



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**  on the context toolbar, **Fig. 1**.

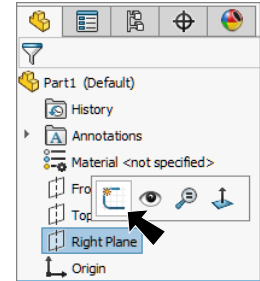


Fig. 1


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



Step 4. Sketch **3 lines** starting at Origin , **Fig. 2**.



Fig. 2

B. Centerpoint Arc.

Step 1. Confirm Snap Angle is turned on. To confirm, click Options  on the Standard toolbar, on the System Options tab, select **Relations/Snaps** and **Angle** should be checked.

Step 2. Click **Centerpoint Arc**  (S) in the **Arc flyout**  on the Sketch toolbar.

Step 3. Click the bottom horizontal line close to the Origin to place the center of the arc. Click the Origin to start the first arc endpoint, then move cursor around clockwise to swing arc 90 degrees. Click to place the second endpoint, **Fig. 3**. Use the inferencing line, the dotted line that appears when you sketch the arc 90 degrees.



Fig. 3

C. Line and Tangent Arc.

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

Step 2. Starting from the endpoint of the arc, sketch a horizontal line across the sketch and auto-transition to Tangent Arc tool and sketch tangent arc to endpoint of short horizontal line, **Fig. 4**. To autotransition to arc, after sketching second endpoint of line, move cursor away and back. The preview shows a tangent arc. Click to place the arc at endpoint of short horizontal line.

Tip: Toggle between line and arc without returning to the endpoint, use A key.

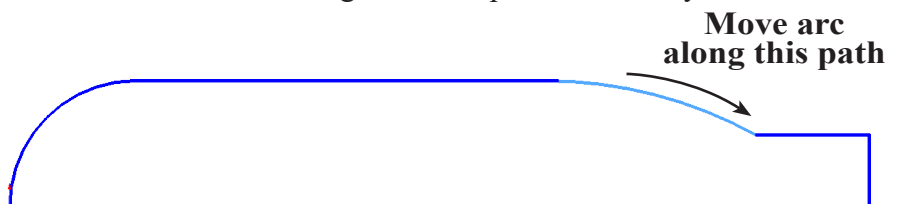

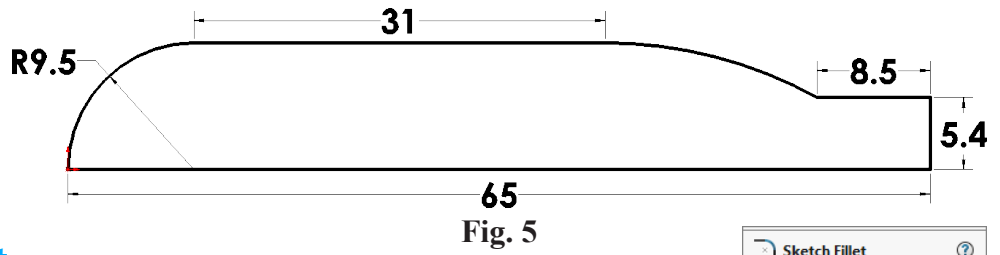


Fig. 4

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



Step 4. Dimension line and arc, **Fig. 5**.

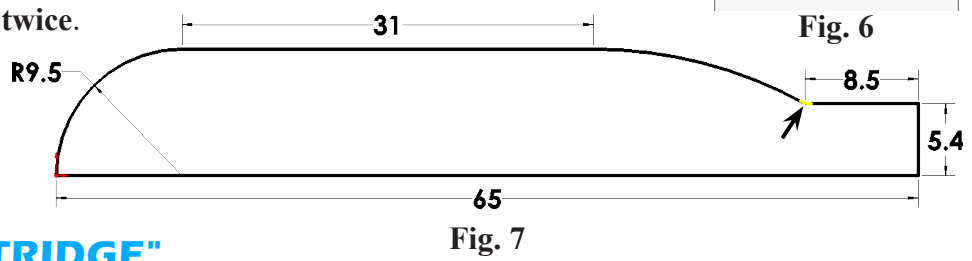
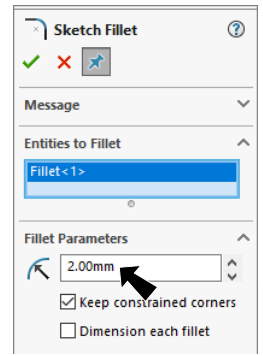


