360^{o} ROTATING CONVEYOR BELT WITH UP-DOWN MECHANISM

SUBMITTED BY :

CHAUDHARY KRUNAL M.(09ME03)

CHAUDHARY RAJESH D. (09ME04)

PATEL ANKIT J. (09ME18)

PRAJAPATI SACHIN J. (09ME49)

GUIDED BY : PROF. D.M.PATEL

DEFINATION :

- **Development** of 360° belt conveyor with up-down mechanism.

WHY WE SELECT THE PROJECT…?

- Used in industries.
- In airport.
- Used in warehouse.
- In stone breaking factory.

PROJECT BACKGROUND

- One motor is connected with the shaft of the belt which will rotate the conveyor belt.
- Two motors and two actuator will be use for making the up-down mechanism.
- Two motor are connected with those actuator and when the motor will rotate the actuator will move in the up-down position.

- One another motor is provided in the bottom of the base and the shaft will be connect to the clamp which is connected with that motor shaft with the help of brass coupling.
- So with the help of this we can rotate the conveyor belt at 360°.
- So with the help of this 360° rotated conveyor belt the material handling can be done easily at desired place.

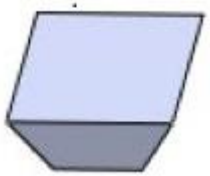
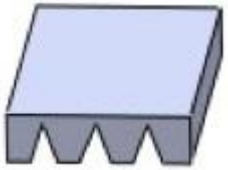
OBJECTIVE

- Now in industries only fixed type belt conveyor is available.
- But we will make the conveyor belt such that it can be rotate 360° and up-down mechanism with proto type model.

METHODOLOGY

- Visit industries
- Evaluate current application
- Collection of Data
- Designing
- Analysis
- Collection of raw material
- Fabrication work
- Make a proto type model
- Submission of project

Types Of Belt Drives

- Round Belts 
- V Belts 
- Flat Belts 
- Timing/Toothed Belts 

Flat Belts

- Flat belts are used to transmit power from one shaft to another.
- They are generally classified as either small woven endless belts or higher power flat belts.
- The woven endless belts are especially useful where minimum vibration is required at the driven pulley due to semi-elastic material used in construction.

- The higher power flat belts are often useful because they eliminate the need to high belt tension used to grip pulleys, which in turn reduces the load on the shaft bearings.
- The material used for high power flat belts is sticky yet abrasion-resistant rubber compounds.

Types of Actuators

- Hydraulic Actuators
- Pneumatic Actuators
- Electric Actuators
- Mechanical Actuators

Types Of Bearings

- Ball Bearings
- Roller Bearings
- Ball Thrust Bearings
- Roller Thrust Bearings
- Tapered Roller Bearings

Ball Bearings

- Ball Bearings are extremely common because they can handle both radial and thrust loads, but can only handle a small amount of weight.

- They are found in a wide array of applications, such as roller blades and even hard drives, but are prone to deforming if they are overloaded.

- In a ball bearing, the load is transmitted from the outer race to the ball and from the ball to the inner race.
- Since the ball is a sphere, it only contacts the inner and outer race at a very small point which helps it spin very smoothly.
- But it also means that there is not very much contact area holding that load so if the bearing is overloaded, the balls can deform or squish, ruining the bearing

Pulleys

- Conveyor belt pulleys vary in diameter and width on different applications.
- The diameter of the pulley must be large enough to prevent ply separation of the belt composition due to flexing over small pulleys.
- The pulley diameter is thus a function of the number of belt plies and material construction.

- Therefore, the standard rule is that the diameter of the drive head pulley should not be smaller than 125 times the number of plies in the belt

Head Pulley

- Normally the discharge end of the conveyor where the material is transferred to another conveyor is called as the Head end and the pulley in this end is called the head pulley. Most of the cases the drive is attached to the Head end of the pulley and so head pulley will designed stronger and bigger when compared to others.

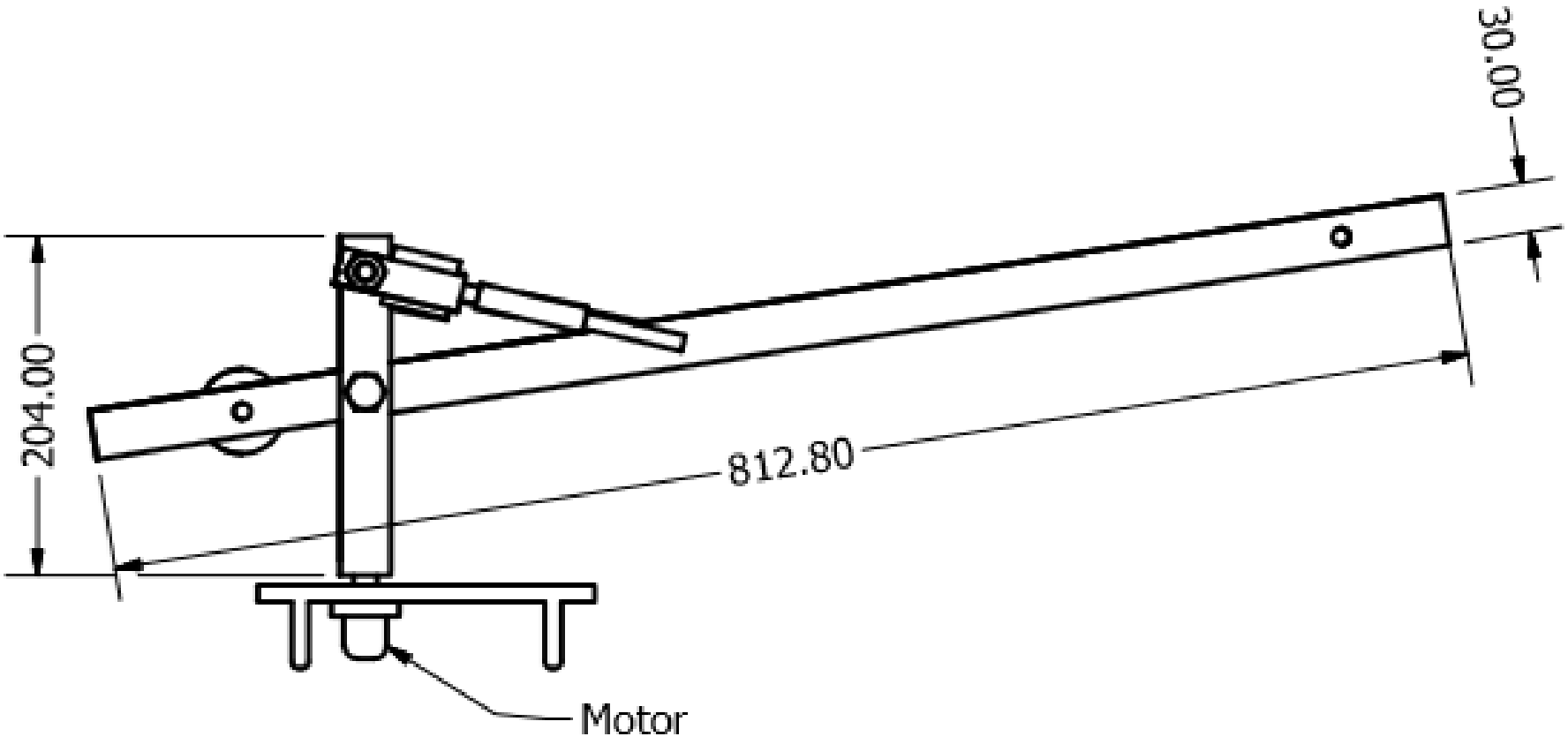
Tail Pulley

- The pulley which is situated in the receiving end of the conveyor is called as tail pulley. Some times Screw take-up will be situated in this pulley. This pulley is movable when take up is kept in this. When belt takes a turn for take-up arrangement or for any other drive arrangement this term comes. This acts as a support when belt takes a turn.

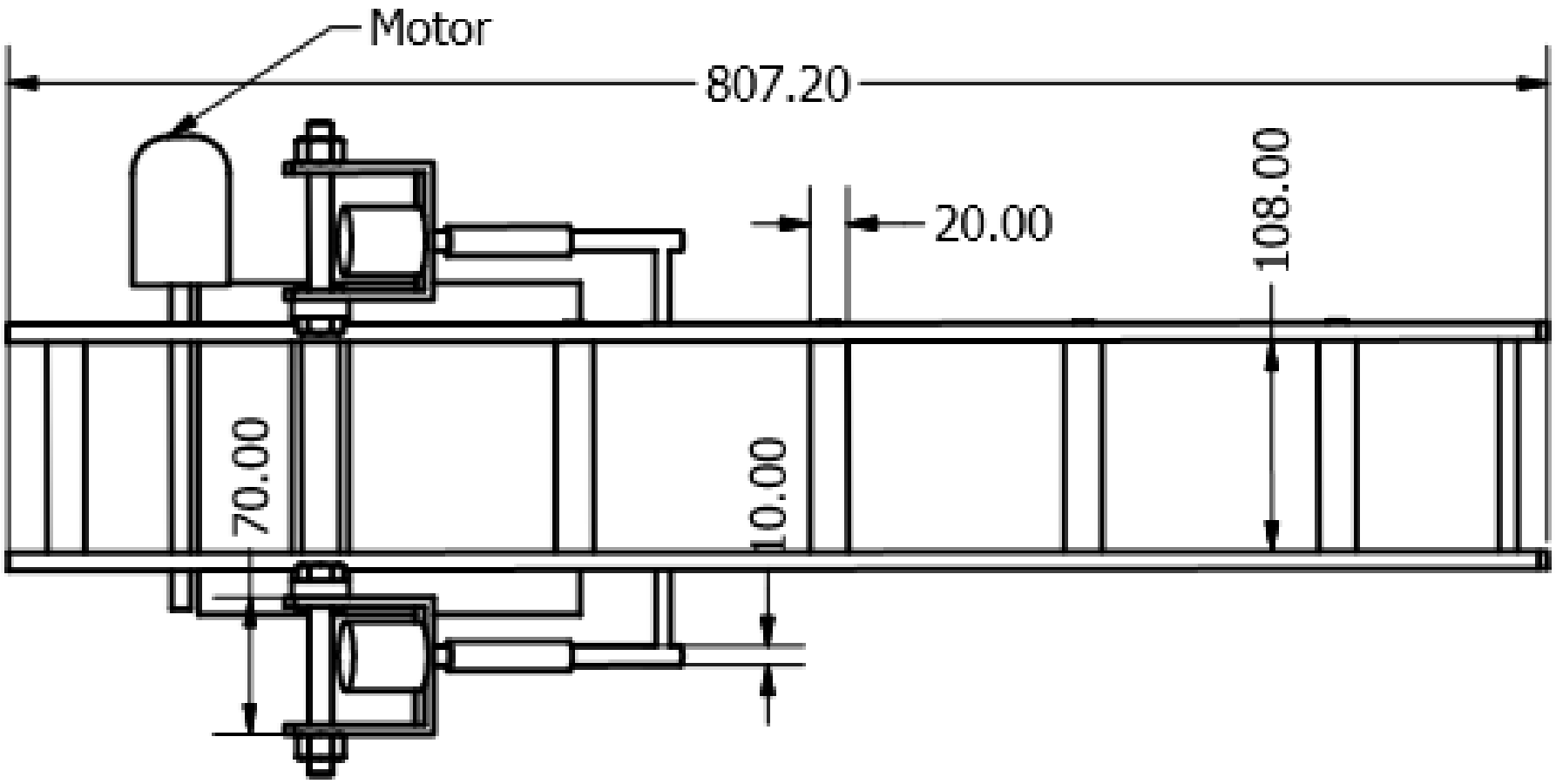
Advantages

- Can be operated easily some distances.
- Carry all kinds of loads.
- Noiseless as compared to chain conveyors.
- Much simpler to maintain and don’t require any major lubrication system like chain conveyors.
- Their reliability has been proved over a long period by its use in the industry.

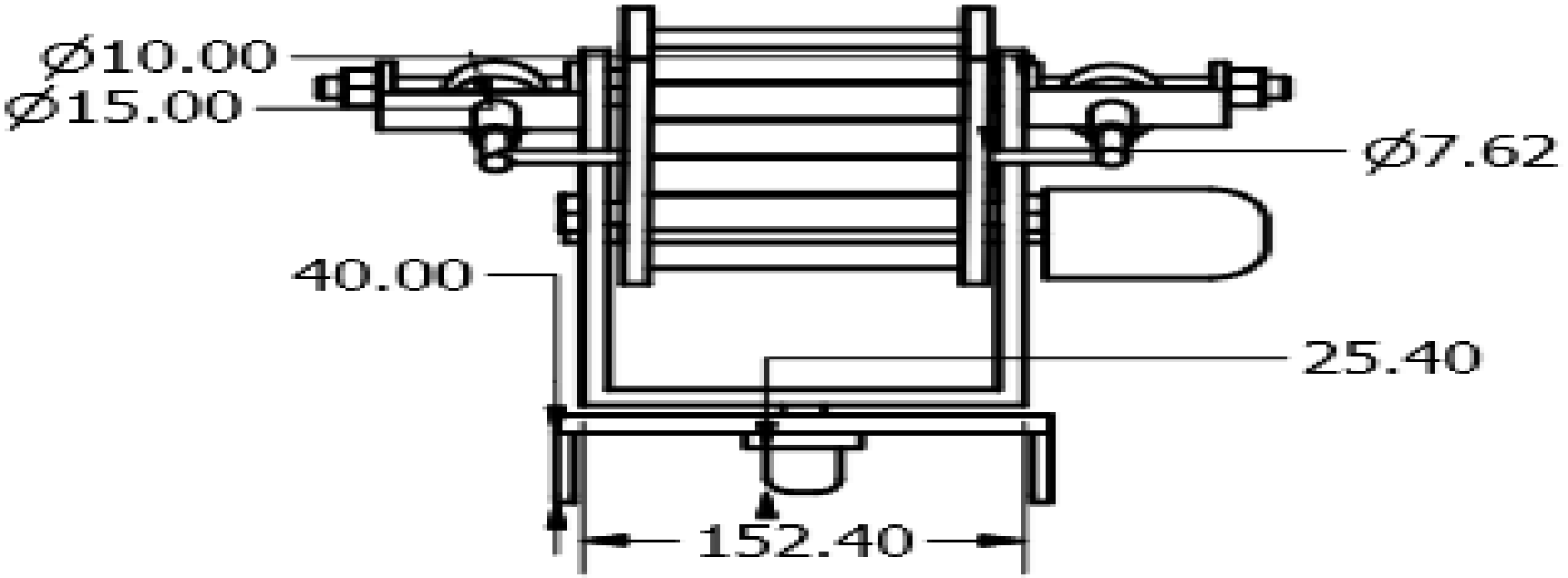
- Environmentally more acceptable.
- Low labor and low energy requirements.
- Unlike screw conveyors, belt conveyors can be easily used for performing processes functions in a production line.
- It’s rotated at 360 degree.



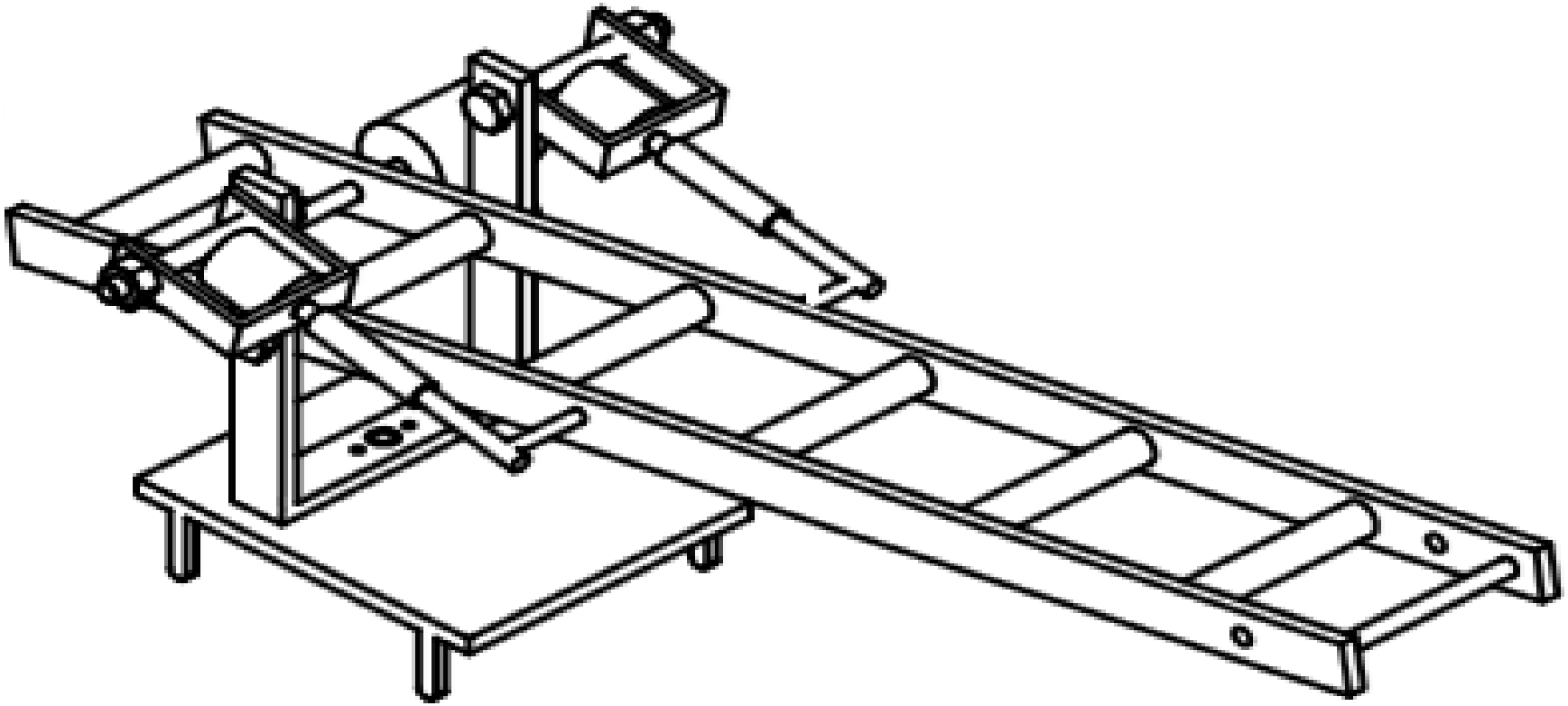
FRONT VIEW
(INVENTOR DWG DRAWING)



