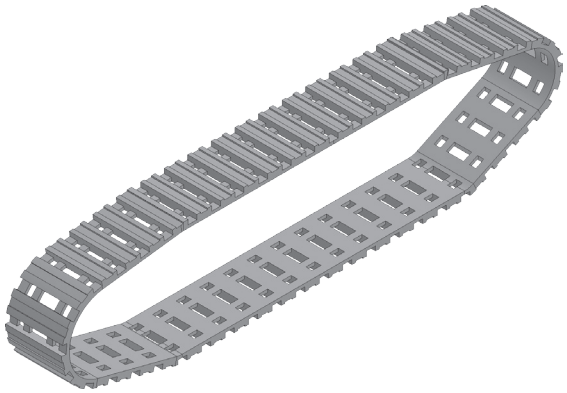
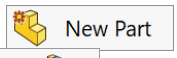
Chapter 18

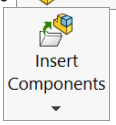
Tank Track



A. New Component Part.

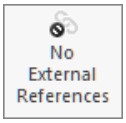
Step 1. Open your **TANK ASSEMBLY** file.

Step 2. Click **New Part** 

in the **Insert Components flyout** 

on the Assembly toolbar.

Step 3. Click **Front Plane** in the Feature Manager, **Fig. 1**.

Step 4. Confirm **No External References** 

on the Sketch toolbar should not be on (button should not be depressed).

Step 5. Set **document units to Millimeters**, **Fig. 2**. To set units, in the status bar at bottom right corner of the display, click Unit System, then select **MMGS** (millimeter, gram, second). Note that this will exit the sketch.

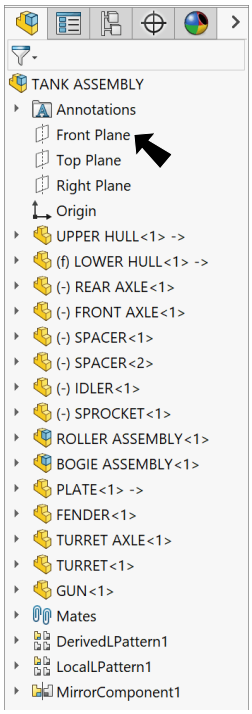


Fig. 1

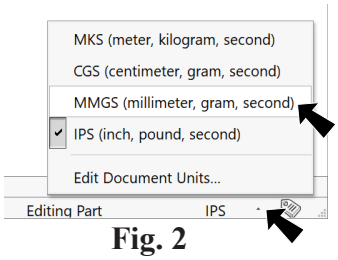


Fig. 2

B. Save as "TRACK".

Step 1. Click File Menu > Save As.

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

© Cudacountry.net Tech Ed
http://www.cudacountry.net email:cudacountry@hotmail.com

C. Create Plane1 and Plane2.

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

Step 2. Expand **Track** part in the Feature Manager, click **Right Plane** to display Plane is graphics area, **Fig. 3**.

Step 3. In graphics area **Ctrl drag Right plane to right** and release, **Fig. 4**.

Step 4. In the Plane Property Manager set:
under First Reference, **Fig. 5**

Distance **49.75**
and press **ENTER**.
The new plane should be towards right, **Fig. 4**

Click **Keep Visible** and OK . The Push Pin on allows creating another Plane.

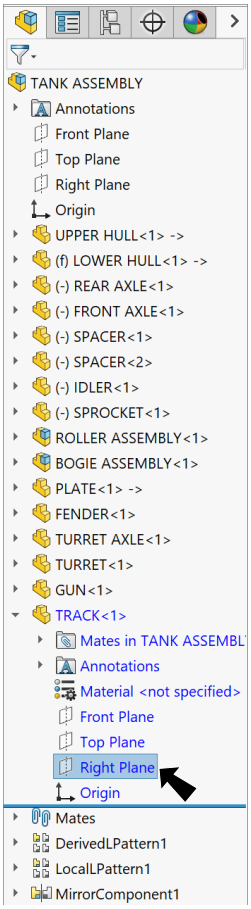


Fig. 3

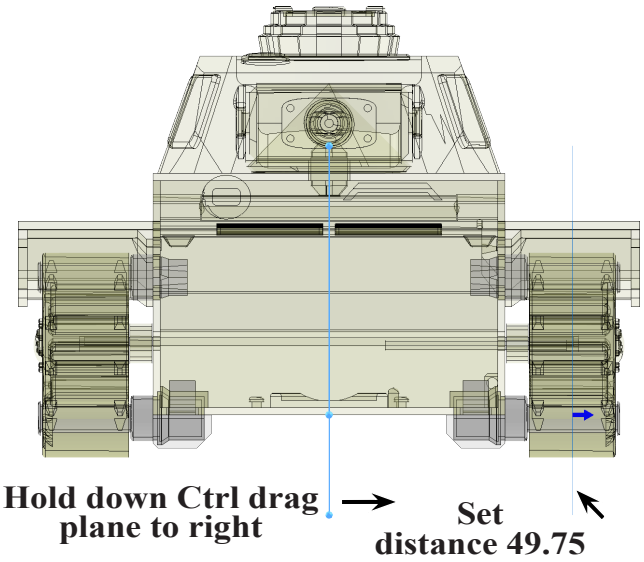


Fig. 4

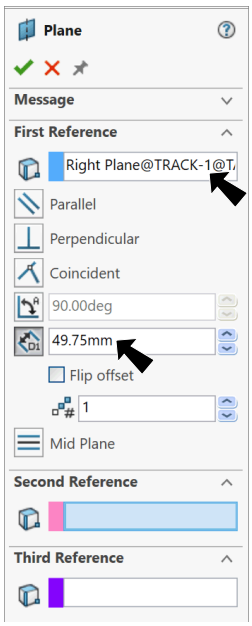


Fig. 5

Step 5. Click **Right** on the Standard Views toolbar. (**Ctrl-4**)

Step 6. In the Plane Property Manager:
under First Reference, **Fig. 6**
click in First Reference box
expand flyout Feature Manager design tree,
expand **Track** part and click **Front Plane**, **Fig. 7**
Distance **100** and press **ENTER**
check **Flip offset**
the new plane should be to rear, **Fig. 8**.
Click OK and click Cancel.

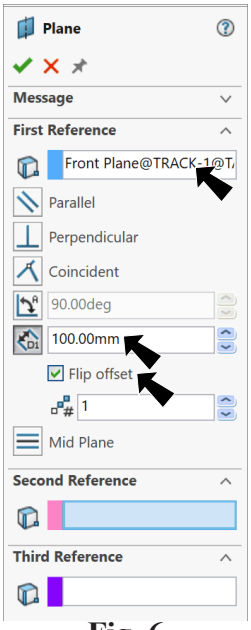


Fig. 6

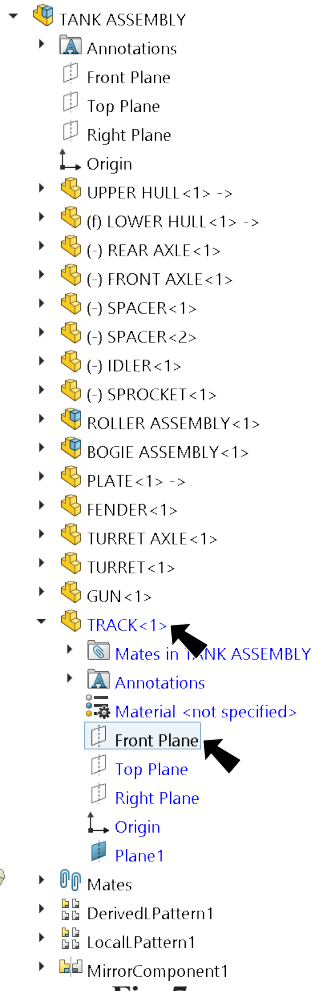


Fig. 7

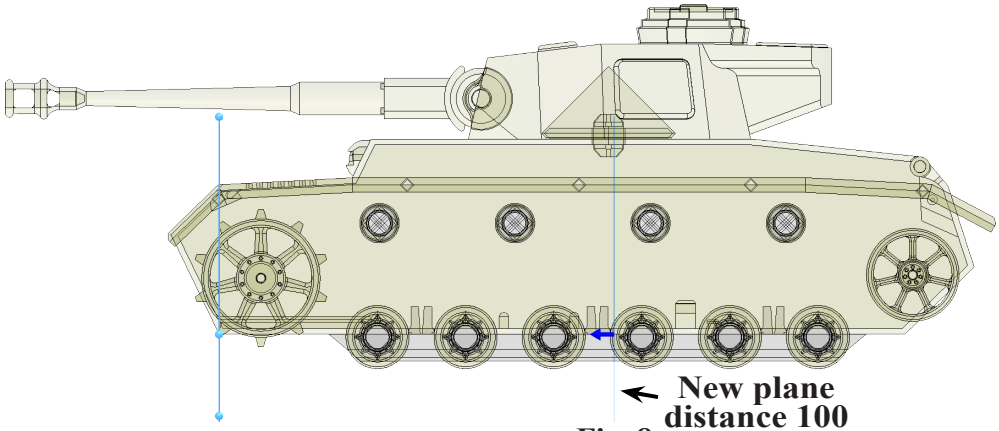


Fig. 8

D. Sweep Sketch2.

Step 1. **Hide Planes**. To hide, click **Hide All Types flyout** in the Heads-Up View toolbar and click **View Planes**, **Fig. 9**. Or click View Menu > Show/Hide > Planes, to hide Plane (**Alt-V then H P press ENTER**).

