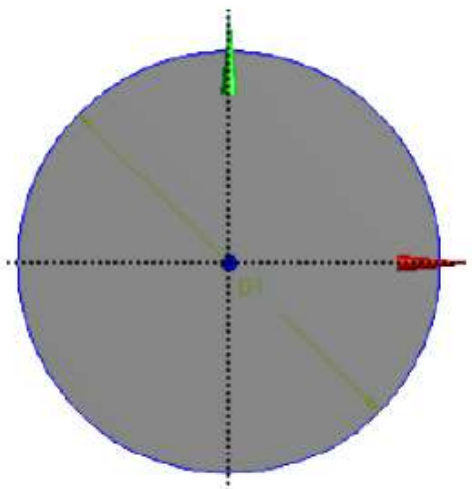
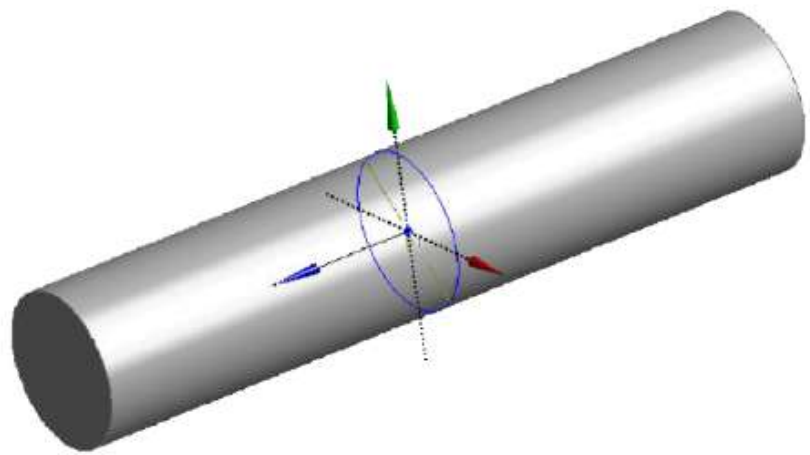
Questions 1 - Mesh the Geometry

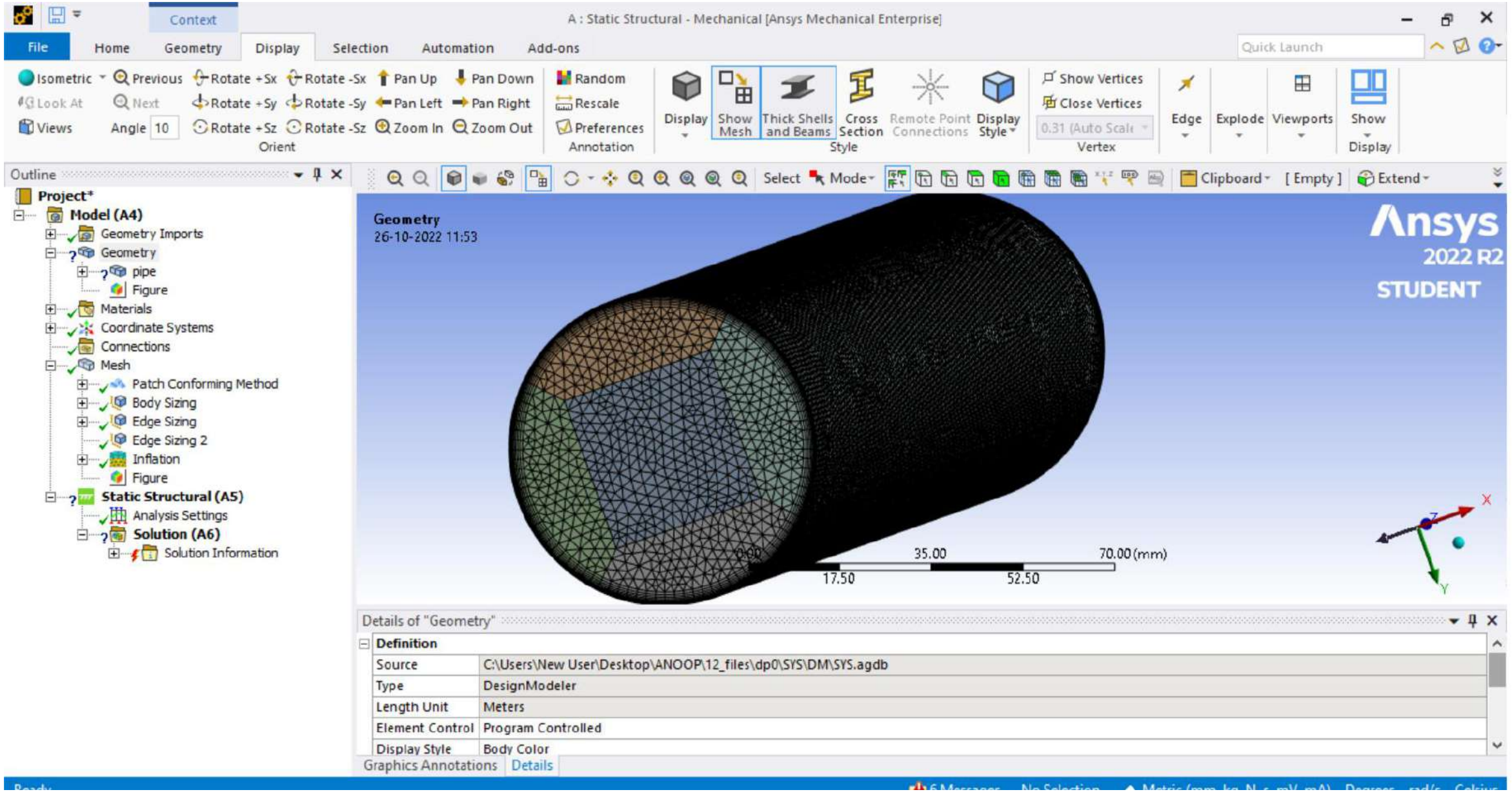
Geometry Detail's

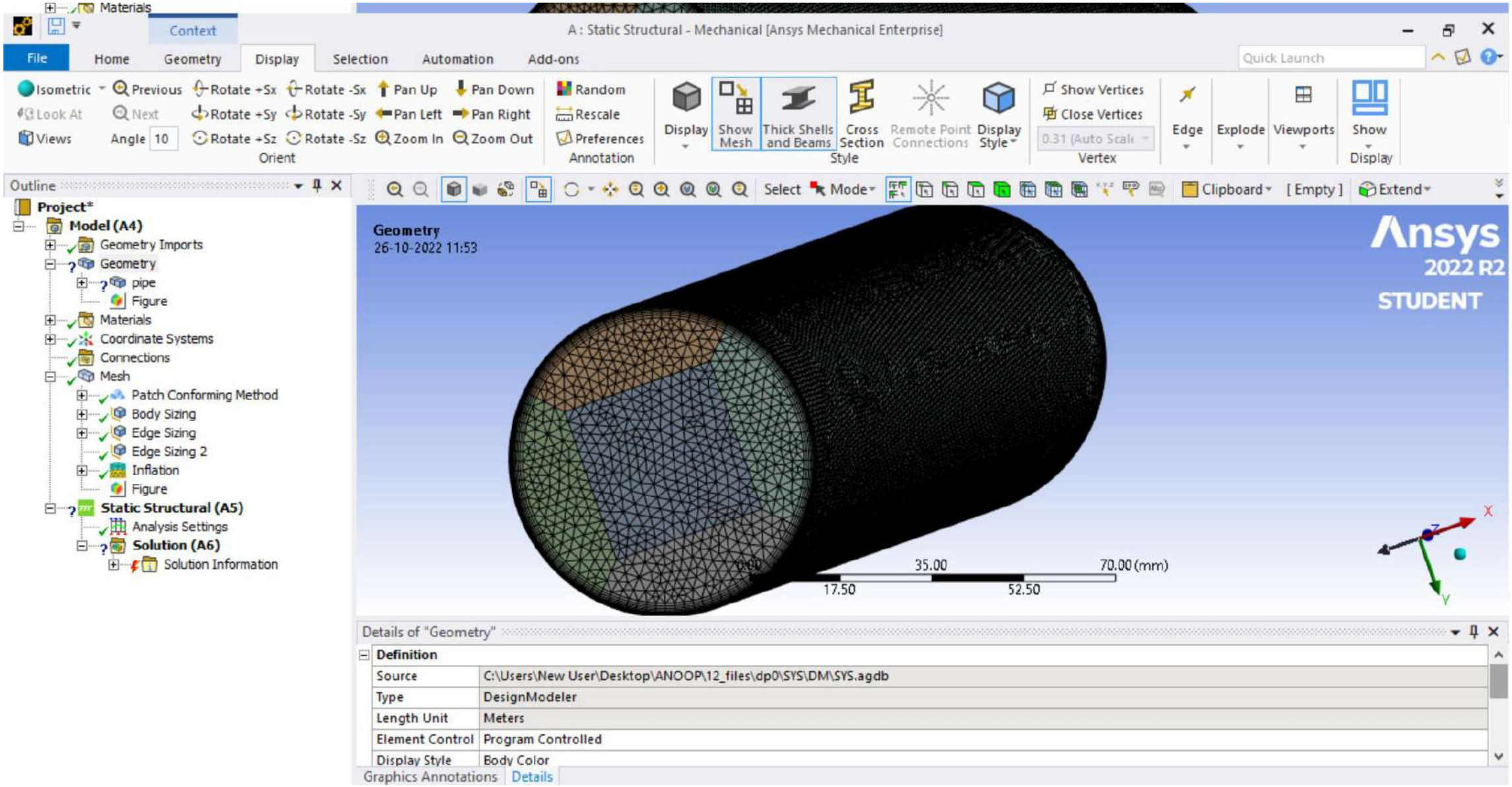
- Mesh the cylindrical PIPE as per the given instructions
- Dimension for PIPE

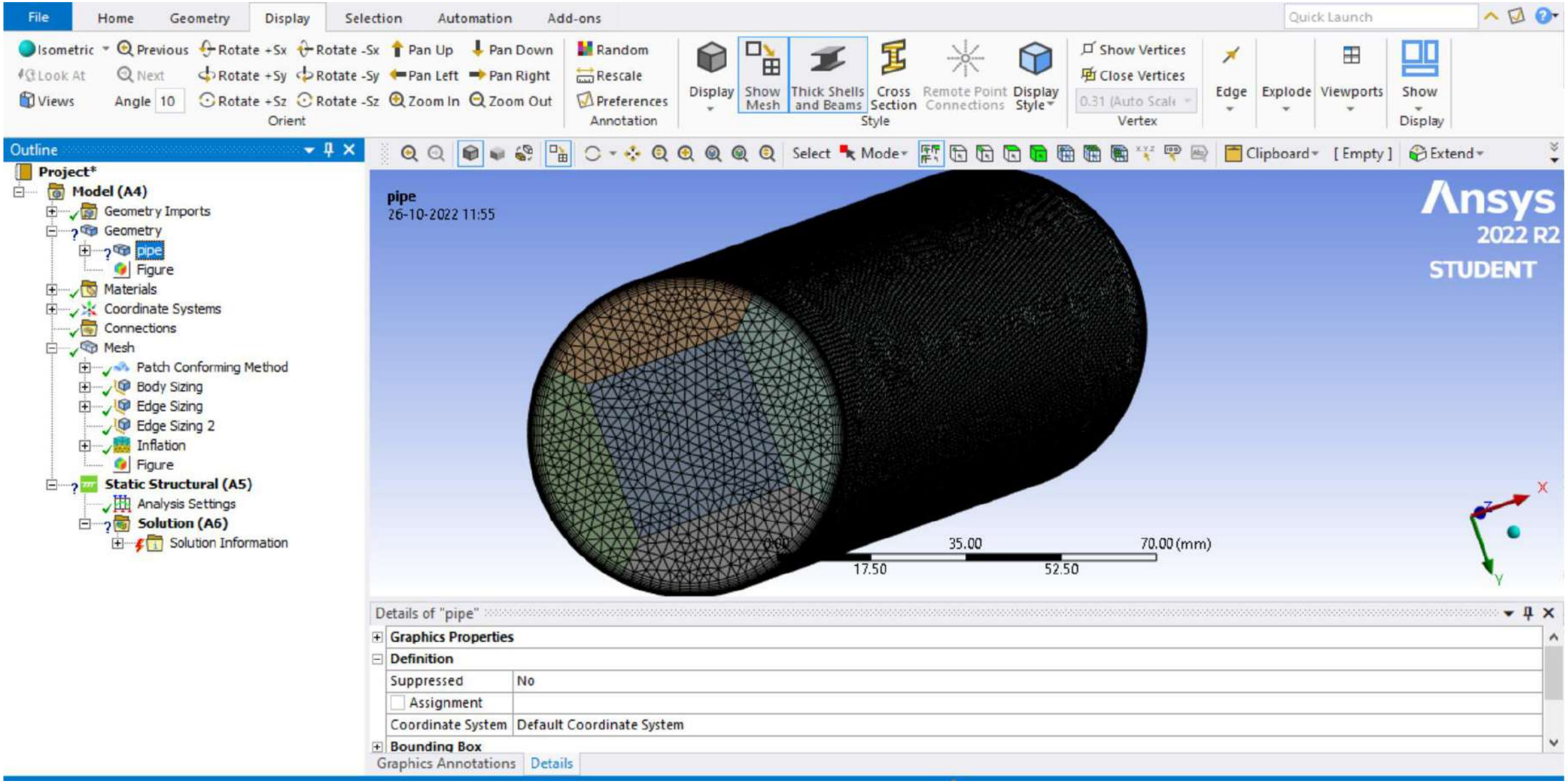
1. Diameter of pipe= 60mm
2. Length of pipe= 300mm