D. Sketch Fillet.

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

Step 2. In the Sketch Fillet Property Manager set:
under Fillet Parameters, **Fig. 6**

Radius  **2**
click corner, **Fig. 7**
click OK  twice.

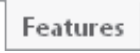



E. Save as "CARTRIDGE".



Step 1. Click File Menu > Save As.

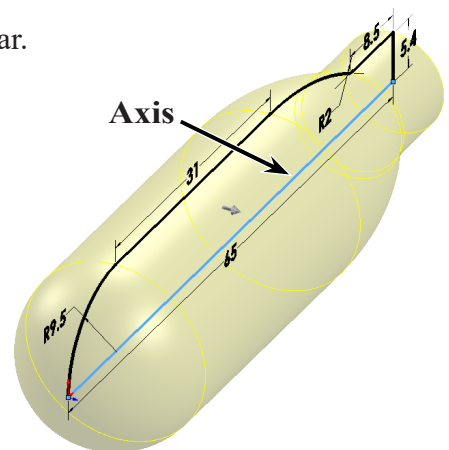
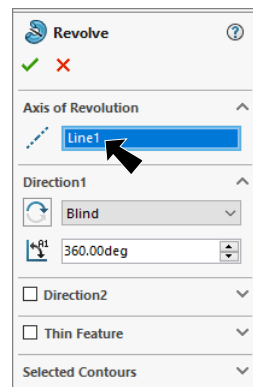
Step 2. Key-in **CARTRIDGE** for the filename and press ENTER.

F. Revolve.

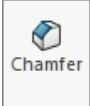
Step 1. Click **Features**  on the Command Manager toolbar.

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


Step 3. In the Revolve Property Manger,
under Axis of Revolution 
click **bottom line of sketch**,
Fig. 9
click OK .



G. Chamfer.

Step 1. Click **Chamfer**  on the Features toolbar.

Step 2. In the Chamfer Property Manager set:
under Chamfer Parameters, **Fig. 10**

select **Distance Distance** 
under Items To Chamfer
click **end edge**, **Fig. 11**
under Chamfer Parameters
select **Asymmetric**

Depth 1  1

Depth 2  2

click OK .

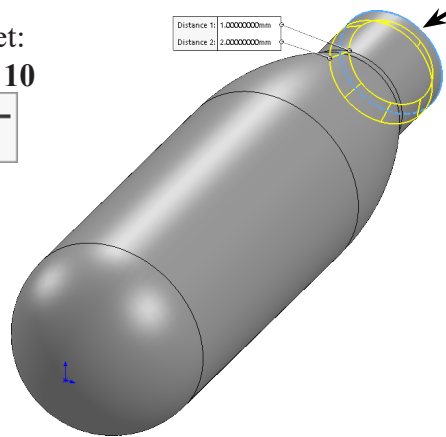


Fig. 11

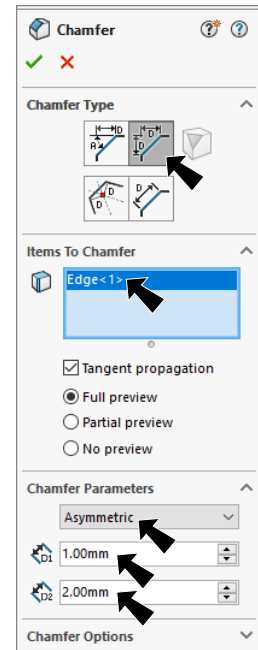



Fig. 10

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

H. Shell.

Step 1. Click **Wireframe**  on the View toolbar.

