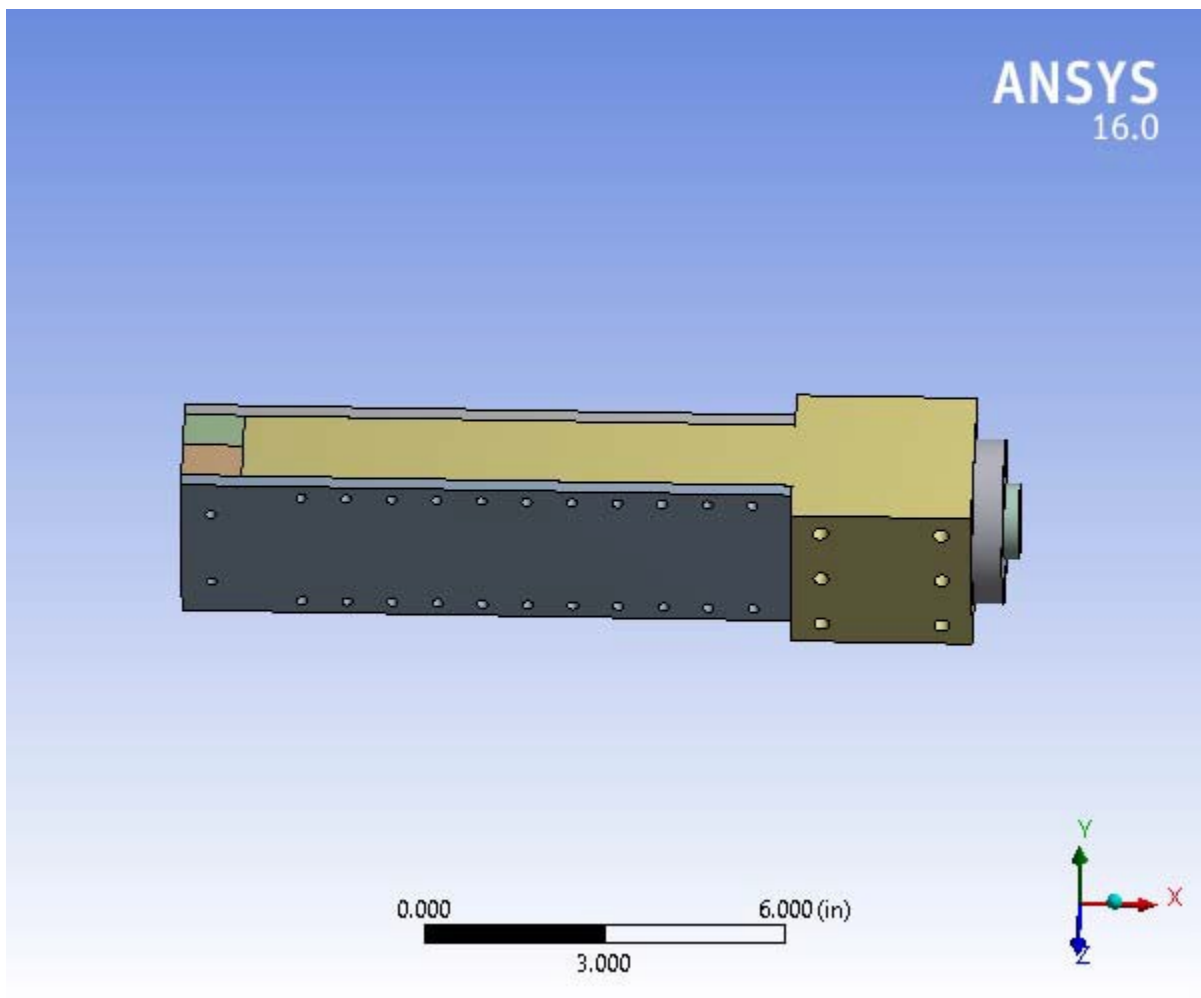




TGT-CALC-103-007

Author	Dave Meekins
Number	TGT-CALC-103-007
Revision	0
Applicable Code	ASME B31.3 (2012)



Units

TABLE 1

Unit System	U.S. Customary (in, lbm, lbf, s, V, A) Degrees rad/s Fahrenheit
Angle	Degrees

Rotational Velocity	rad/s
Temperature	Fahrenheit

Model/Assumptions

TGT-CALC-103-007

Elastic-plastic model of cell with shipping covers. The design pressure of the assembly in the configuration is 1000 psi. This is required for the fill line design pressure/relief at SRS. These covers will remain installed for shipping/handling and are removed only for beam operations. Model is in compliance with ASME BPVC VIII D2 Part 5.2.4 and 5.3.3 with the load factor of 3 for pressure to be consistent with ASME B31.3 (2012) basis.

The applicable Code is ASME B31.3 (2013)

Assumptions:

- Design Pressure is 1000 psi
- Material model is from MPDB
- Bolted connections are bonded and reaction loads are used to determine the stress on the bolts
- Surfaces that are in contact but not bolted are not assumed to be bonded
- Load Pressure assumed to be 3000 psi for elastic-plastic model

The model solves and equations 5.6 and 5.7 are satisfied (local plastic failure is not an issue). Note that there an extremely small volume where 5.7 is not satisfied but, this is acceptable and is a feature of the mesh/solver.

Model (A4)

Geometry

TABLE 2
Model (A4) > Geometry

Object Name	Geometry
State	Fully Defined
Definition	
Source	D:\Meekins\GoogleDrive\JLAB\Hall A\Trtium\Calculations\ANSYS\Shipping\ship full.stp
Type	Step
Length Unit	Meters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	13.9 in
Length Y	2.7882 in

Length Z	3. in
Properties	
Volume	78.779 in ³
Mass	7.7402 lbm
Scale Factor Value	1.
Statistics	
Bodies	7
Active Bodies	7
Nodes	96186
Elements	55400
Mesh Metric	None
Basic Geometry Options	
Solid Bodies	Yes
Surface Bodies	Yes
Line Bodies	No
Parameters	Yes
Parameter Key	DS
Attributes	No
Named Selections	No
Material Properties	No
Advanced Geometry Options	
Use Associativity	Yes
Coordinate Systems	No
Reader Mode Saves Updated File	No
Use Instances	Yes
Smart CAD Update	No
Compare Parts On Update	No
Attach File Via Temp File	Yes
Temporary Directory	C:\Users\David\AppData\Local\Temp
Analysis Type	3-D
Mixed Import Resolution	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (A4) > Geometry > Parts

Object Name	TGT-103-1000-0110	TGT-103-1000-0110	TGT-103-1000-0106	TGT-103-1000-0106	TGT-103-1000-0109	TGT-103-1000-0101	TGT-103-1000-0100
State	Meshed						
Graphics Properties							
Visible	Yes						
Transparency	1						
Definition							
Suppressed	No						
Stiffness Behavior	Flexible						

Coordinate System	Default Coordinate System				
Reference Temperature	By Environment				
Material					
Assignment	7075 (UNS A97075)				
Nonlinear Effects	Yes				
Thermal Strain Effects	No				
Bounding Box					
Length X	10.15 in	1. in	3.569 in	12.668 in	3.329 in
Length Y	2.788 in		1.25 in	2.7876 in	2.75 in
Length Z	0.77315 in	0.75 in	1.25 in	3. in	2.75 in
Properties					
Volume	11.516 in ³	1.9213 in ³	0.7664 in ³	47.863 in ³	3.2739 in ³
Mass	1.1315 lbm	0.18877 lbm	7.53e-002 lbm	4.7026 lbm	0.32167 lbm
Centroid X	-6.7984 in		-11.574 in	0.58548 in	0.98433 in
Centroid Y	-3.1032 in		-3.1034 in	-3.1039 in	-3.1032 in
Centroid Z	5.8211 in	7.3043 in	6.1892 in	6.9362 in	6.5627 in
Moment of Inertia Ip1	9.5473 lbm·in ²		0.13405 lbm·in ²	0.10141 lbm·in ²	0.32514 lbm·in ²
Moment of Inertia Ip2	9.1106 lbm·in ²		2.4769e-002 lbm·in ²	0.10143 lbm·in ²	0.32514 lbm·in ²
Moment of Inertia Ip3	0.52164 lbm·in ²		0.12727 lbm·in ²	6.4176e-003 lbm·in ²	0.24803 lbm·in ²
Statistics					
Nodes	17480	1720	5777	43505	8504
Elements	9642	965	2982	26297	4907
Mesh Metric	None				

Coordinate Systems

TABLE 4
Model (A4) > Coordinate Systems > Coordinate System

Object Name	<i>Global Coordinate System</i>
State	Fully Defined
Definition	
Type	Cartesian
Coordinate System ID	0.
Origin	
Origin X	0. in
Origin Y	0. in
Origin Z	0. in
Directional Vectors	
X Axis Data	[1. 0. 0.]
Y Axis Data	[0. 1. 0.]
Z Axis Data	[0. 0. 1.]

Connections

TABLE 5
Model (A4) > Connections

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

TABLE 6
Model (A4) > Connections > Contacts

Object Name	Contacts
State	Fully Defined
Definition	
Connection Type	Contact
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Auto Detection	
Tolerance Type	Slider
Tolerance Slider	0.
Tolerance Value	3.6226e-002 in
Use Range	No
Face/Face	Yes
Face/Edge	No
Edge/Edge	No
Priority	Include All
Group By	Bodies
Search Across	Bodies
Statistics	
Connections	11
Active Connections	11

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

Object Name	Bonde d - TGT- 103- 1000- 0101 To TGT- 103- 1000- 0110	Bonde d - TGT- 103- 1000- 0110 To TGT- 103- 1000- 0101	Bonde d - TGT- 103- 1000- 0100 To TGT- 103- 1000- 0101	Bonde d - TGT- 103- 1000- 0100 To TGT- 103- 1000- 0109	Bonde d - TGT- 103- 1000- 0106 To TGT- 103- 1000- 0101	Bonde d - TGT- 103- 1000- 0106 To TGT- 103- 1000- 0101	Bonde d - TGT- 103- 1000- 0110 To TGT- 103- 1000- 0101	Bonde d - TGT- 103- 1000- 0101 To TGT- 103- 1000- 0110	Bonde d - TGT- 103- 1000- 0101 To TGT- 103- 1000- 0106	Bonde d - TGT- 103- 1000- 0101 To TGT- 103- 1000- 0106	Bonde d - TGT- 103- 1000- 0109 To TGT- 103- 1000- 0100
State	Fully Defined										
Scope											

Scoping Method	Geometry Selection						
Contact	2 Faces	1 Face				2 Faces	10 Faces
Target	1 Face	2 Faces	1 Face	2 Faces	1 Face	2 Faces	3 Faces
Contact Bodies	TGT-103-1000-0101	TGT-103-1000-0110	TGT-103-1000-0100	TGT-103-1000-0106	TGT-103-1000-0110	TGT-103-1000-0101	TGT-103-1000-0109
Target Bodies	TGT-103-1000-0110	TGT-103-1000-0101	TGT-103-1000-0109	TGT-103-1000-0101		TGT-103-1000-0110	TGT-103-1000-0106
Definition							
Type	Bonded						
Scope Mode	Manual						
Behavior	Program Controlled						
Trim Contact	Program Controlled						
Suppressed	No						
Advanced							
Formulation	Program Controlled						
Detection Method	Program Controlled						
Penetration Tolerance	Program Controlled						
Elastic Slip Tolerance	Program Controlled						
Normal Stiffness	Program Controlled						
Update Stiffness	Program Controlled						
Pinball Region	Program Controlled						
Geometric Modification							
Contact Geometry Correction	None						
Target Geometry Correction	None						

Mesh

**TABLE 8
Model (A4) > Mesh**

Object Name	<i>Mesh</i>
State	Solved
Display	
Display Style	Body Color
Defaults	
Physics Preference	Mechanical
Relevance	0
Sizing	
Use Advanced Size Function	Off
Relevance Center	Coarse
Element Size	Default
Initial Size Seed	Active Assembly
Smoothing	Medium
Transition	Fast
Span Angle Center	Coarse
Minimum Edge Length	6.5449e-002 in
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
Patch Conforming Options	
Triangle Surface Mesher	Program Controlled
Patch Independent Options	
Topology Checking	No
Advanced	
Number of CPUs for Parallel Part Meshing	Program Controlled
Shape Checking	Standard Mechanical
Element Midside Nodes	Program Controlled
Straight Sided Elements	No
Number of Retries	Default (4)
Extra Retries For Assembly	Yes
Rigid Body Behavior	Dimensionally Reduced
Mesh Morphing	Disabled
Defeaturing	
Pinch Tolerance	Please Define
Generate Pinch on Refresh	No
Automatic Mesh Based Defeaturing	On
Defeaturing Tolerance	Default
Statistics	
Nodes	96186
Elements	55400
Mesh Metric	None

Static Structural (A5)

TABLE 9
Model (A4) > Analysis

Object Name	<i>Static Structural (A5)</i>
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Static Structural
Solver Target	Mechanical APDL
Options	
Environment Temperature	71.6 °F
Generate Input Only	No

TABLE 10
Model (A4) > Static Structural (A5) > Analysis Settings

Object Name	<i>Analysis Settings</i>
State	Fully Defined
Restart Analysis	
Restart Type	Program Controlled
Status	Done
Step Controls	
Number Of Steps	1.
Current Step Number	1.
Step End Time	1. s
Auto Time Stepping	On
Define By	Substeps
Initial Substeps	1.
Minimum Substeps	1.
Maximum Substeps	20.
Solver Controls	
Solver Type	Direct
Weak Springs	Program Controlled
Solver Pivot Checking	Program Controlled
Large Deflection	On
Inertia Relief	Off
Restart Controls	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	Yes
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	Constant
--Method	Energy
--Energy Dissipation Ratio	1.e-004
--Activation For First Substep	No
--Stabilization Force Limit	0.2
Output Controls	
Stress	Yes
Strain	Yes
Nodal Forces	Yes
Contact Miscellaneous	Yes
General Miscellaneous	Yes
Store Results At	All Time Points
Analysis Data Management	
Solver Files Directory	D:\Meekins\GoogleDrive\JLAB\Hall A\Trtium\Calculations\ANSYS\Shipping\Shipping Cov_files\dp0\SYS\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Delete Unneeded Files	No
Nonlinear Solution	Yes
Solver Units	Manual
Solver Unit System	Bin

TABLE 11
Model (A4) > Static Structural (A5) > Loads

Object Name	<i>Fixed Support</i>	<i>Pressure</i>	<i>Pressure 2</i>
State	Fully Defined		
Scope			
Scoping Method	Geometry Selection		
Geometry	1 Face	3 Faces	4 Faces
Definition			
Type	Fixed Support	Pressure	
Suppressed	No		
Define By		Normal To	
Magnitude		3000. psi (ramped)	

