

3D Studio VIZ™ R2

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Using the 3D Studio VIZ Tutorials

This book is a set of seven design-oriented tutorials. The lessons that make up each tutorial provide all the step-by-step information you need to complete the work. They also help you understand the process involved and how it fits into the design objective.

If you're using 3D Studio VIZ for the first time, you should start with the two opening tutorials, "Creating a Massing Model" and "Building an Interior Model." They give you a solid grounding in the interface as well as hands-on experience with most aspects of the program.

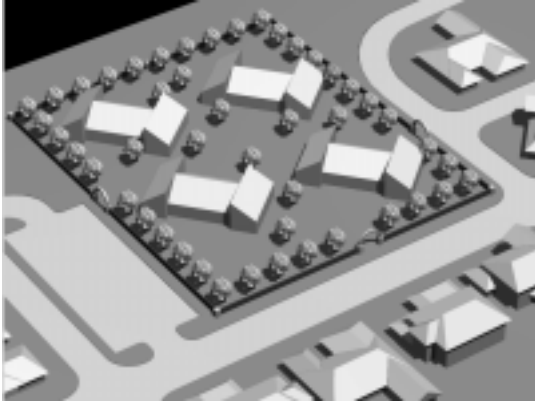
The remaining tutorials are focused on specific design tasks. They can be done in any order.

When you begin a tutorial, you typically open a setup file as a specific starting point. These setup files were copied to disk when you installed 3D Studio VIZ. You often continue from one lesson to the next, using the current scene you've created as the starting point for the next.

A sequence of startup files is provided in many of the tutorials. This means you can start a later lesson without reconstructing the scene from the beginning. This is particularly useful when you want to review a lesson at a later time.

1

Creating a Massing Model



Early in the design process, you need to be able to quickly create and assemble basic building forms for preliminary studies of form, relationship to site features, shadow casting, and other design elements.

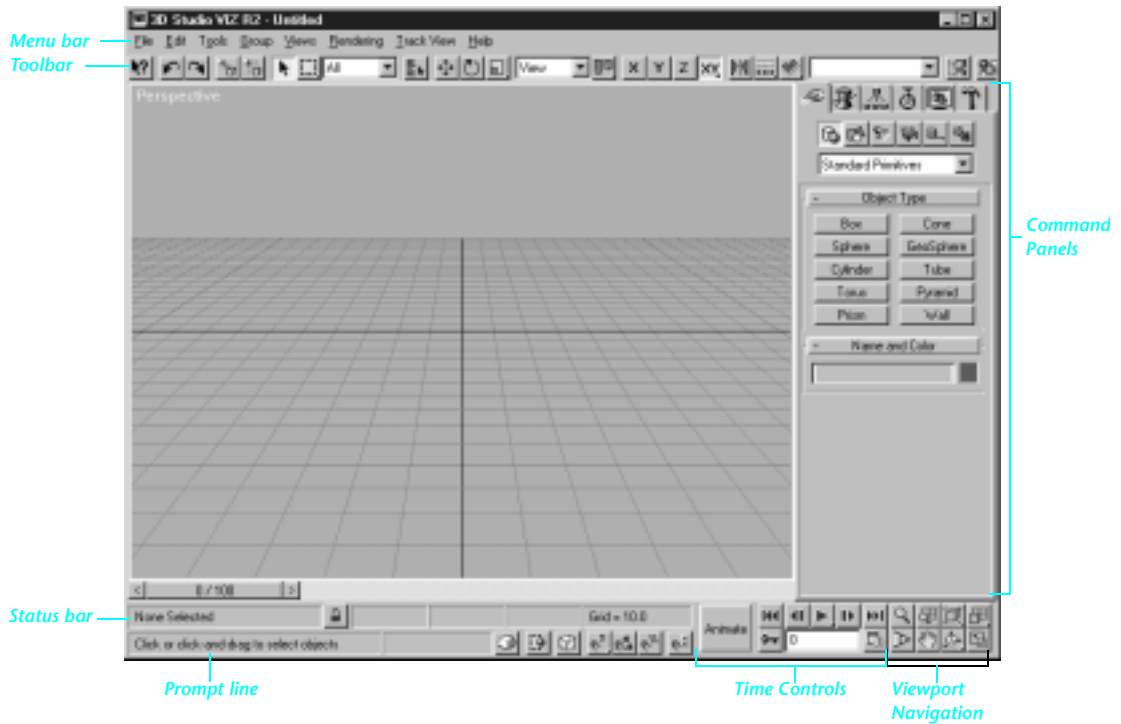
The following lessons teach you how to the develop a massing study for a suburban school campus.

Lessons in this Tutorial

If you're using 3D Studio VIZ for the first time, these lessons are designed as an introduction to the features and interface of the program. No prior experience is assumed. The lessons are:

- Reviewing the Interface
- Setting Up a Site Model
- Setting Views and Workplanes
- Creating a Building Mass
- Copying and Assembling a Building Mass
- Positioning Buildings on the Site
- Creating an Arched Entry
- Lighting the Outdoor Scene
- Creating a Camera and Rendering an Image

Reviewing the Interface



When you start 3D Studio VIZ, the initial screen is a single Perspective viewport. The background is a dark gray. For better print resolution, a light gray background is substituted in tutorial illustrations.

Interface Components

Even if you're familiar with the Windows interface, you should review the 3D Studio VIZ interface. Some components do not appear in other Windows programs.

These are the basic components of the 3DS VIZ interface:

- Menu bar
- Toolbar
- Command panels
- Time controls
- Viewport Navigation controls
- Status bar
- Prompt line

Setting Up a Site Model



As in any design project, setting up the right starting conditions is important. In this lesson, you open a file and set up the units and grid spacing for this project.

Opening a File

The following steps open the site plan model used for this tutorial.

1. On the File menu, click Open to display the Open File dialog.
2. Select the file *3dsviz2\scenes\tut0101.max*.

3. Click Open.

Four views of a residential neighborhood appear in the 3D Studio VIZ viewports

This model represents a quick site layout that could have been modeled in either AutoCAD or 3D Studio VIZ.



Setting Scene Units

The site plan model uses architectural units with no fractional inches displayed.

1. On the Views menu, click Units Setup.
 2. On the Units Setup dialog, select US Standard units.
 3. Select Feet with Fractional Inches, and select 1/1 (whole inches) for fractional precision.
 4. Click OK to change the settings.
- The changes take effect immediately.

Setting Grid Spacing

The site plan model uses a grid spacing of 1'0" with every tenth line emphasized.

1. On the Views menu, click Grid And Snap Settings.
2. Click the Home Grid tab on the dialog.
3. On the Home Grid panel, enter:
 - Grid Spacing=1'0"
 - Major Lines every Nth=10

The changes take effect immediately.

Setting Views and Workplanes



You can simultaneously view and construct your models from multiple viewing angles. 3D Studio VIZ supports orthographic projection views and custom axonometric, perspective, camera and spotlight views.

The construction plane on which objects are created is determined by either the active viewport or by custom grid objects that you create.

- Understanding Construction Planes
- Rotating a User or Perspective View
- Zooming and Panning a View

Setup

- Open the file *3dsviz2\scenes\tut0102.max*.

Steps in this Lesson

- Making a Viewport Active
- Changing a View

Making a Viewport Active

Before you can work in a viewport, you must make the viewport active. The active viewport is outlined with a white border.

To make a viewport active, do one of the following:

- Right-click in any viewport.
- Click the viewport label.

You also make a viewport active when you click to select an object. The techniques above ensure that you don't change the current selection as you activate the viewport.

Changing a View

A convenient way to change the current view in a viewport is to use the viewport shortcut menu.

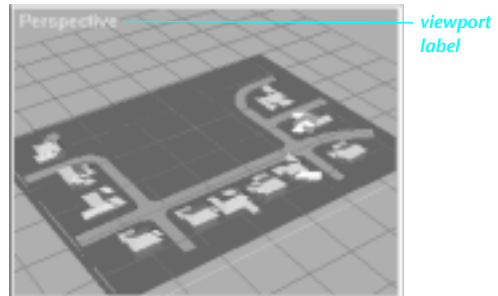
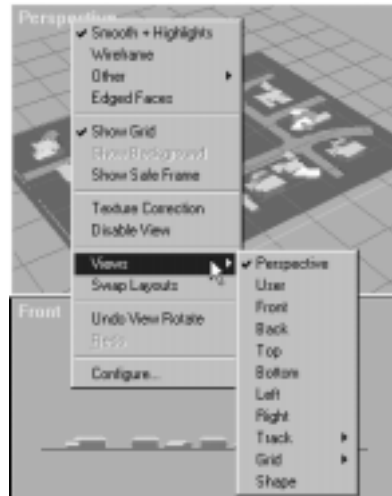
1. Right-click the active viewport label to display the shortcut menu.
2. Choose Views, then choose the view you want to use, such as Perspective, User, Front, or Top.

Using Keyboard Shortcuts

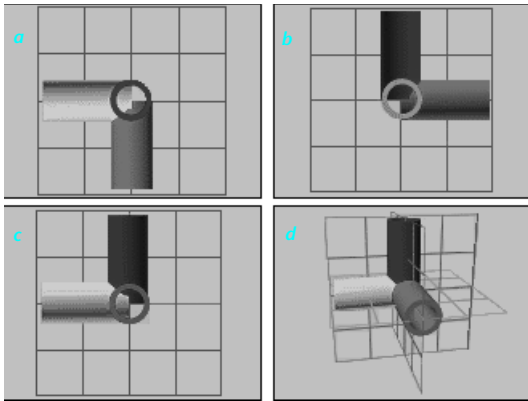
You can use keyboard shortcuts to change the view projection type by pressing the first letter of the projection name. These are typical examples:

- Pressing **T** changes the active viewport to a Top view.
- Pressing **L** changes the active viewport to Left view, **R** to Right view, and so on.

The shortcut for the Back view is **K**, because **B** is already used for the Bottom view.



Understanding Construction Planes



- a) Darkest object created in Top viewport
- b) Lightest object created in Left viewport
- c) Medium gray object created in Front viewport
- d) User view showing all three objects

Objects you create are placed on the active construction plane. The default construction plane is one of the three planes aligned with the X, Y, and Z world coordinate axes. The active view determines which plane is used as the construction plane.

- The Front and Back views use the vertical XZ plane.
- The Left and Right views use the vertical YZ plane.
- Almost all other views use the horizontal XY plane.

You can also create grid objects and assign them as custom construction planes. Working with grid objects is presented in another lesson.

Turning Grids On and Off

By default, 3DS VIZ shows only the XY plane in Perspective, Top, and User viewports. You can toggle the grid display in any viewport.

- Right-click the viewport label and choose Show Grid.

- Choose Show Grid again to toggle the current setting.

Rotating a User or Perspective View


When you convert a viewport to a User or Perspective view, the viewing angle remains unchanged.

For example, converting a Top view to a Perspective view still views your model from the top, but now a perspective projection is applied. User and Perspective views are most effective once you rotate the view.

Rotating an orthographic view like Top or Front automatically converts the viewport to a User view.

Rotating a View

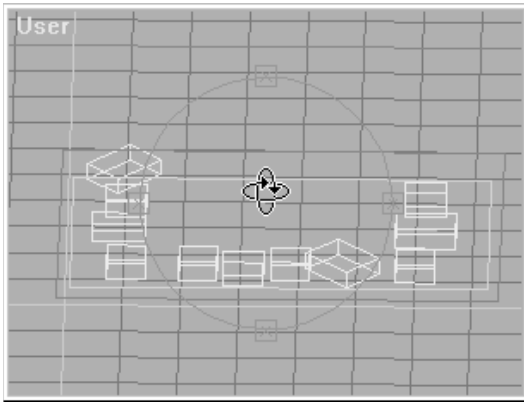
1. Make any viewport active.

2.  Click Arc Rotate Selected to display a green circle with four square handles at quadrant points.
3. Drag on the top or bottom handle to rotate the view up or down.

- If an object is selected, rotation is around the center of that object.
- If no object is selected, rotation is around the center of the scene in a Perspective viewport, or around the origin in a User viewport.



Rotation without selection is the same as Arc Rotate, a flyout button from Arc Rotate Selected.



Rotating a viewport with Arc Rotate

4. Drag on the side handles to rotate the view from side to side.
5. Drag on the circle between handles to rotate the view in both directions at once. This rotation is more fluid and harder to control.

Undoing a View Change









- Right-click the viewport label and choose Undo. In this case, the menu reads Undo View Rotate.

Zooming and Panning a View

Arc Rotate is one of the Viewport Navigation buttons. You use the other buttons to zoom, pan, and enlarge the view.



Viewport Navigation buttons

-  Click Zoom, then drag up or down in any viewport to change the magnification of the active viewport.
-  Click Zoom All, then drag up or down in any viewport to change the magnification of all viewports.
-  Click Zoom Extents to show all objects in the active viewport. A flyout from this button, Zoom Extents Selected, centers a selected object in the active viewport.
-  Click Zoom Extents All to show all objects in all viewports. A flyout from this button, Zoom Extents All Selected, centers a selected object in all viewports.
-  Region Zoom appears when an orthographic or User viewport is active. Click this button, then drag a dotted rectangle around the area of the viewport you want to magnify.
-  Field-of-View replaces Region Zoom when a Perspective viewport is active. Click this button, then drag up or down in the viewport to change the magnification.
-  Click Pan, then drag in any viewport to slide that view in any direction.
-  Click Min/Max Toggle to make the active viewport full sized. Toggle again to return to the original viewport layout. Same as the keyboard shortcut **W**.

Creating a Building Mass

In this lesson, you work with the techniques for creating and modifying an object. The design study for this neighborhood school includes four identical buildings containing classrooms and support spaces.

Each building consists of a gabled center mass and wings with shed roofs at each end. You create a simple shed-roofed building block from which the school buildings are formed.

Steps in this Lesson

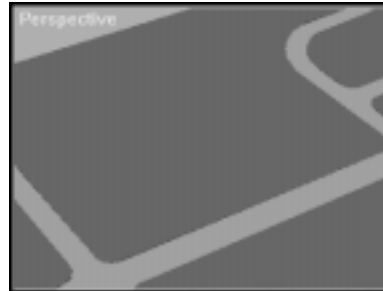
- Creating a Building Block
- Tapering the Block to Form a Shed Roof

Setup

- Open the file *3dsviz2\scenes\tut0103.max*.


If you're prompted to save changes, choose No.

The surrounding houses have been hidden in the setup file and the viewports are zoomed in close to the building site.



Creating a Building Block



1.  On the Create panel, click Box.

On the Parameters rollout at the bottom of this panel, notice the fields for Length, Width, and Height.

2. In the Top viewport, drag the box base to a Length of about 50' and a Width of about 20'.

Release the drag, move the pointer up, and click to set a Height of about 18'. (Don't worry about being precise, you'll enter exact values later.)

3D Studio VIZ assigns a default name of Box01 to the new object. You refine its dimensions and

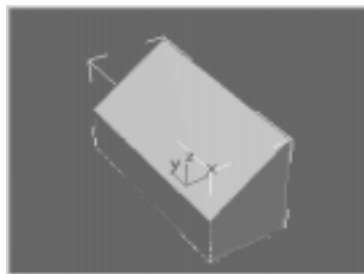
rename it in the following steps.

3. On the Create panel, on the Parameters rollout, enter the following box parameter values:

- Length=50'
- Width=20'
- Height=18'

The box resizes to these parameters.


4. On the Name And Color rollout, highlight the name Box01 and type **MassBlock01**. Press ENTER to accept the name change.



Partial building mass with shed roof

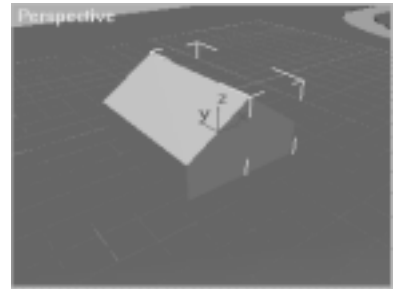
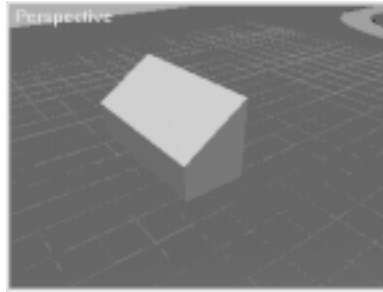
Boxes you create during this session will be called MassBlock and numbered sequentially.

Tapering the Block to Form a Shed Roof

1.  On the Modify panel, click the More button. Highlight Taper in the list of object-space modifiers, then click OK to apply the modifier.
2. Set the Taper parameters as follows:
 - Set Amount= **0.75**
 - Select X as the Primary taper axis.
 - Select Z as the Effect taper axis.

You now have a partial building mass with a shed roof. Four of these blocks connect to form one school building.

Copying and Assembling a Building Mass



You use *transforms* such as Move, Rotate, and Scale to position objects in your scene. You can also create a *clone*, or copy, of the object as it is transformed. In this lesson, you use cloning and transform commands to copy a simple building block and position the copies to form a school building.

When using transforms, you can specify the active coordinate system, center point, and axis constraints for the transform command. This lesson uses the default transform settings, so no adjustments are necessary.

Steps in this Lesson


- Mirroring the Gabled Center of the Building
- Copying and Positioning a Mass Block
- Mirroring the Second Mass Block

Setup

- Open the file `3dsviz2\scenes\tut0104.max`.

If you're prompted to save changes, choose No.

Mirroring the Gabled Center of the Building

1. In the Top viewport, click MassBlock01 to select it.
2.  On the toolbar, click Mirror.
3. On the Mirror dialog, do the following:
 - Select X as the Mirror Axis.
 - Enter **20'** in the Offset field.
 - Select Copy as the Clone Selection.
 - Click OK.


MassBlock02 is created next to MassBlock01, forming the gable.


The offset value moves a mirrored copy of the object along the X axis, measured from the edge of the original object. The two objects align exactly to form the gable.

Copying and Positioning a Mass Block

In this series of steps, you first rotate and copy a mass block. You then set up a 2D object snap using a flyout button that lets you choose among three snap options. Finally you move and snap the copy into place.



Rotating and Copying

1.  On the Prompt line, click Angle Snap Toggle to turn it on.
This restricts rotation to 5-degree increments.

2.  On the toolbar, click Rotate.
3. In the Top viewport, press SHIFT and drag down from MassBlock02 to rotate it 90 degrees.
The Clone Options dialog appears when you release the drag.
4. On the Clone Options dialog, select Copy, then click OK.
MassBlock03 is created with a rotation of 90 degrees.


Setting Up Snaps



1.  On the Prompt line, click down and hold on 3D Snap Toggle to display a flyout of three buttons.
2.  Drag along the flyout to 2D Snap Toggle and release.
The 2D Snap Toggle button now replaces 3D Snap and is automatically turned on.
3. Right-click 2D Snap Toggle to display the Snaps panel of the Grid And Snap Settings dialog.
4. On the Snaps panel, do the following:
 - Select Midpoint and Endpoint.
 - Clear Grid Points.
 - Close the dialog.


Moving into Final Position

You can precisely position the mass blocks using these snap settings. You snap the edge midpoint of one mass block to the endpoint of another.

1. On the toolbar, click Move.
2. In the Top viewport, drag from the middle of the bottom edge of MassBlock03 to the top where MassBlock01 and MassBlock02 meet.
 - As you drag MassBlock03 into position, a cyan object snap target appears indicating when the midpoint of MassBlock03 has snapped to the endpoint of MassBlock01.
 - Release when the target is aligned.
 MassBlock03 now forms one end of the building.
3.  Click 2D Snap Toggle to turn it off.

Mirroring the Second Mass Block

The final step in this lesson is to create a second mass block. This is again a Mirror operation.

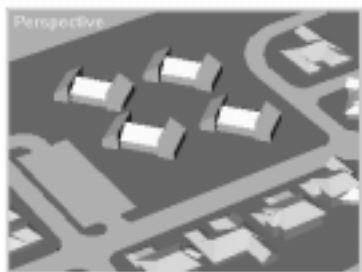
1. Click MassBlock03 to select it.
2.  On the toolbar, click Mirror.
3. In the Mirror dialog, do the following:
 - Select Y as the Mirror Axis.
 - Enter **-70'** in the Offset field.
 - Select Copy as the Clone Selection.
 - Click OK.

MassBlock04 is created at the opposite end, completing the mass model for one school building. You have now created the basic building mass for one of the four school buildings.

In the next lesson, you group these four boxes into a single building. You then make three copies of the building and position the copies on the site.



Positioning Buildings on the Site



The grouping features of 3D Studio VIZ let you collect and define an assembly of multiple objects as a single object. Groups in 3DS VIZ are equivalent to Blocks in AutoCAD.

In this lesson, you group multiple objects to define a single school building. You then make copies of the building and position them as a campus on the site.

The setup file contains the building created in the previous lesson and has a parking area added to the site.


Steps in this Lesson

- Grouping Multiple Objects as a Single Object
- Copying Groups to Form a Campus

Setup

- Open the file *3dsviz2\scenes\tut0105.max*.
If you're prompted to save changes, choose No.



Grouping Multiple Objects as a Single Object

1.  On the toolbar, click Select By Name.
2. In the Select Objects dialog, do the following:
 - Hold down the CTRL key and click the four objects named MassBlock01 through MassBlock04.
 - Click Select.
3. On the Group menu, click Group.
4. In the Group dialog, do the following:
 - Enter the name **School01** for the group object.
 - Click OK.

You have now grouped the original four objects as a new object named School01.

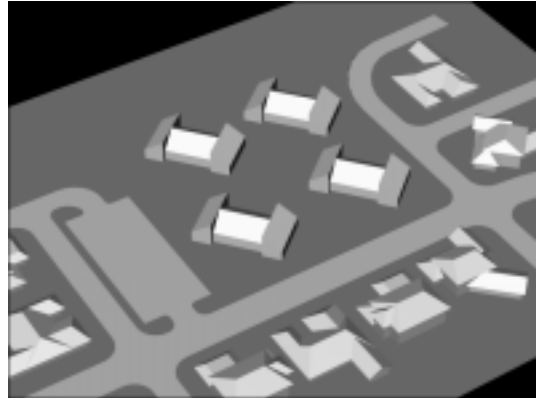
An advantage of using groups is that you can open the group and modify, add, or remove the objects in the group at any time.

Copying Groups to Form a Campus

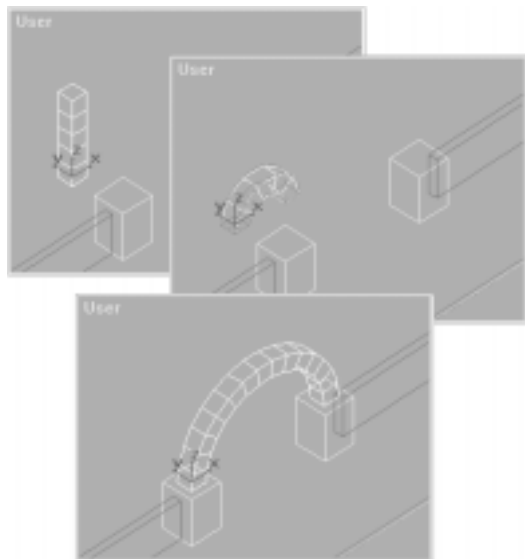
1.  On the toolbar, click Rotate.
2. Select the group object School01.
3. On the Tools menu, choose Transform Type-In to open a Rotate-specific dialog.
Using the Transform Type-In dialog, you can enter precise values rather than dragging objects to move or rotate them. As a shortcut to this dialog, you can right-click a selected transform button (Move, Rotate, or Scale).
4. In the Rotate Transform Type-In dialog, type an Offset Z axis rotation of **40.0** degrees in the right-hand column and press ENTER. Then close the dialog.
5.  On the toolbar, click Move.
6. In the Top viewport, drag School01 near the lower-right corner of the site.
7. In the Top viewport, press SHIFT and drag a clone of School01 up and to the left.
8. In the Clone Options dialog, do the following:
 - Leave the default setting unchanged. The name School02 is entered automatically.
 - Click OK.
9. Continue to press SHIFT and drag a school building two more times to create **School03** and **School04** as shown in the illustration.

You have now completed the mass model of the proposed school campus buildings.

In the following lessons, you create an arched entryway, simulate sunlight, and render an image of the scene.



Creating an Arched Entry



You use *modifiers* to change the form of an object you create. You can go back at any time and change the modifier parameters, as well as the parameters of the original object.

In this lesson, you complete an arched entry by bending a block.

Steps in this Lesson



- Bending an Arch
- Aligning the Arch with a Post

Setup

- Open the file `3dsviz2\scenes\tut0106.max`.
If you're prompted to save changes, choose No.

Bending an Arch

You first create a box to become the arch, then apply a Bend modifier.


1.  On the Create panel, click Box.
2. In the upper-right User viewport, drag the base of a box about 2' square, then release the drag. Move the pointer up, and click to set a Height of about 15'.
3. Enter the following box parameters:
 - Length=2'
 - Width=2'
 - Height=15'
 - Height Segs=5
4. Select the name of the box on the Name And Color rollout and type **Arch**.
5. Click the color swatch next to the name Arch. Choose a light tan color from the Object Color dialog, then click OK.
6.  On the Modify panel, click the More button. Highlight Bend in the list of object-space modifiers, then click OK to apply the modifier.
7. Set the Bend parameters as follows:
 - Angle=180

You now have an arch, but it is sitting on the ground.

Aligning the Arch with a Post

These steps center the base of the arch on the base of the post.

Aligning Centers

1. Click the arch to select it.
2.  On the toolbar, click Align. Then click the left post in the User viewport as the align target.
3. In the Align Selection dialog, select both X Position and Y Position alignment.
4. Select Pivot Point for both the Current Object and Target Object.
5. Click Apply to complete the alignment.

Aligning Vertically

Next you align the bottom of the arch with the top of the post.


1. In the Align Selection dialog, select the following:
 - Z Position alignment
 - Minimum for the Current Object
 - Maximum for the Target Object
2. Click Apply to set this part of the alignment.
The Arch is properly aligned with the top of the post, but is too short and rough.
3. Close the dialog.



Align Selection dialog

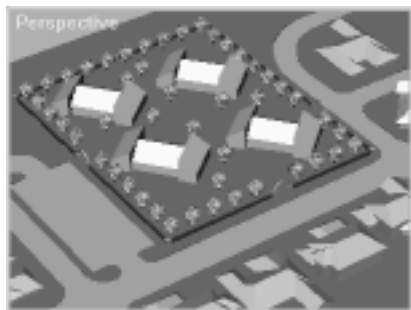
Resizing the Arch

Next you use the Modifier Stack to go back and change the base parameters of the original box.

1.  On the Modify panel, open the Modifier Stack list and choose Box from the bottom of the list.
2. Change the following box parameters:
 - Height=29'
 - Height Segs=15

The Arch is now properly sized for the fence opening.

Lighting the Outdoor Scene



In the previous lessons, objects have been illuminated by default lights. These lights are convenient while modeling and are sometimes suitable for presentations. When you need better lighting, you create light objects.

A gray diffuse light and a black ambient light illuminate a default scene. The effect is flat and lifeless; real-world light is usually colored. In this lesson, you create the following lights:

- A warm yellow sun, for late summer noon
- Deep purple-blue ambient light, for light reflected from the sky
- Dark green fill lights, for light reflected from the ground

Steps in this Lesson

- Creating a Sun
- Making Light and Shadow Adjustments
- Adding Fill Lights
- Test Rendering the Scene


Setup

- Open the file *3dsviz2\scenes\tut0107.max*.

If you're prompted to save changes, choose No.

Creating a Sun

Sunlight in 3DS VIZ is a system that positions a directional light at the correct angle for a given date, place, and time of day.

1.  On the Create panel, click Systems, then click Sunlight
2. In the Top viewport, click down in the center of the campus, drag slightly to create a compass rose, then release to set the rose.
3. Continue dragging toward the edge of the viewport.
A yellow light icon representing the sun moves away from the compass rose.
4. Near the edge of the viewport, click to set the light. If you happen to drag the light out of the viewport, you can click anyway.
The light is now attached to the center of the compass rose by ray lines.
5. On the Create panel, set the following Control Parameters:
 - Hours = **12**
 - Mins = **0**
 - Secs = **0**
 - Month = **8**
 - Day=**25**
 - Year = **2000**


- Click Get Location to display the Geographic Location dialog, then select San Francisco CA, and click OK.

The sun shifts over the site to correspond to the parameters you set.

Making Light and Shadow Adjustments

Shadows are cast only in areas covered by the hotspot/falloff cone of the directional light. Increasing the Hotspot size casts shadows over the entire school yard.

Increasing the Shadow-Casting Area

-  Open the Modify panel to display the General Parameters rollout for the light object.
- In the Directional Parameters area, do the following:
 - Select Show Cone.
 - Set Hotspot = **300'**

Setting the Color of Sunlight

- Click the gray color swatch next to the Exclude button.
- On the Color Selector: Light Color dialog, specify a light yellow-gray color by entering the following:
 - Red = **195**, Green = **195**, Blue = **170**
- Click OK.

Setting the Color of Ambient Light

Ambient light determines the color of shadows.

- On the Rendering menu, choose Environment.



- On the Environment dialog, in the Global Lighting area, click the color swatch under Ambient.
- On the Color Selector: Ambient Light dialog, specify a deep purple color by entering the following:
 - Red = **80**, Green = **45**, Blue = **125**
- Click Close, then close the Environment dialog.

