Welcome to RealiMation

This help file has been designed to give you all the information you need to start working in RealiMation... click on the green text to jump to the section you want to read.

Before you begin ...

What is RealiMation STE?
RealiView
Conventions

Introduction to 3D Graphics

Please read this section first *if you are not familiar with 3D computer graphics, and its terminology*
3D Computer Graphics and RealiMation

Getting Started

Starting RealiMation
The Desktop Layout
General Working Information
Flying Controls
Drag and Drop

Building your Worlds

Where to start .... *How to get the most from RealiMation*

Reference Section

Frequently Asked Questions *and answers about working in RealiMation - plus some hints and tips!*
Ordering additional copies of RealiMation STE
RealiMation Developer Toolkit *More information on the Software Development Toolkit*
What's new in RealiMation STE V4.10 *Click here for a quick reference list of the new features and functionality in the latest version!*

If you have any questions, or comments, please do not hesitate to contact us at Datapath

Happy RealiMating ....

Conventions

The Help file and the Tutorials use a number of conventions, many of which are standard to Windows ...

- 'Jumps' to different sections are shown as green text with a solid underline.
- 'Pop-ups' to information / definition displays are shown as green text with a dotted underline.
- Menu options are shown in blue text e.g. File | Open.
- Important terms are shown as **highlighted in red**.

Overview of RealiMation STE

Welcome to RealiMation

What's New in V4.10?

The following is a "quick reference" listing of the new features and functionality in Version 4.10. Each is covered in more detailed in this document - the structure and layout of this addendum is similar to the User Manual.

Driver Support

Support has been added for a number of new renderers including: Direct 3D, 3Dfx (Glide) and Rendition Verite. This opens up a greater selection of accelerated hardware platforms for RealiMation. In addition, Open GL drivers for Windows95 are also redistributed and installed with RealiMation STE.

Properties

Properties for all object types include a 'Name' page where you can change the name of an object, without having to use the Edit | Rename command. (This option is still available.) Placement Properties include Level of Detail.

Shapes

The Shape create dialog displays a 3D preview window of the shape. (This is configurable with a new Customise option.)
Shapes Properties contain pages displaying the statistics, locks and the Name. The Level of Detail information is now stored within the Placement Properties.

Cameras

Cameras can be configured to aim at objects, and track them as they move though the world, they can also be attached to placements to follow their actions. Free cameras can now be set up to follow the terrain (e.g climb stairs, hills etc.) or slide as they hit solid objects (e.g. similar to slide cameras in popular computer games). These are toggled on and off using menu buttons.

Lights

Lights are a new object type which can be created individually and added into atmospheric objects. Lights can be associated with placements and actions to create some interesting effects, such as roving spotlights, and car headlights.

Atmospherics

These define ambient lighting, fog effects and contain light sources.

Actions

Actions can be associated with light objects, to create moving light sources.
There is a new Action Property - 'Velocity' for changing the individual x, y, z rates for finer speed controls.

Images

There are a number of new image handling options to configure the use of an image as it is imported, e.g. whether it will be used as a texture, a background image or a depth image. You can then configure texture mapping options, such as bi-linear filtering, mip mapping and mip map blending.

Texture Mapping

There are new options and layout changes on the Texture Map Tool dialog, as well as new manipulation features. You can now edit the texture map tool with rotation, scale and transformation handles (like placement edit handles).

RealiMate Setup

The key RealiMate functions are now on hotkeys: F10 to start and stop a sequence, and F11 to rewind. Time lapse and slow motion can be configured for the RealiMation sequences from the RealiMate setup.
The RealiMate toolbar has been changed to allow horizontal docking on the main button bar. The frame rate information has been moved to the Status Bar and its display is toggled from the Customise | RealiMate menu.

Video compression can be configured when recording a RealiMation to AVI format - choose from a number of different compressors, change the compression quality and frame information to generate the result that best suits the sequence.

New Menus and Options

The menus have been reorganised and a new menu added.
Copying objects is not limited to one object. The Edit | Copy (Ctrl + C) option can be set up for single or multiple copies of objects, a complete hierarchy, even certain object types in the hierarchy.
Edit | Find by Name finds every use of a search string in the current Lister.
Edit | Invert Face Selection selects all faces, except those already selected.
Edit | Reselect Faces for reselecting faces.
A new menu, Optimise has been added with options for improving and optimising the scene including shape and hierarchy reduction.
These options are Merge Vertices (previously found on the Tools menu), Merge Faces, Cull Hierarchy, Merge Hierarchy, Purge RealiBase, Prelight objects and Remove pre-lighting. These are described in more detail below (see 'Scene optimisation functions').
The Pick menu has a new option - Select Visible Faces Only - which forces a 'fence pick' to only select the visible faces of a shape, i.e. not those which appear to be 'at the back' from the viewpoint.

Customise Options

The Customise | Preview configures the previews used for Shape, Material and Placement Properties pages.
Use Customise | Startup to change RealiMation's status as it starts up - select to automatically open the last RealiBase used, a new RealiBase, open an existing RealiBase or to have a blank application window (no RealiBase). From this dialog you can also setup whether RealiMation automatically creates a new view when you open a new RealiBase, whether default materials are created, and the initial size of the 3D view window.
The Customise | Texture Edit menu allows you to enable negative texture coordinates.
The Customise | RealiMate menu displays the options for configuring the RealiMation sequence, e.g. changing the playback, enabling frame rate displays etc.
The Customise | Display Drivers option contains more details about the selected drivers, and for developers has an additional sub-page with more technical information.
The Customise | Web browser sets up the Web browser you want to use, and the Customise | AutoTile page has been modified to allow you to fix the current size of the 3D View windows.

Scene Optimisation Functions

The Optimise menu has new scene optimisations for shape reduction and pre-lighting objects.
The Merge Faces option merges coplanar faces in a shape to make it more efficient. Configuration options allow you to change the coplanar angle tolerance, merge faces of the same colour, and merge the faces of all shapes in the hierarchy.
The Merge Vertices option has been modified to include the traverse hierarchy option.
Optimise | Cull Hierarchy investigates the selected hierarchy and removes any unnecessary objects, e.g. placements and shapes.

Optimise | Merge Hierarchy merges shapes and placements to create a completely new geometry object. (NB: This preserves all transformation information.)
Optimise | Purge RealiBase works through the RealiBase checking usage of objects and deleting them.
The Optimise | Pre-light objects makes the lighting calculations for the selected object once, and then applies them, rather than relighting the objects every frame. This keeps the lighting conditions the same until they are expressly removed (Optimise | Remove pre-lighting).

Level of Detail
Level of Detail is now edited under the Placement Properties, on a new page. The mechanism can be set to switch according to either projected size or distance, depending on the model.

Listers
Expand and contract an entire hierarchy by holding down the Alt key as you click on the expand/contract button.

Desktop Settings Files
From V4.10 the desktop settings file extension has changed from RDS to STE. This should avoid confusion with the RBS extension. NB: Desktop files with the RDS extension will be not be used, so you may need to reconfigure your desktop after installing V4.10. Any files with the RDS extension can be deleted.

Overview of RealiMation STE

Welcome to the **RealiMation Space Time Editor (STE)**, the real time interactive 3D multimedia world builder component of the RealiMation system. Using Windows95 or WindowsNT, the RealiMation STE acts as a gathering point for 3D data, which you can then manipulate into a form suitable for high speed 3D display. Richness can be added with motions, hotlinks, materials, articulation, textures, and much more. It is a real time 3D visualisation and manipulation tool, where the primary output is the RealiBase, which describes all the shapes, views, textures, motion etc. within a 3D world.

The STE is *not* a 3D modeller, rather it is designed to be used in conjunction with existing programs, as shown by its powerful import facilities. The ability to import files from a wide variety of applications, such as VRML, DXF and 3DS, is one of RealiMation's strengths. Uniquely, the 3DS import filter understands and converts *frame based* animation to true *time based* movement. In addition to these you can also import text and other 2D profiles from Windows clipboard, then add depth to them to make realistic 3D models.

You can create some quite sophisticated models using standard geometry models, and then editing them to build up complex objects in the world. Model hierarchy can then be built and adjusted as necessary with other objects either created or imported into the world. Faces can be "tweaked" and adjusted for proper 3D functionality (for example, correct definitions of surface).

The final RealiBase can be then viewed with RealiView (a freely distributable viewer supplied with the STE) or it can be used as part of a specific application that has been created using the RealiMation high level API toolkit.

There are a number of other features within the STE which set it apart from anything else. Its **renderer independence** is quite unique. Select the renderer to suit the application and / or and the target hardware ... even change renderers dynamically! **Time and Motion** - *time* is understood by and is an integral part of RealiBases. *Motion* is also a central part of the data structure, and not simply added on as an afterthought. Additionally you can generate fixed time deltas for time lapse or slow motion effects in your scene. **Advanced Texture Mapping** techniques are extremely advanced and very easy to use, and include control of mip-mapping, perspective correction, filtering etc. Such features are rarely found even on expensive high end workstation software. Images can be brought in from a variety of popular formats including BMP, PCX, Targa, and JPEG. (RealiMation also comes with some image conversion utilities).
Hotlinks allow you to attach external “things” to objects in a scene, e.g. other RealiBases, sound files, other applications, documents (e.g. word processor and CAD files), and even World Wide Web addresses. These “hotlinks” can be triggered when, for example, the user selects the 3D object, or flies the camera through it. The Internet plug-in fully understands hotlinks, adding more to the 3D experience than graphics. Very powerful multimedia presentations are easy to put together using just the STE, and they can even access the Web!

Possible application areas for the STE

There are many different opportunities for using the STE - some of those currently in use include: 3D multimedia, 3D on the Web, Vis Sim, game development / deployment, architectural walk-throughs and 3D art. Please note that this is by no means an exhaustive list.

In summary you can use RealiMation STE to ...

- Create your own virtual worlds for CAD walk-throughs, visualise your prototypes and send them to your clients, prospects or friends;
- Build your own interactive 3D VR Multimedia presentations or training..
- Make your own VR art ... and 3D screen savers for Windows95 and WindowsNT
- Entertain your family and create your own VR experiences.
- Create your own 3D web pages on the Internet.
- Launch other applications from inside 3D worlds - play sound and video files.

- Create 3D VR exploration stories for kids..!
- Output your RealiMations to AVI to integrate them into your video presentations.

The possibilities are endless ...

The Concepts Behind RealiMation

Working with RealiMation

Datapath

RealiBase - What is it?

The RealiMation Database, or **RealiBase**,   can be considered as one of the main parts of RealiMation. - It is the heart and real core of the system.

Created by the Space Time Editor (STE), a RealiBase contains all the information that is used to define the virtual world, views, models, motions, textures, background bitmaps, effects etc.   (RealiBases can also be created by independent applications developed using the full RealiMation VSG (Visual Simulation & Game toolkit.)

Once created, the RealiBase calls the initialisation functions of the RealiMation libraries which takes care of the rest - so we have built in as much flexibility as possible into RealiMation.   Far from just being a visual database as in other older systems, the RealiBase is:

Extensible

It allows the application developer to add, modify and delete objects from within the application.   Many other systems do not allow this - once a database is released from a world builder, it is cast in concrete. This is **NOT** the case with RealiMation.

Processor Independent

It is not "locked in" to any particular CPU or Operating System.

Multi-Instancing

It can be split across a network of geometry processors with only the relevant parts occupying each CPUs valuable resources.

These factors make the RealiMation system totally flexible.

Overview of RealiMation STE

RealiView

The Concepts Behind RealiMation

Working with RealiMation

RealiView

RealiView is a freely distributable, platform independent viewer for RealiMations.   Once you have created your world, you can then distribute it to colleagues, clients or even friends for them to view on their own computers ...

Where Can I Use RealiView?

RealiView is available on a variety of platforms, including Windows 95, WindowsNT (currently Intel and DEC Alpha only, although there are plans to support PowerPC in the near future), MSDOS, and Silicon Graphics workstations. Porting to other platforms is an ongoing process.

What about the Web?

Latest versions of RealiView also include a plug-in for **Netscape Navigator** and **Microsoft Internet Explorer 3** to deliver real time 3D access to the World Wide Web, and also understands VRML files for true Web compatibility.

What about AVI?

RealiMations can also be recorded to '.AVI' format, for playback.   However, RealiView offers more flexibility by virtue of its compact data size and the ability to interact with the world.
For example, we created an AVI file of Newton's cradle - it ended up as a 17 Megabyte file - the corresponding RealiBase was just 17 Kilobytes!   Therefore RealiView is a more efficient and compact method of transferring concepts and ideas around!

RealiView is installed automatically during the RealiMation installation - it is also supplied in a separate directory on the CD.

Working with RealiMation

The Concepts Behind RealiMation

Overview of RealiMation STE

RealiMation Developer Toolkit

RealiMation (TM) is the full developers suite of software designed by Datapath to ease the tasks of creating real time 3D Visualisation, Simulation, and Game (VSG) applications. These can run on a wide variety of hardware from low end PC's up to multiprocessor networked workstations (e.g. DEC Alpha), leaving the cost/performance tradeoff decision to the developer.

RealiMation is setting the new standards for Visualisation Simulation, Games and Multimedia development.

Key Features

- Platform Independence
- Ease of Use
- Multi-channel
- Scaleability
- Flexibility
- Extensibility
- Rapid Application Development
- Selective Visual Quality

Key Benefits

- Reduced time to market
- Reduced costs
- Structured, management controlled development
- Re-useable assets (content)
- Minimal changes between platforms
- Easy deployment on new platforms
- Improved performance trade off decision making

Vis Sim Applications as Data

Basically *all* simulations, virtual environments and even 3D CAD systems exhibit common characteristics. For example, while many developers may be using different libraries that can draw 3D, they are all doing very similar things with those libraries.

In oversimplified terms, these include:

- Taking 3D model data from external sources.
- Manipulating model data into the correct form for the target environment.
- Building model hierarchies.
- Writing behavioural programs for models and implementing them.
- Converting scene data to polygons and sending them to the rendering pipeline.
- Setting up the rendering pipeline and controlling lighting and what is seen in the view.
- Controlling multiple views and keeping them in sync.

Although there doesn't seem to be much involved in this list, each of these often represents many man-months of effort. However, most of the functionality is dealing with model data and its delivery to a screen, on time and with the correct shape, and behaviour. It is this view of simulated environments as data, a true virtual world, that makes RealiMation an exciting development and delivery tool for developers.

The RealiMation Developer Toolkit contains a special version of the STE which can be used in conjunction with the development environment. Please contact Datapath for more information.

Concepts

Overview of RealiMation STE

RealiMation STE Desktop

The Concepts Behind RealiMation

The RealiMation library, RealiLib, provides a set of functions for defining and manipulating three dimensional shapes and their movement over time.

The fundamental building block of a RealiMation application is an ***ID**,* a unique handle given to objects of the following types: views, instances, geometry, paths, atmospherics, lights, cameras. These objects are used to describe a virtual environment, called a RealiBase.

A **view** object contains everything needed to describe the appearance of a rendered scene. Views contain a list of instances describing the shape information to be rendered, a camera object, and an atmospheric object.

A **camera** object defines the viewing projection to transform the three dimensional scene onto a two dimensional display surface. The same camera can be attached to more than one view at once. The position and orientation of a camera can be varied over time by attaching a path object to it.

A **light** object describes a particular light source type.   A number of lights can exist as part of an atmospheric, or attached to instances, paths etc.

An **atmospheric** object describes the lighting conditions that apply in a view. These conditions include light sources, and weather effects such as fog.

A **placement** object defines the position and orientation of a geometry object, or shape. This position and orientation can be automatically varied over time by attaching a path object to the placement.

A **geometry** object defines the actual shape of items to be rendered, in terms of three dimensional points and faces. Geometry objects, or shapes, can contain a set of placements of other shapes, so defining a geometry hierarchy.

An **action** object defines motion. It consists of a number of nodes, each of which specifies a position, orientation, and rates of change of position and orientation, at a particular time value. The position and orientation of objects is interpolated between these nodes as the application program runs.

Working with RealiMation
RealiMation
Drag and Drop
Geometry Hierarchies
Shortcuts & Hot keys

Datapath

Datapath Limited is a world leading innovator in the field of computer graphics, combining state of the art expertise in both hardware and software design. The company maintains a tight, highly motivated team of specialist graphics engineers with over 100 man years of experience covering all areas of the computer graphics and displays industry.

With this extensive wealth of knowledge, Datapath's expertise in the field of computer graphics is recognised as being unsurpassed. Datapath has been designing and supplying graphics display systems to the world's largest and most demanding companies and institutions, since 1982, and has become one of the most respected and successful companies in the graphics industry.

The size of the company has been carefully controlled in order to maintain a sharp focus on leading edge graphics technology. By working closely with our partners (customers, suppliers and associated companies) and particularly by having involvement in both hardware and software areas, we achieve the benefits of scale and coordinated technological strength.

As new technology advances, so we take this on-board to improve the performance and features of our products to benefit our customers. With a continuous development programme, we pride ourselves on our support and responsive nature towards our customers and their changing needs.

Importantly, in addition to this, Datapath has experienced continuous profitability assuring success and continued growth in an advancing industry.

Datapath has a long and very successful history in the computer graphics industry. Founded in 1982, Datapath has been designing and supplying high performance, high quality graphics display systems to the world's largest and most demanding companies and institutions.

Background

Datapath was founded in 1982 by its three present directors, Brett Butcher, Steve De'Ath and Tony Jones, who had all worked together as electronics engineers at Rolls Royce. Initially established to offer consultancy and custom design services to industry, Datapath soon moved into the design of sophisticated graphics terminals capable of quality colour displays for use in CAD applications - the beginning of a long and successful future in the computer graphics industry.

Datapath's maxim of Excellence by Design is continually at the forefront of the company's work. High standards of quality are ensured through high levels of *independence*, *dependability* and *quality*.

INDEPENDENCE: Being wholly self owned, and thus self funded, underwrites Datapath's total independence from negative external influences

DEPENDABILITY: Datapath consistently achieves the highest levels of technical merit, with qualified, experienced staff at all stages of product development and manufacture.

QUALITY: The highest standards form an integral part of the production processes with strict quality control in all areas. All processes are controlled by Datapath at all stages from design, through development and manufacture to packaging and despatch. Datapath was awarded the prestigious BS5750 /ISO 9001/EN29001 Quality Award and the TickIT mark for software in August 1992, proving that a Datapath product is a quality product.

Power Groups

Datapath markets its product areas under the Power Group banners. These identify new areas of business using existing skills and expertise gained over years in the industry. Today's activities can be categorised into three main areas, which are outlined below.

Power Graphics

This banner covers Datapath's activities in the field of home branded graphics plug-in cards and

continues to exploit the superb wealth of knowledge expected from Datapath graphics products. The main thrust of Power Graphics is core graphics card development, design, manufacture and support. Datapath products are intended to be specialised and to uniquely address niche market areas.
In addition to the latest ranges of graphics accelerators Datapath has a strong history of extensive driver support in other, more vertical markets, e.g. CAD CAM. Both AutoCAD and MicroStation have been supported by Datapath for the last decade along with many other CAD applications, which are now only associated with the Windows environment. With all this experience Datapath is well positioned to advise on all aspects of graphics software applications and environments.

Power Software

Datapath's hardware activities have always involved software development. Indeed the software team is the largest single group within the company. Over the years, the type of software projects undertaken have evolved from writing terminal emulators (VTxx, Tektronix 4014 etc.) to CAD drivers (AutoCAD, MicroStation and as many as 30 others) to GUI drivers (Windows, X-Windows, NT ,'95 etc.) From time to time driver software has been licenced to other graphics card companies around the world.
From this background the software department has successfully designed standalone software products, such as ***TWIN* for Windows** and RealiMation.

***TWIN* for Windows** is the world's leading multiple screen Windows display technology to offer users flexibility and productivity from their Windows operations. Key market areas for this technology include financial institutions where live data can be displayed on one screen, and custom financial applications can be viewed simultaneously on the other, under one session of Windows, with complete freedom of movement between the two.

REALIMATION - Since 1990, when Datapath developed the Merlin (i860 RISC processor based 3D graphics board), the company has been involved in 3D software development. This first manifested itself as a 3D Viewer for AutoCAD, then addressed the problems encountered in fulfilling a number of simulation projects (ATC, marine, low-cost flight simulation, artillery etc.) and has lead to the development of RealiMation, a unique Visual Simulation and Game development toolset.

And finally, ***Power Projects*** encompasses Datapath’s extensive abilities and expertise in hardware and software integrated designs. Several major projects and OEM contracts, including a number of Virtual Reality and Simulation projects, have already been undertaken under this banner and many more are on the way.

Power Projects offers the combined skills of the other aspects to deliver fully integrated project managed solutions, and can offer customers our expertise in hardware and software, bringing together individual components for specific tasks.

For example: the Belgian Air Force air traffic/pilot training simulator project was undertaken by Power Projects and used graphics accelerators from Power Graphics and REALIMATION from Power Software.

Additionally, components from external sources can also be managed. For example: in a financial contract, Datapath supplies ***TWINOrion-LCD*** display controller and special ***TWIN*** screen display and digitiser software combined with LCD panels and specialist digitisers from other companies to produce a totally integrated project managed solution.

The Benefits

Datapath has a number of key areas of excellence that set is apart from others in the industry.

Datapath is a **European based** company, with all aspects of design development *and* complete manufacture carried out in Europe. A long established history in the computer graphics industry is borne out by a strong technical base and a comprehensive, technically lead product range.

The Datapath hardware product range is indeed extensive, from S-VGA Windows accelerators, through powerful 2D and 3D Windows and CAD accelerators on all bus architectures to the H2000 - an ultra high resolution display controller capable of resolutions up to 2048 x 2048 - ideal for radar and simulation.

Technical Support: Complete computer controlled order processing and despatch systems ensure speedy processing of orders - efficient and accurate. More than this, the same systems enable product tracking for on-going support. With a direct technical support hot-line, manned by a highly specialised technical support team, support issues can be dealt with quickly and easily.

Additionally our Web Site and Bulletin Board Service operate 24 hours a day, 365 days a year, holding information and new product releases, as well as providing a communication path to our software engineering team when the offices are closed.

Datapath's strong customer base includes many of the world's recognised Blue Chip companies: BBC, British Telecom, British Gas, British Airways, Luftwaffe, Siemens. Datapath also has a number of OEM customers for whom we have designed and implemented complete turnkey systems. These include British Aerospace, Ferranti, Marconi, GEC, Hughes Rediffusion Simulation and the Belgian Air Force.

From the very first terminals to the most advances and powerful controllers Datapath has been dedicated to providing the maximum in graphics performance and quality efficiently and effectively With an ability to manage costs whilst maintaining technical integrity, Datapath is determined to continue to lead the field and the international marketplace.

In summary Datapath has a commitment to excellence - to provide complete customer service and support without compromise.

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Copyright Statement

Overview of RealiMation STE

Introductory Guide to 3D Computer Graphics

Although we all live and work in a 3D environment, our perception of 2D graphics is clearer than our understanding of the more complex concepts of 3D. The aim of this section of the manual is to introduce some of these basic 3D concepts, and explain how RealiMation uses them to construct 3D virtual world scenarios.

One of the important things to remember about working in 3D is that you can view a scene from any angle, at any time, at any magnification. Different 'cameras' can be used to give different view points from any where in your 3D world - even easier than in real life!

What is a virtual world ...?

A virtual world is a digital representation of a real world. The human mind understands three dimensions with shapes or 'objects' moving around and exhibiting actions or 'behaviours' in relation to others. A virtual world allows us to do this digitally.

While the term 'world' does not necessarily mean something of planet size proportions, (although it could do), it defines the limits of the creation. For example, a world could be microscopic, the size of a large city, or involve interplanetary sized interactions. The user makes the choice.

There are a number of key elements that go to make up a 3D virtual world which will be explained in some detail in this section of the online help.

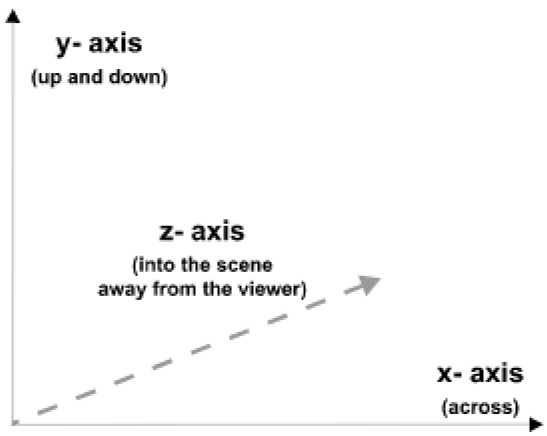
For example, firstly we need to understand the basics of **3D coordinate systems**, **axes** and **positions** in space. Then, once the world is set up, shapes and models will be included. There are built up from defined faces - so we will look at explaining **faces**, **normals** and **lighting**. The different methods of manipulating and organising these shapes, including the use of **geometry hierarchies** will be described. The scene and all its components are then displayed on the screen using a method called **rendering**. This, along with all the other concepts will be described in some detail.

Please remember, this is intended as an introductory guide to the concepts behind 3D computer graphics. If you have any problem understanding these concepts, please take time to re-read this section before moving on to the sections describing how RealiMation uses these concepts to build 3D virtual worlds.

Coordinate Systems, Points, Axes and Position
Faces, Directions and Appearances
Lighting
Projection

Coordinate Systems, Points, Axes and Position

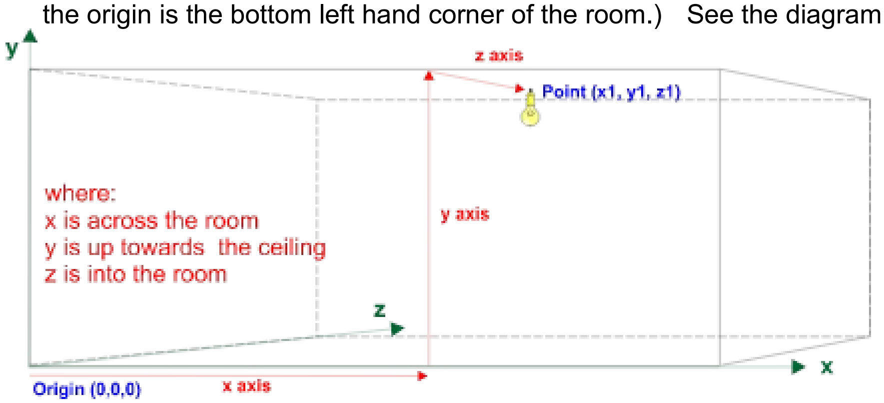
To give the desired effect, 3D objects should be displayed with depth or perspective, to bring realism to a scene. We do this by using points and axes to determine position.



Within RealiMation, we use three perpendicular axes, which are conventionally labelled as x, y and z axes and the distances that form the position of the point are referred to as the x, y and z values. We also adopt the ***left hand rule***, where, as you can see from the diagram, the z axis points *into* the screen. (This is also often referred to as a Cartesian Coordinate System.) We will use a simple analogy below to describe the basics of how such a coordinate, or point, system works.

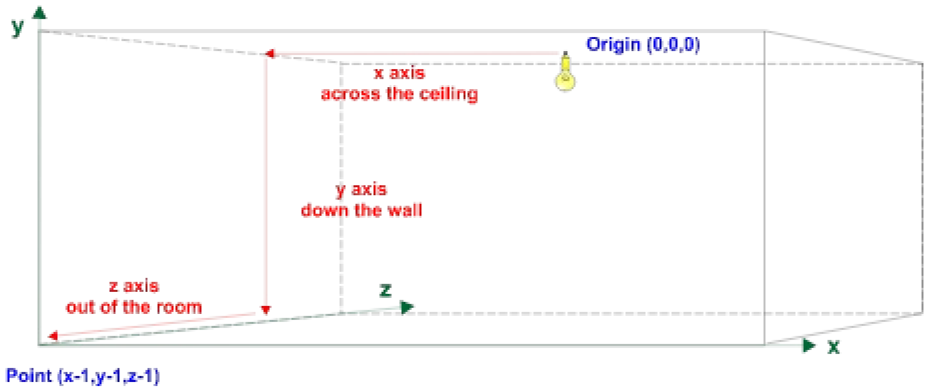
Example:

Taking a room with four walls, a floor and a ceiling - this is our imaginary, or virtual, world. Any point within this world, in this example a light bulb, can be specified using three distances - *across* the front, *up* towards the ceiling, and then *into* the room.
These three values define a coordinate, or point, and are measurements from the origin (in this case the origin is the bottom left hand corner of the room.) See the diagram below.



If we were to change the origin to another part of the room, then the distances to the light bulb (our point) will change as well. The direction in which we measure these three distances to the point defines an axes system.

Distances do not need to be shown as positive values. For example, if we make the position of the light bulb our starting point, or origin, and our destination is the bottom left hand corner, then the values are all negative. This is shown in the diagram below.



Points outside our room can also be readily defined. So points in another room or another building can be defined with respect to this origin, which is known as our **world origin**. Therefore, we can say that everything in our world is measured from this world origin.

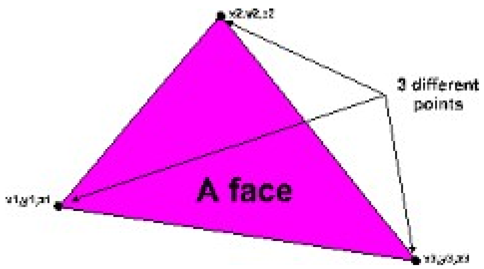
It is important to note that the units of measurement in RealiMation are not specified. You can use metres, yards, feet, kilometres. RealiMation is not tied to one type, and the size of the world is infinite.

Once we understood the coordinate systems, we need to look at how objects are created and how to position them in our world, so we need to look at faces, directions and appearances.

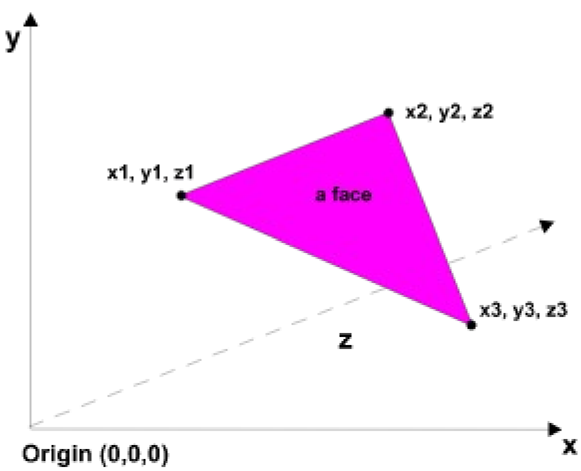
Introductory Guide to 3D Computer Graphics

Faces, Directions and Appearances

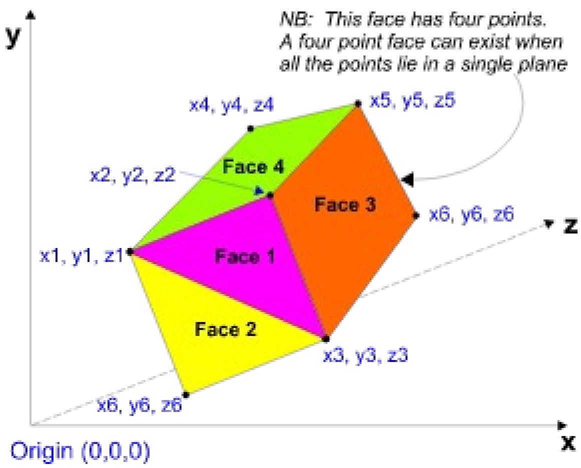
A shape, or model, is made up of a number of **faces** which form a representation of the shape of the object we want to work with. A face can be regarded as a list of points which define its outline, where each point is defined relative to a local origin. The points on a face are all planar, i.e. exist on one flat plane.



Faces are made of materials which give the underlying colour of the face. We will look at materials in more detail later in this document.



The individual points which make up a face have a position relative to the origin (0,0,0) as shown here.



Faces are the primary building blocks for shapes and models. You can define multiple faces which are used to build up more complex shapes and models for positioning in your virtual world.

The faces, and hence complete models or elements of models are defined around a local origin.

The concept of a local origin is very important. It is used as a reference point for placing shapes and models in the world both individually, and as part of an extended hierarchy, allowing complete flexibility.
When the shape is added into the world, the local origin is referenced to the **world origin**. So, as we move shapes within the virtual world, we only change the local origin, rather than the position of each individual face.

Hierarchies work in the same way, where sub-shapes with their own local coordinate system can be based around their local origin. The x, y and z values are therefore defined in relation to a **local axis system**. The position of the local origin could be anywhere within the shape, and a common place for it to be located is at its centre.

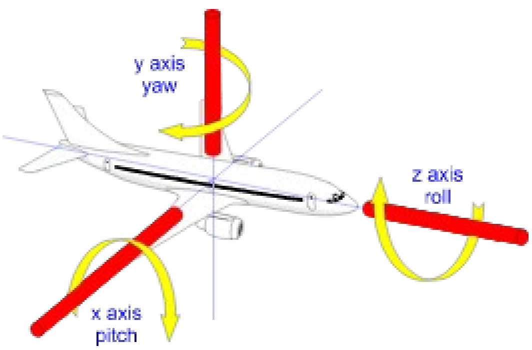
Once we have knowledge of our shapes, then we can look at orienting them.

Orienting Shapes

A shape not only has an origin defined by a point in space, but it also has an **orientation**. Most real world shapes have a logical 'upright' orientation and some can be considered as having a logical 'front', for example, aircraft and cars, i.e. you can think of an object's orientation as 'the way that it faces'.

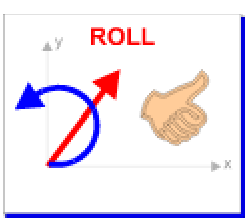
Orientation applies to all objects in the virtual world - models, lights, cameras etc., and can be defined as 'a measure of the angular rotation about each of the three axes' - the RealiMation Space Time Editor allows these angles to be specified in degrees.
As the distances along each axis are labelled x, y and z, so the labels for the rotations are known by terms from the world of aviation: pitch, yaw and roll.

Pitch is a rotation around the **x-axis**, **yaw** is a rotation around the **y-axis** and **roll** is a rotation around the **z-axis**. This is shown in the simple drawings below:

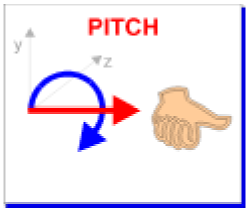


The point and the orientation define the **position** of the aircraft. (NB: Although the axes may appear to be positioned differently compared with our first axes diagram, the directions are in fact the same, but this representation with the axes positioned in this way makes the description of roll, pitch and yaw easier to visualise.

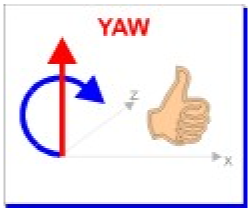
There are rules for determining orientation known as the left hand and right hand rules. RealiMation uses the ***left hand rule***. The diagrams below demonstrate how to use your left hand to show roll, pitch and yaw. In the diagrams below, the direction of the thumb is shown with a red arrow and the movement of the fingers is shown with a blue arrow.



LEFT HAND: Thumb points inwards (along z axis), and fingers curl around 'under' in a clockwise direction following the blue arrow.



LEFT HAND: Thumb points out (along x axis), and fingers curl 'over' and 'under' the thumb in the direction of the blue arrow.



LEFT HAND: Thumb points upwards (on y axis), and fingers curl around to the right in the direction of the blue arrow.

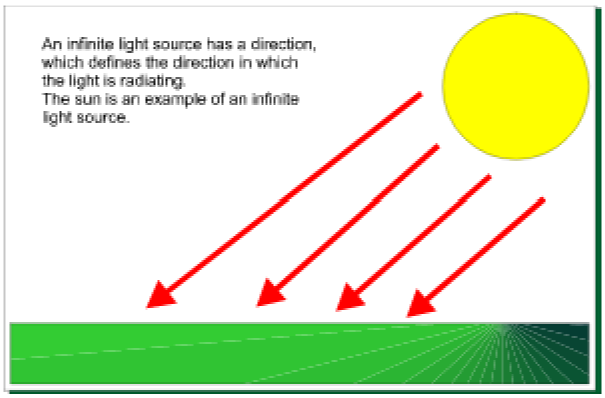
Now please move onto ....
Lighting

Lighting

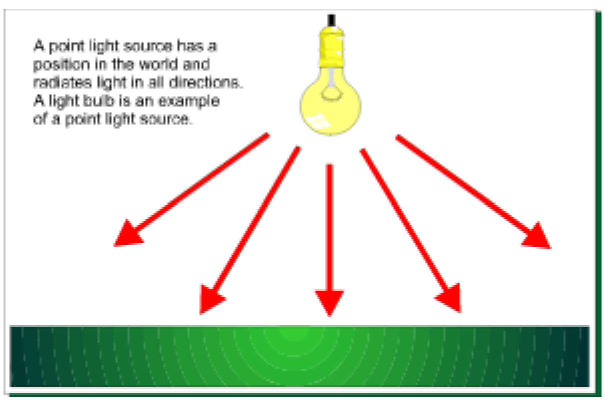
Lighting effects, or atmospherics are provided to illuminate geometry in views and are very important to the final appearance of a virtual world. An “atmospheric” object encapsulates all the information needed to describe the lighting effects in a world, including setting up and positioning different light sources, controlling the ambient light and describing other effects such as fog.

There are four main types of light sources which can be used in a virtual world to give different atmospheric effects - ambient, infinite, point and spot.

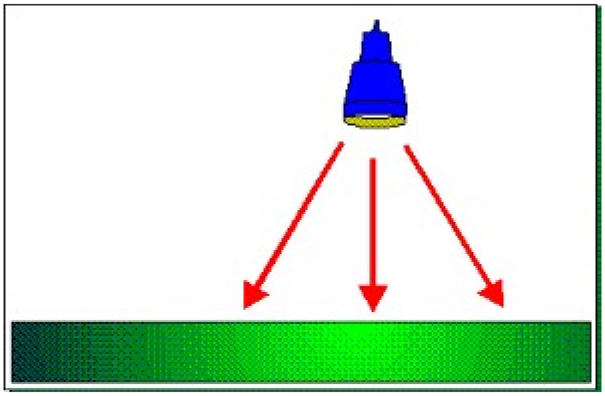
Ambient light is general background lighting, without any radiation direction.



Infinite light sources have direction which define the direction in which the light radiates. An example of an infinite light source is the sun, as seen from the earth.



Point light sources have a position somewhere in the world, and this type of light source radiates light in all directions. An example is a naked light bulb.



Spot light sources combine the different properties of both infinite and point light sources - light is radiated from a given point in a given direction.

Changing the atmospherics can have a dramatic effect on the appearance of a shape.

Now please move onto ....Materials and Textures

Materials and Textures

While the outward appearance of objects is largely determined by lights (showing colour, highlights, and depth effects) materials and textures play a large part in lending realism to the scene.

Individual faces, and subsequent shapes are made from materials. These materials define the appearance of a shape or model on screen.
Materials can be made up of several surface properties - for example a base colour, an emission colour, transparency and light reflectance.

Reflection

Many real world surfaces are at least somewhat reflective - most types of metal and glass are partially reflective, as are some plastics.
Reflection is where the light is almost 'thrown back' from the surface - for example, a mirror is so reflective that it takes almost all its colour from the environment around it. Atmospheric effects and materials work together to determine how a shape appears when lit. Altering the different reflection, or reflectance, options: (usually ambient, diffuse and specular) and changing the transparency and shininess of the colour will make a considerable difference.
Specular is the reflectance value - i.e. the amount of light falling on to the object and reflected away. The viewer's angle, the object and the lighting effect the specular effect.
In the real world, most objects show some highlights when they are illuminated. These bright spots or streaks are simply direct reflections of light sources, for example the sun glinting off a chrome bumper will show up a strong highlight.
Different objects have different types of highlight / shininess. For example, metallic objects have small, bright highlights, while plastic usually has dim large highlights, whereas unpolished stone generally has no highlights.
Diffuse light is scattered in all directions, for example a matt surface is diffuse.

Transparency

When light strikes an opaque surface, it bounces off. When light strikes a semi-transparent surface, some bounces off, but some passes through - i.e. you can see through a transparent object. Glass, water and clear plastic are examples of semi-transparent materials.
An opaque surface is 0% transparent - no light passes through it. At 100% transparency, a surface is completely invisible, regardless of any other settings

Colour

Altering the colour (red, green and blue) values and the intensity of a light source has the most obvious effect on the shape or model. It is often possible to alter these values for any light source, including the ambient settings.

Emission

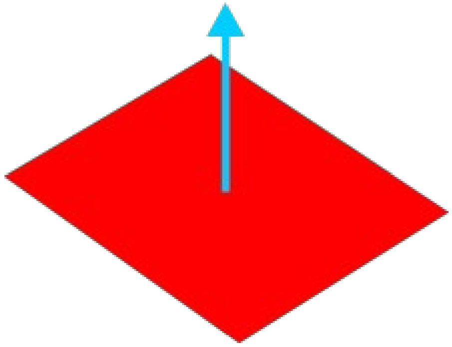
The emission colour is a constant colour, which is not affected by atmospherics. You can change emission to set up glow effects, where there is little atmospheric illumination. For example, rendering windows at night where light needs to be emitted.

Additionally images can be added to materials as textures. A texture is simply a bitmap image which can be 'mapped' onto part or the whole of a face or faces to bring realism to an object. For example changing a green face to a textured one to give the effect of grass, or using a brick effect for buildings.

Now please move onto ....
Face Directions

Faces, Direction and Displays

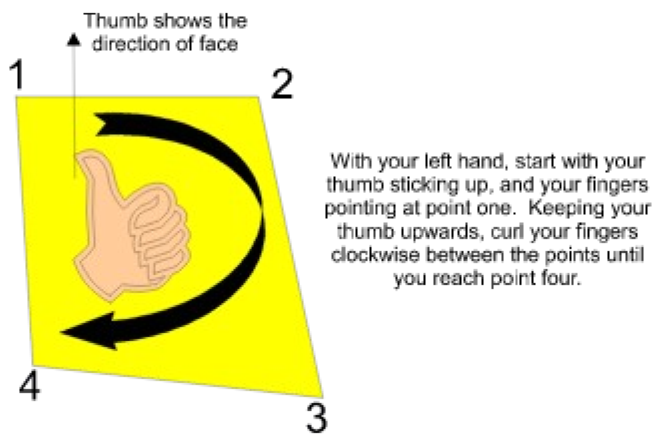
Each face in a representation of a shape must be planar, i.e. all the points defining a face must be flat. These points are also known as **vertices**. Each face has a direction - i.e. it 'points' one way, out of the face. The direction of the face is also known as a **face normal**.



This direction is important because it is used in determining the way that the face is displayed. This direction is set when the face is created by the order of the list of points (or vertices) which define the face. (Don't worry, all this is handled automatically by the modelling package you are using!) However, we can go some way to finding out his direction, by using the left hand rule once more. NB: These points, or vertices, also have a direction, known as the **vertex normal**. We will look at these in more detail later on.

Left hand rule

Supposing our face looks like the one below, where each point is numbered in order of creation (from one to four).

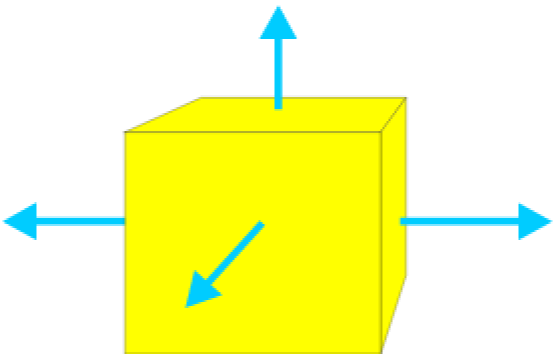


1. Start by stretching your left hand out, with the tips of your fingers pointing towards the first point.

2. Curl your fingers around, following the points from 1 through 2 and 3 to four.

3. You will notice that your thumb points up and out of the face, in the same direction as the face.

The direction of a face is very important because it defines whether it is 'inside' or 'outside', i.e. whether the face is visible from the viewpoint or not.



Taking a cube as an example, the blue arrows show the direction of each face - therefore, we can conclude that the direction of each face is outwards.

As you move around the outside of the cube you will always see a face pointing towards you. When a 3D shape is displayed on screen, every face is drawn, including those faces where the direction is away from the viewpoint. Because all the faces are drawn we can move our viewpoint to any angle including underneath or inside the shape and look at it still seeing a 'solid' shape.

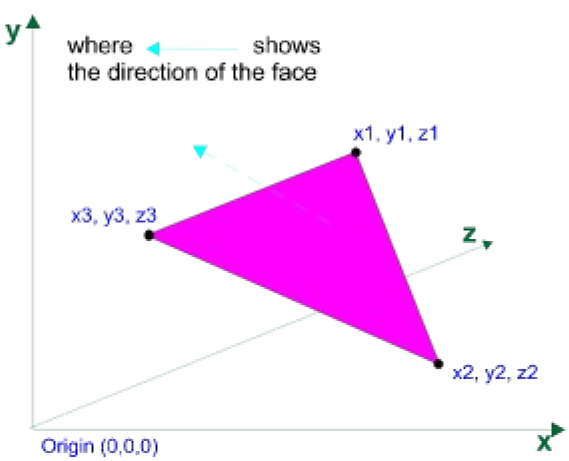
Example

The file teapot.rbs can be viewed from any angle. If we were to view the inside of the teapot through the lid, we can see the inside of the teapot wall, even though the direction of the faces away from the eye. The teapot appears complete from whichever view angle we use.

However, drawing every face can be very expensive in terms of processor time, particularly as on average only half the faces of a shape need to be drawn. To try to reduce system overheads, we can employ a technique called **back face culling.**

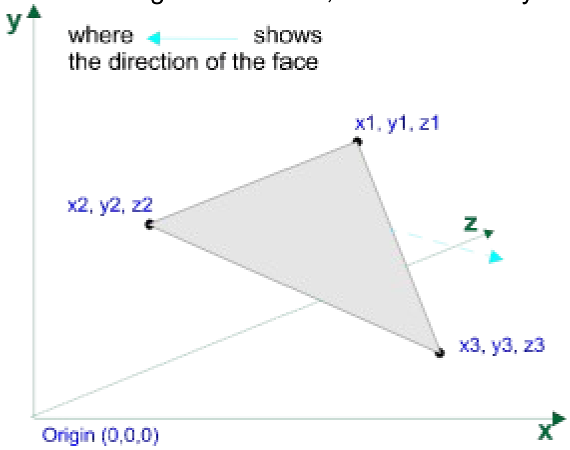
What is back face culling and why use it?

Back face culling is an efficiency tool, designed to reduce system processing overheads. It does this by investigating each face normal, and calculates its direction.



If the face's direction is pointing more towards the viewpoint than away from it, then the face is drawn on screen.

If the face's direction is pointing more away from the viewpoint than towards it, as in the diagram here, then these faces can be determined as being unlikely to be making a contribution to the appearance of the final image.   Therefore, these faces may be discarded.



The teapot model came from a file where there is no face normal definition so there is no 'inside wall' - it is just a 'shell'.   While this speeds up the display processing, by only drawing the faces on the outside, it means that we cannot look at the pot from the inside when back face culling is turned on.

Example

There are some cases where we do not wish to perform back face culling.   Using teapot.rbs again as an example, we can enable 'back face culling'.   As we orbit around the shape and look inside the pot through the lid as before ... the image we see has changed.   The back face culling has discarded the faces which it has calculated as not affecting the final image, i.e. those which make up the far wall. This means that we can now see right through the teapot to the spout.

So, while back face culling does have advantages in terms of reduced system overhead, it also has disadvantages in that it can discard faces we need to see, giving a false impression of the final image.

Shading

In addition to back face culling, the direction of a face normal is also used to determine the colour that is used when displaying the face, when lights are applied.

Flat shading calculates one colour for the entire face.   Because each face normal is different it produces a different colour, which gives an obvious 'faceted' appearance.   For example if you look a cylinder which has been flat shaded, you can clearly see the individual faces, where the face normals are producing different, solid colours.
To produce a smooth surface, we need to vary the colour across the entire surface of each face.   This uses the normal information at each vertex, and all vertices   sharing a common point should have the same vertex normal.
The resulting image is a smooth shaded representation of the same cylinder, where we cannot distinguish the different faces.

Now please move onto ....
Projection

Projection

Once the shape has been created and its display effects chosen, it needs to be positioned, or **projected** onto the monitor display screen and then drawn, or **rendered**.

In real life we view our worlds with **perspective projection**. While we do it unconsciously, the process involved is quite complex. It takes into account the distance of each vertex of the face from the viewing position, i.e. objects in the distance appear smaller than similar sized objects positioned in the foreground.

Parallel projection ignores the distance between object and view position, thus giving a projection similar to draughtsman's drawings.

There is a special case of parallel projection, called **orthogonal projection** which is where the viewpoint is restricted to the axes of the coordinate system.

A good visual example of the different types of projection is to look at the 'vanishing point'.

For example, imagine a road in a world. With perspective projection, as the road disappears into the distance, it seems to narrow down to a tiny point before it disappears. This is the traditional perspective projected view.

If the same road is being shown using parallel projection, then the world appears to have no depth, and so the road seems to continue running forever, without narrowing to a point.

The most common projection method used in 3D computer graphics is perspective projection, but RealiMation allows you to use both types.

Whichever projection method is used the resulting 3D face is converted to a 2D polygon for on screen display. This because the display screen is only 2 dimensional, and thus can only display individual faces in 2D.

Now please move onto ....
Rendering

Rendering

Rendering is the process for filling polygons with colour to give realistic results for shaded images. Rendering processes take the colour information at each vertex and face normal information and determine the type of shading to use. Flat shading fills the polygon with a solid colour throughout, whereas smooth shading involves the interpolation colours between vertices to give graduated fills.

Now please move on to ..
Hidden Surface Removal

See Also:

Display Drivers

True Colour Displays

Hidden Surface Removal in RealiMation

Faces in a scene are rendered in an unpredictable order. This means that faces which are actually behind others may in fact be rendered last, and so appear on top of faces which are actually in front. Because this can result in an incorrect image, there is a process to work around this.
Hidden surface removal determines which faces lie behind others, and as its name suggests, removes them, so that they are not drawn at all. That is, only the front faces are drawn / rendered. Hidden surface removal can be calculated using a number of different techniques. A common method in use is **depth, or z- buffering** which works on an individual pixel basis determining the visibility of each pixel on the screen.

Now please move on to..
Geometry Hierarchies

Hidden Surface Artifacts

This section describes some cures for visible artifacts of hidden surface removal. (These are sometimes referred to as "sorting problems".)

The Problem

With certain models, cameras, and renderers, both developers and users of the RealiMation STE may notice that it is very hard to get accurate hidden surface removal.
This manifests itself where some parts of the scene which should be at the back "poke through" other parts.

Explanation

All of the renderers currently supported by RealiMation use a technique called z-buffering to determine which parts of a scene are in front and which are behind others. Different renders have different degrees of accuracy in the buffer.

For example, the RenderWare driver has what is called a 16 bit z-buffer, where each depth value of an object is converted to a 16 bit integer. This equates to a whole number between 0 and 65,535. In other words, there are only 65,535 discrete depth values available. When one polygon is being rendered, at each pixel its depth value is compared to the stored depth at the same pixel. If the current polygon pixel is closer to the eye than that stored, the new pixel is plotted, and the depth value for that pixel is stored in memory.

Because there are only 65,535 discrete depth values, numeric rounding errors in the display pipeline may cause the same depth value to be calculated for two otherwise separate polygons.

This effect may be exaggerated due to the way that perspective interpolation of depth works. When using a perspective camera (which happens by default), depth values are not mapped evenly to the 0-65535 range. Due to the mathematics of perspective projection, depth values "bunch" closer to the eye than far away. What actually happens is that one-over-z is interpolated when polygons are rendered. This means that there is more likelihood of objects clashing.

