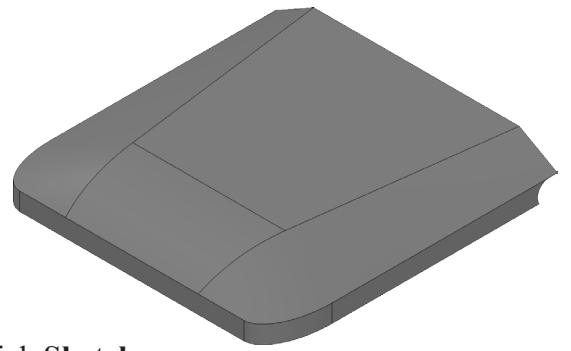





# E's Small Car Roof



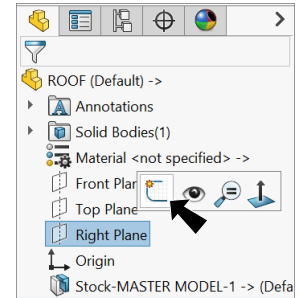
## A. Extruded Cut1 Sketch1.

Step 1. Open your **Roof** part file.

Step 2. Click **Right Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 1**.

Step 3. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 4. Click **Style Spline**  in the **Spline flyout**  on the Sketch toolbar.




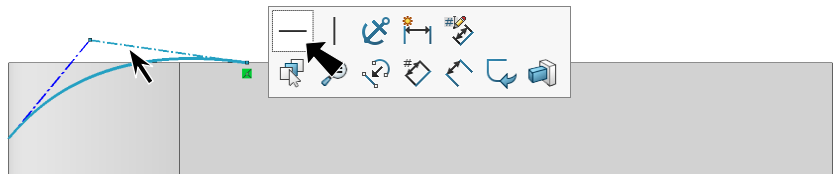
**Fig. 1**

Step 5. Sketch a **3 control vertex point Spline** across top left corner of body, **Fig. 2**. Press Escape to end spline.



**Fig. 2**

Step 6. Click **top control polygon segment** and click **Make Horizontal**  on the context toolbar, **Fig. 3**.




**Fig. 3**

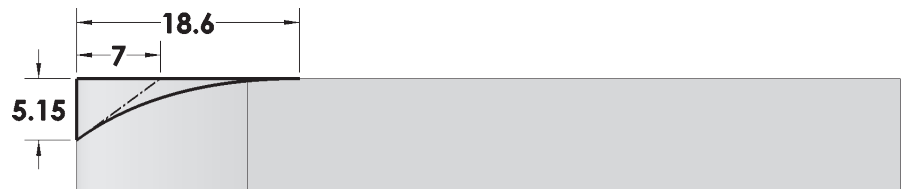
Step 7. Click **Line**  (L) on the Sketch toolbar.

Step 8. Sketch **lines along edges to close sketch**, **Fig. 4**.




**Fig. 4**


Step 9. Click **Smart Dimension**  (S) on the Sketch toolbar.

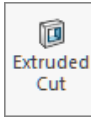



**Fig. 5**

Step 10. Add dimensions, **Fig. 5**.

Step 11. Click **Isometric**  on the Standard Views toolbar. (Ctrl-7)

Step 12. Click **Features**  on the Command Manager toolbar.

Step 13. Click **Extruded Cut**  on the Features toolbar.

Step 14. In the Cut-Extrude Property Manager set:  
under Direction 1, **Fig. 6**  
End Condition **Through All - Both**  
click OK .

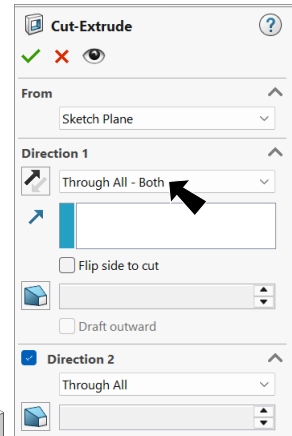


Fig. 6

Step 15. Save  (Ctrl-S).

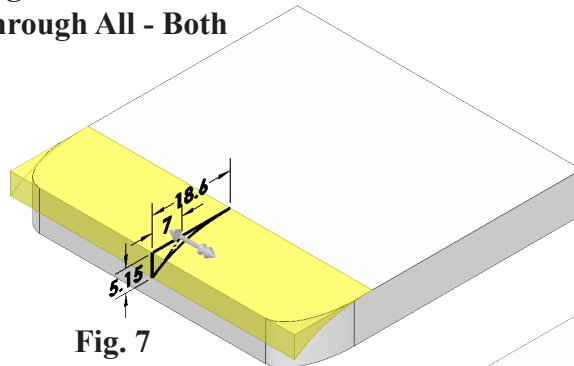



Fig. 7

## B. Curve1 Sketch2 for Boundary Cut.

Step 1. Click the **front face** and click **Sketch**  on the context toolbar, Fig. 8.

Step 2. Click **Normal To**  on the Standard Views toolbar. (Ctrl-8)

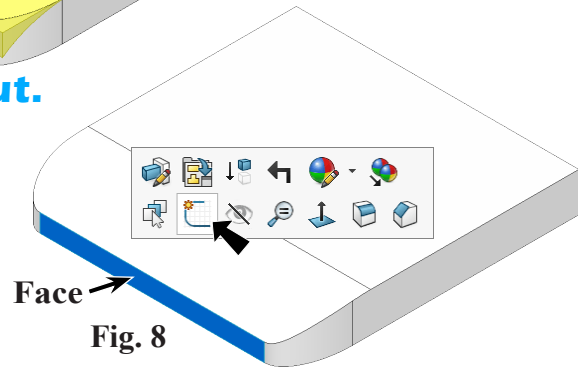




Fig. 8

Step 3. Click **Corner Rectangle**  in the **Rectangle flyout**  on the Sketch toolbar.

Step 4. Sketch corner rectangle from the top right corner down coincident with edge of cut, Fig. 9.

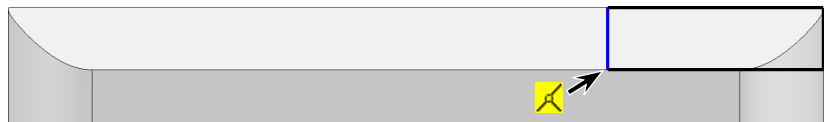


Fig. 9



Step 5. Click **Smart Dimension**  (S) on the Sketch toolbar.




Fig. 10

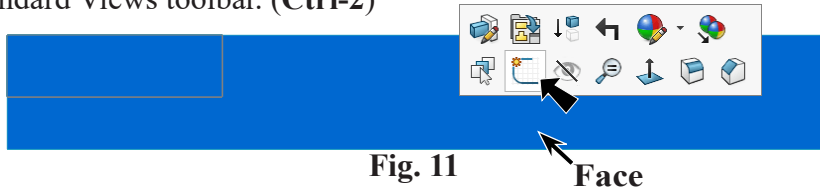
Step 6. Add 18 dimension, Fig. 10.

