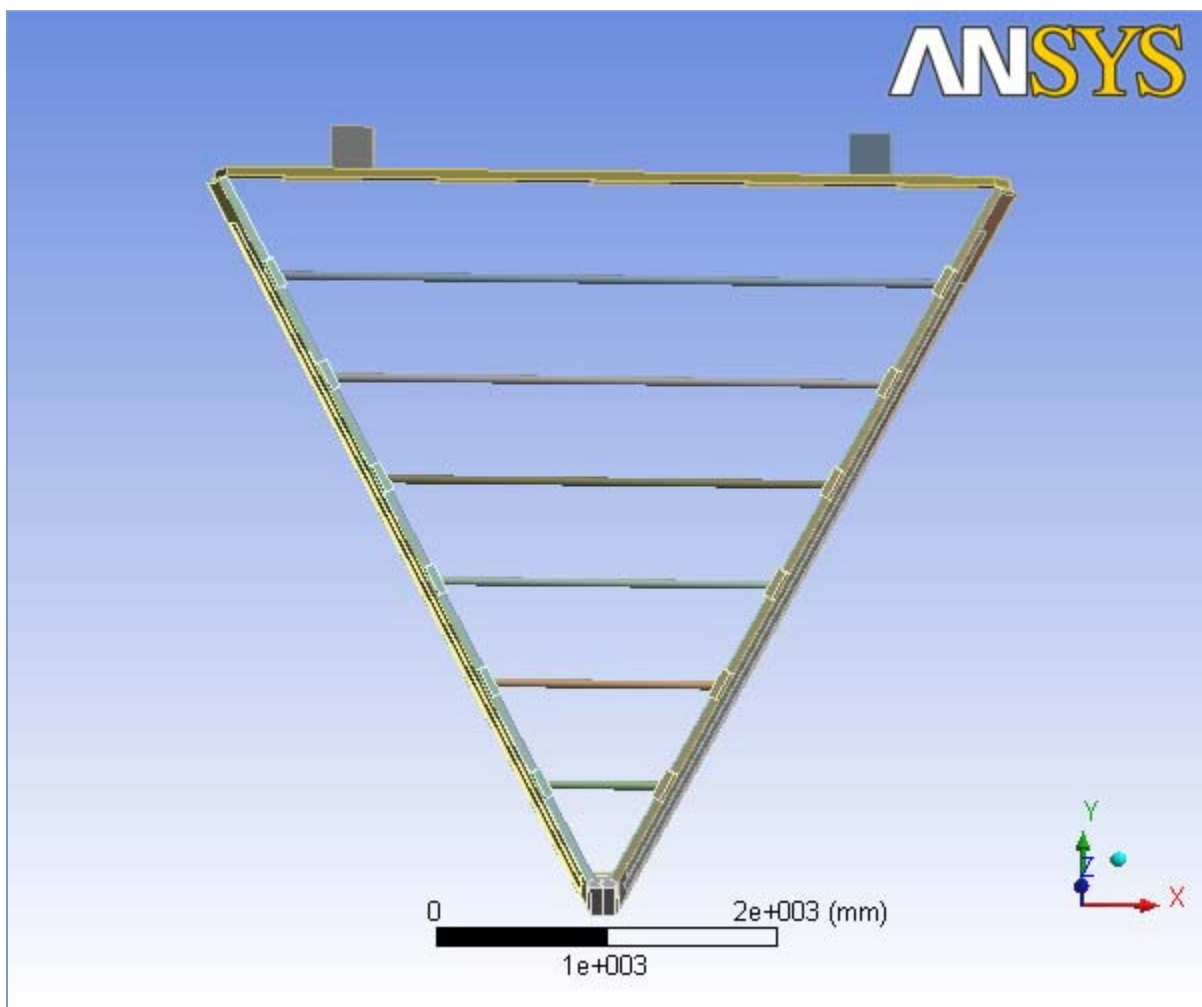




## Analysis 2.2

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<i>Subject</i>	<i>Ideal Case with Wire Tensions and Rods( No Gravity, No Hexcel)</i>
<i>Prepared for</i>	<i>Region 3 Drift chamber Design</i>
<i>First Saved</i>	<i>Friday, April 25, 2008</i>
<i>Last Saved</i>	<i>Thursday, May 01, 2008</i>
<i>Product Version</i>	<i>11.0 Release</i>



## Contents

- **Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity**
  - [Geometry](#)
    - [Parts](#)
  - [Connections](#)
    - [Contact Regions](#)
  - [Mesh](#)
  - **Static Structural**
    - [Analysis Settings](#)
    - [Acceleration](#)
    - [Loads](#)
    - [Solution](#)
      - [Solution Information](#)
      - [Results](#)
- **Material Data**
  - [Aluminum](#)
  - [Polyurethane](#)
  - [Stainless Steel](#)
  - [Carbon fiber](#)

## Units

**TABLE 1**

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

## Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity

### Geometry

**TABLE 2**

**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Geometry**

Object Name	<i>Geometry</i>
State	Fully Defined
<b>Definition</b>	
Source	C:\Documents and Settings\Jinnuri\Desktop\website\R3_2.agdb
Type	DesignModeler
Length Unit	Millimeters
Element Control	Program Controlled
Display Style	Part Color
<b>Bounding Box</b>	
Length X	4768.3 mm
Length Y	4317.7 mm
Length Z	2060. mm
<b>Properties</b>	
Volume	4.5833e+008 mm <sup>3</sup>

Mass	331.4 kg
<b>Statistics</b>	
Bodies	28
Active Bodies	28
Nodes	156969
Elements	24894
<b>Preferences</b>	
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**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Geometry > Parts**

Object Name	<i>Nose Plate</i>	<i>Left Endplate Downstream Hole area</i>	<i>Right Endplate Upstream Hole area</i>	<i>Left Endplate Upstream Hole area</i>	<i>Left Endplate Aluminum Casing</i>
State	Meshed				
<b>Graphics Properties</b>					
Visible	Yes				
Transparency	1				
<b>Definition</b>					
Suppressed	No				
Material	Aluminum	Polyurethane			Aluminum
Stiffness Behavior	Flexible				
Nonlinear Material Effects	Yes				
<b>Bounding Box</b>					
Length X	180.6 mm	2159.8 mm	2116.2 mm	1973.8 mm	2338.9 mm
Length Y	94.006 mm	3690. mm	3614.6 mm	3368. mm	4000.3 mm
Length Z	529.95 mm	1562.8 mm	1531.7 mm	1437.5 mm	1983.2 mm
<b>Properties</b>					
Volume	6.6319e+006 mm <sup>3</sup>	4.3107e+007 mm <sup>3</sup>	4.1332e+007 mm <sup>3</sup>	3.8462e+007 mm <sup>3</sup>	1.1673e+007 mm <sup>3</sup>
Mass	17.906 kg	10.346 kg	9.9198 kg	9.2309 kg	31.518 kg
Centroid X	-1.8724e-016 mm	-1157.7 mm	1145.5 mm	-1057.2 mm	-1178.2 mm
Centroid Y	42.65 mm	1932.5 mm	1911.3 mm	1758.4 mm	1967.9 mm

Centroid Z	-263.29 mm	368. mm	587.1 mm	528.73 mm	639.08 mm
Moment of Inertia Ip1	4.2714e+005 kg·mm <sup>2</sup>	1.68e+007 kg·mm <sup>2</sup>	1.5457e+007 kg·mm <sup>2</sup>	1.2459e+007 kg·mm <sup>2</sup>	5.6821e+007 kg·mm <sup>2</sup>
Moment of Inertia Ip2	4.4442e+005 kg·mm <sup>2</sup>	34145 kg·mm <sup>2</sup>	31455 kg·mm <sup>2</sup>	29271 kg·mm <sup>2</sup>	1.6143e+006 kg·mm <sup>2</sup>
Moment of Inertia Ip3	43603 kg·mm <sup>2</sup>	1.677e+007 kg·mm <sup>2</sup>	1.543e+007 kg·mm <sup>2</sup>	1.2434e+007 kg·mm <sup>2</sup>	5.5221e+007 kg·mm <sup>2</sup>
<b>Statistics</b>					
Nodes	440	296	272	2445	
Elements	179	24	22	926	

**TABLE 4**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Geometry > Parts**

Object Name	<i>Left Endplate Polyurethane</i>	<i>Right Endplate Downstream Hole area</i>	<i>Right Endplate Aluminum Casing</i>	<i>Right Endplate Polyurethane</i>	<i>Left Endplate Inner Steel slice</i>
State	Meshed				
<b>Graphics Properties</b>					
Visible	Yes				
Transparency	1				
<b>Definition</b>					
Suppressed	No				
Material	Polyurethane		Aluminum	Polyurethane	Stainless Steel
Stiffness Behavior	Flexible				
Nonlinear Material Effects	Yes				
Thickness					
Thickness Mode	Manual				
<b>Bounding Box</b>					
Length X	2327.6 mm	1998.1 mm	2338.8 mm	2322.8 mm	2294.9 mm
Length Y	3980.8 mm	3410. mm	4000.2 mm	3972.4 mm	3974.9 mm
Length Z	1956.7 mm	1457.6 mm	1984. mm	1954.5 mm	1983.2 mm
<b>Properties</b>					
Volume	3.4557e+007 mm <sup>3</sup>	3.9784e+007 mm <sup>3</sup>	1.1919e+007 mm <sup>3</sup>	3.4764e+007 mm <sup>3</sup>	2.9149e+006 mm <sup>3</sup>
Mass	8.2936 kg	9.5482 kg	32.181 kg	8.3434 kg	23.319 kg
Centroid X	-1396. mm	1078.8 mm	1201.6 mm	1379.8 mm	
Centroid Y	2345.1 mm	1795.8 mm	2008.4 mm	2317.1 mm	
Centroid Z	542.67 mm	316.67 mm	651.27 mm	513.21 mm	
Moment of Inertia Ip1	2.0961e+007 kg·mm <sup>2</sup>	1.321e+007 kg·mm <sup>2</sup>	6.0236e+007 kg·mm <sup>2</sup>	2.1346e+007 kg·mm <sup>2</sup>	
Moment of Inertia Ip2	2.0417e+005 kg·mm <sup>2</sup>	31513 kg·mm <sup>2</sup>	1.6548e+006 kg·mm <sup>2</sup>	1.8581e+005 kg·mm <sup>2</sup>	
Moment of Inertia Ip3	2.076e+007 kg·mm <sup>2</sup>	1.3183e+007 kg·mm <sup>2</sup>	5.8594e+007 kg·mm <sup>2</sup>	2.1163e+007 kg·mm <sup>2</sup>	
Surface Area (approx.)					
	2.3908e+006 mm <sup>2</sup>				
<b>Statistics</b>					
Nodes	1862	272	2379	1843	168
Elements	639	22	905	627	124

