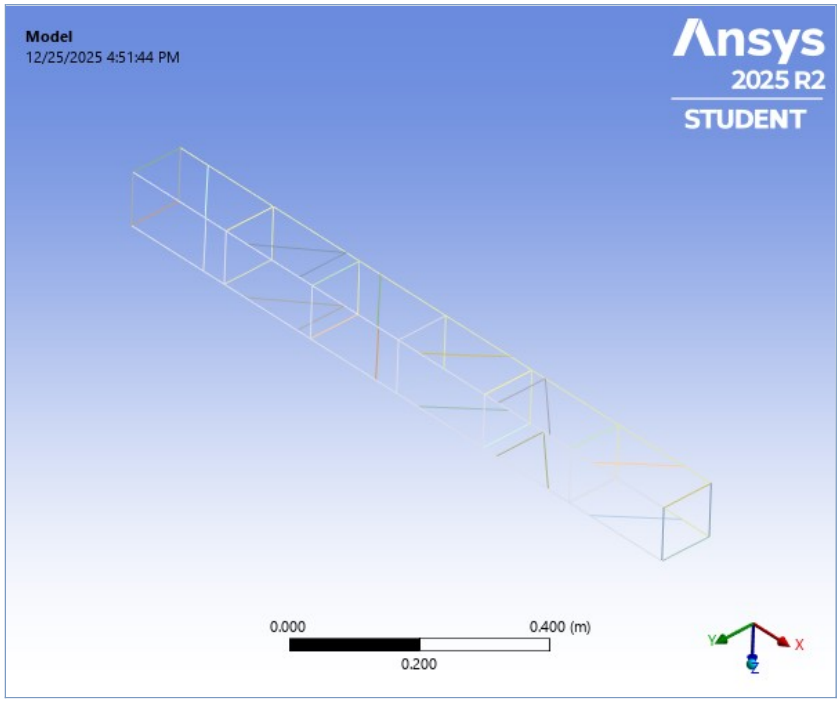
Project*

First Saved	Saturday, March 1, 2025
Last Saved	Saturday, March 1, 2025
Product Version	2025 R1
Save Project Before Solution	No
Save Project After Solution	No



Contents

Units

TABLE 1

Unit System	Metric (m, kg, N, s, V, A) Degrees rad/s Celsius
Angle	Degrees
Rotational Velocity	rad/s
Temperature	Celsius

Model (A4)

FIGURE 1
Model (A4) > Figure

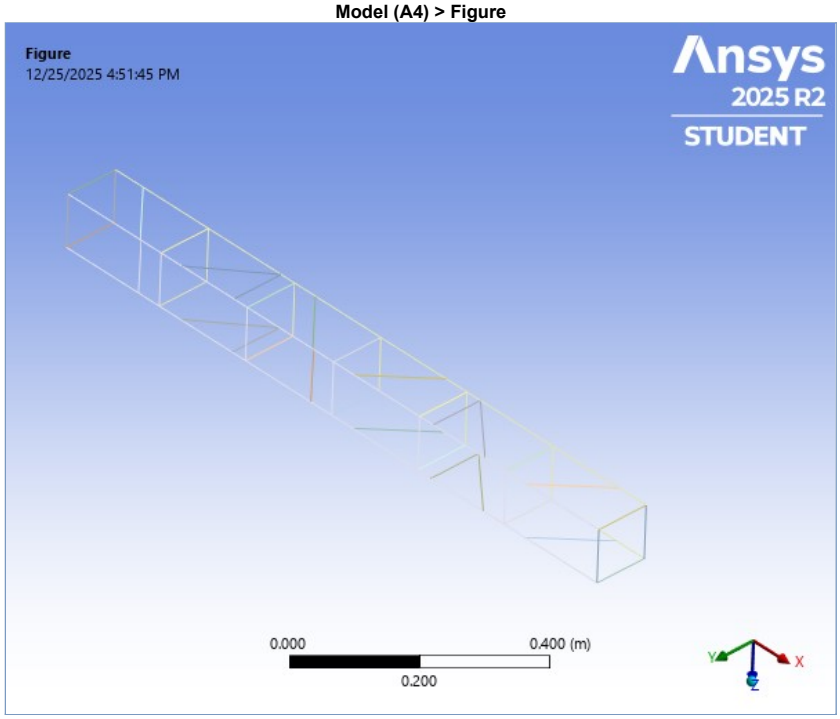


TABLE 2
Model (A4) > Geometry Imports

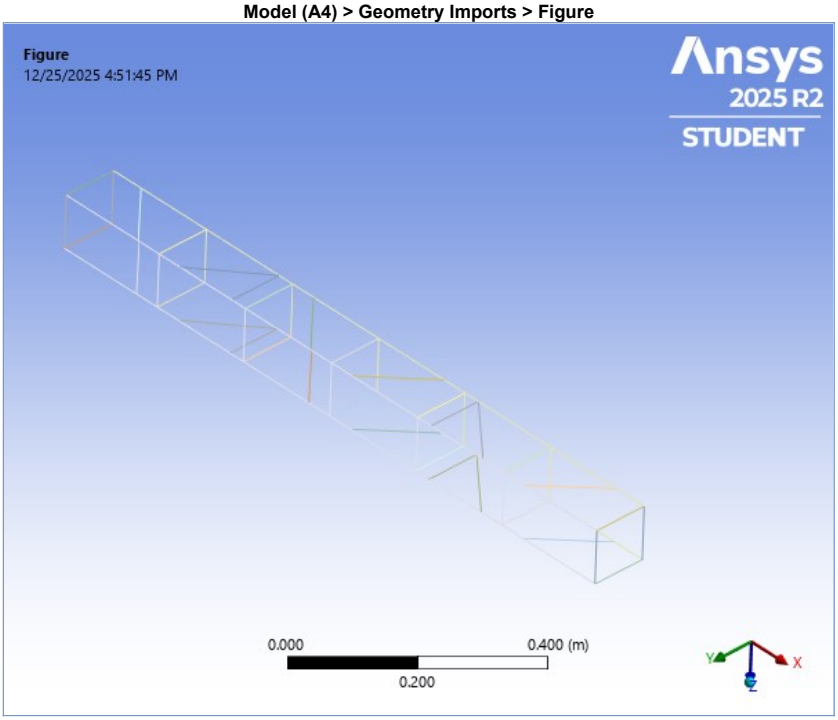
Object Name	*Geometry Imports*
State	Solved

TABLE 3
Model (A4) > Geometry Imports > Geometry Import (A3)

Object Name	*Geometry Import (A3)*
State	Solved
Definition	
Source	E:\from mhmd LAB\Ansys mechanical\1d element lec12\Truss_files\dp0\SYS\DM\SYS.scdocx
Type	SpaceClaim
Basic Geometry Options	
Solid Bodies	Yes
Surface Bodies	Yes
Line Bodies	Yes
Parameters	Independent
Parameter Key	
Attributes	Yes
Attribute Key	
Named Selections	Yes
Named Selection Key	
Material Properties	Yes

