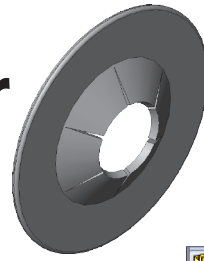




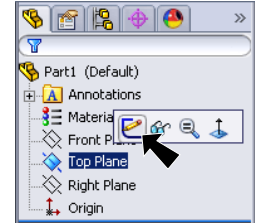
# CO2 Shell Car Axle Retainer



## A. Sketch.


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

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



**Fig. 1**

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

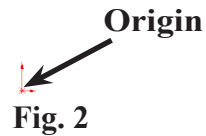
Step 4. Draw a line starting directly above the Origin  but do not draw the line to the Origin, **Fig. 2**. Draw a second line from the end of the first line at an angle to the right. Do not bring the angle line down to the Origin.

Use the inferencing line, the dotted line that appears when you draw the lines. Use **L** key to start and end line.

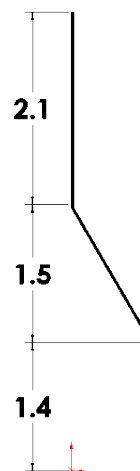
Step 5. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 6. Add the dimensions as shown in **Fig. 3**.

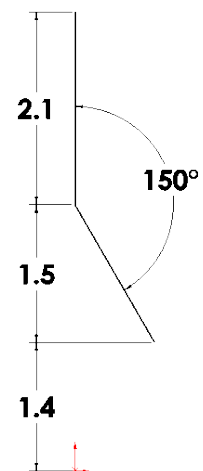
Step 7. Dimension the angle between the top line and angle line **150 degrees** as shown in **Fig. 4**. To Smart dimension the angle click both lines then move the cursor out away from the lines and click. Key-in **150** for the dimension and press ENTER.



**Fig. 2**



**Fig. 3**



**Fig. 4**

## 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. Offset Entities.

Step 1. Click **Offset Entities**  on the Sketch toolbar.

Step 2. In the Offset Entities Property Manager set:  
**Distance .3**  
**Select chain, Fig. 5.**

**click a line of the sketch.**

The yellow offset spline should be on the right of the initial green lines, **Fig. 6**. If it is not, click Reverse. Click OK .

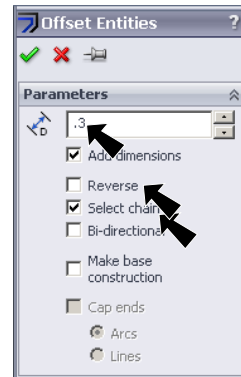


Fig. 5

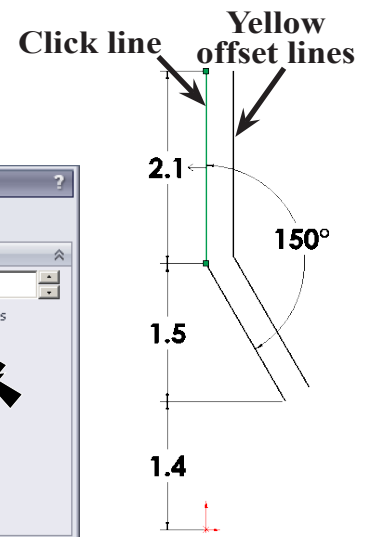


Fig. 6



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


## D. Connect Ends of Offsets.

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

Step 2. Draw lines to connect the ends of the offset lines, **Fig. 7**.

## E. Centerline.

Step 1. Click **Centerline**  in the **Line flyout**  (S) on the Sketch toolbar.

Step 2. Starting from the Origin , draw a centerline across the bottom of the sketch extending the centerline out past the sketch, **Fig. 8**.