Step 2. Expand **Track** part in the Feature Manager, click **Plane1** and click **Sketch** on context toolbar, **Fig. 10**.

Step 4. Click **Convert Entities** on the Sketch toolbar.

Step 5. In the Convert Entities Property Manager:
under Entities to Convert, **Fig. 11**
click **outside cylindrical edge of**:
Sprocket
Idler
end Rollers front and rear
end Bogies - front and rear (6),
Fig. 12
click OK .

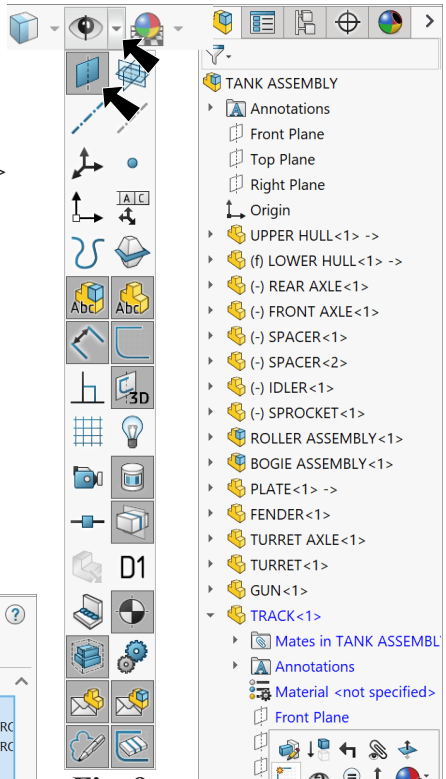


Fig. 9

Fig. 10

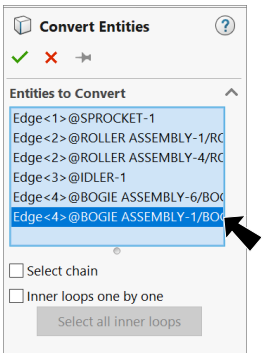


Fig. 11

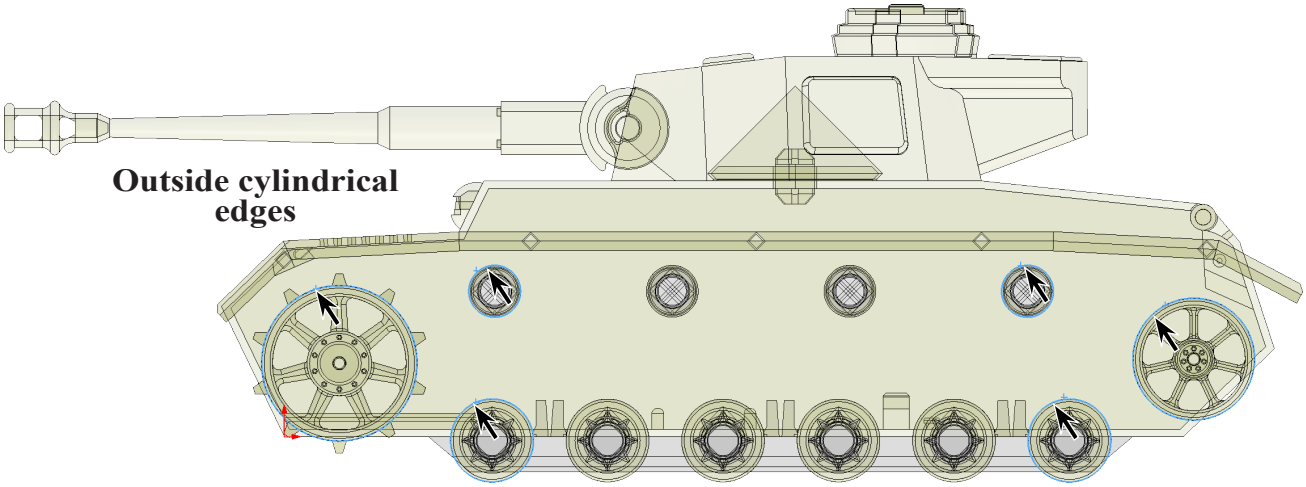


Fig. 12

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

Step 7. Sketch **line to connect Roller circles at top quadrant** and **line to connect Bogie circles at bottom quadrant**, **Fig. 13**. Double click to terminate chained lines.

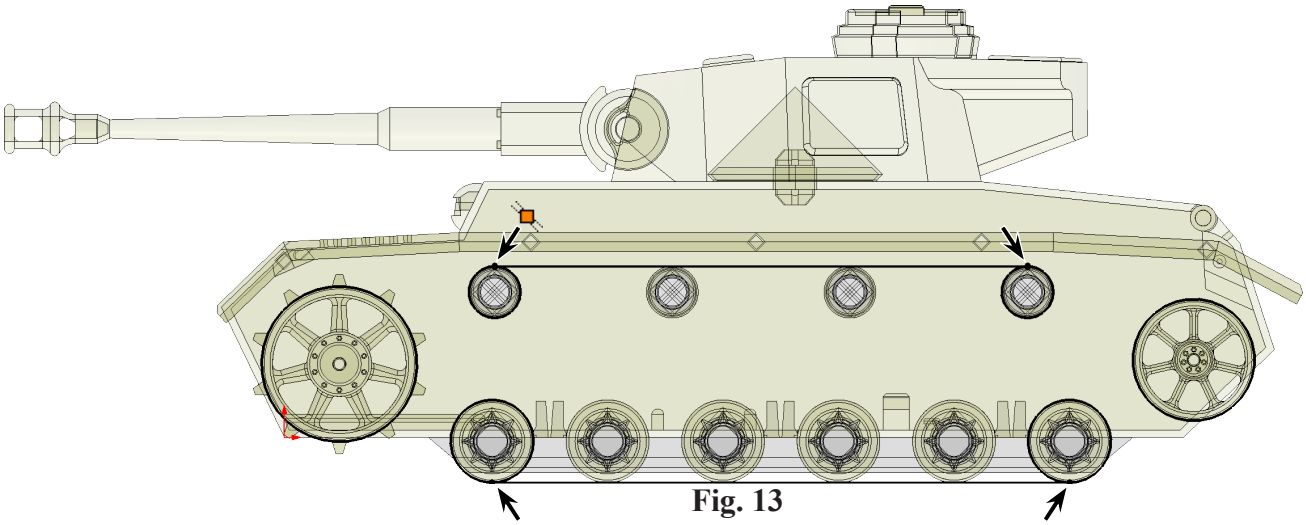


Fig. 13

Step 8. Sketch **tangent lines to connect the converted edge circles**, **Fig. 14**. **Tip:** To sketch line tangent to circle, click the circle and hover over circle until centerpoint of circle ⊕ wakes up. Then, move to other circle. The sketch should now be fully defined (all black).

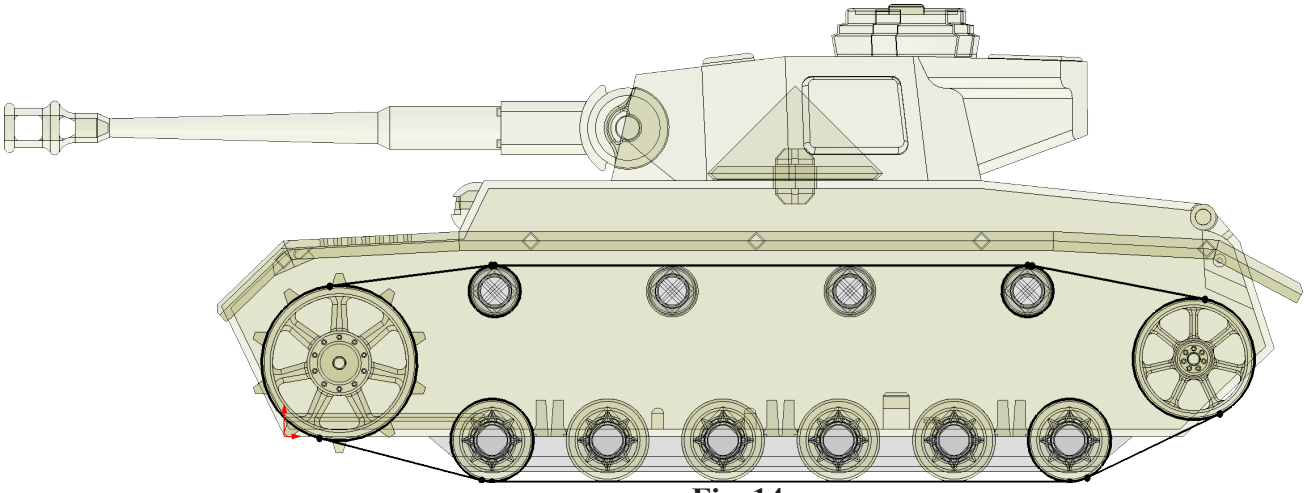


Fig. 14

Step 9. Confirm lines are tangent: click a tangent line and should be two Tangent relation listed in Property Manager, **Fig. 15**.

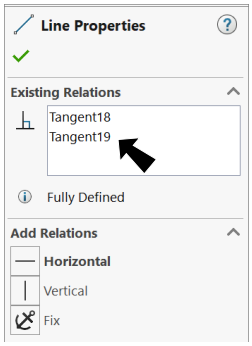


Fig. 15

Step 10. Click **Trim Entities**

(S) on the Sketch toolbar.