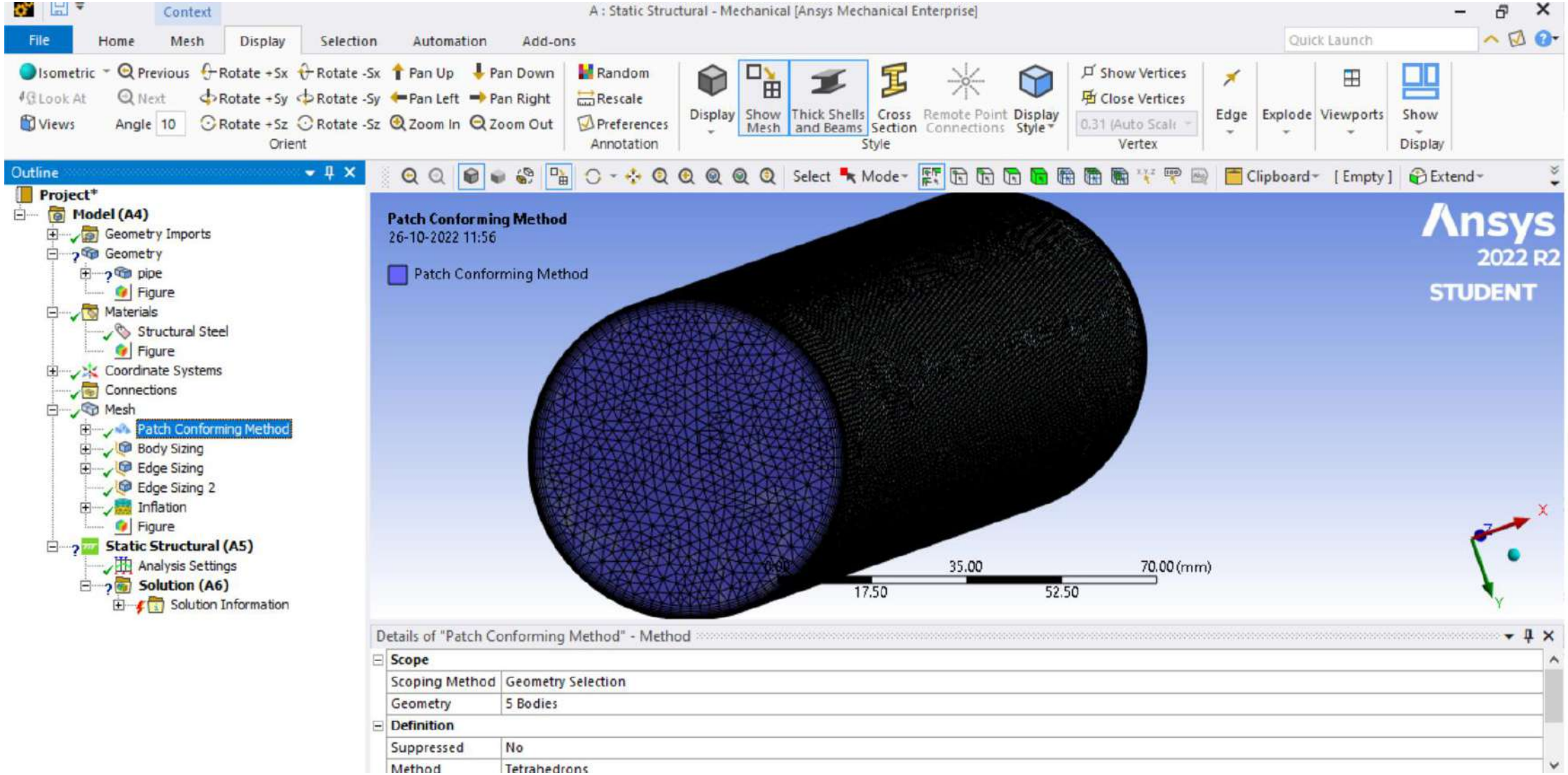


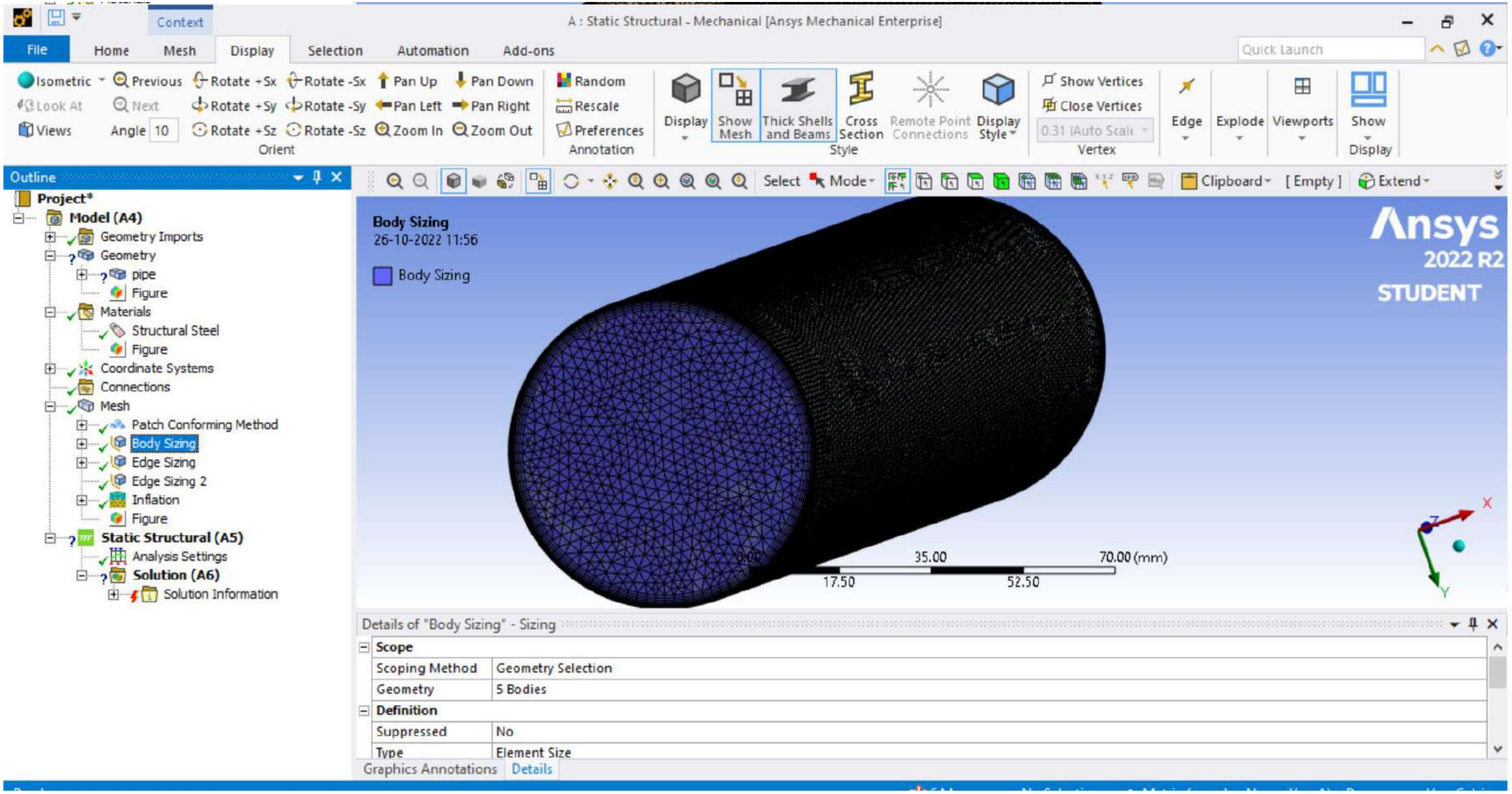


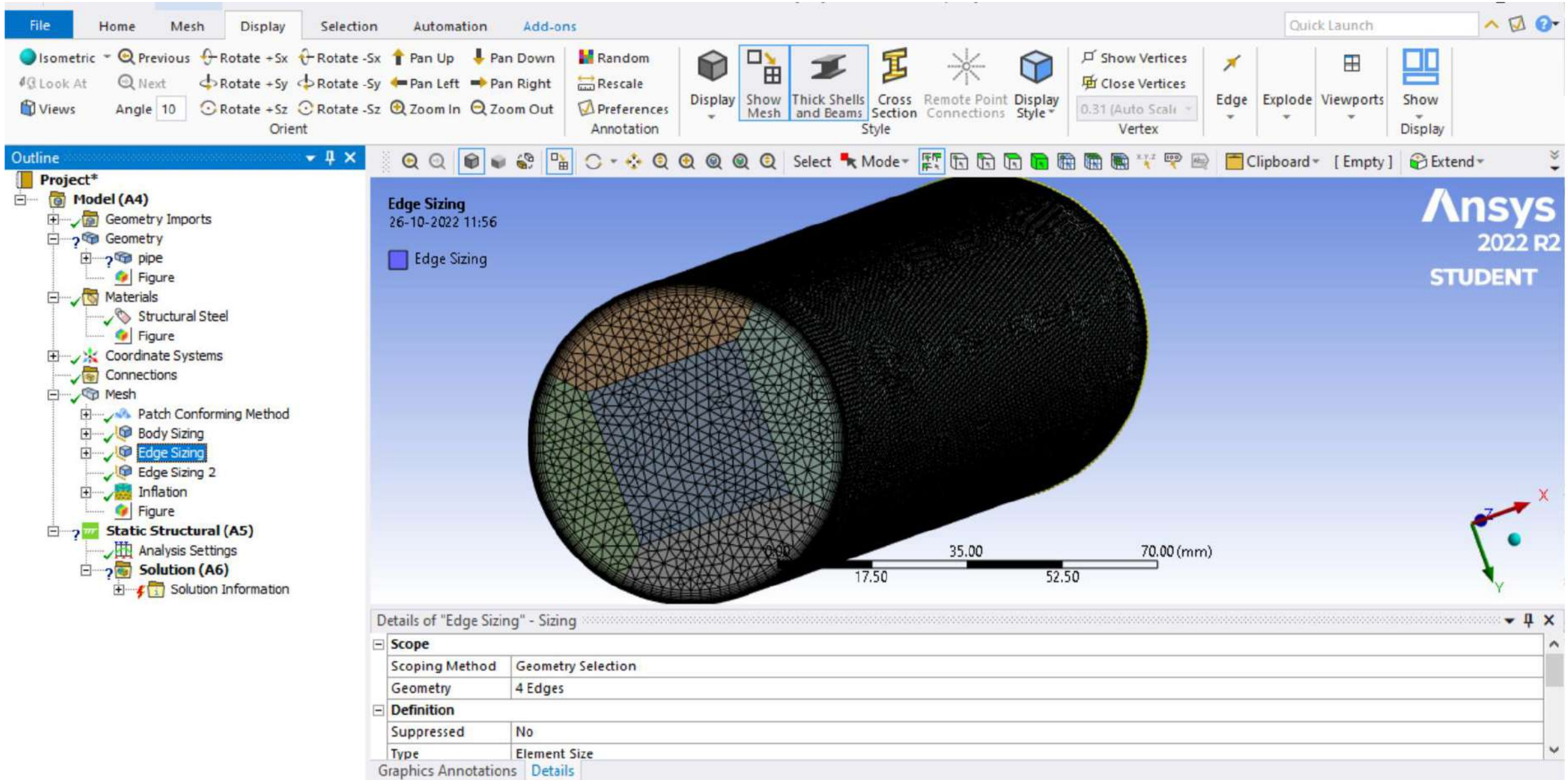

A : Static Structural - Mechanical [Ansys Mechanical Enterprise]
Context
File
Home
Geometry
Display
Selection
Automation
Add-ons
Quick Launch
Isometric
Look At
Views
Previous
Next
Angle 10
Rotate +Sx
Rotate +Sy
Rotate +Sz
Rotate -Sx
Rotate -Sy
Rotate -Sz
Pan Up
Pan Down
Pan Left
Pan Right
Zoom In
Zoom 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
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
Select
Mode
Clipboard
[Empty]
Extend
Geometry
26-10-2022 11:53
Ansys
2022 R2
STUDENT
0.00
35.00
70.00 (mm)
17.50
52.50
X
Y
Z
Details of "Geometry"
Definition
Source
C:\Users\New User\Desktop\ANOOP\12_files\dp0\SYS\DM\SYS.agdb
Type
DesignModeler
Length Unit
Meters
Element Control
Program Controlled
Display Style
Body Color
Graphics Annotations
Details

