



# Simulation of Connector Assembly AA

**Date:** Tuesday, March 1, 2016

**Designer:** Solidworks

**Study name:** Horizontal Stress in AA inner tab fold

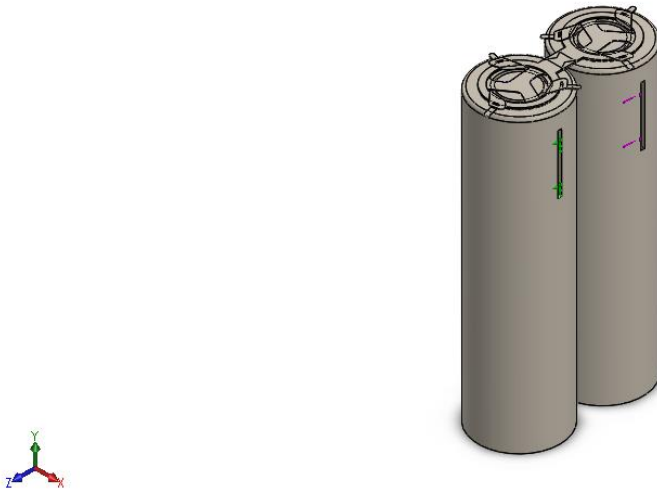
**Analysis type:** Static

## Table of Contents

Model Information .....	2
Study Properties.....	3
Units.....	3
Material Properties .....	4
Loads and Fixtures .....	4
Contact Information .....	5
Mesh information.....	6
Resultant Forces.....	7
Study Results.....	8
Conclusion .....	11





## Model Information



**Model name:** Connector Assembly AA  
**Current Configuration:** Default

### Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude2 	Solid Body	Mass:0.0630182 kg Volume:7.4139e-006 m <sup>3</sup> Density:8500 kg/m <sup>3</sup> Weight:0.617578 N	E:\Battery Connector\Parts\3D\Batte ry AA.SLDPRT Feb 14 08:05:46 2016
Cut-Extrude2 	Solid Body	Mass:0.0630182 kg Volume:7.4139e-006 m <sup>3</sup> Density:8500 kg/m <sup>3</sup> Weight:0.617578 N	E:\Battery Connector\Parts\3D\Batte ry AA.SLDPRT Feb 14 08:05:46 2016



## Study Properties

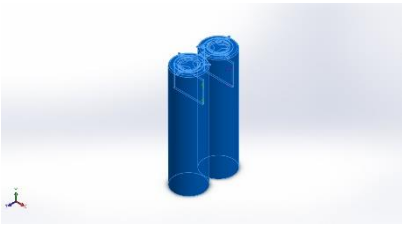
Study name	Horizontal Stress in AA inner tab fold
Analysis type	Static
Mesh type	Mixed Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	Automatic
Inplane Effect:	Off
Soft Spring:	On
Inertial Relief:	On
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	Off
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Battery Connector\Assembly)

## Units

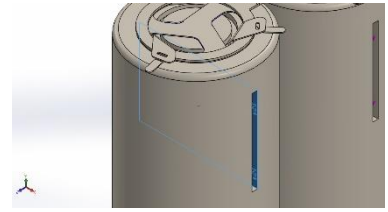
Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m <sup>2</sup>



## Material Properties

Model Reference	Properties	Components
	<b>Name:</b> Nickel <b>Model type:</b> Linear Elastic Isotropic <b>Default failure criterion:</b> Unknown <b>Yield strength:</b> 5.9e+007 N/m <sup>2</sup> <b>Tensile strength:</b> 3.17e+008 N/m <sup>2</sup> <b>Elastic modulus:</b> 2.1e+011 N/m <sup>2</sup> <b>Poisson's ratio:</b> 0.31 <b>Mass density:</b> 8500 kg/m <sup>3</sup> <b>Shear modulus:</b> 7.9e+010 N/m <sup>2</sup> <b>Thermal expansion coefficient:</b> 1.7e-005 /Kelvin	SolidBody 1(Cut-Extrude1)(Barbell Connector AA-2), SolidBody 1(Cut-Extrude2)(Battery AA-1), SolidBody 1(Cut-Extrude2)(Battery AA-2), SolidBody 1(Cut-Extrude6)(Star Connector AA 3D-1), SolidBody 1(Cut-Extrude6)(Star Connector AA 3D-2)
Curve Data:N/A		

