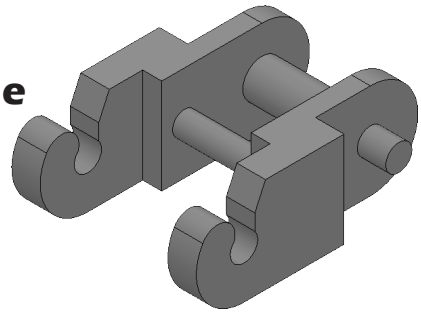
Chapter 13

Cluster Wheel Vehicle

Chain Link



A. Create Plane1.

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

Step 2. Click **Right Plane** in the Feature Manager to display Plane in graphics area, **Fig. 1**.

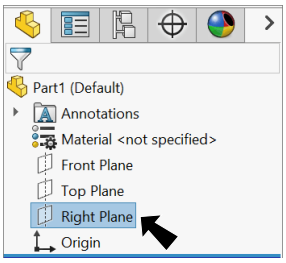


Fig. 1

Step 3. In graphics area **Ctrl drag Right plane to** right hand side of the vehicle (passenger's side) and release, **Fig. 2**.

Step 4. In the Plane Property Manager set:
under First Reference, **Fig. 3**
Distance **3.875**
and press **ENTER**.
The new plane should be right hand side of vehicle (passenger's side) of Right plane, **Fig. 2**.
Click OK .

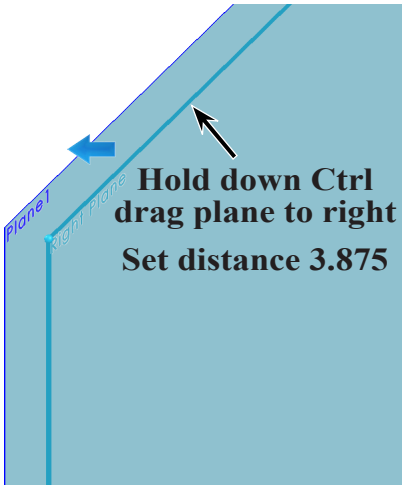


Fig. 2

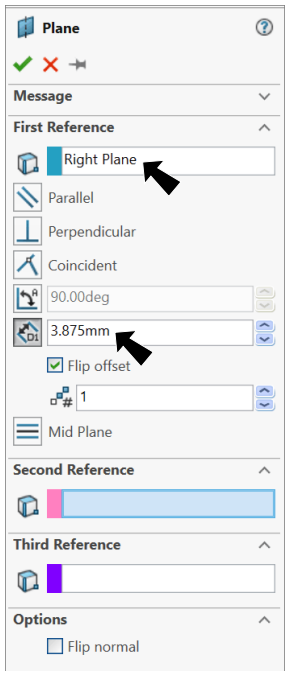


Fig. 3

B. Save as "CHAIN LINK".

Step 1. Click File Menu > Save As.

Step 2. Key-in **CHAIN LINK** for the file-name and press ENTER.

C. Extrude1 Sketch1 Body.

Step 1. **Hide Plane1** . To hide, click **Plane1** in the graphics area and **Hide** on the context toolbar, **Fig. 4**.

Step 2. Click **Plane1** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 5**.

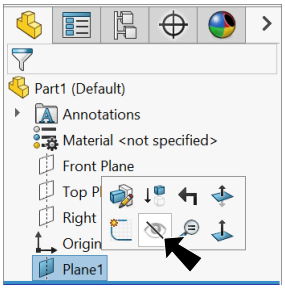


Fig. 4

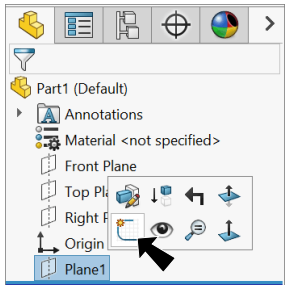


Fig. 5

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Step 3. Click **Centerpoint Straight Slot** (**S**) in the **Straight Slot flyout** on the Sketch toolbar.

Step 4. Sketch a **horizontal Centerpoint Straight Slot at Origin**, **Fig. 6**. To sketch horizontal slot, click centerpoint of slot at Origin. Move cursor to the right. Use the horizontal relation . Click for ending point of length. Move cursor down for width and click.

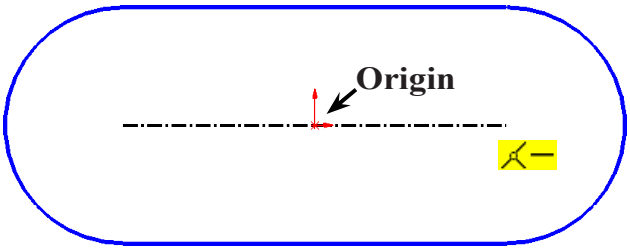


Fig. 6

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

Step 6. Add dimensions, **Fig. 7**. To wake up midpoint of radii, hover cursor over circular entity.

