

	NAME	DATE
DRAWN	A. BALOGH	6/4/2023
CHECKED		
APPROVED		
MATERIAL	-	
FINISH	-	
	PROJECTION	

TITLE: Finder Scope Assembly		
SIZE <b>A</b>	DWG. NO. M210-4	REV -
SCALE: 1:2	WEIGHT: 1.27	SHEET 2 OF 14

2

1

ITEM NO.	DESCRIPTION	ORDER NUMBER	QUANTITY
1	TUBE		1
2	THREADED INSERT		1
3	SHIELD		1
4	FOCUSER		1
5	EYEPIECE RETAINER		1
6	OBJECTIVE RETAINER		1
7	MOUNT - LOWER		1
8	MOUNT - INTERMEDIATE		1
9	MOUNT - UPPER		1
10	FLEXURE		1
11	CROSSHAIR AND CARRIER SUBASSEMBLY		1
12	28MM ID X 32MM OD X 2MM THICK BUNA-N O-RING	MCM #9262K405	1
13	15.5MM ID X 17.5MM OD X 1MM THICK BUNA-N O-RING	MCM #9262K164	1
14	32MM DIA X 130MM FL ACHROMATIC DOUBLET	SS #L1317	1
15	17.5MM DIA X 22MM FL ACHROMATIC DOUBLET	SS #L10844	1
16	#6-32 X 5/16IN LONG X 100° PHILLIPS FLAT HEAD SCREW (BLACK OXIDE)	MCM #96640A341	3
17	#6-32 X 1/4IN LONG BUTTON HEAD CAP SCREW (BLACK OXIDE)	MCM #91255A144	8
18	1/4-20 X 1/2IN LONG SOCKET HEAD CAP SCREW (BLACK OXIDE)	MCM #91251A537	1
19	1/4-20 X 5/8IN LONG BUTTON HEAD CAP SCREW (BLACK OXIDE)	MCM #91255A539	1
20	R4A-2RS BALL BEARING (1/4IN ID X 3/4IN OD X 9/32IN WIDE)		1
21	.25IN ID X .335IN OD X .05IN THICK STEEL WASHER		1
22	#6-32 X 1/2IN LONG SOCKET HEAD CAP SCREW (BLACK OXIDE)	MCM #91251A148	1
23	1/4-20 X 3/4IN LONG SOCKET HEAD CAP SCREW (BLACK OXIDE) WITH BLACK PLASTIC SCREW-HEAD MOUNT KNOB	MCM #91251A540 & #94052A033	2
24	.022IN WIRE X .18IN OD X .63IN LONG COMPRESSION SPRING	MCM #9657K646	1
25	.022IN WIRE X .18IN OD X .75IN LONG EXTENSION SPRING	MCM #9044K128	1
26	1/8IN OD X 5/16IN LONG STEEL DOWEL PIN	MCM #98381A216	2

		NAME	DATE	TITLE:  <b>Bill of Materials</b>	
DRAWN		A. BALOGH	6/4/2023		
CHECKED					
APPROVED					
MATERIAL					
FINISH		PROJECTION		SIZE <b>A</b>	DWG. NO. <b>M210-4</b>
				SCALE: -	WEIGHT: -
				REV -	
				SHEET 3 OF 14	



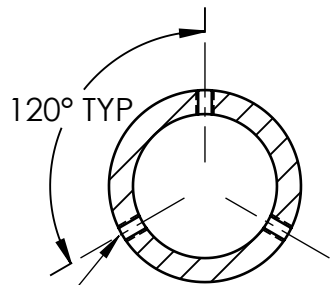
2

1

2

1

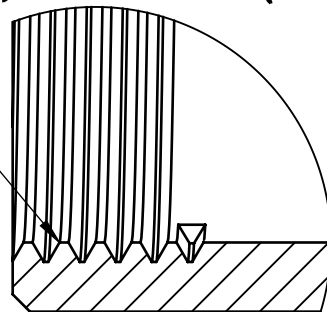
MINIMUM TO CLEAN  
( $\phi$  1.5 STOCK)



3X #6-32 UNC 2B THRU ONE SIDE

*not my inner  $\phi$  is 1.155  
not 1.13. This is ok?*

1 5/16 - 16 UNS 2B  $\nabla$  .3



DETAIL A  
THREAD DETAIL  
SCALE 3 : 1



3.22

.775

1/4-20 UNC 2B THRU ONE-SIDE

2X .03 X 45°

$\phi$  1.265  $\begin{smallmatrix} +.005 \\ -.003 \end{smallmatrix}$

$\phi$  1.13

.588

1.5

45°

1.00

2.0

5.8

$\phi$  1.06

$\phi$  1.126  $\phi$  1.124

$\phi$  1.38

*1.125 + 0.006 / 0.007  
1.131 / 1.132  
This is ok, but  
remember and  
remeasure for  
the threaded  
insert*

# NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL LATHE AND MILL.

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES:

1/X or .X  $\pm$  1/64 (.0156)

.XX  $\pm$  .010

.XXX  $\pm$  .005

X°  $\pm$  1°

ALL SURFACES

125/

INTERPRET PER ASME Y14.5-2018

NAME

DATE

DRAWN

A. BALOGH

6/4/2023

CHECKED

APPROVED

MATERIAL

6061-T6 ALUMINUM

FINISH

TYPE II  
BLACK ANODIZE

PROJECTION



© LANEY COLLEGE

MACHINE TECH

TITLE:

Tube

SIZE

DWG. NO.

