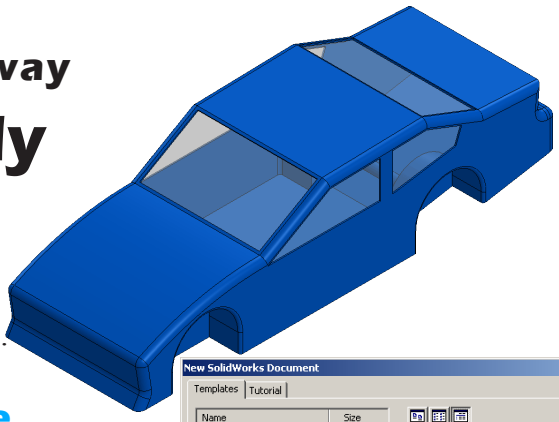
Chapter 1

Speedway Body



A. New Part.

Step 1. Click File Menu > New.

Step 2. Click **Part** from the list and click OK, **Fig. 1**.

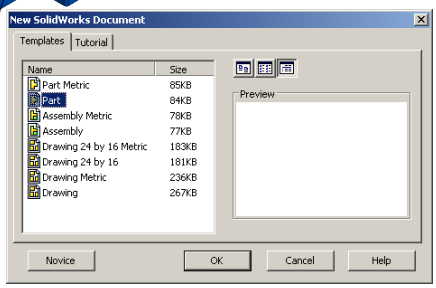


Fig. 1

B. Sketch Construction Rectangle.

Step 1. Click **Right Plane** in the Feature Manager and click **Sketch** from the Content toolbar, **Fig. 2**.

Step 2. Click **Rectangle** (**S**) on the Sketch toolbar.

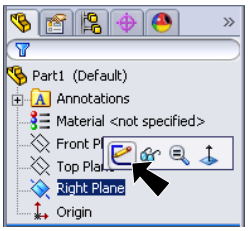


Fig. 2

Step 3. Draw a rectangle starting at the Origin and before you move the cursor away from the rectangle, **right click a line** and click **Construction Geometry** on the Content menu, **Fig. 3**.

Step 4. Click **Smart Dimension** (**S**) on the Sketch toolbar.

Step 5. Add dimensions as shown in **Fig. 4**. To Smart dimension, click the line then move the cursor out away from the line and click. Key-in the dimension and press ENTER. Arrange the dimensions as shown in **Fig. 4**.

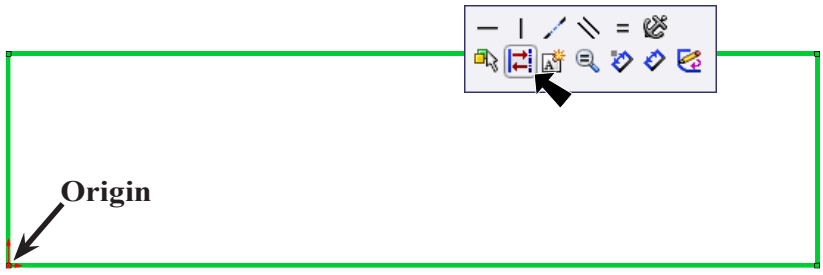


Fig. 3

Step 6. Click Zoom to Fit (**F**) on the View toolbar.

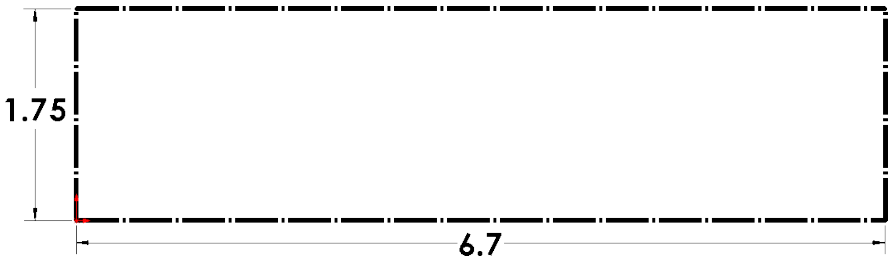


Fig. 4

C. Save as "BODY".

Step 1. Click File Menu > Save As.

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

D. Lines Part 1.

Step 1. Click **Line** (**L**) on the Sketch toolbar.

Step 2. Draw the **5 lines** in **Fig. 5**.

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

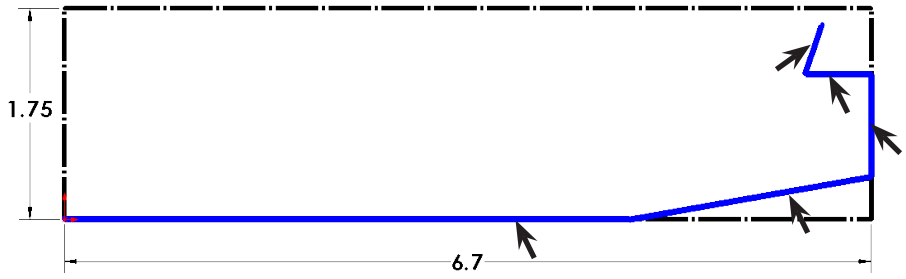


Fig. 5

Step 4. Add dimensions as shown in **Fig. 6**. To Smart dimension an angle, click both lines, then move the cursor inside the angle and click. Key-in angle for the dimension and press ENTER. Add the other dimensions.

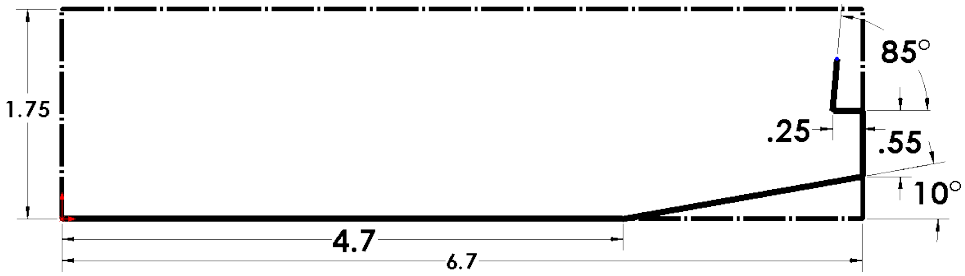


Fig. 6

E. Lines Part 2.

Step 1. Click **Line** (**L**) on the Sketch toolbar.

Step 2. Draw the **3 lines** in **Fig. 7**.

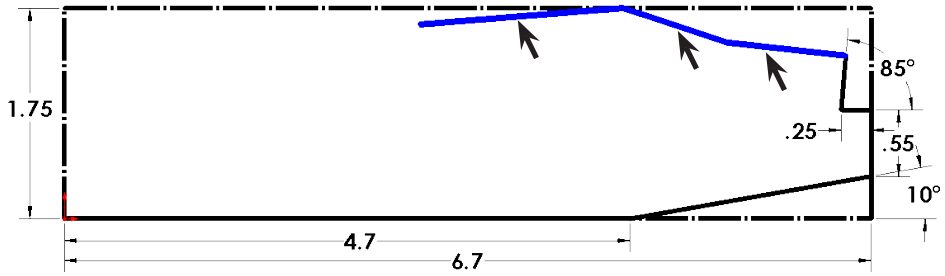


Fig. 7

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

Step 4. Add dimensions as shown in **Fig. 8**.

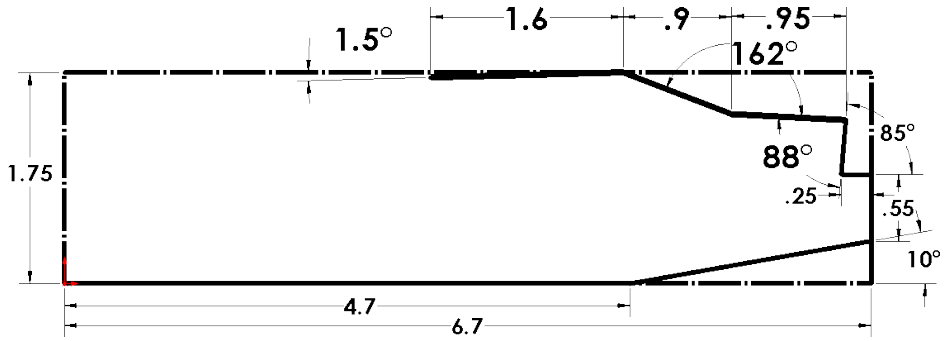


Fig. 8

F. Lines Part 3.

Step 1. Click **Line** (**L**) on the Sketch toolbar.

Step 2. Draw the **4 lines** in **Fig. 9**.

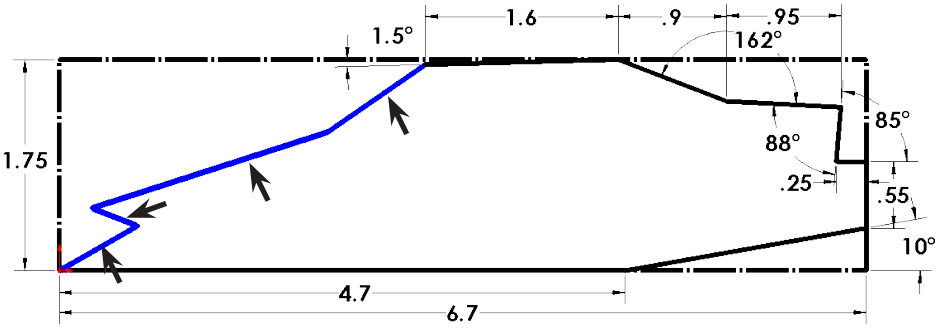


Fig. 9

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

Step 4. Add dimensions, **Fig. 10**.

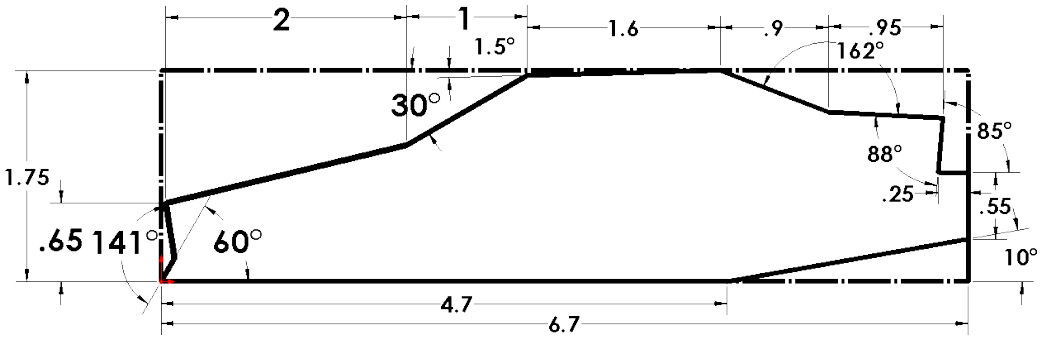


Fig. 10

G. 3 Point Arc.

Step 1. Click **3 Point Arc** (**S**) in the **Arc flyout** on the Sketch toolbar.

Step 2. Draw an arc across hood. To draw arc, click Point 1 for start point and Point 2 for ending point, then Point 3 for third point, **Fig. 11**.

