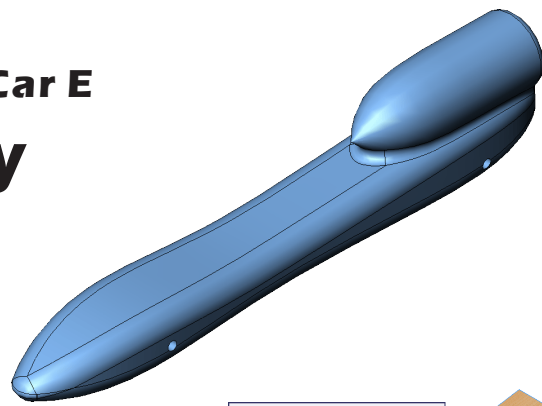


CO2 Rail Car E Body



A. Save as "BODY RAIL E".

- Step 1. Open your **BLANK** file.
- Step 2. Click File Menu > Save As.
- Step 3. Key-in **BODY RAIL E** for the filename and press ENTER.

B. Appearance.

- Step 1. Click the Body to select the part, click **Appearances Callout**  on the Content menu and click **BODY RAIL E** , Fig. 1.

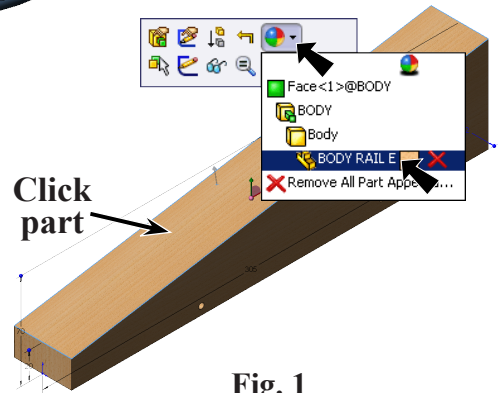



Fig. 1

- Step 2. In the Appearances Task pane, expand **Metal**, click **Chrome** and in the lower pane select **chromium plate**, Fig. 2.

- Step 3. In the Appearances Property Manager, Fig. 3 under Color:
set **RGB values** to:
R 135
G 192
B 255
click **OK**  in the Property Manager.

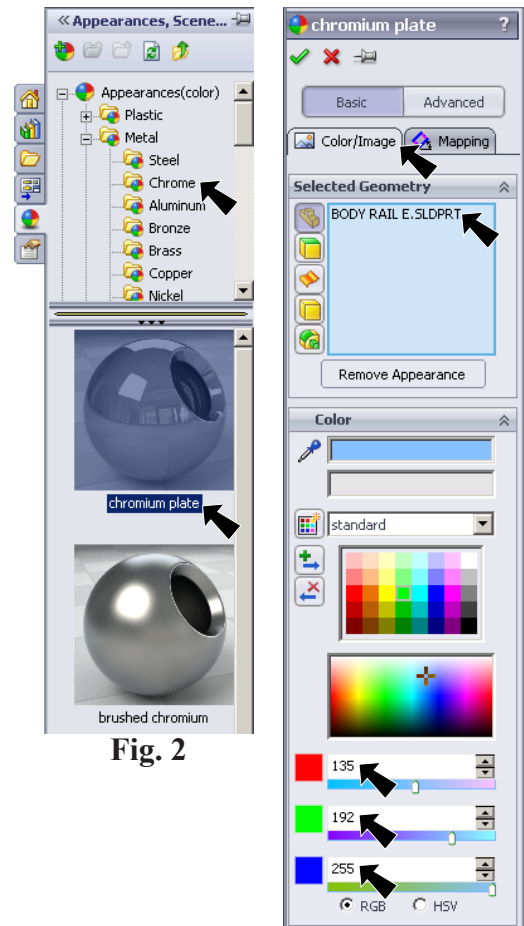


Fig. 2

Fig. 3

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

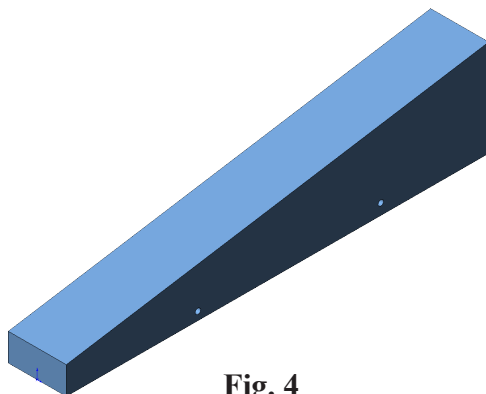



Fig. 4

C. Edit Axle Holes Sketch.

Step 1. Click **AXLE HOLES** in the Feature Manager and click **Edit Sketch**



on the Content menu, **Fig. 5**.

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

Step 3. Change dimensions as shown in **Fig. 6**. To change dimension, double click the dimension and key-in new dimension.

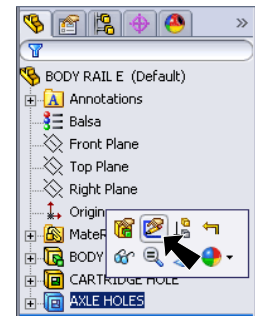


Fig. 5

Step 4. Click **Exit Sketch**  on the Sketch toolbar.

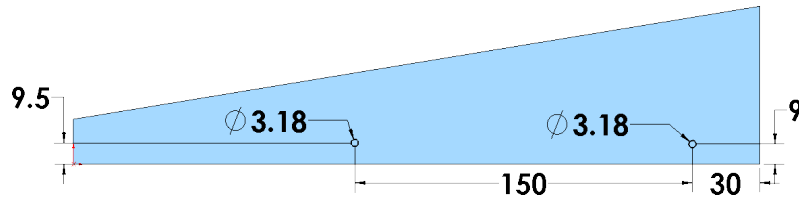




Fig. 6

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

D. Side Cut.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**  from the Content toolbar, **Fig. 7**.

Step 2. Click **Spline**  (S) on the Sketch toolbar.