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

Step 3. In the Shell Property Manager:
under Parameters, **Fig. 12**

Distance  1.25

click OK .

The Shell shells out inside of
cartridge.

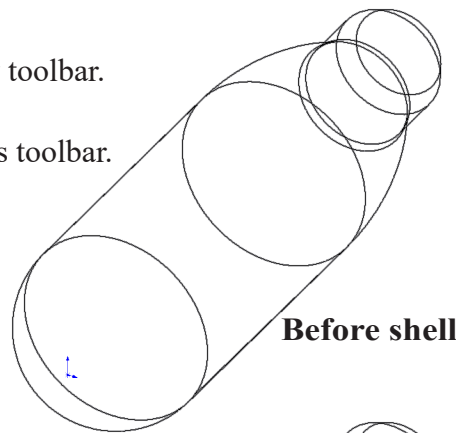


Fig. 13

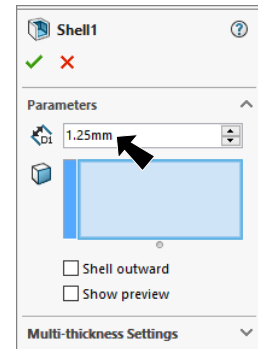


Fig. 12

Step 4. Click **Shaded With Edges**  on the View toolbar.

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

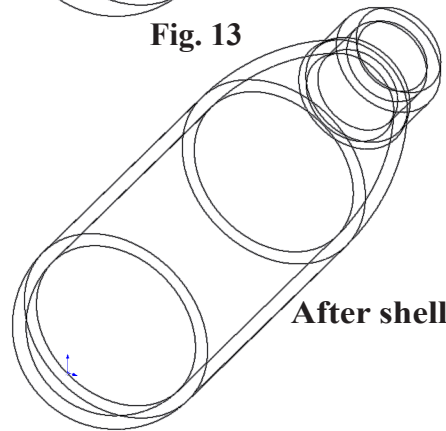


Fig. 14

I. Material Steel 304.

Step 1. Right click **Material** in the Feature Manager and click **Edit Material**, Fig. 15.

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

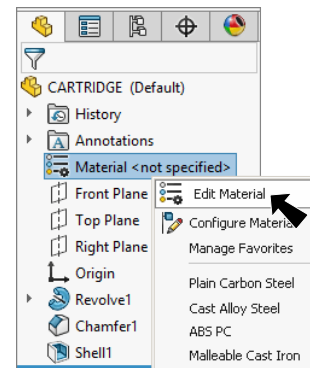


Fig. 15

J. Appearance Color.

Step 1. Click the part, expand **Appearance Callout** on the context toolbar and click **CARTRIDGE**, Fig. 16.

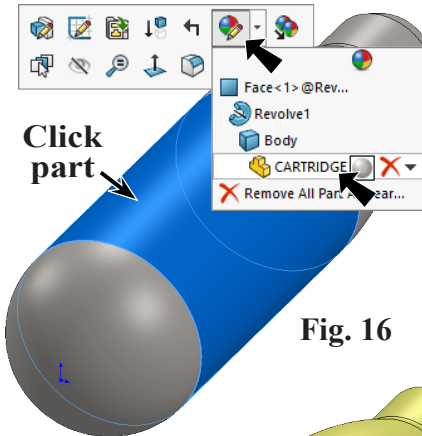


Fig. 16

Step 2. In the Appearances Property Manager under **Color**, Fig. 17 click **second from top Yellow** swatch click **OK**.

