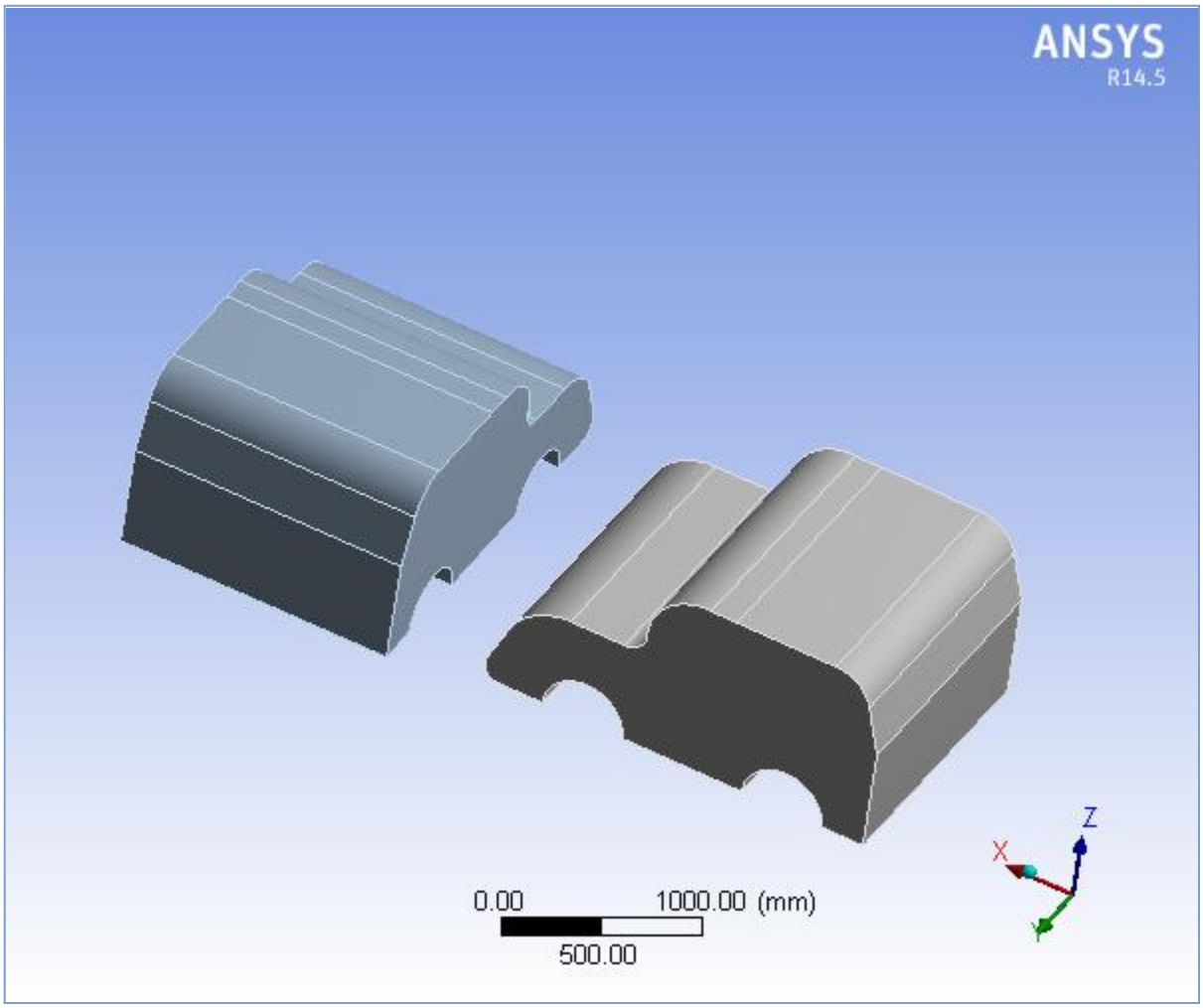
Project

First Saved	Tuesday, February 19, 2019
Last Saved	Tuesday, February 19, 2019
Product Version	14.5 Release
Save Project Before Solution	No
Save Project After Solution	No



Contents

Units

TABLE 1

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

Model (C4)

Geometry

TABLE 2
Model (C4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\mech\Desktop\project\c1.igs
Type	Iges
Length Unit	Meters
Display Style	Body Color
Bounding Box	
Length X	4134.9 mm
Length Y	2154.4 mm
Length Z	1018. mm
Properties	

Volume	4.5792e+009 mm³
Mass	12684 kg
Scale Factor Value	1.
Statistics	
Bodies	2
Active Bodies	2
Nodes	18216
Elements	15488
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
Attach File Via Temp File	Yes
Temporary Directory	C:\Users\mech\AppData\Local\Temp
Analysis Type	3-D
Mixed Import Resolution	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (C4) > Geometry > Parts

Object Name	*Part 1*	*Part 2*
State	Meshed	
Graphics Properties		
Visible	Yes	
Transparency	1	
Definition		
Suppressed	No	
Stiffness Behavior	Flexible	
Coordinate System	Default Coordinate System	
Reference Temperature	By Environment	
Reference Frame	Lagrangian	
Material		
Assignment	Aluminum Alloy	
Bounding Box		
Length X	2167.8 mm	1500. mm
Length Y	1519.2 mm	2154.4 mm
Length Z	1000.6 mm	
Properties		
Volume	2.2896e+009 mm³	

Mass	6342.2 kg	
Centroid X	-2468.6 mm	-2.0332e-002 mm
Centroid Y	1624.2 mm	1591.3 mm
Centroid Z	481.41 mm	463.98 mm
Moment of Inertia Ip1	2.3899e+009 kg·mm²	
Moment of Inertia Ip2	1.5852e+009 kg·mm²	
Moment of Inertia Ip3	3.1828e+009 kg·mm²	
Statistics		
Nodes	9108	
Elements	7744	
Mesh Metric	None	

Coordinate Systems

TABLE 4
Model (C4) > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
Definition	
Type	Cartesian
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 5
Model (C4) > Connections

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

TABLE 6
Model (C4) > Connections > Body Interactions

Object Name	*Body Interactions*
State	Fully Defined
Advanced	
Contact Detection	Trajectory
Formulation	Penalty
Body Self Contact	Program Controlled
Element Self Contact	Program Controlled
Tolerance	0.2

TABLE 7

Model (C4) > Connections > Body Interactions > Body Interaction

Object Name	*Body Interaction*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Frictionless
Suppressed	No

Mesh

TABLE 8
Model (C4) > Mesh

Object Name	*Mesh*
State	Solved
Defaults	
Physics Preference	Explicit
Relevance	0
Sizing	
Use Advanced Size Function	On: Curvature
Relevance Center	Fine
Initial Size Seed	Active Assembly
Smoothing	High
Transition	Slow
Span Angle Center	Coarse
Curvature Normal Angle	Default (70.3950 °)
Min Size	Default (0.696690 mm)
Max Face Size	Default (69.6690 mm)
Max Size	Default (139.340 mm)
Growth Rate	Default (1.20)
Minimum Edge Length	14.9120 mm
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
Advanced	
Shape Checking	Explicit
Element Midside Nodes	Dropped
Straight Sided Elements	
Number of Retries	0
Extra Retries For Assembly	Yes
Rigid Body Behavior	Full Mesh
Mesh Morphing	Disabled
Defeaturing	
Pinch Tolerance	Default (0.627020 mm)

Generate Pinch on Refresh	No
Automatic Mesh Based Defeaturing	On
Defeaturing Tolerance	Default (0.348340 mm)
Statistics	
Nodes	18216
Elements	15488
Mesh Metric	None

Explicit Dynamics (C5)

TABLE 9
Model (C4) > Analysis

Object Name	*Explicit Dynamics (C5)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Explicit Dynamics
Solver Target	AUTODYN
Options	
Environment Temperature	22. °C
Generate Input Only	No

TABLE 10
Model (C4) > Explicit Dynamics (C5) > Initial Conditions

Object Name	*Initial Conditions*
State	Fully Defined

TABLE 11
Model (C4) > Explicit Dynamics (C5) > Initial Conditions > Initial Condition

Object Name	*Pre-Stress (None)*
State	Fully Defined
Definition	
Pre-Stress Environment	None

TABLE 12
Model (C4) > Explicit Dynamics (C5) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Analysis Settings Preference	
Type	Program Controlled
Step Controls	
Resume From Cycle	0
Maximum Number of Cycles	1e+07
End Time	1.e-002 s
Maximum Energy Error	0.1
Reference Energy Cycle	0
Initial Time Step	Program Controlled
Minimum Time Step	Program Controlled
Maximum Time Step	Program Controlled
Time Step Safety Factor	0.9
Characteristic Dimension	Diagonals

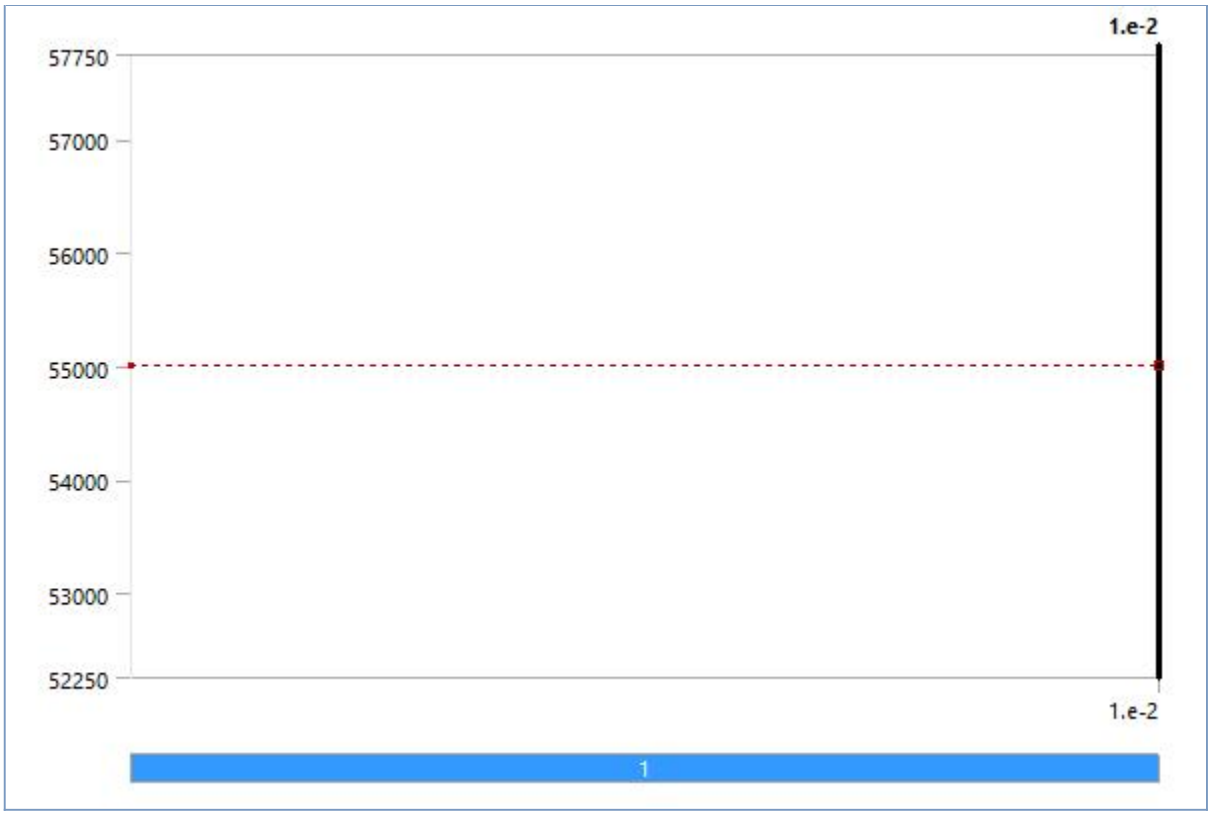
Automatic Mass Scaling	No
Solver Controls	
Precision	Double
Solve Units	mm, mg, ms
Beam Solution Type	Bending
Beam Time Step Safety Factor	0.5
Hex Integration Type	Exact
Shell Sublayers	3
Shell Shear Correction Factor	0.8333
Shell BWC Warp Correction	Yes
Shell Thickness Update	Nodal
Tet Integration	Average Nodal Pressure
Shell Inertia Update	Recompute
Density Update	Program Controlled
Minimum Velocity	1.e-003 mm s^-1
Maximum Velocity	1.e+013 mm s^-1
Radius Cutoff	1.e-003
Minimum Strain Rate Cutoff	1.e-010
Euler Domain Controls	
Domain Size Definition	Program Controlled
Display Euler Domain	Yes
Scope	All Bodies
X Scale factor	1.2
Y Scale factor	1.2
Z Scale factor	1.2
Domain Resolution Definition	Total Cells
Total Cells	2.5e+05
Lower X Face	Flow Out
Lower Y Face	Flow Out
Lower Z Face	Flow Out
Upper X Face	Flow Out
Upper Y Face	Flow Out
Upper Z Face	Flow Out
Euler Tracking	By Body
Damping Controls	
Linear Artificial Viscosity	0.2
Quadratic Artificial Viscosity	1.
Linear Viscosity in Expansion	No
Hourglass Damping	AUTODYN Standard
Viscous Coefficient	0.1
Static Damping	0.
Erosion Controls	
On Geometric Strain Limit	Yes
Geometric Strain Limit	1.5
On Material Failure	No
On Minimum Element	No

Time Step	
Retain Inertia of Eroded Material	Yes
Output Controls	
Save Results on	Equally Spaced Points
Number of points	20
Save Restart Files on	Equally Spaced Points
Number of points	5
Save Result Tracker Data on	Cycles
Cycles	1
Output Contact Forces	Off
Analysis Data Management	
Solver Files Directory	C:\Users\mech\AppData\Local\Temp\WB_RISE_4724_2\unsaved_project_files\dp0\SYS-2\MECH\
Scratch Solver Files Directory	

TABLE 13
Model (C4) > Explicit Dynamics (C5) > Loads

Object Name	*Velocity*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	1 Body
Definition	
Type	Velocity
Define By	Components
Coordinate System	Global Coordinate System
X Component	55000 mm/s (step applied)
Y Component	Free
Z Component	Free
Suppressed	No

FIGURE 1
Model (C4) > Explicit Dynamics (C5) > Velocity



Solution (C6)

TABLE 14
Model (C4) > Explicit Dynamics (C5) > Solution

Object Name	*Solution (C6)*
State	Solved
Information	
Status	Done

TABLE 15
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Solution Information

Object Name	*Solution Information*
State	Solved
Solution Information	
Solution Output	Solver Output
Update Interval	2.5 s
Display Points	All
Display Filter During Solve	Yes

TABLE 16
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Results

Object Name	*Total Deformation*	*Equivalent Elastic Strain*	*Equivalent Stress*
State	Solved		
Scope			
Scoping Method	Geometry Selection		
Geometry	All Bodies		
Definition			
Type	Total Deformation	Equivalent Elastic Strain	Equivalent (von-Mises) Stress

By	Time		
Display Time	Last		
Calculate Time History	Yes		
Identifier			
Suppressed	No		
Results			
Minimum	12.253 mm	2.7024e-005 mm/mm	1.0918 MPa
Maximum	550.21 mm	2.9581e-002 mm/mm	1733.5 MPa
Minimum Occurs On	Part 2	Part 1	
Maximum Occurs On	Part 1	Part 2	
Minimum Value Over Time			
Minimum	0. mm	0. mm/mm	0. MPa
Maximum	12.253 mm	2.7024e-005 mm/mm	1.246 MPa
Maximum Value Over Time			
Minimum	0. mm	0. mm/mm	0. MPa
Maximum	550.21 mm	7.4035e-002 mm/mm	4506.3 MPa
Information			
Time	1.0001e-002 s		
Set	21		
Integration Point Results			
Display Option		Averaged	

FIGURE 2
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Total Deformation

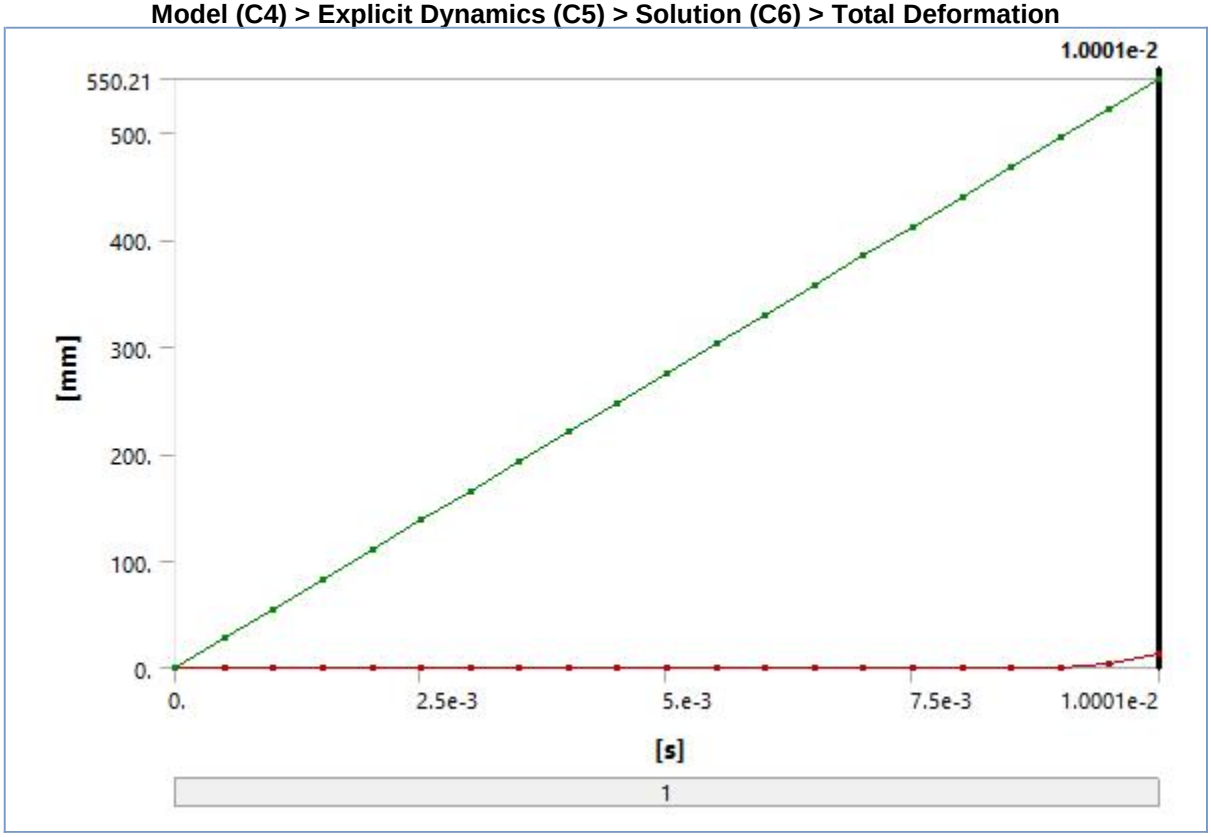


TABLE 17
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Total Deformation

Time [s]	Minimum [mm]	Maximum [mm]
1.1755e-038		0.