**TABLE 5**

**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Geometry > Parts**

Object Name	<i>Left Endplate Outer Steel slice</i>	<i>Right Endplate Outer Steel slice</i>	<i>Right Endplate Inner Steel Slice</i>	<i>Backplate Aluminum Casing</i>	<i>Backplate Polyurethane</i>
State	Meshed				
<b>Graphics Properties</b>					
Visible	Yes				
Transparency	1				
<b>Definition</b>					
Suppressed	No				
Material	Stainless Steel			Aluminum	Polyurethane
Nonlinear Material Effects	Yes				
Thickness	1.2192 mm				
Thickness Mode	Manual				
Stiffness Behavior				Flexible	
<b>Bounding Box</b>					
Length X	2294.9 mm	2294.8 mm		4682.7 mm	4659.3 mm
Length Y	3974.9 mm	3974.8 mm		186.53 mm	180.41 mm
Length Z	1983.2 mm	1984. mm		498.46 mm	476.92 mm
<b>Properties</b>					
Volume	2.9149e+006 mm <sup>3</sup>			5.2863e+006 mm <sup>3</sup>	1.1124e+008 mm <sup>3</sup>
Mass	23.319 kg			14.273 kg	26.698 kg
Surface Area (approx.)	2.3908e+006 mm <sup>2</sup>				
Centroid X				175.74 mm	-0.24556 mm
Centroid Y				3986.6 mm	3987.5 mm
Centroid Z				1225.6 mm	1222.4 mm
Moment of Inertia Ip1				7.8718e+005 kg·mm <sup>2</sup>	5.1362e+005 kg·mm <sup>2</sup>
Moment of Inertia Ip2				3.0219e+007 kg·mm <sup>2</sup>	4.725e+007 kg·mm <sup>2</sup>
Moment of Inertia Ip3				2.9438e+007 kg·mm <sup>2</sup>	4.6748e+007 kg·mm <sup>2</sup>
<b>Statistics</b>					
Nodes	176	157	155	708	241
Elements	132	113	111	74	24

**TABLE 6**

**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Geometry > Parts**

Object Name	<i>Rod 4</i>	<i>Rod 5</i>	<i>Rod 6</i>	<i>Rod 1</i>	<i>Rod 2</i>
State	Meshed				
<b>Graphics Properties</b>					
Visible	Yes				
Transparency	1				
<b>Definition</b>					
Suppressed	No				
Material	Carbon fiber				
Stiffness Behavior	Flexible				
Nonlinear Material Effects	Yes				

<b>Bounding Box</b>					
Length X	2618.1 mm	3260.4 mm	3902.6 mm	691.28 mm	1333.5 mm
Length Y	50.8 mm				
Length Z	50.8 mm				
<b>Properties</b>					
Volume	5.1151e+005 mm <sup>3</sup>	6.3841e+005 mm <sup>3</sup>	7.6532e+005 mm <sup>3</sup>	1.3079e+005 mm <sup>3</sup>	2.577e+005 mm <sup>3</sup>
Mass	0.29667 kg	0.37028 kg	0.44388 kg	7.586e-002 kg	0.14946 kg
Centroid X	-3.0688e-010 mm	-8.6731e-011 mm	-1.3795e-008 mm	-7.386e-011 mm	5.0812e-010 mm
Centroid Y	2220.1 mm	2776.3 mm	3332.5 mm	551.82 mm	1107.8 mm
Centroid Z	880.31 mm	1091.6 mm	1302.9 mm	246.45 mm	457.74 mm
Moment of Inertia Ip1	177.84 kg·mm <sup>2</sup>	221.97 kg·mm <sup>2</sup>	266.09 kg·mm <sup>2</sup>	45.457 kg·mm <sup>2</sup>	89.595 kg·mm <sup>2</sup>
Moment of Inertia Ip2	1.6387e+005 kg·mm <sup>2</sup>	3.1853e+005 kg·mm <sup>2</sup>	5.4867e+005 kg·mm <sup>2</sup>	2768.1 kg·mm <sup>2</sup>	21001 kg·mm <sup>2</sup>
Moment of Inertia Ip3	1.6388e+005 kg·mm <sup>2</sup>	3.1853e+005 kg·mm <sup>2</sup>	5.4867e+005 kg·mm <sup>2</sup>	2768.2 kg·mm <sup>2</sup>	21001 kg·mm <sup>2</sup>
<b>Statistics</b>					
Nodes	27520	34352	41184	11946	7788
Elements	3920	4896	5872	1760	1104

**TABLE 7**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Geometry > Parts**

Object Name	<i>Rod 3</i>	<i>Force ref line</i>	<i>30 deg Ref line</i>	<i>60 Deg Ref line</i>	<i>Left Hinge</i>
State	Meshed				
<b>Graphics Properties</b>					
Visible	Yes				
Transparency	1				
<b>Definition</b>					
Suppressed	No				
Material	Carbon fiber	Polyurethane			
Stiffness Behavior	Flexible				
Nonlinear Material Effects	Yes				
<b>Bounding Box</b>					
Length X	1975.8 mm	70. mm	11.116 mm	20.123 mm	250.37 mm
Length Y	50.8 mm	3.6786 mm	19.253 mm	11.618 mm	371.11 mm
Length Z	50.8 mm	5. mm			528.13 mm
<b>Properties</b>					
Volume	3.846e+005 mm <sup>3</sup>	643.76 mm <sup>3</sup>	535.05 mm <sup>3</sup>	584.49 mm <sup>3</sup>	2.9863e+007 mm <sup>3</sup>
Mass	0.22307 kg	1.545e-004 kg	1.2841e-004 kg	1.4028e-004 kg	7.1671 kg
Centroid X	-5.8382e-011 mm	2.7078e-014 mm	-3.7053 mm	-6.7077 mm	-1527.6 mm
Centroid Y	1663.9 mm	68.426 mm	39.079 mm	13.673 mm	4131.5 mm
Centroid Z	669.03 mm	2.5 mm			1265.9 mm
Moment of Inertia Ip1	133.72 kg·mm <sup>2</sup>	4.3804e-004 kg·mm <sup>2</sup>	3.1967e-003 kg·mm <sup>2</sup>	1.0045e-003 kg·mm <sup>2</sup>	1.7368e+005 kg·mm <sup>2</sup>
Moment of Inertia Ip2	69702 kg·mm <sup>2</sup>	3.1866e-002 kg·mm <sup>2</sup>	8.6441e-004 kg·mm <sup>2</sup>	3.7877e-003 kg·mm <sup>2</sup>	1.7368e+005 kg·mm <sup>2</sup>
Moment of Inertia Ip3	69702 kg·mm <sup>2</sup>	3.1661e-002	3.526e-003	4.2077e-003	74658 kg·mm <sup>2</sup>

		kg·mm <sup>2</sup>	kg·mm <sup>2</sup>	kg·mm <sup>2</sup>	
<b>Statistics</b>					
Nodes	20576	237	294	250	376
Elements	2928	22	38	30	54

**TABLE 8**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Geometry > Parts**

Object Name	<i>Right Hinge</i>	<i>Backplate Outer steel slice</i>	<i>Back Plate Inner Steel slice</i>
State	Meshed	Hidden	
<b>Graphics Properties</b>			
Visible	Yes	No	
Transparency	1		
<b>Definition</b>			
Suppressed	No		
Material	Polyurethane	Stainless Steel	
Stiffness Behavior	Flexible		
Nonlinear Material Effects	Yes		
Thickness		1.2192 mm	
Thickness Mode		Manual	
<b>Bounding Box</b>			
Length X	250.37 mm	4524.4 mm	
Length Y	371.11 mm	137.65 mm	
Length Z	528.13 mm	484.52 mm	
<b>Properties</b>			
Volume	2.9863e+007 mm <sup>3</sup>	2.7483e+006 mm <sup>3</sup>	
Mass	7.1671 kg	21.987 kg	
Centroid X	1521.8 mm		
Centroid Y	4132.1 mm		
Centroid Z	1263.7 mm		
Moment of Inertia Ip1	1.7368e+005 kg·mm <sup>2</sup>		
Moment of Inertia Ip2	1.7368e+005 kg·mm <sup>2</sup>		
Moment of Inertia Ip3	74658 kg·mm <sup>2</sup>		
Surface Area(approx.)		2.2542e+006 mm <sup>2</sup>	
<b>Statistics</b>			
Nodes	376	174	186
Elements	54	129	141

## Connections

**TABLE 9**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections**

Object Name	<i>Connections</i>
State	Fully Defined
<b>Auto Detection</b>	
Generate Contact On Update	Yes
Tolerance Type	Slider
Tolerance Slider	0.
Tolerance Value	16.886 mm
Face/Face	Yes
Face/Edge	No
Edge/Edge	No

Priority	Include All
Same Body Grouping	Yes
Revolute Joints	Yes
Fixed Joints	Yes
<b>Transparency</b>	
Enabled	Yes

**TABLE 10**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	Contact Region	Contact Region 2	Contact Region 3	Contact Region 4	Contact Region 5
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	2 Faces				1 Face
Target	2 Faces				1 Face
Contact Bodies	Nose Plate				
Target Bodies	Left Endplate Aluminum Casing	Left Endplate Polyurethane	Right Endplate Aluminum Casing	Right Endplate Polyurethane	Left Endplate Inner Steel slice
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
<b>Advanced</b>					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

**TABLE 11**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	Contact Region 6	Contact Region 7	Contact Region 8	Contact Region 9	Contact Region 10
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	1 Face			4 Faces	
Target	1 Face			4 Faces	
Contact Bodies	Nose Plate			Left Endplate Downstream Hole area	
Target Bodies	Right Endplate Inner Steel Slice	Force ref line	30 deg Ref line	60 Deg Ref line	Left Endplate Polyurethane
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				



<b>Advanced</b>	
Formulation	Pure Penalty
Normal Stiffness	Program Controlled
Update Stiffness	Never
Thermal Conductance	Program Controlled
Pinball Region	Program Controlled

**TABLE 12**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	<i>Contact Region 11</i>	<i>Contact Region 12</i>	<i>Contact Region 13</i>	<i>Contact Region 14</i>	<i>Contact Region 15</i>
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	1 Face		4 Faces		1 Face
Target	1 Face		4 Faces		1 Face
Contact Bodies	Left Endplate Downstream Hole area		Right Endplate Upstream Hole area		
Target Bodies	Left Endplate Inner Steel slice	Left Endplate Outer Steel slice	Right Endplate Aluminum Casing	Right Endplate Polyurethane	Right Endplate Outer Steel slice
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
<b>Advanced</b>					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

**TABLE 13**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	<i>Contact Region 16</i>	<i>Contact Region 17</i>	<i>Contact Region 18</i>	<i>Contact Region 19</i>	<i>Contact Region 20</i>
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	1 Face		4 Faces		1 Face
Target	1 Face		4 Faces		1 Face
Contact Bodies	Right Endplate Upstream Hole area	Left Endplate Upstream Hole area			
Target Bodies	Right Endplate Inner Steel Slice	Left Endplate Aluminum Casing	Left Endplate Polyurethane	Left Endplate Inner Steel slice	Left Endplate Outer Steel slice
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				