Step 7. Click **Exit Sketch**  on the Sketch toolbar.

### C. Curve2 Sketch3 for Boundary Cut.

Step 1. Click **Back**  on the Standard Views toolbar. (Ctrl-2)


Step 2. Click the **rear face** and click **Sketch**  on the context toolbar, **Fig. 11**.



Step 3. Click **Line**  (L) on the Sketch toolbar.

Step 4. Sketch **triangle along top and side edge**, **Fig. 12**.




Step 5. Click **Smart Dimension**  (S) on the Sketch toolbar.



Step 6. Add dimensions, **Fig. 13**.



Step 7. Click **Exit Sketch**  on the Sketch toolbar.

## D. 3D Sketch 1 Profile 1 for Boundary Cut.

Step 1. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)

Step 2. Click **3D Sketch**  in the **Sketch flyout**

 on the Sketch toolbar.

Step 3. Click **Spline on Surface**  in the **Spline flyout**  on the Sketch toolbar.

Step 4. Sketch a **2 point Spline** on **top surfaces of body**, **Fig. 14**. Start near Sketch2 (rectangle) and end near Sketch3 (triangle). Press Escape to end spline.

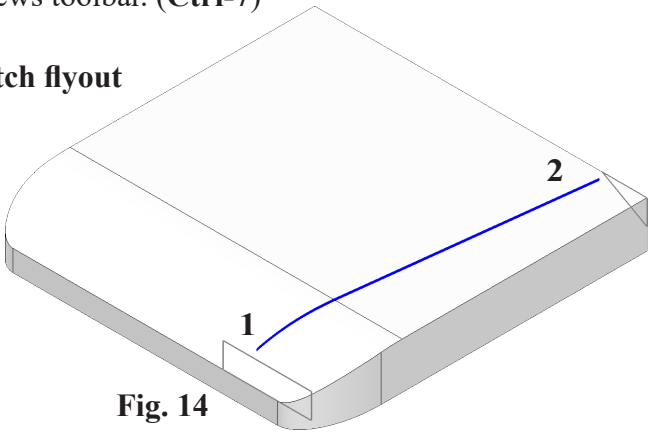



Fig. 14

Step 5. **Ctrl click Spline Point 1 and line in Sketch2** to select both, **Fig. 15**. Release Ctrl key and click **Make Coincident**  on the Context toolbar.

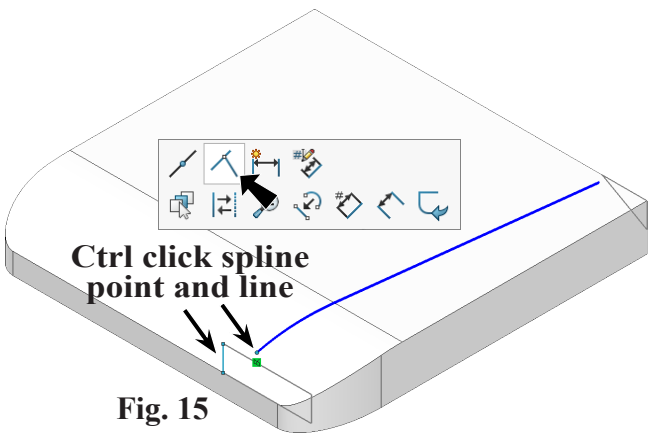



Fig. 15

Step 6. **Ctrl click Spline Point 2 and line in Sketch3** to select both, **Fig. 16**. Release Ctrl key and click **Make Coincident**  on the Context toolbar.

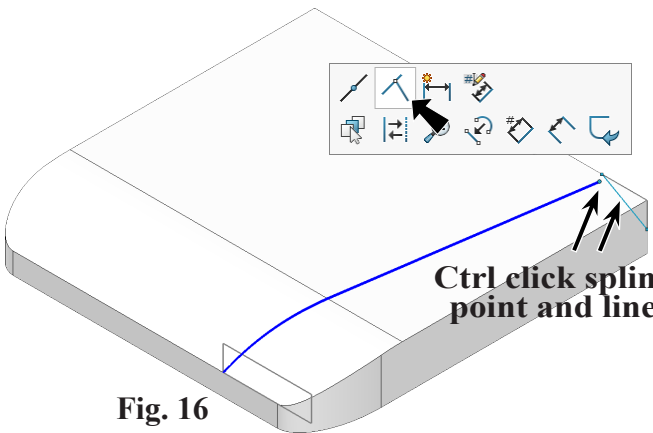


Fig. 16

Step 7. Exit the **3D Sketch**. To Exit, click **Exit 3D Sketch**  in top right corner of graphics area.

Step 8. Save  (**Ctrl-S**).

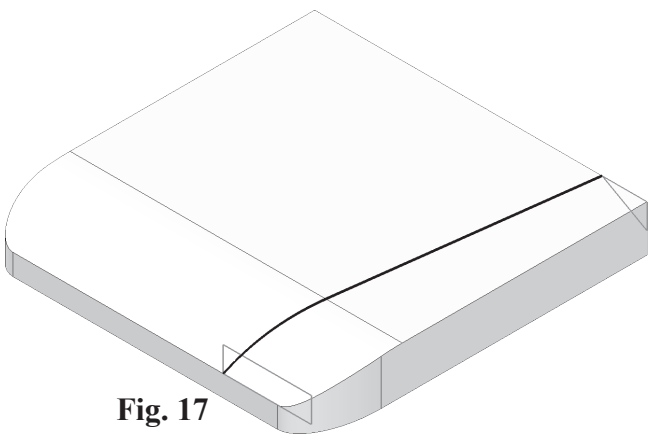
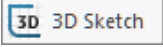





Fig. 17

## E. 3D Sketch2 Profile2 for Boundary Cut.

Step 1. Click **3D Sketch**  in the **Sketch flyout**  on the Sketch toolbar.

Step 2. Click **Spline on Surface**  in the **Spline flyout**  on the Sketch toolbar.

Step 3. Sketch a **2 point Spline** on **side surface of body**, **Fig. 18**. Start near Sketch2 (rectangle) and end near Sketch3 (triangle). Press Escape to end spline.

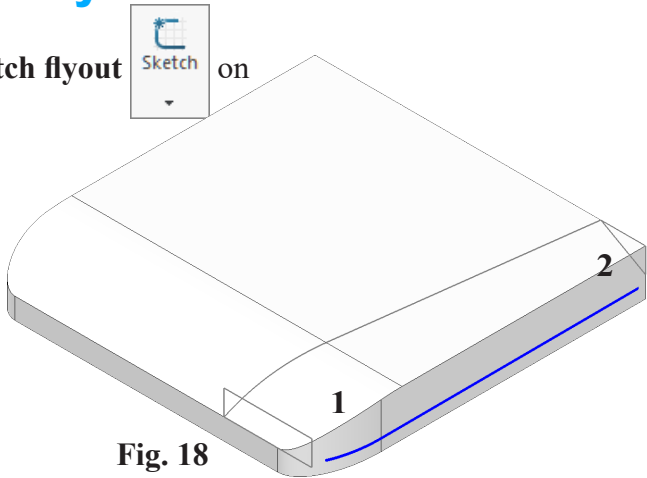



Fig. 18

Step 4. **Ctrl click Spline Point 1 and vertex at corner** to select both, **Fig. 19**. Release Ctrl key and click **Make Coincident**  on the Context toolbar.