5.0047e-004		27.526
1.0021e-003		55.115
1.5007e-003		82.541
2.0024e-003		110.13
2.501e-003		137.56
3.0026e-003		165.15
3.5013e-003		192.57
4.0029e-003		220.16
4.5016e-003	0.	247.59
5.0002e-003		275.01
5.5018e-003		302.6
6.0005e-003		330.03
6.5021e-003		357.62
7.0007e-003		385.04
7.5024e-003		412.63
8.001e-003		440.06
8.5026e-003		467.65
9.0021e-003	8.2898e-003	495.14
9.5007e-003	3.4156	522.8
1.0001e-002	12.253	550.21

FIGURE 3
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Equivalent Elastic Strain

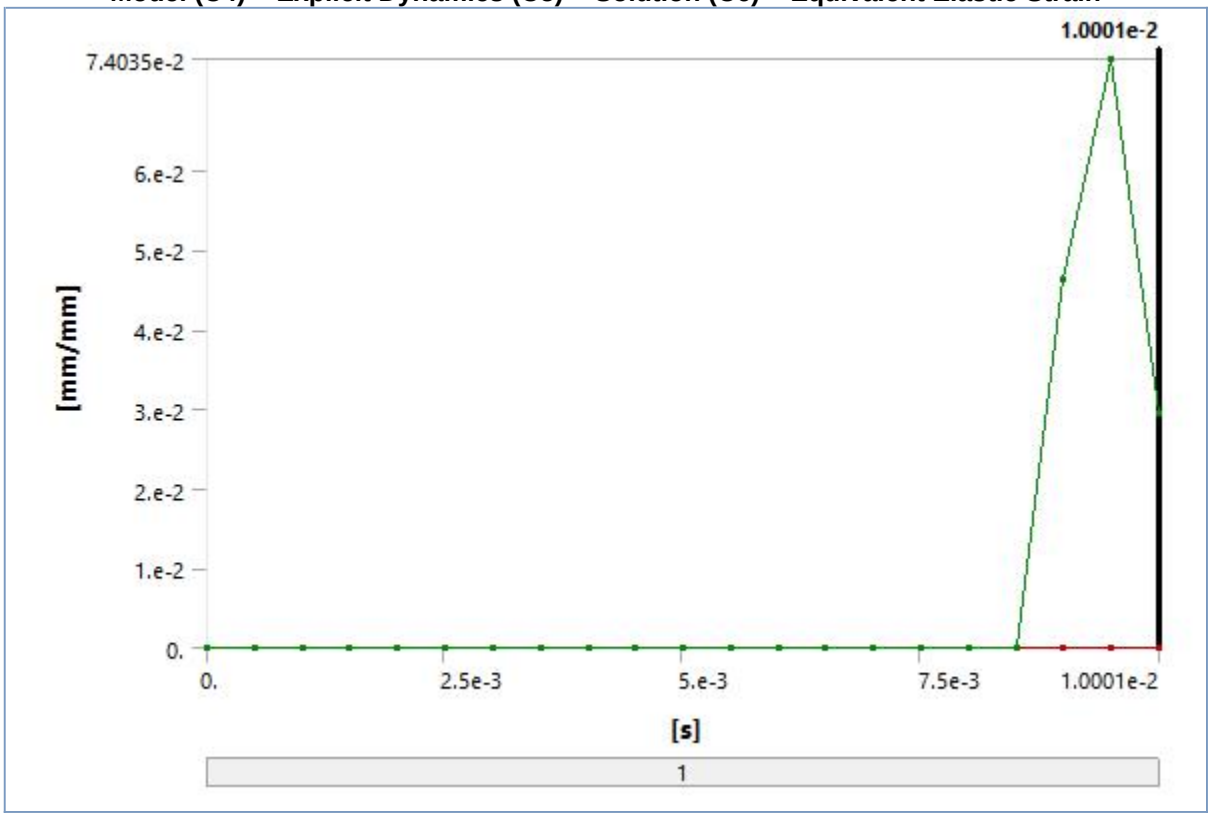


TABLE 18
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Equivalent Elastic Strain

Time [s]	Minimum [mm/mm]	Maximum [mm/mm]
1.1755e-038		
5.0047e-004		

1.0021e-003	0.	0.
1.5007e-003		
2.0024e-003		
2.501e-003		
3.0026e-003		
3.5013e-003		
4.0029e-003		
4.5016e-003		
5.0002e-003		
5.5018e-003		
6.0005e-003		
6.5021e-003		
7.0007e-003		
7.5024e-003		
8.001e-003		
8.5026e-003		
9.0021e-003		4.6374e-002
9.5007e-003	1.7585e-005	7.4035e-002
1.0001e-002	2.7024e-005	2.9581e-002

FIGURE 4
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Equivalent Stress

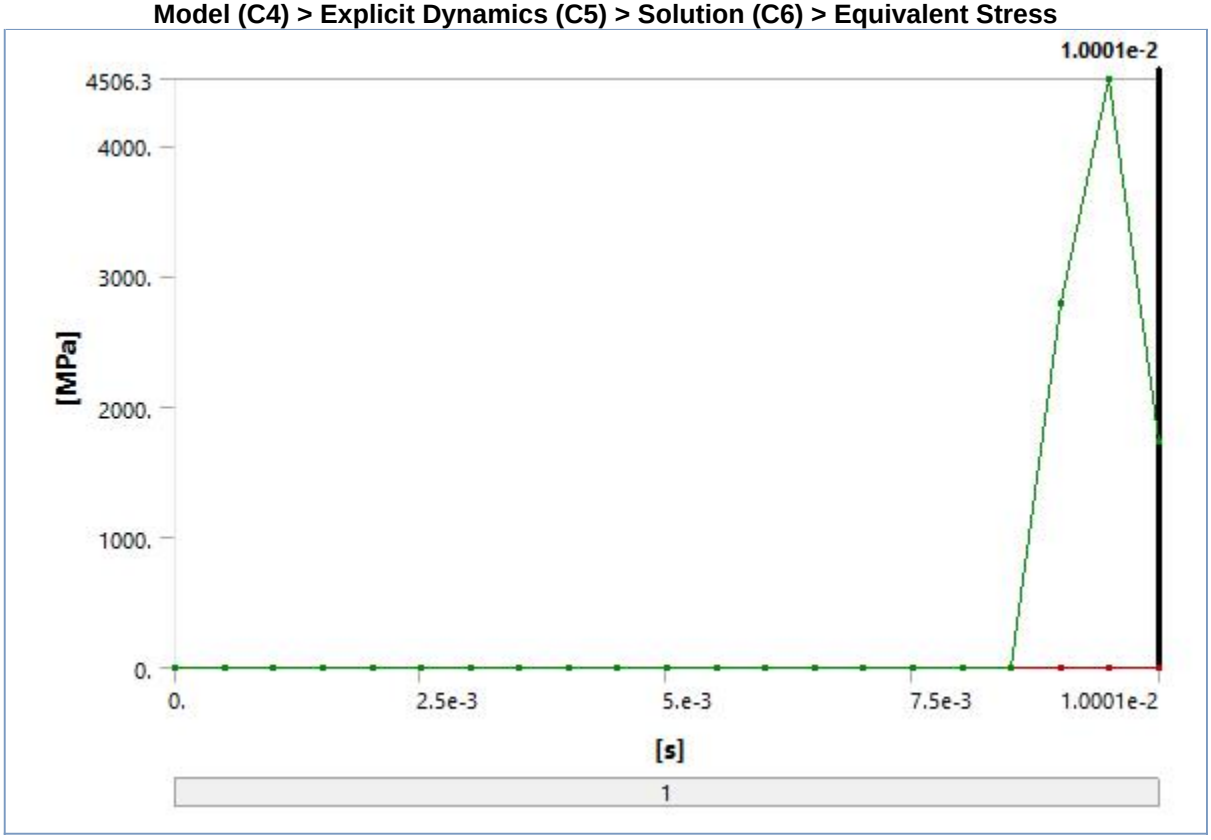


TABLE 19
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Equivalent Stress

Time [s]	Minimum [MPa]	Maximum [MPa]
1.1755e-038		
5.0047e-004		
1.0021e-003		

1.5007e-003	0.	0.
2.0024e-003		
2.501e-003		
3.0026e-003		
3.5013e-003		
4.0029e-003		
4.5016e-003		
5.0002e-003		
5.5018e-003		
6.0005e-003		
6.5021e-003		
7.0007e-003		
7.5024e-003		
8.001e-003		
8.5026e-003		
9.0021e-003		2786.5
9.5007e-003	1.246	4506.3
1.0001e-002	1.0918	1733.5

Material Data

Aluminum Alloy

TABLE 20
Aluminum Alloy > Constants

Density	2.77e-006 kg mm^-3
Coefficient of Thermal Expansion	2.3e-005 C^-1
Specific Heat	8.75e+005 mJ kg^-1 C^-1

TABLE 21
Aluminum Alloy > Compressive Ultimate Strength

Compressive Ultimate Strength MPa
0

TABLE 22
Aluminum Alloy > Compressive Yield Strength

Compressive Yield Strength MPa
280

TABLE 23
Aluminum Alloy > Tensile Yield Strength

Tensile Yield Strength MPa
280

TABLE 24
Aluminum Alloy > Tensile Ultimate Strength

Tensile Ultimate Strength MPa
310

TABLE 25
Aluminum Alloy > Isotropic Secant Coefficient of Thermal Expansion

Reference Temperature C

22

TABLE 26
Aluminum Alloy > Isotropic Thermal Conductivity

Thermal Conductivity W mm^-1 C^-1	Temperature C
0.114	-100
0.144	0
0.165	100
0.175	200

TABLE 27
Aluminum Alloy > Alternating Stress R-Ratio

Alternating Stress MPa	Cycles	R-Ratio
275.8	1700	-1
241.3	5000	-1
206.8	34000	-1
172.4	1.4e+005	-1
137.9	8.e+005	-1
117.2	2.4e+006	-1
89.63	5.5e+007	-1
82.74	1.e+008	-1
170.6	50000	-0.5
139.6	3.5e+005	-0.5
108.6	3.7e+006	-0.5
87.91	1.4e+007	-0.5
77.57	5.e+007	-0.5
72.39	1.e+008	-0.5
144.8	50000	0
120.7	1.9e+005	0
103.4	1.3e+006	0
93.08	4.4e+006	0
86.18	1.2e+007	0
72.39	1.e+008	0
74.12	3.e+005	0.5
70.67	1.5e+006	0.5
66.36	1.2e+007	0.5
62.05	1.e+008	0.5

TABLE 28
Aluminum Alloy > Isotropic Resistivity

Resistivity ohm mm	Temperature C
2.43e-005	0
2.67e-005	20
3.63e-005	100

TABLE 29
Aluminum Alloy > Isotropic Elasticity

Temperature C	Young's Modulus MPa	Poisson's Ratio	Bulk Modulus MPa	Shear Modulus MPa
	71000	0.33	69608	26692

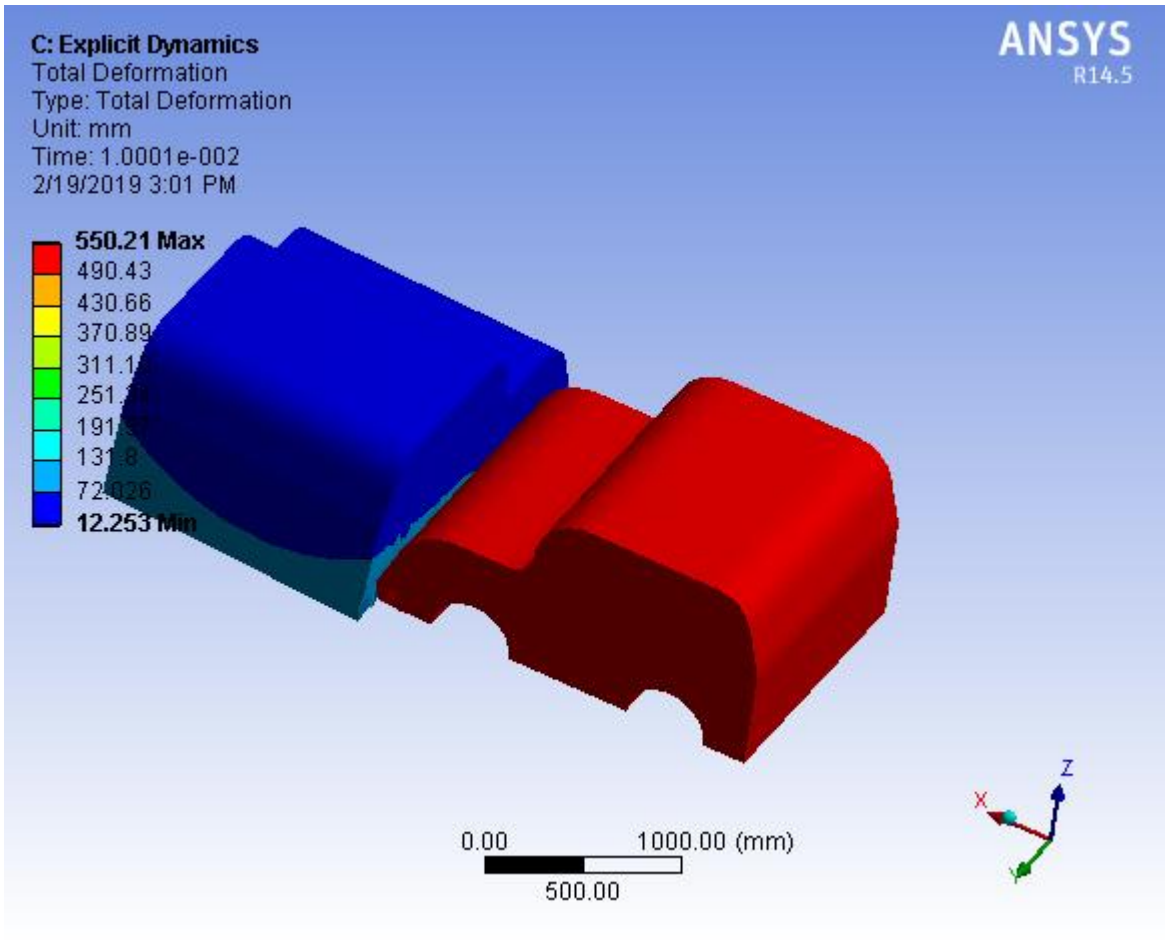
TABLE 30
Aluminum Alloy > Isotropic Relative Permeability

Relative Permeability

1

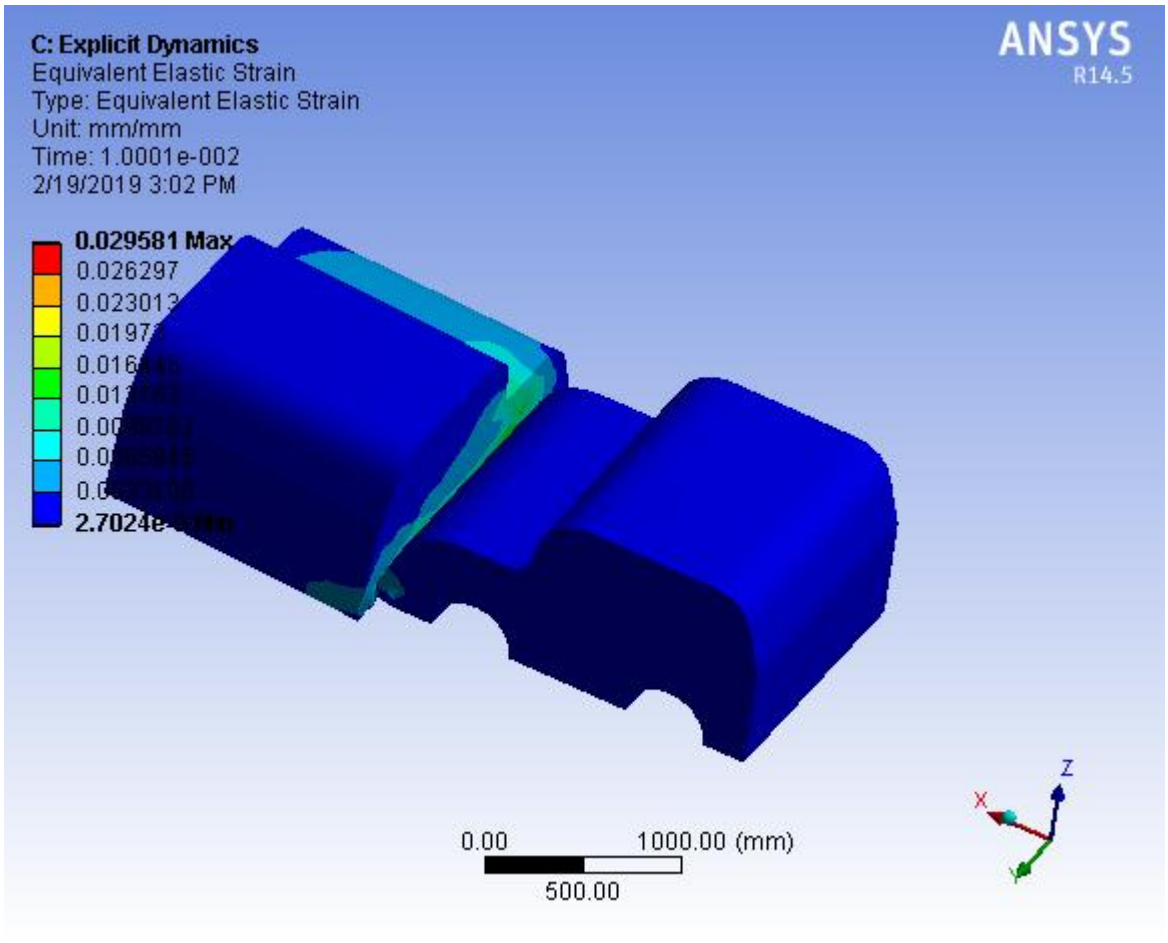
Total Deformation

Subject: 55+AL+AL+S+DEFORMATION
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



