



Rocket 3D Print Nose Cone

A. Revolve.

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

Step 2. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the content toolbar, **Fig. 1**.

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

Step 4. Starting from the Origin  sketch lines, **Fig. 2**.

Step 5. **Right click graphics area and click Select** from menu to unselect Line tool.


Step 6. Click the **vertical line at Origin** and click **Construction Geometry**  on the context toolbar, **Fig. 3**.

Step 7. Click **Smart Dimension**



(S) on the Sketch toolbar.

Step 8. Dimension lines, **Fig. 4**. Dimension **double distance both diameters**. To double distance dimension inside diameter, click centerline and then left vertical line, move the cursor Origin and click. Key-in 1.04 in the Modify box and press ENTER. Double distance outside diameter.

Step 9. Click Zoom to Fit  (F) on the View toolbar.

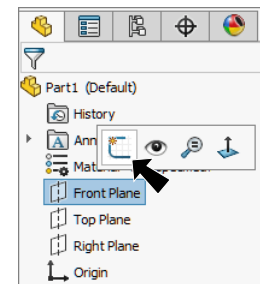
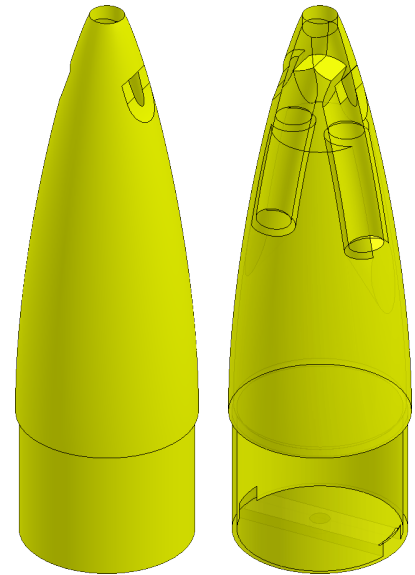


Fig. 1

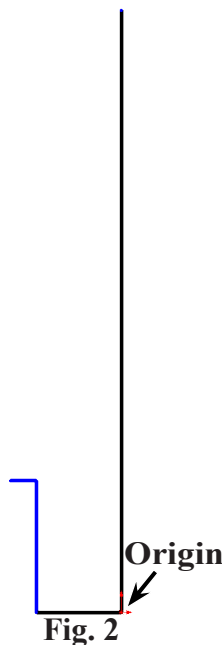


Fig. 2

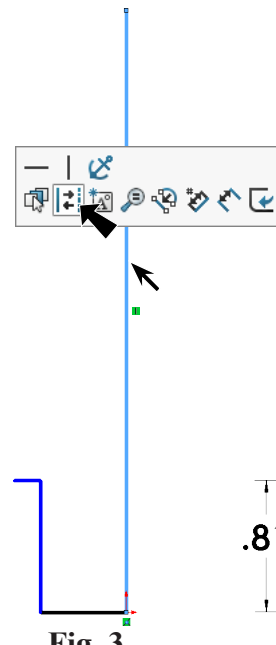


Fig. 3

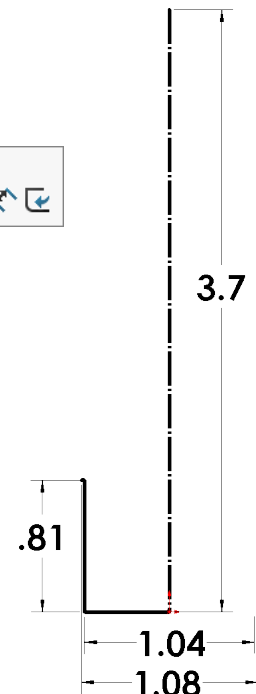




Fig. 4

Step 10. Click **Style Spline**  in the **Spline flyout**  on the Sketch toolbar.

Step 11. Sketch a **4 control vertex point Spline** between left endpoints of short horizontal line and top endpoint of vertical centerline, **Fig. 5**. Press Escape to end the spline.

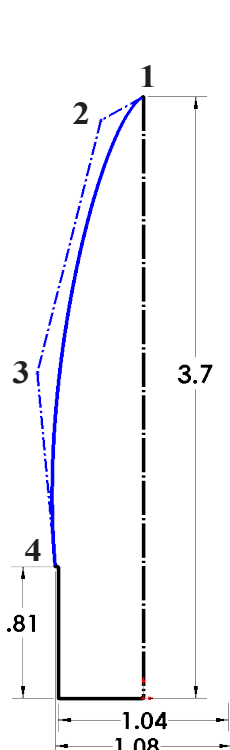


Fig. 5

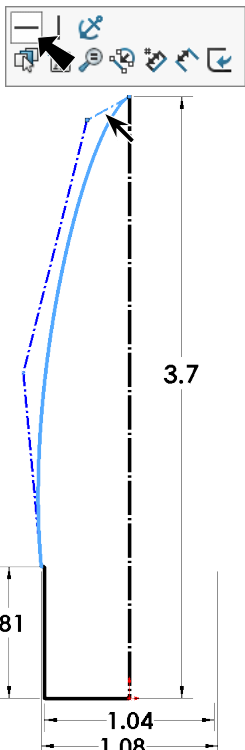


Fig. 6

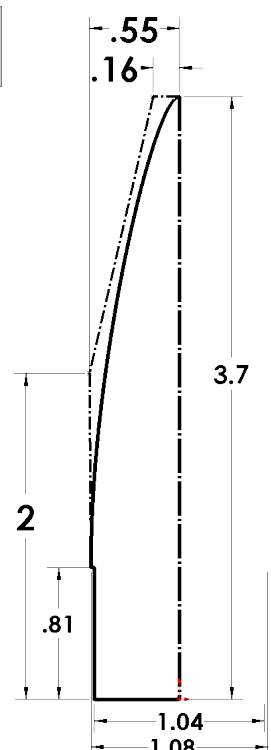





Fig. 7

Step 12. Click **top control polygon segment** and click **Make Horizontal**  on the context toolbar, **Fig. 6**.



Step 13. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 14. Add dimensions, **Fig. 7**.

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

Step 16. Click **Revolved Boss/Base**  on the Features toolbar.

Step 17. Click **Yes** to close sketch message.

Step 18. In the Revolve Property Manger set:
 under Axis of Revolution 
vertical centerline should be selected, **Fig. 8**
 click OK .

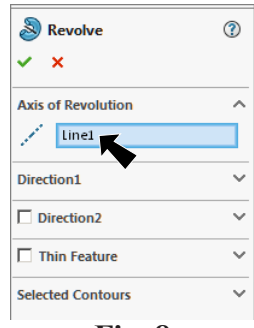


Fig. 8

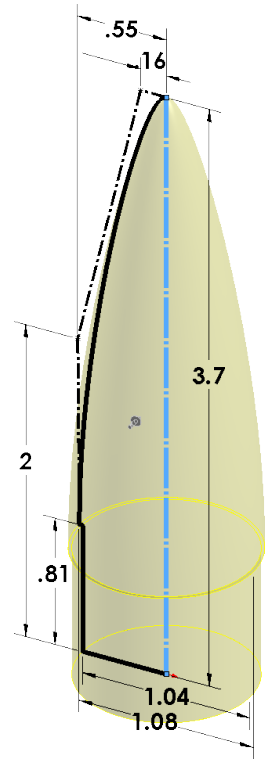



Fig. 9

B. Save as "NOSE CONE WHISTLE".

Step 1. Click File Menu > Save As.

Step 2. Key-in **NOSE CONE WHISTLE** for the filename and press ENTER.

C. Swept Cut Path Bore.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 10**.

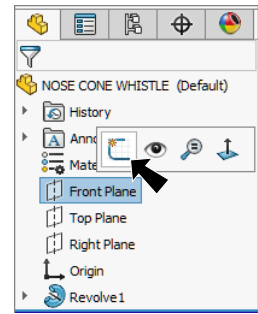




Fig. 10

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

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

Step 4. In the Convert Entities Property Manager:
 under Entities to Convert, **Fig. 11**
 click **right silhouette edge of Nose Cone**, **Fig. 12**
 click OK .

