



Bike and Trailer Tire



A. Extrude1 Tire.

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 **two circles at Origin** , **Fig. 2**.

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

Step 6. Dimension **diameters 35 and 28**, **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 Boss-Extrude Property Manager set:
under Direction 1, **Fig. 3**
End Condition **Mid Plane**
Depth  **5**
click OK .

B. Save as "TIRE".

Step 1. Click File Menu > Save As.

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

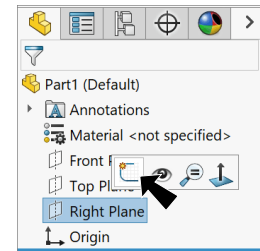


Fig. 1

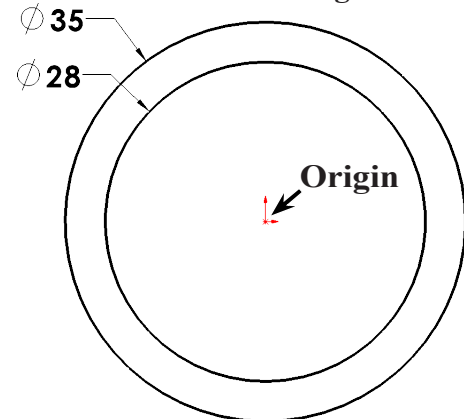


Fig. 2

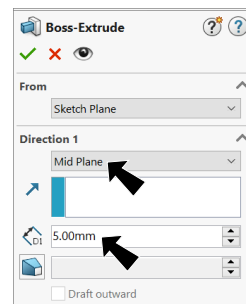


Fig. 3

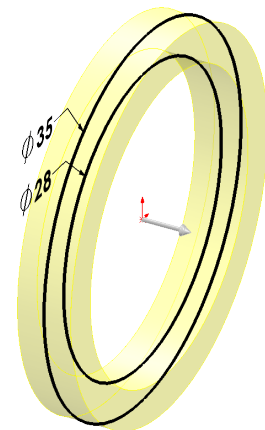




Fig. 4

C. Extrude2 Tread 1.

Step 1. Click **Top Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 5**.

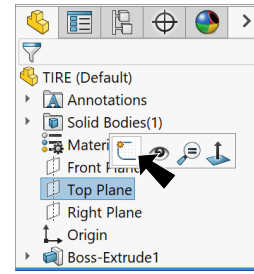



Fig. 5

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

Step 3. Zoom in around the Origin , **Fig. 6**.

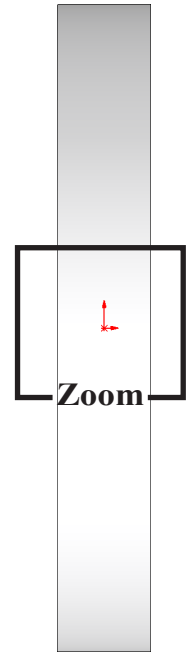


Fig. 6

Step 4. Click **Center Rectangle**  in the **Rectangle flyout**  on the Sketch toolbar.

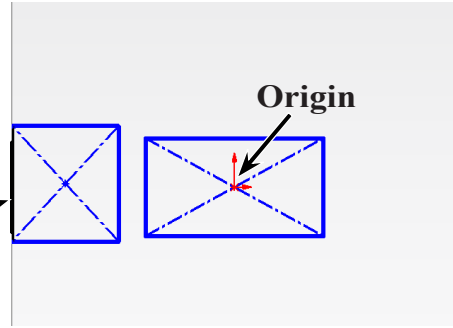
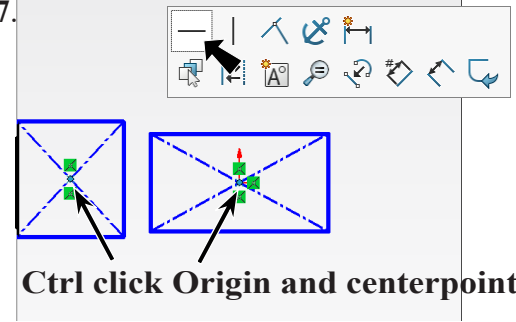


Fig. 7



Step 5. Sketch a **center rectangle at Origin**  and a **second rectangle with left side of rectangle coincident with left edge of Extrude1**, **Fig. 7**.


Step 6. **Unselect Rectangle tool.** To unselect, **right click graphics area and click Select**  from menu.

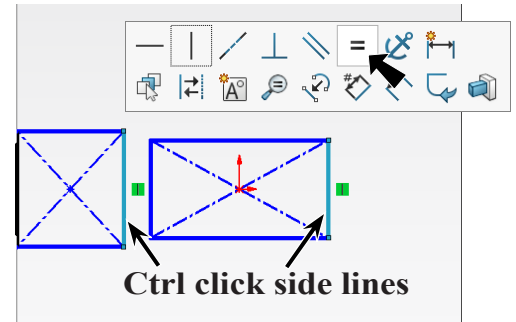


Ctrl click Origin and centerpoint

Fig. 8

Step 7. **Ctrl click Origin**  **centerpoint of second rectangle** to select both. Release Ctrl key and click **Make Horizontal**  on the context toolbar, **Fig. 8**.

Step 8. **Ctrl click a vertical line of each rectangle** to select lines. Release Ctrl key and click **Make Equal**  on the context toolbar, **Fig. 9**.



Ctrl click side lines

Fig. 9

Step 9. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 10. Add dimension, **Fig. 10**.

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

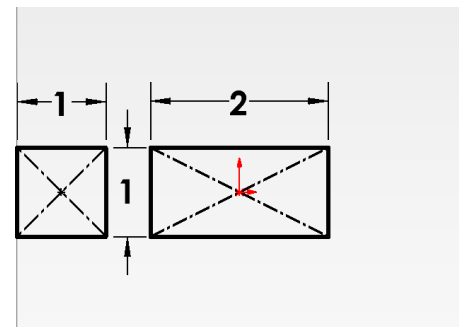


Fig. 10

Step 12. Click **Right Plane**  in the Feature Manager to select plane, **Fig. 11**.

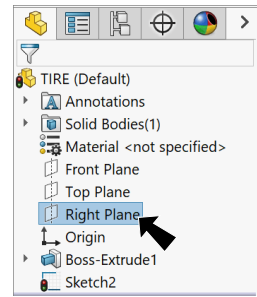





Fig. 11

Step 13. **Ctrl drag** a selection to **select left rectangle**, **Fig. 12**.

Step 14. Click **Mirror Entities**  **Mirror Entities** on the Sketch toolbar, **Fig. 13**.

Step 15. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)

Step 16. Click **Features**  on the Command Manager toolbar.

Step 17. Click **Extruded Boss/Base**  on the Features toolbar.

