

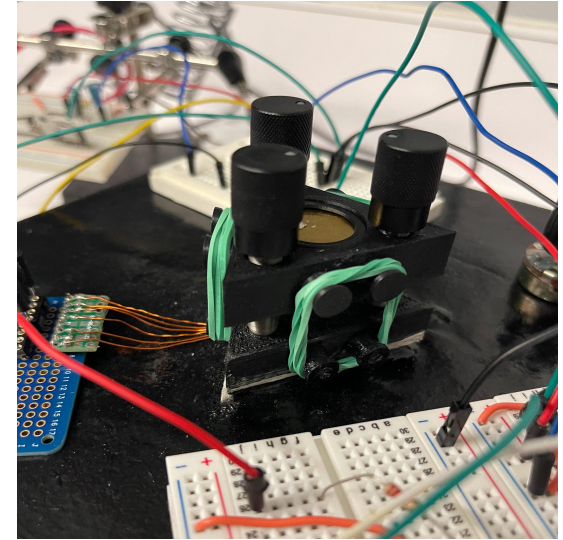
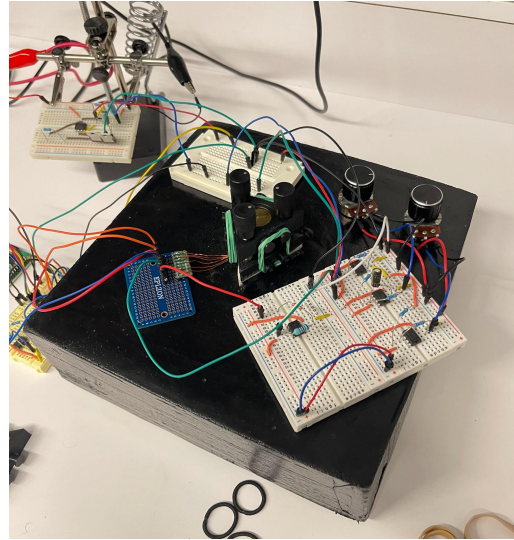
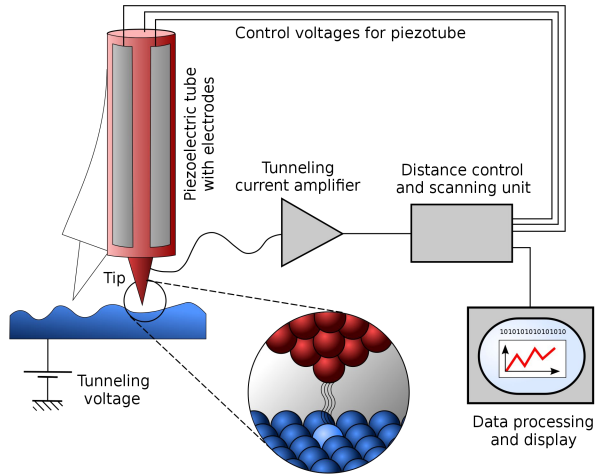


# STM 33% Build Update

Clay Culpepper, Phillip Krigbaum, Lucas Abedrabbo, Alec Markosian

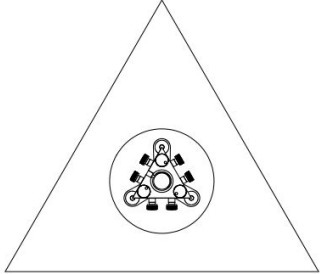
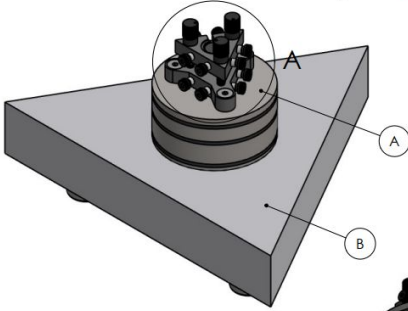
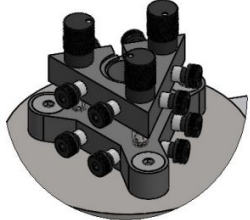
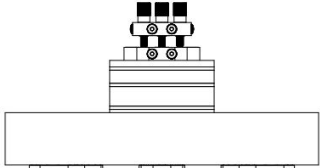
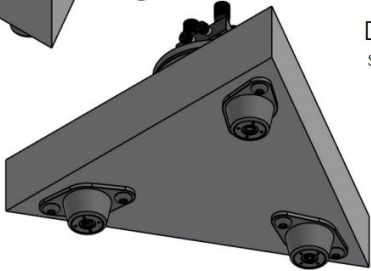
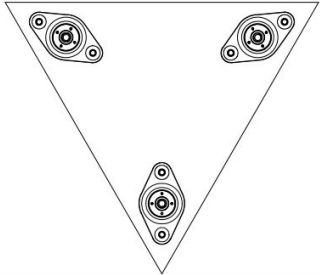