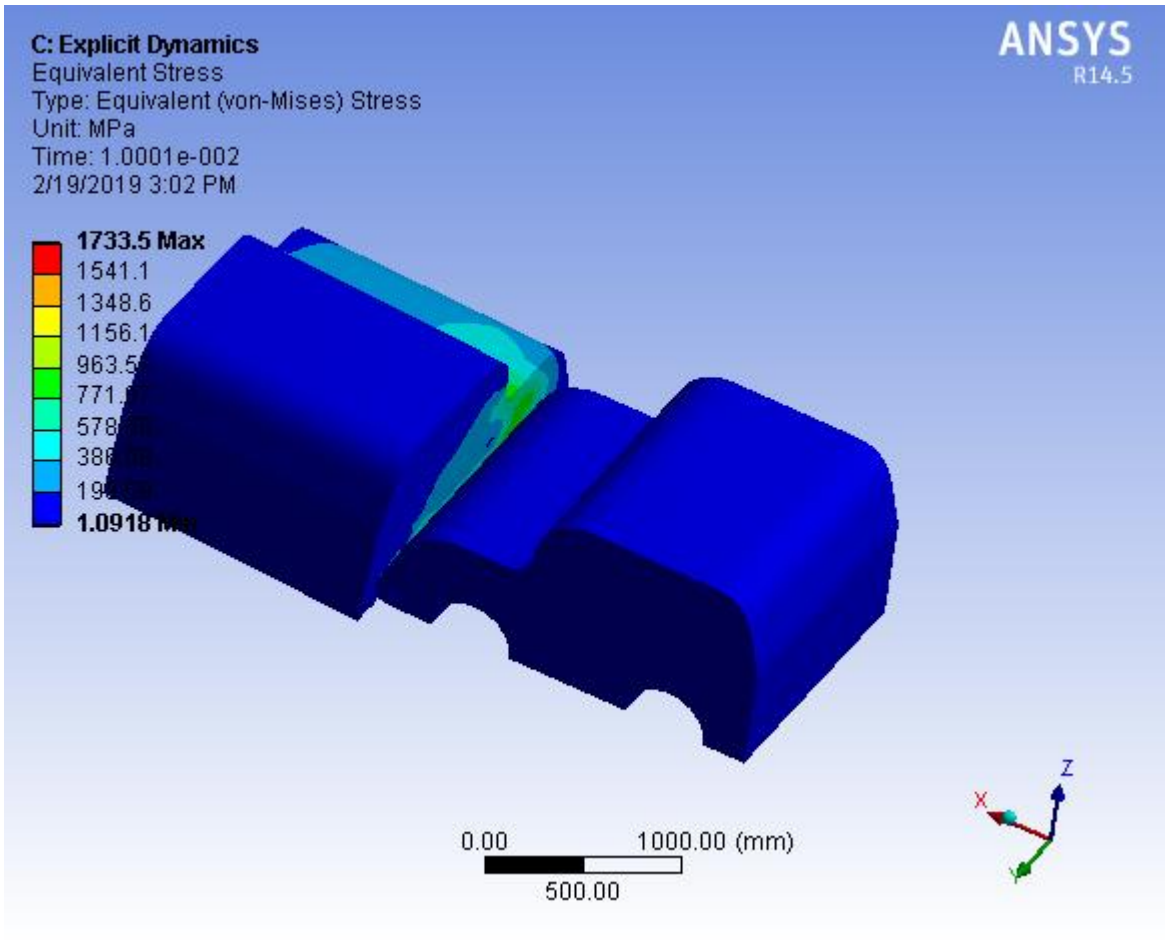
Equivalent Elastic Strain

Subject: 55+AL+AL+S+STRAIN
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



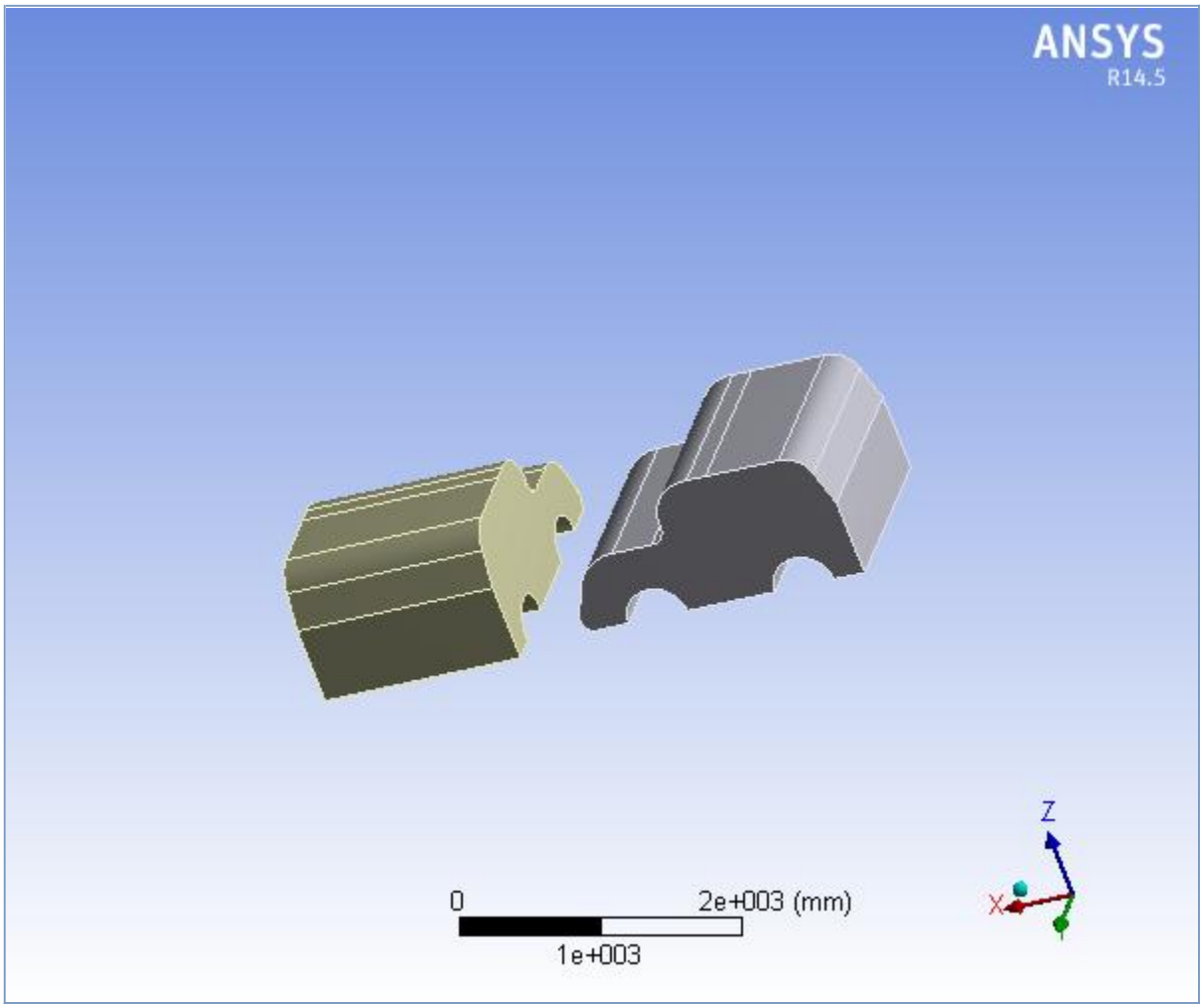
Equivalent Stress

Subject: 55+AL+AL+S+STRESS
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



Project

First Saved	Tuesday, February 19, 2019
Last Saved	Tuesday, February 19, 2019
Product Version	14.5 Release
Save Project Before Solution	No
Save Project After Solution	No



Contents

Units

TABLE 1

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

Model (D4)

Geometry

TABLE 2
Model (D4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\mech\Desktop\project\c1.igs
Type	Iges
Length Unit	Meters
Display Style	Body Color
Bounding Box	
Length X	4134.9 mm
Length Y	2154.4 mm
Length Z	1018. mm
Properties	

Volume	4.5792e+009 mm³
Mass	8242.5 kg
Scale Factor Value	1.
Statistics	
Bodies	2
Active Bodies	2
Nodes	18216
Elements	15488
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
Attach File Via Temp File	Yes
Temporary Directory	C:\Users\mech\AppData\Local\Temp
Analysis Type	3-D
Mixed Import Resolution	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (D4) > Geometry > Parts

Object Name	*Part 1*	*Part 2*
State	Meshed	
Graphics Properties		
Visible	Yes	
Transparency	1	
Definition		
Suppressed	No	
Stiffness Behavior	Flexible	
Coordinate System	Default Coordinate System	
Reference Temperature	By Environment	
Reference Frame	Lagrangian	
Material		
Assignment	Magnesium Alloy	
Bounding Box		
Length X	2167.8 mm	1500. mm
Length Y	1519.2 mm	2154.4 mm
Length Z	1000.6 mm	
Properties		
Volume	2.2896e+009 mm³	

Mass	4121.3 kg	
Centroid X	-2468.6 mm	-2.0332e-002 mm
Centroid Y	1624.2 mm	1591.3 mm
Centroid Z	481.41 mm	463.98 mm
Moment of Inertia Ip1	1.553e+009 kg·mm²	
Moment of Inertia Ip2	1.0301e+009 kg·mm²	
Moment of Inertia Ip3	2.0683e+009 kg·mm²	
Statistics		
Nodes	9108	
Elements	7744	
Mesh Metric	None	

Coordinate Systems

TABLE 4
Model (D4) > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
Definition	
Type	Cartesian
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 5
Model (D4) > Connections

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

TABLE 6
Model (D4) > Connections > Body Interactions

Object Name	*Body Interactions*
State	Fully Defined
Advanced	
Contact Detection	Trajectory
Formulation	Penalty
Body Self Contact	Program Controlled
Element Self Contact	Program Controlled
Tolerance	0.2

TABLE 7

Model (D4) > Connections > Body Interactions > Body Interaction

Object Name	*Body Interaction*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Frictionless
Suppressed	No

Mesh

TABLE 8
Model (D4) > Mesh

Object Name	*Mesh*
State	Solved
Defaults	
Physics Preference	Explicit
Relevance	0
Sizing	
Use Advanced Size Function	On: Curvature
Relevance Center	Fine
Initial Size Seed	Active Assembly
Smoothing	High
Transition	Slow
Span Angle Center	Coarse
Curvature Normal Angle	Default (70.3950 °)
Min Size	Default (0.696690 mm)
Max Face Size	Default (69.6690 mm)
Max Size	Default (139.340 mm)
Growth Rate	Default (1.20)
Minimum Edge Length	14.9120 mm
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
Advanced	
Shape Checking	Explicit
Element Midside Nodes	Dropped
Straight Sided Elements	
Number of Retries	0
Extra Retries For Assembly	Yes
Rigid Body Behavior	Full Mesh
Mesh Morphing	Disabled
Defeaturing	
Pinch Tolerance	Default (0.627020 mm)

Generate Pinch on Refresh	No
Automatic Mesh Based Defeaturing	On
Defeaturing Tolerance	Default (0.348340 mm)
Statistics	
Nodes	18216
Elements	15488
Mesh Metric	None

Explicit Dynamics (D5)

TABLE 9
Model (D4) > Analysis

Object Name	*Explicit Dynamics (D5)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Explicit Dynamics
Solver Target	AUTODYN
Options	
Environment Temperature	22. °C
Generate Input Only	No

TABLE 10
Model (D4) > Explicit Dynamics (D5) > Initial Conditions

Object Name	*Initial Conditions*
State	Fully Defined

TABLE 11
Model (D4) > Explicit Dynamics (D5) > Initial Conditions > Initial Condition

Object Name	*Pre-Stress (None)*
State	Fully Defined
Definition	
Pre-Stress Environment	None

TABLE 12
Model (D4) > Explicit Dynamics (D5) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Analysis Settings Preference	
Type	Program Controlled
Step Controls	
Resume From Cycle	0
Maximum Number of Cycles	1e+07
End Time	1.e-002 s
Maximum Energy Error	0.1
Reference Energy Cycle	0
Initial Time Step	Program Controlled
Minimum Time Step	Program Controlled
Maximum Time Step	Program Controlled
Time Step Safety Factor	0.9
Characteristic Dimension	Diagonals

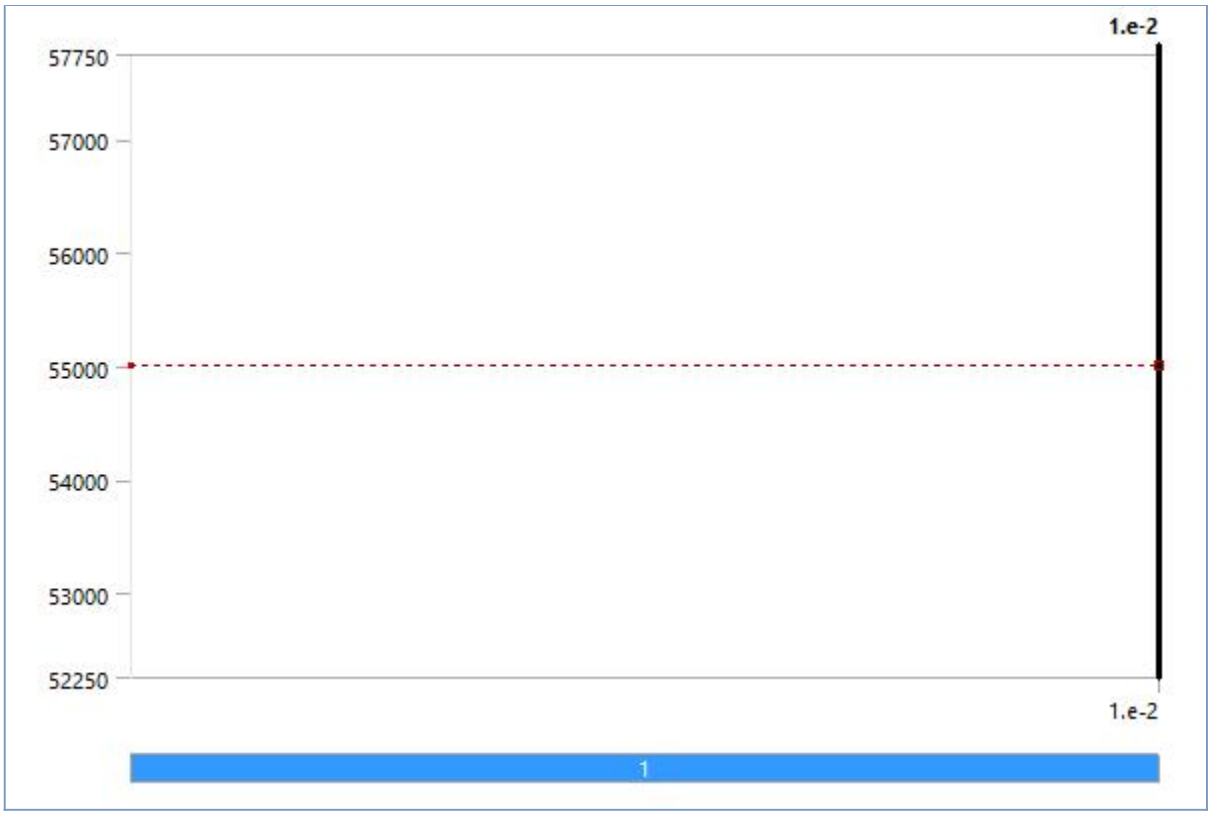
Automatic Mass Scaling	No
Solver Controls	
Precision	Double
Solve Units	mm, mg, ms
Beam Solution Type	Bending
Beam Time Step Safety Factor	0.5
Hex Integration Type	Exact
Shell Sublayers	3
Shell Shear Correction Factor	0.8333
Shell BWC Warp Correction	Yes
Shell Thickness Update	Nodal
Tet Integration	Average Nodal Pressure
Shell Inertia Update	Recompute
Density Update	Program Controlled
Minimum Velocity	1.e-003 mm s^-1
Maximum Velocity	1.e+013 mm s^-1
Radius Cutoff	1.e-003
Minimum Strain Rate Cutoff	1.e-010
Euler Domain Controls	
Domain Size Definition	Program Controlled
Display Euler Domain	Yes
Scope	All Bodies
X Scale factor	1.2
Y Scale factor	1.2
Z Scale factor	1.2
Domain Resolution Definition	Total Cells
Total Cells	2.5e+05
Lower X Face	Flow Out
Lower Y Face	Flow Out
Lower Z Face	Flow Out
Upper X Face	Flow Out
Upper Y Face	Flow Out
Upper Z Face	Flow Out
Euler Tracking	By Body
Damping Controls	
Linear Artificial Viscosity	0.2
Quadratic Artificial Viscosity	1.
Linear Viscosity in Expansion	No
Hourglass Damping	AUTODYN Standard
Viscous Coefficient	0.1
Static Damping	0.
Erosion Controls	
On Geometric Strain Limit	Yes
Geometric Strain Limit	1.5
On Material Failure	No
On Minimum Element	No

Time Step	
Retain Inertia of Eroded Material	Yes
Output Controls	
Save Results on	Equally Spaced Points
Number of points	20
Save Restart Files on	Equally Spaced Points
Number of points	5
Save Result Tracker Data on	Cycles
Cycles	1
Output Contact Forces	Off
Analysis Data Management	
Solver Files Directory	C:\Users\mech\AppData\Local\Temp\WB_RISE_4724_2\unsaved_project_files\dp0\SYS-3\MECH\
Scratch Solver Files Directory	

TABLE 13
Model (D4) > Explicit Dynamics (D5) > Loads

Object Name	*Velocity*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	1 Body
Definition	
Type	Velocity
Define By	Components
Coordinate System	Global Coordinate System
X Component	55000 mm/s (step applied)
Y Component	Free
Z Component	Free
Suppressed	No

FIGURE 1
Model (D4) > Explicit Dynamics (D5) > Velocity



Solution (D6)

TABLE 14
Model (D4) > Explicit Dynamics (D5) > Solution

Object Name	*Solution (D6)*
State	Solved
Information	
Status	Done

TABLE 15
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Solution Information

Object Name	*Solution Information*
State	Solved
Solution Information	
Solution Output	Solver Output
Update Interval	2.5 s
Display Points	All
Display Filter During Solve	Yes

TABLE 16
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Results

Object Name	*Total Deformation*	*Equivalent Elastic Strain*	*Equivalent Stress*
State	Solved		
Scope			
Scoping Method	Geometry Selection		
Geometry	All Bodies		
Definition			
Type	Total Deformation	Equivalent Elastic Strain	Equivalent (von-Mises) Stress

By	Time		
Display Time	Last		
Calculate Time History	Yes		
Identifier			
Suppressed	No		
Results			
Minimum	12.176 mm	2.184e-005 mm/mm	0.56559 MPa
Maximum	550.16 mm	3.0022e-002 mm/mm	1121.9 MPa
Minimum Occurs On	Part 2	Part 1	
Maximum Occurs On	Part 1	Part 2	
Minimum Value Over Time			
Minimum	0. mm	0. mm/mm	0. MPa
Maximum	12.176 mm	2.184e-005 mm/mm	0.67514 MPa
Maximum Value Over Time			
Minimum	0. mm	0. mm/mm	0. MPa
Maximum	550.16 mm	7.4349e-002 mm/mm	2865.4 MPa
Information			
Time	1.e-002 s		
Set	21		
Integration Point Results			
Display Option		Averaged	

FIGURE 2
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Total Deformation

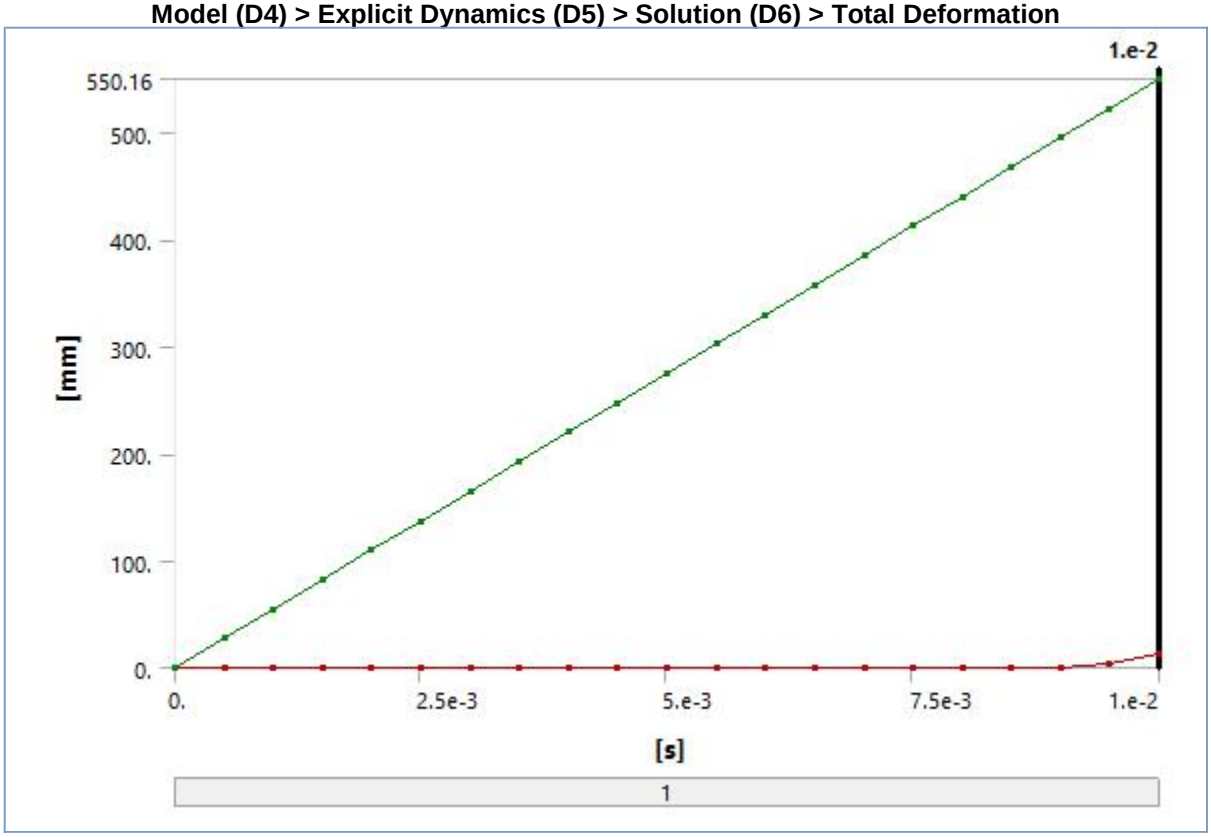


TABLE 17
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Total Deformation

Time [s]	Minimum [mm]	Maximum [mm]
1.1755e-038		0.

