

Stress Analysis Report



Analyzed File:	Treliça_José_1.iam
Autodesk Inventor Version:	2017.2 (Build 212233000, 233)
Creation Date:	07/12/2016, 22:35
Study Author:	Walter A. Kapp
Summary:	

Project Info (iProperties)

Summary

Title	Auto financiado
Subject	Robo EngeMOVI serial de 7 juntas
Author	Walter A. Kapp
Manager	Walter A. Kapp
Company	EngeMOVI

Project

Part Number	Treliça_José_1
Project	RES
Designer	Walter A. Kapp
Engineer	Walter A. Kapp
Cost	R\$ 0,00
Date Created	01/11/2016

Status

Design Status	WorkInProgress
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Custom

Cliente	EngeMOVI
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Physical

Mass	83,7758 kg
Area	2734620 mm ²
Volume	10658500 mm ³
Center of Gravity	x=110,84 mm y=571,847 mm z=32,4082 mm

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

Static Analysis:1

General objective and settings:

Design Objective	Single Point
Study Type	Static Analysis
Last Modification Date	07/12/2016, 22:32
Detect and Eliminate Rigid Body Modes	No
Separate Stresses Across Contact Surfaces	No
Motion Loads Analysis	No

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)

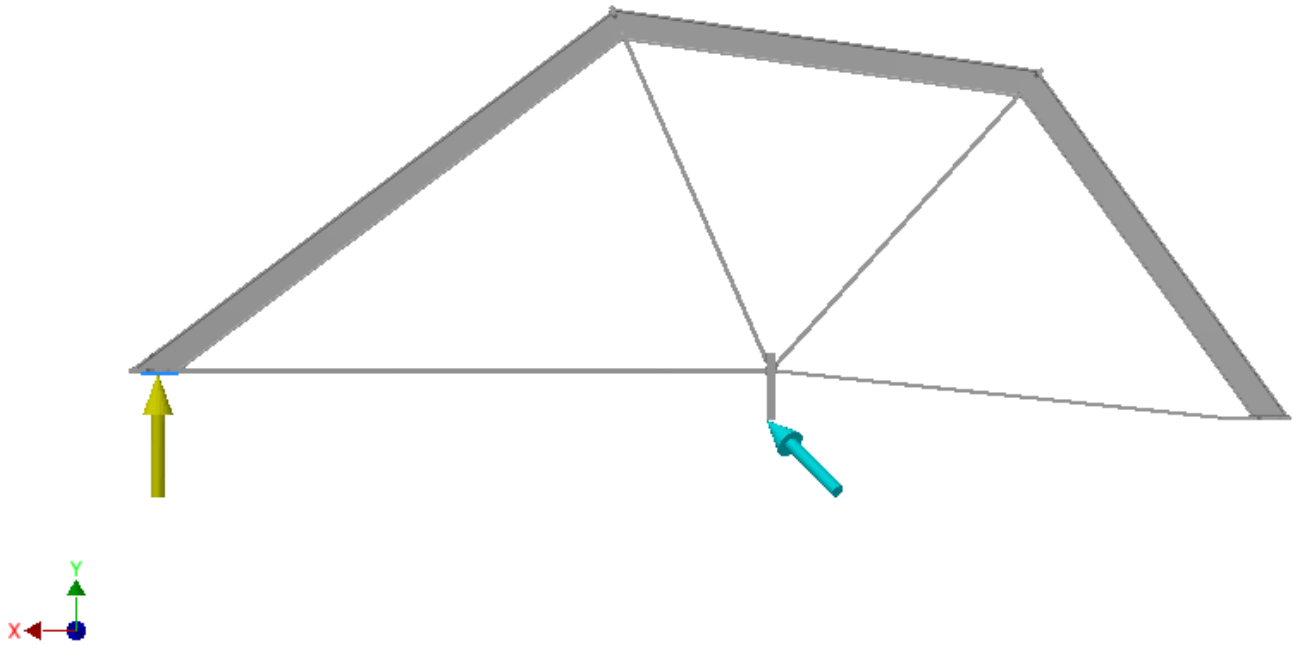
Name	Generic	
General	Mass Density	1 g/cm ³
	Yield Strength	0 MPa
	Ultimate Tensile Strength	0 MPa
Stress	Young's Modulus	0,0000001 GPa
	Poisson's Ratio	0 ul
	Shear Modulus	0,00000005 GPa
Part Name(s)	esqueleto Skeleton0001	
Name	Steel, Mild	
General	Mass Density	7,86 g/cm ³
	Yield Strength	207 MPa
	Ultimate Tensile Strength	345 MPa
Stress	Young's Modulus	220 GPa
	Poisson's Ratio	0,275 ul
	Shear Modulus	86,2745 GPa
Part Name(s)	ISO 120x 30 00000048.ipt ISO 120x 25 00000050.ipt ISO 120x 15 00000045.ipt ISO 120x 15 00000045.ipt ISO 120x 15 00000044.ipt ISO 120x 15 00000044.ipt ISO 120x 15 00000044.ipt ISO 120x 12 00000043.ipt ISO 120x 12 00000043.ipt ISO 120x 15 00000046.ipt ISO 120x 15 00000046.ipt ISO 100x100x6 00000038.ipt ISO 100x100x6 00000038.ipt ISO 100x100x6 00000005.ipt ISO 100x100x6 00000005.ipt ISO 100x100x6 00000006.ipt ISO 100x100x6 00000006.ipt	

Operating conditions

Force:1

Load Type	Force
Magnitude	15000,000 N
Vector X	0,000 N
Vector Y	15000,000 N
Vector Z	-0,000 N

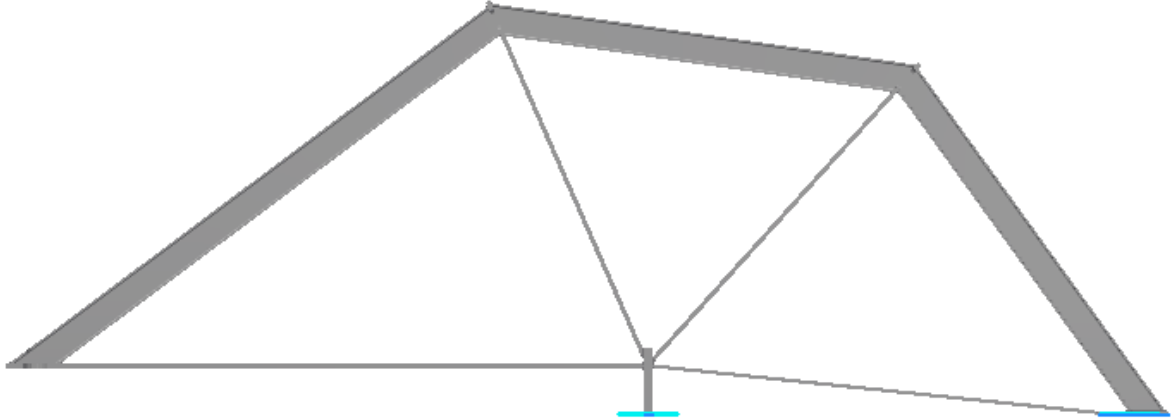
Selected Face(s)



Frictionless Constraint: 1

Constraint Type Frictionless Constraint

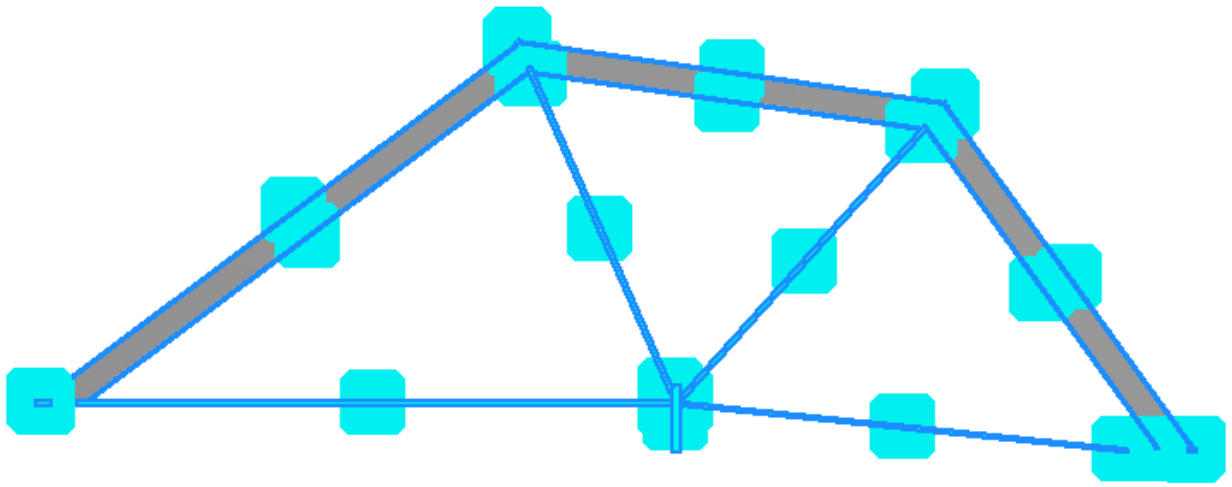
Selected Face(s)



Frictionless Constraint: 2

Constraint Type Frictionless Constraint

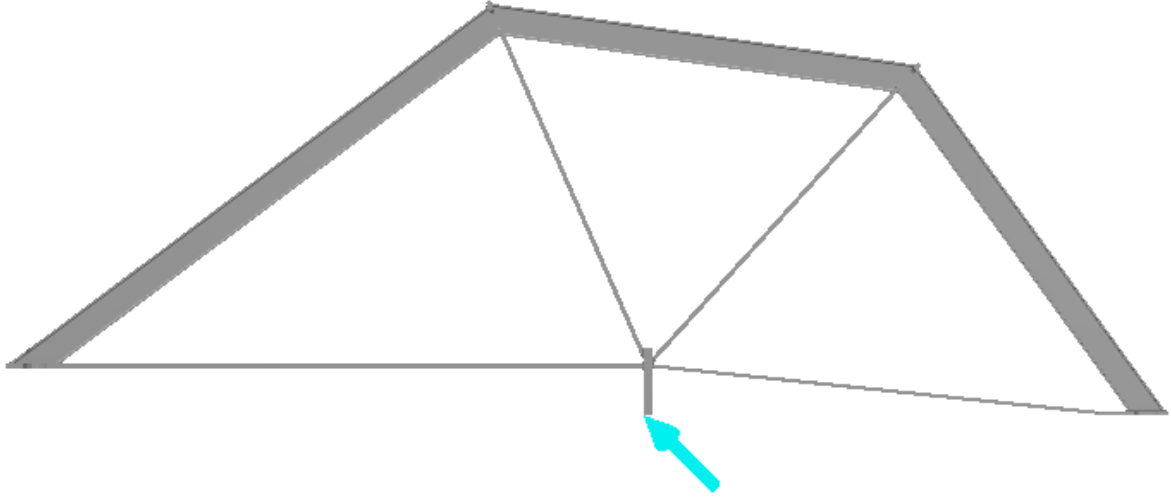
Selected Face(s)



Fixed Constraint:1

Constraint Type	Fixed Constraint
Vector X	0,000 mm

Selected Face(s)



☐ Contacts (Bonded)

Name	Part Name(s)
Bonded:1	_Weldbead:1 Frame0001:1/ISO 120x 15 00000044:1
Bonded:2	_Weldbead:1 Frame0001:1/ISO 120x 15 00000045:1
Bonded:3	_Weldbead:1 Frame0001:1/ISO 120x 30 00000048:1
Bonded:4	_Weldbead:1 Frame0001:1/ISO 120x 30 00000048:1
Bonded:5	_Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:6	_Weldbead:1 Frame0001:1/ISO 120x 12 00000043:1
Bonded:7	_Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:8	_Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:9	_Weldbead:1 Frame0001:1/ISO 120x 15 00000046:1
Bonded:10	_Weldbead:1 Frame0001:1/ISO 120x 12 00000043:1
Bonded:11	_Weldbead:1 Frame0001:1/ISO 120x 12 00000043:1
Bonded:12	_Weldbead:1 Frame0001:1/ISO 120x 12 00000043:1
Bonded:13	_Weldbead:1 Frame0001:1/ISO 120x 30 00000048:1
Bonded:14	_Weldbead:1 Frame0001:1/ISO 120x 15 00000044:1
Bonded:19	_Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:20	_Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:21	_Weldbead:1 Frame0001:1/ISO 120x 25 00000050:1
Bonded:22	_Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1

Bonded:23	Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:24	Weldbead:1 Frame0001:1/ISO 120x 25 00000050:1
Bonded:25	Weldbead:1 Frame0001:1/ISO 120x 12 00000043:1
Bonded:26	Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:27	Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:28	Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:29	Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:30	Weldbead:1 Frame0001:1/ISO 100x100x6 00000006:1
Bonded:31	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:32	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:33	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:34	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:35	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:36	Weldbead:1 Frame0001:1/ISO 120x 15 00000044:1
Bonded:37	Weldbead:1 Frame0001:1/ISO 120x 15 00000044:1
Bonded:38	Weldbead:1 Frame0001:1/ISO 120x 15 00000045:1
Bonded:39	Weldbead:1 Frame0001:1/ISO 120x 15 00000045:1
Bonded:40	Weldbead:1 Frame0001:1/ISO 120x 30 00000048:1
Bonded:41	Weldbead:1 Frame0001:1/ISO 120x 15 00000046:1
Bonded:42	Weldbead:1 Frame0001:1/ISO 120x 30 00000048:1
Bonded:43	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:44	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:45	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:46	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:47	Weldbead:1 Frame0001:1/ISO 100x100x6 00000005:1
Bonded:48	Weldbead:1 Frame0001:1/ISO 120x 15 00000045:1
Bonded:49	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:50	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:51	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:52	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:53	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:54	Weldbead:1 Frame0001:1/ISO 120x 15 00000046:1
Bonded:55	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:56	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:57	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:58	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:59	Weldbead:1 Frame0001:1/ISO 100x100x6 00000038:1
Bonded:60	Frame0001:1/ISO 120x 15 00000046:1 Frame0001:1/ISO 120x 30 00000048:1

☐ Contacts (Separation)

Name	Part Name(s)
Separation:1	Frame0001:1/ISO 100x100x6 00000038:1 Frame0001:1/ISO 120x 15 00000045:1
Separation:2	Frame0001:1/ISO 100x100x6 00000006:1 Frame0001:1/ISO 120x 15 00000044:1
Separation:3	Frame0001:1/ISO 100x100x6 00000005:1 Frame0001:1/ISO 120x 15 00000044:1
Separation:4	Frame0001:1/ISO 100x100x6 00000005:1 Frame0001:1/ISO 120x 15 00000045:1

Results

Reaction Force and Moment on Constraints

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Frictionless Constraint:1	11235,6 N	-6,86653 N	1224,8 N m	-63,9705 N m
		-11235,2 N		-13,2623 N m
		-86,6618 N		-1223,06 N m
Frictionless Constraint:2	813,318 N	11,9587 N	1411,56 N m	550,733 N m
		-804,381 N		1298,52 N m
		119,641 N		55,1288 N m
Fixed Constraint:1	2962,94 N	2,61605 N	0,92491 N m	-0,22797 N m
		-2962,93 N		-0,896375 N m
		-2,37133 N		0 N m

Result Summary

Name	Minimum	Maximum
Volume	10658500 mm ³	
Mass	83,7758 kg	
Von Mises Stress	0,318578 MPa	66,4151 MPa
1st Principal Stress	-14,8019 MPa	47,0884 MPa
3rd Principal Stress	-66,7147 MPa	10,6481 MPa
Displacement	0 mm	1,76347 mm
Safety Factor	3,11676 ul	15 ul
Stress XX	-38,9101 MPa	35,6659 MPa
Stress XY	-27,2509 MPa	35,7552 MPa
Stress XZ	-13,7835 MPa	14,8425 MPa
Stress YY	-59,2004 MPa	43,9656 MPa
Stress YZ	-13,0983 MPa	18,5333 MPa
Stress ZZ	-45,7563 MPa	27,4407 MPa
Y Displacement	-0,0745193 mm	1,7521 mm
Contact Pressure	0 MPa	710,354 MPa

Figures

Von Mises Stress

Type: Von Mises Stress

Unit: MPa

07/12/2016, 22:35:21

66,42 Max

53,2

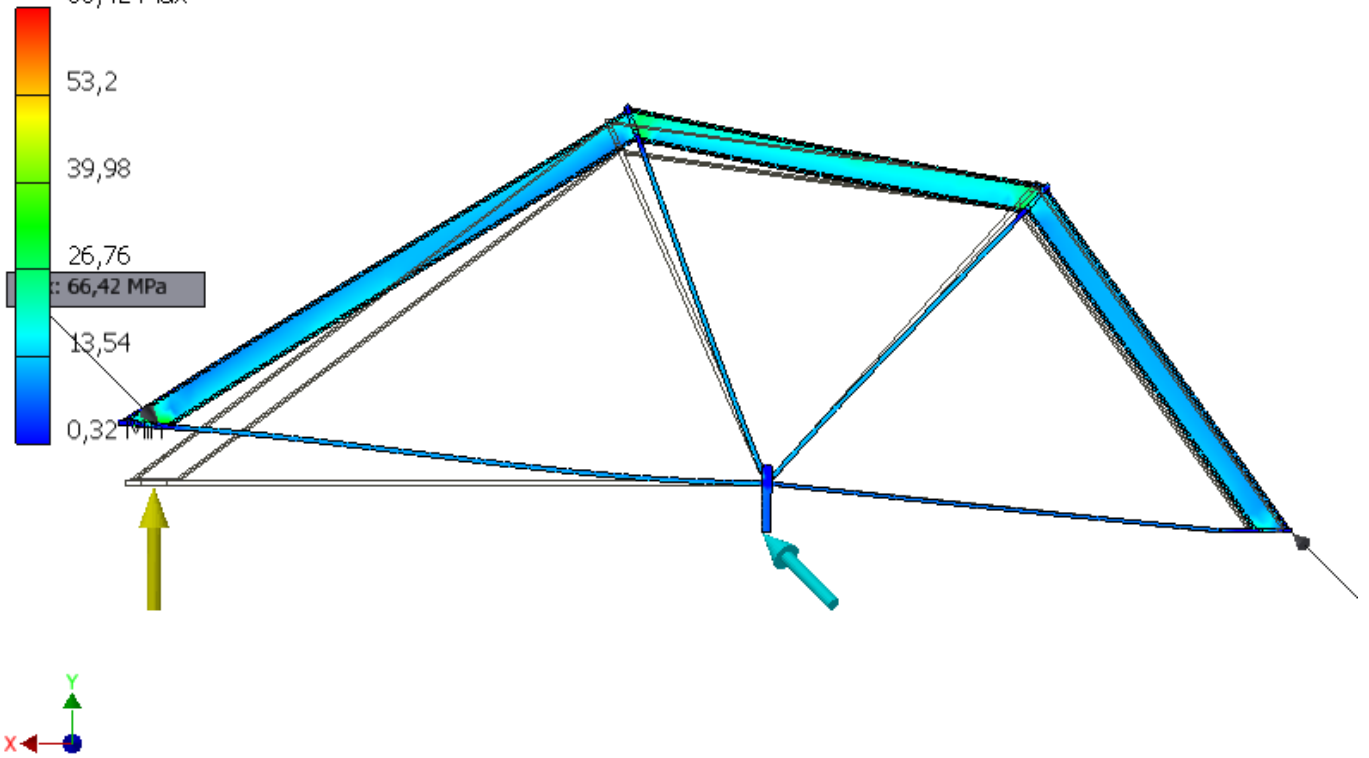
39,98

26,76

66,42 MPa

13,54

0,32 Min



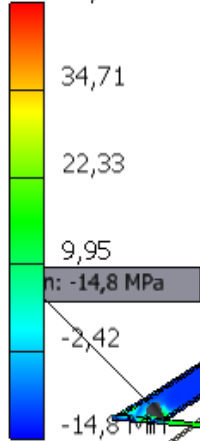
☐ 1st Principal Stress

Type: 1st Principal Stress

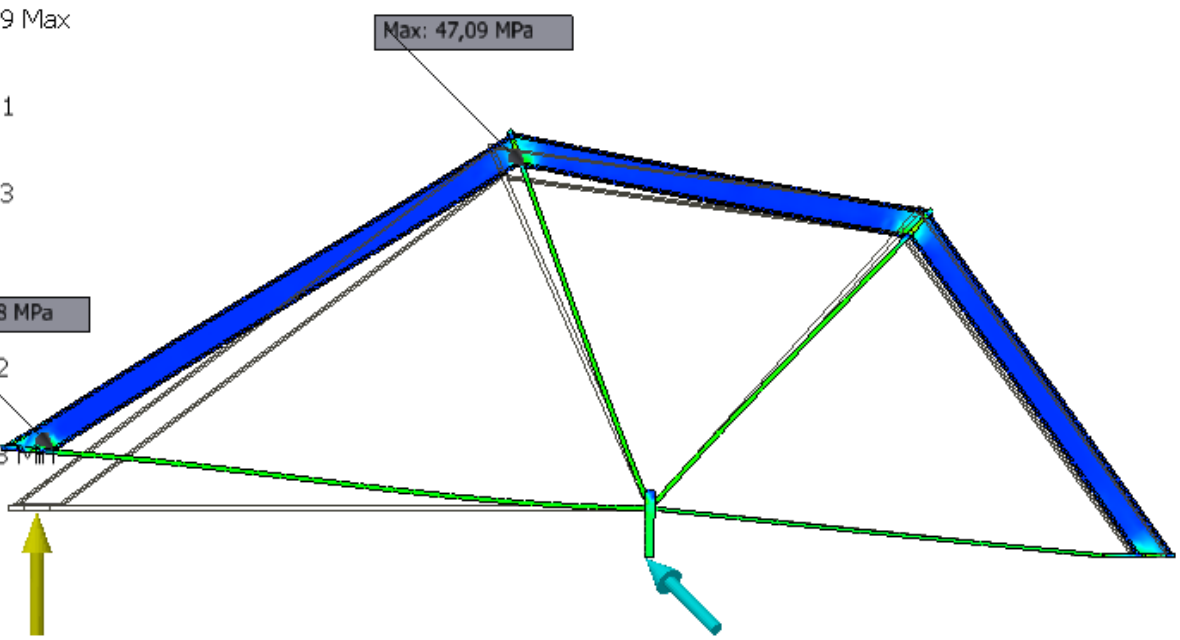
Unit: MPa

07/12/2016, 22:35:22

47,09 Max



Max: 47,09 MPa



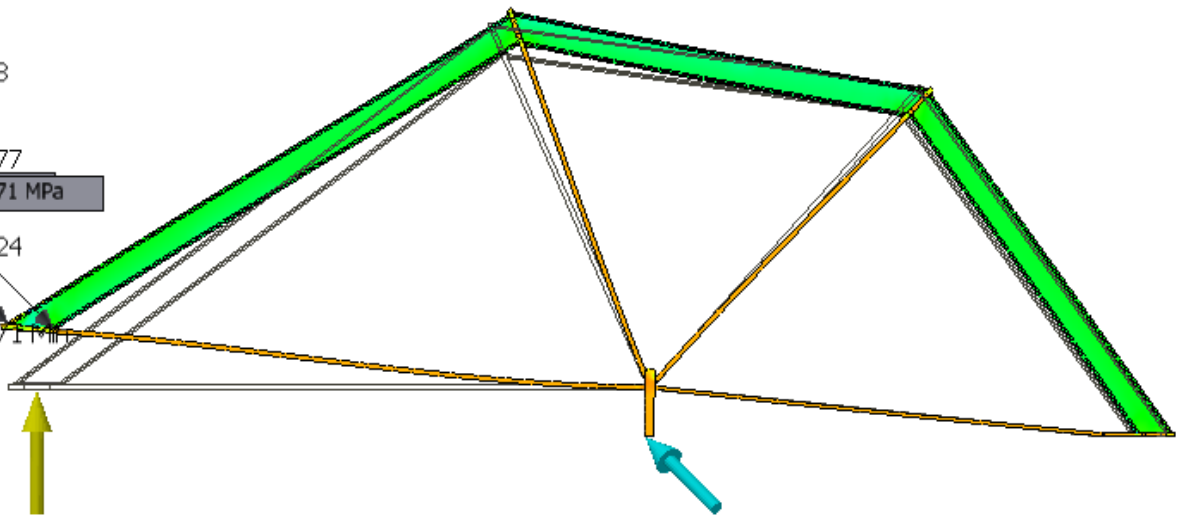
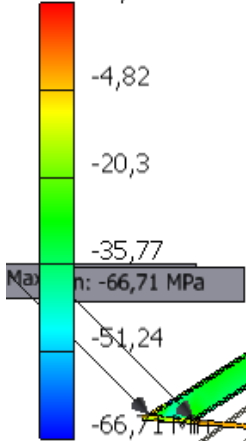
☐ 3rd Principal Stress

Type: 3rd Principal Stress

Unit: MPa

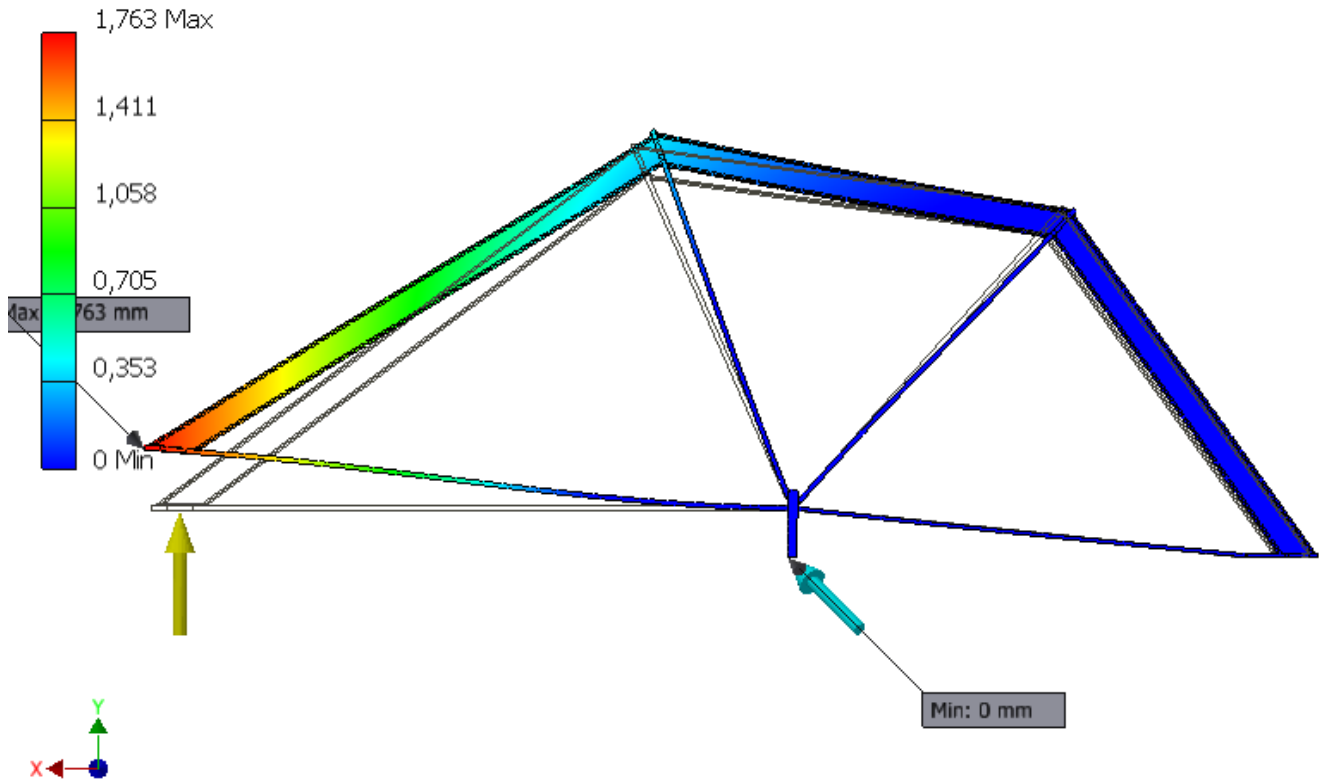
07/12/2016, 22:35:24

10,65 Max



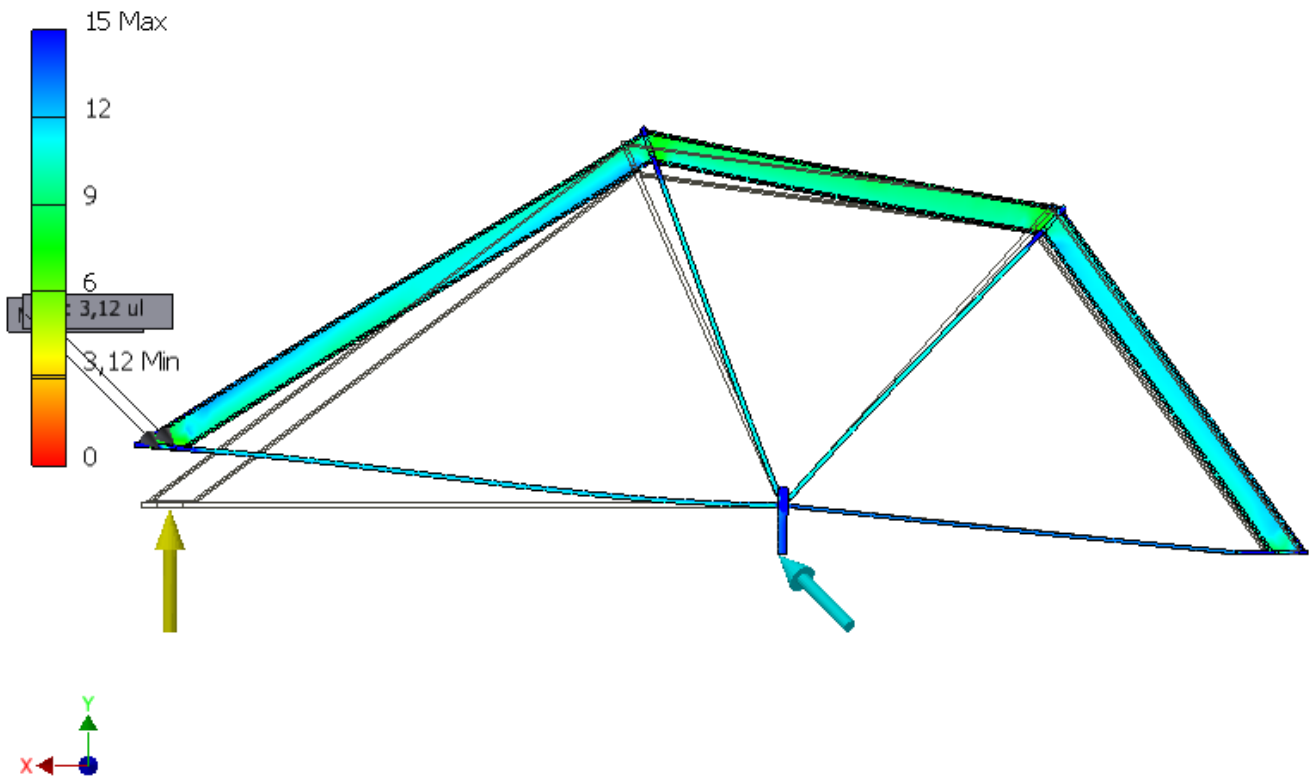
Displacement

Type: Displacement
Unit: mm
07/12/2016, 22:35:35



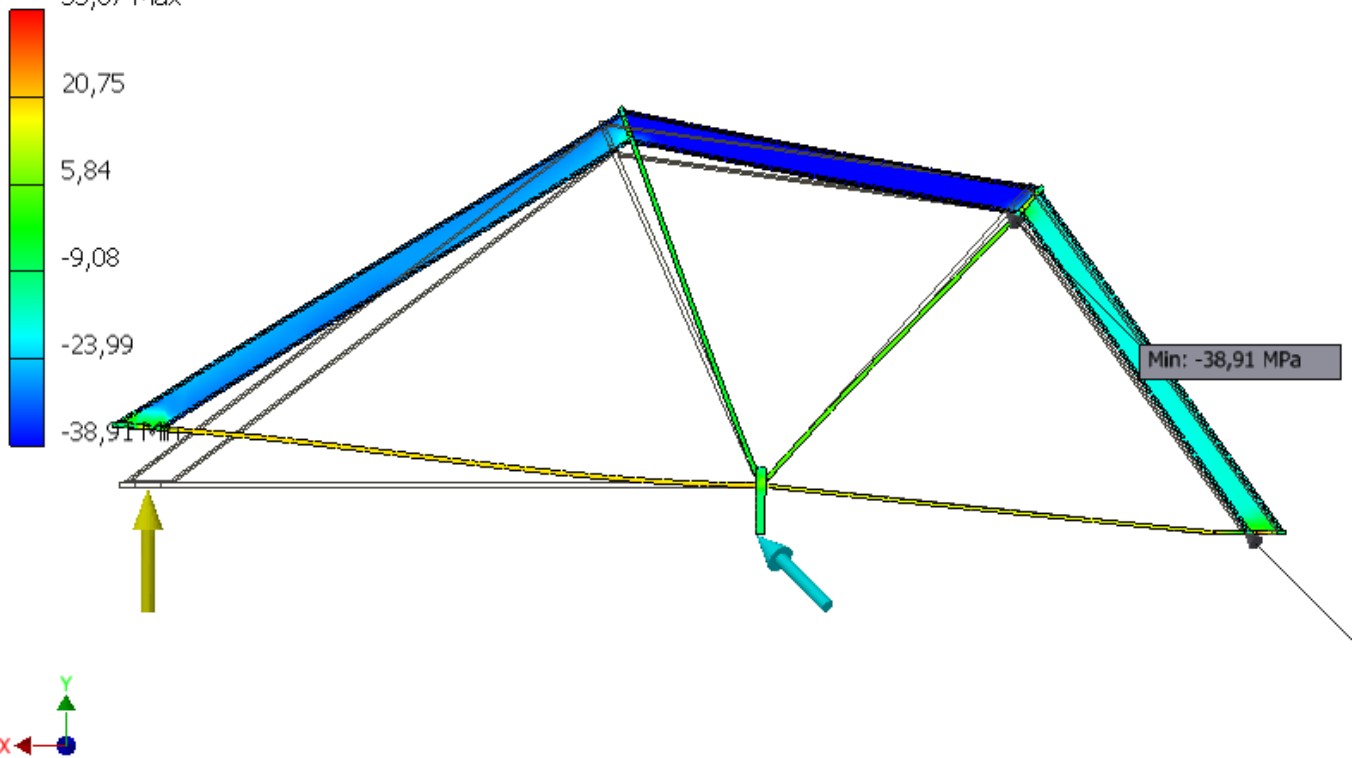
Safety Factor

Type: Safety Factor
Unit: ul
07/12/2016, 22:35:33



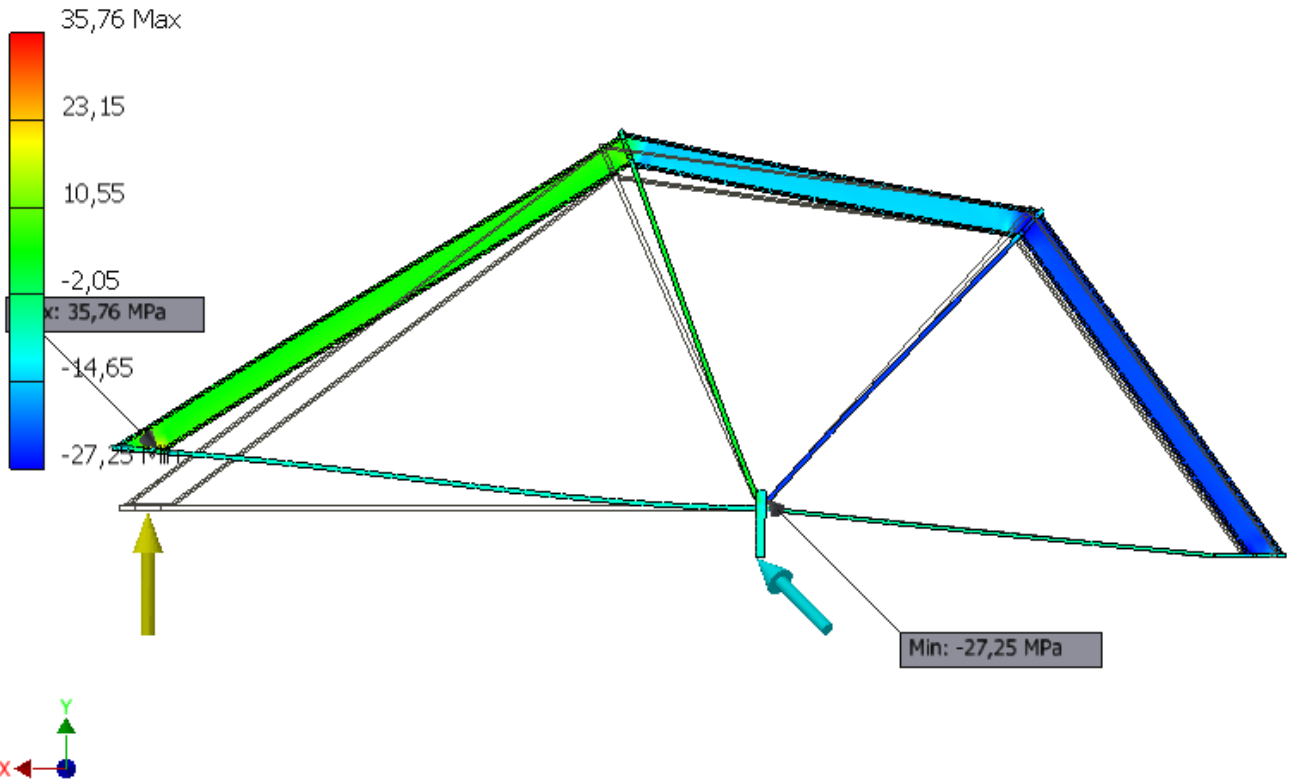
☐ Stress XX

Type: Stress XX
Unit: MPa
07/12/2016, 22:35:25
35,67 Max



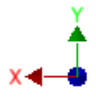
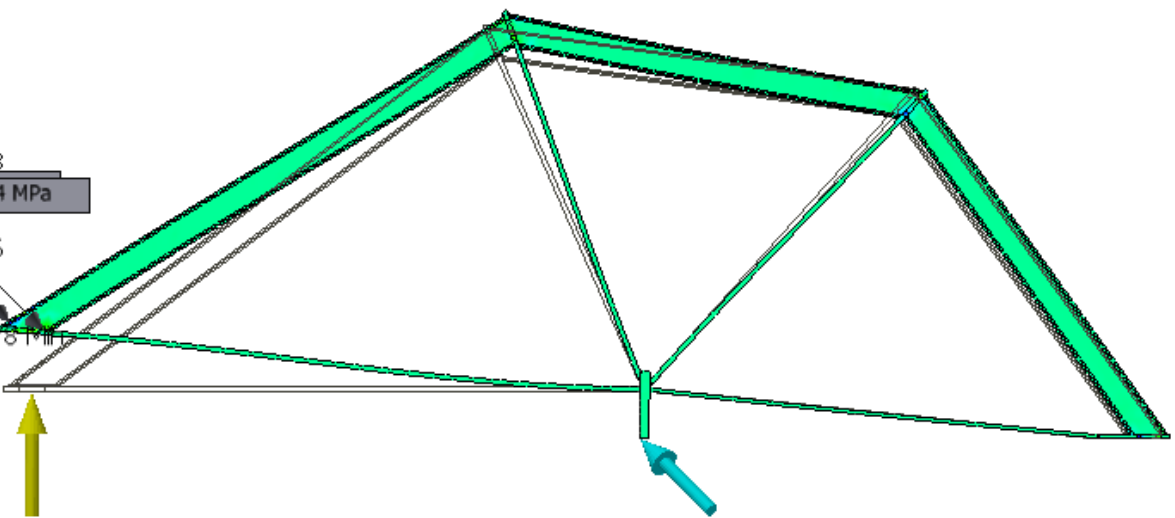
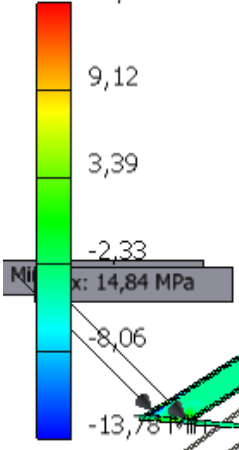
☐ Stress XY

Type: Stress XY
Unit: MPa
07/12/2016, 22:35:27



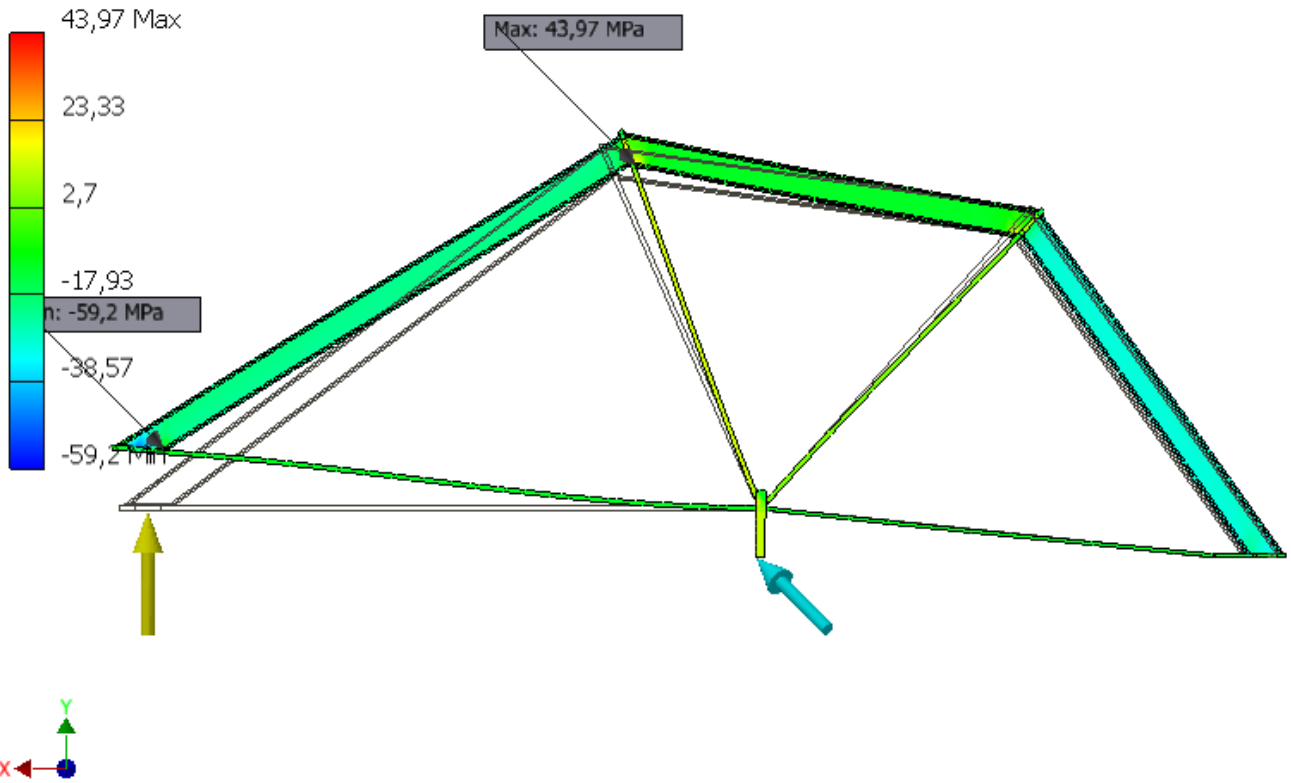
☐ Stress XZ

Type: Stress XZ
Unit: MPa
07/12/2016, 22:35:28
14,84 Max



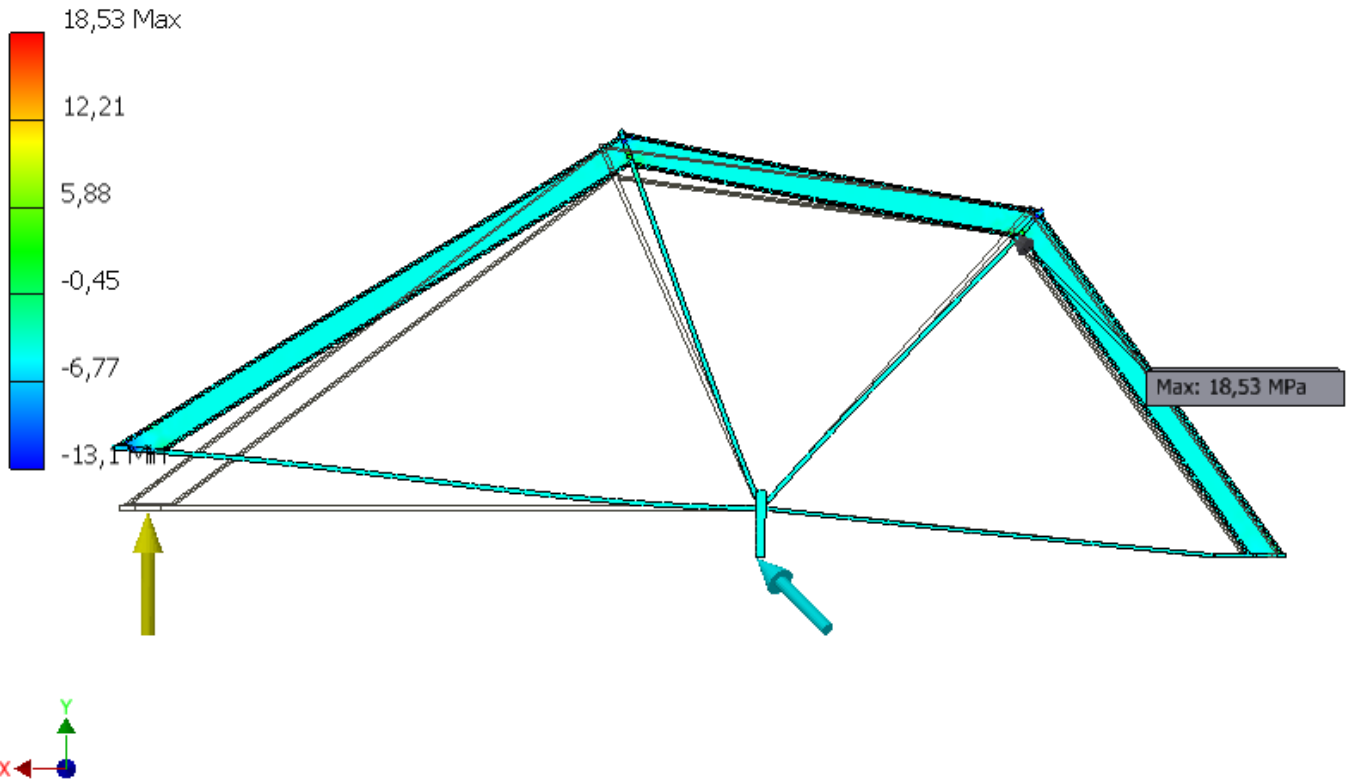
Stress YY

Type: Stress YY
Unit: MPa
07/12/2016, 22:35:29



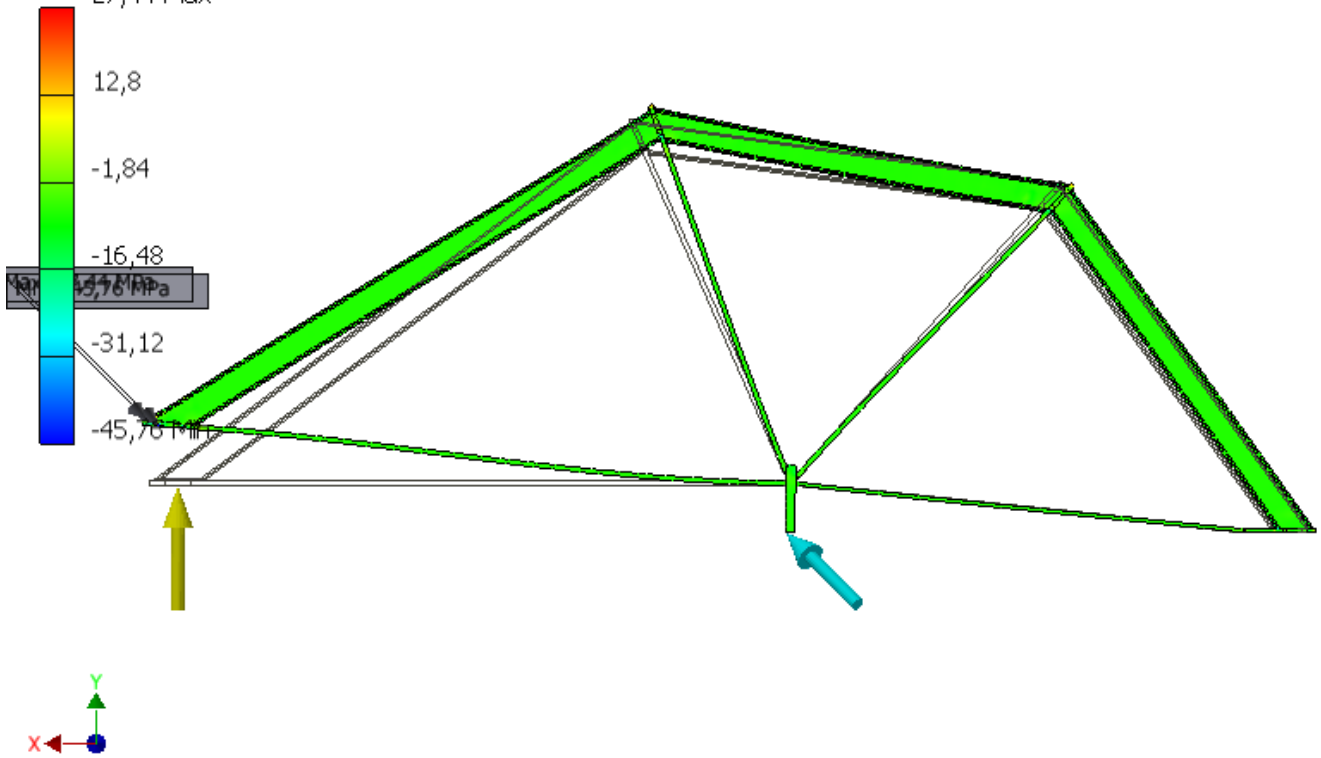
☐ Stress YZ

Type: Stress YZ
Unit: MPa
07/12/2016, 22:35:31



Stress ZZ

Type: Stress ZZ
Unit: MPa
07/12/2016, 22:35:32
27,44 Max

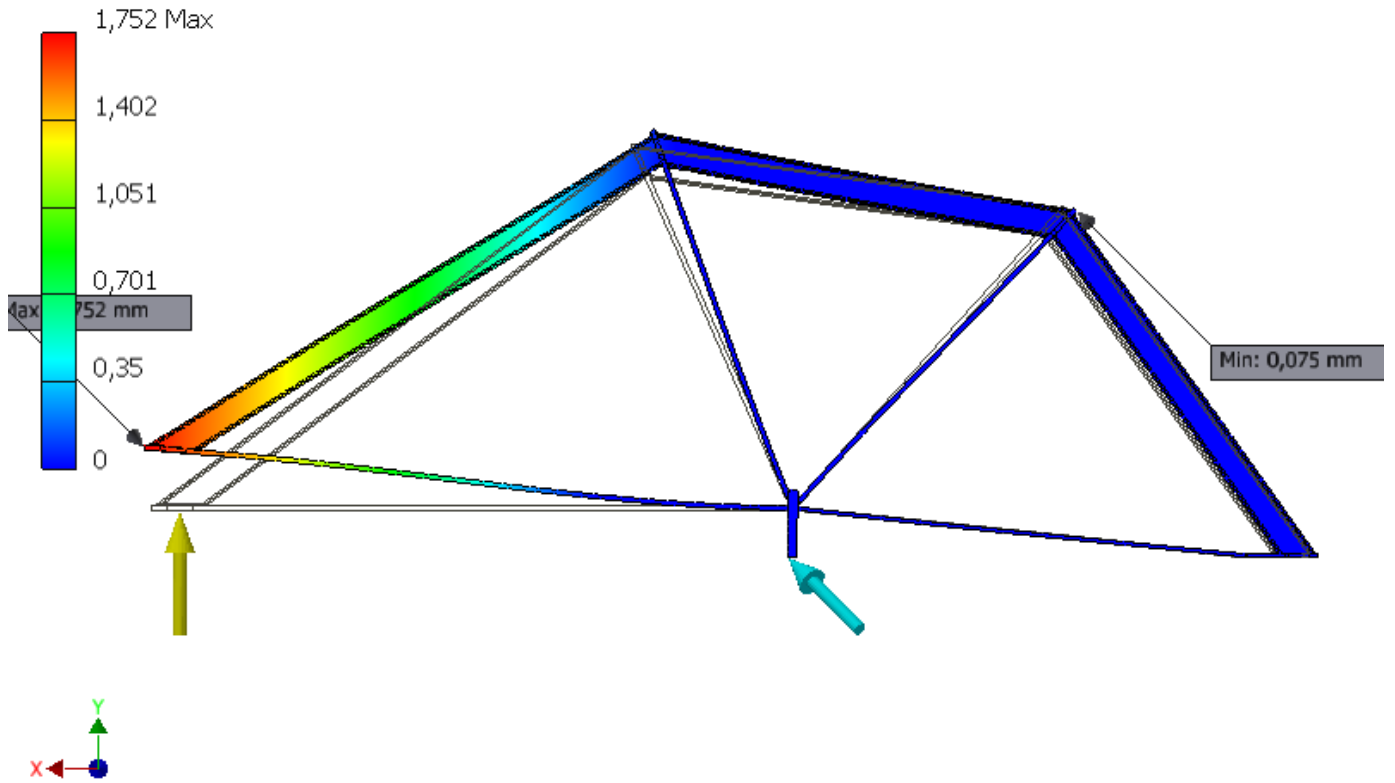


Y Displacement

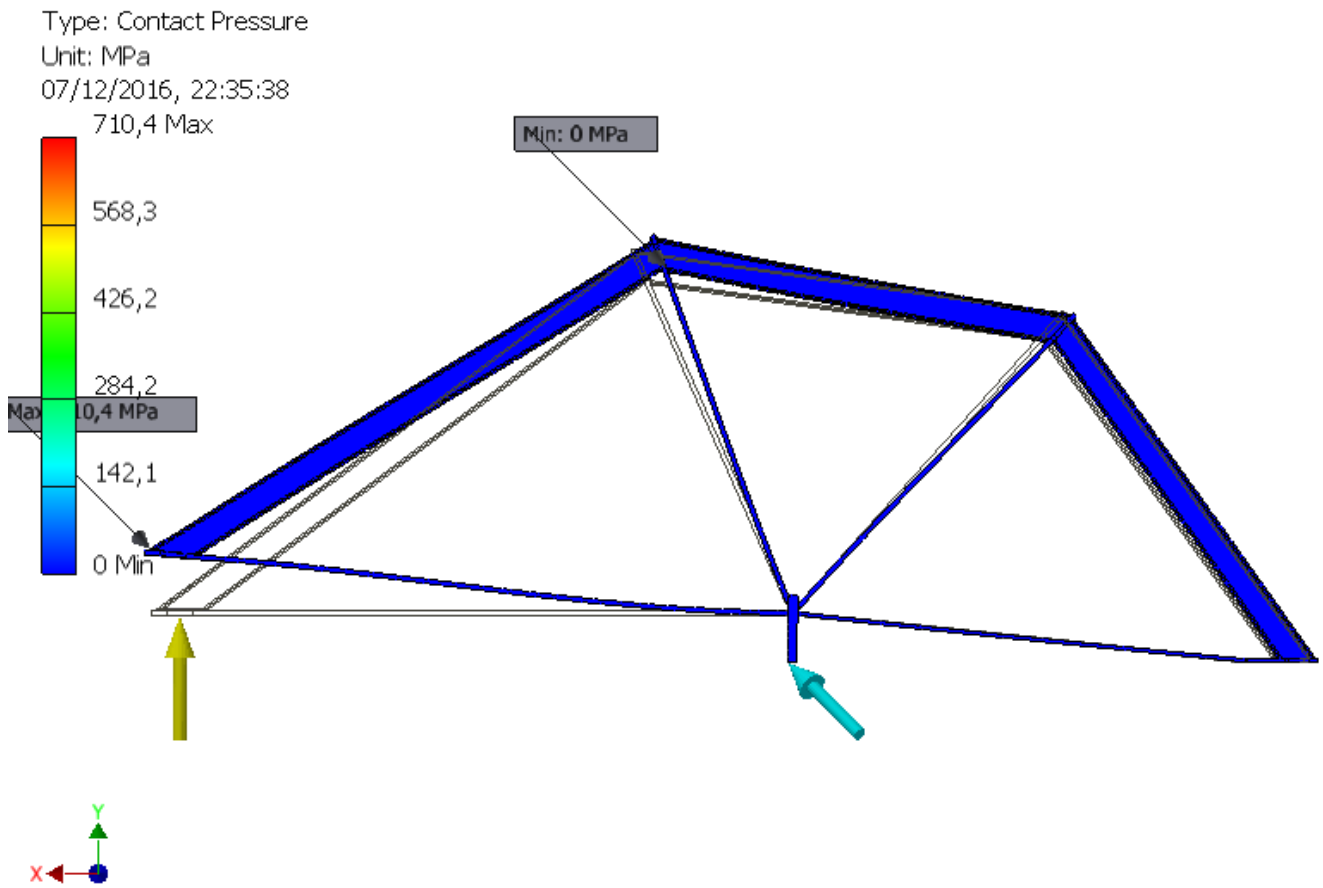
Type: Y Displacement

Unit: mm

07/12/2016, 22:35:36



Contact Pressure



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