

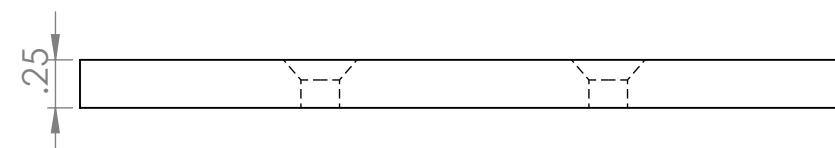
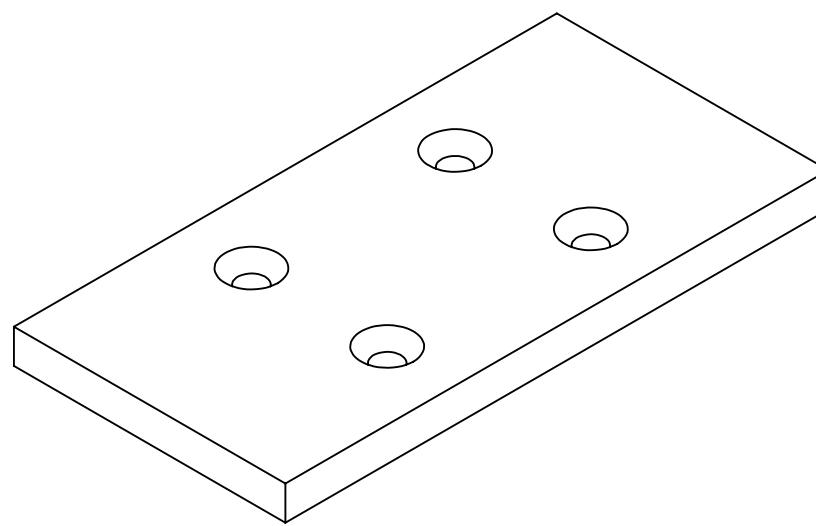
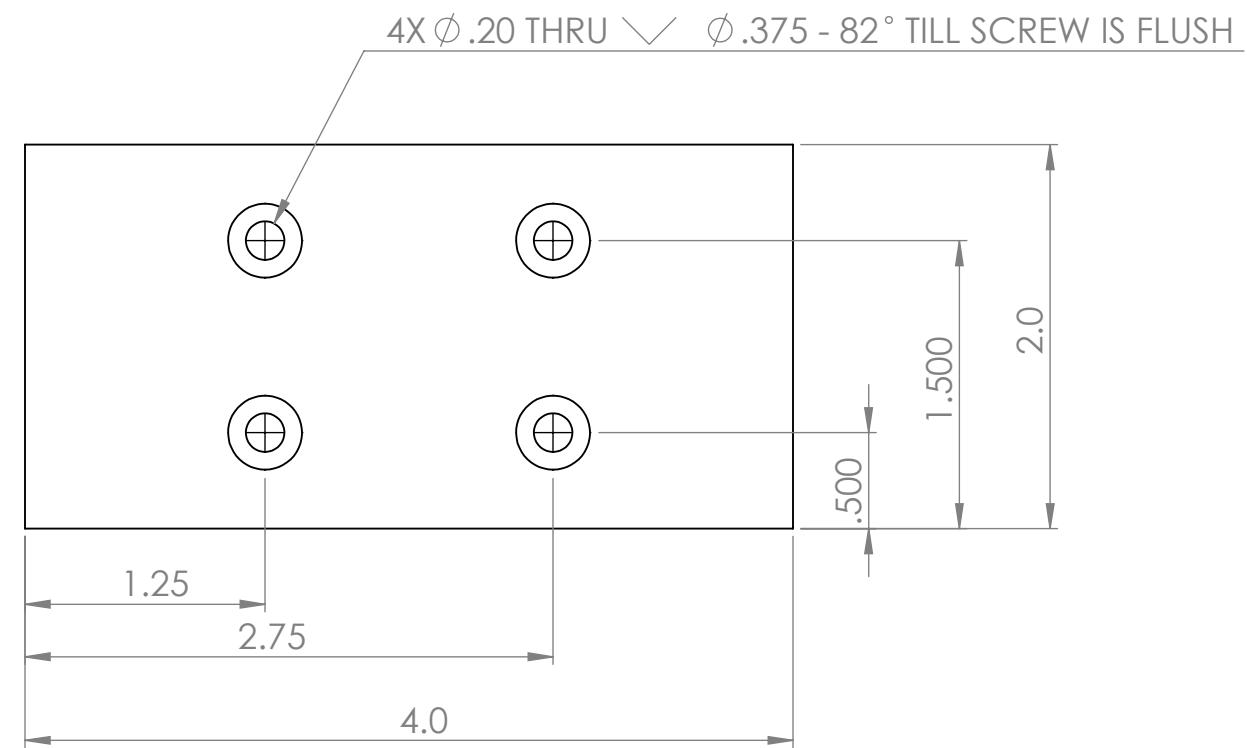
# Prototype Package

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BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN INCHES  
DEFAULT TOLERANCES:  
 $x.x = \pm .02$   
 $x.xx = \pm .01$   
 $x.xxx = \pm .005$   
ANGULAR:  $x.x = \pm 1$

MATERIAL  
ALUMINUM 6061 - T6

FINISH  
EXTRUDED AND MACHINED

DRAWN	M.S. KEYES	04 AUG 2025
CHECKED	J. PATTEN	06 AUG 2025

COMMENTS:

TEAM 5

BASEPLATE

SIZE	PART NO.	REV
<b>B</b>	1	1
SCALE: 1:1		WEIGHT:
		SHEET 1 OF 1

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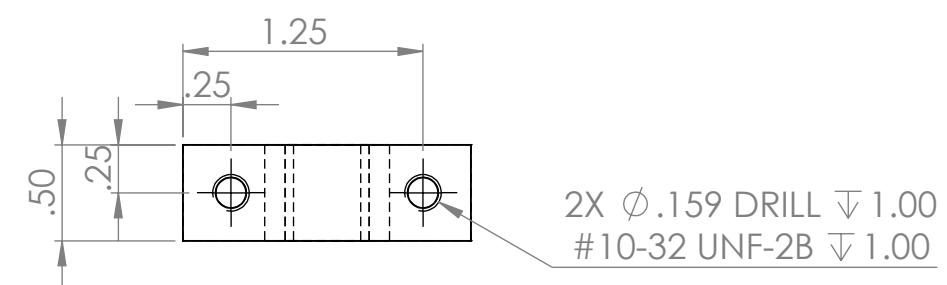
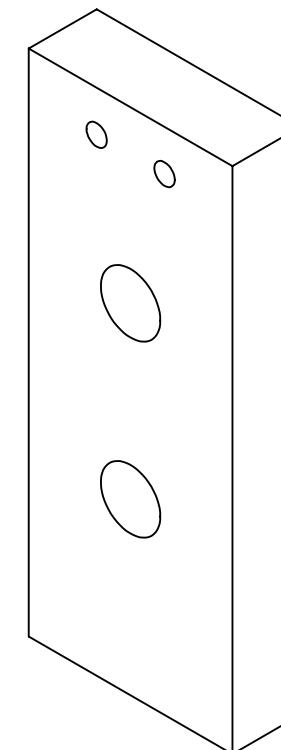
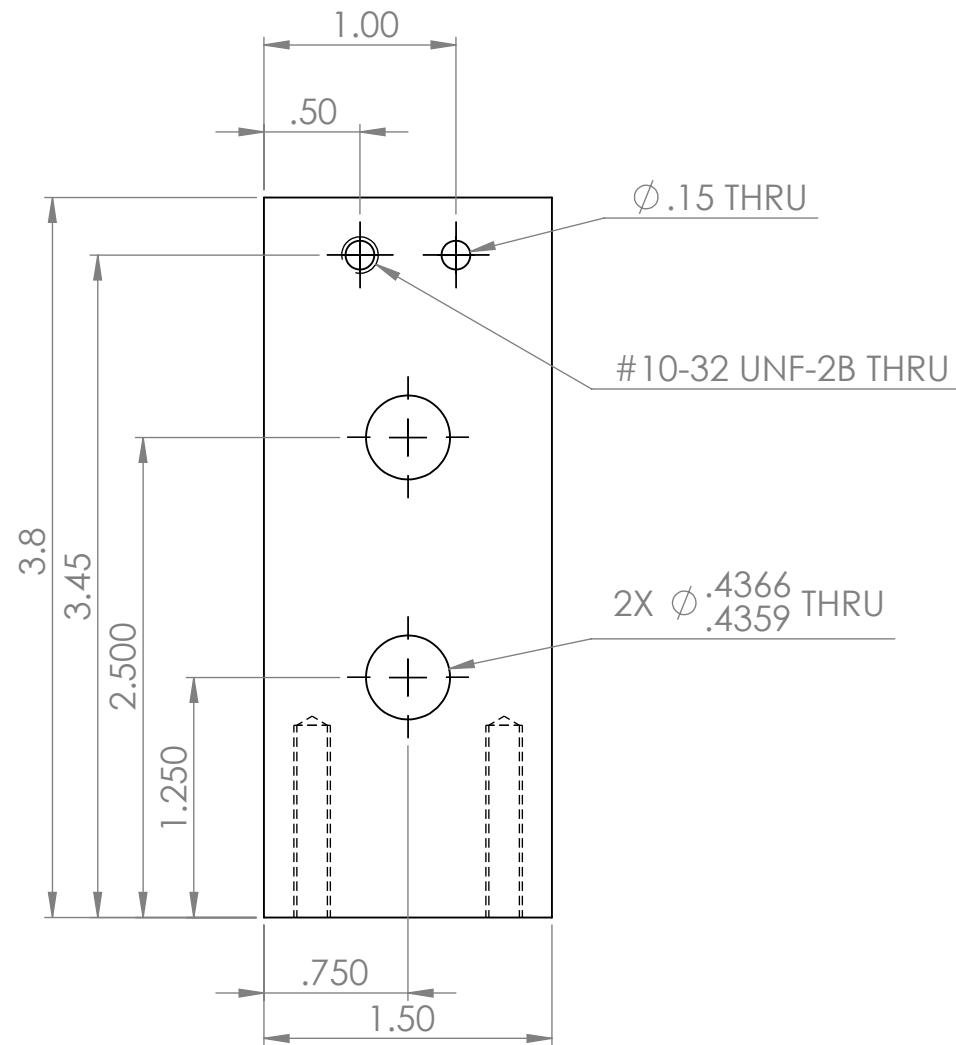
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BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN INCHES  
DEFAULT TOLERANCES:  
 $x.x = \pm .02$   
 $x.xx = \pm .01$   
 $x.xxx = \pm .005$   
ANGULAR:  $x.x = \pm 1$

MATERIAL  
ALUMINUM 6061 - T6  
FINISH  
EXTRUDED AND MACHINED

DRAWN	NAME	DATE
J. PATTEN		25 JUN 2025
CHECKED	B. W. COON	26 JUN 2025

COMMENTS:

TEAM 5

MAIN UPRIGHT

SIZE	PART NO.	REV
<b>B</b>	2	1

DO NOT SCALE DRAWING    SCALE: 1:1    WEIGHT: 0.25    SHEET 1 OF 1

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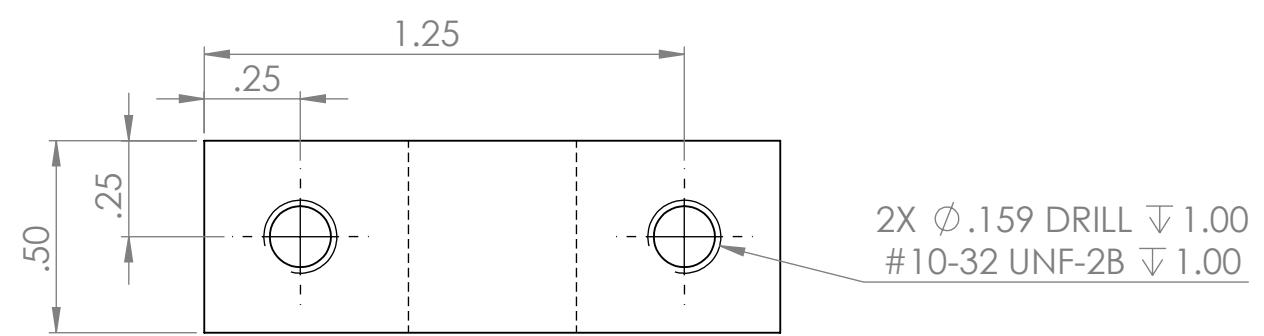
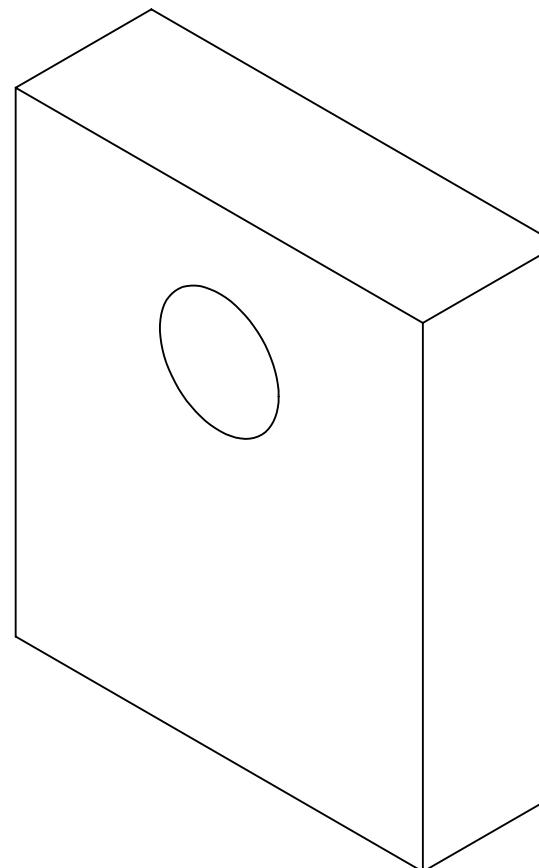
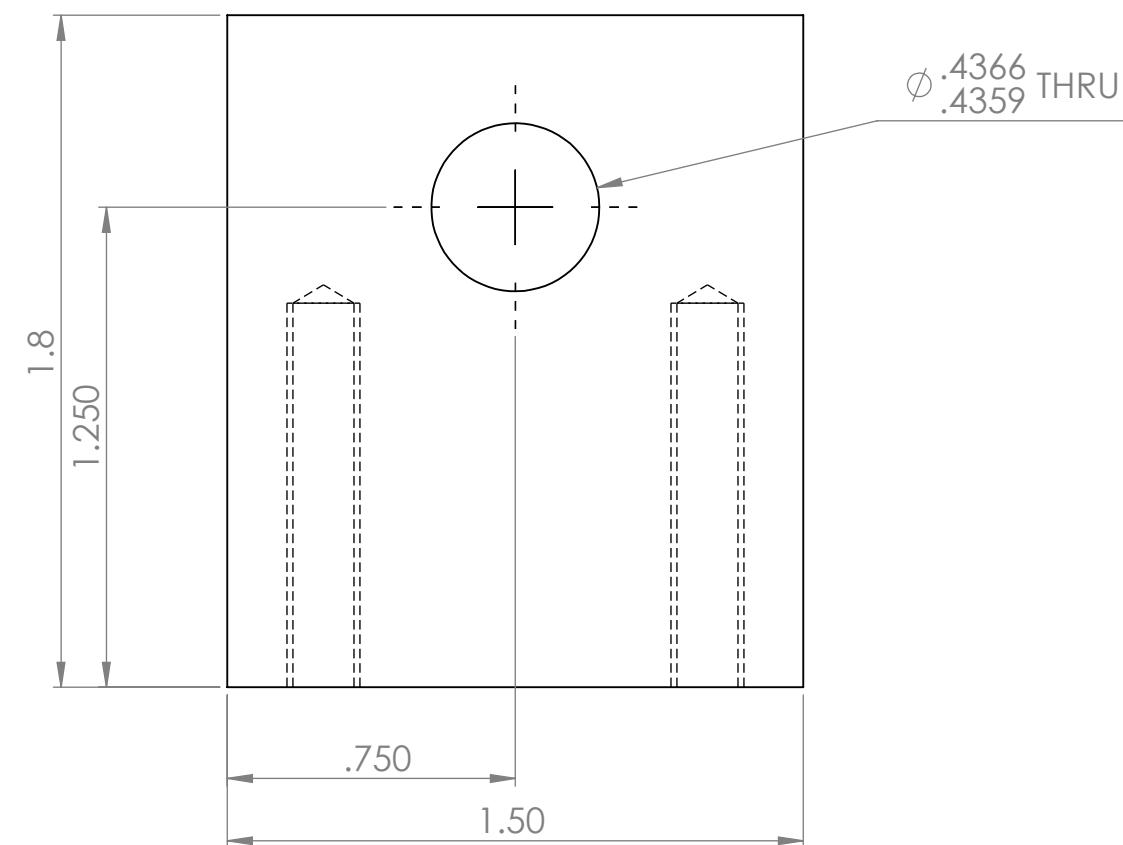
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BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DEFAULT TOLERANCES: $x.x = \pm .02$ $x.xx = \pm .01$ $x.xxx = \pm .005$ ANGULAR: $x.x = \pm 1$	DRAWN J. PATTEN 06 AUG 2025	NAME M.S. KEYES 06 AUG 2025	DATE
COMMENTS:			TEAM 5
			TITLE: <b>SMALL UPRIGHT</b>
			SIZE PART NO. <b>B</b> 3
			REV 1
DO NOT SCALE DRAWING			SCALE: 2:1 WEIGHT: 0.12 SHEET 1 OF 1

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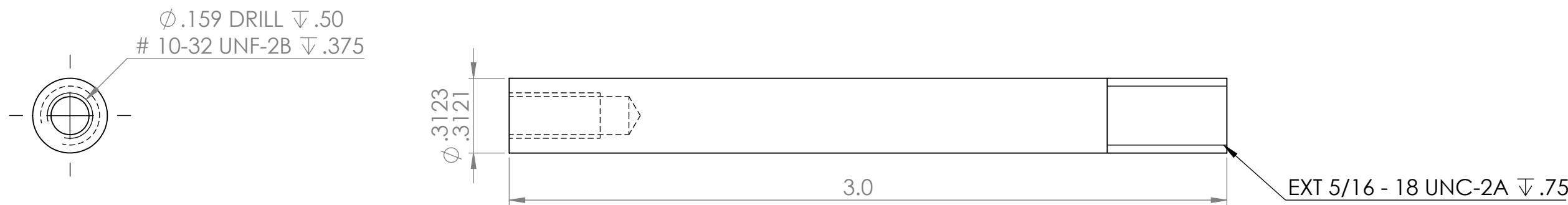
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BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DEFAULT TOLERANCES: $x.x = \pm .02$ $x.xx = \pm .01$ $x.xxx = \pm .005$ ANGULAR: $x.x = \pm 1$			DRAWN	NAME	DATE	TEAM 5 TITLE: CRANKSHAFT	
			CHECKED	M.S. KEYES	05 AUG 2025		
			COMMENTS:				
MATERIAL	AISI 1018 STEEL	FINISH	COLD ROLLED	SIZE	PART NO.		
<b>B</b>	4	REV	11	SCALE: 2:1	WEIGHT: .07	SHEET 1 OF 1	
DO NOT SCALE DRAWING					1		

