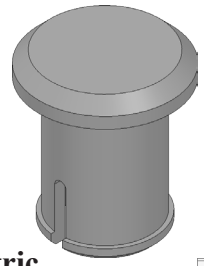
Chapter 26

Solar Train

# Stud Pin



## 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**.

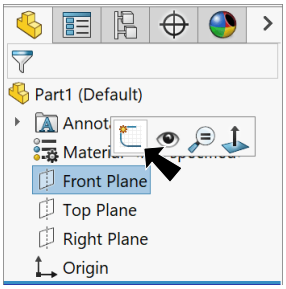



Fig. 1

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

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

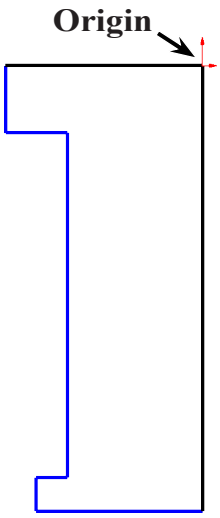



Fig. 2

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

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

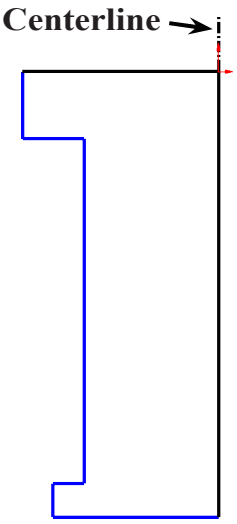



Fig. 3

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. Double distance dimension the 4.8.

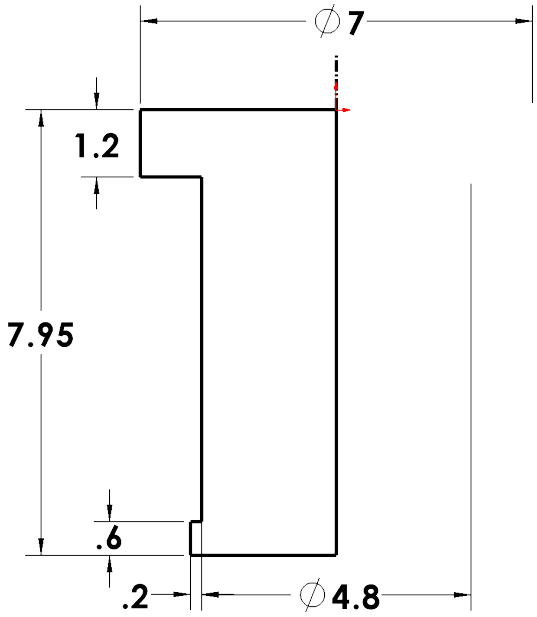



Fig. 4

Step 9. Click **Features** Features on the Command Manager toolbar.

Step 10. Click **Revolved Boss/Base** Revolved Boss/Base on the Features toolbar.

Step 11. In the Revolve Property Manger:

for Axis of Revolution , centerline will be selected, **Fig. 6**

click OK .

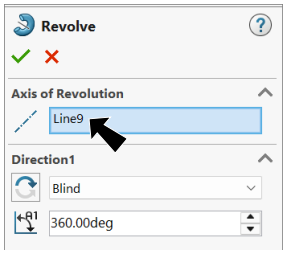



**Fig. 5**

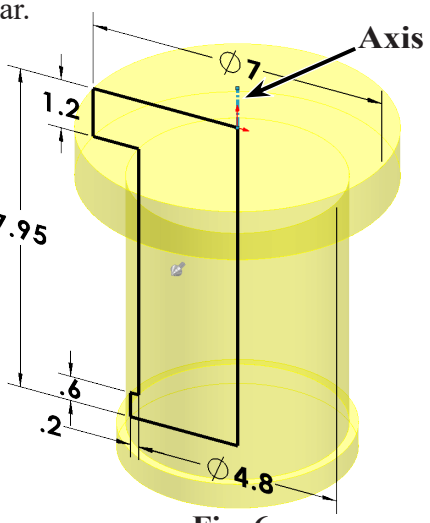



**Fig. 6**

## B. Save as "STUD PIN".

Step 1. Click File Menu > Save As.

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

## C. Extruded Cut1.

Step 1. Click **Bottom** on the Standard Views toolbar. (**Ctrl-6**)

Step 2. Click the **bottom face** and click **Sketch** on the context toolbar, **Fig. 7**.

