

Other 3D Mesh Editing Techniques

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Introduction

In these two tutorials, we look at how to edit the edges and vertices of 3D mesh models, and what happens when you add a fillet.

Tutorial 1: Selecting Edges and Vertices

1. Continue in AutoCAD 2010 with the "Mesh-2.dwg" drawing file you created in the previous tutorial.
2. Until now, you have been selecting the faces of the mesh model. But you can also select edges and vertices:
 - *Edges* are the lines between faces.
 - *Vertices* are at the intersections of edges.

To switch between faces, edges, and vertices, you use the **Subobject** panel of the Mesh Modeling tab:

- a. Click **No Filter**.
- b. From the droplist, choose **Edge**.

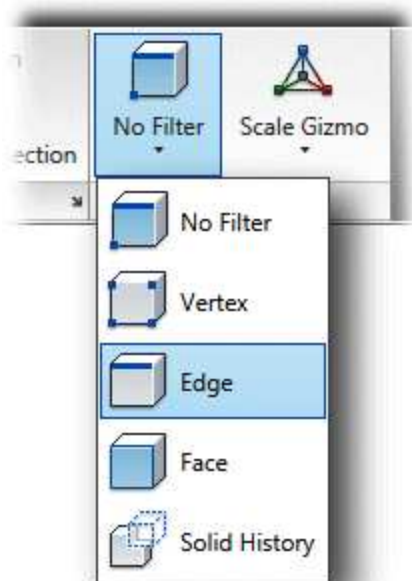


Figure 1: Changing to Edge selection mode.

AutoCAD is now in edge selection mode. When you hold down the Ctrl key, you will be able to select only edges of 3D mesh models.

3. Hold down the **Ctrl** key, and then move the cursor over the edge of the side of the model. Notice the small blue icon that floats near the cursor: it reminds you that you are in edge selection mode.

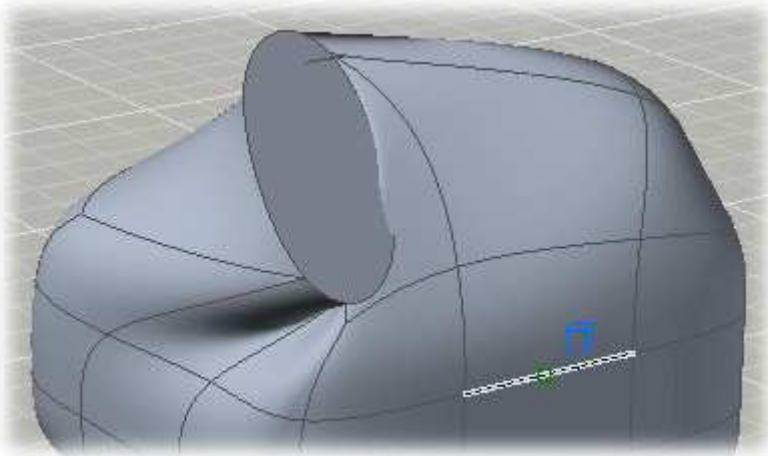


Figure 2: Selecting an edge.

4. Click. Just one of the face's four edges is selected. You can select additional edges, if you wish. You can drag the edge around. Press **Esc** to end the editing.

