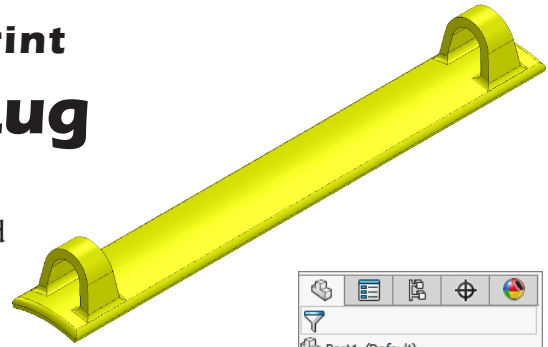


# Rocket 3D Print Launch Lug



## A. Sketch Circles.

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

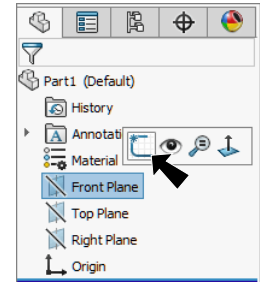


Fig. 1

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

Step 3. Sketch **three circles**. Start two at the Origin and sketch a smaller circle above circles, **Fig. 2**.

Step 4. Click **Line** (L) on the Sketch toolbar.

Step 5. Sketch **4 radii** from **Origin** to large circle, a horizontal and vertical and two at angle, **Fig. 3**.

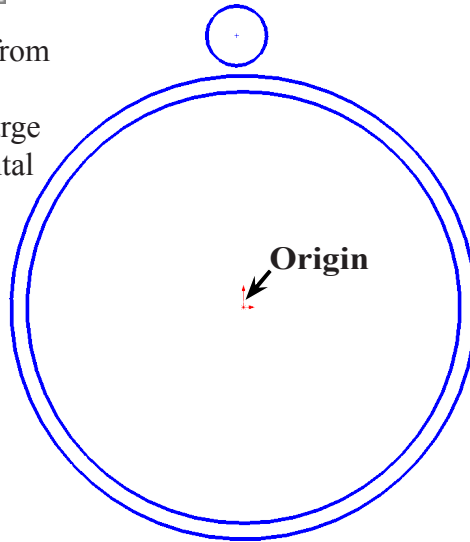


Fig. 2

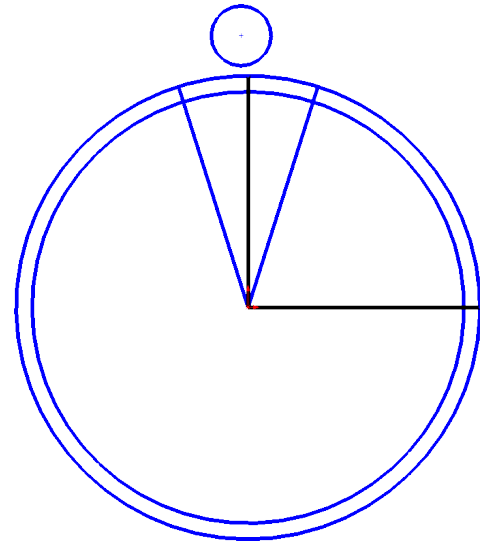


Fig. 3

Step 6. **Right click graphics area and click Select** from menu to unselect Line tool.

Step 7. **Ctrl click horizontal and vertical radii**. Release Ctrl key and click **Construction Geometry** on the context toolbar, **Fig. 4**.

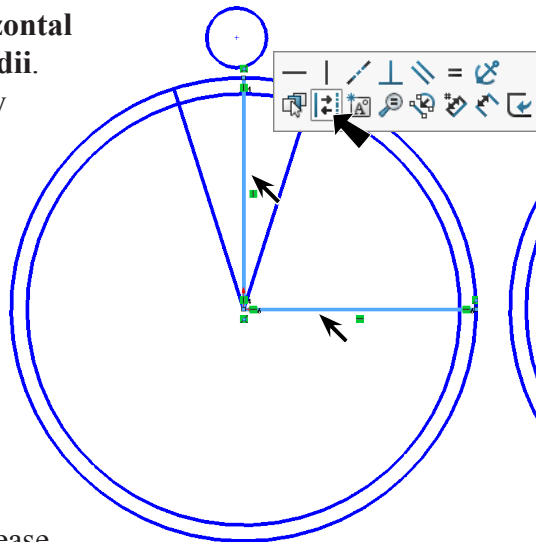


Fig. 4

Step 8. **Drag a "trend to left - more liberal" selection across all three radii**. Release Ctrl key and click