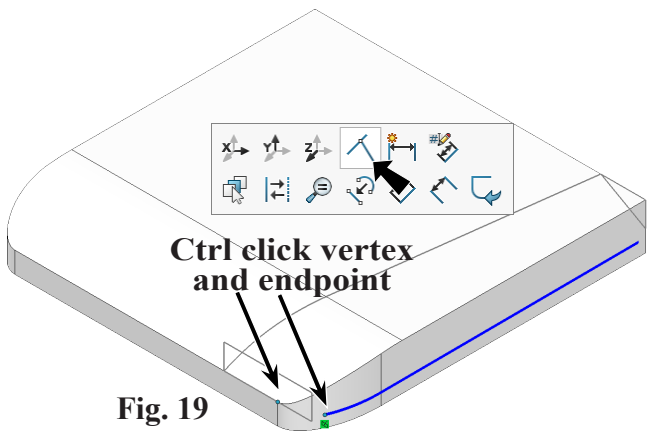



Fig. 19

Step 5. **Ctrl click Spline Point 2 and endpoint Sketch3** to select both, **Fig. 20**. Release Ctrl key and click **Make Coincident**  on the Context toolbar.

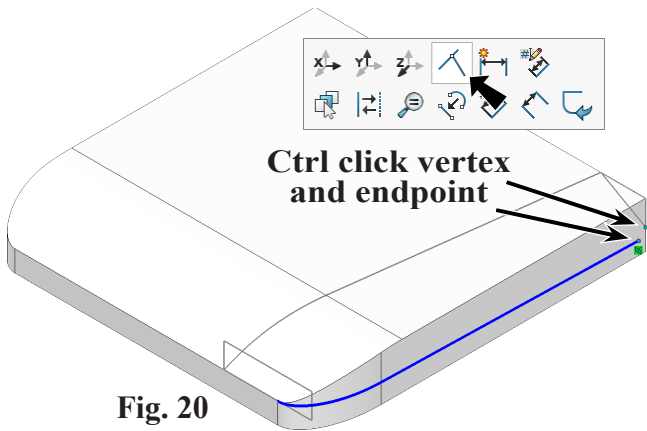



Fig. 20

Step 6. Exit the **3D Sketch**. To Exit, click **Exit 3D Sketch**  in top right corner of graphics area.

Step 7. Save  (**Ctrl-S**).

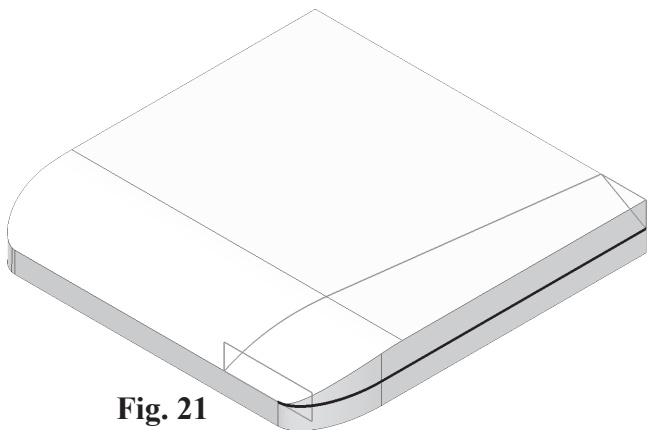
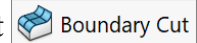


Fig. 21

## F. Boundary Cut.

Step 1. Click **Features**  on the Command Manager toolbar.

Step 2. Click **Boundary Cut**  on the Features toolbar.

Step 3. In the Boundary-Cut Property Manager set:

under Direction 1, **Fig. 22**

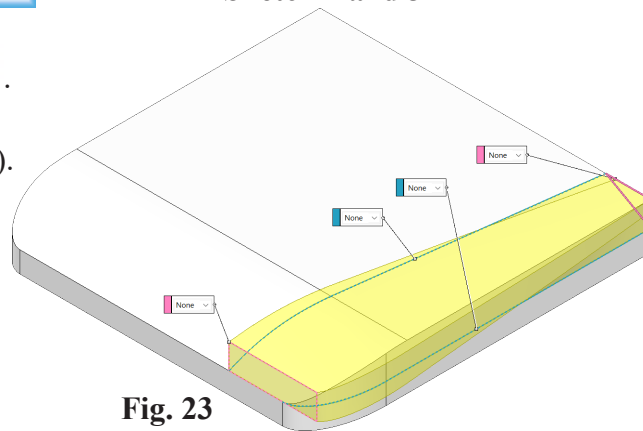
click **3DSketch1** and **3DSketch2** at the same location on sketch to keep the connectors aligned, **Fig. 23**

under Direction 2

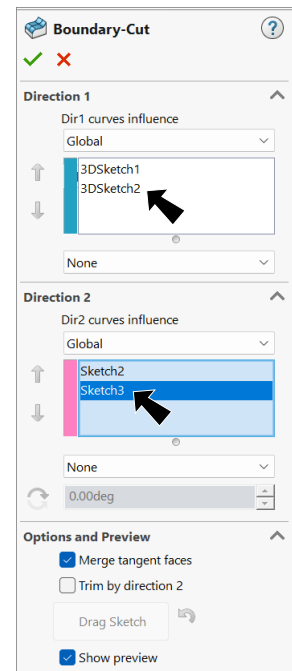
click in  box and click **Sketch 2** and **3** at the same location on sketch

click OK .

Step 4. Save  (**Ctrl-S**).



**Fig. 23**




**Fig. 22**

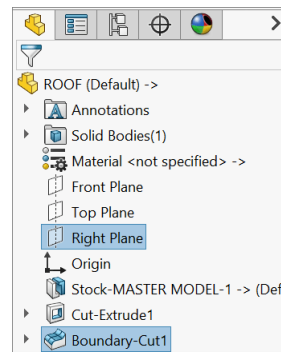
## G. Mirror1 Boundary Cut.

Step 1. **Ctrl click Right Plane and Boundary-Cut1** features to select plane and features, **Fig. 24**.

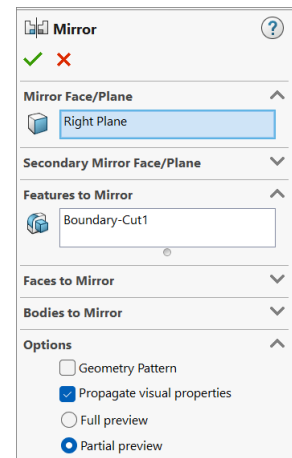
Step 2. Click **Mirror**  on the Features toolbar.