5.0143e-004		27.579
1.0011e-003		55.059
1.5007e-003		82.54
2.0004e-003		110.02
2.5e-003		137.5
3.0026e-003		165.14
3.5022e-003		192.62
4.0019e-003		220.1
4.5015e-003	0.	247.58
5.0012e-003		275.06
5.5008e-003		302.54
6.0005e-003		330.03
6.5001e-003		357.51
7.0027e-003		385.15
7.5023e-003		412.63
8.002e-003		440.11
8.5016e-003		467.59
9.002e-003	9.6327e-003	495.13
9.5006e-003	3.427	522.8
1.e-002	12.176	550.16

FIGURE 3
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Equivalent Elastic Strain

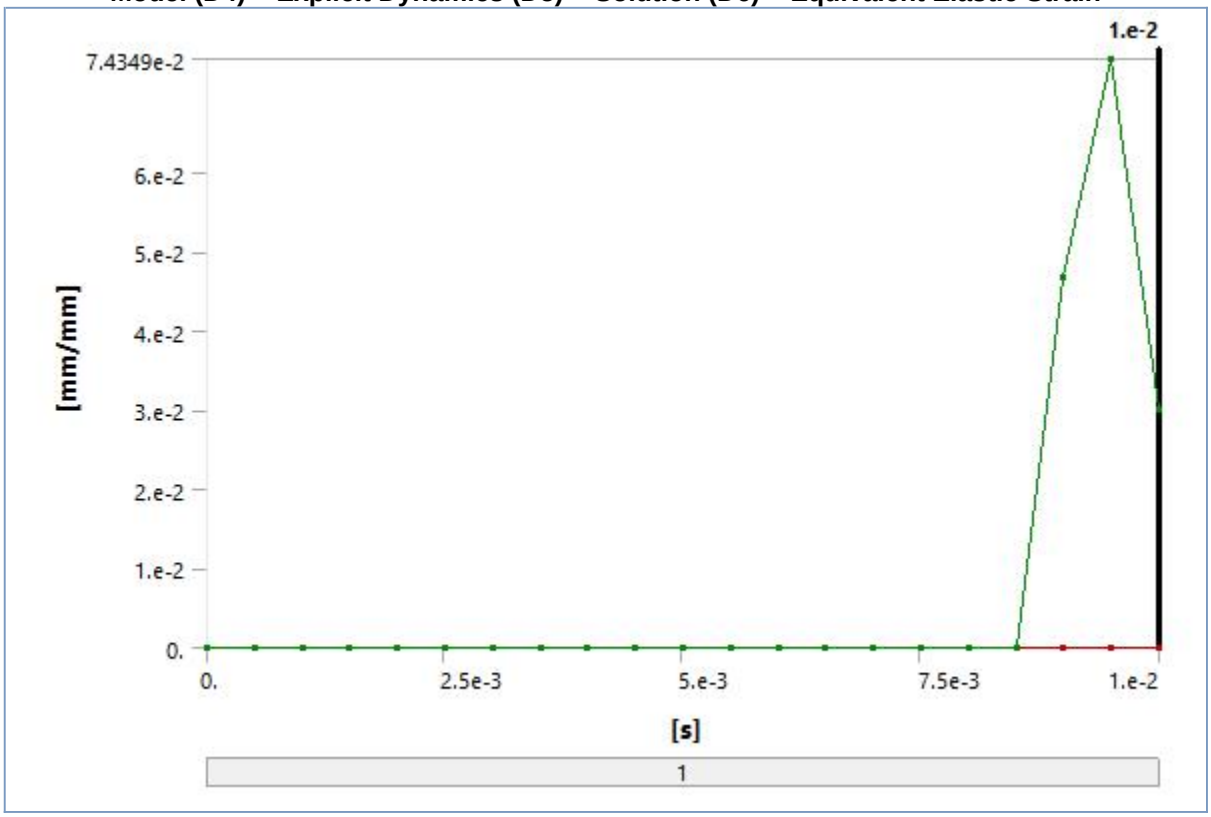


TABLE 18
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Equivalent Elastic Strain

Time [s]	Minimum [mm/mm]	Maximum [mm/mm]
1.1755e-038		
5.0143e-004		

1.0011e-003	0.	0.
1.5007e-003		
2.0004e-003		
2.5e-003		
3.0026e-003		
3.5022e-003		
4.0019e-003		
4.5015e-003		
5.0012e-003		
5.5008e-003		
6.0005e-003		
6.5001e-003		
7.0027e-003		
7.5023e-003		
8.002e-003		
8.5016e-003		
9.002e-003		4.683e-002
9.5006e-003	1.5051e-005	7.4349e-002
1.e-002	2.184e-005	3.0022e-002

FIGURE 4
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Equivalent Stress

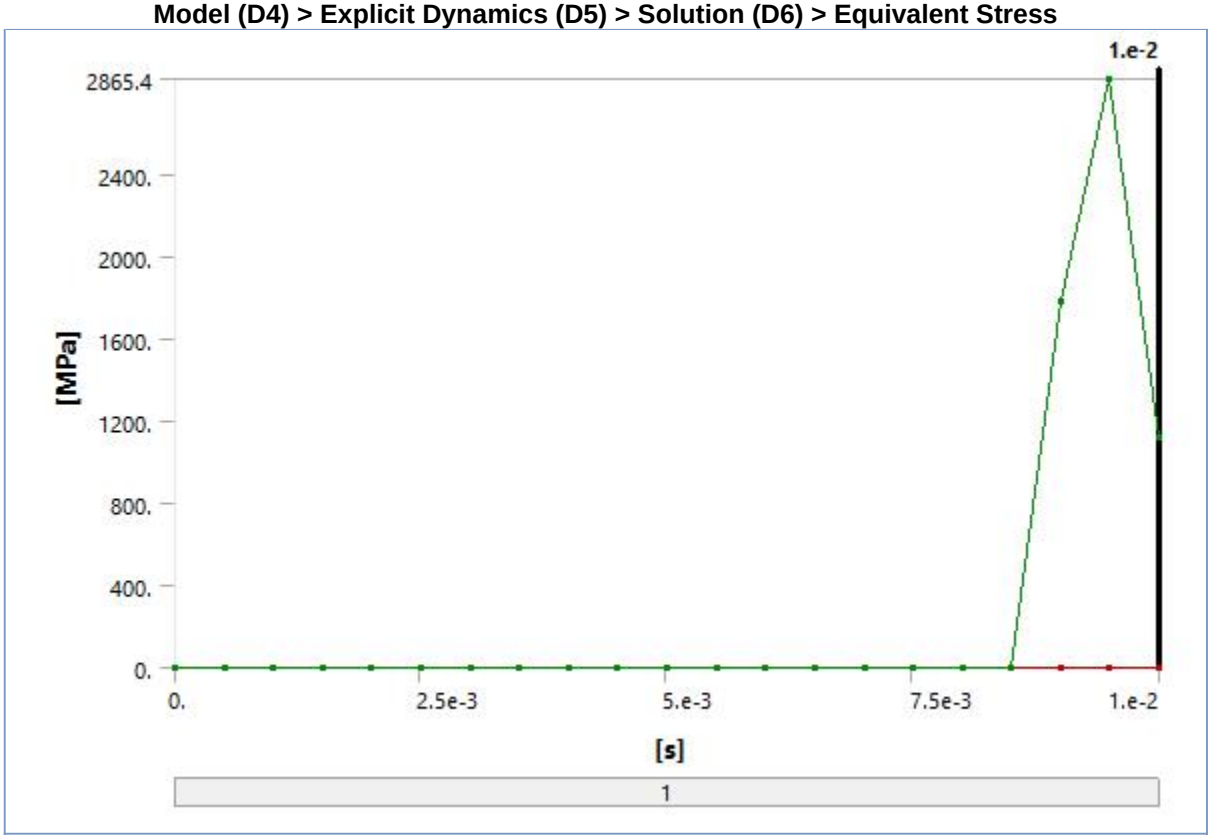


TABLE 19
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Equivalent Stress

Time [s]	Minimum [MPa]	Maximum [MPa]
1.1755e-038		
5.0143e-004		
1.0011e-003		

1.5007e-003	0.	0.
2.0004e-003		
2.5e-003		
3.0026e-003		
3.5022e-003		
4.0019e-003		
4.5015e-003		
5.0012e-003		
5.5008e-003		
6.0005e-003		
6.5001e-003		
7.0027e-003		
7.5023e-003		
8.002e-003		
8.5016e-003		
9.002e-003		1785.9
9.5006e-003	0.67514	2865.4
1.e-002	0.56559	1121.9

Material Data

Magnesium Alloy

TABLE 20
Magnesium Alloy > Constants

Density	1.8e-006 kg mm^-3
Coefficient of Thermal Expansion	2.6e-005 C^-1
Specific Heat	1.024e+006 mJ kg^-1 C^-1
Thermal Conductivity	0.156 W mm^-1 C^-1
Resistivity	7.7e-004 ohm mm

TABLE 21
Magnesium Alloy > Compressive Ultimate Strength

Compressive Ultimate Strength MPa
0

TABLE 22
Magnesium Alloy > Compressive Yield Strength

Compressive Yield Strength MPa
193

TABLE 23
Magnesium Alloy > Tensile Yield Strength

Tensile Yield Strength MPa
193

TABLE 24
Magnesium Alloy > Tensile Ultimate Strength

Tensile Ultimate Strength MPa
255

TABLE 25

Magnesium Alloy > Isotropic Secant Coefficient of Thermal Expansion

Reference Temperature C
22

TABLE 26
Magnesium Alloy > Isotropic Elasticity

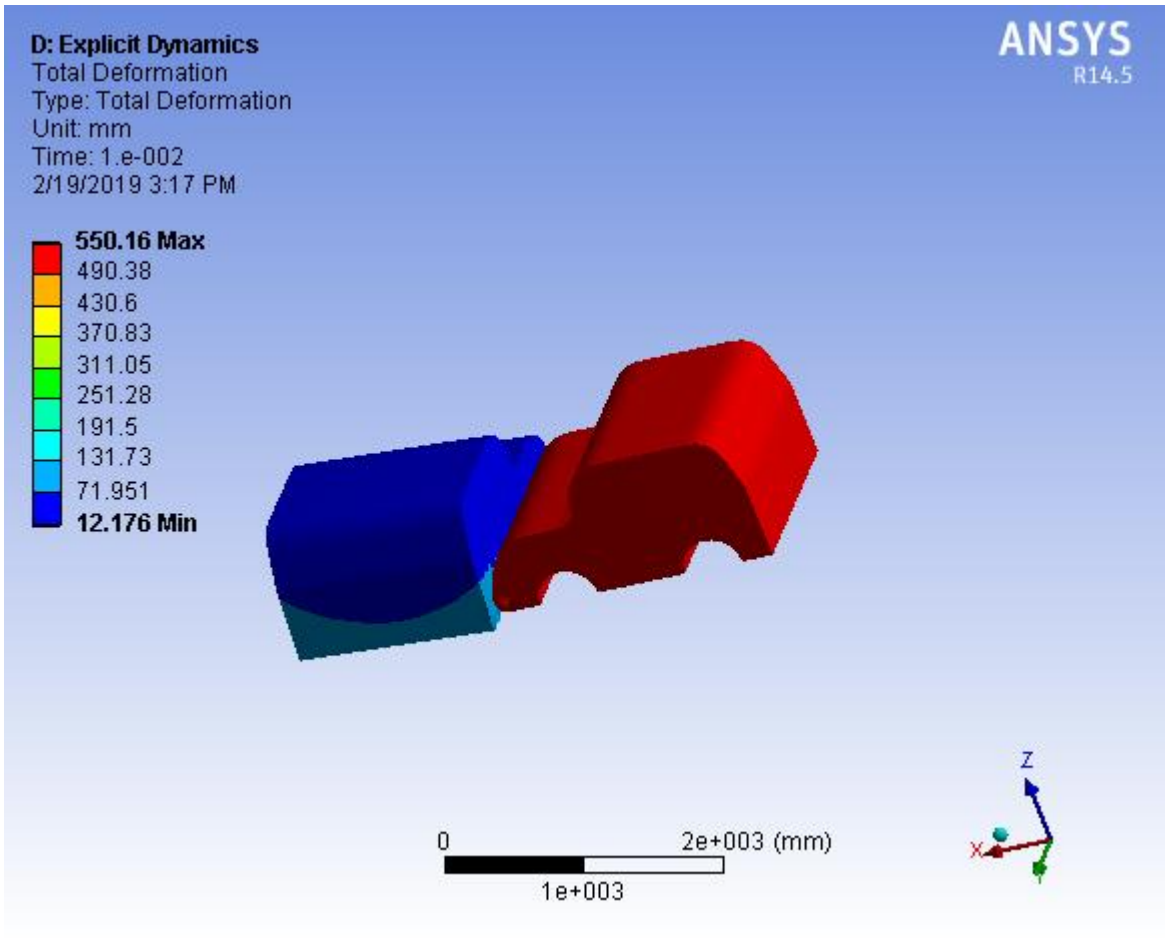
Temperature C	Young's Modulus MPa	Poisson's Ratio	Bulk Modulus MPa	Shear Modulus MPa
	45000	0.35	50000	16667

TABLE 27
Magnesium Alloy > Isotropic Relative Permeability

Relative Permeability
10000

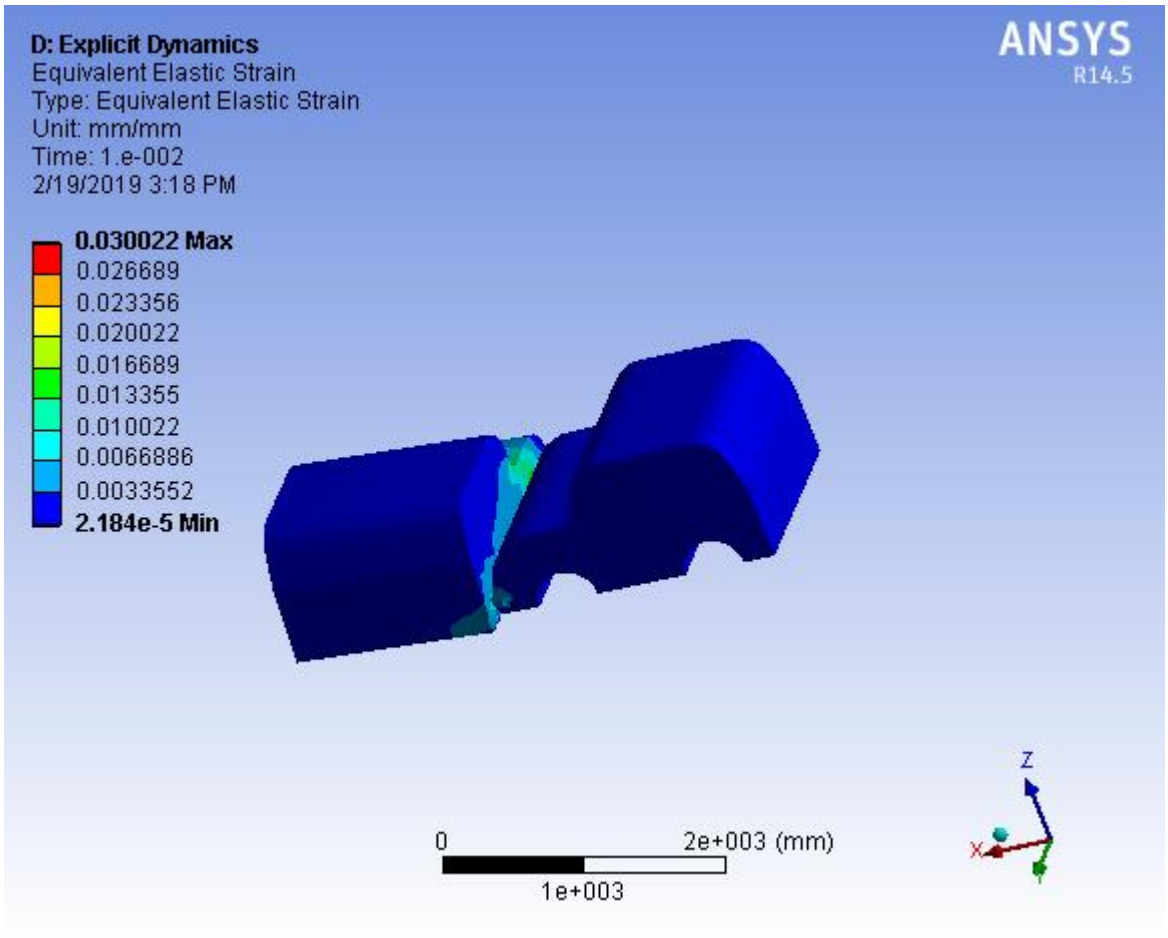
Total Deformation

Subject: 55+MG+MG+S+DEFORMATION
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



