AUTODESK

Create a fixture plate

In this module, you'll design and create a custom fixture plate to hold raw stock that will be machined.

Learning objectives:

- Identify fixturing requirements for a design.
- Create a 3D model of a fixture plate.

The completed exercise

1. Open the supplied *Engine Case RH – No Timeline.f3d file*. A fixture plate needs to be created to hold this design in a vise while the geometry is being machined.

Figure 1. Open the supplied file

2. Click Assemble> New Component.

Figure 2. Create a new component

3. Choose to name the new component ***Fixture Plate***, make sure the activate option is checked, then OK the dialog.

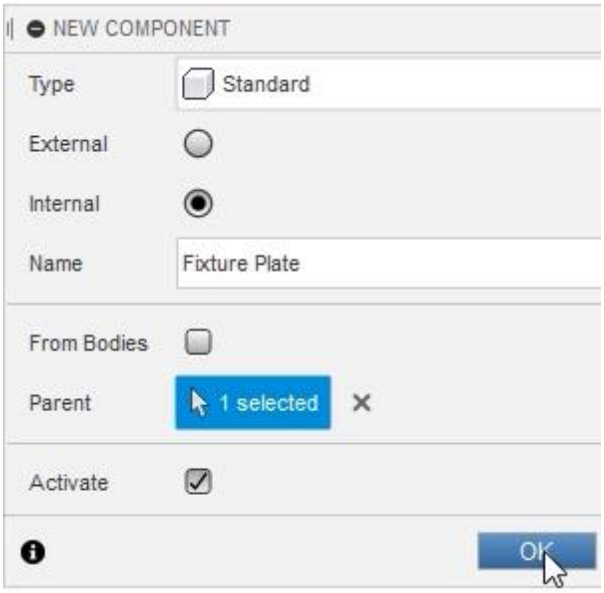

Figure 3. Create a new component

4. Since the new component is activated, the existing components' opacity are reduced so it is easier to see the new component.

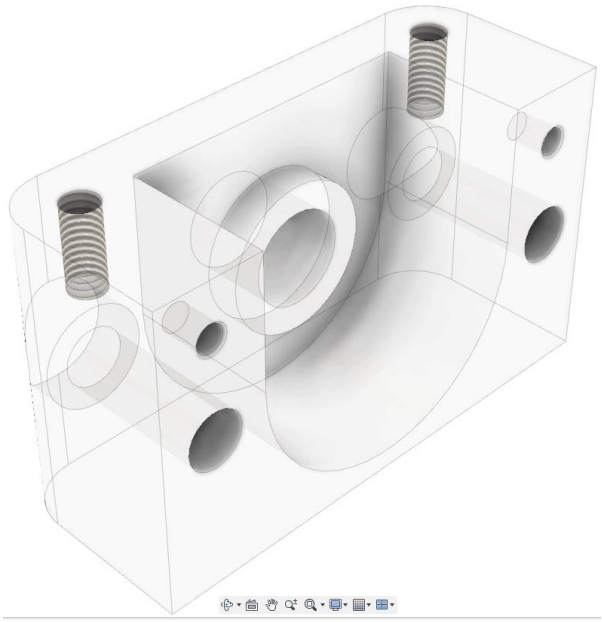

Figure 4. Notice the opacity is reduced for any existing components

5. Create a new sketch on the face shown in the image on the right.

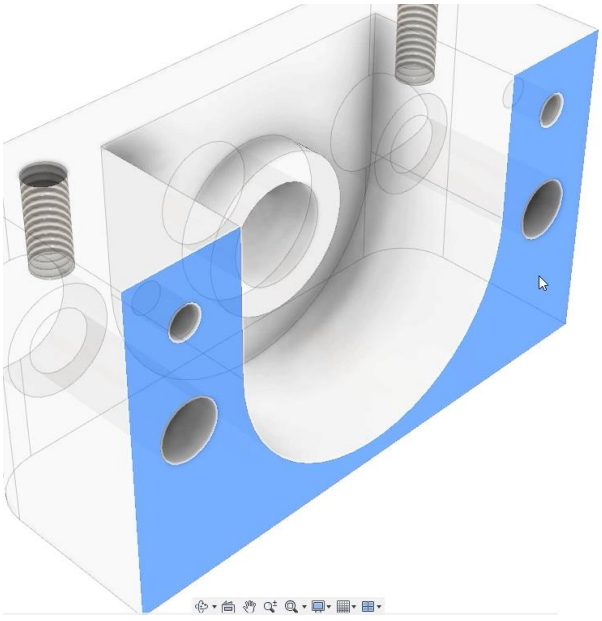

Figure 5. Create a new sketch

6. Press P to open the Project tool, then select the inside diameter for both alignment pin holes. OK the Project dialog.