Step 11. In the Trim Property Manger:

select **Trim to closest** , **Fig. 16**

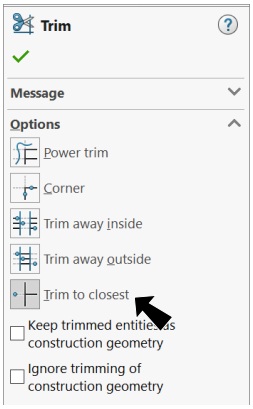


Fig. 16

Trim the 6 segments of circles inside of tangent lines, **Fig. 17**.
Click segments to trim.
Results shown in **Fig. 18**.

Click OK ✔ when done.

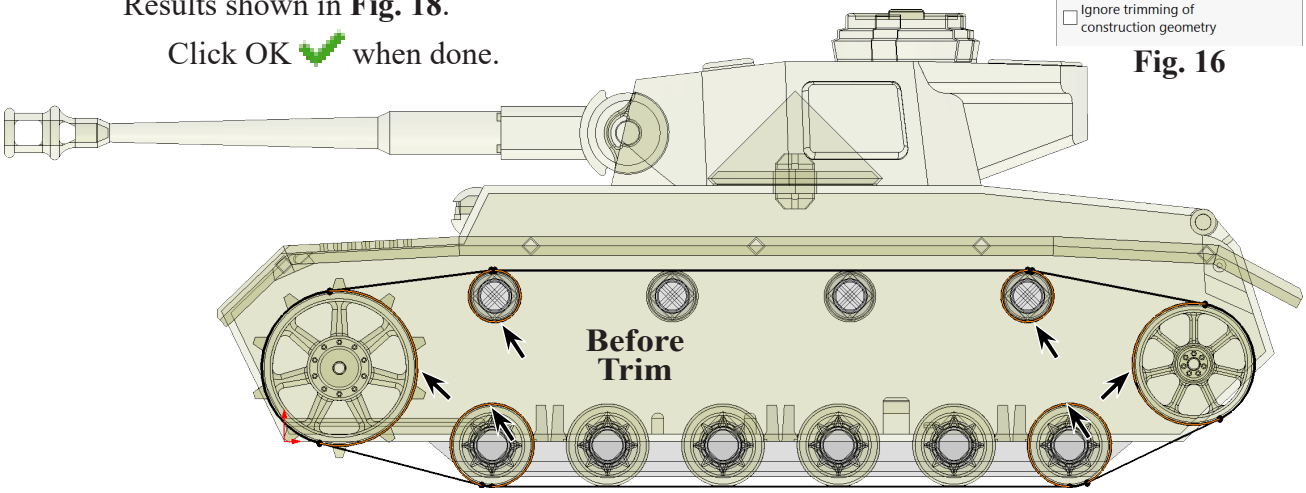


Fig. 17

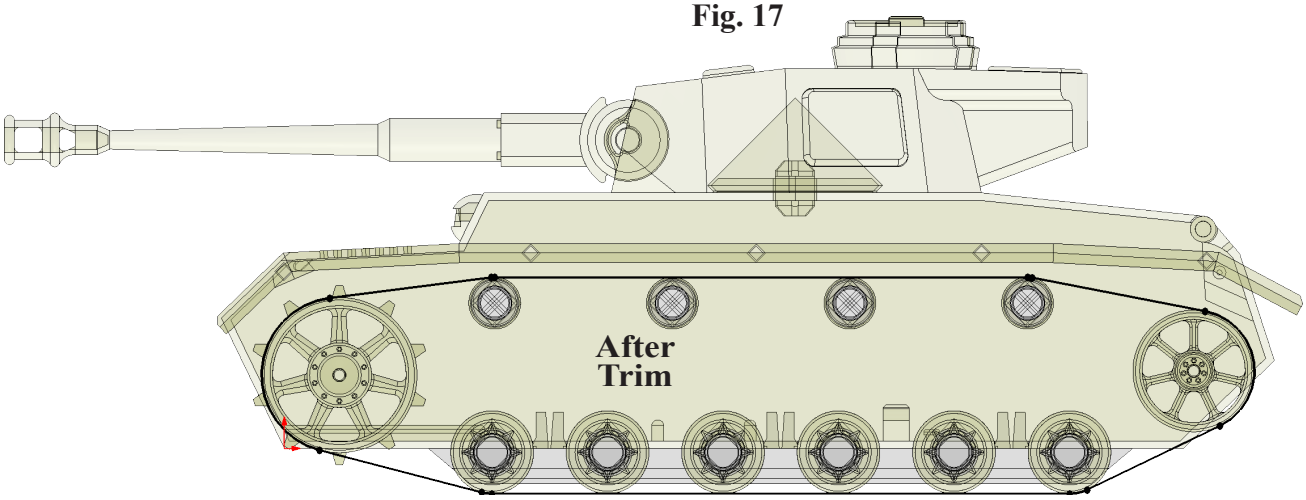
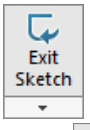
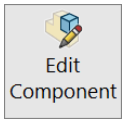


Fig. 18

Step 12. Click **Exit Sketch** 

on the Sketch toolbar.

Step 13. Click **Edit Component** 

on the Features toolbar to exit.

Step 14. Save **(Ctrl-S)**.

E. Open Track.

Step 1. Click **Track** in the Feature Manager and click **Open Part** on context toolbar, **Fig. 19**.

Step 2. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

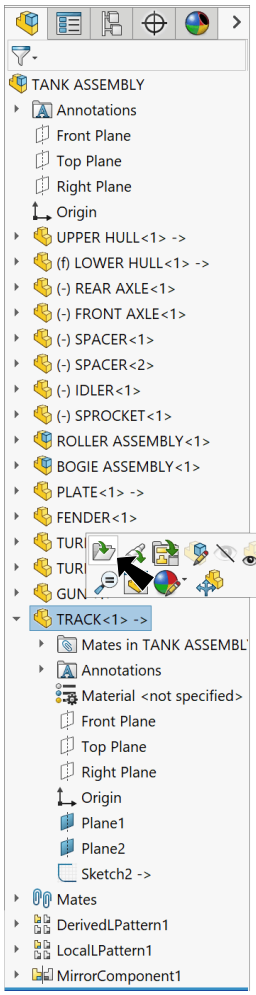


Fig. 19

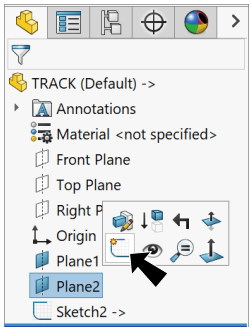


Fig. 20

F. Sweep Sketch3.

Step 1. Click **Plane2** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 20**.

Step 2. Click **Corner Rectangle** in the **Rectangle flyout** on the Sketch toolbar.

Step 3. Sketch corner **rectangle above Sketch 2**, **Fig. 21**. Planes are hidden here for clearity - we will use them shorty.

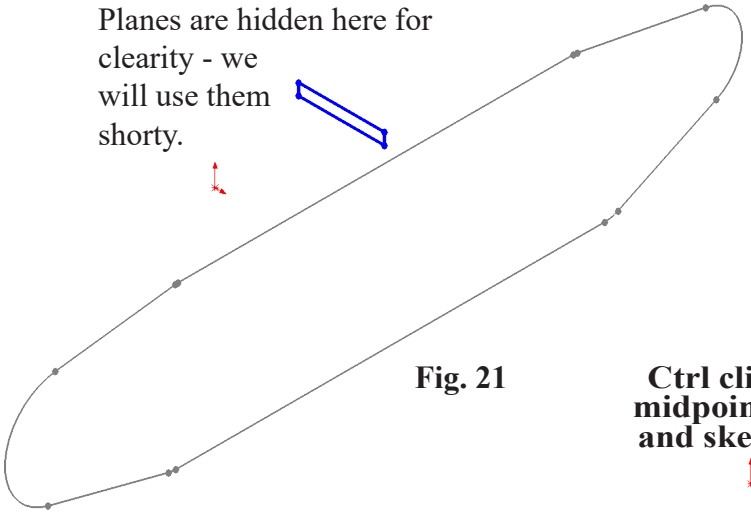


Fig. 21

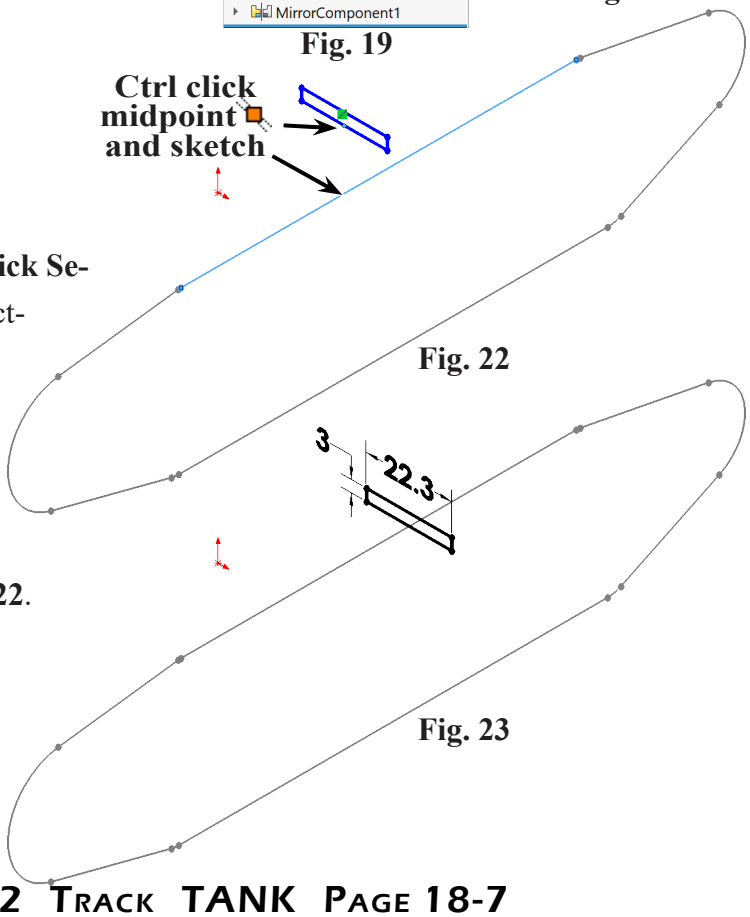


Fig. 22

Step 4. **Right click graphics area and click Select** from menu to unselect Rectangle tool.