Solutions

Use a Different Renderer

A quick fix is to use one of the other renderers, such as OpenGL, that use a 32 bit z-Buffer. The disadvantage here is that, unless you have some extra hardware acceleration, these other drivers are not as fast as RenderWare.

A 32 bit z-Buffer gives many more discrete depth "buckets" - in fact over 4 thousand million. This gives much finer resolution for the hidden surface removal than the 65535 "buckets" available with a 16 bit depth buffer.

Use clipping planes effectively

The Z-Buffer range (be it 16 or 32 bit) is mapped to the physical distance between a camera's front and back clipping planes. In other words, if the front plane is 10 units away, and the back plane is 15 units, objects at the front plane will have Z-Buffer values of around zero, and objects at the back plane will have Z-Buffer values of 65535 (assuming a 16 bit Z-Buffer).

The distribution of values will bunch up towards the front clipping plane, however, due to the mathematics of perspective projection (as mentioned in the previous section).

The clipping planes of a camera can, therefore, become very important parameters to generate quality imagery. You should try and put the front clipping plane as away from the camera position as possible. Also, set the back clipping plane to get as tight around your scene as possible.

Take care of your model measurements

The unit system in RealiMation is arbitrary. By convention, many people use meters when using RealiMation. However, if you are creating your own models with your own program, say, you should ensure that you do not use lots of very large numbers which never get anywhere near zero. A common occurrence among developers who have been using other tool kits is to define everything in a 32 bit integer coordinate system. These numbers have no meaning in the real world, and are there for the convenience of the computer, not the user.

RealiMation's coordinates, however, are floating point numbers, so you can put in the values that a user would understand (e.g. meters). This is a much more user-friendly way of working.

Display Drivers

Geometry Hierarchies

Typically, 3D scenes are made up of multiple complex objects which are often modelled individually. Building up large, complex scenes without any recognised structure would be very difficult, so we use 'geometry hierarchies' to simplify the organisation of multiple objects.

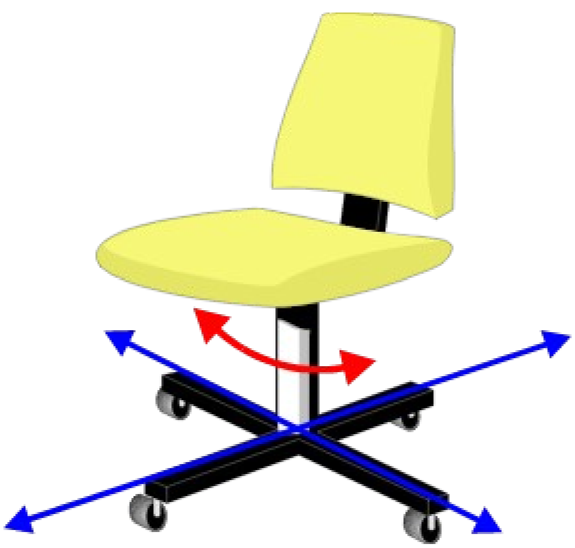
There are two key benefits from the use of hierarchies - handling very large, multi sub-shape models and manipulating articulated models.

Large models

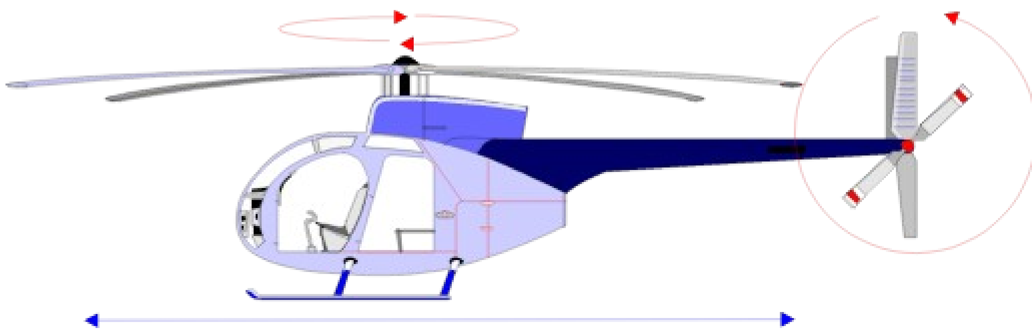
Often large models are created from individual, multiple shapes where each shape may have independent characteristics attached. The behaviour of these shapes may also impinge on other component shapes.
With so many different components, we need to make use of hierarchies, where we can link subcomponents under a top level or 'parent' object or name tag.
Using hierarchies makes moving or manipulating simpler and easier and allows us to keep the position of each individual shape relative to others.
Different attributes can still be attached to the different models within the hierarchy, without affecting other shapes or objects at different levels.

Articulated models

Some of the models in 3D may be articulated, i.e. have joints and movement. Typical examples include cranes, and swivel chairs. More advanced articulations include sophisticated engine designs individual components turn independently of other moving objects within the same main model.



In this example, the arrows show the direction of the different sub-shapes of the main overall swivel chair. The red arrows show that the chair 'swivels' from left to right. It does this independently of the casters which can move in the direction of the blue arrows as it swivels. If we did not use a geometry hierarchy, this would be very difficult to manipulate.



A helicopter is a larger example of an articulated model. The red arrows show how the different subcomponents, i.e. the rotor blades, turn independently of each other.
Not only that but by using a geometry hierarchy we can add a behavioural action to the entire model, and to get the helicopter to fly around the world while the rotor blades turn continuously, keeping their position in relation to the body of the helicopter. This is shown by the blue arrows.

Working with Hierarchies

A hierarchy is created as objects are introduced into a scene and linked together. These objects can be displayed as a tree of elements, traditionally in a vertical arrangement where each element may be represented by an icon. One of the benefits of this is to allow you to see how different objects are related, and how they are built up in a scene.

The top level of the hierarchy can be thought of as a container for sub-objects within the world - this level is sometimes called the 'root', since this can be considered as the base.

Normally, any number of objects can be attached to others in a hierarchy - and behaviours and actions can also be assigned in a similar way.
Using our previous example of a helicopter, the hierarchy might look something like this:

Helicopter
- ***Body***
  - ***Cabin***
- ***Main Rotor***
  - ***Main Blades***
- ***Tail Rotor***

where **Helicopter** is the main object, (parent) and **Body** is a sub-shape, (child). We can attach other shapes, like the **Cabin**. You can attach different attributes and actions to the child objects, without them affecting shapes further up the hierarchy. For example attaching a spin action to the tail rotor will not directly effect the body. However, if you attach a general movement at the Helicopter level it will affect the child objects attached to it.

A simple analogy for you to consider is Windows Explorer, where the file structures are arranged in a hierarchy. You can add and delete files from the hierarchy without actually affecting other items in the 'listing'.

Further Reading

If you are still feeling confused about 3D computer graphics, then please re-read this section, to make sure that you are comfortable with it. Additionally, you may wish to do some further reading on this subject. If that is the case, we would like to recommend that you consult the following publications:

Foley, J.D. and Van Dam, A.
Computer Graphics Principles and Practice 2nd edition
Addison - Wesley Publishing Co Inc., 1990
ISBN: 0-201-12110-7

One of the best ways to learn about 3D computer graphics is to start using RealiMation - we recommend that you start with the tutorials, and work through them.

Additionally, you can continue through the sections to read 3D Computer Graphics and RealiMation

3D Computer Graphics and RealiMation

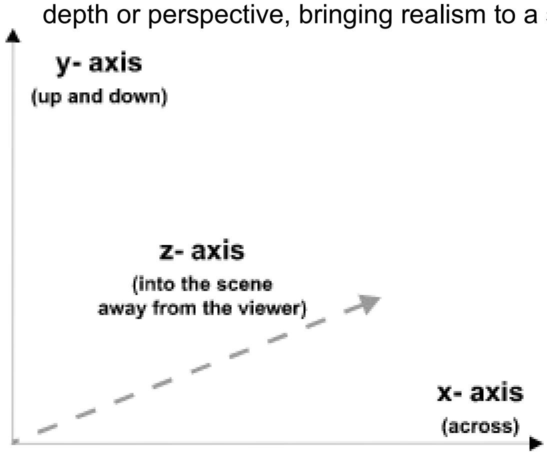
RealiMation STE is a sophisticated virtual world builder and editor and now that we have described and understood a little of the basics of 3D computer graphics, we need to take each of those concepts in turn and relate them to using RealiMation STE.

Creating Virtual Worlds

This is really what RealiMation STE is all about. You can build up your own virtual world, of any size and dimension filled with whatever models, scenery and images *you* want. RealiMation uses 'Views' as the mechanism for overseeing and 'viewing' the new world you are creating.

Coordinate Systems Points, Axes and Position

RealiMation uses the Cartesian Coordinate System (the x, y and z axes) to display the 3D worlds with depth or perspective, bringing realism to a scene.



All our shapes and models are defined with a local origin, which is defined in terms of our world origin. Remember .... with RealiMation *you* specify the units of measurement, and the size of the world is infinite.

Faces, Directions and Appearances

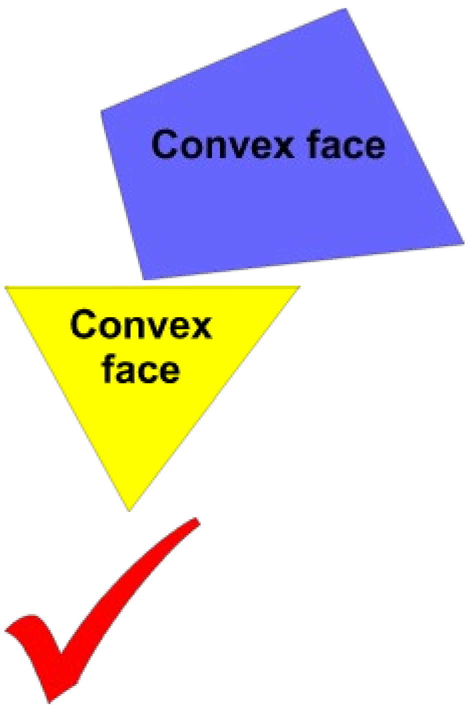
All shapes, or models, in RealiMation are made up of faces which form a representation of the shape we want to work with.
As with all 3D graphics, faces are a list of points, or vertices, defining an outline, where each point is defined relative to a local origin. This local origin is used a reference point for placing shapes and models within the virtual world and is referenced to the **world origin**.

Orienting shapes

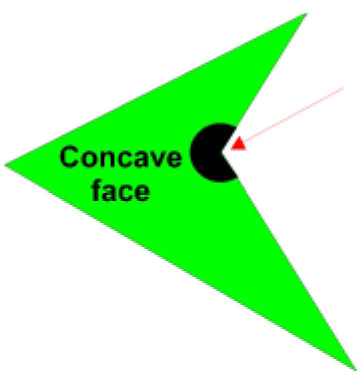
RealiMation uses the left hand rule for determining the roll, pitch and yaw (orientation) of shapes and models.

Face Types

RealiMation supports triangles and convex, coplanar quadrilaterals i.e. faces, which are flat and have four or more points. (Triangles are convex and coplanar implicitly.)



NB: Although RealiMation can also support concave faces, this support is not always within the capability of the sub-renderers used.



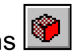
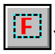
Where this angle is greater than 180 degrees.

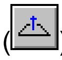
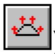
Most of the import filters in RealiMation convert the incorrect faces to be convex and coplanar automatically.   The concave or convex settings are handled directly by RealiMation, and so require no user intervention!

Face Normals

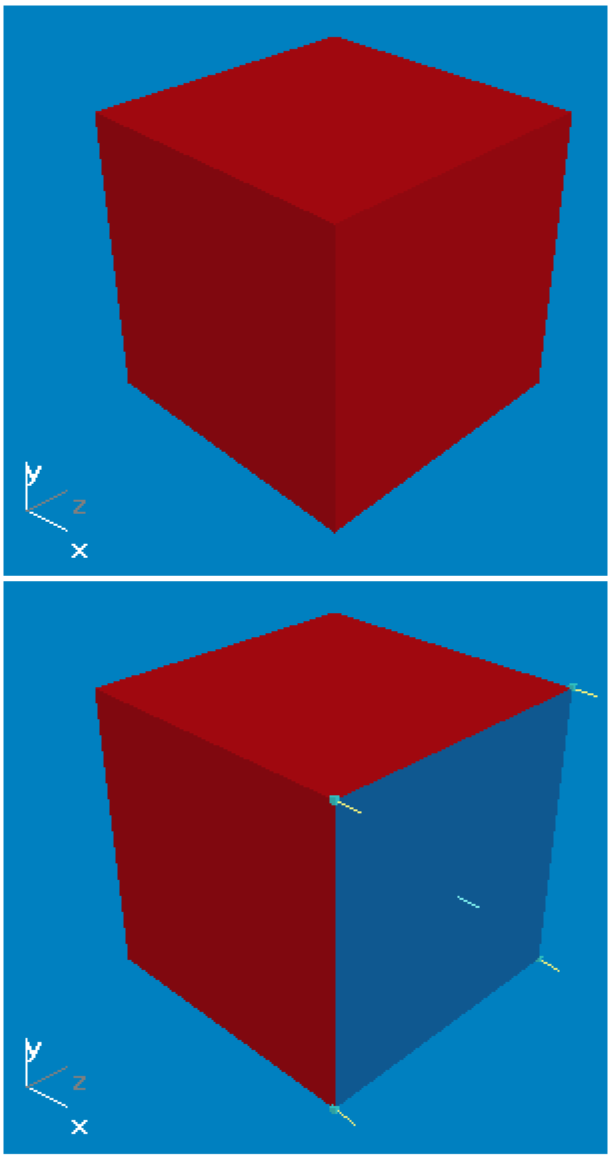
Every face has a direction (i.e. it 'points' one way.)   This direction is also known as a **face normal**. (NB: We use the left hand rule to work out this direction).   The face and vertex normal information is implicit in the models - and is determined by the modelling application - RealiMation simply takes this information and interprets it.

Some file formats (e.g. DXF) for 3D data do not provide a mechanism for storing face and vertex directions consistently.   This can cause problems when the data is imported, and is a common problem for any 3D graphics package.   However, RealiMation has substantial tools for correcting any such anomalies. You can investigate and display the normals for any face of a model.

Select the face or faces (Pick | Shapes | Snap to .. Face or the toolbar buttons  and )

Select to display the face and / or vertex normals View | Show Face Normals () or View | Show Vertex Normals ().

The images below show how faces change to display the normals. Selected faces are displayed blue, and vertices are displayed with a small cyan (light blue) cube. Normals are always displayed as wires which point in the direction of the face.
NB: Face and vertex normals are displayed using different coloured wires to avoid the two being confused.
(All the colours and sizes of the markers can be changed in the Customise menu.)



Shape with no faces selected and Face selected, all normals displayed

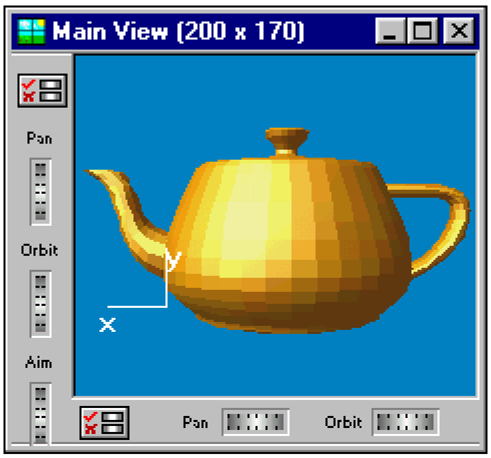
Back Face Culling

RealiMation allows extensive use of back face culling for any number of shapes and models within our virtual world.

Shading

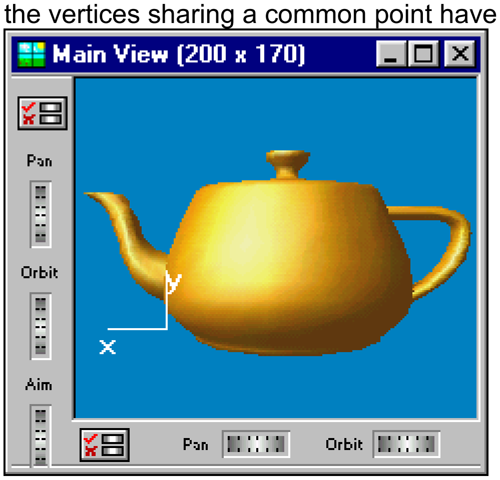
RealiMation uses the face normal to determine the shading, lighting or illumination. (Illumination determines the colour used for displaying the face.)

Flat shading calculates one colour for the entire face, giving a 'multifaceted' appearance. This is because there is a considerable difference in the direction of each group of faces. If we consider a small group of faces, each one has a different surface normal which will usually produce a different colour.



For example the teapot on the left has been flat shaded, and clearly shows the individual faces, where the face normals are producing different, solid colours.

To produce a smooth surface, we need to vary the colour across the entire surface of each face. This is called smooth shading, and needs to determine a colour at each vertex of a face and be sure that the vertices sharing a common point have the same vertex normal.

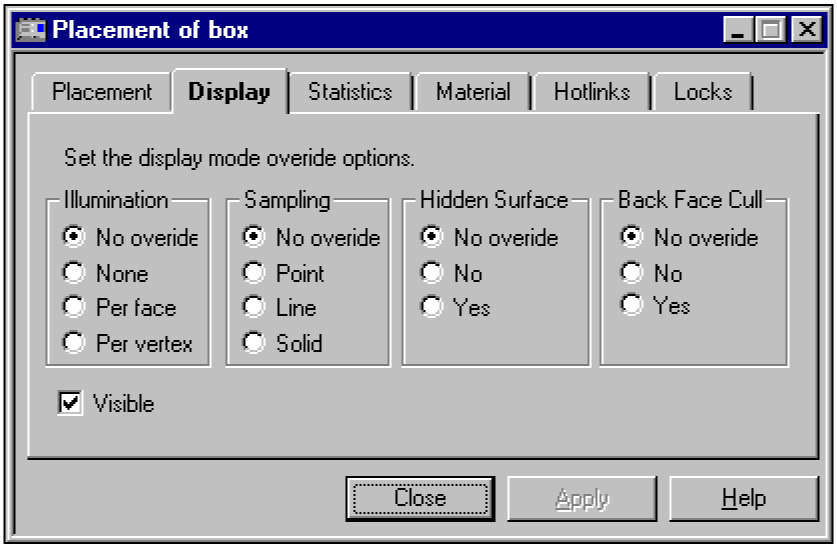


In RealiMation we can toggle between the different display modes by clicking on the appropriate button: wireframe , flat shaded

 and smooth shaded

.

Additional flexibility comes from the ability to alter the display modes for different shapes and models in the world using the illumination and the sampling sections of the Placement Display Properties:



In RealiMation we can edit the face and vertex normals to change the appearance of models in the world.   This is covered in much more detail in the advanced tutorials, which can be accessed from the Help menu, and can be found in printed manuals.

Lighting

Lighting effects, or atmospherics illuminate the views and are very important to the final appearance of a virtual world.   An "atmospheric" object encapsulates all the information needed to describe the lighting effects in a world, including setting up and positioning different light sources, controlling the ambient light and describing other effects such as fog.

Effects

The fog effect in an atmospheric object is controlled by minimum and maximum distances, a colour and an attenuation factor. The minimum distance ensures that the colour of any object, that is closer to the camera than the minimum distance, will not be affected by the fog. The maximum distance forces the colour of any object, that is further than the maximum distance from the camera to have it's colour blended with that of the attenuation factor. The blend effect between these two distances is a linear interpolation.

Defining atmospherics in RealiMation

Setting up atmospherics within RealiMation is a very simple process, but at the same time lends a great deal of flexibility to their definition, in terms of light positioning, colour values and effects.
From the atmospherics Properties box you can make the following adjustments to the lighting effects:

- *Change the ambient light settings*
- *Change the red, green and blue values, using the slider bars and the preview box as a guide*
- *Change the intensity of the ambient light with the slider and the preview box.*
- *Set up effects such as fog - determining the colour, attenuation and the clipping lengths for the effect.*

Atmospherics can contain any number of light sources, which are set up separately.

Defining lights in RealiMation

Light sources can be set up and associated with atmospherics, or with other objects in a world, e.g. actions, placements etc.

From the light sources Properties box you can make the following adjustments to the lighting effects:

- *Create new lights*
- *Disable and enable different light sources in a scene*
- *Change the colour values (red, green and blue) for each light source using simple slider bars.*
- *Alter the direction / position of the light source, by changing the X, Y and Z coordinates and its elevation (i.e. vertical direction) and azimuth (horizontal direction) using co-ordinate values and thumb wheels*
- *Select the source type from the options infinite, point or spot.*
- *Change the attenuation of point and spot light sources to force a fall-off in the intensity of the radiated light.*
- *Alter the inner and outer light angles to limit the 'volume' illuminated.*

Materials and Textures

While the outward appearance of objects is largely determined by lights (showing colour, highlights, and depth effects) materials and textures play a large part in lending realism to the scene. Individual faces, and subsequent shapes are made from materials. These materials define the appearance of a shape or model on screen. Materials can be made up of several surface properties - for example a base colour, an emission colour, transparency and light reflectance to name a few.

Colour

This has the most obvious effect on the shape or model. You can specify different values of red green and blue within the light, and modify the intensity. This can be altered for every light source, as well as the ambient light source.

Highlight and shininess

In the real world, most objects show some highlights when they are illuminated. It is the same with RealiMation - and these can These bright spots or streaks are direct reflections of light sources, like the sun glinting off a chrome bumper.
Metallic objects have small, bright lights. Plastics have dim large highlights. Stone has no highlights (unless polished).

Reflection

Many real world surfaces are at least somewhat reflective. Most types of metal and glass are partially reflective, as are some plastics. A mirror is so reflective that it takes almost all its colour from the environment around it. Alter the different reflectance options: ambient, diffuse and specular, and to change the transparency and shininess of the colour. As you move the slider bars the preview colour will change dynamically. The reflectance properties, in conjunction with the base colour control how the material is affected by ambient and other light sources in the views' atmospheric model.

Transparency

When light strikes an opaque surface, it bounces off. When light strikes a semi-transparent surface, some bounces off, but some passes through - i.e. you can see through a transparent object. Glass, water and clear plastic are examples of semi-transparent materials.
An opaque surface is 0% transparent - no light passes through it. At 100% transparency, a surface is completely invisible, regardless of any other material settings.
Specular is the reflectance value - i.e. the amount of light falling on to the object and reflected away. The viewer's angle, the object and the light falling on to affect the specular effect.
Diffuse - The object and the light falling on it affect the diffuse light

Emission

The emission colour is a constant colour emitted irrespective of the views' atmospherics. This functionality is particularly useful for situations such as rendering windows at night, glow effects where there is little atmospheric illumination, but light needs to be emitted.
You can think of materials as the colours on an artist's palette - simply apply them to the shape and alter the combinations of the different properties. In this way shapes can carry complex characteristics, such as rough brick work, shiny chrome, and long grass.

Textures

Additionally images can be added to materials as textures. A texture is simply a bitmap image which can be 'mapped' onto part or the whole of a face or faces to bring realism to an object. For example changing a green face to a textured one to give the effect of grass, or using a brick effect for buildings.

In RealiMation, textures are actually added to the material rather than directly to the models, and sophisticated texture mapping techniques to give amazing results.

All these illumination effects combine to determine the colour of the displayed face.

Projection and Cameras

RealiMation offers perspective, parallel and orthogonal projection. Perspective is the most common form of projection, and is the default setting. Orthogonal projection is where the viewpoint is restricted to one of the axes of the coordinate system.
Within RealiMation you can set up either type of camera for your views. Additionally, there is the option of 'splitting' the screen into four sections. This will show the view from the current perspective / parallel camera and also the three ortho views - along the x, y and z axes. This is particularly useful when positioning models within the world, in relation to others, and when moving objects next to one another, with the intention of getting them to meet exactly, or touch. (The Collision detection option helps with this by preventing the models from insecting.)

Rendering

As we have already described, rendering is the process for filling polygons with colour to give realistic results for shaded images.
In RealiMation, there are three main display modes - wire frame and two rendering modes - flat and smooth shading.
You can switch between the three modes simply by clicking on the appropriate icon. The display will change immediately.
Additional flexibility is offered through the ability to alter the display options for shapes in the world independently of the main scene.
This is particularly useful where you have a very complex model, for example, an engine. To display this in a fully rendered view uses a great deal of processing power, and may not be necessary. If this is the case, then you can simply change the default settings for that model, so that it is always drawn in wireframe, while the entire view is still fully rendered.

Hidden Surface Removal

Faces in a scene are rendered in a random order and so faces which are actually behind others may in fact rendered last, and appear in front. This can give a distorted image, so there is a process to work around this.
Hidden surface removal determines which faces lie behind others, and as its name suggests, removes or discards, the faces behind front faces, so that they are not drawn.
The hidden surface removal process inside RealiMation is **depth, or z-, buffering** which works on an individual pixel basis determining the visibility of each pixel on the screen. As with back face culling,

and rendering, you can enable and disable hidden surface removal for individual objects or for the entire view.

World Structures and Geometry Hierarchies

Typically, 3D scenes are made up of multiple complex objects which are often modelled individually. Building up large, complex scenes without any recognised structure would be very difficult, so we use 'geometry hierarchies' to simplify the organisation of multiple objects. There are two key benefits from the use of hierarchies - handling very large, multi sub-shape models and manipulating articulated models.

Working with Hierarchies

A hierarchy is created as objects are introduced into a scene and linked together. These objects are often displayed as a tree of elements, traditionally in a vertical arrangement where each element may be represented by an icon. One of the benefits of this is to allow you to see how different objects are related, and how they are built up in a scene.

The top level of the hierarchy can be thought of as a container for sub-objects within the world - this level is sometimes called the 'root', since this can be considered as the base. The top level of a hierarchy in RealiMation is the View. Sub-objects for display in the view are then attached from this level. Normally, any number of objects can be attached to others in a hierarchy - and behaviours and actions can also be assigned in a similar way.

As you look at a hierarchy in any Lister window, you can see that several of the objects listed have a 'plus' symbol next to them.
This indicates that there are child-objects attached to this, so it can be thought of as a top level. You can click on this hierarchy symbol to expand the top levels to view the child-objects, so that the image looks like the one below.

Once a level is extended, it is shown with a 'minus' sign to show that it has been expanded to show the next level of child objects. You can continue to expand each level of the hierarchy until each object is fully expanded.
You can collapse different levels in the hierarchy, by clicking on this minus sign, until the top terms are visible.

Fully extended hierarchies can be thought of as being ‘open’, while collapsed hierarchies can be thought of as being ‘closed’ with the top level entry containing all the information for the object.
For example, in a View Lister window the top level (in this example 'Main view') contains all the objects in that view, including placements, actions, cameras and atmospherics.
In the Shapes Lister, an example of a top level could be the term 'Hind' where the different components making up the model will be attached to this as child objects.
You can add levels into any part of the hierarchy using the drag and drop mechanism.

For example if you want to add a shape to a placement, simply highlight the placement in the Placements Lister, and drag it onto another placement - a hierarchy will be created immediately. You can now add this hierarchy into the main view, by dragging it and dropping it onto its new position. The placement will then appear in its position in the hierarchy in the View Lister and also in the View window. Hierarchies can be created with any type of object - shapes, placements, actions, atmospherics, cameras etc.

Additionally, you can decide to move, or even remove an object, by simply selecting and dragging it to a new position or selecting and deleting it.

Extensive use of hierarchical objects, known as the parent / child relationship allows the complete manipulation of multiple objects from a number of reference points. For example, build up objects with articulations, e.g. a robot arm, which is connected to the main body of a machine which is also moving around the scene.

Hierarchies also aid navigating around the world. You may need to expand a series of groups to find an object, then wish to return to the top level, collapsing the sub levels from view.

A simple analogy would be to File Manager under windows - where the top levels are directories, and the sub-objects are files.

You can add levels into any part of the hierarchy and then move, or even remove them without affecting the overall structure.

Now that we have associated all the terminology described in the previous section to RealiMation, we recommend that the best way to put it all into practice is to start the tutorials. These are accessed from the Help menu in RealiMation. A printed copy of the tutorials can also be found in the user manual.

RealiMation STE Desktop

Getting Started

Working with RealiMation

RealiMation STE Desktop

This section describes each menu, button and toolbar in RealiMation.

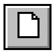
When you start RealiMation it automatically opens a RealiBase. The first time you use RealiMation it opens with helisim.rbs (the tutorial file), but later it will open the last RealiBase file you were working on.

Look on to the next sections ....

File Menu
Edit Menu
Tools Menu
Optimise Menu
Create Menu
Pick Menu
View Menu
Customise Menu
Toolbars Menu
Windows Menu
Help Menu

File Menu

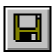
This drop down menu offers many standard file operations, many of which can be accessed by hotkeys and buttons:



New (Ctrl + N)
Opens a new empty RealiBase

Open (Ctrl + O)
Opens an existing RealiBase

Close
Closes the current RealiBase



Save (Ctrl + S)
Saves the current RealiBase

Save As
Allows you to save the RealiBase with a new name

Information
Allows you to display, add and edit textual information for the RealiBase you are working on, such as copyright notices, and a description.
NB: You are not limited to the amount of information you can type by window size.

Import (Ctrl + I)
Displays a dialog for importing a number of file formats - e.g. DXF, 3D Studio, VRML and other RBS files.
From the dialog select the file type and the file name to import. Some import filters, e.g. 3DStudio will provide further options. See the section on 3DStudio import for more details.

Export (Ctrl+E)
Allows you to save your RealiBase without any view information - e.g. saves only geometry, placements, actions, materials and images.

Record to AVI
Opens a dialog for recording your RealiMation sequence into AVI file format. (Remember, that you can distribute RealiMation sequences to others using RealiView, and RealiMations require much less disk space than AVI files.) This option is enabled when a 3D View window has input focus. For more information please see the dialog help.

Execute Hotlink (F2)
Execute a hotlink to which has been assigned to a placement in the RealiBase. This option is enabled when you have a placement that has a hotlink assigned to it.

Filenames lists the last four files you have worked on in RealiMation

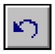
Exit
Ends the RealiMation session. If you are currently editing a RealiMation you will be prompted to respond to save it.

Edit Menu
Tools Menu

Optimise Menu
Create Menu
Pick Menu
View Menu
Customise Menu
Toolbars Menu
Windows Menu
Help Menu

Edit Menu

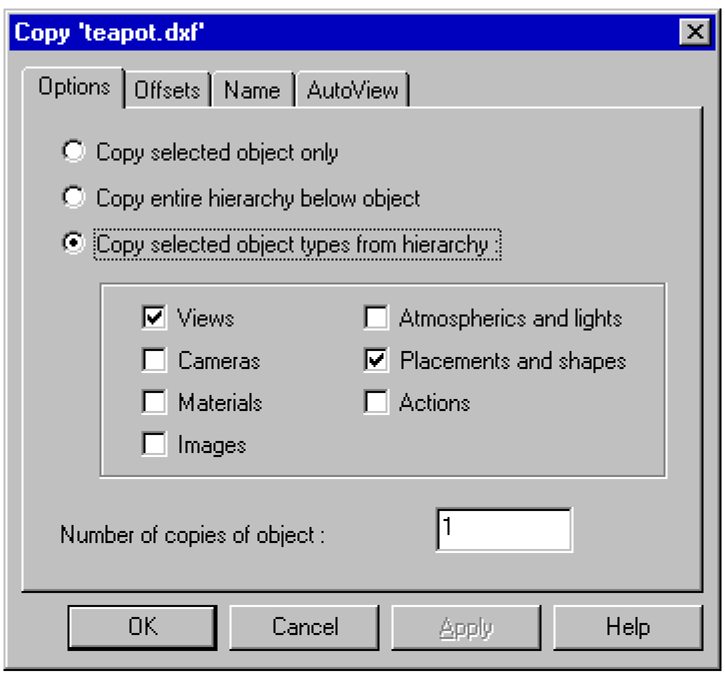
Some of these options are not available at all time - depending on the view mode and window selected. These options appear greyed out until they become available.



Undo *<last action type>* (Ctrl + Z)
Undoes the last action performed.

Multi Undo
Displays a dialogue listing the editing and actions made during the current session.
Use the shift / Ctrl keys with the mouse to select multiple actions.
To preserve memory, only the last 50 operations are stored for 'undoing'. However, you can alter this in the Registry Editor.

Copy (Ctrl + C)
Copies the selected objects (highlighted in the Lister). The following dialog is displayed:



- Select the extent of copy you want to take, i.e. the selected objects, the hierarchy below the object or selected object types from the hierarchy, and the number of copies you want to take.
- Offset the copies using the next Properties page, changing the positional and orientational offsets.
- Use the 'Name' page to rename the copies and select the autoview options.

This option is enabled when you have one or more objects selected in a Lister Window. See also: Copying Objects

Each time you copy an object you can edit its settings as a new object - any changes you make will not affect the original settings.

Rename (Ctrl + R)
Displays a dialog to rename the selected object. Any objects can also be renamed from the Properties page.

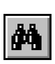
Merge (Ctrl + M)
This option is only active when two or more shapes are selected in a Lister Window. Highlight the shapes you want to merge - hold down the shift key to select continuous shapes, or the Ctrl key to select individual ones. This merges the objects into a new object - the rename dialog appears.

Delete or Detach (Delete key)
This option serves two functions depending on the mode: you can either delete the selected object from the RealiBase or detach it from a hierarchy.
For example, if you delete an object from the View Lister, it is detached from the View object and removed from the view, but the object is still actually stored in the RealiBase.
If, however, you delete a shape from the Shapes Lister, then it will be deleted from the RealiBase, and all references to it will also be deleted. We recommend that you use the Usage option before deleting objects from the RealiBase. (If the object you delete is referenced by other objects, then you will be prompted.

Detach Faces (Ctrl+Delete key)
This option detaches individual selected faces from a shape.
These faces can be used to create a new shape (consisting of just these faces), which is added back into the hierarchy by default. At the prompt choose whether to delete the selected faces from the shape as well as creating a new one.
This option is useful for breaking up large complex shapes, into smaller ones, which may be edited and rendered more efficiently. This mechanism may also be used for producing different levels of detail.

Properties (Space)
Displays the Properties for the currently selected objects. For example, select a placement and press the space bar, double click the mouse, or use the Edit | Properties option to display the Properties for that placement.
Different objects have different Properties, which are set up when you create the object.

Usage (Ctrl+ U)
Displays the references to the selected object, i.e. where it is used or referenced by another object.
For example if you select a material in the Material Window, and click Ctrl+U, the dialog will display which shapes and placements use this material. The dialog also reports if the selected object is unused. Once you know this information, then you can choose whether to delete the object form the database, so you can keep the RealiBase 'clean' and free from unnecessary objects.



Find / Fit to View (F3)
This works in two ways:
1. With a free camera in the view, select a placement in the View Lister, and use 'Fit to View' to change the camera.
The selected object now appears in the view window, surrounded by an edit bounding box.

NB: The Auto-linking feature (Customise | 3D Interaction) toggles display of bounding boxes. The default is on.

2. Where there are no individual objects selected, this option will move the viewpoint to fit the entire scene into the View Window.
   This also sets the selected object's centre as the orbit centre for the camera thumbwheels (positioned around the View Window).

Find by Name
Selecting this option displays a dialog. Type in the term you want to find, and start the search to find the string in the currently selected Lister. This is particularly useful for finding objects within large RealiBases.

Select All Unused items (Ctrl + A)
Lists all the objects in the selected Lister which are not used in the RealiBase, and highlights those which are not referenced by any other object in the RealiBase. Pressing the Delete key (or use Edit | Delete), removes the objects, and means that the size of the RealiBase is reduced.
NB: We recommended that you when you clean your RealiBase, you use the Listers using a 'top down' method:
Select and delete objects from the Views Lister.
Then do the same for other objects in the following order: placements, shapes, cameras, actions, light, atmospherics, materials and images. In some situations you may need to repeat the process for placements and shapes (due to hierarchies).
To find out which objects are currently referencing another object, you can use the Edit | Usage option.

Note: View objects which are not visible are considered as unused.
You can also use the Optimise | Purge RealiBase option, which does this automatically for you.

Clear Selection (Esc)
This option deselects all the objects selected, either from the View Window or the Listers.

Invert Face Selection
Select some faces, and then use this option to select the currently unselected faces instead. This is useful for selecting lots of disparate faces quickly and easily.
Pictorial exapmplesexamples can be found in the User Manual Addendum.

Reselect Faces
This option reselects the last group of faces selected. For example, if you select some faces, and then make another pick which deselects them (e.g. pick another shape), click on this option to reselect the original selection.

Move Up (Alt + Up arrow key) and **Move Down** (Alt + Down arrow key)

- Use to change the order in which placements are 'sent' to the renderer, and displayed on the screen.
  For example, in helisim.rbs, the order of Targets 1 and 2 and the Terrain show that Target 2 is drawn after Target 1, but they are both drawn after the Terrain placement.
  RealiMation uses this order to calculate which parts of the the terrain are behind the targets and so do not need to be 'z-buffered' because they are obscured. This can improve performance by working in conjunction with the **hidden surface removal**.

- Use to change the model used as a particular Level of Detail
  Moving a shape within a Level of Detail hierarchy changes the shape used to represent the model at that Level.
  For example, in helisim.rbs, the Hercules model has three separate Levels of Detail.
  - Switch to a Free camera (drag the Free Camera from the Camera Lister and drop it into the view)
  - Highlight Target 3 in the View Lister and find it in the view (F3)
  - Once you can see the Hercules orbit around so that you are viewing the model from the top
  - Now highlight 'Hercules Level 2' in the View Lister and use the Alt | Up Arrow to move the shape up to Hercules
  - You will notice that the shape changes as you do this - the Level of Detail parameters remain constant, but the model used changes.

Note: Placements at the top level of a hierarchy need to be fully contracted (Press Alt as you click on the expander / contractor button to the left of the placement) before they can be moved.

See Also
File Menu
Tools Menu
Optimise Menu
Create Menu
Pick Menu
View Menu
Customise Menu
Toolbars Menu
Windows Menu
Help Menu

Copying Objects in RealiMation

Copying a view
The new (copied) view will reference the same camera, lighting, atmospherics and any placements in the original view.

Copying a shape
Creates an exact copy - including all faces, points and lights, and any references to placements. NB: In a hierarchy, the placements themselves are not copied, just the references.

Copying a placement
The copied placement references the same shape as the original placement, and the transformation information is identical. If an action is attached to the original placement then a reference to the action is also copied (the action is not copied).

Copying a camera
The new (copied) camera will have identical view and positional parameters to match the original camera.

Copying a material
Copies all the settings of the selected material e.g. colour values, emission, reflectance etc. Textures associated with the original image will also be copied.

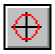
Copying an action
All the nodes of the original action are copied in the new one.
Note: When you copy a spin action, the Properties revert to the type used for other action types with the position, orientation rates etc.

Copying a light source
The new (copied) light source has identical settings to the original one.

Copying an atmospheric
Copied atmospherics have identical light sources, settings and effects.

Tools Menu

There are several options from this menu, which can also be found on the Shape Edit Tool bar. Some of these options will only be active when you are editing in the world.



Centre Shape

Once you have transformed a placement of a shape either by moving it or typing in new values in the Placement Properties you can centre the selected shape around its local origin. You must have at least one placement selected to enable this option.

Apply Transformation

Whenever you transform a placement of a shape, e.g. rotate, scale etc. you may want to apply these values back to the main shape to reduce geometry processing.

For example, define a box, positioned at x1, y1, z1 with a scale factor of 1 and you create a placement of that box in the View Window which you translate to x3, y4, z8, and scaled by 2.
Each time you draw that placement, RealiMation takes the shape's original coordinates of x1, y1, z1 and 'passes them through' the transformation matrix of +2, +3, +7, scale of 2 before drawing it at x3, y4, z8.
If you permanently apply the values in the transformation matrix to the original shape, then every subsequent placement of the shape will be drawn without using the transformation matrix, i.e. less geometry processing is required.

Apply transformation alters the points of a shape to be those of the transformed placement transformation, and sets the transformation matrix back to zero.

The tutorial 'Creating a Butterfly' uses the Apply Transformation command - please refer to this and the reference section for other examples.

Align Placement menu

Available when the View window has focus, and has three options:

Orientation

Active when two or more placements are selected, this option matches their orientation.
NB: It matches to the last placement selected.

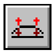
Position

Active when two or more placements are selected, this displays the options for positioning the placements relative to each other.
As you select the placements you want to align (holding down the Ctrl key as you click on the placement(s) with the mouse), the last placement you select is the reference for the alignment.
So if you select placement A, B and C, then placements A and B will be aligned to the settings of placement C.
Choose the alignment option from the dialog.

Size

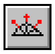
Active when two or more placements are selected, you can use this dialog to change the size of placements to be identical, or the same in certain axes.

Occasionally file formats such as DXF do not transfer the face and vertex normals for an object correctly. Sometimes you may find that they point the wrong way thus giving the impression of the object being “inside out”. To solve the problem use the flip normal options so when you re-shade the view, the placement will be drawn correctly.



Flip Vertex Normals
Enabled when vertices are selected, use this to flip the vertex normals.

Flip Face Normals
Enabled when faces, or a shape, are selected, use this option to flip the selected face normals .



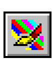
Smooth Vertex Normals
You can improve the shaded display by smoothing the normals, which converts the vertex normals to give a smoother appearance to the placement. Change to a smooth shaded display mode to see the difference.
Note: We recommend that you ensure that faces share vertices wherever possible, by using the Optimise | Merge Vertices option. This option is enabled when faces, or a shape, are selected.

Unsmooth Vertex Normals
If you want the placement to have a more faceted appearance when smooth shaded, then choose to Unsmooth the normals. This will then cause the faces of the placement to become more visible when shaded.
This option is enabled when faces, or a shape, are selected.

Match Face Orientation
Flips all the selected face normals to be the same direction. Use this when an imported model has some faces pointing the wrong way, while others are correct.
Select the faces, display the normals and then choose this option. RealiMation picks one of the selected faces (arbitrarily) and changes the direction of all the other faces to match.

If the normals are now all pointing in the wrong direction, then you can use the Flip Face Normals option to flip them to the correct direction.
Note: This operation relies on shared vertex information, therefore we recommend that you merge the vertices first.
This option is enabled when a shape or some of its faces are selected

Paint Faces
Select this to paint the selected faces with the current material. As you select this option, the cursor changes to a paintbrush.



Select Material
Changes the current material you are using to paint the faces, to a material you select from the dialog. When you have chosen the material, click on OK and as you select the faces the newly material will be used.

You can also highlight a material in the Material Lister and drag it over the selected shape in the View window or other Listers. The shape will be updated to use the new material wherever it appears.
If the material you want to use is not shown in the pull down list, this is probably because it has not been defined in this RealiBase. (RealiMation already has a few set up by default.) You can create a new material from the Create | Material options.

Texture Map Tools menu
Select the overall mapping tool to use from the three options:

Spherical mapping 'places' the texture image into a sphere (like a map of the world would wrap around a sphere to create a globe). The image is then projected inwards onto the faces.

Cylindrical mapping 'wraps' the texture image into a tube (like a label being wrapped around a tin can). The image is then projected inwards, onto the faces.

Planar mapping 'places' the texture on a flat surface, and then projects the image onto the face(s) using parallel rays which are perpendicular to the surface.

Show Texture Coordinate Editor
This displays the Texture Coordinate Editor Window. This window allows you to fine tune the application of the texture onto the shape. The functionality of the Texture Coordinate Editor is explained in more detail in the section Working with Textures.

Texture Coordinate Editor
The options from this flyout are also accessed from the Texture Coordinate Editor button bar which appears when the editor is active. Click here for more on these menu options.

Zoom; Pan; Drag all Faces; Drag Vertex; Drag Edge; Drag Face; Rotate Faces; Scale Faces; Flip Faces - about the U Axis; Flips Faces - about the V Axis

Also see Working with Textures for more information.

Actions menu
The options from this flyout are also accessed from the Action Node Editor button bar which appears when the editor is active. Also see Editing Action Nodes for more on these menu options.

Insert a node; Delete a node; Node at camera; Space Evenly; Repeat; Advance Time; Show Action; Preserve Shape; and Smooth Nodes

NB: The Camera at Node option, is part of the action editing features, and is found on the View menu and the Action Properties.

See Creating and Working with Actions for more information.

See Also
File Menu
Edit Menu
Optimise Menu
Create Menu
Pick Menu
View Menu
Customise Menu
Toolbars Menu
Windows Menu
Help Menu

Optimise Menu

A new menu from V4.10, the Optimise menu contains a number of tools for optimising shapes, placements, and general RealiBase performance improvement.

Merge Faces
Shapes can often be optimised by reducing the number of faces, by calculating and then merging selected faces into one.
Simply select the faces you want to merge into one, and choose this option. This option is enabled then a shape or some of its faces are selected.
Why: Shapes are made up of individual faces which are positioned next to one another to create a final model. If these faces are planar , i.e. fall in the same plane, then they can often be merged to produce one single face which requires significantly less processing times.
How: You can select multiple shapes either directly in the View window or in the Shapes or View Listers. The shapes you have selected will appear in the Merge dialog. You can refine the merge to certain tolerance levels, to only merge faces using the same materials and apply these merge factors down the hierarchy. Click here to view help for the dialog.

Merge Vertices
Merging Vertices is a similar optimisation tool to face merging, by calculation and deleting any duplicate or unnecessary vertices.
Once the vertices are merged, then the shading of the model can also improve, by using the Tools | Smooth Vertex Normals option. This option is enabled when a shape or some of its faces are selected.

Why: Shapes are made up of individual faces which are positioned next to one another to create a final model. When two four sided faces are adjacent to one another, a total of eight vertices would be processed, when in fact only six are needed (because two vertices from each face occupy the same space, and do the same job.)
While this display overhead may seem small when you are looking at two faces, consider a complex model with hundreds of faces! This can be improved considerably by calculating which vertices are not needed, and then removing them from the model. Vertex merging is covered in some detail in the tutorials.

How: You can select multiple shapes either directly in the View window or in the Shapes or View Listers. The shapes you have selected will appear in the Merge dialog. You can refine the merge to certain tolerance levels, to only merge faces using the same materials and apply these merge factors down the hierarchy. Click here to view help for the dialog.

Prelight objects
Lighting calculations can take a lot of processing time. Using the pre-lighting feature, calculates the lighting for that point, and applies it to the selected object. Click here to find out more.
How?

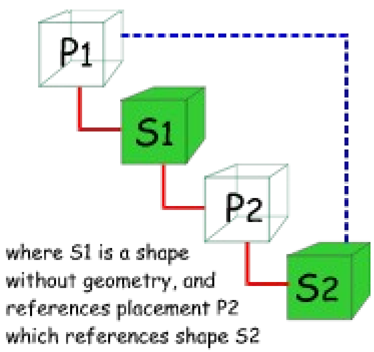
- Select the shapes you want to pre-light. If you select the view object then every shape in that view will be pre-lit.
- Choose the Optimise | Pre-light objects option
- The lighting calculations will be processed and applied to the shapes.
- Pre-lit shapes are displayed in blue text in the Lister to make them easily identifiable.

Remove pre-lighting
Select the pre-lit object in a Lister and use this option to remove any associated pre-lighting. The calculations will now be made throughout the scene, as it plays.

Merge Hierarchy
Merges all the shapes and placements within a hierarchy to create one new geometry object.
Try it out with the terrain object ('Terrain') in helisim RealiBase.
(Pictorial examples can be found in the manual addendum).
This process reduces the complexity of a hierarchy, making it easier to move complex objects around, and further optimise them e.g. merging faces and vertices.

Note:
This process preserves all transformation information applied to the merged objects.
The individual shapes and placements still exist as separate items in the Listers and can be edited (changes will not be applied to the new geometry.)

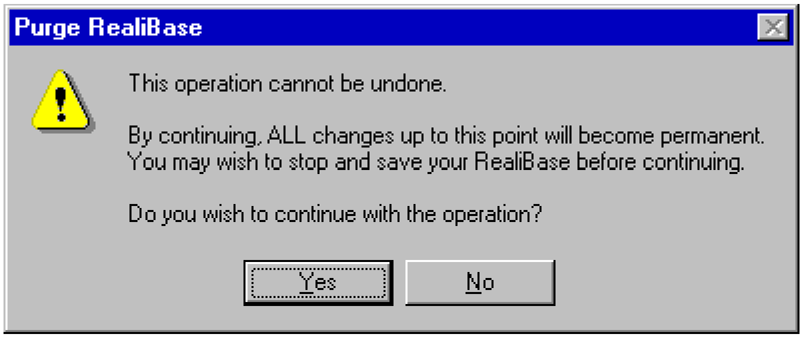
Cull Hierarchy
Searches through a selected hierarchy removing any objects (e.g. empty placements and shapes) which are not essential to the hierarchy structure.
This option is useful where you have imported or created a model structure with an over complicated hierarchy which includes shapes and placement references which are not strictly essential. The process deletes these links and creates new ones to associate objects more logically in the hierarchy.
For example using the diagram below, the refine process calculates that Shape S1 contains no geometry, just a reference to a Placement (P2) which in turn refers to Shape S2. Therefore S1 and P2 are calculated as being unnecessary within the hierarchy.



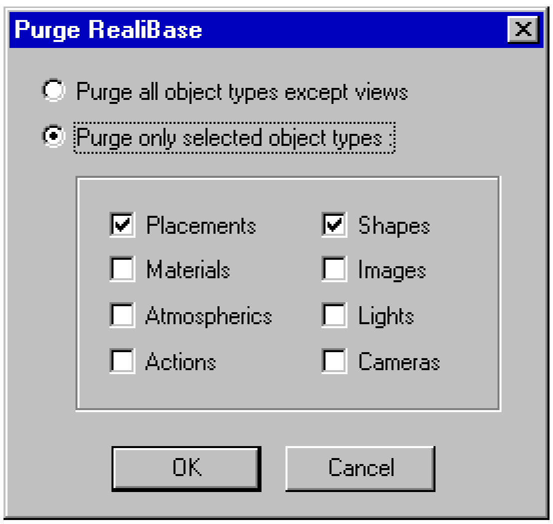
The Cull Hierarchy process would delete S1 and P2 and then P1 would reference S2 directly (as highlighted in the diagram with the blue line).

Purge RealiBase
Searches through the entire RealiBase deleting all unused objects.

When you select the option the following warning message appears:



When you select 'Yes' the following dialog appears:



Use this to select the extent of the purge, i.e. all unused items, or just certain object types. When you press OK, the purge will begin. This process make take some time

When the purge is complete a message displays the number of different objects deleted from the RealiBase.

Note: You can move through the individual Listers deleting the unused objects using the 'Select All Unused'and 'Delete' options. However, doing this for a complete RealiBase could take a great deal of time, and involve several revisits to different Listers to reselect and delete objects. The Purge RealiBase option simplifies this by searching every Lister and deleting objects automatically.

See Also

File Menu
Edit Menu
Tools Menu
Create Menu
Pick Menu
View Menu
Customise Menu
Toolbars Menu
Windows Menu

Help Menu

Create Menu

This is the menu you will use to define and create objects in the RealiBase. As you click on Create a drop down menu appears with the following sub-menus:

Views
Creates a new view using the display parameters you set up.

Shapes
Creates a simple shape based on the following geometry: box; sphere; cylinder; cone; torus and grid. Also create an 'empty' shape from here and import 2D objects and text from the Windows Clipboard.

Placements
Creates a new placement of an existing shape.
Select a shape from the drop down list, select name, materials, and display options.

