R3 Analysis Sector 1 with rear rod, 3.5 inch dia 0.5 inch thick carbon rods, 2.5 inch poly on end plates

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Subject	Sector 1 with corrected axis and corrected engineering data
Prepared for	Region 3 Drift Chamber Analysis
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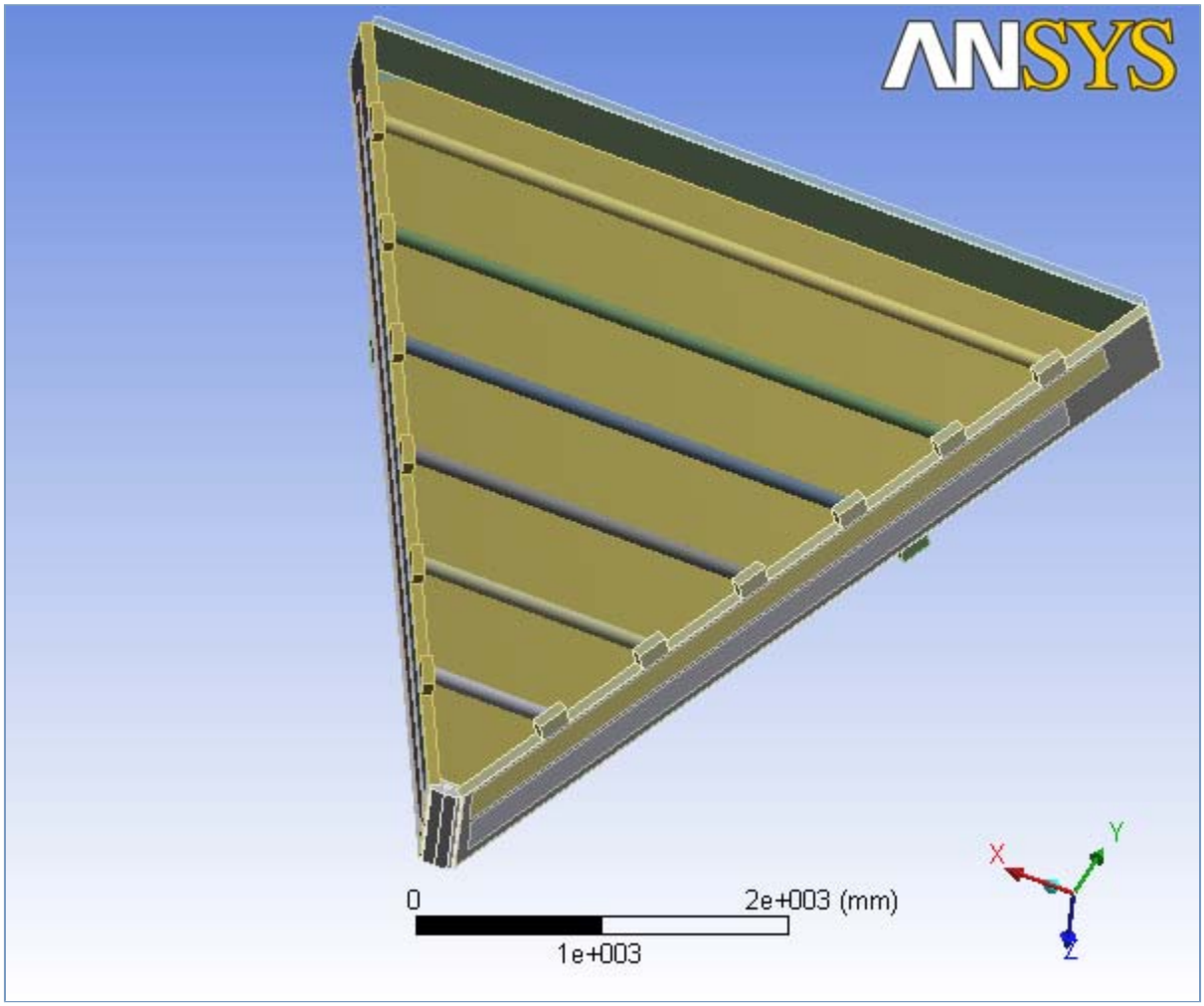

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  - Stainless steel
  - Carbon fiber
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Units

TABLE 1

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

Sector 1

Geometry

TABLE 2
Sector 1 > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Documents and Settings\Jinnuri\Desktop\website\Al slit\change of directions\2.agdb
Type	DesignModeler
Length Unit	Millimeters
Element Control	Program Controlled
Display Style	Part Color
Bounding Box	
Length X	4790.3 mm
Length Y	4080.2 mm

Length Z	1998.5 mm
Properties	
Volume	8.8246e+008 mm³
Mass	374.97 kg
Statistics	
Bodies	27
Active Bodies	27
Nodes	201556
Elements	74092
Preferences	
Import Solid Bodies	Yes
Import Surface Bodies	Yes
Import Line Bodies	Yes
Parameter Processing	Yes
Personal Parameter Key	DS
CAD Attribute Transfer	No
Named Selection Processing	No
Material Properties Transfer	No
CAD Associativity	Yes
Import Coordinate Systems	No
Reader Save Part File	No
Import Using Instances	Yes
Do Smart Update	No
Attach File Via Temp File	No
Analysis Type	3-D
Mixed Import Resolution	None
Enclosure and Symmetry Processing	Yes

TABLE 3
Sector 1 > Geometry > Parts

Object Name	*Nose Plate*	*Right End Plate Upstream Hole Area*	*Right End Plate Downstream Hole Area*	*Right End Plate Aluminum Casing*	*Right End Plate Polyurethane*
State	Meshed				
Graphics Properties					
Visible	Yes				
Transparency	1				
Definition					
Suppressed	No				
Material	Aluminum	Polyurethane		Aluminum	Polyurethane
Stiffness Behavior	Flexible				
Nonlinear Material Effects	Yes				
Coordinate System	Global Coordinate System				
Bounding Box					
Length X	180.6 mm	2127.2 mm	2009.1 mm	2349.8 mm	2338.5 mm
Length Y	94.006 mm	3621. mm	3416.4 mm	4006.5 mm	3986.9 mm
Length Z	532.95 mm	1531.7 mm	1457.6 mm	1984. mm	1957.6 mm
Properties					

Volume	6.6335e+006 mm³	5.1665e+007 mm³	4.973e+007 mm³	1.4592e+007 mm³	4.3763e+007 mm³
Mass	17.91 kg	12.4 kg	11.935 kg	39.397 kg	10.503 kg
Centroid X	-4.9797e-016 mm	-1133.7 mm	-1081.1 mm	-1183.6 mm	-1416. mm
Centroid Y	42.651 mm	1878.1 mm	1787.1 mm	1964.6 mm	2367.1 mm
Centroid Z	-266.72 mm	-1095.2 mm	-834.01 mm	-1169.5 mm	-1088.2 mm
Moment of Inertia Ip1	4.2744e+005 kg·mm²	1.9322e+007 kg·mm²	1.6513e+007 kg·mm²	7.1015e+007 kg·mm²	2.638e+007 kg·mm²
Moment of Inertia Ip2	4.4471e+005 kg·mm²	40819 kg·mm²	40835 kg·mm²	2.0232e+006 kg·mm²	2.8152e+005 kg·mm²
Moment of Inertia Ip3	43603 kg·mm²	1.9289e+007 kg·mm²	1.648e+007 kg·mm²	6.9018e+007 kg·mm²	2.6105e+007 kg·mm²
Statistics					
Nodes	819	2791	2541	2057	14587
Elements	366	1333	1173	731	6506

TABLE 4
Sector 1 > Geometry > Parts

Object Name	*Right End Plate Inner Steel Slice*	*Right End Plate Outer Steel Slice*	*Left End Plate Downstream Hole Area*	*Left End Plate Upstream Hole Area*	*Left End Plate Aluminum Casing*
State	Hidden		Meshed		
Graphics Properties					
Visible	No		Yes		
Transparency			1		
Definition					
Suppressed	No				
Material	Stainless steel		Polyurethane		Aluminum
Nonlinear Material Effects	Yes				
Coordinate System	Global Coordinate System				
Thickness	1.2192 mm				
Thickness Mode	Manual				
Stiffness Behavior			Flexible		
Bounding Box					
Length X	2294.8 mm		2170.7 mm	1984.8 mm	2349.9 mm
Length Y	3974.8 mm		3696.3 mm	3374.3 mm	4006.7 mm
Length Z	1984. mm		1562.8 mm	1437.5 mm	1983.2 mm
Properties					
Volume	2.9149e+006 mm³		5.3884e+007 mm³	4.8078e+007 mm³	1.4592e+007 mm³
Mass	23.319 kg		12.932 kg	11.539 kg	39.397 kg
Surface Area (approx.)	2.3908e+006 mm²				
Centroid X			1160. mm	1059.5 mm	1183.7 mm
Centroid Y			1923.8 mm	1749.7 mm	1964.7 mm
Centroid Z			-885.34 mm	-1046.1 mm	-1169. mm
Moment of Inertia Ip1			2.1e+007 kg·mm²	1.5574e+007 kg·mm²	7.0969e+007 kg·mm²
Moment of Inertia Ip2			44246 kg·mm²	37984 kg·mm²	2.0254e+006 kg·mm²

Moment of Inertia Ip3		2.0964e+007 kg·mm²	1.5544e+007 kg·mm²	6.897e+007 kg·mm²
Statistics				
Nodes	167	2833	2558	2036
Elements	122	1365	1212	716

TABLE 5
Sector 1 > Geometry > Parts

Object Name	*Left End Plate Polyurethane*	*Left End Plate Outer Steel Slice*	*Left End Plate Inner Steel Slice*	*Back Plate Aluminum Casing*	*Back Plate Polyurethane*
State	Meshed	Hidden		Meshed	
Graphics Properties					
Visible	Yes	No		Yes	
Transparency	1			1	
Definition					
Suppressed	No				
Material	Polyurethane	Stainless steel		Aluminum	Polyurethane
Stiffness Behavior	Flexible			Flexible	
Nonlinear Material Effects	Yes				
Coordinate System	Global Coordinate System				
Thickness		1.2192 mm			
Thickness Mode		Manual			
Bounding Box					
Length X	2338.6 mm	2294.9 mm		4678.4 mm	4655. mm
Length Y	3987.1 mm	3974.9 mm		185.06 mm	179.6 mm
Length Z	1956.7 mm	1983.2 mm		493.9 mm	474.66 mm
Properties					
Volume	4.3196e+007 mm³	2.9149e+006 mm³		5.1666e+006 mm³	1.1129e+008 mm³
Mass	10.367 kg	23.319 kg		13.95 kg	26.71 kg
Centroid X	1409. mm			1.8531e-002 mm	3.8297e-002 mm
Centroid Y	2355. mm			3988.7 mm	3988.1 mm
Centroid Z	-1102.4 mm			-1748. mm	-1750.2 mm
Moment of Inertia Ip1	2.5907e+007 kg·mm²			7.7888e+005 kg·mm²	5.1269e+005 kg·mm²
Moment of Inertia Ip2	2.9664e+005 kg·mm²			3.0062e+007 kg·mm²	4.7337e+007 kg·mm²
Moment of Inertia Ip3	2.5618e+007 kg·mm²			2.9289e+007 kg·mm²	4.6836e+007 kg·mm²
Surface Area (approx.)		2.3908e+006 mm²			
Statistics					
Nodes	14287	170	180	684	7485
Elements	6369	125	135	62	3598