# Overview - Scanning Tunneling Microscope

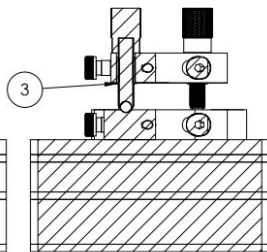
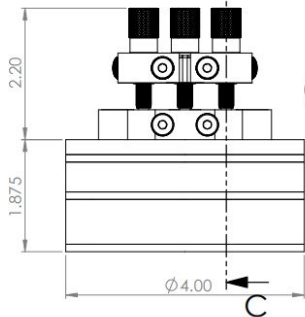
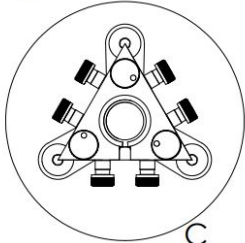


First iteration of STM

# Design Efforts - CAD

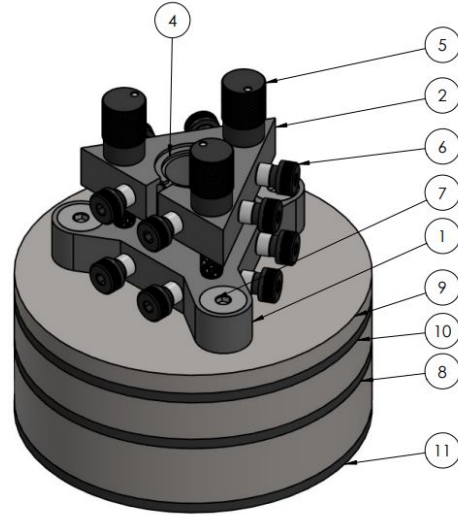
4	3	2	1																													
		 <p style="text-align: center;">DETAIL A SCALE 2 : 2.5</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">ITEM NO.</th> <th style="width: 50%;">DESCRIPTION</th> <th style="width: 25%;">QTY.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td>DAMPED MOUNTING SYSTEM</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">B</td> <td>WEIGHTED BASE</td> <td style="text-align: center;">1</td> </tr> </tbody> </table>	ITEM NO.	DESCRIPTION	QTY.	A	DAMPED MOUNTING SYSTEM	1	B	WEIGHTED BASE	1																				
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	<div style="border: 1px solid black; padding: 2px; font-size: 8px;"> <p><b>PROPRIETARY AND CONFIDENTIAL</b></p> <p>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF HOERBIGER ARIZONA UNIVERSITY. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF HOERBIGER ARIZONA UNIVERSITY IS PROHIBITED.</p> </div>	<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <tr> <td style="width: 50%; vertical-align: top;">                 UNLESS OTHERWISE SPECIFIED:                   DIMENSIONS ARE IN INCHES                  TOLERANCES:                  FRACTIONAL ±                  ANGULAR MATCH ± BEND ±                  TWO PLACE DECIMAL ±                  THREE PLACE DECIMAL ±                   INTERPRET GEOMETRIC TOLERANCING PER MATERIAL                   FINISH                   NEXT ASSY      USED ON                   APPLICATION      DO NOT SCALE DRAWING             </td> <td style="width: 50%; vertical-align: top;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">DRAWN</td> <td style="width: 33%;">NAME</td> <td style="width: 33%;">DATE</td> </tr> <tr> <td>CHECKED</td> <td></td> <td></td> </tr> <tr> <td>ENG APPR.</td> <td></td> <td></td> </tr> <tr> <td>MFG APPR.