Materials
Create a new material, setting the colour values, emission, reflectance. Textures can also be associated with a material when you create it.

Cameras
Create either a 'Normal' or an 'Ortho' camera, setting up display parameters. A RealiMation can use multiple cameras, although a view can only have one camera at a time.

Light
Create a light source, either an infinite light source, a spot light or a point light. Set up colour values, direction / position etc. Light sources must always be added to the atmospheric object in a view, and can also be associated with placements and actions to create special effects.
See also Creating and Working with Lights

Atmospherics
Atmospheric objects contain ambient lighting and fog settings (if required). Every view should contain an atmospheric object so that the view is illuminated and can be seen. (Only one atmospheric object can exist in a view).
Atmospherics can contain multiple light source.
Note: If you do not set up an atmospheric before creating a new view, then RealiMation will create an atmospheric by default to use for the view.

Images
Specify an image file you want to associate with the RealiMation. Images can be used as textures, background bitmaps or depth images. You can configure a number of different image handling options.
RealiMation can use a number of different image formats including BMP, PCX, and TGA.

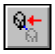
Actions
Create different actions for association with placements, cameras and lights. Configure your own behaviours with the General type, or set up different parameters for the predefined spinning, circular and linear (straight line) actions.

Face
Create a face between three selected vertices. (Select the vertices first before choosing this menu option.)

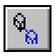
See Also

Pick Menu

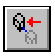
This menu is only visible when the view window is active, and the options can also be accessed from the toolbar.
The Pick 'Filter options' enable the editing mode and which objects are to be picked for editing.



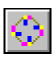
Top Level Placements
Selects whole models, i.e. the top level in a geometry hierarchy. For example in helisim, this will select the helicopter as one object to move or edit within the world.



Placements
Selects individual placements in an object. For example, in helisim, you can select the wheels or rotor blades of the helicopter independently of the rest of the model.



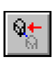
Shapes
Allows you to select individual faces, edges or vertices of a shape. For example, in helisim, you can select the individual faces which make up the side of the helicopter independently of the rest of the model.
Snap To flyout forces the picking to faces, edges or vertices.



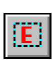
Actions
Click on this icon to constrain the pick/edit mode to actions. For example, you can select the action associated with the helicopter and move to another position in the world. (Once selected, the actions are displayed with the standard edit box and controls.) Next time you RealiMate the world, the helicopter will fly following the action in its new position.

Action Nodes
Not only can you select an action to move around the world, but you can also move the individual nodes to change the shape and route of the action. Once selected, the actions are displayed with the standard edit box and controls.

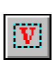
Snap to ... menu



... Faces
Used with Shape picking mode, this button limits the selection to faces only.



... Edges
Used with Shape picking mode, this button limits the selection to edges only.



... Vertices
Used with Shape picking mode, this button limits the selection to vertices only.

Select Visible Faces Only
Checking this forces a fence pick to ignore the faces 'at the back' of an object, i.e. you only select those faces you can see from the current viewpoint.
Toggle the option off to select the faces out of sight.

Mouse flies camera F9

This enables mouse control for free camera flight - moving the mouse moves the camera around the world. The controls are outlined in Flying Controls. You can use the solid, terrain following and slide cameras in conjunction with this for different camera control effects.

Ground Flight

This option toggles between free flight (default) and ground flight.

Solid Camera

Toggles the solid camera option. You can use this function in conjunction with hotlinks to enable you to fly into objects, and hotlink to somewhere else. See the section on hotlinks for more information.

Terrain Following Camera

Use with a free camera to hug a landscape, or climb stairs!

- Drop a free camera into the view and move it to the height you want from the nearest object, e.g. the land, or floor.
- Toggle the terrain following using the Pick menu or the button
- To change height, pan the camera up and down to the desired height and enable the terrain following again.

Note: This option is only available when a "free" camera is selected, i.e. one that is not attached to any other object.

Slide Camera

Use with a free camera to ‘slide’ along a placement.
The arrow in the image below shows the path of the camera as it flies into the object, and slides along.

The direction of the slide (up, down, left, right) is taken from the direction and angle of the camera as it ‘hits’ the placement - if the camera angle is at 45 degrees to the left as it hits a wall, then it will slide to the left. This is similar to the slide camera in many computer games.

From the sample RealiBase helisim.rbs:

- Drop a free camera into the view and toggle Mouse Flies Camera
- Enable the solid camera, and the slide camera
- Locate the castle (F3) and then fly the camera into the wall from the right (to the left)at a slight angle.
- As you touch the wall the camera will begin to slide towards the left until you connect with another part of the castle wall.
- Try it on other objects, for example create a grid, and then slide along it.

Note: This option is only available when a "free" camera is selected and solid camera is enabled.

Collision Detection

The collision detection button allows you to move shapes close together, and to them to touch one another. When this is disabled, placements can intercept one another.

See Also

View Menu

This menu allows you to change the display modes and display options for the current RealiBase.

Wireframe
Changes the current view to be wireframe

Flat Shaded
Changes the current view to display flat shaded

Smooth Shaded
Changes the current view to smooth shaded

Anti alias
Enables anti-aliasing for the shaded modes (where supported by the renderer)
These options are enabled when a 3D View window has focus.

Flip camera **F8**
Flips the camera to view the scene from the opposite position.
Useful with ortho views so you can view from the other end of the axis. This option is enabled when a 3D view window has focus.

Level Camera **F7**
Use this to "straighten up" the camera, i.e. remove the pitch and roll values currently assigned to the camera.
This option is available when the 3D view window has focus, and the camera is "free", i.e, not attached to an action.

Camera at node **F6**

Positions the camera at the selected node, allowing you to review the action within the world and fine tune the node's position and orientation. This option is enabled when an action node is selected, either in the Action Properties, or a 3D view.

Set size
Displays a dialog for altering the view window:
Altering the pixel values changes the size of the view window - so you can constrain the view to be a particular size. Simply type in the new values - instead of trying to drag the outside of the window to the exact size. The size of the view window is displayed on its title bar.
Click here for more about this option.

Show Vertex Normals
Selected vertex normals are displayed with a small blue 'wire' pointing out to show the direction of the normal. You can display the normals for multiple selected faces.

Show Face Normals
Once you have selected the face you want to edit, either click on the icon, or select the option from the View | Show Face Normals menu. The face normals are displayed with a small blue 'wire' which points out in the direction of the face.

See Also
File Menu

Customise Menu

The Customise menu contains a number of options for setting up the RealiMation desktop:

AutoTile

This sets up the following AutoTile options for the screen:

- the horizontal and vertical split (use the slider bars)
- arrangement of the Listers and 3D View e.g. whether they are tiled horizontally, vertically or in a square formation
- the position of the 3D views, i.e. position them on the left or the right of the application window
- the tiling to leave from for the icons representing the minimised Listers
- fix the size of the 3D Views to remain at the current size, and tile the Listers to fit the available space.

Click here to view the help.

Hints

Configure the hints mechanism for RealiMation. We strongly recommend that as you are learning RealiMation you choose to Enable all hints boxes and disable them as you view them until you are familiar with the product. When you have made the changes you can either hit the "Apply" button to confirm the changes and continue editing or "OK" to confirm the changes and close the dialogue.
Click here to view the help.

3D Interaction

3D Views options

Show axes: Toggle the display of the x, y and z axes in the bottom left corner of the view window
Auto-Link: Select a placement in a view and the reference in a Lister is highlighted, similarly, highlight a placement in a Lister and an edit box appears around it in the view.

Camera flight options

Show box in fly mode: Toggle display of the white box in the view when you select Pick | Mouse Flies Camera or F9.
Sensitivity: Use the slider bar to change the sensitivity of the free, mouse flying camera modes.
Click here to view the help.

Edit Display

Marker Sizes

Change the sizes of the markers for the vertices (shown as small blue boxes) and the face and vertex normals (blue wires). the values are shown as percentages, where 100% is the default size. Increasing or decreasing the size depends on the size of an object - the smaller the object the smaller you will want the markers to be and vice versa.

Colours

Change the colours used for the selection / editing handles, markers etc. The current colour for the selected component is shown in the preview box.
To change the colour, select the component from the drop down list, and click on the 'Choose Colour' button. Select a colour from the palette and press OK. The preview will be updated to show the new colour.
Click here to view the help.

Action Display

Change the size of the action nodes when they appear in the View window (similar to the marker sizes), and set up the time deltas and actions display. Click here for more information.

Display Driver
Select the display driver / renderer you want to use for any new views. The capabilities of each renderer are shown as a check list. Use this to determine how you set up other parameters, e.g. image handling etc.
Click here to view the help.

Previews
Configure the settings for the different preview windows - background colours, shape and Level of Detail previews etc. Click here to see more information.
Click here to view the help.

Startup

Click here to view the help.

Texture Edit

Click here to view the help.

RealiMate
Click here to view the help.

Web Browser
Select your preferred Web Browser from this dialog box.

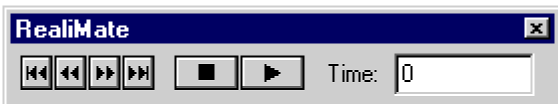
See Also
File Menu
Edit Menu
Tools Menu
Optimise Menu
Create Menu
Pick Menu
View Menu
Toolbars Menu
Windows Menu
Help Menu

Toolbars Menu

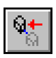
From this list select the menus and Toolbars on display in the application window. All Toolbars are active by default and can be floated around the application window or docked either at the top or down the outside edges of the screen.

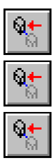
Standard
Toggles the standard function buttons: New, Open and Save RealiBases, Copy, Paste, Undo and Find.

RealiMate Control Bar
Toggles display of the RealiMation sequence controls. The toolbar has standard playback controls: stop (F10), play (F10), rewind (F11), back one frame, forwards one frame and fast forward.

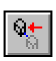


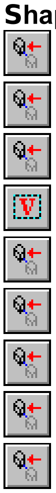
The Time shows the current position (in seconds) in the sequence - you can type a value directly into this box to 'jump' forward to a specific point (don't forget to press return).
The frame rate can be displayed in the Status Bar information.

View 



These buttons allow you to select the different display modes, i.e. wireframe, flat shaded or smooth shaded. The button for 'flipping' the camera is also on this toolbar - click on this button to look at the view along the same axis but from the other direction.

Shape Edit 



These buttons are used for editing objects in the current view, and can also be enabled from drop down menus. These options are described in more detail elsewhere.
Enable collision detection, centre shapes (re- aligns the coordinates of a placement to around its local origin), select faces, edges and vertices, show face and vertex normals, flip face and vertex normals and smooth vertex normals.

Paint and Texture

These buttons are used for painting the selected faces of a shape or shapes in the current view. The functionality of each of these buttons is explained in more detail in Painting Faces and Working with Textures.

Pick Mode

Select the pick mode from the buttons - from whole hierarchies, to individual faces, to action nodes.

Pick Information
This toggles an information bar (similar to the Status Bar) for displaying information about a selected placement in the current view, e.g. the underlying geometry shape name, its world and local coordinates and its distance from the camera. (The latter information is useful when setting up the Level of Detail switching.)

Listers
This toggles the Lister toolbar situated by default on the right hand side of the desktop. Use these buttons to enable and disable the display of the Lister windows.

Status Bar
This toggles the display of the status bar. The status bar displays progress information for lengthy operations, as well as transformation information e.g. 3D dragging. The frame rate for the current RealiMation also appears in the status bar.

Reset Toolbars
Resets the position of your RealiMation toolbars if they disappear off the screen or become displaced.

See Also
File Menu
Edit Menu
Tools Menu
Optimise Menu
Create Menu
Pick Menu

View Menu
Customise Menu
Windows Menu
Help Menu

Windows Menu

This menu is a standard Windows application menu, with options and shortcuts to arrange the desktop with commands to **Cascade**; **Tile**; **Arrange Icons**; **AutoTile** and **Split**.

The Split option is for Views and Lister Windows.
In a View Window - split the screen into four sections, where one section uses the current camera, and the other three sections use ortho cameras. These other sections are labelled top, rear and side to show the type of camera used.

You can move the split by clicking the left mouse button over the splits and dragging them around the View, to a new position. Click with the left mouse button once more to secure the split to this new position.

Listers
Lister Windows (Listers) are the sub-windows which list all the different objects in a RealiBase.
For example, the View Lister shows all the views defined in a RealiBase, and everything contained in every view (placements, actions, cameras, atmospherics and light sources). The Shapes Lister lists all the shapes created/imported in the RealiBase, etc.

You can have any Lister open at any one time - the button bar (which can be toggled on and off, and moved around the desktop) toggles which Listers are visible. (You can also toggle Listers using the pull-down menu.)
Click on the Materials button to display the Materials Lister etc.

A list of the currently open windows is also shown in this menu.

See Also
File Menu
Edit Menu
Tools Menu
Optimise Menu
Create Menu
Pick Menu
View Menu
Customise Menu
Windows Menu
Help Menu

Help Menu

The Help menu gives access to the On-line help, the tutorials and the 'About RealiMation' information box.

Another useful option from this menu is 'Show Last Hint' which re-displays the last hint card.

The 'About ..' box displays Version and Copyright information.

See Also

File Menu
Edit Menu
Tools Menu
Optimise Menu
Create Menu
Pick Menu
View Menu
Customise Menu
Windows Menu
Working with RealiMation

Getting Started

Starting RealiMation

Once you have installed RealiMation you are ready to start creating your own real time interactive 3D worlds for presentations, Web pages, fly throughs etc.

How do I Start RealiMation?

Windows 95 and WindowsNT4

- From the Start menu, select the option "RealiMation STE" in your RealiMation Group.

Notes: As with any popular program we recommend you make a shortcut and add it to your desktop ...
If you entered your RealiMation Serial Number incorrectly at installation time, you will now be given the opportunity to correct it. Type the serial number in correctly and press OK - you will find the serial number on the back of the CD wallet.

WindowsNT 3.51

- From WindowsNT 3.51 double click on the "RealiMation STE" icon in the RealiMation group.

As you start up, a splash panel appears with registration information, including serial number.
Note: If you entered your RealiMation Serial Number incorrectly at installation time, you will now be given the opportunity to correct it. Type the serial number in correctly and press OK - you will find the serial number on the back of the CD wallet.

What Do I Do Now?

Once the program is running we recommend that you work through the tutorials - these have been designed to introduce some of the fundamental concepts in building your worlds.

- To run the tutorials, move to the Help menu and select "Tutorials".

Note: You will see that Hints cards appear as you choose menus and click around the desktop. These have been added to help you learn about RealiMation as you use it - explaining what you have done, why you have done it and what you could do next ...

These hints can be disabled after you have read them, by checking the box. However, you can re-enable them all, using the Customise | Hints menu option.

Once you have run through the tutorials, you can start to build your own RealiMation worlds - for more detail click here.

Hardware Locks, or "Dongles" - Developer Edition Only

The Developer Edition of the Space Time Editor requires a hardware lock (or "dongle") to operate properly. If you have not attached your lock, then you should do so before attempting to run RealiMation.

Windows 95
If you are running under Windows 95 then the system will automatically detect that you have attached a lock and will run RealiMation without any other intervention.

WindowsNT
Windows NT cannot automatically detect and configure the hardware lock, so some user intervention is needed to install the correct software. This is supplied on the RealiMation CD-ROM, under the directory "Security".

- Attach to that directory, and run the file "install.bat"

Note: We recommend that you read the instructions provided in the file "readme.doc".

Editing the Registry

The Registry is used in many ways for configuring aspects of RealiMation. This section outlines some of the areas where you may need to make changes.

You need to modify the registry to make changes to the following areas:
Setting Display Drivers - where you experience problems with preview windows.
Texture Loading

Take Care: Careless editing can cause mistakes which could corrupt entries and cause problems later. Having said that, do not worry - if you follow these instructions you should not make any mistakes.

To Access the Registry Editor from Windows95 and NT4

- Run the "Registry Editor", by selecting the "Run" command from the "Start" menu and type in *regedit.exe*.
- Alternatively you can find it using Explorer to search the windows\system directory for the file *regedit.exe* and double click on it to launch the editor.
- You can also drag it the program from Explorer onto the desktop to create a short cut for easy access.

To Access the Registry Editor from WindowsNT 3.51

- Run the "Registry Editor", by selecting the File | Run command from the Program Manager menu and type in *regedit.exe*.
- Alternatively you can find it using File Manager to search the windows\system directory for the file *regedit.exe* and double click on it to launch the editor.
- You can also create an icon in a Program Group for easy access.

To Edit the Registry
Once the Registry Editor is running, you will see that the layout is similar to Explorer / File Manager with many different sub sections. All the edits you need to make to the registry are in the sub section for your version of RealiMation:

For *RealiMation VSG Developers Edition* use HKEY_CURRENT_USER / Software / Datapath / RealiMation VSG /

For *RealiMation Professional Edition* use HKEY_CURRENT_USER / Software / Datapath / RealiMation /

For *RealiMation Demo Edition* use HKEY_CURRENT_USER / Software / Datapath / RealiMation Demo /

To Add Entries in Windows95

- Click with the right mouse button and press 'New' to add keys, binary, string and DWORD values and type in the new value.
- To modify a value click over it with the right mouse button and type new data, and press OK.

Registry Edits

Display Drivers - (Problems with Hardware Accelerators and Preview Windows)

If you are having a problem displaying preview windows then you may need to amend the registry to use a different display driver for these previews. (Click here for more about this problem.)

- Add a new DWORD value, called ***Alternate***, in the Channel section: e.g.
  HKEY_CURRENT_USER / Software / Datapath / RealiMation VSG / Channel / Alternate

- Change the Alternate value to set the driver you want to use for previews etc.

  The Channel subkey lists all the drivers which are currently installed under RealiMation, and each one is assigned a value which identifies it within the system.
  For example if your Channel registry is set up as follows:

  DisplayDriver1=c:/realimation/bin/rgdgl4
  DisplayDriver2=c:/realimation/bin/rgdrw4
  DisplayDriver3=c:/realimation/bin/rgdd3d4
  Display=1

  then you have installed OpenGL, RenderWare, and Direct3D drivers, and DisplayDriver1 (i.e. OpenGL) is your current default setting.

- To set RenderWare as the Alternate driver, modify the Alternate value to be 2. To set Direct3D as the Alternate driver, modify the value to be 3.

Texture Loading

By default, RealiMation STE loads textures on demand, although you can override this using the Settings subkey in the Registry.

- In the Settings subkey, add a new DWORD, and call it "LoadOnDemand"

- Setting the value to 0 (False) loads all textures first. (The default value is 1 (True) which loads all the textures on demand).

Note: Only the main 3D views are affected by this - previews and texture editors always load on demand.

See Also

Editing the Registry for more information on accessing the Registry and the various subkeys.

Texture Loading

The underlying RealiMation API (Application Programming Interface) has the ability to load textures into memory either on demand (i.e. when a polygon using that texture comes into view), or by loading all at once when the view is first displayed on screen.

The advantage of loading on demand is that a scene with many textures will be first displayed much quicker than if it has to go off and load all textures first. The disadvantage is that when you start to interact with a scene (or start a fly through), you may get a visible pause when a new texture is loaded.

By default, the STE loads textures on demand. You can override this by editing the Registry.

Renderers / Display Drivers

RealiMation is 'renderer independent', i.e. it is not built upon one particular display technology like OpenGL. It has been designed so that different 3D display mechanisms can be used, and, given underlying operating system support, that these renderers can even be dynamically swapped at run time.

There are several reasons we decided to take this approach:

- **Portability** - One particular rendering technology may not be available on all the different combinations of CPU type and operating system that our customers want to use with RealiMation.

- **User Choice** - This is actually very important. Different 3D display technologies have different rendering 'artifacts', normally determined by the tradeoffs that each technology decided to make when being developed. For example, one renderer might decide to sacrifice quality of display for speed. Since every user has a different set of requirements, we decided not to limit our users to one particular set of rendering tradeoffs. The user can decide what rendering artifacts are acceptable in their particular application.

- **Future Proof** - There are new 3D display technologies being announced all the time. By not being tied to any one renderer, RealiMation can expand its capabilities in line with new developments.

This section gives further details on the display drivers currently supported, including some of the different pros and cons of each one.

Criterion Renderware Driver

Available under DOS, Windows 95, and Windows NT (both Intel and DEC Alpha), Renderware is a very fast software rendering library. RealiMation is set to use this as the default renderer, because it is both fast and runs on just about all platforms.

Some of the disadvantages of this driver are:

- Currently only uses a 16 bit z-buffer, so some hidden surface problems can manifest themselves in some scenes. You can alleviate this in the STE by moving your front and back clip planes so that they surround you scene as tightly as possible. See also Hidden Surface Artifacts
- Only supports 256 and 65535 colour displays (i.e. 8 and 16 bits per pixel).
- Transparency is achieved by pixel dithering, rather than by blending. This, while fast, does not produce the best quality image.

Note: Developers cannot redistribute the Renderware runtime without entering into a separate licensing agreement with Criterion Software. For more details please contact: Criterion Software, Westbury Court, Buryfields, Guildford, Surrey, GU2 5AZ, England, Tel: +44 1483 406200 Fax: +44 1483 406211

OpenGL Driver

Available only on Windows platforms that support OpenGL. (This includes all processor versions of Windows NT 3.5 and upwards.) OpenGL is included as standard with Windows 95.
If you do not have OPenGL on your system, then the RealiMation installation will add the Windows 95 OpenGL runtime components.

OpenGL gives very high quality results, for example, transparency is done by true pixel blending, to give impressive appearance. High quality texture modes are also supported, such as bilinear filtering and mip-mapping.

The price of this is performance. Textures are not handled very well at all - and in fact without hardware acceleration the presence of textures in your scenes can make display with OpenGL at least 10 times slower than Renderware.

The RealiMation OpenGL implementation does support the new OpenGL 1.1 texture object extensions, and this can help texture performance considerably when used with a hardware accelerator, for example the GLINT and Permedia chipsets from 3Dlabs and the R3D100 chipset from Real3D.

There are a number of GLINT based OpenGL accelerator cards commercially available. Using one of these under Windows NT can make for very fast displays at large view sizes.

RealiMation's implementation of OpenGL supports all pixel depths and resolutions.

Intel 3DR

Please note that Intel 3DR is no longer supported from V4.10 of RealiMation.

Null Driver

The null driver is a special display driver that does not produce any output! Its purpose is to do everything except draw polygons. It can be used to optimise the geometry processing overhead of a scene.
This driver is only of interest to a minority of users, and is not installed by default.

Rendition Verite Driver

This driver directly drives the chip as an external non-Windows frame buffer. It can be used as a 'slave' window from the VSG Developer edition of the STE. One of a new generation of cheap high performance 3D rendering chips, it provides high quality texturing modes (bilinear filtering and trilinear mip mapping, for example) with fast rendering speeds.

Direct 3D

Direct3D is a new rendering API from Microsoft designed for use under Windows 95. To use Direct3D, RealiMation assumes that you have installed the D3D runtimes first. If you have not done this, you can find the Direct setup program on the RealiMation CD under the DirectX directory.

The most recent release of Windows 95 comes with Direct3D installed, so you will not have to do anything further after installation. We recommend that you try the Direct3D driver with RealiMation first - if it fails, then install DirectX from the RealiMation CD.

3Dfx Obsidian Pro

This card is a very fast graphics card that works in addition to your 2D Windows 95/NT accelerator. It works best with a second monitor. The driver for this card should work with any 3Dfx-based products, e.g. Orchid's Righteous 3D, Diamond's Monster3D.

Note that you can only use the 3Dfx chipset from RealiView (including Internet plug-in), and from the VSG Developer Edition of the STE. *It will not be available from the Professional edition of the STE.*

RealiMation will install the current versions of the 3Dfx hardware drivers for both Windows 95 and Windows NT. During installation, however, if existing 3Dfx drivers are found, they are copied into a Safe directory under the RealiMation Glide subdirectory. If you find existing 3Dfx applications do not work after installing RealiMation, you can restore the original 3Dfx drivers from this safe directory. Please let

Datapath know if this happens - we have not yet come across such a situation, but we guard against it just in case.

3Dlabs GLINT

If you have a 3Dlabs GLINT based accelerator, you can use this with the OpenGL driver, in which case it will work within a window as normal. You can, however, also driver the chip direct to a second monitor, in which case you will need an ordinary graphics accelerator to handle the Windows desktop.

By driving the chip directly, you can get much higher performance out of the GLINT chipset than by going through OpenGL.

Other Drivers

There are various other drivers in development, and which will be available in the near future. Other platforms that may be of interest to you are Silicon Graphics and Apple PowerMac. If you have any requests for particular drivers, or wish to develop your own, then please contact Datapath Ltd directly.

Known Problems

Texture Coordinate Editor Display

On some configurations, the Texture Coordinate Editor may not be displayed correctly the first time. This appears to be restricted to using OpenGL drivers as the default. You can easily fix this, however, by just grabbing the corner of the TCE window and resizing slightly.
You should also see the RealiMation Display Driver readme file for a work around to this problem.

See Also:

True Colour Displays

Display Problems with Hardware Accelerators

True Colour Displays

The different display drivers supported in RealiMation (i.e. Direct 3D, RenderWare, OpenGL, etc.), deal with different Windows display resolutions differently. More details on the characteristics of the different display drivers are to be found in the section on Display Drivers, and in the "Display Driver Readme" file that is installed whenever you install RealiMation.

Users should be aware that RenderWare is only designed to work with 8 and 16 bit per pixel displays, giving 256 and 65535 colours respectively. 8 bit is best for speed, whereas 16 bit is better quality, yet is still very fast. You should not have your Windows display mode set to a True Colour mode (24 or 32 bit) if you intend to use RenderWare drivers. Your graphics will be very slow.

OpenGL generally supports all colour resolutions. You do, however, suffer a performance hit using True Colour displays. It is advised to keep your Windows display mode to 16 bits per pixel or less. Some hardware accelerated OpenGL drivers work best at 12 bits per pixel, which works well, but has the disadvantage that the RenderWare and driver will behave badly if used (wrong colours, slow etc).

General Working Information

As you work through the tutorials, and begin to create your own 3D worlds, you will notice that a number of the different dialogs and Properties pages are similar between the different objects. The aim of this section of the manual is to describe these pages, and to give you a few tips on how to use them.

Lister Windows

Properties

Naming Objects

Assigning Materials to Shapes and Placements

AutoViewing Shapes and Placements

Locking Objects

See Also:
Shortcuts & Hotkeys

Hotlinks

Flying Controls

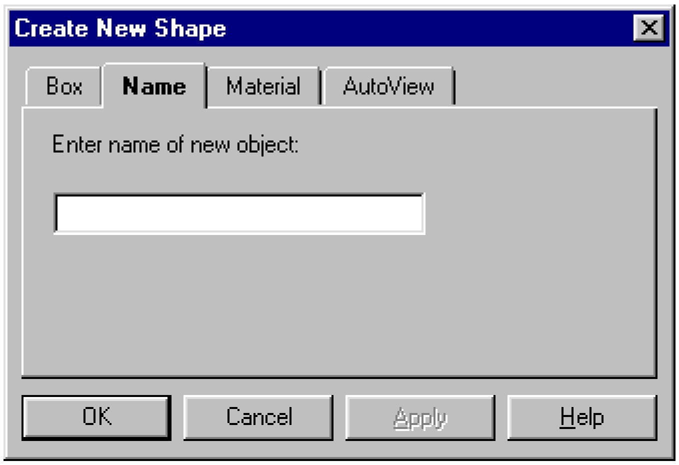
Drag and Drop

Import filters

Naming Objects

When you create any object in RealiMation you set up the different parameters using the Properties for that object.
One of the tab pages which appears as part of the Properties for every object is the 'Name' tab. You can use this to name and subsequently rename the object.

The Name tab usually looks like this:



Simply type in the name for the object and press Apply or OK.

AutoNaming Objects

If you do not expressly name an object, then RealiMation 'autonames' it using a predefined mechanism, created using a combination of the object type, and sequential number sequence. (The number used is determined by the number of objects already created in the RealiBase.)

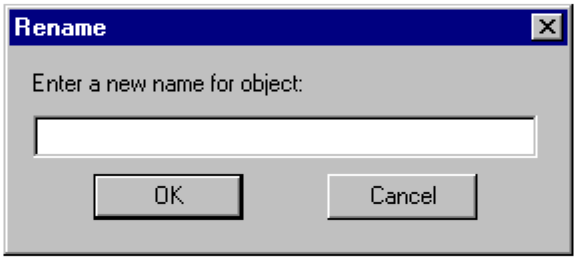
For example, suppose you create a new light source and there are already 51 different objects created, then the light source would be autonamed as <*Light Source 52*>, where the < > identifies that the object has not been expressly named.
In the case where you create a view, the default camera and atmospheric objects are autonamed using the name of the view if it is specified.
While autonaming is useful, be careful - it can cause confusion in larger RealiBases which use lots of different objects.

Renaming Objects

If you do not name the object when you create it, or you want to change the name you can do so by either:

- Displaying the editing the Properties for that object, moving to the Name tab and typing in the new string, or

- Use the Edit | Rename option (Ctrl+R) which will display the following dialog:



Once you have typed in the new name simply click on Apply or OK.

Assigning Materials

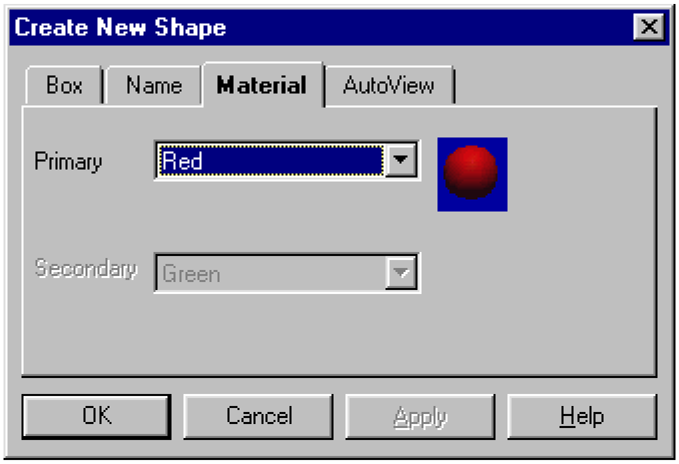
AutoViewing Shapes and Placements

Working with RealiMation

Assigning Materials

Each time you create a shape or a placement of a shape you can alter the material (colour) used:

- Move to the Material tab and the Properties should look something like this:



- Use the drop down arrow to display the available materials in this RealiBase.
  Every RealiBase has a number of basic materials set up by default - you can edit and add to these using the Create | Material option.

  Hint: You can do this while you are defining the shape / placement. (As you create the material you can add images as textures to bring increased realism to your objects in the world.

- Some shapes / placements (e.g. a grid) can use two materials. This is shown by the second drop down arrow and preview box becoming active. Select the material for this object in the same way.

- You can change the materials for a placement later, either using drag and drop on an entire object, or you can paint individual faces.

See Also:
Properties

Shortcuts & Hotkeys

Working with RealiMation

Naming Objects

Locking Objects

The locking mechanism has been included for use by RealiMation application developers ***only***, and allows them to ‘lock’ any object (view, shape, camera etc.) used within a particular RealiBase.   There are three levels of locking which can be used in combination.   The locks are set by checking the boxes alongside each one.

The locks are visible as Properties for the selected object, and users of the STE can see which objects are locked and the level at which they are locked.   Users of the Professional or Demo versions of the STE cannot change the locking status of the selected object.

The three options are:
Cannot delete objects
Objects locked in this way cannot be deleted from the RealiBase.
Cannot change objects
Properties for objects locked in this way cannot be changed in any way.   All the Properties on the individual tabs will appear ‘greyed out’ or disabled - no changes can be made.
Cannot remove object from parent
Objects locked in this way cannot be detached from its position in a hierarchy.

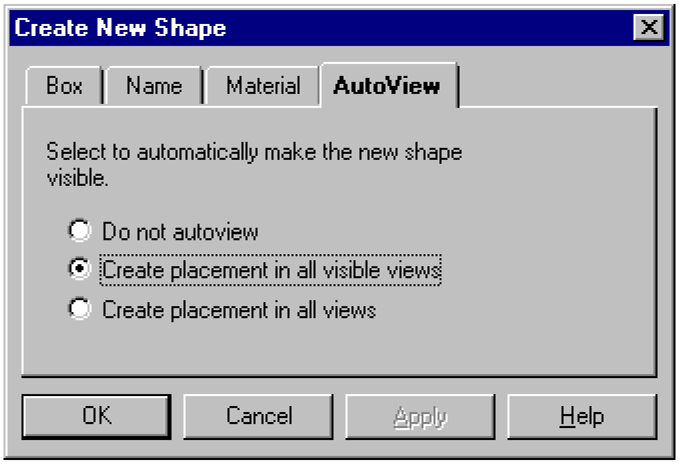
Working with RealiMation

RealiMation Developer Toolkit

AutoViewing Shapes and Placements

When you create a new shape use this page to automatically create a placement and display it the selected views.

- Click on the appropriate option.   The default setting is to create and add a placement in all currently shown views.



NB: If you select "Do not autoview" then a placement will not be created.

- When you have completed the set up click the OK button and the new shape will be created.   The 'Apply' button remains disabled unless you are updating the settings for the object.

Defining and Working with Shapes

Creating and Working with Placements

Working with Properties

Properties define an object in the RealiBase - how it is made up. For example, the Properties of a Placement include it's display characteristics, statistics - the number of faces, vertices, material etc. The Properties are set when the object is created, but they can be edited at any time from the Properties Page.

Displaying and Editing with Property Pages

To edit the Properties for an object:

- Highlight the object in a Lister or in the View window and either:
- Use the Edit | Properties menu or
- Double click the mouse over the selected object or
- Press the Space bar.

The Properties for the selected object will appear. Click on the appropriate 'tab' to move between the different settings for the object.

Use the scroll arrows on the right hand side of the Properties page to view more options. To do this, click on the right hand arrow to scroll through the remaining pages, and then use the left hand arrow to scroll back. This is standard Windows functionality, and should be familiar to all Windows95 and WindowsNT users.

Working with Properties: Drag and Drop

Once the Properties for an object are displayed you can change the object referred 'on the fly'.
For example, in helisim.rbs
Display the Properties for Target 3,
Move to the Level of Detail Properties and highlight Level 0, so that the model appears in the preview window
Next select Target 2 in the Lister and drag it over and drop it onto the page.
You will see that the information and the preview has changed and now shows the details of Target 2.

All Properties work in this way. Click here for more details and options using drag and drop.

Modeless Operation

Many Properties pages are modeless, i.e. you can work on other aspects of the RealiBase while they are still visible.
Modeless Properties are identified by an active 'Apply' button.
For example, if you are changing the position of the nodes on an action, the action edit box remains open while you are making your changes. When you have made all the changes you wish, then click on the Close button and the Properties will disappear.

See Also:

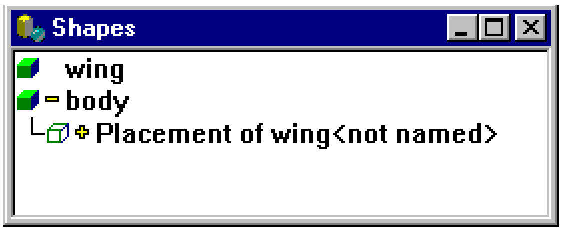
Working with RealiMation

Shortcuts & Hotkeys

Lister Windows

RealiMation uses Lister Windows (Listers) to *list* the different objects defined in the current RealiBase, according to their type.   There is a Lister window for every type of object.   For example, all shapes are listed in the Shapes Lister, all cameras in the Cameras Lister and all Images in the Images Lister etc.

A Lister looks something like this:



Hierarchies are also displayed in Listers.   For example, the View Lister contains View objects which are hierarchies, referencing all the placements, actions, atmospherics and cameras in a view.

Materials and actions associated with placements will appear in the hierarchy in the Placement Lister, and the View Lister (where a placement is in the View).

Note: You can create multiple view objects for your RealiBase, and all these are listed in the View Lister.   See creating views for more information.

Using Listers to View Information

Lister Windows can be 'split' into two sections using the Window | Split (or Ctrl+W) command, so that you can see two view objects simultaneously.
Scroll bars are added to the Lister, so you can move to see all the details.

Creating and Manipulating Hierarchies using Listers

Listers can also be used for creating and manipulating hierarchies - with the drag and drop mechanism.

For example, to add a placement to a particular view:

- Select the placement in the Placement Lister and drag it over, and drop it onto the view object in the View Lister.

A reference will appear in the View Lister and the placement will appear in that view window (if it is visible).

You can do the same with other types of objects, for example with materials...

- Select a material, drag and drop it over a placement and the placement changes to use this new selected material.

The material is added to the hierarchy of the placement in all the Listers in which it appears.

See Also:
Defining and Working with Shapes
Creating and Working with Placements
Working with Materials
Building up a Geometry Hierarchy

Shortcuts & Hotkeys

Working with Properties

Shortcuts & Hotkeys

RealiMation makes extensive use of hotkeys and shortcuts to allow quick and easy working around your virtual world. There are also hotkey accelerators for menu options. (Note: Many shortcuts are the same as standard Windows options.)

Ctrl + N File | New
Opens a new RealiBase

Ctrl + O File | Open
Opens and existing RealiBase

Ctrl + S File | Save
Saves a RealiBase

Ctrl + I File | Import
Imports models e.g. 3DS, DXF into the current RealiBase.

Ctrl + E File | Export
Saves the current RealiBase without any view information

Ctrl + Z Edit | Undo
Undo command - undoes the last action

Ctrl + C Edit | Copy
Copies the selected objects. Displays dialog for selecting extent of copy, from single objects to complete hierarchy

Ctrl + R Edit | Rename
Renames the selected object

Ctrl + M Edit | Merge
Merges the selected objects into one new object

Ctrl + U Edit | Usage
Checks whether the selected object is used and lists where

Ctrl + W Window | Split
Splits a View window into four: one uses the current camera and the other three show ortho camera views. Also splits any Lister

Ctrl + A Edit | Select All Unused
Selects and displays all the objects in the RealiBase which are not used.

Ctrl + F Edit | Reselect Faces
Reselects deseleced faces

Alt + Arrow Edit | Move up or Move Down
Moves the position of a placement in a hierarchy or change the display order

Esc Edit | Clear
Deselects the current selection in a view and all highlighted objects in any Lister Window

Space bar Edit | Properties

Displays the properties for the selected object

'F' + mouse Pick | Snap to Face
Force face pick

'E' + mouse Pick | Snap to Edge
Force edge pick

'V' + mouse Pick | Snap to Vertex
Force vertex pick

'+' Create | Face
Creates a face between three selected vertices

F2 File | Execute Hotlink
Executes a hotlink on the placement

F3 Edit | Fit to View
Locates the highlighted object in the view.

F5 Window | Autotile
Auto tiles the View Windows and the Listers to fit the screen

F6 View | Camera at node
Jumps the camera to the selected node

F7 View | Level Camera
Levels or straightens up the camera

F8 View | Flip Camera
Flips the camera

F9 Pick | Mouse flies camera
Switches to mouse flies camera mode.
(Make sure that you are using a 'free' camera.)

Ctrl + F3 Edit | Find by Name
Searches the Lister for the entered text string

See Also

Hotlinks

Flying Controls

Drag and Drop

RealiMation STE Desktop

Working with RealiMation

Hotlinks

These are links to other files and applications (e.g. RealiBases, document files, programs or WWW pages) which are attached to placements within the world and activated as you fly into or click on them.
You associate these files with the placements using the Placement Hotlink Properties.

How RealiMation Deals with Hotlinks
The way that RealiMation interprets the hotlink string depends on the type of link made.
For example:

- If the link is RealiBase, then that RealiBase file is loaded into the STE or RealiView. This is useful when you want to create a large scenario, but do not want to create an enormous RealiBase file. This feature allows you to swap files on the fly to make the scene compact and efficient.

- If the link is an executable then the associated program starts up. For example you could attach the program *winfile.exe* to a placement, and File Manager will run each time you activate the link.

- If the link is to a document file, then the appropriate Windows application will start up and the document will be loaded. For example, a link to *readme.txt* will invoke Notepad, and display the file.

- If the links specifies an HTML page (i.e. it begins with "http:") then your Web Browser will start up and search for and display the page.
  Note: You should set up the pathname to your preferred Web browser to using the Customise | Web Browser option.

Activating a Hotlink
Hotlinks are activated by either:

- flying into the placement
- picking the placement and hitting F2 (a shortcut to File | Execute hotlink.)

Note: If you want to fly into a link to activate it, then you **must** have the solid camera enabled.

Hotlinks and RealiView
The latest version of RealiView is fully hotlink enabled, and displays the hotlinks as you move your cursor over them. Use the spacebar to activate these links.

The potential applications of this feature are numerous. You could create a 3D program manager, for example - using only the editor and RealiView. It is the RealiBase that defines the program manager!

Another application is to link different RealiBases together. For example, the interior of an office might be loaded when you fly through the door from the outside. You might even make a RealiBase browser, which is itself a RealiBase.

See Also:
Frequently Asked Questions

Flying Controls

When you have toggled the mouse files camera option ( ) you can begin to fly around the world. You may notice that a white box has appeared in the centre of the view window which has been included to help improve flying controls.   You can toggle the display of this box

Note: We recommend that you also select the solid camera ( )and perhaps the ground flight ( ) options to improve the camera control as you experiment with flying.

When you have toggled the option to use the mouse to fly around the world, you will see that a white box has been drawn in the centre of the screen.   This box has been designed to improve you flying controls.

The centre of the box is like a 'dead' area, i.e. camera flight is disabled when you position and click the mouse inside the box.

PLEASE TURN TO TUTORIAL ONE FOR A 'REFRESHER COURSE' IN FLYING AROUND THE WORLD, IF YOU NEED TO.

Mouse Controls   - when the LEFT mouse button is depressed
To look left (i.e. turn the camera to the left)   **-** move the cursor to the left
To look right (i.e. turn the camera to the right) **-** move the cursor to the right
To move into the scene   **-** move the cursor up above the box
To move out of the scene   **-** move the cursor down below the box

Mouse Controls - when the RIGHT mouse button is depressed
To pan left   **-** move the cursor to the left
To pan right **-** move the cursor to the right
To pan up   **-** move the cursor up above the box
To pan down **-** move the cursor down below the box

As you pan up or down, **tap the left mouse key to tilt** the camera viewpoint up or down, to look onto the view from a different angle.
If you pan down then the left mouse button will tilt the camera up, and if you pan up then the left mouse button will tilt the camera down.

Mouse Controls -when left AND right mouse buttons are pressed together
To tilt the camera up   **-** position the cursor in the top half of the window and hold both buttons down
To tilt the camera down **-** position the cursor in the bottom half of the window and hold both buttons down
*To roll the camera anticlockwise***-** position the cursor in the left half of the window and hold both buttons down
To roll the camera clockwise **-** position the cursor in the right half of the window and hold both buttons down
NB: Holding down the Control key as you move the mouse gives finer control over the camera. Holding the Shift key as you move accelerates the flying.   You can also adjust the flight sensitivity from the Customise | 3D Interaction menu.

See Also:
Solid Camera
Ground Flight
Terrain Following Camera

Drag and Drop

One of RealiMation's most powerful user interface is its extensive use of Drag and Drop functionality. Drag in Drop is a common feature of the Windows working environment and RealiMation exploits it to the full.
Below is a list of the types of functions which can be carried out using drag and drop - no key board use at all!!

General

Drag a selected object over the Properties page of another object of the same type

This updates the Properties displayed to those of the newly selected object. You do not need to close the Properties page for one object before viewing another. You can do this for any type of object, e.g. drop an action over the Action Properties and the information displayed will automatically update.

Shapes

Drag a selected shape into a View window

A placement of the shape is created, and appears in the View window. References to the placement are added to the Placements and View Listers.
Where the view is split, the placement is added into each view.

Drag a selected shape onto a particular position in a view

If you drop a shape onto some existing geometry in a View window, (i.e. not in an empty space) the placement will automatically be positioned at the cursor.
For example, you can place a model of a building onto an exact point on the landscape.

Drag a selected shape onto another shape

This creates a placement of the selected shape, and adds it to the other shape as a "child object". The new placement is added to the destination shape's hierarchy, and a reference will be added to the Placement Lister if one does not already exist. Every placement of that shape will also be updated to include the new placement.

Drag a selected shape onto a placement

Adds the shape to the placement as a Level of Detail, or replaces the shape referenced by the placement. Choose from the message prompt.

Placements

Drag a selected placement into a View

A placement is added to the View and a reference to it appears in the view object in the View Lister.

Drag a selected placement onto a shape

This adds the placement as a child shape to the hierarchy of the destination shape. Every reference of the shape will be updated to include the placement.

Drag a placement onto an action

Actions can be made to ‘hug’ placements, such as a landscape, by simply dragging the landscape and dropping it onto this action. This is particularly powerful, since it allows you to set up terrain following simply and easily. Once the action and the landscape have been associated, you can add multiple placements to follow the action, which will in turn follow the landscape.

Drag a placement onto a camera

The camera will now "point at" the placement wherever either object is located in the world. A typical example could be following the flight of an aircraft from an air traffic control tower.

Materials

Drag a selected material onto a shape

Doing this changes the underlying material of the shape.

NB: You will not see a reference to the material attached to the shape in the Lister Window, because the shape's individual faces can have different materials.

Drag a selected material onto a placement

This changes the material used to display the individual placement. A reference to the material will be added to the placement in the Placement and any View Lister Windows where the placement is displayed.

NB: It does not change the underlying material of the shape. See the User Manual (E: 86) for more details on Material Inheritance).

Drag a selected material onto selected faces

This 'paints' the selected faces with the new material. Since a material can include a texture, you can use the Texture Editing functionality to give the required finish. If an entire shape or model is selected, the whole thing will be painted in the material.

Drag a selected material onto the Texture Coordinate Editor

This 'paints' the selected faces with the new material. If the new material incorporates a texture, then you can continue to use the Texture Editing functionality. The new material will be applied to all the selected faces.

Images

Drag a selected image onto a material

This adds an image onto the material as a texture. Any shapes and placements which use this material will change to incorporate the added image. Since a material can include a texture, you can use the Texture Editing functionality to give the required finish.

Drag a selected image into a view

This adds the image into the View as a background bitmap.

Atmospherics

Drag a selected atmospheric into a View Window or onto the view object in the View Lister

This changes the atmospheric used in the view. The View Lister will now contain a reference for the new atmospheric object..

Lights

Drag a selected light source onto an atmospheric object

This adds the new light source to the atmospheric. Multiple light sources can exist within one atmospheric object.

To replace a light source in an atmospheric, delete the existing light source before or after adding the new one.

Drag a selected light source onto a placement

This attaches the light to the placement. Depending on the type of light, you can use this to create effects such as car headlights, search lights etc. See the earlier section on lights for more details, as well as the previous examples section.

Drag a selected light source into a view

This adds the light source to the atmospheric object used for that view.

Cameras

Drag a selected camera into a View or onto the view object in the View Lister

This changes the current camera used in a view, and replaces the current reference with the new one.

Drag a camera onto a placement

When a camera is dropped onto a placement, the camera is fixed onto and follows the placement as it travels through the world. Any action associated with the placement will also be associated with the camera.

Actions

Drag a selected action onto a placement in its Lister Window

This adds the action directly onto the placement. Any view using the placement or camera will be updated automatically.

Drag a selected action onto a camera in its Lister Window

This adds the action directly onto the camera. Any view using the placement or camera will be updated automatically.

Drag a selected action onto a light source

This associates an action to the light, so that the light can move around the world on its own path. This is useful in situations like a spotlight following an actor on stage, or a searchlight or light house beacon.

Drag a selected action onto another action

This creates a ‘nested action’. As an example, try creating a circular action and display it in a view. Then create a roll path. Drop the roll action onto the circular path. Assign the roll action to a placement in the view, and watch how it rolls around while following the circular action.

Working with RealiMation

Once you have an understanding of 3D computer graphics and have run through the tutorial you can start to create your own worlds and scenarios.

Click on the topics below to find out more detailed information about the different objects you can incorporate into your world.

1. Start by opening up a new RealiMation file to work on.

2. Next create a view so can look at the world you are creating. You can have multiple views in a world, each one showing a different aspect of the scenario you are creating. Find out how to use images as background bitmaps to the view too!

3. Once you have created a view, you can begin to import models, or define basic shapes to place in the world. (Click here to find out more about how to create and select shapes, edit faces and shapes and has more information on faces and vertices.)

4. Find out about creating and working with Placements in your world. Placements (sometimes known as instances) are are representations of models and shapes in your world, and are also very powerful with extensive editing options, which are explained in some detail.

5. Add materials and textures to your models to make them more realistic, and change or add to the cameras and atmospherics used for any view ...

6. Actions bring it all to life - find out how to use actions for placements, cameras and even lights!

7. Now your world is complete you can distribute it freely using RealiView ...

See Also

Shortcuts and Hotkeys
Lists the main keyboard shortcuts and hot key combination for many common functions in RealiMation.

Frequently Asked Question
A few tips to getting the most from your RealiMation session

Hotlinks
Describes how the Hotlink features in RealiMation can help you...

Quick Reference
Just in case you need reminding about what the different buttons do, is and where they are located this is a quick reference view of a typical RealiMation desktop. And please remember, you can re-run the tutorials at any time to familiarise yourself with the powerful functionality of RealiMation.

General Information
As you begin to use RealiMation, both with the tutorials and on your own, you will notice that there are some common dialogs and Properties pages which appear. This section outlines some of these, as well as some other common functions.

Creating Views

What is a View?

Views contain **everything** needed to describe how a scene appears in a virtual world. In RealiMation terms, views contain a list of the individual placements (which describe the shape information to be rendered), combined with all the required attributes such as materials, textures and actions, a camera object, light objects and an atmospheric object. Although a view has no "physical" appearance, it enables shapes to be rendered onto a display.

Any placement that is included in a view will be displayed, unless it is obscured by other placements or is "clipped out" of the view. And since motion is associated with placements, all actions happen automatically inside the view.
When a view is rendered, it is evaluated at some defined time value which may be obtained directly from a real time clock or could be determined to provide slow motion or time lapse effects.
You can create multiple views in a single RealiBase, and you can also define views which are not shown, or 'realised', immediately, but become active on demand.

Creating a View

- To create views use the Create | View menu.

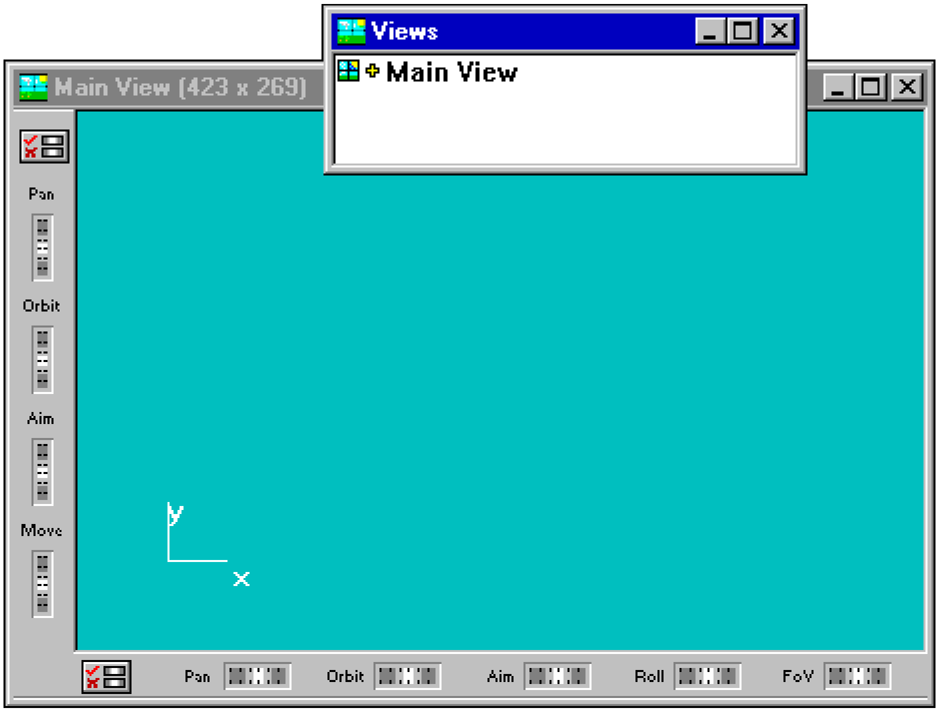
- When the Properties appear, set up the new view, by clicking on the tabs to turn the pages...