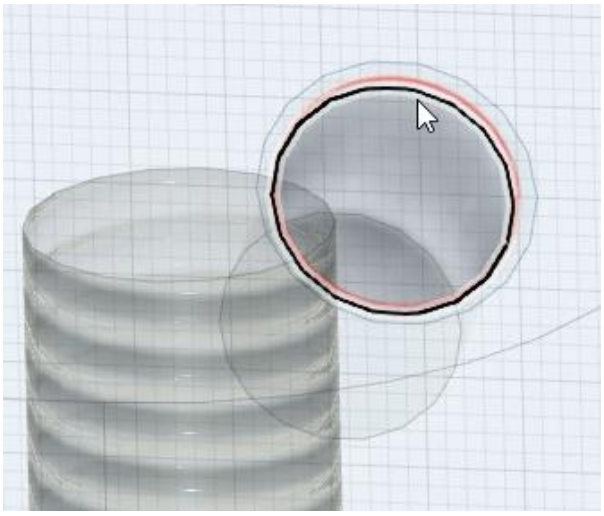

Figure 6. Select geometry to project into the current sketch

7. Click Create> Center Diameter Circle.

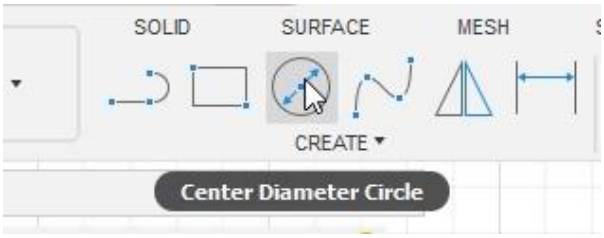

Figure 7. Open the Circle tool

8. Draw a 0.201-inch diameter circle concentric with the existing counterbore holes. Repeat this process on the other side of the part.

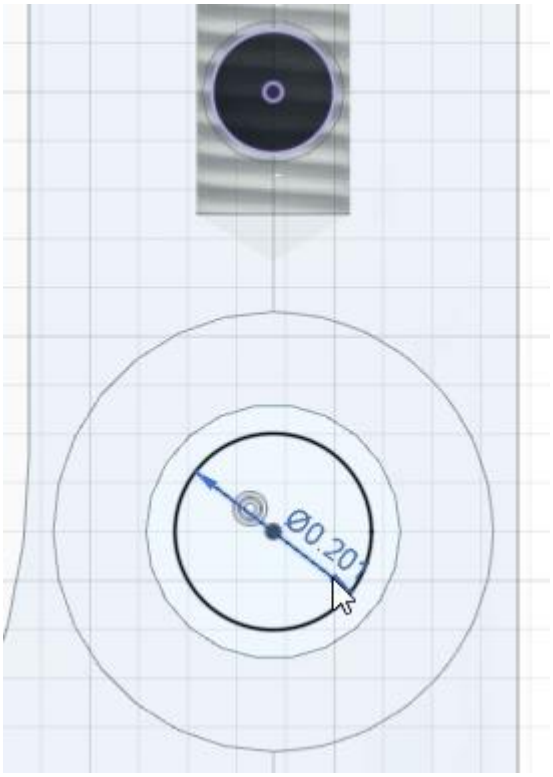

Figure 8. Draw a circle

9. Press Esc to leave the Circle tool, then click Modify> Offset.

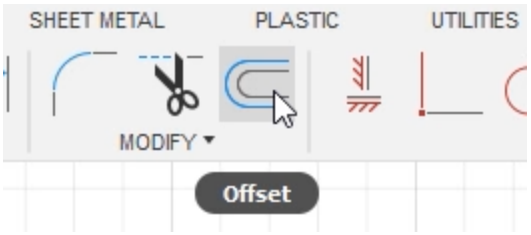

Figure 9. Open the Offset tool

10. Select the edge shown in the image on the right, then use the on-screen manipulator to offset the selection inwards -0.02 inches. OK the Offset dialog.