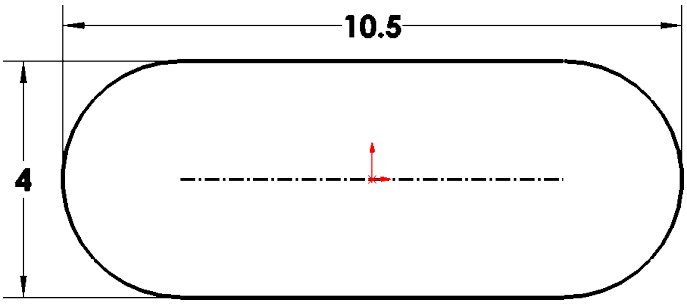


Fig. 7

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

Step 8. Click **Features** on the Command Manager toolbar.

Step 9. Click **Extruded Boss/Base** on the Features toolbar.

Step 10. In the Boss-Extrude Property Manager set:
under Direction 1, **Fig. 8**
End Condition **Blind**
Depth **2**
click OK .

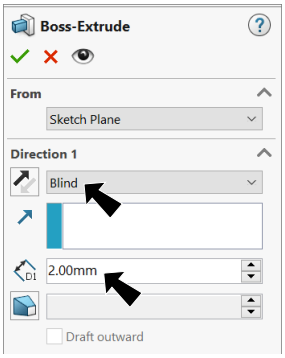


Fig. 8

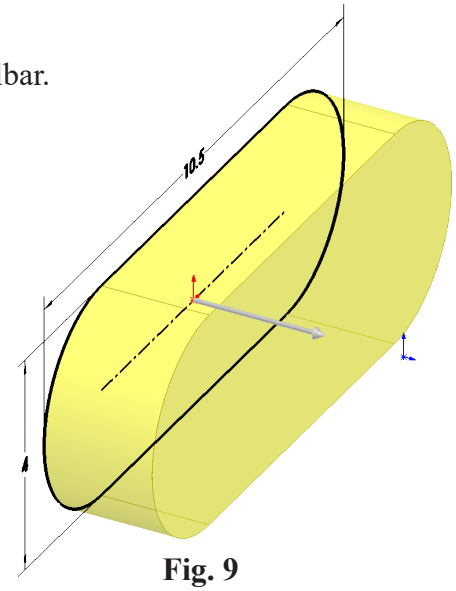


Fig. 9

D. Cut Extrude1 Sketch2.

Step 1. Click **Top Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 10**.

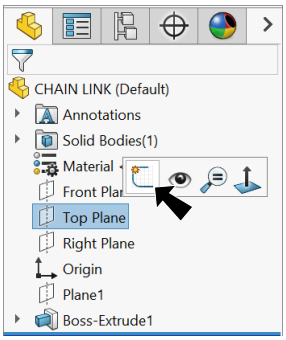


Fig. 10

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

Step 3. Click **Corner Rectangle** in the **Rectangle flyout** on the Sketch toolbar.

Step 4. Sketch corner **two rectangles** starting from corner endpoints, **Fig. 11**.

Step 5. **Unselect Rectangle tool**. To unselect, right click graphics area and click Select from menu.

Step 6. **Ctrl click both vertical lines in center** to select both. Release Ctrl key and click **Make Collinear** on the context toolbar, **Fig. 12**.