Control Tab page
Background Tab page
Locks

- You can view the Statistics for a view, displaying the number of faces, points and beacons used for the view.

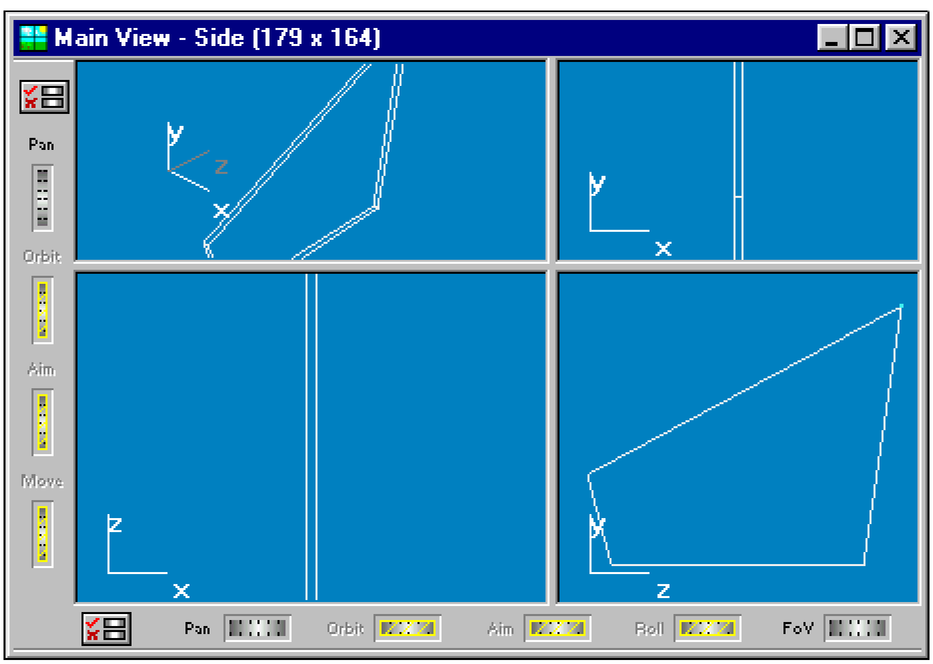
- Additionally, you can change the renderer used for views independently - even when you are RealiMating the scene. Once you have the Properties visible, simply click on the drivers tab and select a new renderer from the pull down menu.

- Every time you create a view, an atmospheric, a light source and a camera are set up by default. This is to enable you to see any placements that are positioned in the view. You can alter the defaults at any time.



- Use the 'thumb wheels' along the left and bottom edges of the View window to move the camera's position around the world. You can use the buttons at the top to toggle the different camera movements. (These are all dealt with in more detail in the section 'Working with Cameras'.)

- Views can be split into four to show the current camera view and three ortho views (using the ortho cameras). This is useful when moving around the world and repositioning placements in relation to one another.



- Use the Window | Split menu option or the Ctrl+W shortcut keys to split the view window. You will notice as you move the mouse over the view window, a cross hair appears - click with the left mouse button to secure the cross hair.

- The sections can all be different sizes - depending on which viewpoint you are working with - for example, if you want to work using the y-ortho camera, then position the cross-hair so that the y-ortho view is largest.

- When you want to return the view to use the current camera, click on the centre of the cross hair and drag it over the bottom right corner view until it disappears.

- Once you have created a view you will need to add shapes and models to it - and you may want to alter the cameras, lights and atmospherics used.

View Projection

The view projection is set up by adding cameras. Every time a view is created, a camera and an atmospheric are created by default. This is because a camera is required so that you can see the objects in the view, and by the same token, we need atmospheric effects to light the view so that we can actually see the models in the world.

The position of the camera marks the viewpoint, so this means that if you move the camera, then the viewpoint moves too.

NB: Although a camera and atmospherics are set up you can change these at any time, to alter the viewpoint, and the illumination, or add other effects.

View Display Modes

Views can be rendered in a number of different display modes including wire frame, flat shading, smooth shading and full anti aliasing, with or without texturing, These modes can be changed dynamically, and can be set up for individual placements in a view.

Raster Backgrounds

Bring stunning realism to your worlds by adding raster backgrounds, or bitmap images. RealiMation Developers can also make use of a depth buffer which allows you to obscure models in the world. This is very useful for applications that have a fixed eye point, e.g. air traffic control tower simulators, where images of a real airport can be used complete with ground obstructions such as hangars, trees etc.

In such a scenario, the computer generated images of the aircraft are combined with the real background which remains static.

See Also

Defining and Working with Shapes
Creating and Working with Placements
Creating and Working with Cameras
Creating and Working with Actions
Creating and Working with Atmospherics
Working with Textures
RealiMation Screen Layout

Defining and Working with Shapes

Once you have created a view, you can add shapes and models to exist in the world you are creating. There are two ways of creating RealiMation models: ***import*** them from other third party applications or ***define simple shapes***, and edit them into more complex models. Click here for a shape definition.

Please note that RealiMation STE is ***not*** a modeller, but a world builder and editor. However, there are extensive features within the STE which allow you to change the basic shapes you create to produce complex models. Shape editing is covered in some detail in this section.

Importing Shapes from External Sources

You can import any objects into the RealiMation World Editor from many other external sources - for example whole models that have been designed in AutoCAD, MicroStation (.DXF format), 3DStudio (.3DS), VRML and Windows Clipboard etc.

DXF is a public file format which is widely supported by animation, modelling, rendering and CAD applications, thus making a universally suitable import vehicle for RealiMation to use. DXF can export both 2D and 3D data, although RealiMation can only convert the 3D data correctly.
MicroStation drawing files can be transferred to RealiBase format from inside MicroStation using a special MDL application from Datapath - the **RealiMation CADPack for MicroStation**. This is a separate chargeable item - contact Datapath for more details.
In addition to the different file formats, you can also import **WMF** (Windows MetaFiles) objects directly from the clipboard. These are particularly useful for importing text and graphics from 2D desktop applications, such as Corel, Word and Excel.

The list of import filters is fairly comprehensive, however, many more filters are planned for inclusion in the future. Additionally, RealiMation Developers can create their own import filters for other applications. This is detailed in the SDK API documentation.
Please turn to the section on import filters for details on the acceptable file formats and import instructions.

Creating Shapes inside RealiMation

The basic shapes which can be defined in RealiMation are simple common primitives: block, cone, cylinder, sphere, torus and grid. These basic shapes, as well as more complex imported ones, can be edited with the extensive editing options found in RealiMation.

- Choose the Shape option from the Create drop down menu. From here select the type of shape you want to create: a dialog showing a preview window of the shape will appear.
  NB: An ***empty*** shape object is a special sort of shape which does not contain any points or faces. An empty shape can then be added to a view and placements of other objects referenced to it, to form the top level of a geometry model hierarchy.

  All 'Create | Shape' dialogs set up the Properties for the new shape. RealiMation makes use of tabbed Properties which display related options for the shape.

- Once you have decided which type of shape to create, type in values for its dimensions, position, materials and autoview options.

  NB: You can create / setup the different materials as you go, using the Create | Material menu. Materials are looked at in more detail later on.

- Your shape will now be created, and you can begin to work with it in the world. Read through this section about working with shapes before moving onto other objects within RealiMation.

- Unless you change the default setting, a placement of this shape will now appear automatically in the view window. Also, it will appear in the **Shapes**, **Placements** and **View** Lister Windows.

  NB: Creating a face is a special function for joining three selected vertices. This can be used, for patching spaces between models, or joining up sections of imported models.

  Each Create Shape Properties page has a Help button - please read the individual help for each type of shape to guide you through the different options.

Working with Shapes

Building up a Geometry Hierarchy

How to select shapes

Editing Shapes - Changing their appearance

Using Empty Objects

The Create | Shapes | Empty option sets up the Properties of a new 'empty' object, i.e. one without any faces that can act as the top level of the hierarchy from which to attach subsequent objects. Creating an empty object allows you to assign certain attributes to the empty shape e.g. materials, actions etc. which will also affect any 'child objects' in the subsequent hierarchy.
More information on hierarchies can be found in the 'Introductory Guide to 3D Computer Graphics' and '3D Computer Graphics & RealiMation' at the front of this manual.

Hints & Tips on Working with Shapes

- Select a shape in the Shape Lister Window, then drag and drop it over the view window - a placement of the shape appears in the view and the placement automatically appears in the Placement and View Lister Windows.

- If you drop a shape onto some existing geometry in the View Window (i.e. not in an empty space) then the new placement will automatically be placed at the cursor position. For example, this is useful if you want to place a model of a building onto a landscape - you can drop it exactly where you want it to be.

- Double click on the Shape in the Shape Lister window and the Shape Properties page pops up - one of the tabs shown is for configuring the Level of Detail options. To change the shape referred to in the Properties page simply select a new shape (from the Lister Window) drag it over and drop it onto the Level of Detail page. The information will then change to give the values for the new shape.

- Placements are 'links' to or 'references' of shapes. Therefore only one physical copy of the shape needs to be stored in the RealiBase, thus making access and transformation operations speedier i.e. the system does not become over full.

- To change the material of a shape, you need to edit individual placements. Changing the placement material simply overrides the base colour - to change the material permanently you need to paint the individual faces of the shape.

- We recommend that you name all objects created in RealiMation STE (particularly at the beginning) to avoid the chance of confusion between objects.

See Also
Selecting Shapes
Editing Faces & Shapes
Creating and Working with Placements
Creating Views
Creating and Working with Cameras
Creating and Working with Actions
Creating and Working with Atmospherics

What is a "Shape"?

A shape is made up of faces, which define the actual physical characteristics of objects, in terms of three dimensional points and faces. The basic shapes which can be defined in RealiMation are simple common primitives: block, cone, cylinder, sphere, torus and grid. The faces which make up the shapes use materials which define light reflectance characteristics, colour and transparency. Materials can be shared by a number of faces.

The basic shapes you can define, as well as more complex imported ones, can be edited with the extensive editing options found in RealiMation.
Shapes can also contain references to other shapes, using placements, to define a geometry hierarchy. Empty shapes can also be created - as top level objects in hierarchies with other shapes 'attached' to them. Actions can then be attached to these empty shapes which will pass down the whole hierarchy. Additionally, the shapes can be split into a number of different levels of detail.

Each time you import a model, or define a shape, the STE stores just one physical representation of it within the database, and then creates 'references' of the object each time you use it.
Behaviours and attributes are then attached to these placements, rather than the actual object itself, which allows the system overhead to be kept to a minimum. Placements are covered in more detail in the section Working with Placements.

When you are defining shapes it is important you remember that the RealiMation world does not make use of specific units of measurement - any values shown are all in relation to one another rather than a fixed scale. This means that you can define the units of measurements for each Realibase as you create it - so these can be in kilometres, metres, miles etc. - the choice is yours.

Working with Shapes

Once you have imported or created the shapes to use in the 3D world you will notice that, unless you have changed the default settings, a placement of the shape has been added to the view window, and also to the View, Shapes and Placement Lister Windows.

You can now edit a shape's appearance by changing the faces, to alter the reference shape. You can create multiple placements of the reference shape and alter their position and material and view them in relation to other shapes, and from different camera positions.

While face editing changes the original shape, most of the manipulation of shapes is actually done by editing the placement of that shape.
If there are multiple placements of the shape, RealiMation will ask you if you want to create a copy of the shape. Making a copy of the shape before you begin to edit the placement is a good idea when you don't want to change every placement referencing the shape. If you did not make a copy, e very placement of the shape would be altered.

You can still view the Properties of the original shape by double clicking on it as it is selected in the Lister window.

You can also change the appearance of a shape by editing individual faces. For more details on this please see Editing Faces & Shapes

How to select shapes
Editing Shapes - Changing their appearance

Building up a Geometry Hierarchy

The 'empty' shape feature is particularly useful for building up geometry hierarchies, where actions can be assigned to the top level, which then traverse down to the sub-shapes in the hierarchy.
To create a simple geometry hierarchy, you can use Drag and Drop functionality.

Drag a selected shape onto another shape

If you do this you can create a hierarchy, by adding the selected shape to the other as a child-shape. Alternatively, you can add the selected shape as a level of detail of the other.

Drag a selected placement onto a shape

This adds the placement as a child to the main shape in a hierarchy. You can then add the hierarchy to the view or onto another shape.

Import Filters

RealiMation comes complete with a number of import filters - for example DXF (AutoCAD and MicroStation), 3DS (3D Studio), BMP (Windows Bitmap) and Windows Clipboard.

To import a DXF file

- Use the File | Import menu
- Select DXF from the drop down menu
- Select the file name ....
  ... RealiMation will do the rest.

All shapes and materials will appear in the appropriate Listers. The object is automatically named with the complete directory and file name structure. (You can rename the shape using the Edit | Rename (Ctrl+R) or via the Shape's Properties - highlight and double click or press space bar or use Edit | Properties.)

If your DXF files do not appear correctly, i.e. look inside out, or back to front then use RealiMation's powerful model optimisation and editing techniques, which are found on the Tools and Optimise menus. These include vertex and face merge and normal smoothing. **Note:** We recommend looking at Tutorial Four "Importing a DXF file" for examples.

To import a BMP file

- Use the File | Import menu
- Select BMP from the drop down menu
- Select the file name ....
  ... RealiMation will do the rest.

Note: You can also use the Create | Image menu to load BMP files into your RealiBase. Click here to see help on these Properties.

To import a 3D Studio file

The 3D Studio import is a little bit more complex, and allows you to import both geometry and key frame data.

- Use the File | Import menu
- Select BMP from the drop down menu
- Select the file name ....
  .... a dialog will appear with import options for smoothing, keyframe data, frame rates and 'unlinking'.

For more details on these click here to read the dialog help information.
Note: We assume complete familiarity with 3DStudio and its file formats. We do not offer technical support on 3DStudio.

See Also

Imported 3DStudio models have actions but don't move - why?

To import from Windows Clipboard

- Use the Create | Shape | Clipboard menu
- The object, whether text or 2D graphic, will be imported and added to the RealiBase.

We assume some familiarity with the product used to generate the clipboard data , you may need to understand how the application works to ensure that you get the exact results you require, which may involve some trial and error!

See Also
How can I make 3D text?

To import an OpenFlight file *(Developers only)*

- Use the File | Import menu
- Select BMP from the drop down menu
- Select the file name ....

Selecting Shapes

- Hold down the **Ctrl** key as you click with the left mouse button over objects in any Lister to select multiple objects.
  Note: to make multiple selections in various Listers, then keep the **Ctrl** key pressed as you move to the next Lister and continue to click.

- Deselect objects by picking them with the **Ctrl** key still held down.

- Clear all selections in the Listers by pressing the **Escape** key or from the Edit | Clear selected menu.

See Also:
Selecting Faces and Vertices
Editing Faces & Shapes

Editing Faces & Shapes

Remember when you edit the faces of a model, you are actually editing the shape's characteristics. (However, once you have changed the placement you can copy it to generate more models based on the same shape.)

Changing Individual Faces: 'Reshaping your shape'

The face manipulating/editing features in RealiMation are very extensive, and allow you to alter a model completely. Editing can be performed on imported models as well as those shapes you have defined in RealiMation.
Elementary face editing is covered in the tutorial, so, we recommend that you follow this first of all, if you have not already done so.

- Before you can do anything to a shape, you need to select the faces to work on, and then you can begin to make your changes.

- You can change the edges and vertices of any face, although you can only edit one face at a time. Once the face is selected use the mouse to pick the vertices (or points) of the face one by one and pull them 'out' from their original position to the new one.

Editing: Face and Vertex Dragging

- Simply click on the face(s) you want to edit and drag them around to a new position.

  As you start to drag the mouse **all** the selected faces and vertices will be dragged.
  If you only want to edit one face, then ensure that one face is selected.
  All dragging actions are parallel to the view plane, and are freeform by default. However, you can constrain the limits of the dragging to the axes.

Constraining the Editing

Hold down the **X** key as you drag, and the movement will be constrained to the shape's local **X** axis
Hold down the **Y** key as you drag, and the movement will be constrained to the shape's local **Y** axis
Hold down the **Z** key as you drag, and the movement will be constrained to the shape's local **Z** axis

NB: Holding down two keys will constrain the editing to those two axes, e.g. holding down the **X** and **Z** keys while moving the mouse will drag in the **XZ** plane.

Hold down the **Ctrl** key (face drag only) to constrain the drag to the direction of the face normal
Hold down the **Shift** key (before starting the drag) to extrude the selected face(s)

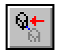
With these few simple key constrains you can completely alter your model, adding new sections and changing others. Once you have edited your model, you may want to make the changes permanent in the world - you can do this using the Tools | Centre Shape and Tools | Apply Transformation options.
This is covered in more detail in the following section on placements.

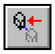
See Also
Creating Faces

Working with Face and Vertex Normals

Creating a Face

When you import a model, or edit a shape object, there may be an occasion where you need to create a very simple face, to fill a hole, or join up two parts of a shape. You can do this very simply:

- Switch to face picking mode:  and



- Select three vertices (you can only create a face using 3 vertices)

- Select the Create | Face menu

A new three sided face appears, joined between the three selected vertices.   You can edit this face as any other in RealiMation.

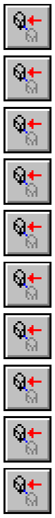
You may also decide to edit the placements of the new shape, changing their position and orientation. See manipulating placements for more information.

NB: If you change the position of a vertex so much that the face becomes non-planar (i.e. the points are not flat) then a warning message will appear in the View window.   This is because sometimes non-planar faces cannot be rendered correctly, so we would advise you to keep the faces 'flat' wherever possible.   Clicking on the 'Cancel' button 'undoes' the edit, and returns the face to being planar.

Working with Face and Vertex Normals

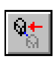
Face and vertex normals determine the way that the light falls onto a surface, and can affect the shading of a placement. Within RealiMation you can edit the normals to alter the shading effects of a placement.

The tools for editing the normals can be found in the Tools menu or from the buttons:



Before you can edit the normals, you need to change to select the faces and / or vertices to edit.

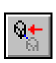
Once you have selected the faces you want to look at, then you can view the individual normals to change the appearance of the objects in the view.

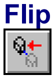
Show Normals 

How? Select to ‘Show Face / Vertex Normals’. You will see that all selected faces have changed to display the normals. Normals are shown as light blue coloured ’wires’ which point out of the selected face/vertex in the direction that the face is pointing.

The length of these can be changed in the Customise | Edit Display menu.

Once the normals are displayed, you can edit them by flipping, smoothing or merging them.

Flip Normals 



Why? Occasionally file formats, such as DXF, do not transfer a model's face and vertex normals correctly - that is, sometimes they point the wrong way. This means that the model can look as if it is 'inside out'.

To solve this problem, you can use this option (via button or menu) to 'flip' the selected normals so that they point the correct way, and then when you re-shade the view, the placement will be drawn correctly.

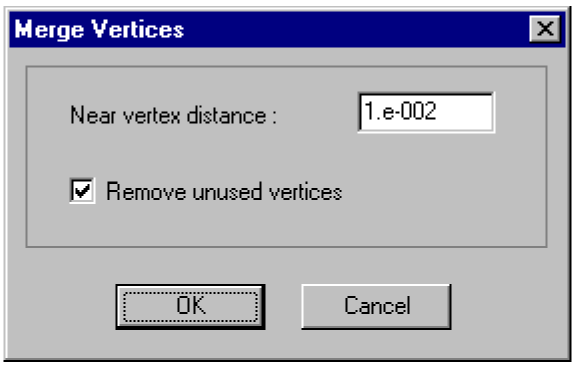
How? Once the normals are selected click on the icon and the normals will flip. You can flip either the face or vertex normals - the procedure is exactly the same. When faces are flipped, this effects whether the faces are shown if back face culling is enabled.

Merging the Vertices

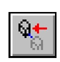
Often, imported shapes can have more vertices that are really required. This is because each face has at least three corners, or vertices, and therefore at least three vertex normals. When you consider that these vertices are positioned next to others which are pointing in an almost identical direction, then you will soon see that there are really more vertices in the model than are required.

Taking the teapot.rbs database is a good example because while it represents a curved shape, it is actually made up of a number of flat faces. If the individual vertex normals are displayed then the teapot becomes a mass of blue 'spines' showing each vertex.

This can increase display processing quite dramatically, and can also be an additional, unnecessary strain on the system. So, the Merge Vertices option allows you to reduce the number of vertices, by calculating the direction of each vertex, and then defaulting to the shortest distance between points and deleting any unnecessary or duplicated ones.
When you select to merge the vertices, a dialog will appear:



The value in the near vertex distance can be set to any user preference from this dialog We recommend that you remove any unused vertices since this will improve the final image quality and reduce the size of the RealiBase.

Smoothing and Unsmoothing Vertex Normals 

Why? You can improve the shaded display by converting the selected normals to give the placement a smooth appearance. This feature is particularly useful for shapes and models with lots of faces, which when shaded for example can give a faceted appearance rather than showing a smooth and continuous curve.

How? Select the normals and either click on the icon or select the option from the pull down menu and then change the display to smooth shaded to see the difference it has made.

Alternatively, you may want to change a placement to make it more faceted when it is smooth shaded. To do this you can simply choose to Unsmooth the Vertex Normals. This will accentuates the edges of the faces, thus making them more ‘visible’ when shaded.

More about shapes

Creating and Working with Placements

The concept of **placements** is widely utilised in RealiMation. Placements are **references** of shapes, and include any associated transformations or actions.
This means that only one physical object of the shape needs to be stored regardless of the number of placements that are created. This makes access and transformation operations speedier i.e. the system does not become overloaded with many copies of the same object. In technical terms, a placement is an instance, and consists of the ID of the shape being referenced, and a general matrix which specifies the transformation of the placement with respect to a parent object.

Placements can be used to build up complex hierarchies, and can preserve local coordinate systems, and also allow display Properties to be selectively inherited down the 'chain'.

Actions can be added to individual placements anywhere in the hierarchy - the placements will move in their own local coordinate system, so hierarchy of motion can be built up.

An typical example of where placements can be used for the best effect is the modelling of a car. The car shape can 'instance' a wheel object four times to create four placements. Although there is only a single representation of the faces and points describing the shape of the wheel, each of the four placements has its own transformation information to position it at the correct place.

Creating Placements of Shapes

You can either:

- Use the Create | Placements menu option.
  The Properties dialog for the new placement will appear on screen, with a number of sections to configure. Click here for more information about the Create | Placements dialog.

- Highlight a shape in the Shapes Lister and drop it into a View window or

- Highlight a shape in the Shapes Lister and drop it onto a View object in a View Lister

  When you create a placement using the drag and drop mechanism, the new placement will be displayed in the View window and will also appear in the View Lister and Placement Lister Windows.

  You can create placements of new shapes automatically, as you create the shape. To do this make sure that you set the autoview option in the Create | Shape dialog.

Hint: If you ant to edit a placement in isolation from other placements in a view, create a new view, drop a copy of the placement into the new view and edit it there. This makes the actual editing process easier. If you keep the main view visible, you can see how the changes affect the scene as a whole.

With smaller, more compact scene, you may find it helpful to split the View window into four (Ctrl + W) to show the view using the current camera view and three ortho views (using the ortho cameras).

See Also:

Placement Properties

Collision Detection

Placement Appearance

Terrain Following

Working with Shapes

Working with Cameras

Working with Actions

Working with Atmospherics

Creating Views

Working with Textures

RealiMation Screen Layout

Placement Properties

Use the Placement Properties to view and change the following:

- Position, Scale and Orientation
- The way that the placement is displayed e.g. lighting, shading, etc.
- View the statistics, e.g. number of faces, points and beacons
- The name of the placement
- The material used for the placement
- Any hotlinks attached to the placement
- The level of detail
- Locks (can only be changed in the Developer Edition)

You can edit the position, scale and orientation of the selected placement using the powerful mouse and keyboard transformations.
If you display the Properties while editing the placement you will see the values change.

See Also:
Create Placements

Placement Appearance

The appearance of placements (e.g. shaded, wire frame, lit, depth buffered etc.) is normally defined by the display mode of the view in which it is being displayed

These settings can be overridden on an individual placement basis, by specifying a "display mode override". This can be used, for example, to ensure that a particular placement is always displayed in wire frame mode or that it is not depth buffered, or that it is always flat shaded, etc.

To access the display mode overrides for a placement:

- Select the placement in the Placement or View Lister Window and double click or
- Select the placement in the View Windows and press the space bar

The Placement Properties will appear - move the Display tab and make the changes, and click on 'Apply' or 'OK' when you have finished.

See Also:

Placement Properties

Manipulating Placements

Editing Placements

Working with Shapes

Manipulating Placements

RealiMation offers intuitive manipulation techniques for placements in the virtual world. You can either manipulate placements by directly editing the values on the Properties pages, or by using the mouse controls and keyboard commands.

Hint: You may find it helpful to split the View window into four separate sections (Ctrl + W) to show the view using the current camera view and the three ortho cameras.

To display the Properties either:
- highlight the placement in the View or Lister and select Edit | Properties

or
- highlight the placement in a Lister Window and double clicking the mouse

or
- highlight the placement in the View window and pressing the space bar

Mouse Transformations: Translating and Scaling

When a placement is selected it is drawn with a wireframe bounding box with a set of triangular ‘handles’ on each corner and one rectangle in the centre of each ‘face’.
These handles allow you to alter the size, position and orientation of the shape interactively with the mouse. These handles are colour coded to show their movement direction. (You can change these colours using the Customise | Edit Colours menu)

- Drag the triangular handles on the corners (red by default) and drag the mouse to scale (i.e. make smaller and larger) the shape about the opposite corner.

- Drag the rectangular handles to translate the placement (change it’s position). The colour of the handle identifies the direction of the movement. The handles are colour coded as follows:

cyan	drag in the local X axis
magenta	drag in the local Y axis
yellow	drag in the local Z axis.

(This is the same colour / axis combination as the action nodes.)

- Hold down the **Ctrl** key as you drag to move the placement in the direction of the axis. (e.g. hold down the Ctrl key and drag the yellow face to scale the placement in the Z axis.)

- Hold down **Ctrl + Shift** as you drag to scale the placement in its local direction about its centre of origin.

- Double click the mouse over the selected placement to switch to rotation mode.

NB: If you drag the mouse over the entire edit box (not over a specific handle) then the placement will be dragged parallel to the viewing plane, which is particularly useful if the view is shown with Ortho cameras.

Keyboard Transformations: Translating and Scaling

You can also use the numeric keypad on your keyboard to change the position and size of the placement. (Please make sure that the number lock button is depressed before you start trying to move / scale the placement)

Translating

Keys 7 and 9	translate the placement along the X axis

(where 7 is negative and 9 is positive)

Keys 4 and 6 translate the placement along the Y axis
(where 4 is negative and 6 is positive)

Keys 1 and 3 translate the placement along the Z axis
(where 1 is negative and 3 is positive)

Scaling

Ctrl + 7 and 9 scales the placement along the X axis
(where 7 decreases and 9 increases)

Ctrl + 4 and 6 scale the placement along the Y axis
(where 4 decreases and 6 increases)

Ctrl + 1 and 3 scale the placement along the Z axis
(where 1 decreases and 3 increases)

Ctrl + 2 and 8 scales the entire placement around its centre of origin.

You will notice that as you keep the number keys depressed the editing gradually increases in speed.

Press key 5 to switch to rotation mode.

Mouse Transformations: Rotation

- Double click the mouse over the selected placement, to switch to 'rotation mode'. The handles have changed from rectangles to pentagons, and allow you to rotate the placement around its origin, in the direction shown with colour coding.

- Drag on the pentagon to rotate the placement, about its respective axis in the direction shown by the colour of the handle. The handles are colour coded as follows:
  cyan drag in the local X axis
  magenta drag in the local Y axis
  yellow drag in the local Z axis.

(This is the same colour / axis combination as the translation modes and is used to display the direction of the action nodes. These are the default colours - you can alter them in the Customise | Edit Colours menu.)

- Click on the corners (red) to initiate a 'trackball' type of drag option.

- You can change the centre of the object by holding down the **right mouse button** key and dragging a pentagon with the left mouse button in its respective direction.

Keyboard Transformations: Rotation

You can also use the numeric keypad on your keyboard to rotate the placement. (Please make sure that the number lock button is depressed.)

Keys 7 and 9 rotate the placement in the X axis (change pitch)
(where 7 is negative and 9 is positive)

Keys 4 and 6 rotate the placement in the Y axis (change yaw)
(where 4 is negative and 6 is positive)

Keys 1 and 3 rotate the placement in the Z axis (change roll)
(where 1 is negative and 3 is positive)

You will notice that as you keep the number keys depressed the editing gradually increases in speed.

Press key 5 to switch to translation mode.

Transforming Multiple Placements

To transform more than one placement at a time:

- hold down the **Ctrl** key and pick the placements in the 3D View window
  As you are select placements, the most recently selected is displayed using the usual coloured edit box, while previously selected placement(s) are displayed with greyed edit box(es).

- Change the placement transformation using the current edit box, and all the selected placements will change. You can switch between selected placements, changing the edit focus simply by clicking on another edit box.

- Once you have changed the position and orientation of a placement, you can edit them further by changing individual faces to define a different shape.
  See editing faces and shapes - changing the shape of a placement

Editing Placement Position and Orientation

You can change the position and orientation of a placement either using the mouse or typing new values into the Properties. See Placement Position and related sections for more details.

Aligning the Orientation, Position and Size of Placements

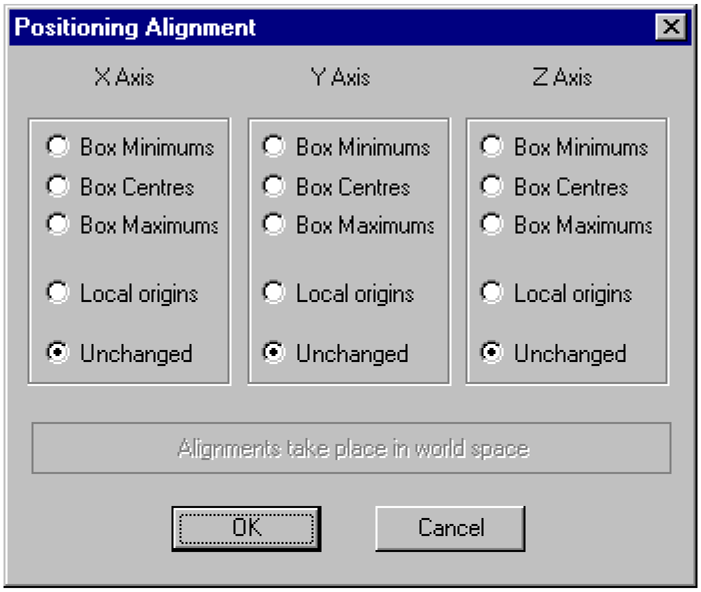
You can also change the orientation, position and size of multiple placements in relation to one another. The options on the Tools menu are available when the View window has focus and when two or more placements are selected.
Note: All alignments take place in the world coordinate space.

Orientation

Select two or more placements, and use this option Tools | Align | Orientation to match the orientation of the placements.

Position

Select when two or more placements are selected, and use this option to position the placements relative to each other. Make the selections from the dialog:

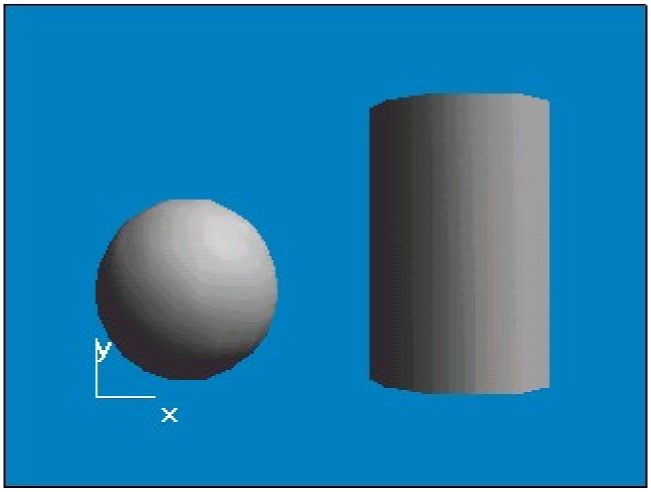


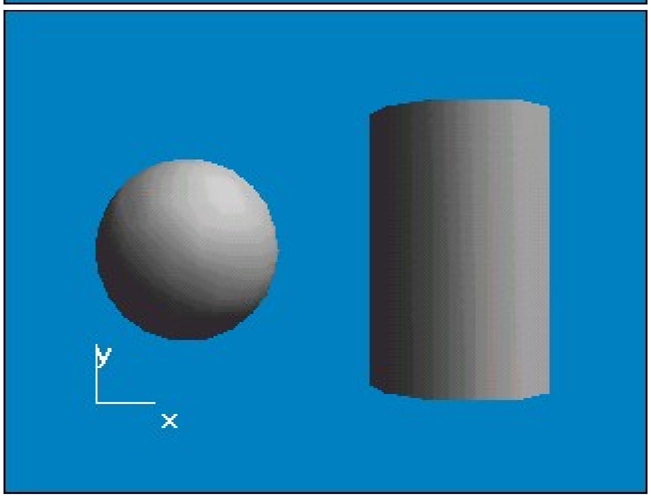
As you select the placements you want to align (holding down the **Ctrl** key as you click on the placement(s) with the mouse), the last placement you select is the reference for the alignment. So if you select placement A, B and C, then placements A and B will be aligned to the settings of placement C.

Alignment options

The term 'boxes' refers to the edit bounding boxes which appear around the placements as you select them. The choices are to align the extremes of the bounding boxes in the x, y or z axis, or to align the local origins of the placements. Any option can be set, in any axis independently of others.

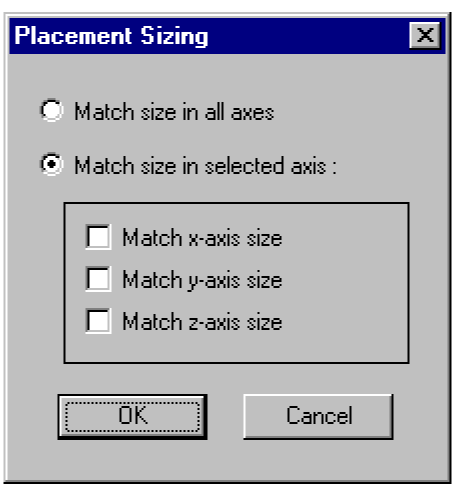
Looking at the examples below: the image on the left shows two placements in a view, while the image on the right shows the effect of a box centre alignment, i.e. they are aligned centrally to one another.





Size

Active when two or more placements are selected, you can use this dialog to change the size of placements to be identical, or the same in certain axes.



Once you have repositioned your model in the world, you may want to make the changes permanent in this world.   You can do this with the Centre Shape and Apply Transformation options in the Tools menu.

Creating and Working with Cameras

Cameras are used to define the projection of a shape or shapes within a view. It is possible to have many different cameras in a RealiBase, and switch between them instantly to see alternative viewpoints.

The parameters of a camera are specified as its position in space, the field of view, the type of projection and front and back clipping distances. The **orientation is defined in terms of roll, pitch, and yaw angles**.

Two types of projection types are available: **perspective** and **parallel**. Perspective projection is like real life - objects in the distance appear smaller.

As with other objects in RealiMation, cameras can be completely user defined and altered at any time. Each time a view is created, a camera is also specified to allow users to see the contents of the view straight away. This camera can be modified to different parameters at any time.

Creating Cameras

Camera Types
RealiMation offers a number of different cameras for the views - constrained to the axes, solid, free flight camera, and free flight camera constrained to the ground.

Controlling Camera Movements

Setting a Camera Orbit Centre

Camera Offsets

Positional and angular camera offsets change the view generated.
For example, if a camera is attached to an action then it generates a view in the direction of travel. However, adding an offset changes the view, because it alters the position of the camera, and so the view.

Another example is where a camera is attached to say an aircraft, but the required view is over to the left applying an offset will keep the camera on the aircraft's action, but displaying the view to the left side.

Multiple Cameras

Any number of cameras can exist simultaneously, but only one can be placed in a particular view at any one time. This camera will then be used when the view is next drawn. Multiple views can share a single camera.

Stereo Cameras

Stereo cameras are a new feature with RealiMation 4.10. Set up the camera to give multiple viewpoints - even up to 28!!

See Also:
Defining and Working with Shapes
Creating and Working with Placements
Creating and Working with Actions
Creating and Working with Atmospherics
Creating Views

Working with Textures

Creating Cameras

Use the menu option Create | Camera | Normal to create a new camera with a given name with a specified eye position, orientation and field of view. Use the Properties to set up the different parameters.

The Create | Camera | Ortho menu creates a new, ortho camera. Use the Properties to set up the different parameters.

Camera Offsets

- Change the x, y and z coordinates to set the cameras offset from the centre of origin. (The default values are 0, 0, 0 to position the camera at the same point as the camera base position.)

Note: You cannot edit the orientation of an ortho camera. This is set automatically to one axis.

See Also:
Controlling Camera Movements

Setting a Camera Orbit Centre

Camera Types

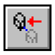
Creating Views

Camera Types

RealiMation offers a number of different types of cameras..

Constraining Cameras

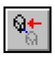
Cameras can be constrained to looking down only one axis e.g. the x, y or z. This type of camera is known as an **ortho camera**, i.e. its projection is always orthogonal to one of the three world space planes. Actions can also be attached to cameras, to create fly-throughs where the projection changes over time. See Working with Actions for more details.



Mouse flies camera

F9 or Pick | Mouse Flies Camera

This option enables mouse controls for flying a 'free' camera around the world. A 'free' camera is one that is not attached to an action or constrained to used ortho views.



Ground Flight

Pick | Ground Flight

This option toggles between free flight (default) and ground flight.

In free flight, if you tilt the camera down and continue to fly 'forwards', then you will fly into the ground - whereas in ground light, if you tilt the camera down and continue to fly forwards, then you will continue to fly forwards, but the viewpoint will be tilted down.

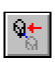
The ground flight mode option keeps the camera steady as you fly around, and gradually accelerates as you move the mouse to fly around. All flight controls are the are the same, whether you are in free flight or ground flight except ground flight does not have a roll function.

Level Camera

F7

Select this option (View menu) to remove the pitch and roll components of the camera. It can be thought of as a 'straighten up' mode.

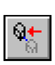
This option is enabled when the 3D view window has input focus, and the camera is not attached to an action.



Solid Camera

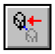
The solid camera option is a special feature toggled by the button and from the Edit menu. The solid camera uses a type of collision detection which stops you from flying through solid objects. For example, if you are flying around a building, with solid camera enabled, then as you fly up to a wall, floor or ceiling, or in fact any solid object, the camera movement will stop and not let you go on any further. When this happens the white box turns red, and you will need to 'pull the camera back' and change direction.

You can use the solid camera function in conjunction with hotlinks to enable you to fly into objects, and hotlink to somewhere else. See the section on hotlinks for more information.



Terrain Following Camera

The terrain following camera can only be applied to a "free" camera, i.e. one that is not attached to any other object.   Enable this option to keep the camera at a constant height from the closest object, for example, use this to climb stairs, or follow the hills and vallies of a landscape.



Slide Camera

This option is only available when a "free" camera is selected and collision detection enabled. When enabled, flying the camera into a solid object at a slight angle will cause the camera to slide along the object.   For example, in helisim.rbs, enable collision detection and the slide camera, and fly into the castle ... you will see that you simply slide along to the end of the wall.

See Also:

Controlling Camera Movements

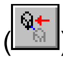
Creating Cameras

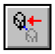
Creating and Working with Cameras

Creating and Working with Actions

Creating a Fly-through

Controlling Camera Movements

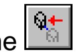
Camera movement can be controlled either using the Pick | Mouse Flies Camera () option or with the thumbwheels which appear on the left and bottom edges of the View window. These options control the position and orientation of the current camera in the current view.



- Click on the button to display the dialog for enabling and disabling the different options.

  The wheel options available in the list depend on whether you are configuring the horizontal or vertical bar (where certain wheels are not available they will be greyed out. Simply, check the active wheels you want to display. See Wheel Bar Options for more details.

Setting a Camera Orbit Centre

To reposition the orbit centre use Edit | Fit to View, F3 or the  button.

The orbit centre can either be related to a placement or to a view. If you have a placement selected as you Fit to View, the orbit centre will be positioned at the centre of the placement.
If your View has focus, then the orbit centre will be the centre of the view.

NB: As you pan and aim the camera, so the orbit centre will also move.

Creating and Working with Actions

An action defines a behaviour for an object.   rather like a script it describes the position, orientation and the movement of a shape over time.   (RealiMation actions are defined according to time, and not by key frames.)   Actions can also be made to hug ground features, to give an effective terrain following capability.

Actions can also be created and modified dynamically by applications, which is useful for say, a guided missile, since the path it flies along can be changed to keep track of a moving target.

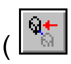
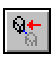
Action Nodes

An action is made up of **nodes**, where each node describes the position, orientation (in terms of roll, pitch and yaw), and speed (rate of change) at a particular time.   To allow a placement to move along a determined action route, the action handle is just attached to the placement. As time passes in the application, RealiMation moves the placement between actions nodes.
Scaling is also handled as part of an action node, and a final factor specifies the time stamp (in seconds) of the node. When an object is travelling following the action, it will be guaranteed to be at a specific position, scale and speed at the exact time required.

Editing Actions and Action Nodes

Actions and action nodes can be altered in one of two ways:

1. You can use the view window to change the position and orientation of either a complete action or the individual nodes.

   Make sure that the action is visible in the view, and then select the appropriate picking mode () for actions and (
) for nodes and move them around.

2. Editing all aspects of actions, including speed and velocity, is done using the Action Properties.

Pre-Defined Actions

General, or free form actions can be set up with any number of nodes, positions etc.   However, for convenience, RealiMation also supplies some functions for creating certain sorts of actions: spinning, circling, straight or linear , and general freeform actions.

Placements on Actions

If a placement is associated with an action, the height and orientation of each action node is calculated from the placement's face information. This means that any objects (for example a camera) set to follow the action will follow the contours of the object.
Typically, actions and landscapes can be associated to create a land or terrain following path.   Other placements can then be associated with the action, which will then also follow the landscape, rising up with the hills and moving down into any vallies.

See: Setting up a terrain following action

Nested Actions

Nested actions are a special feature in RealiMation, so that you can assign multiple actions to a single placement.   As an example:

- Create a simple circular action and display it in a view.
- Create a gentle spin action.

- Drop the spin action onto the circular one.
- Next create a simple shape and place it in the view
- Assign the new combined action to the shape and press the 'play' button
- Notice that the shape spins around while following the main circular action.

Note: When an action is assigned to a top level object (i.e. immediately referenced from a view), the location of the action is in **world space** which means that the placement will move to the first node position, but will be offset from it by its current transformation.
Therefore, when you assign an action to a placement, the placement may disappears 'into space', so you will need to reset your placement transformation. Do this using the Placement Properties.

Hint: Because top level actions are fixed in world space, you will need to take an extra step when you make an object spin about its local axis (no matter where it is in the world). Do this by creating an extra level in the hierarchy, for the object.
For example, you have a shape called *top*, which needs to spin about its own axis, but the placement of *top* is away from the origin. Create a new 'empty' shape called *top-master*, with the original shape *top* added as a child object, and add a placement of *top-master* to the view. Now if you attach a spin path to the placement of *top* (i.e. the child object), it will now spin around its local axis.

Smoothing Nodes

Action node smoothing helps where the movement between two nodes is 'jerky'. Select the option from the Tools | Actions | Smooth Nodes menu or  on the action Properties.
This displays the options for smoothing the orientation and orientation rates of the selected node.

Creating a Fly-through

See Also
Defining and Working with Shapes
Creating and Working with Placements
Creating and Working with Cameras
Creating and Working with Atmospherics
Creating Views
Working with Textures

Creating a Fly-through

Creating fly-throughs using cameras and actions is easy using the STE ... just follow the following simple steps:

NB: Before you start creating a fly through following these steps we assume that you have created and are displaying a view with a camera, and that you have positioned the camera at the point where you want to start your fly through. A view using that camera is currently visible.

- Create a new action using Create | Action | General.
  Accept the default values, but change the name to something meaningful, e.g. "Flight Path". As you create a new action, the action editor properties appear.

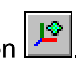
- Select the first node (number 1). The selected node is shown by a highlight bar.

- Select the Tools | Actions | Node at Camera option. Note that the action editor has a shortcut on the button bar. The button looks like this: 

Notice how the position fields are updated to show that the first node's position is at the camera position in the view.

- Position the camera at the next position in the flight. Do this in the usual way - i.e. use the thumbwheels or mouse flight mode to move the camera. Note that you do not have to change the position of the camera, for example, you may just aim to the left by 45 degrees.

- Select the second node in the list, and select Tools | Actions | Node at Camera again. The second node now takes on the characteristics of the new camera position.

- Select Tools | Actions | Insert Node to create a new node, or use the shortcut button . The new node should be automatically selected, so you can mode you camera to the next part of the flight, and do another Node At Camera.

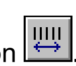
- Repeat step 6 until you have added all the required nodes and the action is complete.

Now that the node positions are set up, we need to specify times:

- Select the last node on the action, and type the total flight time into the Time field.

- Now select all nodes in the action. You can do this either by selecting the first node and dragging the mouse to the last node (i.e. keeping the left mouse pressed), or selecting the first node, and keeping the SHIFT key down, selecting the last node.

- Click on the Override checkbox in the Time column.

- Choose the Tools | Actions | Space Evenly menu option . This spaces the overridden property (in this case time), equally between the first and last values.

- Now pick up the new action "Flight Path", and drop it over the camera being used by the view. This associates the camera with the action, so that the camera moves along the action over time.

- Start RealiMating.

- You can continue editing and tweaking the action using all of the available action editing options.

Note: You may need to create a separate "free camera" that you can drop into the view so you can see the action from a different viewpoint.

You can use the Fit to View option to locate individual action nodes in the View window.

Creating and Working with Atmospherics

Creating Circular Actions

The Create | Action | Circular menu invokes a dialog to create a circling action for models in the world. From the dialog you can specify the number of nodes in the action and the time value to move between the first node and the last node.
These elements, as well as the settings for the nodes in between the first and last nodes can be edited from the subsequent dialog box which appears as you select OK.

See Also:
Creating Spin Actions

Creating Linear Actions

Creating General Actions

Creating a Fly-through

Creating Spin Actions

The Create | Action | Spin menu invokes a dialog to create a spinning action for models in the world. The nodes are set to spin a model around the axis, in a user defined direction and speed.

From the dialog you can select the spin type, choosing between e.g. roll, pitch or yaw, and configure the rotation rate, in degrees per second.

See Also:
Creating Circular Actions

Creating Linear Actions

Creating General Actions

Creating a Fly-through

Creating Linear, Straight Line Actions

The Create | Action | Linear option invokes a dialog to create a circling action for models in the world. From the dialog you can specify the number of nodes in the action and the time value to move between the first node and the last node. The intermediate nodes (between the beginning and the end) are set automatically.
These elements, as well as the settings for the nodes in between the first and last nodes can be edited from the subsequent dialog box which appears as you select OK.

See Also:
Creating Spin Actions

Creating Circular Actions

Creating General Actions

Creating a Fly-through

Creating General Actions

The Create | Action | General menu invokes a dialog to create a general moving action for models. From the dialog you can determine the number of nodes for the action and the time value for moving between the new nodes.   These are then edited from the subsequent dialog box that appears which appears as you select OK.

To edit actions, select the action in a Lister window and display the Properties (Edit | Properties, double click or Space bar over it).   See Editing Action Nodes for more information on the Action Properties.

See Also:
Creating Spin Actions

Creating Linear Actions

Creating Circular Actions

Creating a Fly-through

Setting up a Terrain Following Action

Terrain following is quite simple in RealiMation. The example below shows how in four simple steps toy can create an action which follows a complex landscape.

1. **Create the landscape.** Create a grid as the base, select face editing mode and drag the individual faces to form hills and valleys, to give a rolling hillside effect. Or just import your grid from an external source, e.g. DXF.

2. **Add realism** by adding a texture, such as grass, to the material.

3. **Create an action** - this example uses a simple circular action.
4. **Add the action to the landscape** placement. Highlight the placement of the landscape and drag and drop it onto the action. The action then attaches itself to the rise and fall of the terrain. You can even continue to edit the terrain - changing faces here and there, and the action will follow!

Creating and Working with Atmospherics

The atmospheric functions illuminate the view windows, and include ambient settings, individual light settings, and special atmospheric effects like fog. Atmospherics can contain multiple light sources, of different colours, intensities and positions.

An atmospheric is created and assigned to every new view created in a RealiBase.   Each atmospheric also has an individual light source assigned - see the section on light sources for more information.

Ambient

Primarily the atmospheric sets the general background (or ambient) lighting for the view.   The default settings are white light, although this can be changed using the sliders.
Changing these values will alter the background light in any view using this atmospheric.

Fog

Fog is one type of realism effect and is controlled by minimum and maximum distances, a colour and an attenuation factor.
The minimum distance ensures that the colour of any object, that is closer to the camera than the minimum distance, will not be affected by the fog.
The maximum distance forces the colour of any object that is further than the maximum distance from the camera, to have it's colour the same as the fog colour.
The blend effect between these two distances is a linear interpolation.   If the attenuation factor is 100%, then objects further away than the maximum distance will be completely fogged.   Factors of less than 100% allow some of the original object's colour to still be shown.

Creating an Atmospheric

The Create | Atmospheric option create a new atmospheric object with a number of different settings and attributes.   The Properties which appear as you create (and subsequently edit) an atmospheric allow you to edit existing lights and create new illuminations as well as other atmospheric effects.

See
Defining and Working with Shapes
Creating and Working with Placements
Creating and Working with Cameras
Creating and Working with Actions
Creating Views
Working with Textures

Creating and Working with Lights

Light Types

There are four types of light source: ambient; infinite; point and spot, each of which has its own settings for colour and intensity, and some also have position and orientation settings.

The **ambient** light is the general background lighting, and is set up as an atmospheric.

An **infinite** light source has a direction, which defines the direction in which the light is radiating, for example, the sun can be regarded as an infinite light source.

A **point** light source has a position somewhere in the world, and it radiates light in all directions, for example, a naked light bulb.

A **spot** light combines the properties of both infinite and positional light sources so that light is radiated from a given point in a given direction.   Combined with this are two angles that limit the volume that is illuminated by such a light source. Both the position and spot light sources can have an attenuation factor applied so that there is a fall off in intensity of the radiated light due to distance.

Creating a Light Source

Use the Create | Light menu to display the Properties for the light you want to create, specifying the type, colour values, position etc.

Using Light Sources

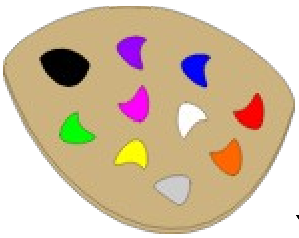
Once created, light sources are added to views as part of the atmospheric object.   An atmospheric object can have any number of different lights associated, each one generating a different effect.

