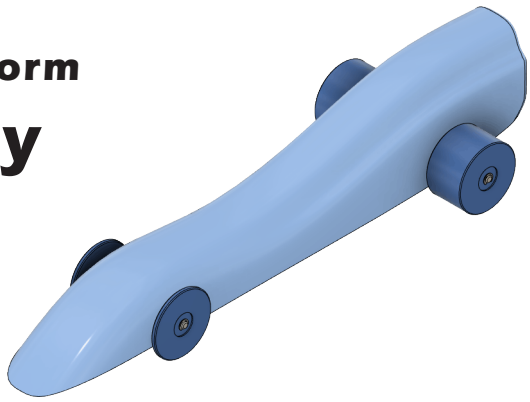
Chapter 12

CO2 Rail Car Form

Assembly



A. New Component.

Step 1. Open your **BODY RAIL FORM** file.

Step 2. If necessary, switch to the Design workspace.

Step 3. In the Browser **Hide** **Sketches** and **Construction** used in the CAM tutorial. Hide **Sketch3**, **Sketch4** and **Plane1**, **Fig. 1**.

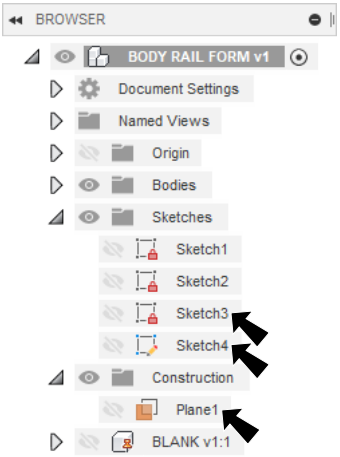


Fig. 1

Step 4. Expand **Bodies** in the Browser, **right click** **Body1** and click **Create Components from Bodies**, **Fig. 2**.

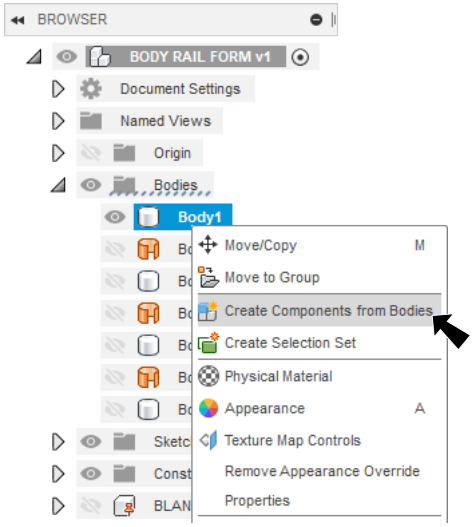


Fig. 2

Step 5. Rename new Component **CAR BODY**, **Fig. 3**. To rename, slowly double click.

Step 6. Right click **CAR BODY** and click **Ground**, **Fig. 4**.

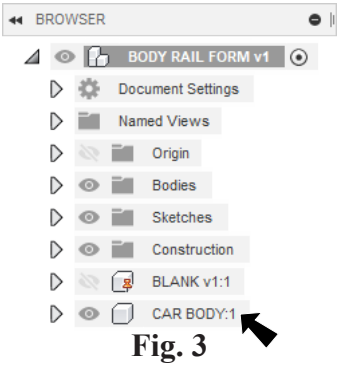


Fig. 3

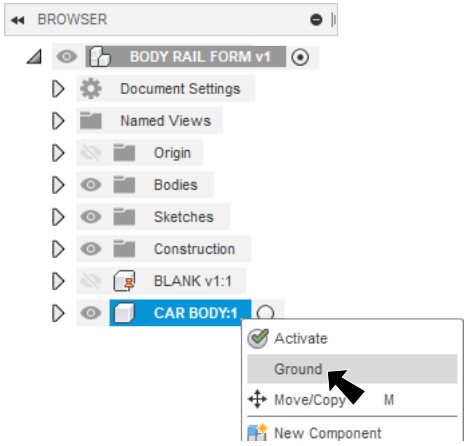


Fig. 4

B. Insert Front Axle.

Step 1. Click Data Panel in top left corner of display.

Step 2. Right click **FRONT AXLE** file and click **Insert into Current Design**, **Fig. 5**.

Step 3. Click **Close Data Panel**.

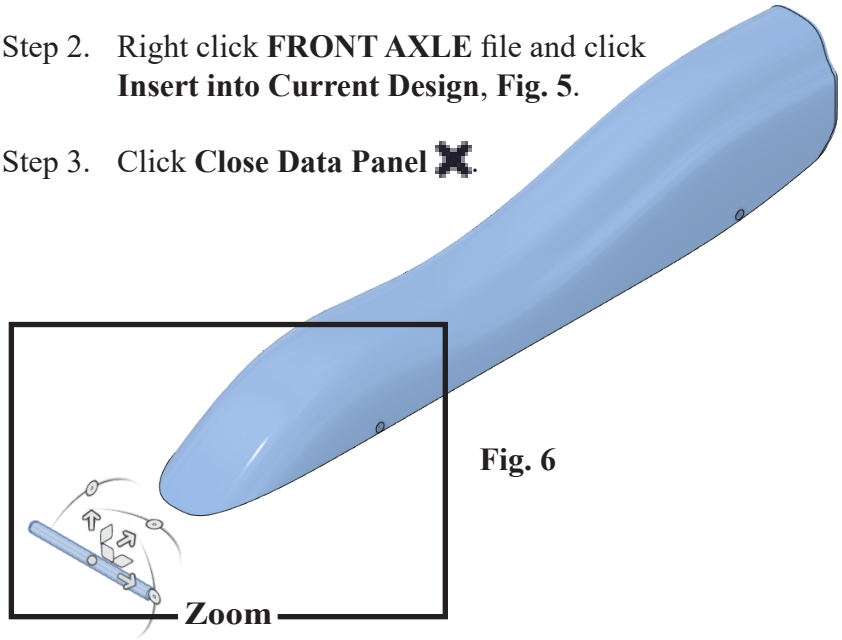


Fig. 6

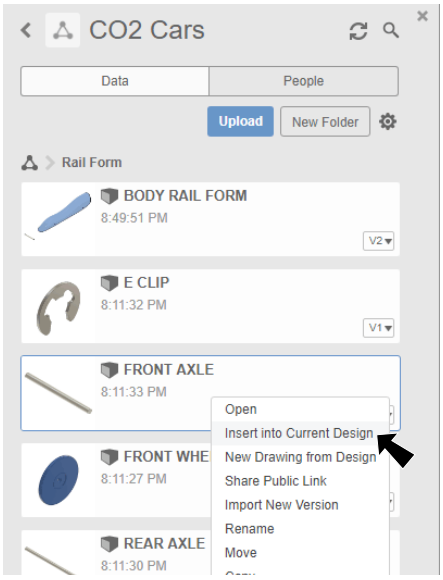


Fig. 5

Step 4. Zoom in on the Axle and axle hole in body, **Fig. 6**.

Step 5. On the Solid tab SOLID click **Joint** (**J**) in the Assembly area of toolbar.

Step 6. Click **centerline/midpoint on the Axle** for the first component selection and **centerline/midpoint on front axle hole in Body** second component selection, **Fig. 7**.

