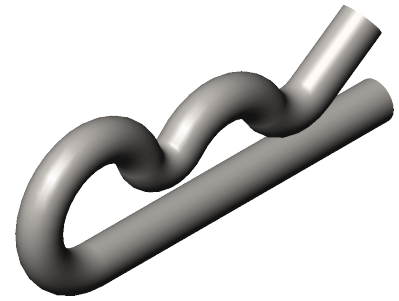




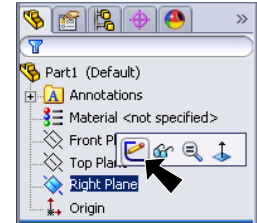
# CO2 Shell Car Hair Pin Clip



## A. Sketch Lines.


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

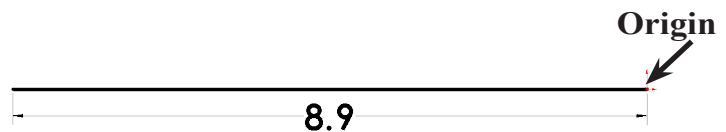
Step 2. Click **Right Plane**  in the Feature Manager and click **Sketch**  from the Content toolbar, **Fig. 1**.



**Fig. 1**

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

Step 4. Draw a horizontal line as shown in **Fig. 2**. Start at the Origin  and draw to left.



**Fig. 2**

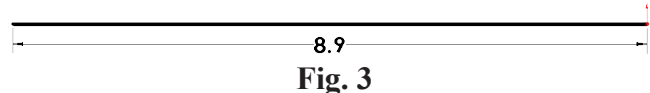
Step 5. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 6. Dimensions line **8.9**, **Fig. 2**.

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

Step 8. Click **Line**  (L) on the Sketch toolbar.

Step 9. Draw line at angle above horizontal line and left of Origin as shown in **Fig. 4**.



**Fig. 3**

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

Step 11. Add dimensions as shown in **Fig. 3**. To dimension angle, click both lines then move the cursor between lines and click. Key-in **35** for the dimension and press ENTER.





**Fig. 4**

## B. Save as "HAIR PIN CLIP".

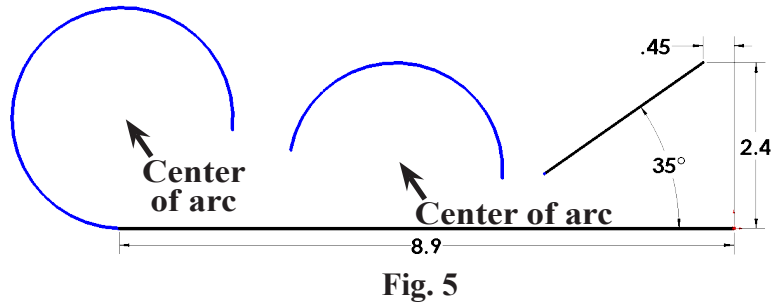
Step 1. Click File Menu > Save As.

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

## C. Centerpoint Arc.

Step 1. Click **Centerpoint Arc**  (S) in the **Arc flyout**  on the Sketch toolbar.

Step 2. Draw two arcs. Click directly about endpoint of horizontal line to place the center of arc. Click left endpoint of line to start arc, swing around and click to place the second endpoint, **Fig. 5**. Start second arc between first arc and angled line.