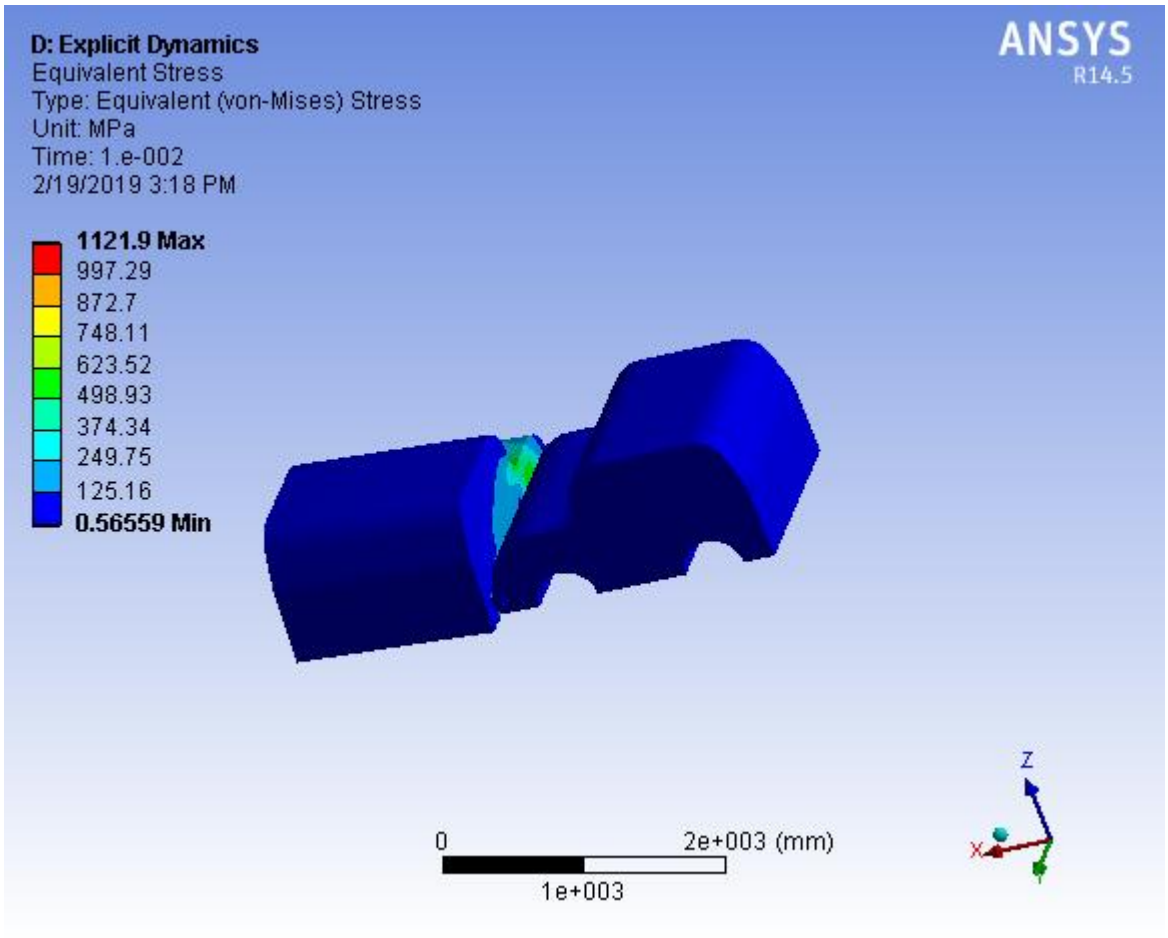
Equivalent Elastic Strain

Subject: 55+MG+MG+S+STRAIN
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



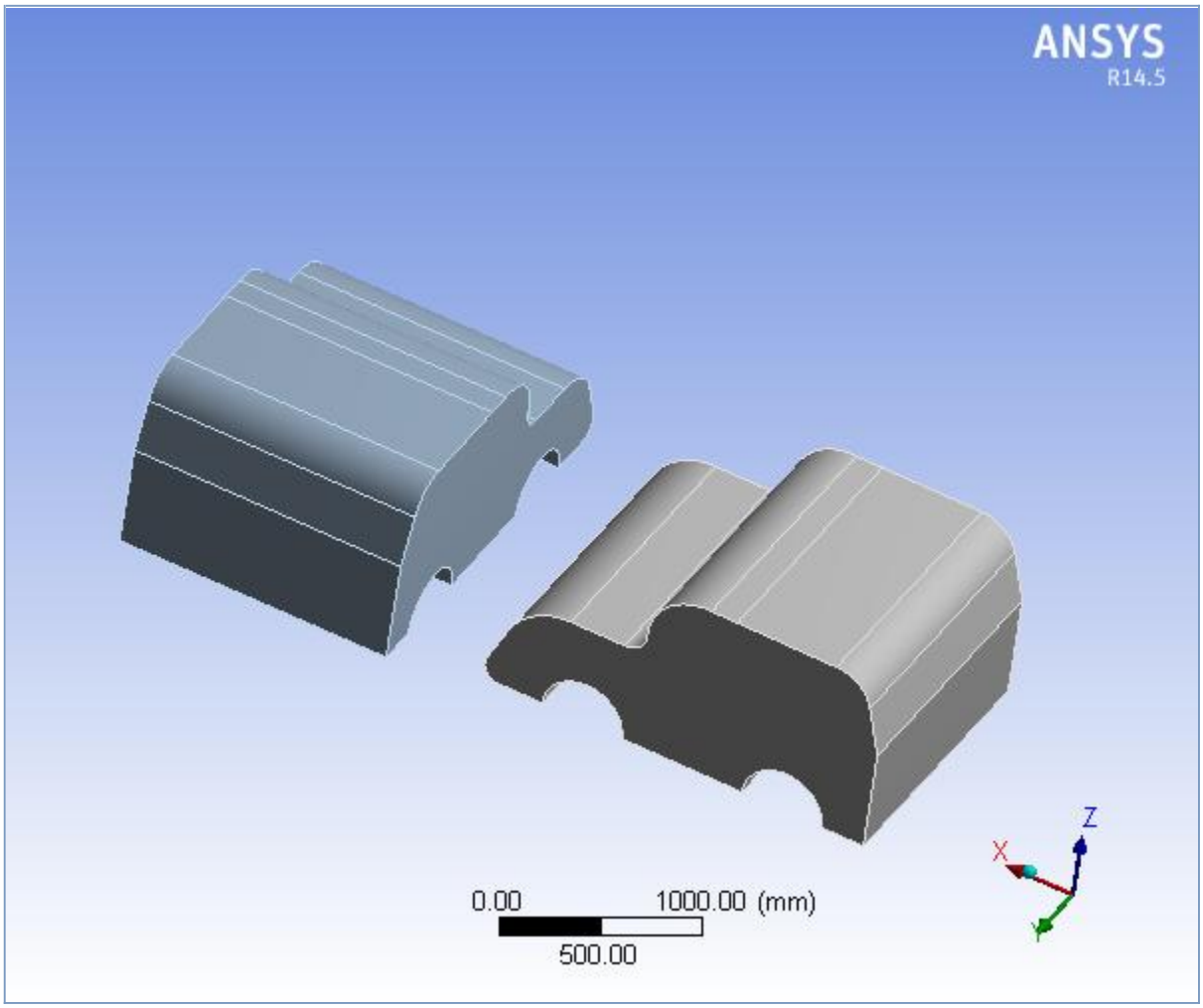
Equivalent Stress

Subject: 55+MG+MG+S+STRESS
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



Project

First Saved	Tuesday, February 19, 2019
Last Saved	Tuesday, February 19, 2019
Product Version	14.5 Release
Save Project Before Solution	No
Save Project After Solution	No



Contents

Units

TABLE 1

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

Model (C4)

Geometry

TABLE 2
Model (C4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\mech\Desktop\project\c1.igs
Type	Iges
Length Unit	Meters
Display Style	Body Color
Bounding Box	
Length X	4134.9 mm
Length Y	2154.4 mm
Length Z	1018. mm
Properties	

Volume	4.5792e+009 mm³
Mass	12684 kg
Scale Factor Value	1.
Statistics	
Bodies	2
Active Bodies	2
Nodes	18216
Elements	15488
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
Attach File Via Temp File	Yes
Temporary Directory	C:\Users\mech\AppData\Local\Temp
Analysis Type	3-D
Mixed Import Resolution	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (C4) > Geometry > Parts

Object Name	*Part 1*	*Part 2*
State	Meshed	
Graphics Properties		
Visible	Yes	
Transparency	1	
Definition		
Suppressed	No	
Stiffness Behavior	Flexible	
Coordinate System	Default Coordinate System	
Reference Temperature	By Environment	
Reference Frame	Lagrangian	
Material		
Assignment	Aluminum Alloy	
Bounding Box		
Length X	2167.8 mm	1500. mm
Length Y	1519.2 mm	2154.4 mm
Length Z	1000.6 mm	
Properties		
Volume	2.2896e+009 mm³	

Mass	6342.2 kg	
Centroid X	-2468.6 mm	-2.0332e-002 mm
Centroid Y	1624.2 mm	1591.3 mm
Centroid Z	481.41 mm	463.98 mm
Moment of Inertia Ip1	2.3899e+009 kg·mm²	
Moment of Inertia Ip2	1.5852e+009 kg·mm²	
Moment of Inertia Ip3	3.1828e+009 kg·mm²	
Statistics		
Nodes	9108	
Elements	7744	
Mesh Metric	None	

Coordinate Systems

TABLE 4
Model (C4) > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
Definition	
Type	Cartesian
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 5
Model (C4) > Connections

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

TABLE 6
Model (C4) > Connections > Body Interactions

Object Name	*Body Interactions*
State	Fully Defined
Advanced	
Contact Detection	Trajectory
Formulation	Penalty
Body Self Contact	Program Controlled
Element Self Contact	Program Controlled
Tolerance	0.2

TABLE 7

Model (C4) > Connections > Body Interactions > Body Interaction

Object Name	*Body Interaction*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Frictionless
Suppressed	No

Mesh

TABLE 8
Model (C4) > Mesh

Object Name	*Mesh*
State	Solved
Defaults	
Physics Preference	Explicit
Relevance	0
Sizing	
Use Advanced Size Function	On: Curvature
Relevance Center	Fine
Initial Size Seed	Active Assembly
Smoothing	High
Transition	Slow
Span Angle Center	Coarse
Curvature Normal Angle	Default (70.3950 °)
Min Size	Default (0.696690 mm)
Max Face Size	Default (69.6690 mm)
Max Size	Default (139.340 mm)
Growth Rate	Default (1.20)
Minimum Edge Length	14.9120 mm
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
Advanced	
Shape Checking	Explicit
Element Midside Nodes	Dropped
Straight Sided Elements	
Number of Retries	0
Extra Retries For Assembly	Yes
Rigid Body Behavior	Full Mesh
Mesh Morphing	Disabled
Defeaturing	
Pinch Tolerance	Default (0.627020 mm)

Generate Pinch on Refresh	No
Automatic Mesh Based Defeaturing	On
Defeaturing Tolerance	Default (0.348340 mm)
Statistics	
Nodes	18216
Elements	15488
Mesh Metric	None

Explicit Dynamics (C5)

TABLE 9
Model (C4) > Analysis

Object Name	*Explicit Dynamics (C5)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Explicit Dynamics
Solver Target	AUTODYN
Options	
Environment Temperature	22. °C
Generate Input Only	No

TABLE 10
Model (C4) > Explicit Dynamics (C5) > Initial Conditions

Object Name	*Initial Conditions*
State	Fully Defined

TABLE 11
Model (C4) > Explicit Dynamics (C5) > Initial Conditions > Initial Condition

Object Name	*Pre-Stress (None)*
State	Fully Defined
Definition	
Pre-Stress Environment	None

TABLE 12
Model (C4) > Explicit Dynamics (C5) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Analysis Settings Preference	
Type	Program Controlled
Step Controls	
Resume From Cycle	0
Maximum Number of Cycles	1e+07
End Time	1.e-002 s
Maximum Energy Error	0.1
Reference Energy Cycle	0
Initial Time Step	Program Controlled
Minimum Time Step	Program Controlled
Maximum Time Step	Program Controlled
Time Step Safety Factor	0.9
Characteristic Dimension	Diagonals

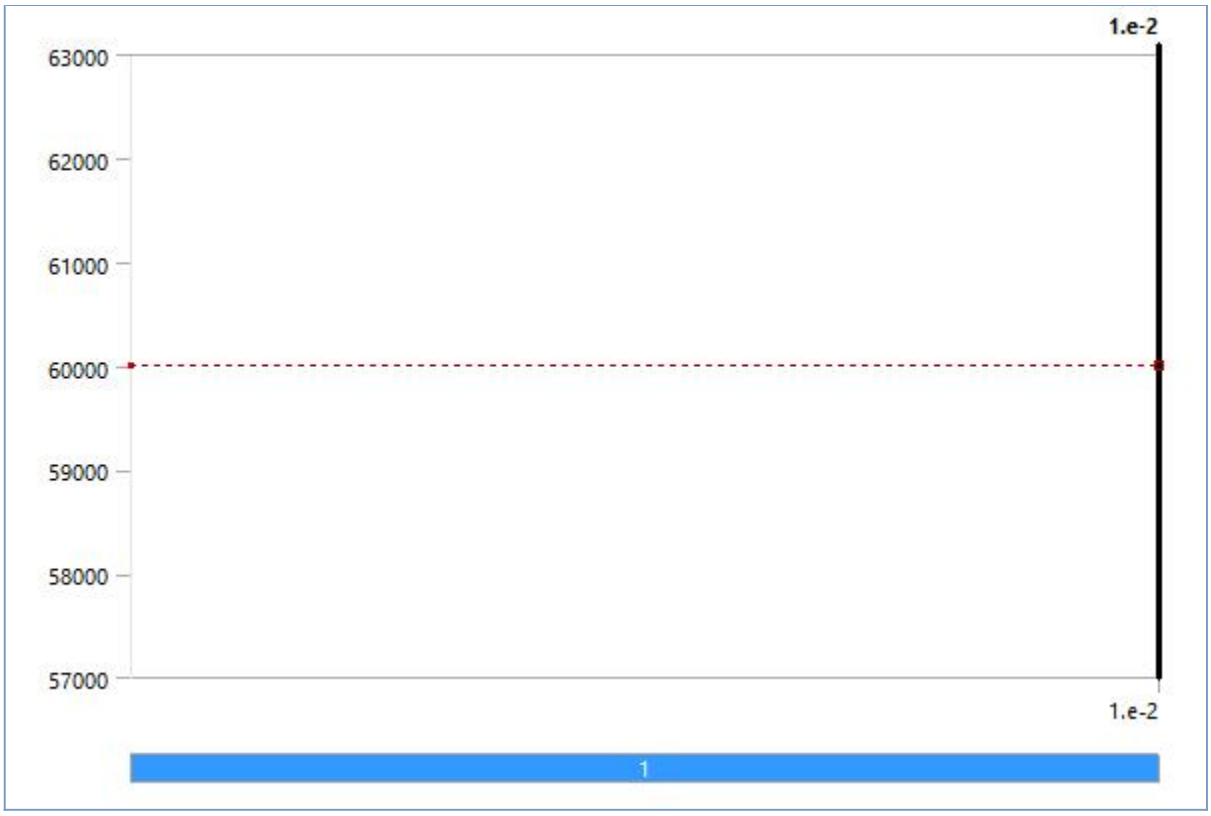
Automatic Mass Scaling	No
Solver Controls	
Precision	Double
Solve Units	mm, mg, ms
Beam Solution Type	Bending
Beam Time Step Safety Factor	0.5
Hex Integration Type	Exact
Shell Sublayers	3
Shell Shear Correction Factor	0.8333
Shell BWC Warp Correction	Yes
Shell Thickness Update	Nodal
Tet Integration	Average Nodal Pressure
Shell Inertia Update	Recompute
Density Update	Program Controlled
Minimum Velocity	1.e-003 mm s^-1
Maximum Velocity	1.e+013 mm s^-1
Radius Cutoff	1.e-003
Minimum Strain Rate Cutoff	1.e-010
Euler Domain Controls	
Domain Size Definition	Program Controlled
Display Euler Domain	Yes
Scope	All Bodies
X Scale factor	1.2
Y Scale factor	1.2
Z Scale factor	1.2
Domain Resolution Definition	Total Cells
Total Cells	2.5e+05
Lower X Face	Flow Out
Lower Y Face	Flow Out
Lower Z Face	Flow Out
Upper X Face	Flow Out
Upper Y Face	Flow Out
Upper Z Face	Flow Out
Euler Tracking	By Body
Damping Controls	
Linear Artificial Viscosity	0.2
Quadratic Artificial Viscosity	1.
Linear Viscosity in Expansion	No
Hourglass Damping	AUTODYN Standard
Viscous Coefficient	0.1
Static Damping	0.
Erosion Controls	
On Geometric Strain Limit	Yes
Geometric Strain Limit	1.5
On Material Failure	No
On Minimum Element	No

Time Step	
Retain Inertia of Eroded Material	Yes
Output Controls	
Save Results on	Equally Spaced Points
Number of points	20
Save Restart Files on	Equally Spaced Points
Number of points	5
Save Result Tracker Data on	Cycles
Cycles	1
Output Contact Forces	Off
Analysis Data Management	
Solver Files Directory	C:\Users\mech\AppData\Local\Temp\WB_RISE_4724_2\unsaved_project_files\dp0\SYS-2\MECH\
Scratch Solver Files Directory	

TABLE 13
Model (C4) > Explicit Dynamics (C5) > Loads

Object Name	*Velocity*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	1 Body
Definition	
Type	Velocity
Define By	Components
Coordinate System	Global Coordinate System
X Component	60000 mm/s (step applied)
Y Component	Free
Z Component	Free
Suppressed	No

FIGURE 1
Model (C4) > Explicit Dynamics (C5) > Velocity



Solution (C6)

TABLE 14
Model (C4) > Explicit Dynamics (C5) > Solution

Object Name	*Solution (C6)*
State	Solved
Information	
Status	Done

TABLE 15
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Solution Information

Object Name	*Solution Information*
State	Solved
Solution Information	
Solution Output	Solver Output
Update Interval	2.5 s
Display Points	All
Display Filter During Solve	Yes

TABLE 16
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Results

Object Name	*Total Deformation*	*Equivalent Elastic Strain*	*Equivalent Stress*
State	Solved		
Scope			
Scoping Method	Geometry Selection		
Geometry	All Bodies		
Definition			
Type	Total Deformation	Equivalent Elastic Strain	Equivalent (von-Mises) Stress

By	Time		
Display Time	Last		
Calculate Time History	Yes		
Identifier			
Suppressed	No		
Results			
Minimum	36.029 mm	4.5456e-005 mm/mm	1.5682 MPa
Maximum	600.29 mm	9.0137e-003 mm/mm	625.29 MPa
Minimum Occurs On	Part 2	Part 1	
Maximum Occurs On	Part 1	Part 2	
Minimum Value Over Time			
Minimum	0. mm	0. mm/mm	0. MPa
Maximum	36.029 mm	4.5456e-005 mm/mm	2.0732 MPa
Maximum Value Over Time			
Minimum	0. mm	0. mm/mm	0. MPa
Maximum	600.29 mm	7.3697e-002 mm/mm	4483.2 MPa
Information			
Time	1.0003e-002 s		
Set	21		
Integration Point Results			
Display Option		Averaged	

FIGURE 2
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Total Deformation

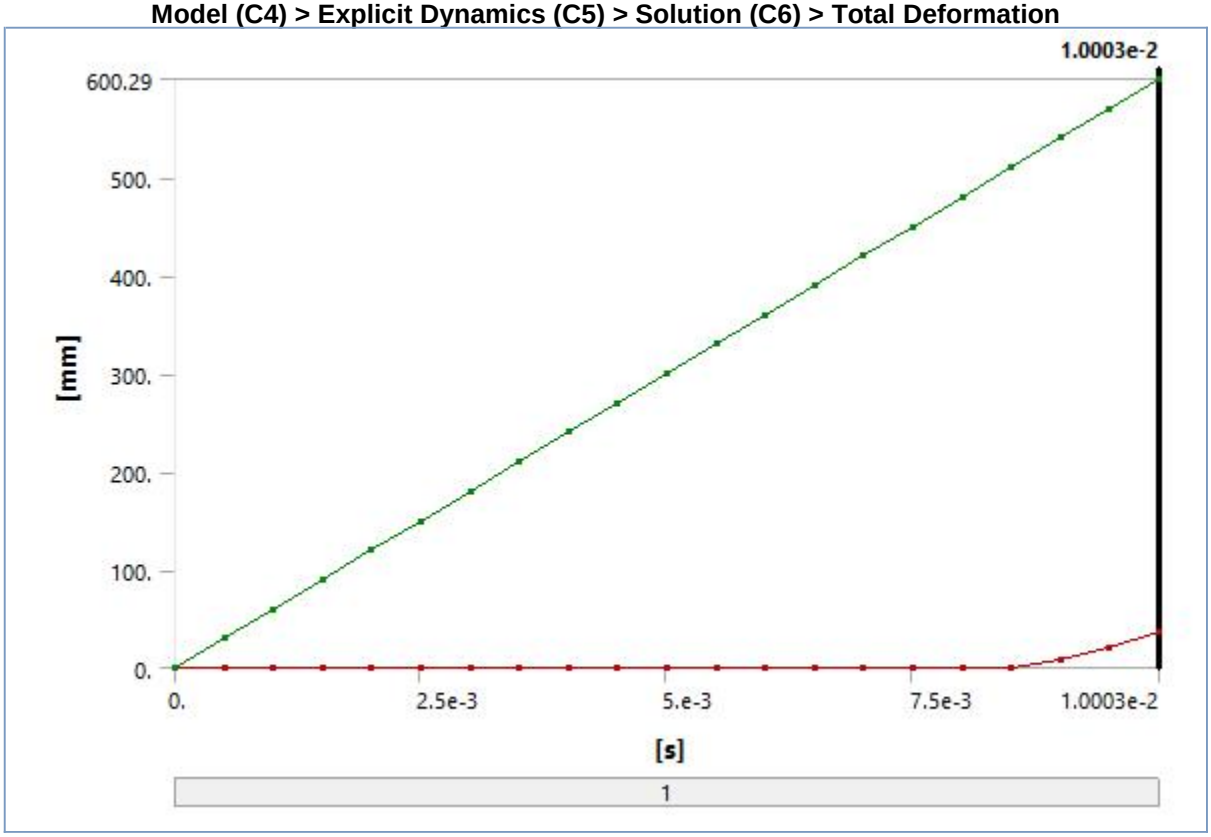


TABLE 17
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Total Deformation

Time [s]	Minimum [mm]	Maximum [mm]
1.1755e-038		0.