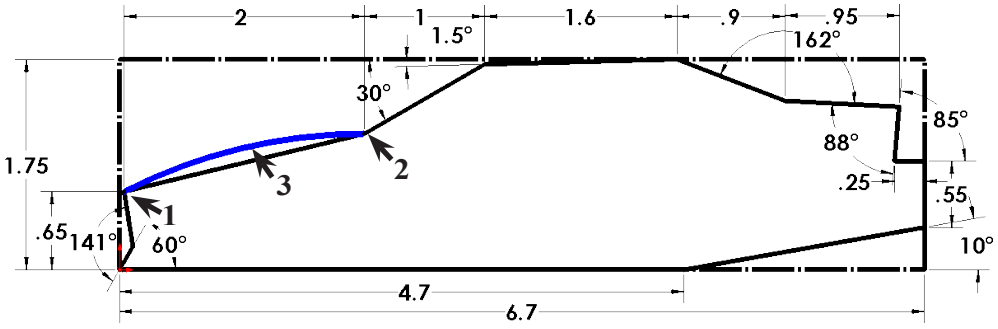


Fig. 11

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

Step 4. Dimension arc radius **4.4**, **Fig. 12**.

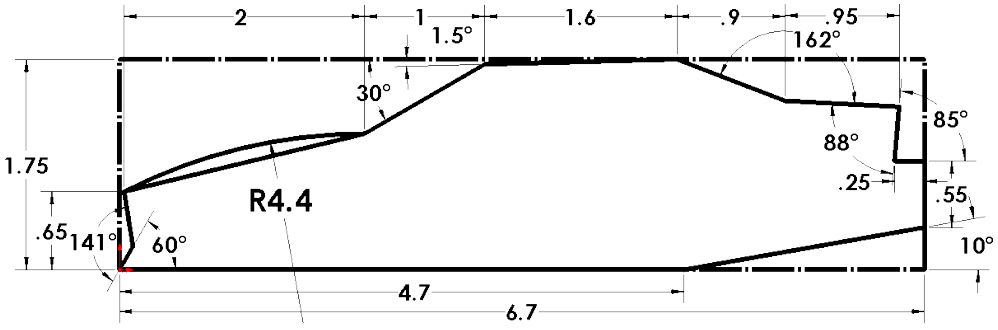


Fig. 12

Step 5. **Right click drawing and click Select** from menu to unselect Smart Dimension.

Step 6. Click **line under arc** and click **Construction Geometry** on the Content menu, **Fig. 13** and **Fig. 14**.

Step 7. Save. Use **Ctrl-S**.

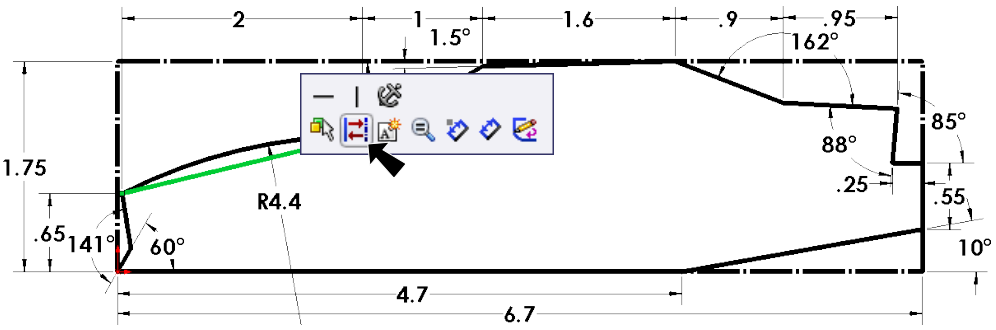


Fig. 13

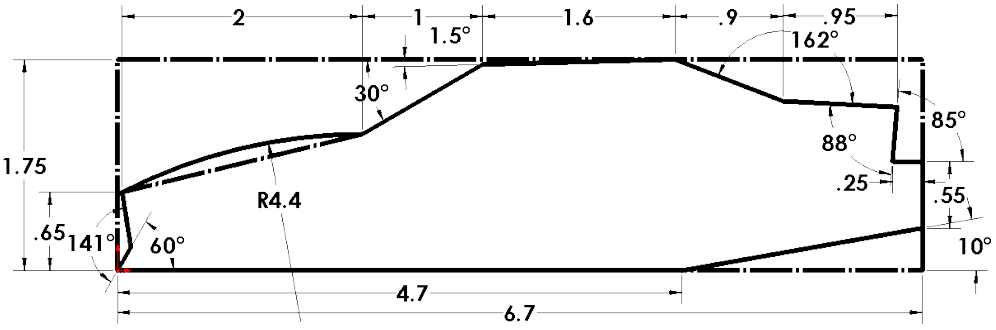


Fig. 14

H. Extrude.

Step 1. Click **Features** Features on the Command Manager toolbar.

Step 2. Click **Extruded Boss/Base** Extruded Boss/Base on the Features toolbar.

Step 3. In the Property Manager set:
under Direction 1, **Fig. 15**
End Condition **Mid Plane**
Depth D1 **2.2**
click OK, **Fig. 16**.

Step 4. Save. Use **Ctrl-S**.

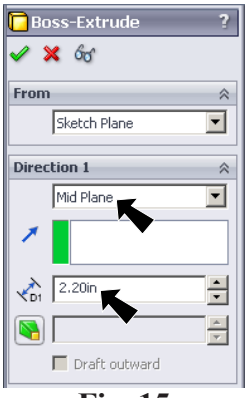


Fig. 15

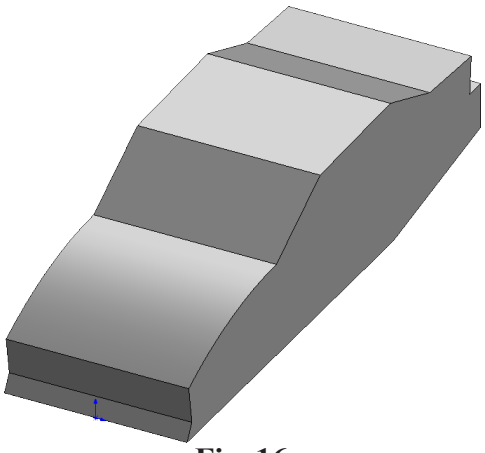


Fig. 16

I. Wheel Wells.

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

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

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

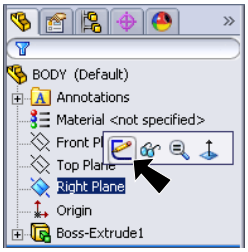


Fig. 17

Step 4. Click below the hood of car to place centerpoint of arc. Click to place the first end point to the right of centerpoint, then move cursor counterclockwise 180 degrees. Click to place the second end point, **Fig. 18**. Make sure Angle Snap is turned on in Options. To turn on, go to Tools Menu > Options. Click System tab and under Sketch Relation/Snaps, check Angle at the bottom of dialog box.

Step 5. Click **Line** (**L**) on the Sketch toolbar.

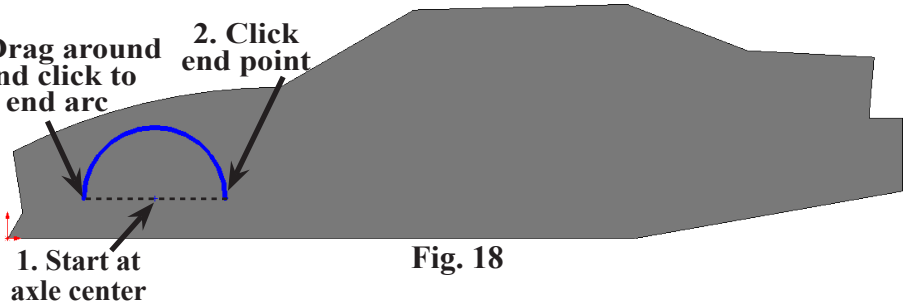


Fig. 18

Step 6. Draw the **3 lines** in **Fig. 19**. Start the line at the end of the arc. Use the inferencing line, the dotted line that appears when you draw the lines. Be sure to add the line across the bottom between the vertical lines, as sketch has to be closed.

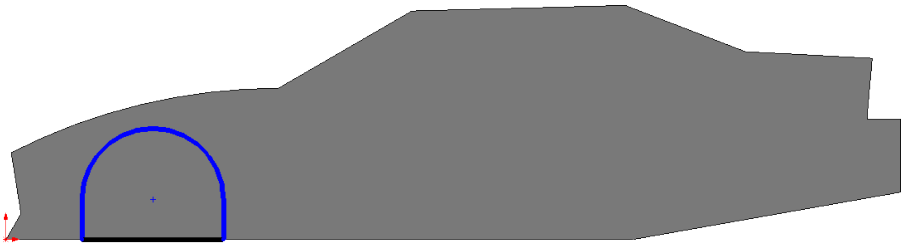


Fig. 19

Step 7. Click **Smart Dimension** (**S**) on the Sketch toolbar.

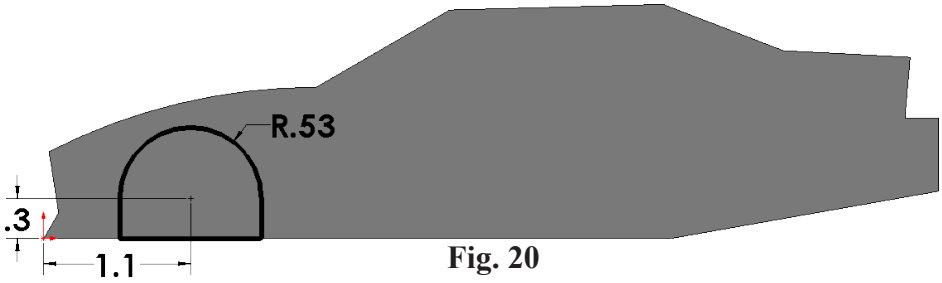


Fig. 20

Step 8. Add Dimensions: **arc radius .53**, **.3** and **1.1** from Origin to centerpoint of arc, **Fig. 20**.

J. Linear Pattern.

Step 1. **Right click drawing and click Select** from menu to unselect Smart Dimension.

Step 2. **Right click the arc** and click **Select Chain** from the menu, **Fig. 21**.

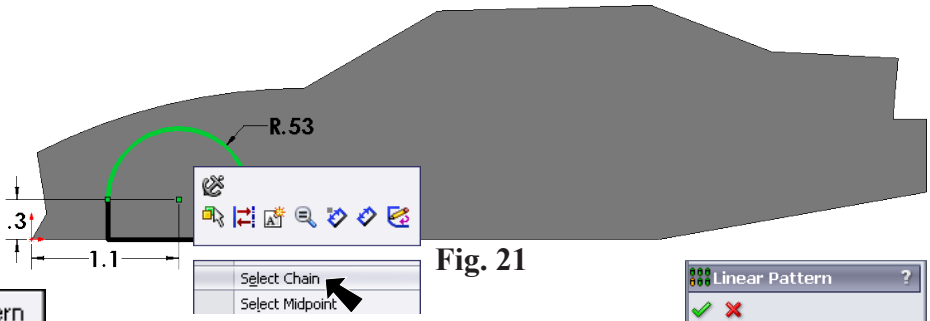


Fig. 21

Step 3. Click **Linear Sketch Pattern**

on the Sketch toolbar.