Step 5. **Click midpoint of bottom line of rectangle** and **top line of Sketch2** to select both. Release Ctrl key and click **Make Pierce** on the context toolbar, **Fig. 22**.

Step 6. Click **Smart Dimension** (**S**) on the Sketch toolbar.

Fig. 23

Step 7. Add dimensions, **Fig. 23**.

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

Step 9. Click **Swept Boss/Base** Swept Boss/Base on the Features toolbar.

Step 10. In the Swept Boss/Base Property Manager:
under Profile and Path, **Fig. 24**
Profile click Sketch3 **rectangle**, **Fig. 25**
Path click any geometry in **Sketch2**
click OK .

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

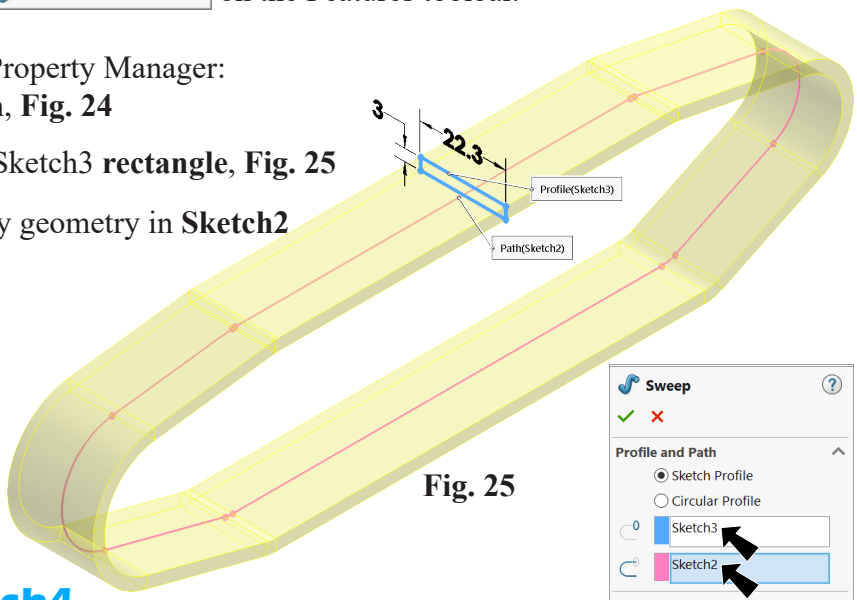


Fig. 25

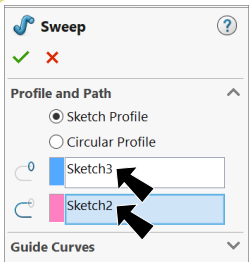


Fig. 24

G. Cut-Extrude1 Sketch4.

Step 1. Click **Plane1** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 26**.

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

Step 3. **Show Planes**. To show, click **Hide All Types flyout** in the Heads-Up View toolbar and click **View Planes**, **Fig. 27**. Or click View Menu > Show/Hide > Planes, to show Plane **(Alt-V then H P press ENTER)**.

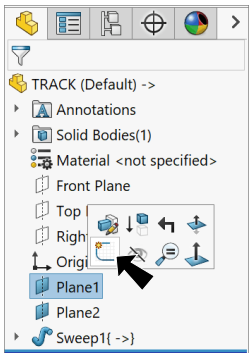


Fig. 26

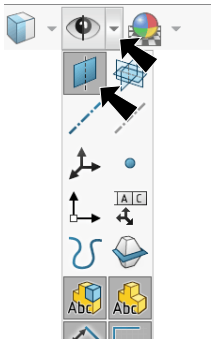


Fig. 27

Step 4. **Zoom in on top of Sweep at Plane2**, **Fig. 28**.

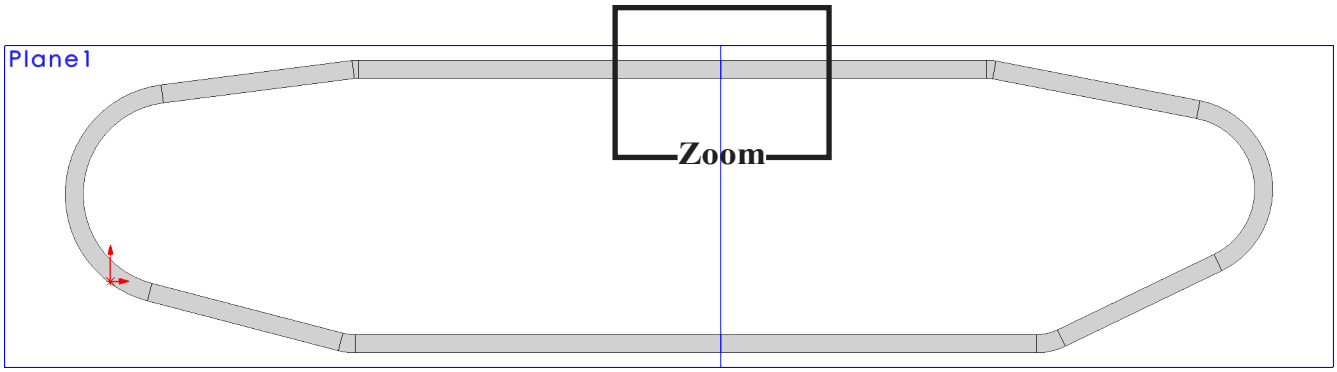


Fig. 28

Step 5. Click **Corner Rectangle** in the **Rectangle flyout** on the Sketch toolbar.

Step 6. Sketch **corner rectangle with top line of rectangle coincident with top edge of Sweep, Fig. 29**.

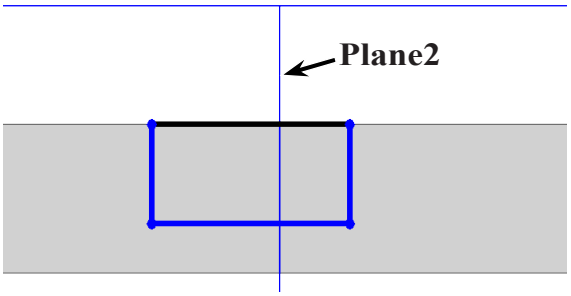


Fig. 29

Step 7. **Right click graphics area and click Select** from menu to unselect Rectangle tool.

Step 8. **Ctrl click midpoint of horizontal line** and **Plane2** in graphics area to select both. Release Ctrl key and click **Make Coincident** on the context toolbar, **Fig. 30**.

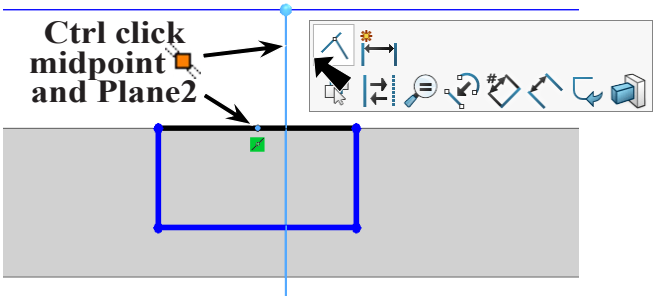


Fig. 30

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

Step 10. Add dimensions, **Fig. 31**.

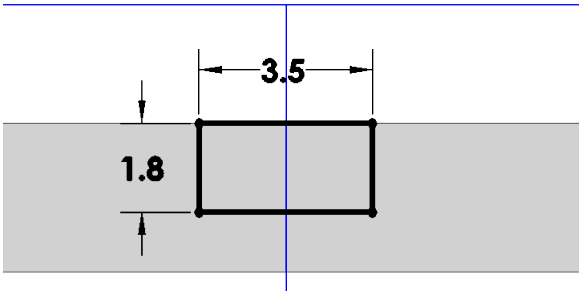


Fig. 31

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

Step 12. Click **Extruded Cut** on the Features toolbar.

Step 13. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 32**
End Condition **Through All - Both**
click OK .

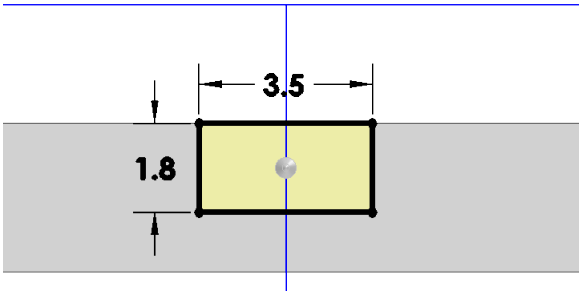


Fig. 33

Step 14. Save **(Ctrl-S)**.

