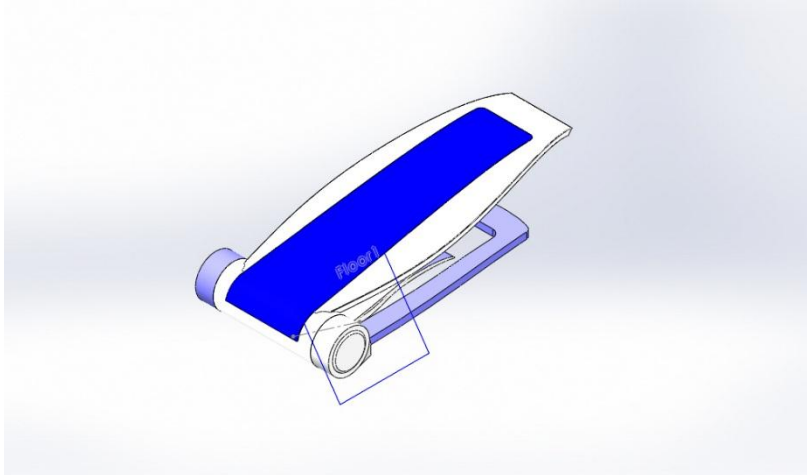


Simulation of ATS-012333

Date: Wednesday, June 04, 2014
Designer: Estiven Sierra
Study name: Drop Test 1
Analysis type: Drop Test

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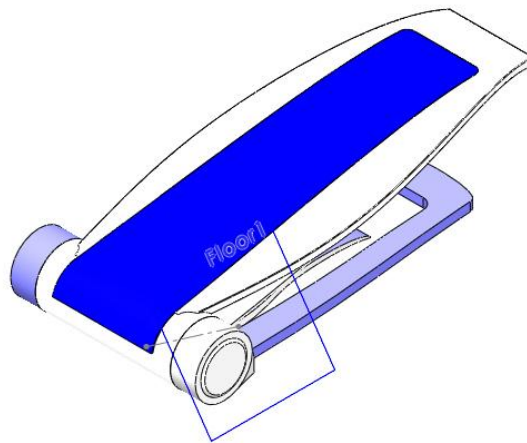
Description

This test consist in dropping the lamp from a 6 ft height. The purpose is to see what kind of damage the device will sustain.

Assumptions

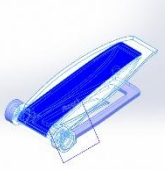
Part material maintains similar physical and mechanical properties along all axes (isotropic).

Model Information



Model name: ATS-012333
 Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Combine5 	Solid Body	Mass:0.0269744 kg Volume:2.64455e-005 m ³ Density:1020 kg/m ³ Weight:0.264349 N	C:\Users\esierra\Documents\SW_projects\ReadingLamp\ATS-012333.SLDPRT Jun 04 12:54:19 2014

Comments:

In order to reduce computing time the device is model as a single solid.

Study Properties

Study name	Drop Test 1
Analysis type	Drop Test
Mesh type	Solid Mesh
Large displacement	On
Result folder	SolidWorks document (C:\Users\esierra\Documents\SW_projects\ReadingLamp)

Setup Information

Type	Drop height
Drop height from lowest point	6 ft
Gravity	9.81 m/s ²
Gravity Reference	Floor1
Friction Coefficient	0
Target Stiffness	Rigid target
Critical Damping Ratio	0.1

Result Options

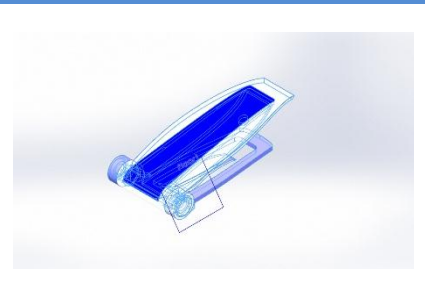
Solution Time After Impact	77.51 microsec
Save Results Starting From	0 microsec
No. of Plots	25
No. of Graph Steps Per Plot	20
Number of vertex	0