</td> <td></td> <td></td> </tr> <tr> <td colspan="3">Q.A.</td> </tr> <tr> <td colspan="3">COMMENTS</td> </tr> </table> </td> </tr> </table>	UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR MATCH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±  INTERPRET GEOMETRIC TOLERANCING PER MATERIAL  FINISH  NEXT ASSY      USED ON  APPLICATION      DO NOT SCALE DRAWING	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">DRAWN</td> <td style="width: 33%;">NAME</td> <td style="width: 33%;">DATE</td> </tr> <tr> <td>CHECKED</td> <td></td> <td></td> </tr> <tr> <td>ENG APPR.</td> <td></td> <td></td> </tr> <tr> <td>MFG APPR.</td> <td></td> <td></td> </tr> <tr> <td colspan="3">Q.A.</td> </tr> <tr> <td colspan="3">COMMENTS</td> </tr> </table>	DRAWN	NAME	DATE	CHECKED			ENG APPR.			MFG APPR.			Q.A.			COMMENTS			<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <tr> <td colspan="3">TITLE: <b>STM OVERVIEW</b></td> </tr> <tr> <td style="width: 33%;">SIZE <b>B</b></td> <td style="width: 33%;">DWG. NO. STM DRAWING</td> <td style="width: 33%;">REV</td> </tr> <tr> <td>SCALE: 1:1.5</td> <td>WEIGHT:</td> <td>SHEET 1 OF 7</td> </tr> </table>	TITLE: <b>STM OVERVIEW</b>			SIZE <b>B</b>	DWG. NO. STM DRAWING	REV	SCALE: 1:1.5	WEIGHT:	SHEET 1 OF 7
UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR MATCH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±  INTERPRET GEOMETRIC TOLERANCING PER MATERIAL  FINISH  NEXT ASSY      USED ON  APPLICATION      DO NOT SCALE DRAWING	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">DRAWN</td> <td style="width: 33%;">NAME</td> <td style="width: 33%;">DATE</td> </tr> <tr> <td>CHECKED</td> <td></td> <td></td> </tr> <tr> <td>ENG APPR.</td> <td></td> <td></td> </tr> <tr> <td>MFG APPR.</td> <td></td> <td></td> </tr> <tr> <td colspan="3">Q.A.</td> </tr> <tr> <td colspan="3">COMMENTS</td> </tr> </table>	DRAWN	NAME	DATE	CHECKED			ENG APPR.			MFG APPR.			Q.A.			COMMENTS															
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SCALE: 1:1.5	WEIGHT:	SHEET 1 OF 7																														