Suppressed	No
<b>Advanced</b>	
Formulation	Pure Penalty
Normal Stiffness	Program Controlled
Update Stiffness	Never
Thermal Conductance	Program Controlled
Pinball Region	Program Controlled

**TABLE 14**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	<i>Contact Region 21</i>	<i>Contact Region 22</i>	<i>Contact Region 23</i>	<i>Contact Region 24</i>	<i>Contact Region 25</i>
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	4 Faces	1 Face			
Target	4 Faces	1 Face			
Contact Bodies	Left Endplate Aluminum Casing				
Target Bodies	Left Endplate Polyurethane	Left Endplate Inner Steel slice	Left Endplate Outer Steel slice	Rod 4	Rod 5
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
<b>Advanced</b>					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

**TABLE 15**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	<i>Contact Region 26</i>	<i>Contact Region 27</i>	<i>Contact Region 28</i>	<i>Contact Region 29</i>	<i>Contact Region 30</i>
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	1 Face				
Target	1 Face				
Contact Bodies	Left Endplate Aluminum Casing				Left Endplate Polyurethane
Target Bodies	Rod 6	Rod 1	Rod 2	Rod 3	Left Endplate Inner Steel slice
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				

<b>Advanced</b>	
Formulation	Pure Penalty
Normal Stiffness	Program Controlled
Update Stiffness	Never
Thermal Conductance	Program Controlled
Pinball Region	Program Controlled

**TABLE 16**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	<i>Contact Region 31</i>	<i>Contact Region 32</i>	<i>Contact Region 33</i>	<i>Contact Region 34</i>	<i>Contact Region 35</i>
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	1 Face	4 Faces	1 Face	4 Faces	
Target	1 Face	4 Faces	1 Face	4 Faces	
Contact Bodies	Left Endplate Polyurethane	Right Endplate Downstream Hole area			Right Endplate Aluminum Casing
Target Bodies	Left Endplate Outer Steel slice	Right Endplate Polyurethane	Right Endplate Outer Steel slice	Right Endplate Inner Steel Slice	Right Endplate Polyurethane
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
<b>Advanced</b>					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

**TABLE 17**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	<i>Contact Region 36</i>	<i>Contact Region 37</i>	<i>Contact Region 38</i>	<i>Contact Region 39</i>	<i>Contact Region 40</i>
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	1 Face				
Target	1 Face				
Contact Bodies	Right Endplate Aluminum Casing				
Target Bodies	Right Endplate Outer Steel slice	Right Endplate Inner Steel Slice	Rod 4	Rod 5	Rod 6
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				

Behavior	Symmetric
Suppressed	No
<b>Advanced</b>	
Formulation	Pure Penalty
Normal Stiffness	Program Controlled
Update Stiffness	Never
Thermal Conductance	Program Controlled
Pinball Region	Program Controlled

**TABLE 18**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	Contact Region 41	Contact Region 42	Contact Region 43	Contact Region 44	Contact Region 45
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	1 Face				
Target	1 Face				
Contact Bodies	Right Endplate Aluminum Casing			Right Endplate Polyurethane	
Target Bodies	Rod 1	Rod 2	Rod 3	Right Endplate Outer Steel slice	Right Endplate Inner Steel Slice
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
<b>Advanced</b>					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

**TABLE 19**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	Contact Region 46	Contact Region 47	Contact Region 48	Contact Region 49	Contact Region 50
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	4 Faces	2 Faces		1 Face	
Target	4 Faces	2 Faces		1 Face	
Contact Bodies	Backplate Aluminum Casing			Backplate Polyurethane	
Target Bodies	Backplate Polyurethane	Left Hinge	Right Hinge	Left Hinge	Right Hinge
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				

<b>Advanced</b>	
Formulation	Pure Penalty
Normal Stiffness	Program Controlled
Update Stiffness	Never
Thermal Conductance	Program Controlled
Pinball Region	Program Controlled

**TABLE 20**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	<i>Contact Region 51</i>	<i>Contact Region 52</i>	<i>Contact Region 53</i>	<i>Contact Region 54</i>	<i>Contact Region 55</i>
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	1 Face				
Target	1 Face				
Contact Bodies	Backplate Aluminum Casing		Backplate Polyurethane		Left Hinge
Target Bodies	Backplate Outer steel slice	Back Plate Inner Steel slice	Backplate Outer steel slice	Back Plate Inner Steel slice	Backplate Outer steel slice
<b>Definition</b>					
Type	Bonded				
Scope Mode	Automatic				
Behavior	Symmetric				
Suppressed	No				
<b>Advanced</b>					
Formulation	Pure Penalty				
Normal Stiffness	Program Controlled				
Update Stiffness	Never				
Thermal Conductance	Program Controlled				
Pinball Region	Program Controlled				

**TABLE 21**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	<i>Contact Region 56</i>	<i>Bonded - Backplate Aluminum Casing To Left Endplate Aluminum Casing</i>	<i>Bonded - Backplate Aluminum Casing To Right Endplate Aluminum Casing</i>	<i>No Separation - Backplate Outer steel slice To Backplate Polyurethane</i>	<i>No Separation - Back Plate Inner Steel slice To Backplate Polyurethane</i>
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Contact	1 Face	1 Edge		1 Face	
Target	1 Face	1 Edge		1 Face	
Contact Bodies	Right Hinge	Backplate Aluminum Casing		Backplate Outer steel slice	Back Plate Inner Steel slice
Target Bodies	Backplate Outer steel slice	Left Endplate Aluminum Casing	Right Endplate Aluminum Casing	Backplate Polyurethane	
<b>Definition</b>					
Type	Bonded			No Separation	

Scope Mode	Automatic	Manual
Behavior	Symmetric	Symmetric
Suppressed	No	
<b>Advanced</b>		
Formulation	Pure Penalty	
Normal Stiffness	Program Controlled	
Update Stiffness	Never	
Thermal Conductance	Program Controlled	
Pinball Region	Program Controlled	Radius
Pinball Radius		50. mm

**TABLE 22**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Connections > Contact Regions**

Object Name	<i>Bonded - Left Endplate Aluminum Casing To Backplate Outer steel slice</i>	<i>Bonded - Left Endplate Aluminum Casing To Back Plate Inner Steel slice</i>	<i>Weld - Backplate Aluminum Casing To Backplate Outer steel slice</i>	<i>Weld - Backplate Aluminum Casing To Back Plate Inner Steel slice</i>
State	Fully Defined			
<b>Scope</b>				
Scoping Method	Geometry Selection			
Contact	1 Edge		1 Vertex	
Target	1 Edge		1 Vertex	
Contact Bodies	Left Endplate Aluminum Casing		Backplate Aluminum Casing	
Target Bodies	Backplate Outer steel slice	Back Plate Inner Steel slice	Backplate Outer steel slice	Back Plate Inner Steel slice
<b>Definition</b>				
Type	Bonded			
Scope Mode	Manual			
Suppressed	No			
<b>Advanced</b>				
Formulation	Pure Penalty			
Normal Stiffness	Program Controlled			
Update Stiffness	Never			
Thermal Conductance	Program Controlled			
Pinball Region	Radius			
Pinball Radius	200. mm			

**Mesh**

**TABLE 23**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Mesh**

Object Name	<i>Mesh</i>
State	Solved

<b>Defaults</b>	
Physics Preference	Mechanical
Relevance	-35
<b>Advanced</b>	
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
<b>Statistics</b>	
Nodes	156969
Elements	24894

## Static Structural

**TABLE 24**  
Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Analysis

Object Name	<i>Static Structural</i>
State	Fully Defined
<b>Definition</b>	
Physics Type	Structural
Analysis Type	Static Structural
<b>Options</b>	
Reference Temp	22. °C

**TABLE 25**  
Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Analysis Settings

Object Name	<i>Analysis Settings</i>
State	Fully Defined
<b>Step Controls</b>	
Number Of Steps	1.
Current Step Number	1.
Step End Time	1. s
Auto Time Stepping	Program Controlled
<b>Solver Controls</b>	
Solver Type	Direct
Weak Springs	Program Controlled
Large Deflection	Off
Inertia Relief	Off
<b>Nonlinear Controls</b>	
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\AI slit\New Constraints\Analysis 2 \Analysis2 Simulation Files\Static Structural\
Future Analysis	None
Save ANSYS db	No
Delete Unneeded Files	Yes
Nonlinear Solution	No