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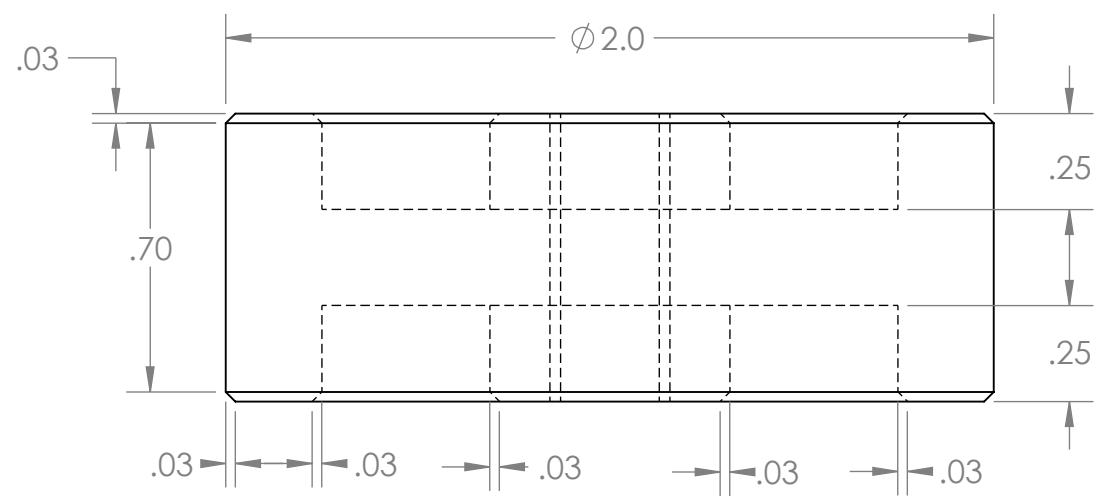
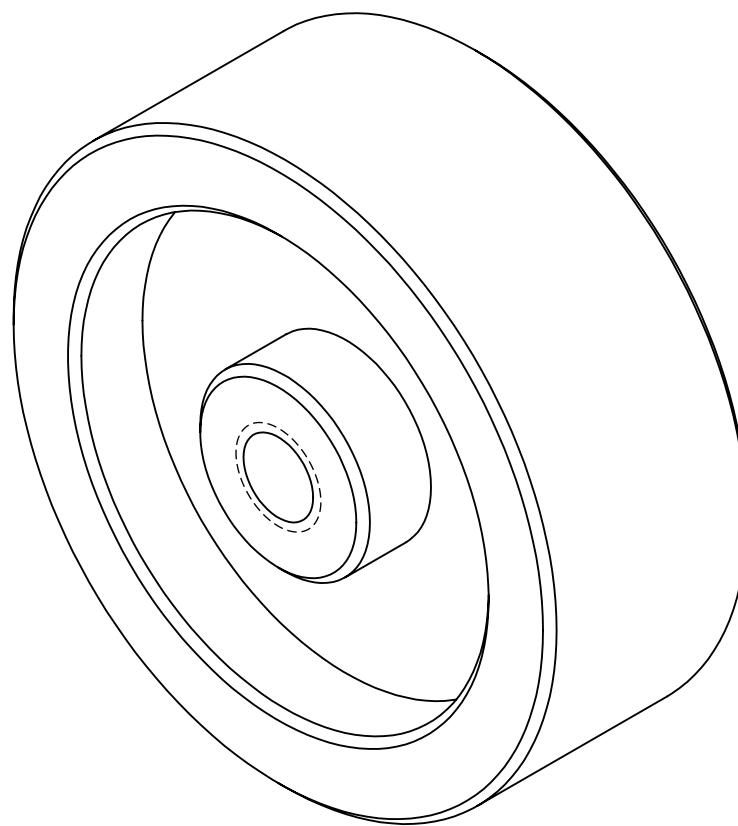
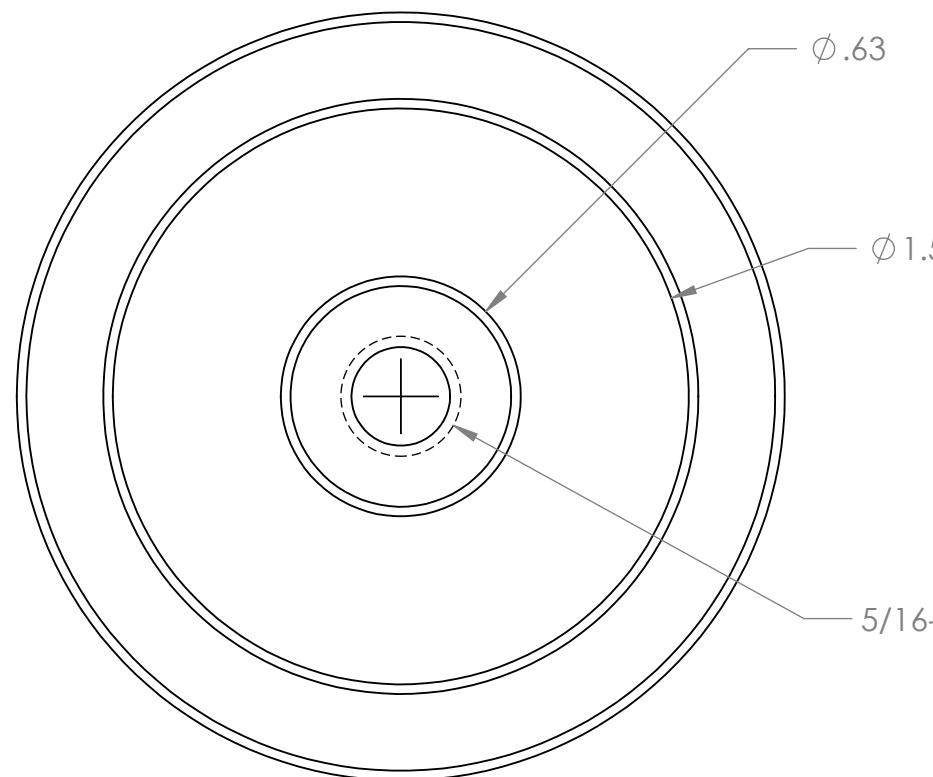
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BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DEFAULT TOLERANCES: $x.x = \pm .02$ $x.xx = \pm .01$ $x.xxx = \pm .005$ ANGULAR: $x.x = \pm .5$			NAME DRAWN M. S. KEYES CHECKED J. PATTEN	DATE 4 AUG 2024 7 AUG 2025
COMMENTS:				
MATERIAL ALUMINUM 6061 ALLOY BRASS	SIZE B	PART NO. 5	REV 2	TEAM 5
FINISH SAND BLASTED	DO NOT SCALE DRAWING	SCALE: 2:1	WEIGHT: .23	SHEET 1 OF 1

