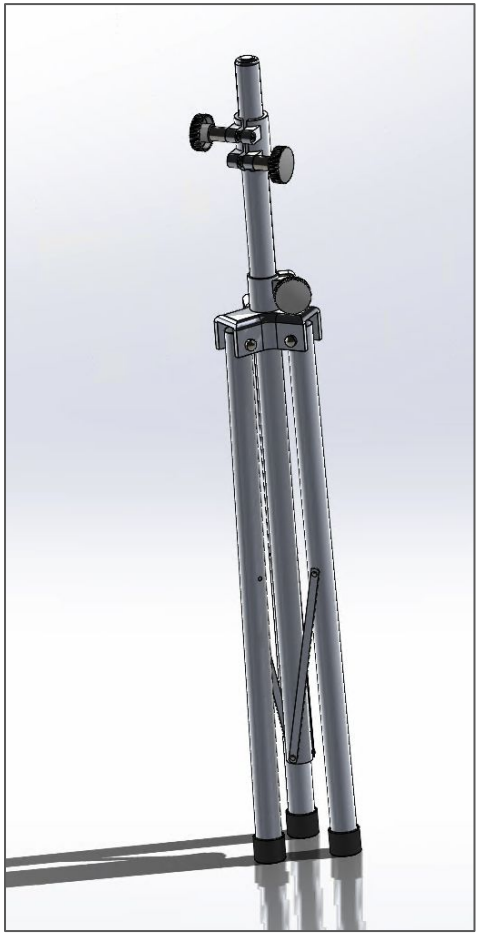
Drawings and Simulations for: Proline SPS502 Speaker Stand

Javi Fernandez de Ybarra & Juan Perez

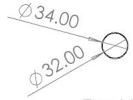
Enabled by:

SOLIDWORKS

Overview

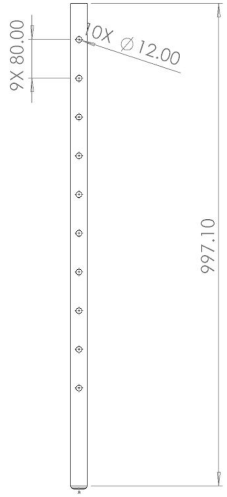


Inner Shaft

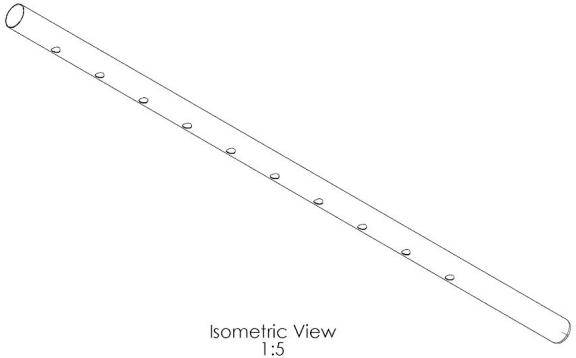


Top View

Side View



Side View



Isometric View
1:5

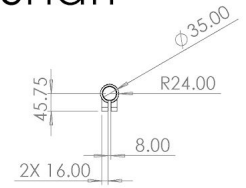
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN MILLIMETERS	DRAWN	JP	5/11/26
		TOLERANCES: FRACTIONAL ±	CHECKED		
		ANGULAR: MACH ± BEND ±	ENG APPR.		
		TWO PLACE DECIMAL ±0.25	MFG APPR.		
		THREE PLACE DECIMAL ±	Q.A.		
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:		
		MATERIAL 6061 Alloy			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

TITLE: Inner Shaft

SIZE	DWG. NO.	REV
B	part_drawings	

SCALE: 1:8 | WEIGHT: 279.63 g | SHEET 2 OF 7

Outer Shaft

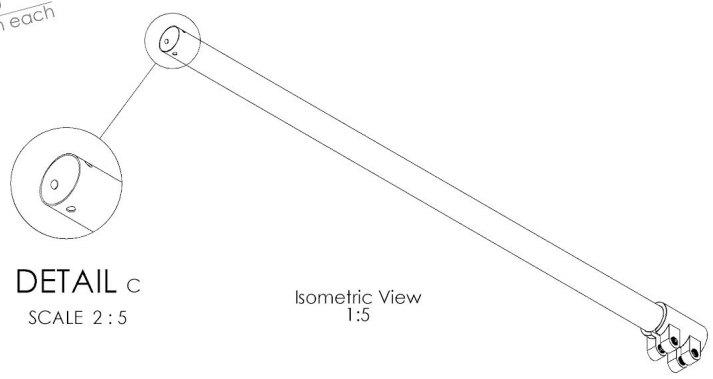


Top View

Side View

Side View

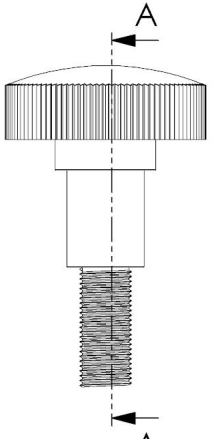
DETAIL C
SCALE 2 : 5



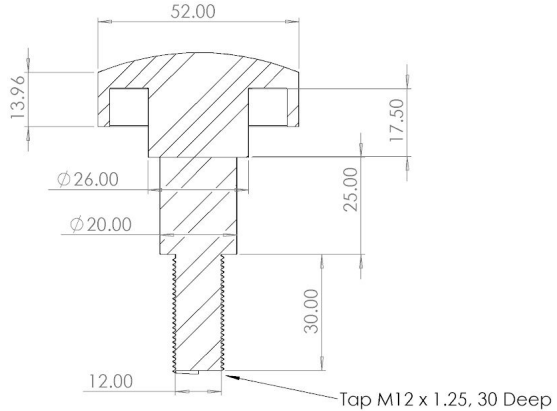
Isometric View
1:5

UNLESS OTHERWISE SPECIFIED:		NAME	DATE	
DIMENSIONS ARE IN MILLIMETERS	DRAWN	JP	5/11/26	TITLE: Outer Shaft
TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ±0.25 THREE PLACE DECIMAL ±	CHECKED			
	ENG APPR.			
	MFG APPR.			
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			
MATERIAL 6061 Alloy	COMMENTS:			SIZE B | DWG. NO. part_drawings | REV
FINISH				
NEXT ASSY / USED ON				SCALE: 1:10 | WEIGHT: 491.70 g | SHEET 3 OF 7
APPLICATION / DO NOT SCALE DRAWING				