Step 4. In the Linear Sketch Property Manager set:

under **x-axis**, **Fig. 22**

Spacing **3.9**

check **Dimension X spacing**

Number of Instances **2**

Angle **0º**

press **ENTER**, **Fig. 23**

click OK, **Fig. 24**

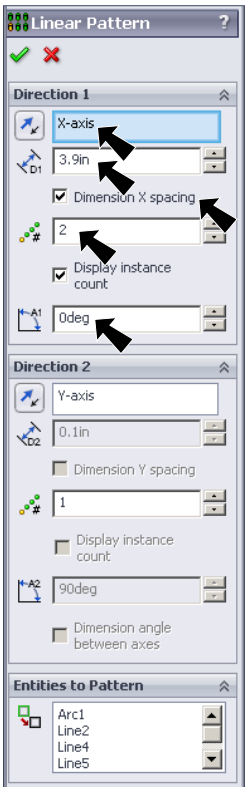


Fig. 22

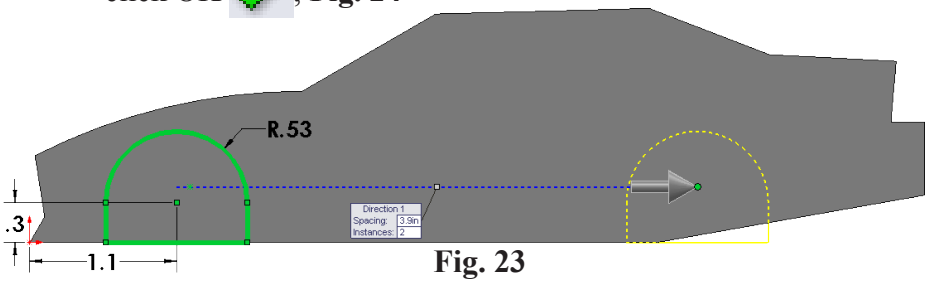


Fig. 23

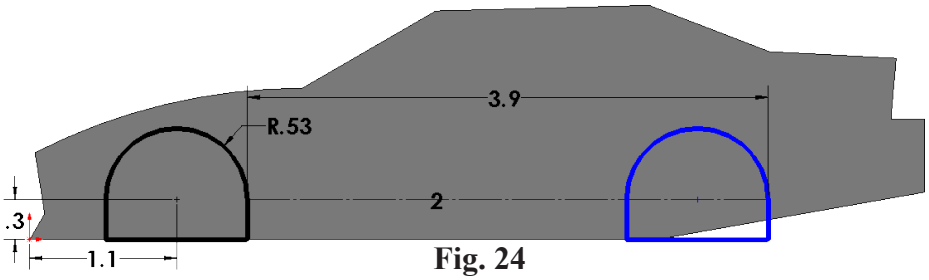
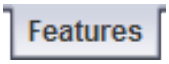
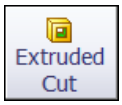


Fig. 24

Step 5. Click **Features** 

on the Command Manager toolbar.

Step 6. Click **Extruded Cut** 

on the Features toolbar.

Step 7. Click **Bottom**  on the Standard Views toolbar. (**Ctrl-6**)

Step 8. In the Property Manager set:
under From, **Fig. 25**
Start Condition **Offset**
Offset Value .6
under Direction 1
click **Reverse direction** 
Depth  **.5**
click OK  , **Fig. 26**.

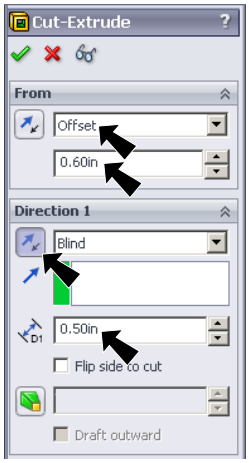


Fig. 25

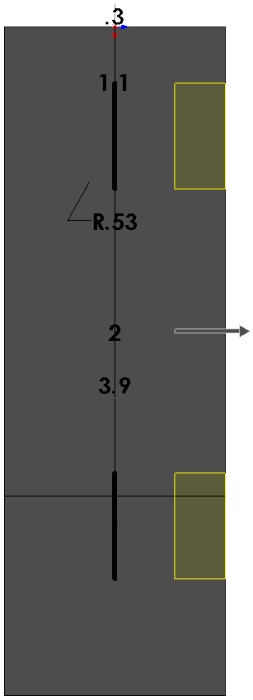


Fig. 26

K. Mirror Wheel Wells.

Step 1. **Ctrl click Right Plane**  and **Cut-Extrude1** (wheel wells) in Feature Manager to select both, **Fig. 27**. To Ctrl click, click Right Plane in Feature Manager. Hold down Ctrl key and click Cut-Extrude1.

Step 2. Click **Mirror** 

on the Features toolbar.

Step 3. In the Mirror Property Manager click OK  , **Fig. 28** and **Fig. 29**.

Step 4. Save. Use **Ctrl-S**.

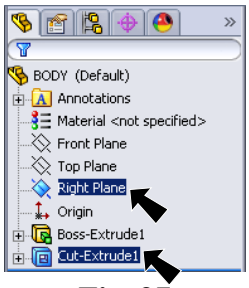


Fig. 27

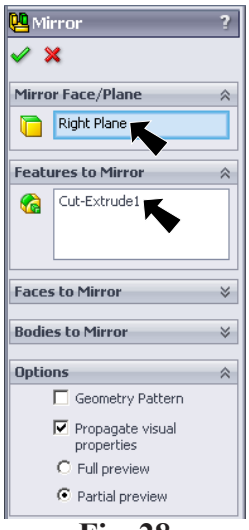


Fig. 28

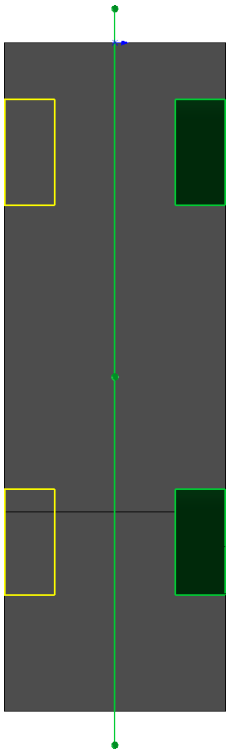


Fig. 29

L. Fillet Edges.

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

Step 2. Click **Fillet** on the Features toolbar.

Step 3. In the Fillet Property Manager set:

select **FilletXpert**, **Fig. 30**

Radius **.1**

Click **edges on front, top and rear of both sides of car**, **Fig. 31**.

Also, select **edges in front at grill**, **Fig. 32**.

Rotate view, hold down middle mouse button (wheel) and drag to rotate view.

And select the 2 edges in rear above bumper, **Fig. 33**.

Click **Apply**, **Fig. 30**.

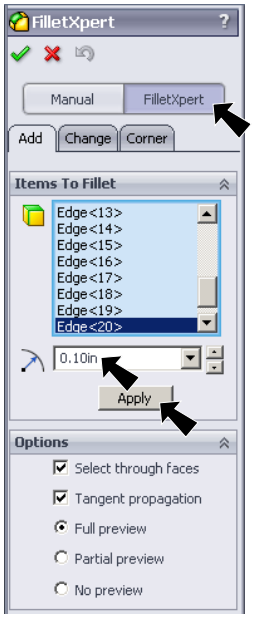


Fig. 30

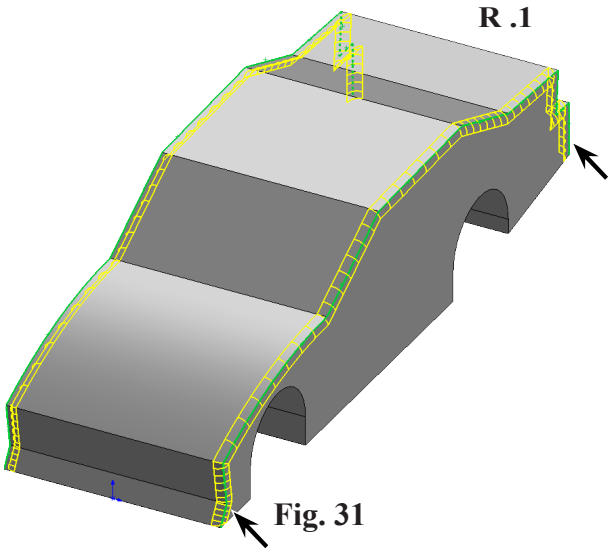


Fig. 31

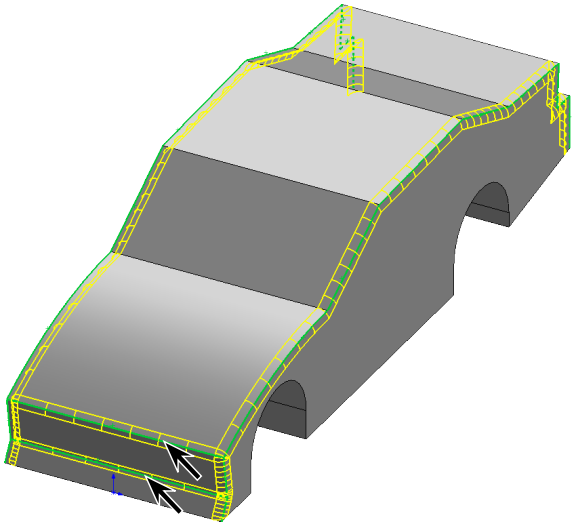


Fig. 32

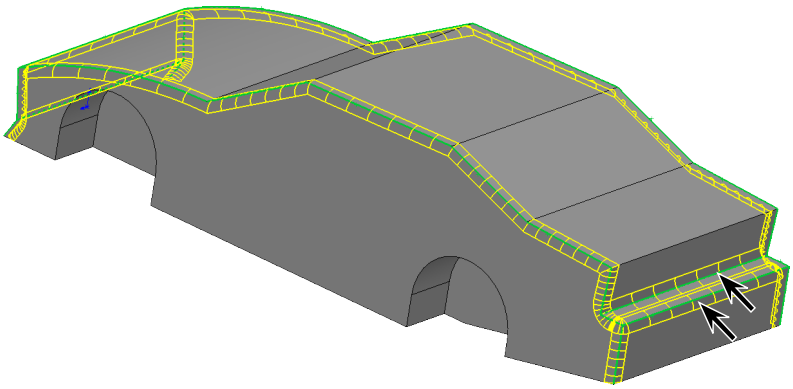


Fig. 33

Step 4. Set **Radius**  **.04**, **Fig. 34**

Click **edge around wheel wells**, **Fig. 35**.

Rotate view, hold down middle mouse button (wheel) and drag.

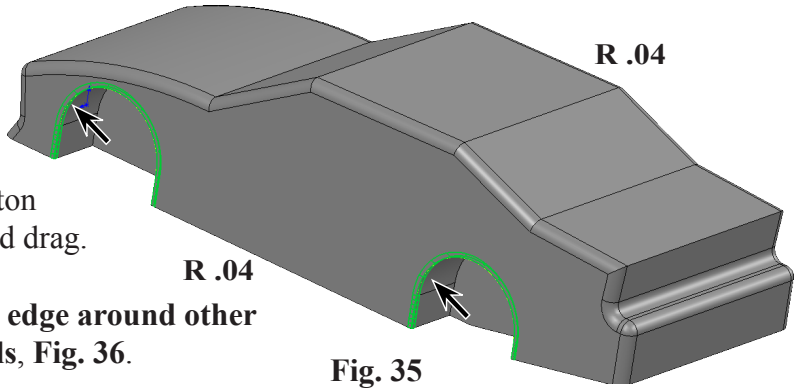


Fig. 35

And select **edge around other wheel wells**, **Fig. 36**.

Click OK  .

