

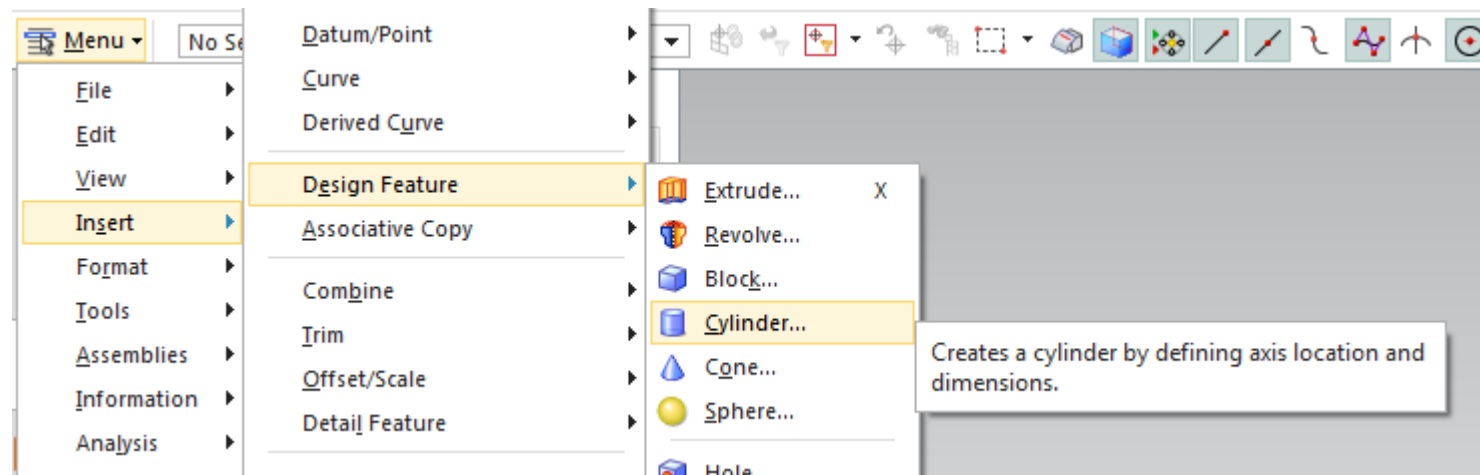
PROJETO E MANUFATURA ASSISTIDOS POR COMPUTADOR 27260 A

AULA 03– MODEL SHAFT

Introduction

We will now model a shaft having two cylinders and one cone joined together.

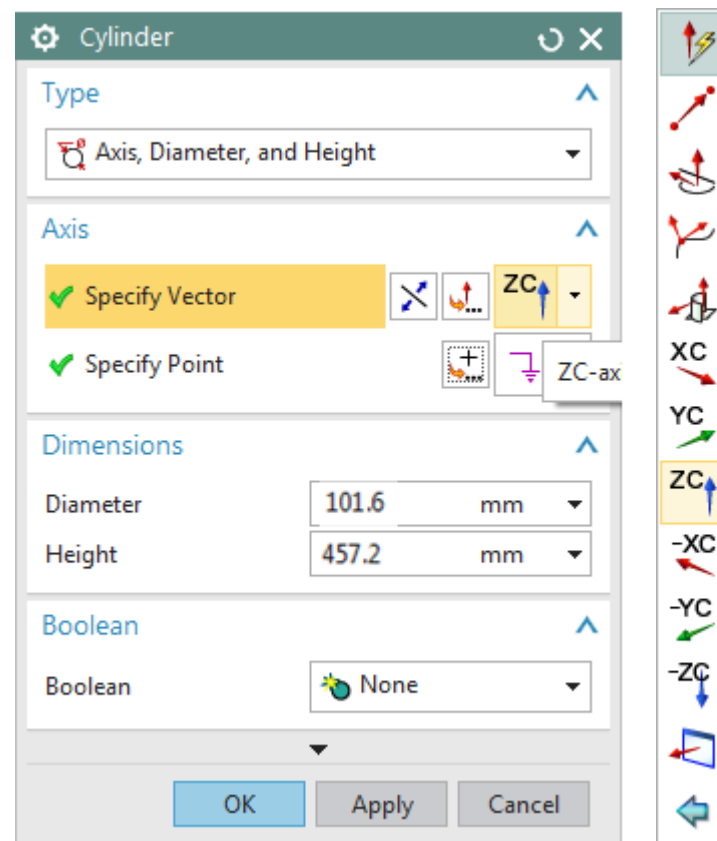
1. Create a new file and save it as **Impeller_shaft.prt**
2. Choose **Insert** → **Design Feature** → **Cylinder** or click on **More** in **Feature** group in the ribbon bar to find **Cylinder** in **Design Feature** section.



