Welcome To The Manual

Welcome to the Vector Reality manual.   To browse the help file, click on the 'Contents' button.   To look up a specific topic, click on the 'Index' button.   To bring up help on a specific topic within Vector Reality, use the Help menu, press the Help button (where available) or press F1.

What Vector Reality Does

Vector Reality is a three-dimensional modeler and renderer.

The role of the modeler is to allow the user to draw three-dimensional objects.   The problem with drawing in 3D is that computer input and displays are focused on two-dimensional input.   Vector Reality allows three-dimensional editing by having three views which are two-dimensional, the top, right, and front views.   The combination of these views allow the user the full range of three-dimensional motion. Actual 3D data is stored internally; however, only two-dimensional views into the three dimensional data is allowed due to the 2D representation of a computer monitor.

In Vector Reality the 3D surface data is stored as a collection of polygons.   These polygons often form only a good approximation of an actual surface;   however, by increasing the number of polygons in the approximation, the stored surface can be made to look more and more like an actual surface.

The role of the renderer is to take the 3D surface description of the modeler data and to output a photo realistic shaded two dimensional picture which appears three dimensional.   To achieve this, materials are applied to surfaces which gives the surfaces desired qualities, lights are placed, and the environment is described.   For example, one could take a surface description of a spaceship and apply a metallic material to it, light could be placed in the distance to light the scene, stars could be placed in the environment description, and then the renderer would be able to render a metallic spaceship in the stars.

In Vector Reality, the rendering process used is called ray-tracing.   It allows a high degree of realism, including effects like translucency, reflection, refraction, and shadows.   The material system allows for smoothing of polygons, and multiple procedural and bitmap textures.

Features

Vector Reality is a 3D modeler and renderer which incorporates polygon mesh based editing with the power of raytracing into one integrated environment. From the surreal to the real, your creativity is set free to create images from your dreams to recreation of actual scenery.

32bit Operating System Technology
Runs natively in Windows 95 and Windows NT with multithreaded rendering

Powerful Object Editing
Hierarchical Grouping

Boolean Operations

Real-time shaded preview while editing

Primitive functions create simple objects automatically

Extrude and Lathe functions create symmetric objects quickly

Array function replicates objects in a pattern

Point Editing allows precise control over object generation

Curve Deformations create smooth 3d curves for organic effects

Import and Export objects using DXF

Realistic Rendering
Reflection, translucency, refraction, and shadows create 3d effect

Texture mapping color, translucency, reflection, bumps makes objects alive

Supersampling creates high quality images

Procedural textures include wood, marble, clouds, turbulent colors, granite

Environmental effects include horizon, fog, and stars

Logical and Customizable Interface
Object oriented operation creates a consistent interface for ease of use

User definable view system allows for infinite customization

Button bar and Accelerator keys allow for quick function access

Context sensitive help brings you answers when and where you need them

Requirements

Operating Systems Supported:

Windows 95 and 8MB (or more) Ram

Windows NT and 16MB (or more) Ram

Hardware

Video card running in 256 (or more) colors at (or above) 640x480

486DX (or better)   with math co-processor

Hard Drive with 10MB (or more) free

3.5" High Density Floppy Drive for installation

New Version Information

Vector Reality Version 2.0 represents a major upgrade.   The following is a list of significant changes made since the last release.

Major Additions

Real-time shaded preview for camera views added
Hierarchical Grouping added
DXF Import and Export added
Printing support added
Boolean Operations
New Paint Based Material System
Smart Smoothing System

Additions and Changes

Render, Environment, and Material setting redone as property pages
Box Primitive Added
Large Images Supported in Image Viewer
Files now support large objects
New Camera Model, Up Stays Up
Trackball Style Rotation
Added Numerical Input to all objects' properties' sheet
Program works with Concave polygons
New add system:Add Menu allows Opening, Primitives moved to Add Menu
New method of computing layer coordinates
New cameras auto select into empty camera views
New naming system
Tip of the Day added
Hold Shift/Ctrl to size and keep aspect
Default option to autodelete lathe mold polygon when lathing
New Material Preview System
Integrated Moving into Select Mode (Move groups w/o holding ctrl down)
Zoom functions work as tools
Select Camera moved to menu
New X/Y/Z Mouse Restrict method: click on view axes to toggle
New Cursors
New Workspace coloration design
Grid Snap in mode menu (functions as a document property)
RMB in Object List/Main Window for Menu
New About Box/Splash Screen

Start Render? Dialog Removed

Menu rearrangement: Properties on bottom, Change Notify All to Resize All

Redone Tool Bars

Redone Window Icons

New view name title arrangement in title bar, View Name changes with Type change if its not custom

Bounding Boxes appear solid

Moved coordinate display to status bar

Larger sized Object List

All new about pages

Rendering Stats redone

Rendering Status Bar minimizes to taskbar, displays % complete

Smaller Primitive Size Defaults

Degrees specified as rot units in dialogs

Forms renamed to Shapes

Save Modified Flag sets at right times

Removed

Removed Form 'External' Tab

Removed Workspace 'General' Tab

Cloning System removed

Open Development Policy

We believe that in order to create the best product, we must be as open as possible to the ideas of our customers.   If you have any ideas, comments, criticisms, or implementations please communicate them to us.   By combining the ideas of our customers with quality software engineering, we know we will be able to create the most useful, understandable, and creative 3D modeling and rendering package possible.

Vector Reality Demo

The Vector Reality Demo is a working demonstration of the Vector Reality product.   It includes all of the Vector Reality package, except save is disabled in workspaces, and it only renders at 160x120.

The Vector Reality Demo comes in the form of two zip files.   To use the demo, retrieve both zips and place them in their own directory and unzip them using an unzipping tool like pkunzip.   For pkunzip, use 'pkunzip vecd20d1.zip' to unzip disk 1, and 'pkunzip vecd20d2.zip' to unzip disk 2.   The Vector Reality zips will decompress into that directory.   Install the package by running install, which is in the directory you unzipped to, from within Windows.

The Vector Reality Demo is available from the High Velocity Systems WWW
site at http://nyx10.cs.du.edu:8001/~jvanabra/highvel.html and directly via ftp as:
Disk 1: ftp://avalon.viewpoint.com/avalon/demos/vecd20d1.zip
Disk 2: ftp://avalon.viewpoint.com/avalon/demos/vecd20d2.zip

Disclaimer

This software is sold on an as-is basis.   The author specifically disclaims all warranties, expressed or implied.   In no event shall the author be liable for any loss of profit or any other damage including but not limited to special, incidental, consequential or other damages including damages to a third party.   By using this software you are agreeing to these terms.

Copyright Information

All Versions

All Vector Reality executables and help files are Copyright 1994-1995 by High Velocity Systems.   The Vector Reality executables and help files may not be modified and/or redistributed in any way without permission.   Texture Images files were retrieved from the public domain.

Demonstration Version

Permission is granted for one copy per computer for the Vector Reality Demonstration Version as packaged by High Velocity Systems at no cost to the user.

Directory Structure

General Information

All files required to operate Vector Reality are located in the 'VECREL' directory created on installation. Within this directory, other sub directories are created.   When loading or saving a file it is recommended that you place it in the most appropriate directory. Following this convention helps to keep things in order. The directory structure created and the files they should hold are as follows.

VECREL/ - Holds program files.

> LIBSTORE/ - Holds material, environment, and render settings libraries.   This directory is used internally by the program.   There is normally no need to enter into this directories.

> OBJSTORE/ - Holds shapes and workspaces used to create a rendering.
> > RENDERED/ - Holds rendered images.
> > TEXTURE/ - Holds texture images.
> > PREVIEW/ - Holds material preview files.

Moving and Sharing Files

If you keep all shapes and workspaces within the 'OBJSTORE' directory you will be able to transfer your files to other systems even if the location of the 'VECREL' directory is different.   To completely transfer any file, you must also make sure to copy all files required by it.   These may include materials, environments, render settings, or shapes.   To manipulate files, refer to the Windows manual which came with your system.

The Manual

On-Line Manual

All documentation for Vector Reality is located in this Windows help file.   This help file may be browsed by clicking on the Vector Reality Help icon, or by selecting from the Help menu within Vector Reality.

When your want to work with the program and read the manual at the same time, it may be useful to keep the help on top of the screen.   To do this, select the corresponding command from the menu of the help viewer.

Conventions

Menu Convention: Menu selections are written in this format Menu:Submenu:Command.   To access the command, first click on the Menu in the window, then select the submenu (where applicable),   and finally select the command.

Mouse Button Convention: The term primary mouse button is used to define the mouse button used for selection in windows, this is normally the left mouse button.   The term secondary mouse button is used to define the mouse button not normally used for selection in windows, this is normally the right mouse button.

Starting Your First Rendering

This section will teach you how to open existing workspaces and how to render them.

Open the workspace named 'demo.wsp.'
Choose File:Open, the File Open dialog will appear
Double click the file demo.wsp from the list of files

Start rendering the camera view
Choose View:Render, the Rendering status indicator will appear
Wait for the rendering to complete

View the rendering
When rendering is completed, the rendering will display
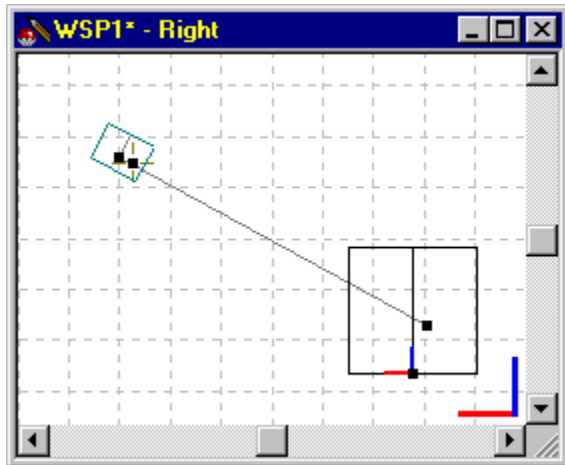
Clean up
Choose File:Close to close the image
Choose File:Close to close the workspace

Repeat
Repeat this process for other .wsp files to render them.

Editing Your First Scene

In this section, you will create and render a wood box.   When complete, the right view should look like the following:

Create a new workspace

Choose File:New, a new workspace will appear.

Find the window labeled 'Right.'   This is the right view.   All   work will be done in this view for this tutorial.

Add a camera

Choose Mode:Add.

