* this space with the Object Rotate tool, and when using the Cylindrical and Spherical spaces, you can also *move* the space. Rotation is particularly important, because it lets you place the "seam," indicated by a brown line or polygon, over which images cannot be mapped.

This step determines the shape and positioning of the UV space in which the image is to mapped. The choices are:

Planar

Specifies a rectangular image space, which is squashed and stretched to match the object's cross-section as it is rotated about the object. The image is projected "through" the object, and appears on the "front" and "back" sides.

Cylindrical

The image is mapped onto a cylindrical space, much like the label on a can of food. This space can be moved as well as rotated.

Spherical

The image is mapped onto a spherical space. This space can be moved as well as rotated. Spherical mapping is best for objects like planets.

3. Adjust the mapping space if necessary as described above.

4. Click on Apply. The UV mapping wireframe and panel both go away.

5. Select the Paint tool. You can close the Color panel, but you might wish to leave the Attributes panel open.

6. Select a Texture method from the Attribute panel by clicking on the desired button:

Texture Map (Transparency Map)

Bump Map

Environment Map

Important: In all cases, to select an image file, right click on the respective map button. Select the file name from the property panel, then select an image file from the requester, then click on OK. To temporarily disable an texture map, left-click on the respective Texture panel button. To re-enable the image, left-click on the button again. To access mapping parameters, right-click on the Texture panel button.

Texture Map

The image is literally mapped onto the object surface. That is, its colors replace any colors already on the affected polygons. You can also use transparency maps, with the option to allow transparent areas to show underlying object colors, or to simply be clear.

To select the image file, right-click on the Texture Map icon. This opens the Texture Map Panel. Select the File Name box in the upper left corner to open a file requester for selecting an image file. Currently the program can use files in these formats: .bmp (Windows bitmap), .tga (Targa), and .txr (Rendition antialiased Mipmap texture−see Transparency Map below). The new texture is immediately mapped onto the example sphere in the Attributes panel.

To temporarily disable the current texture map, click on the Texture Map icon. Select it again to enable the image.

Texture Map Panel

This panel, accessed by right-clicking on the Texture Map tool in the Attributes panel, allows setting of the image file used for texture mapping as well as various settings:

Overlay

If a Targa or Texture image file contains transparency information, this can be used either to cause the bitmap to become transparent in those areas (Overlay on), revealing the underlying surface. Or it can be used to make the underlying surface transparent (Overlay off). See Transparency Map below for further information.

U Repts

Sets the number of times the image is repeated in the horizontal dimension. Click on the white box and enter a new value from the keyboard, or click on the double-headed arrow to its left and set a new value by dragging the mouse sideways. Images can be repeated by fractional amounts.

V Repts

Sets the number of times the image is repeated in the vertical dimension. Click on the white box and enter a new value from the keyboard, or click on the double-headed arrow to its left and set a new value by dragging the mouse sideways. Images can be repeated by fractional amounts.

U Offset

Sets the amount by which the image is offset horizontally from the start of the UV mapping space, as determined in step 2 or 3 above. Click on the white box and enter a new value from the keyboard, or click on the double-headed arrow to its left and set a new value by dragging the mouse sideways. The U offset value ranges from 0 (left edge) to 1 (right edge).

V Offset

Sets the amount by which the image is offset vertically from the start of the UV mapping space, as determined in step 2 or 3 above. Click on the white box and enter a new value from the keyboard, or click on the double-headed arrow to its left and set a new value by dragging the mouse sideways. The V offset value ranges from 0 (top edge) to 1 (bottom edge).

Bump Map

The image's brightness is mapped onto the surface as bumps. The brighter the pixels, the higher the apparent bumps, and vice versa (this can be reversed). This effect doesn't actually affect surface height, so bumps cannot be seen in profile.

To select the image file, right-click on the Bump Map icon. This opens the Bump Map Panel (see below). Select the File Name box in the upper left corner to open a file requester for selecting an image file. Currently the program can use files in these formats: .bmp (Windows bitmap), .tga (Targa), .tab (Rendition bump tables) and .txr (Rendition Mipmap texture – see Transparency Map above). The new texture is immediately mapped onto the example sphere in the Attributes panel.

To temporarily disable the current bump map, click on the Bump Map icon. Select it again to enable the image.

Hint: It is very effective to use the same image map for the texture **and** bump map, particularly if colors in the map have smooth transitions.

Bump Map Panel

This panel, accessed by right-clicking on the Bump Map tool in the Attributes panel, allows setting of the image file used for texture mapping as well as various settings:

Amp(litude)

Determines the bump height (positive numbers) or depth (negative numbers). A value of 0 has no effect. Click on the white box and enter a new value from the keyboard, or click on the double-headed arrow to its left and set a new value by dragging the mouse sideways. A good value for the amplitude is 0.1.

U Repts

Sets the number of times the image is repeated in the horizontal dimension. Click on the white box and enter a new value from the keyboard, or click on the double-headed arrow to its left and set a new value by dragging the mouse sideways. Images can be repeated by fractional amounts.

V Repts

Sets the number of times the image is repeated in the vertical dimension. Click on the white box and enter a new value from the keyboard, or click on the double-headed arrow to its left and set a new value by dragging the mouse sideways. Images can be repeated by fractional amounts.

U Offset

Sets the amount by which the image is offset horizontally from the start of the UV mapping space, as determined in step 2 or 3 above. Click on the white box and enter a new value from the keyboard, or click on the double-headed arrow to its left and set a new value by dragging the mouse sideways. The U offset value ranges from 0 (left edge) to 1 (right edge).

V Offset

Sets the amount by which the image is offset vertically from the start of the UV mapping space, as determined in step 2 or 3 above. Click on the white box and enter a new value from the keyboard, or click on the double-headed arrow to its left and set a new value by dragging the mouse sideways. The V offset value ranges from 0 (top edge) to 1 (bottom edge).

Environment Map

Environment mapping makes shiny objects in the scene appear to reflect their environment. As the objects move the reflections change, enhancing the illusion. Ordinary image files can be used as environment maps, and **trueSpace** can perform 1D and 2D (cubic) environment mapping using special image files.

Note: For best results with environment-mapped objects, select the Metal shader from the Attributes property panel.

1D mapping creates the effect of a horizon reflecting on the object's shiny surface. A 1D map file, which has a . t1d file name extension, is essentially a linear gradient. Several .t1d files are included with **trueSpace**.

2D mapping simulates reflections of an actual environment without the time cost of ray tracing. The drawback is that 2D environment map files must be created for each reflective object, and with animations, for each frame as well.

Right click on the Environment Map icon to open property panel. From there select a name to display a file requester for selecting the environment map image file. Currently the program can use images in the .bmp, .tga, .t1d and .txr formats. The new texture is immediately mapped onto the example sphere in the Attributes panel.

To temporarily disable the current environment map, click on the Environment Map icon. Select it again to enable the image.

UV Projection Tool

When you use texture mapping to apply images to objects, the images are actually projected through the objects, and wherever the object's surface intersects with part of the image, it appears there. The image can be projected through the object in a planar fashion, like the label on a box, or cylindrically, like a can label, or spherically, like a planet surface.

This tool permits setting an object's UV space to *Planar*, *Cylindrical* or *Spherical* for texture mapping. The term UV space comes from a mathematical way of describing any point on an object's surface with the parameters U (horizontal distance around the object from a given point) and V (vertical distance around the object from a   given point).

When you select the UV tool, a new UV space, depicted as a wireframe, appears over or around the object. The new UV mapping type is the last used, or if it is the first time in this session, Planar. Note that this is *not* the object's current or default space, which can't be depicted once set.

Related Topics:

UV Map Property Panel

UV Map Property Panel

The UV Map property panel also appears with icons for Planar, Cylindrical, Spherical, plus the Apply buttons. Select the mapping type that most closely resembles your object shape, whereupon the wireframe depiction of the mapping space is redrawn to reflect the change. Using standard Object Navigation controls, this space can be rotated, and with Cylindrical and Spherical mapping, it can also be moved.