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

Step 4. Sketch **circle at Origin** , **Fig. 8**.

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

Step 6. Dimension **diameter 3.7**, **Fig. 8**.

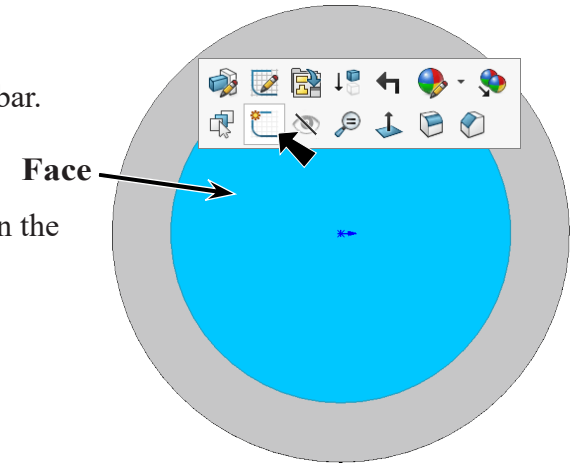



**Fig. 7**

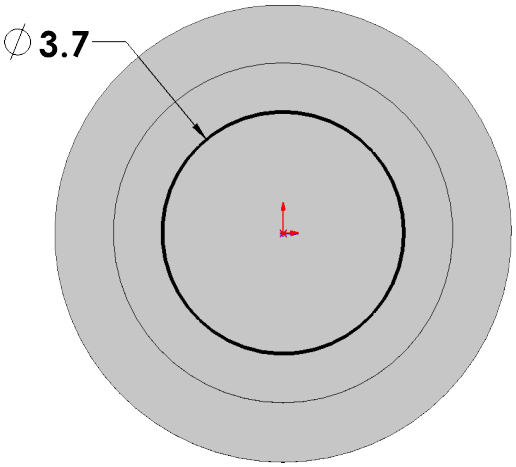



**Fig. 8**

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

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

Step 9. Click **Extruded Cut** Extruded Cut on the Features toolbar.

Step 10. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 9**
End Condition **Blind**
**Depth** D1 **4**
click OK .

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

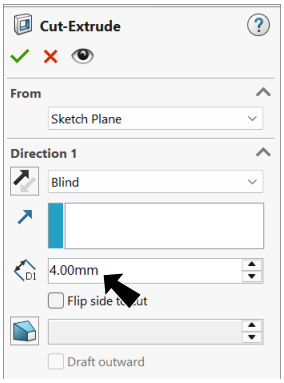


**Fig. 9**

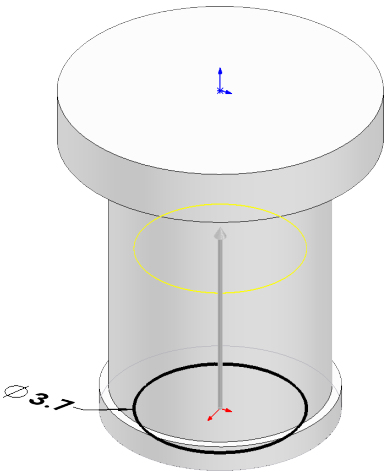


**Fig. 10**

## D. Extruded Cut2.

Step 1. Click **Front Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 11**.

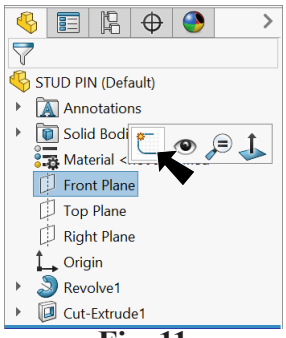


**Fig. 11**

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 below Origin** , **Fig. 12**.

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

Step 6. **Ctrl click centerpoint of circle** and **Origin** to select both. Release Ctrl key and click **Make Vertical** on the context toolbar, **Fig. 13**.