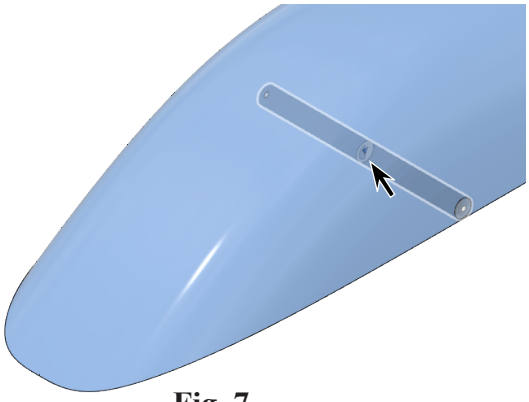


Fig. 7

Step 7. In the Joint panel set:
under Motion, **Fig. 8**
Type **Revolute**
click OK.

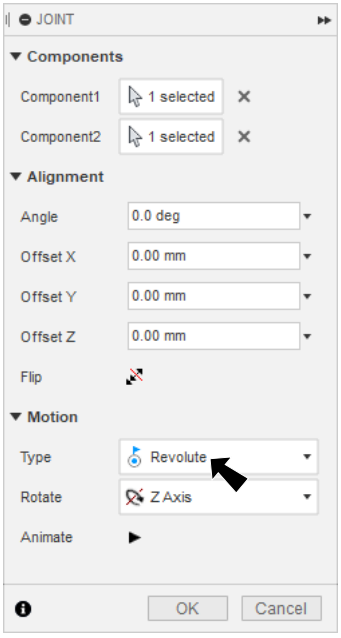


Fig. 8

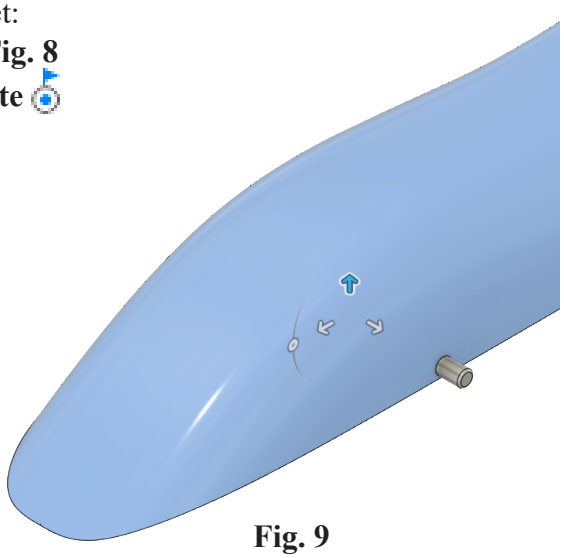


Fig. 9

C. Insert Washer, 2 E Clips and Front Wheel.

Step 1. Open Data Panel .

Step 2. **Right click WASHER** file and click **Insert into Current Design**, **Fig. 10.**

Tip: Simply drag Washer from Data Panel onto the canvas.

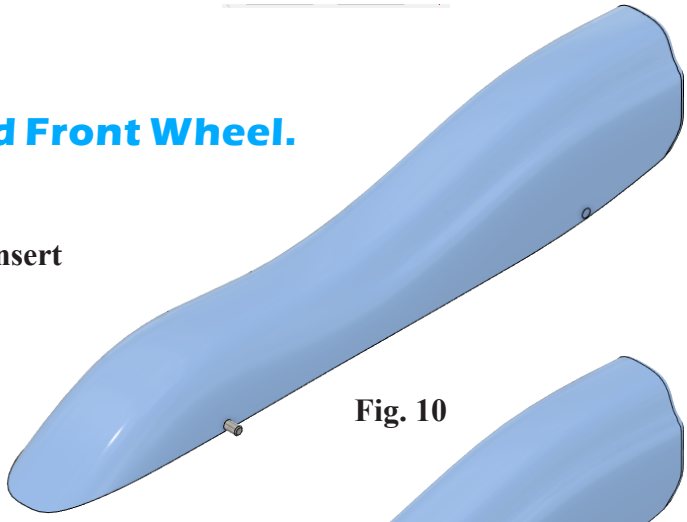


Fig. 10

Step 3. Click the **Square XY Manipulator** on the Washer, **Fig. 10**.

Step 4. Drag **Washer Square XY Manipulator** over to Front Axle, **Fig. 11**.

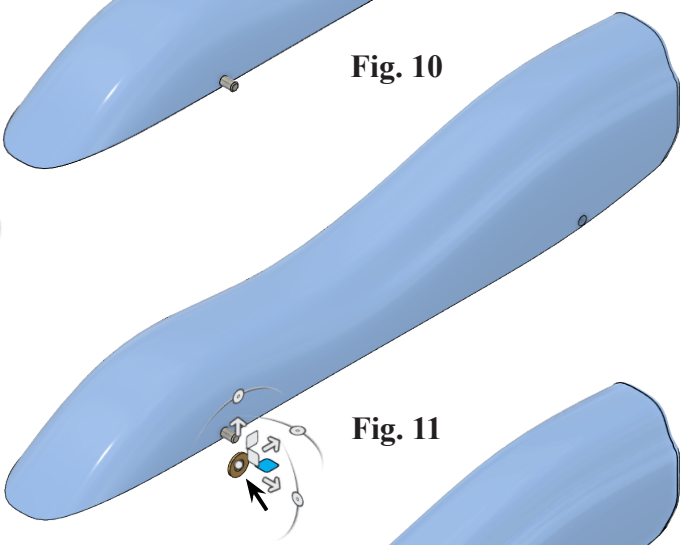


Fig. 11

Step 5. **Right click** canvas and click OK OK to close Move/Copy panel.

Step 6. **Repeat** and insert E Clip, **Fig. 12**.

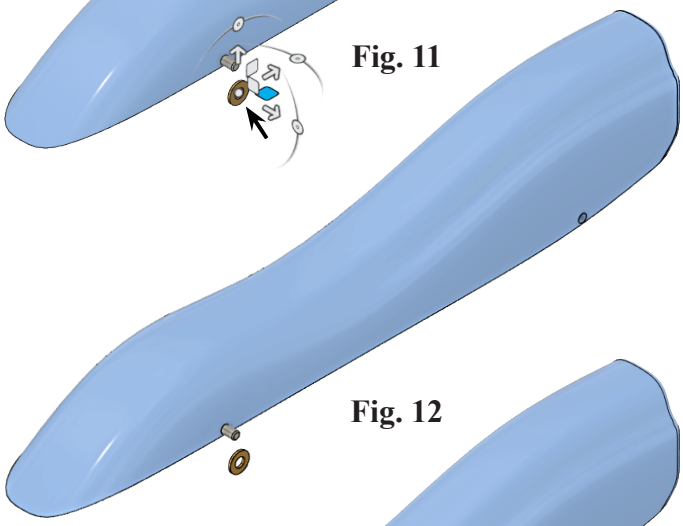
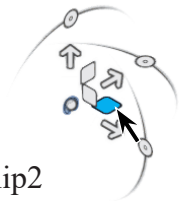


Fig. 12

Step 7. Drag **E Clip Square XY Manipulator** to along side Washer, **right click** and click OK OK, **Fig. 13**.



Step 8. **Repeat** and insert **a second E Clip**, drag E Clip2 **Square XY Manipulator** to other components, **Fig. 14**.