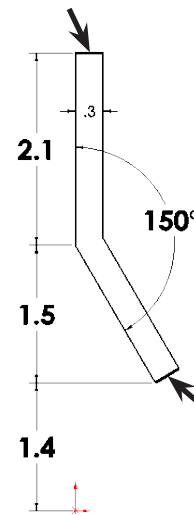


Fig. 7

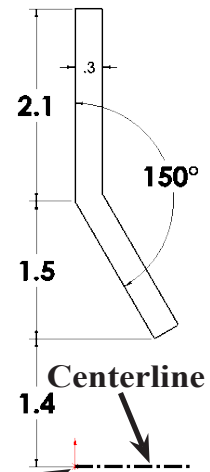



Fig. 8

## F. Revolve.

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

Step 2. Click **Revolved Boss/Base**  on the Features toolbar.

Step 3. Click OK  in the Revolve Property Manager, **Fig. 9** and **Fig. 10**.

Step 4. Click **Zoom to Fit**  (F) on the View toolbar.

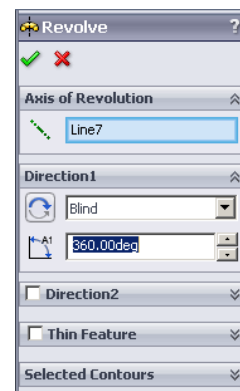


Fig. 9

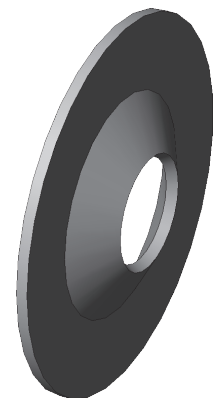




Fig. 10

## G. Sketch Cut.

Step 1. Click **Left**  on the Standard Views toolbar. (Ctrl-3)

Step 2. Click the back face of the body and click **Sketch**  on the Content menu, **Fig. 11**.

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

Step 4. Draw a horizontal line across away from the Origin, **Fig. 12**.

Step 5. **Right click drawing and click Select** from menu to unselect **Line**.

Step 6. **Ctrl click line and Origin** to select both. **Release Ctrl key** and click **Make Midpoint**  on the Content menu, **Fig. 13**.

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

Step 8. Draw **two lines** as shown in **Fig. 14**.

Step 9. Click **Smart Dimension**  on the Sketch toolbar.

Step 10. Dimension the horizontal line **.3**, **Fig. 15**.

Step 11. Save. Use **Ctrl-S**.

