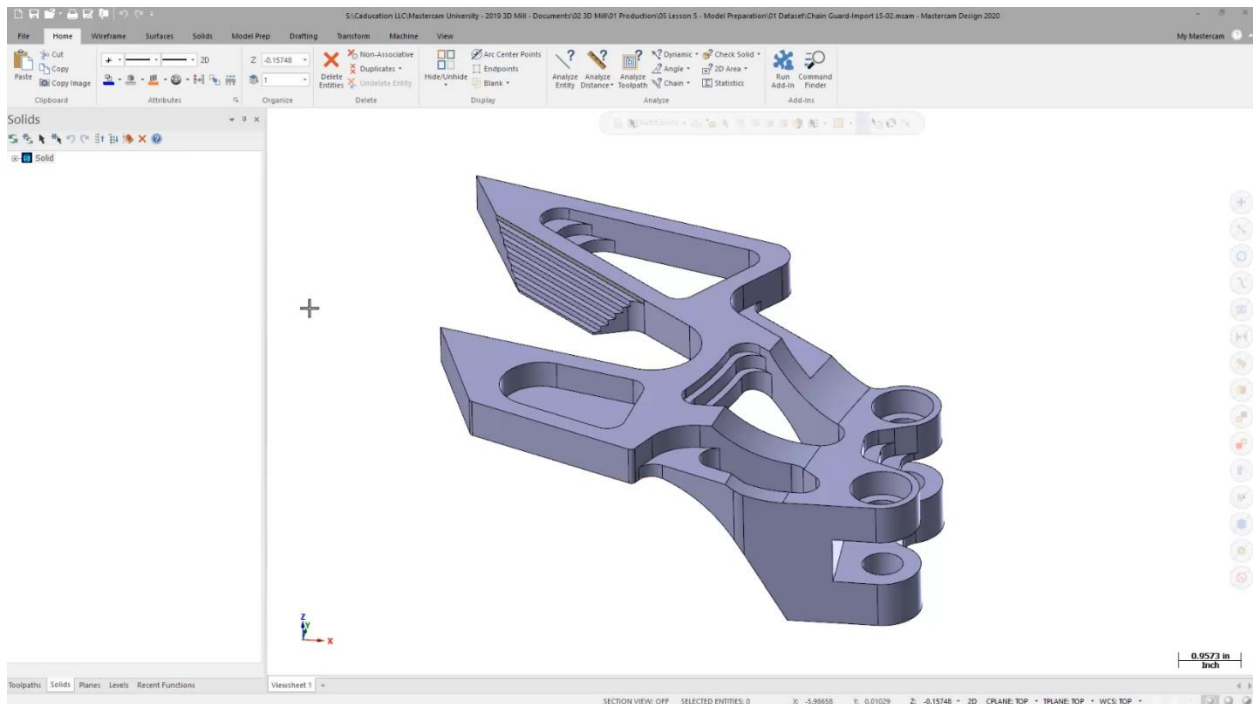# Mastercam®

L5-03 - Use Solids and Model Prep Features

This module will cover some preparation tools such as the use of surfaces on the model to restrict the rough machining tool from entering open pockets. Additionally, it will cover different methods to alter a model's geometry.
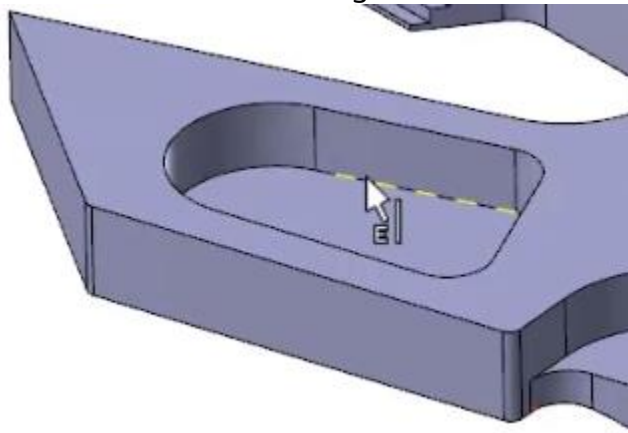
1. Continue with the file from the previous module.

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2. In order to add fillets, go to the **Solids** tab and select **Constant Fillet**. Change the selection type so that only **Edge** is selected.


3. Select the edge shown below. and click the green **OK** button.

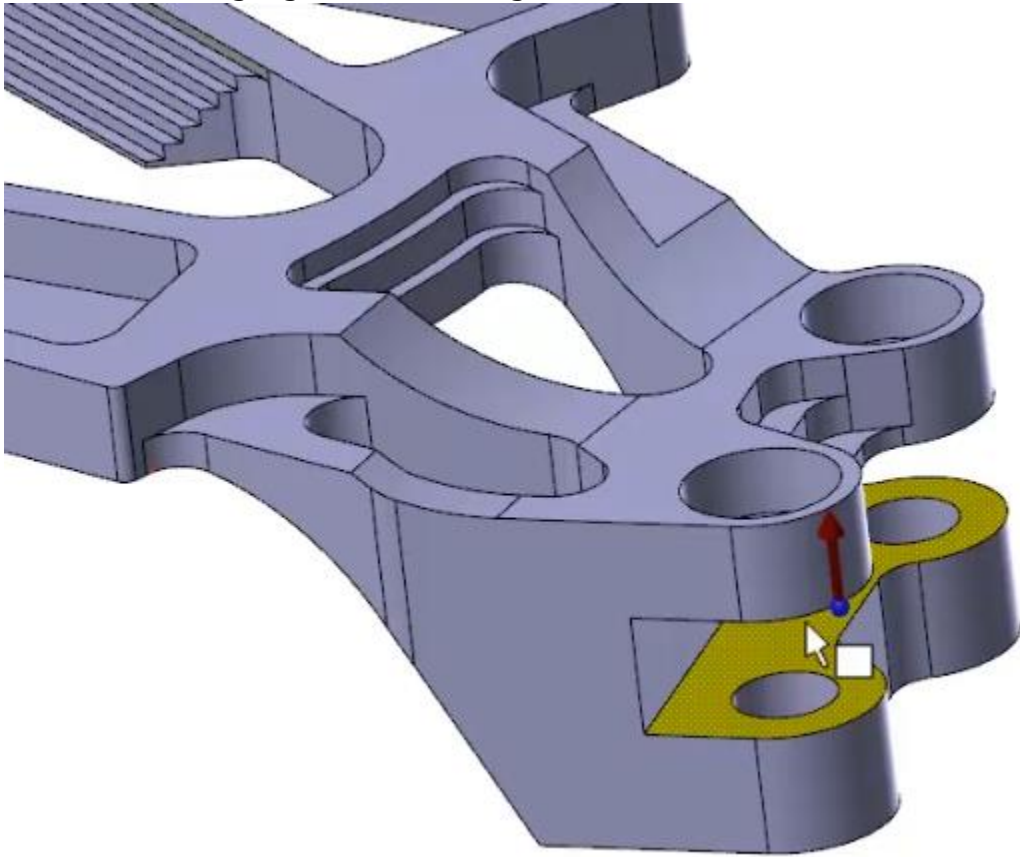SHAPING THE FUTURE OF MANUFACTURING™   **Mastercam**®

4. In the Constant Radius Fillet Manger, selecting **Propagate along tangencies** makes the fillet extend along all the tangent edges around the selected edge. On this model, fillets are not desired. Click the red **Cancel** button to cancel the process of adding fillets.
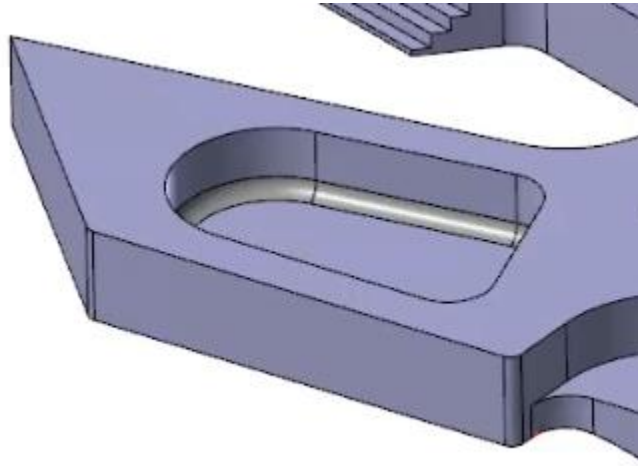

5. One desired change for this model, is to remove the horizontally cutout portion on the right side of the model. This can be done using the extrude feature that was mentioned in the last module. For this module, go to the ribbon's **Model Prep** tab and select the **Push-Pull** tool.


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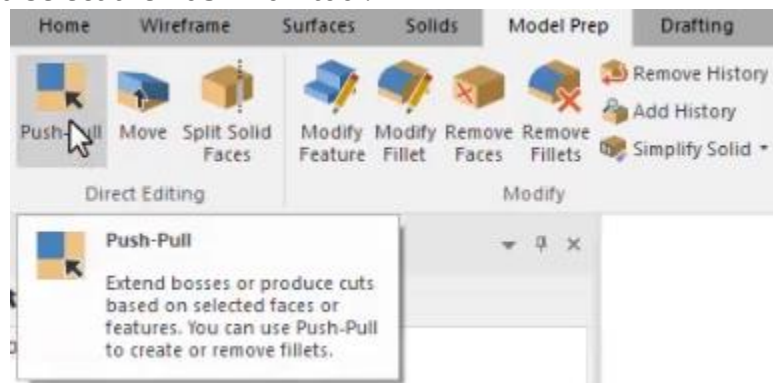
6. Select the face highlighted in the image below.


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7. Click the red arrow and drag to move the face up or down. Placing the mouse over the ruler snaps the face to specific increments. Additionally, a specific value can be typed on the keyboard to determine how far the face is pushed or pulled. Extend the face by 0.75, so the gap is removed. Then press the green **OK** button.
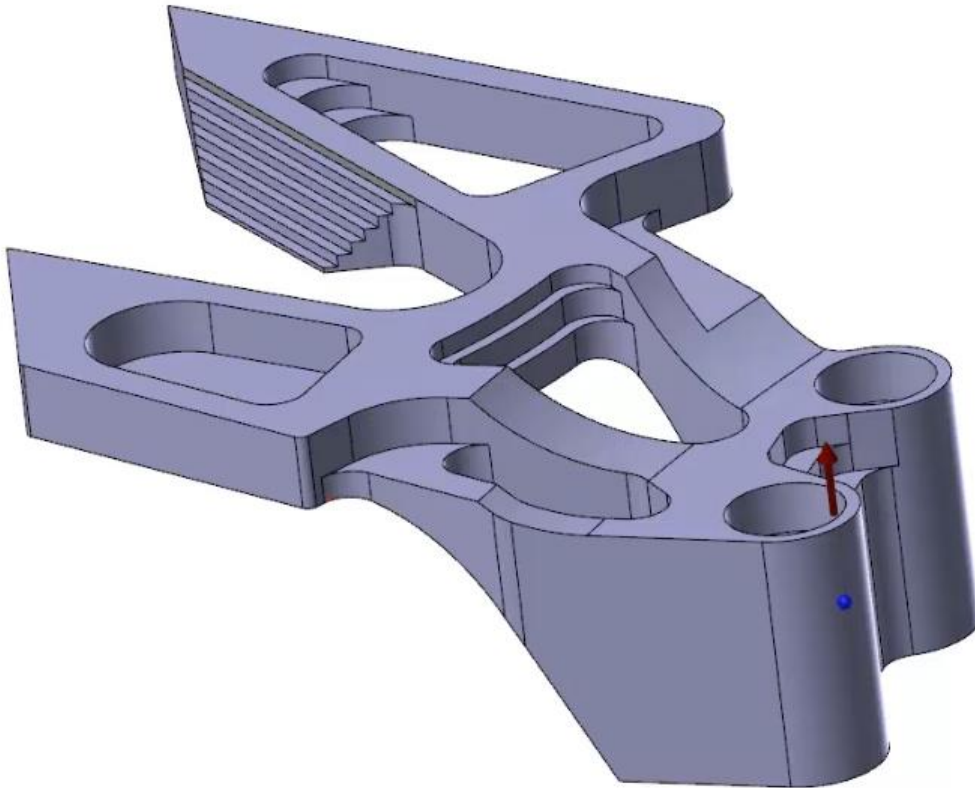

8. Next, this step covers the process to add surfaces to a level. To begin, open the Levels Manager. Rename level 1 to "Chain Guard" without quotes and rename level 20 to "Surfaces" again without quotes. Once this is done, set level 20 as the active level and make it visible. Hide level 1.