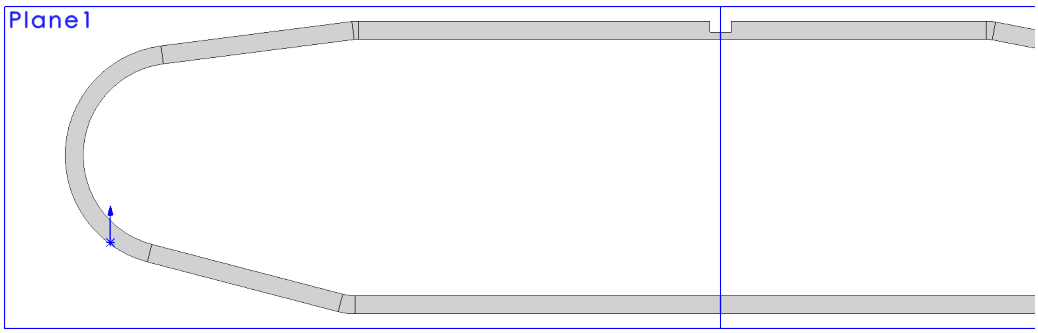


Fig. 34

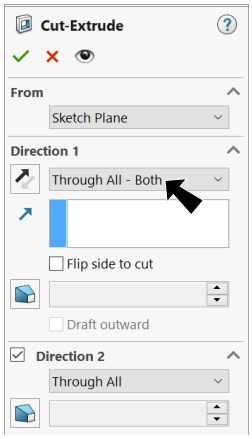


Fig. 32

H. Curve Driven Pattern1

Step 1. **Ctrl click Sketch2** and **Cut-Extrude1** in the Feature Manager to select both. To select both, expand **Sweep1**, **Ctrl click Sketch2** and click **Cut-Extrude1**, **Fig. 35**.

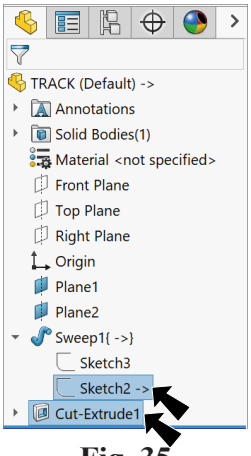
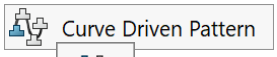


Fig. 35

Step 2. Click **Curve Driven Pattern** 

in the **Linear Pattern fly-out**

on the Features toolbar.

Step 3. In the Curve Pattern Property Manager set:

under Direction 1, **Fig. 36**

Sketch2 was preselected

Number of Instances # **45**

check **Equal spacing**

Curve method:

Offset to curve

Alignment method:

Tangent to curve

under Features and Faces

click **Cut-Extrude1** was preselected

click OK .

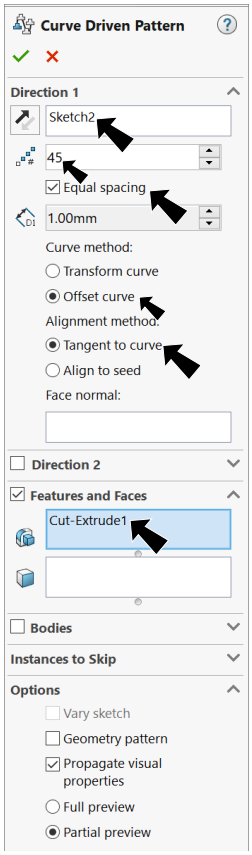


Fig. 36

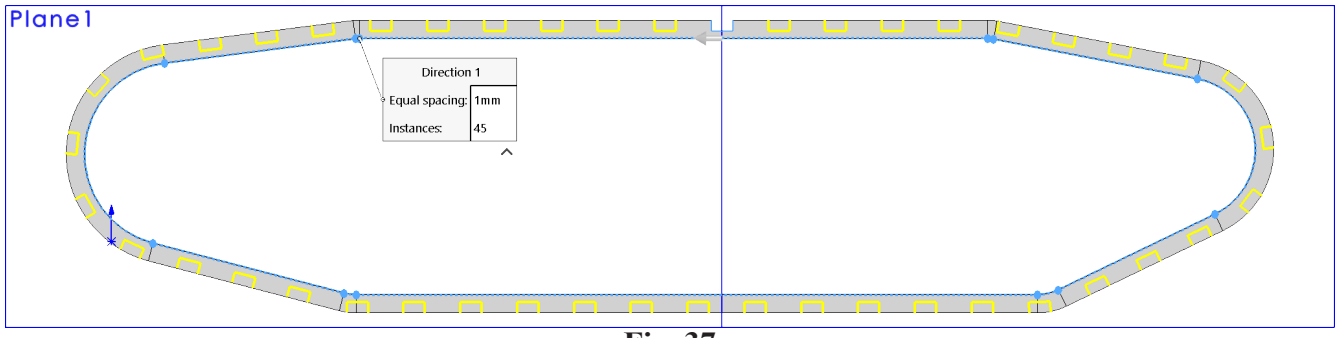


Fig. 37

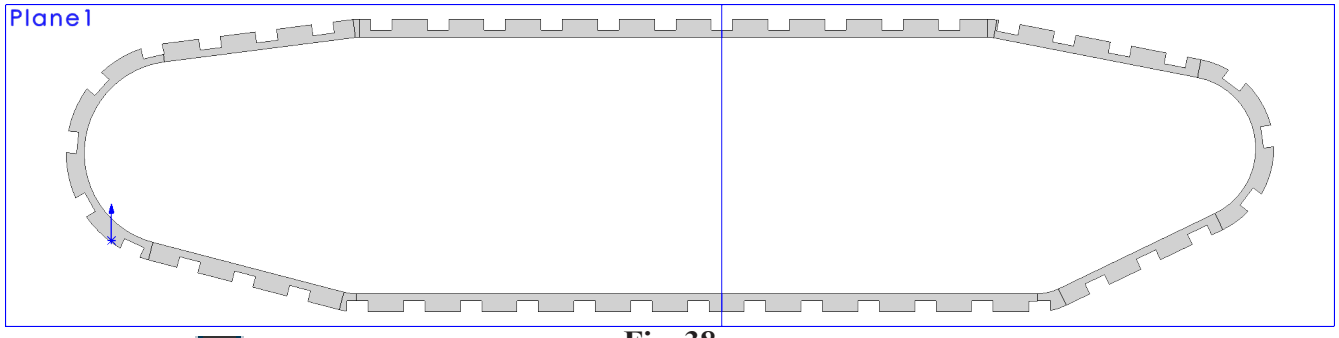


Fig. 38

Step 4. Save (**Ctrl-S**).

I. Cut-Extrude2 Sketch5.

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

Step 2. Click **top face of Sweep** and click **Sketch** on the context toolbar, **Fig. 39**.

Step 3. Click **Normal To** on the Standard Views toolbar. (**Ctrl-8**)

Step 4. Zoom-in at **Plane2**, **Fig. 40**.

Step 5. Click **Corner Rectangle** in the **Rectangle flyout** on the Sketch toolbar.

Step 6. In the cut below **Plane2** sketch rectangle **coincident** with the cut edges, **Fig. 41**. Sketch a second rectangle **coincident** with the cut edges and **coincident** with **Plane1**.

Step 7. **Right click graphics area and click Select** from menu to un-select Rectangle tool.

Step 8. Click **line coincident with Plane1** and click **Construction Geometry** on the context toolbar, **Fig. 42**.

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

Step 10. Add dimensions, **Fig. 43**.

Step 11. **Right click graphics area and click Select** from menu to unselect Smart Dimension.