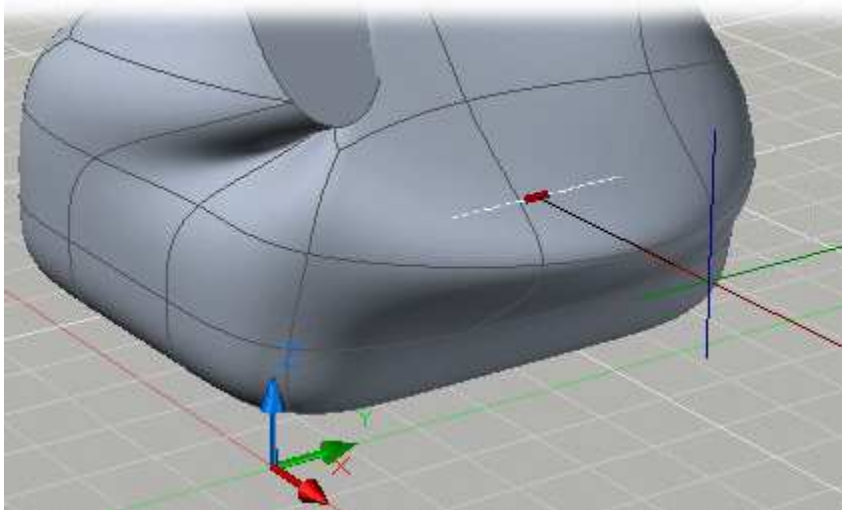


Figure 3: Dragging the edge.

5. Change from Edge to **Vertex** selection mode. (Choose the option from the Suboption panel on the ribbon.) Hold down **Ctrl**, and then choose a vertex (at the intersection of edge lines).

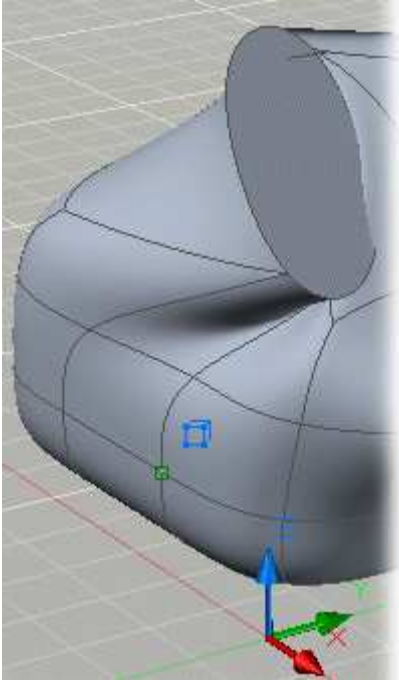


Figure 4: Selecting a vertex.

6. Click, and then drag the red dot to create a dimple on the model. By now you have a 3D shape you would never be able to create through solid modeling!

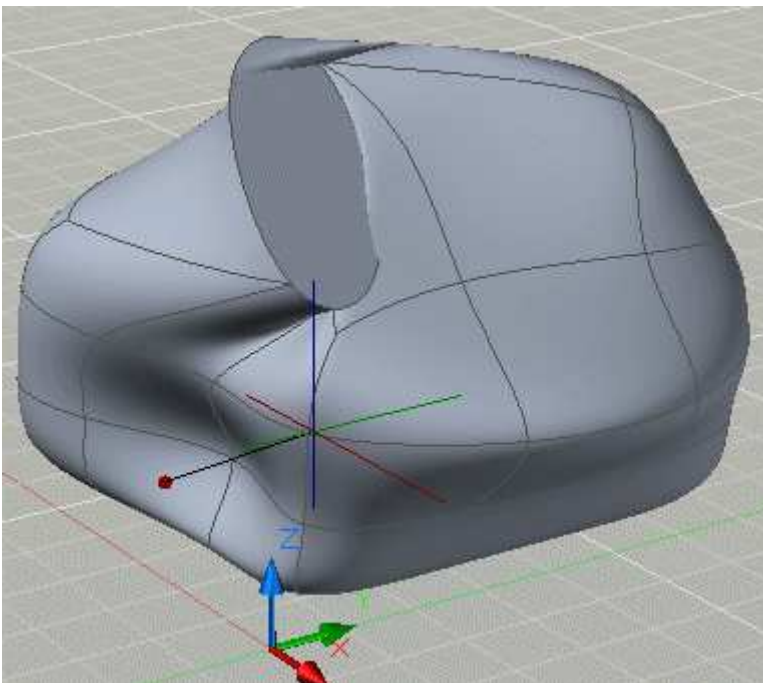


Figure 5: Dragging the vertex.

7. This concludes this part of the tutorial. There is no need to save the drawing.

Tutorial 2: Adding Fillets

In this tutorial, you add a fillet to an edge of a 3D mesh box using the **Fillet** command.