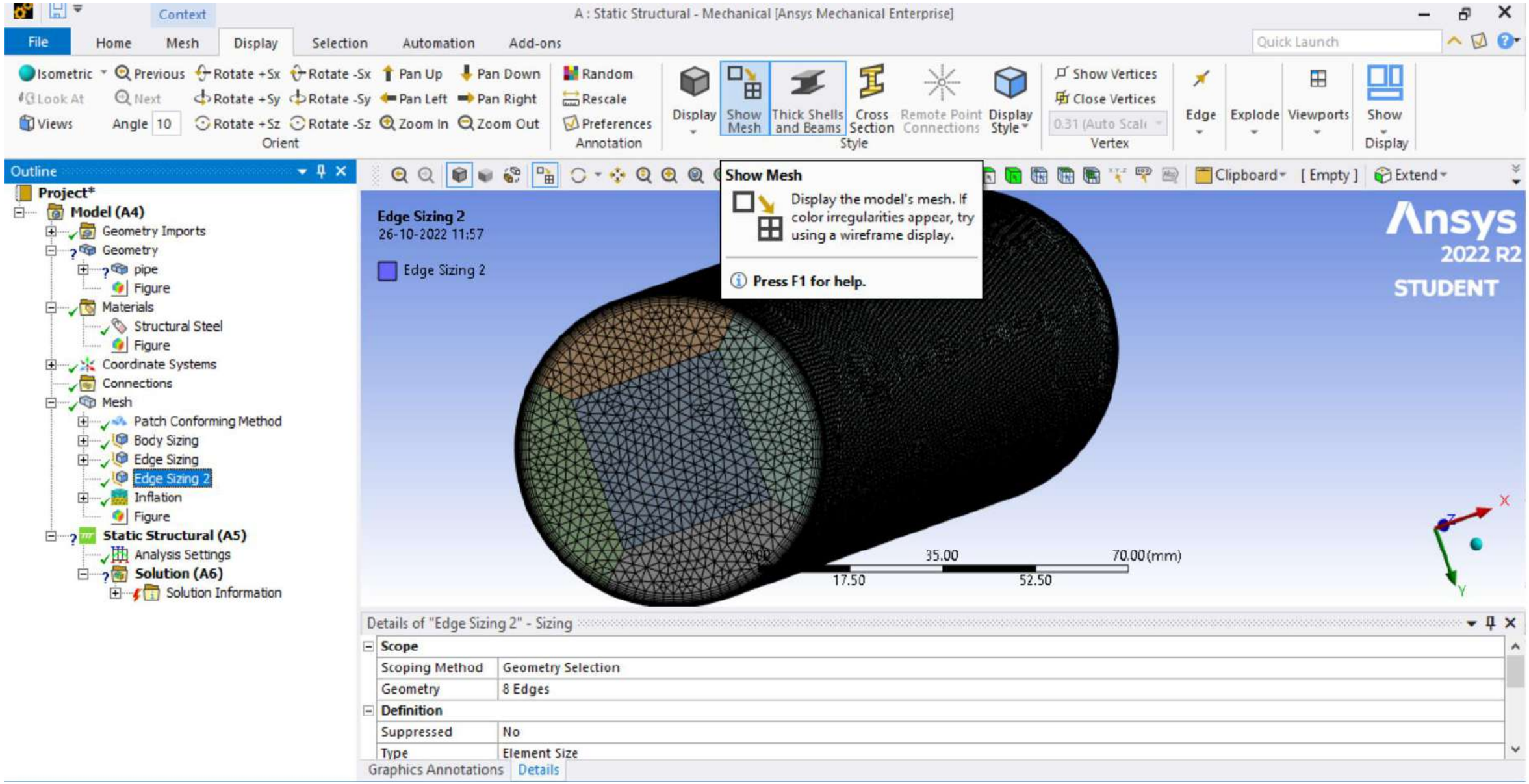

Materials
Context
A : Static Structural - Mechanical [Ansys Mechanical Enterprise]
File
Home
Geometry
Display
Selection
Automation
Add-ons
Quick Launch
Isometric
Previous
Rotate +Sx
Rotate -Sx
Pan Up
Pan Down
Look At
Next
Rotate +Sy
Rotate -Sy
Pan Left
Pan Right
Views
Angle 10
Rotate +Sz
Rotate -Sz
Zoom 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
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
Select
Mode
Clipboard
[Empty]
Extend
Geometry
26-10-2022 11:53
Ansys
2022 R2
STUDENT
0.00
35.00
70.00 (mm)
17.50
52.50
X
Y
Z
Details of "Geometry"
Definition
Source
C:\Users\New User\Desktop\ANOOP\12_files\dp0\SYS\DM\SYS.agdb
Type
DesignModeler
Length Unit
Meters
Element Control
Program Controlled
Display Style
Body Color
Graphics Annotations
Details

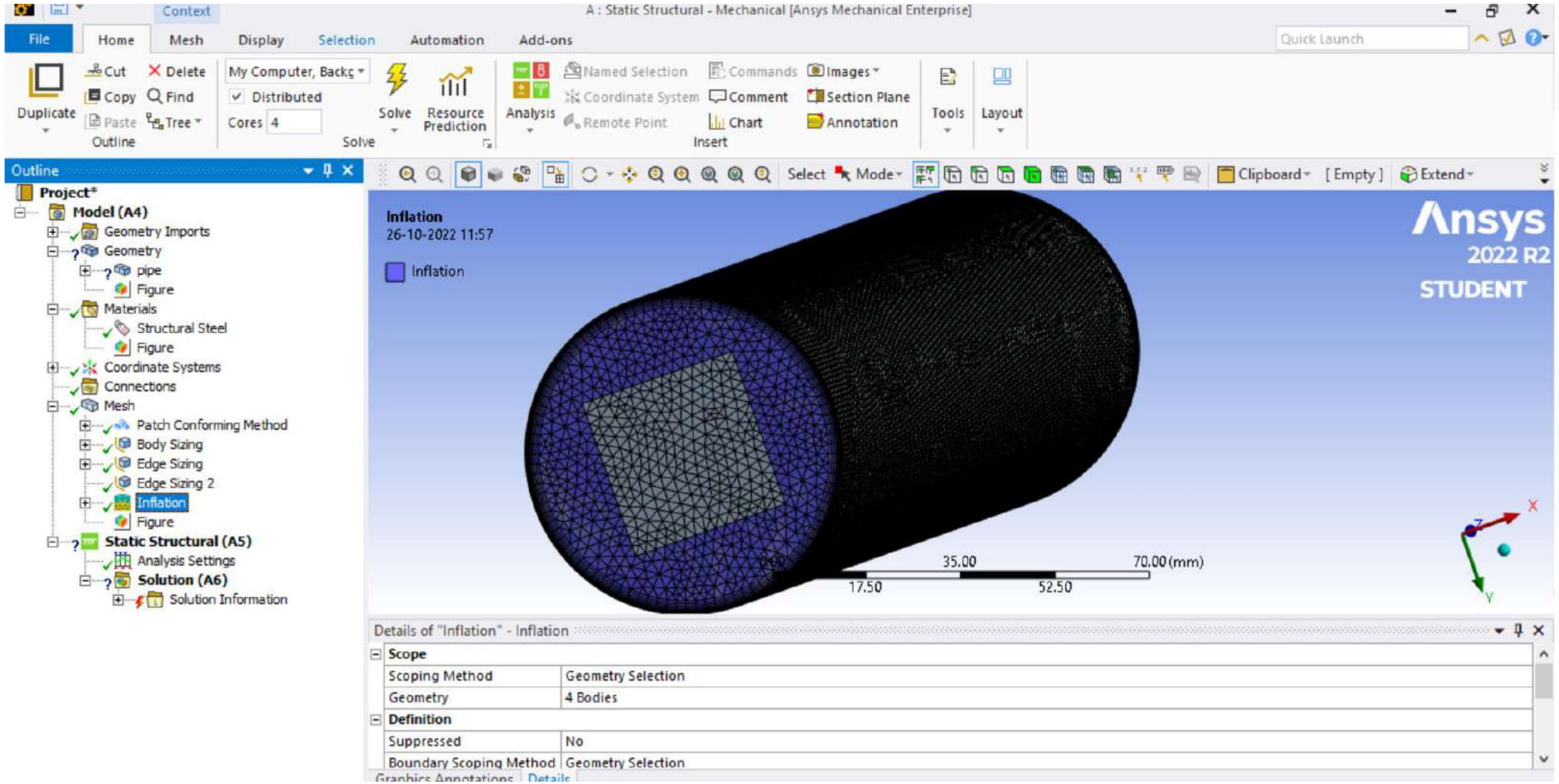

File
Home
Geometry
Display
Selection
Automation
Add-ons
Quick Launch
Isometric
Previous
Rotate +Sx
Rotate -Sx
Pan Up
Pan Down
Look At
Next
Rotate +Sy
Rotate -Sy
Pan Left
Pan Right
Views
Angle 10
Rotate +Sz
Rotate -Sz
Zoom In
Zoom Out
Orient
Random
Rescale
Preferences
Annotation
Display
Show Mesh
Thick 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
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
Select
Mode
Clipboard
[Empty]
Extend
pipe
26-10-2022 11:55
Ansys
2022 R2
STUDENT
0.00
35.00
70.00 (mm)
17.50
52.50
X
Y
Z
Details of "pipe"
Graphics Properties
Definition
Suppressed
No
Assignment
Coordinate System
Default Coordinate System
Bounding Box
Graphics Annotations
Details

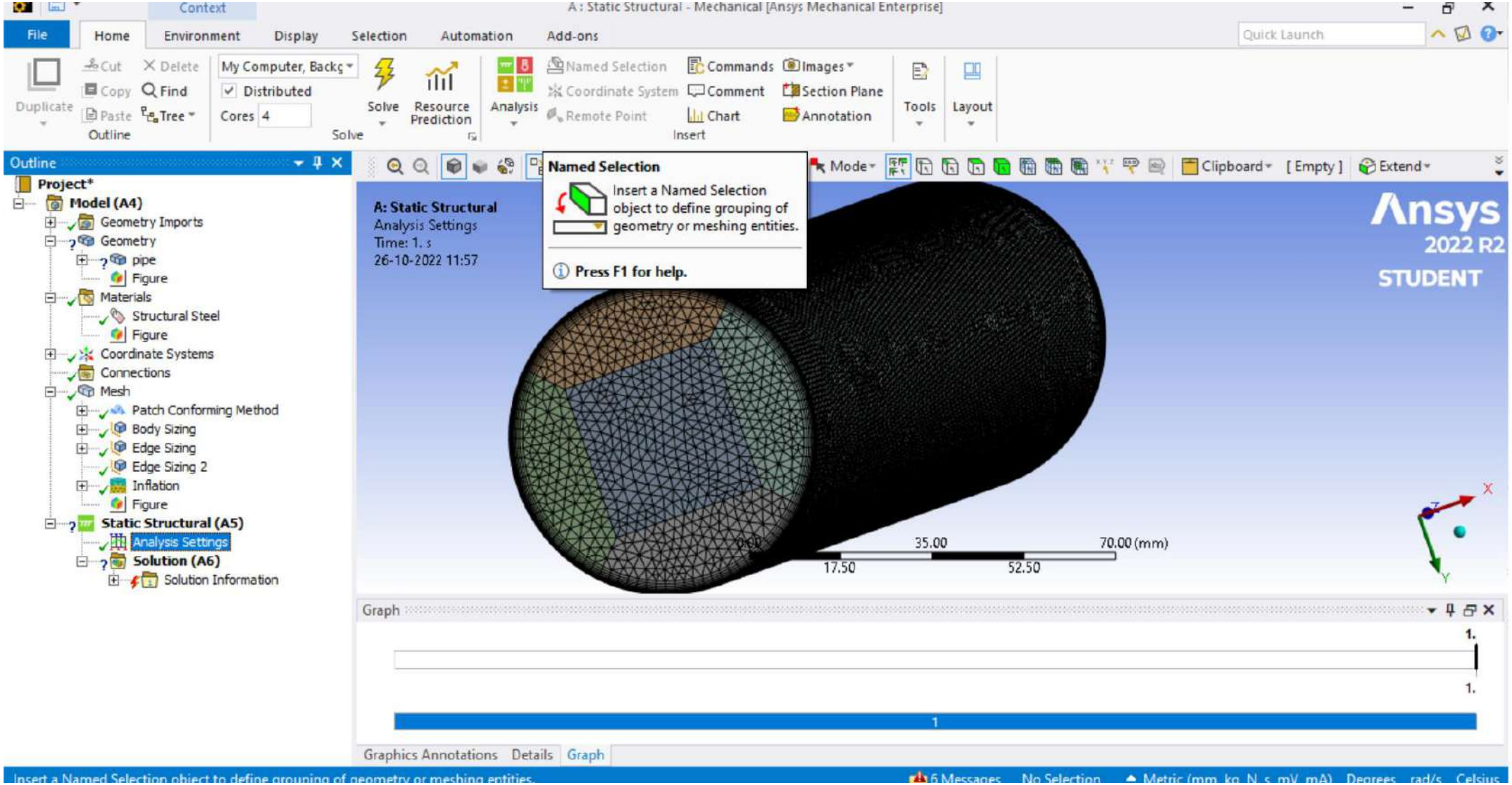

A : Static Structural - Mechanical [Ansys Mechanical Enterprise]
Context
File
Home
Mesh
Display
Selection
Automation
Add-ons
Quick Launch
Isometric
Previous
Rotate +Sx
Rotate -Sx
Pan Up
Pan Down
Look At
Next
Rotate +Sy
Rotate -Sy
Pan Left
Pan Right
Views
Angle 10
Rotate +Sz
Rotate -Sz
Zoom In
Zoom Out
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
Select
Mode
Clipboard
[Empty]
Extend
Patch Conforming Method
26-10-2022 11:56
Patch Conforming Method
Ansys
2022 R2
STUDENT
0.00
35.00
70.00 (mm)
17.50
52.50
X
Y
Z
Details of "Patch Conforming Method" - Method
Scope
Scoping Method
Geometry Selection
Geometry
5 Bodies
Definition
Suppressed
No
Method
Tetrahedrons