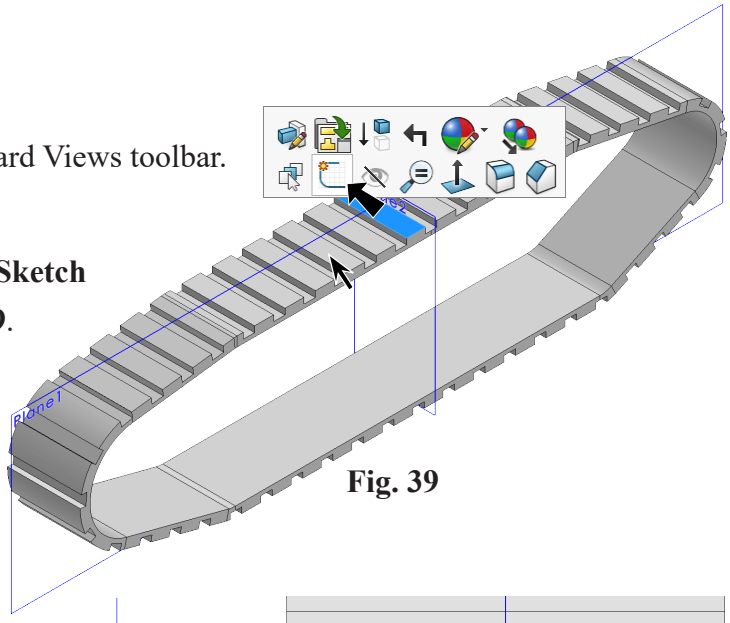


Fig. 39

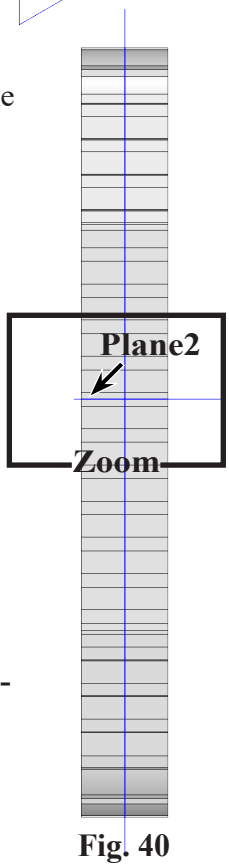


Fig. 40

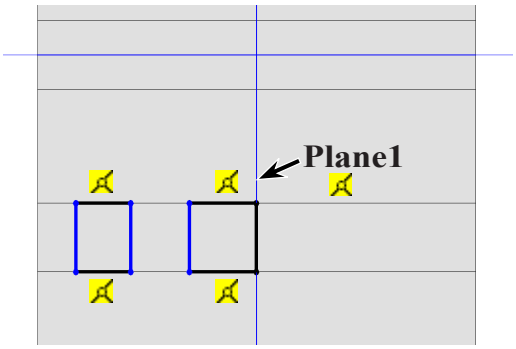


Fig. 41

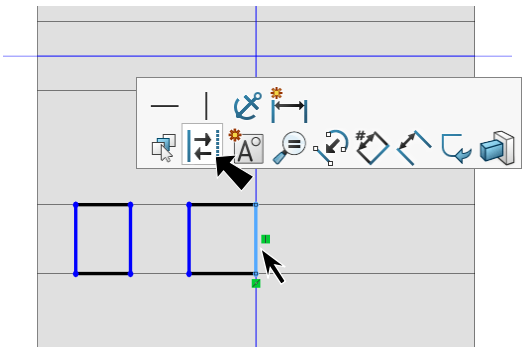


Fig. 42

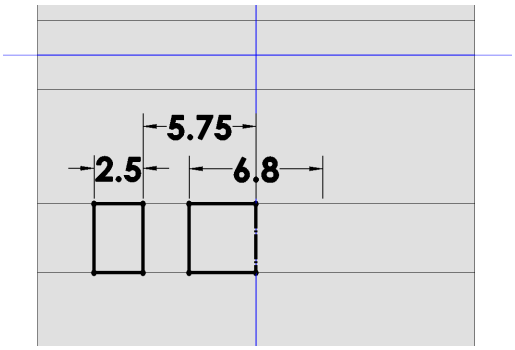


Fig. 43

Step 12. Drag a selection to select both rectangles **Fig. 44**.

Step 13. Click **Mirror Entities**

on the Sketch toolbar, **Fig. 45**.

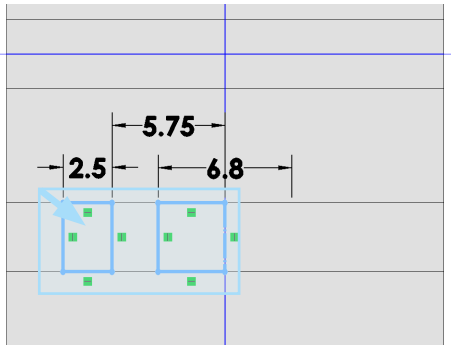


Fig. 44

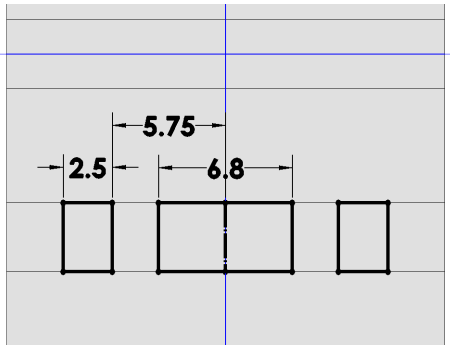
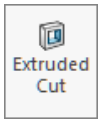


Fig. 45

Step 14. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

Step 15. Click **Features**

on the Command Manager toolbar.

Step 16. Click **Extruded Cut** 

on the Features toolbar.

Step 17. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 45**
End Condition **Up To Next**
click OK .

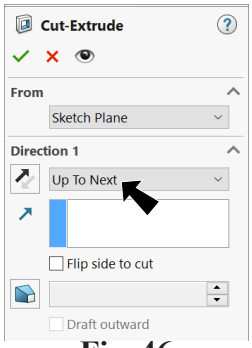


Fig. 46

Step 18. Save (**Ctrl-S**).

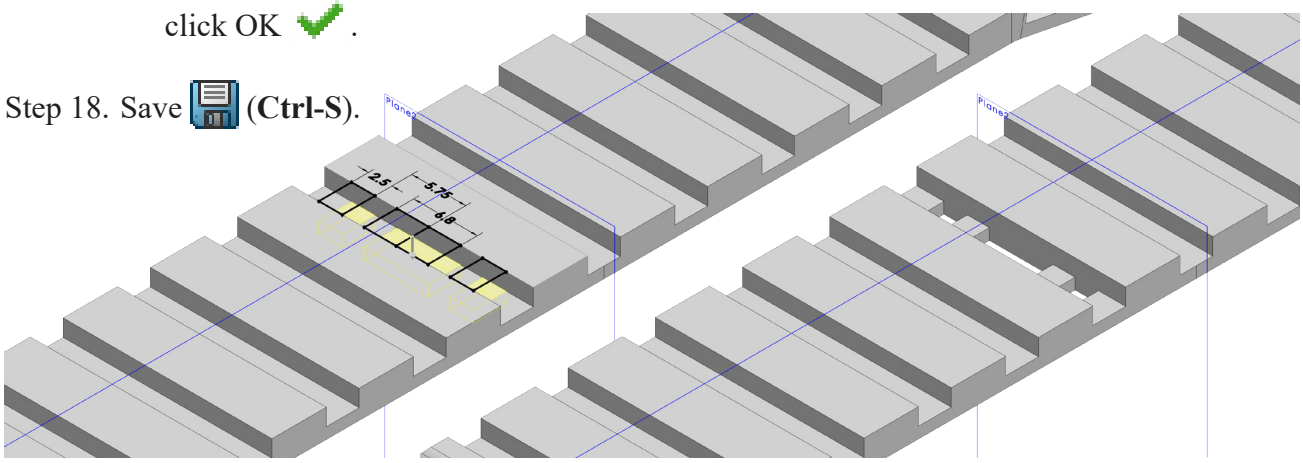


Fig. 47

Fig. 48

J. Curve Driven Pattern2

Step 1. **Hide Planes** . To hide, click **Hide All Types flyout** in the Heads-Up View toolbar and click **View Planes** , **Fig. 49**.

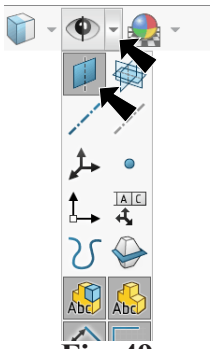


Fig. 49

Step 2. Click **Right** on the Standard Views toolbar. (**Ctrl-4**)

Step 3. **Ctrl click Sketch2** and **Cut-Extrude2** in the Feature Manager to select both , **Fig. 50**.

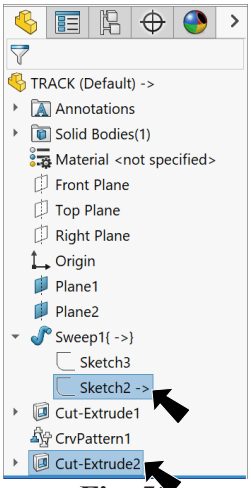


Fig. 50

Step 4. Click **Curve Driven Pattern** Curve Driven Pattern in the **Linear Pattern flyout** Linear Pattern on the Features toolbar.

Step 5. In the Curve Pattern Property Manager set:

under Direction 1 , **Fig. 51**

Sketch2 was preselected

Number of Instances # **45**

check **Equal spacing**

Curve method:

Offset to curve

Alignment method:

Tangent to curve

under Features and Faces

click **Cut-Extrude2** was preselected,

click OK .

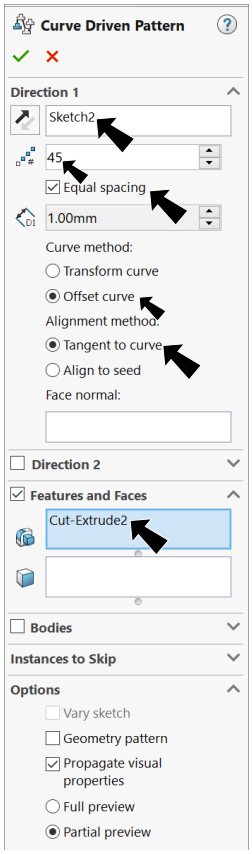


Fig. 51

Step 6. Save (**Ctrl-S**).

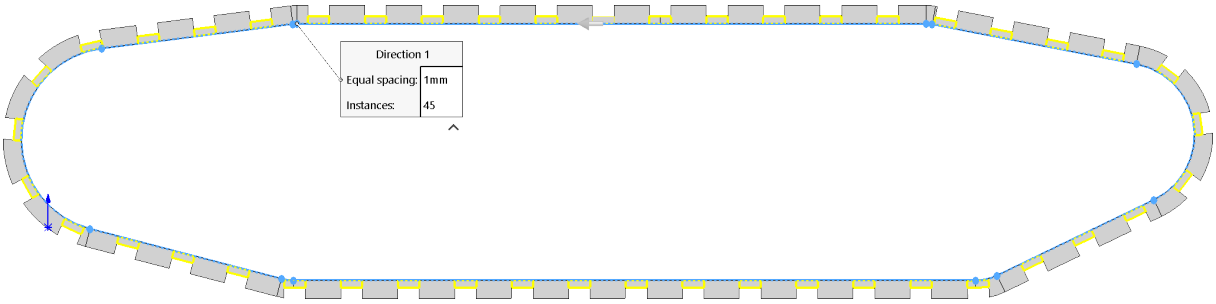


Fig. 52

K. Cut-Extrude3 Sketch6.

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

Step 2. Click **top face of Sweep** and click **Sketch** on the context toolbar, **Fig. 53**.