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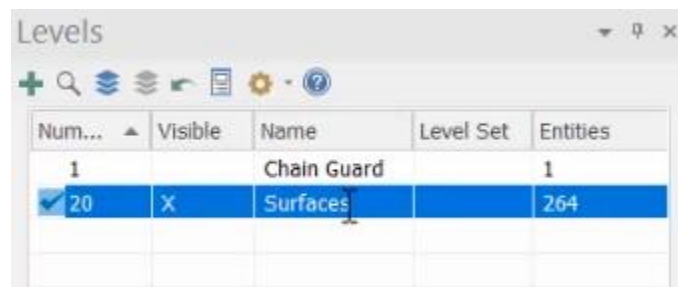
9. Currently only one entity is shown in the workspace. Select the line and press the [**Delete**] key on the keyboard.
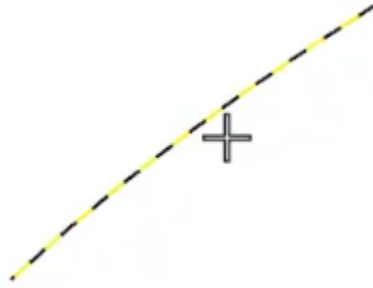
10. Notice that while nothing appears on screen, the Levels Manager still shows that 263 entities exist on level 20. Go to the **Home** tab and click **Blank**. Select **Unblank** in the dropdown menu.

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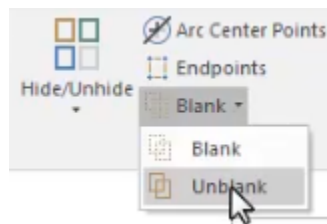
11. All the blanked objects in the file should appear in the workspace. Box select everything and press **End Selection**.

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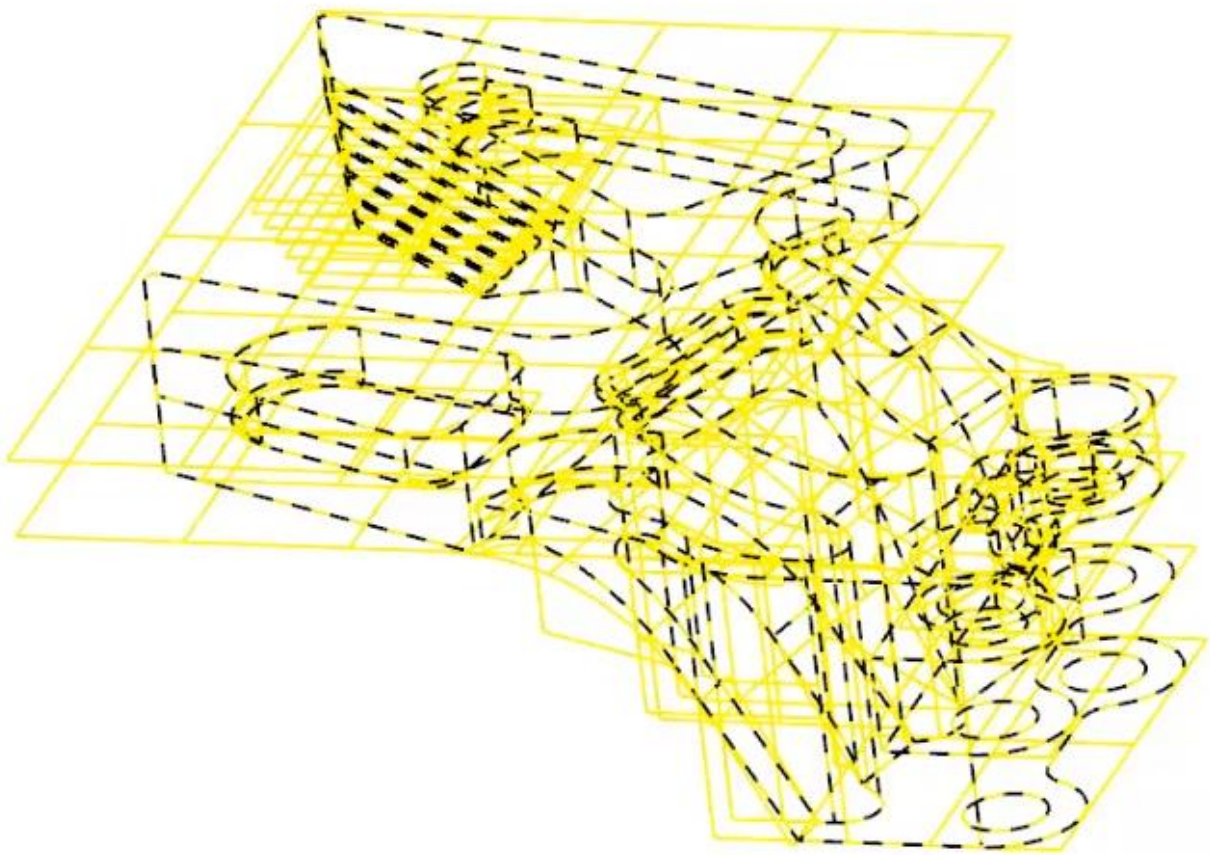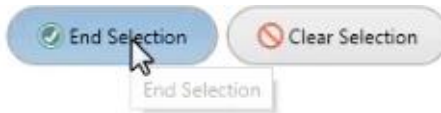
12. All the blanked geometry should now be visible as shown in the image below. Box select everything on the workspace and delete it.
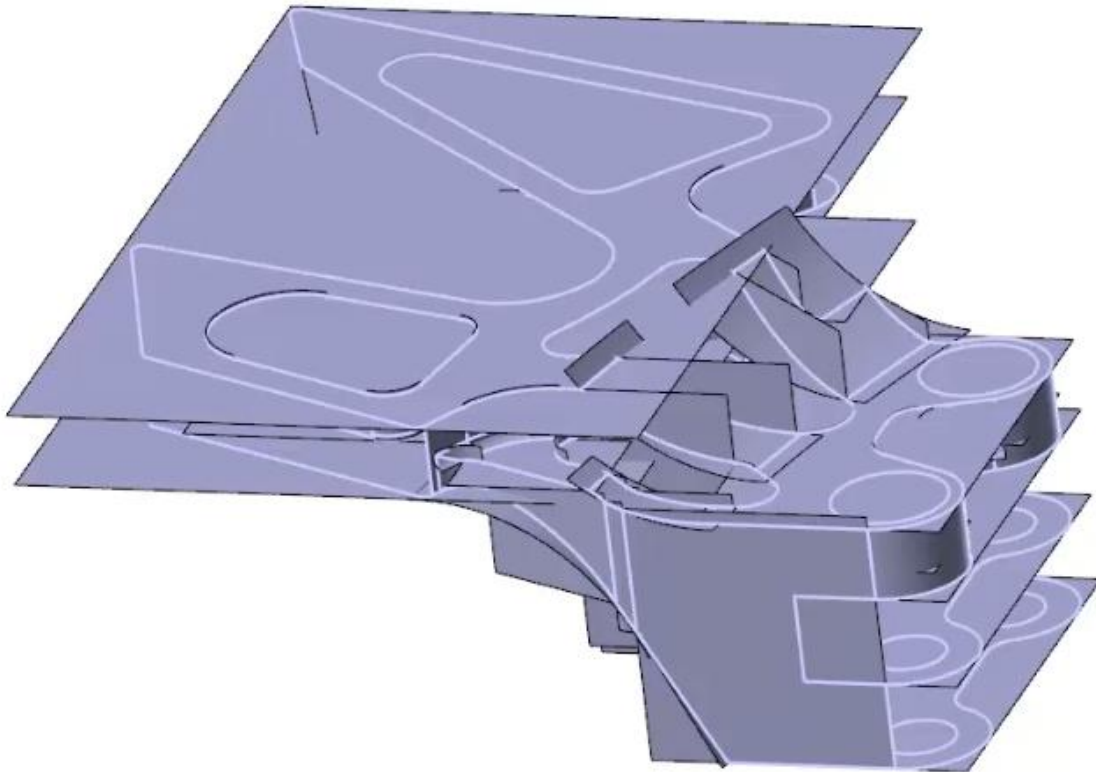

13. In the Planes Manager, make level 1 visible. Leave level 20 as the active level. The solid should be visible in the workspace.
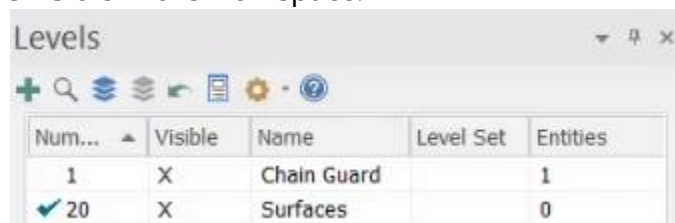

14. To prepare this model for machining, the holes should be blocked so the roughing tool does not dip into them. To begin, go to the ribbon's **Surfaces** tab and select the **Fill Holes** tool.
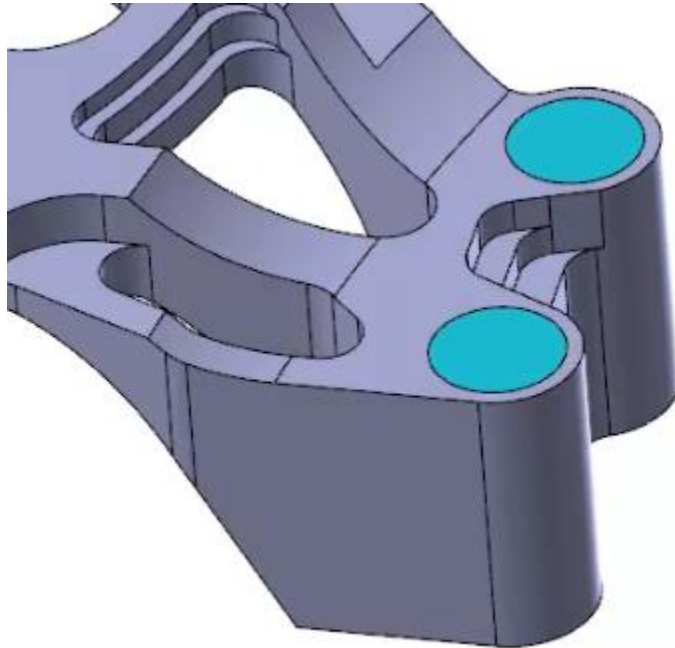

