Chapter 7

Rail Car E
E-Clip

A. Sketch Circles.

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

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

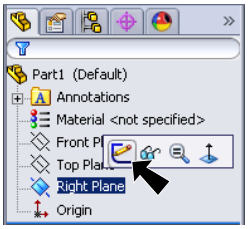


Fig. 1

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

Step 4. Draw **three circles** starting at the Origin , **Fig. 2**.

Step 5. Click **Fully Defined Sketch** (**D**) on the Sketch toolbar and OK in the Property Manager.

Step 6. Dimension the circles as shown in **Fig. 2**.

Step 7. Click **Zoom to Fit** (**F**) on the View toolbar.

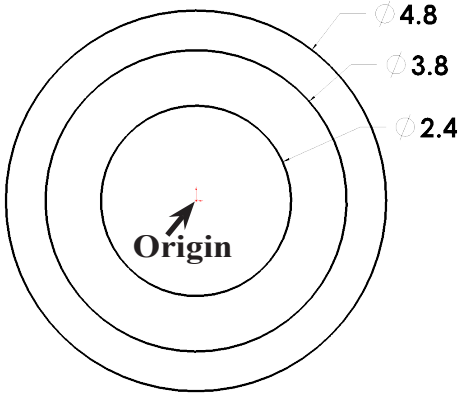


Fig. 2

B. Save as "E CLIP".

Step 1. Click File Menu > Save As.

Step 2. Key-in **E CLIP** for the filename and press ENTER.

C. Add Lines.

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

Step 2. Starting from the Origin draw **two lines** out to the middle circle. Keep **one line horizontal** and the other at angle as shown in **Fig. 3**. To restart the line, **right click** and select **End Chain** from menu.

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

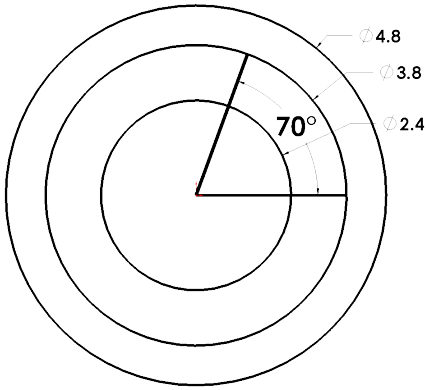


Fig. 3

Step 4. Dimension the angle between the lines **70 degrees** as shown in **Fig. 3**. To Smart dimension the angle click both lines then move the cursor out away from the lines and click. Key-in **70** for the dimension and press ENTER.

D. Trim 1.

Step 1. Click **Trim Entities** 

on the Sketch toolbar.

Step 2. In the Property Manger select **Trim to closest**  , **Fig. 4**.
Click entities to trim, **Fig. 5**.
Results shown in **Fig. 6**.

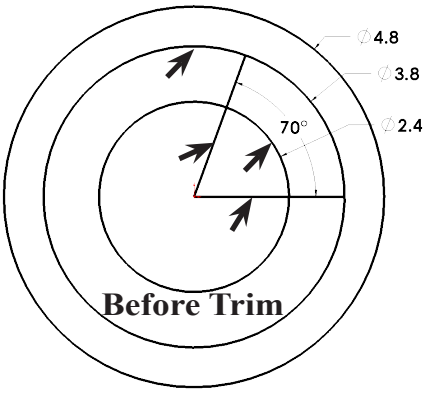


Fig. 5

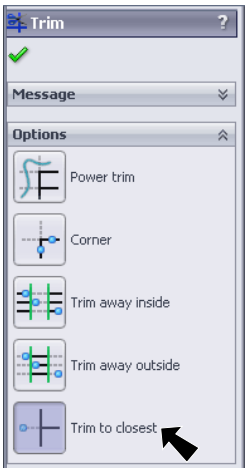


Fig. 4

E. Centerline.

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

Step 2. Draw a vertical centerline starting from the Origin  and extending out pass the top of large circle, **Fig 7**.
Continue a second centerline back down at angle and extending outside bottom of large circle as shown in **Fig 7**.

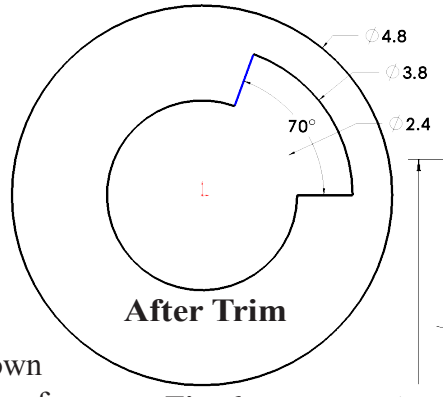


Fig. 6

Step 3. Click **Smart Dimension** 

(S) on the Sketch toolbar.

