



Chapter 8 CO2 Rail Car E Assembly



A. Insert Axles, Washers, E-Clips and Wheels.

Step 1. Click File Menu > New, click **Assembly Metric** and OK.

Step 2. Click **Keep Visible**  in the Property Manager, **Fig. 1**.

Step 3. Click **Browse** in the Property Manager, **Fig. 1**.

Step 4. Select your **BODY RAIL E** file and click Open.

Step 5. Click OK  in the Property Manager. This will place the body origin at the assembly origin and fix the position of the body so that it cannot move. This fixed component should have a **(f)** before its name in the Feature Manager  **(f) BODY RAIL E<1>**.

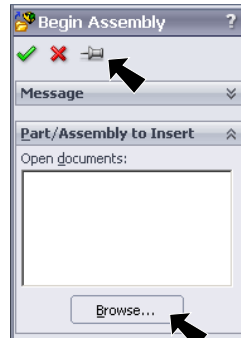



Fig. 1

Step 6. Click **Browse** in the Property Manager, **Fig. 1**.

Step 7. Select your **FRONT AXLE** file and click Open.

Step 8. Position Front Axle near Front Axle hole, **Fig. 2**. When Axle snaps into place and pointer (cursor)

changes to indicate a Concentric mate , click to release Axle.

Step 9. Zoom in around **Front Axle**, **Fig. 2**. 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).

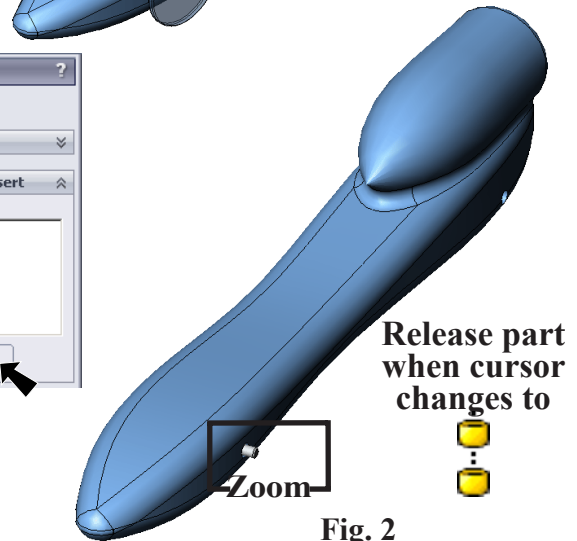
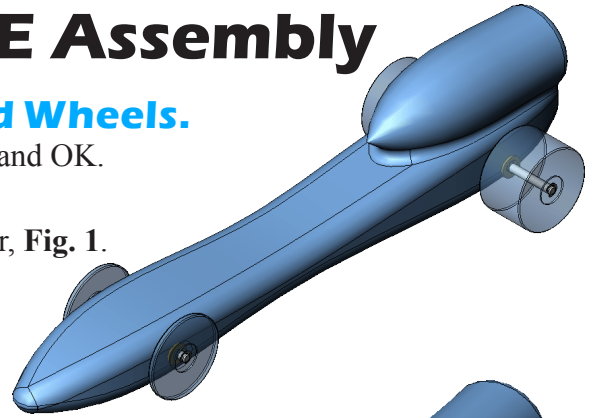



Fig. 2

Step 10. Click **Browse** in the Property Manager, **Fig. 1**.

Step 11. Select **WASHER** and click Open.

Step 12. Place **Washer on Front Axle** close to the body, **Fig. 3**. When Washer snaps into place and pointer changes to indicate a Concentric mate , click to release Washer.

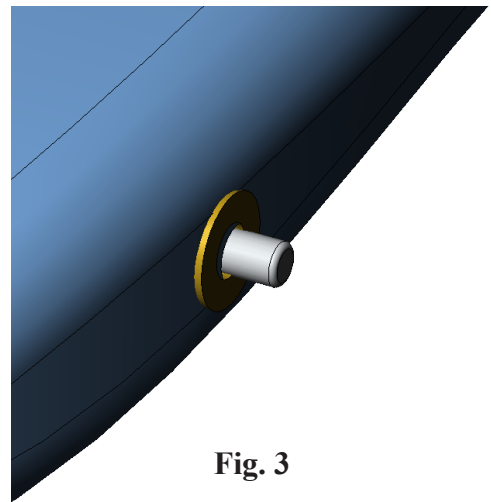


Fig. 3

Step 13. Click Add/Finish Mate  in Mate pop-up toolbar to add a **Concentric** mate, **Fig. 4**.