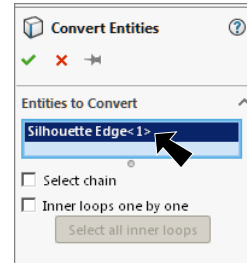


Fig. 11

Step 5. Click **Offset Entities**  on the Sketch toolbar.

Step 6. In the Offset Entities Property Manager set:
 under Parameters, **Fig. 13**

Distance  **.135**
 click **converted edge**, **Fig. 14**
 uncheck **Bi-directional**
 check **Reverse**
 click OK .

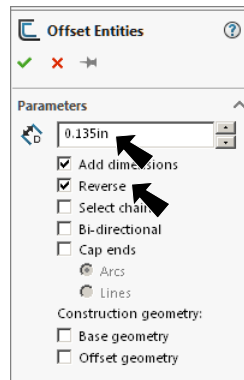


Fig. 13

Step 7. Click **Line**  (**L**) on the Sketch toolbar.

Step 8. Sketch **vertical line down from top endpoint of converted edge** and **horizontal line** across Nose Cone, **Fig. 15**. To terminate chain, double click back on the line you have just sketched.

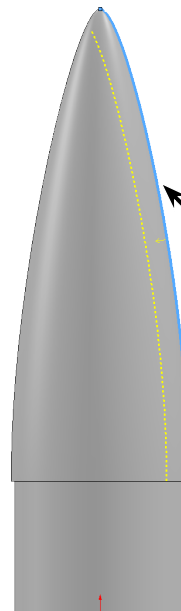


Fig. 14

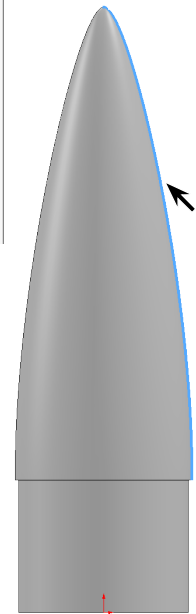


Fig. 12

Step 9. **Right click graphics area and click Select** from menu to unselect Line tool.

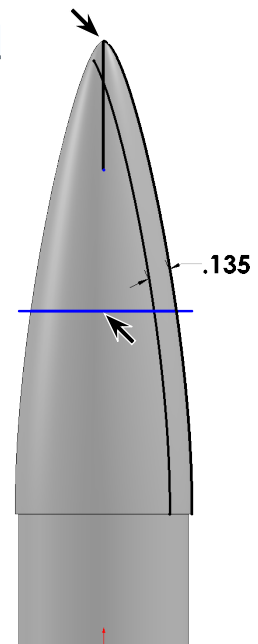



Fig. 15

Step 10. Make **converted silhouette edge and horizontal line construction geometry**. To make construction geometry, Ctrl click **converted silhouette edge and horizontal line construction line** to select both and click **Construction Geometry**  on the context toolbar, **Fig. 16**.

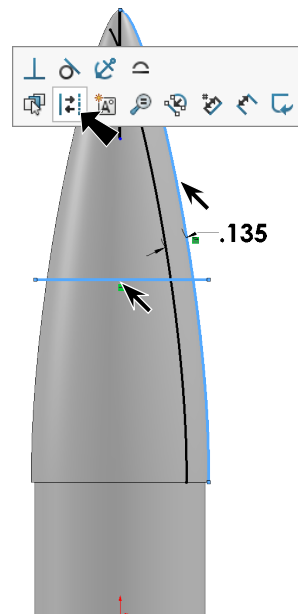


Fig. 16

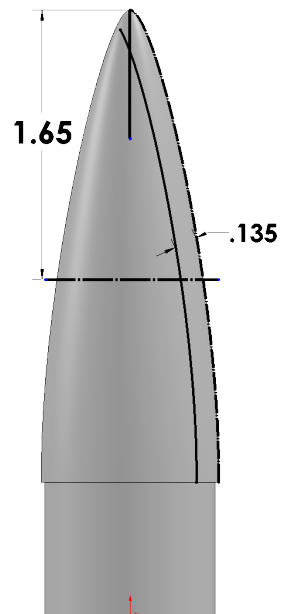



Fig. 17

Step 11. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 12. Add **1.65** dimension, **Fig. 17**.

Step 13. Click **Trim Entities**  (S) on the Sketch toolbar.

Step 14. In the Trim Property Manger:

select **Trim to closest** , **Fig. 18**

Trim the bottom segment of vertical line, left segment of offset spline and bottom segment of spline, **Fig. 19**. Click segments to trim. Results shown in **Fig. 20**.

Click OK  when done.

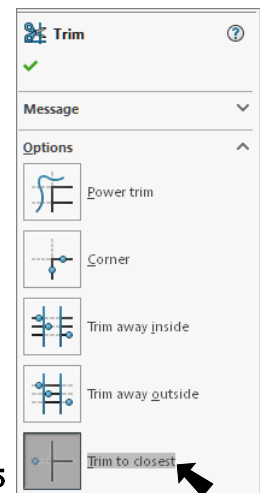



Fig. 18

Step 15. Click **Exit Sketch**  on the Sketch toolbar.

Step 16. Save. Use **Ctrl-S**.

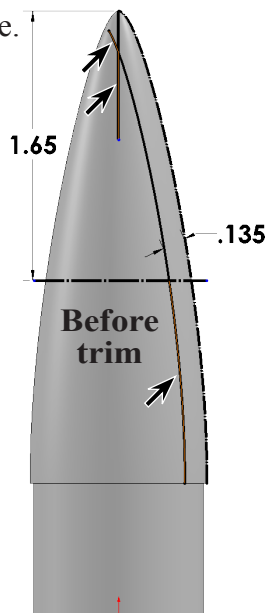


Fig. 19

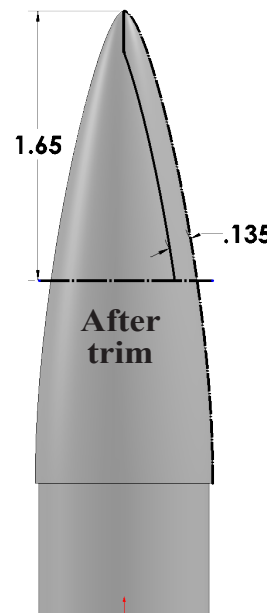



Fig. 20

D. Create Section View.

Step 1. Click **Section View**  on the View toolbar.

Step 2. In the Section View Property Manager set:
 under Section Options, **Fig. 21**
 check **Graphics-only section**
 under Section 1
 confirm **Front Plane** is selected
 click OK .

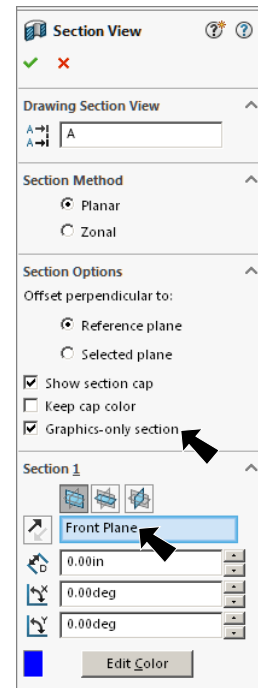


Fig. 21

E. Swept Cut Bore.

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

Step 2. Click **Swept Cut**  on the Features toolbar.

Step 3. In the Cut-Sweep Property Manager:
 under Profile and Path, **Fig. 22**
 select **Circular Profile**

Path  click Sketch3, **Fig. 23**

Diameter  .21

click OK .