TABLE 6
Sector 1 > Geometry > Parts

Object Name	*Back Plate Inner Steel Slice*	*Back Plate Outer Steel Slice*	*Rod 6*	*Rod 1*	*Rod 2*
State	Hidden		Meshed		

Graphics Properties				
Visible	No	Yes		
Transparency		1		
Definition				
Suppressed	No			
Material	Stainless steel	Carbon fiber		
Nonlinear Material Effects	Yes			
Coordinate System	Global Coordinate System			
Thickness	1.2192 mm			
Thickness Mode	Manual			
Stiffness Behavior		Flexible		
Bounding Box				
Length X	4678.4 mm	3946.2 mm	734.86 mm	1377.1 mm
Length Y	136.19 mm	88.9 mm		
Length Z	480.03 mm	88.9 mm		
Properties				
Volume	2.7943e+006 mm³	6.4132e+006 mm³	1.126e+006 mm³	2.183e+006 mm³
Mass	22.354 kg	3.7196 kg	0.65307 kg	1.2662 kg
Surface Area (approx.)	2.2919e+006 mm²			
Centroid X		2.8607e-009 mm	1.1718e-011 mm	-1.7591e-011 mm
Centroid Y		3351.3 mm	571.43 mm	1127. mm
Centroid Z		-1839.9 mm	-783.5 mm	-994.79 mm
Moment of Inertia Ip1		6226.6 kg·mm²	1091.5 kg·mm²	2118.9 kg·mm²
Moment of Inertia Ip2		4.6519e+006 kg·mm²	25849 kg·mm²	1.8473e+005 kg·mm²
Moment of Inertia Ip3		4.6519e+006 kg·mm²	25851 kg·mm²	1.8473e+005 kg·mm²
Statistics				
Nodes	169	173	19582	14794	11484
Elements	124	128	4048	2220	1780

TABLE 7
Sector 1 > Geometry > Parts

Object Name	*Rod 3*	*Rod 4*	*Rod 5*	*Hexcel*	*Hexcel Outer Carbon Fiber Slice*
State	Meshed				
Graphics Properties					
Visible	Yes				
Transparency	1				
Definition					
Suppressed	No				
Material	Carbon fiber			Hexcel	Carbon fiber
Stiffness Behavior	Flexible				
Nonlinear Material Effects	Yes				
Coordinate System	Global Coordinate System				

Thickness					0.254 mm
Thickness Mode					Manual
Bounding Box					
Length X	2019.4 mm	2661.7 mm	3303.9 mm	4681.3 mm	4665.4 mm
Length Y	88.9 mm			3974.6 mm	3960.1 mm
Length Z	88.9 mm			1540.7 mm	1504.3 mm
Properties					
Volume	3.2406e+006 mm³	4.2981e+006 mm³	5.3556e+006 mm³	3.9039e+008 mm³	2.5598e+006 mm³
Mass	1.8795 kg	2.4929 kg	3.1063 kg	11.255 kg	1.4847 kg
Centroid X	-8.2126e-010 mm	8.2949e-010 mm	-5.138e-010 mm	-2.9966e-013 mm	
Centroid Y	1682.9 mm	2239. mm	2795.2 mm	2677.4 mm	
Centroid Z	-1206.1 mm	-1417.4 mm	-1628.7 mm	-1023.1 mm	
Moment of Inertia Ip1	3145.9 kg·mm²	4172.9 kg·mm²	5199.7 kg·mm²	1.1686e+007 kg·mm²	
Moment of Inertia Ip2	6.0173e+005 kg·mm²	1.4019e+006 kg·mm²	2.7103e+006 kg·mm²	1.0248e+007 kg·mm²	
Moment of Inertia Ip3	6.0174e+005 kg·mm²	1.4019e+006 kg·mm²	2.7103e+006 kg·mm²	2.1931e+007 kg·mm²	
Surface Area (approx.)					1.0078e+007 mm²
Statistics					
Nodes	8714	8246	8380	20494	363
Elements	1316	1260	1190	9809	310

TABLE 8
Sector 1 > Geometry > Parts

Object Name	*Hexcel Inner Carbon Fiber Slice*	*back slit*
State	Meshed	
Graphics Properties		
Visible	Yes	
Transparency	1	
Definition		
Suppressed	No	
Material	Carbon fiber	
Nonlinear Material Effects	Yes	
Coordinate System	Global Coordinate System	
Thickness	0.254 mm	
Thickness Mode	Manual	
Stiffness Behavior		Flexible
Bounding Box		
Length X	4665.4 mm	3295.4 mm
Length Y	3960.9 mm	209.64 mm
Length Z	1504.6 mm	167.2 mm
Properties		
Volume	2.5599e+006 mm³	4.491e+006 mm³
Mass	1.4847 kg	2.6048 kg
Surface Area(approx.)	1.0078e+007 mm²	
Centroid X		94.462 mm
Centroid Y		2638.5 mm
Centroid Z		-918.28 mm

Moment of Inertia Ip1		6808.3 kg·mm²
Moment of Inertia Ip2		4.3385e+006 kg·mm²
Moment of Inertia Ip3		4.34e+006 kg·mm²
Statistics		
Nodes	344	55451
Elements	291	27681

Coordinate Systems

TABLE 9
Sector 1 > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
Definition	
Type	Cartesian
Ansys System Number	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 10
Sector 1 > Connections

Object Name	*Connections*
State	Fully Defined
Auto Detection	
Generate Contact On Update	Yes
Tolerance Type	Slider
Tolerance Slider	0.
Tolerance Value	16.505 mm
Face/Face	Yes
Face/Edge	No
Edge/Edge	No
Priority	Include All
Same Body Grouping	Yes
Revolute Joints	Yes
Fixed Joints	Yes
Transparency	
Enabled	Yes

TABLE 11
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Nose Plate To Right End Plate*	*Bonded - Nose Plate To Right End Plate Inner*	*Bonded - Nose Plate To Left End Plate Aluminum*	*Bonded - Nose Plate To Left End Plate Inner*	*Bonded - Right End Plate Upstream Hole Area To Right End*

	Aluminum Casing	*Steel Slice*	*Casing*	*Steel Slice*	*Plate Polyurethane*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	2 Faces	1 Face	2 Faces	1 Face	4 Faces
Target	2 Faces	1 Face	2 Faces	1 Face	4 Faces
Contact Bodies	Nose Plate				Right End Plate Upstream Hole Area
Target Bodies	Right End Plate Aluminum Casing	Right End Plate Inner Steel Slice	Left End Plate Aluminum Casing	Left End Plate Inner Steel Slice	Right End Plate Polyurethane
Definition					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

TABLE 12
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Right End Plate Upstream Hole Area To Right End Plate Inner Steel Slice*	*Bonded - Right End Plate Upstream Hole Area To Right End Plate Outer Steel Slice*	*Bonded - Right End Plate Downstream Hole Area To Right End Plate Polyurethane*	*Bonded - Right End Plate Downstream Hole Area To Right End Plate Inner Steel Slice*	*Bonded - Right End Plate Downstream Hole Area To Right End Plate Outer Steel Slice*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Face		4 Faces	1 Face	
Target	1 Face		4 Faces	1 Face	
Contact Bodies	Right End Plate Upstream Hole Area		Right End Plate Downstream Hole Area		
Target Bodies	Right End Plate Inner Steel Slice	Right End Plate Outer Steel Slice	Right End Plate Polyurethane	Right End Plate Inner Steel Slice	Right End Plate Outer Steel Slice
Definition					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				

Normal Stiffness	Program Controlled
Update Stiffness	Never
Thermal Conductance	Program Controlled
Pinball Region	Program Controlled

TABLE 13
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Right End Plate Aluminum Casing To Right End Plate Polyurethane*	*Bonded - Right End Plate Aluminum Casing To Right End Plate Inner Steel Slice*	*Bonded - Right End Plate Aluminum Casing To Right End Plate Outer Steel Slice*	*Bonded - Right End Plate Polyurethane To Right End Plate Inner Steel Slice*	*Bonded - Right End Plate Polyurethane To Right End Plate Outer Steel Slice*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	4 Faces	1 Face			
Target	4 Faces	1 Face			
Contact Bodies	Right End Plate Aluminum Casing			Right End Plate Polyurethane	
Target Bodies	Right End Plate Polyurethane	Right End Plate Inner Steel Slice	Right End Plate Outer Steel Slice	Right End Plate Inner Steel Slice	Right End Plate Outer Steel Slice
Definition					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

TABLE 14
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Left End Plate Downstream Hole Area To Left End Plate Polyurethane*	*Bonded - Left End Plate Downstream Hole Area To Left End Plate Outer Steel Slice*	*Bonded - Left End Plate Downstream Hole Area To Left End Plate Inner Steel Slice*	*Bonded - Left End Plate Upstream Hole Area To Left End Plate Polyurethane*	*Bonded - Left End Plate Upstream Hole Area To Left End Plate Outer Steel Slice*
State	Fully Defined				
Scope					
Scoping	Geometry Selection				

Method					
Contact	4 Faces	1 Face		4 Faces	1 Face
Target	4 Faces	1 Face		4 Faces	1 Face
Contact Bodies	Left End Plate Downstream Hole Area			Left End Plate Upstream Hole Area	
Target Bodies	Left End Plate Polyurethane	Left End Plate Outer Steel Slice	Left End Plate Inner Steel Slice	Left End Plate Polyurethane	Left End Plate Outer Steel Slice
Definition					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

TABLE 15
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Left End Plate Upstream Hole Area To Left End Plate Inner Steel Slice*	*Bonded - Left End Plate Aluminum Casing To Left End Plate Polyurethane*	*Bonded - Left End Plate Aluminum Casing To Left End Plate Outer Steel Slice*	*Bonded - Left End Plate Aluminum Casing To Left End Plate Inner Steel Slice*	*Bonded - Left End Plate Polyurethane To Left End Plate Outer Steel Slice*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Face	4 Faces	1 Face		
Target	1 Face	4 Faces	1 Face		
Contact Bodies	Left End Plate Upstream Hole Area	Left End Plate Aluminum Casing			Left End Plate Polyurethane
Target Bodies	Left End Plate Inner Steel Slice	Left End Plate Polyurethane	Left End Plate Outer Steel Slice	Left End Plate Inner Steel Slice	Left End Plate Outer Steel Slice
Definition					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				

Thermal Conductance	Program Controlled
Pinball Region	Program Controlled

TABLE 16
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Left End Plate Polyurethane To Left End Plate Inner Steel Slice*	*Bonded - Back Plate Aluminum Casing To Back Plate Polyurethane*	*Bonded - Back Plate Polyurethane To Back Plate Inner Steel Slice*	*Bonded - Back Plate Polyurethane To Back Plate Outer Steel Slice*	*Bonded - Back Plate Aluminum Casing To Right End Plate Aluminum Casing*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Face	4 Faces	1 Face	3 Faces	1 Edge
Target	1 Face	4 Faces	1 Face		1 Edge
Contact Bodies	Left End Plate Polyurethane	Back Plate Aluminum Casing	Back Plate Polyurethane		Back Plate Aluminum Casing
Target Bodies	Left End Plate Inner Steel Slice	Back Plate Polyurethane	Back Plate Inner Steel Slice	Back Plate Outer Steel Slice	Right End Plate Aluminum Casing
Definition					
Type	Bonded				
Scope Mode	Automatic				Manual
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				Radius
Pinball Radius					20. mm