Fig. 4


Step 14. Browse and place **two E-Clips on Front Axle**, **Fig. 5**. Keep parts close to Washer. Release when pointer changes to indicate a Concentric mate 



Fig. 5



Step 15. Click Add/Finish Mate  in Mate pop-up toolbar to add a **Concentric** mate, **Fig. 6**.



Fig. 6

Step 16. Browse and place **FRONT WHEEL** on Front Axle, **Fig. 7**. Release when pointer changes to indicate a Concentric mate 

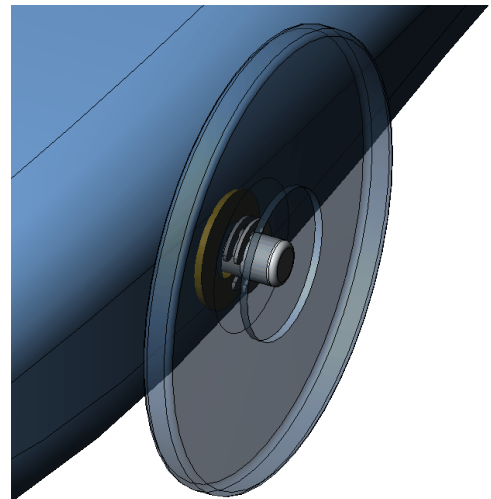


Fig. 7

Step 17. Click Add/Finish Mate  in Mate pop-up toolbar to add a **Concentric** mate, **Fig. 6**.

Step 18. Click Zoom to Fit  (F) on the View toolbar.

Step 19. Repeat, Browse and place at Rear Axle hole **REAR AXLE, WASHER, 2 E-CLIPS** and **REAR WHEEL**, **Fig. 8 - Fig. 10**.

Step 20. Click OK  in the Property Manager when done.

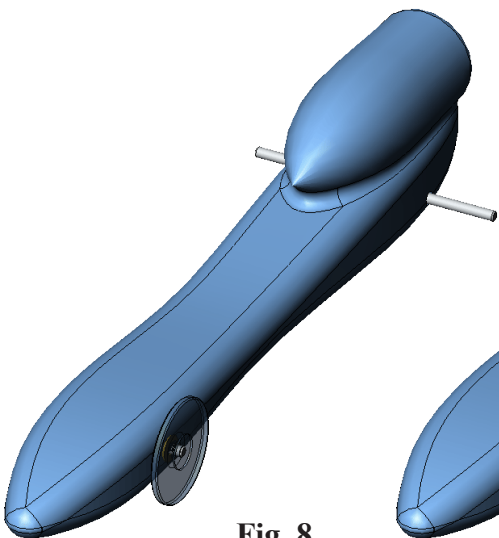


Fig. 8

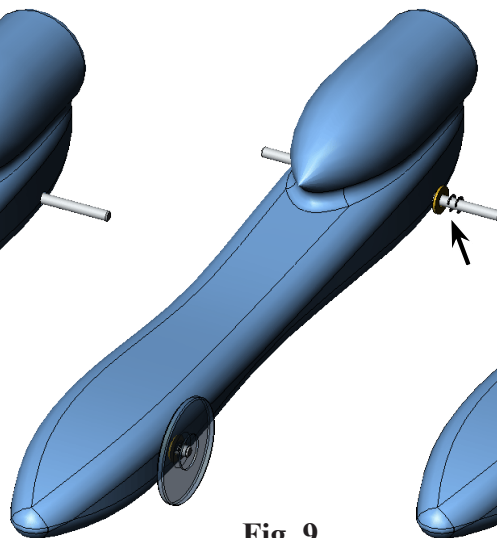


Fig. 9

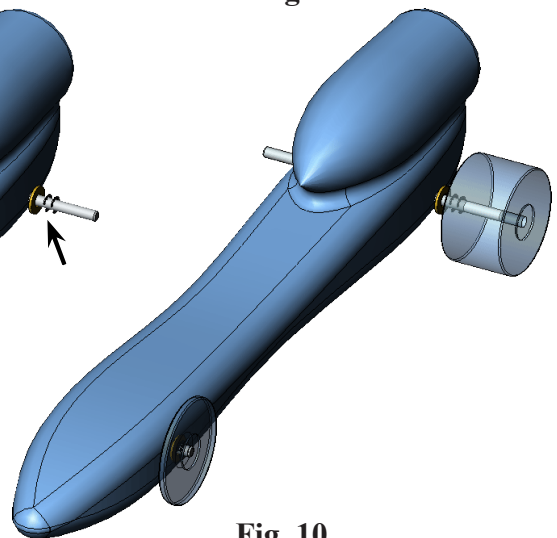


Fig. 10

B. Save as "RAIL CAR E ASSEMBLY".

Step 1. Click File Menu > Save As.