REV

A

M210-4

-

SCALE: 1:1.5

WEIGHT: .46

SHEET 4 OF 14

2

1

Tube  
part

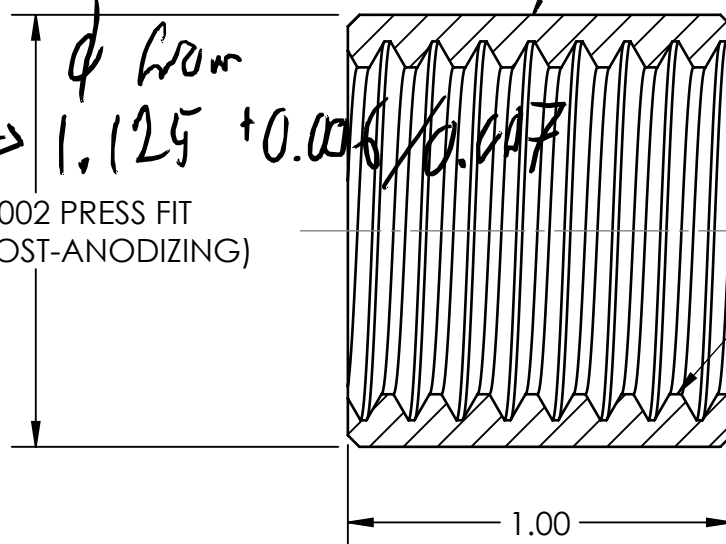
B

Be sure to measure precisely

This  $\phi$  must match your  
tube bore  $\phi$  from  
step 9  $\rightarrow 1.125 \pm 0.006 / 0.007$

$\phi .001-.002$  PRESS FIT  
INTO  $\triangle 1$  (POST-ANODIZING)

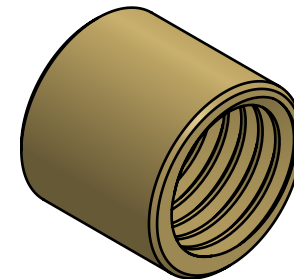
(1.131 / 1.132)



2X .03 X 45°

1-8 UNC 2B THRU

1.00



B

A

#### NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE PROVIDED TO STUDENT AS CNC MACHINED COMPONENT.

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH	6/4/2023
TOLERANCES:	CHECKED		
1/X or .X $\pm 1/64$ (.0156)	APPROVED		
.XX $\pm .010$	MATERIAL		
.XXX $\pm .005$	932 ALU BRONZE		
X° $\pm 1^\circ$	FINISH	PROJECTION	
ALL SURFACES $\sqrt{125}$	-		
INTERPRET PER ASME Y14.5-2018			