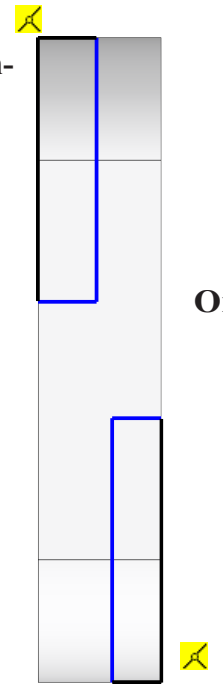


Fig. 11

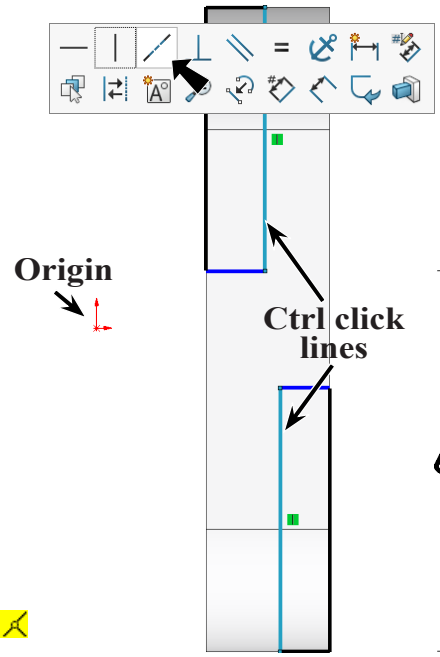


Fig. 12

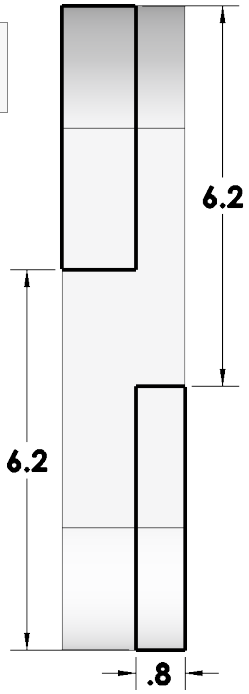


Fig. 13

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

Step 8. Add dimensions, **Fig. 13**.

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:
under Direction 1, **Fig. 14**
End Condition
Through All - Both
click OK .

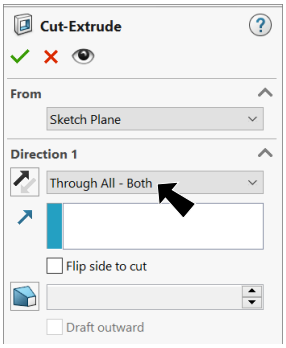


Fig. 14

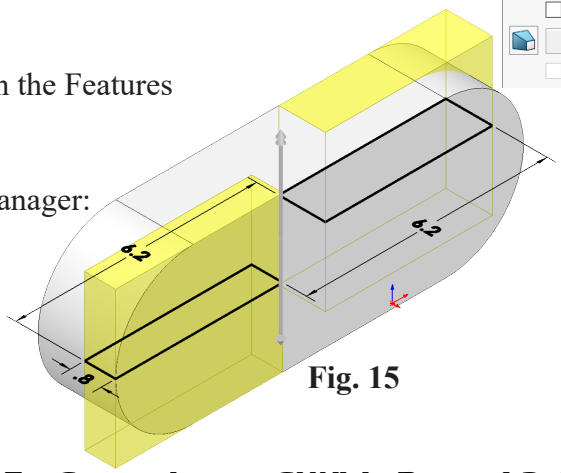


Fig. 15

E. Extrude2 Sketch3 Pins.

Step 1. Click **Right Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 16**.

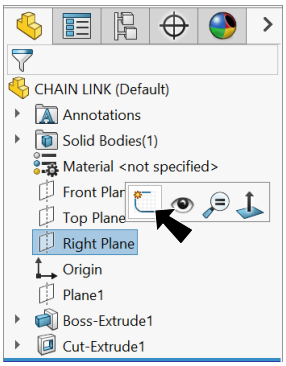


Fig. 16

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

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

Step 4. Sketch **circle at Origin** **and circle concentric with right circular edge**, **Fig. 17**. To wake up centerpoint of edge, hover cursor over circular edge.

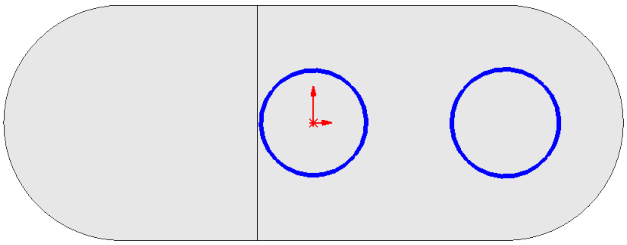


Fig. 17

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

Step 6. Dimension diameters, **Fig. 18**.

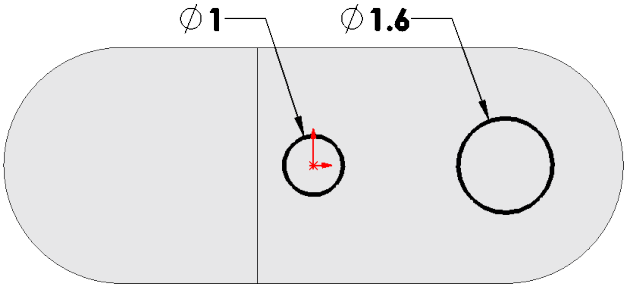


Fig. 18

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

Step 8. Click **Features** on the Command Manager toolbar.

Step 9. Click **Extruded Boss/Base** on the Features toolbar.

Step 10. In the Boss-Extrude Property Manager set:
under Direction 1, **Fig. 19**
Reverse Direction
End Condition **Up To Next**
click OK .