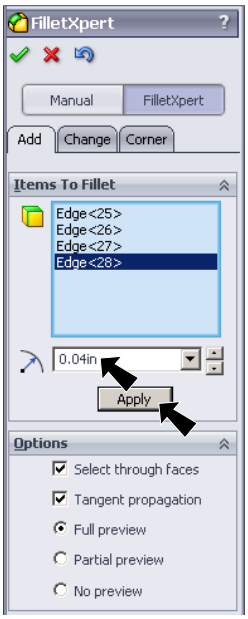


Fig. 34

Step 5. Save. Use **Ctrl-S**.

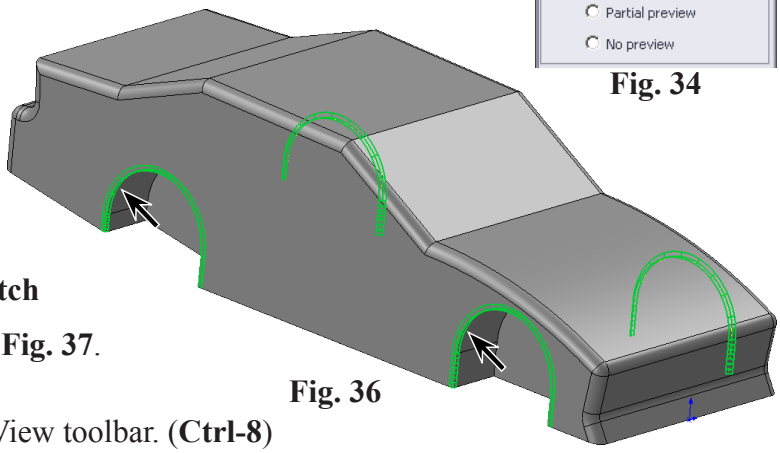


Fig. 36

M. Axle Holes.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**  from the Content toolbar, **Fig. 37**.

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

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

Step 4. Draw **two circles** for the axle holes at centerpoint of wheel well arc, **Fig. 38**. Move cursor across wheel well and centerpoint will highlight.

Step 5. **Right click drawing and click Select** from menu to unselect Circle Tool.

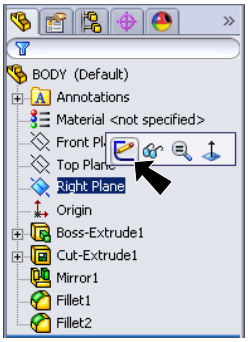


Fig. 37

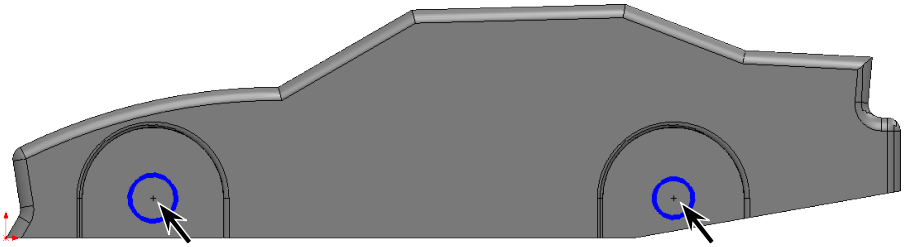


Fig. 38

Step 6. **Ctrl click both circles** to select both. Release Ctrl key and click **Make Equal**  on the Content menu, **Fig. 39**.

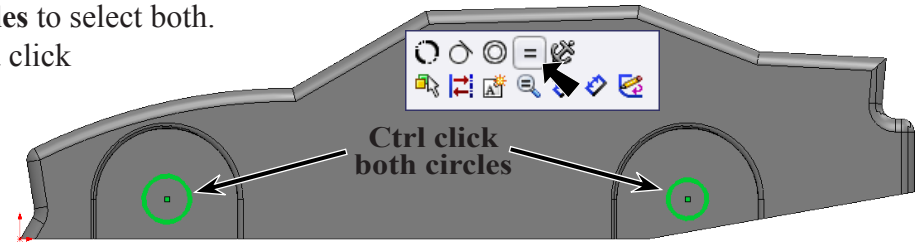


Fig. 39

Step 7. Click **Smart Dimension**  (**S**) on the Sketch toolbar.

Step 8. Dimension **a circle diameter .15**, **Fig. 40**.

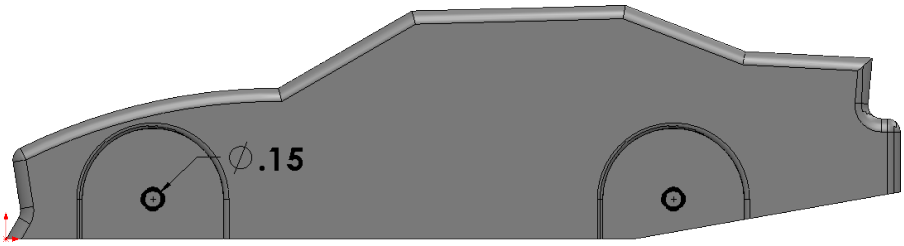
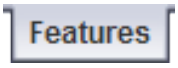
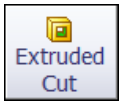


Fig. 40

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

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

Step 11. In the Property Manager set:
under Direction 1, **Fig. 41**
End Condition **Mid Plane**
Depth  **2.2**
click OK  , **Fig. 42**.

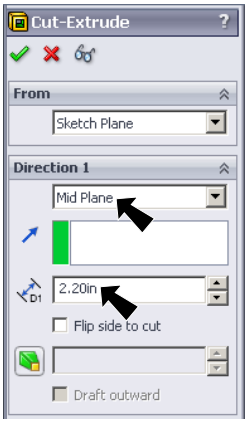


Fig. 41

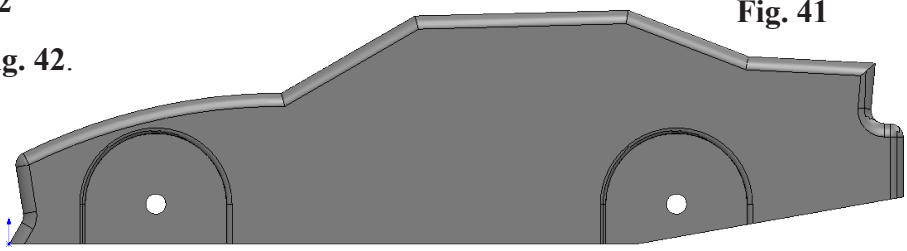


Fig. 42

Step 12. Save. Use **Ctrl-S**.

N. Side Windows.

Step 1. Click the **side face of Car** and click **Sketch**  on the Content menu, **Fig. 43**.

Step 2. Press **Escape** key to unselect the face.

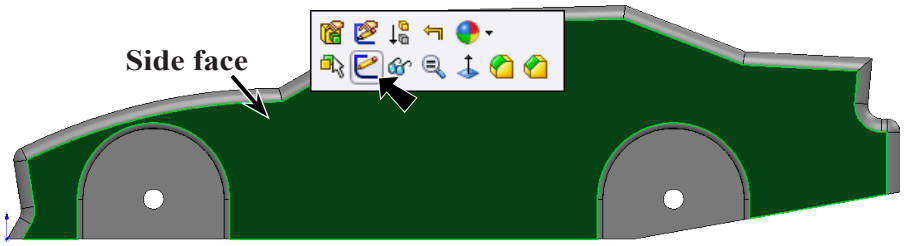


Fig. 43

Step 3. Click **Offset Entities** 

on the Sketch toolbar.

Step 4. In the Offset Entities Property Manager set:

Distance 

.02 Fig. 44
check **Reverse**

click the 3 inside edges fillets around side window, **Fig. 45**.

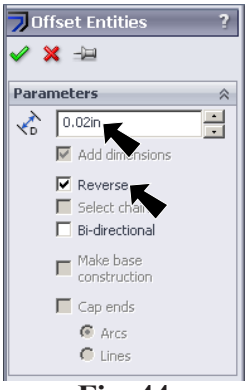


Fig. 44

The yellow offset should be below green edges, **Fig. 45**. If it is not, uncheck Reverse.

Click OK  .

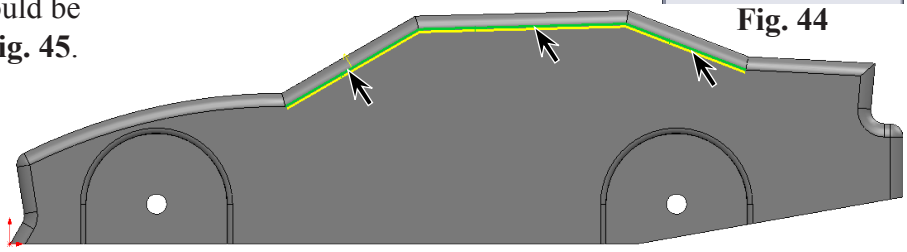


Fig. 45

Step 5. Click **Line** 
(**L**) on the Sketch toolbar.

Step 6. Draw **2 Lines**, **Fig. 46**.
Line 1) Start at endpoint of wind shield offset and keep horizontal.
Line 2) Draw at angle to rear endpoint of offset.

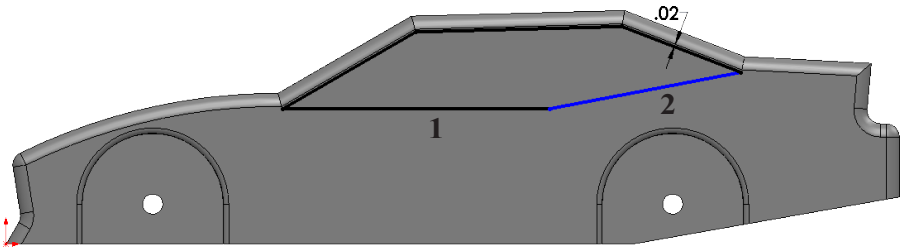


Fig. 46

Step 7. Draw **3 Lines** in **Fig. 47**.
Line 3) Draw from horizontal line and keep vertical.
Line 4) Draw from endpoint of horizontal line and keep vertical.
Line 5) Keep Perpendicular to back window offset

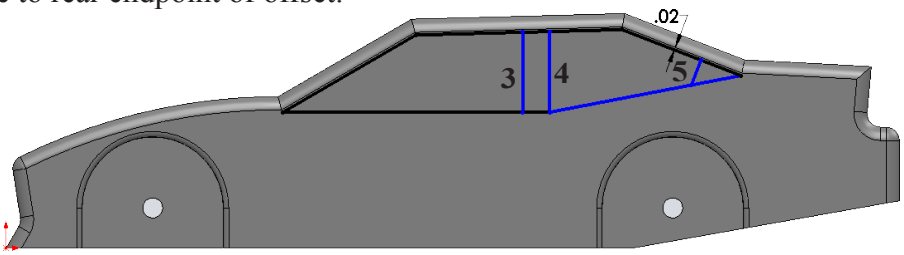


Fig. 47

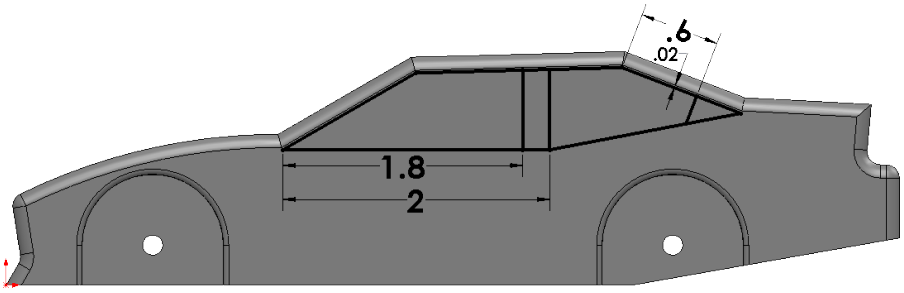
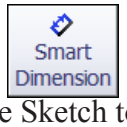


Fig. 48

Step 8. Click **Smart Dimension** 

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

Step 9. Dimension as shown in **Fig. 48**.