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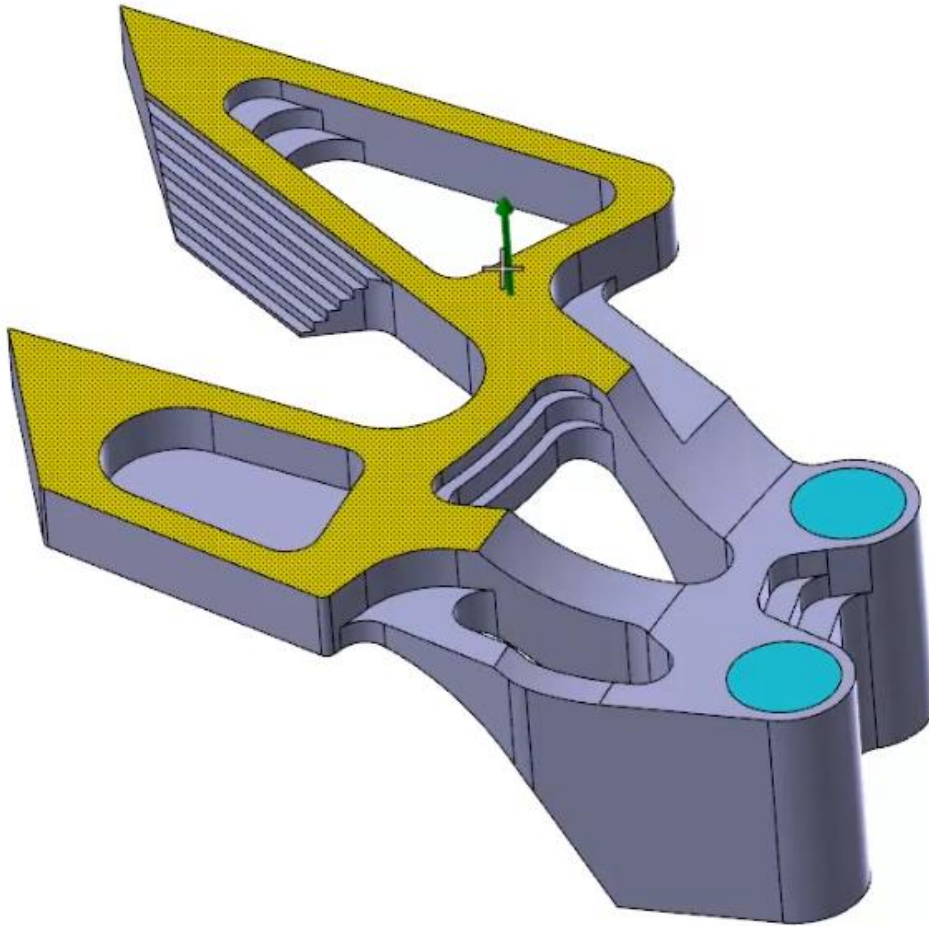**15.** Left click the surface of the model as shown below.

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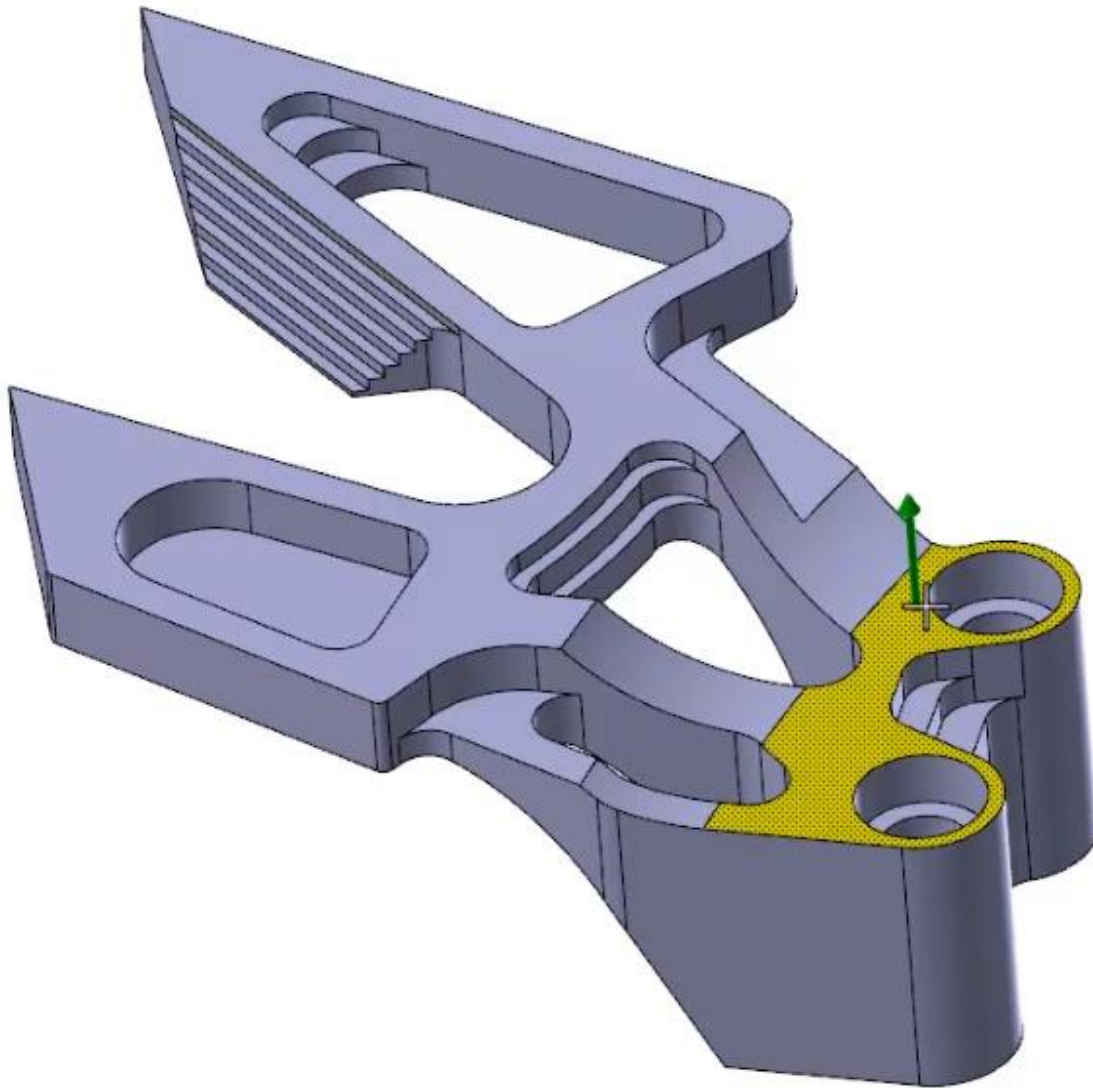
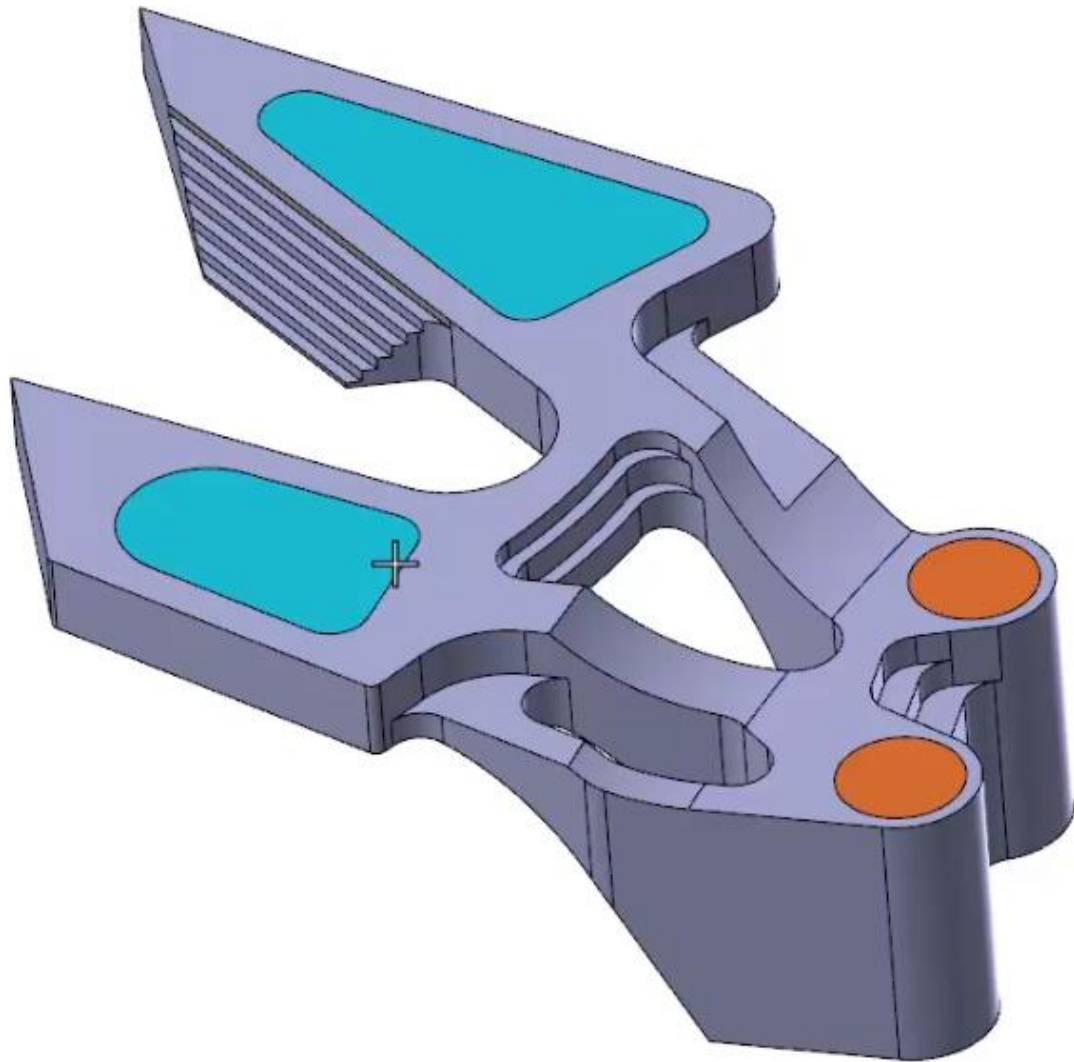**16.** Left click over one of the holes surrounded by the selected surface to create a surface covering it.
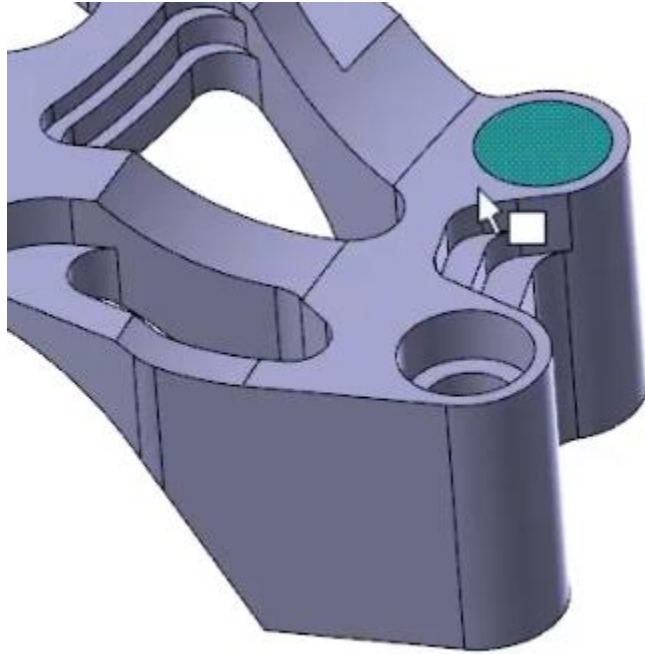
**17.** Repeat steps 15 and 16 to cover the other hole.