Click the mouse in the white area of the right view near the upper left corner.   A menu will appear.

Choose 'Add Camera' from the new menu.   A camera will appear.

Choose Mode:Select/Drag

Click and drag the black box at the end of the camera to the bottom right corner.

Add a light

Choose Mode:Add

Click the mouse where you added the camera.   A menu will appear.

Choose 'Add Light' from the new menu.   A light will appear.

Add a box

Click the mouse in the white area of the right view near the bottom right corner.   A menu will appear.

Choose 'Add Shape:Box' from the new menu, the Box Definition dialog will appear.

Click on 'Create.'

Apply a wood material to the box

Choose Object:Paint.   The Material Group Properties dialog will appear.

Select 'Demo' from the list of groups.

Select 'Wood' from the list of names.

Click on 'Ok'

Start rendering the camera view

Choose View:Render, the Rendering status indicator will appear

Wait for the rendering to complete

View the rendering

When rendering is completed, the rendering will display

Clean up

Choose File:Close to close the image

Choose File:Close to close the workspace

Ordering and Support

Ordering Vector Reality

Vector Reality is only available directly from High Velocity Systems.   It is not available in stores or by any mail order company.

Vector Reality: US $99/copy (NE Residents add 6.5% Sales Tax)

Shipping and Handling: US $4/copy

Call: (402) 423-1848 to order via Visa/Mastercard or C.O.D. (C.O.D. is for US Residents only)

Or, See Order Form to order by mail.

Support

All questions about the Vector Reality product are handled through any of the following addresses of High Velocity Systems.   Service and Technical Support is provided free of charge.

Phone Number: (402) 423-1848

Internet Mail Address: jvanabra@nyx10.cs.du.edu

Mail Address: High Velocity Systems;   6521 S. 41st Street;   Lincoln, NE 68516

Additional Information

Additional information about Vector Reality, including the Vector Reality Demo, can be found on the World Wide Web at: http://nyx10.cs.du.edu:8001/~jvanabra/highvel.html

Order Form for Vector Reality V2.0

Print out this form by selecting File:Print Topic, fill in, and mail form and payment to:

High Velocity Systems
6521 S. 41st Street
Lincoln, NE 68516 USA

Contact Information

_____
First Name   Last Name

_____
Company Name

_____
Street Address Line #1

_____
Street Address Line #2

_____
City   State   Zip Code   Country

_____
Telephone Number

_____
E-Mail Address

Payment Information   (All Payments in US Funds)

☐ Check or Money Order (written out to High Velocity Systems)

☐ C.O.D. (US Residents Only)

☐ Visa or Mastercard

_____
Card Name

_____
Card Number   Expiration Date

Quantity: _____ * $99/copy: _____

NE Residents 6.5% State Sales Tax: _____

Shipping & Handling $4/copy: _____

Total: _____

About Vector Reality Dialog Box

The About Dialog Box Displays the title, version, credits, and copyright notice for the program.

File Open Dialog Box

The following options allow you to specify which file to open:

File Name

Type or select the filename you want to open.   This box lists files with the extension you select in the List Files of Type box.

List Files of Type

Select file type to open.   If possible Vector Reality presents the most logical type already selected.

Drives

Select the drive in which Vector Reality stores the file that you want to open.

Directories

Select the directory in which Vector Reality stores the file that you want to open.

Network...

Choose this button to connect to a network location, assigning it a new drive letter.

File Save Dialog Box

The following options allow you to specify which file to save:

File Name

Type or select the filename you want to save.   This box lists files with the extension you select in the List Files of Type box.

List Files of Type

Select file type to save.   If possible Vector Reality presents the most logical type already selected.

Drives

Select the drive in which Vector Reality will store the file that you want to save.

Directories

Select the directory in which Vector Reality will store the file that you want to save.

Network...

Choose this button to connect to a network location, assigning it a new drive letter.

Add Texture Dialog Box

Texture List

Select the texture you want to add to the current material by clicking on the name of the texture and clicking on OK, or by double clicking on the name of the texture.

Available Textures:
Bitmap
Checkerboard
Clouds
Color Range
Granite
Marble
Radial Wave
Roughness
Wood

Texture System

This section describes the texture system.

Texture Definition

Texture is used to vary an attribute of a material by position within a texture domain.

Texture Modifications

Textures may vary the Color, Filter, Reflect, and Surface Normal of a surface. For example, by color modification texture can be used to define complex material patterns such as wood, or to project images upon an object. By Filter and Reflect modification, it can make the reflective and translucent spots of an ornament. By Surface Normal modification (called Bump Mapping, or Bump Normal), it can be used to simulate the bumps of a rock. Bump normal effects only modify the surface normal of the shape, and thus the edges and silhouette of the shape remains the same.

The Texture Domain

The texture domain, which is the area in which texture exists, is defined by the mapping axis of a shape. The visual length of the mapping axis x, y and z components is 1 unit. Positioning, Rotating, and Scaling the mapping axis correspondingly affects how the texture is mapped.

Texture Domain Mappings

Texture may be defined in the texture domain either by a two or three dimensional mapping. These mappings are defined as follows:

Two Dimensional Mappings

A Two Dimensional Map takes a texture which is defined in 2D and maps it to the 3D texture domain using either a plane, cylinder, or sphere mapping. Select the mapping type for a shape by selecting the mapping axis and choosing Object:Properties to bring up the <u>Mapping Property Page Dialog Box</u>. The following images demonstrate the different types of mapping.

Will be mapped as follows:

Plane

All points at (x,y) regardless of the Z component retrieve their color from x,y

Cylinder

All points (x,y,z) retrieve their color from their angle around the Z axis and the Z component.

Sphere

All points (x,y,z) retrieve their color from their angle around the Z and Y axes.

Three Dimensional Mapping

A Three dimensional mapping is called space filling.   In a Three Dimensional map, all points in the texture domain are already defined, so no extra mapping is required.

Combining Textures

Many textures of the same modification type may be defined at the same position.   When this happens, there respective attributes at that position are added.

Texture Types

Bitmap: see Bitmap Properties Dialog Box

Checkerboard: see Checkerboard Properties Dialog Box

Clouds: see Clouds Properties Dialog Box

Color Range: see Color Range Properties Dialog Box

Granite: see Granite Properties Dialog Box

Marble: see Marble Properties Dialog Box

Radial Wave: see Radial Wave Properties Dialog Box
Roughness: see Roughness Properties Dialog Box
Wood: see Wood Properties Dialog Box

Bitmap Properties Dialog Box

See <u>Texture System</u> for general information on texture.

Property Modification: Color, Filter, Reflectivity, Bump Normal
Mapping Type: 2D

Bitmap texture defines an image file as a 2D map.   This texture supports JPeg (jpg), Targa (tga), Tiff (tif), PhotoCD (pcd), PCX (pcx), and Windows Bitmap (BMP) image types.   Mapped Color, Filter, and Reflectivity properties are taken directly from the bitmap.   The surface normal is modified by interpreting the red value of the bitmap as the height to disturb the surface of the object at any mapping point.

(Bitmap Image) Browse
Click on this button to select the image file to map.

Horizontal Repetitions
Controls the number of times the image is tiled horizontally (y axis.)

Vertical Repetitions
Controls the number of times the image is tiled vertically (x axis)

Bump Height
Defines the bump height of the maximum red value for bump normal modifications.

Object Modification
Click on the modification types desired, as described in <u>Texture System</u>.

Checkerboard Properties Box

See <u>Texture System</u> for general information on texture.

Property Modification: Color, Filter, Reflect
Mapping Type: 2D

The checkerboard texture defines a pattern of alternating color squares in 2D.

First Color
Defines the color of the first set of checks.

Second Color
Defines the color of the second set of checks.

Horizontal Repetitions
Defines the number of horizontal tilling (y axis.)

Vertical Repetitions
Defines the number of vertical tilling (x axis.)

Twist Per Radial Unit
Defines how the checkerboard twists around the origin.   When set to zero, no twisting occurs.   When set to 90, the checkerboard twists 90 degrees at a distance of one from the origin.

Object Modification
Click on the modification types desired, as described in <u>Texture System</u>.

Clouds Properties Dialog Box

See <u>Texture System</u> for general information on texture.

Property Modification: Color
Mapping Type: 3D Space Filling

This texture creates a cloud-like texture in 3D.

Color Map

Click to define a color mapping.

Turbulence

Controls the turbulence of the clouds.   Higher numbers produce more turbulence, while lower number produce a more calm effect.

Color Range Properties Dialog Box

See <u>Texture System</u> for general information on texture.

Property Modification: Color
Mapping Type: 3D

This texture creates a color range on a Shape object in various ways.

Color Map
Click to define a color map for the color range.

(Areas Of Equal Color) XY Planes
Click to make the planes corresponding to z=constant the areas of equal color.

(Areas Of Equal Color) Cylinders around Z
Click to make cylinders with an axis at the z axis corresponding to radius=constant the areas of equal color.

(Areas Of Equal Color) Spheres a Origin
Click to make spheres with their centers at the origin corresponding to radius=constant the areas of equal color.

(Areas Of Equal Color) Radial Planes Around Z
Click to make planes which rotate about the z axis through the yz plane the areas of equal color.

Turbulence
Controls the turbulence of the color range.   Higher numbers produce more turbulence, while lower number produce a more calm effect.   Set to zero to create a non-turbulent color range.

Granite Properties Dialog Box

See <u>Texture System</u> for general information on texture.

Property Modification: Color
Mapping Type: 3D Space Filling

This texture creates a 3D granite like effect.

Color
Click to define the color of granite.

Marble Properties Dialog Box

See <u>Texture System</u> for general information on texture.

Property Modification: Color
Mapping Type: 3D Space Filling

This texture creates a 3D marble effect.

Color Map

Click to define a color mapping.

Turbulence

Controls the turbulence of the color range.   Higher numbers produce more turbulence, while lower number produce a more calm effect.

Radial Wave Properties Dialog Box

See <u>Texture System</u> for general information on texture.

Property Modification: Bump Normal
Mapping Type: 2D

This texture creates a radial wave effect, like a rock dropped in water.

Height
Defines the height of the radial wave.

Wave Length
Defines the wave length of the radial wave.   The wavelength is the length of one complete wave.

Phase
Defines the phase of the wavelength.   Increasing the phase pushes the wave along its path.

Radius at A/2
Defines the radius(distance) at which the amplitude (height) is one half of its original value.   Set to a large value to create the effect of no decay.