TABLE 17
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Back Plate Aluminum Casing To Left End Plate Aluminum Casing*	*Bonded - Right End Plate Aluminum Casing To Rod 6*	*Bonded - Left End Plate Aluminum Casing To Rod 6*	*Bonded - Back Plate Aluminum Casing To Back Plate Inner Steel Slice*	*Bonded - Back Plate Aluminum Casing To Back Plate Outer Steel Slice*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				

Contact	1 Edge	1 Face			
Target	1 Edge	1 Face			
Contact Bodies	Back Plate Aluminum Casing	Right End Plate Aluminum Casing	Left End Plate Aluminum Casing	Back Plate Aluminum Casing	
Target Bodies	Left End Plate Aluminum Casing	Rod 6		Back Plate Inner Steel Slice	Back Plate Outer Steel Slice
Definition					
Type	Bonded				
Scope Mode	Manual	Automatic			
Suppressed	No				
Behavior		Symmetric			
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Radius	Program Controlled			
Pinball Radius	20. mm				

TABLE 18
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Nose Plate To Right End Plate Polyurethane*	*Bonded - Nose Plate To Left End Plate Polyurethane*	*Bonded - Right End Plate Aluminum Casing To Rod 1*	*Bonded - Right End Plate Aluminum Casing To Rod 2*	*Bonded - Right End Plate Aluminum Casing To Rod 3*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	2 Faces		1 Face		
Target	2 Faces		1 Face		
Contact Bodies	Nose Plate		Right End Plate Aluminum Casing		
Target Bodies	Right End Plate Polyurethane	Left End Plate Polyurethane	Rod 1	Rod 2	Rod 3
Definition					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

TABLE 19
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Right End Plate Aluminum Casing To Rod 4*	*Bonded - Right End Plate Aluminum Casing To Rod 5*	*Bonded - Left End Plate Aluminum Casing To Rod 1*	*Bonded - Left End Plate Aluminum Casing To Rod 2*	*Bonded - Left End Plate Aluminum Casing To Rod 3*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Face				
Target	1 Face				
Contact Bodies	Right End Plate Aluminum Casing		Left End Plate Aluminum Casing		
Target Bodies	Rod 4	Rod 5	Rod 1	Rod 2	Rod 3
Definition					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

TABLE 20
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Left End Plate Aluminum Casing To Rod 4*	*Bonded - Left End Plate Aluminum Casing To Rod 5*	*Bonded - Right End Plate Inner Steel Slice To Hexcel*	*Bonded - Left End Plate Aluminum Casing To Hexcel*	*Bonded - Back Plate Aluminum Casing To Hexcel*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Face				1 Edge
Target	1 Face				1 Edge
Contact Bodies	Left End Plate Aluminum Casing		Right End Plate Inner Steel Slice	Left End Plate Aluminum Casing	Back Plate Aluminum Casing
Target Bodies	Rod 4	Rod 5	Hexcel		
Definition					
Type	Bonded				
Scope Mode	Automatic		Manual		
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal	Program Controlled				

Stiffness			
Update Stiffness	Never		
Thermal Conductance	Program Controlled		
Pinball Region	Program Controlled	Radius	Program Controlled
Pinball Radius		5. mm	

TABLE 21
Sector 1 > Connections > Contact Regions

Object Name	*Bonded - Left End Plate Aluminum Casing To Hexcel*	*Bonded - Right End Plate Polyurethane To Right End Plate Outer Steel Slice*	*Bonded - Back Plate Polyurethane To Back Plate Outer Steel Slice*	*Bonded - Hexcel Inner Carbon Fiber Slice To Hexcel*	*Bonded - Hexcel Outer Carbon Fiber Slice To Hexcel*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Edge	1 Face			
Target	1 Edge	1 Face			
Contact Bodies	Left End Plate Aluminum Casing	Right End Plate Polyurethane	Back Plate Polyurethane	Hexcel Inner Carbon Fiber Slice	Hexcel Outer Carbon Fiber Slice
Target Bodies	Hexcel	Right End Plate Outer Steel Slice	Back Plate Outer Steel Slice	Hexcel	
Definition					
Type	Bonded				
Scope Mode	Manual				
Suppressed	No				
Behavior		Symmetric			
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

TABLE 22
Sector 1 > Connections > Contact Regions

Object Name	*Contact Region 56*	*Contact Region 57*	*Contact Region 58*	*Contact Region 59*	*Contact Region 60*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Face				
Target	1 Face				
Contact Bodies	Right End Plate Aluminum Casing	Right End Plate Polyurethane	Right End Plate Inner Steel Slice	Left End Plate Aluminum Casing	Left End Plate Polyurethane

Target Bodies	Hexcel
Definition	
Type	Bonded
Scope Mode	Automatic
Behavior	Symmetric
Suppressed	No
Advanced	
Formulation	Pure Penalty
Normal Stiffness	Program Controlled
Update Stiffness	Never
Thermal Conductance	Program Controlled
Pinball Region	Program Controlled

TABLE 23
Sector 1 > Connections > Contact Regions

Object Name	*Contact Region 61*	*Contact Region 62*	*Contact Region 63*	*Contact Region 64*	*Contact Region 65*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Face	2 Faces	1 Face		
Target	1 Face	2 Faces	1 Face		
Contact Bodies	Left End Plate Inner Steel Slice	Back Plate Aluminum Casing	Back Plate Polyurethane	Back Plate Inner Steel Slice	Hexcel
Target Bodies	Hexcel				Hexcel Outer Carbon Fiber Slice
Definition					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

TABLE 24
Sector 1 > Connections > Contact Regions

Object Name	*Contact Region 66*	*Contact Region 67*	*Contact Region 68*	*Contact Region 69*	*Contact Region 71*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Face				
Target	1 Face				

Contact Bodies	Hexcel	Hexcel Outer Carbon Fiber Slice	Right End Plate Aluminum Casing	Right End Plate Polyurethane	Left End Plate Aluminum Casing
Target Bodies	Hexcel Inner Carbon Fiber Slice		back slit		
Definition					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

TABLE 25
Sector 1 > Connections > Contact Regions

Object Name	*Contact Region 72*	*Contact Region 74*	*Contact Region 75*	*Contact Region 76*	*Bonded - Back Plate Aluminum Casing To Left End Plate Aluminum Casing*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Contact	1 Face				1 Edge
Target	1 Face				1 Edge
Contact Bodies	Left End Plate Polyurethane	Nose Plate		Left End Plate Outer Steel Slice	Back Plate Aluminum Casing
Target Bodies	back slit	Right End Plate Outer Steel Slice	Left End Plate Outer Steel Slice	back slit	Left End Plate Aluminum Casing
Definition					
Type	Bonded				
Scope Mode	Automatic				Manual
Behavior	Symmetric				
Suppressed	No				
Advanced					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

Mesh

TABLE 26

Sector 1 > Mesh

Object Name	*Mesh*
State	Solved
Defaults	
Physics Preference	Mechanical
Relevance	-35
Advanced	
Relevance Center	Coarse
Element Size	Default
Shape Checking	Standard Mechanical
Solid Element Midside Nodes	Program Controlled
Straight Sided Elements	No
Initial Size Seed	Active Assembly
Smoothing	Low
Transition	Fast
Statistics	
Nodes	201556
Elements	74092

TABLE 27
Sector 1 > Mesh > Mesh Controls

Object Name	*Refinement 2*	*Refinement 4*	*Refinement*	*Refinement 5*
State	Fully Defined			
Scope				
Scoping Method	Geometry Selection			
Geometry	6 Faces	2 Faces	6 Faces	2 Faces
Definition				
Suppressed	No			
Refinement	1			

Static Structural

TABLE 28
Sector 1 > Analysis

Object Name	*Static Structural*
State	Fully Defined
Definition	
Physics Type	Structural
Analysis Type	Static Structural
Options	
Reference Temp	22. °C

TABLE 29
Sector 1 > Static Structural > 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	Direct
Weak Springs	Program Controlled
Large Deflection	Off
Inertia Relief	Off
Nonlinear Controls	
Force Convergence	Program Controlled
Moment Convergence	Program Controlled
Displacement Convergence	Program Controlled
Rotation Convergence	Program Controlled
Line Search	Program Controlled
Output Controls	
Calculate Stress	Yes
Calculate Strain	Yes
Calculate Results At	All Time Points
Analysis Data Management	
Solver Files Directory	C:\Documents and Settings\Jinnuri\Desktop\website\Al slit\change of directions\2 Simulation Files\Static Structural\
Future Analysis	None
Save ANSYS db	No
Delete Unneeded Files	Yes
Nonlinear Solution	No

FIGURE 1
Sector 1 > Static Structural > Figure

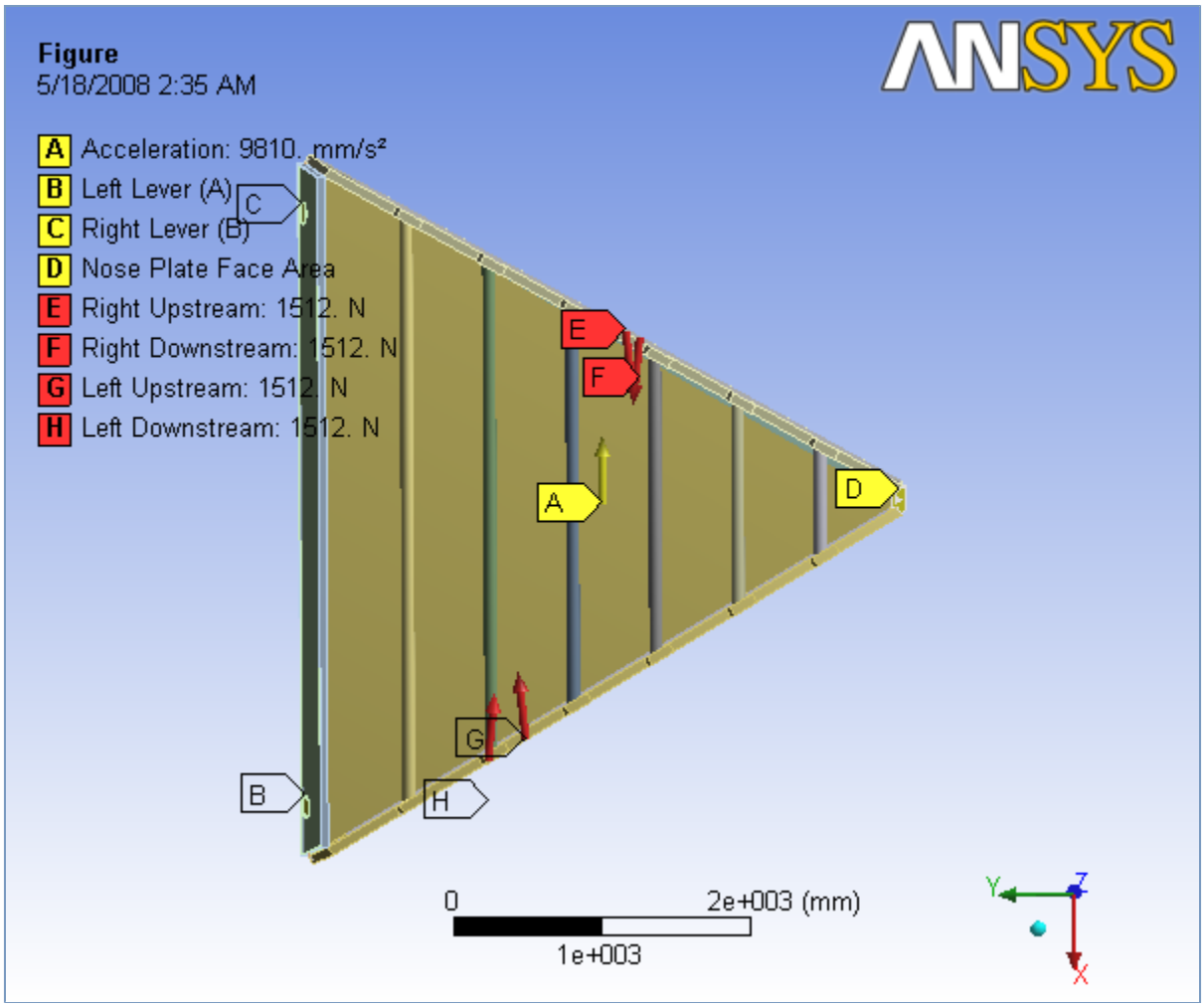


TABLE 30
Sector 1 > Static Structural > Accelerations

Object Name	*Acceleration*
State	Fully Defined
Scope	
Geometry	All Bodies
Definition	
Define By	Vector
Magnitude	9810. mm/s² (ramped)
Direction	Defined
Suppressed	No