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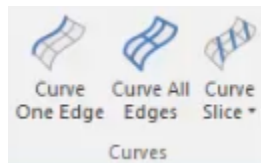**18.** Select the face shown in the image below.

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19. Using the same process as before, create surfaces covering the holes on the left side enclosed by the highlighted surface. Click the green **OK** button in the Fill Holes Manager.


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20. While the fill holes tool is useful for covering holes surrounded by a single surface, the center hole of the model requires some additional steps to cover. Open the **Home** tab, make sure the construction mode is set to **2D**. Now click **Set Z Depth** and enter "z" to select the z coordinate of a point. Click on the point shown in the image below.
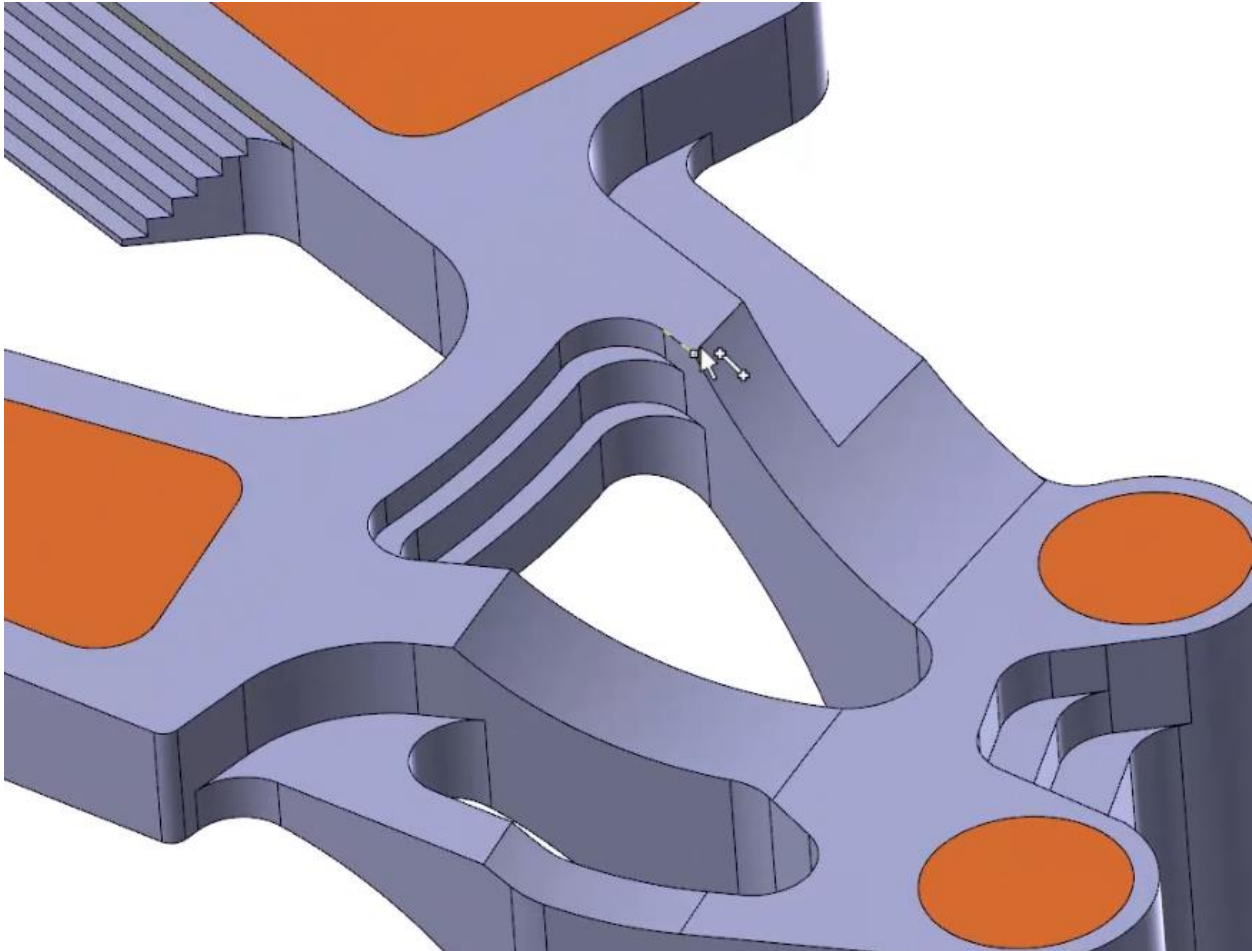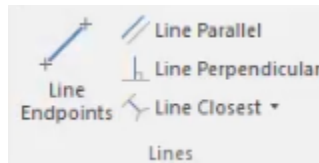

21. Open the **Wireframe** tab and select **Curve One Edge**.
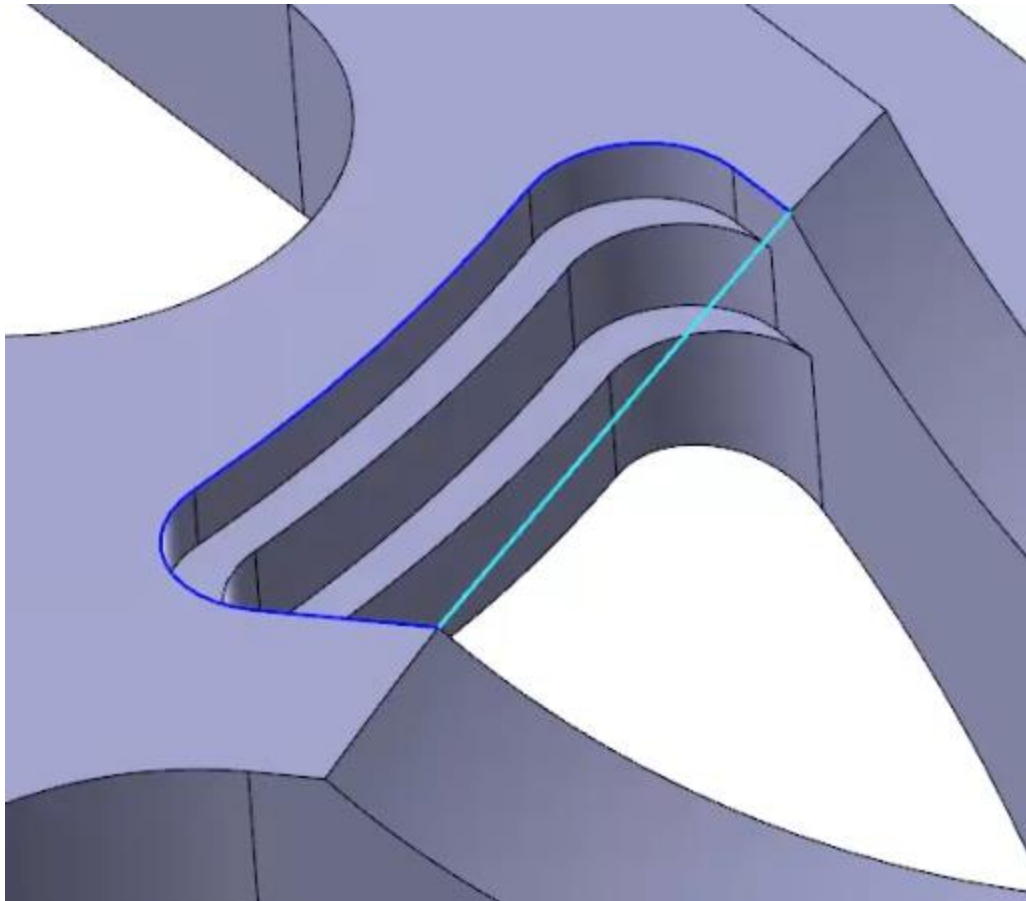
22. Select each of the edges highlighted in blue below. Then click the green **OK** button.
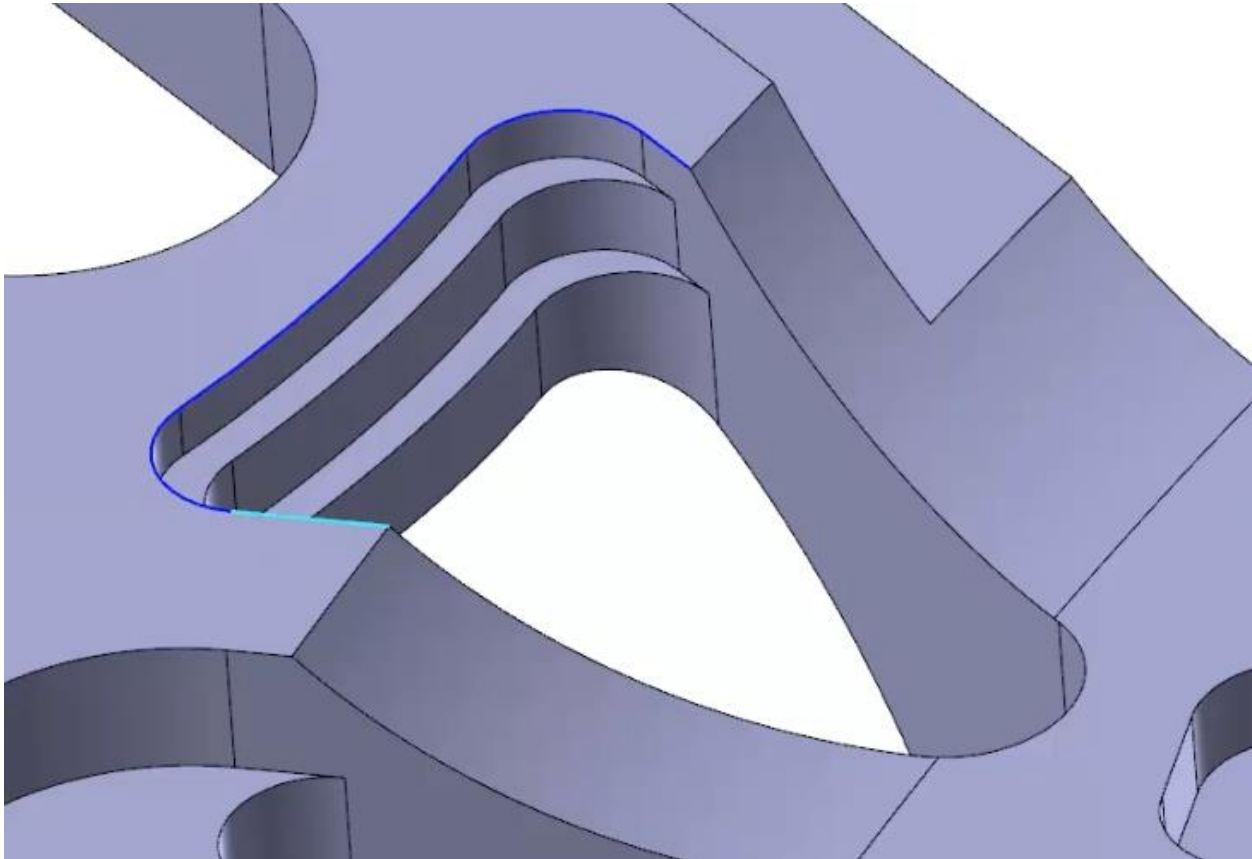
23. Click the **Line Endpoints** button in the **Wireframe** tab.