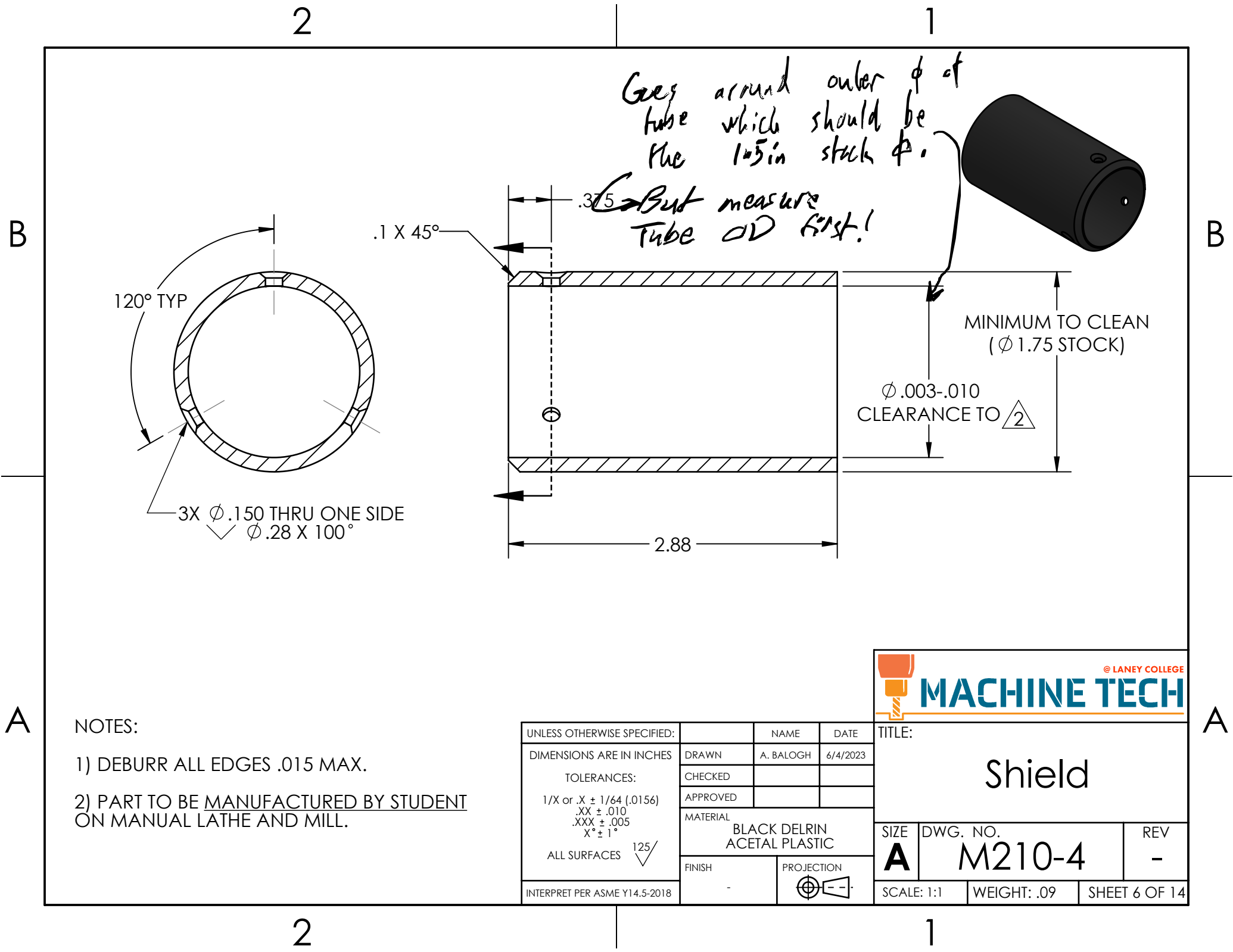
© LANEY COLLEGE

TITLE:			
Threaded Insert			
SIZE	DWG. NO.	REV	
A	M210-4	-	
SCALE: 2:1	WEIGHT: .11	SHEET 5 OF 14	

A

2

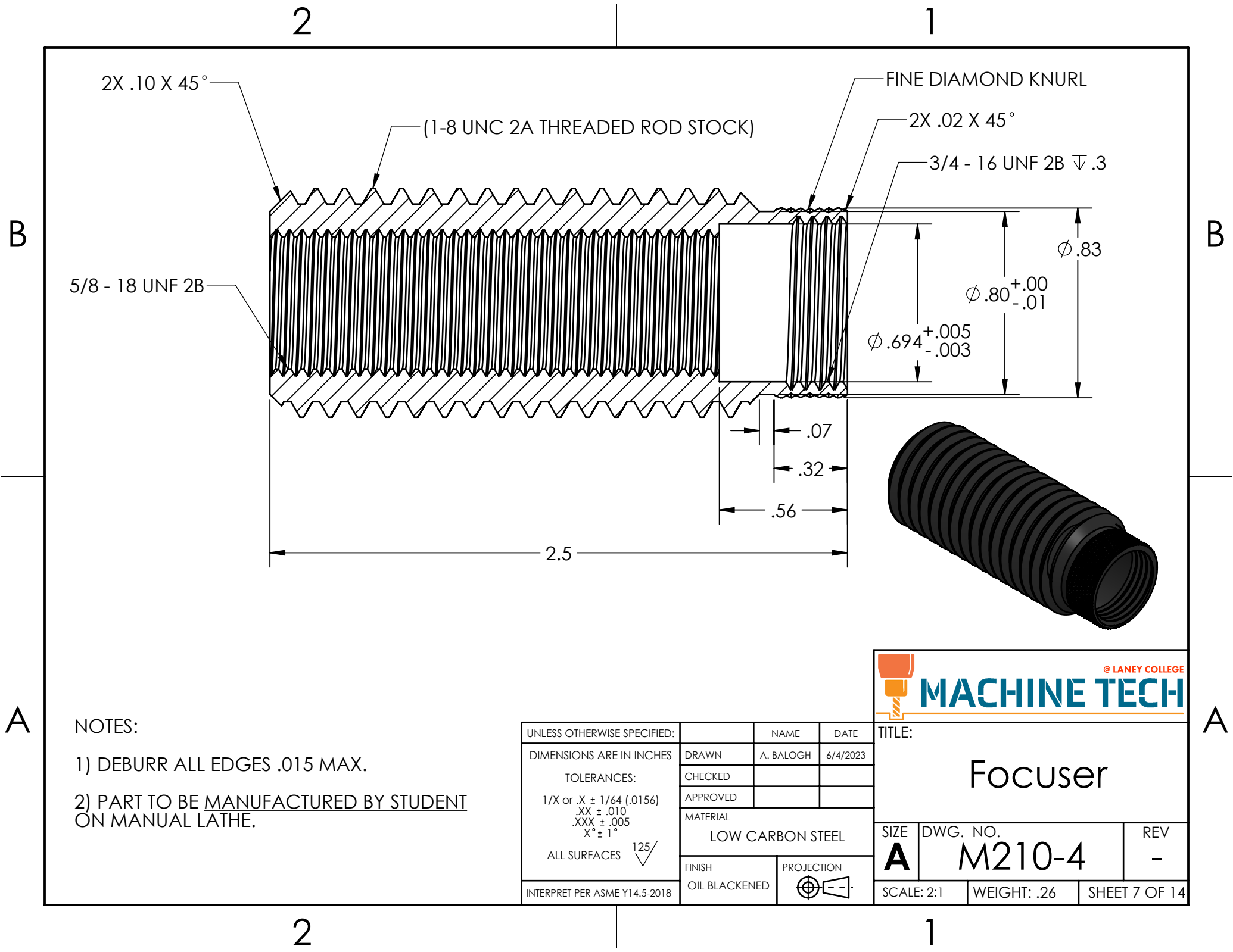
1



NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL LATHE AND MILL.

