Tutorials: Using AutoCAD® Files

Autodesk® 3ds Max®

Design 2010

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Autodesk® 3ds® Max Design 2010 Software

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Disclaimer

Using AutoCAD Files

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A key feature of 3ds Max Design is its ability to let you work with drawings and models you've created with AutoCAD and AutoCAD Architecture (formerly Architectural Desktop), or drawings you've exported from Autodesk Revit. 3ds Max Design gives you the advantage of being able to improve on sound, precise drawings by letting you create realistic design visualization presentations.

The integration of drawings created with AutoCAD and AutoCAD Architecture or exported from Revit with 3ds Max Design scenes is extremely tight. DWG files convert cleanly and maintain their layer identities while giving you control over import smoothing, normal unification, and several other geometry specifications. You can import entire drawings, merge specific layers or components, and even create a live link between 3ds Max Design and AutoCAD.

In this tutorial, you will learn how to:

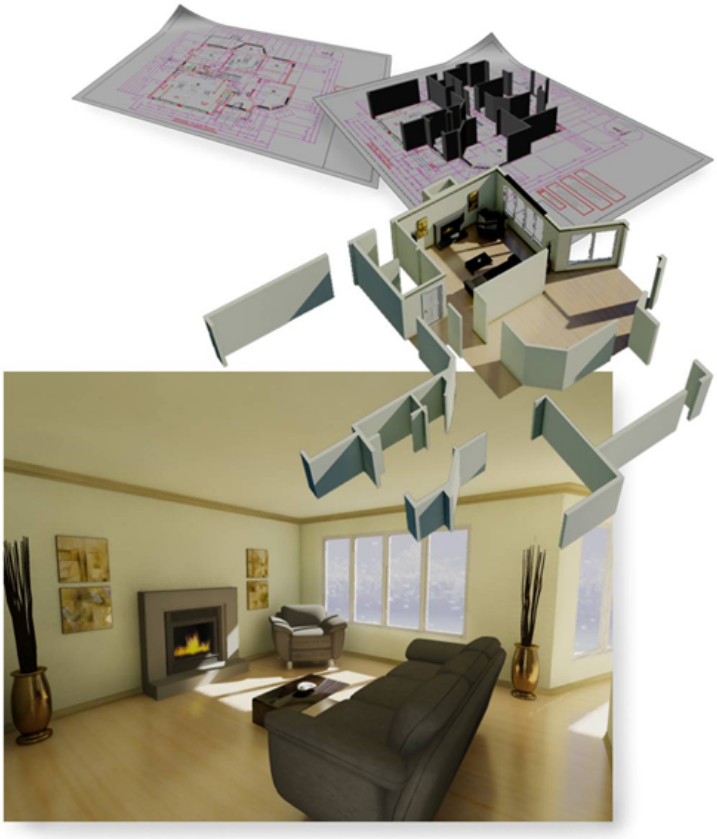
- Prepare an AutoCAD drawing for import
- Use an AutoCAD drawing as the basis for a photorealistic walkthrough animation
- Use the File Link Manager to create a live link between AutoCAD and 3ds Max Design

Skill Level: Beginner

Time to Complete: 1.5 to 2 hours

 Creating a Walkthrough from an AutoCAD Drawing

This tutorial is a guide to creating a virtual visit of a room in a house using AutoCAD and 3ds Max Design. In it, you will learn production techniques used for creating a photorealistic animation sequence from a 2D house plan.



Features Covered in This Tutorial

- Link an AutoCAD file to 3ds Max Design
- Quickly create walls, ceilings, and floors in 3D
- Set up a camera for a walkthrough
- Create natural exterior light
- Use mental ray to create photorealistic rendering
- Prepare the scene for animation

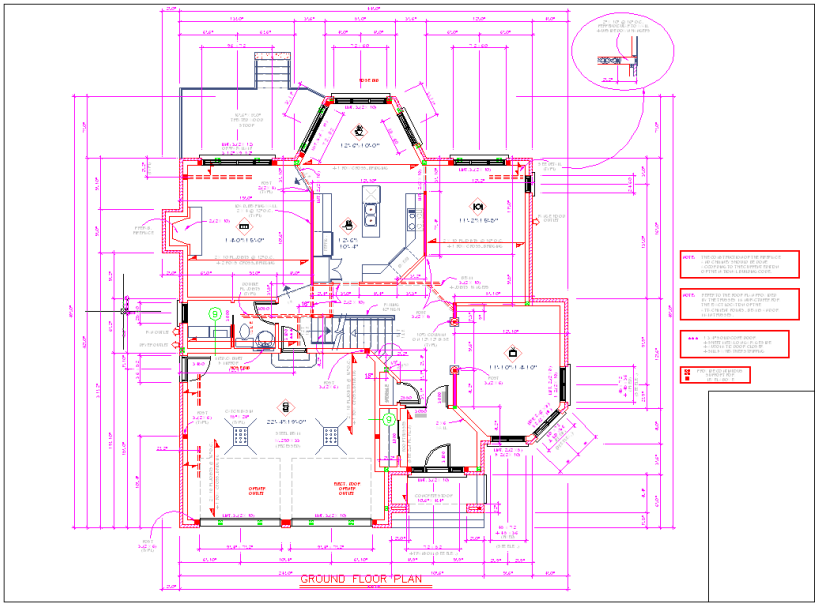
Preparing and Exporting the DWG File

In this lesson, you prepare a 2D DWG file as the basis for the 3D house model.

NOTE If you don't have a running version of AutoCAD, skip ahead to the next lesson, Importing the DWG File on page 851. A DWG file with the necessary preparation is available in the *\import\AutoCAD files* folder.

Open the file:

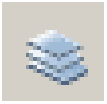
- From AutoCAD 2007 (or a later version), choose File > Open and browse to the *\import\AutoCAD files* folder. Open *wt_start.dwg*.



Freeze the layers:

This file contains a lot of elements that aren't necessary for the 3D walkthrough. Using the Layer Manager, you can hide all the elements that

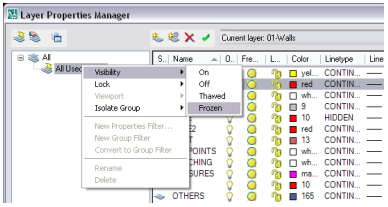
you will not use. The only layers that are required for this tutorial are *01-Walls* and *02-Windows*.

1  Click the Layer Manager button (or choose Format > Layer) to open the Layer Manager.

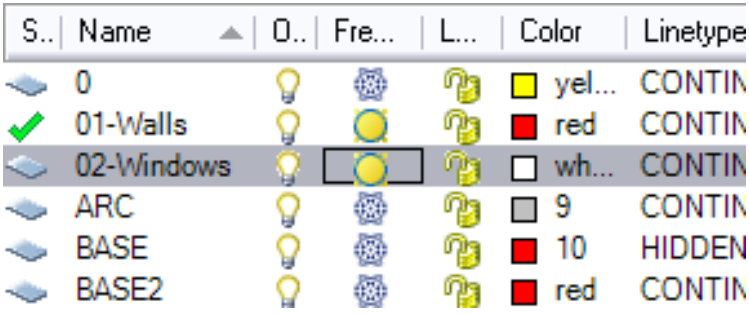
2 Select the *01-Walls* layer.

3  Click the Set Current button to make this layer current.

4 In the left pane, right-click All Used Layers, then choose Visibility > Frozen to freeze all the layers. A dialog appears to inform you that the current layer cannot be frozen. Click OK.



5 Click the icon to unfreeze the *02-Windows* layer as well.

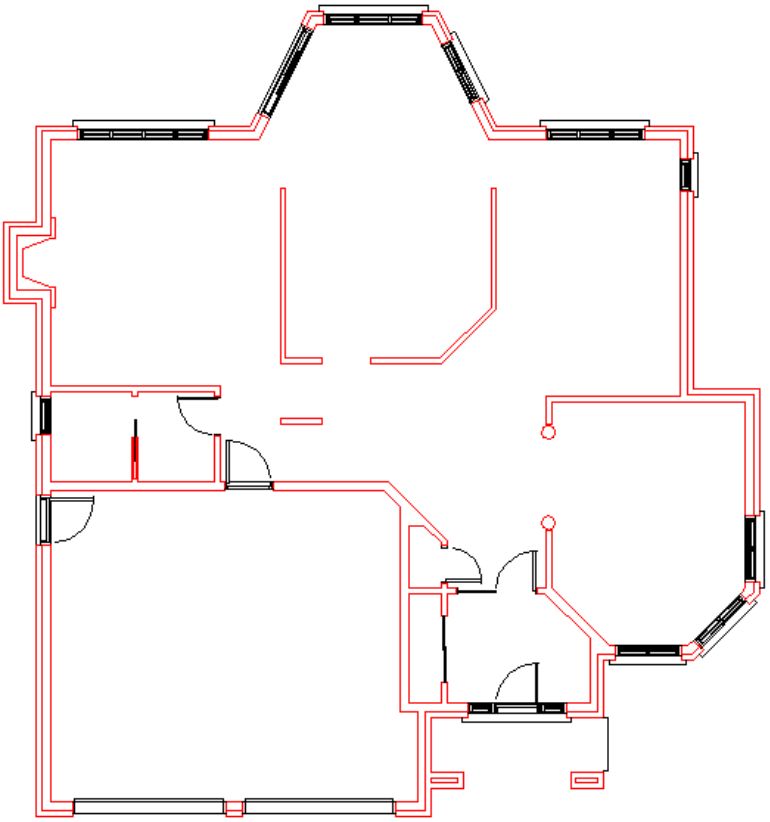


6  Create a new layer by clicking the New Layer button (or press Alt+N). Name this new layer **3DWalls.** Change its color to a dark blue using the square color icon in the Color column.

7 Right-click the new layer (*3DWalls)* and click Set Current.

8 Click OK to close the Layer Manager.

In the viewport, you should now see walls, windows, and doors.



Create polylines:

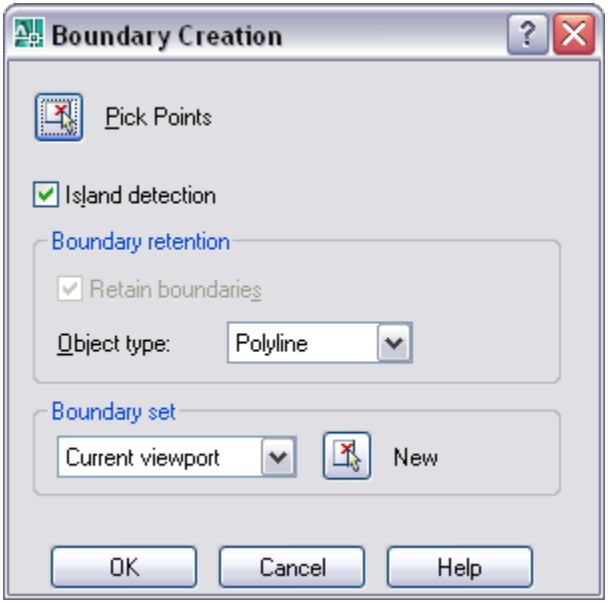
In order to create 3D walls in 3ds Max Design efficiently, you need to create Polylines using the wall lines and the Bpoly command. This command draws a closed polyline around the boundary of a selected field, leaving the original wall lines untouched. Using polylines instead of lines greatly simplifies the creation of walls later on in 3ds Max Design.

1 Make sure Snap is turned off. (Pressing F9 toggles Snap)

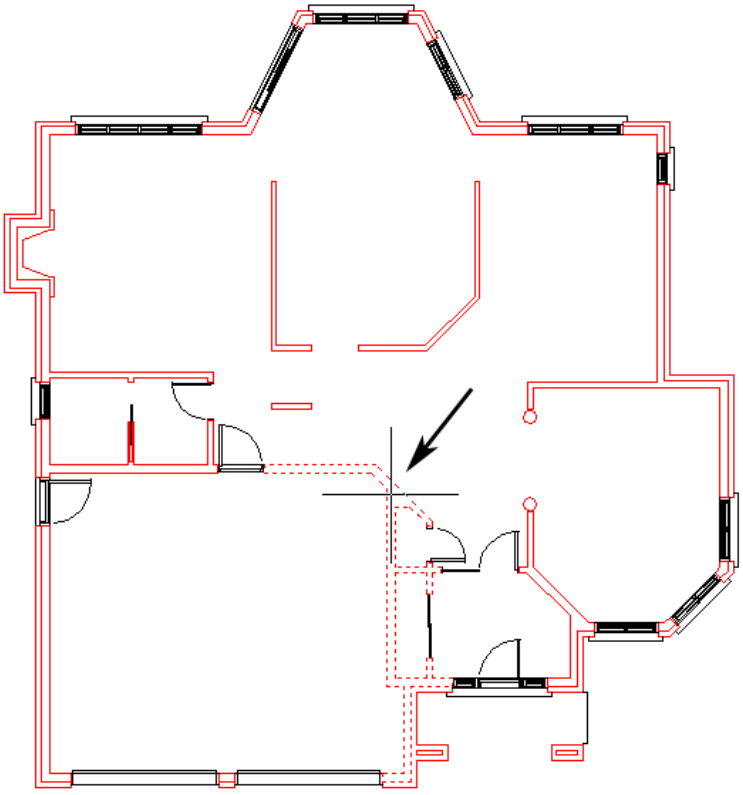
2 In the viewport, zoom out until you see all the wall lines. This is required for the Bpoly command to work.

3 Type **bpoly** and then press Enter.
A Boundary Creation dialog appears.

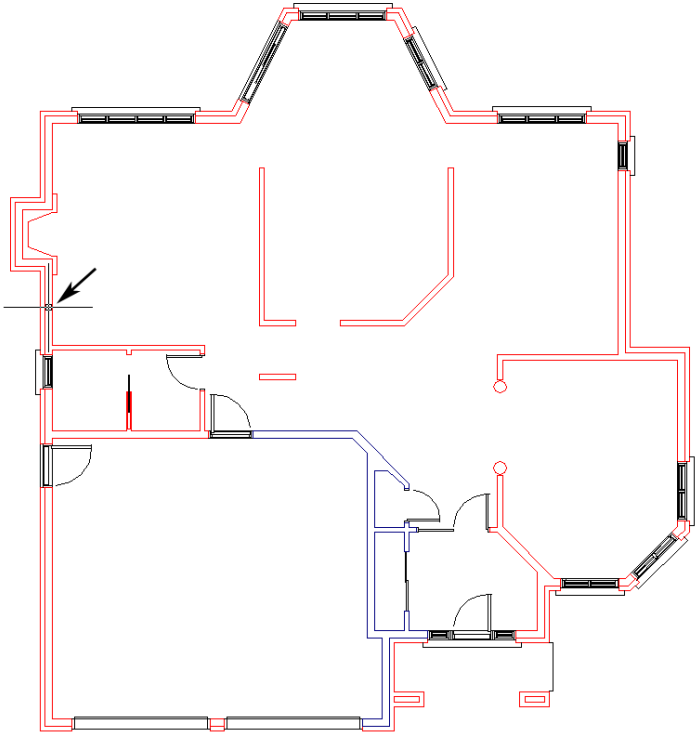
4 In the Boundary Creation dialog, click Pick Points.



5 Click the wall shown in the following illustration, and then press Enter.
AutoCAD creates a polyline.



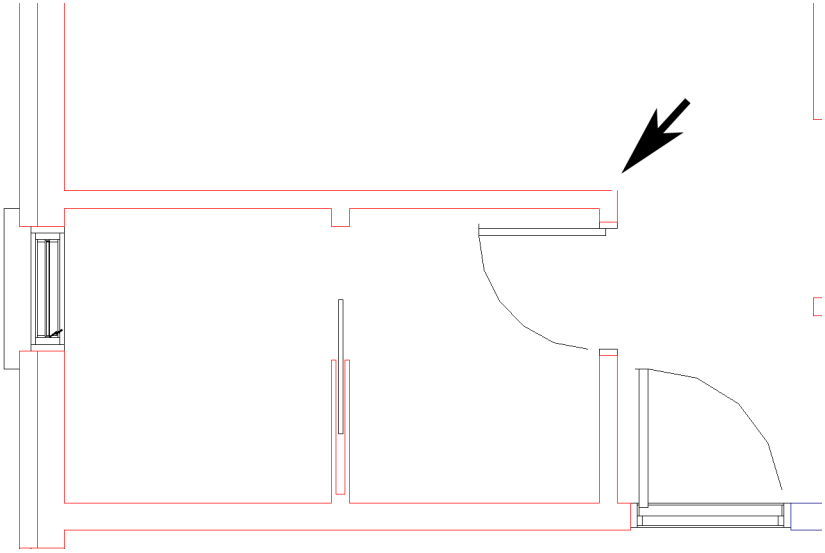
6 Retype **bpoly**. Click Pick Points once again, then click the wall shown in the following illustration. Press Enter. This time the polyline wasn't created properly. Press Ctrl+Z to undo this last operation.