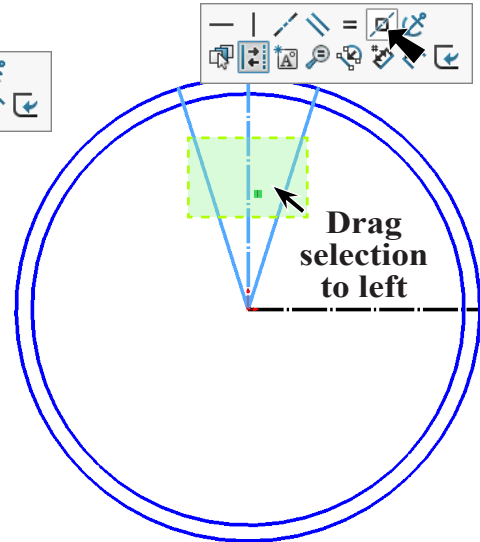



Fig. 5

**Make Symmetric** on the context toolbar, **Fig. 5**.

Step 9. **Ctrl click centerpoint of small circle and Origin**

to select both.  
Release Ctrl key  
and click **Make**

**Vertical**   
on the context  
toolbar, **Fig. 6**.

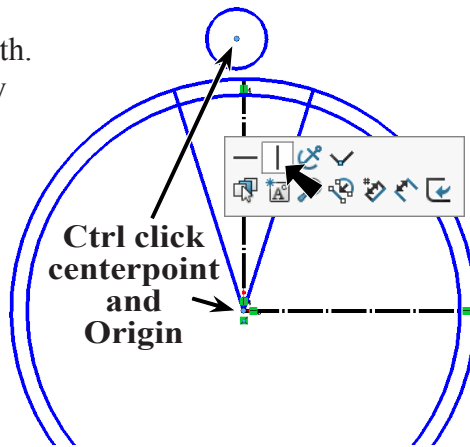



Fig. 6

Step 10. Click **Smart Dimension**

 (S)  
on the Sketch  
toolbar.

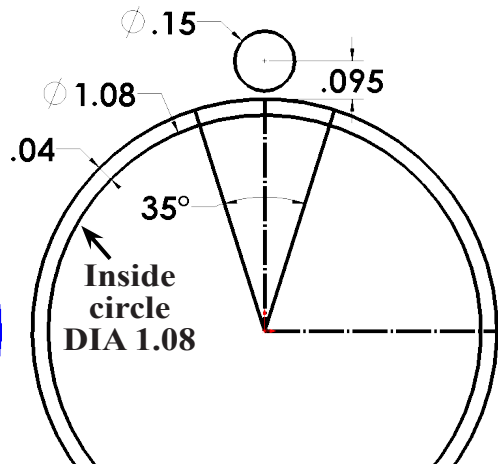


Fig. 7

Step 11. Add dimensions, **Fig. 7**. Be sure to dimension **inside circle 1.08**.

## B. Save as "LAUNCH LUG".

Step 1. Click File Menu > Save As.

Step 2. Key-in **LAUNCH LUG** for the filename and press ENTER.

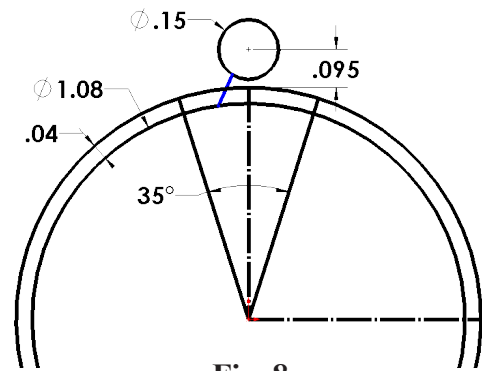



Fig. 8

## C. Sketch Lug.

Step 1. Click **Line**  (L) on the Sketch toolbar.

Step 2. Sketch line from small circle to inside circle, **Fig. 8**.

Step 3. **Right click graphics area and click Select** from menu to unselect Line tool.