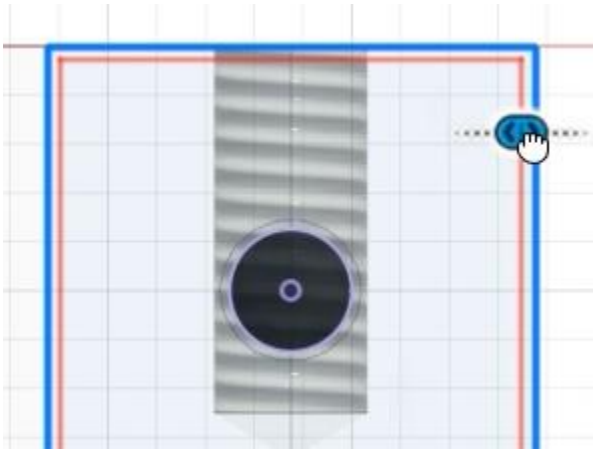

Figure 10. Offset the edge

11. Click Create> 2-Point Rectangle.

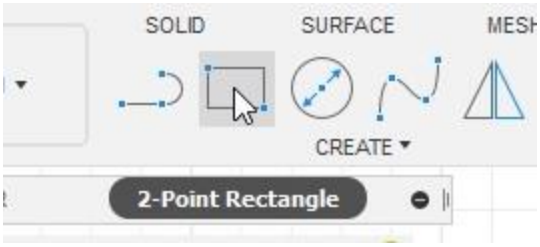

Figure 11. Open the Rectangle tool

12. Draw a rectangle around the entire part.

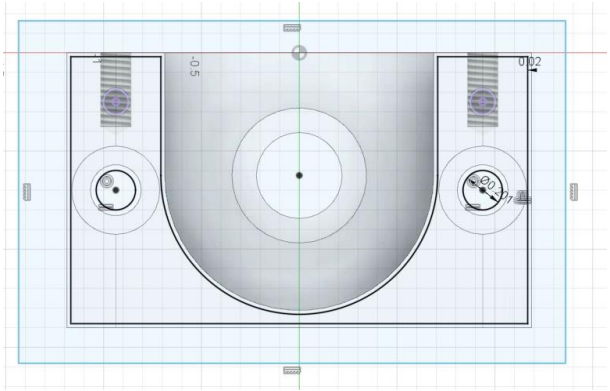

Figure 12. Draw a rectangle

13. Press L to open the Line tool and draw two lines connecting the body's top left corner to the rectangle's horizontal and vertical lines. Repeat this process to connect the body's bottom right corner to the rectangle's horizontal and vertical lines.