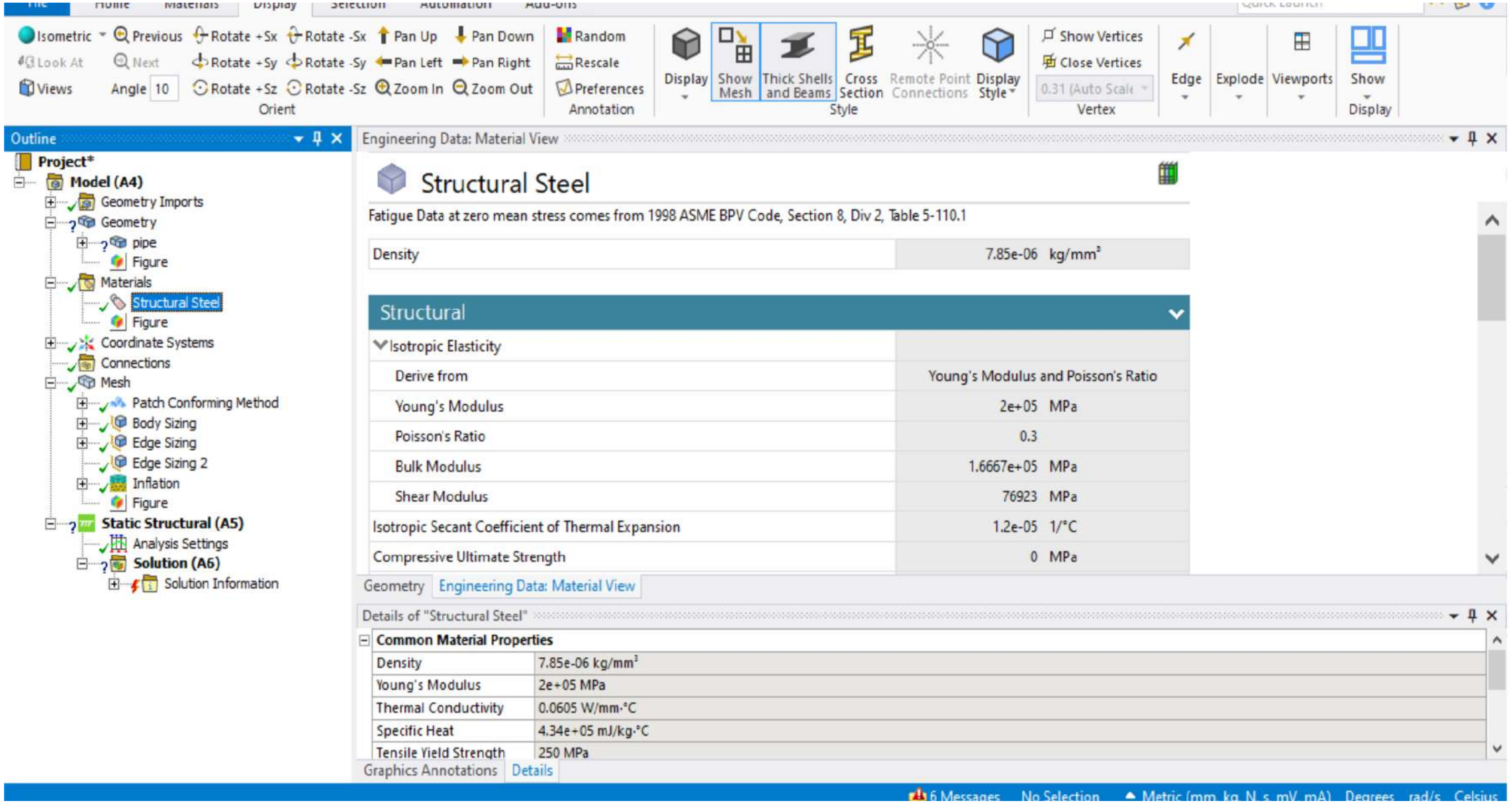

A : Static Structural - Mechanical [Ansys Mechanical Enterprise]
Context
File
Home
Mesh
Display
Selection
Automation
Add-ons
Quick Launch
Isometric
Previous
Rotate +Sx
Rotate -Sx
Pan Up
Pan Down
Look At
Next
Rotate +Sy
Rotate -Sy
Pan Left
Pan Right
Views
Angle 10
Rotate +Sz
Rotate -Sz
Zoom In
Zoom Out
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
Select
Mode
Clipboard
[Empty]
Extend
Body Sizing
26-10-2022 11:56
Body Sizing
Ansys
2022 R2
STUDENT
0.00
35.00
70.00 (mm)
17.50
52.50
X
Y
Z
Details of "Body Sizing" - Sizing
Scope
Scoping Method
Geometry Selection
Geometry
5 Bodies
Definition
Suppressed
No
Type
Element Size
Graphics Annotations
Details


File
Home
Mesh
Display
Selection
Automation
Add-ons
Quick Launch
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
Select
Mode
Clipboard
[Empty]
Extend
Edge Sizing
26-10-2022 11:56
Edge Sizing
Ansys
2022 R2
STUDENT
0.00
17.50
35.00
52.50
70.00 (mm)
Details of "Edge Sizing" - Sizing
Scope
Scoping Method
Geometry Selection
Geometry
4 Edges
Definition
Suppressed
No
Type
Element Size
Graphics Annotations
Details


Context
A : Static Structural - Mechanical [Ansys Mechanical Enterprise]
File
Home
Mesh
Display
Selection
Automation
Add-ons
Quick Launch
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
Show Mesh
Display the model's mesh. If color irregularities appear, try using a wireframe display.
Press F1 for help.
Clipboard
[Empty]
Extend
Edge Sizing 2
26-10-2022 11:57
Edge Sizing 2
Ansys
2022 R2
STUDENT
0.00
35.00
70.00 (mm)
17.50
52.50
X
Y
Z
Details of "Edge Sizing 2" - Sizing
Scope
Scoping Method
Geometry Selection
Geometry
8 Edges
Definition
Suppressed
No
Type
Element Size
Graphics Annotations
Details

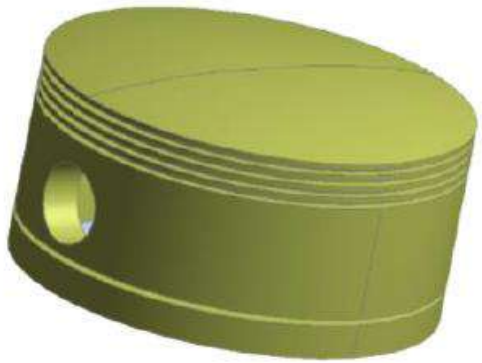

A : Static Structural - Mechanical [Ansys Mechanical Enterprise]
Context
File
Home
Mesh
Display
Selection
Automation
Add-ons
Quick Launch
Duplicate
Cut
Copy
Paste
Delete
Find
Tree
Outline
My Computer, Backg
Distributed
Cores 4
Solve
Resource Prediction
Solve
Analysis
Named Selection
Coordinate System
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
Select
Mode
Clipboard
[Empty]
Extend
Inflation
26-10-2022 11:57
Inflation
Ansys
2022 R2
STUDENT
0.00
35.00
70.00 (mm)
17.50
52.50
X
Y
Z
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
Duplicate
Cut
Copy
Paste
Delete
Find
Tree
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