Step 4. **Ctrl click small circle and line** to select both. Release Ctrl key and click **Make Tangent**  on the context toolbar, **Fig. 9**.

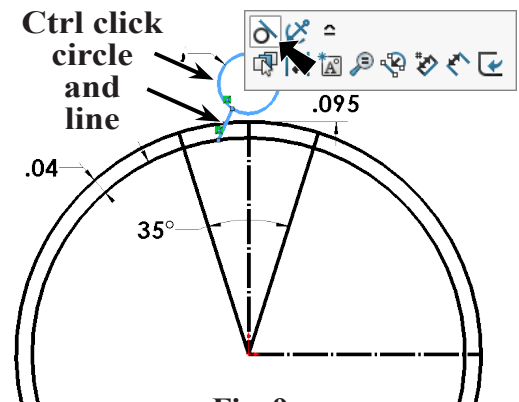


Fig. 9

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

Step 6. Add **80°** dimension, **Fig. 10**.

Step 7. **Right click graphics area and click Select** from menu to unselect Smart Dimension.

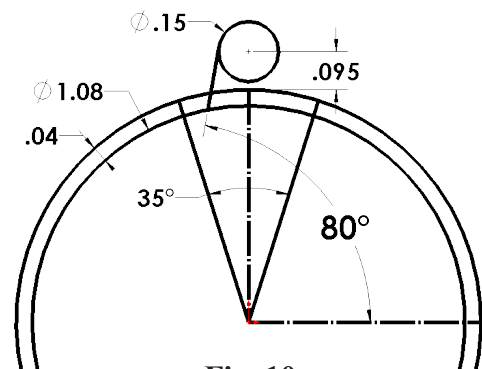


Fig. 10


Step 8. **Ctrl click line and centerline line** to select both, **Fig. 11.**

Step 9. Click **Mirror Entities**  **Mirror Entities** on the Sketch toolbar, **Fig. 13.**

Step 10. Click **Trim Entities**  **(S)** on the Sketch toolbar.



Step 11. In the Trim Property Manger:

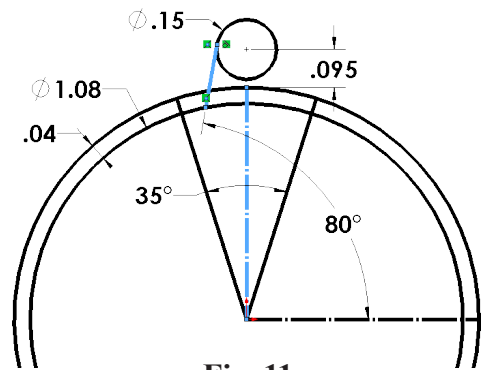
select **Trim to closest** , **Fig. 12**

Trim **bottom segment of small circle**, **Fig. 13.**  
 Click segment to trim.  
 Results shown in **Fig. 14.**  
 Click OK  when done.

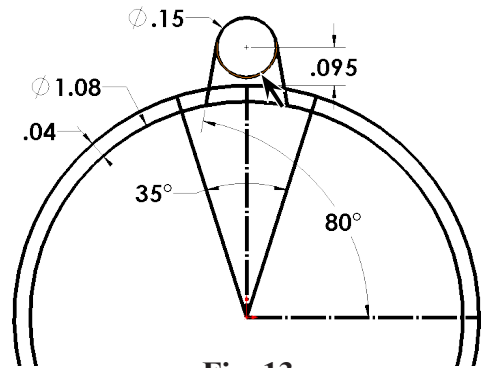
Step 12. Click **Offset Entities**  on the Sketch toolbar.

Step 13. In the Offset Entities Property Manager set:  
 under Parameters, **Fig. 15**

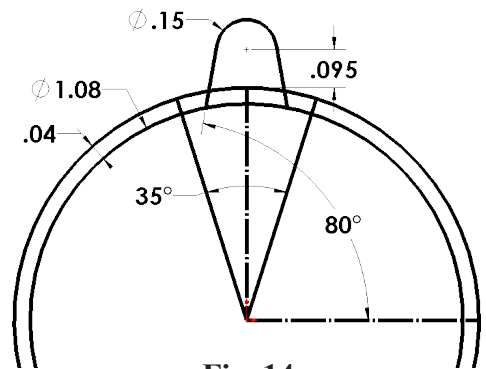
**Distance**  **.04**  
 check **Select chain**  
 click **line**, **Fig. 16**  
 click OK .



