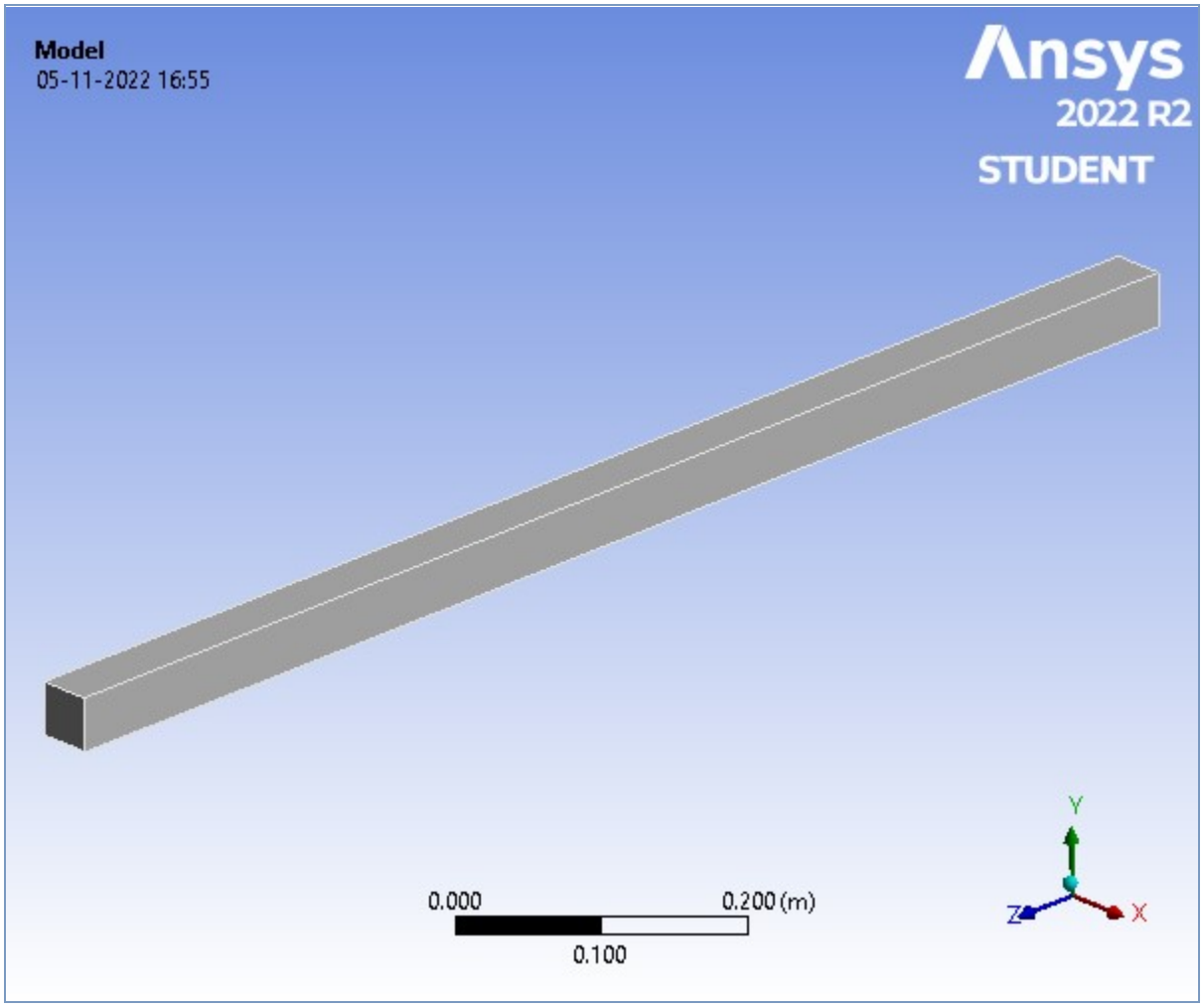
Project*

First Saved	Saturday, November 5, 2022
Last Saved	Saturday, November 5, 2022
Product Version	2022 R2
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)

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	C:\Users\DELL\Ansys simply supported beam_files\dp0\SYS\DM\SYS.agdb
Type	DesignModeler
Basic Geometry Options	
Parameters	Independent

Parameter Key	
Advanced Geometry Options	
Compare Parts On Update	No
Analysis Type	3-D

Geometry

TABLE 4
Model (A4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\DELL\Ansys simply supported beam_files\dp0 \SYS\DM\SYS.agdb
Type	DesignModeler
Length Unit	Meters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	4.e-002 m
Length Y	4.e-002 m
Length Z	1. m
Properties	
Volume	1.6e-003 m³
Mass	12.56 kg
Scale Factor Value	1.
Statistics	
Bodies	1
Active Bodies	1
Nodes	1521
Elements	200
Mesh Metric	None
Update Options	
Assign Default Material	No
Basic Geometry Options	
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
Import Facet Quality	Source

Clean Bodies On Import	No
Stitch Surfaces On Import	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 5
Model (A4) > Geometry > Parts

Object Name	*Solid*
State	Meshed
Graphics Properties	
Visible	Yes
Transparency	1
Definition	
Suppressed	No
Stiffness Behavior	Flexible
Coordinate System	Default Coordinate System
Reference Temperature	By Environment
Treatment	None
Material	
Assignment	Structural Steel
Nonlinear Effects	Yes
Thermal Strain Effects	Yes
Bounding Box	
Length X	4.e-002 m
Length Y	4.e-002 m
Length Z	1. m
Properties	
Volume	1.6e-003 m³
Mass	12.56 kg
Centroid X	-1.7647e-019 m
Centroid Y	1.7647e-019 m
Centroid Z	0.5 m
Moment of Inertia Ip1	1.0483 kg·m²
Moment of Inertia Ip2	1.0483 kg·m²
Moment of Inertia Ip3	3.3493e-003 kg·m²
Statistics	
Nodes	1521
Elements	200
Mesh Metric	None

TABLE 6
Model (A4) > Construction Geometry

Object Name	*Construction Geometry*
State	Fully Defined
Display	
Show Mesh	No

TABLE 7
Model (A4) > Construction Geometry > Paths

Object Name	*Path*	*Path 2*
State	Fully Defined	
Definition		

Path Type	Two Points	
Path Coordinate System	Global Coordinate System	
Number of Sampling Points	47.	
Suppressed	No	
Start		
Coordinate System	Global Coordinate System	
Start X Coordinate	0. m	
Start Y Coordinate	2.e-002 m	0. m
Start Z Coordinate	1. m	
Location	Defined	
End		
Coordinate System	Global Coordinate System	
End X Coordinate	0. m	
End Y Coordinate	2.e-002 m	0. m
End Z Coordinate	0. m	
Location	Defined	

TABLE 8
Model (A4) > Materials

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

Coordinate Systems

TABLE 9
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.]