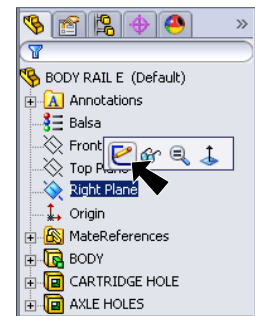


Fig. 7

Step 3. Draw a 5 point spline starting on the rear edge of Blank, **Point 1, Fig. 8**. Click approximately where the 5 points are positioned in **Fig. 8**. Keep the other splines points, Points 2, 3 and 4 away from other geometry, axle holes and bottom edge of Blank. Press **Escape** to end the spline.

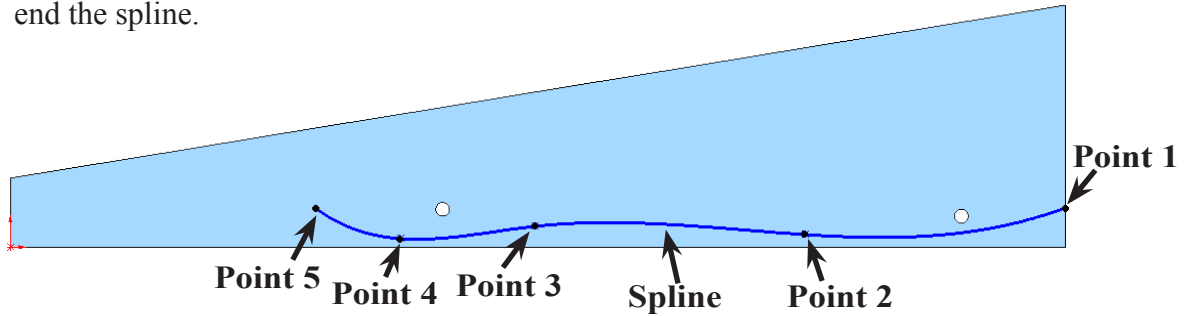


Fig. 8

Step 4. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 5. Add the dimensions as shown in **Fig. 9**.

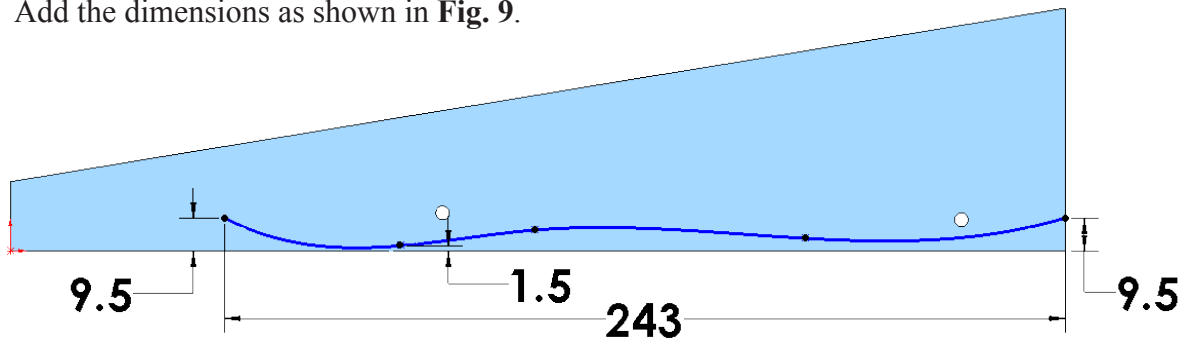


Fig. 9

Step 6. Click **Spline**  (S) on the Sketch toolbar.

Step 7. Draw a 4 point spline starting on the rear edge of Blank above the first spline, **Point 1, Fig. 10**. Click approximately where the 4 points are positioned in **Fig. 10**. Keep the other splines points, Points 2 and 3 away from other geometry and top edge of Blank. Press **Escape** to end the spline.

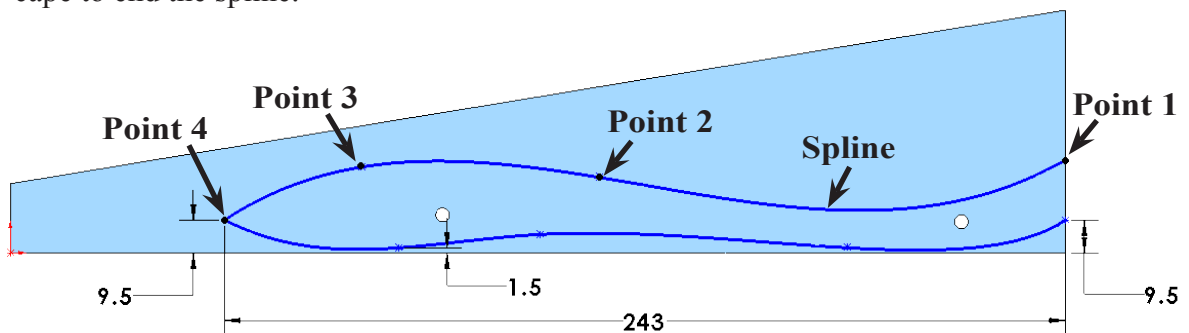


Fig. 10

Step 8. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 9. Add the **26.5** dimension as shown in **Fig. 11**.