A *Cylinder* can be defined by two *types* which can be obtained by scrolling the drop-down menu under *Type*

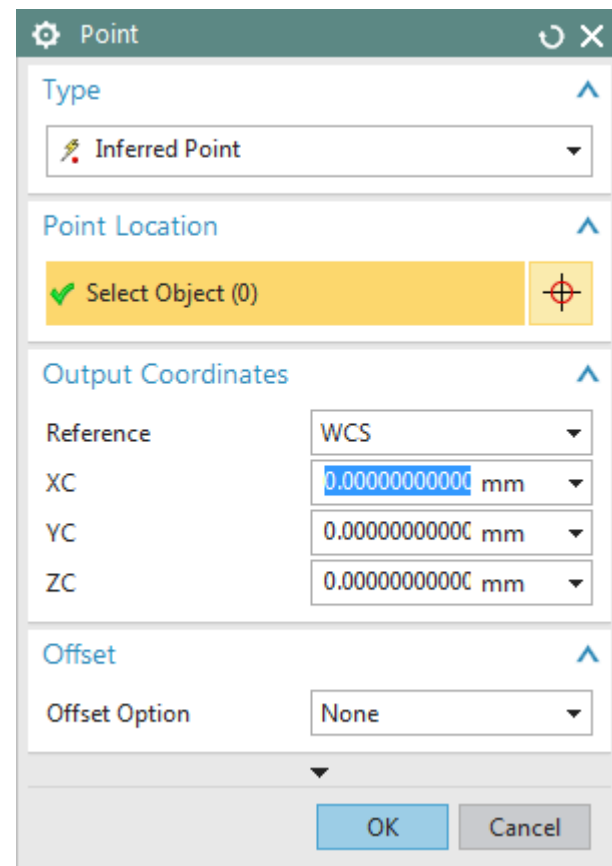
- Axis, Diameter, and Height
- Arc and Height

3. Select **Axis, Diameter, and Height**
4. Click on the **Vector Constructor** icon next to **Specify Vector** and select the **ZC** Axis icon



5. Click on the **Point Dialog** icon next to **Specify Point** to set the origin of the cylinder

6. Set all the **XC**, **YC**, and **ZC** coordinates to be 0



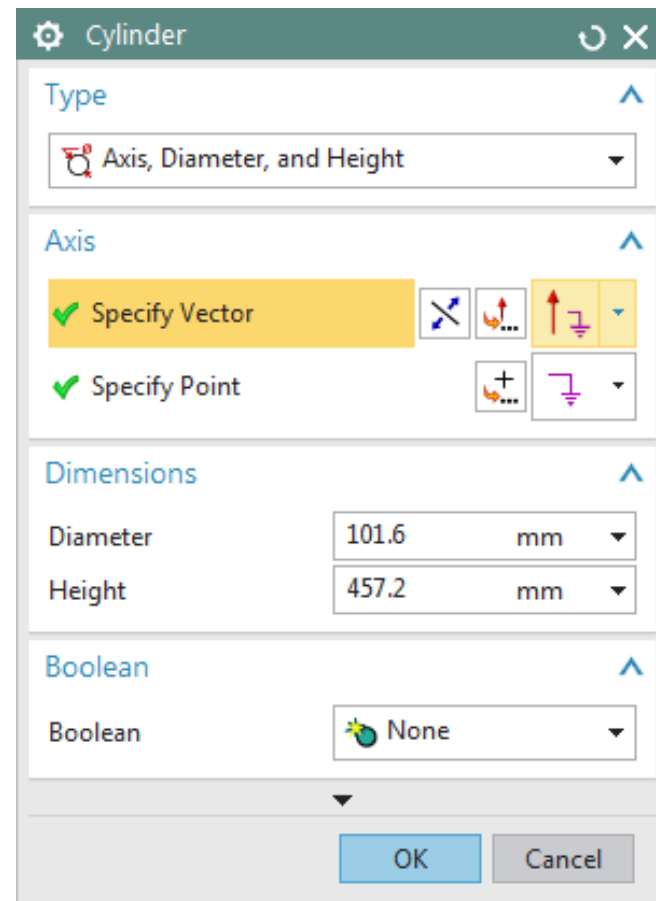
The image shows a software dialog box titled "Point". It has a green header bar with a gear icon, the title "Point", and standard window controls (refresh, close). The dialog is organized into sections with expandable/collapsible arrows:

- Type**: A dropdown menu showing "Inferred Point".
- Point Location**: A yellow button labeled "Select Object (0)" with a red crosshair icon to its right.
- Output Coordinates**: A section containing four rows of input fields:
 - Reference**: A dropdown menu set to "WCS".
 - XC**: A text input field containing "0.000000000000" followed by a unit dropdown set to "mm".
 - YC**: A text input field containing "0.000000000000" followed by a unit dropdown set to "mm".
 - ZC**: A text input field containing "0.000000000000" followed by a unit dropdown set to "mm".
- Offset**: A section with a dropdown menu for "Offset Option" set to "None".

At the bottom of the dialog are "OK" and "Cancel" buttons.

7. In the next dialog box of the window, type in the following values

- Diameter = **101.6 mm**
- Height = **457.2 mm**



Cylinder

Type
Axis, Diameter, and Height

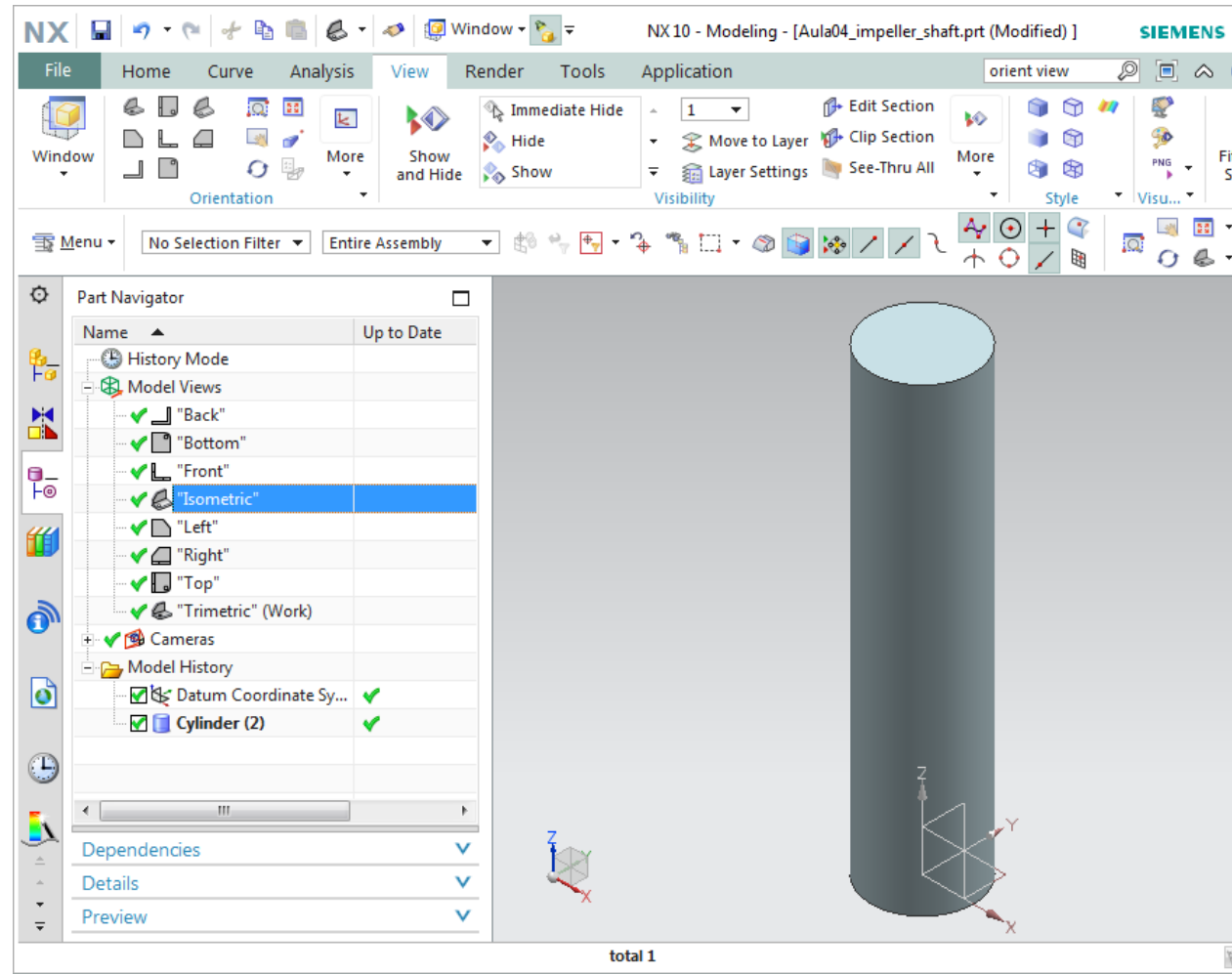
Axis
Specify Vector
Specify Point

Dimensions
Diameter: 101.6 mm
Height: 457.2 mm

Boolean
None

OK Cancel

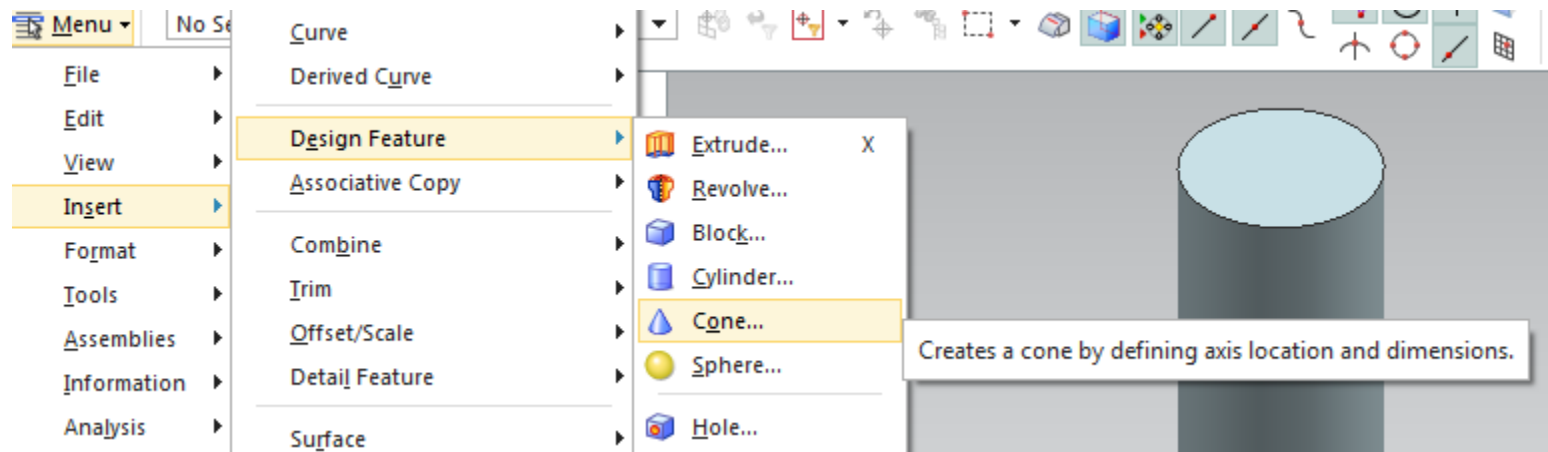
8. Right-click on
the screen, choose
Orient View
→ **Isometric**



The cylinder will look as shown on the right. Now we will create a cone at one end of the cylinder.



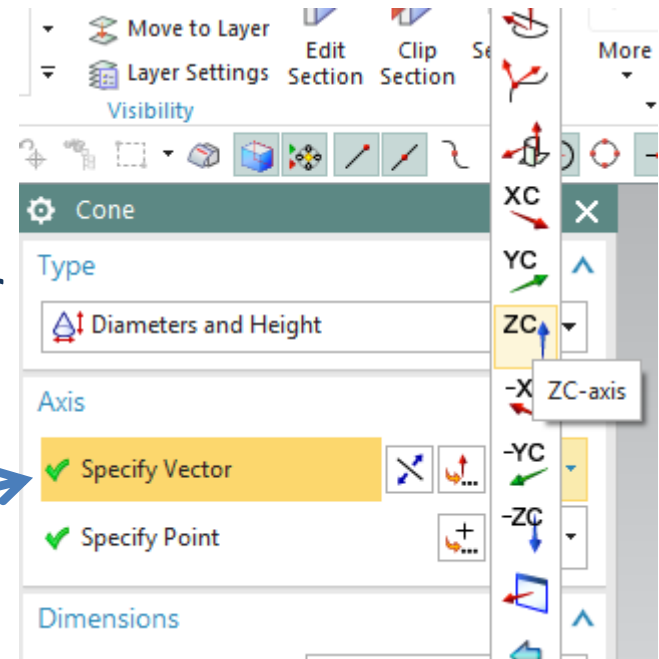
9. Choose **Insert** → **Design Feature** → **Cone** or click on **More** in **Feature** group in the ribbon bar to find **Cone** in **Design Feature** section