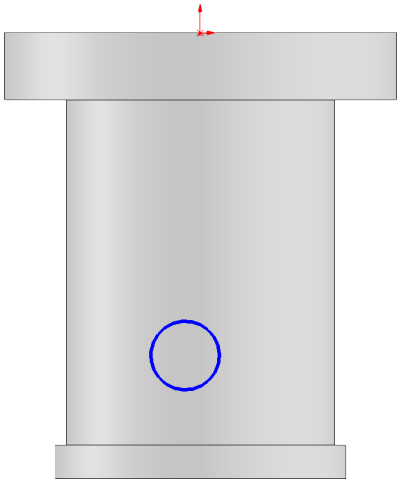


**Fig. 12**

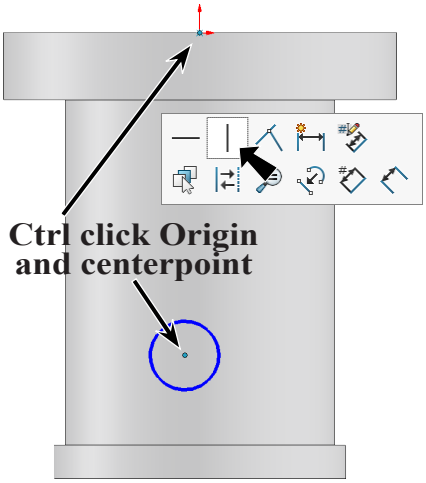


**Fig. 13**

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

Step 8. Sketch **line from circle quadrant point down to bottom edge of Revolve across edge and back up to quadrant point, Fig. 14.**

Step 9. Click **Smart Dimension** 

**(S)** on the Sketch toolbar.

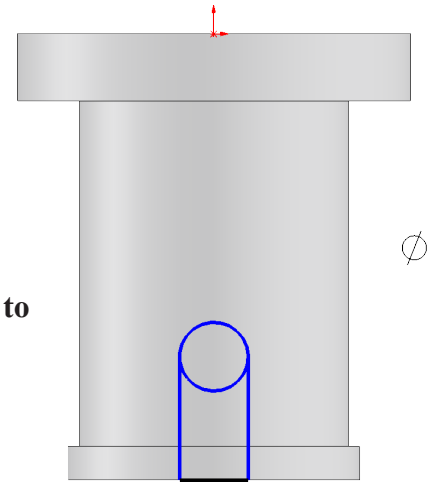


**Fig. 14**

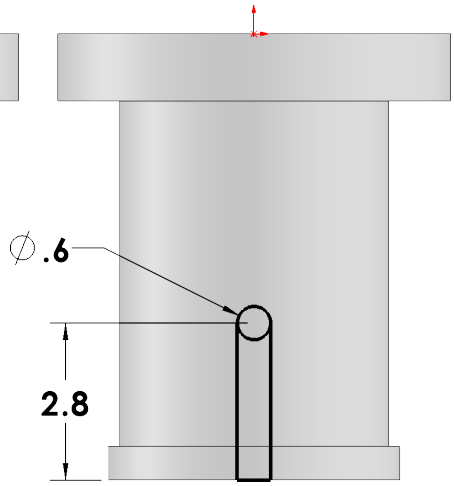


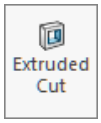
**Fig. 15**

Step 10. Add dimensions, **Fig. 15.**

Step 11. Click **Isometric**  on the Standard Views toolbar. **(Ctrl-7)**

Step 12. Click **Features** 

on the Command Manager toolbar.

Step 13. Click **Extruded Cut** 

on the Features toolbar.

Step 14. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 16**
End Condition **Through All - Both**
under Selected Contours
click **both contours, Fig. 17**
click OK  .

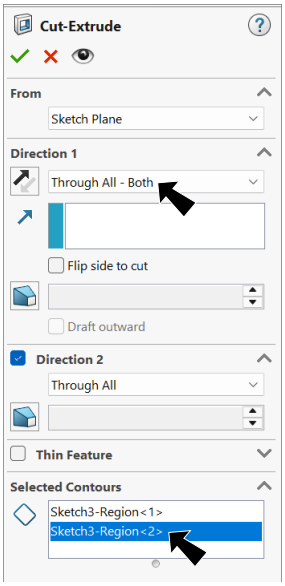


**Fig. 16**

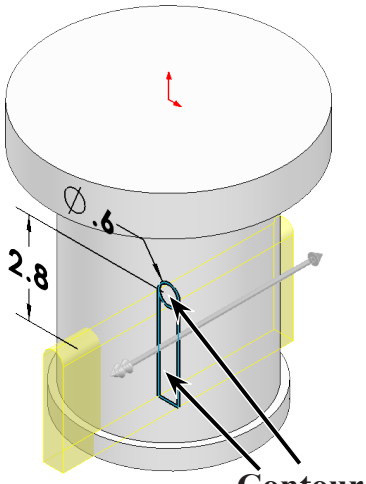


**Fig. 17**

## E. Chamfer 1-2.

Step 1. Click **Chamfer** 

on the Features toolbar.