Step 3. In the Mirror Property Manager click OK .

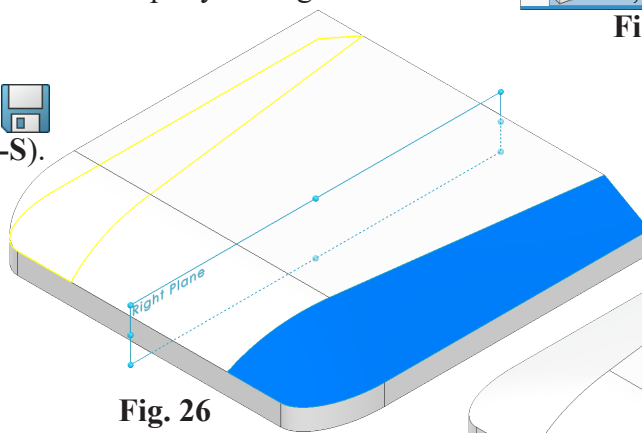
Step 4. Save  (**Ctrl-S**).



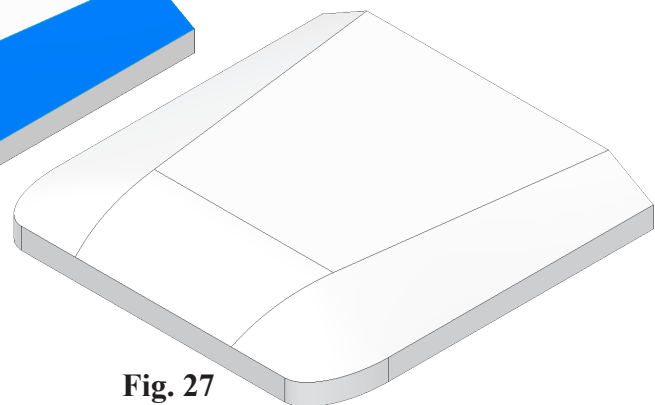
**Fig. 24**



**Fig. 25**



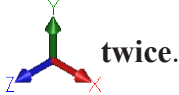
**Fig. 26**



**Fig. 27**

## H. Extruded Cut2 Sketch4 Stud Holes.

Step 1. Rotate view to bottom, Fig. 28. To rotate view, **Shift click the Z axis of the Reference Triad**



Face

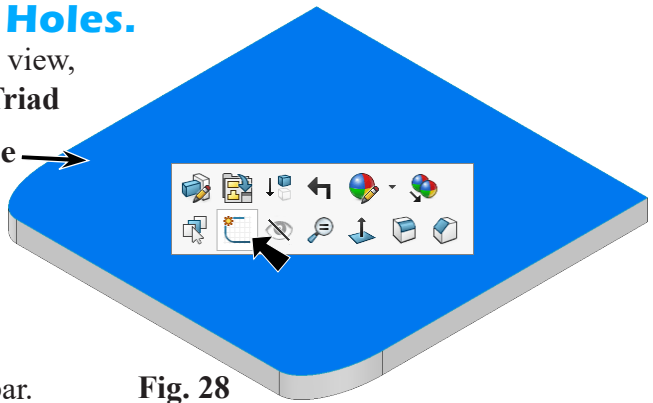


Fig. 28

Step 2. Click the **bottom face** and click **Sketch** on the context toolbar, Fig. 28.



Step 3. Click **Circle** (S) on the Sketch toolbar.



Step 4. Sketch **circle**, Fig. 29.

Step 5. **Unselect Circle tool.** To unselect, right click graphics area and click **Select** from menu.

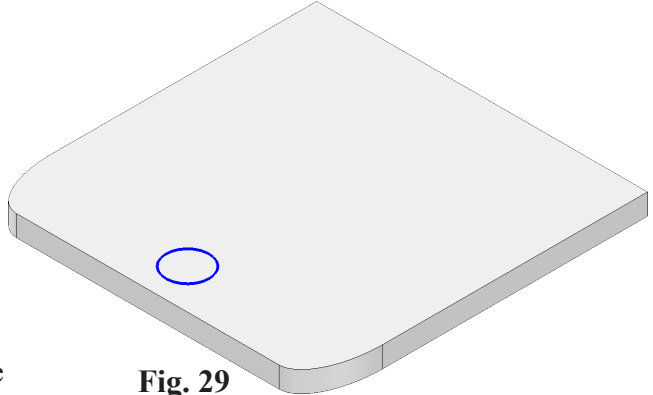


Fig. 29

Step 6. **Ctrl click centerpoint of circle** and

**Origin** (blue) to select both. Release Ctrl key and click **Make**

**Vertical** on the context toolbar, Fig. 30.

Ctrl click centerpoint and Origin

Step 7. Click **Smart Dimension** (S) on the Sketch toolbar.

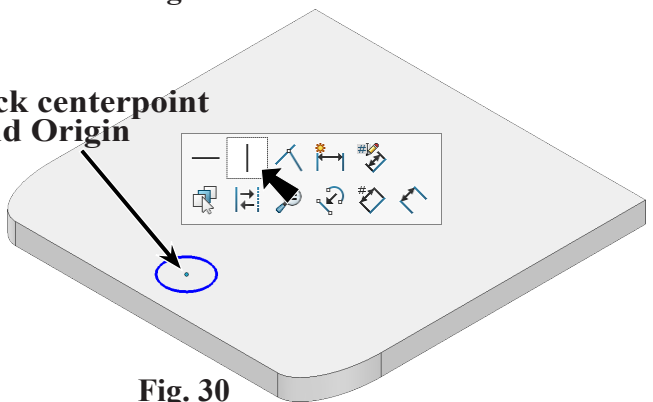


Fig. 30

Step 8. Add dimensions, Fig. 31.

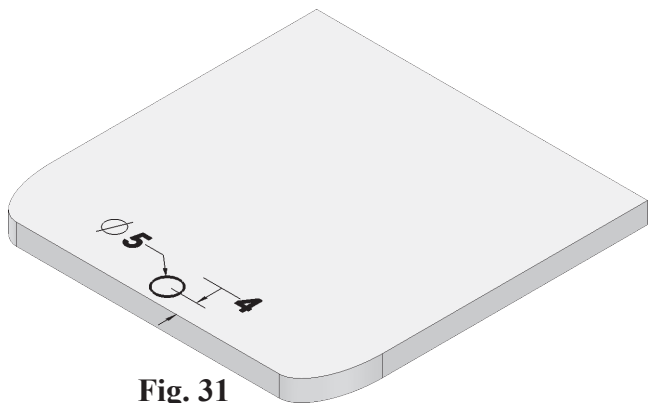


Fig. 31

Step 9. Click **Offset Entities**  on the Sketch toolbar.