5.0046e-004	0.	30.027
1.0021e-003		60.125
1.5007e-003		90.044
2.0024e-003		120.14
2.501e-003		150.06
3.0026e-003		180.16
3.5013e-003		210.08
4.0029e-003		240.17
4.5015e-003		270.09
5.0002e-003		300.01
5.5018e-003		330.11
6.0005e-003		360.03
6.5021e-003		390.13
7.0007e-003		420.04
7.5024e-003		450.14
8.001e-003		480.06
8.5001e-003	0.44065	510.13
9.0021e-003	7.7173	540.45
9.5019e-003	19.983	570.21
1.0003e-002	36.029	600.29

FIGURE 3
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Equivalent Elastic Strain

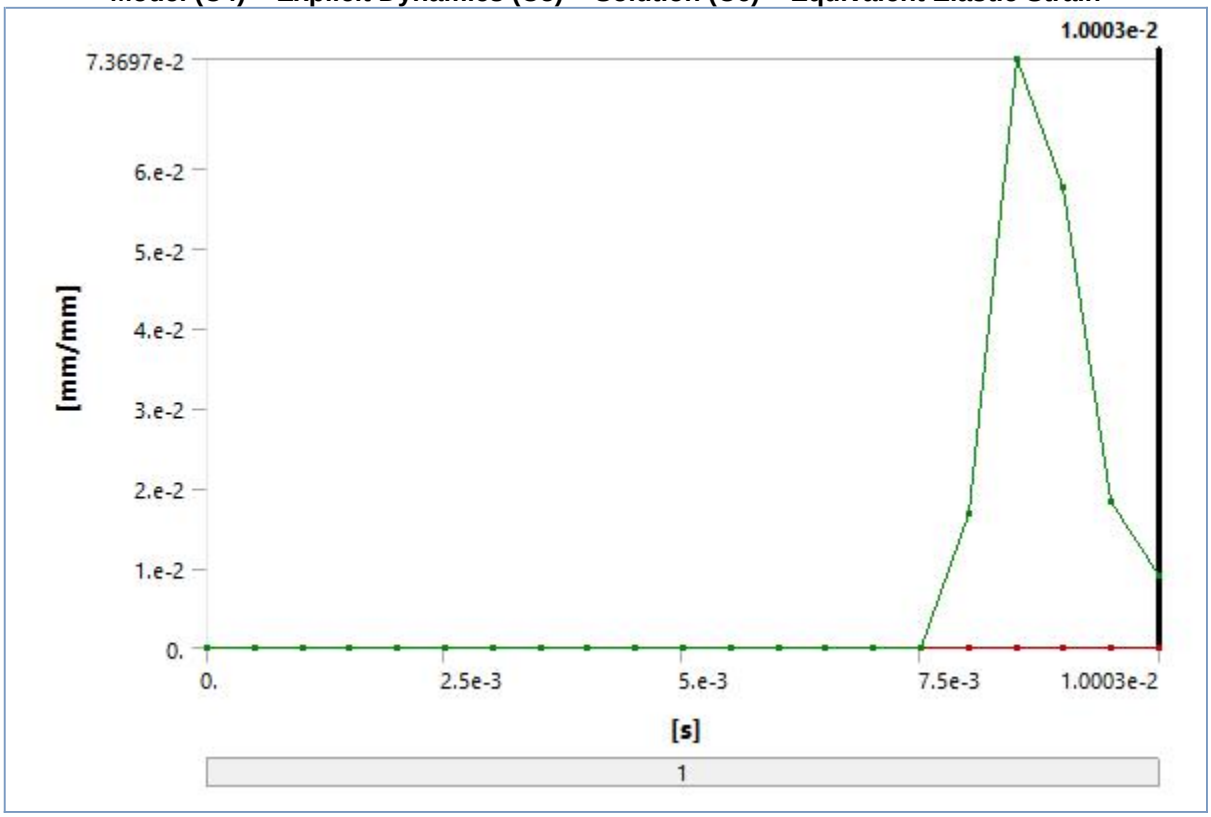


TABLE 18
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Equivalent Elastic Strain

Time [s]	Minimum [mm/mm]	Maximum [mm/mm]
1.1755e-038		
5.0046e-004		

1.0021e-003	0.	0.
1.5007e-003		
2.0024e-003		
2.501e-003		
3.0026e-003		
3.5013e-003		
4.0029e-003		
4.5015e-003		
5.0002e-003		
5.5018e-003		
6.0005e-003		
6.5021e-003		
7.0007e-003		
7.5024e-003		
8.001e-003		1.6733e-002
8.5001e-003		7.3697e-002
9.0021e-003	2.92e-005	5.7546e-002
9.5019e-003	1.9161e-005	1.8342e-002
1.0003e-002	4.5456e-005	9.0137e-003

FIGURE 4
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Equivalent Stress

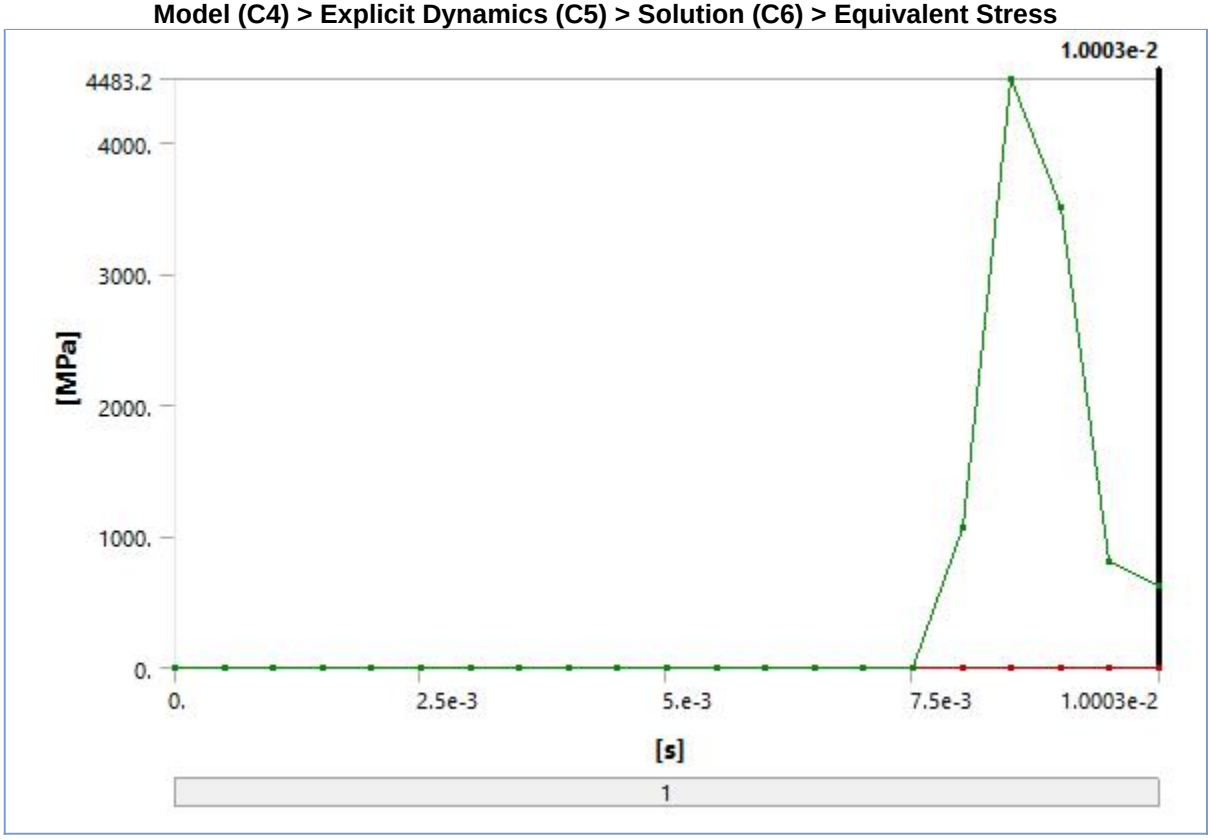


TABLE 19
Model (C4) > Explicit Dynamics (C5) > Solution (C6) > Equivalent Stress

Time [s]	Minimum [MPa]	Maximum [MPa]
1.1755e-038		
5.0046e-004		
1.0021e-003		

1.5007e-003	0.	0.
2.0024e-003		
2.501e-003		
3.0026e-003		
3.5013e-003		
4.0029e-003		
4.5015e-003		
5.0002e-003		
5.5018e-003		
6.0005e-003		
6.5021e-003		
7.0007e-003		
7.5024e-003		
8.001e-003		1068.7
8.5001e-003		4483.2
9.0021e-003	2.0732	3514.3
9.5019e-003	0.9936	805.75
1.0003e-002	1.5682	625.29

Material Data

Aluminum Alloy

TABLE 20
Aluminum Alloy > Constants

Density	2.77e-006 kg mm^-3
Coefficient of Thermal Expansion	2.3e-005 C^-1
Specific Heat	8.75e+005 mJ kg^-1 C^-1

TABLE 21
Aluminum Alloy > Compressive Ultimate Strength

Compressive Ultimate Strength MPa
0

TABLE 22
Aluminum Alloy > Compressive Yield Strength

Compressive Yield Strength MPa
280

TABLE 23
Aluminum Alloy > Tensile Yield Strength

Tensile Yield Strength MPa
280

TABLE 24
Aluminum Alloy > Tensile Ultimate Strength

Tensile Ultimate Strength MPa
310

TABLE 25
Aluminum Alloy > Isotropic Secant Coefficient of Thermal Expansion

Reference Temperature C

22

TABLE 26
Aluminum Alloy > Isotropic Thermal Conductivity

Thermal Conductivity W mm^-1 C^-1	Temperature C
0.114	-100
0.144	0
0.165	100
0.175	200

TABLE 27
Aluminum Alloy > Alternating Stress R-Ratio

Alternating Stress MPa	Cycles	R-Ratio
275.8	1700	-1
241.3	5000	-1
206.8	34000	-1
172.4	1.4e+005	-1
137.9	8.e+005	-1
117.2	2.4e+006	-1
89.63	5.5e+007	-1
82.74	1.e+008	-1
170.6	50000	-0.5
139.6	3.5e+005	-0.5
108.6	3.7e+006	-0.5
87.91	1.4e+007	-0.5
77.57	5.e+007	-0.5
72.39	1.e+008	-0.5
144.8	50000	0
120.7	1.9e+005	0
103.4	1.3e+006	0
93.08	4.4e+006	0
86.18	1.2e+007	0
72.39	1.e+008	0
74.12	3.e+005	0.5
70.67	1.5e+006	0.5
66.36	1.2e+007	0.5
62.05	1.e+008	0.5

TABLE 28
Aluminum Alloy > Isotropic Resistivity

Resistivity ohm mm	Temperature C
2.43e-005	0
2.67e-005	20
3.63e-005	100

TABLE 29
Aluminum Alloy > Isotropic Elasticity

Temperature C	Young's Modulus MPa	Poisson's Ratio	Bulk Modulus MPa	Shear Modulus MPa
	71000	0.33	69608	26692

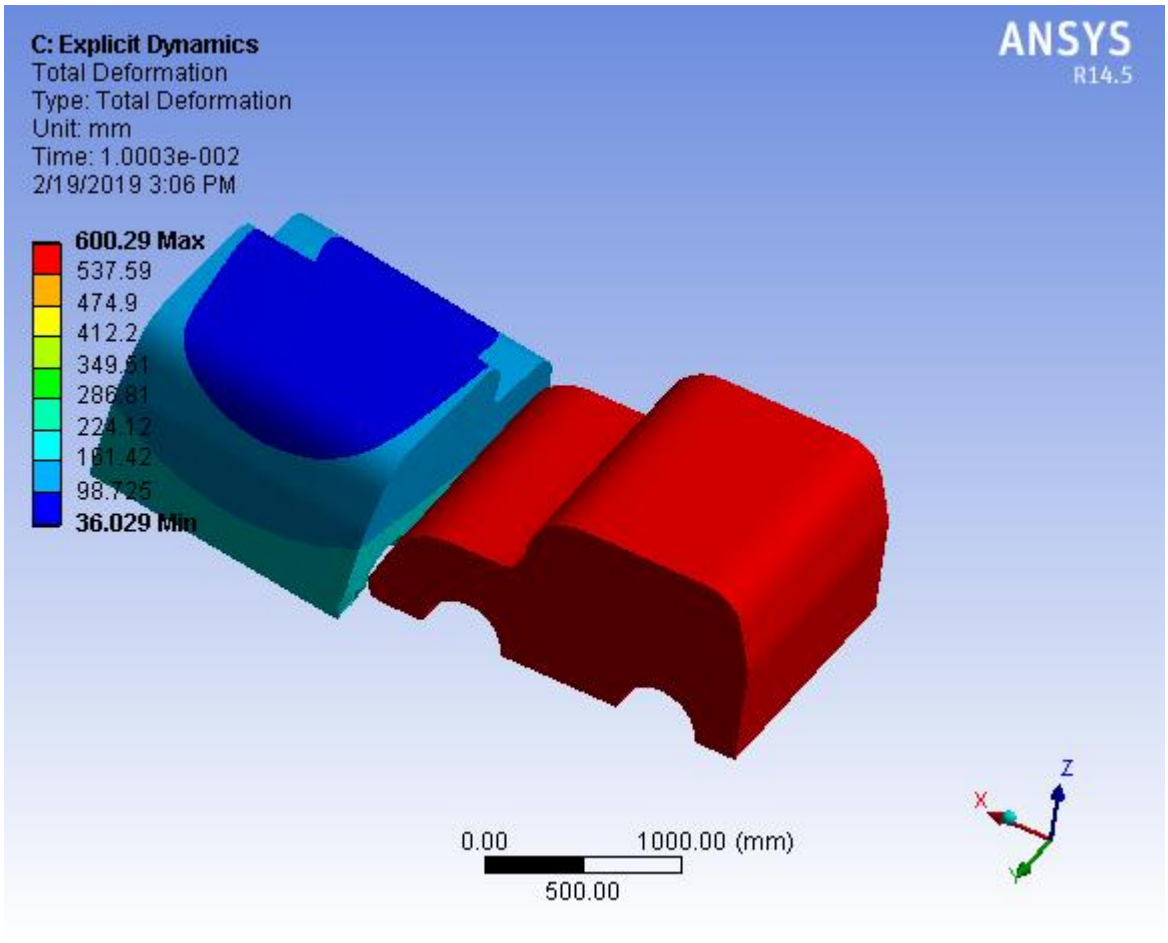
TABLE 30
Aluminum Alloy > Isotropic Relative Permeability

Relative Permeability

1

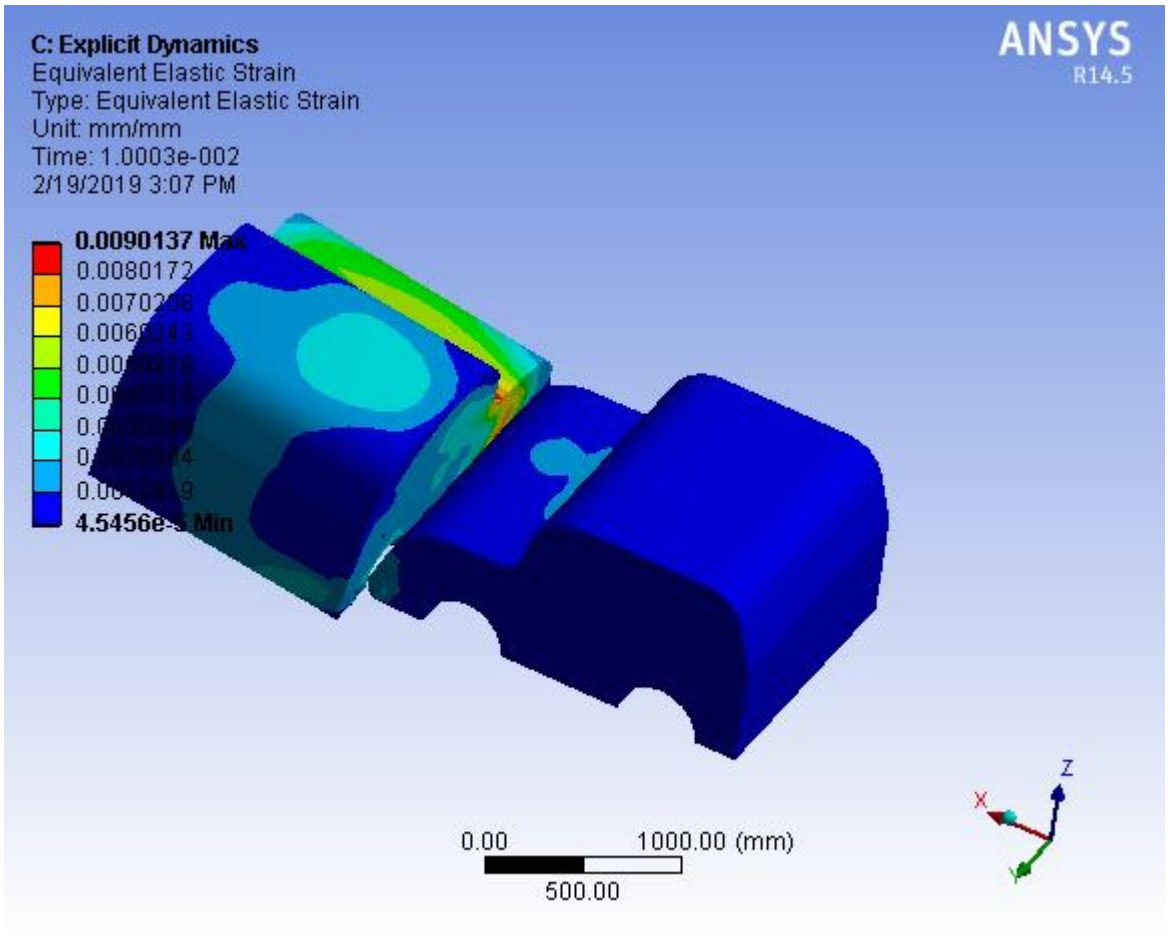
Total Deformation

Subject: 60+AL+AL+S+DEFORMATION
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