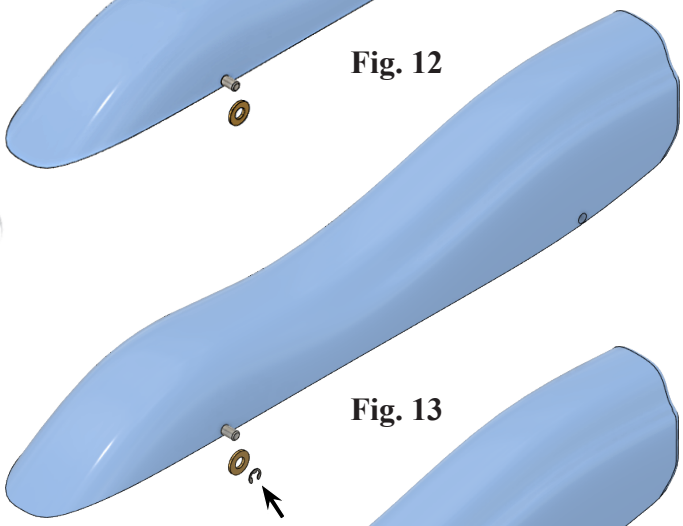


Fig. 13

Step 9. **Repeat** and insert **Front Wheel**, drag **Square XY Manipulator** to other components, **Fig. 14**.

Step 10. Click **Close Data Panel** .

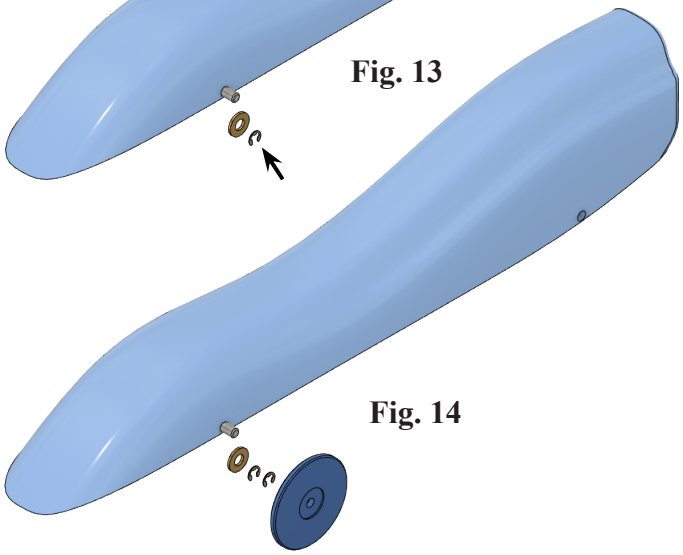


Fig. 14

Step 11. Zoom in on the Axle and inserted components, **Fig. 15**.

Step 12. On the Solid tab SOLID click **Joint** (**J**) in the Assembly area of toolbar.

Step 13. Click **inside cylindrical edge of Washer** for first component selection, **Fig. 16**.

Step 14. Click **large cylindrical edge of Axle** for second component selection, **Fig. 17**.