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24. Click the opposite corners to create a line as shown in the image below. Then, click **OK**.

25. Go to the **Surfaces** tab and click **Flat Boundary**.

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26. Click one of the chain entities created in the previous steps and click **OK** to create a surface enclosed by the wireframe. Click **OK** again to close the Flat Boundary Surface Manager.

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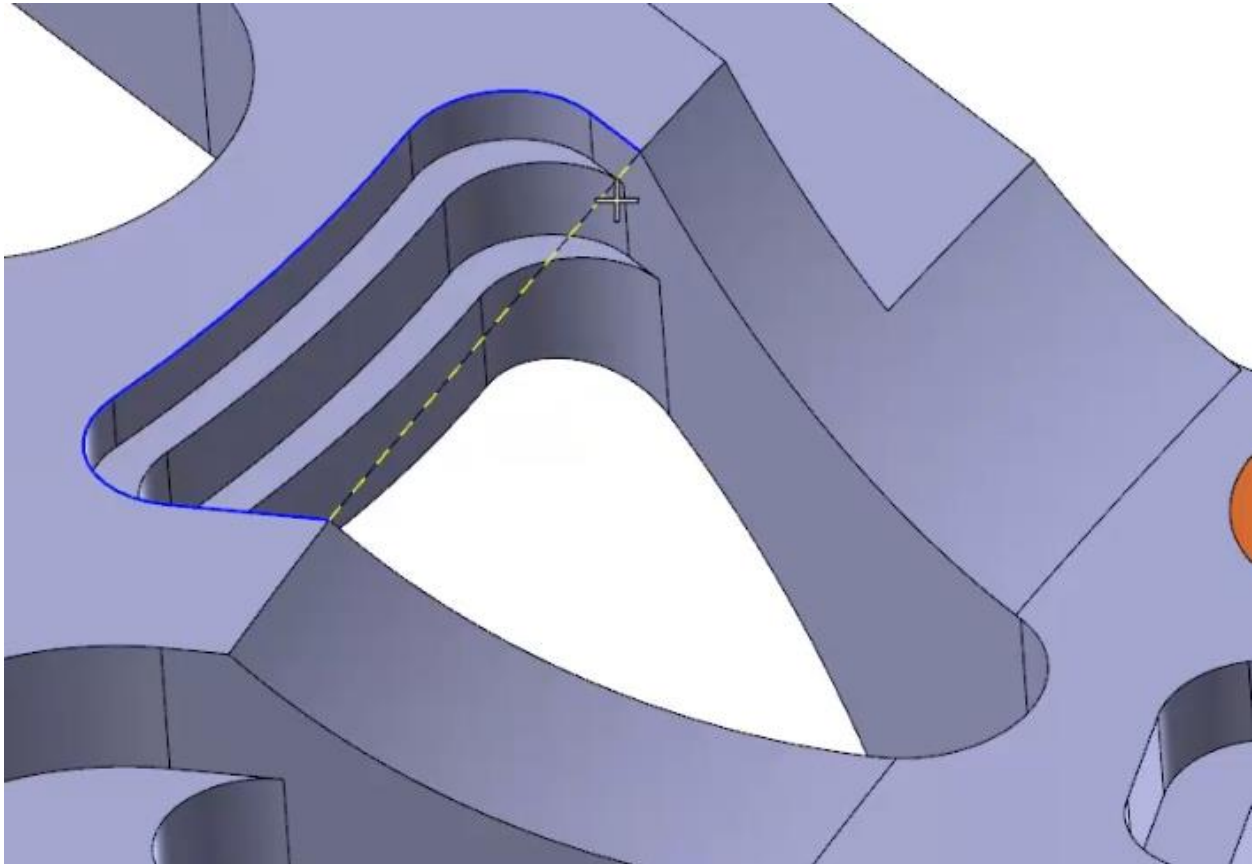
27. Set the Z height to the point under the cursor in the image below.

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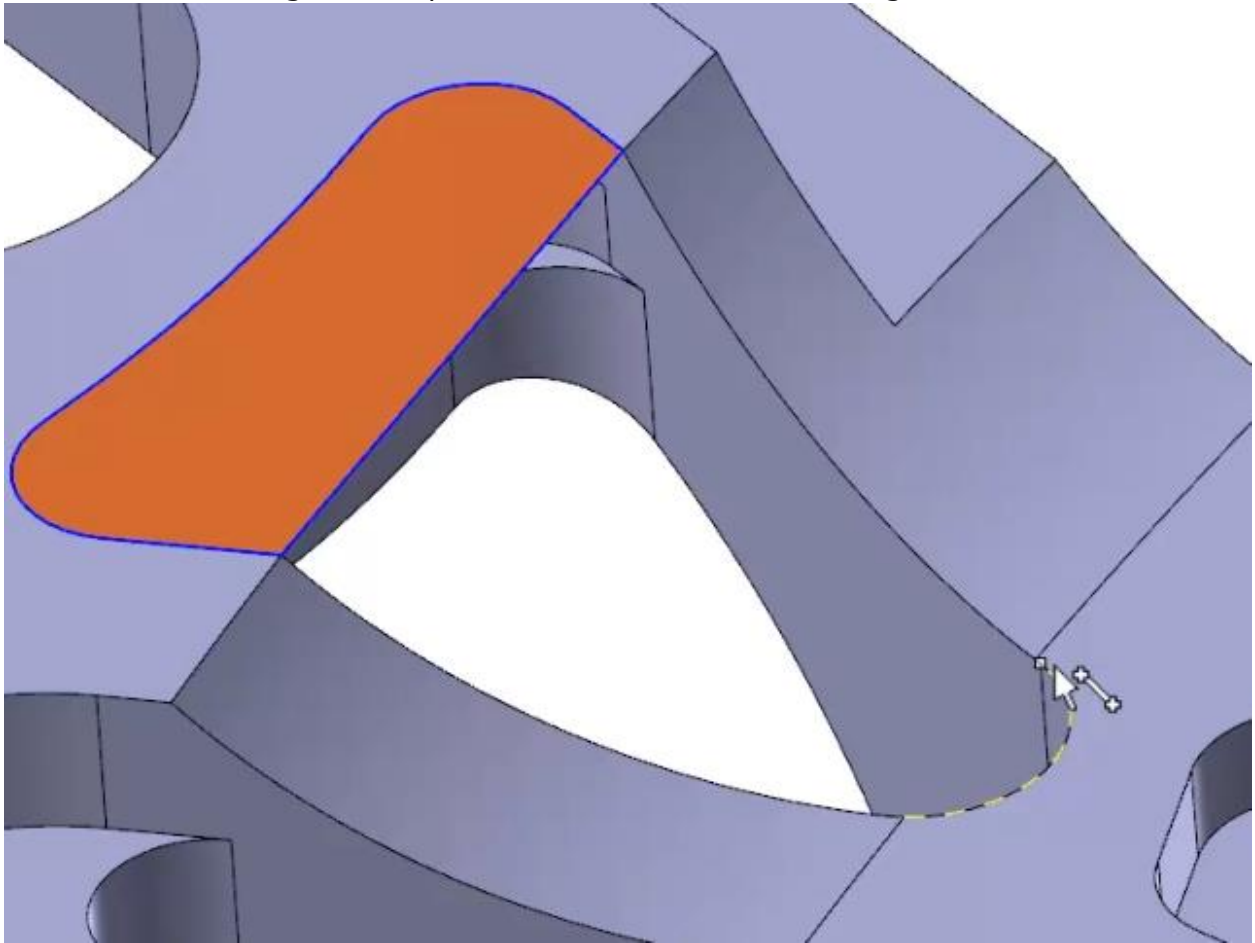
28. Select the **Curve One Edge** tool again and select the edges around the bottom part of the hole. Note that there is a small portion of the edge that is easy to miss. A total of two edge segments should be selected.

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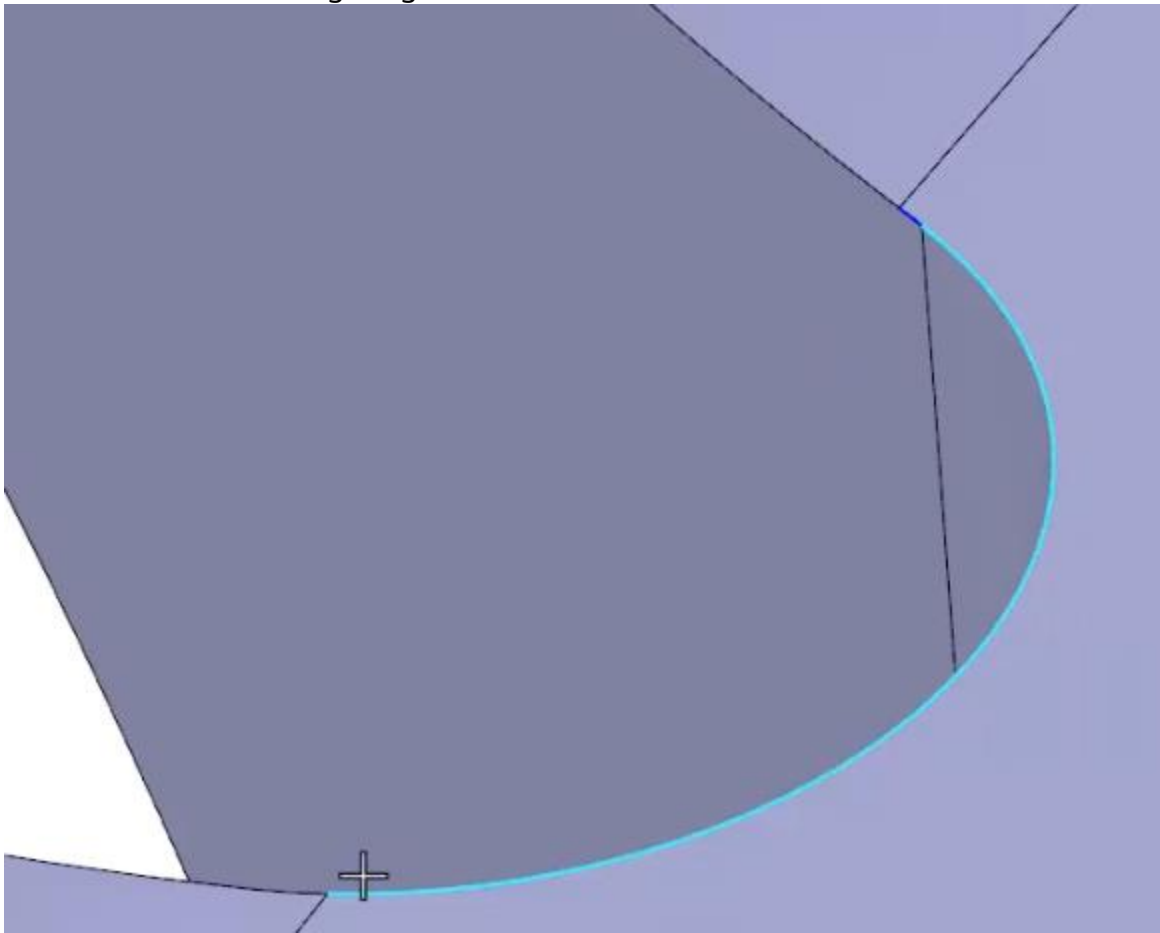
29. Use the **Line Endpoints** tool to close the shape as shown below. Then click the green **OK** button.
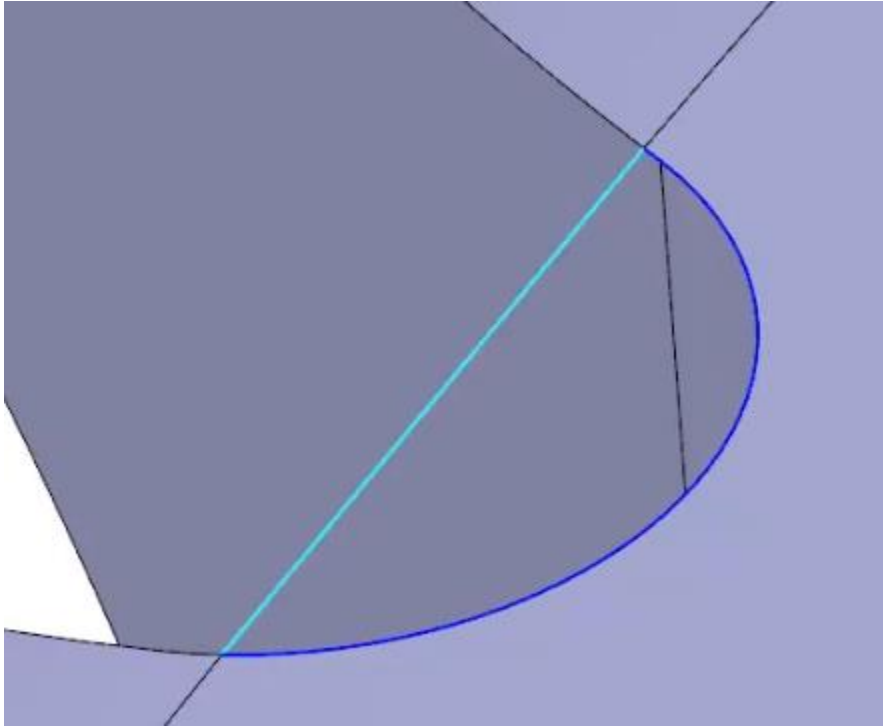