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

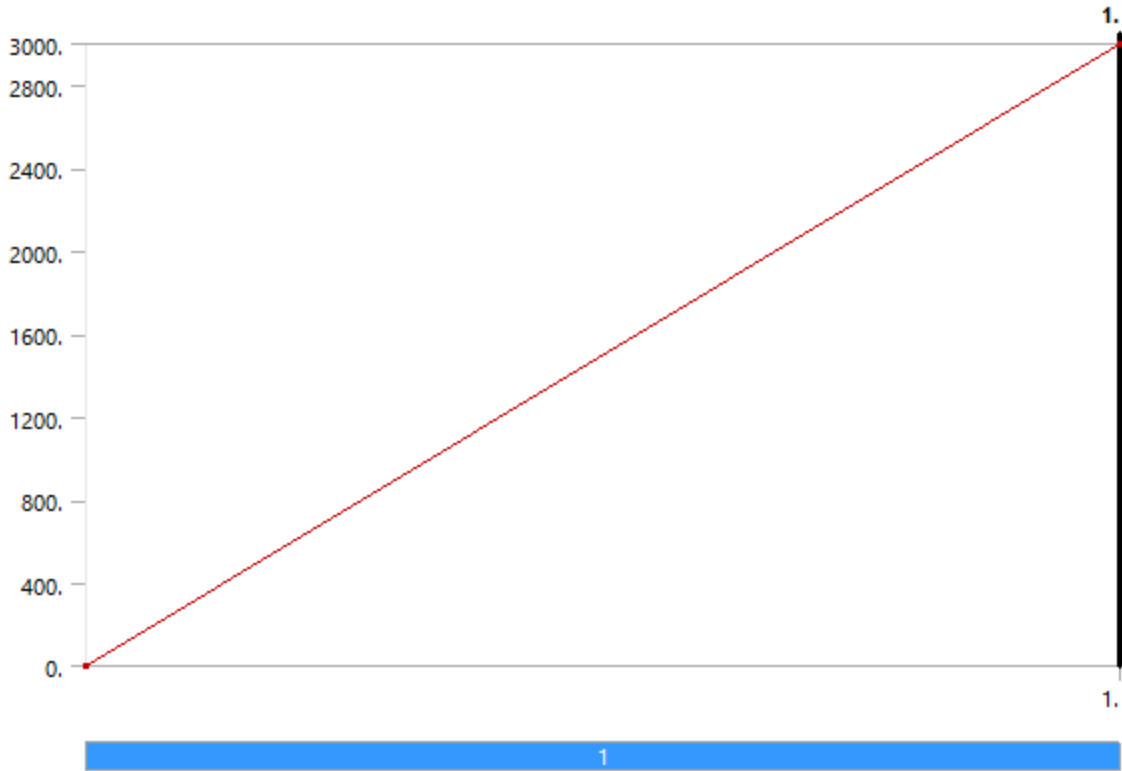
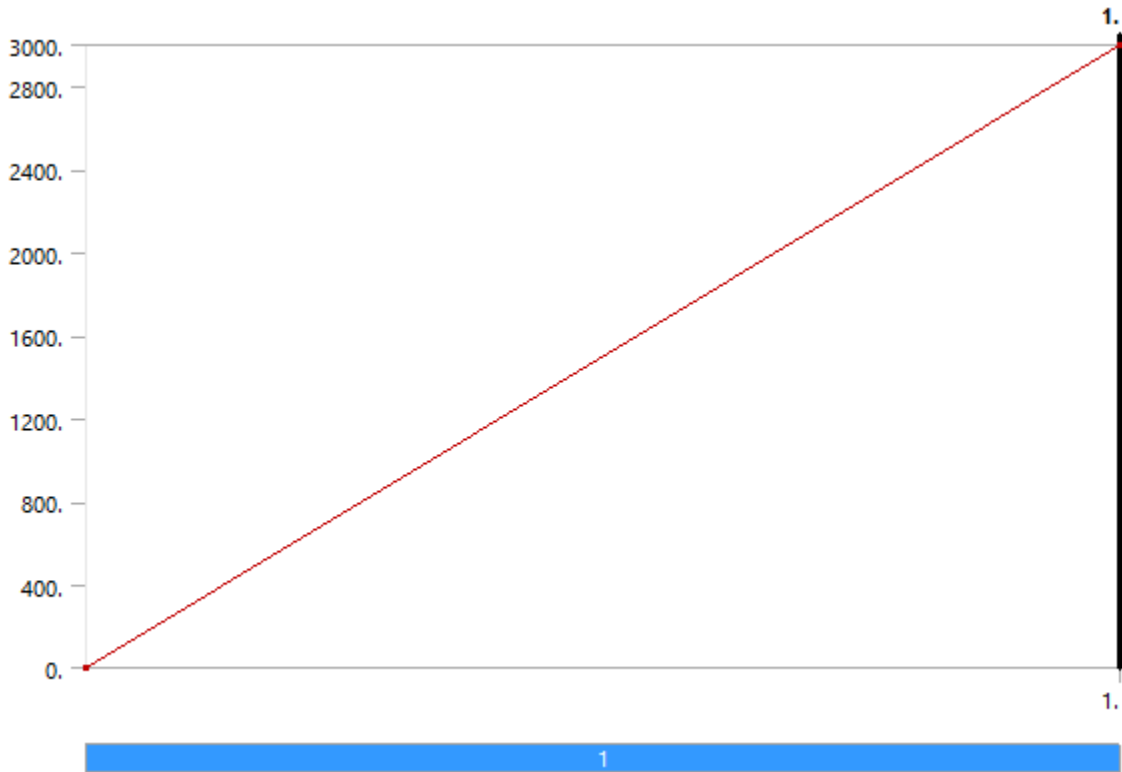


FIGURE 2
Model (A4) > Static Structural (A5) > Pressure 2



Solution (A6)

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

Object Name	<i>Solution (A6)</i>
State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	
Status	Done
Post Processing	
Calculate Beam Section Results	No

TABLE 13
Model (A4) > Static Structural (A5) > Solution (A6) > Solution Information

Object Name	<i>Solution Information</i>
State	Solved
Solution Information	
Solution Output	Solver Output
Newton-Raphson Residuals	0
Update Interval	0. 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

Total Deformation

TABLE 14
Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation > Results

Object Name	<i>Total Deformation</i>
State	Solved
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Total Deformation
By	Time
Display Time	Last
Calculate Time History	Yes
Identifier	
Suppressed	No

Results	
Minimum	0. in
Maximum	1.2051e-002 in
Minimum Occurs On	TGT-103-1000-0101
Maximum Occurs On	TGT-103-1000-0101
Minimum Value Over Time	
Minimum	0. in
Maximum	0. in
Maximum Value Over Time	
Minimum	8.495e-004 in
Maximum	1.2051e-002 in
Information	
Time	1. s
Load Step	1
Substep	7
Iteration Number	30

FIGURE 3

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

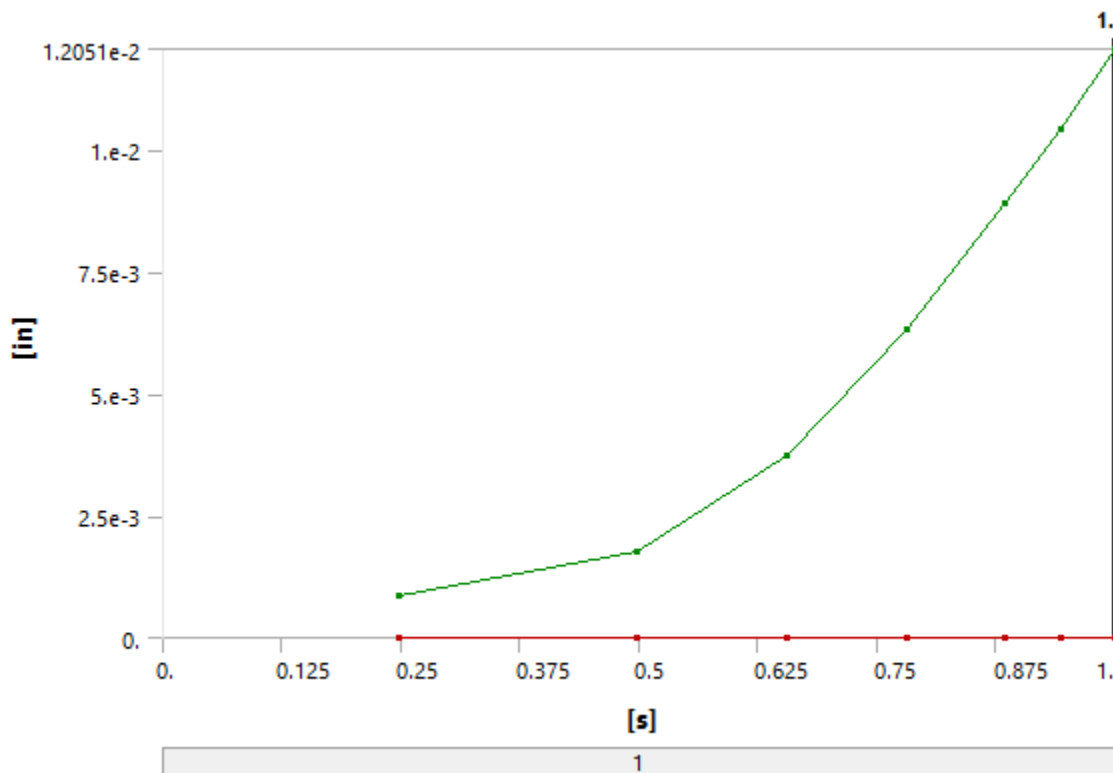


TABLE 15

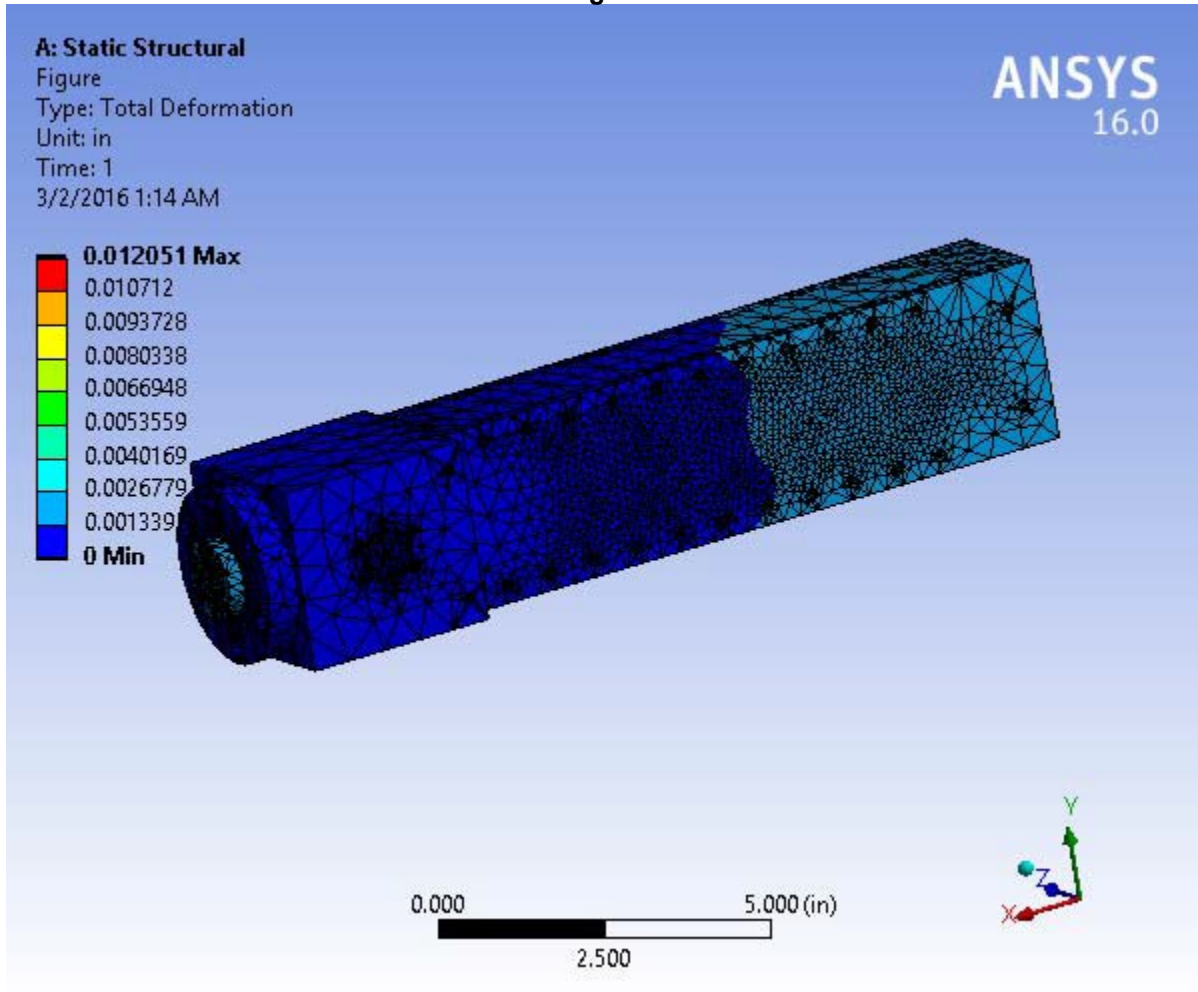
Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation > Total Deformation

Time [s]	Minimum [in]	Maximum [in]
0.24866		8.495e-004
0.49732	0.	1.7684e-003
0.65639		3.7243e-003

0.78105		6.3267e-003
0.88509		8.8762e-003
0.94255		1.0413e-002
1.		1.2051e-002

FIGURE 4

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



Equivalent (von-Mises) Stress

TABLE 16

Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent (von-Mises) Stress > Results

Object Name	<i>Equivalent Stress</i>
State	Solved
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Equivalent (von-Mises) Stress

By	Time
Display Time	Last
Calculate Time History	Yes
Identifier	
Suppressed	No
Integration Point Results	
Display Option	Averaged
Average Across Bodies	No
Results	
Minimum	8.1019 psi
Maximum	31709 psi
Minimum Occurs On	TGT-103-1000-0106
Maximum Occurs On	TGT-103-1000-0101
Minimum Value Over Time	
Minimum	1.6083 psi
Maximum	8.1019 psi
Maximum Value Over Time	
Minimum	11198 psi
Maximum	31709 psi
Information	
Time	1. s
Load Step	1
Substep	7
Iteration Number	30

FIGURE 5
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent (von-Mises) Stress > Equivalent Stress