FIGURE 1

Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Figure

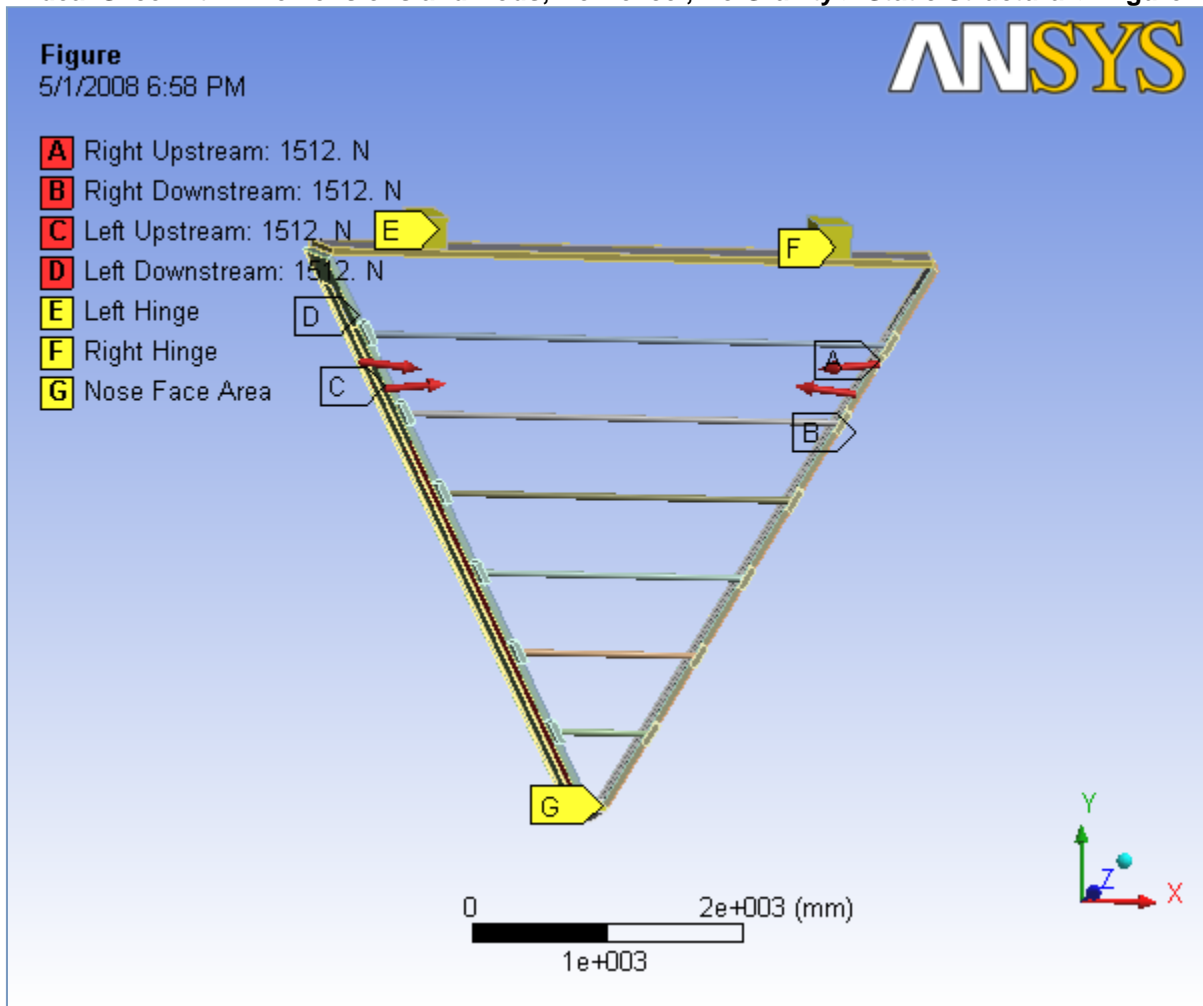


TABLE 26

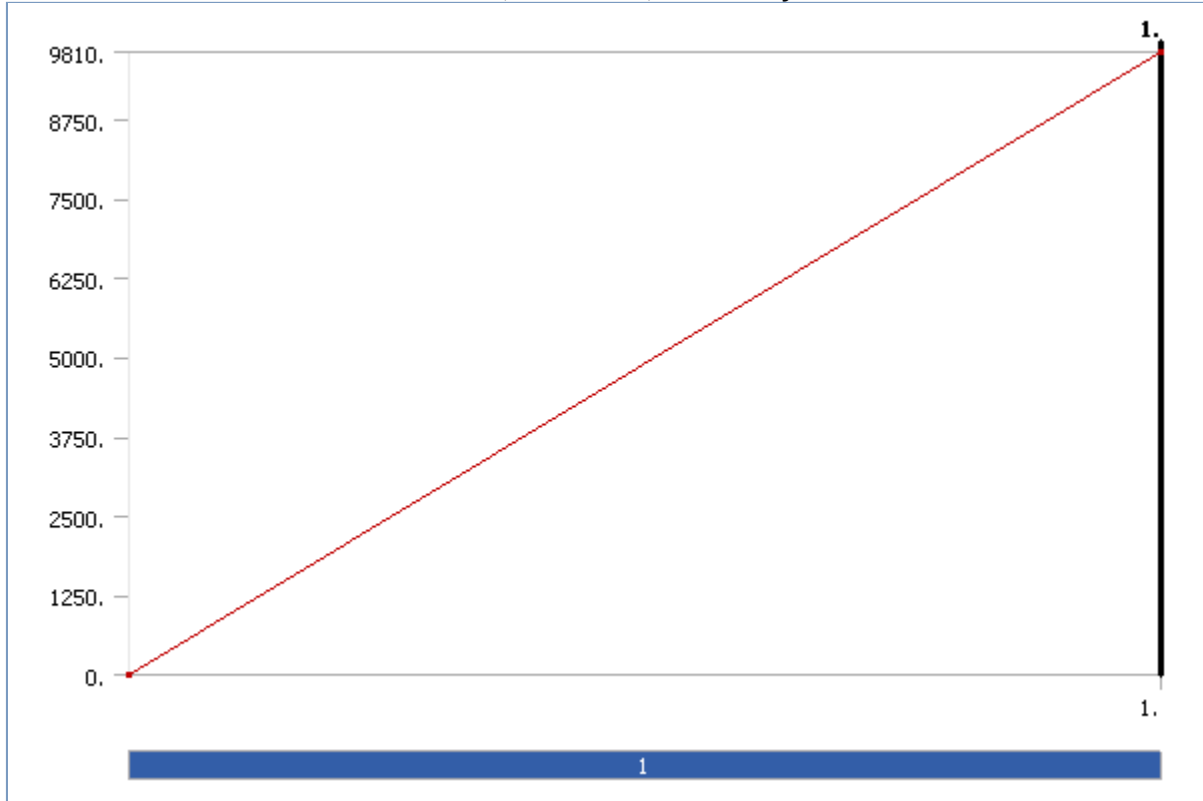
Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Accelerations

Object Name	Acceleration
State	Suppressed
Scope	
Geometry	All Bodies
Definition	



Define By	Vector
Magnitude	9810. mm/s <sup>2</sup> (ramped)
Direction	Defined
Suppressed	Yes

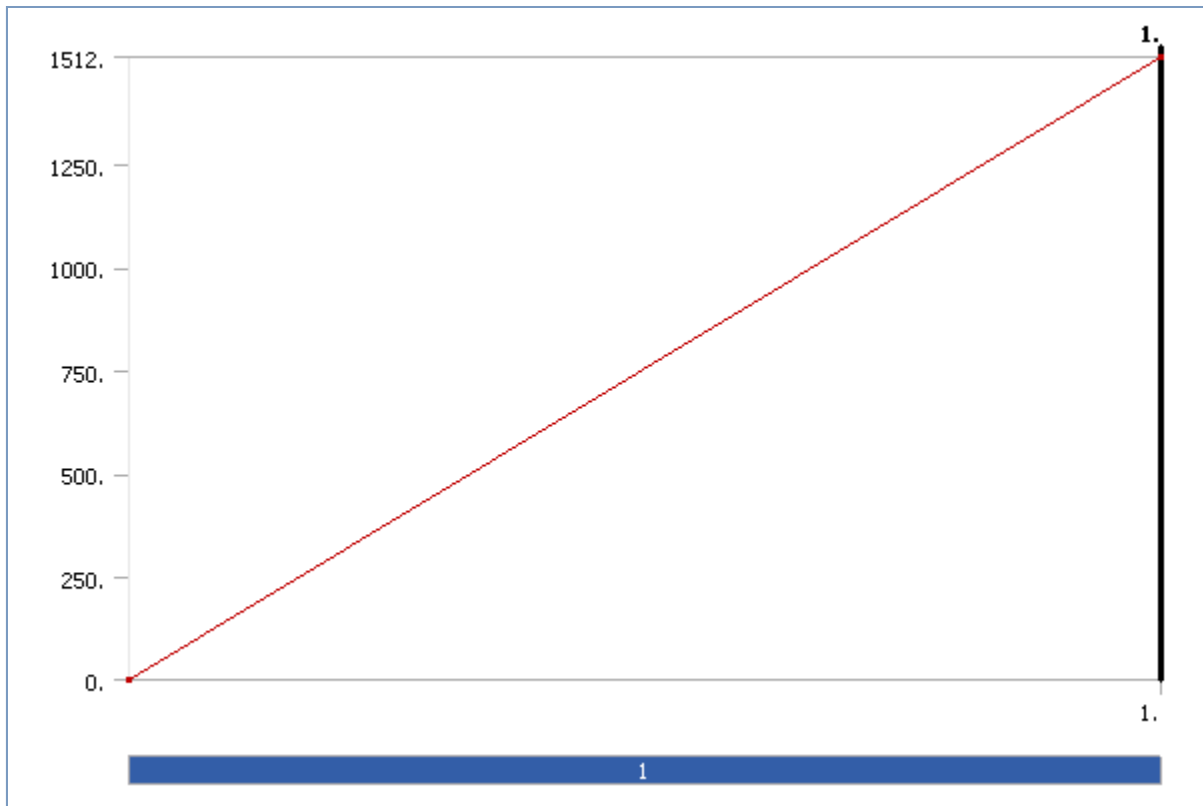
**FIGURE 2**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Acceleration**



**TABLE 27**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Loads**

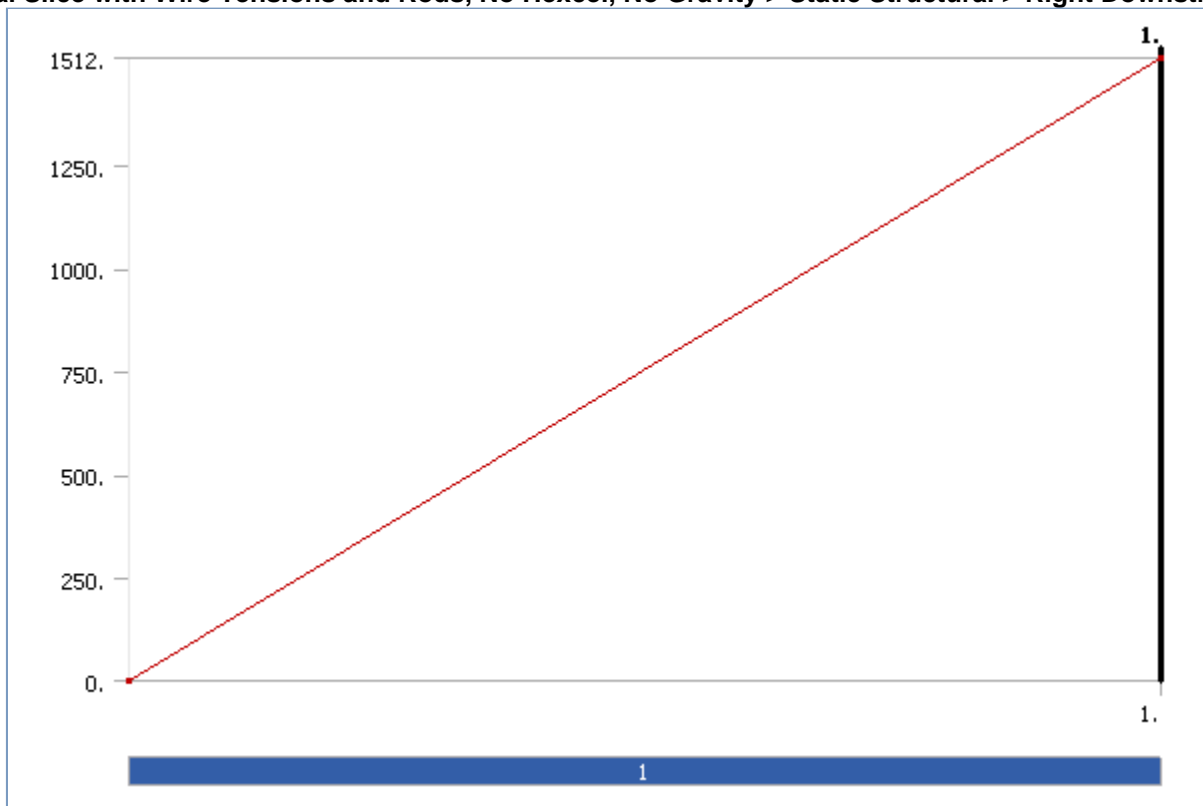
Object Name	<i>Right Upstream</i>	<i>Right Downstream</i>	<i>Left Upstream</i>	<i>Left Downstream</i>	<i>Left Hinge</i>
State	Fully Defined				
<b>Scope</b>					
Scoping Method	Geometry Selection				
Geometry	1 Face			5 Faces	
<b>Definition</b>					
Define By	Vector				Components
Type	Force				Displacement
Magnitude	1512. N (ramped)				
Direction	Defined				
Suppressed	No				
X Component					Free
Y Component					0. mm (ramped)
Z Component					0. mm (ramped)

