

# Simulation of Connector Assembly Sub C

**Date:** Thursday, February 25, 2016

**Designer:** Solidworks

**Study name:** Horizontal Stress Test in Sub C both bend

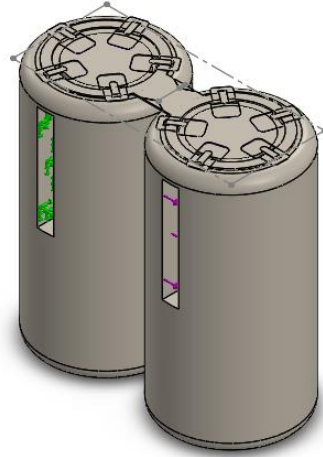
**Analysis type:** Static

## 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 .....	12





## Model Information



Model name: Connector Assembly Sub C  
Current Configuration: Default

### Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude2 	Solid Body	Mass:0.12997 kg Volume:1.52906e-005 m <sup>3</sup> Density:8500 kg/m <sup>3</sup> Weight:1.27371 N	E:\Battery Connector\Parts\3D\Batter y Sub C.SLDPRT Feb 25 11:16:32 2016
Cut-Extrude2 	Solid Body	Mass:0.12997 kg Volume:1.52906e-005 m <sup>3</sup> Density:8500 kg/m <sup>3</sup> Weight:1.27371 N	E:\Battery Connector\Parts\3D\Batter y Sub C.SLDPRT Feb 25 11:16:32 2016



## Study Properties

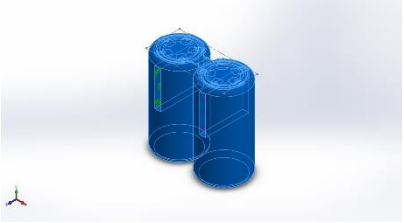
Study name	Horizontal Stress Test in Sub C both bend
Analysis type	Static
Mesh type	Mixed Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	Automatic
Inplane Effect:	Off
Soft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

## Units

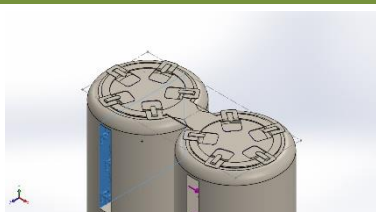
Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m <sup>2</sup>



## 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(Flat-Pattern)(Barbell Connector Sub C-1), SolidBody 1(Cut-Extrude2)(Battery Sub C-1), SolidBody 1(Cut-Extrude2)(Battery Sub C-2), SolidBody 1(Fold2)(Star Connector Sub C 3D-3), SolidBody 1(Fold2)(Star Connector Sub C 3D-4)
Curve Data:N/A		

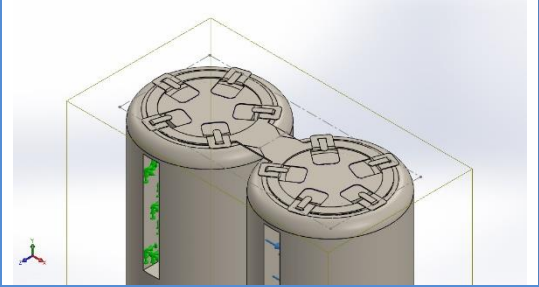
## Loads and Fixtures

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)	-0.999981	1.22802e-005	-9.96044e-007	0.999981
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> 1 N



## 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	4.06673 mm
Minimum element size	0.813347 mm
Mesh Quality	High
Remesh failed parts with incompatible mesh	Off

## Mesh information - Details

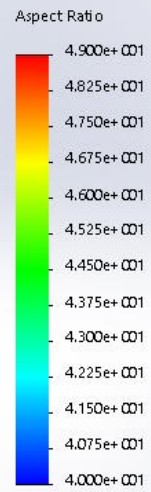
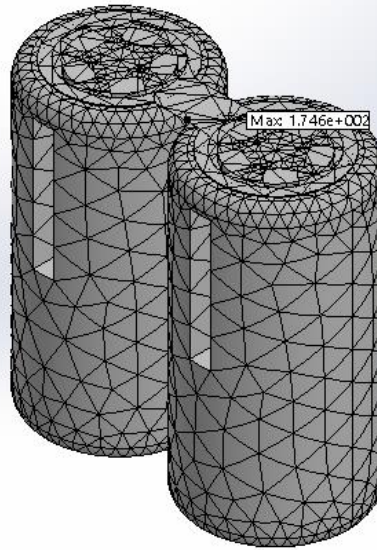
Total Nodes	12724
Total Elements	7162
Time to complete mesh(hh:mm:ss):	00:00:08
Computer name:	