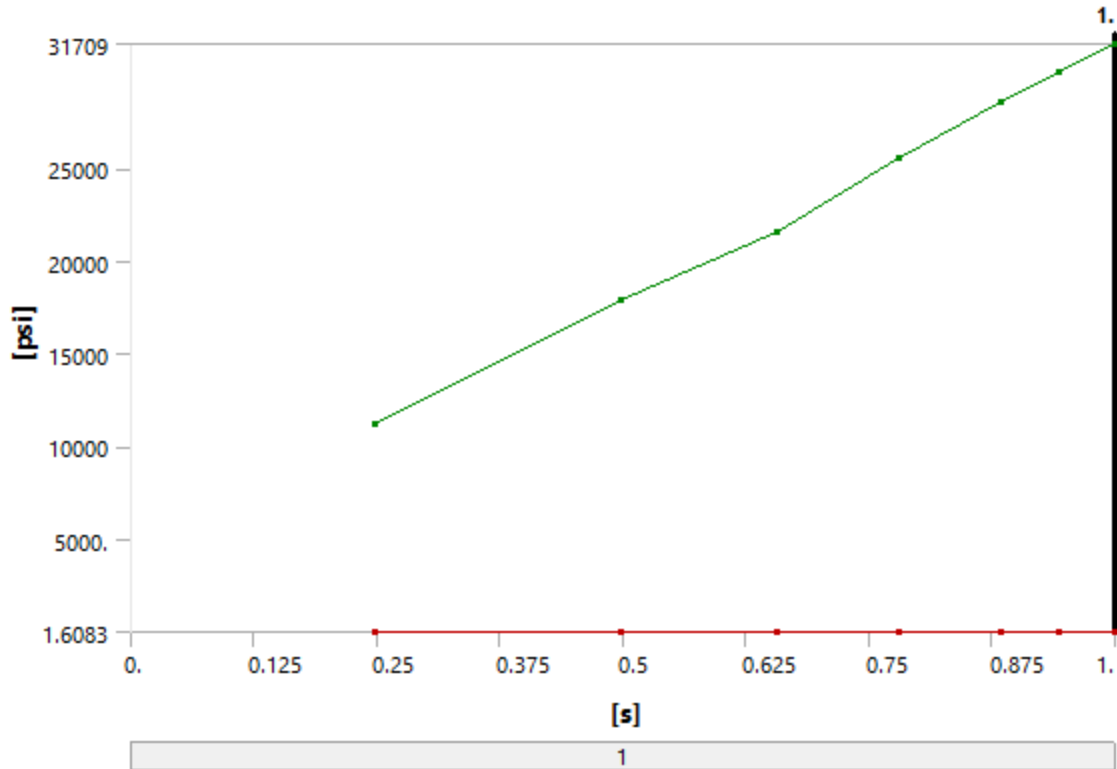


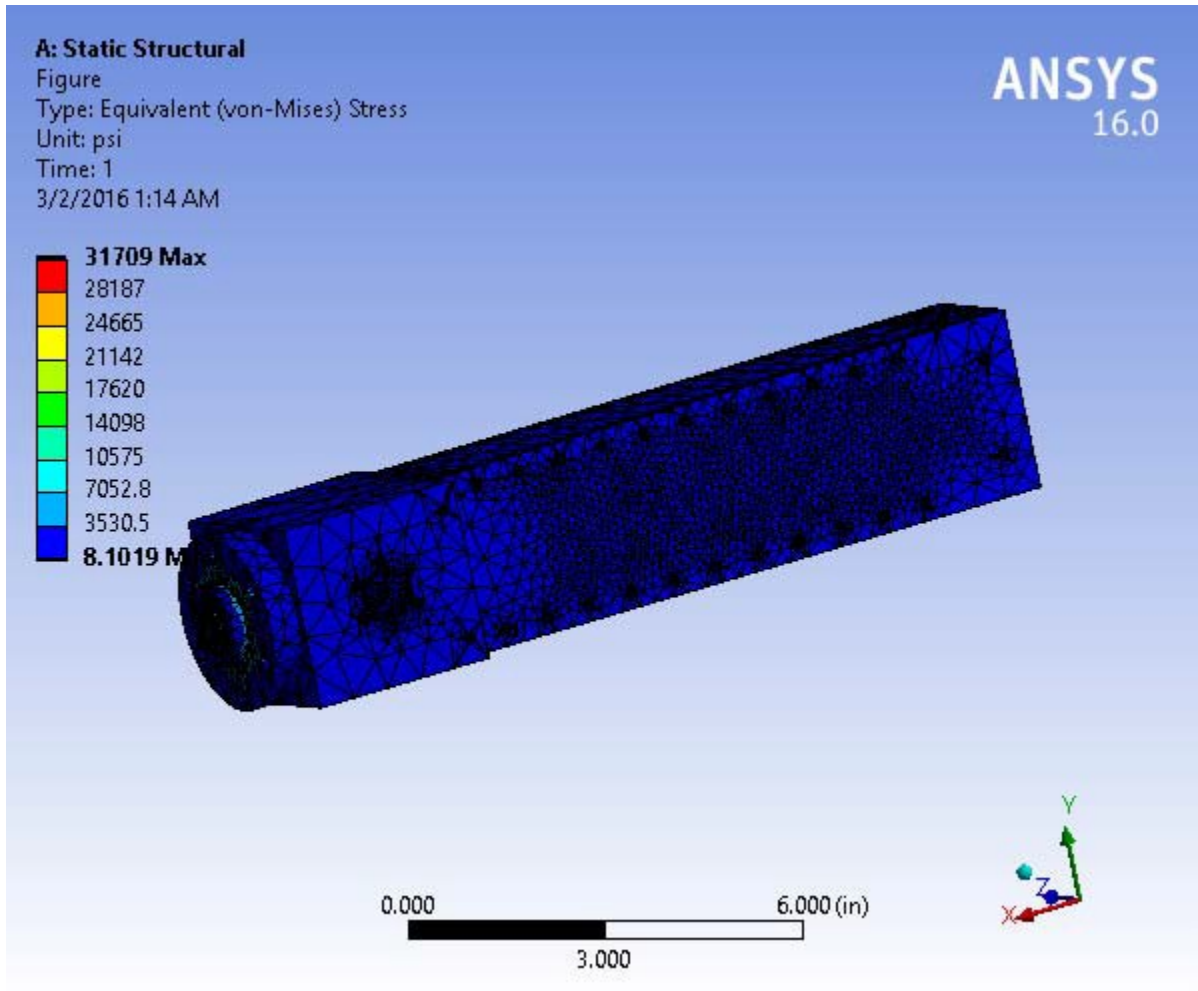
TABLE 17

Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent (von-Mises) Stress > Equivalent Stress

Time [s]	Minimum [psi]	Maximum [psi]
0.24866	1.6083	11198
0.49732	3.2463	17880
0.65639	4.9803	21580
0.78105	6.6301	25563
0.88509	7.5558	28634
0.94255	7.7772	30216
1.	8.1019	31709

FIGURE 6

Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent (von-Mises) Stress > Equivalent Stress > Figure



Maximum Principal Stress

TABLE 18
Model (A4) > Static Structural (A5) > Solution (A6) > Maximum Principal Stress > Results

Object Name	Maximum Principal Stress
State	Solved
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Maximum Principal Stress
By	Time
Display Time	Last
Calculate Time History	Yes
Identifier	
Suppressed	No
Integration Point Results	
Display Option	Averaged
Average Across Bodies	No

Results	
Minimum	-7427.4 psi
Maximum	35827 psi
Minimum Occurs On	TGT-103-1000-0101
Maximum Occurs On	TGT-103-1000-0101
Minimum Value Over Time	
Minimum	-7427.4 psi
Maximum	-1738.1 psi
Maximum Value Over Time	
Minimum	11781 psi
Maximum	35827 psi
Information	
Time	1. s
Load Step	1
Substep	7
Iteration Number	30

FIGURE 7
Model (A4) > Static Structural (A5) > Solution (A6) > Maximum Principal Stress > Maximum Principal Stress

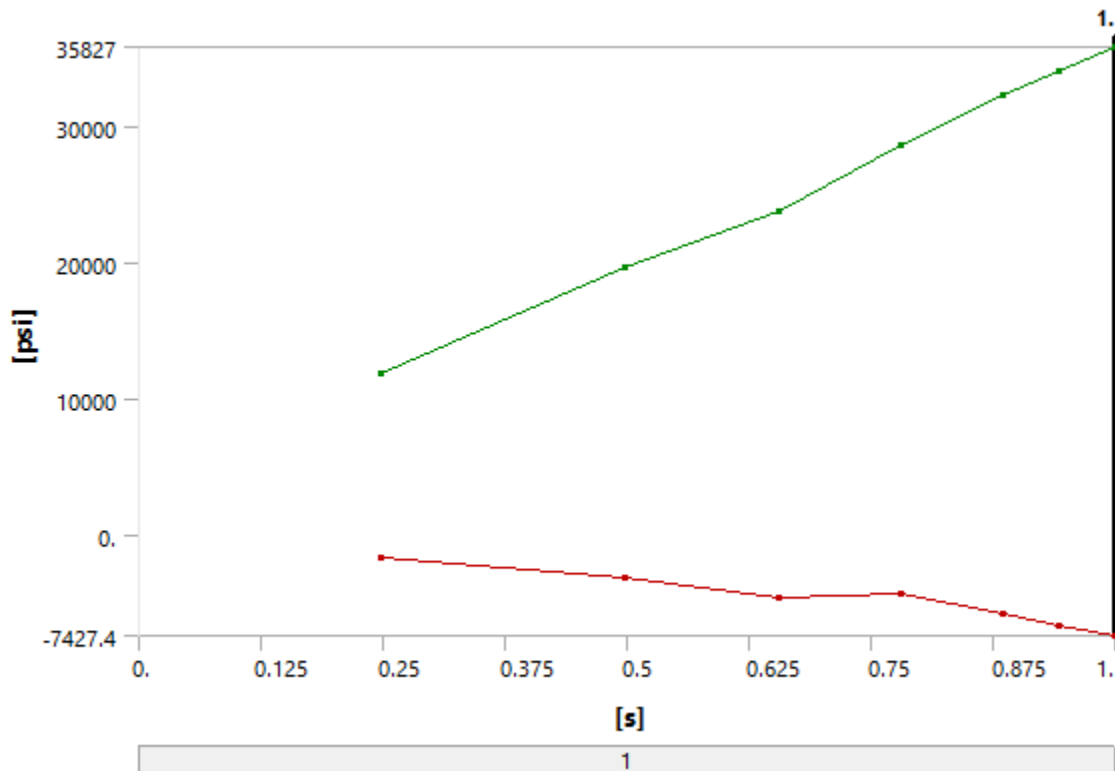
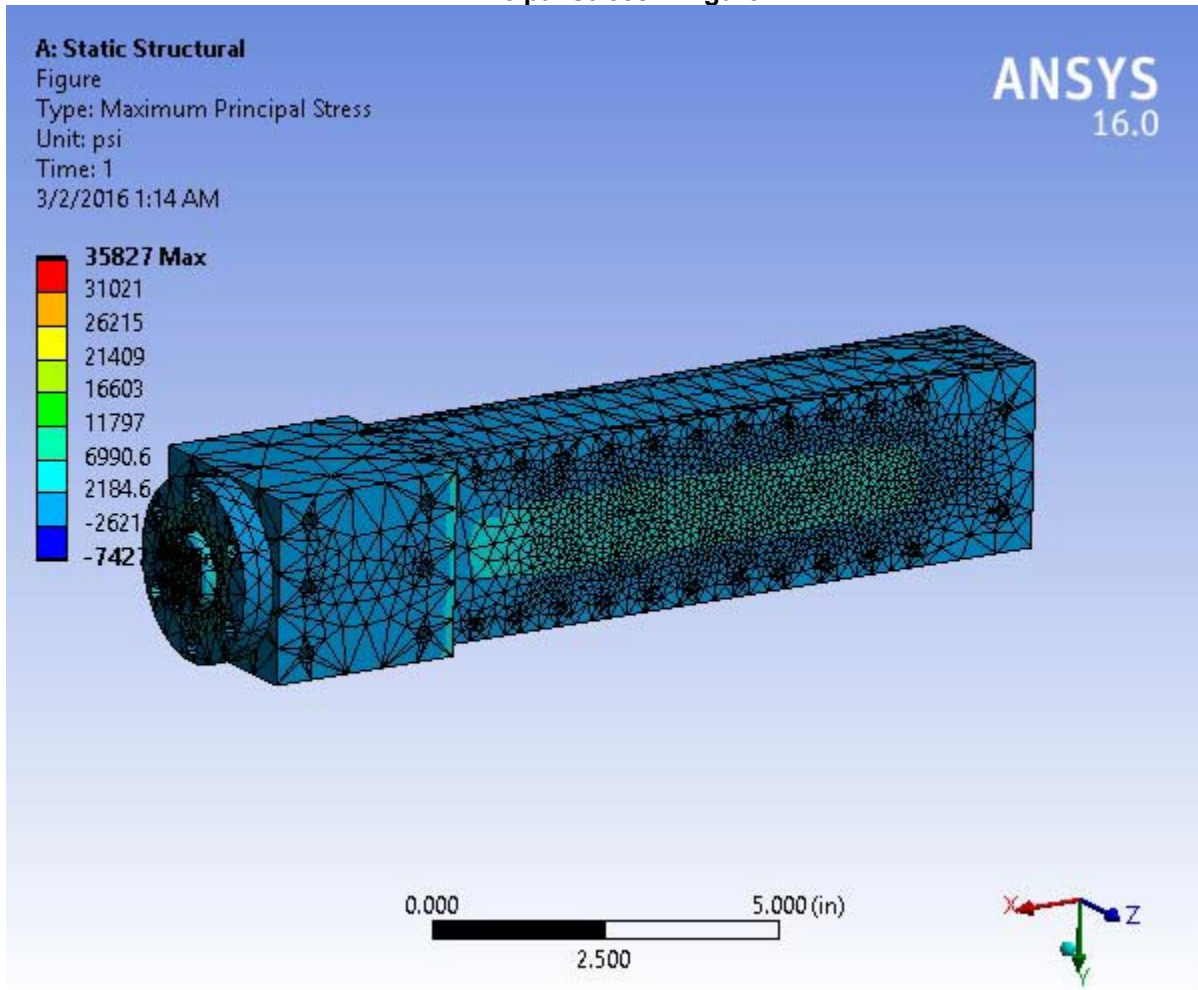


TABLE 19
Model (A4) > Static Structural (A5) > Solution (A6) > Maximum Principal Stress > Maximum Principal Stress

Time [s]	Minimum [psi]	Maximum [psi]
0.24866	-1738.1	11781

0.49732	-3133.9	19689
0.65639	-4615.8	23825
0.78105	-4386.3	28592
0.88509	-5833.8	32255
0.94255	-6618.3	34104
1.	-7427.4	35827

FIGURE 8
Model (A4) > Static Structural (A5) > Solution (A6) > Maximum Principal Stress > Maximum Principal Stress > Figure



Maximum Shear Stress

TABLE 20
Model (A4) > Static Structural (A5) > Solution (A6) > Maximum Shear Stress > Results

Object Name	Maximum Shear Stress
State	Solved
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies

Definition	
Type	Maximum Shear Stress
By	Time
Display Time	Last
Calculate Time History	Yes
Identifier	
Suppressed	No
Integration Point Results	
Display Option	Averaged
Average Across Bodies	No
Results	
Minimum	4.5906 psi
Maximum	18307 psi
Minimum Occurs On	TGT-103-1000-0106
Maximum Occurs On	TGT-103-1000-0101
Minimum Value Over Time	
Minimum	0.92735 psi
Maximum	4.5906 psi
Maximum Value Over Time	
Minimum	6369.1 psi
Maximum	18307 psi
Information	
Time	1. s
Load Step	1
Substep	7
Iteration Number	30

FIGURE 9
Model (A4) > Static Structural (A5) > Solution (A6) > Maximum Shear Stress > Maximum Shear Stress