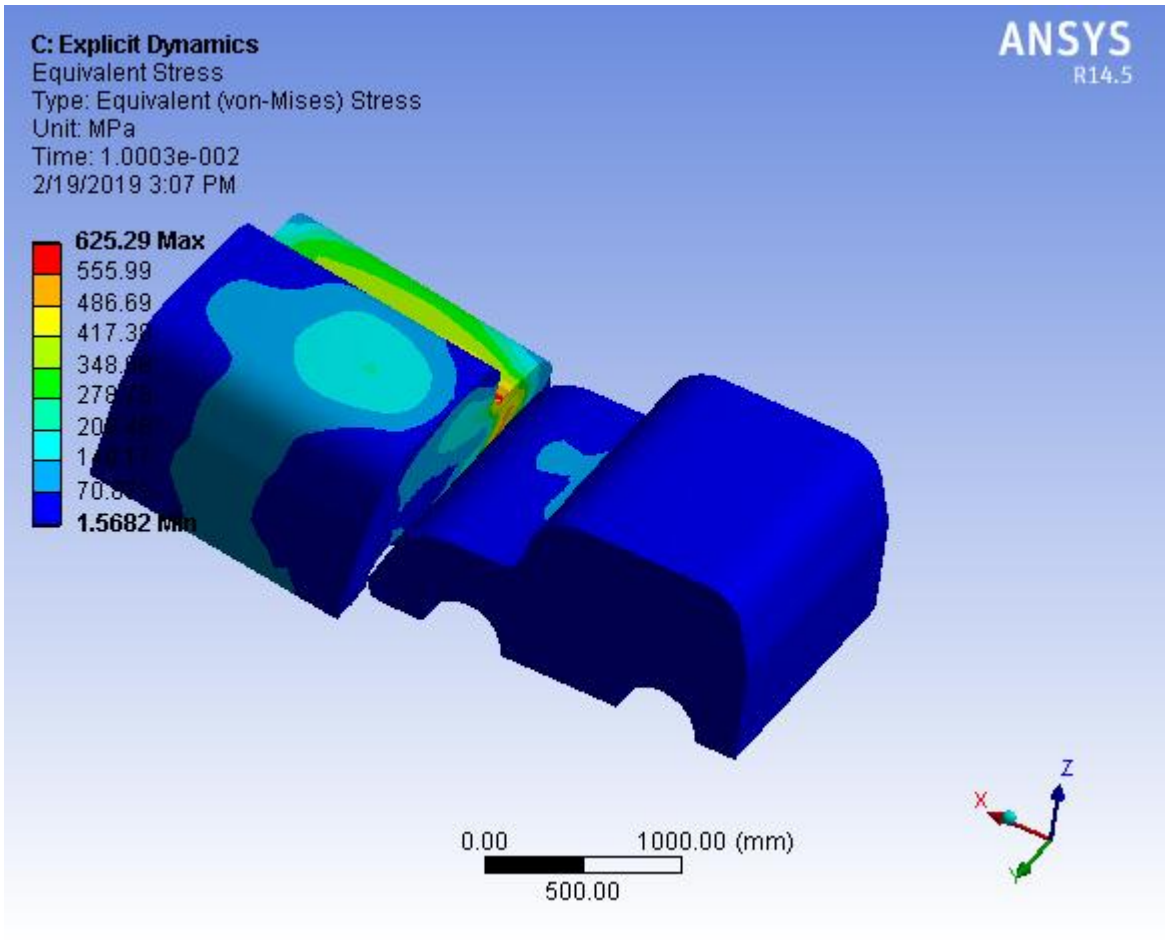
Equivalent Elastic Strain

Subject: 60+AL+AL+S+STRAIN
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



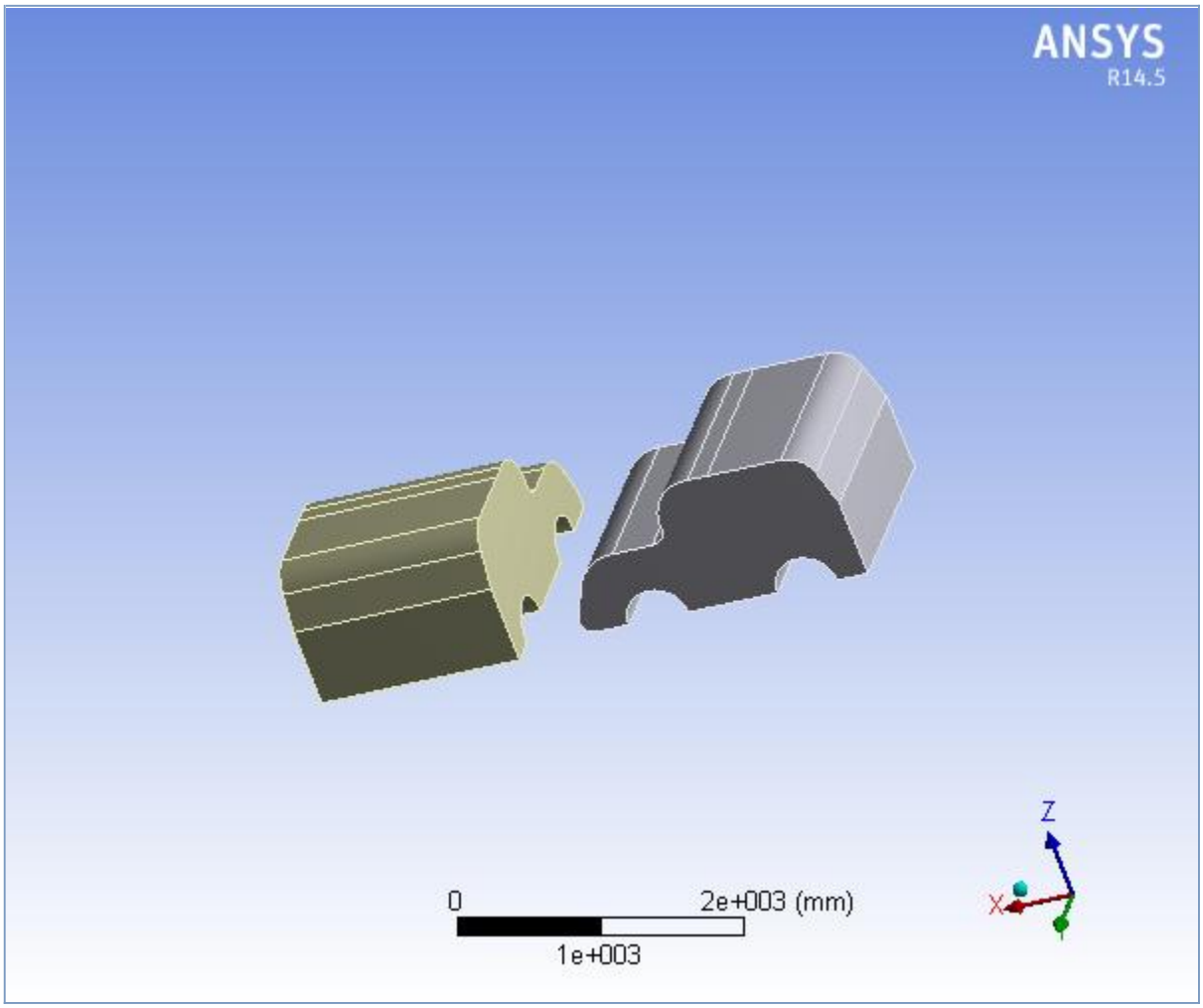
Equivalent Stress

Subject: 60+AL+AL+S+STRESS
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



Project

First Saved	Tuesday, February 19, 2019
Last Saved	Tuesday, February 19, 2019
Product Version	14.5 Release
Save Project Before Solution	No
Save Project After Solution	No



Contents

Units

TABLE 1

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

Model (D4)

Geometry

TABLE 2
Model (D4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\mech\Desktop\project\c1.igs
Type	Iges
Length Unit	Meters
Display Style	Body Color
Bounding Box	
Length X	4134.9 mm
Length Y	2154.4 mm
Length Z	1018. mm
Properties	

Volume	4.5792e+009 mm³
Mass	8242.5 kg
Scale Factor Value	1.
Statistics	
Bodies	2
Active Bodies	2
Nodes	18216
Elements	15488
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
Attach File Via Temp File	Yes
Temporary Directory	C:\Users\mech\AppData\Local\Temp
Analysis Type	3-D
Mixed Import Resolution	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (D4) > Geometry > Parts

Object Name	*Part 1*	*Part 2*
State	Meshed	
Graphics Properties		
Visible	Yes	
Transparency	1	
Definition		
Suppressed	No	
Stiffness Behavior	Flexible	
Coordinate System	Default Coordinate System	
Reference Temperature	By Environment	
Reference Frame	Lagrangian	
Material		
Assignment	Magnesium Alloy	
Bounding Box		
Length X	2167.8 mm	1500. mm
Length Y	1519.2 mm	2154.4 mm
Length Z	1000.6 mm	
Properties		
Volume	2.2896e+009 mm³	

Mass	4121.3 kg	
Centroid X	-2468.6 mm	-2.0332e-002 mm
Centroid Y	1624.2 mm	1591.3 mm
Centroid Z	481.41 mm	463.98 mm
Moment of Inertia Ip1	1.553e+009 kg·mm²	
Moment of Inertia Ip2	1.0301e+009 kg·mm²	
Moment of Inertia Ip3	2.0683e+009 kg·mm²	
Statistics		
Nodes	9108	
Elements	7744	
Mesh Metric	None	

Coordinate Systems

TABLE 4
Model (D4) > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
Definition	
Type	Cartesian
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 5
Model (D4) > Connections

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

TABLE 6
Model (D4) > Connections > Body Interactions

Object Name	*Body Interactions*
State	Fully Defined
Advanced	
Contact Detection	Trajectory
Formulation	Penalty
Body Self Contact	Program Controlled
Element Self Contact	Program Controlled
Tolerance	0.2

TABLE 7

Model (D4) > Connections > Body Interactions > Body Interaction

Object Name	*Body Interaction*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Frictionless
Suppressed	No

Mesh

TABLE 8
Model (D4) > Mesh

Object Name	*Mesh*
State	Solved
Defaults	
Physics Preference	Explicit
Relevance	0
Sizing	
Use Advanced Size Function	On: Curvature
Relevance Center	Fine
Initial Size Seed	Active Assembly
Smoothing	High
Transition	Slow
Span Angle Center	Coarse
Curvature Normal Angle	Default (70.3950 °)
Min Size	Default (0.696690 mm)
Max Face Size	Default (69.6690 mm)
Max Size	Default (139.340 mm)
Growth Rate	Default (1.20)
Minimum Edge Length	14.9120 mm
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
Advanced	
Shape Checking	Explicit
Element Midside Nodes	Dropped
Straight Sided Elements	
Number of Retries	0
Extra Retries For Assembly	Yes
Rigid Body Behavior	Full Mesh
Mesh Morphing	Disabled
Defeaturing	
Pinch Tolerance	Default (0.627020 mm)

Generate Pinch on Refresh	No
Automatic Mesh Based Defeaturing	On
Defeaturing Tolerance	Default (0.348340 mm)
Statistics	
Nodes	18216
Elements	15488
Mesh Metric	None

Explicit Dynamics (D5)

TABLE 9
Model (D4) > Analysis

Object Name	*Explicit Dynamics (D5)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Explicit Dynamics
Solver Target	AUTODYN
Options	
Environment Temperature	22. °C
Generate Input Only	No

TABLE 10
Model (D4) > Explicit Dynamics (D5) > Initial Conditions

Object Name	*Initial Conditions*
State	Fully Defined

TABLE 11
Model (D4) > Explicit Dynamics (D5) > Initial Conditions > Initial Condition

Object Name	*Pre-Stress (None)*
State	Fully Defined
Definition	
Pre-Stress Environment	None

TABLE 12
Model (D4) > Explicit Dynamics (D5) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Analysis Settings Preference	
Type	Program Controlled
Step Controls	
Resume From Cycle	0
Maximum Number of Cycles	1e+07
End Time	1.e-002 s
Maximum Energy Error	0.1
Reference Energy Cycle	0
Initial Time Step	Program Controlled
Minimum Time Step	Program Controlled
Maximum Time Step	Program Controlled
Time Step Safety Factor	0.9
Characteristic Dimension	Diagonals

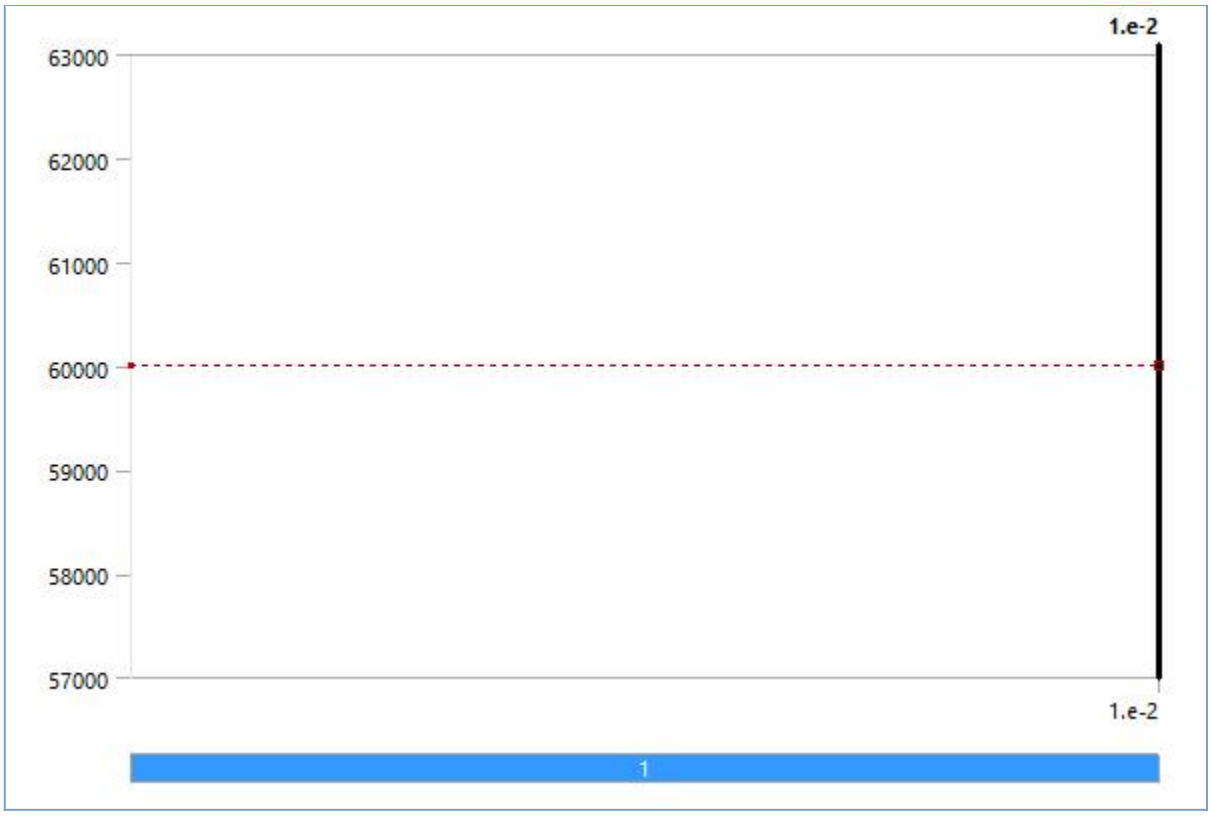
Automatic Mass Scaling	No
Solver Controls	
Precision	Double
Solve Units	mm, mg, ms
Beam Solution Type	Bending
Beam Time Step Safety Factor	0.5
Hex Integration Type	Exact
Shell Sublayers	3
Shell Shear Correction Factor	0.8333
Shell BWC Warp Correction	Yes
Shell Thickness Update	Nodal
Tet Integration	Average Nodal Pressure
Shell Inertia Update	Recompute
Density Update	Program Controlled
Minimum Velocity	1.e-003 mm s^-1
Maximum Velocity	1.e+013 mm s^-1
Radius Cutoff	1.e-003
Minimum Strain Rate Cutoff	1.e-010
Euler Domain Controls	
Domain Size Definition	Program Controlled
Display Euler Domain	Yes
Scope	All Bodies
X Scale factor	1.2
Y Scale factor	1.2
Z Scale factor	1.2
Domain Resolution Definition	Total Cells
Total Cells	2.5e+05
Lower X Face	Flow Out
Lower Y Face	Flow Out
Lower Z Face	Flow Out
Upper X Face	Flow Out
Upper Y Face	Flow Out
Upper Z Face	Flow Out
Euler Tracking	By Body
Damping Controls	
Linear Artificial Viscosity	0.2
Quadratic Artificial Viscosity	1.
Linear Viscosity in Expansion	No
Hourglass Damping	AUTODYN Standard
Viscous Coefficient	0.1
Static Damping	0.
Erosion Controls	
On Geometric Strain Limit	Yes
Geometric Strain Limit	1.5
On Material Failure	No
On Minimum Element	No

Time Step	
Retain Inertia of Eroded Material	Yes
Output Controls	
Save Results on	Equally Spaced Points
Number of points	20
Save Restart Files on	Equally Spaced Points
Number of points	5
Save Result Tracker Data on	Cycles
Cycles	1
Output Contact Forces	Off
Analysis Data Management	
Solver Files Directory	C:\Users\mech\AppData\Local\Temp\WB_RISE_4724_2\unsaved_project_files\dp0\SYS-3\MECH\
Scratch Solver Files Directory	

TABLE 13
Model (D4) > Explicit Dynamics (D5) > Loads

Object Name	*Velocity*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	1 Body
Definition	
Type	Velocity
Define By	Components
Coordinate System	Global Coordinate System
X Component	60000 mm/s (step applied)
Y Component	Free
Z Component	Free
Suppressed	No

FIGURE 1
Model (D4) > Explicit Dynamics (D5) > Velocity



Solution (D6)

TABLE 14
Model (D4) > Explicit Dynamics (D5) > Solution

Object Name	*Solution (D6)*
State	Solved
Information	
Status	Done

TABLE 15
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Solution Information

Object Name	*Solution Information*
State	Solved
Solution Information	
Solution Output	Solver Output
Update Interval	2.5 s
Display Points	All
Display Filter During Solve	Yes

TABLE 16
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Results

Object Name	*Total Deformation*	*Equivalent Elastic Strain*	*Equivalent Stress*
State	Solved		
Scope			
Scoping Method	Geometry Selection		
Geometry	All Bodies		
Definition			
Type	Total Deformation	Equivalent Elastic Strain	Equivalent (von-Mises) Stress

By	Time		
Display Time	Last		
Calculate Time History	Yes		
Identifier			
Suppressed	No		
Results			
Minimum	35.636 mm	3.9739e-005 mm/mm	1.3203 MPa
Maximum	600.26 mm	9.5194e-003 mm/mm	422.79 MPa
Minimum Occurs On	Part 2	Part 1	
Maximum Occurs On	Part 1	Part 2	
Minimum Value Over Time			
Minimum	0. mm	0. mm/mm	0. MPa
Maximum	35.636 mm	4.0831e-005 mm/mm	1.8374 MPa
Maximum Value Over Time			
Minimum	0. mm	0. mm/mm	0. MPa
Maximum	600.26 mm	7.3987e-002 mm/mm	2845.7 MPa
Information			
Time	1.0002e-002 s		
Set	21		
Integration Point Results			
Display Option		Averaged	

FIGURE 2
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Total Deformation

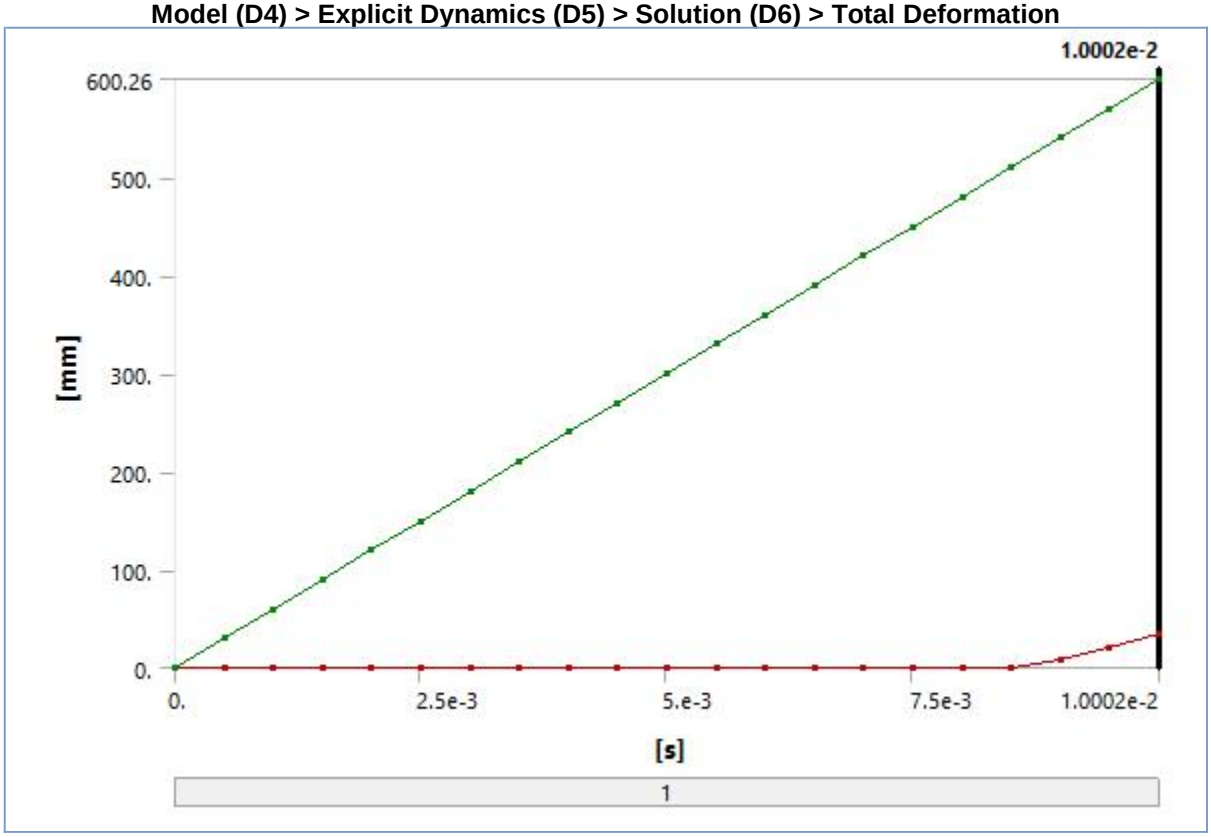


TABLE 17
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Total Deformation

Time [s]	Minimum [mm]	Maximum [mm]
1.1755e-038		0.

