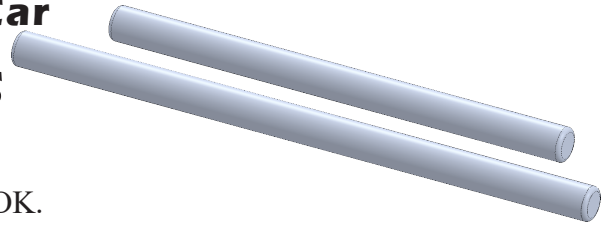






## CO2 Rail Car Axles



### A. Axle.

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**.

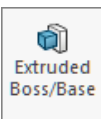
Step 3. Click **Circle**  (S) on the Sketch toolbar.



Step 4. Sketch a circle starting at the Origin , **Fig. 2**.


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

Step 6. Dimension circle **diameter 3.18**, **Fig. 2**.

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

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

Step 9. In the Property Manager set:  
under Direction 1, **Fig. 3**  
End Condition **Mid Plane**  
**Depth**  **56**  
click OK .

Step 10. Click **Zoom to Fit**  (F) on the View toolbar.

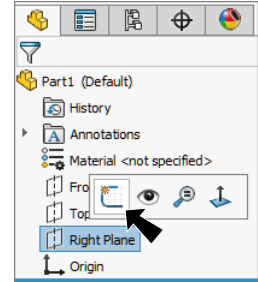


Fig. 1

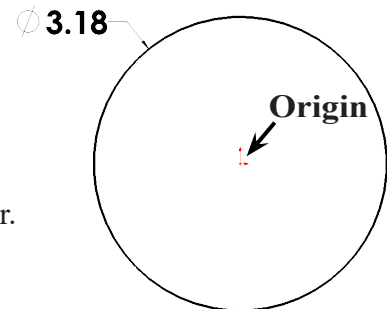


Fig. 2

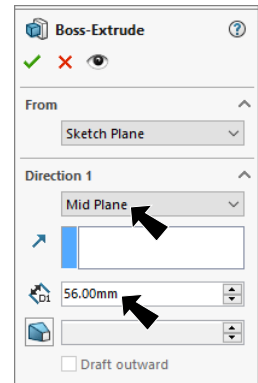


Fig. 3

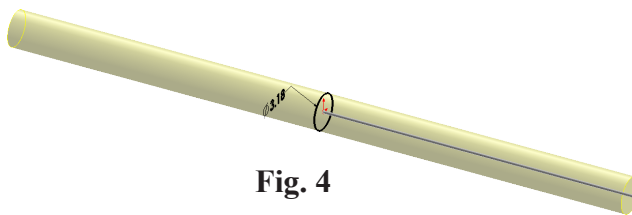


Fig. 4

### B. Save as "FRONT AXLE".

Step 1. Click File Menu > Save As.

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

### C. Fillet Edges.

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

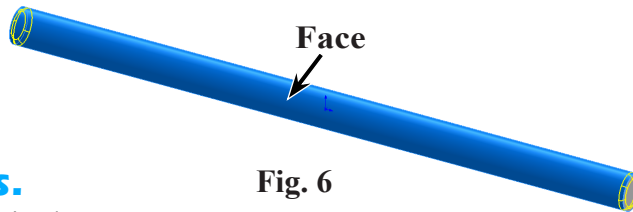
Step 2. In the Fillet Property Manager set:  
select **FilletXpert**, **Fig. 5**

set **Radius**  **.4**

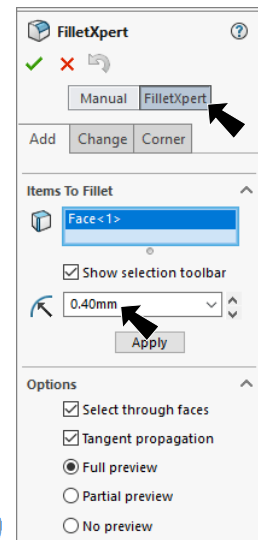
click **cylindrical axle face**, **Fig. 6**

click **OK** .

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




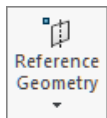
**Fig. 6**



**Fig. 5**

### D. Mate References.

Step 1. Click **Right Plane**  in the Feature Manager to select the Plane, **Fig. 7**.

Step 2. Click **Reference Geometry**  on the Features toolbar and **Mate Reference** from the menu.

Step 3. In the Mate Reference Manager set:  
under **Primary Reference Entity**, **Fig. 8**

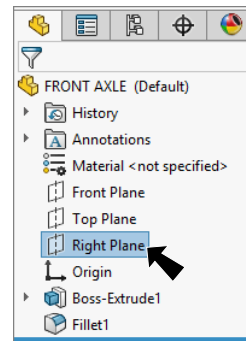
**Mate Reference Type**  **Coincident**

under **Secondary Reference Entity**

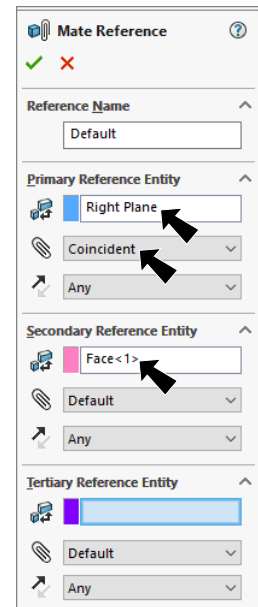
click in Entity box 

and click **cylindrical face of axle**, **Fig. 9**

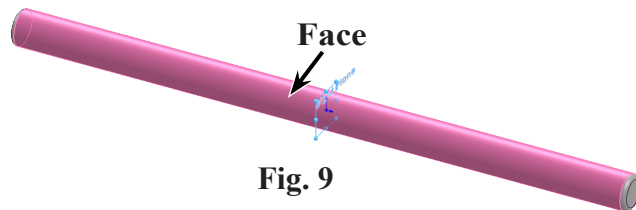
click **OK** .



