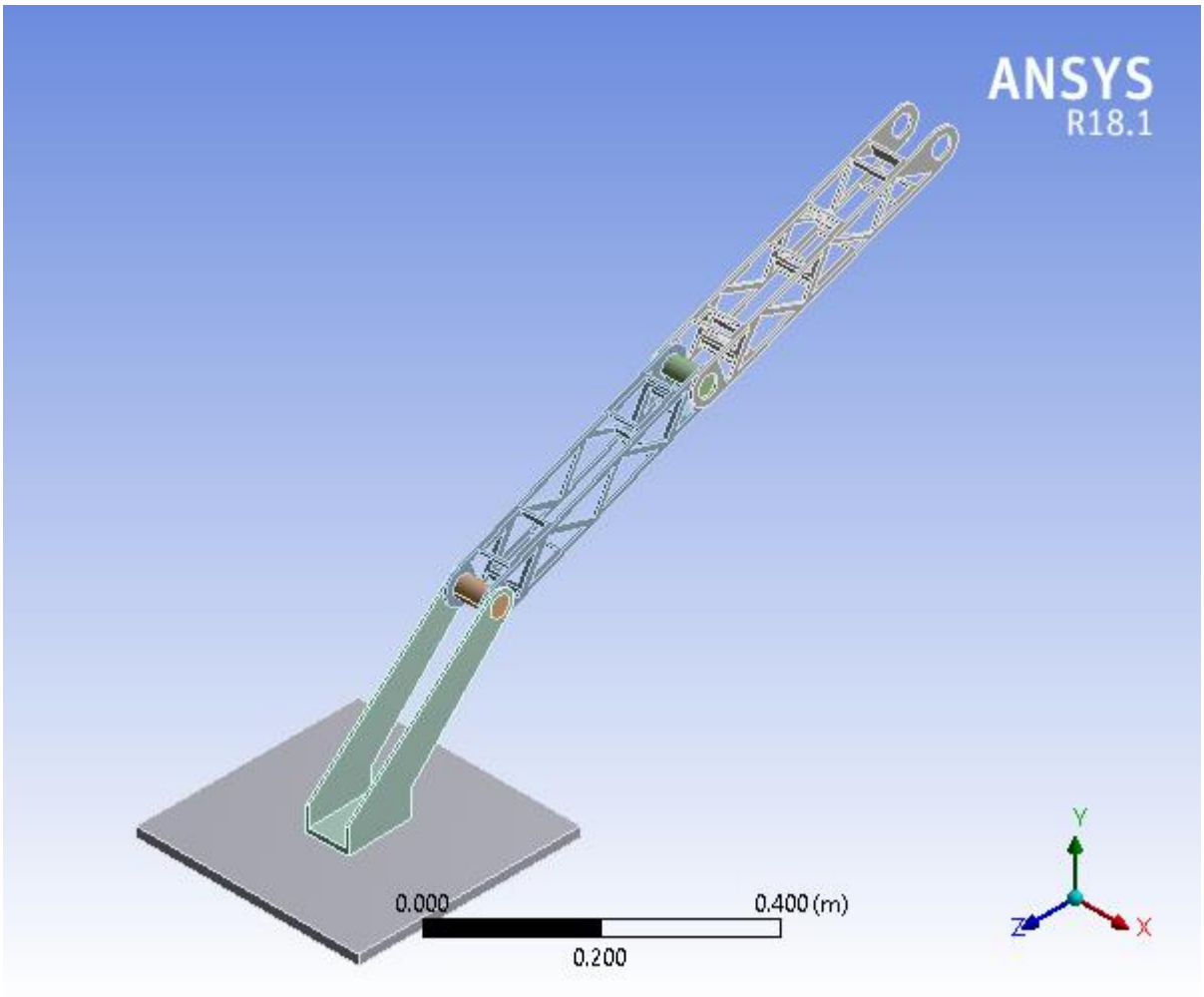
Project

Subject	Brazo antropomórfico
First Saved	Tuesday, August 13, 2019
Last Saved	Tuesday, August 13, 2019
Product Version	18.1 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 (m, kg, N, s, V, A) Degrees rad/s Celsius
Angle	Degrees
Rotational Velocity	rad/s
Temperature	Celsius

Model (B4)

Geometry

TABLE 2
Model (B4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\Marco\Desktop\ansys brazo final\Ensamblaje1.IGS
Type	Iges

Length Unit	Meters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	0.35 m
Length Y	0.52473 m
Length Z	1.117 m
Properties	
Volume	2.5424e-003 m³
Mass	1.9068 kg
Scale Factor Value	1.
Statistics	
Bodies	7
Active Bodies	7
Nodes	13720
Elements	4644
Mesh Metric	None
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
Attach File Via Temp File	Yes
Temporary Directory	C:\Users\Marco\AppData\Local\Temp
Analysis Type	3-D
Mixed Import Resolution	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (B4) > Geometry > Parts

