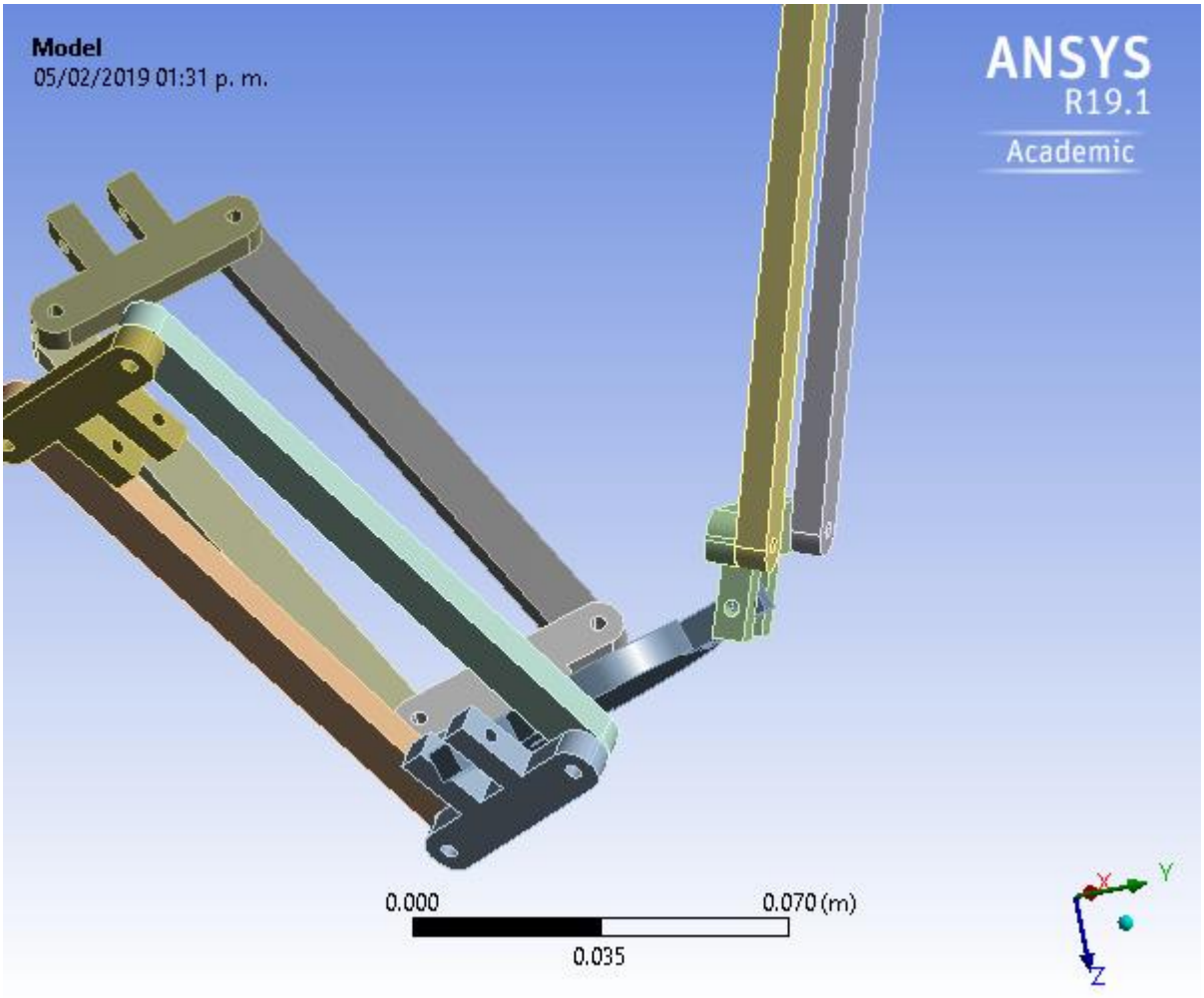
Project

First Saved	Tuesday, February 5, 2019
Last Saved	Tuesday, February 5, 2019
Product Version	19.1 Release
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)

Geometry

TABLE 2
Model (A4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\INFER\OneDrive\Escritorio\delta_man_asm.IGS
Type	Iges
Length Unit	Millimeters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	0.2293 m
Length Y	0.23276 m

Length Z	0.22097 m
Properties	
Volume	8.281e-005 m³
Mass	0.65006 kg
Scale Factor Value	1.
Statistics	
Bodies	29
Active Bodies	13
Nodes	29704
Elements	13791
Mesh Metric	None
Update Options	
Assign Default Material	No
Basic Geometry Options	
Solid Bodies	Yes
Surface Bodies	Yes
Line Bodies	No
Parameters	Independent
Parameter Key	ANS;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	Yes
Compare Parts On Update	No
Analysis Type	3-D
Mixed Import Resolution	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (A4) > Geometry > Parts

an_1	*delta_man_2*	*delta_man_2[2]*	*delta_man_3*	*delta_man_4*	*delta_man_4[2]*	*delta_man_4[3]*	*delta_man_5*	*delta_man_5[2]*	*delta_m*
Suppressed									
Graphics Properties									
No									
Definition									
Yes									
Flexible									
Default Coordinate System									
By Environment									

None
Material
Structural Steel
Yes
Yes

Bounding Box						
33 m	6.e-003 m	0.20402 m	3.7642e-002 m	6.0021e-003 m	3.7642e-002 m	6.0021e
01 m	9.5e-002 m	6.0026e-003 m	3.6343e-002 m	5.0417e-002 m	3.6343e-002 m	5.0417e
-002	6.e-002 m	0.18148 m	4.5835e-002 m	5.0417e-002 m	4.5835e-002 m	5.0417e