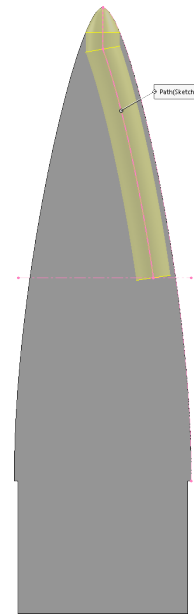


Fig. 23

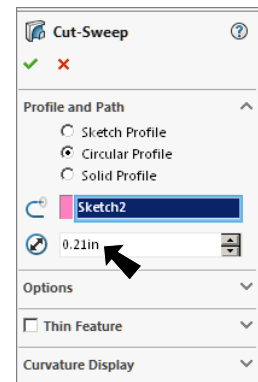


Fig. 22

F. Mirror Swept Cut Bore.

Step 1. Ctrl click **Right Plane**  and **Cut-Sweep1** in Feature Manager to select both, **Fig. 24**.

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

Step 3. In the Mirror Property Manager click OK , **Fig. 25**.

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

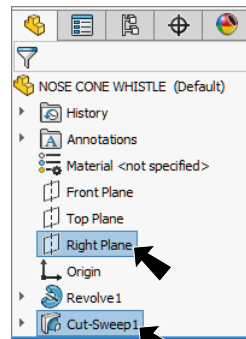


Fig. 24

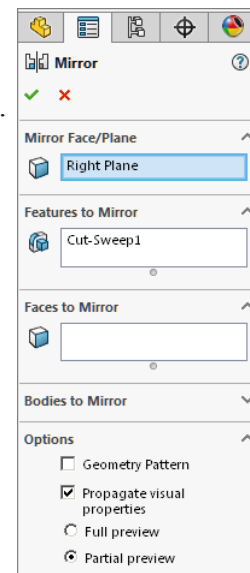


Fig. 25

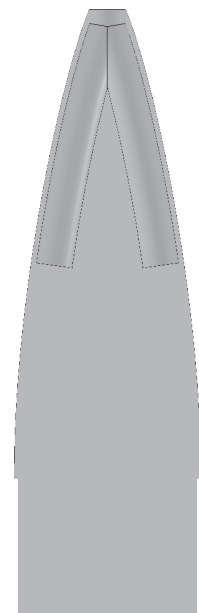



Fig. 26

G. Cut-Extrude 1 Duck.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 27**.

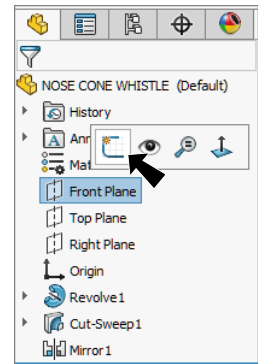



Fig. 27

Step 2. Click **Centerline**  in the **Line flyout**  on the Sketch toolbar.

Step 3. Sketch **horizontal construction line out from right silhouette edge**, **Fig. 28**.

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

Step 5. Dimension line **3.22** to Origin , **Fig. 29**.

Step 6. Zoom in around **top of Nose Cone at left end of construction line**, **Fig. 29**. To zoom, place the cursor over the top of Nose Cone and spin the wheel on mouse back. While spinning the wheel keep cursor on the area.

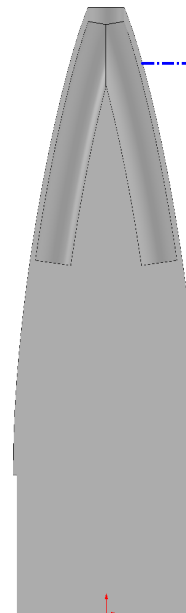


Fig. 28

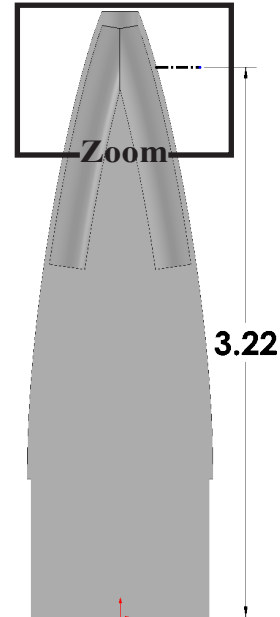


Fig. 29

Step 7. Click **Line**  (L) on the Sketch toolbar.

Step 8. Sketch **3 lines and autotransition to tangent arc**, **Fig. 30** and **Fig. 31**. To make the sketch, Start at Position 1 outside the Nose Cone body and sketch a line to left endpoint of construction line. Continue line at angle back into the sweep cut, then down somewhat parallel to first line. Use autotransition to transition from line to tangent arc. To transition, move cursor away from endpoint of line. Move cursor back to endpoint and away again to transition to Tangent Arc tool.

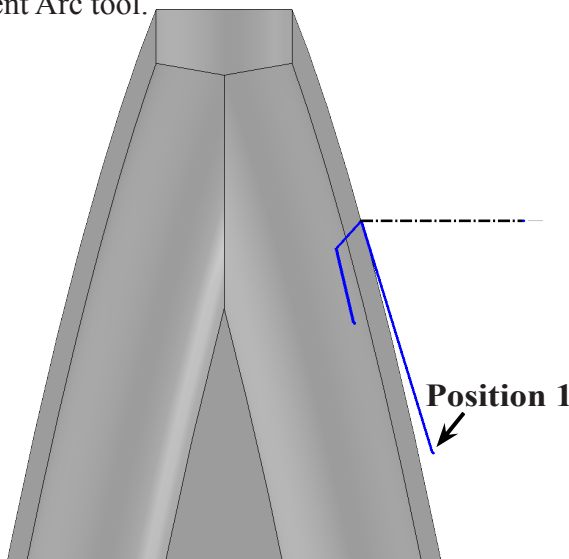


Fig. 30

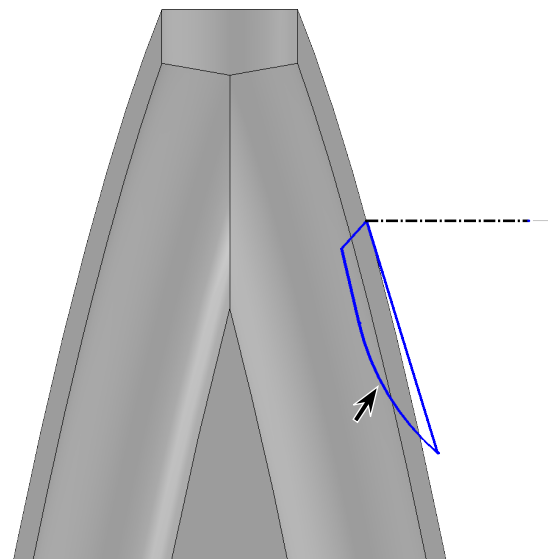


Fig. 31

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

Step 10. Add dimensions, **Fig. 32**.

Step 11. Turn off **Section View**  on the View toolbar.

Step 12. Use **Left Arrow** key on keyboard to rotate view slightly, **Fig. 34**.

Step 13. Click **Features**  on the Command Manager toolbar.

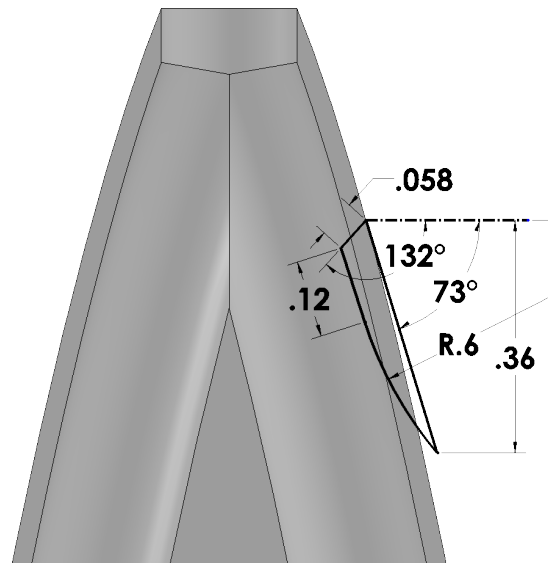



Fig. 32

Step 14. Click **Extruded Cut**  on the Features toolbar.

Step 15. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 33**
End Condition **Through All-Both**
click OK .