Step 10. In the Offset Entities Property Manager set:  
under Parameters, Fig. 32

**Distance**  **.2 (clearance for stud)**

uncheck **Reverse**

uncheck **Bi-directional**

under Construction geometry

check **Base geometry**

click **circle**, Fig. 33

**yellow offset circle on outside - base geometry (construction) on inside**

click OK  .

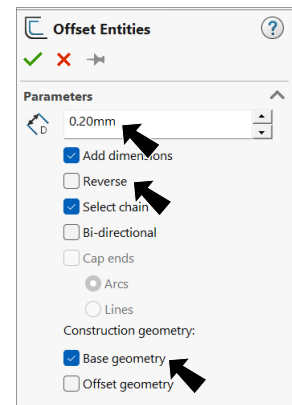


Fig. 32

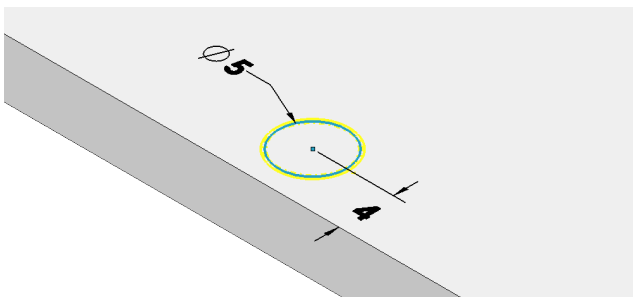


Fig. 33

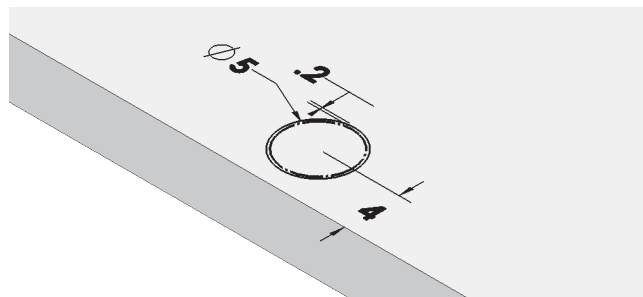


Fig. 34

Step 11. Click **Features**  on the Command Manager toolbar.

Step 12. Click **Extruded Cut**  on the Features toolbar.

Step 13. In Cut-Extrude Property Manager set:  
under Direction 1, Fig. 35

End Condition **Blind**

**Depth**  **2**

click OK  .

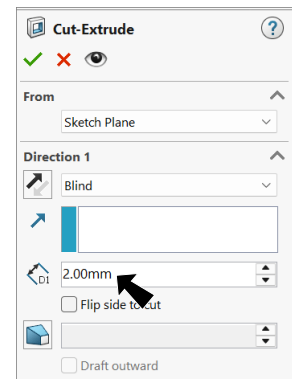


Fig. 35

Step 14. Save  (Ctrl-S).

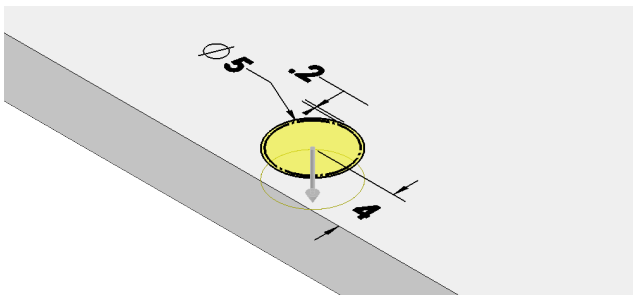


Fig. 36

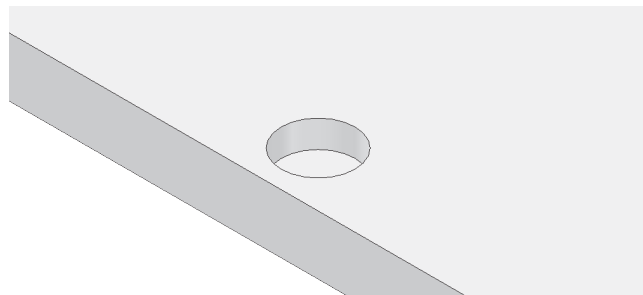


Fig. 37

## I. Linear Pattern 1 Stud Holes.

Step 1. Click **Linear Pattern**  on the Features toolbar.

Step 2. In the Linear Pattern Property Manager set:

under Direction 1, **Fig. 38**  
click a **front edge**, **Fig. 39**

**Spacing**  **8**

**Number of Instances**  **2**

under Direction 2

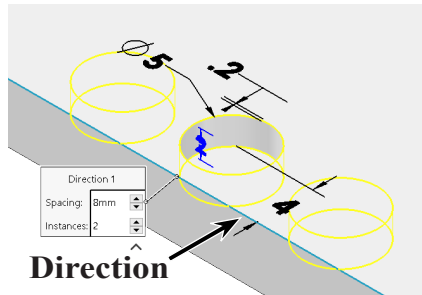
check **Symmetric**

under Features and Faces

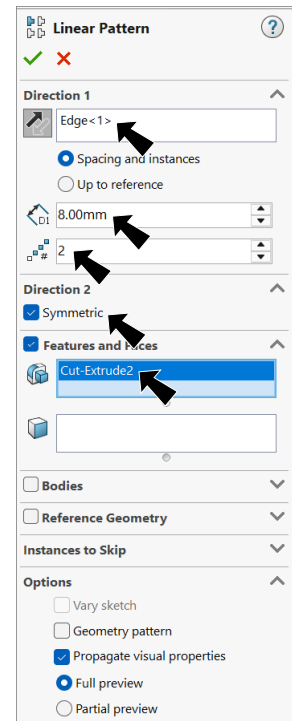
click in  box

click **Cut-Extrude2**

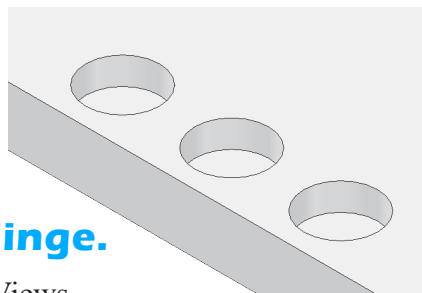
click OK .



**Fig. 39**





**Fig. 38**



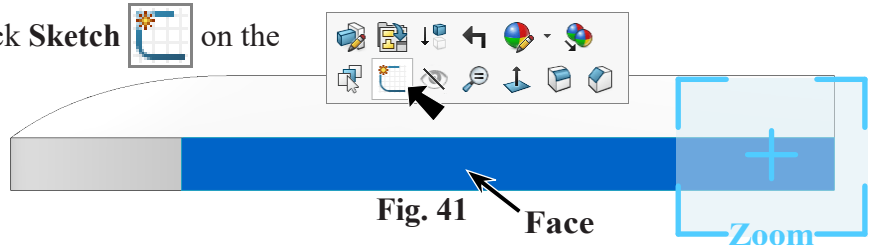
**Fig. 40**

## J. Extruded Cut3 Sketch5 Hinge.

Step 1. Click **Right**  on the Standard Views toolbar. (Ctrl-4)

Step 2. Click the **side face** and click **Sketch**  on the context toolbar, **Fig. 41**.