4

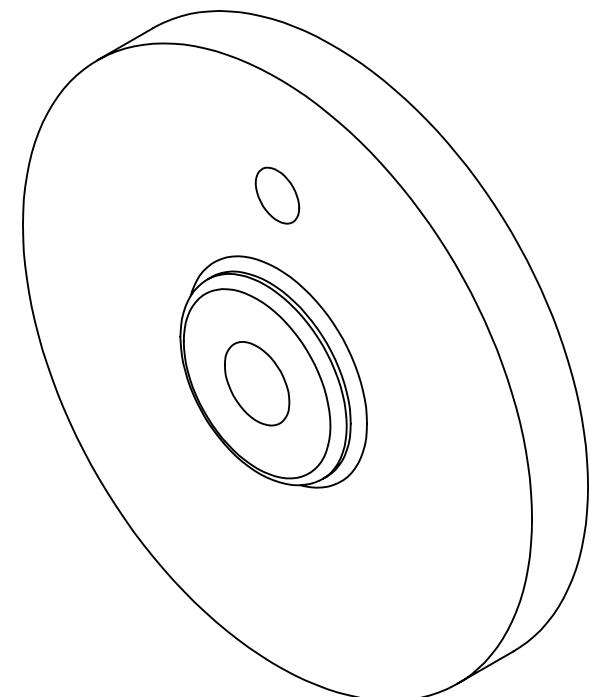
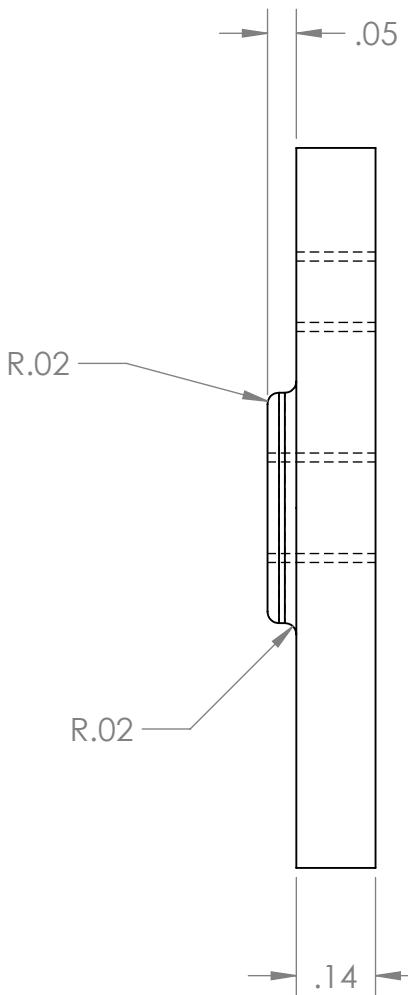
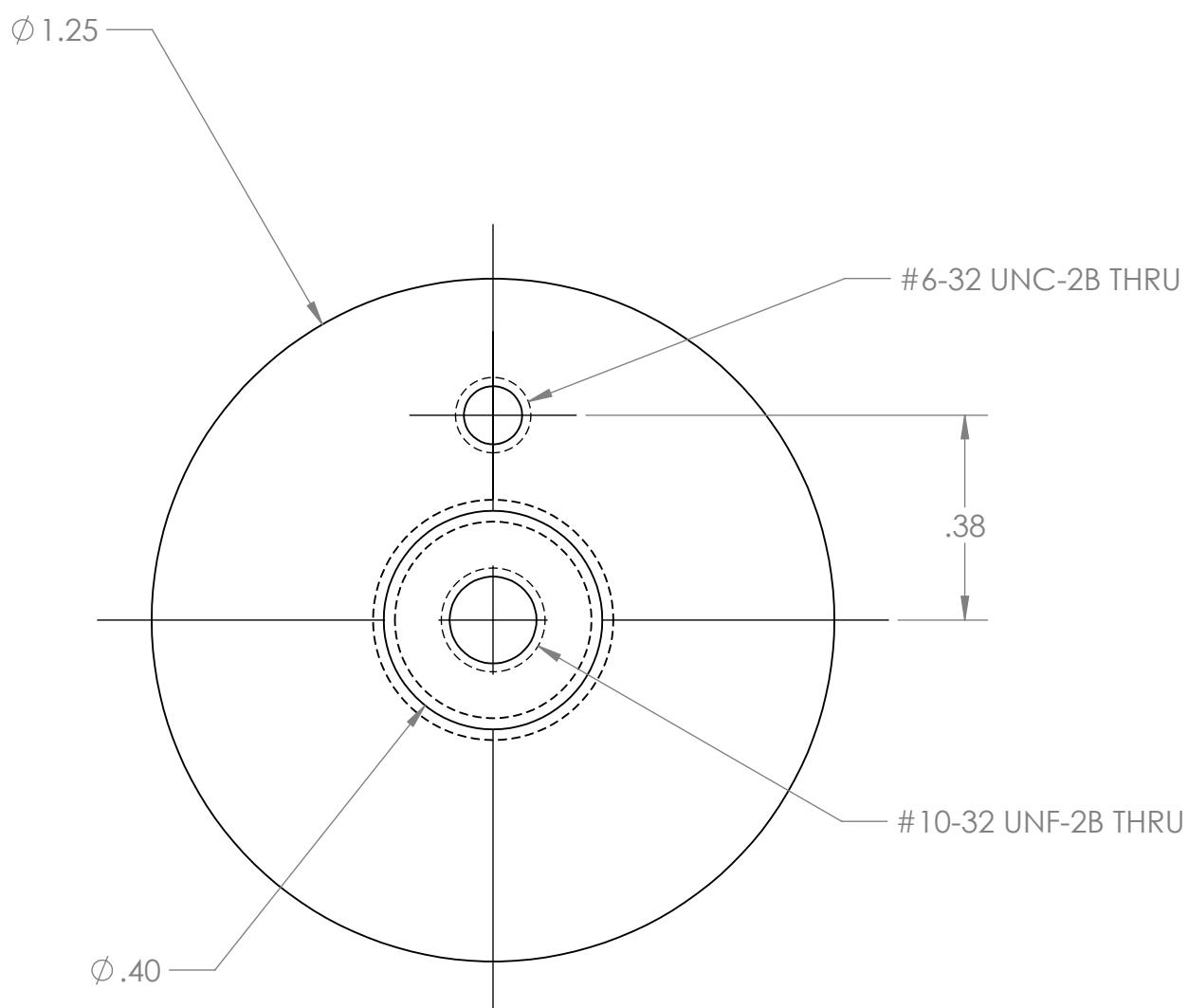
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BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN INCHES  
DEFAULT TOLERANCES:  
 $x.x = \pm 0.02$   
 $x.xx = \pm 0.01$   
 $x.xxx = \pm 0.005$   
ANGULAR:  $x.x \pm 1$