Advanced Geometry Options	
Use Associativity	Yes
Coordinate Systems	Yes
Coordinate System Key	
Reader Mode Saves Updated File	No
Use Instances	Yes
Smart CAD Update	Yes
Compare Parts On Update	No
Analysis Type	3-D
Mixed Import Resolution	None
Import Facet Quality	Source
Clean Bodies On Import	No
Stitch Surfaces On Import	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

FIGURE 2
Model (A4) > Geometry Imports > Figure



Geometry

TABLE 4
Model (A4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	E:\from mhmd LAB\Ansys mechanical\1d element lec12\Truss_files\dp0\SYS\DM\SYS.scdocx
Type	SpaceClaim
Length Unit	Meters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	1.1925 m
Length Y	0.1 m
Length Z	0.1 m
Properties	
Volume	6.3857e-004 m³
Mass	5.0128 kg
Scale Factor Value	1.
Statistics	
Bodies	30
Active Bodies	30
Nodes	368
Elements	208
Mesh Metric	None
Update Options	
Assign Default Material	No
Basic Geometry Options	
Solid Bodies	Yes
Surface Bodies	Yes
Line Bodies	Yes
Parameters	Independent
Parameter Key	
Attributes	Yes
Attribute Key	
Named Selections	Yes
Named Selection Key	
Material Properties	Yes
Advanced Geometry Options	
Use Associativity	Yes
Coordinate Systems	Yes
Coordinate System Key	
Reader Mode Saves Updated File	No
Use Instances	Yes
Smart CAD Update	Yes

Compare Parts On Update	No
Analysis Type	3-D
Mixed Import Resolution	None
Import Facet Quality	Source
Clean Bodies On Import	No
Stitch Surfaces On Import	None
Decompose Disjoint Geometry	Yes
ID_GeometryPrefProcessPhysicsDefinition	No
Enclosure and Symmetry Processing	Yes

TABLE 5
Model (A4) > Geometry > Body Groups

Object Name	*SYS*
State	Meshed
Graphics Properties	
Visible	Yes
Definition	
Suppressed	No
Assignment	Structural Steel
Coordinate System	Default Coordinate System
Bounding Box	
Length X	1.1925 m
Length Y	0.1 m
Length Z	0.1 m
Properties	
Volume	6.3857e-004 m³
Mass	5.0128 kg
Statistics	
Nodes	368
Elements	208
Mesh Metric	None
CAD Attributes	
PartTolerance:	0.00000001
SCRootPartComponent	
Color:143.175.143	

TABLE 6
Model (A4) > Geometry > SYS > Parts

Object Name	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*
State	Meshed										
Graphics Properties											
Visible	Yes										
Transparency	1										
Definition											
Suppressed	No										
Model Type	Beam										
Stiffness Behavior	Flexible										
Coordinate System	Default Coordinate System										
Reference Temperature	By Environment										
Cross Section	Extracted Profile1										
Offset Mode	Refresh on Update										
Offset Type	Centroid										
Treatment	None										
Material											
Assignment	Structural Steel										
Nonlinear Effects	Yes										
Thermal Strain Effects	Yes										
Bounding Box											
Length X	0. m			1.e-001 m	0. m	1.e-001 m	0. m	0.11688 m			1.e-001 m
Length Y	0.1 m										
Length Z	0. m										
Properties											
Volume	3.436e-006 m³			4.8592e-006 m³	3.436e-006 m³	4.8592e-006 m³	3.436e-006 m³	8.721e-006 m³			4.8592e-006 m³
Mass	2.6972e-002 kg			3.8144e-002 kg	2.6972e-002 kg	3.8144e-002 kg	2.6972e-002 kg	6.846e-002 kg			3.8144e-002 kg
Length	0.1 m			0.14142 m	0.1 m	0.14142 m	0.1 m	0.25382 m			0.14142 m
Cross Section Area	3.4359e-005 m²										
Cross Section IYY	3.3551e-010 m²·m²										
Cross Section IZZ	3.3551e-010 m²·m²										
Statistics											
Nodes	5			7	5	7	5	11			7
Elements	2			3	2	3	2	5			3
Mesh Metric	None										

TABLE 7
Model (A4) > Geometry > SYS > Parts

Object Name	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*	*Beam (Extracted Profile1)*
State	Meshed										
Graphics Properties											
Visible	Yes										
Transparency	1										
Definition											
Suppressed	No										

Model Type	Beam							
Stiffness Behavior	Flexible							
Coordinate System	Default Coordinate System							
Reference Temperature	By Environment							
Cross Section	Extracted Profile1							
Offset Mode	Refresh on Update							
Offset Type	Centroid							
Treatment	None							
Material								
Assignment	Structural Steel							
Nonlinear Effects	Yes							
Thermal Strain Effects	Yes							
Bounding Box								
Length X	1.e-001 m	0.1 m	0.11687 m	0. m	0.1 m	0. m	0.1 m	0. m
Length Y	0.1 m							
Length Z	0. m							
Properties								
Volume	4.8592e-006 m³		8.721e-006 m³	3.436e-006 m³	4.8592e-006 m³	3.436e-006 m³	4.8592e-006 m³	3.436e-006 m³
Mass	3.8144e-002 kg		6.846e-002 kg	2.6972e-002 kg	3.8144e-002 kg	2.6972e-002 kg	3.8144e-002 kg	2.6972e-002 kg
Length	0.14142 m		0.25382 m	0.1 m	0.14142 m	0.1 m	0.14142 m	0.1 m
Cross Section Area	3.4359e-005 m²							
Cross Section IYY	3.3551e-010 m²·m²							
Cross Section IZZ	3.3551e-010 m²·m²							
Statistics								
Nodes	7		11	5	7	5	7	5
Elements	3		5	2	3	2	3	2
Mesh Metric	None							

TABLE 8
Model (A4) > Geometry > SYS > Parts

Object Name	*Beam (Extracted Profile2)*	*Beam (Extracted Profile2)*	*Beam (Extracted Profile3)*	*Beam (Extracted Profile3)*	*Beam (Extracted Profile4)*	*Beam (Extracted Profile4)*	*Beam (Extracted Profile4)*	*Beam (Extracted Profile4)*
State	Meshed							
Graphics Properties								
Visible	Yes							
Transparency	1							
Definition								
Suppressed	No							
Model Type	Beam							
Stiffness Behavior	Flexible							
Coordinate System	Default Coordinate System							
Reference Temperature	By Environment							
Cross Section	Extracted Profile2		Extracted Profile3		Extracted Profile4			
Offset Mode	Refresh on Update							
Offset Type	Centroid							
Treatment	None							
Material								
Assignment	Structural Steel							
Nonlinear Effects	Yes							
Thermal Strain Effects	Yes							
Bounding Box								
Length X	1.1925 m		0. m					
Length Y	0. m		0.1 m					
Length Z	0.1 m				0. m			
Properties								
Volume	2.1242e-004 m³		2.75e-005 m³		1.2656e-005 m³			
Mass	1.6675 kg		0.21588 kg		9.9352e-002 kg			
Length	2.885 m		0.4 m		0.1 m			
Cross Section Area	7.3627e-005 m²		6.875e-005 m²		1.2656e-004 m²			
Cross Section IYY	3.2497e-009 m²·m²		1.0514e-009 m²·m²		1.2014e-008 m²·m²			
Cross Section IZZ	3.2497e-009 m²·m²		3.3171e-009 m²·m²		1.4832e-010 m²·m²			
Statistics								
Nodes	113	121	16		5			
Elements	58	62	8		2			
Mesh Metric	None							