30. Use the **Flat Boundary** tool in the **Surfaces** tab as before to create a surface enclosed in the wireframe. Click **OK** to close the tool.

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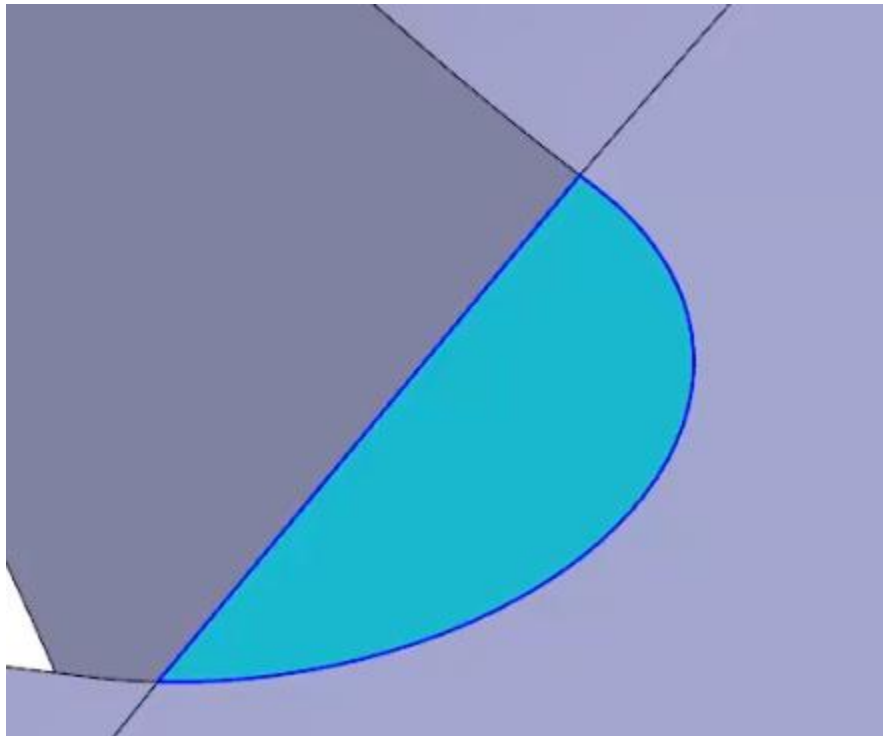
31. The center part of the hole still needs to be covered. Go to the **Surfaces** tab and select the **From Solid** tool.


32. Left click the two surfaces of the solid shown in the image below. Then click **End Selection**. This creates a separate surface entity on both surfaces of the solid entity. Then click **OK**.

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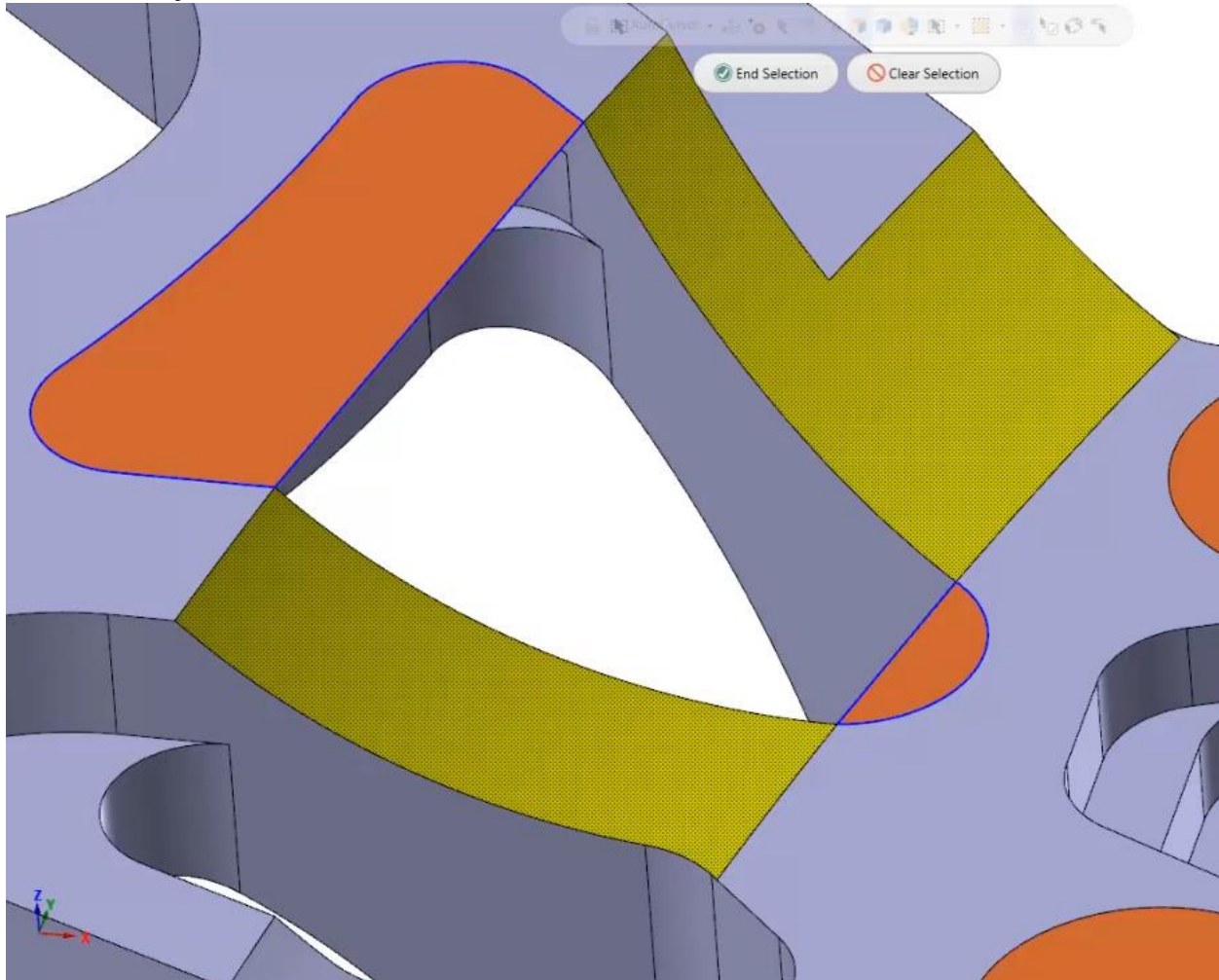
33. Open the Levels Manager and hide level 1. Only the surface entities and wireframe entities should be visible. Change the construction mode to **3D**. Go to the **Wireframe** tab and select the **Curve One Edge** button. Click the surface on the right. This changes the cursor to have an up arrow following it.

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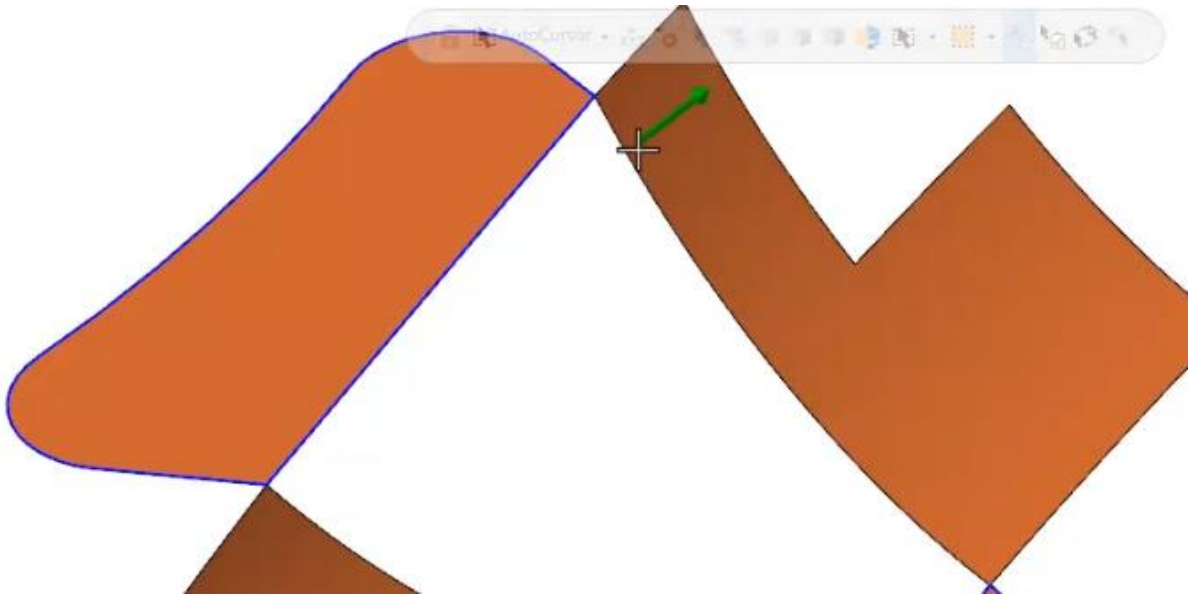
34. Left click inside the hole next to the surface. This creates a new wireframe line along the edge of the surface.
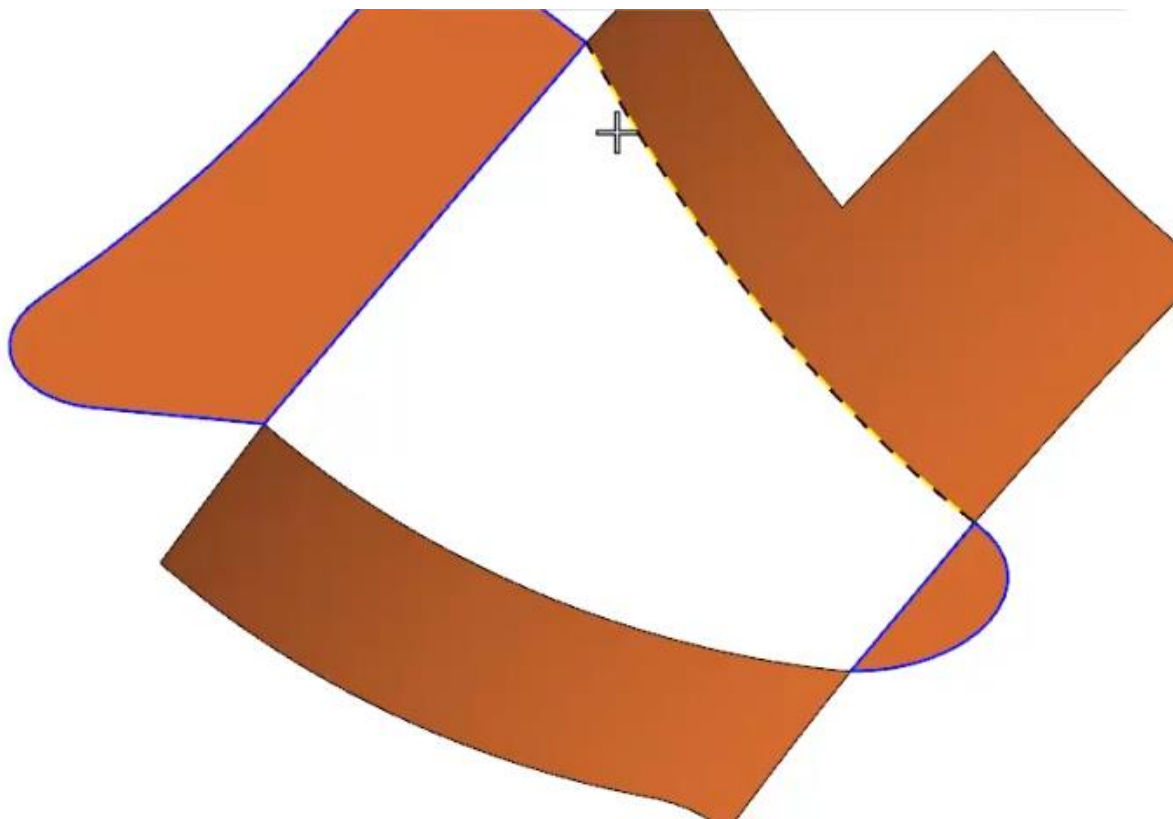
35. Repeat the last two steps to create a wireframe along the other surface. Then click the green **OK** button.