Lights can also be associated with actions to give roving light effects such as searchlights, or car headlights etc.   Click here for more information about actions and lights.

Working with Materials

While the outward appearance of objects is largely determined by lights (showing colour, highlights, and depth effects) materials and textures play a large part in lending realism to the scene.

Individual faces, and subsequent shapes are made from **materials**. These define the appearance of a shape or model on screen and can be made up of several surface properties - for example a base colour, an emission colour, transparency and light reflectance.



You can think of materials as the colours on an artist's palette - simply apply them to the shape and alter the combinations of the different properties. In this way shapes can carry complex characteristics, such as rough brick work, shiny chrome, and long grass.

Bitmap images can be added to materials as textures. A texture is simply a bitmap image which can be 'mapped' onto part or the whole of a face or faces to bring realism to an object. For example changing a green face to a textured one to give the effect of grass, or using a brick effect for buildings.

RealiMation offers great flexibility by associating textures with the material rather than directly to the models, and with sophisticated texture mapping techniques you can get amazing results. Texture mapping is covered in the tutorials, and also in the section Working with Textures

RealiMation has some default materials created with every new RealiBase. You can edit and add to these default materials using the Create | Material menu and the Properties to build up a set which are unique to each RealiBase.

See Also:
Painting Faces
Creating, editing and deleting materials
Material Inheritance

You can also add textures to materials to bring realism to your world - this is looked at in more detail in the Textures section.

Creating, Selecting, Editing and Deleting Materials

Whether you are creating or editing materials you will use the same Properties which remain visible while you work, allowing you to continue editing until you have the material exactly as you want it.

You can edit a number of Properties, each one on its own page - colour values, emission and reflectance.

Associating a Texture Image with a Material

- Create an image, and select it in the Image Lister
- Drag and drop the image over the material
- The image will appear in a hierarchy below the material

Deleting Materials

- Select the materials you want to delete in the Materials Lister and press the delete key.
- Use the Edit | Undo menu or Undo button to restore the material to the list.

Selecting Materials for Shapes

The faces of shapes are made from materials - to change the material used for an underlying shape:

- Select the material in the Materials Lister and drag and drop it over the shape in either the View or Shape Lister.
- All placements of that shape will use this new material as its base, except where a placement has a material override. (See below)

Note: You can check whether a material is used anywhere in the RealiBase using the Edit | Usage menu. Additionally, if you pick an individual face, then the material used for that face will appear highlighted in the Materials Lister.

Selecting Materials for Placements

Placements are drawn using the material of the base shape unless they are changed individually to use other materials. This means that you can create one model, display it several times, each one with a different material, and so a different appearance.
To change the material used to display a placement:

- Select the material in the Materials Lister and drag and drop it over the placement either directly in the 3D View window, or in a Lister.
- The selected placement will now use this new material, and a reference to the material will appear in the placement hierarchy in the Listers.

Note: If you now want to paint individual faces, you will need to remove the placement's material override to see the effects.

See Also:

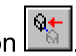
Painting Faces

material inheritance

Painting Faces

Painting individual faces changes the underlying shape, to give different effects.
Note: If the placement you are painting has a material assigned to it (overriding the shape's base material), then you will not see any changes until you remove the material from the placement.

To Paint Faces

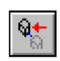
- First of all make sure that you are in Shape Pick mode.
- Select the faces you want to paint. Click here to find out about selecting faces.
- **Either** select the Tools | Materials | Paint Face menu or the Paint Face toolbar button . When the cursor changes to a paint brush, click the left mouse button over the face to paint. (If you have not selected a material, then you will be prompted to choose one)
- **Or** select a material in the Material Lister and drag it over the face you want to paint. This will automatically paint the face with the selected material.

If faces are already selected when you switch to face painting mode, RealiMation will prompt whether to paint all the currently selected faces. If you select No then you can select other faces.

You can also paint multiple faces using the 'fence pick' mechanism to 'fence paint'. Click the mouse over the shape and drag the selection rectangle to paint the faces which fall inside the rectangle.

- When you have finished painting click on the Paint Face toolbar button once more to switch back to pick mode.

Notes:

- When you are painting individual faces, you can just pick the material from the Lister and drop it onto the required faces.
- You can select the material with the material selector tool  (Paint and Texture Toolbar).
- If the material has an image associated with it the texture will be applied to the faces. If the texture is not quite where you want it to be, and its position needs to be modified you should use the extensive texture mapping to improve the final appearance.

See Also:
Working with Images

Creating, Selecting, Editing and Deleting Materials

Working with Textures

Textures can be applied to shapes to make them more realistic.   For example add a grass texture to a landscape. or a brick effect to a building.

RealiMation's texture capabilities mean that you can take a 2D image (e.g. a bitmap, a scanned photo or paint illustration) and place it onto a shape and then ‘map’ it onto the individual faces to alter its final appearance.   Click here for a brief description on texture mapping.

We recommend that you work through the tutorials on Texture Mapping before attempting the options for yourself - The methods and options are described in some detail, and the practical experience will be invaluable.   This texture section serves purely as a reference and explanation of the processes involved.

Texture Mapping Tools

The texture mapping tools are used for positioning the texture onto the selected face.   In simple terms, the texture is ‘stretched’ across the entire surface of the mapping tool, which is then ‘mapped down’ onto the faces, before being fine tuned with the more advanced tools.
(**Note**:   you must have at least one face of the shape selected.)

The three mapping tools (accessed from the Tools | Texture menu and the Paint and Texture tool bar) are generally used for different shapes models, although you can use any mapping tool for any shape.

When texturing an object you would normally choose a mapping model appropriate to the object, for example:

- use planar mapping for a single face
- use cylindrical mapping for a collection of faces in a cylindrical configuration
- use spherical mapping for a collection of faces in a spherical configuration.

Mapping Textures onto Faces

- Select the faces you want to texture and the texture map tool buttons will become active.
- Select the tool you want to use, and you will see that a wireframe bounding box has appeared around the shape.   (The shape of the wireframe box depends on the tool you have selected) and the texture map tool window appears.   This is for configuring how the texture is applied onto the mapping tool - click here for more details on the options.   You can also use the handles on the wireframe box to rotate and move the texture map over the faces.
- When you are happy with the overall position of the texture on the faces, close the window, and you can now fine tune the mapping if required.

Fine Tuning the Texture Map

To improve the appearance of the faces, you can fine tuning the way the texture ‘fits’ on the selected faces

- Select the Texture Coordinate Editor (accessed from either the Tools | Texture menu or from the button on the Paint/Texture tool bar.
- The Texture Coordinate Editor options allow you to individually move the edges, faces and vertices to get the texture to fit the painted faces exactly.

Miscellaneous Functions

- The Edit | Fit Texture View will change the view size so that all the faces can be seen.
- Faces can continue to be selected and deselected in the 3D View Window - the Texture Coordinate Editor will keep up to date with the changes.
- If you deselect faces to look at the result (press Escape, or click elsewhere in the view) you can reselect them easily using the Edit | Reselect faces option.
- Drop a material over the Texture Coordinate Editor window to change the material used to paint the selected faces.
- Drop an image over the Texture Coordinate Editor to change the texture used by the selected faces.
- The Texture coordinate Editor and the Mapping Tools can be used simultaneously - drag the tool and see the faces in the Texture coordinate Editor change. However, this can reduce performance levels where multiple faces are selected.

See Also
Defining and Working with Shapes
Creating and Working with Placements
Creating and Working with Cameras
Creating and Working with Actions
Creating and Working with Atmospherics
Creating Views

Working with Images

Two dimensional images can be imported into RealiMation, and then used as a texture (to add realism to models - as described in Working with Textures) or as a background / depth image to a scene.

Defining Images

You can add 2D images to the RealiBase using either the File | Import option or the Create | Image menu.

File / Import Option

RealiMation's image import filter is installed by default, and supported formats include *.BMP, *.JPG, *.TGA and *.PCX files. If you accepted the default import filters at installation, then you can import multiple images into your RealiBase simultaneously.
(Additionally, other supported formats which understand images, e.g. 3DStudio, will also bring associated images.

- Choose the File | Import option and a standard Windows dialog will appear:

- Change the file type to bitmaps, and move to the appropriate directory where the image(s) you want to import are stored. You can now select multiple files in that directory, and click on the button to import them.

The Images Lister will appear with the new bitmap listed.
Note: RealiMation automatically uses the bitmap's original name by default. You can change this to a name of your choice, by using the Rename options.

Create | Image Menu Option

You can also add images to the RealiBase using the Create | Image menu.

- Select the Create | Image menu and the Create New Image dialog appears.

- Once you have selected the image you want to use (either use the Browse button, or type the exact directory and file name if you know them)

- Use the radio buttons to pick how the image will be used: either as a texture, background image or a depth image. The check box options are only applicable to images when they are used as textures. Click here for more about configuring these Properties.

Now that you have images in your RealiBase, you can begin to use them.

See Also:
Using Images as Textures

Using Images as View Backgrounds

Additional Notes about Working Images

Working with Textures

Using Images as Textures

Once you have imported your image, and checked the radio button to use it as a texture, you need to configure
the other texture options from the check list.
Note: Not all these options are supported by all display drivers. You will need to refer to the Customise | Drivers Properties to confirm which options are available for the current driver.

Mix colour with face

Enabling this option blends the RGB (red, green and blue) values of the material with the image. It also uses the underlying faces lighting and shading modes as it displays the texture. This is useful for pre-lit textures, where you do not want to change their appearance, by adding extra lighting.

Perspective correct

Enabling this option continually changes and updates the texture map to match the perspective of the viewer to give a more accurate representation of textures when they are close to the camera.
When used as textures, images are wrapped around the faces of the shape, and so can appear distorted if close to the camera, and may result in "crawling pixels" as the scene moves. Perspective correction prevents this, but at a cost. Because it requires more computation it can carry an expensive overhead, so it can make a significant impact on performance. The overhead varies depending on the display driver and hardware acceleration used in the system. See the section in 'How do I..?'
Note: You may find it better to use non-perspective textures on shapes in the distance, or on highly curved objects. You can use the perspective correction flag quite effectively in level of detail models. For example, where detail levels are used when an object is small, use non-perspective textures.

Bi-linear interpolation

This process samples and blends more of the texels (texture pixels) to interpolate a pixel, and then maps this average onto the selected polygon, removing "chunky pixelation", and produces a better quality image. Click here for a full explanation.

Mip-mapped

Mip mapping samples and filters the original image to create three or more mip levels of the texture, each one of a different size. These refined maps produce a smoother texture eliminating any 'shimmer' or 'twinkling' by selecting the best 'match' from the available mip levels. Click here for a full explanation.

Mip-map blend

This process refines the images further, by blending between the mip maps. The texels to be mapped can then be chosen from a wider range of possibilities to produce a high quality finish.
Note: You can combine mip map blending and bi-linear interpolation to produce tri-linear mip mapped textures.

Save in RealiBase file

Embeds the image file as part of the RealiBase, so RealiMations can be distributed as just one file, rather than several linked files in a directory structure. Also the image cannot get 'separated' from the file if the actual image file is moved. NB: You cannot un-embed a file from the RealiBase, to change it you need to reselect the original file.

Now that you have images in your RealiBase, you can begin to use them. Click here for additional notes about images, and also refer to the following sections: using images as backgrounds, working with images and texture mapping.

See Also:
Using Images as View Backgrounds

Additional Notes about Working Images

Working with Textures

Creating Views

Using Images as View Backgrounds

Images can also be used as backgrounds to view windows in RealiMation. Typically images can be landscapes, and skylines, however, they can as easily be any type of image perhaps of interior walls, or noise bitmaps of no particular pattern. The choice, as always with RealiMation, is yours and depends on the world you are creating.

Before you add an image as a background to a view you need to be sure that you have selected the option to use the image as background in the main Image Properties.

You will also need to set the special mapping options for using the image as a background. These are setup from the background mapping Properties.

To associate an image with a view either:

- Select the image in the Image Lister and drag and drop it over the view object in the View Lister; over the 3D View window itself,
- Use the view background Properties to set up the image to use. Associate depth images in the same way.
- Once you have associated an image as a view background, then you can further configure its display using the View | Set Size option, which displays the following dialog:

See Also:
Using Images as Textures

Additional Notes about Working Images

Working with Images

Creating Views

Additional Notes about Images

- To use an image as a texture you need to associate it with a material. To do this select the image in the Image Lister and drag and drop it over the material in the Material Lister.

  - The texturing options e.g. mip mapping etc. can be set up regardless of the current display driver selected. If you are currently using a driver which does not support all the options, then these will be ignored when the view is displayed. If you change driver at a later date to use one that does have the selected capabilities, then the settings will become 'active'.

- If you do not select the option 'Save in RealiBase file' and subsequently move the image so that RealiMation cannot find it, then a message will be displayed reporting that the image file cannot be loaded. You will need to re-associate the image file with the RealiBase.

Note: You cannot un-embed a file from the RealiBase, except by re-selecting the original file with the Set File button. These options can be altered later from the Image Properties. If you do not save the image in the RealiBase, and the file cannot be found when the file is loaded, then an error message will appear.

Image Conversion

RealiMation supports a wide range of different file formats: BMP, PCX, JPG, TGA and SGI files.

Many renderers can only deal with relatively small texture map sizes (typically 128 x 128 or 256 x 256). Therefore, if you have large images you may want to split them into smaller tiles to allow easier texture mapping.   RealiMation comes with a conversion program to convert these image types into multiple tiled Targa files.

(This is also particularly good if you have large Silicon Graphics files you want to look at.)

"Usage: splitimg <filename> [width] [height]\n"
"   Splits <filename> into a number of TGA tiles,\n"
"   each [width]x[height].\n"
"   If dimensions not given, just shows image size\n"
"   If just width given, height is same as width\n"

Additionally RealiMation comes with a conversion program to convert images to Targa format (MakeTGA).

"Usage: maketga <filename>\n"

See Also
Working with Textures

Using Images as Textures

How Do I ..?

This section of the manual contains a number of frequently asked questions and answers for getting the most out of RealiMation.   Simply click on the Question below, and the answer will appear.

General Questions and Answers

Which Way is Up?

Using Hotlinks

Using Fit to View

Changing Properties Information 'On the Fly'

Using Different Renderers / Display Drivers

Why Can I See Things I Shouldn't?!

My Previews Aren't Correctly Displayed

Help!   My Toolbars have disappeared!

Some Text in the Listers is Blue - Why?

I've Changed Display Mode - But My Model Has Not Updated

Importing Models into RealiMation

Imported Files Look Inside Out - Why?

My 3DStudio Model Doesn't Move!

How Do I Create 3D Text?

Editing Placements

Getting Finer Rotation Control

I Can't See the Rotation Handles!

Collision Detection Doesn't Seem to Work Properly

Setting up Terrain Following

Changing a Placement's Rotation Origin

Optimising the World

Making the Display Faster

Counting Faces in a Scene

Using Cameras and Flying

Using Actions

Using Lights

Using Materials and Textures

Which Way is Up?

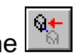
RealiMation uses the traditional perpendicular axes, conventionally labelled as x, y and z.
The x and z axes define the ground plane, while the y axis defines the height.
The positive z axis is also treated as 'forward' in a local coordinate system, so an aircraft, for example would have its nose pointing along the z axis with its wings spread across the x axis. This is important when making the models move automatically with actions.
We recommend that you follow this convention, to ensure that the features such as terrain following work correctly.
To help you remember, just think of 'looking down from on Y', which may be a terrible pun, but will hopefully work as a reminder!

More Frequently Asked Questions

Using Fit to View

If your scene is complex, containing lots of objects within a large area, it can be quite difficult to quickly fly to a placement you might want to view or edit.
For this reason you can use the Edit | Find / Fit to View option to find the object quickly and make it the centre of the view window.
Note: You can only use Fit To View if you are using a 'free' camera, i.e. it does not have an action attached to it.)

To use the Fit to View option to locate a placement:

- Make sure that you have a 'free' camera in the View (i.e. one that is not associated with a placement or action)
- Select the placement you want to find in either the Placement Lister or the View object in the View Lister.
- When it is highlighted either use the Edit | Find menu option, press F3 or the  button.
- The view will change to show the selected placement.

Note: This has changed the placement's centre of orbit, so that you can easily look around your object, using the two of the thumbwheels at the side of a view.

- If you have not selected a placement and the 3D View has focus, then the option changes to Edit | Fit To View and it moves your camera to show the entire contents of the view. This is very useful if you get lost in space inadvertently.

To use the Fit to View option when working with actions:

- Make sure that you have a 'free' camera in the View (i.e. one that is not associated with a placement or action)
- Display the Action in the View window (using the Action Properties)
- Select a node (in the Properties) and press F3 / Edit | Fit to View / 

The camera will move to show the node in the centre of the View window.

More Frequently Asked Questions

Creating and Working with Actions

Changing Properties Information 'On the Fly'

When you display the Properties of an object, using the Edit | Properties option (or double clicking on the object in a Lister, or using the space bar when an object is selected), RealiMation creates a new window specific to the type of object. If you just want to use the Properties to browse an object, you can easily end up with a large number of Property windows on display.

However, you can avoid having multiple windows open by dragging another object (of the same type) from a Lister window onto the Property window already open. For example, if you are displaying the properties of shape 'Wheel', you can drag another shape (e.g. 'Axle'), from a Lister window into the Wheel's Properties. The Properties will update to show those of the Axle.

You need to be a little careful with the mouse when doing this, as some Property windows have a large amount of 'dead area' which is not associated with the object. Just ensure that the cursor changes to indicate a valid drop point, and then you can release the mouse button.

More Frequently Asked Questions

My Previews Aren't Correctly Displayed
Display Problems with Hardware Accelerators

RealiMation supports multiple views, and uses small 3D "preview" windows to show materials, textures, shapes etc within dialogs.

We have found, however, that most 3D accelerator chips, e.g. OpenGL and Direct3D,   can only handle a *single* 3D view correctly.

For example, if you have a OpenGL accelerator, you will probably select OpenGL as the default driver for RealiMation STE. However, because the STE uses the default driver (as set using the Customise | Display Driver menu) for the preview windows and texture editors as well, this can cause display problems.

If you are having problems with preview windows, you can edit the Registry to force RealiMation to use a different display driver for previews.

In most cases, you will find that the software RenderWare driver is most suited to previews, since this always works correctly for multiple views.

See Also:
True Colour Displays
Display Drivers

Texture Loading

What Drivers Can I Use?

Firstly, one of the key features of RealiMation is that it is renderer independent. There is a plethora of "Rendering API's" available today, such as RenderWare and OpenGL, with more and more appearing all the time, e.g. Direct 3D and Apple's QuickDraw3D.

What is a rendering API?
A rendering API is responsible for taking 3D polygons and drawing them on the screen. The different renderers all have their own pros and cons, and can be accelerated to varying degrees by different hardware and operating system combinations. They also deliver different quality results in a variety of circumstances.

This means that a user's decision on which 3D application to buy may be affected by the rendering technology used and its efficiency on their particular platform. This is complicated yet further if they have different machines (e.g. some users may have ordinary PC's, while others have expensive ones with advanced OpenGL hardware accelerators, such as the Intergraph TDZ range).
So this is where RealiMation scores, solving this dilemma by letting the user change the renderer dynamically to suit his own needs.

By the virtue that it is not built upon one particular display technology like OpenGL, different 3D display mechanisms can be used, and, given underlying operating system support, that these renderers can even be dynamically swapped at run time.
Once you have installed the STE you can see this in operation. Load one of the samples (e.g. the default helisim.rbs). Assuming the main view is visible, display the view's Properties. (Double click on the view object in the Views Lister called 'Main View') and click on the 'Driver' tab, and change to use another renderer from the drop down list. The capabilities of each available renderer is shown in a checklist which updates as you select a new driver.
You can even have different views running different renderers simultaneously. The simplest way to do this is to copy the view, show both views next to one another, and then change its renderer as before.

When you do this, you may notice that the two views look subtly different. These differences are due to the peculiarities of the renderer - so you can decide the quality/speed tradeoff when you run the RealiMation. This feature has many benefits, including the easy scaleability of 3D performance on the wide and ever increasing variety of PC hardware.

There are several reasons we decided to take this approach:
Portability: One particular rendering technology may not be available on all the different combinations of CPU type and operating system that you want to use with RealiMation.

User choice: This is very important. Different 3D display technologies have different rendering 'artifacts', normally determined by the tradeoffs that each technology decided to make when being developed. For example, one renderer might sacrifice quality of display for speed. Since every user has a different set of requirements, we decided not to limit our users to one particular set of rendering tradeoffs. The user can decide what rendering artifacts are acceptable in their particular application.

Future Proof: There are new 3D display technologies being announced all the time. By not being tied to any one renderer, RealiMation can expand its capabilities in line with new developments.
Below are further details on the different display drivers supported, including some of the pros and cons of each one!

Criterion RenderWare Driver
Available under DOS, Windows 95, and Windows NT (both Intel and DEC Alpha), RenderWare is a very fast software rendering library. RealiMation tends to use this as the default renderer, because it is both fast and runs on just about all platforms.
Some of the disadvantages of this driver are:

- Currently only uses a 16 bit z-buffer, so some hidden surface problems can manifest themselves in some scenes. (See the FAQ on Hidden Surface Artifacts.) You can alleviate this in the STE by moving your front and back clip planes so that they surround you scene as tightly as possible.
- Only supports 256 and 65,535 colour displays (i.e. 8 and 16 bits per pixel).
  8 bit is best for speed, whereas 16 bit is better quality, yet is still very fast. Setting your Windows display mode set to 24 or 32 bit True Colour mode if you intend to use RenderWare drivers could slow down you graphics performance.
- Transparency is achieved by pixel dithering, rather than by blending. This, while fast, does not produce the best quality image.

Important: Developers cannot redistribute the RenderWare runtime without entering into a separate licensing agreement with Criterion Software. Contact information is: Criterion Software, Westbury Court, Buryfields, Guildford, Surrey GU2 5AZ, Tel.: +44 (0)1483 406200 Fax: +44 (0)1483 406211

OpenGL Driver

Available only on Windows platforms that support OpenGL. This includes all processor versions of Windows NT 3.5 upwards, and Windows 95.

OpenGL gives very high quality results. Transparency is done by true pixel blending, and so looks very good. High quality texture modes are also supported, such as bi-linear filtering and mip-mapping.
The price of this is performance. Textures are not handled particularly well - and without specific hardware acceleration, textures in your scenes can make display with OpenGL at least 10 times slower with RenderWare.
There are a number of GLINT based OpenGL accelerator cards commercially available. Using one of these under Windows NT can make for very fast displays at large view sizes
The texturing version of the GLINT chip (TX), offers very good performance of fully textured scenes.
RealiMation's implementation of OpenGL supports all pixel depths and resolutions.
However, you can suffer a performance hit using True Colour displays. It is advised to keep your Windows display mode to 16 bits per pixel or less. Some hardware accelerated OpenGL drivers work best at 12 bits per pixel, which works well (although other drivers such as RenderWare drivers may not work correctly in this mode e.g. wrong colours, slow performance etc.)

Null Driver

The null driver is a special display driver that does not produce any visible output! Its purpose is to do everything except draw polygons and can be used to optimise geometry processing overhead of a scene. It is not of interest to most users, and is only installed by default with the VSG Developers Edition.

Intel 3DR

Support for Intel 3DR has been dropped with this release.

Rendition Verite Driver

This driver directly drives the chip as an external non-Windows frame buffer. It can be used as a 'slave' window from the VSG Developer edition of the STE. One of a new generation of cheap high performance 3D rendering chips, it provides high quality texturing modes (e.g. bi-linear filtering and trilinear mip mapping) with fast rendering speeds. A DOS version is also available.

Direct 3D

Direct 3D is Microsoft's latest renderer and as such is supported by a selection of high performance, low cost accelerators from a number of different hardware manufacturers.

3Dfx

This driver directly drives the chip as an external non-Windows frame buffer, and can be used as a 'slave' window from the VSG Developer Edition. The 3Dfx technology is a high performance 3D rendering chip, providing high quality texturing modes (bi-linear filtering and trilinear mip mapping, f or example) with fast rendering speeds.

Other Drivers

There are various other drivers in development, and which will be available in the future. If you have any requests for particular drivers, or wish to develop your own, then please contact Datapath Limited directly.

More Frequently Asked Questions

Why Can I See Things I Shouldn't?!

Models which should not be visible are ‘poking through’ and can be seen - why & what can I do?

With certain models, cameras, and renderers it can be very hard to get accurate hidden surface removal, which tens to result in hidden surface artifacts. (Also referred to as "sorting problems".)

Why

The renderers currently supported by RealiMation use "z-buffering" to determine which parts of a scene are in front and which are behind others, and different renders have different degrees of accuracy in the buffer.

For example, the RenderWare driver has a 16 bit z-buffer, where each depth value (or distance from the eye) of an object is converted to and stored as a 16 bit integer, which is a whole number between 0 and 65,535. In other words, there are only 65,535 discrete depth values or "buckets" available.

When one polygon is rendered, its depth value is compared pixel by pixel with the stored depth. If the current polygon pixel is closer to the eye than that stored one, then the new pixel is plotted, and the depth value for this new pixel is stored in memory.

Because there are only 65,535 discrete depth values, numeric rounding errors in the display pipeline can cause the same depth value to be calculated for two separate polygons. This effect may be exaggerated due to the way that perspective interpolation of depth works.
Using a perspective camera (the default), depth values are not mapped evenly to the 0-65535 range. Because of the mathematics of perspective projection, depth values “bunch” closer to the eye than further away, so what actually happens is that ‘one-over-z’ is interpolated when polygons are rendered. This means that there is more likelihood of objects clashing.

What You Can Do ..

1. Use a different Renderer
A quick fix is to use a renderer with a 32 bit z-buffer, e.g. OpenGL. A 32 bit z-buffer gives many more discrete depth buckets (over 4 thousand million) for a much finer resolution for the hidden surface removal than the 65535 buckets with a 16 bit depth buffer. The disadvantage here is that, unless you have some extra hardware acceleration, these may not be as fast.

2. Use clipping planes effectively
The z-buffer range (whether 16 or 32 bit) is mapped to the physical distance between a camera’s front and back clipping planes.
In other words (assuming you are using a 16 bit z-buffer) - if the front plane is 10 units away, and the back plane is 15 units, objects at the front will have z-buffer values of around zero, and objects at the back will have z-buffer values of 65535.
The mathematics of perspective projection forces the distribution of values to bunch up towards the front clipping plane. Therefore, the camera clipping planes can be very important parameters for generating good quality imagery.
With this in mind we would recommend that you try and put the front clipping plane as far away from the camera position as possible, and set the back clipping plane to get as tight around your scene as possible.

3. Take care with model measurements
(Remember, that the unit system in RealiMation is arbitrary, although, by convention, many people do use metres.)
If you are creating your own models with your own program, you should ensure that you do not use lots of very large numbers which never get anywhere near zero.
A common problem is where everything is defined in a 32 bit integer coordinate system. These

numbers have no meaning in the real world, and are there for the convenience of the computer, not the user. However, because RealiMation's coordinates are floating point numbers, you can use values that a user would understand (e.g. metres), which is a much more user-friendly way of working.

More Frequently Asked Questions

Help!   My Toolbars have disappeared!

From V4.10 you can reset your toolbars to their original position (i.e. as they were when you first installed RealiMation by selecting the Toolbars | Reset Toolbars option.

More Frequently Asked Questions

Some Text Appears Blue - Why?

If an object is shown using blue text in Lister are shown then this identifies it as being 'pre-lit'. This option is set up using the Optimise | Pre light objects menu, and helps with scene optimisation. Lighting calculations can take a great deal of processing power, depending on the complexity of the RealiBase. Pre-lighting can be applied to any individual placement in a view. You can select the entire view (in the View Lister) before choosing the option to pre-light every placement in that view in one go.

The lighting calculations used are taken at the point where you select the option, and remain set until you expressly remove them (Optimise | Remove pre-lighting).

More Frequently Asked Questions

I've Changed Display Mode - But My Model Has Not Updated

This problem may occur for one of two reasons, and can happen whichever smooth shaded modes you are using.

1. If you have applied pre-lighting (Optimise menu) to your model in one display mode e.g. flat shaded and then changed the display mode of the view to be smooth shaded, the model will still appear as flat shaded. This is because the prelighting algorithm applies the lighting to the model according to the current display mode.
   To prevent this occuring, you should ensure that you only apply prelightign to an object when you are using your preferred display mode.

   Note: Models will appear correctly when the new display mode selected is wire frame.

2. If the placement of your model has a display override set up, then changing the overall view display mode will not affect the model either. To fix this, you would need to change the illumination flag in the placement display override Properties.

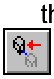
   Note: To determine the cause of the problem, simply flip the display into wire frame. If the model is still displayed in a shaded mode, then there is an override. Additionally, you can easily identify prelit objects in the Listers.

More Frequently Asked Questions

Imported Files Look Inside Out - Why?

The 'holes' and/or 'inside out' faces appear because the face normals (i.e. the directions of the faces) are reversed. This happens because DXF entities have no consistent mechanism of specifying which way a face points.

One solution is to override the display of the placement to disable back face culling. From placement Properties)
Backface culling (enabled by default) attempts to speed up display by discarding those faces that point away from the camera. Turning off the backface culling is not an ideal solution, however, because it will result in slower display.

RealiMation provides facilities to fix the badly defined faces, with the Match Face Orientations option (from the Tools menu).
Because this process arbitrarily picks a selected face to match the others, you may find that they are matched the 'wrong way'.
If this is the case, you can use the 'flip face normals' and 'flip vertex normals' option (accessed from the Tools menu or  and ) to reverse the normals.

Alternatively you can select individual faces to flip. Switch to Shape pick mode, with Snap to faces enabled. Select the faces in a 3D view by clicking on them with the mouse. (You can select more than one face by pressing the control key at the same time as picking.) You can now use the flip tools to turn the faces around.

More Frequently Asked Questions

My 3DStudio Model Doesn't Move!

The 3D Studio import filter assumes that all objects are animated, and creates an action for each object in the file.

Unfortunately, the filter cannot detect whether animations exist in the file before it is imported, so if your original 3D Studio object is not animated, then extra actions are created, even if they are not required.

To stop the actions created, you must disable the 'Import keyframe data' switch to stop the import filter from creating animation information.

More Frequently Asked Questions

How Do I Create 3D Text?

RealiMation provides a simple to use mechanism for creating 3D text, using Windows Clipboard and the Create | Shape menu.

- Using a text editor (such as Windows Notepad), type the text you want.
- Select the text and copy it to the Windows clipboard as normal (e.g. Ctrl+C)
- Select the Create | Shape | Clipboard option in RealiMation (Clipboard is only available when something is stored there.)
- When the dialog appears, select the font options you want to use and click on OK.
- RealiMation converts the clipboard text information into 3D shapes.

  The text will be listed in the Shapes Lister window, called Text_n, where 'n' is a number. To view the text, just drag the shape into a view.

  You can now edit this text like any other 3D shape. Although RealiMation does not recognise text as such - it is purely storing and dealing with it as 3D shapes.

More Frequently Asked Questions

Finer Rotation Control

When an object in a view is in rotation mode (i.e. it is displayed with round handles), you can get finer control by clicking on the desired handle to start the drag, then move your cursor to the edge of the screen before moving it in a circle to rotate. The rotation angle is derived from the angular movement of the mouse, therefore a large radius circle will give finer control.

More Frequently Asked Questions

I Can't See the Rotation Handles!

The rotation handles of a placement are, by default, positioned at the local origin (x = y = z = 0) of the shape referenced by the placement. If the faces of the placement are offset from the origin, then it will appear as if the rotation handles are not at the centre of the object.

This can be simply fixed by using the Centre Shape option available from the Tools menu. Simply pick the object you want to centre in the 3D view, and then choose Tools | Centre Shape.

More Frequently Asked Questions

Collision Detection Doesn't Seem to Work Properly

There are two possible explanations for this:

a) If the two placements are already 'in collision' - i.e. parts of the placements being dragged are already intersecting with a placement of another shape - then the collision detection will not prevent the placement being dragged.

b) If either of the two placements is particularly 'thin' in the direction of the drag, then it is possible for one placement to 'jump' over another, from being on one side of a placement, to being totally on the other side, giving the appearance of one placement passing through another. The faster you are dragging an object, the more likely this is to happen. You might be able to achieve slower, and more accurate, dragging, by using the numeric keypad to perform the drag.

More Frequently Asked Questions

Setting up Terrain Following

RealiMation's terrain following capability provides a powerful, yet simple to use, mechanism of getting objects to move over irregular shapes such as landscapes. This section describes how to use it.

There are three elements to terrain following:

a. A model of the ground (i.e. the surface to move over).
b. An action (or path) that describes the plan view of the track to be taken over the ground.
c. An object to move along the terrain.

The requirements for these three items are described in more detail below. For now, assuming that you have these three models and they are called 'Ground' (which is a placement), 'Track' (which is an action), and 'Tank' (which is another placement), you need to combine these by:

- Drop the Ground over the Track object to attach the terrain placement to the action.
- Drop the Track object onto the Tank. This attaches the action to the tank, and because the action has a terrain attached to it, the Tank will automatically follow the ups and downs of the underlying terrain.

The terrain following mechanism assumes that the y axis is 'up' in the world. In other words, y is treated as altitude. The nodes of the action define the x and z coordinates of the path. The y is generated from the height of the ground model.

The ground model itself is just a placement of some shape (which may in turn have a hierarchy) whose faces describe the surface to be followed. The only restriction on the shape is that it must not 'wrap around' in the y axis. In other words, if you look down from high above your ground model, and draw a line from the eye straight down, the line should not be able to intersect more than one face of your shape.

A good way to see terrain following in action is to look at the helisim.rbs database supplied in the samples directory of your RealiMation installation.

- Find the 'Airborne path' object in the Actions Lister, and display its Properties.
- Select the Show Action option (). This generates a graphical representation of the route taken by any objects moving along this path. You may have to move your camera to see this effectively.
- The 'Airborne path' action object is attached to the aeroplane called 'Target3', so locate this by selecting Target3 from the Views Lister (you may need to expand the listing of 'Main View'), and pressing the F3 key (a shortcut for Edit | Find).
- Move away from the aeroplane, and you can see a large circle in the sky. This circle is the action.

One of the other objects in the view is called 'Terrain' - this model defines the faces making up the hills and fields of the landscape. Just to prove this:

- Display the Properties for the Terrain object (in the same way as you did for the Airborne path)
- Select the Display tab, and toggle the 'Visible' checkbox to make the terrain invisible. If you now hit the 'Apply' button the Main View will be redrawn, but the terrain object will not be displayed. Before continuing, make the terrain visible again.
- To make 'Airborne path' a terrain following action: Pick up the 'Terrain' placement from a Lister window, and drop it over the 'Airborne path' object in a Lister window.
  You should now see the graphical representation of the action change in the 3D view, such it will now follow the contours of the ground.
- If you expand the 'Airborne path' object in the Lister window, you will notice that it has the 'Terrain' object attached to it.
- Since the placement 'Target3' was already moving along the 'Airborne path' action, it is now following the ground. Locate on it again, and you will see that it has dropped to ground level.

More Frequently Asked Questions

Changing a Placement's Rotation Origin

You can move the centre of rotation around by picking on the rotation handles with the right mouse button, and moving the mouse.

More Frequently Asked Questions

Making the Display Faster

The speed of your graphics display in RealiMation depends on a number of factors, including screen size, number of colours, size of model, lighting, and texturing. This section will give you some hints and tips for optimising your frame rate.

1 View size

After every frame has been computed, a block of memory which represents the view has to be copied onto your graphics card. The amount of memory required is affected by the width and height of your view window, and so reducing the size of the window means that less memory needs to be copied, and so the faster the system can work. In addition to this, fewer pixels need to be drawn for triangles in a smaller view.

2 Number of colours

There is a speed and quality tradeoff between systems running graphics cards at 256 colours (8 bits per pixel) and 65, 536 colours (16 bits per pixel). Although 16 bits per pixel displays a better, more realistic image, 8 bits per pixel is much faster. Select the number of colours you want to use depending on the image / speed ratio you require.

3 Scene Size

Frame rate, or speed of RealiMation playback, is related to the number of vertices and faces which need to be processed each time a frame is displayed. Therefore, we recommend that you keep these as low as possible to help the display. There are a number of ways you can achieve this:

a) Keep all models as simple as possible when you create them;

b) Where you have no control over the complexity of model, for example with imported models, you can use the 'Merge Vertices' and 'Merge Faces' options (Optimise | Merge Vertices and Optimise | Merge Faces). Used on shapes, this option rationalises any vertices which occupy the same position in space. The simplest method, once you have imported some data, is to select the shapes in the Shapes Lister, and then use the Merge commands;

c) Use the level of detail mechanism. The idea behind level of detailing is that when objects are drawn 'small' in the view, they are displayed using a very simple representation, and more a complex one when they appear larger on the screen. RealiMation lets you add different sets of vertices and faces to a shape to represent the object at different sizes, or levels. In scenes where objects can be close or faraway, you can gain a significant performance advantage when they are in the distance just by setting up the levels of detail. As an example, look at the helisim.rbs RealiBase - specifically, the aircraft, fire truck, tanks and helicopter. To see the Level of Detail statistics, select the Shape in a Lister and double click the mouse - the Level of Detail for that Shape will now appear.

4 Optimise non-moving placements

When you begin building a scene, it is very likely that you will take one, or more, shapes and move placements of them around in space. Each time you move a placement, you are specifying a transformation that must be applied to all of the points and faces of that shape each time a new frame is computed.

If you have objects in your scene that do not have to move (e.g. floors, walls, buildings, etc.), you can remove the overhead of this transformation by 'fixing' the underlying shape in space using the Tools | Apply Transformation command.

This takes the transformation of the current placement, and applies it permanently to the points and faces of the underlying shape. The placement transformation is automatically reset to zero (i.e. no movement, rotation, or scaling information) and because RealiMation automatically detects placements without transformation information, it can optimise the geometry processing.

Because this method modifies the actual underlying shape information (i.e. the x,y,z positions of the points), it will not work with multiple placements of the same shape. In this situation, you will have to decide whether to make copies of the shape, and make each placement reference a different copy, or to just accept the extra transformation overhead. The disadvantage of having more copies of the shape is that more memory will be required.

5 Optimise Textures

Texture mapping can be expensive in terms of computing power, and the effect on performance can be significant, varying depending on which display driver you are using. The RenderWare driver, for example, is much faster at computing textures than the OpenGL driver - the difference can be as much as a factor of 10.

The total number of textures in a scene will only be significant if the display driver does not cache textures. (RenderWare does; the Windows NT implementation of OpenGL does not, although some hardware devices under NT may do so).

The exception to this is when you are using RenderWare in conjunction with a 3D accelerator which may be trying to cache textures in graphics card memory. If this memory runs out, then the display will slow down.

A more significant overhead on texture mapping is whether the image is 'perspectively corrected'. When an image is used as a texture, it is wrapped around the faces of the object. When this object appears close to the camera and is not perspectively corrected, you may notice "crawling pixels" as the scene moves. Fix this by toggling the switch in the Image Properties. However, this needs more computation to stop the pixels crawling.

While you could perspectively correct all images, it is worth bearing in mind that the images applied to objects in the distance, or those that are placed on highly curved objects, will just be incurring an unnecessary overhead. Try turning the perspective correction on and off to see if it has an adverse effect on the display. If it does not, then keep the switch turned off, otherwise only keep it on for those objects affected. You can use the perspective correction flag quite effectively in level of detail models. For example, where detail levels are only used when the object is small, use non perspective textures.

6 Display Overrides

By default, all objects are displayed in the mode for the view window e.g. wireframe, flat, or smooth shaded. When in one of the shading modes, lighting, backface culling, solid display, and depth buffering are applied automatically.

Knowledge about your scene may enable you to optimise the display of some of your objects. For example, if placement A never appears in front of object B, you can disable the depth buffering of these two objects using the display page of the placement Properties. As long as you display A before B, the picture will look correct, but be quicker to draw. See item 2.7 for more information on changing the display order.

An example of this in use is a placement which acts as the floor of a room. Turn off depth buffering for the floor and ensure that it is drawn first.

Another display override to consider is the illumination mode. You can set the illumination mode to either none (i.e. not lit), per face, or per vertex. The latter two distinguish between flat and smooth shading, and flat is much faster than smooth.

If, for example, you have an object made up of just slab faces (e.g. a block), there is no point in using a smooth shading mode, so you can just illuminate every face and not every vertex. This will make the lighting calculations for the block faster, and the rendering stage (i.e. drawing the pixels) can also be faster as it assumes a single pixel colour for the entire face. If you have a large flat object (e.g. a floor), you could decide to turn off all illumination, in which case it will be displayed in the base material of the object's faces.

7 Ordering the Display

You can change the display order of placements within a view (or within a shape) by selecting on one in a Lister window, and using the Edit | Move Up or Edit | Move Down commands.

8 Clearing Views

Each time a frame is generated, the background must be cleared to prevent pixels from the last frame

appearing in the new one. This clearing is quite expensive, and sometimes unnecessary.
For example, scenes which do not show the background (e.g. tunnel simulation, walking around a room), do not need to use background clearing each frame. Using the view's Properties, select the 'Control' page and disable the screen clearing.

9 Splitting up the Scene

When RealiMation computes a display frame, it has to consider all of the placements in a view, and in turn all of the sub-placements attached to other shapes in the hierarchy. In a scene where the camera is moving around inside an object, RealiMation tries to discard all placements that fall outside the current field of view. This means, for example, that objects behind the viewer are very quickly removed from the geometry processing of the frame, and so speeds up display.
To take advantage of this feature, you should try and split up objects such as walls, floors, ground, furniture etc., so they exist as separate placements. You can use an object hierarchy to do this.
For example, if you look at the helisim.rbs RealiBase supplied in the samples directory, the 'Terrain' object actually consists of several smaller objects, each of which define the faces of a part of the overall landscape. As you fly over the scene, RealiMation can quickly discard the hills that are not in the field of view of the camera.

10 Reduce windows

Multiple View and Lister windows, as well as Properties pages will tend to slow the screen update rate. Therefore, we recommend that wherever possible, you close down, or minimise any windows and Properties pages you are not working on. This will then free up some resources for refreshing the view window.

More Frequently Asked Questions

Counting Faces in a Scene

- Display the Properties for the selected view (by selecting the view in the Views Lister, and pressing the Spacebar, or using the Edit | Properties menu),

- Click on the Statistics tab.
  The numbers here show the total number of points and faces that are available to be drawn in the view.

To see the statistics for a shape or placement, display the Properties for the selected object and view the Statistics.

More Frequently Asked Questions

Editing One Object in a Large Scene

You may find that you build up very complex scenes by adding more and more objects to a view, and this view is considered to be the 'master view'.
At some later date, you may want to edit the objects within that view, but one at a time, or independently of others. For example, you may want to paint individual faces, or change some other property, and doing this interactively in a 3D view can be tedious.

To work around this we recommend that you create a new view, using Create | View option.
Then simply drag just the object you want to edit into the new view, and work on it there - you can even have both views visible simultaneously so that you can see the effects of the editing on other objects.

However, we recommend that you close the master view while you are editing to speed the process up a little. This is because every time you change the object, any views in which it appears (either directly or indirectly) will be automatically redrawn.

More Frequently Asked Questions

Changing the Camera Used in a View

If you have a number of different cameras you can change the one used in a view window using the drag and drop mechanism:

- Display the Cameras Lister

- Highlight the camera you want to use, click the left mouse button and drag it over and drop it onto either the view object in the View Lister, or directly onto the 3D View window.

- The View window will update automatically to use the new camera.

More Frequently Asked Questions

Creating and Working with Cameras

Tracking / Aiming a Camera at an Object

The helisim RealiMation supplied with V4.10 makes use of object following cameras, but following the steps below you can create your own camera to follow the flight of the Hercules around the world ...

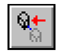
- Open helisim.rbs, and create a new ‘normal’ camera and add it to the view.
- Because the camera will appear at the coordinates shown in the camera Properties we recommend that you 'fit to view' on an object in the world (F3), e.g. the Hercules (labelled Target 3)
- Select the Target 3 placement in the View Lister, then drag and drop it onto the new camera you have created.   This creates a connection between object and camera.
- Press Play or F10, and the camera will track the flight path of the Hercules as it moves around the world.
- Try dragging and dropping other placements onto the camera - the view will update to follow the newly associated placement ... for example, drop Target 2 on the camera to follow the tank around.

Note: Dropping the camera onto a placement e.g. Target 3, physically attaches that camera to the placement, and will literally follow the placement around the world.

More Frequently Asked Questions

Why is the Free Camera so Sluggish?

If you have toggled mouse flies camera and you do not seem to make progress as you fly through the world there are one or two settings you can check.

1. Make sure that the ground flight button ()is not enabled. This mode can make the flight seem slow, so it is better to have the option disabled if you want to fly through your world.

2. Check the sensitivity of the camera flight in the Customise | 3D Interaction dialog. Use the slider bar to make the flight finer or coarser.

3. Because flying camera speed is scaled according the last shape you had selected when you used 'fit to view' the flight mode may be optimised incorrectly.

Note: You will notice a slight performance 'hit' if you are RealiMating as you fly - the extent of this is affected by your host machine.

More Frequently Asked Questions

Why Doesn't my Action Spin?

When an action is assigned to a top level object (i.e. immediately referenced from a view), the location of the action is in world space. This means that the placement will move to the first node position (but be offset from it by its current transformation). If, on assigning an action to a placement, your placement disappears off into space, you will need to reset your placement transformation. Do this from the Properties of the placement.

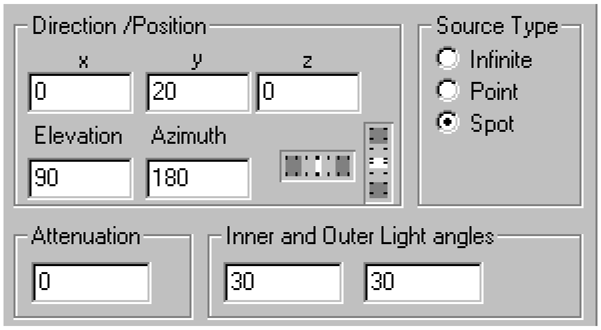
A side effect of top level actions being fixed in world space is that making an object spin, for example, about its local axis (no matter where in the world it is placed) requires an extra step.

You need to create an extra level in the hierarchy, to put the object in. For example, a shape called *top*, needs to be spinning about its own axis, but the placement of *top* is away from the origin. Here, create a new empty shape called *top-master*, and put the original shape *top* into it as a child object. Then put a placement of *top-master* into the view. If you attach a spin path to the placement of *top* (i.e. the child object), it will now spin around its local axis.

More Frequently Asked Questions

Creating a Swinging Spotlight

- Start a new RealiMation and create a view
- Create a grid of a size 20 x 20 and place it in the view
- Create a spot light, with the following settings:



Setting the X and Z to 0 keeps the light in the centre of the grid, and a value of 20 for Y positions it 20 units above the grid, so that you can see the light on the "floor". Setting the elevation to 90 will force the light to point downwards. The value for the azimuth will set to 180 degrees automatically.

- Add the spot light to the atmospheric - either drag and drop it over the view object, or into the atmospheric.

  NB: Remember that the light must be associated with the atmospheric objects used for it to appear in the view, even if you want to ultimately attach the light to a placement.

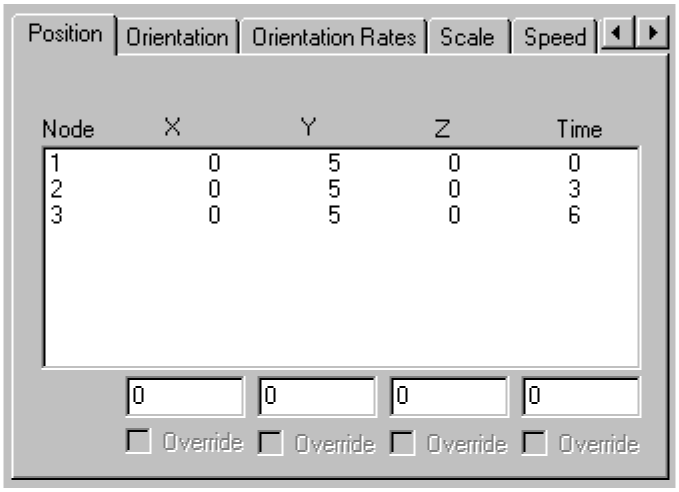
  You should notice the effect of the spot light straightaway.

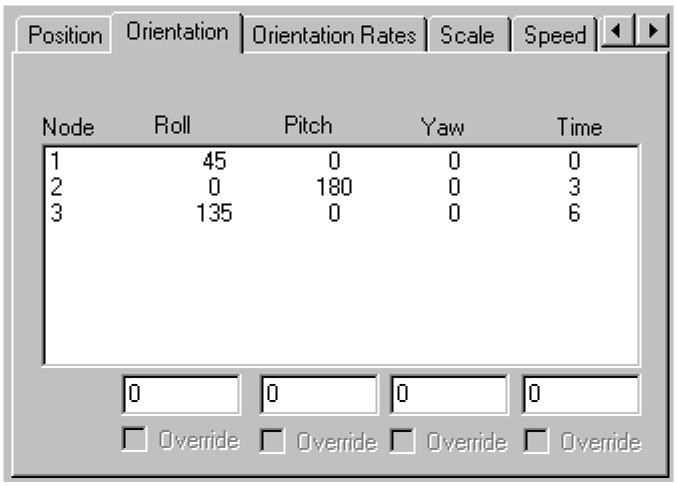
Changing the Y value moves the light up and down the Y axis, to either concentrate or dissipate the light on the grid.

- To see this, change the Y value to be 10, and notice that the light is now concentrated in a smaller area, and appears to be brighter.

Now that the light has been defined, an action needs to be associated with it to cause it to swing, as if in a breeze.

- Create a General Action (Create | Action | General), with 3 nodes and a duration of 6 seconds, and set up the position and orientation as follows:



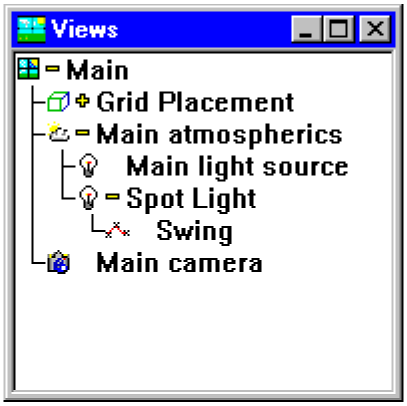


When a light swings it pivots from one central point, so the Y axis should remain constant at a specified height above the grid, i.e. 5 units.

- To set the swing motion change the orientation as shown above. Alter the roll values for nodes 1 and 3 to be 45 and 135 respectively, to swing the light an equal amount in each direction. Try altering them to see the effects different angles can make. Setting the roll for node 2 at 0 and changing the pitch to 180 keeps the light pointing down.

- Click the Autorepeat button and name the action "Swing"

- Drag the action from the Action Lister and drop it onto the spot light in the Atmospheric object, so now the View Lister looks something like this:



- Press F10 to start the RealiMation sequence. Change the time values for the action and the orientation angles to get some different effects.

- Display the Properties for the light and change the inner and outer angles.

NB: You will notice that the light's Direction / Position and Elevation/ Azimuth values have changed to show their settings at the time you displayed the Properties. Try changing the red, green and blue values as well as altering the type of light and see how the changes you make affect the lighting.