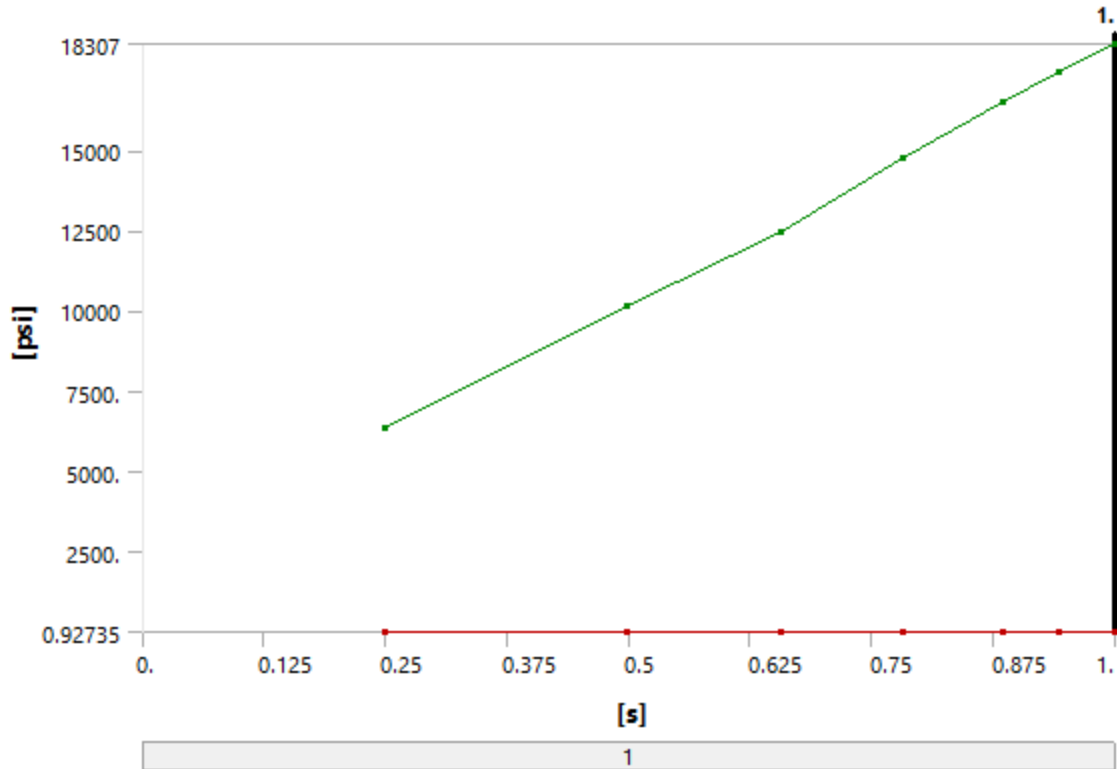
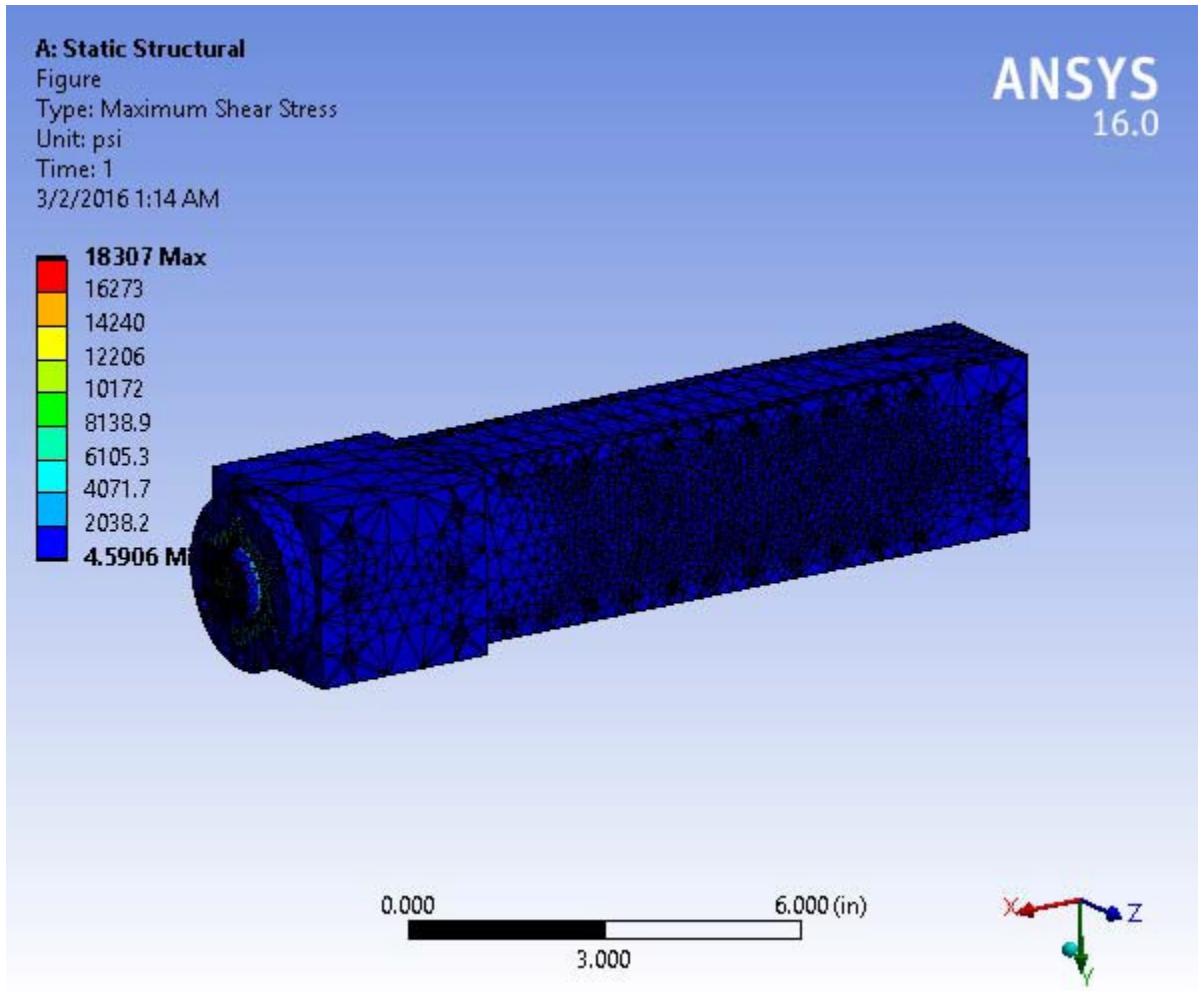


TABLE 21
Model (A4) > Static Structural (A5) > Solution (A6) > Maximum Shear Stress > Maximum Shear Stress

Time [s]	Minimum [psi]	Maximum [psi]
0.24866	0.92735	6369.1
0.49732	1.8722	10180
0.65639	2.8752	12456
0.78105	3.7628	14758
0.88509	4.2977	16531
0.94255	4.4152	17444
1.	4.5906	18307

FIGURE 10
Model (A4) > Static Structural (A5) > Solution (A6) > Maximum Shear Stress > Maximum Shear Stress > Figure



User Defined Result

TABLE 22
 Model (A4) > Static Structural (A5) > Solution (A6) > User Defined Result > $EL = 0.069 \cdot 2.72^{(-2.06 \cdot ((S1+S2+S3)/(3 \cdot SEQV) - 0.333))}$

Object Name	$EL = 0.069 \cdot 2.72^{(-2.06 \cdot ((S1+S2+S3)/(3 \cdot SEQV) - 0.333))}$	EL-EPPLEQV_RST
State	Solved	
Scope		
Scoping Method	Geometry Selection	
Geometry	All Bodies	
Definition		
Type	User Defined Result	
Expression	$= 0.069 \cdot 2.72^{(-2.06 \cdot ((S1+S2+S3)/(3 \cdot SEQV) - 0.333))}$	= EL-EPPLEQV_RST
Input Unit System	U.S. Customary (in, lbm, lbf, °F, s, V, A)	
Output Unit		
By	Time	
Display Time	Last	
Coordinate System	Global Coordinate System	
Calculate Time History	Yes	

Identifier	EL	
Suppressed	No	
Integration Point Results		
Display Option	Averaged	
Average Across Bodies	No	
Results		
Minimum	6.0322e-005	-8.083e-003
Maximum	1.8713e+016	
Minimum Occurs On	TGT-103-1000-0110	TGT-103-1000-0101
Maximum Occurs On	TGT-103-1000-0109	
Minimum Value Over Time		
Minimum	1.0418e-006	-8.083e-003
Maximum	6.0322e-005	4.9765e-006
Maximum Value Over Time		
Minimum	1.8713e+016	
Maximum	2.7008e+016	
Information		
Time	1. s	
Load Step	1	
Substep	7	
Iteration Number	30	

FIGURE 11
Model (A4) > Static Structural (A5) > Solution (A6) > User Defined Result > EL = 0.069*2.72^(-2.06*((S1+S2+S3)/(3*SEQV)-0.333))

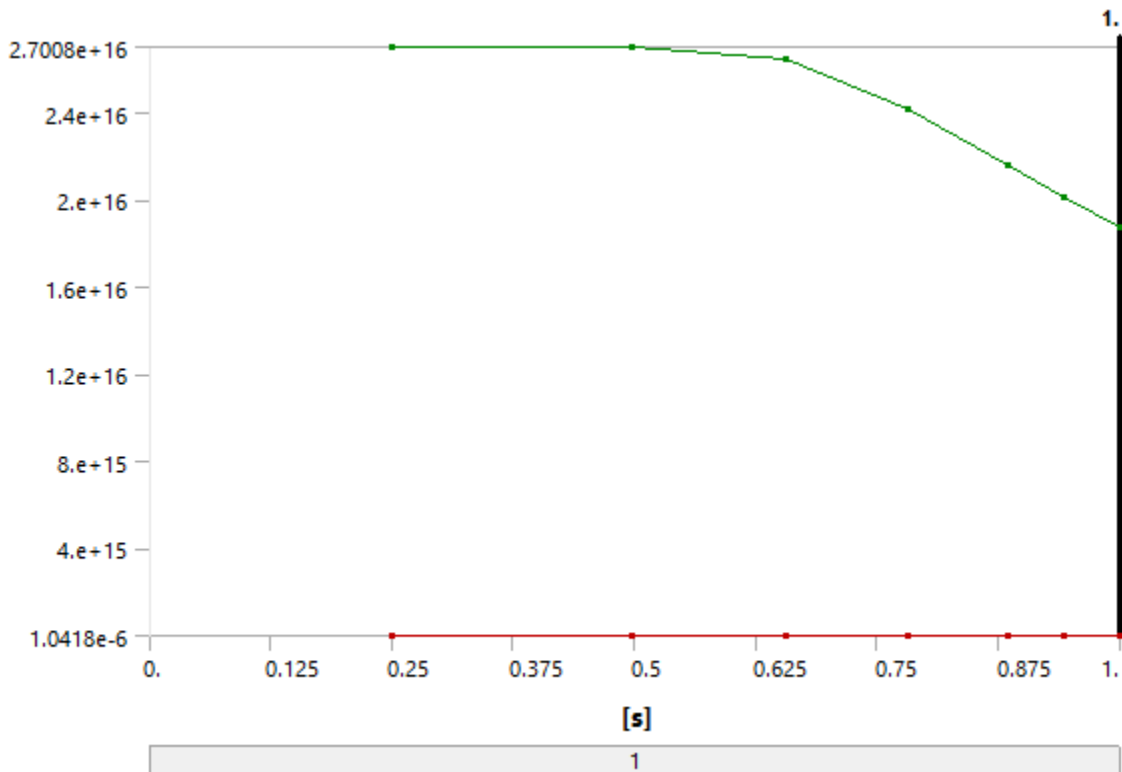


TABLE 23

Model (A4) > Static Structural (A5) > Solution (A6) > User Defined Result > EL = 0.069*2.72^(-2.06*((S1+S2+S3)/(3*SEQV)-0.333))

Time [s]	Minimum	Maximum
0.24866	4.9765e-006	2.697e+016
0.49732	4.6891e-006	2.7008e+016
0.65639	1.0418e-006	2.6425e+016
0.78105	4.1448e-006	2.4171e+016
0.88509	1.7874e-005	2.1573e+016
0.94255	3.5396e-005	2.0162e+016
1.	6.0322e-005	1.8713e+016

FIGURE 12

Model (A4) > Static Structural (A5) > Solution (A6) > User Defined Result > EL = 0.069*2.72^(-2.06*((S1+S2+S3)/(3*SEQV)-0.333)) > Figure

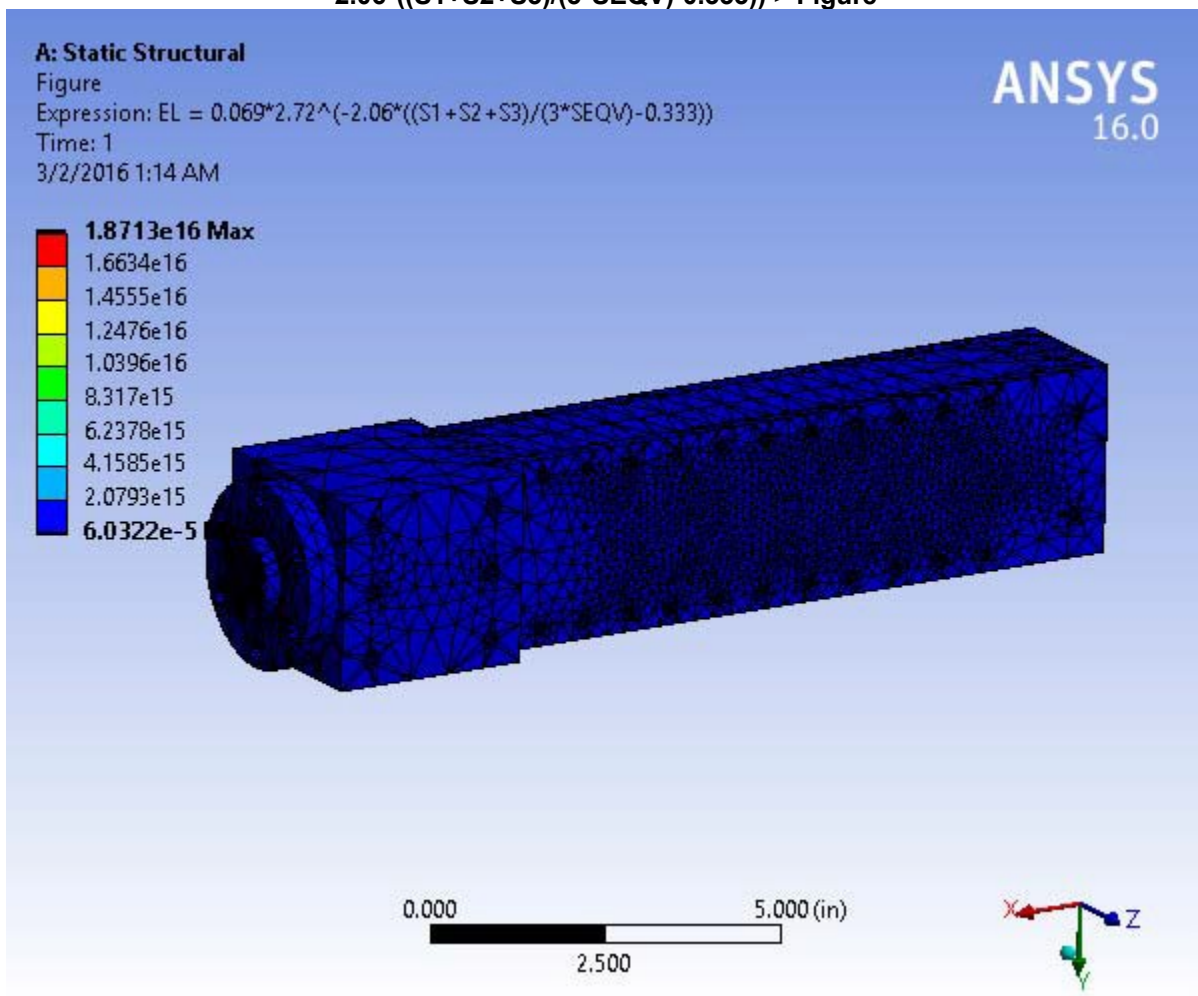


FIGURE 13

Model (A4) > Static Structural (A5) > Solution (A6) > User Defined Result > EL-EPPLEQV_RST