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	N/A	BOTTOM OF STM BODY	1
2	N/A	TOP OF STM BODY	1
3	McMC #98625A960	LONG BRASS INSERT	3
4	N/A	PIEZO DISK RETAINING RING	1
5	McMC #97424A590	ULTRA-FINE-THREAD THUMB SCREW	3
6	McMC #91259A533	ALLOY STEEL SHOULDER SCREW	12
7	McMC #91253A540	HEX DRIVE FLAT HEAD SCREW	3
8	N/A	4" X 0.75" VIBRATION PLATE	1
9	N/A	4" X 0.25" VIBRATION PLATE	1
10	N/A	4" X 0.50" VIBRATION PLATE	1
11	N/A	4" RUBBER DAMPENER	3



SECTION C-C

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

TITLE:		
<b>DAMPED MOUNTING SYSTEM</b>		
SIZE:	DWG. NO.	REV
<b>B</b>	<b>STM DRAWING</b>	
SCALE: 1:1.5WEIGHT:	SHEET 2 OF 7	

4

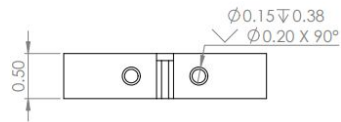
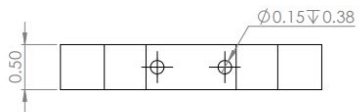
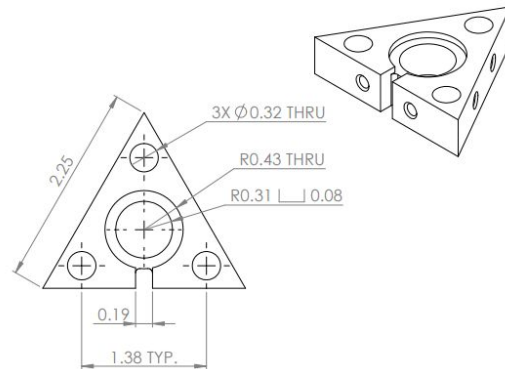
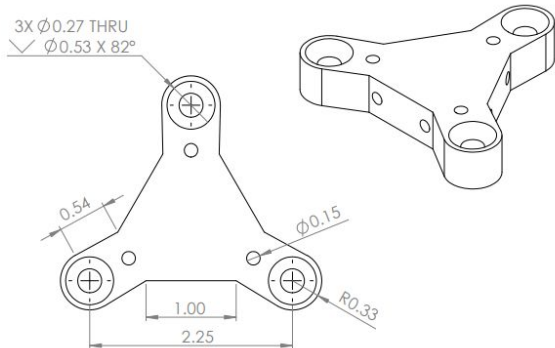
3

2

1

B

B



ITEM 1  
3D PRINTED  
QTY 1 REQ'D

ITEM 2  
3D PRINTED  
QTY 1 REQ'D

A

A

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		TOLERANCES:	CHECKED		
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		ANGULAR: MACH ± BEND ±	MFG APPR.		
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		THREE PLACE DECIMAL ±	COMMENTS		
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		MATERIAL			
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

TITLE:		
PART DETAILS		
SIZE	DWG. NO.	REV
<b>B</b>	<b>STM DRAWING</b>	
SCALE: 1:1 WEIGHT:		SHEET 3 OF 7

3

2

1

4

3

2

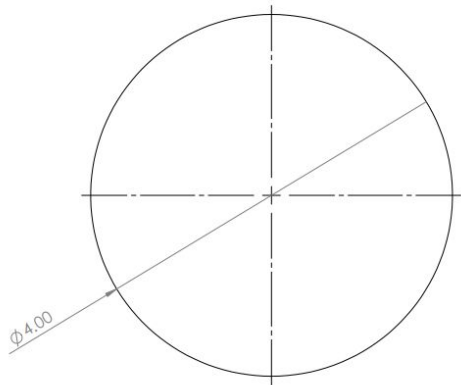
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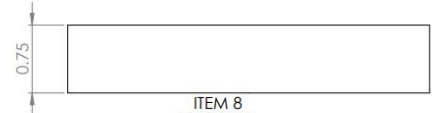
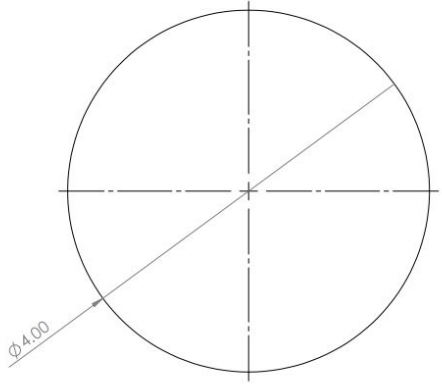
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A

A



ITEM 10  
1018 STEEL  
QTY 1 REQ'D



ITEM 8  
1018 STEEL  
QTY 1 REQ'D

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DIMENSIONS ARE IN INCHES		DRAWN		
TOLERANCES:		CHECKED		SIZE DWG. NO. REV <b>B STM DRAWING</b>
FRACTIONALS		ENG APPR.		
ANGULARS MATCH ± BEND ±		MEG APPR.		
TWO PLACE DECIMAL ±		Q.A.		SCALE: 1:1 WEIGHT: SHEET 4 OF 7
THREE PLACE DECIMAL ±		COMMENTS:		
INTERPRET GEOMETRIC TOLERANCING PER:				
MATERIAL:				
FINISH:				
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DRAWING		