TOP VIEW (INVENTOR DWG DRAWING)



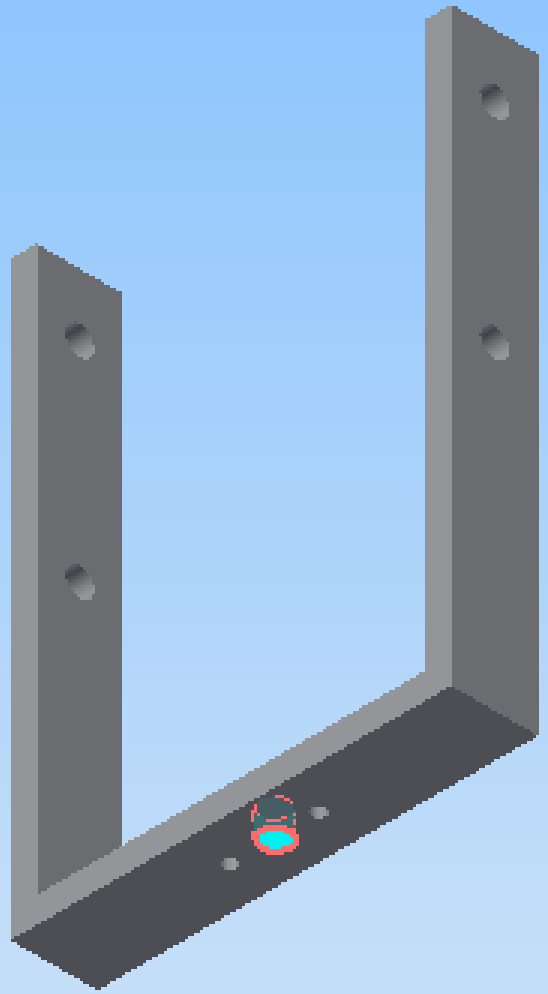
SIDE VIEW(INVENTOR DWG DRAWING)



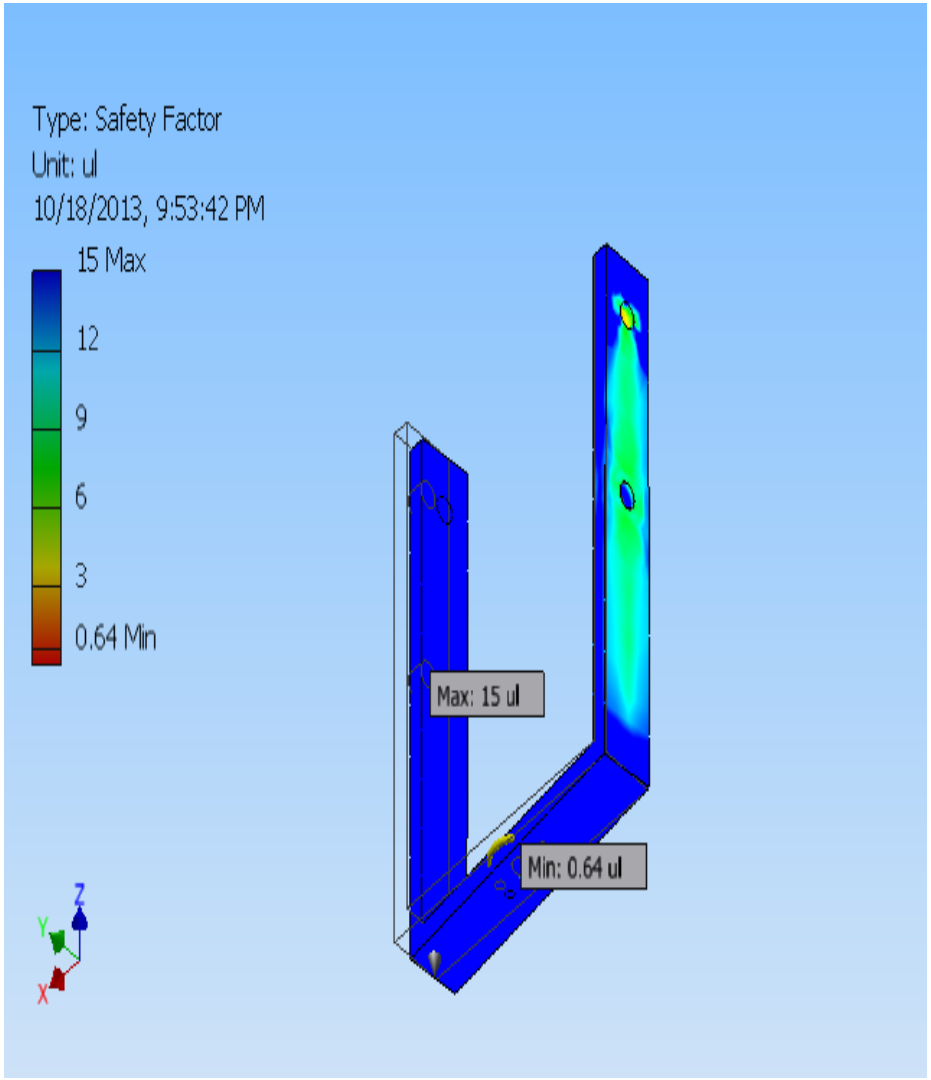
ISOMETRIC VIEW (INVENTOR DWG DRAWING)

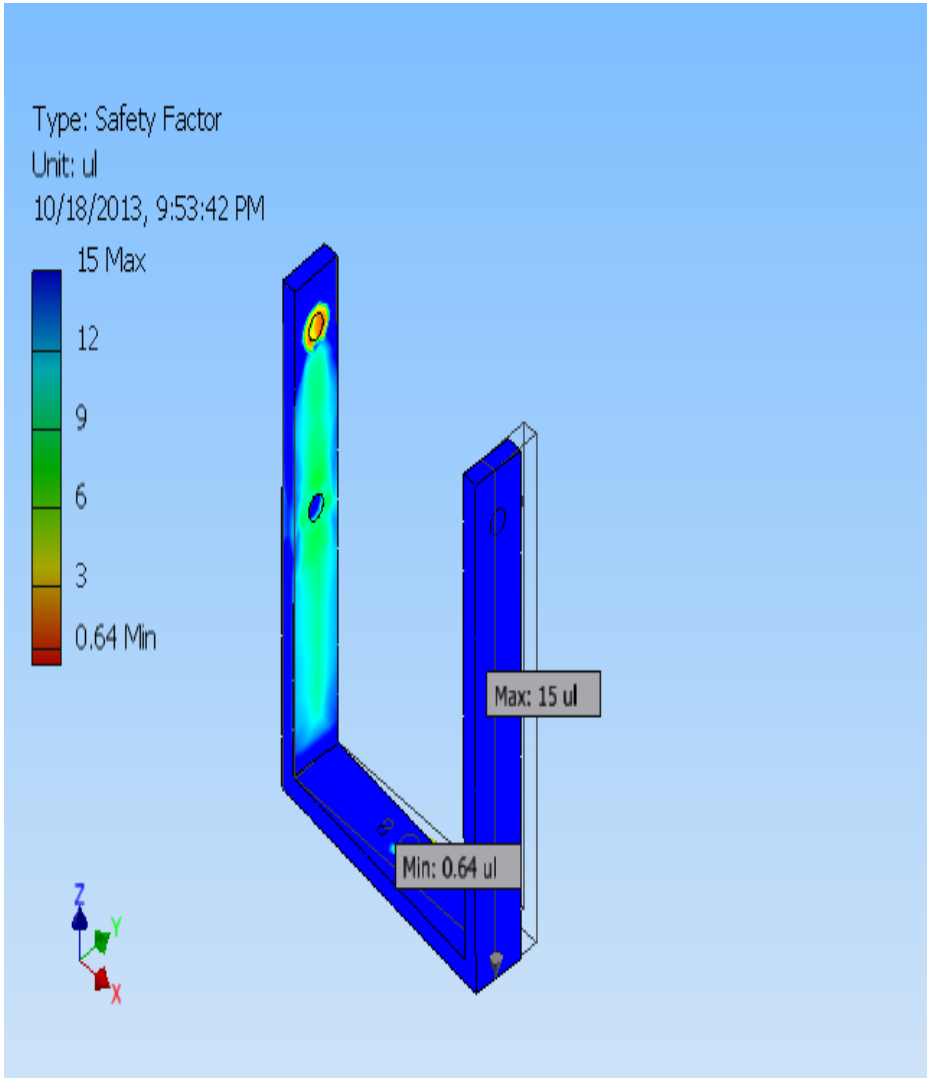
Below shown faces analysis is according to

- **Safety Factor**
- **Von Mises Stress**
- **1st principal stress**
- **3rd principal stress** and
- **Displacement** is done and the related result and figures are shown below.

