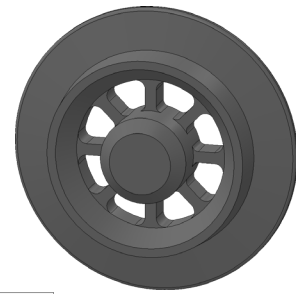


Solar Train Front Wheel



A. Revolve.

Step 1. Click **New**  on the Standard toolbar, click **Part Metric**  and OK.

Step 2. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 1**.

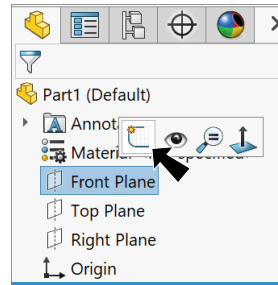


Fig. 1

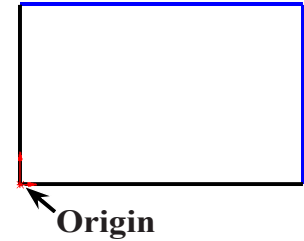


Fig. 2

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

Step 4. Sketch **corner rectangle** from **Origin**  , **Fig. 2**.

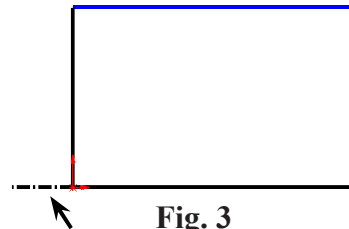


Fig. 3

Step 5. Click **Centerline**  in the **Line** flyout  on the Sketch toolbar.

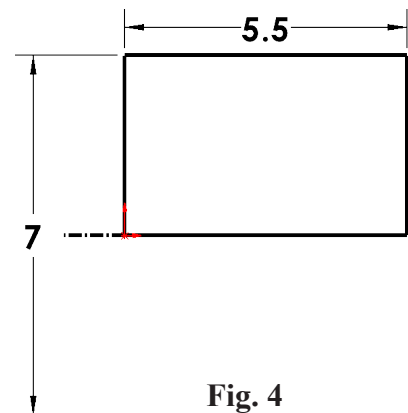


Fig. 4

Step 6. Sketch **horizontal centerline** from **Origin**  , **Fig. 3**.

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

Step 8. Add dimensions, **Fig. 4**. Dimension **double distance** 7. To double distance dimension, click centerline and then top horizontal line, move the cursor below centerline (Origin) and click. Key-in 7 in the Modify box and press ENTER.

Step 9. Click **Line**  (L) on the Sketch toolbar.

Step 10. Sketch the 7 lines, **Fig. 5**.

Step 11. **Unselect Line tool**. To unselect, right click graphics area and click **Select**  from menu.

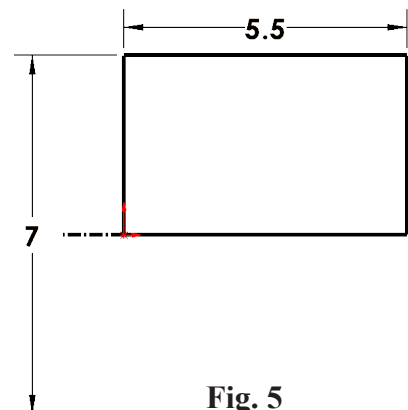
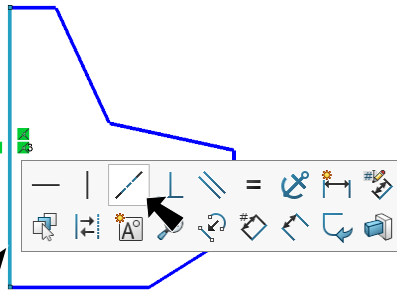


Fig. 5

Step 12. **Ctrl click the left vertical lines** to select both. Release Ctrl key and click **Make Collinear**

 on the context toolbar, **Fig. 6**.



Step 13. Click **Smart Dimension**

 (S) on the Sketch toolbar.