UNLESS OTHERWISE SPECIFIED:			NAME	DATE	TITLE:  <div>Shield</div>			
DIMENSIONS ARE IN INCHES		DRAWN	A. BALOGH	6/4/2023				
TOLERANCES:  1/X or .X ± 1/64 (.0156) .XX ± .010 .XXX ± .005 X° ± 1°  ALL SURFACES <div>125√</div>		CHECKED						
		APPROVED						
		MATERIAL			SIZE	DWG. NO.	REV	
		BLACK DELRIN ACETAL PLASTIC			A	M210-4	-	
		FINISH	PROJECTION					
		-						
INTERPRET PER ASME Y14.5-2018						SCALE: 1:1	WEIGHT: .09	SHEET 6 OF 14



NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL LATHE.

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES		DRAWN	A. BALOGH
TOLERANCES:		CHECKED	
1/X or .X $\pm$ 1/64 (.0156)		APPROVED	
.XX $\pm$ .010		MATERIAL	
.XXX $\pm$ .005		LOW CARBON STEEL	
X° $\pm$ 1°		FINISH	PROJECTION
ALL SURFACES $\sqrt{125}$		OIL BLACKENED	
INTERPRET PER ASME Y14.5-2018		TITLE:	
		Focuser	
SIZE	DWG. NO.	REV	
A	M210-4	-	
SCALE: 2:1	WEIGHT: .26	SHEET 7 OF 14	

2

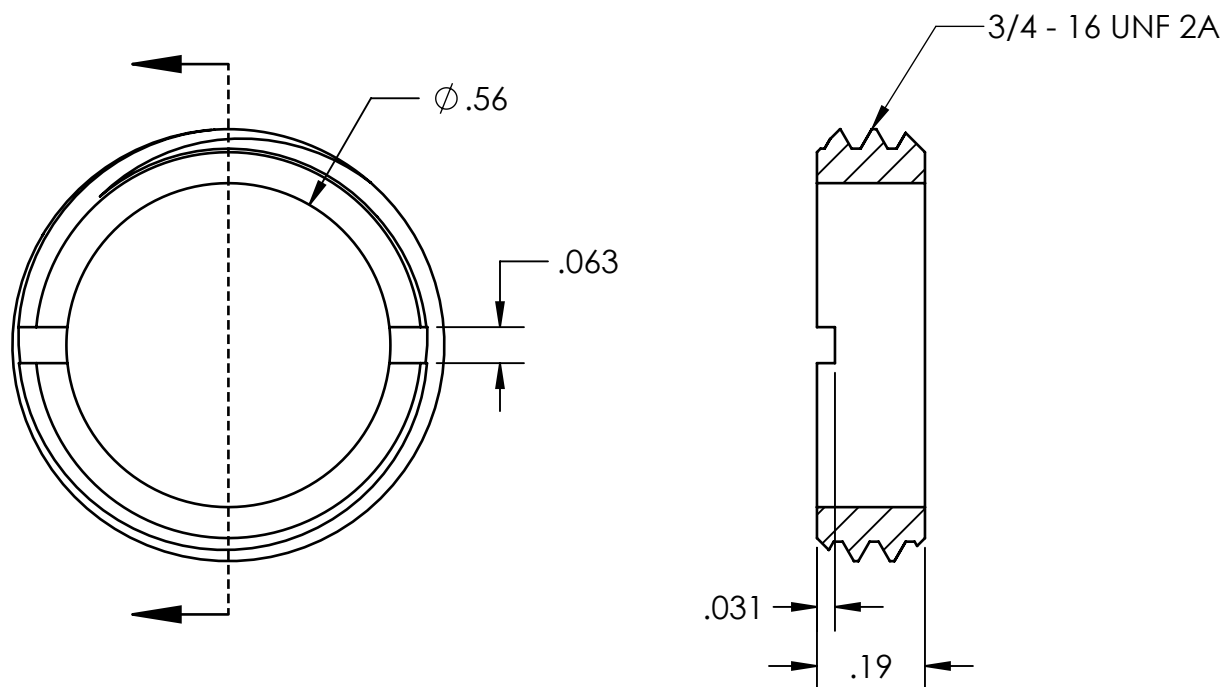
1

THREAD DATA FOR 3/4-16 UNF 2A

MAJOR DIA. .739-.749

PITCH DIA. .703-.708

MINOR DIA. (.674)



## NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL LATHE AND MILL.

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH	6/4/2023
TOLERANCES:	CHECKED		
1/X or .X $\pm 1/64$ (.0156)	APPROVED		
.XX $\pm .010$	MATERIAL		
.XXX $\pm .005$	360 BRASS		
X $\pm 1^\circ$	FINISH	PROJECTION	
ALL SURFACES $\sqrt{125}$	-		
INTERPRET PER ASME Y14.5-2018			