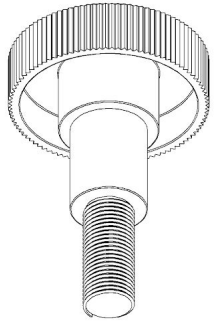
Fastening Screw



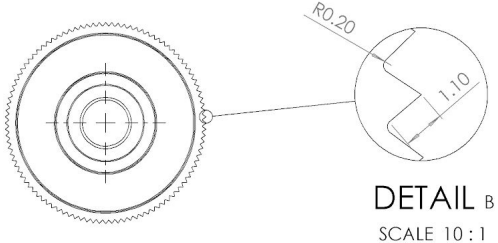
Side View



SECTION A-A



Isometric View



DETAIL B

SCALE 10 : 1

Bottom View

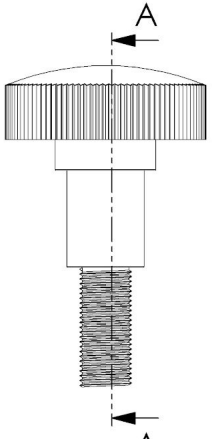
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	
DIMENSIONS ARE IN MILLIMETERS	DRAWN	JP	5/11/26	
TOLERANCES: FRACTIONAL ±	CHECKED			
ANGULAR: MACH ± BEND ±	ENG APPR.			
TWO PLACE DECIMAL ±0.25	MFG APPR.			
THREE PLACE DECIMAL ±	Q.A.			
INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:			
MATERIAL 6061 Alloy				
FINISH				
NEXT ASSY / USED ON				
APPLICATION / DO NOT SCALE DRAWING				

TITLE: Fastening Screw

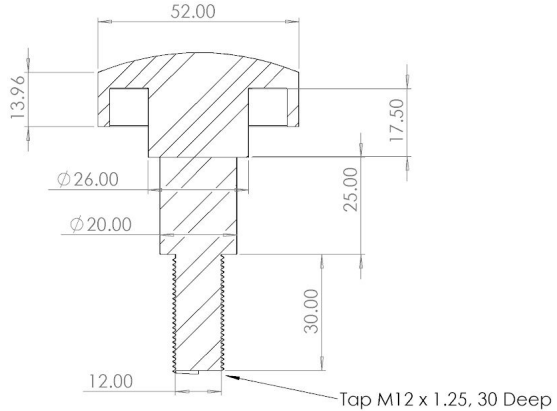
SIZE	DWG. NO.	REV
B	part_drawings	

SCALE: 1:1 | WEIGHT: 114.93 g | SHEET 6 OF 7

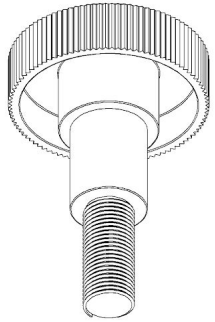
Fastening Screw



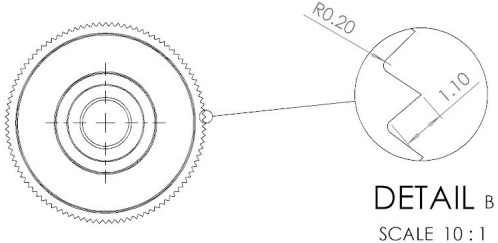
Side View



SECTION A-A



Isometric View



DETAIL B

SCALE 10 : 1

Bottom View

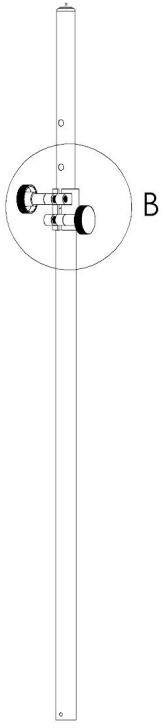
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	
DIMENSIONS ARE IN MILLIMETERS	DRAWN	JP	5/11/26	
TOLERANCES: FRACTIONAL ±	CHECKED			
ANGULAR: MACH ± BEND ±	ENG APPR.			
TWO PLACE DECIMAL ±0.25	MFG APPR.			
THREE PLACE DECIMAL ±	Q.A.			
INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:			
MATERIAL 6061 Alloy				
FINISH				
NEXT ASSY / USED ON				
APPLICATION / DO NOT SCALE DRAWING				