3

2

1

4

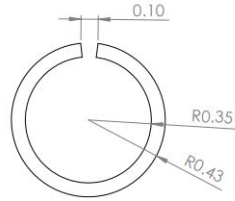
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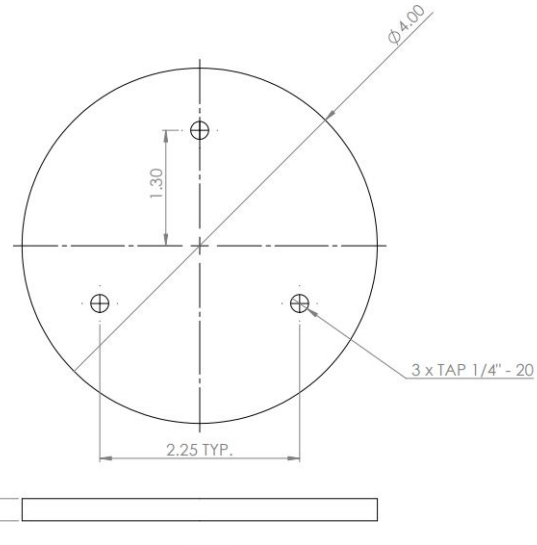
1

B

B



ITEM 4  
3D PRINTED  
QTY 1 REQ'D



ITEM 9  
1018 STEEL  
QTY 1 REQ'D

A

A

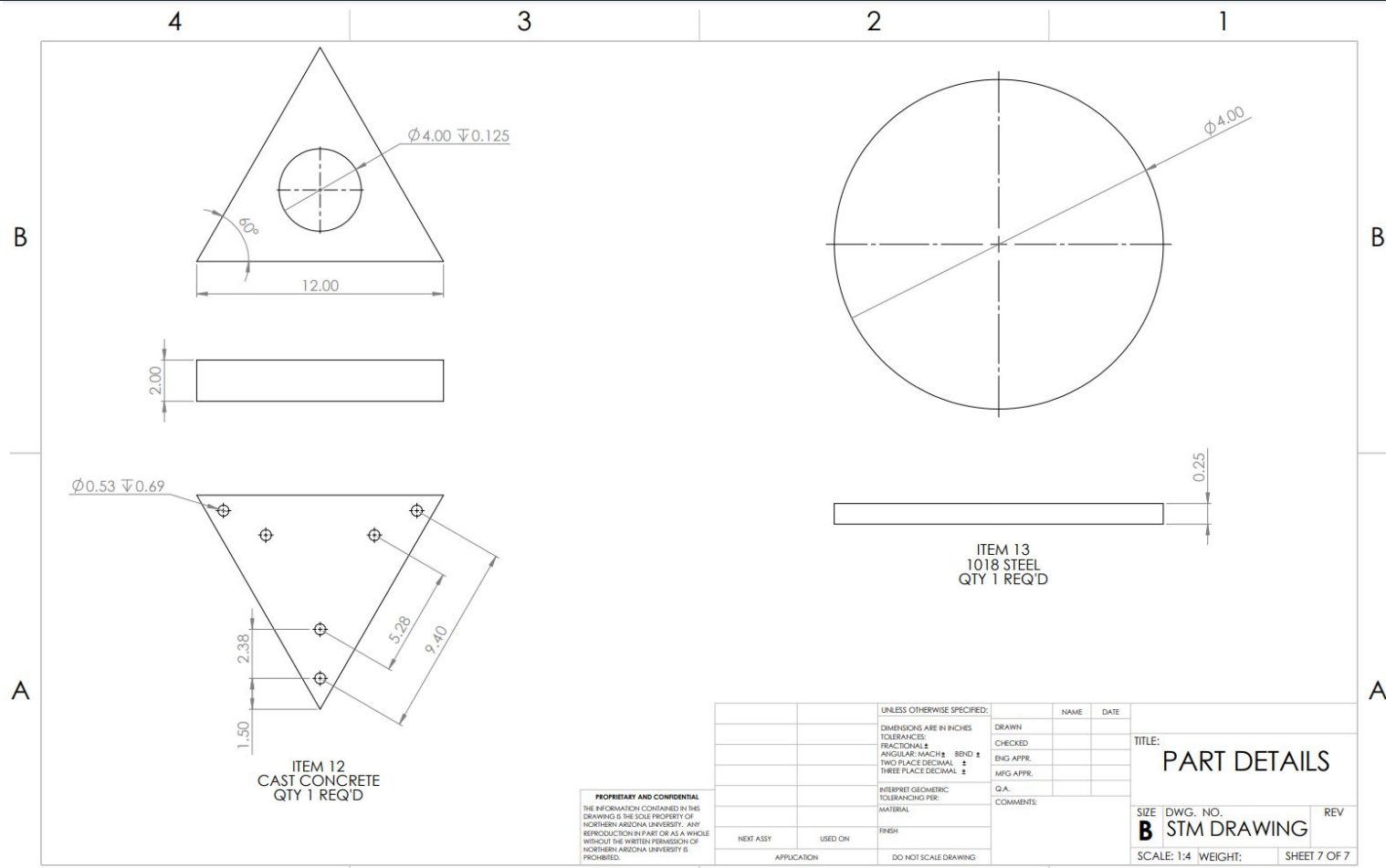
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		TOLERANCES:	CHECKED			
		FRACTIONAL ±	ENG APPR.			
		ANGULAR: MACH ± BEND ±	MFG APPR.			
		TWO PLACE DECIMAL ±	G.A.			
		THREE PLACE DECIMAL ±	COMMENTS:			
		INTERPRET GEOMETRIC TOLERANCING PER:				
		MATERIAL				
NEXT ASSY	USED ON	FINISH				
APPLICATION		DO NOT SCALE DRAWING				
			TITLE:			
			PART DETAILS			
SIZE		DWG. NO.	REV			
B		STM DRAWING				
SCALE: 5:1		WEIGHT:	SHEET 5 OF 7			