Object Name	*Part 1*	*Part 2*	*Part 3*	*Part 4*	*Part 5*	*Part 6*	*Part 7*
State	Meshed						
Graphics Properties							
Visible	Yes						
Transparency	1						
Definition							

Suppressed	No						
Stiffness Behavior	Flexible						
Coordinate System	Default Coordinate System						
Reference Temperature	By Environment						
Behavior	None						
Material							
Assignment	Polyethylene						
Nonlinear Effects	Yes						
Thermal Strain Effects	Yes						
Bounding Box							
Length X	7.6031e-002 m	6.7104e-002 m	7.0872e-002 m	7.0735e-002 m	7.1619e-002 m	4.53e-002 m	0.35 m
Length Y	0.19887 m	0.19691 m	3.5881e-002 m	3.04e-002 m	0.25307 m	1.5e-002 m	1.6e-002 m
Length Z	0.44517 m	0.40764 m	3.7613e-002 m	3.2134e-002 m	0.26809 m	4.53e-002 m	0.35 m
Properties							
Volume	1.4149e-004 m³	1.4033e-004 m³	5.0808e-005 m³		2.0624e-004 m³	1.873e-005 m³	1.934e-003 m³
Mass	0.10612 kg	0.10525 kg	3.8106e-002 kg		0.15468 kg	1.4048e-002 kg	1.4505 kg
Centroid X	-3.5477e-002 m	-2.648e-002 m	-3.7157e-002 m	-2.4771e-002 m	-1.8715e-002 m	-1.7435e-002 m	
Centroid Y	0.37143 m	0.23956 m	0.30301 m	0.17571 m	3.4147e-002 m	-4.749e-002 m	-4.7995e-002 m
Centroid Z	-0.37414 m	-1.3071e-002 m	-0.1806 m	0.15593 m	0.29864 m	0.35 m	
Moment of Inertia Ip1	1.7862e-003 kg·m²	9.9789e-005 kg·m²	1.7611e-005 kg·m²		1.4149e-003 kg·m²	2.4547e-006 kg·m²	1.5035e-002 kg·m²
Moment of Inertia Ip2	1.8302e-003 kg·m²	1.5857e-003 kg·m²	1.7613e-005 kg·m²		1.8219e-004 kg·m²	4.384e-006 kg·m²	3.0008e-002 kg·m²
Moment of Inertia Ip3	1.1392e-004 kg·m²	1.5608e-003 kg·m²	4.3364e-006 kg·m²		1.4627e-003 kg·m²	2.4545e-006 kg·m²	1.5035e-002 kg·m²
Statistics							
Nodes	5125	4266	688		1702	497	754
Elements	1925	1606	126		699	70	92
Mesh Metric	None						

Coordinate Systems

TABLE 4
Model (B4) > 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 5
Model (B4) > Connections

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

TABLE 6
Model (B4) > 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	3.2069e-003 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	9
Active Connections	9

TABLE 7
Model (B4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region*	*Contact Region 2*	*Contact Region 3*	*Contact Region 4*	*Contact Region 5*	*Contact Region 6*	*Contact Region 7*	*Contact Region 8*	*Contact Region 9*
State	Fully Defined								
Scope									
Scoping Method	Geometry Selection								
Contact	2 Faces	5 Faces	4 Faces		2 Faces		3 Faces	1 Face	2 Faces
Target	2 Faces	3 Faces	2 Faces			4 Faces	3 Faces	1 Face	2 Faces
Contact Bodies	Part 1		Part 2			Part 4	Part 5		Part 6
Target Bodies	Part 2	Part 3		Part 4	Part 5		Part 6	Part 7	
Definition									
Type	Bonded								
Scope Mode	Automatic								
Behavior	Program Controlled								
Trim Contact	Program Controlled								
Trim Tolerance	3.2069e-003 m								
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								

Mesh

TABLE 8
Model (B4) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Body Color
Defaults	
Physics Preference	Mechanical
Relevance	0
Element Order	Program Controlled
Sizing	

Size Function	Adaptive
Relevance Center	Coarse
Element Size	Default
Initial Size Seed	Assembly
Transition	Fast
Span Angle Center	Coarse
Automatic Mesh Based Defeaturing	On
Defeature Size	Default
Minimum Edge Length	1.7194e-003 m
Quality	
Check Mesh Quality	Yes, Errors
Error Limits	Standard Mechanical
Target Quality	Default (0.050000)
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
Number of Retries	Default (4)
Rigid Body Behavior	Dimensionally Reduced
Mesh Morphing	Disabled
Triangle Surface Mesher	Program Controlled
Topology Checking	No
Pinch Tolerance	Please Define
Generate Pinch on Refresh	No
Statistics	
Nodes	13720
Elements	4644