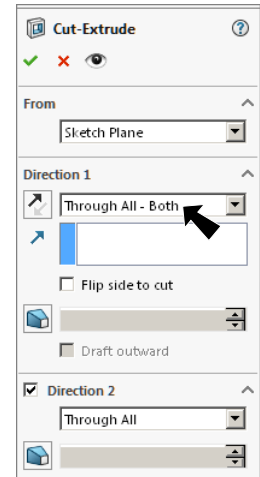


Fig. 33

Step 16. Save. Use **Ctrl-S**.

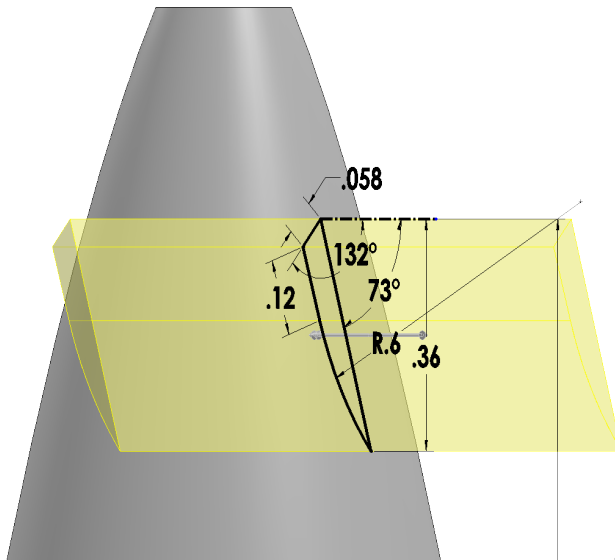


Fig. 34

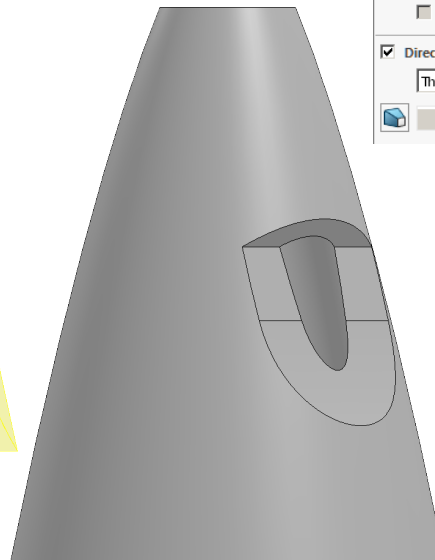






Fig. 35

H. Extruded Boss/Base Block.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 36**.

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

Step 3. Click **Section View**  on the View toolbar.

Step 4. In the Section View Property Manager set: under Section Options, **Fig. 37** check **Graphics-only section** click OK .

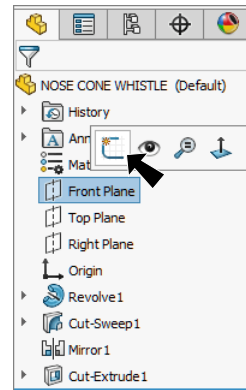


Fig. 36

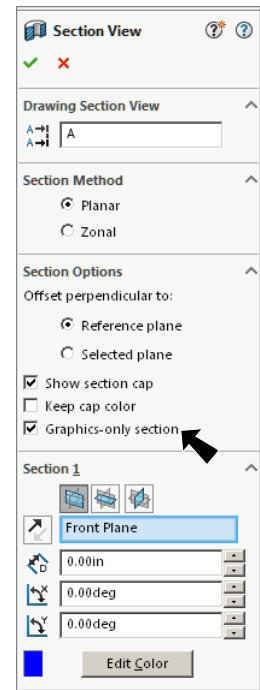



Fig. 37

Step 5. Zoom back in around **top of Nose Cone**.

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

Step 7. Sketch the **3 lines**, **Fig. 38**. Start at **Position 1** and keep vertical line coincident with vertical edge of sweep cuts. As you sketch last endpoint back at **Position 1**, click **Make Perpendicular**  the constraint pop-up toolbar to add continuity relation to line.

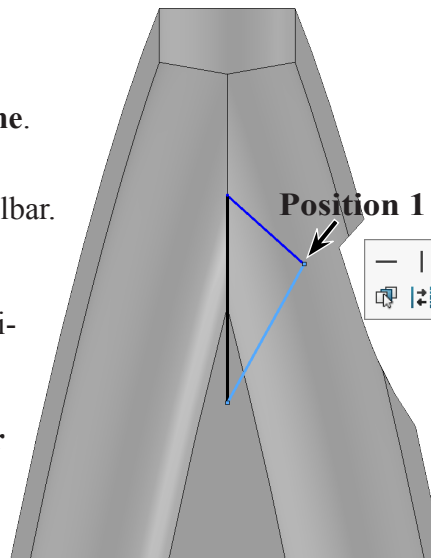




Fig. 38

Step 8. **Right click graphics area and click Select** from menu to unselect Line tool.

Step 9. Click **Extruded Cut** vertex and **Position 1** vertex and click **Make Horizontal**  on the context toolbar, **Fig. 39**.

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

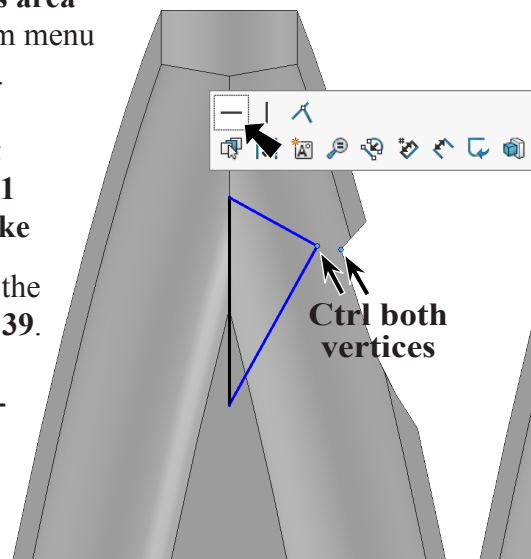


Fig. 39

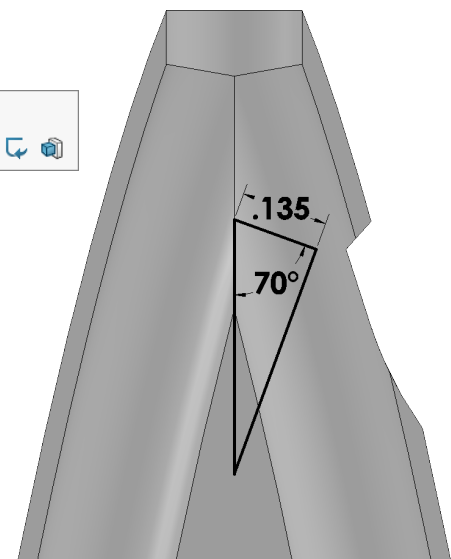
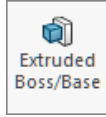


Fig. 40

Step 11. Add dimensions, **Fig. 40**.


Step 12. Use **Left Arrow** key on keyboard to rotate view slightly.

Step 13. Click **Features**  on the Command Manager toolbar.

Step 14. Click **Extruded Boss/Base**  on the Features toolbar.

Step 15. In the Boss-Extrude Property Manager set:

under Direction 1, **Fig. 40**
 End Condition **Up To Body**
 for Solid/Surface Body
 click **Nose Cone body**, **Fig. 41**

under Direction 2
 End Condition **Up To Body**
 for Solid/Surface Body
 click **Nose Cone body**
 click OK .

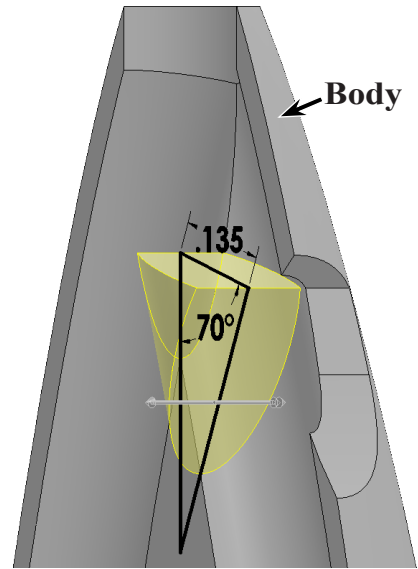
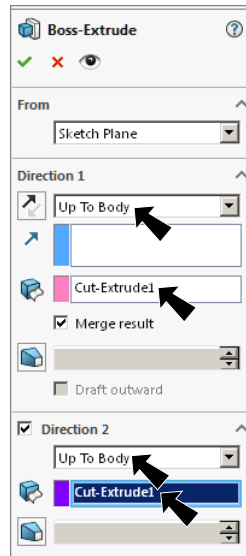


Fig. 40

Fig. 41

Step 16. Save. Use **Ctrl-S**.