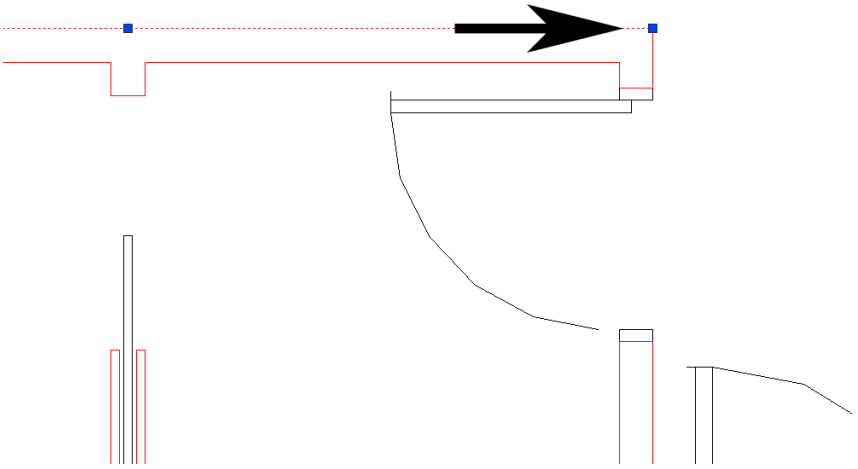
The polyline was not created because the wall is not continuous. You must close the gap before you can create a polyline.

7 Press Esc to exit the Bpoly command.

8 Zoom in until you get a better view of the gap between the walls.



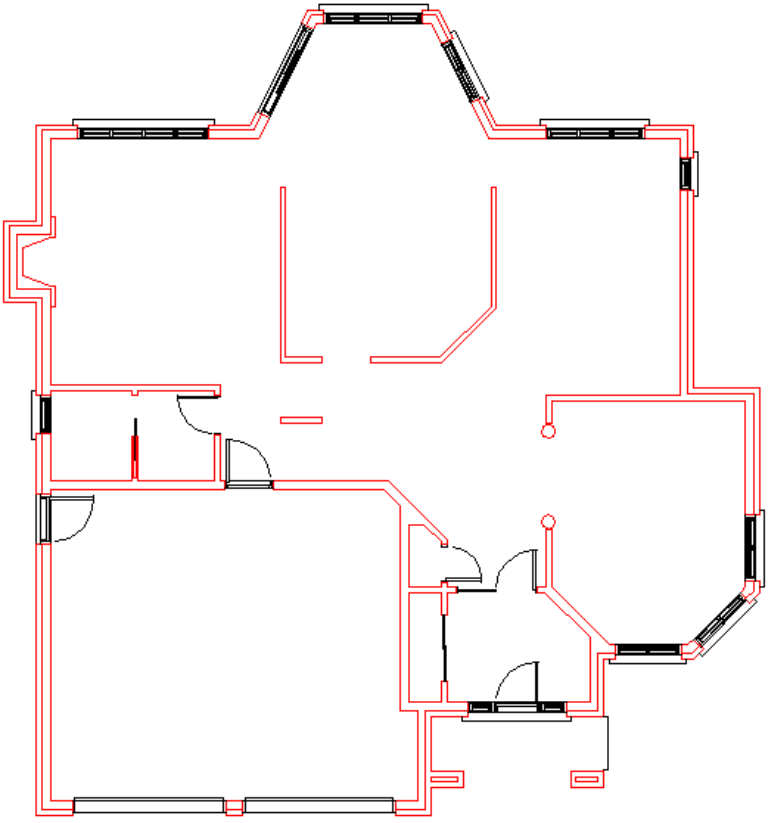
9 Fix the gap by extending the line on the left to the endpoint of the next wall. Click the line to select it, then drag from its endpoint to the endpoint of the other wall.



10 Zoom out until you see all the wall lines again, then repeat the Bpoly command.

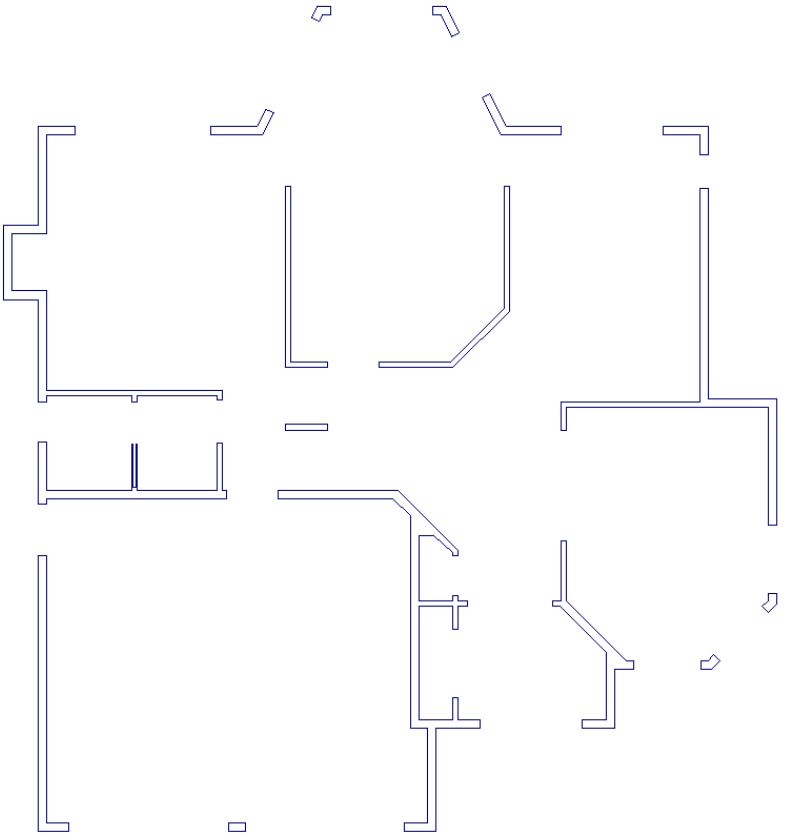
This time, a polyline is created.

11 Use Bpoly to create polylines from all the walls in the drawing file. Don't forget the small lines between the windows.



If you see a warning that says "Valid Hatch Boundary not found," zoom out so all the wall lines are visible in the viewport, and then use the Bpoly command again.

NOTE The new polylines should have the dark blue color of the *3DWalls* layer.



Save the DWG file:

- Your work in AutoCAD is now done. Save the file as **wt_2dplan.dwg**, and then exit AutoCAD.

Importing the DWG File

You are now ready to import the *wt_2dplan.dwg* file into 3ds Max Design and use it to create the general structure of the 3D room.

Set up the units:

The AutoCAD file you are importing is measured in feet and inches. It is best to use the same units setting in 3ds Max Design.

1. From the Customize menu, choose Units Setup.
2. In the Units Setup dialog, choose US Standard > Feet With Fractional Inches. Leave the other values set to their defaults, and then click OK.

Import the DWG file:

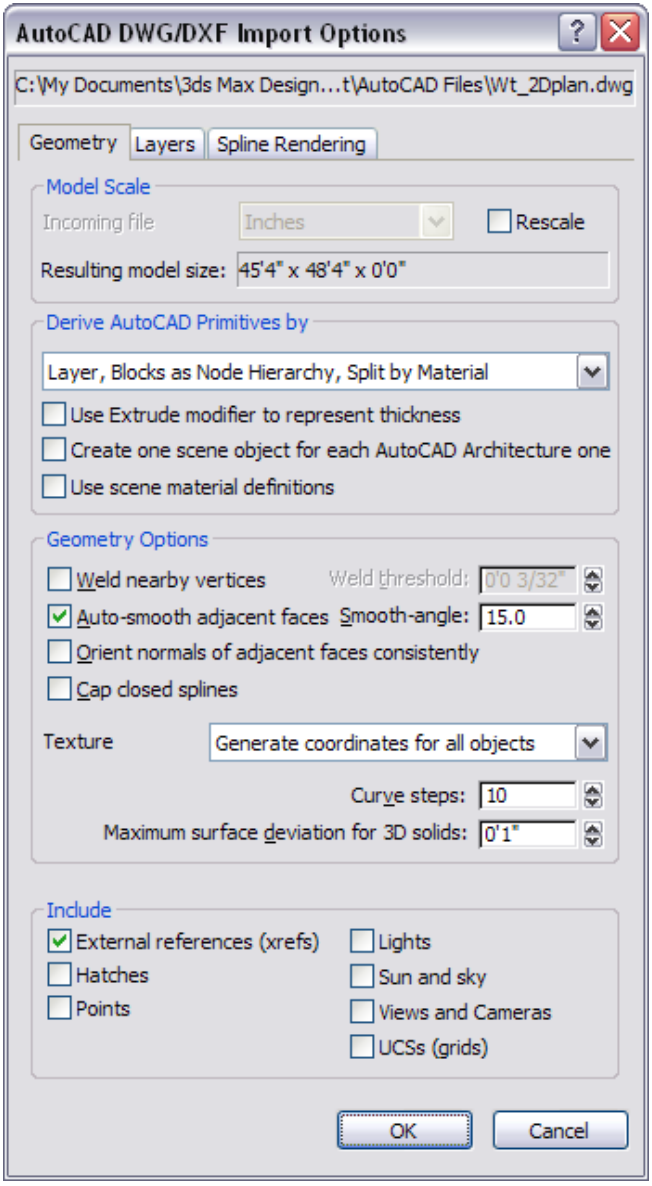
1.  From the Application menu, choose Import.

   A Select File To Import dialog appears.
2. Browse to *\import\autocad files* and choose the file *wt_2dplan.dwg*, or use the one you created yourself in the first lesson.

   After a pause, an AutoCAD DWG/DXF Import Options dialog appears.

Adjust the import options:

1. On the Geometry tab of the AutoCAD DWG/DXF Import Options dialog, leave the settings at their defaults. (These are shown in the following illustration.) Before you click OK, you must change settings on the Layers tab.



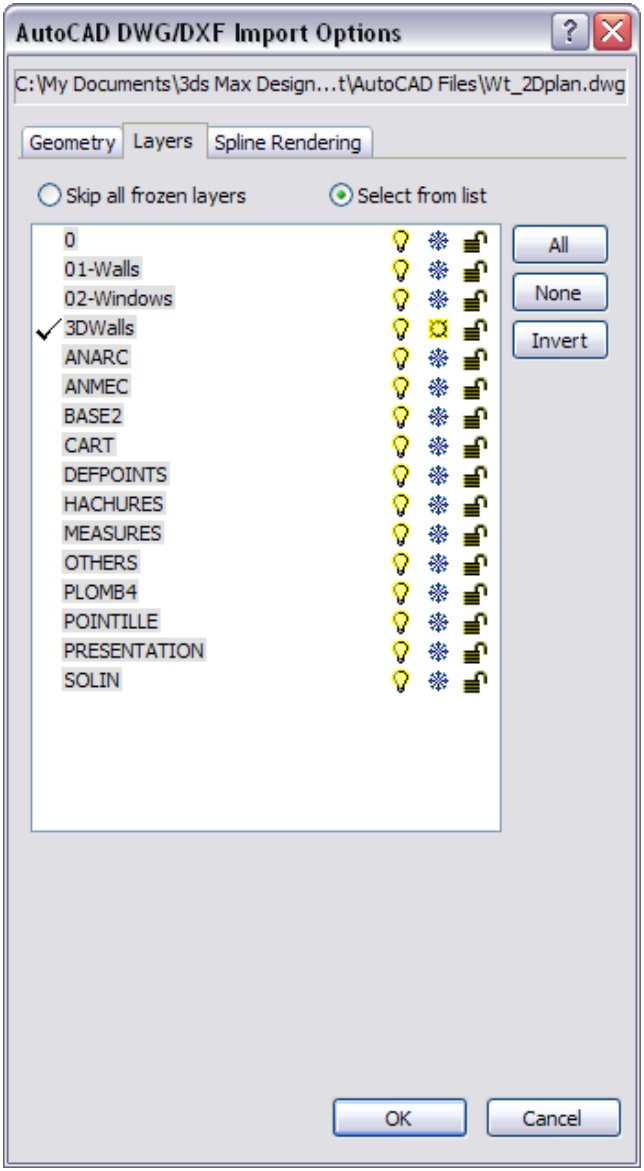
2 Click to go to the Layers tab.

3 Choose Select From List to enable individual layer selection. At first, all the layers are selected.

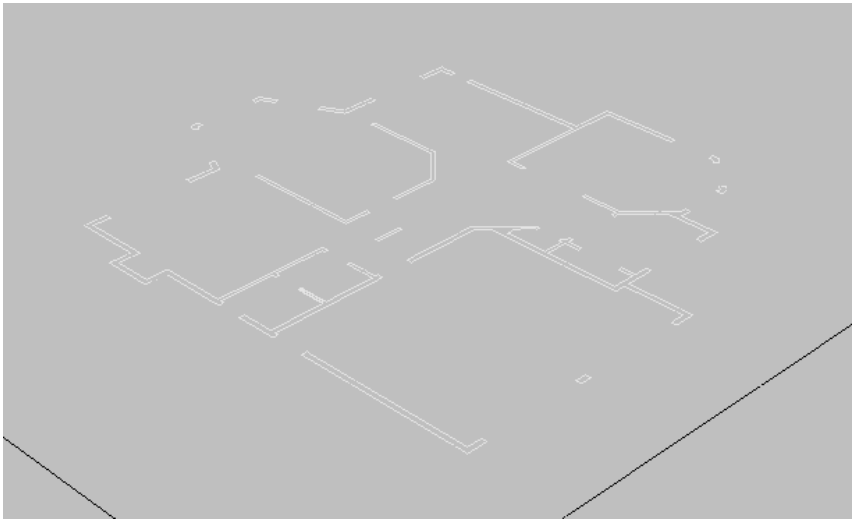
4 Click Invert.

Now none of the layers is selected.

5 Click the *3Dwalls* layer to select it, and then click OK.



3ds Max Design imports the floor plan, which should appear similar to the following illustration.



Save the scene file:

- 

From the Application menu choose Save As, and save the scene as **my_wt_floorplan.max**.

Constructing the Walls

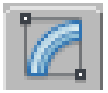
To construct the walls, you simply extrude the floor plan polyline that you just imported.

Set up the scene:

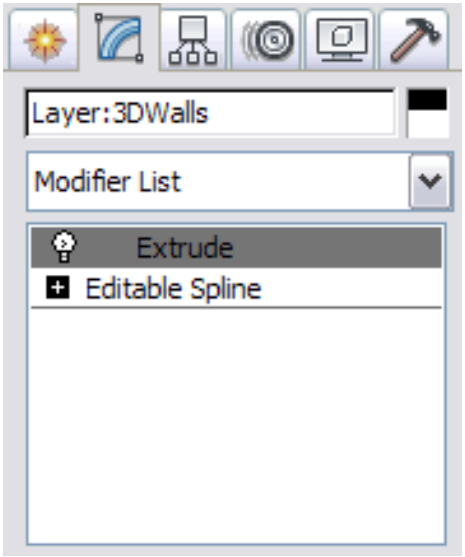
- Continue from your previous scene.

Extrude the polyline:

1  Click the polyline object to select it.

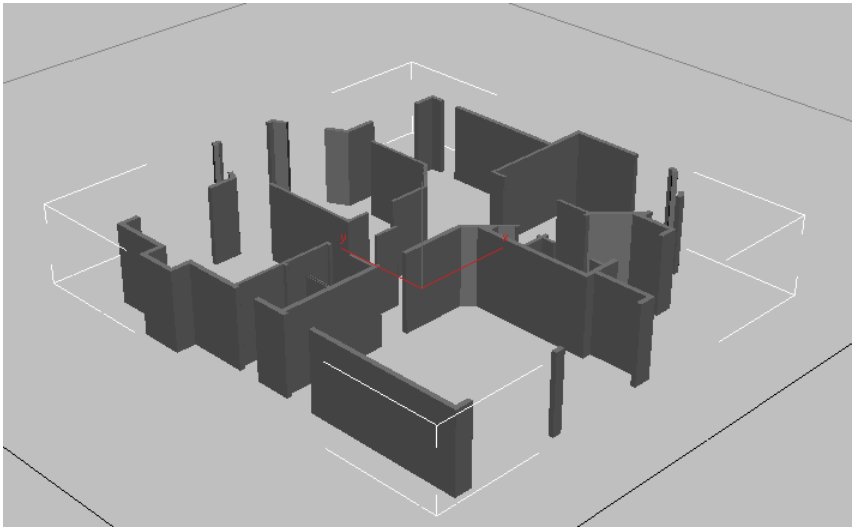
2  Go to the Modify panel. Choose Extrude from the Modifier drop-down list.

TIP While the Modifier list is open, you can press E a few times to find the Extrude modifier more quickly.



3 On the Extrude modifier's Parameters rollout, set the Amount to **8'0"**.

3ds Max Design extrudes the polyline to create walls that are eight feet high.



Save the scene:

- Choose File > Save As, and name the new scene **my_wt_walls.max**.

Establishing the Camera Shot

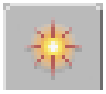
Now that the walls are built, you will establish the camera angles and position. In the film and electronic media industry, this is described as “camera blocking”. This is an important step, as it defines what you need to do afterward, and prevents unnecessary work (for example, creating objects in locations that the camera will never see).

For this camera shot, you will use a target camera that follows a path. A target camera points toward a target object, which makes the camera's orientation easy to control. The path helps create smooth and easy-to-control motion for the camera.