Static Structural (B5)

TABLE 9
Model (B4) > Analysis

Object Name	*Static Structural (B5)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Static Structural
Solver Target	Mechanical APDL
Options	

Environment Temperature	22. °C
Generate Input Only	No

TABLE 10
Model (B4) > Static Structural (B5) > Analysis Settings

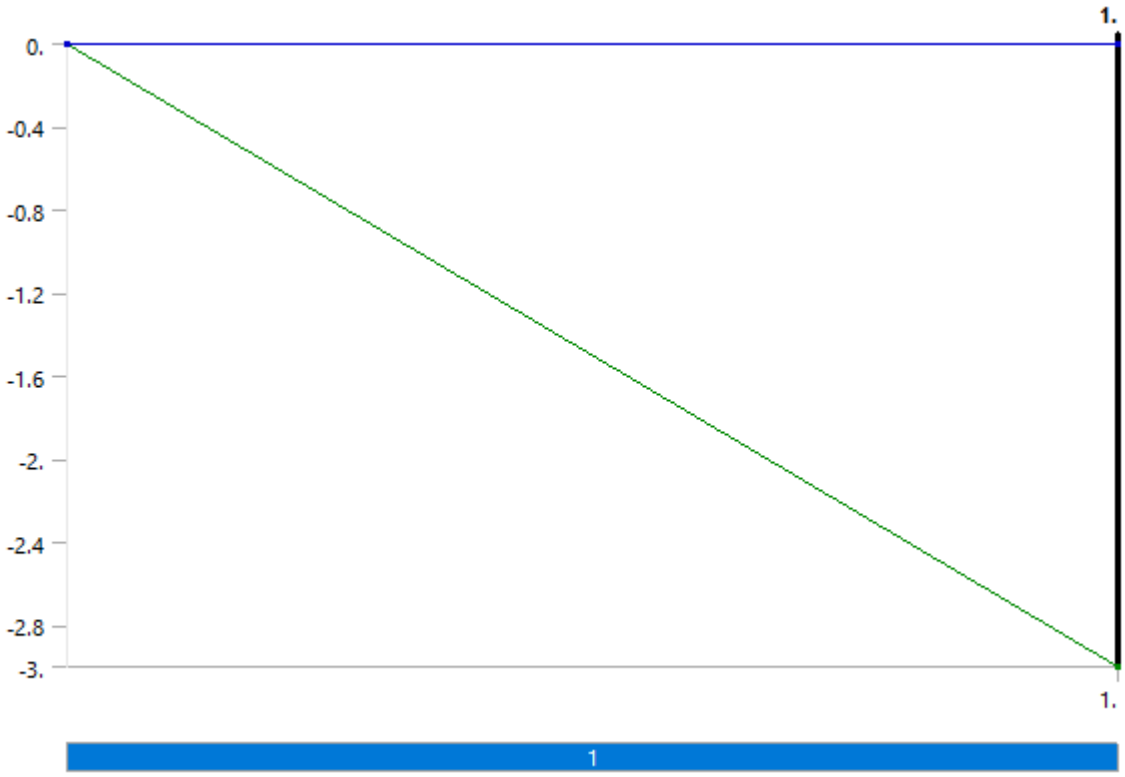
Object Name	*Analysis Settings*
State	Fully Defined
Step Controls	
Number Of Steps	1.
Current Step Number	1.
Step End Time	1. s
Auto Time Stepping	Program Controlled
Solver Controls	
Solver Type	Program Controlled
Weak Springs	Off
Solver Pivot Checking	Program Controlled
Large Deflection	Off
Inertia Relief	Off
Rotordynamics Controls	
Coriolis Effect	Off
Restart Controls	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	No
Combined 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\Marco\Desktop\ansys brazo final\Brazo_files\dp0\SYS\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Delete Unneeded Files	Yes
Nonlinear Solution	No
Solver Units	Active System

Solver Unit System	mks

TABLE 11
Model (B4) > Static Structural (B5) > Loads

Object Name	*Fixed Support*	*Force*
State	Fully Defined	
Scope		
Scoping Method	Geometry Selection	
Geometry	1 Face	
Definition		
Type	Fixed Support	Force
Suppressed	No	
Define By		Components
Coordinate System		Global Coordinate System
X Component		0. N (ramped)
Y Component		-3. N (ramped)
Z Component		0. N (ramped)

FIGURE 1
Model (B4) > Static Structural (B5) > Force



Solution (B6)

