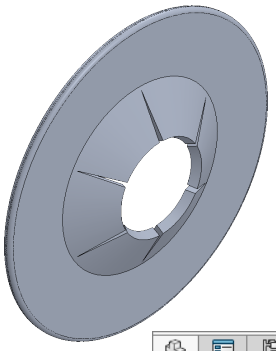
Chapter 17

# CO2 Shell Car
# Axle Retainer



## A. Revolve Thin Feature.

Step 1. Click File Menu > New, click **Part Metric** and OK.

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

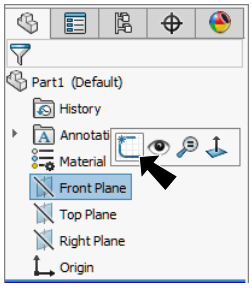


**Fig. 1**

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

Step 4. Sketch a line starting directly above the Origin but do not sketch the line to the Origin, **Fig. 2**. Sketch a second line from bottom end-point of first line at angle to the right. Do not bring the angle line down to Origin.

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

Step 6. Add dimensions, **Fig. 3**.

Step 7. Click **Centerline** in the **Line flyout** on the Sketch toolbar.

Step 8. Sketch a **horizontal centerline** from the Origin, **Fig. 4**.

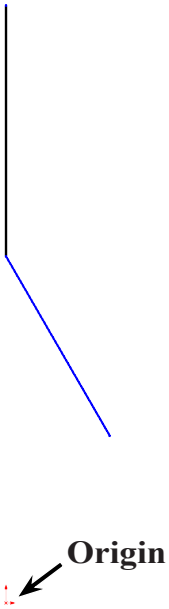


**Fig. 2**

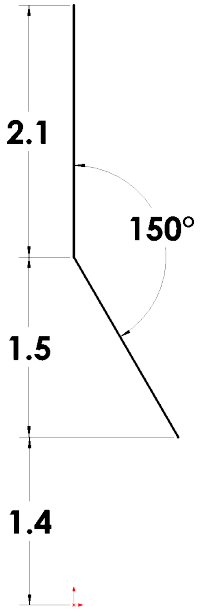


**Fig. 3**

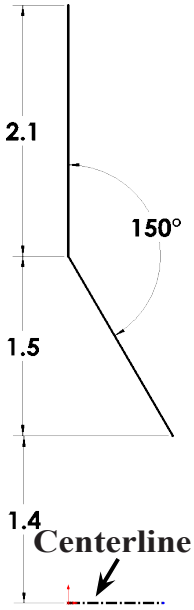


**Fig. 4**

Step 9. Click **Features** on the Command Manager toolbar.

Step 10. Click **Revolved Boss/Base** on the Features toolbar.

Step 11. Click **No** to automatically close sketch, **Fig. 5**.

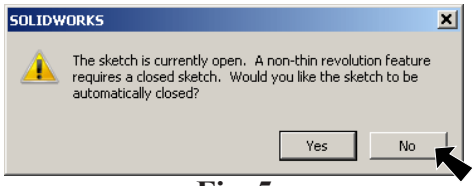


**Fig. 5**

Step 12. Click **Front** on the Standard Views toolbar. (**Ctrl-1**)

Step 13. In the Revolve Property Manger set:
under Thin Feature, **Fig. 6**
click **Reverse direction**
Thin feature should be to **right of sketch**, if in opposite direction, click Reverse direction, **Fig. 7**
**Direction 1 Thickness** **.3**
click OK .

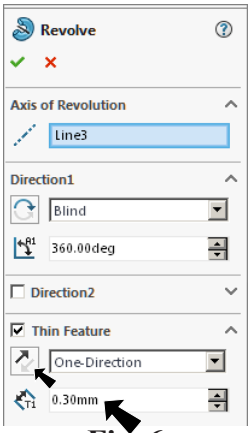


**Fig. 6**

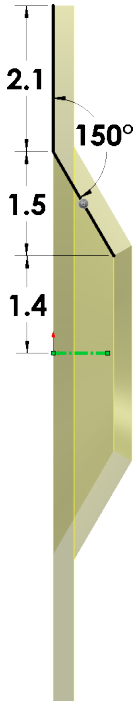


**Fig. 7**

## B. Save as "AXLE RETAINER".

Step 1. Click File Menu > Save As.

Step 2. Key-in **AXLE RETAINER** for the filename and press ENTER.

## C. Cut.

Step 1. Click **Right Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 8**.

Step 2. Click **Left** on the Standard Views toolbar. (**Ctrl-3**)

Step 3. Click **Midpoint Line** in the **Line flyout** on the Sketch toolbar.

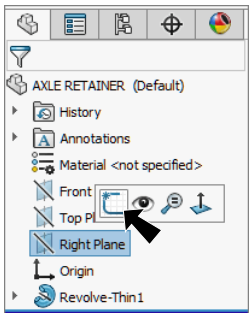


**Fig. 8**

Step 4. Sketch a horizontal line out from the Origin and continue line up to edge of body and back to other endpoint of horizontal line, **Fig. 9**.