Set up the scene:

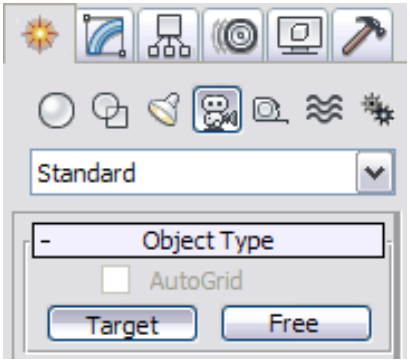
- Continue from your previous scene, or go to the folder *\scenes\interoperability\using_autocad_files\walkthrough* and open the file *wt_walls.max*.

Create the target camera:

1  Go to the Create panel.

2  Click the Camera button to turn it on.

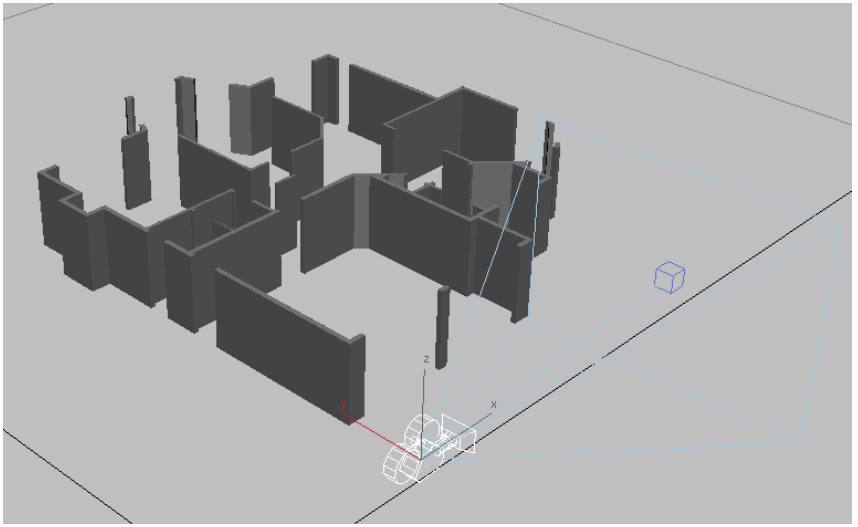
3 Click Target to turn it on.



Now you can create a target camera.

4 In a viewport, click and drag to create a camera with a target. Release the mouse, then right-click to finish camera creation.

The position of the camera and the target don't matter, as you will change these later.



5 On the Name And Color rollout, change the camera's name to **CameraDen**.

The walkthrough shows part of the den of the house, not the entire house: which would take considerable time to generate.

Zoom in to the area you will edit:

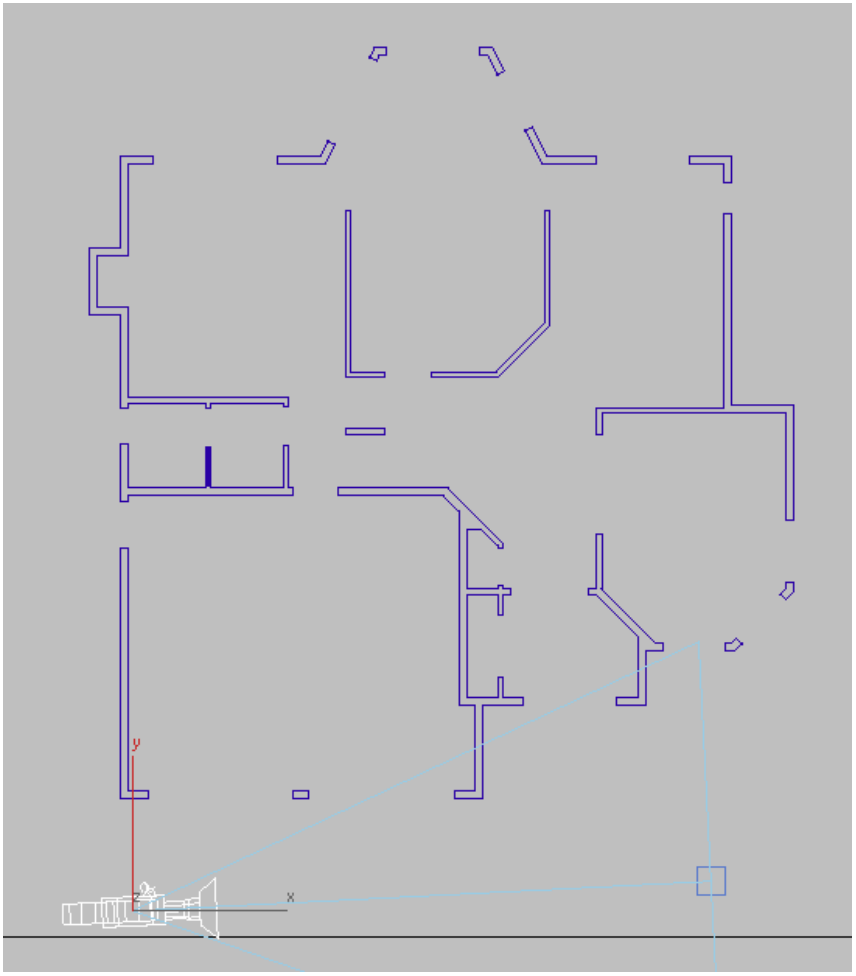
1 Click the Point-Of-View (POV) viewport label and choose Top (or press T).

The viewport changes to a top view, but it appears empty.

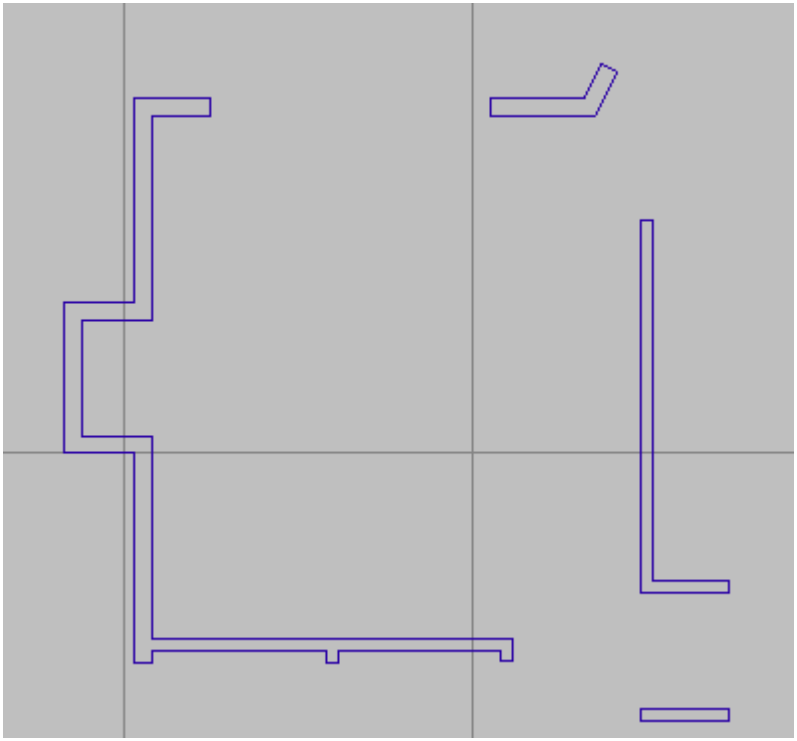
2  Click Zoom Extents.

Now you should see the floor plan and the camera.

Press F3 to switch to Wireframe display mode, if necessary.

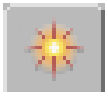


3  Click Zoom Region, and in the viewport, drag a rectangle to zoom in closer on the area where the hall approaches the den (the den is the room at the upper left of the house).



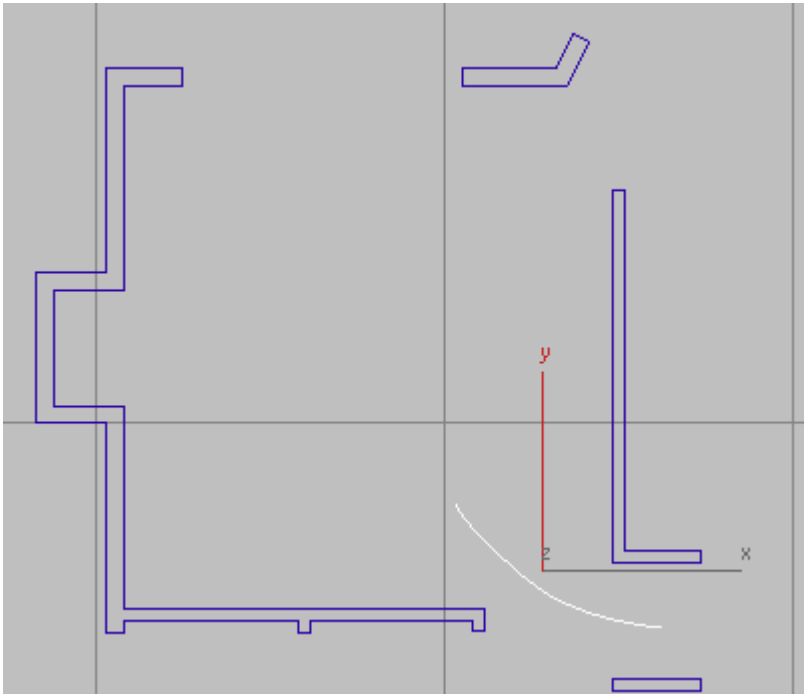
Now you are ready to create the path.

Create the path:

1.  Go to the Create panel.
2.  Click the Shapes button to turn it on.
3. Click the Line button to turn it on.

   Now you are ready to create a polyline.
4. In the Creation Method rollout, set both the Initial Type and the Drag Type to Smooth.

5 In the viewport, click to begin creating a polyline, move to the left, and click as you move to set additional vertices. After the fourth vertex, right-click to complete the line. It should appear something like the following illustration.



Once you have created the curve, you can edit it by selecting it, going to the Modify panel, and then clicking Vertex to go to the Vertex sub-object level. Move individual vertices until the line appears the way you want it, and then turn off Vertex.

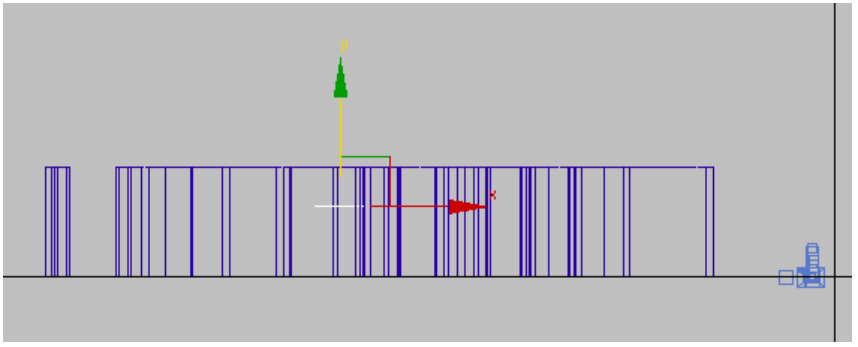
6 With the line still selected, use the Name And Color rollout to change its name to **CameraPath**.

If you deselected the line, select it again, go to the Modify panel, and then use the name field at the top of the panel to rename the line.

Elevate the path:

The path was created at a height of zero. If you moved the camera along it, the camera would be moving at ground level! You need to move the path upward.

1. Cick the POV viewport label and choose Left (or press L).
2.  Click Zoom Extents.
3. If the *CameraPath* spline is not selected, press H to display a Select From Scene dialog, and then select the *CameraPath* object.
4.  Right-click the viewport, and choose Move from the quad menu.
5. Drag the path upward along the Y axis until it's a little over five feet high (watch the Y coordinate display on the status bar while you're dragging the path).



6. Click an empty part of the viewport to deselect the path.

Attach the camera to the path:

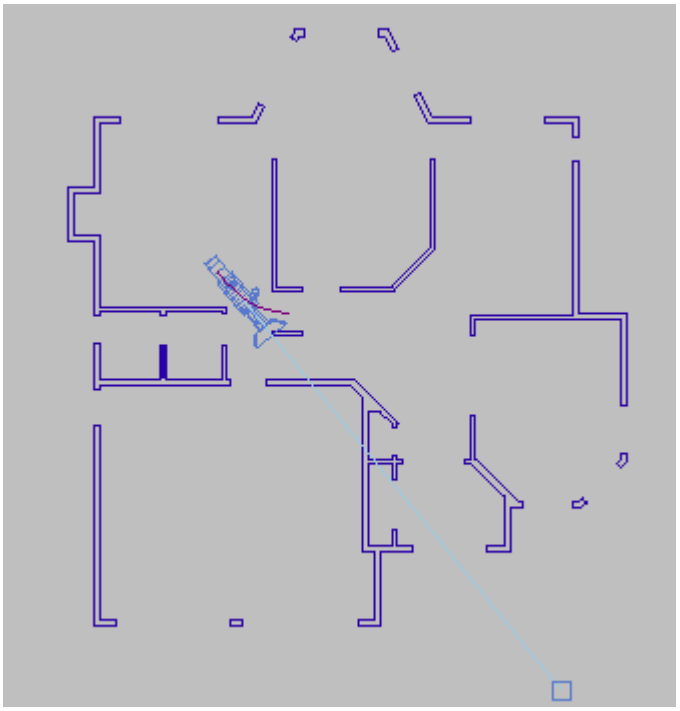
1. Click the viewport label and choose Top (or press T).
2.  Click Zoom Extents.
3. Click the camera object to select it.

4 Choose Animation > Constraints > Path Constraint.

A rubber band line appears, leading from the camera to the cursor location.

5 Click the *CameraPath* spline.

3ds Max Design repositions the camera so it is located on the path.



6  Click Play Animation to view the animation generated by the Path constraint.

The camera moves along the path. However, the target, which is stationary, is not in the proper location. You will fix this in the following steps.

7  Click Stop to stop playback.

Orient the camera:

1. In viewports, the camera's target is represented as a small cube. Click this cube to select it, and then move it to a position inside the den.

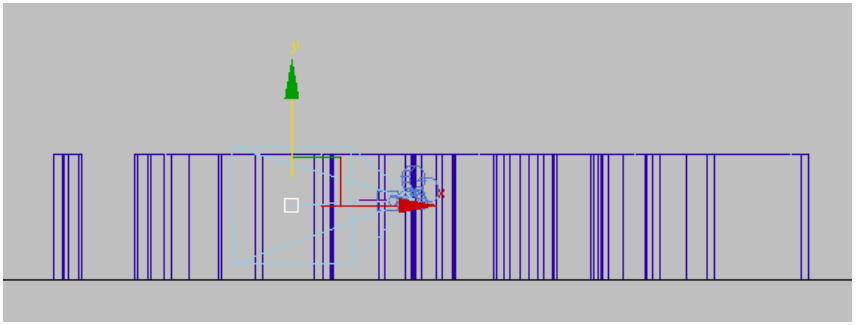
   As you move the target, the camera rotates to remain aimed in the target's direction.

2. Click the viewport label and choose Left (or press L).

3.  If the walls and camera aren't visible, click Zoom Extents.

   The target is still at ground level (Y=0), so the camera is aimed at the floor.

4.  Move the target upward along its Y axis until it is about the same height as the path.

   Now both the camera and its target (point of view) are at approximately human height.

Preview the animation:

1. Click the Point-Of-View (POV) viewport label and choose Cameras > CameraDen (or press C).

   This view corresponds to what the camera sees. If the view isn't already shaded, press F3 to display the view in shaded mode.

2.  Click Play Animation to preview the walkthrough.

As the animation plays, the camera moves into the room.

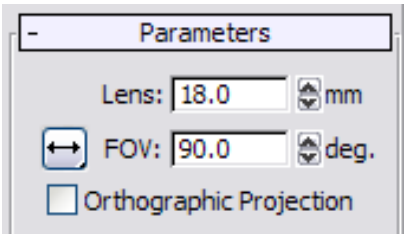
3  Click Stop to stop playback.

Set the camera's field of view:

The room is fairly small. Decreasing the camera's focal length and increasing its field of view (FOV) lets the camera show more of the room.

1 Press H to display a Select Objects dialog, then choose the *CameraDen* object.

2 Go to the Modify panel. On the Parameters rollout, set the Lens value to **18.0** mm and the FOV value to **90** degrees.



Now the camera viewport shows more of the house.

TIP FOV values greater than 90 degrees tend to give a distorted view of objects.

Save your work:

- Choose File > Save As, and save the file as **my_wt_camera.max**.
  If you want to do additional editing of the camera position, move the path to which it is attached, or the vertices of that path. You can't move the camera itself, because it is constrained to this path. You *can* move the camera's target, if you want to.

Adjusting the Camera's Timing

Camera timing is important. If the camera moves too fast, viewers will miss important elements of the animation (and might become dizzy). On the other

hand, if the camera moves too slowly, viewers will lose interest. When you attach a camera to a path, the start and end frames of the timeline are used for the camera path animation; here, the camera starts moving at frame 0 and stops at frame 100. You'll adjust these values for the walkthrough animation so it is slow enough for viewers to see the details of the room. To modify the duration of the camera animation, you will use Track View, the 3ds Max Design animation editor.

Set up the scene:

- Continue from your previous scene.