Step 3. Zoom on **rear of body**, **Fig. 41**.



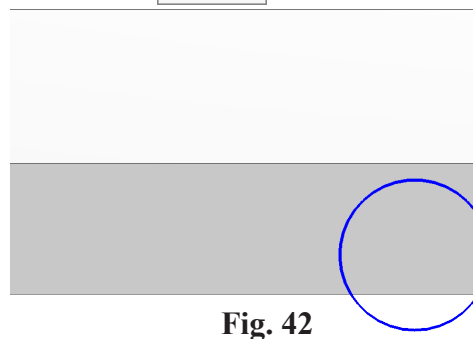
**Fig. 41**

Step 4. Click **Circle**  (S) on the Sketch toolbar.

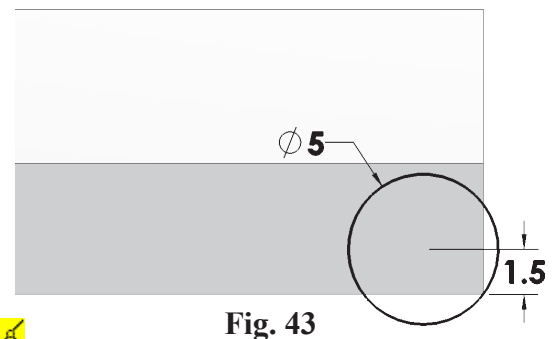
Step 5. Sketch **circle inside the bottom rear corner of body coincident**  with the rear vertex, **Fig. 42**.

Step 6. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 7. Add dimensions, **Fig. 43**.




**Fig. 42**



**Fig. 43**

Step 8. Click **Offset Entities**  on the Sketch toolbar.

Step 9. In the Offset Entities Property Manager set:  
under Parameters, Fig. 44

**Distance**  **.3 (clearance for Hinge)**

uncheck **Reverse**

uncheck **Bi-directional**

under Construction geometry

check **Base geometry**

click **circle**, Fig. 45

**yellow offset circle on outside - base geometry (construction) on inside**

click OK .

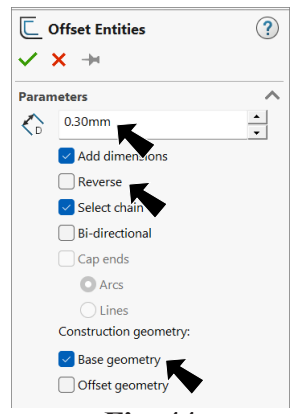



Fig. 44

Step 10. Click **Line**  (L) on the Sketch toolbar.

Step 11. Sketch a **horizontal line from offset circle top quadrant point**  **across to rear edge of body and down along edge to offset circle**, Fig. 46.

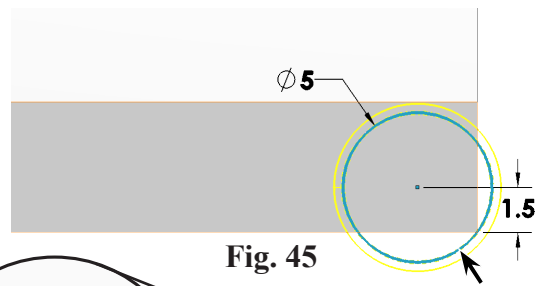


Fig. 45

Step 12. Rotate view to **rear hinge cut**, Fig. 48.

Use **Left Arrow key**  **once.**

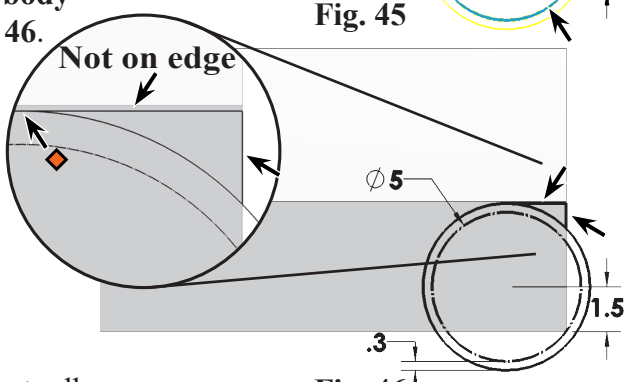


Fig. 46

Step 13. Click **Features**  on the Command Manager toolbar.

Step 14. Click **Extruded Cut**  on the Features toolbar.

Step 15. In the Cut-Extrude Property Manager set:  
under Direction 1, Fig. 47

End Condition **Blind**

**Depth**  **17.15**

under Selected Contours

click the **two contours**, Fig. 48

click OK .

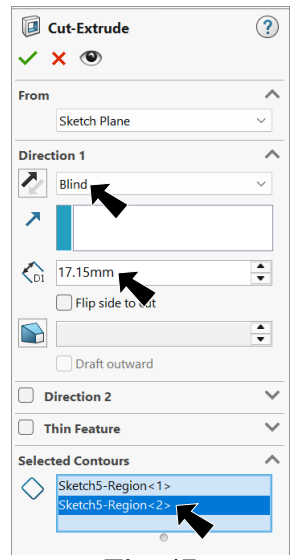


Fig. 47

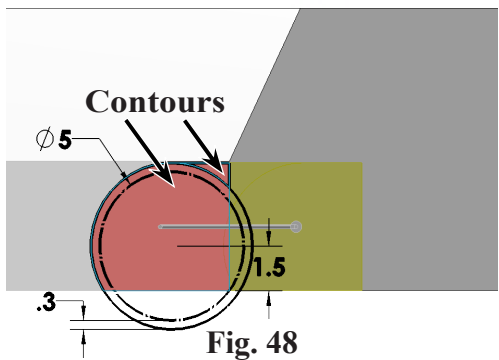


Fig. 48

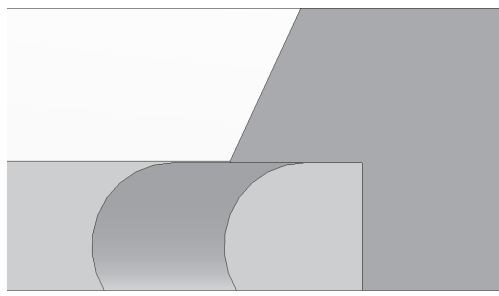


Fig. 49

## K. Split Line and Dome Sketch6 for Hinge.

Step 1. Click the **inside face of hinge** and click **Sketch** on the context toolbar, **Fig. 50**.