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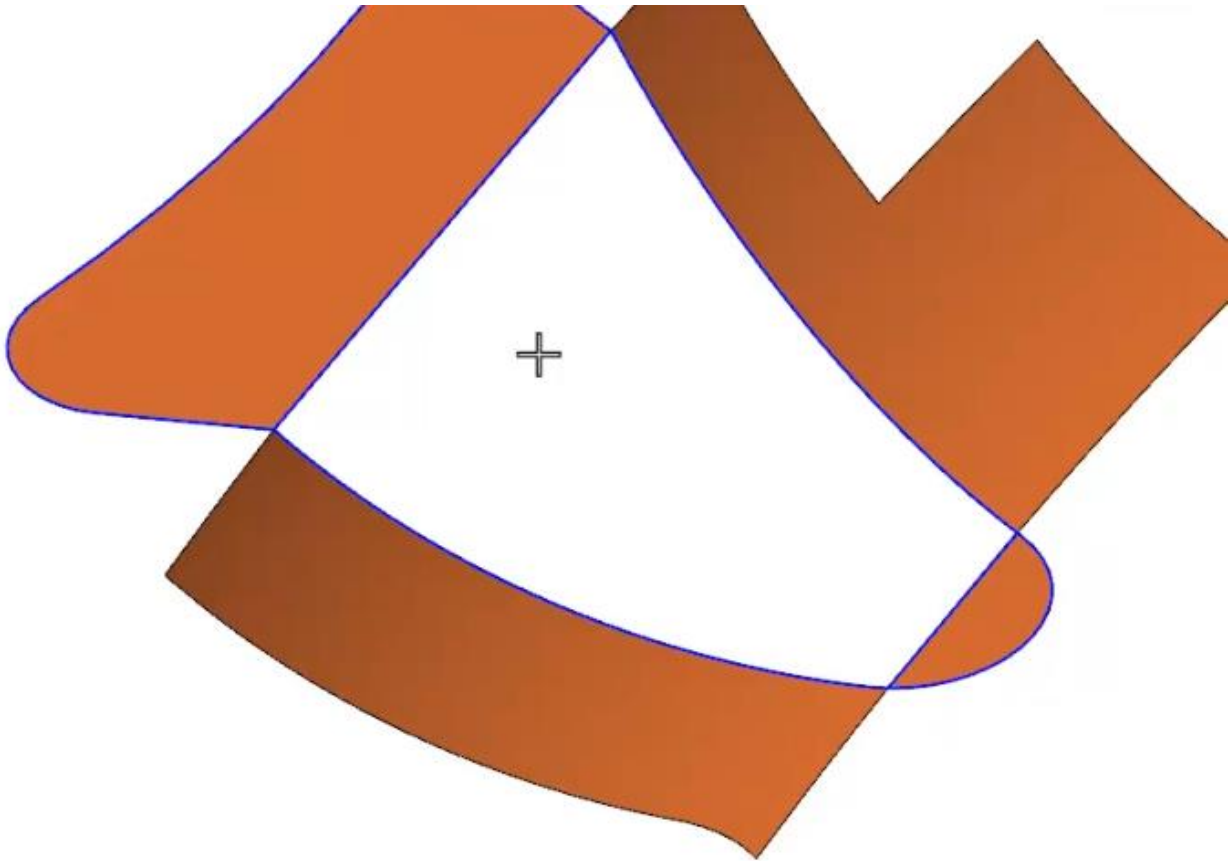
36. Now that the hole is completely surrounded by wireframe entities, there are a couple different methods that can be used to fill in the hole. To begin the first one, go to the **Surfaces** tab and select the **Loft** tool. In the Wireframe Chaining options change the Selection Method to **Single**.

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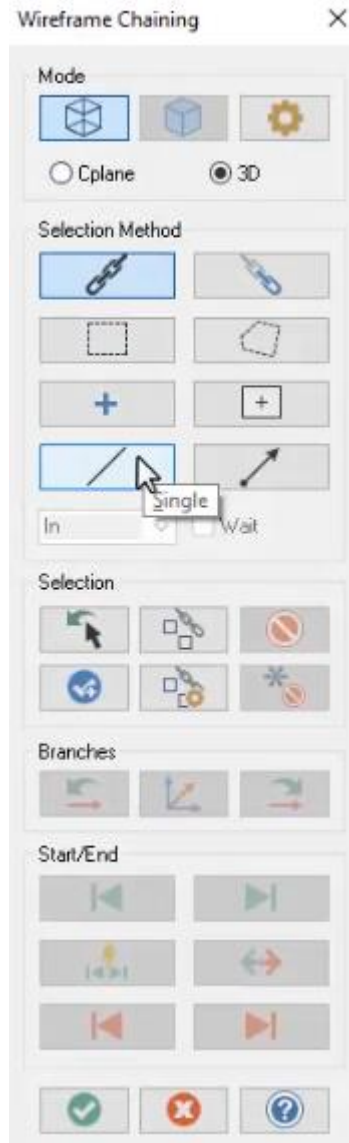
37. Select the two edges along the curved surfaces on the sides of the hole. Then, click the green **OK** button. If done correctly the center will be filled by a new surface. This method works since the top and bottom lines edges of the desired surface are straight.

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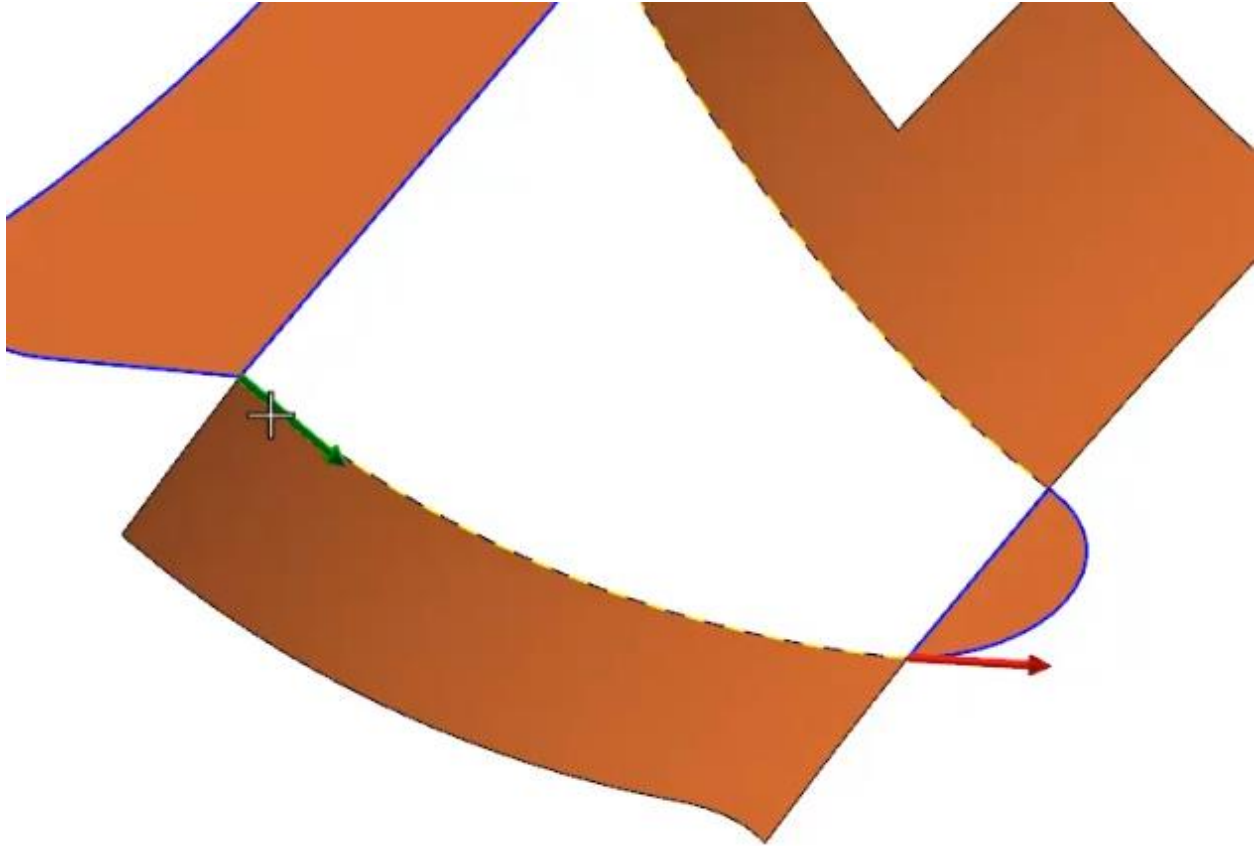
38. Click the red **Cancel** button to close the tool, then press [**Ctrl + z**] on the keyboard to undo the creation of the surface.
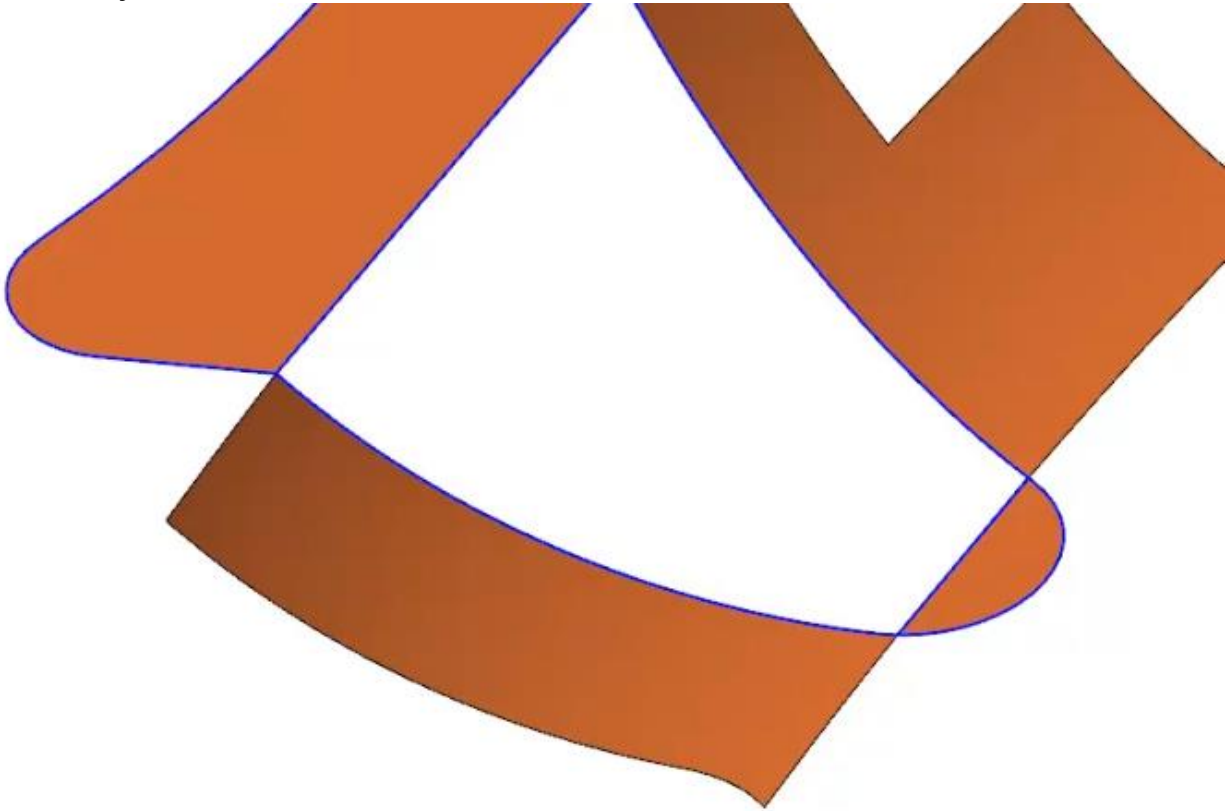