Units

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

Material Properties

Model Reference	Properties	Components
	Name: ABS Model type: Linear Elastic Isotropic Default failure criterion: Unknown Tensile strength: 3e+007 N/m ² Elastic modulus: 2e+009 N/m ² Poisson's ratio: 0.394 Mass density: 1020 kg/m ³ Shear modulus: 3.189e+008 N/m ²	SolidBody 1(Combine5)(ATS-012333)
Curve Data:N/A		

Comments:

Average yield strength for ABS: 46.2 MPa
 Average yield strength for Acrylic: 113 MPa

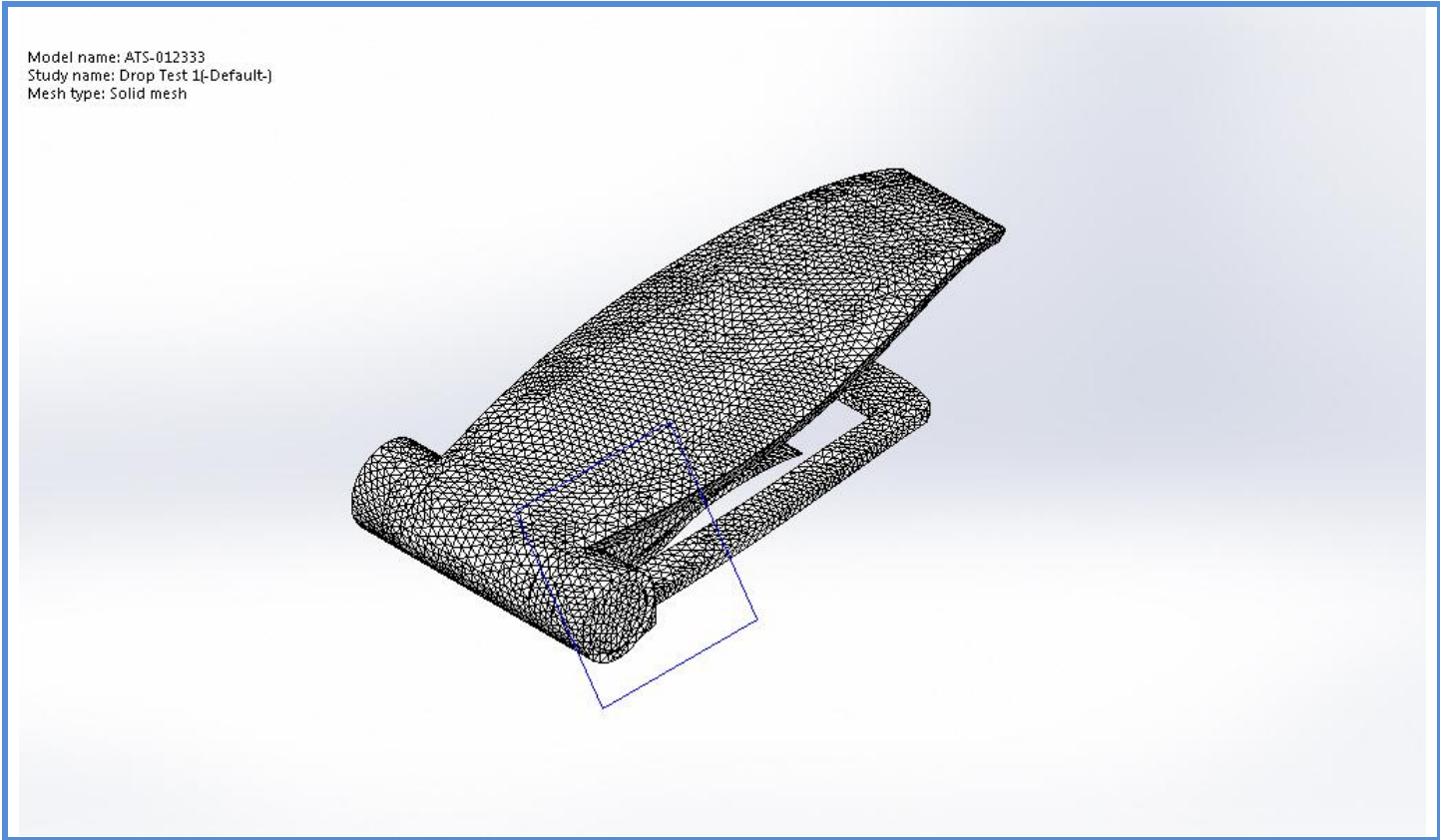
Mesh Information

Mesh type	Solid Mesh
Mesher Used:	Curvature based mesh
Jacobian points	4 Points
Maximum element size	9.08906 mm
Minimum element size	1.81781 mm
Mesh Quality	Draft Quality Mesh

Mesh Information - Details