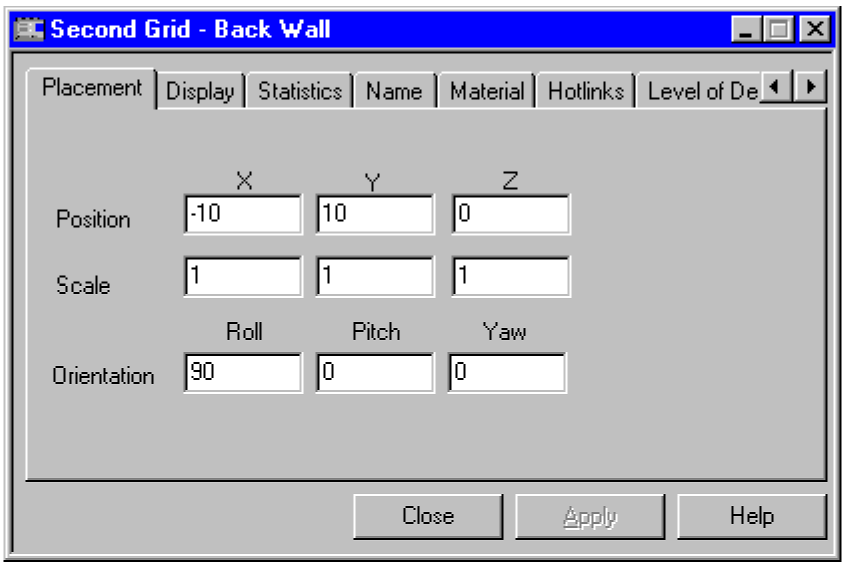
Note: You can use this view for more lighting and action experiments - click here to find out how to create a circling point light

More Frequently Asked Questions

Creating a Circling Light

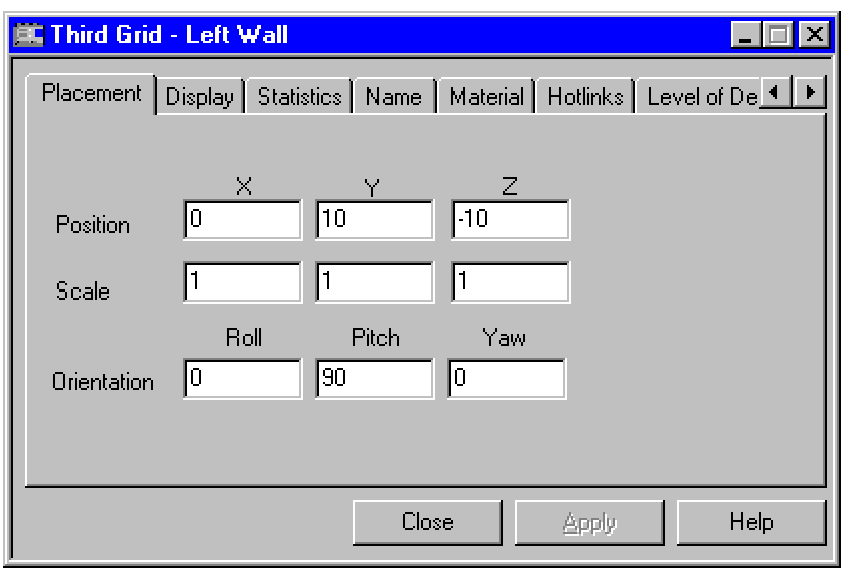
You can either start from scratch or follow on from the previous example (creating a swinging spotlight) ...

- Start a new RealiMation and create a view
- Create a grid of a size 20 x 20 and place it in the view
- Create copies of the grid, to use as "walls" (keep the existing grid as a floor). Do this, by making a copy of the grid, and renaming it Back Wall.
- Next display the Properties and change the position of the placement to be as follows:



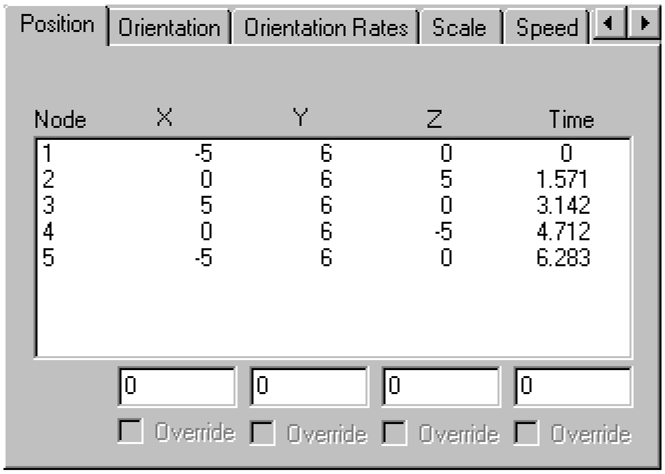
Changing the roll, alters the orientation to turn it to join the floor.

- Do this again to create a left wall, by setting it to the following position and orientation:

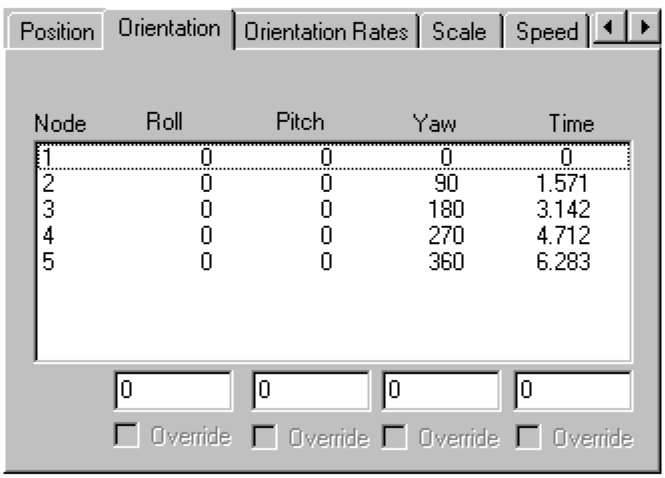


You can create a third wall and even a ceiling in this way ... but for the purposes of this example we will just use two walls.

Now create a circular action (Create | Action | Circle) with 5 nodes, using the settings shown:



Node	X	Y	Z	Time
1	-5	6	0	0
2	0	6	5	1.571
3	5	6	0	3.142
4	0	6	-5	4.712
5	-5	6	0	6.283



Node	Roll	Pitch	Yaw	Time
1	0	0	0	0
2	0	0	90	1.571
3	0	0	180	3.142
4	0	0	270	4.712
5	0	0	360	6.283

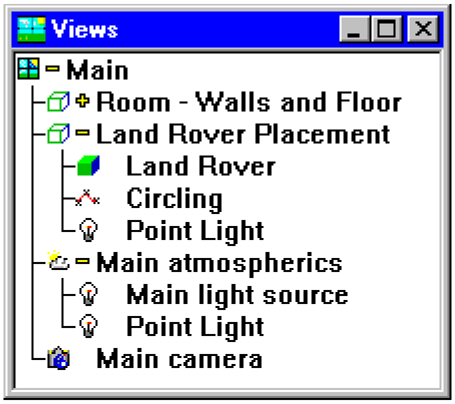
Note: The time values for each node have been set by overriding the speed to 10 in the "Speed" Properties.

- Create a point light source, and drop it onto the Atmospheric object used in the view, and drop the circling action onto it in the Lister. Press F10 to start the RealiMation.

Now we can add other objects, and associate them with the action and light...

- Import the file Landrvr.rbs from the samples\vehicles directory and add it into the current view

- Add the point light and circling action to the Land Rover as shown here:



Note: The walls and floor have been merged into a single placement (under the empty shape "Room - Walls and Floor") This makes their manipulation easier, and the view "tidier".

- Press F10 or Play - the Land Rover and the light are moving around.

- The Land Rover is now floating 6 units above the floor - so to make it more realistic, move it (and the action onto the floor) by changing the Y value to be 0. Press Play again, and now the Land Rover moves over the floor. Don't forget that you can use the Terrain Following features to get objects to hug the landscape!

These two examples are basic instructions to show you how easily you can manipulate lights to create a variety of effects - try this out with other models, different action and light types.

More Frequently Asked Questions

Why Can't I See Actions?

You can have problems displaying actions in view windows if you are using a time delta with a similar value to the duration of the action.
This is because the display uses time and position data to calculate the actions position.

- Set the time delta to a significantly different value.

More Frequently Asked Questions

Why Isn't my Spot Light Moving?

When you light a face, the lighting calculations are made using the vertex normals. So, if the surface you are lighting has only one face, then there are only four vertex normals to use for the calculation. This may result in a more general illumination - a bit like ambient lighting.

To see a light source moving across a surface you should ensure that the surface contains more than one face. Follow the example below:

- Create two grids of the same size, but one should be made up of one face (i.e. select 1 segment as the X value and 1 segment as the Z value), while the other has 100 faces (i.e. 10 segments in X and 10 segments in Z).

- Separate the two grids and flip one so that they face each other. (Do this by displaying the Properties of one grid and changing the Y position and changing the Pitch to 180.)

- Create a point light source, and make sure that all X, Y, and Z values are zero. Add the light source to the atmospherics (deleting any existing light sources).

- Create a circular action with a position of 0, 5, 0 and a radius of 5.
- Attach the action to the light and press F10 (or Play).

The action should circle between the two grids. You can see that the light moves more smoothly over the surface with many faces - this is because there are more vertex normals to make the calculations.

More Frequently Asked Questions

The New Material I Selected Hasn't Been Applied - Why?

The material used when drawing a placement comes from one of two places:

1. Each face in the underlying shape can have its own material, which is used by default. To change the material used for the shape drag and drop a new material directly onto the ***Shape*** in a Lister. This changes the material used to display the selected faces. (The material used is inherent to that shape, and is not shown in a Lister)

2. Individual placements can use their own material, applied using drag and drop, or the Placement Properties. This means that you can create multiple placements from one basic shape, but where each one uses a different material for a different appearance. Materials associated with placements appear in the Listers.
   Note: The new material overrides the material assigned to the underlying shape.

Assigning a new material to a placement at the top of a hierarchy will not affect the placements further down which have a material expressly associated.

When you paint a face you are changing the Shape, and not the placement. So if the placement has a material associated with it directly, then this will override the materials painted on the individual faces. Once you remove the material override, then you will be able to see the effects of painting the faces.

Painting Faces

More Frequently Asked Questions

Working with Materials

How Can I Find Out Which Material is Used on a Face?

If you have a complex scene full of shapes, each one using different materials and textures there is a quick way to fin out which material is being used for which shape.

- Display the Material Lister

- Swap into Shape Pick mode and click on the shape you want to query. The material used for that face will be highlighted in the Materials Lister.

- You can now double click on it or its associated texture and modify the settings.

More Frequently Asked Questions

Mapping Textures onto Part of a Face

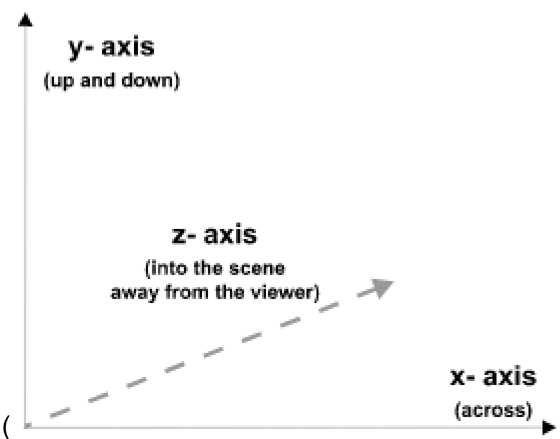
The best method to use in this situation is using the texture clamping options (in the image Properties), and the best way to explain the process is by using a simple example describing how to map a decal onto the face of a cube.

Please note that texture clamping is not supported on all driver technologies. At the time of writing it is only supported on OpenGL and 3Dfx technology.

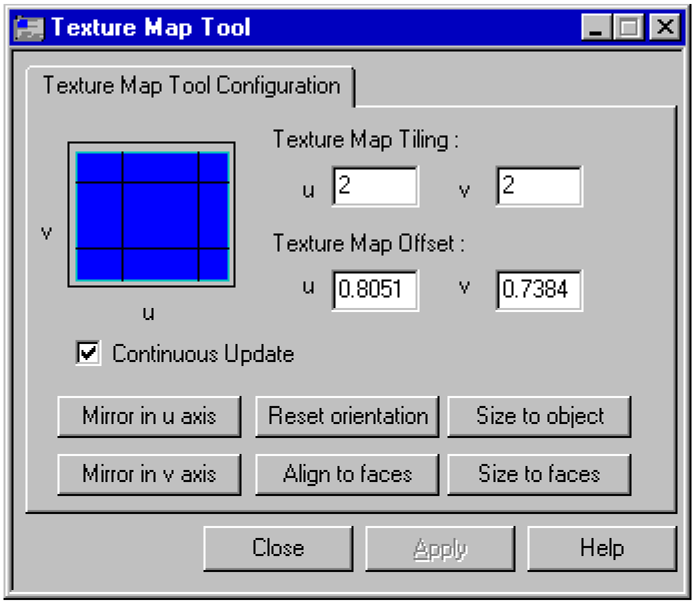
We assume the following:

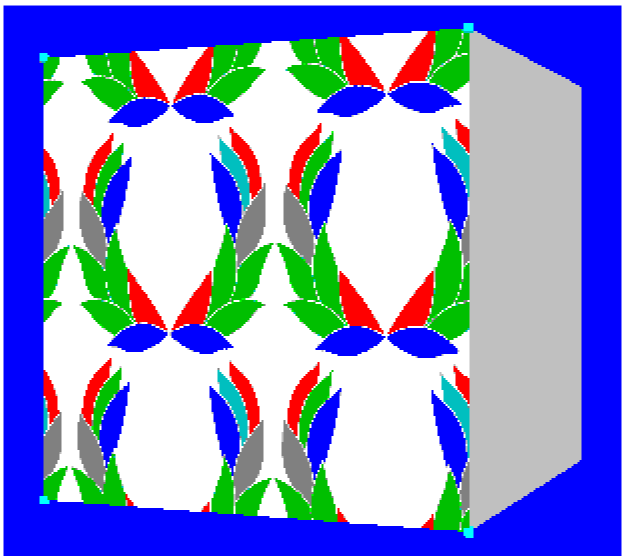
- you have created a new view in your RealiBase, and that you are using a driver which supports texture clamping
- you have created a cube and added it to the view
- you have imported an image, set up the Properties correctly (i.e. use as a texture etc.) and associated it with the material you want to use.

To map the decal texture onto the cube:

- Select a face on the cube you want to modify
- Paint the face with the material, and you will see the texture appear.
- Use the Planar Mapping Tool (

) to roughly position over the face and to the preferred size - as shown below:

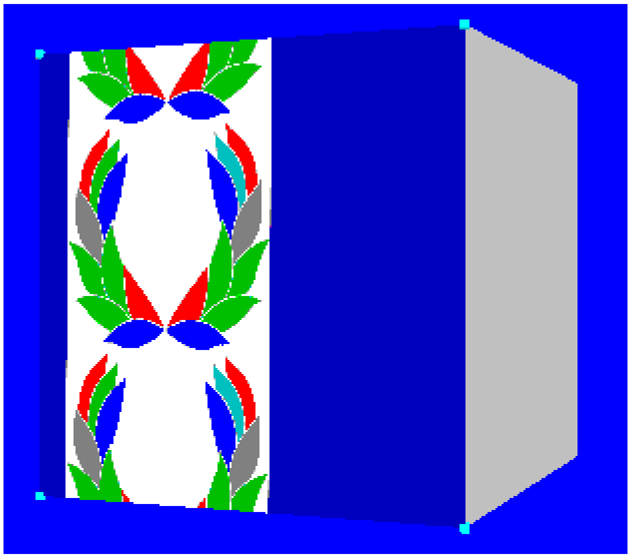




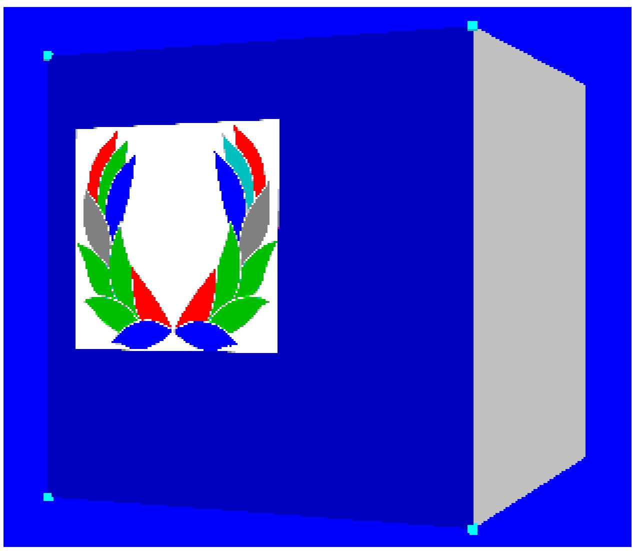
- Then use the Texture Coordinate Editor to move the texture to the preferred position. For the purposes of this example, we will try to map one decal into the upper left corner of the face.

Now the image is roughly in place, we can clamp it in either direction to fit it more perfectly. You can clamp in both u and v direction in one go, but for the purposes of this example we will clamp in one direction then the other.

- First check the 'Clamp in u direction' in the Image Properties and the texture will change to look more like the image below:



- Next clamp the texture in the v direction and the it will look more like this:



The decal is now at the correct size and in the correct position. You can move it around but you will still only have one decal on the selected face.

More Frequently Asked Questions

What Image File Formats Can I Use?

RealiMation supports a wide range of different file formats: BMP, PCX, JPG, TGA and SGI files.

Many renderers can only deal with relatively small texture map sizes (typically 128 x 128 or 256 x 256). Therefore, if you have large images you may want to split them into smaller tiles to allow easier texture mapping.   RealiMation comes with a conversion program to convert these image types into multiple tiled Targa files.

(This is also particularly good if you have large Silicon Graphics files you want to look at.)

"Usage: splitimg <filename> [width] [height]\n"
"   Splits <filename> into a number of TGA tiles,\n"
"   each [width]x[height].\n"
"   If dimensions not given, just shows image size\n"
"   If just width given, height is same as width\n"

Additionally RealiMation comes with a conversion program to convert images to Targa format (MakeTGA).

"Usage: maketga <filename>\n"

More Frequently Asked Questions

RealiMation STE Order Form

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Terms

Ambient light is the general background lighting in a view, without any radiation direction.

Anti-Aliasing is a corrective algorithm for improving jaggy edges around static or moving shapes. The process oversamples and blurs the edges of individual pixels to produce a smooth line.

Bi-linear Interpolation is a texture filtering technique for reducing chunky pixelation. It does this by sampling the texels around the selected texel, and interpolating between them to produce a new source texel to use, thus resulting in a smoother image.

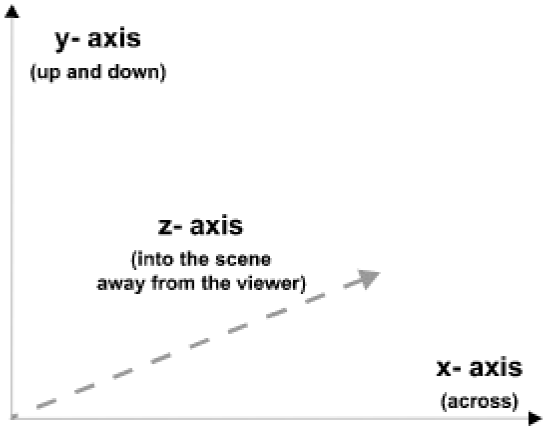
Note: Combine bi-linear interpolation with mip-map blending to produce trilinear mip mapped textures.

See Also mip mapping and trilinear mip mapping.

Collision Detection

Using Collision Detection can determine whether a placement of a shape is "in collision" with any other placement. This can be most extensively used in moving shapes next to one another to get them to meet exactly.

- Make sure that the View window is active and enable Collision detection using Pick | Collisions or



- If Collision Detection is enabled, you will not be able to move placements so that they intercept one another, but stop when their faces 'touch'.

Note: The Collision Detection implemented in RealiMation uses the most complex methodology, determining whether the actual geometry of the shapes are intersecting.

Any placements already intercepting one another will continue to do so until they are separated.

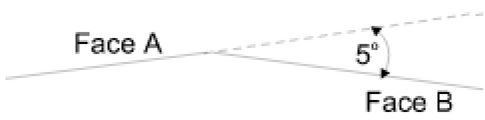
Coplanar Tolerance

The Optimise | Merge Faces option allows you to merge faces which are coplanar (coplanar faces are connected but do not lie in the same plane). Traditionally, only planar faces would be merged, (i.e. those faces which are connected and lie in the same plane.)

However, RealiMation also allows you to merge coplanar faces up to a certain tolerance level. Whether faces are planar is determined by the coplanar tolerance, which is set to 1 degree by default, to ensure that the resulting shape appears correctly after a merge command. There is no limit to the tolerance level you want to set.

The diagram below demonstrates how the coplanar tolerance level can be used for best effect.

The two coplanar faces are labelled A and B, and the dashed line is there to represent the position of Face B if it was planar to Face A. We can use this dashed line to determine the coplanar tolerance angle.



Suppose you wanted to merge faces A and B. However they are coplanar, so will not be merged by default.
To make sure that they are included in the merge command, you need to calculate the angle of tolerance between where Face B is, and where it would be if it was planar to A (i.e. the dashed line).

In the diagram above the angle between the planar face representation (dashed) and the actual coplanar face (B) is 5 degrees.
So to merge Faces A and B you would need to set the tolerance angle to be 5 degrees.

Note: Setting the tolerance to 5 degrees merges all selected coplanar faces with a tolerance of 5 degrees or less. Selected coplanar faces with a tolerance level of more than 5 degrees will not be merged.

RealiMation sets the tolerance to 1 degree by default. Using high values can give some unusual results, for example, poor quality rendered images, or 'fractures' in curved surfaces (i.e. faces pulled away from other to show 'holes') so take care with setting the tolerance!

- Select the shapes in a Lister, or select a number of faces in the shape, and choose the Optimise | Merge Faces option:
- To merge faces which are not co- planar, change the "Coplanar angle tolerance" to set the flexibility of the merge.
- You can refine the merge to include only those faces which use the same material. (NB: Faces should still be within the coplanar tolerance, and share common vertices.) This is the default setting.
- Check the box to remove any unused vertices to optimise the display further.
- Check the 'Traverse hierarchy' option (only available when you have selected the shape in a Lister) to merge the faces of any shape listed below the selected one in the hierarchy, e.g. the

different models used for Level of Detail.

- Click on OK to start the merge. A message box will appear displaying the number of faces that have been removed.

Display performance can be greatly improved by optimising complex models to reduce faces and vertices wherever possible. This is useful if you have merged two shapes or models into one, and want to optimise it further.

Cylindrical mapping ‘wraps’ the texture image into a tube (like a label being wrapped around a tin can). The image is then projected inwards, onto the faces. For each vertex in the face, the projection line passes through the vertex, and through the axis of the cylinder. The projection line is perpendicular to the axis of the cylinder.

See also:
planar texture mapping
spherical texture mapping

Depth Images

Depth images can be thought of as 'masks' which lay over a background image to allow depth within the flat 2D image.
Depth images are set up in other applications with depth values applied to different parts of the image, and then the whole thing is applied to the view. Objects within RealiMation can then move 'inside' the background image - behind other solid objects, such as trees and buildings.

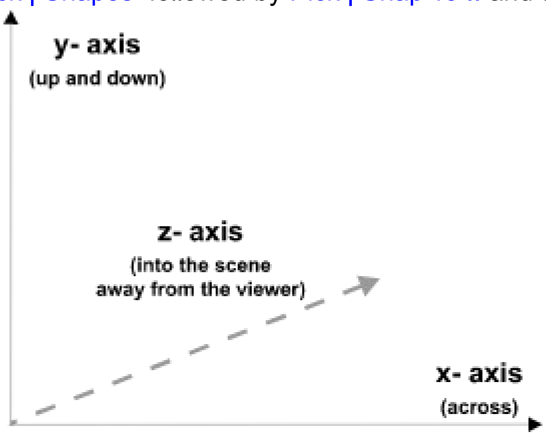
Diffuse light is light that is scattered in all directions, an example of a diffuse light effect is a matt surface

Emission is a constant colour emitted irrespective of the views" atmospherics. This functionality is particularly useful for situations such as rendering windows at night, glow effects where there is little atmospheric illumination, but light needs to be emitted.

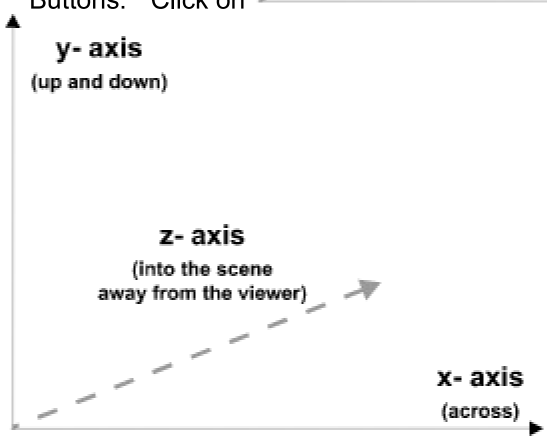
Face and Vertex Normals

Face and vertex normals determine the way that the light falls onto a surface, and can affect the shading of a placement.   You can edit the normals to alter the effects with the options available from the main drop down menus and the icon Tool bar).

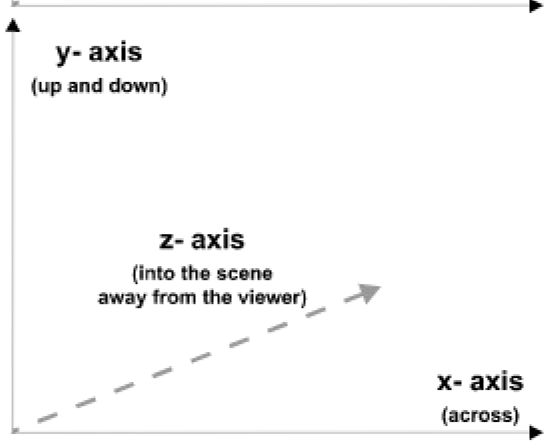
Before you can edit the normals, change the type of 'picking' mode using either menus or buttons:
Menu options: Pick | Shapes followed by Pick | Snap To .. and select Faces, Edges or Vertices

Buttons: Click on 

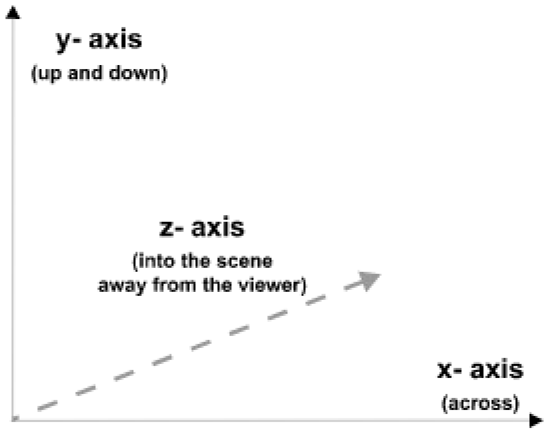
and then select either



Faces,



Edges or



Vertices

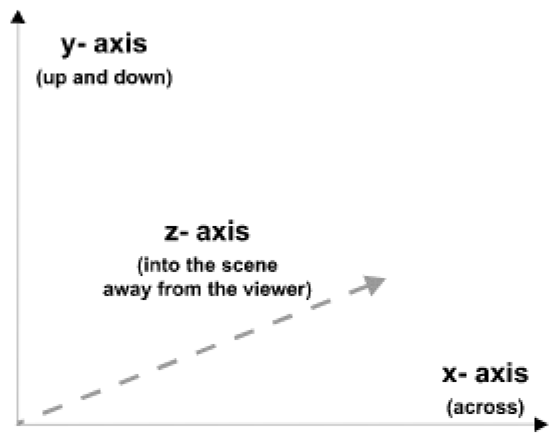
Selecting Faces

- First select the individual faces you want to edit, or select the entire placement.
  To select separate multiple faces, hold down the **Ctrl** key while you click the mouse of the face to select.
  To select the entire placement either double click over the placement or click once over the placement with the left mouse button and drag the selection outline box over the faces you want to select.

Selecting Vertices

- Select vertices (these are the corners of faces) in a similar way.
  Select the vertex you want to edit, or double click to select multiple vertices / entire placement by clicking once over the placement and then dragging the selection outline box over the vertices.
  You can select separate vertices by holding down the Control key as you click the mouse on the vertex.

Now that you have selected your faces or vertices you can edit them ,,, click here for more information about editing the face and vertex normals.



Ground Flight

Toggles between free flight (default) and ground flight.

In free flight, if you tilt the camera down and continue to fly 'forwards', then you will fly into the ground. In ground flight, if you tilt the camera down and continue to fly forwards, you continue to fly forwards, but the viewpoint will be tilted down.
The ground flight mode option keeps the camera steady as you fly around, and gradually accelerate. All flight controls are the same, whether you are in free or ground flight except that ground flight does not have a roll function.

Hidden Surface Removal

Faces in a scene are rendered in a random order and so faces which are actually behind others may in fact rendered last, and appear in front.   This can give a distorted image, so there is a process to work around this.
Hidden surface removal determines which faces lie behind others, and as its name suggests, removes or discards, the faces behind front faces, so that they are not drawn.

The hidden surface removal process inside RealiMation is **depth-**, or **z- buffering** which works on an individual pixel basis determining the visibility of each pixel on the screen.   As with back face culling, and rendering, you can enable and disable hidden surface removal for individual objects or for the entire view.

See Also:
Hidden Surface Artifacts

An **infinite** light source has a direction which defines the direction in which the light is radiating e.g. the sun.

Importing Shapes from External Sources

You can import any objects into the RealiMation STE from many other external sources - for example include whole models that have been designed in AutoCAD, MicroStation (.DXF format), 3DStudio (.3DS), VRML, MultiGen Open FLight (.FLT) etc. While the list is fairly comprehensive now, many more filters are planned for inclusion in the near future. Please turn to the section on import filters for details on the acceptable file formats and import instructions.

Note: MultiGen import functionality is only available in the Developer's Edition of the STE.

3D Studio Import Options

How can I make 3D text?

Level of Detail

The Level of Detail can make displays significantly faster by using different representations of models depending on where they are in a scene.
For example, use simple representations for shapes drawn in the distance and then more complex, and so more detailed, ones as they appear in the foreground.
Hint: Look at *helisim.rbs* - specifically, the Levels of Detail of the aircraft, fire truck, tanks and helicopter. (Select a placement in a Lister, display the Properties and view the Level of Detail page.)

Each level contains information relating to an object, and can be more or less detailed than the previous or following one.
Generally, **Level 0** (zero) contains the most detail, with other, less detailed, objects numbered from **Level 1** (one) upwards. (There is no limit to the number of levels.)

Level of Detail switching can be on either the projected size or the distance from the camera. Whichever type is chosen the point at which they switch is determined by minimum and maximum values shown.

For example, Level 0 may be set to a minimum of 0 and a maximum of 150 pixels, then Level 1 would typically be set with a minimum of 150 and perhaps a maximum of 1e+020 (infinity). This would cause level 1 to switch in and replace the shape at level 0 as soon as the threshold is exceeded.

Employing levels of detail are particularly powerful in terms of optimising the display - no resource is wasted with unnecessary display processing overhead.

See Also:

Adding and Deleting Levels of Detail

Editing the Level of Detail Threshold

Levels of Detail ...

Levels of Detail are shown as a hierarchy of objects in a Lister.

To Add A Level of Detail

- Select a shape in the Shapes Lister and 'drop' it on top of the placement of another shape.
- Choose to add the Shape as a Level of Detail, or to replace the current Shape referenced by the placement at the prompt.

  The Level of Detail Properties are updated automatically, displaying another level referring to the new shape.

  Hint: If the shape you have added is no longer required or used anywhere else, you can delete the it from the RealiBase to keep the components down to a minimum.
  Remember, you can check the usage of any shape from Edit | Usage.

To Delete A Level of Detail

- Locate the Shape in a Lister, and delete the placement from the hierarchy.

See Also:

Editing the Level of Detail

To Edit the Level of Detail

- Highlight the level you wish to edit
- Select the 'Switch Type' you wish to use - 'size' or 'distance'.   As you select the switch mechanism type you will notice that the edit boxes for that type will be active, and the others inactive.   For example, if you select to switch using Size then the edit boxes for the Distance will be greyed.
- Type in new values in the boxes at the base of each column.
- When you have made the changes click on ‘Apply’ or 'Close'.
- To move levels of detail around simply select them in the appropriate Lister and use the Edit | Move Up and Move Down options, or the Alt + Up or Down arrow keys to change the order.

Mip Mapping is a technique used to improve texture mapping, by sampling the individual texels of the original map to produce several pre filtered texture maps until there is a map containing just a single texel.
The texture map process then selects the correct mip map according to the shape, and places the texel at that point. This eliminates almost all ‘shimmer’ that might appear as the textured shape is redrawn.

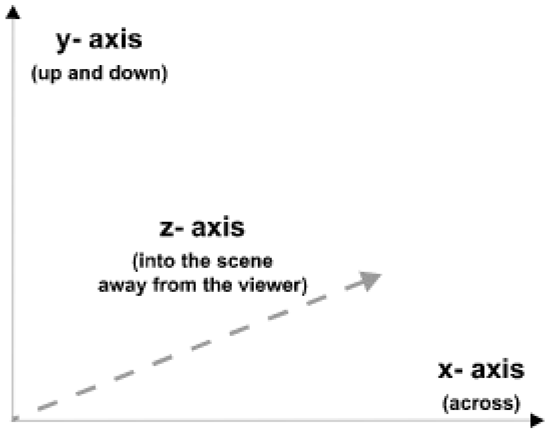
Note: Combine bi-linear interpolation with mip-map blending to produce trilinear mip mapped textures.

See Also bi-linear interpolation and trilinear mip mapping.

Material Inheritance

You can assign materials to placements which override the base material of the shape. A simple method of doing this it to select a material from the Material Lister and drag it over a placement either directly in the 3D View window or a Lister - the placement will then use this new material instead of the shape's base material. This is known as material inheritance, and means that you can create multiple placements of the same shape, but each one with a different material.
NB: Material inheritance only affects the shape that is immediately referenced - not all subsequent placements in the hierarchy

Mouse flies camera option

Pick | Mouse flies camera or F9 or button 

This option enables mouse control for free camera flight. In mouse control flight, a small white box appears in the view window. (This is configurable from the Customise | 3D Interaction menu option - check the box to display the white box during flight, and uncheck the box to disable it.)

Once you are in mouse flight mode, moving the mouse moves the camera. See flying controls for flying information.

Ortho cameras

Ortho cameras are specially constrained cameras that are fixed along a chosen axis and cannot have their orientation changed once created. They can, however, be moved and panned. Note that these cameras still use a perspective projection.

Ortho cameras can also be used for 'split views', i.e. where you split the current view into four segments - one using the current camera and the other three each show the view from a different ortho camera.

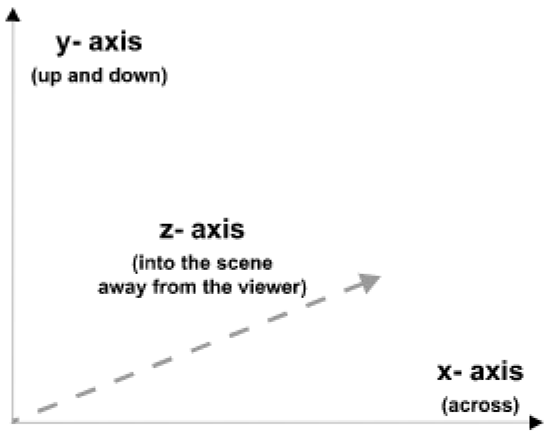
Split views are particularly useful when scaling, rotating and translating placements, as well as fine tuning the collision detection options.

Planar mapping places the texture image on a flat surface, and then projects the image onto the face(s) using parallel rays which are perpendicular to the surface. For each vertex in the face, a 'projection line' is drawn through the vertex, perpendicular to the surface of the mapping tool. This means that all projection lines are parallel.
The point at which the projection line intersects the mapping tool gives us the required texture coordinates.

See also:
cylindrical texture mapping
spherical texture mapping

A **point light source** has a position somewhere in the world and radiates light in all directions e.g. a naked light bulb.

Pitch is a rotation around the x-axis.



LEFT HAND: Thumb points out (along x axis), and fingers curl 'over' and 'under' the thumb in the direction of the blue arrow.

Roll

Yaw

Pre-Lighting Objects

(Optimise Menu)

Lighting a scene is usually calculated on a frame by frame basis, i.e. for every object each time a frame is generated. So, if your scene contains lots of different objects then the lighting calculations can take a great deal of processing power. (It is worth noting that the extent of calculations depends on the complexity of the RealiBase).

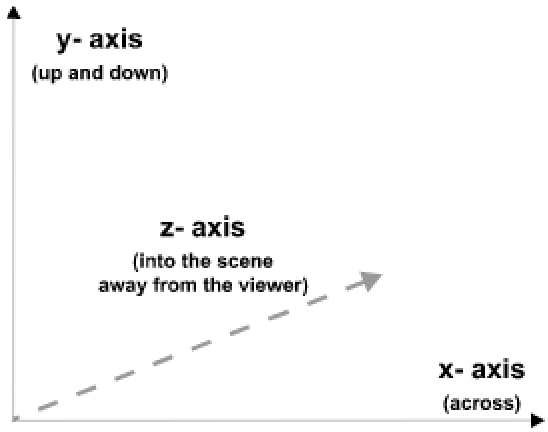
However, in many situations some objects do not need to be lit on a frame by frame basis, but could have the lighting calculated and applied once. Typically these are static objects which do not move in the world, for example terrains, buildings etc.

Simply select the object and use the Optimise | Prelight Objects option to calculate the lighting at that point in time and apply it to the shapes. The lighting will remain constant until you expressly remove it.

Notes:

While you can pre-light moving objects we recommend that you do not do so if you want to produce a true representation of the world.

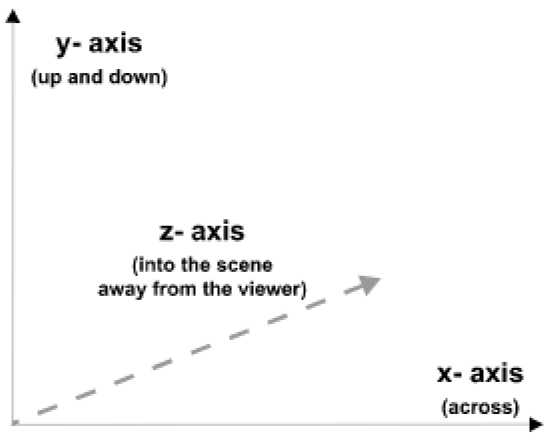
Remove the pre-lighting settings by selecting the pre-lit objects and choosing the Optimise | Remove Pre-lighting option.



Solid Camera

The solid camera option is a special feature which uses a type of collision detection which stops you from flying through solid objects. For example, if you are flying around a building, with solid camera enabled, then as you fly up to a wall, floor or ceiling, or in fact any solid object in the building the camera movement will stop and not let you go on any further. When this happens you will need to 'pull the camera back' and change direction.

Roll is a rotation around the z-axis



LEFT HAND: Thumb points inwards (along z axis), and fingers curl around 'under' in a clockwise direction following the blue arrow.

Pitch

Yaw

Shininess brings realism to objects, since most objects in the real world show some highlights when they are illuminated. Different objects have different levels of shininess, for example metallic objects have small, bright lights, while plastic usually has large, dim lights. Bearing this in mind RealiMation allows you to change the shininess values for different objects.

Specular affects the reflectance value, i.e. it is scattered in a mirrored direction - the viewer's angle, the object and the light falling onto the object affect the specular effect.

Spherical mapping ‘wraps’ the texture image into a sphere (like a map of the world would wrap around a sphere to create a globe). The image is then projected inwards onto the faces. For each vertex in the face, the projection line is drawn through the vertex, and also passes through the centre of the mapping tool. The point at which this line intersects the surface of the spherical mapping is converted into longitude and latitude values. The required texture coordinates can be obtained from these values.

See also:
cylindrical texture mapping
planar texture mapping

A **spot light** combines the properties of both an infinite light source and a point light source, so that light is radiated from a given point in a given direction.

Texture Mapping places a 2D image onto the faces of a 3D object to give realistic results. It is the process used to place and display an enhanced material onto a face.

The mechanics can be likened to using a projector to show a photographic slide on a screen, where the slide is the texture, the projector is the mapping tool, the slide represents the texture and the screen represents the face. A light source within the projector casts rays through the slide, and 'maps' the image onto the screen.

Texture maps are square or rectangular in shape, while the shape they are mapped onto is usually irregular, and once the texture pixels (texels) have been converted to screen coordinates, the texels and screen pixels are unlikely to correspond directly. The screen pixel could correspond with anything from a tiny portion of an individual texel, or a large collection of them. Either way the result would be undesirable - either ‘blocky/chunky pixelation’ or extra artifacts could appear on screen.

To work around these problems some drivers have interpolation processes to clean up the texture mapping by filtering and refining the original texture map before placing it on the shape. These methods are offered in RealiMation as part of the image options, and include bi-linear interpolation, mip mapping and trilinear mip mapping.

Terrain Following

Models can be made to follow irregular surfaces by using a feature known as terrain following. This is done by combining actions and placements to create an action that follows the position of the faces of the placement. Models can then be associated with this action to follow the terrain. This is particularly useful for applications where a vehicle needs to follow a certain route, e.g. a car on a track or a bike travelling over hills, or even a person walking through a scene.

Additionally, where a placement represents a terrain model such as a landscape, then the height at any particular point can be determined, to give slope information for that the point. Models associated with that terrain will follow the slope information.

Please turn to the Frequently Asked Questions and Working with Actions sections for more details on terrain following.

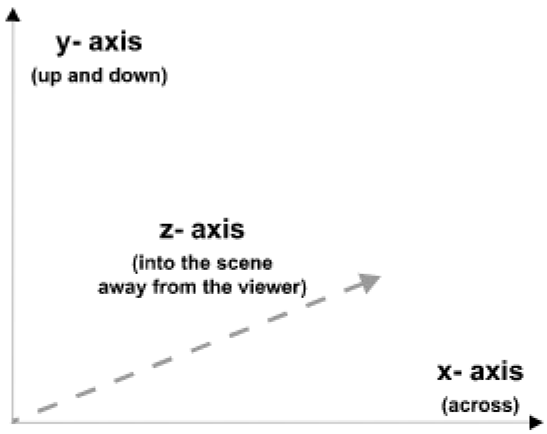
Transparency of an object is also affected by the light. When light strikes an opaque surface, it bounces off. When light strikes a semi-transparent surface, some of it bounces off, while some passes through - i.e. you can see through a transparent object. When the transparency is set to 100% then the surface is completely invisible regardless of any other settings.

Trilinear Mip-Mapping is a method of texture map refinement which combines both mip mapping blending and the bi-linear interpolation processes to produce texture maps of stunning clarity.

Simply this process creates multiple mip maps, and then interpolates each texel to produce more sub mip maps. The texels can then be chosen from a wider range of filtered texture maps to give closer correlation between the individual texels.
Trilinear mip mapping can be very compute intensive, and so is not offered by all drivers. However, with a suitable driver and accelerated graphics hardware the results can be stunning, without experiencing any real performance 'hit'.

See Also bi-linear interpolation and mip mapping.

Yaw is a rotation around the y-axis.



LEFT HAND: Thumb points upwards (on y axis), and fingers curl around to the right in the direction of the blue arrow.

Roll

Pitch

Dialogs

File | New

Opens a new, empty RealiBase file. From here you can begin to build your world by adding shapes, atmospherics, actions etc.

- To create new objects use the Create menu, which will display a drop down menu of the types of objects available - shapes, cameras, actions etc.
- You will notice that as you make selections, Hint Cards will pop-up with information about the choices you have just made, and the next steps you can take.
- All Tool bars are active and displayed by default.

Note: You can configure the certain aspects of new RealiBases e.g. automatic creation of a view window, the size of 3D view window
when it is created, etc using the Customise | Startup option.

File | Open

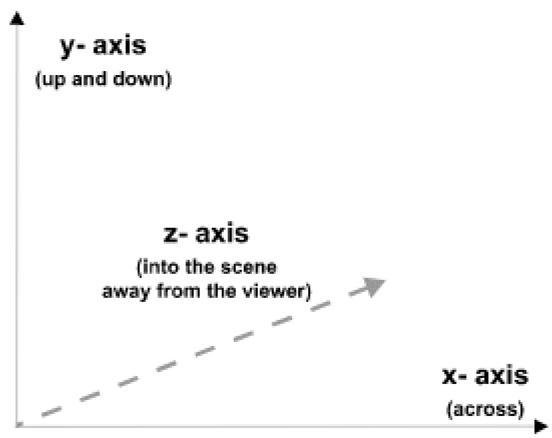
Opens an existing RealiBase. RealiMation keeps track of the last four RealiBases you have worked on - and you can quickly open one of these by selecting it from the bottom of the File menu.

You can create new documents with the File|New command.

File Name

Select or type the name of the file you want to open. This box lists documents with the filename extension selected in the List Files of Type box. The types of files available are *.RBS and *.* files. using the directory box if required.

Use the directories and drives boxes to move to other locations to look for the files you require. You can also open files across a network, by checking on the network box and selecting a destination from the choices offered.



The shortcut to open a file is to use the Open button on the standard Tool bar

Importing Files

The file import filters for RealiMation allow you to import bitmap images for use as textures, other RealiBase files, 3D Studio and DXF models. Simply select the file format, and the file to import and RealiMation will do the rest.

NB: When you import 3D Studio files a dialog will appear, with connections to specific help.

Click here for more information on importing data.

Connecting Hotlinks

Browse through the directories to find the appropriate file, www address or executable for use with the hotlinks.

Save As

Saves the current RealiBase.

- Type in a new name, or select a name from the standard Windows file dialog.
- Use the Network button to attach to other machines.

File | Information

Add, edit and view information directly related to the current RealiBase, for example, include author details, subject, date etc., or other information which you want to distribute.

Enable / disable file compression when you save the RealiBase. The default is to have compression enabled.

Import Options: 3D Studio

The 3DStudio import filter can import both geometry and key frame data as prepared in an AutoDesk 3D Studio file (.3ds).

There are a number of options available which effect the way the import filter works:

Use Smoothing Group data to alter vertex normals

When an object is created in 3D Studio, sets of faces are collected together into 'smoothing groups'. These, when rendered, give the surface a smoothed, rather than faceted, appearance.

Disable this option to ignore the smoothing group information in the file - the imported model will be displayed with a faceted appearance, even when a smooth shading mode is enabled.

Import KeyFrame Data

Toggle this option to generate a path for each object, based on the keyframe data in the .3ds file.

If you disable this option (e.g you do not want to import the keyframe data, or the file does not contain any useful keyframe data) then you can save both time and memory used by the import filter.

If this option is selected, then other options are also available:

Note: At present, if the keyframe data includes scaling or morphing information, the paths created may not produce the expected RealiMation sequence.

Disable 'unlinking' of rotations

When creating a hierarchy in 3D Studio, it is possible to release the linkage of a child to its parent on any axis of rotation transformations. With this option selected, the filter ignores any 'unlink' information, and each child inherits the full transformation from it's parent.

This option is included because, at present, the import filter does not always handle the unlinking correctly.   Best results are obtained if the RealiMation sequence is set up in 3D Studio so that it does not use unlinking.   We hope to improve this in a future release.

Animation frame rate *- only available when you import keyframe data*

This option tells the filter at what speed the animation is designed to run at, in frames per second (fps).   The filter uses this information to set up the correct time in any path nodes that it generates. The default setting is 30 fps.

See Also:

Import Filters

FAQ: Imported 3DStudio models have actions but don't move - why?

File | Export

Exports all the geometry, placement, action and material information into a new RealiBase. The next time you open the RealiBase it will contain everything except the views, cameras, atmospherics and light objects.

- Type in a new name and click on OK.

This is a useful mechanism for storing RealiMation objects for import into other RealiBases.

Recording to AVI Format

RealiMation sequences can be output to AVI file formats for distribution to users without access to RealiMation or RealiView, (our freeware 3D viewer, flyer and browser).

This dialog allows you to specify the different settings for recording AVI files.

- Click on 'Set file' to specify the directory and file name for the AVI file. The File and Directory details in the dialog will update automatically. You cannot start the recording until you have set up the file and directory.

- Define the duration of the sequence by typing in a start and finish time.
  Note: The default start time is 0, and the default end point is the last point of the longest action in the sequence.

- Specify the number frames per second you want to use for the recording (the default is 15fps).

- Click on the 'Compression' button to setup the compression utility you want to use. (We would recommend that where you do not have hardware accelerated compression, that you use the Codepack compression utility where available).

From the 'Compression' dialog you can ...

- alter the quality of the compression, by moving the slider bar. (Higher quality recording takes longer and will result in a larger AVI file size.)

- Set up the key frame rate and the data rate. (Use the data rate to allow for different storage media / playback times). Availability of these options is compressor dependent and the compressor might change the quality automatically to best suit its capabilities.
  Note: The settings you make here will be stored and be used as the defaults until you change them.

- When you have finished changing the settings, click on 'OK' to start the recording process. RealiMation will then begin to record the AVI file.

Note: To abort the process press the Escape key several times.

RealiMating Sequences

Multi-Undo

This presents a list of the last 50 editing and actions you have made during the session. You can multiple select any number of consecutive actions from the list, by either selecting one action down the list and clicking OK, or highlight multiple actions using the Ctrl key with the mouse.

Edit | Copy ... Options

Click on the appropriate radio button to set the depth of the copy.
either:

- Copy the object selected in the Lister
- Copy every object that appears in the hierarchy below the currently selected object
- Copy all objects of the selected types from the hierarchy below the currently selected object.
  For example, select a view object in the View Lister, and use this option to refine the copy to include only placements and shapes and materials.
  You do not have to make a copy of the view itself - just selected objects within it.
- Change the number in the edit box to create multiple copies.
- Next set up offsets, name and autoview options for the copies.

Copying Objects for more on the copy mechanism of individual objects within RealiMation.

Edit | Copy ... Offsets

Offset the copies from one another (and the original) by changing their position and orientation.

- Change any or all of the x, y, z and Roll, Pitch and Yaw values and these will be applied to every copy made (using the previous copy as the baseline).

  Depending on the autoview options selected, the copies may appear in the current view window.

  Also set up options and name options for the copies.

  See Also
  Copying Objects for more on the copy mechanism of individual objects within RealiMation.

Renaming Objects

Rename the selected object by typing a new name into the edit box.

This dialogue can also be accessed using the Ctrl + R keys.

Note: Objects can also be renamed using the Name page in the Properties.

Merging Objects

This merges two or more selected objects into one new object which can be added to a new or existing view.

- Highlight the objects you wish to merge and choose the Edit | Merge option (or use the Ctrl + M shortcut keys)

- The new merged object(s) will be renamed automatically.

- To rename the object choose the Edit | Rename option or the Ctrl + R keys, or display the Properties and move to the Name tab.

Note: To select multiple items hold down the Control key and select the items with the mouse.

Detaching Faces

Detaches the selected faces from the shape. Useful for splitting large, complex models into smaller more manageable ones.

- Choose to either delete them or use them to create a new shape

- The newly created shape can be moved around, edited or later deleted or detached from the hierarchy.

NB: References to the new shape are shown in the Shape Lister, and will remain there even if you delete the new shape from the hierarchy. To delete the new shape permanently, delete it from the Shapes Lister.

Checking the Object's Usage

Displays how and where the selected object is used in the current RealiBase.

All objects which reference the selected object are listed, e.g. if you select a material in the Material Lister the dialog will display which shapes and placements use this material.