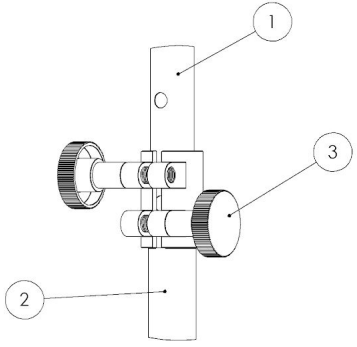
TITLE: Fastening Screw

SIZE	DWG. NO.	REV
B	part_drawings	

SCALE: 1:1 | WEIGHT: 114.93 g | SHEET 6 OF 7

CENTER SHAFT SUBASSEMBLY





DETAIL B

SCALE 1 : 3

BILL OF MATERIALS

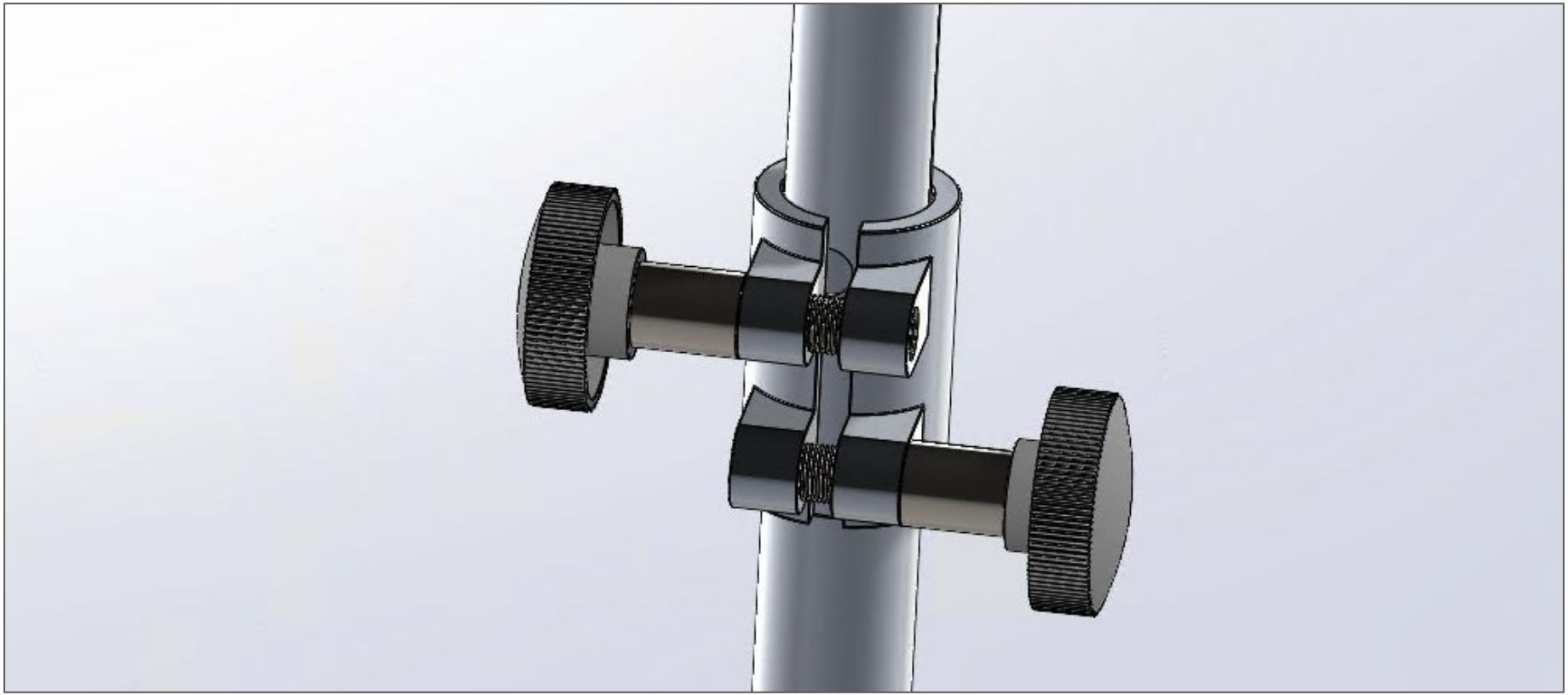
ITEM NO.	PART NUMBER	Material	QTY.
1	Top shaft	6061 Alloy	1
2	Bottom Shaft	6061 Alloy	1
3	stand_screw	Alloy Steel	2

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	DRAWN	JP	5/11/26
			CHECKED		
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

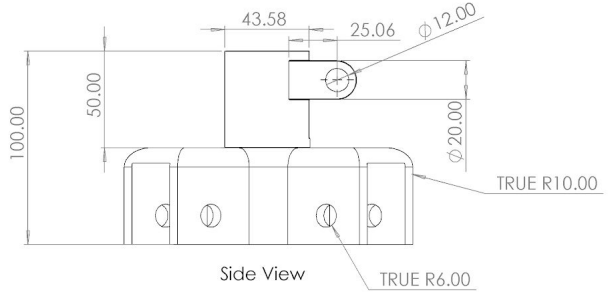
TITLE: Pole Subassembly

SIZE	DWG. NO.	REV
B	subassembly_drawings	

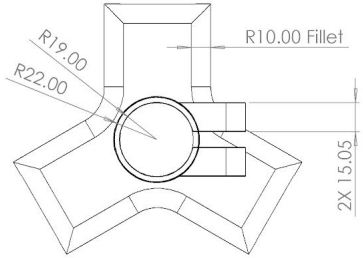
SCALE: 1:10 | WEIGHT: 1001.19 g | SHEET 1 OF 3



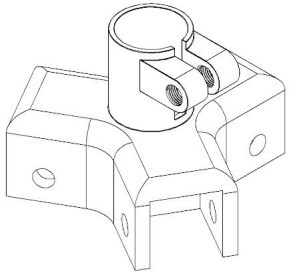
Leg Trimount



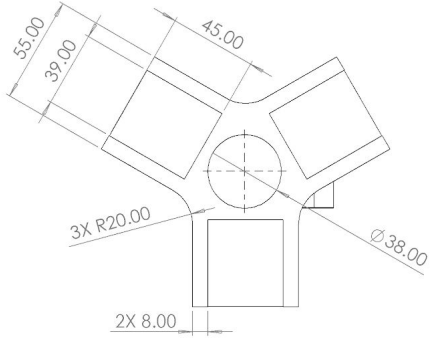
Side View



Top View



Isometric View



Bottom View

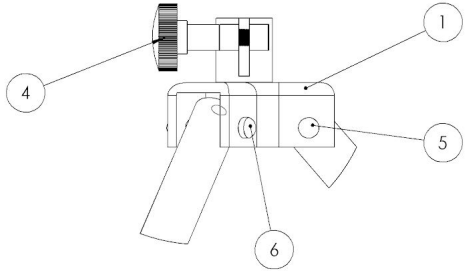
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN MILLIMETERS	DRAWN	JP	5/11/26
		TOLERANCES: FRACTIONAL ±	CHECKED		
		ANGULAR: MACH ± BEND ±	ENG APPR.		
		TWO PLACE DECIMAL ±0.25	MFG APPR.		
		THREE PLACE DECIMAL ±	Q.A.		
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:		
		MATERIAL 6061 Alloy			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