Properties									
e-005 m³	1.3701e-005 m³		1.2392e-004 m³	8.8682e-006 m³			9.1622e-006 m³		
6 kg	0.10756 kg		0.97276 kg	6.9616e-002 kg			7.1923e-002 kg		
e-002	6.1398e-002 m	8.7266e-002 m	7.4289e-002 m	0.12714 m	3.4381e-002 m	6.1261e-002 m	2.1381e-002 m	0.11414 m	8.7261e
44 m	0.13077 m		9.4509e-002 m	0.17367 m	0.15226 m	0.23952 m	0.17366 m	0.15225 m	0.239
62 m	0.1135 m		0.13675 m	9.507e-002 m	0.10204 m	7.3634e-002 m	9.5055e-002 m	0.10202 m	7.3618e
e-003 m²	8.4484e-005 kg·m²		1.8034e-003 kg·m²	1.8714e-005 kg·m²			1.8754e-005 kg·m²		
e-003 m²	1.3139e-005 kg·m²		5.2547e-003 kg·m²	9.5757e-006 kg·m²			9.6023e-006 kg·m²		
e-003 m²	7.1991e-005 kg·m²		3.4571e-003 kg·m²	9.5563e-006 kg·m²			9.5836e-006 kg·m²		

Statistics
0
0
None

TABLE 4
Model (A4) > Geometry > Parts

6[2]	*delta_man_6[3]*	*delta_man_7*	*delta_man_7[2]*	*delta_man_7[3]*	*delta_man_7[4]*	*delta_man_7[5]*	*delta_man_7[6]*	*delta_man_8*	*delta*
uppressed		Meshed							
Graphics Properties									
No		Yes							
		1							
Definition									
Yes		No							
Flexible									
Default Coordinate System									

By Environment								
None								
Material								
Structural Steel								
Yes								
Yes								
Bounding Box								
m	9.1145e-002 m	3.9435e-002 m	4.8e-002 m	3.9503e-002 m		3.9435e-002 m	4.8e-002 m	7.1494e-002
m	4.598e-002 m	5.3737e-002 m	1.4001e-002 m	5.3751e-002 m		5.3737e-002 m	1.4001e-002 m	6.6908e-002
2 m	8.4884e-002 m	3.5104e-002 m	2.5569e-002 m	3.5057e-002 m		3.5104e-002 m	2.5569e-002 m	0.105 m
Properties								
581e-006 m³		3.6847e-006 m³						7.58
396e-002 kg		2.8925e-002 kg						5.95
2 m	0.14111 m	1.0827e-002 m	7.4761e-002 m	0.18009 m	0.12808 m	6.5382e-002 m	9.2543e-002 m	5.2337e-002 m	3.283
n	0.15388 m	0.17459 m	0.31424 m	0.14209 m	0.21264 m	0.22347 m	0.2724 m	0.18449 m	0.2
2 m	0.10885 m	0.16794 m	0.10177 m	0.14719 m	0.23864 m	0.25442 m	0.21994 m	0.21272 m	0.2
1e-006 kg·m²		1.2928e-006 kg·m²						6.720
7e-005 kg·m²		5.2037e-006 kg·m²						8.012
4e-005 kg·m²		4.0877e-006 kg·m²						7.980
Statistics								
0		2932						
0		1504						
None								

TABLE 5
Model (A4) > Geometry > Parts

Object Name	*delta_man_8[4]*	*delta_man_8[5]*	*delta_man_8[6]*	*delta_man_9*	*potentiometer*	*potentiometer[2]*	*potentiometer[3]*
State	Meshed				Suppressed		
Graphics Properties							
Visible	Yes				No		
Transparency	1						
Definition							
Suppressed	No				Yes		
Stiffness Behavior	Flexible						
Coordinate System	Default Coordinate System						
Reference Temperature	By Environment						
Behavior	None						

Material						
Assignment	Structural Steel					
Nonlinear Effects	Yes					
Thermal Strain Effects	Yes					
Bounding Box						
Length X	2.9193e-002 m	6.2999e-002 m	7.2108e-002 m	6.5238e-002 m	6.0007e-002 m	5.8461e-002 m
Length Y	4.9157e-002 m	8.23e-002 m	6.7796e-002 m	7.4929e-002 m	4.4299e-002 m	6.622e-002 m
Length Z	0.12484 m	0.10076 m	2.9038e-002 m	4.0813e-002 m	4.0986e-002 m	5.7545e-002 m
Properties						
Volume	7.5839e-006 m³		1.5198e-005 m³	4.4995e-006 m³		
Mass	5.9534e-002 kg		0.1193 kg	3.5321e-002 kg		
Centroid X	0.10315 m	0.1488 m	0.1683 m	9.2048e-002 m	0.12601 m	6.31e-002 m	3.3547e-002 m
Centroid Y	0.29898 m	0.1598 m	0.19192 m	0.23475 m	0.17224 m	0.2391 m	0.15355 m
Centroid Z	0.16286 m	0.20185 m	0.19139 m	0.24108 m	9.498e-002 m	7.3312e-002 m	0.10076 m
Moment of Inertia Ip1	6.7206e-007 kg·m²			2.6681e-005 kg·m²	9.5924e-006 kg·m²		
Moment of Inertia Ip2	8.0123e-005 kg·m²			2.6754e-005 kg·m²	9.5547e-006 kg·m²		
Moment of Inertia Ip3	7.9808e-005 kg·m²			5.2714e-005 kg·m²	1.2067e-006 kg·m²		
Statistics						
Nodes	653			8194	0		
Elements	68			4359	0		
Mesh Metric	None					

Coordinate Systems

TABLE 6
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.]