1. Start a new drawing in AutoCAD 2010 with the *acad3d.dwt* template drawing.
2. As in the earlier tutorial, draw a 3D box as a mesh model. (Use the **Mesh Box** button on the Mesh Modeling tab.)
3. Start the **Fillet** command, and then select the box. Notice the dialog box:

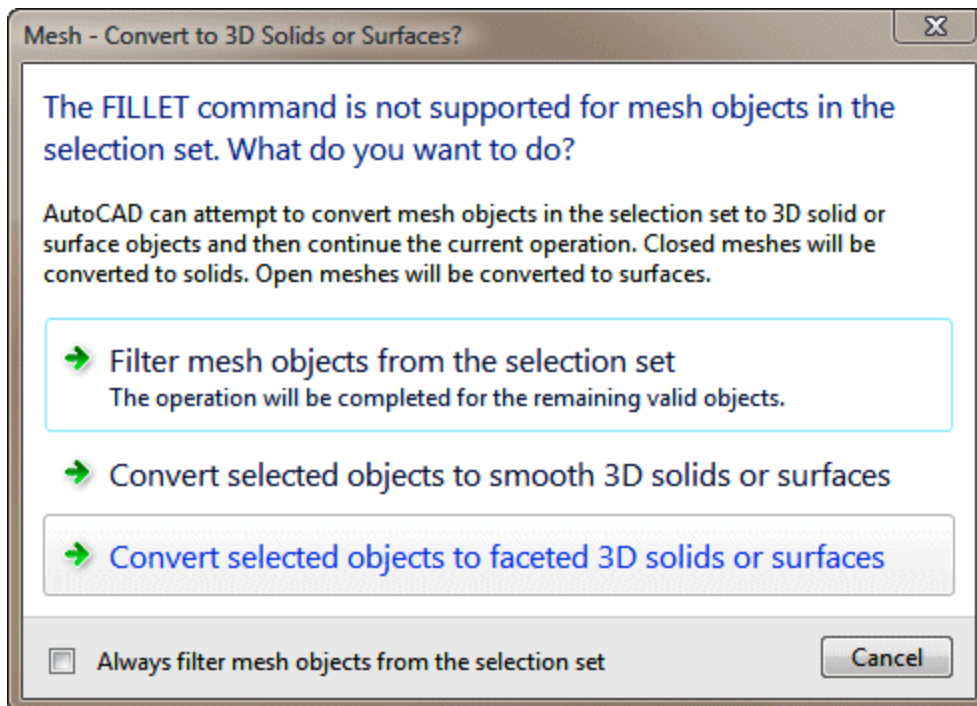


Figure 6: Warning dialog box.

Here's the problem: AutoCAD cannot fillet a 3D mesh model directly. Instead, it can convert the mesh model to a solid model, and then apply the fillet. (After that, you convert the solid back to a mesh.)

Choose the last option: **Convert Selected Objects to Faceted 3D Solids or Surfaces**. Notice that the face lines disappear after the model is converted to a solid.

TIP Closed mesh models are converted to 3D solids; open mesh models are converted to surfaces. Closed models are also known as "watertight" models.

(If converted to smooth 3D solids, (the object will behave peculiarly when converted back to the mesh model.)

4. Notice also that the Fillet command continues, uninterrupted by the mesh-solid conversion process.

```
Select an edge or [Chain/Radius]: (Pick an edge.)  
Enter fillet radius <0.0000>: (Enter a radius, such as 5)  
Select an edge or [Chain/Radius]: (Press Enter.)  
1 edge(s) selected for fillet.
```

The fillet is added. Now you need to turn the solid back into a 3D mesh model.