Step 2. In the Chamfer Property Manager set:
under Chamfer Type, **Fig. 18**
select **Angle Distance** 
click **top circular edge**, **Fig. 19**
under Chamfer Parameters
**Distance** .6
**Angle** 45°
Click **Keep Visible** and OK . The Push Pin on allows selection of another chamfer.

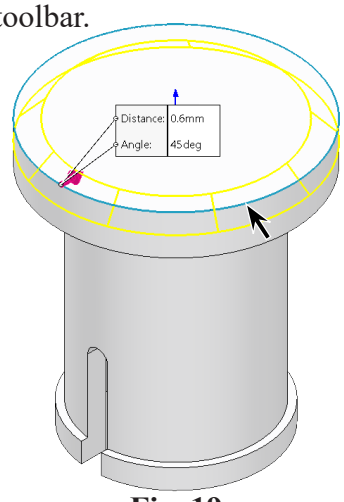


Fig. 19

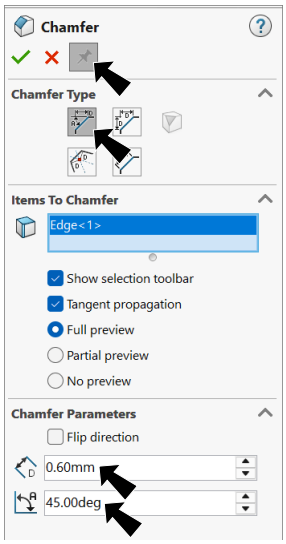


Fig. 18

under Chamfer Parameters, **Fig. 20**
**Distance** .25
click **bottom circular edges** (2), **Fig. 21**
click OK and click Cancel .

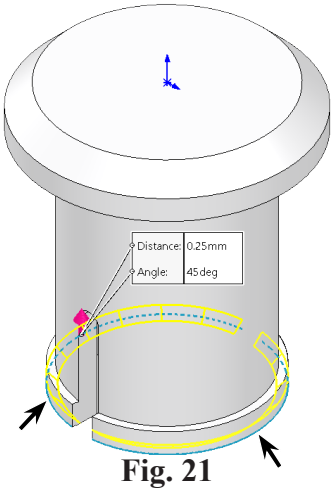


Fig. 21

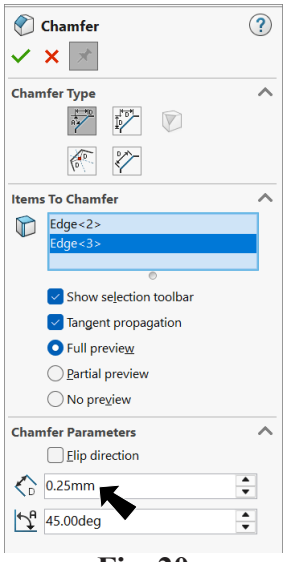
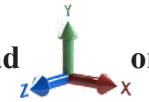
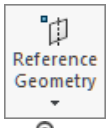


Fig. 20

Step 3. Save (**Ctrl-S**).

## F. Mate Reference.

Step 1. Rotate view to under cap, **Fig. 23**. To rotate view, **Shift click the X**  **axis of the Reference Triad**  **one time**.

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
click **top circular edge of shaft under cap**, **Fig. 23**
click OK .