FIGURE 3
Model (A4) > Geometry > Figure

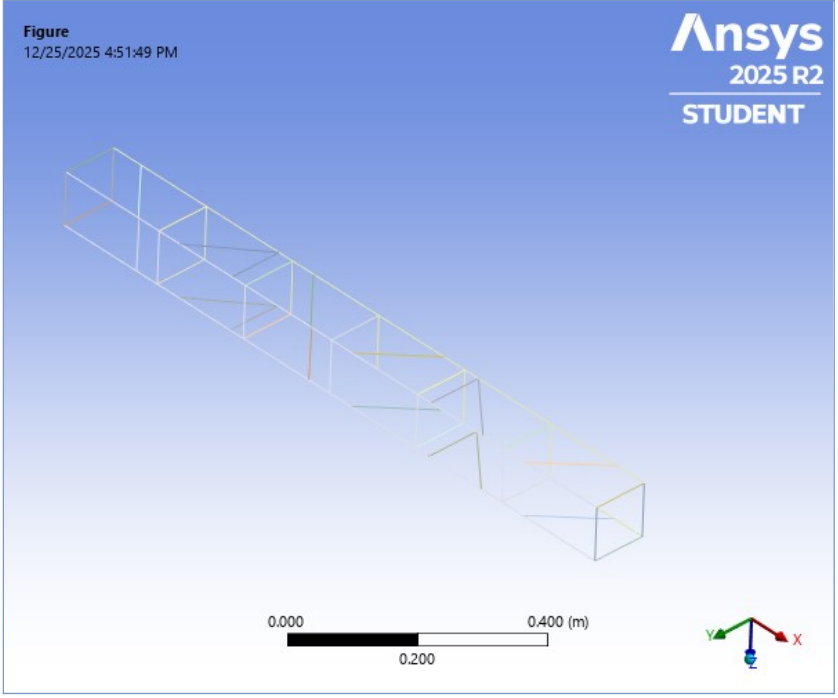


TABLE 9
Model (A4) > Materials

Object Name	*Materials*
State	Fully Defined
Statistics	
Materials	1
Material Assignments	0

TABLE 10
Model (A4) > Cross Sections

Object Name	*Cross Sections*
State	Fully Defined
Statistics	
Cross Sections	4

TABLE 11
Model (A4) > Cross Sections > Extracted Profile1

Object Name	*Extracted Profile1*	*Extracted Profile2*	*Extracted Profile3*	*Extracted Profile4*
State	Fully Defined			
Definition				
Type	CTUBE		HREC	RECT
Import Type	Imported			
Dimensions				
Ri	3.75e-003 m	8.75e-003 m		
Ro	5.e-003 m	1.e-002 m		
W1			2.e-002 m	
W2			1.e-002 m	
t1			1.25e-003 m	
t2			1.25e-003 m	
t3			1.25e-003 m	
t4			1.25e-003 m	
B				3.75e-003 m
H				3.375e-002 m
Physical Properties				
Beam Section	Extracted Profile1	Extracted Profile2	Extracted Profile3	Extracted Profile4
A	3.4359e-005 m²	7.3627e-005 m²	6.875e-005 m²	1.2656e-004 m²
Iyy	3.3551e-010 m²·m²	3.2497e-009 m²·m²	1.0514e-009 m²·m²	1.2014e-008 m²·m²
Izz	3.3551e-010 m²·m²	3.2497e-009 m²·m²	3.3171e-009 m²·m²	1.4832e-010 m²·m²