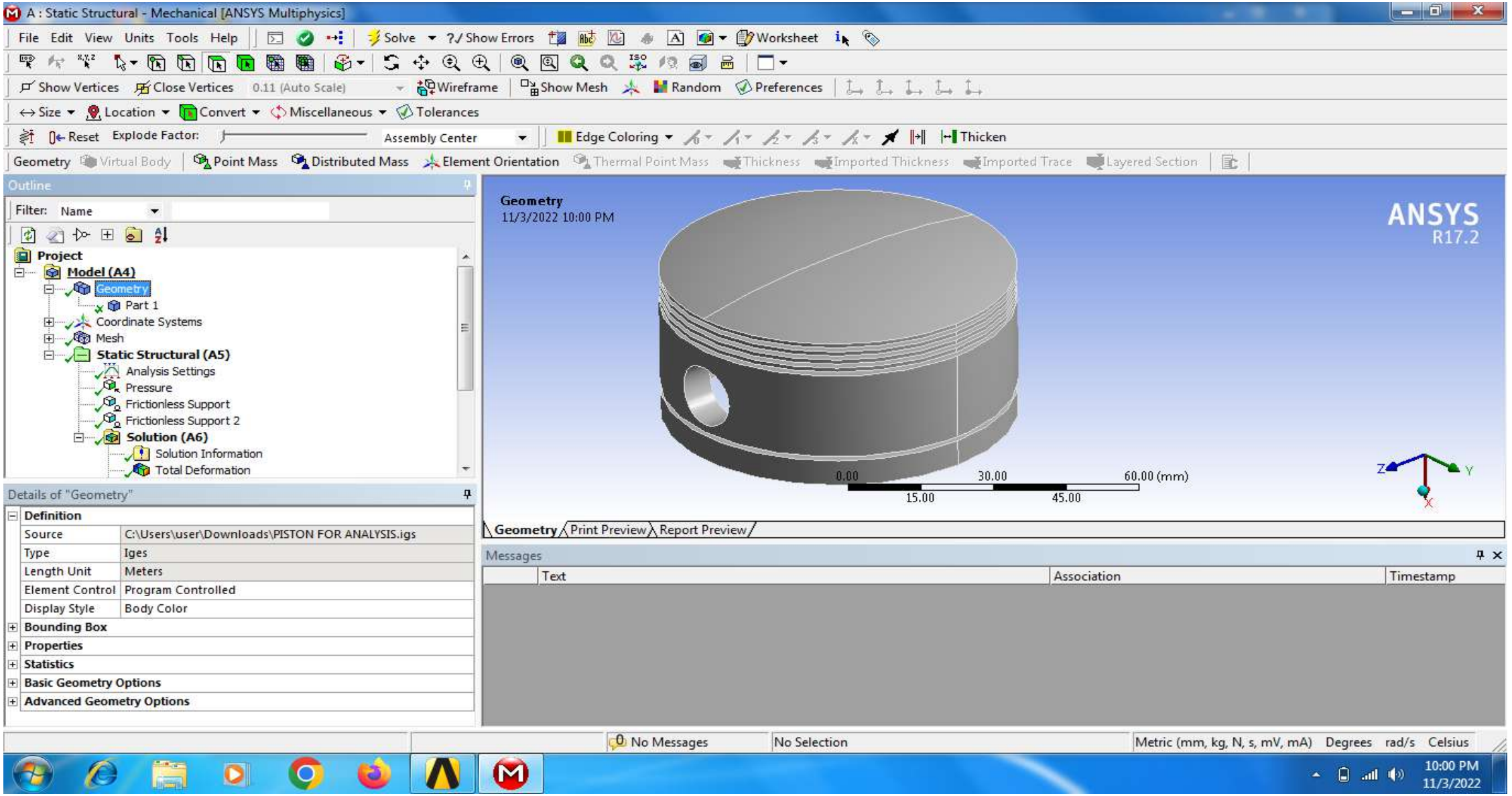
Question 2: Static Structural Analysis

Geometry Detail's

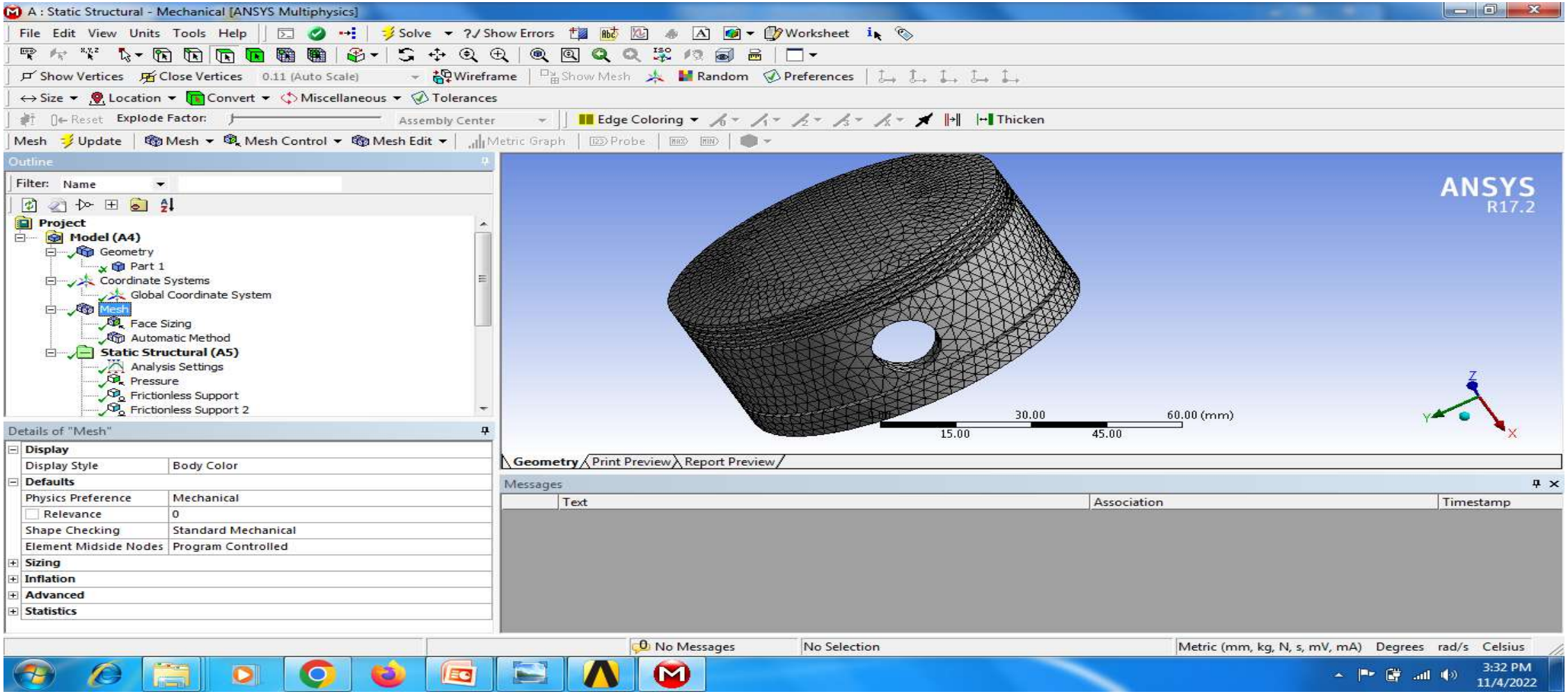


- **Meshing Details**
  4. Meshing Methods= Automatic
  5. Body Sizing
  6. Element Size= 3mm

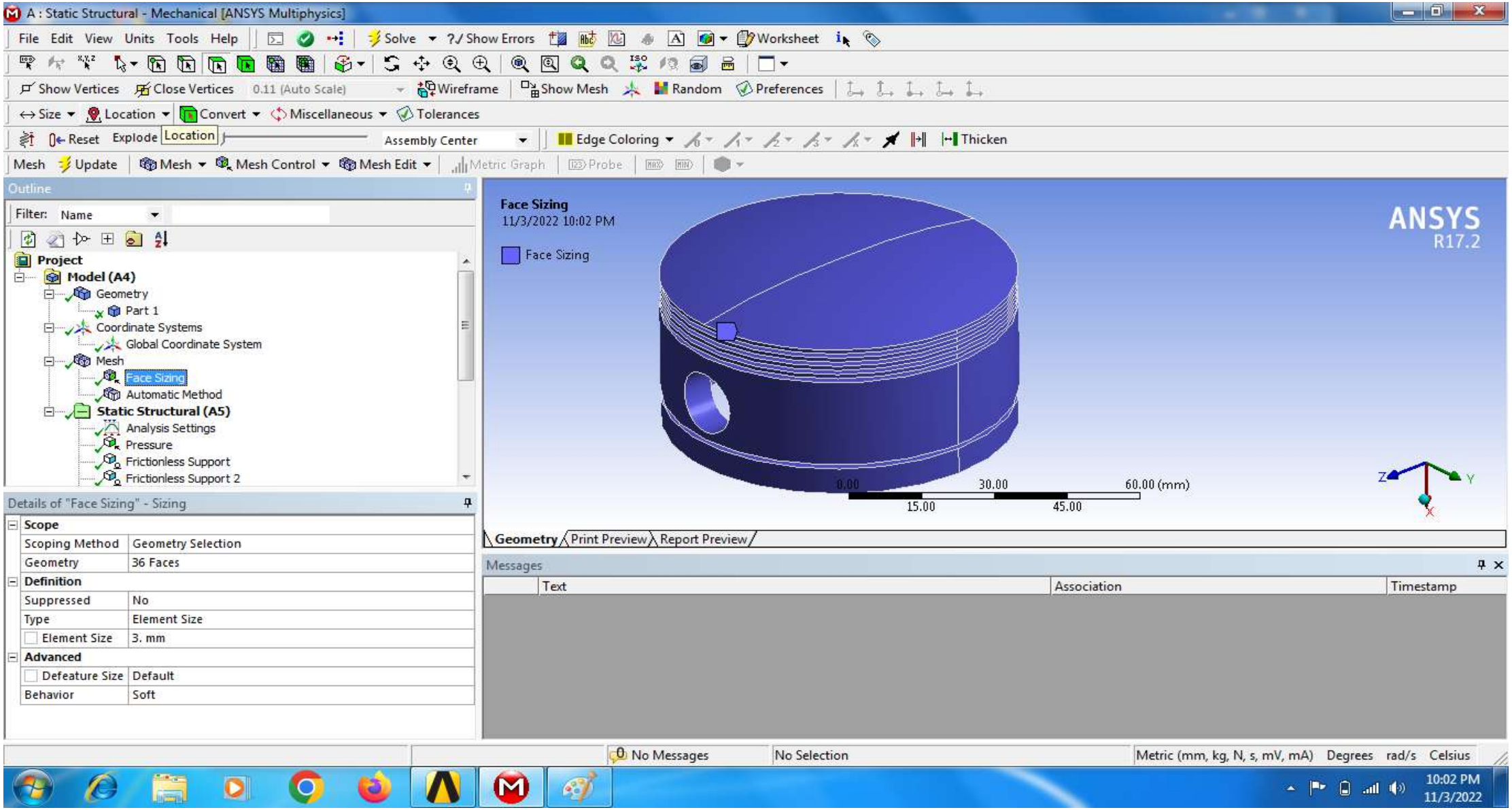
- **Boundary Condition**
  3. Material – Structural Steel
  4. Pressure 5Mpa
  5. Frictionless support


A : Static Structural - Mechanical [ANSYS Multiphysics]
File Edit View Units Tools Help
Solve
Show Errors
Worksheet
Show Vertices
Close Vertices
0.11 (Auto Scale)
Wireframe
Show Mesh
Random
Preferences
Size
Location
Convert
Miscellaneous
Tolerances
Reset
Explode Factor:
Assembly Center
Edge Coloring
Thicken
Geometry
Virtual Body
Point Mass
Distributed Mass
Element Orientation
Thermal Point Mass
Thickness
Imported Thickness
Imported Trace
Layered Section
Outline
Filter: Name
Project
Model (A4)
Geometry
Part 1
Coordinate Systems
Mesh
Static Structural (A5)
Analysis Settings
Pressure
Frictionless Support
Frictionless Support 2
Solution (A6)
Solution Information
Total Deformation
Details of "Geometry"
Definition
Source C:\Users\user\Downloads\PISTON FOR ANALYSIS.igs
Type Iges
Length Unit Meters
Element Control Program Controlled
Display Style Body Color
Bounding Box
Properties
Statistics
Basic Geometry Options
Advanced Geometry Options
Geometry
11/3/2022 10:00 PM
ANSYS
R17.2
0.00
30.00
60.00 (mm)
15.00
45.00
Z
Y
X
Geometry
Print Preview
Report Preview
Messages
Text
Association
Timestamp
No Messages
No Selection
Metric (mm, kg, N, s, mV, mA)
Degrees
rad/s
Celsius
10:00 PM
11/3/2022

GEOMETRY



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



MESHING- face sizing

A : Static Structural - Mechanical [ANSYS Multiphysics]

File Edit View Units Tools Help | Solve | Show Errors | Worksheet

Show Vertices | Close Vertices | 0.11 (Auto Scale) | Wireframe | Show Mesh | Random | Preferences

Size | Location | Convert | Miscellaneous | Tolerances

Reset | Explode Factor: | Assembly Center | Edge Coloring | Thicken

Mesh | Update | Mesh | Mesh Control | Mesh Edit | Metric Graph | Probe

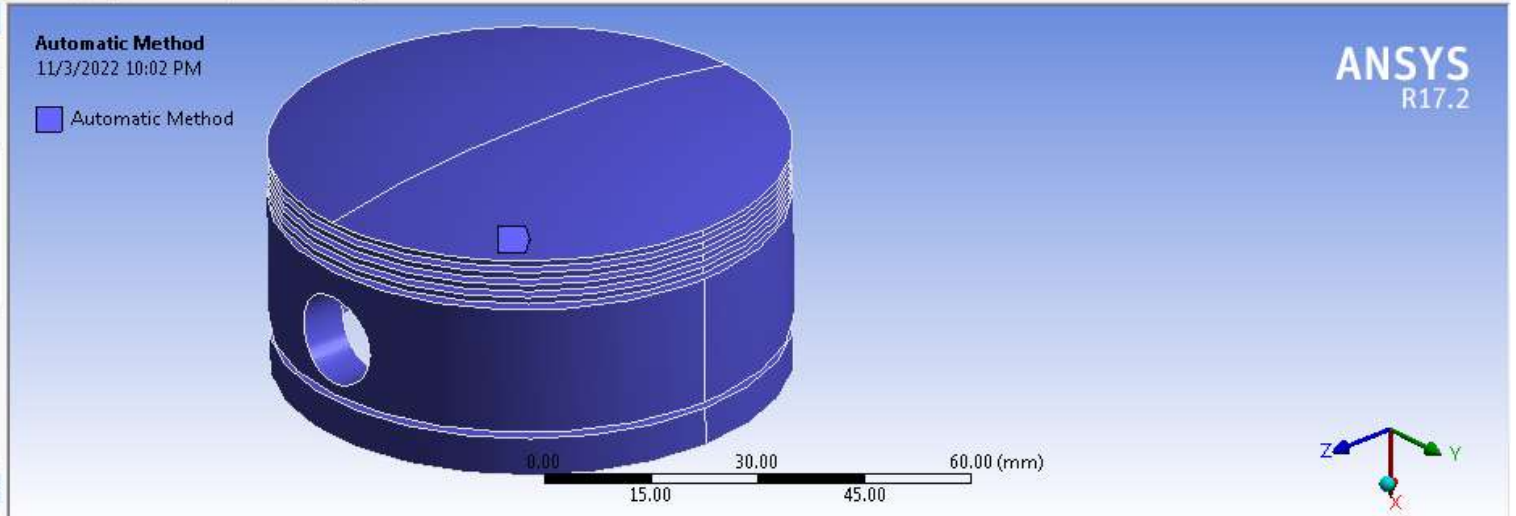
Outline

Filter: Name

- **Project**
  - **Model (A4)**
    - Geometry
      - Part 1
    - Coordinate Systems
      - Global Coordinate System
    - Mesh
      - Face Sizing
      - Automatic Method
    - **Static Structural (A5)**
      - Analysis Settings
      - Pressure
      - Frictionless Support
      - Frictionless Support 2

Details of "Automatic Method" - Method

Scope	
Scoping Method	Geometry Selection
Geometry	1 Body
Definition	
Suppressed	No
Method	Automatic
Element Midside Nodes	Use Global Setting