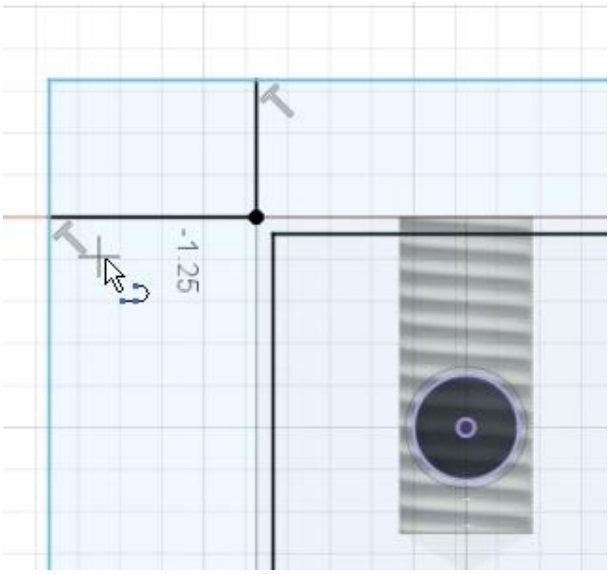

Figure 13. Draw two lines

14. Select the four lines you just drew, then press X to convert them to construction geometry.

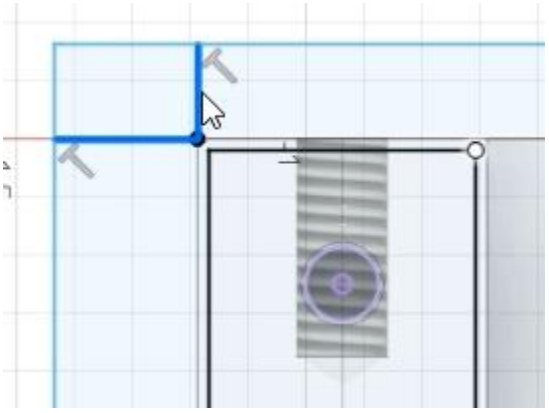

Figure 14. Convert the lines to construction geometry

15. Click Constraints> Equal, then select the two horizontal lines you just drew so that an equal constraint is added between them. Next, select the two vertical lines you just drew so that they are equal.

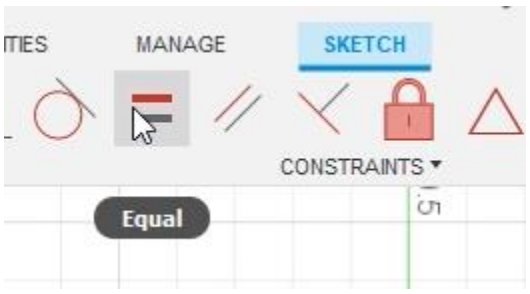

Figure 15. Open the Equal tool

16. Press D to open the Dimension tool and dimension the rectangle you drew in Step 12. Add a dimension of 1.75 inches to the vertical line and 2.75 inches to the horizontal line. Finish the sketch after you finish dimensioning the rectangle.

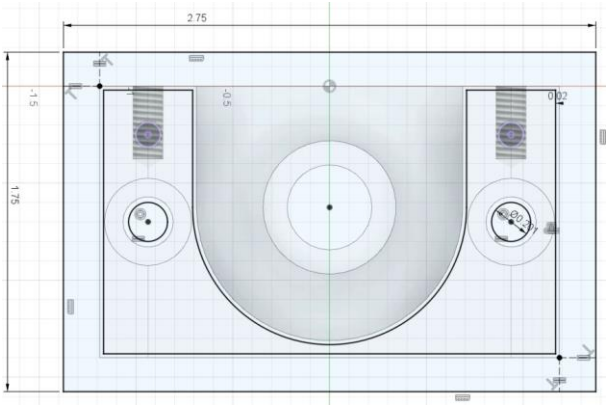

Figure 16. Dimension the rectangle

17. Turn off the visibility for the Browser's Bodies folder.

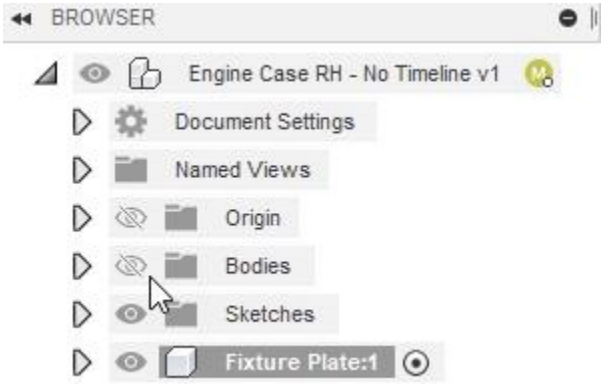

Figure 17. Hide the Bodies folder

18. Click Create> Extrude.

Figure 18. Open the Extrude tool

19. For the dialog's Profiles selection, choose the region inside the offset and the small region next to all four holes.

