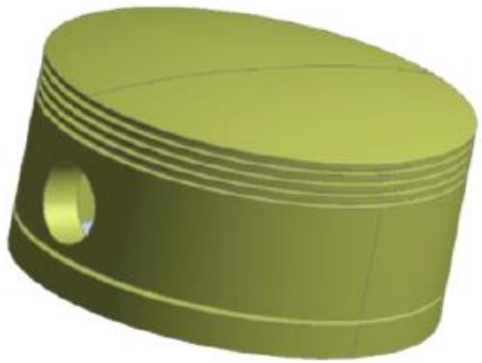
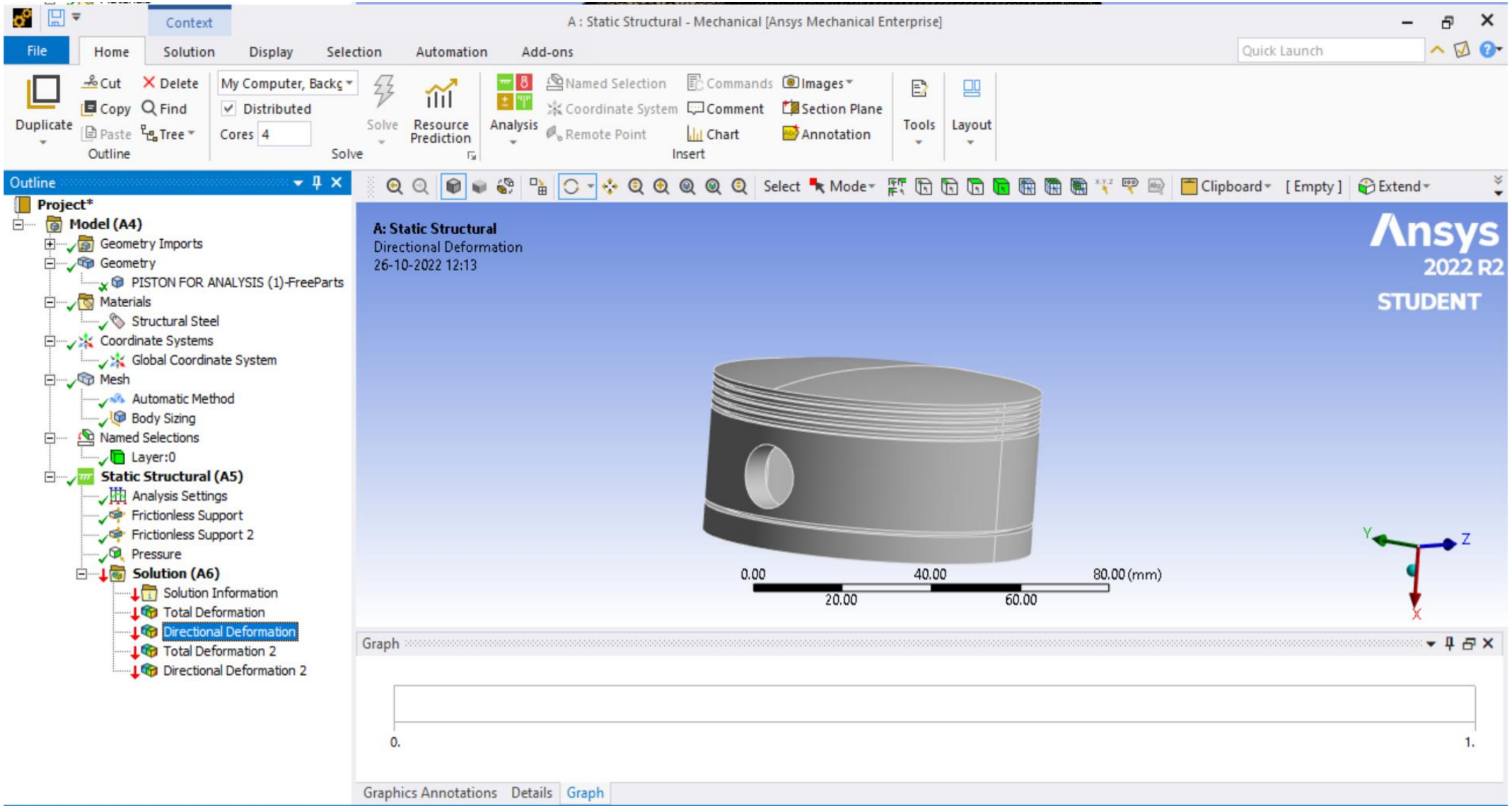
Question 2: Static Structural Analysis

Geometry Detail's



- **Meshing Details**
  4. Meshing Methods= Automatic
  5. Body Sizing
  6. Element Size= 3mm

- **Boundary Condition**
  3. Material – Structural Steel
  4. Pressure 5Mpa
  5. Frictionless support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Add-ons
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Resource Prediction
Solve
Analysis
Named Selection
Coordinate System
Remote Point
Commands
Comment
Chart
Images
Section Plane
Annotation
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Layout
Outline
Project*
Model (A4)
Geometry Imports
Geometry
PISTON FOR ANALYSIS (1)-FreeParts
Materials
Structural Steel
Coordinate Systems
Global Coordinate System
Mesh
Automatic Method
Body Sizing
Named Selections
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Static Structural (A5)
Analysis Settings
Frictionless Support
Frictionless Support 2
Pressure
Solution (A6)
Solution Information
Total Deformation
Directional Deformation
Total Deformation 2
Directional Deformation 2
Select
Mode
Clipboard
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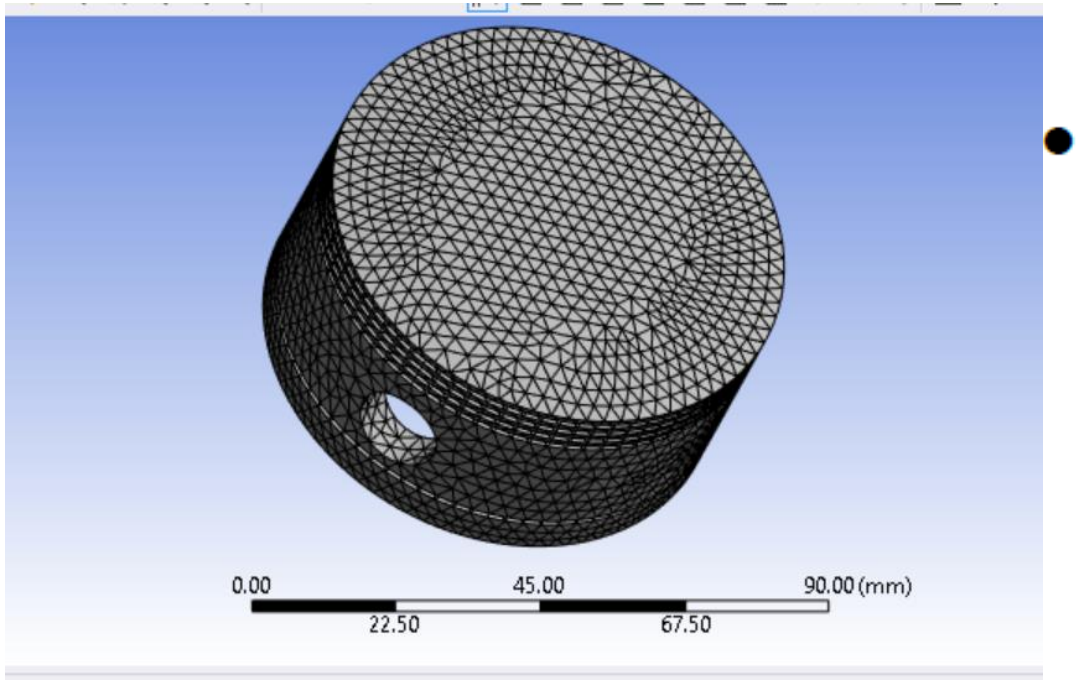
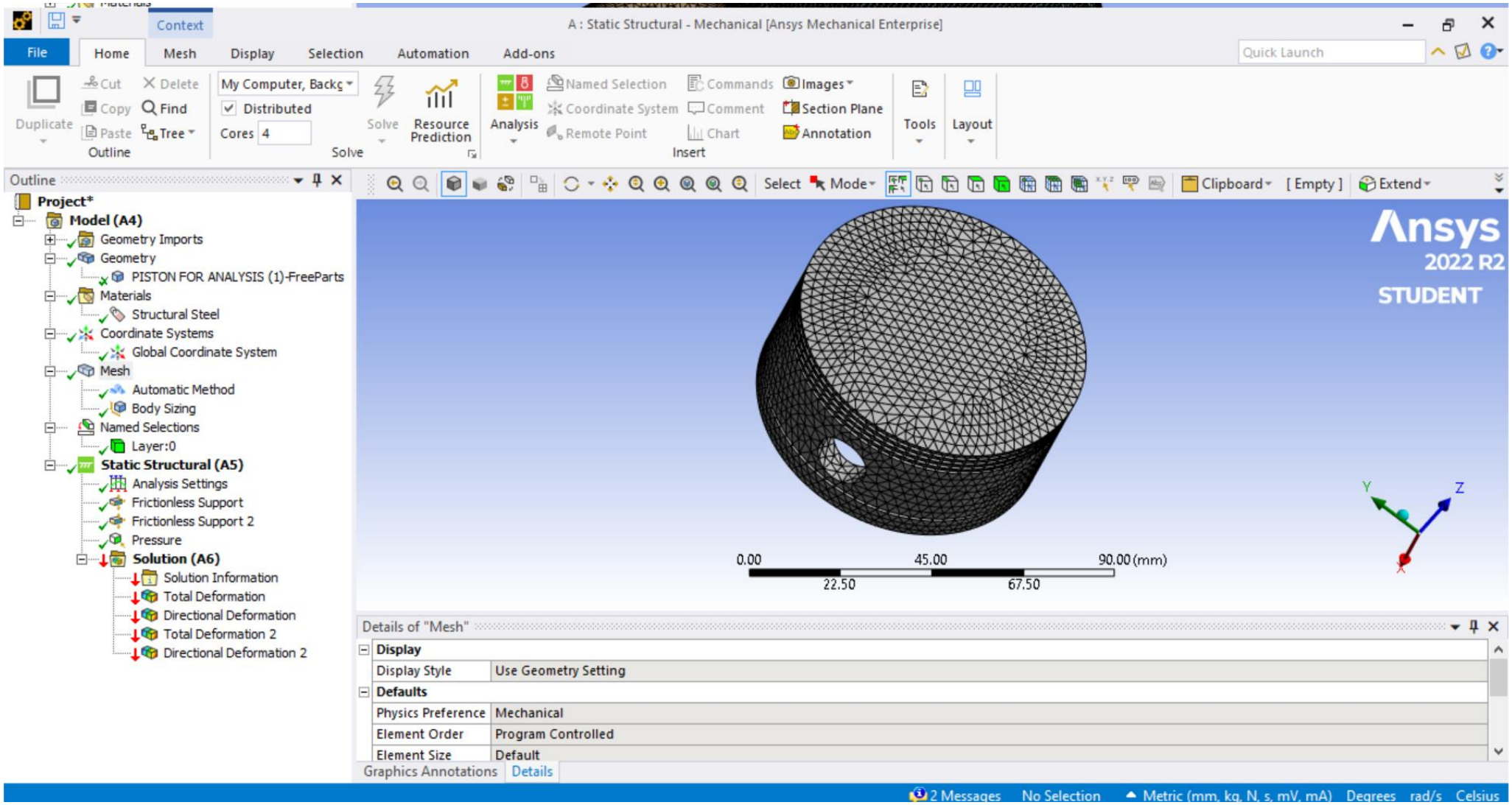
Extend
A: Static Structural
Directional Deformation
26-10-2022 12:13
Ansys
2022 R2
STUDENT
0.00
40.00
80.00 (mm)
20.00
60.00
Y
Z
X
Graph
0.
1.
Graphics Annotations
Details
Graph