Geometry | Print Preview | Report Preview

Messages

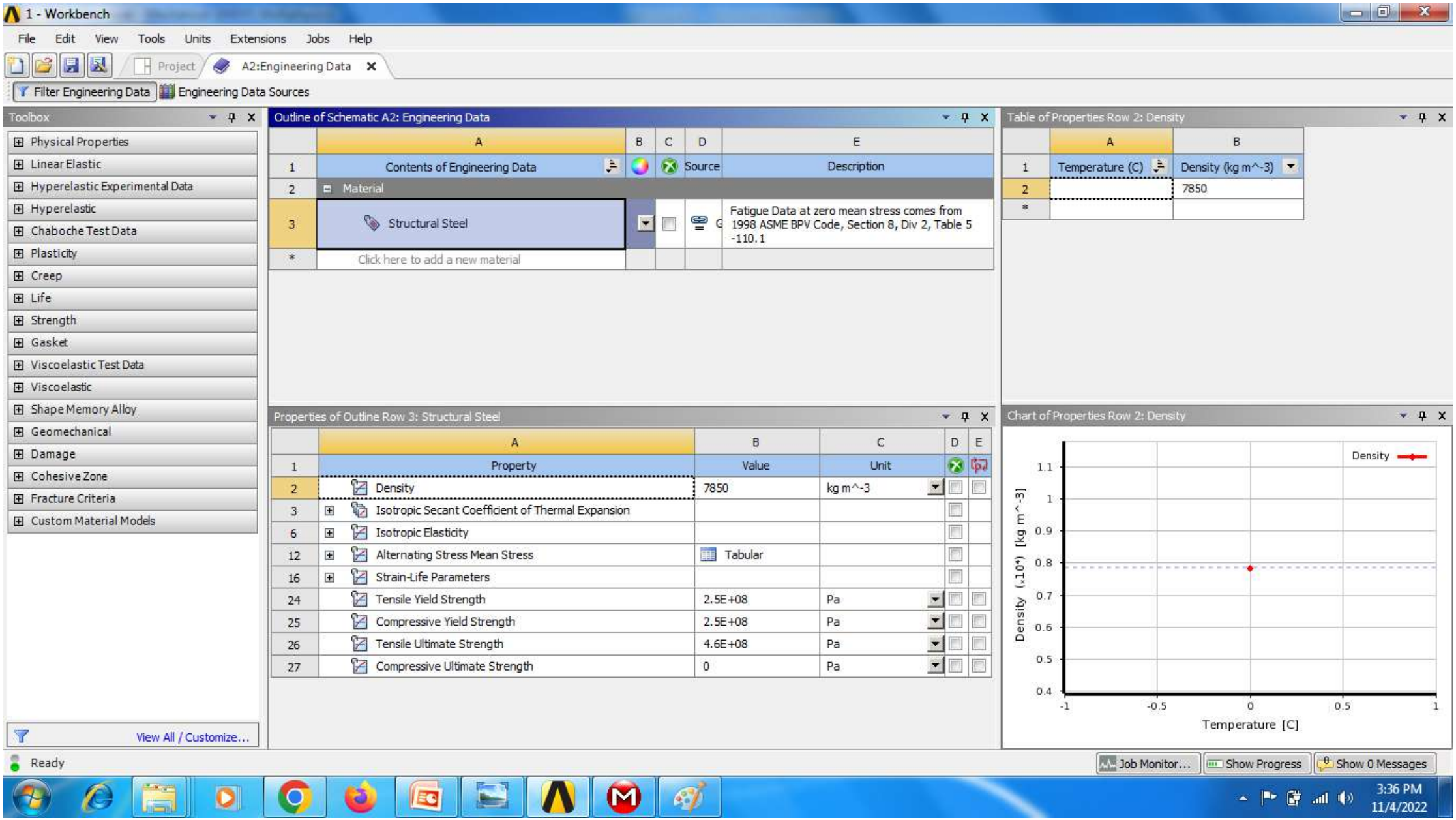
	Text	Association	Timestamp

No Messages | No Selection | Metric (mm, kg, N, s, mV, mA) Degrees rad/s Celsius

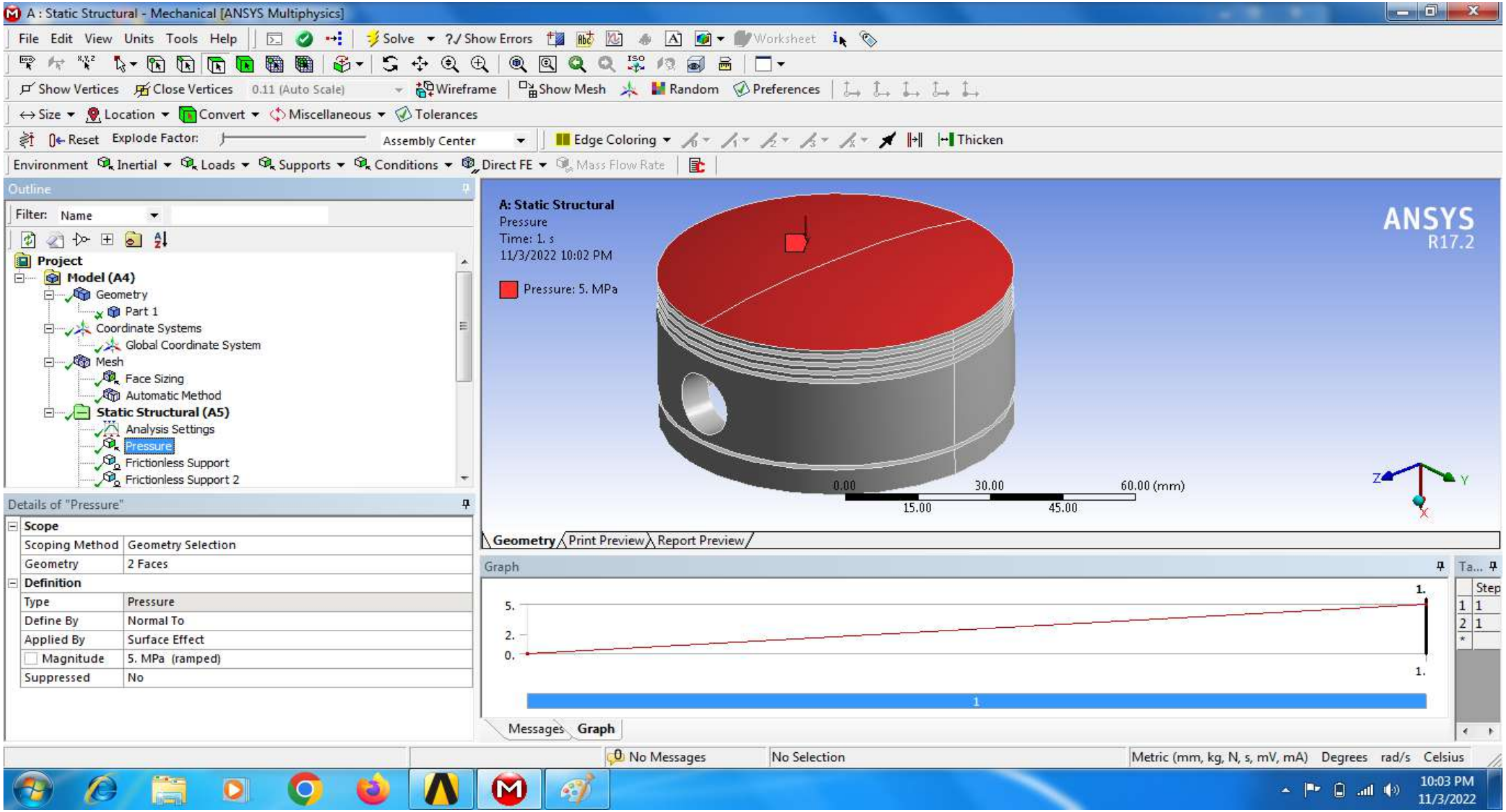
10:02 PM
11/3/2022

BOUNDARY CONDITIONS

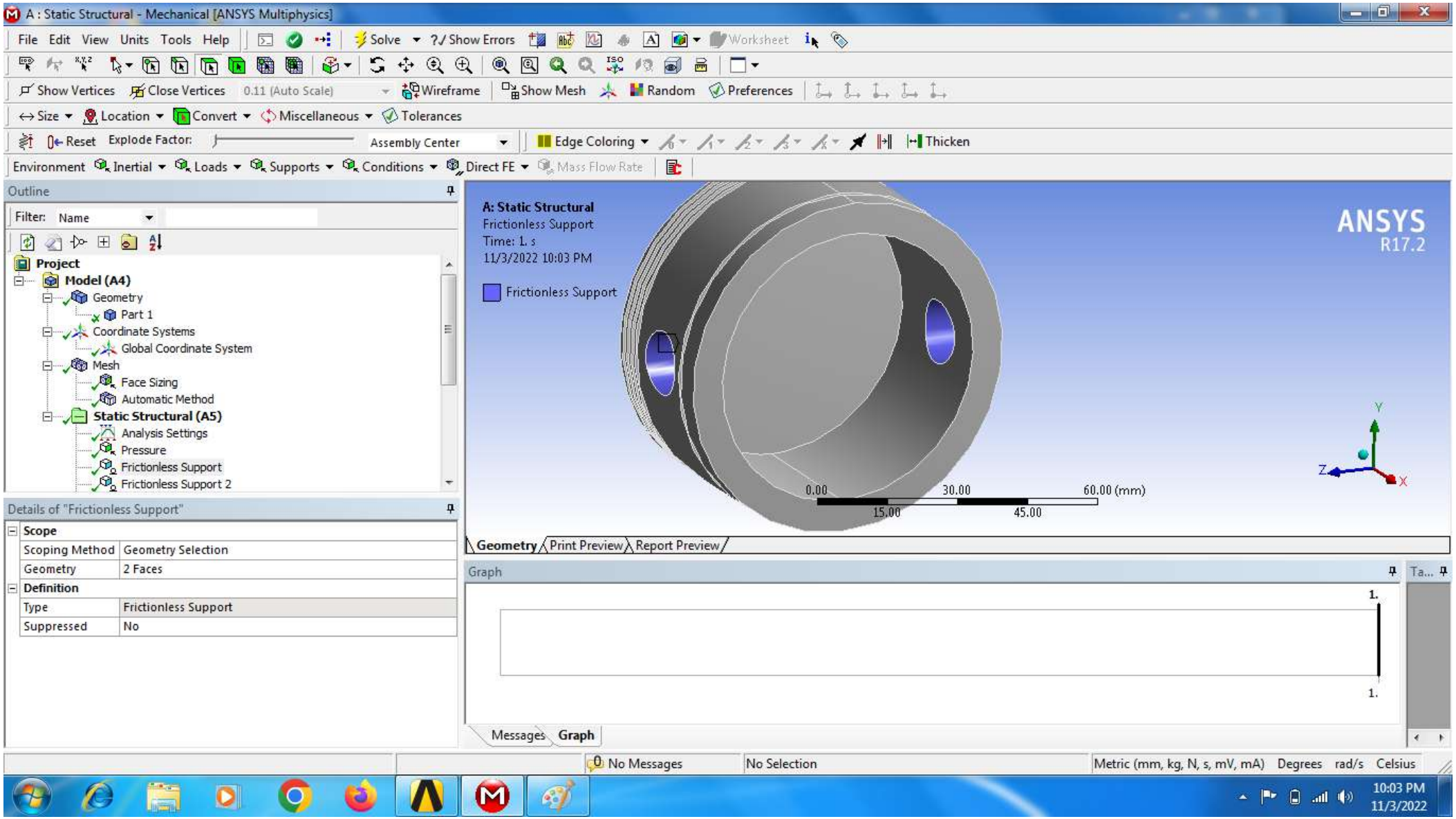
- **Boundary Condition**
  3. Material – Structural Steel
  4. Pressure 5Mpa
  5. Frictionless support


1 - Workbench
File Edit View Tools Units Extensions Jobs Help
Project
A2:Engineering Data
Filter Engineering Data
Engineering Data Sources
Toolbox
Physical Properties
Linear Elastic
Hyperelastic Experimental Data
Hyperelastic
Chaboche Test Data
Plasticity
Creep
Life
Strength
Gasket
Viscoelastic Test Data
Viscoelastic
Shape Memory Alloy
Geomechanical
Damage
Cohesive Zone
Fracture Criteria
Custom Material Models
View All / Customize...
Outline of Schematic A2: Engineering Data
Contents of Engineering Data
Source
Description
Material
Structural Steel
Fatigue Data at zero mean stress comes from 1998 ASME BPV Code, Section 8, Div 2, Table 5 -110.1
Click here to add a new material
Table of Properties Row 2: Density
Temperature (C)
Density (kg m^-3)
7850
Properties of Outline Row 3: Structural Steel
Property
Value
Unit
Density
7850
kg m^-3
Isotropic Secant Coefficient of Thermal Expansion
Isotropic Elasticity
Alternating Stress Mean Stress
Tabular
Strain-Life Parameters
Tensile Yield Strength
2.5E+08
Pa
Compressive Yield Strength
2.5E+08
Pa
Tensile Ultimate Strength
4.6E+08
Pa
Compressive Ultimate Strength
0
Pa
Chart of Properties Row 2: Density
Density
Density (x10^) [kg m^-3]
Temperature [C]
Ready
Job Monitor...
Show Progress
Show 0 Messages
3:36 PM
11/4/2022