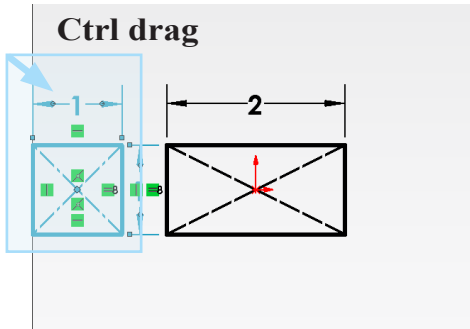


Fig. 12

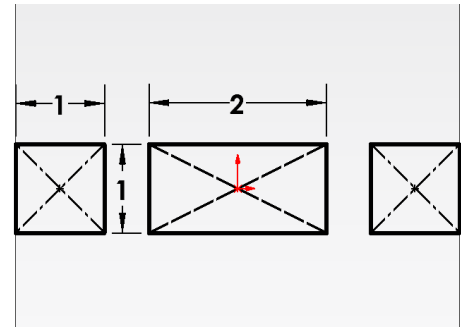


Fig. 13

Step 18. In the Boss-Extrude Property Manager set:
under From, **Fig. 14**

Start Condition **Surface/Face/Plane**

in Select A Surface/Face/Plane box

click **outside cylindrical face**, **Fig. 15**

under Direction 1

End Condition **Blind**

Depth  **.5**

uncheck **Merge results**

click OK .

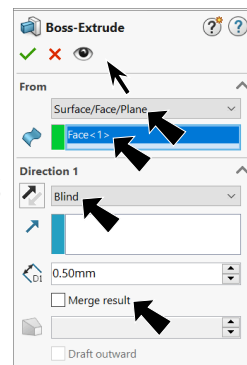
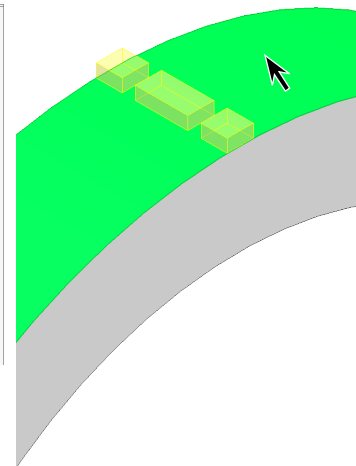


Fig. 14



Step 19. Save  (**Ctrl-S**).

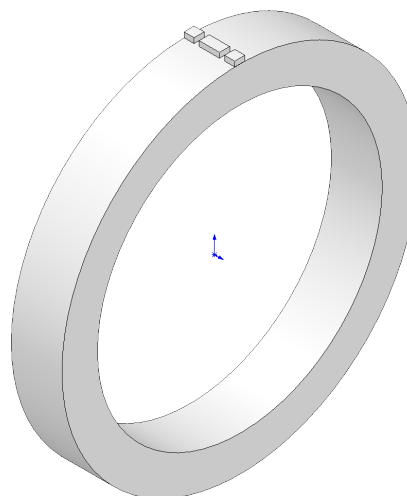


Fig. 16

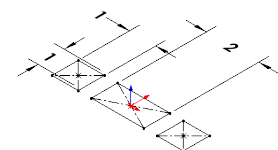




Fig. 15

D. Create Plane 1.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 17**.

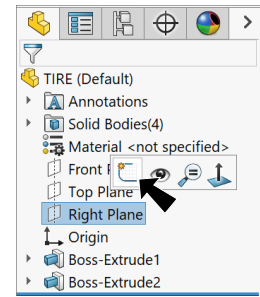





Fig. 17

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

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

Step 4. Sketch line up from **Origin**  at angle to left, **Fig. 18**.

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

Step 6. **Dimension angle 6°**, **Fig. 19**. To dimension angle to imaginary line, click line and Origin , then click the **top vertical crosshair**  and place dimension.

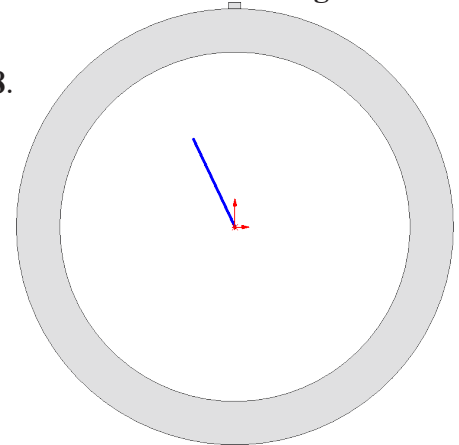

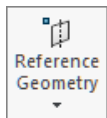


Fig. 18

Step 7. Click **Exit Sketch**  on the Sketch toolbar.

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

Step 9. Click **Reference Geometry**  on the Features toolbar and **Plane** from the menu.

Step 10. In the Plane Property Manager set: under First Reference, **Fig. 20**

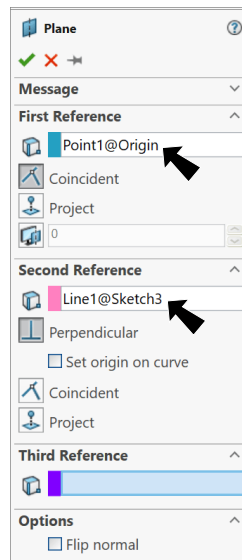




Fig. 20

click **Origin** , **Fig. 21**
 under Second Reference
 click in Second Reference box
 click **line in Sketch3**
 The new plane should be at
 Origin and perpendicular to line
 Click OK .

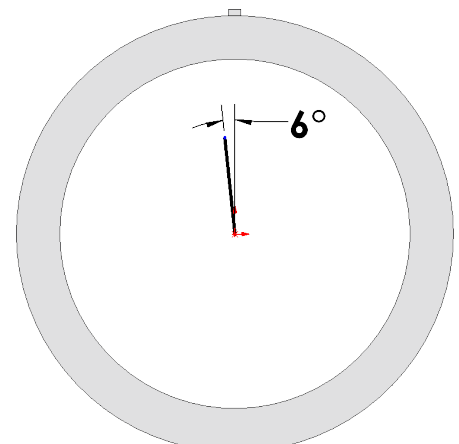


Fig. 19

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

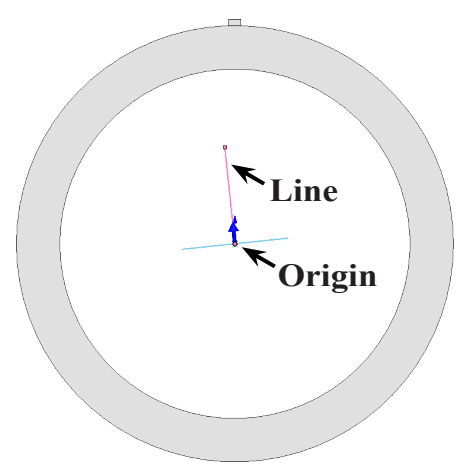





Fig. 21

E. Extrude3 Tread 2.

Step 1. **Hide Sketch3** . To hide, click **Sketch3**  in the Feature Manager and **Hide**  on the context toolbar, **Fig. 22**.

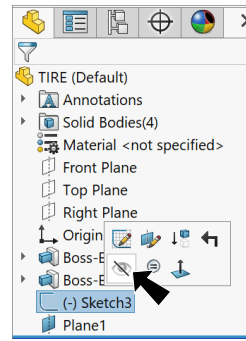





Fig. 22

Step 2. **Hide Plane1** . To hide, click **Plane1**  in the Feature Manager and **Hide**  on the context toolbar, **Fig. 23**.