Ctrl click lines

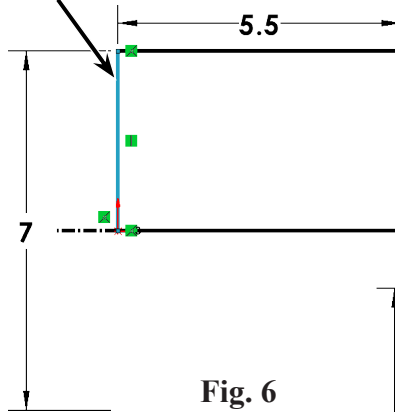
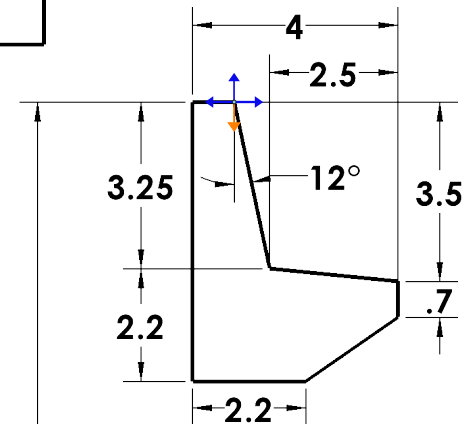
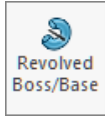


Fig. 6

Step 14. Add dimensions, **Fig. 7**. To dimension angle to imaginary line, click angled line and top endpoint, then click the **bottom vertical crosshair**  and place dimension.



Step 15. Click **Features**  on the Command Manager toolbar.

Step 16. Click **Revolved Boss/Base**  on the Features toolbar.

Step 17. In the Revolve Property Manger:

for Axis of Revolution , centerline will be selected, **Fig. 8** click OK .

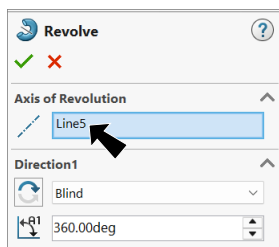


Fig. 8

Axis

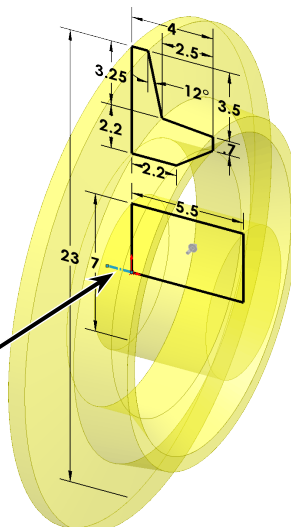


Fig. 9

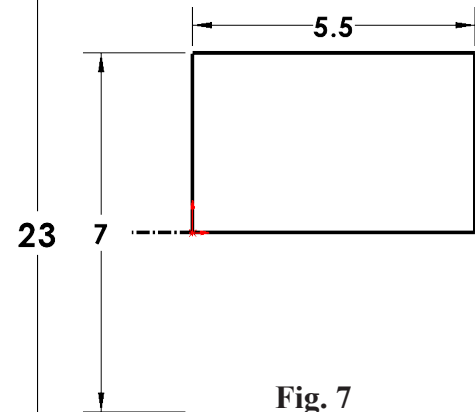


Fig. 7

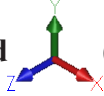
B. Save as "FRONT WHEEL".

Step 1. Click File Menu > Save As.

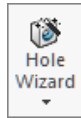
Step 2. Key-in **FRONT WHEEL** for the filename and press ENTER.

C. Hole Wizard.

Step 1. Rotate view to back side, **Fig. 11**. To rotate view, **Ctrl-Shift** click the **Y** axis of the **Reference Triad** (bottom left corner of graphics area).



Step 2. Click **Hole Wizard** on the Features toolbar.