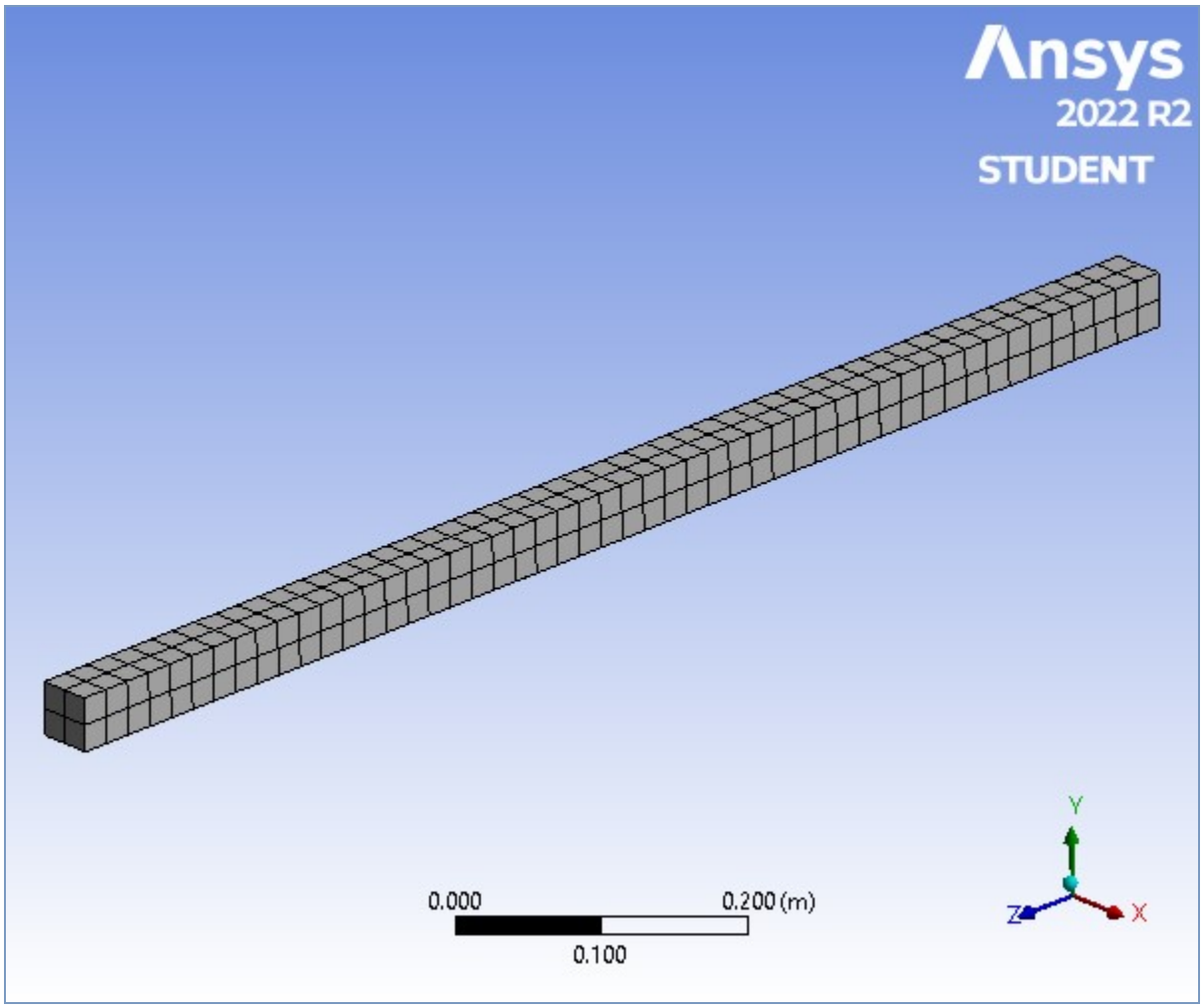
Mesh

TABLE 10
Model (A4) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Use Geometry Setting
Defaults	

Physics Preference	Mechanical
Element Order	Program Controlled
Element Size	2.e-002 m
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	1.0016 m
Average Surface Area	2.72e-002 m²
Minimum Edge Length	4.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
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
Statistics	
Nodes	1521
Elements	200

FIGURE 1
Model (A4) > Mesh > Mesh



Static Structural (A5)

TABLE 11
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 12
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)	Off
Output Controls	
Stress	Yes
Surface Stress	No
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	C:\Users\DELL\Ansys simply supported beam_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

FIGURE 2
Model (A4) > Static Structural (A5) > Boundary Condition

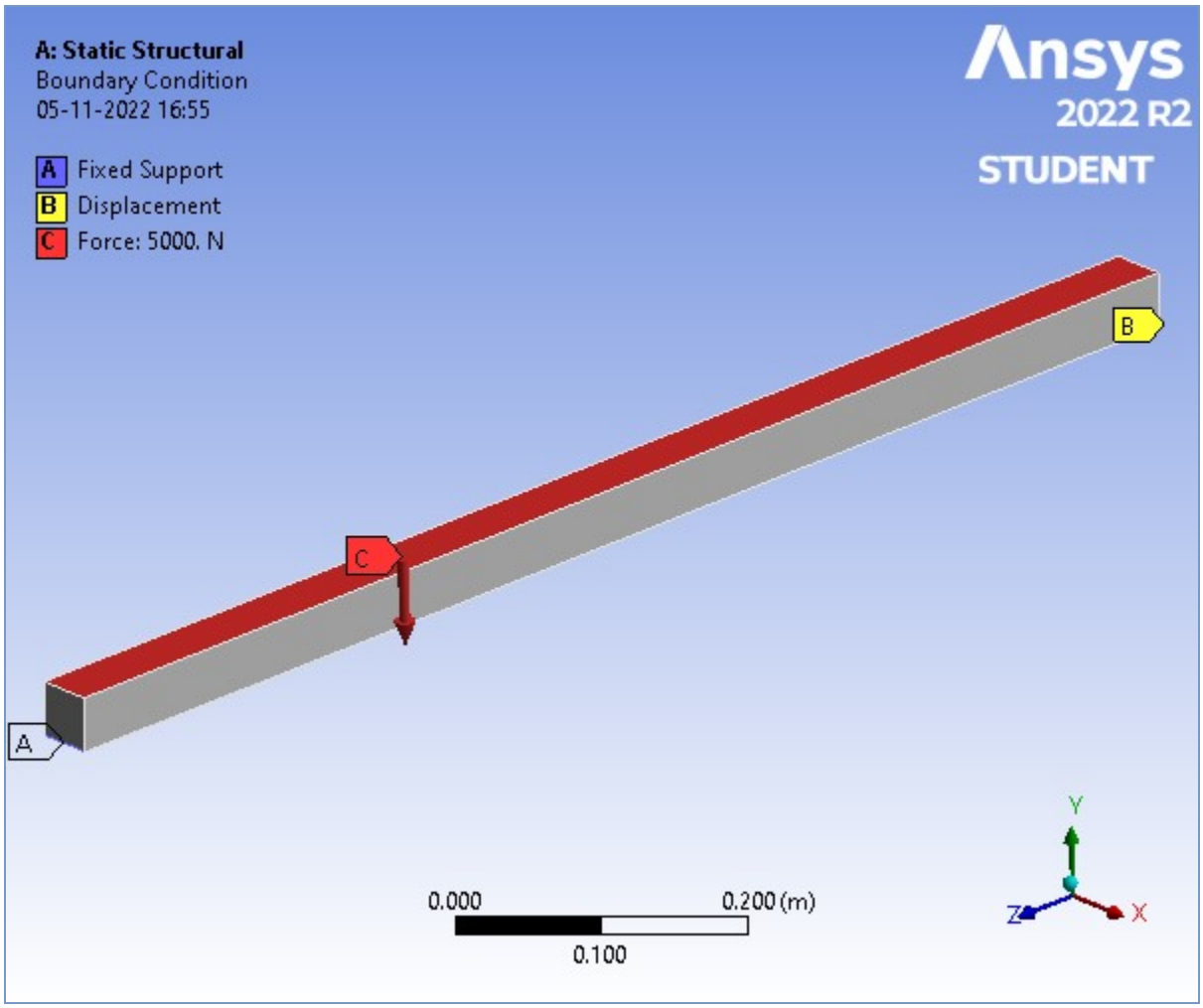


TABLE 13
Model (A4) > Static Structural (A5) > Loads

Object Name	*Fixed Support*	*Displacement*	*Force*
State	Fully Defined		
Scope			
Scoping Method	Geometry Selection		
Geometry	1 Edge		1 Face
Definition			
Type	Fixed Support	Displacement	Force
Suppressed	No		
Define By		Components	Vector
Coordinate System		Global Coordinate System	
X Component		0. m (ramped)	
Y Component		0. m (ramped)	
Z Component		Free	
Applied By			Surface Effect
Magnitude			5000. N (ramped)
Direction			Defined