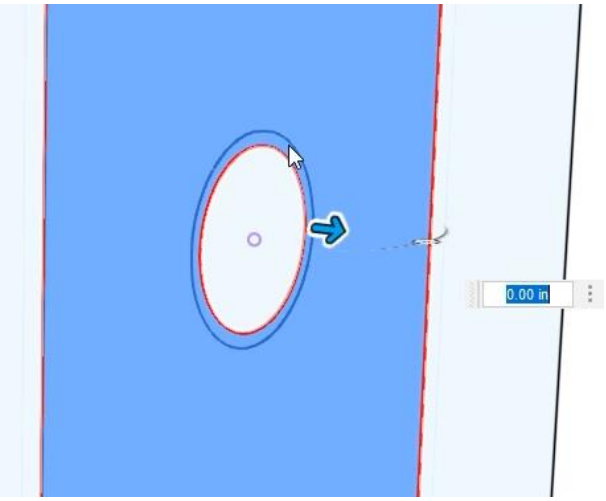

Figure 19. Choose the regions to extrude

20. Use the on-screen manipulator to drag the selection forwards 0.0625 inches, then OK the dialog.

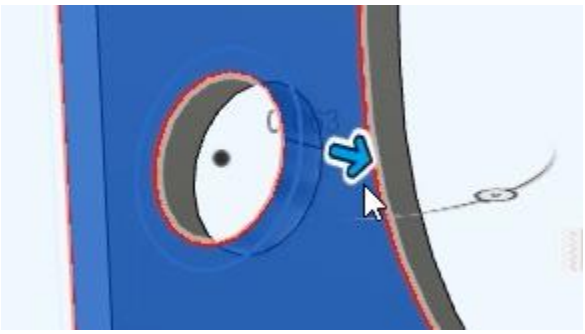

Figure 20. Extrude the selection

21. Expand the new component's Sketches folder and turn on the visibility for Sketch1. Turn off the visibility for the Bodies folder.

Figure 21. Show Sketch1

22. Press E to open the Extrude tool, then select the seven regions shown in the image on the right. Use the Browser to turn on the visibility for the Bodies folder.