## Mesh Quality Plots

Name	Type	Min	Max
Mesh Quality1	Aspect Ratio	1.06818 Element: 3318	174.61 Element: 7



Model name: Connector Assembly Sub C  
 Study name: Horizontal Stress Test in Sub C both bend (Default)  
 Plot type: Aspect ratio Mesh Quality1  
 Global value: 1.0818 to 174.61



Connector Assembly Sub C-Horizontal Stress Test in Sub C both bend-Mesh Quality-Mesh Quality1

## Resultant Forces

### Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	-0.999981	1.22802e-005	-9.96044e-007	0.999981

### Reaction Moments

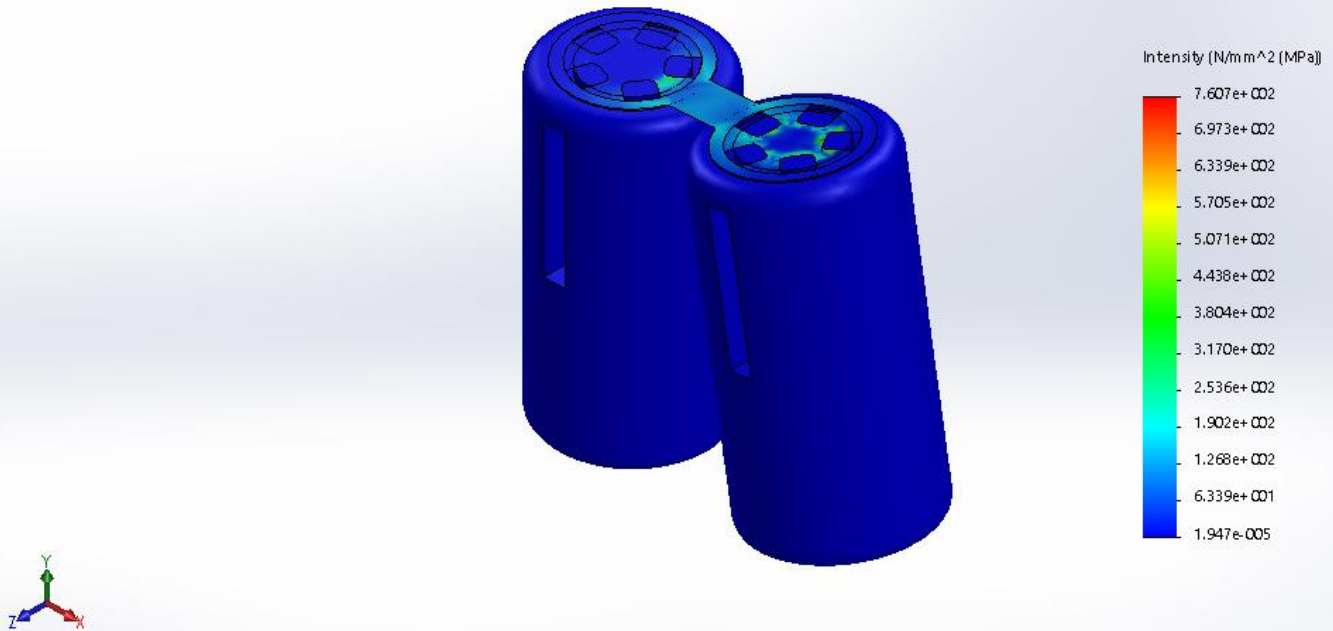
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	1e-033



## Study Results

Name	Type	Min	Max
Stress1 (MPa)	INT: Stress Intensity(P1-P3)	1.94727e-005 N/mm <sup>2</sup> (MPa) Node: 2005	760.717 N/mm <sup>2</sup> (MPa) Node: 677

Model name: Connector Assembly Sub C  
Study name: Horizontal Stress Test in Sub C both bend (Default)  
Plot type: Static nodal stress Stress1  
Deformation scale: 1



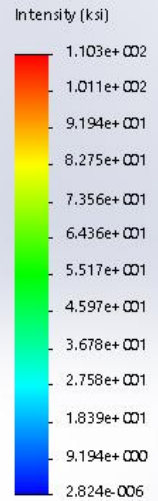
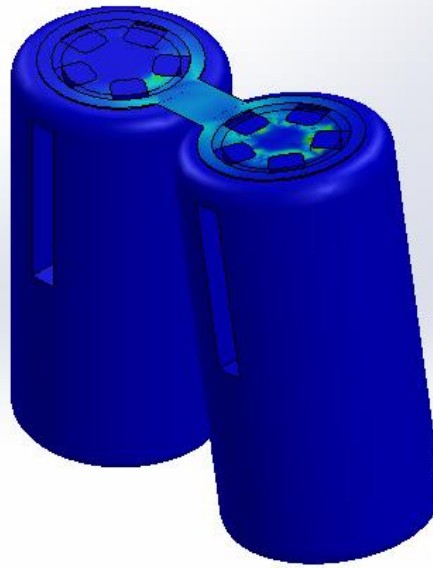
Connector Assembly Sub C-Horizontal Stress Test in Sub C both bend-Stress-Stress1