FIGURE 4
Model (A4) > Cross Sections > Extracted Profile1 > Figure

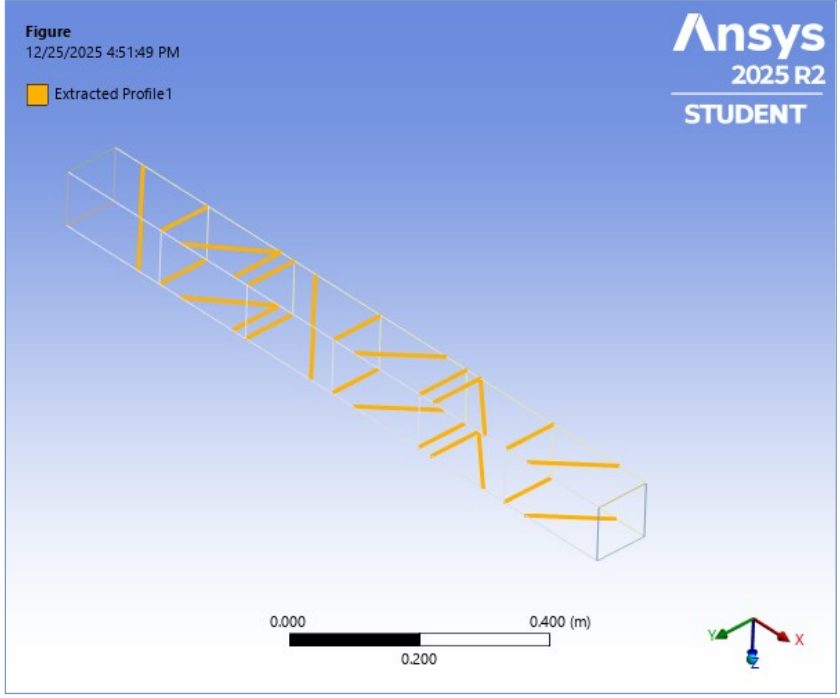


FIGURE 5
Model (A4) > Cross Sections > Extracted Profile2 > Figure

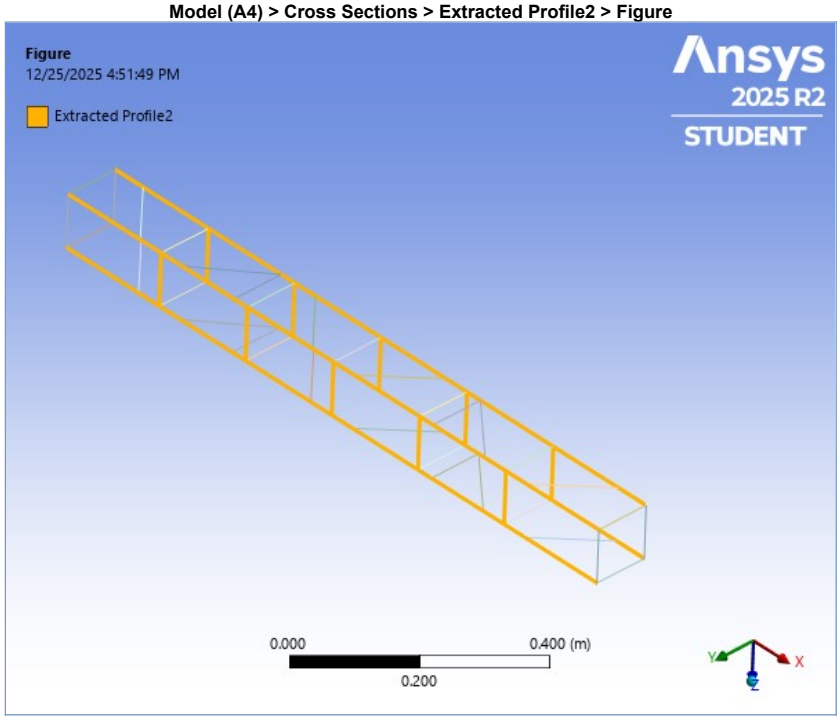


FIGURE 6
Model (A4) > Cross Sections > Extracted Profile3 > Figure

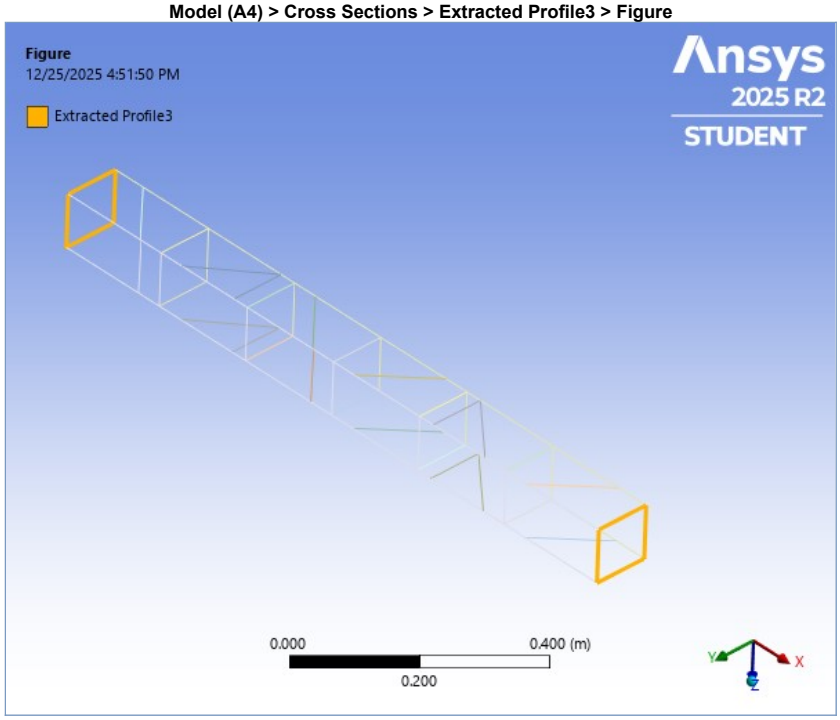
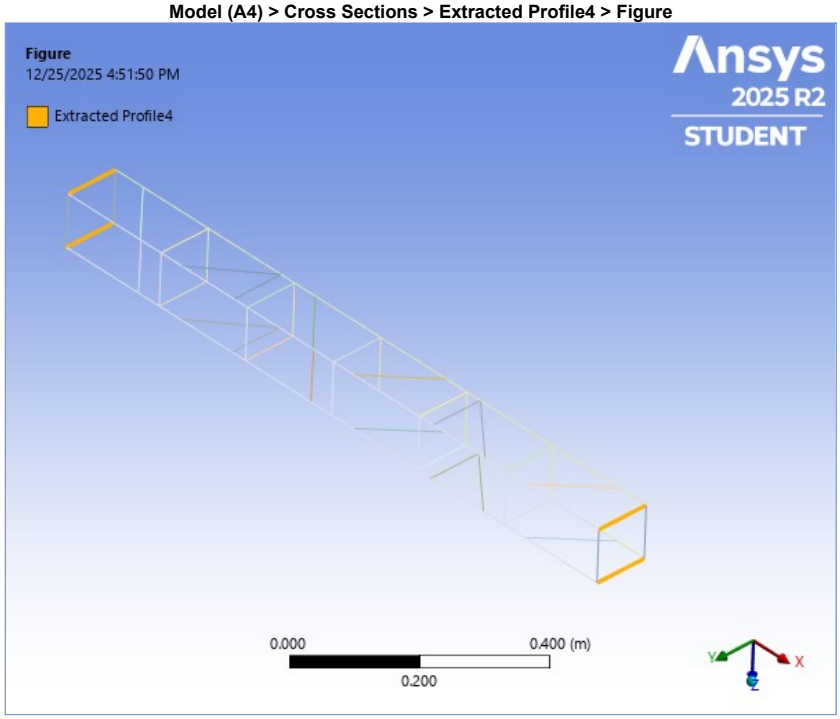


FIGURE 7
Model (A4) > Cross Sections > Extracted Profile4 > Figure



Coordinate Systems

TABLE 12
Model (A4) > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
Definition	
Type	Cartesian
Coordinate System ID	0.
Origin	
Origin X	0. m
Origin Y	0. m
Origin Z	0. m
Directional Vectors	
X Axis Data	[1. 0. 0.]
Y Axis Data	[0. 1. 0.]
Z Axis Data	[0. 0. 1.]
Transfer Properties	
Source	
Read Only	No

Connections

TABLE 13
Model (A4) > Connections

Object Name	*Connections*
State	Fully Defined
Auto Detection	
Generate Automatic Connection On Refresh	Yes
Transparency	
Enabled	Yes
Statistics	
Contacts	0
Active Contacts	0
Joints	0
Active Joints	0
Beams	0
Active Beams	0
Bearings	0
Active Bearings	0
Springs	0
Active Springs	0
Body Interactions	0
Active Body Interactions	0

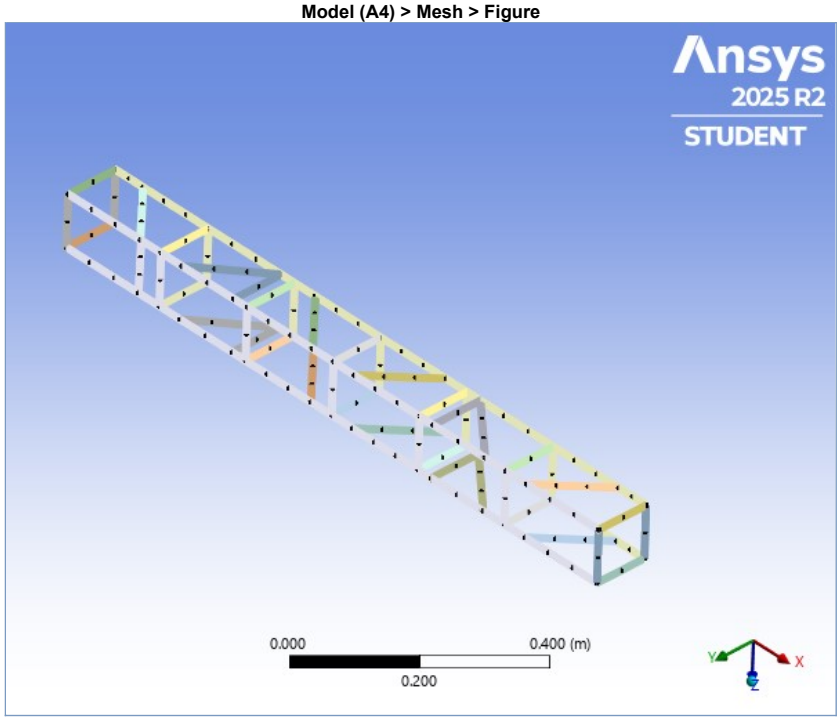
Mesh

TABLE 14
Model (A4) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Use Geometry Setting
Defaults	
Physics Preference	Mechanical
Element Order	Program Controlled
Element Size	Default
Sizing	
Use Adaptive Sizing	Yes
Resolution	Default (2)
Mesh Defeaturing	Yes
Defeature Size	Default