FIGURE 3
Model (A4) > Static Structural (A5) > Displacement

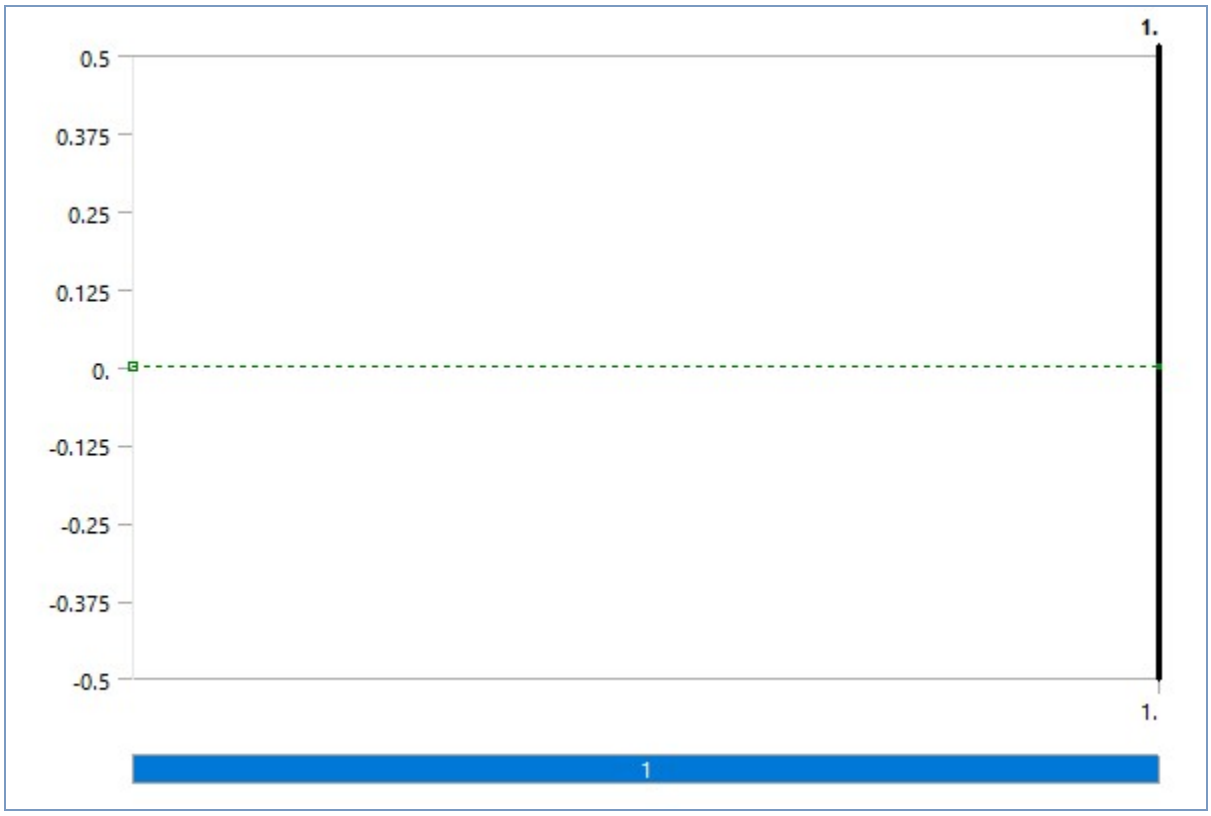
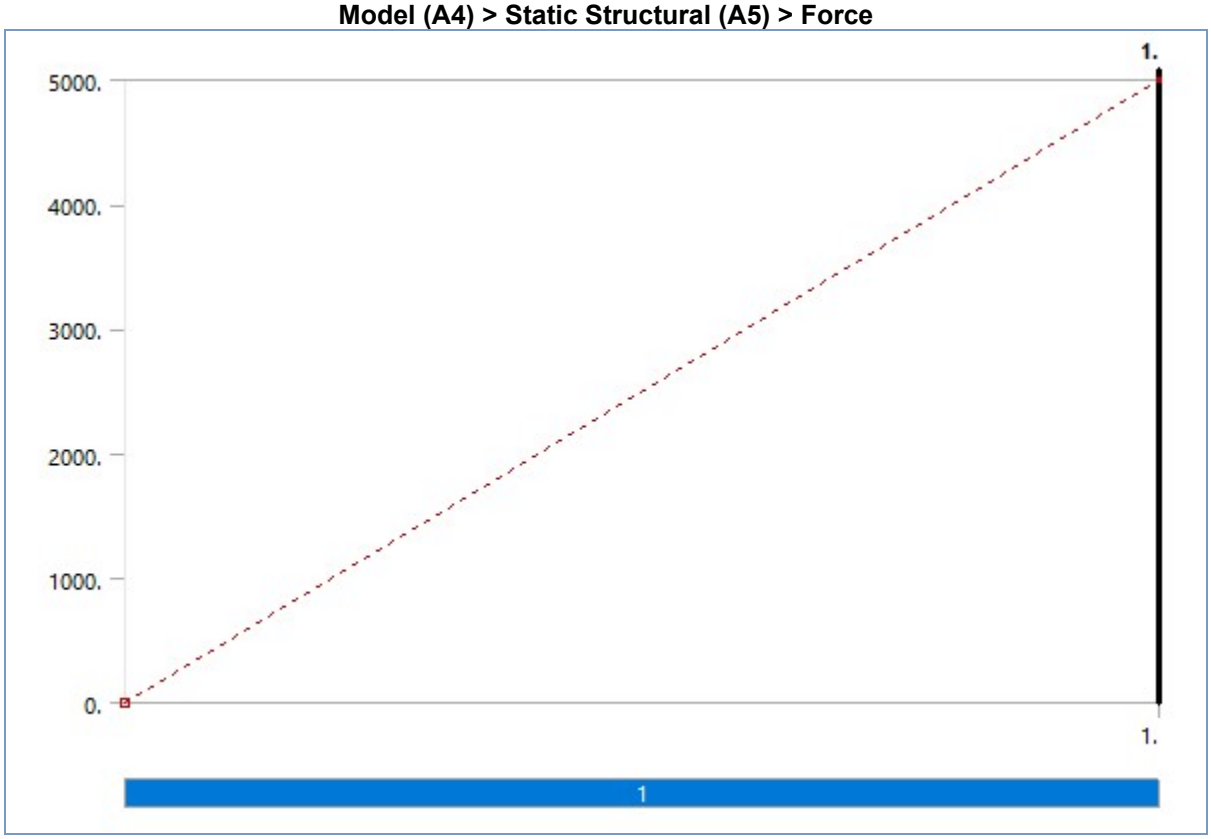


FIGURE 4
Model (A4) > Static Structural (A5) > Force



Solution (A6)

TABLE 14
Model (A4) > Static Structural (A5) > Solution

Object Name	*Solution (A6)*
State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	3.
Refinement Depth	2.
Information	
Status	Done
MAPDL Elapsed Time	4. s
MAPDL Memory Used	188. MB
MAPDL Result File Size	2.875 MB
Post Processing	
Beam Section Results	No
On Demand Stress/Strain	No

TABLE 15
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 16
Model (A4) > Static Structural (A5) > Solution (A6) > Results

Object Name	*Directional Deformation*	*Equivalent Stress*	*Directional Deformation 2*	*Equivalent Stress 2*	*Equivalent Stress 3*	*Normal Stress*
State	Solved					
Scope						
Scoping Method	Geometry Selection		Path			Geometry Selection
Geometry	All Bodies					
Path			Path		Path 2	
Definition						
Type	Directional Deformation	Equivalent (von-Mises) Stress	Directional Deformation	Equivalent (von-Mises) Stress		Normal Stress
Orientation	Y Axis		Y Axis			Z Axis
By	Time					
Display Time	Last					
Coordinate	Global Coordinate		Global Coordinate			Global Coordinate

System	System		System			System
Calculate Time History	Yes					
Identifier						
Suppressed	No					
Results						
Minimum	-1.4603e-003 m	62010 Pa	-1.4586e-003 m	5.162e+005 Pa	60783 Pa	-5.8628e+007 Pa
Maximum	0. m	5.8619e+007 Pa	-1.5654e-006 m	5.856e+007 Pa	5.4488e+006 Pa	5.8626e+007 Pa
Average	-9.7175e-004 m	2.7554e+007 Pa	-9.1474e-004 m	3.8156e+007 Pa	1.9804e+006 Pa	-49518 Pa
Minimum Occurs On	Solid					
Maximum Occurs On	Solid					
Information						
Time	1. s					
Load Step	1					
Substep	1					
Iteration Number	1					
Integration Point Results						
Display Option		Averaged		Averaged		
Average Across Bodies		No		No		
Graph Controls						
X-Axis			S			

FIGURE 5
Model (A4) > Static Structural (A5) > Solution (A6) > Directional Deformation