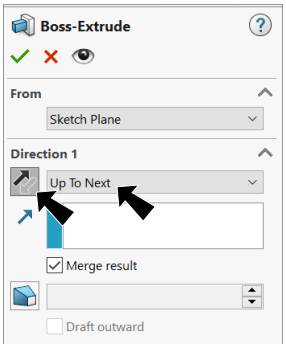


Fig. 19

Step 11. Save **(Ctrl-S)**.

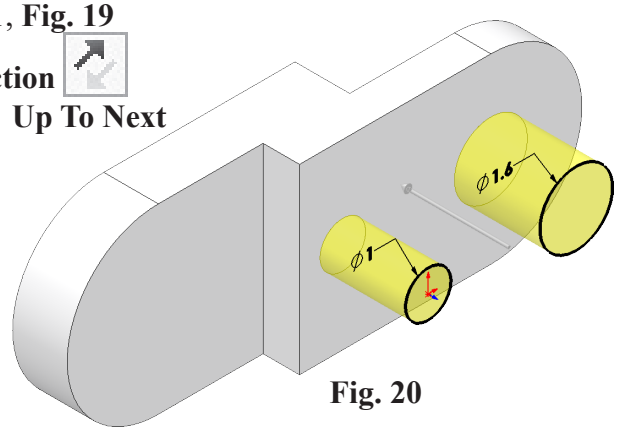
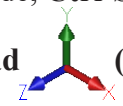


Fig. 20

F. Extrude3 Sketch4.

Step 1. Rotate view to back side, **Ctrl-Shift click the Y axis of the Reference Triad**  (bottom left corner of graphics area).

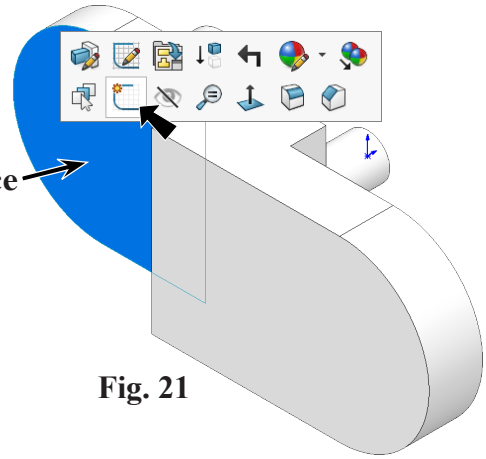


Fig. 21

Step 2. Click the **rear face of left side** and click **Sketch** on the context toolbar, **Fig. 21**.

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

Step 4. Sketch circle concentric with circular edge, **Fig. 22**. To wake up centerpoint, hover cursor over circular edge.

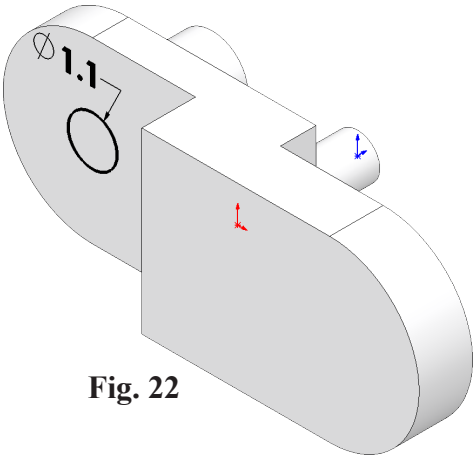
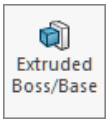


Fig. 22

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

Step 6. Dimension **diameter 1.1**, **Fig. 22**.

Step 7. Click **Features** on the Command Manager toolbar.

Step 8. Click **Extruded Boss/Base**  on the Features toolbar.

Step 9. In the Boss-Extrude Property Manager set:
under Direction 1, **Fig. 23**
Start Condition **Surface/Face/Plane**
in Select a Surface/Face/Plane box
click **outside face**, **Fig. 24**
click OK .

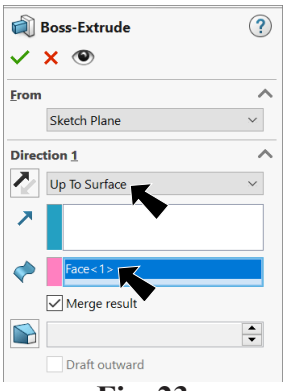


Fig. 23

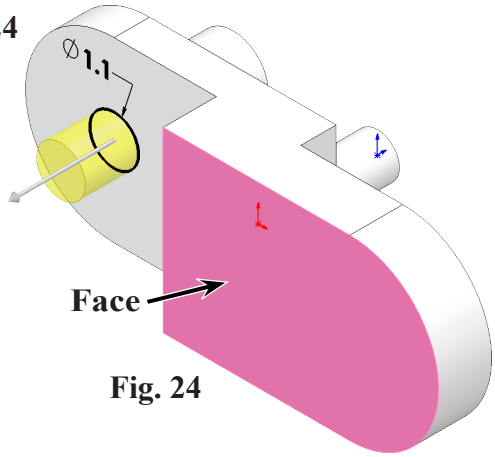


Fig. 24

G. Cut Extrude2 Sketch5.

Step 1. Click **Right** on the Standard Views toolbar. **(Ctrl-4)**

Step 2. Click the **side face of left side** and click **Sketch** on the context toolbar, **Fig. 25**.