When manipulating cylindrical and spherical UV spaces, be aware of the position of the brown line at the outer edge. This represents the mapping space's "seam," and if you move part of a Material rectangle past that seam, it disappears. You can see this happen as you position the Material rectangles (see below).

This step determines the shape and positioning of the UV space in which the image is to mapped. The four choices are:

Planar

Specifies a rectangular image space. Use Object Rotate to reposition the mapping plane, which is squashed and stretched to match the object's cross-section as it is rotated about the object. The image is projected "through" the object, and appears on the "front" and "back" sides.

This is **trueSpace**'s default mapping space, and is automatically applied to newly created objects when UV is selected.

Cylindrical

Specifies a cylindrical mapping space, much like the label on a can of food. This space can be moved as well as rotated.

Spherical

Specifies a spherical mapping space. This space can be moved as well as rotated. Spherical mapping is best for objects like planets.

Apply

To exit UV mapping mode and save the current mapping space, click on Apply or select a different tool. If any textures were previously applied to the object, they are automatically remapped using the new UV space.

Note: Changing an object's shape with the Deformation tool can also change the shape of the object's UV mapping space. To use a known mapping space with a deformed object, re-apply the desired space after deformation.

Material Rectangle Tool

This tool lets you create and apply Material rectangles. A Material rectangle is a sizable, movable rectangular area of any Material, typically a texture map containing a digitized images. It can be overlaid on object surfaces and slid around interactively with the mouse like a decal. Material rectangles are applied in the same UV projection space as the overall mapping .

A Material defines all of an object's surface characteristics, including color, shininess, transparency, texture maps, bump maps, and more. The Paint tool lets you create Materials, and apply Materials to objects a polygon at a time or all at once. The Material Rectangle tool lets you apply as many as eight rectangles of any Material or Materials to an object's surface. These rectangles can be positioned and scaled any way you like, but they move in the same space as the object's overall UV mapping.

If it's necessary to change an object's UV mapping from the default Planar and parallel to the ground, do so before applying Material Rectangles. Otherwise, the rectangles are remapped to the changed UV space, and may become distorted.

When you select the Material Rectangle tool, the object's current Material rectangle, if any,   appears as a 3 x 3 wireframe rectangle on the object's surface. If the object's UV space is Flat or Square, the rectangle is projected "through" the object and appears on opposite sides.

The Material Rectangle property panel also appears. This contains tools for creating and editing Material rectangles.

Related Topics:

Material Rectangle Property Panel

Material Rectangle Property Panel

Move

Lets you move the Material rectangle interactively around the object's surface by dragging the left mouse button. Horizontal and vertical mouse movements translate respectively to U and V movement.

Scale

Lets you scale the Material rectangle interactively by dragging the left mouse button. Horizontal and vertical mouse movements translate respectively to U and V scaling.

U/V

To access the U/V sub-panel, right-click on Move or Scale (above). To disable moving and scaling operations on either the U or V axis, click on the respective button. Click on it again to re-enable that axis.

New

Creates a new Material rectangle, and displays it on the object's surface. Up to eight Material rectangles can be added to an object.

Del

Deletes the current Material rectangle.

< / >

These two buttons cycle through an object's Material rectangles, if there are more than one. If the sample sphere is visible, it is *not* updated to reflect the current rectangle's Material. This makes it easy to set several rectangles to the same Material in rapid succession, by alternating clicks of the < or > button with the Paint button.

Paint

Left-click on Paint to set the current rectangle's Material to the current Material, as shown in the sample sphere. Right-click on the Paint tool to display the Paint Tool property panels: Attributes, Shaders, Color and Sample Sphere.

Note: The current Material can also be set from the Material Library. See Materials on page .

Inspect

Left-click on Inspect to set the current Material, as shown in the sample sphere, to the current rectangle's Material. Right-click on Inspect to display the Paint Tool property panels: Attributes (sample sphere), Color and Texture.

Material Rectangle to Front

When an object has multiple Material rectangles that overlap, select this tool to bring the current Material rectangle to the "top of the stack" of any overlapping rectangles. Normally when rectangles overlap, the topmost is the most recently created.

Light/Camera Tool

Use this pop-up graphic menu to add light and camera objects to the workspace. Light objects are not visible when rendered, but illuminate surfaces of other objects in the scene. Multiple camera objects can be added, and any window can be set to show what any camera sees.

Related Topics:

Lighting
Infinite Light
Local Light
Spotlight
Light Control Panel
Camera Tool

Lighting

trueSpace offers three types of light sources: Infinite, Local and Spotlight (depicted to the left, from top to bottom). Before adding any lights, the default lighting in **trueSpace** consists of several non-controllable infinite light sources.

To add a light source, select the Light tool if the desired new light source type is displayed, or click and drag on the icon to display the pop-up menu, then drag to the desired light type and release the mouse button. When the first light source is added to a scene, the default lighting is automatically turned off.

The user has the option, when ray tracing a scene to allow any and all light sources to cast shadows. Also, when not ray tracing, spotlights can cast shadows, if set to do so, using the fast-rendering shadowmap method. Each light also has its own color, intensity and falloff settings. You can set these values in the Light control panel (see below), which is always open when a light is active.

All added light sources have wireframe representations in the workspace and can be directly manipulated with the Object Navigation tools.

Infinite Light

The infinite light source's only controllable setting is direction or rotation. It can be moved and scaled for improved feedback in the editor, but neither has any effect on lighting. The rays of light from this source cover a scene uniformly, all moving in the indicated direction. Its wireframe representation looks like a straight line with a four-sided cone at one end. The tip of the cone indicates the light's direction. The infinite light in the illustration below is pointing straight down.

Local Light

A local light, also known as a point source, has position but no direction or size. It radiates light uniformly in all directions. Its wireframe representation resembles a star.

Spotlight

A spotlight has direction, set with the Object Rotate tool, and position, set with the Object Move tool. It resembles a cone, and creates a cone-shaped beam of light. The spotlight in the illustration above is pointing straight down. You can adjust the cone angle with the Object Scale tool. You can also, with the Object Move tool, adjust the size of the shaded region between the cone edge and the fully illuminated center cone by clicking and dragging on the green circle at the base of the cone.

Hint: To see how well a spotlight is covering the scene, you can set a window to view the scene from the light's point of view:

1. Add a window using any of the Window menu's commands.

2. In the main view, select the spotlight.

3. Select Camera View from the new window's View Tool pop-up. You can adjust the cone angle and the shaded region interactively from this view, with real-time feedback.

You can use this same technique with any type of light, rendering from the light's point of view window to check the light's intensity.

Light Control Panel

Adding or selecting a light automatically opens the Light control panel:

Related Topics:

Light Color
Light Intensity
Shadow
Shadow Property Panel
Falloff

Light Color

Set the light color by clicking on the color hexagon.

Light Intensity

Set the light intensity by clicking and dragging on the slider. Drag upward to increase the light's intensity, or downward to decrease its brightness.

Shadow

To cause a light source to cast shadows, click on the Shadow button. If ray tracing isn't turned on, only spotlights can cast shadows, using the shadowmap method. This is much faster than ray tracing, so if your animations need shadows but not reflections and refraction, light your scenes with spotlights set to Shadow for improved rendering speed.

Note: If Shadow isn't enabled, a light's rays go "through" objects on which they're cast.

Shadow Property Panel

For further control over shadows, right-click on the Shadow button to open the Shadow property panel:

There are three settings for controlling the shadow type, shadowmap size and shadowmap sharpness.

Shadow Type
Ray

This is the default shadow type for infinite and local lights. For these lights to be able to cast shadows, ray tracing must be enabled via the Settings panels, and of course, Shadow must be enabled. For infinite and local lights, none of the other settings on this panel is relevant.

Map

This is the default shadow type for spotlights. Shadow mapping works without the necessity of ray tracing, and it can be considerably faster. A shadowmap is actually a sort of rendered image, and can be quite large in size. With this method of shadowmapping, **trueSpace** uses a disk file while rendering the image. The disk file for each light can be as large as two megabytes, so you should be sure there's sufficient free space on your hard disk.