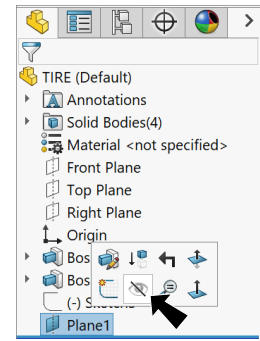




Fig. 23

Step 3. Click **Plane1**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 24**.

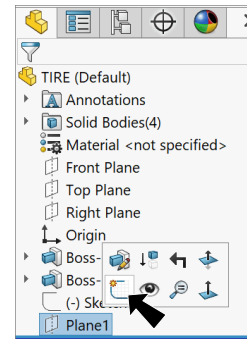



Fig. 24

Step 4. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 5. Zoom in around the Origin  , **Fig. 25**.

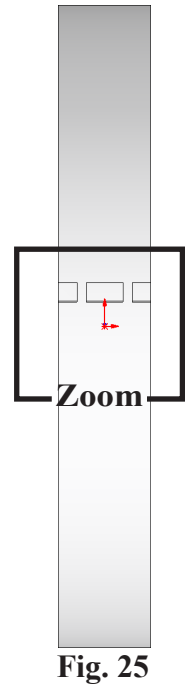




Fig. 25

Step 6. Click **Center Rectangle**  in the **Rectangle flyout**  on the Sketch toolbar.

Step 7. Sketch a **center rectangle with left side of rectangle coincident with left edge of Extrude1**, **Fig. 26**.

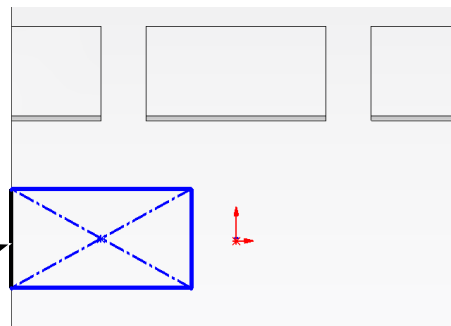


Fig. 26

Step 8. **Unselect Rectangle tool**. To unselect, **right click graphics area and click Select**  from menu.

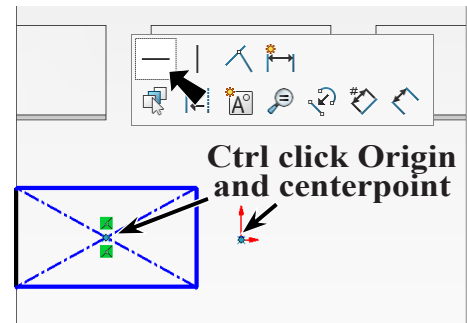




Fig. 27

Step 9. **Ctrl click Origin**  and **centerpoint of rectangle** to select both. Release Ctrl key and click **Make Horizontal**  on the context toolbar, **Fig. 27**.

Step 10. Click **Smart Dimension**  (**S**) on the Sketch toolbar.

Step 11. Add dimension, **Fig. 28**.

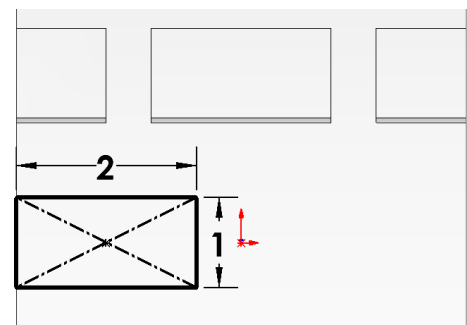



Fig. 28

Step 12. **Unselect Smart Dimension.** To unselect, **right click graphics area and click Select**  from menu.

Step 13. Click **Right Plane**  in the Feature Manager to select plane, **Fig. 29.**

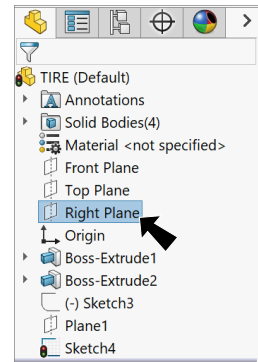





Fig. 29

Step 14. **Ctrl drag** a selection to **select rectangle**, **Fig. 30.**

Step 15. Click **Mirror Entities**  **Mirror Entities** on the Sketch toolbar, **Fig. 31.**

Step 16. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)

Step 17. Click **Features**  on the Command Manager toolbar.

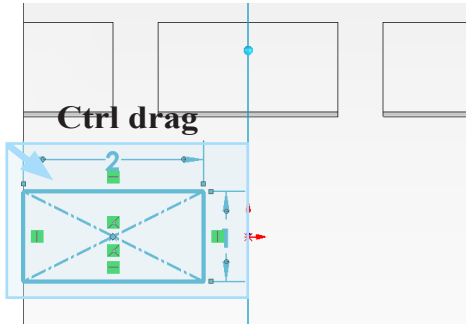


Fig. 30

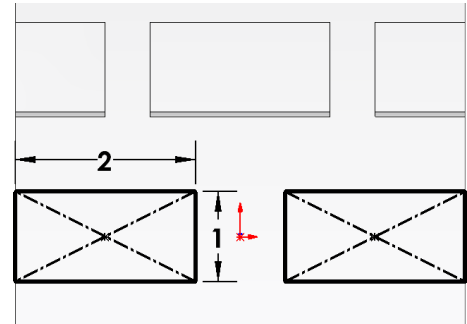



Fig. 31

Step 18. Click **Extruded Boss/Base**  on the Features toolbar.

Step 19. In the Boss-Extrude Property Manager set: under From, **Fig. 32**

Start Condition **Surface/Face/Plane**
in Select A Surface/Face/Plane box
click **outside cylindrical face**, **Fig. 33**
under Direction 1

End Condition **Blind**

Depth  **.5**
uncheck **Merge results**
click OK .

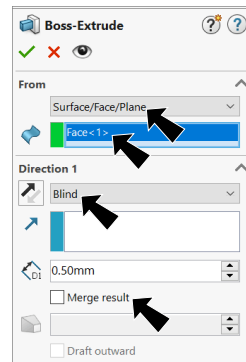
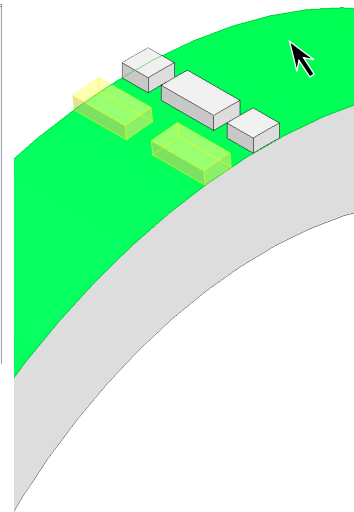


Fig. 32



Step 20. Save  (**Ctrl-S**).