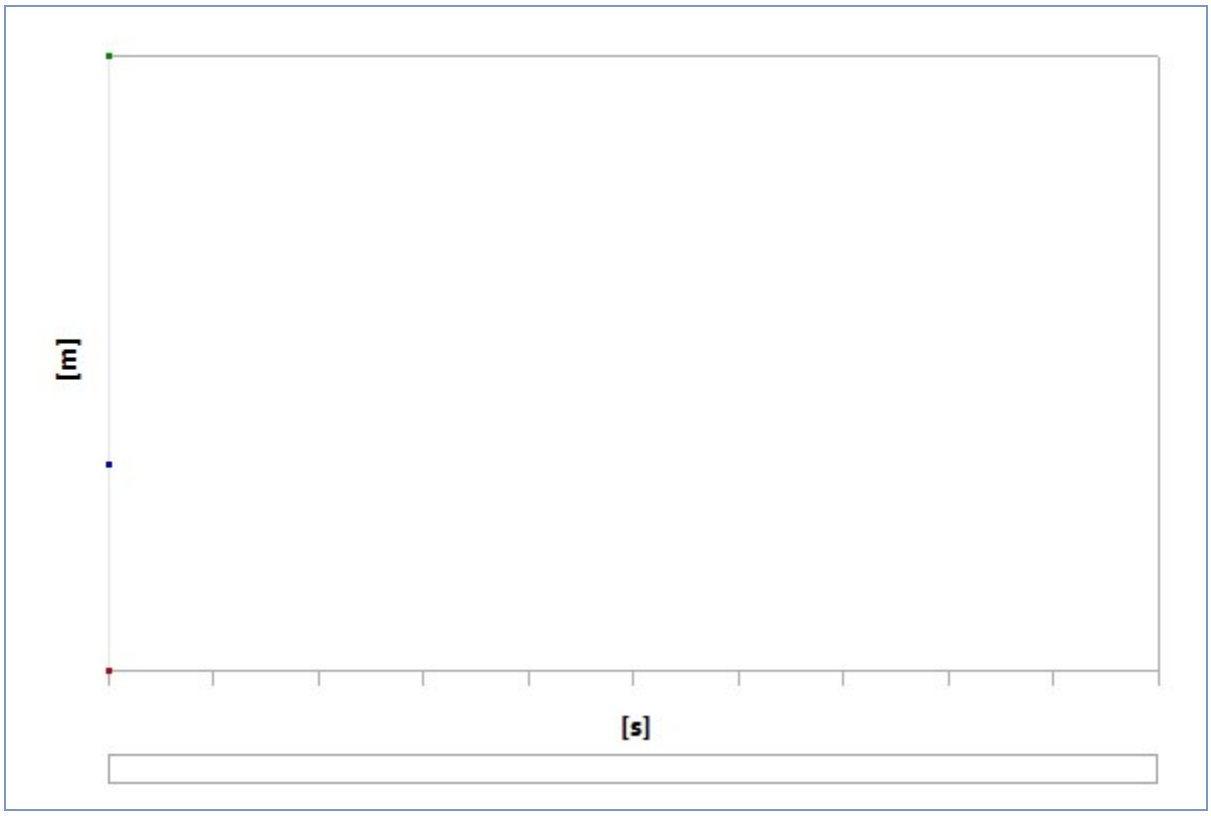


TABLE 17
Model (A4) > Static Structural (A5) > Solution (A6) > Directional Deformation

Time [s]	Minimum [m]	Maximum [m]	Average [m]
1.	-1.4603e-003	0.	-9.7175e-004

FIGURE 6
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress

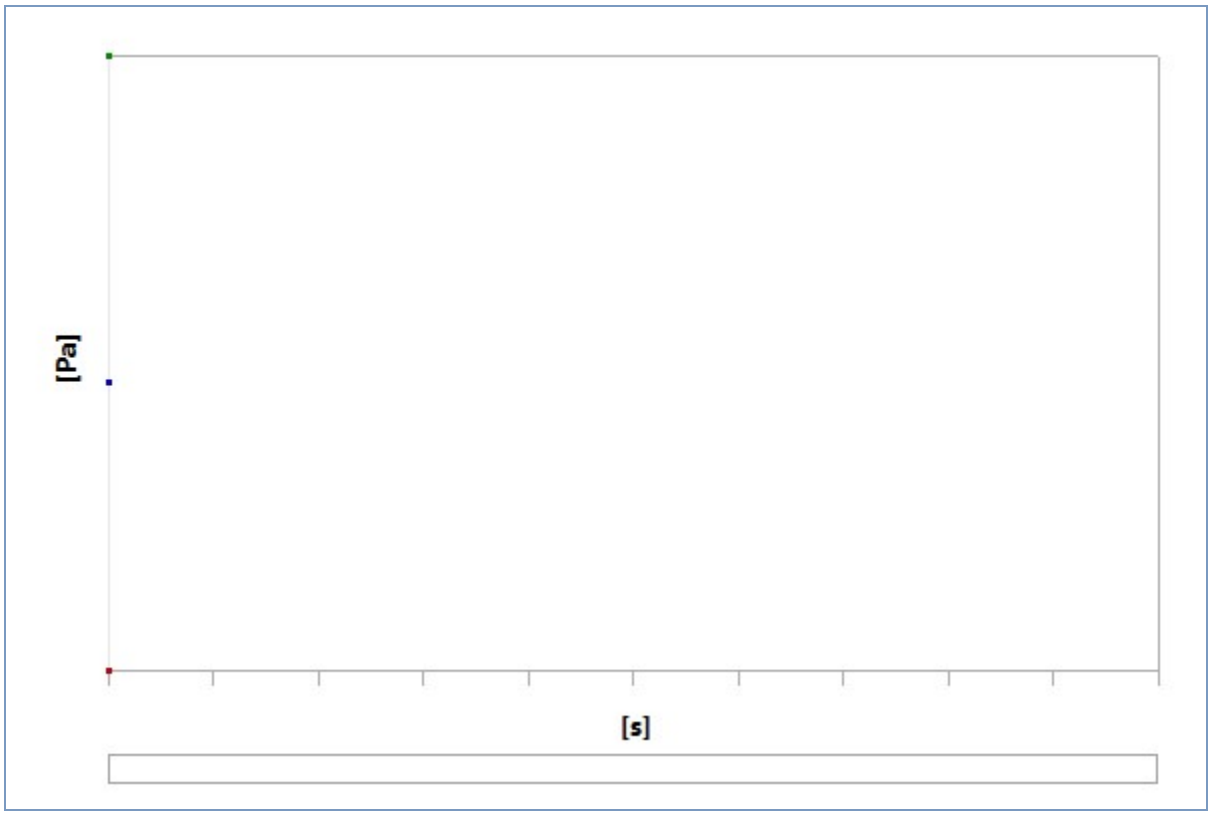


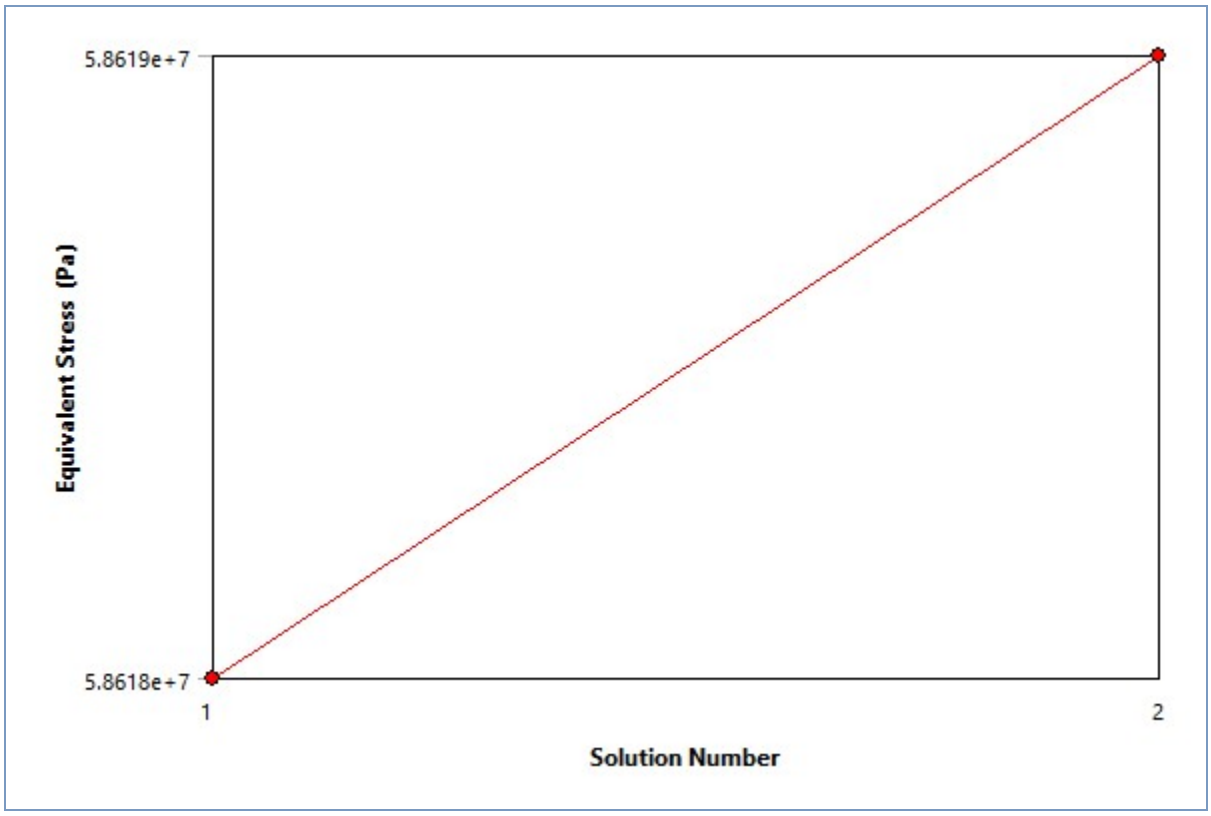
TABLE 18
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress

Time [s]	Minimum [Pa]	Maximum [Pa]	Average [Pa]
1.	62010	5.8619e+007	2.7554e+007

TABLE 19
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress > Convergences

Object Name	*Convergence*
State	Solved
Definition	
Type	Maximum
Allowable Change	1. %
Results	
Last Change	1.8469e-004 %
Converged	Yes

FIGURE 7
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress > Convergence



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

	Equivalent Stress (Pa)	Change (%)	Nodes	Elements
1	5.8618e+007		1521	200
2	5.8619e+007	1.8469e-004	8097	3880

FIGURE 8
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress > Equivalent stress

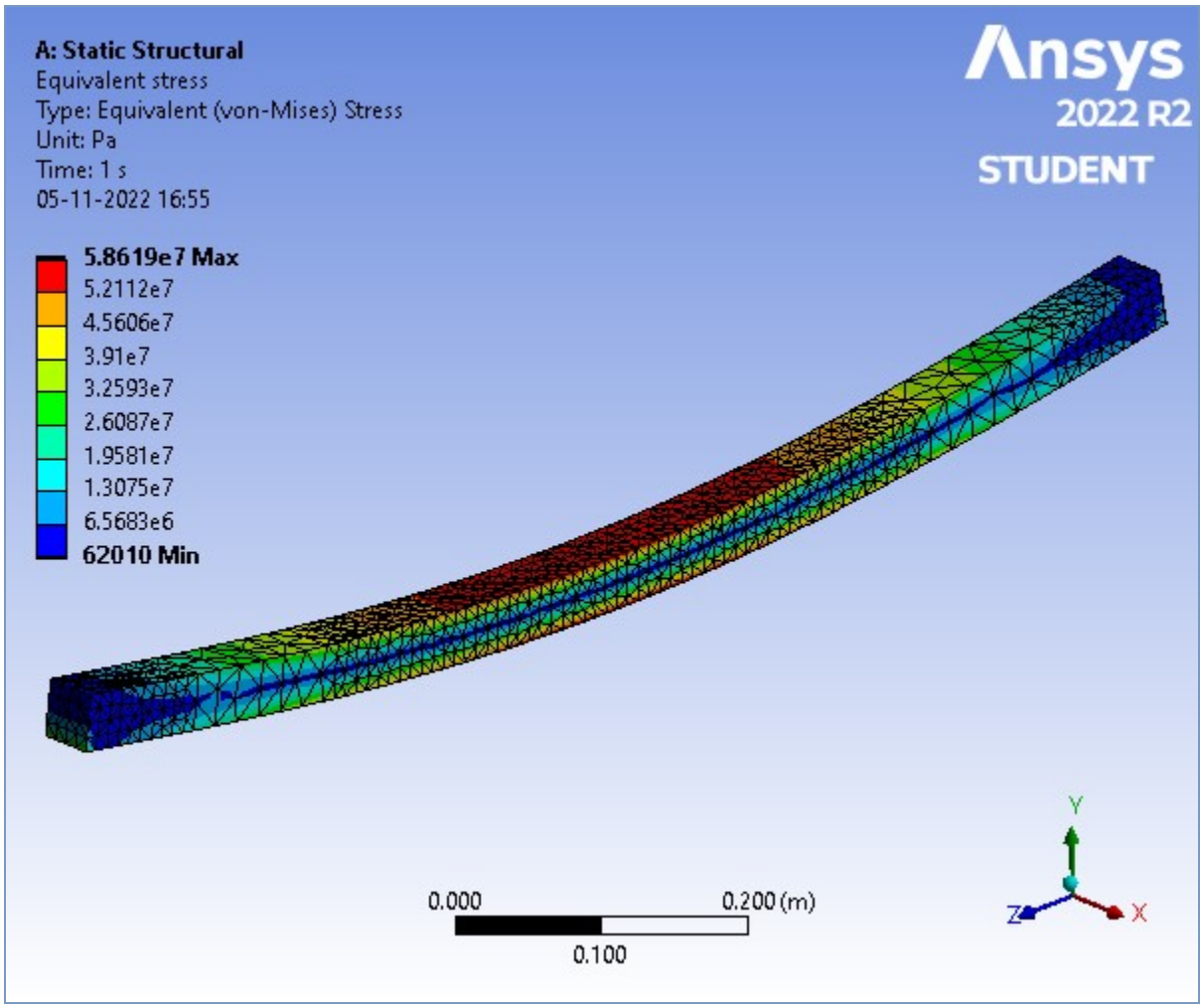


FIGURE 9
Model (A4) > Static Structural (A5) > Solution (A6) > Directional Deformation 2

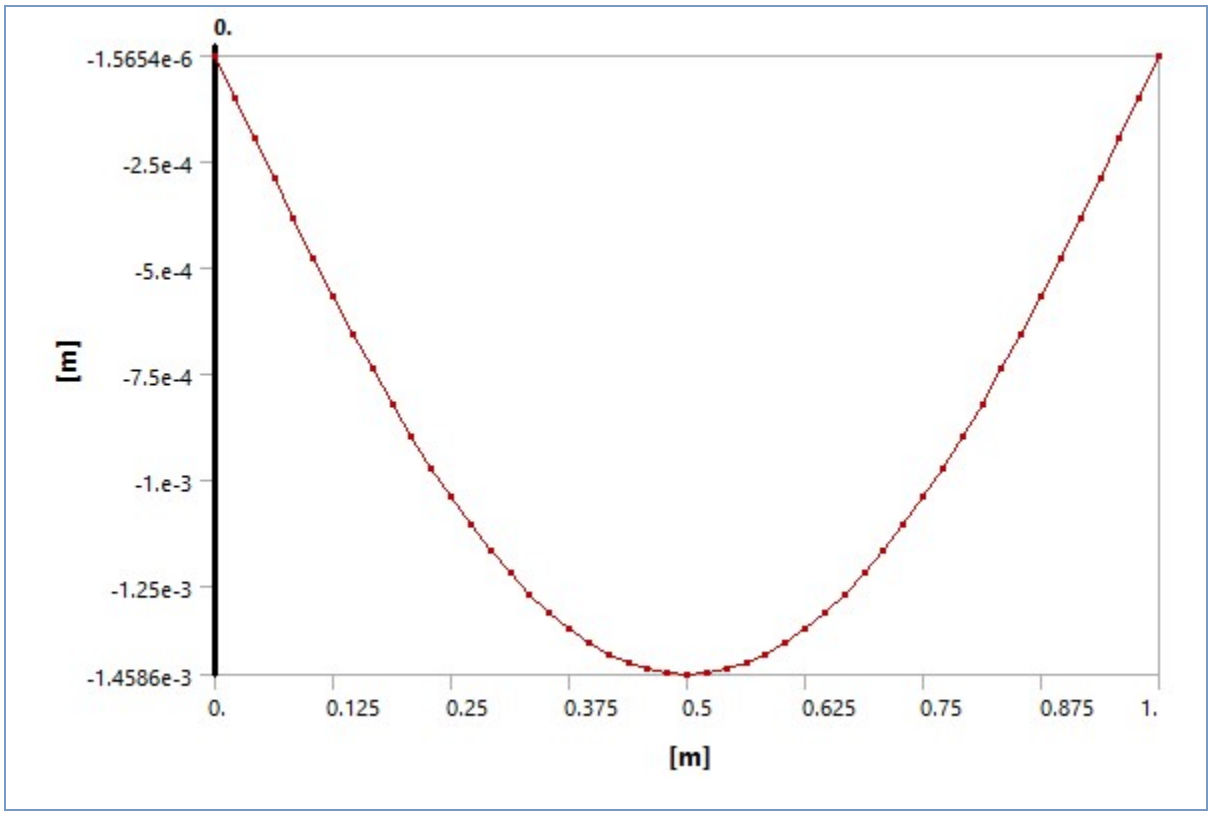


TABLE 20
Model (A4) > Static Structural (A5) > Solution (A6) > Directional Deformation 2