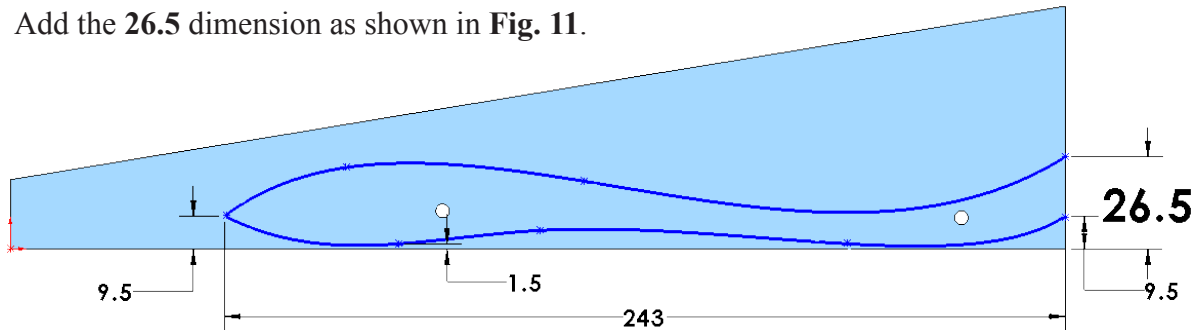



Fig. 11

Step 10. **Right click drawing and click Select** from menu to unselect Smart Dimension.

Step 11. Click the top spline to select it. Grab the **Circular Spline handle**  (small gray dot) of the first spline point, **Fig. 12** and pull up to straighten the spline, **Fig. 13**.

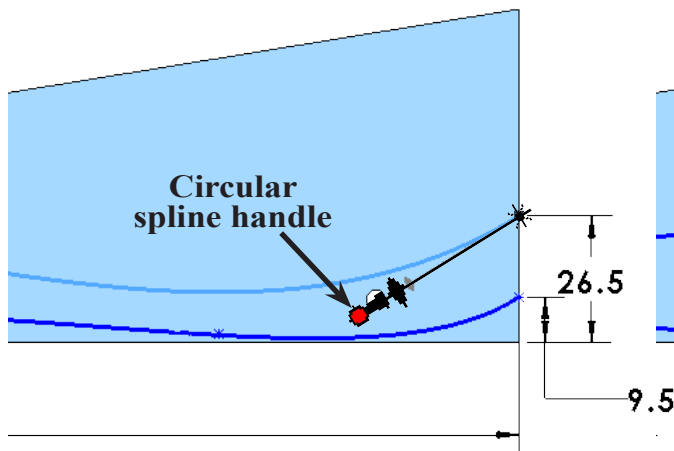


Fig. 12

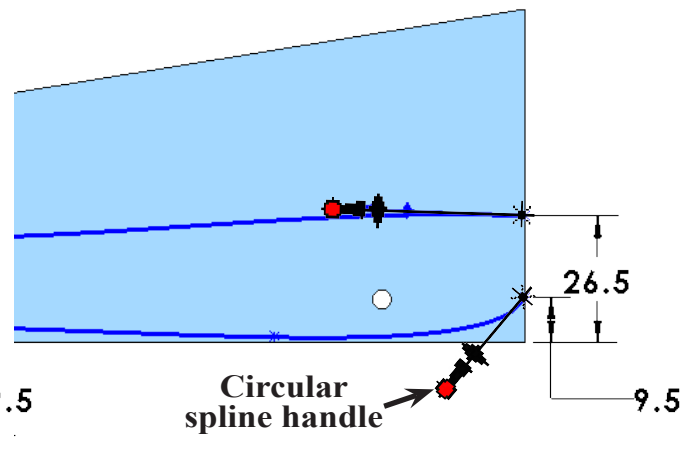



Fig. 13

Step 12. Click the bottom spline to select it, **Fig. 13**. Grab the **Circular Spline handle**  (small gray dot) of the first spline point and pull to the rear to adjust spline, **Fig. 14**. Very important to keep the spline inside the Blank, **Fig. 14**.

Step 13. Also, you can drag a Spline point to adjust the spline.

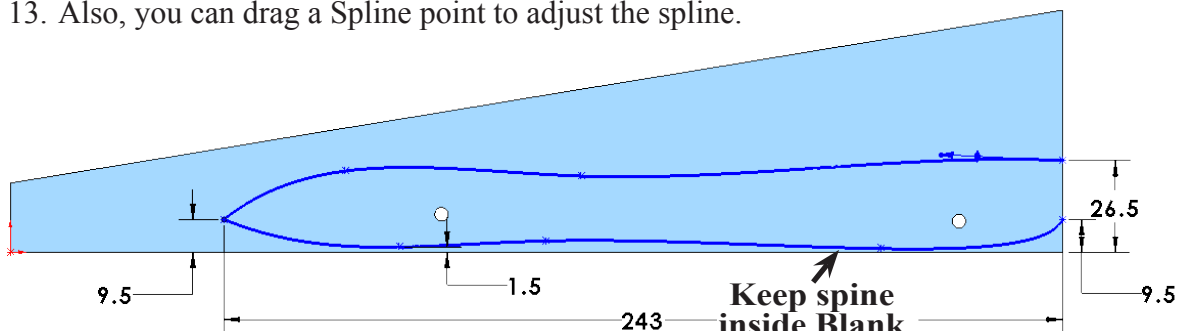
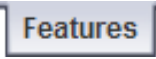


Fig. 14

Step 14. Click **Features**  on the Command Manager toolbar.

Step 15. Click **Extruded Cut**



on the Features toolbar.