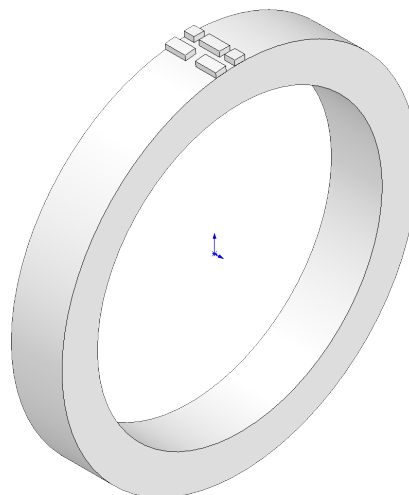


Fig. 34

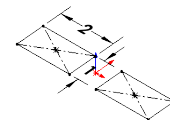
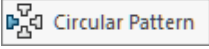






Fig. 33

F. Circular Pattern 1.

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

Step 2. In the Circular Pattern Property Manager set:
 uncheck Features and Faces, **Fig. 35**
 under Bodies
 click the **five Extruded bodies** in graphics area, **Fig. 36**
 under Direction 1
 click in Pattern Axes box
 click a **cylindrical face**
 select **Instance spacing**
 Angle  **12°**
 Number of Instances  **34**
 click OK .

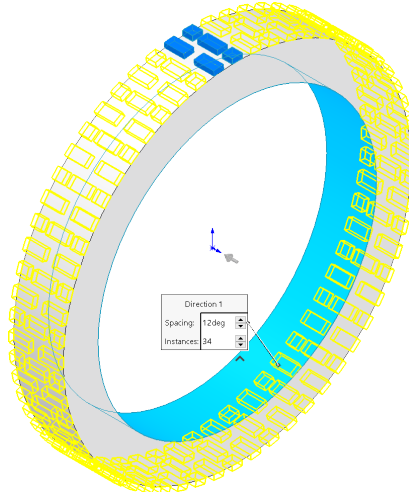


Fig. 36

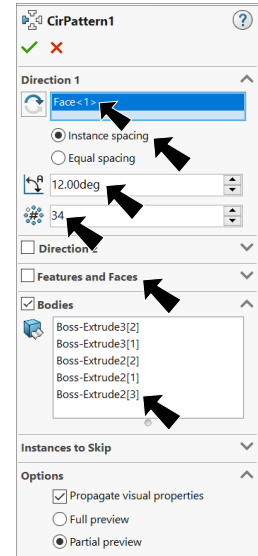




Fig. 35

Step 3. Save  (Ctrl-S).
Be sure to save here. Combining all bodies could stress your computer.

G. Combine Bodies 1.

Step 1. Click Insert Menu > Features > Combine.

Step 2. In the Combine Property Manager:
 under Operation Type, **Fig. 37**
 select **Add**
 drag a selection or use **Ctrl-A**
 to select all bodies, **Fig. 38**
 click OK .

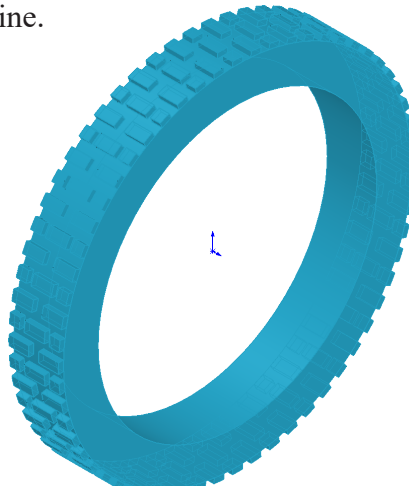


Fig. 38

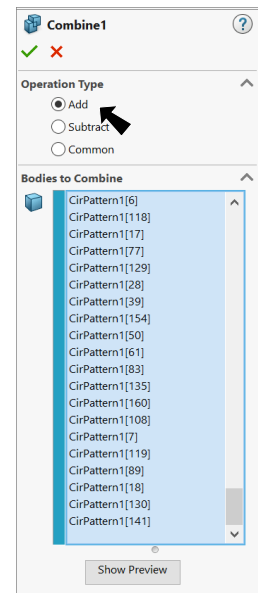





Fig. 37

Step 3. Save  (Ctrl-S).

H. Revolved Cut.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 39**.

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

Step 3. Click **Centerline**  in the **Line flyout**  on the Sketch toolbar.

Step 4. Sketch **horizontal centerline** from **Origin** , **Fig. 40**.

Step 5. Zoom in on top of view, **Fig. 40**.

Step 6. Click **Line**  (L) on the Sketch toolbar.


Step 7. Sketch **line up along left edge and horizontal above top edge**, **Fig. 41**.

Step 8. Click **3 Point Arc**  (S) in the **Arc flyout**  on the Sketch toolbar.

Step 9. Sketch **arc with start and endpoints at line endpoint and radius up toward lines**, **Fig. 42**.

Step 10. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 11. Add dimension, **Fig. 43**. Dimension the **.02** first, from top endpoint of vertical line to top silhouette edge.

Step 12. **Unselect Smart Dimension**. To unselect, **right click graphics area and click Select**  from menu.

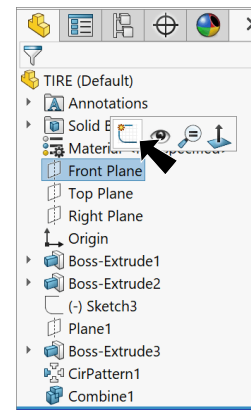
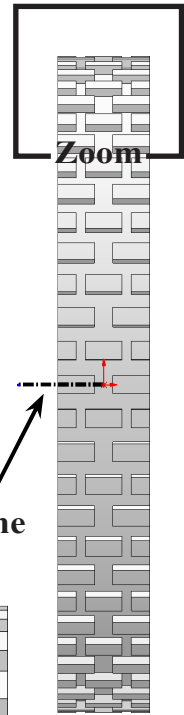