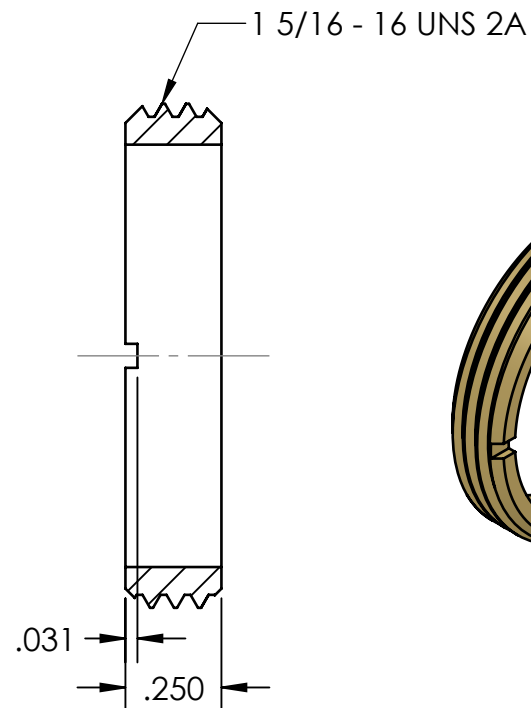
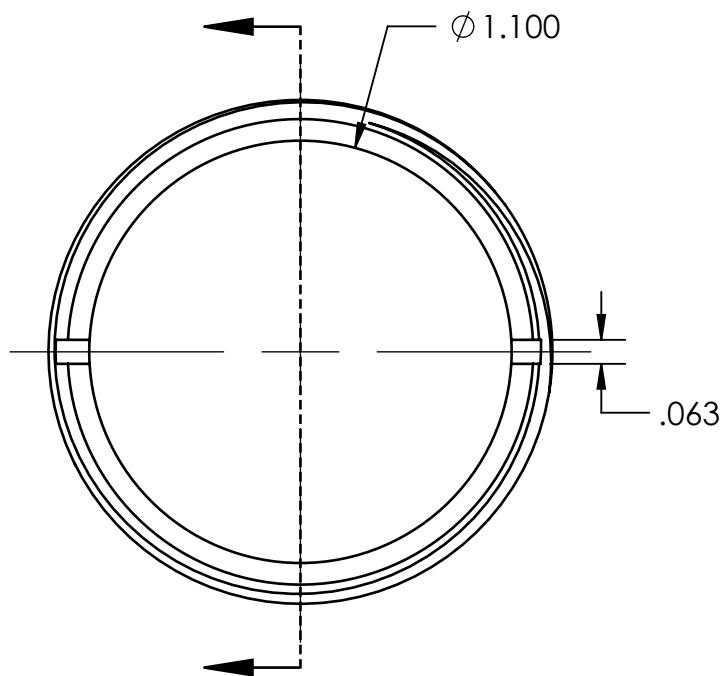


TITLE: Eyepiece Retainer			
SIZE <b>A</b>	DWG. NO. M210-4	REV -	
SCALE: 3:1	WEIGHT: .01	SHEET 8 OF 14	