Transition	Fast
Span Angle Center	Coarse
Initial Size Seed	Assembly
Bounding Box Diagonal	1.2009 m
Average Surface Area	0.0 m²
Minimum Edge Length	3.e-002 m
Quality	
Check Mesh Quality	Yes, Errors
Error Limits	Aggressive Mechanical
Target Element Quality	Default (5.e-002)
Smoothing	Medium
Mesh Metric	None
Inflation	
Use Automatic Inflation	None
Inflation Option	Smooth Transition
Transition Ratio	0.272
Maximum Layers	5
Growth Rate	1.2
Inflation Algorithm	Pre
Inflation Element Type	Wedges
View Advanced Options	No
Advanced	
Number of CPUs for Parallel Part Meshing	Program Controlled
Straight Sided Elements	No
Rigid Body Behavior	Dimensionally Reduced
Triangle Surface Mesher	Program Controlled
Topology Checking	Yes
Pinch Tolerance	Please Define
Generate Pinch on Refresh	No
Auto-Map Fillets	No
Automatic Methods	
Sheet Body Method	Quad Dominant
Sweepable Body Method	Sweep
Statistics	
Nodes	368
Elements	208
Show Detailed Statistics	No

FIGURE 8
Model (A4) > Mesh > Figure



Static Structural (A5)

TABLE 15
Model (A4) > Analysis

Object Name	*Static Structural (A5)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Static Structural
Solver Target	Mechanical APDL
Options	
Environment Temperature	22. °C
Generate Input Only	No

TABLE 16
Model (A4) > Static Structural (A5) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Step Controls	
Number Of Steps	1.
Current Step Number	1.
Step End Time	1. s
Auto Time Stepping	Program Controlled

Solver Controls	
Solver Type	Program Controlled
Weak Springs	Off
Solver Pivot Checking	Program Controlled
Large Deflection	Off
Inertia Relief	Off
Quasi-Static Solution	Off
Rotordynamics Controls	
Coriolis Effect	Off
Restart Controls	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	No
Combine Restart Files	Program Controlled
Nonlinear Controls	
Newton-Raphson Option	Program Controlled
Force Convergence	Program Controlled
Moment Convergence	Program Controlled
Displacement Convergence	Program Controlled
Rotation Convergence	Program Controlled
Line Search	Program Controlled
Stabilization	Program Controlled
Advanced	
Inverse Option	No
Contact Split (DMP)	Program Controlled
Output Controls	
Output Selection	None
Stress	Yes
Back Stress	No
Strain	Yes
Contact Data	Yes
Nonlinear Data	No
Nodal Forces	No
Volume and Energy	Yes
Euler Angles	Yes
General Miscellaneous	No
Contact Miscellaneous	No
Store Results At	All Time Points
Result File Compression	Program Controlled
Analysis Data Management	
Solver Files Directory	E:\from mhmd LAB\Ansys mechanical\1d element lec12\Truss_files\dp0\SYS\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Contact Summary	Program Controlled
Delete Unneeded Files	Yes
Nonlinear Solution	No
Solver Units	Active System
Solver Unit System	mks

TABLE 17
Model (A4) > Static Structural (A5) > Loads

Object Name	*Fixed Support*	*Force*
State	Fully Defined	
Scope		
Scoping Method	Geometry Selection	
Geometry	4 Vertices	
Definition		
Type	Fixed Support	Force
Suppressed	No	
Define By		Components
Coordinate System		Global Coordinate System
X Component		0. N (ramped)
Y Component		-400. N (ramped)
Z Component		0. N (ramped)

