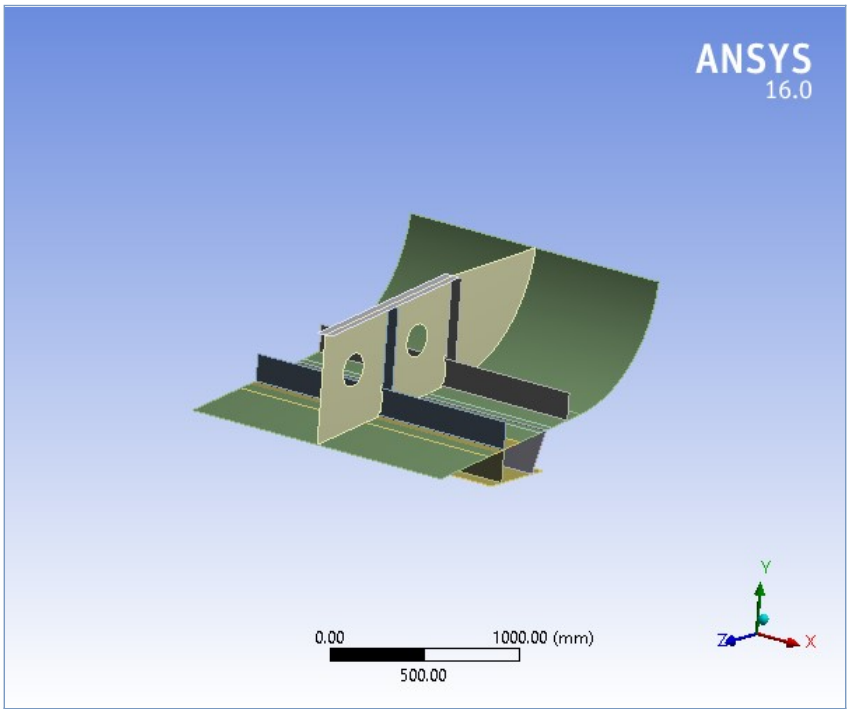
Project

First Saved	Sunday, August 8, 2021
Last Saved	Sunday, August 8, 2021
Product Version	16.0 Release
Save Project Before Solution	No
Save Project After Solution	No



Contents

Report Not Finalized

Not all objects described below are in a finalized state. As a result, data may be incomplete, obsolete or in error. View first state problem. To finalize this report, edit objects as needed and solve the analyses.

Units

TABLE 1

Unit System	Metric (mm, kg, N, s, mV, mA) Degrees rad/s Celsius
Angle	Degrees
Rotational Velocity	rad/s
Temperature	Celsius

Model (A4)

Geometry

TABLE 2
Model (A4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\klievfam07\Desktop\mat123_files\dp0\SYS\DM\SYS.agdb
Type	DesignModeler
Length Unit	Meters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	1650. mm
Length Y	868.19 mm
Length Z	1818.9 mm
Properties	
Volume	6.4261e+007 mm³
Mass	504.45 kg
Surface Area(approx.)	7.1988e+006 mm²
Scale Factor Value	1.
Statistics	
Bodies	10
Active Bodies	10
Nodes	1386
Elements	1111
Mesh Metric	None
Basic Geometry Options	
Parameters	Yes
Parameter Key	DS
Attributes	No
Named Selections	No
Material Properties	No

Advanced Geometry Options	
Use Associativity	Yes
Coordinate Systems	No
Reader Mode Saves Updated File	No
Use Instances	Yes
Smart CAD Update	No
Compare Parts On Update	No
Attach File Via Temp File	Yes
Temporary Directory	C:\Users\klievfam07\AppData\Local\Temp
Analysis Type	3-D
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (A4) > Geometry > Parts