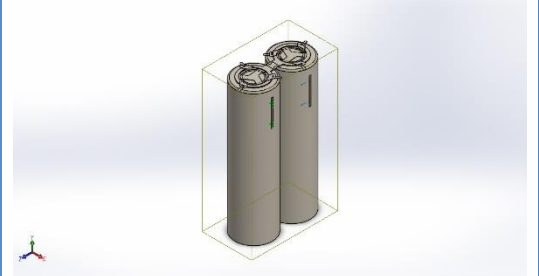
## Loads and Fixtures

Fixture name	Fixture Image	Fixture Details		
Fixed-1		<b>Entities:</b> 1 face(s) <b>Type:</b> Fixed Geometry		
<b>Resultant Forces</b>				
<b>Components</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Resultant</b>
Reaction force(N)	4.95841e-005	1.33645e-005	-0.323517	0.323517
Reaction Moment(N.m)	0	0	0	1e-033

Load name	Load Image	Load Details
Force-1		<b>Entities:</b> 1 face(s) <b>Type:</b> Apply normal force <b>Value:</b> 0.65 N (0.146126 lbf)



## Contact Information

Contact	Contact Image	Contact Properties
Global Contact		<b>Type:</b> Bonded <b>Components:</b> 1 component(s) <b>Options:</b> Compatible mesh



## Mesh information

Mesh type	Mixed Mesh
Mesher Used:	Blended curvature-based mesh
Jacobian points	4 Points
Jacobian check for shell	On
Maximum element size	3.19494 mm
Minimum element size	0.638989 mm
Mesh Quality	High
Remesh failed parts with incompatible mesh	Off

## Mesh information - Details

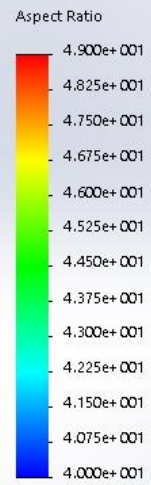
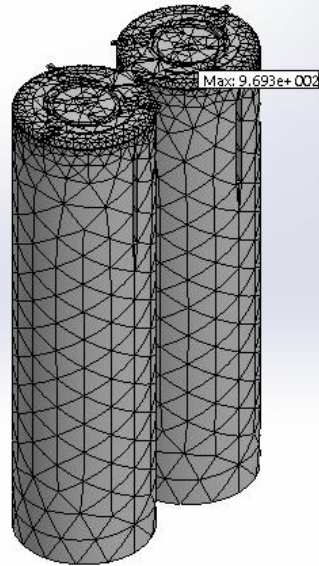
Total Nodes	14153
Total Elements	7916
Time to complete mesh(hh:mm:ss):	00:00:13
Computer name:	

## Mesh Quality Plots

Name	Type	Min	Max
Mesh Quality1	Aspect Ratio	1 Element: 234	969.336 Element: 37



Model name: Connector Assembly AA  
 Study name: Horizontal Stress in AA inner tab fold(-Default-)  
 Plot type: Aspect ratio Mesh Quality1  
 Global value: 1 to 969.336



Connector Assembly AA-Horizontal Stress in AA inner tab fold-Mesh Quality-Mesh Quality1

## Resultant Forces

### Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	4.95841e-005	1.33645e-005	-0.323517	0.323517

### Reaction Moments

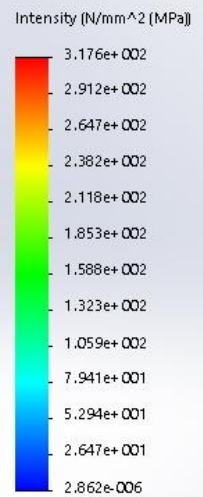
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	1e-033