MATERIAL  
BRONZE UNS22000  
FINISH  
SINTERED

DRAWN	J. WINTERS	06 AUG 2025
CHECKED	M.S. KEYES	07 AUG 2025

COMMENTS:

TEAM 5

TITLE:  
CRANKWHEEL

SIZE	PART NO.	REV
<b>B</b>	6	1

DO NOT SCALE DRAWING  
SCALE: 3:1 WEIGHT: .07 SHEET 1 OF 1

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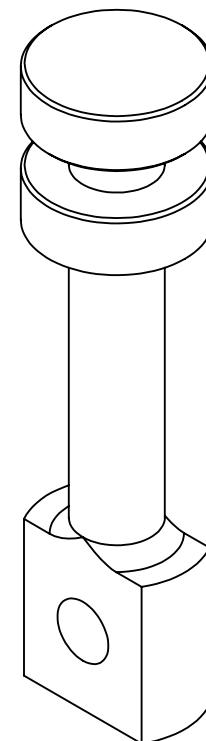
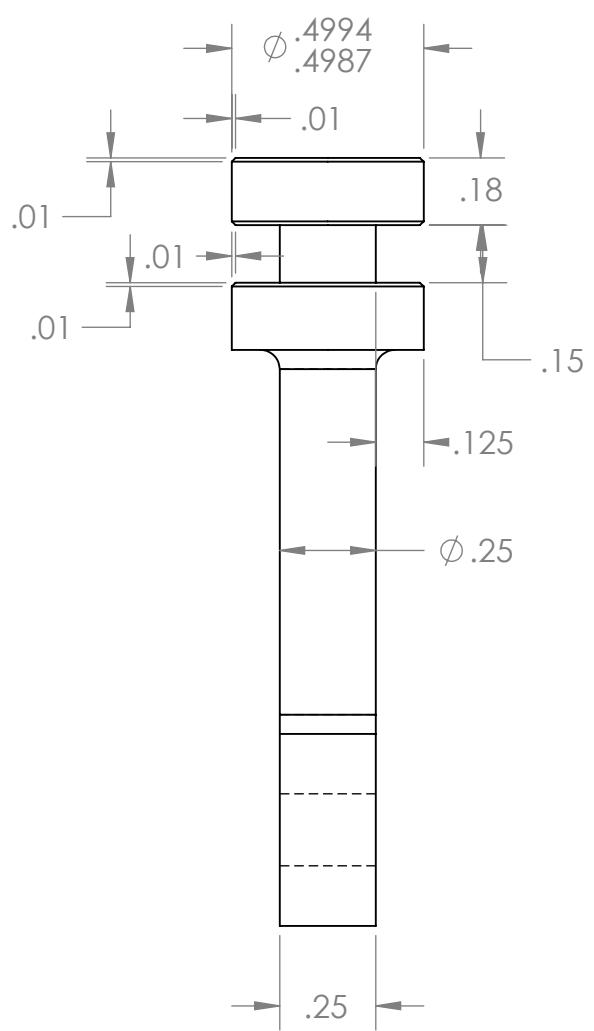
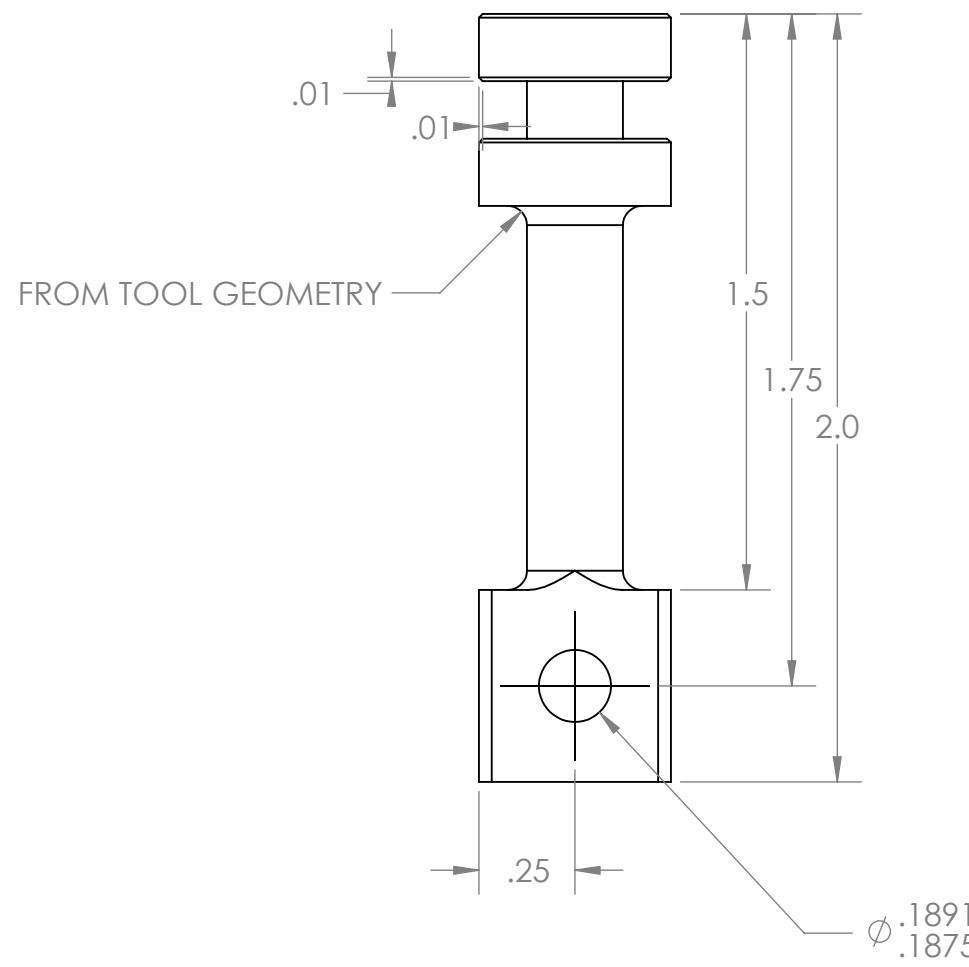
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**BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.**