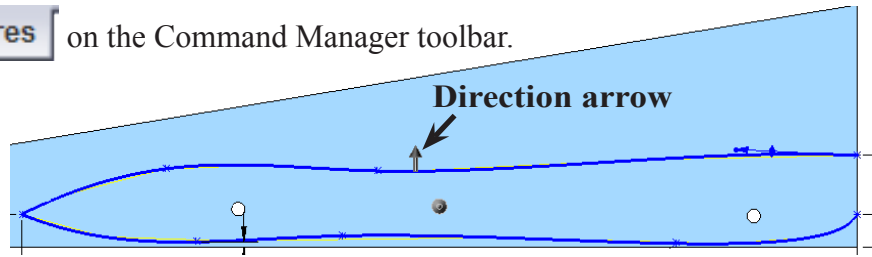



Fig. 16

Step 16. In the Cut-Extrude Property Manager:
under **Direction 1**

End Condition to Through All
The Direction arrow should point towards area to be cut away,

Fig. 16. If arrow is pointing in wrong direction, click **Flip side to cut,**

Fig. 15. Click OK .

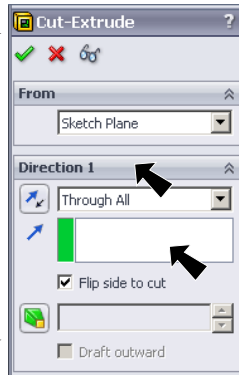


Fig. 15

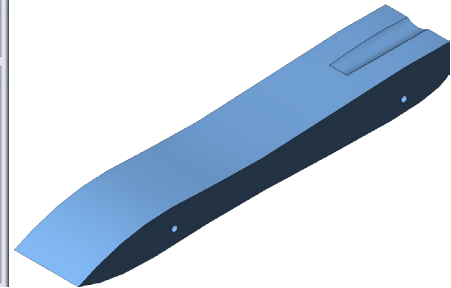



Fig. 17

Step 17. Click **Isometric**  on the Standard Views toolbar. (Ctrl-7)

Step 18. Save. Use Ctrl-S.

E. Rename Cut-Extrude1 SIDE CUT.

Step 1. **Rename Cut-Extrude1 to SIDE CUT** in the Feature Manager, **Fig. 18.** To rename, click **Cut-Extrude1** name in Feature Manager and press **F2** on keyboard. Key-in **SIDE CUT**.

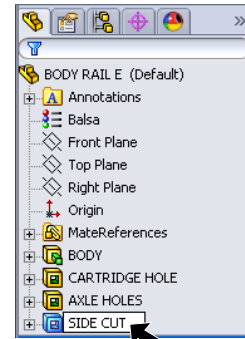






Fig. 18

F. Top Cut.

Step 1. Click **Top Plane**  in the Feature Manager and click **Sketch**  from the Content toolbar, **Fig. 19.**

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

Step 3. Click **Centerline**  in the **Line flyout**  (S) on the Sketch toolbar.

Step 4. Starting from midpoint of the front of the body, draw a centerline up through the body and extend the centerline out past the rear of the body, **Fig. 20.**

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

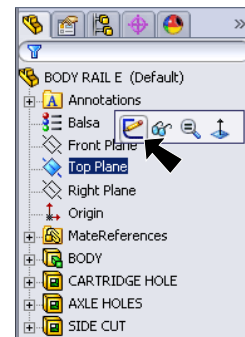
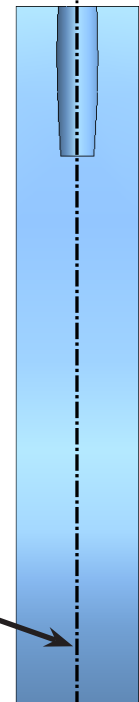


Fig. 19


Extend centerline past body



Centerline

Fig. 20

Step 6. Click the centerline to select it, **Fig. 21**.

Step 7. Click **Dynamic Mirror**  on the Sketch toolbar or Tools Menu > Sketch Tools > Dynamic Mirror, **Fig. 21**. Symmetry symbols appear at both ends of the centerline. Geometry drawn on one side of mirror centerline will mirror onto the other side.


Step 8. Click **Spline**  (S) on the Sketch toolbar.

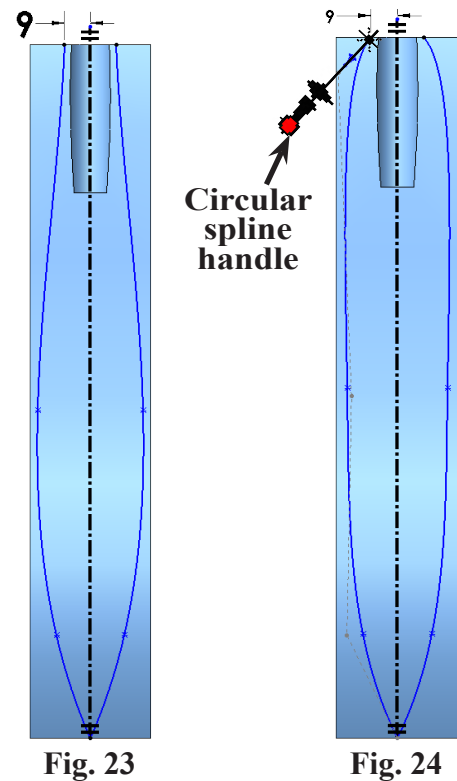
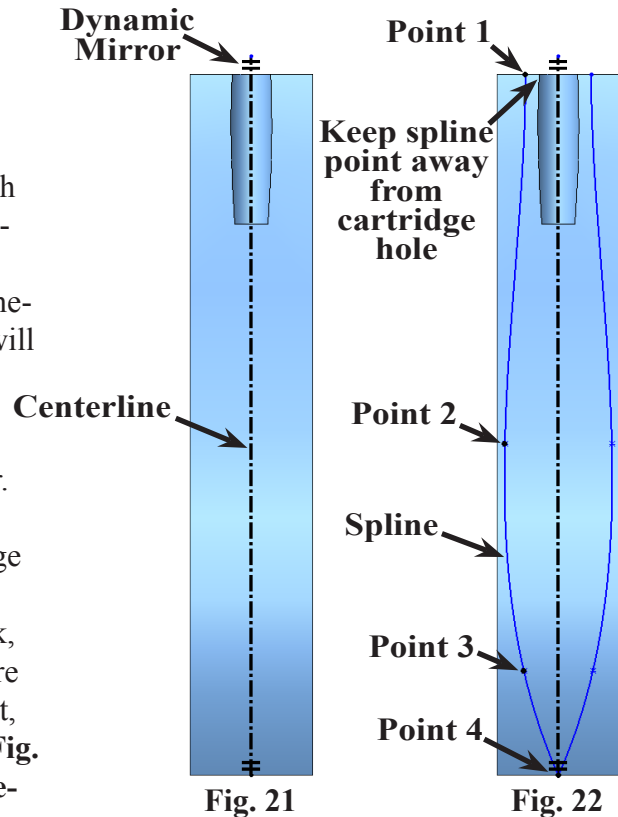
Step 9. Draw a 4 four point spline from the rear edge of Blank to the front edge at centerline. To draw the spline, click the rear edge of Blank, **Point 1, Fig. 22**. Click approximately where the 3 points are positioned and the last Point, Point 4 on the front edge at the centerline, **Fig. 22**. **Keep Point 2 and 3 away from any geometry**, that is, side edge of the Blank. Press Escape to end the spline.