Connections

TABLE 7
Model (A4) > Connections

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

TABLE 8
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	9.861e-004 m
Use Range	No
Face/Face	Yes
Face Overlap Tolerance	Off
Cylindrical Faces	Include
Face/Edge	No
Edge/Edge	No
Priority	Include All
Group By	Bodies
Search Across	Bodies
Statistics	
Connections	37
Active Connections	15

TABLE 9
Model (A4) > Connections > Contacts > Contact Regions

t n	*Contact Region 2*	*Contact Region 3*	*Contact Region 4*	*Contact Region 5*	*Contact Region 6*	*Contact Region 7*	*Contact Region 8*	*Contact Region 9*	*Contact 1*
Suppressed									
Scope									
Geometry Selection									
No Selection									
No Selection									
delta_man_1								delta_man_2	delta_m

n_2	delta_man_2[2]	delta_man_4	delta_man_4[2]	delta_man_4[3]	delta_man_5	delta_man_5[2]	delta_man_5[3]	delta_man_3
No								
Definition								
Bonded								
Automatic								
Program Controlled								
Program Controlled								
9.861e-004 m								
No								
Advanced								
Program Controlled								
Program Controlled								
Program Controlled								
Program Controlled								
Program Controlled								
Program Controlled								
Program Controlled								
Program Controlled								
Geometric Modification								
None								
None								

TABLE 10
Model (A4) > Connections > Contacts > Contact Regions

	Contact Region 13	*Contact Region 14*	*Contact Region 15*	*Contact Region 16*	*Contact Region 17*	*Contact Region 18*	*Contact Region 19*	*Contact Region 20*	C
Suppressed									
Scope									
Geometry Selection									
No Selection									
No Selection					1 Face	No Selection	1 Face	No Selection	
]	delta_man_4[3]	delta_man_5	delta_man_5[2]	delta_man_5[3]	delta_man_6		delta_man_6[2]		
]	potentiometer[2]	potentiometer[3]	potentiometer	potentiometer[2]	delta_man_7	potentiometer[3]	delta_man_7[2]	potentiometer[2]	d

No
Definition
Bonded
Automatic
Program Controlled
Program Controlled
9.861e-004 m
No
Advanced
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Geometric Modification
None
None

TABLE 11
Model (A4) > Connections > Contacts > Contact Regions

	Contact Region 24	*Contact Region 25*	*Contact Region 26*	*Contact Region 27*	*Contact Region 28*	*Contact Region 29*	*Contact Region 30*	*Contact Region 31*	*Co Reg*
Fully Defined									
Scope									
Geometry Selection									
1 Face									
1 Face									
ta_man_7		delta_man_7[2]		delta_man_7[3]		delta_man_7[4]			
8	delta_man_8[2]	delta_man_8[3]	delta_man_8[4]	delta_man_8[5]	delta_man_8[6]	delta_man_8[5]	delta_man_8[6]	delta_man_9	delta
No									
Definition									

Bonded
Automatic
Program Controlled
Program Controlled
9.861e-004 m
No
Advanced
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Geometric Modification
None
None

TABLE 12
Model (A4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region 34*	*Contact Region 35*	*Contact Region 36*	*Contact Region 37*
State	Fully Defined			
Scope				
Scoping Method	Geometry Selection			
Contact	1 Face			
Target	1 Face			
Contact Bodies	delta_man_7[5]	delta_man_7[6]		
Target Bodies	delta_man_9	delta_man_8[3]	delta_man_8[4]	delta_man_9
Protected	No			
Definition				
Type	Bonded			
Scope Mode	Automatic			
Behavior	Program Controlled			
Trim Contact	Program Controlled			
Trim Tolerance	9.861e-004 m			

Suppressed	No
Advanced	
Formulation	Program Controlled
Small Sliding	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 13
Model (A4) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Body Color
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	0.39444 m
Average Surface Area	3.4047e-004 m²
Minimum Edge Length	2.6393e-005 m
Quality	
Check Mesh Quality	Yes, Errors
Error Limits	Standard Mechanical
Target Quality	Default (0.050000)
Smoothing	Low
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
Number of Retries	Default (4)
Rigid Body Behavior	Dimensionally Reduced
Triangle Surface Mesher	Program Controlled
Topology Checking	Yes
Pinch Tolerance	Please Define
Generate Pinch on Refresh	No
Statistics	
Nodes	29704
Elements	13791

Static Structural (A5)

TABLE 14
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 15
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

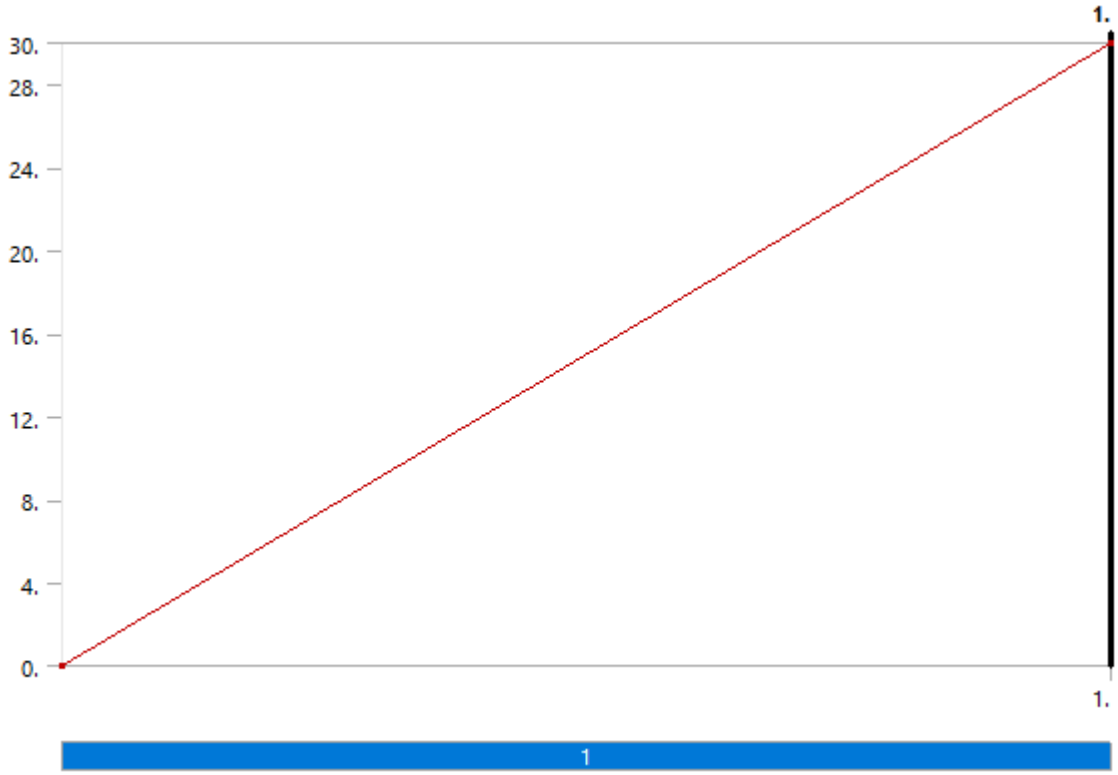
Rotordynamics Controls	
Coriolis Effect	Off
Restart Controls	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	No
Combine Restart Files	Program Controlled
Nonlinear Controls	
Newton-Raphson Option	Program Controlled
Force Convergence	Program Controlled
Moment Convergence	Program Controlled
Displacement Convergence	Program Controlled
Rotation Convergence	Program Controlled
Line Search	Program Controlled
Stabilization	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\INFER\AppData\Local\Temp\WB_DESKTOP-OSROVNK_INFER_9744_2\unsaved_project_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 16
Model (A4) > Static Structural (A5) > Loads