Step 3. In the Property Manager on the Type tab set:
under Hole Type, **Fig. 10**

select **Hole** 
under Standard:
select **ANSI Metric**
under Type:
Drill Sizes
under Hole Specifications
check **Show custom sizing**
Through Hole Diameter  **3.09**
Angle at Bottom  **90°**
under End Condition
End Condition **Blind**
Blind Hole Depth  **3.8**
Depth up to Shoulder 

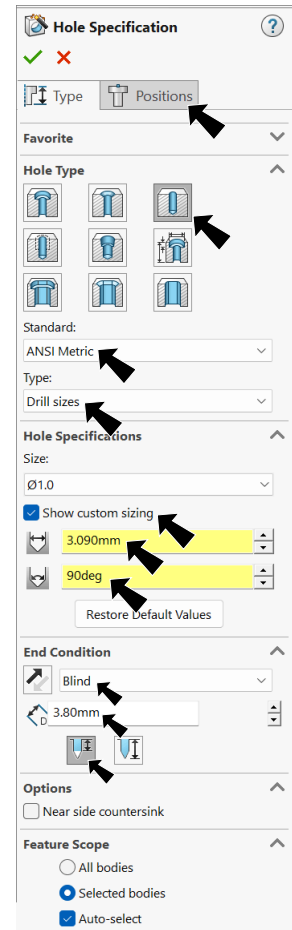


Fig. 10

Step 4. Click **Positions** tab  at top of Property Manager.

Step 5. Click **face of hub** one time as face for hole and click the

Origin  to place the point, **Fig. 11**.

Step 6. Click OK  in Hole Property Manager.

Step 7. Save  (Ctrl-S).

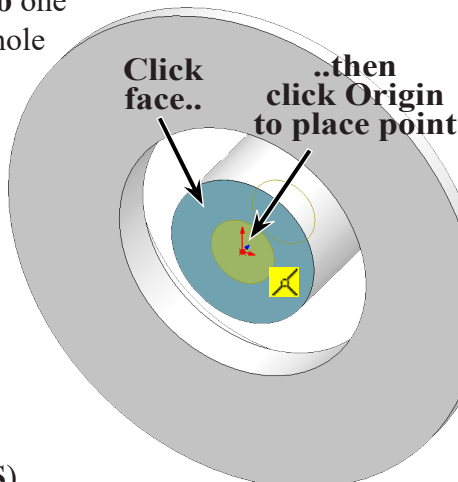


Fig. 11

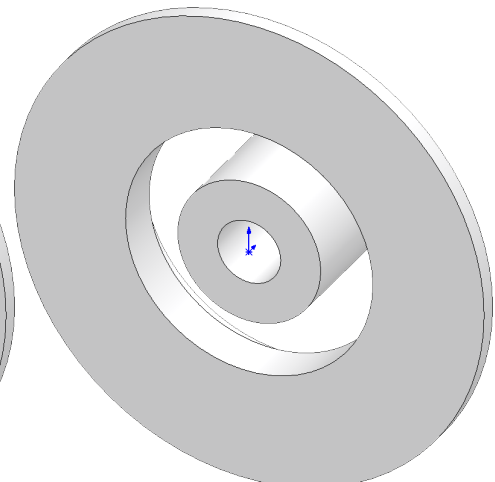


Fig. 12

D. Extrude Spoke.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 13**.

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

Step 3. Click **Convert Entities**  on the Sketch toolbar.

Step 4. In the Convert Entities Property Manager:
under Entities to Convert, **Fig. 14**
click the **two inside**
circular edges, **Fig. 15**
click OK .

Step 5. Click **Centerline**  in the
Line flyout  on the
Sketch toolbar.

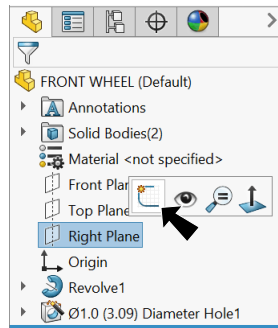


Fig. 14

Step 6. Sketch a **vertical centerline** from the **Origin**  **up**
to top converted circle, **Fig. 16**.