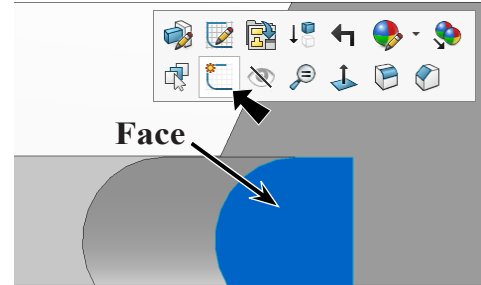


Fig. 50

Step 2. Click **Circle** (S) on the Sketch toolbar.

Step 3. Sketch **circle at centerpoint of cut**, **Fig. 51**. Wake up centerpoint.

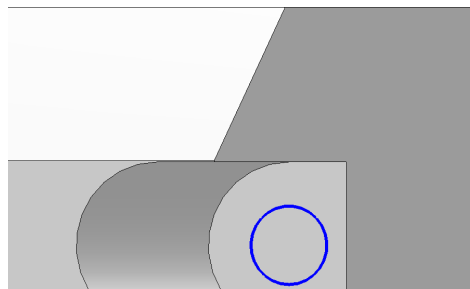


Fig. 51

Step 4. Click **Smart Dimension** (S) on the Sketch toolbar.



Step 5. Dimension **diameter 3**, **Fig. 52**.

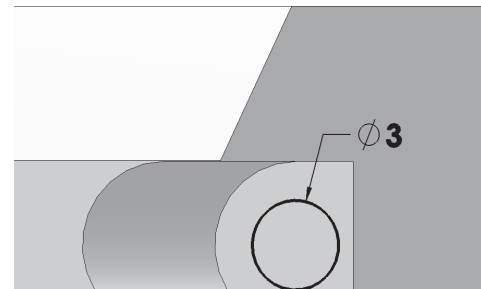


Fig. 52

Step 6. Click Insert Menu > Curve > Split Line.

Step 7. In the Split Line Property Manager:

under Type of Split, **Fig. 53** select **Projection**

under Selections **Sketch** is selected

in Faces to Split field click **side face**, **Fig. 54** click OK ✓.

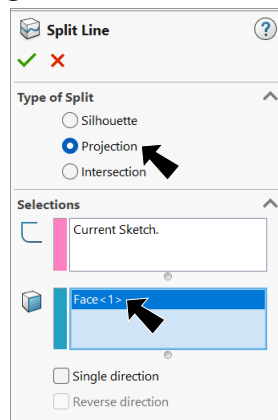


Fig. 53

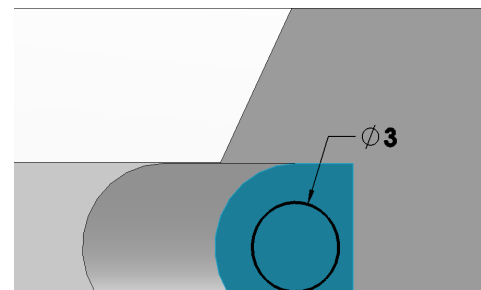


Fig. 54

Step 8. Click **Dome** on the Features toolbar.

Step 9. In the Dome Property Manager set:

under Parameters, **Fig. 55** click **split line face**,

**Fig. 56**

**Distance .7**

click OK ✓.

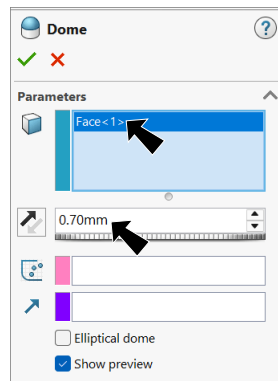


Fig. 27

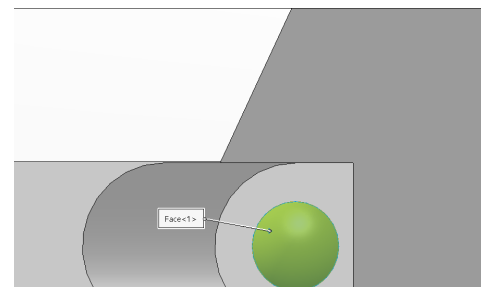



Fig. 56

Step 10. Save (Ctrl-S).

## L. Mirror2 Dome.

Step 1. Click Zoom to Fit  (F) and Down Arrow key .

Step 2. Ctrl click Right Plane, Cut-Extrude3, Split Line1 and Dome1 features, Fig. 57.

Step 3. Click Mirror  on the Features toolbar.

Step 4. In the Mirror Property Manager click OK .

Step 5. Save  (Ctrl-S).