FIGURE 9
Model (A4) > Static Structural (A5) > Fixed Support > Figure

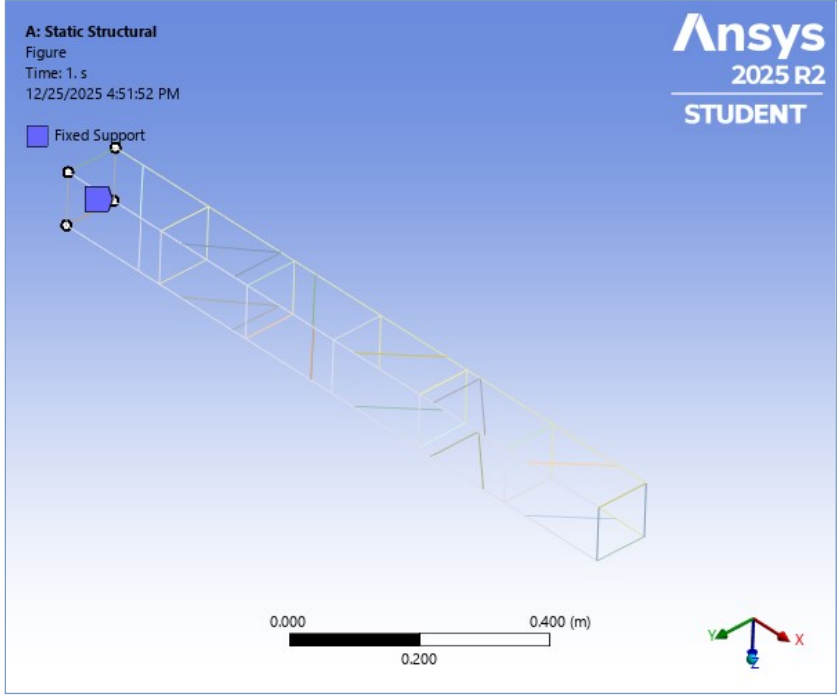


FIGURE 10
Model (A4) > Static Structural (A5) > Force

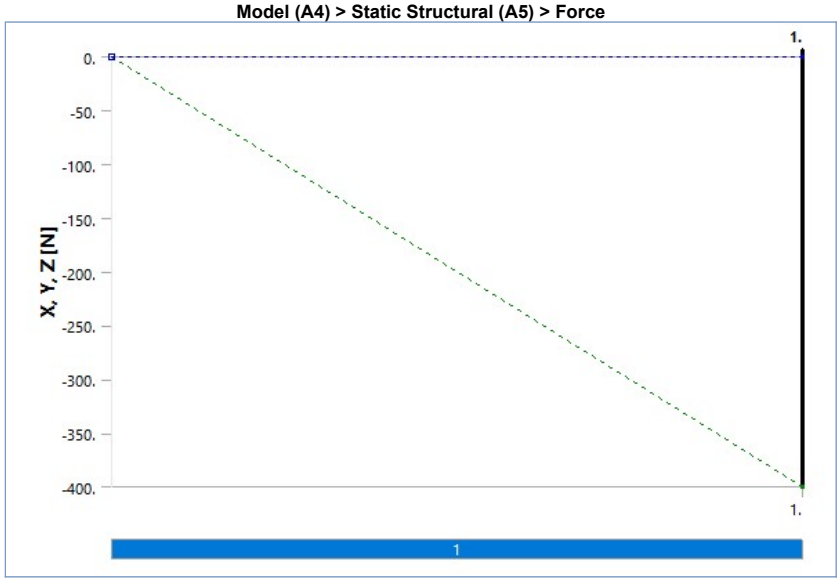
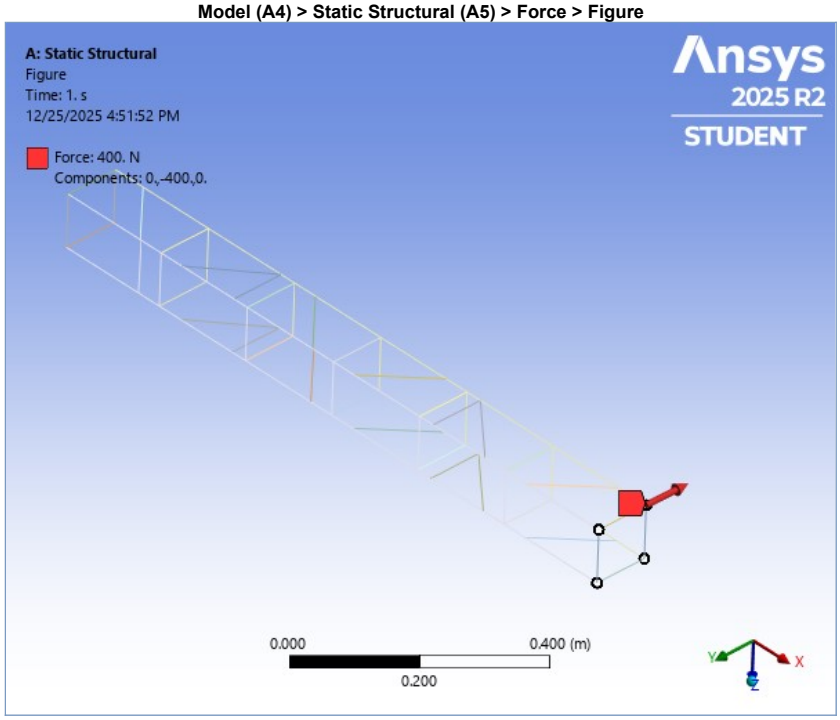


FIGURE 11
Model (A4) > Static Structural (A5) > Force > Figure



Solution (A6)

TABLE 18
Model (A4) > Static Structural (A5) > Solution

Object Name	*Solution (A6)*

State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	
Status	Done
MAPDL Elapsed Time	3. s
MAPDL Memory Used	188. MB
MAPDL Result File Size	960. KB
Post Processing	
Beam Section Results	Yes
On Demand Stress/Strain	No

TABLE 19
Model (A4) > Static Structural (A5) > Solution (A6) > Solution Information

Object Name	*Solution Information*
State	Solved
Solution Information	
Solution Output	Solver Output
Newton-Raphson Residuals	0
Identify Element Violations	0
Update Interval	2.5 s
Display Points	All
FE Connection Visibility	
Activate Visibility	Yes
Display	All FE Connectors
Draw Connections Attached To	All Nodes
Line Color	Connection Type
Visible on Results	No
Line Thickness	Single
Display Type	Lines

TABLE 20
Model (A4) > Static Structural (A5) > Solution (A6) > Results

Object Name	*Total Deformation*	*Equivalent Stress*
State	Solved	
Scope		
Scoping Method	Geometry Selection	
Geometry	All Bodies	
Definition		
Type	Total Deformation	Equivalent (von-Mises) Stress
By	Time	
Display Time	Last	
Separate Data by Entity	No	
Calculate Time History	Yes	
Identifier		
Suppressed	No	
Results		
Minimum	0. m	0. Pa
Maximum	2.07e-003 m	7.3647e+007 Pa
Average	8.3597e-004 m	1.1963e+007 Pa
Minimum Occurs On	Beam (Extracted Profile2)	Beam (Extracted Profile3)
Maximum Occurs On	Beam (Extracted Profile3)	Beam (Extracted Profile2)
Information		
Time	1. s	
Load Step	1	
Substep	1	
Iteration Number	1	
Integration Point Results		
Display Option		Averaged
Average Across Bodies		No