2

1



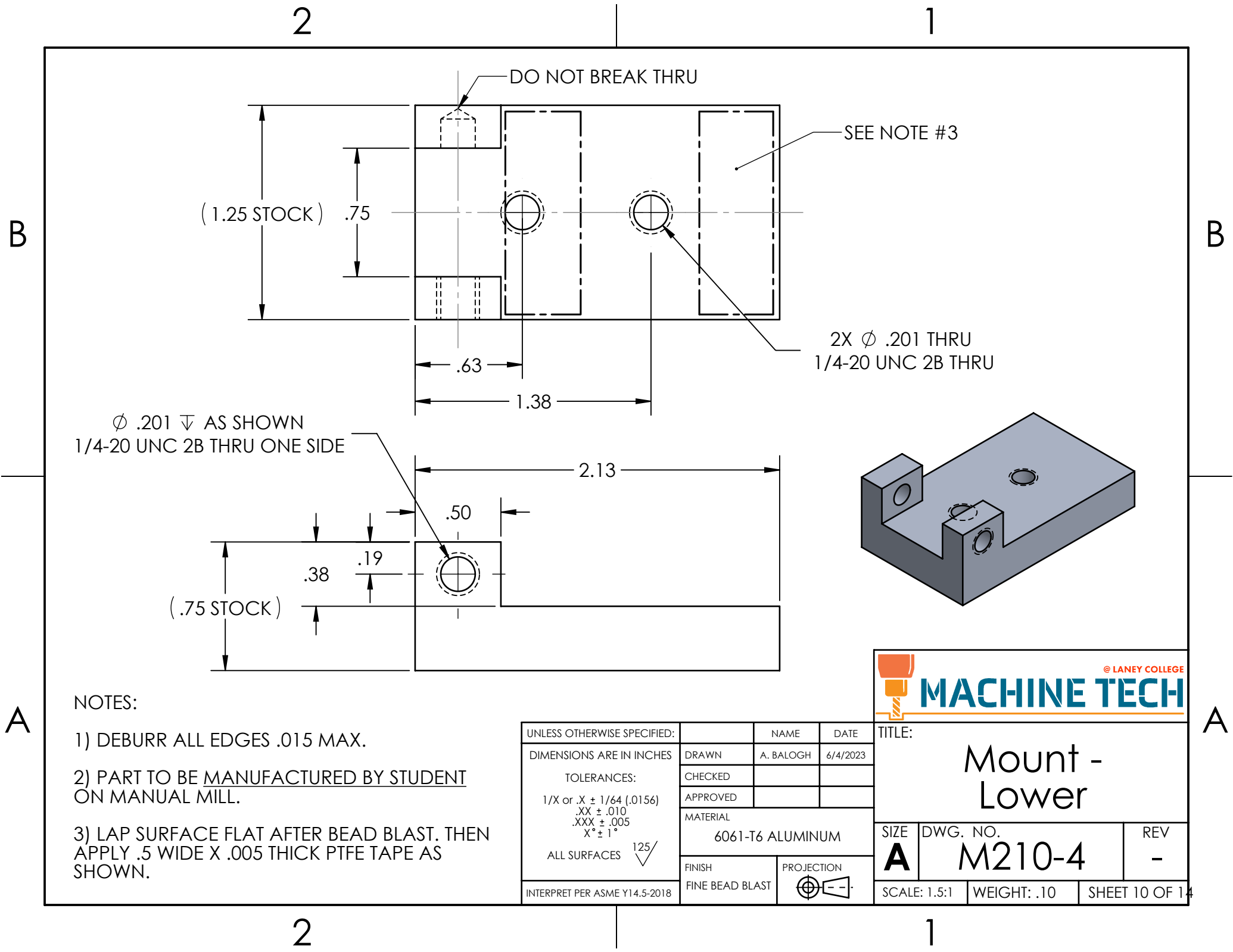


# NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON CNC TURNING CENTER WITH LIVE TOOLING.

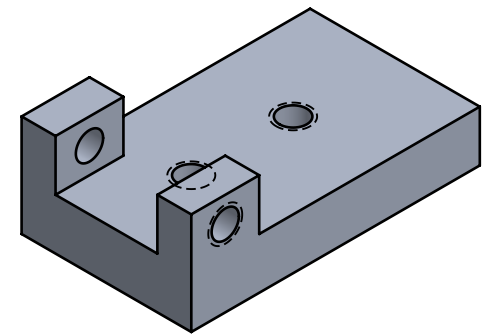
UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH	6/4/2023
TOLERANCES:	CHECKED		
1/X or .X $\pm$ 1/64 (.0156)	APPROVED		
.XX $\pm$ .010	MATERIAL		
.XXX $\pm$ .005	932 ALU BRONZE		
X° $\pm$ 1°	FINISH	PROJECTION	
ALL SURFACES $\sqrt{125}$	-		
INTERPRET PER ASME Y14.5-2018			

TITLE:			
Objective Retainer			
SIZE	DWG. NO.	REV	
A	M210-4	-	
SCALE: 2:1	WEIGHT: .02	SHEET 9 OF 14	