FIGURE 2
Sector 1 > Static Structural > Acceleration

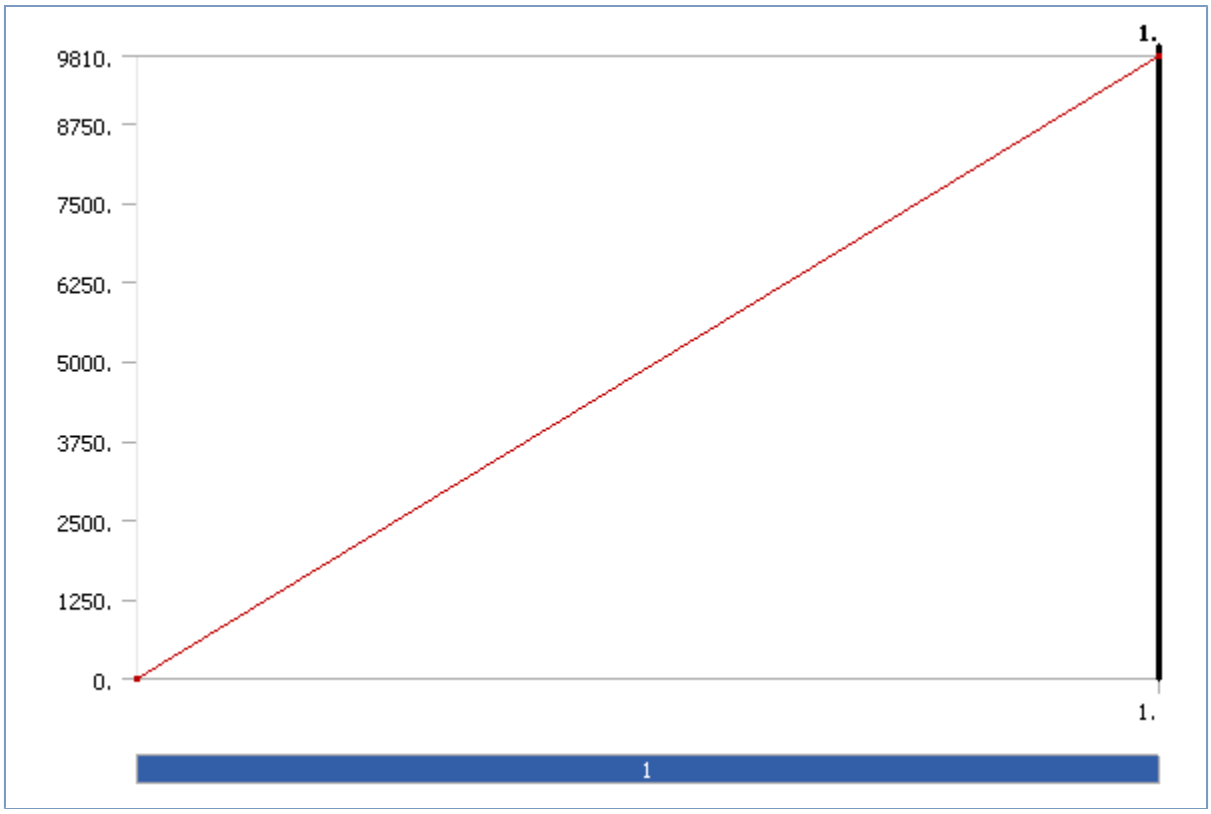


TABLE 31
Sector 1 > Static Structural > Loads

Object Name	*Left Lever (A)*	*Right Lever (B)*	*Nose Plate Face Area*	*Right Upstream*	*Right Downstream*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Geometry	1 Face				
Definition					
Define By	Components				
Type	Displacement			Force	
Coordinate System	Global Coordinate System				
X Component	Free	0. mm (ramped)		1503.7 N (ramped)	
Y Component	0. mm (ramped)	Free		-158.05 N (ramped)	158.05 N (ramped)
Z Component	0. mm (ramped)			0. N (ramped)	
Suppressed	No				

FIGURE 3
Sector 1 > Static Structural > Left Lever (A)

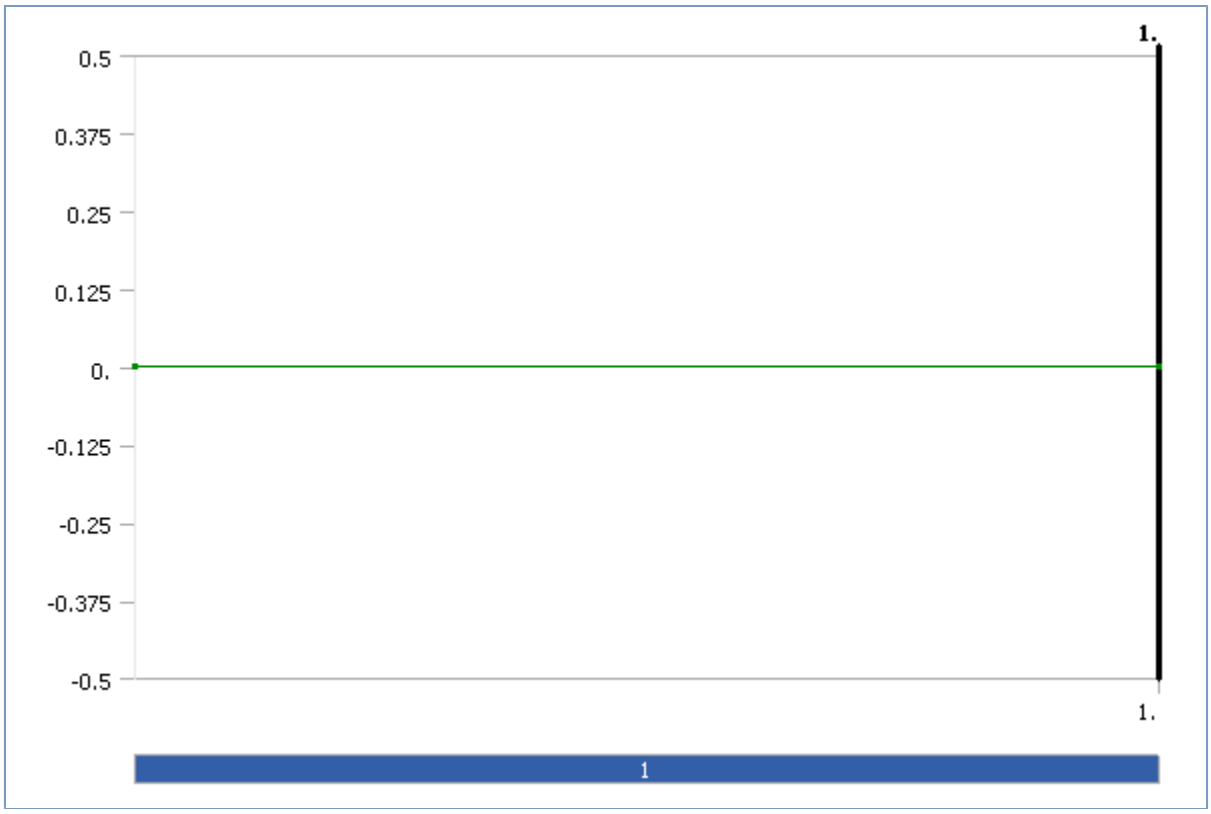


FIGURE 4
Sector 1 > Static Structural > Right Lever (B)