Step 2. Key-in **RAIL CAR E ASSEMBLY** for the filename and press ENTER.

C. Mate: Washer1.


Step 1. Zoom in around **Front Wheel**, Fig. 11. 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 2. Drag Wheel and E-Clips slightly off Axle, Fig. 12.

Step 3. Click **Mate**  on the Assembly toolbar.

Step 4. Expand the Design Tree (click +) in the top left corner of the drawing area, Fig. 13.

Step 5. Click **Right Plane** , Fig. 13.

Step 6. Expand **WASHER1** and click **Right Plane** , Fig. 13.




Step 7. Click **Distance**  in Mate pop-up, Fig. 14. Set **distance to 17.6** and press ENTER. The Washer should set slightly into the Body. The distance might need to be adjusted + or - 1 mm depending on the width of your body, Fig. 15. If positioned on opposite side of body, click **Flip Dimension**  in the Mate pop-up, Fig. 14. Click **Add/Finish Mate**  to add Distance mate.



Fig. 14

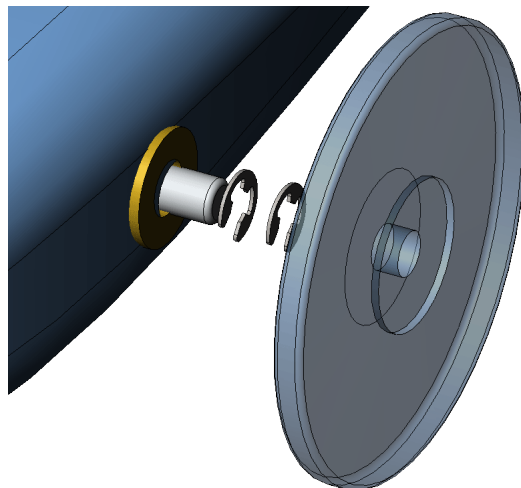


Fig. 15

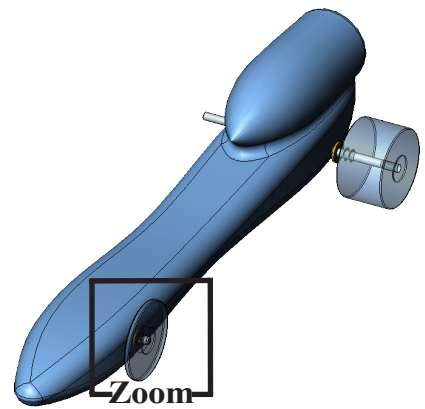