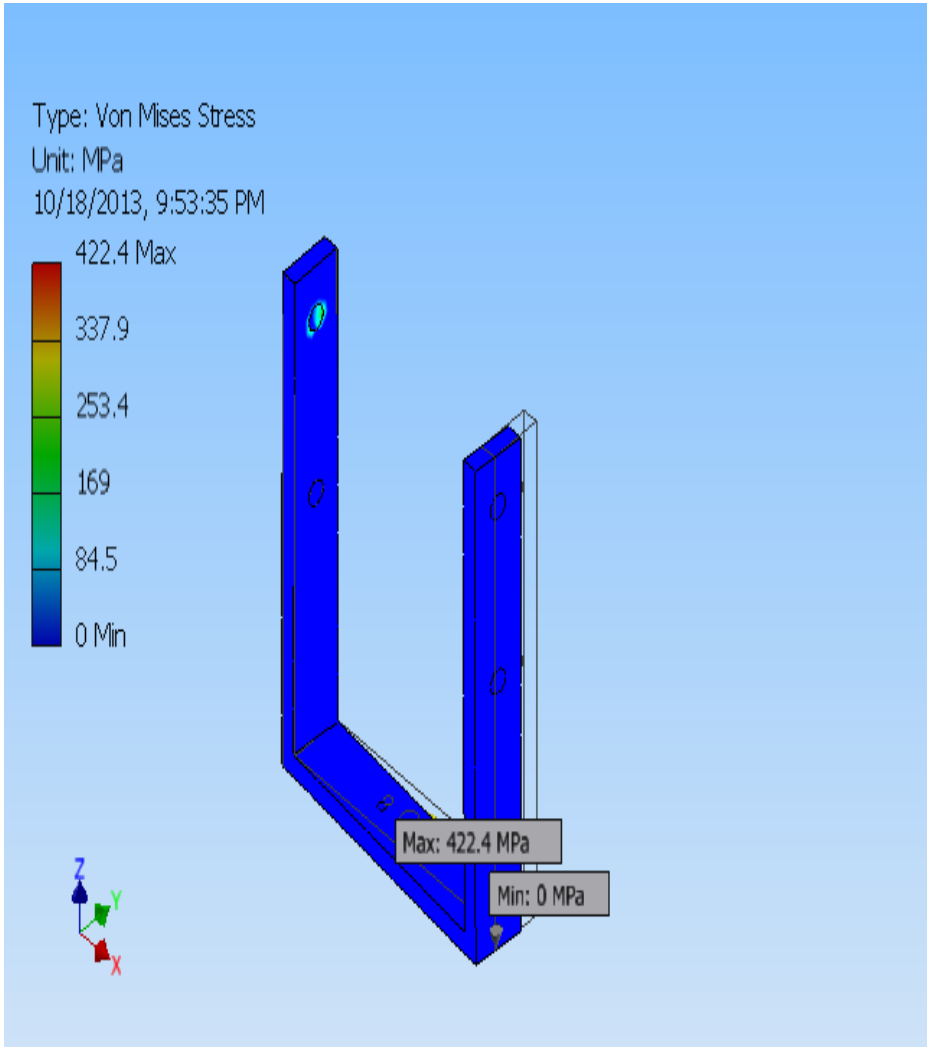

Z
Y
X

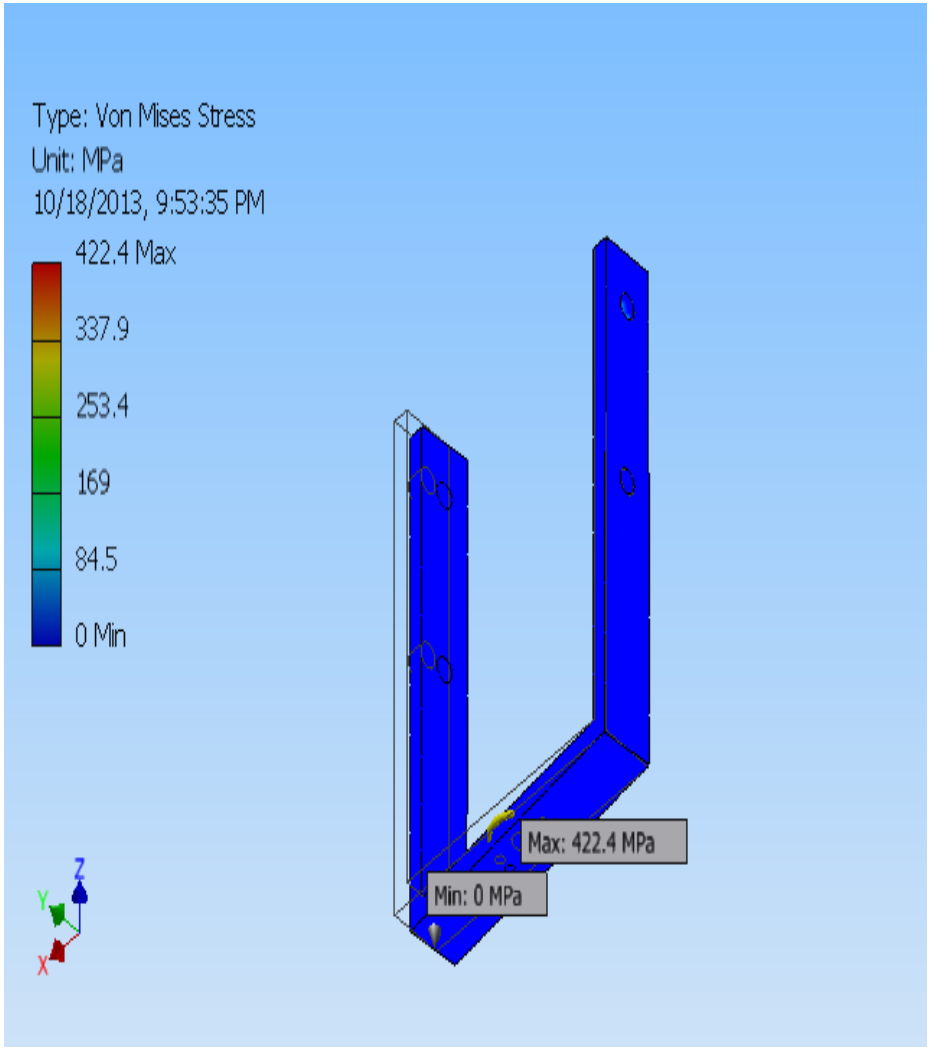
Safety Factor



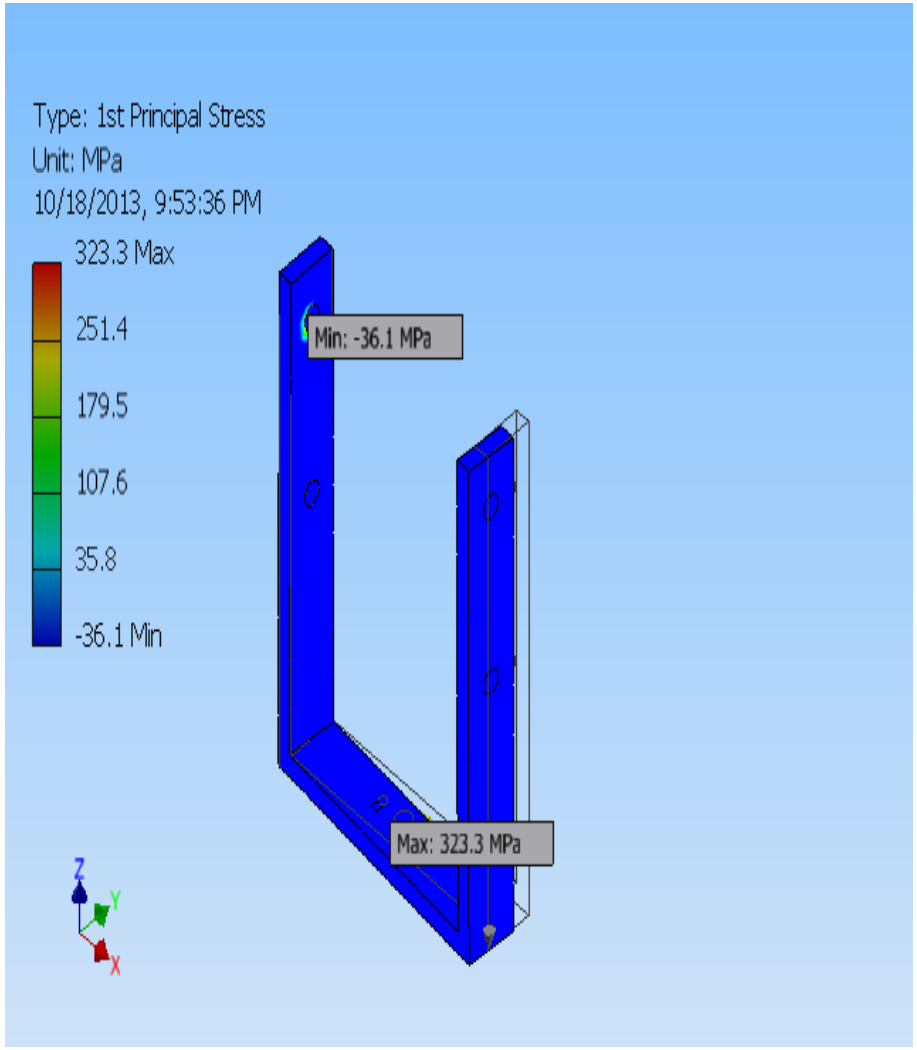


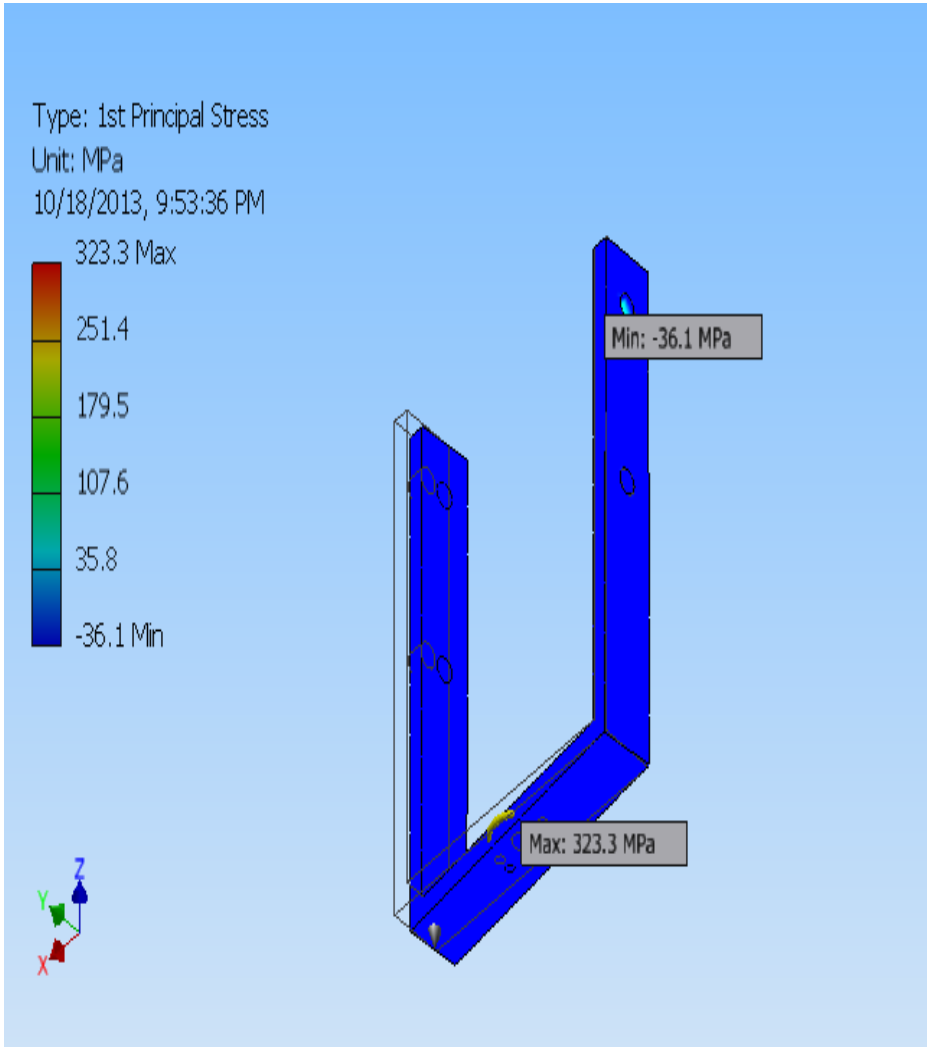
Von Mises Stress



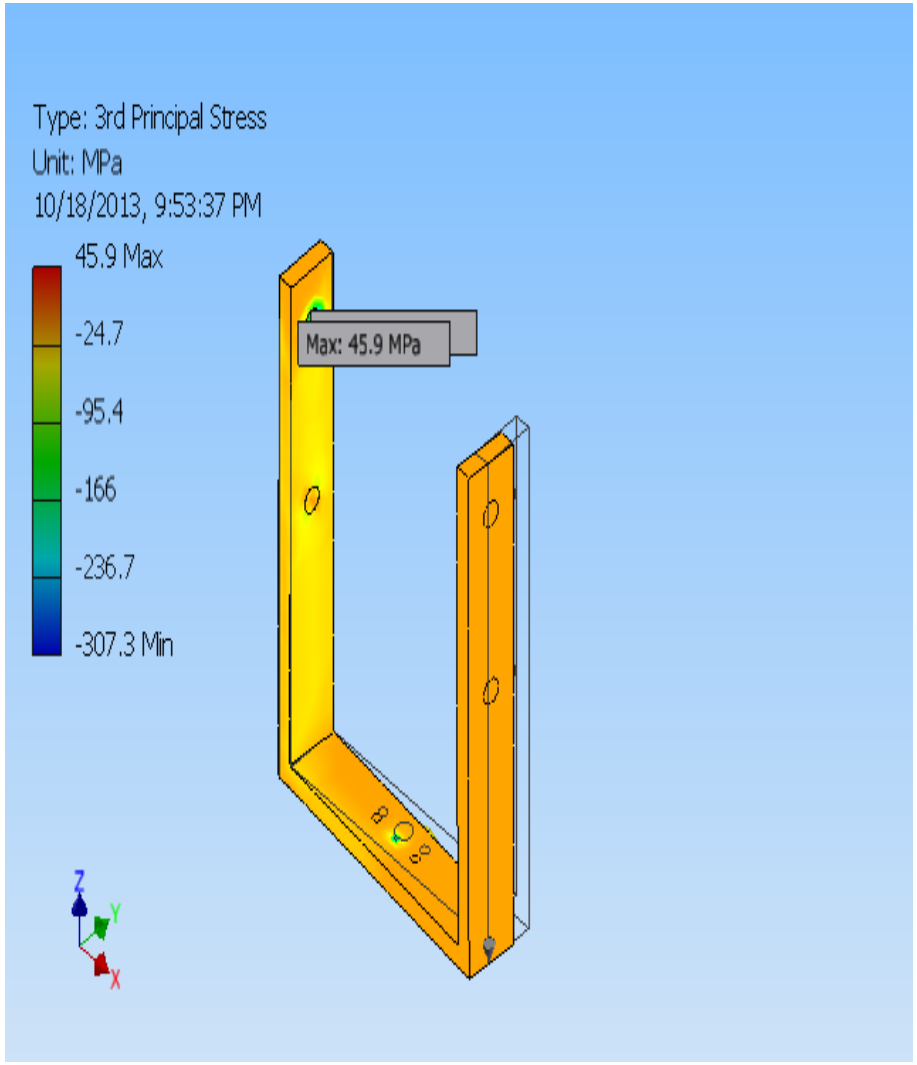


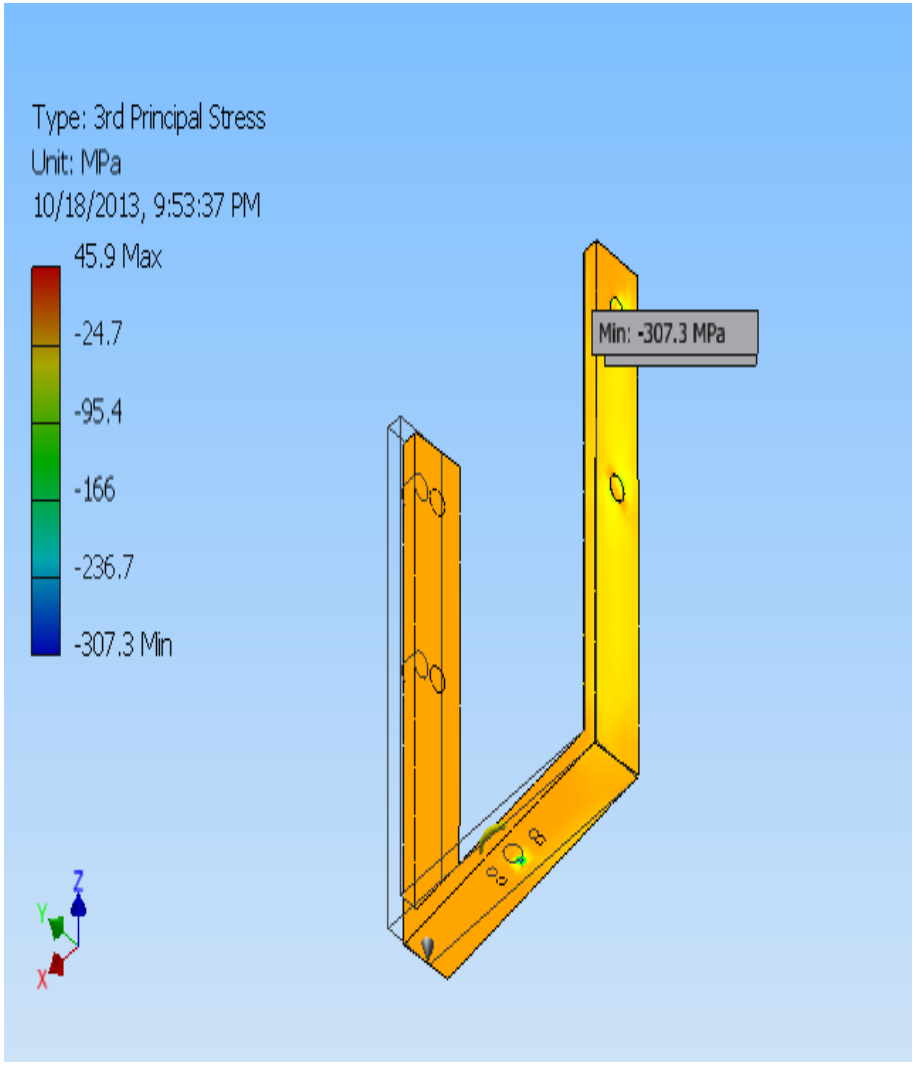
1st Principal Stress



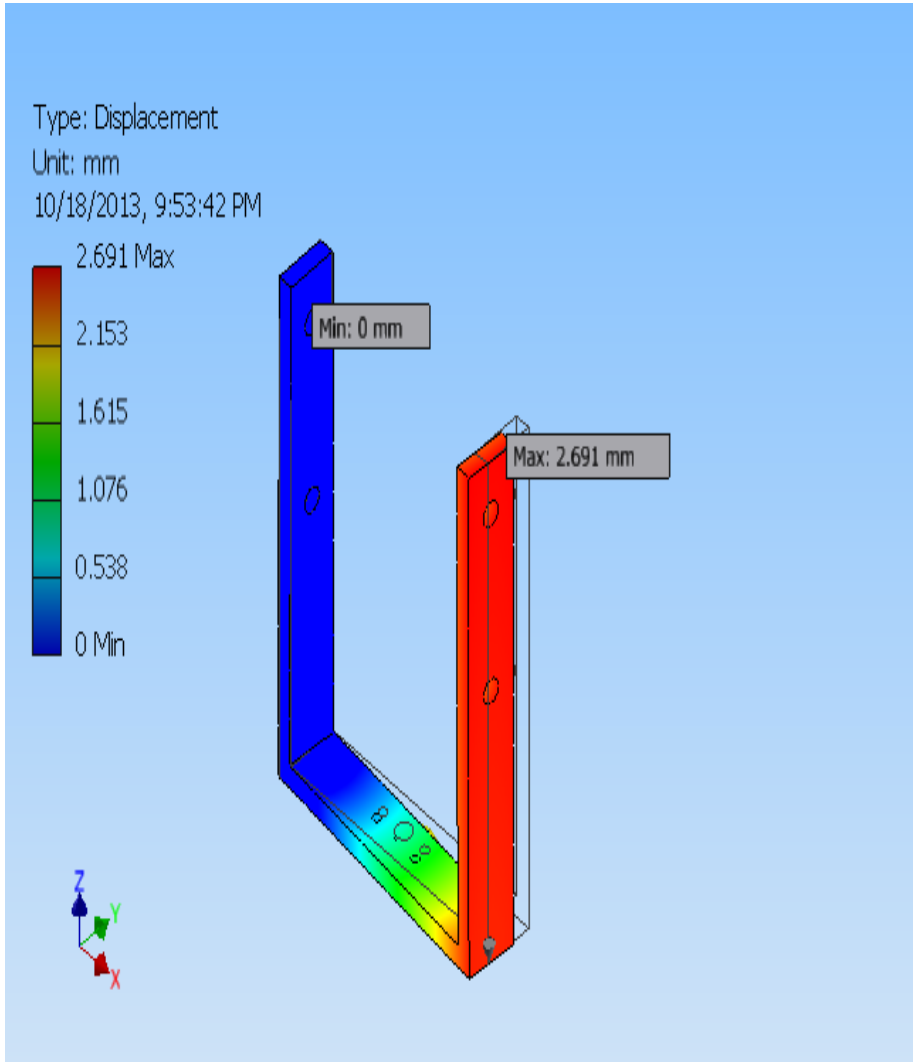


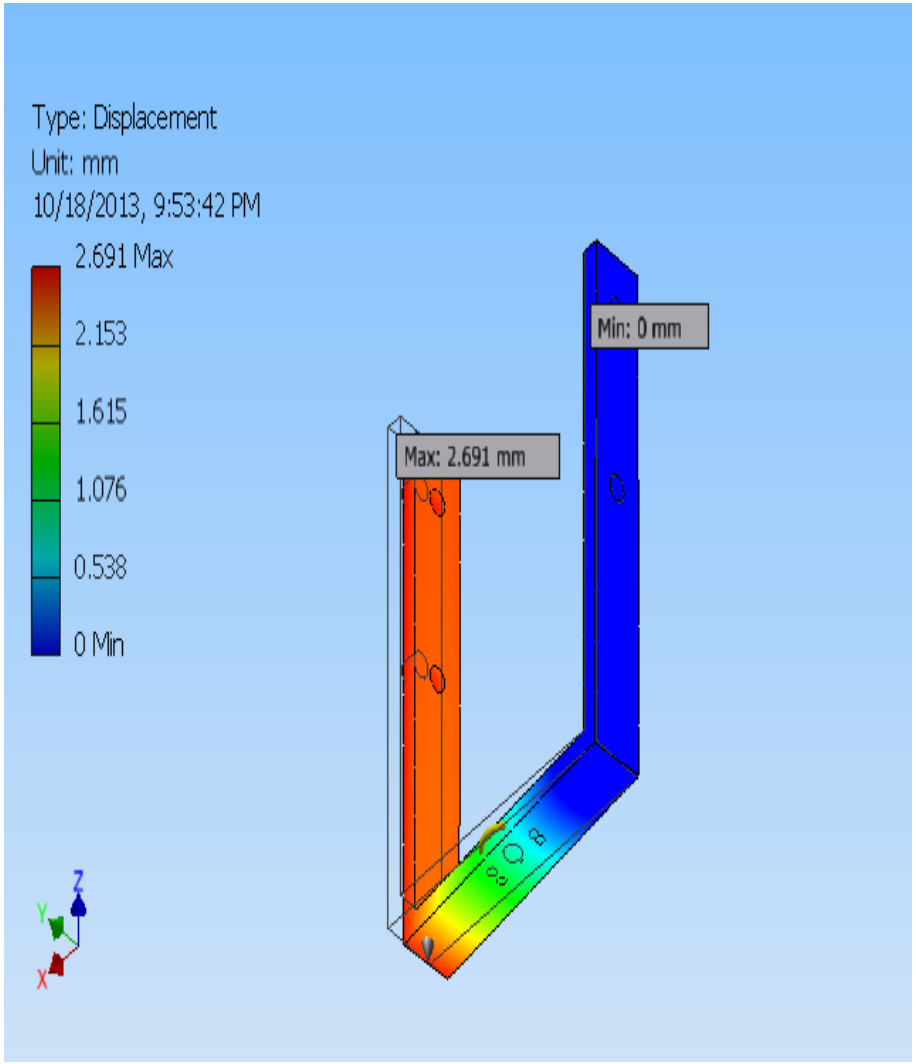
3rd Principal Stress



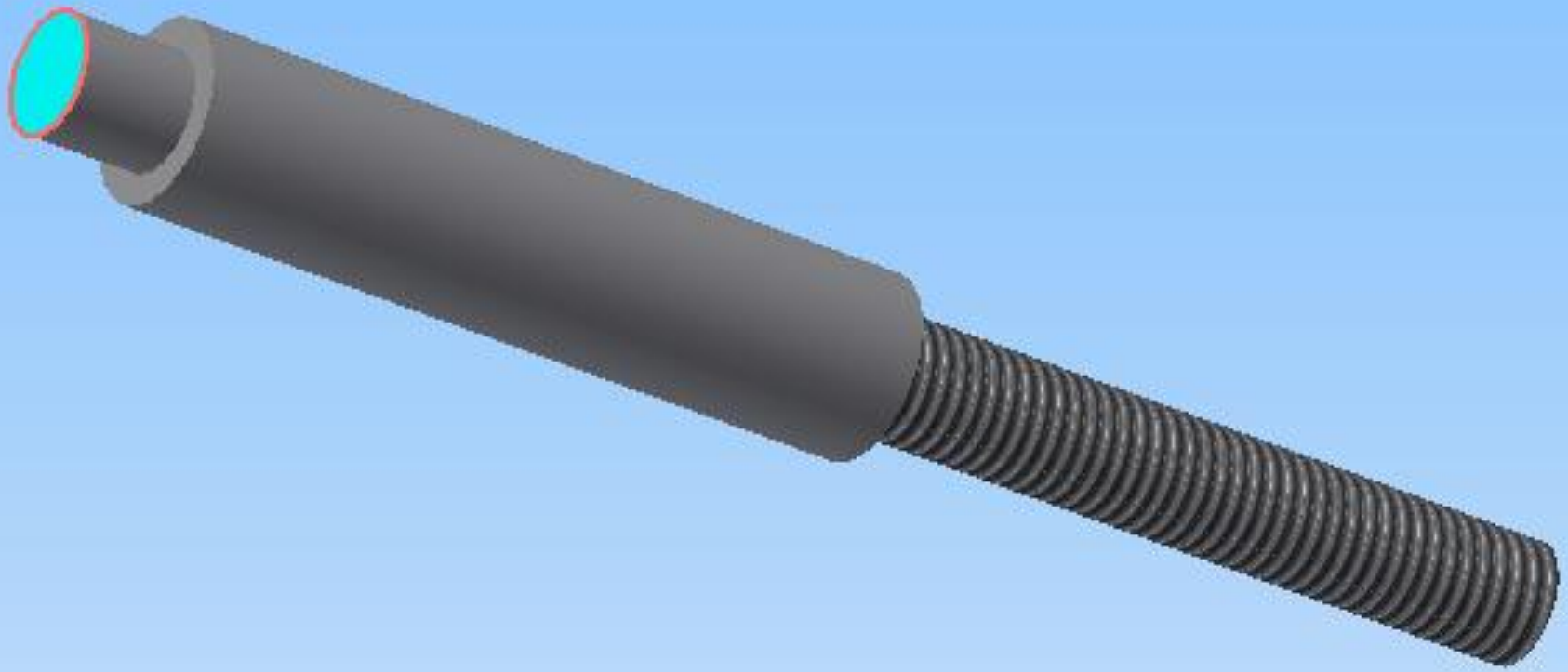


Displacement

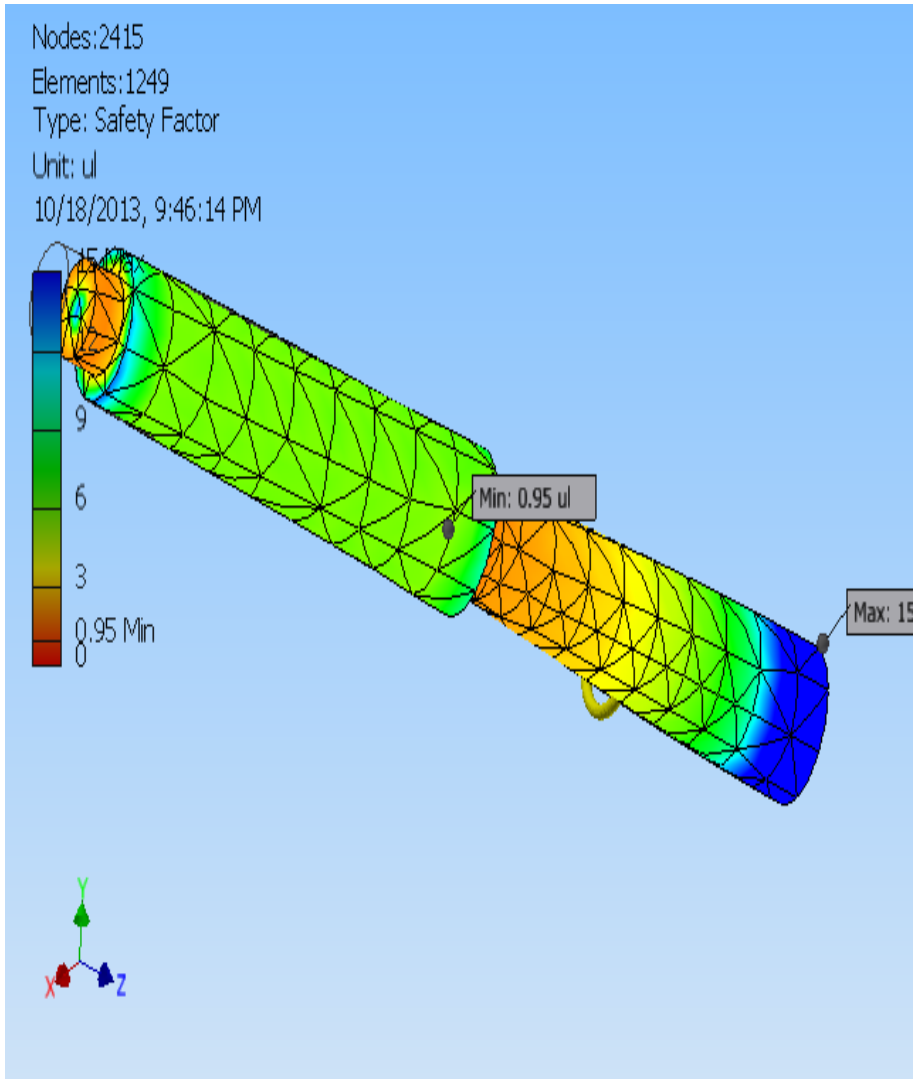


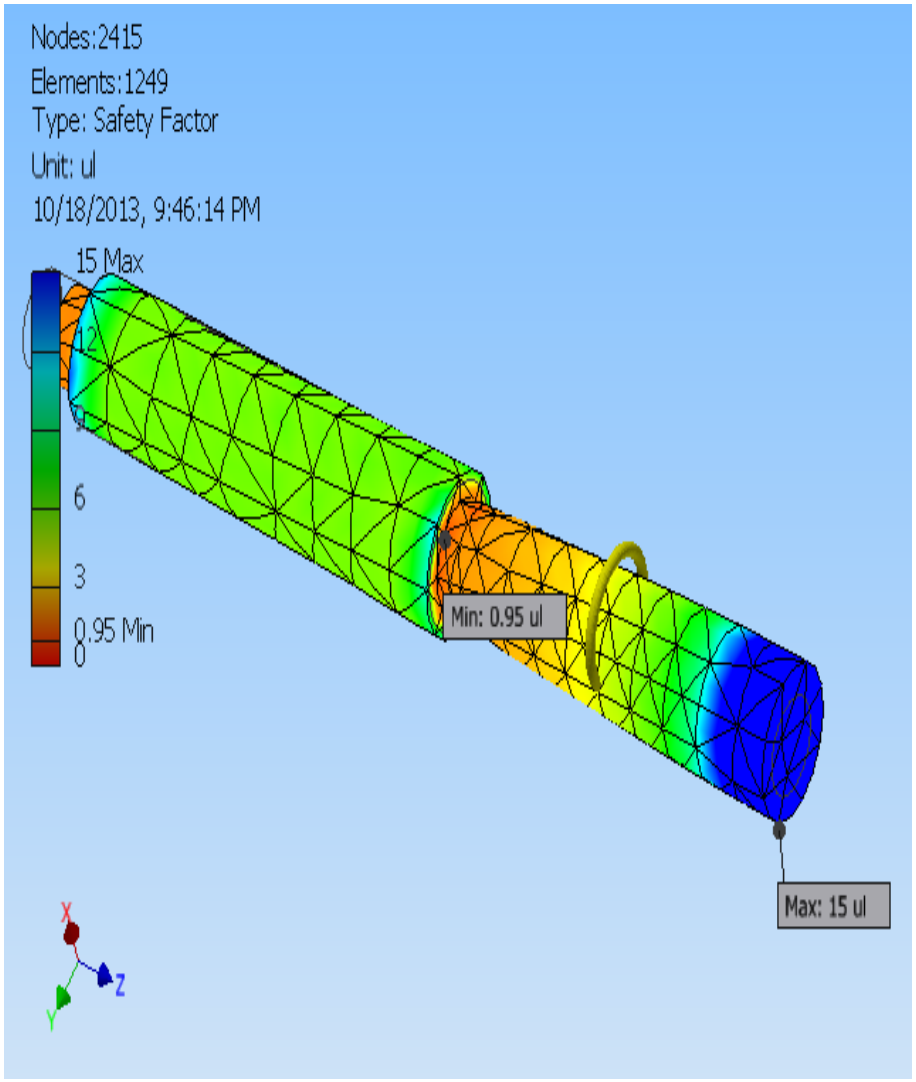


Name	Minimum	Maximum
Volume	143239 mm^3	
Mass	0.388177 kg	
Von Mises Stress	0.00114222 MPa	422.399 MPa
1st Principal Stress	-36.1034 MPa	323.27 MPa
3rd Principal Stress	-307.348 MPa	45.9247 MPa
Displacement	0 mm	2.69113 mm
Safety Factor	0.636161 ul	15 ul
Stress XX	-268.397 MPa	262.037 MPa
Stress XY	-238.813 MPa	184.155 MPa
Stress XZ	-92.2997 MPa	96.1548 MPa
Stress YY	-210.175 MPa	250.076 MPa
Stress YZ	-24.3478 MPa	47.5568 MPa
Stress ZZ	-111.147 MPa	134.456 MPa
X Displacement	-0.267256 mm	0.270205 mm
Y Displacement	-2.67753 mm	0.0837282 mm
Z Displacement	-0.00563371 mm	0.00544223 mm
Equivalent Strain	0.0000000171639 ul	0.00544117 ul
1st Principal Strain	0.00000000731401 ul	0.00499021 ul
3rd Principal Strain	-0.00441626 ul	-0.00000000589397 ul
Strain XX	-0.00373656 ul	0.00424021 ul
Strain XY	-0.0046099 ul	0.00355481 ul
Strain XZ	-0.00178169 ul	0.00185611 ul
Strain YY	-0.00398359 ul	0.00409095 ul
Strain YZ	-0.000469993 ul	0.000918006 ul

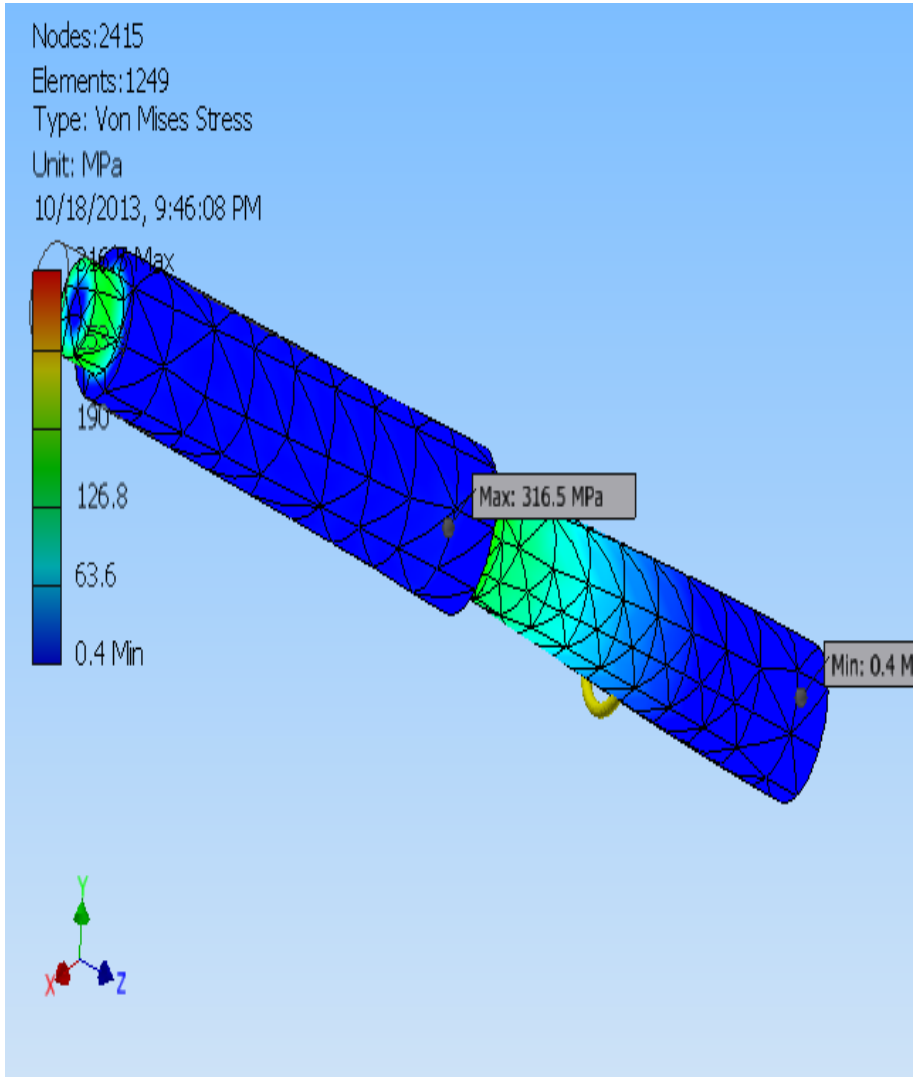

Y
X
Z

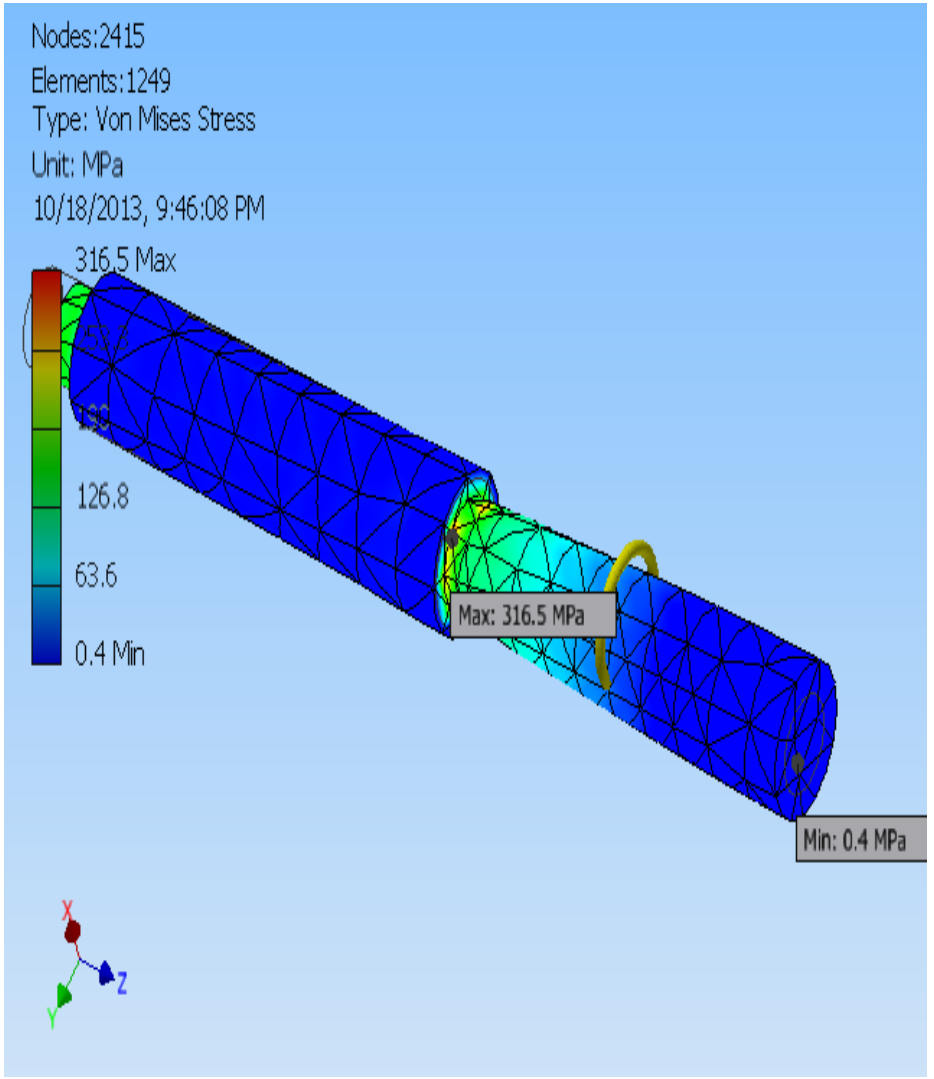
Safety Factor



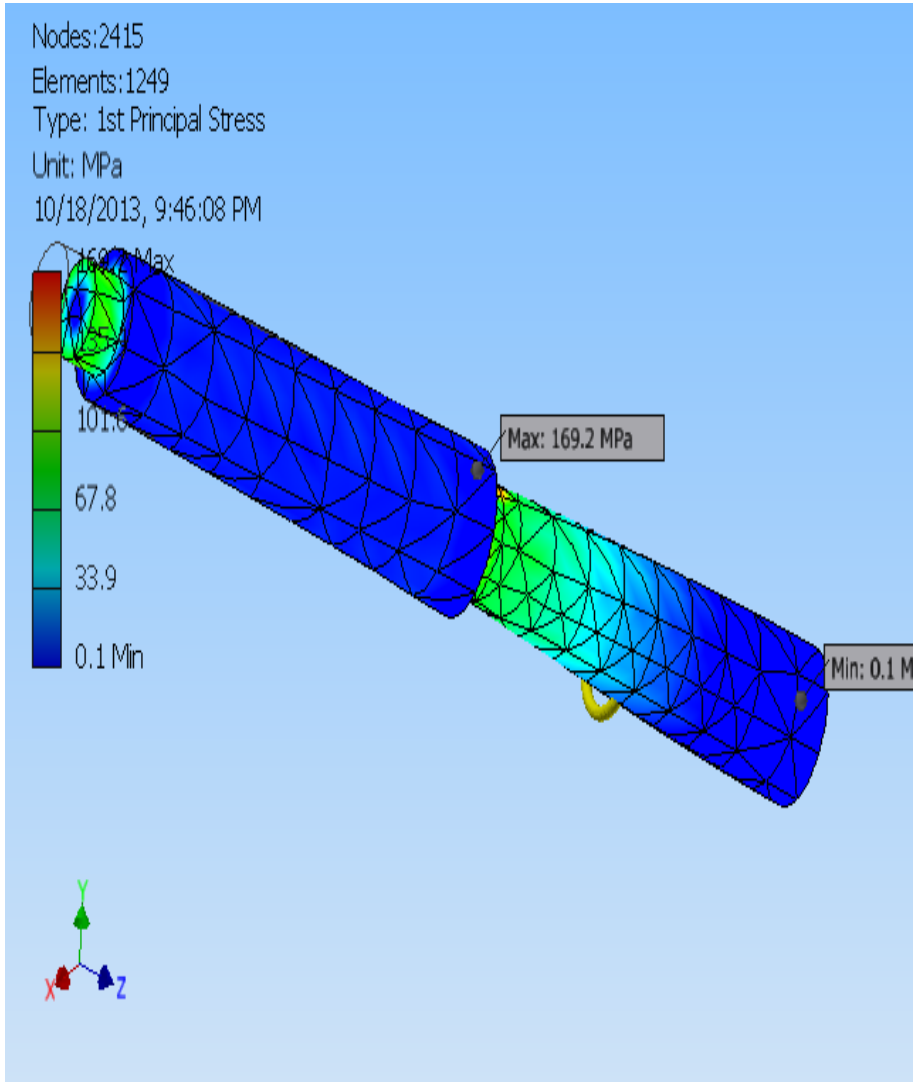


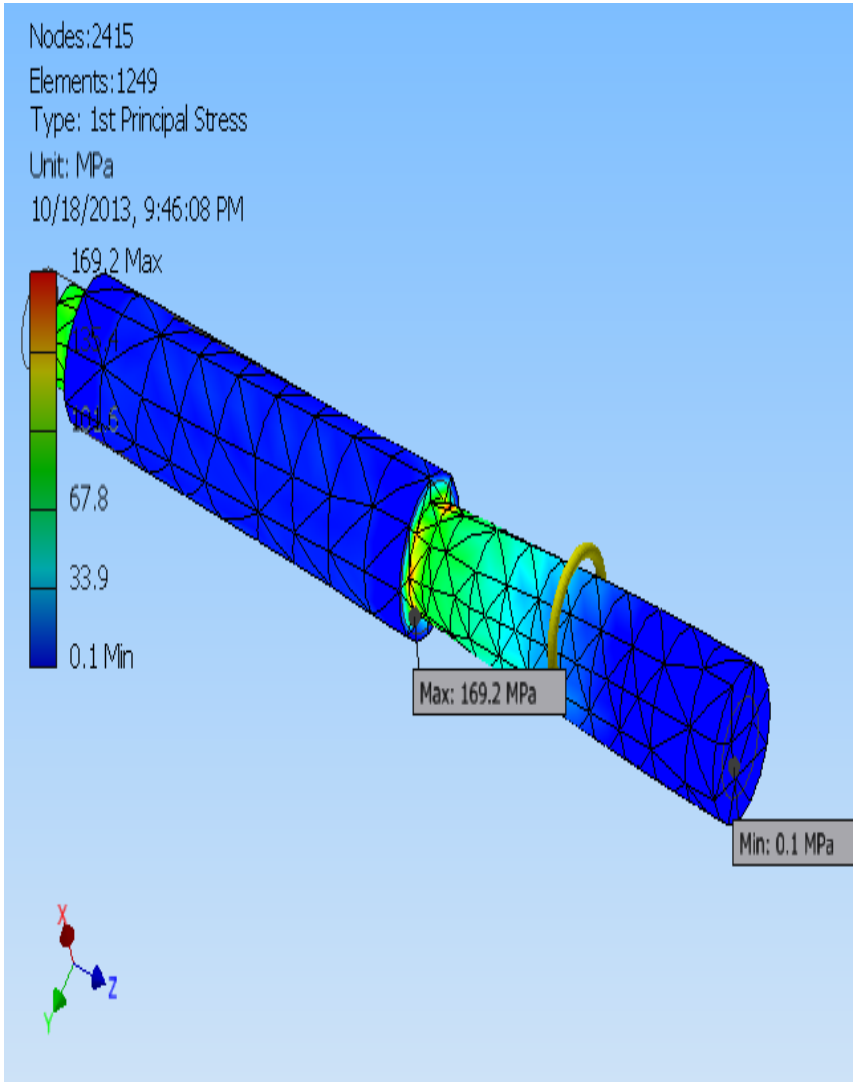
Von Mises Stress



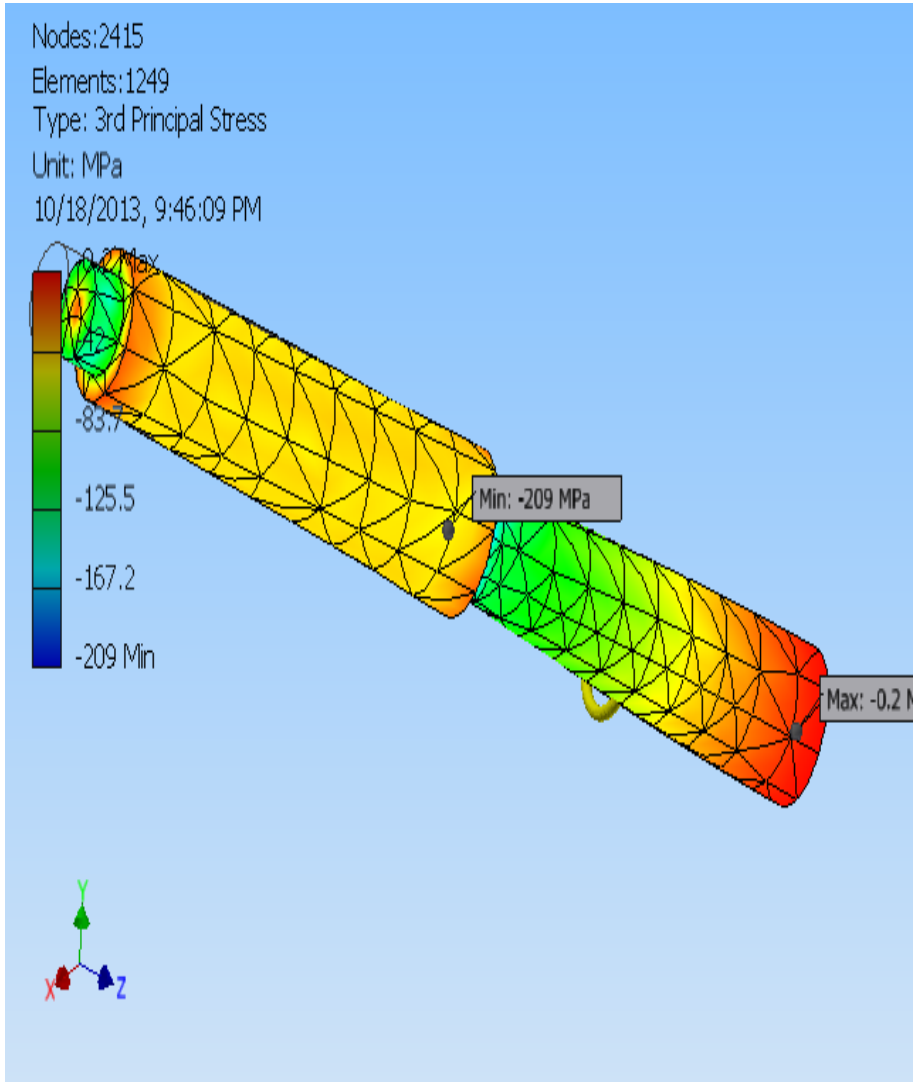


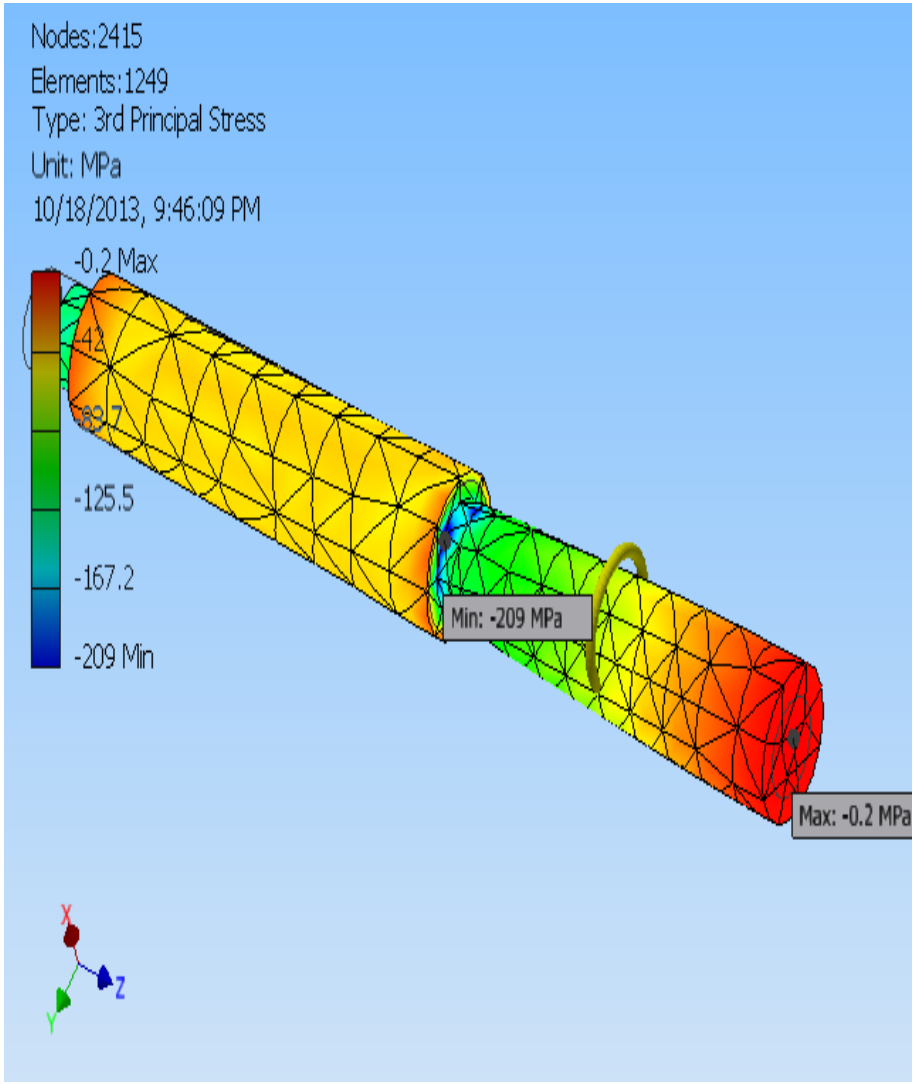
1st Principal Stress



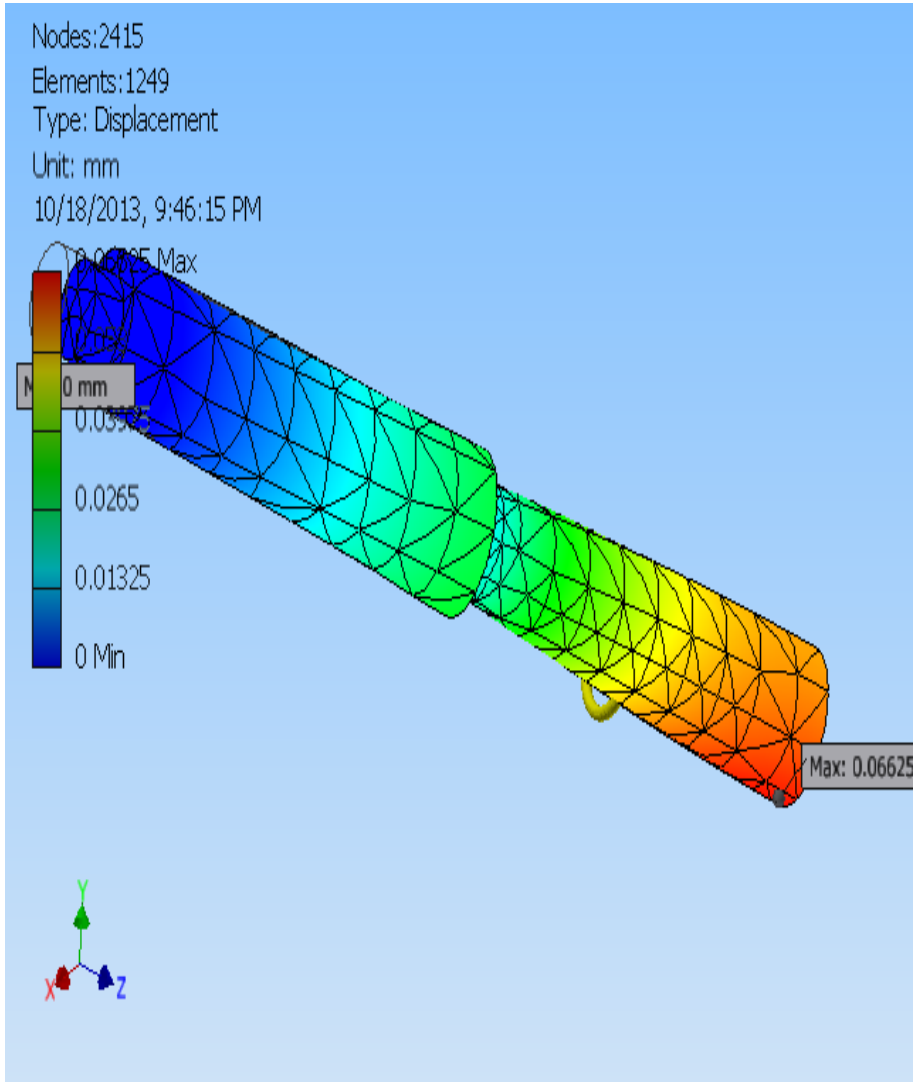


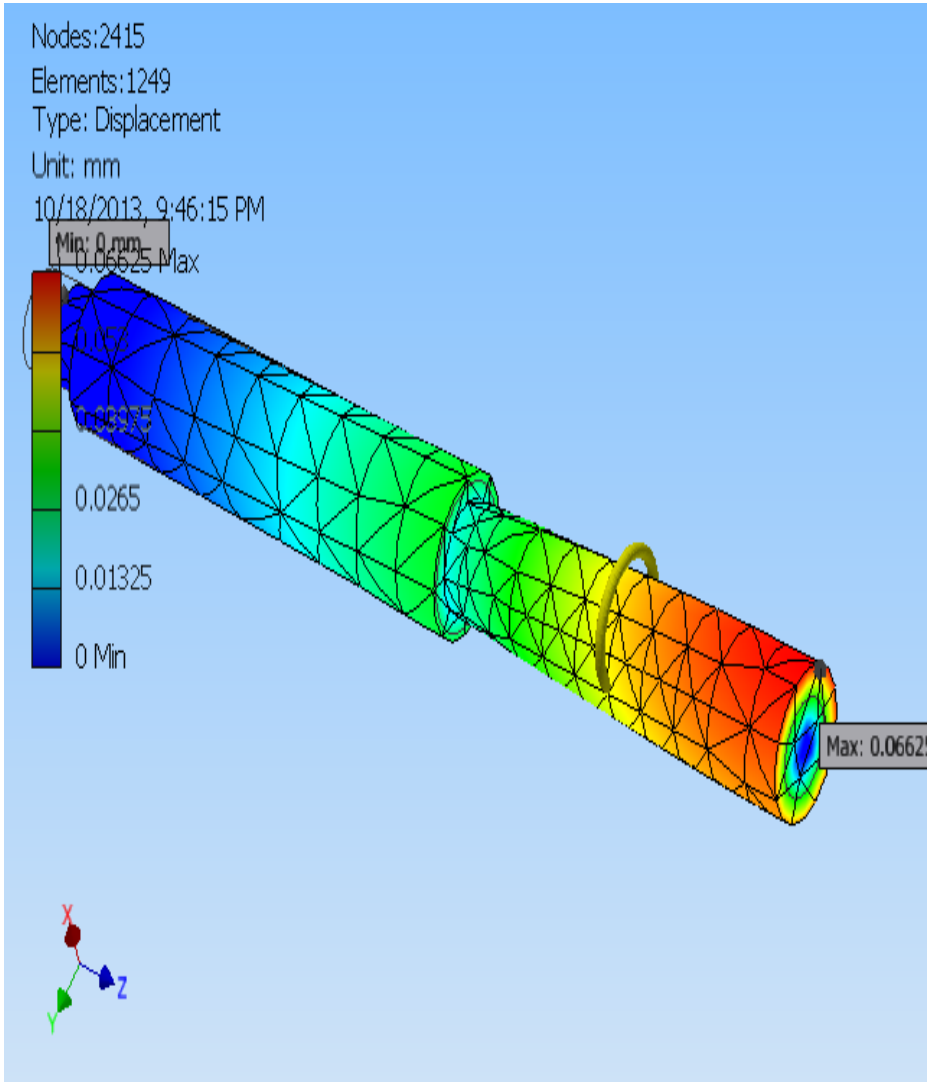
3rd Principal Stress



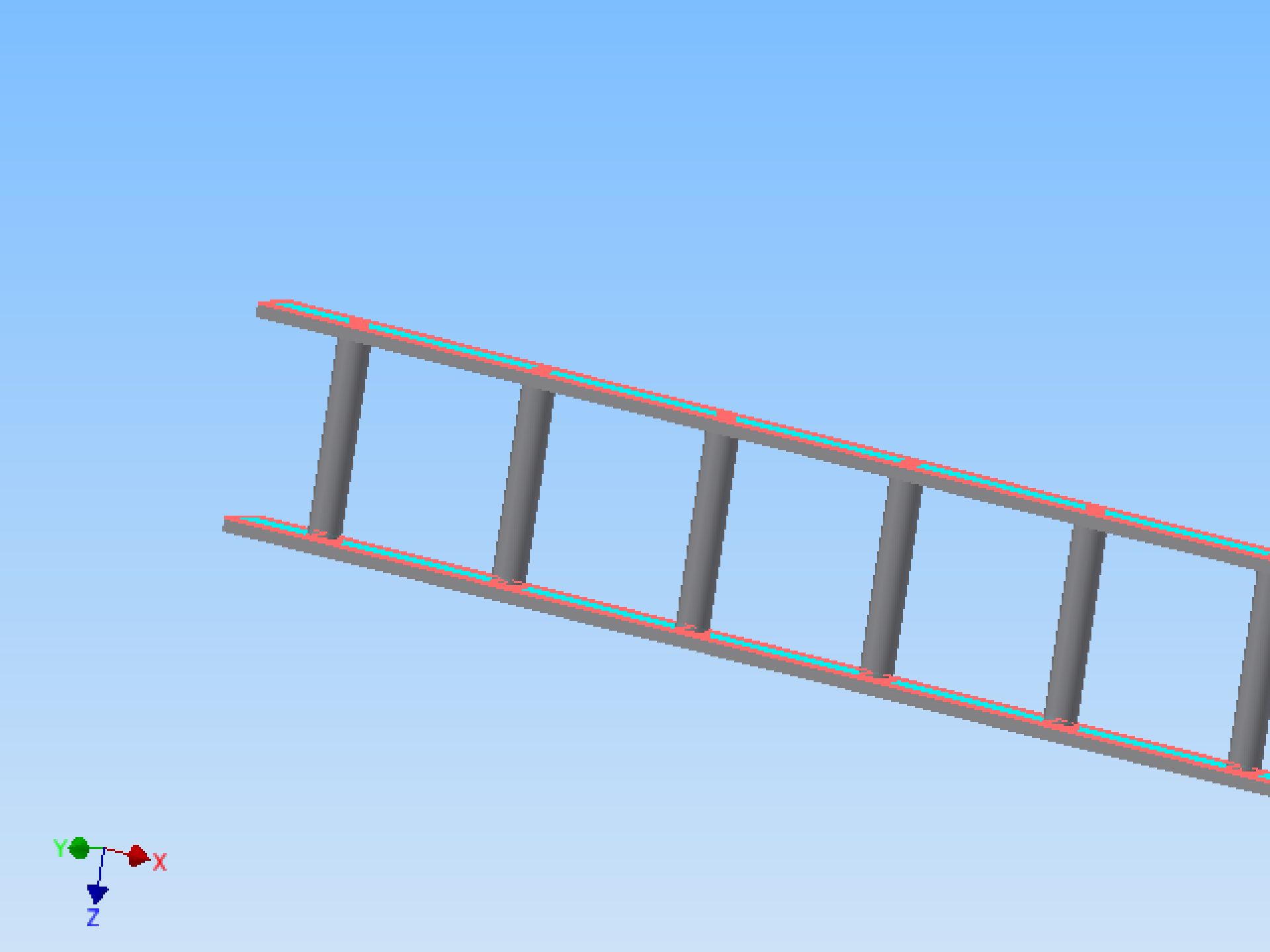


Displacement

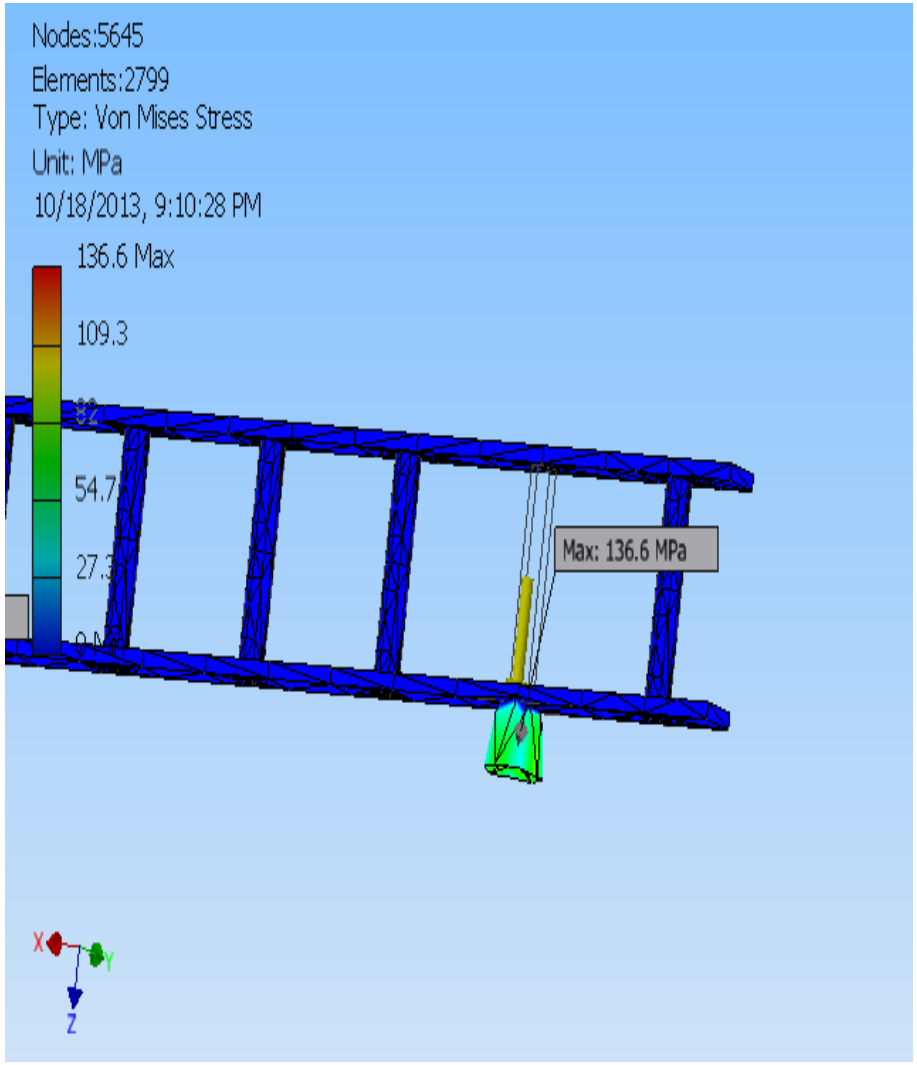


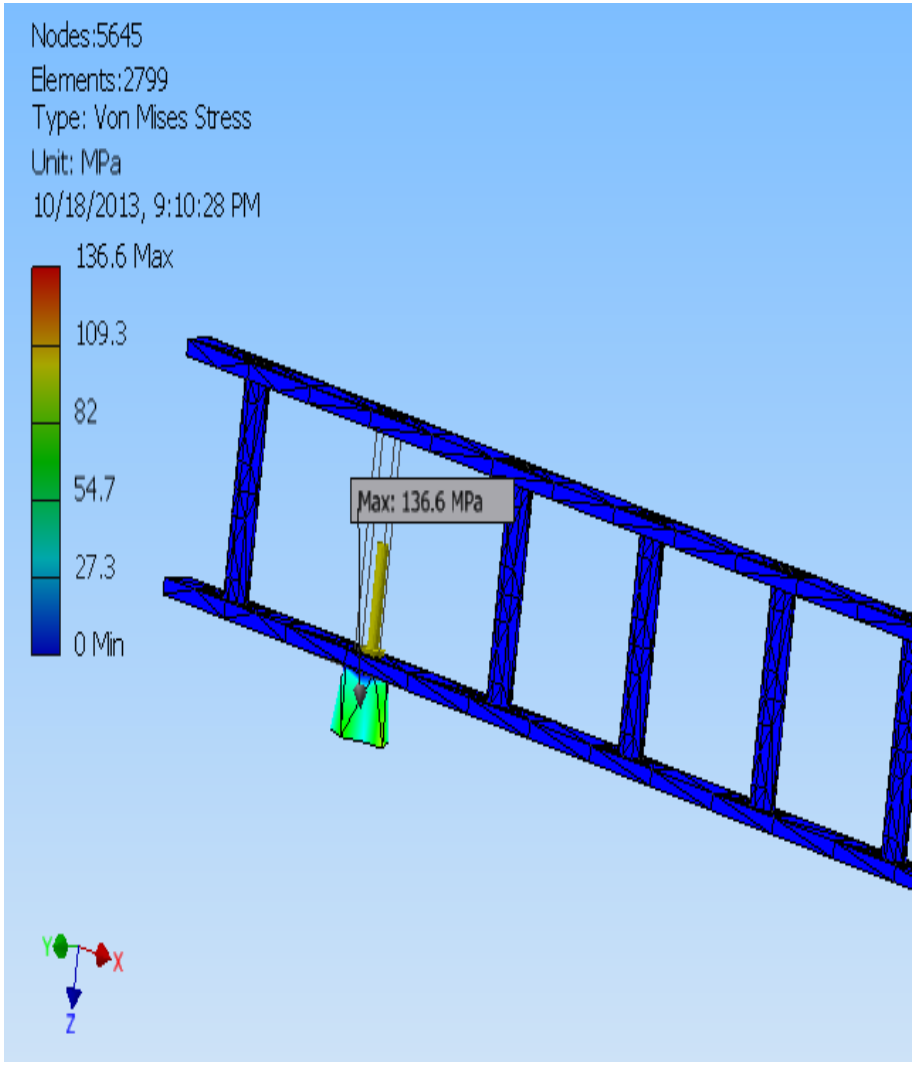


Name	Minimum	Maximum
Volume	11879.1 mm^3	
Mass	0.0933701 kg	
Von Mises Stress	0.387542 MPa	316.467 MPa
1st Principal Stress	0.148469 MPa	169.155 MPa
3rd Principal Stress	-208.981 MPa	-0.216527 MPa
Displacement	0 mm	0.0662466 mm
Safety Factor	0.949356 ul	15 ul
Stress XX	-152.495 MPa	120.716 MPa
Stress XY	-112.483 MPa	94.506 MPa
Stress XZ	-119.361 MPa	120.931 MPa
Stress YY	-98.443 MPa	115.875 MPa
Stress YZ	-167.022 MPa	139.843 MPa
Stress ZZ	-23.9528 MPa	19.6967 MPa
X Displacement	-0.0612779 mm	0.0625337 mm
Y Displacement	-0.0662436 mm	0.0576319 mm
Z Displacement	-0.00028939 mm	0.0003399 mm
Equivalent Strain	0.00000151569 ul	0.00122361 ul
1st Principal Strain	0.00000116544 ul	0.000977075 ul
3rd Principal Strain	-0.00115039 ul	-0.00000142489 ul
Strain XX	-0.000823022 ul	0.000633285 ul
Strain XY	-0.00065189 ul	0.000547705 ul
Strain XZ	-0.000691754 ul	0.000700852 ul
Strain YY	-0.00059028 ul	0.000732303 ul
Strain YZ	-0.000967967 ul	0.000810453 ul
Strain ZZ	-0.000108539 ul	0.000106064 ul
Contact Pressure	0 MPa	147.805 MPa