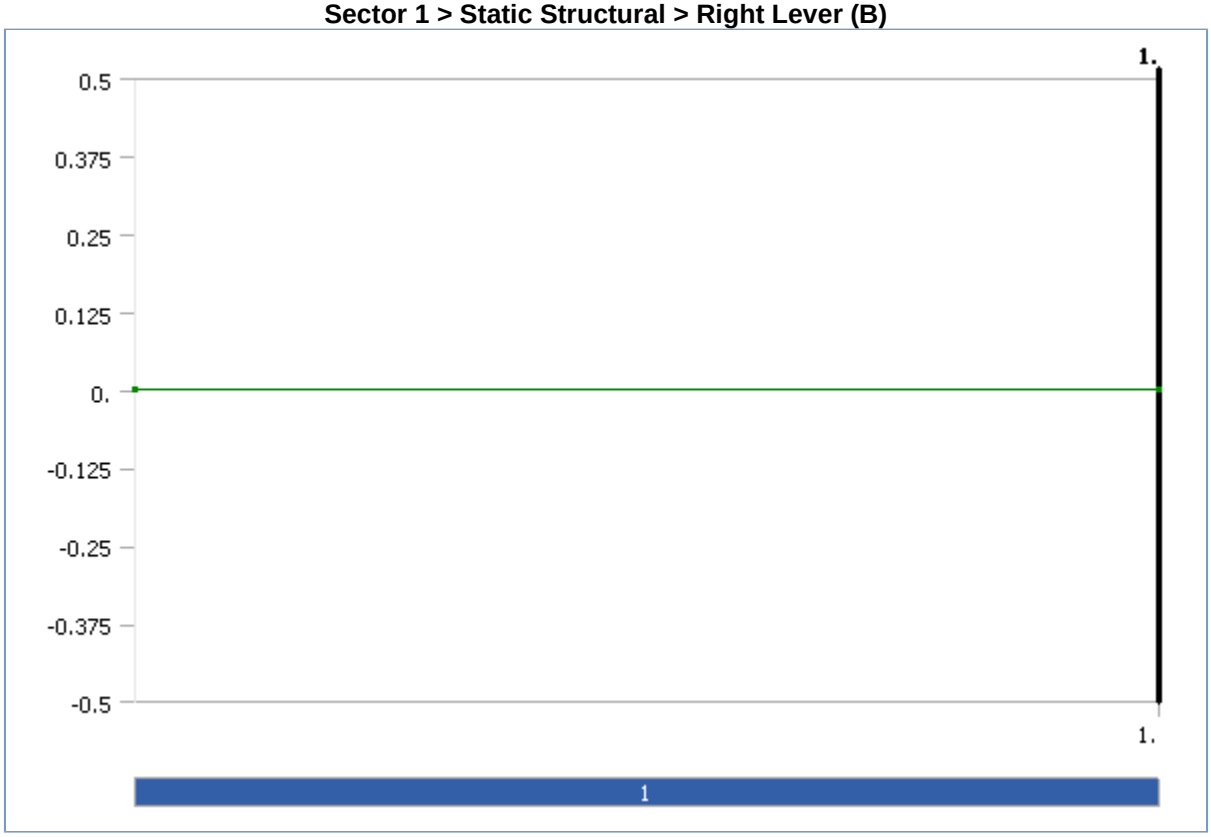


FIGURE 5
Sector 1 > Static Structural > Nose Plate Face Area

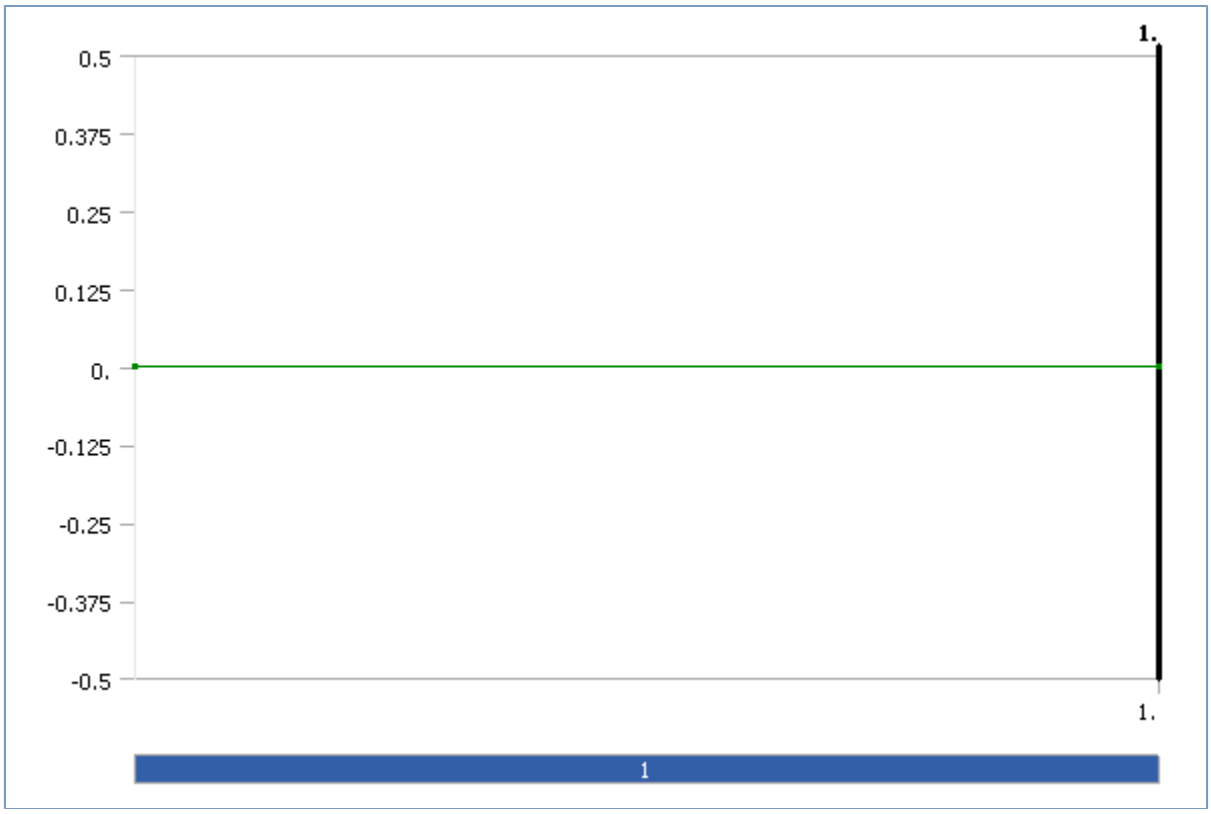


FIGURE 6
Sector 1 > Static Structural > Right Upstream

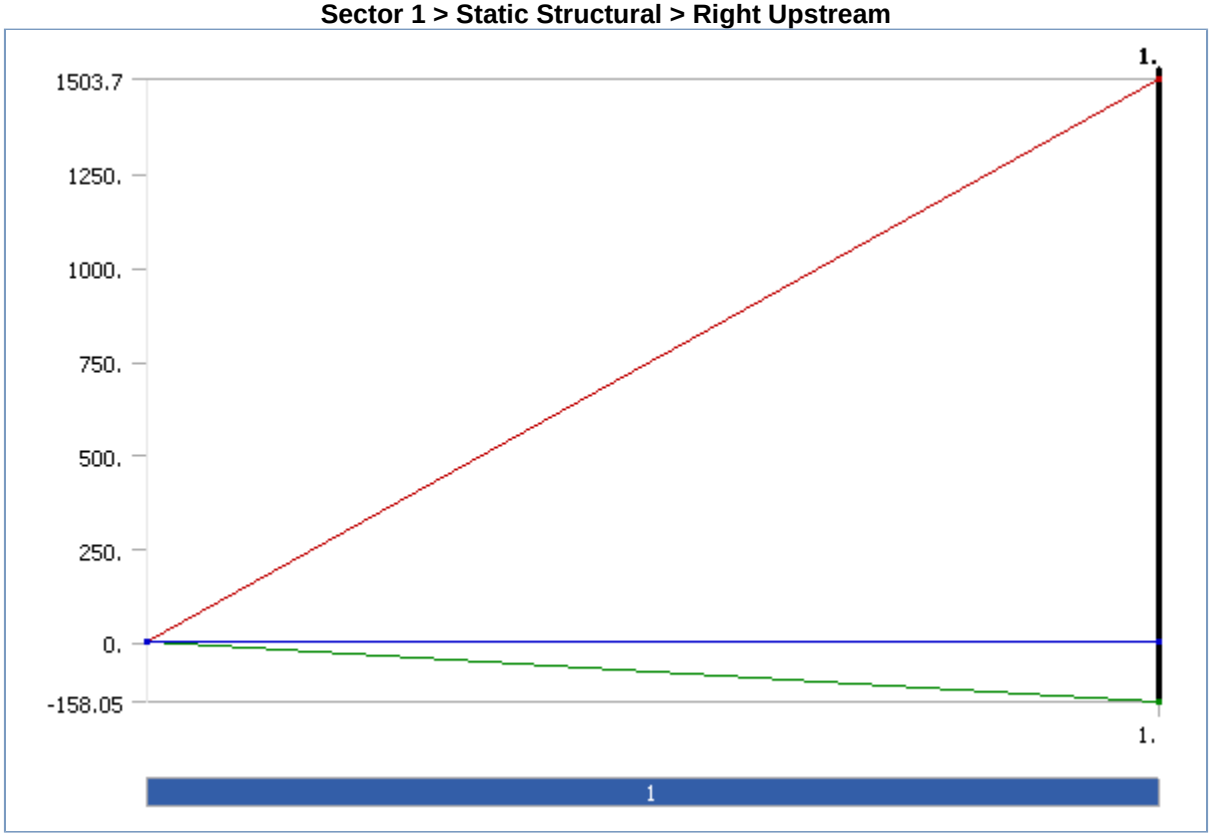


FIGURE 7
Sector 1 > Static Structural > Right Downstream

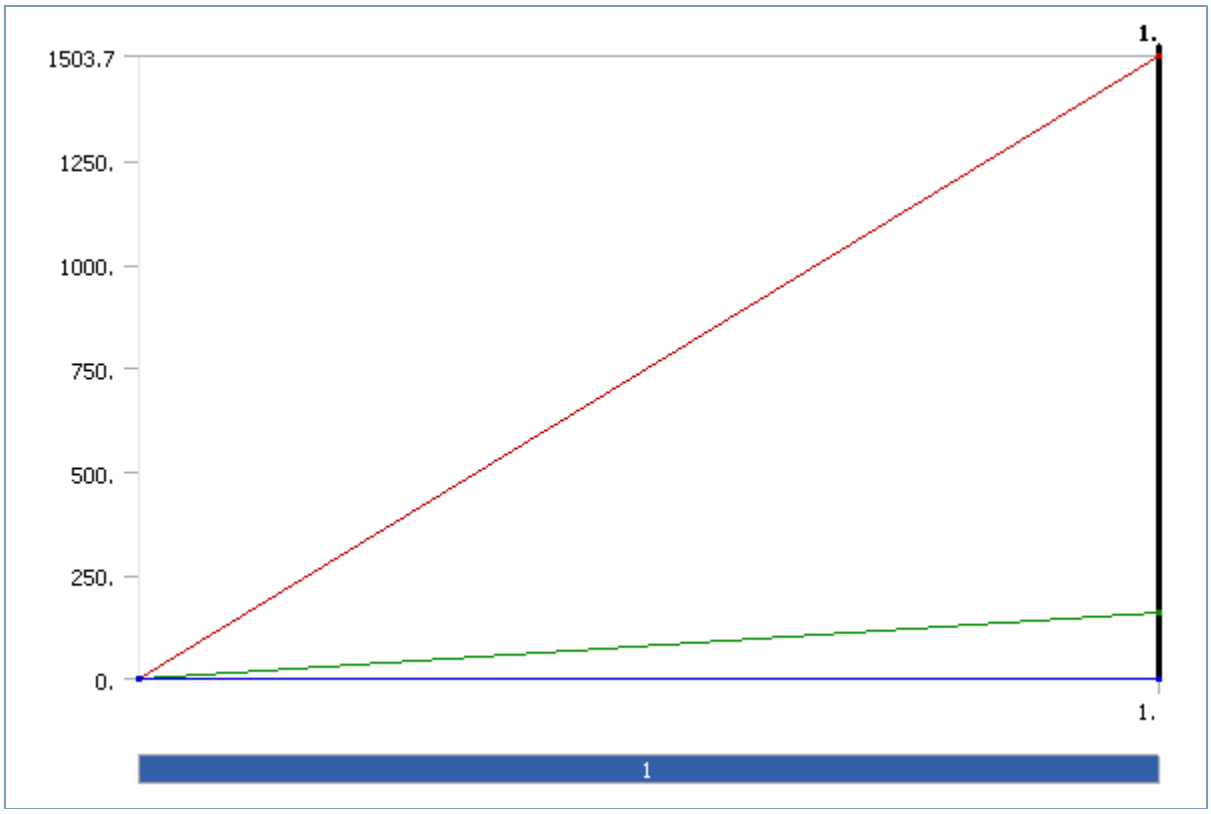


TABLE 32
Sector 1 > Static Structural > Loads

Object Name	*Left Upstream*	*Left Downstream*
State	Fully Defined	
Scope		
Scoping Method	Geometry Selection	
Geometry	1 Face	
Definition		
Define By	Components	
Type	Force	
Coordinate System	Global Coordinate System	
X Component	-1503.7 N (ramped)	
Y Component	158.05 N (ramped)	-158.05 N (ramped)
Z Component	0. N (ramped)	
Suppressed	No	