Step 4. Dimension the vertical centerline **6.5** and the angle between centerlines **8 degrees** as shown in **Fig. 7**.

Step 5. Save. Use **Ctrl-S**.

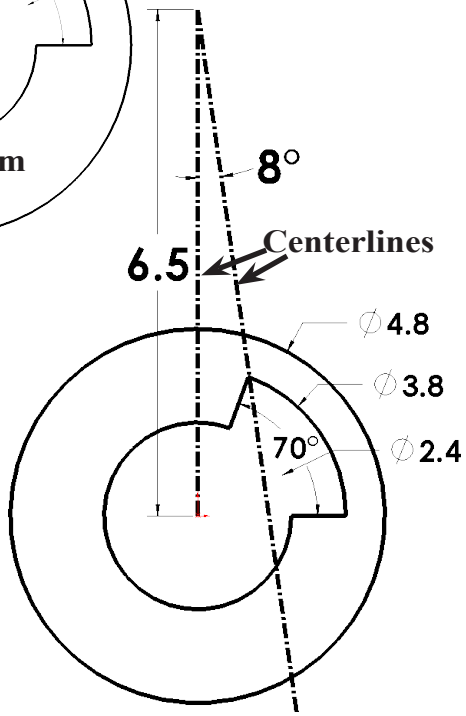


Fig. 7

F. Trim 2.

Step 1. Click **Trim Entities** 

on the Sketch toolbar.

Step 2. In the Property Manger select **Trim to closest**  and click entities to trim, **Fig. 8**. Results shown in **Fig. 9**.

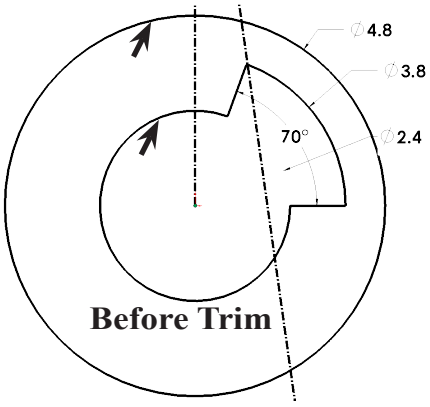


Fig. 8

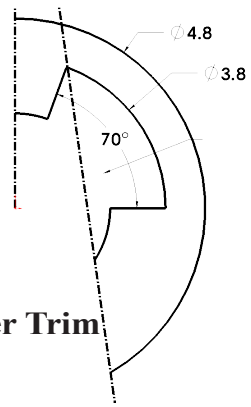


Fig. 9

G. Add Line.

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

Step 2. Draw a line to close bottom of clip as shown in **Fig. 10**.

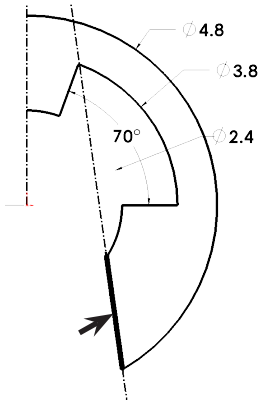


Fig. 10

H. Sketch Fillets.

Step 1. Click **Sketch Fillet**  on the Sketch toolbar.

Step 2. In the Sketch Fillet Property Manager set:

Radius  **.3**, **Fig. 11**
click **top two corners** shown in **Fig. 12**
click OK 

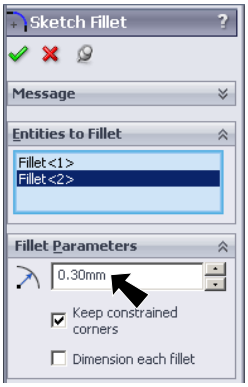


Fig. 11

Radius  **.35**, **Fig. 13**
click **bottom corner** shown in **Fig. 12**
click OK **twice**  when done.