Roughness Properties Dialog Box

See <u>Texture System</u> for general information on texture.

Property Modification: Bump Normal
Mapping Type: 3D Space Filling

This texture creates a roughness or graininess.

Use Noise

Click on this to create noise base roughness.

Use Turbulence

Click on this to create turbulence based roughness.

Roughness

Defines the amount of roughness.   Higher values produce more roughness.   Lower values produce less roughness.

Wood Properties Dialog Box

See <u>Texture System</u> for general information on texture.

Property Modification: Color
Mapping Type: 3D Space Filling

This texture creates a wood effect.

Base Color
Click on this button to define the base color of the wood.

Grain Color
Click on this button to define the color of the grain of the wood.

Radial Waves
Defines the number of whole waves around one grain ring.

Length Per Twist
Defines the length at which one whole twist of the grain occurs.

Percent Base
Defines the percent of the wood effect which should be colored the Base Color.

Radial Ring Size
Defines the size of one radial ring.

Quick Access

Tool Bars

Certain menu functions and operations can be accessed via the tool bars.   See the Window Menu for a description of these items.

Accelerator Keys

Certain menu functions can also be accessed via accelerator keys. If there exists an accelerator key for a menu item, then it is stated in that menu functions name.   Functions with accelerator keys may be accessed by pressing and holding either the Alt or Ctrl keys and then pressing another key. The notation used to denote this, for example, is Alt+A or Ctrl+1.

Objects and Files

This section defines two terms which are fundamental to understanding Vector Reality.

Objects

In Vector Reality generic items are referred to as objects.   Each object is discussed in detail in their own appropriate section of the manual.

Files

When an object is placed on disk, it is then called a file.   Files can be as large as the available free space on the drive.

Work Cycle

Working in Vector Reality involves 1. Editing your scene in a workspace, 2. Telling the program to render an image, 3. Viewing the rendered image. This general work cycle is represented in the following diagram:
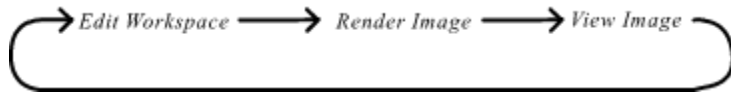
The Workspace Editor

The workspace editor is a set of tools which lets you edit your scene objects. These scene objects are all stored in three dimensions. You edit these objects by looking through various different two dimensional views. The view displays a wireframe representation of the objects while you work on them.

Rendering

To create a realistic shaded image, you must tell the program to render an image. This is done by selecting a view in the workspace editor, and calling the render function. The rendering process may take anywhere from a few seconds to hours, depending upon the speed of your computer, the complexity of the scene, and the size of the rendering. The rendered image is stored on disk in the 'ObjStore/Rendered' directory with the name of the workspace.

Viewing Images

Once the rendering is completed, it will automatically be opened into the image viewer. Depending upon the image output, you may either be finished, or you may want to continue editing the scene to refine it. Whenever you create changes in the scene, you will want to re-render the scene to see the effect of the changes.

Starting The Workspace Editor

To open a workspace from disk, choose File:Open.   To create a new workspace, choose File:New.   In either case, the workspace editor will be started.   The following picture depicts and labels some important parts of the workspace.
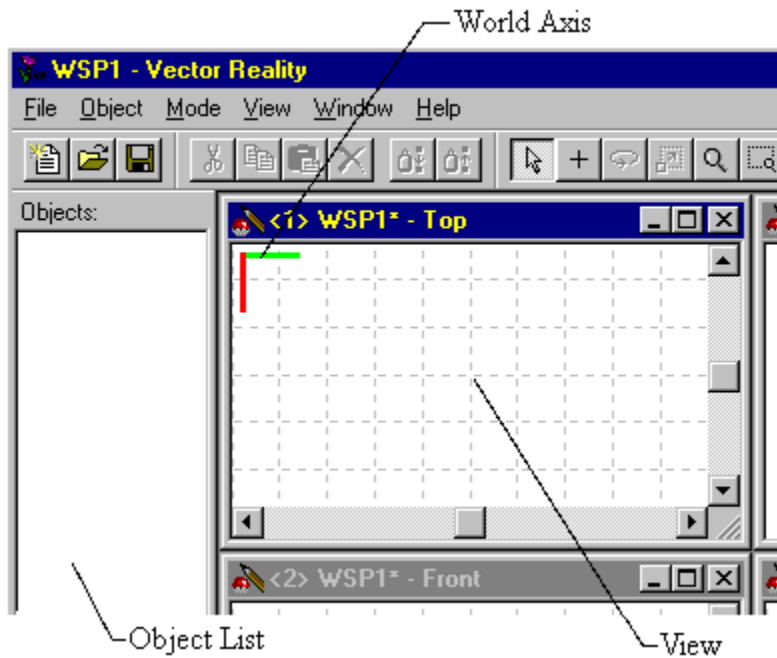
Viewing Images

The image viewer is used to display images created by Vector Reality and other programs in a window. You can open an image to view by choosing <u>File:Open</u>.   You can close an image by choosing <u>File:Close</u>.

Image Types

The image viewer supports viewing of the following types of images.   Their file extensions are listed after them in parenthesis.

    JPeg (.jpg)
    Targa (.tga)
    Tiff (.tif)
    PhotoCD (.pcd)
    PCX (.pcx)
    Windows Bitmap (.bmp)

Color Depth

For users of 256 color graphics modes, an optimal palette will be computed for display.   The displayed image may not perfectly represent the actual picture due to the lack of display colors.   In these palette based modes, only one image can be displayed an optimal palette, therefore, when more than one image is opened only the image with the active display will be displayed optimally.

For users of true color graphics modes (16, or 24 bit) no palette is computed.   Pictures displayed on true color graphics mode will more accurately represent the actual image than those produced on 256 color displays.   Since there is no palette, many pictures may be opened simultaneously, all with optimal displays.
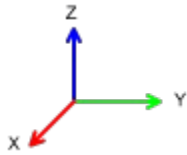
Coordinates

3D Space and Coordinates

Vector Reality operates in the three dimensions of space.   All spots in this space can be addressed, much like a street address.   This address is called a co-ordinate.   A coordinate consists of three decimal numbers, which are labeled 'x','y', and 'z'.   In the workspace, x is represented by the color red, y is represented by the color green, and z is represented by the color blue.   Each of these x, y, and z values refer to the distance in one direction in the space from the center of the space.

A coordinate is often written in the shorthand (x,y,z).   For example (1.0,2.5,3.0) is a coordinate which is located at x=1.0, y=2.5, and z=3.0.

Axis

An axis is used to represent the position, rotation, and size of space.   The center of the axis is the origin of the space, which is the coordinate (0,0,0).   Three lines are drawn from the origin in the direction of (1,0,0), (0,1,0), and (0,0,1). The length each of these lines is draw to depends upon the type of object the axis is used in.

View System

Since a scene is defined in 3D and monitors are only 2D, we need to define a viewing system from 2D into 3D.   The viewing system consists of individual 2D views.   Vector Reality has four different types of views: top, front, right, and camera.   The top view looks from the top to the bottom of the scene.   The front view looks from the front to the back of the scene. The right view looks from the right to the left of the scene.   The camera view looks from a camera object, much like a real camera looks at a scene.

There may be any number of any type of views, and they may be used independently of one another. These views are enclosed by a window frame in the workspace.   To select an existing view, click on the window frame which contains the view.   Views are manipulated using normal Windows window operations, those functions in the View Menu and the Window Menu.

Workspace Objects

The workspace is used to edit a scene.   A scene consists of shapes, lights, and cameras.

Shapes

Shapes are the objects which describe the surfaces of things in the scene,   such as a ball, or a table.

All Shapes have an axis.   The axis defines a local coordinate space which is independently oriented from the world space.   Everything within the shape exists within this local coordinate space.   This axis may be rotated, sized, moved, and dragged thereby rotating, scaling, moving, and dragging everything within it from the view of the world space.

Lights

Lights are used to make the scene visible.   A light may be of any color and intensity.   Lights are moved around the scene to create different lighting effects.

Cameras

A Camera is used to look into the scene much like a movie camera looks at a scene.   A camera consists of two distinct parts: the Camera, which is displayed as a green box, and the target, which is a hotspot connected by a gray line to the camera. By moving these two parts, you may look from and to anywhere in the workspace.   The camera may also be rotated to tilt it left and right.

Manipulating Objects

Hotspots

All workspace objects are manipulated in the views through their hotspot. A hotspot is a small clickable box located on or near an object which when selected is red, and when unselected is black.   To affect an object, it must be selected.   The following diagram shows selected and unselected hotspots:

Unselected
Hotspot
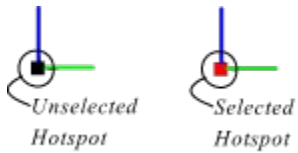
Selected
Hotspot

Mouse Operations

Operations in the View

The mouse is used within the view to perform a variety of operations.   The operation performed varies according to the tool selected and the context of the operation.   The workspace has the following tools: Select/Drag, Add, Rotate, Size, Zoom, and Zoom Box.   These tools are accessed by choosing them from the <u>Mode Menu</u>. The following sections discuss the operations you can perform with the mouse and these tools.   For complete information, follow the link to the description of the tool in the Mode menu.

Object Creation

Select the Add Tool by choosing <u>Mode:Add</u>.   To create an object, click on the primary mouse button at the location you want to add the object.

Object Selection and Dragging

Select the Select/Drag Tool by choosing <u>Mode:Select/Drag</u>.   To select an object, click on the primary mouse button on the object hotspot while in select mode.   To drag and object, click and drag the object hotspot.

Rotating

Select an object and then select the Rotate Tool by choosing <u>Mode:Rotate</u>.   To rotate, drag the mouse in the corresponding direction.

Scaling

Select an object and then select the Size Tool by choosing <u>Mode:Size</u>.   To size, drag the mouse in the corresponding direction.

Zooming

Select the Zoom or Zoom Box Tool by choosing <u>Mode:Zoom</u> or <u>Mode:Zoom Box</u>.   To Zoom, drag the mouse.

Panning

To pan a view, use the two sliders at the left and bottom of the views.   To pan up and down, move the slider at the right.   To pan left and right, move the slider at the bottom.