**FIGURE 3**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Right Upstream**



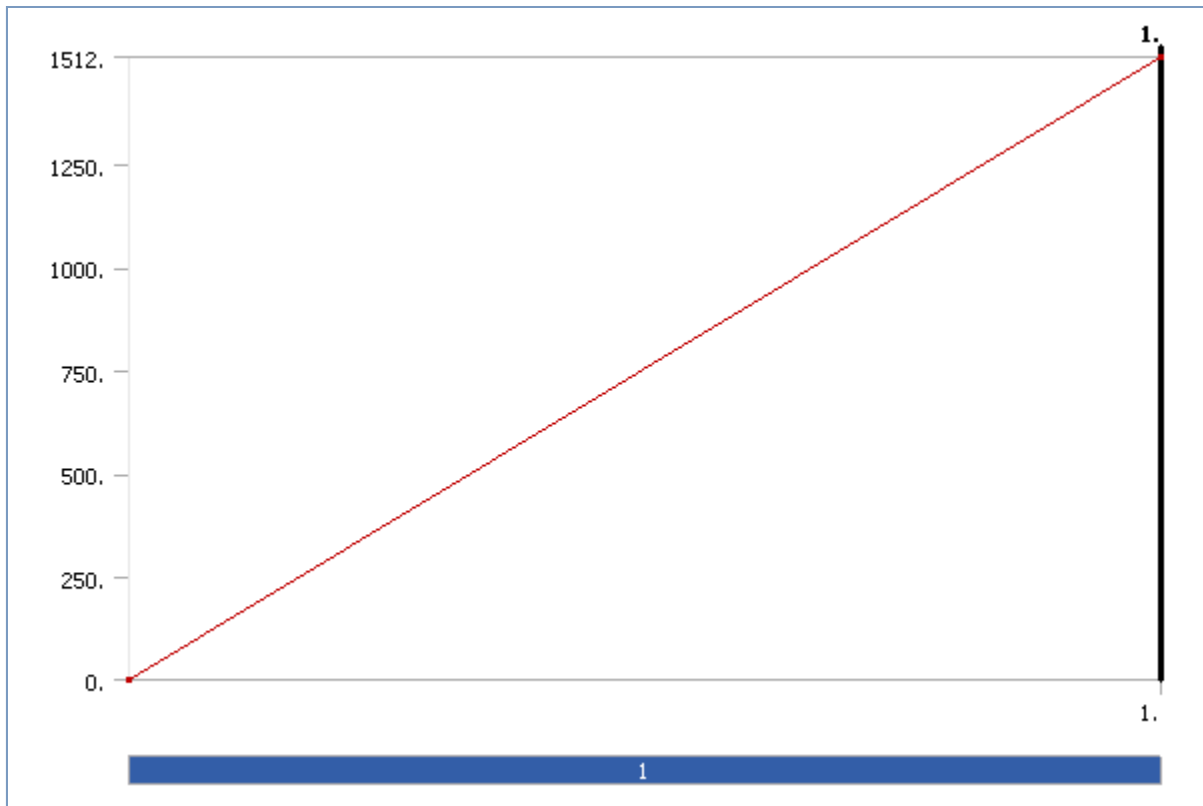
**FIGURE 4**

**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Right Downstream**



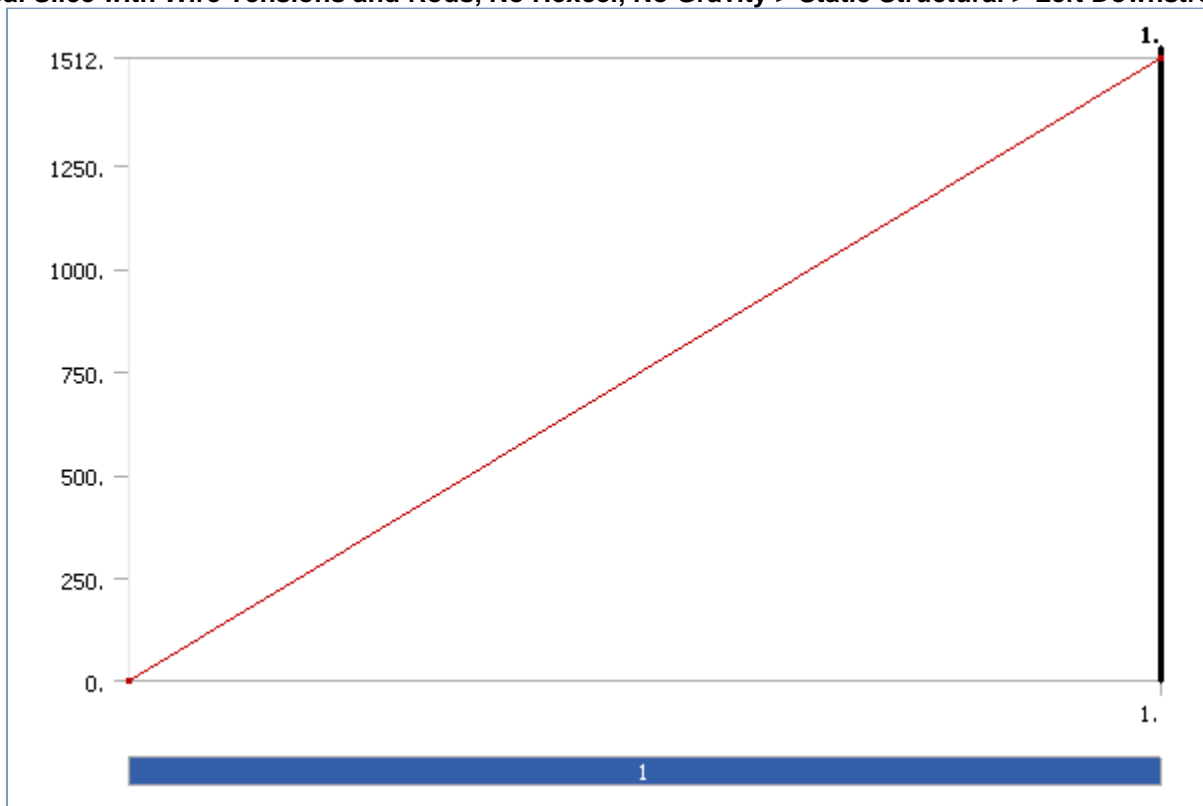
**FIGURE 5**

**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Left Upstream**



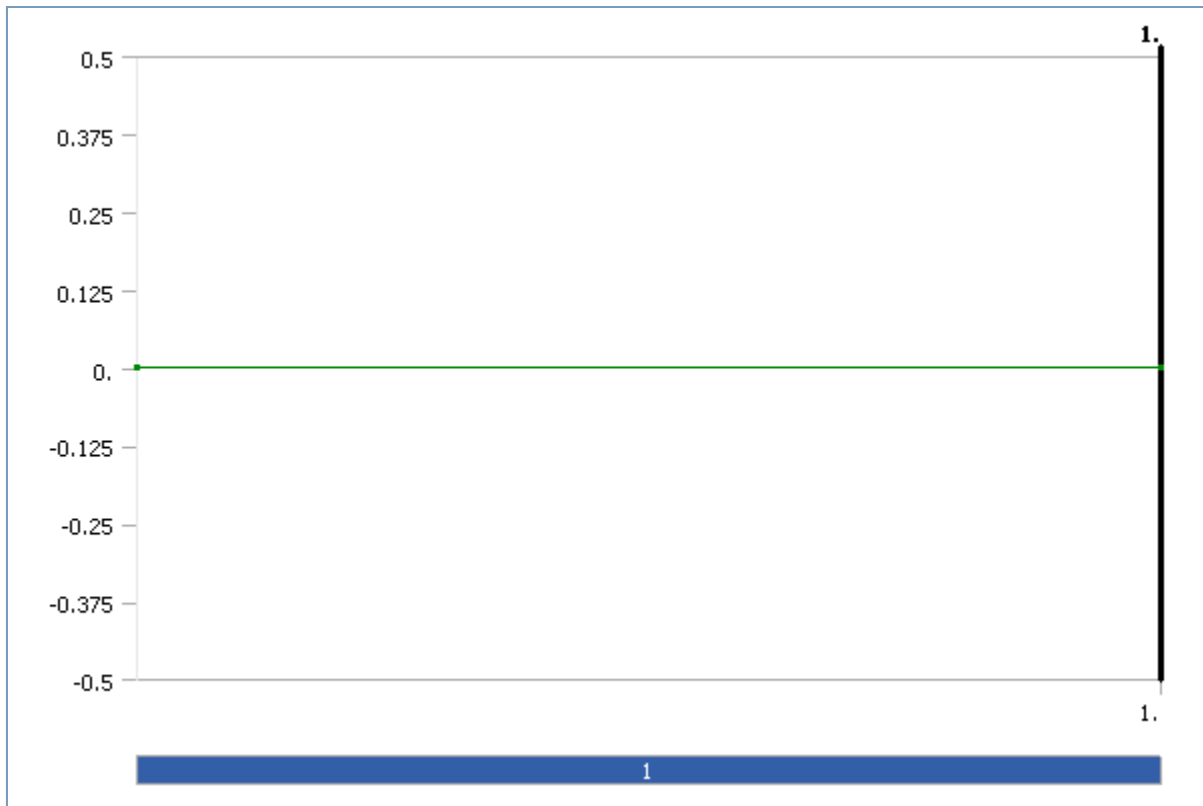
**FIGURE 6**

**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Left Downstream**



**FIGURE 7**

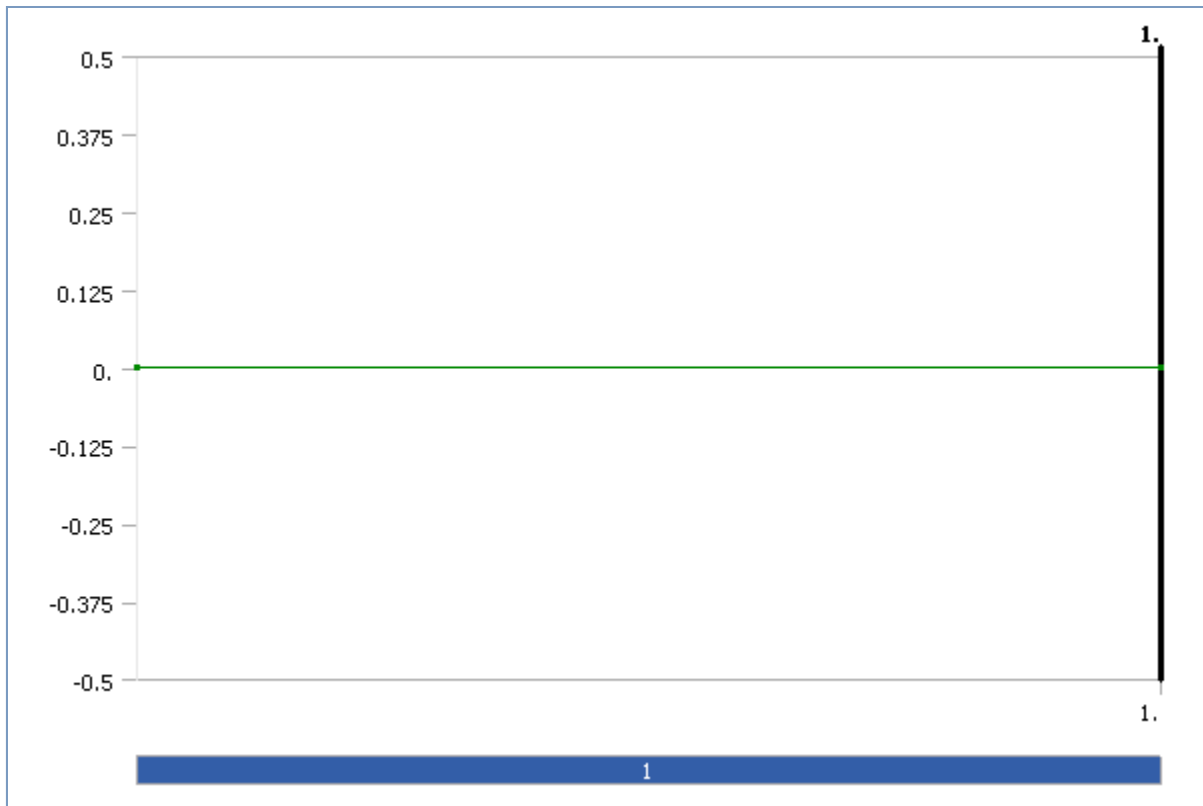
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Left Hinge**



**TABLE 28**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Loads**

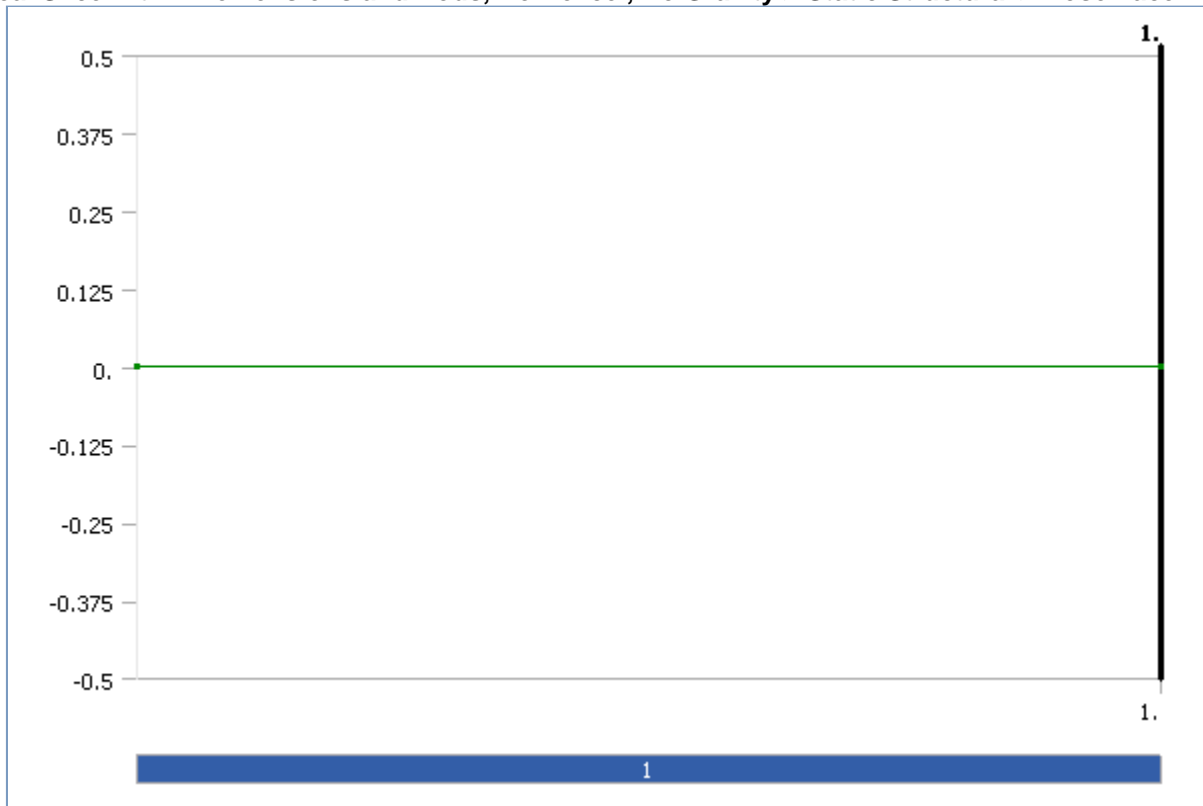
Object Name	<i>Right Hinge</i>	<i>Nose Face Area</i>
State	Fully Defined	
<b>Scope</b>		
Scoping Method	Geometry Selection	
Geometry	5 Faces	1 Face