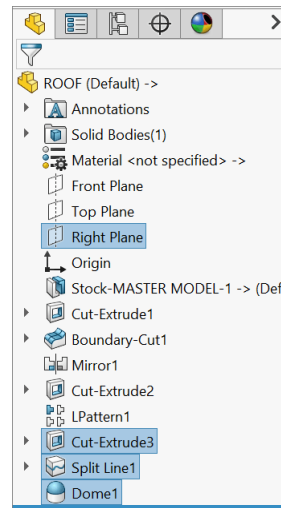


Fig. 57

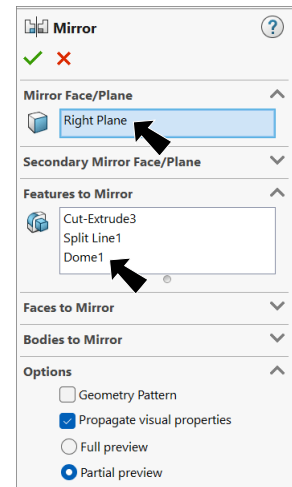


Fig. 58

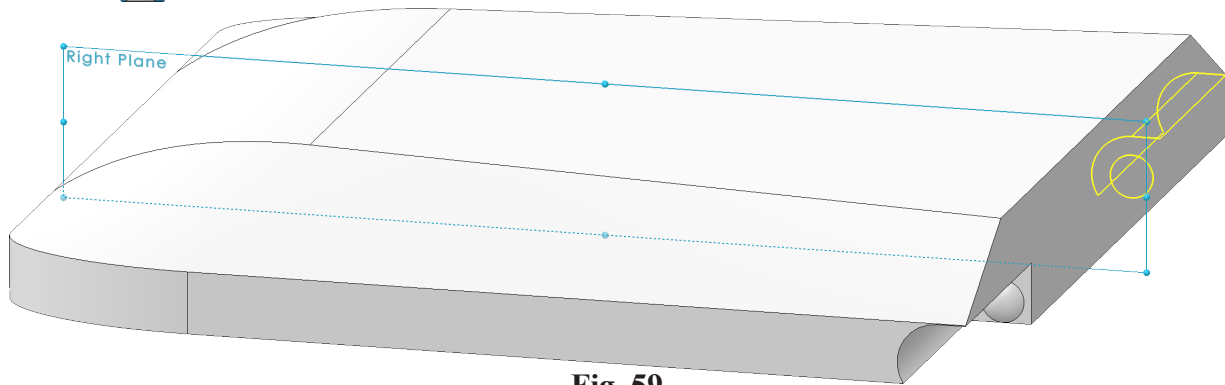


Fig. 59

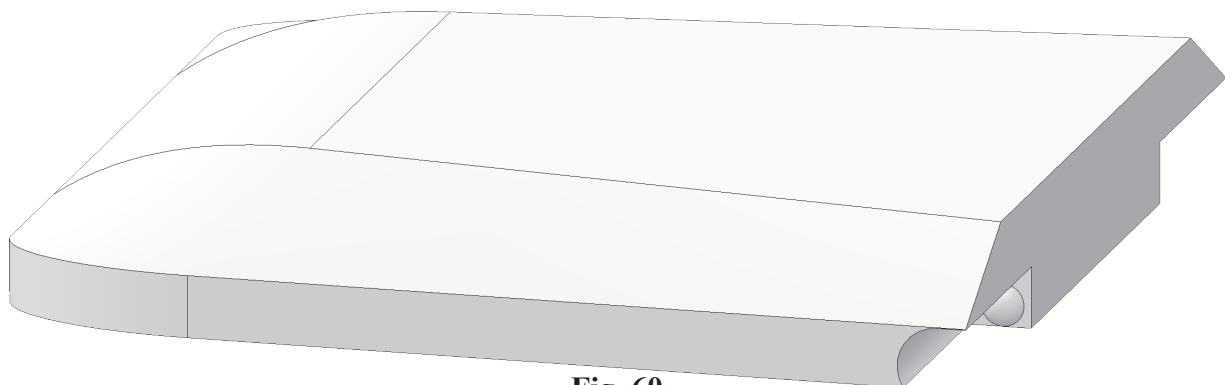






Fig. 60

## M. Appearance: Gray Plastic.

Step 1. Click **Isometric**  on the Standard Views toolbar. (Ctrl-7)

Step 2. Click the **Roof** to select part, click **Appearances Callout**  on the context toolbar and click **Roof** , Fig. 61.

Step 3. In the Appearances Task pane, expand **Plastic**, click **Medium Gloss** and in the lower pane select **light grey medium gloss plastic**, Fig. 62.

Step 4. In the Appearances Property Manager:  
 under Color, Fig. 63  
 set RGB values:  
**R 127**  
**G 127**  
**B 127**  
 click OK .

Step 5. Save  (Ctrl-S).

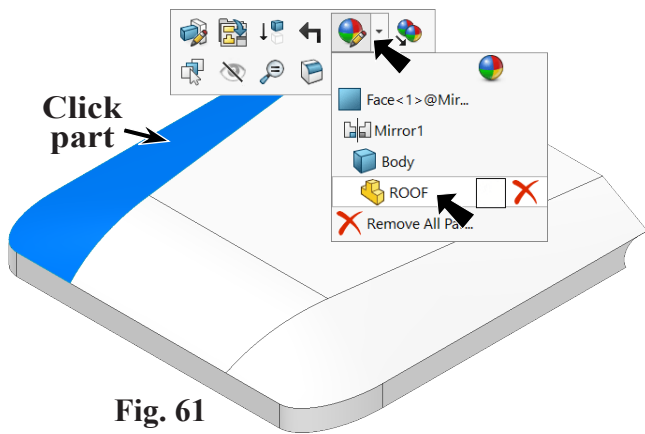


Fig. 61

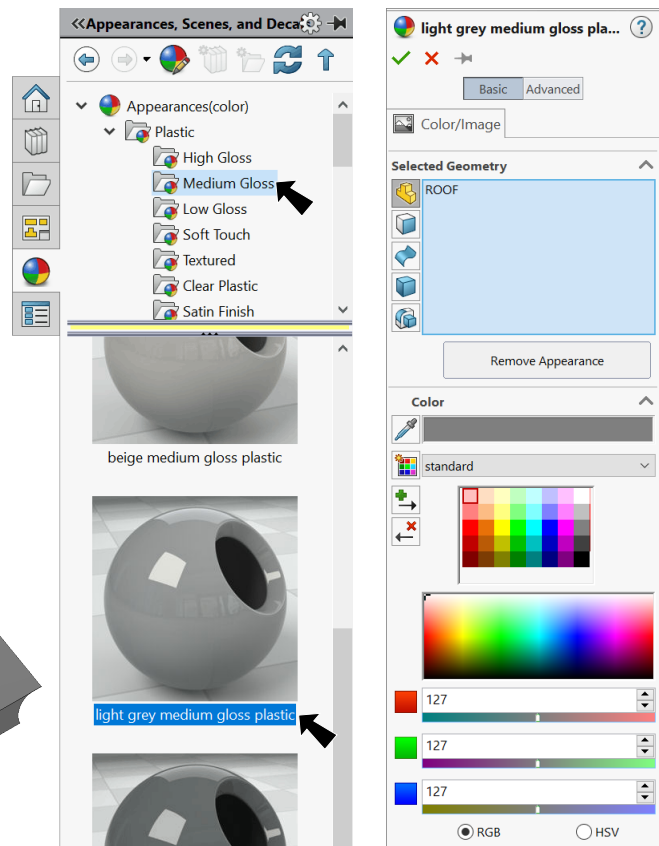


Fig. 62

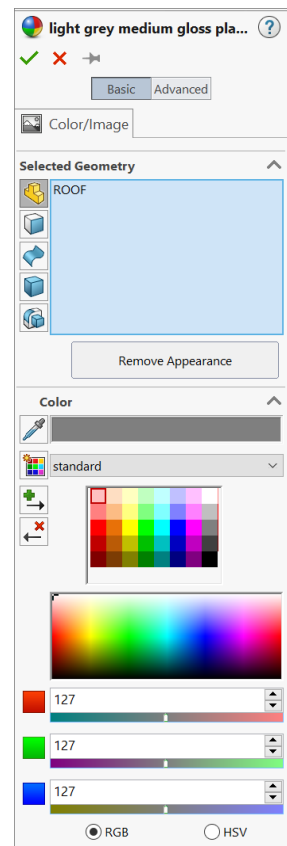


Fig. 63

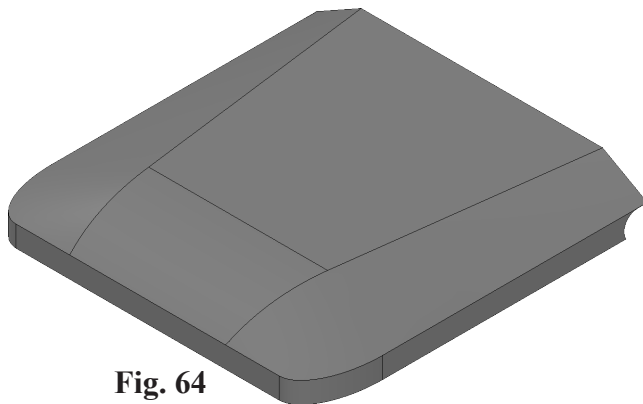


Fig. 64