Once you know this information, you can choose whether to delete the object from the database, so you can keep the RealiBase 'clean' and free from unnecessary objects.

The Optimise | Purge RealiBase option automatically works through the RealiBase checking usage of every object and deletes unused / unreferenced ones from the system.

Find by Name

- Type in the object name you want to find in the currently selected Lister.

Refine the search string by restricting the search to text which exactly matches the string you have typed, or to search for the text as a whole word rather than part of another string.

Centre Shape

This centres the geometry of the select shape (in local coordinates) so that the local origin now coincides with the centre of the object's bounding box.

Generally, you will use this once you have transformed the placement of a shape either by moving it or typing in new values in the Placement Properties to centre the selected shape around its local origin.

See Also
Apply Transformation

Apply Transformation

Use this option to permanently apply any transformations you have made to a placement (e.g. scale, rotate etc.) to the underlying geometry object.   Each time you create an additional placement of the changed geometry it will use the new transformation information.

Why: When you change the transformation information of a placement (e.g. scale, rotate or move it) you are effectively creating a 'transformation matrix' which is then applied to the placement every time it is drawn.   This can take up valuable processing time, so you can permanently apply the transformation to the underlying geometry to reduce this overhead.

(You can view the transformation information in the Placement Properties.   Once you have used Apply Transformation the values i the edit boxes will revert to 0,0,0).

You will also notice that the edit handles will change to reflect the Apply Transformation function.

See Also
Centre Shape

Align Positions

- Use this dialog to position two or more placements in relation to one other, making the selections from the dialog
  The last placement you select is the reference used for the alignment. So if you select placement A, B and C, then placements A and B will be aligned to the settings of placement C.

  Previously selected placements are identified by a grey edit box.

- Use the radio buttons to line up the bounding box extremes in each axis, or align according to the local origins.

Align Sizes

- Use this dialog to match the sizes of two or more placements, making the selections from the dialog
  The last placement you select is the reference used for the alignment. So if you select placement A, B and C, then placements A and B will be aligned to the settings of placement C.

  Previously selected placements are identified by a grey edit box.

- Use the radio buttons to match the placements in all axes (i.e. so they are identical sizes) or in the selected axes. (The different axes become active then the option is selected.

Smooth Vertex Normals

This improves the shaded display by converting the vertex normals giving the placement a smoother appearance.

- Set the angular threshold to alters the extent of the smoothing.
  For example if the angular threshold is 45 degrees, then only those vertex normals within the 45 degree tolerance will be smoothed. Anything outside that will not be affected.

Note: We recommend that you ensure that faces share vertices wherever possible, by using the Optimise | Merge Vertices option. This option is enabled when faces, or a shape, are selected. You will see the best effects if you are using a smooth shaded display mode.

Action Properties

This displays the Properties for the selected action. Move between the tabs to change the position, orientation, orientation rates, scale, velocity and speed. Please use the Help button to get more information about the Properties for actions.

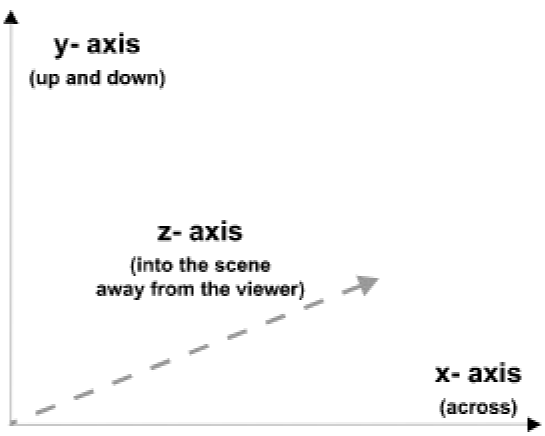
You can change the action currently displayed by selecting another in a Lister, then dragging and dropping it into the Properties - the information will change automatically.

Action Properties Button Bar

The buttons at the top of the Action Properties act as shortcuts for setting up action nodes. Each function is also available on the Tools | Actions menu.

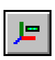
Show Action

Displays the action in all View windows. We recommend that you do this when you are editing actions.



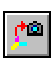
Add Node

Adds a new node either between two existing nodes, or at the beginning or end of an action.



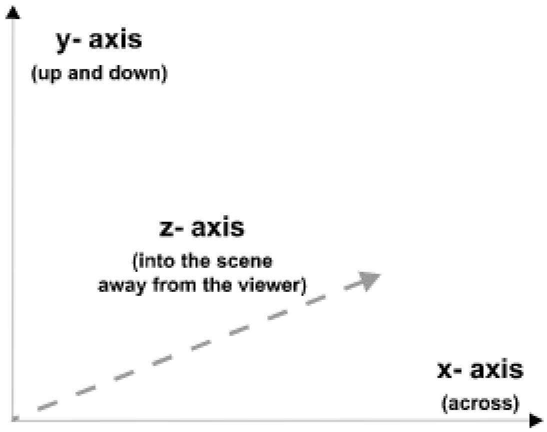
Remove Node

Removes selected nodes from the action



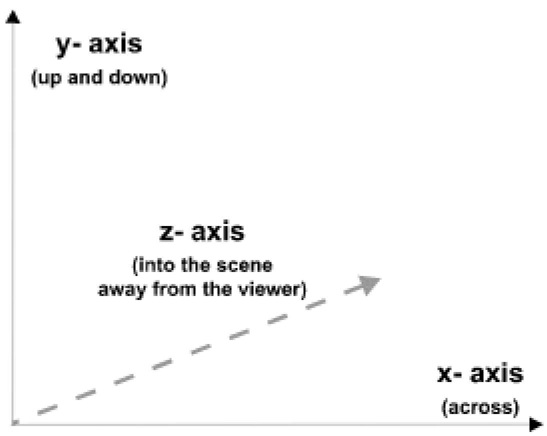
Node at camera

Change the current action by flying through the RealiMation to a preferred point and add a node by clicking this button.
The new node will use that position and orientation unless you alter it.
Click here to create an action using the 'Node at camera' function



Camera at Node

Moves the camera to the selected node.
This allows you to view and subsequently edit the action the exact position of the action node.



Node Spacing

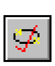
Evenly spaces the nodes, overriding any other Properties, e.g. scaling, time, orientation etc.
Click here for node spacing instructions.

AutoRepeat

When enabled this forces the action to loop back to the first node and to restart the RealiMation from the beginning.

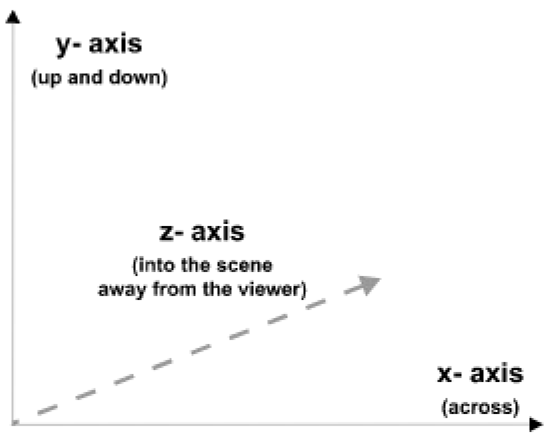
Offset time

*A*dvances the time for individual nodes using the previous node as the base time.
Click here to find out how to use Offset time



Preserve Shape

When you change a node's speed or time, the shape of action may change to fit best fir the route between the nodes. To preserve the shape of the action, click on this button before you make any changes.
The action will retain its shape, but the rate between the nodes may increase or decrease depending on the changes you have made. This is particularly useful with terrain following actions.



Smooth Nodes

Reduces jerkiness between selected nodes, by smoothing the orientation and orientation rates of the selected nodes.

Texture Mapping Tool

This controls how the selected tool maps the texture onto the surface of the mapping tool.

Texture coordinates are measured in **u** and **v** values (where u is similar to x in that it refers to horizontal coordinates and v is similar to y in that it refers to vertical coordinates). The uv display in the top left corner of the dialog shows the current tiling and offsets, and is useful when the texture is a whole object, e.g. a face, or a regular pattern, rather than a grass or brick work effect.

Texture Map Tiling and Offsets

- Change the tiling and offsets by typing in new u and v values, or by clicking inside the box and dragging the tiles.
  You can use the **Ctrl** to just move the vertical split and **Shift** to just move the horizontal split.

Textures can also be manipulated using the edit handles.

- Double click on the texture map bounding box to switch between scale/drag and rotation. The handles change to show the current mode and they work in the same way as the handles for editing placements.

Mirror in u axis and Mirror in v axis

- Click on these to flip the texture either horizontally (u) or vertically (v).

Reset Orientation

- Click on this to reset the orientation of the texture mapping tool over the model. You may have changed this with the spin handles in the 3D View.
- Use this option to reset the orientation of the tool to its default, e.g. the planar map is reset to point along the y axis.

Align to Faces (This option is only available for the planar mapping tool)

- Use this to align the texture map to the faces of a cube. Where multiple faces are selected, it will align to the average direction in which the faces are pointing.

Size to object

- Check this option to size the texture to the entire shape.

Size to faces

- Automatically sizes the texture to fit the selected face (and is quicker than trying to resize it using the drag handles.)

Continuous Update

- Check 'Continuous Update' (the 'Apply' button is disabled) to apply the changes made immediately. If the option is not checked, changes are applied when you hit the 'Apply' button.

Once the texture is positioned on the faces you can fine tune the image further with the Texture Coordinate Editor.

See Also

Configuring the Texture Coordinate Editor
Working with Textures

Texture Coordinate Editor (TCE)

Use this editor to to really fine tune the the individual aspects of the texture to improve the 'fit' onto the selected faces, by showing a representation of the selected faces, in texture coordinates, against a background of the image being used.

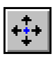
The default display shows the texture as black with an olive grid, and the outline of the faces shown in white - a green cross marks the centre point used for rotations / scales and flips.   These can be altered using the TCE Configuration menu.

Use either the buttons on the menu bar, or the Texture drop down menu, to move and change the texture, to give a different final image.

 opens the Texture Co-ordinate Editor Configuration

Screen Management

 **ZOOM**.   Click in the 'window' with the left mouse button to zoom in and the right mouse button to zoom out of it.

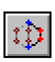
 **PAN**.   Use the mouse to pan around the selected faces. This is particularly useful when you have zoomed right in and want to edit different vertices, edges etc. at high magnification.

 **MOVE ALL FACES**.   Changes the area of texture being mapped onto the faces.   Click on the button and drag the selected faces to a different part of the texture.   Constrain the drag to the axes using the **Ctrl** and **Shift** keys.

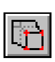
Editing Texture Coordinates to change the position of the texture for smoother images.

 **DRAG VERTEX**.   Pick up individual vertices and move them around to change the area. As you make changes the faces on the shape in the view window are updated automatically.

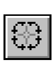
Note: As you drag the vertices the aspect ratio is preserved.   To constrain the drag to the axes, hold down the **Ctrl** and **Shift** keys.

 **DRAG EDGE**   Select the edges you want to drag - you can select multiple edges and drag them simultaneously.

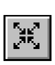
Note: As you drag the edges the aspect ratio is preserved.   To constrain the drag to the axes, hold down the **Ctrl** and **Shift** keys.

 **DRAG FACE**.   Select the faces you want to drag - you can select multiple faces and drag them simultaneously.

Note: As you drag the faces the aspect ratio is preserved.   To constrain the drag to the axes, hold down the **Ctrl** and **Shift** keys.

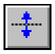
 **ROTATE** the selected faces around the current centre of rotation (shown by the green cross).

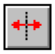
To change the centre of rotation, hold down the **Alt** key and click the mouse on a different point in the window.   Next time you start to rotate you will use the new centre.

 **SCALE** the image evenly to make it appear bigger or smaller around the current centre of rotation (shown by the green cross)..   As you change the scaling the U V aspect ratio will be preserved.

- Constrain the scaling in the U and V axes with the **Ctrl** (U axis) and **Shift** (V axis) keys.

  For freeform, or random, scaling, i.e. where the aspect ratio is not preserved, hold down both the **Ctrl** and **Shift** keys as you drag the faces.
- To change the centre of scale, hold down the **Alt** key and click the mouse on a different point in the window. Next time you start to scale you will use the new centre.

 **FLIPS the selected face about the U Axis**. The flip point is shown by the green cross. To change the point around which the image flips, hold down the **Alt** key, and click on the new point.

 **FLIPS the selected face about the V Axis.** The flip point is shown by the green cross. To change the point around which the image flips, simply hold down the **Alt** key, and click on the new point.

Hot Key Functions

- Alt and mouse changes the flip point, centre of rotation and centre of scaling.
- Ctrl & mouse constrains scaling in the u axis
- Shift and mouse constrains scaling in the v axis
- Ctrl & Shift & mouse for random, free scaling

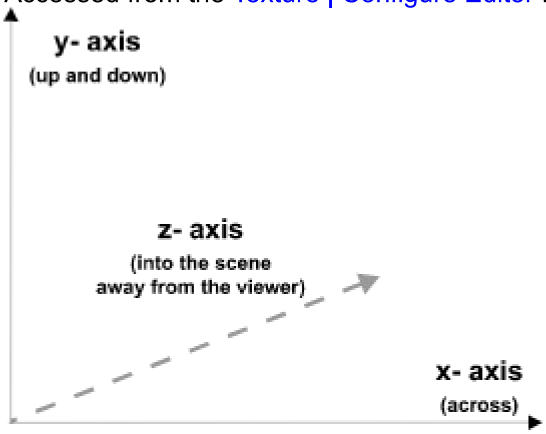
- You will notice that a you make any change to the appearance of the texture the model in the view window is updated dynamically. Once you have edited the texture coordinates to achieve the desired effect, close the dialog.

See Also

Texture Co-ordinate Editor Configuration

TCE Configuration: Display Options

Accessed from the Texture | Configure Editor menu or the button on the TCE window (



), use this dialogue to configure the TCE (accessed from the Materials | Texture Map Tools | Edit Texture Coordinates menu.

- Check 'Display image in background' to toggle between displaying the image, and clearing the background
  This is good for reducing system display processing overheads
- Enable 'Fast Pan Mode' to 'remove' the image temporarily as you pan around the window
- Use the slider to change the 'Image Brightness' so you can see the image more clearly

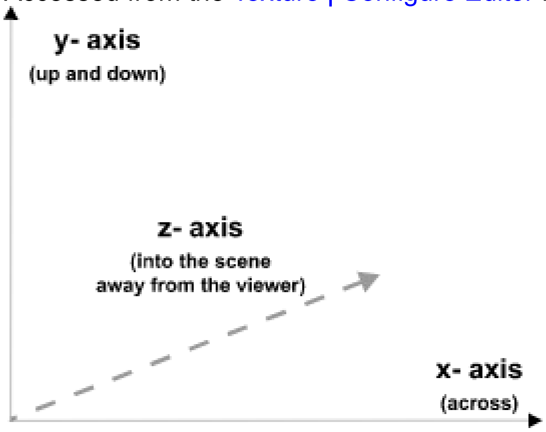
- Face Display Colour shows the colour currently selected to display the faces in the TCE. Click on 'Set' to change the colour.
- Grid Display Colour shows the colour currently selected to display the grid in the TCE. Click in 'Set' to change the colour.

TCE Configuration: Snap Options

See Also
Texture Co-ordinate Editor

TCE Configuration: Snap Options

Accessed from the Texture | Configure Editor menu or the button on the TCE window (



), use this dialogue to configure the TCE (accessed from the Materials | Texture Map Tools | Edit Texture Coordinates menu.

- Changing the value alters the number of points to snap to along the edge of the image.   For example, using a large number here will produce a finer control.   Change the value by either typing directly in the box (either type in directly or use the scrolls)
- Toggle the snap to grid option on and off with the check box
- Change the angle snap to allow exact angle values for rotation.   Change the value by either typing directly in the box (either type in directly or use the scrolls)
- Toggle the snap to angle option on and off with the check box

TCE Configuration: Display Options

See Also

Texture Co-ordinate Editor

Texture Map Tool Window

Use this window to fine tune how the texture is mapped onto the mapping tool, before it is mapped down onto the selected surface.

Texture coordinates are measured in **u** and **v** values (where u refers to horizontal coordinates and v refers to vertical coordinates).

Change the tiling and offsets applied to the texture, mirror the texture and align and resize it.

For more information on these option click here.

Merge Vertices

Calculates the unnecessary / duplicated vertices for the selected faces or shape, and merges them to optimise the shape for the best display performance.

- The selected shapes appear in the list
- Type in a 'Near vertex distance' value to change the minimum distance between vertices before merging them. The default setting is 0.01, which is the shortest distance.
- Check the 'Remove unused vertices' to delete the duplicate vertices from the shape. We recommend that you delete any unnecessary vertices, as this will improve the system performance, and increase display processing times.
- Select the 'Traverse hierarchy' option to merge the vertices for any associated shapes in a hierarchy below the selected shapes.

Why: The number of faces and vertices used in a model is a major factor in the display processing speed. Once you have imported or edited a complex model you can then optimise the display performance by reducing the number of faces and vertices wherever possible. This is useful if you have merged two shapes or models into one, and want to optimise it further.

Once you have merged the vertices of a shape you can further optimise the shape by merging the faces, and then smoothing the normals to improved its shading and so its appearance.

Merge Faces

Merges adjacent faces which share common vertices, i.e. are planar, (or are within the coplanar angle tolerance).

- The list box displays the shapes you have selected. You can select multiple shapes and merge their faces simultaneously.

- To merge coplanar faces set the coplanar angle tolerance to the appropriate value (in degrees). The default setting is 1 degree to produce a smooth merge. Take care, because selecting high values can create some unusual effects.

- Refine the process further by only merging faces using the same material. (NB: Faces should still be within the coplanar tolerance, and share common vertices.) This is the default setting.

- Check the box to remove any unused vertices which will to optimise the display further.

- The 'Traverse hierarchy' option (only available when you have selected the shape from a Lister) merges the faces of any shape listed below the selected one in the hierarchy, e.g. the different models used for Level of Detail.

- Click on OK to start the merge. A message box will appear displaying the number of faces that have been removed.

Why: The number of faces and vertices used in a model is a major factor in the display processing speed. Once you have imported or edited a complex model you can then optimise the display performance by reducing the number of faces and vertices wherever possible. This is useful if you have merged two shapes or models into one, and want to optimise it further.

This process is similar in functionality to, and should be used in conjunction with, the Merge Vertices option to get the best results. We recommend that you merge the vertices of the shapes first.

Purge RealiBase

This option works through the complete RealiBase, taking each Lister one by one and searches through the hierarchies, checking the usage of objects and deleting any which are not used.

The Purge operation is completely recursive, i.e. if a placement is removed then the Purge operation checks the shapes which were referenced by the placement to check their usage, and deletes them if required, it then checks placements referenced by those shapes and deletes unused ones and so on until the entire hierarchy is checked and refined.

- Use the check boxes to confine or extend the purge to selected object types. RealiMation will only purge those objects which you have selected.

- If you click Cancel, the purge will be aborted.

Note: Views are not purged, because they are never considered to be unused.

Naming Objects in RealiMation

- Type in a name for the object you have created.
- When you have completed the set up click the ***OK*** button and the new object will be created. The "Apply" button remains disabled unless you are updating the settings for the object.

Note

Autonaming: If you do not expressly name an object, RealiMation uses its autonaming mechanism to create a unique name. These auto names are made up of a reference to the object you have created, e.g. Shape, Camera, Placement etc., followed by a numeric, which is determined by the number of objects already created in the RealiBase.

For example, if you create a Light Source and the RealiBase already has 25 objects (these can be either expressly or automatically named items) then the autoname will be shown as *<Light source 26>*.

(The **<>** symbols identify an autonamed object)

See Also:

Copying objects

Merging objects

Object Locking

The locking mechanism allows developers to 'lock' any object within a RealiBase in a combination of three ways.   These locks are selected by checking the boxes alongside them.

Cannot delete objects
When this option is checked you cannot delete the object from the RealiBase.

Cannot change objects
When this option is checked you cannot change any properties of the object.   All the properties on the individual tabs in the Properties boxes will appear 'greyed out' or disabled - no changes can be made.

Cannot remove object from parent
When this option is checked, you cannot detach the object from its position in a hierarchy.

NB: Changing the locking mechanism is only available to RealiMation developers, and objects which are locked cannot be unlocked by end users of the standard STE edition or demonstration version. The options on this tab will appear, but are always disabled, unless accessed using the Developer Edition of the software.

Properties Information

This displays the Properties for the selected object -- e.g. for a placement, shape, view, camera etc. The information displayed depends on which type of object is selected.

Each page contains different information which is shown on the tabs - click on a tab to select a different page of information.

To view the Properties of an object, select it in the Lister Window and press the Space Bar, double click the mouse, or use the Edit | Properties menu option.

Swapping the Properties Displayed

When the Properties are visible, you can change the object described, by selecting another object of the same type, e.g. another placement or another view, and dragging it and dropping it over the visible 'page'. The information will change to reflect the details of the new object.

To find out more about the contents of Properties for different objects, use the Help button to display specific details.

Lister Windows

This is a Lister Window, also referred to as a Lister. These are used extensively to make working in the RealiMation world simpler.
Every time you create an object it will appear in the appropriate Lister. There is one Lister for every type of object e.g. Shapes, Placements, Actions, Cameras, Views, Atmospherics, Materials and Images.

Using drag and drop you can create hierarchical links between objects, and the Listers allow you to keep track of every object you create in a RealiBase.

All Lister Windows can be 'minimised' to an icon at the bottom of the desktop, or closed completely. To view the contents of a Lister Window, you can make them visible by either using the button tool bar on the right hand side of the desktop, or use the Windows | Lister menu option.

View Backgrounds

Set up the background Properties and image options for the selected view.

Use Background Image

- Check the box to use a background image for the view.
  Using an image in the background of the view can bring immediate realism to the scene. For example, set your world against a real life backdrop, e.g. a photograph of a landscape, a skyline or race track. If you are using a bitmap you can alter the size of the view window to match the size of the image using the View | Set Size option.

  Select the **Visual Image** you want to use from the drop down list.

  Select the **Depth Image** you want to use over your selected background visual image from the drop down list.

Notes: The images should be configured correctly for use as either a background or depth image in the Image Properties.
If you do not have any images in the RealiBase the check boxes will remain inactive. You can define new images at any time - without closing this dialog, using the Create | Image menu.

Move images with camera

Check the box to ensure that the image moves in relation to the movement of the camera. For example, if you leave it unchecked then the background will remain static as you pan around.

Colour

The preview box shows the current colour used for the background of the view. All objects, including images will be placed on top of this colour. To change the colour:

- Click on 'Change' and the standard Windows colour selection palette will appear.
- Select a new colour, or define one and when you are happy click on OK.
- The preview box will update, and when you click on Apply, the view window will also change.

Click on Close to finish editing the View, or change the view control, view name, display driver or view locks and statistics Properties.

Using Images as View Backgrounds

View Properties Control

Clear image each frame

This option clears the entire view including the background image each time it generates a new frame. However, if the view screen is always covered with placements, then uncheck the option to disable it, and thus reduce system overhead and improve performance.

Clear depth each frame

This reduces system overhead by clearing memory used to store depth information. This option is really useful in specialist applications, or where complex effects are required. (**Developers:** See also Display Driver Details)

Enable level of detail

Checking this box enables the Level of Detail processing algorithm in views. If it is not set, then all the levels of detail are always displayed. If you have a scene without detail levels, then you may get a small performance increase by disabling this option.

To edit the level of detail for a shape double click (or press enter) when the shape is highlighted in the Lister Window.

You can change and view other Properties: the view control, view name, display driver or view locks and statistics Properties.

3D View Window

This window contains a complete view object displaying the 3D world. Every view contains a camera, an atmospheric object (containing individual light sources) and then placements of shapes, actions etc.

Note: Although RealiMation supports multiple cameras (as well as multiple views) please note that a view can only use **one** camera at a time. You can swap cameras dynamically, by dragging a different camera from the Lister into the view. (The new camera will automatically replace the current camera.

However, you *can* split the view window into four sections, with one part using the current camera setting, and the other three using ortho cameras. to view the world from different viewpoints. Use the Window | Split (Ctrl+W) menu option to do this.

You can also look at a world using different cameras by creating copies of the view, and then associating a different camera with each view.

Wheel Bar Options

- Check the boxes to disable / enable the thumbwheels around the 3D View window
- Click on and move the slider between 'Fine' and 'Coarse' to set the sensitivity / speed / accuracy of the thumbwheels as you move around.

Note: The Horizontal and Vertical wheels are not identical - where a wheel is not available it appears greyed out.

Pan (Horizontal and Vertical) pans the camera left and right and up and down.
An analogy could be moving your body along a straight line both sideways and up and down, while keeping you head, and so your view, completely still.

Orbit (Horizontal and Vertical) moves the position of the camera around the centre of vision in a circular path, keeping a constant distance from the orbit centre.
An analogy for this could be the way that the moon orbits the earth.

Aim (Horizontal and Vertical) aims the camera in a different direction - left and right and up and down.
An analogy could be turning your head from left to right and up and down, without moving your body

Roll (Horizontal only) spins the camera while maintaining the direction in which it is pointing.

Move (Vertical only) moves the camera position into and out of the scene, to give the impression of zooming in and out.

Field of View (Horizontal only) changes the camera's 'span', and so limits the extent of the view.

These thumbwheels are used to control the camera movements for that view.

AutoView

Use these options to configure automatic placement creation create and add placements to

Do not autoview

Do not add the object to any views

Create placement in all visible views

Create a placement of the new shape, and make it visible in any visible views, i.e. those which are visible (This is the default setting)

Create placements in all views

Create a placement of the new shape and make it visible in all views, even those which are not currently active.

When you have completed the set up click the ***OK*** button and the new object will be created. The "Apply" button remains disabled unless you are updating the settings for the object

Add Shape to Placement

This appears when you have dropped a selected shape onto a placement in a Lister. You have two options for attaching the new shape.

Replace current shape

Replaces the shape currently referenced by the placement - this means that you can change the shape in a view but use an existing name.

Add as level of detail

Select this option to make the selected shape a level of detail of the main shape. If the shape you have added is not required or used anywhere else, you can delete the shape from the RealiBase to keep the components down to a minimum.

NB: Check the usage of any shape from Edit | Usage. This will pop-up a dialog to show you any references to a shape.

Assigning a Material to a Shape or Placement

- Choose the material you want to associate with the new shape, or a placement from the drop down list.

  Materials associated with placements will be referenced in the hierarchy, whereas those materials associated with shapes do not appear in the Lister.

  Several materials are created for every RealiBase by default, e.g. red, green, blue and white are shown in the materials Lister and the drop down list. To create new materials use the Create | Material menu, and see creating materials for editing existing ones.

- When you have completed the set up click the ***OK*** button and the new object will be created. The "Apply" button remains disabled unless you are updating the settings for the object

Note:

Materials assigned to a shape, can be thought of as the *base* material, and will be applied to any placement of that shape. To change a shape's "underlying" colour, drag another material from the Materials Lister onto the shape in the Shape Lister.

Materials assigned to a placement, can be thought of as "painting over" the shape's underlying material. Different placements can use different materials to give alternative representations of the same basic shape or model.

The materials used for a placement can be changed by painting the faces of the shape or changing the placement Properties.

Create | Shape | Box

Set up the Properties of a new box shape - click on the tabs to turn the pages to alter the different properties.

- The first page of the dialog holds the coordinate and box size information. The default coordinates are 0, 0, 0, i.e. centred around the origin and the default size is 1,1,1.

  You can alter any of these values - the units of measurement are designed to be independent rather than absolute ones to offer flexibility. As you change the size of the box, the preview window will update.
  You can change the settings of the preview window using the Customise | Preview menu.

- You can now set up the name, material and autoview Properties for the box.

- When you have completed the set up click the ***OK*** button and the new shape will be created. The 'Apply' button is disabled when you are creating an object.

Create | Shape | Sphere

Sets up the Properties for the new sphere shape. Click on the tabs to turn the pages to alter the different Properties

- Set the radius of the sphere by typing a value into the box. The default radius is 0.5.

- Set the number of segments you want to use to make up the sphere. The default is to use 12 segments.

  You can alter any of these values - the units of measurement are designed to be independent rather than absolute ones to offer flexibility. As you change the size of the box, the preview window will update.
  You can change the settings of the preview window using the Customise | Preview menu.

- You can now set up the name, material and autoview Properties for the sphere.

- When you have completed the set up click the ***OK*** button and the new shape will be created. The 'Apply' button is disabled when you are creating an object.

Create | Shape | Cone

Sets up the properties of a new cone shape. Click on the tabs to turn the pages to alter the different properties.

- Set the radius for the top and bottom of the cone. The defaults are 1 and zero

- Type in a value for the number of segments you want to use to make up the cone. The default is 12 segments.

- Type in a value for the height of the cone. The default is 3.

- Check the box to 'cap' the ends, i.e. ensure that the cone has a solid base and a 'closed' point at the top.

  You can alter any of these values - the units of measurement are designed to be independent rather than absolute ones to offer flexibility. As you change the size of the box, the preview window will update.
  You can change the settings of the preview window using the Customise | Preview menu.

- You can now set up the name, material and autoview Properties for the cone.

- When you have completed the set up click the ***OK*** button and the new shape will be created. The 'Apply' button is disabled when you are creating an object.

Create | Shape | Cylinder

Sets up the Properties of a new cylinder shape. Click on the tabs to turn the pages to alter the different properties

- Set the radius of the cylinder by typing in a new value. The default is 0.5.
- Type in a new value for the number of segments to use to build the cylinder. The default is 12 segments.
- Type in a new value for the height of the cylinder. The default height is 3.
- Check the box to 'cap' the ends i.e. so that the cylinder has a solid top and bottom.

  You can alter any of these values - the units of measurement are designed to be independent rather than absolute ones to offer flexibility. As you change the size of the box, the preview window will update.
  You can change the settings of the preview window using the Customise | Preview menu.

- You can now set up the name, material and autoview Properties for the cylinder.
- When you have completed the set up click the ***OK*** button and the new shape will be created. The 'Apply' button is disabled when you are creating an object.

Create | Shape | Torus

Sets up the properties of a new torus shape. Click on the tabs to turn the pages to alter the different properties.

- Type in a value for the major radius, i.e the radius of the entire torus.   The default is 5.

- Type in a new value for the number of segments used to make up the torus, i.e. the number of 'chunks'.   The default is 15.

- Type in a value for the minor radius, i.e. the radius of the solid 'pipe' that is the torus.   The default is 2.

- Type in a value for the minor segments, i.e. the number of different segments that make up the circle defined by the minor radius..   The default is 12 segments.

  You can alter any of these values - the units of measurement are designed to be independent rather than absolute ones to offer flexibility.   As you change the size of the box, the preview window will update.
  You can change the settings of the preview window using the Customise | Preview menu.

- You can now set up the name, material and autoview Properties for the torus.

- When you have completed the set up click the ***OK*** button and the new shape will be created. The 'Apply' button is disabled when you are creating an object.

Create | Shape | Grid

Sets up the properties of a new square grid. Click on the tabs to turn the pages to alter the different properties

- Set the size of a new grid by typing new X and Z values. The default is a 20 square arrangement.
- Type in new values for the segments in the X and Z planes. The default is 4.
- Check the box to make the grid 2 sided, i.e. so it can be viewed from beneath as well as above. You can use the grid to create an undulating terrain.

  You can alter any of these values - the units of measurement are designed to be independent rather than absolute ones to offer flexibility. As you change the size of the box, the preview window will update.
  You can change the settings of the preview window using the Customise | Preview menu.

- You can now set up the name, material and autoview Properties for the grid.
- When you have completed the set up click the ***OK*** button and the new shape will be created. The 'Apply' button is disabled when you are creating an object.

Create | Shape | Empty

Creates a new "empty" shape. Empty shapes do not have any geometry, and are most useful as the top level object in a hierarchy, which acts as a container with other placements attached.

You can add actions to an empty object which will affect any 'child' objects in the hierarchy.

- Type in a new name, and set up the autoview Properties for the shape.
- When you have completed the set up click the ***OK*** button and the new empty shape will be created. The 'Apply' button is disabled when you are creating an object.

Beacons (Developer Edition Only)

Beacons can be applied to any shape or model in the RealiMation world, and can be individually configured, changing the colour, flash frequency etc.   They are placed in world coordinates, specified by the X Y Z values, and any number of beacons can be attached to a model.

Beacons are added and edited using the Beacons page in the Shape Properties.

- Click on the 'Add' button and the Beacon Information dialog appears.
  Set up the different options, click on OK and then type in the coordinates in the edit boxes.

To edit a beacon position, highlight it in the list and change the coordinate values in the edit boxes.

To remove a beacon, highlight it in the list and click on the 'Remove' button.

To change the settings for the beacon click on the 'Details' button and another dialogue will appear.

Beacon Settings (Developer Edition Only)

Use this page to configure the selected beacon. (This appears when you add a beacon and when you click on the 'Details' button on the Beacons Properties.)

- Select the material you want to use from the drop down list.
  Note: The beacon's appearance is determined by the emission level of the material you select. You will need to alter the emission in order to see the beacon correctly.

- Type in values for:
  the ***size*** of the beacon (the default is 1)
  You should set the size according to the model you are using

  the ***distance*** - the point where the beacon disappears from view. (The default is 1+e-20, which is the maximum distance possible, i.e. you can always see the flashing beacon however far it is from the camera.)

- Set the frequency of the beacon flash, and any offset you want to apply.
  The offset allows you to create multiple beacons flashing at the same frequency, but alternately from one another. For example, create two beacons each one flashing at 1Hz, and offset one by 0.5 seconds to produce two alternate flashes.

  Note: Every beacon is set up independently of others attached to the shape.

- Use the Beacon Sector options to set the visibility range of the beacon by typing values to show where you want to see the beacon.

A typical example of where to use this to best effect is 'port' and 'starboard' beacons which are generally visible independently of one another. In this situation you could set one at 0 to 180 degrees and the other at 180 to 360 and so on.
Similarly, you could set up smaller quadrants, where beacons are visible in just a slice of the view.

- Click on OK button to finish the configuration.

At this point you will return to the main Beacons Properties, where you can edit the positions of any beacon.

Statistics

This is a static page with information that cannot be edited. It displays the number of faces, points and beacons used, and other information relating to the object to which it refers.
If you alter the object, then the information will be changed.

Now you can move to other pages and change the placement position / orientation, display options, name, material, edit level of detail add hotlinks and view the lock options.

Create | Placement

Creates a placement of a shape which can then be added to other shapes, placements and views. Using placements means that you can reference one object from another so that any database need only store one version of a physical object, thus keeping the database size to a minimum. Empty objects can be used to attach placements of other objects to build up hierarchies.

- Select the shape you want from the pull-down list, and either click OK or move onto another part of the dialog.
- You can now set up the name, material, display and autoview Properties for the placement.
- When you have completed the set up click the ***OK*** button and the new shape will be created. The 'Apply' button is disabled when you are creating an object.
- Depending on the AutoView option selected, as you click on OK to close the dialog, you will see that the placement may have been added to the current view. Additionally, new referenced are added to the relevant Listers to show the change.

Placement Properties
Placement Position, Scale and Orientation

Displays the current position, scale and orientation information of the selected placement.

To change the placement position, scale and orientation:
either typing directly into the boxes, or
move the placement in the View window using the edit handles. If you do the latter then the values shown in will update automatically.

- Change the x, y and z coordinates to change position in the world. The default setting is 0, 0, 0.

- Change the scale factor in each axis. The default is 1, 1, 1. This increases or decreases the size of the placement in the view, in the direction and by the factor in the edit box.

- Change the orientation of the placement by altering the values in the roll, pitch and yaw edit boxes. The default is 0, 0, 0.

Now move to other pages and change the placement display options, name, material, add hotlinks, view the statistics, edit level of detail and view the lock options.

These Properties will remain visible until you click OK. The 'Apply' button will apply the changes but keep the Properties visible.

Note: Changes made in the Placement Properties do not alter the geometry of the underlying shape. For example, you can add the same shape to a view twice (creating two separate placements) and then edit the placements independently of one another, using these Properties.

Placement Display

Use these settings to optimise the display by configuring different overrides for individual placements. (This is particularly useful when you want to reduce system overheads based on your knowledge of your worlds.)

The status of the 'Visible' box determines whether the selected placement is displayed in all the views in which it appears.

To accept the current defaults for each placement click on "**No override**".

Illumination

Changes the display appearance by altering the lighting / shading modes applied

No override*:* uses the current display mode of the view

None*:* the placement is drawn in its base material, i.e. it is not lit, and is useful with pre-lit texture

Per Face*:* uses flat shading mode is

Per Vertex*:* uses smooth shading mode

Sampling

Changes the display mode for the placement

No override*:* uses the current display mode

Point*:* shows each face of the placement drawn at its points

Line*:* shows the placement in wireframe, i.e. where each face is shown by lines

Solid*:* shows the placement in shaded mode - which can be fine tuned further using the Illumination dialog.

Hidden Surface

While hidden surface removal requires extra computational time, disabling the process could result in an incorrect display, by drawing the shapes in the wrong order, i.e. faces behind others actually being drawn in front. Therefore, there is a trade off between slower processing times and displaying the shapes correctly.
Knowledge about your scene, and RealiMation's ability to allow users to change the display order of placements, and can be used to optimise the display. There is more information on using Hidden Surface Removal in the Frequently Asked Questions (Quick Reference section).

No override*:* all faces in the RealiBase will be drawn, shaded and textured regardless of whether they are actually obscured

You can alter the order in which models are displayed, by changing the order in which they appear in the geometry hierarchy. To do this, select the placement in the View Lister Window and use the move up or move down commands (Edit | Move Up and Edit | Move Down) to change the placements position in relation to other shapes in the view.

Select *Yes* or *No* to enable or disable hidden surface.

Back Face Cull

Back face culling speeds up display processing by only drawing sides of a placement that can be seen from the current view point (i.e. the sides or faces of a placement that are obscured by the front faces are not drawn thus speeding up the redraw time. If back face culling is disabled, then the update time is slower since all sides of a solid object will be drawn.

However, problems can arise where back face culling is enabled on placements such as grids, which are not "solid", when the view point moves to the side which has been culled. To work around this grids can be created as two sided to ensure that they are always visible from any viewpoint.

No override: Uses the current display mode and will be updated as changes are made to the global view display.

Select *Yes* or *No* to enable or disable back face culling.

Hint: To edit the Properties for a different placement, keep the Properties 'open', select a new placement from a Lister, and drag and drop it over the Properties page. The information displayed will change to match the values and specifications for the newly selected placement.

Now you can move to other pages and change the placement position / orientation, name, material, add hotlinks, view the statistics, edit level of detail and view the lock options.

Note: Changes made in the Placement Properties do not alter the geometry of the underlying shape. For example, you can add the same shape to a view twice (creating two separate placements) and then edit the placements independently of one another, using these Properties.

Placement Hotlinks

Hotlinks are links to other files, applications etc., which are attached to a placement, and then activated on contact.

Attaching a Hotlink to a Placement
Hotlink

- Type in the name of the file, executable, RealiBase, WWW page that you want to link to when the contact is made. (If you do not know the name, then use the 'Select File' button to browse.)

Parameters

- Type in the playback parameters you want to associate with the link (if applicable). For example, if you were linking to a sound file, then you could set the parameters to '/play/close', to automatically play the file, and then close Media Player.

Hotlink Description

- You can use this edit box to label the hotlink connection with a full description. This description appears in the RealiMation and RealiView status bars. For example, if the link is to a Web page then the description can be expanded to give full information about the page.
  If the field is empty, then the name of the link will appear in the Status bar.

- Use the 'Test' button to test that the hotlink launches the file or application you expect!

Activating a Hotlink
Hotlinks are activated by either:

- flying into the placement
- picking the placement and hitting F2 (a shortcut to File | Execute hotlink.)

Note: If you want to fly into a link to activate it, then you **must** have the solid camera enabled.

Now you can move to other the other Properties and change the placement position / orientation, display options, name, material, edit level of detail and view the statistics and the lock options.

Placement Level of Detail

Change the switching type and the thresholds for the different Levels of Detail. The preview window changes to show the model associated with each level.

Switch Type

Models can be switched according to either their:

- Distance from the viewpoint or
- Projected area.

Click on the appropriate option to select the switch type to use.

You will notice that the thresholds change depending on the switching type.

Thresholds

You can change the threshold, i.e. the point at which one level replaces or combines with another, for individual levels, although all levels within a hierarchy should use the same switching type.

- Highlight the level you wish to edit - depending on your preview window set up, you will see a preview of the shape used for the selected level of detail.

- Type in new values in the boxes at the base of each column.

- When you have made the changes click on 'Apply' or 'Close'.

- To move levels of detail around simply select them in the appropriate Lister and use the Edit | Move Up and Move Down options, or the Alt + Up or Down arrow keys to change the order.

Now you can move to other pages and change the placement position / orientation, display options, name, material, add hotlinks and view the statistics and the lock options.

Note: Changes made in the Placement Properties do not alter the geometry of the underlying shape. For example, you can add the same shape to a view twice (creating two separate placements) and then edit the placements independently of one another, using these Properties.

Material Colour Properties

- Use the slider bar to change the red, green and blue values to produce the colour you require. The effects of changing the colour values is shown dynamically in the preview window.
- To apply any changes made hit the 'Apply' button or press return.
- Move between the different tabs to change the name, emission and reflectance Properties, as well as view the lock options.
- When you have finished close the dialogue (use the 'Close' button). To display these again double click on the material in the Material Lister Window.

Note: To associate an image with a material for texture mapping, select the image you want to use in the Images Lister (make sure that the Texture option is checked in the Image Properties) and drag it over and drop it onto the material.

See also:
Working with Textures

Material Emission Properties

- Use the slider bars to alter the emission, or 'glow' for each colour value.
- To apply any changes made hit the 'Apply' button or press return.
- Move between the different tabs to change the name, colour and reflectance Properties, as well as view the lock options.
- When you have finished close the dialogue (use the 'Close' button). To display these again double click on the material in the Material Lister Window.

See also:
Working with Textures

Material Reflectance Properties

- Use the slider bars to alter the different reflectance options: ambient, diffuse and specular, and to change the shininess and transparency of the colour.

  As you move the slider bars the preview windows will change dynamically. The reflectance properties, in conjunction with the base colour control how the material is affected by ambient and other light sources in the views atmospheric model.

- To apply any changes made hit the 'Apply' button or press return.

- Move between the different tabs to change the name, colour and emission Properties, as well as view the lock options.

- When you have finished close the dialogue (use the 'Close' button). To display these again double click on the material in the Material Lister Window.

See also:
Working with Textures

Create Camera

Cameras define how an object is projected in a view. These Properties determine the settings for a standard, or normal, camera. Ortho cameras are set up using a different menu (Create | Camera | Ortho).

- Type in new X, Y and Z coordinates to change the eye point of the camera in relation to the world coordinates.
- Type in new roll, pitch and yaw values to change the camera's orientation.
- You can change the front and back clipping planes for the camera by typing directly in the edit box. **Note**: We recommend that you keep the default front clip of 1 wherever possible.
- Change the camera's Field of View by typing in a value (shown in degrees).
- Check the 'Perspective' box to preserve the perspective of the camera's view.

More specific configuration information covers offsets, and ortho camera creation.

Camera Offsets

- Offset the position and orientation of the camera by changing the values for the X, Y and Z coordinates and the roll, pitch and yaw.

  NB: You can only edit the orientation of a 'normal' camera - ortho cameras are fixed to an axis.

See creating cameras and ortho camera creation for more specific configuration information.

See Also:
Creating and Working with Cameras

Create Ortho Camera

Cameras define how an object is projected in a view.   These Properties determine the settings for an ortho camera.
Standard, or normal, cameras are set up using a different menu (Create | Camera | Normal).

- Type in new X, Y and Z coordinates to change the eye point of the camera in relation to the world coordinates.

- Click on the radio button to select the axis for the ortho camera (XY - Back, XZ - Top, or YZ - Side).

- You can change the front and back clipping planes for the camera by typing directly in the edit box.
  Note: We recommend that you keep the default front clip of 1 wherever possible.

- Change the camera's Field of View by typing in a value (shown in degrees).

- Check the 'Perspective' box to preserve the perspective of the camera's view.

More specific configuration information covers positional offsets, and normal camera creation.

See Also

Creating and Working with Cameras

Create Light Source

Colour

- Use the slider bars, or type new percentages directly into the box, to change the red, green and blue values and the intensity of the light.
  (The preview box updates automatically to show the new colour and intensity)

Source Type

- Click on the radio button to select the type of light source - infinite, point or spot.

Direction / Position

- Change the X, Y and Z coordinates by typing in the edit boxes
- Change the elevation (vertical direction) and azimuth (horizontal direction) by either typing in the edit box or using the thumbwheels.

You will notice that some options are disabled (greyed out) for certain light source types.

Attenuation

The attenuation affects the amount of light cast onto an object relative to its distance from that object. The larger the value the faster the light fades, so we recommend that you use lower values.

(Attenuation can only be applied to point and spot light sources)

Inner and Outer Light Angles

Change these values to limit the amount of light emitted. Bigger values increase the arc of the illuminated light.

Light sources are added to atmospheric objects and can be associated with placements and actions.

Create Atmospheric

Atmospherics define the ambient lighting and other effects such as fog.   Multiple light sources can be associated with an atmospheric object.

- Use the slider bars, or type directly into the edit boxes, to change the colour values and intensity of the ambient light.

Fog Settings

Configures the fogging effects for the atmospheric.

- Change the colour of the fog, by using the sliders or typing new values directly into the edit box.

- Check the box 'Enable fog' to show the fog in the view which uses the atmospheric.
  Note: Fog effects will only be displayed when this option is checked and when the view is shaded (i.e. not in wire frame)

- Change the front clip value to set the distance where an object is fogged by the attenuation factor.

- Change the back clip value to set the minimum distance where an object is fogged by the attenuation factor.

- Set the attenuation factor, by typing a value into the box.

Note: When fog is used in an atmospheric, it is helpful if the view's background colour is similar to the fog colour. This helps to blend the fog into the background, and so is more realistic.

See Also:
Creating and Working with Atmospherics
Creating a light source

Image Properties

Select and configure the images you want to use and how you want to use them in the current RealiBase.

- Select the image to want to use, by either using the 'Browse' button to search for the file, or type the directory and filename directly into the boxes. The current supported file formats include *.bmp, *.tga, *.pcx and *.jpg.

- A preview of the image will appear in the dialog, and the file name and directory are also displayed.

Imported images can be used as textures, as backgrounds or as depth images (placed over backgrounds).

- Select the way you want to use the image by clicking on the appropriate radio button.

- Set up the advanced options for the image. (Many of these options only apply to images used as textures, and their availability is dependent on the display driver used - see Customise | Drivers for more details..)

Mix colour with face

Enabling this option blends the RGB (red, green and blue) values of the material with the image. It also uses the underlying faces lighting and shading modes as it displays the texture. This is useful for pre-lit textures, where you do not want to change their appearance, by adding extra lighting.

Perspective correct

Enabling this option continually changes and updates the texture map to match the perspective of the viewer to give a more accurate representation of textures when they are close to the camera. When used as textures, images are wrapped around the faces of the shape, and so can appear distorted if close to the camera, and may result in “crawling pixels” as the scene moves. Perspective correction prevents this, but at a cost. Because it requires more computation it can carry an expensive overhead, so it can make a significant impact on performance. The overhead varies depending on the display driver and hardware acceleration used in the system. See the section in 'How do I..?'

Note: You may find it better to use non-perspective textures on shapes in the distance, or on highly curved objects. You can use the perspective correction flag quite effectively in level of detail models. For example, where detail levels are used when an object is small, use non-perspective textures.

Bi-linear interpolation

This process samples and blends more of the texels (texture pixels) to interpolate a pixel, and then maps this average onto the selected polygon, removing "chunky pixelation", and produces a better quality image. Click here for a full explanation.

Note: You can combine bi-linear interpolation with mip map blending to produce trilinear mip mapped textures.

Mip-mapped

Mip mapping samples and filters the original image to create three or more mip levels of the texture, each one of a different size. These refined maps produce a smoother texture eliminating any ‘shimmer’ or ‘twinkling’ by selecting the best 'match' from the available mip levels. Click here for a full explanation.

Mip map blend

This process refines the images further, by blending the mip maps. The texels to be mapped can then be chosen from a wider range of possibilities to produce a superb high quality finish.

Note: You can combine bi-linear interpolation with mip map blending to produce trilinear mip mapped textures.

Save in RealiBase file
Embeds the image file as part of the RealiBase, so RealiMations can be distributed as just one file, rather than several linked files in a directory structure. Also the image cannot get 'separated' from the file if the actual image file is moved. NB: You cannot un-embed a file from the RealiBase, to change it you need to reselect the original file.

Now that you have images in your RealiBase, you can begin to use them. Click here for additional notes about images, and also view the other tabs within these Properties for more information about using images as backgrounds, the advanced texture blending and offsets, name and view the locks.

Clamp Texture in u Direction and Clamp Texture in v Direction
Enable these options to constrain the texture in either direction. For example, if you want to fix a texture onto a section of a face (e.g. a decal on a racing car) then you can use this option, combined with the advanced texture mapping techniques to create good effects. For more information please look at the Frequently Asked Questions section.

See Also
Working with Images

Working with Textures

Images for Background Mapping

Adding an image as a background lends realism to your RealiMation, but this can be extended and improved using these option to assign real world properties to the image.

Horizontal Field of View

- Use this to set the field of view of the image.

Because a background image usually represents a 'real scene' e.g. a landscape, skyline etc., it naturally has a field of view, which is the same as the lens of the camera used to take the original picture.

Note: Not all display drivers currently support 360 degree images. You should ensure that the 'Move camera with view' option is enabled.

Image Centre Direction

- Use this option to change the centre of the image horizontally.
  The middle pixel of a background image must match a direction in 3D, and the value is in degrees.

Image Centre Elevation

- Check this option to change the elevation of the middle pixel of the image.
  A good example of this is where a landscape image is used as a background, and you want to change the level or the horizon. To move the horizon up, increase the elevation. To move the horizon down, decrease the elevation. The value is in degrees.

From these Properties you can move to different tabs to set up the texture mapping options, the advanced texture blending and offsets, name and view the locks.

See Also

Working with Images

Working with Textures

Advanced Image Options

The Advanced Options are only available where your hardware supports multiple textures, for example with 3Dfx based technology. They control how the selected texture is blended and positioned in relation to another. Typical examples of where multiple textures could be use is a brick wall covered in graffiti, or sponsorship decals on a racing car etc.

Blend Options
Determines the blending between two textures when one is placed on top of another to affect the overall appearance. For example, lower blend factors result in the second texture looking 'stuck on' the base texture, and higher blends will merge them to look like one image. Use the sliders to change the blend factor moving between 0 and 100%. The current setting is shown as a percentage to the right of the slider. The default is 50%.

Mip-map Options
Use the slider to set the Mip Map threshold level, moving between 0 and 100%. Higher values will swap the mip map used closer to the camera. The setting is shown to the right of the slider. The default is 50%.

Texture Coordinate Offset
Use the edit boxes to scale and position the selected texture, in conjunction with the texture clamping options.

From these Properties you can move to different tabs to set up the background image options, texture mapping options, name and view the locks.

See Also
Working with Images

Working with Textures

Spin Action

Automatically generates the nodes to spin an object around the selected axis.

Spin Type

Click on the radio button for the spin type / axis you wish to use, e.g. roll, pitch or yaw

Rate

Type in a value to determine the rate at which an object spins around the chosen axis.

NB: Any type of action can be created by using the Create | Action | General menu.

General, Linear (straight) and Circling actions can be created automatically using the Create | Action | General, | Linear or | Circle options.