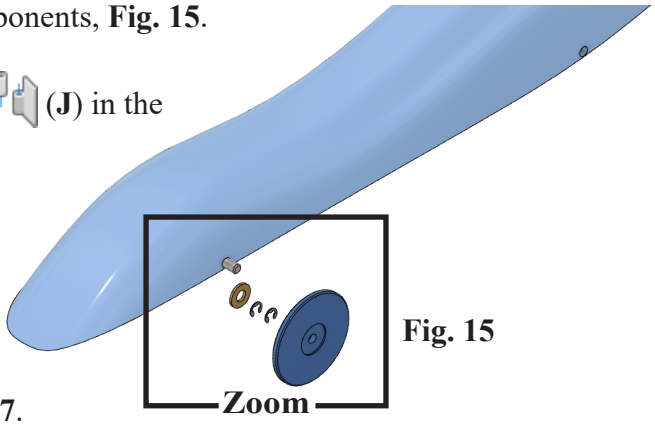


Fig. 15

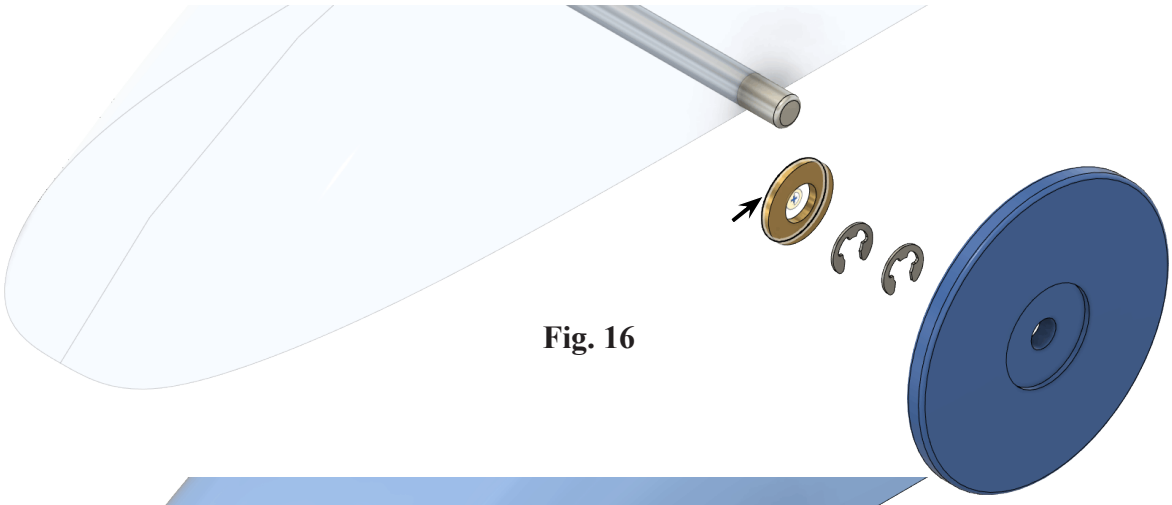


Fig. 16

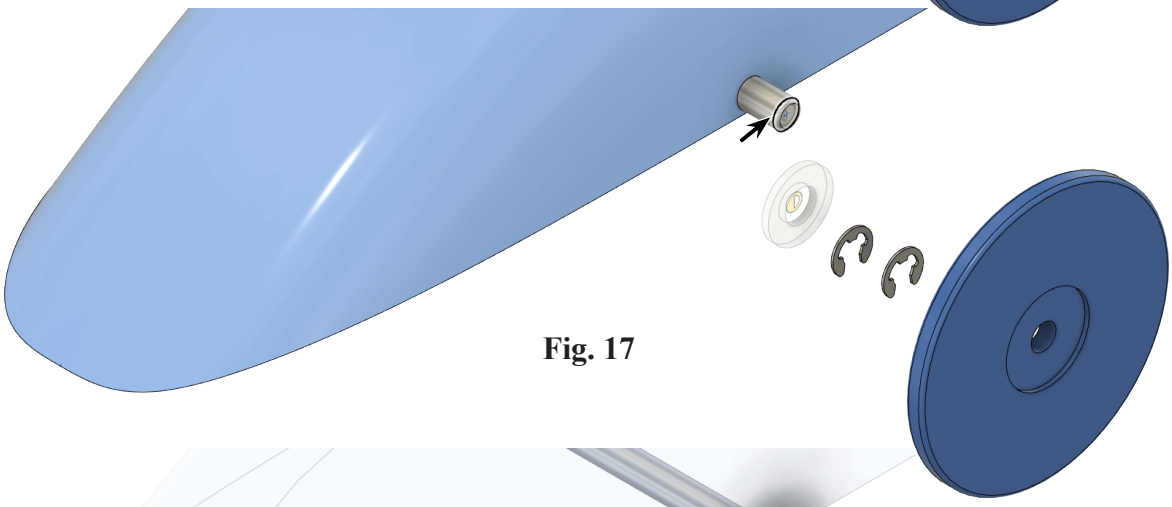


Fig. 17

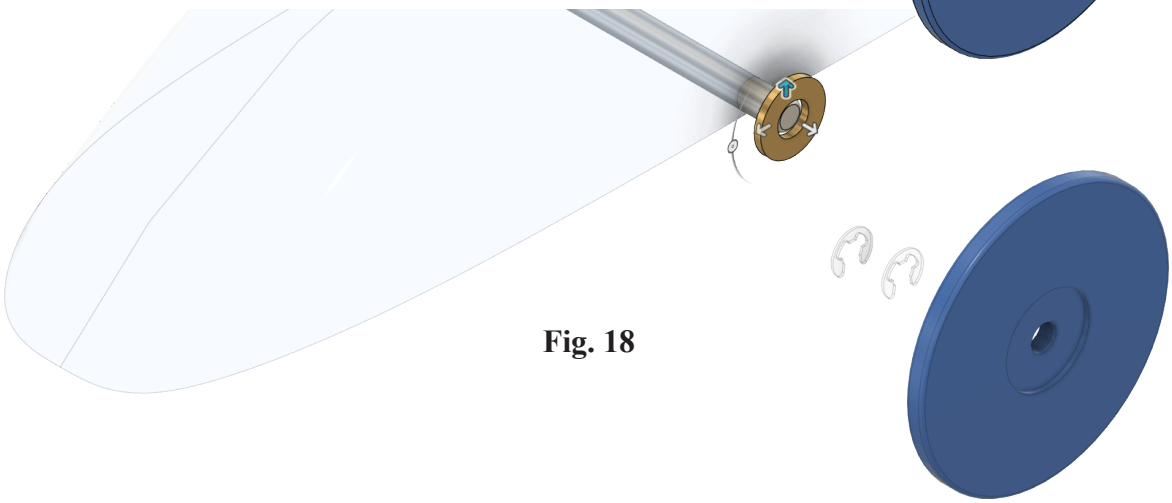
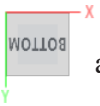


Fig. 18

Step 15. Click **Bottom** on View Cube 

and zoom in on components.

Step 16. In the Joint panel set:
under Alignment, **Fig. 19**
Offset **Z -4.1**
under Motion
Type **Revolute**
click OK.

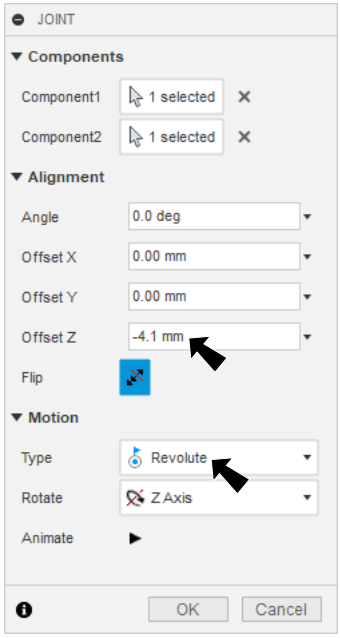


Fig. 19

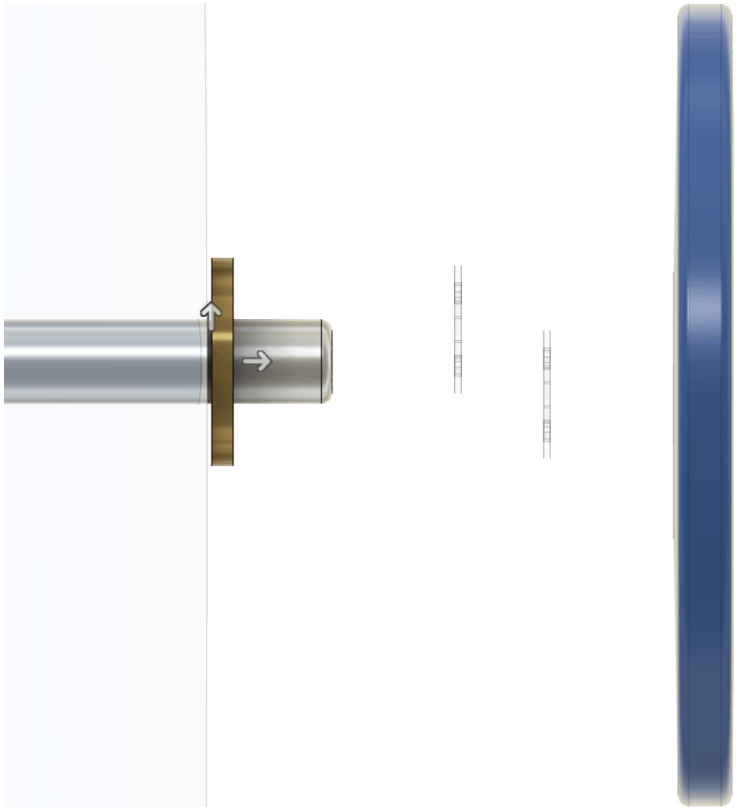
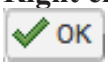


Fig. 20

Step 17. Click **Joint**  **(J)** on toolbar.

Step 18. Click **inside cylindrical edge of E Clip1** for first component selection and **outside cylindrical edge of Washer** for second component selection, **Fig. 21**. **Right click** and click OK 

or click OK in panel.

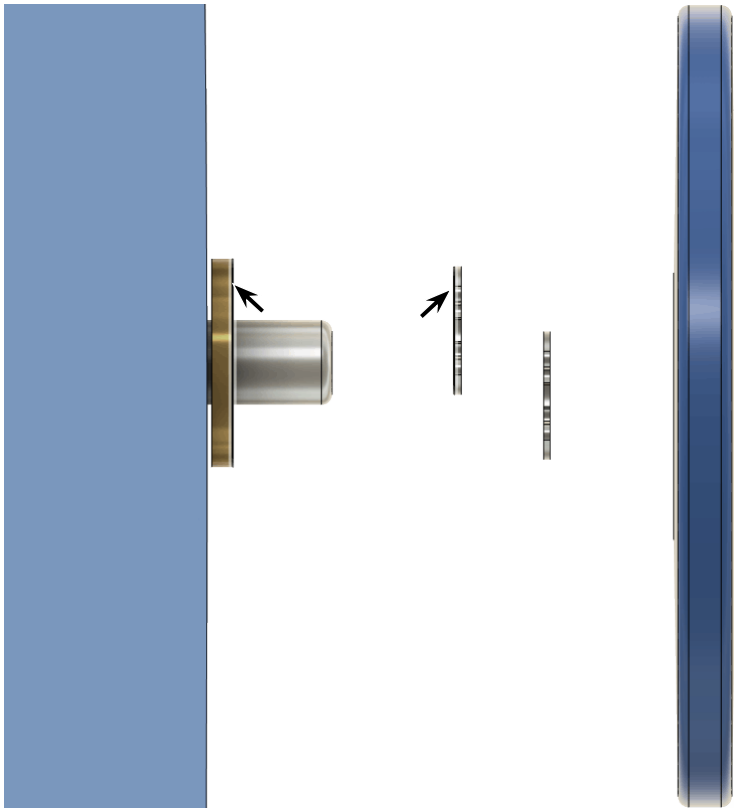


Fig. 21

Step 19. Click **Joint** (**J**) on toolbar.