Object Name	*Pressure*	*Fixed Support*

State	Fully Defined	
Scope		
Scoping Method	Geometry Selection	
Geometry	1 Face	3 Faces
Definition		
Type	Pressure	Fixed Support
Define By	Normal To	
Applied By	Surface Effect	
Magnitude	30. Pa (ramped)	
Suppressed	No	

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



Solution (A6)

TABLE 17
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	22. s

MAPDL Memory Used	186. MB
MAPDL Result File Size	13. MB
Post Processing	
Beam Section Results	No
On Demand Stress/Strain	No

TABLE 18
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 19
Model (A4) > Static Structural (A5) > Solution (A6) > Results

Object Name	*Total Deformation*	*Equivalent Elastic Strain*	*Equivalent Stress*	*Strain Energy*
State	Solved			
Scope				
Scoping Method	Geometry Selection			
Geometry	All Bodies			
Definition				
Type	Total Deformation	Equivalent Elastic Strain	Equivalent (von-Mises) Stress	Strain Energy
By	Time			
Display Time	Last			
Calculate Time History	Yes			
Identifier				
Suppressed	No			
Results				
Minimum	0. m	7.6046e-013 m/m	4.9452e-002 Pa	3.6407e-023 J
Maximum	6.8237e-009 m	4.6991e-008 m/m	9119.9 Pa	2.4831e-012 J
Average	2.9101e-009 m	3.5511e-009 m/m	613.76 Pa	
Minimum Occurs On	delta_man_7			

Maximum Occurs On	delta_man_9	delta_man_7[4]	delta_man_8[5]
Total			1.5319e-010 J
Information			
Time	1. s		
Load Step	1		
Substep	1		
Iteration Number	1		
Integration Point Results			
Display Option		Averaged	
Average Across Bodies		No	