Step 5. **Right click graphics area and click Select** from menu to unselect Line tool.

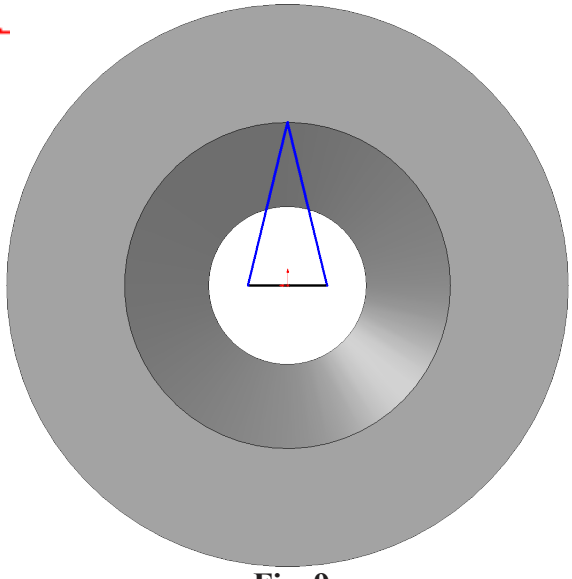


**Fig. 9**

Step 6. **Ctrl click top endpoint of line** and **Origin** to select both. Release Ctrl key and click **Make Vertical** on the context toolbar, **Fig. 10**.

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

Step 8. Dimension horizontal line **.3**, **Fig. 11**.

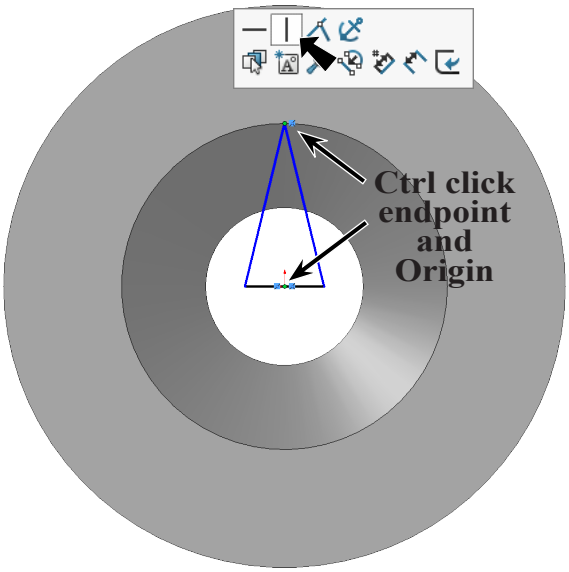



**Fig. 10**

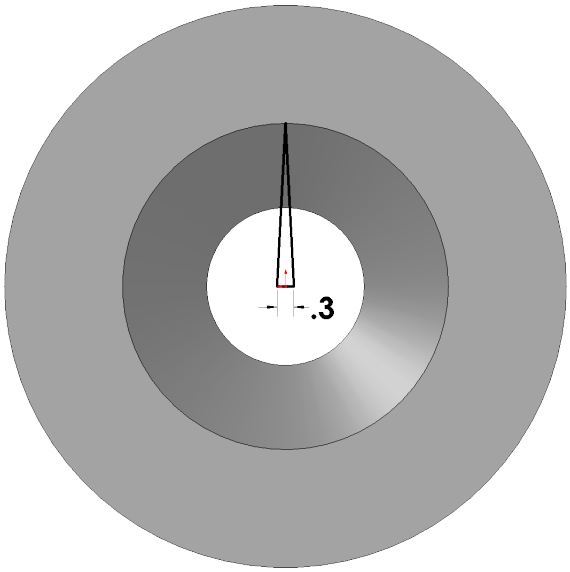



**Fig. 11**

Step 9. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

Step 10. Click **Features** on the Command Manager toolbar.

Step 11. Click **Extruded Cut** on the Features toolbar.

Step 12. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 12**
End Condition **Through All**
click **Reverse Direction**
**Direction arrow** should point **to right**, **Fig. 13**
click OK .