Mem

Stands for memory resident shadowmap. This renders the shadowmap in memory, which is faster than standard shadowmapping, but requires considerably more computer memory. If Windows is set up to use virtual memory, it's employed during memory resident shadowmapping.

Shadowmap Size
Low/Med/High

Size in this case refers to the amount of memory used by the shadowmap, not the physical size of the shadow. Smaller shadowmaps are faster to render and use less disk space (or memory). However, larger shadowmaps are sharper, and they look better because they use anti-aliasing − smaller maps may tend to look grainy. For most purposes, Med(ium) is the optimum setting.

Shadowmap Sharpness
Low/Med/High

This sets the shadowmap's "fuzziness."   The lower the sharpness, the fuzzier the shadow. This helps obscure graininess in smaller shadowmaps.

Falloff

This setting, available from icons in the Light control panel, determines the rate at which a light source's intensity diminishes with distance, if at all.

Constant

The default falloff setting for new lights causes no falloff at all. The light's intensity does not diminish with increased distance.

Linear

The light's intensity diminishes at a direct ratio to its distance. For example, if the light illuminates an object with a given intensity at a given distance, its intensity is half at twice that distance, and a fifth at five times that distance.

If the Linear option is selected, the user should increase the light intensity for best results.

Squared

The light's intensity diminishes at a direct ratio to the square of its distance. For example, if the light illuminates an object with a given intensity at a given distance, its intensity is one fourth at twice that distance, and 1/25th at five times that distance. This is the way light works in the real world.

If the Squared option is selected, the user should increase the light intensity for best results.

Camera Tool

This adds a new camera to the scene. The camera can be moved, rotated, and zoomed (scaled) like any other object. A scene may contain as many cameras as you wish. To change a view to a camera's viewpoint, select the camera, then access the window's View pop-up and select the Camera icon .

Render Tool

The Render pop-up menu is found at the left end of each window's tool group. This tool lets you render the current object or all objects to the window whose Render tool you choose, and all objects to a disk image file. There's also an variant that refreshes (redraws) the wireframe view. As with the other tools with pop-up variant menus, you select the variant by clicking the left button on the icon, then dragging the mouse slightly. Then drag the mouse to the desired variant and release the button.

Access the Render Options panel by right-clicking on any Render tool.

Note: Rendering can be stopped by pressing the Esc key or double clicking the righ mouse button..

Related Topics:

Render Current Object

Render the current object to the display.

Render Scene

Renders all objects to the display.

Render Scene to File

Renders all objects in any frame to a as a still image to a disk file in the Targa or Windows Bitmap format, or any sequence of animation frames as an AVI animation file. The Render To File requester appears. This combination requester lets you enter both rendering settings and file information.

Render to File Requester

This requester opens automatically when you select Render to File (above). Settings include file name, output file type and resolution, and animation file parameters.

Related Topics:

List Files of Type

To view available file formats and their file name extensions, click on the box under "List Files of Type:".

File Name

Enter a file name with the proper extension in this box: .tga, .bmp, or .dib (same format as .bmp) for still files; and .avi for Video for Windows movie files.

If rendering a range of still frames, specify a still-frame-type extension and use five characters or less as the primary file name to leave room for the three-character frame number. For example, if you use the name Myani and want to generate .bmp files, you would enter "Myani.bmp" for the file name, and the program would name the rendered files "Myani000.bmp," "Myani001.bmp," "Myani002.bmp," and so on.

Resolution

Renderings can be output at any resolution up to 8,192 x 8,192 pixels. Select Window to render at the same size as the current active window, whose resolution is shown. To render at a different size, select Other and set the desired frame size in pixels in the Width and Height boxes.

Animation

Select Current Frame Only, or All Frames, or to render a specific range, select From and enter a frame range in the boxes to the left and right of the word To.

Super Sampling

Super sampling is a form of anti-aliasing, in which the entire image is rendered at several times the indicated resolution, then "sampled" down to size for improved edge smoothing. Possible settings are None, 2X, 3X and 4X. The higher the setting, the longer rendering takes.

Frame Rate

trueSpace uses a frame rate of 30 frames per second internally. But if you choose a lower frame rate, then **trueSpace** will skip frames to output at the correct rate. (i.e. if you choose 10 frames per second, then only every third frame will be output.)   This is particularly useful for outputting previews of animations at a lower frame rate. When saving AVI-format animations the frame rate is recorded in the file so the playback will occur at the correct speed.

Pixel Aspect Ratio

The Pixel Aspect Ratio setting is used primarily in desktop publishing applications to match that required by certain software. If an image created with **trueSpace** and loaded into another application appears out of proportion, this setting may require adjustment. Consult the application's documentation for the proper ratio value.

Render

Select this button to render and save the select frame or frames. During this time the mouse pointer turns into an egg timer to indicate the computer is busy. You should also see your hard disk busy light activate. When rendering is finished, the hard disk busy light goes out and the mouse pointer returns to the shape of an arrow.

Refresh Wireframe

Forces window contents to be redrawn in wireframe mode.

Render Options Panel

Access the Render options panel which is by right clicking on any of the render variants. This allows you to set several render effects:

Related Topics:

Reflection Threshold (RefThr)
Background Color
Opaque
Background Image
Global Environment
Fog
AntiAlias Level
RayTrace
Draft

Reflection Threshold (RefThr)

This is related to the Shininess setting. When an object's shininess is set below this value, no reflections are traced for it when ray tracing a scene. This helps save time when ray tracing.

Background Color

You can set a solid background color for rendering. To set a color, select the Background Color button. An RGB requester appears:

Set a color with the mouse and sliders, or click on the number boxes and set new values from the keyboard.

Opaque

If the rendered image is saved in the Targa format, it contains an eight-bit alpha channel to define transparency, which can be used in texture mapping in **trueSpace**, as well as in compositing images in other graphics programs. If Opaque is *not* selected, the alpha channel defines full transparency wherever the background appears in the rendered Targa image. Otherwise, the background is rendered in the specified color with no transparency.

Background Image

To set a background image, click on the Background Image File Name button and select an image file with the file requester. If the image is not the same size as the image to be rendered, **trueSpace** automatically scales it to the proper size during rendering.

Use the Background Image Switch to enable and disable use of a loaded background image.

Global Environment

A global environment works like a regular environment map but is automatically applied to all objects that do not have an individual environment map. You can set a solid color or you can specify an environment map. Note that these do not appear in the scene, but are reflected by reflective objects.

To set a solid color, select the Global Environment Color button. An RGB requester appears:

Set a color with the mouse and sliders, or click on the number boxes and set new values from the keyboard.

To set a global environment map image, click on the Global Environment Map Image File Name button and select an image file with the file requester.

Use the Global Environment Map Switch to enable and disable use of a loaded image.

Fog

An optional fog effect affects object color and shading depending on the distance from the "eye" or camera point, creating a convincing illusion of a fogged-out scene.

Fog Switch

Select the Fog switch to turn the fog effect on. An X appears in the white box to indicate that this feature is active.

Fog Color

Use the Fog Color button to specify the color of the fog. Note that this color affects objects only, not the background. For best results, use a solid background, and use the background color for the fog. Use a black fog to simulate distance attenuation and medium to light grays for normal fog.

Fog Maximum Percent

Use this setting to determine the relative fog density at and beyond the Far distance.

Fog Extents

A scene with fog normally consists of three zones: the clear zone starts at the eye and ends at the Near point; the transition zone, in which the fog gradually becomes thicker, starts at the Near point and ends at the Far point; and the "maximum percent" zone starts at the Far point and extends to infinity.   The Near setting lets you set the distance in grid squares to the point where the fog starts affecting the scene.   The Far setting lets you set the distance to where the fog reaches maximum density.

AntiAlias Level

Antialiasing reduces jagged edges in images that should only contain smooth edges. Select the AntiAlias switch to turn the fog effect on. An X appears in the white box to indicate that this feature is active. This pop-up menu offers four levels of antialiasing: 1X, the default; and 2X, 3X and 4X. The greater the antialiasing, the more smoothing of edges, but the longer the amount of time required for rendering.