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

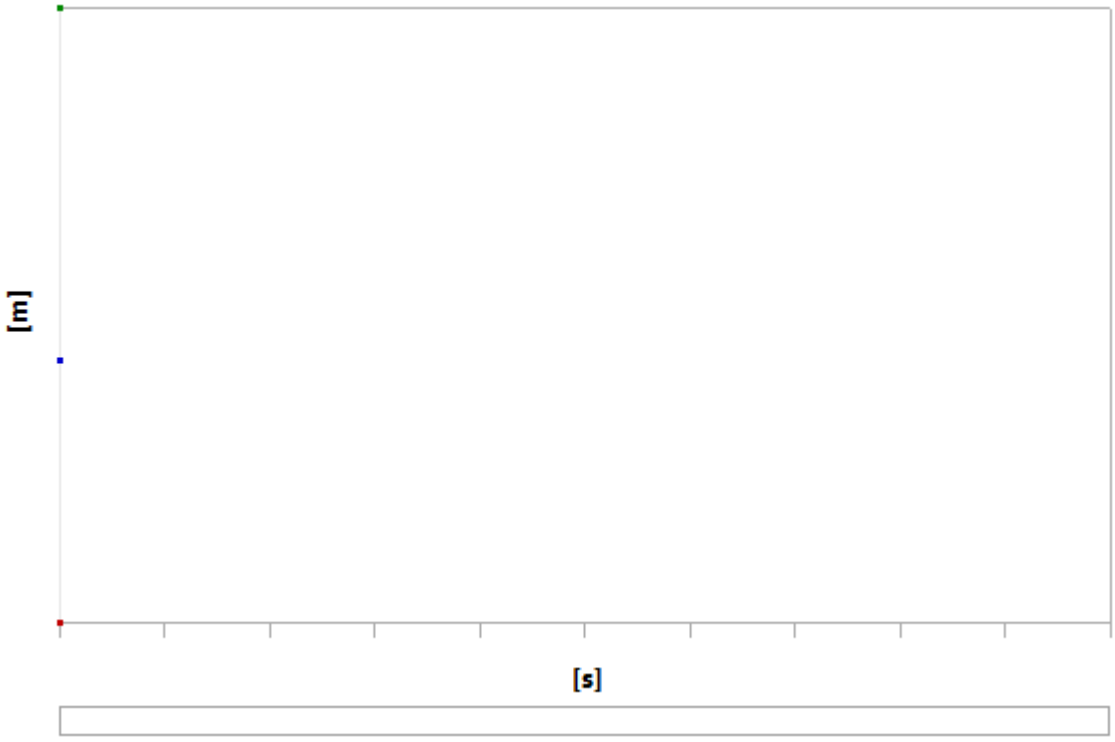


TABLE 20
Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation

Time [s]	Minimum [m]	Maximum [m]	Average [m]
1.	0.	6.8237e-009	2.9101e-009

FIGURE 3
Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation > Image

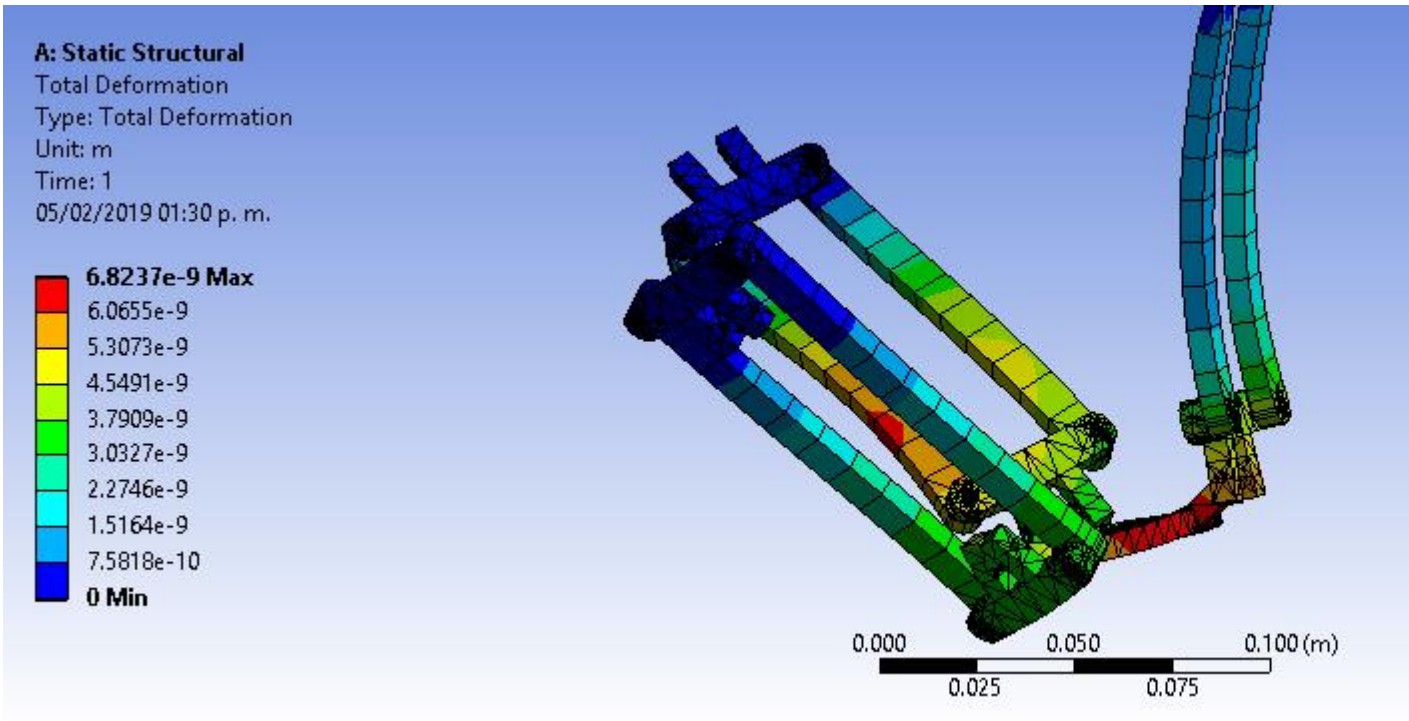


FIGURE 4
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Elastic Strain

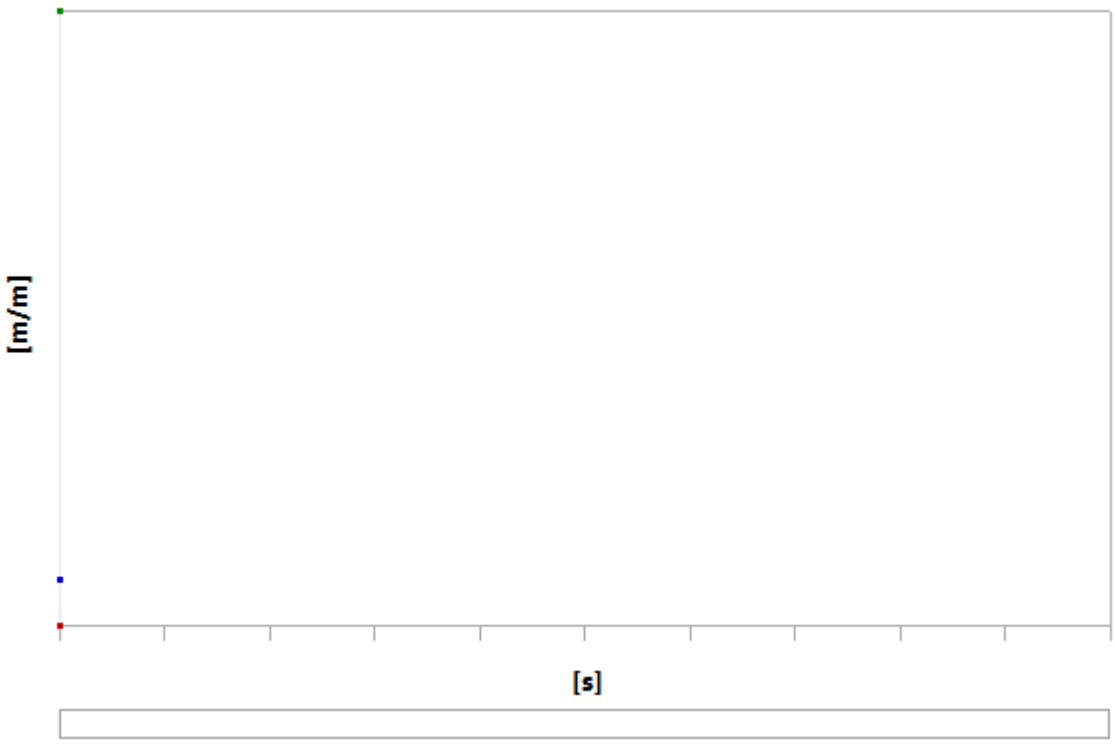


TABLE 21
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Elastic Strain

Time [s]	Minimum [m/m]	Maximum [m/m]	Average [m/m]
1.	7.6046e-013	4.6991e-008	3.5511e-009