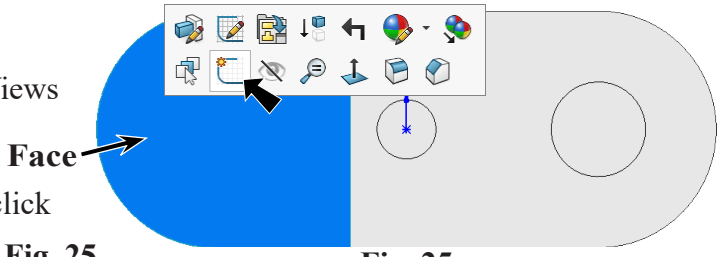


Fig. 25

Step 3. **Unselect face** and click **Convert Entities** on the Sketch toolbar.

Step 4. In the Convert Entities Property Manager:
under Entities to Convert, **Fig. 26**
click **left circular edge and top edge**, **Fig. 27**
click OK .

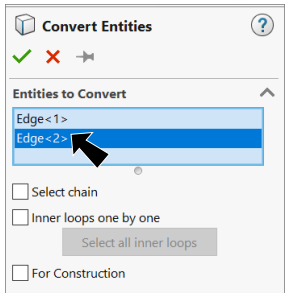


Fig. 26

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

Step 6. Sketch circle concentric with circular edge of left side, **Fig. 28**. To wake up center-point, hover cursor over circular edge.

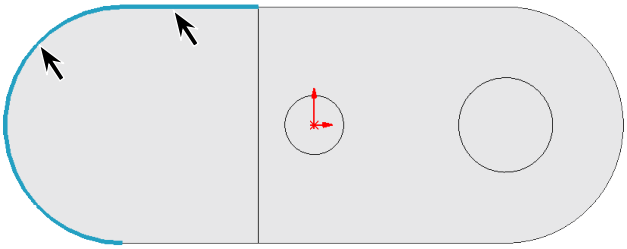


Fig. 27

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

Step 8. Sketch **vertical line up from circle and chained line angled to right up to converted line**, **Fig. 29**. To sketch nontangent line, **click circle and move cursor up very slightly**.

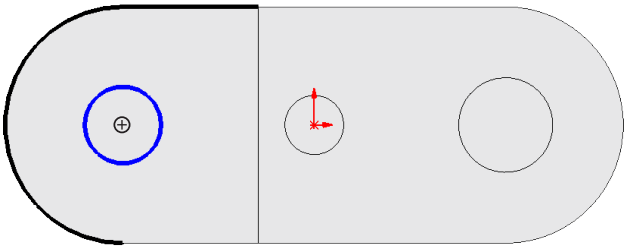


Fig. 28

Step 8. Click **3 Point Arc** **(S)** in the **Arc flyout** on the Sketch toolbar.

Step 9. Sketch **arc with start endpoint at converted circular edge and endpoint at circle and radius up**, **Fig. 30**.

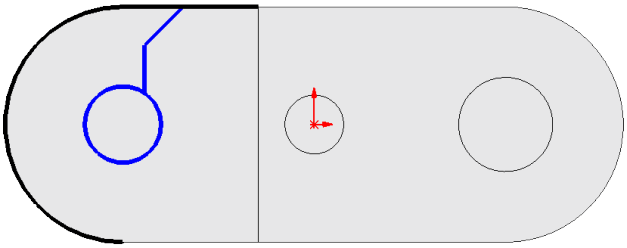


Fig. 29

Step 10. **Unselect Arc tool**. To unselect, right click graphics area and click Select from menu.

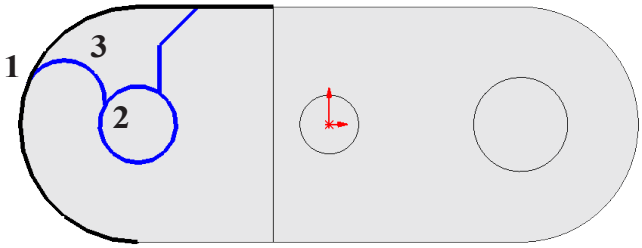


Fig. 30

Step 11. **Ctrl click converted circular edge and arc** to select both. Release Ctrl key and click **Make Tangent** on the context toolbar, **Fig. 31**.