Object Name	*Surface Body*	*Surface Body*	*Surface Body*	*Surface Body*	*Surface Body*	*Surface Body*	*Surface Body*	*Surface Body*	*Surface Body*	*Surface Body*
State	Meshed									
Graphics Properties										
Visible	Yes									
Transparency	1									
Definition										
Suppressed	No									
Stiffness Behavior	Flexible									
Coordinate System	Default Coordinate System									
Reference Temperature	By Environment									
Thickness	9. mm	8. mm	9. mm		8. mm	12. mm	11. mm	10. mm		
Thickness Mode	Manual									
Offset Type	Middle									
Material										
Assignment	Structural Steel NL								Structural Steel	
Nonlinear Effects	Yes									
Thermal Strain Effects	Yes									
Bounding Box										
Length X	90. mm	0. mm	1650. mm							
Length Y	119.37 mm	743.63 mm	603.52 mm		743.63 mm	0. mm	223.3 mm	183.81 mm	10.852 mm	29.3 mm
Length Z	1100. mm	1818.9 mm	0. mm		1818.9 mm	450. mm	99.771 mm	0. mm	100. mm	270. mm
Properties										
Volume	8.9623e+005 mm³	7.4695e+006 mm³	2.5054e+006 mm³	2.4928e+006 mm³	2.8374e+007 mm³	8.91e+006 mm³	4.4391e+006 mm³	3.0329e+006 mm³	1.6597e+006 mm³	4.4812e+006 mm³
Mass	7.0354 kg	58.635 kg	19.667 kg	19.569 kg	222.74 kg	69.944 kg	34.847 kg	23.808 kg	13.029 kg	35.177 kg
Centroid X	1.0888e-015 mm	4. mm	3.8577 mm	3.8847 mm	-5.9694e-014 mm	-5.6072e-014 mm	8.5972e-014 mm	4.5758e-014 mm	-4.1808e-014 mm	2.4775e-013 mm
Centroid Y	1032.8 mm	773.81 mm	595.38 mm	535.96 mm	566.25 mm	245.04 mm	356.69 mm	336.94 mm	468.04 mm	429.19 mm
Centroid Z	-2431.9 mm	-2733.3 mm	-2973.4 mm	-2427.9 mm	-2911.6 mm	-2560.9 mm	-2742. mm	-2428.1 mm	-2789.1 mm	-2431. mm
Moment of Inertia Ip1	7.1776e+005 kg·mm²	1.6451e+007 kg·mm²	2.3802e+005 kg·mm²	2.3784e+005 kg·mm²	7.9581e+007 kg·mm²	1.1803e+006 kg·mm²	1.7371e+005 kg·mm²	67033 kg·mm²	10985 kg·mm²	2.1622e+005 kg·mm²
Moment of Inertia Ip2	7.2251e+005 kg·mm²	1.4779e+007 kg·mm²	3.9937e+006 kg·mm²	3.9704e+006 kg·mm²	1.2798e+008 kg·mm²	1.7049e+007 kg·mm²	7.9059e+006 kg·mm²	5.4015e+006 kg·mm²	2.9668e+006 kg·mm²	8.197e+006 kg·mm²
Moment of Inertia Ip3	4748.9 kg·mm²	1.6723e+006 kg·mm²	4.2317e+006 kg·mm²	4.2083e+006 kg·mm²	5.2631e+007 kg·mm²	1.5868e+007 kg·mm²	8.0796e+006 kg·mm²	5.4685e+006 kg·mm²	2.9558e+006 kg·mm²	7.9808e+006 kg·mm²
Surface Area (approx.)	99581 mm²	9.3369e+005 mm²	2.7837e+005 mm²	2.7698e+005 mm²	3.5468e+006 mm²	7.425e+005 mm²	4.0356e+005 mm²	3.0329e+005 mm²	1.6597e+005 mm²	4.4812e+005 mm²
Statistics										
Nodes	26	409	67		456	114	76	57	38	76
Elements	12	351	41		414	90	54	36	18	54
Mesh Metric	None									

Coordinate Systems

TABLE 4
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. mm
Origin Y	0. mm
Origin Z	0. mm

Directional Vectors	
X Axis Data	[1. 0. 0.]
Y Axis Data	[0. 1. 0.]
Z Axis Data	[0. 0. 1.]