Length [m]	Value [m]
0.	-1.5967e-006
2.0833e-002	-9.848e-005
4.1667e-002	-1.951e-004
6.25e-002	-2.9075e-004
8.3333e-002	-3.8497e-004
0.10417	-4.7733e-004
0.125	-5.6739e-004
0.14583	-6.5479e-004
0.16667	-7.3916e-004
0.1875	-8.2016e-004
0.20833	-8.9746e-004
0.22917	-9.7076e-004
0.25	-1.0398e-003
0.27083	-1.1042e-003
0.29167	-1.1639e-003
0.3125	-1.2185e-003
0.33333	-1.268e-003
0.35417	-1.312e-003
0.375	-1.3505e-003
0.39583	-1.3833e-003
0.41667	-1.4103e-003
0.4375	-1.4314e-003
0.45833	-1.4465e-003
0.47917	-1.4556e-003
0.5	-1.4586e-003

0.52083	-1.4556e-003
0.54167	-1.4465e-003
0.5625	-1.4314e-003
0.58333	-1.4103e-003
0.60417	-1.3833e-003
0.625	-1.3505e-003
0.64583	-1.312e-003
0.66667	-1.268e-003
0.6875	-1.2185e-003
0.70833	-1.1639e-003
0.72917	-1.1042e-003
0.75	-1.0398e-003
0.77083	-9.7077e-004
0.79167	-8.9747e-004
0.8125	-8.2018e-004
0.83333	-7.3915e-004
0.85417	-6.5478e-004
0.875	-5.6737e-004
0.89583	-4.7729e-004
0.91667	-3.8494e-004
0.9375	-2.9072e-004
0.95833	-1.9507e-004
0.97917	-9.8449e-005
1.	-1.5654e-006

FIGURE 10
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress 2

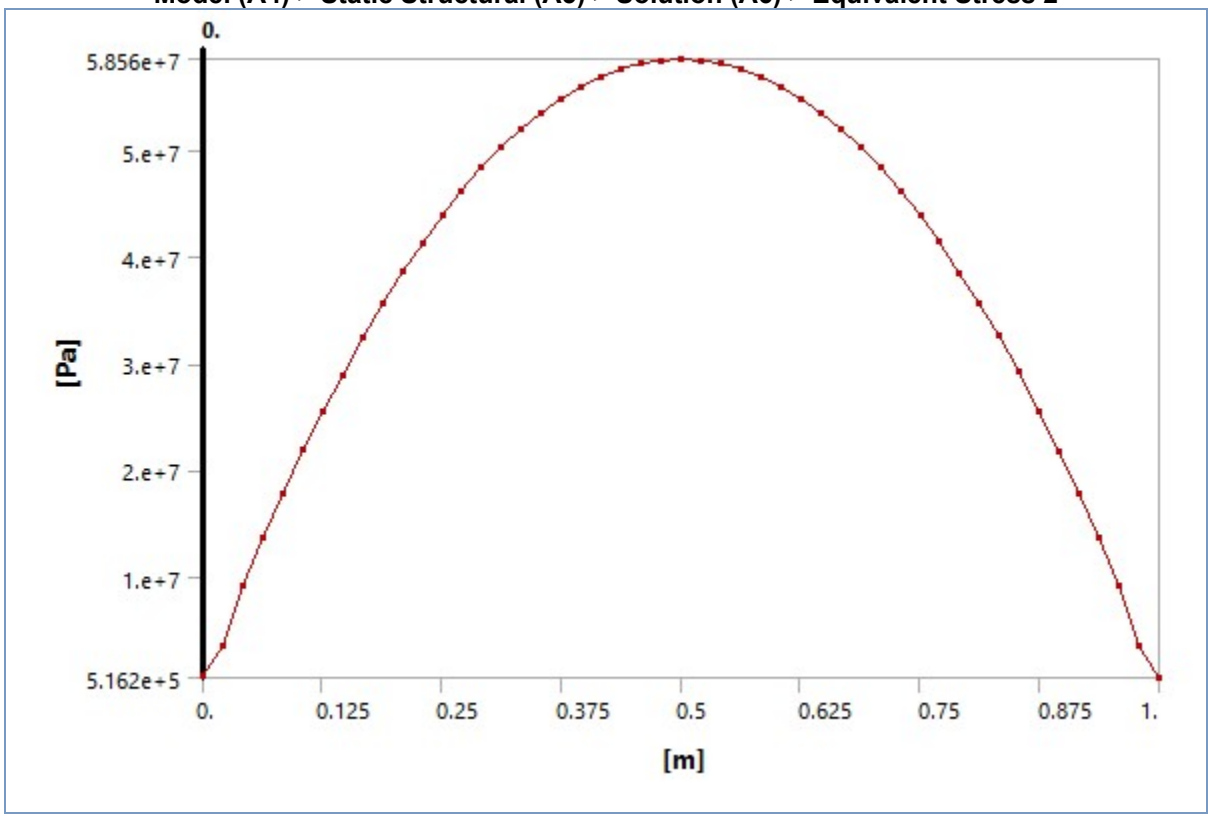


TABLE 21

Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress 2

Length [m]	Value [Pa]
0.	6.9836e+005
2.0833e-002	3.5907e+006
4.1667e-002	9.1526e+006
6.25e-002	1.3655e+007
8.3333e-002	1.7857e+007
0.10417	2.1908e+007
0.125	2.5421e+007
0.14583	2.8804e+007
0.16667	3.2393e+007
0.1875	3.5608e+007
0.20833	3.8605e+007
0.22917	4.1238e+007
0.25	4.3918e+007
0.27083	4.6244e+007
0.29167	4.8378e+007
0.3125	5.0292e+007
0.33333	5.2005e+007
0.35417	5.357e+007
0.375	5.4886e+007
0.39583	5.602e+007
0.41667	5.6904e+007
0.4375	5.7664e+007
0.45833	5.8123e+007
0.47917	5.8449e+007
0.5	5.856e+007
0.52083	5.8435e+007
0.54167	5.8131e+007
0.5625	5.7613e+007
0.58333	5.6916e+007
0.60417	5.6011e+007
0.625	5.4852e+007
0.64583	5.3562e+007
0.66667	5.1976e+007
0.6875	5.0358e+007
0.70833	4.8352e+007
0.72917	4.6202e+007
0.75	4.3897e+007
0.77083	4.1378e+007
0.79167	3.8554e+007
0.8125	3.5614e+007
0.83333	3.2655e+007
0.85417	2.917e+007
0.875	2.5581e+007
0.89583	2.1823e+007
0.91667	1.7755e+007
0.9375	1.3596e+007
0.95833	9.1701e+006
0.97917	3.5846e+006
1.	5.162e+005