RayTrace

Enables true ray tracing. Reflective objects accurately reflect their surroundings, refractive transparent objects bend light, and all lights set to cast shadows do so. Ray tracing requires longer rendering times than usual.

Draft

By default, **trueSpace** renders objects and scenes at the full video quality of your display. For faster test rendering at full size but one-fourth resolution, turn Draft on.

Image Utilities

This menu item (accessible from Edit menu) opens a panel with several image conversion functions.

The left side of the panel is concerned with the creation of transparency maps for texture mapping, and the right side contains tools for creating environment maps.

Related Topics:

Transparency Map
1D Environment Map
2D Environment Map

Transparency Map

If you convert a bitmap to a Mipmap texture, you can use it as a texture map, in which capacity it functions as a color/transparency map. The Checker.txr file provided with **trueSpace** is an example of such an image. Currently there is no way to use transparency information without also using color information, nor is there any way to use different images as color and transparency maps.

Note: The Texture Map property panel (see above) contains an Overlay option that determines how transparency maps interact with an object's surface.

How to Create a Transparency Map

1.   From the Edit menu, select Image Utilities.

2.   Click on the box under Input Image and select an image file. Supported formats are .bmp, .tga, and .txr, as above.

3.   From the pop-up under Alpha Conversion, select the conversion method:

None

No conversion is performed.

Intensity

A pixel's gray-scale brightness is used to determine the degree of transparency. The darker the bitmap, the more transparent the resultant texture, and vice-versa. This is the only way to get variable transparency.

Top Left

The bitmap's "first" or top left pixel is used to determine transparency. Wherever that color appears in the bitmap, transparency results.

Black/White

Wherever black or white (respectively) appears in the bitmap, transparency results.

.   Click on Convert Image, then click under Save File as Type: and select a save format (usually *.txr):

Mipmap Texture *.txr

If conversion is performed, creates a color/transparency file that can be used as an texture map. If no conversion is performed, saves an anti-aliased color map. In both cases .txr textures appear considerably smoother in the rendered image.

Mipmap Bump Table *.tab

Creates a special bump-map file that can only be used as a bump-map image (see below). This renders faster than a standard image used as a bump map.

Targa File *.tga

Creates a Targa-format color image with alpha channel (transparency) information added if any conversion was performed.

.   Enter a file name in the file requester that appears and press Enter.

.   When the drive light goes out, map the .txr or .tga file as a standard texture map, or the .tab file as a Bump map. The Attributes panel 3D example sphere accurately displays its effect.

1D Environment Map

A 1D environment map is a special image containing a one-dimensional color gradient. Used with metallic and glass objects it can create colorful simulated reflections at a minimal cost in memory. An Image Utilities function lets you extract 1D environment maps from any image.

How to create a 1D environment map:

1.	Select Image Utilities from the File menu.

.	Use Input Image to load an image file. This file should have the gradient to be extracted along its left or right edge, or vertically down its center.

2.	Choose from the pop-up next to "Column." The choices are Left, Middle and Right, allowing you to choose from which part of the image the gradient will be extracted.

3.	Select the Image Utility panel button marked "1D Envr Map," and in the file requester enter a name for the environment map, followed by .t1d. The file is saved.

4.	The environment map can now be used in Materials with the Environment Map tool in the Attributes panel.

2D Environment Map

A two-dimensional environment map, also known as a cubic map, is a special type of reflection map that is prepared by this utility. It is used to simulate reflection of an actual environment, rather than an image, and is much faster than ray tracing. Six small images are taken in different directions from an object's point of view, then applied to that object as an environment map.

How to create a 2D environment map:

1.   Select Image Utilities from the File menu.

2.   A cubic map is always created from the point of view of a specific object. In the workspace, select the object that will receive the map. There should be objects around it to reflect.

3.   Choose from the pop-up next to "Resolution." The choices are Low, Medium and High, allowing you to select the rendered size of the reflection maps, thus the quality of the reflected image.

4.   Select the Image Utility panel button marked "2D Envr Map," and in the file requester enter a name for the environment map, followed by .t2d. The six different views are rendered on the screen as you watch, then saved as a 2D environment file.

5.   The environment map can now be used in Materials with the Environment Map tool in the Attributes panel.

Introduction

The Animation group contains tools for creating and modifying 3D animations.

Note: Deformation lattice elements can be key-frame animated in the same manner as objects. The term "object" in this section refers to both lattice elements and regular objects.

Getting Started with Animation

trueSpace employs a uniquely powerful and easy-to-use animation interface. Total animation length is automatically set by the last frame in which action occurs. Wireframe animation is played back at as close to 30 frames per second as your computer system can manage.

There are a number of shortcuts to setting up object animation so that you needn't set every object's position in every frame. First, you can draw paths for objects to move along directly in the workspace. Each point you click on can have any number of frames between it and its neighbors, each of which is automatically calculated by the computer. Paths are composed of fully adjustable spline curves, so motion is smooth and natural. Also, you can set up key frames for object motion by simply going to the desired frame and manipulating an object. The computer then automatically creates the motion between each key frame.

Unlike most 3D animation systems, **trueSpace** permits an unlimited number of cameras to exist simultaneously in the workspace. Each camera can be animated separately and tied to a different window. If you want to render different versions of your animation, you can do it all from the same scene file.

For editing animations, **trueSpace** offers an interactive Time Editor which displays actions on a horizontal bar graph. Changing an animation element's duration or position in time is as simple as clicking and dragging.

Finally, the powerful Constraints tools aid in aiming objects at other objects and pointing objects in the direction they're going.

To be able to take full advantage of **trueSpace**'s innovative animation system, be sure to read this section thoroughly and follow the tutorials carefully.

Animation Tool

Selecting the Animation tool opens the Animation property panel, which contains VCR-like controls for playing animations, recording and deleting key frames, and moving between animation frames.   Select the Animation tool with the right button to open the Animation property panel.

Path animation is useful for easily animating object movement, but it has no provision for controlling object rotation and size. In key-frame animation, you set object positions, alignments and scale at critical positions in "key" frames, and then the program automatically moves them between the keys in the interim frames. To set a key frame for an object, simply move to that frame and manipulate the object with navigation tools or a deformation lattice. When you release the mouse button, the X button on the Animation panel changes from ghosted to active (assuming no previous key existed), indicating that a key is set in this frame and can now be deleted.

Animation Panel

Record Key
Unset Key
Play
First Frame
Rewind
Fast Forward
Last Frame
Previous Frame
Next Frame
Frame Number Field
Animation Parameters Panel

Record Key

Sets a key frame for movement, rotation, or scaling−depending on which navigation tool is active−for the current object or the eye at the current frame. Use this function to "lock" an object's behavior until a certain frame so transformation doesn't begin at the animation's first frame.

Unset Key

Deletes the current key for movement, rotation, or scaling – depending on which navigation tool is active – for the current object or the eye at the current frame. This button is ghosted unless there's an active key. For example, if you set a movement key for an object at frame 10, then select the Object Rotation tool, the Unset Key icon becomes ghosted, unless a rotation key had previously been set for the object at that frame.

Play

Renders a animation to screen or disk, in wireframe or solid mode, as specified by the Play property panel settings. The animation is always rendered in real time – each frame is calculated, then immediately displayed or saved.

First Frame

Jumps to the animation's first frame.

Rewind

Jumps to the previous keyframe.

Fast Forward

Jumps to the next keyframe.

Last Frame

Jumps to the animation's final frame.

Previous Frame

Jumps to the animation's previous frame.

Next Frame

Jumps to the animation's next frame.

Frame Number Field

Set the current frame from the keyboard in the numeric field, or by dragging the mouse horizontally on the left-right arrow.

Animation Parameters Panel

Right-click on the Animation tool to open the Animation parameters panel:

Settings here include the animation start and end frame, whether the current object or the entire scene is animated, and looping controls.

Related Topics:

> Object/Scene
> Loop
> Tog(gle)
> Start/End

Object/Scene

This determines whether the current object or the entire scene (all objects) is animated when the Play button is activated. If two or more windows are open, including the main view, Object animates in all windows, but Scene animates only in the active window.