Connections

TABLE 5
Model (A4) > Connections

Object Name	*Connections*
State	Fully Defined
Auto Detection	
Generate Automatic Connection On Refresh	Yes
Transparency	
Enabled	Yes

TABLE 6
Model (A4) > Connections > Contacts

Object Name	*Contacts*
State	Fully Defined
Definition	
Connection Type	Contact
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Auto Detection	
Tolerance Type	Slider
Tolerance Slider	0.
Tolerance Value	6.5118 mm
Use Range	No
Face/Face	Yes
Face/Edge	No
Edge/Edge	No
Priority	Include All
Group By	Bodies
Search Across	Bodies
Statistics	
Connections	3
Active Connections	3

TABLE 7
Model (A4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region*	*Contact Region 2*	*Contact Region 3*
State	Fully Defined		
Scope			
Scoping Method	Geometry Selection		
Contact	1 Face		
Target	1 Face		
Contact Bodies	Surface Body		
Target Bodies	Surface Body		
Contact Shell Face	Program Controlled		
Target Shell Face	Program Controlled		
Shell Thickness Effect	No		
Definition			
Type	Bonded		
Scope Mode	Automatic		
Behavior	Program Controlled		
Trim Contact	Program Controlled		
Trim Tolerance	6.5118 mm		
Suppressed	No		
Advanced			
Formulation	Program Controlled		
Detection Method	Program Controlled		
Penetration Tolerance	Program Controlled		
Elastic Slip Tolerance	Program Controlled		
Normal Stiffness	Program Controlled		
Update Stiffness	Program Controlled		
Pinball Region	Program Controlled		
Geometric Modification			
Contact Geometry Correction	None		
Target Geometry Correction	None		

Mesh

TABLE 8

Model (A4) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Body Color
Defaults	
Physics Preference	Mechanical
Relevance	0
Sizing	
Use Advanced Size Function	On: Curvature
Relevance Center	Coarse
Initial Size Seed	Active Assembly
Smoothing	Medium
Span Angle Center	Coarse
Curvature Normal Angle	Default (30.0 °)
Min Size	Default (18.6020 mm)
Max Face Size	Default (93.0080 mm)
Growth Rate	Default
Minimum Edge Length	41.9730 mm
Inflation	
Use Automatic Inflation	None
Inflation Option	Smooth Transition
Transition Ratio	0.272
Maximum Layers	2
Growth Rate	1.2
Inflation Algorithm	Pre
View Advanced Options	No
Patch Conforming Options	
Triangle Surface Mesher	Program Controlled
Patch Independent Options	
Topology Checking	No
Advanced	
Number of CPUs for Parallel Part Meshing	Program Controlled
Shape Checking	Standard Mechanical
Element Midside Nodes	Program Controlled
Straight Sided Elements	No
Number of Retries	Default (4)
Extra Retries For Assembly	Yes
Rigid Body Behavior	Dimensionally Reduced
Mesh Morphing	Disabled
Defeaturing	
Use Sheet Thickness for Pinch	No
Pinch Tolerance	Default (16.7410 mm)
Generate Pinch on Refresh	No
Sheet Loop Removal	No
Automatic Mesh Based Defeaturing	On
Defeaturing Tolerance	Default (13.9510 mm)
Statistics	
Nodes	1386
Elements	1111
Mesh Metric	None

Named Selections

TABLE 9
Model (A4) > Named Selections > Named Selections

Object Name	*Problematic Geometry*
State	Suppressed
Scope	
Scoping Method	Geometry Selection
Geometry	No Selection
Definition	
Send to Solver	Yes
Visible	Yes
Program Controlled Inflation	Exclude
Statistics	
Type	Manual
Total Selection	No Selection
Suppressed	0
Used by Mesh Worksheet	No

Static Structural (A5)

TABLE 10
Model (A4) > Analysis

Object Name	*Static Structural (A5)*
State	Not Solved
Definition	
Physics Type	Structural
Analysis Type	Static Structural
Solver Target	Mechanical APDL
Options	
Environment Temperature	22. °C
Generate Input Only	No