<b>Definition</b>		
Define By	Components	
Type	Displacement	
X Component	0. mm (ramped)	
Y Component	Free	
Z Component	0. mm (ramped)	
Suppressed	No	

**FIGURE 8**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Right Hinge**



**FIGURE 9**

**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Nose Face Area**



***Solution***

**TABLE 29**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution**

Object Name	<i>Solution</i>
State	Solved
<b>Adaptive Mesh Refinement</b>	
Max Refinement Loops	1.
Refinement Depth	2.

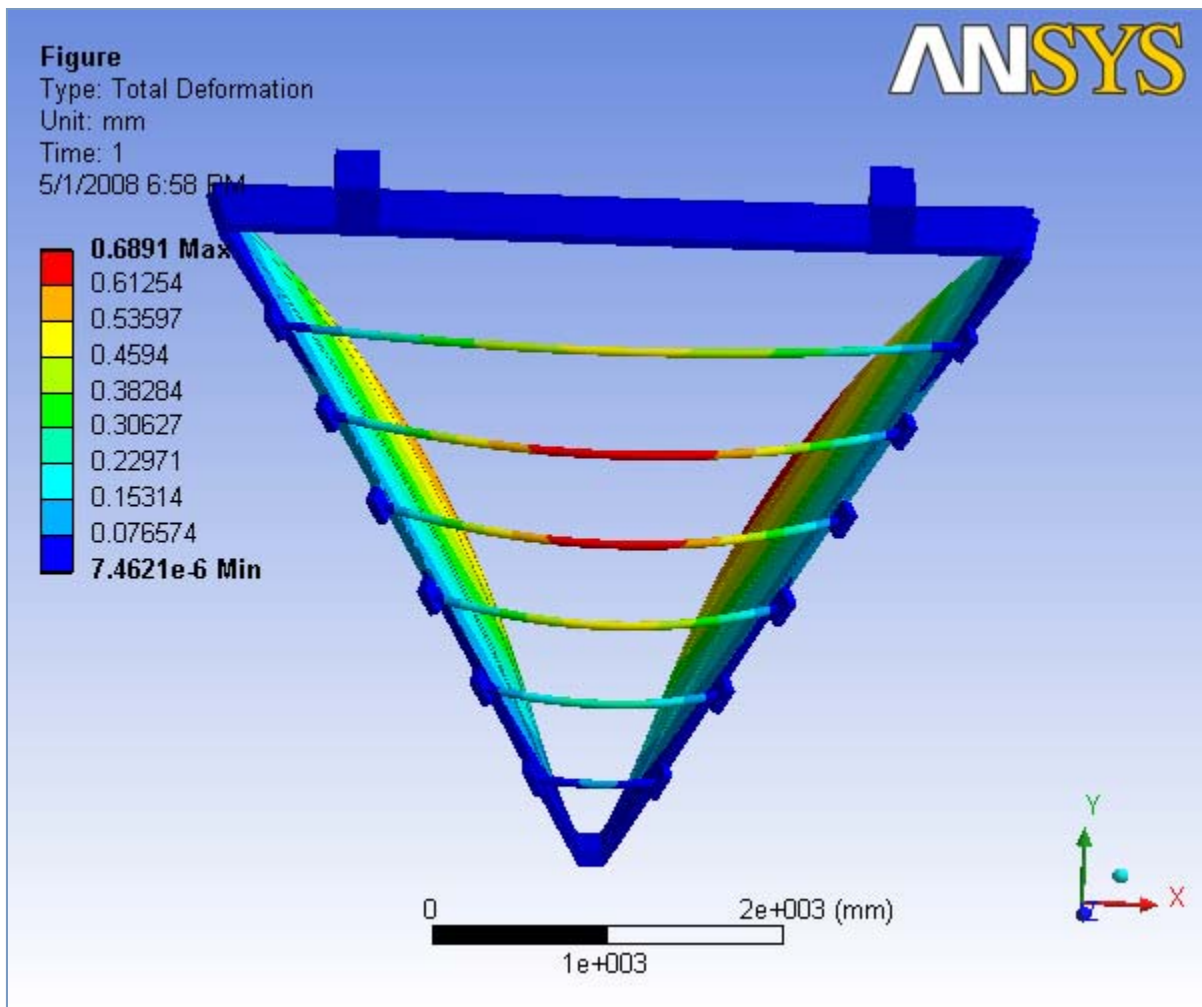
**TABLE 30**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution > Solution Information**

Object Name	<i>Solution Information</i>
State	Solved
<b>Solution Information</b>	
Solution Output	Solver Output
Newton-Raphson Residuals	0
Update Interval	2.5 s
Display Points	All