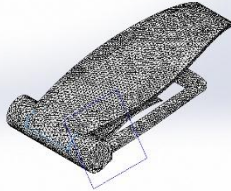
Total Nodes	18893
Total Elements	86799
Maximum Aspect Ratio	7366.7
% of elements with Aspect Ratio < 3	94.7
% of elements with Aspect Ratio > 10	2.22
Time to complete mesh(hh;mm;ss):	00:00:10
Computer name:	ESIERRA-PC





Mesh Control Information:

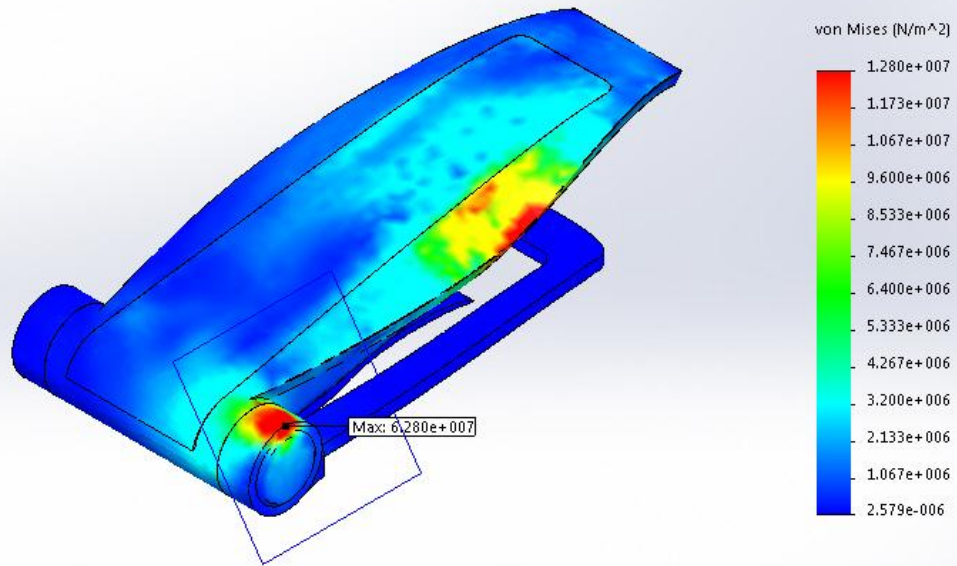
Mesh Control Name	Mesh Control Image	Mesh Control Details
Control-1		<p>Entities: 1 Solid Body (s) Units: mm Size: 1.58894 Ratio: 1.5</p>

Control-2	 <p>Model Name: 012333 Simulation Date: 2014-06-04 Step Name: 012333</p>	<p>Entities: 3 edge(s) Units: mm Size: 1.50949 Ratio: 1.5</p>
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Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	2.57932e-006 N/m ² Node: 9915	6.28e+007 N/m ² Node: 2422