I. Mirror Swept Cut Bore and Extruded Boss/Base Block.

Step 1. Ctrl click **Right Plane** , **Cut-Extrude1** and **Boss-Extrude1** in Feature Manager to select all three, **Fig. 42**.

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

Step 3. In the Mirror Property Manager click OK , **Fig. 43**.

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

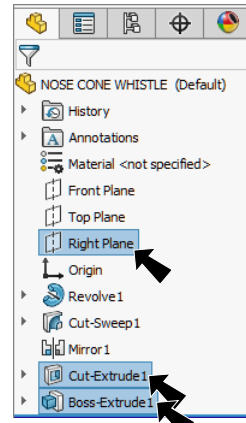


Fig. 42

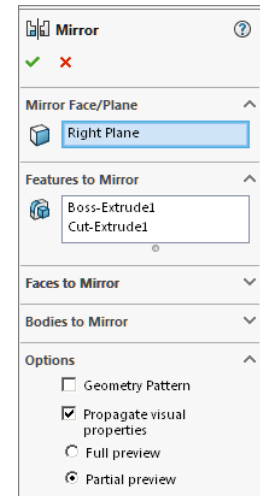


Fig. 43

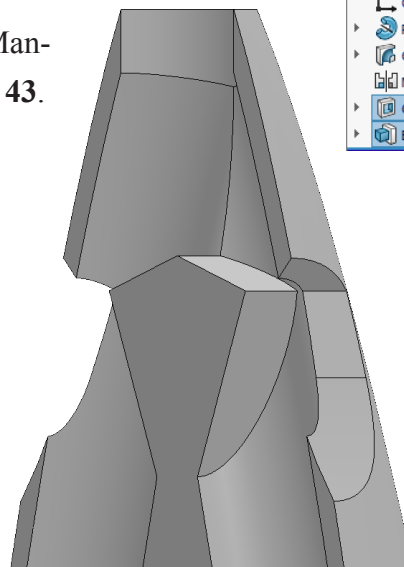



Fig. 44

J. Split.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the content toolbar, **Fig. 45**.

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

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

Step 4. Sketch a horizontal line across Nose Cone, **Fig. 46**.

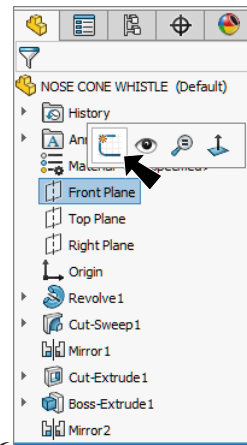


Fig. 45

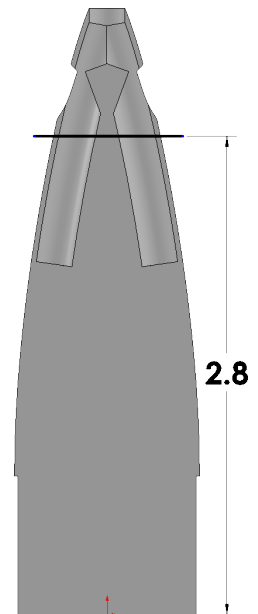



Fig. 46

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

Step 6. Add **2.8** dimension, **Fig. 46**.

Step 7. Click Insert Menu > Features > Split.

Step 8. In the Split Property Manager:
 under Trim Tools, **Fig. 47**
 click **Cut Part**
 click part in graphics area, **Fig. 48**
 uncheck **Consume cut bodies**
 click OK .

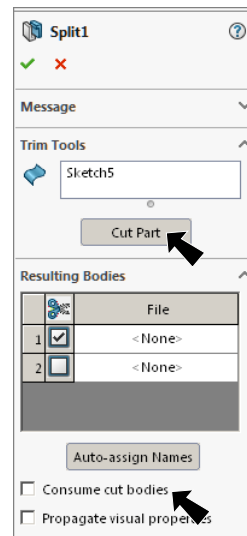



Fig. 47



Fig. 48

Step 9. **Hide Sketch5**. To hide, click **Sketch5** in the Feature Manager and **Hide**  on the context toolbar, **Fig. 49**.

Step 10. Save. Use **Ctrl-S**.

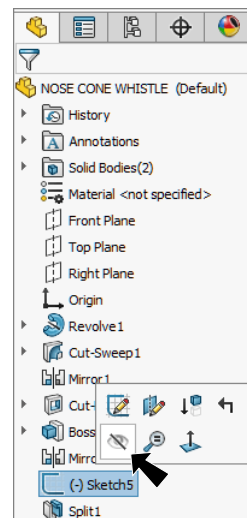


Fig. 49

K. Shell.

Step 1. Use **Up Arrow** key on keyboard to rotate view slightly.

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

Step 3. In the Shell Property Manager set:
under Parameters, **Fig. 50**

Distance  **.03**

check **Show preview**

click **bottom face** of Nose Cone, **Fig. 51**

click OK  .

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

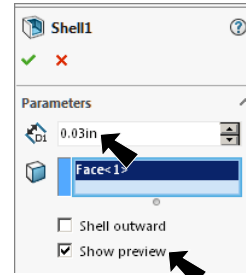


Fig. 50

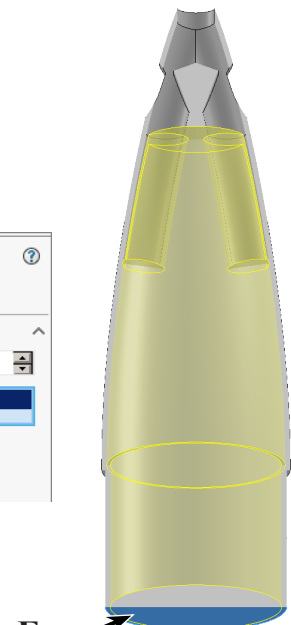


Fig. 51

L. Combine Bodies.

Step 1. Click Insert Menu > Features > Combine.

Step 2. In the Combine Property Manager:
under Operation Type, **Fig. 52**

select **Add**

under Bodies to Combine

drag a selection to select both bodies, **Fig. 53**

click OK  .

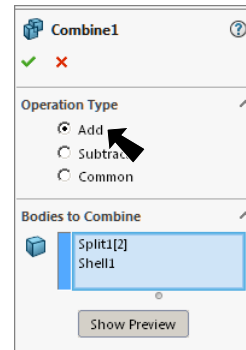


Fig. 52

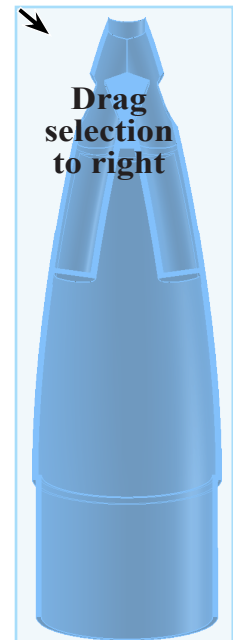


Fig. 53

M. Sweep Profile Support.

Step 1. Click **bottom face of right Sweep Cut Bore** and click **Sketch**  on the context toolbar, **Fig. 54**.

Note: The Sweep steps, M thru Q create supports for 3D Printer. Then when printing the 3D part turn off supports in the slicer software to reduce the slicer software supports from clogging up the air passages.

Step 2. With the **bottom face of Sweep Cut Bore** still selected, click **Convert Entities**  on the Sketch toolbar, **Fig. 55**.