39. To create the surface an alternate way, go to the ribbon's **Surfaces** tab and click the **Net** button.


40. Once again, in the Wireframe Chaining Options, change the Selection Method to **Single**. Then, select each of the four edges around the hole. Then click the **OK** button. Click the **OK** button again to close the Surface Net Manager.

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41. Select and delete the two surfaces to the side of the new one.
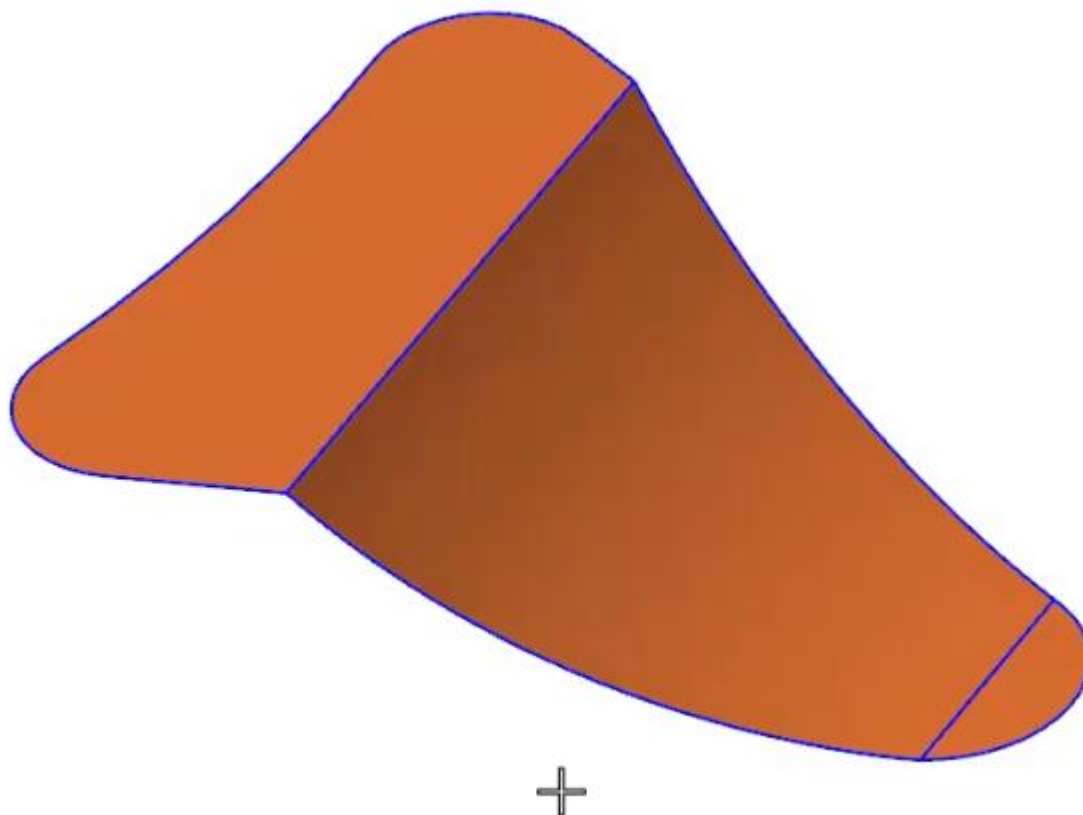
42. Select each of the blue wireframe entities and delete them as well.

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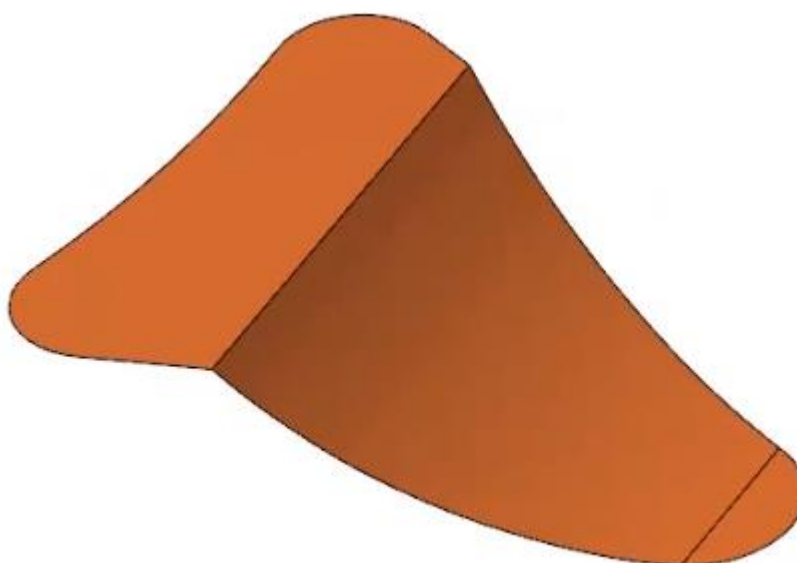
43. Zoom back out and set level 1 to be visible in the Levels Manager. Note that there is still one hole that is uncovered. This hole would be complicated to cover and will be left undone for this module.

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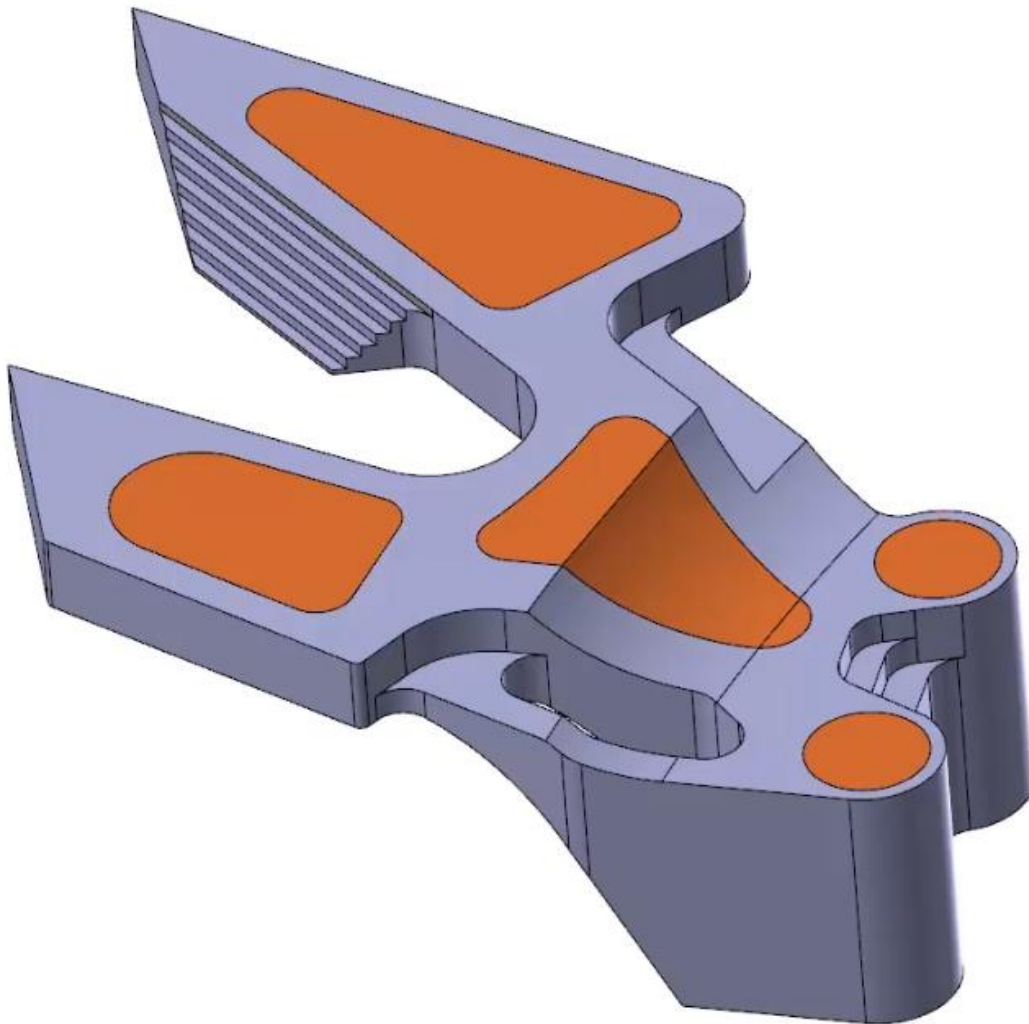
44. Hide level 20 in the Levels Manager and set level 1 as active. Save the file and continue to the next module.

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