FIGURE 5
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Elastic Strain > Image

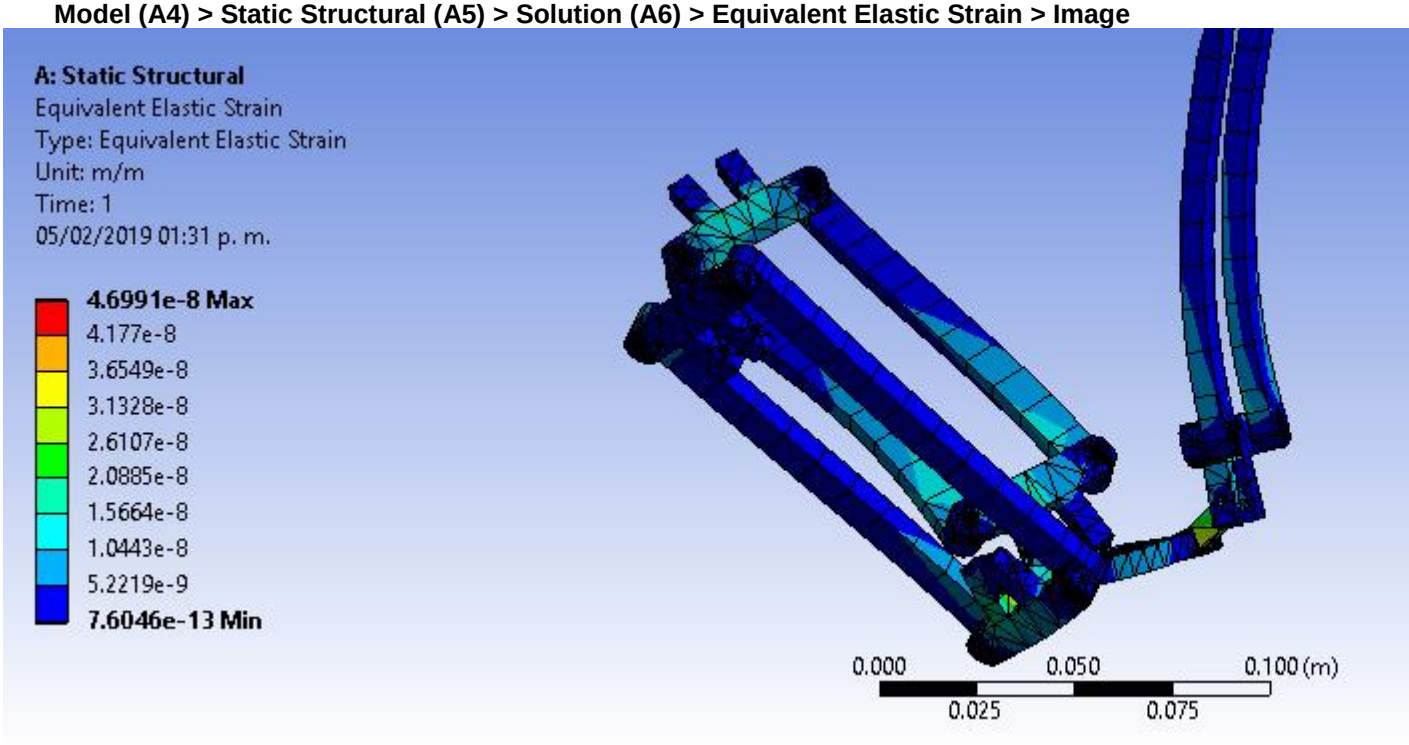


FIGURE 6
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress

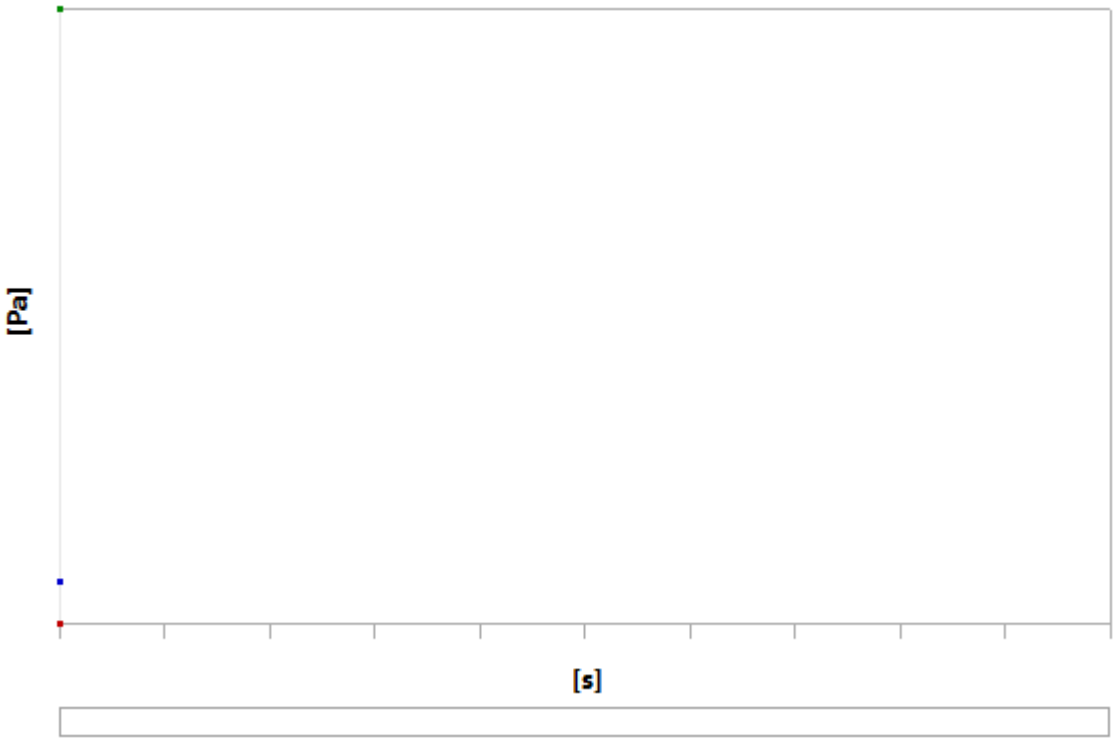


TABLE 22
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress

Time [s]	Minimum [Pa]	Maximum [Pa]	Average [Pa]
1.	4.9452e-002	9119.9	613.76

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

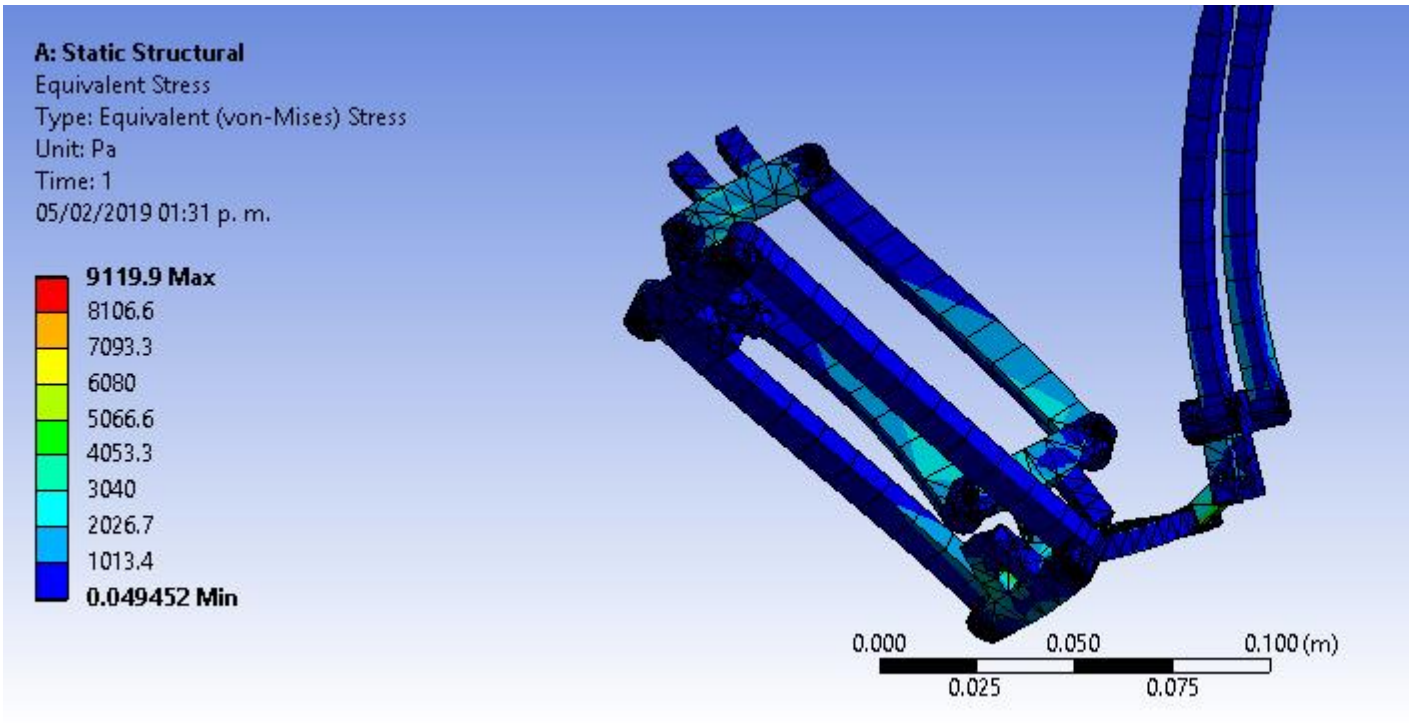


FIGURE 8
Model (A4) > Static Structural (A5) > Solution (A6) > Strain Energy

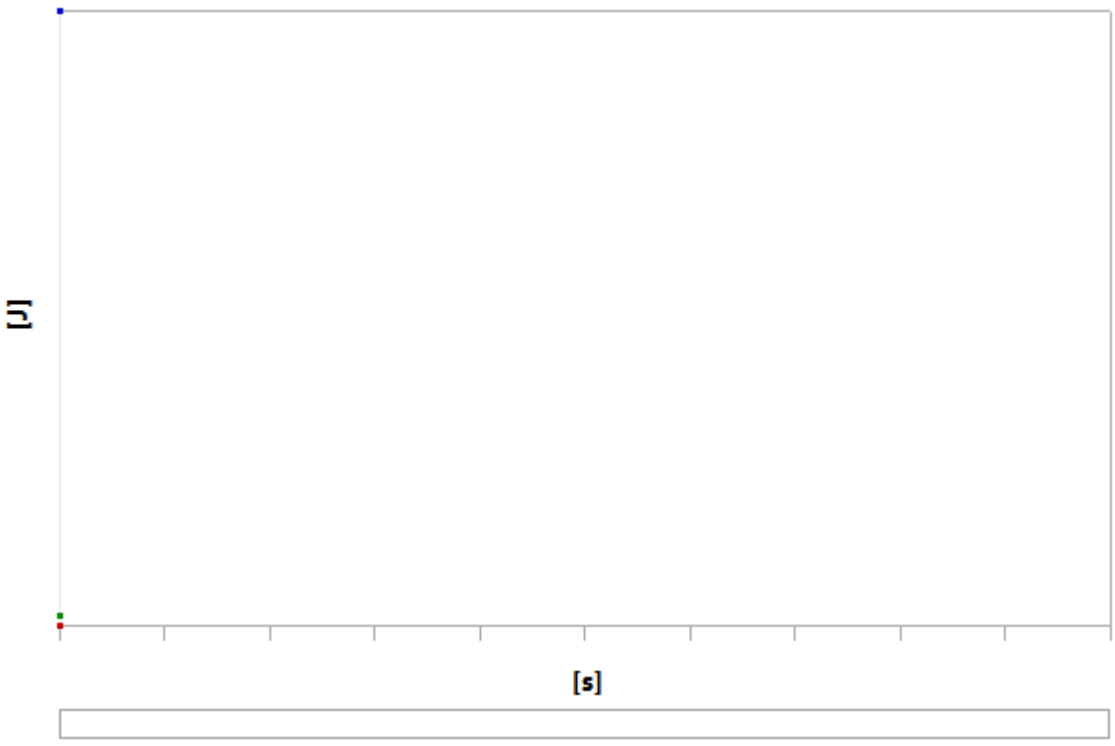