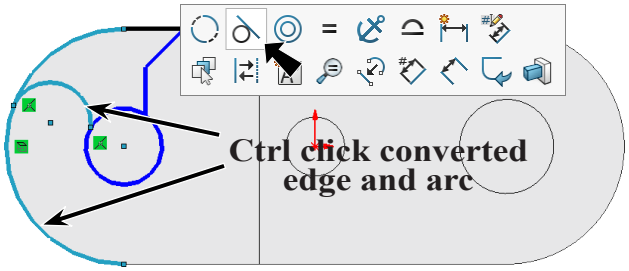


Fig. 31

Step 12. **Ctrl click centerpoint of circle** and **angled line** to select both. Release Ctrl key and click **Make Coincident** on the context toolbar, **Fig. 32**.

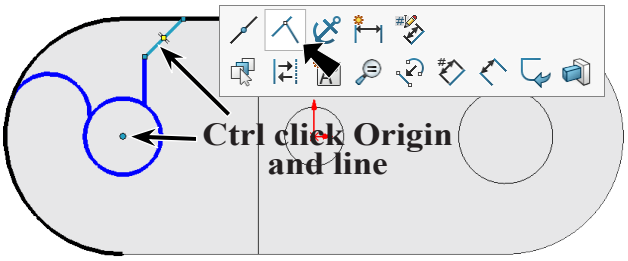


Fig. 32

Step 13. Click **Smart Dimension** (**S**) on the Sketch toolbar.

Step 14. Add dimensions, **Fig. 33**.

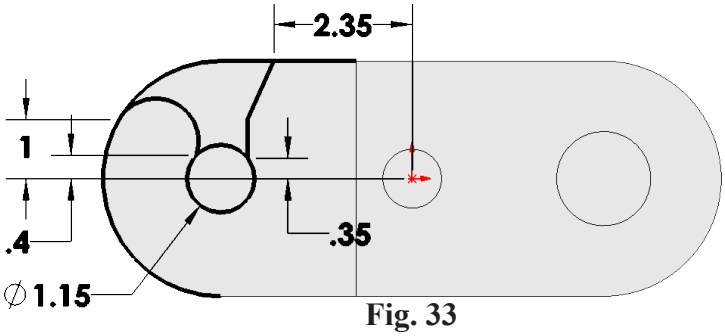


Fig. 33

Step 15. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

Step 16. Click **Features** on the Command Manager toolbar.

Step 17. Click **Extruded Cut** on the Features toolbar.

Step 18. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 34**
End Condition **Through All**
under Selected Contours
click the **two contours**, **Fig. 35**
click OK .

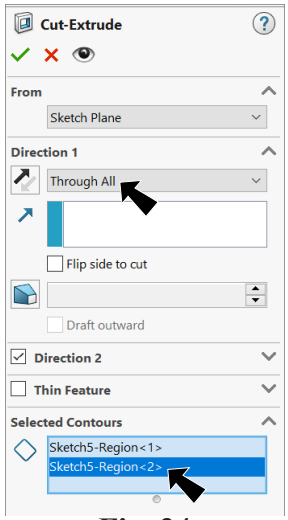


Fig. 34

Step 19. Save (**Ctrl-S**).