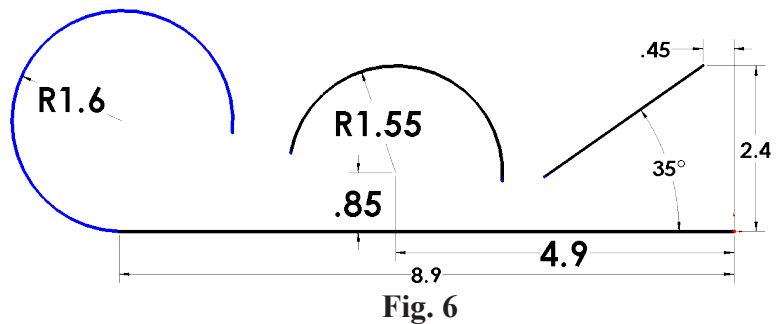


Step 3. Click **Smart Dimension**




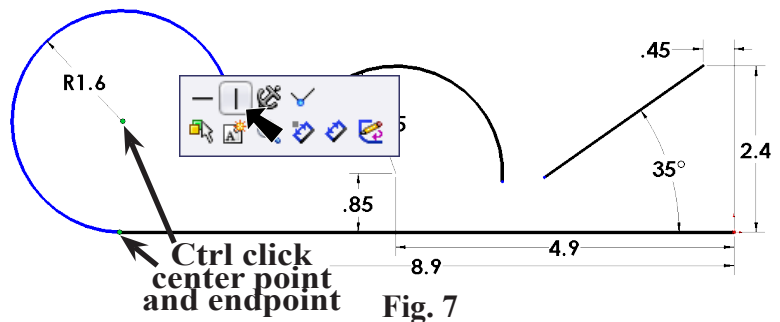
(S) on the Sketch toolbar.

Step 4. Dimension the arc radius **1.6** and **1.55**, **Fig. 6**. Dimension **.85** and **4.9**. To Smart dimension click the arc then move the cursor out away from the arc and click. Key-in the dimension and press ENTER. Arrange the dimension as **Fig. 6**.



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

Step 6. **Ctrl click the center point of first arc and left endpoint of line** to select both. Release Ctrl key and click **Make Vertical**  on the Content menu, **Fig. 7**.



## D. Sketch Fillet.

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

Step 2. In the Fillet Property Manager set,

**Radius**  1, Fig. 8

click right end of second arc and left end of angled line as shown in Fig. 9

click OK twice .

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

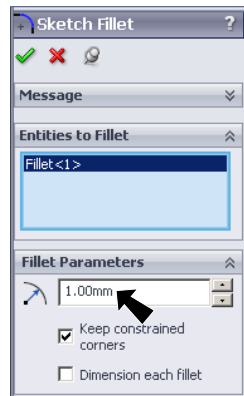


Fig. 8

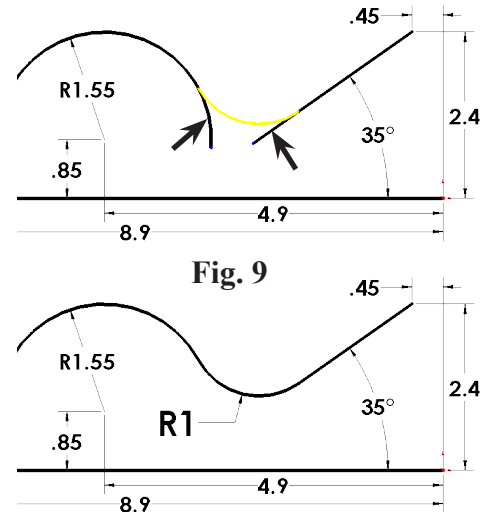



Fig. 9

Fig. 10


## E. Tangent Circle.


Step 1. Click **Circle**  (S) on the Sketch toolbar.

Step 2. Draw circle between the two arcs, Fig. 11.

Step 3. **Right click drawing and click Select** from menu to unselect Circle.

Step 4. **Ctrl click an arc and circle** to select both, Fig. 12. Release **Ctrl** key and click **Make**

**Tangent**  on the Content menu, Fig. 12.

Step 5. Make **other arc tangent** with circle. To make tangent, **Ctrl click other arc and circle** to select both, release **Ctrl** key and click **Make Tangent**  on the Content menu, Fig. 13.