3

2

1



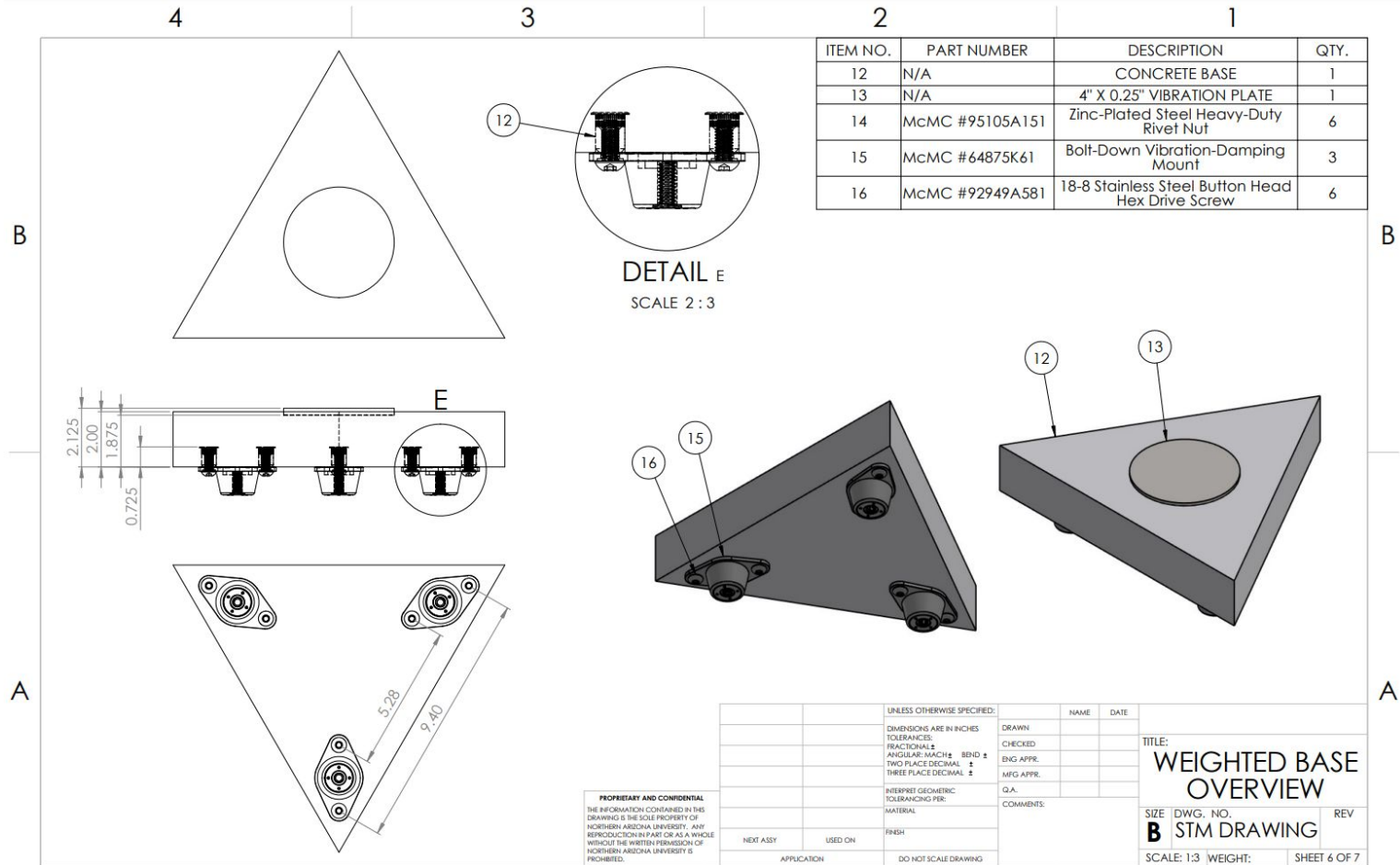
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		INTERPRET GEOMETRIC TOLERANCING PER:			
		MATERIAL:			
		FINISH:			
NEXT ASSY	USED ON				
APPLICATION		DO NOT SCALE DRAWING			