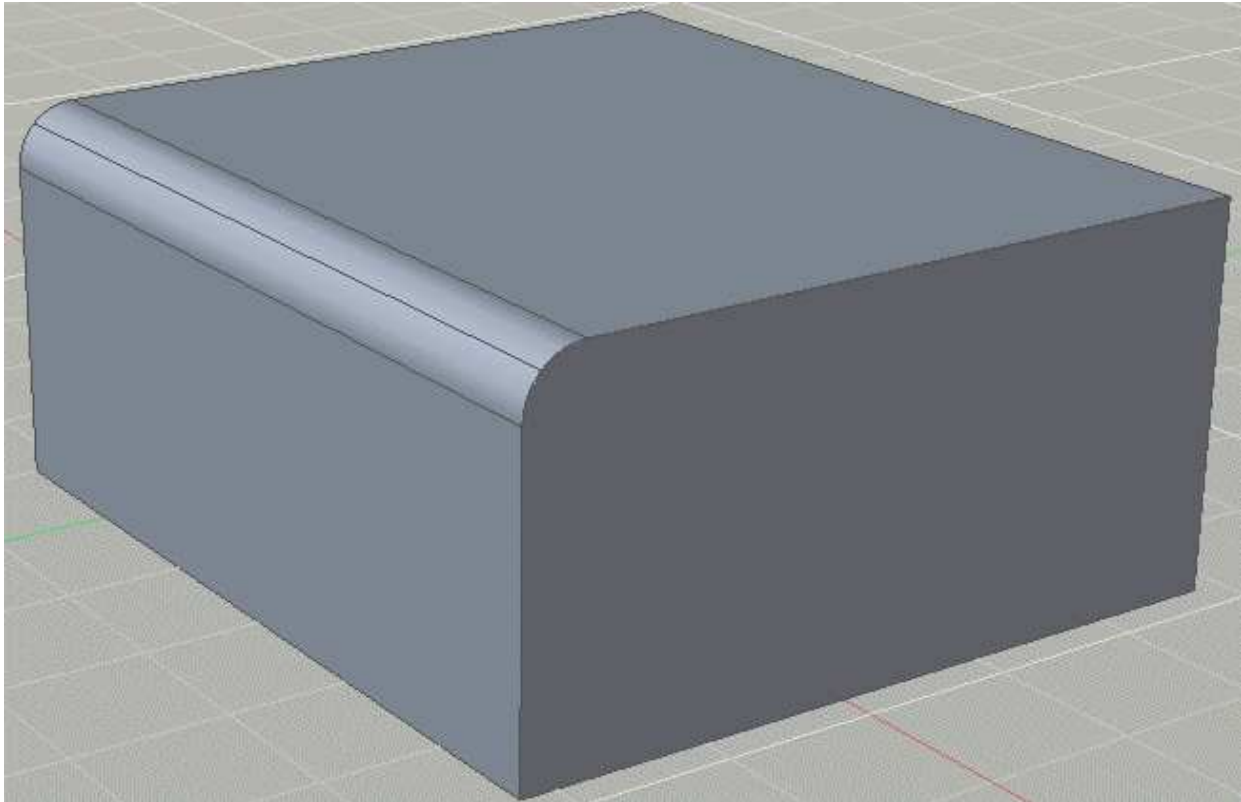


Figure 7: Filleted 3D solid model.

5. To convert solid models into 3D mesh models, click the **Smooth Object** button in the ribbon's Mesh panel. It activates the **MeshSmooth** command.

6. Select the solid model, and then press **Enter**.

```
Command: _.MESHSMOOTH  
Select objects to convert: (Pick 3D solid model.)  
Select objects to convert: (Press Enter.)
```