Context Menu

Select the Select/Drag Tool by choosing <u>Mode:Select/Drag</u>.   Click the secondary mouse button on the object hotspot.   The menu displayed be the same as the <u>Object Menu</u> in the menu bar.

Editing Obscured Points

Handling Mouse Operations in Parallel Projections

Selecting the intended point may be problematic because objects in flat projections often wind up with points in the same visual spot.

To select a point in a view where there is more than one hotspot in the same location, first deselect and select the point in a view where it is not obscured by the same points.   Then, move back to the problematic view and perform your operation on the point.

Conversely, you may also remove points from being chosen first where there is an obscurity problem by selecting and then deselecting the point(s) you do not want to have selected in a view where they can be distinguished.

Understanding The Implementation

Vector Reality stores all points in an ordered list.   When the mouse is clicked, the list is searched from head to tail for the first point at the mouse location.   When a point is selected, it is moved to the front of the list.   When deselected, it moves to the back of the list.   So, in effect, you can set the priority of points for the selection search by:

1)Selecting/deselecting points in a view where the points do not overlap to set the search priority.

2)Moving to the view where the overlap problem existed and clicking.   The first point in the list that is clicked upon will be selected.

Object List

Displays a list of all objects in the current workspace by name.   The object list is especially useful for selecting objects by name, for finding objects, and for determining which objects exist in a workspace. To open or close the object list dialog bar, use the menu command <u>Window::Object List</u>.

Selected objects have a darkened background, while objects which are not selected have bright backgrounds.   You may select an object by clicking on it with the primary mouse button.   You may select multiple objects by clicking on an object with the primary mouse button and dragging, or buy holding down the Control (Ctrl) Key and selecting multiple objects individually.   To deselect an object, hold down the Control (Ctrl) Key and click on it with the primary mouse button.

Clipboard

The clipboard is a temporary storing location for objects of any type.   The functions Object:Cut, Object:Copy, and Object:Paste operate on the clipboard.   See the menu commands for information on how each of these functions work.

Shapes

Parts of a Shape

A shape starts with an axis.   Within that axis are points, polygons, and a mapping axis.

Editing Different Parts

When you're editing shapes, lights, and cameras, your working at the root level.   In order to edit the different parts of a shape, you must change the editing level to the appropriate level for that part. Changing the editing level is described for each of the parts of a shape, below.

Points

Points define a place in 3D space.   The points of a shape are edited by selecting the axis of that shape and then changing to the point editing level by choosing Mode:Point.

Polygons

Polygons define a portion of the surface of a shape.   Polygons may consist of any number of connected points existing in a plane.   Polygons are considered 'oriented' according to the direction in which the points are ordered.   When creating polygons by hand, it is important that you orient all polygons clockwise when viewed from the outside surface of the polygon.   Polygons may either be convex or concave.   The polygons of a shape are edited by selecting a shape and then changing to the polygon editing level by choosing Mode:Polygon.

Mapping Axis

The Mapping Axis defines a texture domain and a 2d->3d mapping as described in Texture System.   The Mapping Axis of a shape is edited by selecting the axis of that shape and then changing to the Mapping editing level by choosing Mode:Mapping.

Shape Generation and Deformation

Generation

Shapes are originally created by choosing <u>Mode:Add</u> and <u>Mode:Root</u>, and then clicking in the view. Using this method will allow you to generate an empty shape, open a shape from disk, or generate a simple shape called a primitive.

Lathing and Extruding

In Vector Reality, polygons may be lathed and extruded.   To do this, you must first select an existing shape, then choose <u>Mode:Polygon</u>, and then select or add polygons.   You may then lathe the selected polygons by calling <u>Object:Lathe</u>, or extrude the selected polygons by calling <u>Object:Extrude</u>.

Deformation

To deform a set of points of a shape, first set up the curved drag parameters by calling <u>Mode:Curved Drag</u>.   Then, select a shape, choose <u>Mode:Point</u>, select the points you want to drag, and drag them.

Applying Materials

To apply materials, you use the Object:Paint command.

This command functions on polygons (when in polygon mode) and on shapes (when at the root level).

To paint an entire shape the same material, first select Object:Root and select the shapes you want to paint. When you call Object:Paint, the Paint Property Page Dialog Box will appear to let you select the material to apply.   The default material in the dialog will be the material applied to the most polygons on the shape.

To paint only parts of a shape, first select the shape you want to paint, and then choose Object:Polygon to change to polygon mode.   Select the polygons you wish to paint the same material. When you call Object:Paint, the Paint Property Page Dialog Box will appear to let you select the material to apply.   The default material in the dialog will be the material applied to the last selected polygon.

Hierarchy

Hierarchy

Object hierarchies are a convenient way to link together existing objects to form more complex ones without loosing the individual definitions of the individual objects.

Parents and Children

In a hierarchy there are the notions of parents and children.   These notions work much as they do in a family tree.   In the preceding diagram, the legs are children of the body, and likewise, the body is the parent of the legs.   The body and the legs remain distinct objects, but the legs only exist within the hierarchy of the body.   Whenever you drag, size, or rotate the parent of a hierarchy all the children move with it as if they were 'glued' to the parent.

Creating a Hierarchy

There are two commands which directly create hierarchies.   To create a hierarchy from a group of objects, first select the objects and choose Object:Glue as Group.   To create a hierarchy from a group of objects where you already have an existing parent, first select the future children, select the parent, and then choose Object:Glue as Child.

Navigating a Hierarchy

To edit the children of a parent, you must first select the parent, and then choose Mode:Down Hierarchy. To return to editing the parent, choose Mode:Up Hierarchy.

Deconstructing a Hierarchy

To deconstruct a hierarchy, select the children to remove from the hierarchy, and then choose Object:UnGlue.

Environments and Render Settings

General

The environment and render settings control the type of rendering you will receive from the renderer. The controls include: rendering size, background colors, ambient light, and much more.

Editing Environments and Render Settings

To edit the environment and render settings of the current workspace, choose <u>File:Properties</u>.   The Workspace Properties dialog box will appear.   To edit the environment, choose the <u>Environment Tab</u>. To edit the render settings, choose the <u>Render Tab</u>.

Rendering

To start rendering, first select a camera view by clicking within in.   It is important that a camera be selected into the view.   When you add a camera, it is automatically selected into an empty camera view. To learn how to select other cameras, see <u>View:Type:Select Camera</u>.   To start rendering, choose <u>View:Render</u>.

Importing and Exporting

General

By importing and exporting your shapes you can share your work with other programs which can read and write the same formats.   Vector Reality allows importing and exporting of DXF files.   DXF is a freely published file format which is used in a variety of programs for file exchange.

It is important to note that not all Vector Reality information can be stored in a DXF file.   Vector Reality will only import and export polygon information.   It will not import/export cameras, lights, materials, render settings, or environments.

Importing and Exporting

To import from a DXF file, choose File:Import. To export to a DXF file, choose File:Export.

Sample Design Cycle

This section covers a general design cycle used in Vector Reality.   This design cycle is to give the new user an idea of what working in Vector Reality is like, and how to go about creating rendering projects.

I. Startup

1. Come up with the project idea.

    One could ask: what is the theme of the project?,   what is the artistic style of the project?,   what will the project be composed of?,   what time will this project take to complete?

2. Find existing objects which could be used in the project.

    If a part of the project already exists, such as a render settings, shapes, or environments, then you should try to reuse that part in your current project.   Doing this will greatly reduce project generation time.

3. Create a new Workspace.

    Select <u>File:New</u> to create a new workspace.

II. Create needed Shapes and Materials

1. Create a Shape in the Workspace

    Using the Mouse, create a new shape in the workspace.   Edit the object using all the Workspace Editor tools.

2. Apply Materials to the Shapes

    A Shape can have one or many different materials used on it.   To apply materials you 'paint' them on using <u>Object:Paint</u>.

3. Place a camera and light.

    Using the <u>Mouse</u>, create a new camera and light and/or drag them into position.   New cameras will automatically be selected into the camera view.

4. Test render the Shapes.

    Select the camera view and choose <u>View:Render</u> to render the scene.

5. Repeat until all objects are created.

III.   Scene Organization

1. Think of how the Shapes, Lights, and Camera Position should work together in the scene.

    Using the <u>Mouse</u> and other Workspace Editor tools, position the object for the final scene.

2. Setup the Environment for the final scene.

Edit the environment for the workspace choosing the <u>File:Properties</u> command.   This environment file should be setup as the environment for the final image.

3.   Test Render the arranged objects in the environment using the test Render Settings.

Select the camera view and choose <u>View:Render</u> to render the scene.   Use the test Render Settings so that the rendering does not take too long.

4.   Repeat until satisfied with appearance.

IV.   Generate the Final Image

1. Setup a final Render Settings file.

Edit the Render Settings for the workspace by choosing the <u>File:Properties</u> command.   The render settings file should generate the appropriate final image.

2. Render the final image.

Select the camera view and choose <u>View:Render</u> to render the scene.

File Menu

New

Use this command to create a new workspace.

Open

Use this command to open a new document.   Select the type of document you want to open and select the name of the file to open in the File Open Dialog Box.

Close

Use this command to close the active document.   Vector Reality suggests that you save changes to your document before you close it.   If you close a document without saving, you lose all changes made since the last time you saved it.   You may also close the document by closing all windows representing the active document.

Save

Use this command to save the active document using the current name.   If a name has not yet been given, then you will be asked to choose a file name in the File Save Dialog Box.

Save As...

Use this command to save the active document under a new name.   You will be asked to choose a document name in the File Save Dialog Box.

Print

Use this command to print the contents of the current window.   A standard print dialog will display to allow you to set up your printer for printing.

Import

Use this command to import shapes from a DXF file.   You will be prompted with a File Open Dialog Box where you will be able to select the file to open.   Once you select a file, you will be asked if you want to 'Size Objects To View Size'   Selecting yes will size the objects such that they will fit into the current view.   Selecting no will import the shapes exactly as they are in the DXF file.

Implementation Note

Import will import 3d Faces and 3d Polygon Mesh entities from the DXF file, all other items will be ignored.   Each 3D Polygon Mesh will get its own shape, all 3d Faces will be placed into one shape.

Export

 Use this command to export the selected shapes from into a DXF file.   You will be prompted with a File Save Dialog Box where you will be able to select the file name to save to.

Implementation Note

Export will save shapes as individual 3d Polygon Mesh entities.

Rendering Statistics

Use this command to open the <u>Rendering Statistics Dialog Box</u>.