Step 20. Click **inside cylindrical edge of Front Wheel hub** for first component selection and **outside cylindrical edge of E Clip1** for second component selection, **Fig. 22**.
Right click and click OK OK.

Step 21. Click **Joint** (**J**) on toolbar.

Step 22. Click **inside cylindrical edge of E Clip2** for first component selection and **outside cylindrical edge of Front Wheel hub** for second component selection, **Fig. 23**.
Right click and click OK OK.

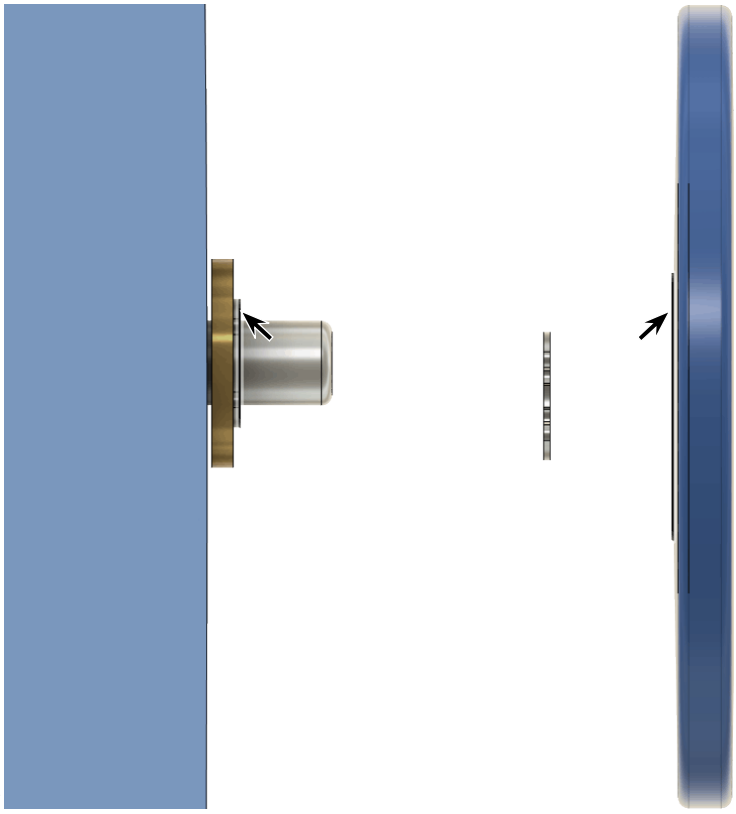


Fig. 22

Step 23. Save. **Ctrl-S** and press ENTER.

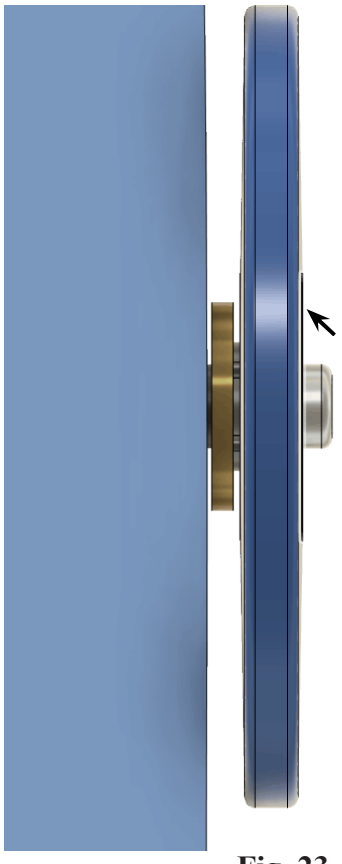


Fig. 23

Fig. 24

D. Insert Rear Axle.

Step 1. Click **Home** (Isometric) on View Cube .

Step 2. Open Data Panel .

Step 3. Insert **REAR AXLE** file, **Fig. 25**.

Step 4. Click **Joint** **(J)** in toolbar.

Step 5. Click **centerline/mid-point** **on the Rear Axle** for the first component selection and **centerline/midpoint on rear axle hole in Body** second component selection, **Fig. 26**.

Step 6. In the Joint panel set:
under Motion, **Fig. 27**
Type **Revolute**
click OK.

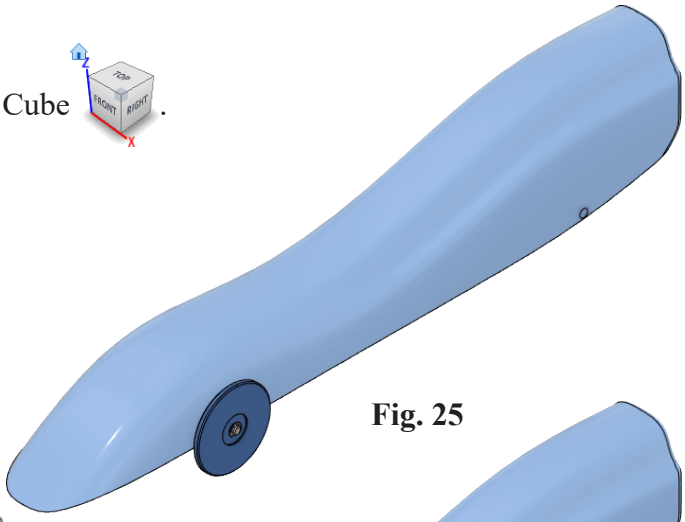


Fig. 25

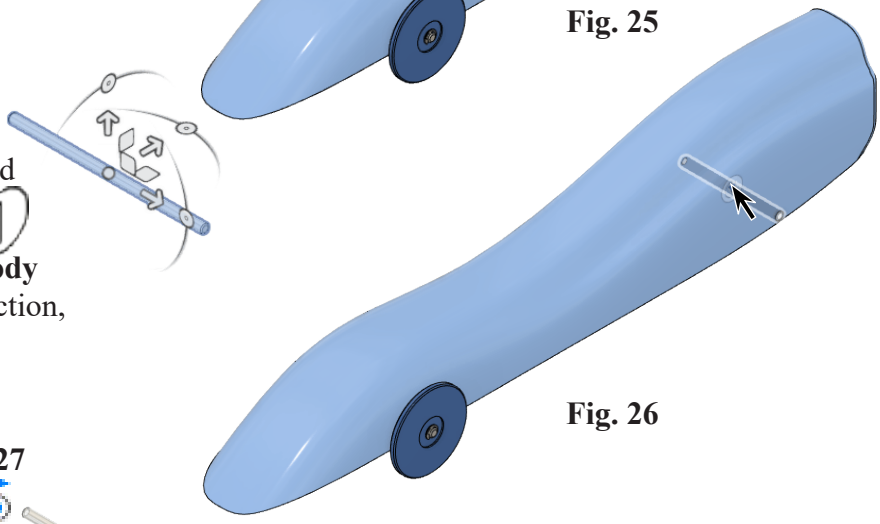
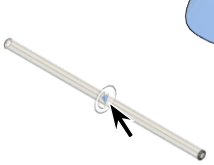