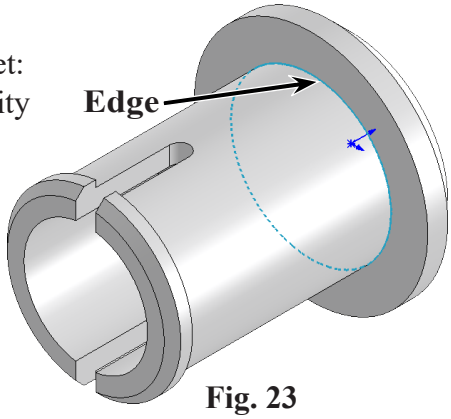


Fig. 23

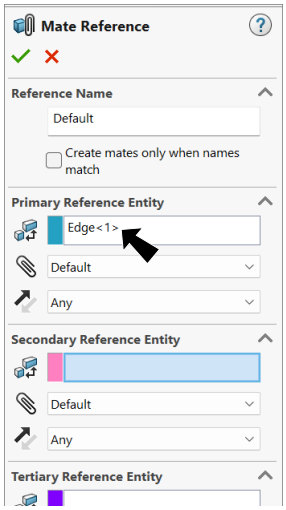


Fig. 22

## G. Appearance: Light Gray Plastic.

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

Step 2. Click the part, click **Appearance Callout** on the context toolbar and click **STUD PIN**, **Fig. 24**.

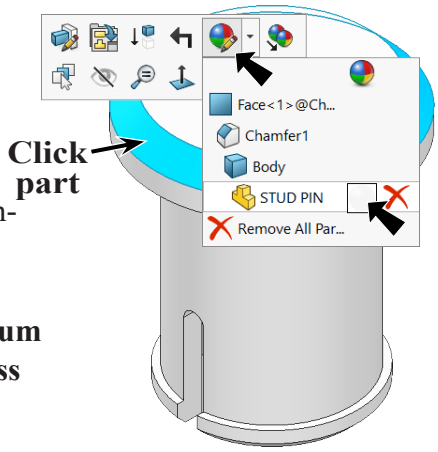



Fig. 24

Step 3. In the Appearances Task Pane expand **Plastic**, click **Medium Gloss** and in the lower pane click **light gray medium gloss plastic**, **Fig. 26.**

Step 4. Click OK in the Property Manager.

Step 5. Save (**Ctrl-S**).

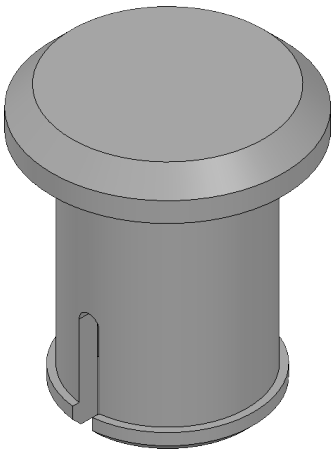


Fig. 27

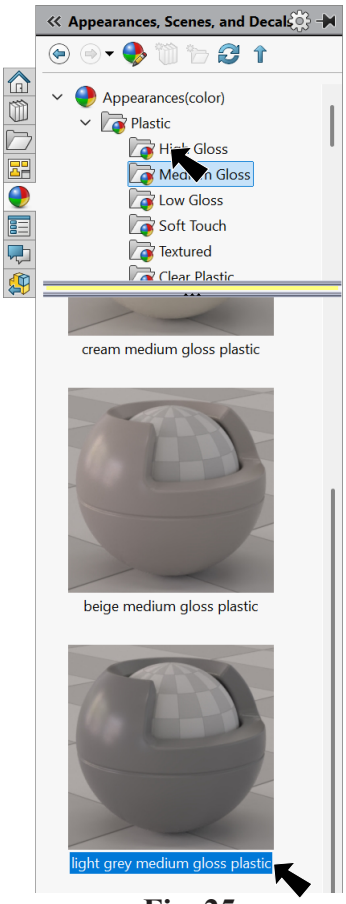



Fig. 25

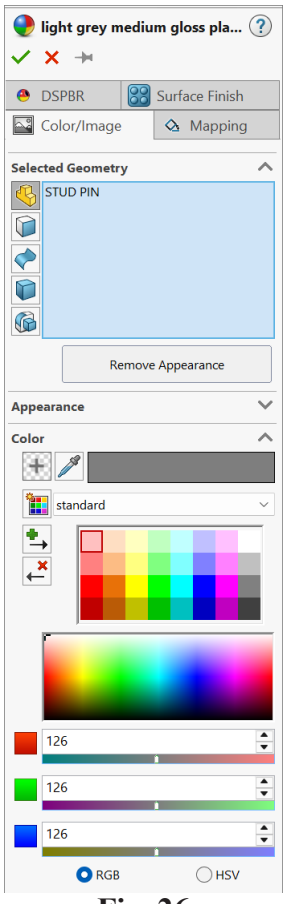



Fig. 26

## H. Insert Pins Into Locomotive Assembly.

Step 1. Open your **Locomotive Assembly** file.