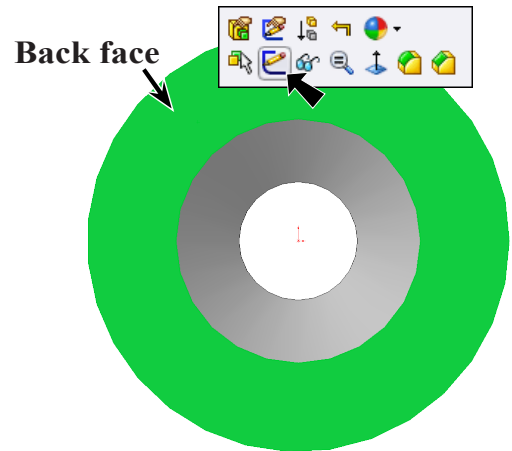


Fig. 11

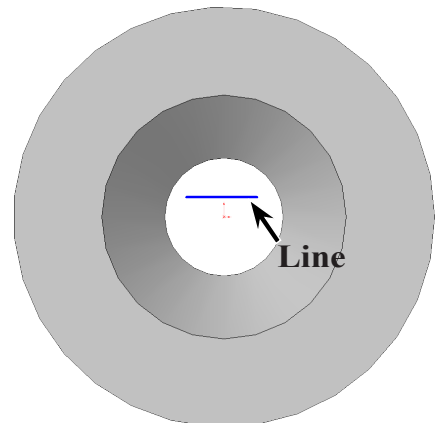


Fig. 12

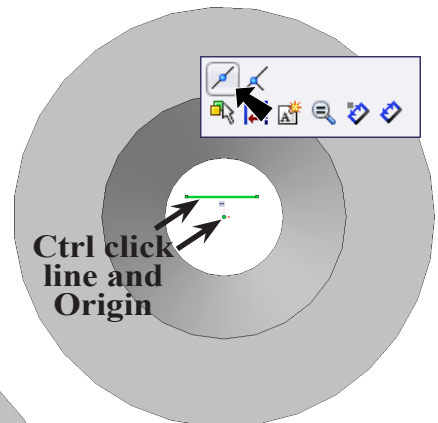


Fig. 13

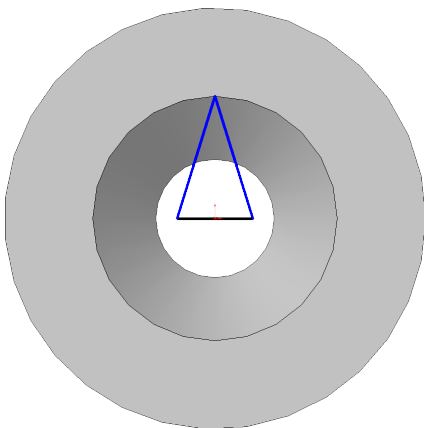


Fig. 14

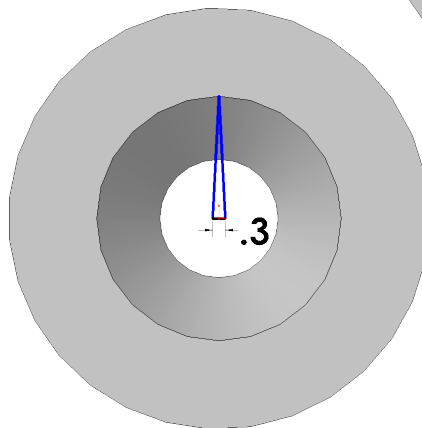
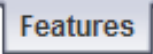
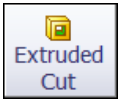



Fig. 15

## H. Extrude Cut.

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

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

Step 3. In the Property Manager set:  
 under **Direction 1**  
**End Condition to Through All**  
 click OK , Fig. 16 and Fig. 17.

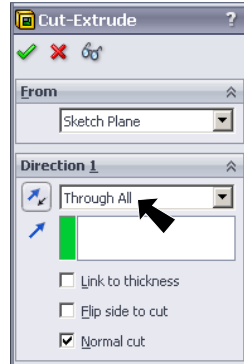


Fig. 16

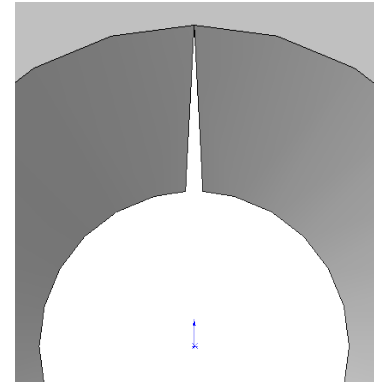


Fig. 17

## I. Circular Pattern Cut.

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

Step 2. Click View Menu > Temporary Axes. (Alt-V X)

Step 3. Click **Cut-Extrude1** in the Feature Manager to select the feature, Fig. 18.

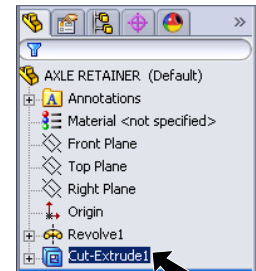






Fig. 18

Step 4. Click **Circular Pattern**  in the **Linear Pattern** flyout  on the Features toolbar. Be sure to click the flyout arrow  to select Circular Pattern.

Step 5. In the Circular Pattern Property Manager set:  
 under **Parameters**   
 for Axis, click the temporary axis in drawing, Fig. 19

**Number of Instances**  6, Fig. 20  
 check **Equal spacing**, Fig. 20

click OK , Fig. 21.