Fig. 26



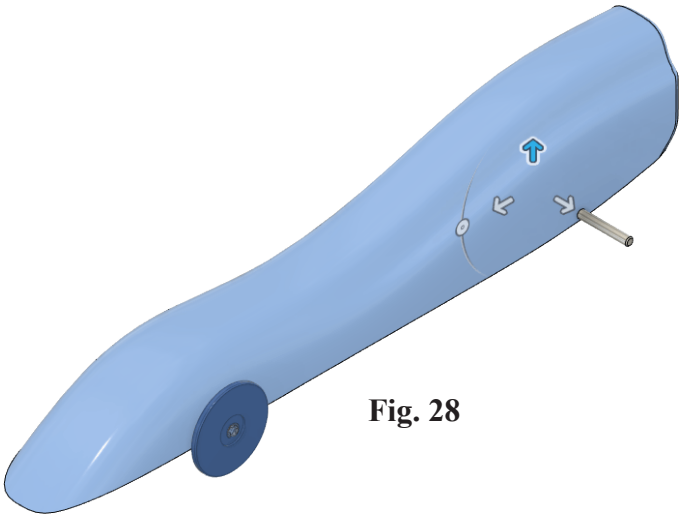


Fig. 28

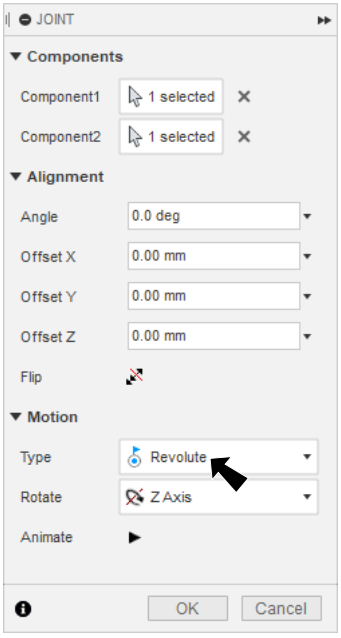


Fig. 27

E. Insert Washer, 2 E Clips and Rear Wheel.

Step 1. From the Data Panel insert **WASHER**, move with **Square XY Manipulator** over to Rear Axle, **Fig. 29**. **Right click** and click OK to close Move/Copy panel.

Step 2. **Repeat** and insert and move **two E Clips** and **Rear Wheel**, **Fig. 29**.

Step 3. Click **Close Data Panel**.

Step 4. Zoom in on the Rear Axle and inserted components, **Fig. 29**.

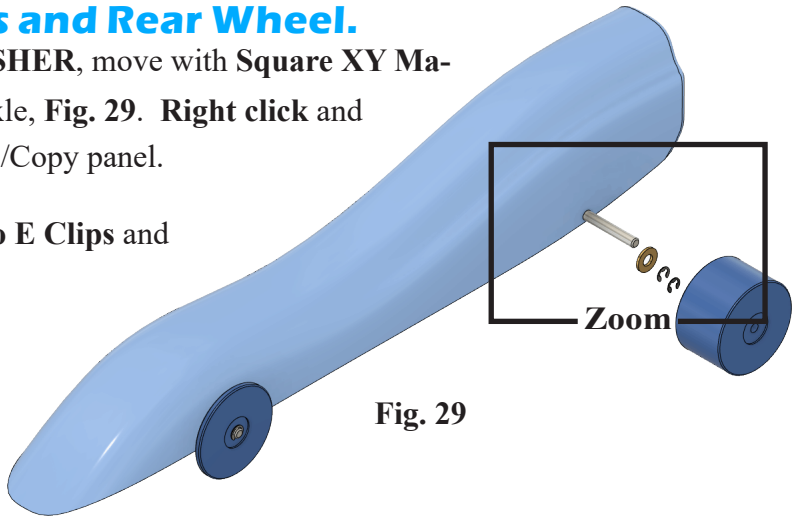


Fig. 29

Step 5. Click **Joint** (**J**) on toolbar.

Step 6. Click **inside cylindrical edge of Washer** for first component selection and **large cylindrical edge of Axle** for second component selection, **Fig. 30**.

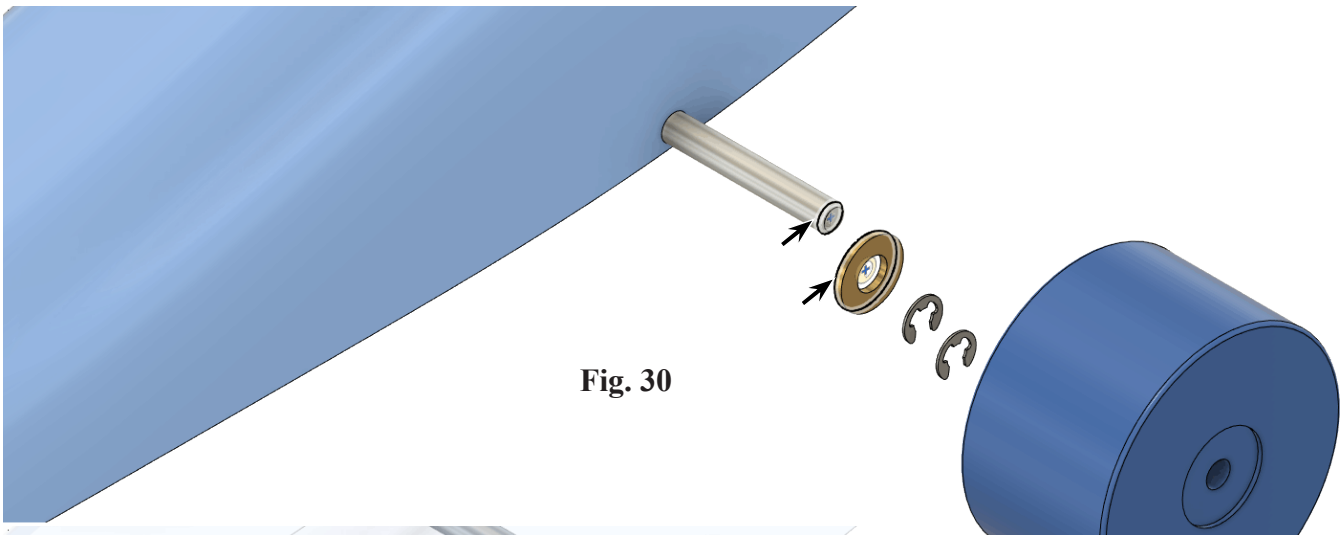


Fig. 30

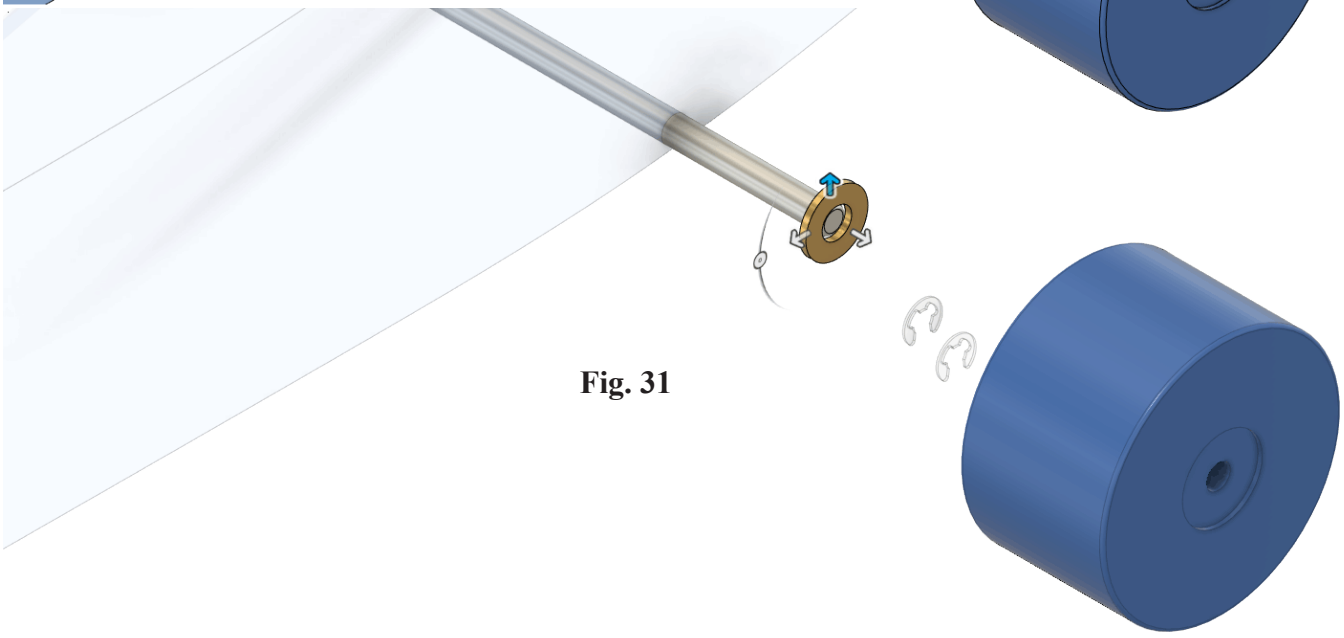
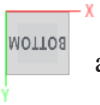


Fig. 31

Step 7. Click **Bottom** on View Cube 

and zoom in on components.

Step 8. In the Joint panel set:
under Alignment, **Fig. 32**
Offset **Z -19.45**
under Motion
Type **Revolute**
click OK.

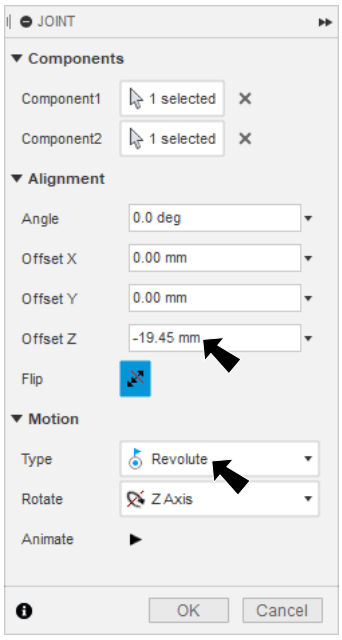


Fig. 32

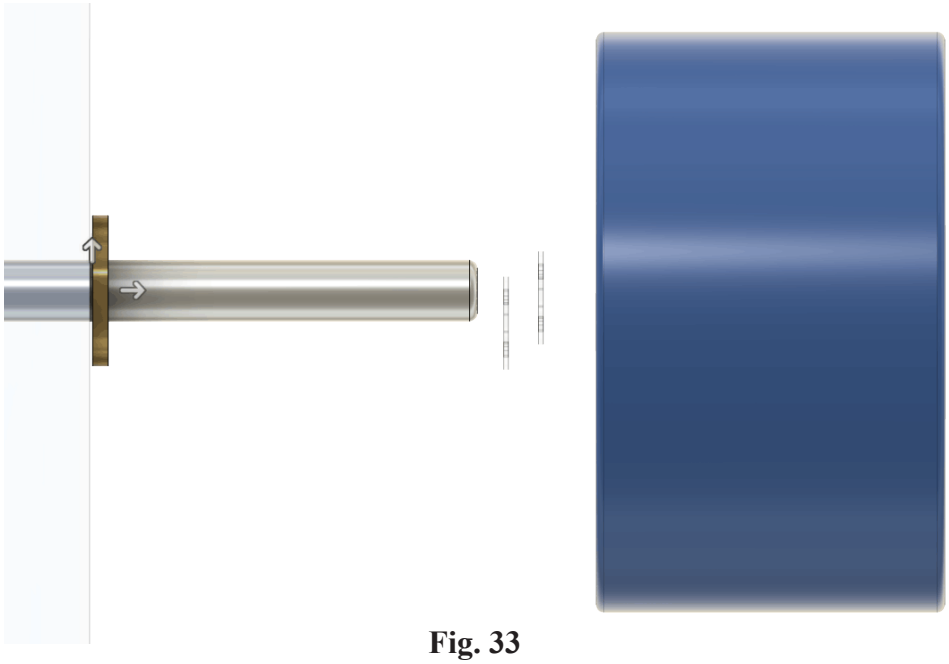
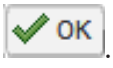


Fig. 33

Step 9. Click **Joint** (**J**) on toolbar.

Step 10. Click **inside cylindrical edge of E Clip1** for first component selection and **outside cylindrical edge of Washer** for second component selection, **Fig. 34**. **Right click** and click OK 

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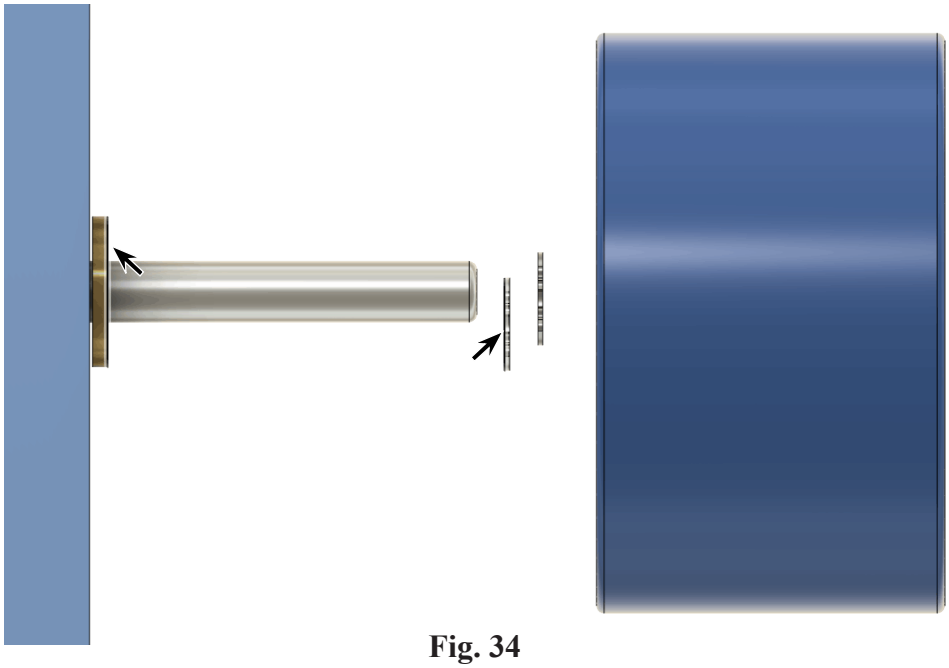

Fig. 34

Step 11. Click **Joint** (**J**) on toolbar.

Step 12. Click **inside cylindrical edge of Rear Wheel** for first component selection and **outside cylindrical edge of E Clip1** for second component selection, **Fig. 35**. **Right click** and click OK.

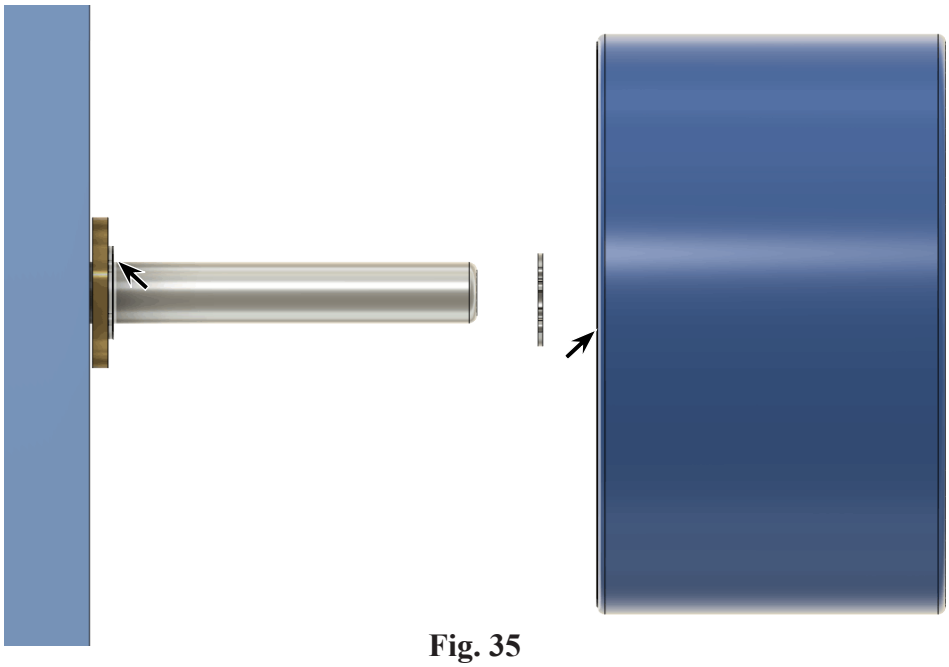

Fig. 35

Step 13. Click **Joint** (**J**) on toolbar.

Step 14. Click **inside cylindrical edge of E Clip2** for first component selection and **outside cylindrical edge of Rear Wheel** for second component selection, **Fig. 36**. **Right click** and click OK.

Step 15. Save. **Ctrl-S** and press ENTER.

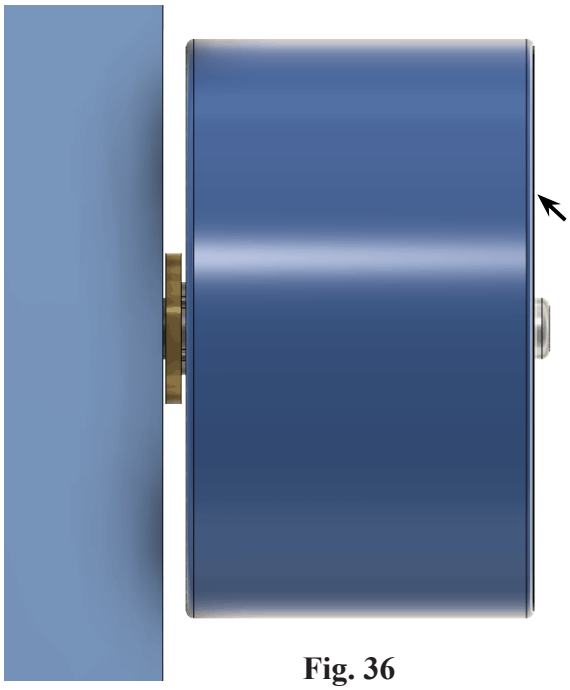

Fig. 36

Fig. 37

F. Mirror.

Step 1. Click **Home** (Isometric) on View Cube .

Step 2. On the Solid tab SOLID click Create Menu > Mirror.

Step 3. In the Mirror panel set, **Fig. 38**
Pattern Type **Components**
Objects in the Browser click **all Washers, E Clips and Wheels**, **Fig. 39**
confirm 8 selected
Mirror Plane **click Mirror Plane** button
click **YZ Plane**, **Fig. 40**
click OK.

Step 4. Save. **Ctrl-S** and press ENTER.

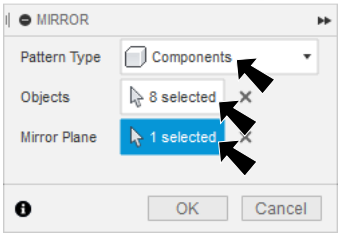

Fig. 38

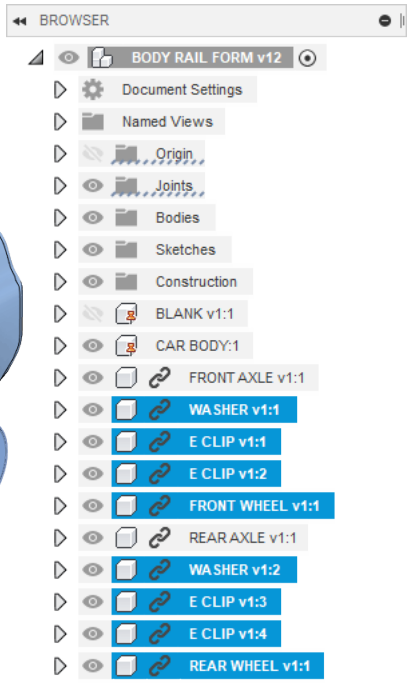

Fig. 39

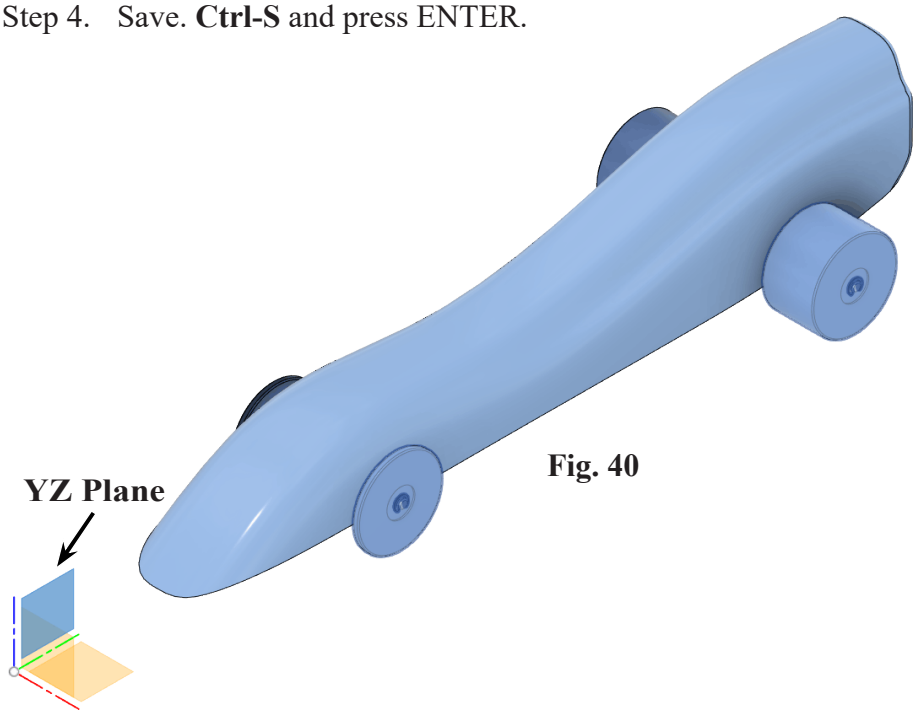

Fig. 40