Step 2. If necessary, **hide Hatch** **and Solar Panel** components, **Fig. 29**. To hide, move cursor over the component and press **Tab** key. To show **Shift - Tab**.

Step 3. Click **Isometric** on the Standard Views toolbar and **Down Arrow key** **twice** to view all pin holes.

Step 4. Click **Insert Components** Insert Components on the Assembly toolbar.

Step 5. In the Insert Component Property Manager set:
click **Keep Visible** , **Fig. 28**.

Step 6. In the graphic area position cursor over **edge of a Pin hole**, **Fig. 29**. When Pin snaps into place and cursor changes to indicate Concentric and Coincident mate , click to release the Pin.

Step 7. Place Pin at **all 5 holes**, **Fig. 29**.

Step 8. Click OK in the Property Manager.

Step 9. Save (**Ctrl-S**).

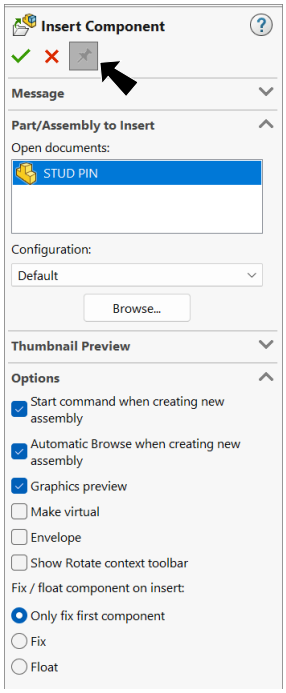



**Fig. 28**

**Release part when cursor changes to**

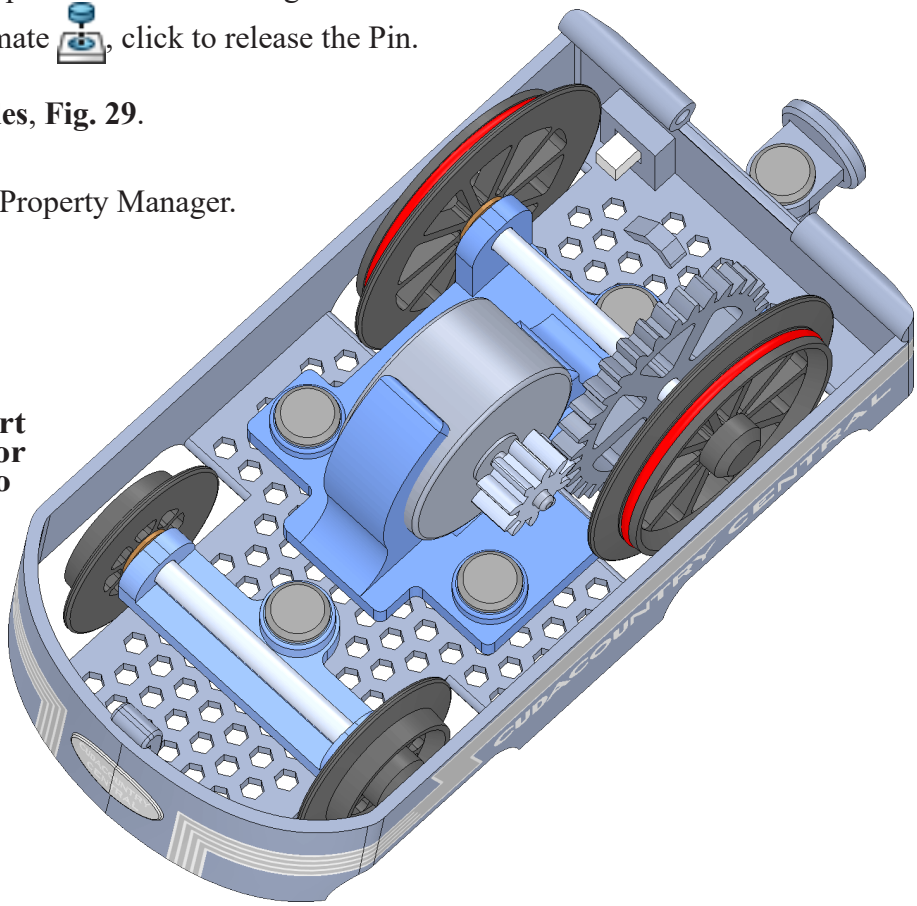



**Fig. 29**