$\phi .201 \nabla$  AS SHOWN  
1/4-20 UNC 2B THRU ONE SIDE


2X  $\phi .201$  THRU  
1/4-20 UNC 2B THRU

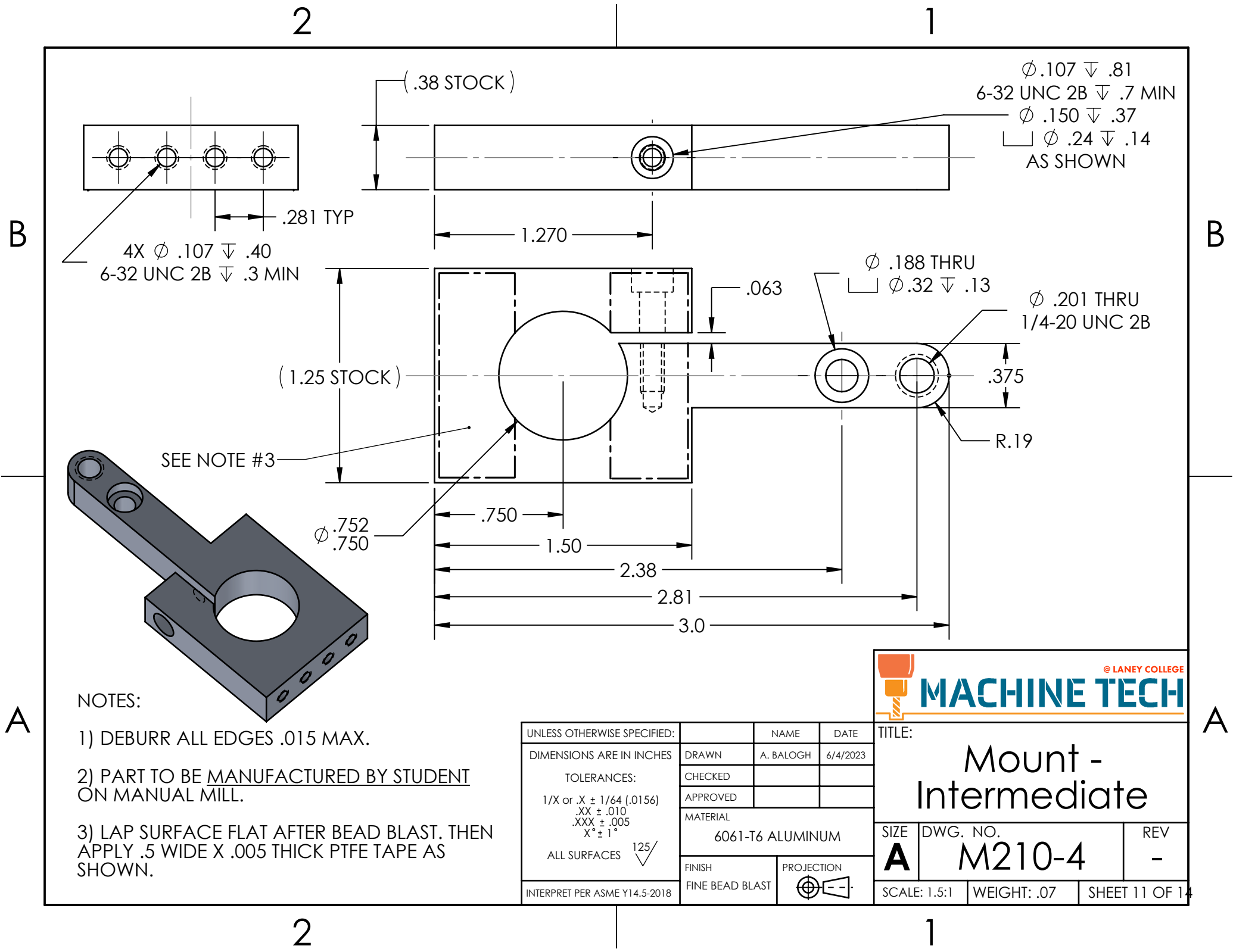


NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) PART TO BE MANUFACTURED BY STUDENT ON MANUAL MILL.
- 3) LAP SURFACE FLAT AFTER BEAD BLAST. THEN APPLY .5 WIDE X .005 THICK PTFE TAPE AS SHOWN.

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH	6/4/2023
TOLERANCES:	CHECKED		
1/X or .X $\pm$ 1/64 (.0156)	APPROVED		
.XX $\pm$ .010	MATERIAL		
.XXX $\pm$ .005	6061-T6 ALUMINUM		
X $\pm$ 1°	FINISH	PROJECTION	
ALL SURFACES $\sqrt{125}$	FINE BEAD BLAST		
INTERPRET PER ASME Y14.5-2018			

 <b>MACHINE TECH</b> <small>© LANEY COLLEGE</small>			
TITLE: <b>Mount - Lower</b>			
SIZE <b>A</b>	DWG. NO. <b>M210-4</b>	REV <b>-</b>	
SCALE: 1.5:1	WEIGHT: .10	SHEET 10 OF 14	



1



$\varnothing .188 \text{ THRU}$   
 $\sqcup \varnothing .32 \nabla .13$

Be careful w/ whole

b/c of  
milling error  
here)

1.50 ————— 2.38

- 3.0

- 1.00

- 1.000

Ø .750 GAGE PIN

is my dimension

GE PIN  
~ 1.25

172)


 $\pm 0.01$ 

1.23

(.75 STOCK)

.375

 $120^\circ$ 

 .281 TYP

$$(.424)$$


4X  $\varnothing$  .107  $\nabla$  .40

6-32 UNC 2B  $\nabla$  .3 MIN

NOTES:

1) DEBURR ALL EDGES .015 MAX.

2) PART TO BE MANUFACTURED BY STUDENT ON  
MANUAL MILL.

UNLESS OTHERWISE SPECIFIED:	NAME		DATE
DIMENSIONS ARE IN INCHES  TOLERANCES:  1/X or .X ± 1/64 (.0156) .XX ± .010 .XXX ± .005 X° ± 1°  ALL SURFACES 125/√	DRAWN	A. BALOGH	6/4/2020
	CHECKED		
	APPROVED		
	MATERIAL  6061-T6 ALUMINUM		
INTERPRET PER ASME Y14.5-2018	FINISH  FINE BEAD BLAST	PROJECTION 	



**@ LANEY COLLEGE**

# MACHINE TECH

TITLE:
--------

# Mount - Upper

SIZE  
**A**

DWG. NO.
----------

M210-4

REV



SCALE: 1.5:1

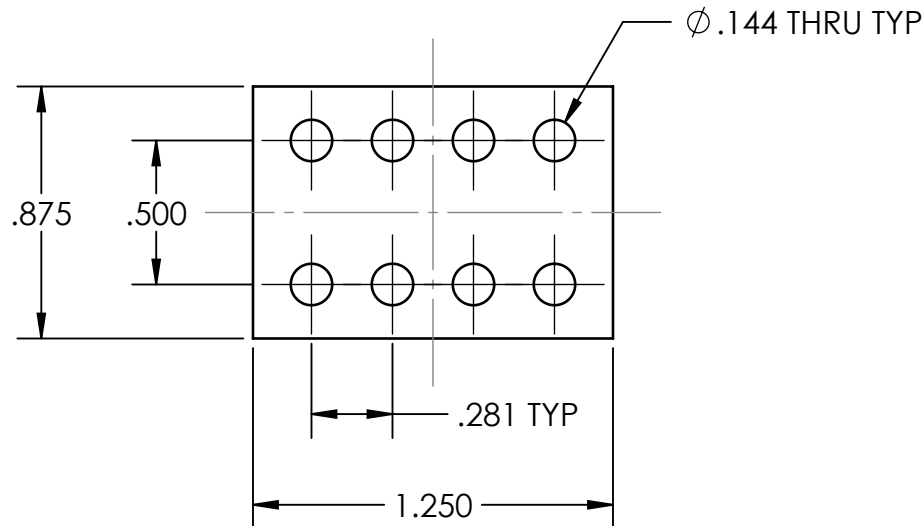
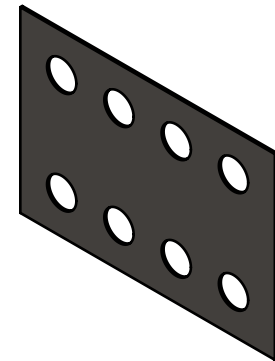
WEIGHT: .16
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SHEET 12 OF 14