**Fig. 7**




**Fig. 8**



**Fig. 9**

## E. Material Aluminum.

- Step 1. Right click Material  in the Feature Manager and click Edit Material, Fig. 10.
- Step 2. Expand Aluminum Alloys in the material tree and select 1060 Alloy, Fig. 11. Click Apply and Close.

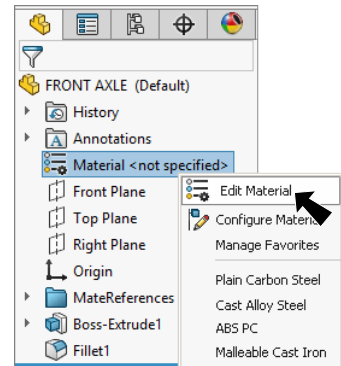


Fig. 10

## F. Save as "REAR AXLE".

- Step 1. Save.  
Use **Ctrl-S** to save FRONT AXLE. **Very important to save here.**
- Step 2. Click File Menu > Save As.
- Step 3. Key-in **REAR AXLE** for the filename.  
You now have two axle files, FRONT and REAR. Next, we change length of REAR axle.

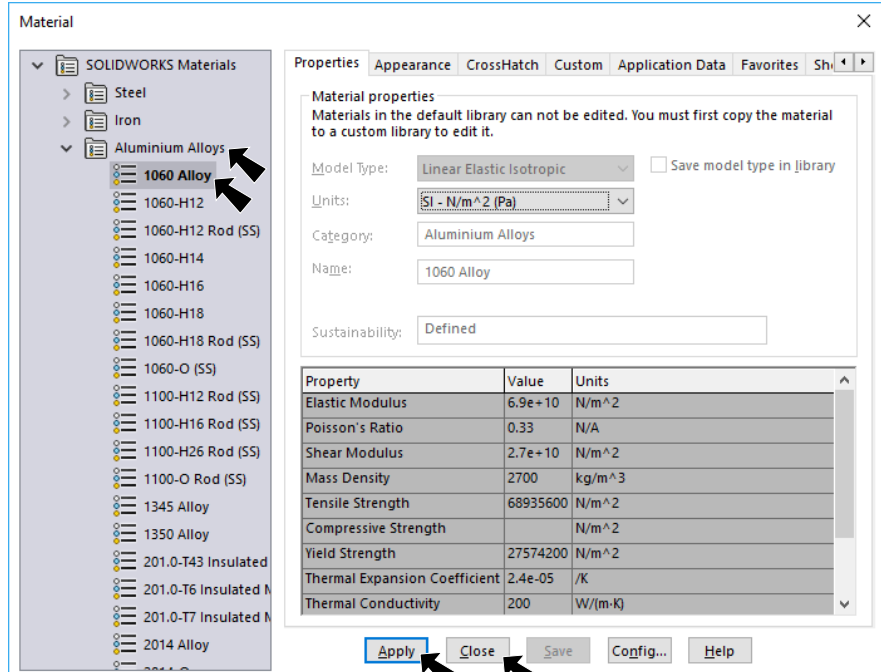





Fig. 11

## G. Change Extrude Depth.

- Step 1. Click **Boss-Extrude1** in the Feature Manager and click **Edit Feature**  in the menu, Fig. 12.
- Step 2. In the Property Manager change:  
**Depth**  **44**  
click **OK** , Fig. 13.
- Step 3. Save. Use **Ctrl-S**.

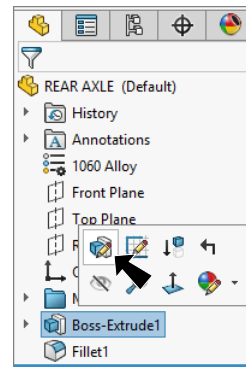


Fig. 12

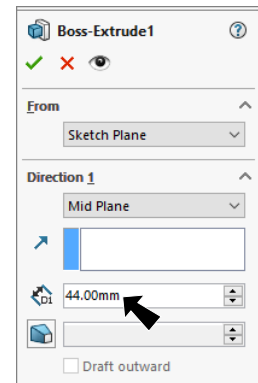


Fig. 13

You should have 2 axles:  
**FRONT 56**  
**REAR 44**

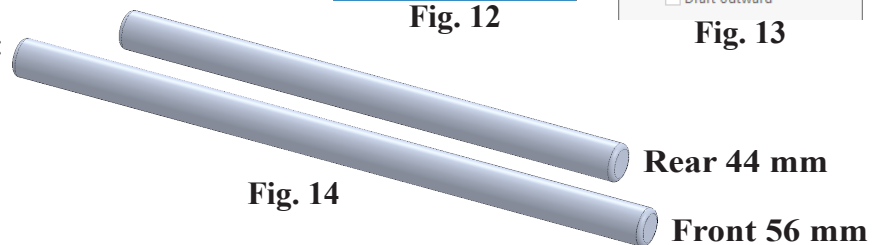


Fig. 14