Fig. 11

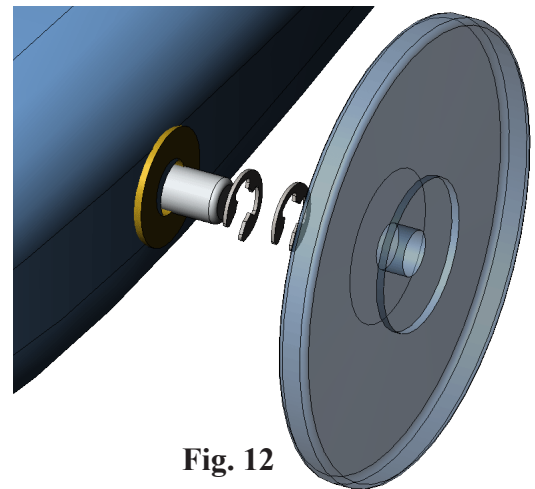


Fig. 12

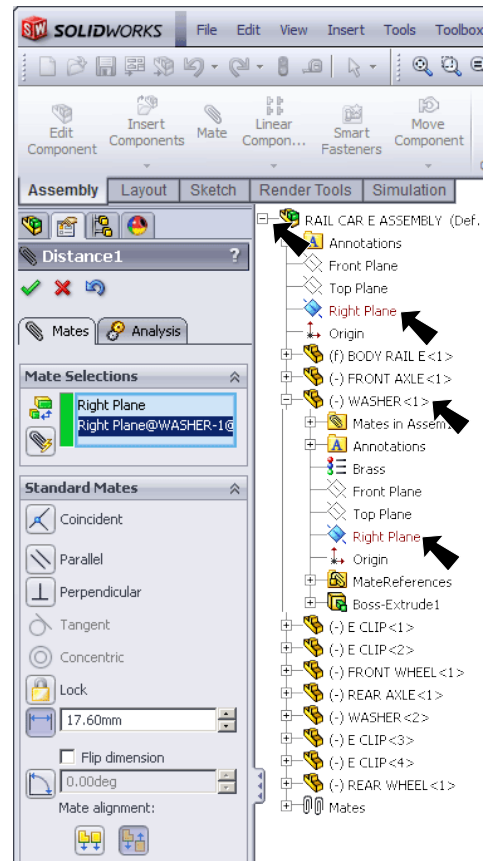


Fig. 13

D. Mate: E-Clip1.

Step 1. Click **side face of Washer**, Fig. 16.

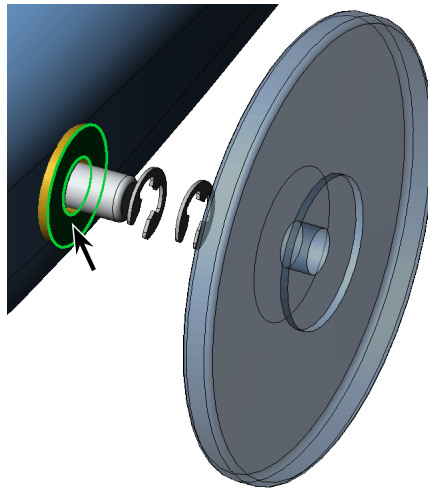


Fig. 16

Step 2. Use **Right arrow** key to rotate assembly to view **inside side face of E-Clip1**, Fig. 17.

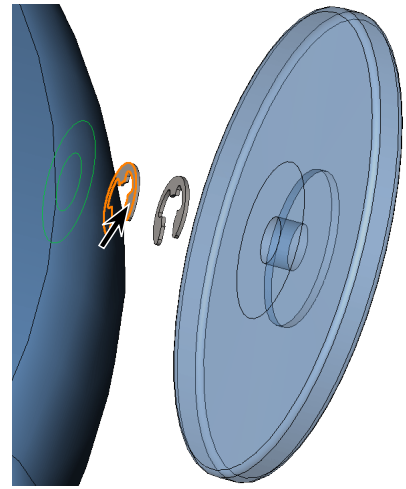




Fig. 17

Step 3. Click **inside face of E-Clip1**, Fig. 17.

Step 4. Click Add/Finish Mate  in Mate pop-up toolbar to add a **Coincident** mate.

E. Mate: Front Wheel.

Step 1. Click **Previous View**  on the Standard Views toolbar. (**Ctrl-Shift-Z**)

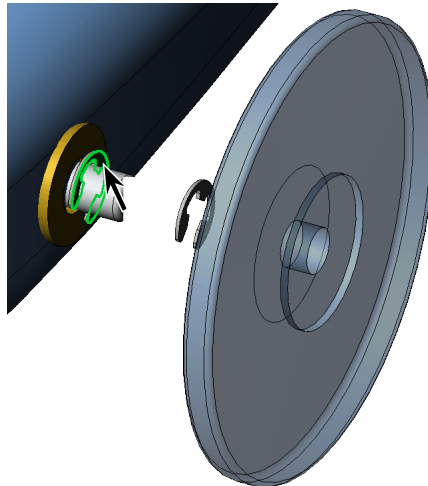


Fig. 18

Step 2. Click **outside face of E-Clip1**, Fig. 18.

Step 3. Use **Right arrow** key to rotate assembly to view side face of **inside vertical face of Front Wheel**, Fig. 19.

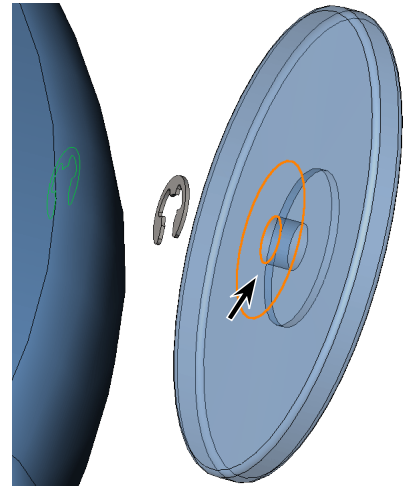



Fig. 19

Step 4. Click **vertical flat face on Front Wheel**, Fig. 19.