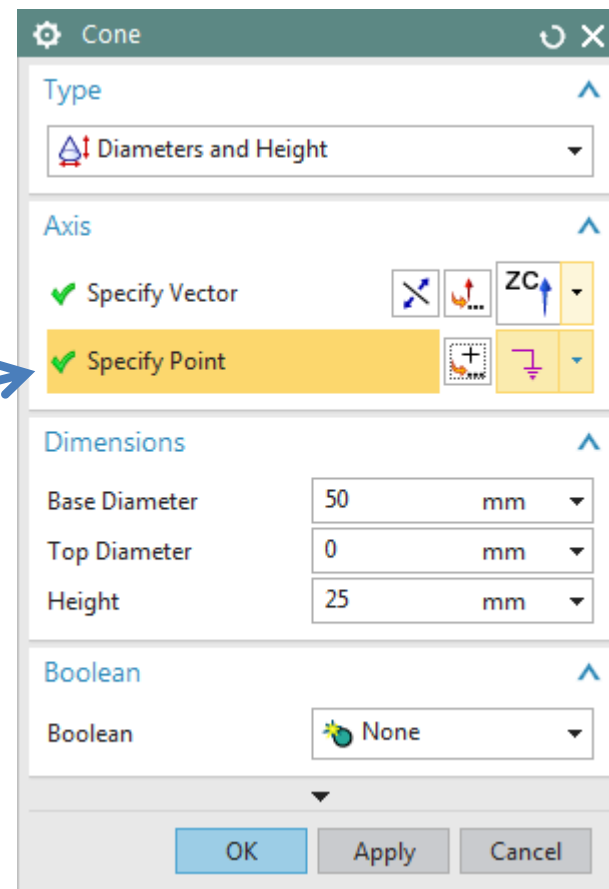
Similar to *Block* and *Cylinder*, there are various ways to create a cone which can be seen by scrolling the drop-down menu in the *Type* box.

- Diameters and Height
- Diameters and Half Angle
- Base Diameter, Height, and Half Angle
- Top Diameter, Height, and Half Angle
- Two Coaxial Arcs

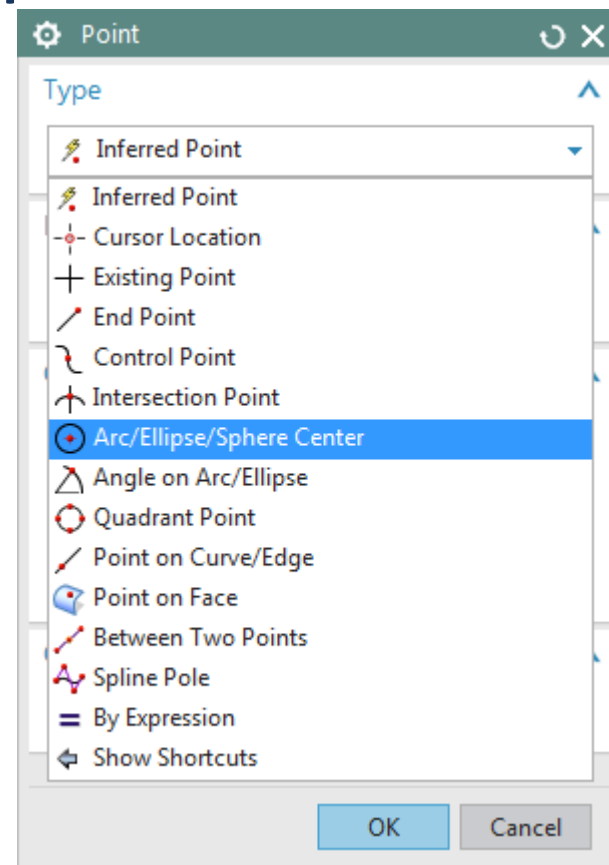
- 10. Select **Diameters and Height**
- 11. Click on the Vector Constructor icon next to **Specify Vector**
- 12. Choose the **ZC-Axis** icon so the vector is pointing in the positive Z direction