FIGURE 11

Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress 3

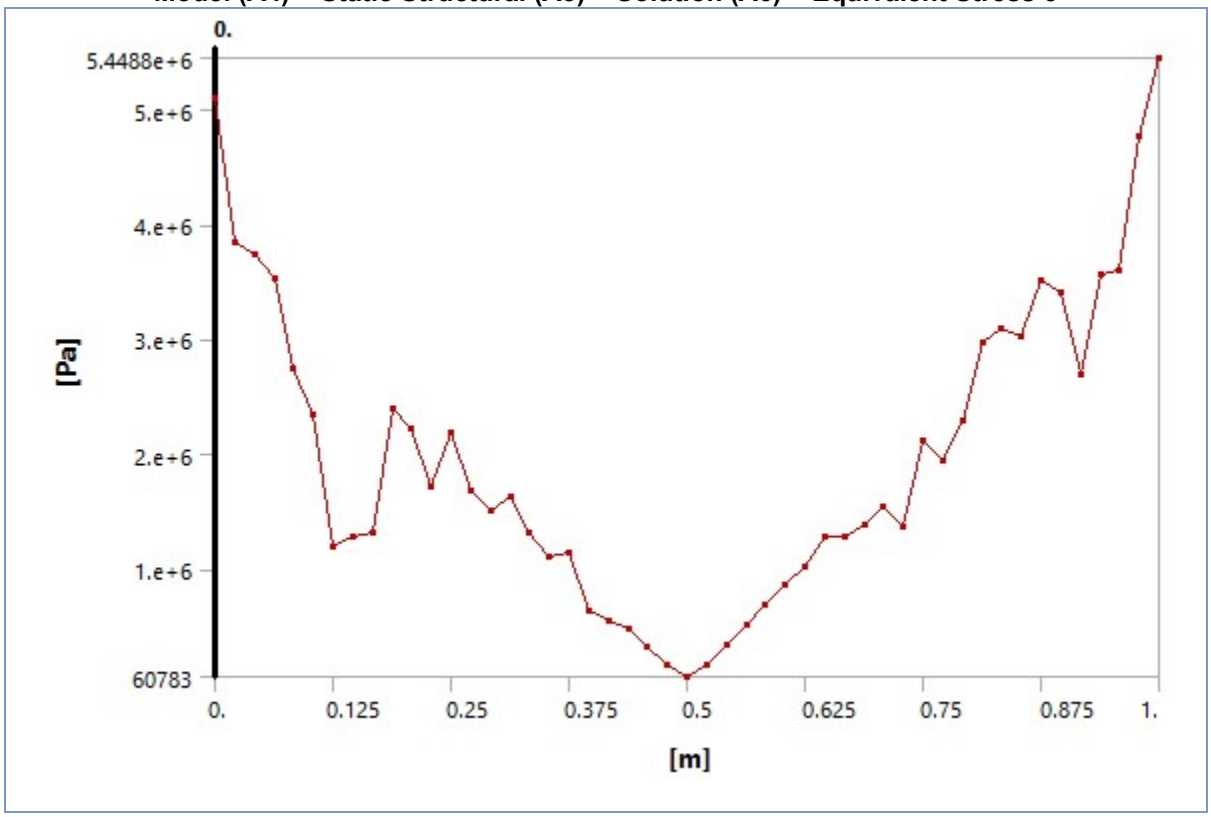


TABLE 22
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress 3

Length [m]	Value [Pa]
0.	5.0915e+006
2.0833e-002	3.8424e+006
4.1667e-002	3.74e+006
6.25e-002	3.5286e+006
8.3333e-002	2.7407e+006
0.10417	2.3385e+006
0.125	1.1886e+006
0.14583	1.2755e+006
0.16667	1.308e+006
0.1875	2.3943e+006
0.20833	2.215e+006
0.22917	1.7139e+006
0.25	2.1956e+006
0.27083	1.6745e+006
0.29167	1.5032e+006
0.3125	1.636e+006
0.33333	1.3084e+006
0.35417	1.1005e+006
0.375	1.1353e+006
0.39583	6.2779e+005
0.41667	5.5086e+005
0.4375	4.7985e+005
0.45833	3.2504e+005
0.47917	1.7212e+005

0.5	60783
0.52083	1.6138e+005
0.54167	3.4305e+005
0.5625	5.1294e+005
0.58333	6.8157e+005
0.60417	8.5657e+005
0.625	1.0205e+006
0.64583	1.2757e+006
0.66667	1.277e+006
0.6875	1.3891e+006
0.70833	1.5409e+006
0.72917	1.3629e+006
0.75	2.1185e+006
0.77083	1.9489e+006
0.79167	2.301e+006
0.8125	2.9736e+006
0.83333	3.0933e+006
0.85417	3.0225e+006
0.875	3.5157e+006
0.89583	3.4127e+006
0.91667	2.693e+006
0.9375	3.5672e+006
0.95833	3.6072e+006
0.97917	4.7688e+006
1.	5.4488e+006

FIGURE 12
Model (A4) > Static Structural (A5) > Solution (A6) > Normal Stress

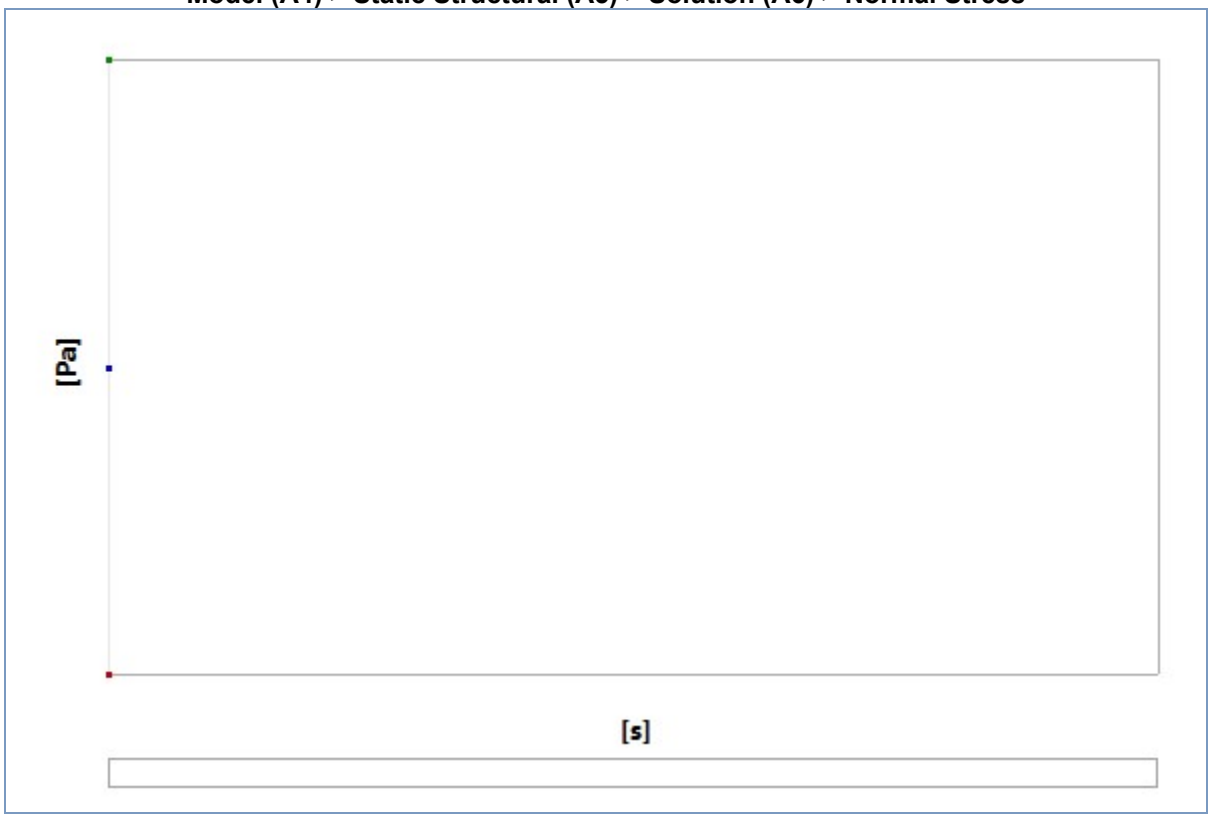
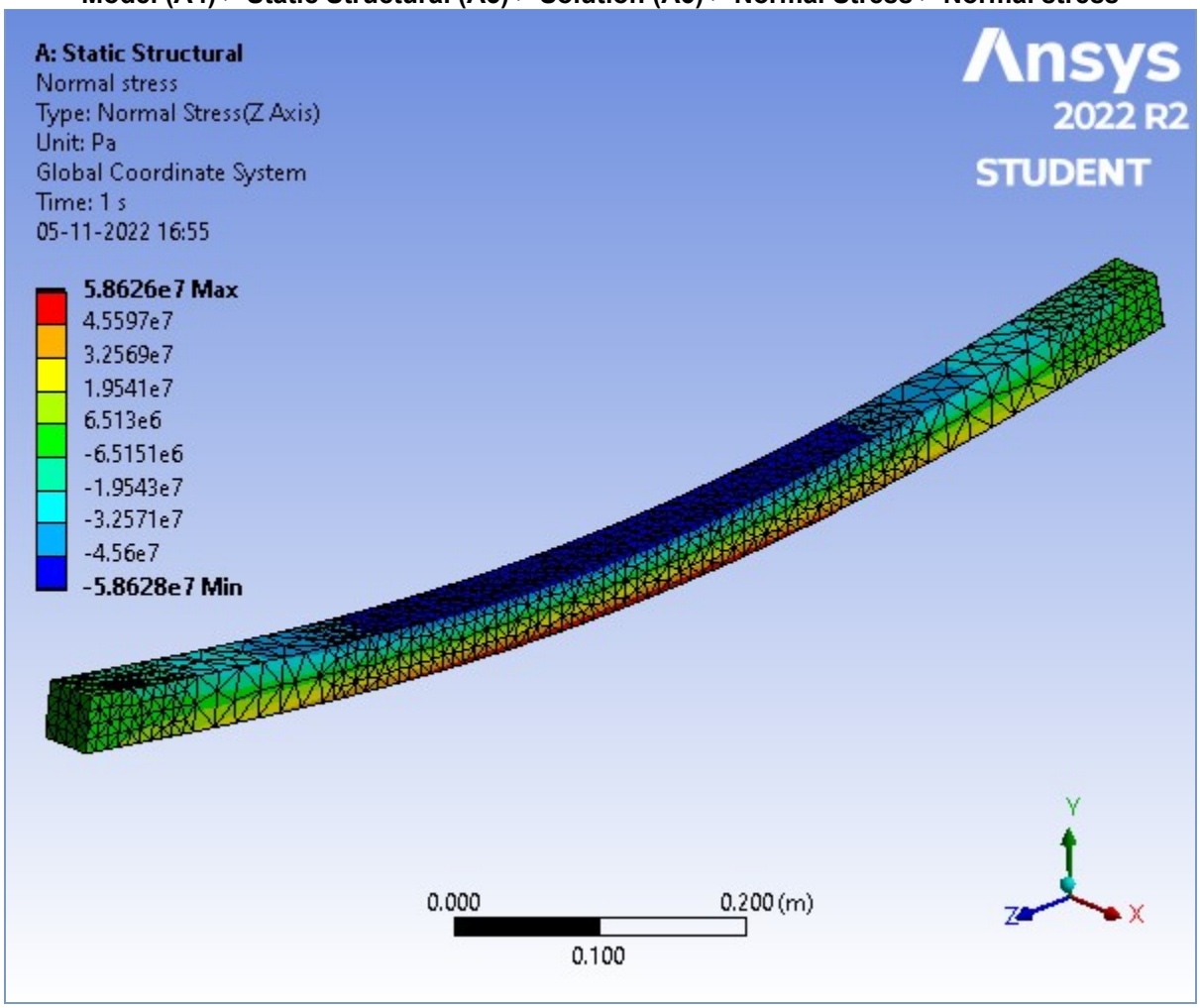