Use the Curve Editor to increase the animation length:

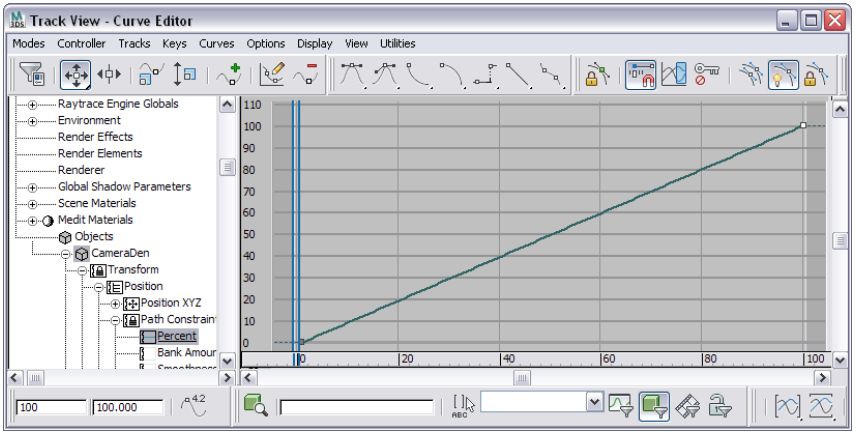
1. Press H to display a Select Objects dialog, then select the *CameraDen* camera.
2.  On the toolbar, click Curve Editor (Open).

   Track View opens in Curve Editor mode.
3. In the Controller Window (on the left side), open these tracks: Objects > *CameraDen* > Transform > Position > Path Constraint > Percent.

   You should now see a linear position graph, or "function curve" in the Curve Window on the right.

   The function curve represents a space-time relationship for the position of *CameraDen*. It starts at frame 0, 0 percent of the path, and it ends at frame 100, 100 percent of the path (which also is the end of the spline). To change the length of the camera animation, you need to edit the time value of the last keyframe.
4. Click the key at frame 100 to select it.

   The key is represented by a gray square. When you select it, it turns white with a black border.

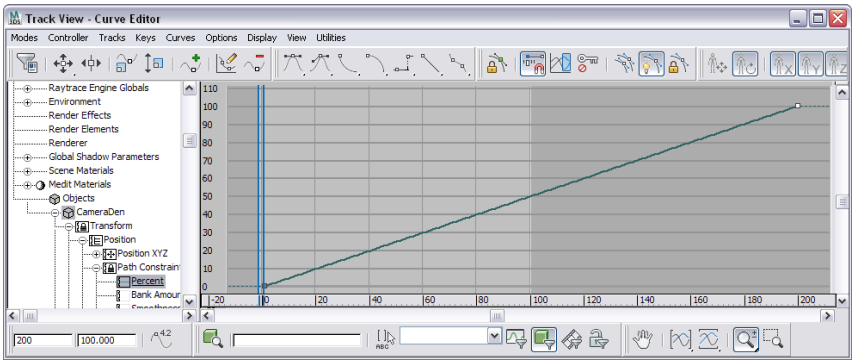


TIP  Move Keys must be on to select the key.

5 In the Key Time field at the bottom of the Curve Editor (the text field at the lower left), change the key's time from 100 to **200**.

The duration of the animation is now set to 200 frames, and the curve now goes off the right end of the window.

6  Click Zoom to turn it on, and drag downward in the Curve Window until you see the entire curve once again.



7  Click Zoom again to turn it off.

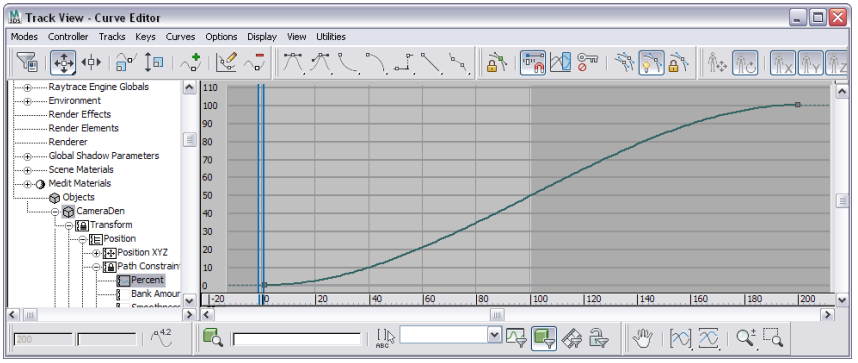
Use the Curve Editor to adjust the camera's speed:

Right now, the camera has a constant speed between frames 0 and 200. This is indicated by the linear “curve” in the curve window. The camera starts suddenly and stops suddenly, which is not typical for real-world movement. It would be more realistic, and more pleasant to viewers' eyes, if the camera began moving slowly, speeded up a bit, and then slowed down before coming to a stop. In animation, the expression for this type of motion is “slow in, slow out.”

1 In the Controller Window, right-click the Percent track. Choose Assign Controller from the quad menu that pops up.

An Assign Float Controller dialog appears.

2 Choose Bezier Float, and then click OK.



The Bezier Float controller changes the key tangents so the camera speeds up a bit when it begins to move, and slows down a bit before it stops. The shape of the curve is now a real curve, and indicates the changes in acceleration.

3 Close the Curve Editor by clicking the X button in the upper-right corner.

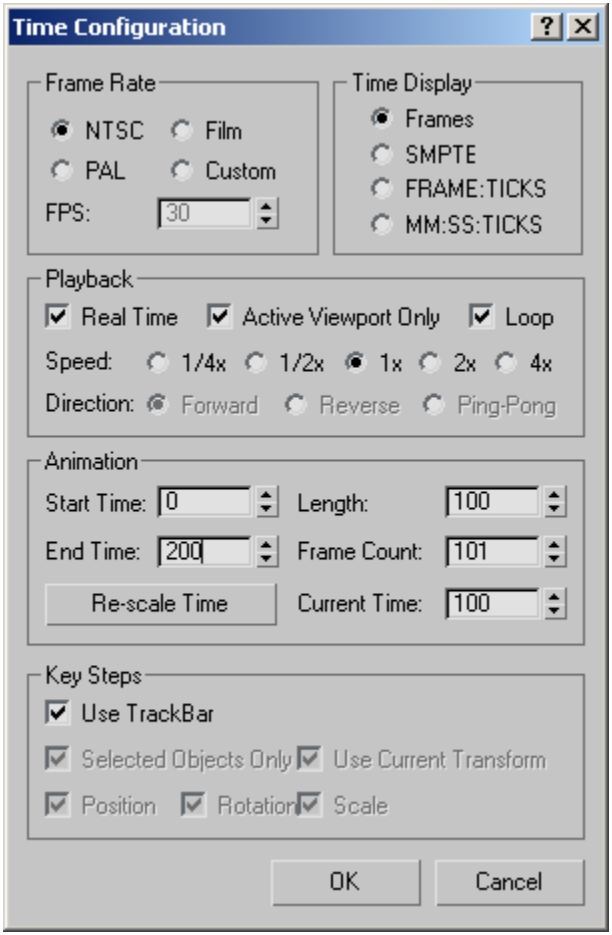
Change the time configuration:

You have changed the keys for the camera to indicate a 200-frame animation, but 3ds Max Design is still set to render only 100 frames. You also need to change this setting.

1.  Click Time Configuration in the animation controls at the lower right of the 3ds Max Design window.

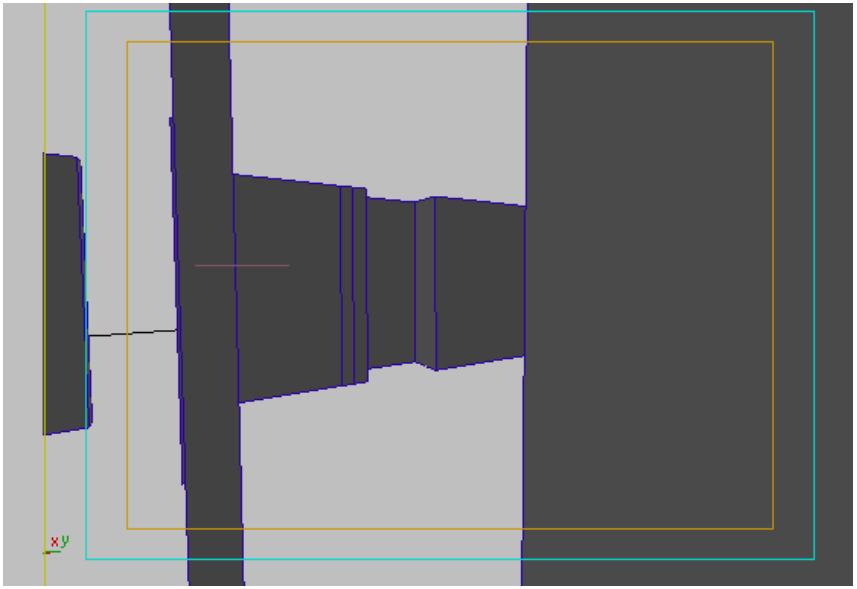
   A Time Configuration dialog appears.

2. In the Animation group, change the End Time value to **200**, and then click OK.



Show safe frames:

- Click the POV viewport label, and choose Show Safe Frames.



Three rectangles appear in the camera viewport. The outer rectangle is the area and aspect ratio of your current display. The middle rectangle is the zone that is safe for action: outside this rectangle, the image might be cut off when displayed on a video screen. The inner rectangle is the zone that is safe for displaying "titles" such as credits.

View the adjusted animation:

1.  Click Play to view the animation.

   The camera begins to move slowly, speeds up, and then slows down before coming to a stop.

2.  Click Stop to stop playback.

Save your work:

- Choose File > Save As, and save the scene as **my_wt_camera_animated.max**.

Constructing the Ceiling

To construct the ceiling, you create a polyline shape, and then convert it to a surface.

Set up the scene:

- Continue from your previous scene, or go to the *\using_autocad_files\walkthrough* folder and open the file *wt_camera.max*.

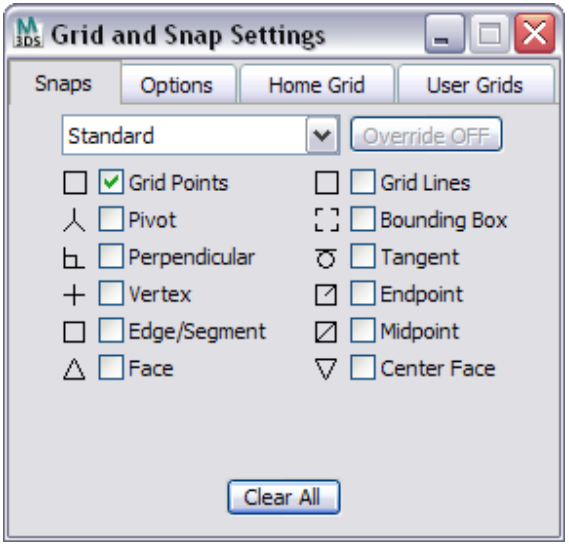
Change the view:

1. Click the POV viewport label and choose Top (or press T).
2.  Click Zoom Extents.

Set up snaps:

Snaps ensure that the line you create will align with the geometry of the walls.

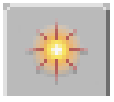
1.  On the main toolbar, choose 3D Snap from the Snaps flyout.
2. Right-click the same 3D Snap button.
   A Grid And Snap Settings dialog appears.



3 In the Grid And Snap Settings dialog > Snaps panel, click Clear All, and then click Vertex to turn it on.

4 Close the Grid And Snap Settings dialog by clicking the X button in the upper-right corner.

Create a ceiling shape for the den:

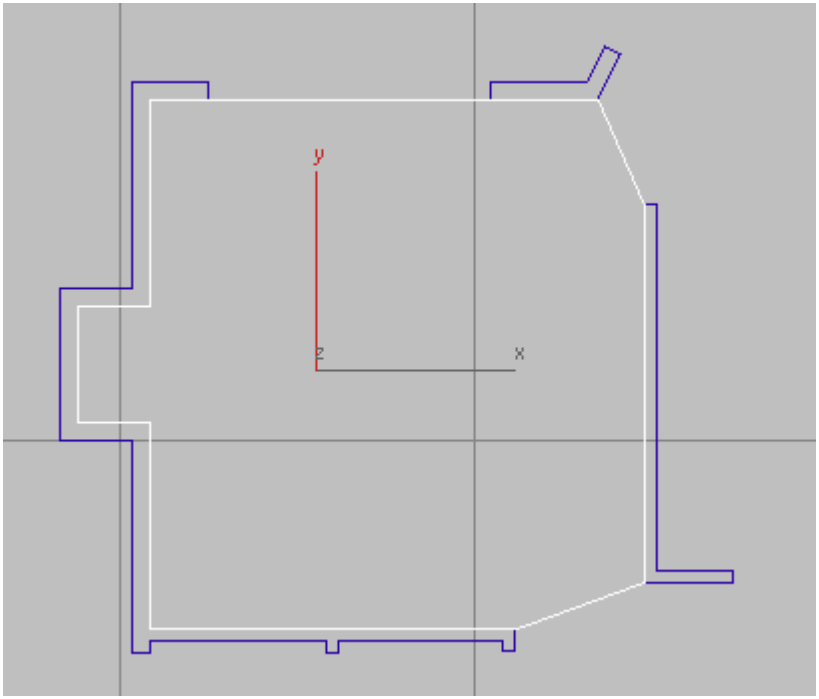
1  Go to the Create panel.

2  Click the Shapes button to turn it on.

3 Click Line to turn it on.

4 On the Creation Method rollout, make sure that Corner is chosen as both the Initial Type and the Drag Type.

5 Starting at the upper-left corner of the den, draw a Line shape that connects the interior vertices of the walls of this room, as shown in the illustration that follows. Proceed in a clockwise direction.



Complete the line by clicking the vertex with which you began the Line. When 3ds Max Design asks if it should close the spline, click Yes.

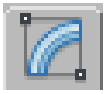
6  On the main toolbar, click the 3D Snap button again to turn it off.

7 While the line is still selected, rename it **Ceiling** on the Name And Color rollout.

Convert the shape to a polygon surface:

- Right-click the Line object, then choose Convert To > Convert To Editable Poly from the Transform (lower-right) quadrant of the quad menu. This converts the *Ceiling* line into a polygonal surface.

Correct the normal of the ceiling surface:

1.  Go to the Modify panel.
2. Make sure the ceiling is still selected, and then choose Normal from the Modifier List drop-down.
3. Make sure Flip Normals is on (it should be on by default).
4. Press F9 to render the view.

   The rendering should show the ceiling geometry.

If the rendering doesn't show the ceiling, use the Normal modifier to change the state of Flip Normals.

Save your work:

- Choose File > Save As, and save the scene as **my_wt_ceiling.max**.

Constructing the Floor

To construct the floor, you simply copy the ceiling geometry.

Set up the scene:

- Continue from your previous scene, or go to the *\using_autocad_files\walkthrough* folder and open the file *wt_ceiling.max*.

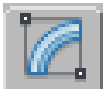
Construct the floor by cloning the ceiling:

1. Click the POV viewport label and choose Left (or press L).
2.  Click Zoom Extents.
3.  If the ceiling is not still selected, click Select By Name (or press H) and use the Select From Scene dialog to select it.
4.  On the main toolbar, click Select And Move to turn it on.
5. Hold down a Shift key while you drag the ceiling down to floor level.

   Shift+move creates a copy of the ceiling object, and when you release the mouse, a Clone Options dialog appears.
6. In the Clone Options dialog, choose Copy. Change the name of the cloned object to **Floor**, and then click OK.

Fix the floor's normal:

The floor faces upwards, so it doesn't need the Normal modifier.

1.  Go to the Modify panel.

2  On the modifier stack, make sure the Normal modifier is highlighted, and then click Remove Modifier From The Stack.

Correct the floor's alignment:

1  Click the Maximize Viewport Toggle (or press Alt+W) to see four viewports.

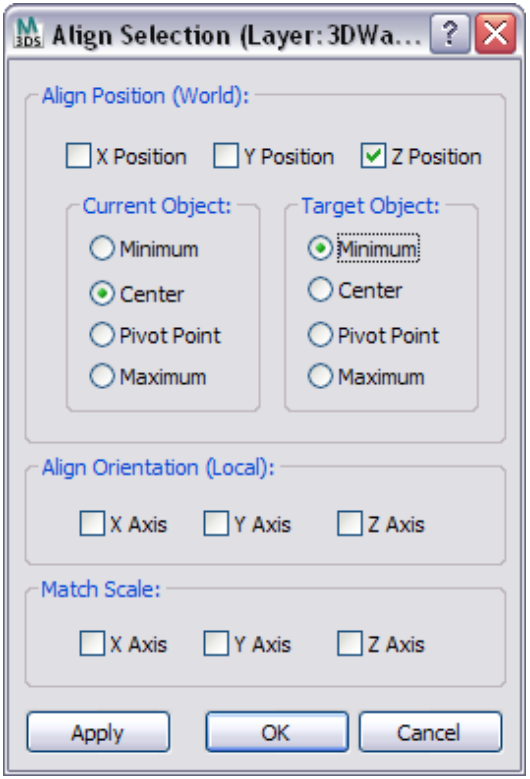
2 Activate the CameraDen viewport by right-clicking it.