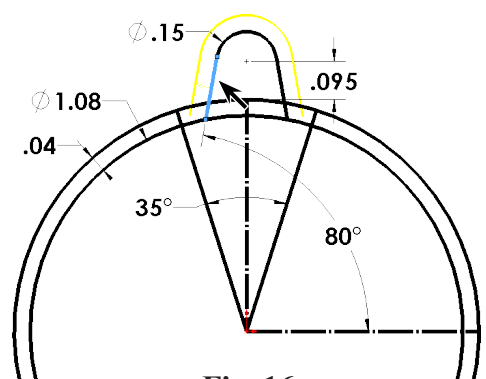
**Fig. 11**



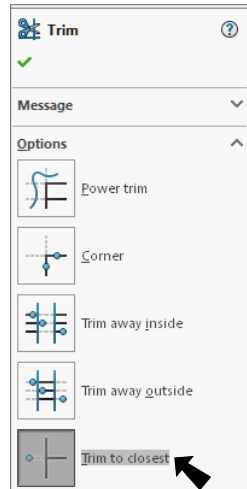
**Fig. 13**



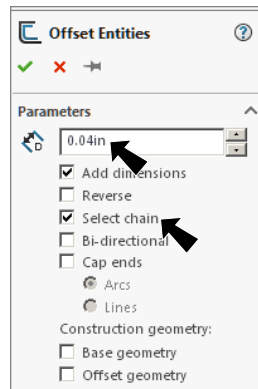
**Fig. 14**




**Fig. 16**



**Fig. 12**



**Fig. 15**

Step 14. Click **Features**  on the Command Manager toolbar.

Step 15. Click **Extruded Boss/Base**  on the Features toolbar.

Step 16. In the Boss-Extrude Property Manager set:

under Direction 1, **Fig. 17**

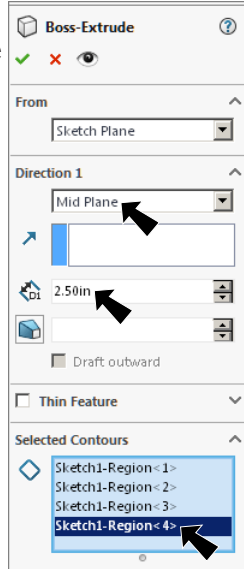
End Condition **Mid Plane**

**Depth**  **2.5**

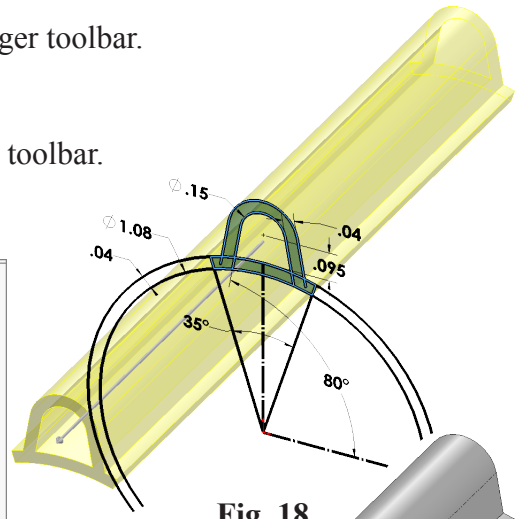
under Selected Contours

click **4 contours between circles and radii**, **Fig. 18**

click OK .



**Fig. 17**



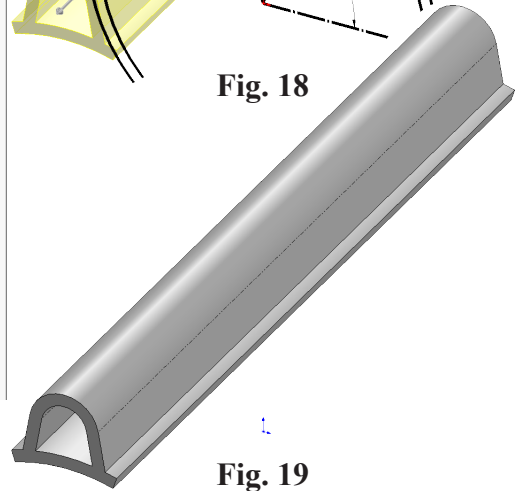
**Fig. 18**

Step 17. Save. Use **Ctrl-S**.