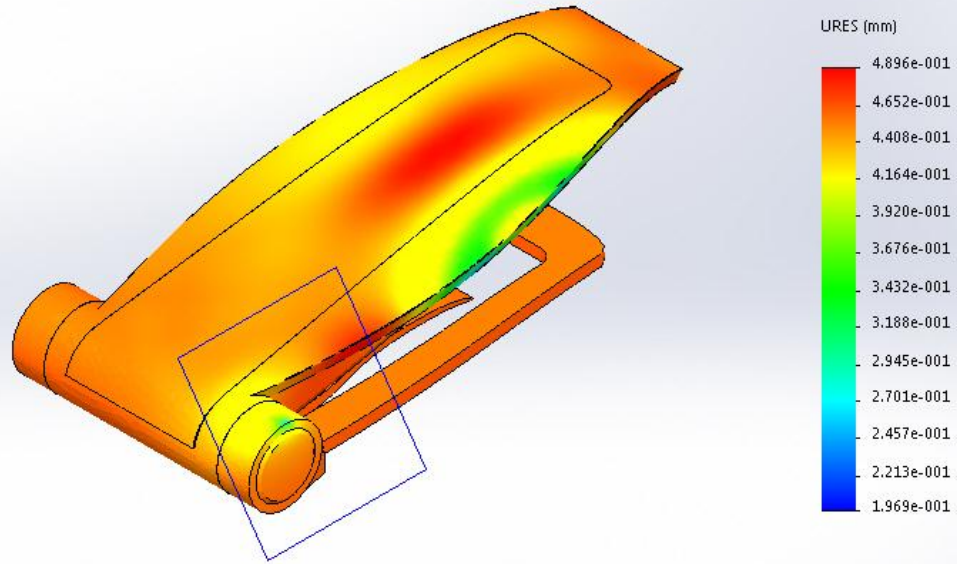
Model name: ATS-012333
 Study name: Drop Test 1(-Default-)
 Plot type: Stress1
 Plot step: 25 time : 77.5095 Microseconds
 Deformation scale: 4



ATS-012333-Drop Test 1-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.196874 mm Node: 8331	0.489615 mm Node: 7025

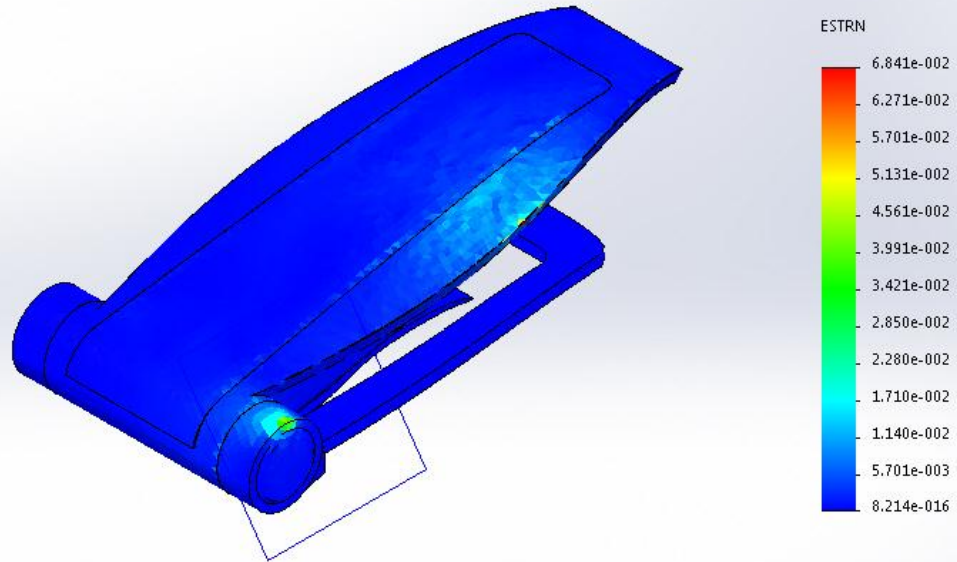
Model name: ATS-012333
 Study name: Drop Test 1(-Default-)
 Plot type: Displacement1
 Plot step: 25 time : 77.5095 Microseconds
 Deformation scale: 1