3  Make sure the floor is still selected, and then on the main toolbar, click the Align button to turn it on.

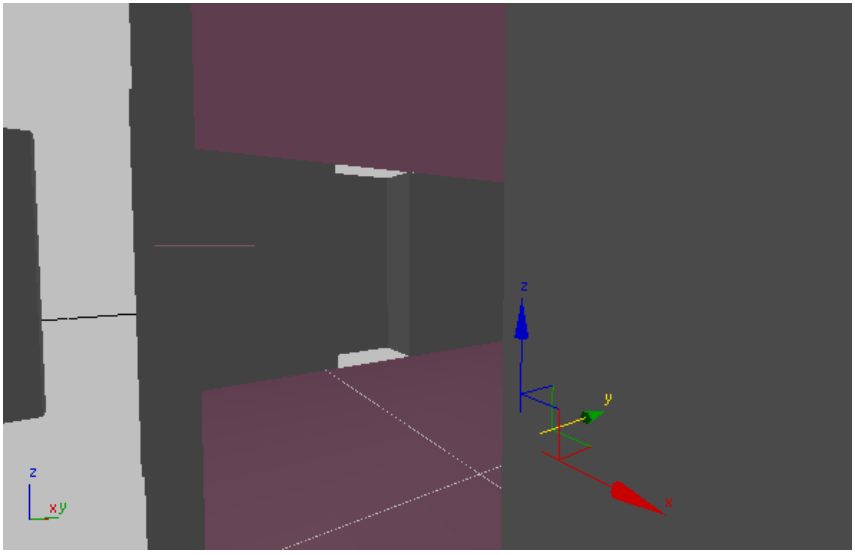
4 Click one of the walls.

An Align Selection dialog appears.

5 In the Align Selection dialog, turn off X Position and Y Position. Turn on Z Position. For Current Object choose Center, and for Target Object choose Minimum.



This aligns the floor with the bottom of the walls, along the floor's local Z axis.



6 In the Align Selection dialog, click OK.

Preview the floor:

1 Press F9 to render the view.
Now the rendering shows both a floor and a ceiling.

2 Close the rendering by clicking the X button in the upper-right corner.

Save the scene:

- Choose File > Save As, and save the scene as **my_wt_floor.max**.

Texturing the Walls, Floor, and Ceiling

So far, preview renderings of the scene have shown simple color tones. To give an object a more interesting and more realistic look, you need to apply a material to it. Material attributes give an object its color and describe what type of surface the object has. By adjusting material attributes, you can make a surface look hard and shiny like a billiard ball or soft and bumpy like a piece of cloth made of wool. To create materials, you use the Material Editor.

Set up the scene:

- Continue from your previous scene, or go to the *\using_autocad_files\walkthrough* folder and open the file *wt_floor.max*.

Create a material for the walls and ceiling:

1.  On the main toolbar, click the Material Editor button, or press M.

   The Material Editor opens. At the top of this dialog are 24 preview windows known as "sample slots."

2. Click the second sample slot to make it active.

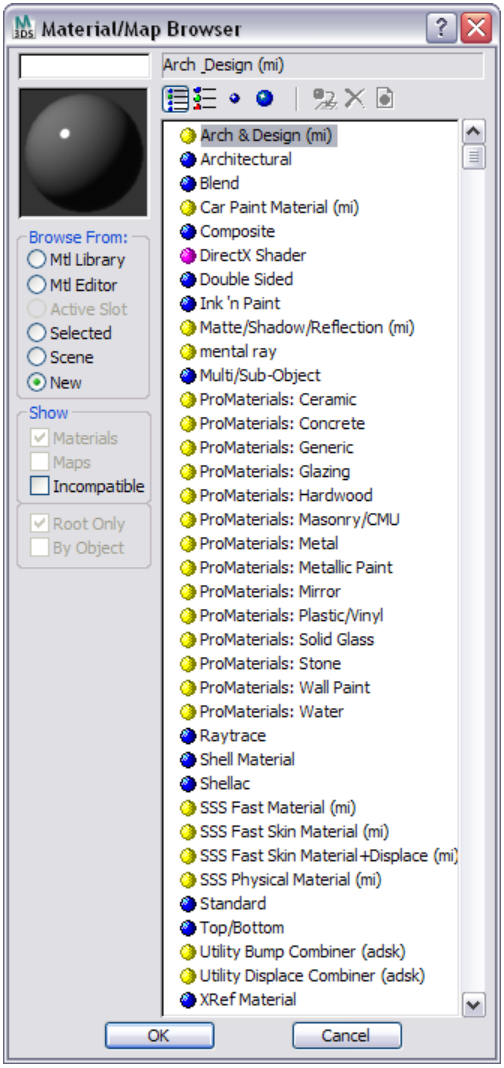
   The border of the slot turns white.

3. Change the name of the material from "02 - Default" to **Wall Ceiling Material**.

   The material name field is between the color picker button and the Material Type button (which shows "Architectural").

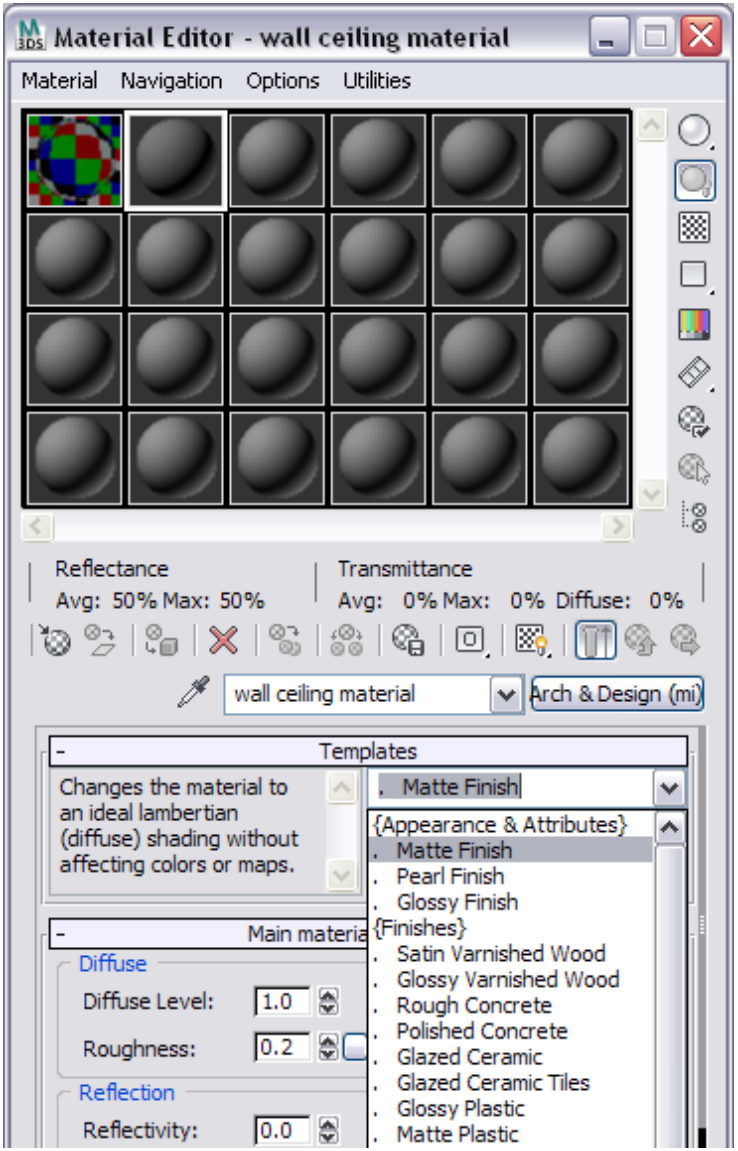
4. Click the Material Type button that shows "Architectural."

   A Material/Map Browser appears.



5 In the list, click “Arch & Design (mi)” to highlight it, and then click OK.

6 You will use a template to create the floor material. Templates help speed up material creation. On the Templates rollout, choose Matte Finish from the drop-down list.



7 On the Main Material Parameters rollout, click the color swatch in the Diffuse group.

A Color Selector appears.

A surface's *diffuse color* is the color it reveals under pure white light.

8 In the Color Selector, assign these values to the color:

- Hue: **0.19**
- Sat (saturation): **0.2**
- Value: **1.0**

Now the paint color is a pale yellow.

9 Click OK to close the Color Selector.

Apply the material to the walls and ceiling:

1  Click Select By Name (or press H) to display a Select From Scene dialog. In the list, click and Ctrl+click to select the wall and ceiling objects, and then click Select.

2  In the Material Editor, click Assign Material To Selection.

3ds Max Design applies the material to the selected objects.

NOTE The sample slot that displays the material now shows white triangles in each corner: these indicate that the material is being used in the scene.

Create a material for the floor:

The floor material is slightly more complex: you will use a map to display a wooden floor effect.

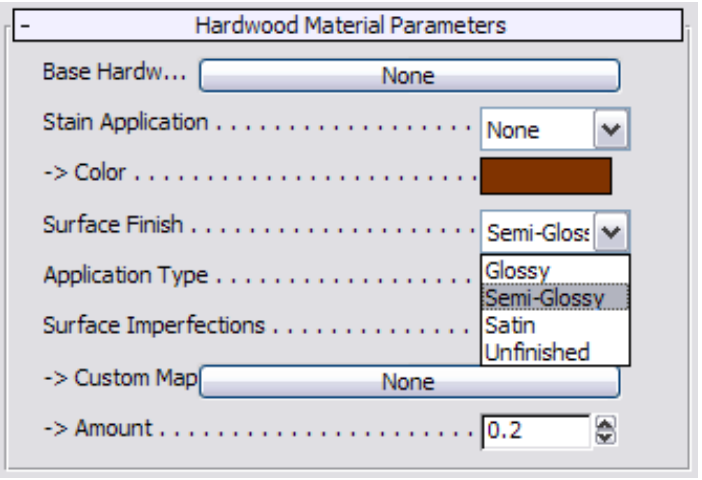
1 Click the third sample slot to make it active.

2 Change the name of this material to **Floor Material**.

3 Click the Material Type button, and use the Material/Map Browser to choose the material ProMaterials: Hardwood.

The Hardwood ProMaterial makes it easy to define wooden materials for mental ray rendering.

4 On the Hardwood Material Parameters rollout, change the Surface Finish value to Semi-Glossy.



5 Also on the Hardwood Material Parameters rollout, click the Base Hardwood map button. This is the first button on the rollout. No map is assigned, so its label shows "None."

A Material/Map Browser appears.

6 In the Browser's list of map types, click Bitmap to highlight it, and then click OK.

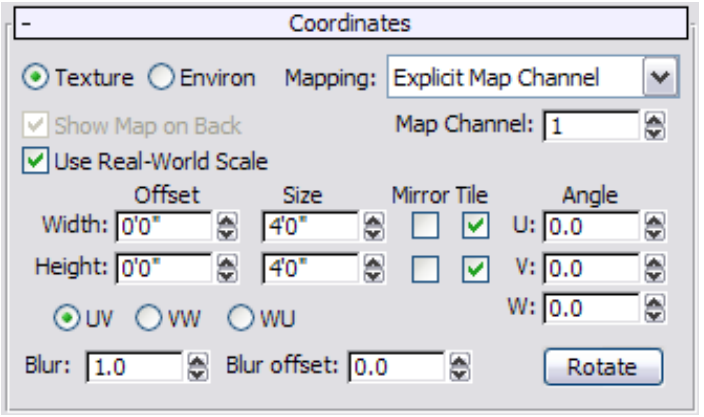
A Select Bitmap Image File dialog appears.

7 In the file dialog, choose *cherry.jpg,* and then click Open.

NOTE First, you might have to navigate to the folder where your tutorial scene and image files are stored.

After you assign *cherry.jpg,* the sample slot shows this bitmap's wood-grain pattern.

8 On the Coordinates rollout, make sure Use Real-World Scale is turned on, and then set the Width and Height Size values to both equal **4'0"**.



3ds Max Design will repeat ("tile") the wood-grain bitmap on the floor object. Setting the size to 4 feet square ensures that the tiling appears correct: these dimensions match the original photograph of cherry floorboards.

9  In the Material Editor, turn on Show Map In Viewport so you can see the wood-grain map in shaded views.

Apply the material to the floor:

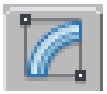
1  Click Select By Name (or press H) to display a Select From Scene dialog. In the list, click to highlight the floor object, and then click Select.

2  In the Material Editor, click Assign Material To Selection.

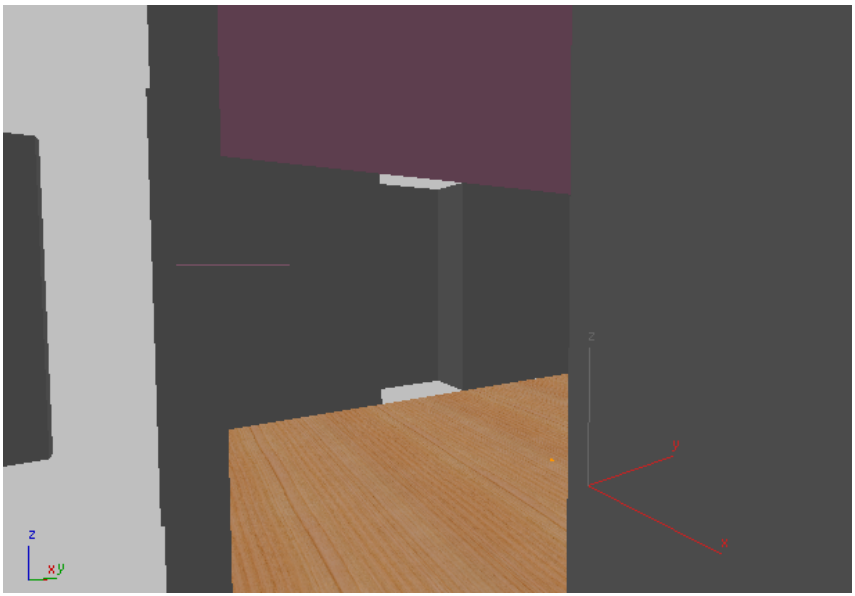
3  Make a camera *(CameraDen)* viewport active, and then click Render Production (or press F9) to render the scene.

3ds Max Design displays a warning that the floor doesn't have map coordinates. Click Cancel to stop the rendering.

The floor is an Editable Poly object. By default, object primitives have mapping coordinates assigned to them, but editable surfaces do not.

4  Go to the Modify panel. Choose UVW Map from the modifier list.

3ds Max Design applies mapping coordinates to the floor.



The floor grain appears in shaded viewports after you apply UVW Map.

5  In the Parameters rollout > Mapping group, make sure that Planar is chosen, turn off Real-World Map Size, and then click Render Production once again.

3ds Max Design renders the scene with painted walls and a wood-grain floor. (The lighting is uninteresting, but you'll fix that in a later lesson.)

6 Close the Material Editor.

Save your scene:

- Choose File > Save As, and save your scene as **my_wt_material.max**.

Adding the Furniture and Decorative Elements

To complete the room, you will now merge some pre-built elements into the scene. These are the windows, a fireplace, and a door. They include the wall portions that are above and underneath them. The file also includes floors and ceilings for the hallway and kitchen. Another scene file provides the furniture.

Set up the scene:

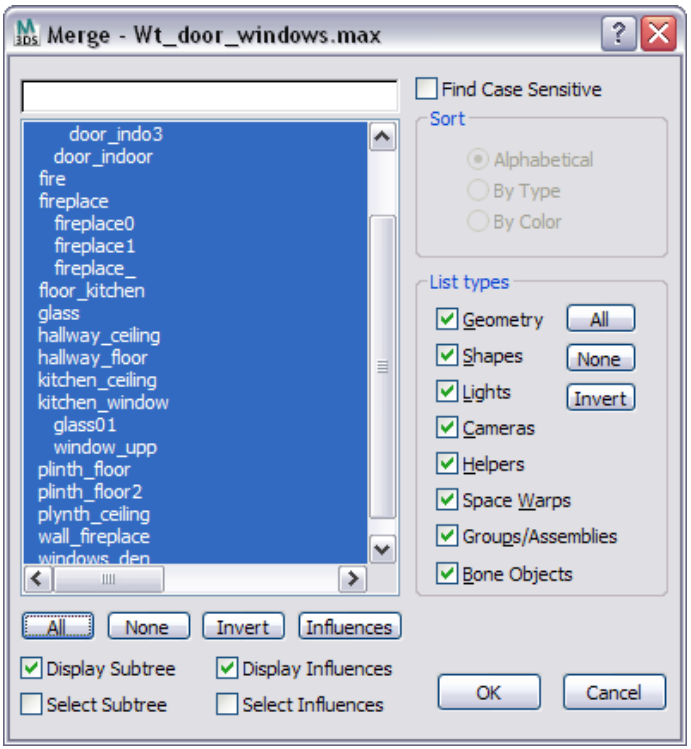
- Continue from your previous scene, or go to the *\using_autocad_files\walkthrough* folder and open the file *wt_material.max*.

Add the windows, fireplace, and door:

1  From the Application menu, choose Import > Merge. Browse to the *\using_autocad_files\walkthrough* folder, choose the file *wt_door_windows.max,* and then click Open.

A Merge dialog appears.

2 In the Merge dialog, click the All button beneath the list of objects, and then click OK.



The door, windows, and fireplace are added to the scene.