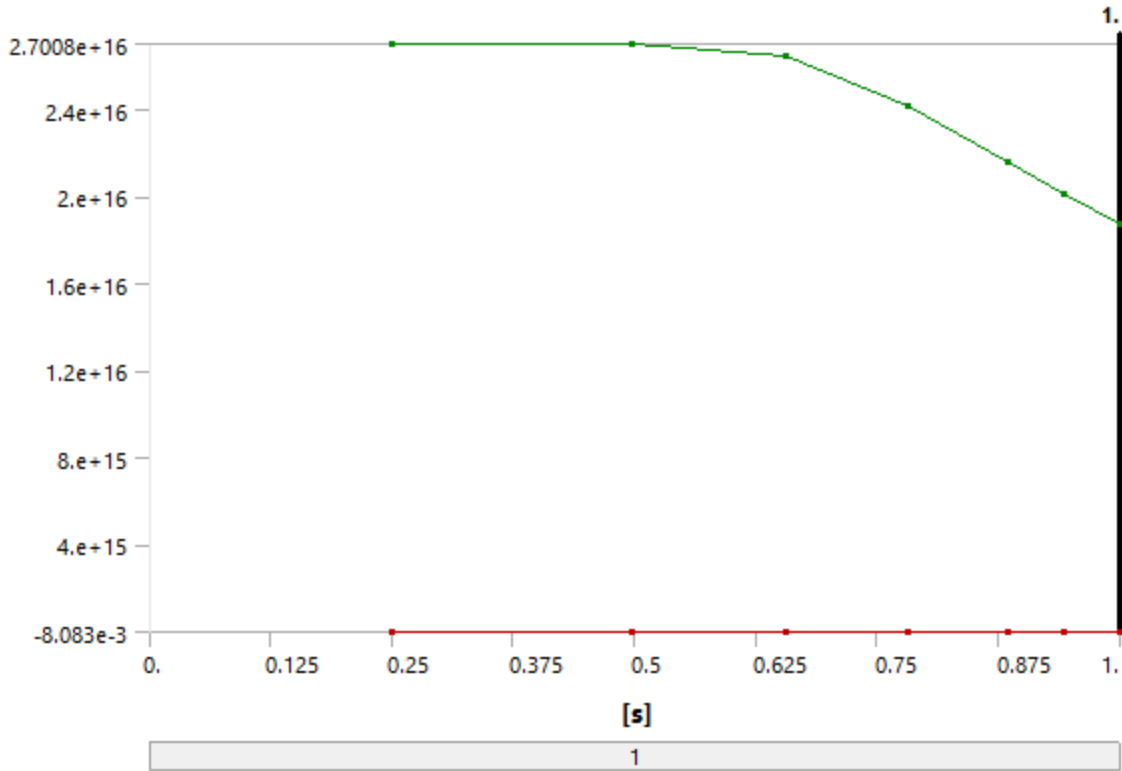


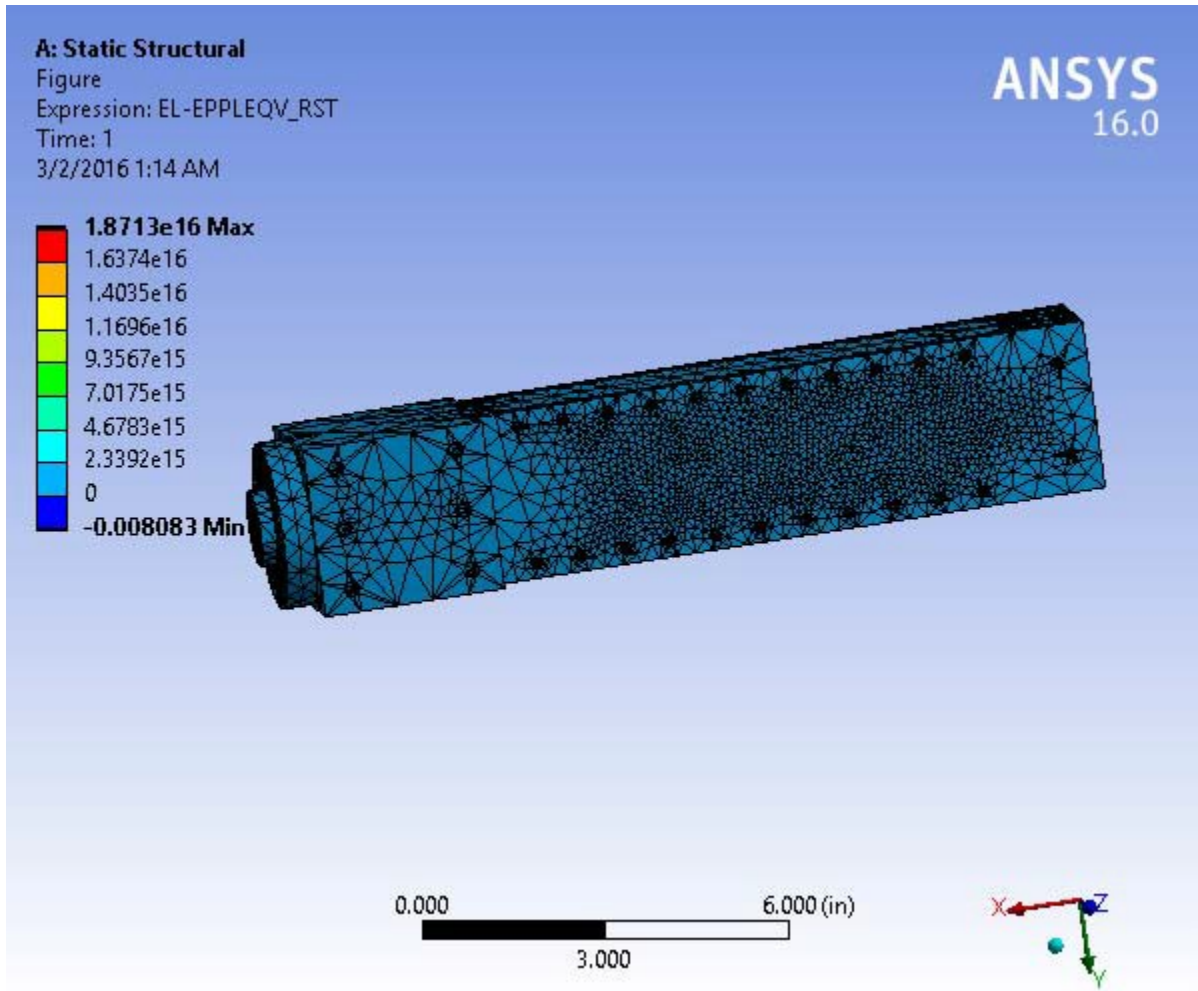
TABLE 24

Model (A4) > Static Structural (A5) > Solution (A6) > User Defined Result > EL-EPPLEQV_RST

Time [s]	Minimum	Maximum
0.24866	4.9765e-006	2.697e+016
0.49732	4.6891e-006	2.7008e+016
0.65639	1.0418e-006	2.6425e+016
0.78105	4.1448e-006	2.4171e+016
0.88509	-1.9045e-004	2.1573e+016
0.94255	-4.1391e-003	2.0162e+016
1.	-8.083e-003	1.8713e+016

FIGURE 14

Model (A4) > Static Structural (A5) > Solution (A6) > User Defined Result > EL-EPPLEQV_RST > Figure



Force Reaction

TABLE 25
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > Probes

Object Name	All - Force Reaction - Bonded - TGT-103-1000-0101 To TGT-103-1000-0110 - Contact (Underlying Element)	All - Force Reaction - Bonded - TGT-103-1000-0110 To TGT-103-1000-0101 - Contact (Underlying Element)	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0101 - Contact (Underlying Element)	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0109 - Contact (Underlying Element)	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element)	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element)
State	Solved					
Definition						
Type	Force Reaction					
Location Method	Contact Region					

Contact Region	Bonded - TGT-103-1000-0101 To TGT-103-1000-0110	Bonded - TGT-103-1000-0110 To TGT-103-1000-0101	Bonded - TGT-103-1000-0100 To TGT-103-1000-0101	Bonded - TGT-103-1000-0100 To TGT-103-1000-0109	Bonded - TGT-103-1000-0106 To TGT-103-1000-0101	
Orientation	Global Coordinate System					
Extraction	Contact (Underlying Element)					
Suppressed	No					
Options						
Result Selection	All					
Display Time	End Time					
Results						
X Axis	26.05 lbf	58.673 lbf	-6410.8 lbf	373.64 lbf	234.93 lbf	233.36 lbf
Y Axis	0.42821 lbf	-12.689 lbf	6.5561e-003 lbf	13.251 lbf	7.1337 lbf	-7.0315 lbf
Z Axis	4.774e-002 lbf	-3692.9 lbf	-1.4279 lbf	6.6897 lbf	-375.93 lbf	333.67 lbf
Total	26.053 lbf	3693.4 lbf	6410.8 lbf	373.93 lbf	443.35 lbf	407.23 lbf
Maximum Value Over Time						
X Axis	26.05 lbf	58.673 lbf	-1594.9 lbf	373.64 lbf	234.93 lbf	233.36 lbf
Y Axis	0.4583 lbf	-5.8322 lbf	6.5561e-003 lbf	13.251 lbf	7.1337 lbf	-1.7077 lbf
Z Axis	4.774e-002 lbf	-920.3 lbf	-8.9804e-002 lbf	6.6897 lbf	-94.15 lbf	333.67 lbf
Total	26.053 lbf	3693.4 lbf	6410.8 lbf	373.93 lbf	443.35 lbf	407.23 lbf
Minimum Value Over Time						
X Axis	7.2373 lbf	15.944 lbf	-6410.8 lbf	93.312 lbf	59.17 lbf	57.639 lbf
Y Axis	7.8419e-002 lbf	-26.875 lbf	2.3031e-004 lbf	3.2897 lbf	1.6265 lbf	-7.0315 lbf
Z Axis	-0.56416 lbf	-3692.9 lbf	-1.4279 lbf	1.6447 lbf	-375.93 lbf	90.926 lbf
Total	7.2432 lbf	920.46 lbf	1594.9 lbf	93.384 lbf	111.21 lbf	107.67 lbf
Information						
Time	1. s					
Load Step	1					
Substep	7					
Iteration Number	30					

FIGURE 15
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0101 To TGT-103-1000-0110 - Contact (Underlying Element)

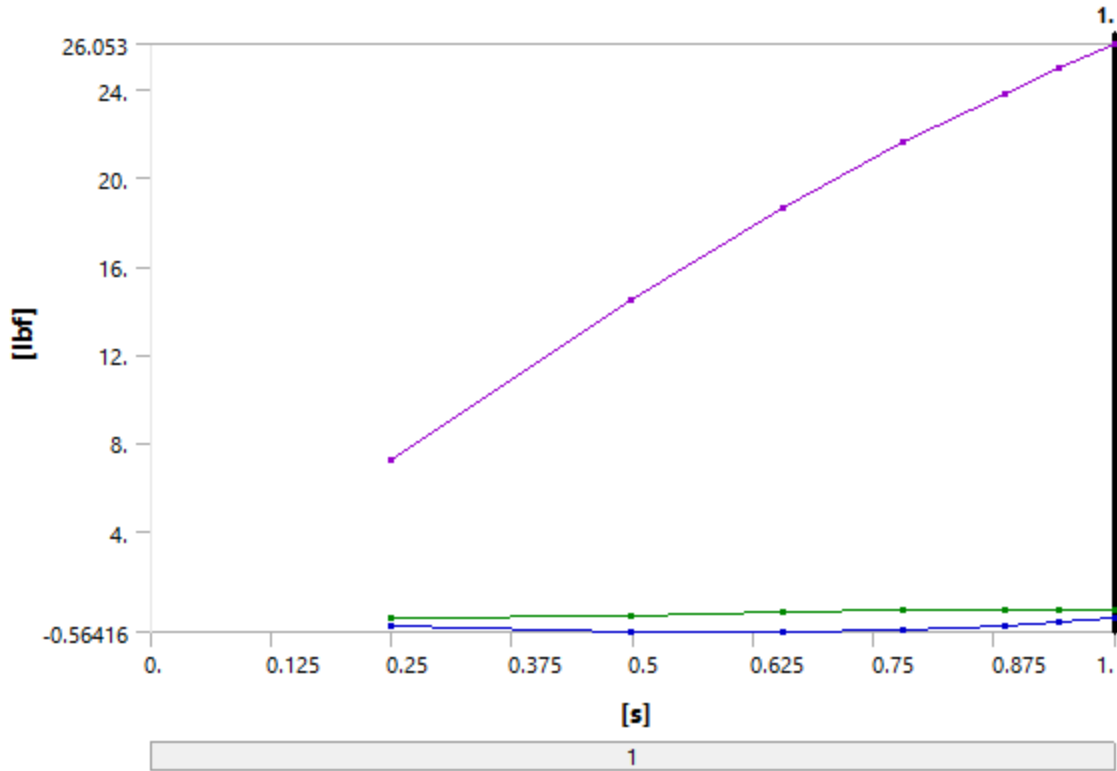


TABLE 26
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0101 To TGT-103-1000-0110 - Contact (Underlying Element)

Time [s]	All - Force Reaction - Bonded - TGT-103-1000-0101 To TGT-103-1000-0110 - Contact (Underlying Element) (X) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0101 To TGT-103-1000-0110 - Contact (Underlying Element) (Y) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0101 To TGT-103-1000-0110 - Contact (Underlying Element) (Z) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0101 To TGT-103-1000-0110 - Contact (Underlying Element) (Total) [lbf]
0.24866	7.2373	7.8419e-002	-0.28126	7.2432
0.49732	14.491	0.16977	-0.55725	14.503
0.65639	18.652	0.31522	-0.56416	18.663
0.78105	21.598	0.42448	-0.46015	21.607
0.88509	23.827	0.4583	-0.26936	23.832
0.94255	24.959	0.45223	-0.11958	24.964
1.	26.05	0.42821	4.774e-002	26.053

FIGURE 16
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0110 To TGT-103-1000-0101 - Contact (Underlying Element)