GEOMETRY



- **Meshing Details**

4. Meshing Methods= Automatic
5. Body Sizing
6. Element Size= 3mm


A : Static Structural - Mechanical [Ansys Mechanical Enterprise]
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Body Sizing
Named Selections
Layer:0
Static Structural (A5)
Analysis Settings
Frictionless Support
Frictionless Support 2
Pressure
Solution (A6)
Solution Information
Total Deformation
Directional Deformation
Total Deformation 2
Directional Deformation 2
Select
Mode
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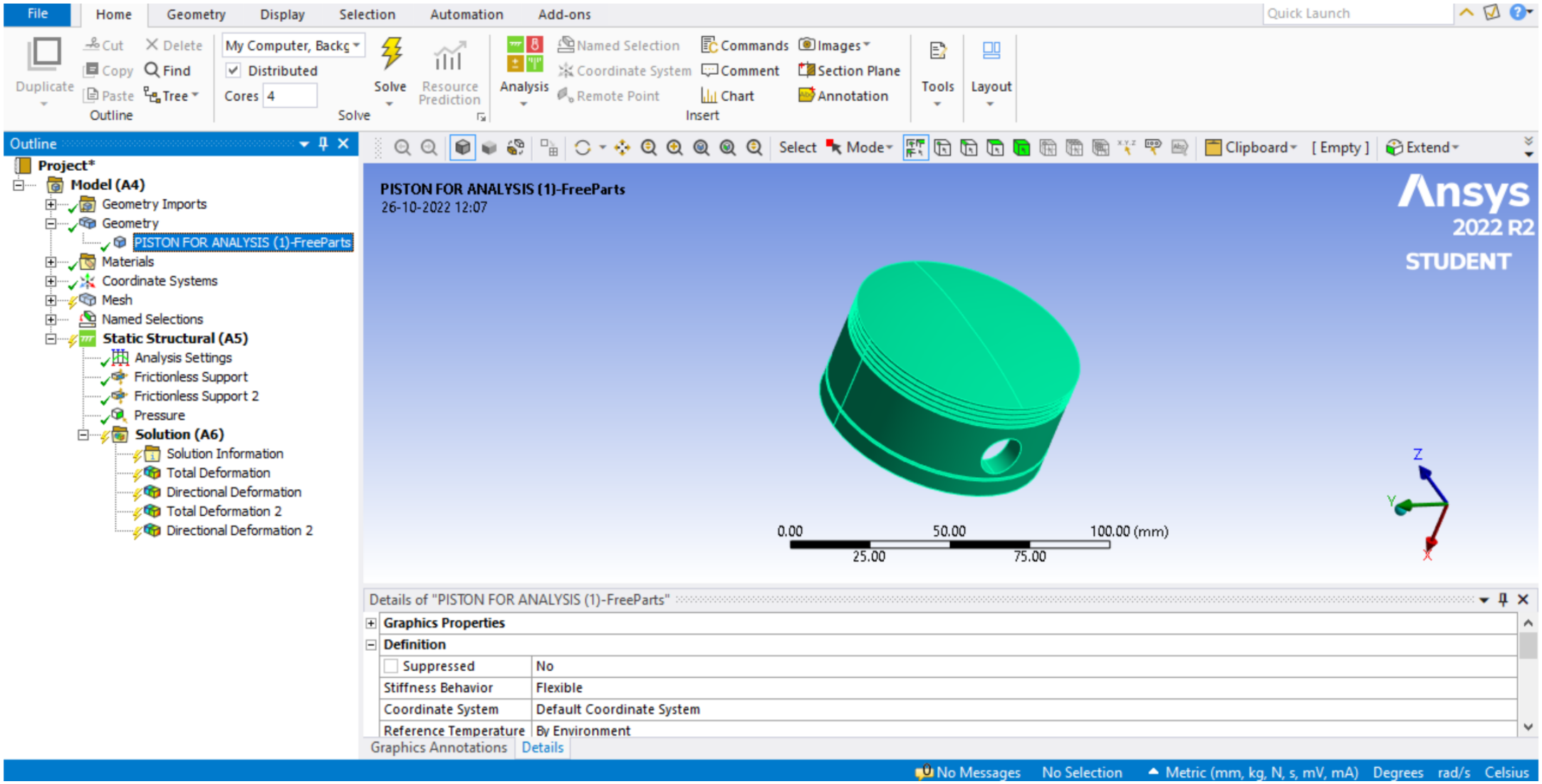
Extend
Ansys
2022 R2
STUDENT
0.00
45.00
90.00 (mm)
22.50
67.50
Y
Z
X
Details of "Mesh"
Display
Display Style
Use Geometry Setting
Defaults
Physics Preference
Mechanical
Element Order
Program Controlled
Element Size
Default
Graphics Annotations
Details
2 Messages
No Selection
Metric (mm, kg, N, s, mV, mA)
Degrees
rad/s
Celsius

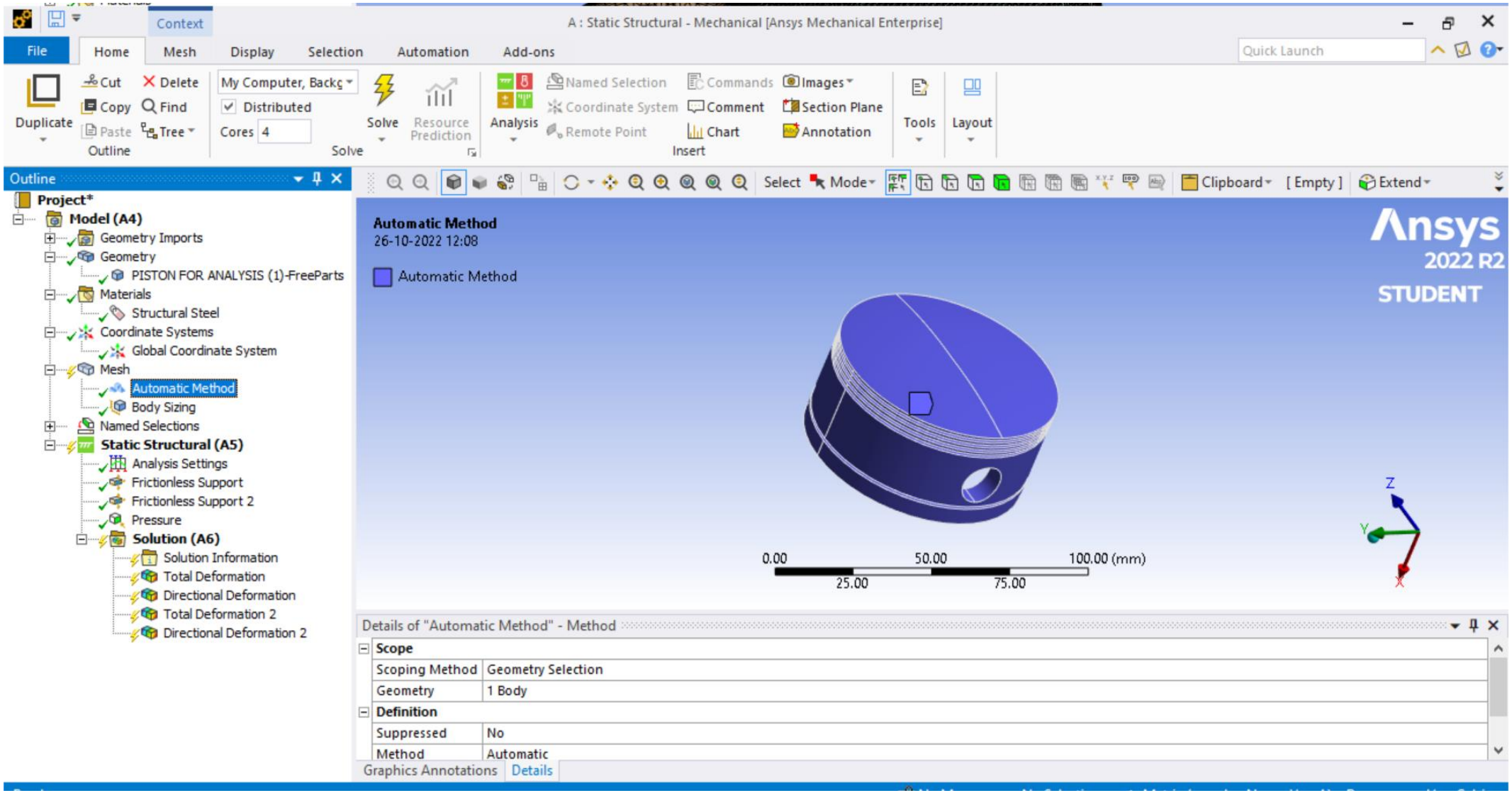
MESHING

BOUNDARY CONDITIONS

- **Boundary Condition**
  3. Material – Structural Steel
  4. Pressure 5Mpa
  5. Frictionless support