FIGURE 12
Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation

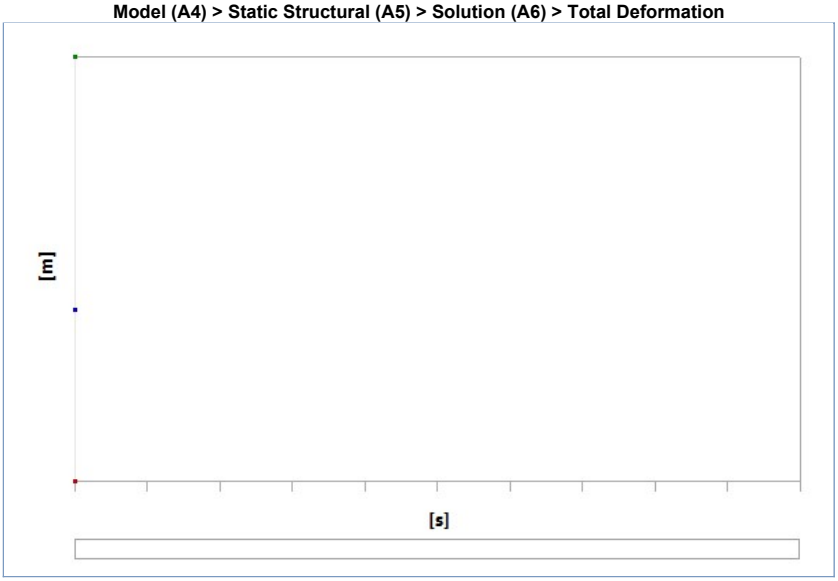


TABLE 21
Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation

Time [s]	Minimum [m]	Maximum [m]	Average [m]
1.	0.	2.07e-003	8.3597e-004

FIGURE 13

Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation > Image

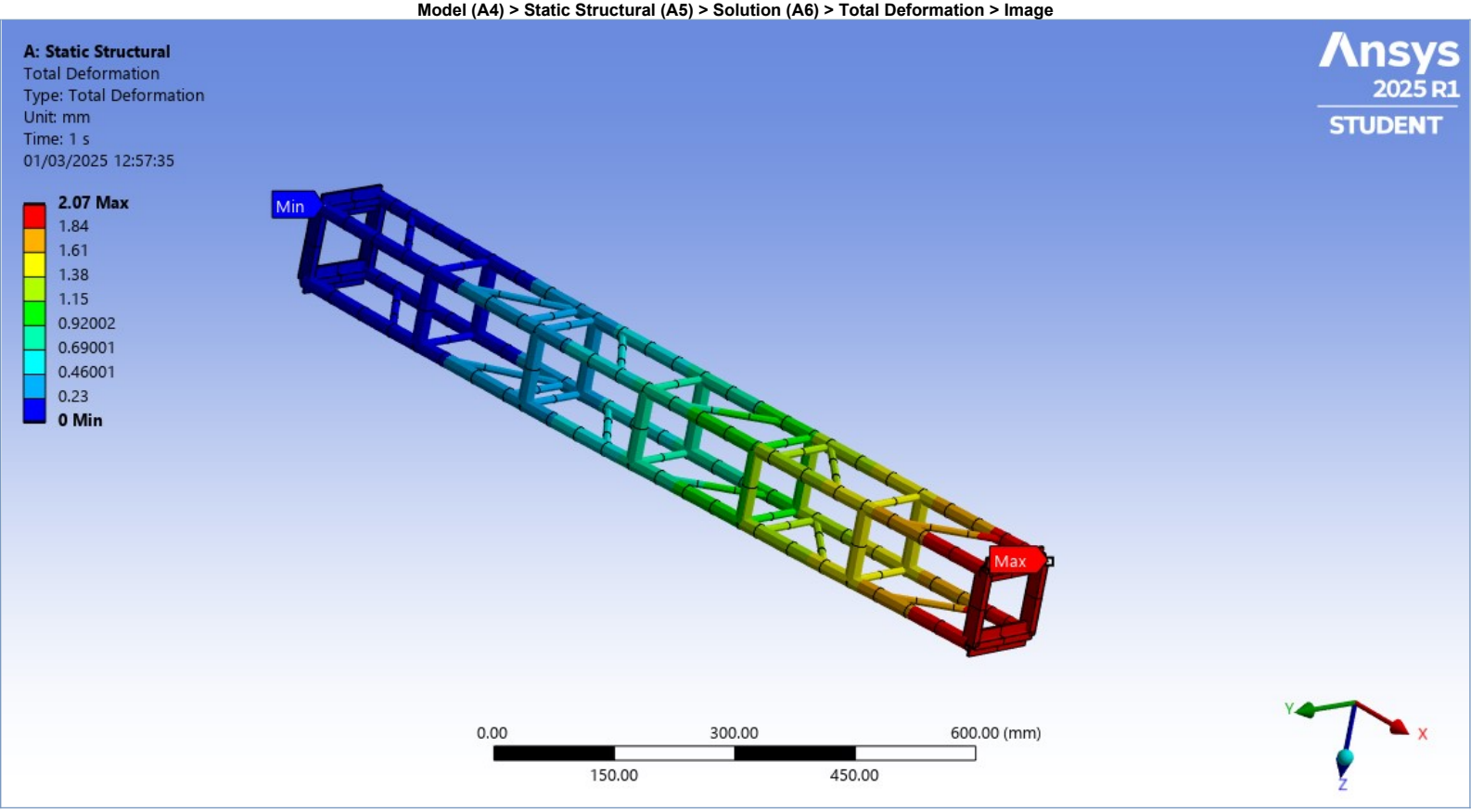


FIGURE 14
Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation > Figure

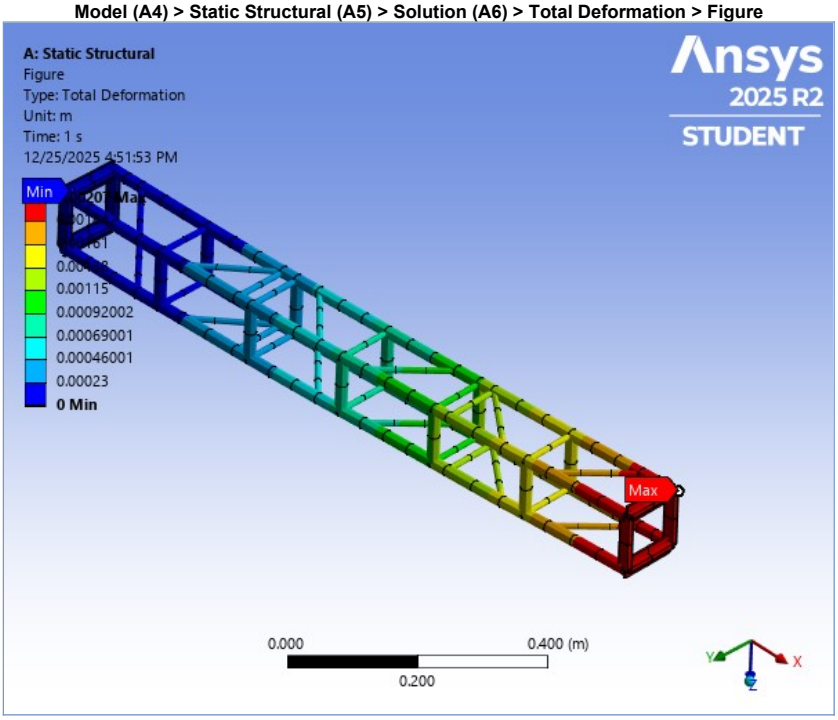


FIGURE 15
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress

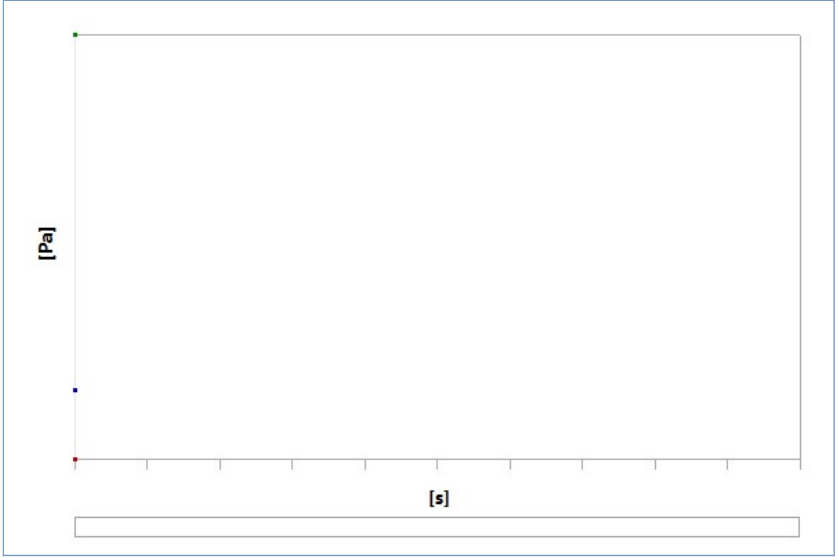


TABLE 22
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress

Time [s]	Minimum [Pa]	Maximum [Pa]	Average [Pa]
1.	0.	7.3647e+007	1.1963e+007

FIGURE 16
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress > Image

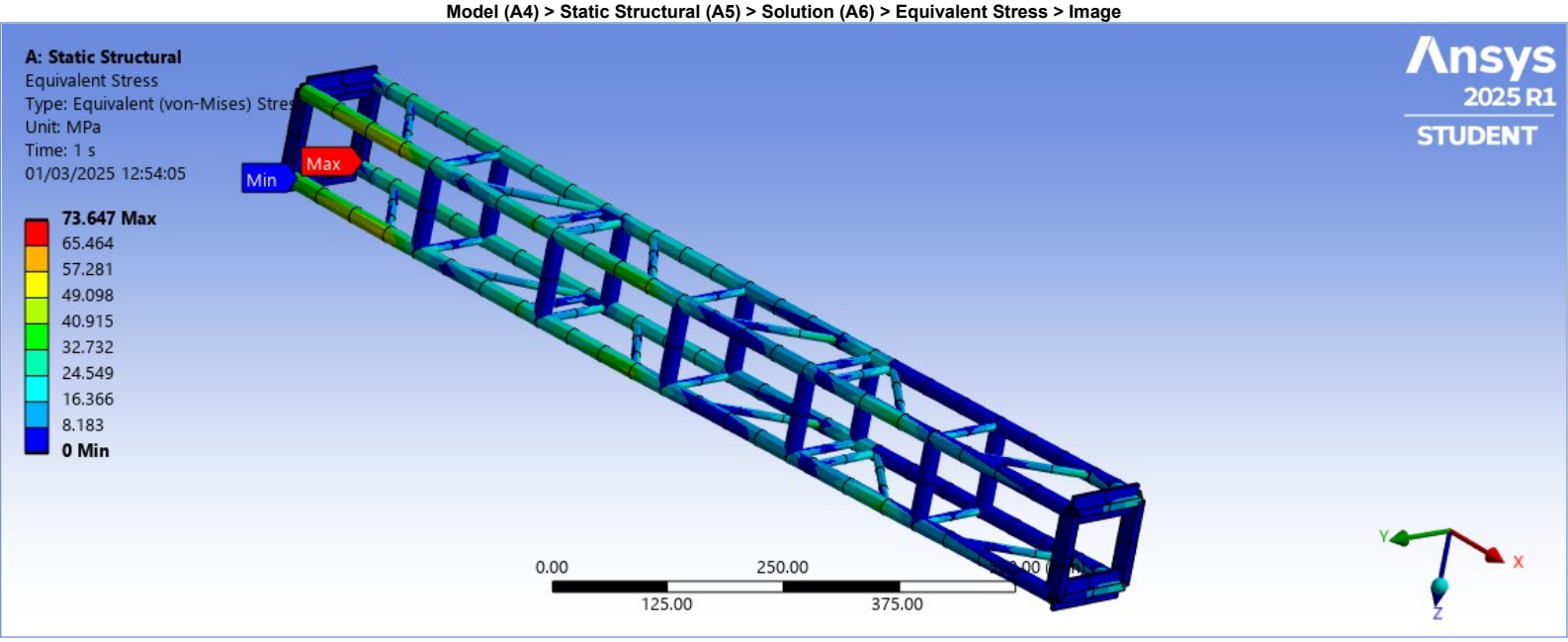
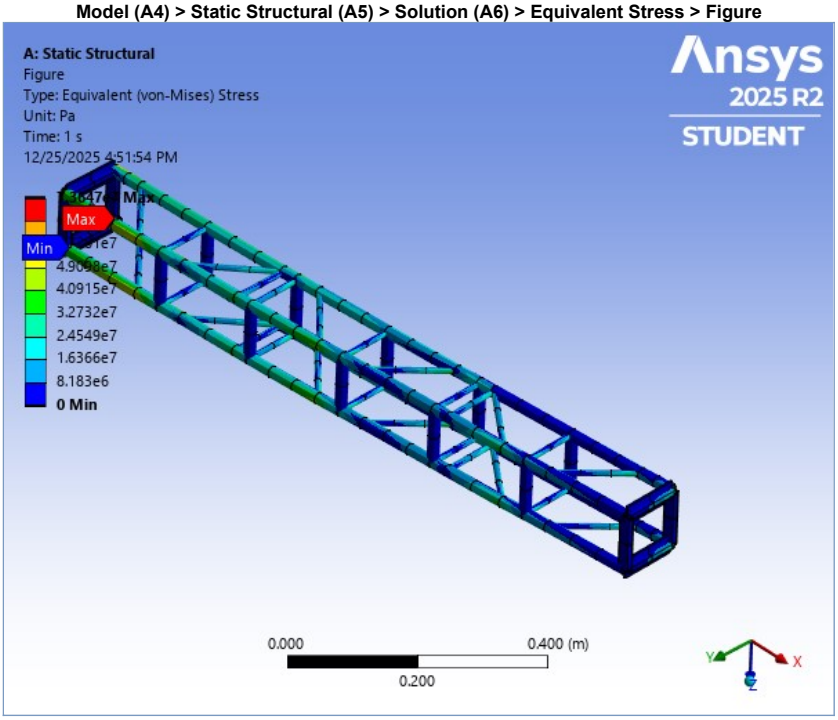


FIGURE 17
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress > Figure



Material Data

Structural Steel

TABLE 23
Structural Steel > Constants

Density	7850 kg m^-3
Coefficient of Thermal Expansion	1.2e-005 C^-1
Specific Heat	434 J kg^-1 C^-1
Thermal Conductivity	60.5 W m^-1 C^-1
Resistivity	1.7e-007 kg m^3 A^-2 s^-3

TABLE 24
Structural Steel > Color

Red	Green	Blue