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

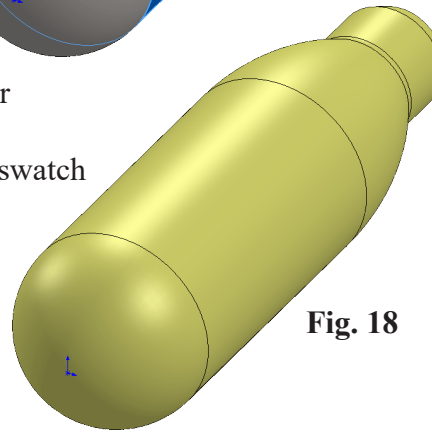


Fig. 18

K. Insert Cartridge in Assembly.

Step 1. Open your **SHELL CAR ASSEMBLY** file.

Step 2. Rotate view to view **bottom of cartridge hole in Body**, hold down middle mouse button (wheel) and drag to rotate view, Fig. 19.

Step 3. Click **Insert Components** on the Assembly toolbar.

Step 4. Select your **CARTRIDGE** file and place approximately where the Cartridge is positioned in Fig. 19.

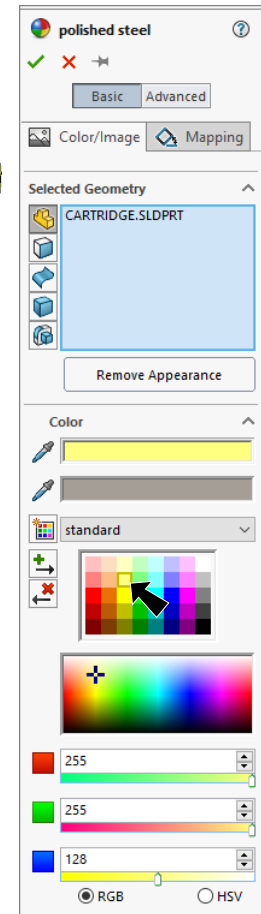
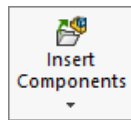


Fig. 17

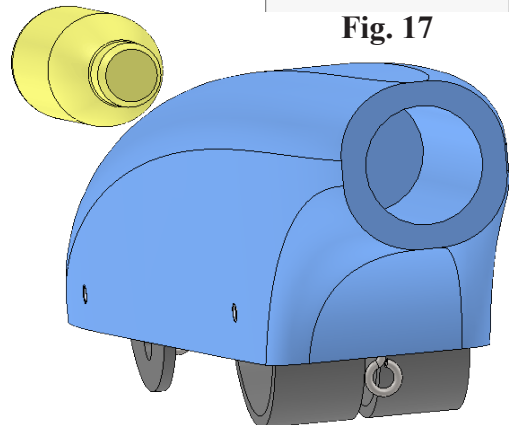
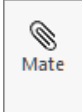


Fig. 19

L. Mate: Cartridge and Body.

Step 1. Click **Mate**  on the Assembly toolbar.


Step 2. Click **cylindrical face of cartridge hole** and **cylindrical face of Cartridge**, Fig. 20.


Step 3. Click **Add/Finish Mate**  in Mate pop-up toolbar to add a **Concentric** mate.


Step 4. Click **bottom face of cartridge hole**, Fig. 21.

Step 5. Rotate view to view **bottom of Cartridge**, Fig. 22.

Step 6. Click **bottom face of Cartridge**, Fig. 22.

Step 7. The cartridge should extend out rear of Body, Fig. 23. If in opposite direction, click **Flip Mate Alignment**  in the Mate pop-up, Fig. 24.

Step 8. Click **Add/Finish Mate**  in Mate pop-up toolbar to add a **Tangent** mate.

Step 9. Click **OK**  in the Property Manager when done.