BOUNDARY CONDITIONS



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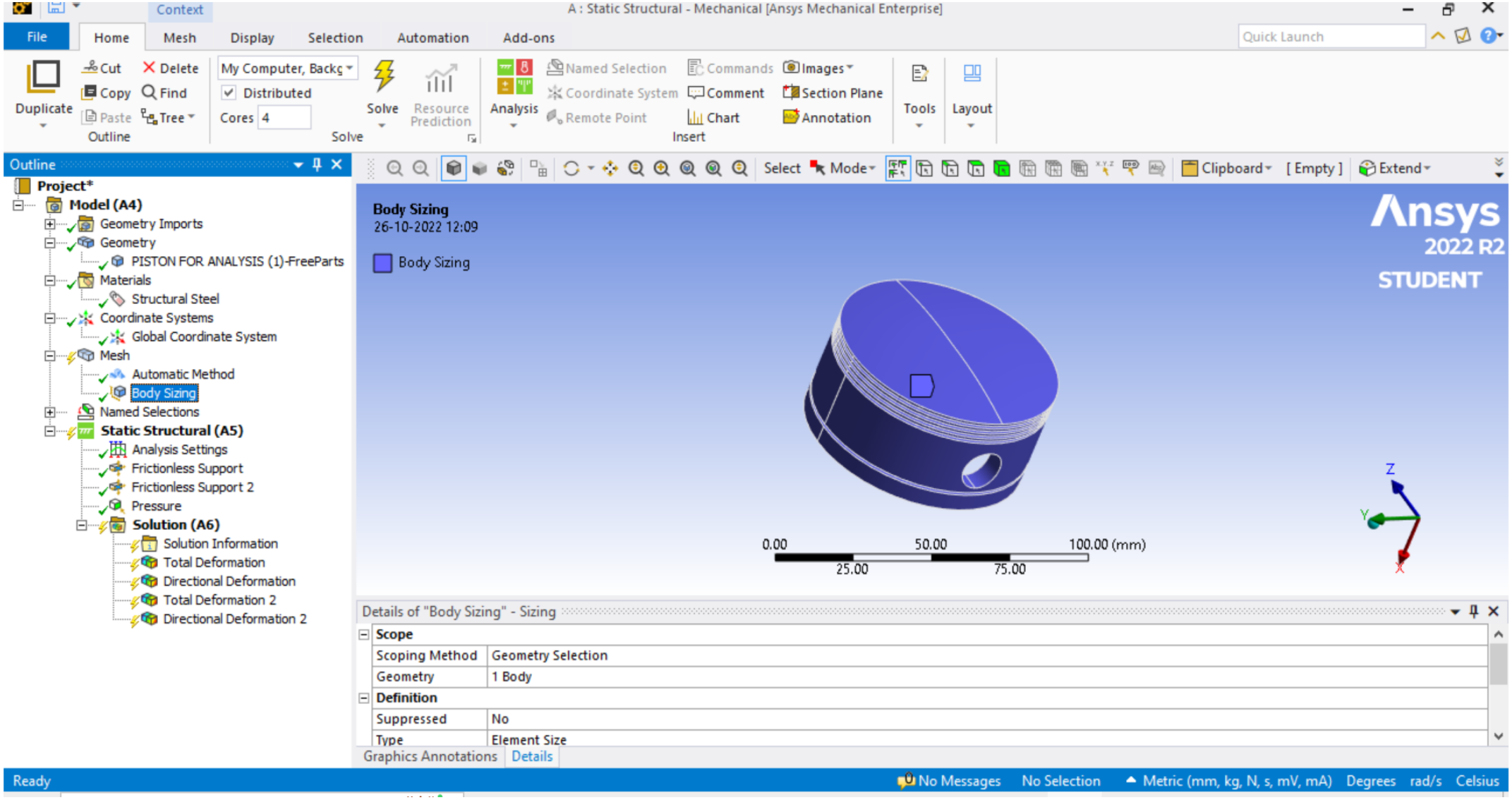
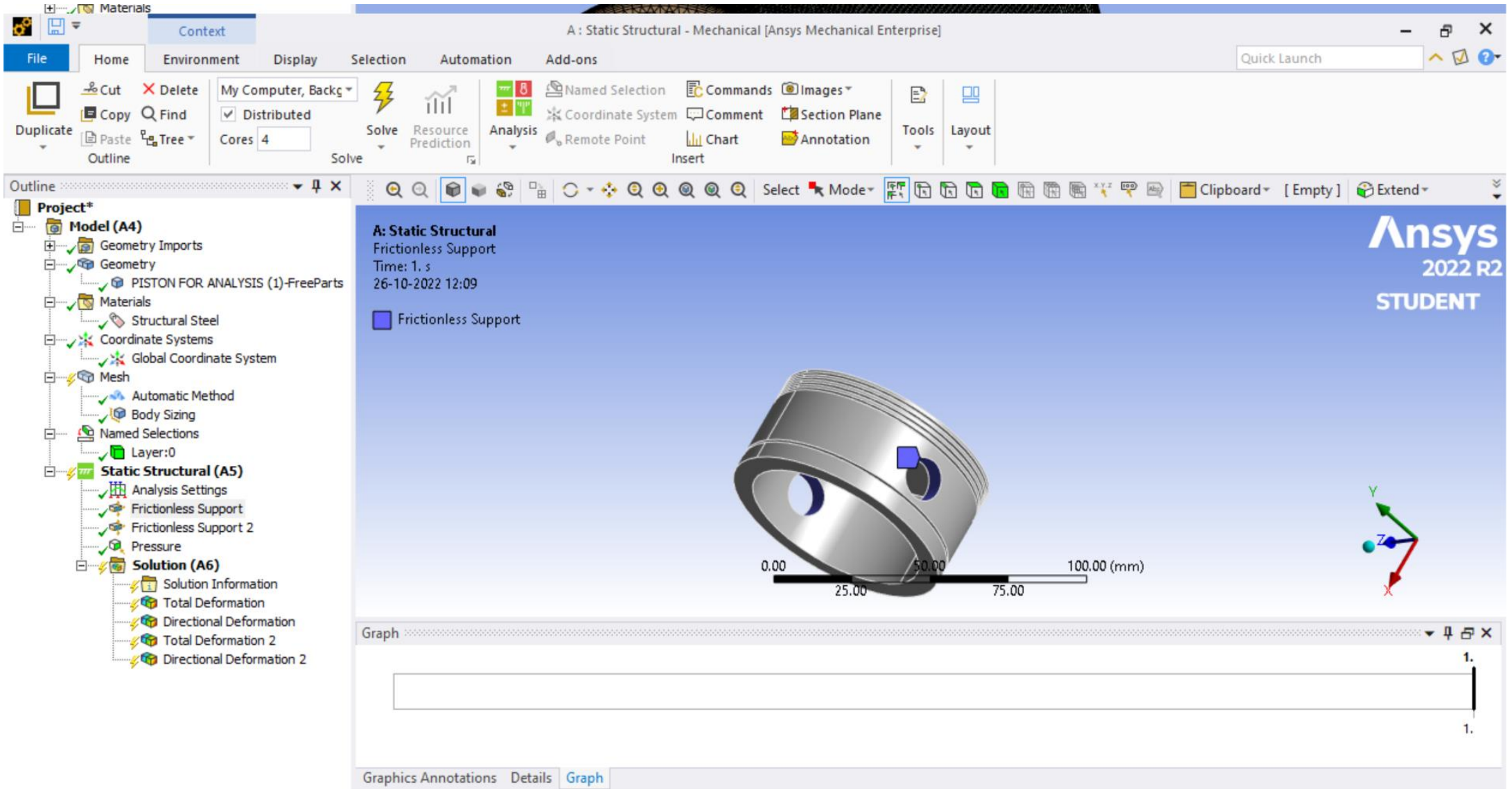


BOUNDARY CONDITIONS



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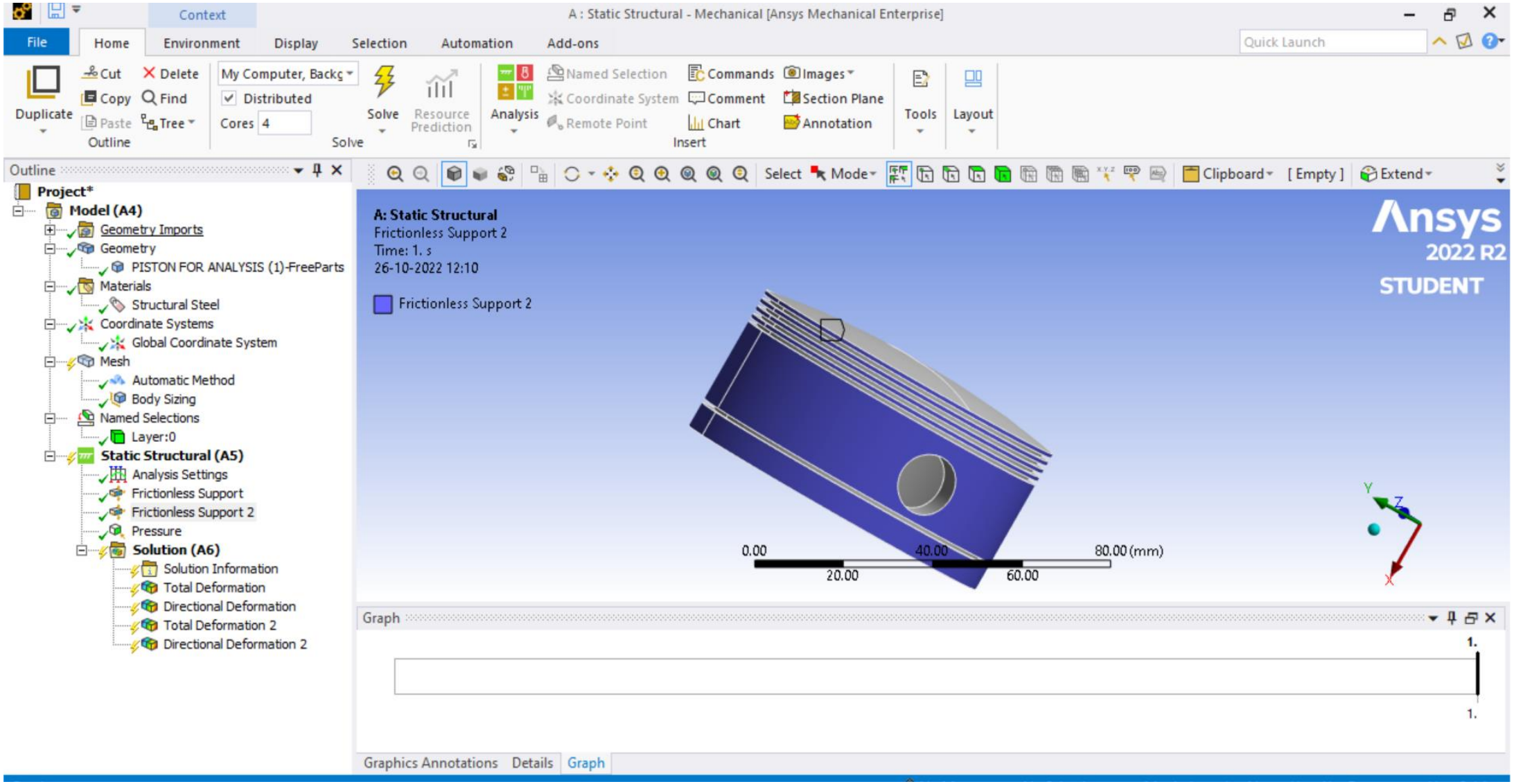
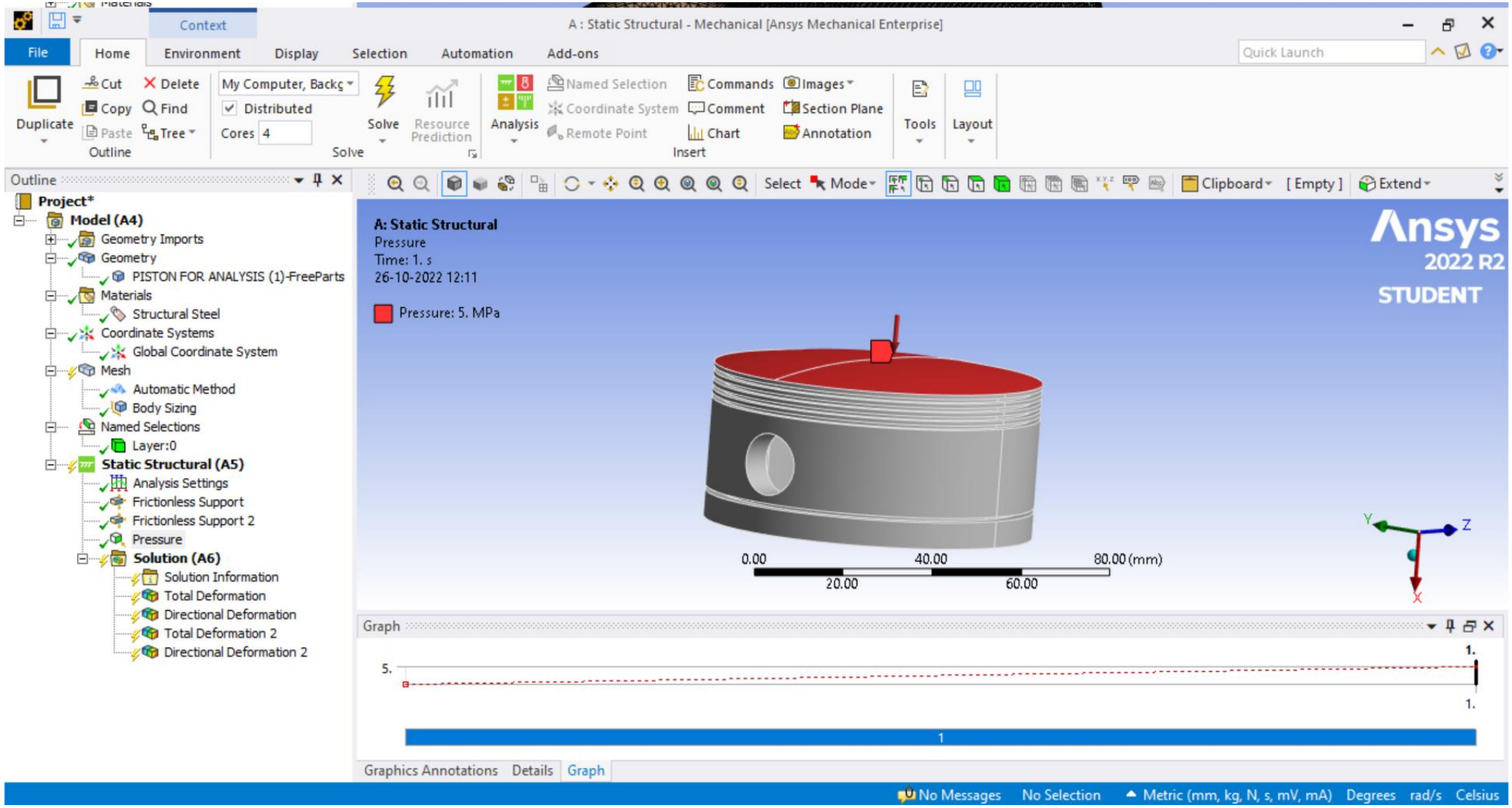
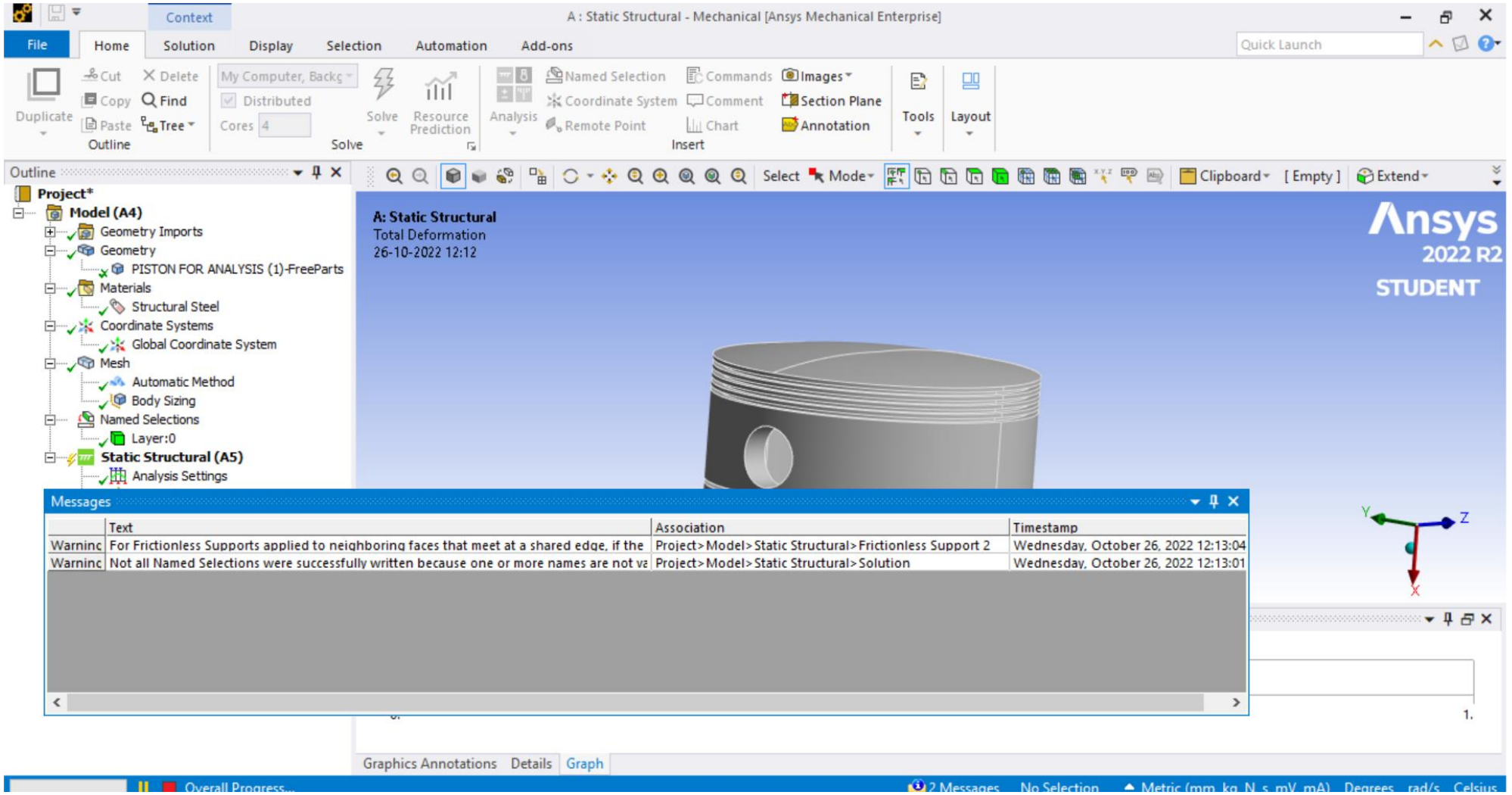