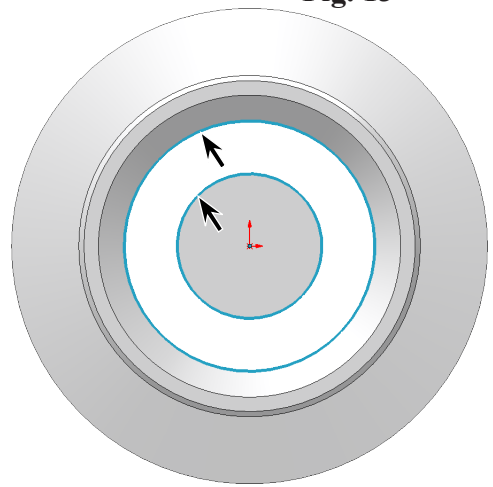
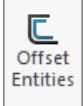


Fig. 15

Step 7. Click **Offset Entities**  on the Sketch toolbar.

Step 8. In the Offset Entities Property Manager set:
under Parameters, **Fig. 17**

Distance  **.45**
check **Bi-directional**
click **centerline**, **Fig. 18**
click OK .

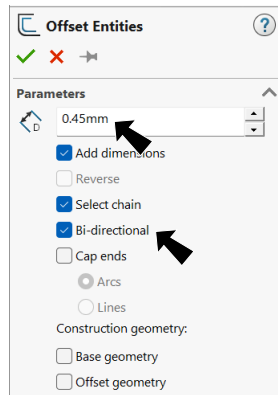


Fig. 17

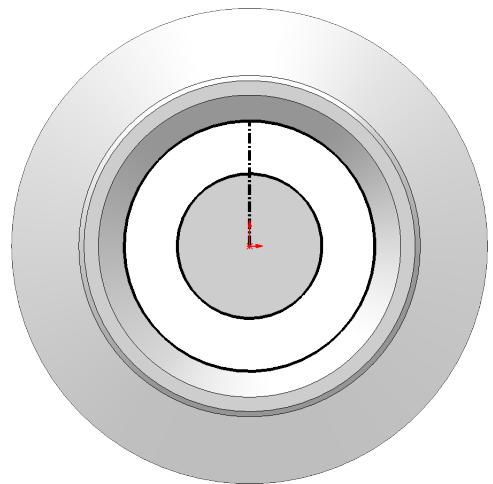


Fig. 16

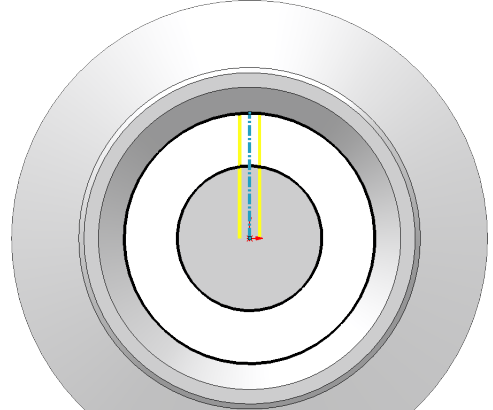
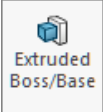


Fig. 18

Step 9. Rotate view to **view extrude**, **Fig. 20**. Use **Left Arrow key**  **once** and **Down Arrow key**  **once**.

Step 10. Click **Features**  on the Command Manager toolbar.

Step 11. Click **Extruded Boss/Base**  on the Features toolbar.

Step 12. In the Boss-Extrude Property Manager set:

under Direction 1, **Fig. 19**

End Condition **Blind**

Depth  **2.2**

uncheck **Thin Feature**

under Selected Contours

click the **two contours**,

Fig. 20

click OK  .

Step 13. Save  (Ctrl-S).