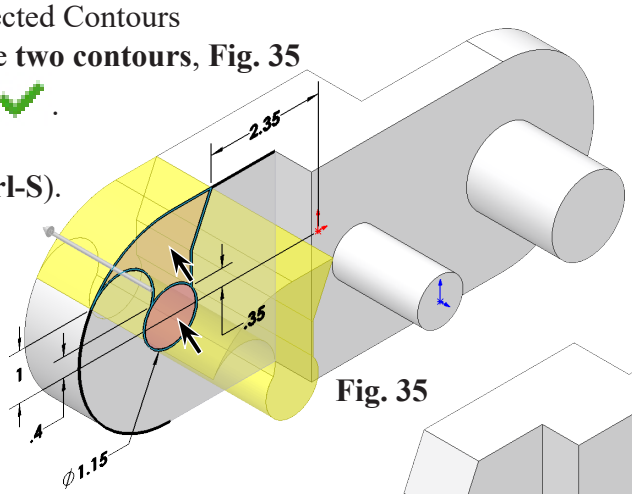


Fig. 35

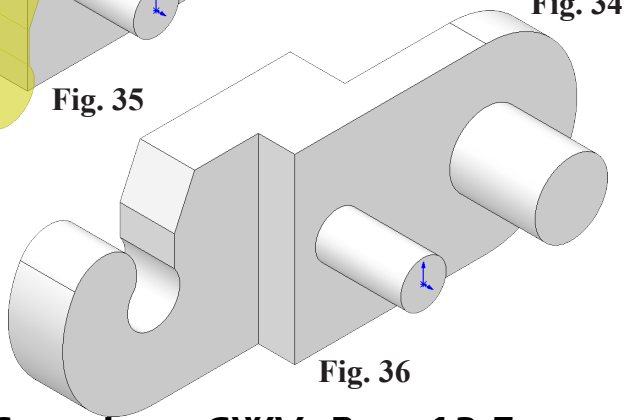


Fig. 36

H. Mirror Body.

Step 1. Expand Solid Bodies folder in the Feature Manager. **Ctrl click Cut-Extrude2 body and Right Plane** to select Body and Plane, **Fig. 37**.

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

Step 3. In the Mirror Property Manager click OK .

Step 4. Save (**Ctrl-S**).

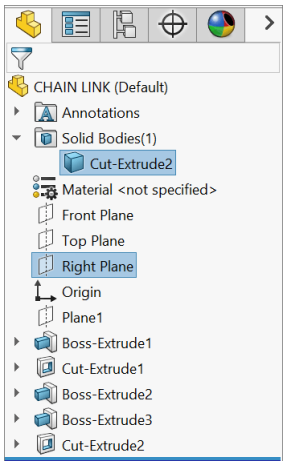


Fig. 37

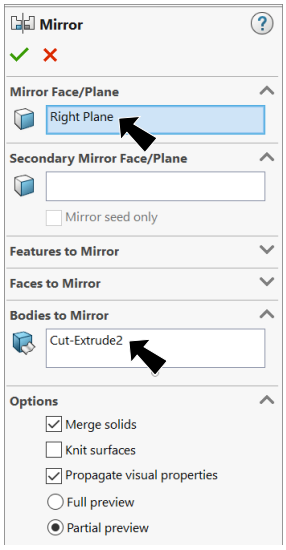


Fig. 38

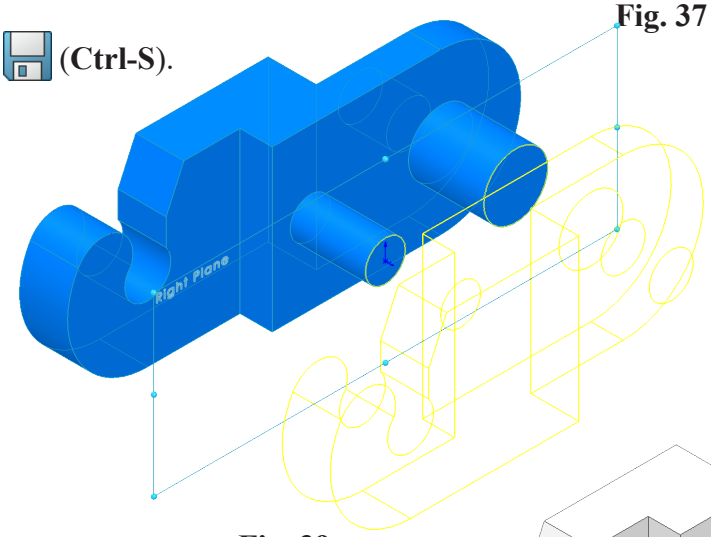


Fig. 39

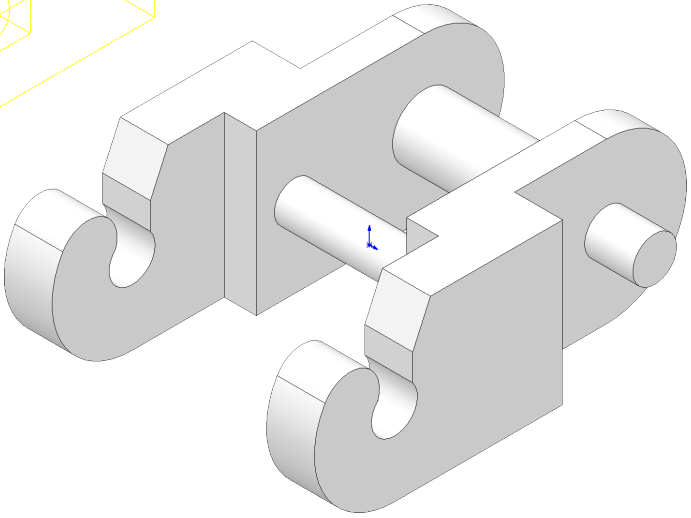


Fig. 40

I. Appearance Gray Plastic.

Step 1. Click the **Chain Link** to select part, click **Appearances Callout** on the context toolbar and click **Chain Link..**, **Fig. 41**.