## Study Results

Name	Type	Min	Max
Stress	INT: Stress Intensity(P1-P3)	2.86228e-006 MPa Or 4.15138e-007 ksi  Node: 478	317.633 MPa Or 46.0688 ksi  Node: 1269

Model name: Connector Assembly AA  
 Study name: Horizontal Stress in AA inner tab fold(-Default-)  
 Plot type: Static nodal stress: Stress1  
 Deformation scale: 1

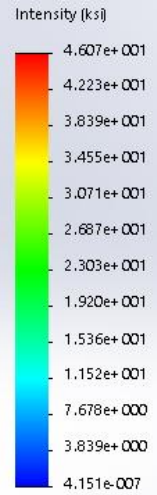


Connector Assembly AA-Horizontal Stress in AA inner tab fold-Stress-Stress (MPa)





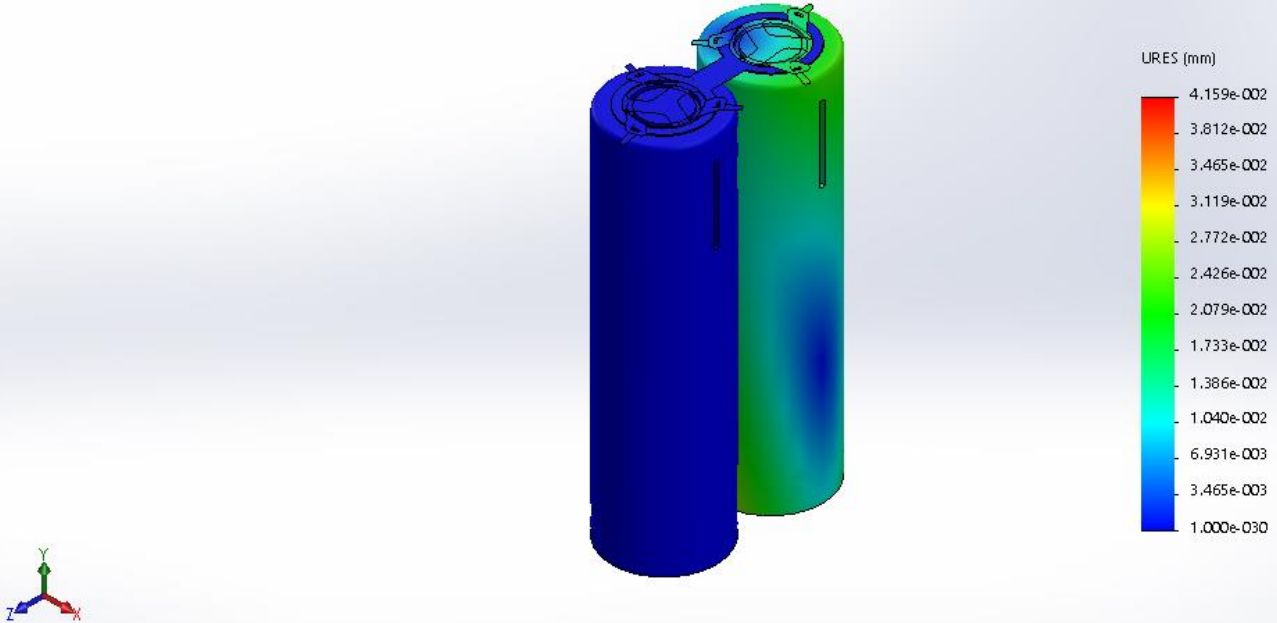
Model name: Connector Assembly AA  
 Study name: Horizontal Stress in AA inner tab fold(-Default-)  
 Plot type: Static nodal stress Stress1  
 Deformation scale: 1



Connector Assembly AA-Horizontal Stress in AA inner tab fold-Stress-Stress (ksi)