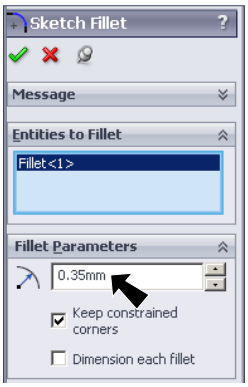


Fig. 13

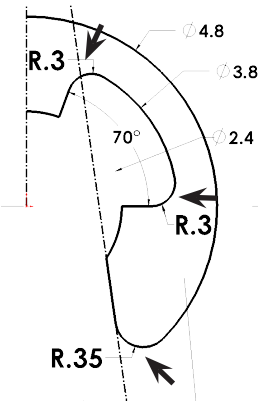
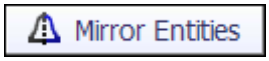


Fig. 12

I. Mirror Geometry.

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

Step 2. In the Mirror Property Manager set:
under **Entities to mirror:**
click in the **Entities to mirror**  box**, Fig. 14**

in the sketch, **drag a selection around all the geometry** as shown in **Fig. 15**
click in **Mirror about**  box, **Fig. 14**

click **vertical centerline as entity to mirror about**, **Fig. 15**

click OK  **Fig. 16**.

Drag a selection around all geometry

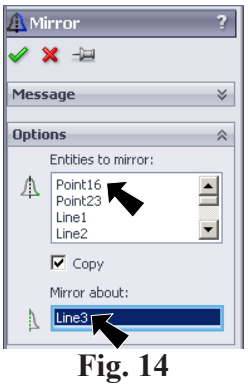


Fig. 14

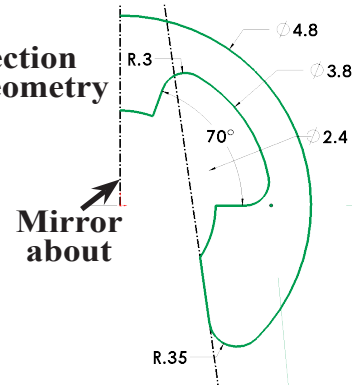


Fig. 15

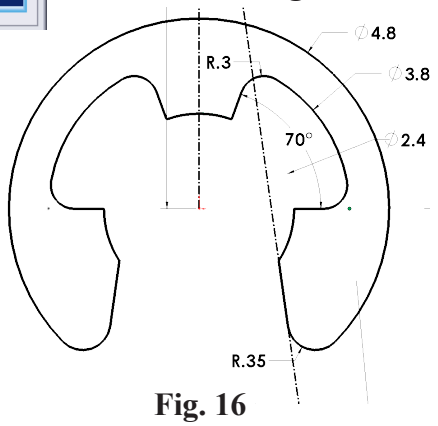
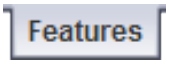
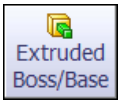


Fig. 16

J. Extrude.

Step 1. Click **Features** 

on the Command Manager toolbar.

Step 2. Click **Extruded Boss/Base** 

on the Features toolbar.

Step 3. In the Property Manager set:

End Condition **Mid Plane**

Depth  **.25**

click OK  , **Fig. 17** and **Fig. 18**.

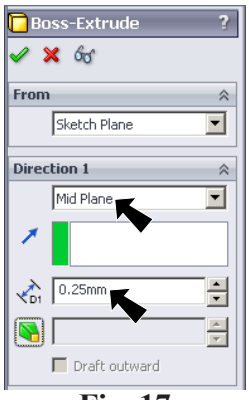
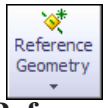


Fig. 17


Fig. 18

K. Mate Reference.

Step 1. Click the **inside cylindrical face** to select it, **Fig. 19**.

Step 2. Click **Reference Geometry** 

on the Features toolbar and **Mate Reference** from the menu.

Step 3. In the Mate Reference Property Manager click OK  , **Fig. 20**.

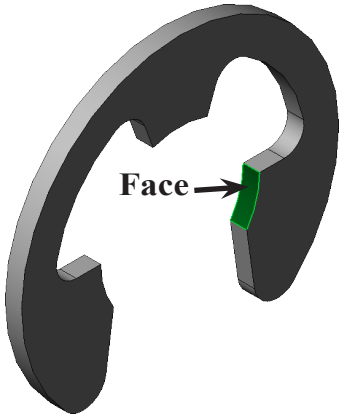


Fig. 19

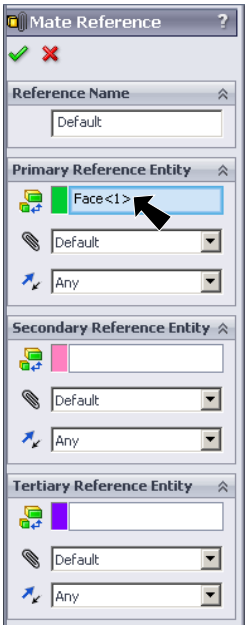


Fig. 20

L. Material Stainless Steel.

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

Step 2. **Expand Steel** in the material tree and select **AISI 316 Stainless Steel Sheet**. Click **Apply** and **Close**.

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