Fig. 39



Centerline

Fig. 40

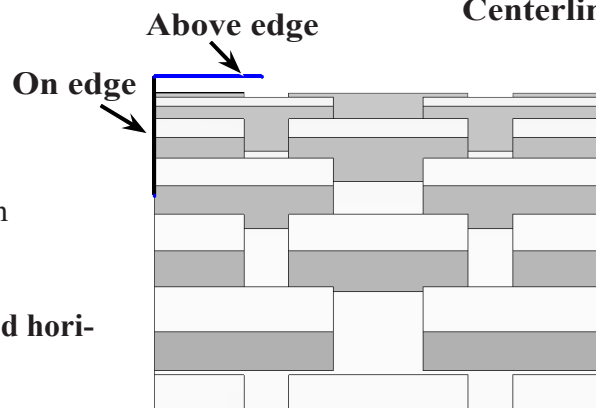


Fig. 41

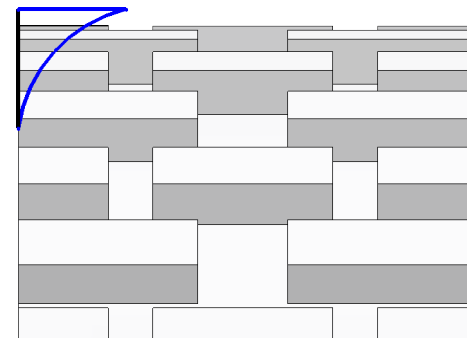


Fig. 42

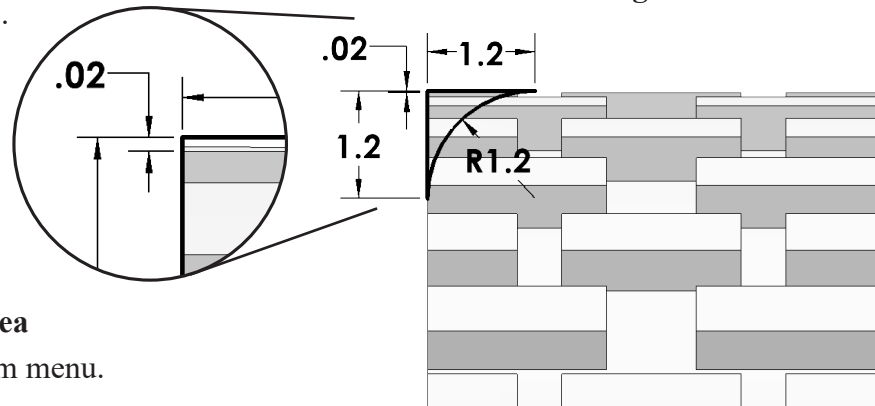


Fig. 43

Step 13. Click **Right Plane**  in the Feature Manager to select plane, **Fig. 44**.

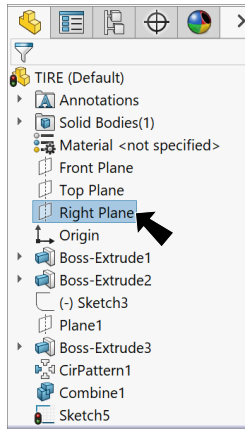


Fig. 44

Step 14. **Ctrl drag** a selection to **select all geometry at top of part**, **Fig. 45**.

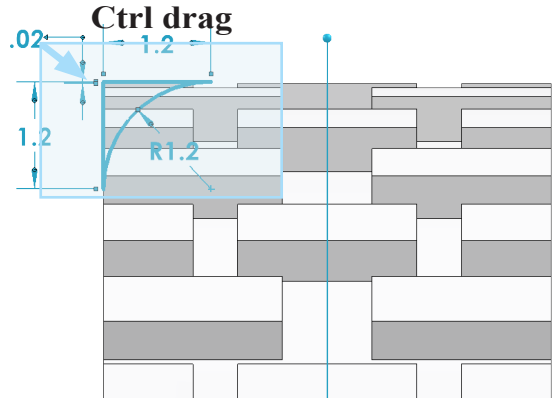


Fig. 45

Step 15. Click **Mirror Entities**  on the Sketch toolbar, **Fig. 46**.

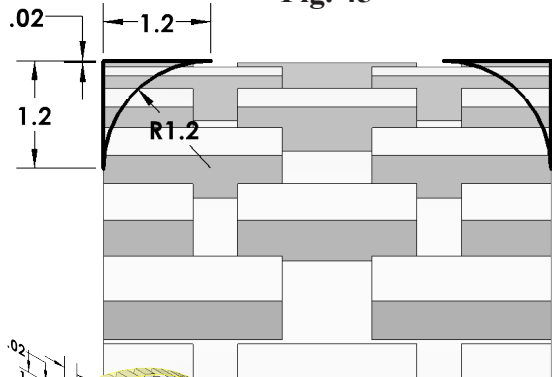




Fig. 46

Step 16. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)

Step 17. Click **Features**  on the Command Manager toolbar.

Step 18. Click **Revolved Cut**  on the Features toolbar.

Step 19. In the Cut-Revolve Property Manger set:
 under Axis of Revolution , **Fig. 47**
 click construction line is selected
 click OK .

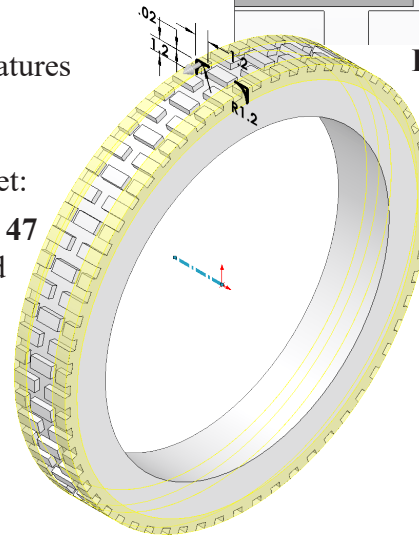


Fig. 48

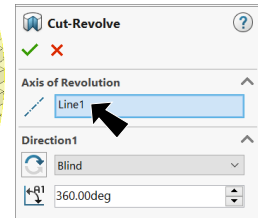




Fig. 47

Step 20. Save  (**Ctrl-S**).

I. Fillet Edges.

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

Step 2. In the Fillet Property Manager set:
 select **FilletXpert**, **Fig. 49**

Radius  **1.7**
 click **both inside circular edges**, **Fig. 50**
 click OK .

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

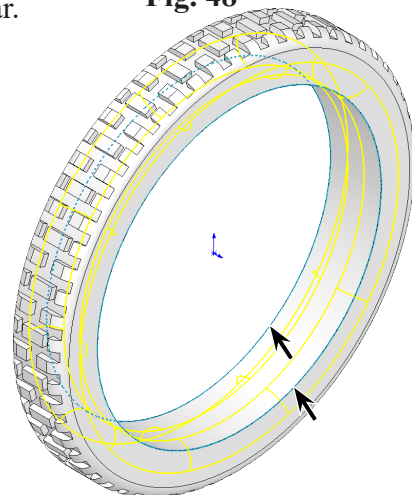


Fig. 50

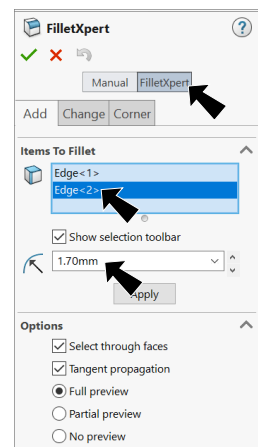



Fig. 49

J. Surface Offset.

Step 1. Click Insert Menu > Surface > Offset.

Step 2. In the Offset Surface Property Manager set:
 under Offset Parameters, **Fig. 51**
 Surface or Face to Offset
 click the **3 side faces**, **Fig. 52**
Offset distance .1
 offset should be to right
 click OK .

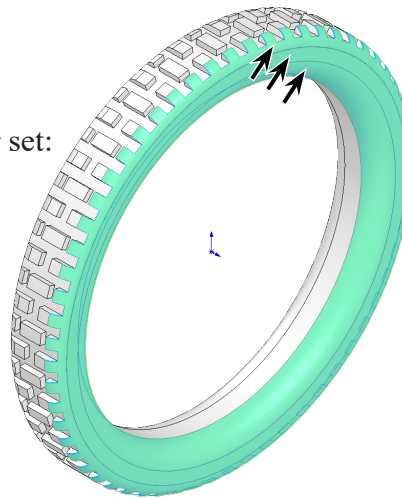


Fig. 52

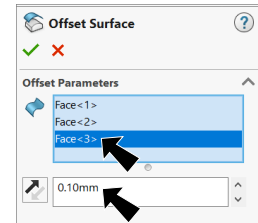





Fig. 51

K. Text on Arc.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 53**.

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

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

Step 4. Sketch a circle starting at the Origin , **right click circle** and click **Construction Geometry**  on the context toolbar, **Fig. 54**.