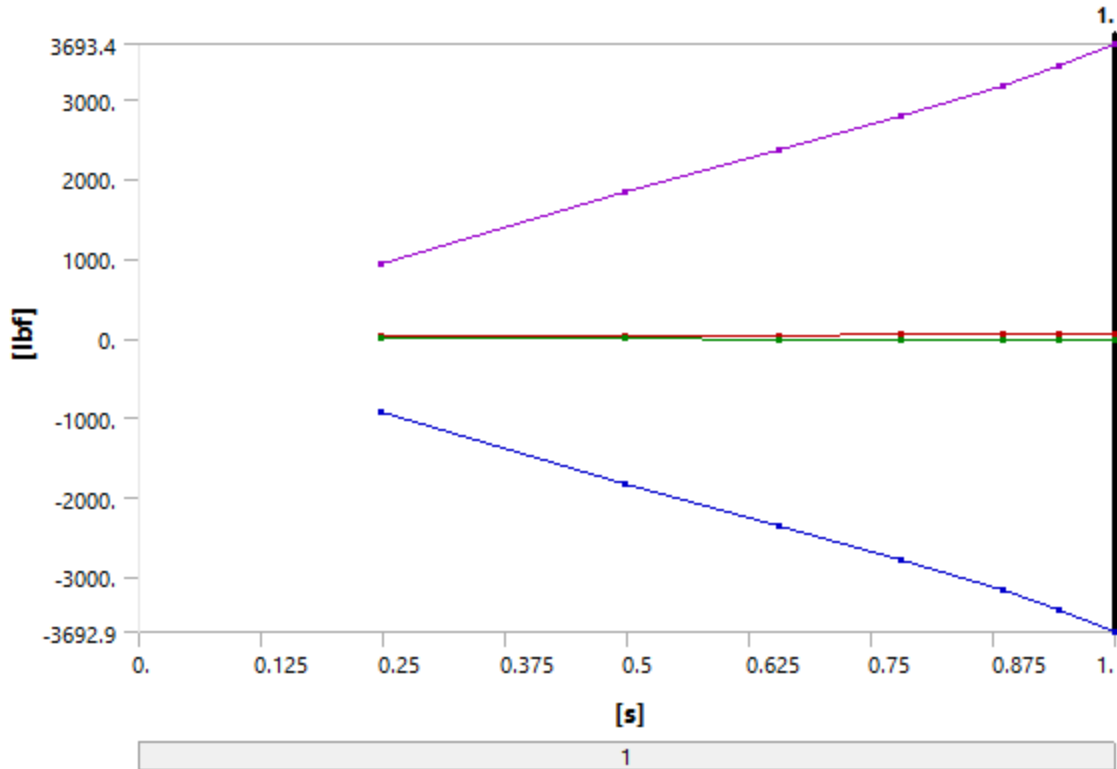


TABLE 27
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0110 To TGT-103-1000-0101 - Contact (Underlying Element)

Time [s]	All - Force Reaction - Bonded - TGT-103-1000-0110 To TGT-103-1000-0101 - Contact (Underlying Element) (X) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0110 To TGT-103-1000-0101 - Contact (Underlying Element) (Y) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0110 To TGT-103-1000-0101 - Contact (Underlying Element) (Z) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0110 To TGT-103-1000-0101 - Contact (Underlying Element) (Total) [lbf]
0.24866	15.944	-5.8322	-920.3	920.46
0.49732	31.091	-12.022	-1835.9	1836.2
0.65639	37.794	-22.795	-2368.6	2369.
0.78105	44.405	-26.875	-2781.8	2782.2
0.88509	51.078	-25.726	-3174.1	3174.6
0.94255	54.878	-19.095	-3423.	3423.5
1.	58.673	-12.689	-3692.9	3693.4

FIGURE 17
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0101 - Contact (Underlying Element)

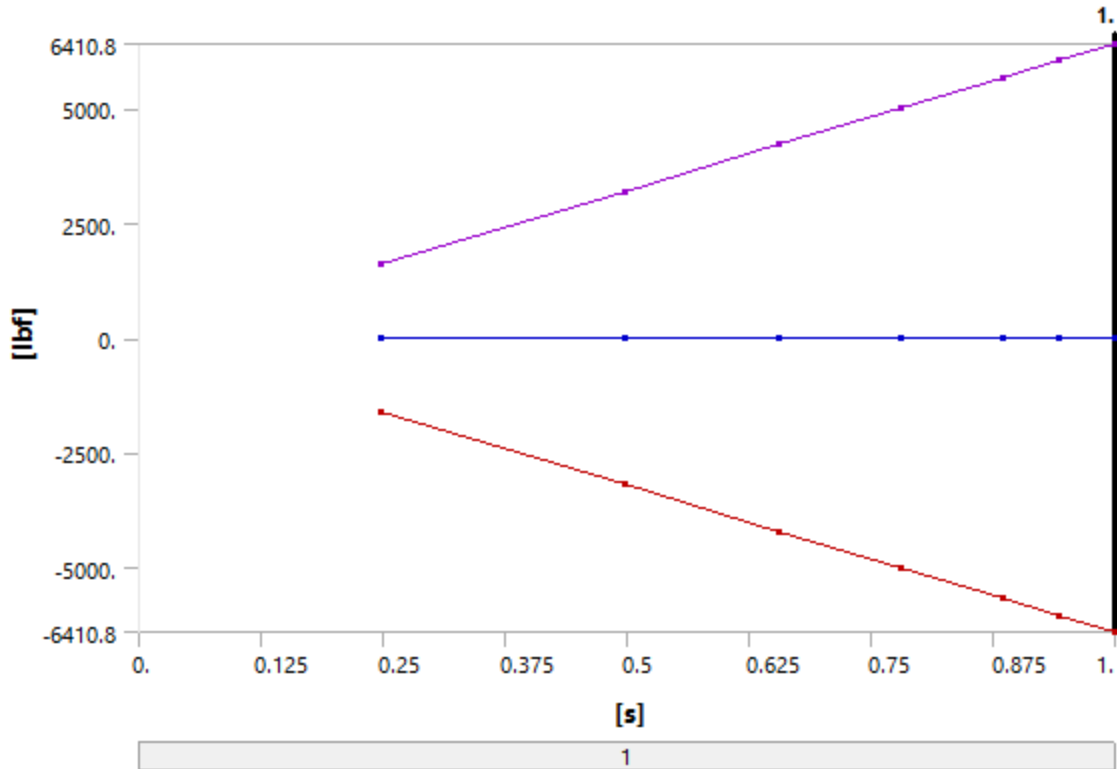


TABLE 28
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0101 - Contact (Underlying Element)

Time [s]	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0101 - Contact (Underlying Element) (X) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0101 - Contact (Underlying Element) (Y) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0101 - Contact (Underlying Element) (Z) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0101 - Contact (Underlying Element) (Total) [lbf]
0.24866	-1594.9	2.3031e-004	-8.9804e-002	1594.9
0.49732	-3189.1	1.1965e-003	-0.34206	3189.1
0.65639	-4208.8	2.1147e-003	-0.60706	4208.8
0.78105	-5007.8	3.0781e-003	-0.86563	5007.8
0.88509	-5674.6	4.3976e-003	-1.1157	5674.6
0.94255	-6042.7	5.446e-003	-1.267	6042.7
1.	-6410.8	6.5561e-003	-1.4279	6410.8

FIGURE 18
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0109 - Contact (Underlying Element)

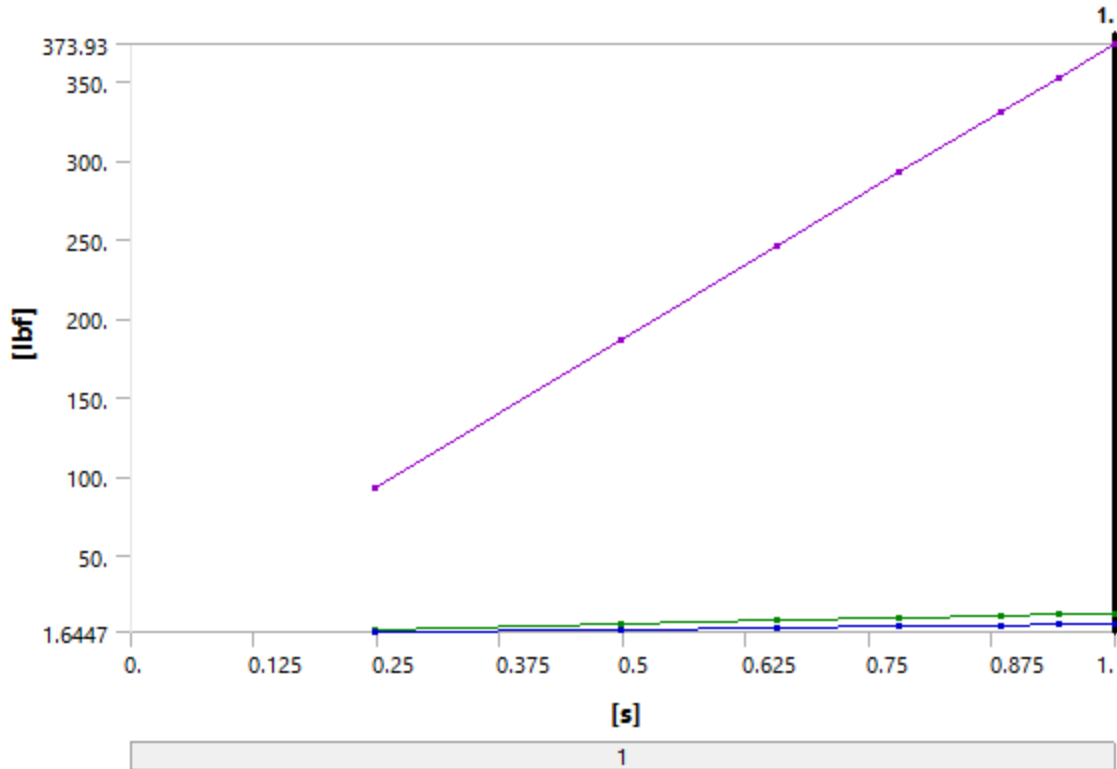


TABLE 29
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0109 - Contact (Underlying Element)

Time [s]	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0109 - Contact (Underlying Element) (X) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0109 - Contact (Underlying Element) (Y) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0109 - Contact (Underlying Element) (Z) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0100 To TGT-103-1000-0109 - Contact (Underlying Element) (Total) [lbf]
0.24866	93.312	3.2897	1.6447	93.384
0.49732	186.6	6.5785	3.2993	186.74
0.65639	246.16	8.684	4.367	246.35
0.78105	292.59	10.338	5.2063	292.82
0.88509	331.17	11.722	5.9095	331.43
0.94255	352.43	12.486	6.2989	352.7
1.	373.64	13.251	6.6897	373.93

FIGURE 19
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element)

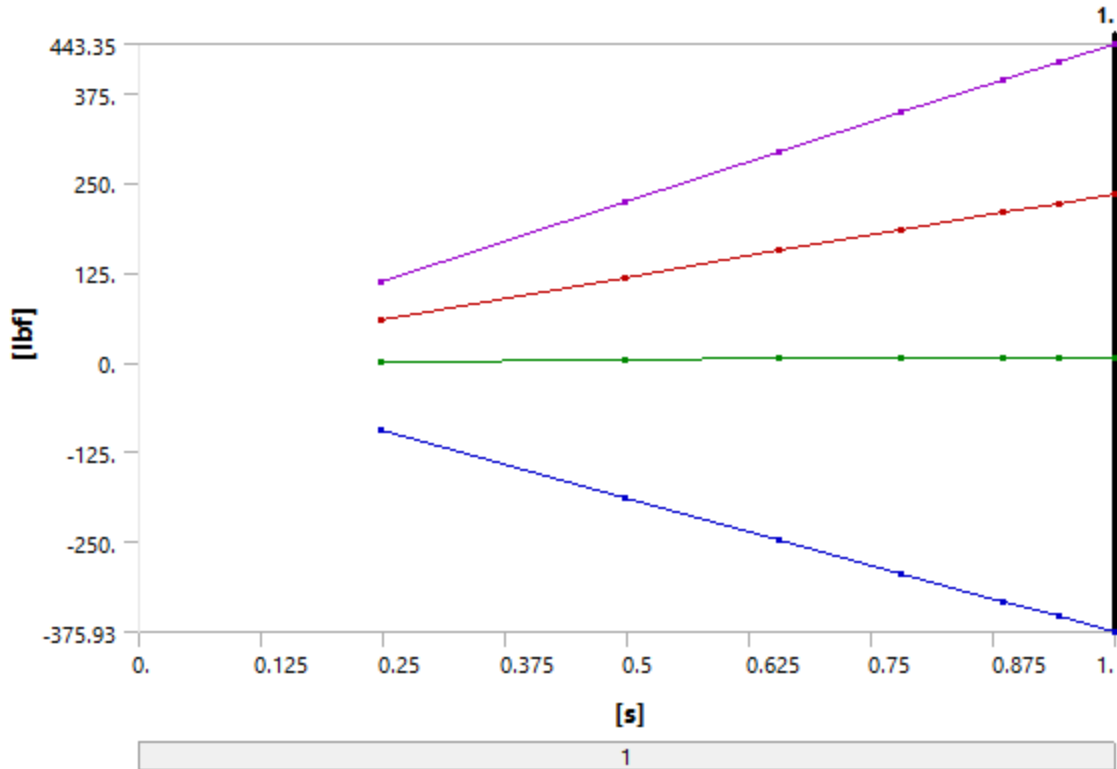


TABLE 30
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element)

Time [s]	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element) (X) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element) (Y) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element) (Z) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element) (Total) [lbf]
0.24866	59.17	1.6265	-94.15	111.21
0.49732	118.28	3.2472	-188.4	222.48
0.65639	155.56	4.8329	-248.18	292.94
0.78105	184.5	5.9805	-294.68	347.72
0.88509	208.51	6.6458	-333.38	393.27
0.94255	221.71	6.9142	-354.67	418.33
1.	234.93	7.1337	-375.93	443.35

FIGURE 20
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element)