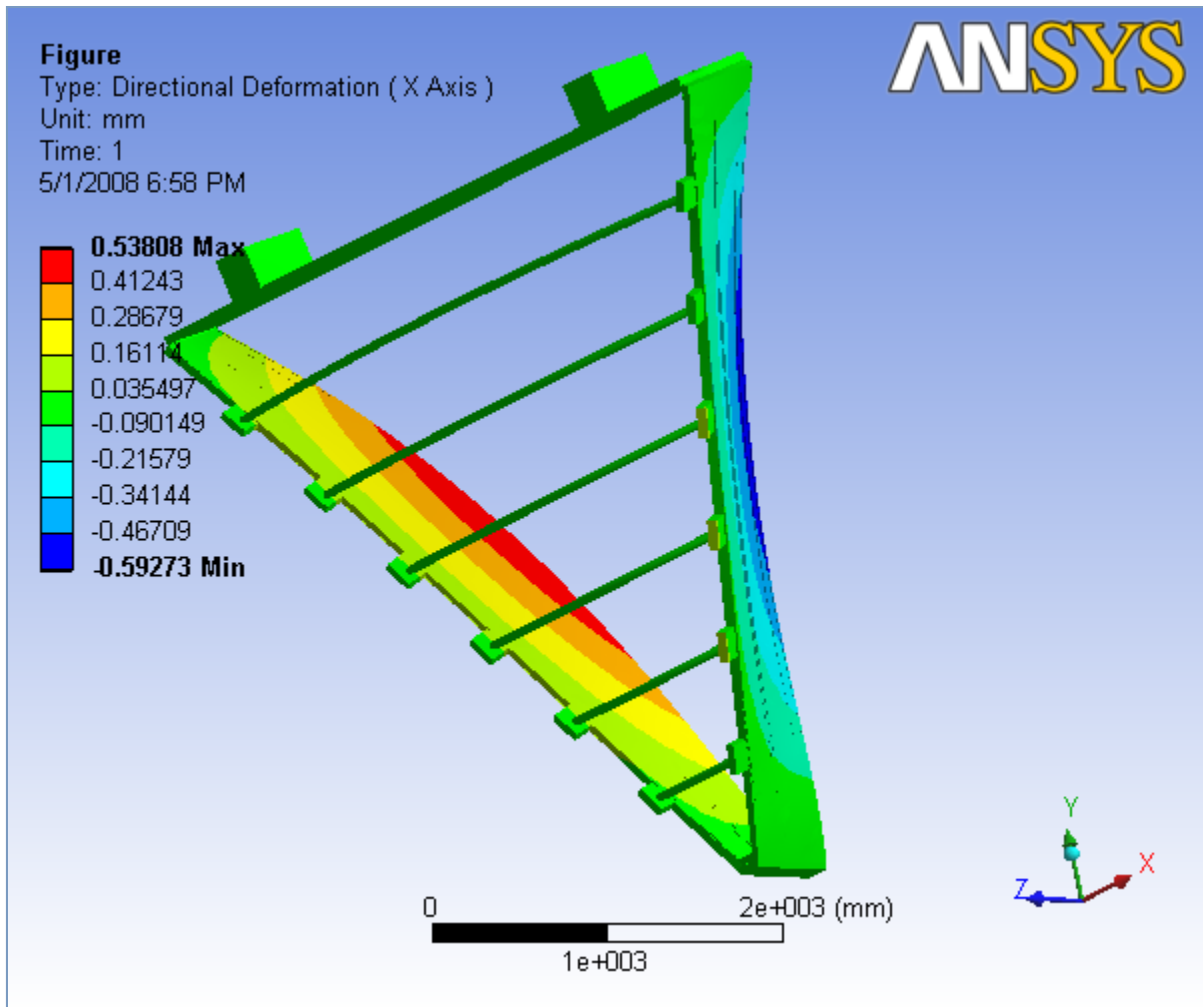
**TABLE 31**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution > Results**

Object Name	<i>Total Deformation</i>	<i>X Deformation</i>	<i>Y Deformation</i>	<i>Z Deformation</i>	<i>Equivalent Stress</i>
State	Solved				
<b>Scope</b>					
Geometry	All Bodies				
<b>Definition</b>					
Type	Total Deformation	Directional Deformation			Equivalent (von-Mises) Stress
Display Time	End Time				
Orientation		X Axis	Y Axis	Z Axis	
Shell					Top/Bottom
<b>Results</b>					
Minimum	7.4621e-006 mm	-0.59273 mm	-0.24376 mm	-4.0094e-002 mm	1.8244e-006 MPa
Maximum	0.6891 mm	0.53808 mm	0.33484 mm	0.6539 mm	7.2108 MPa
Minimum Occurs On	Left Hinge	Right Endplate Inner Steel Slice	Rod 4	Right Endplate Outer Steel slice	Force ref line
Maximum Occurs On	Rod 5	Left Endplate Inner Steel slice	Right Endplate Outer Steel slice	Rod 5	Rod 2
<b>Information</b>					
Time	1. s				
Load Step	1				
Substep	1				
Iteration Number	1				