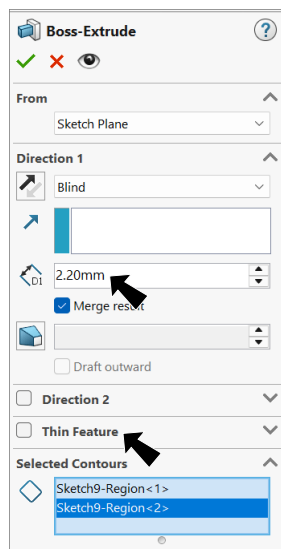


Fig. 19

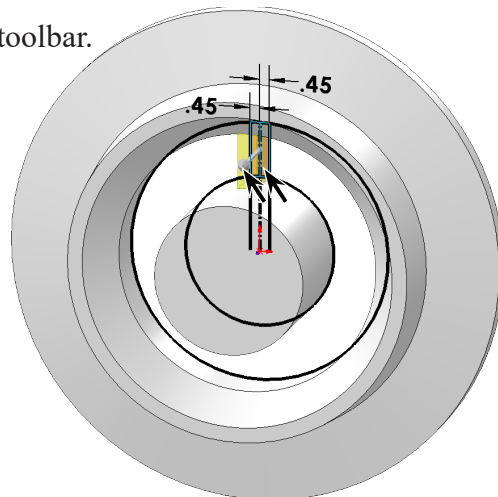


Fig. 20

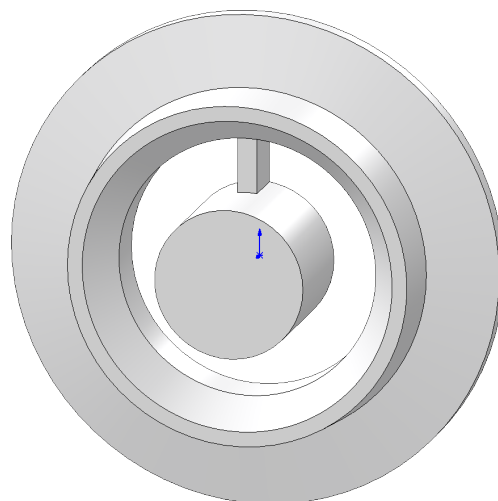


Fig. 21

E. Fillets 1-3.

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

Step 2. In the Fillet Property Manager set:
select **FilletXpert**, Fig. 22

- ① **Radius**  **.7**
click **inside top edges of spoke (2)**, Fig. 23
click **Apply**

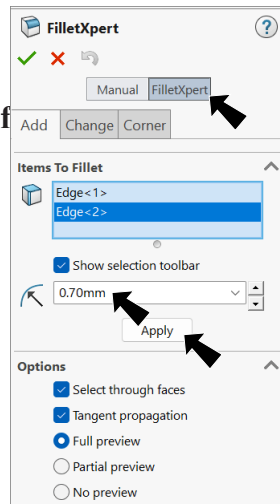


Fig. 22

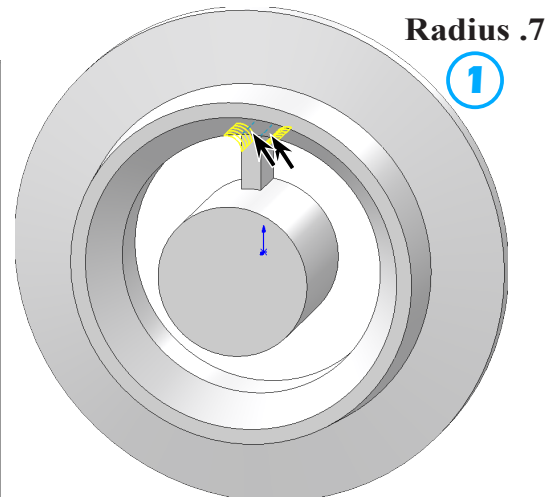


Fig. 23

- ② **Radius**  **.5**
click **inside bottom edges of spoke (2)**, Fig. 24
click **Apply**

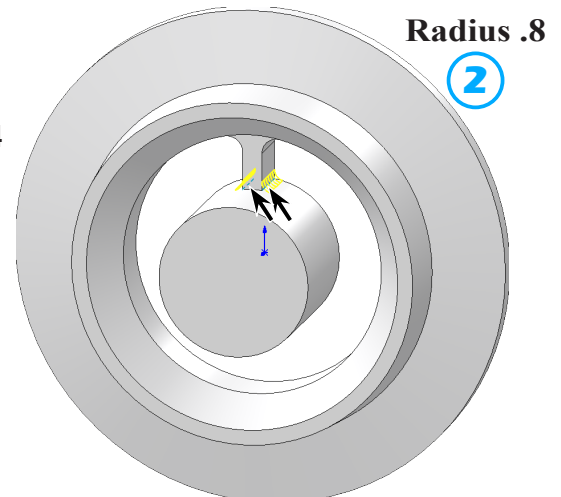


Fig. 24

- ③ **Radius**  **.3**
click **both outside circular edges of Wheel (2)**, Fig. 25
click **OK** .