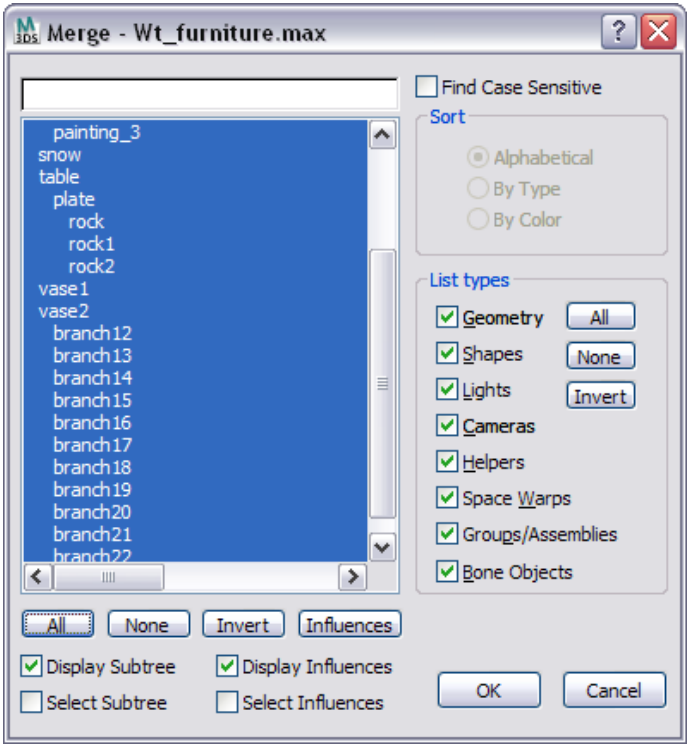
Add the furniture:

1. 

Choose Import > Merge once again. In the *\using_autocad_files\walkthrough* folder, choose *wt_furniture.max,* and click Open.

   The Merge dialog opens.

2. In the Merge dialog, click the All button beneath the list of objects, and then click OK.



3ds Max Design merges chairs and some decorative elements into the scene. (The merged scene also includes a sky dome, which supports distant scenery and snow falling, seen through the windows.)

Save your work:

- Choose File > Save As, and save the scene as **my_wt_furnishings.max**.

Adding and Adjusting a Daylight System

To simulate natural sunlight coming from the outside, you will use a Daylight system. A Daylight system uses lights in a setup that follows the geographically correct angle and movement of the sun over the earth at a given location.

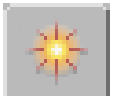
Set up the scene:

- Continue from your previous scene.

Add the daylight system:

1.  Right-click the Perspective viewport to make it active, and then click the Maximize Viewport Toggle (or press Alt+W).

   TIP If a Perspective viewport is not visible, you can change one of the orthographic views to a Perspective view, but then you will have to navigate in the viewport to get a good overhead view of the house, with some empty space around it.

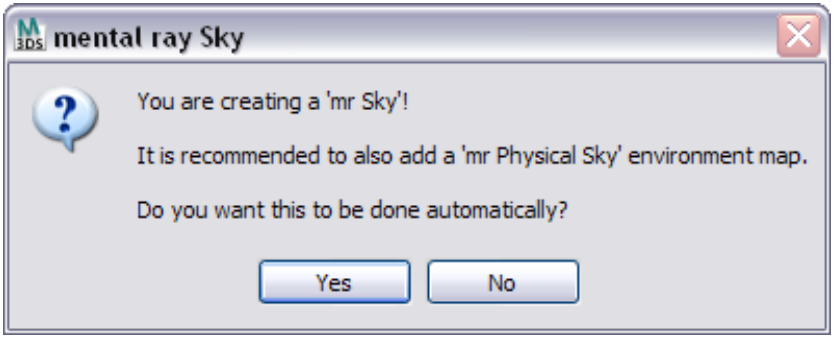
2.  Go to the Create panel.

3.  Click the Systems button to turn it on.

4. Click the Daylight button to turn it on.

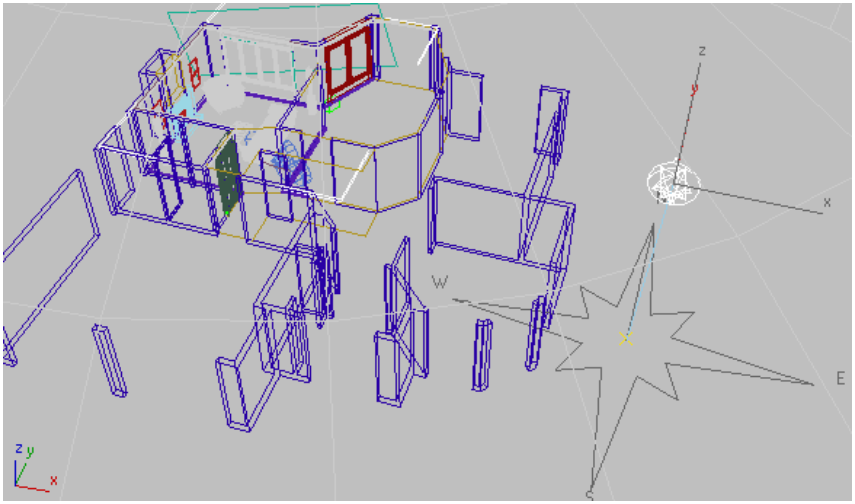
5. Drag in an empty area of the Perspective viewport. A compass rose appears. Release the mouse.

   3ds Max Design displays a dialog that asks if you want to add a Physical Sky environment map.



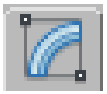
6. Click Yes to accept the environment map creation and dismiss the dialog.

7. Back in the Perspective viewport, drag to set the height of the Daylight light. Click to complete creation of the Daylight system.



NOTE The scene position of the compass and the height of the light don't really matter: 3ds Max Design will calculate correct values for daylight. Later, you will adjust the orientation of the compass to reflect the geographic orientation of your model.

Adjust the daylight values:

1.  With Daylight still selected, go to the Modify panel.
2. On the Daylight Parameters rollout, in the Position group, click Setup.

   3ds Max Design goes to the Motion panel and displays a Control Parameters rollout.
3. On the Control Parameters rollout, in the Time group, change the Hours value to **16**.
4. In the Location group, click Get Location.

   A Geographic Location dialog appears.
5. Use the City list or a map to choose your present location, and then click OK.

   For example, Montreal QC Canada was used for the sample scenes.
6. In the Site group, change the North direction to **112.0**.

This value corresponds to Montreal. It also ensures that the living room is oriented to the southwest, toward the setting sun.

If you chose a different city, you might want to use its local value for north.

3ds Max Design changes the orientation of the compass to point to the north you entered.

Save the scene:

- Choose File > Save As, and save your scene as **my_wt_daylight.max**.

Adjusting the Environment

Before you do any renderings, some environment parameters that control the image results should be set correctly for the current scene.

Set up the scene:

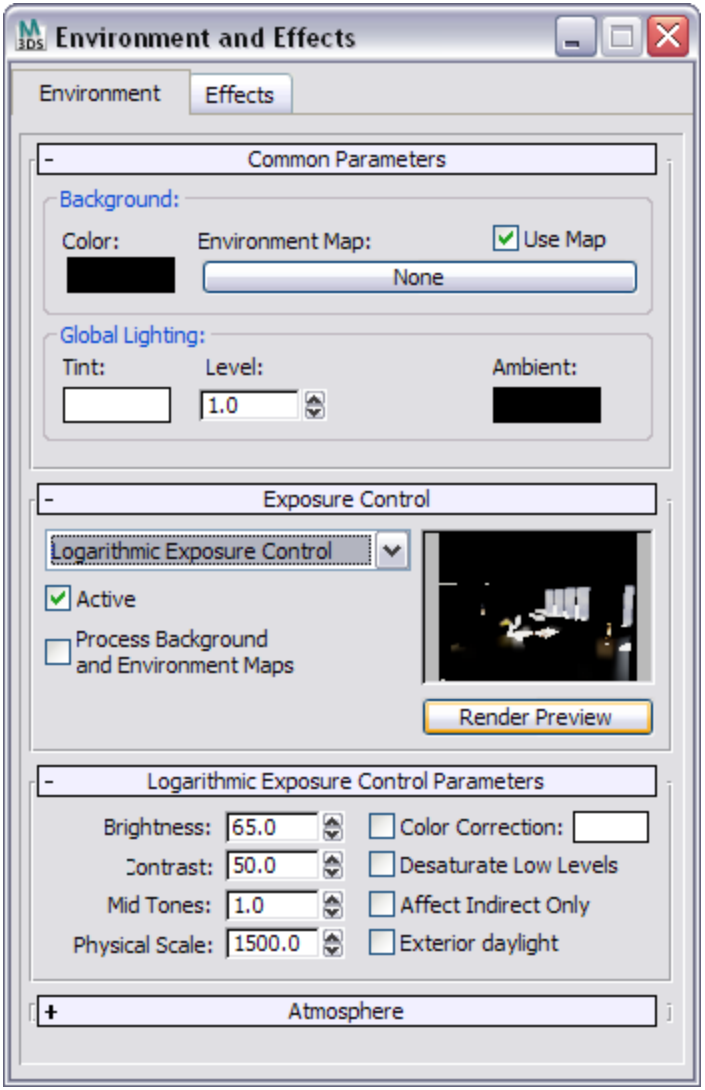
- Continue from your previous scene, or go to the *\using_autocad_files\walkthrough* folder and open the file *wt_daylight.max*.

Set the exposure control:

1. Drag the time slider to frame 120.

   This gives you a better view of the room.
2. Make sure the CameraDen viewport is active.
3. Choose Rendering > Environment.

   An Environment And Effects dialog appears.
4. On the Exposure Control rollout, make sure the exposure control type is Logarithmic Exposure Control.
5. On the Logarithmic Exposure Control Parameters rollout, turn off Exterior Daylight.
6. On the Exposure Control rollout, make sure Active is turned on, and then click Render Preview.



The preview window shows that the scene is dark. This is because the rendering shows only direct lighting. It doesn't show the indirect lighting from bounced sunlight that would occur in real life. You will use the mental ray renderer to correct this.

Using the mental ray Renderer

You can use the mental ray renderer to generate indirect lighting, using bounced daylight to improve the illumination of th scene.

Set up the scene:

- Continue from your previous scene.

Preview the room:

➤  Make sure the CameraDen viewport is still active, and then click Render Production (or press F9).

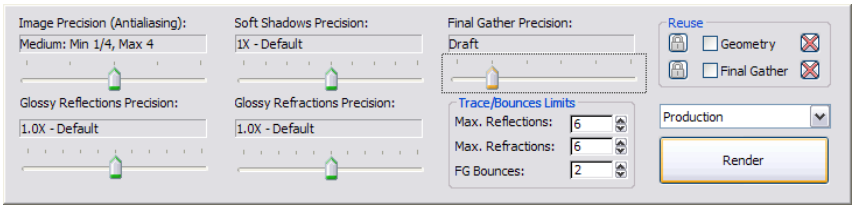
3ds Max Design renders the scene, but hardly any of the room is visible at all. Sunlight enters through the window, but it doesn't spread through the room the way real-life sunlight does.

Turn on final gathering:

Final Gather causes light to bounce off surfaces as it does in real life.

1. At the bottom of the Render Scene dialog, drag the Final Gather Precision slider one notch to the left, so the status changes from "Final Gather Disabled" to "Draft."

2. In the Trace/Bounces Limits group, set FG Bounces to **2**.



3. Click Render.

   Now the room is clearly lit by daylight. It is actually a little too well lit. Also, there are some dark patches on the ceiling that are caused by inaccuracies at the Draft level of Final Gather. These are easy to fix.

Adjust the exposure and final gather settings:

1. On the Environment And Effects dialog, on the Logarithmic Exposure Control Parameters rollout, reduce the value of Brightness to **45**.
2.  Open the Render Setup dialog. Go to the Indirect Illumination panel, and on the Final Gather rollout, change the value of Interpolate Over Num. FG Points to **100**.
3. Click Render again.

   Now the room is well and realistically lit.

   (You might notice that on the Rendered Frame Window dialog, the status of Final Gather changes from "Draft" to "Custom," because of your Render Setup change.)

Save your work:

- Choose File > Save As, and save the scene as **my_wt_fg.max**.

Rendering the Walkthrough Animation

At a resolution of 640 x 480, it can take 1 minute or more to render each frame, depending on the speed of your computer, so you probably don't want to render the entire animation: at 200 frames, that would take a few hours on a standalone system. This lesson describes some ways to check your work and preview what the final result would be.

Set up the scene:

- Continue from your previous scene, or go to the *\using_autocad_files\walkthrough* folder and open the file *wt_finalgather.max*.

Render a preview animation:

A preview renders at low resolution, with shading but no rendering effects. It is a good way to check the animation you've created.

1. From the main menu, choose Animation > Make Preview.

   A Make Preview dialog appears.

2. Click Create.

3. Click OK to accept the default Cinepak codec.

   3ds Max Design renders the animation as an AVI movie file. As it creates the preview, 3ds Max Design displays each frame in the viewport. When the preview is done, it launches the Windows Media Player and plays the preview animation.

   You can replay the preview in the Media Player by clicking Play once more, or by choosing Animation > View Preview in 3ds Max Design.

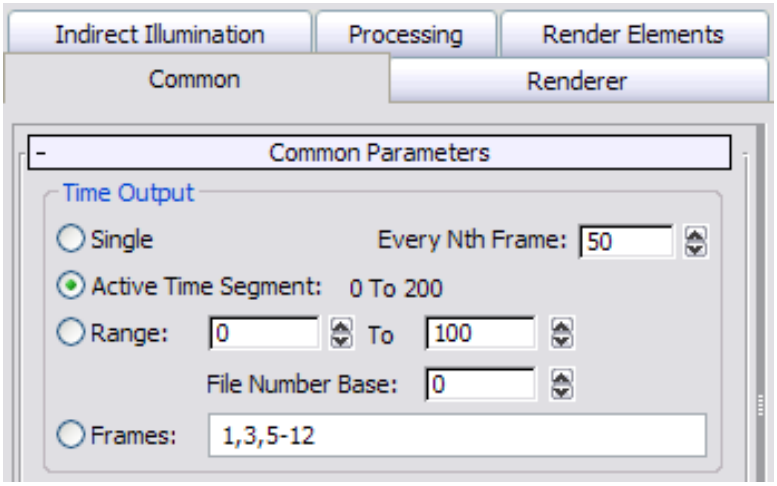
   The preview gives you a precise idea of the speed and rhythm of the animation, and lets you see if there is anything you need to fix. At this point, you might want to make adjustments by changing the camera's target position or the shape of the path.

Render sample frames:

While the preview shows the animation's speed and rhythm, it doesn't show how frames look when fully rendered. To get a better idea of the look of the animation, you can render sample frames.

1  Click Render Setup (or press F10) to display the Render Setup dialog.

2 On the Common panel, in the Common Parameters rollout, find the Time Output group. Change the output from Single to Active Time segment, and then change Every Nth Frame to **50**.



This will render five frames that are sampled along the duration of the animation, from frame 0 to frame 200. (Rendering five frames will take probably 5 to 10 minutes: adjust the Every Nth Frame value to suit the time you want to spend on this lesson.)

You need to specify an animation file for the rendering.

3 Scroll down to the Render Output group (also on the Common Parameters rollout). Click the Files button.

A Render Output File dialog appears.

4 In the file dialog, enter **wt_samples** as the File Name, and then choose "JPEG File (*.jpg,*.jpe,*.jpeg)" from the Save As Type drop-down list.

When you render an animation to a still-image file type such as JPEG, 3ds Max Design creates a sequence of image files. Each has the file name you chose (*wt_samples)* followed by a sequence number (for example, *wt_samples0000.jpg)*.

TIP Leave the folder name set to *\renderoutput*. The *\renderoutput* folder is a sub-folder of the 3ds Max Design tutorials project folder.

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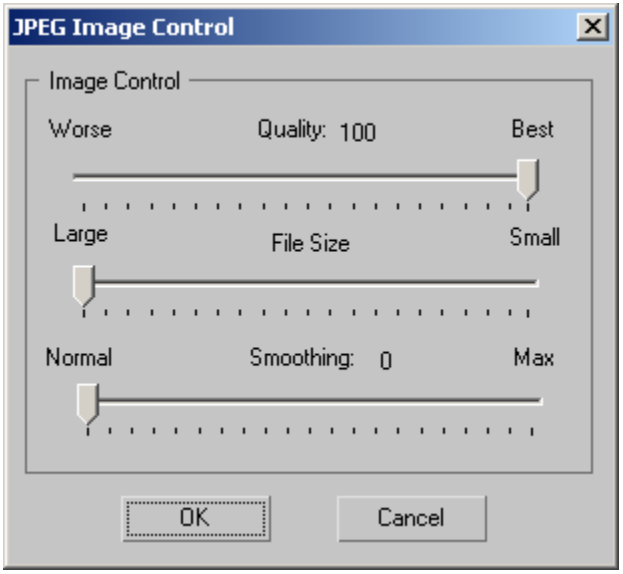
5 Click Save.

3ds Max Design displays a JPEG Image Control dialog.