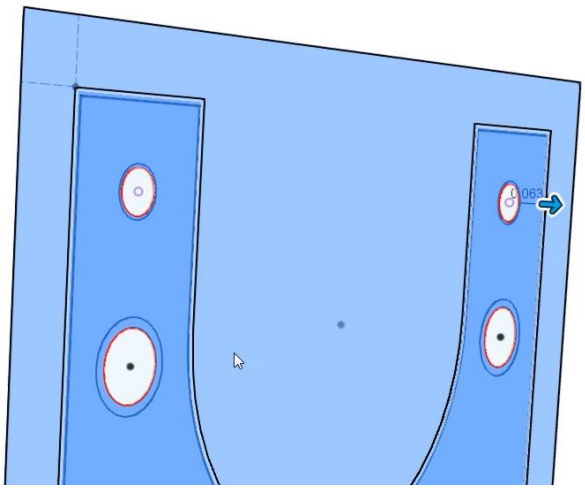

Figure 22. Select the regions to extrude

23. Use the on-screen manipulator arrow to drag the selection away from the existing fixture plate.

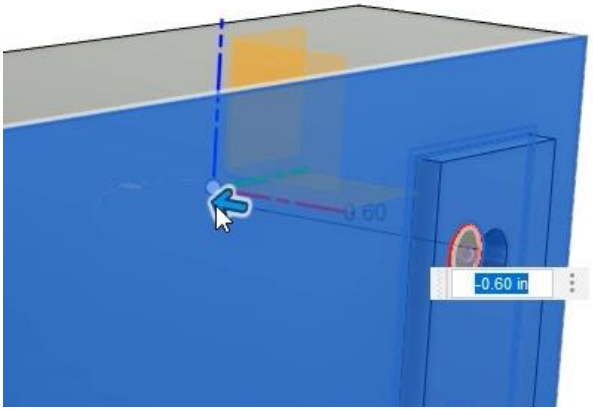

Figure 23. Begin extruding the selection

24. Select the fixture plate's front face, then choose the Offset option from the dialog's Start menu.

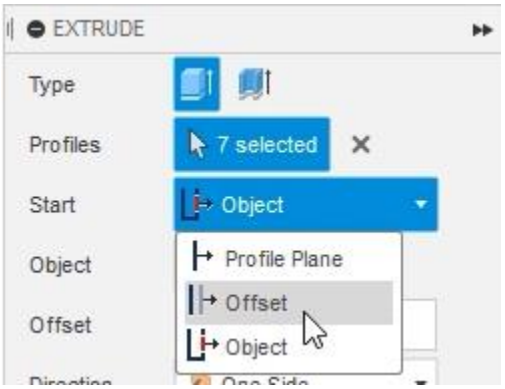

Figure 24. Choose the Start criteria

25. Enter **0.5 inches** into the Offset box so that the extrude begins 0.5 inches away from the selected object.

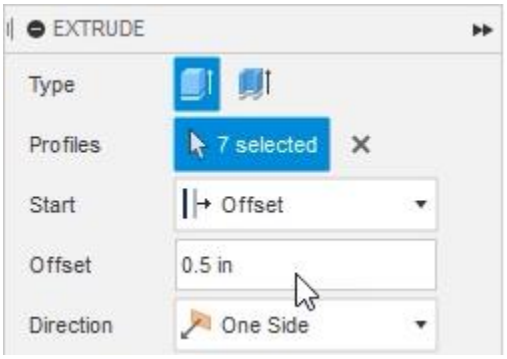

Figure 25. Select the face

26. Choose the To Object option from the dialog's Extent Type menu.

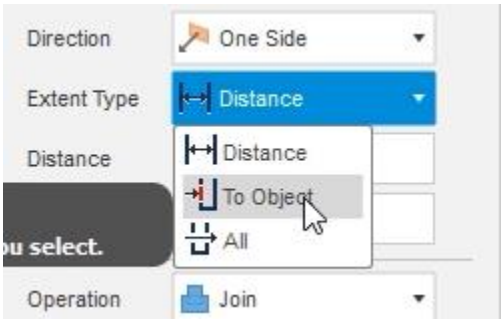

Figure 26. Choose the extent type

27. For the dialog's Object selection, choose the fixture plate's front face shown in the image on the right. OK the dialog to create the extrude.

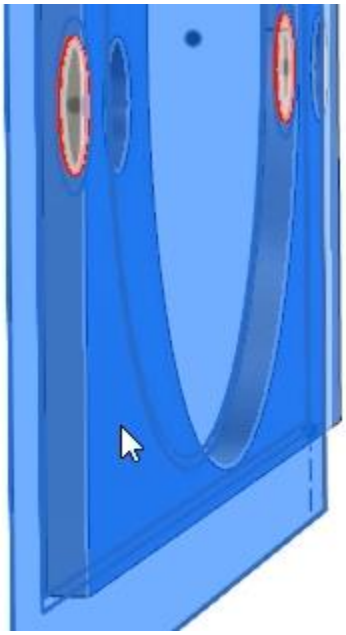

Figure 27. Choose the object for the extrude to meet

28. Rotate the model and make sure it matches the image on the right.

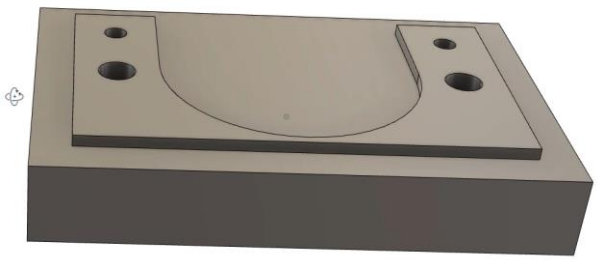

Figure 28. Inspect the result

29. Turn on the visibility for the Browser's Bodies folder, then activate the top level of the Browser by clicking Activate Component next to it.

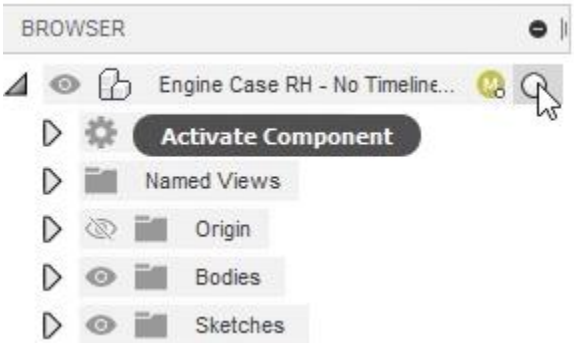

Figure 29. Activate the Browser's top level

30. Inspect the fixture plate to make sure it is appropriate for the model's geometry. Turn off the visibility for the Browser's Bodies folder after you finish.