**FIGURE 10**  
**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution > Total Deformation > Figure**

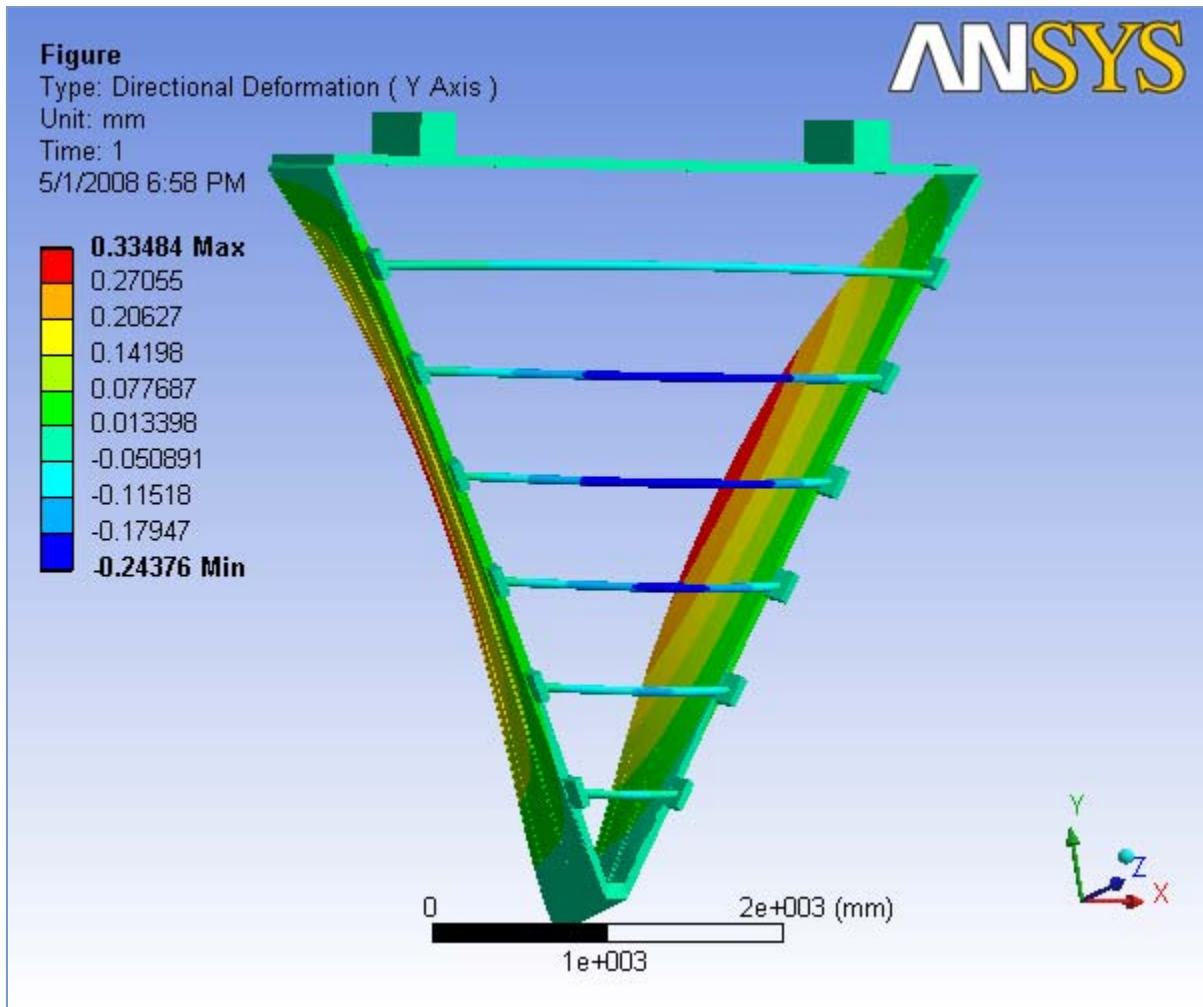


**FIGURE 11**  
Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution > X  
Deformation > Figure

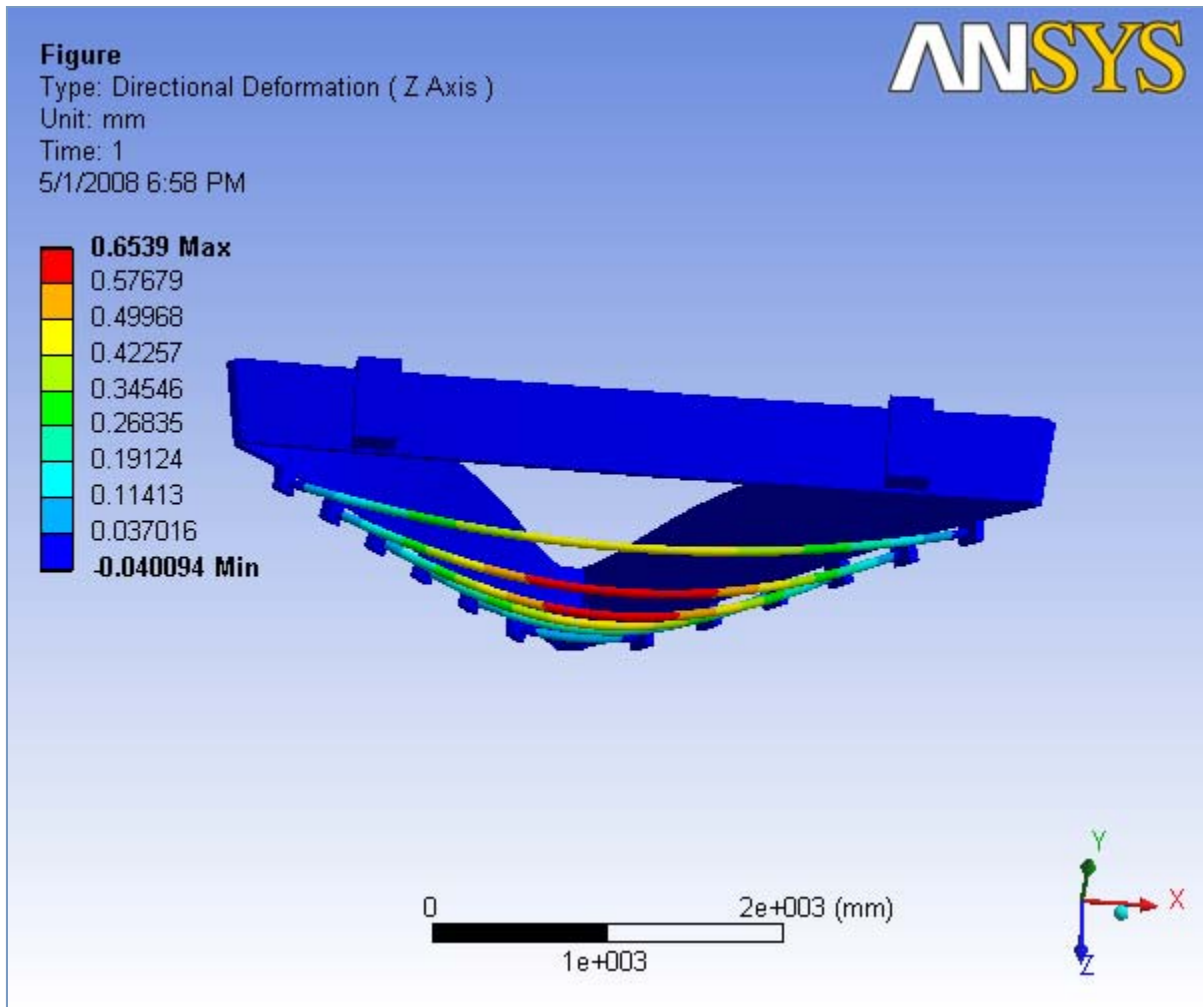


**FIGURE 12**  
 Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution > Y  
 Deformation > Figure

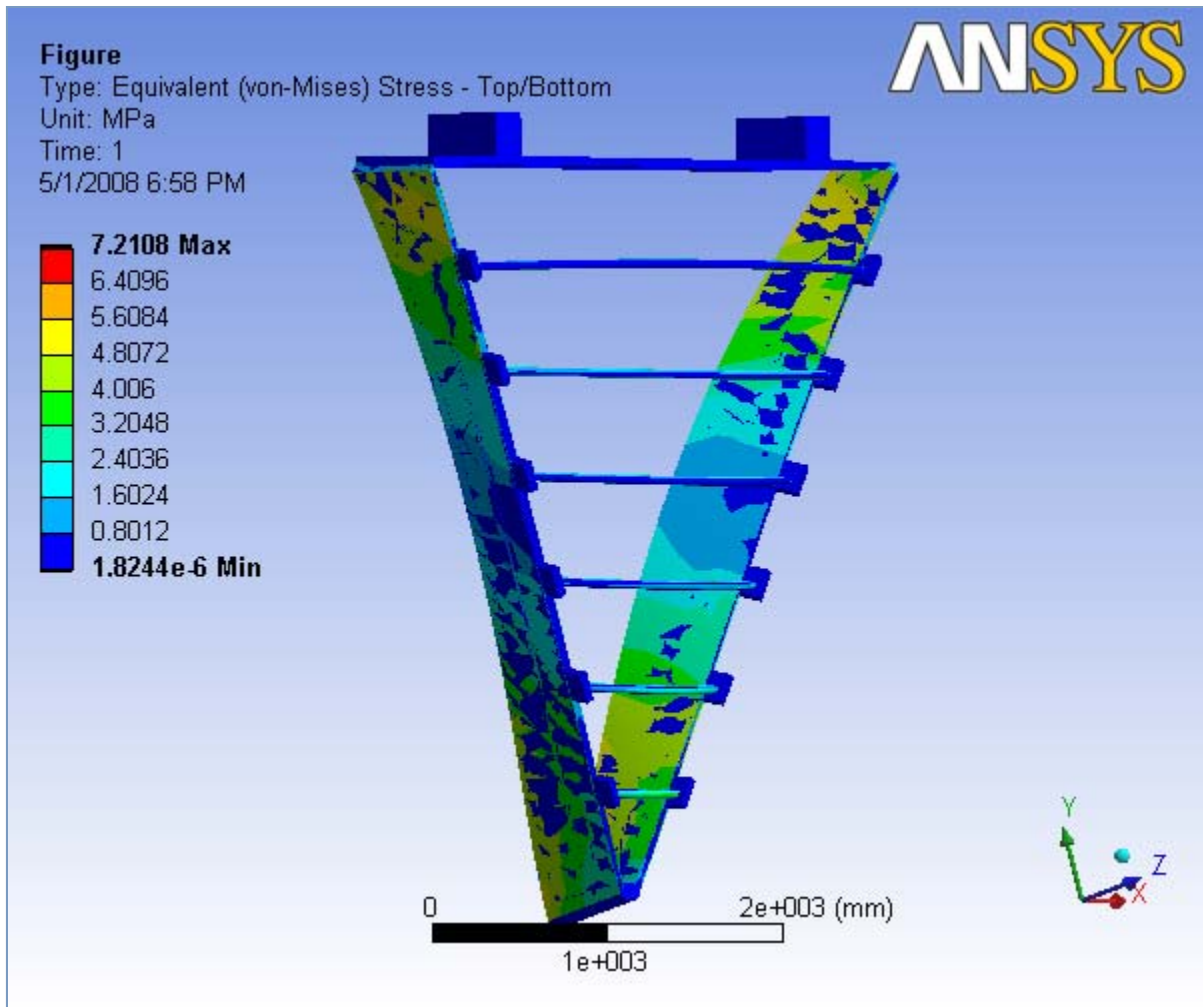




**FIGURE 13**  
 Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution > Z  
 Deformation > Figure



**FIGURE 14**  
 Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution > Equivalent Stress > Figure



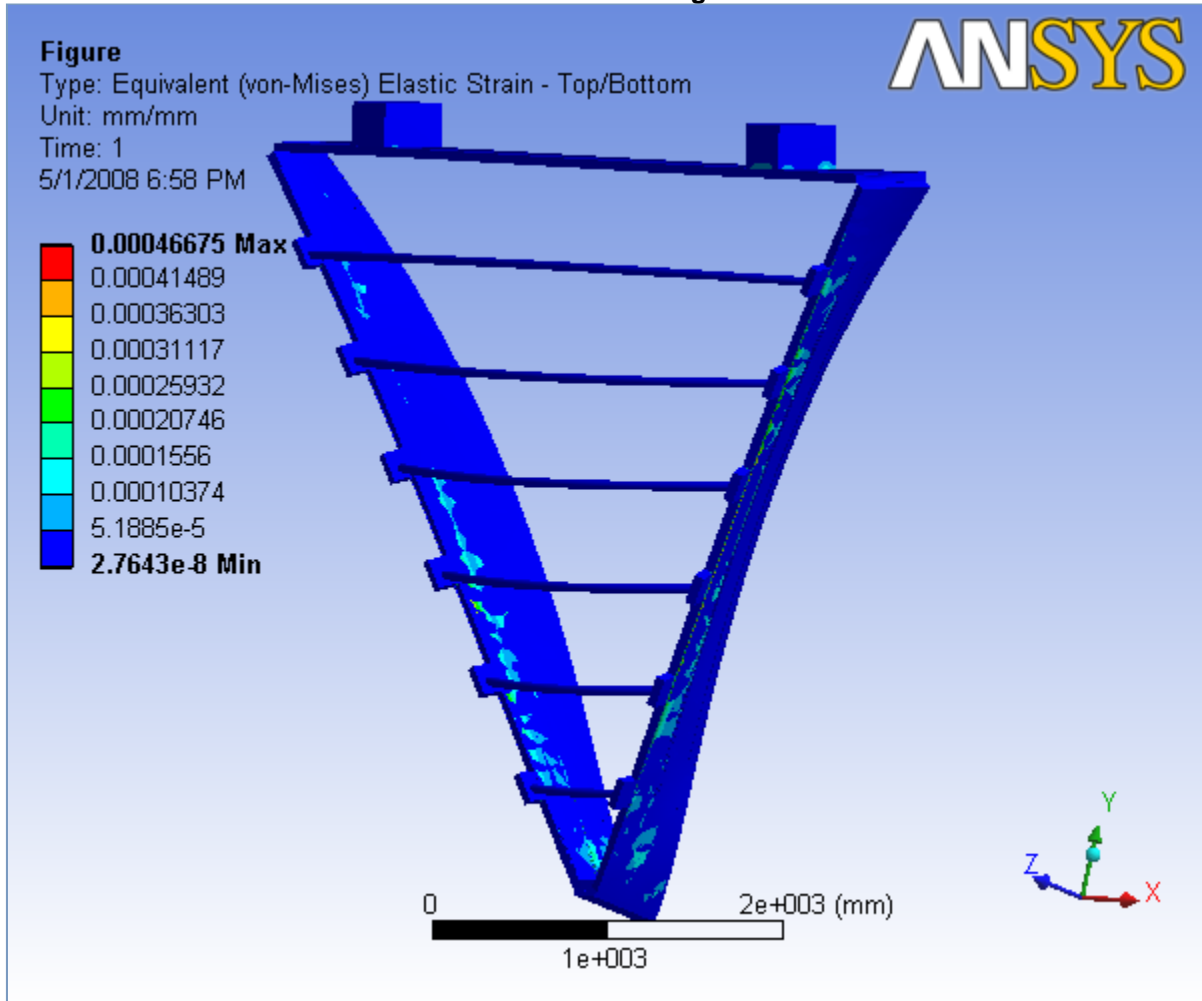
**TABLE 32**

**Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution > Results**

Object Name	<i>Equivalent Elastic Strain</i>
State	Solved
<b>Scope</b>	
Geometry	All Bodies
<b>Definition</b>	
Type	Equivalent (von-Mises) Elastic Strain
Shell	Top/Bottom
Display Time	End Time
<b>Results</b>	
Minimum	2.7643e-008 mm/mm
Maximum	4.6675e-004 mm/mm
Minimum Occurs On	Force ref line
Maximum Occurs On	Left Endplate Polyurethane
<b>Information</b>	
Time	1. s
Load Step	1
Substep	1
Iteration Number	1

**FIGURE 15**

Ideal Slice with Wire Tensions and Rods, No Hexcel, No Gravity > Static Structural > Solution > Equivalent Elastic Strain > Figure



## Material Data

### Aluminum

**TABLE 33**  
**Aluminum > Constants**

<b>Structural</b>	
Young's Modulus	68900 MPa
Poisson's Ratio	0.33
Density	2.7e-006 kg/mm <sup>3</sup>
Thermal Expansion	2.3e-005 1/°C
<b>Thermal</b>	
Thermal Conductivity	0. W/mm·°C
Specific Heat	0. J/kg·°C
<b>Electromagnetics</b>	
Relative Permeability	0.
Resistivity	0. Ohm-mm

### Polyurethane

**TABLE 34**  
**Polyurethane > Constants**

<b>Structural</b>	
Young's Modulus	66. MPa
Poisson's Ratio	0.3
Density	2.4e-007 kg/mm <sup>3</sup>
Thermal Expansion	6.12e-005 1/°C
<b>Thermal</b>	
Thermal Conductivity	0. W/mm·°C
Specific Heat	0. J/kg·°C
<b>Electromagnetics</b>	
Relative Permeability	0.
Resistivity	0. Ohm·mm

## **Stainless Steel**

**TABLE 35**  
**Stainless Steel > Constants**

<b>Structural</b>	
Young's Modulus	1.93e+005 MPa
Poisson's Ratio	0.3
Density	8.e-006 kg/mm <sup>3</sup>
Thermal Expansion	0. 1/°C
<b>Thermal</b>	
Thermal Conductivity	1.63e-002 W/mm·°C
Specific Heat	500. J/kg·°C
<b>Electromagnetics</b>	
Relative Permeability	0.
Resistivity	0. Ohm·mm

## **Carbon fiber**

**TABLE 36**  
**Carbon fiber > Constants**

<b>Structural</b>	
Young's Modulus	1.5e+005 MPa
Poisson's Ratio	0.3
Density	5.8e-007 kg/mm <sup>3</sup>
Thermal Expansion	0. 1/°C
<b>Thermal</b>	
Thermal Conductivity	0. W/mm·°C
Specific Heat	0. J/kg·°C
<b>Electromagnetics</b>	
Relative Permeability	0.
Resistivity	0. Ohm·mm