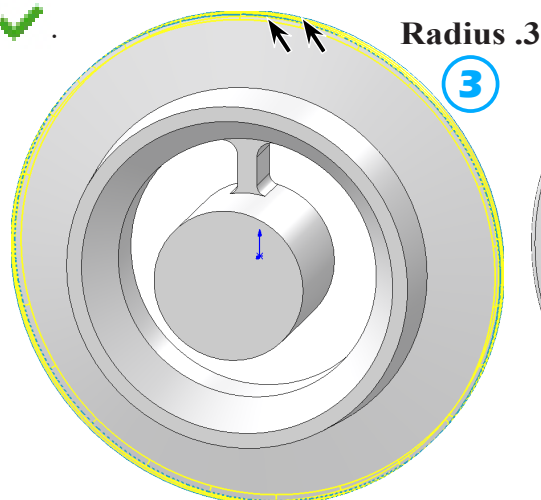


Fig. 25

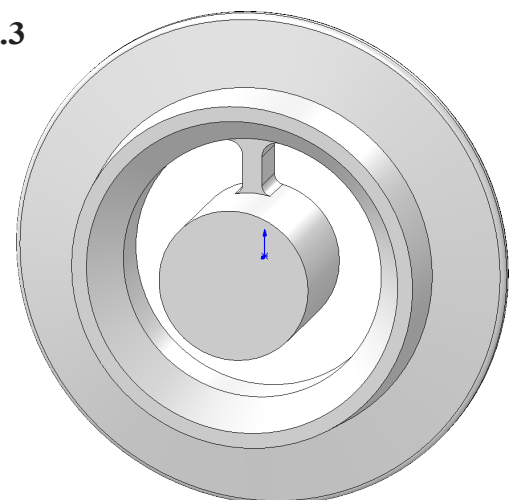
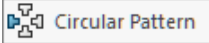


Fig. 26

Step 3. Save 
(Ctrl-S).

F. Circular Pattern Spoke.

Step 1. Click **Circular Pattern**  in the **Linear Pattern** flyout  on the Features toolbar.

Step 2. In the Circular Pattern Property Manager set:
 under Features and Faces, **Fig. 27**
 click **Boss-Extrude1**, **Fillet1** and **Fillet2** in graphics area, **Fig. 27**
 under Direction 1
 click in **Pattern Axes**  box
 click a **cylindrical face**, **Fig. 28**
 check **Equal spacing**
Number of Instances  **8**
 click OK .

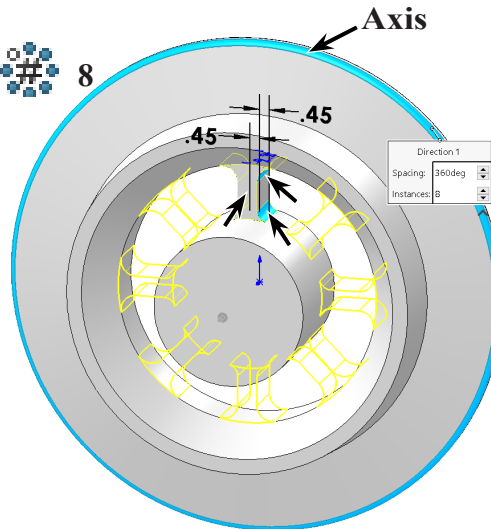


Fig. 28

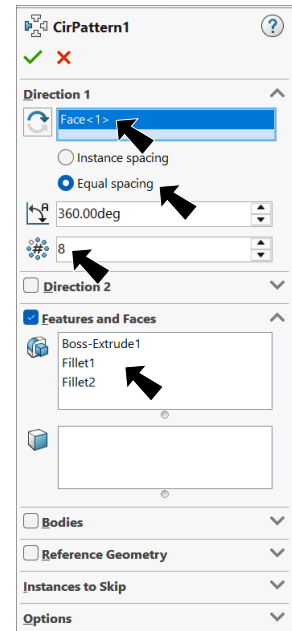
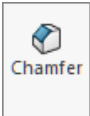