Properties

Use this command to bring up the properties page of the workspace:

<u>Workspace Property Page Dialog Box</u>

Most Recently Used List

Vector Reality keeps track of the four most recently used documents and displays them in the most recently used list at the end of the file menu.   Selecting one of these menu items will open the corresponding document.

Exit

Use this command to quit Vector Reality.   All active documents will be closed and Vector Reality will exit.   If there are any unsaved documents you will be prompted to save them.

Object Menu

Object menu functions operate on objects in views.   The object menu changes according to the object currently selected.   The object menu may also be viewed by clicking the secondary mouse button on an object in the view.

Cut
Use this command to copy the selection into the clipboard and to delete the selection.

Copy
Use this command to copy the selection into the clipboard.

Paste
Use this command to paste the selection from the clipboard into the current workspace.   Note that the data contained in the clipboard must match the current editing level.

Delete
Use this command to delete the selection.

Select All
Use this command to select all hotspots at the current editing level.

Invert Selection
Use this command to deselect selected objects and to select those objects not selected.

Find In View
Center Object
Centers the current view on the selected objects in the workspace.   This function does not operate on camera views.

Center Object All
Centers the all non-camera views on the selected objects in the workspace.

Zoom Object
Centers and Zooms the current view on the selected objects in the workspace so that the objects fill the view.   This function does not operate on camera views.

Zoom Object All
Centers and Zooms all non-camera views on the selected objects in the workspace so that the objects fill

the views.

Array

Use this command to create a two or three dimensional array of the currently selected shapes.   When you select this command, the Array Dialog Box appears to allow you to specify the type of array.

Combine

Join

When editing points, use this command to join all selected points which share the exact same position into one point.   When in root mode, use this command to join a group of selected shapes under the last selected axis.

Glue As Group

Use this command to make the selected shapes and lights the children of a new grouping shape.   When an object is a child, any manipulation of the axis of the parent will cause a corresponding manipulation of that object. See hierarchy for more information.

Glue As Child

Use this command to make the selected shapes and lights the children of the last selected shape.   When an object is a child, any manipulation of the axis of the parent will cause a corresponding manipulation of that object. See hierarchy for more information.

UnGlue

Use this command to move the selected shapes and lights back to the top of the hierarchy, such that they will no longer be children of any object. See hierarchy for more information.

Union

Use this command to combine surfaces of two shapes such that their new surface will be equivalent to the combined surface.   The surfaces stuck in-between the two shapes will be removed.   Once you use this command, it may be useful to combine the resulting shapes by the Join command or by Glueing them.

Intersection

Use this command to combine surfaces of two shapes such that their new surface will be equivalent to the intersecting surfaces.   The surfaces outside the intersection of the shapes will be removed.   Once you use this command, it may be useful to combine the resulting shapes by the Join command or by Glueing them.

Subtraction

Use this command to remove the surface of the last selected shape from the first selected shape. Once you use this command, it may be useful to combine the resulting shapes by the Join command or by Glueing them.

Select Points

Use this command to select all the component points of the selected polygons.

Extrude

Use this command on selected polygons to extrude them.   This creates a 3D effect from planar objects like pushing dough through a form.   The Extrude Dialog Box pops up for you to enter the extrude parameters.

Lathe

Use this command on selected polygons to lathe them.   This creates a 3D effect from a planar set of polygons by spinning them around their shape's z-axis.   The Lathe Dialog Box pops up for you o enter the lathe parameters.

File

Open...

Use this command to open a new shape from disk into the currently selected shape.   When you select open, a File Open Dialog Box appears to let you select the shape file to open.   The file you select will completely replace the current object.

You may only load a file into the workspace once.   If you want to have multiple, separately editable, copies of an object in one workspace, then select the object and copy it using the clipboard.

Save

Use this command to save the selected shapes to disk under their current names.   Note that when you save a workspace, all shapes in it are automatically saved.

Save As...

Use this command to save the selected shapes to disk under new names.   When you select Save As, a File Save Dialog Box will appear to allow you to select the new names.   You may not give the objects file names which are already used as file names by other objects in the workspace.

Paint...

This command functions on polygons (when in polygon mode) and on shapes (when at the root level).

For Shapes, use this command to paint the selected shape with the same material.   When you call this function, the Paint Property Page Dialog Box will appear to let you select the material to apply.   The default material in the dialog will be the material applied to the most polygons on the shape.

For Polygons, use this command to paint the selected polygons with the same material. When you call this function, the Paint Property Page Dialog Box will appear to let you select the material to apply.   The default material in the dialog will be the material applied to the last selected polygon.

Smooth...

This command functions on selected shapes.

Use this command to smooth (or facet) the selected shapes automatically. When you call this function, the Smooth Dialog Box will appear to allow you to select the type of smoothing you want.

Advanced Use:

You may also control smoothing by hand. To do this, you join and separate points in the places you want to make sharp or smooth. When points are not joined there is no smoothing. When points are joined, there is smoothing.

To join points in the exact same location into one actual point, select the points and call Object:Join. The boundary at the selected points will now be smooth.

To separate a point into two points which share the same location but are attached to different polygons, select the polygons which will form the smoothed or the non-smoothed area, then call Object:Cut and then Object:Paste. The boundary of the selection will now be sharp.

Properties

Use this command to bring up the properties page of the selection. A Property page is a unique set of editable properties available for most objects. The property page format is different for every different object type.

Property Page Dialog Box Description by Object Type:

    Shape Property Page Dialog Box
    Light Property Page Dialog Box
    Camera Property Page Dialog Box
    Point Property Page Dialog Box
    Polygon Property Page Dialog Box
    Mapping Property Page Dialog Box

Mode Menu

Add

Changes to the add tool.   This item is checked when using the add tool.

To create an object, click on the primary mouse button while in add mode.   An object will be created at the mouse position according to which editing level you're in.

Adding at the root level

When your at the root level, more than one type of object can be created.   When you click, a menu will popup to allow you to choose which type of object to create.   See The Workspace and Objects for information on the basic object types.

Add Shape:Empty - Create an empty shape

Add Shape:Open... - Open a shape from disk

Add Shape:Sphere,Cylinder,Cone,Disk,Box,Plane - Use these commands to create a shape based upon a primitive.   After determining the type of primitive to add a dialog pops up to ask you what parameters to use for primitive generation.

Primitive Parameter Dialogs:

Sphere Definition Dialog Box

Cylinder Definition Dialog Box

Cone Definition Dialog Box

Disk Definition Dialog Box

Box Definition Dialog Box

Plane Definition Dialog Box

Add Light - Add a light

Add Camera - Add a camera

Adding Polygons

When creating polygons, click on the primary mouse button for every point to add to the polygon.   If you click on an existing point, then that point will be incorporated into the polygon.   If you click in an area with no points, then a point will be created there.   To finish the polygon, reselect the add tool.   See The Workspace and Objects for information on polygon orientation.

Select/Drag

Changes to the select and drag tool.   This item is checked when using the select and drag tool.

Select

To select an object click on the primary mouse button on the object hotspot while in select mode.   The

hotspot is a small box which when deselected is black, and when selected is red.

Object Selection Box

To select all objects within a certain rectangular area, click and hold the primary mouse button in an area without any hotspots while in select mode; this spot will define one corner of the rectangle.   Now, drag the mouse to another position to define the second corner.   The selection box will be drawn as you drag the mouse.   When you drag the mouse beyond the window you clicked in, the view will pan in the direction of the mouse.   When you are satisfied with the area, release the primary mouse button.   All the objects which have hotspots within the drawn box will be selected.

Multiple Object Selection

To select more than one object at once, hold down the control (ctrl) key and individually select the objects either by individual selection of object selection box.

Object Deselection

To deselect an object, hold down the control (ctrl) key and click on the primary mouse button on the object hotspot while in select mode.

Deselecting All

To deselect all objects at the current editing level, click the primary mouse button in an area with no hotspots while in select mode.

Dragging

To drag the selected objects, click and hold on one of the selected object's hotspot with the primary mouse button while in select mode. Move the mouse and all selected objects will drag with it.   When you drag the mouse beyond the window you clicked in, the view will pan in the direction of the mouse.   Release the mouse button when finished.

Rotate

If the selected object supports rotation, then selecting this will select the rotate tool. This item is checked when using the rotate tool.   To rotate the object, click the primary mouse button and drag the mouse in the direction you want the object to rotate.

Size

If the selected object supports scaling, then selecting this will select the size tool. This item is checked when in size tool is selected.

To size the object, click the primary mouse button and drag the mouse in the direction you want the object to size.

Dragging in the positive x direction sizes the local x axis positively.
Dragging in the positive y direction sizes the local y axis positively.
Dragging in the positive z direction sizes the local z axis positively.

Zoom

Selects the zoom tool.   To zoom in, primary click and drag up in a view.   To zoom out, click and drag down in a view.

Zoom Box

Selects the zoom box tool.   In this mode, you will be able to select a rectangular area of the view to be zoomed up so that it fits appropriately in the current view.   To select the area, primary click at the position of the upper left corner and drag until you reach the lower left corner.   When you drag the mouse beyond the window you clicked in, the view will pan in the direction of the mouse.

Root

Changes to the root editing mode.   At this level, you may edit root objects such as shape axis, cameras, and lights.   This item is checked when in the root edit mode.

Point

Changes to the point editing mode of the selected shape.   At this level, you may edit the points of the selected shape.   This item is checked when in the point edit mode.

Polygon

Changes to the polygon editing mode of the selected shape.   At this level, you may edit the polygons of the selected shape.   This item is checked when in the polygon edit mode.

Mapping

Changes to the mapping editing mode of the selected shape.   At this level, you may edit the mapping axes of the selected shape.   To change the mapping type, choose Object:Properties. This item is checked when in the mapping edit mode.

Up Hierarchy

Selecting this item will move you up one level in the hierarchy, such that you could edit the parent of the currently selectable objects.

Down Hierarchy

Selecting this item will move you down one level in the hierarchy, so that you can edit the children of the selected object.

Motion
X

Select this item to toggle the ability to move the selection in the world x direction.   When this item is checked, you can move in the world x direction.   You may also click on the red wing of the world axis, which is in the corner of every view, to toggle motion in the world x direction.

Y

Select this item to toggle the ability to move the selection in the world y direction.   When this item is checked, you can move in the world y direction.   You may also click on the green wing of the world axis, which is in the corner of every view, to toggle motion in the world y direction.