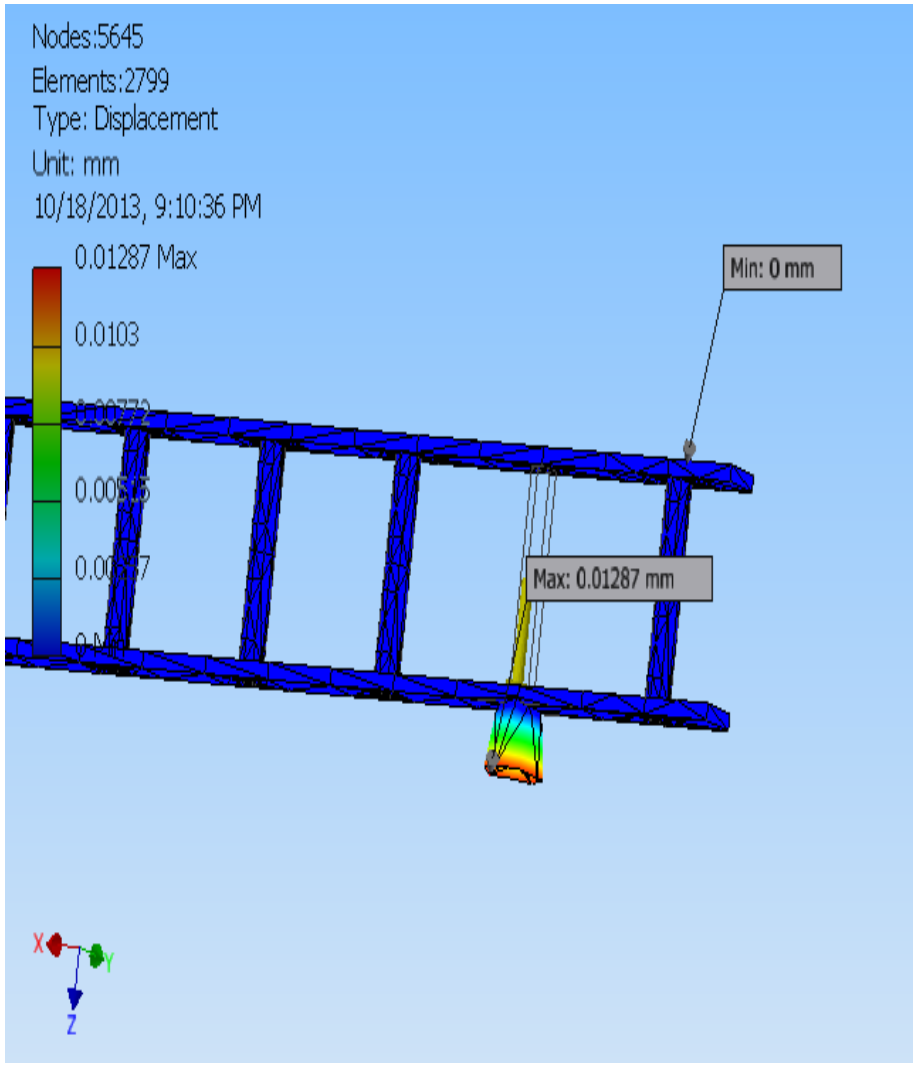

Y
X
Z

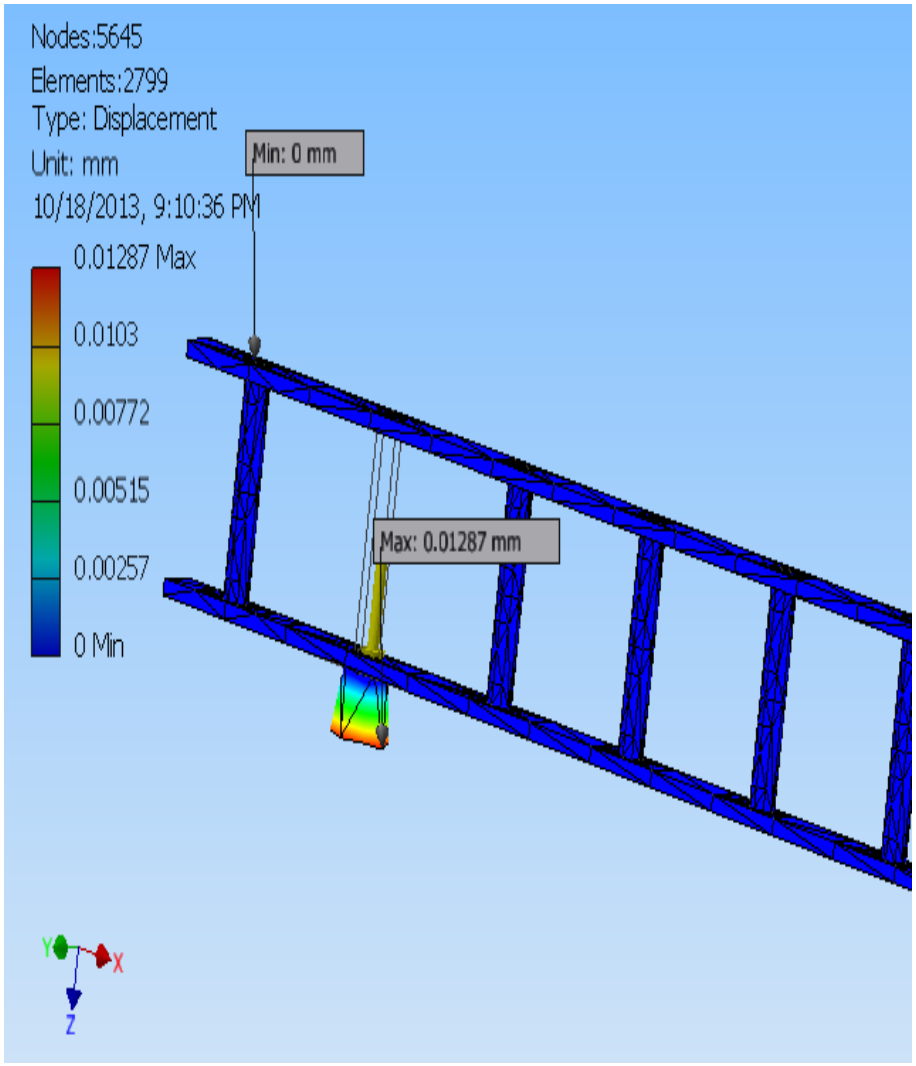
Von Mises Stress



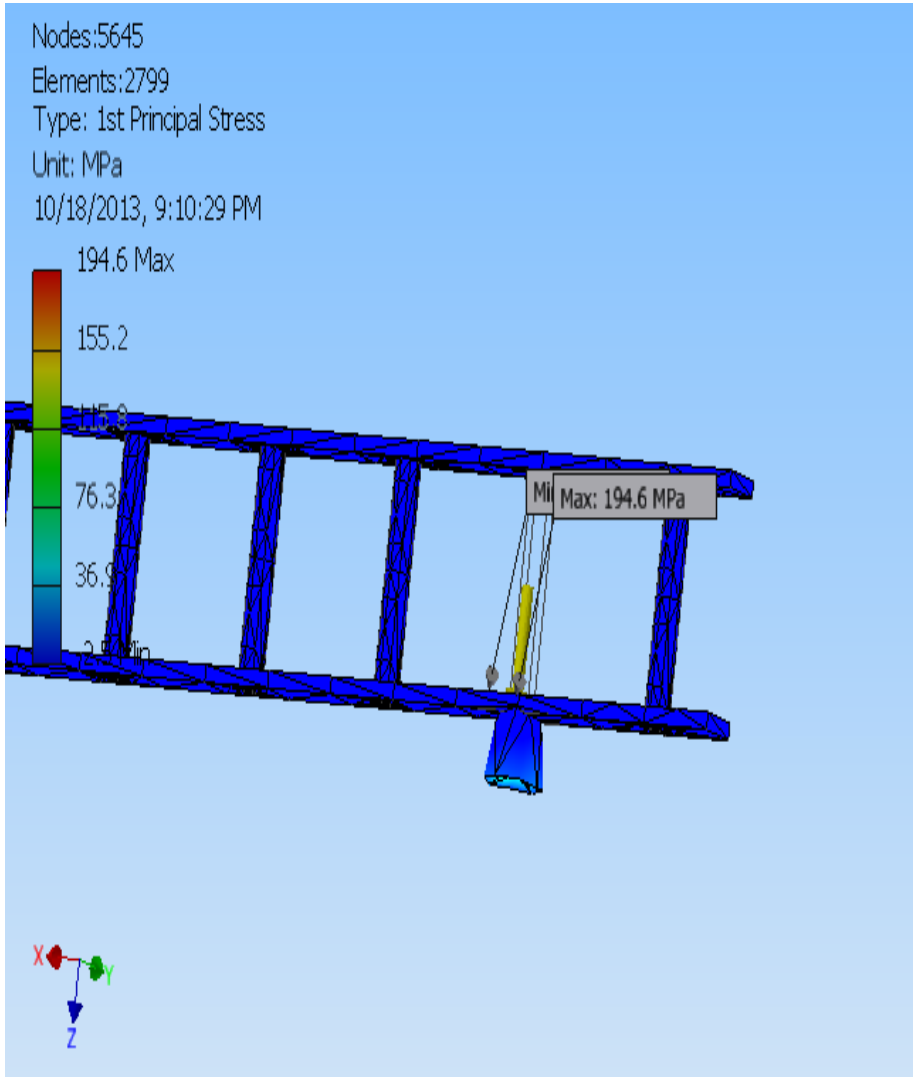


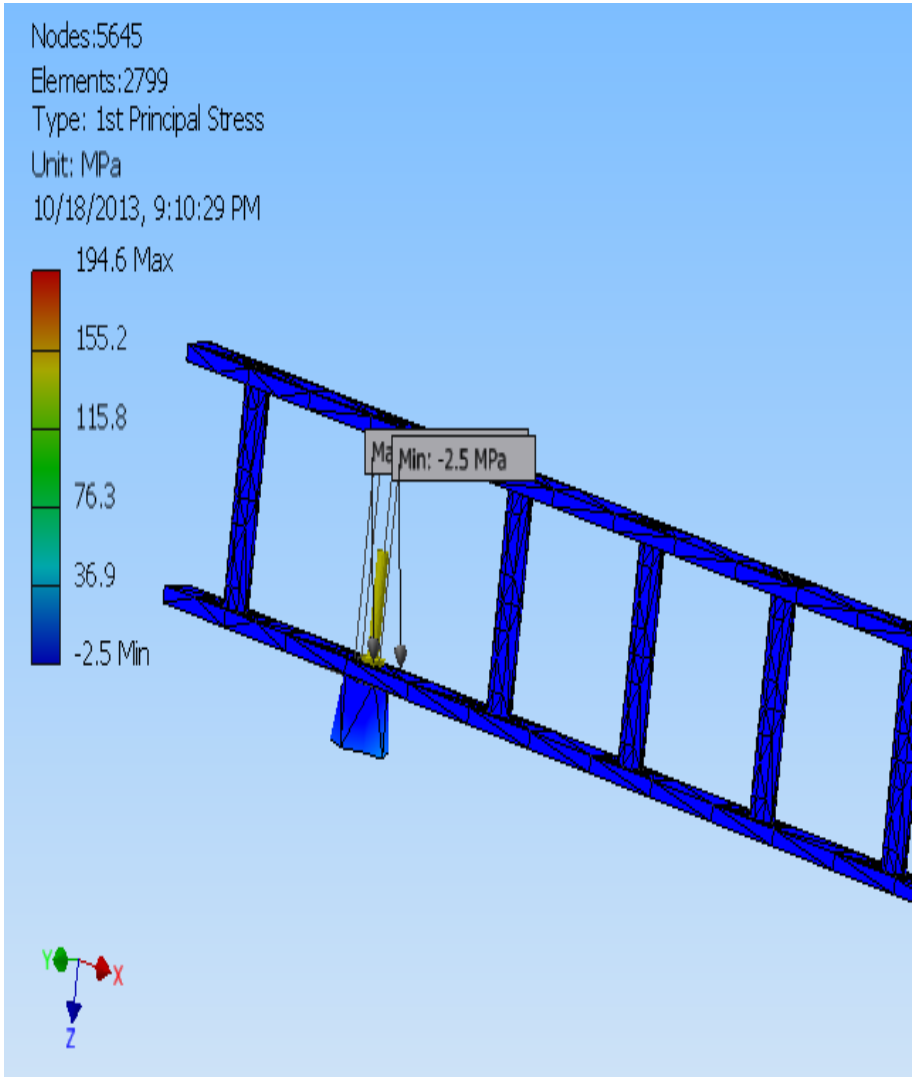
Displacement



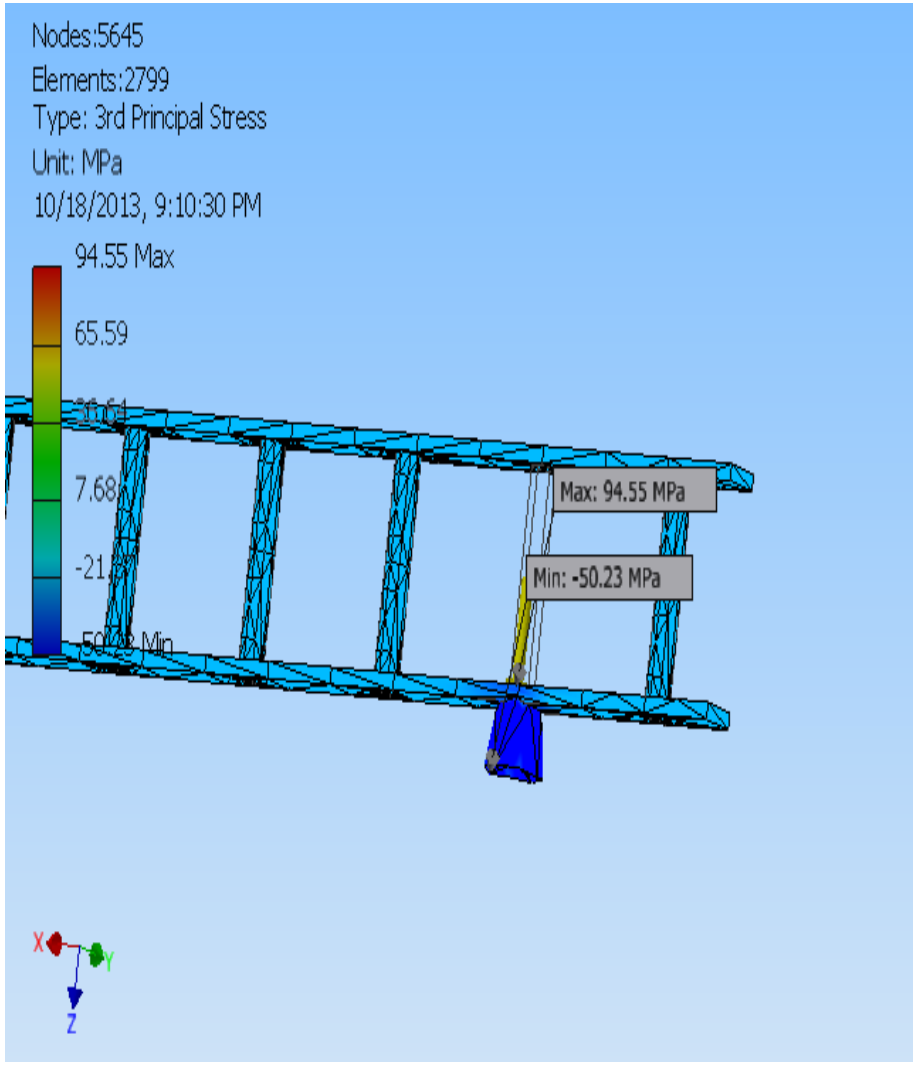


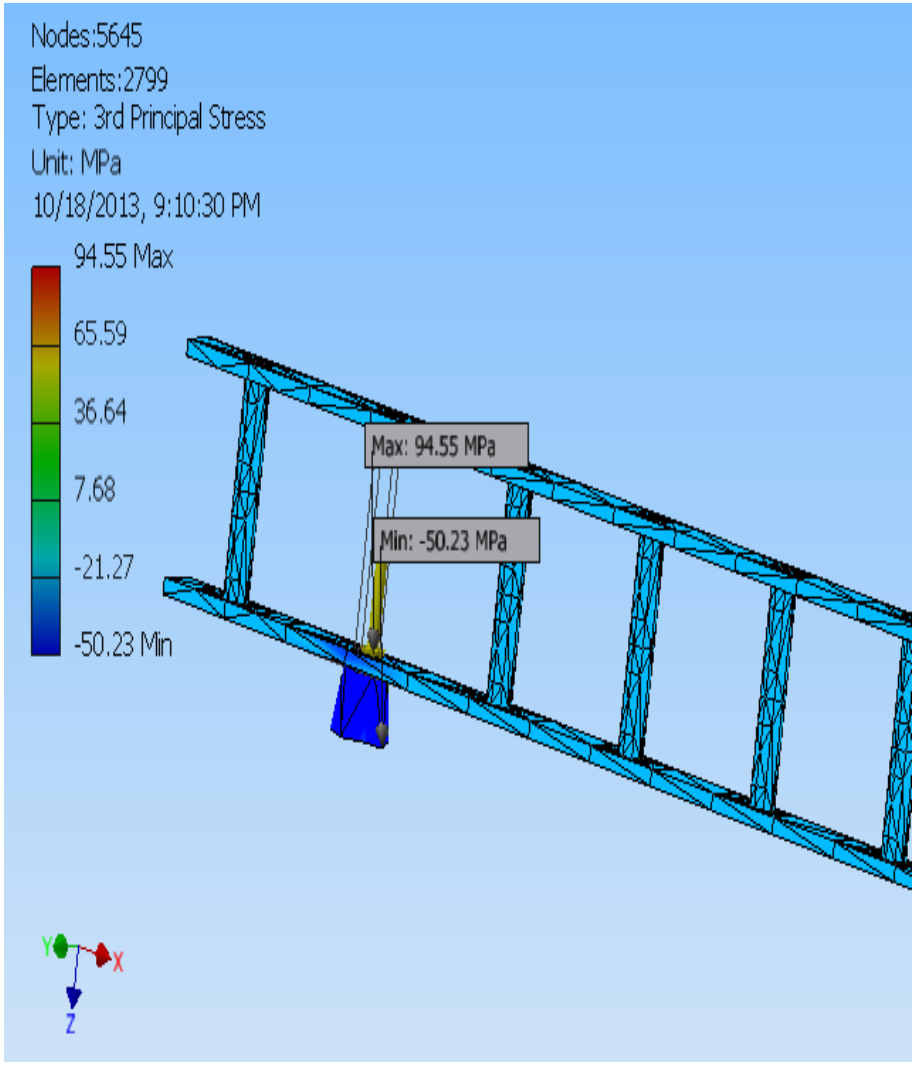
1st Principal Stress



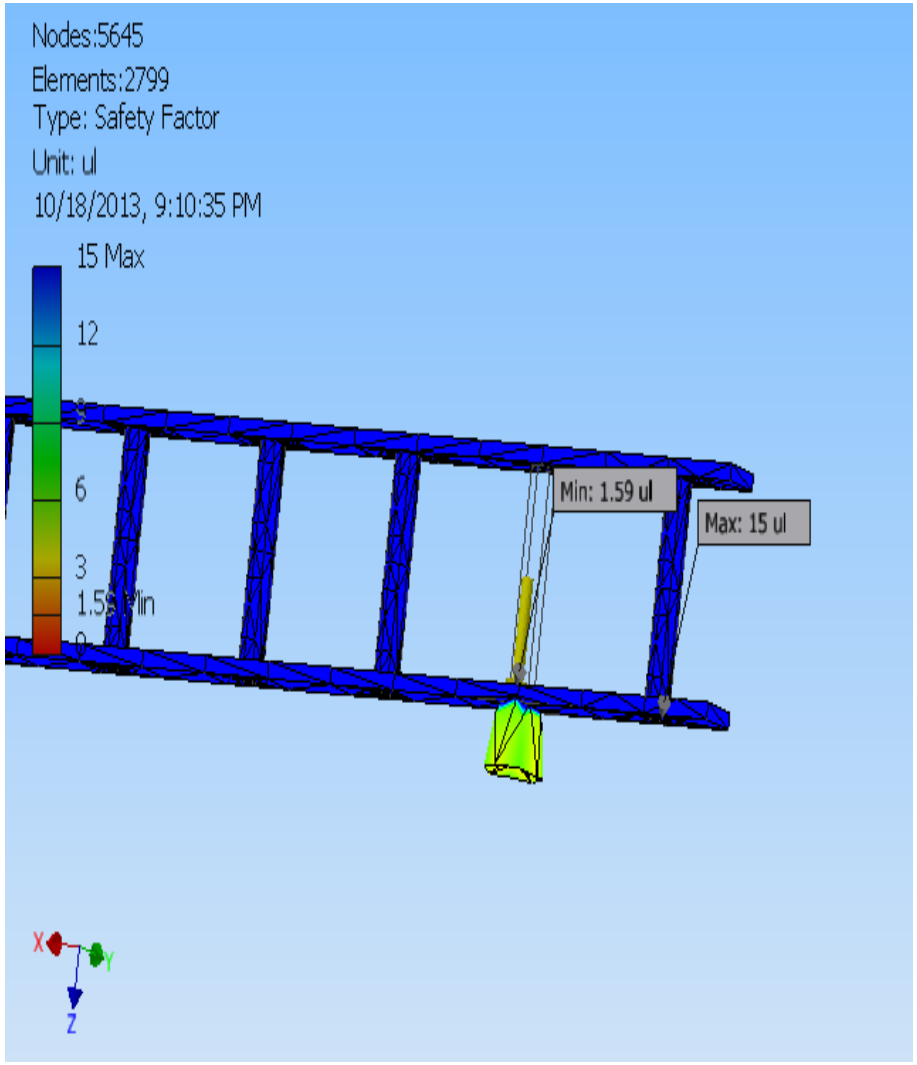


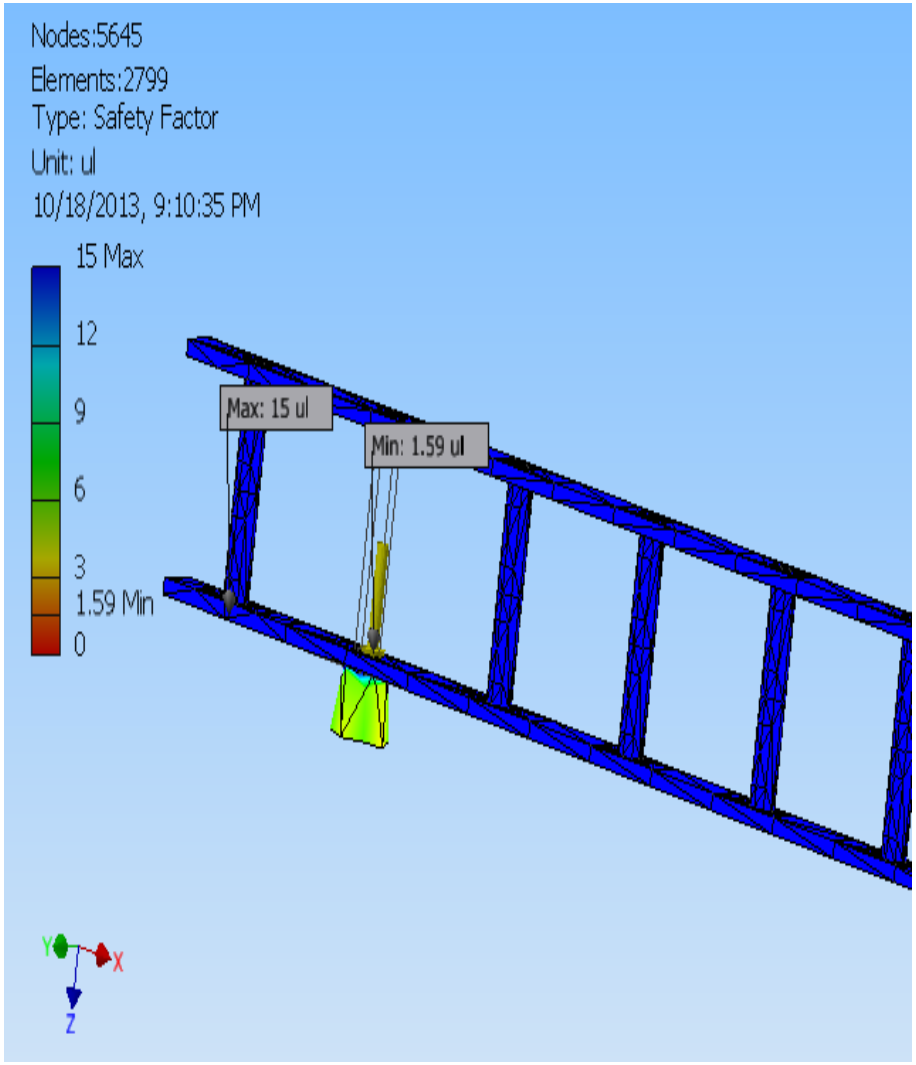
3rd Principal Stress



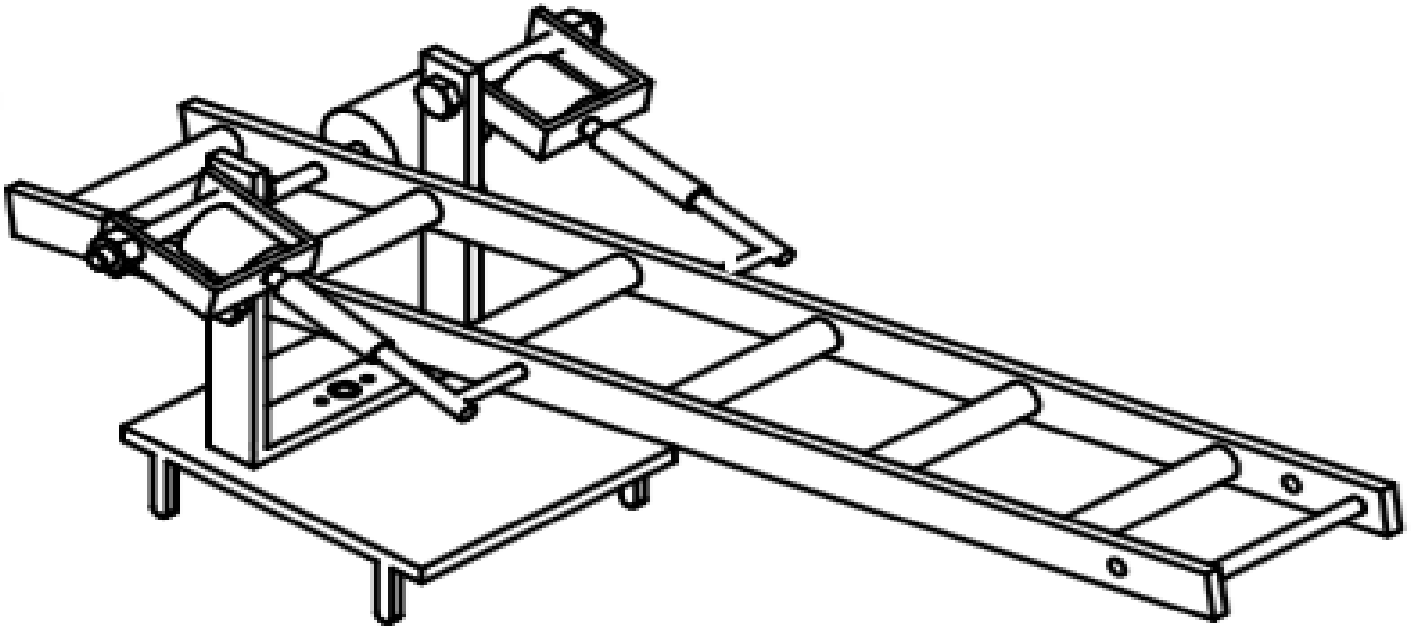


Safety Factor





ame	Minimum	Maximum
Volume	567089 mm^3	
Mass	1.53681 kg	
Von Mises Stress	0.00000000258838 MPa	136.649 MPa
1st Principal Stress	-2.47093 MPa	194.575 MPa
3rd Principal Stress	-50.226 MPa	94.5476 MPa
Displacement	0 mm	0.0128718 mm
Safety Factor	1.59321 ul	15 ul
Stress XX	-34.8852 MPa	95.2139 MPa
Stress XY	-27.0396 MPa	26.5716 MPa
Stress XZ	-50.2678 MPa	48.2663 MPa
Stress YY	-32.8577 MPa	94.7405 MPa
Stress YZ	-67.1937 MPa	67.2838 MPa
Stress ZZ	-13.2554 MPa	194.506 MPa
X Displacement	-0.00586583 mm	0.00596711 mm
Y Displacement	-0.00626845 mm	0.00635627 mm
Z Displacement	-0.000775717 mm	0.011405 mm
Equivalent Strain	0.0000000000000449878 ul	0.00177983 ul
1st Principal Strain	-0.000000000879127 ul	0.00191456 ul
3rd Principal Strain	-0.00127323 ul	0.000000000520035 ul
Strain XX	-0.000662532 ul	0.000753869 ul
Strain XY	-0.000521954 ul	0.000512921 ul
Strain XZ	-0.000970337 ul	0.000931702 ul
Strain YY	-0.000684787 ul	0.000639144 ul
Strain YZ	-0.00129706 ul	0.0012988 ul
Strain ZZ	-0.000163294 ul	0.00191322 ul

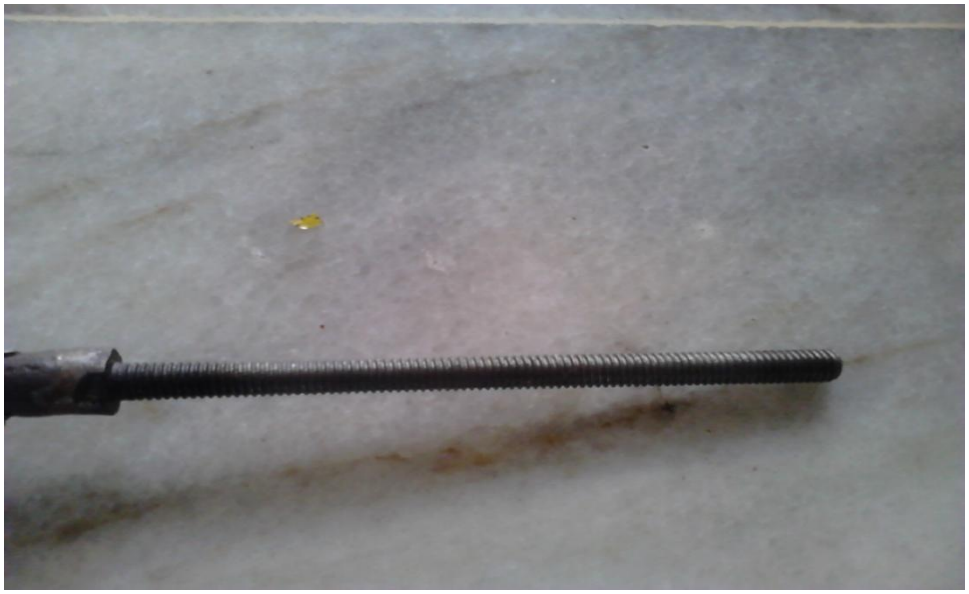


Isometric View

WODDEN BASE

MOTOR

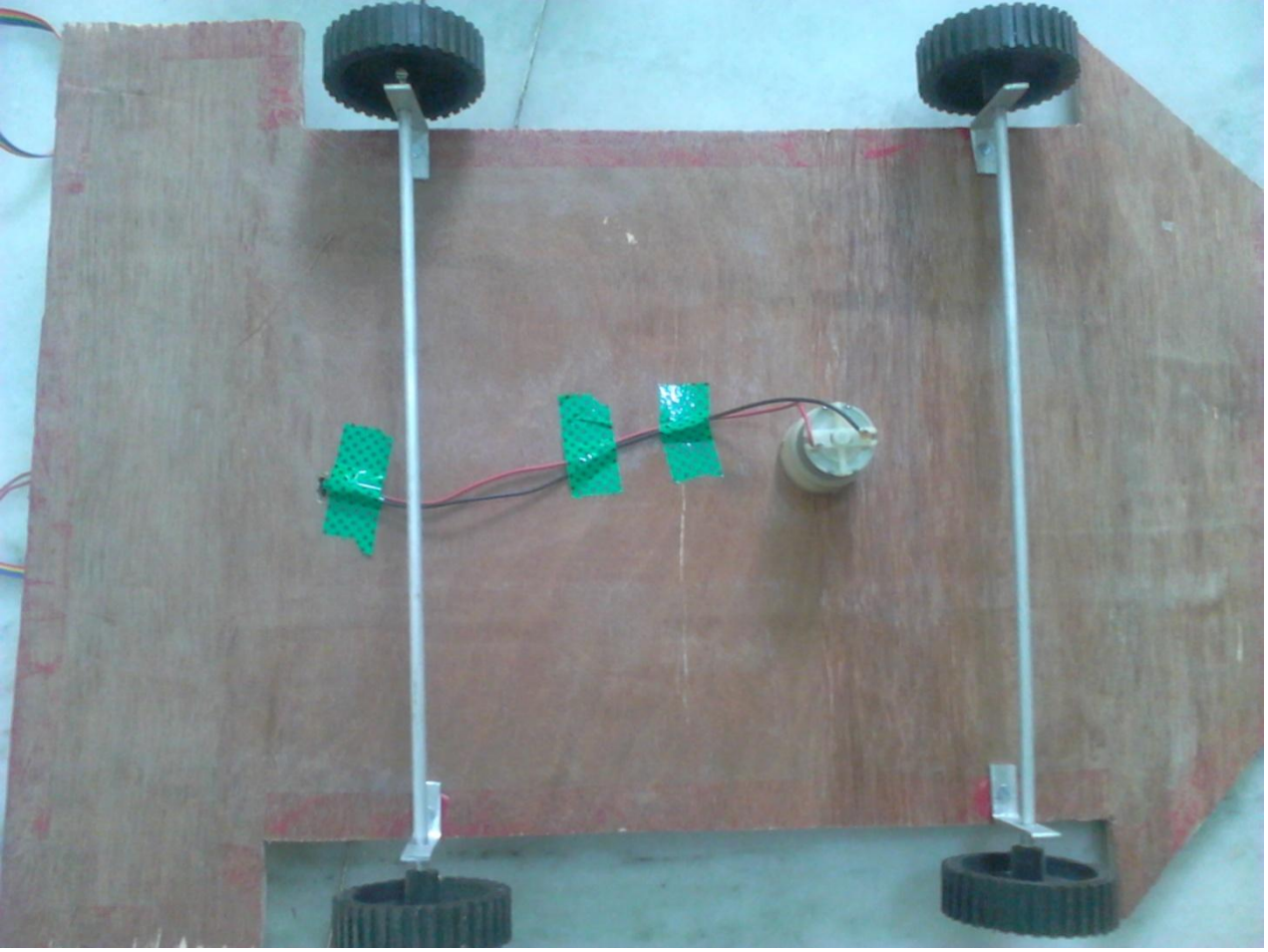
CLAMP



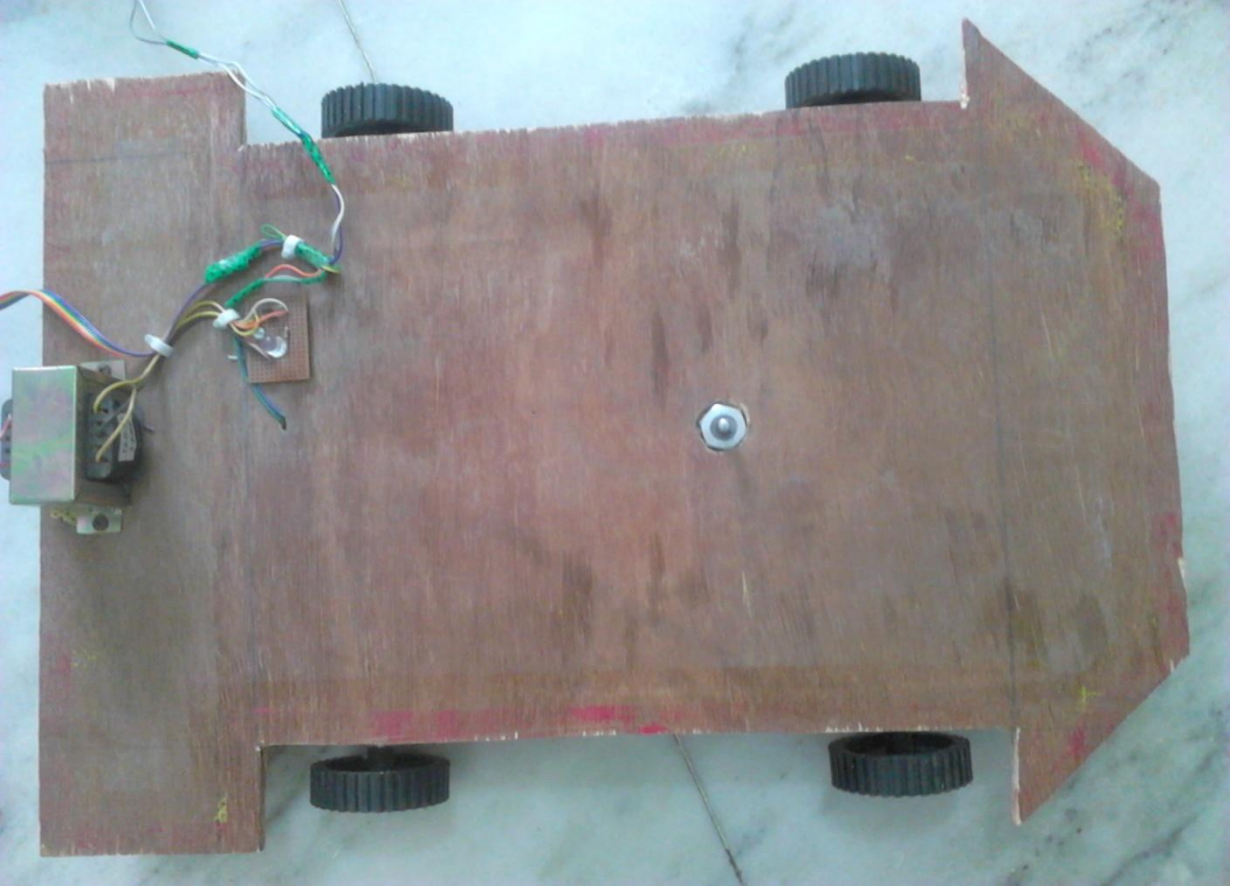
ACTUATOR

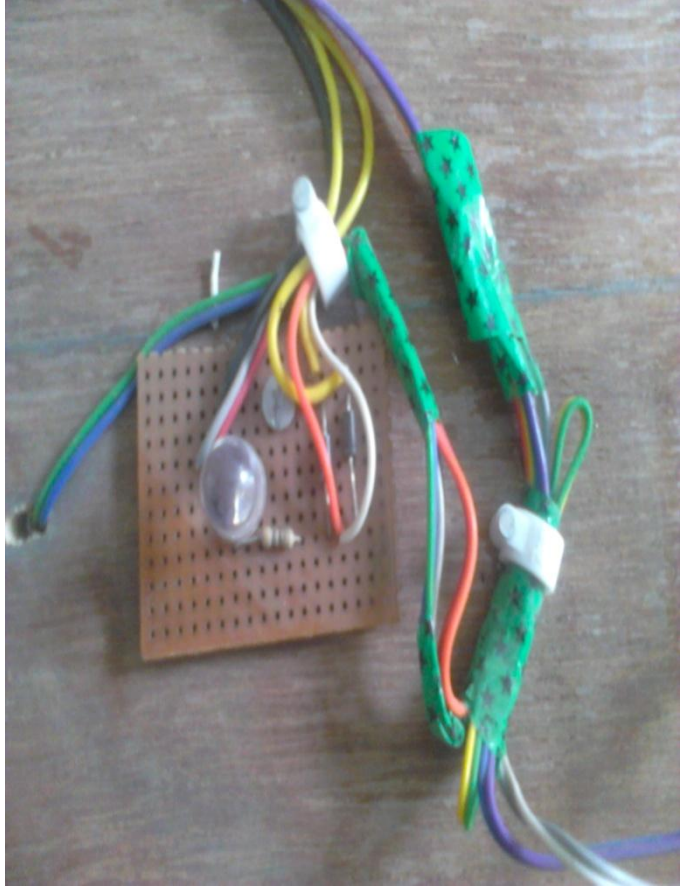
ACTUATOR

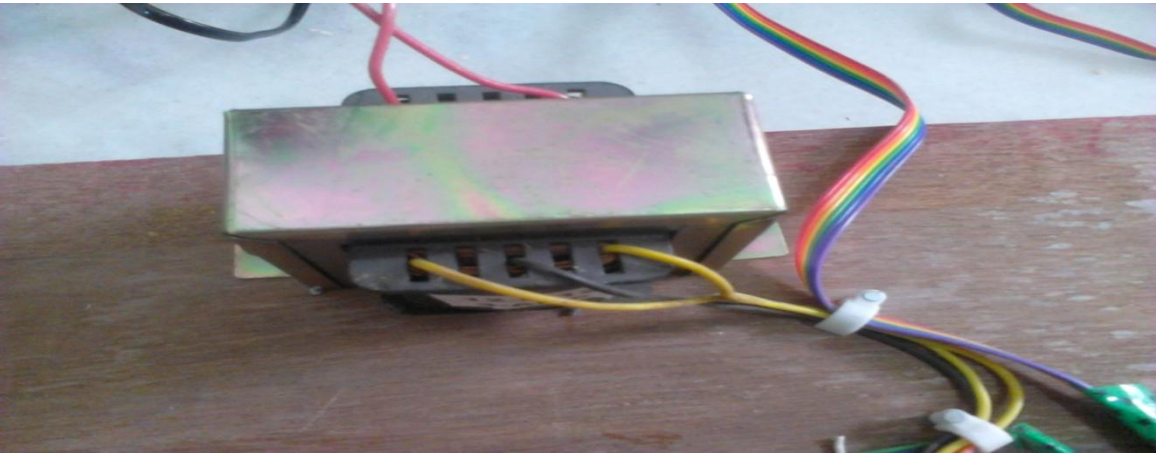
150 R.P.M. MOTOR CONNECTED WITH ACTUATOR



3.5 RPM MOTOR IN THE BOTTOM OF WODDEN BASE

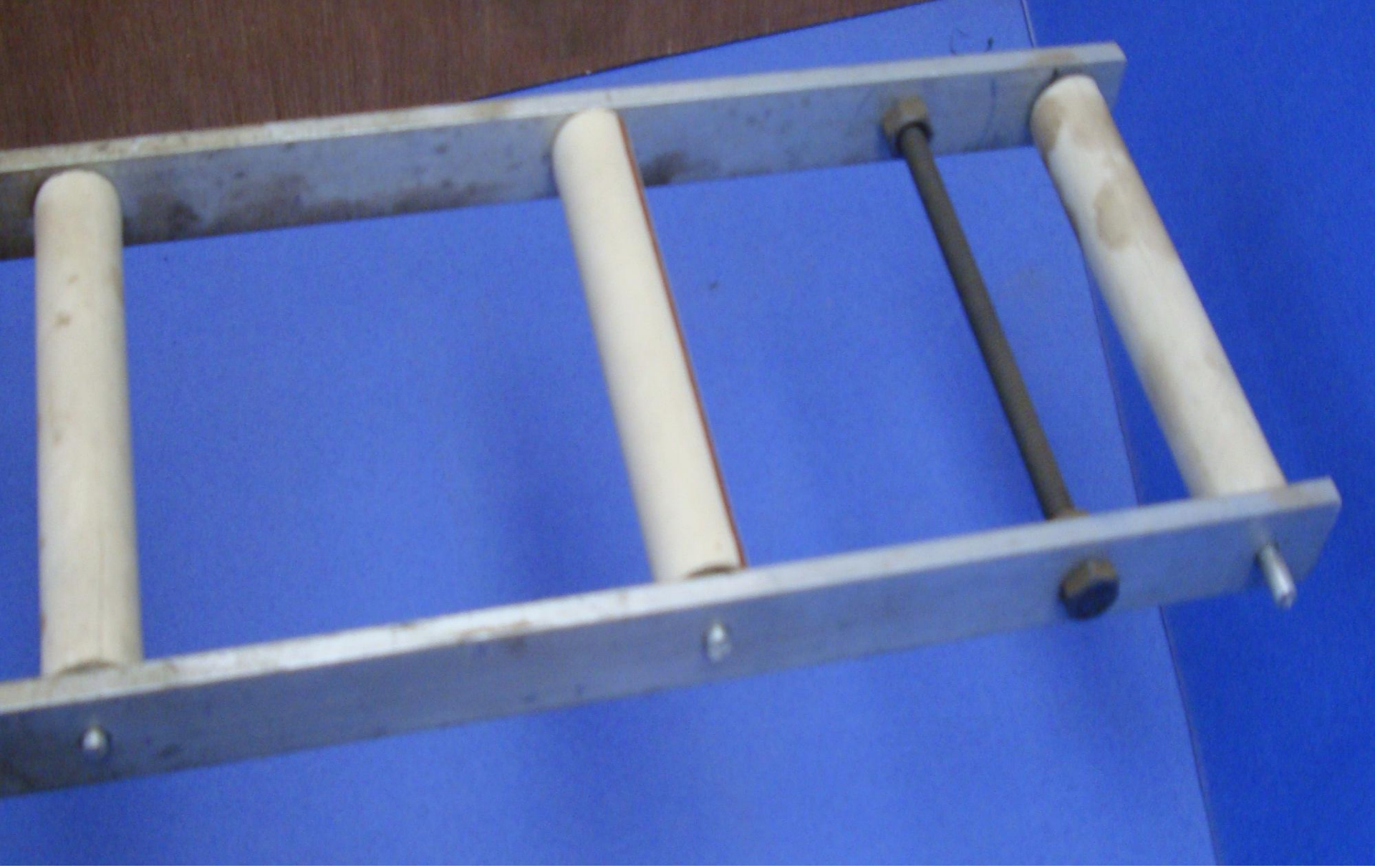






RECTIFIRE CIRCUIT

TRANSFORMER



ROLLER

CONVEYOR BELT