TABLE 12
Model (B4) > Static Structural (B5) > Solution

Object Name	*Solution (B6)*

State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	
Status	Done
MAPDL Elapsed Time	25. s
MAPDL Memory Used	298. MB
MAPDL Result File Size	5.125 MB
Post Processing	
Beam Section Results	No

TABLE 13
Model (B4) > Static Structural (B5) > Solution (B6) > 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 14
Model (B4) > Static Structural (B5) > Solution (B6) > Results

Object Name	*Total Deformation*	*Equivalent Elastic Strain*	*Equivalent Stress*
State	Solved		
Scope			
Scoping Method	Geometry Selection		
Geometry	All Bodies		
Definition			
Type	Total Deformation	Equivalent Elastic Strain	Equivalent (von-Mises) Stress
By	Time		
Display Time	Last		
Calculate Time History	Yes		
Identifier			
Suppressed	No		
Results			
Minimum	0. m	2.248e-009 m/m	0.43254 Pa

Maximum	8.4286e-003 m	7.2466e-004 m/m	7.9453e+005 Pa
Minimum Occurs On	Part 7		
Maximum Occurs On	Part 1	Part 2	
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 (B4) > Static Structural (B5) > Solution (B6) > Total Deformation

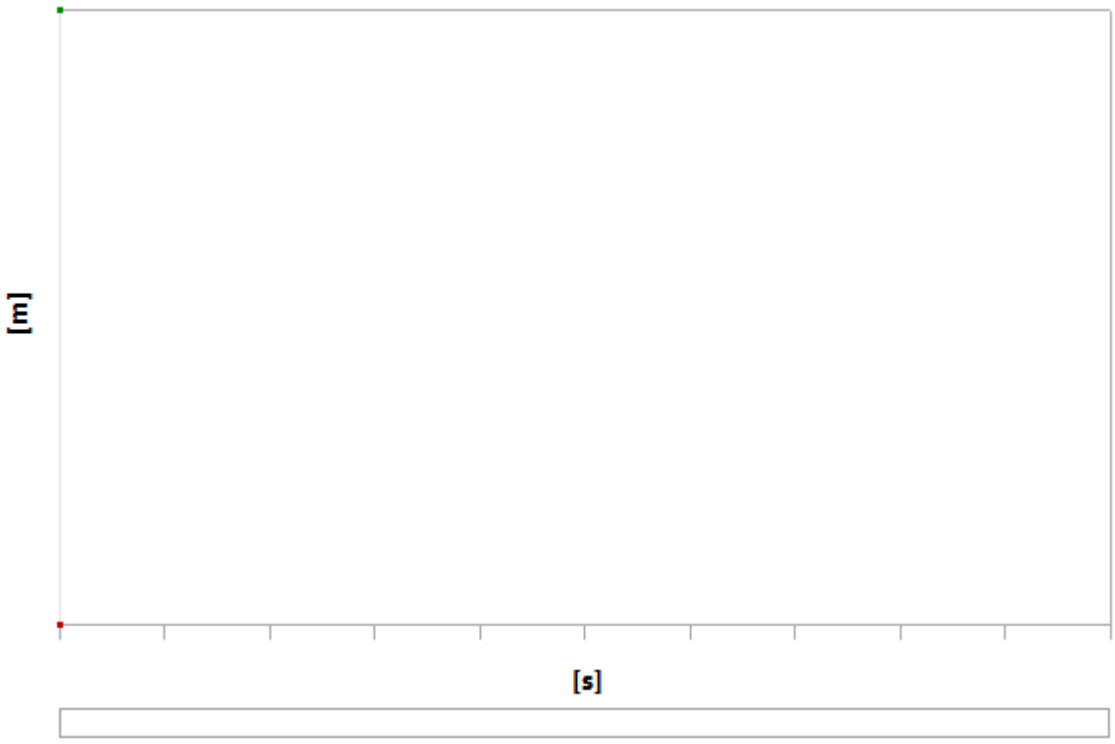


TABLE 15
Model (B4) > Static Structural (B5) > Solution (B6) > Total Deformation

Time [s]	Minimum [m]	Maximum [m]
1.	0.	8.4286e-003

FIGURE 3
Model (B4) > Static Structural (B5) > Solution (B6) > Total Deformation > Figure