TITLE:		
<b>PART DETAILS</b>		
SIZE	DWG. NO.	REV
<b>B</b>	<b>STM DRAWING</b>	
SCALE: 1:4	WEIGHT:	SHEET 7 OF 7





# Purchasing Plan

Part	Quantity Needed	Purchase Quantity	Current Quantity	Price	Total Unit Price	Need to be ordered (Y/N)	Link	Notes
Accelerometer	4	4	0		\$0.00	N		EE Team is ordering
Arduino	1	1	0		\$0.00	N		EE Team is ordering
Concrete	1	1	0	\$5.41	\$5.41	N	<a href="https://www.homedepot.com/p/Quikrete-80-lb-Concr">https://www.homedepot.com/p/Quikrete-80-lb-Concr</a>	20 pound bag
Thumb Screws	6	3	3	\$9.02	\$27.06	N	<a href="#">Ultra-Fine-Thread Plastic-Head Thumb Screw, 1/4"-</a>	
Brass Inserts	6	3	3	\$9.00	\$27.00	N	<a href="#">0.438" Long Brass Insert for 1/4"-80 Thread Ultra-Fi</a>	
Shoulder Bolt	12	12	0	\$1.41	\$16.92	N	<a href="#">Alloy Steel Shoulder Screw, 1/4" Shoulder Diameter</a>	
PLA	2	0	2	\$13.99	\$0.00	N	<a href="https://www.amazon.com/gp/product/B0BM739JRF/">https://www.amazon.com/gp/product/B0BM739JRF/</a>	1 kg spool
Low Carbon Steel Disks	4	4	0	\$12.04	\$48.16	N	<a href="https://www.mcmaster.com/8924K46/">https://www.mcmaster.com/8924K46/</a>	
Viton O-rings	4	2	0	\$5.36	\$10.72	N	<a href="https://www.mcmaster.com/9464K517/">https://www.mcmaster.com/9464K517/</a>	
Damping rubber feet	3	3	0	\$8.55	\$25.65	N	<a href="https://www.mcmaster.com/64875K61/">https://www.mcmaster.com/64875K61/</a>	
Bolts for Mounting Rubber Feet	6	1	0	\$8.26	\$8.26	N	<a href="https://www.mcmaster.com/92949A581/">https://www.mcmaster.com/92949A581/</a>	5/16-18 button head (Pack of 25)
Bolts for Mounting Bottom Triangle	3	1	0	\$10.69	\$10.69	N	<a href="https://www.mcmaster.com/91253a540/">https://www.mcmaster.com/91253a540/</a>	1/4-20 Flat head (82 degree head) (Pack of 50)
Rivnuts	6	1	0	\$13.49	\$13.49	N	<a href="#">160Pcs Rivnuts Nutserts Kit, SAE Rivet Nuts Assort</a>	Rivnut Kit for fastening to concrete and metal
<b>Total without Further Dampening</b>					<b>\$193.36</b>			
<b>Remaining Purchases Total</b>					<b>\$0.00</b>			

