

Complete Wall 3.5 15.88kN Uplift 1.8kPa Bearing 4.4kPa Bearing

Autodesk®

Analyzed File:	Roof Testing - complete Wall 2700 3500.iam
Autodesk Inventor Version:	2012 (Build 160160000, 160)
Creation Date:	23/06/2013, 16:47
Simulation Author:	Petei7Ivy
Summary:	

☐ Project Info (iProperties)

☐ Summary

Author	Petei7Ivy
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☐ Project

Part Number	Roof Testing - complete Wall 2700 3500
Designer	Petei7Ivy
Cost	£0.00
Date Created	21/06/2013

☐ Status

Design Status	WorkInProgress
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☐ Physical

Mass	1038.37 kg
Area	62491800 mm ²
Volume	1021800000 mm ³
Center of Gravity	x=45.6312 mm y=1384.82 mm z=1749.62 mm

Note: Physical values could be different from Physical values used by FEA reported below.

☐ Complete Wall 2700 3.5 15.88kN

General objective and settings:

Design Objective	Single Point
Simulation Type	Static Analysis
Last Modification Date	21/06/2013, 15:17
Detect and Eliminate Rigid Body Modes	No
Separate Stresses Across Contact Surfaces	No
Motion Loads Analysis	No

Advanced settings:

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Avg. Element Size (fraction of model diameter)	0.1
Min. Element Size (fraction of avg. size)	0.2
Grading Factor	1.5
Max. Turn Angle	60 deg
Create Curved Mesh Elements	No
Use part based measure for Assembly mesh	Yes

Material(s)

Name		FRP
General	Mass Density	2 g/cm ³
	Yield Strength	204 MPa
	Ultimate Tensile Strength	204 MPa
Stress	Young's Modulus	13.5 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	5.19231 GPa
Stress Thermal	Expansion Coefficient	0 ul/c
	Thermal Conductivity	0 W/(m K)
	Specific Heat	0 J/(kg c)
Part Name(s)	92 92 5 FRP SHS 3.5 102mm FRP Roof Support 15 degrees	
Name		EPS
General	Mass Density	0.016 g/cm ³
	Yield Strength	0.1166 MPa
	Ultimate Tensile Strength	0.1166 MPa
Stress	Young's Modulus	1.4 GPa
	Poisson's Ratio	0 ul
	Shear Modulus	0.7 GPa
Stress Thermal	Expansion Coefficient	0 ul/c
	Thermal Conductivity	0 W/(m K)
	Specific Heat	0 J/(kg c)
Part Name(s)	92mm EPS 3.5 2	
Name		MgO
General	Mass Density	0.93 g/cm ³
	Yield Strength	12 MPa
	Ultimate Tensile Strength	12 MPa
Stress	Young's Modulus	3.5 GPa
	Poisson's Ratio	0.25 ul
	Shear Modulus	1.4 GPa
Stress Thermal	Expansion Coefficient	0 ul/c
	Thermal Conductivity	0 W/(m K)
	Specific Heat	0 J/(kg c)
Part Name(s)	10mm MgO Wall Sheet 2 10mm MgO Wall Sheet 2	

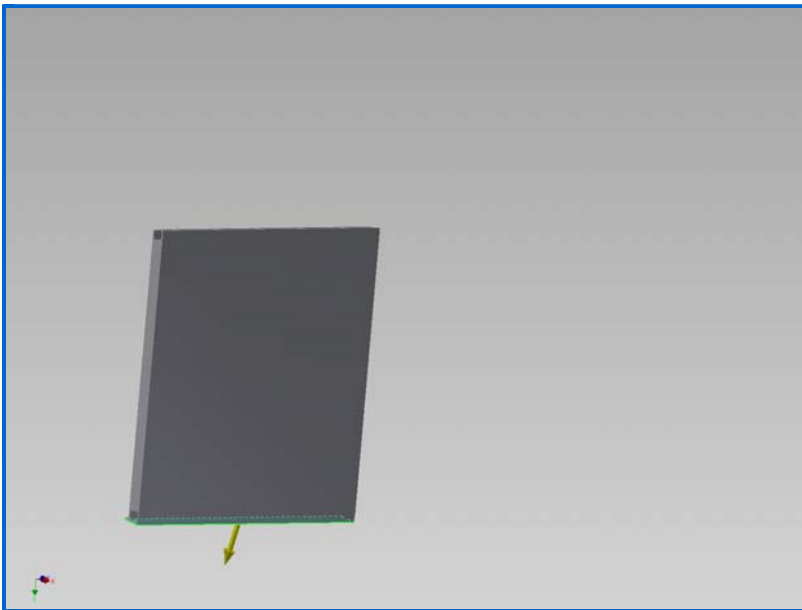
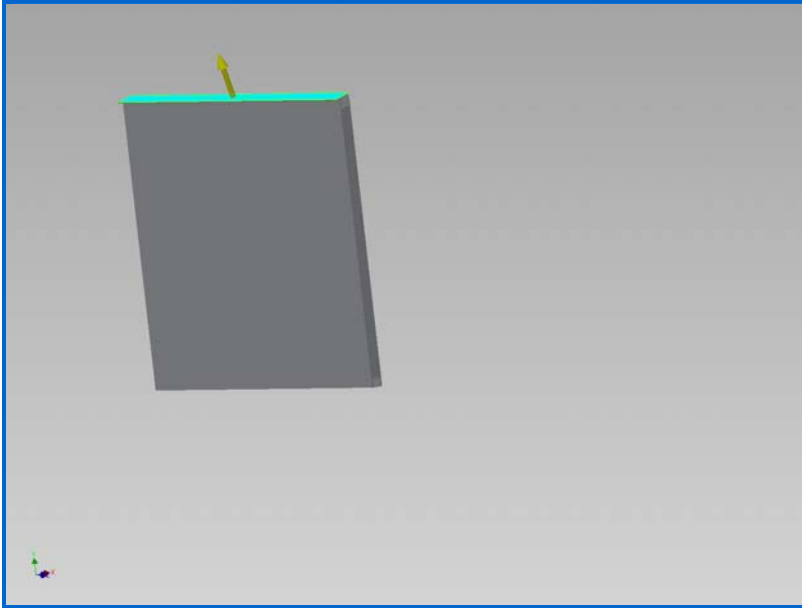
Operating conditions

Force:1

Load Type	Force
Magnitude	15880.000 N
Vector X	-4110.046 N

Vector Y	15338.902 N
Vector Z	0.000 N

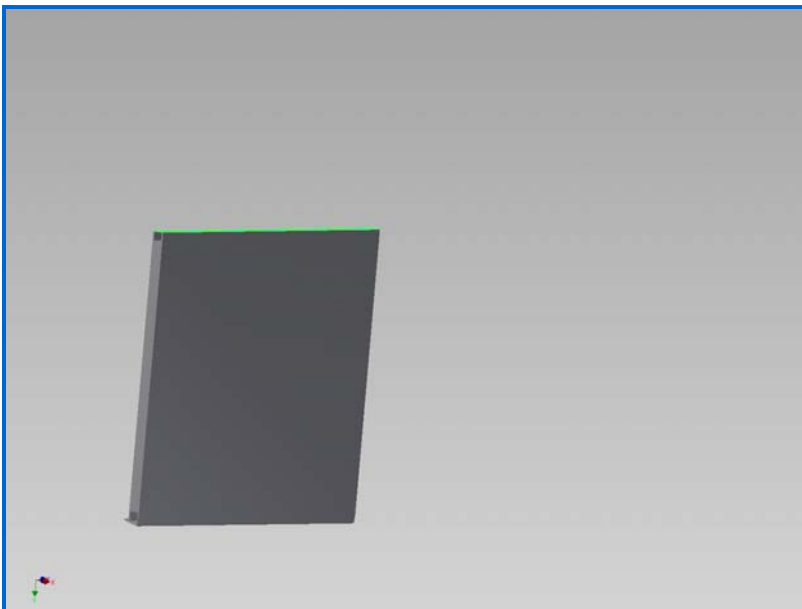
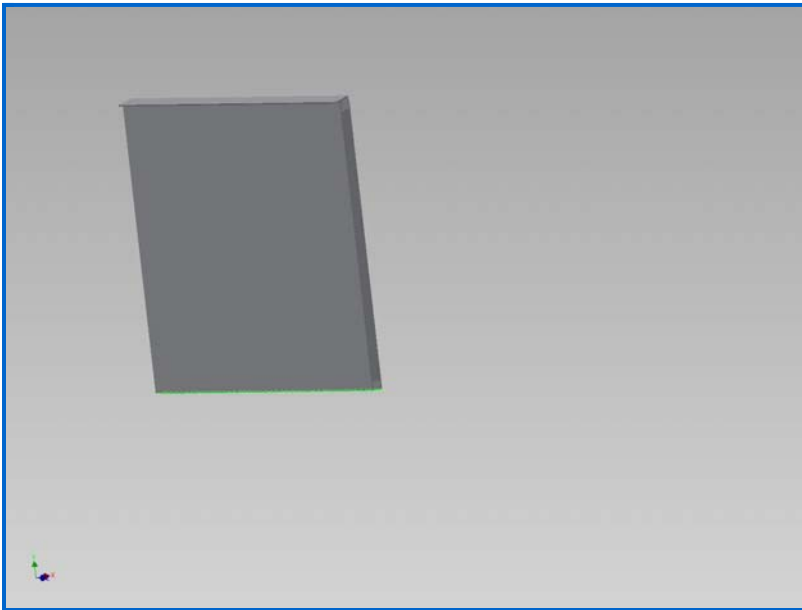
☐ Selected Face(s)



☐ Fixed Constraint: 1

Constraint Type	Fixed Constraint
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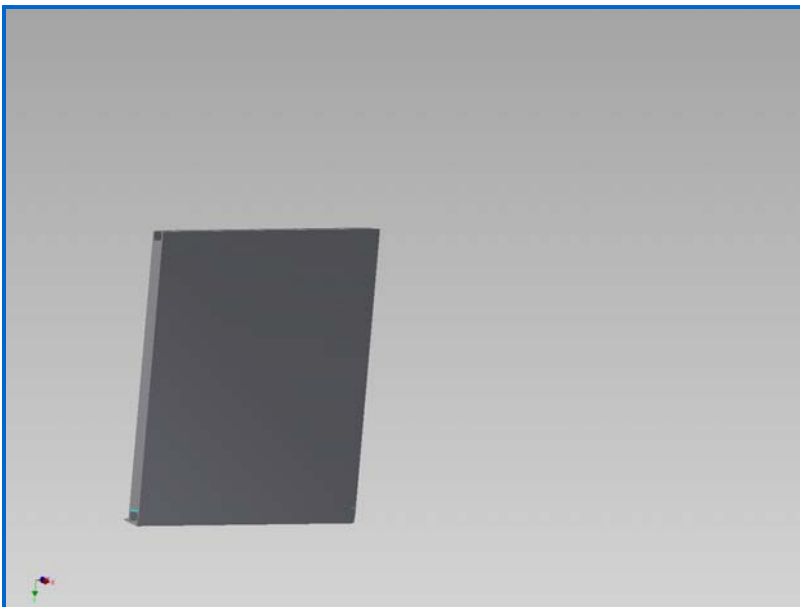
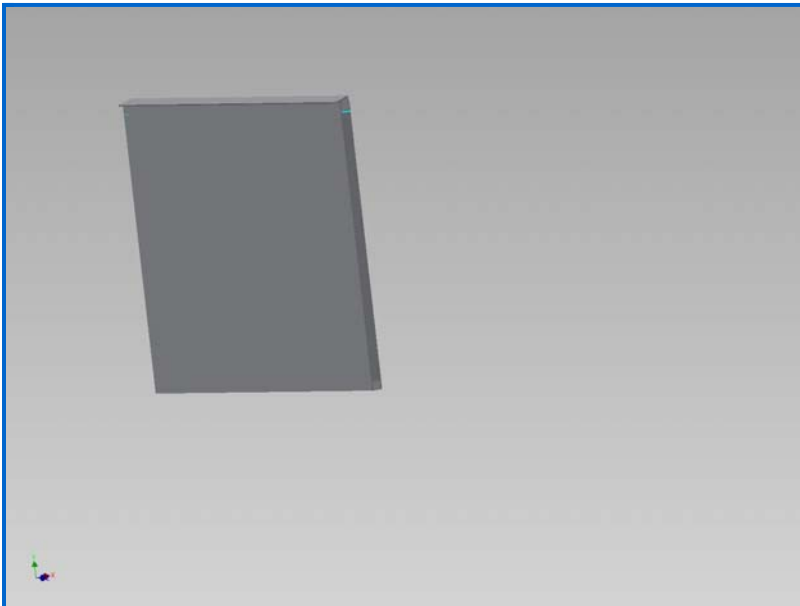
☐ Selected Face(s)



[-] **Fixed Constraint:2**

Constraint Type Fixed Constraint

[-] **Selected Face(s)**



Results

Reaction Force and Moment on Constraints

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	11248.2 N	231.202 N	536.672 N m	-25.8825 N m
		-11245.7 N		0 N m
		-52.4678 N		-536.048 N m
Fixed Constraint:2	5616.09 N	3830.79 N	229.313 N m	-150.007 N m
		-4105.71 N		-85.6279 N m
		93.0002 N		-150.831 N m

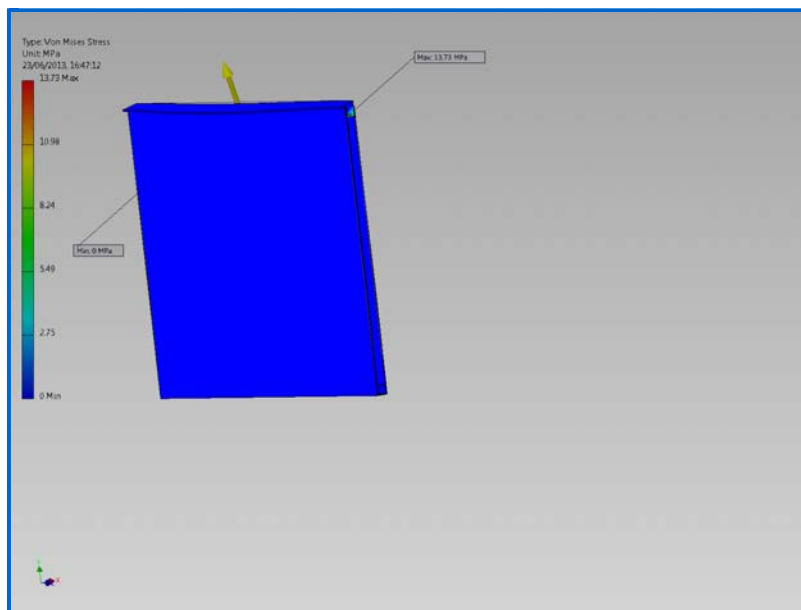
Result Summary

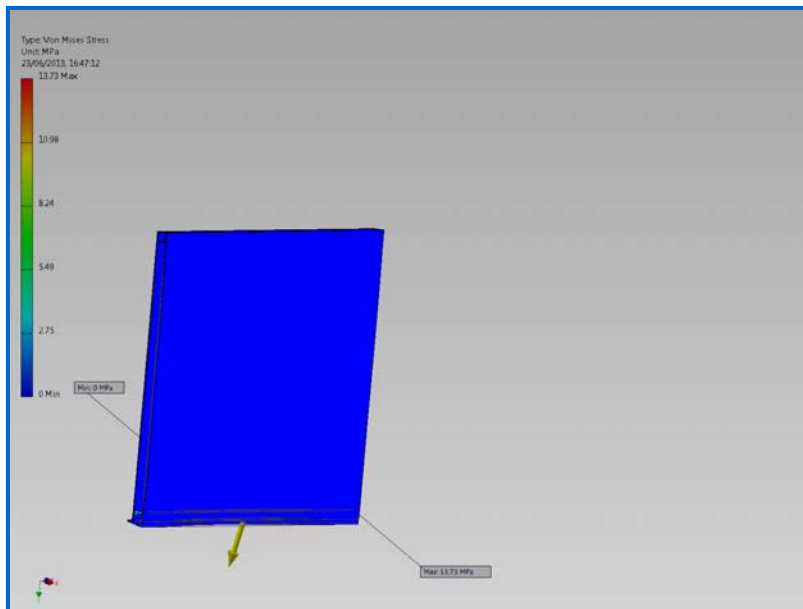
Name	Minimum	Maximum
Volume	1021800000 mm ³	
Mass	234.037 kg	
Von Mises Stress	0.00414137 MPa	13.73 MPa

1st Principal Stress	-0.96655 MPa	14.6013 MPa
3rd Principal Stress	-13.16 MPa	0.835498 MPa
Displacement	0 mm	2.08755 mm
Safety Factor	0.111283 ul	15 ul
Stress XX	-2.49848 MPa	3.1663 MPa
Stress XY	-0.685798 MPa	0.840731 MPa
Stress XZ	-3.70252 MPa	5.19071 MPa
Stress YY	-1.48223 MPa	3.6839 MPa
Stress YZ	-4.87692 MPa	4.86617 MPa
Stress ZZ	-9.32285 MPa	11.2462 MPa
X Displacement	-2.0849 mm	0.0702226 mm
Y Displacement	-0.0717816 mm	0.115104 mm
Z Displacement	-0.17928 mm	0.178967 mm
Equivalent Strain	0.000000464101 ul	0.000900806 ul
1st Principal Strain	-0.00000775362 ul	0.00100391 ul
3rd Principal Strain	-0.000971626 ul	0.000000310159 ul
Strain XX	-0.000255677 ul	0.000147841 ul
Strain XY	-0.0000711239 ul	0.000154429 ul
Strain XZ	-0.000505481 ul	0.000499846 ul
Strain YY	-0.000178854 ul	0.000165881 ul
Strain YZ	-0.000469629 ul	0.000468594 ul
Strain ZZ	-0.000602122 ul	0.000680822 ul
Contact Pressure	0 MPa	1.42151 MPa
Contact Pressure X	-0.184973 MPa	0.293955 MPa
Contact Pressure Y	-0.475885 MPa	0.452293 MPa
Contact Pressure Z	-0.934094 MPa	1.37087 MPa

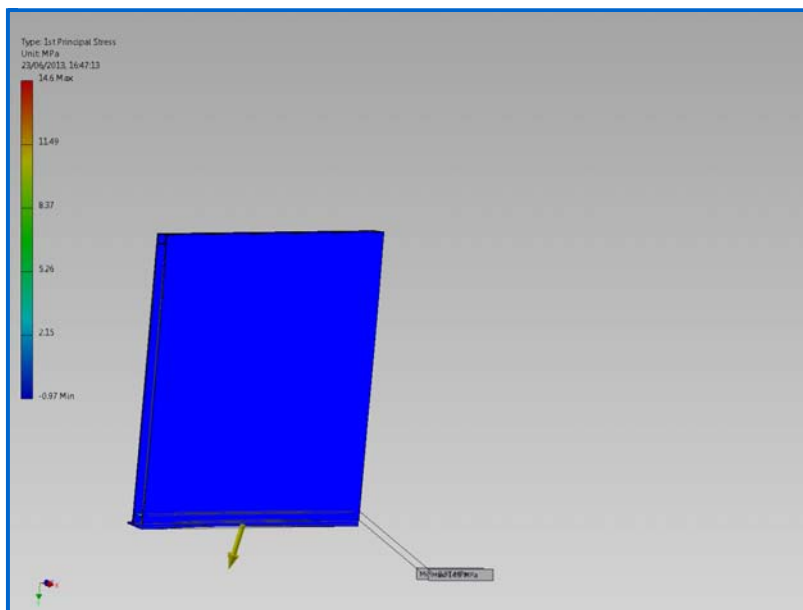
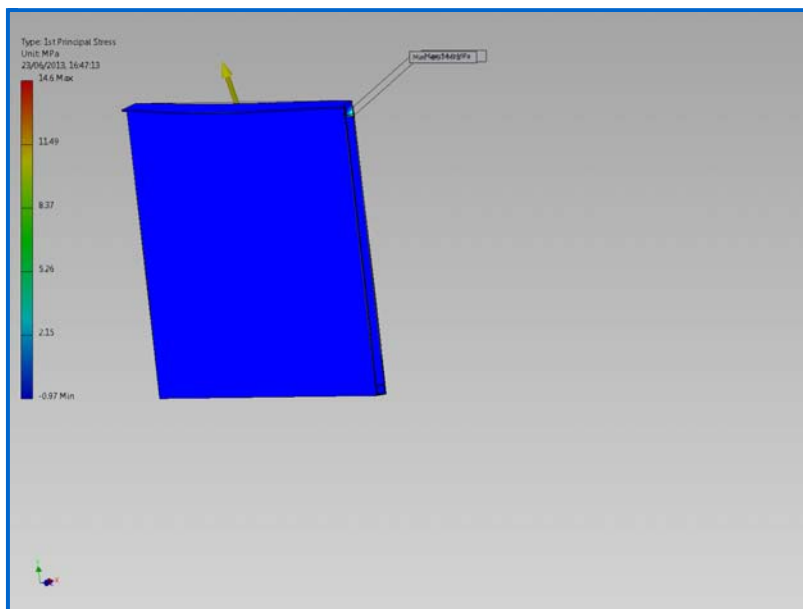
☐ Figures

☐ Von Mises Stress

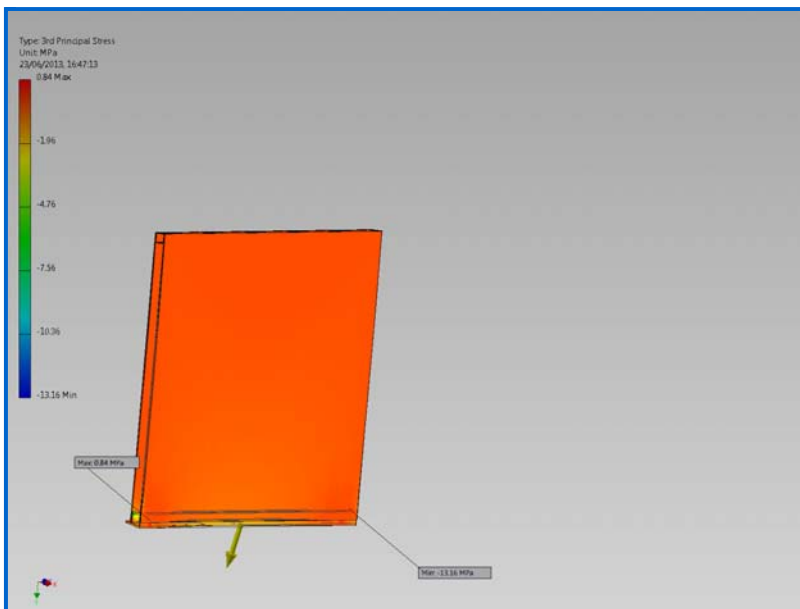
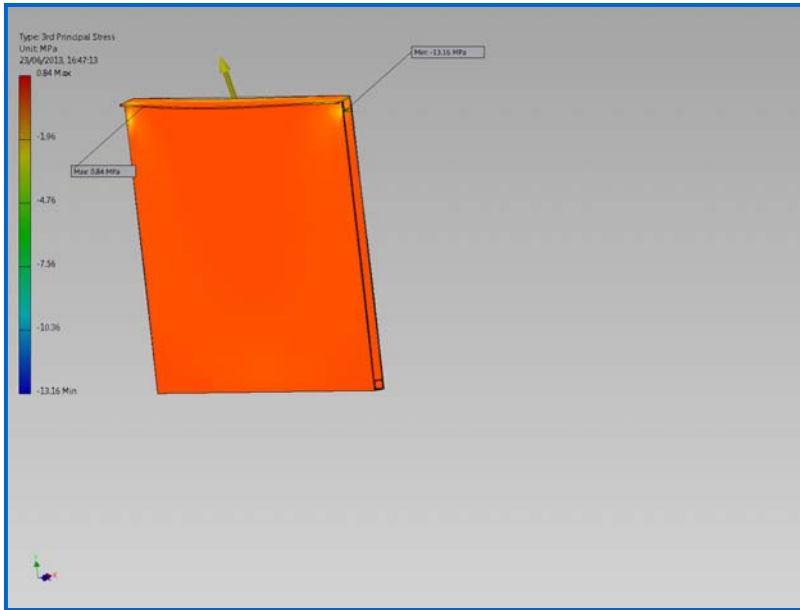




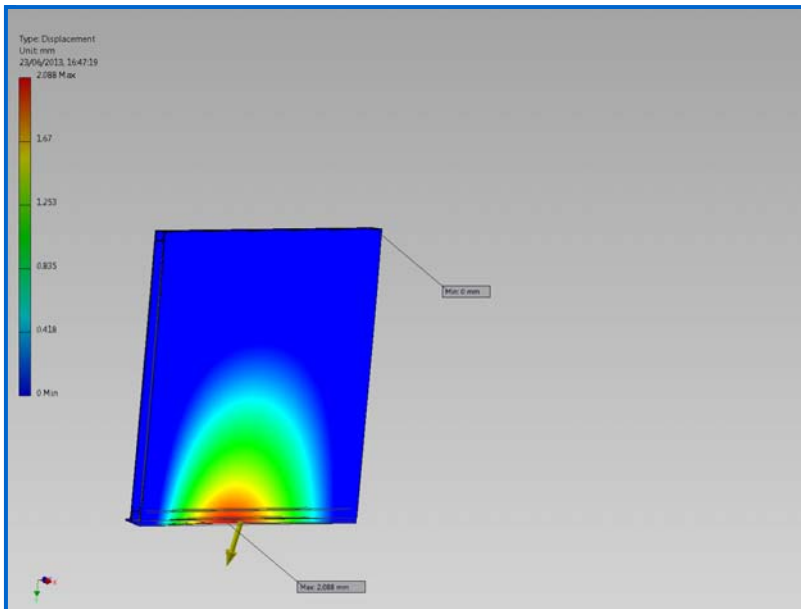
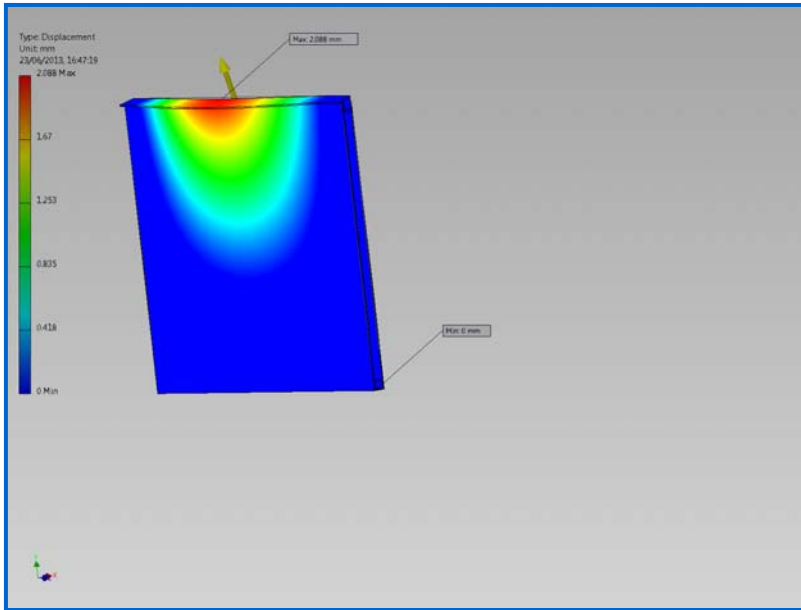
☐ 1st Principal Stress



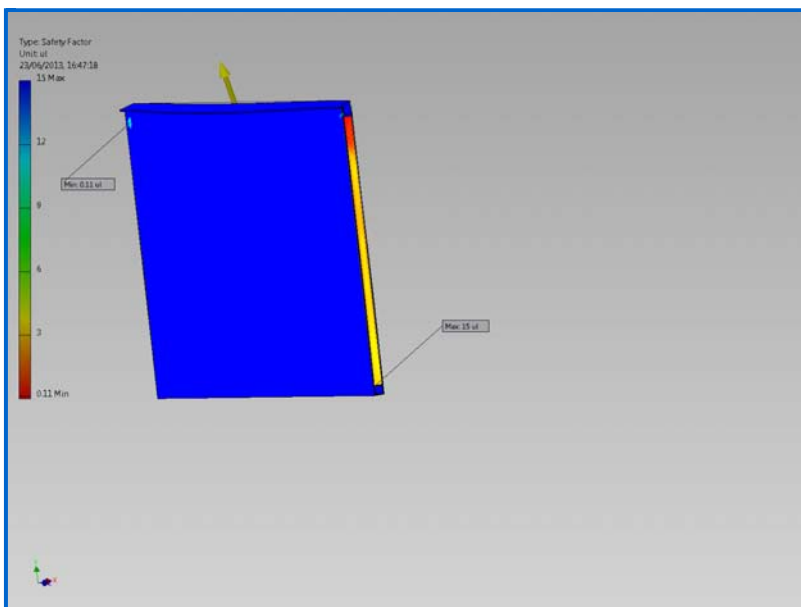
☐ 3rd Principal Stress

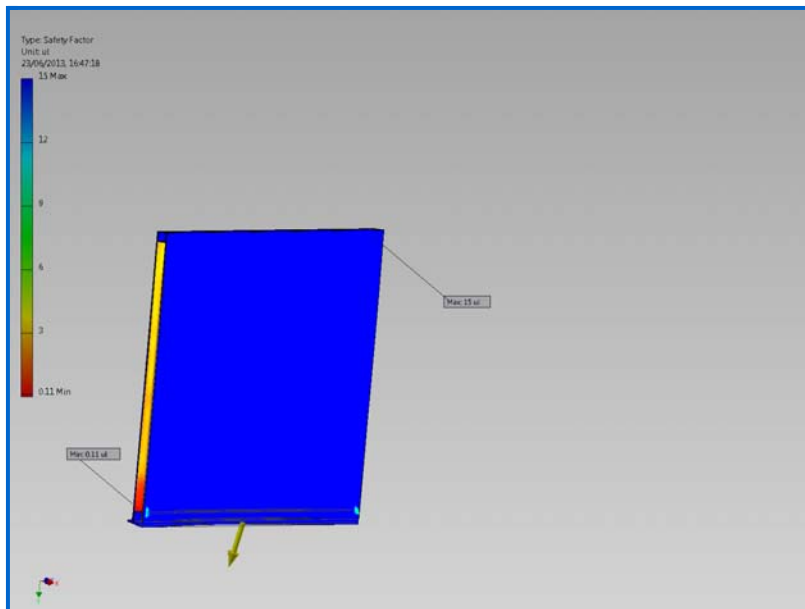


☐ Displacement

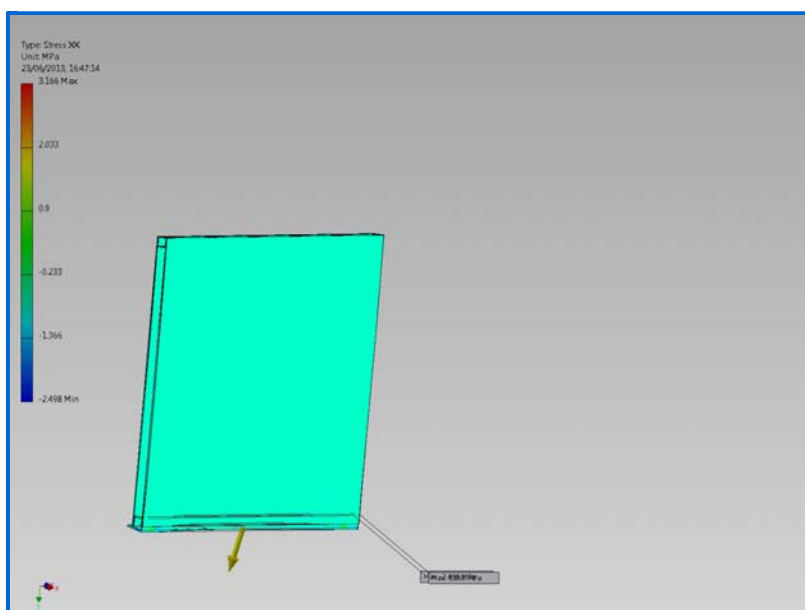
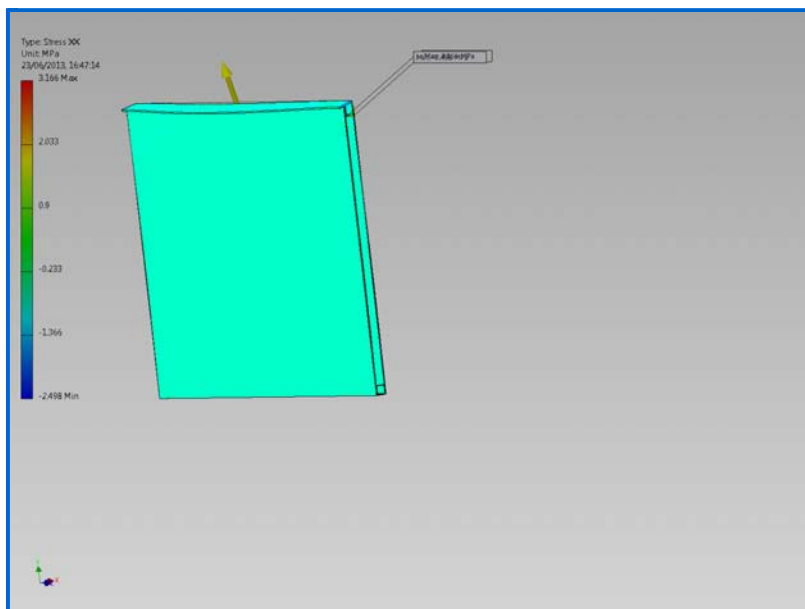


☐ Safety Factor

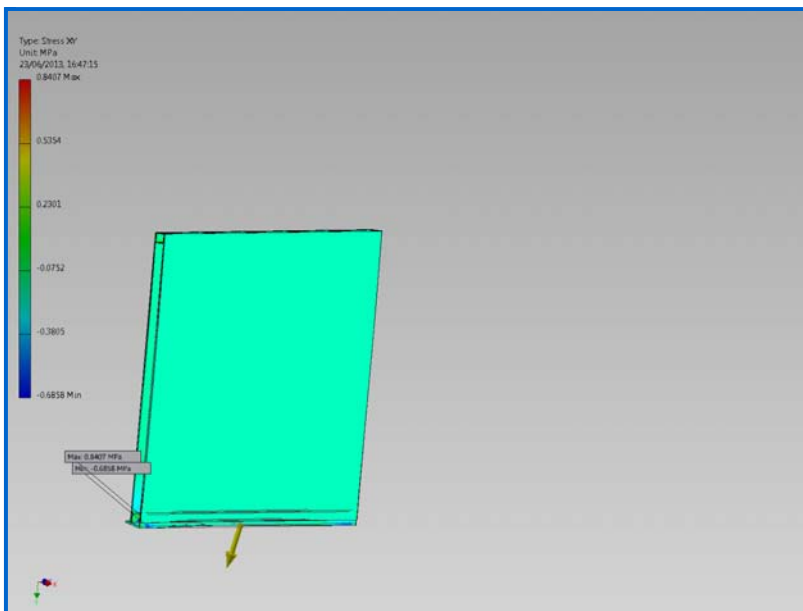
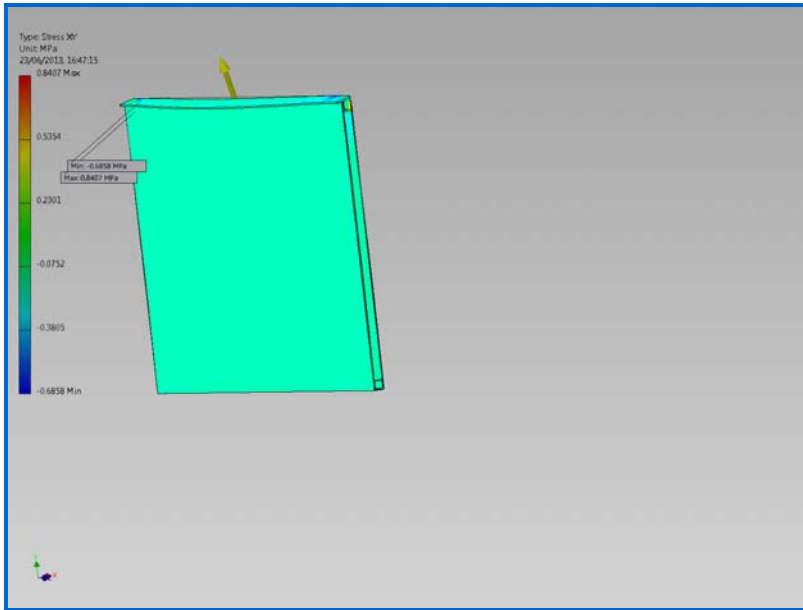




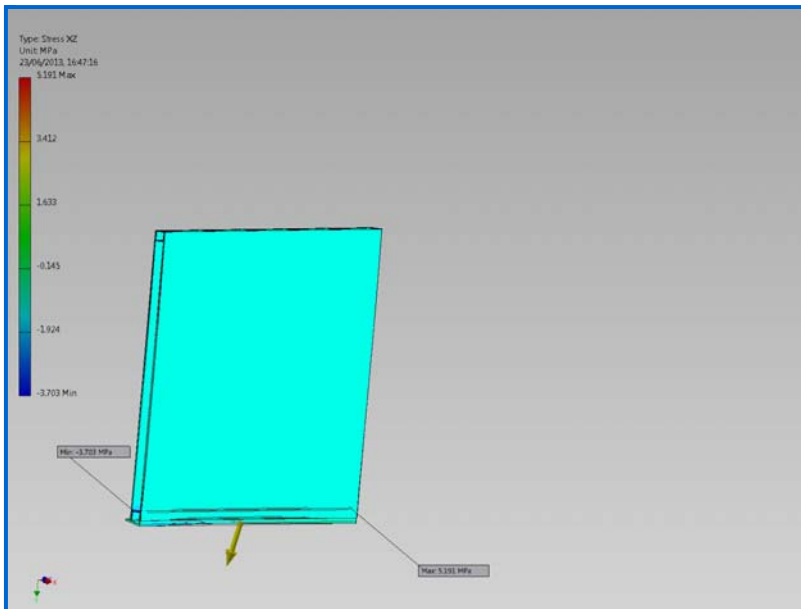
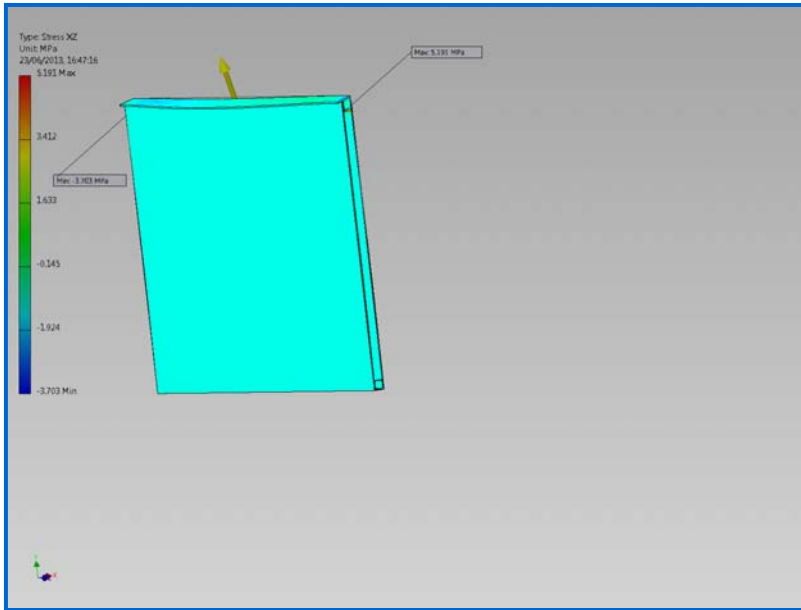
☐ Stress XX



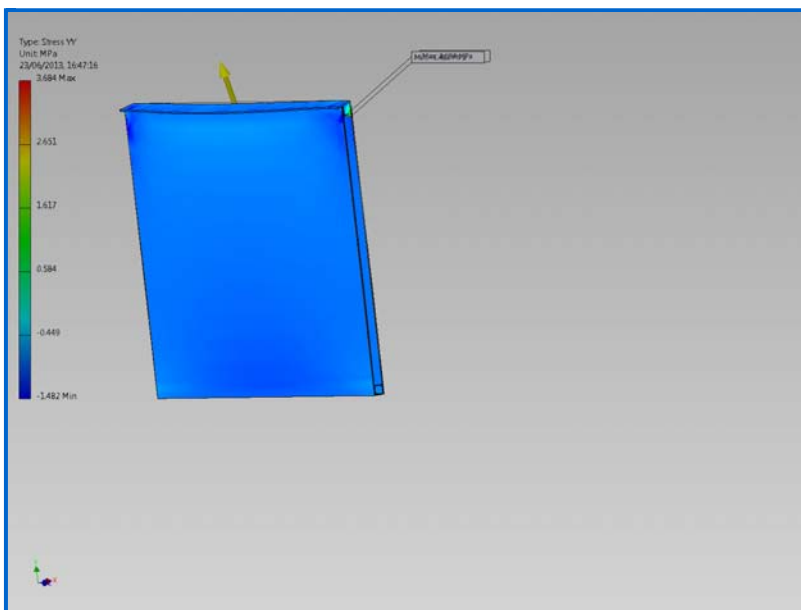
☐ Stress XY

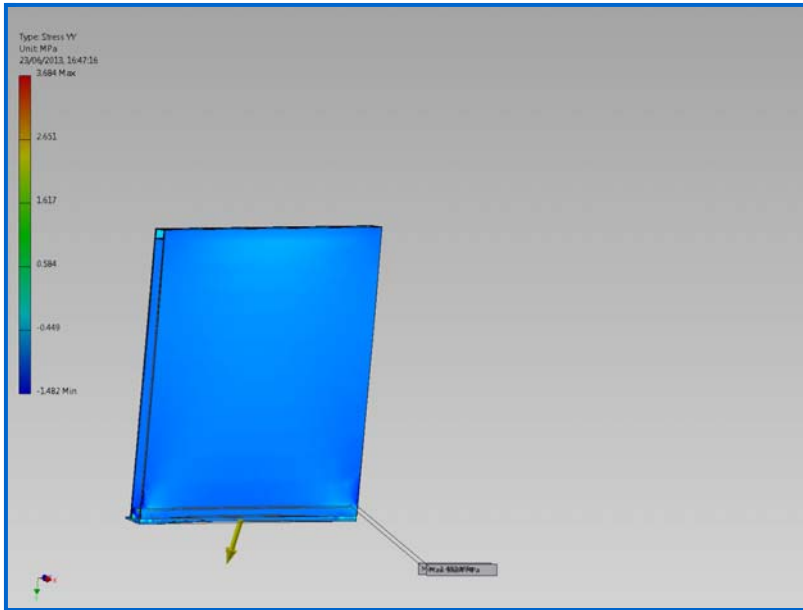


☐ Stress XZ

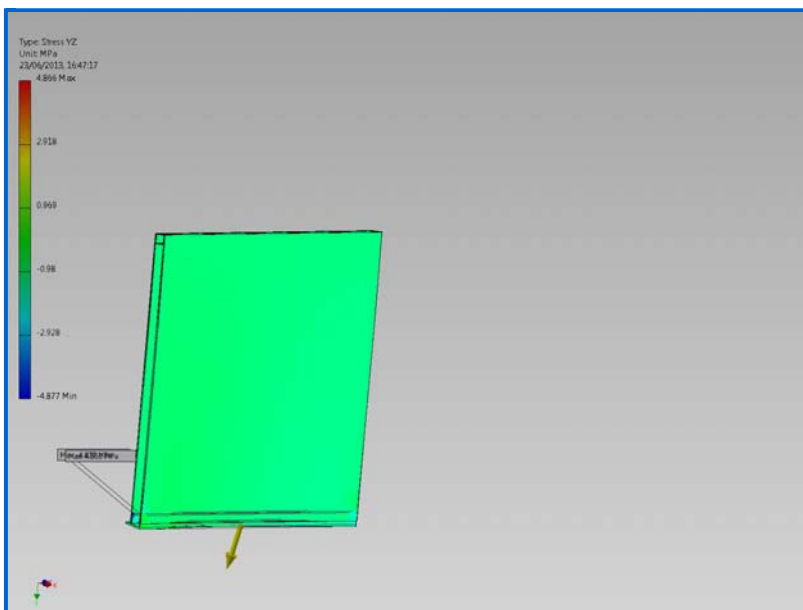
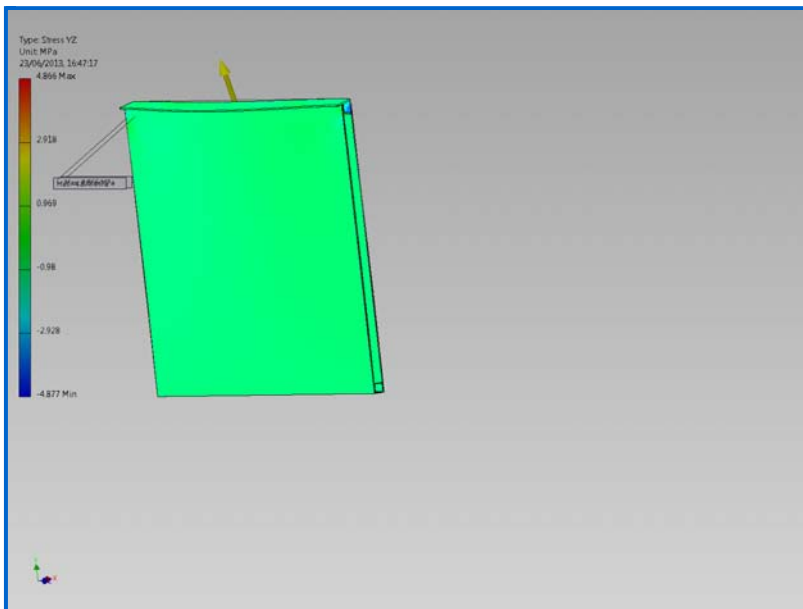


☐ Stress YY

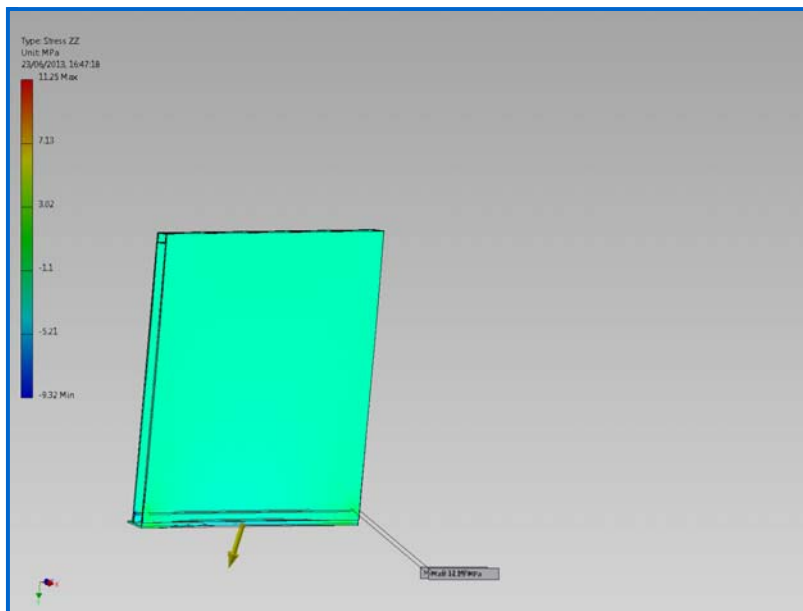
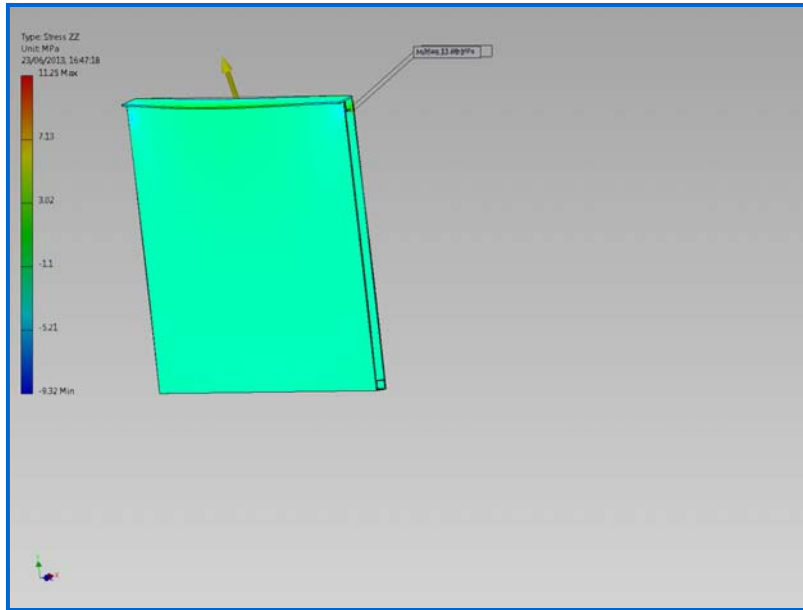




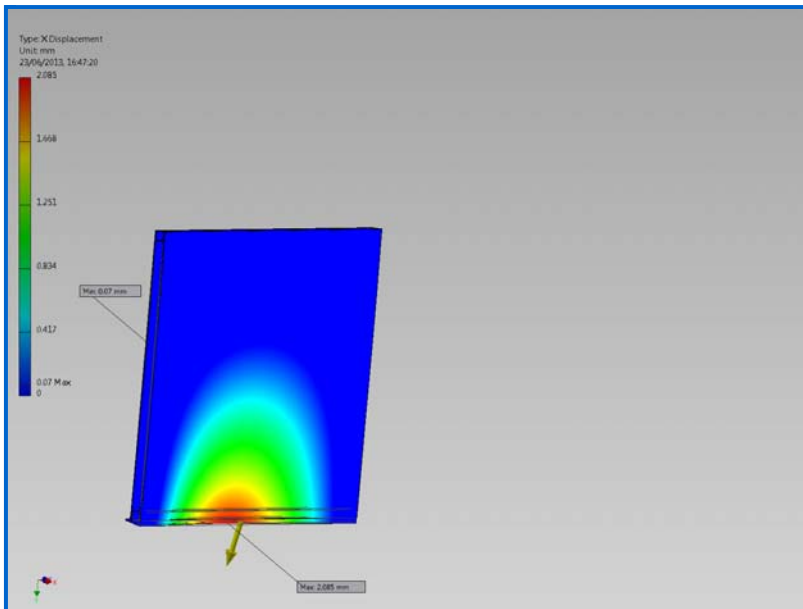
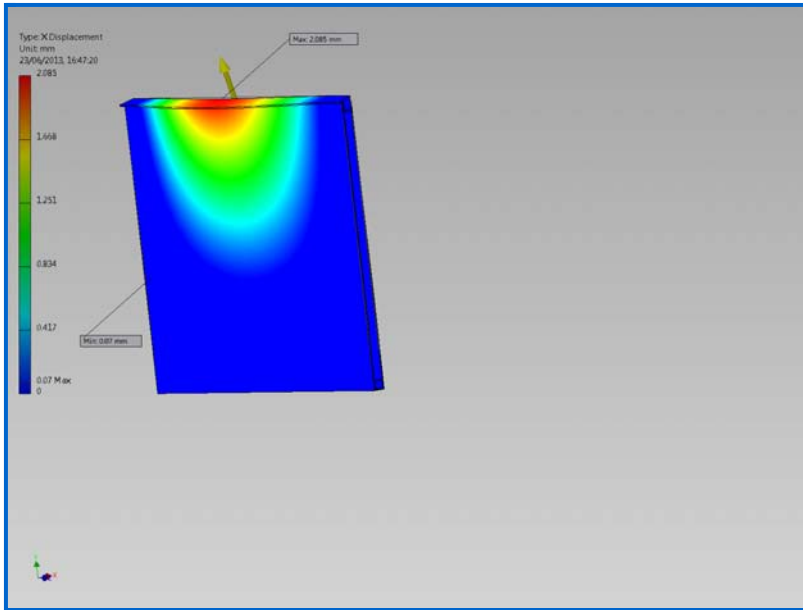
☐ Stress YZ



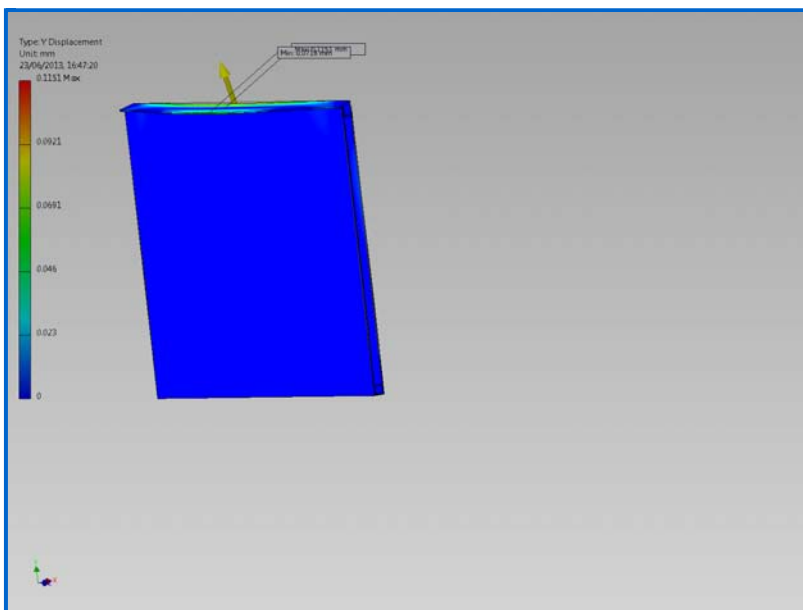
☐ Stress ZZ

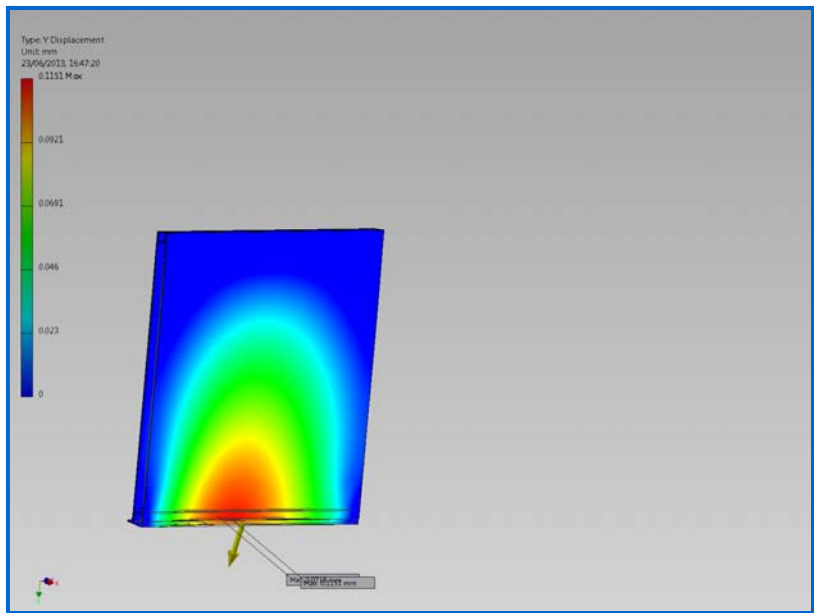


☐ X Displacement

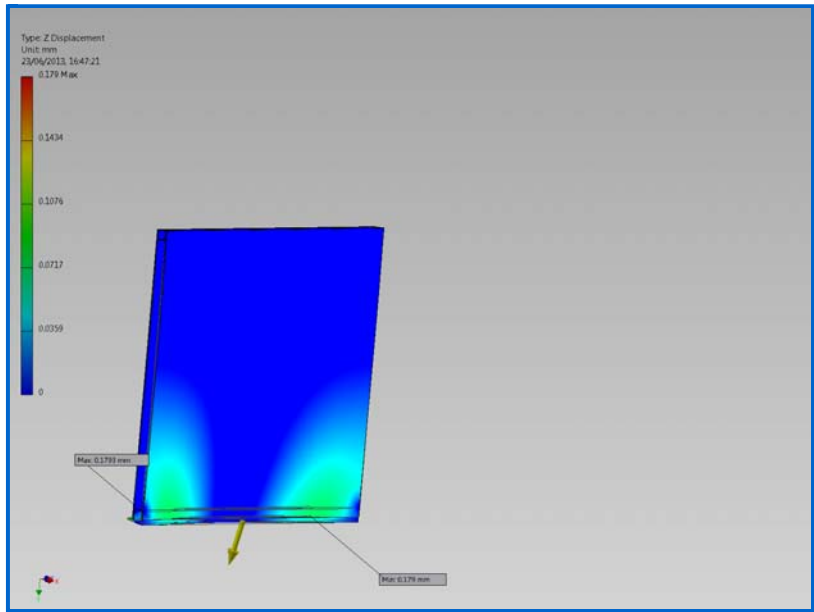
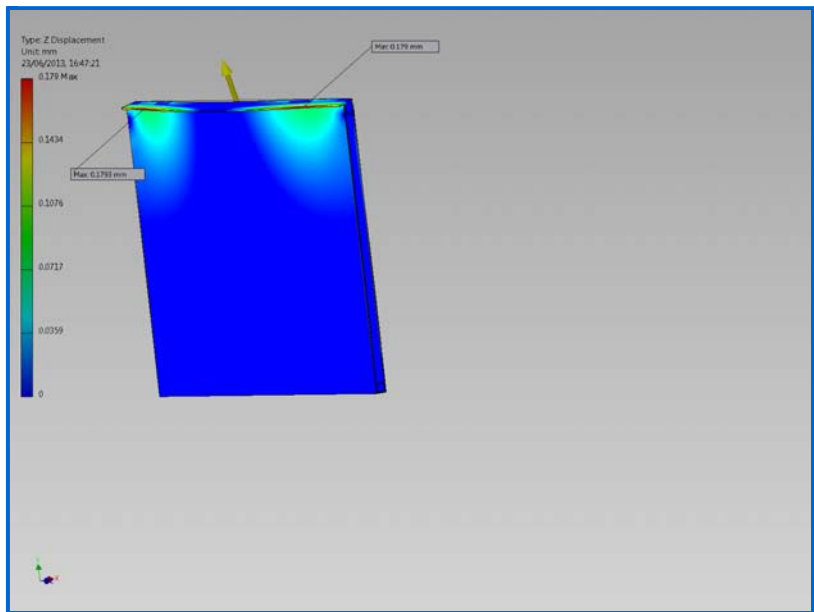


Y Displacement

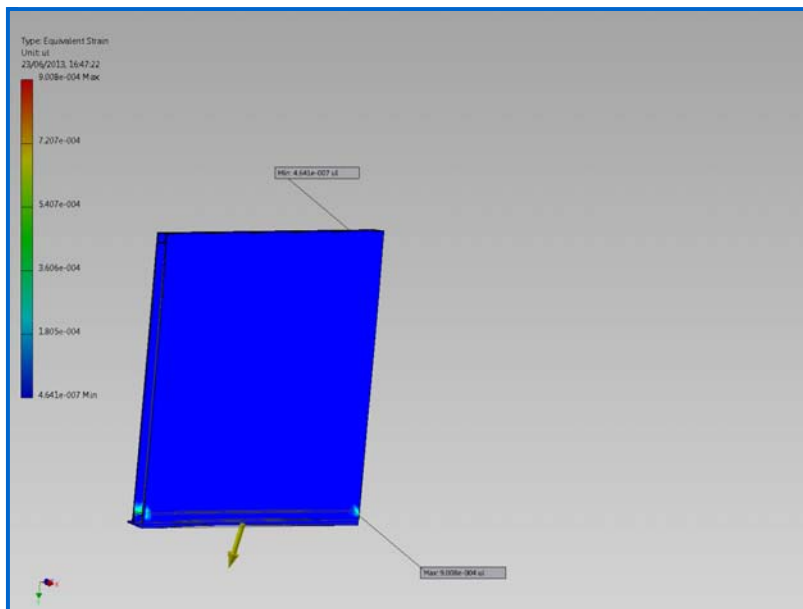
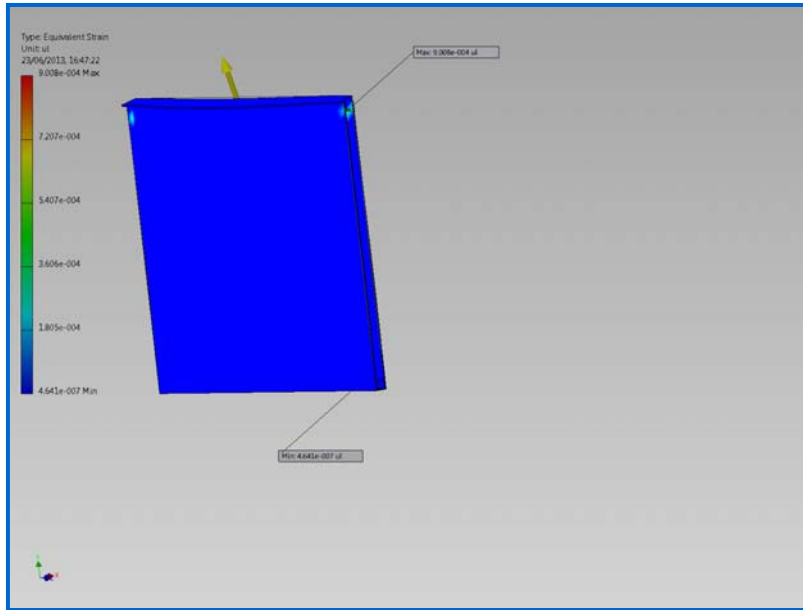




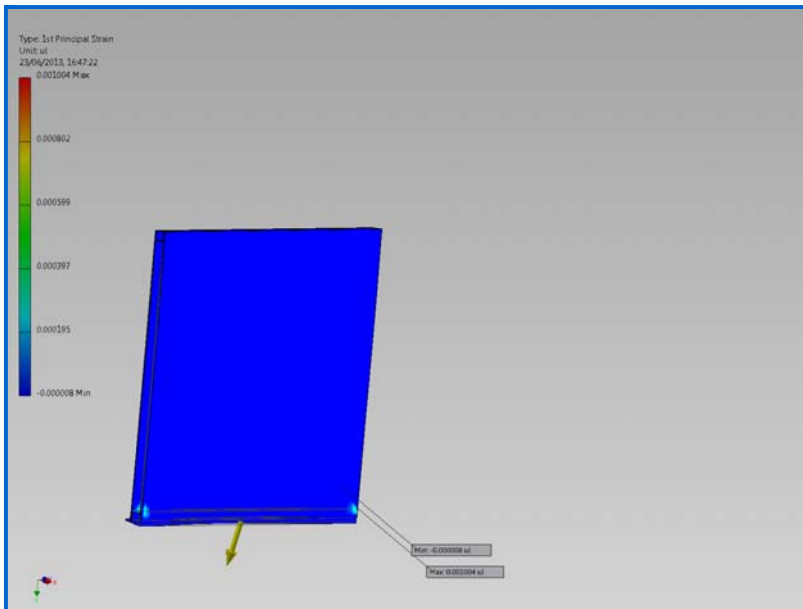
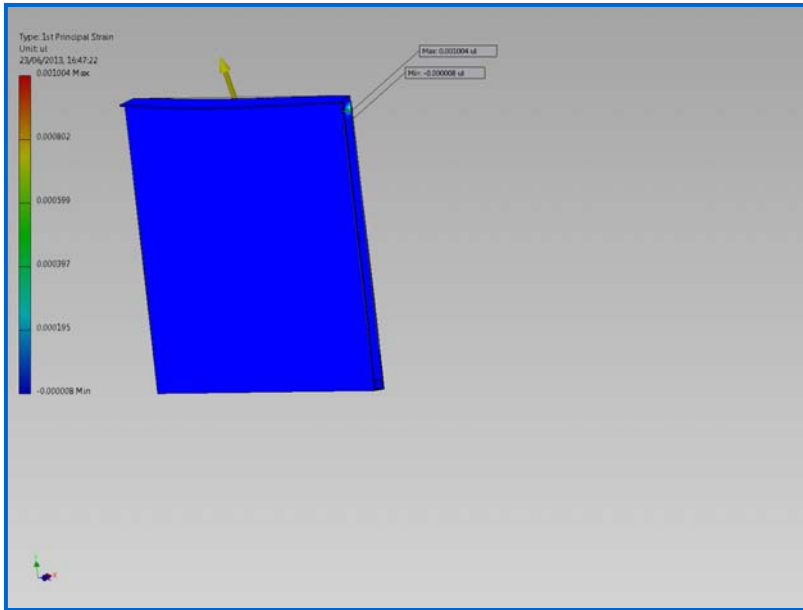
Z Displacement



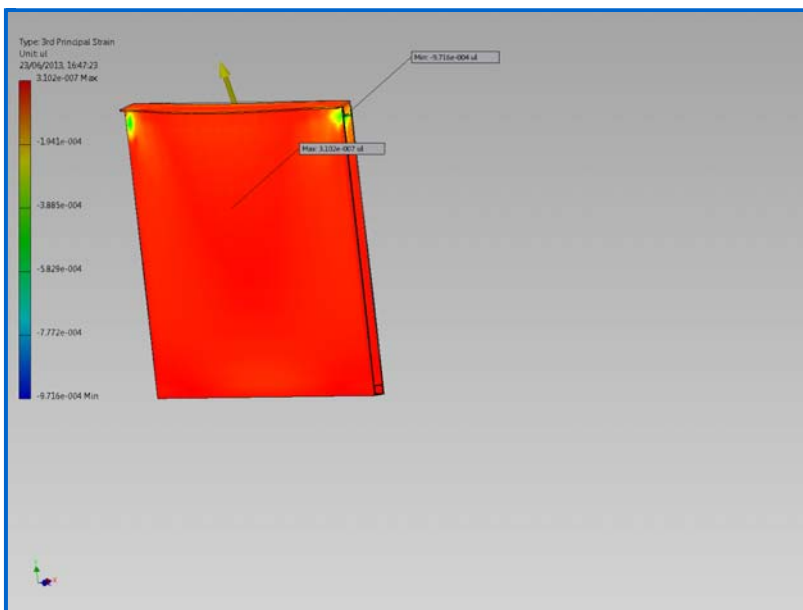
☐ Equivalent Strain

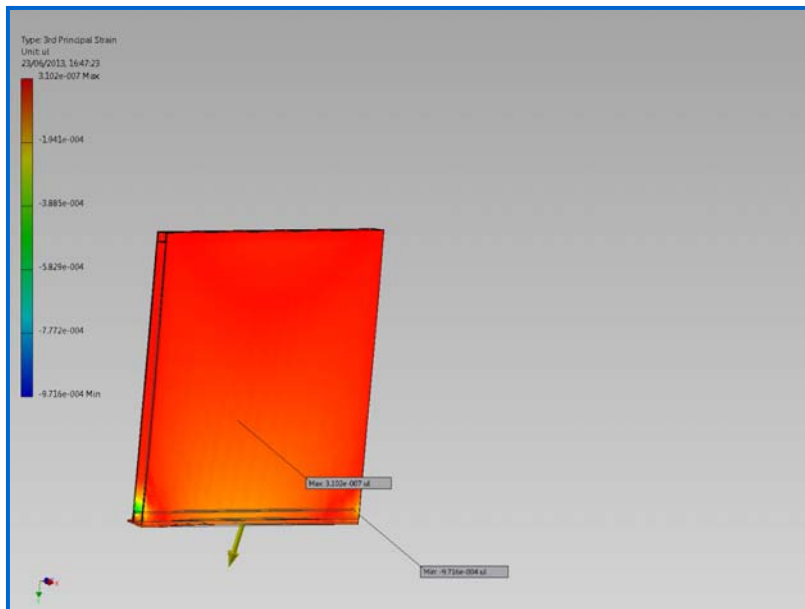


☐ 1st Principal Strain

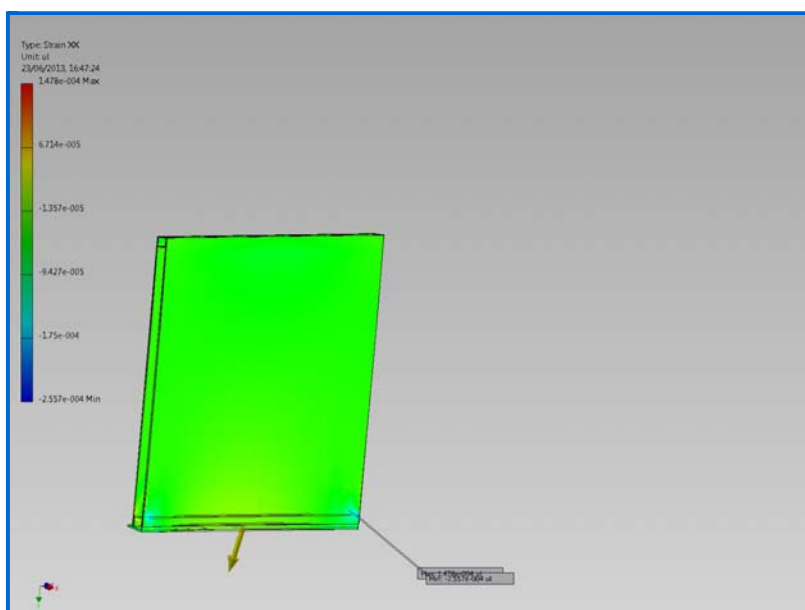
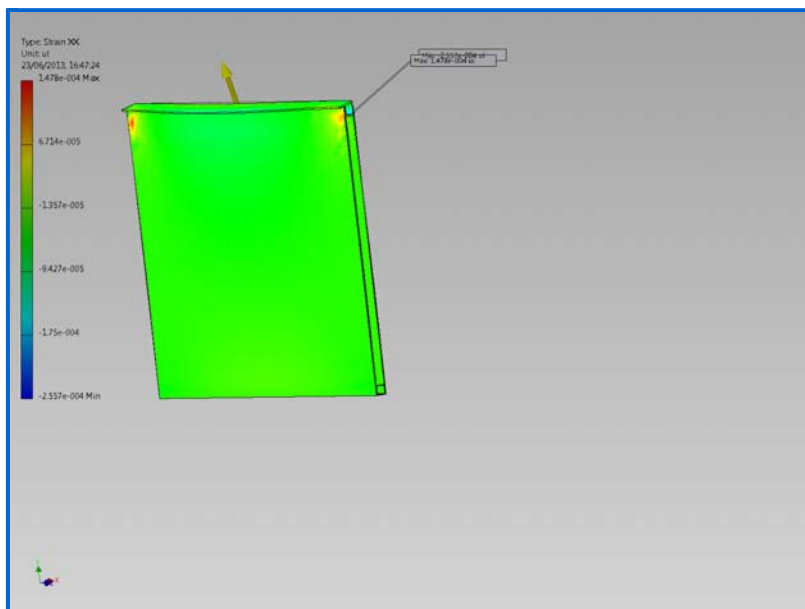


3rd Principal Strain

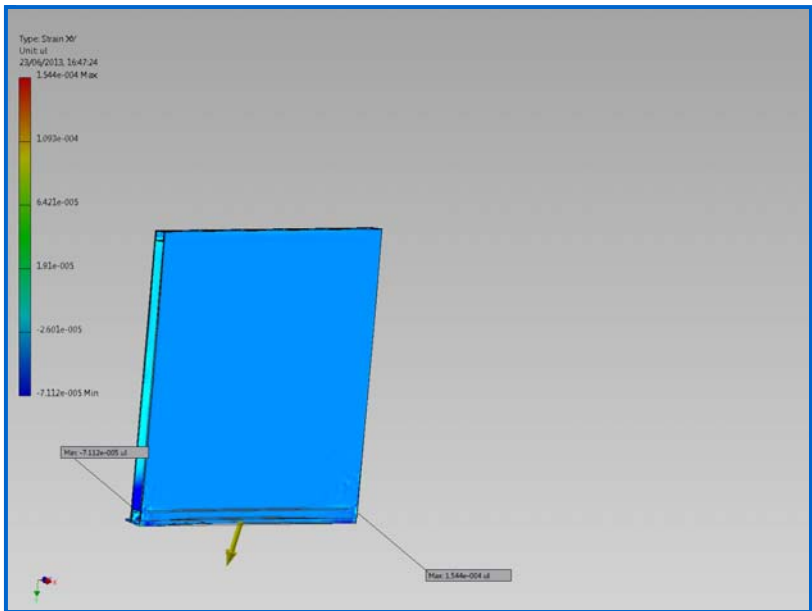
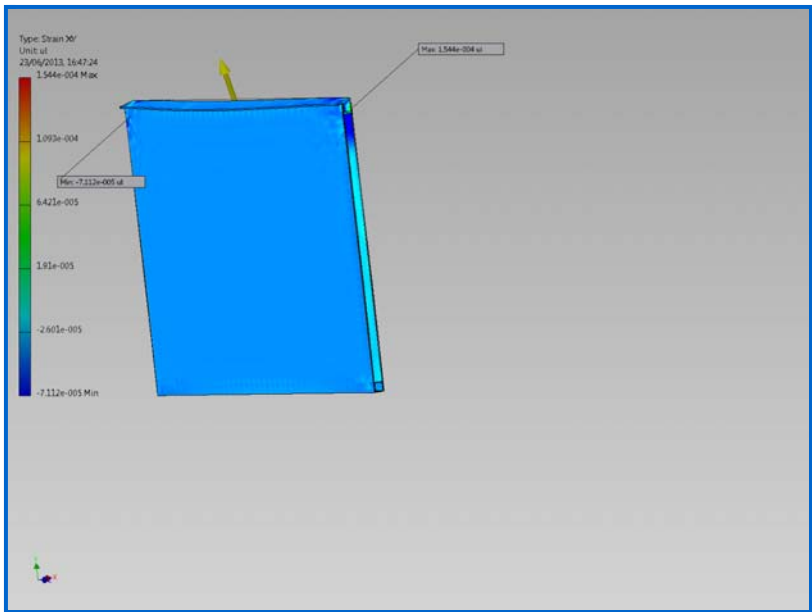




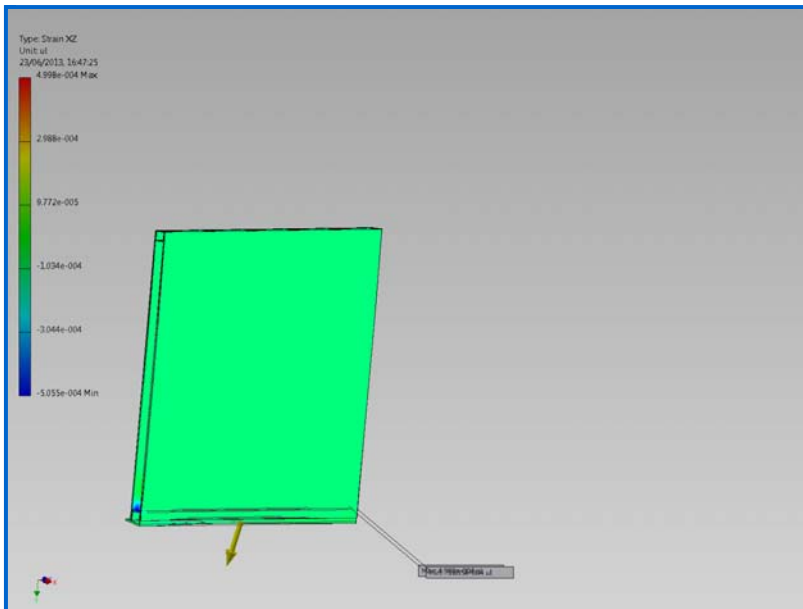
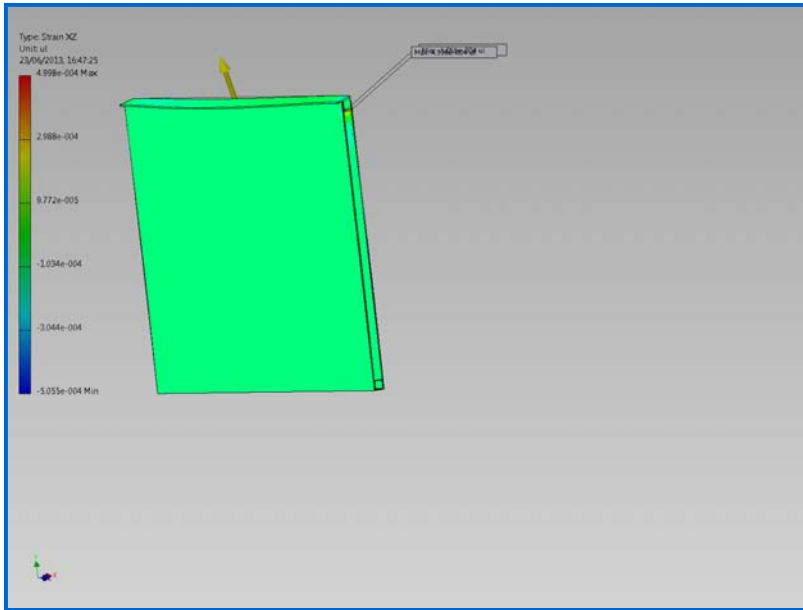
☐ Strain XX



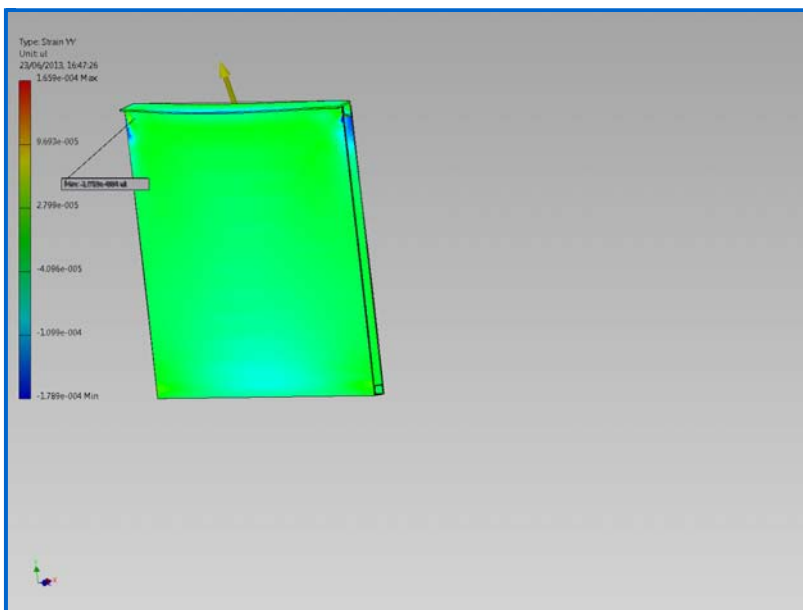
☐ Strain XY

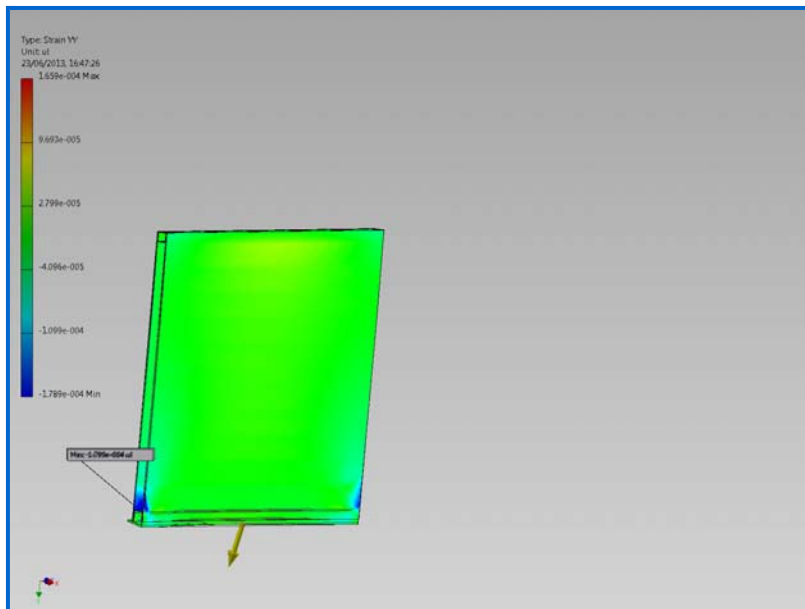


☐ Strain XZ

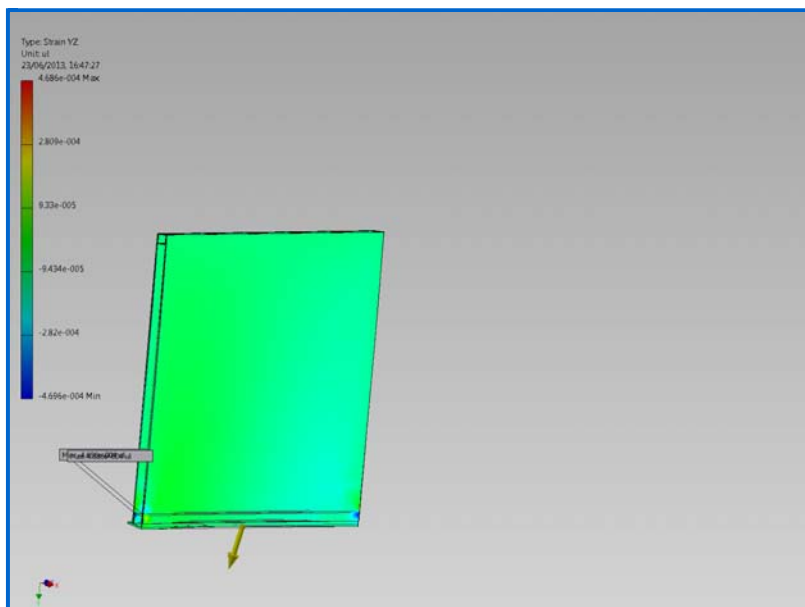
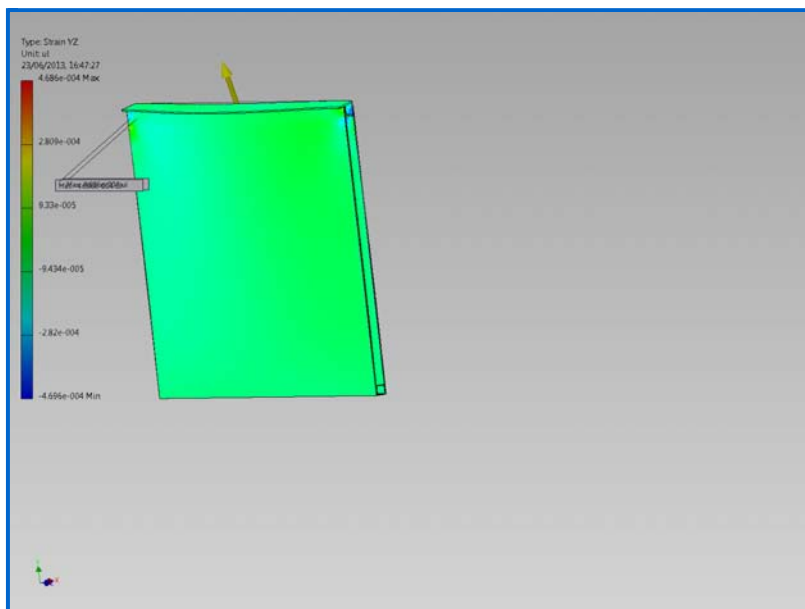


☐ Strain YY

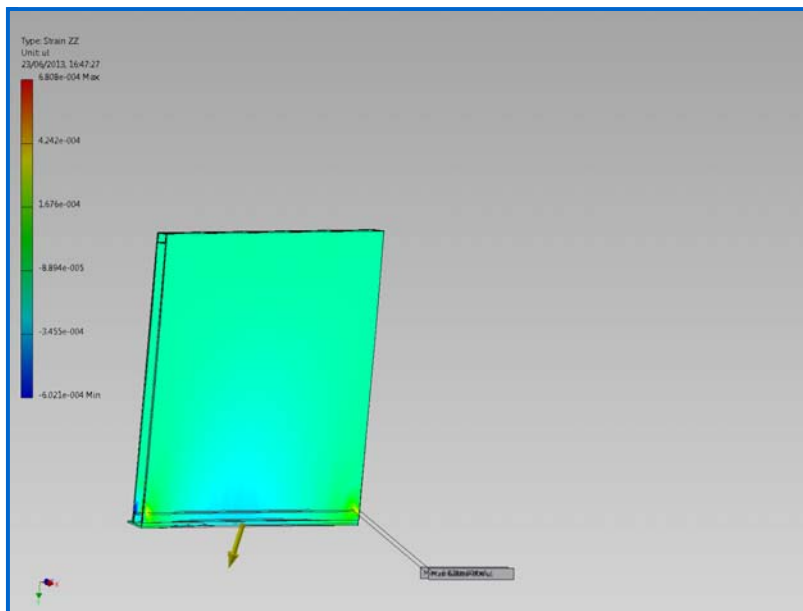
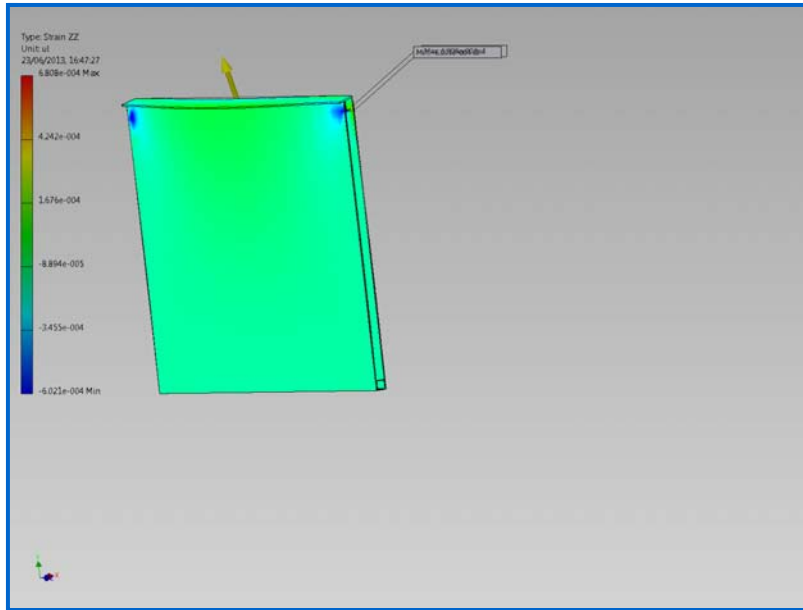




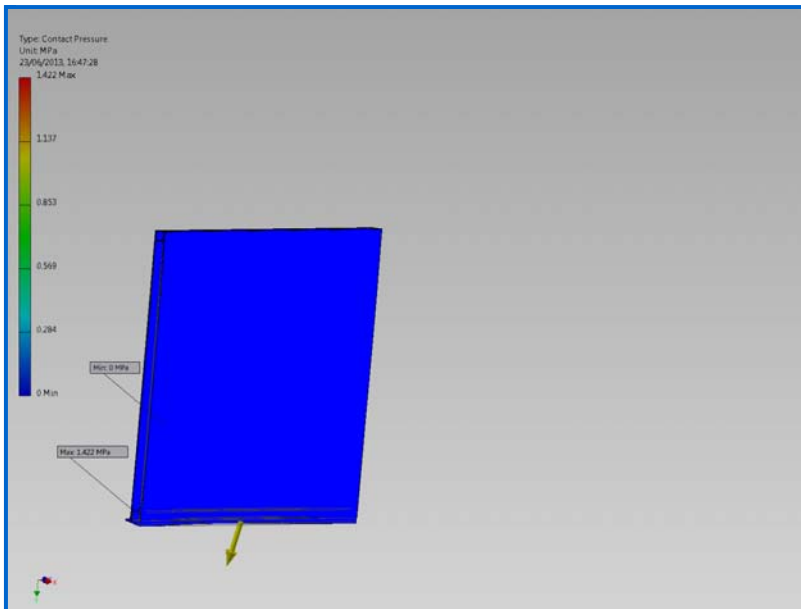
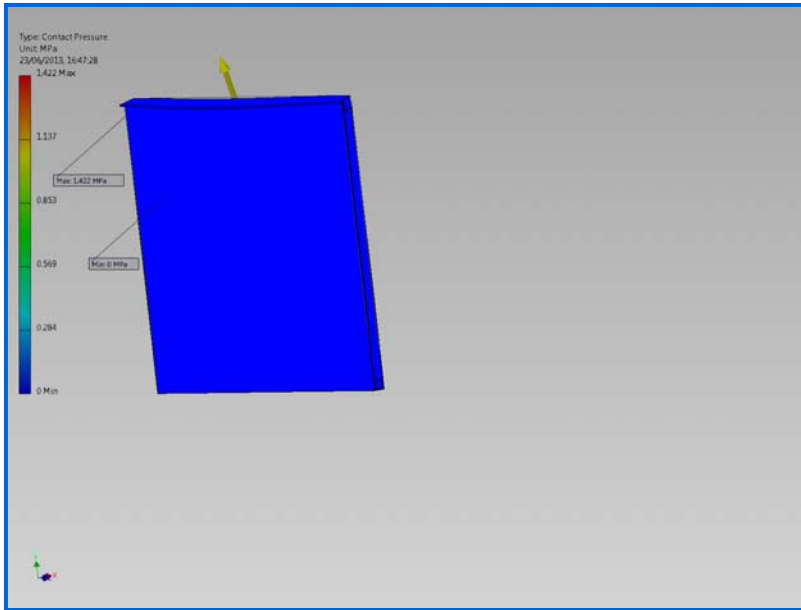
☐ Strain YZ



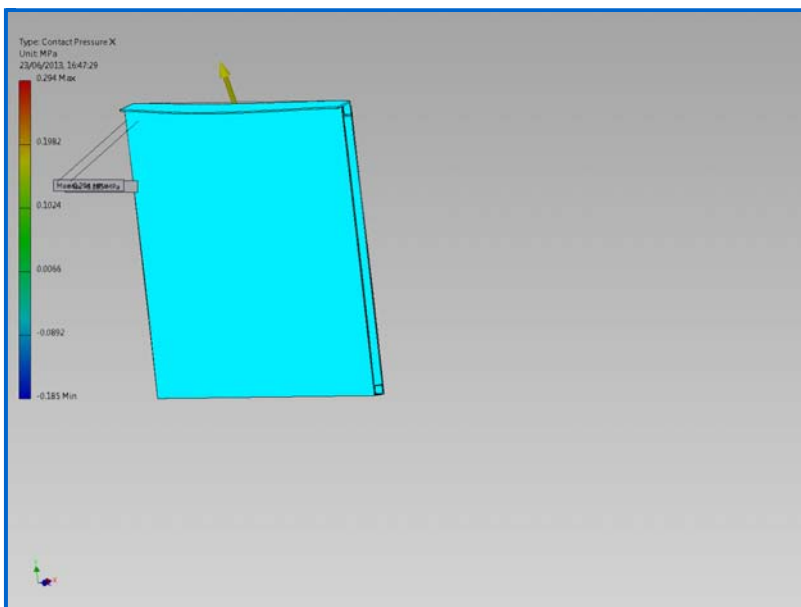
☐ Strain ZZ

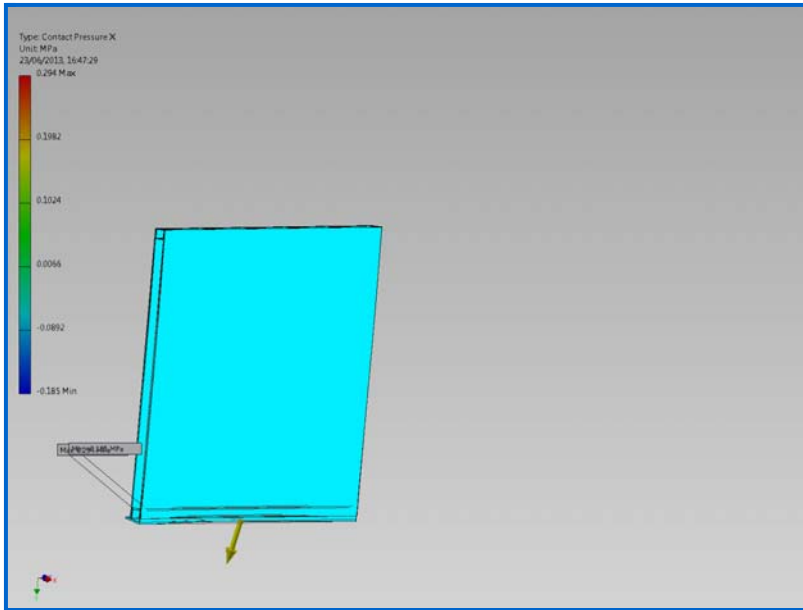


☐ Contact Pressure

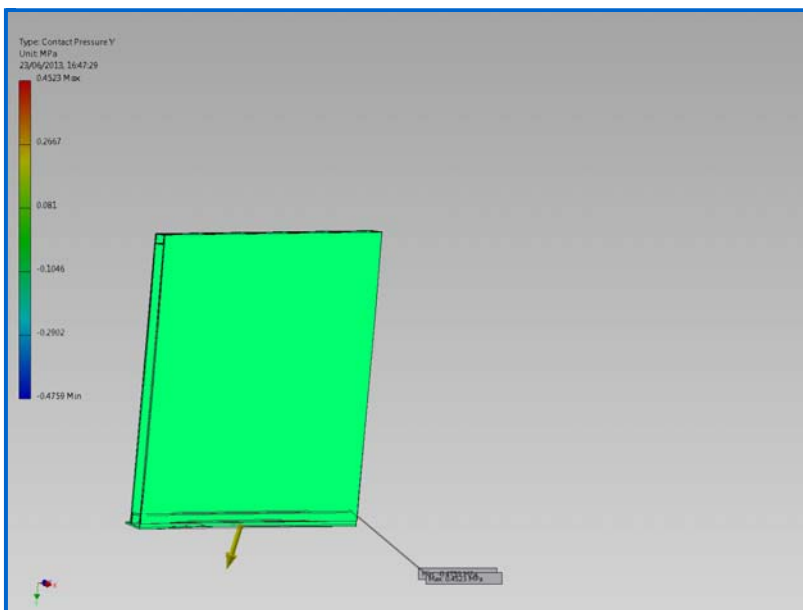
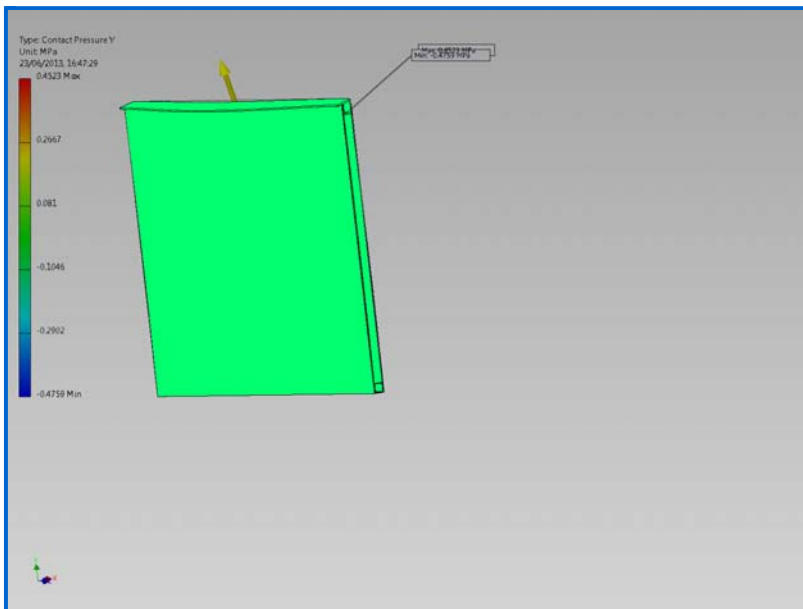


☐ Contact Pressure X

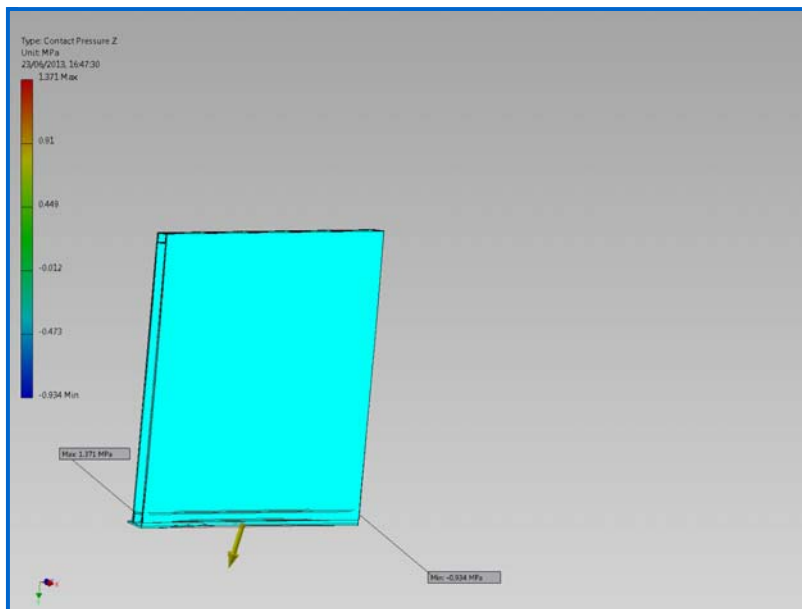
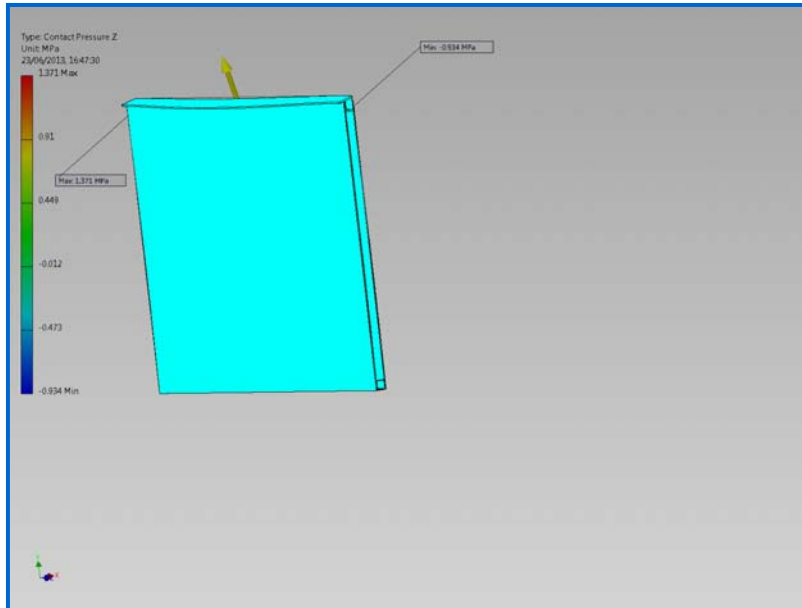




☐ Contact Pressure Y



☐ Contact Pressure Z



☐ Complete Wall 3.5 Bearing Test 4.4kPa

General objective and settings:

Design Objective	Single Point
Simulation Type	Static Analysis
Last Modification Date	23/06/2013, 16:45
Detect and Eliminate Rigid Body Modes	No
Separate Stresses Across Contact Surfaces	No
Motion Loads Analysis	No

Advanced settings:

Avg. Element Size (fraction of model diameter)	0.1
Min. Element Size (fraction of avg. size)	0.2
Grading Factor	1.5
Max. Turn Angle	60 deg
Create Curved Mesh Elements	No

Use part based measure for Assembly mesh Yes

Material(s)

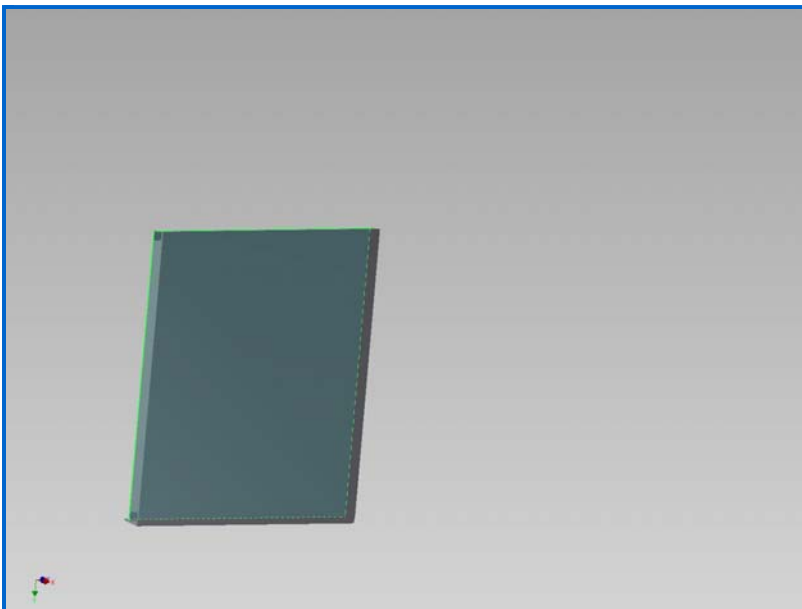
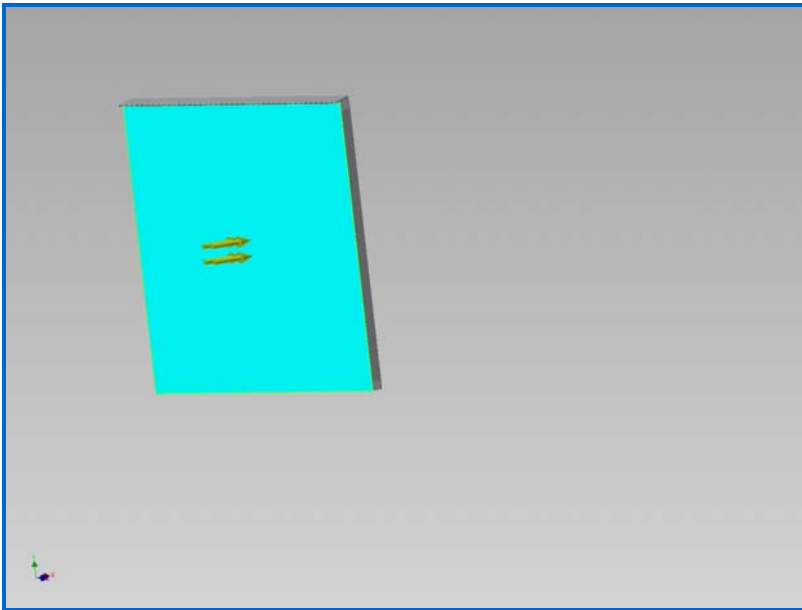
Name	FRP	
General	Mass Density	2 g/cm ³
	Yield Strength	204 MPa
	Ultimate Tensile Strength	204 MPa
Stress	Young's Modulus	13.5 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	5.19231 GPa
Stress Thermal	Expansion Coefficient	0 ul/c
	Thermal Conductivity	0 W/(m K)
	Specific Heat	0 J/(kg c)
Part Name(s)	92 92 5 FRP SHS 3.5 102mm FRP Roof Support 15 degrees	
Name	EPS	
General	Mass Density	0.016 g/cm ³
	Yield Strength	0.1166 MPa
	Ultimate Tensile Strength	0.1166 MPa
Stress	Young's Modulus	1.4 GPa
	Poisson's Ratio	0 ul
	Shear Modulus	0.7 GPa
Stress Thermal	Expansion Coefficient	0 ul/c
	Thermal Conductivity	0 W/(m K)
	Specific Heat	0 J/(kg c)
Part Name(s)	92mm EPS 3.5 2	
Name	MgO	
General	Mass Density	0.93 g/cm ³
	Yield Strength	12 MPa
	Ultimate Tensile Strength	12 MPa
Stress	Young's Modulus	3.5 GPa
	Poisson's Ratio	0.25 ul
	Shear Modulus	1.4 GPa
Stress Thermal	Expansion Coefficient	0 ul/c
	Thermal Conductivity	0 W/(m K)
	Specific Heat	0 J/(kg c)
Part Name(s)	10mm MgO Wall Sheet 2 10mm MgO Wall Sheet 2	

Operating conditions

Pressure:1

Load Type	Pressure
Magnitude	0.004 MPa

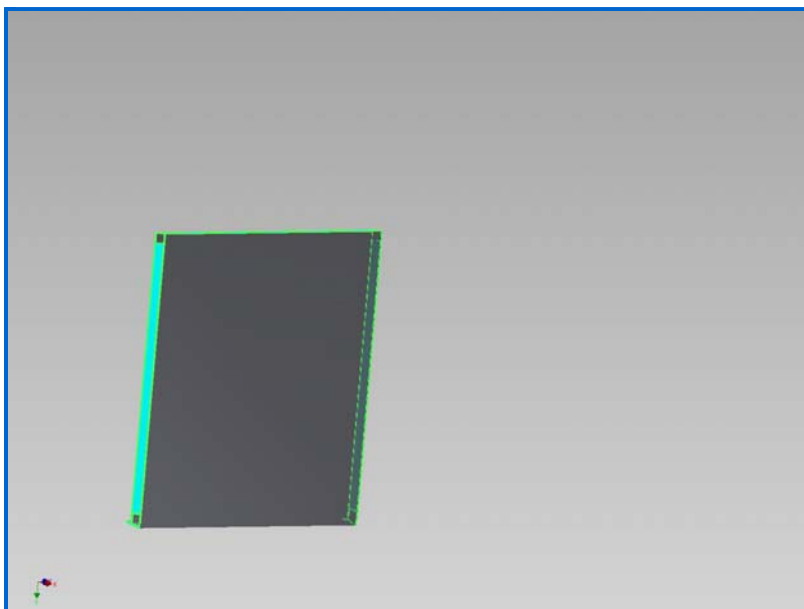
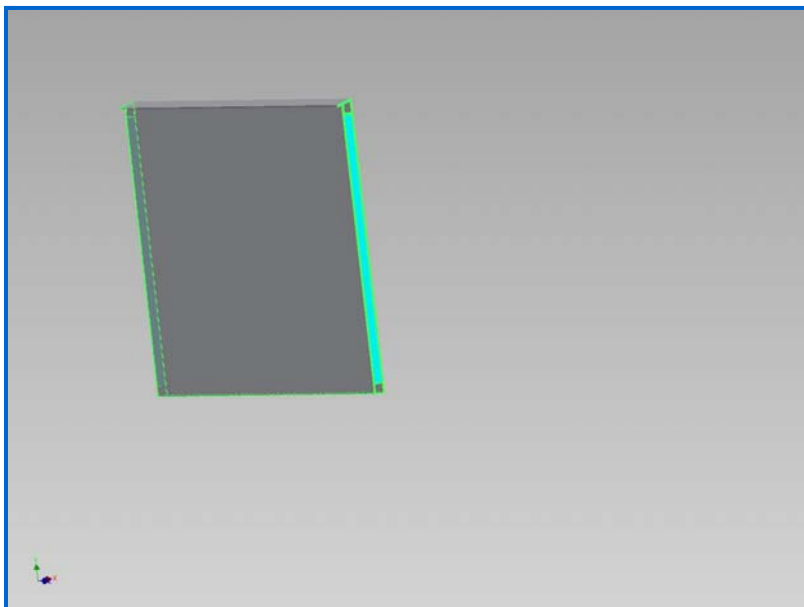
Selected Face(s)



[-] **Fixed Constraint: 1**

Constraint Type Fixed Constraint

[-] **Selected Face(s)**



☐ **Results**

☐ **Reaction Force and Moment on Constraints**

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	41580 N	-41580 N	19791.3 N m	0 N m
		0 N		0 N m
		0 N		19791.3 N m

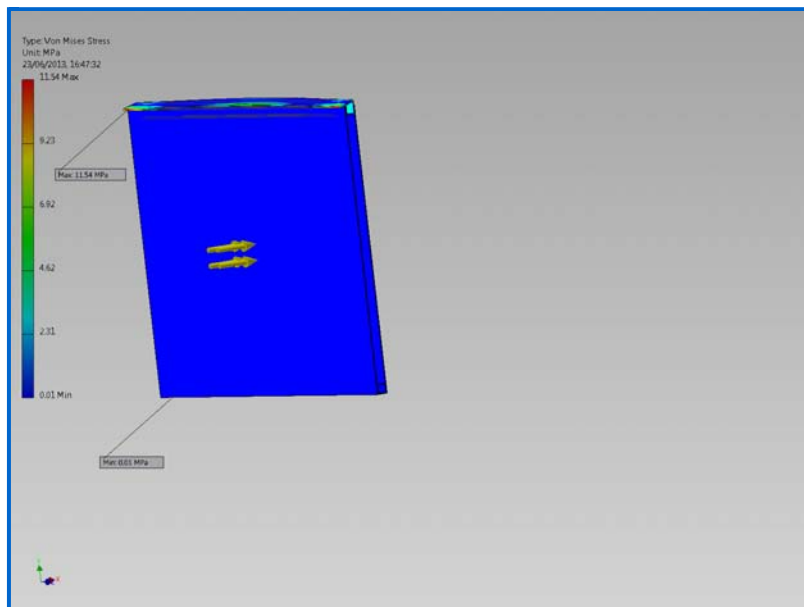
☐ **Result Summary**

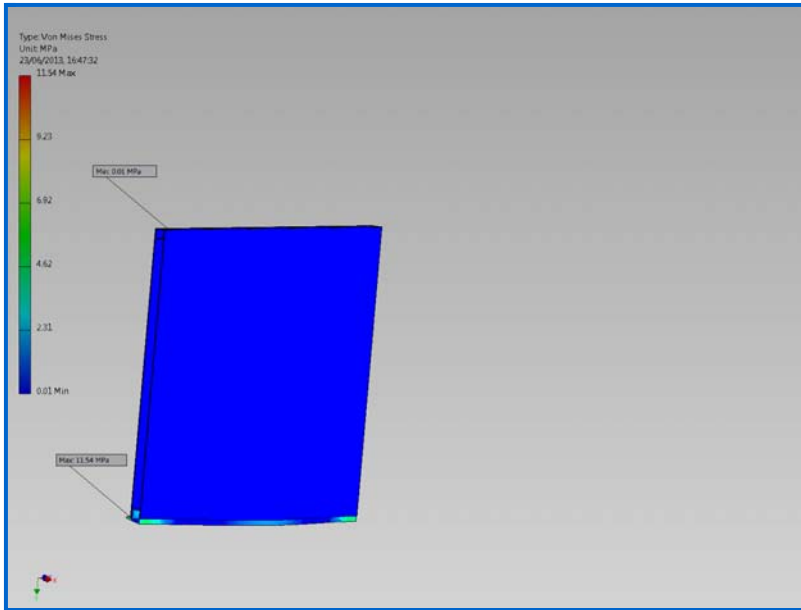
Name	Minimum	Maximum
Volume	1021800000 mm ³	
Mass	234.037 kg	
Von Mises Stress	0.0087186 MPa	11.535 MPa
1st Principal Stress	-3.3652 MPa	13.9798 MPa
3rd Principal Stress	-8.15821 MPa	5.01957 MPa
Displacement	0 mm	4.02172 mm

Safety Factor	0.174078 ul	15 ul
Stress XX	-3.45702 MPa	5.42399 MPa
Stress XY	-0.727192 MPa	1.62347 MPa
Stress XZ	-1.76636 MPa	1.67296 MPa
Stress YY	-4.06335 MPa	5.47045 MPa
Stress YZ	-0.834645 MPa	0.701365 MPa
Stress ZZ	-8.06638 MPa	13.6496 MPa
X Displacement	-0.00144735 mm	4.02172 mm
Y Displacement	-0.151589 mm	0.161454 mm
Z Displacement	-0.343844 mm	0.345771 mm
Equivalent Strain	0.000000589633 ul	0.000751101 ul
1st Principal Strain	-0.00000874204 ul	0.000834777 ul
3rd Principal Strain	-0.000626809 ul	0.00000429657 ul
Strain XX	-0.000299472 ul	0.000214874 ul
Strain XY	-0.000259712 ul	0.000156334 ul
Strain XZ	-0.000170094 ul	0.0001611 ul
Strain YY	-0.000386834 ul	0.000427327 ul
Strain YZ	-0.000138834 ul	0.00014178 ul
Strain ZZ	-0.00061894 ul	0.000830562 ul
Contact Pressure	0 MPa	31.6479 MPa
Contact Pressure X	-5.48648 MPa	1.55971 MPa
Contact Pressure Y	-1.74228 MPa	2.00985 MPa
Contact Pressure Z	-25.1286 MPa	31.1679 MPa

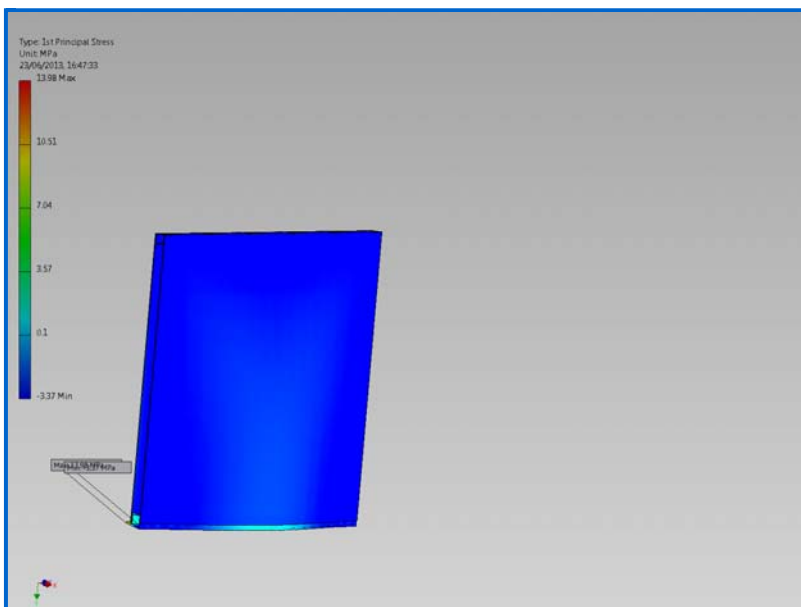
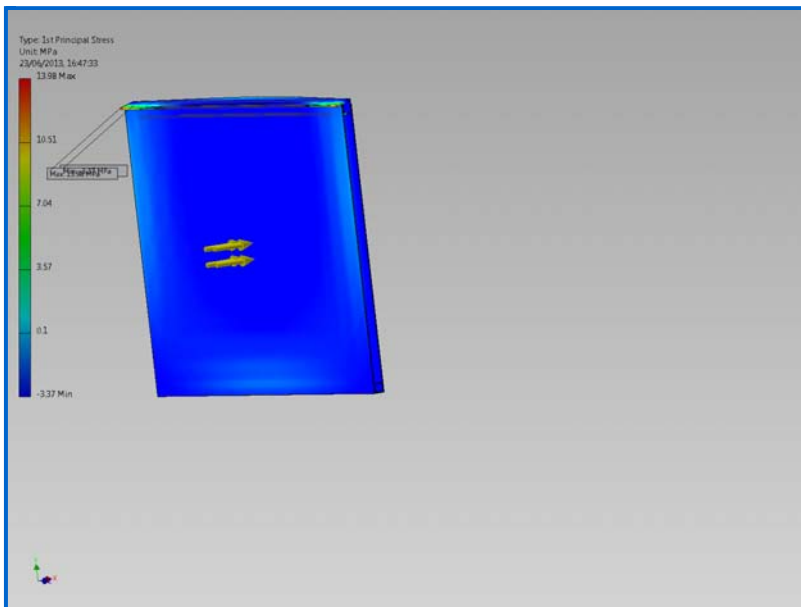
☐ Figures

☐ Von Mises Stress

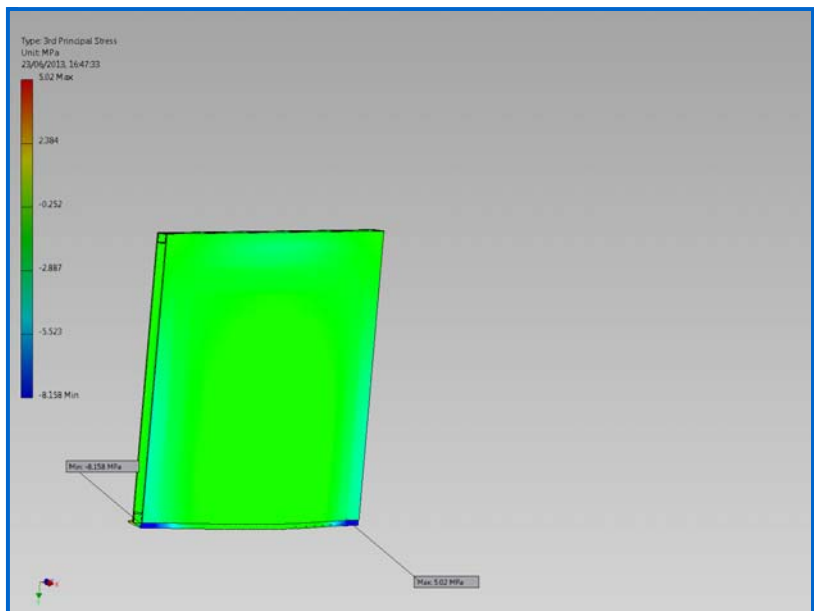
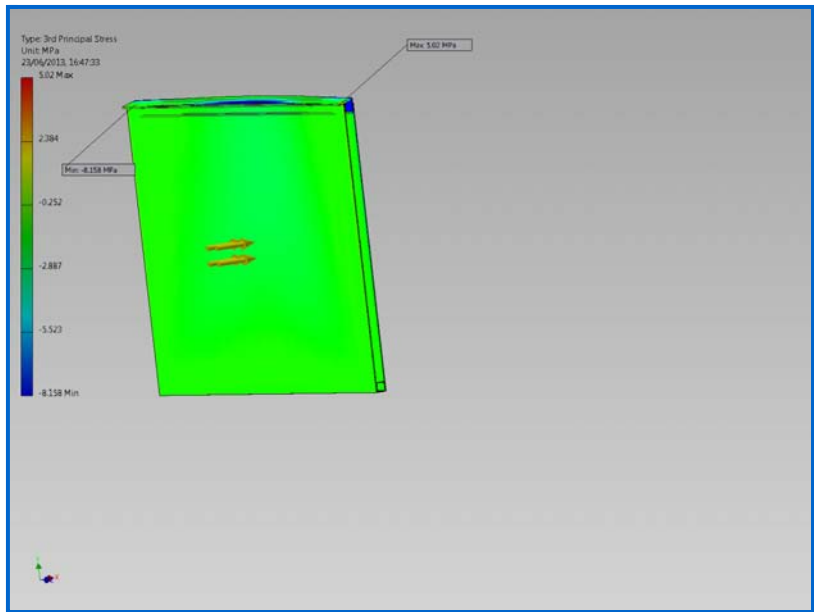




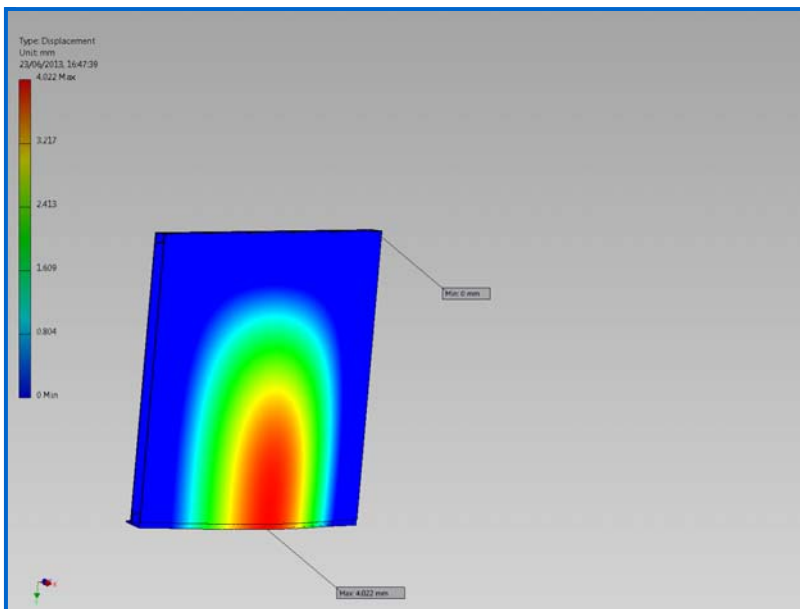
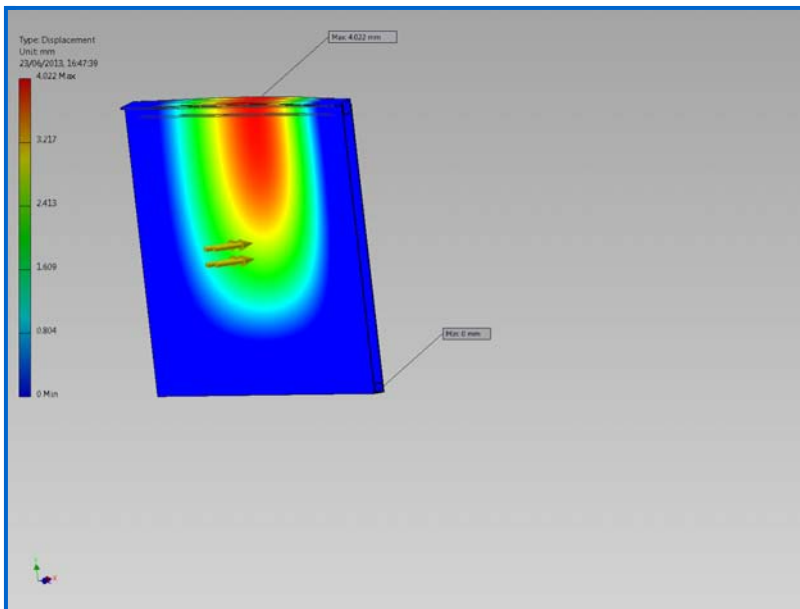
☐ 1st Principal Stress



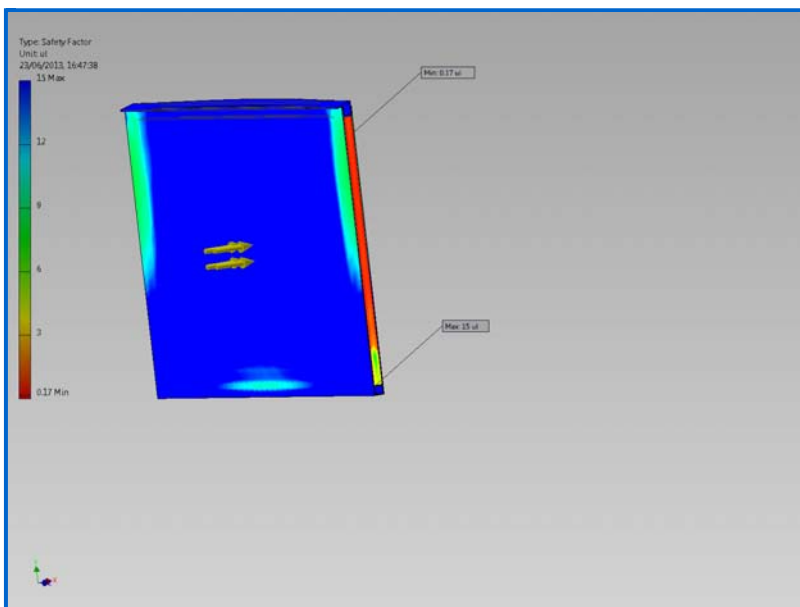
☐ 3rd Principal Stress

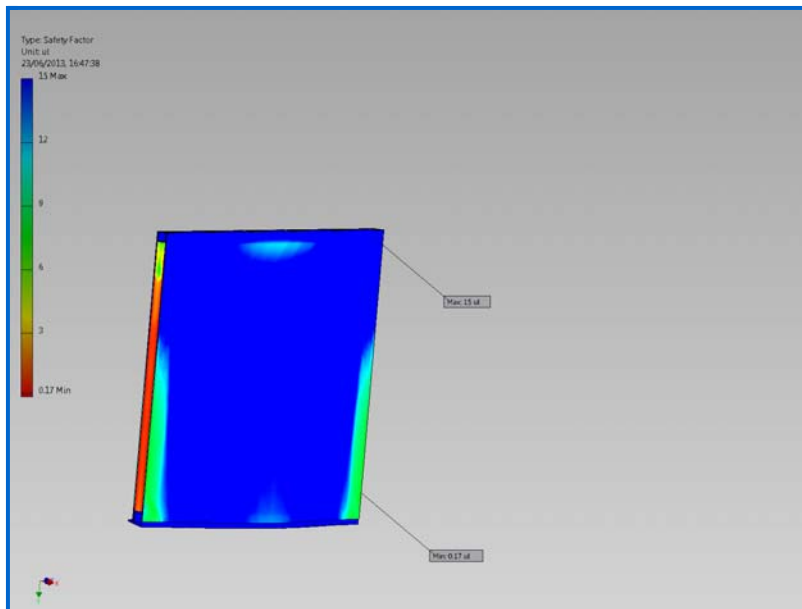


☐ Displacement

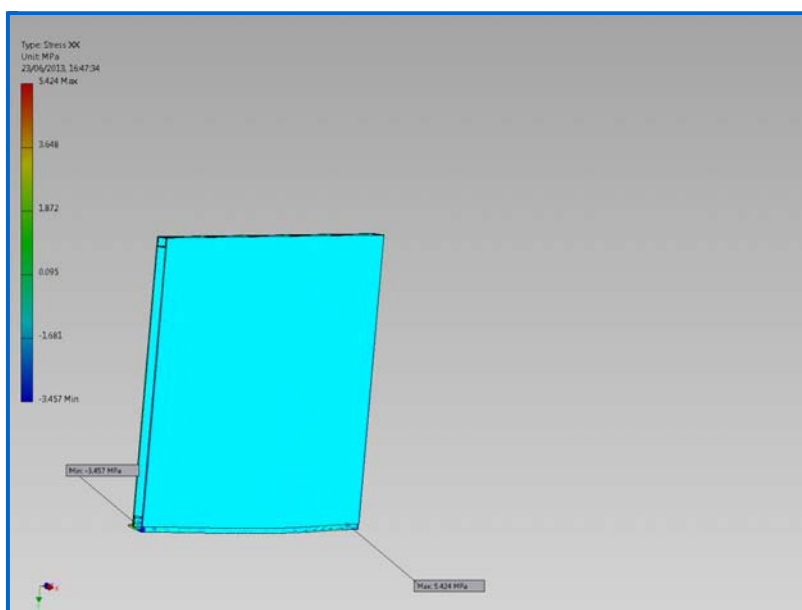
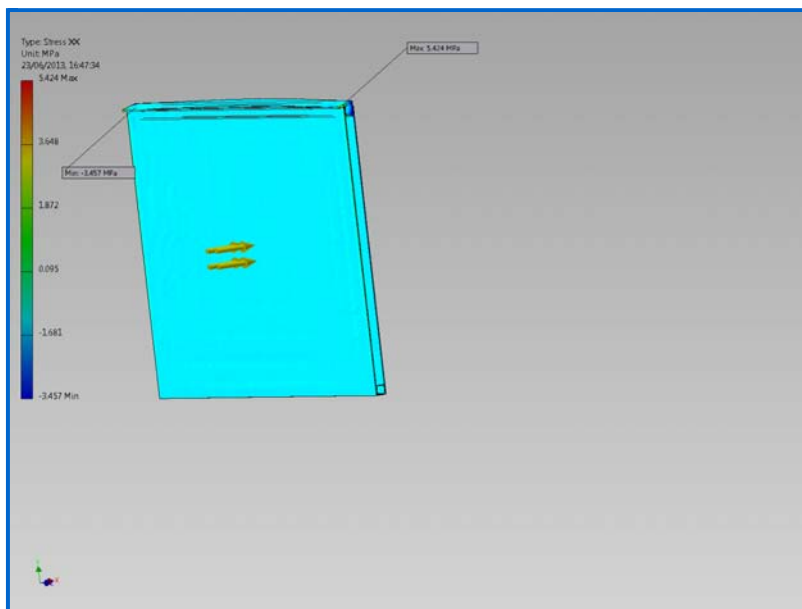


☐ Safety Factor

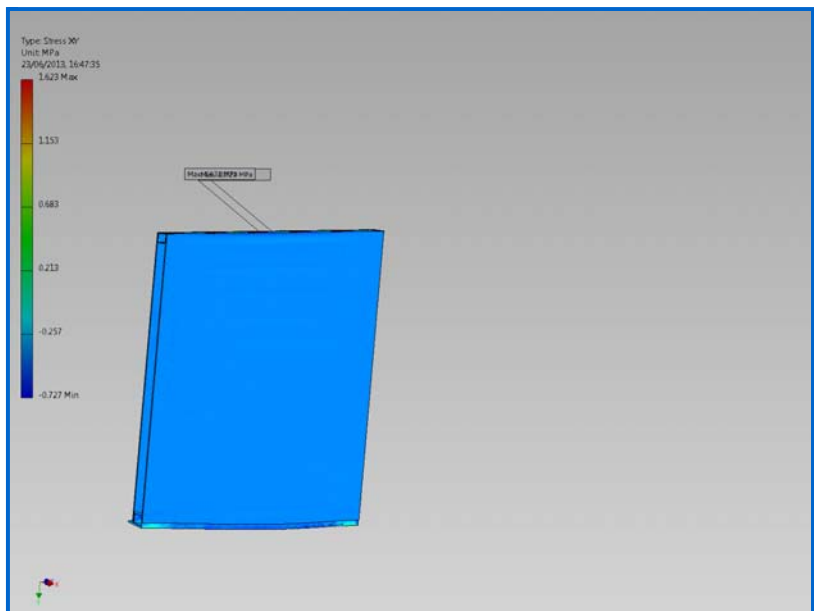
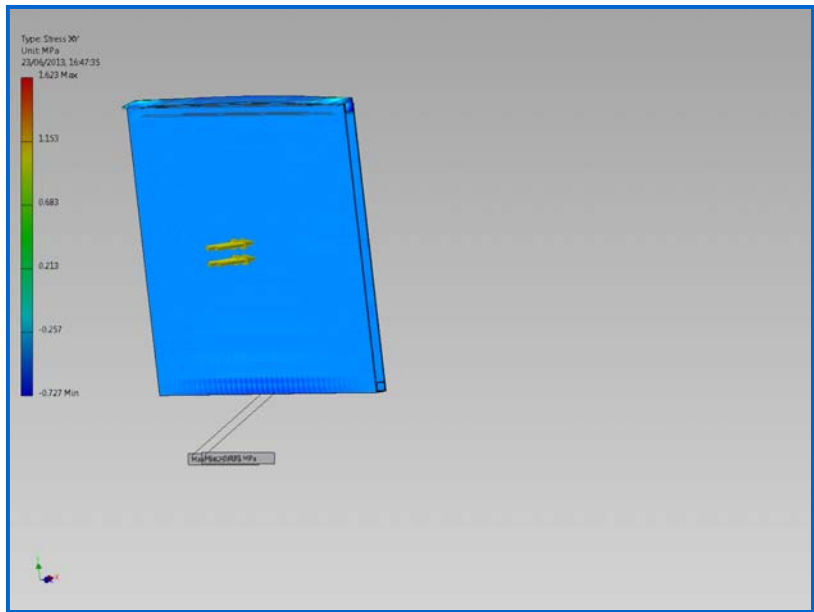




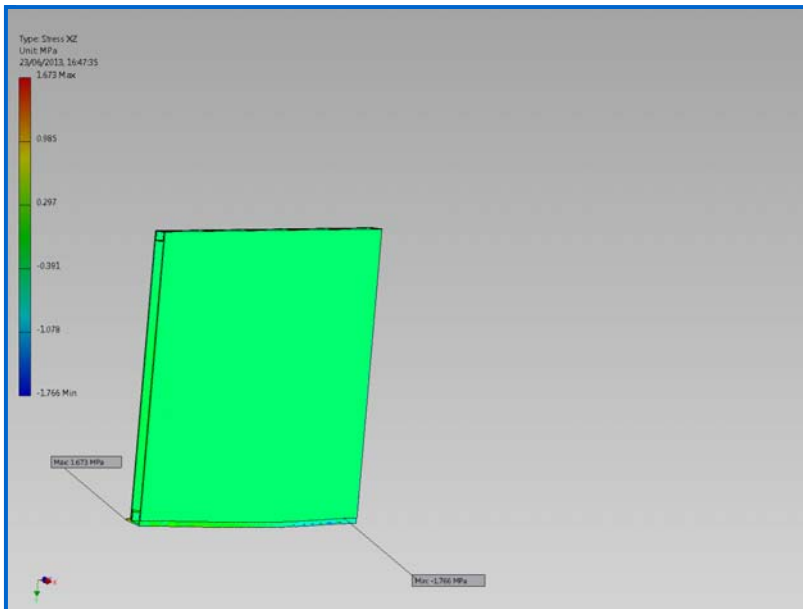
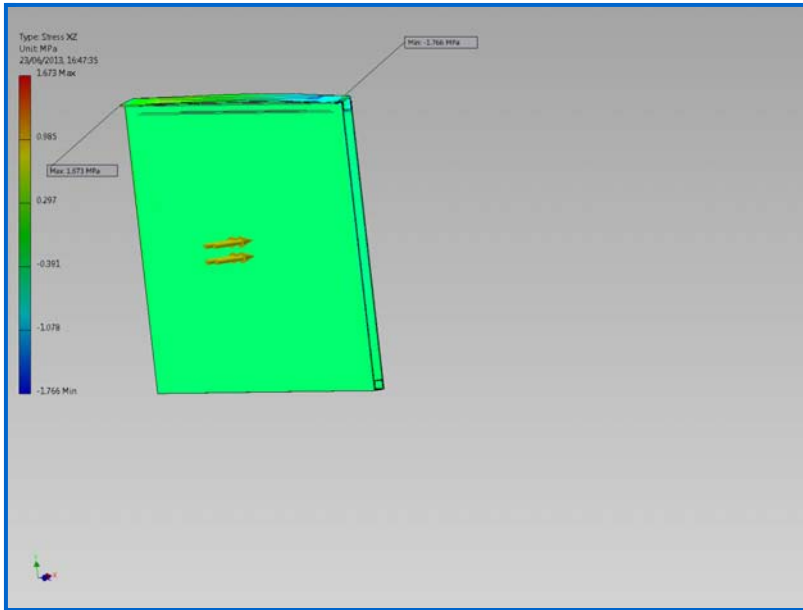
☐ Stress XX



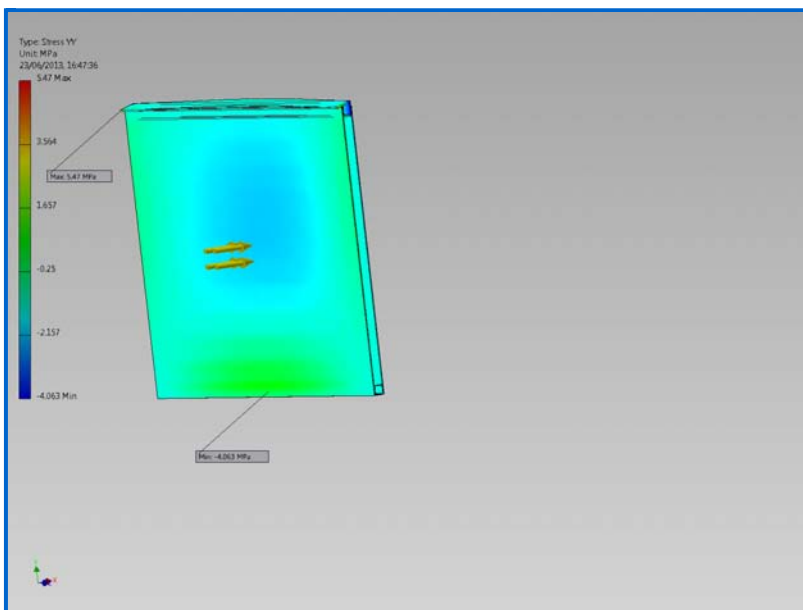
☐ Stress XY

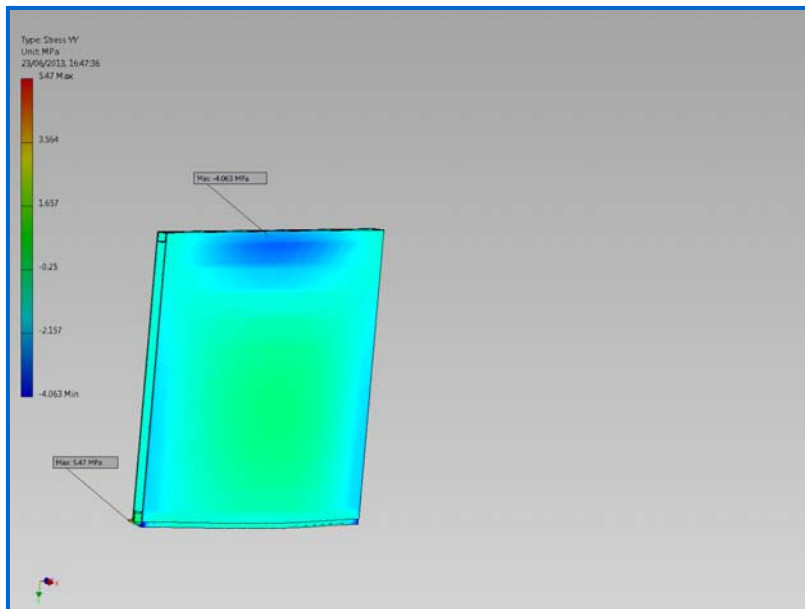


☐ Stress XZ

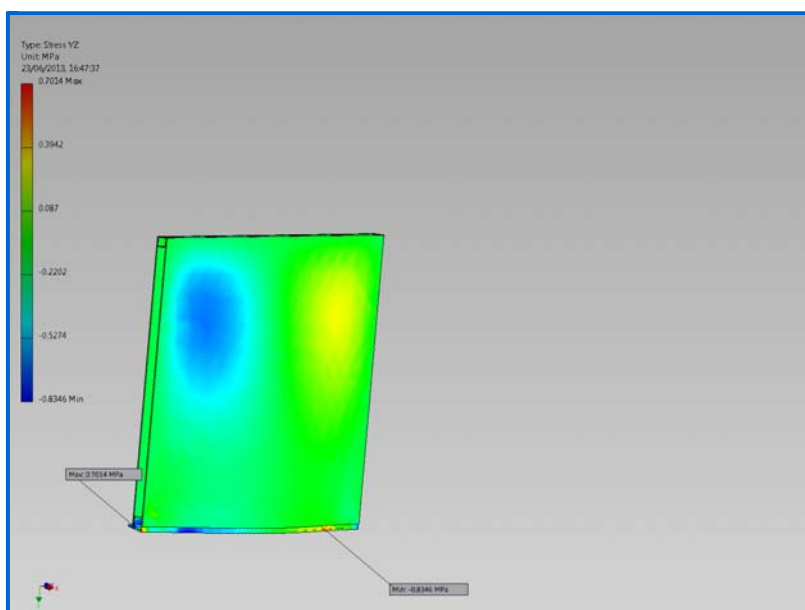
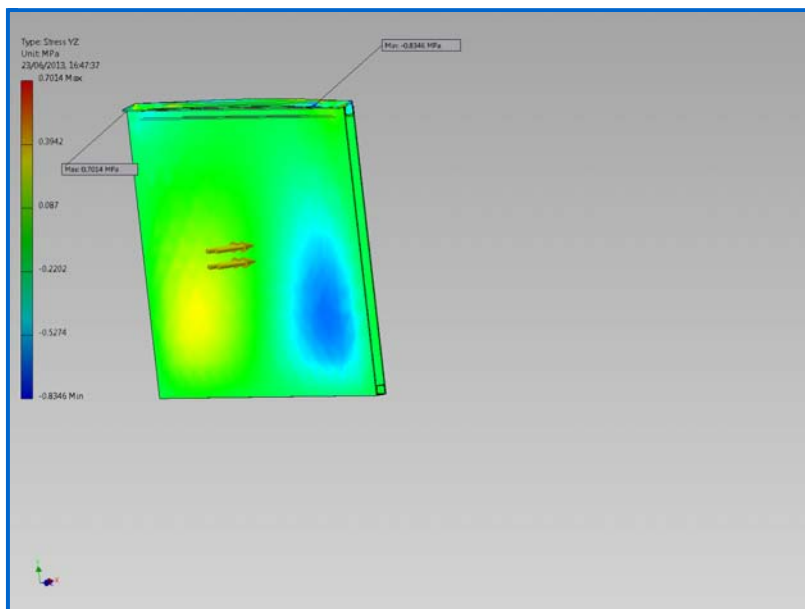


☐ Stress YY

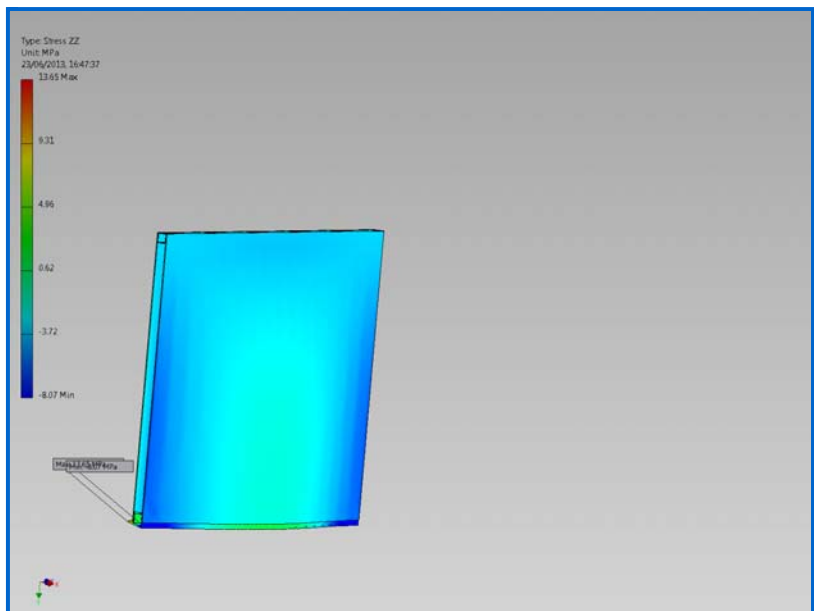
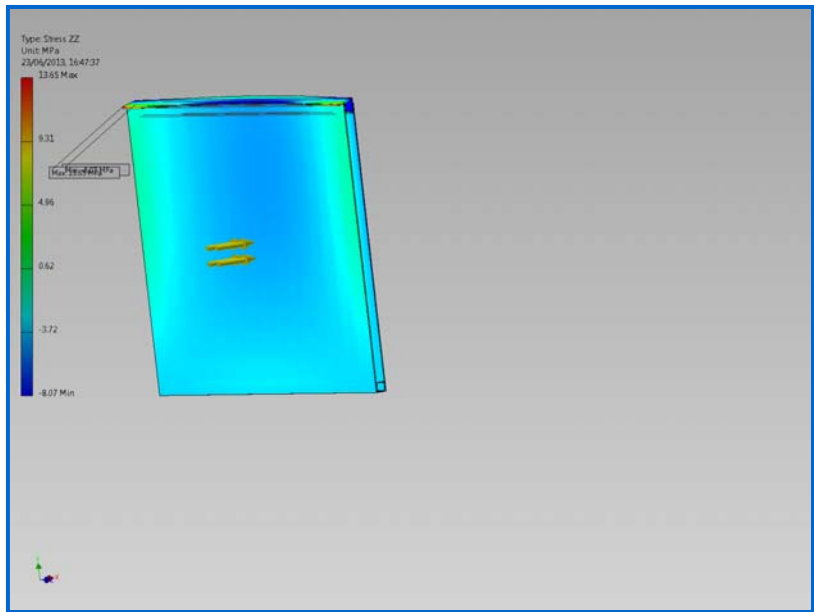




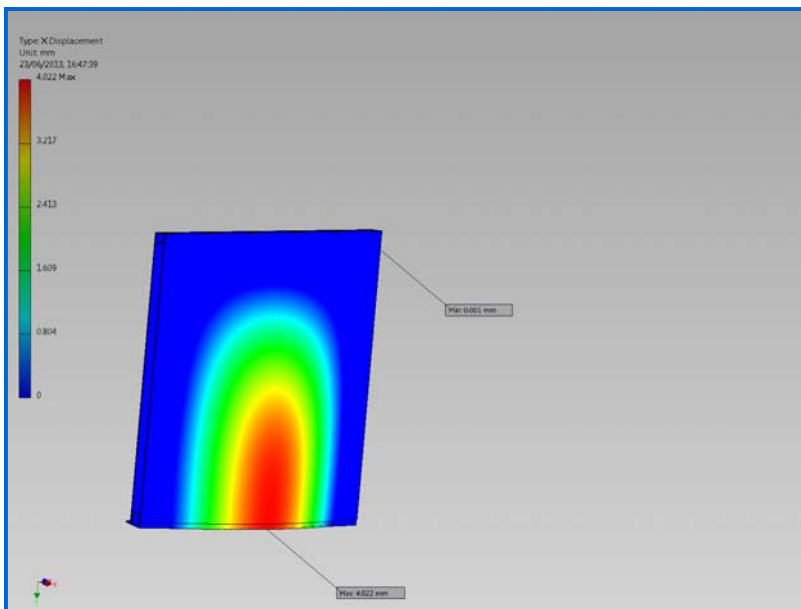
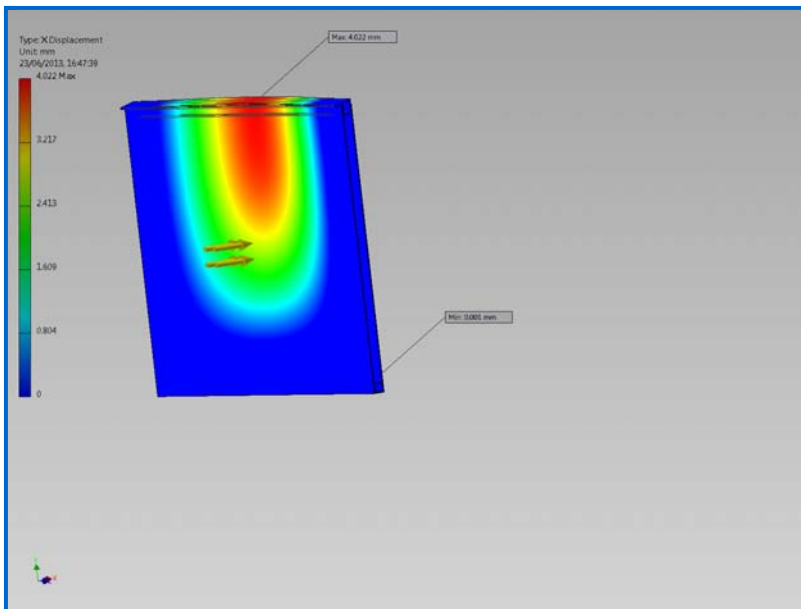
☐ Stress YZ



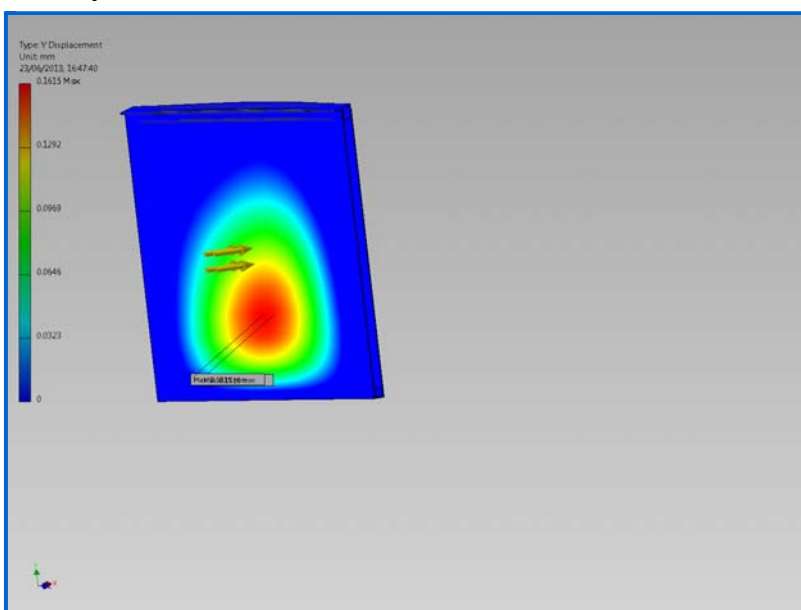
☐ Stress ZZ

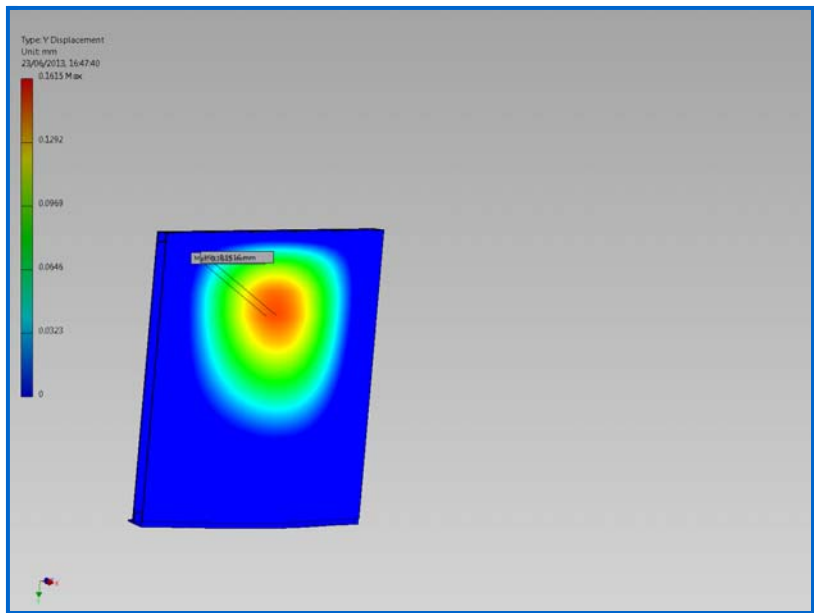


☐ X Displacement

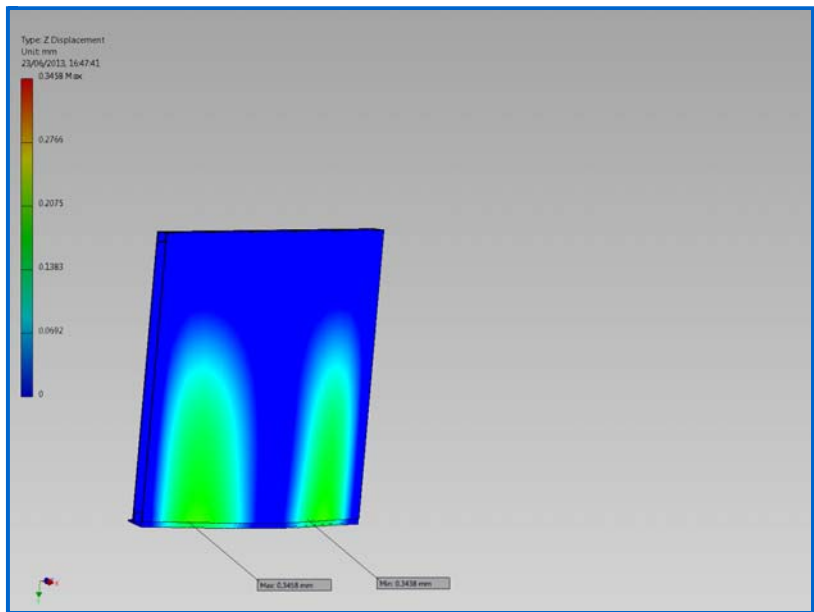
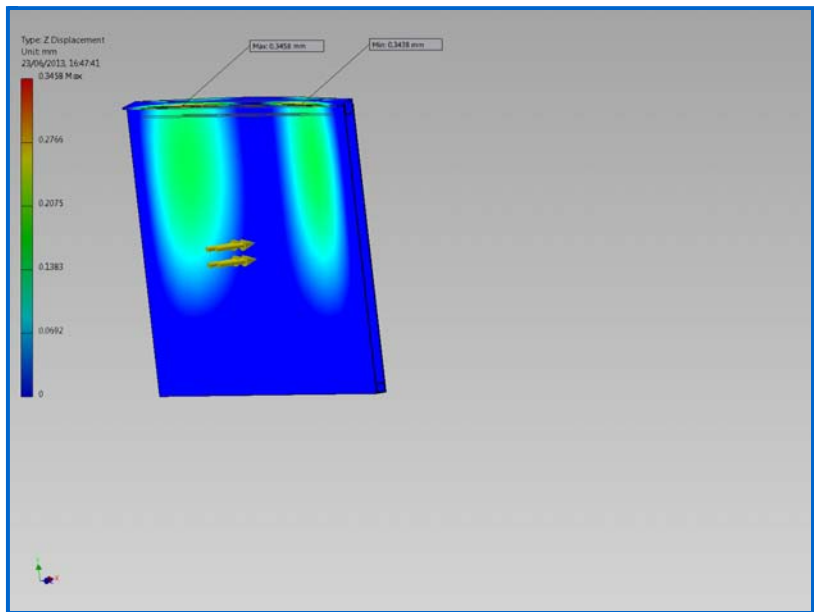


Y Displacement

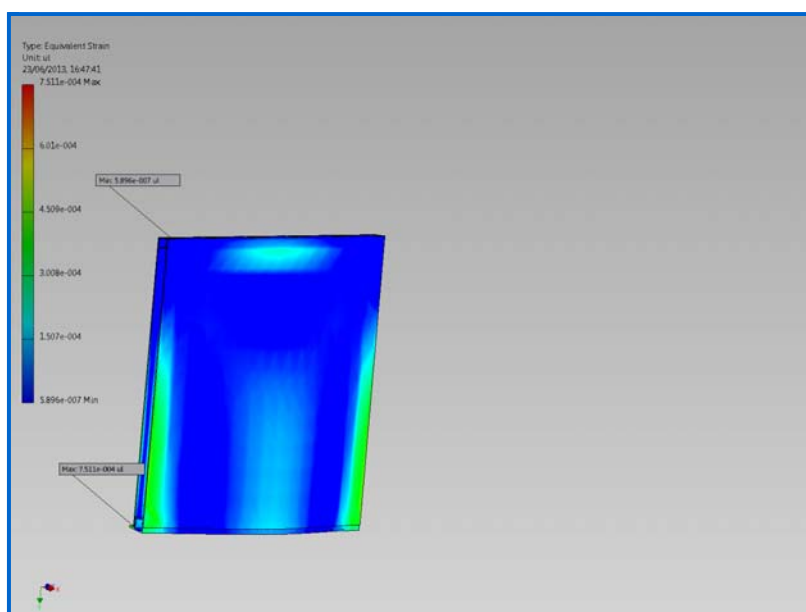
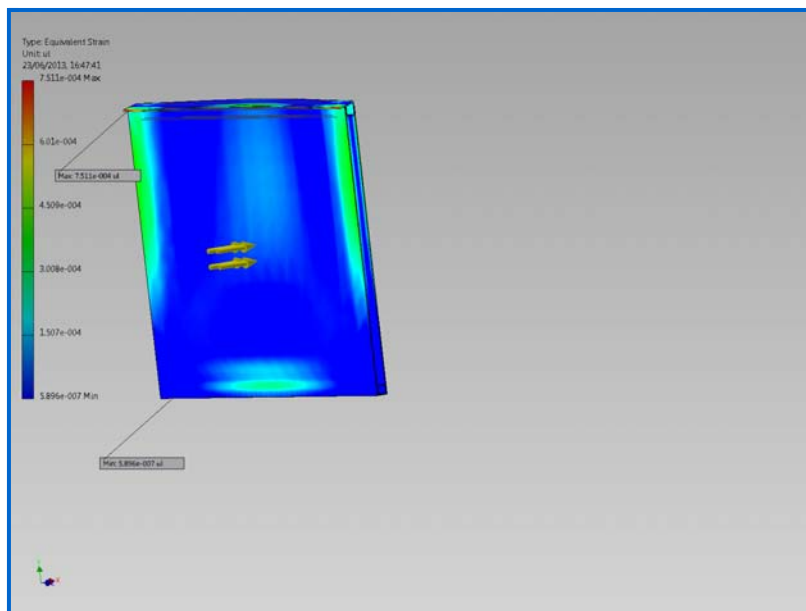




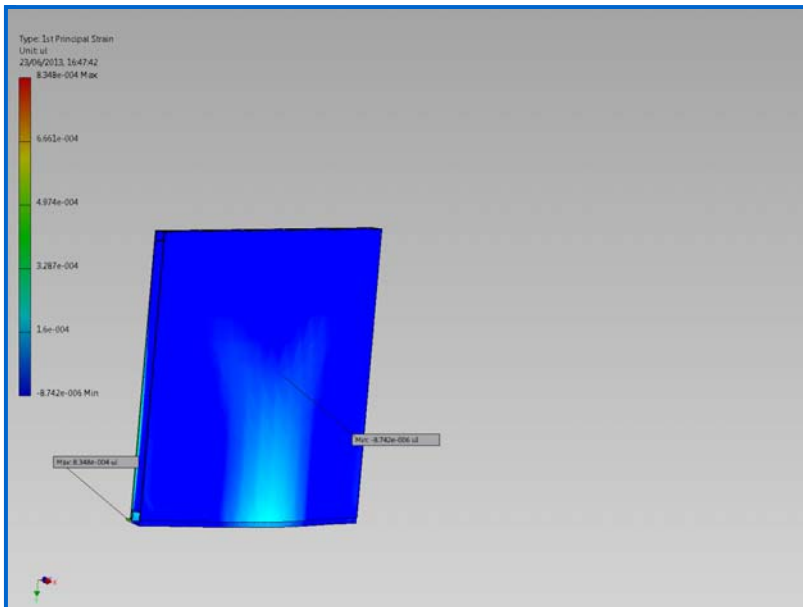
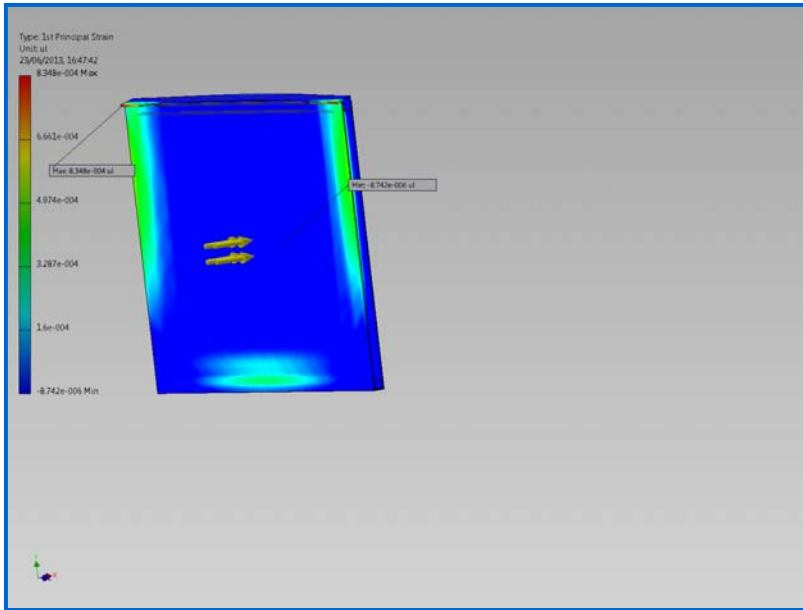
Z Displacement



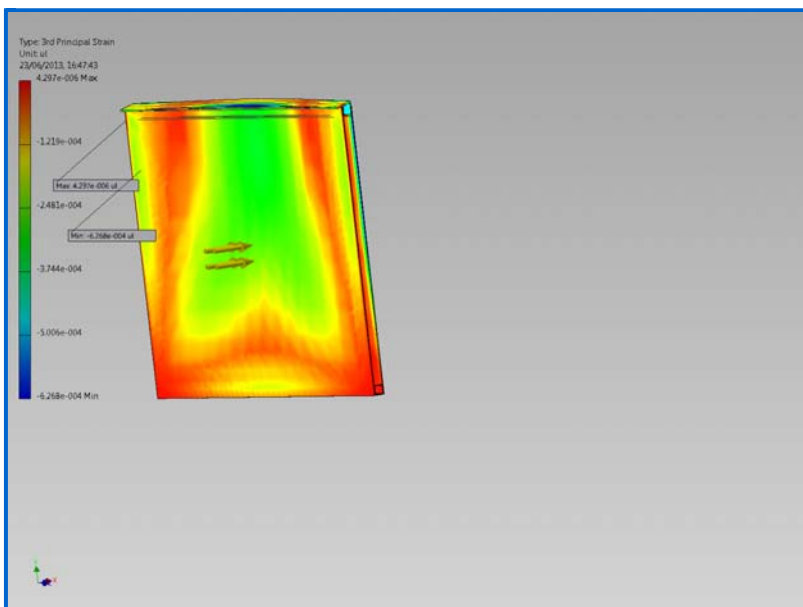
☐ Equivalent Strain

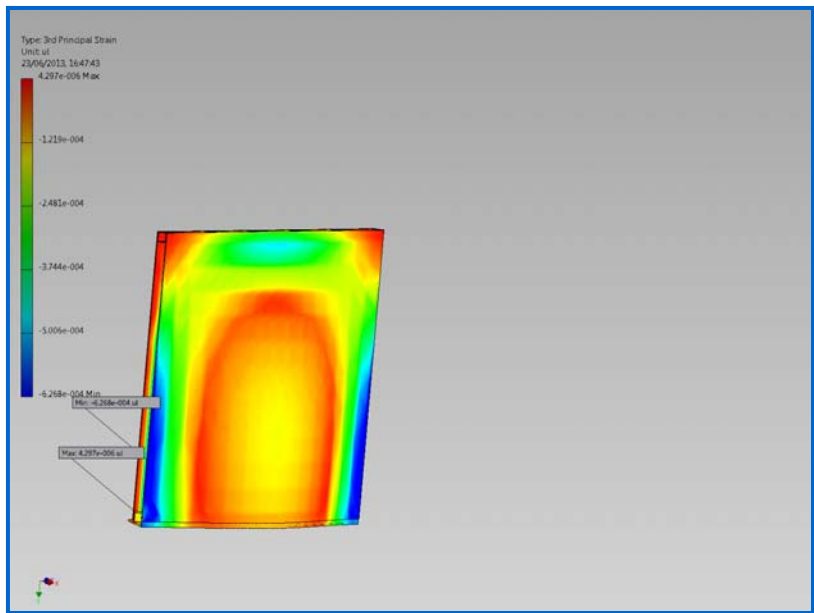


☐ 1st Principal Strain

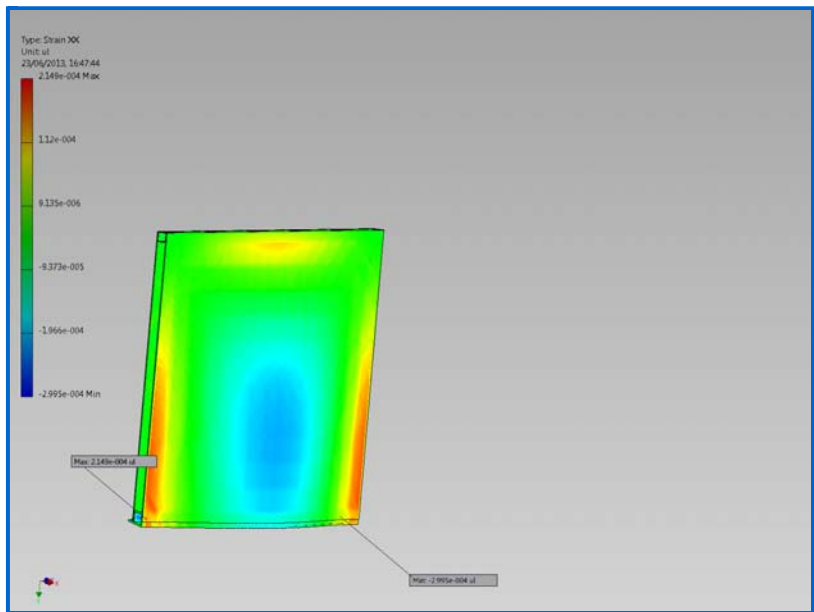
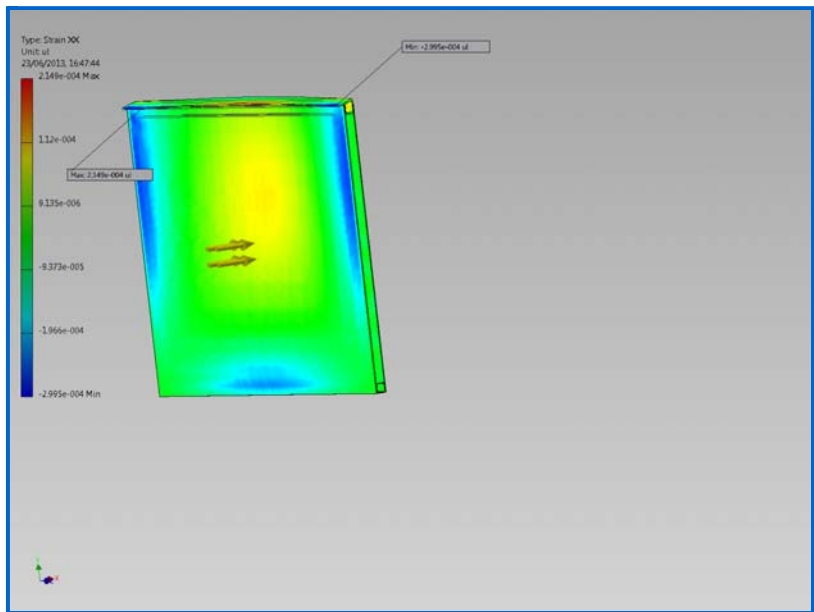


☐ 3rd Principal Strain

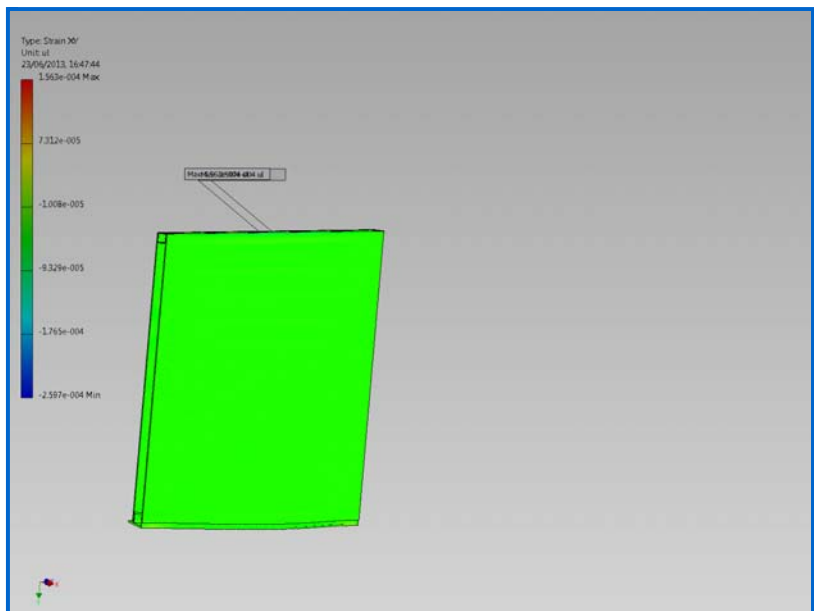
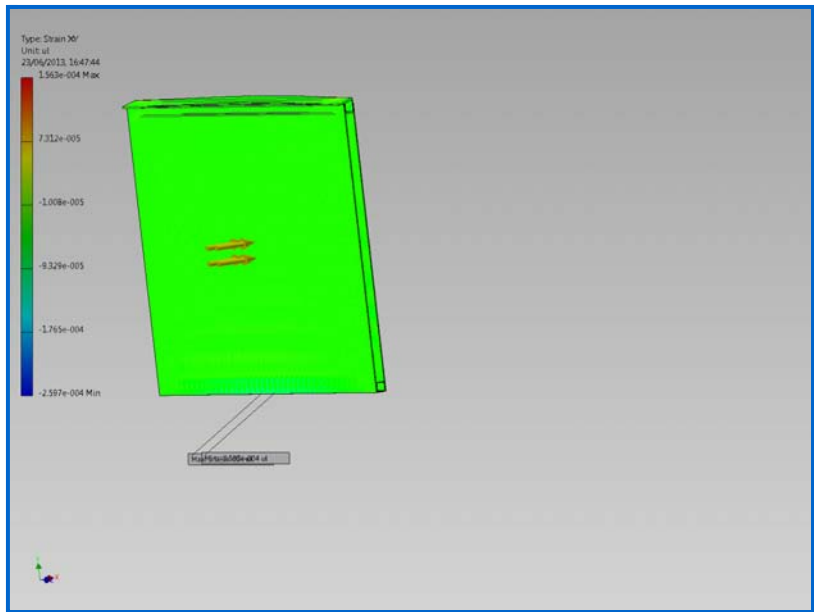




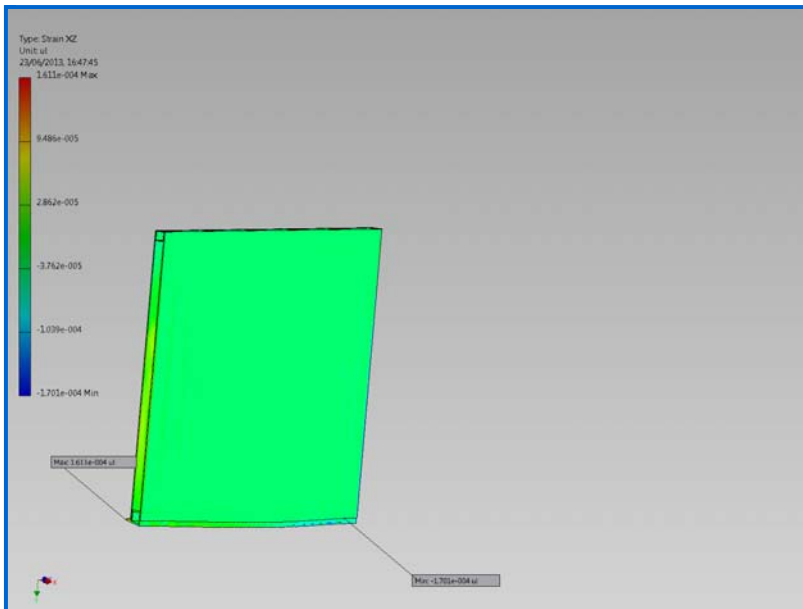
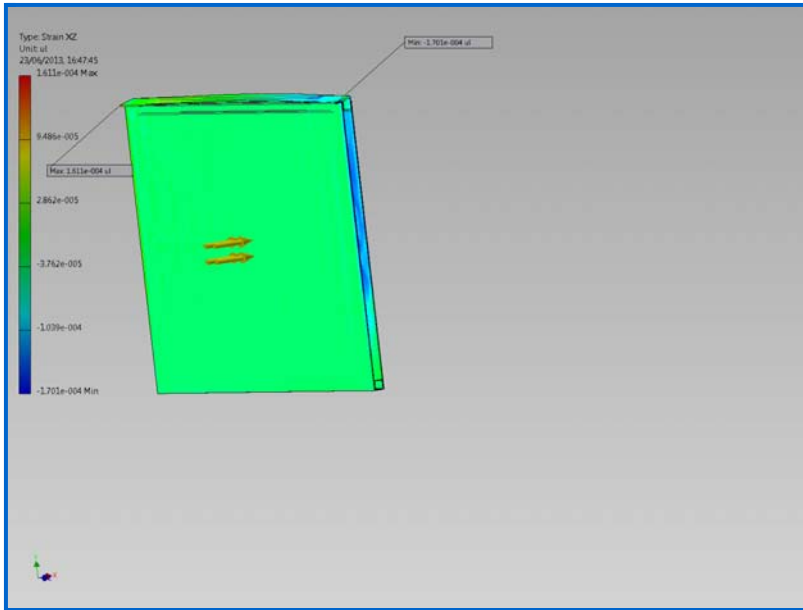
☐ Strain XX



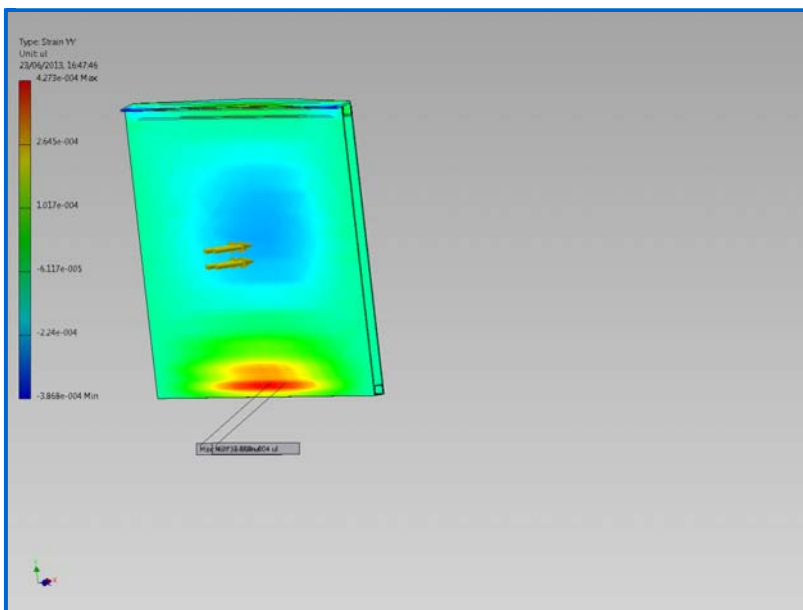
☐ Strain XY

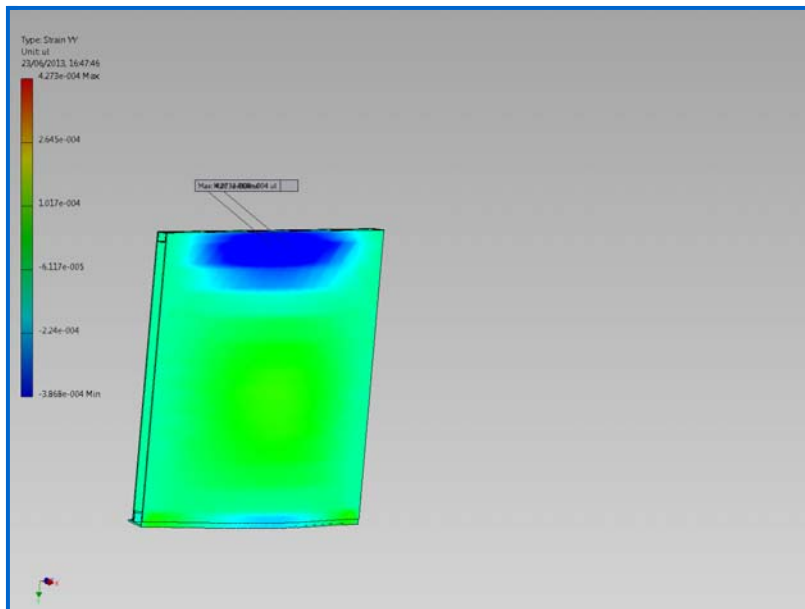


☐ Strain XZ

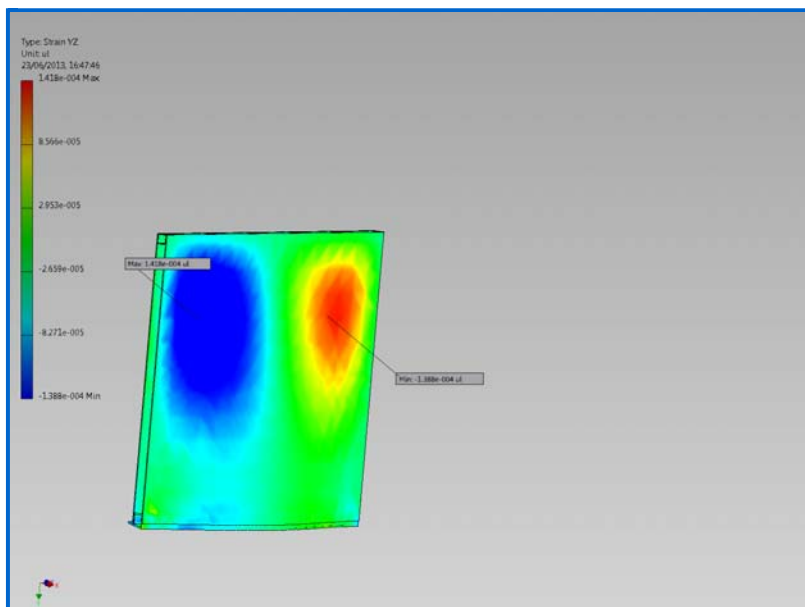
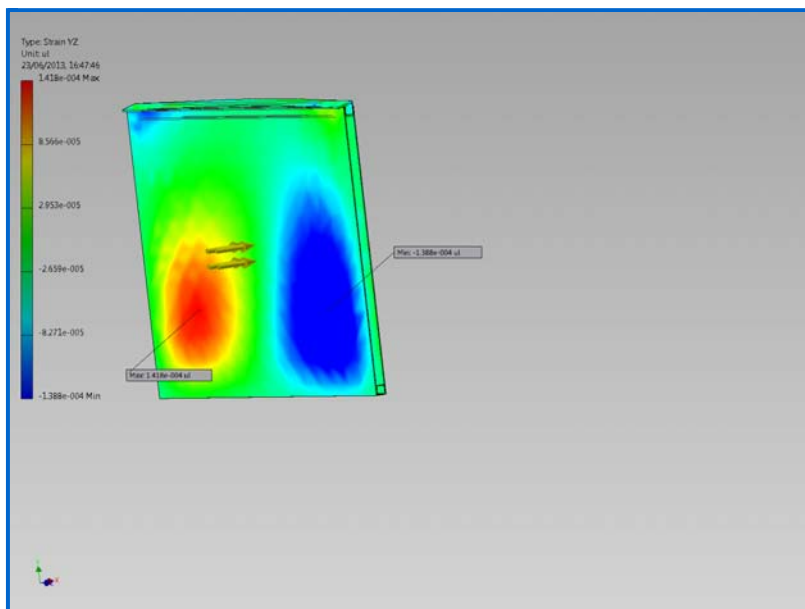


☐ Strain YY

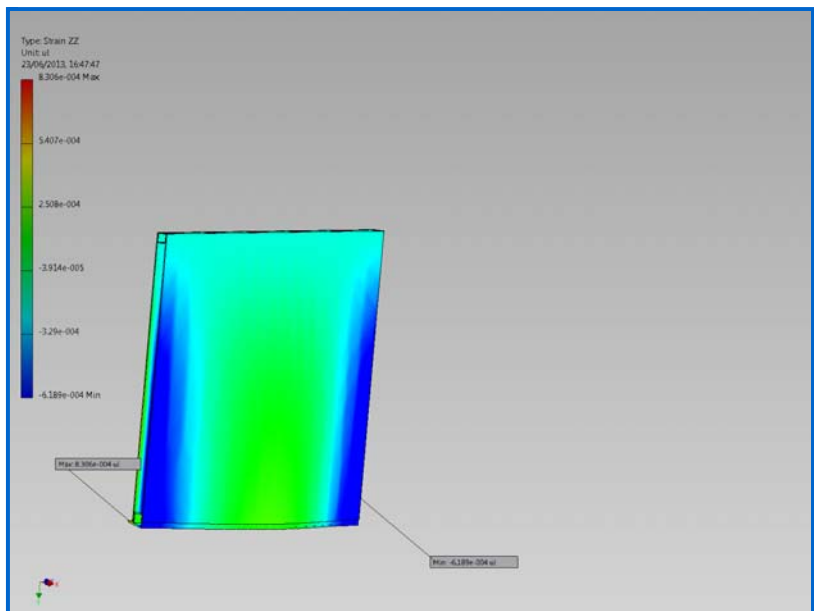
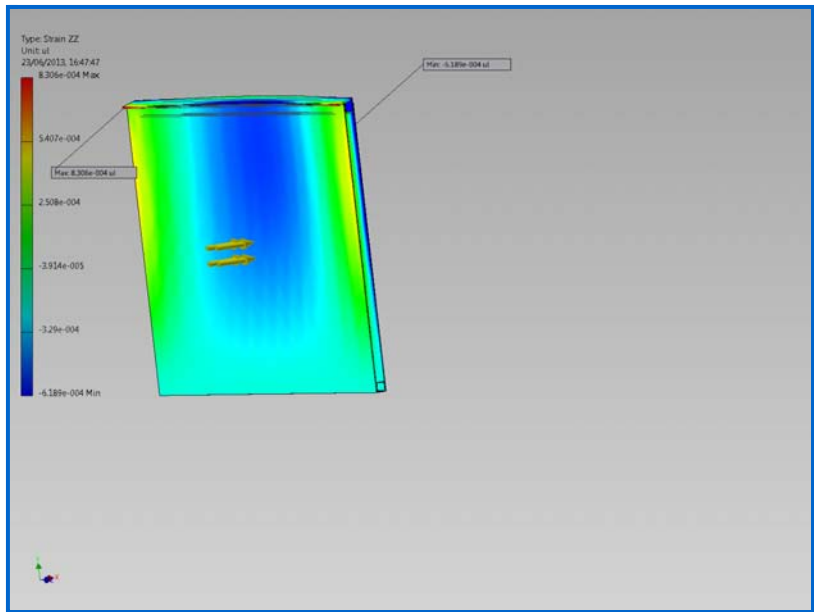




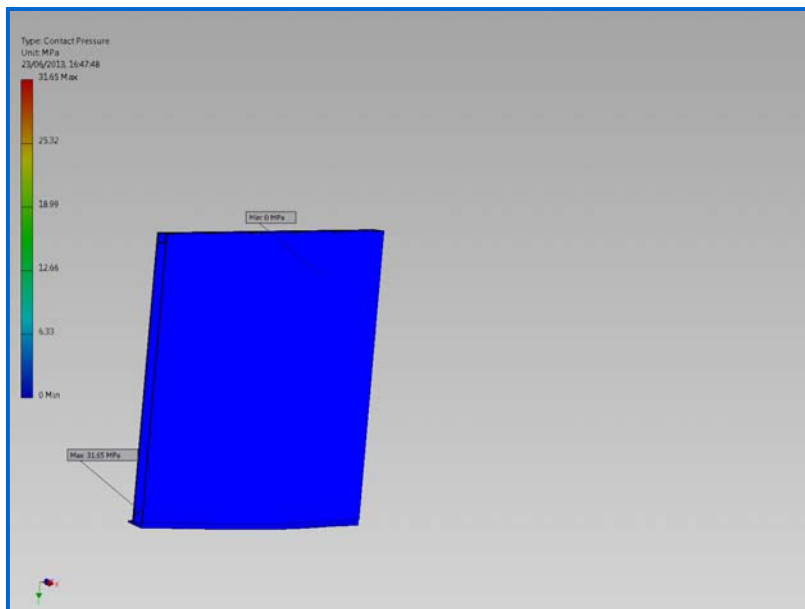
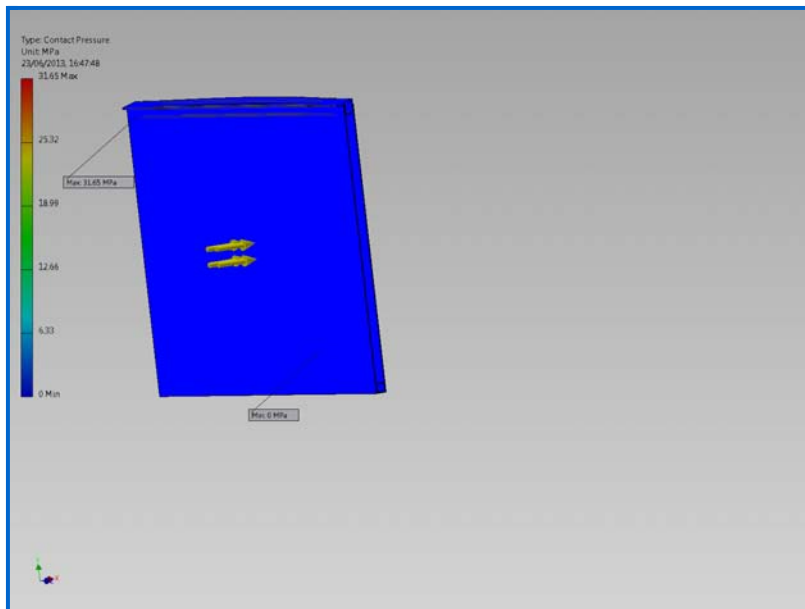
☐ Strain YZ



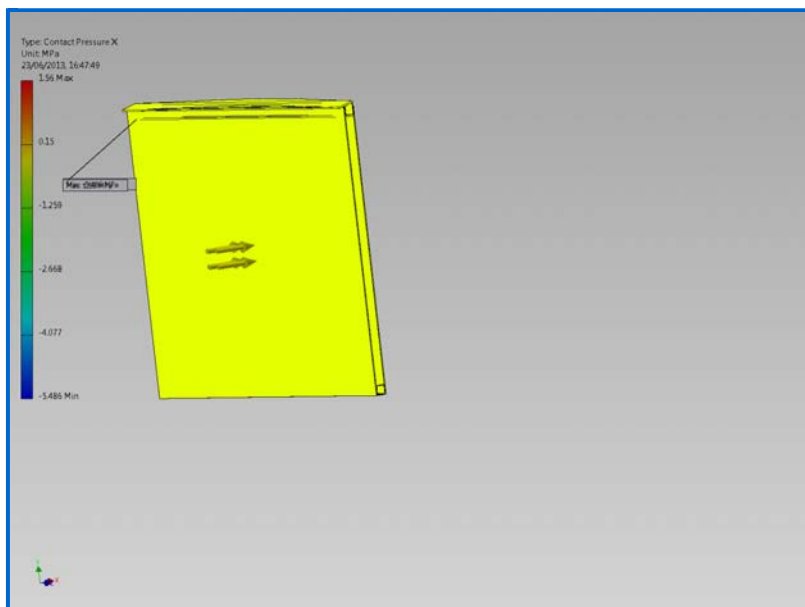
☐ Strain ZZ

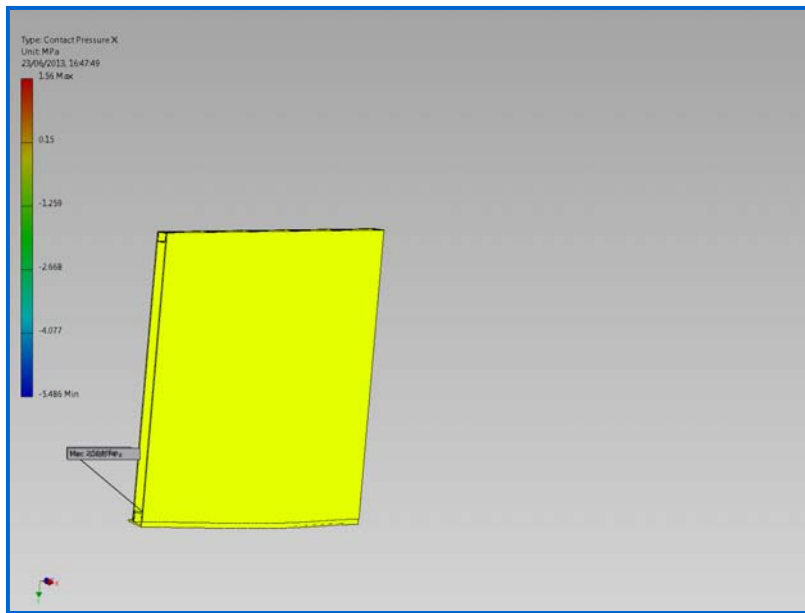


☐ Contact Pressure

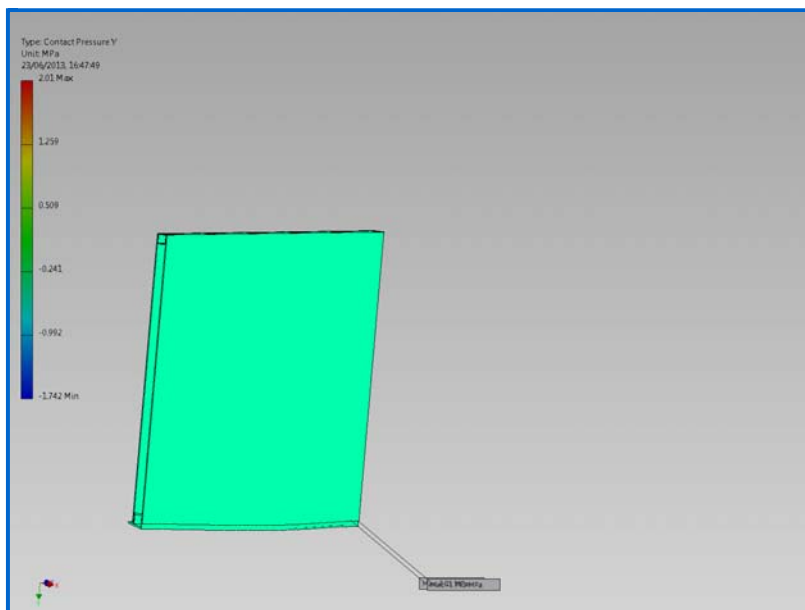
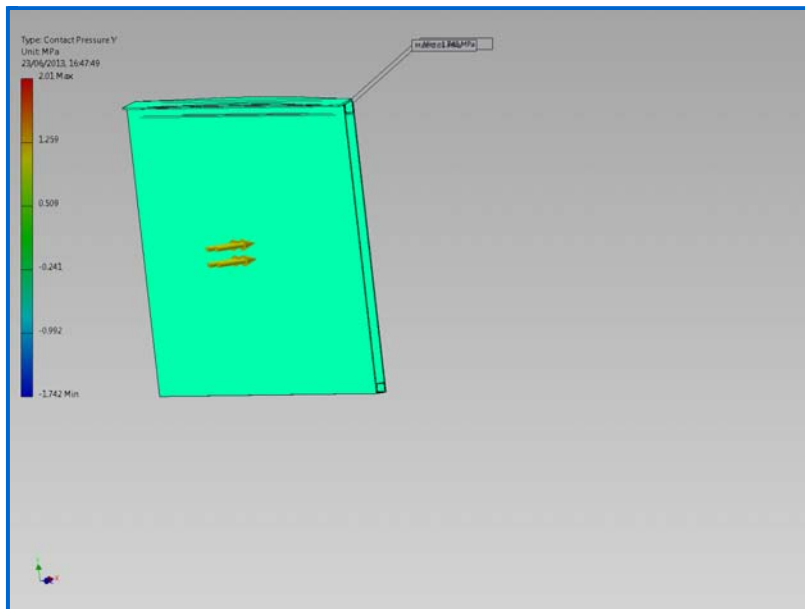


☐ Contact Pressure X

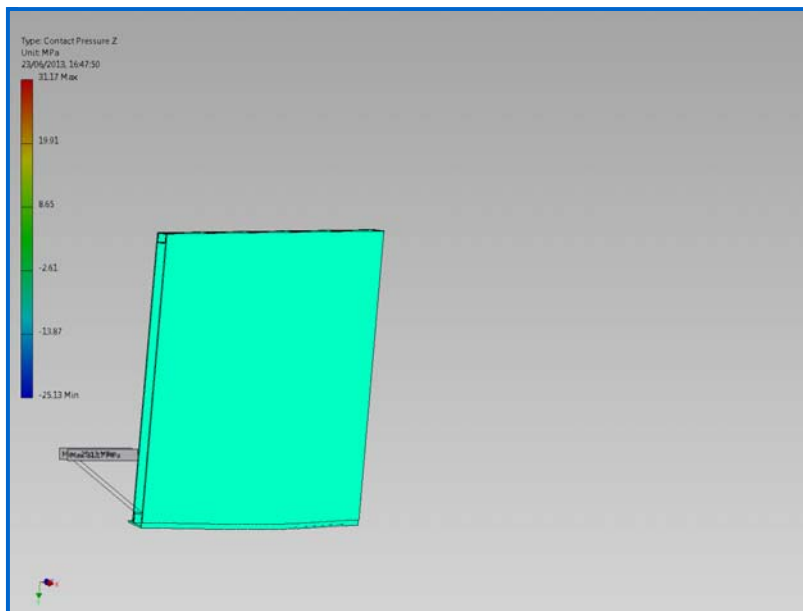
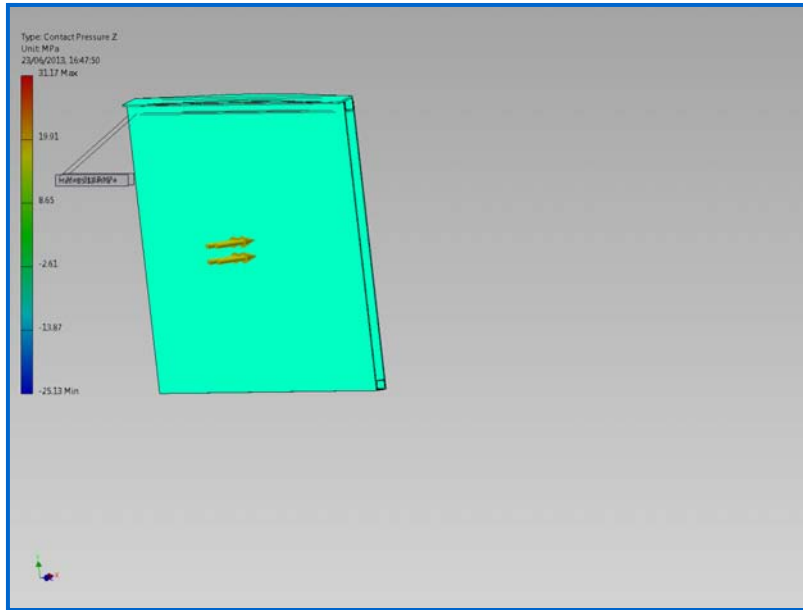




☐ Contact Pressure Y



☐ Contact Pressure Z



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