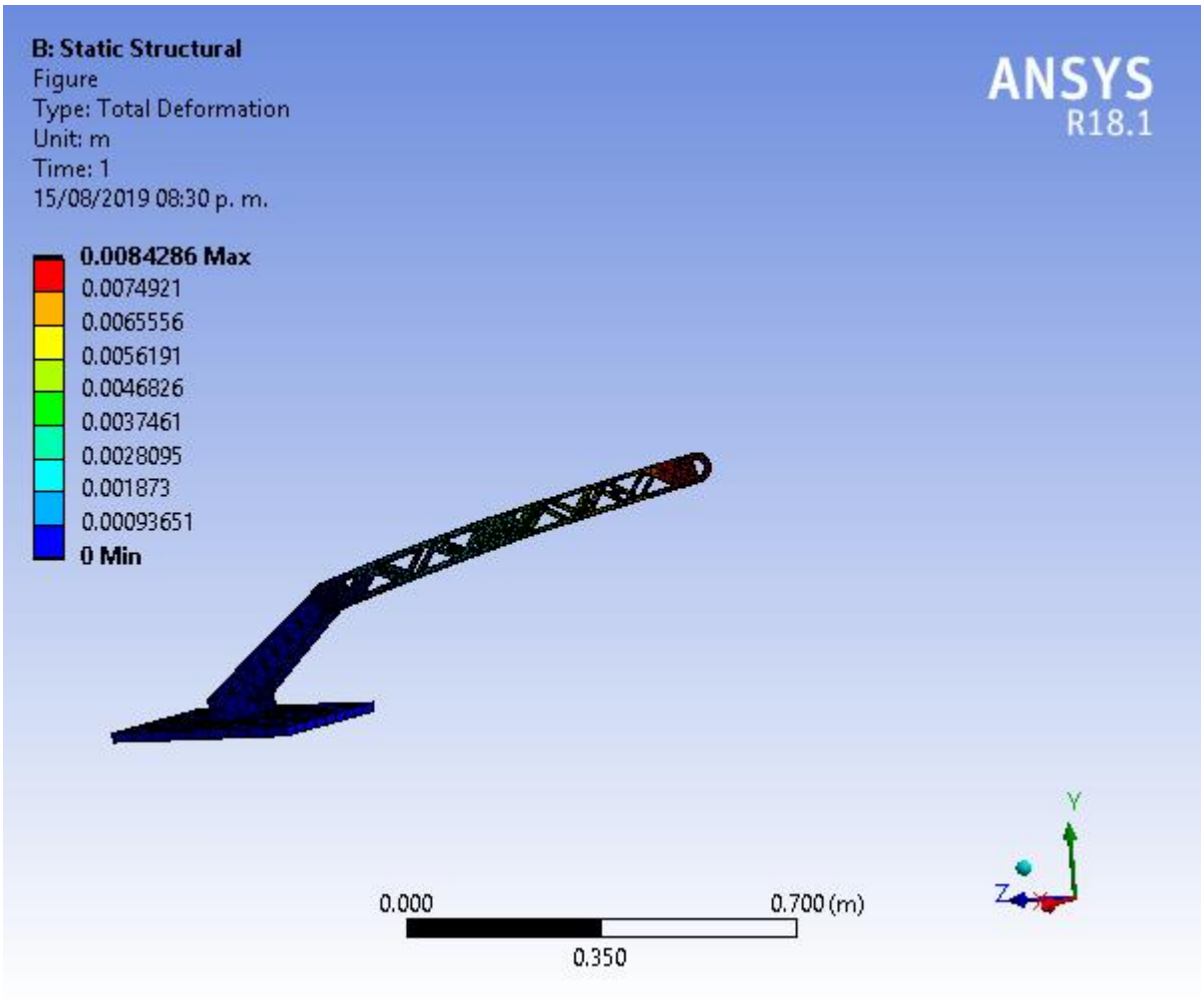


FIGURE 4
Model (B4) > Static Structural (B5) > Solution (B6) > Equivalent Elastic Strain