Loop

Repeats the animation forever. Only the Esc key   (or double click of the right mouse button) interrupts it. It can be combined with Tog.

Tog(gle)

Plays the animation forward then backward.

Start/End

These values show the current start and end frames for animation preview. By default Start is set to 0, the first frame, and End is set to the last frame in which animation occurs.

Change either value by clicking on the numbers and entering new values from the keyboard, or clicking on the double-headed arrows and dragging left and right. You can also change these in the Project window.

Path Tool

To draw an animation path, select this tool, then click the left mouse button on each vertex in turn. Each point you click on sets a new spline for the polygon, with an intermediate number of interpolated or "frames" determined by the Segments setting in the Draw Path panel.

The Path tool lets you draw and modify spline-based animation paths in much the same way as creating spline polygons. It can only be used after an object is selected. When the Path tool is activated, the Draw Path panel opens.

If the selected object has no animation information, you're placed in Path Draw mode and can instantly create a path by clicking on successive locations in the workspace.

If when you click on Path the selected object already has more than one key frame of animation information, the path is displayed and you're placed in Path Edit mode, and can manipulate path vertices and handles. In either case you can readily switch between Path Draw and Path Edit modes via the Path property panel.

•   If you use only the Perspective and/or Top views for placing path points, they're all created level with the ground. However, unlike drawing a spline polygon, you can place path points in three dimensions by using different views.

•   While drawing a path, you can switch between adding new points and editing existing ones using the Draw and Edit controls in the Draw Path panel (see below).

•   Unlike spline polygons, it's not necessary to close a path.   When you're finished working with it, select the Path tool again to turn off display of the path.   It remains a spline path, and can be re-opened for editing by selecting the object, then the Path tool.

•   To close a path, click the right mouse button, which connects the last point with the first. At this point, you can still edit the polygon, but you can't add new spline points.

•   A spline path can be added to the Path library whenever displayed. See Path Library for information. Also, you can replace the current path by selecting different one from the Path library.   Use this method for animating different objects with the same path.

Related Topics:
Editing Paths
Draw Path Panel
Spline Property Panel
Spline Parameters Panel

Editing Paths

In Edit mode, you can select any spline path vertex, indicated by a light green dot, by clicking on it, and then can move it in the X, Y and Z dimensions. You cannot rotate or scale path vertices.

When a path is visible, handles are also visible. Handles are the green lines emanating from spline vertices. Polygon endpoints have one handle, while intermediate points have two. Handles can be manipulated interactively with the mouse by clicking and dragging. To control *both* of a vertex's handles, use the *left* mouse button and click on either of the handles' endpoints. To control *one* handle, use the *right* mouse button.

Draw Path Panel

When you select the Path tool, the Draw Path panel opens.

Related Topics:

[Edit](#)
[Draw](#)
[New](#)
[Segments](#)
[Frames](#)
[AllHandl](#)

Edit

To move path points and spline handles, select this button. Draw and Edit are mutually exclusive.

Draw

If, before closing a spline path, you select Edit to modify spline points or handles, you can return to adding points by selecting this button.

New

Deletes the current path and lets you immediately start placing points for a new path.

Segments

Sets the number of interpolated vertices between spline points when drawing a polygon. Click and drag on the arrow button to change, or click on the number and enter a new value from the keyboard. The higher this number, the smoother the outline, and the greater the number of resultant polygons if the polygon is swept.

Frames

This button toggles the display of individual frames, shown as blue hash marks along the path.

AllHandl

Handles are the green lines emanating from path control points. When a path is displayed, this setting determines which handles are visible.   With AllHandl on, all handles are drawn. Otherwise only the handles attached to the currently selected path vertex are displayed. As path vertices tend to be hard to see, this option helps locate the active vertex.

Spline Property Panel

Right-click on the Spline path tool to access the Spline property panel. While drawing a spline path, before selecting any other objects, you can edit spline characteristics with the controls on this panel.

Related Topics:

Spline Presets
Interpolated Value
Local
Global

Spline Presets

The buttons in the top row contain preset combinations of spline settings for fast adjustment of all three settings at once. Also, you can access the Spline parameters panel for numeric settings by right-clicking on any of the preset buttons.

The first preset removes any smoothing, causing the spline segments to act like straight lines. The other two implement smoothing as described by their names.

Interpolated Value

The second row of buttons is for selecting whether the adjustments use location, rotation, or scaling values for interpolation. Normally when you edit the spline settings, you're changing how the program interpolates between the spline points' different location values. Because the spline points' rotation and scaling values don't vary, there is no interpolation possible, so changing settings with either of the two latter buttons active, in this case, doesn't alter the polygon's shape.

When spline points do have different values for rotation and scaling, as in macro/sweep paths and animation paths with rotation and scaling key frames, you can vary those interpolations as well.

Local

By default this switch is on, which means only the current spline is affected by changing settings. To easily identify the current vertex, turn off AllHandl from the Path control panel. Selecting Local turns off Global.

Global

All splines are affected by changing settings via the presets or the parameters panel. Selecting Global turns off Local.

Spline Parameters Panel

To open the Spline parameters panel, right-click on any of the Spline presets buttons in the Spline property panel. This allows numeric adjustment of path spline settings Tension, Continuity and Bias. Change values by clicking on the numbers and entering new values from the keyboard, or clicking on the double-headed arrows and dragging left and right. While any numbers can be set, the most useful values range between -1 and 1.

Related Topics:

Tension
Bias
Continuity

Tension

Controls how sharply the curve bends. When decreasing tension, not only does the curve sharpen, but frames from either side are pushed toward that vertex, causing deceleration into the curve and acceleration out of the curve. High tension decreases curve sharpness, while causing acceleration into the curve and deceleration out of the curve.

Bias

This effect helps the simulation of traditional animation effects such as following through after an action by overshooting (positive bias) and undershooting (negative bias). It helps create discontinuity in a curve, which Tension doesn't do.

Continuity

Affects curve sharpness like tension, but without changing speed.

Constraints Tool

This pop-up menu contains variants for constraining an object's rotation by forcing it to look at another object, or to look in the direction in which it's moving.

Related Topics:

Look At
Look Ahead

Look At

Used to make an object continually realign itself during an animation to remain pointed at another object. When used in animation, the Look At tool takes effect from the current frame until the end of the animation or the next frame in which Look At is invoked. The program accomplishes this by automatically pointing the object's Z axis at the second object, no matter where either is moved.

To use Look At, select the object that is to look at another object, then select Look At, then select the object that is to be looked at. When an object is under Look At's influence, it cannot be rotated manually.

When the active object in the current frame is under Look At's control, the tool icon is highlighted. To turn off Look At for an object under its control, go to the frame at which you wish to regain manual control and select the Look At button again. At this point, if you click on Look At again, you can aim the object at a different object.

Look Ahead

Used to make an object point forward along its motion path during animation. Look Ahead takes effect from the current frame until the end of the animation or the next frame in which Look Ahead is invoked. The program accomplishes this by automatically pointing the object's Z axis along the path, reaiming in each frame. To use this, during animation set-up, go to the frame at which the action is to start, select the object that is to look ahead, then select Look Ahead. When an object is under Look Ahead's influence, it cannot be rotated manually.

When the active object in the current frame is under Look Ahead's control, the tool icon is highlighted. To turn off Look Ahead for an object under its control, go to the frame at which you wish to regain manual control and select the Look Ahead button again.

To set Look Ahead parameters, right-click on the Look Ahead button.

The parameters are:

Bias

Determines the amount of "overshoot" when the object moves around curves.

Tension

Determines the degree by which the object tries to follow its original orientation.

Bank

The animated object "leans" into curves in the motion path. The bank amount can be specified numerically.

All Look Ahead spline parameters are saved with the animation in the Scene file.

Animation Project

 The Animation Project window graphically displays animation actions and events, and allows interactive animation editing. There is a separate horizontal channel for each object in the current scene. The object's name is at the left end of its channel.