TABLE 23
Model (A4) > Static Structural (A5) > Solution (A6) > Normal Stress

Time [s]	Minimum [Pa]	Maximum [Pa]	Average [Pa]
1.	-5.8628e+007	5.8626e+007	-49518

FIGURE 13
Model (A4) > Static Structural (A5) > Solution (A6) > Normal Stress > Normal stress



Stress top surface

FIGURE 14
Model (A4) > Stress top surface

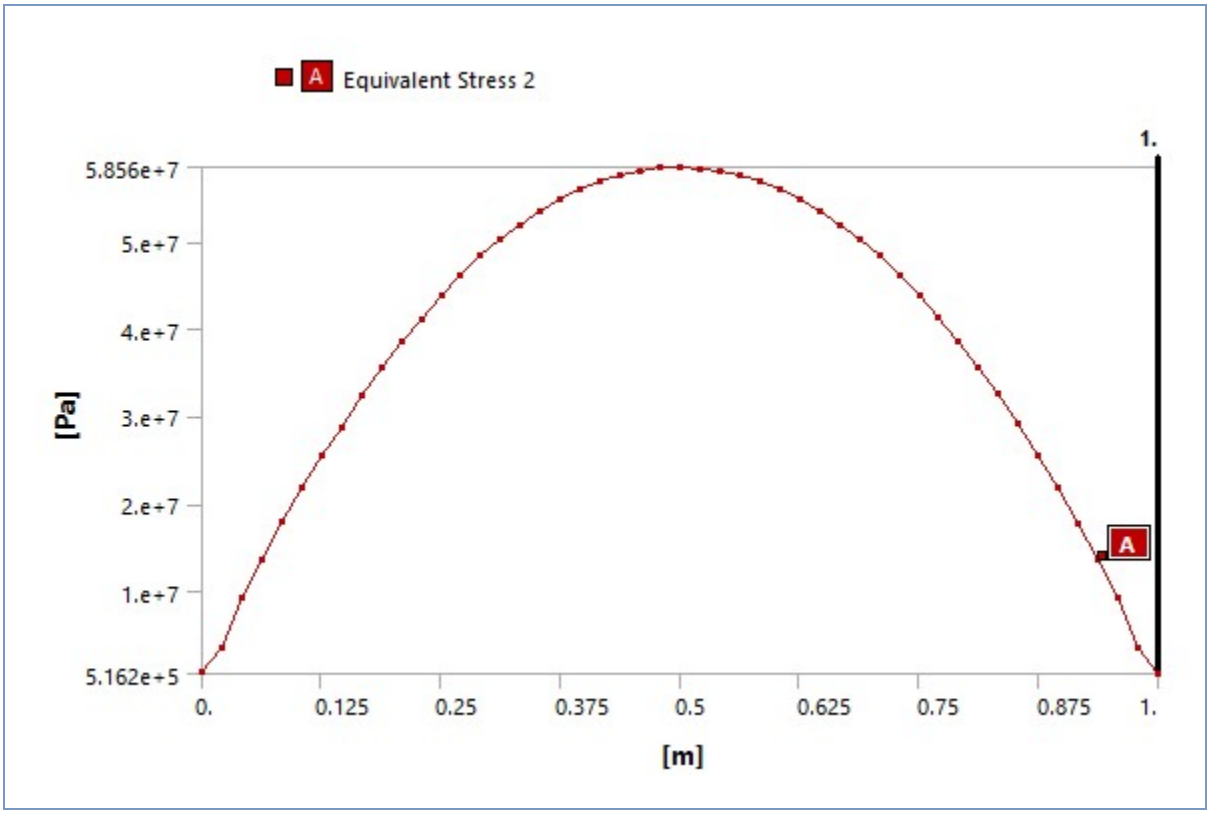


TABLE 24
Model (A4) > Stress top surface

Length [m]	[A] Equivalent Stress 2 [Pa]
0.	6.9836e+005
2.0833e-002	3.5907e+006
4.1667e-002	9.1526e+006
6.25e-002	1.3655e+007
8.3333e-002	1.7857e+007
0.10417	2.1908e+007
0.125	2.5421e+007
0.14583	2.8804e+007
0.16667	3.2393e+007
0.1875	3.5608e+007
0.20833	3.8605e+007
0.22917	4.1238e+007
0.25	4.3918e+007
0.27083	4.6244e+007
0.29167	4.8378e+007
0.3125	5.0292e+007
0.33333	5.2005e+007
0.35417	5.357e+007
0.375	5.4886e+007
0.39583	5.602e+007
0.41667	5.6904e+007
0.4375	5.7664e+007
0.45833	5.8123e+007
0.47917	5.8449e+007
0.5	5.856e+007

0.52083	5.8435e+007
0.54167	5.8131e+007
0.5625	5.7613e+007
0.58333	5.6916e+007
0.60417	5.6011e+007
0.625	5.4852e+007
0.64583	5.3562e+007
0.66667	5.1976e+007
0.6875	5.0358e+007
0.70833	4.8352e+007
0.72917	4.6202e+007
0.75	4.3897e+007
0.77083	4.1378e+007
0.79167	3.8554e+007
0.8125	3.5614e+007
0.83333	3.2655e+007
0.85417	2.917e+007
0.875	2.5581e+007
0.89583	2.1823e+007
0.91667	1.7755e+007
0.9375	1.3596e+007
0.95833	9.1701e+006
0.97917	3.5846e+006
1.	5.162e+005

Material Data

Structural Steel

TABLE 25
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 ohm m

TABLE 26
Structural Steel > Color

Red	Green	Blue
132	139	179

TABLE 27
Structural Steel > Compressive Ultimate Strength

Compressive Ultimate Strength Pa
0

TABLE 28
Structural Steel > Compressive Yield Strength

Compressive Yield Strength Pa
2.5e+008

TABLE 29
Structural Steel > Tensile Yield Strength

Tensile Yield Strength Pa
2.5e+008

TABLE 30
Structural Steel > Tensile Ultimate Strength

Tensile Ultimate Strength Pa
4.6e+008

TABLE 31
Structural Steel > Isotropic Secant Coefficient of Thermal Expansion

Zero-Thermal-Strain Reference Temperature C
22

TABLE 32
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 33
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 34
Structural Steel > Isotropic Elasticity

Young's Modulus Pa	Poisson's Ratio	Bulk Modulus Pa	Shear Modulus Pa	Temperature C
2.1e+011	0.3	1.75e+011	8.0769e+010	

TABLE 35
Structural Steel > Isotropic Relative Permeability

Relative Permeability
10000