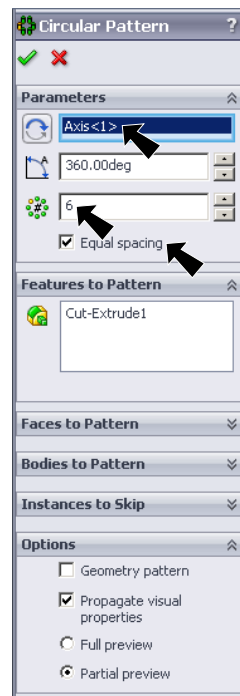


Fig. 20

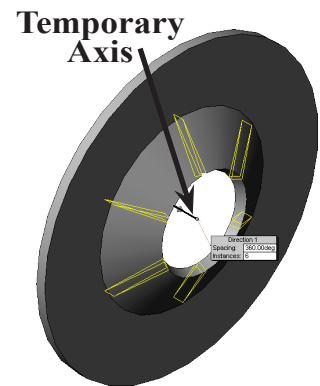


Fig. 19

Step 6. Save. Use Ctrl-S.

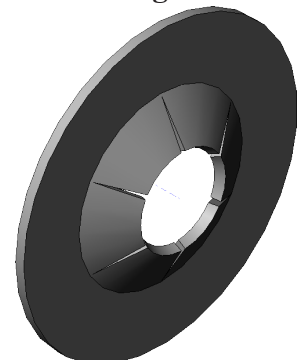


Fig. 21

## J. Fillet Edges of Hub.

Step 1. **Turn off** Temporary Axes. Click View Menu > Temporary Axes. (Alt-V X)

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

Step 3. In the Property Manager set:

**Radius**  .13, Fig. 22

click **outside cylindrical face**, Fig. 23

click **OK** , Fig 24.

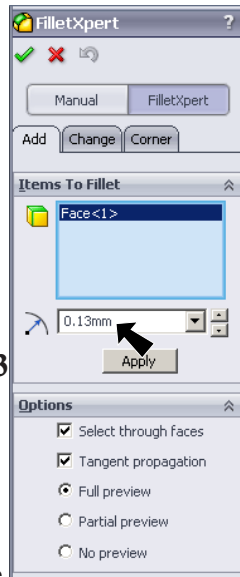


Fig. 22

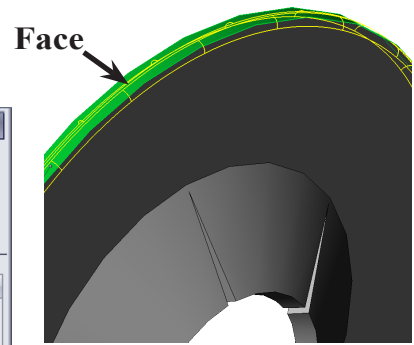


Fig. 23

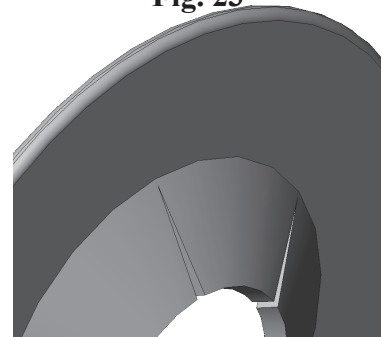



Fig. 24

## K. 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**.

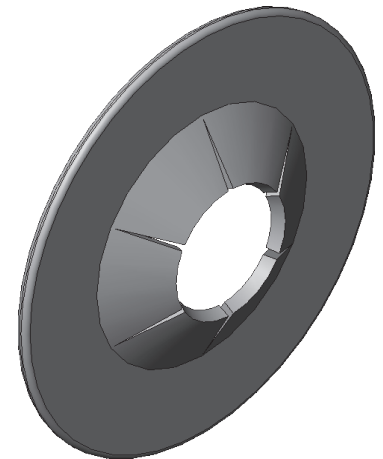


Fig. 25