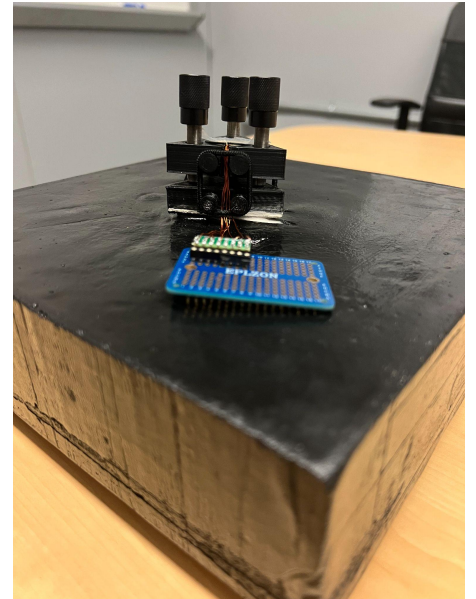
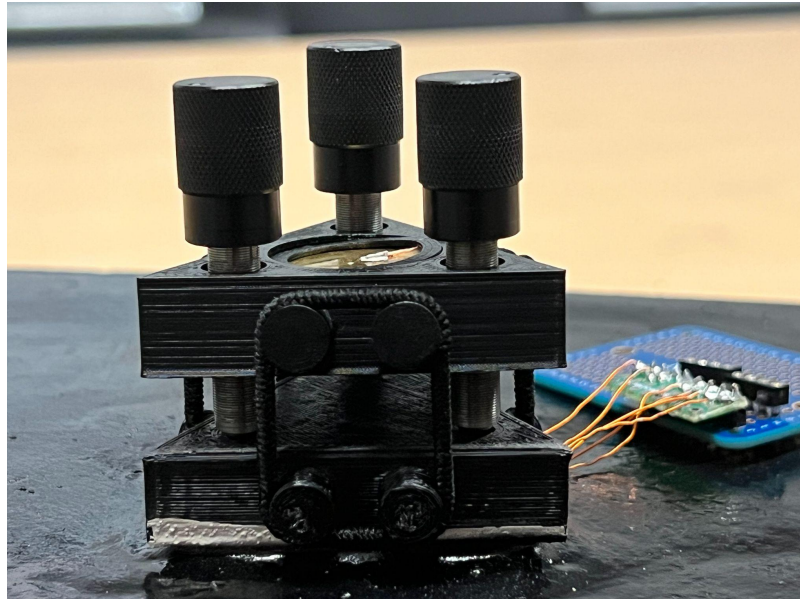
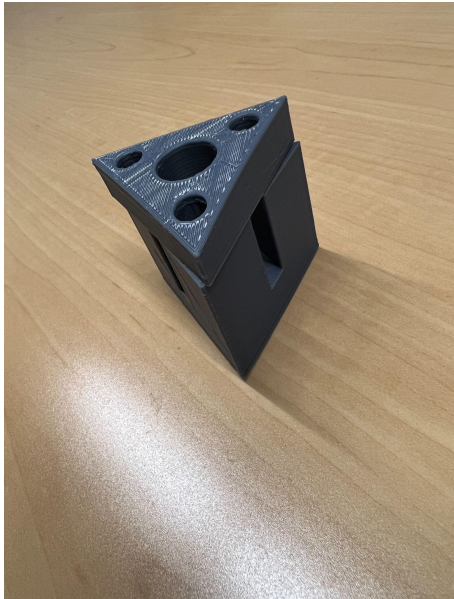
## IF FURTHER DAMPENING IS REQUIRED

Extension spring		3			\$0.00			
Aluminum Round Stock		1			\$0.00			
All thread		1		\$12.56	\$12.56		<a href="#">Superstrut 3/8 in. x 10 ft. Strut Fitting Galvanized Th</a>	3/8 inch x 10ft
<b>Total with Further Dampening</b>					<b>\$205.92</b>			

# Manufacturing Plan

Part	Time [hours]	Manufacturing Method	Progress Percent
Top Triangle	2	3d Printed	100%
Bottom Triangle	2.5	3d Printed	100%
Concrete Base	2	Cast	0%
Dampening System (Steel)	5	Machined on Lathe	40%
Dampening System (Rubber)	1	Cut	0%
Acoustic System	1	Wood Working	15%
<b>Total</b>	<b>13.5</b>		<b>49.26%</b>

# Demonstration



# Demonstration