### D. Revolve Cut.

Step 1. Click **Right Plane**  in the Feature Manager and click

**Sketch**  on the context toolbar, **Fig. 20**.

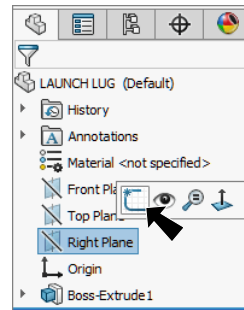


**Fig. 19**

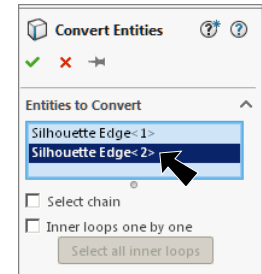
Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 3. Click **Wireframe**  on the View toolbar.

Step 4. Click **Convert Entities**  on the Sketch toolbar.



**Fig. 20**



**Fig. 21**

Step 5. In the Convert Entities Property Manager:

under Entities to Convert, **Fig. 21**

click **very top edge silhouette edge** and **silhouette edge of outside circle (top edge of group)**, **Fig. 22**

click OK .



**Fig. 22**


Step 6. Click **Line**  (L) on the Sketch toolbar.

Step 7. Sketch **line on left and right edges of part between converted lines and two lines at angle between converted lines**, **Fig. 23**. To terminate chain, double click back on the line you have just sketched.



Fig. 23

Step 8. **Right click graphics area and click Select** from menu to unselect Line tool.

Step 9. **Ctrl click both angled lines** to select both. Release Ctrl key and click **Make Equal**  on the context toolbar, **Fig. 24**.

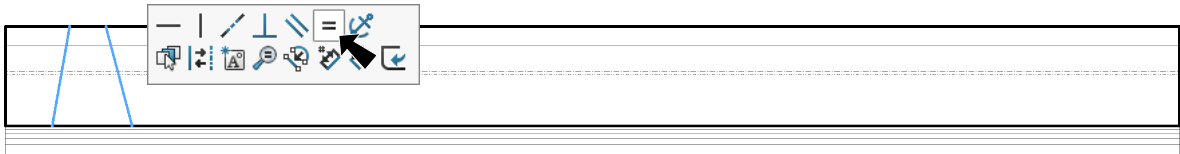


Fig. 24

Step 10. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 11. Add dimensions, **Fig. 25**.

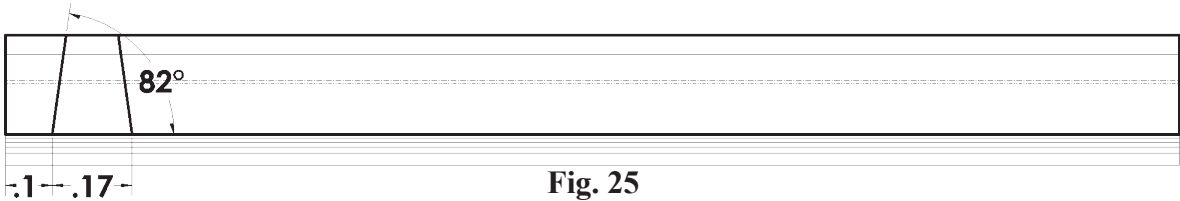


Fig. 25

Step 12. Click **Centerline**  in the **Line flyout**  on the Sketch toolbar.

Step 13. Sketch **vertical line from Midpoint**  of part up beyond top converted edge, **Fig. 26**.