Step 2. In the Appearances Task pane, expand **Plastic**, click **Medium Gloss** and in the lower pane select **light gray medium gloss plastic**, **Fig. 42**.

Step 3. In the Appearances Property Manager:
under Color, **Fig. 43**
set **RGB values:**
R 127
G 127
B 127
click OK .

Step 4. Save **(Ctrl-S)**.

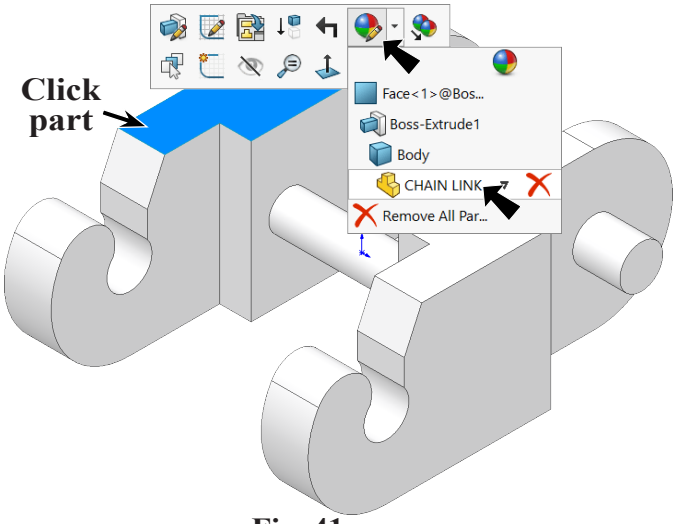


Fig. 41

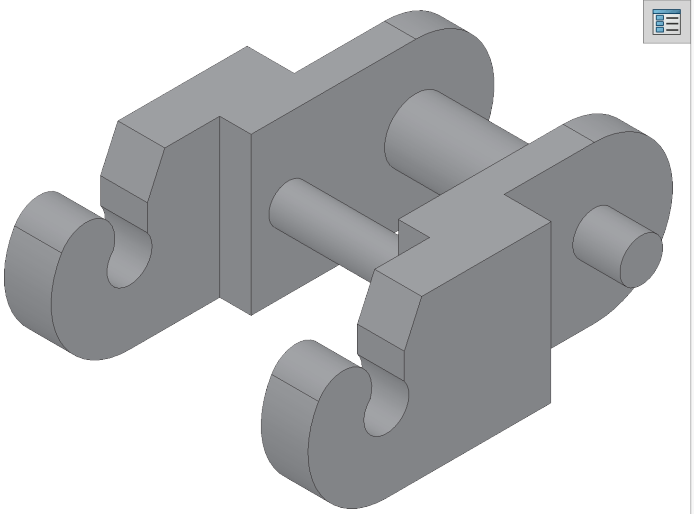


Fig. 44

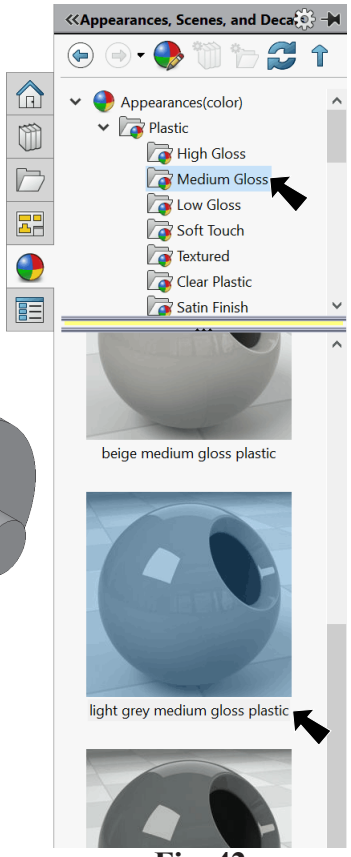


Fig. 42

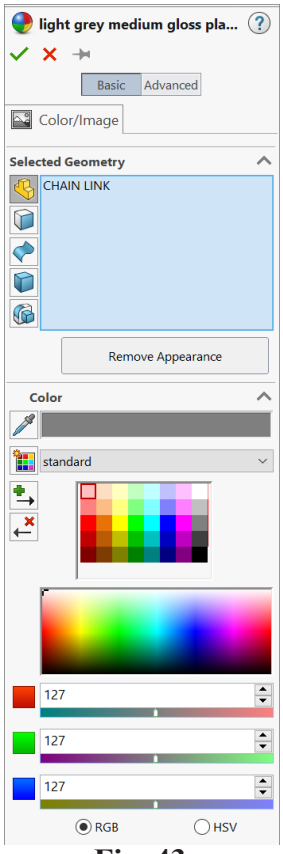


Fig. 43