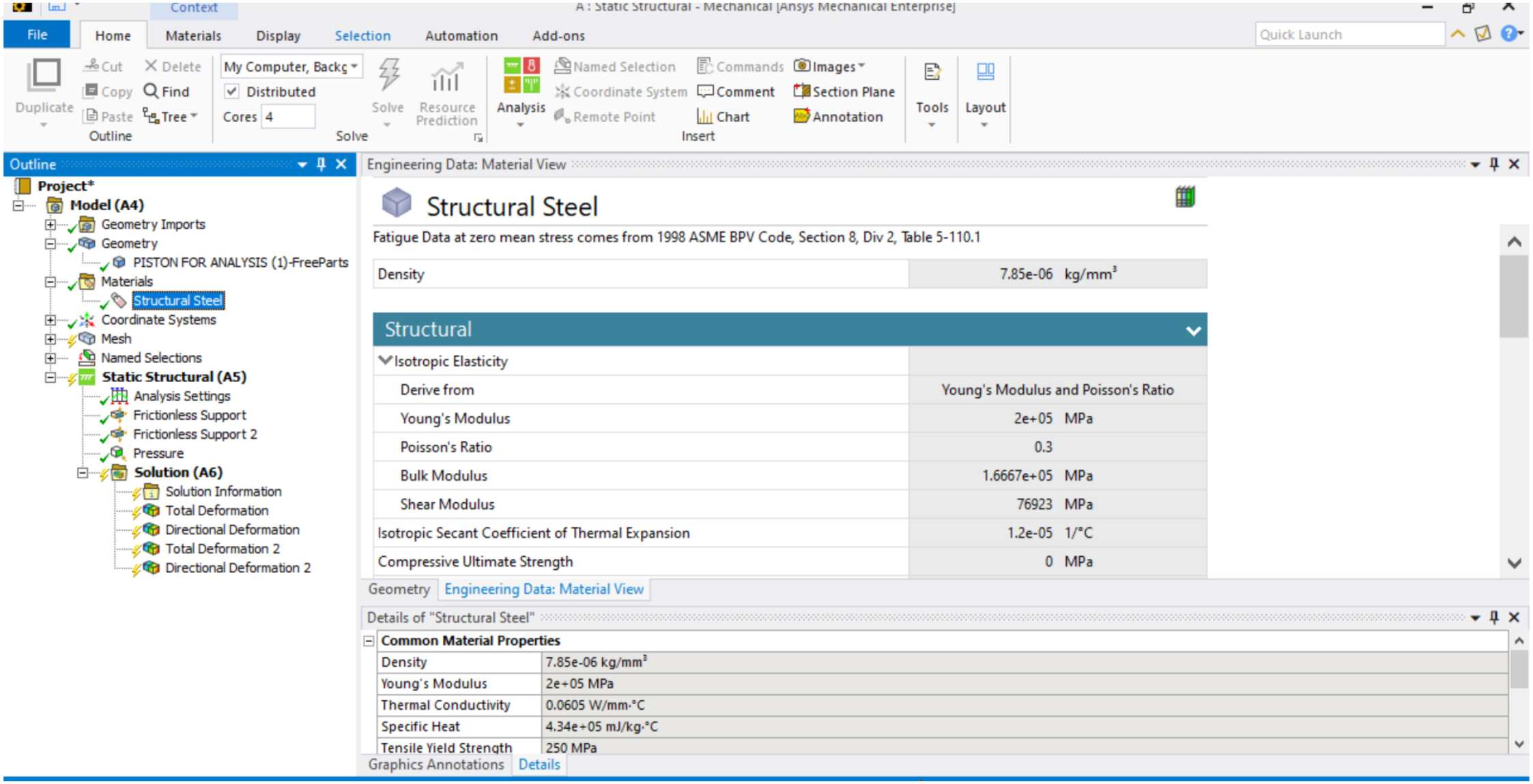
BOUNDARY CONDITIONS



BOUNDARY CONDITIONS



BOUNDARY CONDITIONS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Coordinate System
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Commands
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Section Plane
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Outline
Project*
Model (A4)
Geometry Imports
Geometry
PISTON FOR ANALYSIS (1)-FreeParts
Materials
Structural Steel
Coordinate Systems
Mesh
Named Selections
Static Structural (A5)
Analysis Settings
Frictionless Support
Frictionless Support 2
Pressure
Solution (A6)
Solution Information
Total Deformation
Directional Deformation
Total Deformation 2
Directional Deformation 2
Engineering Data: Material View
Structural Steel
Fatigue Data at zero mean stress comes from 1998 ASME BPV Code, Section 8, Div 2, Table 5-110.1
Density 7.85e-06 kg/mm³
Structural
Isotropic Elasticity
Derive from Young's Modulus and Poisson's Ratio
Young's Modulus 2e+05 MPa
Poisson's Ratio 0.3
Bulk Modulus 1.6667e+05 MPa
Shear Modulus 76923 MPa
Isotropic Secant Coefficient of Thermal Expansion 1.2e-05 1/°C
Compressive Ultimate Strength 0 MPa
Geometry
Engineering Data: Material View
Details of "Structural Steel"
Common Material Properties
Density 7.85e-06 kg/mm³
Young's Modulus 2e+05 MPa
Thermal Conductivity 0.0605 W/mm·°C
Specific Heat 4.34e+05 mJ/kg·°C
Tensile Yield Strength 250 MPa
Graphics Annotations
Details