Step 5. Click Add/Finish Mate  in Mate pop-up toolbar to add a **Coincident** mate.

F. Mate: E-Clip2.

Step 1. Click **Previous View**  on the Standard Views toolbar. (**Ctrl-Shift-Z**)

Step 2. Click **bottom face of counter-bore in Front Wheel**, **Fig. 20**.

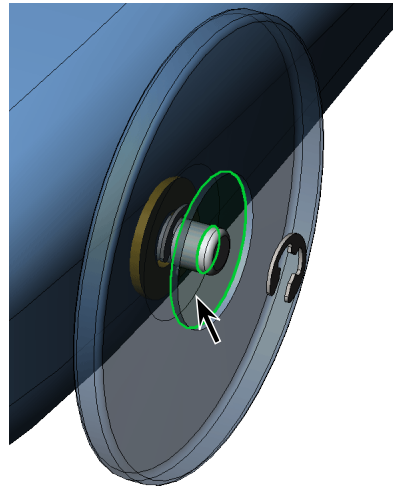


Fig. 20

Step 3. Use **Right arrow** key to rotate assembly to view side face of **inside face of E-Clip2**, **Fig. 21**.

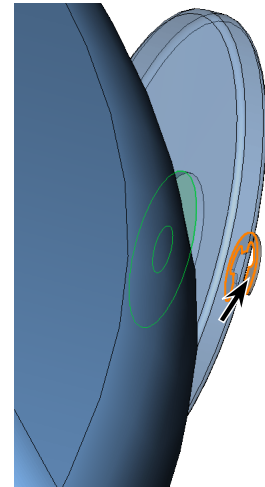



Fig. 21

Step 4. Click **inside face of E-Clip2**, **Fig. 21**.

Step 5. Click **Add/Finish Mate**  in Mate pop-up toolbar to add a **Coincident** mate.

Step 6. Click **Previous View**  on the Standard Views toolbar. (**Ctrl-Shift-Z**)

Step 7. Click **OK**  in the Property Manager when done.

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

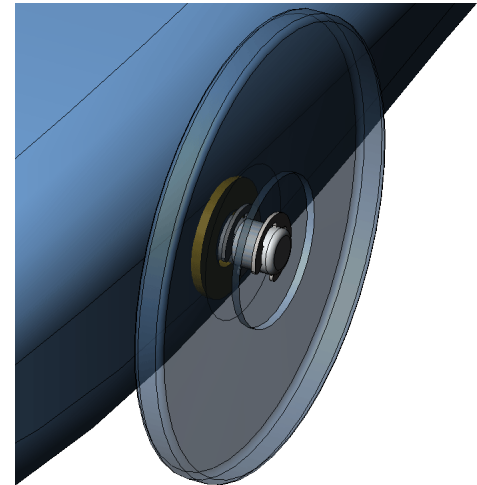


Fig. 22

G. Mate: Washer2.

Step 1. Click **Zoom to Fit**  (**F**) on the View toolbar.

Step 2. Zoom in around **Rear Wheel**, **Fig. 23**. 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).

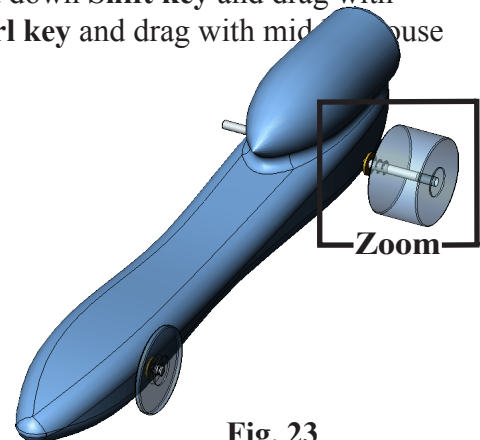


Fig. 23

Step 3. Position Wheel and E-Clips on Axle as shown in **Fig. 24**.