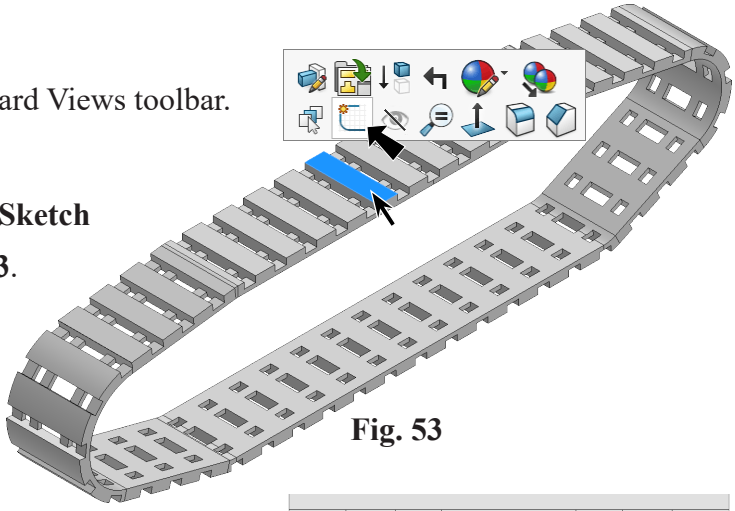


Fig. 53

Step 3. Click **Normal To** on the Standard Views toolbar. (**Ctrl-8**)

Step 4. Zoom-in at **Plane2**, **Fig. 54**. Click Plane2 in Feature Manager to display plane.

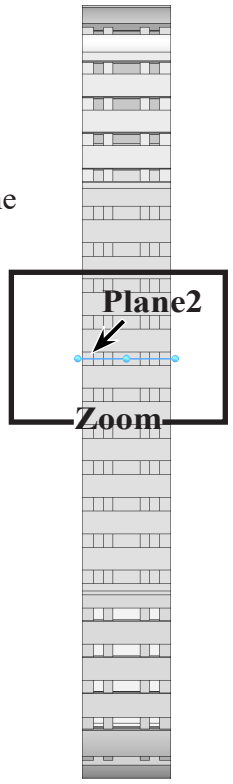


Fig. 54

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

Step 5. In between cuts below **Plane2** sketch rectangle **coincident with the side edges**, **Fig. 55**.

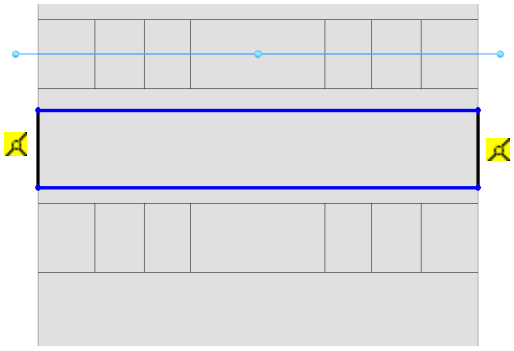


Fig. 55

Step 6. Click **Smart Dimension** (**S**) on the Sketch toolbar.

Step 7. Add **1.5** dimensions, **Fig. 56**.

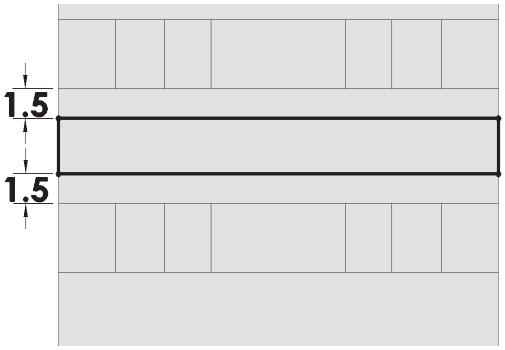


Fig. 56

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

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

Step 10. Click **Extruded Cut** on the Features toolbar.

Step 11. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 57**
End Condition **Blind**
Depth **.5**
click OK .

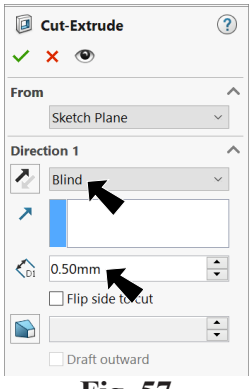


Fig. 57

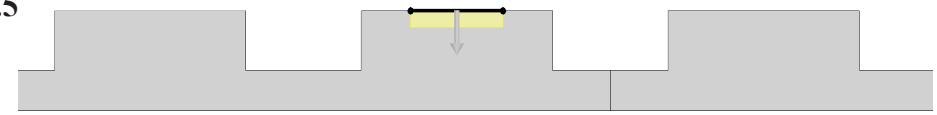
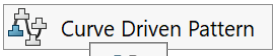


Fig. 58

L. Curve Driven Pattern3

Step 1. **Ctrl click Sketch2** and **Cut-Extrude3** in the Feature Manager to select both, **Fig. 59**.

Step 2. Click **Curve Driven Pattern**  in the **Linear Pattern flyout** on the Features toolbar.

Step 3. In the Curve Pattern Property Manager set:
under Direction 1, **Fig. 60**
Sketch2 was preselected
Number of Instances # **45**
under Features and Faces
click **Cut-Extrude3** was preselected,
click OK .

Step 4. Save (**Ctrl-S**).

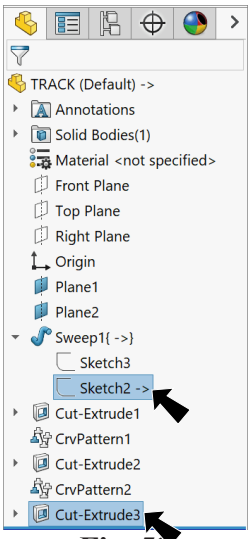


Fig. 59

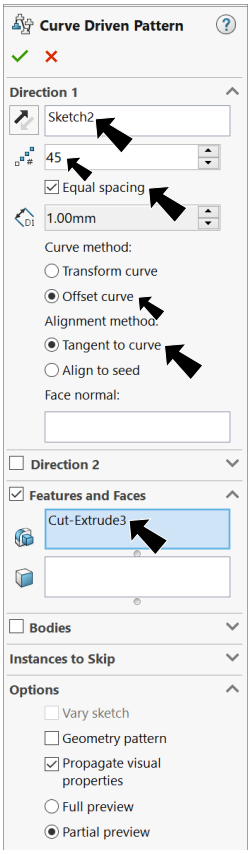


Fig. 60

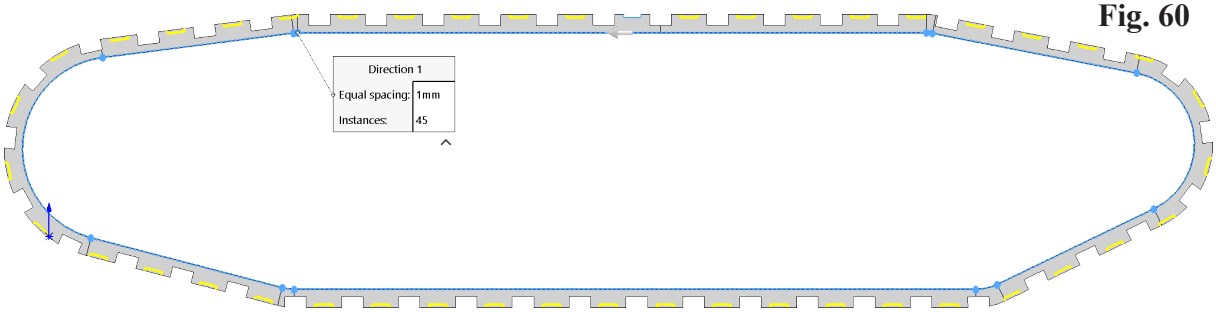


Fig. 61

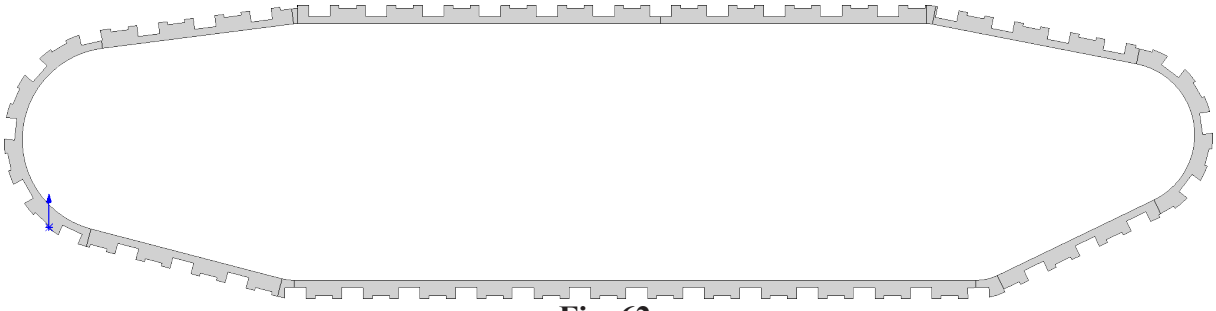


Fig. 62

M. Appearance.

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

Step 2. Click part, click **Appearance Callout** on the context toolbar and click **TRACK**, **Fig. 63**.