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

Step 11. **Dimension between rear spline point and centerline 9** as shown in **Fig. 23**.

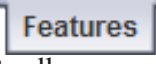
Step 12. **Right click drawing and click Select** from menu to unselect Smart Dimension.

Step 13. Click the spline to select it. Grab the **Circular Spline handle**  (small gray dot) of the first spline point at rear of body and pull to outside to curve spline at rear, **Fig. 24**.



Step 14. Grab the **Circular Spline handle** (small gray dot) of the Spline Point 4 and pull to left to adjust spline, **Fig. 25**. Very important to keep the spline inside the Blank.

Step 15. Also, you can drag a Spline point to adjust the spline.

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:

under **Direction 1**

End Condition to


Through All

The Direction arrow should

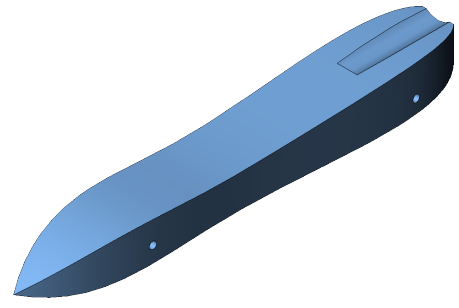
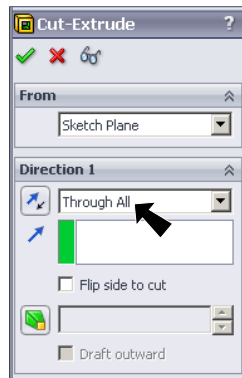
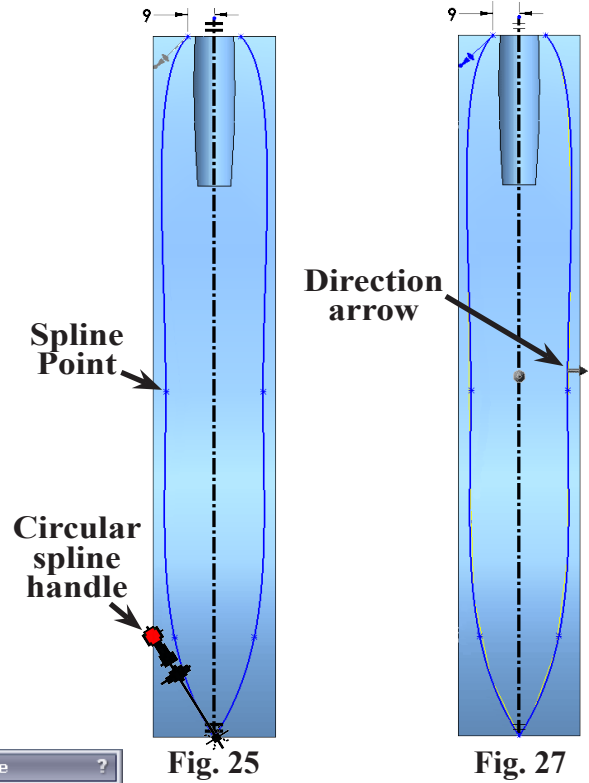
point towards area to be cut

away, Fig. 27. If arrow is pointing

in wrong direction, click **Flip side**

to cut, Fig. 26. Click OK .

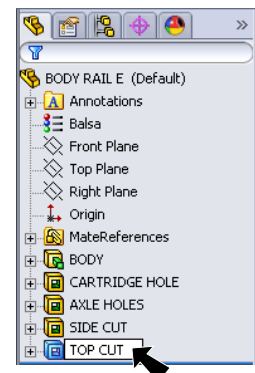
Step 19. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)



G. Rename Cut-Extrude1 TOP CUT.


Step 1. **Rename Cut-Extrude2 to TOP CUT** in the Feature Manager, **Fig. 29**. To rename, click **Cut-Extrude2** name in Feature Manager and press **F2** on keyboard. Key-in **TOP CUT**.

Step 2. Save. Use **Ctrl-S**.



H. Cartridge Revolve .

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

Step 2. **Show Sketch** of the **Cartridge Hole Feature**. To show sketch, expand **CARTRIDGE HOLE** in the Feature Manager, click Sketch2 and click **Show**  in the menu, **Fig. 30**.