Name	Type	Min	Max
Stress1 (ksi)	INT: Stress Intensity(P1-P3)	2.82428e-006 ksi Node: 2005	110.333 ksi Node: 677

Model name:Connector Assembly Sub C  
 Study name:Horizontal Stress Test in Sub C both bend(Default)  
 Plot type: Static nodal stress Stress1  
 Deformation scale: 1

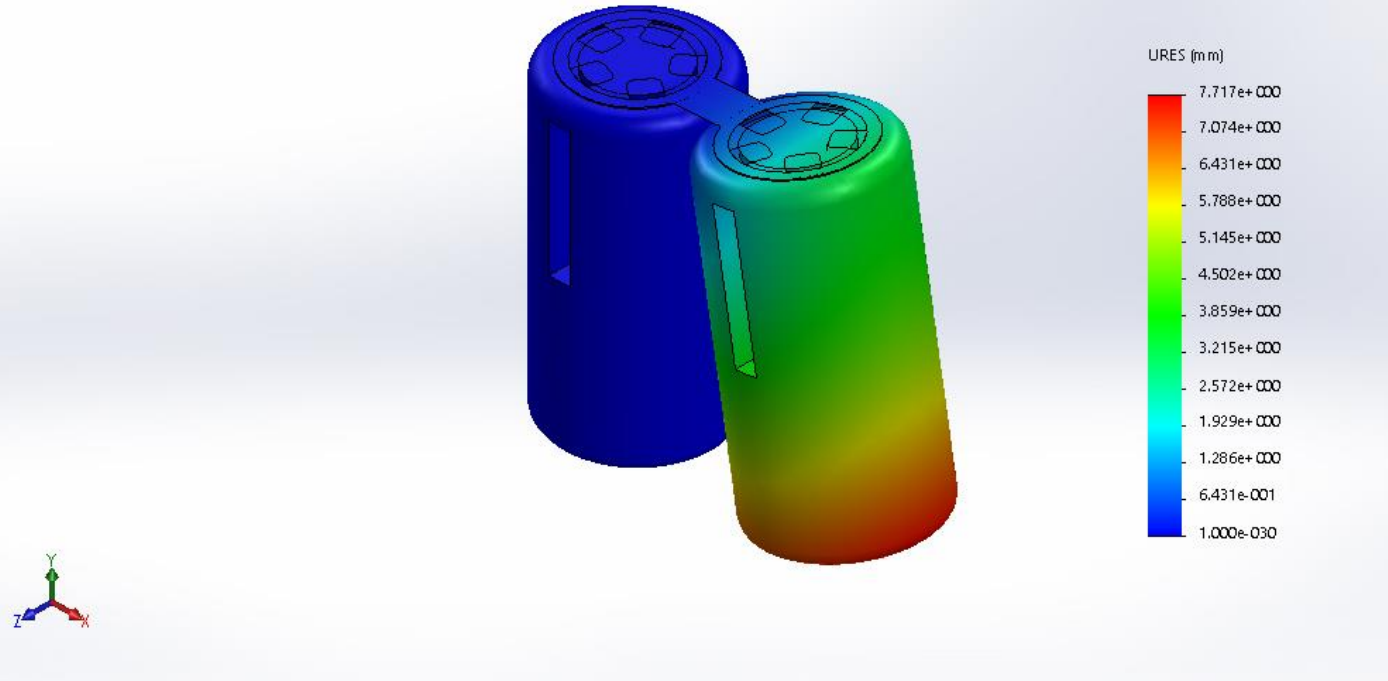


Connector Assembly Sub C-Horizontal Stress Test in Sub C both bend-Stress-Stress1



Name	Type	Min	Max
Displacement1 (mm)	URES: Resultant Displacement	0 mm Node: 1016	7.71705 mm Node: 7788