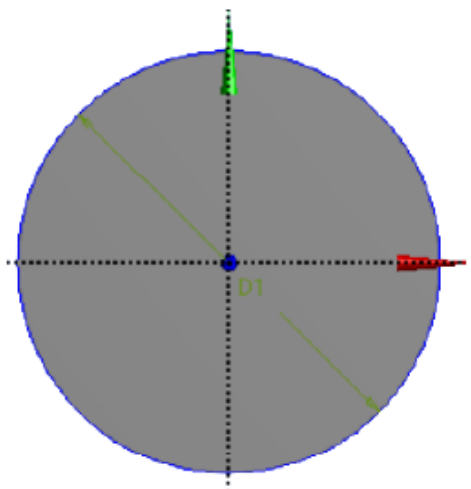
RESULTS

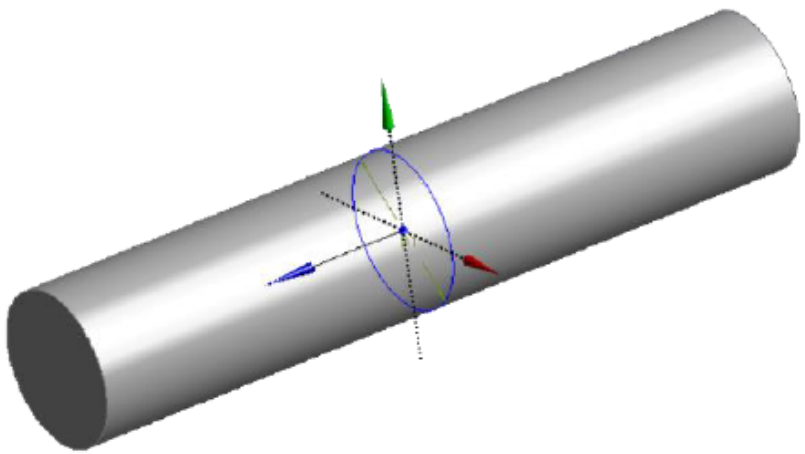
Questions 1 - Mesh the Geometry

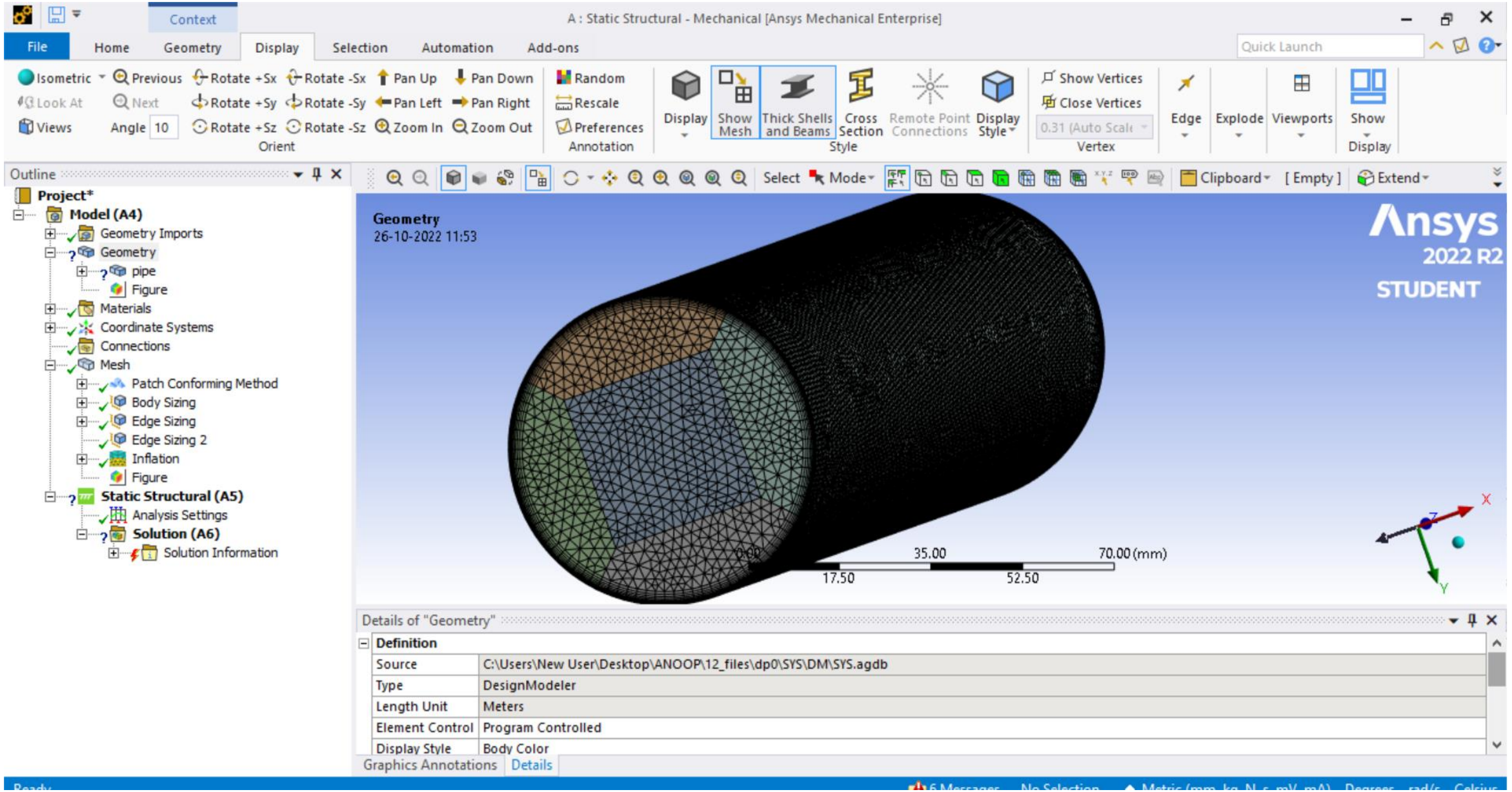
Geometry Detail's

- Mesh the cylindrical PIPE as per the given instructions
- Dimension for PIPE

1. Diameter of pipe= 60mm
2. Length of pipe= 300mm



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Remote Point Connections
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Geometry Imports
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Connections
Mesh
Patch Conforming Method
Body Sizing
Edge Sizing
Edge Sizing 2
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Analysis Settings
Solution (A6)
Solution Information
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Meters
Element Control
Program Controlled
Display Style
Body Color
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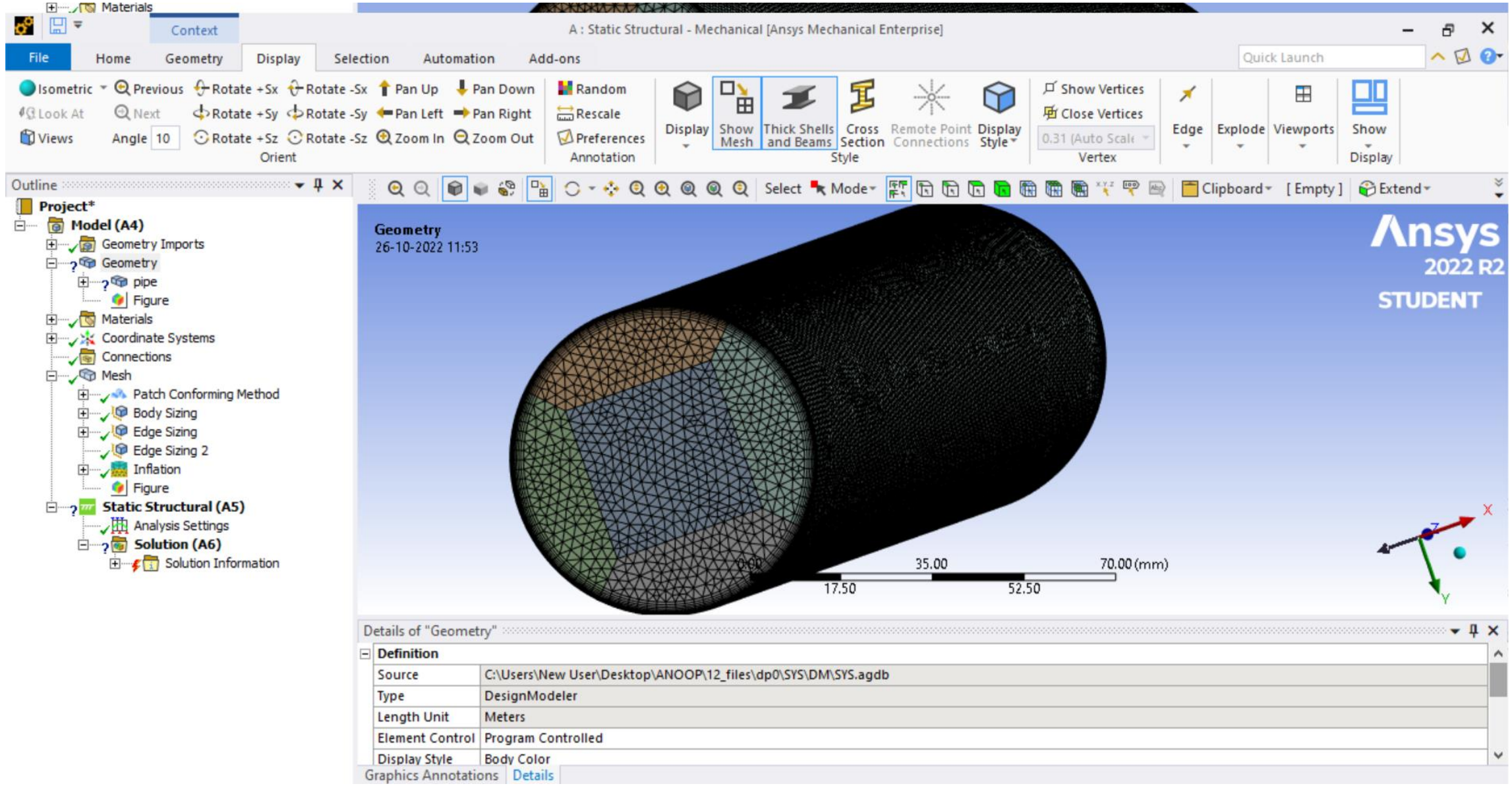
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Solution Information
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2022 R2
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Details of "Geometry"
Definition
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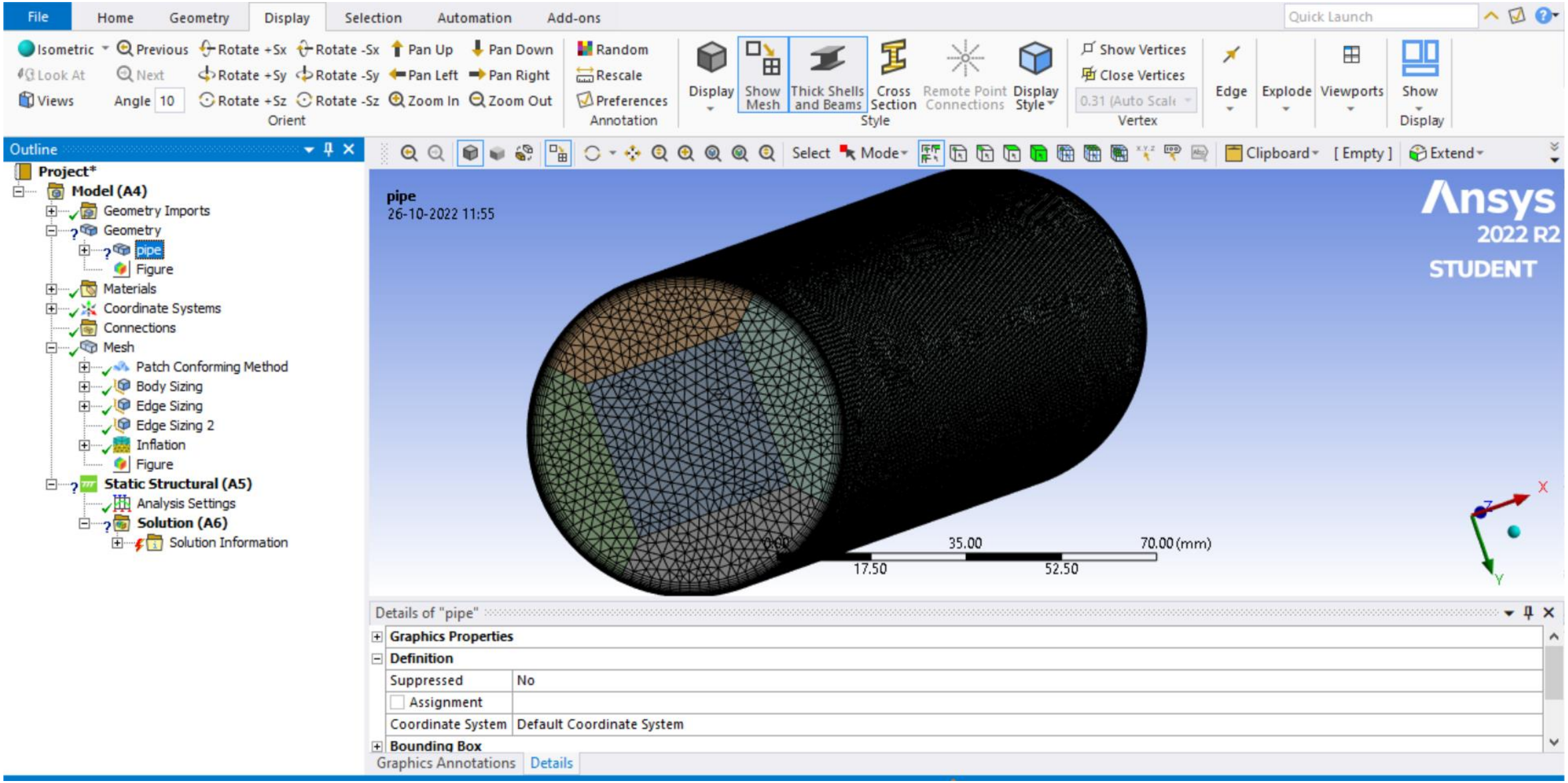
DesignModeler
Length Unit
Meters
Element Control
Program Controlled
Display Style
Body Color
Graphics Annotations
Details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Cross Section
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Geometry Imports
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Coordinate Systems
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Body Sizing