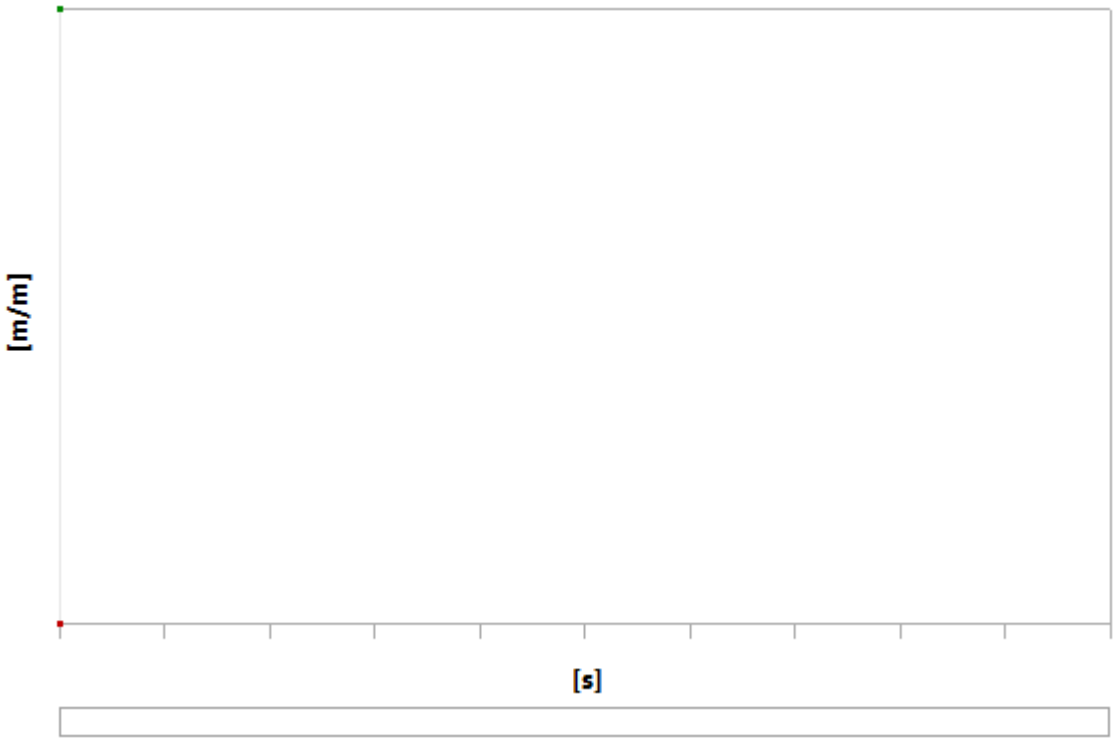


TABLE 16
Model (B4) > Static Structural (B5) > Solution (B6) > Equivalent Elastic Strain

Time [s]	Minimum [m/m]	Maximum [m/m]
1.	2.248e-009	7.2466e-004

FIGURE 5
Model (B4) > Static Structural (B5) > Solution (B6) > Equivalent Elastic Strain > Figure