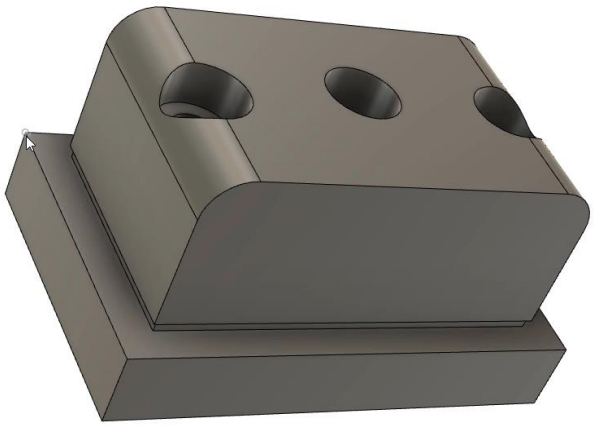

Figure 30. Inspect the fixture plate

31. Activate the Fixture Plate component by clicking the radio button next to it.

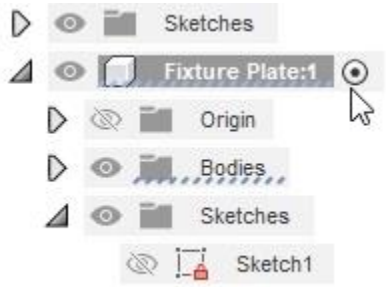

Figure 31. Activate the Fixture Plate

32. Create a new sketch on the fixture plate's large face.

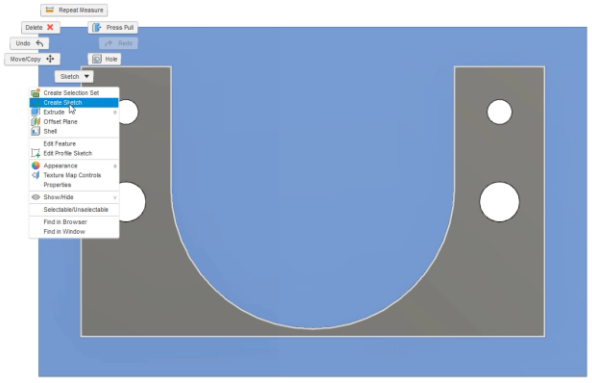

Figure 32. Create a new sketch

33. Click Create> Text.

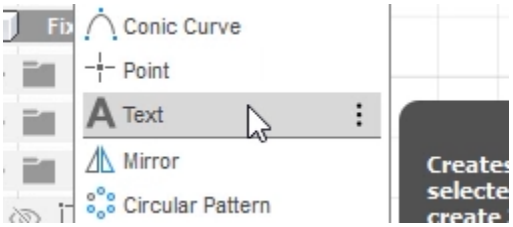

Figure 33. Open the Text tool

34. Click once near the fixture plate's top left corner to place the text box's top left corner. Drag the text box down into the right, then click to place the text box's lower right corner.

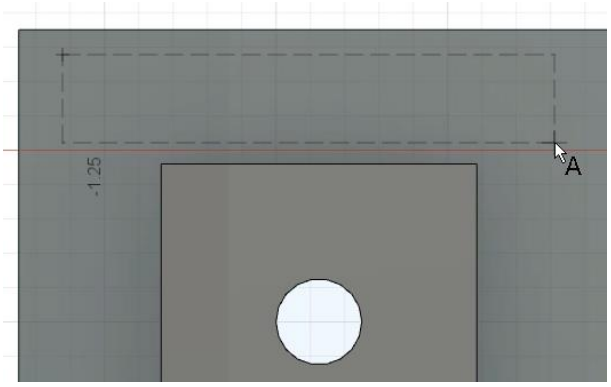

Figure 34. Draw the text box

35. Enter **XYZ** into the dialog's Text box, then enter **0.1** into the Height box. OK the dialog to create the text. Finish the current sketch by clicking Finish Sketch> Finish Sketch.