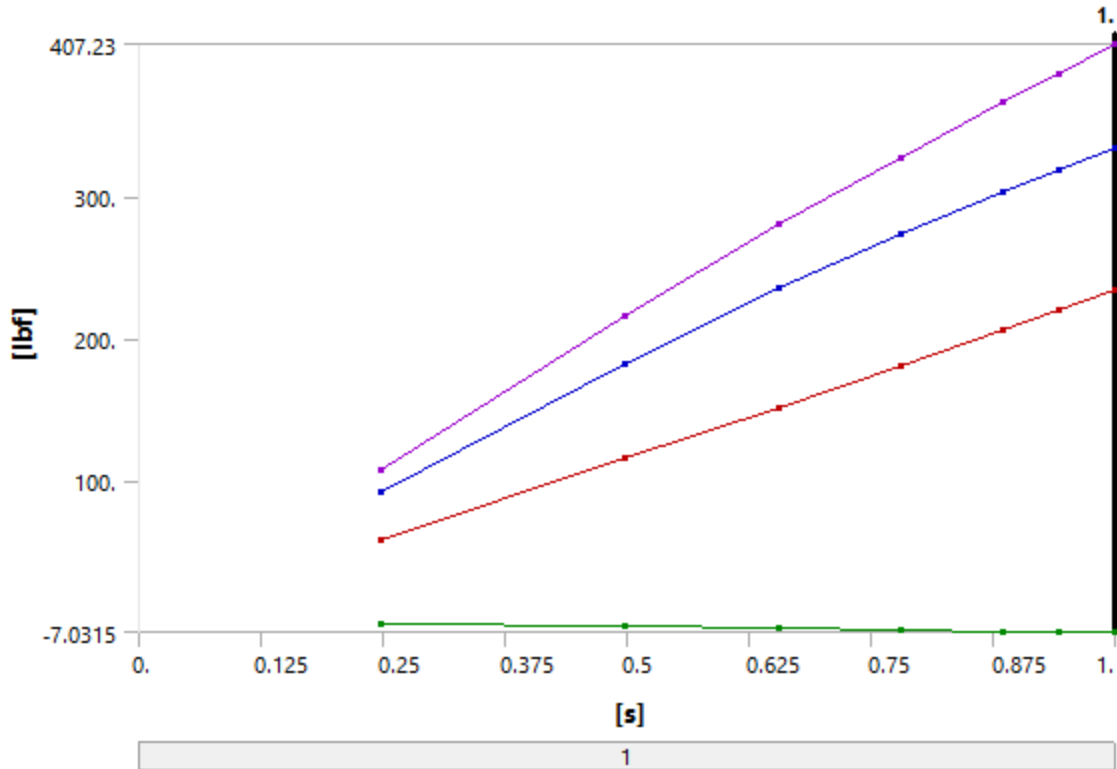


TABLE 31
Model (A4) > Static Structural (A5) > Solution (A6) > Force Reaction > All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element)

Time [s]	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element) (X) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element) (Y) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element) (Z) [lbf]	All - Force Reaction - Bonded - TGT-103-1000-0106 To TGT-103-1000-0101 - Contact (Underlying Element) (Total) [lbf]
0.24866	57.639	-1.7077	90.926	107.67
0.49732	115.28	-3.3728	181.88	215.36
0.65639	151.41	-4.7913	235.66	280.15
0.78105	180.16	-5.9579	272.99	327.13
0.88509	205.18	-6.71	302.81	365.84
0.94255	219.18	-6.9061	318.52	386.71
1.	233.36	-7.0315	333.67	407.23

Material Data

7075 (UNS A97075)

TABLE 32
7075 (UNS A97075) > Density

Density lbm in ⁻³	Temperature F
9.9505e-002	-459.67

9.9504e-002	-446.94
9.9503e-002	-434.22
9.9503e-002	-421.49
9.9505e-002	-408.76
9.9503e-002	-396.03
9.9498e-002	-383.31
9.949e-002	-370.58
9.9479e-002	-357.85
9.9465e-002	-345.12
9.9449e-002	-332.4
9.9431e-002	-319.67
9.941e-002	-306.94
9.9388e-002	-294.22
9.9363e-002	-281.49
9.9336e-002	-268.76
9.9308e-002	-256.03
9.9278e-002	-243.31
9.9247e-002	-230.58
9.9214e-002	-217.85
9.918e-002	-205.12
9.9145e-002	-192.4
9.9109e-002	-179.67
9.9071e-002	-166.94
9.9033e-002	-154.22
9.8994e-002	-141.49
9.8953e-002	-128.76
9.8912e-002	-116.03
9.8871e-002	-103.31
9.8829e-002	-90.579
9.8786e-002	-77.852
9.8742e-002	-65.125
9.8698e-002	-52.397
9.8654e-002	-39.67
9.8609e-002	-26.943
9.8564e-002	-14.215
9.8519e-002	-1.4882
9.8473e-002	11.239
9.8427e-002	23.966
9.838e-002	36.694
9.8334e-002	49.421
9.8287e-002	62.148
9.824e-002	74.875
9.8192e-002	87.603
9.8145e-002	100.33
9.8097e-002	113.06
9.805e-002	125.78
9.8002e-002	138.51
9.7954e-002	151.24

9.7905e-002	163.97
9.7857e-002	176.69
9.7808e-002	189.42
9.776e-002	202.15
9.7711e-002	214.88
9.7662e-002	227.6
9.7612e-002	240.33
9.7563e-002	253.06
9.7513e-002	265.78
9.7464e-002	278.51
9.7414e-002	291.24
9.7363e-002	303.97
9.7313e-002	316.69
9.7262e-002	329.42
9.7211e-002	342.15
9.716e-002	354.88
9.7109e-002	367.6
9.7057e-002	380.33
9.7005e-002	393.06
9.6953e-002	405.78
9.69e-002	418.51
9.6847e-002	431.24
9.6794e-002	443.97
9.674e-002	456.69
9.6687e-002	469.42
9.6632e-002	482.15
9.6578e-002	494.88
9.6523e-002	507.6
9.6467e-002	520.33
9.6412e-002	533.06
9.6356e-002	545.78
9.6299e-002	558.51
9.6243e-002	571.24
9.6186e-002	583.97
9.6128e-002	596.69
9.6071e-002	609.42
9.6013e-002	622.15
9.5954e-002	634.88
9.5896e-002	647.6
9.5837e-002	660.33
9.5778e-002	673.06
9.5719e-002	685.78
9.5659e-002	698.51
9.56e-002	711.24
9.554e-002	723.97
9.548e-002	736.69
9.542e-002	749.42
9.5361e-002	762.15

9.5301e-002	774.88
9.5241e-002	787.6
9.5182e-002	800.33

TABLE 33
7075 (UNS A97075) > Tensile Yield Strength

Tensile Yield Strength psi	Temperature F
18130	-321.07
17998	-310.78
17864	-300.49
17730	-290.2
17594	-279.91
17458	-269.62
17320	-259.32
17181	-249.03
17041	-238.74
16900	-228.45
16758	-218.16
16614	-207.87
16470	-197.58
16324	-187.29
16178	-177
16030	-166.71
15881	-156.42
15731	-146.12
15579	-135.83
15427	-125.54
15274	-115.25
15119	-104.96
14963	-94.67
14806	-84.379
14649	-74.088
14489	-63.797
14329	-53.506
14168	-43.215
14005	-32.925
13842	-22.634
13779	-12.343
13779	-2.0518
13779	8.2391
13779	18.53
13779	28.821
13779	39.112
13779	49.403
13779	59.694
13779	69.985
13779	80.275
13779	90.566
13779	100.86

13779	111.15
13779	121.44
13779	131.73
13779	142.02
13779	152.31
13779	162.6
13779	172.89
13779	183.18
13779	193.48
13775	203.77
13764	214.06
13742	224.35
13708	234.64
13660	244.93
13598	255.22
13520	265.51
13426	275.8
13316	286.09
13188	296.38
13043	306.68
12880	316.97
12699	327.26
12501	337.55
12287	347.84
12055	358.13
11808	368.42
11546	378.71
11270	389
10982	399.29
10681	409.58
10376	419.88
10132	430.17
9883.6	440.46
9630.9	450.75
9374.7	461.04
9115.9	471.33
8855.2	481.62
8593.5	491.91
8331.4	502.2
8069.9	512.49
7809.6	522.78
7551.4	533.08
7296	543.37
7044.3	553.66
6796.9	563.95
6554.8	574.24
6318.6	584.53
6089.2	594.82

5867.3	605.11
5653.8	615.4
5449.4	625.69
5254.9	635.98
5071	646.28
4898.6	656.57
4738.5	666.86
4591.4	677.15
4458.1	687.44
4339.5	697.73

TABLE 34
7075 (UNS A97075) > Tensile Ultimate Strength

Tensile Ultimate Strength psi	Temperature F
47918	-321.07
46755	-310.78
45660	-300.49
44631	-290.2
43666	-279.91
42762	-269.62
41916	-259.32
41127	-249.03
40393	-238.74
39710	-228.45
39077	-218.16
38491	-207.87
37950	-197.58
37452	-187.29
36995	-177
36575	-166.71
36192	-156.42
35841	-146.12
35522	-135.83
35232	-125.54
34968	-115.25
34729	-104.96
34511	-94.67
34313	-84.379
34133	-74.088
33967	-63.797
33814	-53.506
33672	-43.215
33537	-32.925
33409	-22.634
33283	-12.343
33159	-2.0518
33034	8.2391
32906	18.53
32771	28.821

32629	39.112
32476	49.403
32311	59.694
32130	69.985
31932	80.275
31715	90.566
31476	100.86
31212	111.15
30922	121.44
30603	131.73
30253	142.02
29869	152.31
29450	162.6
28993	172.89
28495	183.18
27954	193.48
27369	203.77
26686	214.06
26003	224.35
25293	234.64
24560	244.93
23808	255.22
23041	265.51
22263	275.8
21477	286.09
20690	296.38
19904	306.68
19126	316.97
18361	327.26
17613	337.55
16889	347.84
16193	358.13
15532	368.42
14913	378.71
14340	389
13822	399.29
13490	409.58
13189	419.88
12885	430.17
12578	440.46
12270	450.75
11960	461.04
11650	471.33
11340	481.62
11030	491.91
10721	502.2
10415	512.49
10111	522.78

9809.9	533.08
9512.8	543.37
9220.1	553.66
8932.5	563.95
8650.6	574.24
8375	584.53
8106.3	594.82
7845.2	605.11
7592.3	615.4
7348.3	625.69
7113.7	635.98
6889.3	646.28
6675.5	656.57
6473.2	666.86
6282.8	677.15
6105.1	687.44
5940.6	697.73

TABLE 35
7075 (UNS A97075) > Isotropic Secant Coefficient of Thermal Expansion

Coefficient of Thermal Expansion F ⁻¹	Temperature F
7.9029e-006	-459.67
8.1015e-006	-446.94
8.3002e-006	-434.22
8.505e-006	-421.49
8.7421e-006	-408.76
8.9684e-006	-396.03
9.1842e-006	-383.31
9.3898e-006	-370.58
9.5857e-006	-357.85
9.7722e-006	-345.12
9.9496e-006	-332.4
1.0118e-005	-319.67
1.0278e-005	-306.94
1.0431e-005	-294.22
1.0575e-005	-281.49
1.0712e-005	-268.76
1.0841e-005	-256.03
1.0964e-005	-243.31
1.108e-005	-230.58
1.119e-005	-217.85
1.1294e-005	-205.12
1.1392e-005	-192.4
1.1485e-005	-179.67
1.1572e-005	-166.94
1.1655e-005	-154.22
1.1732e-005	-141.49
1.1806e-005	-128.76
1.1875e-005	-116.03

1.194e-005	-103.31
1.2001e-005	-90.579
1.2059e-005	-77.852
1.2114e-005	-65.125
1.2165e-005	-52.397
1.2214e-005	-39.67
1.226e-005	-26.943
1.2303e-005	-14.215
1.2345e-005	-1.4882
1.2384e-005	11.239
1.2421e-005	23.966
1.2456e-005	36.694
1.249e-005	49.421
1.2522e-005	62.148
1.2553e-005	74.875
1.2583e-005	87.603
1.2612e-005	100.33
1.2641e-005	113.06
1.2668e-005	125.78
1.2695e-005	138.51
1.2722e-005	151.24
1.2748e-005	163.97
1.2774e-005	176.69
1.28e-005	189.42
1.2826e-005	202.15
1.2852e-005	214.88
1.2878e-005	227.6
1.2904e-005	240.33
1.2931e-005	253.06
1.2958e-005	265.78
1.2986e-005	278.51
1.3014e-005	291.24
1.3043e-005	303.97
1.3072e-005	316.69
1.3102e-005	329.42
1.3133e-005	342.15
1.3165e-005	354.88
1.3197e-005	367.6
1.323e-005	380.33
1.3264e-005	393.06
1.3299e-005	405.78
1.3335e-005	418.51
1.3372e-005	431.24
1.3409e-005	443.97
1.3447e-005	456.69
1.3486e-005	469.42
1.3526e-005	482.15
1.3567e-005	494.88

1.3608e-005	507.6
1.365e-005	520.33
1.3692e-005	533.06
1.3735e-005	545.78
1.3779e-005	558.51
1.3823e-005	571.24
1.3868e-005	583.97
1.3912e-005	596.69
1.3958e-005	609.42
1.4003e-005	622.15
1.4048e-005	634.88
1.4093e-005	647.6
1.4138e-005	660.33
1.4183e-005	673.06
1.4227e-005	685.78
1.4271e-005	698.51
1.4315e-005	711.24
1.4357e-005	723.97
1.4399e-005	736.69
1.444e-005	749.42
1.4479e-005	762.15
1.4517e-005	774.88
1.4554e-005	787.6
1.4589e-005	800.33
Reference Temperature F	
67.73	

TABLE 36
7075 (UNS A97075) > Specific Heat

Specific Heat BTU lbm ⁻¹ F ⁻¹	Temperature F
0.13665	-250.87
0.14014	-240.25
0.14351	-229.63
0.14676	-219.02
0.14989	-208.4
0.15291	-197.78
0.15582	-187.16
0.15862	-176.54
0.16132	-165.92
0.16392	-155.31
0.16642	-144.69
0.16883	-134.07
0.17115	-123.45
0.17338	-112.83
0.17553	-102.22
0.1776	-91.597
0.1796	-80.979
0.18152	-70.361
0.18337	-59.743

0.18515	-49.125
0.18687	-38.506
0.18852	-27.888
0.19012	-17.27
0.19165	-6.6518
0.19314	3.9664
0.19457	14.585
0.19596	25.203
0.1973	35.821
0.1986	46.439
0.19985	57.057
0.20107	67.675
0.20225	78.294
0.2034	88.912
0.20451	99.53
0.2056	110.15
0.20666	120.77
0.20769	131.38
0.2087	142
0.20969	152.62
0.21066	163.24
0.21162	173.86
0.21256	184.48
0.21348	195.09
0.2144	205.71
0.2153	216.33
0.2162	226.95
0.21709	237.57
0.21798	248.18
0.21886	258.8
0.21974	269.42
0.22062	280.04
0.2215	290.66
0.22239	301.28
0.22327	311.89
0.22416	322.51
0.22506	333.13
0.22597	343.75
0.22688	354.37
0.2278	364.98
0.22874	375.6
0.22968	386.22
0.23064	396.84
0.23161	407.46
0.23259	418.08
0.23359	428.69
0.2346	439.31
0.23563	449.93

0.23668	460.55
0.23774	471.17
0.23882	481.78
0.23992	492.4
0.24104	503.02
0.24218	513.64
0.24333	524.26
0.24451	534.88
0.2457	545.49
0.24692	556.11
0.24815	566.73
0.2494	577.35
0.25068	587.97
0.25197	598.58
0.25329	609.2
0.25462	619.82
0.25597	630.44
0.25735	641.06
0.25874	651.68
0.26015	662.29
0.26158	672.91
0.26302	683.53
0.26449	694.15
0.26597	704.77
0.26746	715.38
0.26898	726
0.2705	736.62
0.27205	747.24
0.2736	757.86
0.27517	768.48
0.27675	779.09
0.27834	789.71
0.27994	800.33