A black "action" bar appears in each animated object's channel. This is set by the program to the object's animation frames, but can be changed interactively with the mouse. Change the action bar's start or end time by dragging the beginning or end part of the bar. You can also change both while maintaining the length by dragging the entire bar from its center. In all cases, you're changing the length or speed of the action only−the action itself remains the same. You can also remove the action bar by right-clicking on the action bar and dragging away from the window.   This deletes that object's animation.

Above these is a scale showing the time in seconds. The green bar in the scale indicates the preview range−the part of the animation played when Play is clicked on. This is set by the program to the range of any animation, but can be changed interactively with the mouse. Change the preview start or end point by dragging the beginning or end part of the bar. You can also change both start and end points while maintaining the length by dragging the entire bar from its center.

Also found in the scale is a black vertical triangle. This marker, called the Frame Pointer, indicates the current frame shown in the main view. To go to a different frame, click on the triangle and drag it left or right. As with changing the frame in the Path Control panel, the display updates in real time as you drag the pointer, so you can literally drag an object through an animation.

Below and to the right of the time channels are standard Windows scroll bars for displaying parts of the display currently out of view. There are also two Time Zoom controls:

<> : Zoom In

>< : Zoom Out

These let you see a shorter time period in greater detail and a longer time period in less detail respectively.   Repeated clicking zooms cumulatively.

There are also four buttons for manipulating action bars: Repeat, Stop, Copy and Local.

Repeat

Used to repeat an action from its endpoint. Click on Repeat, then on the action bar that's to repeat. This causes it to repeat its action for the remainder of the animation, no matter how long it ultimately becomes. The repetition is depicted as a gray bar to the right of the action bar, with diagonal hash marks showing the loop points. This bar is not directly manipulable, but can be indirectly manipulated by changing the action bar with which it's associated.

When a motion is repeated, it always continues from the last point rather than returning to the start point. For example, if an object moves forward and right, repeating its motion causes it to continue along the same diagonal path indefinitely. If an object moves forward and right, then forward and left, repeating its motion causes it to continue to zig-zag forward throughout the animation.

After selecting the action bar to repeat, the Repeat button becomes inactive, requiring another click to set a different repeat.

Stop

Stop is used to split or end a repetition. Click on Stop, then on the *repeat* portion of an action bar−that is, the gray part. An extra diagonal line appears at the split point. You can then use the mouse to drag the left-hand bar's right end leftward to truncate its final repetition. You can also drag the right-hand bar rightward to separate the two repetitions. Or you can eliminate the second repetition by right-clicking on it

and dragging outward.

Copy

Used to copy an action verbatim within the same channel. Click on C, then on the action bar to copy. The bar is immediately replicated to its right. This bar can be manipulated independently within the channel, but currently it can't be moved to other channels. Unlike repetition, copied action bars start over at the beginning point of the original action. The "notch" between copied action bars can be used as a reminder of this fact.

Local

Used with hierarchical animation. This tool allows separation of sub-hierarchy motions from overall object motions, so that the sub-hierarchy motion can be edited separately from the overall motion.   For example, if you set up a swinging motion for a robot's arm, you can have it repeat automatically while the robot moves forward.

Note: Once an object's motion is made local, *the motion itself* can no longer be edited interactively.   In the above example, once the robot's swinging arm is made local, the angle of the swing cannot be changed, although Project-oriented parameters (e.g., start time, duration, repetition) can still be edited.

How to Use Local

1.   Set up your sub-hierarchy motion.

2.   In the Project panel, select Local--the button stays depressed.

3.   Select a motion bar in the Project window to be made local.   A new line is added to the Project editor, and the selected motion bar is moved to that line as a local motion.

4.   Continue with other sub-hierarchy motions as above.

5.   After all sub-hierarchy basic motions are established, set up your overall object motion.

How to Record an Animation.

There are four basic ways of outputing an animation.

1. Video for Windows playback.

This is the easiest way to view your animations. Simply select .AVI format when rendering the animation to the file. **trueSpace** will create Video for Windows animation file which can be played back on any AVI player. There are number of graphics cards available on the market which will accelerate the playback up to the full screen size. If a particular card provides video output, your movie can be recorded to the video tape in the real time.

2. Dedicated Hardware for Real Time Playback.

For Broadcast quality output you can choose to render your animation in numbered Targa format. Animation file can then be loaded into a dedicated compression/decompression card (usualy including a hard disk) such as Personal Animation Recorder (PAR) or MAX from Maxtor. These devices can then play back the stored video in real time with broadcast quality output.

3. Single Frame Recording.

This is an older (non real-time) method suitable fot those with the single frame controlers, such as VLAN from Video Media or BCD2000 from BCD. **trueSpace** does not provide direct support for these controlers, but since they typicaly include software which outputs numbered Targa files to an industrial quality VCR, users with single frame controlers should be able to record trueSpace animations output in Targa format provided they also own a broadcast quality frame buffer such as Targa/Vista from TrueVision or Illuminator Pro from Matrox.

4. Playback through non-linear editor.

Just like paint programs such as Fractal Design's Painter, Fauve Mattise or HSC's FPC are ideal for producing images which **trueSpace** can use for texture mapping etc, trueSpace's output is ideal input for non-linear editors, such as Adobe Premier or In-Sync's Razor.

These programs can load trueSpace's output in AVI, BMP or TGA format and compose it with other material to produce broadcast quality presentations. They typically provide a variety of output recoding formats.

Grid Snap

Grid Snap provides discrete adjustable increments of motion (as opposed to smooth motion) when adjusting the position, rotation and scaling of the view, objects, points, edges, faces, and deformation lattice points. That is, Grid Snap affects all Navigation tools. With Grid Snap on, entities can only be moved, rotated or scaled by discrete amounts. When using this option, you'll find it necessary to drag the mouse slightly farther than usual before seeing movement on the screen.

To adjust the Grid Snap settings, right-click on Grid Snap.

Grid Snap is useful for creating regularly spaced arrays of objects, used in conjunction with Copy. Select Grid Snap, then select an object, then select Copy and drag either object one grid unit away. Repeat the Copy and Drag operation until you have enough objects.

Related Topics:

Grid Property Panel

Grid Property Panel

Right-click on Grid Snap to open the Grid panel. This shows the current snap settings in grid squares, degrees or scaling units for the current navigation tool. These can be changed via standard methods. Also, click on the X, Y and Z buttons to enable and disable grid snap on individual axes.

Axes

This tool causes the current object's axis to become visible. This is the pivot point for object rotation as well as the coordinate system used for transformations on the object axis. While an object's axis is visible, the axis can be manipulated like any object, but the object itself cannot. To hide the axis and return to manipulating the object, click on the Axes button again.

To enable manipulation of the object while the axis remains visible, select the Object Navigation Up tool or press the up arrow key on the keyboard. To subsequently hide the axis, select Axes twice.

Normalize Object

These tools, available from a graphic pop-up menu in the Utility group, reset the current object's location, rotation and scale to default values.

Related Topics:

Normalize Center
Normalize Rotation
Normalize Scale

Normalize Center

This tool moves the current object to the world center, coordinate (0,0,0).

Normalize Rotation

This tool resets the current object's angle by aligning its axes with the world axes.

Normalize Scale

This tool resets the current object to its original scaling factor as created.

Extended Utilities

The pop-up at the right end of the Utility group features an assortment of useful tools related to modeling. To subdivide any selected object or polygon(s), select the Quad Divide or Smooth Quad Divide tool from the pop-up menu. There are also tools for mirroring objects, for "decomposing" imported objects into hierarchies, and for triangulating objects.

Related Topics:

Quad Divide
Smooth Quad Divide
Mirror
Decompose
Triangulate Object

Quad Divide

Quad divide subdivides selected polygons by a ratio of n to 1, where n is the number of sides in a given polygon. By quad dividing an object, you quad divide all of its faces. For example, if you quad divide a six-sided polygon, the resultant object will look the same but will have six polygons. To subdivide faces you must be in Point Edit mode with one or more faces selected.