Step 10. Click **Trim Entities** 

on the Sketch toolbar.

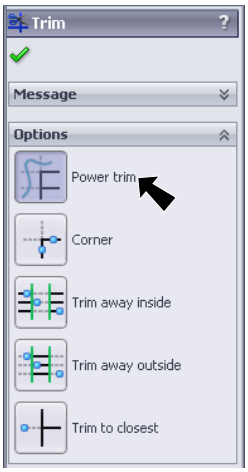


Fig. 49

Step 11. In the Trim Property Manger

select **Power Trim**  , **Fig. 49**.

Trim away lines between windows, **Fig. 50**. Drag across the lines to trim. Results shown in **Fig. 51**.

Trim away offset and line right of second window, **Fig. 52**. Drag across the lines to trim. Results shown in **Fig. 53**.

Click OK  when done.

Draw across lines to Trim

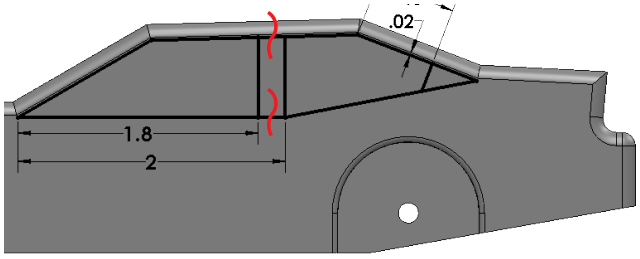


Fig. 50

After Trim

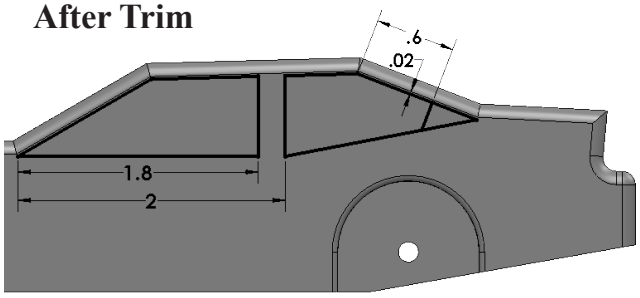


Fig. 51

Draw across lines to Trim

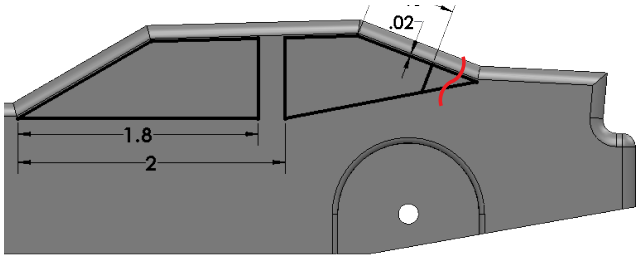


Fig. 52

After Trim

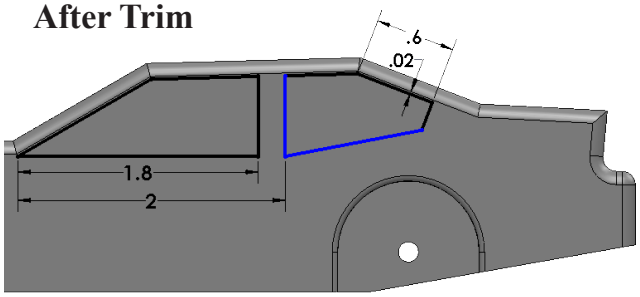


Fig. 53

Step 12. Click **Smart Dimension** 

(S) on the Sketch toolbar.

Step 13. Dimensions **angle 9º**, **Fig. 54**.

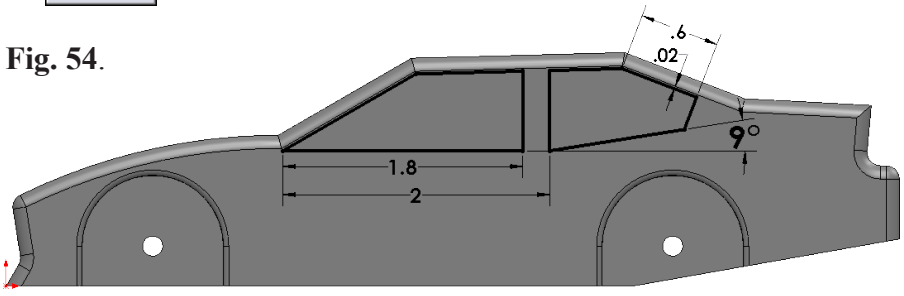
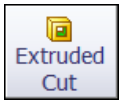


Fig. 54

Step 14. Click **Trimetric**  on the Standard Views toolbar.

Step 15. Click **Features**  on the Command Manager toolbar.

Step 16. Click **Extruded Cut**  on the Features toolbar.

Step 17. In the Property Manager set:
under Direction 1, **Fig. 55**
Depth  **.02**
click OK  , **Fig. 56**.

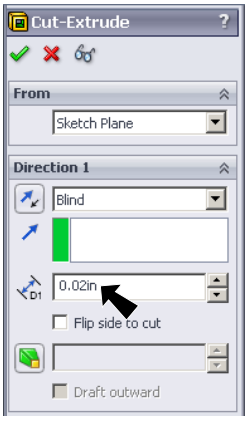


Fig. 55

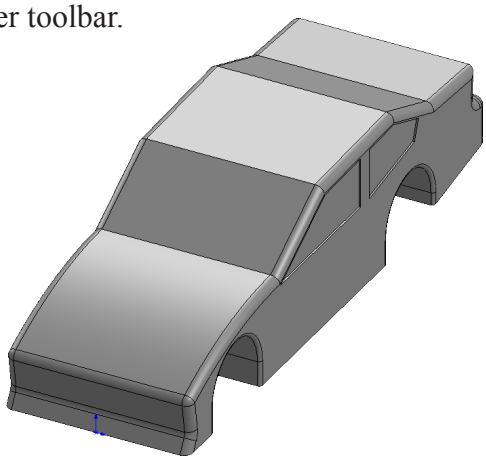


Fig. 56

Step 18. Save. Use **Ctrl-S**.

O. Mirror Side Window.

Step 1. **Ctrl click Right Plane**  and **Cut-Extrude3** (side windows) in Feature Manager to select both, **Fig. 57**. To Ctrl click, click Right Plane in Feature Manager. Hold down Ctrl key and click Cut-Extrude3.

Step 2. Click **Mirror**  on the Features toolbar.

Step 3. In the Mirror Property Manager click OK  , **Fig. 58**.

Step 4. Save. Use **Ctrl-S**.

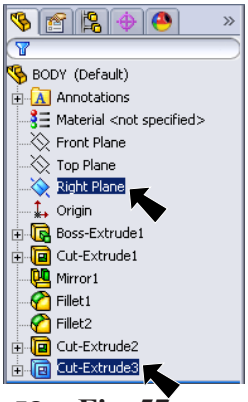


Fig. 57

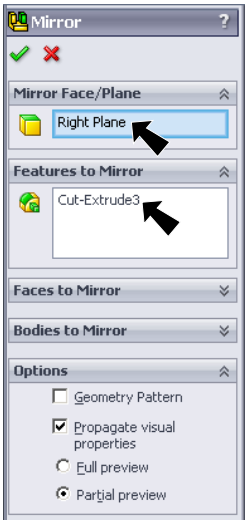


Fig. 58

P. Front Windshield.

Step 1. Rotate view to view **right side window** to confirm mirrored windows, **Fig. 59**. Hold the **middle mouse button** (wheel) and rotate view around to view mirrored side windows.

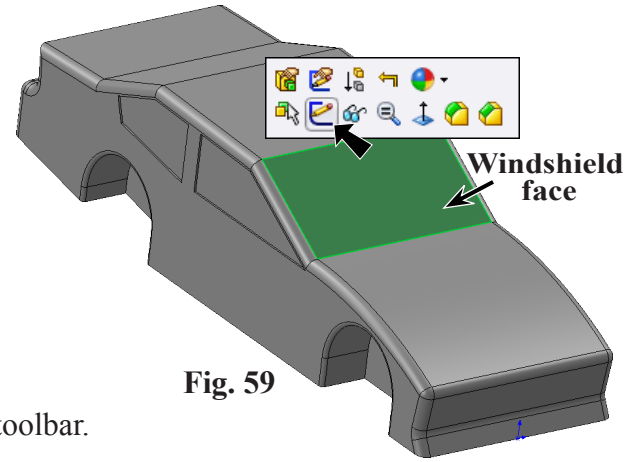


Fig. 59

Step 2. Click the **face of windshield** and click **Sketch** on the Content menu, **Fig. 59**.

Step 3. Click **Offset Entities** Offset Entities on the Sketch toolbar.

Step 4. In the Offset Entities Property Manager set:

Distance D1 **.04** **Fig. 60**
check **Reverse**

face of front windshield should be selected, **Fig. 61**.

The yellow offset should be inside, **Fig. 61**. If it is not, uncheck Reverse.

Click OK .

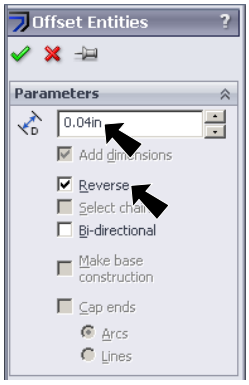


Fig. 60

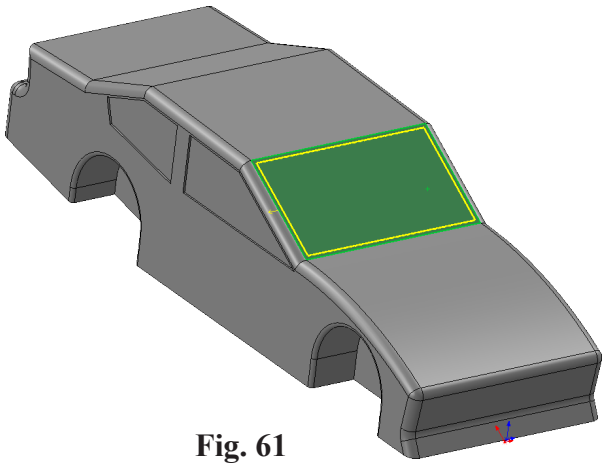


Fig. 61

Step 5. Click **Features** Features on the Command Manager toolbar.

Step 6. Click **Extruded Cut** Extruded Cut on the Features toolbar.

Step 7. In the Property Manager set:
under Direction 1, **Fig. 62**

Depth D1 **.02**

click OK ,
Fig. 63.