6 Change the Quality value to **100** percent, and then click OK.

7 On the Render Setup dialog, click Render.

As each image is rendered, it is stored in the *\renderoutput* folder. When a frame is completed, view it to see if there is a problem with it. If something seems wrong, stop the rendering by clicking Cancel in the Rendering dialog or by pressing Esc. Correct the problem, and then render sample frames once more. This sampling process should help you spot problems before you take the time to render the full animation.

When you are ready to render a full animation, change the output file type to a movie format. AVI and MOV are both available options. 3ds Max Designprompts you to choose a compressor/decompressor (codec) for the movie. Change Every Nth Frame back to **1**, and then render the complete animation.

You can view a sample AVI movie of the walkthrough by choosing Rendering > View Image File, and from the tutorials folder opening *\sceneassets\renderassets\wt.avi*.

A final version of the scene is in the *\using_autocad_files\walkthrough* folder, saved as *wt_final.max*.

Summary

In this tutorial, you learned about basing a model and animation on imported AutoCAD geometry.

Using File Link with AutoCAD Drawings

As you experienced in the previous lessons, the Import functionality of 3ds Max Design allows you to load drawings and models that were created with AutoCAD, AutoCAD Architecture, or AutoCAD Mechanical. A drawing or model is imported and you can begin making alterations using the tools in 3ds Max Design.

Importing is fine for a drawing or model that is no longer being updated, but what about a drawing that is still being developed? Architectural drawings can change greatly in a matter of hours, so if you're building a 3D model based on an imported drawing that is still in flux, you will find yourself changing and rebuilding many objects before the project is finished. Perhaps, completely starting over if the drawings change a lot.

This is a situation where using the File Link Manager is invaluable. This lesson will show you the advantages of the tool and how it will save modeling time.

Set up the lesson:

1. Start AutoCAD and choose File menu > Open.
2. Browse to the *import\AutoCAD_files* folder and open *ww_cad_drawing2link.dwg*.

3 If you see the Proxy Information dialog, it means there are custom objects in the drawing that require special Object Enablers if you plan to edit them. Click OK for now.

4 Choose File menu > Save As and save the drawing as **mydrawing2link.dwg** to the *import\AutoCAD_files* folder.

This is to preserve the original drawing so the tutorial can be easily repeated.

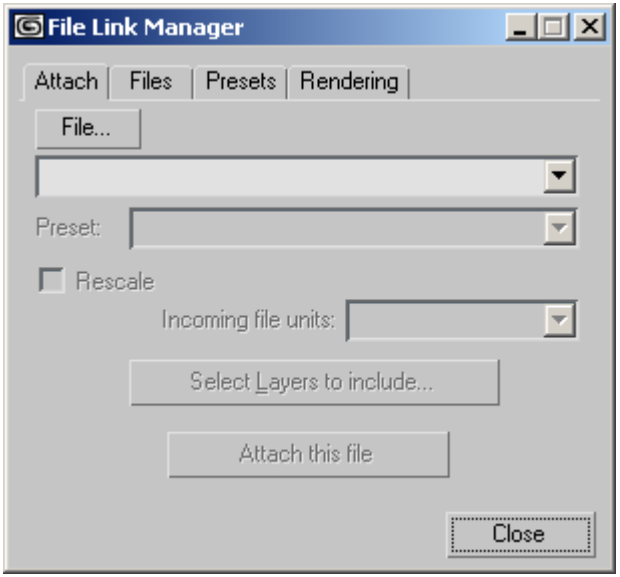
5 Minimize the AutoCAD window.

Make the link:

1  Start 3ds Max Design or if you have 3ds Max Design running, from the Application menu, choose Reset to reset the program.

2  From the Application menu, choose References > File Link Manager.

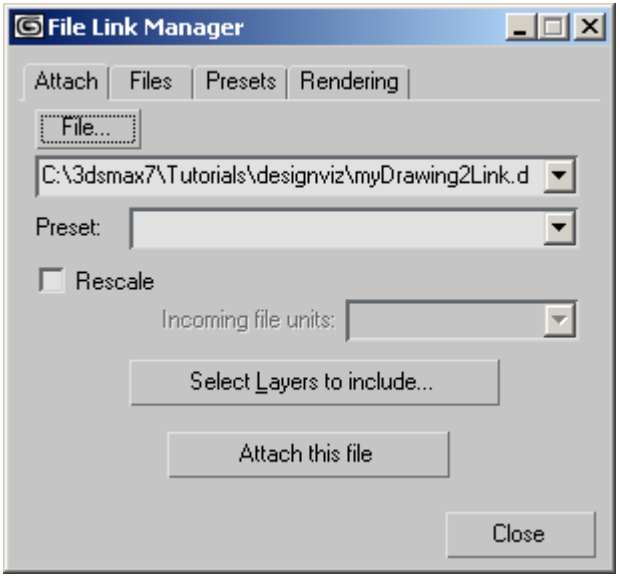
3ds Max Design opens the File Link Manager dialog.



TIP You can also access the File link Manager from the Utilities panel.

3 On the Attach panel, click the File button.

4 From the Open dialog, browse to the *\import\AutoCAD_files* folder and choose **mydrawing2link.dwg**. then click Open.



The drawing appears in the file list.

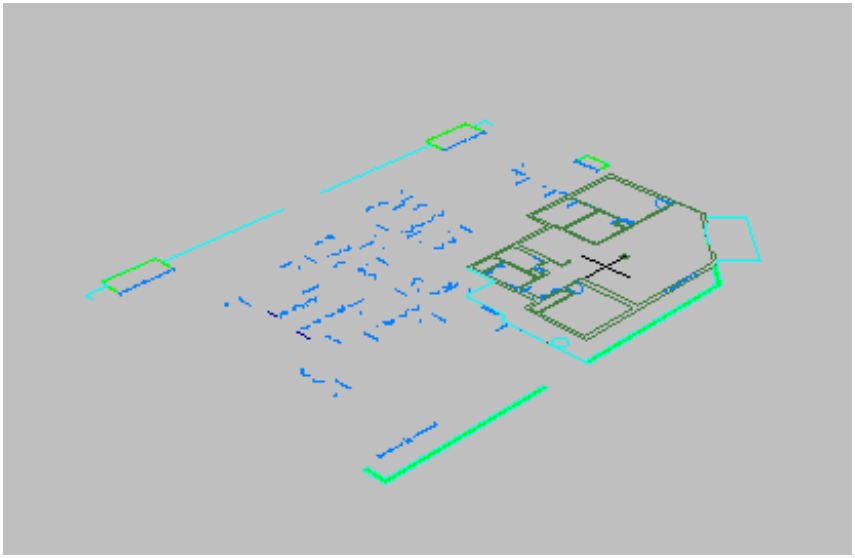
5 Turn on Rescale and make sure the Incoming File Units are set to Inches.

You want the units to match the default unit size in the AutoCAD drawing.

6 Click Attach This File.

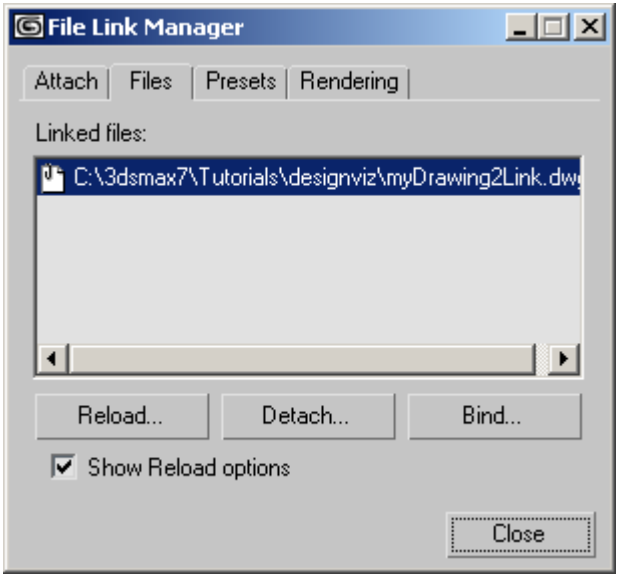
You'll see the Status Bar is replaced with the Linking AutoCAD Drawing progress bar.

Larger, more complex drawing files take longer to link.

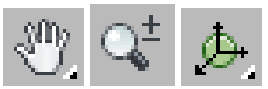


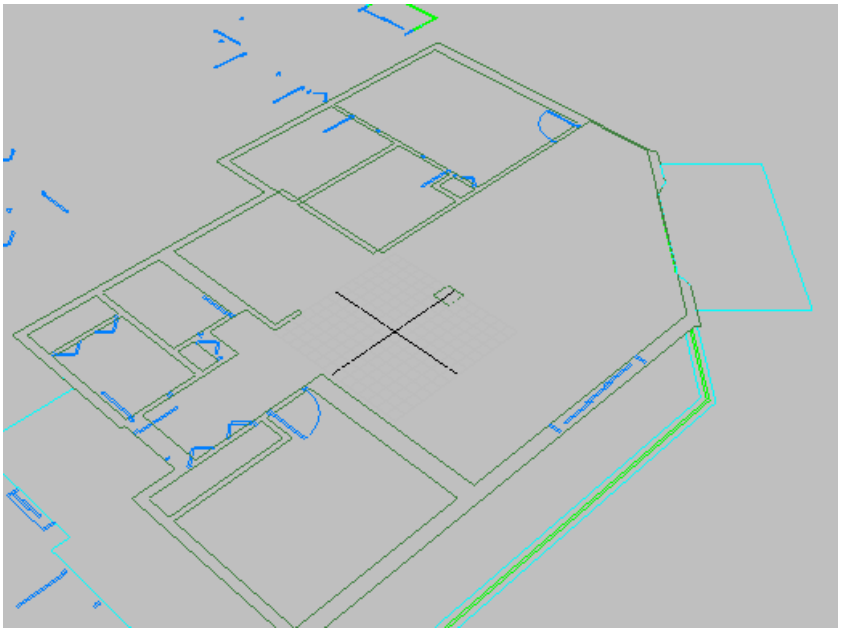
The drawing is linked to 3ds Max Design.

7 Click the Files tab on the File Link Manager dialog.



This panel shows you have one drawing file linked to the scene and the status of the linked file. It also gives you the opportunity to reload, detach, or bind a linked file. You'll experiment with these options later.

8  Use Pan, Zoom, and Orbit to get a closer view of the corner apartment to the right of the plan.



What you've just done is create an active link from 3ds Max Design to a drawing file and verified that the file is linked. Next, you'll start building the model and see how changes to the drawing affect the scene.

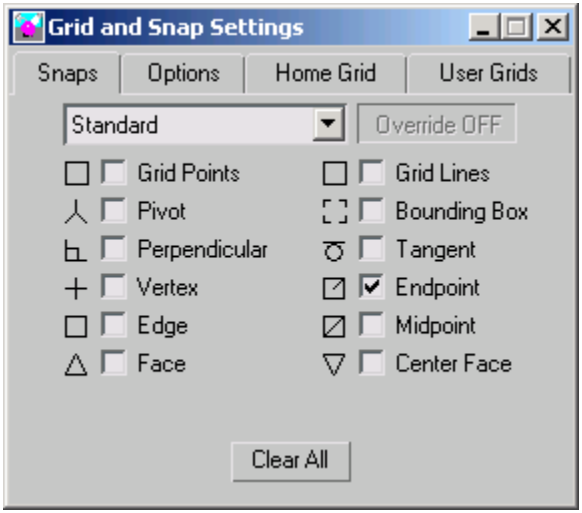
Start building a model:

Next you'll build walls, add doors, and assign materials to objects you've created. In this section, you'll start modeling by adding a wall.

1  Click the 3D Snaps Toggle button to activate it, then right-click the same button.

Right-clicking the button opens the Grid And Snap Settings dialog.

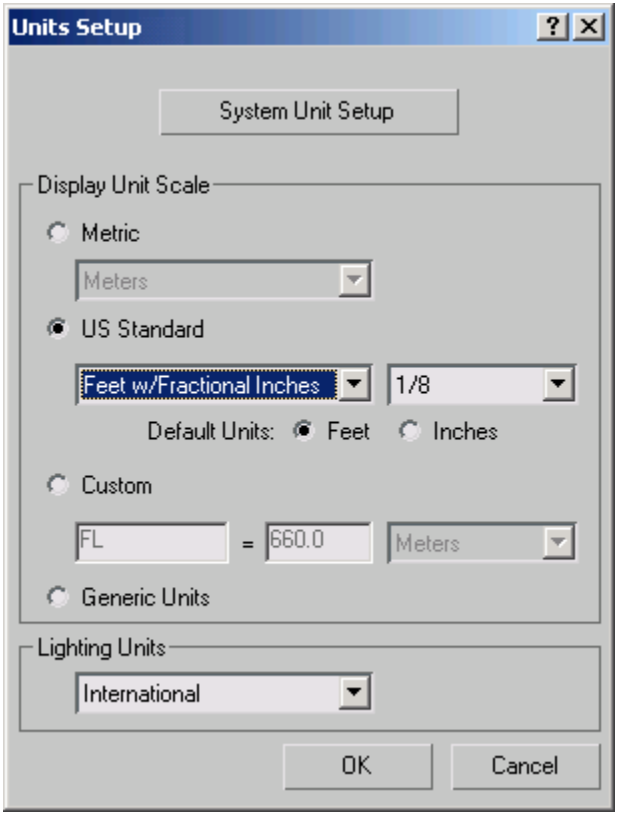
2 On the Snaps panel, make sure Endpoint is the only snap setting that is turned on. Close the dialog.

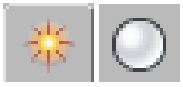


3 Open the Customize menu and choose Units Setup.

The Units Setup dialog is displayed.

4 In the Display Unit Scale group, turn on US Standard, set the units to Feet w/ Fractional Inches, and then click OK.

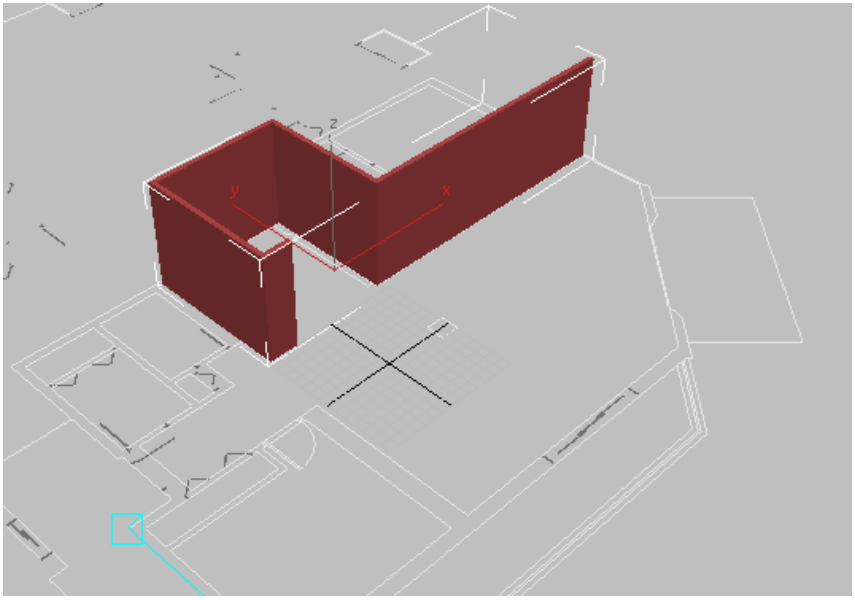


5  On the Create panel, open the geometry list and choose AEC Extended from the drop-down list.

6 Click the Wall button.

7 In the Parameters rollout, set the Width to **5″**, the Height to **9'0″** and the Justification to **Right**.

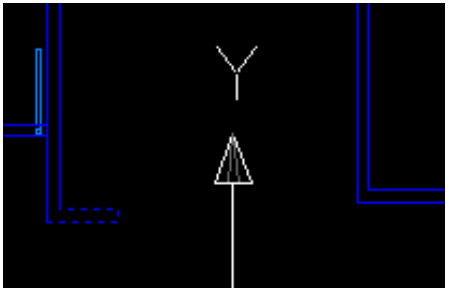
8 Build the wall to enclose the kitchen and then extend to where the fireplace wall meets the exterior wall at the right. Use the illustration as a guide.



9 Minimize 3ds Max Design and restore AutoCAD.

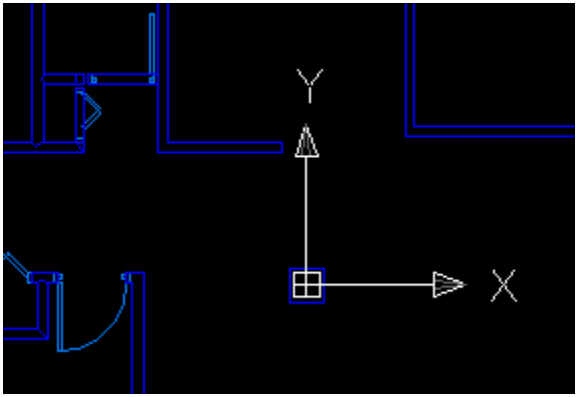
The drawing *mydrawing2link.dwg* should still be open from earlier when you set up the lesson.

10 Using the Stretch command, make a crossing selection at the end of the wall that separates the kitchen from the living/dining room.