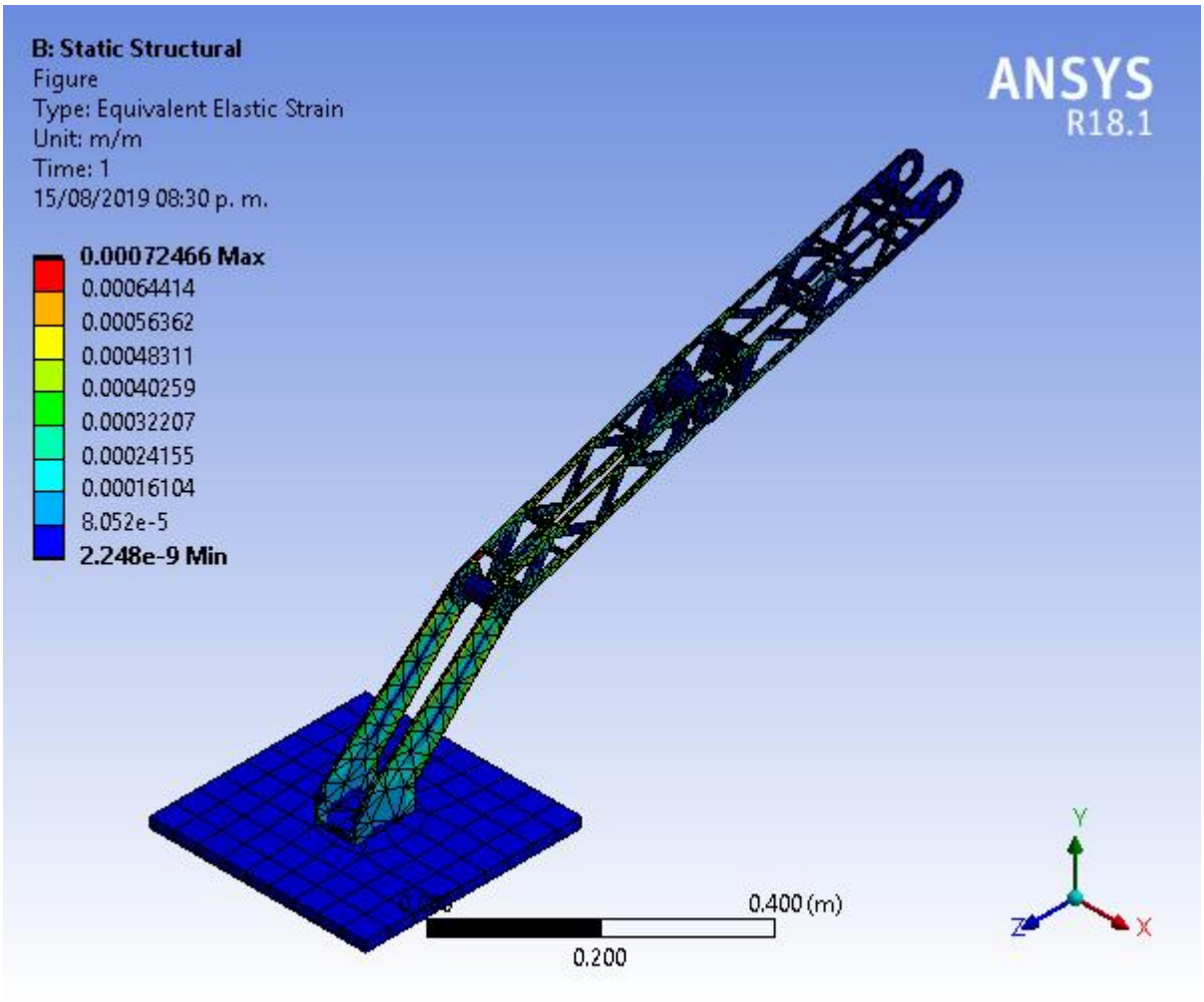


FIGURE 6
Model (B4) > Static Structural (B5) > Solution (B6) > Equivalent Stress

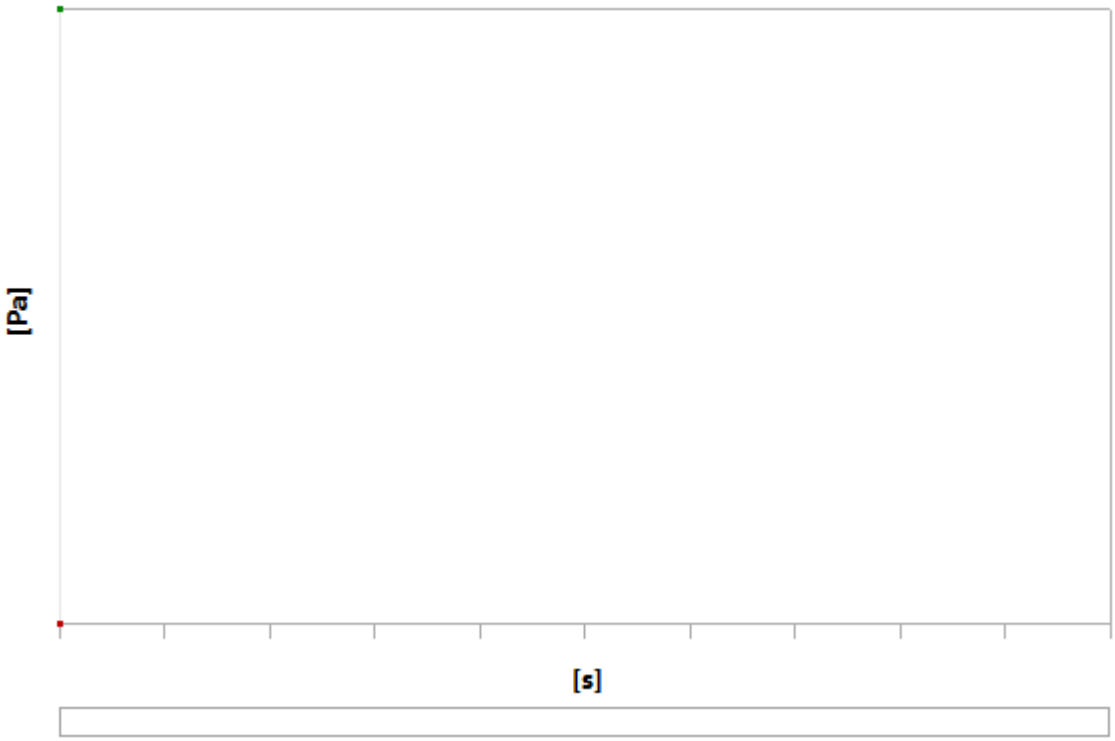
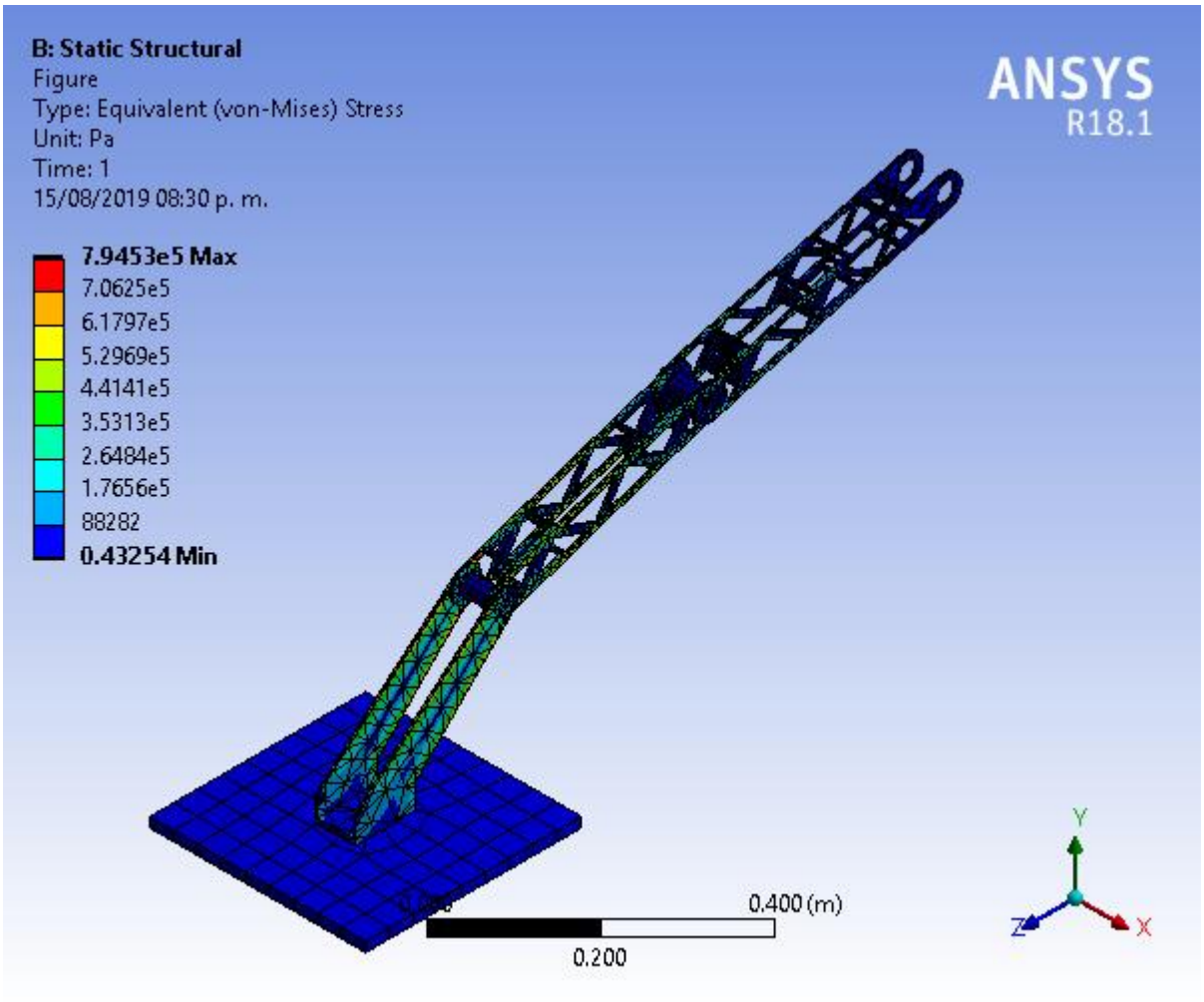