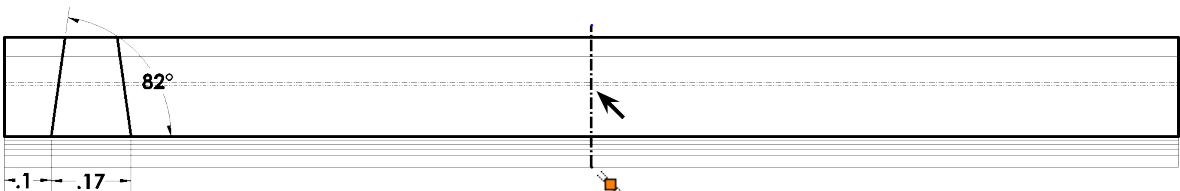
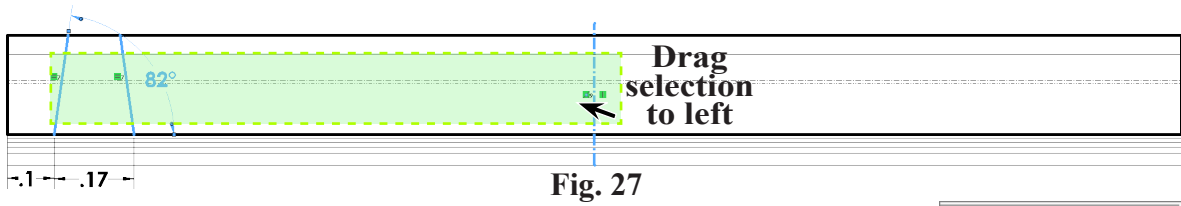


Fig. 26

Step 14. **Right click graphics area and click Select** from menu to unselect Centerline tool.

Step 15. Drag a selection to right across left edge line and centerline which will include the angled lines, Fig. 27.



Step 16. Click **Mirror Entities**  on the Sketch toolbar, Fig. 29.

Step 17. Click **Trim Entities**  (S) on the Sketch toolbar.

Step 18. In the Trim Property Manger:

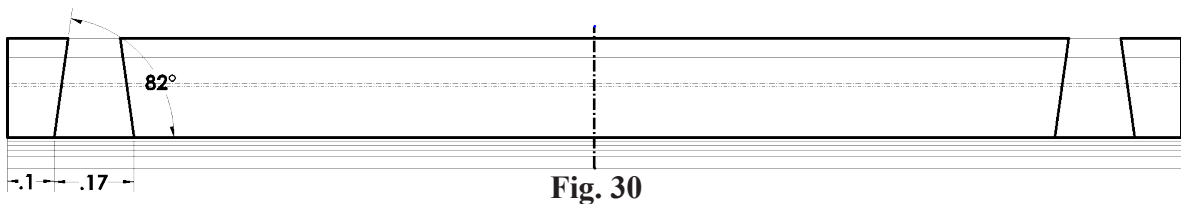
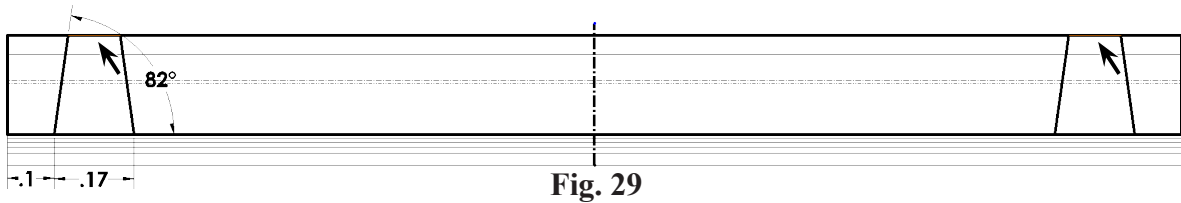
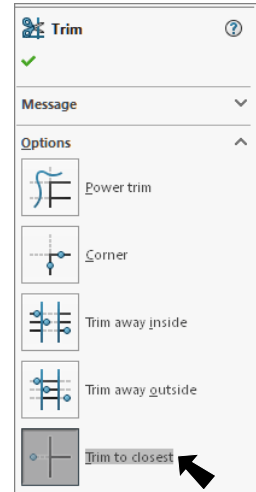
select **Trim to closest** , Fig. 28

Trim the segment on top convert line between angled lines, Fig. 29.

Click segments to trim.

Results shown in Fig. 30.

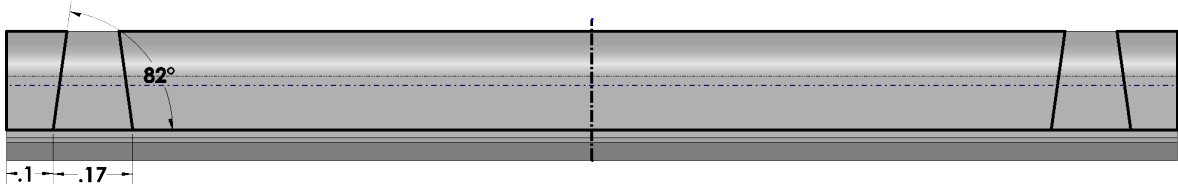
Click OK  when done.