Kitchen wall selected in AutoCAD

11 Specify a base point and then enter **@3',0** for the second point of displacement.

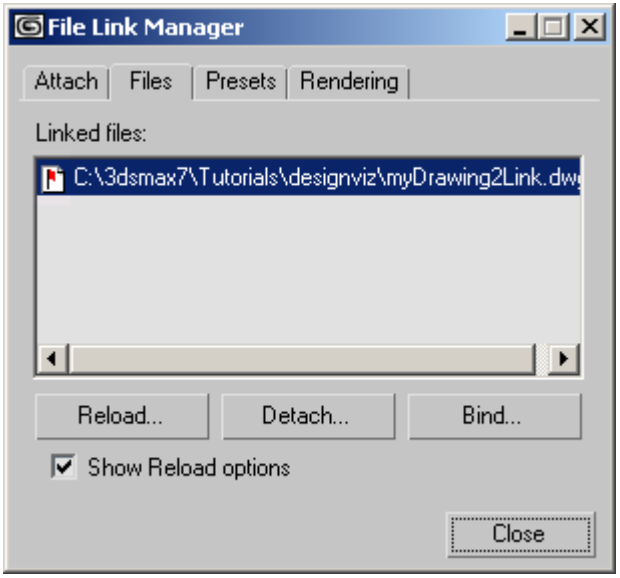


Kitchen wall extended by 3 feet

The kitchen wall is extended to facilitate extra cabinet and counter space.

12  Save the drawing and then minimize the AutoCAD window.

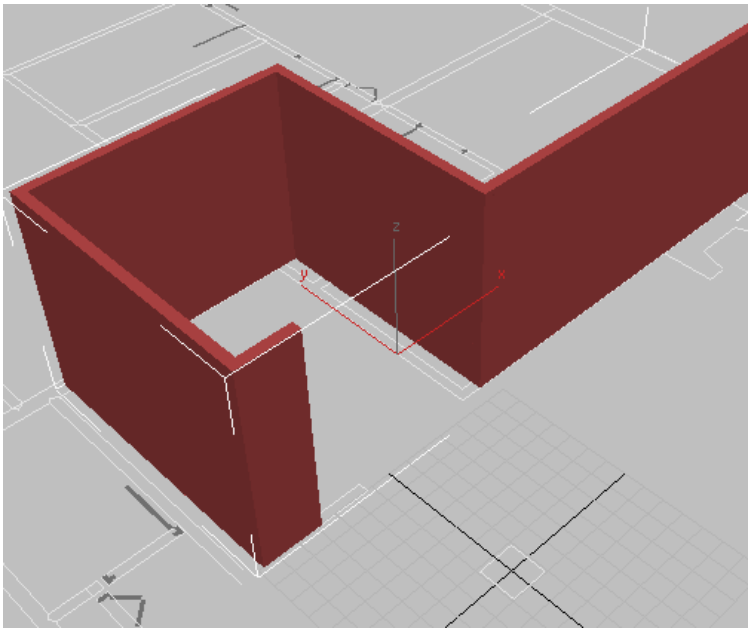
13 Restore the 3ds Max Design window and notice the entry in the File Link Manager.



The red flag in the document symbol next to the linked file indicates a change has occurred in the master drawing.

14 Turn off Show Reload Options and click the Reload button on the File Link Manager dialog.

You'll see the Linking AutoCAD Drawing progress bar, again.



The wall in the drawing is extended but the wall you built is not.

This situation is easy to fix by editing the Wall object at a sub-object level and moving vertices to match the new endpoint.

Next, after resetting the lesson, you'll learn how to manage layers when a drawing is linked.

Reset the lesson:

1 Restore the AutoCAD window and choose File menu > Close.

2 From *import\AutoCAD_files*, open *ww_cad_drawing2link.dwg* again.

3 Choose File menu > Save As and resave the drawing as **mydrawing2link.dwg** again to the *import\AutoCAD_files* folder.

4 Click Yes when asked if you want to save over the existing file.

5 Minimize the AutoCAD window.

Manage layers:

In this section, you'll work on a scene that already has a drawing linked, but you're going to use some of the layer-management features of the File Link Manager.

1 

In 3ds Max Design, from the Application menu, choose Reset to reset the program..

2 
Navigate to *\scenes\interoperability\using_AutoCAD_files\file_link* and open the scene named *ww_cad_file_link.max*.

If you see the Units Mismatch dialog, choose to Adopt The File's Unit Scale.

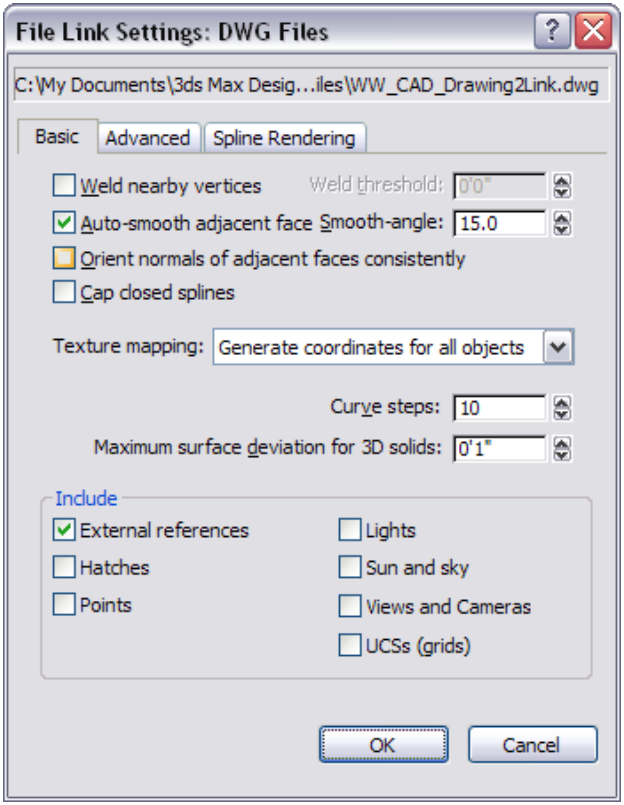
This scene already has a drawing file linked to it, but one of the layers you need was frozen in AutoCAD and by default, frozen layers do not link unless you specify them.

3  Go to the Utilities panel. Click the More button, and open the File Link Manager. On the File Link Manager dialog, click the Files tab if the Files panel is not active.

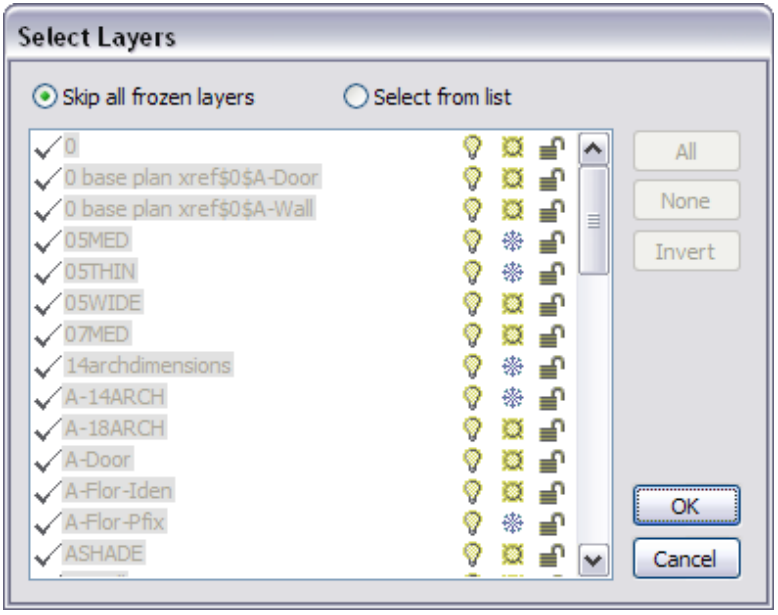
NOTE If you see a question mark (?) displayed next to the linked file's name in the File Link Manager, it means that the linked file is "lost". In this situation, you should click the file name and then click the folder icon to browse for the "lost" file. This can happen, for example, if you move the location of the tutorial project folder.

4 On the Files panel, make sure Show Reload Options is turned on, then click the Reload button.

The File Link Settings dialog appears.

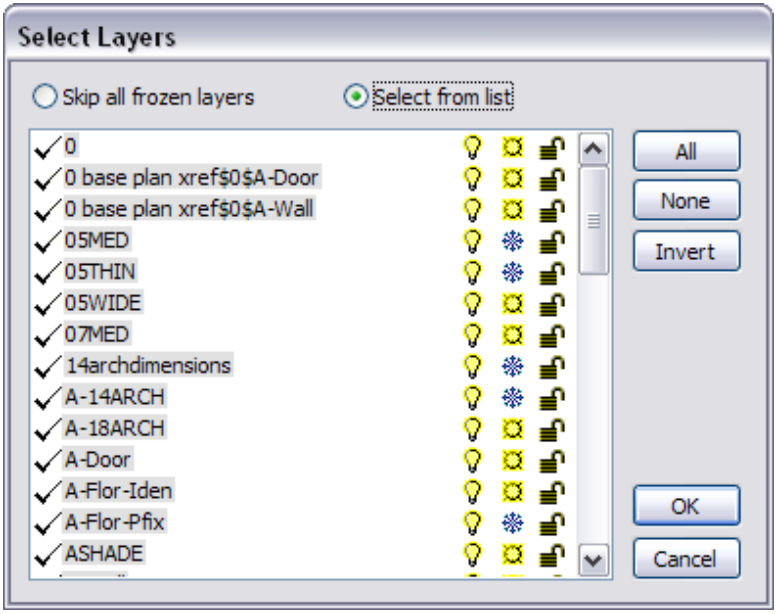


5 Click the Advanced tab and then click the Select Layers To Include button. This opens the Select Layers dialog.



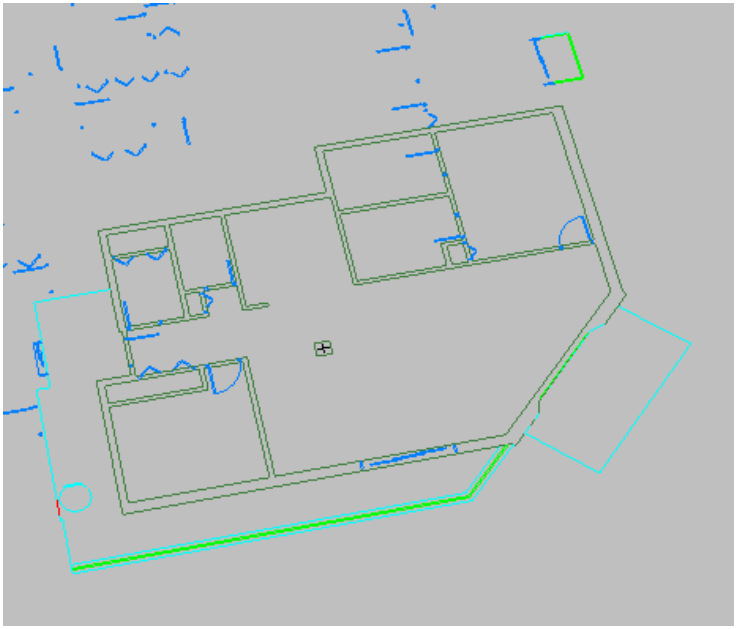
6 Choose the Select From List option and deselect all the layers that are frozen except for *B-Wall*.

The frozen layers show a snowflake symbol in the middle column. A check mark next to a layer means it will be included when you link a DWG file.



7 Click OK after you've deselected the frozen layers and then click OK on the File Link Settings dialog.

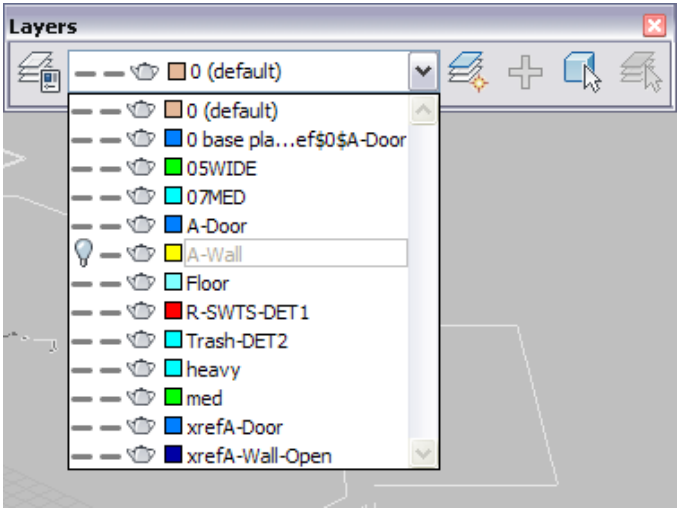
The drawing is reloaded and includes the *Layer:B-Wall* object.



8 Right-click an empty area of the main toolbar, and choose Layers from the pop-up menu.

3ds Max Design opens the Layers toolbar.

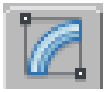
9 On the Layers toolbar, open the Layer list and hide the A-Wall layer.



Now that the new layer has been included, you'll use some of the linked geometry to build your model.

Model with linked geometry:

1. Select the *Layer:B-Wall* object.

2.  Go to the Modify panel and from the Modifier List, choose the Edit Mesh modifier.

   Doing this assigns an Edit Mesh modifier to the linked geometry.

3.  On the Selection rollout, turn on the Polygon sub-object level.

4. Press Ctrl+A to select all the faces.

   Selected faces are displayed in red.

5 In the Edit Geometry rollout, turn on Extrude and set the Amount to **9'0"**, then press Enter.

All the walls and the column are extruded.

NOTE The objects on the B-Wall layer are polylines that enclose each room. If the extrusion were done to the objects on the A-Wall layer, there would have been some flaws in the extrusion due to gaps and incorrectly attached lines in the drawing.

6 Minimize the 3ds Max Design window and restore the AutoCAD window.

7 Choose Format > Layer to open the Layer Properties Manager, then do the following:

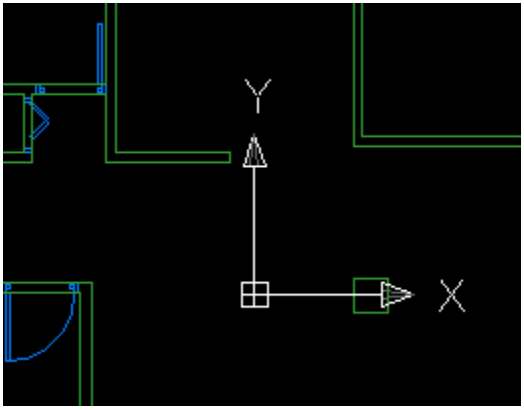
- Freeze the A-Wall layer.
- Thaw the B-Wall layer and make it the current layer.

Click OK to close the Layer Properties Manager.

8 Use the Stretch command to stretch the end of the kitchen wall **3'0"** to the right, as you did earlier in this lesson.

9 Use the Move command and move the column shape **5'1"** to the right.

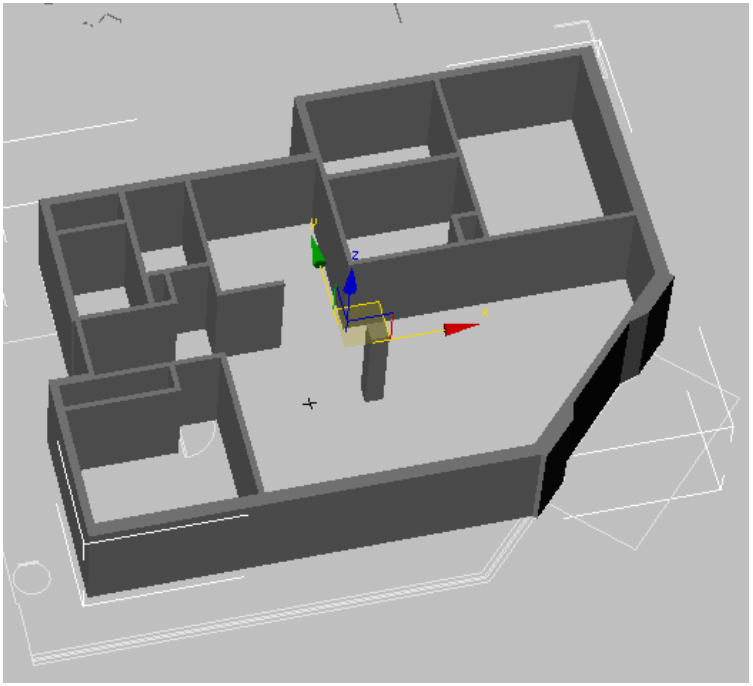
The kitchen wall is extended and the column is lined up with the bedroom wall.



10  Save the drawing, minimize the AutoCAD window, and then restore the 3ds Max Design window.

11 On the File Link Manager dialog, turn off Show Reload Options and then click Reload.

The drawing changes are reflected in the model.



This last set of steps demonstrated how you can use linked geometry as a basis for building a model. Since linked geometry is the basis for this set of walls, they will change as the drawing changes; however, they are only simple extrusions. If, for instance, you wanted to add a door, these walls will not automatically create an opening when the door is placed. You will have to perform a Boolean operation to manually create the opening in the wall where the door is placed.

Summary

In this tutorial, you learned about using the File Link Manager, and about the way a linked file will update in a 3ds Max Design scene.