Edge Sizing
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Solution (A6)
Solution Information
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26-10-2022 11:55
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2022 R2
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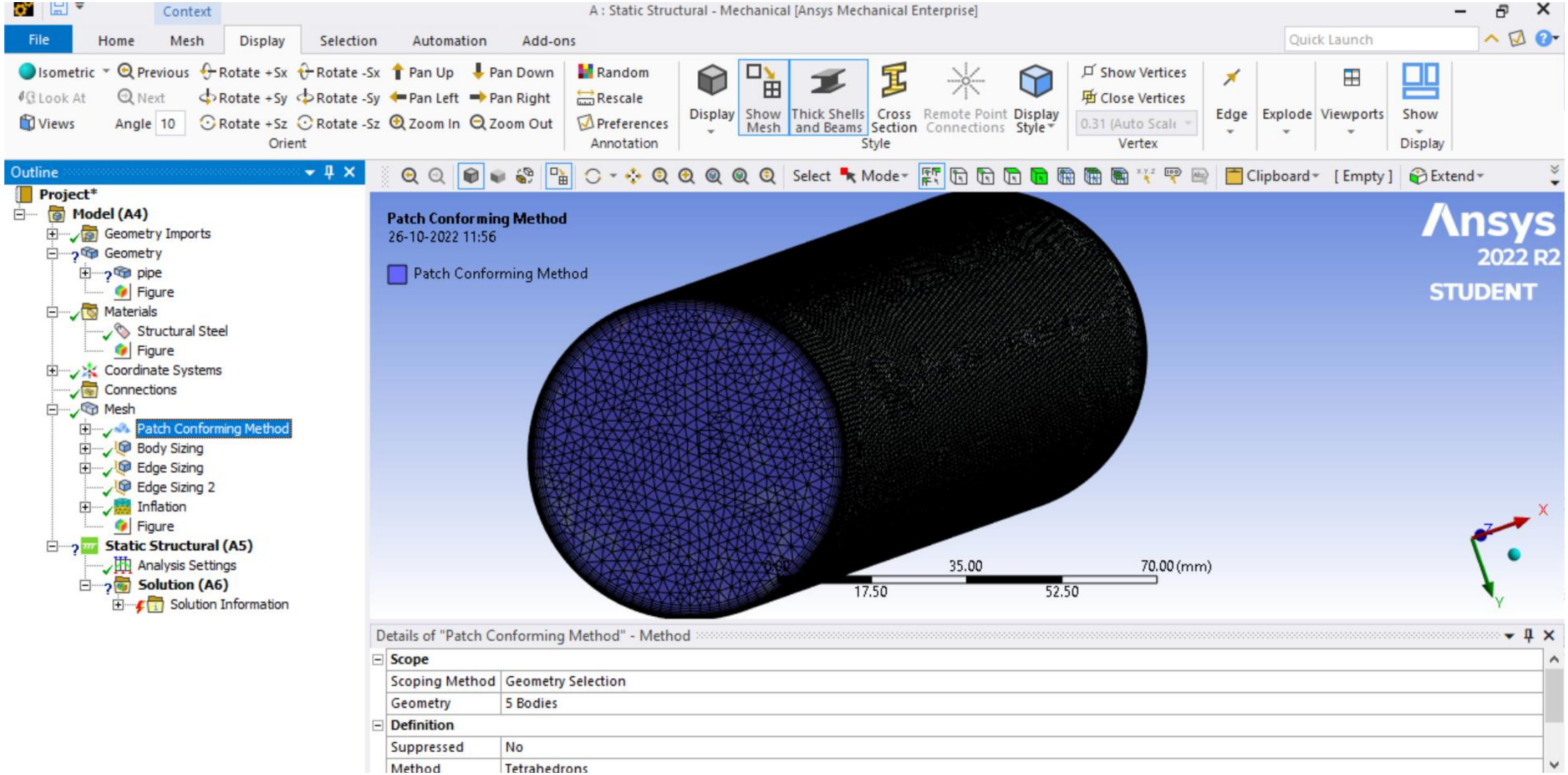
Bounding Box
Graphics Annotations
Details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Body Sizing
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Edge Sizing 2
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Solution Information
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Patch Conforming Method
26-10-2022 11:56
Patch Conforming Method
Ansys
2022 R2
STUDENT
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52.50
70.00 (mm)
X
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Geometry
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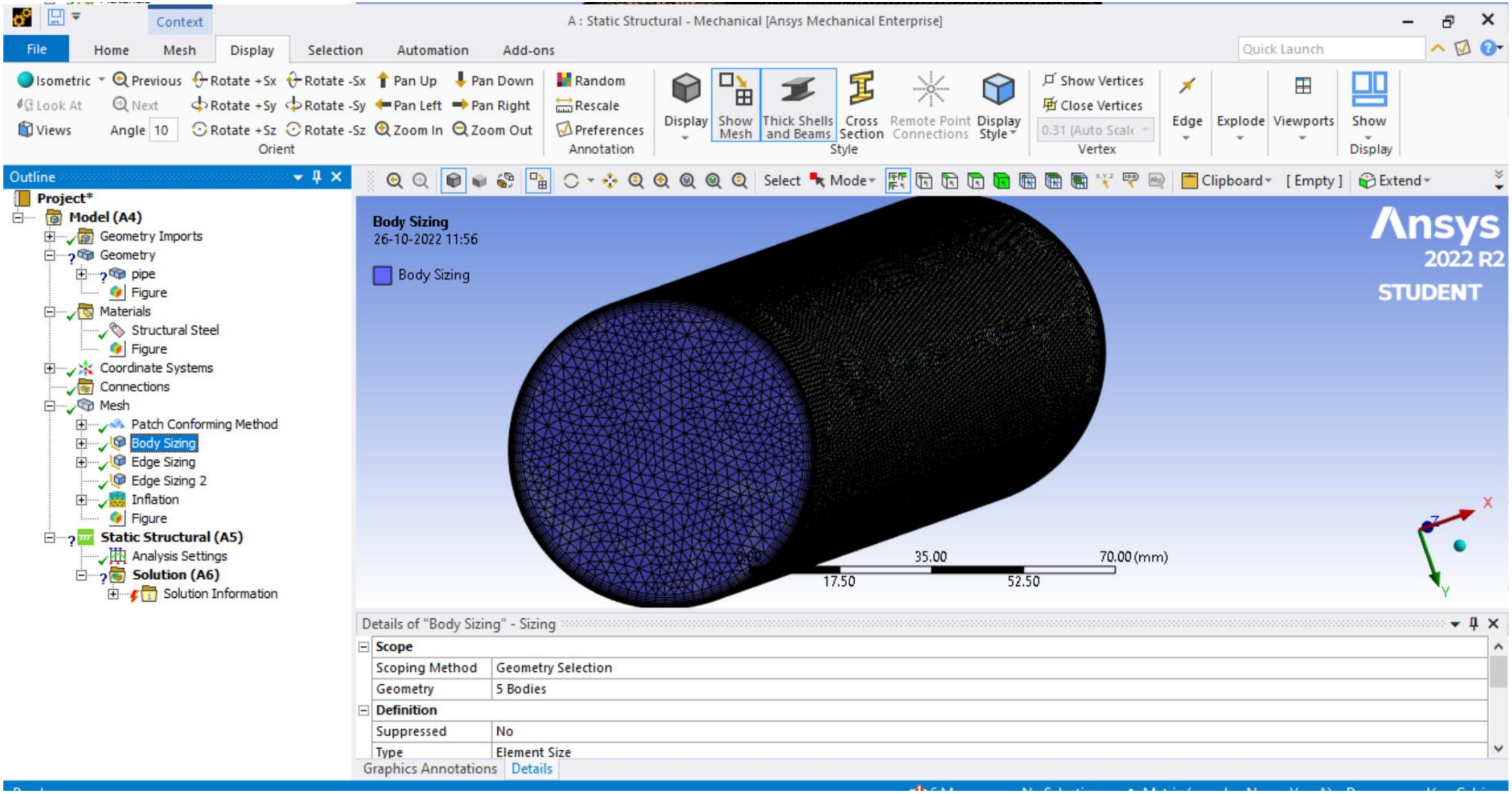
No
Method
Tetrahedrons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Edge Sizing 2
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Solution (A6)
Solution Information
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Body Sizing
Ansys
2022 R2
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70.00 (mm)
17.50
52.50
X
Y
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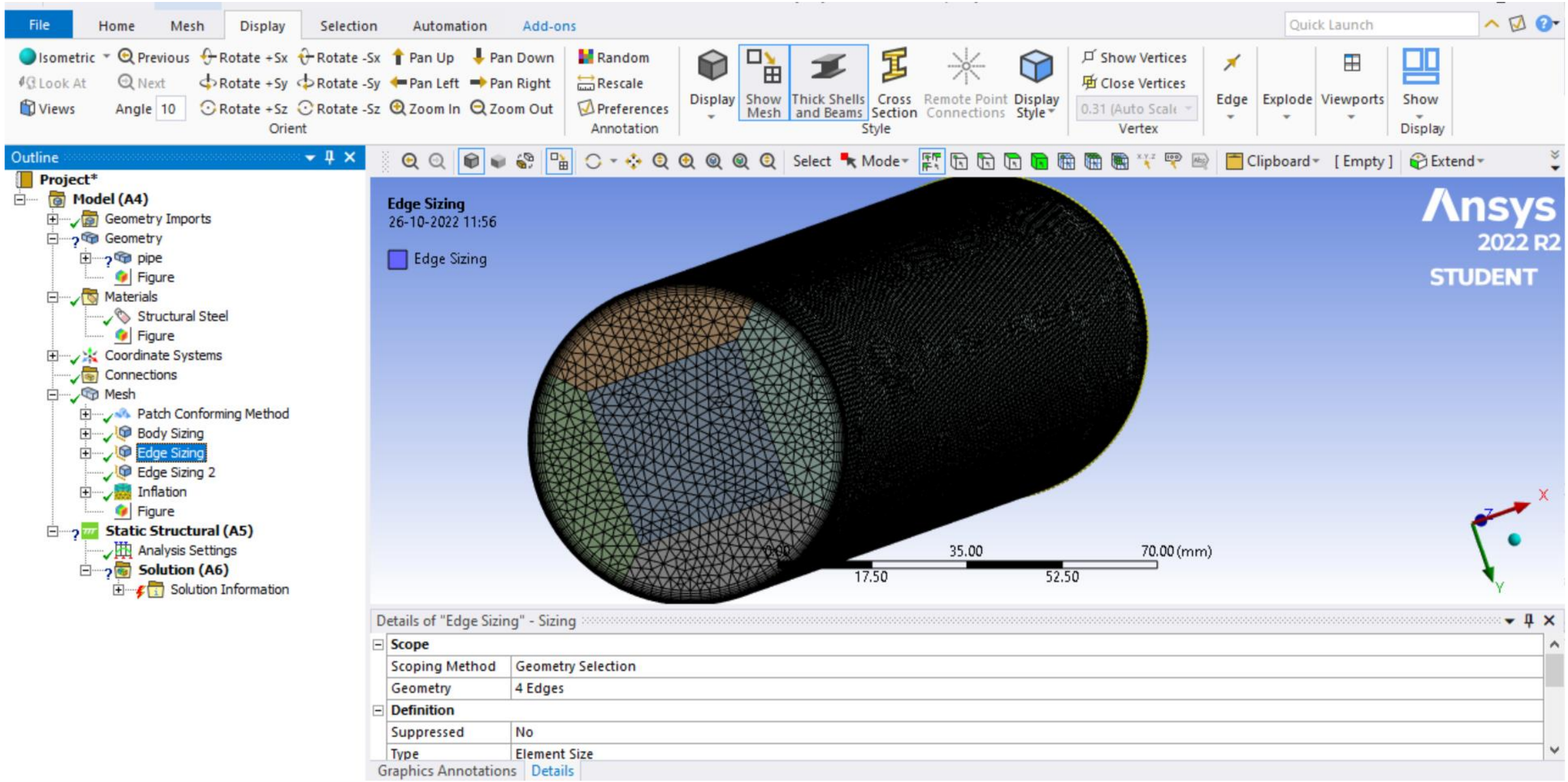
Element Size
Graphics Annotations
Details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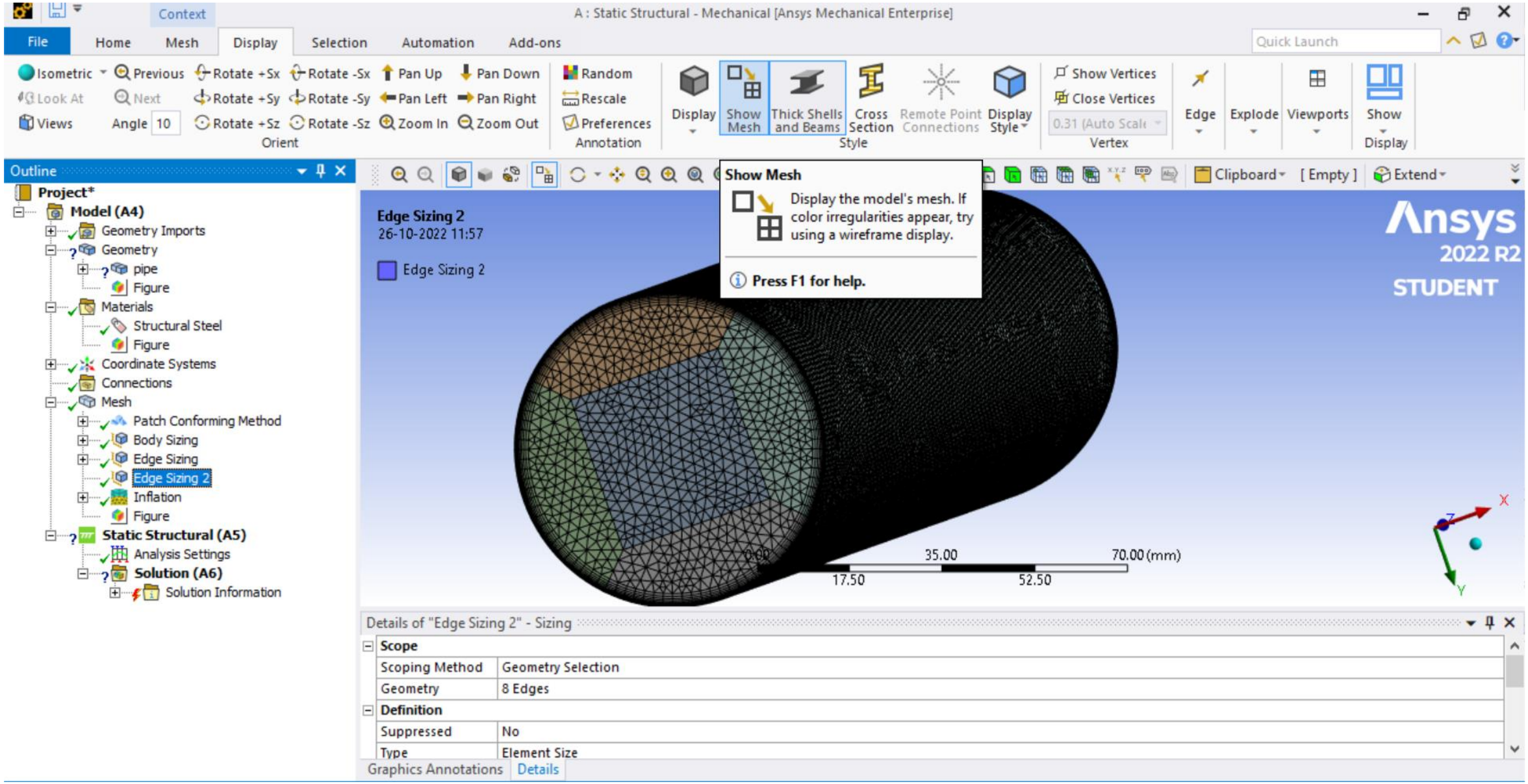
Geometry Selection
Geometry
4 Edges
Definition
Suppressed
No