SOLIDWORKS Educational Product. For Instructional Use Only.

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UNLESS OTHERWISE SPECIFIED:			NAME	DATE	TEAM 5 PISTON			
DIMENSIONS ARE IN INCHES DEFAULT TOLERANCES: x.x = ± .02 x.xx = ± .01 x.xxx = ± .005 ANGULAR: x.x = ± .5		DRAWN	M. S. KEYES	4 AUG 2024				
		CHECKED	J. PATTEN	7 AUG 2025	TITLE:			
		COMMENTS:						
MATERIAL  AISI 1018 STEEL					SIZE		PART NO.	REV
FINISH  COLD ROLLED / MACHINED					B	7		1
DO NOT SCALE DRAWING					SCALE: 2:1	WEIGHT: .06	SHEET 1 OF 1	

4

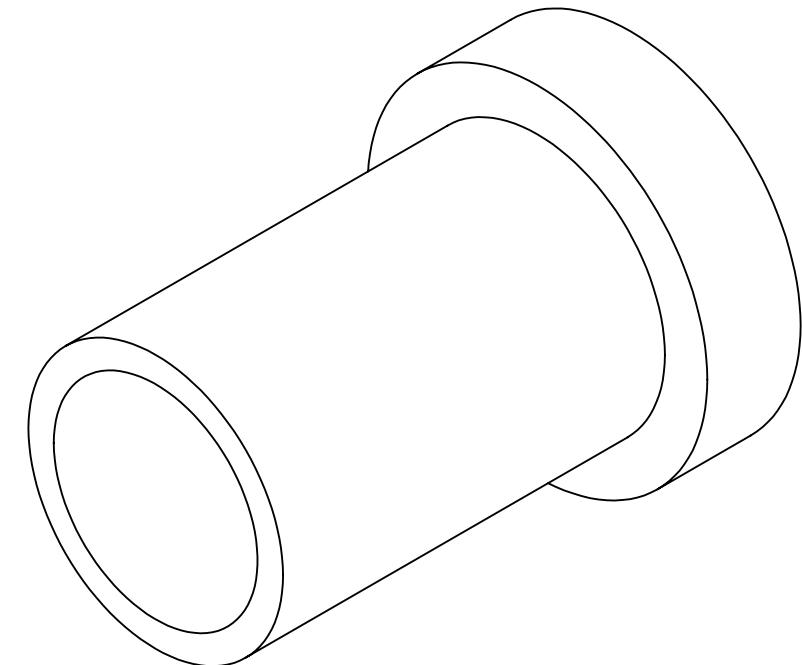
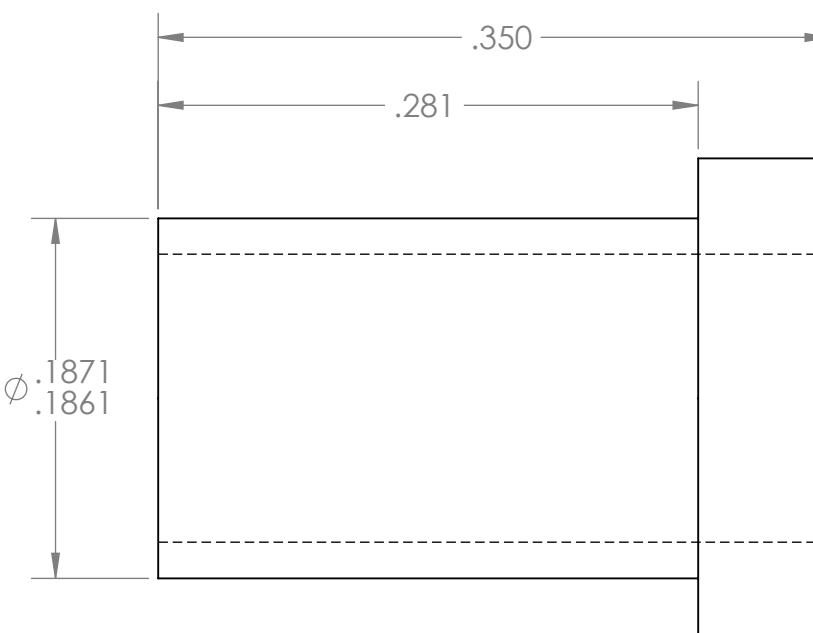
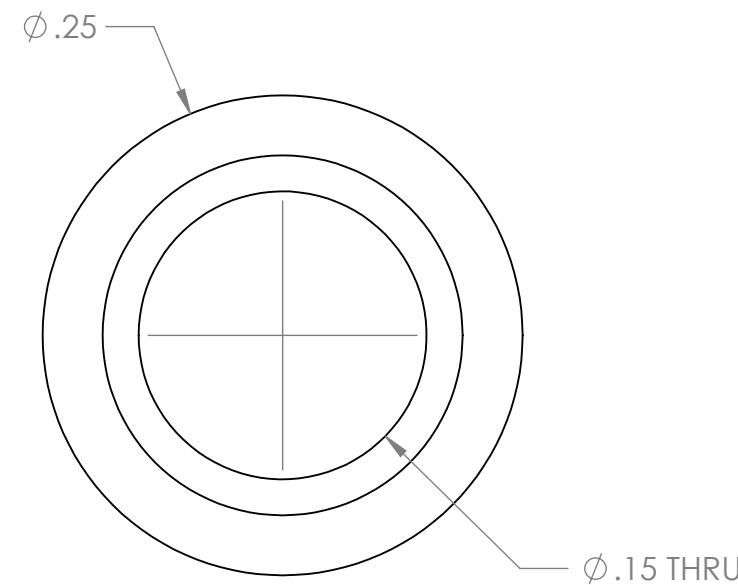
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BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN INCHES  
DEFAULT TOLERANCES:  
 $x.x = \pm .02$   
 $x.xx = \pm .01$   
 $x.xxx = \pm .005$   
ANGULAR:  $x.x = \pm 1$