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

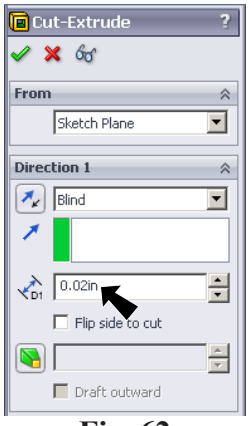


Fig. 62

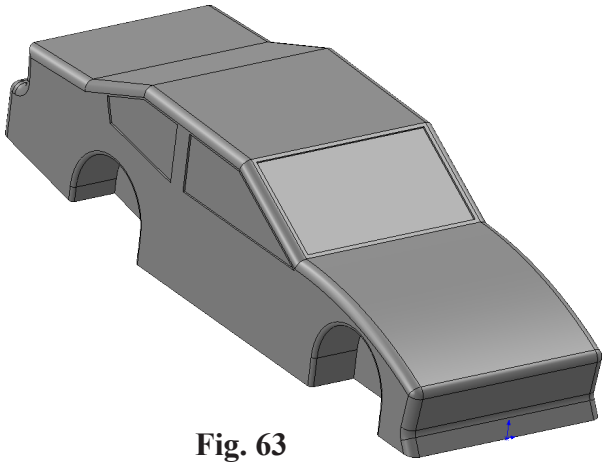


Fig. 63

Q. Rear Window.

Step 1. Rotate view to view **rear window**, **Fig. 64**. Hold the **middle mouse button** (wheel) and drag to rotate view.

Step 2. Click the **face of rear window** and click **Sketch**  on the Content menu, **Fig. 64**.

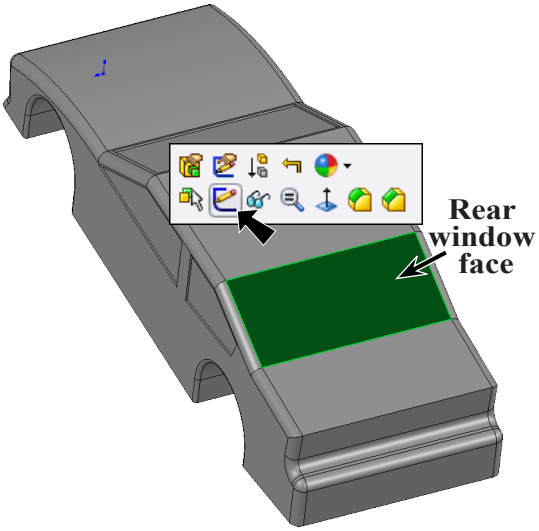


Fig. 64

Step 3. Click **Offset Entities**  on the Sketch toolbar.

Step 4. In the Offset Entities Property Manager set:

Distance  **.02 Fig. 65**
check **Reverse**
the face of rear window should be selected, **Fig. 66**.

The yellow offset should be inside, **Fig. 66**. If it is not, uncheck Reverse.

Click OK  .

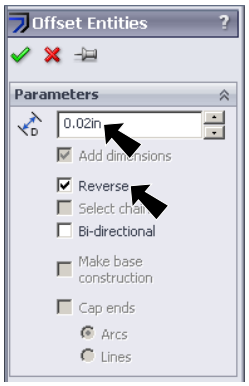


Fig. 65

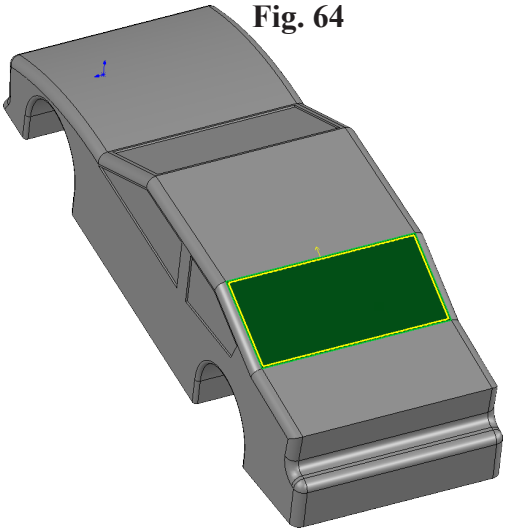
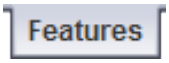
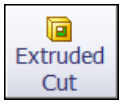


Fig. 66

Step 5. Click **Features**  on the Command Manager toolbar.

Step 6. Click **Extruded Cut**  on the Features toolbar.

Step 7. In the Property Manager set:
under Direction 1, **Fig. 67**

Depth  **.02**

click OK  , **Fig. 68**.

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

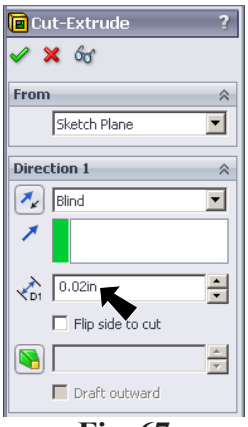


Fig. 67

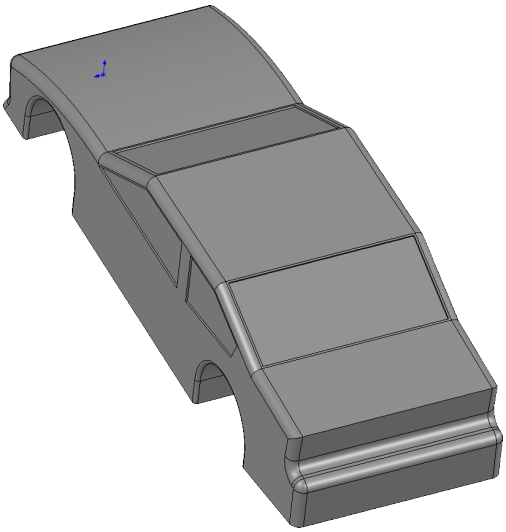


Fig. 68

R. Mate References.

Step 1. Rotate view to view **axle holes**, **Fig. 69**. Hold the **middle mouse button** (wheel) and drag to rotate view.

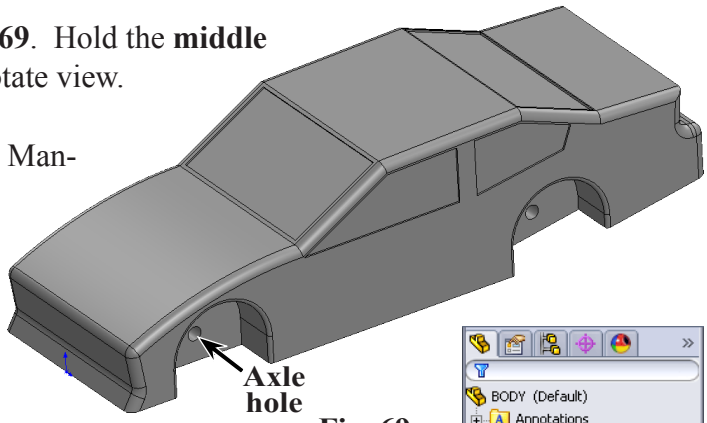


Fig. 69

Step 2. Click **Right Plane** in the Feature Manager to select Plane, **Fig. 70**.

Step 3. Click **Reference Geometry** on the Features toolbar and **Mate Reference** from the menu.

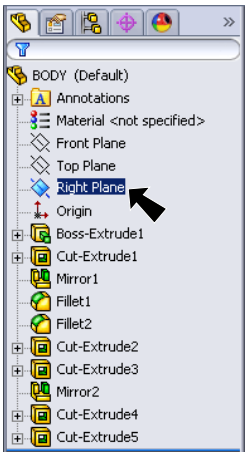


Fig. 70

Step 4. In the Mate Reference Manager set:

under **Primary** Reference Entity, **Fig. 71**

Mate Reference Type **Coincident**

under **Secondary** Reference Entity

click in Entity box and click **inside cylindrical face of front axle hole**, **Fig. 72**

click OK .

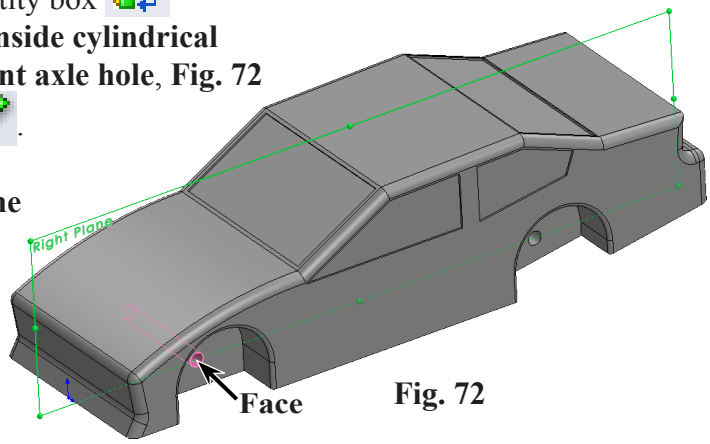


Fig. 72

Step 5. Click **Right Plane** in the Feature Manager to select Plane, **Fig. 70**.

Step 6. Click **Reference Geometry** on the Features toolbar and **Mate Reference** from the menu.

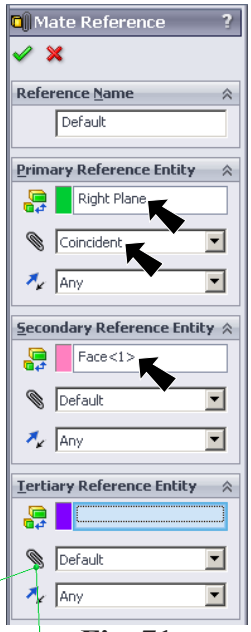


Fig. 71

Step 7. In the Mate Reference Manager set:

under **Primary** Reference Entity, **Fig. 71**

Mate Reference Type **Coincident**

under **Secondary** Reference Entity

click in Entity box and click **inside cylindrical face of rear axle hole**, **Fig. 73**

click OK .

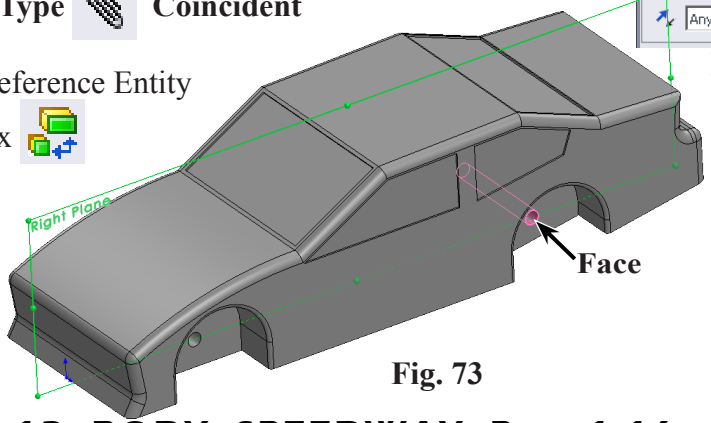


Fig. 73

S. Tow Point.

Step 1. Click **Right Plane** in the Feature Manager and click **Sketch** from the Content toolbar, **Fig. 74**.

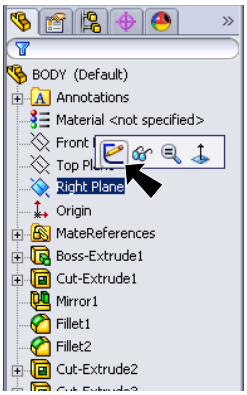


Fig. 74

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

Step 3. Click to select the **edge of front axle hole**, **Fig. 75**.

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

Step 5. Click **Point** on the Sketch toolbar.

Step 6. Draw a **Point below front axle hole**, **Fig. 76**. Be careful not to draw any extra Points.