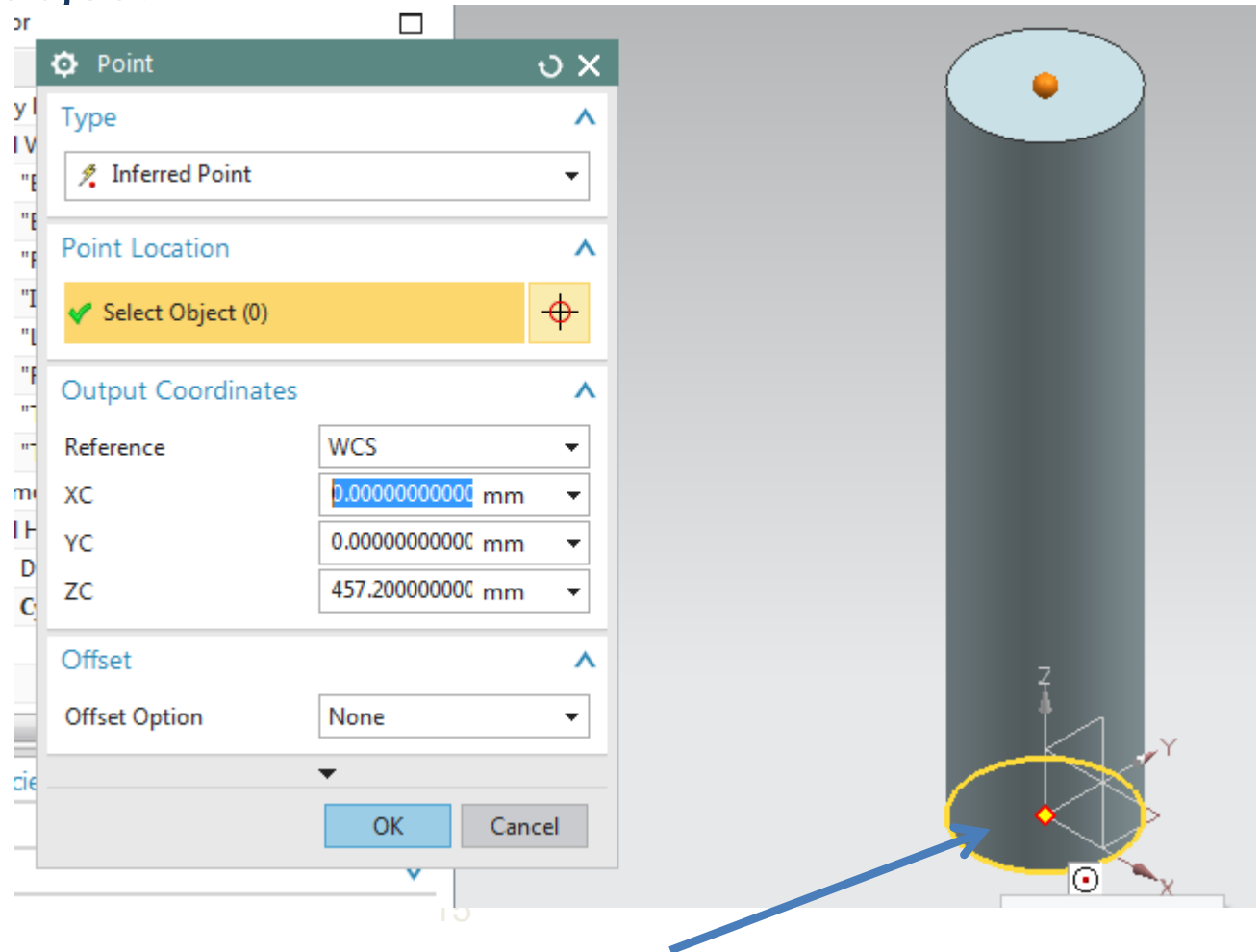
13. Click on the **Point Constructor** icon next to **Specify Point** to set the origin of the cylinder.