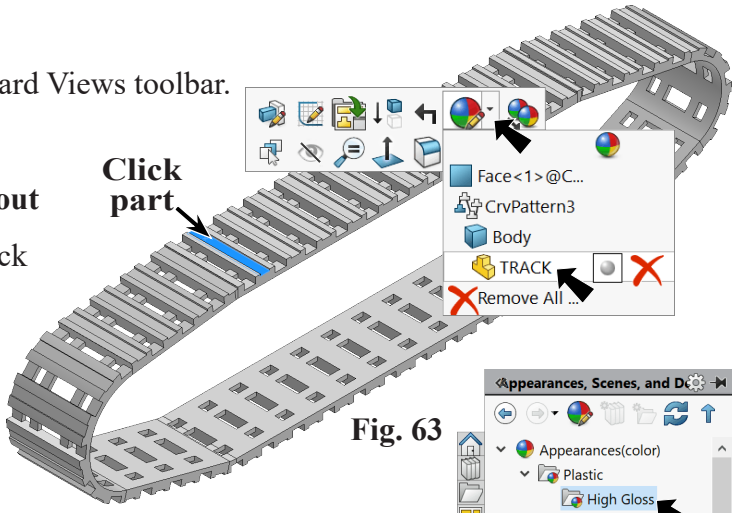


Fig. 63

Step 3. In the Appearances Task pane, expand **Plastic**, click **High Gloss** and in the lower pane select **light gray high gloss plastic**, **Fig. 64**.

Step 4. Click OK in Appearances Property Manager.

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

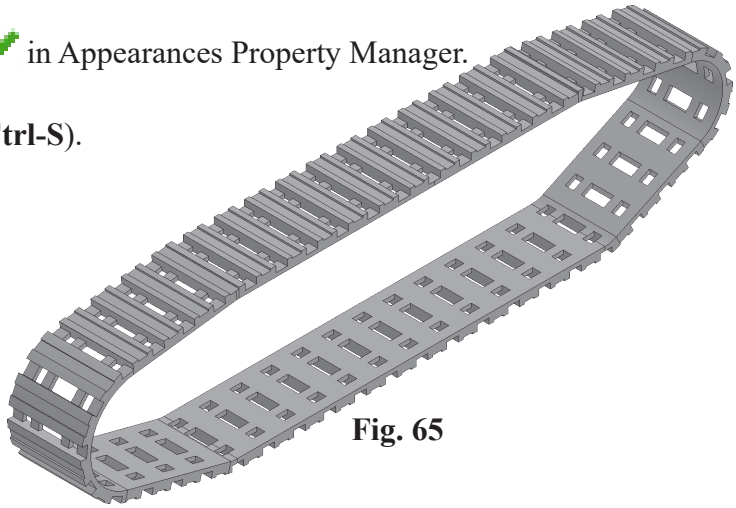


Fig. 65

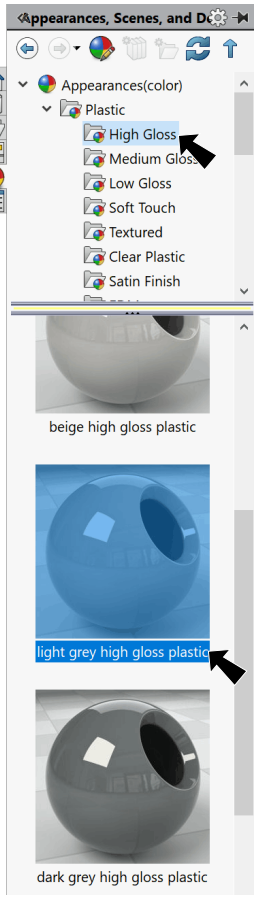


Fig. 64

N. Mirror Track.

Step 1. Open your **TANK ASSEMBLY** file.

Step 2. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

Step 3. Click **MirrorComponent1** in the Feature Manager and click **Edit Feature** on the context toolbar, **Fig. 66**.

Step 4. In the Mirror Property Manager:
Step 1: Selections, **Fig. 67**
click **Track** in graphics area, **Fig. 68**
click **Next** **to see preview**.

Step 5. Still in Mirror Property Manager:
Step 2: Set Orientation, **Fig. 69**
click OK .

Step 6. Save (**Ctrl-S**).

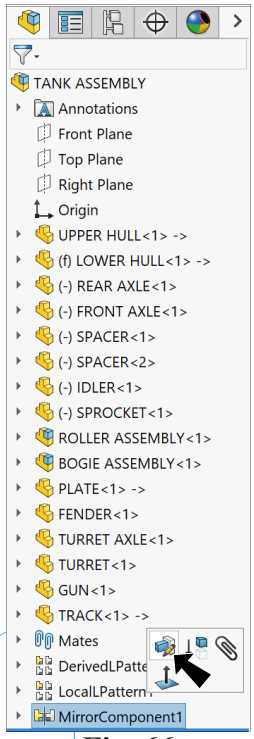


Fig. 66

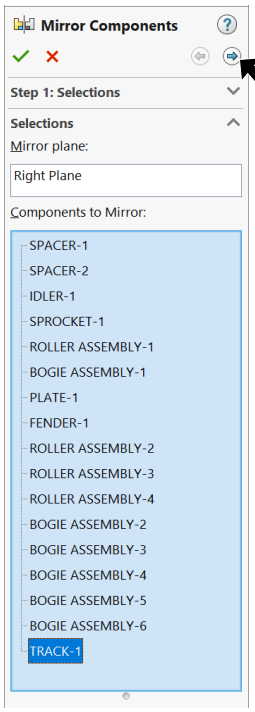


Fig. 67

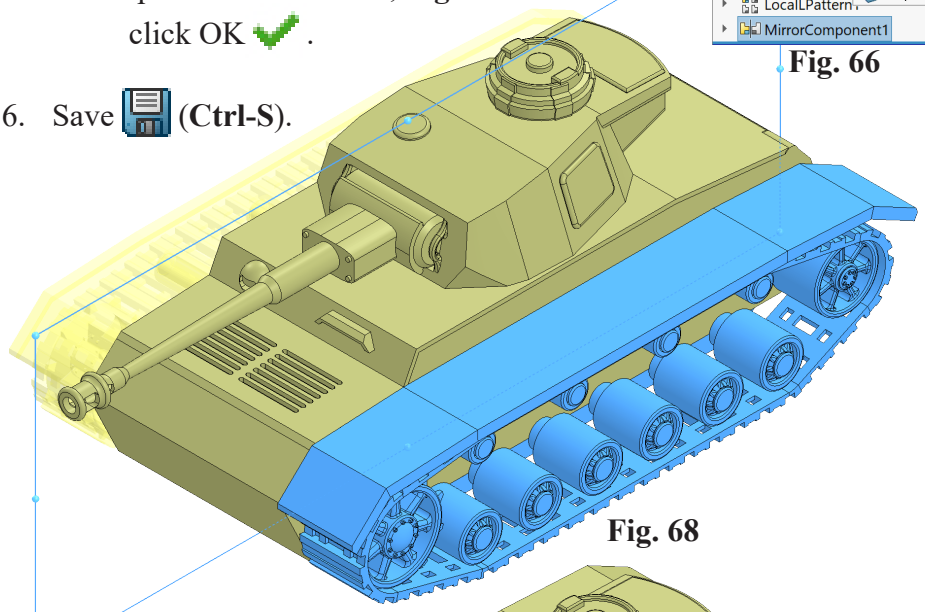


Fig. 68

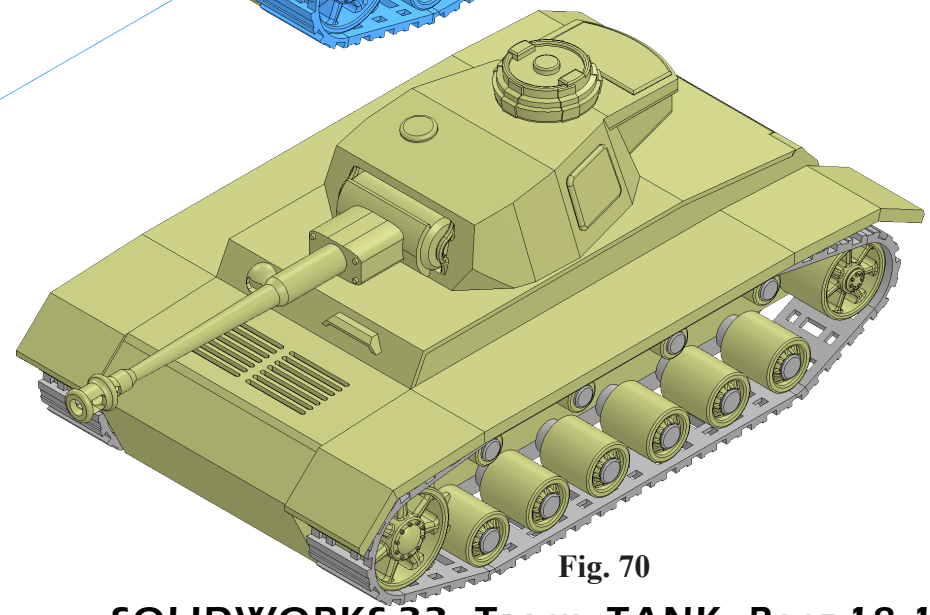


Fig. 70

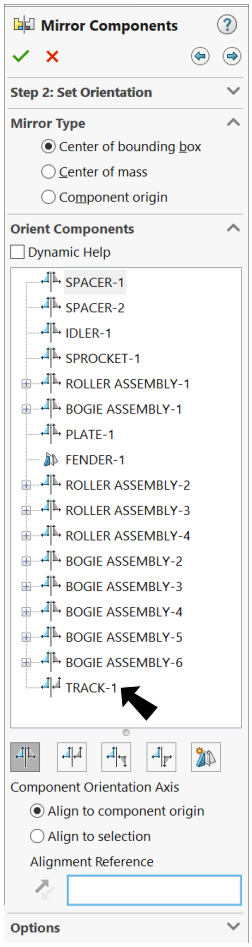


Fig. 69