TITLE: Leg Trimount

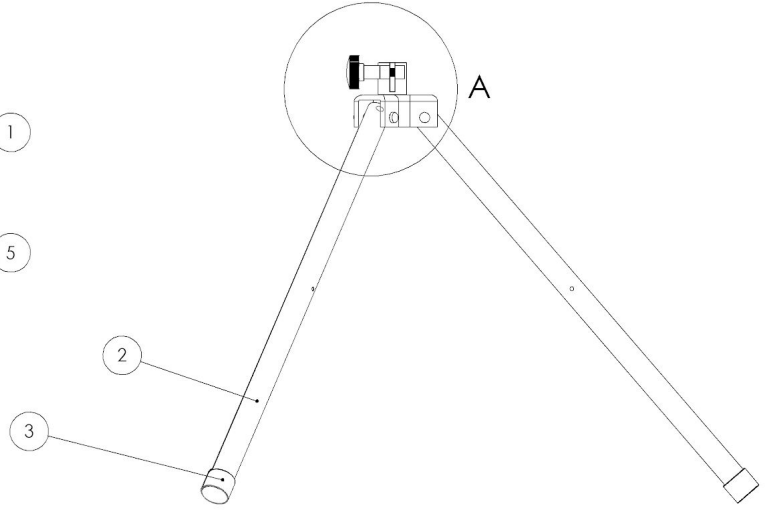
SIZE	DWG. NO.	REV
B	part_drawings	

SCALE: 1:2 | WEIGHT: 686.98 g | SHEET 5 OF 7

BASE SUBASSEMBLY



DETAIL A
SCALE 1 : 3



BILL OF MATERIALS

ITEM NO.	PART NUMBER	Material	QTY.
1	leg_trimount (1)	6061 Alloy	1
2	stand_leg	6061 Alloy	3
3	leg_cap	Rubber	3
4	stand_screw	Alloy Steel	1
5	leg pin	Alloy Steel	3
6	leg pin - top	Alloy Steel	3

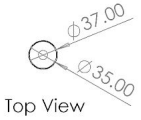
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	DRAWN	JP	5/11/26
			CHECKED		
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

TITLE: Base Subassemly

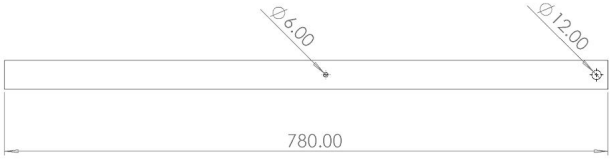
SIZE	DWG. NO.	REV
B	subassembly_drawings	

SCALE: 1:20 | WEIGHT: 1782.67 g | SHEET 2 OF 3

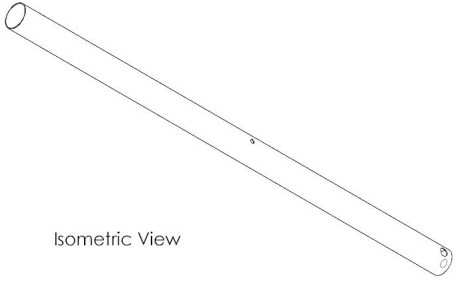
Stand Leg



Top View



Side View



Isometric View

Side View

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN MILLIMETERS	DRAWN	JP	5/11/26
		TOLERANCES: FRACTIONAL ±	CHECKED		
		ANGULAR: MACH ± BEND ±	ENG APPR.		
		TWO PLACE DECIMAL ±0.25	MFG APPR.		
		THREE PLACE DECIMAL ±	Q.A.		
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:		
		MATERIAL 6061 Alloy			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

TITLE: Stand Leg

SIZE	DWG. NO.	REV
B	part_drawings	

SCALE: 1:5 | WEIGHT: 237.38 g | SHEET 4 OF 7

Leg Arm

Front View

Side View

Top View

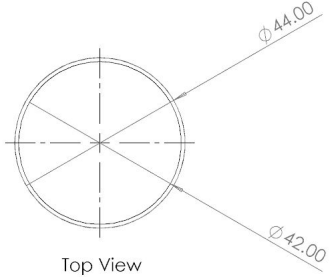
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN MILLIMETERS	DRAWN	JP	5/11
		TOLERANCES: FRACTIONAL ±	CHECKED		
		ANGULAR: MACH ± BEND ±	ENG APPR.		
		TWO PLACE DECIMAL ±0.25	MFG APPR.		
		THREE PLACE DECIMAL ±0.	Q.A.		
		INTERPRET GEOMETRIC TOLERANCING PER:	COMMENTS:		
		MATERIAL 6061 Alloy			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

TITLE: Leg Arm

SIZE	DWG. NO.	REV
B	part_drawings	

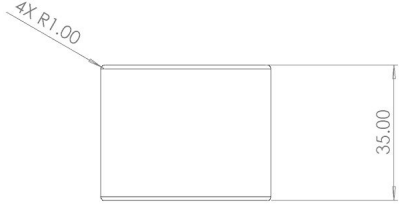
SCALE: 1:2 | WEIGHT: 19.05 g | SHEET 1 OF 7

Leg Cap

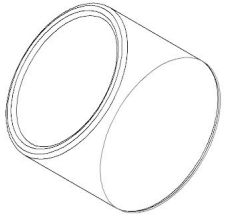


Top View

Isometric View



Side View



Isometric View

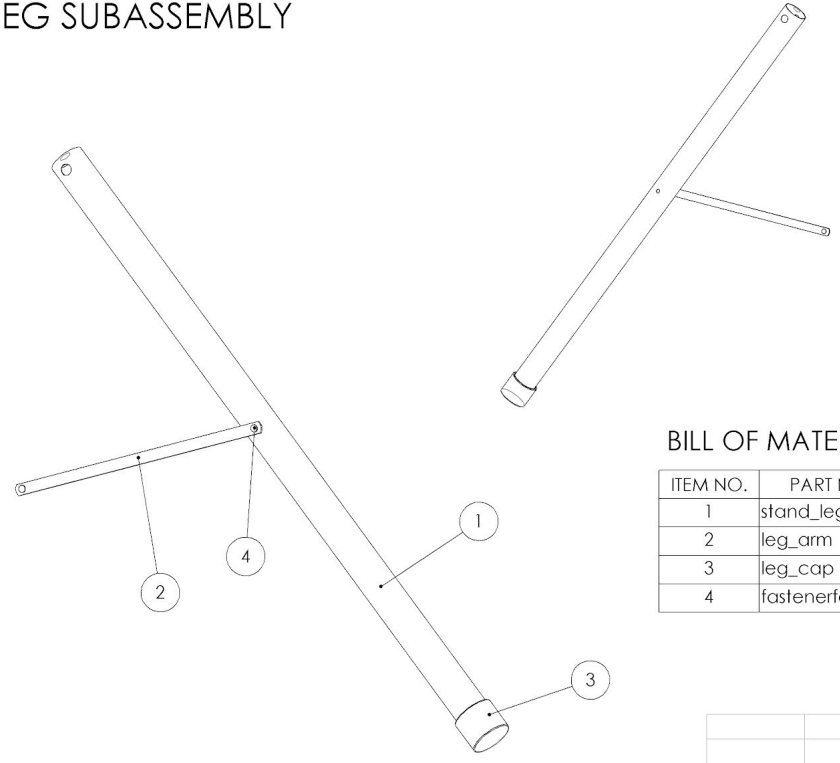
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN MILLIMETERS	DRAWN	JP	5/11/26
		TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ±0.25 THREE PLACE DECIMAL ±	CHECKED		
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL 6061 Alloy	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

TITLE: Leg Cap

SIZE	DWG. NO.	REV
B	part_drawings	

SCALE: 1:1 | WEIGHT: 20.53 g | SHEET 7 OF 7

LEG SUBASSEMBLY



BILL OF MATERIALS

ITEM NO.	PART NUMBER	Material	QTY.
1	stand_leg	6061 Alloy	1
2	leg_arm	6061 Alloy	1
3	leg_cap	Rubber	1
4	fastenerforlegs	Alloy Steel	2

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
NEXT ASSY | USED ON
APPLICATION
DO NOT SCALE DRAWING

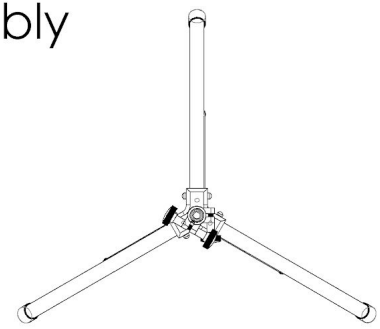
	NAME	DATE
DRAWN	JP	5/11/26
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		
COMMENTS:		

TITLE: Leg Subassembly

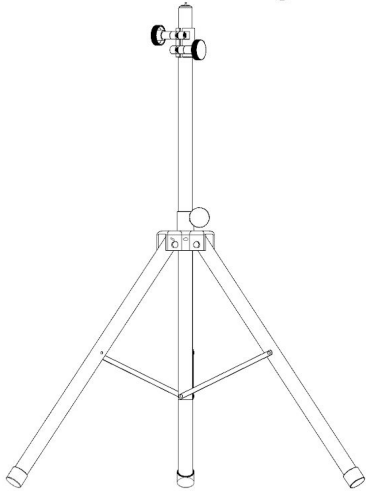
SIZE B | DWG. NO. subassembly_drawings | REV

SCALE: | WEIGHT: 280.59 g | SHEET 3 OF 3

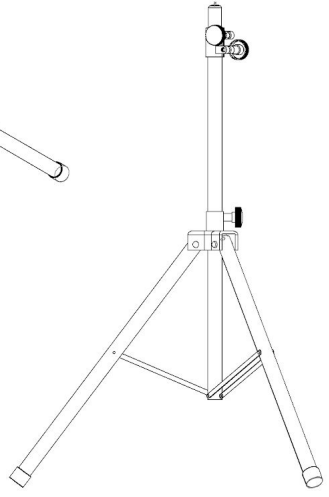
Full Assembly



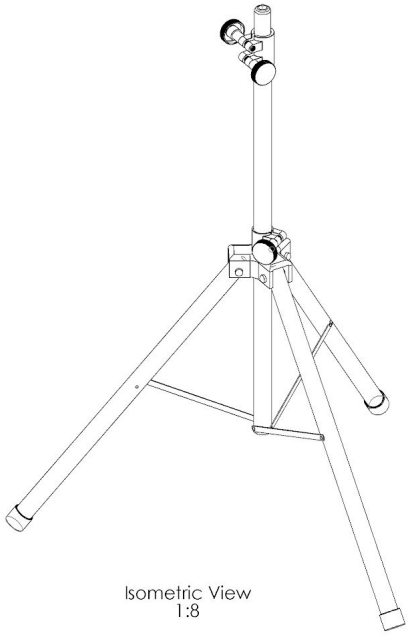
Top View



Front View



Side View



Isometric View
1:8

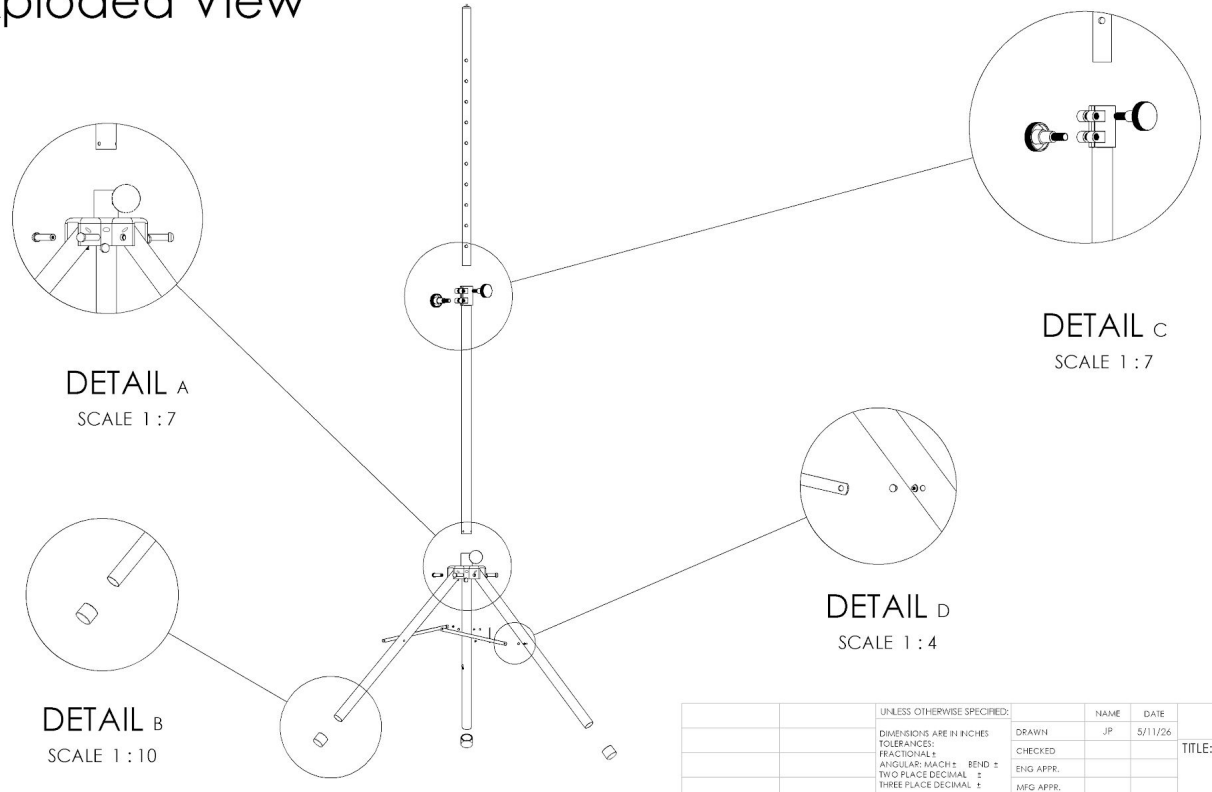
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	DRAWN	JP	5/11/26
			CHECKED		
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

TITLE: Full Assembly

SIZE	DWG. NO.	REV
B	assembly_drawings	

SCALE: 1:10 | WEIGHT: 2851.9 g | SHEET 1 OF 2

Exploded View



DETAIL A
SCALE 1 : 7

DETAIL B
SCALE 1 : 10

DETAIL C
SCALE 1 : 7

DETAIL D
SCALE 1 : 4

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	DRAWN	JP	5/11/26
			CHECKED		
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

TITLE: Exploded Assembly

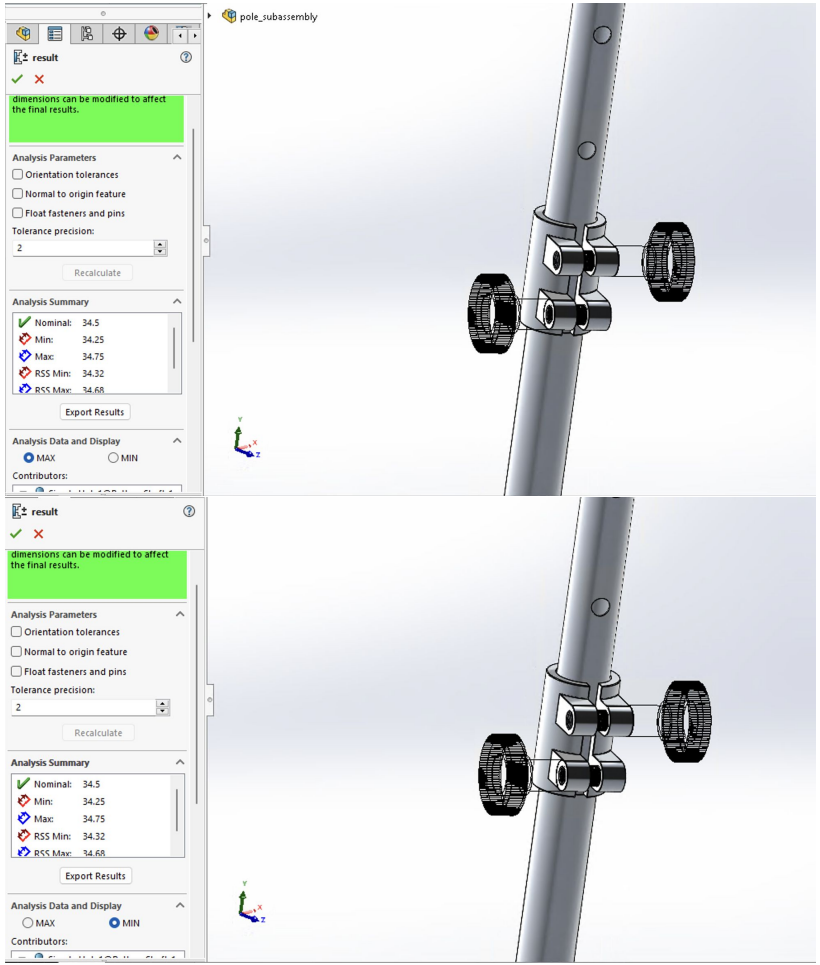
SIZE	DWG. NO.	REV
B	assembly_drawings	

SCALE: 1:15 | WEIGHT: 2851.9 g | SHEET 2 OF 2

Tolerance Analysis

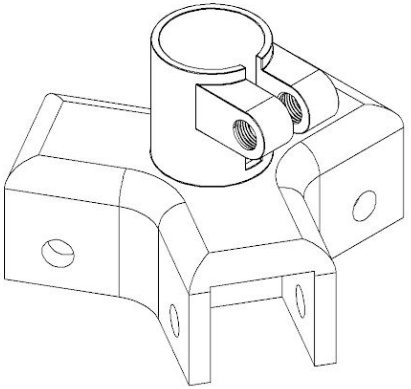
Our tolerance stack-up analyzed the clearance fit between the telescoping inner shaft and the outer collar bore. The design criterion was to maintain sufficient clearance for smooth sliding adjustment while preventing excessive looseness or interference under worst-case tolerance conditions. A TolAnalyst study was performed using the shaft outer diameter and collar inner diameter tolerances to evaluate the minimum and maximum assembly conditions.

[Files of study included in submission]



Motion Analysis

CAM for Leg Trimount Outline



Manufacture of the Leg Trimount Base requires machining from a stock billet of Aluminum 6061:

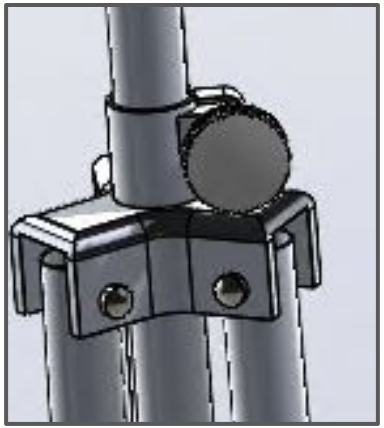
(Dimensions: 185 mm x 220 mm x 250 mm).

The machinery to be used for the part is a metric milling machine + a tap drill for the threads.

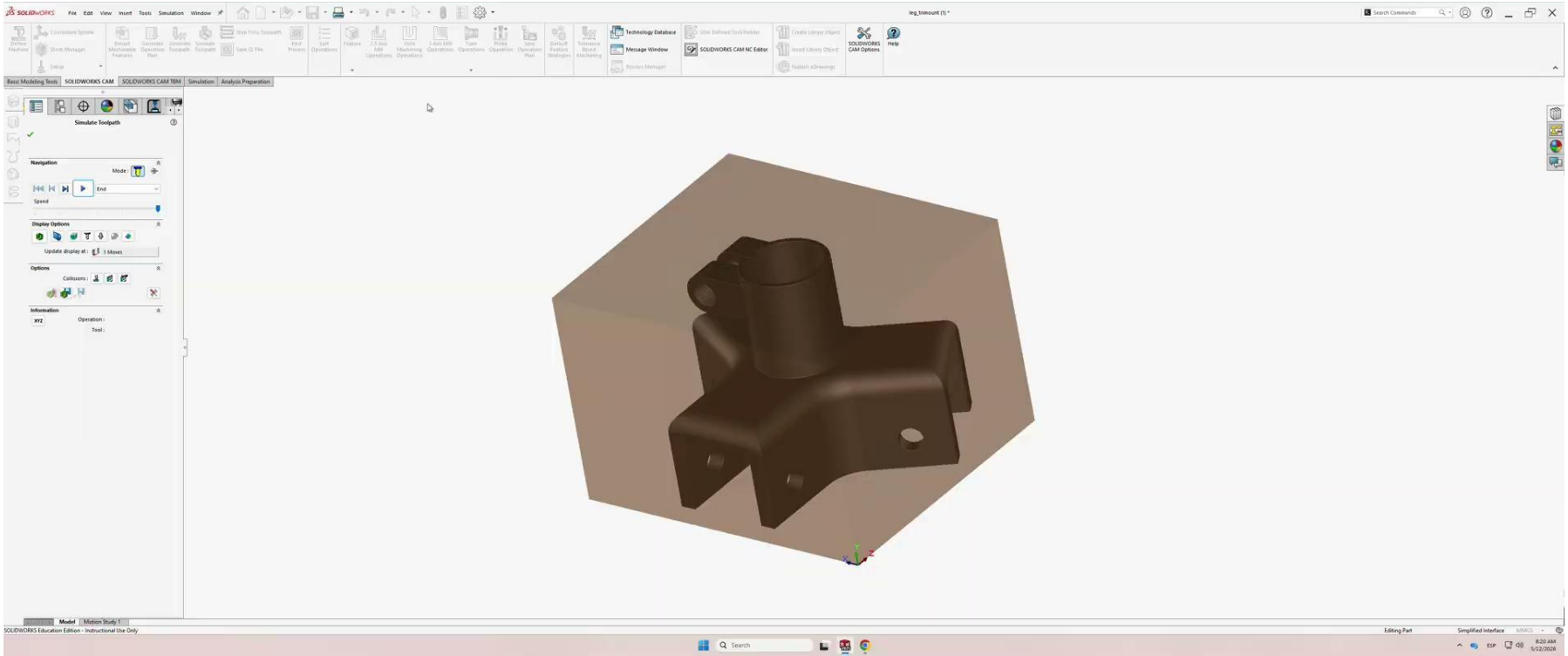
The machining process is purely subtractive, requiring seven distinct drill bits ranging from 6-19 mm in diameter.

There are 24 distinct operations, and ~2000 lines of G-code in the file. The threads were not included in the plan.

Operations include drilling, roughing, and contouring.



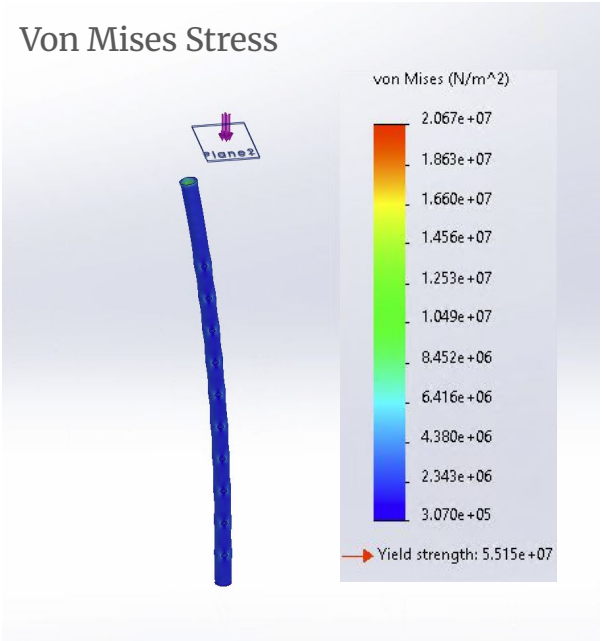
CAM for Leg Trimount Video



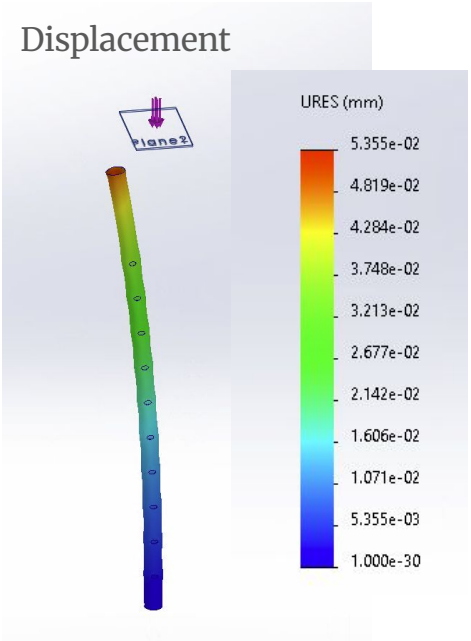
Static FEA Analysis of Top Shaft

Simulating a 25 kg load (245 N) on the top pole

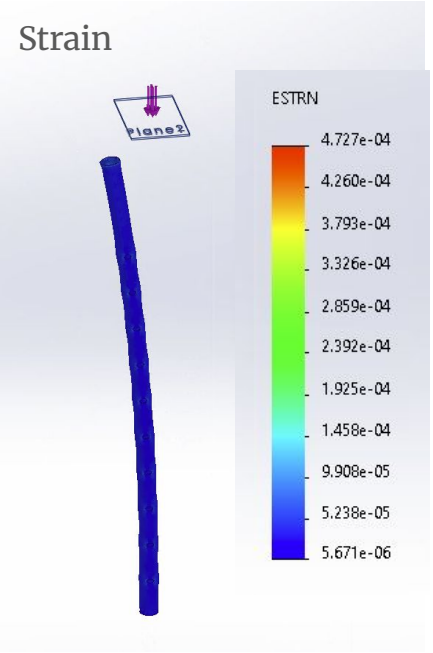
Von Mises Stress



Displacement

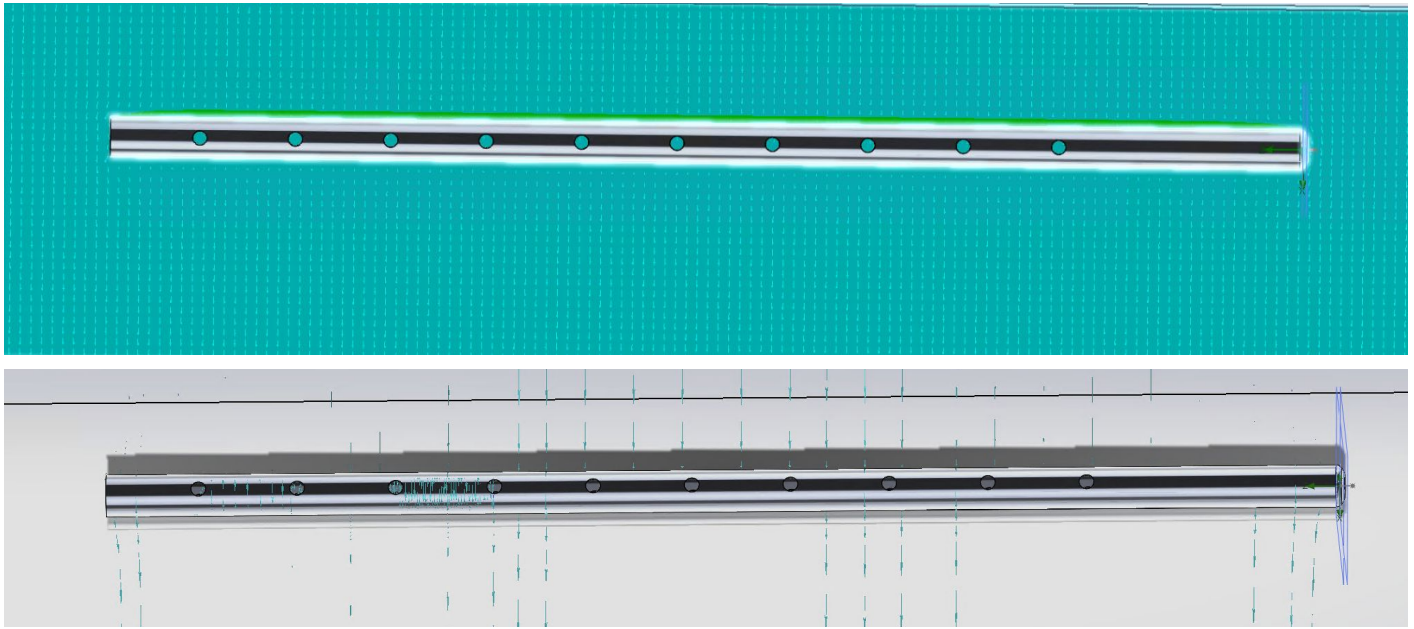


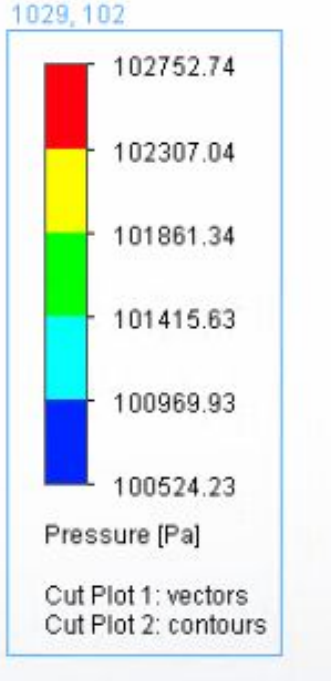
Strain



CFD Analysis of Top Shaft

Simulating a 13 m/s (~30 mph) crosswind hitting the top shaft of the stand





Thermal Analysis of Leg Trimount

Can the trimount withstand 100 W of heat flux? No it can't. It will never have to do that though. 33,670K is hotter than the temperature of the sun, so we likely used too many faces in our analysis.

Load Details	
Entities:	215 face(s)
Heat Power Value:	100 W
Entities:	215 face(s)
Convection Coefficient:	10 W/(m^2.K)
Time variation:	Off
Temperature variation:	Off
Bulk Ambient Temperature:	273 Kelvin
Time variation:	Off