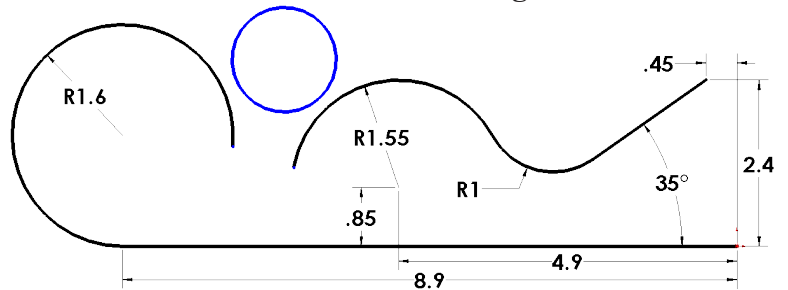


Fig. 11

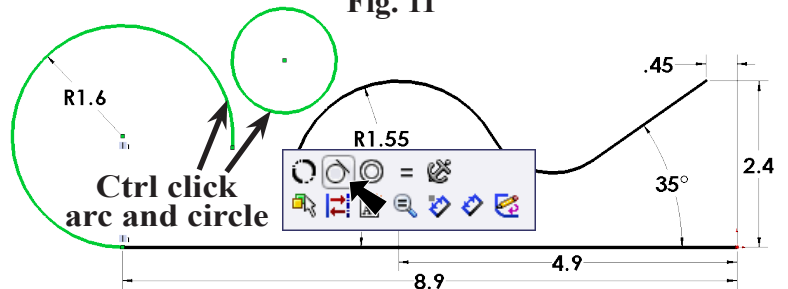


Fig. 12

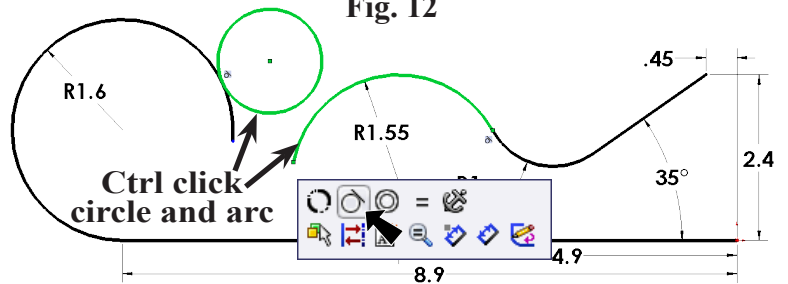


Fig. 13

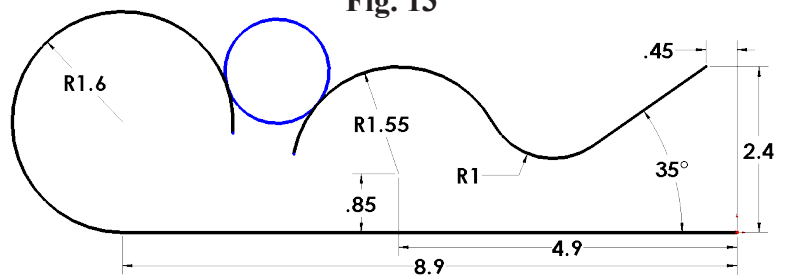



Fig. 14

## F. Trim.

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

Step 2. In the Property Manger select **Trim to closest**  **Fig. 15**. Click entities to trim; **top of circle and bottom ends of arcs**, **Fig. 16**. Results shown in **Fig. 17**.

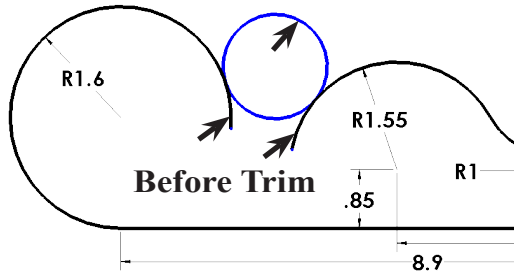


Fig. 16

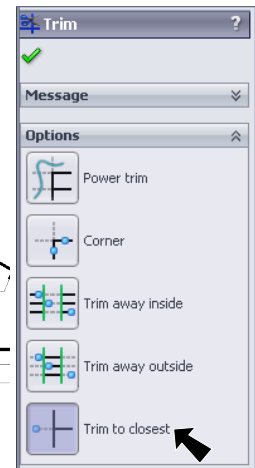



Fig. 15

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

Step 4. Dimension arc radius **.75**, **Fig. 17**.

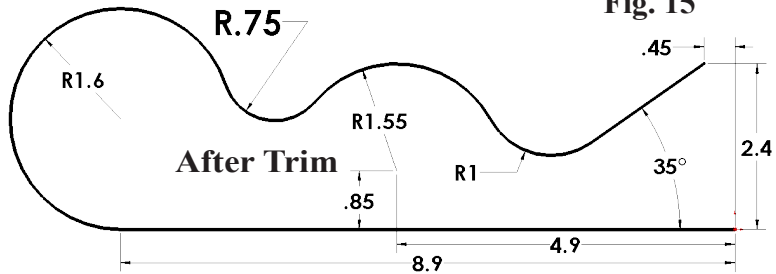


Fig. 17

Step 5. Click **Exit Sketch**  on the Sketch toolbar.

