

## Lampiran 1. Program Untuk Menjalankan Koneyor

```
#define trigPin1 2
#define echoPin1 3
#define trigPin2 7
#define echoPin2 6
#define trigPin3 4
#define echoPin3 5
#define trigPin4 12
#define echoPin4 13

int pompa=8;
int motor=9;
int sp = 5; // cm dari sensor

float kp = 2,215;
float ki = 0,085;
float kd = 0,314;

float p,i,d,pid,pidx;
float error,errorx,sumerr;
long duration1, distance1;
long duration2, distance2;
long duration3, distance3;
long durasi4, jarak4;

void setup() {
  Serial.begin (9600);
  pinMode(trigPin1, OUTPUT);
  pinMode(echoPin1, INPUT);
```

```

pinMode(trigPin2, OUTPUT);
pinMode(echoPin2, INPUT);

pinMode(trigPin3, OUTPUT);
pinMode(echoPin3, INPUT);

pinMode(trigPin4, OUTPUT);
pinMode(echoPin4, INPUT);

pinMode(pompa, OUTPUT);
pinMode(motor, OUTPUT);
}
void loop() {
    error = sp - distance3;
    p = error * kp;
    sumerr = error + errorx;
    i = ki * sumerr;
    d = error - errorx;
    pid = p + i + d;
    pid = 250.0 - pid;

    pidx = pid;
    if(pidx < 1){
        pidx = 0;}
    if(pidx > 250){
        pidx = 250;}

    digitalWrite(trigPin1, LOW); // Added this line
    delayMicroseconds(2); // Added this line
    digitalWrite(trigPin1, HIGH);
    delayMicroseconds(10); // Added this line

```

```

digitalWrite(trigPin1, LOW);
duration1 = pulseIn(echoPin1, HIGH);
distance1 = (duration1/2) / 29.1;

digitalWrite(trigPin2, LOW); // Added this line
delayMicroseconds(2); // Added this line
digitalWrite(trigPin2, HIGH);
delayMicroseconds(10); // Added this line
digitalWrite(trigPin2, LOW);
duration2 = pulseIn(echoPin2, HIGH);
distance2 = (duration2/2) / 29.1;

digitalWrite(trigPin3, LOW); // Added this line
delayMicroseconds(2); // Added this line
digitalWrite(trigPin3, HIGH);
delayMicroseconds(10); // Added this line
digitalWrite(trigPin3, LOW);
duration3 = pulseIn(echoPin3, HIGH);
distance3 = (duration3/2) / 29.1;

long durasi, jarak;
digitalWrite(trigPin4,LOW);
delayMicroseconds(8);
digitalWrite(trigPin4, HIGH);
delayMicroseconds(8);
digitalWrite(trigPin4, LOW);
durasi4= pulseIn(echoPin4, HIGH);
jarak4= (durasi4/2)/29.1;

Serial.print("distance1 ");
Serial.print(distance1);

```

```

Serial.println(" cm");

Serial.print("distance2 ");
Serial.print(distance2);
Serial.println(" cm");

Serial.print("distance3 ");
Serial.print(distance3);
Serial.println(" cm");

Serial.print(jarak4);
Serial.println("cm");
delay(176);

errorx = error;

if (distance1<12){
  digitalWrite(motor,HIGH);}

else if(distance2<12){
  digitalWrite(motor,LOW);}

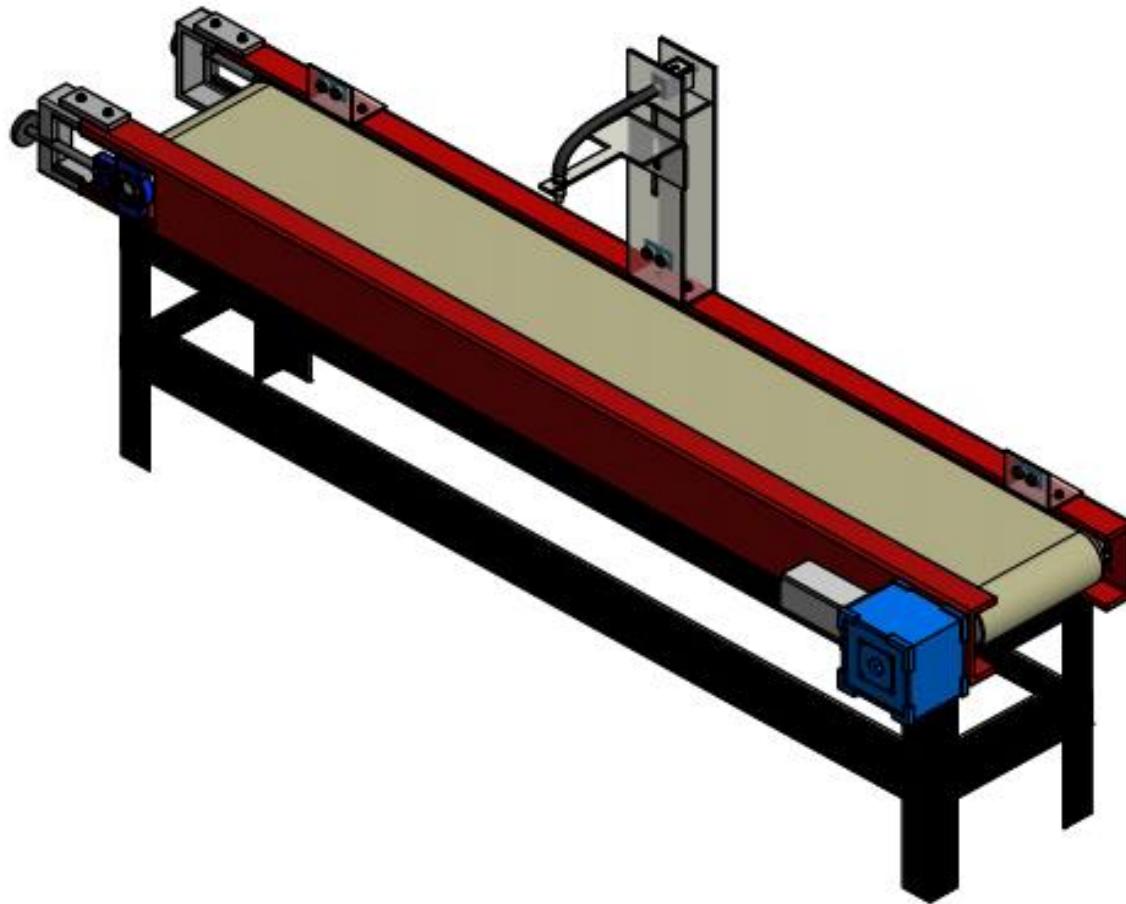
if (distance2<12 and pid>250){
  digitalWrite(pompa,HIGH);}

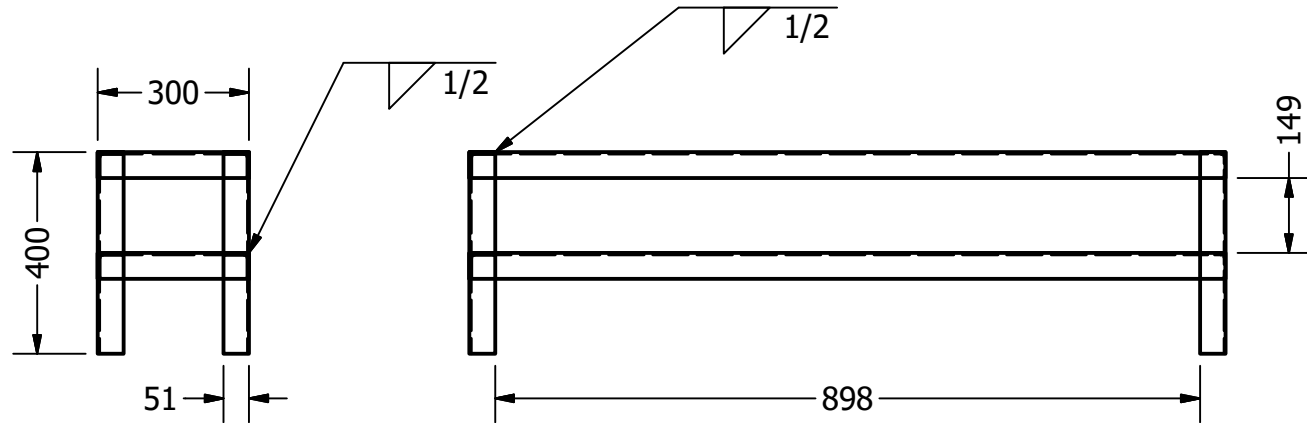
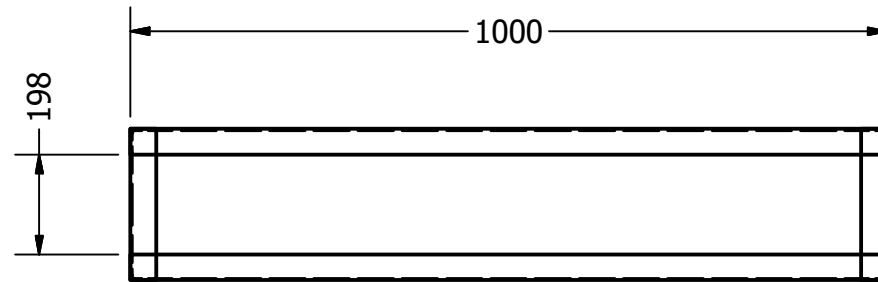
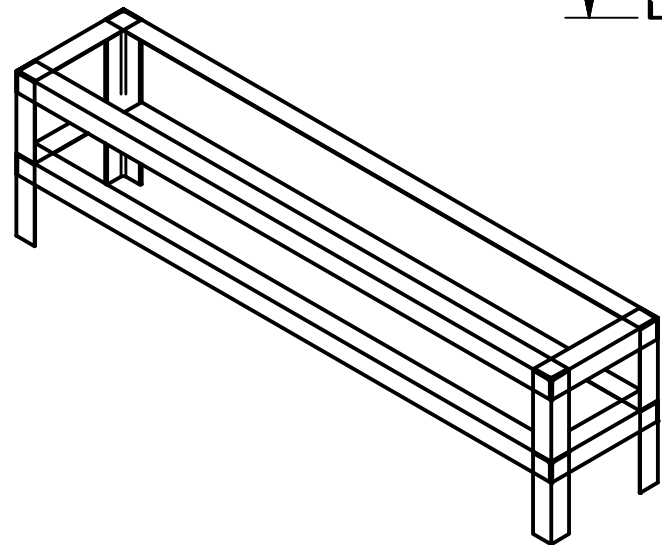
else if(pid<=250 and distance2<12){
  digitalWrite(pompa,LOW);
  digitalWrite(motor,HIGH);}

if (distance2 >12 and jarak4<15){
  digitalWrite(motor,LOW);} }

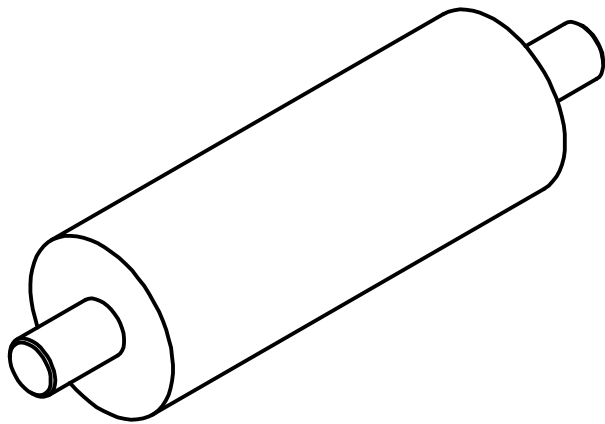
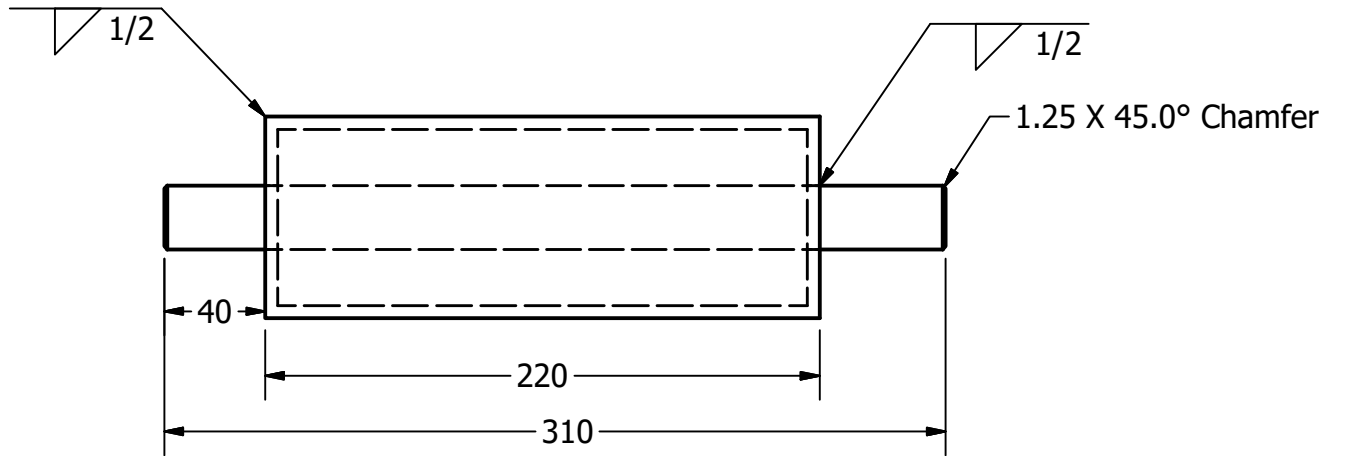
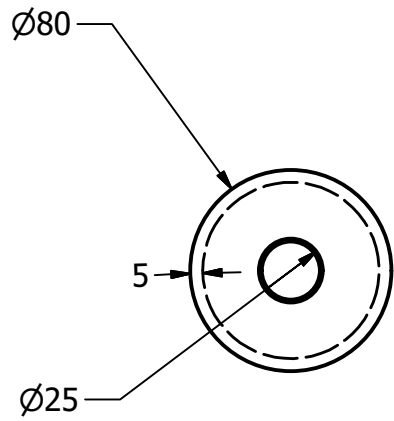
```

**Lampiran 2.** Desain 3D Konveyor Pengisi Bejana

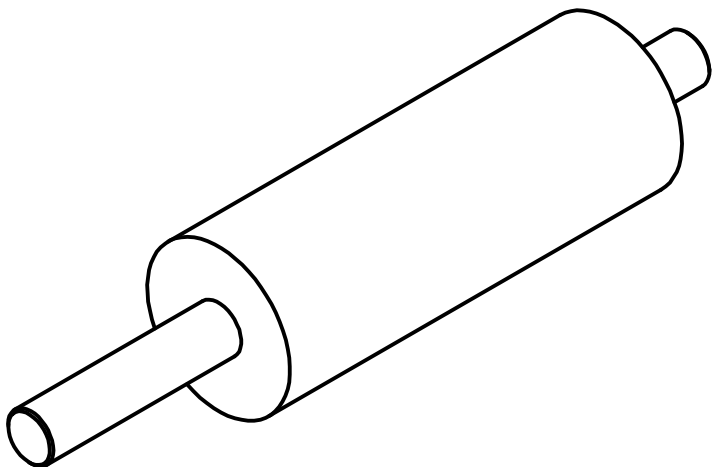
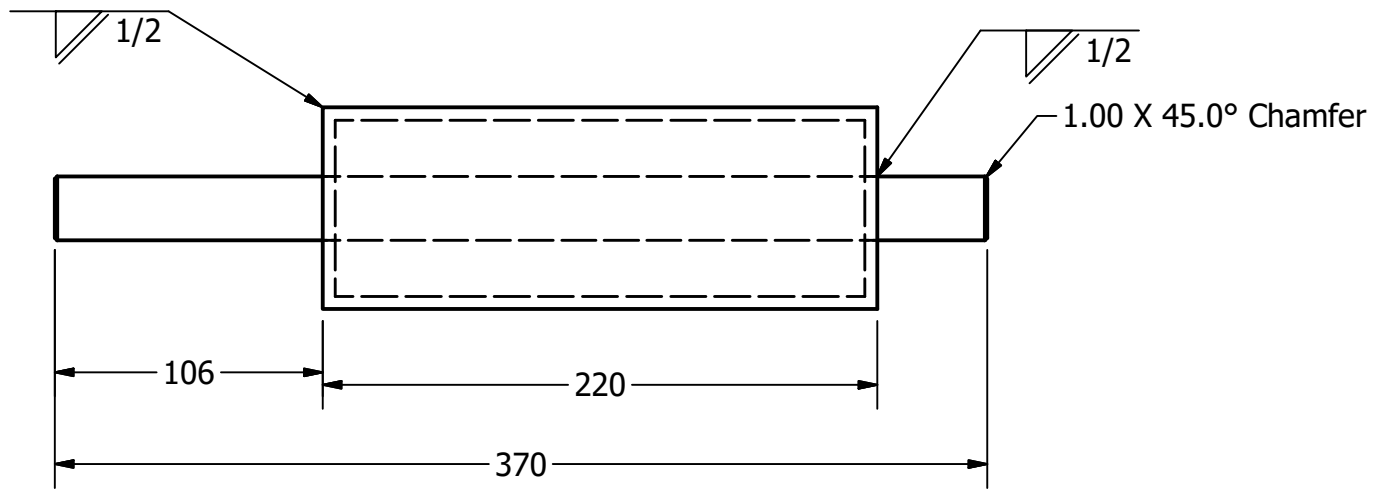
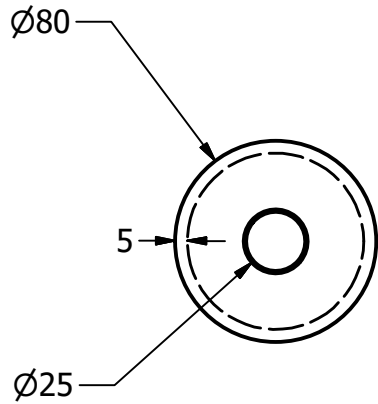




	Skala : 1:15	Digambar : Ainur Rofiq	Keterangan :	
	Satuan : mm	NIM : 20150130157		
	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Meja Konveyor		NO : 1	A4

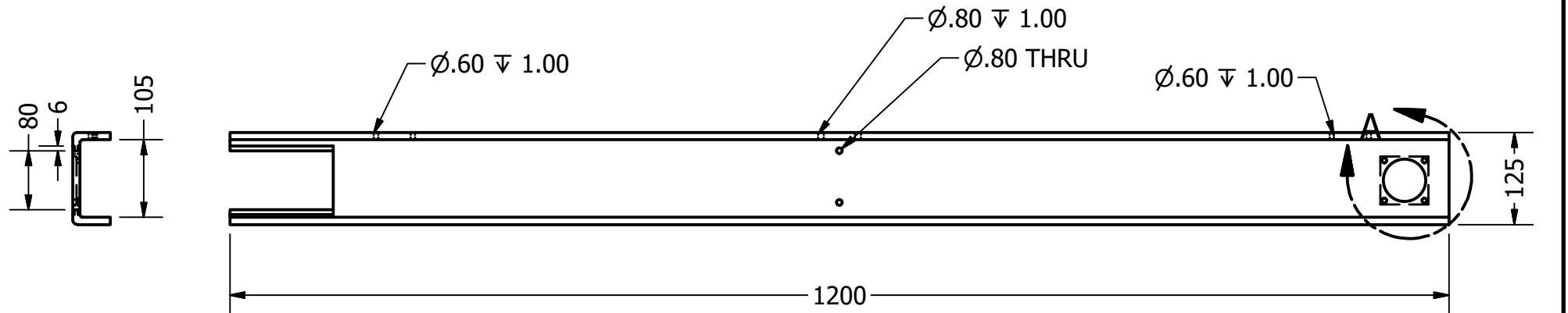


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	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Roll belakang Konveyor		NO : 2	A4



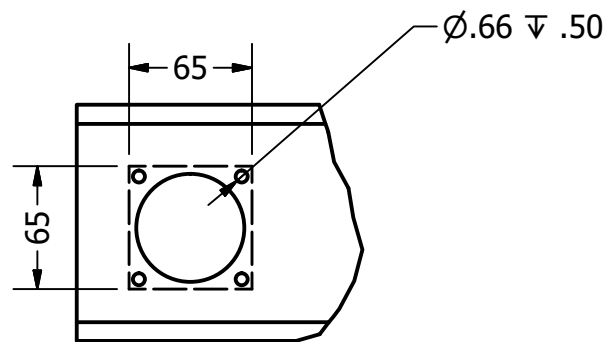
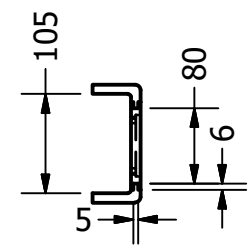
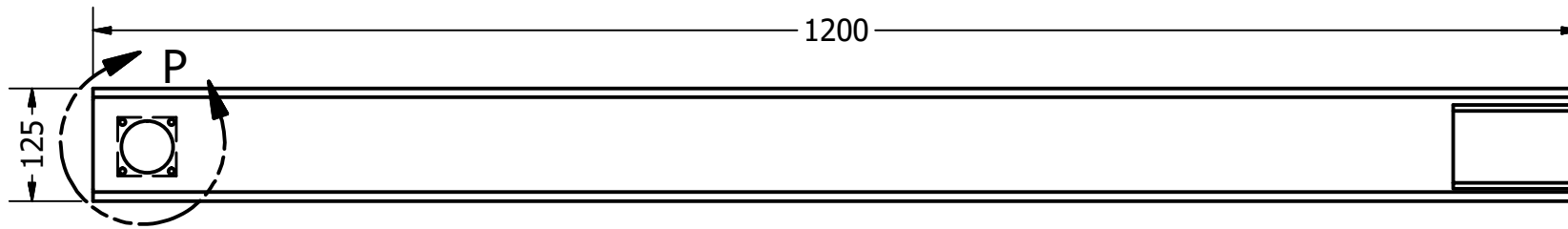
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	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Roll Konveyor Depan		NO : 3	A4





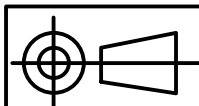
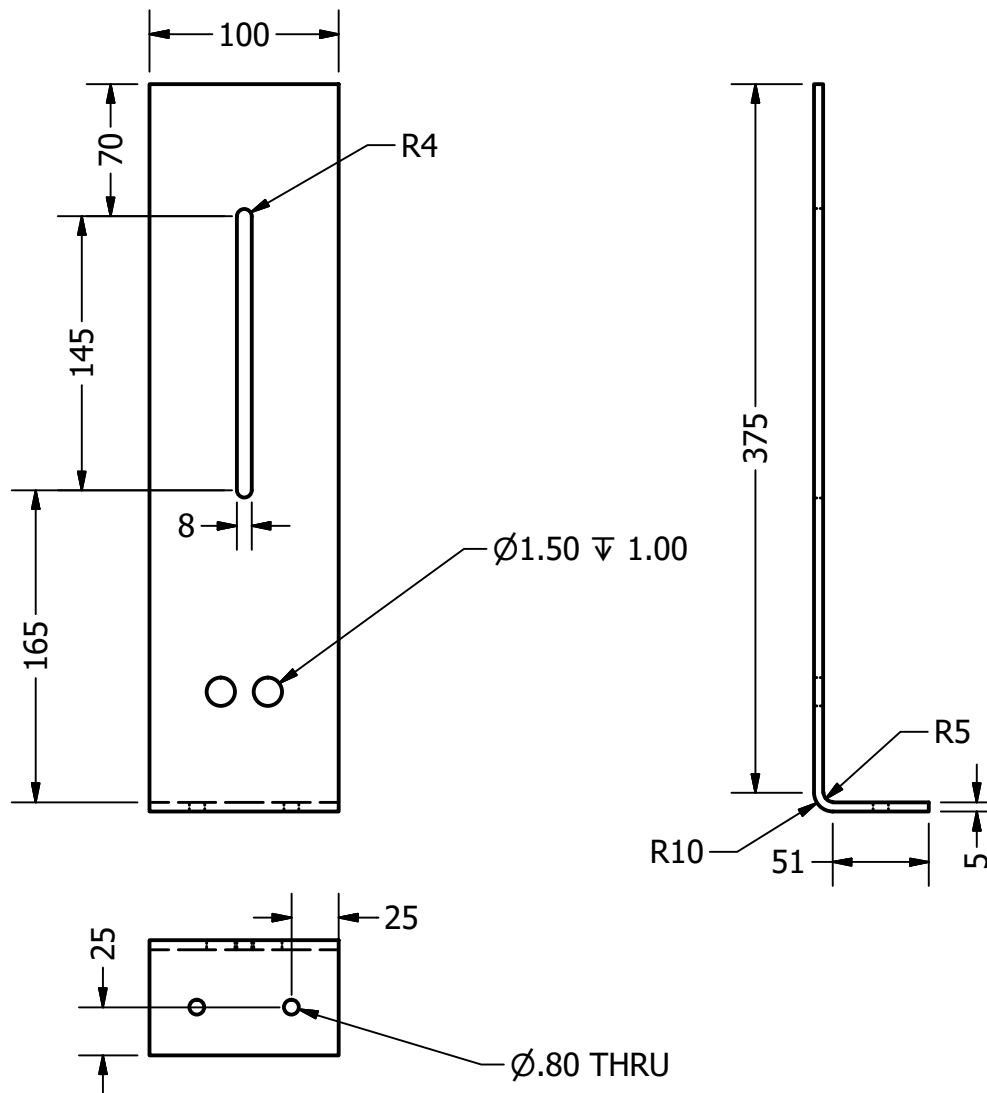
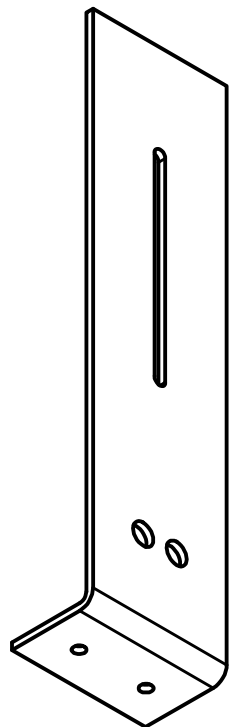
DETAIL A  
SCALE 1 / 4

	Skala : 1:8	Digambar : Ainur Rofiq	Keterangan :	
	Satuan : mm	NIM : 20150130157		
	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Dudukan Konveyor Kanan		NO : 4	A4



DETAIL P  
SCALE 1 / 4

	Skala : 1:8	Digambar : Ainur Rofiq	Keterangan :	
	Satuan : mm	NIM : 20150130157		
	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Dudukan Konveyor Kiri		NO : 5	A4



Skala : 1:4  
 Satuan : mm  
 Tanggal : 04 - 11 -2018

Digambar : Ainur Rofiq  
 NIM : 20150130157  
 Diperiksa :

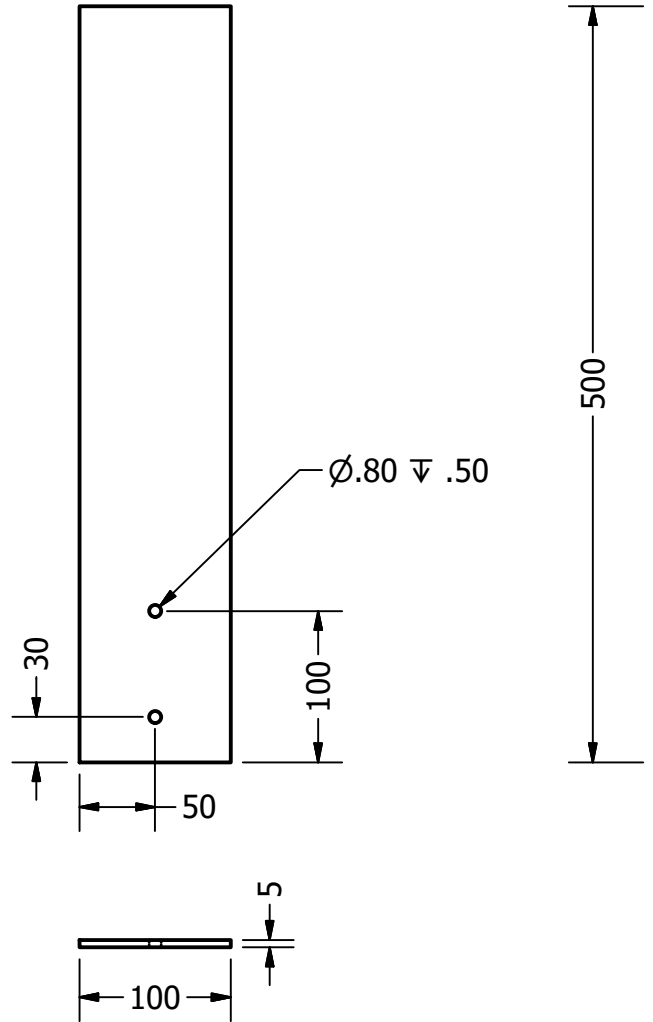
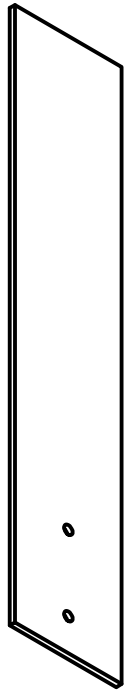
Keterangan :

UMY

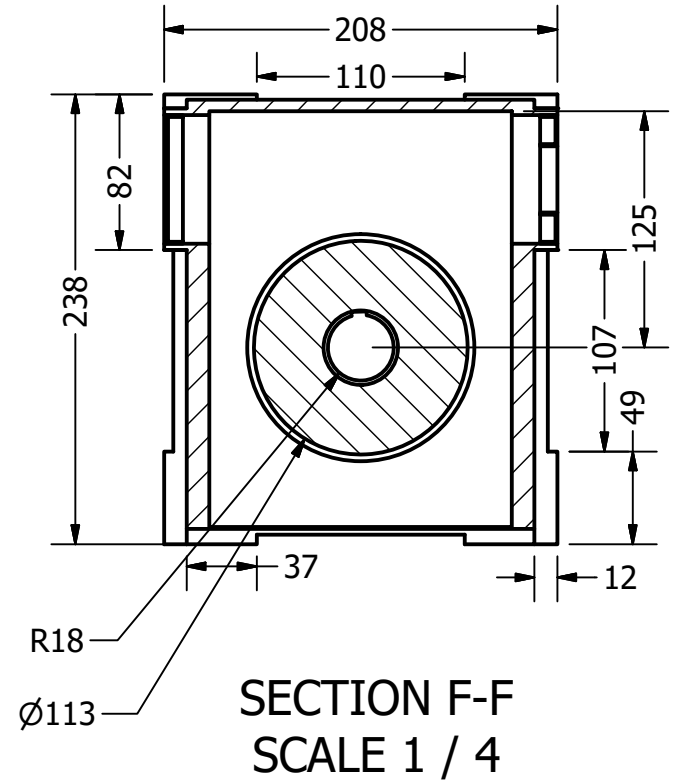
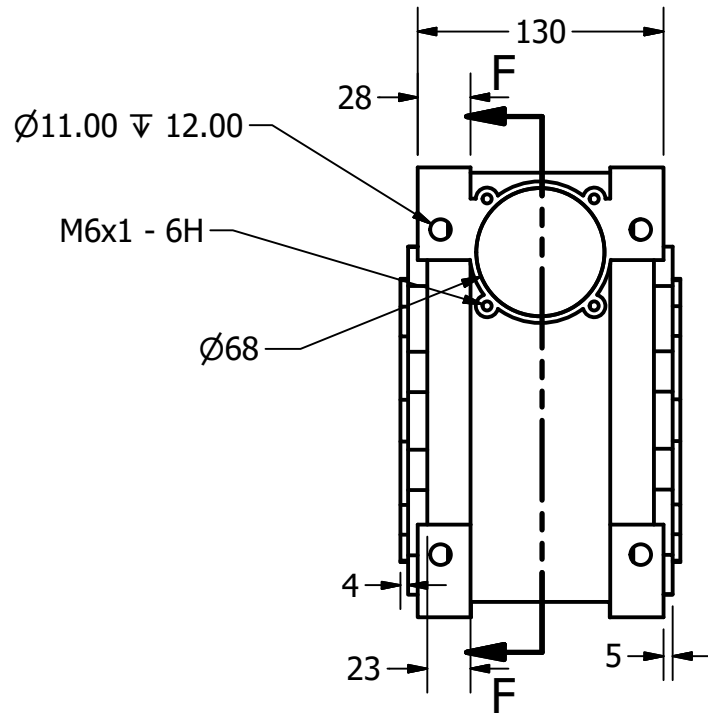
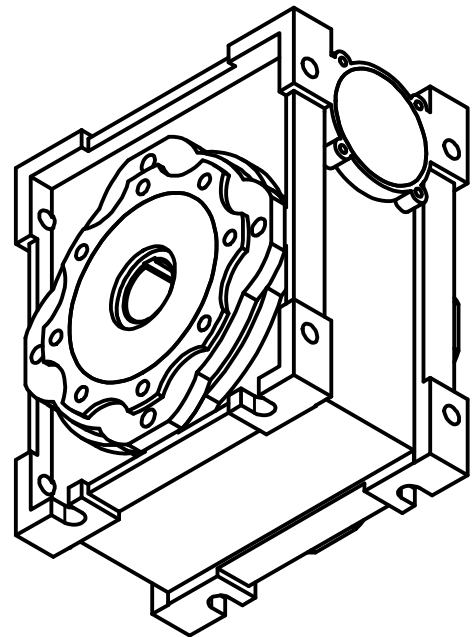
Tiang Pengisi Bejana

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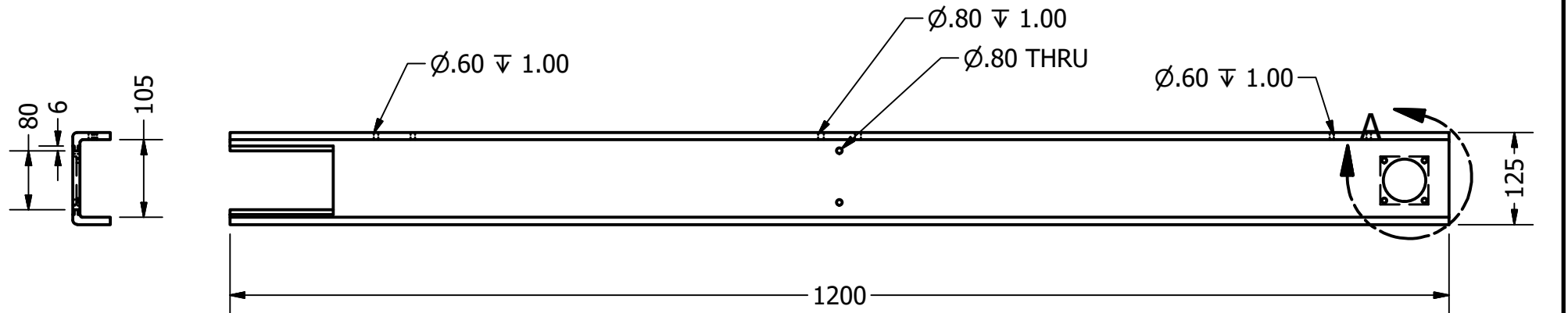
A4



	Skala : 1:4	Digambar : Ainur Rofiq	Keterangan :	
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	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Tiang Pengisi Bejana		NO : 7	A4

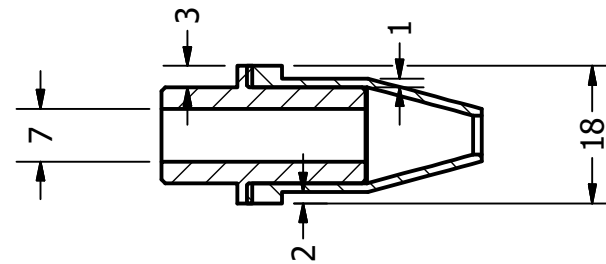
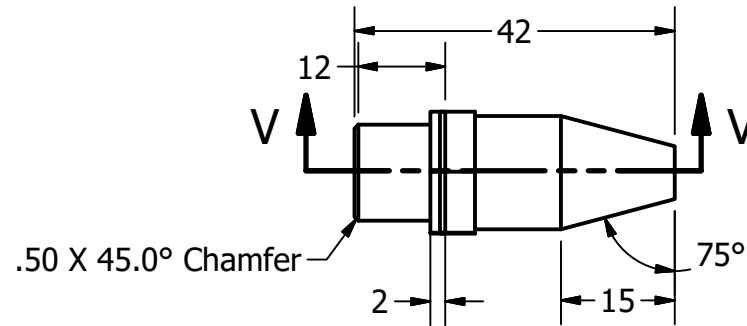
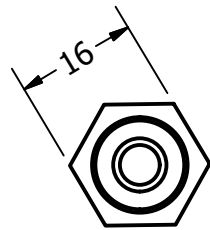


	Skala : 1:1	Digambar : Ainur Rofiq	Keterangan :	
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	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Gearbox		NO : 8	A4

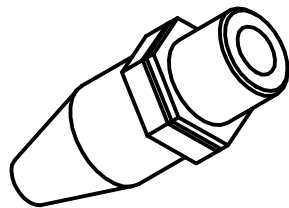


DETAIL A  
SCALE 1 / 4

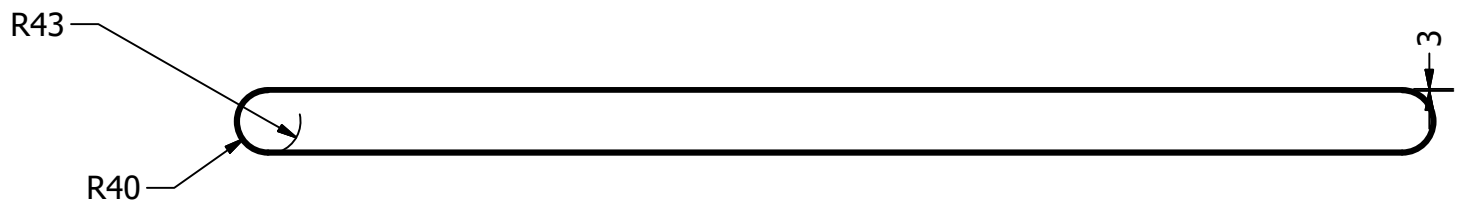
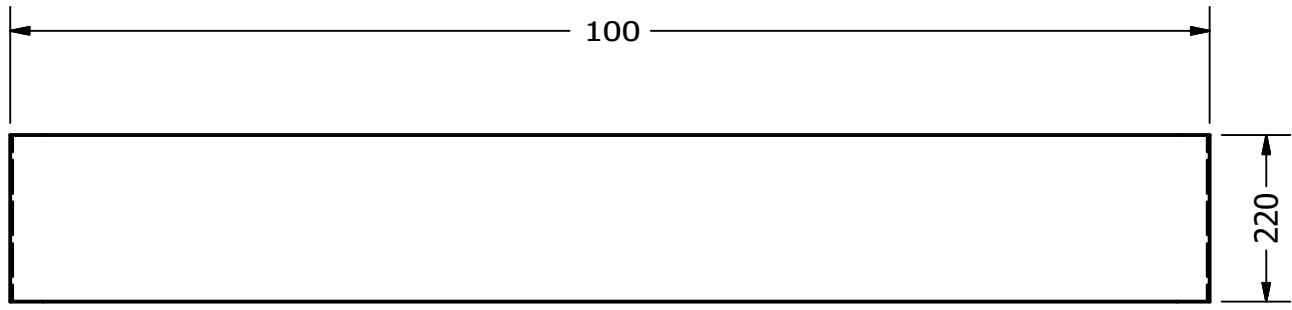
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	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Dudukan Konveyor Kanan		NO : 4	A4



SECTION V-V  
SCALE 1 : 1



	Skala : 1:1	Digambar : Ainur Rofiq	Keterangan :	
	Satuan : mm	NIM : 20150130157		
	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Nozel	NO : 9	A4	



	Skala : 1:1	Digambar : Ainur Rofiq	Keterangan :	
	Satuan : mm	NIM : 20150130157		
	Tanggal : 04 - 11 -2018	Diperiksa :		
UMY	Belt Konveyor		NO : 10	A4



**Lampiran 4.** Hasil *Stress Analysis Report* menggunakan *Autodesk Inventor*

**General objective and settings**

Design Objective	Single Point
Simulation Type	Static Analysis
Last Modification Date	8/14/2019, 5:36 AM
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	Iron, Cast	
General	Mass Density	7.15 g/cm <sup>3</sup>
	Yield Strength	758 MPa
	Ultimate Tensile Strength	884 MPa
Stress	Young's Modulus	120.5 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	46.3462 GPa
Part Name(s)	Kerangka.ipt Skeleton0001.ipt ANSI L 2 x 2 x 1_8 00000001.ipt ANSI L 2 x 2 x 1_8 00000002.ipt ANSI L 2 x 2 x 1_8 00000003.ipt ANSI L 2 x 2 x 1_8 00000004.ipt ANSI L 2 x 2 x 1_8 00000005.ipt ANSI L 2 x 2 x 1_8 00000006.ipt ANSI L 2 x 2 x 1_8 00000007.ipt ANSI L 2 x 2 x 1_8 00000008.ipt ANSI L 2 x 2 x 1_8 00000009.ipt ANSI L 2 x 2 x 1_8 00000010.ipt ANSI L 2 x 2 x 1_8 00000011.ipt ANSI L 2 x 2 x 1_8 00000012.ipt Dudukan Conveyoer.ipt Dudukan conveyor 1.ipt Dudukan Bearing.ipt Dudukan Bearing.ipt Dudukan Bearing stel.ipt Dudukan Bearing stel.ipt	

	plat pengunci kanan.ipt Plat Pengunci.ipt Pengunci.ipt Pengunci.ipt Baut Stel.ipt Baut Stel.ipt penyetel.ipt penyetel.ipt
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Name	Steel, Mild	
General	Mass Density	7.85 g/cm <sup>3</sup>
	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)	SKF Series ALS SKF ALS 8 SKF Series ALS SKF ALS 8 SKF Series ALS SKF ALS 8 SKF Series ALS SKF ALS 8 Hex Flange Head Tapping Screw - Type D - Metric M6x1 x 13 Hex Flange Head Tapping Screw - Type D - Metric M6x1 x 13 Hex Flange Head Tapping Screw - Type D - Metric M6x1 x 13 Hex Flange Head Tapping Screw - Type D - Metric M6x1 x 13 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M6x1 x 13 Hex Flange Head Tapping Screw - Type D - Metric M6x1 x 13 Hex Flange Head Tapping Screw - Type D - Metric M6x1 x 13 Hex Flange Head Tapping Screw - Type D - Metric M6x1 x 13 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10 Hex Flange Head Tapping Screw - Type D - Metric M5x0.8 x 10	

Name	Aluminum 6061-AHC	
General	Mass Density	2.7 g/cm <sup>3</sup>
	Yield Strength	275 MPa
	Ultimate Tensile Strength	310 MPa
Stress	Young's Modulus	68.9 GPa
	Poisson's Ratio	0.33 ul
	Shear Modulus	25.9023 GPa
Part Name(s)	Shaft Conveyor.ipt Shaft Conveyor 1.ipt	

Name	Steel, Carbon	
General	Mass Density	7.85 g/cm <sup>3</sup>
	Yield Strength	350 MPa
	Ultimate Tensile Strength	420 MPa
Stress	Young's Modulus	200 GPa
	Poisson's Ratio	0.29 ul
	Shear Modulus	77.5194 GPa
Part Name(s)	Roll Conveyor.ipt Roll Conveyor.ipt	

Name	PET Plastic	
General	Mass Density	1.541 g/cm <sup>3</sup>
	Yield Strength	54.4 MPa
	Ultimate Tensile Strength	55.1 MPa
Stress	Young's Modulus	27.579 GPa
	Poisson's Ratio	0.417 ul
	Shear Modulus	9.73149 GPa
Part Name(s)	Dudukan nozel 1.ipt dudukan nozel.ipt Dudukan sensor.ipt Dudukan sensor.ipt	

Name	PMMA Plastic	
General	Mass Density	1.188 g/cm <sup>3</sup>
	Yield Strength	48.9 MPa
	Ultimate Tensile Strength	79.8 MPa
Stress	Young's Modulus	2.74 GPa
	Poisson's Ratio	0.355 ul
	Shear Modulus	1.01107 GPa
Part Name(s)	dudukan nosel1.ipt plat dudukan flow.ipt	

Name	Aluminum 6061	
General	Mass Density	2.7 g/cm <sup>3</sup>
	Yield Strength	275 MPa
	Ultimate Tensile Strength	310 MPa
Stress	Young's Modulus	68.9 GPa
	Poisson's Ratio	0.33 ul
	Shear Modulus	25.9023 GPa
Part Name(s)	Nosel 3.ipt nosel4.ipt gearbox.ipt	

Name	Rubber, Silicone	
General	Mass Density	1.25 g/cm <sup>3</sup>
	Yield Strength	10.34 MPa
	Ultimate Tensile Strength	6.5 MPa
Stress	Young's Modulus	0.003 GPa
	Poisson's Ratio	0.49 ul
	Shear Modulus	0.00100671 GPa
Part Name(s)	konveyor jadi.Hose01.ipt Parker Hydraulic Hose - No Skive 1/4 - 5	

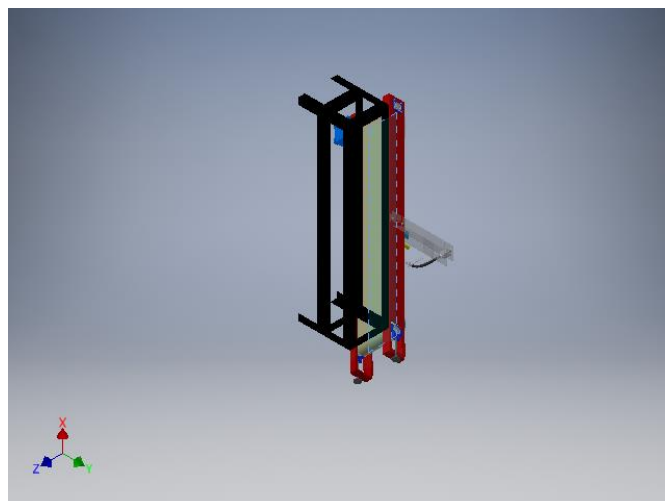
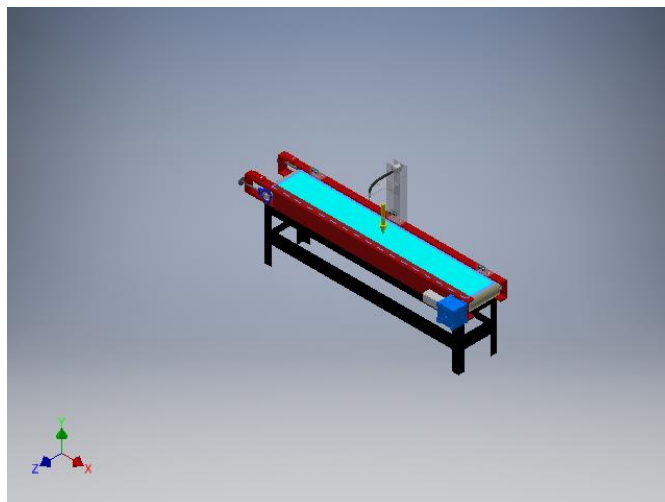
Name	ABS Plastic	
General	Mass Density	1.06 g/cm <sup>3</sup>
	Yield Strength	20 MPa
	Ultimate Tensile Strength	29.6 MPa
Stress	Young's Modulus	2.24 GPa
	Poisson's Ratio	0.38 ul
	Shear Modulus	0.811594 GPa
Part Name(s)	motor listrik.ipt flow meter.ipt Tutup Flow meter.ipt	

Name	Polypropylene	
General	Mass Density	0.899 g/cm <sup>3</sup>
	Yield Strength	30.3 MPa
	Ultimate Tensile Strength	36.5 MPa
Stress	Young's Modulus	1.34 GPa
	Poisson's Ratio	0.392 ul
	Shear Modulus	0.481322 GPa
Part Name(s)	belt 2.ipt	

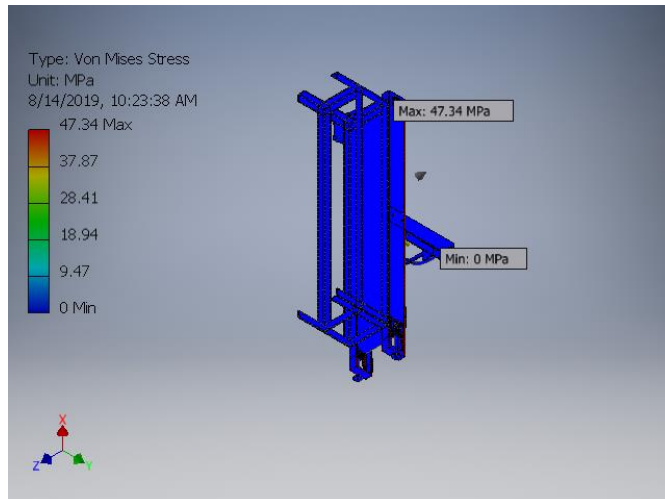
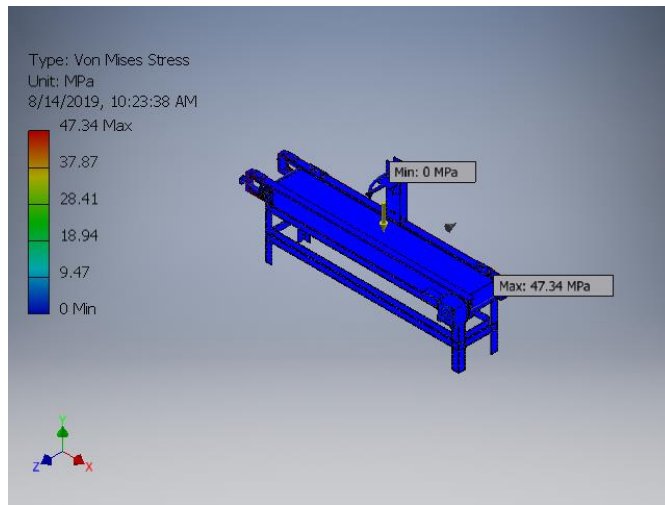
Name	LCP Plastic	
General	Mass Density	1.626 g/cm <sup>3</sup>
	Yield Strength	115 MPa
	Ultimate Tensile Strength	130 MPa
Stress	Young's Modulus	14.25 GPa
	Poisson's Ratio	0.35 ul
	Shear Modulus	5.27778 GPa
Part Name(s)	sensor.ipt sensor.ipt sensor.ipt	

**Force:1**

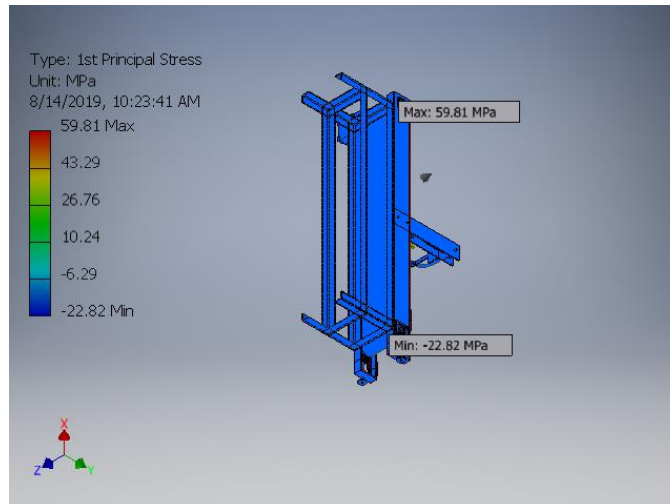
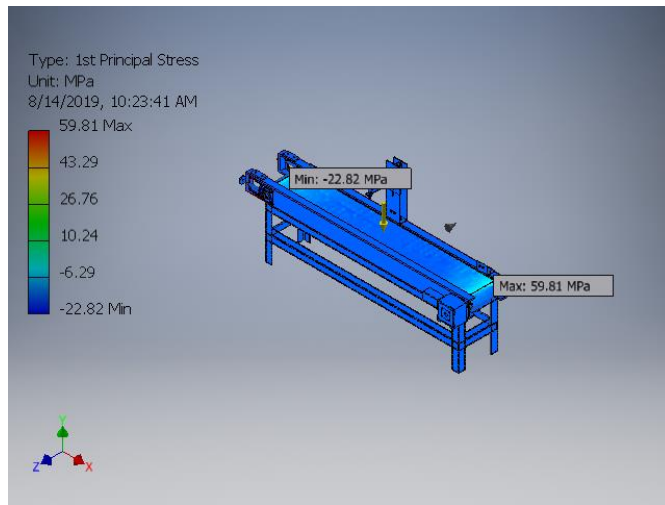
Load Type	Force
Magnitude	49.000 N
Vector X	0.000 N
Vector Y	-49.000 N
Vector Z	0.000 N



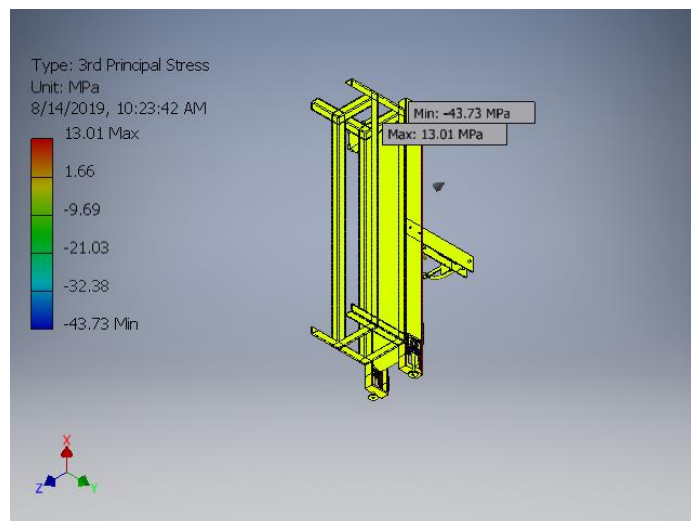
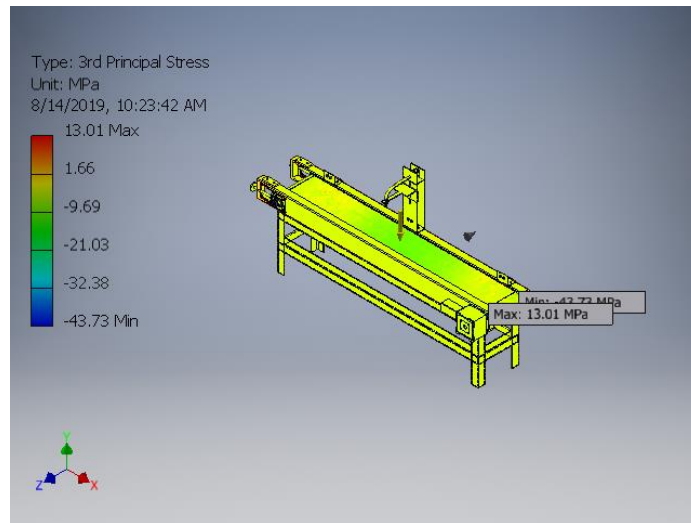
# 1. Von Mises Stress



## 2. 1st Principal Stress

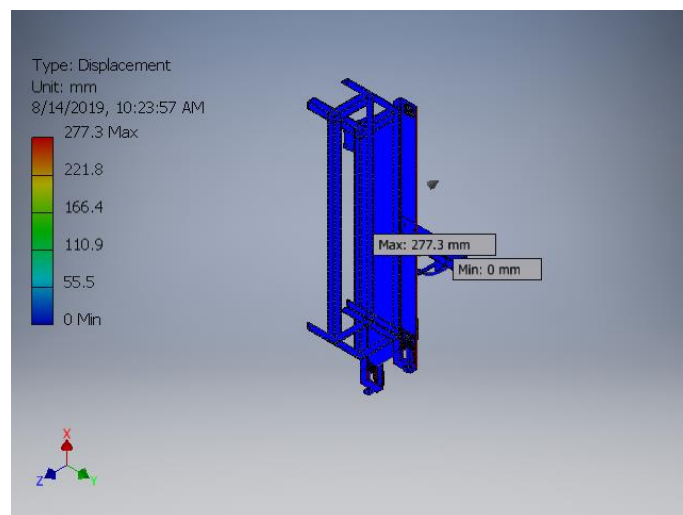
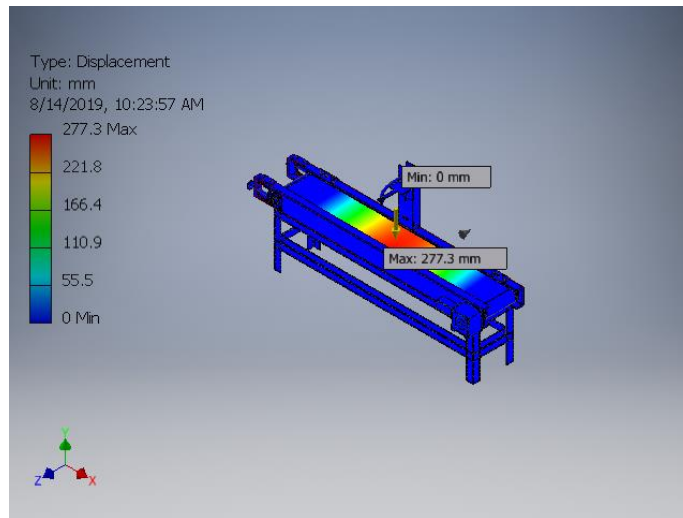


### 3. 3rd Principal Stress

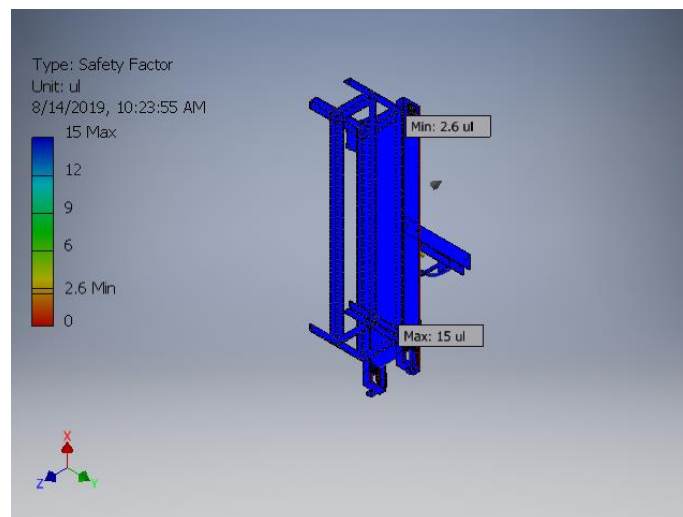
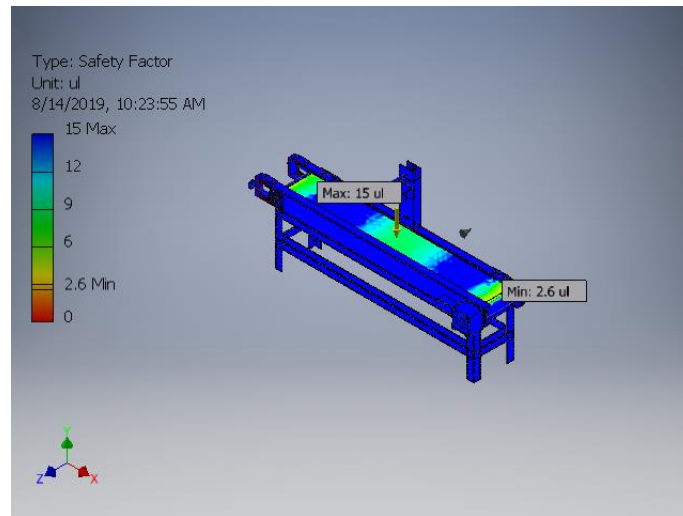




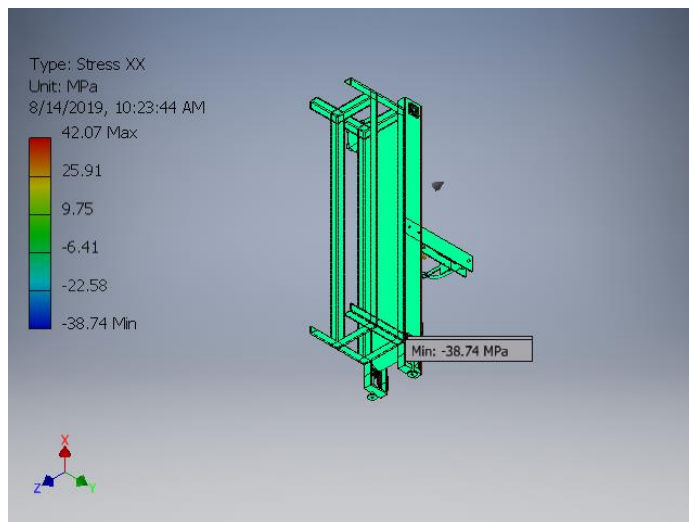
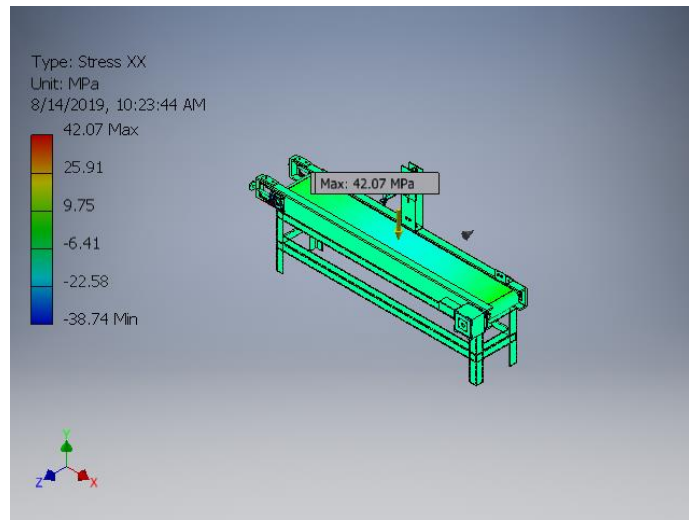
## 4. Displacement



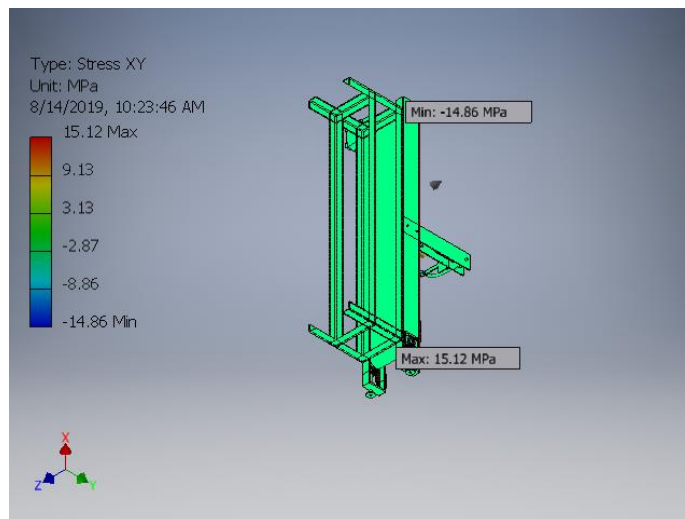
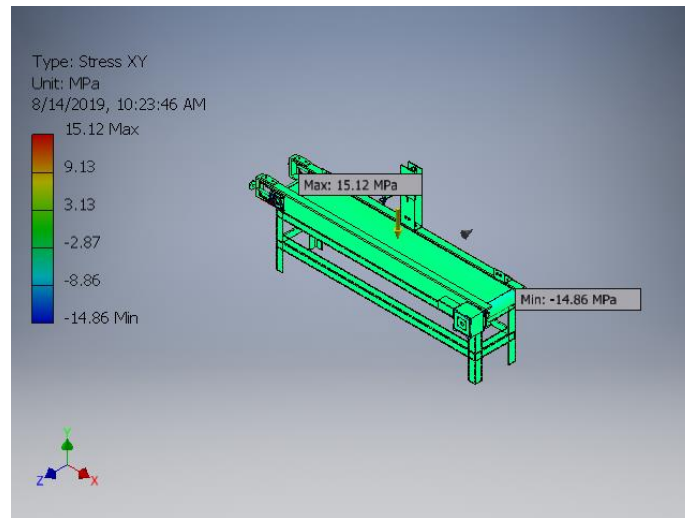
## 5. Safety Factor



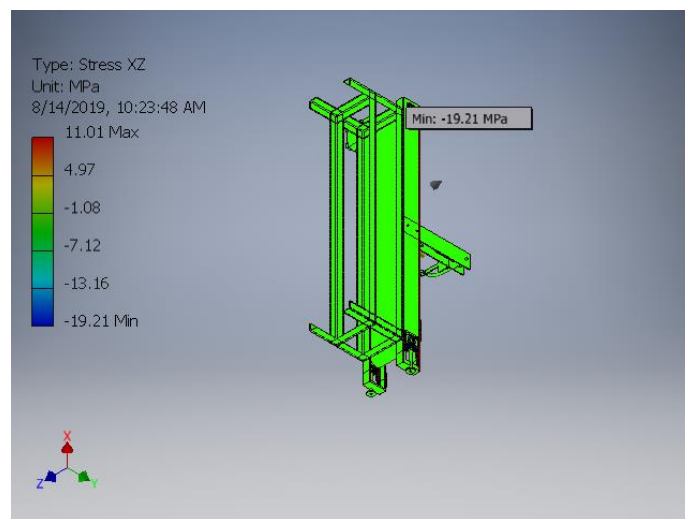
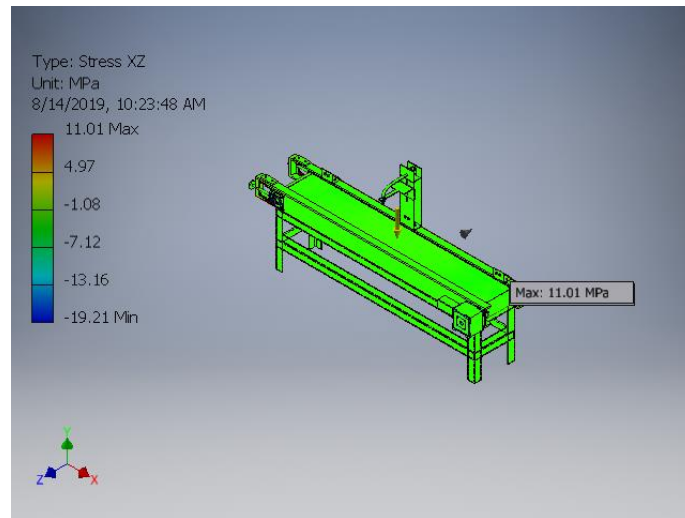
## 6. Stress XX



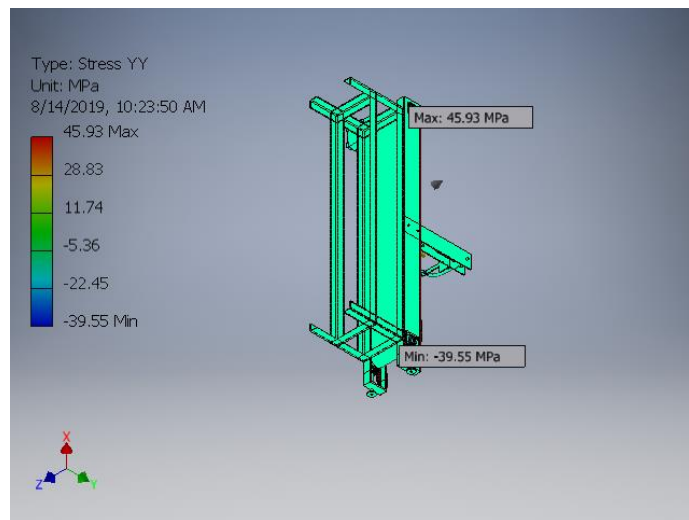
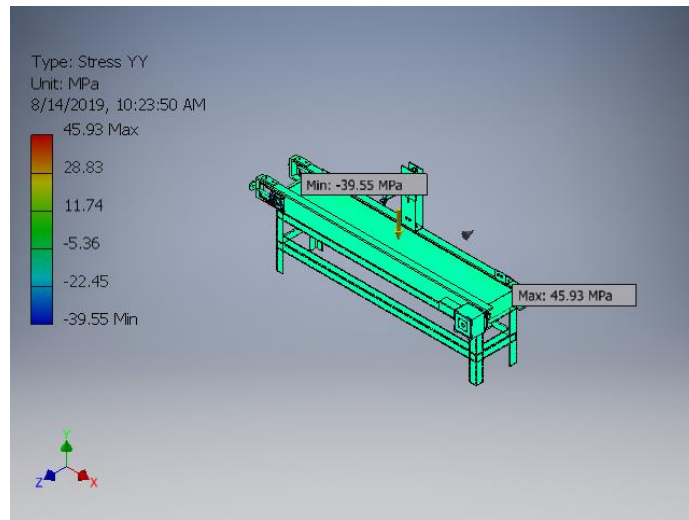
## 7. Stress XY



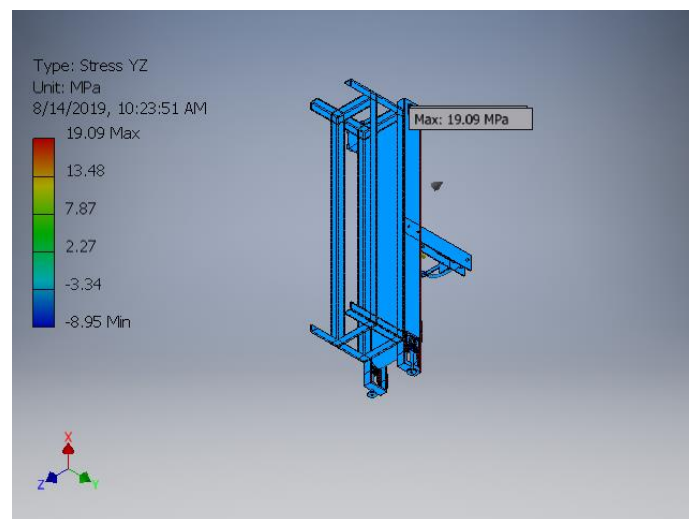
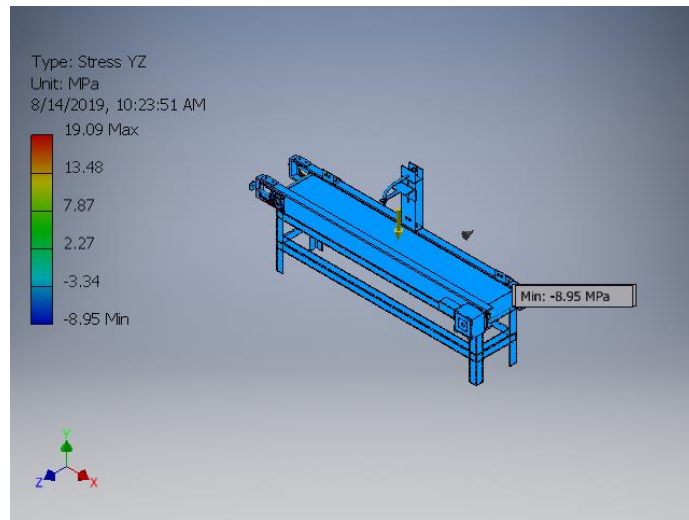
## 8. Stress XZ



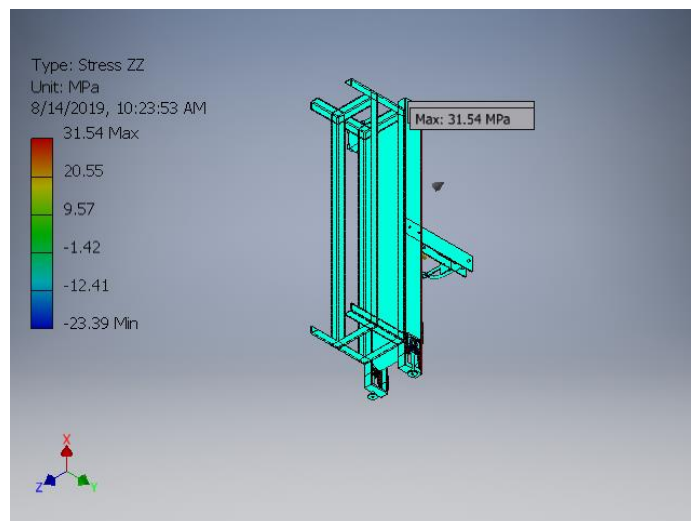
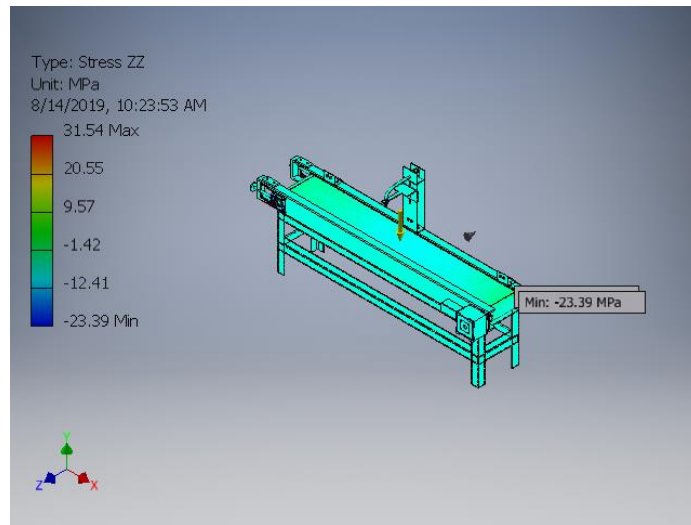
## 9. Stress YY



## 10. Stress YZ

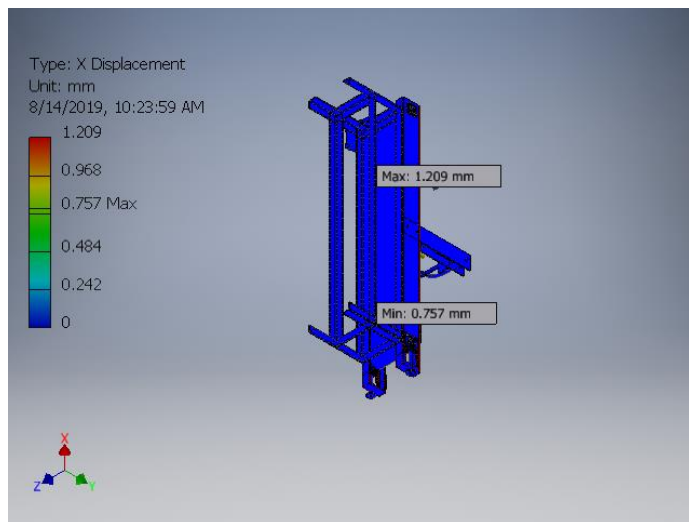
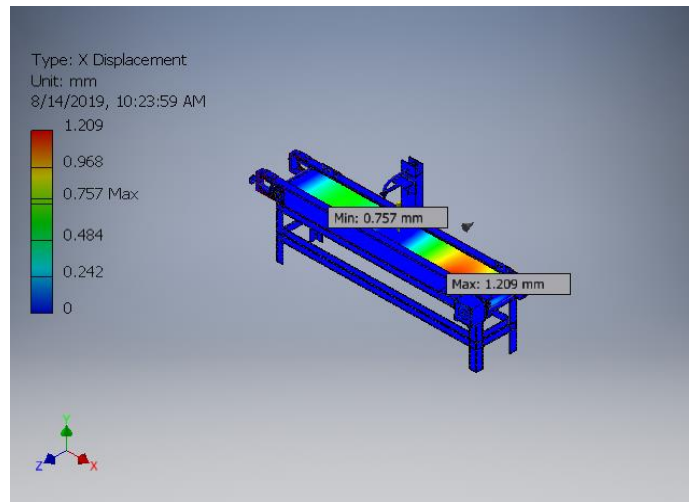


## 11. Stress ZZ

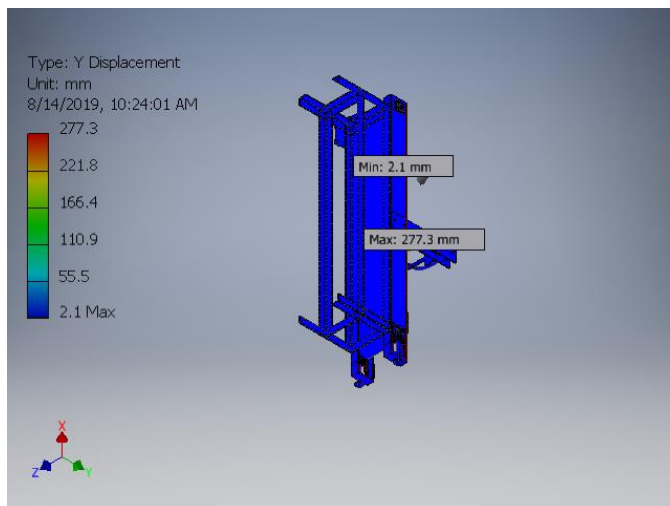
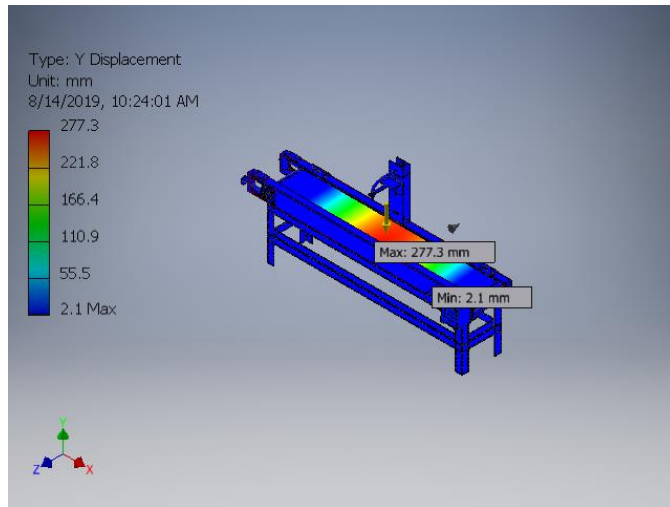




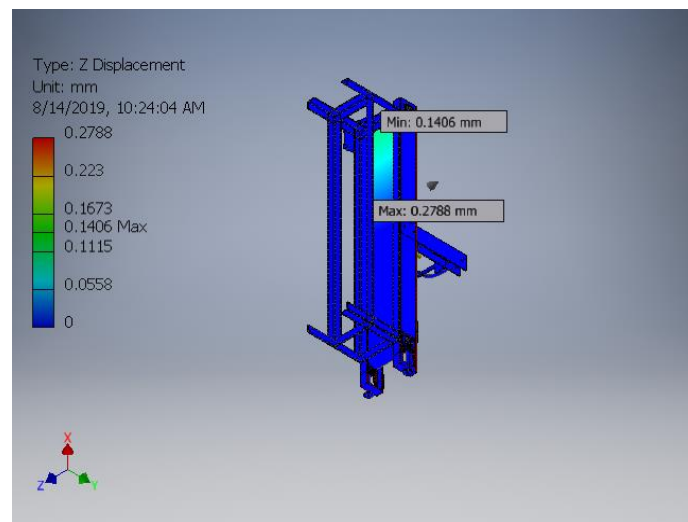
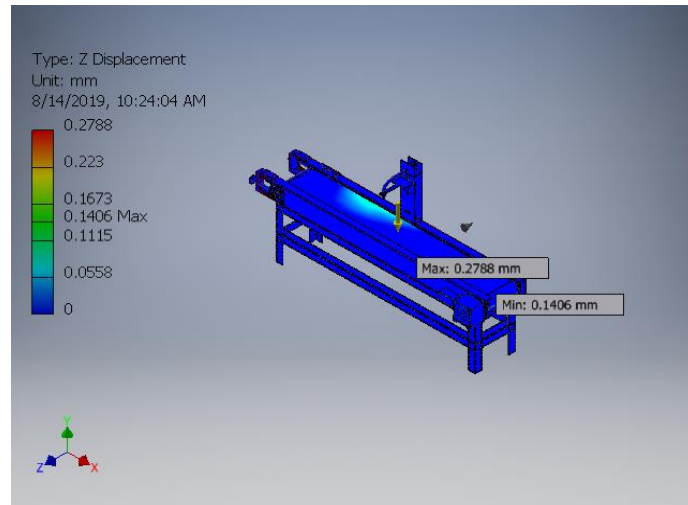
## 12. X Displacement



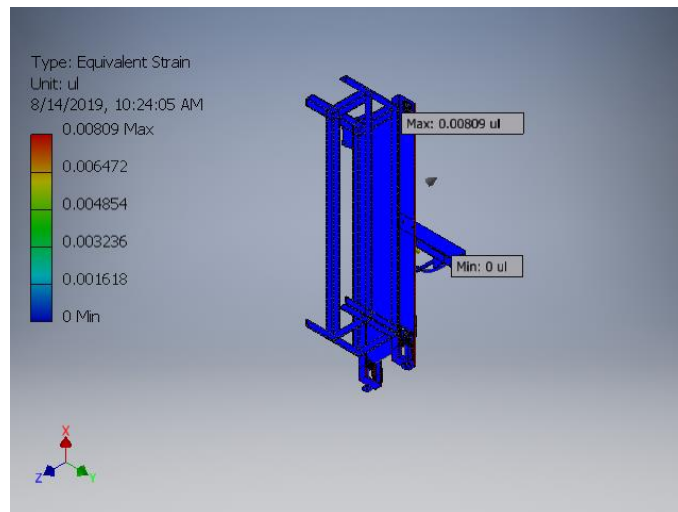
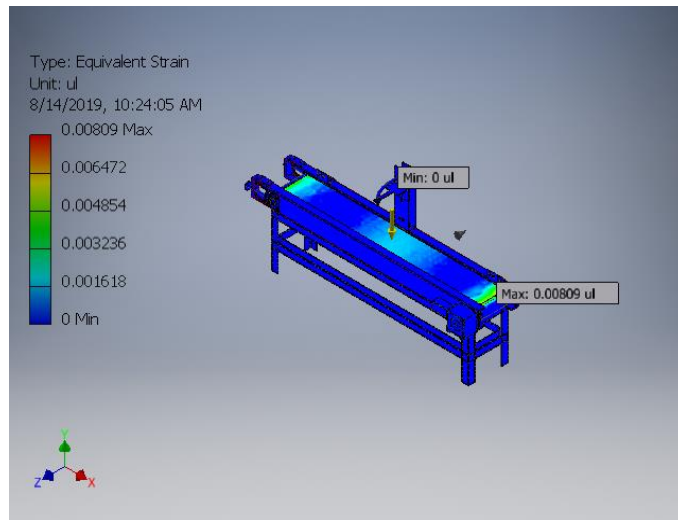
### 13. Y Displacement



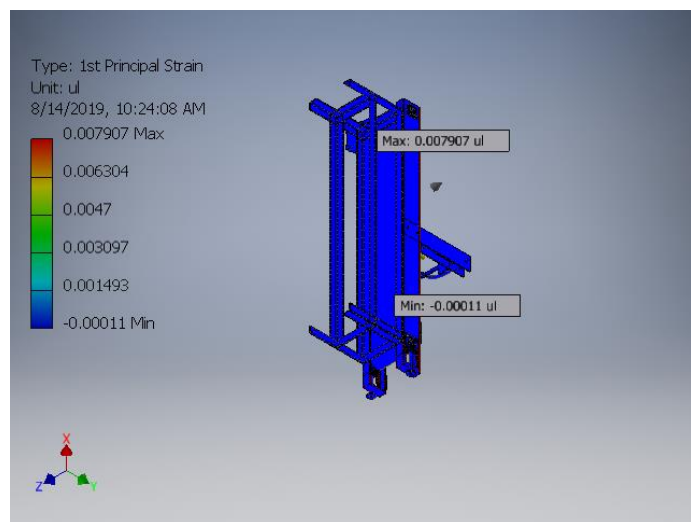
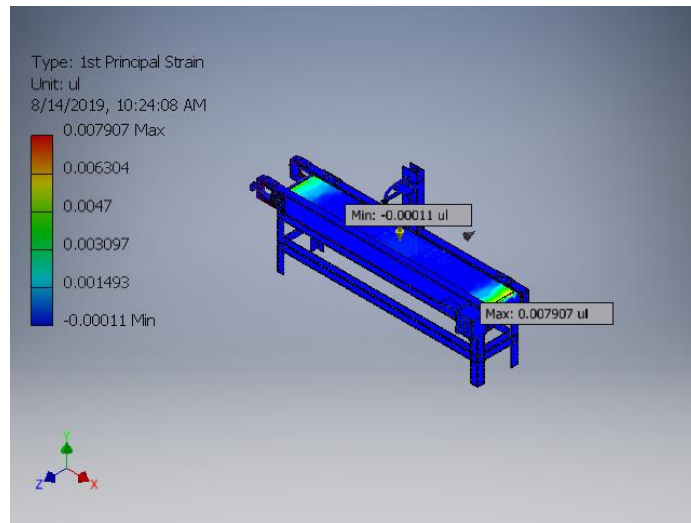
## 14. Z Displacement



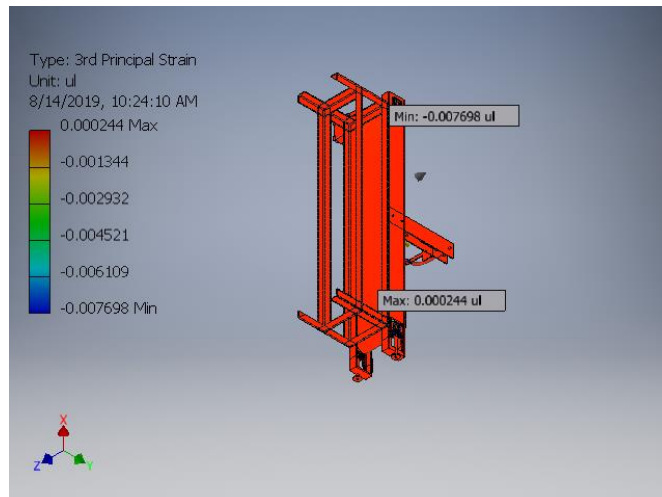
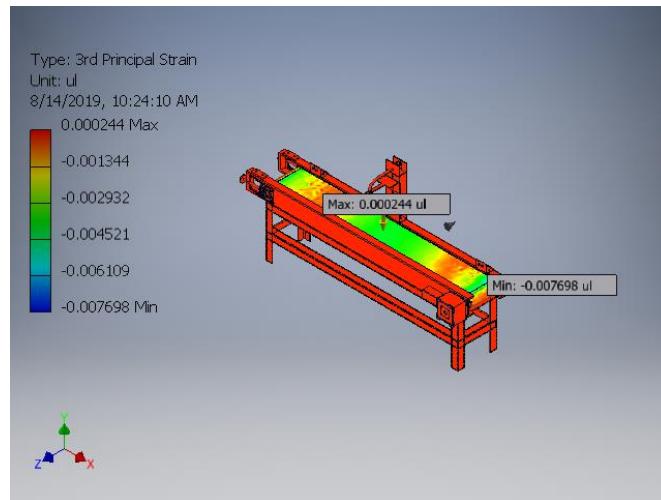
## 15. Equivalent Strain



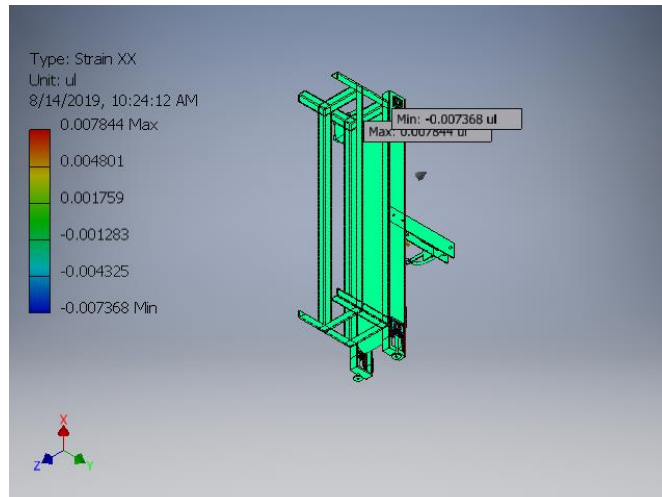
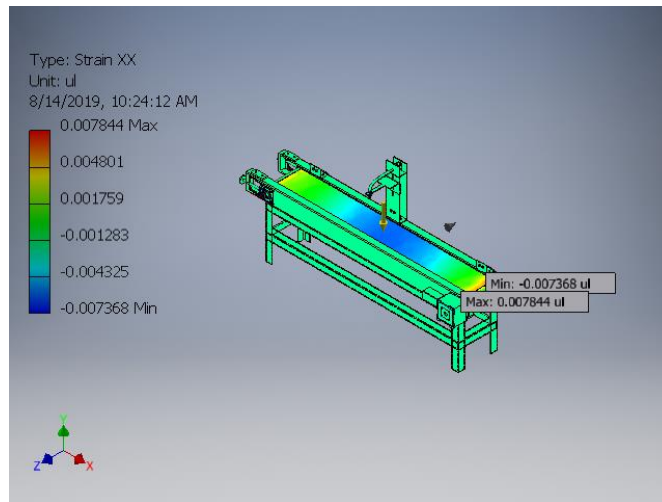
## 16. 1st Principal Strain



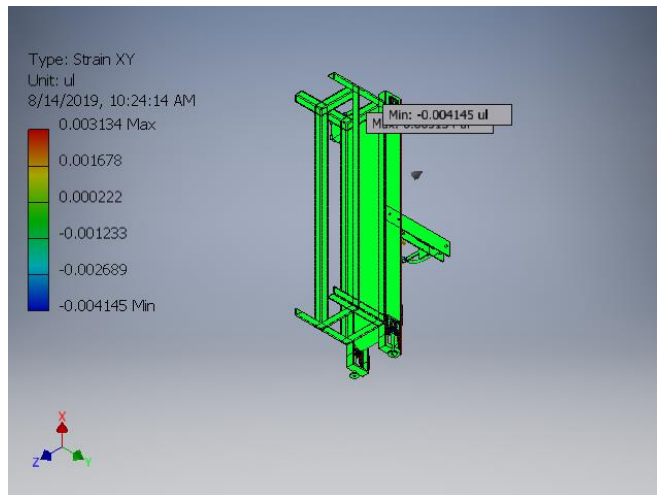
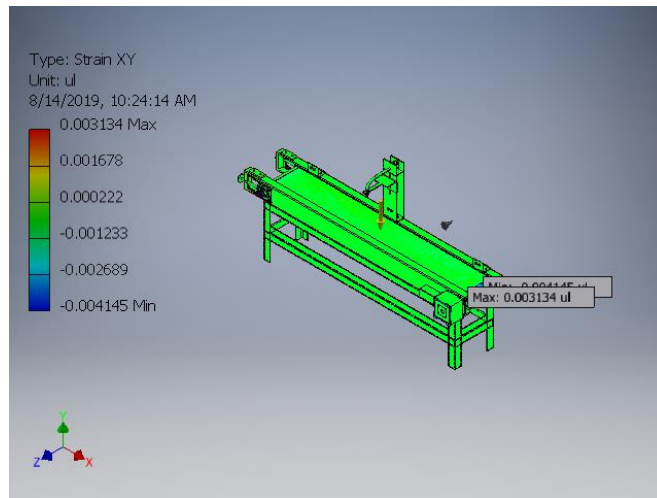
## 17. 3rd Principal Strain



## 18. Strain XX

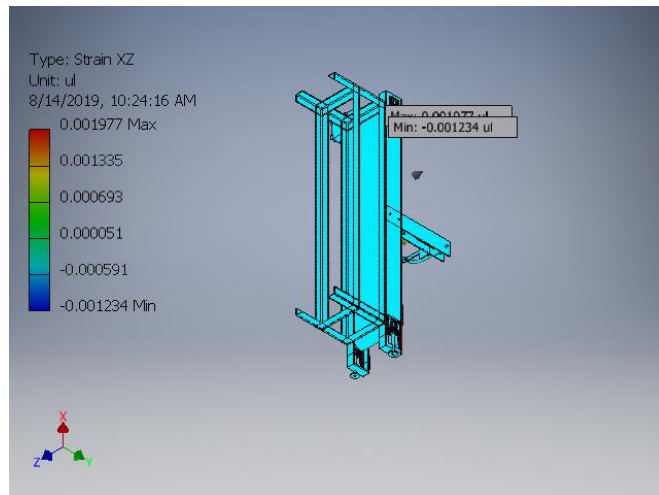
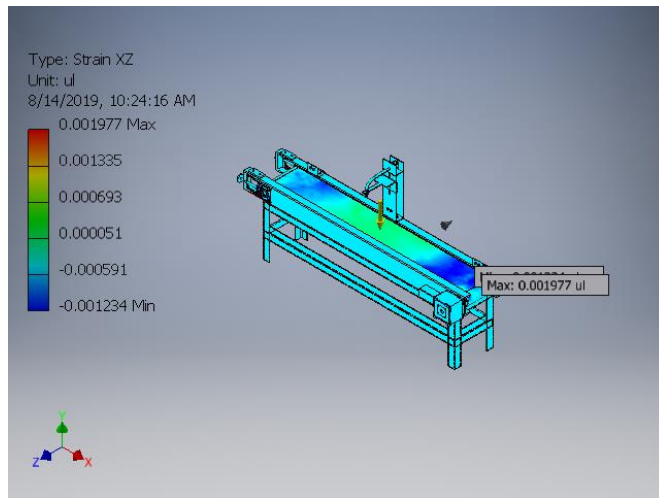


## 19. Strain XY

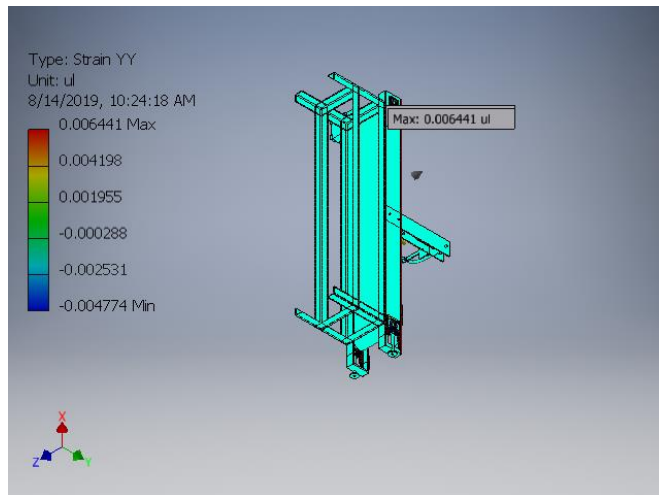
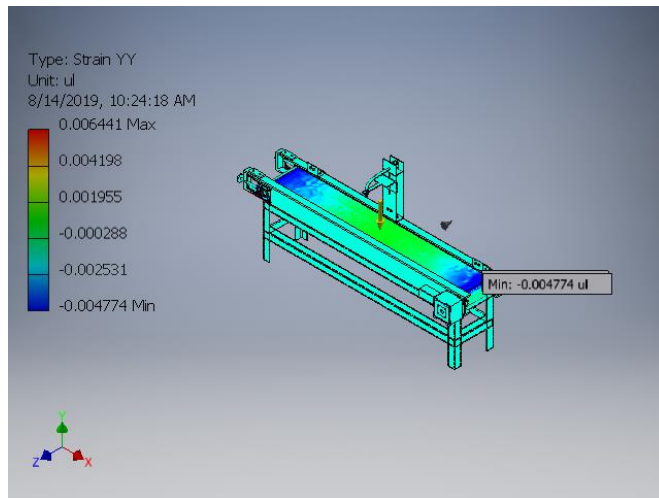




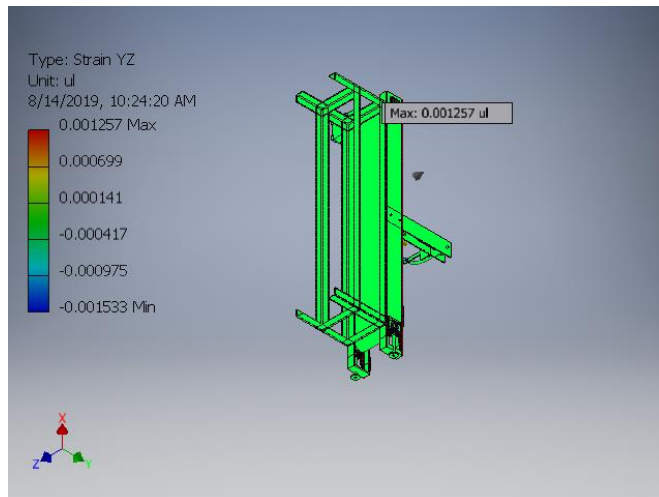
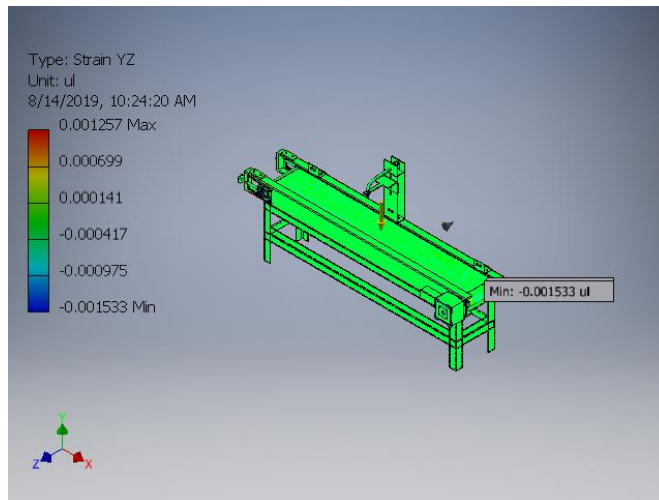
## 20. Strain XZ



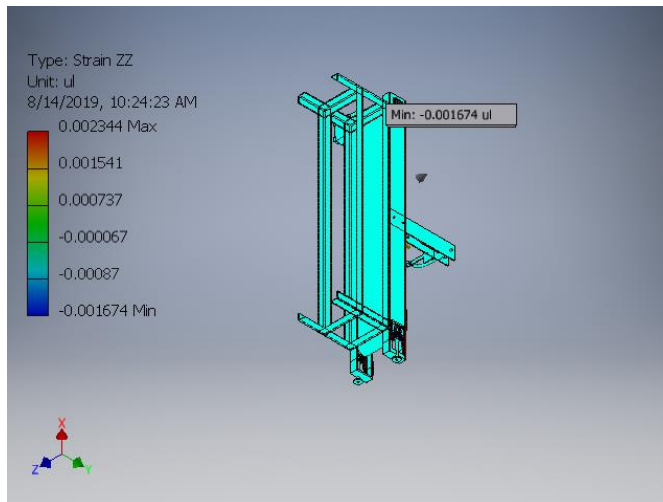
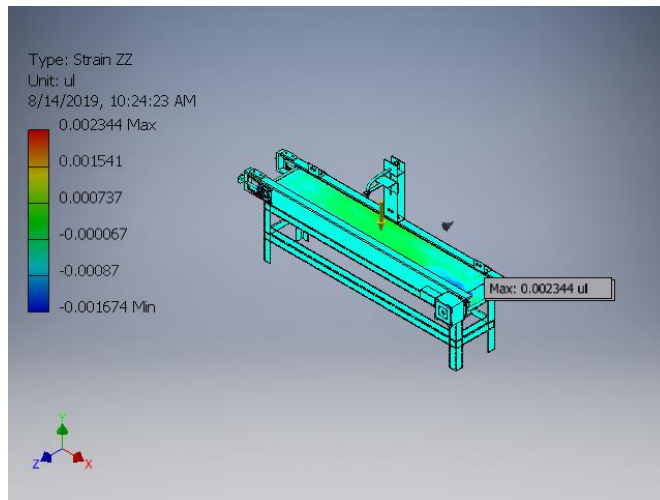
## 21. Strain YY



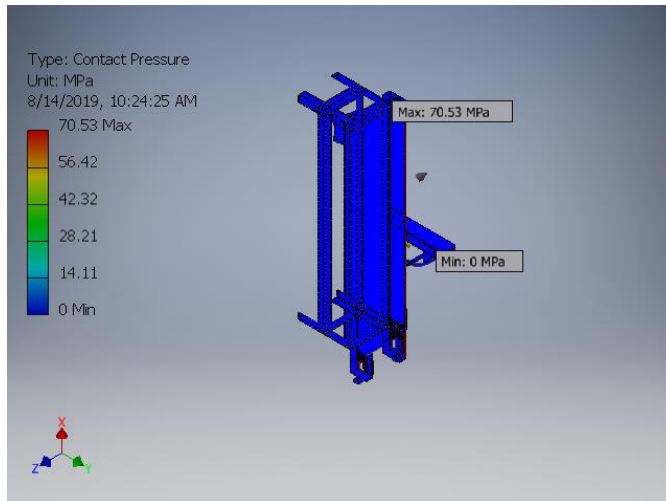
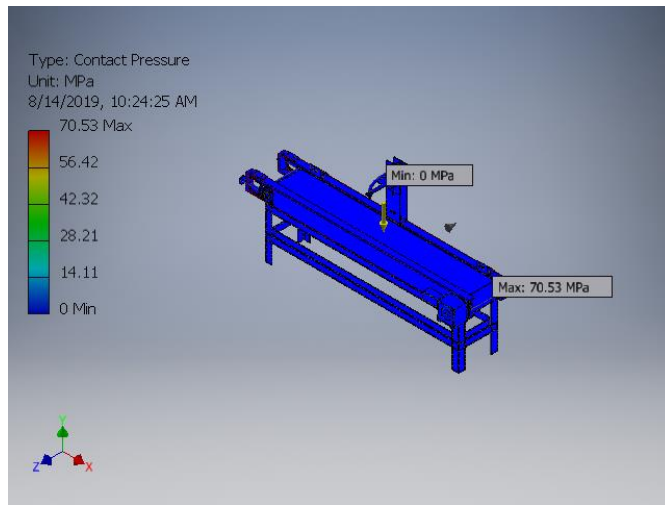
## 22. Strain YZ



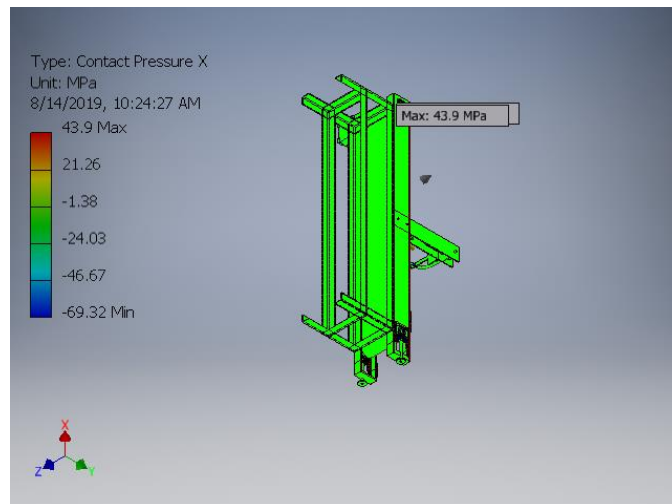
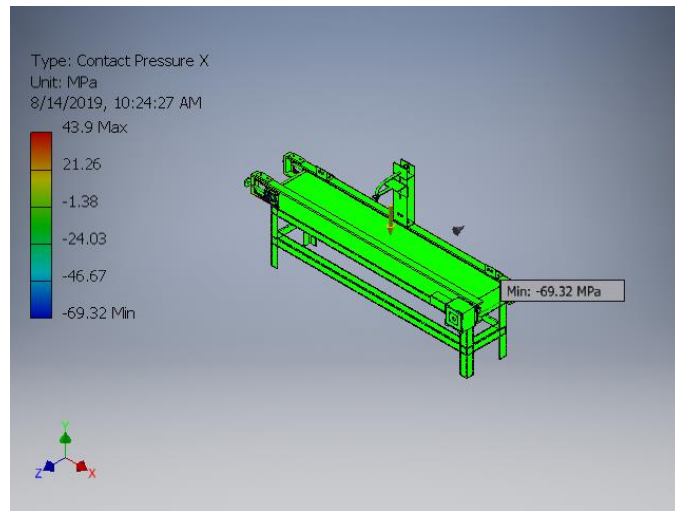
### 23. Strain ZZ



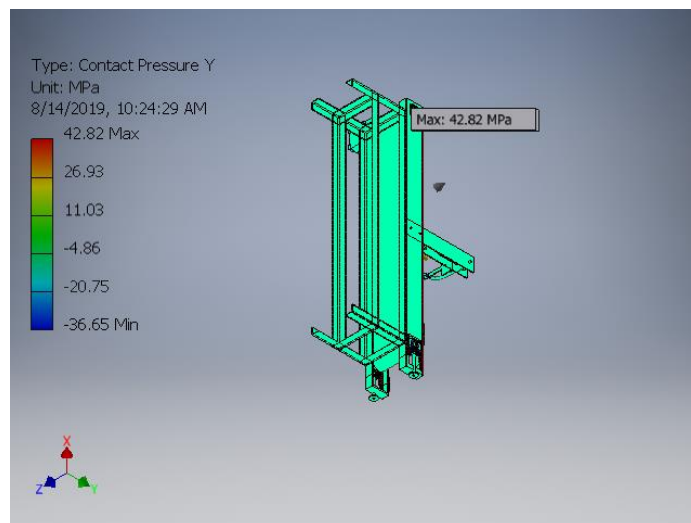
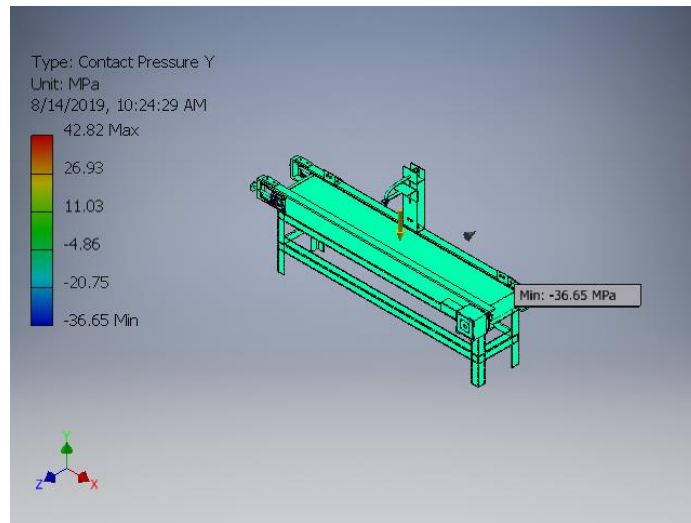
## 24. Contact Pressure



## 25. Contact Pressure X



## 26. Contact Pressure Y



## 27. Contact Pressure Z