7. Another warning dialog box appears. Click **Create Mesh**.

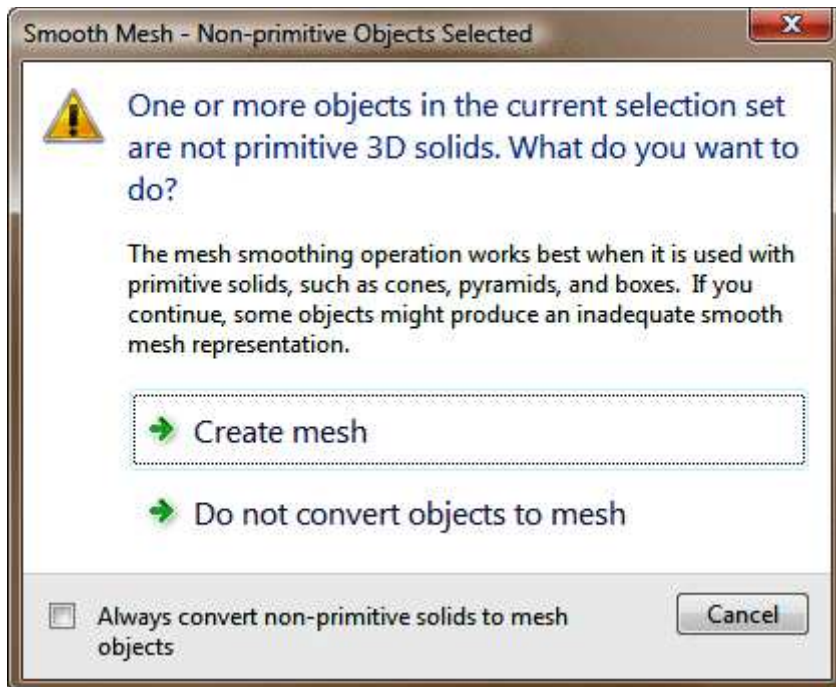


Figure 8: Complex model warning.

8. Yikes, what kind of mess is that?

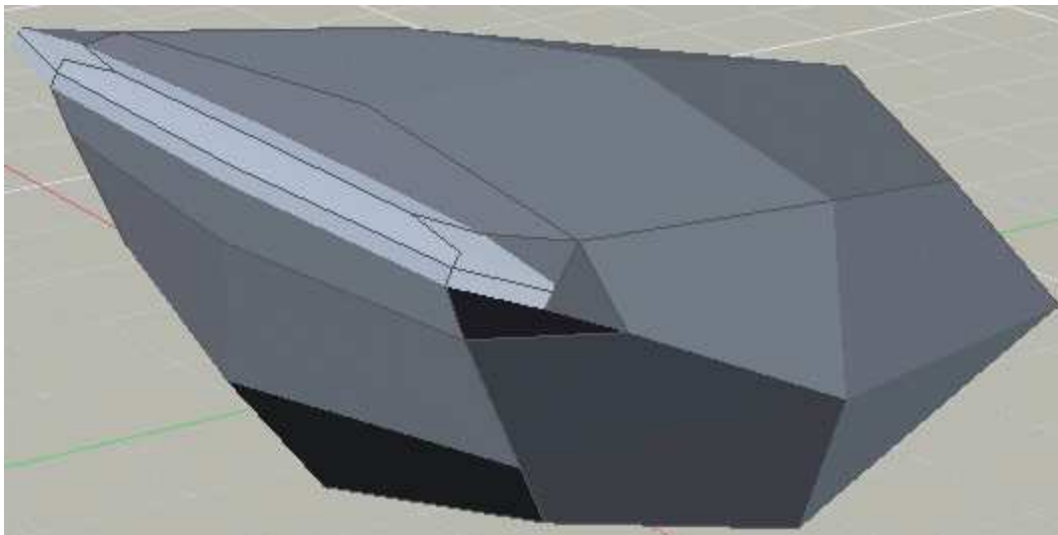


Figure 9: Distorted 3D mesh model.

No worries. Apply the **Smooth Less** button to return the correct look to the 3D mesh model.