See also:
Editing Action Nodes

Create General Actions

Configures general actions and behaviours by generating the nodes to move an object around the world, from one defined node to another at a specified speed.

- Decide on the number of nodes you want in the action. (Nodes can be added and removed later)
  The default is to start with 2 nodes - one at the start and one at the end.

- Type in a time value to move between the first and last node.

Use the Name page to assigned a name to the action

- When click on OK another Properties page appears for setting up the individual nodes.

Note: Actions can be associated with placements, lights and cameras in the world. They can be associated with landscapes for simple terrain following.

NB: Automatic Spinning, Linear and Circling actions can be created by using the Create | Action | Spin, | Linear or | Circle options.

Create Circular Action

Configures the settings for a circling action

Centre

- Type in the X Y and Z coordinates to set the position of the actions centre. The default is 0, 0, 0.

Radius

- Type in a number to represent the radius of the action. The default is 10 metres.

Speed

- Type in a value for the speed of the action, i.e. how quickly it moves from the first node to the last. The default is 10.

Orientation

- Check the orientation plane you want the action to have: i.e. XY, XZ or YZ.

- Specify the number of nodes you want in the action. (Note that you will need at least 5 nodes to create a correct circling action.)

- Use the Name tab to assign a unique name to the action.

- When you click on OK another set of Properties appear to edit each node in more detail.

Note: Actions can be associated with any placement, light or camera. They can also be associated with landscapes for simple terrain following.
Automatic Spinning, Linear and General actions can be created by using the Create | Action | Spin, | Linear or | General options.

Create Linear Action

Automatically generated a linear, or straight line, action.

- Specify the X, Y and Z coordinates for the start and finish points of the action.
- Specify the number of nodes (The default is 2 nodes, one at the start and one at the end.)
- Type in a 'Starting Time' and then click on the appropriate radio button to specify either:

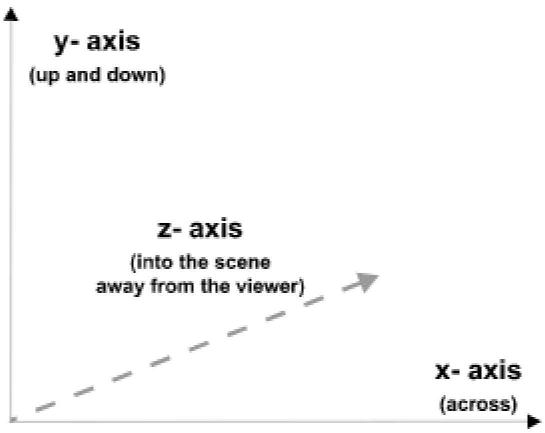
  'Specify duration' i.e. the time taken to move from one node to the other or
  'Specify speed' i.e. the speed between the nodes

- When you click on OK the Action Properties appear so that you can edit the action in more detail.

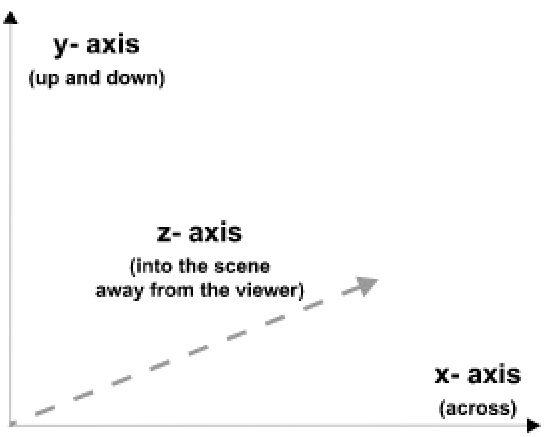
Note: Actions can be associated with any placement, light or camera - and they can be associated with landscapes for simple terrain following.
Automatic Spinning, Linear and General actions can be created by using the Create | Action | Spin, | Circle or | General menus.

Editing Action Nodes

The Action Properties appear whenever you create or edit an action in RealiMation and allow you to change the number of nodes, th positions, orientations and speeds of the nodes as well as set up other options including autorepeat, smoothing etc.



Before you start editing the nodes we recommend that you display the action in the view. To do this use the Tools | Actions | Show Action menu or click on the 'Display action' button.



Adding New Nodes

Between two existing nodes:

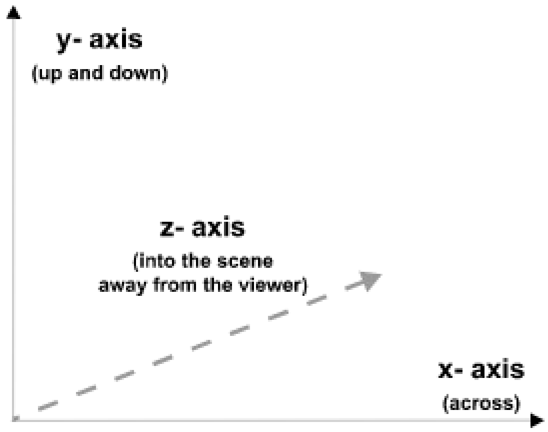
- Decide where you want to add the new node, and highlight the one before it.
  For example if you want to add a new one between nodes 4 and 5, highlight node 4.
- Click on the 'Add node' button (shown above)
  A new node will then be added to the action, and it has the same settings as the previous one. You will need to edit the settings for the position, speed and orientation etc. See below.

To the beginning and / or end of the action:

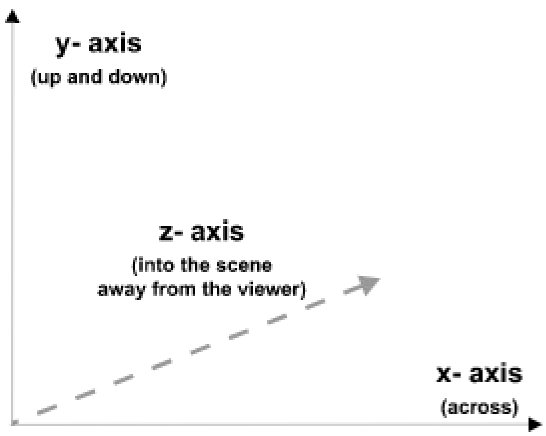
- Highlight the first or the last node of the action and click on the new node icon. Set up the coordinates and new time for the new node in the same way.

Editing Nodes

- Type in the new coordinates for the node in the boxes underneath each column, make sure that the override boxes are checked and click ‘Apply’

- If the action is visible in the view select the 

button ('Pick Action Node') and move the new node within the view window to its new position. The co-ordinate values in the Properties page will update automatically.

- Use the node at camera button 

to fly to a particular part of the world, and then position a node at that point. (See the section on node at camera below for more information.)

- To alter the time type the new time for the selected node in the edit box, check the 'Override' box and click on 'Apply'.

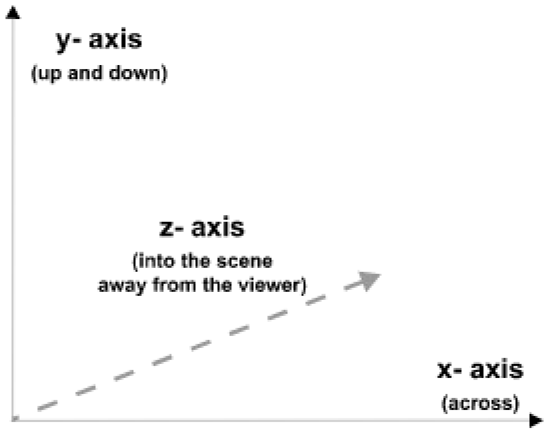
- Do the same for each set of Properties - changing the <u>position</u>, <u>orientation</u>, <u>orientation rates</u>, <u>scale</u>, <u>velocity</u> and <u>speed</u> until the node set up is correct.

Note: You can also update the time for subsequent nodes by using the Offset time button.

Changing Multiple Nodes

- To change more that one node at once e.g. move nodes 2, 3 and 5 to a new position select the nodes using the **Ctrl** key as you click on the nodes with the mouse.

- Move to the Position Properties, type in a new value for the Y position, check the 'Override' and press the 'Apply' button.
  You will see that the value has changed and, where the action is visible, that the position of the node has also changed.

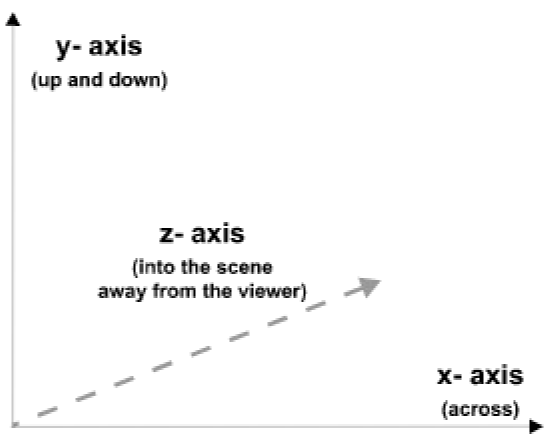


Removing Nodes

- Highlight the nodes you want to delete and click on the "Delete node" button (shown above).
- To change the time of the remaining subsequent nodes use the offset time button and type in a negative number (e.g. remove the time delta for the deleted node).

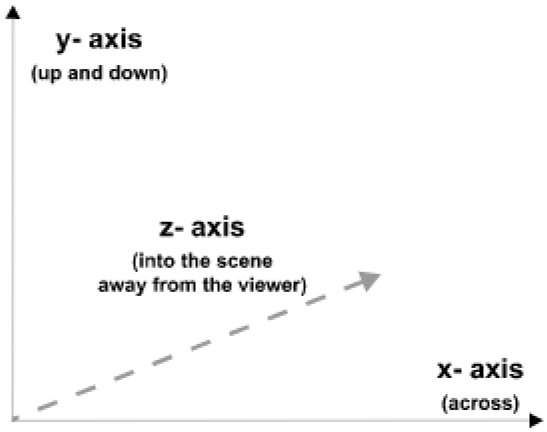
Action Property Options

The buttons at the top of the Action Properties act as shortcuts for setting up action nodes. Each function is also available on the Tools | Actions menu.



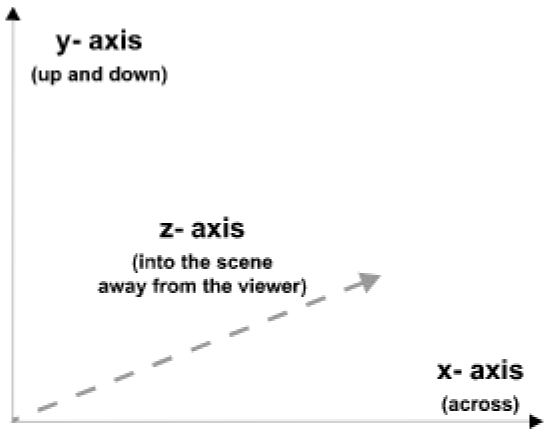
Node at camera

Change the current action by flying through the RealiMation to a preferred point and add a node by clicking this button.
The new node will use that position and orientation unless you alter it.
<u>Click here to create an action using the ‘Node at camera’ function</u>



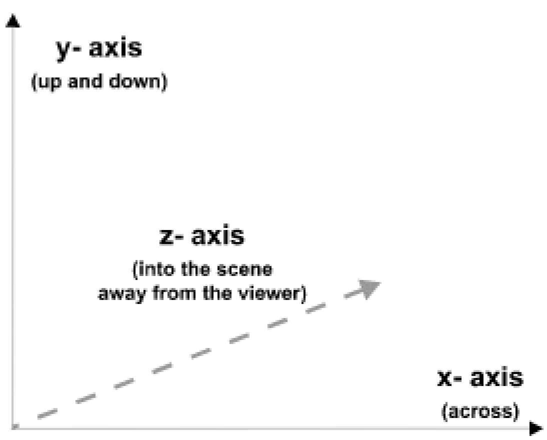
Camera at Node

Moves the camera to the selected node.
This allows you to view and subsequently edit the action the exact position of the action node.



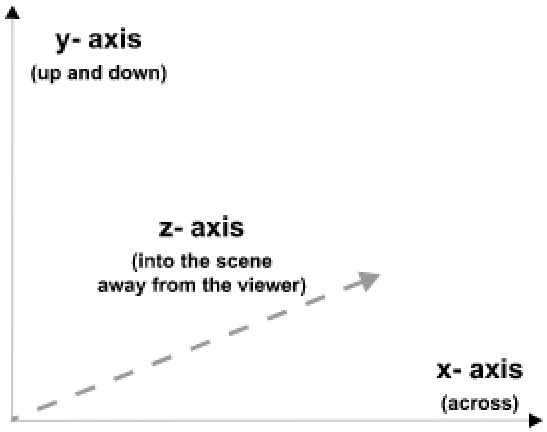
Node Spacing

Evenly spaces the nodes, overriding any other Properties, e.g. scaling, time, orientation etc.
Click here for more on using Node Spacing.



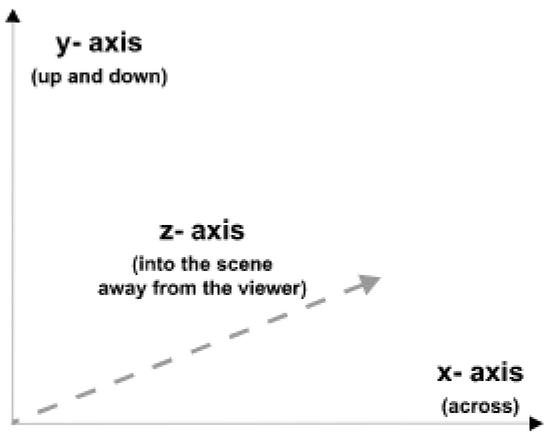
AutoRepeat

When enabled this forces the action to loop back to the first node and to restart the RealiMation from the beginning.



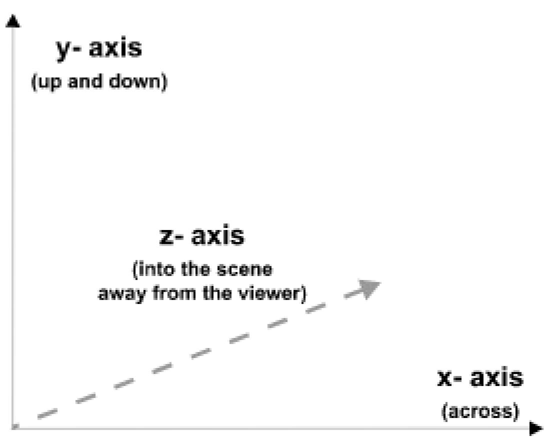
Offset time

*A*dvances the time for individual nodes using the previous node as the base time.
Click here for more on using Offset Time.



Preserve Shape

When you change a node's speed or time, the shape of action may change to fit best fir the route between the nodes. To preserve the shape of the action, click on this button before you make any changes.
The action will retain its shape, but the rate between the nodes may increase or decrease depending on the changes you have made. This is particularly useful with terrain following actions.



Smooth Nodes

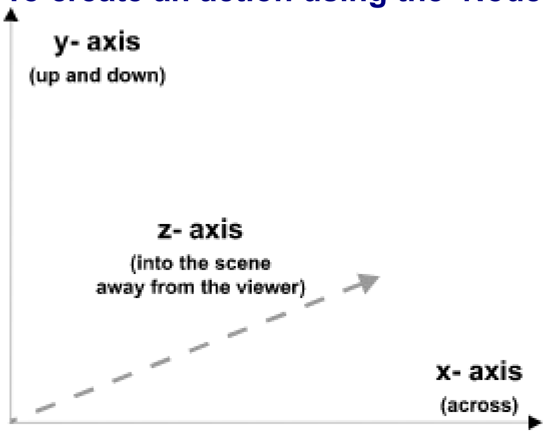
Reduces jerkiness between selected nodes, by smoothing the orientation and orientation rates of the selected nodes.
Smoothing the node speed keeps the time element constant and changes the speed of the action.

Smoothing the node times, keeps the speed between the nodes constant, but changes the time taken to move.

Other tabbed pages:

[Position](#)
[Orientation](#)
[Orientation Rates](#)
[Node Scaling](#)
[Speed](#)
[Velocity](#)
[Smooth Node](#)

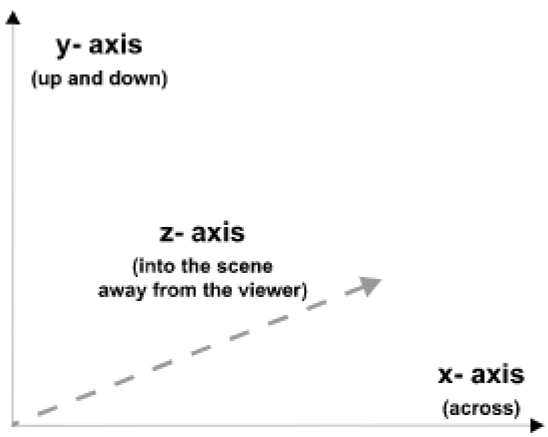
To create an action using the 'Node at camera' function



- Drop a 'free' camera (i.e. one not attached to placements or actions etc) into the current view and make sure that the action is visible in the view.

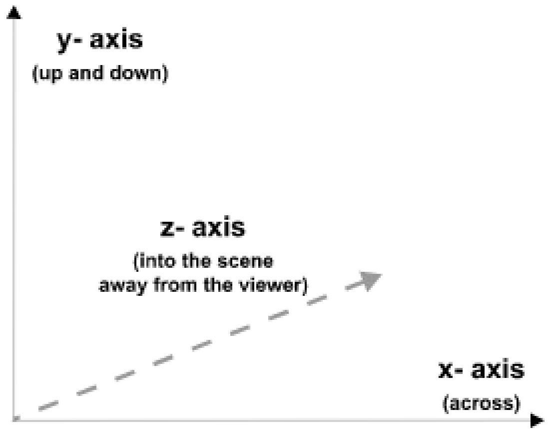
- Click on the 'Add node' button, and then highlight this new node by clicking the left mouse button over it.

- Fly to your preferred start position and click on the 'Node at camera' button. The new node will be positioned at that point.

- Switch into 'Mouse flies camera' mode (

 or F9) and fly to the next preferred point and click on the button again. Continue to do this until you have completed the action - you can attribute positional characteristics, e.g. roll, pitch and yaw to the action using the mouse.

- To specify the time options either change the Time Override box when you add a node, or set the start and finish times and select the 'Node Spacing' button to equally space the time between nodes.

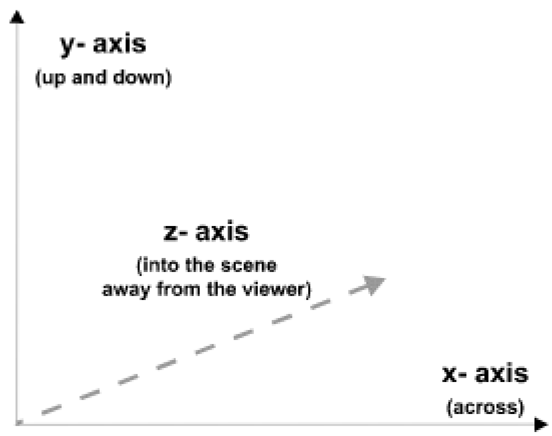


Using Node Spacing

Evenly spaces the nodes, overriding any other Properties, e.g. scaling, time, orientation etc.

- Set the values for the first and last nodes on the appropriate page
- Highlight the nodes you want to change, and check the Override button under the column(s) you have changed.
- Notice that the ‘Node Spacing’ button has become active.
- Click on the button and the values for each node change to become equally spaced.

Note: You may find that changing some Properties alters the shape of the action, because it automatically finds the best route between nodes to ensure that the specifications are met. To retain the original shape of the action click on the ‘Preserve Shape’ button before altering the Node Spacing.



Using Offset Time

*A*dvances the time for individual nodes using the previous node as the base time.

- Select the node to change, and click on the button. The 'Advance Time' dialog appears - simply enter a new time delta value (in seconds) to add to the time of the previous node.

- Click on OK and you will notice that the time for the selected node has been changed by this time delta.

This is useful when you have set up an action containing many nodes and wish to add another node between two existing ones. You can then multiple select the nodes following the new node and increase the time accordingly.

Editing Actions: Orientation

- Select a node and the whole line will appear highlighted.
- Change the roll, pitch and yaw values in the edit box at the bottom of each column.
- Make sure that the 'Override' button is checked as you make the changes.
- Edit the time values in the same way
- When you have finished click on the "Apply" button and the selected node will be updated with new values.
- Do this for all the nodes you want to edit. The time value is changed in the same way and can be done at the same time.

See Also:
Position
Orientation Rates
Scale
Speed
Velocity
Smooth Node

For details of the button bar click here

Editing Actions: Orientation Rates

- Select a node and the whole line will appear highlighted.
- Change the roll, pitch and yaw rates in the edit box at the bottom of each column.
- Make sure that the 'Override' button is checked as you make the changes.
- Edit the time values in the same way
- When you have finished click on the "Apply" button and the selected node will be updated with new values.
- Do this for all the nodes you want to edit.   The time value is changed in the same way and can be done at the same time.

See Also:
Position
Orientation
Scale
Speed
Velocity
Smooth Node

For details of the button bar click here

Editing Actions: Position

- Select a node and the whole line will appear highlighted.
- Change the X, Y and Z values in the edit box at the bottom of each column.
- Make sure that the 'Override' button is checked as you make the changes.
- Edit the time values in the same way
- When you have finished click on the "Apply" button and the selected node will be updated with new values.
- Do this for all the nodes you want to edit. The time value is changed in the same way and can be done at the same time.

See Also:
Orientation
Orientation Rates
Scale
Speed
Velocity
Smooth Node

For details of the button bar click here

Editing Actions: Scaling

- Select a node and the whole line will appear highlighted.
- Change the X, Y and Z scale factors in the edit box at the bottom of each column.
- Make sure that the 'Override' button is checked as you make the changes.
- Edit the time values in the same way
- When you have finished click on the "Apply" button and the selected node will be updated with new values.
- Do this for all the nodes you want to edit. The time value is changed in the same way and can be done at the same time.

See Also:
Position
Orientation
Orientation Rates
Speed
Velocity
Smooth Node

For details of the button bar click here

Editing Actions: Speed

- Select a node and the whole line will appear highlighted.
- Change the speed values in the edit box at the bottom of the column.
- Make sure that the 'Override' button is checked as you make the changes.
- Edit the time values in the same way
- When you have finished click on the "Apply" button and the selected node will be updated with new values.
- Do this for all the nodes you want to edit. The time value is changed in the same way and can be done at the same time.

Note: Changing the speed values of the nodes may change the shape of the overall action. To prevent this, click the Preserve Shape button on the Action Properties. Click here for more information on Preserve Shape.

See Also:
Position
Orientation
Orientation Rates
Scale
Velocity
Smooth Node

For details of the button bar click here

Editing Actions: Velocity

Use this to fine tune the speed of individual nodes in the selected action.

- Select a node and the whole line will appear highlighted.
- Change the X, Y and Z rates in the edit box at the bottom of the column.
- Make sure that the 'Override' button is checked as you make the changes.
- Edit the time values in the same way
- When you have finished click on the "Apply" button and the selected node will be updated with new values.
- Do this for all the nodes you want to edit. The time value is changed in the same way and can be done at the same time.

Note: Changing the speed values of the nodes may change the shape of the overall action. To prevent this, click the Preserve Shape button on the Action Properties. Click here for more information on Preserve Shape.

See Also:
Position
Orientation
Orientation Rates
Scale
Speed
Smooth Node

For details of the button bar click here

Click here for an examples to show how to change the velocity of individual nodes.

Changing the Velocity of Individual Nodes

Looking at the example RealiBase helisim.rbs.

- Display the Properties for the action ‘Road Path 1’.
  This action is used by the camera ‘Follow tank’ and ‘Target 1’, and you can see that each node has a different setting for the X and Z rates.   (There is no change to the Y rate).

- Display the action in the view window and use Fit to View to see the action

To change the velocity at a particular node:
- select a node and type in a new value and check the Override box before hitting the ‘Apply’ button. The value is measured as the distance travelled per second.

  Changing these values alters the shape of the action, but keeps the time value of each node the same.

To see this
- Create a new RealiBase and create a simple circular action.

- Take a copy of it and display both actions in the view.   You will probably need to pick up the copy and move it away from the original so that they are both visible.

- From the Properties change the velocity settings of the copy and see how the changes affect the shape action.

- Now attach a simple shape to each action and press play.

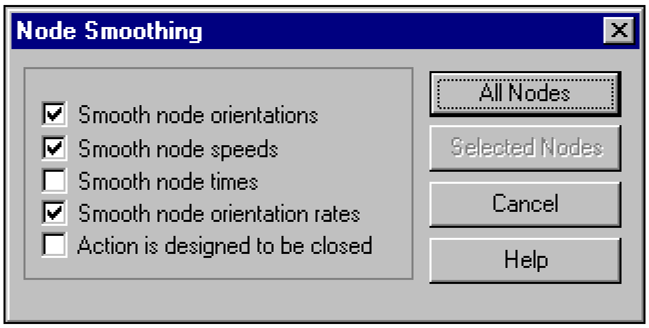
  Notice that the shapes reach the nodes at exactly the same time ever though the route they take may be different.

Note: Using the ‘Preserve Shape’ button will maintain the shape of the action while you change these values.
For more on Velocity Properties see the Egg Timer tutorial.

Edit Actions: Smooth Node

Selecting this option presents a dialog for smoothing the nodes on an action. This is particularly useful where you have two nodes positioned in such a way that the movement between them is jerky.

Using this dialog you can smooth the orientation and orientation rates of the selected node.
Smoothing the node speed, keeps the time element constant and changes the speed to improve the action.
Smoothing the node times, keeps the speed between the nodes constant, but changes the time taken to move.

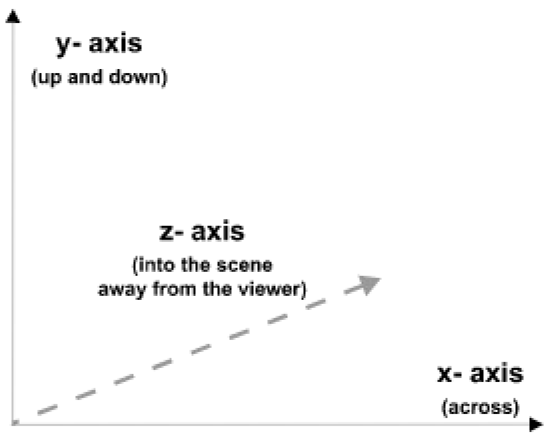


See Also:
Position
Orientation
Orientation Rates
Scale
Speed
Velocity

For details of the button bar click here

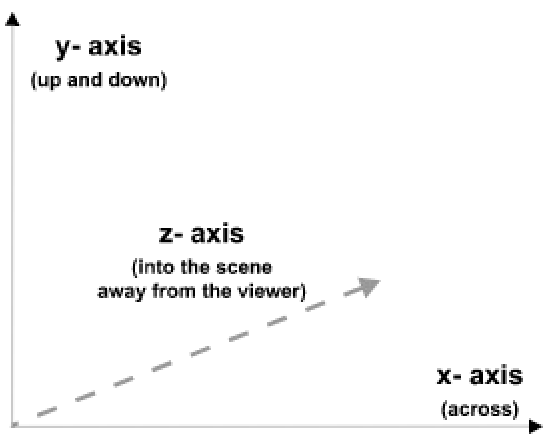
Picking Modes

Because RealiMation allows you to edit different aspects of the view directly in the view window, you must select the type of object before you begin editing. You can make this choice either from the Picking drop down menu or the dock-able Tool bar.



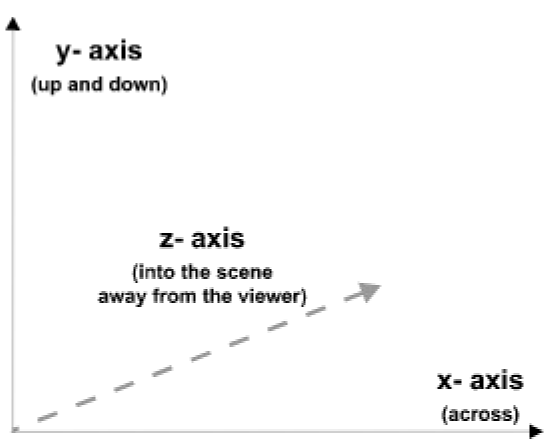
Placements - Top Level Only

selects the object at the top level of a hierarchy. For example when this is active you can select the entire terrain in helisim as one object.



Placements

selects an object individually, e.g. child placements within a hierarchy can be selected separately from other placements.



Shapes

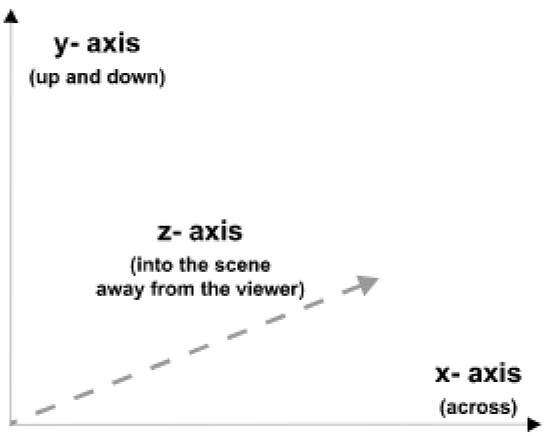
selects individual faces, edges and vertices of shapes to allow face/vertex editing/reshaping and texture mapping.

Force the picking mode to only selected the faces, edges or vertices from the Pick | Snap menu or by clicking on the F, E or V buttons.

If you double click on one face in the shape the following prompt will appear "Do you wish to select all the faces in the object?".

Click on *Yes* to select all the faces or *No* to only select the current or individual ones.

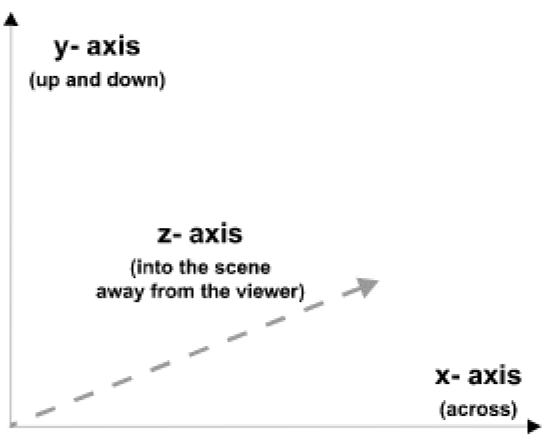
To select multiple faces/edges/vertices, hold down the Control key as you pick on the face/edge/vertex



Actions

selects a complete action for editing.

Note: you will need to make actions visible in the view by clicking the button in the Action Properties. (Double click on the Action in the Lister, and the Properties appear.)



Action Nodes

selects individual action nodes, so you can alter the current position and orientation of a node. Individual nodes can be rotated, scaled, moved etc.

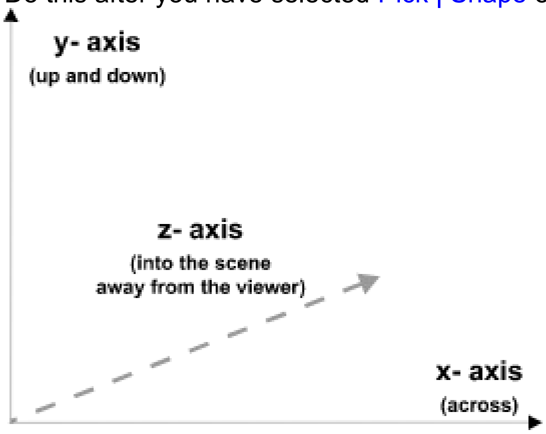
Note: you will need to make actions visible in the view by clicking the button in the Action Properties.

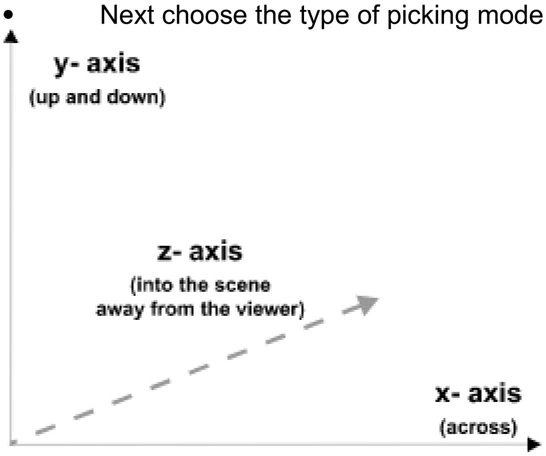
Face Selection

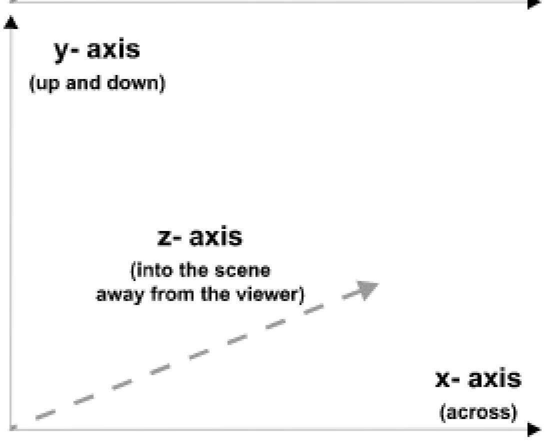
Selecting Faces and Vertices

Face Selection

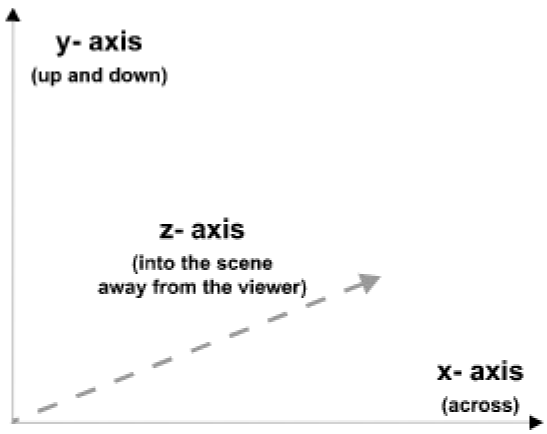
Before editing, reshaping or painting faces, you need to select the faces you want to work on.

- Do this after you have selected Pick | Shape or clicked the 

button.
- Next choose the type of picking mode to use. The options are 

(Face), 

(Edge) or



(Vertex). You can also select the picking mode from the Pick | Snap To flyout.

Note: If you do not select a 'snap' option the face, edge or vertex closest to the 'pick point' will be selected. (The pick point is identified by the mouse position.)

- If you make the selection directly in a 3D view, then RealiMation automatically checks whether there is more than one placement and prompts you to ask if you want to create a copy of the shape to work on.

Selecting one face, edge or vertex

Once in face pick mode...

- Click on the face you want to edit with the pick tool.
  Selected faces are shown in blue.

Note: If you click on the wrong face, hold down the right mouse button, and click the left mouse button over it to deselect it. The selected face becomes blue.

Selecting all faces or 'Fence picking'

- Double click on the shape - RealiMation will prompt you whether you really want to select all the faces.

Additionally, you can select everything by dragging a selection rectangle over the shape. This is similar to 'fence picking' in many standard Windows applications and you can do this in one of two ways:

1. Hold the left mouse button down in an 'empty area' (e.g. top left hand corner 'above' the shape), the cursor will change, and still holding down the mouse button drag the selection rectangle over the faces.

2. Hold the left mouse button and the Alt key down and drag over the shape.
   The faces are now selected and will be displayed in blue with "selection handles" to identify the selected area.

If you already have faces selected on a shape, then RealiMation will try to select from that shape first, or will make a 'best guess' at the shape to use.

Selecting multiple, individual faces

- Hold down the Control key as you make your selection with the mouse.
  To deselect incorrectly selected faces, hold down the right mouse button down and click the left mouse button over the face to deselect.

Select some faces, and use the Edit | Invert Face Selection option to deselect these selected faces, and reselect all those previously unselected.

Note: If you deselect faces in error you can use the Edit | Reselect Faces option to reselect them.

Now you have selected your faces, you can begin to edit and change your shapes and models.

See Also
Picking Modes
Working with Face and Vertex Normals

Splitting Faces

You have dragged the selected faces so that they are no longer planar (i.e. do not lie in the same plane). Some display drivers cannot display non-planar faces correctly, so RealiMation offers you the opportunity to split the non-planar faces into smaller, planar ones which can be displayed.

- Click 'OK' to split the faces into smaller ones. You will be prompted next time you drag to create non-planar faces.
- Click 'Don't Ask Again' to split the faces whenever you drag the faces on this shape without displaying the prompt again.
- Click 'Cancel' if you don't want to split the faces, and undo the drag, returning the faces to their original position.

For more about faces and planar and non-planar differences see:

Faces, Directions and Appearances

coplanar tolerance

Setting the Size of the View Window
(View | Set View Size)

This changes the width and height of the view window (in pixels), which is useful for constraining the view to a particular size, and is easier than dragging outside corners and edges to make the view window the exact size.

- Type in the new pixel values. The size of the view window is displayed on its title bar.

The following options are only available when there is a background image associated with the view.

Set to background size

- Click on this button to resize the view to the exact size of the background image (i.e. it will either shrink or zoom the view so the image fills the view window. The view size on the View window title bar will update automatically.

Match fields of view

- Click on this button to match the fields of view of both camera and the background image to be the same.
  This is used when you want to 'pan' large background images (e.g. a mountain range) as you move the camera to make the vie more realistic.

  A camera and a background image have a 'field of view' (which is specified by the Camera and Image Properties respectively). The resolution of the background image is fixed, so to pan it correctly the width of the view (in pixels) should be set to be some fraction of the image size.

  For example: Your image is 1000 pixels wide, and its field of view (FoV) is 120 degrees; your camera has a FoV of 30 degrees (i.e. one quarter of the FoV of the image).
  Matching the fields of view creates a view width which is one quarter of the image width i.e. 250 pixels, so now as you aim the camera left and right, the background image will scroll at the same rate that the camera is turning.

  Note: The background panning option (part of the View's Properties) should be enabled for this to function correctly.

Customise | AutoTIle

- Use the slider bars in conjunction with the window preview to configure the horizontal and vertical splits when you AutoTile.
  A percentage representation of the split is shown under the preview window.

- Select your preference for arranging the the Listers and 3D view windows, e.g. tile them horizontally, vertically or in a square.

- The 'Favour vertical' option only applies when the Square option is enabled to force arrangement to be more vertical than horizontal.

- Check the option to force the 3D view windows towards the left of the application window, leave it blank to force them to the right (default).

- Use the 'Leave space for icons' option when the Vertical Split is 100%. This ensures that when you AutoTile the windows, the icons for the minimised Listers are still visible.

- Check 'Fix size of 3D Views' to AutoTile without resizing the View window. The Listers are resized to fit.

Other customise options:
Hints
Edit Display
Drivers
3D Interaction
Action Display
Previews
Startup
Texture Edit
RealiMate Options

Customise | Hints

Toggle the appropriate radio button to set up the Hints mechanism.

The Hints have been designed to help you when you first get working with RealiMation, by appearing each time you select an option complete a function to explain what you have done, and to suggest possible steps to take next.

Choose from the options depending on how you progress:

- *Enable all* shows all hints
- *Disable all* switches off all hints
- *Disable on prompt* shows all the hints, and allows you to check the *Do not show again* box when you are familiar with the procedures.

Note: We strongly recommend that as you are learning RealiMation you choose the 'Enable all' option and them move to 'Disable on prompt' as you increase your familiarity with the product.

- When you have set up the Hints as you want them click on 'OK' to confirm the changes and close the dialogue.

Other customise options:

AutoTile
Edit Display
Drivers
3D Interaction
Action Display
Previews
Startup
Texture Edit
RealiMate Options

Customise | 3D Interaction

- Enable or disable display of the axes in the view window.

- Enable or disable the auto-link between placements and Listers.
  If you enable the option and select an object in the view window, the reference to the object in the Lister will be highlighted.
  If you enable the option and select an object in a Lister, then the object in the view window will be highlighted with an edit box.

- Toggle the option to display the 'white box' in the 3D view during mouse flight mode.

- Use the slider to set up the sensitivity of the mouse control for the flying. This can have an effect on the speed of your flight - click here to see the Frequently Asked Questions section.

Other customise options:
AutoTile
Hints
Edit Display
Drivers
Action Display
Previews
Startup
Texture Edit
RealiMate Options

Customise | Edit Display

Marker Sizes
Change the sizes of the markers used to show the vertices and normals.

- Type in a new value or use the arrows on the edit box to change the size

  When you are editing faces and vertices the markers have a default size irrespective of the size of the object, which may be suitable on most occasions.
  However, you may want to increase or decrease the size, for example of you are working on a small object, then you will want to increase the marker size, and vice versa.

Colours
- Select the component within the application to edit from the drop down menu.   This list includes components such as the editing handles, faces and edit box.

- Select the new colour to use by clicking on the Choose Colour button.

  As you select a component, the current colour associated with it is shown.

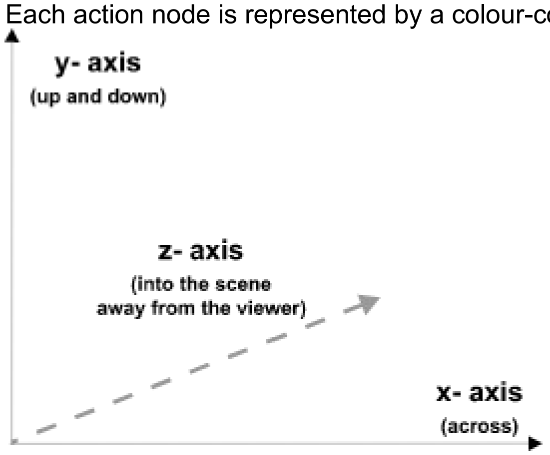
- When you have made the changes click on 'OK' to confirm the changes and close the dialogue.

Other customise options:
AutoTile
Hints
Drivers
3D Interaction
Action Display
Previews
Startup
Texture Edit
RealiMate Options

Customise | Action Display

This tab configures aspects for editing action nodes directly in the View window.

- Enter a new value to change the size of the action nodes when they are displayed in the view window. The size you use depends on the size of the view, and the viewpoint in relation to the action.

  Each action node is represented by a colour-coded 'axis' icon (


), where each colour specifies an axis.
(The defaults are cyan = x axis, magenta = y axis and yellow = z axis.)

- Set up the action to use the same time delta as set up on the RealiMate control bar, or to use one specified here. The seconds box is active when you select the 'Specify Time Delta' option.

- Decide whether to represent the action in the view as a triangular, or 'prism' shape, or as a single line. The triangular shape is the most useful for viewing transformations applied to the action e.g. roll, pitch and yaw.

Other customise options:
AutoTile
Hints
Edit Display
Drivers
3D Interaction
Previews
Startup
Texture Edit
RealiMate Options

Customise | Display Driver

One of RealiMation's key strengths is its ability to support multiple rendering engines, and different views can use different renderers. Now you can choose the renderer to use. The current list of supported drivers includes: RenderWare, OpenGL, Direct 3D, 3Dfx (Glide) and Rendition Verite. This list will continue to grow as more driver support is added.

- Choose the default driver for any new views from the drop down list. This list contains all the supported drivers selected and installed. If the driver you require is not here, and is supported in RealiMation, then you will need to reinstall the software and select the driver you require.

  Note: If you select a 3Dfx driver the 'Resolution Options' box becomes active.

- You can view the capabilities for the different drivers in the list, using the scroll bars. A checked box denotes that the selected driver supports that option. Use this list to help you set up other options such as the advanced image and texture handling.

  Notes: You cannot change the capabilities for the selected drivers (the options are greyed out to reflect this).
  The driver selected in the Customise menu only affects new views. To change the driver for an existing view you should use the View Properties.

- When you have made the changes click on 'OK' to confirm the changes and close the dialogue.

  Developers Note: You can access more detailed information about the selected driver by clicking on the Details button.

Other customise options:
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Resolution Options

This option is currently only available for external 'slave' monitors using display drivers such as 3Dfx based accelerators.

When the box becomes active, use the drop down arrow to display the list of possible resolutions supported by the selected driver. The options differ from one display driver to another, but typically these options can include:

640 x 480 x 16 bpp (60Hz 1 page) where the display is single buffered
640 x 480 x 16 bpp (60Hz 2 pages) where the display is double buffered

Display Driver Details (Developers Only)

These details give more advanced information about the currently selected driver.

- Some of the more advanced renderers offer extensive capabilities. These are described below. You can not alter these settings.

  Assignment of palette to channel
  Particular palettes can be assigned t particular channels - for example you might alter a palette to produce different lighting effects, or use as an overlay to vary the scene. (**Note**: The selected palette is used for every view on that channel.)

  Background depth images & Background visual images
  Not all drivers support background and depth images - and if a renderer supports one it will not automatically support the other!

  Expansion of depth images & Expansion of visual images
  If the renderer supports depth and background images it may also support expansion of these images. This means that the driver expands individual pixels of an image as the camera zooms into the scene. For example, if you were looking at a view with the naked eye, and then looked through binoculars, the image would be "blown up" in absolute proportion and look correct.

  Extent clearing
  This option is used in conjunction with the View Control Properties "Clear image each frame" and "Clear depth each frame". This is an optimisation technique when a model is moving against a static background (for example an aeroplane in the sky) - only the area which has changed is cleared and redrawn.

  Mip map blending

  Texture Clamping

  anti aliasing

- Some drivers can handle multiple textures mapped onto a single polygon. The **Maximum number of textures per polygon** displays the maximum possible - drivers such as OpenGL and 3Dfx support multiple textures.
  Note: This requires texture clamping support.

- The **Texture coordinate range** shows the total number of times a texture can be tiled in both the u and v directions. Different drivers have different capabilities, for example RenderWare only allows a texture to be tiled 32 times in either direction, while OpenGL has no restrictions - you can tile the image as often as you like!

- The **Texture size** information relates to the physical size of the image file - some drivers can only handle small images, while others are not restricted at all.

Customise | Previews

Configure the display options for preview windows - materials, shape, images etc.

Material Displays

- Toggle between using a sphere and a cube to preview the material, and enable/ disable the black and white checkerboard background image. (This is particularly useful for setting up effects like transparency.)

Shape Creation Preview

Configure the preview window in the create shape dialog.

- Toggle between flat and smooth shading for the shape preview
- Check the 'Spin shape' box to rotate the shape.

General

All preview windows use a solid background colour behind the material or shape being previewed, (the current colour is displayed in the dialog).

- Change the colour by clicking on the 'Change' button, to display the standard Windows colour selection palette
- Choose a new colour and the preview will update.
  Next time you display a preview window, the background colour will have changed.
- Check the 'Spin objects' box to rotate objects in preview windows, e.g. Level of Detail Properties.
- Check the 'Show Image Preview' box to toggle the preview of images in the Image Properties.

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Customise | Startup

STE Startup

- Click on the appropriate radio button to change the status of RealiMation as it starts up:
  Reload Last RealiBase is the default option, and opens the last RealiBase worked on.

  Open Existing RealiBase displays the File | Open dialog. Choose the RealiBase you want to view / edit.

  Create New RealiBase to open a new, empty RealiBase (this is the same as a menu option. You can further configure this RealiBase using the section below)

  No RealiBase displays the application window only. (Only the File and Help menus are available)

New RealiBase

- Toggle the check box to automatically create the standard materials (e.g. red, green, blue etc.) and a 3D view window.
  The 3D view window will be setup using the current default settings. You can change these by modifying the View Properties.

Initial 3D View size

- Set the size of any 3D view window you create. Typical sizes are selected using radio buttons, or set your own desired size by clicking on Custom and tying in new values.

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Customise| Texture Edit

Most display drivers only allow you to position a texture on a face within "positive" coordinates. However, some of the more advanced display drivers (e.g. Open GL and 3Dfx) support "negative texture coordinates", i.e. placing textures within negative coordinate space.

Because this is not a standard option, RealiMation's Texture Mapping Tools and Texture Coordinate Editor default settings prevent negative coordinates from being generated.

However, because the negative coordinates are supported in ***some*** drivers, and are required for effects such as texture clamping, you can toggle this option to allow negative coordinates to be generated and used.

Note: If you enable negative texture coordinates, position your textures, and then disable the option at a later date, you may find that your textures are incorrectly positioned, and so need to be repositioned.

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Customise | RealiMate

RealiMations use actions to create complete sequences. These sequences are not animations in the traditional sense of the word, they are NOT frame based, rather they are TIME based and playback objects movements over time.
Use this dialog to set up the properties of the RealiMation

Time Control

Use real time clock

Check this option to show the RealiMation playback in "real time". Use this option in conjunction with the Rate box.

Use time delta

Check this option and type in a value for the time delta (in seconds) which will be added to the actual animation time. You can use this to see the position of objects in the world after this time delta.

Rate

Show rate every * frames

The frame rate per second is displayed in the RealiMate Control Panel. The value entered here determines the interval, in frames, that the frame rate is updated.
For example if the value is set to ten, then the frames/sec value will be updated every 10 frames.
Change the value to 5 and the frames/sec will be updated every 5 frames.

Frame Rate **These are only active when real time clock is selected**

Check the appropriate radio button to set the RealiMate rate.

Normal Rate: Uses the rate set by the real time clock

Time Lapse: Increases the rate of playback by the value in the box

Slow Motion: Slows down the rate of playback by the value in the box

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See Also

Recording to AVI format

RealiView

RealiMating Sequences

Once you have set up the worlds with shapes, atmospherics, actions etc you can set the objects moving along the action behaviour paths.
The RealiMate Tool bar (docked to the left hand side of the application window by default) is active by default. The Tool bar has six main icons which control the RealiMation play backs set up for the individual files. The icons used are standard video playback symbols - stop, play, rewind, back one frame, forward one frame and fast forward.

- Press the Play icon to start the sequence. You will see that all the placements start to move along their specified actions (where they are assigned) until the sequences reach the end. If any actions are set to AutoRepeat the sequences will continue until you press the Stop button.

- Press the Stop icon stops the RealiMation playback sequence at that exact point. You can stop a RealiMation sequence at any point and look at the position of objects, at any given time, and in relation to others objects in a scene.

- Press Play to restart the sequence from the Stop point. If you wish to restart the sequence, press Rewind to reset the sequence at the first frame and then press Play.

- Additionally you can step back through the sequence one frame at a time until you reach the first frame, or advance frame by frame to the end.

- Press Rewind to return the sequence to the first frame

- Press Fast Forward to move the sequence on to the last frame

- Click on the Back one frame icon to step backwards through the sequence frame by frame, and the Forward Frame icons advances the sequence frame by frame to to the last frame in the sequence.

- The value in the "Time" box shows the number of frames played per second with the actual number of seconds taken to play the RealiMation shown below.

- Click on the Setup button to configure the RealiMate Options further.

- Recording to AVI format

Browse

Use this to locate the directories where the display drivers are located.

Driver Registration

This dialog should only appear if the registry has become corrupted and you have lost your display driver information.

- Select the drivers you want to reinstall and from the Customise | Display Driver Properties configure a default driver to use when you restart RealiMation.

- As soon as you have done this, RealiMation will start up in the correct mode with the selected driver.

See Also:
Editing the Registry for more information about the registry and its functionality.

Serial Number Check

You need to type in the correct RealiMation Serial Number before you can run RealiMation.

You will find this key inside the CD packaging and will look like the following:

RMP-1234567890-1x.

If you cannot find the Serial Number, and you have registered your copy of RealiMation, you will need to fax or email your RealiMation Product Code Number (e.g. RMP-1234, found on the outside of the box) to +44 1332 290667 or support@realimation.com. Once your serial number has been checked and verified the RealiMation Serial key will be sent to you by return.