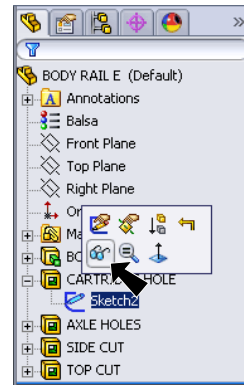


Fig. 30

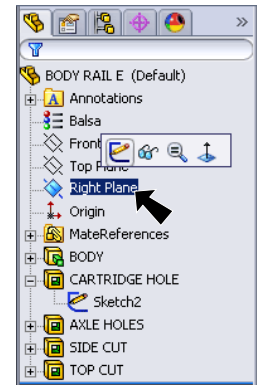





Fig. 31

Step 3. Click **Right Plane**  in the Feature Manager and click **Sketch**  from the Content toolbar, **Fig. 31**.

Step 4. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

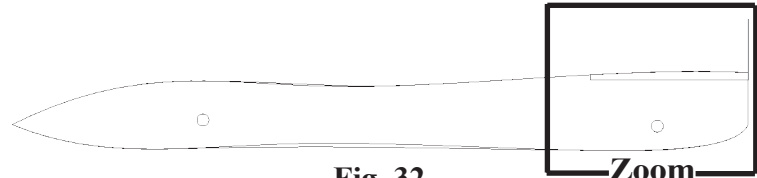



Fig. 32

Step 5. Zoom in around **rear of body**, **Fig. 32**. To **zoom**, hold down **Shift** key and drag with middle mouse button (wheel). To **pan**, hold down **Ctrl** key and drag with middle mouse button (wheel).

Step 6. Click **Line**  (**L**) on the Sketch toolbar.

Step 7. Draw horizontal line and vertical line from the center point of the circle in the Cartridge Hole sketch, **Fig. 33**. Move the pointer (cursor) along the circle sketch and when pointer indicates a  that's the center. Draw a horizontal line out towards the front of body and a vertical line down. To restart the line, right click and select End Chain from menu. Use the inferencing line, the dotted line that appears when you draw the lines.

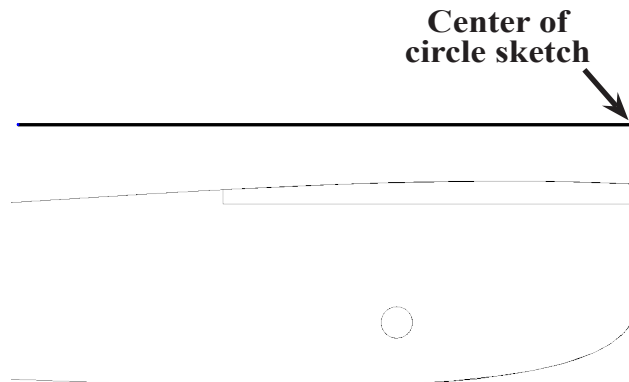


Fig. 33

Step 8. Click **Smart Dimension**  (**S**) on the Sketch toolbar.

Step 9. Dimension as shown in **Fig. 34**.

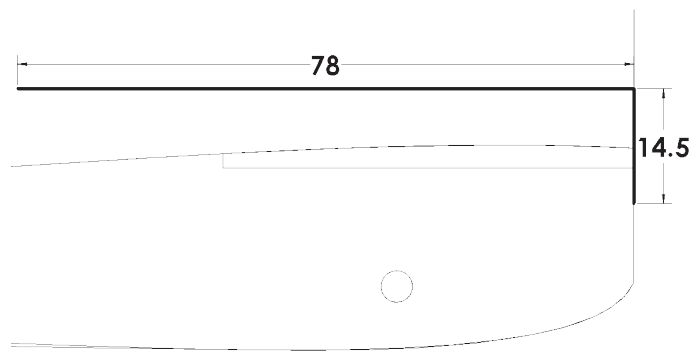


Fig. 34

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

Step 11. Draw a 3 point spline between the endpoints of the line, **Fig. 35**. Place the 2nd spline point below the front of the cartridge hole. Press Escape to end the spline.

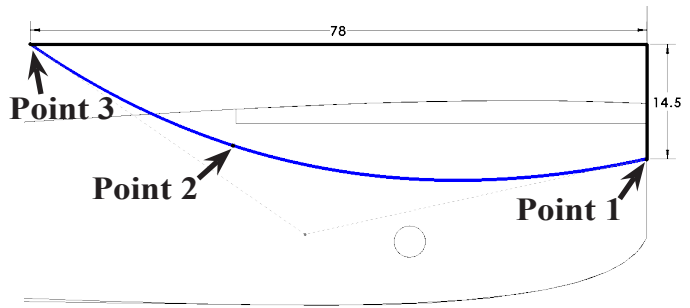


Fig. 35

Step 12. Click **Smart Dimension** (S) on the Sketch toolbar.



Step 13. **Dimension 4** between 2nd spline point and bottom of the cartridge hole as shown in **Fig. 36**. To Smart dimension click the spline point and the cartridge corner, then move the cursor up off the sketch and click. Key-in **4** for the dimension and press ENTER.

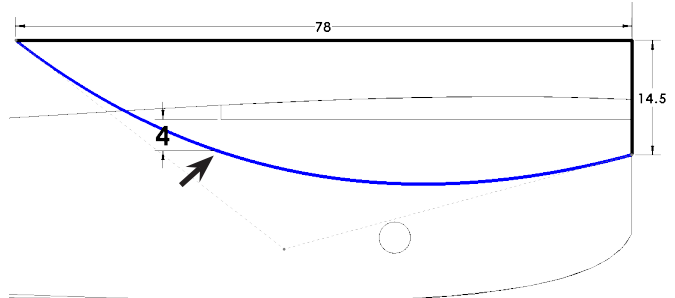


Fig. 36

Step 14. **Right click drawing and click Select** from menu to unselect Smart Dimension.