Z

Select this item to toggle the ability to move the selection in the world z direction.   When this item is checked, you can move in the world z direction.   You may also click on the blue wing of the world axis, which is in the corner of every view, to toggle motion in the world z direction.

Grid Snap

Select this item to toggle grid snapping.   When this item is checked, all object motion will be limited to positions on the visual grid of the current view.

Curved Drag

Selecting this item opens the Curved Drag Dialog Box which allows you to set up curved dragging groups of points.

View Menu

Type

Allows you to select view type information for the current view.

Top

Views from the top down.   Looking in the xy plane toward the negative z axis. This is a parallel projection. It does not show perspective. It does allow editing.

Front

Views from the front toward the back.   Looking in the yz plane toward the negative x axis. This is a parallel projection. It does not show perspective. It does allow editing.

Right

Views from to right to the left.   Looking in the xz plane toward the negative y axis. This is a parallel projection. It does not show perspective. It does allow editing.

Camera

Views from a camera position.   Select the camera to view from by calling Select Camera.   This is a perspective projection type.   It does not allow editing.

Select Camera

Selects the selected camera into the current camera view

Faces Only

When checked, then objects such as cameras, lights, and shape axes will not be displayed in the view. Only shape polygons will be displayed.

Hide Back Faces

When checked, only polygons which face the camera are displayed.   It quickly displays only the most relevant polygons of individual objects.   It does not, however, remove polygons which are obscured by other objects.   This display type is useful for closed object types.   Please note that when using this mode, objects which are just 'one' sided (planes, for example)   will only be visible from one side.   This mode may significantly speed up display time.

Shaded Preview

When checked, the current camera view is displayed using a shaded preview.

Note: The shaded preview system used Intel's 3DR which can be accelerated by special hardware.

Redraw

Redraws the current view.   Vector Reality normally keeps the views in step with the actual object data,

however, sometimes the display may become corrupted.   In this case, use this command to fix the view display.

Redraw All

Redraws all views.   Vector Reality normally keeps the views in step with the actual object data, however, sometimes the display may become corrupted.   In this case, use this command to fix the view display.

Resize All

All views store their properties individually.   This allows all the views to work in completely different ways.   Many times, however, you will want to synchronize the view properties.   Chose Resize All to update all views of the same projection type such that their property page data will be the same as the current view.

Render

Select this command to render the workspace from the current camera view.   A rendering status dialog bar will appear once rendering is started.   This dialog displays a percentage complete bar, it will display: the time spent so far, the percentage complete (estimated), and the time until completion (estimated.)

You may start more than one rendering at once.   While rendering, you are free to use your computer and Vector Reality for other tasks.   A list of all current renderings in process are displayed in the drop list box.   You may select any process from this list to view its completion status.   To stop the current process, press stop.   To temporarily pause the current process, press pause.

Properties

Opens the Camera View Properties for camera views, or the Parallel View Properties for non-camera views to allow you to modify the properties of the view.

Window Menu

New

Select this command to add a new window to the current workspace.   The new windows properties will be copied from the current window.

Standard, Object, Mode, View

Selecting these commands toggles the respective tool bar on and off.   A check mark in from of the menu signifies that the tool bar is open.   Certain menu functions can be accessed via the tool bars.   When you browse over a tool bar button with the mouse, a description of the function is displayed in the status bar and a tool tip appears.   To use a tool bar, click on the picture representation of the function you want to invoke.

Tool bars may be moved by clicking in an open area of the toolbar and dragging the mouse.   Tool bars may be docked to any side of the main window by dragging them close to the edge and releasing, or they may be released in the middle of the window where they will form an independent window.

Tool Bar Function List (from left to right):

Standard Tool Bar

New, Open, Save

Object Tool Bar

Cut, Copy, Paste, Delete, Glue As Group, UnGlue

Mode Tool Bar

Select/Drag Tool, Add Tool, Rotate Tool, Size Tool, Zoom Tool, Zoom Box Tool, Root Level, Point Level, Polygon Level, Mapping Level, Down Hierarchy, Up Hierarchy

View Tool Bar

Hide Back Faces, Shaded Preview, Render View

Status

The status bar informs the user on the state of current processes and displays the current coordinates. Selecting this command toggles the Status Bar on and off.   A check mark in from of the menu signifies that the Status Bar is open.

Object List

Selecting this command toggles the object list on and off.   A check mark in front of the menu signifies that the Object List is open. The functionality of this bar is described in Object List.

The Object List may be moved by clicking in an open area of the bar and dragging the mouse.   The Object List may be docked to the left or right side of the main window by dragging it close to the edge and releasing, or it may be released in the middle of the window where it will form an independent window.

Arrange Windows

1 Custom

Select this command to arrange the windows of the current workspace into positions stored in Custom Arrangement 1.

2 Custom

Select this command to arrange the windows of the current workspace into positions stored in Custom Arrangement 2.

3 Quad View

Select this command to arrange windows of the current workspace into a quad view.   All top windows are placed in the upper left quadrant. All front windows are placed in the bottom left quadrant.   All camera windows are placed in the upper right quadrant.   All right windows are placed in the bottom right quadrant.

4 Restore

Select this command to restore all iconized windows of the current workspace into their last positions.

5 Minimize

Select this command to minimize all windows of the current workspace into icons.

Snapshot 1

Select this command to store the current windows position of the workspace into Custom Arrangement 1. Enter the name to save under in the dialog box which appears.

Snapshot 2

Select this command to store the current windows position of the workspace into Custom Arrangement 2. Enter the name to save under in the dialog box which appears.

Arrange Icons

Selecting this command organizes all icons in to an orderly pattern at the bottom of the application window.

Window List

The window list is a list of all active windows currently open in Vector Reality.   Selecting one of the windows in the list will bring that window to the top and activate it.

Help Menu

Contents

Opens the contents page of the Vector Reality help file.

Context Help Cursor

Starts Context Help Cursor Mode.   After selecting this, the mouse cursor will change to a help pointer. You may then click upon a window, select from the toolbar, or select a menu item to get help on that particular thing.

Using Windows Help

Opens the standard windows help file on using help.

Tip of the Day

Displays the Tip of the Day Dialog Box.

About Vector Reality

Opens the About Vector Reality Dialog Box.

Tip of the Day Dialog Box

The Tip of the Day Dialog Box displays useful pieces of information about the program.

Next Tip
Click to display another tip.

Show Tips at Startup
When selected, the Tip of the Day Dialog Box will appear every time you start the program.

Rendering Statistics Dialog Box

The rendering statistics dialog box displays detailed information about the last rendering which took place.

Name
Displays the name of the project which last rendered.

Start Time
Displays the time at which the rendering was started.

Elapsed Time
Displays the time spent so far in the rendering process.

Primary Rays
Displays the number of primary rays shot directly from the camera into the workspace.

Reflected Rays
Displays the number of rays reflected off of a reflective surface.

Transmitted Rays
Displays the number of rays transmitted, which is the number of rays which pass through a translucent surface.

Shadow Rays
Displays the number of times a ray was shot to determine if a point is in a shadow.

Polygon I-sect Tests
Displays the number of times all rays were tested to see if they hit a polygon in the workspace.

Polygon Intersections
Displays the number of times all rays actually hit any polygon.

Octree Intersections
Display the number of times all rays have hit any octree partition.

Octree Size

Displays the number of boxes in the octree generated for this render.

Parallel View Properties

General Tab
Modify general parallel view properties.

Name
Sets the name for the view to display in the title bar.

View Width
Sets the width the current view will display.   To dynamically change view width, see <u>Mouse Operations</u> about zooming.

World Width
Sets the width of the world according to the current view.   The sliders along side the view will only be allowed to pan inside the world width.   See <u>Mouse Operations</u> for information on panning.

Grid Size
Sets the size of the grid in the current view.   Set Grid Size to 0 to turn the grid off.

Camera View Properties

General Tab
Modify general camera view properties.

Name
Sets the name for the view to display in the title bar.

Curved Drag Dialog Box
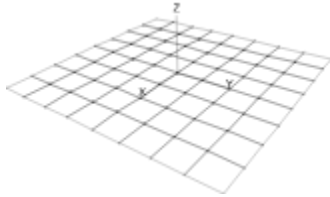
This dialog sets up curved dragging of points.   When the user selects a group of points and starts to drag them when curved drag is enabled, then the points are affected according to the distance of the points from the cursor point such that the point directly under the cursor is most affected while points which are further away are affected less and less according to either a linear, exponential, or bell function.

Curved drag only operates on the points of a shape.

Disable
Selecting this radio button disables curved drag.

Linear
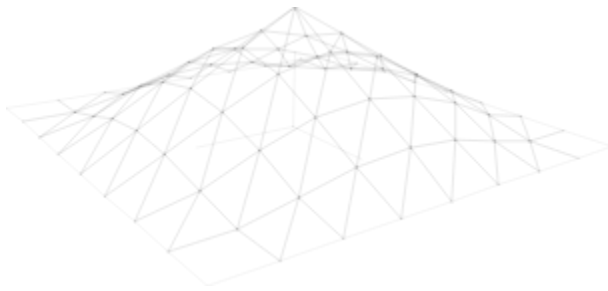
Selecting this radio button enables linear curved drag.   This forms a pyramid type shape.

Exponential
Selecting this radio button enables exponential curved drag.
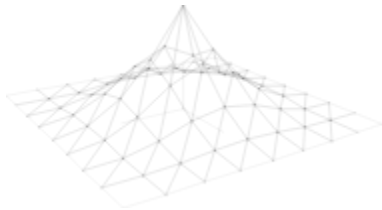
Exponents greater than 1 form pointy shapes.
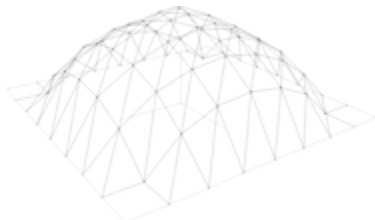
Exponents less than 1 form steep hills.

Bell

Selecting this radio button enables bell curved drag.   This forms a bell hill type shape.

Radius Of Influence

This edit box sets the maximum distance at which points will be affected in a curved drag.

Exponent

This edit box sets the exponent for exponential curved drag.

Array Dialog Box

The array dialog box allows you to specify the creation of an array of a shapes.   There are two main types of arrays: positional and rotational.   The type is selectable at the top of the dialog box.