TABLE 37
7075 (UNS A97075) > Isotropic Thermal Conductivity

Thermal Conductivity BTU s ⁻¹ in ⁻¹ F ⁻¹	Temperature F
1.0373e-003	-250.87
1.0695e-003	-240.25
1.1005e-003	-229.63
1.1303e-003	-219.02
1.1591e-003	-208.4
1.1868e-003	-197.78
1.2135e-003	-187.16
1.2392e-003	-176.54
1.2639e-003	-165.92
1.2878e-003	-155.31
1.3108e-003	-144.69
1.3329e-003	-134.07

1.3543e-003	-123.45
1.3749e-003	-112.83
1.3949e-003	-102.22
1.4141e-003	-91.597
1.4328e-003	-80.979
1.4509e-003	-70.361
1.4684e-003	-59.743
1.4854e-003	-49.125
1.502e-003	-38.506
1.5181e-003	-27.888
1.5339e-003	-17.27
1.5493e-003	-6.6518
1.5645e-003	3.9664
1.5793e-003	14.585
1.594e-003	25.203
1.6084e-003	35.821
1.6228e-003	46.439
1.637e-003	57.057
1.6512e-003	67.675
1.6653e-003	78.294
1.6795e-003	88.912
1.6938e-003	99.53
1.7081e-003	110.15
1.7226e-003	120.77
1.7373e-003	131.38
1.7521e-003	142
1.7673e-003	152.62
1.7828e-003	163.24
1.7986e-003	173.86
1.8147e-003	184.48
1.8314e-003	195.09
1.8484e-003	205.71
1.866e-003	216.33
1.8841e-003	226.95
1.9028e-003	237.57
1.9222e-003	248.18
1.9422e-003	258.8
1.9629e-003	269.42
1.9843e-003	280.04
2.0065e-003	290.66
2.0296e-003	301.28
2.0535e-003	311.89
2.0784e-003	322.51
2.1041e-003	333.13
2.1309e-003	343.75
2.1587e-003	354.37
2.1876e-003	364.98
2.2175e-003	375.6

2.2486e-003	386.22
2.2809e-003	396.84
2.2937e-003	407.46
2.3017e-003	418.08
2.3091e-003	428.69
2.316e-003	439.31
2.3224e-003	449.93
2.3283e-003	460.55
2.3337e-003	471.17
2.3385e-003	481.78
2.3428e-003	492.4
2.3466e-003	503.02
2.3499e-003	513.64
2.3526e-003	524.26
2.3548e-003	534.88
2.3565e-003	545.49
2.3577e-003	556.11
2.3583e-003	566.73
2.3585e-003	577.35
2.3581e-003	587.97
2.3572e-003	598.58
2.3557e-003	609.2
2.3538e-003	619.82
2.3513e-003	630.44
2.3483e-003	641.06
2.3448e-003	651.68
2.3407e-003	662.29
2.3362e-003	672.91
2.3311e-003	683.53
2.3255e-003	694.15
2.3194e-003	704.77
2.3127e-003	715.38
2.3055e-003	726
2.2978e-003	736.62
2.2896e-003	747.24
2.2809e-003	757.86
2.2716e-003	768.48
2.2618e-003	779.09
2.2515e-003	789.71
2.2407e-003	800.33

TABLE 38
7075 (UNS A97075) > Isotropic Resistivity

Resistivity ohm cmil in ⁻¹	Temperature F
1.3838	-452.47
1.3854	-443.34
1.3871	-434.22
1.3887	-425.09
1.3926	-415.96

1.3984	-406.84
1.406	-397.71
1.4152	-388.59
1.426	-379.46
1.4383	-370.33
1.4521	-361.21
1.4674	-352.08
1.484	-342.95
1.502	-333.83
1.5212	-324.7
1.5416	-315.58
1.5632	-306.45
1.5858	-297.32
1.6095	-288.2
1.6342	-279.07
1.6597	-269.94
1.6862	-260.82
1.7134	-251.69
1.7415	-242.56
1.7702	-233.44
1.7995	-224.31
1.8294	-215.19
1.8599	-206.06
1.8908	-196.93
1.9221	-187.81
1.9538	-178.68
1.9858	-169.55
2.018	-160.43
2.0505	-151.3
2.083	-142.18
2.1156	-133.05
2.1483	-123.92
2.1809	-114.8
2.2134	-105.67
2.2457	-96.544
2.2779	-87.417
2.3097	-78.291
2.3413	-69.165
2.3725	-60.038
2.4032	-50.912
2.4335	-41.786
2.4632	-32.659
2.4923	-23.533
2.5207	-14.407
2.5484	-5.2805
2.5754	3.8458
2.6015	12.972
2.6267	22.098

2.651	31.225
2.6743	40.351
2.6965	49.477
2.7176	58.604
2.7376	67.73

TABLE 39
7075 (UNS A97075) > Isotropic Elasticity

Temperature F	Young's Modulus psi	Poisson's Ratio	Bulk Modulus psi	Shear Modulus psi
-459.67	1.1431e+007	0.32387	1.0817e+007	4.3172e+006
-445.62	1.1432e+007	0.32391	1.082e+007	4.3174e+006
-431.56	1.1429e+007	0.32398	1.0822e+007	4.3162e+006
-417.51	1.1423e+007	0.32407	1.0822e+007	4.3138e+006
-403.45	1.1415e+007	0.32418	1.0821e+007	4.3102e+006
-389.4	1.1404e+007	0.32431	1.0818e+007	4.3056e+006
-375.34	1.139e+007	0.32446	1.0814e+007	4.2999e+006
-361.29	1.1374e+007	0.32463	1.0809e+007	4.2932e+006
-347.23	1.1355e+007	0.32481	1.0803e+007	4.2857e+006
-333.18	1.1335e+007	0.32501	1.0796e+007	4.2773e+006
-319.12	1.1312e+007	0.32521	1.0787e+007	4.2682e+006
-305.07	1.1288e+007	0.32543	1.0777e+007	4.2583e+006
-291.02	1.1262e+007	0.32566	1.0766e+007	4.2478e+006
-276.96	1.1234e+007	0.32589	1.0754e+007	4.2366e+006
-262.91	1.1205e+007	0.32613	1.0741e+007	4.2249e+006
-248.85	1.1175e+007	0.32637	1.0727e+007	4.2126e+006
-234.8	1.1143e+007	0.32662	1.0712e+007	4.1999e+006
-220.74	1.1111e+007	0.32687	1.0696e+007	4.1867e+006
-206.69	1.1077e+007	0.32713	1.0679e+007	4.1732e+006
-192.63	1.1042e+007	0.32738	1.0661e+007	4.1593e+006
-178.58	1.1006e+007	0.32763	1.0642e+007	4.1451e+006
-164.52	1.097e+007	0.32788	1.0623e+007	4.1306e+006
-150.47	1.0933e+007	0.32813	1.0602e+007	4.1159e+006
-136.42	1.0895e+007	0.32838	1.0581e+007	4.101e+006
-122.36	1.0857e+007	0.32862	1.0558e+007	4.0859e+006
-108.31	1.0819e+007	0.32885	1.0535e+007	4.0707e+006
-94.252	1.078e+007	0.32908	1.0512e+007	4.0553e+006
-80.197	1.074e+007	0.32931	1.0487e+007	4.0399e+006
-66.143	1.0701e+007	0.32953	1.0462e+007	4.0243e+006
-52.088	1.0661e+007	0.32974	1.0436e+007	4.0088e+006
-38.034	1.0621e+007	0.32995	1.041e+007	3.9931e+006
-23.979	1.0581e+007	0.33014	1.0383e+007	3.9775e+006
-9.9245	1.0541e+007	0.33033	1.0355e+007	3.9618e+006
4.13	1.0501e+007	0.33052	1.0326e+007	3.9462e+006
18.185	1.0461e+007	0.33069	1.0298e+007	3.9306e+006
32.239	1.0421e+007	0.33086	1.0268e+007	3.915e+006
46.294	1.038e+007	0.33102	1.0238e+007	3.8994e+006
60.348	1.034e+007	0.33117	1.0208e+007	3.8839e+006
74.403	1.03e+007	0.33131	1.0177e+007	3.8684e+006
88.457	1.026e+007	0.33145	1.0145e+007	3.8529e+006

102.51	1.022e+007	0.33158	1.0114e+007	3.8375e+006
116.57	1.018e+007	0.33171	1.0081e+007	3.8221e+006
130.62	1.014e+007	0.33183	1.0049e+007	3.8067e+006
144.68	1.01e+007	0.33194	1.0016e+007	3.7914e+006
158.73	1.006e+007	0.33205	9.9828e+006	3.776e+006
172.78	1.002e+007	0.33216	9.9493e+006	3.7607e+006
186.84	9.9795e+006	0.33226	9.9156e+006	3.7453e+006
200.89	9.9393e+006	0.33236	9.8817e+006	3.7299e+006
214.95	9.8989e+006	0.33246	9.8475e+006	3.7145e+006
229	9.8584e+006	0.33257	9.8132e+006	3.699e+006
243.06	9.8176e+006	0.33267	9.7787e+006	3.6835e+006
257.11	9.7766e+006	0.33278	9.7441e+006	3.6678e+006
271.17	9.7353e+006	0.33289	9.7094e+006	3.6519e+006
285.22	9.6935e+006	0.33301	9.6746e+006	3.636e+006
299.28	9.6513e+006	0.33313	9.6397e+006	3.6198e+006
313.33	9.6086e+006	0.33327	9.6048e+006	3.6034e+006
327.38	9.5652e+006	0.33342	9.5699e+006	3.5867e+006
341.44	9.5212e+006	0.33358	9.535e+006	3.5698e+006
355.49	9.4764e+006	0.33375	9.5002e+006	3.5525e+006
369.55	9.4308e+006	0.33394	9.4654e+006	3.5349e+006
383.6	9.3842e+006	0.33416	9.4307e+006	3.5169e+006
397.66	9.3365e+006	0.33439	9.3961e+006	3.4984e+006
411.71	9.2877e+006	0.33465	9.3616e+006	3.4795e+006
425.77	9.2377e+006	0.33493	9.3272e+006	3.46e+006
439.82	9.1863e+006	0.33525	9.293e+006	3.4399e+006
453.88	9.1334e+006	0.33559	9.259e+006	3.4192e+006
467.93	9.0788e+006	0.33598	9.2252e+006	3.3978e+006
481.98	9.0226e+006	0.3364	9.1916e+006	3.3757e+006
496.04	8.9645e+006	0.33686	9.1582e+006	3.3528e+006
510.09	8.9044e+006	0.33736	9.125e+006	3.3291e+006
524.15	8.8421e+006	0.33792	9.0921e+006	3.3044e+006
538.2	8.7776e+006	0.33852	9.0595e+006	3.2788e+006
552.26	8.7106e+006	0.33918	9.0272e+006	3.2522e+006
566.31	8.6411e+006	0.33989	8.9952e+006	3.2245e+006
580.37	8.5688e+006	0.34067	8.9635e+006	3.1957e+006
594.42	8.4935e+006	0.34152	8.9321e+006	3.1657e+006
608.48	8.4153e+006	0.34243	8.9011e+006	3.1343e+006
622.53	8.3337e+006	0.34342	8.8704e+006	3.1017e+006
636.58	8.2487e+006	0.34448	8.8401e+006	3.0676e+006
650.64	8.1602e+006	0.34563	8.8102e+006	3.0321e+006
664.69	8.0678e+006	0.34687	8.7807e+006	2.995e+006
678.75	7.9714e+006	0.34819	8.7516e+006	2.9563e+006
692.8	7.8709e+006	0.34961	8.7229e+006	2.916e+006
706.86	7.7659e+006	0.35114	8.6947e+006	2.8739e+006
720.91	7.6564e+006	0.35277	8.667e+006	2.8299e+006
734.97	7.5421e+006	0.35451	8.6397e+006	2.7841e+006
749.02	7.4228e+006	0.35636	8.6129e+006	2.7363e+006
763.08	7.2982e+006	0.35834	8.5867e+006	2.6864e+006

777.13	7.1682e+006	0.36045	8.561e+006	2.6345e+006
791.18	7.0325e+006	0.36269	8.5359e+006	2.5804e+006
805.24	6.8908e+006	0.36507	8.5113e+006	2.524e+006
819.29	6.7431e+006	0.36759	8.4875e+006	2.4653e+006
833.35	6.5889e+006	0.37026	8.4642e+006	2.4042e+006
847.4	6.4281e+006	0.37309	8.4418e+006	2.3407e+006
861.46	6.2603e+006	0.37608	8.4201e+006	2.2747e+006
875.51	6.0855e+006	0.37925	8.3992e+006	2.2061e+006
889.57	5.9032e+006	0.38258	8.3793e+006	2.1348e+006
903.62	5.7132e+006	0.38611	8.3604e+006	2.0609e+006
917.68	5.5153e+006	0.38982	8.3427e+006	1.9842e+006
931.73	5.3092e+006	0.39373	8.3262e+006	1.9047e+006

TABLE 40
7075 (UNS A97075) > Multilinear Isotropic Hardening

Stress psi	Plastic Strain in in ⁻¹	Temperature F
16249	0	67.73
19107	4.7368e-003	67.73
21701	9.4737e-003	67.73
24046	1.4211e-002	67.73
26154	1.8947e-002	67.73
28039	2.3684e-002	67.73
29714	2.8421e-002	67.73
31193	3.3158e-002	67.73
32488	3.7895e-002	67.73
33612	4.2632e-002	67.73
34580	4.7368e-002	67.73
35405	5.2105e-002	67.73
36099	5.6842e-002	67.73
36676	6.1579e-002	67.73
37150	6.6316e-002	67.73
37533	7.1053e-002	67.73
37840	7.5789e-002	67.73
38082	8.0526e-002	67.73
38274	8.5263e-002	67.73
38429	9.e-002	67.73

TABLE 41
7075 (UNS A97075) > Alternating Stress R-Ratio

Alternating Stress psi	Cycles	R-Ratio
50442	4000	-1
49352	4677.6	-1
48261	5469.9	-1
47166	6396.4	-1
46067	7479.9	-1
44962	8746.9	-1
43853	10229	-1
42739	11961	-1
41620	13987	-1

40499	16356	-1
39375	19127	-1
38251	22367	-1
37129	26156	-1
36010	30586	-1
34896	35767	-1
33790	41826	-1
32695	48910	-1
31612	57195	-1
30546	66883	-1
29498	78213	-1
28471	91461	-1
27468	1.0695e+005	-1
26492	1.2507e+005	-1
25546	1.4626e+005	-1
24632	1.7103e+005	-1
23753	2.e+005	-1
22911	2.3388e+005	-1
22108	2.7349e+005	-1
21346	3.1982e+005	-1
20627	3.7399e+005	-1
19953	4.3734e+005	-1
19325	5.1143e+005	-1
18744	5.9806e+005	-1
18210	6.9936e+005	-1
17724	8.1782e+005	-1
17285	9.5635e+005	-1
16894	1.1183e+006	-1
16548	1.3078e+006	-1
16247	1.5293e+006	-1
15989	1.7884e+006	-1
15771	2.0913e+006	-1
15590	2.4455e+006	-1
15442	2.8598e+006	-1
15324	3.3442e+006	-1
15230	3.9106e+006	-1
15155	4.5731e+006	-1
15092	5.3477e+006	-1
15035	6.2535e+006	-1
14976	7.3128e+006	-1
14816	1.e+007	-1