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

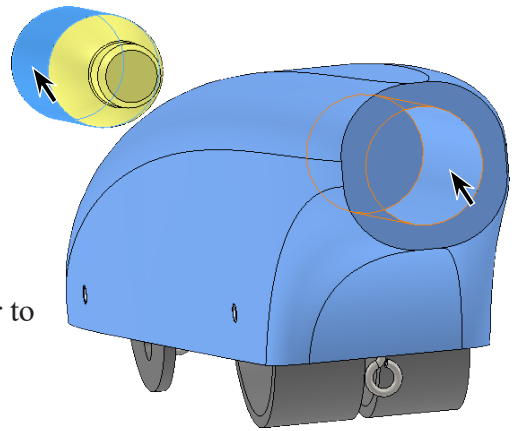


Fig. 20

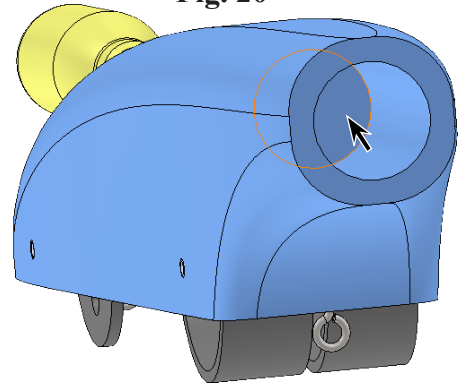


Fig. 21

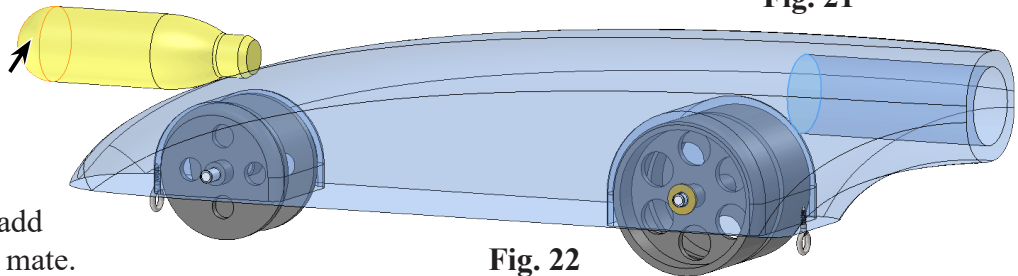


Fig. 22

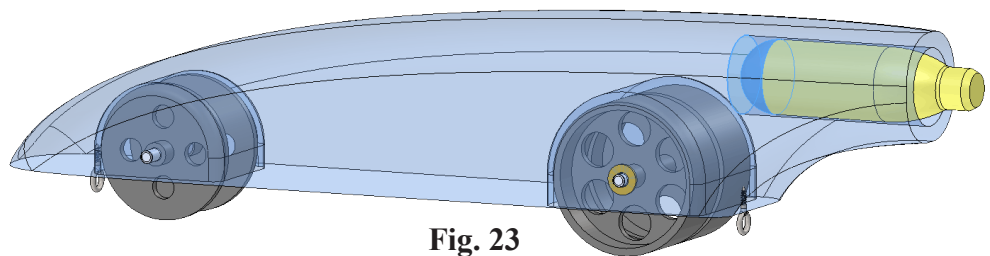


Fig. 23



Fig. 24

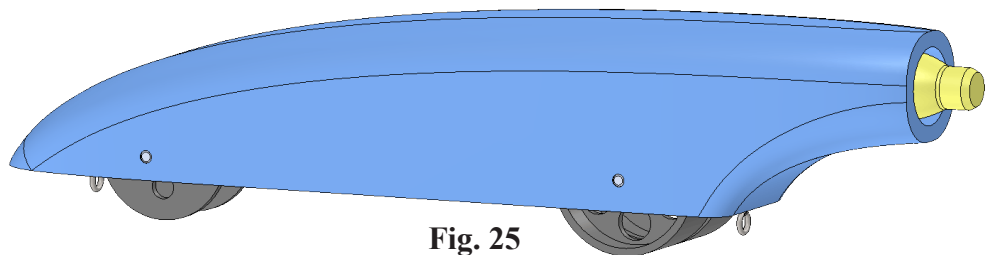


Fig. 25