Step 3. Click **Exit Sketch**  on the Sketch toolbar.

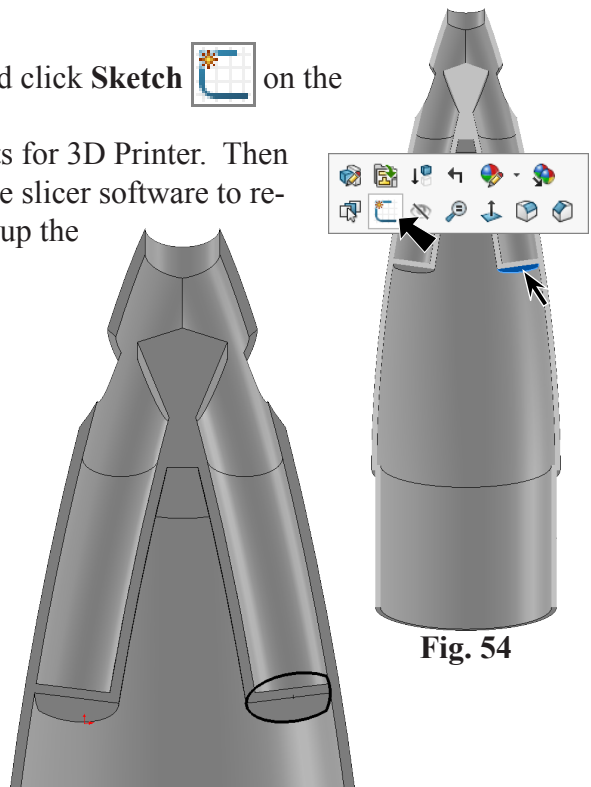





Fig. 54


N. Sweep Path Support.


Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 56**.

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

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

Step 4. Sketch a line from **midpoint**  of **convert face sketch to outside Nose Cone body**, **Fig. 57**.

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

Step 6. Dimension line to Origin , **Fig. 58**.

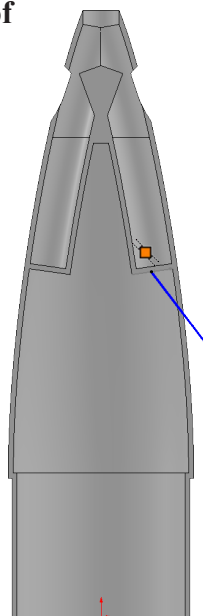


Fig. 57

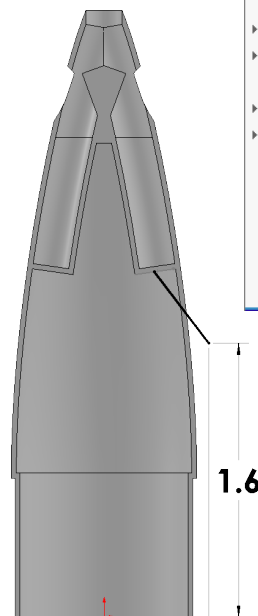


Fig. 58

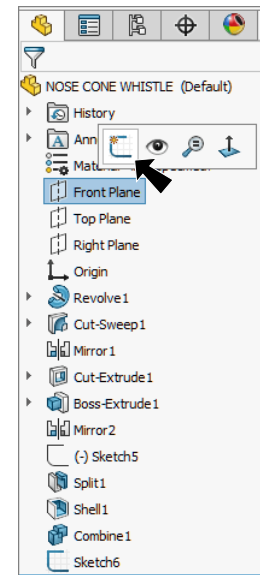
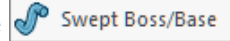


Fig. 56

O. Sweep Support.

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

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

Step 3. In the Sweep Property Manager set:
under Profile and Path, **Fig. 59**

Profile  click a converted entity in Sketch6, Fig. 60

Path  click line in Sketch7
click OK .

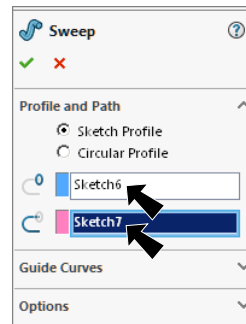


Fig. 59

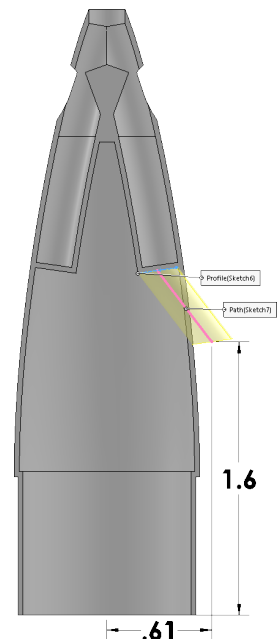


Fig. 60

P. Mirror Sweep Support.

Step 1. Ctrl click **Right Plane**  and **Sweep1** in Feature Manager to select both, Fig. 61.

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

Step 3. In the Mirror Property Manager click OK , Fig. 62.

Step 4. Save. Use Ctrl-S.

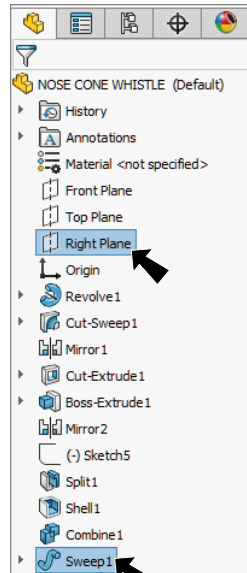


Fig. 61

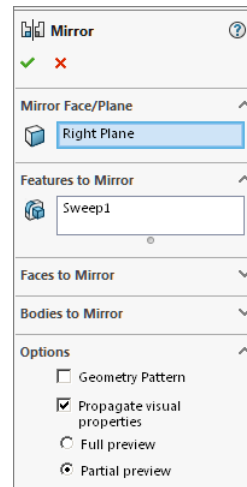


Fig. 62

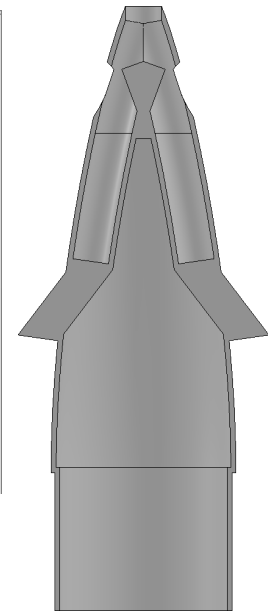



Fig. 63

Q. Surfaces Command Manager.

Step 1. If necessary turn on **Surfaces** Command Manager. To turn on, right click **Sketch**  on the Command Manager toolbar and select **Surfaces**, Fig. 64.

Step 2. Click **Surfaces**  on the Command Manager toolbar.

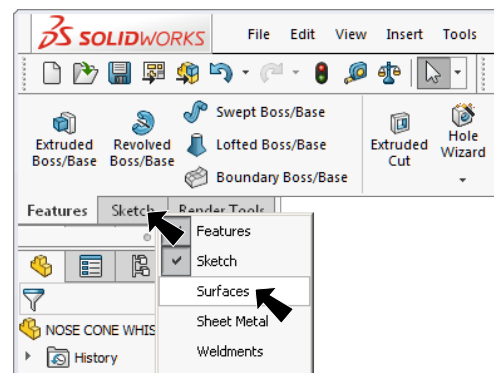




Fig. 64

R. Delete Faces.

Step 1. Turn off **Section View**  on the View toolbar.

Step 2. Click **Delete Face**  on the Surfaces toolbar.

Step 3. In the Delete Face Property Manger:
 under Selections, **Fig. 65**
 click **the 4 faces that extend out from Nose Cone body**, **Fig. 66**.
 Rotate view to select all 4 faces.
 under Options
 select **Delete and Patch**
 click OK  .

