ResCom-flooring
RESIDENTIAL & COMMERCIAL FLOORING

To Whom It May Concern:

Magnesium Oxide Board Corporation Pty Ltd was requested by our clients to present to them clarification on the diaphragm capacity of our 16mm ResCom Structural Flooring board products when applied to a proposed pine timber frame flooring system consisting of 250mm x 50mm joists and the flooring board product are to be fixed on span centres of 400mm.

We wish to advise that it is our opinion that the diaphragm capacity of the 16mm MgO Corp ResCom Flooring will be a minimum of 80K/N based on the attached modelling report carried out on behalf of Magnesium Oxide Board Corporation Pty Ltd utilising the industry standard Finite Elements Analysis Package "Autodesk Inventor Professional: Report Dated the 29th of October 2013.

This report was carried out as per the strict guidelines of ASTM E455-11 (Copy Attached)

- Product Test Dimensions: 2400 x 2400
- Test Joist Span: 600 Centres
- Test Linings Applied: Single Board of 16mm ResCom Flooring

Installation Method:

- The ResCom Flooring is to be glued to the joists by using a minimum crisscross or figure eight pattern of a 4mm thick bead of appropriately approved structural polyurethane adhesive the full length of the joists.
- The ResCom Flooring is then to be screw fixed the to the joists using minimum Class 3 to 5 10g Non Corrosive self embedding screws spaced at 200mm intervals.
- The ResCom Flooring boards will be installed in a brick pattern to offset the joints when installing.

Due care has been taken to prepare and present as clear and precise report as possible to prevail to the customer the potential performance capabilities of the 16mm MgO Corp ResCom Flooring Board.

The attached report is an interim report only and does not constitute a fully tested controlled laboratory test procedure.

Therefore it is the full responsibility of the customer to have their design team and engineers apply and approve the information supplied to the proposed systems.

We thank you kindly for reviewing the attached report.

Please contact the undersigned if your require further support or information.

Kind Regards
Steve Marskell
Principal Director
Magnesium Oxide Board Corporation Pty Ltd
Australia: +61 7 54507314
Cell Phone: +61 411658283
Skype: MgO Corp

I was asked to ensure compliance of MgO Corp Rescom 16mm panel in flooring applications.

The methodology is to use an industry standard Finite Element Analysis package, Autodesk Inventor Professional.

Material properties testing of the MgO floor was conducted in accordance with AS/NZS 2908.2:2000.

The test compares the performance of a timber frame with and without cladding.

The test frame is a timber frame using 90x45 studs. The diaphragm material is 16mm MgO panel.

Configuration	Force	Displacement	Safety Factor
Timber Frame	1kN	29mm	3
Frame plus Sheet	1kN	0.2mm	>12
Frame plus Sheet	80kN	1.7mm	6 Typical

The results appear to meet compliance as:

- ASTM E455 Table 1 for simple beam with uniform load: Maximium Deflection
- ASTM E455 Section 10: Calculation

Peter Schott

FireAcousticBoard

Appendix

Frame and 16mm MgO Sheet 1kN and 80 kN

Analyzed File:	Timber Frame 2400 2400 with diaphram 16mm.iam
Autodesk Inventor Version:	2014 SP1 (Build 180222100, 222)
Creation Date:	29/10/2013, 20:53
Simulation Author:	Petei7Ivy
Summary:	

Mesh 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)

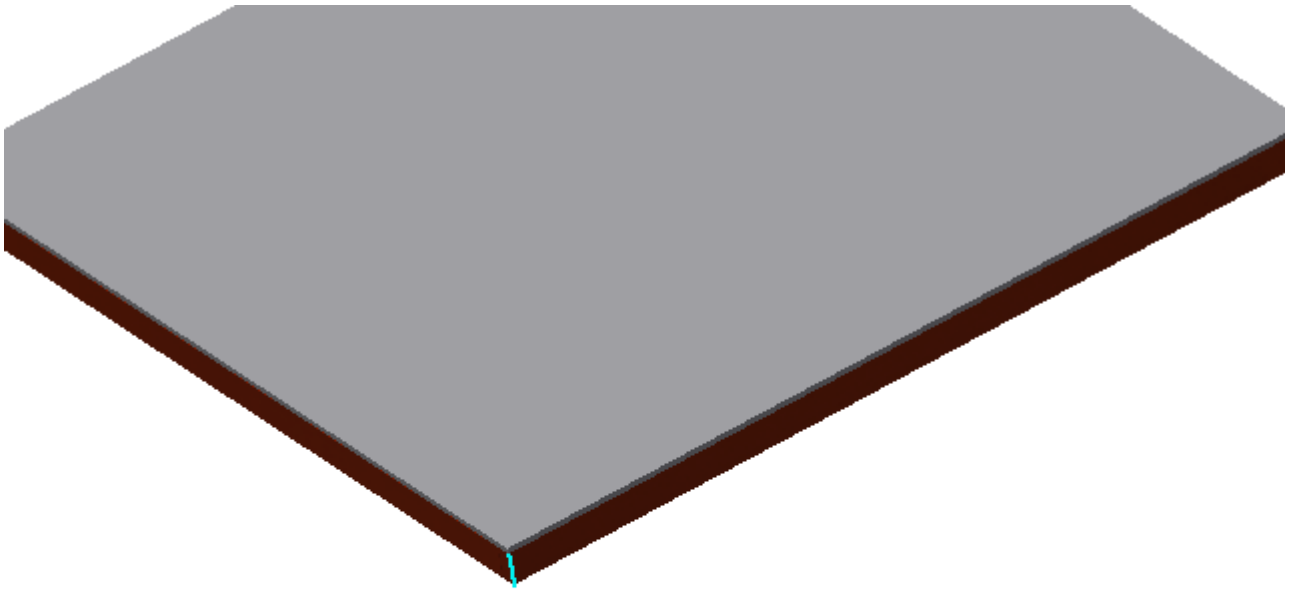
Name	Magnesium	
General	Mass Density	1.74 g/cm^3
	Yield Strength	6.1 MPa
	Ultimate Tensile Strength	8.1 MPa
Stress	Young's Modulus	5.9 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	2.26923 GPa
Part Name(s)	Stud 2400 Stud 2400 Stud 2310 Stud 2310 Stud 2310 Stud 2310 Stud 2310 MgO Floor Sheet	

Force:1

Load Type	Force
Magnitude	1000.000 N
Vector X	1000.000 N
Vector Y	0.000 N
Vector Z	0.000 N

Fixed Constraint:1

Selected Face(s)



Contacts (Bonded)

Name	Part Name(s)
Bonded:1	Stud 2400:1 Stud 2310:1
Bonded:2	Stud 2400:1 Stud 2310:2
Bonded:3	Stud 2400:1 Stud 2310:3
Bonded:4	Stud 2400:1 Stud 2310:4
Bonded:5	Stud 2400:1 Stud 2310:5
Bonded:6	Stud 2400:2 Stud 2310:1
Bonded:7	Stud 2400:2 Stud 2310:2
Bonded:8	Stud 2400:2 Stud 2310:3
Bonded:9	Stud 2400:2 Stud 2310:4
Bonded:10	Stud 2400:2 Stud 2310:5

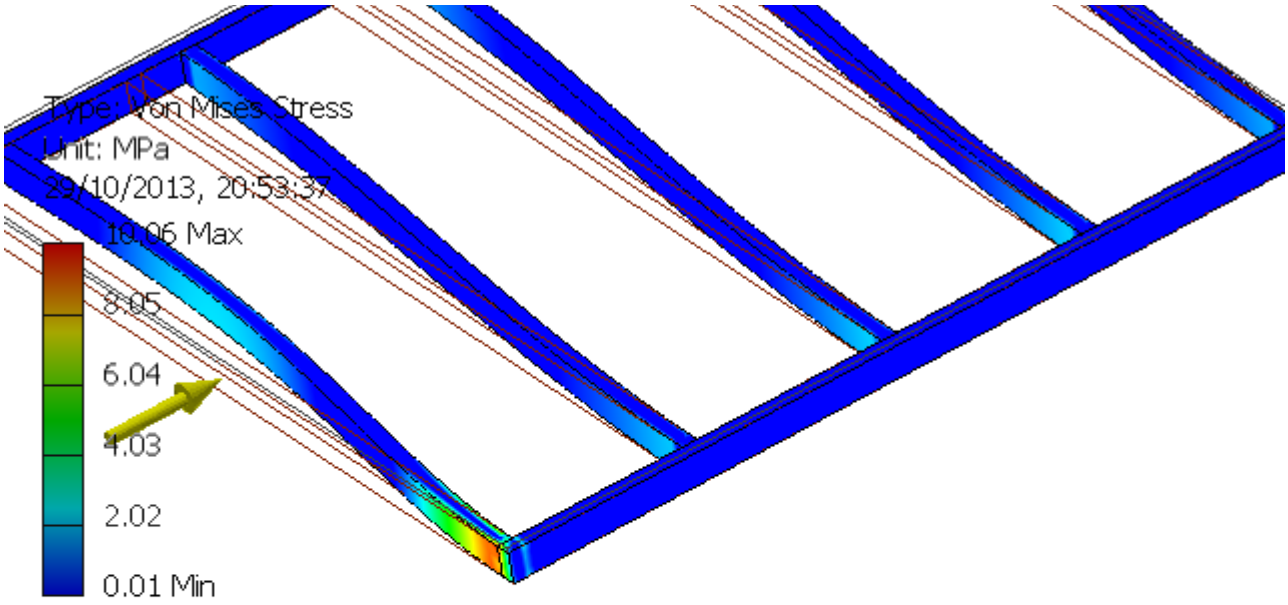
Results

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	1636.93 N	-479.801 N	0.789143 N m	-0.431316 N m
		-4.77953 N		0 N m
		1565.03 N		0.660843 N m
Frictionless Constraint:1	1656.68 N	-522.129 N	783.33 N m	0 N m
		0 N		-783.33 N m
		-1572.25 N		0 N m
Fixed Constraint:2	1636.93 N	-479.801 N	0.789143 N m	-0.431316 N m
		-4.77953 N		0 N m
		1565.03 N		0.660843 N m
Frictionless Constraint:2	1656.68 N	-522.129 N	783.342 N m	-4.37836 N m
		1.77775 N		-783.33 N m
		-1572.25 N		0.306521 N m

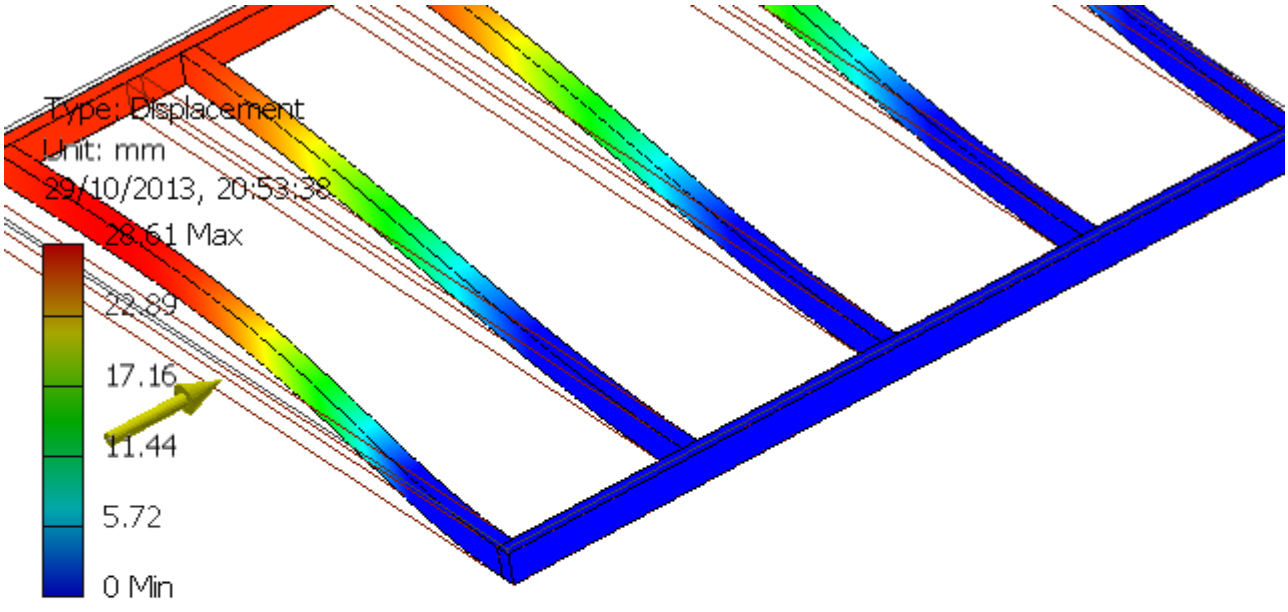
Result Summary

Name	Minimum	Maximum
Volume	66217500 mm^3	
Mass	115.218 kg	
Von Mises Stress	0.0101321 MPa	10.0556 MPa
Displacement	0 mm	28.6071 mm
Safety Factor	0.606629 ul	15 ul

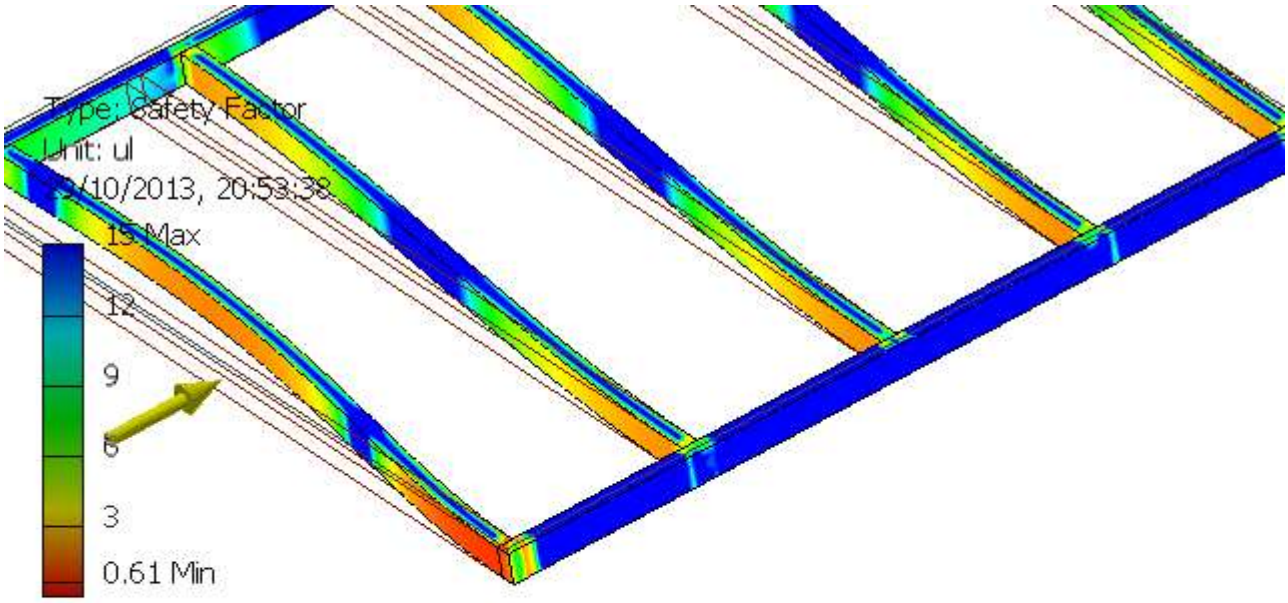
Von Mises Stress



Displacement



Safety Factor



Simulation Floor Diaphragm at 1kn

Mesh settings:

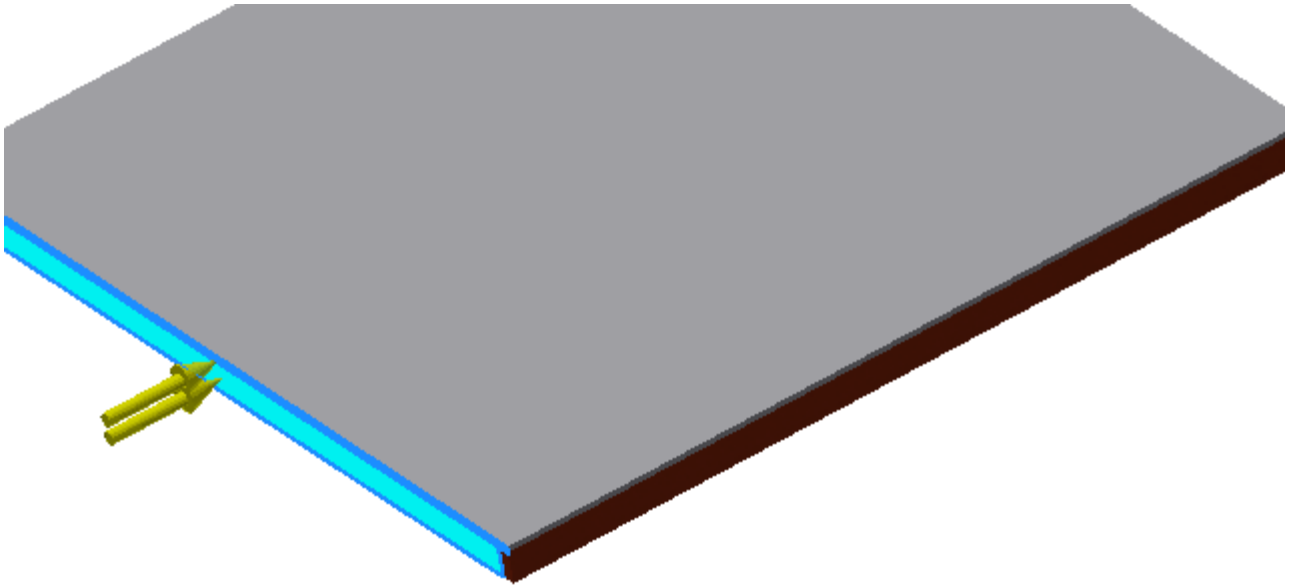
Avg. Element Size (fraction of model diameter)	0.1
Min. Element Size (fraction of avg. size)	0.2
Grading Factor	1.5
Max. Turn Angle	60 deg
Create Curved Mesh Elements	No
Use part based measure for Assembly mesh	Yes

Material(s)

Name	Magnesium	
General	Mass Density	1.74 g/cm^3
	Yield Strength	6.1 MPa
	Ultimate Tensile Strength	8.1 MPa
Stress	Young's Modulus	5.9 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	2.26923 GPa
Part Name(s)	Stud 2400 Stud 2400 Stud 2310 Stud 2310 Stud 2310 Stud 2310 Stud 2310 MgO Floor Sheet	

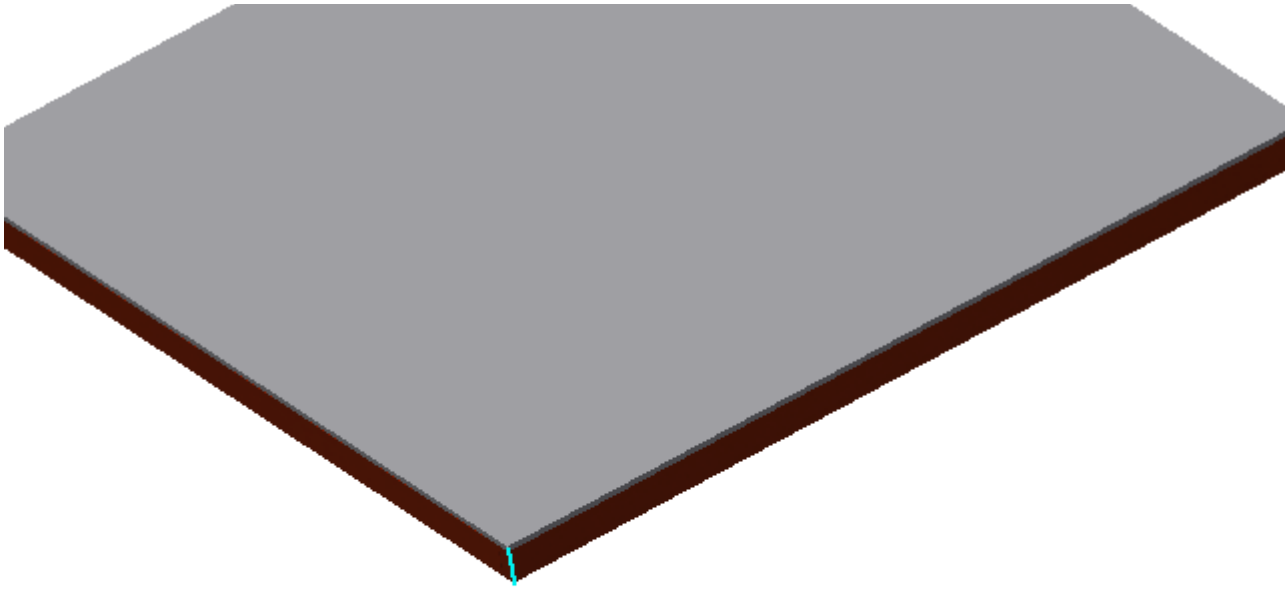
Force:1

Load Type	Force
Magnitude	1000.000 N
Vector X	1000.000 N
Vector Y	0.000 N
Vector Z	0.000 N




Y
X
Z

Fixed Constraint:1



Frictionless Constraint:1

Contacts (Bonded)

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Bonded:4	Stud 2400:1 Stud 2310:4
Bonded:5	Stud 2400:1 Stud 2310:5
Bonded:6	Stud 2400:1 MgO Floor Sheet:1
Bonded:7	Stud 2400:2 Stud 2310:1
Bonded:8	Stud 2400:2 Stud 2310:2
Bonded:9	Stud 2400:2 Stud 2310:3
Bonded:10	Stud 2400:2 Stud 2310:4
Bonded:11	Stud 2400:2 Stud 2310:5
Bonded:12	Stud 2400:2 MgO Floor Sheet:1
Bonded:13	Stud 2310:1 MgO Floor Sheet:1
Bonded:14	Stud 2310:2 MgO Floor Sheet:1
Bonded:15	Stud 2310:3 MgO Floor Sheet:1
Bonded:16	Stud 2310:4 MgO Floor Sheet:1
Bonded:17	Stud 2310:5 MgO Floor Sheet:1

Results

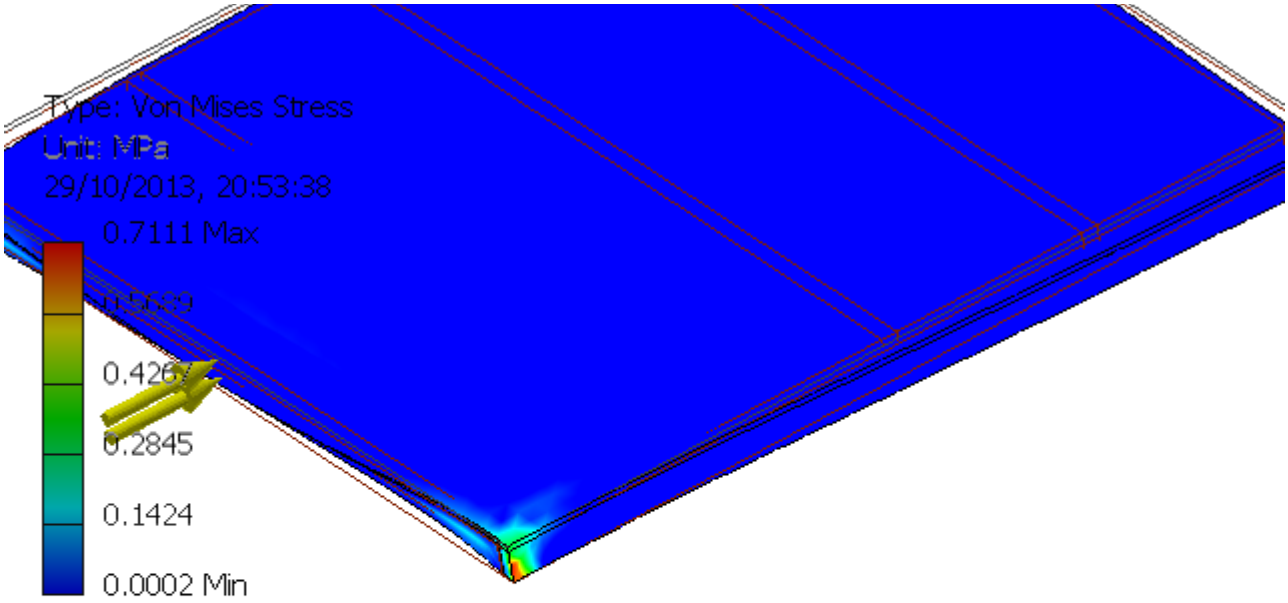
Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	547.616 N	-457.386 N	3.7335 N m	2.58632 N m
		13.7262 N		0 N m
		300.819 N		2.69258 N m
Frictionless Constraint:1	620.541 N	-542.535 N	837.999 N m	-3.38074 N m
		-13.2806 N		837.748 N m

		-300.916 N		20.2229 N m

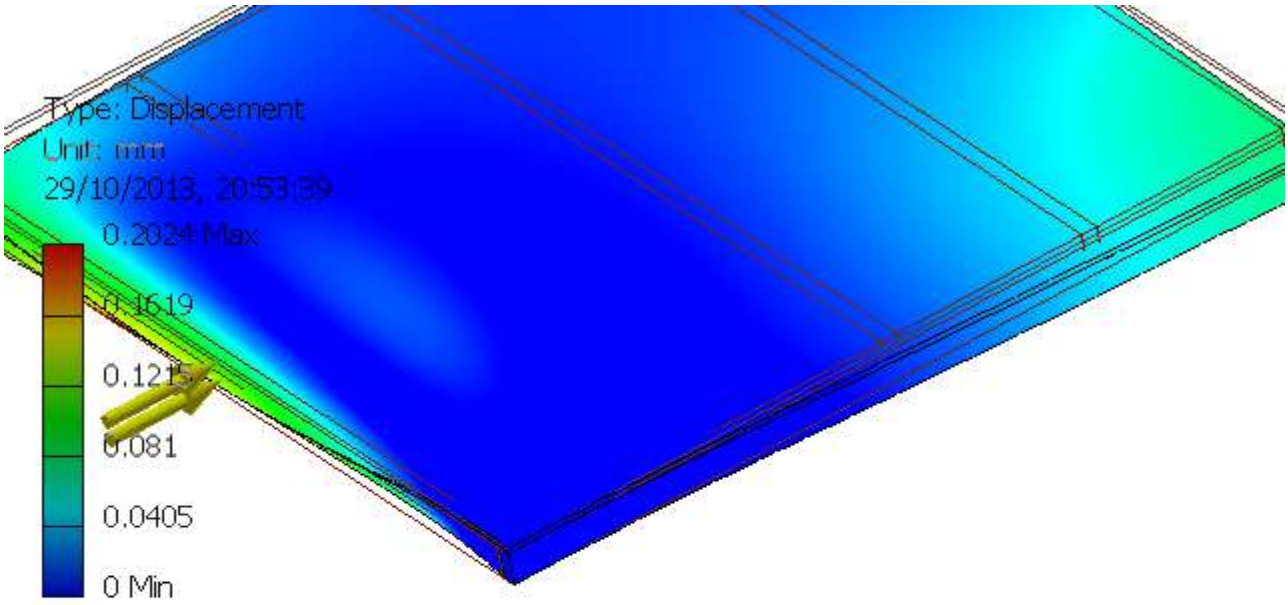
Result Summary

Name	Minimum	Maximum
Volume	158378000 mm^3	
Mass	275.577 kg	
Von Mises Stress	0.000201116 MPa	0.711071 MPa
Displacement	0 mm	0.202426 mm
Safety Factor	8.5786 ul	15 ul

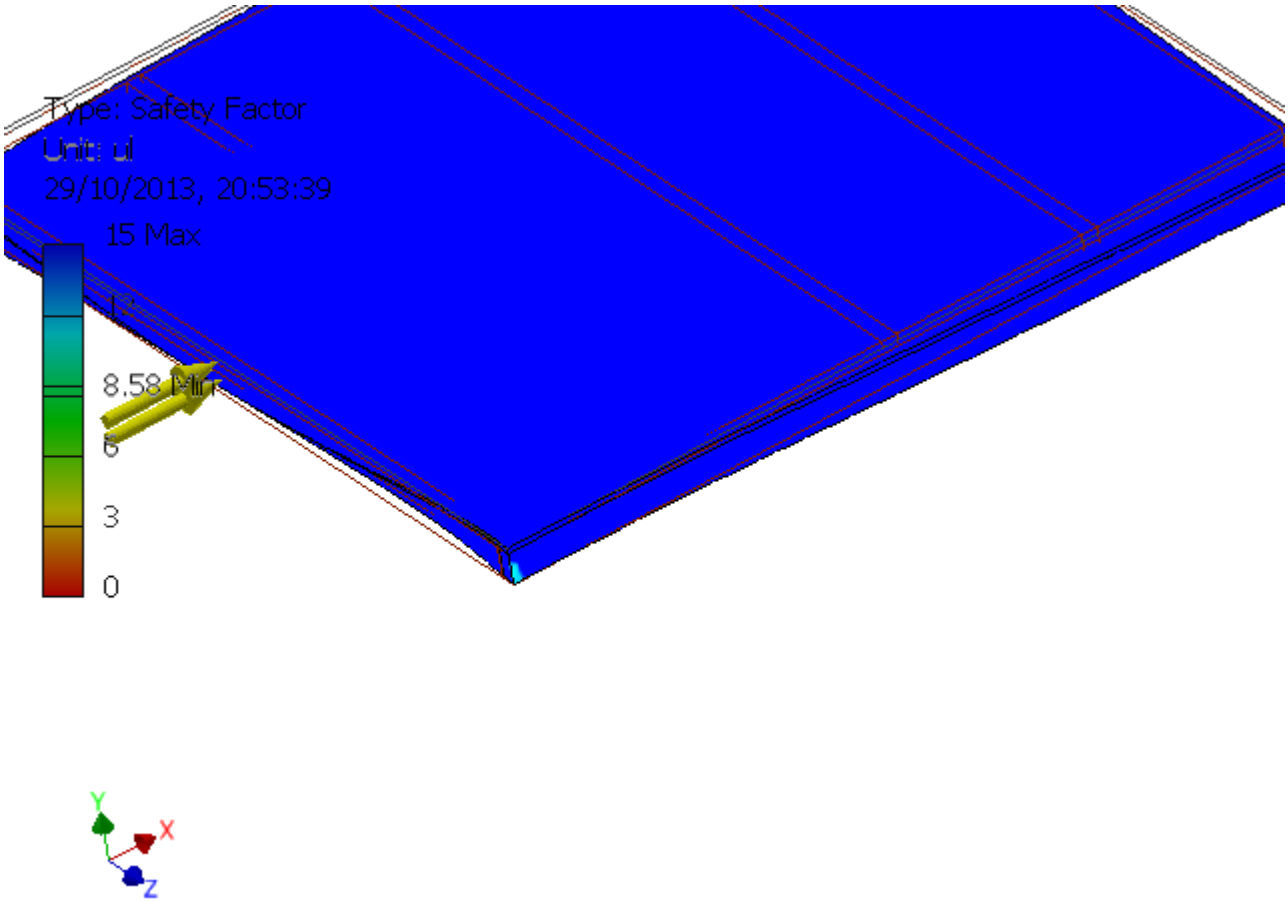
Von Mises Stress



Displacement



Safety Factor



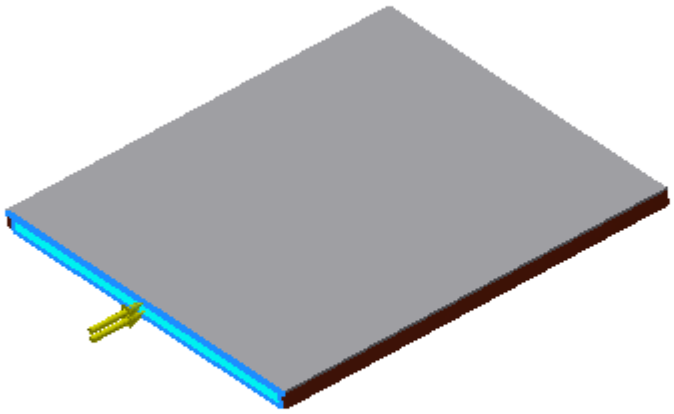
Simulation at 80kN and added constraint

Material(s)

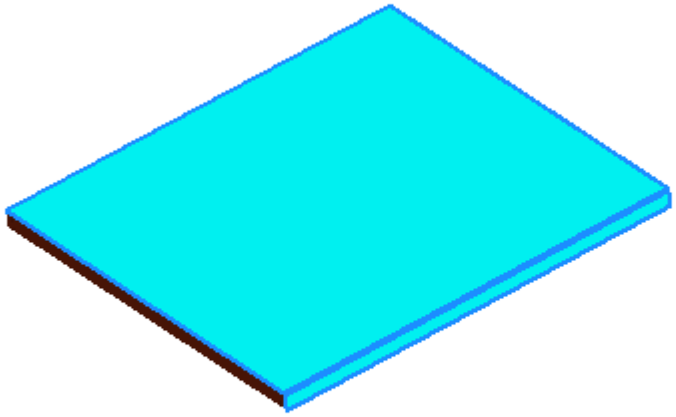
Name	Magnesium	
General	Mass Density	1.74 g/cm^3
	Yield Strength	6.1 MPa
	Ultimate Tensile Strength	8.1 MPa
Stress	Young's Modulus	5.9 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	2.26923 GPa
Part Name(s)	Stud 2400 Stud 2400 Stud 2310 Stud 2310 Stud 2310 Stud 2310 Stud 2310 MgO Floor Sheet	

Force:1

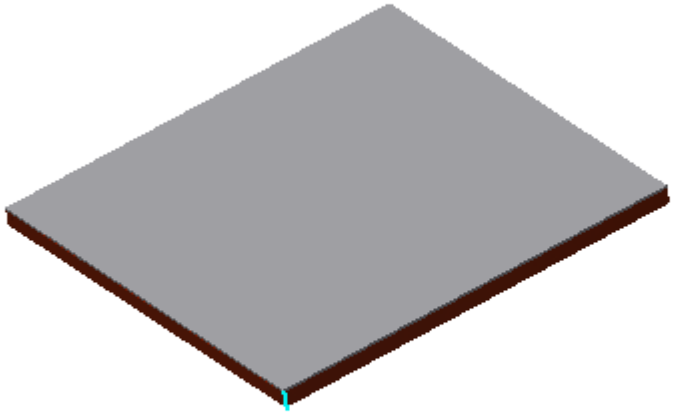
Load Type	Force
Magnitude	40000.000 N
Vector X	40000.000 N
Vector Y	0.000 N
Vector Z	0.000 N



Frictionless Constraint:1



Fixed Constraint:1



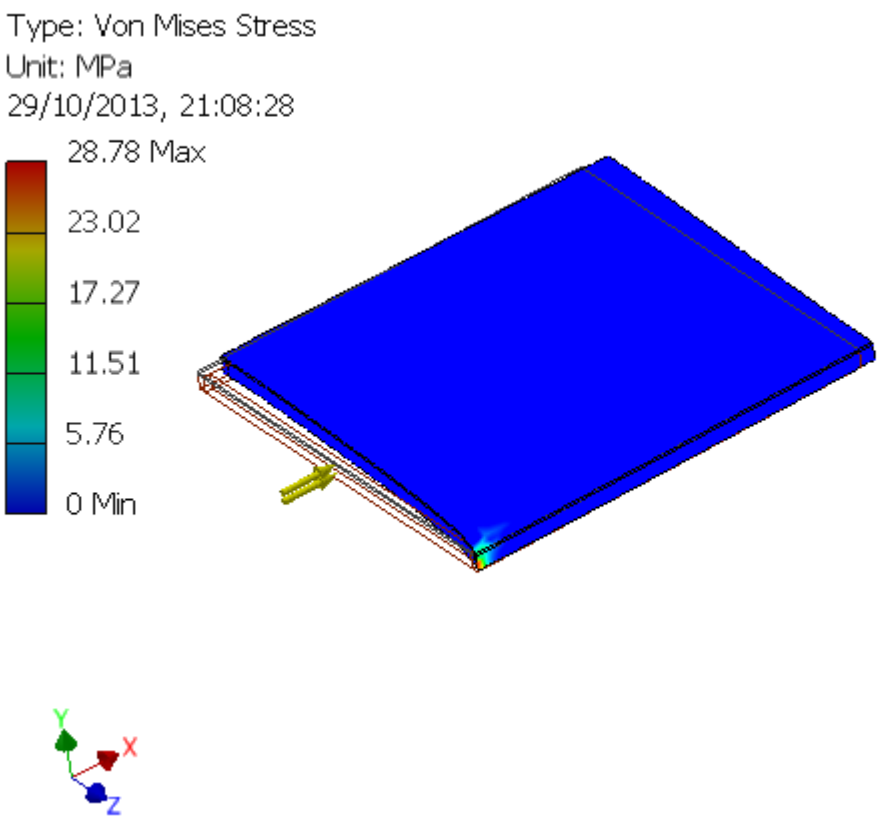
Results

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Frictionless Constraint:1	21775.2 N	-16680.9 N	12865.6 N m	-2144.85 N m
		2320.45 N		12055.2 N m
		-13803 N		-3949.14 N m
Fixed Constraint:1	27208.3 N	-23330.7 N	328.07 N m	147.385 N m
		-2324 N		0 N m
		13804.5 N		293.099 N m

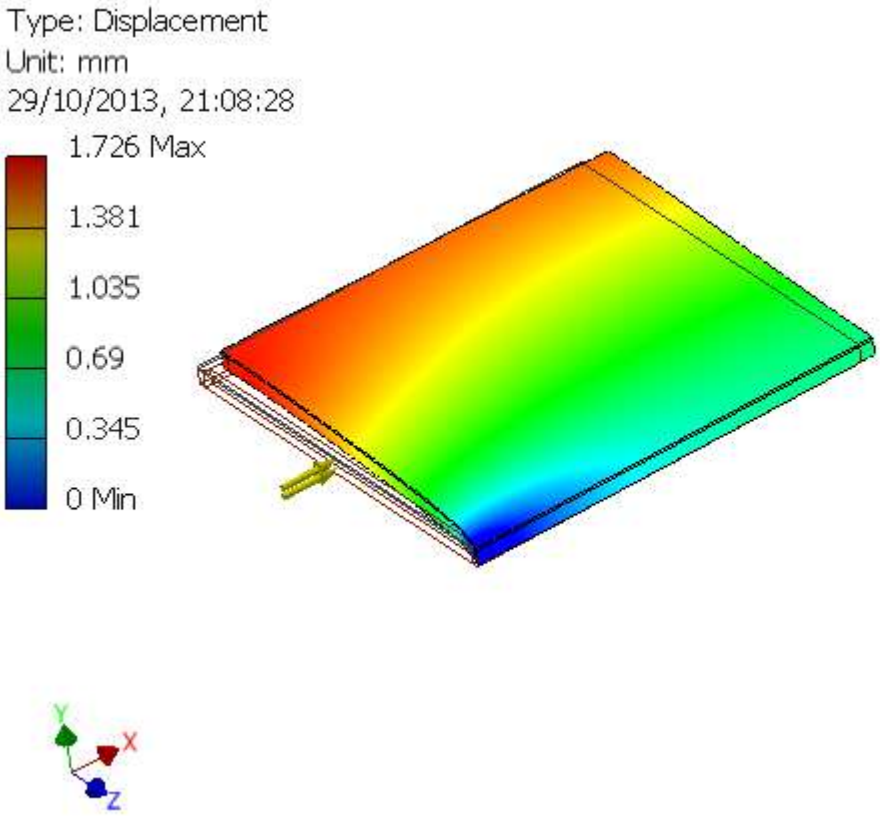
Result Summary

Name	Minimum	Maximum
Volume	158378000 mm^3	
Mass	275.577 kg	
Von Mises Stress	0.00220639 MPa	28.7753 MPa
1st Principal Stress	-0.317704 MPa	41.7732 MPa
3rd Principal Stress	-4.02474 MPa	12.1919 MPa
Displacement	0 mm	1.72569 mm
Safety Factor	0.211988 ul	15 ul

Von Mises Stress



Displacement



Safety Factor