132	139	179

TABLE 25
Structural Steel > Compressive Ultimate Strength

Compressive Ultimate Strength Pa
0

TABLE 26
Structural Steel > Compressive Yield Strength

Compressive Yield Strength Pa
2.5e+008

TABLE 27
Structural Steel > Tensile Yield Strength

Tensile Yield Strength Pa
2.5e+008

TABLE 28
Structural Steel > Tensile Ultimate Strength

Tensile Ultimate Strength Pa
4.6e+008

TABLE 29
Structural Steel > Isotropic Secant Coefficient of Thermal Expansion

Zero-Thermal-Strain Reference Temperature C
22

TABLE 30
Structural Steel > S-N Curve

Alternating Stress Pa	Cycles	Mean Stress Pa
3.999e+009	10	0
2.827e+009	20	0
1.896e+009	50	0
1.413e+009	100	0
1.069e+009	200	0
4.41e+008	2000	0
2.62e+008	10000	0
2.14e+008	20000	0
1.38e+008	1.e+005	0
1.14e+008	2.e+005	0
8.62e+007	1.e+006	0

TABLE 31
Structural Steel > Strain-Life Parameters

Strength Coefficient Pa	Strength Exponent	Ductility Coefficient	Ductility Exponent	Cyclic Strength Coefficient Pa	Cyclic Strain Hardening Exponent
9.2e+008	-0.106	0.213	-0.47	1.e+009	0.2

TABLE 32
Structural Steel > Isotropic Elasticity

Young's Modulus Pa	Poisson's Ratio	Bulk Modulus Pa	Shear Modulus Pa	Temperature C
2.e+011	0.3	1.6667e+011	7.6923e+010	

TABLE 33
Structural Steel > Isotropic Relative Permeability

Relative Permeability
10000