ATS-012333-Drop Test 1-Displacement-Displacement1

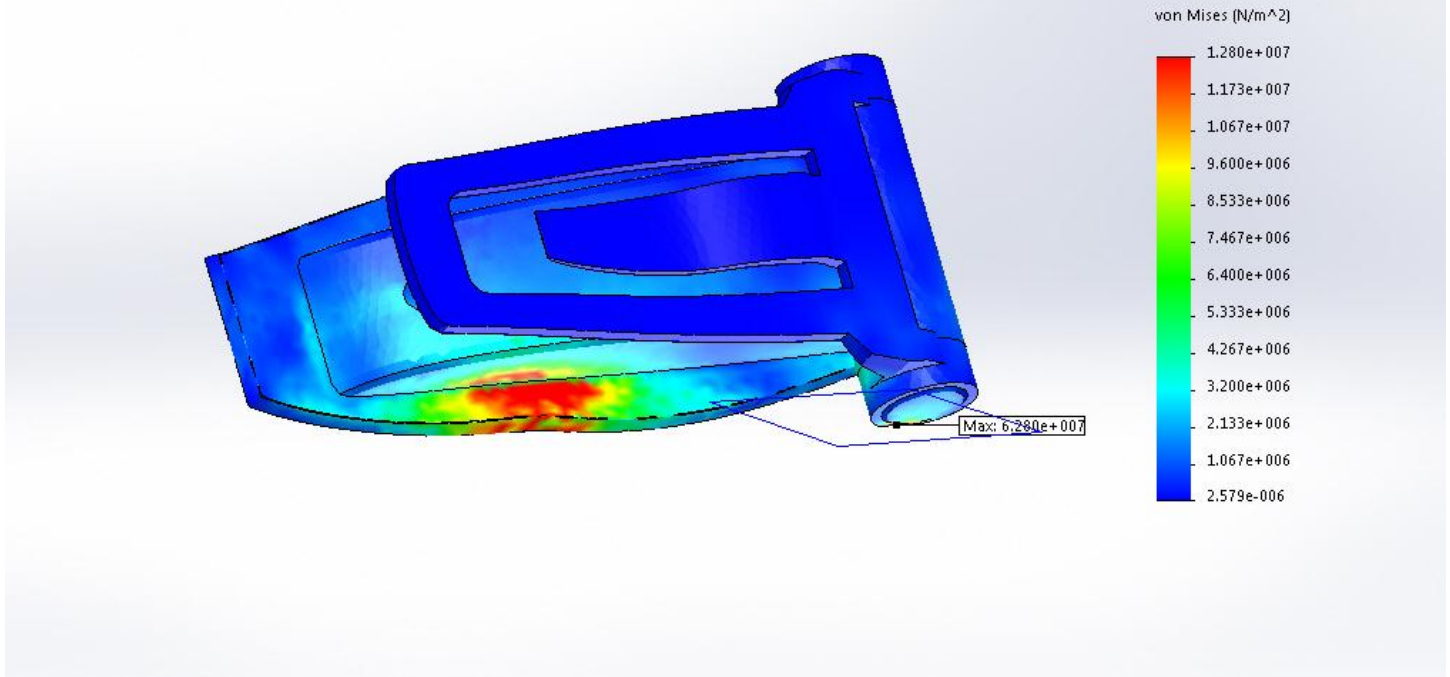
Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	8.21373e-016 Element: 35857	0.06841 Element: 23199

Model name: ATS-012333
Study name: Drop Test 1(-Default-)
Plot type: Strain1
Plot step: 25 time : 77.5095 Microseconds
Deformation scale: 1



ATS-012333-Drop Test 1-Strain-Strain1

Model name: ATS-012333
Study name: Drop Test 1(-Default-)
Plot type: Stress1
Plot step: 25 time : 77.5095 Microseconds
Deformation scale: 4



Stresses at impact

Conclusion

Comments:

Average yield strength for ABS is 46.2 MPa. The highest stress predicted in this test is 62.8 MPa. The device will most certainly suffer breakage at the impact points.