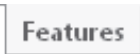
Step 19. Click **Shaded With Edges**  on the View toolbar.

Step 20. Show Temporary Axes. Click View Menu > Show/Hide > Temporary Axes. (**Alt-V H X**)

Step 21. Click to select the Axes thru the Origin, **Fig. 31**.



**Fig. 31**

Step 22. Click **Features**  on the Command Manager toolbar.

Step 23. Click **Revolved Cut**  on the Features toolbar.

Step 24. In the Revolved Cut Property Manager set:

under Axis of Revolution, **Fig. 32**

**Axis 1** should be selected

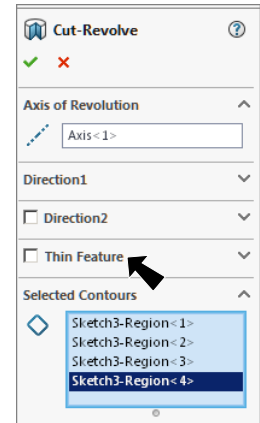
uncheck **Thin Feature**

under Selected Contours

click in the Selected Contours box and

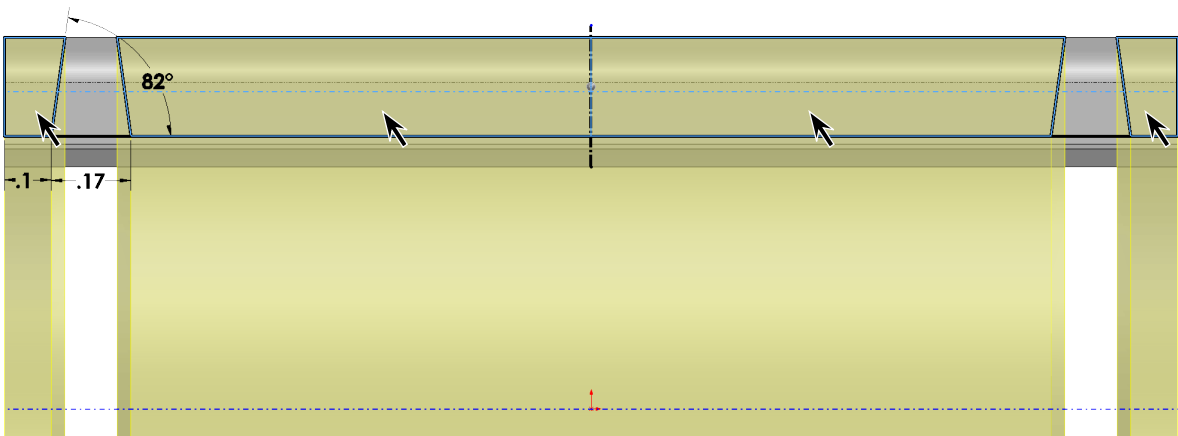
click the **4 contours**, **Fig. 33**

click OK .



**Fig. 32**

Step 25. Hide Temporary Axes. Click View Menu > Show/Hide > Temporary Axes. (**Alt-V H X**)



**Fig. 33**

## E. Fillet.

Step 1. Click **Trimetric**  on the Standard Views toolbar.

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

Step 3. In the Fillet Property Manager set:

select **FilletXpert**, Fig. 34

**Radius**  **.023**

click **top face**, Fig. 35

click **OK** .

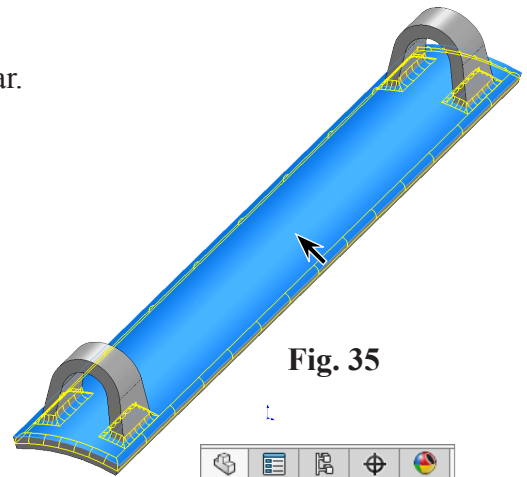


Fig. 35

## F. Material ABS Plastic.

Step 1. **Right click Material**  in the Feature Manager and click **Edit Material**, Fig. 36.