Step 15. Click the spline to select it. First, adjust the **Circular Spline handle** (small gray dot) of rear spline point to straighten the spline, then adjust the other spline points, **Fig. 37**.

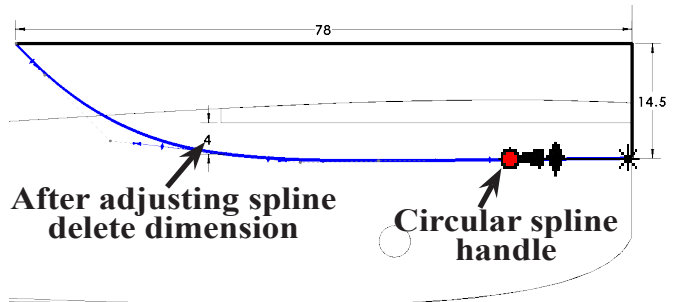


Fig. 37

Step 16. After adjusting the spline, **delete the 4 dimension, Fig. 37 and Fig. 39**. To delete, click dimension and press Delete key. Important to delete this dimension as it creates a relation which will not allow the cartridge hole cut feature to be move down below this revolve feature (see Fig. 43).

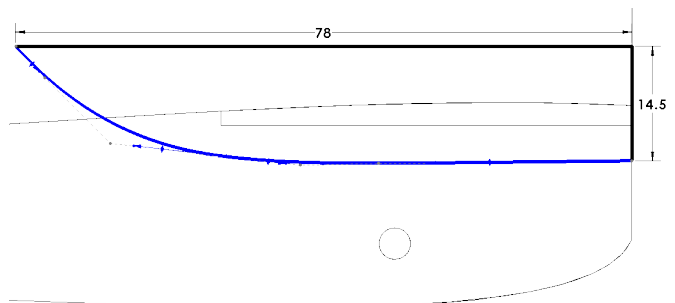
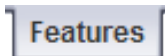


Fig. 38

Step 17. Click **Shaded With Edges** on the View toolbar.



Step 18. Click **Features** on the Command Manager toolbar.



Step 19. Click **Revolved Boss/Base** on the Features toolbar.



on the Features toolbar.

Step 20. In the Revolve Property Manger for the Axis of Revolution

Revolution, click the **horizontal line of sketch**, **Fig. 40**. Click OK.

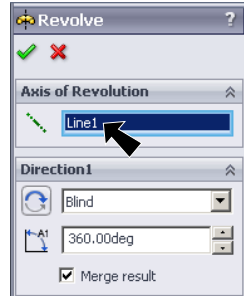


Fig. 39

Step 21. Rotate view as shown in **Fig. 42**. To rotate view, use Left arrow key.

Step 22. **Hide Sketch of the Cartridge Hole Feature**. To hide sketch, click sketch in drawing and click **Hide** in the menu, **Fig. 42**.

Step 23. In the Feature Manager move the **CARTRIDGE HOLE** feature below Revolve1 feature. To move the feature, drag **CARTRIDGE HOLE** down, when the yellow pointer is over Revolve1 release, **Fig. 43** and **Fig. 44**.

Step 24. Save. Use **Ctrl-S**.

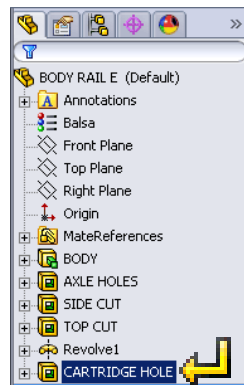


Fig. 43

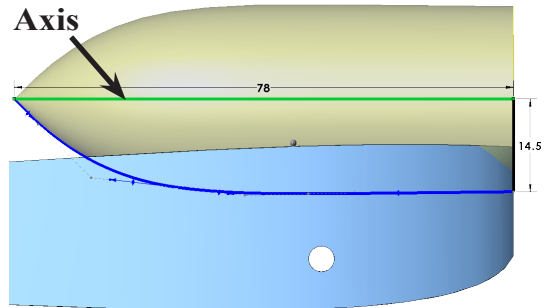


Fig. 40

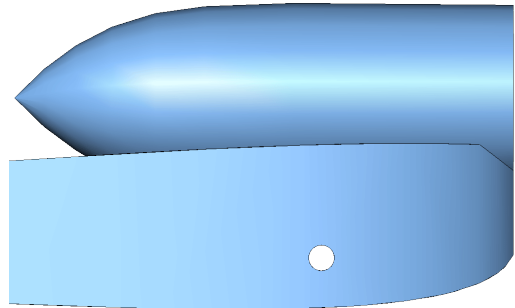


Fig. 41

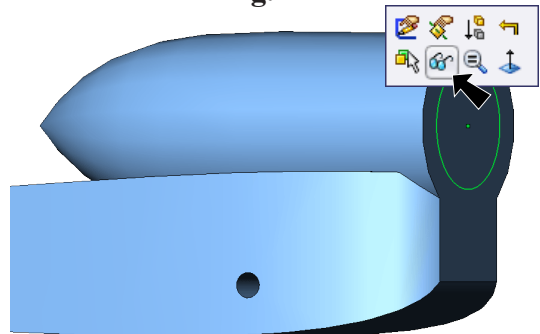


Fig. 42

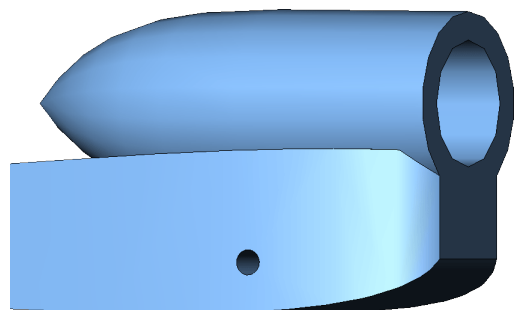


Fig. 44


I. Fillet Edges.

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

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

Step 3. In the Fillet Property Manager set:

select **FilletXpert**, **Fig. 45**

Radius  **8** (if 8mm will not work, try 7 or tweak the side cut splines)

select **Full preview**

click the **top and bottom edges** of **left side** of body, **Fig. 46**

click **Apply**, **Fig. 45**

rotate view to view **right side**, hold down middle mouse button (wheel) and drag to rotate view, **Fig. 47**

click the **top and bottom edges** of **right side** of body, **Fig. 47**

click **Apply**

Step 4. Set **Radius**  **3**

click edge under **cartridge revolve**, **Fig. 48**

click **Apply**

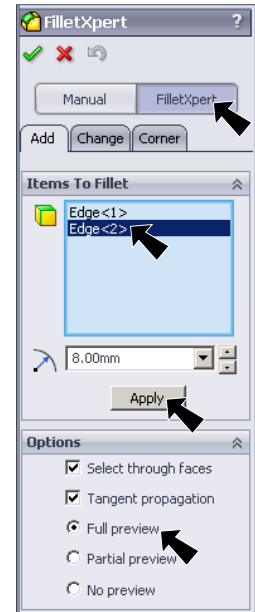


Fig. 45

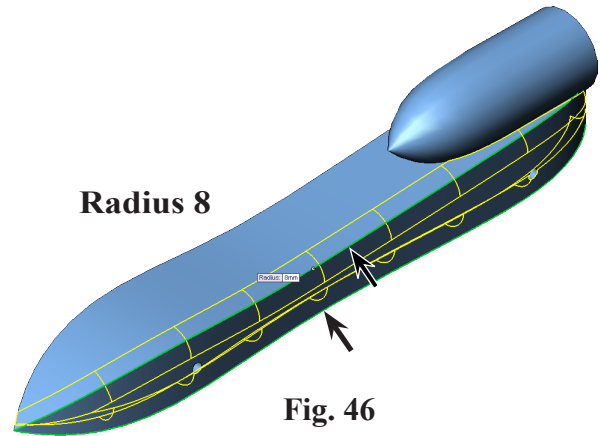


Fig. 46

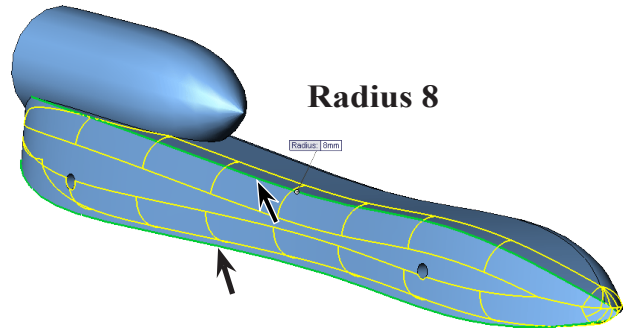


Fig. 47

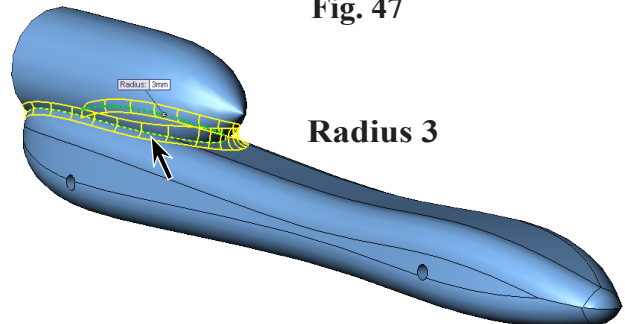


Fig. 48

Step 5. Rotate view to view **back of body**, hold down middle mouse button (wheel) and drag to rotate view, **Fig. 49**

click the **back outside edge** of body, **Fig. 49**.

click **Apply**

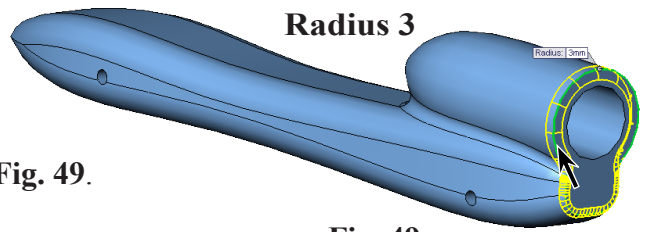


Fig. 49

Step 6. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)

Step 7. Set **Radius**  **2**

click **front edge** of body, **Fig. 50**

click **OK**  in Fillet Property Manager when done.

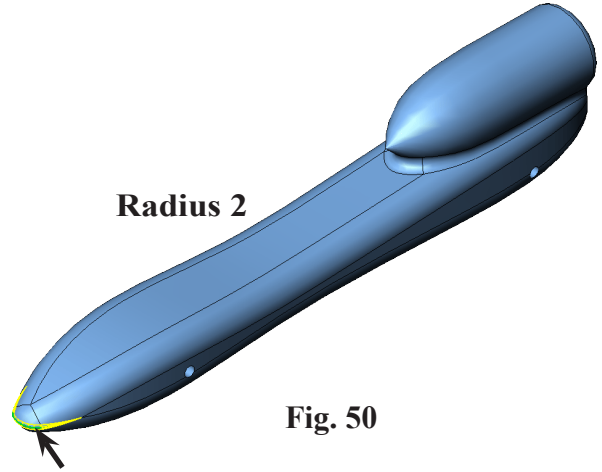


Fig. 50

Step 8. Save. Use **Ctrl-S**.