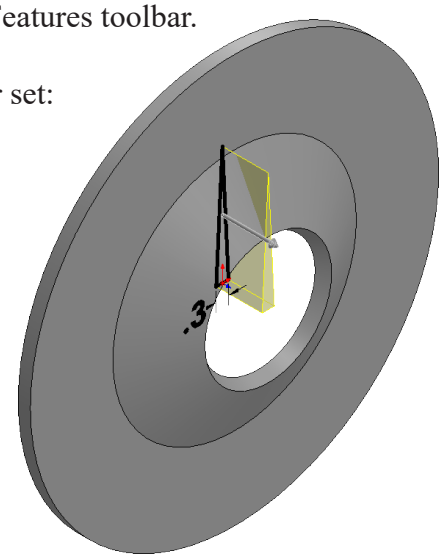



**Fig. 13**

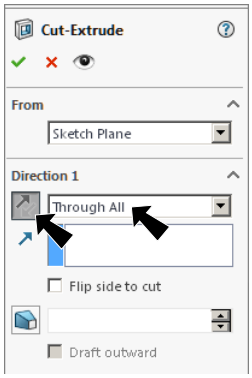
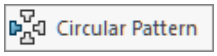



**Fig. 12**

## D. Circular Pattern.

Step 1. Click **Circular Pattern** 

in the **Linear Pattern flyout** 

on the Features toolbar.

Step 2. In the Circular Pattern Property Manager set:
under Features and Faces, **Fig. 14**
click **Cut-Extrude1** in graphics area, **Fig. 15**
under Parameters
click in **Pattern Axes** box
click **cylindrical face Retainer**
**Number of Instances**  **6**
check **Equal spacing**
click OK  .

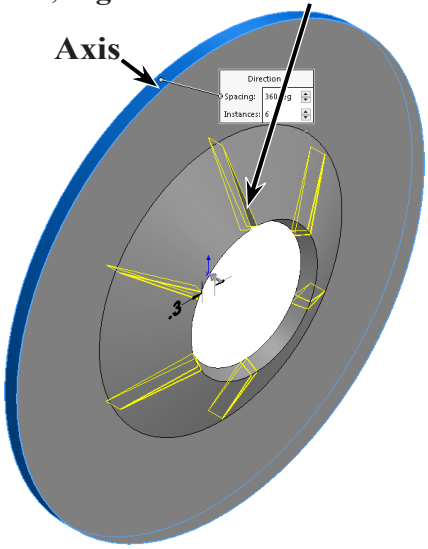


**Fig. 15**

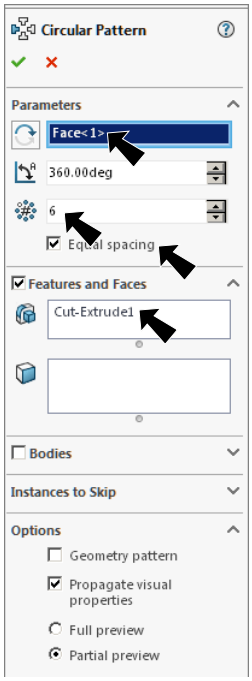


**Fig. 14**

## E. Fillet.

Step 1. Click **Fillet** 

on the Features toolbar.

Step 2. In the Fillet Property Manager:
select **FilletXpert**, **Fig. 16**
**Radius**  **.13**
click **outside cylindrical face**, **Fig. 17**
click OK  .

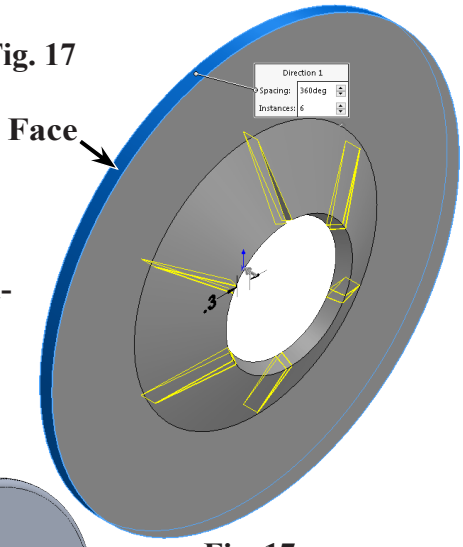


**Fig. 17**

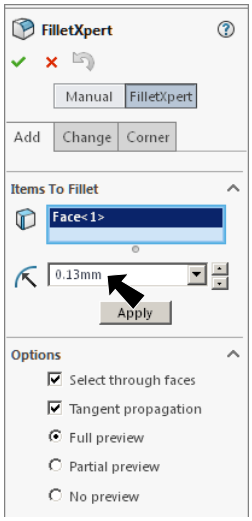


**Fig. 16**

## F. Material Aluminum.

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

Step 2. **Expand Aluminum Alloys** in the material tree and select **1060 Alloy**. Click **Apply** and **Close**.

Step 3. Save. Use **Ctrl-S**.

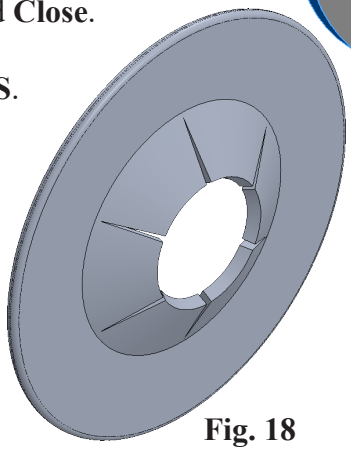


**Fig. 18**