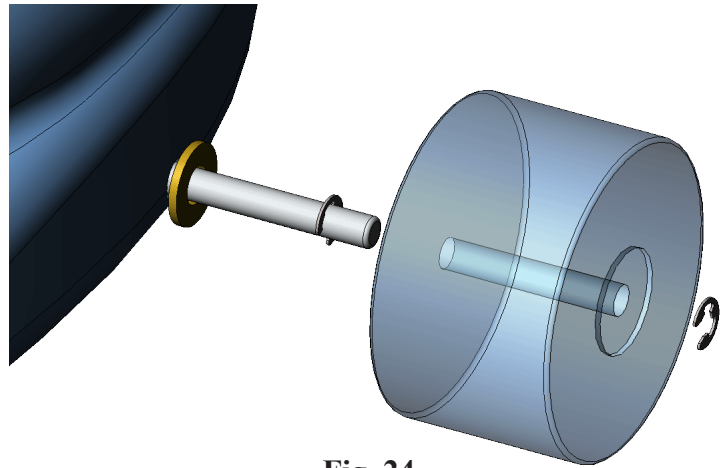





Fig. 24

Step 4. Click **Mate**  on the Assembly toolbar.

Step 5. Expand the Design Tree (click +) in the top left corner of the drawing area, **Fig. 25**.

Step 6. Click **Right Plane** , **Fig. 25**.

Step 7. Expand **WASHER2** and click **Right Plane** , **Fig. 25**.

Step 8. Click **Distance**  in Mate pop-up, **Fig. 26**. Set distance to 17 and press ENTER. The Washer should set next to the Body, **Fig. 27**. If positioned in opposite direction, click **Flip Dimension**  in the Mate pop-up, **Fig. 26**. Click Add/Finish Mate  to add Distance mate.

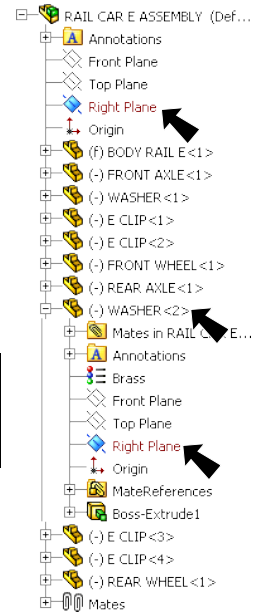


Fig. 25

H. Mate: E-Clip3.

Step 1. Click **side face of Washer2**, **Fig. 27**.



Fig. 26

Step 2. Use **Right arrow** key to rotate assembly to view side face of **inside face of E-Clip3**, **Fig. 28**.

Step 3. Click **inside face of E-Clip3**, **Fig. 28**.

Step 4. Click Add/Finish Mate  in Mate pop-up toolbar to add a **Coincident** mate.

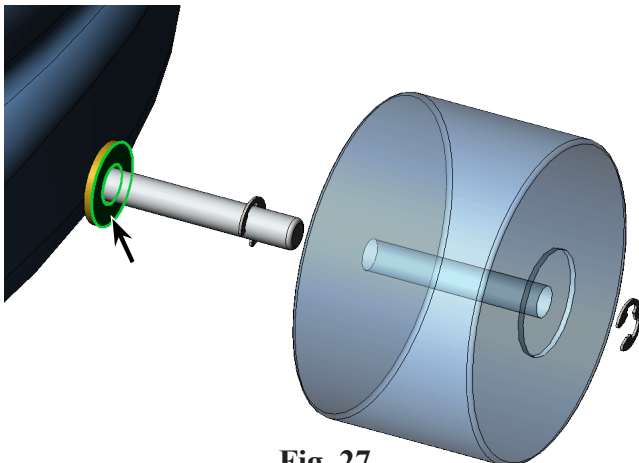


Fig. 27

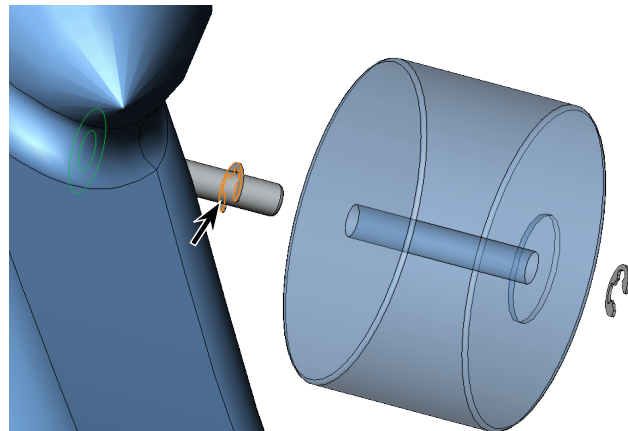


Fig. 28

I. Mate: Rear Wheel.

Step 1. Click **Previous View**  on the Standard Views toolbar. (Ctrl-Shift-Z)

Step 2. Click **outside face of E-Clip3**, Fig. 29.