Fig. 27

G. Chamfer.

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

Step 2. In the Chamfer Property Manager set:
 under Chamfer Type, **Fig. 29**

select **Angle Distance** 
 click **edge hub**, **Fig. 30**
 under Chamfer Parameters

Distance  **1**
Angle  **45°**
 click OK .

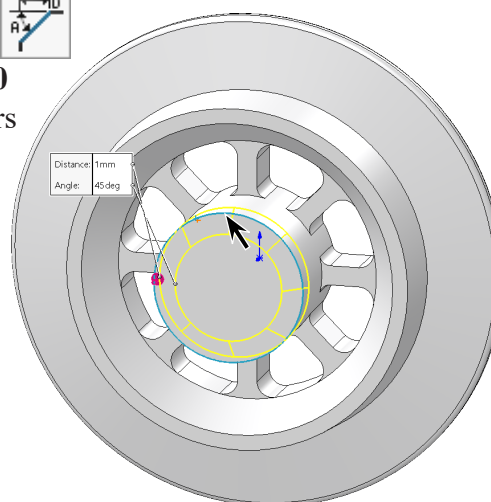


Fig. 30

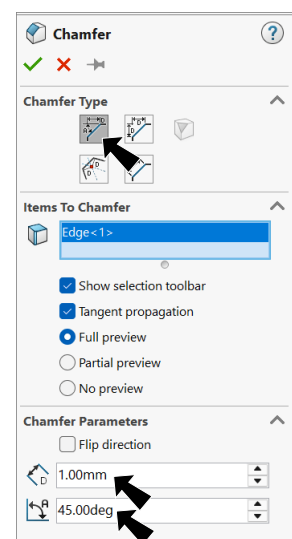
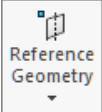


Fig. 29

H. Mate Reference.

Step 1. Click **Reference Geometry**  on the Features toolbar and **Mate Reference**  from the menu.

Step 2. In the Mate Reference Manager set:
under **Primary** Reference Entity
click **cylindrical face**, **Fig. 32**
click OK .

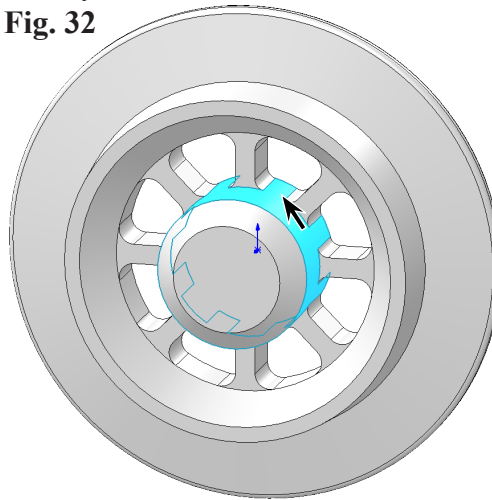


Fig. 32

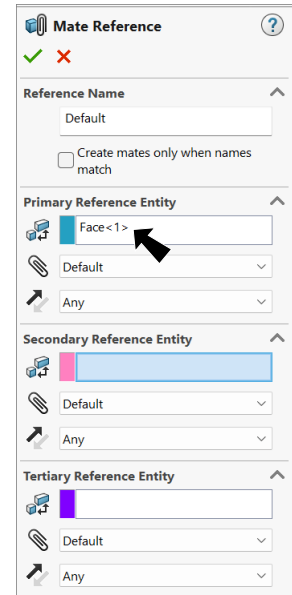


Fig. 31

I. Appearance Light Gray Plastic.

Step 1. Click the part, click **Appearance Callout**  on the context toolbar and click **FRONT WHEEL** , **Fig. 33**.