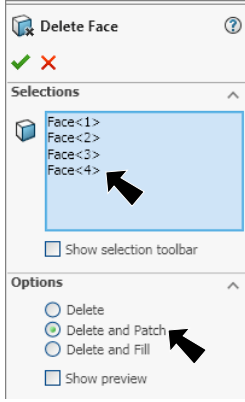


Fig. 65

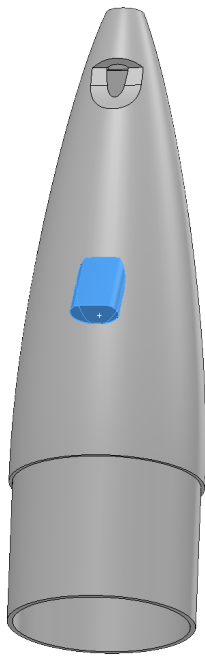


Fig. 66

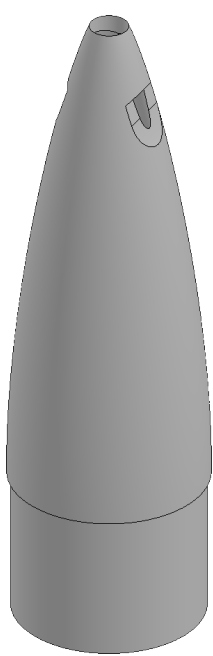



Fig. 67

Step 4. Rotate view and repeat Delete Face for Mirrored Sweep, **Fig. 67**.

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


S. Shock Cord Tie.

Step 1. Click **Top Plane**  in the Feature Manager and click **Sketch**  on the content toolbar, **Fig. 69**.

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

Step 3. Click **Wireframe**  on the View toolbar.

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

Step 5. In the Convert Entities Property Manager:
 under Entities to Convert, **Fig. 70**
 click **inside circular edge**, **Fig. 71**
 click OK  .

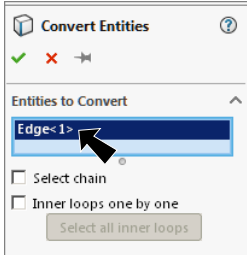


Fig. 70

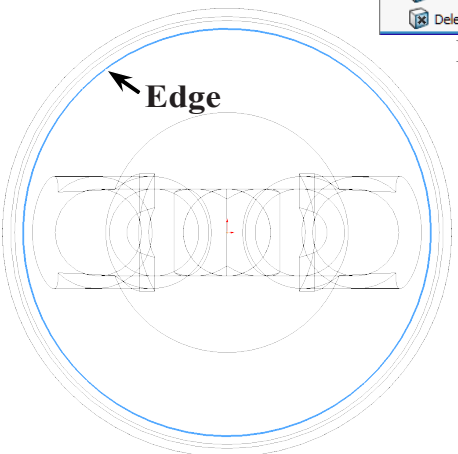


Fig. 71

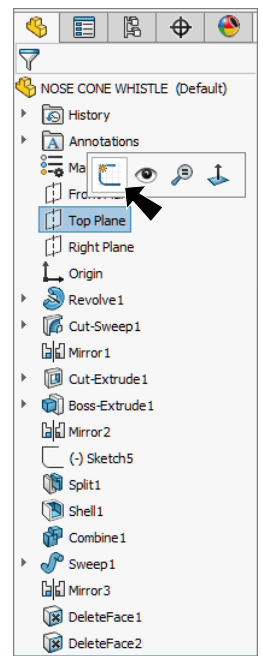



Fig. 69

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

Step 7. Sketch horizontal line across quadrants of circle  **Fig. 72.**

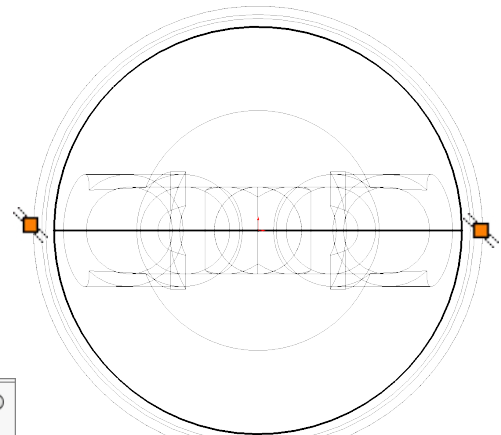
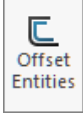




Fig. 72

Step 8. Click **Offset Entities**  on the Sketch toolbar.

Step 9. In the Offset Entities Property Manager set:
under Parameters, **Fig. 73**

Distance  **.11**
check **Bi-directional**
click **horizontal line**, **Fig. 74**
click OK .

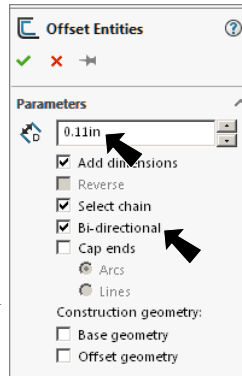


Fig. 73

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

Step 11. Sketch a **circle** at Origin , **Fig. 75.**

Step 12. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 13. Dimension diameter **.12**, **Fig. 75.**

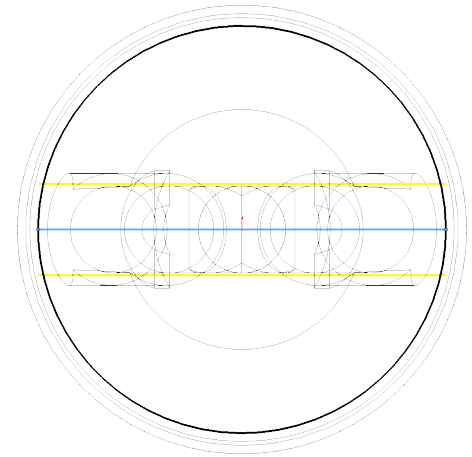


Fig. 74

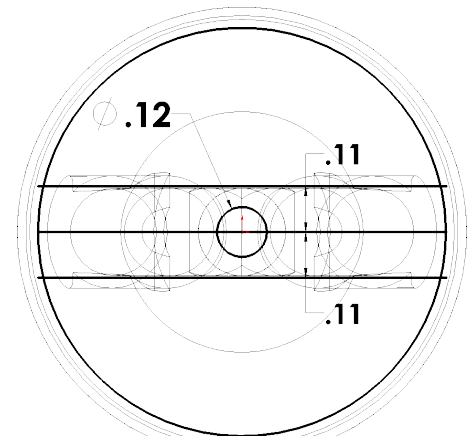
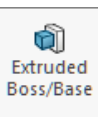





Fig. 75

Step 14. Click **Features**  on the Command Manager toolbar.

Step 15. Click **Extruded Boss/Base**  on the Features toolbar.

Step 16. In the Boss Extrude Property Manager set:

under Direction 1, **Fig. 76**
Depth  **.07**
 under Selected Contours
 click **both contours outside circle**, **Fig. 77**.
 Click **Front**  on the Standard Views toolbar. (**Ctrl-1**)
 Click **OK** .

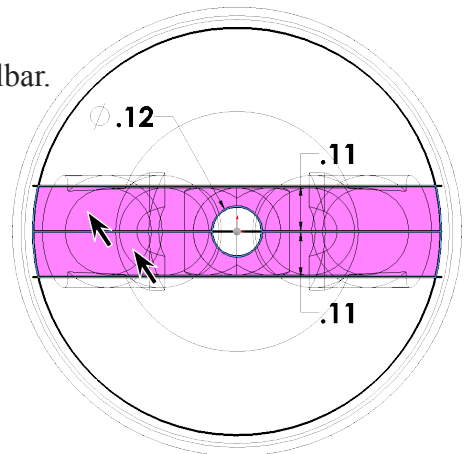
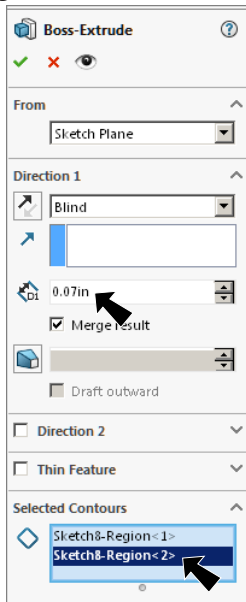


Fig. 77

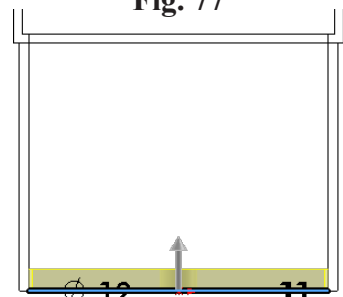





Fig. 78

T. Fillet Edges.

Step 1. Click **Shaded With Edges**  on the View toolbar.