FIGURE 8
Sector 1 > Static Structural > Left Upstream

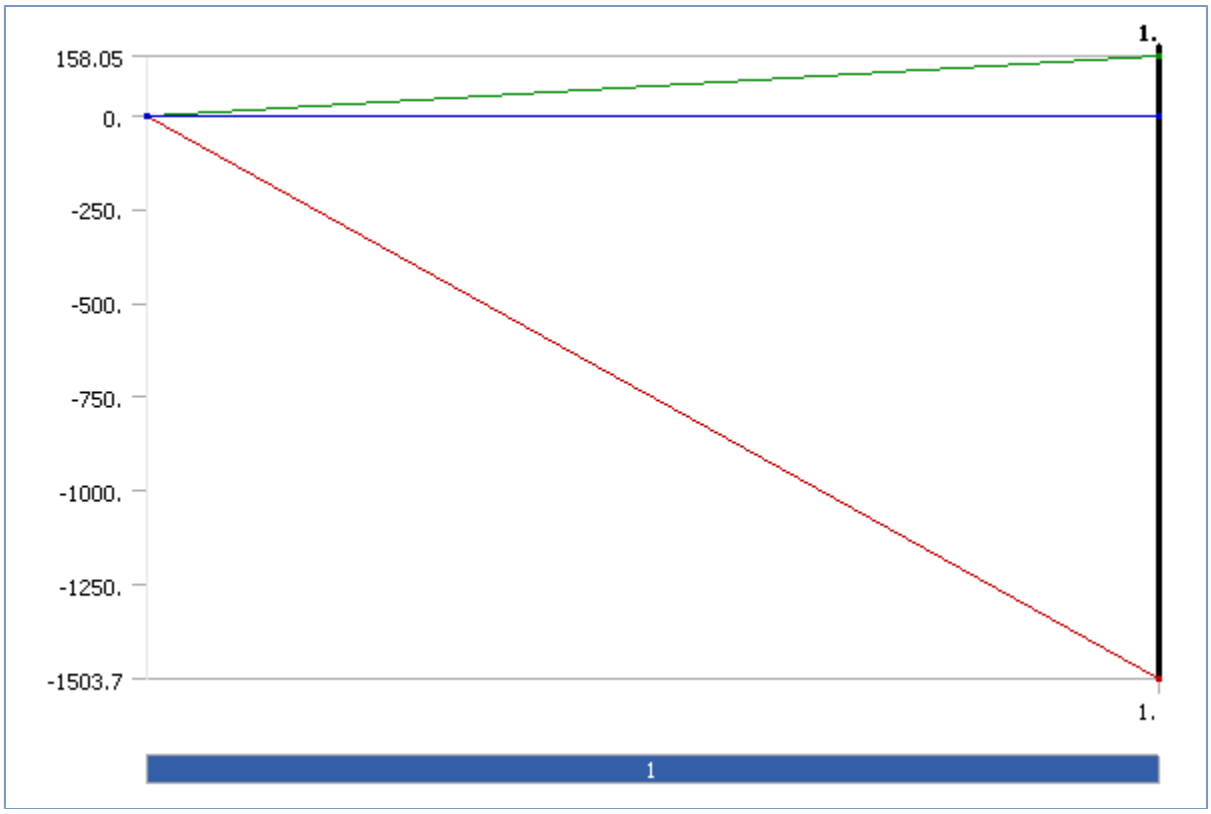
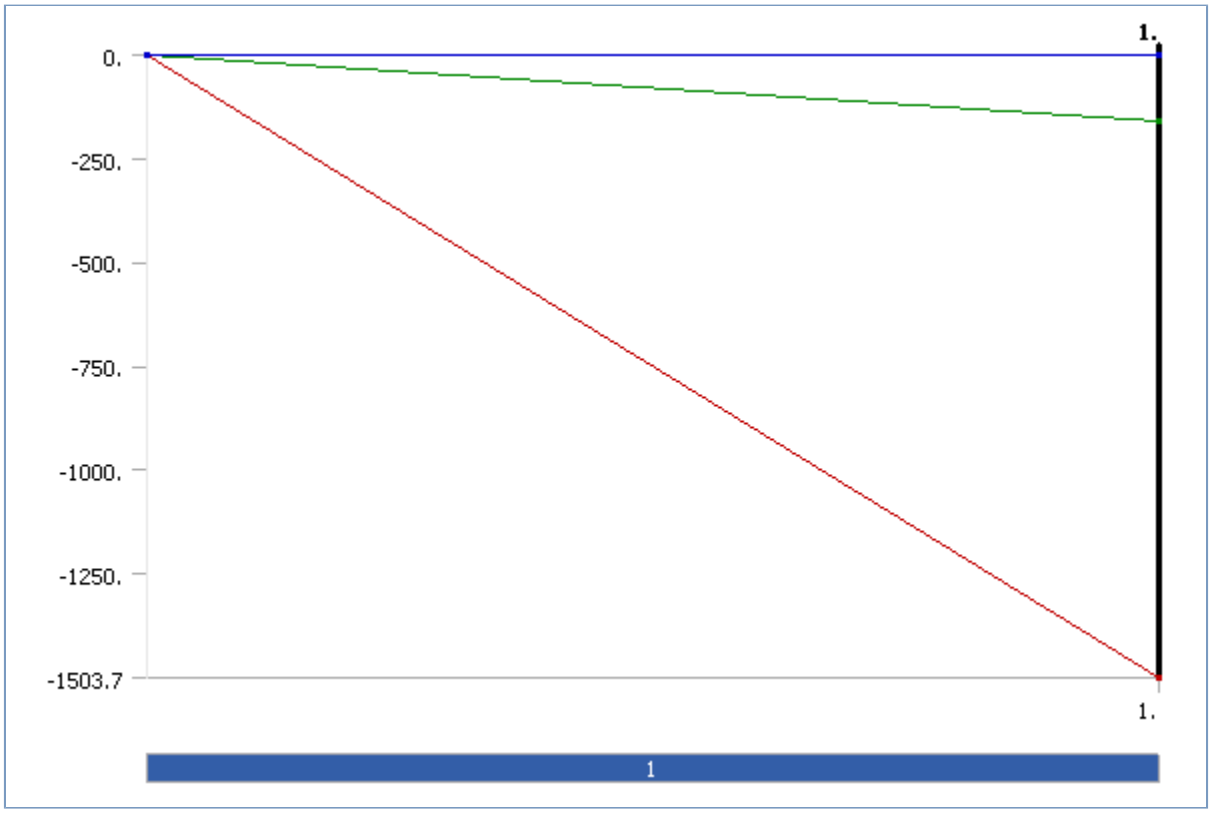


FIGURE 9
Sector 1 > Static Structural > Left Downstream



Solution

TABLE 33
Sector 1 > Static Structural > Solution

Object Name	*Solution*
State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.

TABLE 34
Sector 1 > Static Structural > Solution > Solution Information

Object Name	*Solution Information*
State	Solved
Solution Information	
Solution Output	Solver Output
Newton-Raphson Residuals	0
Update Interval	2.5 s
Display Points	All

TABLE 35
Sector 1 > Static Structural > Solution > Results

Object Name	*Total Deformation*	*X - Directional Deformation*	*Y - Directional Deformation*	*Z - Directional Deformation*	*Equivalent Stress*
State	Solved				
Scope					
Geometry	All Bodies				
Definition					
Type	Total Deformation	Directional Deformation			Equivalent (von-Mises) Stress
Display Time	End Time				
Orientation		X Axis	Y Axis	Z Axis	
Coordinate System		Global Coordinate System			
Shell					Top/Bottom
Results					
Minimum	3.2782e-004 mm	-3.586e-004 mm	-4.252e-002 mm	-3.1199e-002 mm	2.5623e-005 MPa
Maximum	9.0512e-002 mm	8.0306e-002 mm	4.5982e-002 mm	3.1612e-002 mm	3.133 MPa
Minimum Occurs On	Nose Plate	Left End Plate Outer Steel Slice	Rod 5		Back Plate Polyurethane
Maximum Occurs On	Rod 5	Left End Plate Aluminum Casing	Rod 6	back slit	Back Plate Outer Steel Slice
Information					
Time	1. s				
Load Step	1				
Substep	1				
Iteration Number	1				

FIGURE 10
Sector 1 > Static Structural > Solution > Total Deformation > Figure

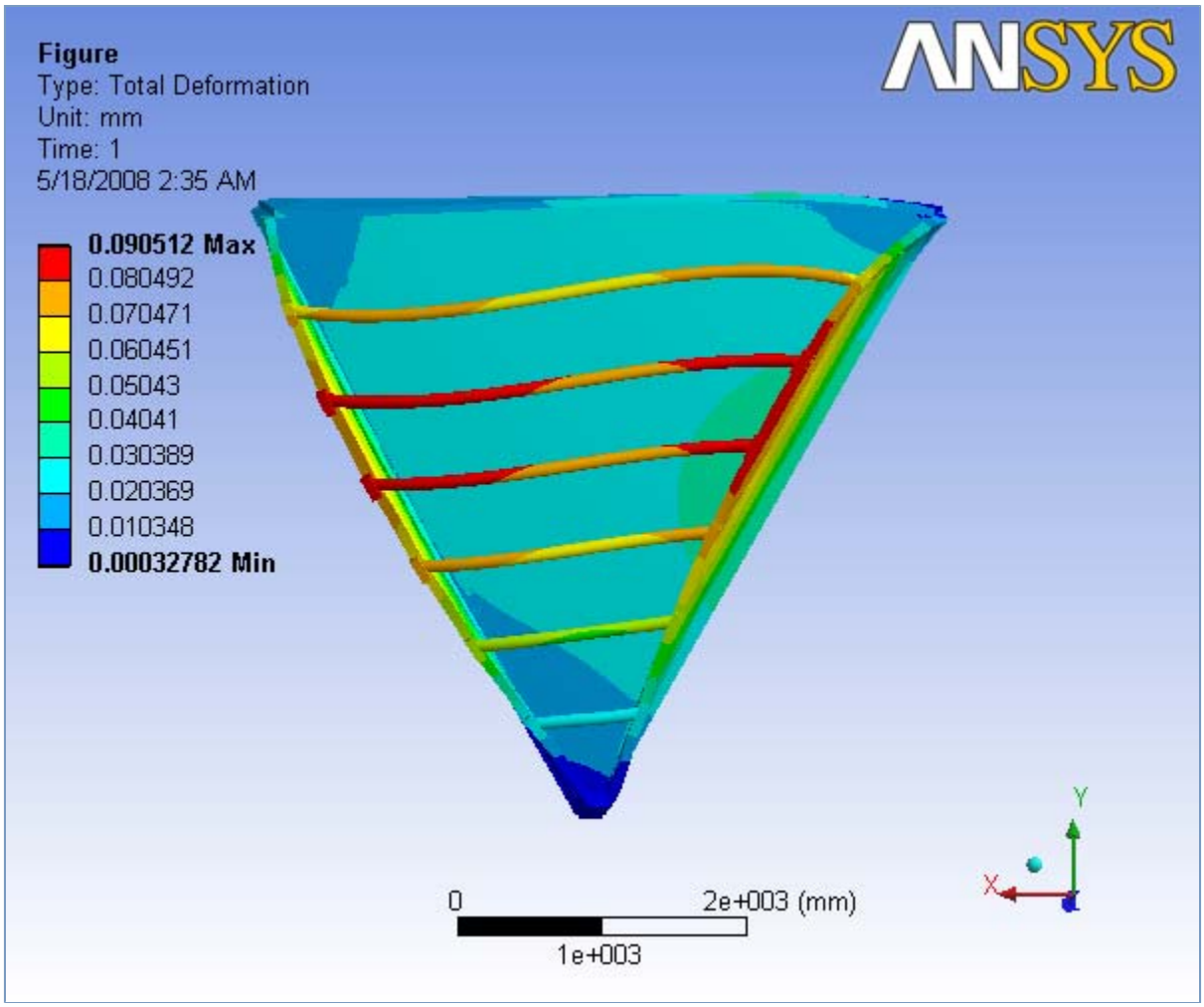


FIGURE 11
Sector 1 > Static Structural > Solution > X - Directional Deformation > Figure