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

Step 6. Dimension diameter 29.5, **Fig. 55**.

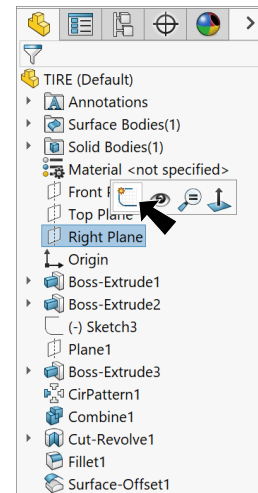


Fig. 53

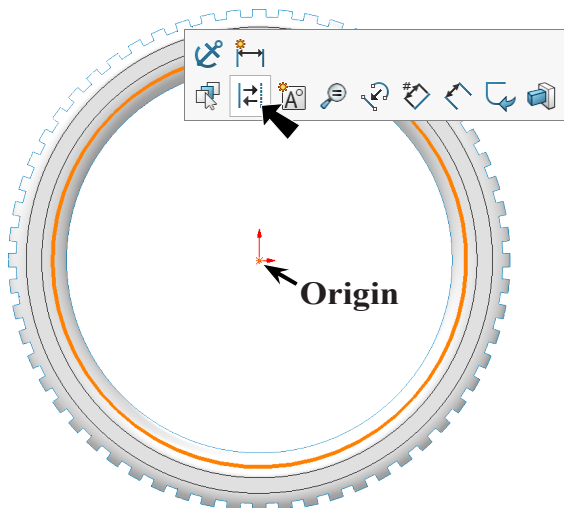


Fig. 54

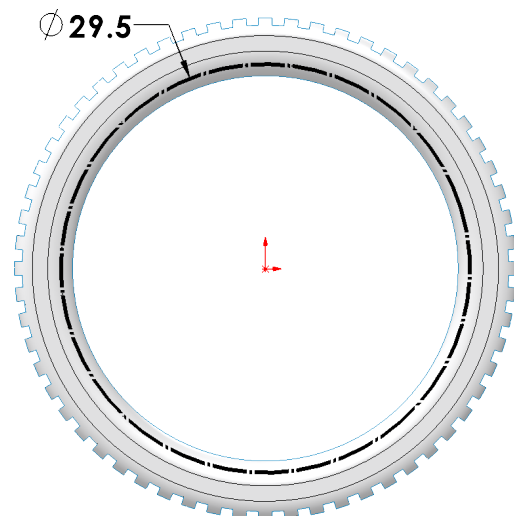


Fig. 55

Step 7. Click **Text Tool**  on the Sketch toolbar.

Step 8. In the Sketch Text Property Manager set:

under Curves, **Fig. 56**

click **circle**, **Fig. 57**

under Text

click in the box and key-in **CUDACOUNTRY**

Center Align 

Flip Vertical 

Flip Horizontal 

uncheck **Use document font** checkbox

Spacing  **110**

click **Font** button.

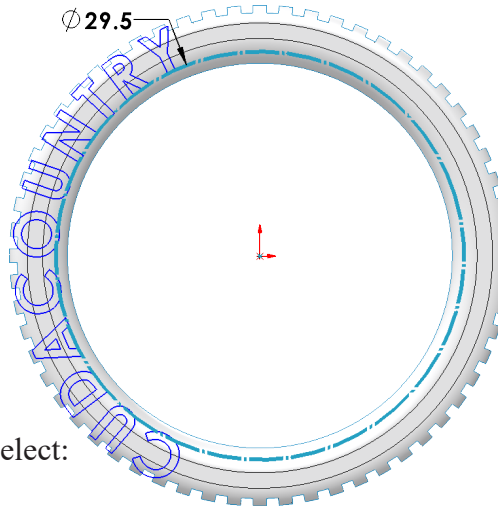


Fig. 57

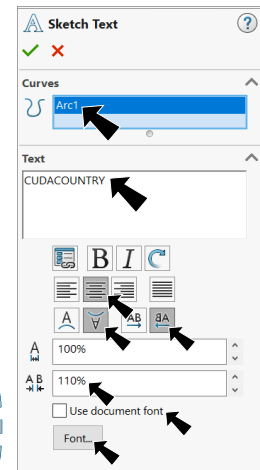


Fig. 56

Step 9. In the Choose Font dialog box select:

under Font, **Fig. 58**

select **Verdana**

under Font Style

Bold Italic

under Height

select **Units**

Size 2

click **OK** button

click **OK** .

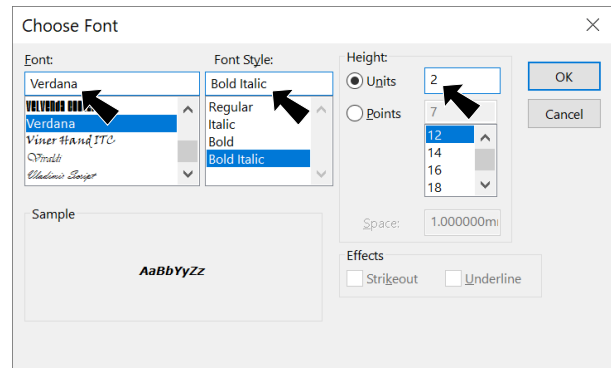


Fig. 58

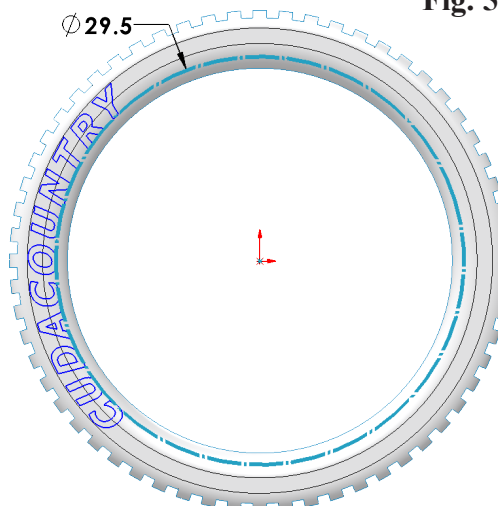




Fig. 59

Step 10 Click **Isometric**  on the Standard Views toolbar. (Ctrl-7)

Step 11. Click **Features**  on the Command Manager toolbar.

Step 12. Click **Extruded Boss/Base**  on the Features toolbar.

Step 13. In the Property Manager set:
under Direction 1, **Fig. 60**
End Condition **Up to Surface**
click in the Face/Plane box
click **Surface-Offset1**, **Fig. 61**
uncheck **Merge result**
click OK .