Step 2. Click **Section View**  on the View toolbar and in Section View Property Manager click **OK** .

Step 3. Use **Down Arrow** key on keyboard to rotate view slightly.

Step 4. Click **Fillet**  on the Features toolbar.

Step 5. In the Fillet Property Manager set:
 select **FilletXpert**, **Fig. 79**

Radius  **.03**
 click the **3 edges on inside**, **Fig. 80**
 click **OK** .

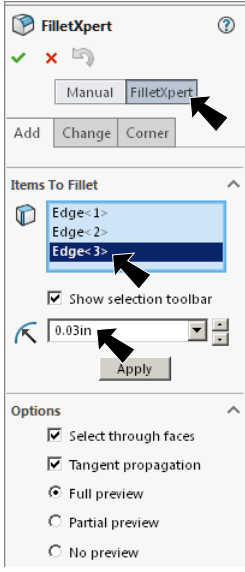


Fig. 79

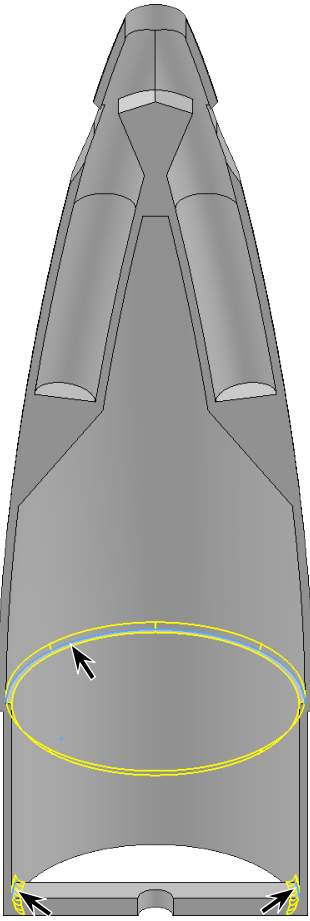


Fig. 80

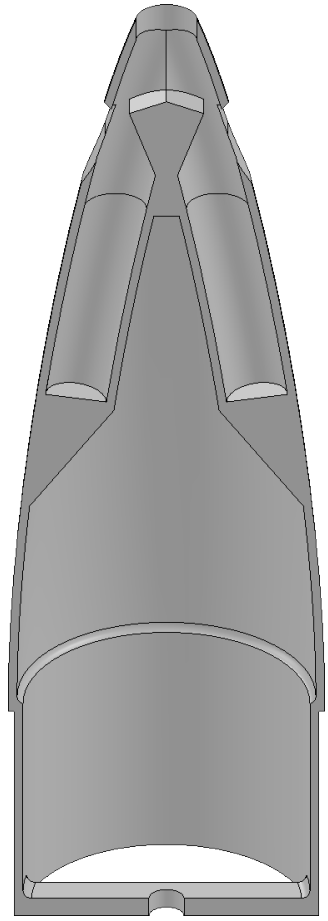



Fig. 81

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

U. Material ABS Plastic.

Step 1. Right click Material  in the Feature Manager and click **Edit Material**, Fig. 82.

Step 2. Expand **Plastics** in the material tree and select **ABS**. Click **Apply** and **Close**.

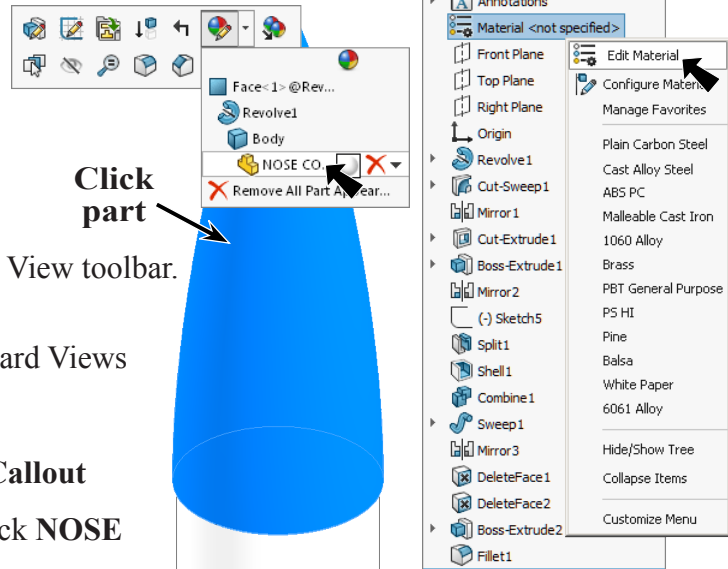




Fig. 82

V. Appearance Color.

Step 1. Turn off **Section View**  on the View toolbar.

Step 2. Click **Trimetric**  on the Standard Views toolbar.

Step 3. Click the part, click **Appearance Callout**  on the context toolbar and click **NOSE CO.** , Fig. 83.

Click part

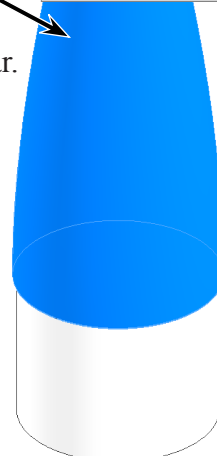




Fig. 83

Step 4. In the Appearances Property Manager, under **Color**, Fig. 84
 set **RGB values**
R 243
G 255
B 0
 click **Advanced** button at top of Property Manager, Fig. 85
 click **Illumination** tab 
 set **Transparency amount .10**
 click **OK** .

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

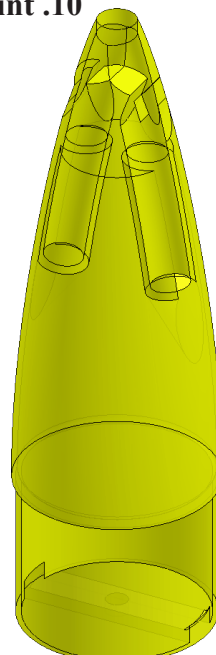


Fig. 86

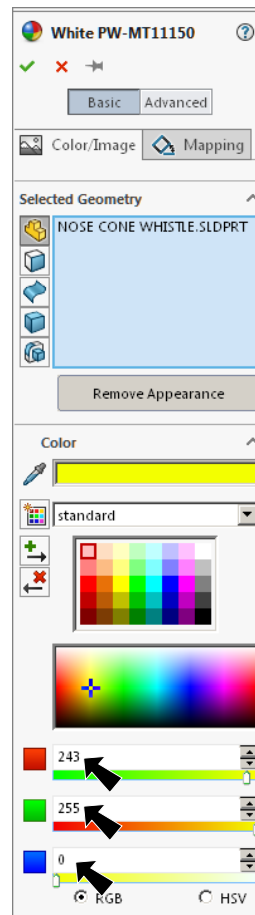


Fig. 84

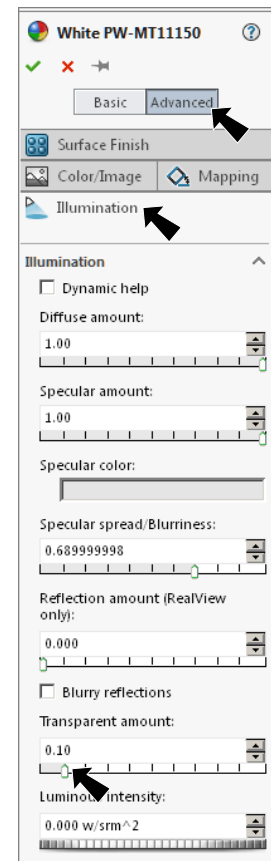


Fig. 85