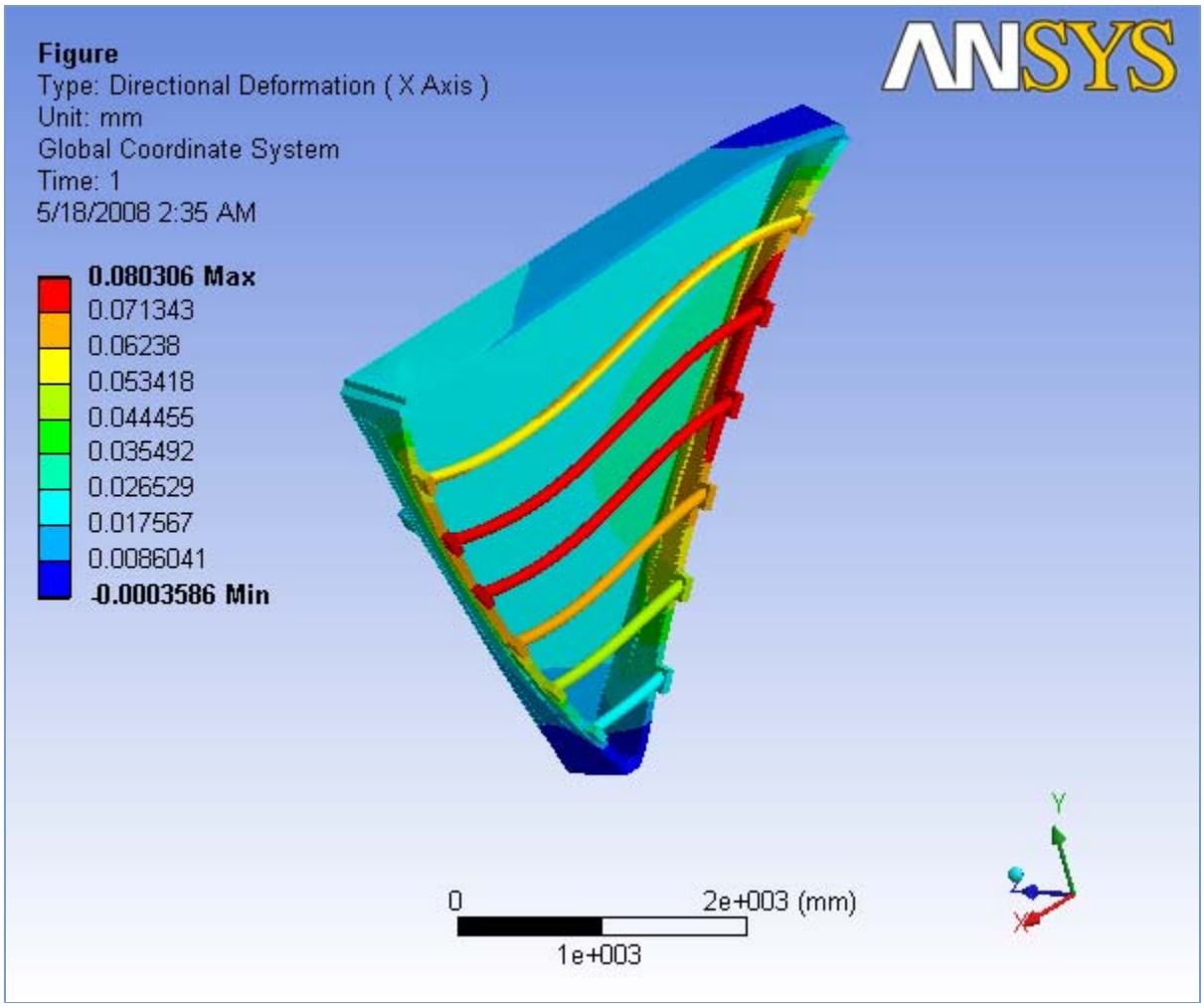


FIGURE 12
Sector 1 > Static Structural > Solution > Y - Directional Deformation > Figure

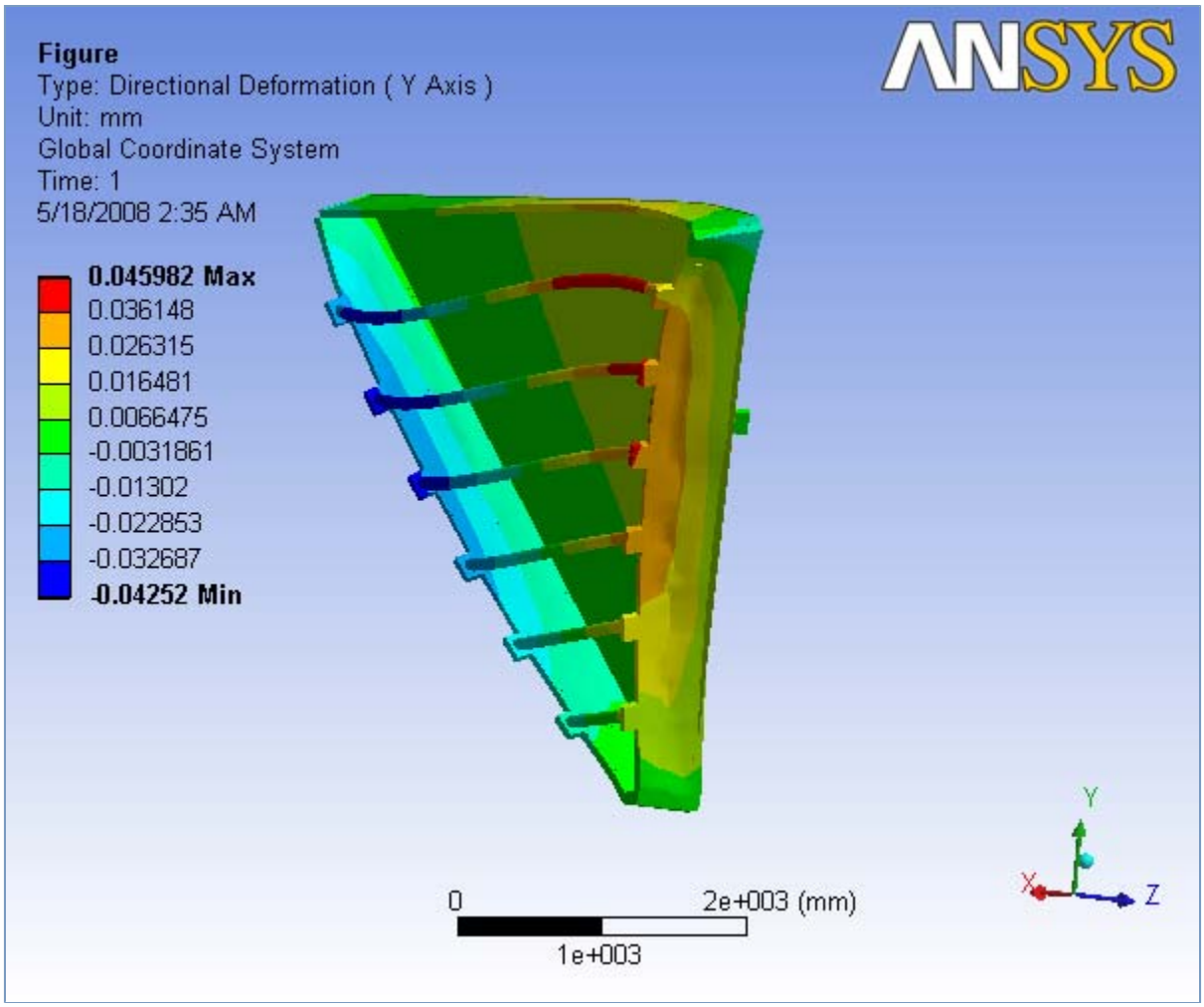


FIGURE 13
Sector 1 > Static Structural > Solution > Z - Directional Deformation > Figure