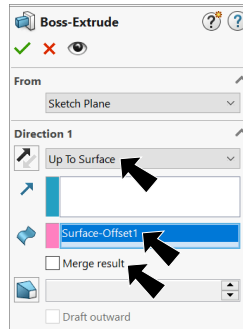


Fig. 60

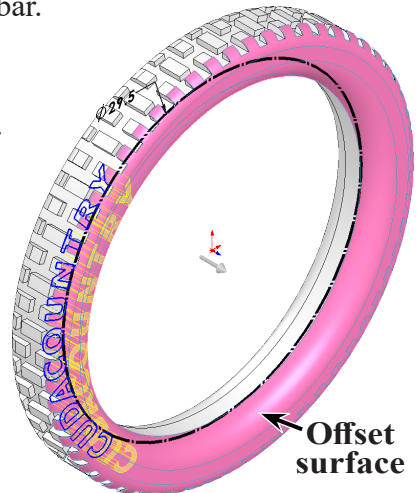




Fig. 61

Step 14. Save  (Ctrl-S).

L. Hide Surface-Offset 1.

Step 1. **Hide Surface-Offset1** , **Fig. 62**.
To hide, click the Surface-Offset1 in
the Feature Manager and **Hide** 
on the context toolbar.

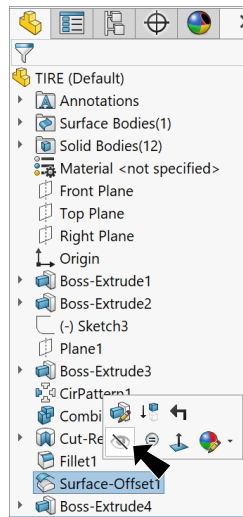


Fig. 62

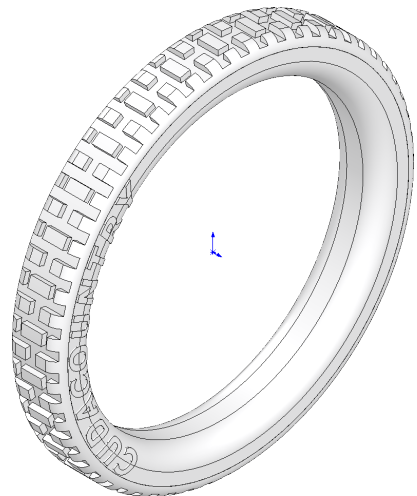


Fig. 63

M. Move Copy Body.

Step 1. Rotate view to left side, **Fig. 66**. To rotate view, **Shift-Ctrl** click the **Y axis of the Reference**

Triad (bottom left corner of graphics area).




Step 2. Expand Solid Bodies folder in the Feature Manager. **Shift** click all the **Text bodies** to select, **Fig. 64**.

Step 3. Click Insert Menu > Features > Move/Copy.

Step 4. In the Move/Copy Property Manager set:
 under Body-Move/Copy, **Fig. 65**
 bodies were preselected
 check **Copy**
 under Rotate
 click in the Rotation Reference box and

click the **Origin**, **Fig. 66**
Z Rotation Angle 180°



click OK.

Step 5. Save (Ctrl-S).

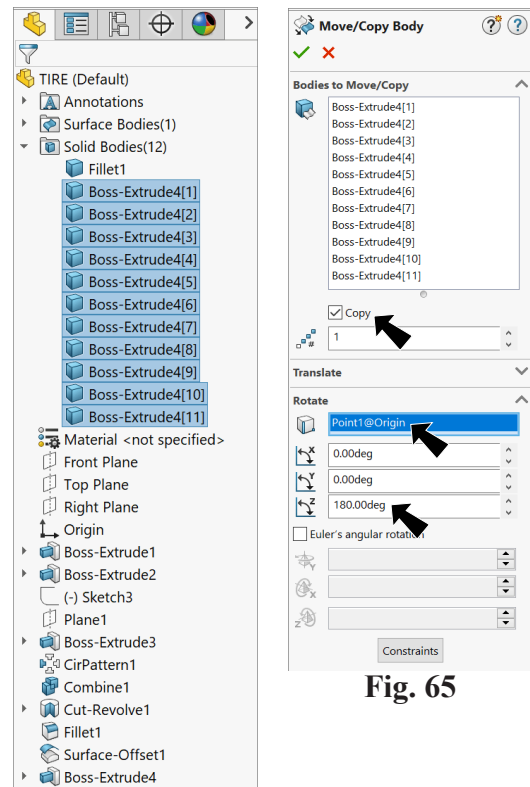


Fig. 64

Fig. 65

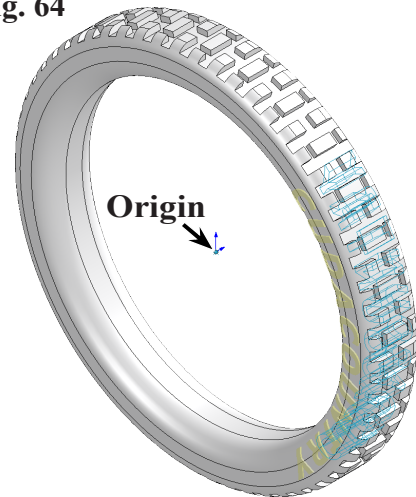


Fig. 66

N. Circular Pattern2.

Step 1. Click **Circular Pattern**  in the

Linear Pattern flyout  on the Features toolbar.

Step 2. In the Circular Pattern Property Manager set: uncheck Features and Faces, **Fig. 67** under Bodies

expand the flyout Feature Manager design tree in top left corner of the graphics area

and **Shift click all the Text bodies** ,

Fig. 68

under Direction 1

select **Equal spacing**

Angle  **360°**

Number of Instances  **2**

click in Pattern Axes box

click a **cylindrical face**, **Fig. 69**

click OK .

Step 3. Save  (Ctrl-S).

Be sure to save here and often. Combining all the bodies could stress your computer.