## G. 3D Sketch Profile.

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

Step 2. Click **Front Plane**  in the Feature Manager, **Fig. 18**.

Step 3. Click **Sketch**  on the Command Manager toolbar.

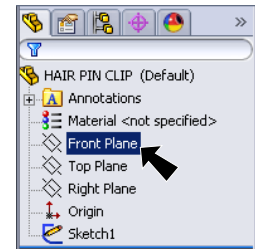


Fig. 18

Step 4. Click **3D Sketch**  **3D Sketch** in the **Sketch flyout**  on the Sketch toolbar. Be sure to click the **flyout arrow**  to select 3D Sketch.

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

Step 6. Draw a circle starting at the Origin , **Fig. 19**.

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

Step 8. Dimension the circle **1.06** diameter as shown in **Fig. 19**.

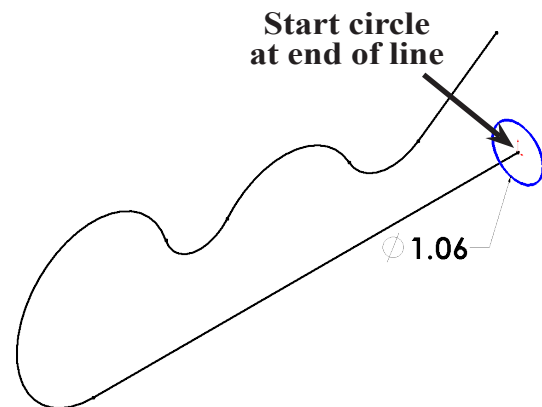



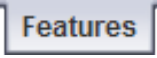


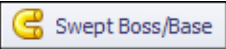
Fig. 19

Step 9. Exit the **3D Sketch**. To Exit, click  **3D Sketch** in the **Sketch flyout**  on the Sketch toolbar. Click the **flyout arrow**  then 3D Sketch.


Step 10. Save. Use **Ctrl-S**.


## H. Sweep.

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

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

Step 3. In the Swept Boss/Base Property Manager:

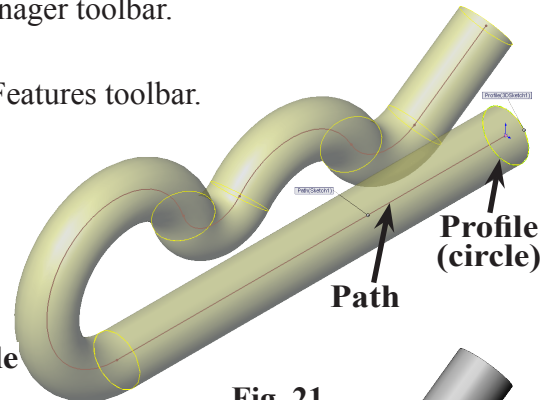
for **Profile**  field, click **circle** in the 3D Sketch, **Fig. 21**

for **Path**  field, click any geometry in **Sketch1** (**line, arc or fillet**), **Fig. 21**

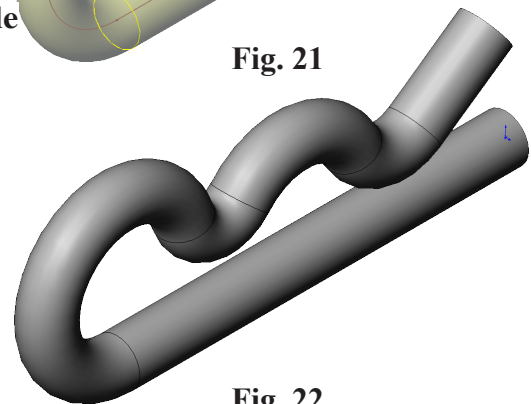
click **OK** 



**Fig. 20**



**Fig. 21**



**Fig. 22**

Step 4. Save. Use **Ctrl-S**.

## I. Material Steel 304.

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

Step 2. Expand **Steel** in the material tree and select **Steel AISI 304**. Click **Apply** and **Close**.

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