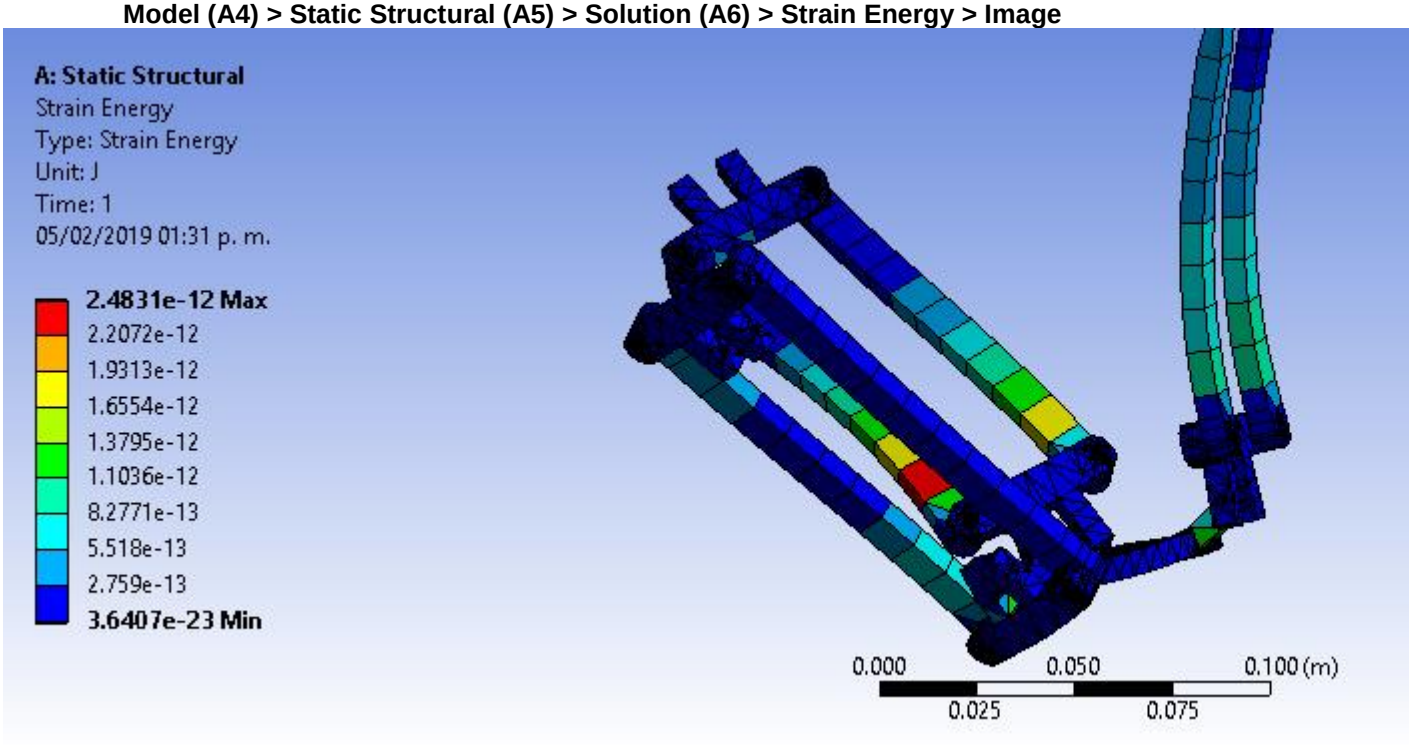


TABLE 23
Model (A4) > Static Structural (A5) > Solution (A6) > Strain Energy

Time [s]	Minimum [J]	Maximum [J]	Total [J]
1.	3.6407e-023	2.4831e-012	1.5319e-010

FIGURE 9
Model (A4) > Static Structural (A5) > Solution (A6) > Strain Energy > Image



Material Data

Structural Steel

TABLE 24
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 25
Structural Steel > Color

Red	Green	Blue
132	139	179

TABLE 26
Structural Steel > Compressive Ultimate Strength

Compressive Ultimate Strength Pa
0

TABLE 27
Structural Steel > Compressive Yield Strength

Compressive Yield Strength Pa
2.5e+008

TABLE 28
Structural Steel > Tensile Yield Strength

Tensile Yield Strength Pa
2.5e+008

TABLE 29
Structural Steel > Tensile Ultimate Strength

Tensile Ultimate Strength Pa
4.6e+008

TABLE 30
Structural Steel > Isotropic Secant Coefficient of Thermal Expansion

Zero-Thermal-Strain Reference Temperature C
22

TABLE 31
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 32
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 33
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 34
Structural Steel > Isotropic Relative Permeability

Relative Permeability

10000