TABLE 11
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	Off
Define By	Substeps
Number Of Substeps	20.
Solver Controls	
Solver Type	Program Controlled
Weak Springs	Program Controlled
Solver Pivot Checking	Program Controlled
Large Deflection	On
Inertia Relief	Off
Restart Controls	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	No
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	Off
Output Controls	
Stress	Yes
Strain	Yes
Nodal Forces	No
Contact Miscellaneous	No
General Miscellaneous	No
Store Results At	All Time Points
Analysis Data Management	
Solver Files Directory	C:\Users\klievfam07\Desktop\mat123_files\dp0\SYS\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Delete Unneeded Files	Yes
Nonlinear Solution	Yes
Solver Units	Active System
Solver Unit System	nmm

TABLE 12
Model (A4) > Static Structural (A5) > Loads

Object Name	*Pressure*	*Fixed Support*	*Displacement*
State	Fully Defined		
Scope			
Scoping Method	Geometry Selection		
Geometry	1 Face	6 Edges	13 Edges
Definition			
Type	Pressure	Fixed Support	Displacement
Define By	Normal To		Components
Magnitude	0.29 MPa (ramped)		
Suppressed	No		
Coordinate System			Global Coordinate System
X Component			0. mm (ramped)
Y Component			Free
Z Component			0. mm (ramped)

FIGURE 1
Model (A4) > Static Structural (A5) > Pressure

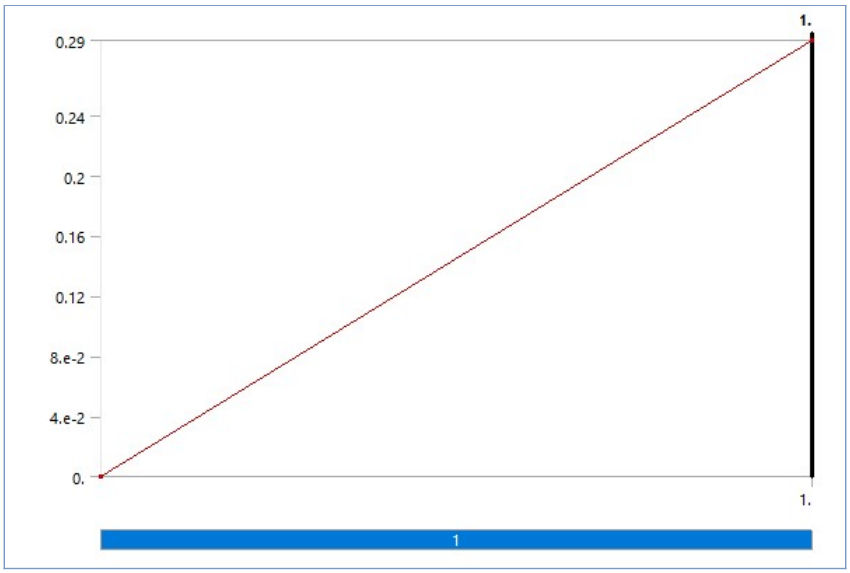
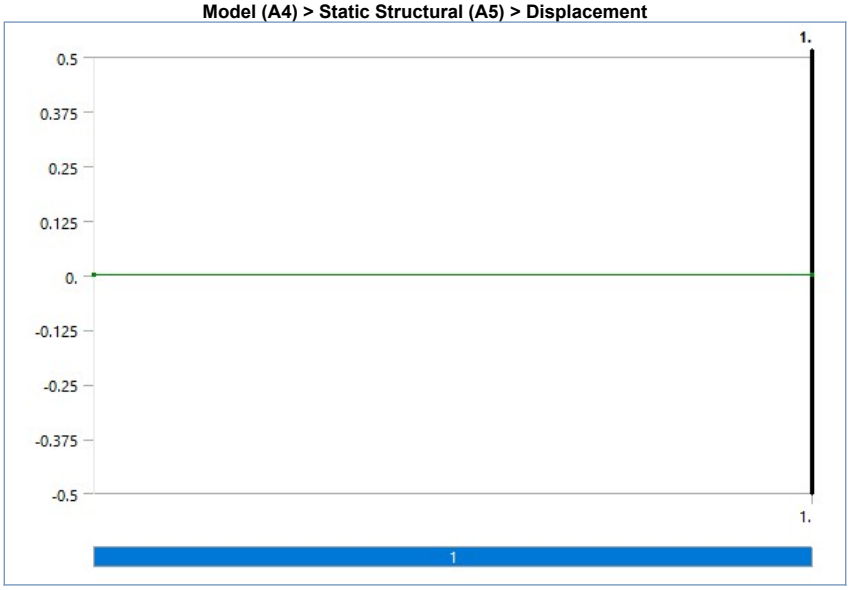