Step 2. Expand **Plastics** in the material tree and select **ABS**. Click **Apply** and **Close**.

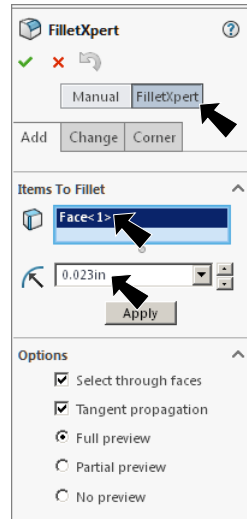


Fig. 34

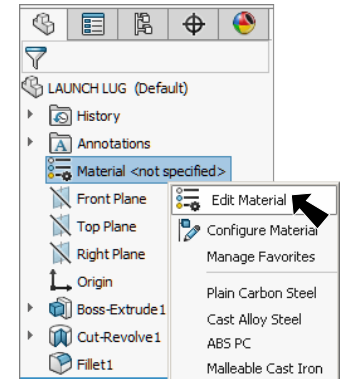




Fig. 36

## G. Appearance Color.

Step 1. Click the part, click **Appearance Callout**  on the context toolbar and click **LAUNCH L** , Fig. 37.

Step 2. In the Appearances Property Manager,

under **Color**, Fig. 38

set **RGB values**

**R 243**

**G 255**

**B 0**

click **OK** .

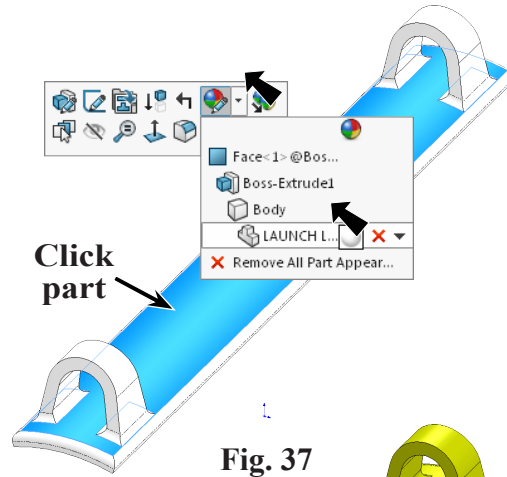


Fig. 37

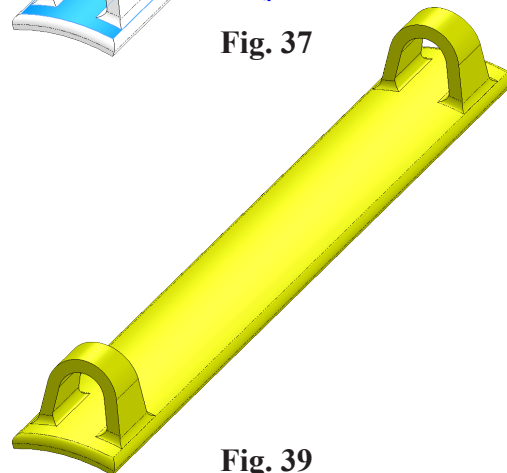


Fig. 39

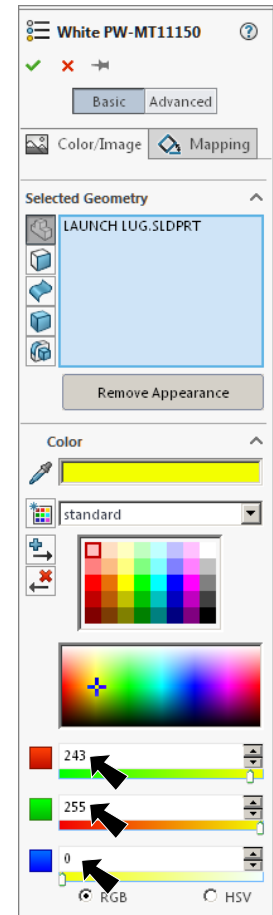


Fig. 38