TABLE 17
Model (B4) > Static Structural (B5) > Solution (B6) > Equivalent Stress

Time [s]	Minimum [Pa]	Maximum [Pa]
1.	0.43254	7.9453e+005

FIGURE 7
Model (B4) > Static Structural (B5) > Solution (B6) > Equivalent Stress > Figure



Material Data

Polyethylene

TABLE 18
Polyethylene > Constants

Density	750 kg m^-3
Isotropic Secant Coefficient of Thermal Expansion	2.3e-004 C^-1
Specific Heat	2300 J kg^-1 C^-1
Isotropic Thermal Conductivity	0.28 W m^-1 C^-1

TABLE 19
Polyethylene > Appearance

Red	Green	Blue
229	143	100

TABLE 20
Polyethylene > Compressive Ultimate Strength

Compressive Ultimate Strength Pa

0

TABLE 21
Polyethylene > Compressive Yield Strength

Compressive Yield Strength Pa
0

TABLE 22
Polyethylene > Tensile Yield Strength

Tensile Yield Strength Pa
2.5e+007

TABLE 23
Polyethylene > Tensile Ultimate Strength

Tensile Ultimate Strength Pa
3.3e+007

TABLE 24
Polyethylene > Isotropic Secant Coefficient of Thermal Expansion

Zero-Thermal-Strain Reference Temperature C
22

TABLE 25
Polyethylene > Isotropic Elasticity

Temperature C	Young's Modulus Pa	Poisson's Ratio	Bulk Modulus Pa	Shear Modulus Pa
	1.1e+009	0.42	2.2917e+009	3.8732e+008