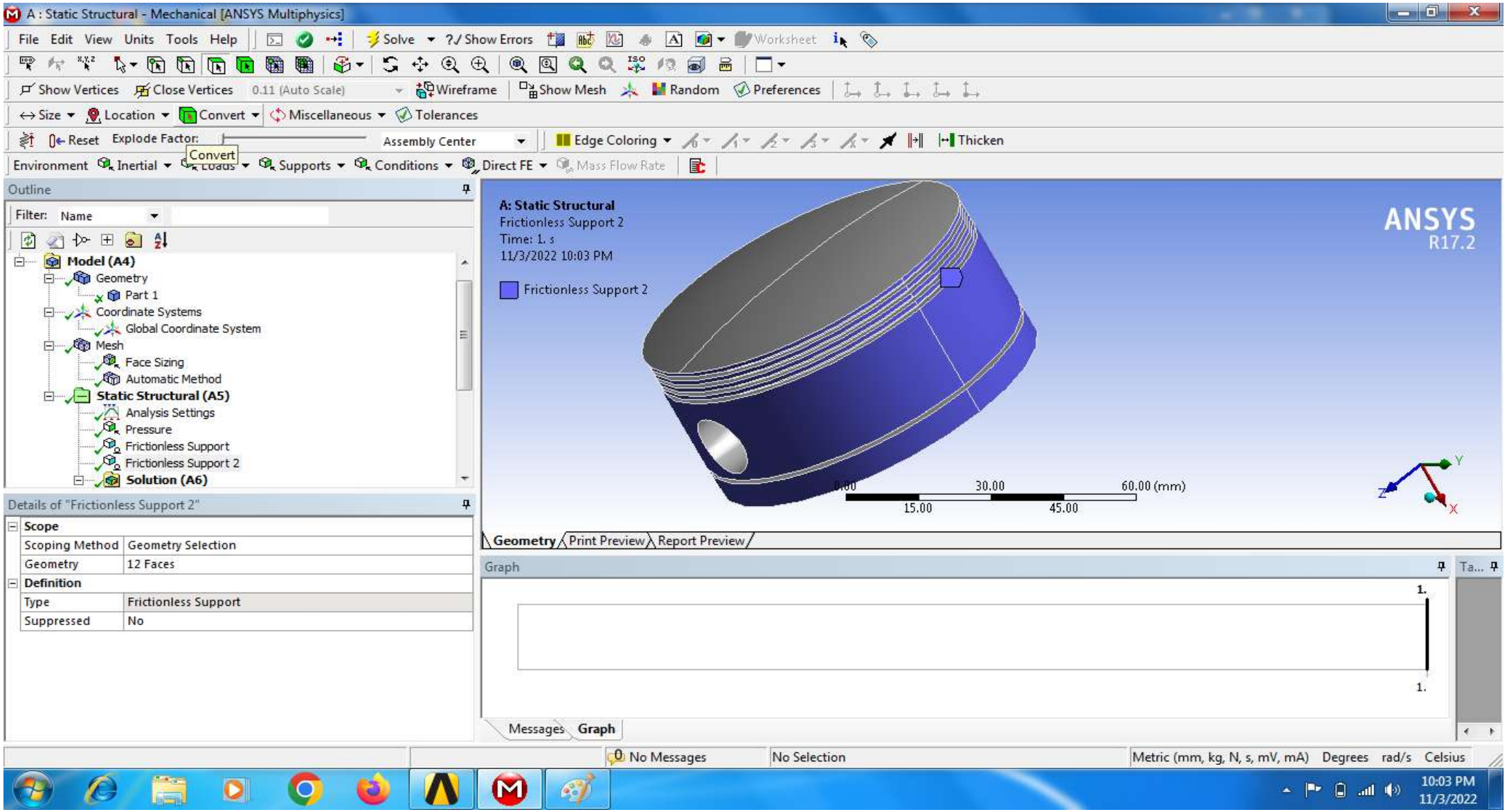
Material



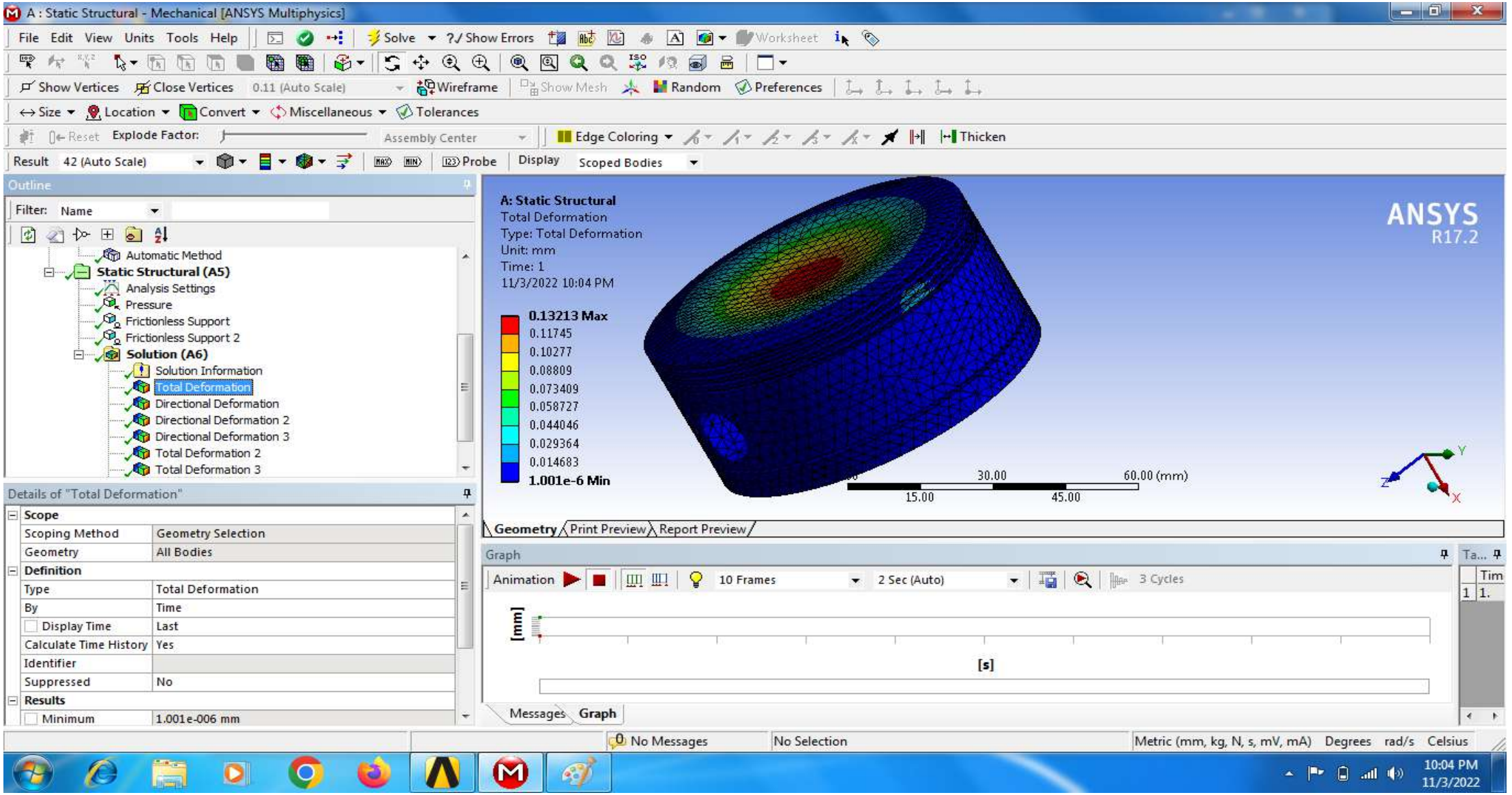
BOUNDARY CONDITIONS- pressure



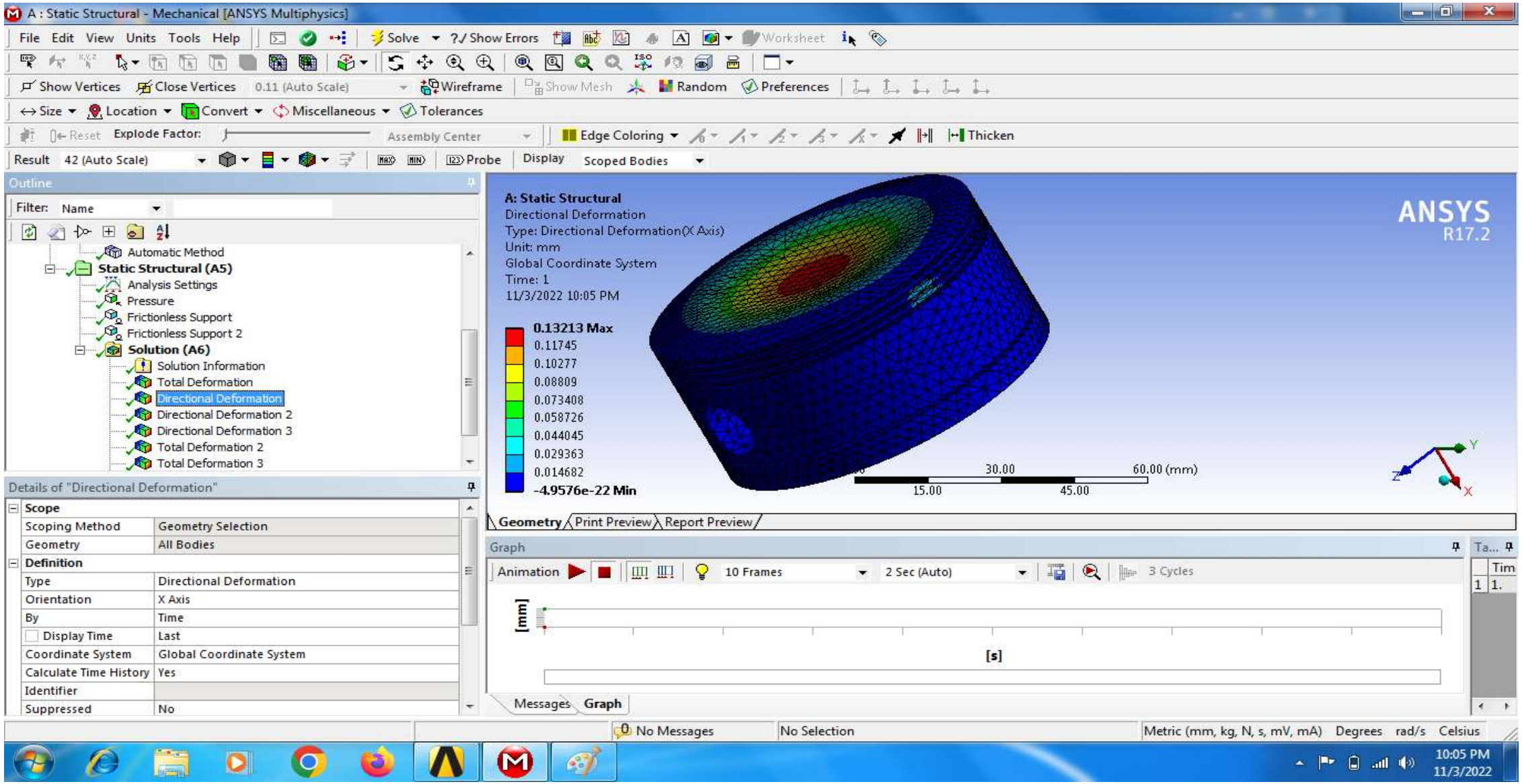
Frictional support



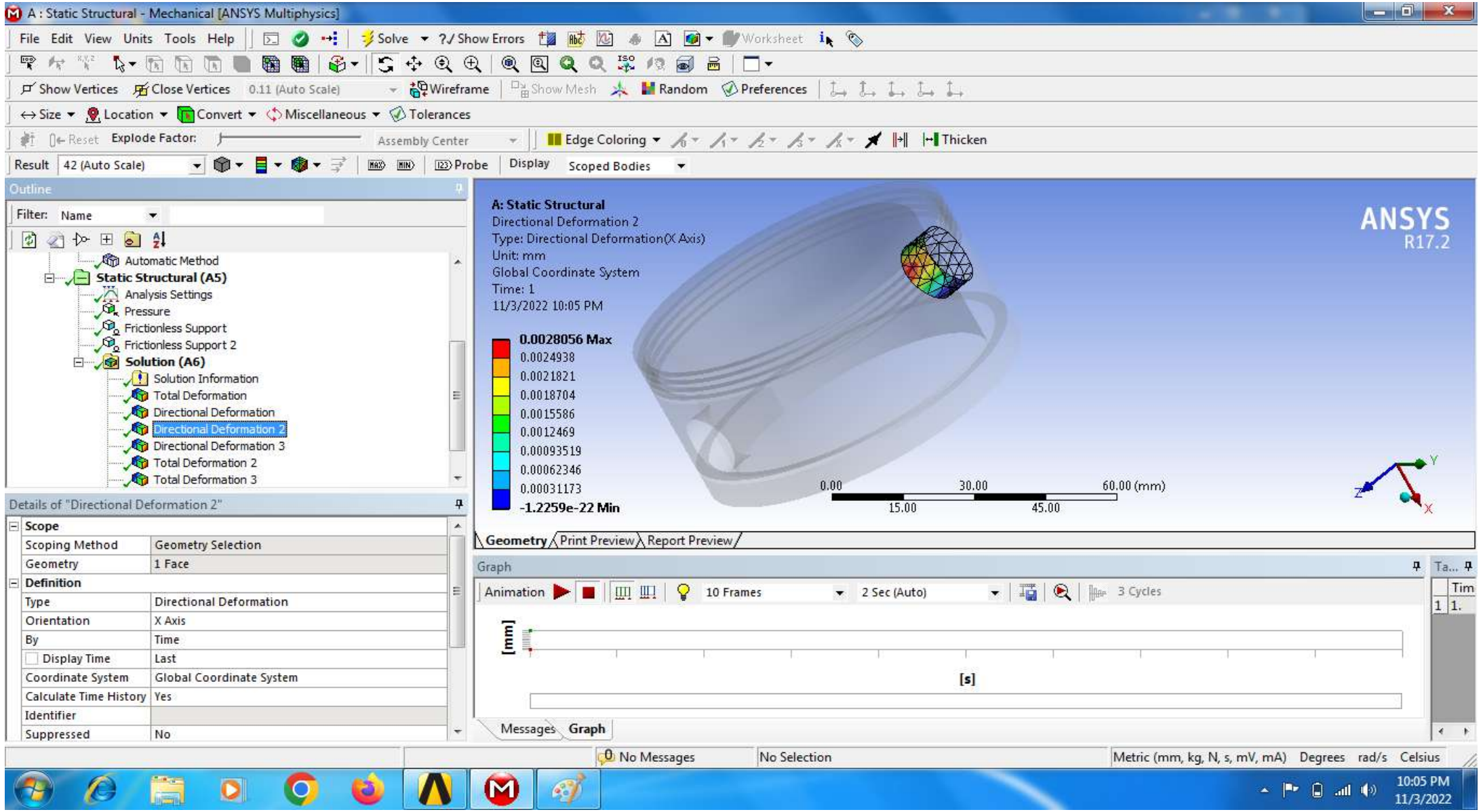
Frictional support