5.0142e-004	0.	30.085
1.0011e-003		60.064
1.5007e-003		90.043
2.0004e-003		120.02
2.5e-003		150.
3.0026e-003		180.15
3.5022e-003		210.13
4.0019e-003		240.11
4.5015e-003		270.09
5.0012e-003		300.07
5.5008e-003		330.05
6.0004e-003		360.03
6.5001e-003		390.01
7.0026e-003		420.16
7.5023e-003		450.14
8.0019e-003		480.12
8.5017e-003	0.42121	510.23
9.0001e-003	7.6559	540.34
9.501e-003	19.804	570.18
1.0002e-002	35.636	600.26

FIGURE 3
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Equivalent Elastic Strain

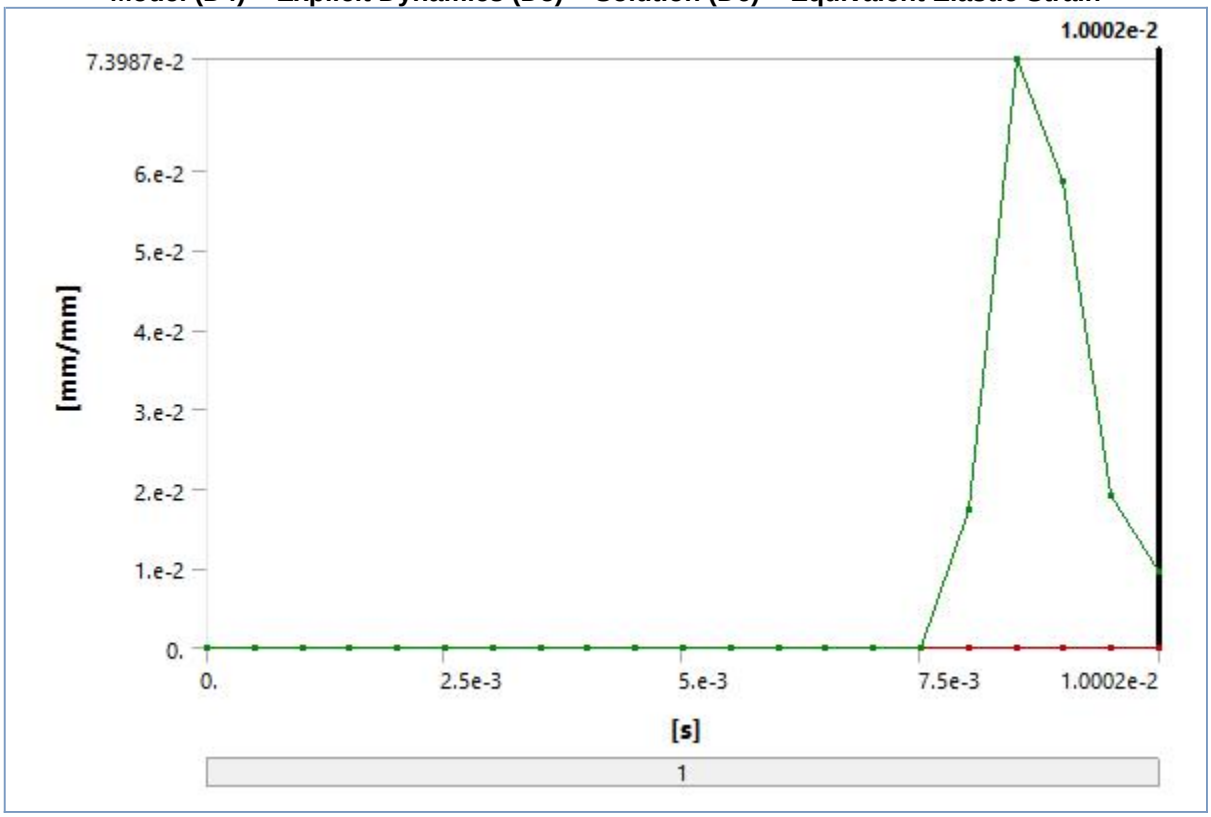


TABLE 18
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Equivalent Elastic Strain

Time [s]	Minimum [mm/mm]	Maximum [mm/mm]
1.1755e-038		
5.0142e-004		

1.0011e-003	0.	0.
1.5007e-003		
2.0004e-003		
2.5e-003		
3.0026e-003		
3.5022e-003		
4.0019e-003		
4.5015e-003		
5.0012e-003		
5.5008e-003		
6.0004e-003		
6.5001e-003		
7.0026e-003		
7.5023e-003		
8.0019e-003		1.725e-002
8.5017e-003		7.3987e-002
9.0001e-003	4.0831e-005	5.8735e-002
9.501e-003	2.2727e-005	1.906e-002
1.0002e-002	3.9739e-005	9.5194e-003

FIGURE 4
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Equivalent Stress

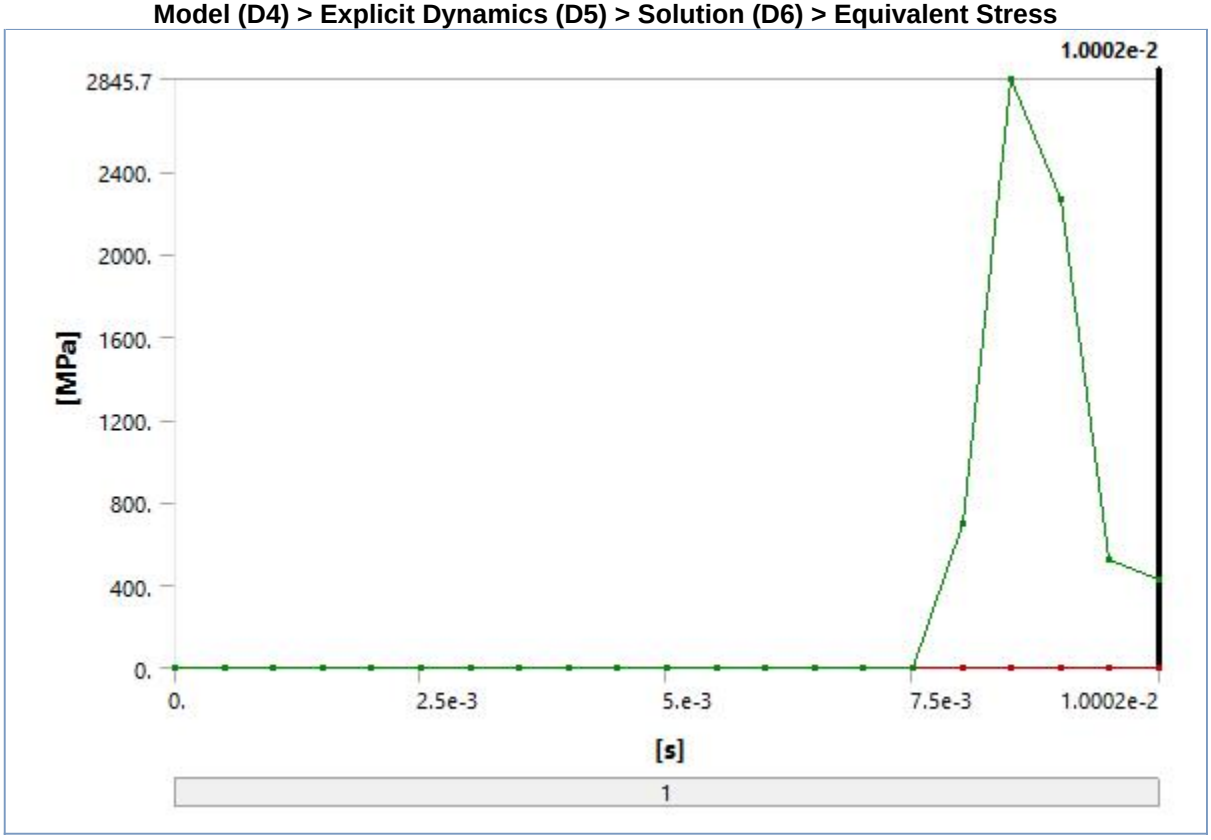


TABLE 19
Model (D4) > Explicit Dynamics (D5) > Solution (D6) > Equivalent Stress

Time [s]	Minimum [MPa]	Maximum [MPa]
1.1755e-038		
5.0142e-004		
1.0011e-003		

1.5007e-003	0.	0.
2.0004e-003		
2.5e-003		
3.0026e-003		
3.5022e-003		
4.0019e-003		
4.5015e-003		
5.0012e-003		
5.5008e-003		
6.0004e-003		
6.5001e-003		
7.0026e-003		
7.5023e-003		
8.0019e-003		698.78
8.5017e-003		2845.7
9.0001e-003	1.8374	2267.6
9.501e-003	0.60433	527.
1.0002e-002	1.3203	422.79

Material Data

Magnesium Alloy

TABLE 20
Magnesium Alloy > Constants

Density	1.8e-006 kg mm^-3
Coefficient of Thermal Expansion	2.6e-005 C^-1
Specific Heat	1.024e+006 mJ kg^-1 C^-1
Thermal Conductivity	0.156 W mm^-1 C^-1
Resistivity	7.7e-004 ohm mm

TABLE 21
Magnesium Alloy > Compressive Ultimate Strength

Compressive Ultimate Strength MPa
0

TABLE 22
Magnesium Alloy > Compressive Yield Strength

Compressive Yield Strength MPa
193

TABLE 23
Magnesium Alloy > Tensile Yield Strength

Tensile Yield Strength MPa
193

TABLE 24
Magnesium Alloy > Tensile Ultimate Strength

Tensile Ultimate Strength MPa
255

TABLE 25

Magnesium Alloy > Isotropic Secant Coefficient of Thermal Expansion

Reference Temperature C
22

TABLE 26
Magnesium Alloy > Isotropic Elasticity

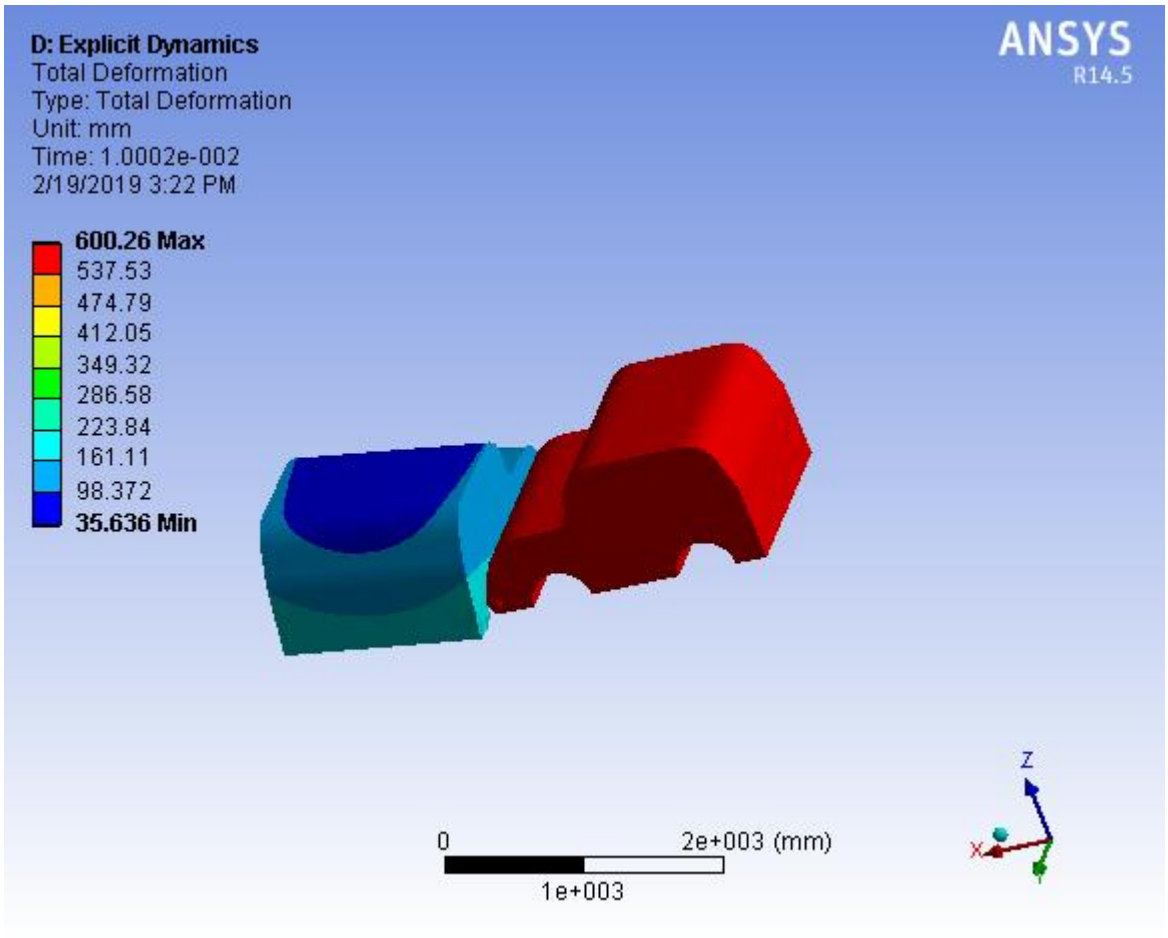
Temperature C	Young's Modulus MPa	Poisson's Ratio	Bulk Modulus MPa	Shear Modulus MPa
	45000	0.35	50000	16667

TABLE 27
Magnesium Alloy > Isotropic Relative Permeability

Relative Permeability
10000

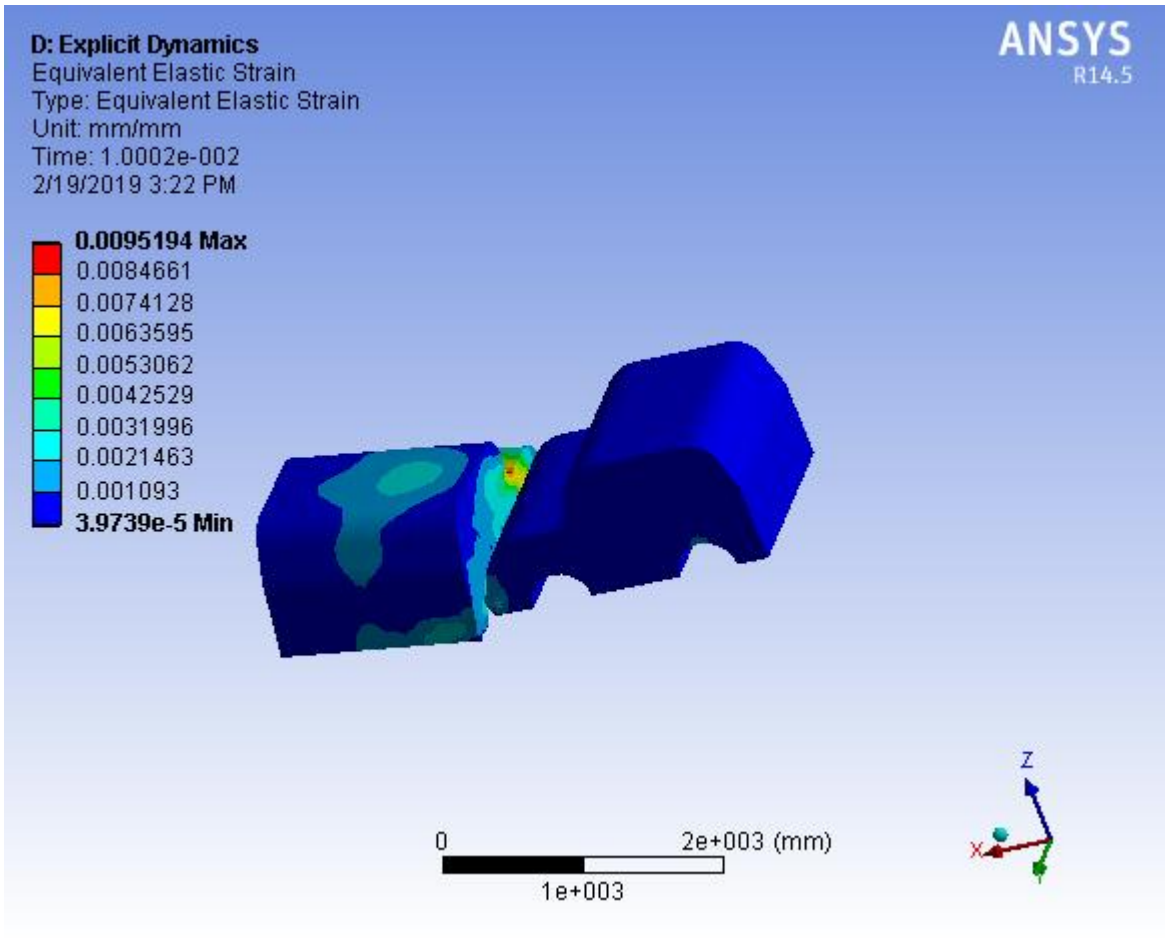
Total Deformation

Subject: 60+MG+MG+S+DEFORMATION
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



Equivalent Elastic Strain

Subject: 60+MG+MG+S+STRAIN
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments:



Equivalent Stress

Subject: 60+MG+MG+S+STRESS
Author:
Prepared For:
Date Tuesday, February 19, 2019
Comments: