Stress Analysis Report

Analyzed File:	final_assembly.iam
Autodesk Inventor Version:	2013 (Build 170138000, 138)
Creation Date:	3/13/2013, 1:18 PM
Simulation Author:	Ivan
Summary:	

Project Info (iProperties)

Summary

Author	Ivan

Project

Part Number	final_assembly
Designer	Ivan
Cost	$0.00
Date Created	3/13/2013

Status

Design Status	WorkInProgress

Physical

Mass	1035.85 lbmass
Area	63857.8 in^2
Volume	7951.64 in^3
Center of Gravity	x=-71.0814 in y=28 in z=1 in

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

Simulation:2

General objective and settings:

Design Objective	Parametric Dimension
Simulation Type	Static Analysis
Last Modification Date	3/13/2013, 1:15 PM
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

Parameter definition:

Component Name	Feature Name	Parameter Name	Values	Current Value	Unit
extren500plateAnalysis	Extrusion1	paddle_thickness	0.25,0.375	0.25	in
extren500plateAnalysis_short	Extrusion1	paddle_thickness	0.25,0.375	0.25	in

Material(s)

Name	extren5002	
General	Mass Density	0.06 lbmass/in^3
	Yield Strength	5853.41 psi
	Ultimate Tensile Strength	5805.52 psi
Stress	Young's Modulus	2601.8 ksi
	Poisson's Ratio	0.31 ul
	Shear Modulus	993.052 ksi
Stress Thermal	Expansion Coefficient	0.00015426 ul/f
	Thermal Conductivity	0.559981 btu/(ft hr f)
	Specific Heat	1.16129 btu/(lbmass f)
Part Name(s)	extren500plateAnalysis extren500plateAnalysis_short extren500plateAnalysis_short extren500plateAnalysis_short extren500plateAnalysis_short extren500plateAnalysis_short extren500plateAnalysis_short	
Name	Steel	
General	Mass Density	0.283599 lbmass/in^3
	Yield Strength	30043.5 psi
	Ultimate Tensile Strength	50072.6 psi
Stress	Young's Modulus	30479 ksi
	Poisson's Ratio	0.3 ul
	Shear Modulus	11722.7 ksi
Stress Thermal	Expansion Coefficient	0.0000216 ul/f
	Thermal Conductivity	104.879 btu/(ft hr f)
	Specific Heat	0.35613 btu/(lbmass f)
Part Name(s)	steel_angle steel_angle_left steel_angle steel_angle_left	

	support flange steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left support flange steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left support flange steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left support flange steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left steel_angle steel_angle_left support flange support flange drive_flange drive_flange	
Name	Steel, Galvanized	
General	Mass Density	0.283599 lbmass/in^3
	Yield Strength	30043.5 psi
	Ultimate Tensile Strength	50072.6 psi
Stress	Young's Modulus	29027.6 ksi
	Poisson's Ratio	0.3 ul
	Shear Modulus	11164.5 ksi
Stress Thermal	Expansion Coefficient	0.0000216 ul/f

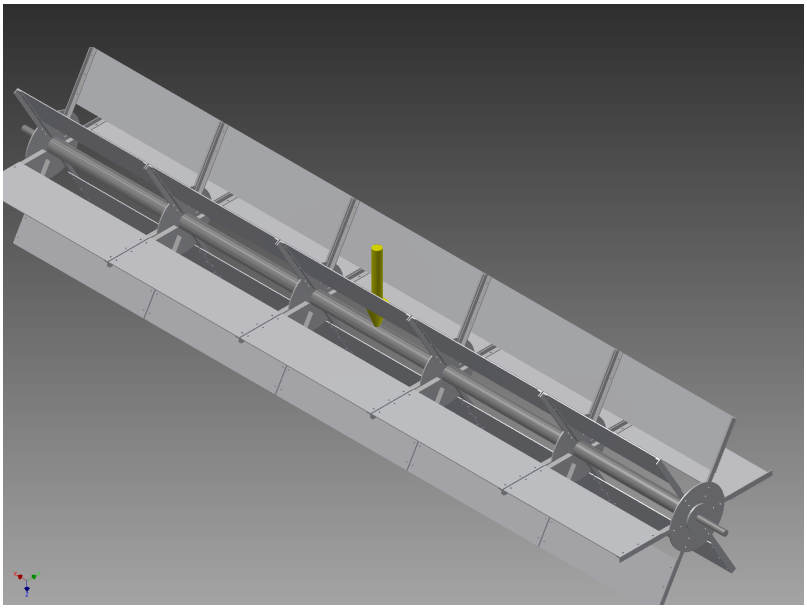
	Thermal Conductivity	99.2609 btu/(ft hr f)
	Specific Heat	0.348388 btu/(lbmass f)
Part Name(s)	sch40steelpipe	
Name	Stainless Steel	
General	Mass Density	0.291909 lbmass/in^3
	Yield Strength	36284.5 psi
	Ultimate Tensile Strength	78374.5 psi
Stress	Young's Modulus	28011.6 ksi
	Poisson's Ratio	0.3 ul
	Shear Modulus	10773.7 ksi
Stress Thermal	Expansion Coefficient	0.00001872 ul/f
	Thermal Conductivity	29.9655 btu/(ft hr f)
	Specific Heat	0.369291 btu/(lbmass f)
Part Name(s)	drive_shaft drive_shaft	

Operating conditions

Gravity

Load Type	Gravity
Magnitude	386.220 in/s^2
Vector X	0.000 in/s^2
Vector Y	0.000 in/s^2
Vector Z	386.220 in/s^2

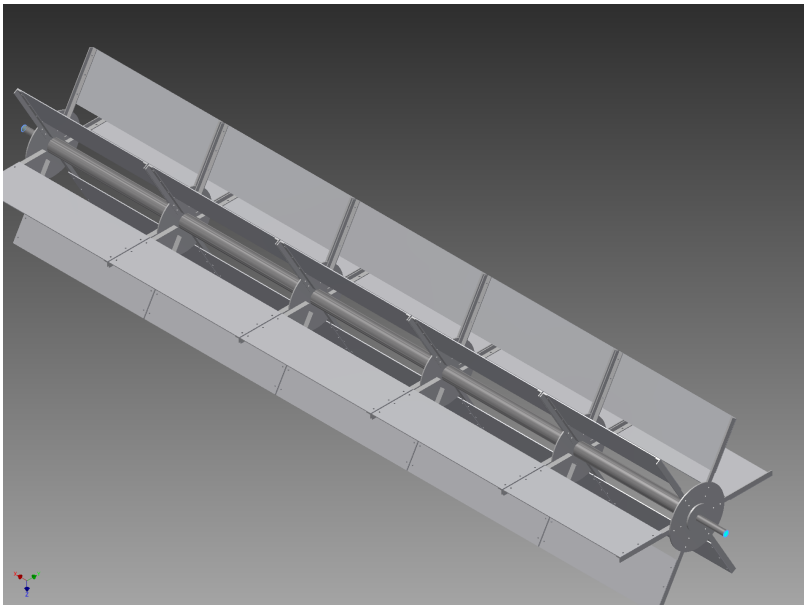
Selected Face(s)



Fixed Constraint:1

Constraint Type	Fixed Constraint

Selected Face(s)



Results

Parametric Configuration:1

Parameter(s)

Component Name	Feature Name	Parameter Name	Current Value	Unit
extren500plateAnalysis	Extrusion1	paddle_thickness	0.25	in
extren500plateAnalysis_short	Extrusion1	paddle_thickness	0.25	in

Reaction Force and Moment on Constraints

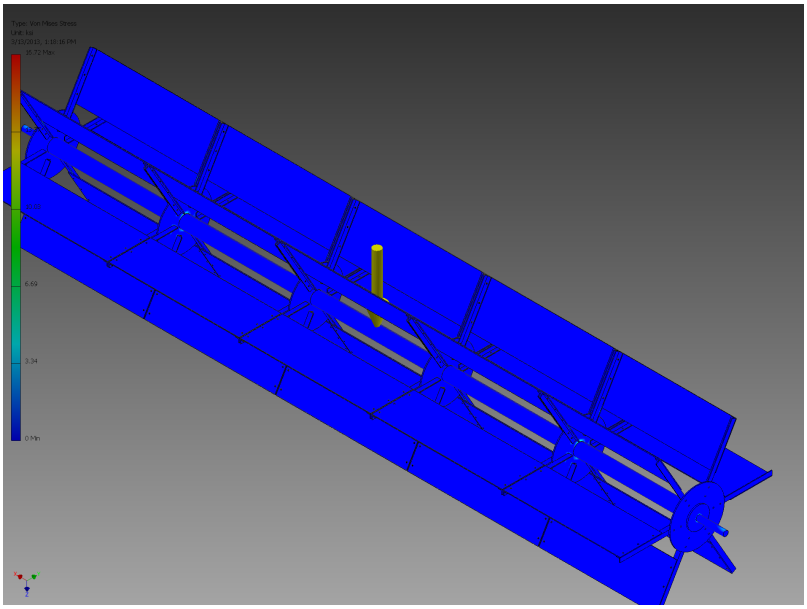
Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	1016.03 lbforce	0 lbforce	133.834 lbforce ft	0 lbforce ft
		0 lbforce		-129.429 lbforce ft
		-1016.03 lbforce		-34.055 lbforce ft

Result Summary

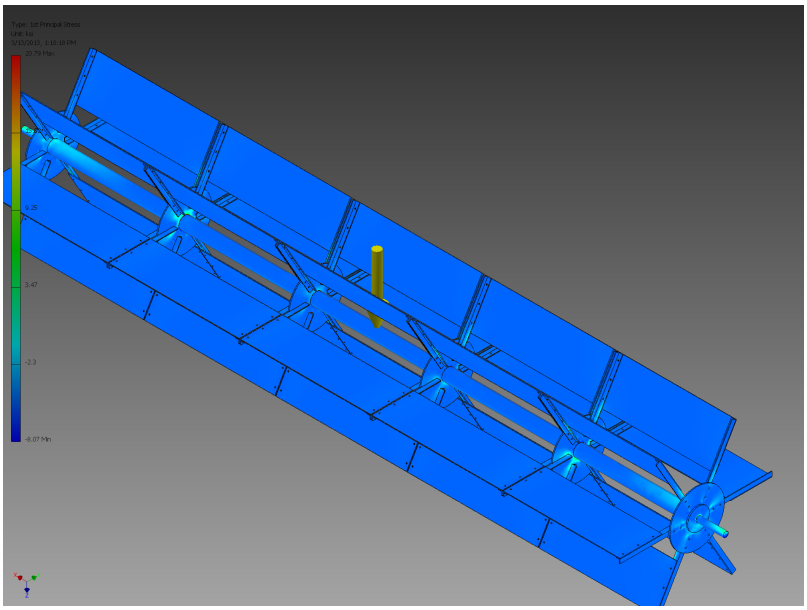
Name	Minimum	Maximum
Volume	7951.64 in^3	
Mass	1035.85 lbmass	
Von Mises Stress	0.00107235 ksi	16.673 ksi
1st Principal Stress	-8.04246 ksi	13.9629 ksi
3rd Principal Stress	-20.5287 ksi	5.16948 ksi
Displacement	0 in	0.156525 in
Safety Factor	1.80068 ul	15 ul

Figures

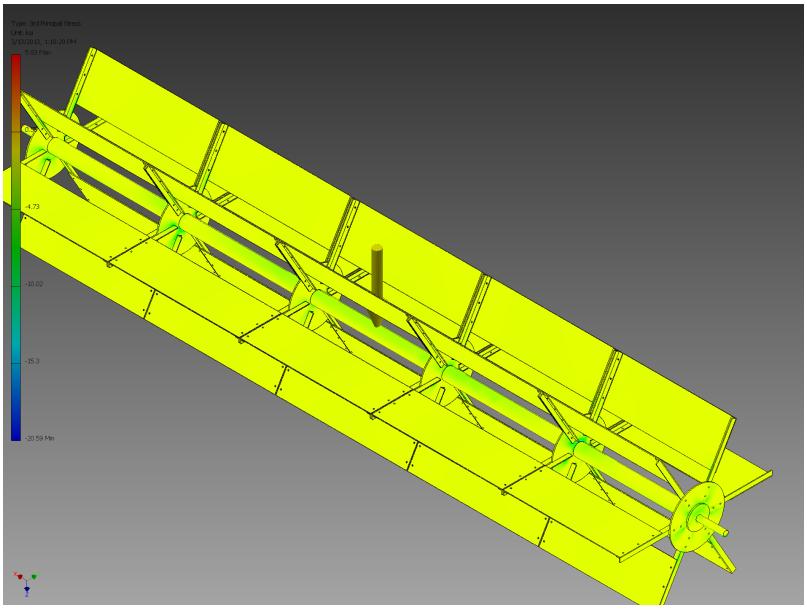
Von Mises Stress



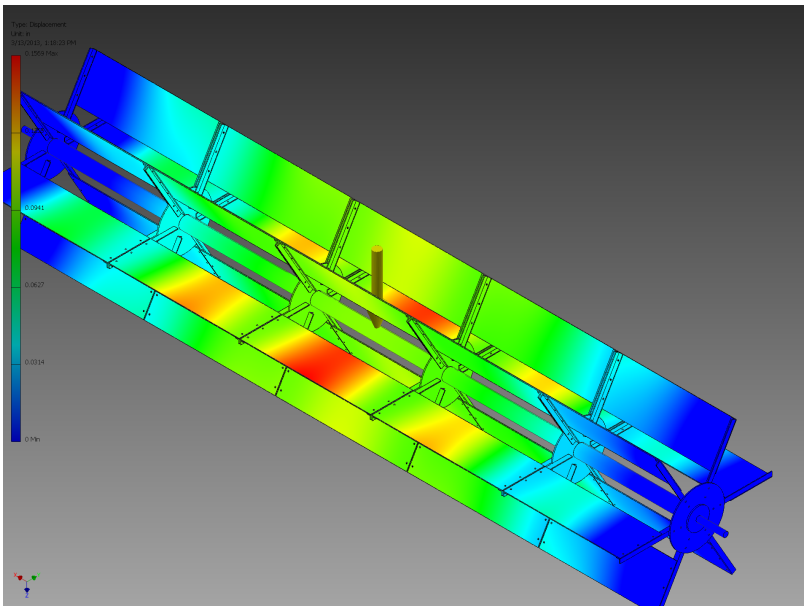
1st Principal Stress



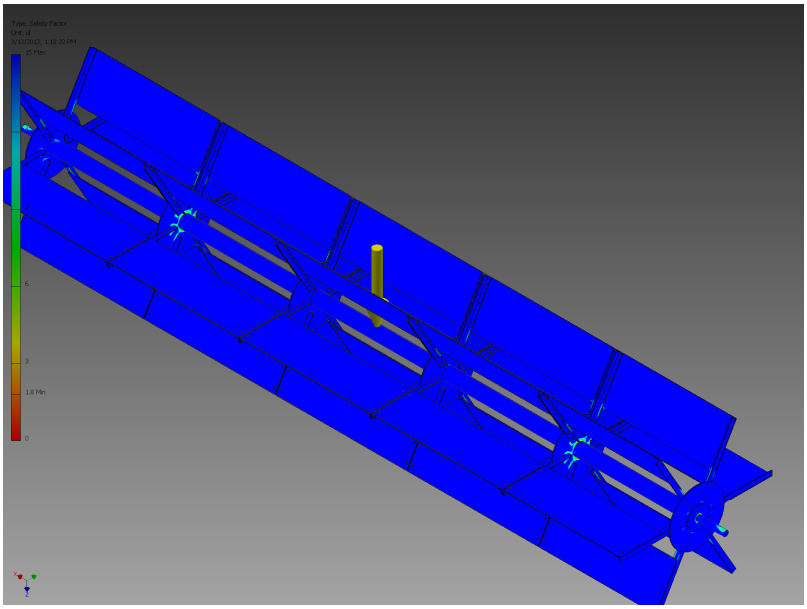
3rd Principal Stress



Displacement



Safety Factor



Parametric Configuration:4

Parameter(s)

Component Name	Feature Name	Parameter Name	Current Value	Unit
extren500plateAnalysis	Extrusion1	paddle_thickness	0.375	in
extren500plateAnalysis_short	Extrusion1	paddle_thickness	0.375	in

Reaction Force and Moment on Constraints

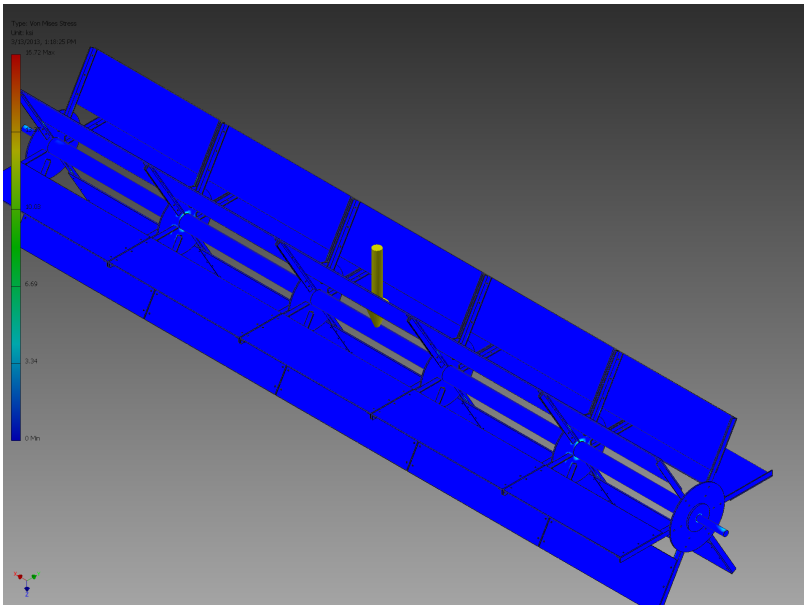
Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	1177.63 lbforce	0 lbforce	166.872 lbforce ft	0 lbforce ft
		0 lbforce		-159.351 lbforce ft
		-1177.63 lbforce		-49.5339 lbforce ft

Result Summary

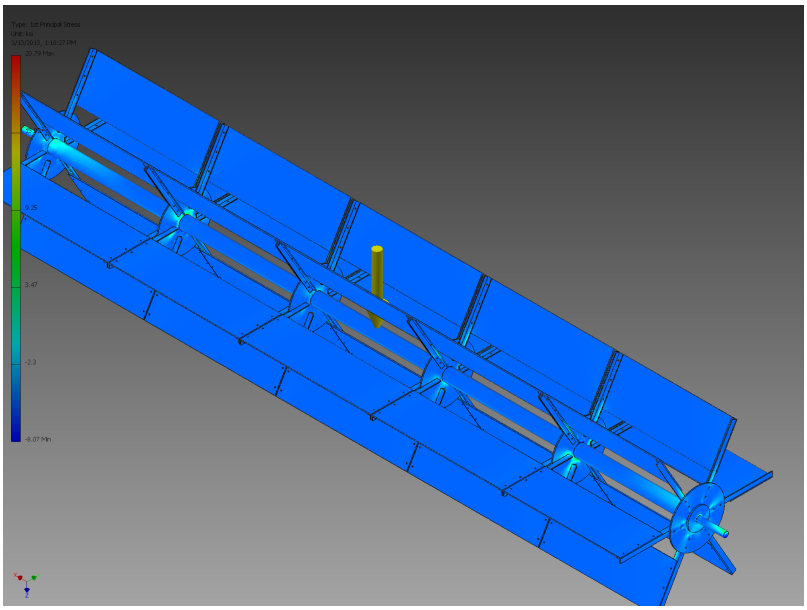
Name	Minimum	Maximum
Volume	10679.1 in^3	
Mass	1199.5 lbmass	
Von Mises Stress	0.00105899 ksi	16.3508 ksi
1st Principal Stress	-5.80594 ksi	20.7756 ksi
3rd Principal Stress	-14.6522 ksi	5.83071 ksi
Displacement	0 in	0.15068 in
Safety Factor	1.83617 ul	15 ul

Figures

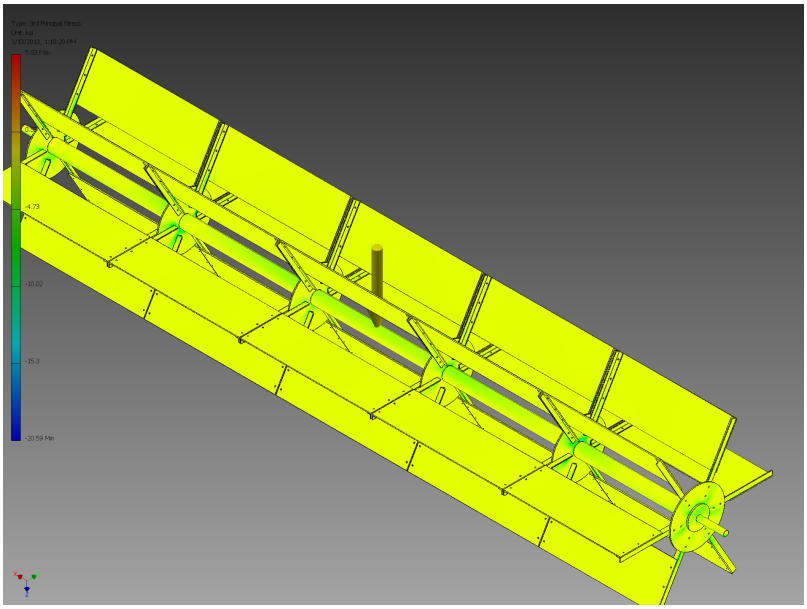
Von Mises Stress



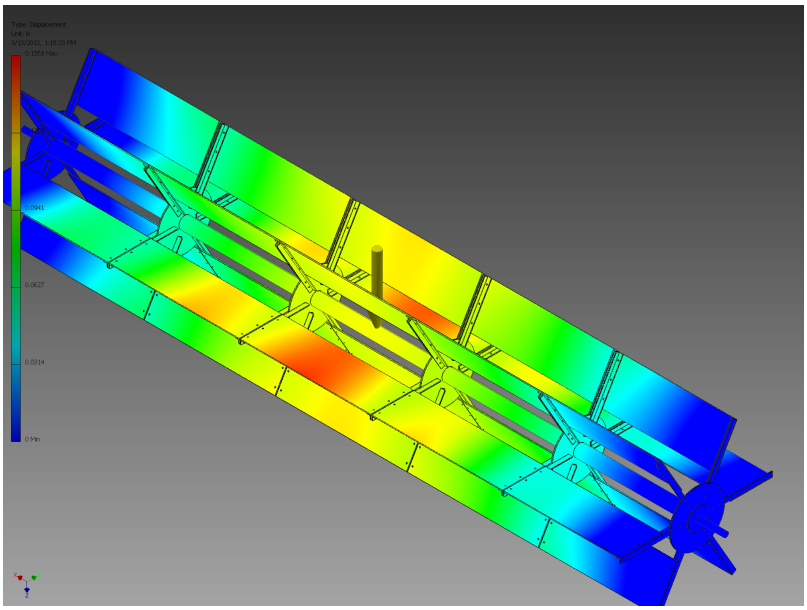
1st Principal Stress



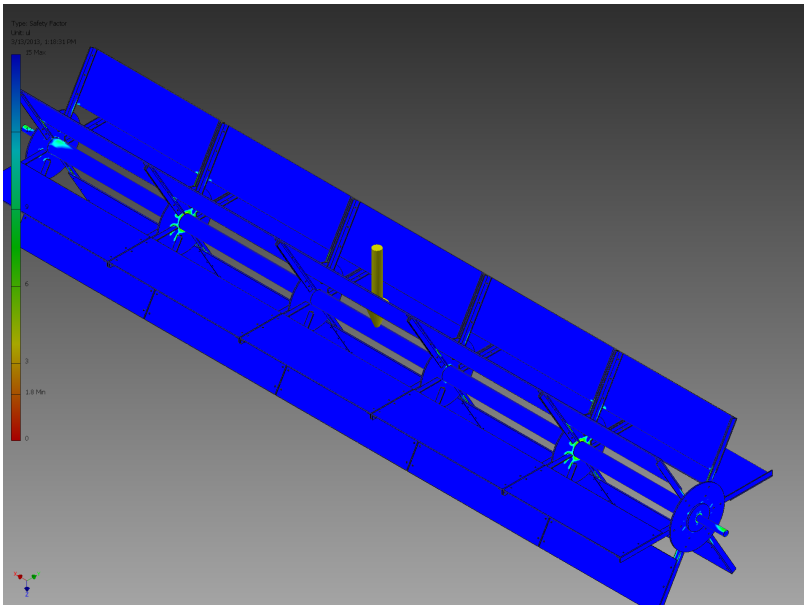
3rd Principal Stress



Displacement



Safety Factor



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