Type
Element Size
Graphics Annotations
Details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Body Sizing
Edge Sizing
Edge Sizing 2
Inflation
Figure
Static Structural (A5)
Analysis Settings
Solution (A6)
Solution Information
Show Mesh
Display the model's mesh. If color irregularities appear, try using a wireframe display.
Press F1 for help.
Clipboard
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Edge Sizing 2
26-10-2022 11:57
Edge Sizing 2
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2022 R2
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Scoping Method
Geometry Selection
Geometry
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Definition
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Element Size
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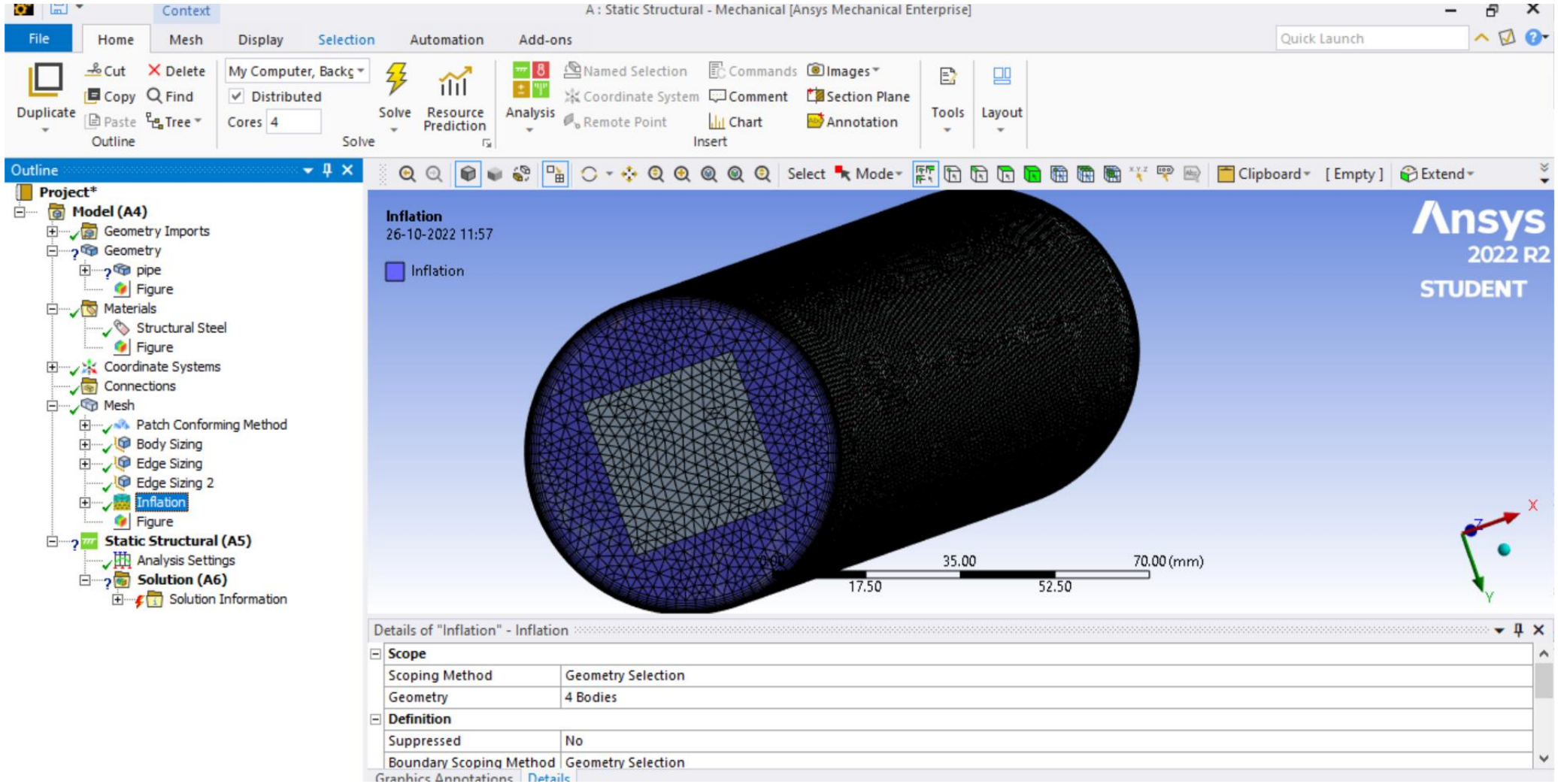
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Body Sizing
Edge Sizing
Edge Sizing 2
Inflation
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Static Structural (A5)
Analysis Settings
Solution (A6)
Solution Information
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Extend
Inflation
26-10-2022 11:57
Inflation
Ansys
2022 R2
STUDENT
0.00
35.00
70.00 (mm)
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52.50
X
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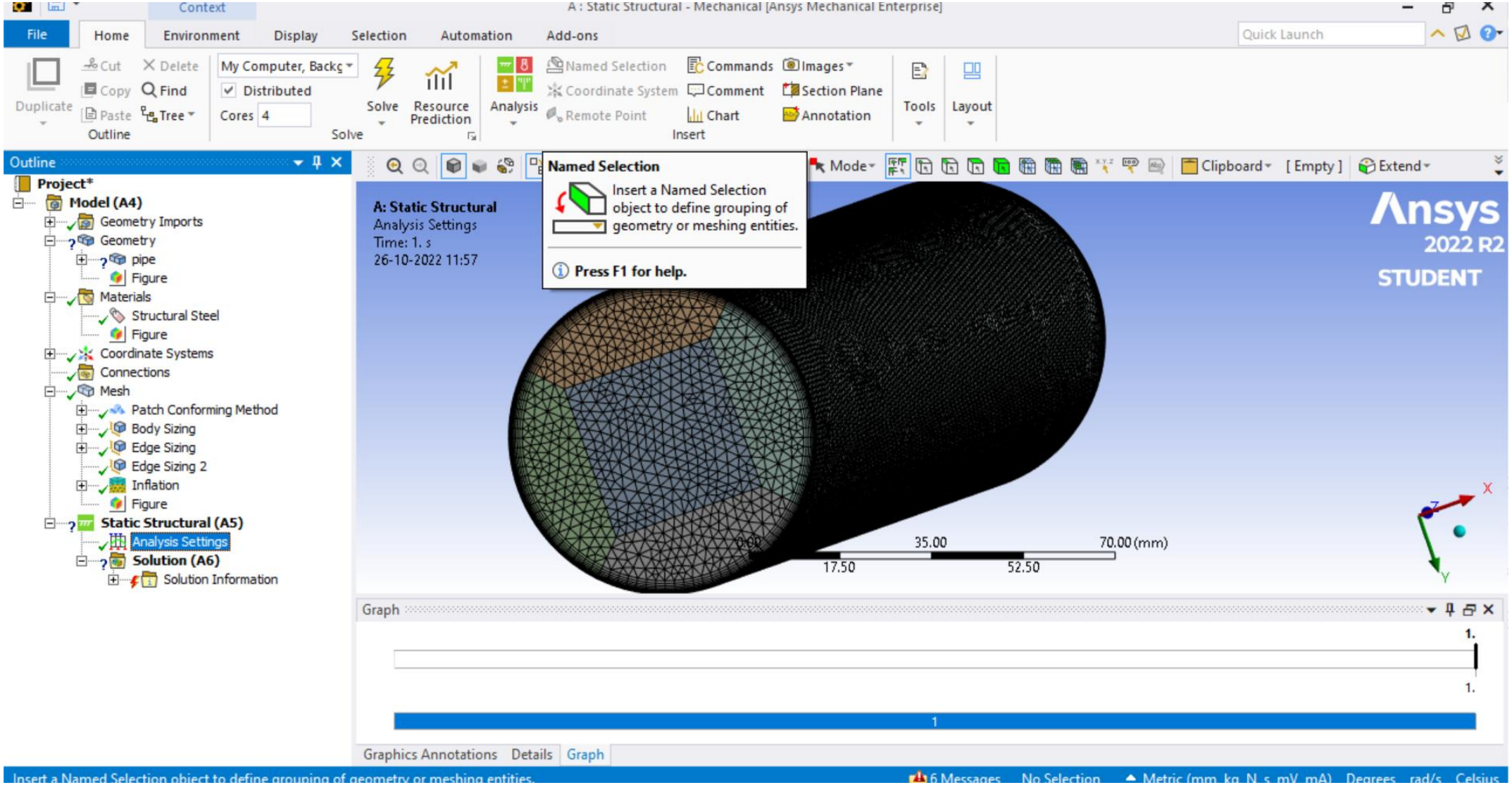
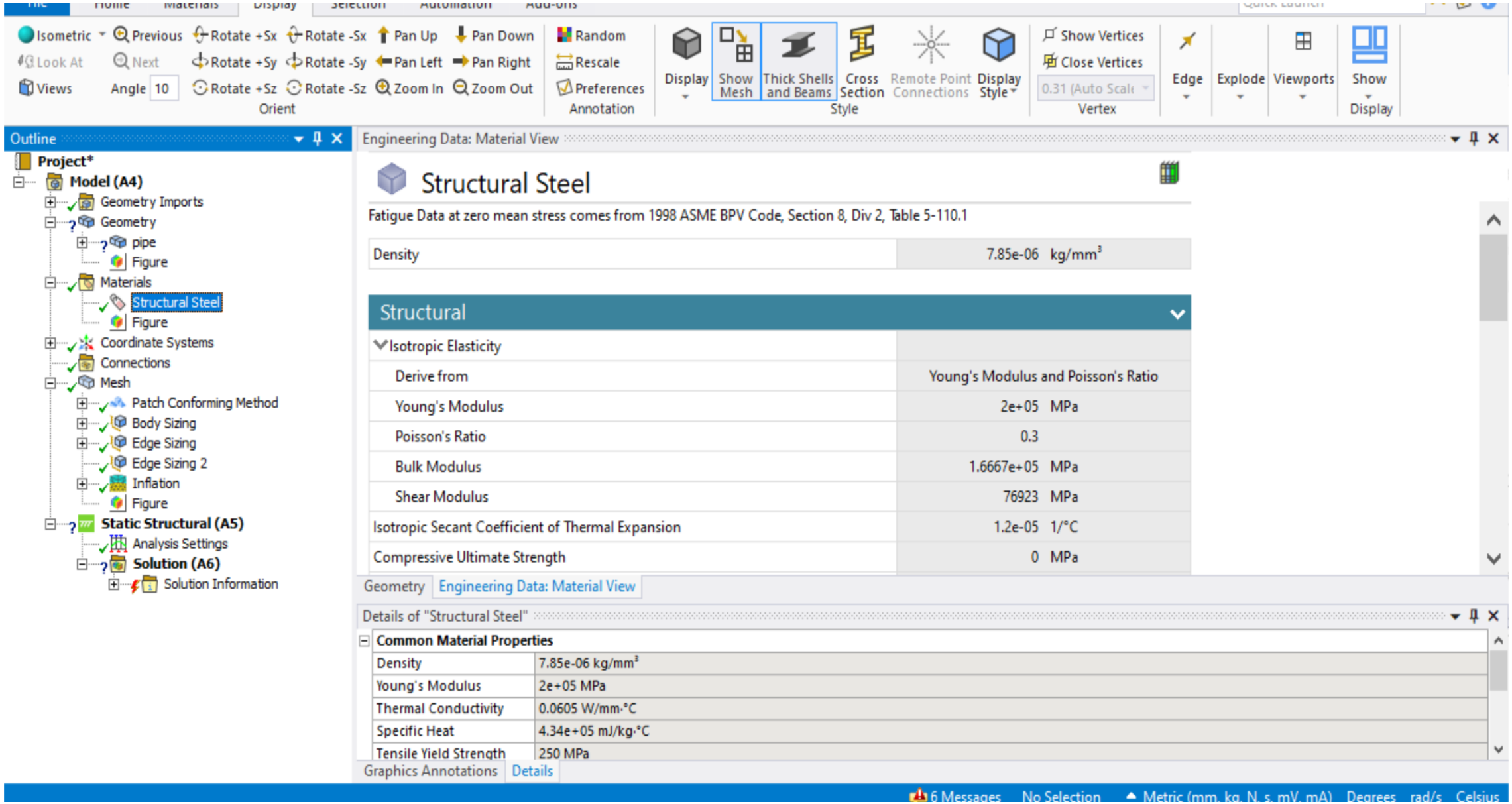
Y
Details of "Inflation" - Inflation
Scope
Scoping Method
Geometry Selection
Geometry
4 Bodies
Definition
Suppressed
No
Boundary Scoping Method
Geometry Selection
Graphics Annotations
Details