Note
It is a good idea to keep the number values small since the number of elements generated is equal to (number in x)*(number in y)*(number in z).

Positional Array
Number:

Specifies the number of items in each direction of position.   Specifying one dimension creates a line. Specifying two dimensions creates a plane.   Specifying three dimensions creates a cube.

Spacing:

Specifies the space(in world units) between each item in each direction

Pos Jit:

Specifies the maximum amount of positional jitter(in world units) for an element in the array in each direction

Rot Jit:

Specifies the maximum amount of rotational jitter (in degrees) for an element in the array in each direction

Rotational Array
Number:

Specifies the number of items in each direction of rotation.   Specifying one dimension creates a circle segment.   Specifying two dimensions creates a spherical segment.   Specifying three dimensions creates a mess.

Spacing:

Specifies the space(in degrees) between each item in each direction

Pos Jit:

Specifies the maximum amount of positional jitter(in world units) for an element in the array in each direction

Rot Jit:

Specifies the maximum amount of rotational jitter (in degrees) for an element in the array in each direction

Point Property Page Dialog Box

General Tab

Position

X,Y,Z: Displays and allows editing of the points position in world space.

About Tab

Polygons In

Number of polygons which reference the point.

Polygon Property Page Dialog Box

About Tab

Points In Polygon
Number of points in the polygon.

Type
Determines if the polygon is concave or convex.

Workspace Property Page Dialog Box

Render Tab

The Render Tab describes the image file which renderer will create.

Group

Groups are used to organize render settings by their similarities.   Use this control to select a group of render settings.   Once you have selected a group, you can then select a render setting name using the Name control.

[Group] New...

Click on this button to create a new group of render settings.   You will be prompted to enter a name for the group.

[Group] Delete

Click on this button to delete the currently selected group.   You may only delete groups which have no render settings within them.

Name

Use this control to choose an render setting which has previously been saved.   Only those render settings within the current group are displayed.

[Name] Save As...

Click on this button to save the render setting.   You will be prompted to enter a name for the render setting.   Once you have saved an render setting, you may later re-apply it by selecting its name in the Name control.   Note that it is not necessary to save a render setting to use it.

[Name] Delete

Click on this button to delete the currently selected render setting.   Be careful when you choose this option, as you may impact other workspaces which use the current render setting.

Width

Use this control to edit the width of the image, in pixels, to be output by the renderer.

Height

Use this control to edit the height of the image, in pixels, to be output by the renderer.

Pixel Ratio

Use this control to edit the pixel ratio of the image to be output by the renderer.   The pixel ratio is the ratio of the width of a pixel over its height.   For instance, if a pixel on the output device is twice is wide as tall, then enter 2 here to create an image with the correct aspect for display.   Most display devices use

square pixels, so the pixel ratio should be 1.

JPeg Quality

Use this control to edit the quality of the JPeg file created by the renderer.   The quality range is 25 to 100, where 100 produces the best images but the worst compression, and 25 produces the worst quality images but the highest compression.

Auto Display Render

If Checked, then once a rendering is complete, the resulting image will be loaded into the Image Viewer.

Octree Limit

An octree is a device used to speed up rendering.   A large octree limit uses more memory and takes longer to build, but, on average, the overall render will take less time.   A small octree limit will use little memory and take less time to build, but, on average, the overall render will take longer.   The default, 6, will work well most of the time.   However, if you are low on memory, you may want to try 4 or 5.   If you have a lot of memory (>8Mb), are working on a fast machine, and are working on large workspaces, then you may want to raise this number to 7 or 8.

Depth Limit

The rendering process used in Vector Reality is ray tracing.   In ray tracing, light rays are reflected and transmitted.   Every time a new reflection or transmission occurs, a new ray is created, and the depth limit for that ray increases by one.   If you don't want any reflections or transmissions to occur, then set he depth limit to one.   To enable reflections and transmissions to occur, set this number greater than one. In highly reflective scenes, you will get better results by raising this number, however, as you increase this number, the rendering may take longer.

Supersampling

You may select no, low, medium, or high supersampling.   Supersampling results in higher quality images at the expense of rendering time.   Use no supersampling when rendering test images.   For the final image, it may be appropriate to select anything from low to high supersampling.   Please note that supersampling increases rendering time dramatically: if you take the time for rendering an image at no supersampling to be 1x, then the rendering time for each of the supersampling levels is as follows low: 4x, medium: 9x, high 25x.

Environment Tab

The environment tab is used to setup the background effects of a rendering.

Group

Groups are used to organize environments by their similarities.   Use this control to select a group of environments.   Once you have selected a group, you can then select a environment name using the Name control.

[Group] New...

Click on this button to create a new group of environments.   You will be prompted to enter a name for the group.

[Group] Delete

Click on this button to delete the currently selected group.   You may only delete groups which have no environments within them.

Name

Use this control to choose an environment which has previously been saved.   Only those environments within the current group are displayed.

[Name] Save As...

Click on this button to save the environment.   You will be prompted to enter a name for the environment.   Once you have saved an environment, you may later re-apply it by selecting its name in the Name control.   Note that it is not necessary to save a environment to use it.

[Name] Delete

Click on this button to delete the currently selected environment.   Be careful when you choose this option, as you may impact other workspaces which use the current environment.

Shell Size

This edit box controls the radius of the background environment shell.   The background environment shell is a large sphere centered at the world origin in which all background environmental effects are projected upon.   The default value is normally sufficient.   However, this value should always be large enough to encompass all objects within the workspace the environment is used in.

Stars

When greater than 0, stars are placed on the environment shell in front of the background color.   The higher the number, the more stars are placed on the shell.   A number of 0.1 produces just a few stars.

Positive Pole

Click on this color box to edit the background color at the positive pole (the color at the +z axis).

Horizon

Click on this color box to edit the background color at the horizon (the color at the xy plane).

Negative Pole

Click on this color box to edit the background color at the negative pole(the color at the -z axis).

Enable Poles

Check this box to have the background color change as the camera is pointed from the Positive Pole to the Horizon to he Negative Pole.   If not checked, then the entire background color is the horizon color.

Pole Tension

This edit box controls the Pole Tension.   The pole tension is a number greater than zero.   As the number goes from one toward zero more and more of the pole colors are pushed toward the horizon.   As the number goes from one up, more and more of the horizon color is pushed away from toward the poles.

Ambient Light

Click on this color to edit the color of ambient light in the environment.   Ambient light comes from every direction onto every object in the scene.   A value of 40,40,40 is normally a good value.   When set much higher, the scene becomes washed-out.

Fog Occluded/Unit

When set greater than 0, fog is placed in the environment.   This value determines the percent of 'haziness' per world unit of distance from the view position.   To set up for your scene, determine the maximum distance you want to be able to see from the camera, and set this value equal to 100/(Max Distance).

Fog Color

Click on this color box to edit the color of the fog.

Shadows

If checked, then shadows will be rendered in the environment.

About Tab

Description

Edit box which is used to store a description of the workspace.

Objects

Number of   root objects in the workspace (shapes+cameras+lights).

Shapes

Number of shapes in the workspace.

Lights

Number of lights in the workspace.

Cameras

Number of cameras in the workspace.

Points

Sum of the number of points in each shape.

Polygons

Sum of the number of polygons in each shape.

Shape Property Page Dialog Box

General Tab

Name

Edit box which is used to name the shape.   This name is used as the filename for the shape.

Location

X,Y,Z: Used to display and edit the location of the shape in world space.

Rotation

X,Y,Z: Used to display and edit the rotation (in degrees) of the shape.

Size

X,Y,Z: Used to display and edit the size of the shape.

Quick Draw

If checked, then the shape is drawn only as it's bounding box;   the underlying shape remains intact.   Use this feature if your video card is slow, and/or the shape is very large to speed up drawing time.

About Tab

Description

Used to edit a description of the object.

Shape Statistics

Points: Number of points in the shape.
Polygons: Number of polygons in the shape.

Hierarchy Statistics

Objects: Number of objects in the hierarchy which starts with the selected shape.
Shapes: Number of shapes in the hierarchy which starts with the selected shape.
Lights: Number of lights in the hierarchy which starts with the selected shape.
Points: Number of points in the hierarchy which starts with the selected shape.
Polygons: Number of polygons in the hierarchy which starts with the selected shape.

Light Property Page Dialog Box

General Tab

Name

Edit box which is used to name the light.

Color

Defines the color of the light for use in rendering.

Paint Property Page Dialog Box

Material Tab

A Material describes the surface properties of a group of Polygons within a Material Group of a Shape. The Material Tab represents a Material by dialog controls which allow the user to create custom materials.   The following controls are used:

Group

Groups are used to organize materials by their similarities.   Use this control to select a group of materials.   Once you have selected a group, you can then select a material name using the Name control.

[Group] New...

Click on this button to create a new group of materials.   You will be prompted to enter a name for the group.

[Group] Delete

Click on this button to delete the currently selected group.   You may only delete groups which have no materials within them.

Name

Use this control to choose a material which has previously been saved.   Only those materials within the current group are displayed.

[Name] Save As...

Click on this button to save the material.   You will be prompted to enter a name for the material.   Once you have saved a material, you may later re-apply it by selecting its name in the Name control.   Note that it is not necessary to save a material to use it for the current object.

[Name] Delete

Click on this button to delete the currently selected material.   Be careful when you choose this option, as you may impact other objects which use the current material.

Color

Click on this color box to edit the color of the material.

Specular

Click on this color box to edit the specular color of the material.   The specular color is the color of the reflective spot on the object.   Set this color to white for a plasticy feel.   Set this color close to the color of the material for a more 'realistic' look.

Reflect

Click on this color box to edit the reflectivity of the material.   The higher the number of any color

component, the more that color component is reflected on the surface.   When set to white, the material is perfectly reflective.

Filter

Click on this color box to edit the filter, or translucency, of the material.   The higher the number of any color component, the more that color component is transmitted through surface.   When set to white, the material is perfectly translucent.

Hardness

This edit box controls the hardness of the material.   Harder materials have smaller specular highlights, while softer materials have larger specular highlights.

Index of Refraction

This edit box controls the index of refraction of the material.   This number only affects the material if the material has some filter defined.   The area around a shape is assumed to be air.   The index of refraction of some common materials are defined below:

Index of Refraction of Some Common Materials
Air: 1.00
Water: 1.33
Salt: 1.54
Quartz: 1.55
Emerald: 1.57
Glass: 1.66
Crystal: 2.00
Diamond: 2.42

The index of refraction affects how light is bent as it passes through the surface of a material.   As light enters an area of a higher index of refraction, light is bent toward the surface normal.   As light enters an area of lower index of refraction, the light is bent away from the surface normal.