Step 2. In the Appearances Task Pane expand **Plastic**, click **Medium Gloss** and in the lower pane click **light gray medium gloss plastic**, **Fig. 34**.

Step 3. Click OK  in the Property Manager.

Step 4. Save  (Ctrl-S).

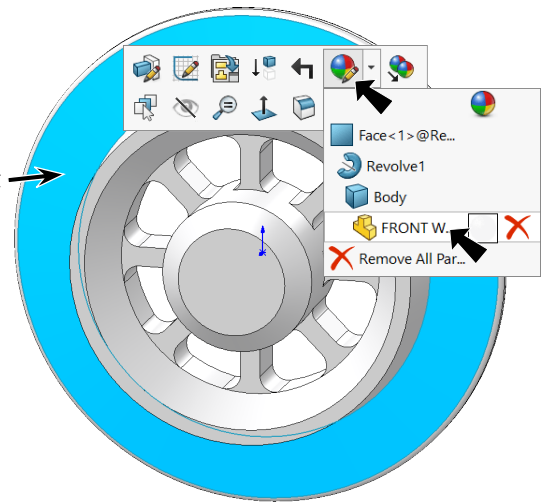


Fig. 33

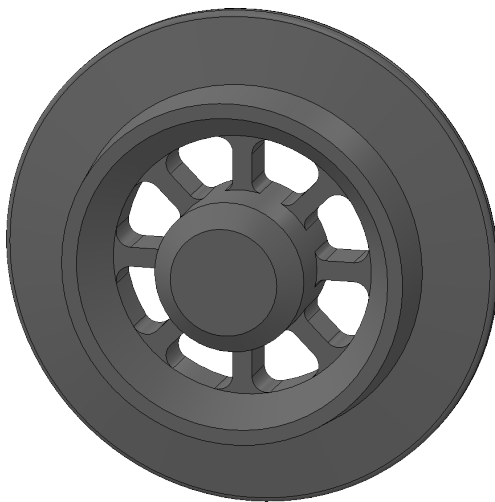


Fig. 36

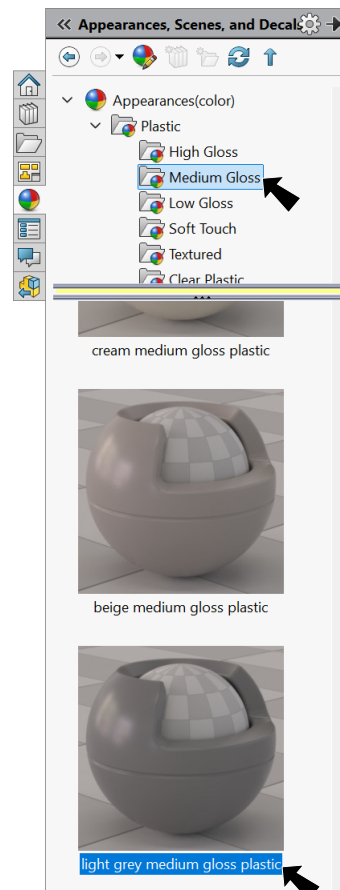


Fig. 34

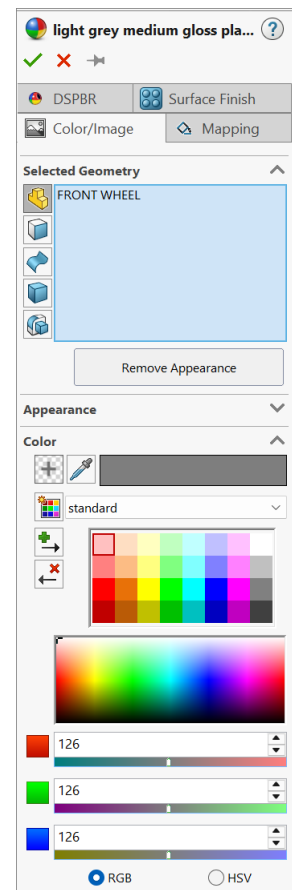


Fig. 35