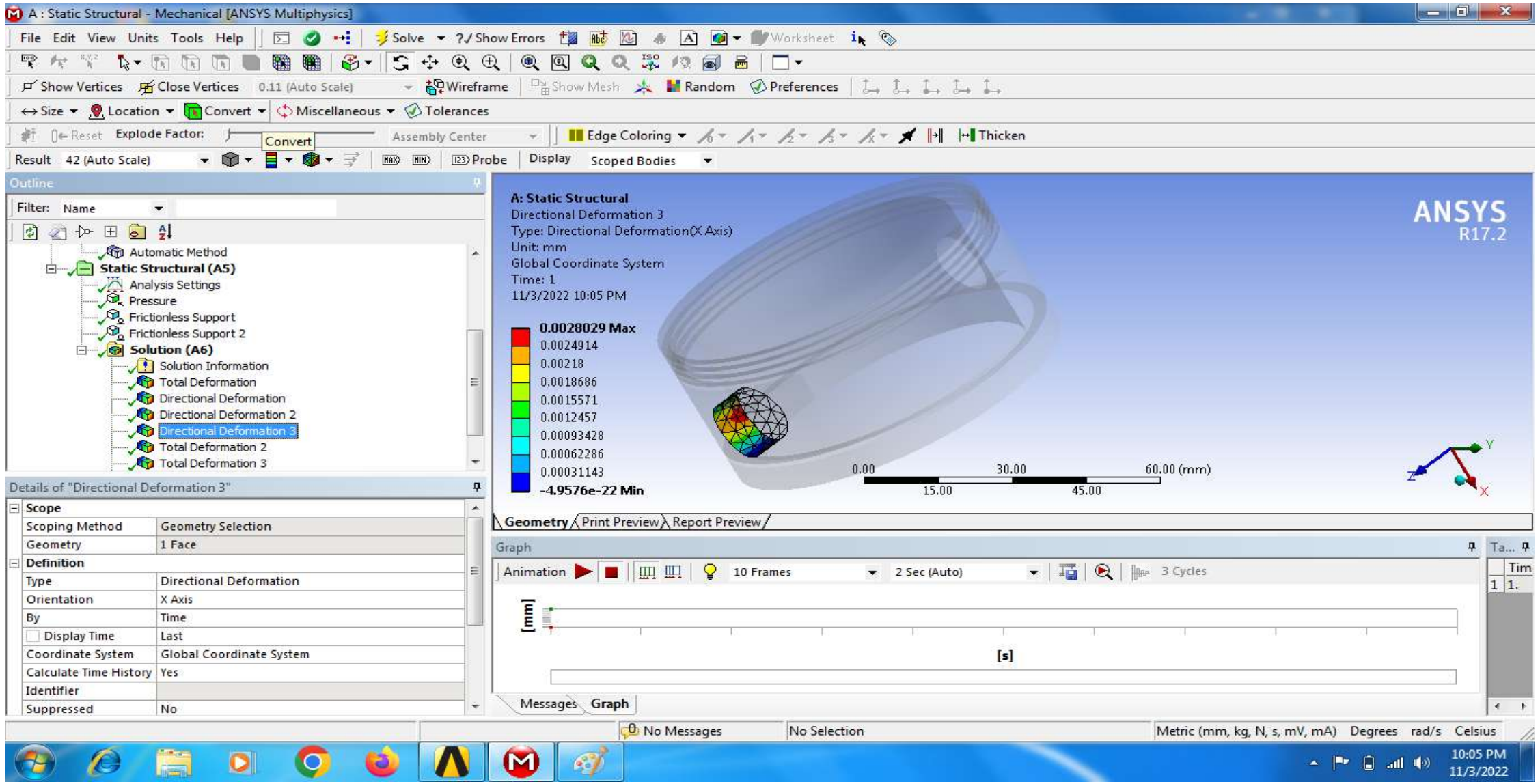
Result- total deformation



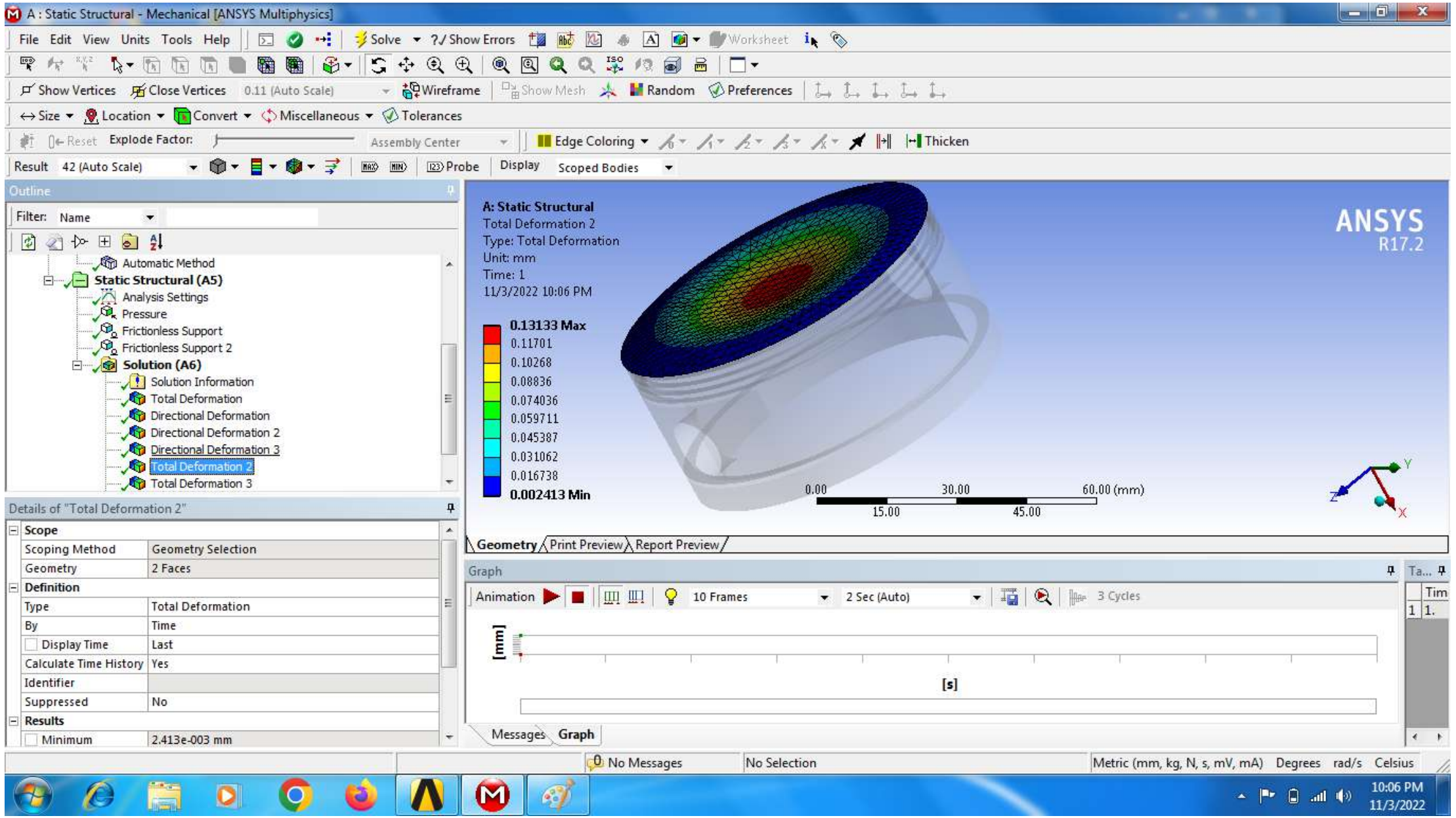
Directional deformation



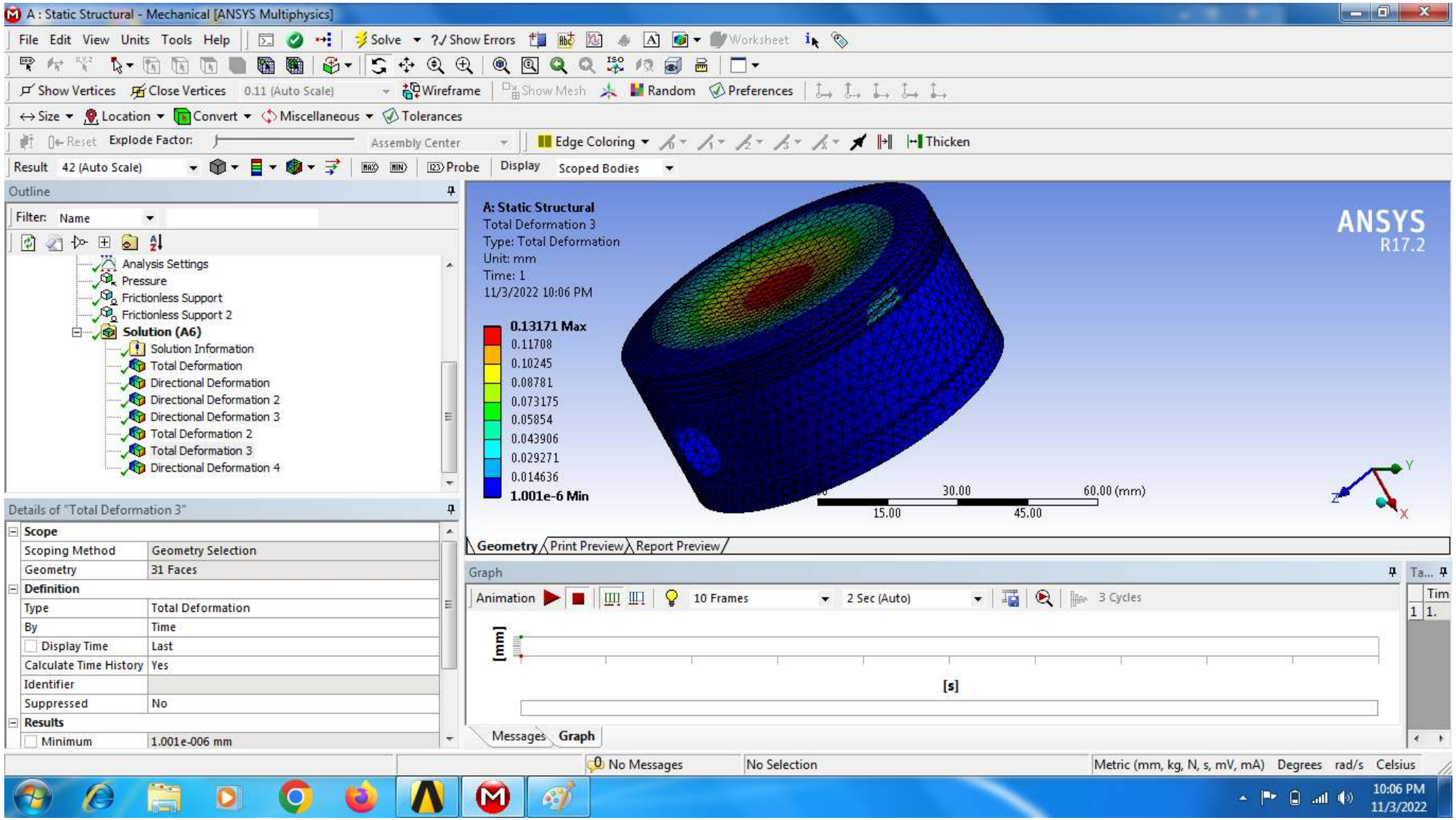
Directional deformation



Directional deformation



Total deformation



Total deformation