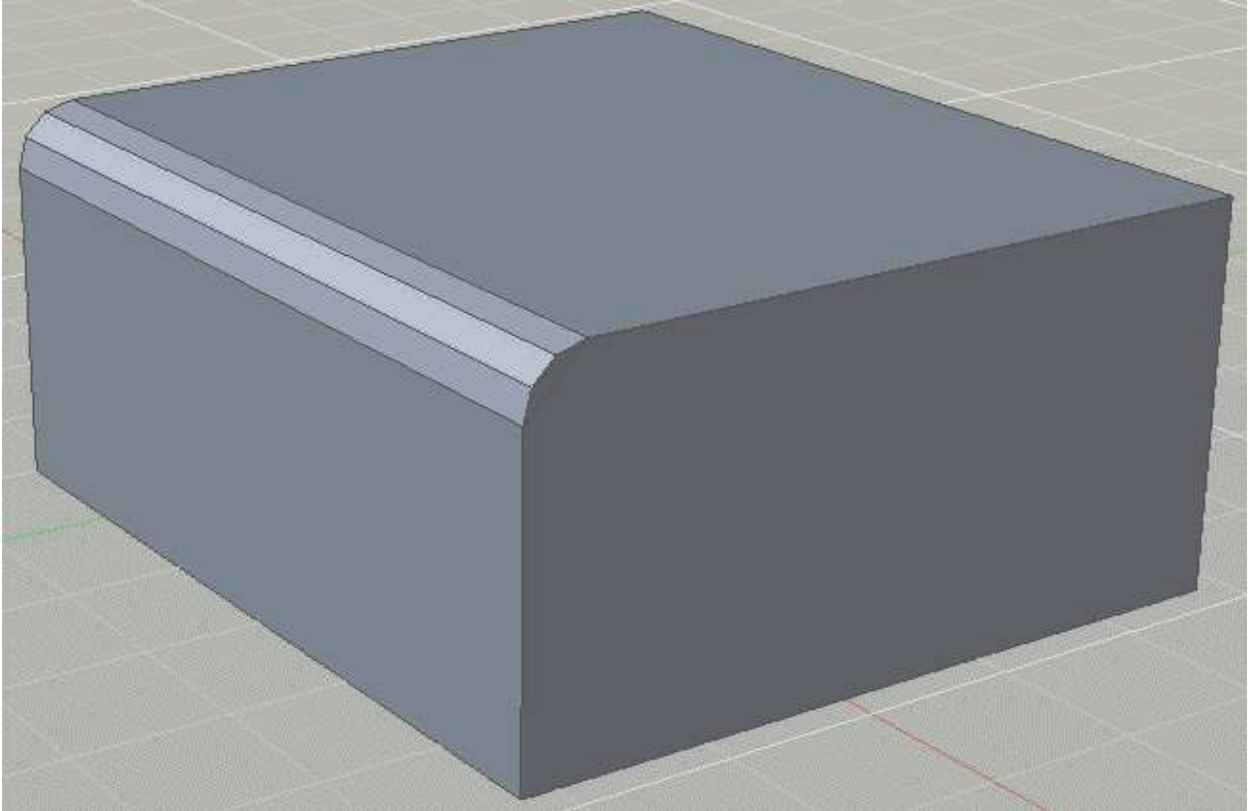


Figure 10: Fixed 3D mesh model.

9. This tutorial shows that it is possible to apply fillets and chamfers to 3D mesh models, but the process is somewhat convoluted, and fraught with potential problems. This ends the tutorial. There is no need to save the drawing.

Test Yourself

1. How would you add a dimple to a 3D mesh model?
 - a. Use the Dimple command.
 - b. Drag a vertex into the model.
 - c. Use the Dimple option of the SmoothMore command.
 - d. Drag a face away from the model.
2. How are solid models converted to mesh models?
 - a. With the ConvertSolid command.
 - b. With the SolidEdit command.
 - c. With the MeshSmooth command.
 - d. With the Convert command.
3. To select an edge, you hold down the **Shift** key while in Edge Selection mode. True/False.
4. To select a vertex, you hold down the **Ctrl** key while in Vertex Selection mode. True/False

5. What must happen to 3D mesh models before fillets can be added to them?
- a. They must be converted to solid models.
 - b. They must be converted to surface models.
 - c. They must be converted to wireframe models.
 - d. Nothing; they cannot be filleted.

Answers:

- 1. *b. Drag a vertex into the model.*
- 2. *c. With the MeshSmooth command.*
- 3. *False*
- 4. *True*
- 5. *a. They must be converted to solid models.*