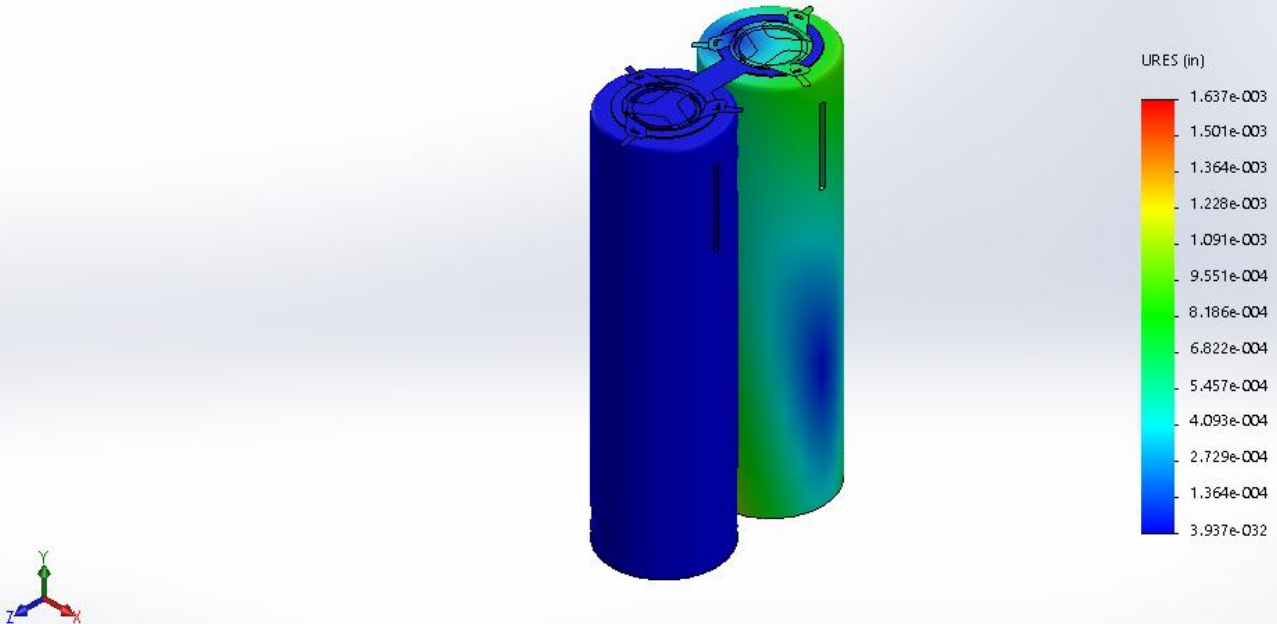
Name	Type	Min	Max
Displacement	URES: Resultant Displacement	0 mm Or 0 in Node: 1849	0.0415856 mm Or 0.00163723 in Node: 7979

Model name: Connector Assembly AA  
Study name: Horizontal Stress in AA inner tab fold(-Default-)  
Plot type: Static displacement: Displacement1  
Deformation scale: 1



Connector Assembly AA-Horizontal Stress in AA inner tab fold-Displacement-Displacement (mm)

Model name: Connector Assembly AA  
Study name: Horizontal Stress in AA inner tab fold(-Default-)  
Plot type: Static displacement: Displacement1  
Deformation scale: 1

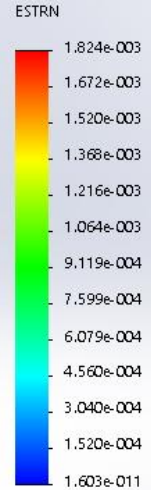


Connector Assembly AA-Horizontal Stress in AA inner tab fold-Displacement-Displacement (in)



Name	Type	Min	Max
Strain	ESTRN: Equivalent Strain	1.60306e-011	0.00182383
		Element: 209	Element: 645

Model name: Connector Assembly AA  
 Study name: Horizontal Stress in AA inner tab fold(-Default-)  
 Plot type: Static strain Strain1  
 Deformation scale: 1



Connector Assembly AA-Horizontal Stress in AA inner tab fold-Strain-Strain

## Conclusion

An application of 0.65 N (0.146126 lbf) load induced the stress value of 317.633 MPa (46.0688 ksi) which touches the tensile strength limit. The material displacement is 0.0415856 mm (0.00163723 in) which is negligible. Since the inner tabs are not locked, the low value of loading i.e. 0.65 N (0.146126 lbf) can be expected.