Adding Fill Lights



Fill lights help reduce the sharp contrast of sunlight and shadow and add a sense of light diffused in the atmosphere.

Creating an Omni Light


-   On the Create panel, click Lights, then click Omni.
- In the Top viewport, click outside the lower-left corner of the site plan.

3. On the Create panel, on the Name And Color rollout, select the name of the light and type **Fill01**.

Improving the Color

1. On the General Parameters rollout, click the gray color swatch next to the Exclude button.
2. On the Color Selector: Light Color dialog, specify a dark green color by entering the following:
 - Red=20, Green=30, Blue=10
3. Click OK.

Positioning and Cloning the Omni Light

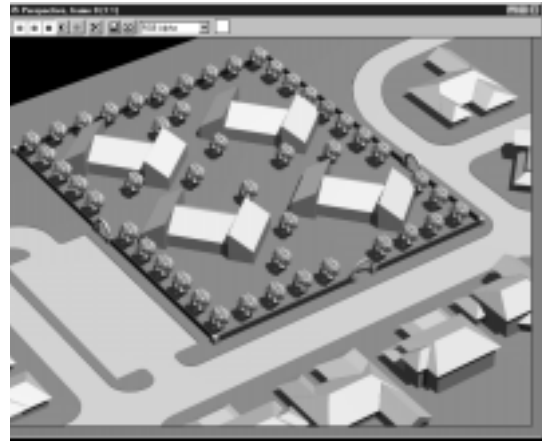
1.  On the toolbar, click Move.
2. In the Top viewport, press SHIFT and drag the Fill01 light to another corner of the site plan.
3. Select Instance on the Clone Options dialog, then click OK.
4. Repeat step 2 and 3 until there is a Fill light at each corner of the site.


Simulating Ground Reflections

As a final step, you move the lights below the ground so the light they cast simulates light reflected from the grass.

1. Press CTRL and click each Fill light to select all four.
2. On the Tools menu, choose Transform Type-In, and enter Offset Z=-1000'.
This moves the omni lights far below the surface of the site and out of all viewports.
3. Close the dialog.

Test Rendering the Scene



1. Right-click the Perspective viewport to make it active.
2.  On the toolbar, click Quick Render.

Creating a Camera and Rendering an Image

Once you've built a model, you often need to present it to others. You can present your work using 3D Studio VIZ and take advantage of the ability to make changes on the spot and view the changes in a rendered viewport. Or you can save a rendered image to a file so you can view or print it later.

In any case, a camera view is essential for framing the view you want to present.

Steps in this Lesson

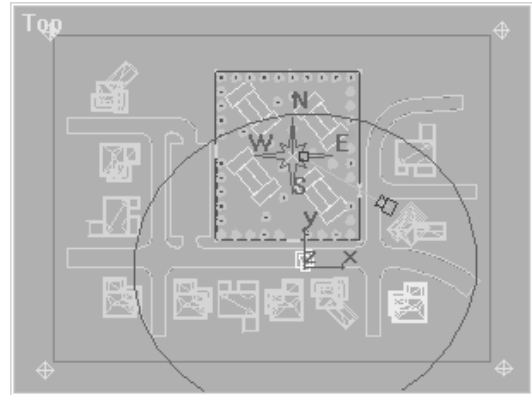
- Creating a Camera
- Changing to a Camera Viewport
- Specifying a Background Color
- Rendering an Image

Setup



- Open the file *3dsviz2\scenes\tut0108.max*.

If you're prompted to save changes, choose No.

Creating a Camera




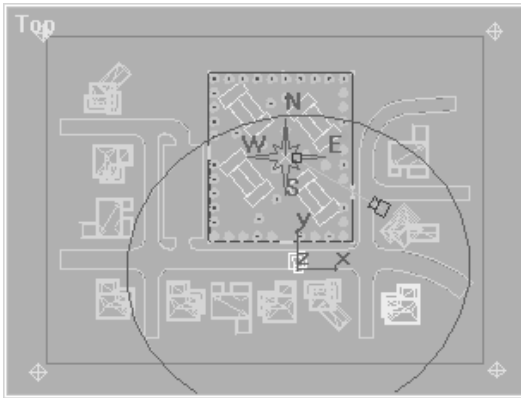
This step uses a fairly wide-angle lens of 35mm, good for capturing a broad view. In other cases, to get a view closer to the human eye sees, try a 50mm lens setting.

1.   On the Create panel, click Cameras, then click Target.
2. In the Top viewport, drag from the middle-right street corner to the center of the school yard. Aim the target so its connecting line to the camera crosses the arch on the right side of the school yard.
3. On the Name And Color rollout, highlight the name Camera01 and enter a descriptive name: **View from East of Site**.
Renaming cameras as you create them is a good practice, since you might use any number of cameras to capture different views of a scene.
4. On the Create panel, click 35mm from the Stock Lenses.

Adjusting the Camera Height

The vertical offset in this step raises the camera and the camera target to a typical person's eye level.

1. In the Top viewport, right-click the camera and click Select Target.
2.  On the toolbar, click Move.
3. Right-click Move to display the Transform Type-In dialog. Enter Offset Z=5'6", then close the dialog.



Changing to a Camera Viewport



You view your virtual scene through the “lens” of a camera viewport, much as you would view a physical scene through the lens of a film or video camera.

1. Right-click in the Top viewport to make it active.
2. Make sure the camera *View from East of Site* is selected.
3. Press **C** to convert the viewport to a Camera view.

The viewport label reads *View from East of Site*, and the view is now through this camera.

4. Right-click the viewport label and click Smooth + Highlight.

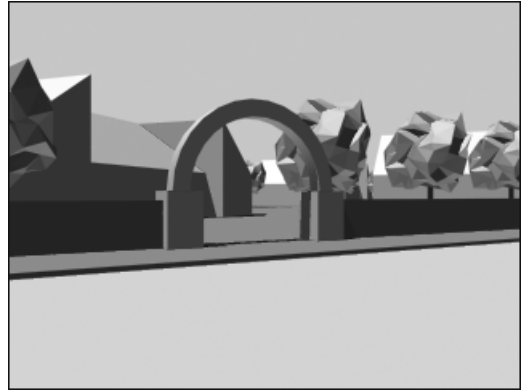
Specifying a Background Color

By default, 3DS VIZ renders a scene with a black background. You might want a more realistic color, or one that shows details better.

1. On the Rendering menu, choose Environment.
2. On the Environment dialog, click the color swatch under Background Color.
3. On the Color Selector: Background Color dialog, specify a sky blue color by entering the following:
 - Red=**90**, Green=**155**, Blue=**210**
4. Click Close, then close the Environment dialog.


Note: Specifying a background color changes only the rendering background. The color of the viewport background is not affected.

Rendering an Image



This is the step that creates a finished visualization.

This lesson uses the default rendering settings for rendering a single file at a resolution of 640x480 pixels. You specify a file type and name in which to save the rendered image.

1. Right-click in the View From East Of Site viewport to make it active.
2.  On the toolbar, click Render Scene.
3. On the Render Scene dialog, click Files under Render Output. This lets you specify a file name and file type for the output.
4. On the Render Output File dialog, do the following:
 - Select Targa Image File from the List Files Of Type list.
 - Enter **Eastview** in the File Name box, then click OK.

A Targa Image Control dialog appears.

- Click OK to dismiss the both dialogs.

5. On the Render Scene dialog, click Render.

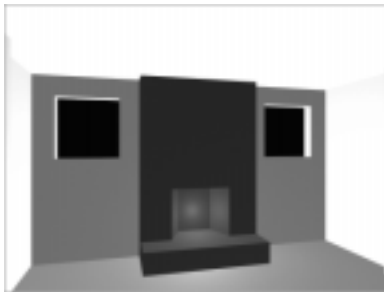
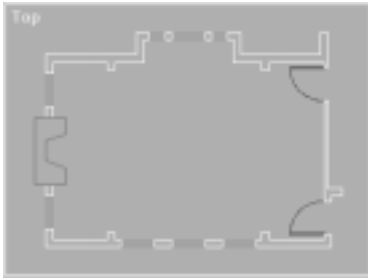
Your rendered image appears on screen and is also saved to the file *eastview.tga* in the default Images folder.

Try rendering other viewports by making them active and clicking Render Scene again.

- Change the file name each time if you want to save the images.

2

Building an Interior Model



Plan view and rendered finished fireplace.

Three-dimensional computer models are useful in all stages of design and presentation. Using 3D models, you can explore and study a space more effectively than trying to visualize it from 2D drawings, and you can share your ideas more easily with others.

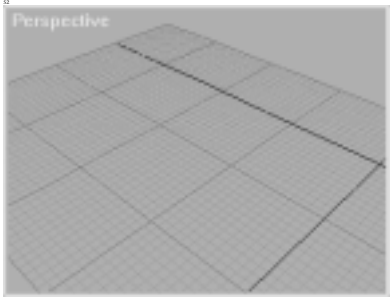
3D Studio VIZ is a flexible design tool, allowing many different approaches to creating models. One common technique is to lay out a 2D plan, and then convert that plan to a 3D model. In the following lessons, you use this approach to build a medium detail interior model for a residential living room. When you complete these lessons, you'll have a basic understanding of the following procedures:

- Extruding a 2D floor plan imported from AutoCAD.
- Constructing sills and headers for windows and doors.
- Inserting parametric windows and doors.
- Moving and scaling geometry to create a complex object.

Lessons in this Tutorial

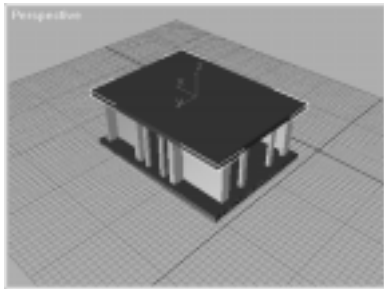
- Creating 3D Walls from a 2D Floor Plan
- Framing Window and Door Openings
- Installing Windows and Doors
- Constructing a Fireplace

Creating 3D Walls from a 2D Floor Plan



You can import your 2D plans into 3D Studio VIZ and extrude them to form walls. The wall extrusion height is a parameter that you can easily change to experiment with various wall heights.

In this lesson, you import an AutoCAD 2D floor plan, extrude the plan, and create floor and wall plates to form the shell of a residential living room.



Steps in this Lesson

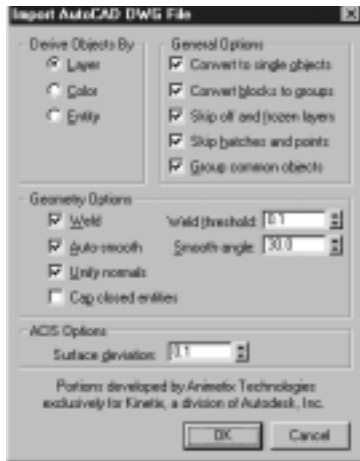
- Importing the 2D Plan
- Extruding the Plan to Form Walls
- Creating Floor and Ceiling Plates

Setup

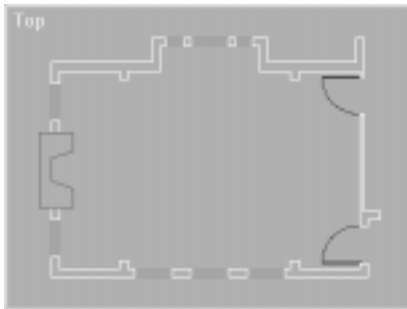
- Open the file *3dsviz2\scenes\tut0201.max*.

This is an empty file with preset units and grid spacing. You import an AutoCAD drawing into this file.

Importing the 2D Plan



Import AutoCAD DWG File dialog



Plan view of AutoCAD drawing

Import is a one-time operation that merges an AutoCAD drawing or other supported file type into a 3D Studio VIZ scene. The Import feature is suitable for providing a fixed floor plan or other static geometry.

In cases where you want updates in the AutoCAD drawing to change the geometry in the 3DS VIZ scene, you use DWG Link Manager, located on the Create panel under Utilities. See Online Reference and the *3D Studio VIZ User's Guide* for details.

1. On the File menu, click Import to display the Import File dialog.
2. On this dialog, from the Files Of Type list, choose AutoCAD (*.DWG).
3. Highlight the file `3dsviz2\Meshes\tut0201.dwg` and click Open.
4. On the DWG Import dialog, accept the default option, "Merge objects with current scene," by clicking OK.
5. On the Import AutoCAD DWG File dialog, accept all defaults by clicking OK.

The AutoCAD floor plan is now loaded into the scene.

Extruding the Plan to Form Walls

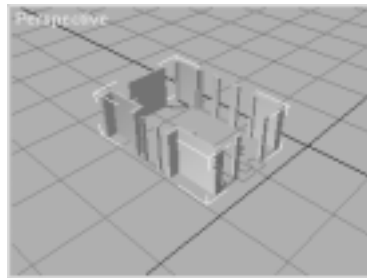
In this step, you extrude the imported wall lines to form 3D walls.

1. In the Perspective viewport, select the wall object, WALLS.01.
2. On the Modify panel, on the Modifiers rollout, click Extrude.
This applies the Extrude modifier to the entire wall object.
3. On the Parameters rollout, set the following value:
 - Amount = 9'
4. Press ENTER to assign the value and create the walls.

The wall height is *parametric*, meaning you can change the Amount value at any time by selecting the wall object and opening the Modify panel.

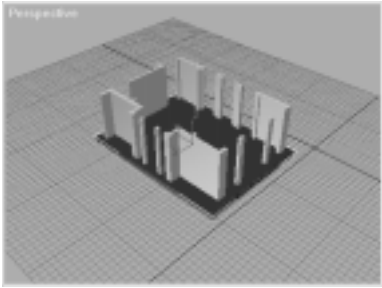


Extrude parameters rollout



Extruded walls in Perspective viewport

Creating Floor and Ceiling Plates





Perspective viewport with floor plate only

Now that you have extruded the walls, you need to create floor and ceiling plates to enclose the room.

In the following steps, you create simple box objects for the floor and ceiling. You first make the floor plate, then move a copy of it to create the ceiling plate. This technique uses very few faces and is appropriate when you only render interior views.

Creating the Floor Plate

The floor plate is a slab that extends around the outside of the walls. The dimensions are not critical, because the model is designed for interior views only.

1.  On the status line, click 2D Snap Toggle to turn it on. This button is a flyout on 3D Snap Toggle.
2.  On the Create panel, click Box.
3. In the Top viewport, do the following:
 - Click down on a grid point beyond the lower-right corner of the wall. A blue square with crosshairs indicates the current grid point.

- Drag diagonally to a grid point beyond from the upper-left corner. In doing this, you enclose the plan in a rectangle.

- Release the mouse button and drag downward. Watch the Height field on the Parameters rollout. Click at a distance of **-1'0"** to complete the box.

If you click at another distance, type the correct Height on the Parameters rollout and press ENTER.


4. Select the name of the box on the Name And Color rollout and type **Floor**.
5. If you want to change the color of the floor to make it more visible, do the following:
 - Click the color swatch next to the name to display the Object Color dialog. Select a lighter color and click OK.

Creating the Ceiling Plate

The floor plate should still be selected. If not, select it now.

1. Right-click in the Front viewport to make it active.
2. From the Edit menu, choose Clone to display the Clone Options dialog. On this dialog, do the following:
 - Select Copy.
 - Enter the name **Ceiling**.
 - Click OK.

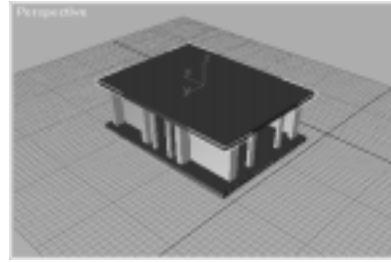
An exact copy is overlaid on the Floor. The name on the Name And Color rollout changes to Ceiling.

3.  On the toolbar, click Move.
4. From the Tools menu, choose Transform Type-In.
5. On the Transform Type-In dialog, enter **10'** in the Absolute World Z field, then close the dialog.



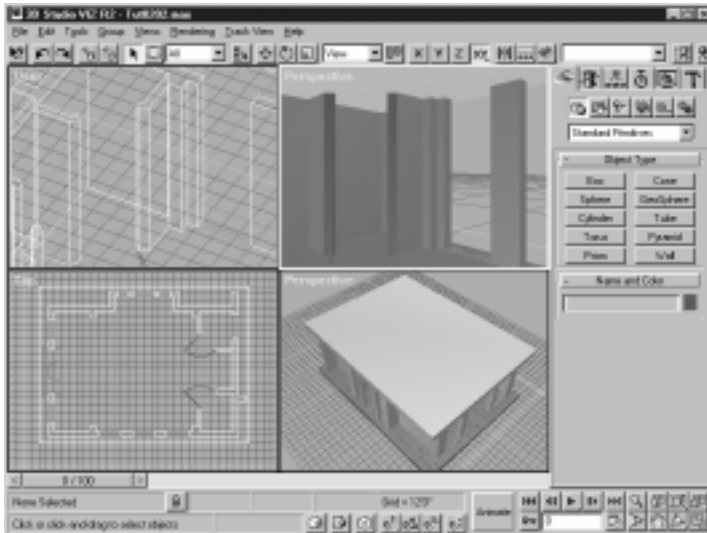
Move Type-in Transform dialog

The Ceiling now sits exactly on the top of the walls.



Perspective viewport with floor and ceiling plate

Framing Window and Door Openings



After extruding a floor plan, you have full height openings where the doors and windows are located in the plan.

In this lesson, you use snaps to precisely fit sills and headers into the openings. You fill in a window opening for a 30" sill height and a 66" tall window, and you place a door header for a 7'0" door.

In the next lesson, you snap a window and a door into these openings.

Steps in this Lesson

- Setting Up the Scene
- Framing a Window
- Framing a Door

Setup

- Open the file *3dsviz2\scenes\tut0202.max*.

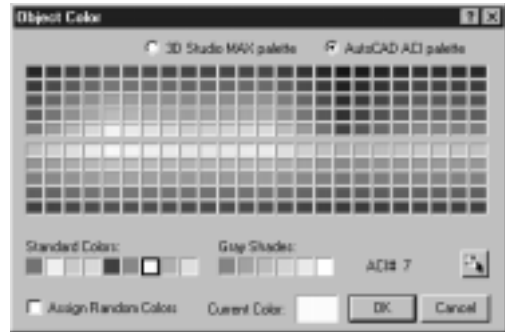
Setting Up the Scene



Snap panel



Freeze rollout




Object Color dialog with Assign Random Colors cleared

In a 3D Studio VIZ project, as in other design projects, you need to set up certain initial conditions to make sure you get the results you want.


In these steps, you select a set of snaps to use and then *freeze* some objects so they won't interfere with your work. You also set the color so the headers and sill match the walls when rendered.


Setting Snaps

1.  On the status Line, click 3D Snap Toggle to turn it on.
2. Right-click the same button to display the Snaps panel on the Grid And Snap Settings dialog.
3. On the Snaps panel, do the following:
 - Select Endpoint and Vertex.
 - Clear Grid Points.
 - Close the dialog.

Freezing Unnecessary Objects

The following steps prevent snapping to objects other than the walls. Frozen objects are visible but cannot be selected.

1.  On the toolbar, click Select By Name to display the Select Objects dialog.
2. On the Select Objects dialog, select WALLS.01 from the list, click Invert below the list, then click Select.
This step selects all the objects except WALLS.01.

3.  On the Display panel, expand the Freeze rollout, then click Freeze Selected.
All objects except the walls turn a dark gray in Perspective viewports to show they are frozen.

Setting Object Color

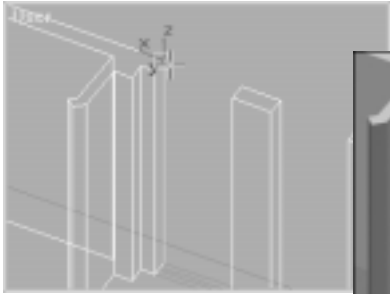
By default, 3DS VIZ assigns random colors to each new object you create. You can choose a uniform color for this purpose, in this case to match the walls.

1. On the toolbar, click Select By Name and select WALLS.01.
2. At the top of the Display panel, click the color swatch next to WALLS.01. This displays the Object Color dialog.

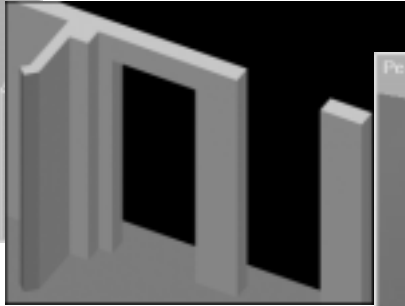
Notice that the Current Color is white. You want to use this same color.

3. Clear Assign Random Colors and click OK.
Until you change this setting, created objects will continue to use white as the default color.

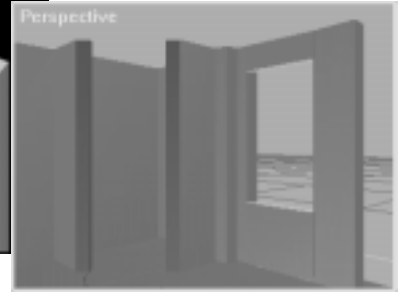
Framing a Window



User viewport showing first snap



Perspective rendered viewport showing completed header




Perspective shaded viewport showing completed header and sill

In this step, you frame a window opening by snapping boxes between extruded walls to create a header and sill. This technique makes it easy to change the height of the window opening by changing the height parameter of either box.

Creating a Window Header

You create the window header by placing a box with its base at the top of the opening with a negative height down to the window head height.

1.  On the Create panel, click Box.
2. In the User viewport, place the cursor near the top outside corner of the window opening and press the mouse button when the corner highlights.
3. Drag to the opposite top inside corner. When the opposite corner highlights, release the mouse button.

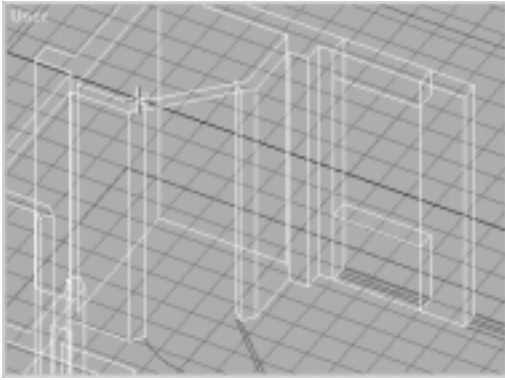
4. Move the mouse down and click to set a height of about **-1'0"**
5. On the Create panel, if necessary, enter exactly **-1'0"** in the Height field.

Creating a Window Sill

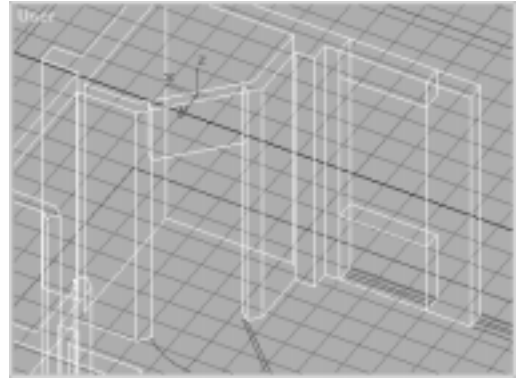
This step is similar to creating the window header. On the Create panel, Box should still be turned on.

1. In the User viewport, place the cursor near the bottom outside corner of the opening and press the mouse button when the corner highlights.
2. Drag to the opposite bottom inside corner. When the opposite corner highlights, release the mouse button.
3. Move the mouse up and click to set a temporary height of **2'0"** or **3'0"**.
4. On the Create panel, enter exactly **2'6"** in the Height field to complete the sill.

Framing a Door







Detail of top of door opening with rectangle drawn



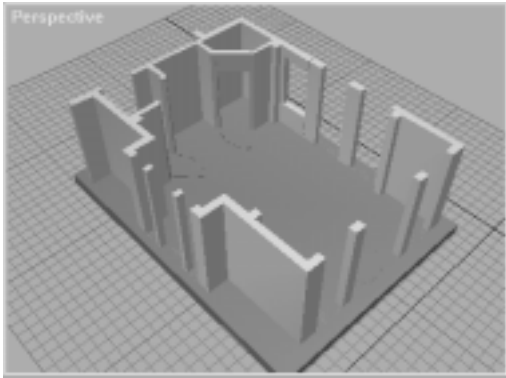
Detail of top of door opening with extruded header

You need to use a different technique to frame the door, because the opening is not square to any construction plane. In the following steps, you use snaps to draw a closed line around the opening and then extrude the line downward to form a header.

Creating a Door Header

1.  Make sure 3D Snap Toggle is turned on.
2.   On the Create panel, click Shapes, then click Line.
3. In the User viewport, do the following to create the closed line:
 - Place the cursor near a top corner of the angled door opening and click when the corner highlights.
 - Draw a rectangle by moving to the remaining corners and clicking when each corner highlights.
 - Click the same corner where you started. A Spline dialog appears. Click Yes to close the spline.
4.  Open the Modify panel, then click Extrude.
5. On the Parameters rollout for Extrude, in the Amount field, enter **-2'0"**.
The line is extruded downward to complete the header.
6. At the top of the Modify panel, rename the header (called Line01 by default) to read **Door header**.

Installing Windows and Doors



Perspective viewport with ceiling hidden

Now that you've roughed in the openings, the next step is to hang a window and door. In this case, the window is sliding, and the door is hinged on one side. The process is the same for any kind of window or door.

Steps in this Lesson

- Installing a Sliding Window
- Installing a Pivot Door


Setup

- Load the file `3dsviz2\scenes\tut0203.max`.

The scene shows a window and door opening on one wall.

Setting Snaps

It's good practice to check snap settings before beginning a modeling task. The following setting should be effect for this lesson:

1.  On the status line, check that 3D Snap Toggle is on.


2. Right-click the same button to display the Snap panel on the Grid And Snap Settings dialog. On this panel, make sure the following are set:

- Endpoint and Vertex are selected.
- Grid Points is cleared.

3. Close the dialog.

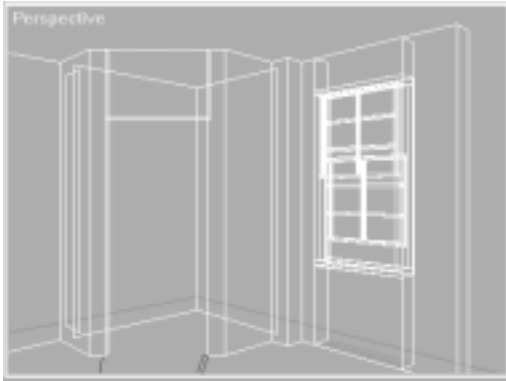
Looking Into the Model

To see the rendered interior of the model, you need to hide the box that forms the ceiling.


1.  Open the Display panel. On the Hide rollout, click Hide By Hit. In this context, Hit means *selecting an object*.
2. In the lower Perspective viewport, click the ceiling object to hide it.
The ceiling disappears in all views, as if you removed a piece of a physical model.

You don't notice the difference in the wireframe User and Top viewports, but you do in the rendered Perspective viewport.

Installing a Sliding Window




Perspective viewport with window in place and open

1.  On the Create panel, open the list of geometry types and choose Windows.
2. On the Object Type rollout, click Sliding.
On the Creation Method rollout, the default method is Width/Depth/Height. This is the order in which you drag out the dimensions of the fixed window.
3. In the User viewport, do the following:
 - Click down at the inside lower-left corner of the window opening.
 - Drag across to the inside lower-right corner and release to create the width of the window.
 - Without clicking, continue dragging to the outside lower-right corner and click. The window is now set to the width and depth of the frame.
 - Drag upward to one of the upper-right corners and click to insert a sliding window in the framed opening.

The window is assigned a random color, and is opaque. In a later lesson, you learn how to add realistic materials to a window, including transparent glass.

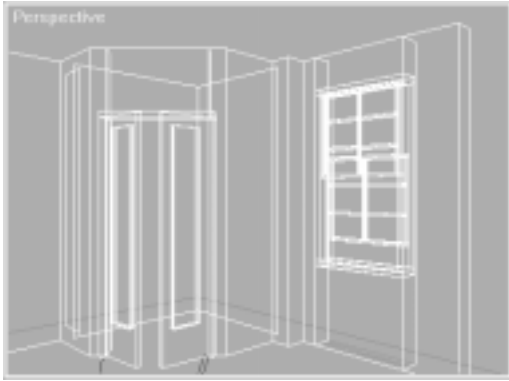
Adjusting Window Parameters

The new window should still be selected. You can set parameters from the Creation panel, but it's generally good practice to do this from the Modify panel when you're making a number of changes.

1.  Open the Modify panel. This turns off creation mode. No snaps are active now.
2. On the Parameters rollout, in the Rails And Panels area, change the number of horizontal and vertical panels:
 - # Panels Horiz=2
 - # Panels Vert=3
3. In the Open Window area, drag the Open spinner upward to open the window.
By default, the window is single-hung and slides vertically.
4. Clear the Hung check box to open the window horizontally.

The window updates as you make these changes. Experiment with other parameters.


Installing a Pivot Door



Perspective viewport with doors open outward

In this step, you insert a side-hinged door, convert it to double doors, adjust the swing, and then animate the opening and closing.


Continue on from the previous step, “Installing a Fixed Window.” The ceiling should be hidden, and no objects frozen. You install the door in the angled wall where you added a door header in an earlier lesson.

1.  Open the Create panel. On the list of geometry types, choose Doors.
2. On the Object Type rollout, click Pivot.
On the Creation Method rollout, the default method is Width/Depth/Height, just as it is for Windows.
3. In the User viewport, do the following:
 - Click down at the inside lower-right corner of the opening in the angled wall.
 - Drag across to the inside lower-left corner and release to create the width of the door.

- Without clicking, continue dragging to the outside lower-left corner and click. The door is now set to the width and depth of the frame.
- Drag upward to one of the upper-right corners and click to insert a paneled door in the framed opening.

By default, doors are closed when inserted. Opening the door is one of many possible parameter adjustments.

Adjusting Door Parameters

1.  Open the Modify panel.
2. On the Parameters rollout for this door, drag the Open spinner upward to open the door.
The door opens into the room.
3. Select Flip Swing.
The door now opens into the corner space.
4. Select Double Door. The door is now split into two paneled doors.
5. Clear Flip Swing so the door opens into the room again.

There are two parameter rollouts for doors. All settings are interactive.

Using a Shaded Viewport

Before experimenting with different settings, switch to a shaded viewport.

1. Right-click the label of the Perspective viewport and choose Smooth + Highlight on the shortcut menu.
2. If the details on the door are hard to see, select a lighter color.

- On the Name And Color rollout, click the color swatch next to PivotDoor01 and choose a light yellow or green.

In default gray lighting with black ambient light, the color you choose will appear darker.



In the shaded viewport, you might see ragged colors along the frame when the door is open. These will not appear when the scene is rendered.

Animating the Doors

In this 100-frame animation sequence, you begin with closed doors, open them wide, and close them again.

1. Set the Open field to **0** so the doors are closed.
2. Make sure the lower-right Perspective viewport is active.
3. Turn on the Animate button at the bottom right of the screen. The button turns red, along with the border around the active viewport.
4. Drag the Time slider, located just below the viewports, so it reads 50/100. This moves the animation to frame 50.
5. Increase the Open field to about **130** degrees so the doors swing wide.
6. Move the Time slider to frame 100 and reset the Open field to **0**.
The doors are closed as they were at frame 0.
7. Turn off the Animate button.

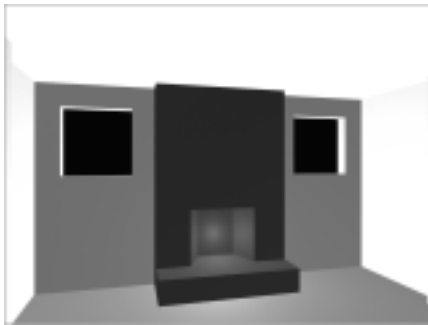
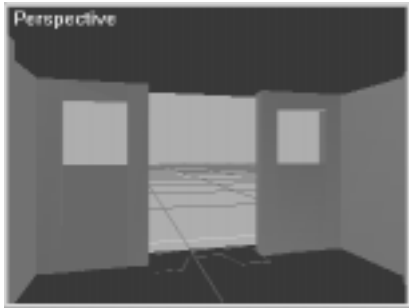
Playing the Animation

1.  Click the Go To Start button, located to the right of the Animate button.
2.  Click the Play Animation button. The button highlights and becomes the Stop Animation button. Playback begins.
Running like a continuous loop of film, the animation shows the doors opening over the first 50 frames and closing over the second 50 frames.
3. To end playback, click the Stop Animation button.

Changing Parameters and Viewports

During playback, you can change door parameters and see the animated effects. You can also right-click in another viewport to see the animation running in that view.

Constructing a Fireplace



Initial viewport and then the finished fireplace rendered

You can gain great control and precision over your modeling process when you use *sub-object* modeling techniques. When sub-object mode is active, you can edit the vertices, faces, splines, and other components that make up an object.

In this lesson, you construct a fireplace from a Box object by editing faces and vertices in sub-object mode.

Steps in this Lesson


- Creating the Fireplace Mass
- Setting Up for Sub-Object Modeling
- Forming the Geometry
- Extruding the Hearth
- Extruding and Scaling the Firebox
- Adding a Firelight Effect

Setup

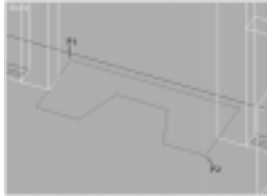
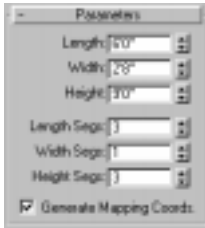
- Open the file `3dsviz2\scenes\tut0204.max`.

Setting Snaps

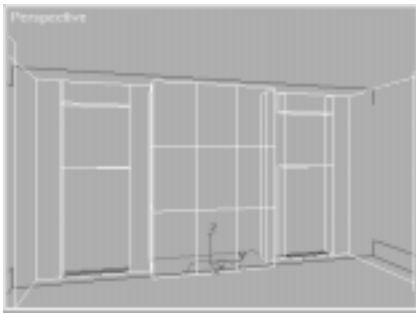
As in previous lessons, choose the snaps to use:

1.  On the status line, click 3D Snap Toggle to turn it on.
2. Right-click the same button to display the Snap panel on the Grid And Snap Settings dialog. On this panel, do the following:
 - Select Endpoint.
 - Clear Grid Points.
 - Close the dialog.

Creating the Fireplace Mass



Points used in creating the box




Perspective viewport with finished box

A red outline of a fireplace was imported from a 2D AutoCAD drawing. You create the fireplace mass by snapping the base of a box to the corners of this outline, then stretching the box to ceiling height.

Creating the Box

This procedure is similar to those used in earlier lessons to frame window and door openings.

1.  On the Create panel, open Standard Primitives, if necessary, and click Box.
2. In the User viewport, do the following:
 - Place the cursor near the outside left corner (P1 in illustration) of the red fireplace outline and press the mouse button when the corner highlights.

- Drag to the opposite inside-right corner (P2). When the opposite corner highlights, release the mouse button.

- Move the mouse up and click to set a height of about **9'0"**. You can change the final height in the next step.

3. On the Create panel, on the Parameters rollout, do the following:

- Enter exactly **9'0"** in the Height field, if the snapped height differs from this value.

- Enter **3** for both Length Segs and for Height Segs. Additional segments are added to the box, replacing the single segment on each side.

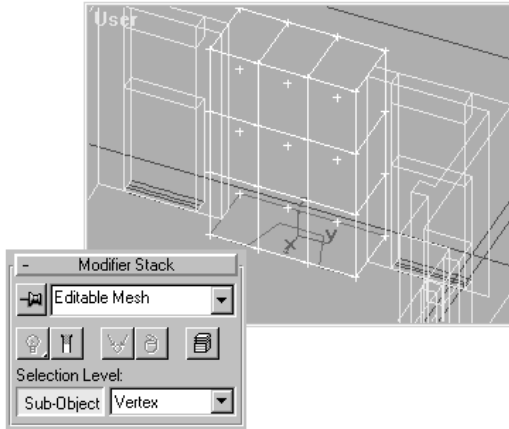
- At the bottom of the Parameters rollout, select Generate Mapping Coordinates. This is good practice for objects you might later map with a realistic material.

You now have the geometry necessary for sub-object modeling. The final steps rename the box and change its color.

4. On the Create panel, in the Name And Color rollout, enter **Fireplace** in the object name field.
5. Click the color swatch next to the name field and choose a dark red or brown for the fireplace.

You won't see the effect of the color until you choose smooth shading in one of the viewports. For now, leave the viewports in wire-frame to make modeling easier.

Setting Up for Sub-Object Modeling





Modifier Stack rollout showing editable mesh and User viewport in Vertex sub-object mode

This step converts the fireplace box into an *editable mesh*, providing different sub-object editing modes. Once converted, a box or other parametric object no longer carries its creation parameters, such as length and width, and number of segments.

- As a general rule, before converting to editable mesh, make sure the geometry is complex enough for the modeling you want to do.

Converting to Editable Mesh

1.  Make sure the fireplace box is selected, then open the Modify panel.
2.  On the Modifier Stack rollout, click Edit Stack to display a menu.
3. Under Convert To, choose Editable Mesh.

The stack list on the Modifier Stack rollout changes from Box to Editable Mesh. Conversion is complete.

Most actions in 3D Studio VIZ are reversible, including this conversion. To undo an action, choose Edit > Undo on the menu bar, or press CTRL+Z.

Entering Sub-Object Mode

1. On the Modifier Stack rollout, click the Sub-Object button.

The Sub-Object button turns yellow to indicate that this mode is now active.

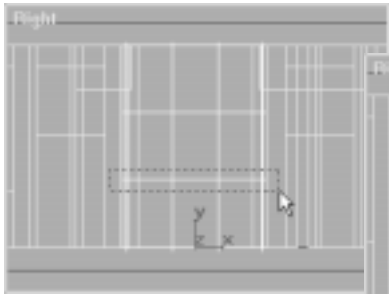
2. Open the list next to the Sub-Object button. The list contains the sub-object editing modes available for this object. They include Vertex, Face, and Edge.

- In this case, Vertex is the default when you first turn on sub-object mode. In the User viewport, notice that each vertex on the fireplace is visible as a small plus (+).

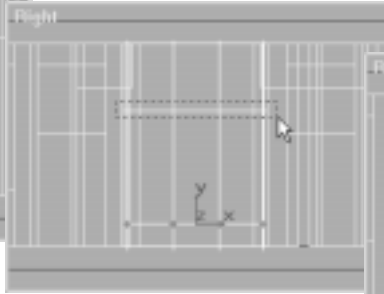
Sub-object mode remains active until you click the button again to turn it off, or take some other action, such as switching to another panel.

- You cannot select other objects while sub-object mode is active.

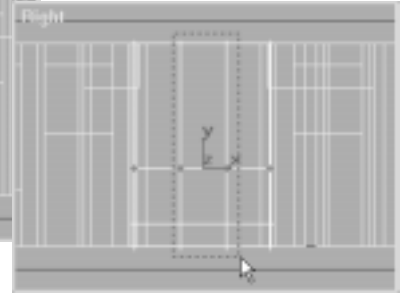
Forming the Geometry



Forming the hearth




Forming the firebox




Forming the firebox width

You now move the vertices of the box to the correct locations for the hearth and firebox.


Setup

- The fireplace should be selected from the previous step, with Sub-Object Vertex mode turned on.
-  Turn off 3D Snap Toggle. Selection is done by region in these steps.

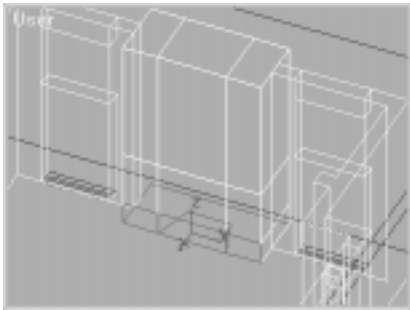
Forming the Hearth

1.  On the toolbar, click Move.
2. In the Right viewport, drag a region selection around the first row of vertices above the base. These vertices form the top of the hearth.
3. On the Tools menu, click Transform Type-In, and move the dialog away from the Right viewport. Enter Offset:Screen Y=-2'0".
The selected vertices drop by this amount along the Y axis.

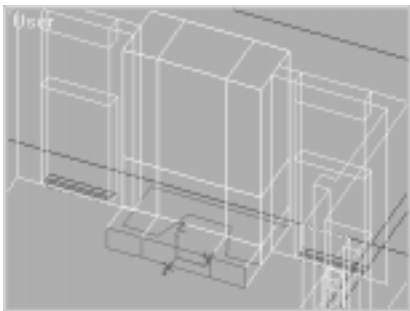
Forming the Firebox

1. In the Right viewport, drag a region selection around the second row of vertices above the base. These vertices form the top of the firebox.
2. On the Transform Type-In dialog, enter Offset:Screen Y=-2'6".
The selected vertices drop by this amount along the Y axis.
3. In the Right viewport, drag a region selection around the two columns of vertices in the center of the fireplace. These vertices form the sides of the firebox.
4.  On the toolbar, click Select And Non-Uniform Scale. This is a flyout button from Select And Uniform Scale.
5. On the Transform Type-In dialog, enter Offset:Screen X=150.
The two columns of vertices move apart along the X axis.

Extruding the Hearth




User viewport showing three selected faces



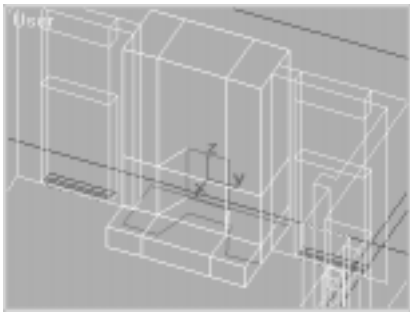
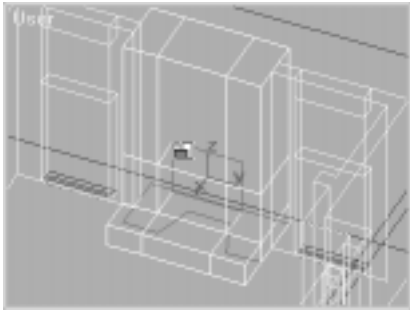
User viewport showing extruded faces

In this step, you extrude the faces at the base of the fireplace to form a low, raised hearth. Sub-Object should be active from the previous task.

1. On the Modifier Stack rollout of the Modify panel, choose Face from the Sub-Object Selection Level.
2.  On the toolbar, click Select Object.
3. In the User viewport, press CTRL and click the three face polygons across the bottom of the fireplace.
4. On the Edit Face rollout, in the Extrusion area, do the following:
 - Click the Extrude button.
 - Type **18** in the Amount field and press ENTER.

When you press ENTER, the selected faces project from the fireplace and connecting side faces are created, forming a hearth.

Extruding and Scaling the Firebox



User viewport showing selected polygon at back of the firebox before and after scaling.

In this step, you complete the firebox by extruding and scaling faces. Sub-Object Face should be active from the previous task, with the Extrude button on.

Extruding the Firebox


1. Click the center polygon above the hearth.
2. On the Edit Face rollout, in the Extrusion area, do the following:
 - Type **-18** in the Amount field and press ENTER.

When you press ENTER, the selected faces project into the fireplace and connecting side faces are created, forming a right-angled firebox.

3. Click the Extrude button to turn off extrude mode.

Scaling the Firebox

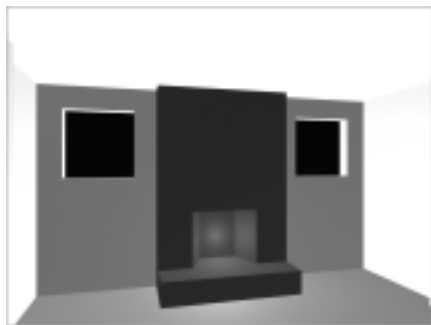
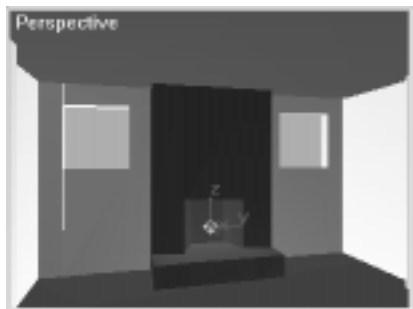
Here you scale the back face of the extruded firebox to create the typical slanted sides.

1.  On the Toolbar, click Select And Non-Uniform Scale.
2. In the User viewport, click the polygon at the back of the firebox to select it.
3. On the Tools menu, click Transform Type-In, then enter Offset:World Y=**60**.
When you press ENTER, the selected face is scaled along the Y axis, angling the sides of the firebox inward.
4. On the Modify panel, click Sub-Object to turn off sub-object mode.

Viewing the Fireplace

1. Right-click the viewport label of the Perspective viewport.
2. On the shortcut menu, choose Smooth + Highlight to show a surfaced view of the fireplace.

Adding a Firelight Effect





Shaded and rendered viewports of the finished fireplace


The fireplace model is complete, but it's hard to see what it looks like. In this step, you add an Omni light to simulate the effect of firelight, then render the result.

Creating an Omni Light

You place an Omni light in the fireplace, then move it upward so it floats inside the firebox.

1.   On the Create panel, click Light, then click Omni.
2. In the Top viewport, center the cross cursor in the middle of the fireplace and click to create the Omni light.


You immediately see the effect in the shaded Perspective viewport. The Omni light shines in all directions, illuminating walls, ceiling, and window openings, as well as the inside of the firebox.

3.  On the toolbar, click Move.
4. On the Tools menu, choose Transform Type-In. Enter Absolute:World Z=**2'0"**.

The Omni light moves up into the firebox.

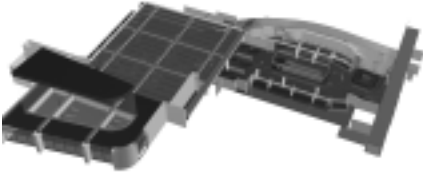
Rendering the Final Effect

The rendering you see in a viewport is only an approximation of a production rendering. In the Perspective viewport, for example, you might see slivers of light along the window headers or other artifacts.

1. Right-click the Perspective viewport to make it active.
 2.  On the toolbar, click the Quick Render button.
- A rendering window opens. Rendering begins immediately, using current defaults.
3. Wait a few moments. This simple scene renders quickly.
 4. Compare the rendered quality with what you see in the viewport.

3

Creating a Walkthrough Animation



Walkthrough animations simulate what you would see if you could walk around inside your model. They are useful for client presentations, and they are equally useful for design exploration.

The general procedure for walkthrough animations is to animate a camera moving along an eye-level path through your model, and then render multiple images to play back as a video.

Walkthrough Assistant, a feature developed using MAXScript, automates most of this work. Interactive and easy to use, Walkthrough Assistant can be used for short, exploratory sequences as well as longer presentations. It has its own rendering window and viewing controls.

In the following lessons, you produce a walkthrough animation of a hospital cafeteria using the Walkthrough Assistant. In the last lesson, you use a panoramic renderer to produce an interactive, spherical view inside this model.

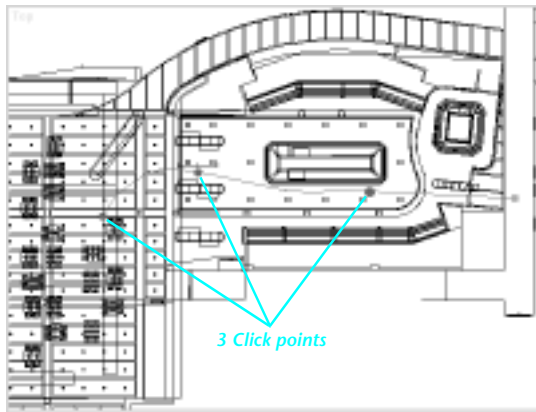
Lessons in this Tutorial

- Drawing an Animation Path
- Moving Through the Model
- Animating a Walkthrough
- Adjusting the Animation in Track View
- Rendering an Animation
- Capturing a Panoramic View

Credit

Cafeteria model provided courtesy of Larson & Darby Architects, Rockford, IL, USA.

The original, highly detailed model has been simplified in its geometry and materials to make it more suitable for this tutorial.



The first step is to draw the route of the walk-through, a line that defines the path a camera follows through your model. You then calculate the overall length of the animation, based on path length and speed of movement.

You can make the path any length, then explore the different views along it and decide which sections you want to render. Often short clips are more effective than one long shot. They are also considerably faster to render, and well-suited to design studies.

Once you've "shot" some clips and have a visual feel for the space, you can decide on the effectiveness of a longer animation.

Steps in this Lesson

- Drawing a Path
- Setting the Animation Length

These steps introduce you to the process of setting up the animation. In the following lessons, you load a similar, preconfigured scene for detailed study.

Setup

- Open the file `3dsviz2\scenes\tut0301.max`.


Drawing a Path

The path is a continuous line. In general, you want to keep sharp corners and tight curves out of the line to provide a smooth camera motion.



Defining the View

1. Right-click the label of the Top viewport and choose Show Grid from the shortcut menu.

This improves the visibility of the model by turning off the grid.

2.  Click Region Zoom.
3. In the Top viewport, drag a region around the serving and part of the dining area. See the illustration for the general area.

Drawing the Line


1.   On the Create panel, click Shapes and then click Line.
2. On the Creation Method rollout, select Smooth for both Initial Type and Drag Type.
3. In the Top viewport, click three points as shown to define a path through the cafeteria. This path leads through the entrance to the cafeteria, down the aisle between serving lines, and into the dining area.
4. Right-click to end line creation.

Setting the Animation Length

The length of an animation is usually specified as a number of *frames*. You can calculate that number from the length of the path.

Determining Path Length

The path should still be selected.

1.  Open the Utilities panel and click Measure.

2. On the Measure rollout, look in the Shapes area to find the length of the line.

Measure provides a number of properties for any selected object. It is definitely a tool to remember for future use.

Calculating the Number of Frames

This calculation assumes a typical playback speed on the computer of 15 frames per second (FPS). The camera is to move at walking speed.

1. Assume the length of the path is 115'.
2. Divide this by an average walking speed of 5' per second.

The result $(115/5)$ is 23 seconds.


3. Add three seconds for a pan shot at some point on the path.

The total running time is 26 seconds.

4. Multiply the running time by 15 frames per second.

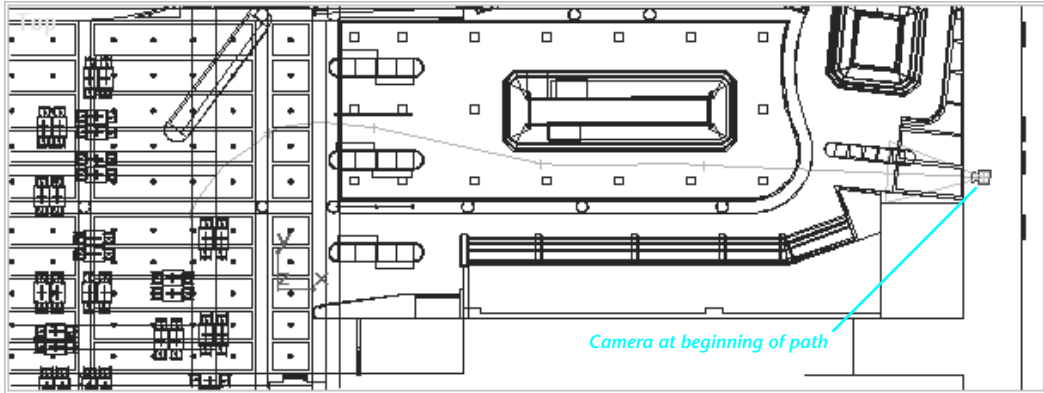
The result (26×15) is 390 frames.

Setting the Number of Frame

1.  Click the Time Configuration button on the status line.
2. On the Time Configuration dialog, in the Frame Rate area, select Custom for the frame rate and enter FPS = **15**.
3. In the Animation area, enter Length = **390** and click OK.

To verify this setting, notice that the Time slider reads 0/390.

Assigning a Camera to a Path



With a few clicks using Walkthrough Assistant, you create the camera and pick the path. You then view the scene in both a render window and the camera viewport. Finally, you move the camera along the path to get a quick view of the scene.

Steps in this Lesson


- Starting Walkthrough Assistant
- Picking a Path
- Viewing the Scene

Setup

- Open `3dsviz2\Scenes\tut0302.max`.

In this scene, the viewports have been rearranged, with a wide top view along the bottom to show the entire path in close detail. The path itself has been adjusted to follow the route of someone walking by the serving stations, avoiding pillars and barriers.

Starting Walkthrough Assistant


1.  Open the Utilities panel and click MAXScript. Wait a few moments while MAXScript loads. If a Listener window opens, you can close it.
2. On the MAXScript rollout, under Utilities, open the list and choose Walkthrough Assistant.
Walkthrough Assistant appears as a set of three rollouts in the upper left of the screen.
3. On the Main Controls rollout, click Create Camera.
A camera is inserted in the middle of the scene.

Tip: Once Walkthrough Assistant is running, leave the dialog open or minimized. If you close it, you will have to start a new session.

Picking a Path

1. On the Main Controls rollout, click Pick Path.

You now select the path line. Because this is a complex model with hundreds of components, you need to be careful in selecting the path. You can screen the selection.

2.  Click Select By Name on the toolbar to display the Pick Object dialog.

You can also press **H** on the keyboard to display the selection dialog. This shortcut is used elsewhere in this tutorial.

3. The Pick Object dialog lists only objects that can be used as a path. In this case, Line01 is the only option listed in the box to the left.
4. Highlight Line01 and click Pick at the bottom of this dialog.

The dialog disappears as the path is selected. The camera moves to the beginning of the path. Walkthrough Assistant is ready to use.

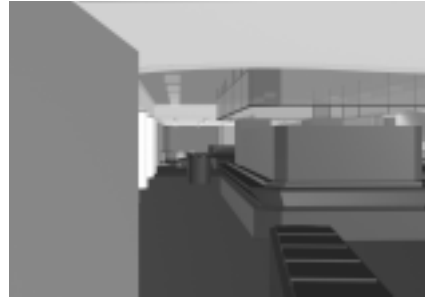
Changing the Eye Height

By default, Walkthrough Assistant raises the path to an eye height of 65". This is the Average option, the middle of three buttons at the bottom of the Main Controls rollout.

- You can change eye height at any time by selecting another of these buttons.

The Short option raises the path to 30", and the Tall option to 90".

Viewing the Scene



Rendering as seen from beginning of path

Walkthrough Assistant has its own render window. You can also view the same scene in a camera viewport.

Switching to Camera View

1. Right-click in the Perspective viewport to make it active.
2. Press **C** to switch this viewport to Camera view. There is currently only one camera in the scene. If there were others, a dialog would give you a choice.

Note that the viewport label now reads Walkthrough Cam.

Using the Render Window

1. Scroll down the Walkthrough Assistant window to the View Controls rollout. You can also close the Main Controls rollout, which won't be needed in the remainder of these lessons.

A large gray square reads "Click to Render Preview."

2. Click the square. This complex scene takes a few moments to render on most computers.

You see the same scene as in the Camera viewport. Both are views through the same camera.

The render window uses the settings for the Scanline renderer instead of the viewport renderer. In the next lesson, you adjust these settings and viewport options to speed up display in both views.

Continue on to the next lesson.

Moving Through the Model



View into dining room

In this lesson, you move the camera along the path and try out various view controls in Walkthrough Assistant. You also make adjustments to speed up viewport display before rendering the result.

Steps in this Lesson

- Taking a Quick Tour
- Improving Display Speed
- Rendering the View

Setup

- Continue from the previous lesson.

Walkthrough Assistant is active, with a camera at the beginning of the path, and a viewport set to the Walkthrough Camera.

Note: The Walkthrough camera and animation effects are saved with the file, but you don't have access to Walkthrough Assistant controls for the camera when you restart the program and reload the file. You can't close the window and then reopen it. This means you need to complete your work with Walkthrough Assistant in one session.


Taking a Quick Tour

The Time slider lets you take a quick tour along the walkthrough path and stop for representative views. This is a good way to check the path to see if it needs further adjustment before beginning a more detailed study or animation.

1. Drag the Time slider to the right. The number on the slider advances to indicate the current frame. Beyond a certain speed, the Camera viewport goes to wireframe to keep up with the movement.

2. Continue to the end of the path.

In the Top viewport, the blue cone of the camera moves along the path. The render window in Walkthrough Assistant remains unchanged.

3.  On the status line, click Go To Start to return to frame 0.

Using Walkthrough Controls

1. Drag to the right again and stop at about frame 130. Click the render window.

The render window updates to match the viewport.

2. Continue dragging to about frame 300. This is near the end of the food line, approaching the checkout counter. Here a person might look left into the dining area to spot a friend or look for an empty table.
3. On the Views Control rollout of the Walkthrough Assistant, drag the Head Turn slider slightly to the left.

The camera view moves to the left.

4. Drag the spinner for Head Tilt Angle to move the camera up and down.
5. Click the Center and Eyes Level buttons to return to a straight-ahead view.

Looking Around the Dining Area

1. Move to frame 390, the end of the path.
2. Drag the Head Turn slider all the way to the left, then back all the way to the right.
By default, Walkthrough Assistant restricts the head turn to 180 degrees. You can change this setting to allow a full half turn in either direction.
3. Open the Advanced Controls rollout and select 360 Degree View Rotation.
4. Repeat the left and right head turns.
Now both views end at the same point, directly behind the camera.
5. Click Center to look into the dining area.

Improving Display Speed

On even fast machines, the massive amount of geometry in this model slows both viewport and rendering display. Here are ways to lighten the calculation load.

Using Wireframe


Once you're familiar with the scene, you might try switching the camera viewport to wireframe. The response is very fast. Renderings continue to show the entire scene.

- Right-click the Walkthrough Cam viewport label and choose Wireframe on the shortcut menu.

You can switch back to Smooth + Highlights on the same menu.

Hiding Objects

By hiding objects in the scene, you get much faster response, yet the hidden objects can still be rendered.

1. Press **H** to display the Select Object dialog and click All to list all objects in the model.
2. At the cursor, type **ch-wood**, the base name for all the table and chair sets.
This highlights all the names, a total of 68.
3. Click Select to complete the selection of all the furniture in the dining area.
4.  Open the Display panel and click Hide Selected.
All the tables and chairs disappear in the wire-frame camera viewport. The space appears empty.
5. Now check the performance. With 360 Degree View Rotation still selected, try left and right head turns.
The response is now considerably quicker.

Improving Rendering Display

1. From the menu bar, choose Rendering > Render to display the Render Scene dialog.
2. On the Common Parameters rollout, be sure the option for Render Hidden Objects is selected. This is a default.
3. Click the Common Parameters bar to close this rollout.
You now see the rollout for the VIZ Default Scanline A-Buffer.
4. On this rollout, clear the following options:
 - Mapping
 - Anti-Aliasing

The Shadows option is cleared by default. Leave it cleared.

5. Click Close.
6. Select a frame and click the render window in Walkthrough Assistant.

With most Scanline options turned off, rendering time is decreased. Because Render Hidden Objects is selected, the tables and chairs appear in the rendering window.


For final rendering, reset scanline options as needed for your project.

Rendering the View

With these rendering and viewport adjustments, you can quickly get the camera angle you want, then update the render window in Walkthrough Assistant for a snapshot of the actual scene.

Doing a Quick Render

From time to time, you may want to see a larger rendered image of your view. You do this with Quick Render.

-  On the toolbar, click the Quick Render button.

This automatically renders the view in a separate window, using the current settings in the Render Scene dialog.

Continue on to the next lesson to begin animation using this session of the Walkthrough Assistant.



Camera view and rendered view

Animating a Walkthrough

Once you complete a tour of the walkthrough, you're in a position to decide what you want to animate and render. This lesson provides an introduction to the animation phase of the process.

Remember that a finished animation is not needed in every case. For many design purposes, especially early visualization, the techniques you've learned to this point are all you need.

Steps in this Lesson

- Deciding What to Animate
- Setting Up for Animation
- Animating a Sequence

Setup

- Continue from the previous lesson.

Deciding What to Animate

Walkthrough Assistant automatically creates an animation. This is what you see as you move or drag the Time slider back and forth (referred to as *scrubbing*). In this case, the animation would consist of 390 frames looking straight ahead through the camera. It would be a walkthrough, but not necessarily a very interesting one. Here are two options to consider:

- You can add interest and a sense of realism by animating head turns. In this lesson, the viewer looks to the left at the serving line as he or she walks along the main aisle of the food service area.
- You can create a number of short paths in specific areas and a Walkthrough Assistant camera for each. From each path, the camera

would view a portion of the model. No additional animation work is necessary because you render along the default path of each camera.

Setting Up for Animation



Time controls

Animation depends on start and end frames. Scrubbing the Time slider is fine for visualization, but cumbersome for setting animation keys.

Moving Between Frames

1. On the prompt line, in the Time Control section, a field reads out the current frame.
2. Double-click the number in this field to highlight it.
3. Type a new number and press ENTER.
This updates the view and moves the Time slider to that location in the animation.
4. The number remains highlighted. You can continue to enter numbers, moving in any sequence through the animation.

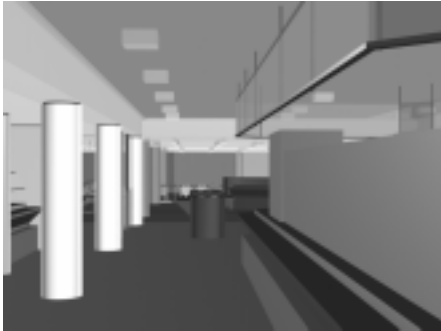
Use this method in the remaining steps when specific frames are required.

Setting Up Walkthrough Assistant

Head turns are relative to the setting for view rotation. You want to use the default of 180 degrees. Check this setting before starting the animation:

- Open the Advanced Controls rollout and clear 360 Degree View Rotation if it is selected.

Animating a Sequence



Rendered scene - frame 90

In this step, a sequence is chosen toward the beginning of the walk. While continuing to walk, the viewer looks left to inspect the food. As the viewer leaves the serving lines, the head turns straight ahead and looks into the dining area.

Tip: Avoid sequences of very short duration. The camera moves do not animate properly in only a second or two or elapsed time. This animation uses 150 frames, or about 10 seconds.

1. Begin at frame 0. Turn on the Animate button.

The button turns red, as well as the border of the active viewport. Make sure the Walkthrough Cam viewport is active.

2. Click Center on the Views Control rollout of the Walkthrough Assistant.
3. Move to frame 70 and click Center again. This is the point at which the head turn begins.

4. Move to frame 90 where the head will be fully turned.
 - Drag the Head Turn slider about half way to the left.
 - Check the Camera viewport to see the view with this head turn. Adjust if necessary.
5. Move to frame 190 and click Center. Between frame 90 and 190, the head will turn back toward center.
6. Move to frame 220 and click Center again. From this point on, the view is straight ahead to the end of the animation.
7. Click the Animate button to turn it off.

This completes the animation sequence for this tutorial. You can now close the Walkthrough Assistant.

Closing Walkthrough Assistant

- At the bottom of the Utilities panel, on the Walkthrough Assistant rollout, click Close.

Continue on to the next lesson.

Adjusting the Animation in Track View



After completing an animation sequence, you typically check its accuracy and make any changes to smooth out the effect. This lesson presents techniques for “finetuning” that help produce the exact nuance you want.

Steps in this Lesson

- Checking the Sequence
- Adjusting the Sequence
- Understanding Animation Controllers
- Adjusting the Function Curve

Setup

- Continue from the previous lesson.

The Walkthrough Assistant should be closed. It is not needed for the remaining lessons in this tutorial.

- If you’re not continuing from the previous lesson, open *3dsviz2\Scenes\tut0303.max*.

Checking the Sequence

1. Move to frame 0 in the head-turn animation.
2. Drag the Time slider to the right and watch the camera cone in the Top viewport. Notice the following effects:
 - Between frames 0 and 70, the camera veers to the right of center when it should be going straight.
 - After frame 90, where the turn should become constant, the turn increases slightly.

Both of these effects result from the interpolation of the camera’s movement along a Bezier curve. This will be clearer when you see the key-frame points you created along the curve.

Adjusting the Sequence

In this step, you use Track View, the animation editor in 3D Studio VIZ.


Setting Up Track View

-  In the toolbar, click Track View.

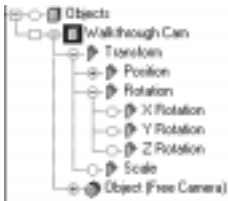
The Track View window opens across the upper viewports.

Track View has its own toolbar across the top, and additional navigation tools at the lower right of the window. To the left is a tree structure of the scene, a hierarchy that can show every object and effect. You can filter objects so that only selected ones appear, as in the following steps. To the right are the animation tracks.

Filtering Objects in Track View

1. Right-click outside of the Track View window so the main 3DS VIZ window is active.
2. Press **H** and select Walkthrough Cam using the Select Object dialog.
3.  At the far left of the Track View toolbar, click Filters to display the large Filters dialog. This is where you control what you see in Track View.
4. In the Show Only area at upper right, select the option Selected Object, and clear the other options. Click OK.

Moving Through the Hierarchy



The hierarchy display at the left end of the Track View window is closed by default. You need to open successive levels until you reach the point of adjustment.

1. In the hierarchy, click the plus sign next to Objects. Since only selected objects are active, you see Walkthrough Camera as the only object. Without the filter, hundreds of objects would appear here.
2. Click the plus sign next to Walkthrough Camera to show the next two levels, Transform and Object (Free Camera).
3. Click the plus sign next to Transform, then the plus sign next to Rotation. You might need to drag this panel so you can see all the rotation tracks.

This is the bottom level of the hierarchy. At this level you can edit the animation for any of the three rotation axes for this camera. The head turn is animated around the vertical Z axis, a line analogous to the spine of an upright human.

4. Click the name Z Rotation to highlight it. The track to the right turns white to select this one animation parameter.

The gray dots in the white track represent the animation keyframes you set at tracks 0, 70, 90, 190, and 220.

5. Drag the Time slider and watch the line that moves across the tracks. At the same time, in the Top viewport, you see the camera cone moving along the path.

This is the level at which you can analyze and adjust an animation.

Understanding Animation Controllers

In Track View, every parameter you can animate (in this case the Z Position controller of the Walkthrough Camera) is preceded by a green right-pointing triangle. These are the *animation controllers*.

Here is the general procedure for adjusting animation controllers in Track View:

- Filter the Track View display for the objects whose controllers you want to adjust.
- Click down to the lowest level of the hierarchy and select a controller.

As a shortcut, right-click the plus or minus sign at any level to display a menu for expanding, collapsing, and selecting the hierarchy.

- Select a view of that controller.

- Make adjustments to the controller.
- Check the effect of those adjustments by scrubbing (moving) the Time slider while watching the effect in one or more viewports. To check subtle adjustments, you need to render a series of frames to check the finished effect.

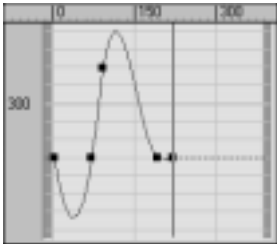
Adjusting the Function Curve

The default view, Edit Keys, is one of several ways to adjust a specific controller. To correct the fluctuations you saw in the head-turn animation, you need to edit the *function curve* of the Z Position controller for the Walkthrough Camera.

1.  On the Track View toolbar, click Function Curves.

The linear time tracks are replaced by a blue curve representing a Bezier Float controller.

2. Click the curve itself to show the keys that you set when animating.



Camera function curve

3. Scrub the Time slider between frame 0 and frame 70. Compare the line moving across the curve to the camera cone in the Top viewport. The curve between these frames is downward, corresponding to the camera's fluctuation to the right of center. You need to flatten out

this section of the curve to eliminate the fluctuation.

4. Right-click the key at frame 0.

The Key Info dialog appears, and the selected key turns white. You use this modeless dialog to adjust the entry and exit of the curve at any key you've set.

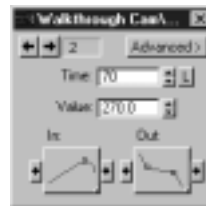
- Move the dialog to the lower left corner of the screen.

5. Click down on the Out diagram and choose the following pattern:

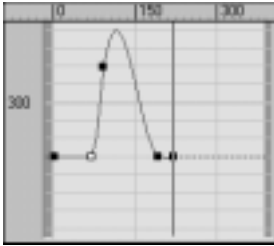


6. Click the right arrow in the upper-left corner of the Key Info dialog to move to the next key at frame 70.

7. Click down on the In diagram and choose the following pattern:



By changing the entry and exit of these two keys, the function curve is flattened to a straight line between frames 0 and 70.



simulating a few seconds of human head movement.


8. To see the effect of this change, scrub the Time slider between frame 0 and 70.

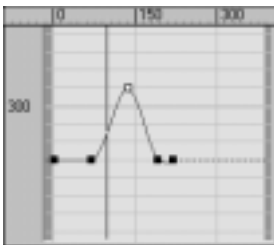
This time the camera moves straight ahead.

Adjusting the Top of the Curve

1. Scrub the Time slider past frame 90.

Here the curve moves above the key, causing the wider swing of the camera. In this case, you can move the key to flatten the curve.

2.  On the Track View toolbar, click Move Keys.
3. Click down on the key at frame 90.
 - Drag the key down and to the right.
 - Release when the key is at the top of the flattened curve and positioned at about the 310 line.



4. Now scrub the Time slider along the entire path to see the effect.

In the Top viewport, the camera cone moves smoothly, swinging left and swinging back,

Rendering the Animation

Once you've set up an animation, you need to render it to a format that can be easily viewed by others. Your choices for rendered animation format include recording the frames to video tape, rendering files to special real-time playback and recording hardware, or rendering to an *.avi* file for playback on any multimedia-capable computer.

In the following steps, you configure the 3D Studio VIZ renderer to create an *.avi* file.

Steps in this Lesson


- Setting Render Length and Size
- Specifying a File Format
- Rendering to File
- Playing an Animation

Setup

- Continue from the previous lesson.
- To start at this point, open the file *3dsviz2\scenes\tut0304.max*.

Setting Render Length and Size

You can render any number of frames, from one frame to the entire animation. You can also specify the animated image. In this step, you render the entire camera animation to a medium size of 320 x 240 pixels.

1. Right-click in the Walkthrough Camera viewport to make it active.
2.  On the toolbar, click Render Scene to display the Render Scene dialog.
3. On the Render Scene dialog, do the following:

- In the Time Output area, select Active Time Segment.
- In the Output Size area, click 320 x 240.

Leave the Render Scene dialog open for the next step.

Specifying a File Format

If you don't specify a file format, 3D Studio VIZ renders all of the frames (in this case the active time segment), but does not save anything. In this step, you specify that the frames get saved to an *.avi* file.

1. On the Render Scene dialog, click Files to display the Render Output File dialog.
2. On the Render Output File dialog, do the following:
 - Notice the location of the file. The default folder is *3dsviz2\images*. Choose another location if desired.
 - In the File Name field, type the name **walk-thru.avi**, then click Setup to display the Video Compression dialog.
3. On the Video Compression dialog, do the following:
 - From the Compressor list, select Intel Indeo (R) Video R3.2.
 - Drag the Compression Quality slider to 100.
 - Click OK.
4. Click OK to close the Render Output File dialog.

This completes the setup for rendering.

Rendering to File



Render Scene dialog with settings ready to render

Rendering this animation will take a long time on most computers. You can cancel at any time and play the portion you've rendered.

To start rendering, do the following on the Render Scene dialog:

- At the bottom of the dialog, check to be sure that Walkthrough Camera is the selected viewport. You can change the viewport here if necessary. Always make this check to avoid rendering the wrong view.
- Click Render to have 3D Studio VIZ render the .avi file.

As rendering begins, a progress dialog opens next to a window that shows the frame currently being rendered.

The estimated time for this rendering is over two hours on some Pentium Pro machines. A fast dual-processor machine reduces the time to less than an hour.

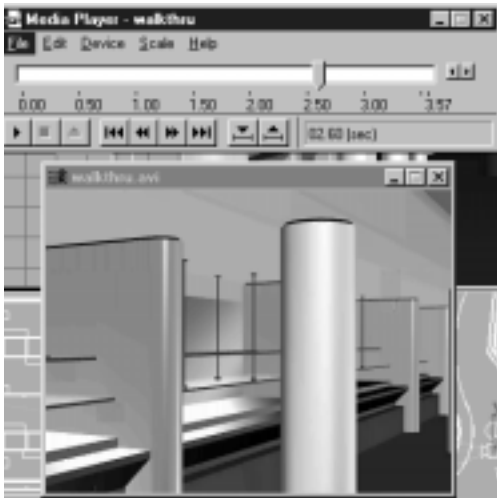
Canceling a Rendering

If you choose not to wait for the full rendering, do the following:

- Click Cancel on the progress dialog.

If you choose to cancel, you can use the sample .avi file provided for the remaining step. Because frames are saved as they are rendered, you can also play back a partial rendering.

Playing an Animation




Scene in playback window and Media Player controls

Once your animation is complete, you can play it back using any *.avi* player. You can also view it from 3D Studio VIZ.

1. On menu bar, choose File > View File.
2. On the View File dialog, select *walkthru.avi* or *tutwalk.avi*, then click OK.

This displays the controls for the Media Player.

3.  On the Media Player toolbar, click Play.
A viewing window opens, and the animation begins to play.

Capturing a Panoramic View

Although effective for presentations, an animated walkthrough can be time-consuming to produce. For design studies, you need a quick way to look around in a scene.

This lesson introduces SmoothMove Panoramas SE (Special Edition), a plug-in supplied with 3D Studio VIZ. By rendering six views from a camera location, SmoothMove creates a seamless sphere of view that you can navigate smoothly and quickly with a mouse.

You can save SmoothMove panoramas to a *.pan* file, then play them back. These files can be very useful in conjunction with an animated walkthrough. For example, you can generate a number of panorama files at key points along the walkthrough path. During a presentation, you can stop at any of these points and open the panorama file, providing an interactive view in all directions.

Note: Another common technique pans the scene from a stationary camera. This technique is presented in “Panning a Camera” in Tutorial 6, “Lighting and Camera Effects.”

Steps in this Lesson

- Choosing a Camera Location
- Rendering the Panorama
- Viewing the Panorama

Setup

- Open the file *3dsviz2\scenes\tut0304.max*.


Choosing a Camera Location

You create a panorama from a Camera viewport. In this scene, the location could be anywhere along the walkthrough path. For this lesson, the view is at the end of the path, looking around the dining area.

1. Right-click in the Walkthrough Camera viewport to make it active.
2. Scrub the Time slider to the last frame in the animation.

Rendering the Panorama

You can render a panorama for immediate use without saving a file. In this lesson, you use the file option.

1.  On the Utilities panel, click SmoothMove Panoramas SE to open its rollout.
2. On the SmoothMove Panoramas SE rollout, click Render.
This opens the Render Panorama dialog, similar in layout to the standard Render Scene dialog and with many of the same settings.
3. In the Render Output area, click Pan Files to display the Save Pan Files As dialog.
The default location for *.pan* files is *3dsviz2\images*.
4. In the File Name field, type **dining_area.pan** and click Save.
5. Also on the Render Panorama dialog, set the following to complete rendering setup:
 - In the Time Output area, select Single.
 - In the Output Size area, click 3072 x 1536.

- In the Options area, select Render Hidden Objects.
 - In the Render Output area, select JPEG Compression, then move the slider all the way to the left to Large.
6. Click Render.
A warning message appears saying the camera has a small FOV or other problem.
 7. Click Render Anyway.
As in the standard renderer, a progress dialog and rendering window appear as rendering begins.
 8. Wait until rendering is complete. With only six frames, this is a fairly quick process.
SmoothMove renders six views using the camera's position and focal length. The views are front, back, top, bottom, left, and right, in that order. The program then "seams" the six views into the final panorama. The progress dialog reports these stages.

Viewing the Panorama

When rendering is complete, a Pan Viewer window appears showing the finished panorama.

Navigating the Panorama with a Mouse

1. Move the mouse cursor into the Pan Viewer.
2. Position the cursor at the center of the window and drag left or right.
The scene begins to pan in the direction you move the mouse. The farther you move from center, the faster the pan. Stay close to the center to do slow, even pans. The window center is the point of no motion.
3. To stop at a view, release the mouse button, then resume the drag to move again.

4. Drag the cursor up and down.
The scene now pans vertically, again increasing in speed from the center.
5. Combine directions by dragging the mouse at a diagonal.
You have full freedom to move in any direction, at any speed.
6. To reset the view to the camera's position, press SPACEBAR, or choose Preferences > Reset Panorama View from the viewing window's toolbar.
Wait while the scene moves from its current position.

Navigating the Panorama with Arrow Keys

You can use the arrow keys on the keyboard instead of the mouse.

- Click an arrow key for a small movement.
- Hold down the left or right arrow key to pan continuously.
- Click the up or down arrow key while panning to raise or lower the view.

Viewing Pan Files

1. Using Windows Explorer or File Manager, go to the *3dsviz2\plugins* directory.
2. Double-click the Pan Viewer executable to launch the viewer.
3. Choose File > Open and select a *.pan* file in the default *3dsviz2\images* directory or other location.
Use the navigation techniques described.



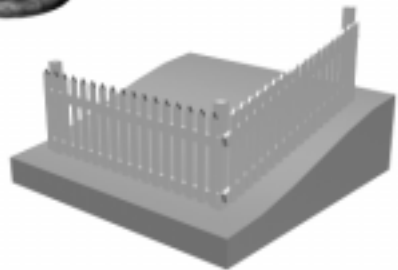
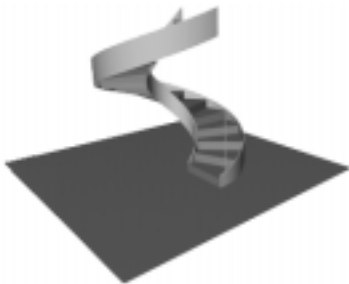
Three panorama views captured in the Pan Viewer window

4

Creating Building Components

Lessons in this Tutorial

- Automatically Creating a Stair and Railing
- Creating a Custom Stair Railing
- Automatically Creating a Fence and Trees
- Creating a Custom Fence
- Lathing a Column



This tutorial introduces the use of parametric objects to automatically build a wide range of stairs, railings, and fences. You also learn manual techniques that you can use when a project requires specialized modeling.

Automatically Creating a Stair and Railing

Stairs and railings are typically time-consuming to draw or model realistically. 3D Studio VIZ provides parametric Stair and Railing objects that automate this process.

Because these objects are parametric, you can continue changing them as your design develops. These objects are also quick to replace if you decide on a different solution, such as switching from a straight stair to one with a landing.

This lesson provides a general orientation to these very flexible modeling tools. A later lesson in this tutorial uses the Railing object to create a fence.

Steps in this Lesson

- Creating a Default Stair with Landing
- Choosing Stair Options
- Adjusting the Layout and Height
- Adding a Second Carriage
- Adjusting the View
- Adding a Railing
- Adjusting the Railing

Setup



In this lesson, you use the default, full-size Perspective viewport. You might notice a difference between the screen and the illustrations. To improve print quality, the illustrations are captured using a light gray background instead of the default background color.

1. Start 3D Studio VIZ, or choose File > Reset if the program is already running.

2. Right-click the Perspective viewport label and choose Wireframe from the shortcut menu. This makes it easier to see the stair geometry during creation.

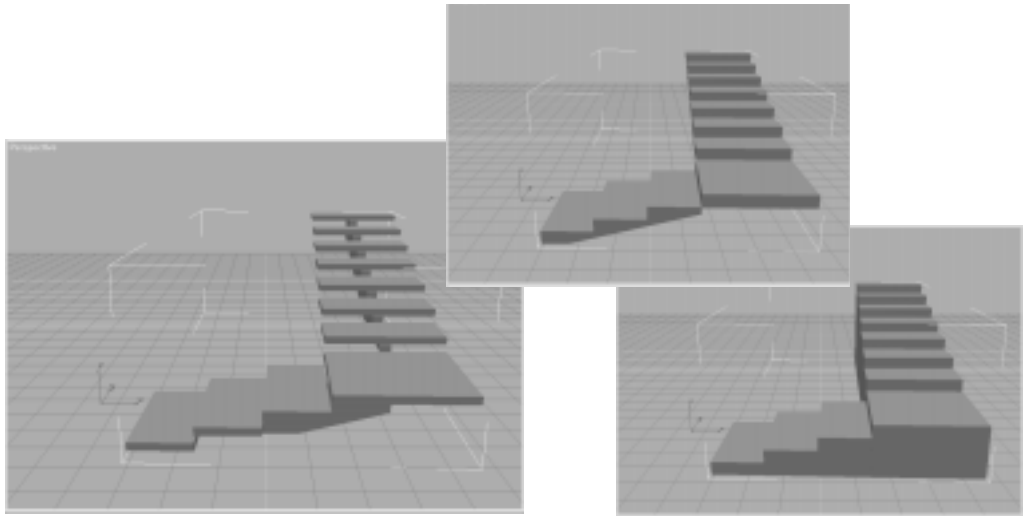
Creating a Default Stair with Landing

This step creates a right-angle stair with a landing between two flights.

1.   On the Create panel, Geometry is the default option. Open the list of geometry types and choose Stairs.

On the Object Type rollout, you see buttons for four stair types.
2. Click L-Type Stair to turn it on.
3. Click down in the lower-left section of the viewport and drag across the center line, parallel with the bottom of the screen.
4. Release and drag upward to create a plan of the stair on the ground plane.

The stair plan shifts between two configurations, based on the inner and outer edges of the landing. Choose the larger, inner-edge plan.
5. Click to set the stair plan, then drag upward to reveal the stair structure. Click again to complete a default stairway with landing.
6. Right-click to turn off Stair creation. The stair should remain selected.
7. Right-click the Perspective viewport label and choose Smooth + Highlight to shade the stair.




Closed and Box stairs

Choosing Stair Options

In practice, you might decide on a stair type before you create the stair, then use 3D Snap Toggle to position it exactly in your model. However, a Stair object is very flexible, allowing you to make a variety of changes to a roughed-in model.

Choosing Stair Type

1.  With the stair selected, open the Modify panel.
2. On the Parameters rollout for Stair, there are three options for Type. Open is the default, with a central carriage supporting the steps.
 - Click Closed and Box to see these options.
3. In the Generate Geometry area, there are options for Stringers and Carriage.
 - Click Stringers to see the effect. By default, this option is off for all stair types.

- If Closed or Box types are selected, Carriage is grayed out. For Open stairs, clear Carriage to remove this support.

4. Return the stair to Open type. Make sure the Stringers check box is clear.

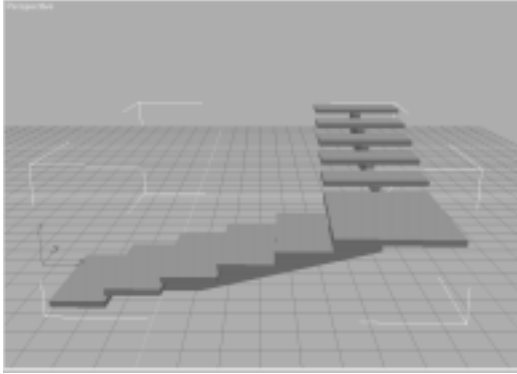
Handrail and Rail Path settings, also in the Generate Geometry area, are discussed later.

Choosing Stair Angle

With L-Type stairs, you have an angle option.

- In the Layout area, set Angle by dragging the spinner or typing in an exact value.

The top flight swings in either direction, and the landing resizes to match. The default, a right-angle of -90 degrees, is used in this lesson.





Stair after layout adjustments

Adjusting the Layout

In this step, you adjust parameters to give the stair a more realistic scale.

1. In the Layout area, set the floor space for a small stairway:
 - Length 1=**96**
 - Length 2=**96**
2. Set the width of the step and elongate the landing:
 - Width=**36**
 - Offset=**12**

This offset increases the landing to 36" x 48".

3.  On the status line, click Zoom Extents so you can see the entire stair.
4.  You might want to enlarge the stair in the viewport. On the status line, click Zoom and drag upward.

Adjusting the Height

The stair is approximately sized, but appears too low for the number of stairs. You use settings in the Rise area of the Parameters rollout to adjust the floor-to-floor height of the stair.

The Rise area has three interdependent settings for Overall Height, Riser Height, and Riser Count. One setting is always locked, or *pinned*, indicated by a pushed-in pin on an indented button. With one parameter pinned, the other two are adjustable. Adjusting one parameter changes the other to maintain the pinned value.

Overall Height is pinned by default. In this step, you increase the height to 84 inches.

1. In the Rise area, set Riser Ct (Count)=**12**.
2. Click the pushpin next to Riser Ct (Count) to pin this value. The field grays out.
3. In the Riser Ht (Height) field, enter **7**.
Because the Riser Count is 12, the overall height is now 84 inches.

Adjusting Step Thickness

The thickness of the steps can be adjusted without changing the overall height of the stair.

- In the Steps area, set Thickness=**1.5**.


The steps are thinner, and the carriage is resized to the changed thickness.

Adding a Second Carriage

In this step, you add a second carriage, then move both carriages to the outside edges of the steps.

1. On the Modify panel, scroll to the bottom and expand the Carriage rollout.

This is where you set the depth and width of the supporting carriage. Notice the control for Spring From Floor. Toggle it off, then on again, to see its effect.

2.  On the Carriage rollout, click the Spacing Tool icon to display a carriage-specific Spacing Tool.
3. Set Count=2 and press TAB.
The viewport updates to show two carriages under the steps.

Adjusting the Carriages

The carriages themselves are 3.0 inches wide, as shown on the Carriage rollout. Changing the default offsets to half that width, 1.5 inches, moves the carriages flush with the ends of the steps.

1. In the Parameters area of the Spacing Tool, open the list of spacing options and choose Specify Offsets, Divide Evenly.



The parameters change to activate the fields for Count (the number of carriages) and the Start and End Offsets.

2. Set Start Offset and End Offset=1.5. Press TAB after each entry.




With each entry, one carriage moves flush.

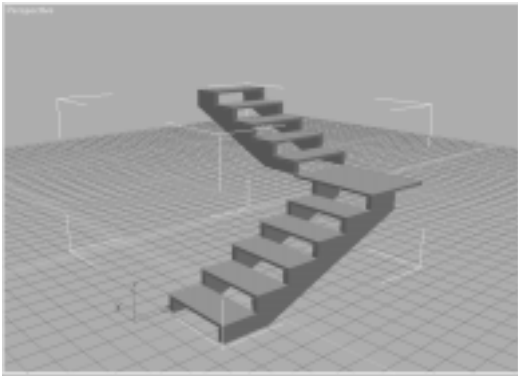
The field at the bottom of the dialog reads “2 objects @ 33 in between centers.” When set flush to the ends of the 36-inch-wide steps, the carriages measure 33 inches between their center lines.

3. Click Close on the Spacing Tool to accept the adjustments.

Adjusting the View

This step gives you a better view of the stairs, in preparation for adding railings.

1.  On the prompt line, click Arc Rotate.
2. In the viewport, drag the handle on the right edge of the green circle to the right. You move the view to look up the stairs from the bottom.
3.   Use Zoom and Pan controls, as needed, to move the view back a little and center it. The following illustration shows the view used in this lesson.
4. When you are satisfied with the view, right-click to cancel the active view control.



Saving the File

It's good practice to save a copy of a scene at each major completion point. This lets you go back to that point and start over, if necessary.

- Choose File > Save As and give this scene a name. A common practice is to add a sequential number at the end of a base name, such as Tut04-01.max.

Adding a Railing

The Stair object has controls that automatically create a railing. This built-in stair railing is useful for some visualization purposes. However, the Railing object provides greater detail and flexibility. In this step, you add rail paths to the stair and then assign Railing objects to use those paths.

Setup

- Continue from the previous step.
- To start from this point, open the file *3dsviz2\scenes\tut0401.max*.

Adding Rail Paths


1. Select the stair if necessary.
2. On the Parameters rollout for the Stair object, in the Generate Geometry area, select Right and Left Rail Path.

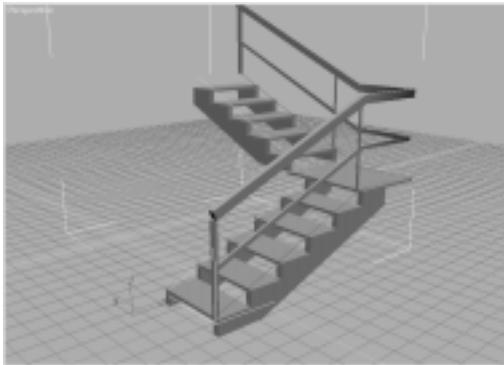
You see the paths as 3D lines above the stairs, set at a standard railing height. You need to adjust the height to use the Railing object in place of the built-in stair railing.

3. Scroll to the bottom of the Modify panel and expand the Railings rollout.
4. Set Height=-1 and press TAB. Leave Offset at the default.

The rail paths are now slightly below the top of the stairs. When the railing is added, its posts will start at the path and appear anchored in the steps.




Creating the Railing

1.  On the Create panel, open the list of geometry types and choose AEC Extended.
2. Click Railing to turn it on.
3. On the Railing rollout, click Pick Railing Path to turn it on.
4. Move the cursor to the right railing path. If you pause here, you see a tooltip that reads: "LTypeStair01.RightRail"
5. Click the right railing path to create a default railing that connects the start and end points of the path.
6. Select Respect Corners.
The railing now bends to follow the edge of the landing, with posts located at the top and bottom of each flight of stairs.
7. Right-click to end railing creation.



Adjusting the Railing


At this point, you're ready to adjust parameters to make the railing more realistic. In these steps, move the Spacing Tool out of the way so you can see changes as they occur in the railing.

1.  With the railing selected, open the Modify panel.
2. In the Top Rail area, you can set the height of the railing as well as the dimensions of the top railing. Reduce the height somewhat by setting Height=37. Accept the other defaults.
With the rail path one inch below the surface, this Height value produces a finished rail that is 36" high.
3.  In the Lower Rails area, click Spacing Tool. On the Lower Rail Spacing dialog, set Count=2 and press TAB to specify a second railing.
At the bottom of the dialog, notice that the spacing is 11". You'll use this value to set the bottom offset of the pickets.
4. Click Close to create the second railing.
5. On the Posts rollout, open the Spacing Tool and set Count=4. Click Close to create posts at the top and bottom of each flight.
6. On the Posts rollout, choose Round from the Profile list. Change the Extension value to 2.
This creates round posts and extends them upward into the top railing.
7.  On the Fencing rollout, leave Pickets as the default type. Click the Spacing Tool. Set Count=4 and close the dialog.
There are now four pickets between each set of posts.

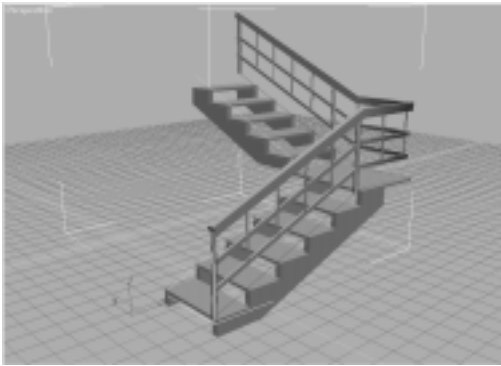
8. On the Fencing rollout, change the Profile to Round, then set the following:

- Extension=2
- Bottom Offset=11

The pickets are now thin rods that run through the railings.

9.  If necessary, use Pan to readjust the scene to see the completed stair and railing.

Notice that the top post is placed to meet the finished floor level, which is the twelfth step.



Completed stair and railing

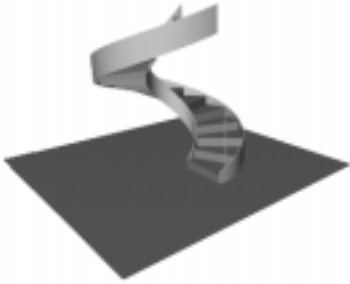
Adjusting the Stair with Railing

Once you've completed the railing, there are a number of changes you can make to the stairs. The railing will update its position while maintaining its geometry. You can also continue to change the railing geometry. Select either object and work on the Modify panel.

These are some of the stair parameters you can change:

- Switch Type between Open, Closed, and Box.
- Add or remove stringers and carriages.
- Change Overall Height, Riser Height, and Riser Count.
- Change Step Thickness.

Creating a Custom Stair Railing



Beginning and ending stairs

In a design where the railing is an important visual element, you might want to customize the railing and its supporting balusters.

In this lesson you create a custom railing for a circular stair. You create a helix and use the Spacing Tool to place the railing balusters along the helix. You then draw a handrail profile and loft it along the top of the balusters.

The same techniques can be used to place a linear arrangement of objects along any stair, ramp, pathway, or other site feature.

Steps in this Lesson

- Creating a Helical Path
- Spacing the Balusters on the Path
- Drawing the Railing Profile
- Lofting the Railing Profile

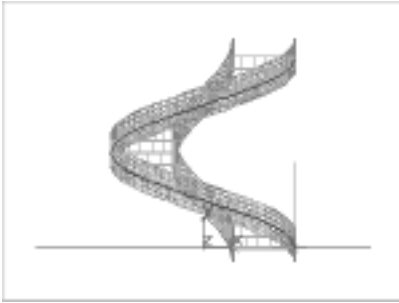
Setup

- Open the file *3dsviz2\scenes\tut0402.max*.

The scene shows a circular stair with one baluster on the first step. The baluster is green in wire-frame views to make it easy to see.

This is a custom stair model that could have been created as a Spiral stair object. In that case, you would normally use the Rail Path option instead of creating a helical path. But automated solutions don't always meet your modeling needs. The purpose of this lesson is to demonstrate some of the manual techniques that let you adapt to specialized requirements.

Creating a Helical Path






Front view with finished helix selected

In this step, you drag out a rough helix and then refine its parameters to fit the stair. The helix shape provides the spiral path for the balusters and railing profile to follow.

A helix is a special case of a 3D spline, a line drawn in space. For other stair configurations, you would draw a continuous 3D line along the sides of the stair or other site feature to create the path. In the next lesson, “Automatically Creating a Fence and Trees,” you convert a 2D line into a 3D path.

Creating the Helix

1.  On the prompt line, click 2D Snap Toggle to turn it on.
2.   On the Create panel, click Shapes.
3. On the Object Type rollout, click Helix.
4. In the Top viewport, do the following:
 - Press the mouse button in the center of the stair, drag right, then release anywhere near the outer circle.

This defines the center and bottom radius of the helix.

- Click near the top of the viewport, then click again.

The first click defines the height of the helix. The second click defines the top radius.

Sizing the Helix

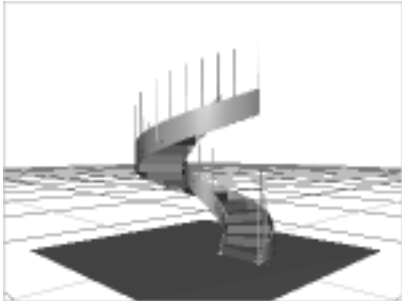
1. On the Parameters rollout, set the following parameters:
 - Radius 1=4'6"
 - Radius 2=4'6"
 - Height=9'4"
 - Select CCW (counterclockwise)

This sets the final size of the helix and specifies a counterclockwise twist.

2. Right-click to end Helix creation.

Continue on to the next step.

Spacing the Balusters on the Path




Stairs with balusters in Perspective view

A single baluster is supplied in this model, placed at the bottom of the stairs. In this step, you space copies of this baluster along the helix using the Spacing Tool.

The Spacing Tool is very versatile, with a variety of options for distributing spaces between objects. Here the choice is to place a baluster at each end of the path, with the others evenly spaced along it.

Picking the Path with Spacing Tool

1. In the Front viewport, select the baluster by clicking it.
2.  On the toolbar, click Spacing Tool to display its dialog.
3. On the Spacing Tool dialog, click Pick Path to turn on this mode.
4. You now select the helix. Because the helix is the same radius as the stair, you should select it by name rather than clicking it.
 - Press **H** on the keyboard to display the Pick Object dialog. Only splines that can be used as paths appear on this dialog.
5. Highlight Helix01 in the list and click Pick at the bottom of this dialog.

The Spacing Tool reappears with the name on the Pick Path button changed to Helix01.

Setting the Spacing


1. On the Spacing Tool dialog, set the following parameters:
 - Count=**32** (the number of balusters in addition to the selected one)
 - Context=Centers (default)
 - Type Of Object=Instance
 - In the list box, choose Divide Evenly, Objects At Ends.

The balusters appear along the path.

2. At the bottom of the Spacing Tool, notice the readout of the number of objects and their spacing. You can continue to make changes in the spacing.
3. Click Apply to accept the spacing, then click Close.

This completes the spacing of new balusters.

Baluster01 interferes visually with the new balusters and is no longer needed. Hiding is an alternative to deleting it:

-  With Baluster01 still selected, open the Display panel and click Hide Selected.

This point in the project would be a good point to save a copy of the scene with File > Save As.

Drawing the Railing Profile


You create the railing profile by first creating a rectangle shape, then rounding its corners.

Setup

- Continue from the previous step.
- To start from this point, open the file *3dsviz2\scenes\tut0403.max*.



Setting Up the Viewport

This adjusts the grid so you can create a small rectangle.

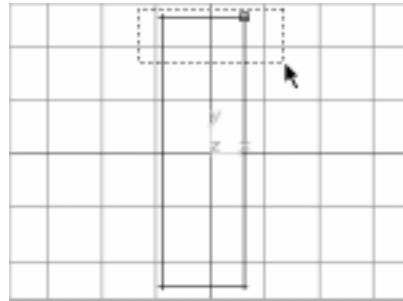
1.  On the status line, click Zoom.
2. In the Top viewport, drag upward. Zoom in until you see only the grid at the center of the stairs.

Creating the Rectangle

You create a roughly sized rectangle and then adjust its dimensions. 2D Snap Toggle is not needed for this.

1.   On the Create panel, click Shapes, then click Rectangle.
2. In the Top viewport, drag a small rectangle about 5" x 1.5".
3. On the Parameters rollout, enter these values:
 - Length=5"
 - Width=1.5"
4. On the Name And Color rollout, enter **Profile**.
You now have the raw blank for the railing. Next you round over the top corners.


Rounding Over the Railing Profile



Rectangle with region selected on top vertices

You could set the Corner Radius parameter for the rectangle to round over all four corners. In this case, only the top two corners need rounding. You use the Fillet/Chamfer modifier to round over selected corners of a shape.

The rectangle should still be selected from the previous step.

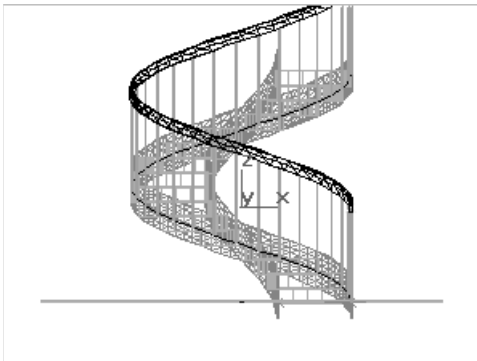
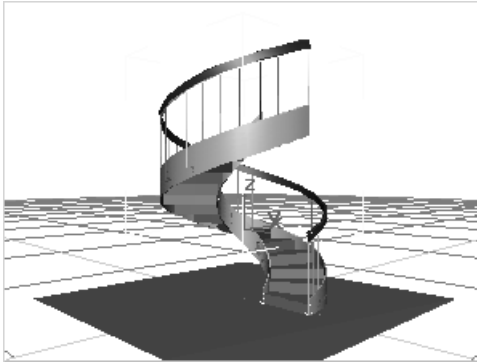
1.  On the Modify panel, click More to display the Modifiers dialog.
2. Click Fillet/Chamfer, then click OK.
By default, the Fillet/Chamfer modifier is applied with sub-object Vertex mode active.
3. In the Top viewport, drag a selection region around the top two vertices of the rectangle.
4. On the Chamfer Vertex rollout, type a value for Distance of **0.5"**, then click Apply.
The two selected corners are chamfered 1/2".
5. On the Modifier Stack rollout, click Sub-Object to exit sub-object vertex mode.

Tip: Using Chamfer instead of Fillet

You can improve interactive performance and rendering speed by using the least number of faces possible to represent an object. In this case,

using a chamfer creates fewer faces and will look just as smooth as a fillet in all but very close views.

Lofting the Railing Profile



Finished railing in Perspective and Front views

You can use *loft objects* to create many kinds of trim, moldings, rails, and edge treatments. A loft object is made from at least two shapes. A shape object, called the path, defines the length of the loft. At least one more shape object is used to define the cross section, or profile, of the loft.

In this step, you copy the helix and move the copy to the top of the balusters, where it becomes the loft path for the railing profile.

Selecting the Helix

The helix is the same radius as the stair and is difficult to select by clicking.


1. Press **H** on the keyboard to display the Select Object dialog.
2. In the List Types area, click Shapes to clear the check box. Then click Invert to show shapes.
3. Highlight Helix01 in the list and click Select at the bottom of this dialog.

The dialog disappears as the helix is selected.

Copying and Moving the Helix

1. On the menu bar, choose Edit > Clone.
2. On the Clone dialog, click Instance and then OK to make a copy.

The copy, Helix02, is automatically selected as it's created. You won't notice any difference in the viewport until you move the copy. However, the name changes on the Name And Color rollout.

3.  Click Move to turn it on.
4. Right-click Move to display the Transform Type-In dialog.
5. On the Transform Type-In dialog, enter:

- Absolute Z=**46.5"**

Helix02 moves up to the proper railing height for the stair.

6. Close the dialog.

Lofting the Profile Along the Helix

You are now ready to create the railing by lofting the profile along the path.

Helix02 should still be selected.



1. On the Create panel, click Geometry.
2. In the list of geometry types, click Loft Object, then click Loft.
3. On the Creation Method rollout, click Get Shape, then press **H** to display the Pick Object dialog.
4. On the Pick Object dialog, select Profile, then click Pick.

In the Perspective viewport, you see a first approximation of the loft object.

5. On the Creation Method rollout, click Get Shape to turn it off.
6. At the bottom of the Modify panel, expand the Skin Parameters rollout and set the following:
 - Path Steps=**10**
 - Shape Steps=**0**
 - Banking=clear

The finished railing is visible in all viewports.

The profile is no longer needed in the scene and can be deleted. In practice however, you often want to save a custom profile or other object for later use.

Saving an Object

1. Select the rectangle.
2. On the menu bar, choose File > Save Selected.
3. On the File Save As dialog, type a name for the file and click Save.

The profile is saved as a *.max* file. It can be brought into another scene with the File > Merge command.

Automatically Creating a Fence and Trees

The Railing object used in the lesson “Automatically Creating a Stair and Railing” can also be used to create fences. Fences with angles or curves require a path for the Railing object to follow. A single run of straight fence does not. Here the path is referred to as a “fence line.”

Most sites have some elevation change. For many fences, you need only a small number of known points to approximate the real surface. Starting from a sufficiently detailed 3D landform, you could snap the fence line to vertices in the model.

This lesson presents another approach. Beginning with a 2D fence line, you move vertices on the line to produce a 3D path for the fence to follow. You also add Foliage objects, in the form of oak trees, to provide a sense of scale.

Steps in this Lesson

- Creating Elevation
- Adding Foliage
- Adding a Fence
- Rendering to Check the Fence

Setup

- If you’re continuing from a previous lesson, choose File > Reset to return all defaults.
- Open the file *3dsviz2\scenes\tut0404.max*.

The scene consists of a 2D fence line. The grid spacing is set at 10’.

Creating Elevation

This example assumes that the fenced area to the left is flat ground, while the fence line to the right runs over a low rise. You simulate this topography by moving four vertices.

- If the line disappears while you’re making these moves, press **1** on the keyboard to refresh the screen.

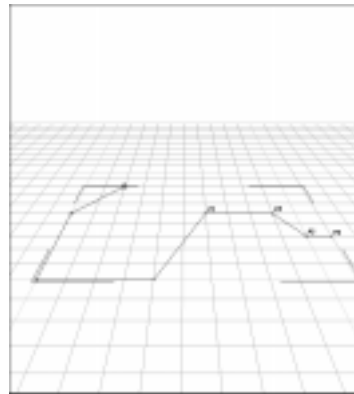
Moving Vertices


1. Select the line, which is named FenceLine.




2. Open the Modify panel. On the Modifier Stack rollout, click the Sub-Object button to turn it on (yellow).

Vertex level is selected by default. Refer to the following illustration to locate the four vertices mentioned in the next steps.



3.  On the prompt line, click 3D Snap Toggle to turn it on, if necessary. Right-click this button to display the Grid And Snap Settings dialog.


4. On the Snaps panel of this dialog, check that the following are set, then close the dialog:
 - Grid Points cleared.
 - Vertex selected.
 5.  On the toolbar, click Move. Then right-click this button again to display the Transform Type-In dialog. Move this dialog as needed so you can see the fence line.
 6. Click P1 to select it. The point displays its own axis icon when selected.
 7. On the Transform Type-In dialog, in the Offset:World Z field, enter **120**. This elevates P1 by 120 inches, or 10 feet. You can see the effect in the Left and Front viewports.
 8. Select P2 and repeat step 7.
 9. Select both P3 and P4 by holding down CTRL while you click. Repeat step 7 using an Offset:World Z value of **60**, or 5 feet.
- Moving these four points simulates a low rise that falls off to the right.

Before continuing, turn off the Sub-Object button. Leave the Type-In dialog open for a later step.

Adding Foliage


Foliage objects include a variety of 3D trees. Trees are useful to provide a sense of scale. Here three tall oaks are positioned close to the fence line. The canopies of these trees will overhang the fence.

Creating a Tree

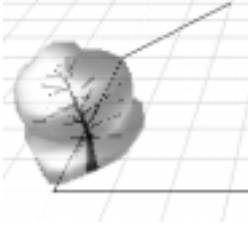
1. Turn off 3D Snap Toggle. You can place the tree by eye.
2.  On the Create panel, open the list of geometry types and choose AEC Extended.
3. Click Foliage to turn it on.
4. Scroll down the Favorite Plants rollout and click Generic Oak.
5. Click just inside the lower-left corner of the fence line.
A very large oak appears in the scene.
6. On the Name And Color rollout, highlight the default name, Foliage01, and change it to OakTree01.
7. Right-click to end tree creation. The tree should remain selected.

You now scale the tree to the scene.

Setting Tree Parameters

1.  Open the Modify panel.
2. On the Parameters rollout for OakTree01, set Height=**240**, or 20 feet.
3. This oak tree has about 24,000 faces, making it slow to move and copy. You can temporarily reduce the complexity by setting the following parameters:


- Under Level-of-Detail, at the bottom of the rollout, select Low. For many purposes, Low detail looks fine.
- Under Viewport Canopy Mode, select Always. This turns off the full leaf and trunk display, producing a bubble-like tree shape.



Oak tree in viewport canopy display

Copying Trees

You now make two additional trees using Shift-Clone. As discussed in an earlier lesson, this is the primary way of making copies in 3D Studio VIZ. In this case, you want the copies to be instances, so that the trees are identical and won't require any further settings.

1.  On the toolbar, click Move.
2. Select OakTree01. Right-click the tree and choose Transform > XY. This is a quick alternative to using the transform restriction buttons on the toolbar.
3. In the Top viewport, hold down the SHIFT key as you drag a copy of the tree to P1, slightly beyond the fence line. Release to display the Clone Options dialog.
4. On the Clone Options dialog, select Instance and then click OK.
5. With the new tree still selected, repeat steps 3 and 4, moving the next tree near P4.

There are now three trees in the scene. The last step is to move the second and third ones to match the elevation of the fence line.


Moving the Trees

The Move button should still be active on the toolbar.

1. Begin with the third tree. Select it if necessary.
2. On the Transform Type-In dialog, in the Offset:World Z field, enter **60**. This raises the tree 5 feet.
3. Select the second tree. In the Offset:World Z field, enter **120** to raise the second tree 10 feet.
4. Close the Transform Type-In dialog.

Returning Trees to Full Detail

With the trees in place, you can now return them to full foliage. This improves the sense of scale in the scene. Because the trees are instanced, you only need to change one of them.

1. Select any tree.
2.  Open the Modify panel and reset these parameters:
 - Under Viewport Canopy Mode, select Never.
 - Under Level-of-Detail, select High. As an experiment, try the different levels of detail. The differences are subtle for this tree. Use High for maximum detail.
3. Right-click the Front viewport label and choose Smooth + Highlights. Click on the background to deselect the tree. You now see the effect of the 3D contour.

- At this point, before adding the fence, you might save a copy of the scene with File > Save As.




Adding a Fence

With the trees correctly positioned and in full foliage, the last step is adding a fence along the fence line.

Setup

- Continue from the previous step.
- If you want to start at this point, open the file *3dsviz2\scenes\tut0405.max*.

Creating the Fence

-  On the Create panel, open the list of geometry types and choose AEC Extended.

If you're continuing from the previous step, this option is already open.
- Click Railing to turn it on.
- On the Railing rollout, click Pick Railing Path to turn it on.
- Move the cursor to anywhere on the fence line and click.

This creates a default "fence" that connects the start and end points of the fence line.
- On the Railing rollout, set Segments=25.



The fence now generally follows the fence line. Later, when you add additional posts, the fence will follow exactly.

- Right-click to end railing creation. The fence should remain selected.


Adjusting the Fence

At large scale, the details of a fence are less important than the overall effect. A fully realistic fence might look too cluttered. In this case, you drop out the pickets entirely and space posts on eight-foot centers to create a rail fence.

As you make these adjustments, the fence might not appear continuous in the viewport. As a final step, you check the finished fence by rendering against a light background.

-  With the fence selected, open the Modify panel to display the Parameters rollout for this railing object.
- In the Top Rail area, set Height=54.
-  In the Lower Rails area, click Spacing Tool. Set Count=2 and close the dialog.

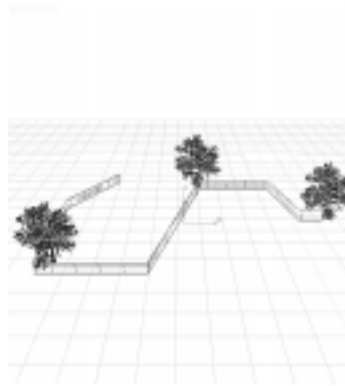
This adds a third rail, including the top rail.
- On the Fencing rollout, open the Type list and choose (none).

This eliminates all pickets between the main posts.
-  In the Post area, click Spacing Tool. Here you clear all the values except Spacing.
 - Clear Start Offset and End Offset. Both values default to 0.0.
 - Select Spacing.
 - Clear the Count check box.

The fence now consists of two posts (Count=2) at either end of the fence line. The Spacing field shows the length of the fence between these posts, roughly 2900 inches, or 240 feet.

6. In the Spacing field, enter **96.0**. This is a spacing of eight feet converted to inches. The Count field updates to 31 posts.
7. Select Start Offset and set to **0.0**. Repeat for End Offset.
8. Click Close on the Spacing Tool dialog to accept these settings.

In the Perspective viewport, you can see the posts in place. But rendering produces a more accurate image.



Fence with posts in place

Rendering to Check the Fence

In general, you can't always trust the viewport renderer for fine details like those in a fence. It's therefore good practice to do an occasional rendering to check your work.

By default, 3DS VIZ renders against a black background. It's helpful to change to a lighter background so you can see details more easily.

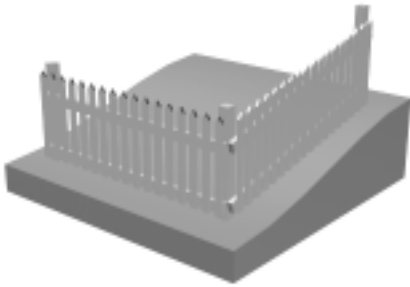
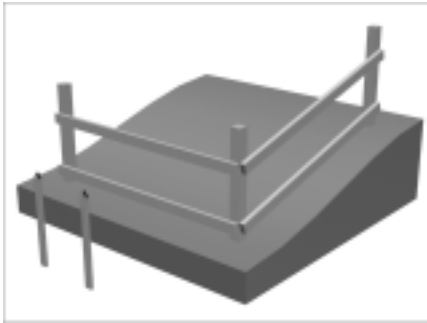
1. On the menu bar, choose Rendering > Environment to display the Environment dialog.
2. On the Common Parameters rollout, in the Background area, click the black Color swatch. This displays a color selector.
3. In the large color square, click near the middle top to select cyan. Move the Whiteness arrow toward the bottom to lighten the color. Then click Close to set the light-blue color.
4. Close the Environment dialog.
5. The Perspective viewport should be active. On the menu bar, choose Rendering > Render to display the Render Scene dialog.
6. In the Output Size area, click 640 x 480.
7. At the bottom of the dialog, click Render.

In this rendering, you can see the details of the fence and trees.



Final rendering

Creating a Custom Fence



Beginning and ending scenes in Perspective viewports

For most purposes, you can use the Railing object to create rails and fences in your scene. On occasion, you might need to customize the appearance and spacing of specific elements. This lesson takes you through the manual techniques to do this, using a simple picket fence as an example. You can apply these techniques to many modeling tasks, such as creating balusters for railings, mullions for curtain wall systems, and trusses between beams.

This lesson uses the Spacing Tool with the Pick Points method. The lesson “Creating a Custom Stair Railing” used the Pick Path method, where you draw a line in advance. With Pick Points, a temporary line is automatically drawn when you pick a start and end point.

Steps in this Lesson

- Spacing Pickets on the Horizontal Rails
- Moving Front Pickets to Final Position
- Spacing Pickets on the Sloping Rails
- Moving Side Pickets to Final Position

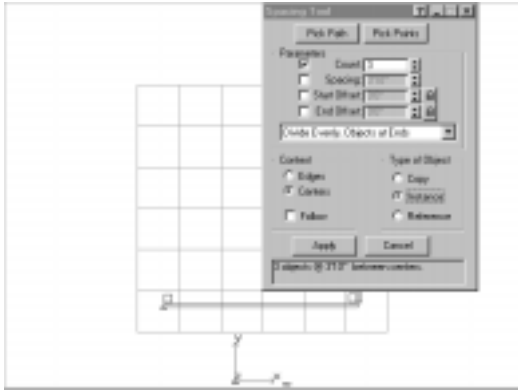
Setup

- Open the file *3dsviz2\scenes\tut0406.max*.

The scene shows posts with two sets of fence rails in place. Two fence pickets stand in front.

The fence rails show two common conditions. In one set, the rails are horizontal, and in the other, the rails run along a slope. In this lesson, you complete the fence by spacing instances of the pickets along the two sets of rails.


Spacing Pickets on the Horizontal Rails




When using the Spacing Tool by picking points, you need to set up a view so you can see both snap points. You also need to set the proper snaps to pick the exact points you want.

In this scene, both points are visible in the Top viewport at the ends of the horizontal railing.

Setting View and Snaps

1. Right-click in the Top viewport to make it active.
2. Press **W** on the keyboard to expand the viewport to full size.
3.  On the prompt line, click 3D Snap Toggle to turn it on, then right-click it to display the Snap panel of the Grid And Snap Settings dialog.
4. Clear Grid Points and select Endpoint, then close the dialog.

Picking Points

1. In the Top viewport, select the left picket, F_Picket01.
2.  On the toolbar, click Spacing Tool. Move the Spacing Tool dialog away from the fence.
3. Click Pick Points to turn it on.
4. You now pick the front corners of the upper horizontal railing, F_Rail01.
 - Begin by clicking the left front corner. A dotted line is now attached to the cursor.
 - Click the right front corner.

A spline is drawn along the top front edge of the top rail.

5. In the Type Of Object area, click Instance so that any modification you make to one picket is made to all the rest.

Three copies of the picket are now equally spaced along the rail, with one centered at each end. This is indicated on the Spacing Tool as “Divide Evenly, Objects at Ends.”

Spacing and Adjusting Pickets

The Spacing Tool allows you to experiment with different settings until you get the arrangement of components you want. No setting is final until you click Apply.

1. On the Spacing Tool dialog, set Count=17.

Seventeen new pickets are now spaced evenly along the railing. Notice that the end pickets overhang the rail ends. You generally want them to be flush with the ends.

2. Open the list again and choose Specify Offsets, Divide Evenly.

There is no visible change in the spacing of pickets.

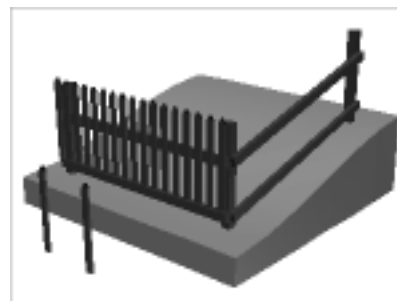
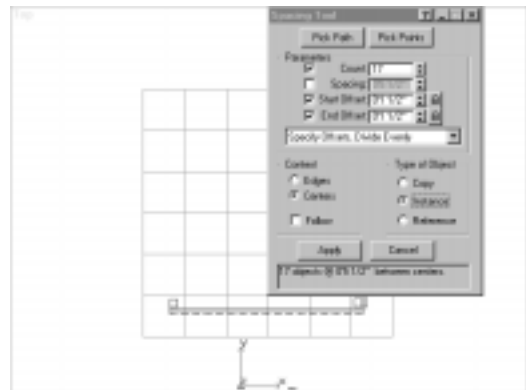
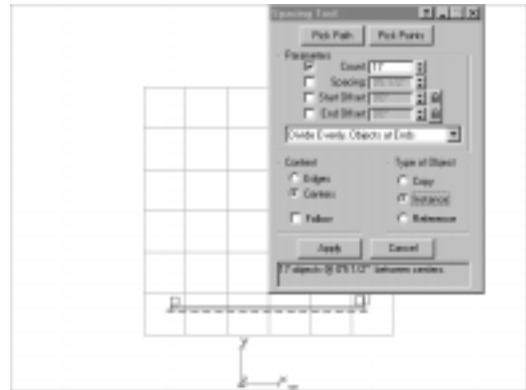
3. You now assign an offset to each end, to change the end conditions. The pickets are 3 inches wide, so you need to move the end pickets in by half that amount. Set the following:
 - Start Offset=1.5"
 - End Offset=1.5"

The end pickets are now flush to the ends.

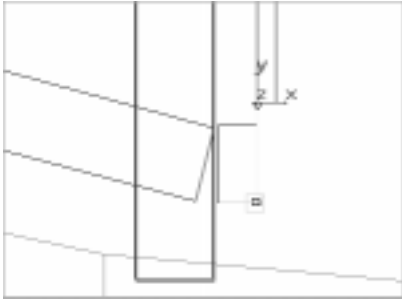
4. Click Apply and then Close to complete this use of the Spacing Tool.

The line disappears, and the new pickets are added as objects in the scene.

5. Press **W** to display the four viewports.



Moving Front Pickets to Final Position







Left viewport with Tape detail

In the Left viewport, notice that the pickets don't reach the lower rail. In this step, before moving the pickets, you make a measurement to determine the distance of this offset, then determine the direction you want to move.

Measuring the Offset

You need a close view to accurately measure between the picket and lower rail.

1.  On the prompt line, click Region Zoom.
2. In the Left viewport, drag a small region around the bottom of the lower post. The region should include the end of the bottom rail and the bottom of the picket.
3.  Turn on 3D Snap Toggle, if necessary. Right-click this button and set Endpoint, clearing any others.
4.   On the Create panel, click Helpers, then Tape.



Like a physical tape measure, Tape measures the length of a line you snap between any two points.

5. Click on the inside bottom corner of the picket and drag straight down to the outside

bottom corner of the rail. Release to create the tape object.

6. On the Parameters rollout, you read the length of the Tape in the grayed-out Length field. In this case, the length is 0'5".
7. Right-click to end Tape creation. You could now delete the tape, or leave it in place. The Tape object does not render.

Determining the Direction

1. If necessary, right-click in the Left viewport, which is zoomed in, to make it active.
2.  On the status line, click Zoom Extents to return the Left viewport to a full view.
3.  On the toolbar, turn on Select Object.
4. Click the fence picket visible in the Left viewport.


Notice the axis icon for the picket. The Y axis points up. To move the pickets downward, you define movement along the -Y axis.

Moving the Pickets

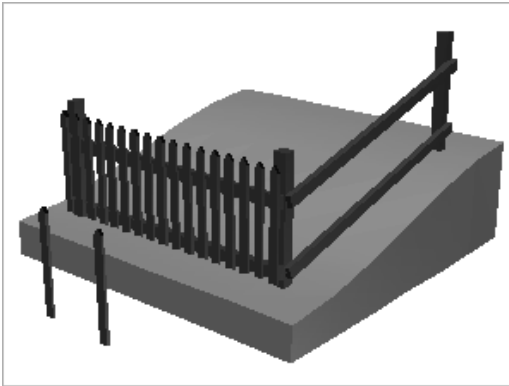
Moving the pickets downward 5 inches (the measured rail-to-picket offset) would make the bottom of the pickets flush with the bottom of the rail. You usually want additional material below the rail. In this case, you add one inch.

The Left viewport should be active.

1. Press **H** to display the Select Objects dialog.
2. In the top field, type **f_p** to highlight all 18 of the F_Pickets.
3. Hold down CTRL and click F_Picket01 to deselect the original picket, which is not part of the fence.
4. Click Select to complete selection of the remaining pickets.

5.  On the toolbar, click Move to turn it on, then right-click it to display the Transform Type-In dialog.
6. In the Y field for Offset:Screen, enter **-0'6"**.
All selected pickets move downward 6 inches, leaving a one-inch overhang below the bottom rail.

The horizontal fence section is complete. You might save a copy of the scene with File > Save As.



Perspective viewport with horizontal fence complete

Spacing Pickets on the Sloping Rails

The Spacing Tool with the Pick Points method works equally well for the sloping rails of this fence.


Setup

- Continue on from the previous lesson.
- If you want to start at this point, open the scene *3dsviz2\scenes\tut0407.max*.

The following steps generally follow the previous ones for spacing pickets along the horizontal rails. There are some differences due to the slope of the rails and picket orientation.


Setting Up Snaps

For the following steps, you need to set up snaps for both object selection and rotation.

1.  On the prompt line, click Angle Snap Toggle to turn it on, then right-click it to display the Grid And Snap Settings dialog.
 - On the Snap panel, be sure Endpoint is the only selected snap.
 - On the Options panel, in the Snap Values area, set Angle (Deg)=**90**.
2. Close the dialog.

Rotating the Picket

The Spacing Tool copies the selected picket with its original orientation. You need to rotate a picket so it will lie with its flat side against the sloping rails.

1.  On the toolbar, click Rotate.
2. In the Top viewport, click the right picket at the bottom of the viewport and drag it upward until it flips at right angles.


This happens immediately because you set the angular snap to 90 degrees. The picket is now oriented for use along the sloping rails.

3. Turn off Angle Snap Toggle.

Setting Up the View

1. The Top viewport should be active. Press **W** to expand the viewport to full size.

Notice at the upper end of the right rail that you can see a small rectangle. This is the foreshortened end of the rail. You need to enlarge the view to make sure you pick the right point with the Spacing Tool.

2.  Drag a region around the right rail. This enlarges the view.




Repeat Region Zoom if necessary. If you want to undo one or all of your view changes, press **SHIFT+Z**.





Top viewport zoomed in after using Region Zoom

Checking Picket Spacing

You typically want equal spacing between all pickets on a fence. Here you measure the center-to-center distance of the front pickets to apply to the right-side pickets.

1.  In the Top viewport, drag a region around three of the front pickets to enlarge the view temporarily.
2.   On the Create panel, click Helpers, then Tape.
3. Click on the outside center of one picket and drag across to the center of the next picket. Release to create the tape object.
4. On the Parameters rollout, the length of the Tape is shown as 0'5 1/2".
5. Press **DELETE** to remove the tape object.
6. Right-click to end Tape creation.
7. Press **SHIFT+Z** to return to the previous view.

Picking Points with Spacing Tool

1.  On the prompt line, click 3D Snap Toggle to turn it on.
2. Press **H** to display the Select Objects dialog.
3. In the top field, type **r_p** to highlight the right picket, **R_Picket01**. Click Select to complete selection of this picket.
4.  On the toolbar, click Spacing Tool. Move the Spacing Tool dialog away from the fence.
5. Click Pick Points to turn it on.
6. You now pick the outer corners of the right-side railing, **R_Rail01**.
 - Click the upper outside corner. Be careful not to click the lower corner, visible on the foreshortened end.

A dotted line is now attached to the cursor.

- Click the lower outside corner.

A spline is now drawn along the top outside edge of the right rail.

Adjusting the Spacing

1. On the Spacing Tool dialog, do the following:

- In the list, scroll down to choose Specify Offsets And Spacing.
- Set Spacing=**5.5"** (the center-to-center distance).
- Select Instance and Centers.

The Spacing Tool now creates a number of pickets based on these settings. By default, the offsets are 0, making the pickets close to the end of the rail. Because the rail slopes, you want to increase the offset at each end so there is no overhang.

2. Set Start Offset and End Offset=**1"**.

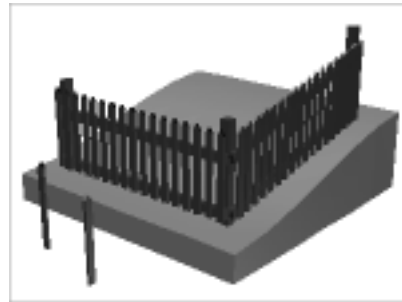
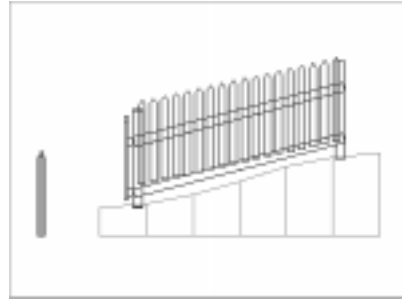
The end pickets move in slightly. If the offset is increased, the total number of pickets is reduced to maintain the required spacing.

3. Click Apply and then Close to complete this use of the Spacing Tool.

The line disappears, and the new pickets are added as objects in the scene.

4. Press **W** to return the four viewports.


Moving Side Pickets to Final Position



Perspective viewport with both fences complete

The final step is to move the pickets down to the lower rail. This is the same procedure as for the pickets on the horizontal rails. The offset is 6", and the downward direction is along the -Y axis.

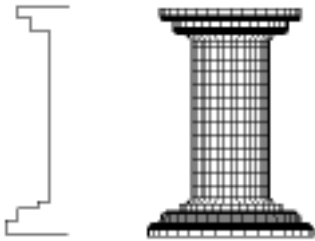
1. Right-click the Left viewport to make it active.
2. Press **R** to convert it to a Right viewport, and then press **W** to make it full screen.
3. Press **H** to display the Select Objects dialog.
4. In the top field, type **r_p** to highlight all the R_Pickets.
5. Hold down CTRL and click R_Picket01, to deselect the original picket, which is not part of the fence.

6. Click Select to complete selection of the remaining pickets.
7.  On the toolbar, click Move to turn it on, then right-click it to display the Transform Type-In dialog.
8. In the Y field for Offset:Screen, enter **-0'6"**.
All selected pickets move downward 6 inches, leaving a one-inch overhang below the bottom rail.

The sloping fence section is complete.

In your own practice, you would always save a copy of the final scene with File > Save As.

Lathing a Column



Rough spline and a lathed column

Lathe is a useful technique for creating surfaced 3D objects from a single 2D spline. The spline is rotated about a central axis to produce columns, balusters, finials, and other architectural elements that were traditionally manufactured on a wood lathe.

Unlike traditional lathing, the number of sides can be set before or after the lathing operation. You can therefore “lathe” square or hexagonal objects, for example. Many symmetrical objects can be modeled in this way.

This lesson produces a simple column, using the techniques of Fillet and Chamfer to detail the spline in preparation for Lathe.

Steps in this Lesson

- Drawing a Rough Shape
- Refining the Shape
- Lathing the Column Shape
- Adjusting the Lathed Shape

Setup

- Open the file `3dsviz2\scenes\tut0408.max`.

A sample outline of a half-column is provided so you don’t have to draw the rough shape, discussed next.


Guidelines to Drawing a Rough Shape



When you lathe an object on your own, the first step is to draw an outline of one half of the object you want to lathe. Most of the modeling work is in the dimensions and proportions of this outline.

Here is the *general* series of steps to follow when you create your own outline. These steps are for later use. You don’t have to do them for this lesson.

1. From the menu bar, choose Views > Units Setup. Select a unit of measurement.
2. On the prompt line, turn on 2D Snap Toggle.
3. Right-click 2D Snap Toggle to display the Grid And Snap Settings dialog. Make these settings:
 - On the Snap panel, select Grid (on by default). No other snap is needed.
 - On the Home Grid panel, set appropriate values for Grid Spacing and Major Lines.

The startup scene has a grid spacing of one inch, and a major grid line every six inches.


4. In a Front Viewport, right-click the viewport label and choose Show Grid.
5.  Zoom in until you can see the smallest grid spacing. Use the **W** hotkey to enlarge the view to full screen.

6.   On the Create panel, click Shapes, then click the Line button.
7. Begin at the top middle of the object and click on grid intersections, moving to the left (counterclockwise).
8. End at the bottom middle of the object. The first and last points must be vertically aligned.

Refining the Shape

Once you have a rough shape, you can chamfer and fillet corners to produce appropriate forms.

1. In the startup scene, select the blue spline in the top Front viewport.

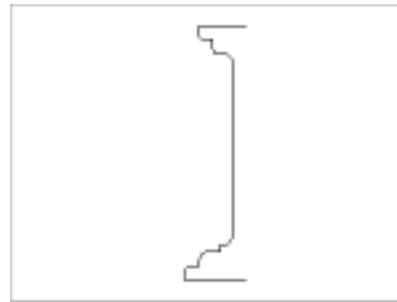
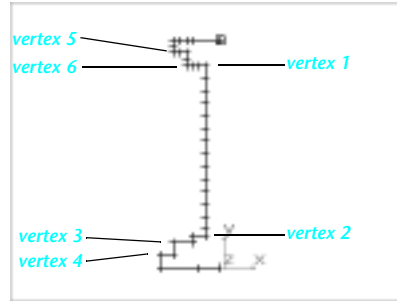
2.  Open the Modify panel and click the More button on the Modifiers rollout.
3. Click Fillet/Chamfer and then OK to display the Edit Vertex rollout.
4. Select vertex 1 where the capital meets the top of the column. In the Distance field for Chamfer, type **0'1"** and click Apply.

This chamfers the corner.

5. Repeat this process for vertex 2 at the base.
6. Select vertex 3, the middle vertex of the base. In the Radius field for Fillet, type **1.5"** and click Apply.

This puts a large fillet on the corner.

7. Select the lowest corner of the base, vertex 4, and fillet by setting Radius to **1"**
8. Select two more corners of the capital, vertices 5 and 6, and fillet by setting Radius to **0.75"**.




Spline with fillets and chamfers

Lathing the Column Shape

Lathing is the quickest part of this modeling process. You can lathe a shape to check its effect, then delete the Lathe modifier and rework the shape.

1. Right-click in the top Front viewport to make it active. The spline should be selected.

2.  On the Modify panel, click the Lathe button.


This produces a structurally improbable column rotated about the pivot point (center) of the shape.

3. Scroll down to the bottom of the Parameters rollout to the Align area. Click Max.

This moves the rotation center to the edge of the shape, producing a true column.

Welding the Core

In this step, you check the top of the column for any surface irregularities that might detract in a final rendering.

1. Right-click the Perspective viewport to make it active.
2.  On the prompt line, click Arc Rotate Selected.
3. In the Perspective viewport, drag the handle on the bottom edge of the green circle downward so you can see the top of the column.
On most systems, you see a triangular area that seems separate from the rest of the surface.
4. On the Parameters rollout, select Weld Core to eliminate the artifact.

Correcting Geometry

Lathe is sensitive to the direction of spline creation. In your own modeling, you might create a column that appears to be “inside-out” with both top and bottom surfaces visible. The easiest way to correct this is as follows:

1. Select the lathed column.
2. On the Modify panel, click the Normal button.

The Normal modifier adjusts the geometry so all its normals point outward. The column now renders as a real object in all views.


Adjusting the Lathed Shape



Rendered column with a marble material

Once a column is lathed, there are a number of adjustments you can make from the rollouts for this modifier.

Adjusting Shaft Thickness

1. In the top Front viewport, select the lathed column.
2. In the Modifier Stack rollout, click the Sub-Object button for the Lathe modifier.
The pivot aligns with the central axis, marked by a yellow line.
3.  On the toolbar, click Move and turn on the X axis constraint button.
4. Now move the axis pivot left or right. The shaft changes in thickness, maintaining the geometry of the capital and base.

Adjusting Segments

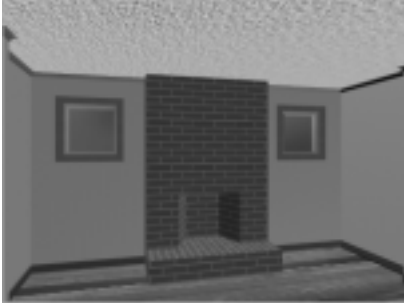
By default, Lathe produces a round object of 16 segments. The Segments field on the Parameters rollout lets you adjust this number.

- Increasing the number of segments produces a smoother round to the column, important for realistic renderings.
- Decreasing the number of segments produces polygonal columns.

Adding Mapping Coordinates

- If you intend to use a material like marble on the column, check Generate Mapping Coordinates at the bottom of the Parameters rollout.

Adding Realistic Details

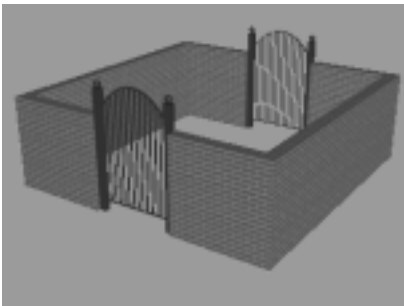


The first two lessons in this tutorial show you how to add realism to your model with existing materials and ready-made furniture and light objects. The final lesson introduces the process of creating an original material, a brick pattern.

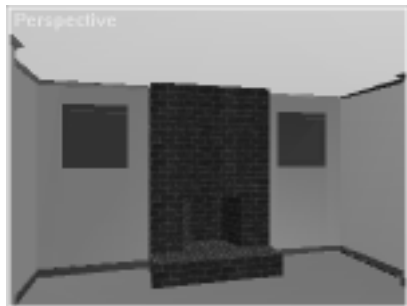
In these lessons, you're introduced to the use of the Asset Manager and the Material Editor, both essential tools when adding realistic details.

Lessons in this Tutorial

- Assigning Materials to Objects
- Adding Furnishings to a Room
- Creating a Material



Assigning Materials to Objects



Starting scene in Perspective viewport

You assign materials to change how surfaces of objects in your scene appear when rendered. Assigning materials is an important step towards enhancing the realism of your scene and is a handy way to study design alternatives for color and texture.

Previous tutorials rendered objects using their default object colors. In the following lessons, you use a drag-and-drop technique to assign textured materials to objects, and use the Material Editor to change and assign other materials to objects.

Steps in this Lesson

- Dragging and Dropping Textured Materials
- Selecting Materials in the Material Editor
- Assigning Materials from the Material Editor

Setup


- Open the file *3dsviz2\scenes\tut0501.max*.

The scene is a version of the interior model created in Tutorial 2.

Dragging and Dropping Textured Materials

Textured materials use an image file to represent textures such as wood grain, fabric patterns, or brick. The easiest way to assign simple textures to objects is to use the Asset Manager. This technique is especially useful for quickly trying different material effects on an object.

Opening the Asset Manager


1.  Open the Utilities panel.
2. On the Utilities rollout, click the Asset Manager button.
A large window opens covering the viewports. The panel on the left is a Windows-like file hierarchy. The panel on the right shows thumbnail images of materials, textures, and objects, depending on the current directory and file filters.
3. You generally want to resize the Asset Manager to fit your working conditions.
 - Drag the right edge of the Asset Manager window to the left, so that the Perspective and Front viewports are visible.
4. In the hierarchy panel of the Asset Manager, open the 3DS VIZ Maps directory, if it is not already open.

A blue progress bar at the bottom indicates when all the thumbnail images in this directory are loaded.

Dragging and Dropping a Floor Material

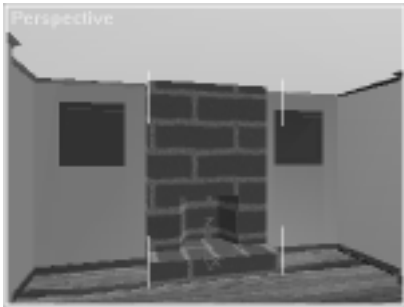
1. Scroll down the thumbnails to find an image named *T_WDFLR.JPG*, a wood flooring pattern.
2. Double-click this image to see a full-size view of this file, then close the viewer window.
3. Click down on the thumbnail image and drag into the Perspective viewport. Release when the cursor is over the floor.

The image is transferred to the floor.

4.  On the toolbar, click Quick Render to see what the rendered result looks like, then close the rendering window.

In this case, the wood flooring pattern is scaled to fit the size of the floor. In the next step, you add brick to the fireplace and adjust its scale to make it more realistic.

Dragging and Dropping a Brick Material





Perspective viewport with large brick on fireplace

1. Scroll through the thumbnails to find *TUTBRK.GIF*, a brick pattern.
2. Drag this image onto the fireplace in the Perspective viewport.

The fireplace turns gray because the original box geometry of the fireplace was not assigned *mapping coordinates*. The material is

applied, but not visible. The next steps automatically create the necessary coordinates.

3.  With Select Object turned on, click the fireplace to select it.
4.  Open the Modify panel. Click the More button and choose Map Scaler in the list of World-Space Modifiers.

This applies the Map Scaler modifier. The brick pattern now appears on the fireplace, but the bricks are much too large.

Adjusting the Material Scale

You adjust Map Scaler on its Parameters rollout. The main setting is Scale, which defaults to 100 units (in this case, 8'4" or 100"). The other defaults are generally correct for realistic materials.

1. Since the bricks appear much too large, try scaling them to one-third size.


- Change scale to **33"** and press ENTER.

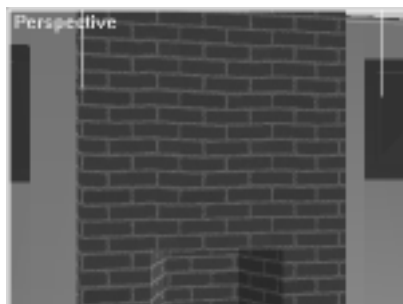
The bricks are still a little large.

2. Try reducing the scale to one-quarter size.

- Change scale to **25"** and press ENTER.

The bricks are now about right.


3.  On the prompt line, click Field-of-View and drag upward in the Perspective viewport. This zooms in on the fireplace for a close look.



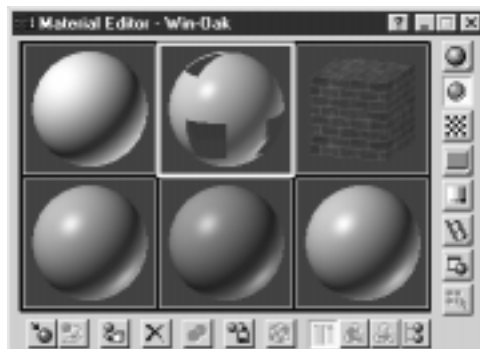
Perspective viewport zoomed in

4. Count the bricks across the front of the fireplace.

There are about six bricks across. The fireplace is 60" wide, so a brick is about 10" in length and approximately accurate in scale.

5. Right-click again to turn off Field-of-View.
6.  On the toolbar, click Quick Render to check the finished effect. Afterward, minimize the rendering window.
7. Right-click the label of Perspective viewport and choose Undo View Field-of-View.

Selecting Materials in the Material Editor





Top half of Material Editor with Win-Oak selected in second slot

As a more flexible alternative to the Asset Manager, you can use the Material Editor to select many ready-made materials from a library or from objects in your scene. You can then apply those materials to any set of selected objects.

As its name implies, you can also use the Material Editor to design and edit any kind of material, from colored plastic to the most complex fabric.

Locating Materials to Use in the Scene

1.  On the toolbar, click Material Editor.
2.  On the Material Editor dialog, click Get Material at the left end of its toolbar.
This displays the Material/Map Browser dialog.
3. On the Material/Map Browser, in the Browse From area, select Mtl (Material) Library to view the ready-made materials in the 3D Studio VIZ library.

You can also click Open and select another library. The 3DS VIZ library is the default.

4. Scroll down the material list and double-click Wall-White Plaster.

The sphere at the top left of the Material/Map browser changes to this material, as does the first sample slot at the upper left of the Material Editor.


5. On the Material/Map Browser, scroll down the material list to find Window-Oak/Clear.
6. Click down on Window-Oak/Clear and drag it directly to the second sample slot in the Material Editor, next to the Wall-White Plaster slot.
The second sample sphere renders with a checkerboard pattern. Material Window-Oak/Clear is a Multi/Sub-Object material that contains materials designed for the frame, sash, and glazing of parametric window objects.
7. Close the Material/Map Browser.

Capturing Materials Used in the Scene

The Material Editor lets you sample a material that already exists in a scene and assign it to one of the sample slots. You can then save it in a library for future use. For example, you could save the brick pattern on the fireplace.


1. On the Material Editor, click the third sample slot to make it active.

A white border appears around the slot.

2.  Next to the material name, click Pick Material From Object.
3. Move the eyedropper cursor into the Perspective viewport and click the fireplace.
The brick pattern appears in the third sample slot. Note that the slot, in addition to the

white border, now has four white corners indicating that this material is already used in the scene.

4. The program assigns a numerical name to this material. Replace this with a descriptive name like **Fireplace Brick**.

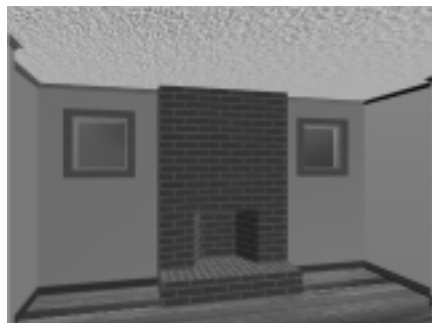
5.  Open the Material/Map Browser. In the Browse From area, select Active Slot.

The material Fireplace Brick is now loaded in the Material/Map Browser.

6. To save this material to a library, select Selected in the Browse From area.
7. Click Save As and either choose an existing library or name a new one.
The material is saved to the library you specify.

You can maintain any number of specialized material libraries as you collect and create materials for different purposes.


Assigning Materials from the Material Editor



Once you have selected materials in the Material Editor, you assign the materials to objects in your scene.

In the following steps, you assign the materials White Plaster to the ceiling and Win-Oak to the windows in your scene.

Assigning White Plaster to the Ceiling

1. In the Perspective viewport, click the Ceiling object to select it.
2. On the Material Editor dialog, click the White Plaster sample to make it active.
3.  Click Assign Material To Selection.

You see only a slight change in the color of the ceiling. The difference will be more apparent when you render the scene.

Assigning Window Materials



As noted earlier, Window-Oak/Clear is a Multi/Sub-Object material that contains materials designed for the frame, sash, and glazing of parametric window objects. The appropriate material is applied to each of these window components with this single “master” material.

1. On the toolbar, select Windows from the Named Selection Sets list.

Windows is a selection set that was defined as part of the setup file. It contains all of the windows in the scene.



Named Selection Sets list with Windows dropped down

2. On the Material Editor dialog, click the Window-Oak/Clear sample to make it active.
3.  Click Assign Material To Selection.
You see the window lights turn dark indicating there is now a glass sub-object material applied to them.
4.  Make sure the Perspective viewport is active. Then, on the toolbar, click Quick Render to see a rendering of the scene.
5. Close the rendering window when you're done with it.

Adding Furnishings to a Room

Adding furniture, plants, and entourage is easy using the Asset Manager. There are a few rules to remember:

- You can drag objects only to the active viewport.
- The objects are placed on the current construction plane.

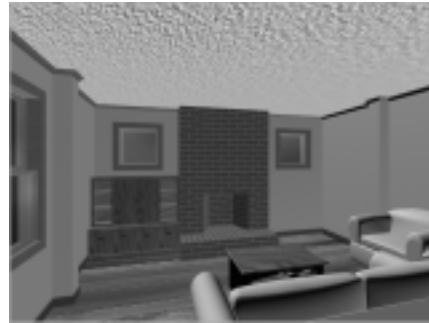
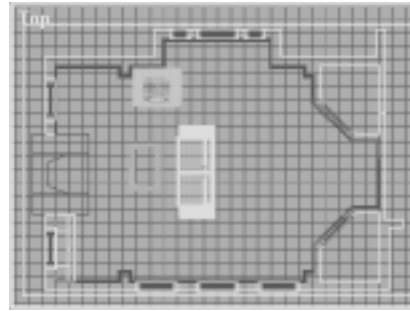
Setting Up Viewports

It's convenient to drag furniture onto the construction plane in a Top viewport, while watching the effect in a Perspective viewport.

In a previous lesson, you set up Asset Manager so it covered the left of the screen. The following steps copy the Top viewport to the lower right, so you use the Asset Manager in the same position.


1. Right-click in the Top viewport to make it active.
2. On the menu bar, choose Views > Save Active Top View.
3. Right-click in the Front viewport, then press **T** on the keyboard to switch this viewport to Top.
4. Choose Views > Restore Active Top View.
This copies the Top view into this Top viewport.

Dragging to Add Furniture




Top and Perspective viewports with some furniture in place.

The lower-right Top viewport should be active.

1.  Open the Utilities panel and click Asset Manager. If necessary, move and resize this dialog to fit over the left two viewports.
2. In the hierarchy panel, open the 3DS VIZ Scenes directory.
3. From the list in the Asset Manager toolbar, choose the *.max* option.
4. Scroll to find the file *t_case.max*, a large cabinet with glass doors at each end.
5. Drag the case into the Top viewport and position it to the left of the fireplace, under the

high window. Click to drop the case into approximate position.

6.  To adjust position, click Move on the toolbar and reposition the case.

The brown border around the room represents the cornice. The face of the wall is at the outer edge of the cornice. The case fits very tightly in this space.

7. Drag other furniture, such as *t_armch*, *t_sofa*, and *t_ctabl* to the top view to furnish the room as you see fit.

Canceling a Drag

- To cancel a drag, right-click during the drag.

Solving Contingencies

In practice, you may occasionally get unexpected results when dragging files from the Asset Manager. Here are some pointers.

- The object might not appear in the scene because it's beyond the viewport. If you can't find an object after dropping it, make the Top viewport active and click Zoom Extents on the status line. You can then move the object into position before returning to the original view by choosing Views > Undo View Zoom Extents.
- If the object merging into the scene has a material with the same name as a material already in the scene, a dialog gives you the choice of which to use. Generally you want to use the merged material, so the complete object appears in the scene. But doing this overwrites the scene material. If in doubt, choose the scene material. You can then find that material and rename it to avoid conflict. Then merge the object again with its own material. As a general practice, try to give

materials unique names to avoid such conflicts.

Dragging to Add Lights

Dragging objects that represent light fixtures into your scene provides a double benefit. If the file contains a light object, such as an Omni or spotlight, you get both the geometry of the light fixture and a light source to illuminate your scene.

Setting Up

- Open *3dsviz2\scenes\tut0502.max*.

This is a sparsely furnished room suited to studying the effects of adding and adjusting lights.

Dragging Lights

1. Right-click in the Top viewport to make it active.
2. Drag the table lamp *t_tblmp.max* to the Top viewport and position it in the middle of the coffee table.

When you do this, the default lighting turns off, and the scene is now lit by only this one light source.
3. Drag the floor lamp *t_flrlmp.max* to the Top viewport and drop it in the corner near the fireplace.

This brightens the scene considerably.
4. Drag the ceiling fan *t_clgfan.max* to the Top viewport and drop it near the center of the room.

The ceiling fan is set to the height of the ceiling, and has a light at its center. The room is now quite bright. You now adjust the light levels to simulate residential lighting.

Adjusting Light Levels

With lights in place, you can adjust each light individually to improve the quality of lighting.


Setup

- Continue from the previous step.
- Open the file *3dsviz2\scenes\tut0503.max* if you want to start at this point.


Adjusting Lights

There are three lights in the scene, which is unrealistically bright by residential standards. You need to dim at least one light.


The light on a ceiling fan is often low wattage or on a dimmer switch, so you can start there.

1.  On the toolbar, click Select By Name and select OmniCeilingFan, the omni light at the center of the fan.

In these steps, use Select By Name to select lights. You need to be sure you get the right light and disturb nothing else in the scene.

2.  Open the Modify panel. On the General Parameters rollout for this light, locate the Multiplier parameter. This parameter defaults to 1.0.
3. You often have to experiment to get the effect you want. In this case, try reducing Multiplier by half. Enter **0.5**.

The room dims quite a bit. When adjusting lighting, you should do renderings often to see the actual effect. This also helps you decide what the next step should be.

4.  Right-click the Perspective viewport to make it active. On the toolbar, click Quick Render to see a rendering of the scene.

The table lamp might be a little too bright. You can see its glare on the case next to the fireplace. Minimize the rendering window.

5. Select OmniTableLamp and adjust its Multiplier to **0.8**.
6. Render again from the Perspective viewport. Now the lighting seems too uniform. Try adjusting the tall lamp in the corner.
7. Select OmniTallLamp and adjust its Multiplier to **1.2** and render again.
The balance is now fairly good.



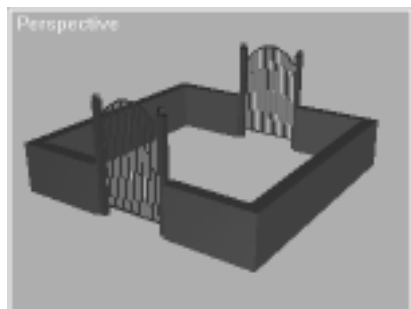
Completed scene in Perspective viewport

Continue experimenting with different lighting effects.

As a general practice, it's a good idea to save a copy of a scene before making experimental changes. You can then discard the changes and return to the starting scene.

- Open the file *3dsviz2\scenes\tut0504.max* if you want to return to the scene at the end of these steps.

Creating a Material



Startup scene in Perspective viewport

In this lesson, you design a brick patterned material and assign it to a walled enclosure.

Brick is a typical design problem because it requires specific dimensions and proportions to look correct.

After assigning the material, you use the Map Scaler modifier to set the exact size of the pattern. The height and surface area of the wall can then be changed without affecting the pattern.

Steps in this Lesson

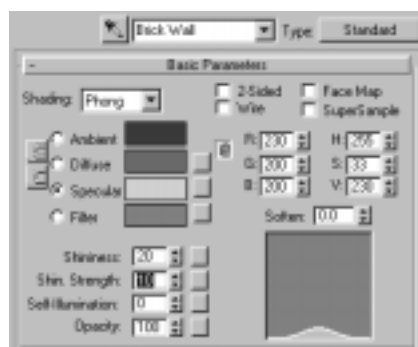
- Specifying Basic Material Properties
- Assigning a Texture Map
- Assigning a Bump Map
- Assigning the Material to an Object

Setup

- Open the file *3dsviz2\scenes\tut0505.max*.

The scene shows a gated garden enclosure with a low brick wall.


Specifying Basic Material Properties



Material Editor with finished settings

The basic properties of a material define such properties as color, transparency, and shininess. Because you use a texture map to control this material's color, you could ignore the basic color properties. However, it's a good idea to set the color properties to the dominant color of the map in case you decide to view or render the scene with mapping turned off.

Setting Colors and Shininess

1.  On the toolbar, click Material Editor.
2. On the Material Editor dialog, highlight the default name Material #1 and enter **Brick Wall** as the new name.
3. On the Basic Parameters rollout, click the Ambient color swatch.

This displays the Color Selector dialog for this color component. Ambient is the color of this material in shadow.

4. Set the following Red-Green-Blue color values for Ambient to produce a grayed purple. Use the TAB key to move from one highlighted field to the next.
 - R=70
 - G=50
 - B=80
5. Click the Diffuse color swatch. Diffuse is the basic color of the material. Set the following color values for Diffuse to produce a muted reddish brown:
 - R=150
 - G=90
 - B=80
6. Click the Specular color swatch. Specular is the color of material's highlights. Set the following color values for Diffuse to produce a dusty pink:
 - R=230
 - G=200
 - B=200
7. Click Close on the Color Selector dialog.
8. On the Basic Parameters rollout, set the following values to reduce the material's shininess:
 - Shininess=20
 - Shininess Strength=10

You have now created a dull material with a basic brick color.

Assigning a Texture Map

You can assign a bitmap as a texture to apply to the material surface. This is much like applying wall paper to the surface of an object. When you design a brick material, it's important to select a bitmap that represents a modular number of brick courses in a repeating bond pattern.

The Material Editor should still be open from the previous step with the Brick Wall material active.

Specifying a Diffuse Map Type

1. In the Material Editor, click the Maps rollout to expand it.
2. Click the Map button to the right of Diffuse. All Map buttons are labeled None to indicate that no maps have been assigned to this material. The Material/Map Browser dialog appears.
3. On the Material/Map Browser, under Browse From, New (the default) should be selected.
4. In the list of maps, click Bitmap, then click OK.

This specifies Bitmap as the map type on the Diffuse Map button for the material Brick Wall.

Selecting the Bitmap


1. On the Bitmap Parameters rollout, click Bitmap (the long, blank gray button).
2. On the Select Bitmap Image File dialog, do the following:
 - Select *3dsviz2\Maps\tutbrk.gif*.
 - Click View to examine the bitmap.


The bitmap shows a running bond pattern that is 6 courses high and 2 stretchers wide.

The bitmap is 16" square using standard modular brick.

3. Close the view window and click OK.

The label TUTBRK.GIF appears on the Bitmap button.

4.  In the Material Editor toolbar, click Show Map In Viewport.
This shows the texture map in rendered viewports.

5.  In the Material Editor toolbar, click Go To Parent to return to the Maps rollout.
The Diffuse Map button now reads Map #2 (TUTBRK.GIF) to identify the map.

The Brick Wall sample slot now displays the brick texture.

Removing a Map Assignment


In creating your own materials, you might want to try various maps on a single button. To remove a map assignment, do the following:

- In the Map rollout, click down on an empty None button and drag it onto the button you want to change.

When you release the drag, the assigned map is deleted, and the button changes to None.

Changing the Sample Display

By default, the sample slots in the Material Editor use spheres. You can change any slot to a cube or cylinder. A cube would work better with this material.


1.  Click Sample Type to the right of the sample slots. This is a flyout showing the three choices.
2. Select the cube icon to switch the current slot.




Sample slots with Brick Wall material as a cube

Viewing the Material's Hierarchy

Materials are usually composed on two or more levels of maps. While you can click various buttons to move up and down the hierarchy, it's much easier to use the Material/Map Navigator, which shows you the entire structure as a visual tree. You click any branch to display the corresponding settings in the Material Editor.

1.  On the Material Editor toolbar, click Material/Map Navigator.

This small dialog can be resized if necessary, and it can be minimized when not in use.

2.  In the Material/Map Navigator, click View List + Icons to show the structure of the Brick Wall material.



Material/Map Navigator dialog

3. Click the Diffuse Map icon. The Bitmap Parameters rollout appears. You could now change the bitmap, for example.

Leave the Material/Map Navigator open. In the next step, you add another level to the Brick Wall material.

Assigning a Bump Map

You can assign a bitmap as a bump map to create the effects of high and low spots on the material's surface. Bump maps use the gray values of a bitmap to define the bump effect.

When you design a material like brick, it's important to use a bump map that exactly matches the joint pattern of the texture map.

The Material Editor should still be open from the previous task with the Brick Wall material active.

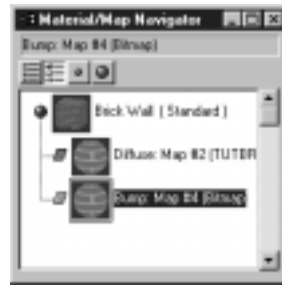
Assigning the Map

This step begins at the top level of the Brick Wall material. If necessary, click the top icon in the Material/Map Navigator to return to this level.

1. On the Maps rollout, click the Map button to the right of Bump.
2. On the Material/Map Browser dialog, click Bitmap, then click OK.
3. On the Bitmap Parameters rollout, click Bitmap. On the Select Bitmap Image File dialog, do the following:
 - Select *3dsviz2\Maps\tutbrk_b.gif*.
 - Click View to examine the bitmap.

The bitmap shows a pattern that matches the texture map you chose in the previous task. The light gray brick faces protrude from the surface to form joints.

- Close the view window and click OK.




Material/Map Navigator with three levels for Brick Wall material

Creating the Surface Effect

1. Click the Brick Wall (Standard) icon in the Material/Map Navigator to return to the top level.
2. On the Maps rollout, enter the following in the Amount field next to the Bump button:
 - Amount=**100**

The Brick Wall material sample now displays the brick texture with recessed joints.

3.  Click Sample Type and select the sphere icon.

In the sample slot, the recessed joints are more apparent on the large sphere.




Top three sample slots with Brick Wall material as a sphere

Assigning the Material to an Object

You can now assign Brick Wall material to the garden wall. The wall has default mapping coordinates enabled so you can see the brick map in the rendered viewport.

The Material Editor should still be open from the previous step with the Brick Wall material active.

1. In the Perspective viewport, click the wall to select it.

2.  On the Material Editor toolbar, click Assign Material To Selection.


The Brick Wall material is applied to the wall and displays in the perspective viewport.

3. Close the Material Editor.

Adjusting the Scale of the Material

The brick pattern is distorted and stretched over the wall. Here you use the Map Scaler modifier to scale the brick material to the correct size, as you did for fireplace brick in an earlier lesson. In this case, you know that the bitmap represents a 16-inch square. You won't have to approximate.

The wall should still be selected.

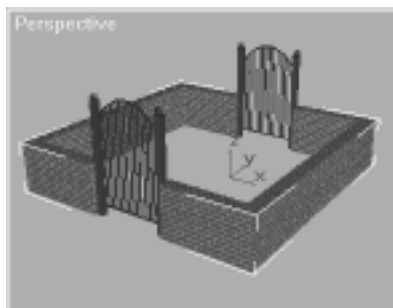
1.  Open the Modify panel. Click the More button and choose Map Scaler from the list of World-Space Modifiers.

This applies the Map Scaler modifier. As in the previous lesson, these bricks are now much too large.

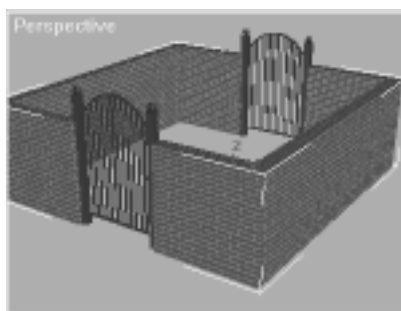
2. On the Parameters rollout, enter the known scale:

- Scale=16"

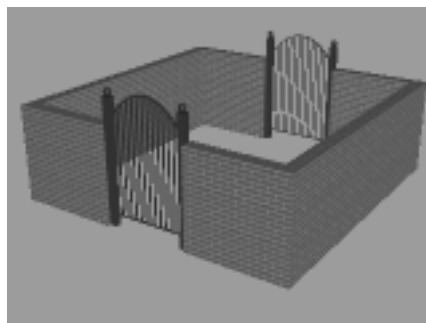
The material Brick Wall is now precisely scaled to the garden wall.



Scene in Perspective viewport with scaled bricks



Scene in Perspective viewport with distorted brick



Rendering of scene in Perspective viewport

Changing the Wall Height

An advantage to using Map Scaler over other mapping methods is that the map scale is independent of the object it is applied to. If you change the height of the wall, Map Scaler causes the additional wall surface to fill with properly sized brick.

The wall should still be selected, with the Modify panel open.

1. On the Modifier Stack rollout, select Extrude from the stack list.
2. On the Parameters rollout for Extrude, set the following:
 - Amount=54"

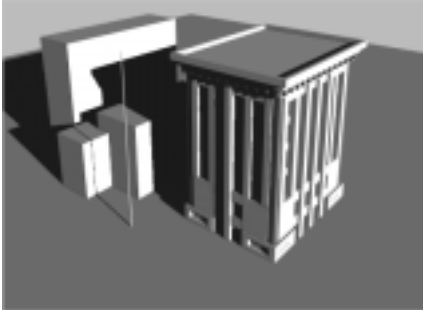
The wall becomes higher, but the brick scale remains the same.

Rendering a Closer View

It's always good practice to render the final effect. The viewport renderer can introduce apparent errors that are not really present.

6

Lighting and Camera Effects



Placing a Sun

Good presentations rely on more than good modeling and material techniques. You must also illuminate your scene and set up camera views to render. The lessons in this tutorial present useful techniques for placing a sunlight source and animating a camera.

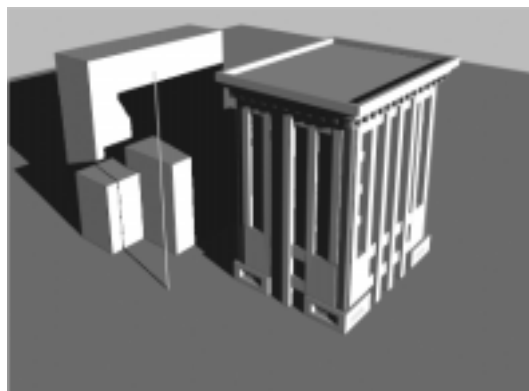
Lessons in this Tutorial

- Placing a Sun
- Panning a Camera



Panning a camera

Placing a Sun



Rendering in Camera viewport with shadows.

3D Studio VIZ supplies a Sunlight system for the placement of a realistic sun in your scene. The system lets you specify date and time as well as geographic location to produce accurate sun angles and rendered shadows.

The illustration shows the scene used in this lesson. The view is to the northwest. The sun and shadows are for 8:30 AM at spring equinox in San Francisco. To provide a sense of scale, the green flagpole is 100 feet high, and the site area is 1000 feet on a side.

Steps in this Lesson

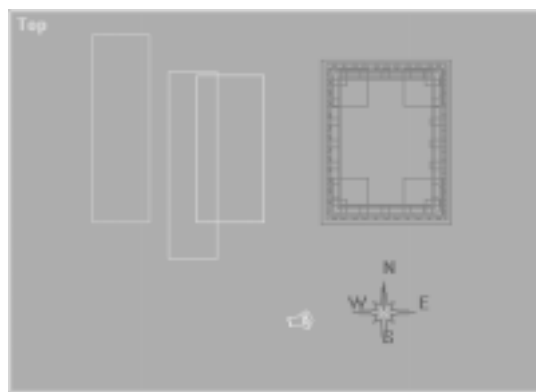
- Creating a Sunlight System
- Specifying Location, Date, and Time
- Specifying Sunlight Color
- Scaling the System
- Rendering Sunlight and Shadows

Setup

- Open the file *3dsviz2\scenes\tut0601.max*.


Creating a Sunlight System

You create a Sunlight system much as you do other objects in 3DS VIZ. Using a Top viewport to represent the surface of the earth, you drag out a compass rose and light object to set up the initial system. You then adjust parameters to meet the requirements of the site, date, and time.



When created, the sun is positioned according to the current date and time on your computer. The position cannot be set manually. When you finish, the position you see in the viewport is likely to vary from this illustration.

Creating the System

1.   Open the Create panel and click Systems.

Unless you've installed other systems, Sunlight is the only option.

2. Click the Sunlight button.
3. In the Top viewport, click down in front of the main building and drag slightly to create a compass rose, then click to set the rose.

You can cancel at any time and start over by right-clicking.

4. Drag toward the lower edge of the viewport, following the direction taken by the light object, then release.

This sets a directional light for the sun overhead. You see lines, representing the angle of the sun's rays, connecting the sun and the compass rose.


5. Right-click in the viewport to turn off the Sunlight button.

Specifying Location, Date, and Time

Once you've created a Sunlight system in your scene, you can specify any location on earth. You either choose the location from a map or list of major cities, or type in geographical coordinates. You then specify time and date.

After creation, you make all these settings on the Motion panel.

Opening Parameters

1. Select the sun directional light (named Sun01) if it is not still selected from the previous step.
2.  Open the Motion panel to display the Control Parameters rollout.

Specifying Location

The Location area of the Control Parameters rollout contains fields for Latitude and Longitude and a Get Location button.

If you were working with the known coordinates of a site, you would enter these values directly in the fields provided.



Geographic Location dialog with world map showing and San Francisco, CA highlighted in list of cities

For this lesson, continue with the following steps, which are commonly used to specify location. Experiment with the different techniques before making a final choice.

1. Click the Get Location button to display the Geographic Location dialog.
2. Open the Map list and choose a world or regional map.
3. Click directly on the map. A large crosshair marks the location.
If Nearest Big City is selected, the crosshair marks that location, with the city name appearing in the list of cities.
4. Scroll through the list of city names to find the location you want.
5. Click in the list and type a city name to highlight that city in the list.
A crosshair appears on the map whenever you highlight a city.
6. To follow this lesson, select San Francisco, CA, then click OK.

The latitude and longitude for San Francisco appear in the fields. On your own projects, you can fine-tune this location if necessary.

Specifying Date and Time

You enter time and date values in the Time area of the Control Parameters rollout. Use 24-hour format for time.

To duplicate the illustration, enter the following values in the Time area of the rollout:

- Hours = **8**, Minutes = **30**, Seconds = **0**
- Month = **3**, Day = **21**, Year = **2000**

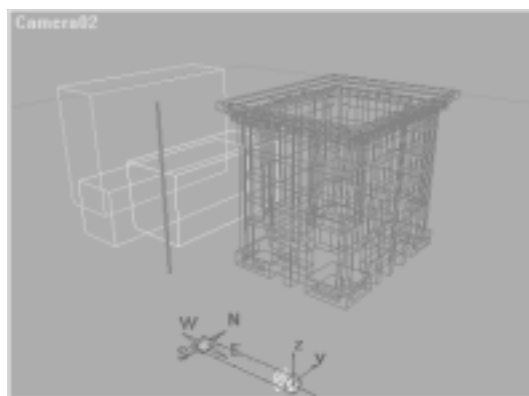
As you enter these values, the sun's position moves to reflect the changes.

The finished time, date, and location is March 21, 2000 at 8:30 AM in San Francisco.

Using Other Parameters

Time Zone. This value represents the number of hours ahead of (plus) or behind (minus) Greenwich Mean Time at a given location.

- If you use the Geographic Location dialog to define a location, the Time Zone is set automatically. Leave Time Zone set at -8 for this lesson. San Francisco is 8 hours behind GMT.
- If you manually enter latitude and longitude, this setting is not updated. Enter the time zone, if known, or click an approximate map location before entering coordinates.





Camera viewport with new settings and the sun selected

Daylight Savings Time. This is a manual setting. Check if daylight savings time is in effect for the date at your location. Leave clear so that standard time is in effect for this lesson.

Azimuth and Altitude. These are current values for the position of the sun as defined by settings for location, date, and time. They are grayed out to indicate that they cannot be changed manually.

Specifying Sunlight Color

For realism in your finished rendering, it's important to give sunlight a natural color. Clear sunlight is typically a pale yellow in color (approximated in the following steps). At sunrise and sunset, the color can be more orange or red than yellow.

1. Select the sun directional light (Sun01) if it is not already selected.
 -  Use Select By Name on the toolbar if the sun is not visible in any viewport.
2.  Open the Modify panel to display the General Parameters rollout for this light.
3. In the Color area, click the color swatch next to the On button to display the Color Selector: Light Color dialog.
4. Pick a light yellow color, or enter the following RGB values:
 - Red = **250**
 - Green = **255**
 - Blue = **175**

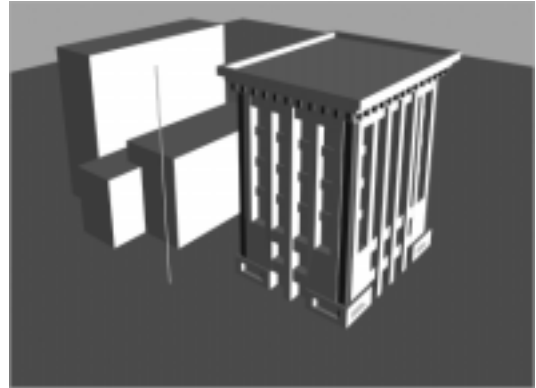
You can also enter these values in the fields on the General Parameters rollout without displaying the Color Selector.

5. Click OK to change the sunlight color.

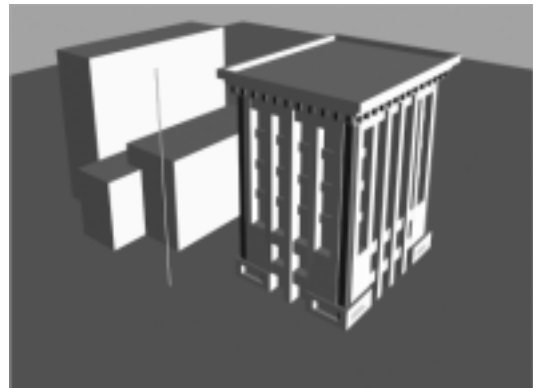
The sunlight changes from a default gray to a bright warm yellow.

The brightness can be deceptive in a shaded viewport. You need to render the scene to see the final light and shadow effects.

Before rendering, you need to “scale the system” to the particular site.

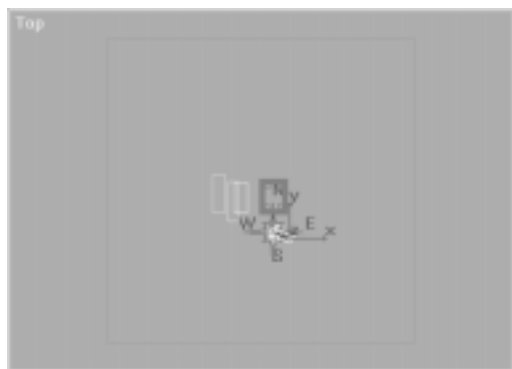


Scene lit with default gray light



Scene lit with warm yellow light

Scaling the System



Top viewport after Zoom Extends



Top viewport with Falloff at 500'

The sun's directional light functions much like a giant flood light above the scene. You need to make sure that the light is large enough and far enough away to cover the entire scene in sunlight. Not all buildings will cast shadows if the sun object is too close, or its beam too narrow. The parameters you set are Falloff and Orbital Scale.

You also need to determine a North Direction for the system. Unlike the other two parameters, this one is crucial to the geographic accuracy of the sun and its shadows on a real-world site.

Setting Up a View


By zooming out to see the sun and site in one viewport, you can visually check the effects of scaling the system.

1. Right-click in the Top viewport to make it active.

2.  On the status line, click Zoom Extends.

Setting Falloff

1. In the Top viewport, click the sun directional light to select it if it is not already selected.

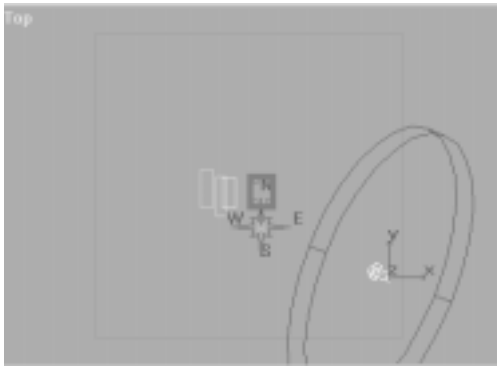
2.  Open the Modify panel. Close the General Parameters rollout to see the Directional Parameters rollout.

3. Set Falloff = **500'**


This widens the beam of the light to a 500-foot diameter, represented in the Top viewport as a wireframe blue cylinder. This cylinder appears wide enough to cover the building mass and its surrounding site. If in doubt, set Falloff even higher.

4. Leave Hotspot at its default value. This is the narrow beam aimed at the compass rose.

Setting Orbital Scale



Top viewport with Falloff and Orbital Scale both 500'

1.  Open the Motion panel to display the Control Parameters rollout. Scroll to the Site area at the bottom of this rollout.
2. Set Orbital Scale = **500'**
This places the light 500 feet away from the compass rose.

Setting North Direction

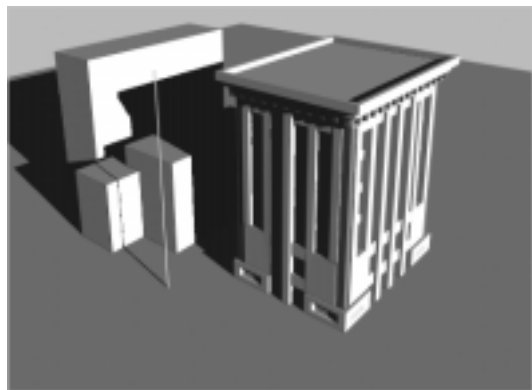
The setting for North Direction is located in the Site area along with Orbital Scale. This setting rotates the compass rose on the XY plane and provides a starting point for the geographical calculations that result in the sun's placement.

- By default, North is along the positive Y axis, a setting of 0. The default is used in this lesson.
- A setting of 90 rotates North clockwise so it points along the positive X axis (the default direction of East).

- You can also select and rotate the Compass01 object to change its direction. This updates the North Direction parameter. Remember that you need to select the Sun01 object to find North Direction on the Motion panel.

Important. In your own projects, rotate the compass rose to correspond with the line of North in your site plan. Sun angles and shadows are not accurate unless you do this correctly.

Rendering Sunlight and Shadows



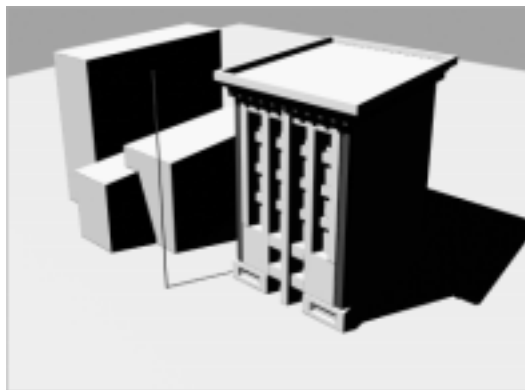
Camera viewport rendered at 8:30 am

Rendering lets you see the end result of the settings for the Sunlight system. Shadows are only visible when you render, and colors and brightness are more realistic than in a shaded viewport.

Rendering the System

1. Right-click in the upper-right Camera02 viewport to make it active.
2. On the menu bar, choose Rendering > Render to display the Render Scene dialog.
3. In the Output Size area, choose 640 x 480 to produce a large, presentation-sized image. Other settings on this dialog can be used without change.
4. Click the Render button. Calculations begin, and the result appears in a popup window.

The illustration shows the lesson scene rendered at 8:30 in the morning and at 2:30 in the afternoon on March 21, 2000 in San Francisco.