Texture List

The texture list box lists all textures applied to the current material.   Textures are described in depth in Texture System.   To select the current texture, click on it.   To edit the properties of the texture, you may double click on it.

(Texture List) Add

Click on this button to add a texture to the material.   The Add Texture Dialog Box appears to allow you to select the texture.   The property page of the texture then appears.

(Texture List) Drop

Click on this button to remove the current texture from the material.

(Texture List) Properties

Click on this button to edit the properties of the current texture.

Preview Button

Click on the preview button to generate a preview of the current material.   The preview type can be customized by modifying the Preview Type and Preview Background controls.

Preview Type

Choose Sphere to preview the material on a sphere.   Choose Box to preview the material on a box. Choose Complex to preview the material on a lens which has a checkered bar in front and in back of it.

Preview Background

Choose White to preview the material on a white background.   Choose Black to preview the material on a black background.   Choose Range to preview the material on a background which changes color from red to green to blue.

Mapping Property Page Dialog Box

General Tab
Mapping
Selects Sphere,Cylinder, or Plane mapping types for texture mapping as described in <u>Texture System</u>.

Location
X,Y,Z: Used to display and edit the location of the mapping axis in world space.

Rotation
X,Y,Z: Used to display and edit the rotation (in degrees) of the mapping axis.

Size
X,Y,Z: Used to display and edit the size of the mapping axis.

Smooth Dialog Box

Always Be Sharp

Select this option if you want your shape to have no smoothing applied.   Polygon edges will be plainly visible.

Always Be Smooth

Select this option if you want your shape have smoothing applied at every edge.   Polygon edges will be less visible.   Please note that this option will not create pleasing results for objects with sharp edges.

Be Smooth If Polygons Within Angle

Select this option if you want only those polygons which appear to approximate smooth surfaces to be smoothed.   Specify the proximity angle in the Angle control.   This option will most often create the best results.

Angle (Deg):

Enter an angle here if 'Be Smooth If Polygons Within Angle' option is selected.   Whenever any two adjacent polygons are within this angle of one another, they will be smoothed.   The default value works well in most cases.

Camera Property Page Dialog Box

General Tab

Controls general editable properties of a camera.

Name

Edit box which is used to name the camera.

Location

X,Y,Z: Used to display and edit the location of the camera in world space.

Target

X,Y,Z: Used to display and edit the location of camera target in world space.

Twist

Used to display and edit the twist of the camera in degrees.   The twist of the camera is the clockwise rotation around the line from the location to the target of the camera.

View Plane Width

The view plane width determines the width in world units which will be displayed in the camera at the view plane distance.   Increasing this number relative to the view plane distance results in a wider field of view.   Decreasing this number relative to the view plane distance results in a narrower field of view.

View Plane Distance

The view plane distance determines the minimum distance from the camera point which will appear in the camera.   Increasing this number relative to the view plane width results in a narrower field of view. Decreasing the number relative to the view plane width results in a wider field of view.

Sphere Definition Dialog Box
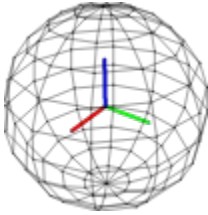
Defines a procedurally created sphere with center at the origin.

Radius

Defines the radius of the sphere, that is, the distance from the center to any point on the sphere.

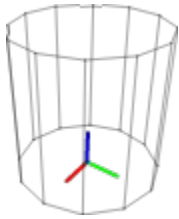### Horizontal Divisions

Defines the number of polygon divisions to divide the sphere up in to in the horizontal direction (around the z axis).   Higher numbers produce a more realistic, better curved sphere, but require more memory and time to operate upon.

Vertical Divisions

Defines the number of polygon divisions to divide the sphere up in to in the vertical direction.   Higher numbers produce a more realistic, better curved sphere, but require more memory and time to operate upon.

Cylinder Definition Dialog Box
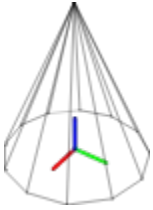

Defines a procedurally created cylinder with center at the origin.

Top Radius

Defines the radius at the top of the cylinder, that is, the distance from the center to any point on the cylinder at the top.

Bottom Radius

Defines the radius at the bottom of the cylinder, that is, the distance from the center to any point on the cylinder at the bottom.

Height

Defines the distance from the top to the bottom of the cylinder.

Number Of Divisions

Defines the number of polygon divisions around the center of the cylinder.   Higher numbers produce a more realistic, better curved cylinder, but require more memory and time to operate upon.

Close Top

If checked, the cylinder will have a closed top.

Close Bottom

If checked, the cylinder will have a closed bottom.

Cone Definition Dialog Box

Defines a procedurally created cone with center at the origin.

Radius

Defines the radius at the bottom of the cone, that is, the distance from the center of the cone to any point at the bottom of the cone.

Height

Defines the height of the cone, that is the distance from the base to the tip.

Number Of Divisions

Defines the number of polygon divisions around the center of the cone. Higher numbers produce a more realistic, better curved cone, but require more memory and time to operate upon.

Close Bottom

If checked, the bottom of the cone is closed.

Box Definition Dialog Box

Defines a procedurally created box with center at the origin.

Length
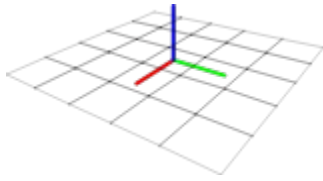Defines the length of the box, that is the distance along the x axis.

Width
Defines the width of the box, that is the distance along the y axis.

Height
Defines the height of the box, that is the distance along the z axis.

Plane Definition Dialog Box

Defines a procedurally created plane with center at the origin.

Length

Defines the length of the plane, that is the distance from the top to the bottom along the x axis.

Width

Defines the width of the plane, that is the distance from left to right along the y axis.

Length   Divisions

Defines the number of polygon divisions along the x axis.

Width Divisions

Defines the number of polygon divisions along the y axis.

Disk Definition Dialog Box

Defines a procedurally created disk in the plane z=0 with center at the origin.

Radius

Defines the radius of the disk, that is the distance from the center to any point on the disk.

Number Of Divisions

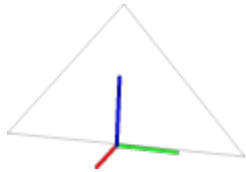Defines the number of segment divisions around the center of the disk.

Make Center Point

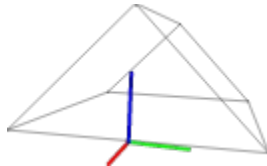If checked, the disk will have a center point connected radially to all other points on the disk.

Extrude Dialog Box

Defines how selected polygons should be extruded. An extrusion forms a 3D object out of a 2D one. For example, a box is an extrusion of a square polygon.

Example:

Starting Shape

Extruded Shape

Number Of Divisions
Defines the number of polygon layer divisions along the extrusion.

Translation
Defines the ending position of the extrusion relative to the starting position.

Size
Defines how the size of the polygons at the end of the extrusion relative to their starting size.

Rotation
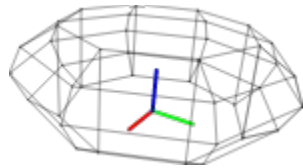Defines how to polygons are rotated at the end of the extrusion relative to their starting rotation.

Lathe Dialog Box

Defines how selected polygons should be lathed.   A lathe spins a 2D polygon to form a 3D object.   For example, a lathe of a circle positioned away from the axis is a donut shape called a torus.

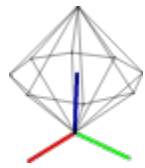Example Lathe no Sealed Center:

Starting Shape

Lathed Shape

Example Lathe with Sealed Center:

Starting Shape

Lathed Shape

Number of Divisions
Defines the number of polygon divisions of the lathe around the z axis.

Sealed Center
If checked the lathe is sealed off.   This means that the top and bottom points are unique and the last polygon segment is removed.   If sealed center is not checked, then the all parts of the polygon are used and the top and bottom points of the lathe will not be unique.

Color System

Whenever there is an editable color it is represented by a color button.   This color button is roughly square and displays the current color inside the button.   To edit the color, click on the color button.   The Select Color Dialog Box then pops up for editing.

Sometimes, it is necessary to define a range of colors.   Whenever there is an editable color range, it is represented by a color map button.   This color map button is much longer than it is tall and it displays the current color map inside the button.   To edit the color map, click on the color map button.   The   Color Map Dialog Box then pops up for editing.

Select Color Dialog Box

The select color dialog box edits a color.   In Vector Reality colors are defined by three components, Red, Green, and Blue.   The three color components are mixed together to form any possible color.   Each component ranges in value from 0 to 255 where 0 corresponds to none of that component, and 255 corresponds to the maximal amount of that component.

The current color composed in the Select Color Dialog Box is displayed top and center.

Red,Green,Blue

The red, green, and blue components are edited either by typing in the value in the corresponding edit box, or by moving the corresponding slider up or down.

Hue,Sat,Level

You may also edit the color by modifying hue, saturation, and level values.   Hue selects the type of color, saturation selects the grayness or depth of color, and level selects the brightness of the color.

Color Map Dialog Box

The Color Map Dialog Box edits a color map.   A color map is a range of colors.   The range of colors is specified by setting the color of any of 21 distinct color boxes located evenly throughout the map and by specifying how that particular color box affects the color map.

Color Boxes

The color boxes start in the top left corner of the dialog and continue to the right.   To set the current color box, click on it.   The properties of the color box are displayed at the bottom of the dialog box.   The color of it is displayed in a color button, and one of the radio buttons are selected to show its type.

Color Button

Click on this button to edit the color of the current color box.

Color Box Types

Click on a color box type to edit the type of the current color box.   A Color Box may be either Solid, Linear, or Empty.   A Color Box defined as empty does not affect the color map.   A Color Box defined as Solid colors the portion of the color map from the last defined color box to the current Color Box the color defined in the color button.   A Color Box defined as Linear colors the portion of the color map from the last defined color box to the current a range of colors varying linearly from the previously defined color to the color of the current color box.

Enter Name Dialog Box

Name

Enter the name to store under.

Help Not Available

Help is not available on that specific subject.