Smooth Quad Divide

The variant tool, Smooth Quad Divide, causes **trueSpace** to attempt to physically smooth the surfaces of subdivided objects, taking advantage of the extra resolution provided by the subdivision. Whether or not this takes place at the intersection of two given polygons depends on the interior angle between them and the Smoothing Angle setting. Smoothed objects tend toward a spherical shape.

Note: With both Quad Divide tools, polygons are subdivided by creating a new point in the center and creating new edges from that point to the center of each side. This is the best way of subdividing objects so that further manipulation with tools such as Deform creates natural-looking rounded forms. If a polygon cannot be subdivided according to this method (e.g., certain concave polygons), Quad Divide doesn't affect it.

Related Topics:

Smoothing Angle Property Panel

Smoothing Angle Property Panel

Right-click on the Smooth Quad Divide button to open this panel, which lets you set the smoothing angle.

Angle

This sets the internal angle between polygons below which smoothing occurs. The higher this number, the more likely that a given internal angle between polygon edges will qualify, and thus the greater the smoothing that occurs. Experiment on a simple object such as a cube with different smoothing amounts to observe the results. With very low smoothing amounts, subdivision may not occur.

The default smoothing angle is 40 degrees.

Mirror

The Mirror tool reverses an object's geometry, essentially mirroring the object. The object's geometry is reversed along the World XZ plane. In the default Perspective view, that's the line running from lower left to upper right.

Mirror eases construction of complex but formal geometric objects. Create one side, copy it, flip the copy, and you've got the other side.

Decompose

Used to and create hierarchical structure in imported objects. Contiguous sections of imported objects with the same surface characteristics are grouped together as hierarchical siblings.

Triangulate Object

This tool divides selected objects or polygons into triangles. This is useful for avoiding rendering problems with objects that are to be subjected to free-form deformation. No matter how twisted the object gets, the triangular polygons can't become non-planar.

Introduction

Attached to the main window is a group of tools known collectively as the View group, containing view navigation and select tools that are also found on auxiliary windows created with the New Window tool. Additional tools found only on the main window are the aforementioned New Window tool, plus tools for rendering and for controlling panels and various program settings.

Note: The Render tool found at the left end of the each window's View group is covered in the Rendering section.

Viewpoint Navigation Tools

The first subgroup of tools to the right of Render is used for navigating and changing the view, and is found on all windows. The viewpoint is the "eye" through which the view is seen when a window is not set to Camera View. It can be positioned, rotated (only in Perspective view) and scaled (zoomed), but unlike camera objects it cannot be seen.

One of **trueSpace**'s strengths is that the user is always aware of his or her position in the 3D workspace and of the changes in this "world."   Movement of the viewpoint is clearly indicated by the perspective change in the ground plane. While the viewpoint is moving, only the groundplane and the selected object (if any) are visible, with the rest of the scene temporarily hidden. When the mouse button is released, the entire scene is re-rendered.

Note: Two additional useful tools for view navigation, Reset View and Look At Object, can be found in the View Utilities pop-up menu to the immediate right of the New Window tool in the Window group.

Related Topics:

> View Select Tool
> Eye Move Tool
> Eye Rotate Tool
> Zoom Tool
> New Window Tool

View Select Tool

Used to set the main view mode: perspective (default), top, left, front or camera. Each window can be set to a different view, and different windows can be set to multiple camera views simultaneously.

You can also open additional windows showing any of these views. See the New Window Tool section below.

Related Topics:

Perspective View
Front View
Left View
Top View
Camera View

Perspective View

Perspective is the default view, being the one in which the program normally starts, and for most users it is the most flexible in which to work. In perspective mode, the point of view or "eye" can be positioned anywhere, pointing in any direction. However, for precise positioning, it may be a good idea to check your set-up from the other, orthogonal views to verify everything is where it should be.

Front View

The front view is orthogonal (no perspective), looking down the world Y axis. The view can be moved and scaled but not rotated.

Left View

The left view is orthogonal (no perspective), looking down the world X axis. The view can be moved and scaled but not rotated.

Top View

The top view is orthogonal (no perspective), looking down the world Z axis. The view can be moved and scaled but not rotated.

Camera View

So named because it is great to see what the camera sees, even when in motion. This is normally done with a camera object, but the camera can be *any* object, even a light source. First select the object that's to act as the camera, then select Camera View. The view then switches to that of the selected object, which "looks" in the direction of its Z axis.

When a window is set to Camera View, the view is adjusted by manipulating the camera object. The View Normalize tool and View Navigation tools are ghosted and not available.

Eye Move Tool

Click on this button to move the view position in the current window. When you change the view position in the Perspective window, you're actually changing the eye position. The left button controls movement along the X axis by horizontal mouse movement, and movement along the Y axis by vertical mouse movement. The right mouse button controls movement along the Z axis.

Some users prefer the Screen coordinate system for moving the view because it seems the most natural-- Z axis movement is "in and out" of the screen. Others prefer the World coordinate system because it provides more natural movement, almost like flying an airplane through the scene. Fortunately, **trueSpace** lets you switch at any time to the coordinate system that works best for the situation at hand.

Eye Rotate Tool

Eye Rotate is only available in the perspective view. Click on this button to rotate the view angle in the current window by dragging with the mouse in the window.

Again, the best coordinate system for viewpoint rotation depends on what you're doing. World coordinates are great for rotating the view around a particular object, or around the world center if no objects are selected--like moving along the surface of a sphere centered on the object of interest. And screen coordinates work like pan, tilt and bank for cinematographers.

Zoom Tool

The Zoom function lets you change the view to see more or less of the scene as necessary. Click on this button to zoom the view in the current window. When you change the view zoom in the Perspective window, you're actually changing the eye focal length. Use either mouse button—there's no zooming on individual axes.

New Window Tool

The New Window tool variants, found only on the main **trueSpace** window, allow opening of one or more auxiliary windows in Perspective, Front, Left and Top views. Auxiliary windows have standard Viewpoint Navigation and View Select tools as described directly above, as well as Render tools. A window can be set to show a Camera view by selecting Camera from its View Select pop-up. These windows can be used for everything the main view can, including object manipulation and animation set-up and rendering. Orthogonal views can be moved and scaled but not rotated.

Windows can be moved by clicking on the blue text box near the left end of the window bar and dragging, and can be resized by the edges and corners using standard Windows mouse techniques. The maximum size of auxiliary windows is limited to about one-fourth of the screen resolution. To close a window, click once on its Control-menu box, then on the Close item, or simply double-click on the Control-menu box.

Related Topics:

New Perspective
New Front
New Left
New Top

New Perspective

Adds a new perspective view window.

New Front

Adds a new front view window.

New Left

Adds a new left view window.

New Top

Adds a new top view window.

View Utilities

This pop-up, found on the main window only, offers two pairs of variants for view navigation and panel control. There are tools for resetting the current view and centering on a particular object, for "docking" all open panels by moving them to the menu bar, and for closing all panels.

Click and hold briefly on this tool to open a pop-up offering tool variants. To select a variant, drag to the desired choice and release the mouse button.

Related Topics:

Reset View
Look At Object
Dock All Panels
Close All Panels

Reset View

This tool let you return the currently active window's view to its default settings. In Perspective view, the default view is the one in which the program always starts, with the "eye" pointed diagonally down at the working grid, situated halfway between the X and Y axes. The orthogonal Left, Front and Top views, which cannot be rotated, are returned to their original position and scaling. If a window is set to Camera view, this tool doesn't affect it.

Look At Object

In Perspective view, this tool rotates the eye to point at the current object. In orthogonal views, which cannot be rotated, Look At Object moves the eye to look at the current object.

Dock All Panels

All open panels are automatically placed in orderly rows immediately above or below any displayed tool groups.

Close All Panels

All open panels are automatically closed.

Settings Panel

Selecting this icon from the Window group opens the Settings panel, in which you can adjust various aspects of program operation.

Related Topics:

Dynapick (Dynamic Pick)
OrthoNav
NoEcho
Top Menu
Titles
SaveState
LoadScene
Threshold Time
Tablet

Dynapick (Dynamic Pick)

With Dynamic Pick on, any time the mouse button is pressed in the design space, an object under the cursor is selected for manipulation. This object can then be manipulated using the current tool by dragging the mouse – no additional mouse click is required. The benefit is that many objects can be manipulated quickly without extra steps required for selecting each.