FIGURE 2
Model (A4) > Static Structural (A5) > Displacement



Solution (A6)

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

Object Name	*Solution (A6)*
State	Solve Failed
Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	
Status	Solve Required
Post Processing	
Calculate Beam Section Results	No

TABLE 14
Model (A4) > Static Structural (A5) > Solution (A6) > Solution Information

Object Name	*Solution Information*
State	Solve Failed
Solution Information	
Solution Output	Solver Output
Newton-Raphson Residuals	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 15
Model (A4) > Static Structural (A5) > Solution (A6) > Results

Object Name	*Equivalent Stress*	*Total Deformation*	*Equivalent Elastic Strain*
State	Solve Failed		
Scope			
Scoping Method	Geometry Selection		
Geometry	All Bodies		
Position	Top/Bottom		Top/Bottom
Definition			
Type	Equivalent (von-Mises) Stress	Total Deformation	Equivalent Elastic Strain
By	Time		
Display Time	Last		
Calculate Time History	Yes		
Identifier			
Suppressed	No		
Integration Point Results			
Display Option	Averaged		Averaged
Average Across Bodies	No		No
Results			
Minimum			
Maximum			
Minimum Occurs On			
Maximum Occurs On			
Information			
Time			
Load Step	0		
Substep	0		
Iteration Number			

Material Data

Structural Steel NL

TABLE 16
Structural Steel NL > Constants

Density	7.85e-006 kg mm^-3
Specific Heat	4.34e+005 mJ kg^-1 C^-1

TABLE 17
Structural Steel NL > Isotropic Elasticity

Temperature C	Young's Modulus MPa	Poisson's Ratio	Bulk Modulus MPa	Shear Modulus MPa
	2.e+005	0.3	1.6667e+005	76923

TABLE 18
Structural Steel NL > Bilinear Isotropic Hardening

Yield Strength MPa	Tangent Modulus MPa	Temperature C
250	1450	

Structural Steel

TABLE 19
Structural Steel > Constants

Density	7.85e-006 kg mm^-3
Coefficient of Thermal Expansion	1.2e-005 C^-1
Specific Heat	4.34e+005 mJ kg^-1 C^-1
Thermal Conductivity	6.05e-002 W mm^-1 C^-1
Resistivity	1.7e-004 ohm mm

TABLE 20
Structural Steel > Compressive Ultimate Strength

Compressive Ultimate Strength MPa
0

TABLE 21
Structural Steel > Compressive Yield Strength

Compressive Yield Strength MPa
250

TABLE 22
Structural Steel > Tensile Yield Strength

Tensile Yield Strength MPa
250

TABLE 23
Structural Steel > Tensile Ultimate Strength

Tensile Ultimate Strength MPa
460

TABLE 24
Structural Steel > Isotropic Secant Coefficient of Thermal Expansion

Reference Temperature C
22

TABLE 25
Structural Steel > Alternating Stress Mean Stress

Alternating Stress MPa	Cycles	Mean Stress MPa
3999	10	0
2827	20	0
1896	50	0
1413	100	0
1069	200	0
441	2000	0
262	10000	0
214	20000	0
138	1.e+005	0
114	2.e+005	0
86.2	1.e+006	0

TABLE 26
Structural Steel > Strain-Life Parameters

Strength Coefficient MPa	Strength Exponent	Ductility Coefficient	Ductility Exponent	Cyclic Strength Coefficient MPa	Cyclic Strain Hardening Exponent
920	-0.106	0.213	-0.47	1000	0.2

TABLE 27
Structural Steel > Isotropic Elasticity

Temperature C	Young's Modulus MPa	Poisson's Ratio	Bulk Modulus MPa	Shear Modulus MPa
	2.e+005	0.3	1.6667e+005	76923

TABLE 28
Structural Steel > Isotropic Relative Permeability

Relative Permeability
10000