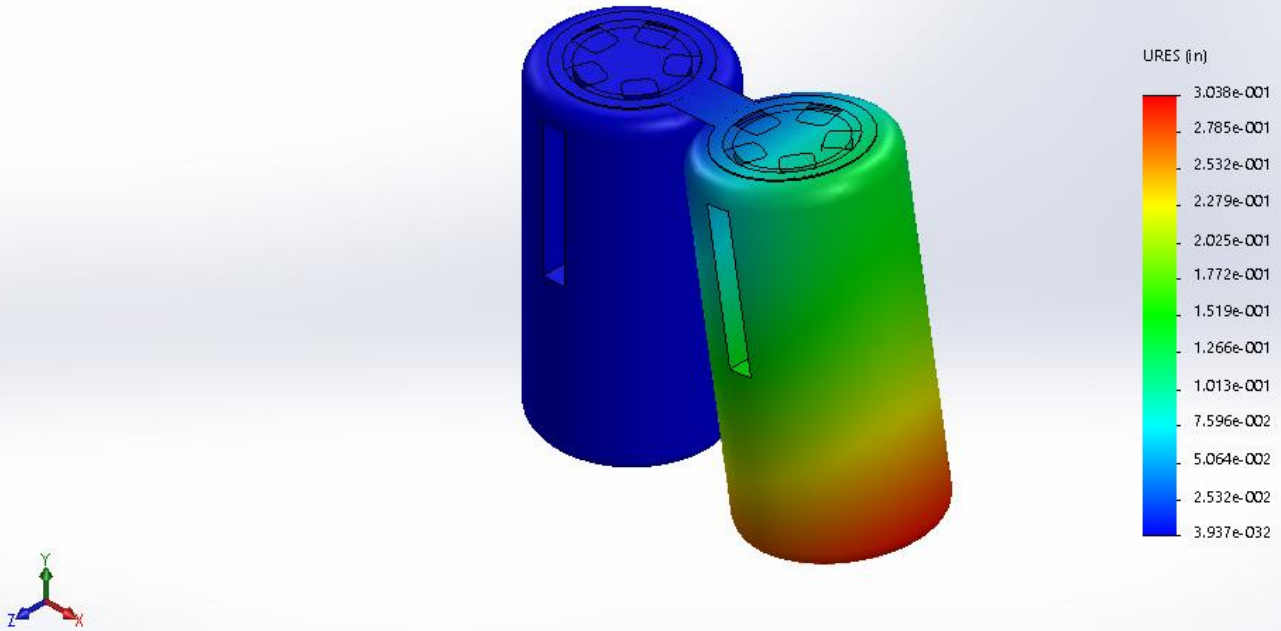
Model name: Connector Assembly Sub C  
 Study name: Horizontal Stress Test in Sub C both bend(-Default)  
 Plot type: Static displacement Displacement1  
 Deformation scale: 1



Connector Assembly Sub C-Horizontal Stress Test in Sub C both bend-Displacement-Displacement1

Name	Type	Min	Max
Displacement1 (in)	URES: Resultant Displacement	0 in Node: 1016	0.303821 in Node: 7788

Model name:Connector Assembly Sub C  
 Study name:Horizontal Stress Test in Sub C both bend(Default)  
 Plot type: Static displacementDisplacement1  
 Deformation scale: 1

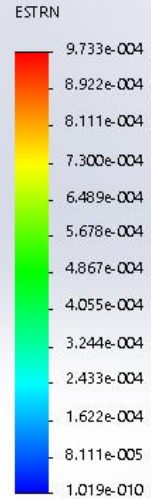
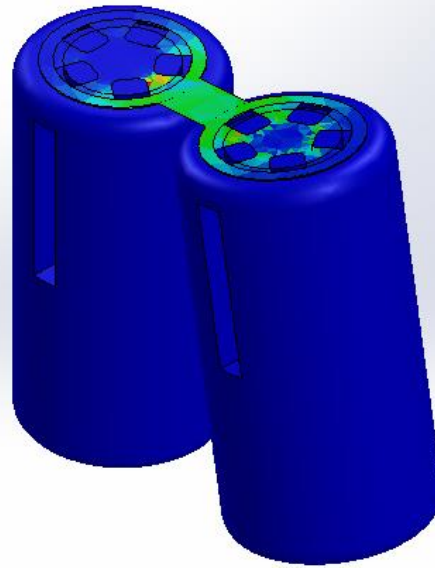


Connector Assembly Sub C-Horizontal Stress Test in Sub C both bend-Displacement-Displacement1



Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	1.01857e-010 Element: 3595	0.000973303 Element: 77

Model name: Connector Assembly Sub C  
 Study name: Horizontal Stress Test in Sub C both bend(-Default)  
 Plot type: Static strain Strain1  
 Deformation scale: 1



Connector Assembly Sub C-Horizontal Stress Test in Sub C both bend-Strain-Strain1

## Conclusion

With both kind of tabs in locking position, and an applied load of 10 N, the maximum stress induced is 760.717 MPa. Under practical loading conditions, the stress induced will be within safe limits and won't cross over the plastic limit to make the connector assembly fail.