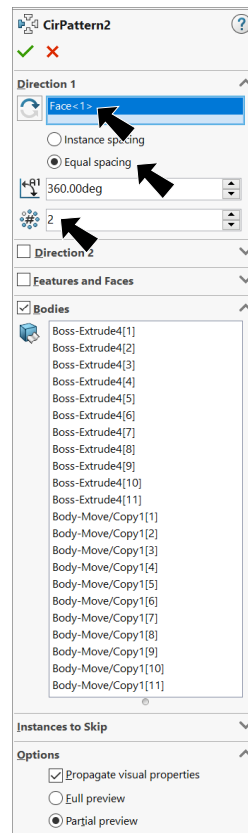


Fig. 67

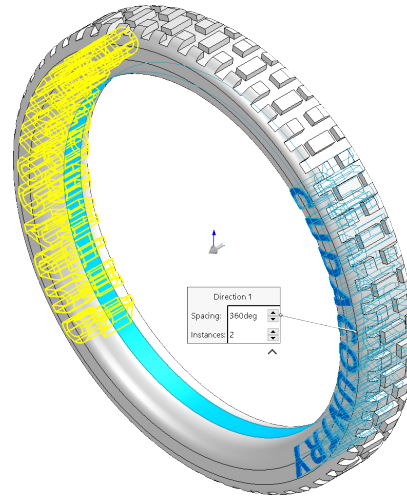


Fig. 69

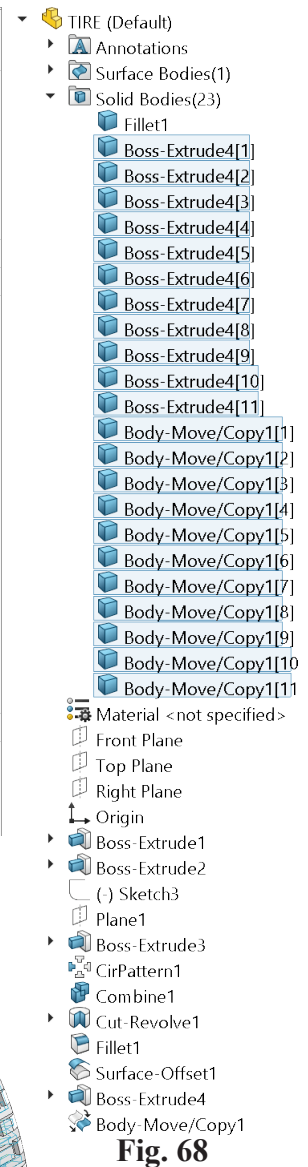



Fig. 68

O. Combine Bodies2.

Step 1. Click Insert Menu > Features > Combine.

Step 2. In the Combine Property Manager:
 under Operation Type, **Fig. 70**
 select **Add**
 drag a selection or use **Ctrl-A**
 to select all bodies, **Fig. 71**
 click OK .

Step 3. Save  (Ctrl-S).

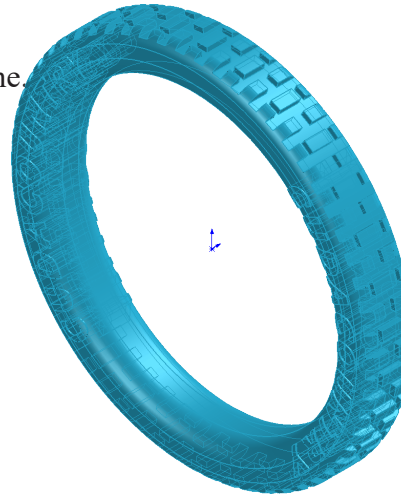


Fig. 71

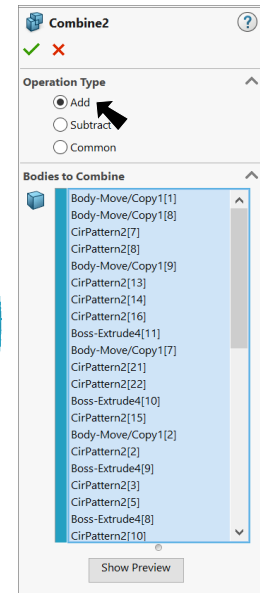








Fig. 70

P. Appearance: Black and White Rubber.

Step 1. Click **Isometric**  on the Standard Views toolbar.

Step 2. Click the part to select part, click **Appearances Callout**  on the context toolbar and click **TIRE** , **Fig. 72**.

Step 3. In the Appearances Task pane, expand **Rubber**, click **Gloss** and in the lower pane select **glossy rubber**, **Fig. 73**.

Step 4. Over in the Appearances Property Manager, click **Keep Visible**  and OK , **Fig. 74**.
 The Push Pin  on allows selection of another appearance.

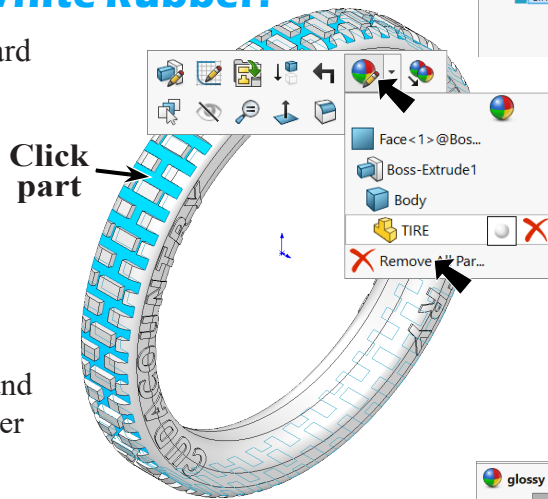


Fig. 72



Fig. 75

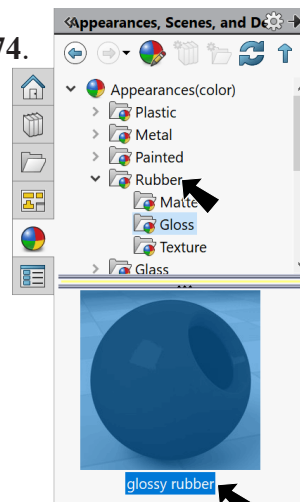


Fig. 73

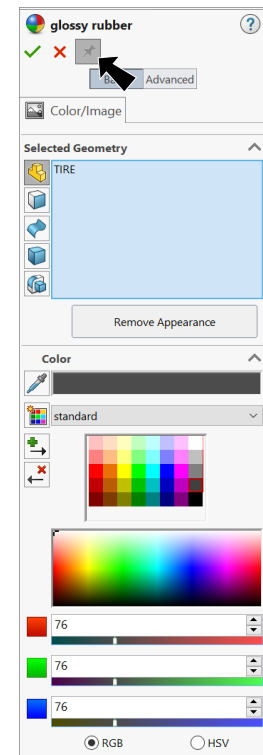


Fig. 74

Step 5. Still in the Appearances Property Manager, under Color, **Fig. 76**
 click **White** swatch
 under Selected Geometry

click **Select Features** 

expand the flyout Feature Manager design tree in top left corner of the graphics area, **Fig. 77**
 and click **the letter features:**

- Boss-Extrude4**
- Body-Move/Copy1** and
- CirPattern2**

click OK  and click Cancel .

Step 6. Save  (Ctrl-S).



Fig. 78

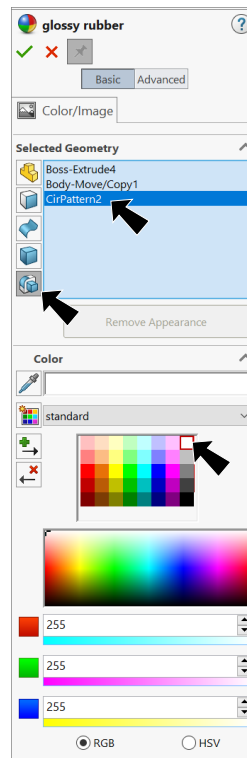


Fig. 76

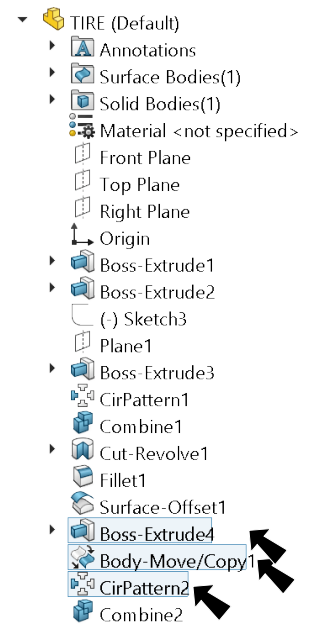


Fig. 77