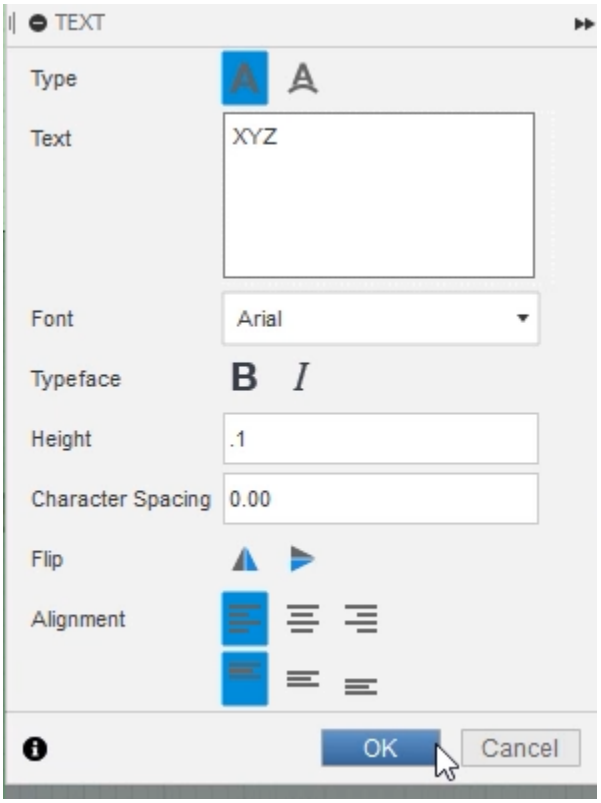

Figure 35. Create the text

36. Select the text, then press E to open the Extrude tool.

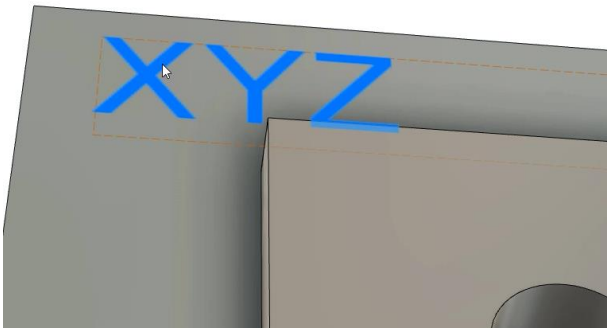

Figure 36. Open the Extrude tool

37. Drag the on-screen manipulator down to remove material from the fixture plate. Okay the dialog to cut the text into the fixture plate. This text identifies the fixture plate's intended WCS location.

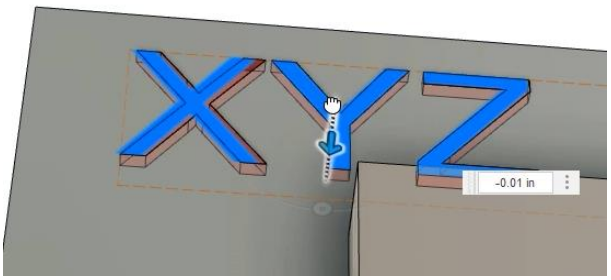

Figure 37. Cut the text from the fixture plate

38. Activate the Browser's top level and inspect the result.

Figure 38. Inspect the result

39. Click File> Save As, then change the name to **Engine Case RH - With Fixture**. Save the file and continue to the next module.

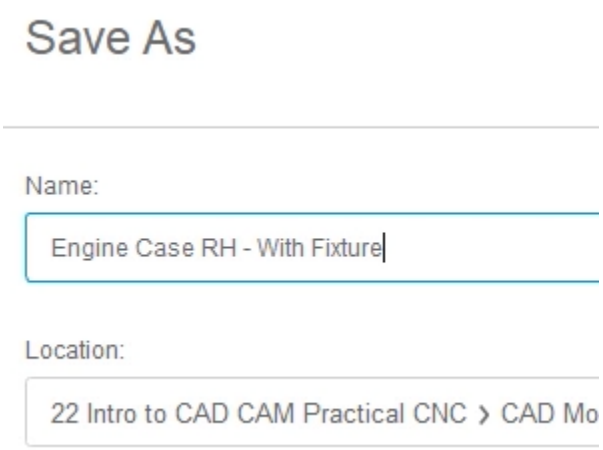

Figure 39. Save the file