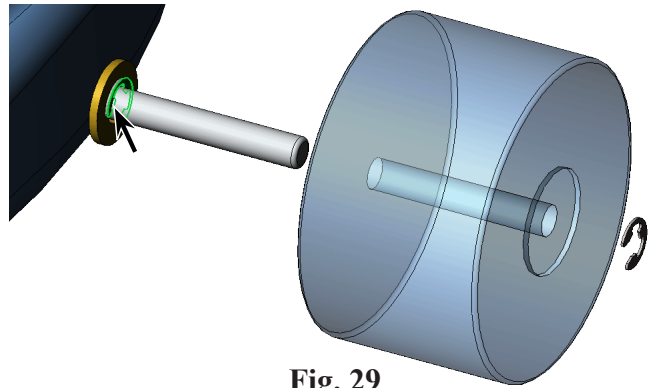


Fig. 29

Step 3. Use **Right arrow** key to rotate assembly to view side face of **inside face of Rear Wheel**, Fig. 30.

Step 4. Click **inside face of Rear Wheel**, Fig. 30.

Step 5. Click Add/Finish Mate  in Mate pop-up toolbar to add a **Coincident** mate.

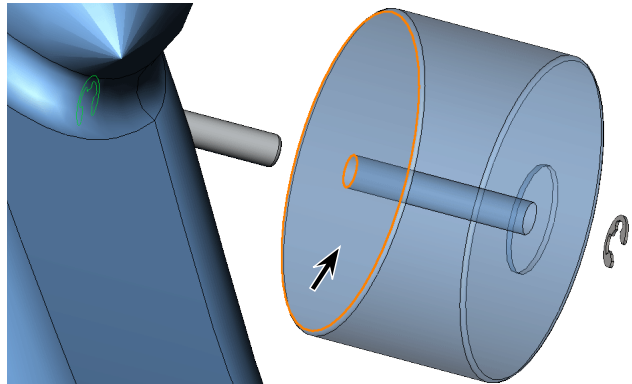


Fig. 30


J. Mate: E-Clip4.

Step 1. Click **Previous View**  on the Standard Views toolbar. (Ctrl-Shift-Z)

Step 2. Click **outside bottom face of counter-bore in Rear Wheel**, Fig. 31.

Step 3. Use **Right arrow** key to rotate assembly to view side face of **inside face of E-Clip4**, Fig. 32.

Step 4. Click **inside face of E-Clip4**, Fig. 32.

Step 5. Click Add/Finish Mate  in Mate pop-up toolbar to add a **Coincident** mate.

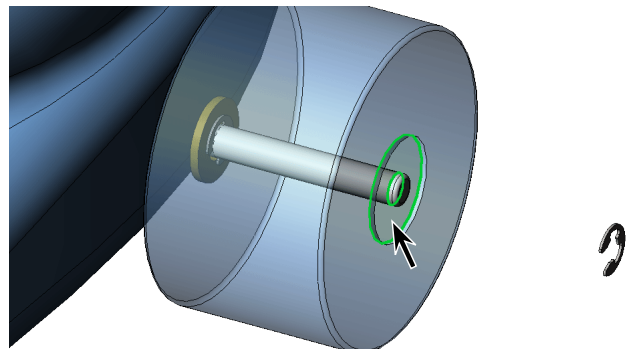



Fig. 31

Step 6. Click **Previous View**  on the Standard Views toolbar. (Ctrl-Shift-Z)

Step 7. Click OK  in the Property Manager when done.

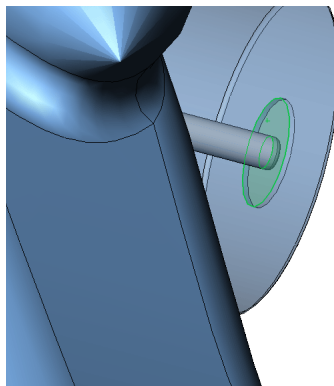


Fig. 32

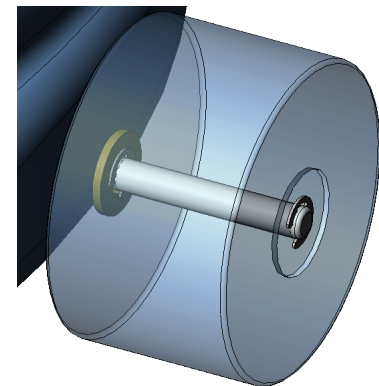


Fig. 33

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

K. Mirror.

Step 1. Click **Zoom to Fit**  (F) on the View toolbar.