A : Static Structural - Mechanical [Ansys Mechanical Enterprise]
Context
File
Home
Environment
Display
Selection
Automation
Add-ons
Quick Launch
Cut
Copy
Paste
Delete
Find
Tree
Duplicate
Outline
My Computer, Backg
Distributed
Cores 4
Solve
Resource Prediction
Solve
Analysis
Named Selection
Coordinate System
Remote Point
Commands
Comment
Chart
Images
Section Plane
Annotation
Insert
Tools
Layout
Outline
Project*
Model (A4)
Geometry Imports
Geometry
pipe
Figure
Materials
Structural Steel
Figure
Coordinate Systems
Connections
Mesh
Patch Conforming Method
Body Sizing
Edge Sizing
Edge Sizing 2
Inflation
Figure
Static Structural (A5)
Analysis Settings
Solution (A6)
Solution Information
Named Selection
Insert a Named Selection object to define grouping of geometry or meshing entities.
Press F1 for help.
Mode
Clipboard
[Empty]
Extend
A: Static Structural
Analysis Settings
Time: 1. s
26-10-2022 11:57
Ansys
2022 R2
STUDENT
0.00
17.50
35.00
52.50
70.00 (mm)
X
Y
Z
Graph
1.
1.
1
Graphics Annotations
Details
Graph
Insert a Named Selection object to define grouping of geometry or meshing entities.
6 Messages
No Selection
Metric (mm, kg, N, s, mV, mA)
Degrees
rad/s
Celsius


Isometric
Previous
Rotate +Sx
Rotate -Sx
Pan Up
Pan Down
Look At
Next
Rotate +Sy
Rotate -Sy
Pan Left
Pan Right
Views
Angle 10
Rotate +Sz
Rotate -Sz
Zoom In
Zoom Out
Orient
Random
Rescale
Preferences
Annotation
Display
Show Mesh
Thick Shells and Beams
Cross Section
Remote Point Connections
Display Style
Style
Show Vertices
Close Vertices
0.31 (Auto Scale
Vertex
Edge
Explode
Viewports
Show
Display
Outline
Project*
Model (A4)
Geometry Imports
Geometry
pipe
Figure
Materials
Structural Steel
Figure
Coordinate Systems
Connections
Mesh
Patch Conforming Method
Body Sizing
Edge Sizing
Edge Sizing 2
Inflation
Figure
Static Structural (A5)
Analysis Settings
Solution (A6)
Solution Information
Engineering Data: Material View
Structural Steel
Fatigue Data at zero mean stress comes from 1998 ASME BPV Code, Section 8, Div 2, Table 5-110.1
Density 7.85e-06 kg/mm³
Structural
Isotropic Elasticity
Derive from Young's Modulus and Poisson's Ratio
Young's Modulus 2e+05 MPa
Poisson's Ratio 0.3
Bulk Modulus 1.6667e+05 MPa
Shear Modulus 76923 MPa
Isotropic Secant Coefficient of Thermal Expansion 1.2e-05 1/°C
Compressive Ultimate Strength 0 MPa
Geometry
Engineering Data: Material View
Details of "Structural Steel"
Common Material Properties
Density 7.85e-06 kg/mm³
Young's Modulus 2e+05 MPa
Thermal Conductivity 0.0605 W/mm·°C
Specific Heat 4.34e+05 mJ/kg·°C
Tensile Yield Strength 250 MPa
Graphics Annotations
Details
6 Messages
No Selection
Metric (mm, kg, N, s, mV, mA)
Degrees
rad/s
Celsius