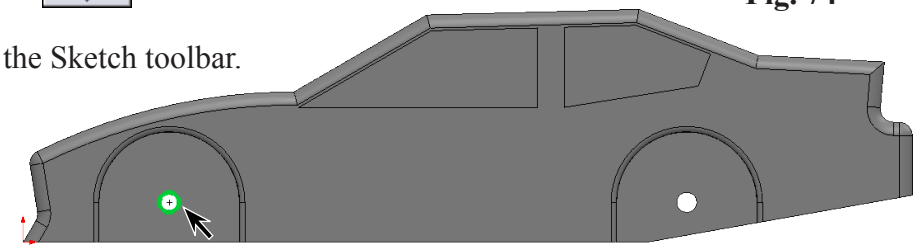


Fig. 75

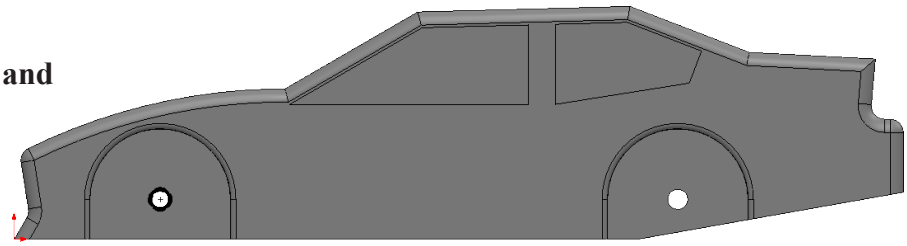


Fig. 76

Step 7. **Right click drawing and click Select** from menu to unselect Point tool.

Step 8. **Ctrl click centerpoint of offset** and **Point** to select both, **Fig. 77**. Release Ctrl key and click **Make Vertical** on the Content menu.

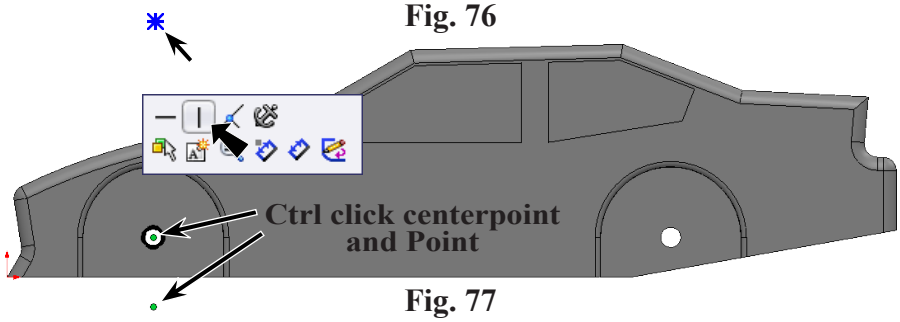


Fig. 77

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

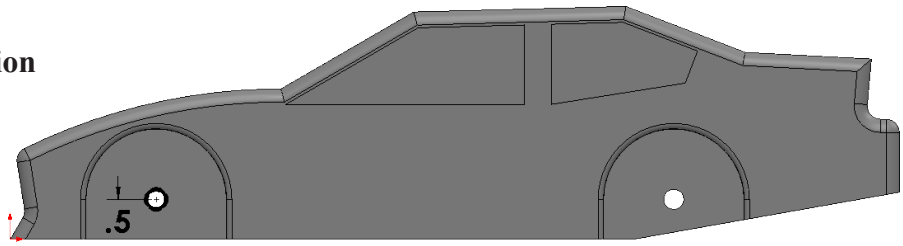


Fig. 78

Step 10. Add **.5** dimension, **Fig. 78**.

Step 11. Delete the offset, **Fig. 79**.

Step 12. Click **Exit Sketch** on the Sketch toolbar.

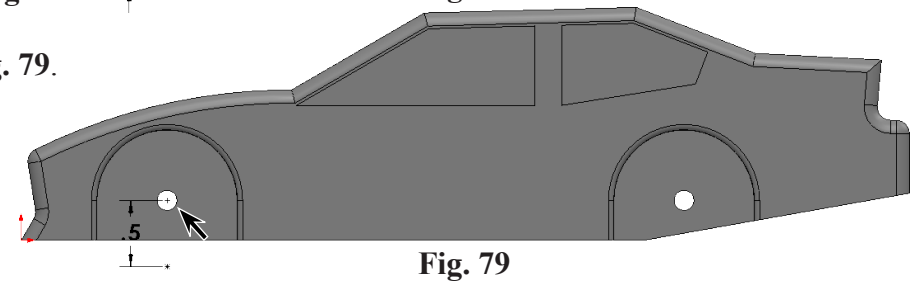


Fig. 79

T. Trail Point.

Step 1. Click **Right Plane** in the Feature Manager and click **Sketch** from the Content toolbar, **Fig. 80**.

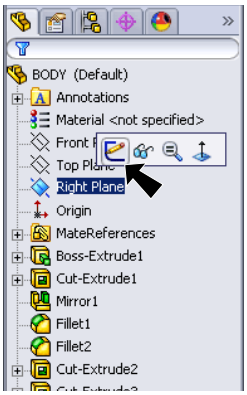


Fig. 80

Step 2. Click to select the **edge of rear axle hole**, **Fig. 81**.

Step 3. Click **Convert Entities** on the Sketch toolbar.

Step 4. Click **Point** on the Sketch toolbar.

Step 5. Draw a **Point below rear axle hole**, **Fig. 82**.

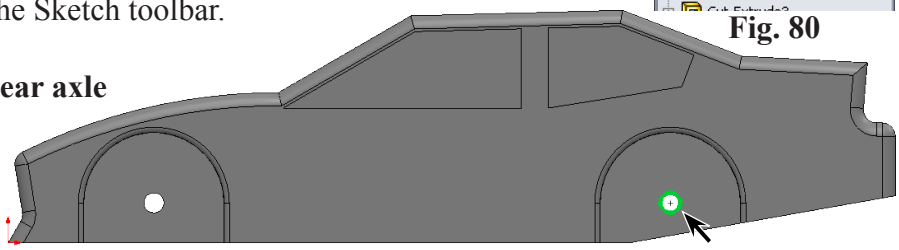


Fig. 81

Step 6. **Right click drawing and click Select** from menu to unselect Point tool.

Step 7. **Ctrl click centerpoint of offset** and **Point** to select both, **Fig. 83**. Release Ctrl key and click **Make Vertical** on the Content menu.

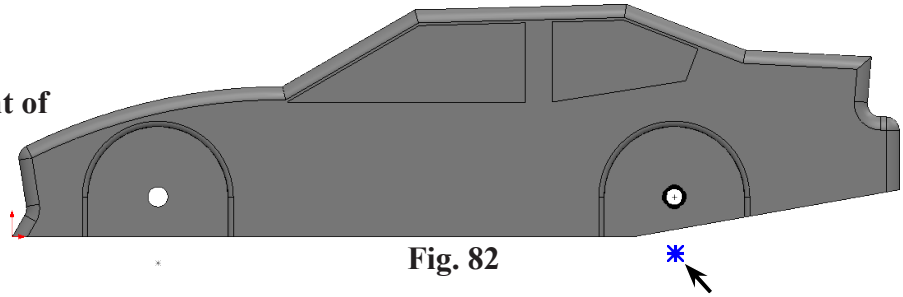


Fig. 82

Step 8. Click **Smart Dimension** (**S**) on the Sketch toolbar.

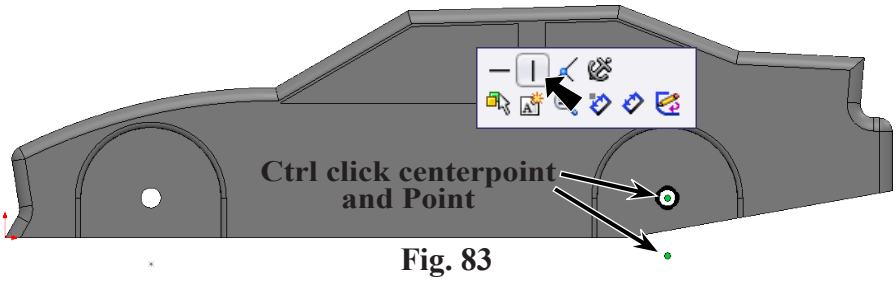


Fig. 83

Step 9. Add **.5** dimension, **Fig. 84**.

Step 10. Delete the offset, **Fig. 85**.

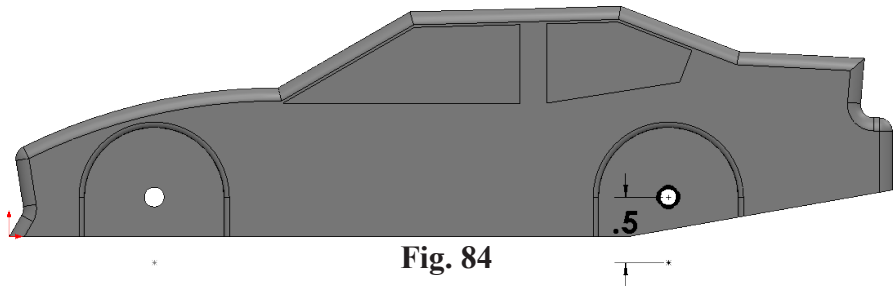


Fig. 84

Step 11. Click **Exit Sketch** on the Sketch toolbar.

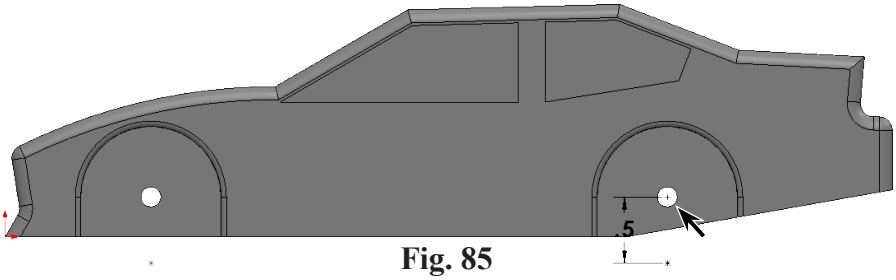


Fig. 85

U. Rename Sketches TOW POINT AND TRAIL POINT.

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

Step 2. **Rename Sketch7 TOW POINT** in the Feature Manager, **Fig. 86**. To rename, click Sketch1 name in Feature Manager and press **F2** on keyboard. Key-in **TOW POINT**.

Step 3. **Rename Sketch8 TRAIL POINT** in the Feature Manager, **Fig. 86**.

Step 4. Save. Use **Ctrl-S**.

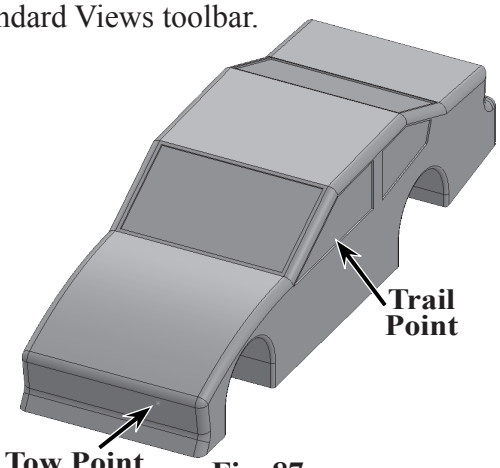


Fig. 87

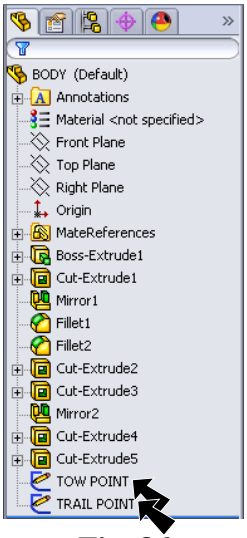


Fig. 86

V. Material Pine.

Step 1. **Right click Material** in the Feature Manager and click **Edit Material**, **Fig. 88**.