14. Choose the **Arc/Ellipse/Sphere Center** icon on the dialog box and click on the top circular edge of the cylinder.



15. Select the object



16. In the **Cone Window**, type in the following values:

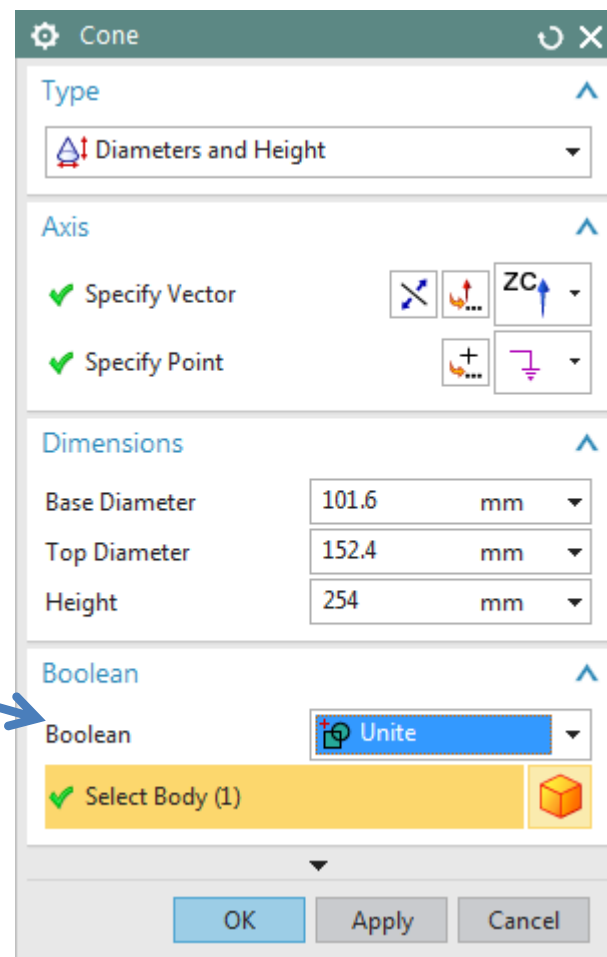
Base Diameter = **101.6 mm**

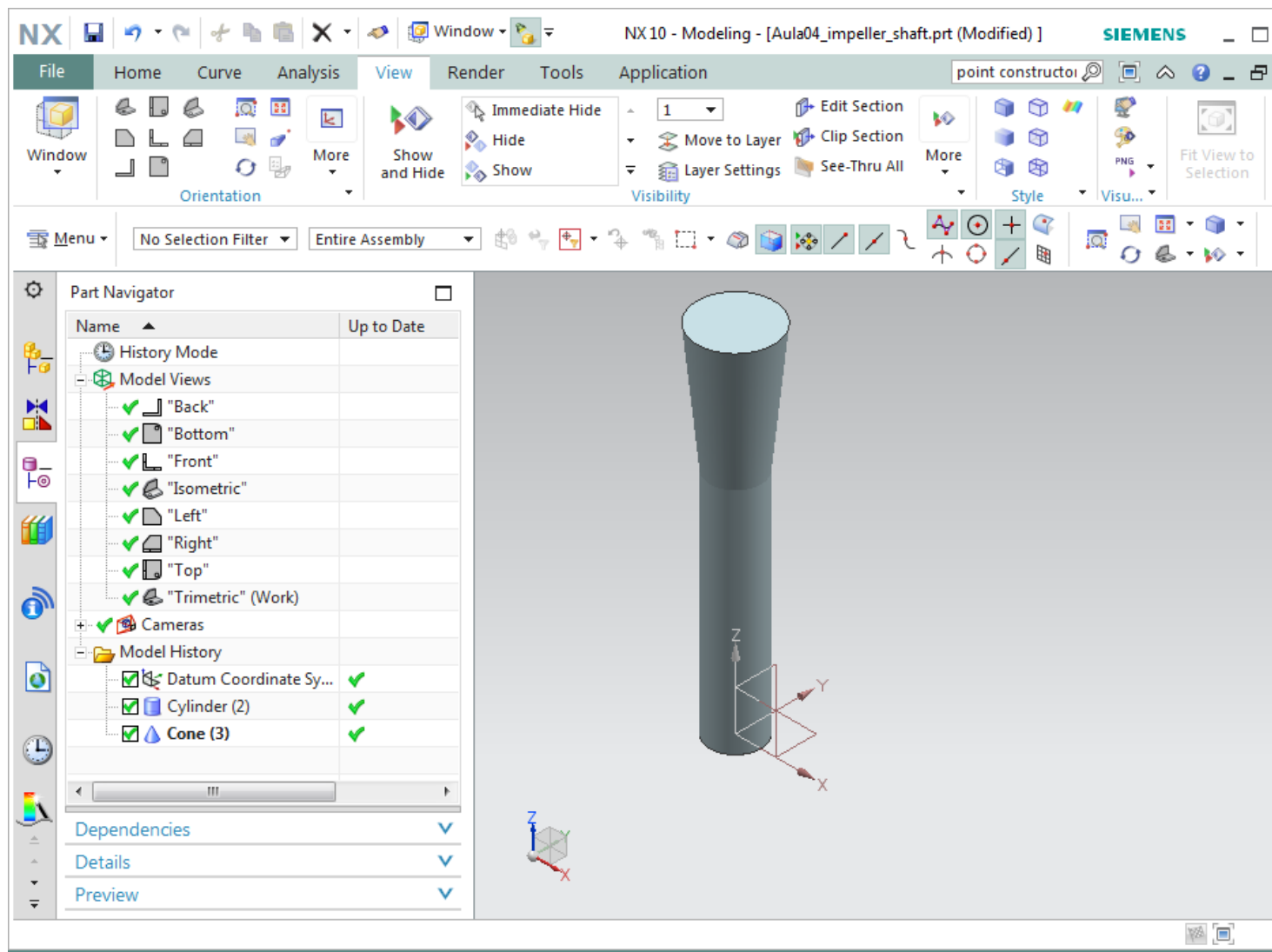
Top Diameter = **152.4 mm**

Height = **254 mm**

17. On the Boolean Operation window, choose **Unite** and select the cylinder

18. Click **OK**

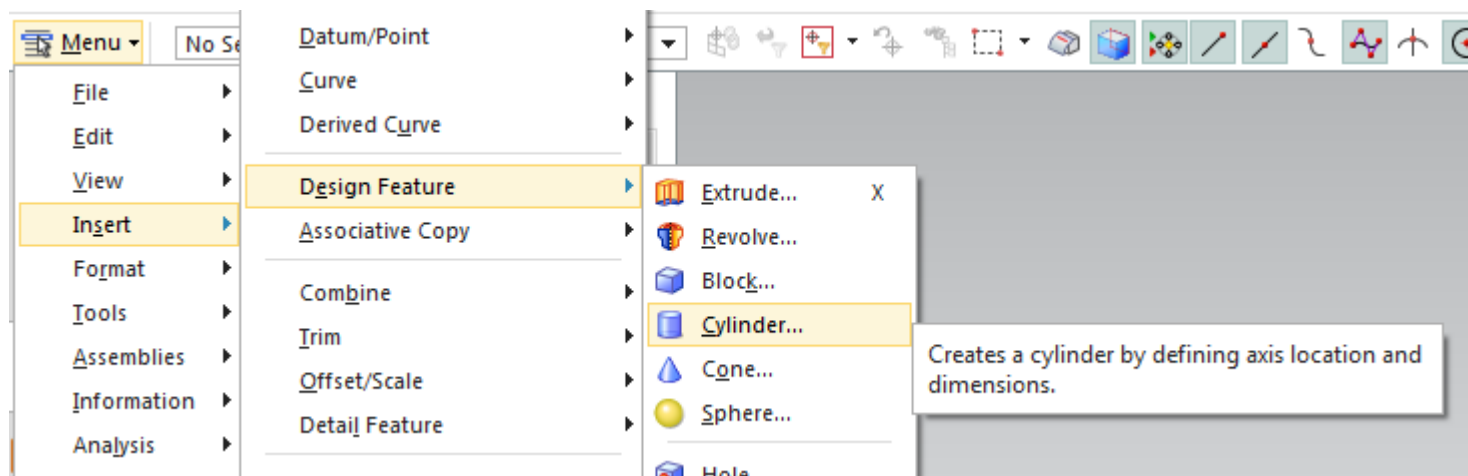




Now the cone will appear on top of the cylinder. The shaft is as shown on right.



19. Choose **Insert** → **Design Feature** → **Cylinder** or click on **More** in **Feature** group in the ribbon bar to find **Cylinder** in **Design Feature** section.



21. Click on the **Vector Constructor** icon next to **Specify Vector** and select the **ZC Axis** icon



22. Click on the **Point Dialog** icon next to **Specify Point** to set the origin of the cylinder.

23. On the **Point Constructor** window, again click on the **Center** icon and construct it at the center point of the base of the cone.

24. In the next dialog box of the window, type in the following values

- Diameter = **152.4 mm**
- Height = **508 mm**

25. Save.