If two objects are under the cursor, selection alternates between them with each successive mouse click. If more than two objects are under the cursor, selection is most reliable when the cursor is positioned over a specific object's edge or vertex. If no object is under the cursor, the currently selected object is used.

With Dynapick off, before you can manipulate an object or item in **trueSpace**'s 3D workspace, you must first select it by clicking on it with the left or right mouse button *without dragging*, then releasing the button. Turning off Dynapick can help avoid accidental selection of objects while manipulating a complex scene. This setting also applies to point editing, FFD manipulation, and path editing.

OrthoNav

Allows left-button-only navigation in the Front and Left views by simulating a 2D interface. This may be easier for the user, as manipulation in orthogonal views is likely to be in two dimensions.

trueSpace's orthogonal views−Top, Front, and Left−only allow movement of objects and the view parallel to the view plane. There's no in/out movement possible in these windows, because, lacking a perspective view, such a change wouldn't be visible. Normally, when using the the Front and Left orthogonal views, to move an object or a view vertically, you must use the right mouse button, as in the Perspective view. To make this particular aspect of **trueSpace**'s interface a bit friendlier, we've provided the OrthoNav switch. When it's activated, you can navigate in all orthogonal views using only the left mouse button, as in a 2D graphics program. Dragging the mouse horizontally and vertically invokes corresponding motion in the orthogonal views.

NoEcho

With NoEcho off, the default condition, when a wireframe object is redrawn, you can see the process on the screen. With NoEcho on, the object appears only after the full wireframe has been redrawn. Turn on NoEcho for improved feedback with complex wireframe objects.

Top Menu

The default position for **trueSpace'**s menu bar is at the bottom of the screen. If you prefer the more conventional position at the top of the screen, select this item.

Titles

When this toggle button is on, all program panels have standard Microsoft Windows title/drag bars across the top (see the above illustration). These can be closed with a single click on the Close box in the upper left corner.

SaveState

SaveState determines whether **trueSpace**'s workspace is "remembered" when you quit the current session. With SaveState on, **trueSpace** saves everything when you quit. The next time you run the program, it starts in the same state as when you last quit the program, with all objects and motion automatically reloaded, and most panels right where you left them. With SaveState off, the program re-starts in a default mode, with no panels open or objects loaded.

LoadScene

If this switch is turned on when you quit the program, the last scene saved or loaded during the current session is automatically reloaded the next time you start **trueSpace**.

Threshold Time

As you transform objects in **trueSpace**'s workspace, the program attempts to maintain maximum feedback by continually redrawing wireframe objects during manipulations. This is in contrast to other programs, which automatically create bounding boxes during any transformation, reducing feedback and requiring more time for set-up. However, with complex objects and/or many simultaneously open views, forcing everything to continually redraw can cause unwanted delays, in which case the program resorts to using bounding boxes during transformations.

This setting determines the maximum redraw time before a scene is simplified with bounding boxes while transforming objects. The lower the setting, the greater the likelihood that simplification will occur. If you're working with a complex object and redraw time is taking too long while transforming it, lower this setting.

If more than one view window is open, the total redraw time in all windows is taken into consideration. If not all windows need to be simplified, the current window is simplified last. In other words, if you have a small Top view window open and you're dragging a complex object in the main Perspective view, it may appear as a bounding box in the Top view but as a wireframe in the Perspective view.

When working with hierarchical objects, there is an additional level of detail between wireframe and bounding box, which is hierarchical bounding box. This creates a bounding box for each member of the hierarchy, rather than a single one for the entire object.

Tablet

Enables input from supported graphics tablets.

File Menu

Scene: New
Scene: Load...
Scene: Save As...
Object: Load...
Object: Save
Object: Save As...
Exit

Scene: New

This clears all objects from the workspace, and leaves all other settings (e.g. Material) as they are.

Scene: Load...

This restores set-ups saved previously with the Scene: Save As... command, including objects, lighting, animation, and so on. When the Load Scene file requester appears, select the file to load, then click on OK. If you don't see a scene file you saved, select "All Files *.*" from the List Files of Type pop-up at the bottom left of the file requester.

Scene: Save As...

This saves to disk all aspects of the current scene, including objects, lighting, animation, and so on. When the Save Scene file requester appears, select the file to save over, or enter a new file name, then click on OK. The default file name extension, ".scn", isn't required, but the program does not add it to file names automatically.

Object: Load...

This allows loading of 3D object files. Supported formats, automatically recognized by the **trueSpace** loader, include **trueSpace**, Wavefront, VideoScape, LightWave, Imagine DXF (AutoCAD) and 3D Studio ASCII files. **trueSpace** objects usually have the file name extension ".cob", although this isn't a requirement. When the Load Object file requester appears, select the file to load, then click on OK. If you don't see an object file you saved, select "All Files *.*" from the List Files of Type pop-up at the bottom left of the file requester.

To restrict the listed files to a particular type, use the pop-up under "List Files of Type:" in the requester.

Object: Save

Saves the current object over the file from which it was loaded, or the last saved version. If the object was created in **trueSpace**, the Save command works the same as Save As..., opening a file requester so you can name the object.

Object: Save As...

This allows saving of objects in **trueSpace** and 3D Studio ASCII (text) formats. When the Save Object file requester appears, select the file to save over, or enter a new file name, then click on OK.

The format under which files are saved is determined by the file name extension you enter.   If you use ".cob" the file is saved in **trueSpace** format, and if you use ".asc" the object is saved in 3D Studio ASCII format.   To see the available formats and the associated file name extensions, use the pop-up under "List Files of Type:" in the requester.The program does not add file name extensions automatically.

Exit

Quit the program. A confirmation requester appears: Click Yes to quit, and No to return to the program.

Edit Menu

[Undo](#)
[Redo](#)
[Erase](#)
[Copy](#)

Undo

Restores the workspace to its condition before the most recent operation or operations. Undo remembers the last several operations, and undoes them one by one in reverse order each time you select the command. Also works in combination with Redo button to repeat operations automatically. See Redo for further information.

Redo

Redoes the last operation undone by Undo. Repeated clicking on Redo after an Undo causes the operation to be applied as many times as the button is clicked on.

For example, move an object, then click on Undo. It moves back to its original position. Click on Redo. It moves back to where you placed it. Click on Redo again. It moves an equal distance past that point, and so on. This procedure works for any transformation.

Erase

Normally, the Erase command deletes the currently selected object. However, if you're working in Point Edit or Deform mode, Erase de-selects any selected entities, allowing you to select others. Also, in Deform mode, Erase lets you change how the lattice is subdivided, which causes the lattice to return to its original oblong shape.

Use the Delete key as a keyboard equivalent to the Erase command.

Copy

Makes an identical copy of the currently selected object. A copy, unlike a clone, is wholly independent of the original object. The new copy initially occupies the same space as the original, and should be moved to distinguish the two.

Groups Menu

Use this menu to open and close **trueSpace**'s different tool groups, each of which is described in detail in its own section above. When a check mark appears next to an item, that means the group is currently active and displayed.

Edit

Libs

(Object) Nav(igation)

Model

Render

Animate

Util(ity)

Help Menu

[Help Bar](#)
[About](#)

Help Bar

Use this item to toggle display of **trueSpace**'s context-sensitive help feature.

By enabling the Help Bar option from the Help menu, you can take advantage of **trueSpace**'s context-sensitive help mode while learning the program and using unfamiliar tools. When the mouse pointer is positioned over any tool icon, the help bar displays its description plus a keyboard shortcut, used for accessing the tool from the keyboard.

Also, when certain tools are active and the mouse pointer isn't over any other tools, the help bar displays brief directions for using the tool. For example, the Polygon tool's directions are: "Click to add points. Right-click to close polygon."

About

Displays basic program information, including the current display mode. To close the information box, right-click on it and drag outward, or if the Titles switch (see below) is enabled, select the Close box in its upper left corner. You can also close it with the Close All Panels tool   from the Edit group.