Step 2. **Shift click** all Parts in the Feature Manager **except BODY RAIL E**, **Fig. 34**. To Shift click, click **FRONT AXLE1**, hold down the Shift key and **REAR WHEEL1**.

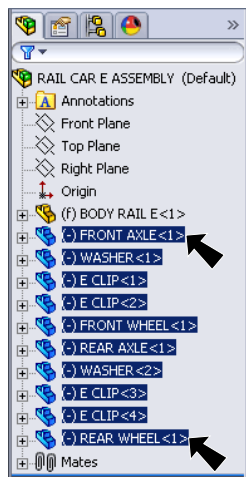




Fig. 34

Step 3. **Ctrl click** **Right Plane**  in the Feature Manager to select all Parts (except BODY RAIL E) and Right Plane, **Fig. 35**. To Ctrl click, hold down the Ctrl key and with the Parts selected, click **Right Plane** .

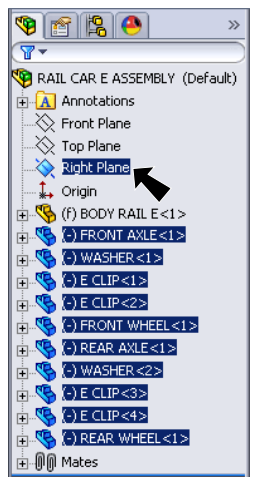


Fig. 35

Step 4. Click Insert Menu > Mirror Components.

Step 5. In the Mirror Property Manager click OK , **Fig. 37**.

Step 6. Save. Use **Ctrl-S**.

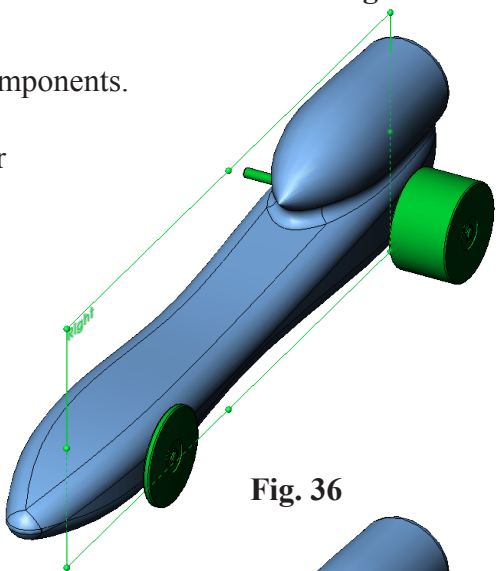


Fig. 36

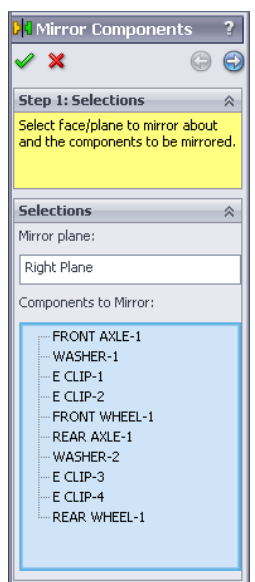


Fig. 37

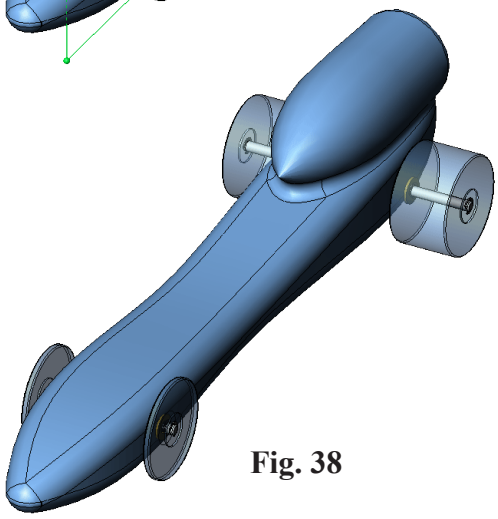


Fig. 38