Step 2. **Expand Woods** (click the +) in the material tree and click **Pine**, **Fig. 89**. Click **Apply** and **Close**, **Fig. 89**.

Step 3. Save. Use **Ctrl-S**.

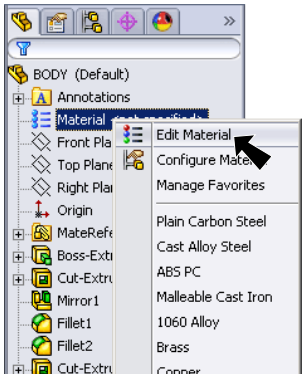


Fig. 88

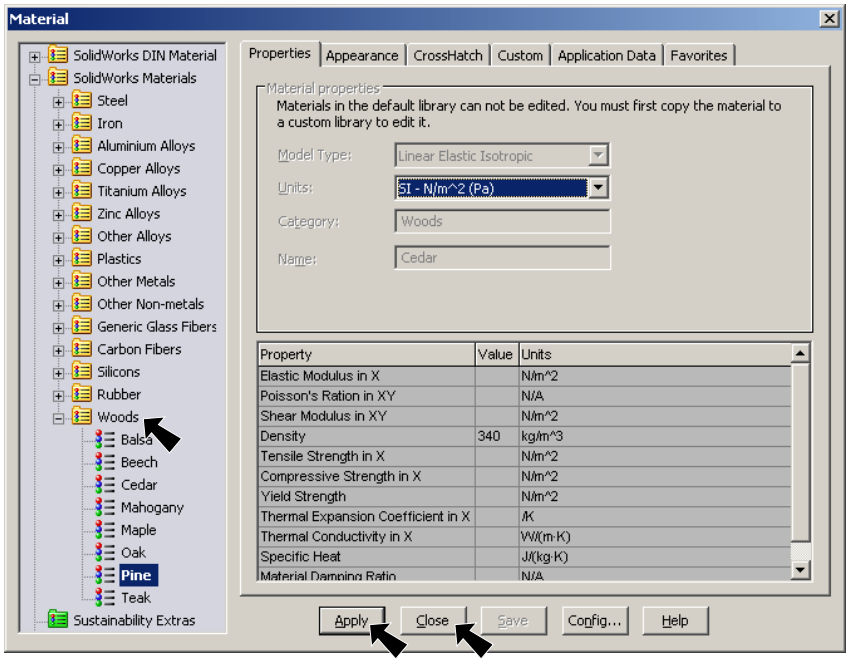


Fig. 89

W. Appearance.

Step 1. Click the Body to select the part, click **Appearances Callout** on the Content menu and click **BODY**, **Fig. 90**.

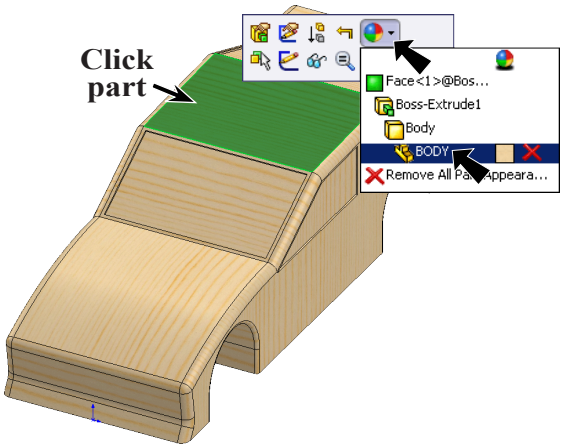


Fig. 90

Step 2. In the Appearances Task pane, expand **Painted**, click **Car** and in the lower pane select **white**, **Fig. 91**.

Step 3. In the Appearances Property Manager, **Fig. 92** under Color:

set **RGB values** to:

R 0

G 112

B 255

click **Keep Visible** and OK, **Fig. 92**. The Push Pin on allows selection of another appearance for windows.

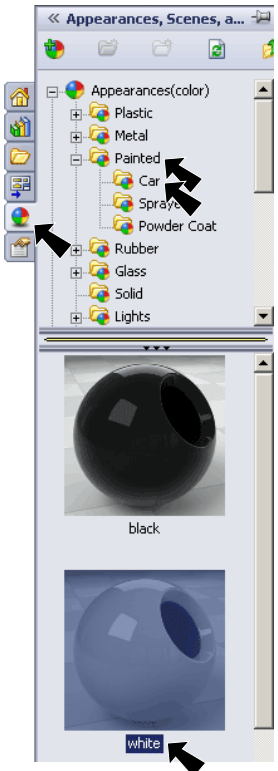


Fig. 91

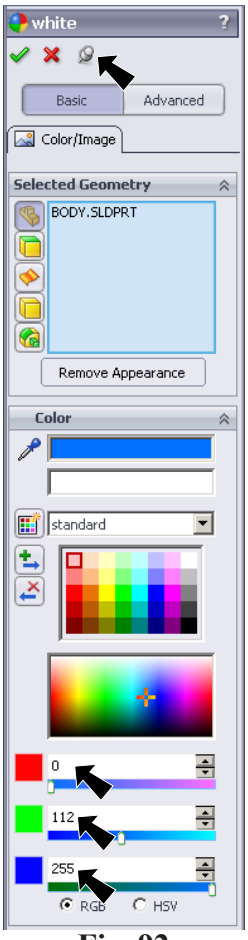


Fig. 92

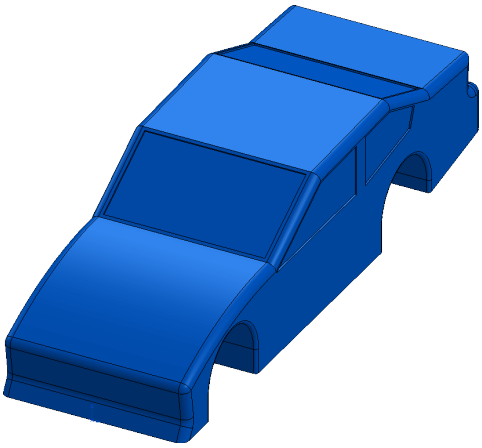


Fig. 93

Step 4. Back over at the Task pane, click the Appearances Task tab  , expand **Glass**, click **Gloss** and in the lower pane select **clear glass**, **Fig. 94**.

Step 5. In the Appearances Property Manager, under Selected Geometry click **Select Faces**  , **Fig. 95**

click **windshield face and all window faces**, **Fig. 96**. Rotate view to select all windows, hold down middle mouse button (wheel) and drag to rotate view, **Fig. 97**.

click OK  and then click Cancel  .

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

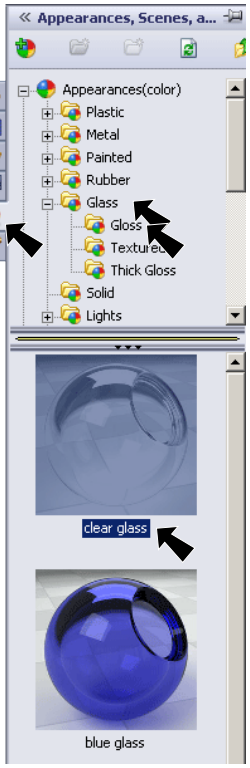


Fig. 94

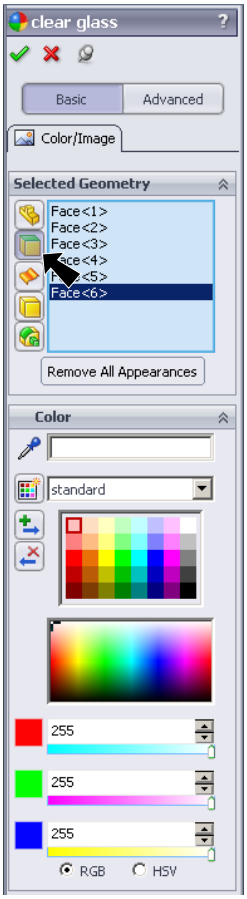


Fig. 95

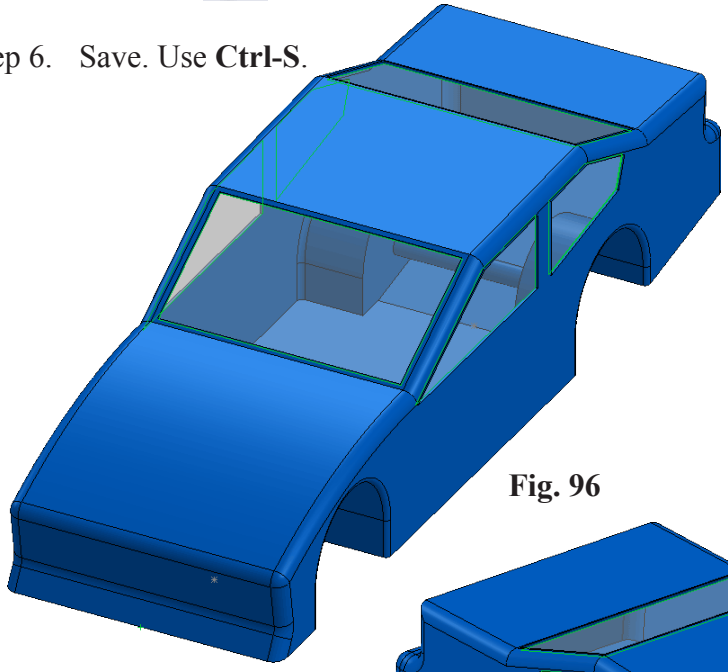


Fig. 96

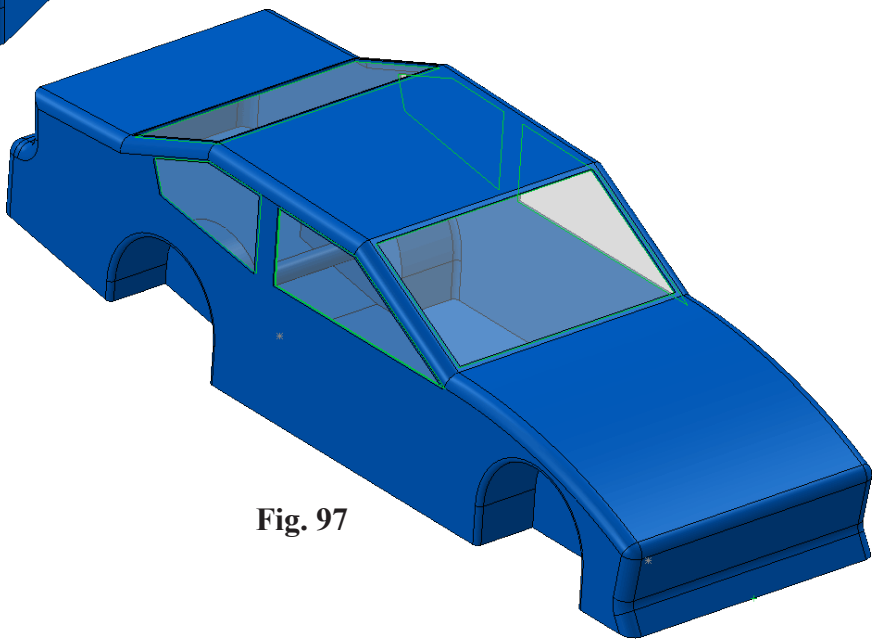


Fig. 97