1

A

Get comp, download flexure model, prep for flash drive



NOTES:

- 1) DEBURR ALL EDGES .015 MAX.
- 2) VECTOR FILE AVAILABLE FROM INSTRUCTOR.
- 3) PART TO BE FABRICATED BY STUDENT ON WATERJET CUTTER AT LANEY FABLAB.

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH	6/4/2023
TOLERANCES:	CHECKED		
1/X or .X $\pm$ 1/64 (.0156)	APPROVED		
.XX $\pm$ .010	MATERIAL		
.XXX $\pm$ .005	.015 THICK SHEET		
X° $\pm$ 1°	420 STAINLESS STEEL		
ALL SURFACES $\sqrt{125}$	FINISH	PROJECTION	
INTERPRET PER ASME Y14.5-2018	GROUND		



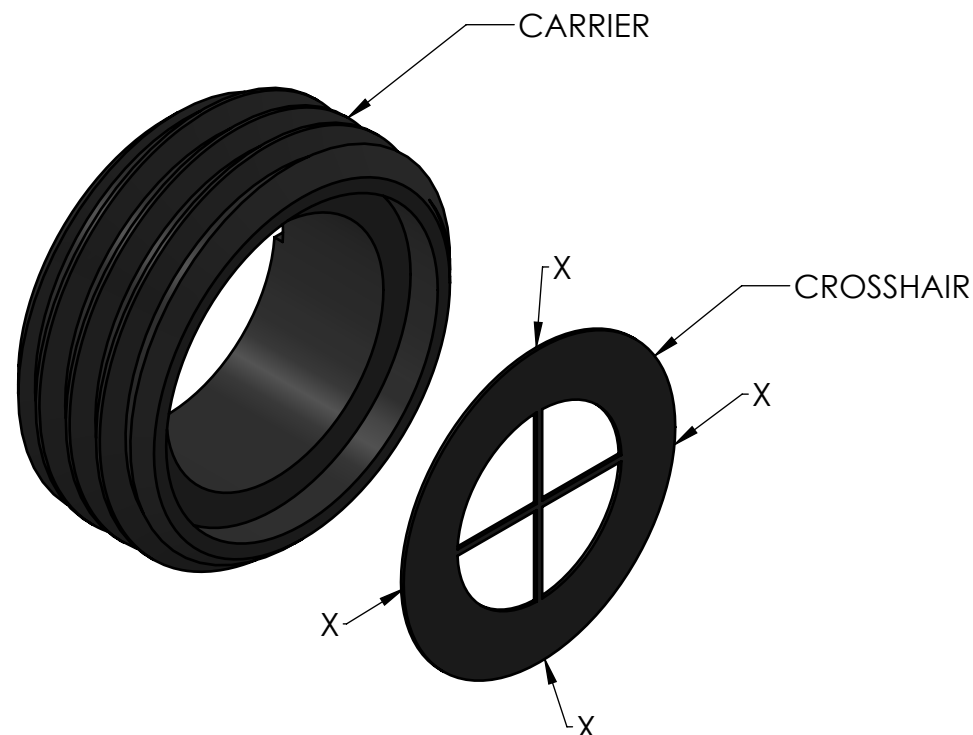
TITLE:			
Flexure			
SIZE	DWG. NO.	REV	
A	M210-4	-	
SCALE: 1.5:1	WEIGHT: .003	SHEET 13 OF 14	

2

1

B

B



## NOTES:

1) MODEL AND VECTOR FILES AVAILABLE FROM INSTRUCTOR.

2) CROSSHAIR TO BE FABRICATED BY STUDENT FROM STEEL SHIM STOCK USING LASER MARKER/CUTTER IN MACH TECH DEPT.

3) CARRIER TO BE FABRICATED BY STUDENT FROM BLACK ABS PLASTIC USING 3D PRINTER IN MACH TECH DEPT OR AT LANEY FABLAB.

4) AFTER ASSEMBLY, TACK CROSSHAIR TO CARRIER USING CYANOACRYLATE ADHESIVE IN FOUR PLACES SHOWN WITH X'S



UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	A. BALOGH	6/4/2023
	CHECKED		
	APPROVED		
	MATERIAL	SEE NOTES	
INTERPRET PER ASME Y14.5-2018	FINISH	-	PROJECTION

TITLE: Crosshair and Carrier Subassembly			
SIZE <b>A</b>	DWG. NO. <b>M210-4</b>	REV -	
SCALE: 4:1	WEIGHT: .01	SHEET 14 OF 14	

A

A

2

1