Camera viewport rendered at 2:30 pm

Experimenting with Sunlight System

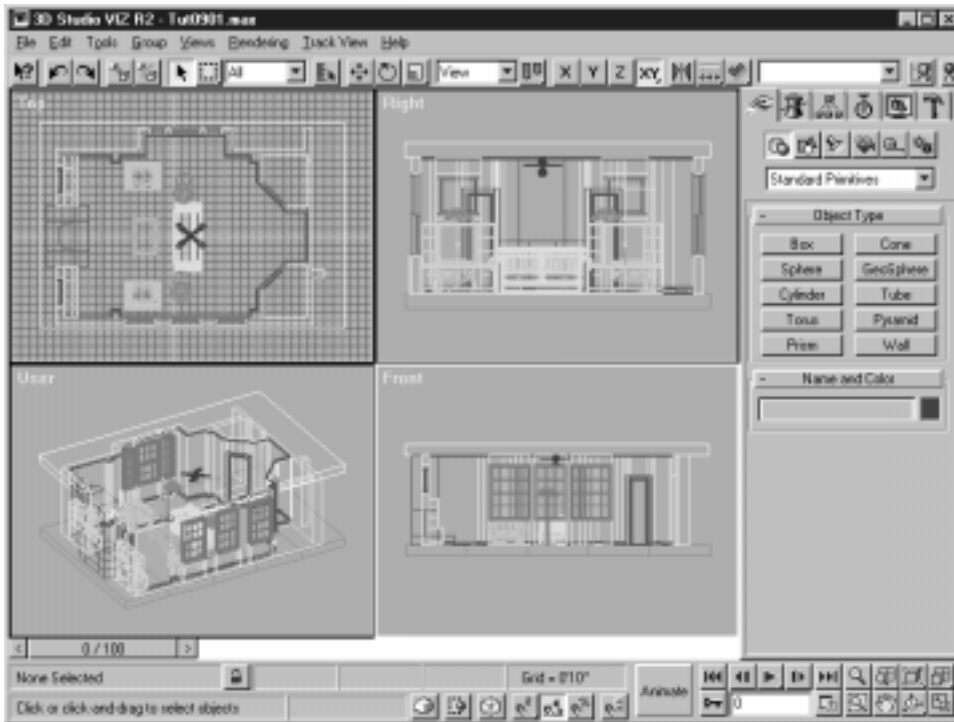
Once a scene is set up with a Sunlight system, it's easy to experiment with different times of day.

- Go back to the time field on the Motion panel, change the time, and render again.
- Keep the time constant and change the date to evaluate seasonal variations.

Tips on Rendering

- If you're repeatedly rendering a scene for shadow studies, choose 320 x 240 on the Render Scene. This smaller size renders much more quickly and is suitable for trials.
- If you want to save the rendering to file, check Save File in the Render Output area, then click the File button. Select a file type and name the file before rendering.

Panning a Camera



You do not always need to render a walkthrough animation to present an interior design. Often an animation of a simple camera pan will do the job.

In this lesson, you create a camera in a room and render an animation as the camera pans from left to right.

Step in this Lesson

- Placing the Camera
- Setting the Animation Length
- Animating Camera Rotation
- Rendering the Scene

Setup



- Open the file *3dsviz2\scenes\tut0602.max*.

The scene shows a model of a living room.


Creating and Positioning the Camera

You can most easily animate a camera pan by creating a Free Camera.

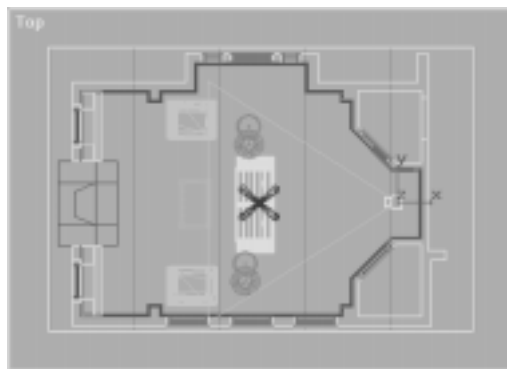
Creating the Camera

1.   On the Create panel, click Cameras, then click Free.
2. In the Right viewport, click near the center of the room to create a camera looking at the fireplace. You adjust this position later.
3. On the Create panel, click 28mm as the Stock Lens length.

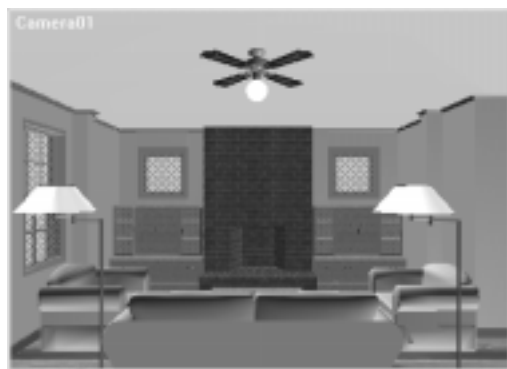
Positioning the Camera

1.  On the toolbar, click Move, then right-click Move to display the Transform Type-In dialog.
2. On the Transform Type-In dialog, enter the following:
 - Absolute:World Z = 5'6"

This raises the camera to an average viewing height.
3. Click the Close button at the upper right of the dialog.
4. In the Top viewport, drag the camera to the right until it is between the door openings.
5. In the Right viewport, do the following:
 - Press **C** to convert the viewport to the view through the camera.
 - Right-click the viewport label and click Smooth+Highlight.



Camera in Top viewport



Camera viewport with Smooth+Highlight

Setting the Animation Length




Time Configuration dialog

You need to decide how long the animation should last before you begin animating the camera.

This animation simulates a slow head turn from left to right, or a camera rotation of about 90 degrees. Try turning your head as you count seconds. An animation length of about 4 seconds should work reasonably well.

For smoothness in panning, this lesson is designed for playback on the computer at 30 frames per second. Therefore, to animate four seconds, you need 120 frames.

1.  On the prompt line, click Time Configuration.
2. On the Time Configuration dialog, set the following:
 - In the Frame area, select Custom.
 - Set FPS (frames per second)=**30**
 - In the Animation area, set Length=**120**
3. Click OK to accept these settings and close the dialog.

Animating Camera Rotation




Camera viewport at Frame 0




Camera viewport at frame 120

You now animate the camera rotating from left to right.

1. In the Top viewport, click the camera to select it.
2.  On the toolbar, click Rotate, then the Z axis constraint button if it is not already on.
3. In the Top viewport, drag down from the camera to rotate the view to the left (about 45 degrees).

The view updates in the Perspective viewport.

4. Click the Animate button to turn it on.
The button and the border of the Top viewport turn red to indicate animation mode.
5.  On the prompt line, click Go To End.
This moves the Time slider to the last frame of the animation, frame 120.
6. Drag up on the camera to rotate the view to the right (about -90 degrees).
7. Click the Animate button again to turn it off.

Checking the Animation

- Drag the Time slider from one end to the other, stopping to check various frames.
- Make sure the opening and closing shots are not looking into a wall or door.
- If you want to change the animation, repeat the procedure in steps 3–6. When you do this, the existing animation keys for camera rotation are overwritten.

The animation is now ready to render.

Rendering the Scene



Render Scene dialog with settings

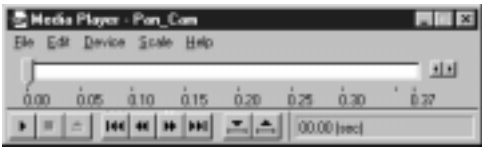
Now you render the animation to an .avi file for playback on the computer. The Camera01 viewport should be active.

- On the toolbar, click Render Scene to display this dialog.
- In the Time Output area, select Active Time Segment to specify rendering all frames of the animation.
- In the Output Size area, click 320x240.
- In the Render Output area, click Files to display the Render Output File dialog.
- Type **Cam_Pan.avi** as the file name and press ENTER.

This displays the Video Compression dialog.



Rendering of one frame



Media Player controls for this animation


- Select Intel Indeo(R) Video R3.2 from the Compressor list, then click OK.
This completes the rendering setup.
- On the Render Scene dialog, click Render to begin rendering.
Windows pop up displaying the progress of the rendering and the current rendered image.

Playing the Animation

When the rendering is complete, you can launch a playback program from 3D Studio VIZ.

- On the menu bar, choose File > View File.
By default, rendering files are stored in the Image subdirectory. If you saved the render-

ing file to another directory, browse to that location.

2. Highlight the file *Cam_Pan.avi* and click OK. Media Player controls and a playback window appear. Notice that the total time listed is very close to 4 seconds.
3.  At the left end of the controls, click Play to watch the animation.

Matching Camera Angles



Using the Camera Match utility in 3D Studio VIZ, you can accurately align a view of your computer scene with a background photograph.

Traditionally, matching a view of an unbuilt design with a photograph of its intended site has been a difficult procedure, reserved for final presentations. The Camera Match utility simplifies this procedure. You can now consider using matched backgrounds in design development and for interim presentations.

Proper use of the Camera Match utility requires some planning and preparation. The following lessons show how to use Camera Match to study the design for a proposed remodeling of a “fixer-upper.”

Lessons in this Tutorial

- Preparing the Scene
- Specifying the Background
- Placing the Camera

Preparing the Scene



Original photograph

These are the basic steps in preparing a scene for a successful camera match.

- Identify five or more reference points on the background photograph for use with Camera Match. Ideally, you identify these points first, then take the photograph.
- Obtain accurate measurements of these points at the site. This is a critical step. Errors in measurement show up in the final match.
- Accurately position these points in your 3D Studio VIZ scene.

Camera Match uses these points to calculate the position and viewing angle of a software camera whose view is the same as the hardware camera that took the photograph.

Steps in this Lesson

- Deciding on Points to Use
- Placing 3D Camera Points

Setup

- On the menu bar, choose File > View File and open the file *markhous.jpg*.

The scene shows a 2D photo of a fixer-upper available for sale. The building is in an historic neighborhood of Victorian houses and is badly in need of renovation.

In this lesson, you prepare the scene to match the background photograph.

Deciding on Points to Use



CamPoints indicated

Selection of good reference points is the key to success with Camera Matching. Here are some guidelines:

- Choose points to match that are not all in one section of the site or photograph. Select points that are widely separated.
- Choose points whose measurements are easy to obtain. These have a higher likelihood of being accurate.
- Choose points to maximize depth. More depth results in a more accurate match.

A minimum of five points is needed for Camera Match to work correctly. This exercise uses the measurements for eight points. In practice, you can't be sure all the points you choose will be accurate or appropriate, so it's a good idea to measure additional ones.

Examining Reference Points

1. Choose File > View File to open *3dsviz2\images\cam8pnt.bmp*.
2. Examine the image in the viewing window.

Arrows identify eight numbered reference points. Two pairs of these points define horizontal edges.

The ground slopes down from the front of the house. To achieve some accuracy in measurement, points were chosen on the concrete sidewalk, retaining wall, and foundation.

Point 1 on the sidewalk is "ground zero," or 0,0,0. The measurements for the other points are taken in three dimensions relative to this point. Positive X is to the right of this point, positive Y beyond this point, and positive Z is above this point.

For example, point 3, where the sidewalk meets the entry walkway, is 15'2.5" to the right of point 1. Assuming the sidewalk is level, its position would be recorded as 15'2.5", 0, 0.

Measuring the Reference Points

For a given project, you might be required to work from an existing photograph and rely on survey data, site plans, and reference elevations to measure the 3D locations of the reference points.

An accurate site plan can work very well for extracting 3D data. But whatever the source, the results of Camera Match are only as accurate as the measurements.

The following recommendations will generally produce the best results:

- Take the photograph yourself, or work directly with the photographer, so you can identify and measure the key points at the same time the photograph is taken.
- Measure the points yourself. Have an assistant hold the other end of the tape measure.

- Make a sketch with dimensions showing the relationships between the points you will match. Site plans and other data can take the guesswork out of estimating slopes.

With a photograph and a set of measured points, you can now input those points to begin Camera Match.

Placing 3D Camera Points

In this step, the reference points you've measured on site and identified in the background photograph are converted to special helper objects called CamPoints. CamPoints represent the scene locations of the points you'll match in the background photograph.

Setup

- Close the viewing window if it's still open from the previous step.
- Open *3dsviz2\scenes\Tut0701.max*.

This scene shows a “stand-in” model of the house in the photograph.

The model has been moved out of the area where you'll place the 3D camera points. After the points are placed, you'll position the stand-in on the site.



Constructing a Simple Model

Constructing a model is not required to make Camera Match work, but generally you'll create a model as part of the design project.

For purposes of checking Camera Match with a model, you can use one or more boxes sized to the outer dimensions of the building you expect to build or remodel. For example, the building in this tutorial is approximately 40' long, 30'

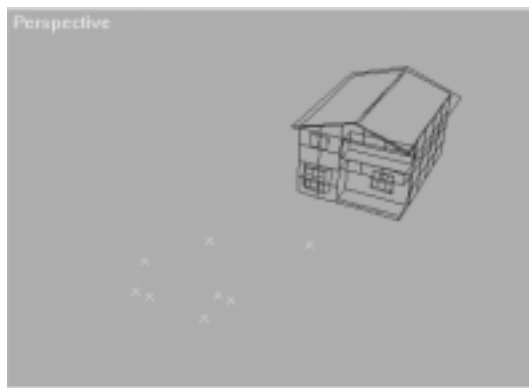
wide, and 25' high. A single box with these dimensions would work as a stand-in.

Setting Up to Place Points

1.   On the Create panel, click Helpers.
2. Click the CamPoint button to turn it on.
3. On the CameraMatch Point rollout, clear Show Axis Tripod.

You are now set up to begin placing CamPoints in the scene.

Placing the Points



Perspective viewport with points in place

In this step, you rename CamPoints as you create them. For your own projects, you might want to develop your own naming system.

In general, it's good practice to use a name that combines a sequence with a very specific description of the point's physical reference. Using only numbers, it's easy to forget the physical relationship.

1. Expand the Keyboard Entry rollout. Accept the zero defaults and click the Create button.

This creates the first CamPoint at World coordinates 0,0,0. Usually you always want your first point at this location.

- On the Name And Color rollout, highlight the default name CamPoint01. Type in a name. For this lesson, use the name:

P1 Sidewalk crack - ground zero

Press ENTER to complete the name change.

- CamPoint is still active. Create the second CamPoint using Keyboard entry. Set the following and then press Create:

- X=-3'9.5"
- Y=0
- Z=0


- Name the point:

P2 Sidewalk crack - parking lot line

- Repeat this process for the remaining points listed in the table on the next page. To speed up keyboard entry, use TAB to move between fields.
- When you're done, right-click to turn off the CamPoint button.

Checking and Repositioning CamPoints

When the CamPoints are in place, you can check them for accuracy and reposition them if necessary.

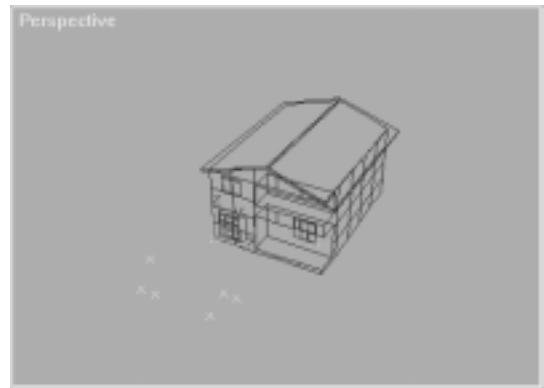
- At the left end of the toolbar, change the Selection Filter list to Helpers. This list defaults to All.
-  On the toolbar, click Move to turn it on, then right-click it to display the Move Transform Type-In dialog. If necessary, move the dialog away from the CamPoints.

- Click any CamPoint to select it.

The dialog displays the exact location of the points in World X,Y,Z coordinates. You can correct or revise these values at any time to reposition the CamPoint.



- Return the Selection Filter list to All.

Moving the Stand-In



Perspective viewport with stand-in moved to CamPoint P7

In this final step, you snap the stand-in to the appropriate camera point, accurately locating it on the site. The components of the model have been grouped into a single unit.

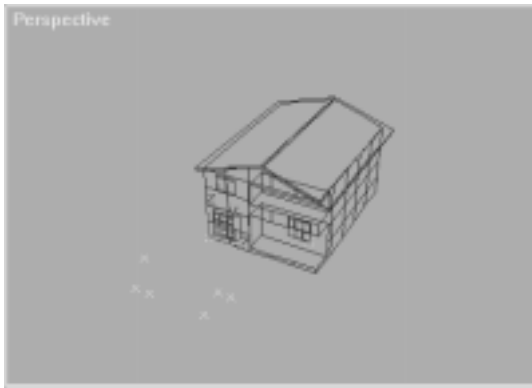
-  On the prompt line, click 3D Snap Toggle to turn it on, then right-click it to display the Grid And Snap Settings dialog.
- On the Snap panel, select Pivot and Endpoint, then close the dialog.
-  On the toolbar, click Move.
- Click at the lower-left front corner of the stand-in model and drag the model to CamPoint P7, the left lower foundation corner. Click at P7 to complete the move.

You now have the CamPoints in accurate, real-world locations and the stand-in model correctly positioned. Continue on to the next les-

son, where you specify background images for the viewports and renderer.

Ref. Point	CamPoint Name	World X	World Y	World Z
1	P1 Sidewalk crack - ground zero	0'0"	0'0"	0'0"
2	P2 Sidewalk crack - parking lot line	-3'9.5"	0'0"	0'0"
3	P3 Sidewalk crack - entry edge left	15'2.5"	0'0"	0'0"
4	P4 Left masonry cap - inside front corner	15'3.5"	6'0"	2'1.5"
5	P5 Right masonry cap - inside front corner	18'8.5"	6'0"	2'1.5"
6	P6 Iron postcap - on property line	-2'11.5"	3'4.5"	7'2.5"
7	P7 Foundation - lower left front corner	3'0"	21'9"	3'5"
8	P8 Living room window - lower right corner	28'4.5"	27'5"	7'0"

Specifying the Background



Perspective viewport of scene



Upper part of Material Editor, including the settings on the Coordinate rollout as given in the steps

In this lesson, you add the photographic image to the scene, first as a rendering background, then as a viewport background.

Steps in this Lesson

- Defining an Image as a Background Map
- Selecting a Map as the Rendering Background
- Setting the Rendering Resolution
- Loading the Image as a Viewport Background

Setup



- Continue from the previous lesson.
- To start at this point, open `3dsviz2\scenes\Tut0702.max`.

The scene shows the stand-in model and the camera match points.

Defining an Image as a Background Map

Before you can use an image as a rendering background, you first define an image as a *map type*. You define an image as a map in the Material Editor.

Choosing a Map Type

1.  On the toolbar, click Material Editor to open it.
2.  Click Get Material to display the Material/Map Browser.
3. On the Material/Map Browser, do the following:
 - In the Browse From area, select New.
 - Click Bitmap in the list to highlight it.

- From the Browser, drag Bitmap to the upper-right sample slot in the Material Editor.

This activates the slot for a bitmap and opens the Bitmap Parameters rollout at the bottom of the Material Editor.

- On the Bitmap Parameters rollout, click Bitmap (the long, blank gray button).
- From the Select Bitmap Image File dialog, select *3dsviz2\maps\markhous.jpg*, then click OK.

The image of the photograph appears in the sample slot.

Defining the Map as a Background

- On the Coordinates rollout, do the following:

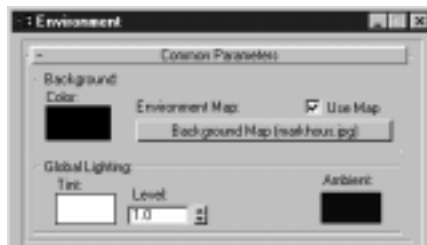
- Select the Environ mapping option.
- In the Mapping list, select Screen as the environment mapping coordinate type.

Screen coordinates display the map as a 2D image behind the scene. This is the only environment coordinate type that works with Camera Match.

- In the name box, type **Background Map**.
- Close the Material Editor and Browser dialogs.

The background map is now ready to be selected as the rendering background.

Selecting a Map as the Rendering Background



Environment dialog with title bar and the Common Parameters rollout

You now have an image defined as a map in the Material Editor. Next you select the rendering background.

- On the toolbar, choose Rendering > Environment to display the Environment dialog.
- On the Common Parameters rollout, click the Environment Map button marked None. This displays the Material/Map Browser.
- On the Material/Map Browser, do the following:
 - In the Browse From area, click Mtl Editor (Material Editor).
 - Select Background Map from the list.
 - Click OK.

A dialog called Instance Or Copy? appears.

- Click OK on this dialog to accept the default. The Environment dialog now shows Background Map as the Environment Map. The Use Map check box is automatically selected.
- Close the Environment dialog. The background image is now set up as your rendering background.

You still need to set the rendering resolution and display the image in a viewport before you can use Camera Match.

Setting the Rendering Resolution



Output Size area of Render Scene dialog with settings as given

Camera Match requires correct synchronization between the rendering background resolution, the final rendering resolution, and the viewport background. Without this synchronization Camera Match produces incorrect results.


Tip: To simplify synchronization, use the same resolutions throughout.

In the following steps, you set the rendering resolution to match the resolution of the background image file.

Determining the Resolution

1. On the menu bar, choose File > View File.
2. On the View File dialog, do the following:
 - Select *3dsviz2\maps\markhous.jpg*.
 - Click Info on the Image Information dialog. Make sure that the resolution of this image is 641 x 479, then click OK.
 - Click Cancel to dismiss the View File dialog.

Setting the Resolution

1.  On the toolbar, click Render Scene to display the Render Scene dialog.

2. On the Common Parameters rollout, in the Output Size area, set the following:
 - Width=**641**
 - Height=**479**
3. Click Close.

Loading the Image as a Viewport Background



Perspective viewport with background

You've specified the rendering background and set the rendering resolution. You're now ready to display the background image in a viewport.

Loading the Image

1. Right-click in the Perspective viewport to make it active.
2. On the menu bar, choose Views > Background Image to display the Viewport Background dialog.
3. On the Viewport Background dialog, do the following:
 - Select Use Environment Background.
 - Select Display Background.
 - Click OK.

The background image of the photograph now appears in the Perspective viewport.

Adjusting the Image

In some cases (usually due to video drivers), the background in the viewport might appear to be

stretched. The following method provides a solution:

1. Reopen the Viewport Background dialog.
2. Clear Use Environment Background.
3. Click Files and select *markhous.jpg*.
4. In the lower part of the Viewport Background dialog, make sure Match Rendering Output and Display Background are selected.
5. Click OK.

The image shifts slightly.

Displaying and Rendering Backgrounds

You can display a different background in every viewport. The Viewport Background dialog is associated with whatever viewport is active at the time.

When you render a viewport, however, the displayed background is ignored. The renderer uses the single environment map specified in the Environment dialog (Render > Environment).

Using Two Versions of the Same Image

Although you want to use the same image for both the viewport and rendering backgrounds, you don't have to use the same file.

The following procedure makes matching the perspective background easier. The procedure is optional here, but you might want to try it in your own projects.

1. Make a copy of the background image file for use as the viewport background.
2. Use a paint program to highlight the Cam-Point locations and prominent edges. You can also fade the contrast of the photo by 50 percent so it's easier to see exactly where you're

placing the camera points. Save the altered image under another name.

3. Follow directions in the step “Adjusting the Image” to use the new copy as the viewport background.

Placing the Camera

To this point, you've placed CamPoints at real-world locations in your scene and synchronized the display of the rendering and viewport backgrounds. You are ready to use the Camera Match utility.

In this lesson, you use Camera Match to create and edit a camera that matches the perspective of your background image.

Steps in this Lesson

- Assigning 2D Camera Screen Points
- Creating the Camera
- Matching Camera to View

Setup

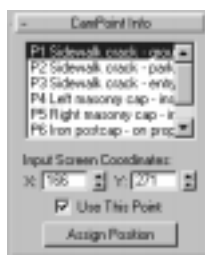
- Continue from the previous lesson.
- To start at this point, open the file *3dsviz2\scenes\tut0703.max*.

The CamPoints and backgrounds are set up according to the previous two lessons.

Assigning 2D Camera Screen Points



Original file with 8 reference points




CamPoint Info rollout with first point selected

You assign 2D camera screen points to identify how the 3D CamPoints are matched to the background image. You can assign camera screen points in either a User or Perspective viewport.

Setting Up the View

1. The Perspective Viewport should be active. If necessary, right-click to make it active.
2. Press **W** on the keyboard to maximize the Perspective viewport.

Assigning Positions to Screen Points

1.  Open the Utilities panel. On the Utilities rollout, click Camera Match.
2. On the CamPoint Info rollout, click Assign Position to turn it on.
3. Select the first CamPoint, P1, from the list. Then click the matching location on the background image.
A red plus appears in the viewport to locate the point.
4. Under Input Screen Coordinates, click the X and Y spinners to adjust the red point one pixel at a time. This movement leaves a solid red track on the screen. Press **1** on the keyboard to refresh the screen and show the current position of the point.
5. Repeat for CamPoints P2 through P8.
Note on CamPoint P7: The left foundation corner is just above ground level, at the visible step in the footing.
6. When you've assigned the eight screen points, click Assign Position to turn it off.

7.  Open the Display panel and click Unhide All.

Adjusting Screen Points

After visually locating the screen points, you can use this procedure to spot check any doubtful screen points and revise them.

Alternatively, using a paint program, you could determine the XY screen coordinates of these points and enter them using the following steps.

1. To adjust any point, select it in the CamPoint Info list, then click Assign Position.

The selected point turns red.

2. Correct the position assignment in the X and Y fields for Input Screen Coordinates.

The table shows the screen coordinates for the eight points, based on a screen resolution of 1024 x 768. If your screen is set to a lower or higher resolution, the numbers will be different from those listed. The screen coordinates 0,0 are at the upper left corner of the image.

All the information is now in place to create a camera that matches the perspective of the background image.

CamPoint	CamPoint Name	Screen X	Screen Y
1	P1 Sidewalk crack - ground zero	334	545
2	P2 Sidewalk crack - parking lot line	222	559
3	P3 Sidewalk crack - entry edge left	644	500
4	P4 Left masonry cap - inside front corner	581	431
5	P5 Right masonry cap - inside front corner	632	427
6	P6 Iron postcap - on property line	225	335
7	P7 Foundation - lower left front corner	258	415
8	P8 Living room window - lower left corner	536	345

Creating the Camera



Perspective viewport with stand-in model in wireframe



Rendered Perspective viewport


You now use Camera Match to create a camera based on the 3D CamPoints and the 2D camera screen points.

1. On the Camera Match rollout, click Create Camera.

A camera, Camera01, is created in approximately the right location. If you get an error message, see the next heading, “Handling Errors.”

2. Right-click the Perspective viewport label. On the menu, choose Views > Camera01.

The viewport changes to the Camera01 view. You can see that the 3D objects in the scene roughly match the perspective of the background.

3.  On the toolbar, click Quick Render to check the camera perspective relative to the background image. Close the rendering window when you’re finished looking at the image.

Don’t worry if the perspective of the scene is a little off from the background image. The next step shows you how to manually correct the view.

Handling Errors

If you get an error message, there are a number of possible causes. Follow any instructions included with the error message.

When you think you’ve corrected the problem, click Create Camera to test the solution. When the camera match is successful, a camera is created in the scene. Use Zoom Extents to see that you have a camera, then change the Perspective viewport to the Camera view.

The following are some general problem areas and the corrective actions you can take.

Unable to create camera, not enough points.

You need at least five CamPoints with positions assigned in the Camera Match utility.

Unable to create camera match. The CamPoints are incorrectly assigned. It’s fairly easy to mismatch points. You might think you assigned the point for the foundation, but you selected the point above or below it in the list. The posi-

tion on the 2D bitmap is then completely off. The result is nonsensical and so doesn't match.

Reassign the CamPoints using the Camera Match utility. Also check the accuracy of their locations by using the Transform Type-In dialog. Typos are easy to make here.

To use the Transform Type-In dialog, turn on Move and right-click it to display the Transform Type-In dialog. Use Select By Name to select each point. Check the coordinates and revise as needed.

Too many points. You might have too many points, some inaccurately measured or placed. Trying using only five points for the camera match. Select points that are spread across the photograph and the scene. Turn off other points by clearing Use This Point.

- In this lesson, the sidewalk points are all considered level (all have $Z=0$). In fact, the sidewalk slopes slightly to the left. Try disabling the sidewalk points P2 and P3.
- Another point to disable might be P7, the foundation corner. The height from the sidewalk point to the foundation corner was an estimate that could be several inches off.

Coplanar problem. It's possible that the CamPoints all lie on the same plane and are therefore invalid. You might have inadvertently snapped the points to a grid. Hide the viewport background and rotate the viewport to see if that's the case. If all points line up during the rotation, then they are all on one plane. Use the Type-In Transform dialog to reposition them.

Matching Camera to View



Perspective viewport with Arc Rotate circle active



If the camera fails to match perfectly, there are many possible reasons:

- Measurements of the points are not accurate enough, particularly elevations.
- Buildings in the photo are not actually square or straight.
- Distortions in the lens, or from the digital scanning and processing of the photo, cause a mismatch.


Manually Adjusting the Match

Regardless of the source of the problem, you can manually adjust a match that is less than perfect.

1. Right-click to activate the Camera01 viewport.
2. Press **P** on the keyboard to change the viewport to Perspective.
3. Use the Perspective navigation tools to adjust the scene visually.

-  Activate the Arc Rotate tool and then roll the perspective viewport by clicking outside the green circle in the viewport.
-  Use the Pan and Arc Rotate tools repeatedly until the stand-in geometry lines up more closely.

In this example, a slight rotation of the Perspective viewport to the right might improve the match.

4.  Select Camera01 by name.
5. Right-click in the Perspective viewport to activate it.
6. On the menu bar, choose Views > Match Camera To View.
Camera01 moves to match the view in the Perspective viewport.
7. Press **C** to switch the viewport to Camera01.
Camera Match is now complete. In practice, you would save the scene at this point.

The Camera01 viewport now gives you a view matched with the background. You can continue to refine the model and see the result displayed against this background.

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