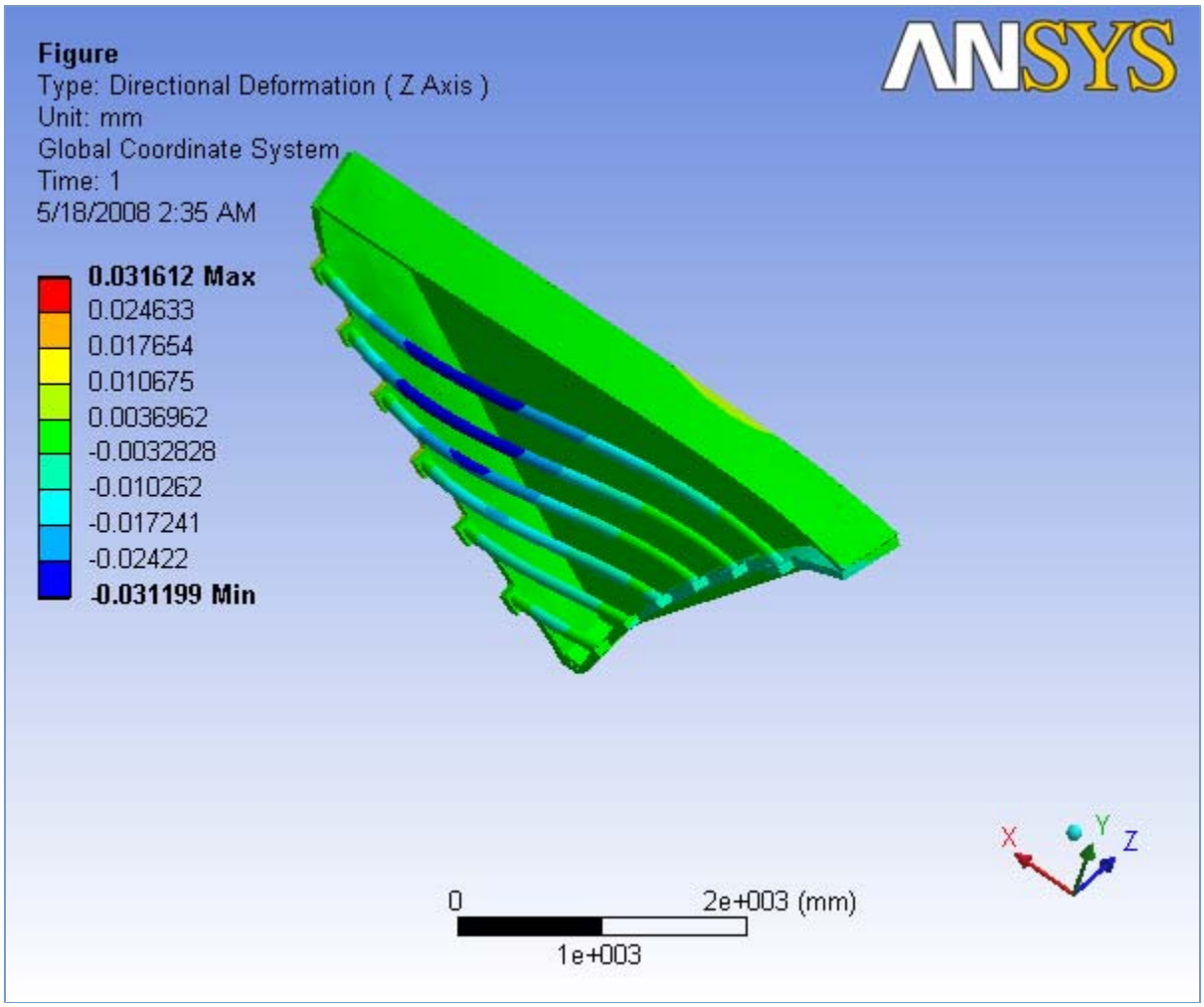


FIGURE 14
Sector 1 > Static Structural > Solution > Equivalent Stress > Figure

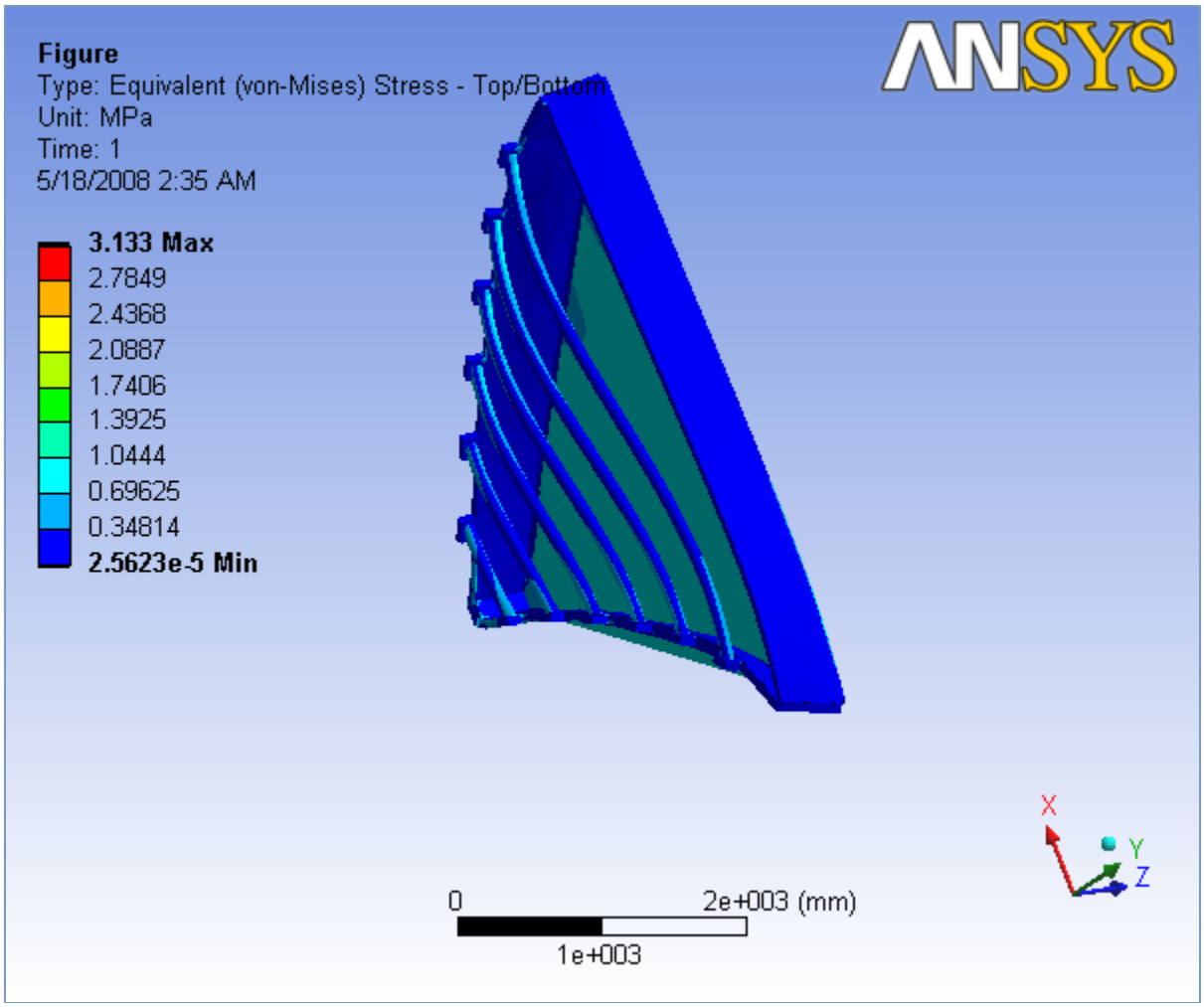
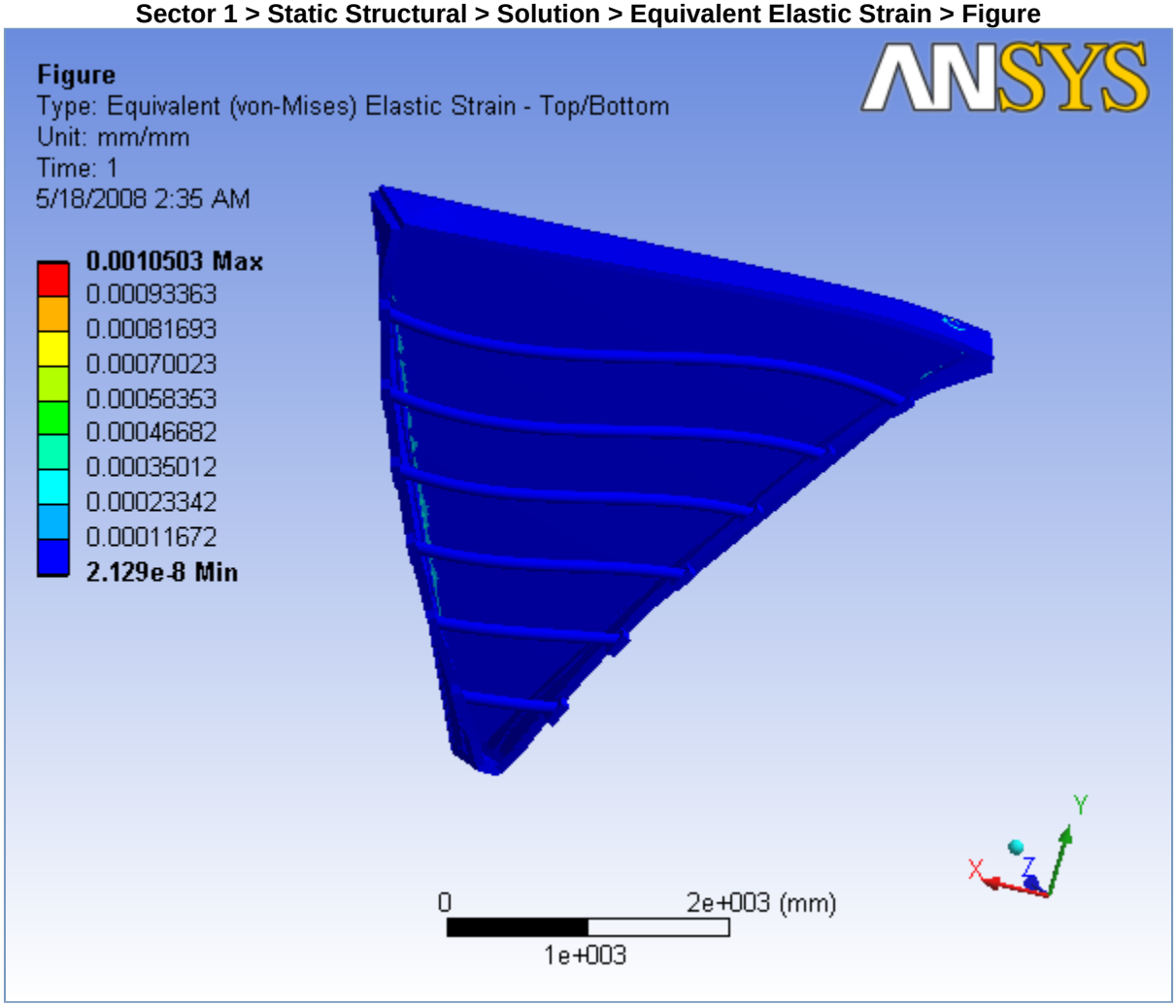


TABLE 36
Sector 1 > Static Structural > Solution > Results

Object Name	*Equivalent Elastic Strain*
State	Solved
Scope	
Geometry	All Bodies
Definition	
Type	Equivalent (von-Mises) Elastic Strain
Shell	Top/Bottom
Display Time	End Time
Results	
Minimum	2.129e-008 mm/mm
Maximum	1.0503e-003 mm/mm
Minimum Occurs On	Rod 2
Maximum Occurs On	Back Plate Polyurethane
Information	
Time	1. s
Load Step	1
Substep	1
Iteration Number	1

FIGURE 15

Sector 1 > Static Structural > Solution > Equivalent Elastic Strain > Figure



Material Data

Aluminum

TABLE 37
Aluminum > Constants

Structural	
Young's Modulus	68900 MPa
Poisson's Ratio	0.33
Density	2.7e-006 kg/mm³
Thermal Expansion	2.3e-005 1/°C
Thermal	
Thermal Conductivity	0. W/mm·°C
Specific Heat	0. J/kg·°C
Electromagnetics	
Relative Permeability	0.
Resistivity	0. Ohm·mm

Polyurethane

TABLE 38
Polyurethane > Constants

Structural	
Young's Modulus	66. MPa
Poisson's Ratio	0.3
Density	2.4e-007 kg/mm³
Thermal Expansion	6.12e-005 1/°C
Thermal	
Thermal Conductivity	0. W/mm·°C
Specific Heat	0. J/kg·°C
Electromagnetics	
Relative Permeability	0.
Resistivity	0. Ohm·mm

Stainless steel

TABLE 39
Stainless steel > Constants

Structural	
Young's Modulus	1.93e+005 MPa
Poisson's Ratio	0.3
Density	8.e-006 kg/mm³
Thermal Expansion	0. 1/°C
Thermal	
Thermal Conductivity	0. W/mm·°C
Specific Heat	0. J/kg·°C
Electromagnetics	
Relative Permeability	0.
Resistivity	0. Ohm·mm

Carbon fiber

TABLE 40
Carbon fiber > Constants

Structural	
Young's Modulus	1.5e+005 MPa
Poisson's Ratio	0.3
Density	5.8e-007 kg/mm³
Thermal Expansion	0. 1/°C
Thermal	
Thermal Conductivity	0. W/mm·°C
Specific Heat	0. J/kg·°C
Electromagnetics	
Relative Permeability	0.
Resistivity	0. Ohm·mm

Hexcel

TABLE 41
Hexcel > Constants

Structural

Young's Modulus	30. MPa
Poisson's Ratio	0.33
Density	2.883e-008 kg/mm³
Thermal Expansion	0. 1/°C
Thermal	
Thermal Conductivity	0. W/mm·°C
Specific Heat	0. J/kg·°C
Electromagnetics	
Relative Permeability	0.
Resistivity	0. Ohm·mm