MATERIAL

BRASS

FINISH

MACHINED

DRAWN	M.S. KEYES	04 AUG 2025
CHECKED	J. PATTEN	06 AUG 2025

COMMENTS:

TEAM 5

# PISTON ROD BUSHING

SIZE	PART NO.	REV
<b>B</b>	8	1

DO NOT SCALE DRAWING      SCALE: 10:1      WEIGHT: .002      SHEET 1 OF 1

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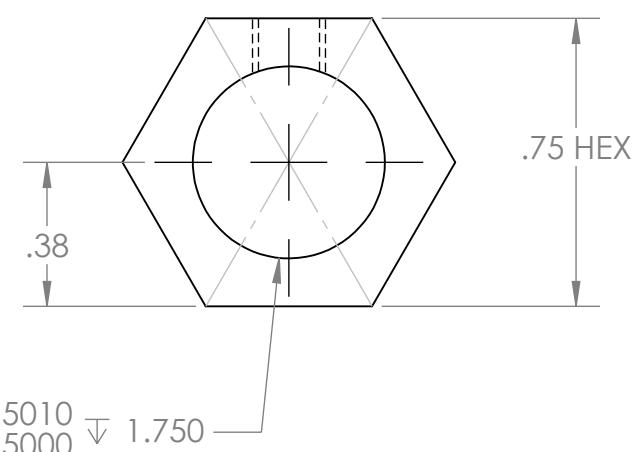
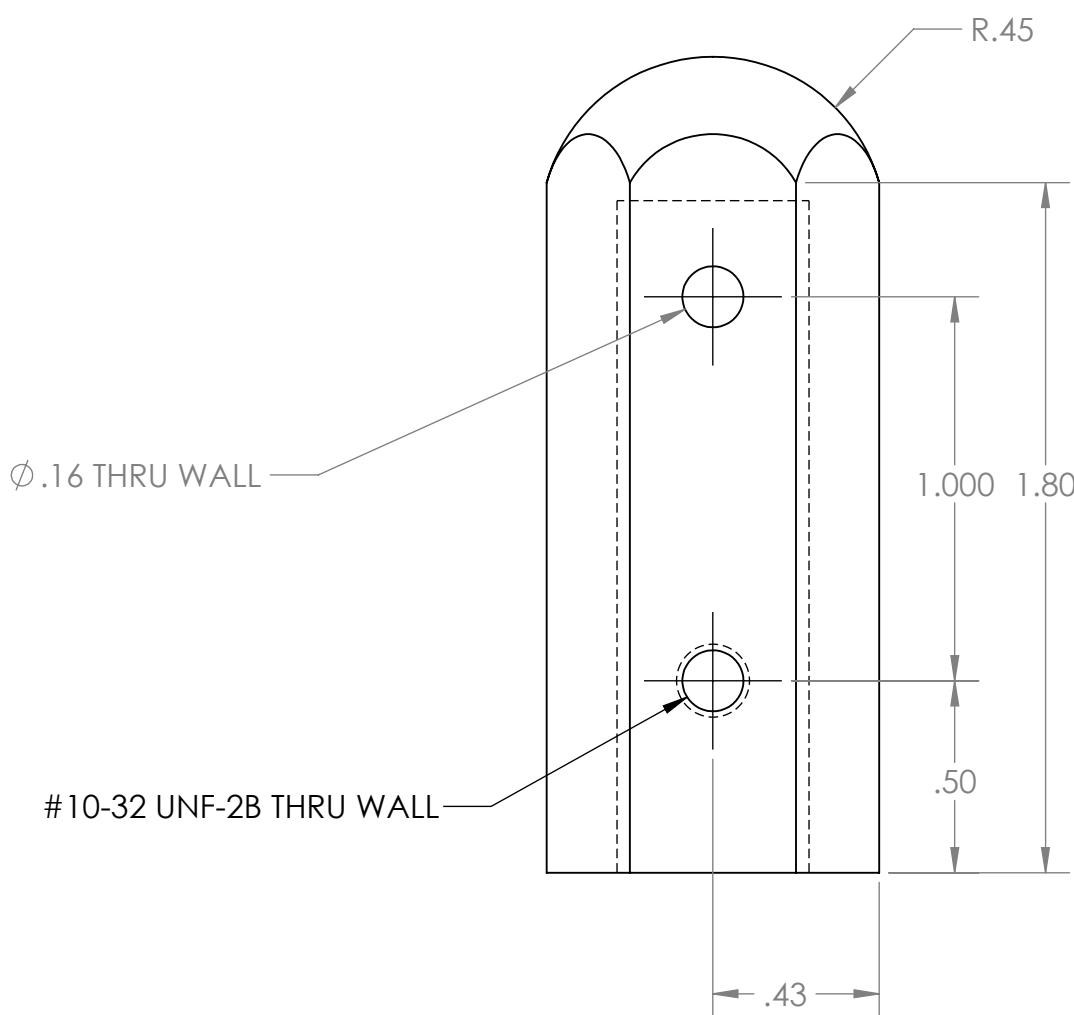
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BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

#### NOTES:

1. TOP RADIUS FORMED WITH THE RADIUS TOOL

UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN INCHES  
DEFAULT TOLERANCES:  
 $x.x = \pm 0.02$   
 $x.xx = \pm 0.01$   
 $x.xxx = \pm 0.005$   
ANGULAR:  $x.x = \pm 1$

#### MATERIAL

BRASS

#### FINISH

EXTRUDED / MACHINED

DO NOT SCALE DRAWING

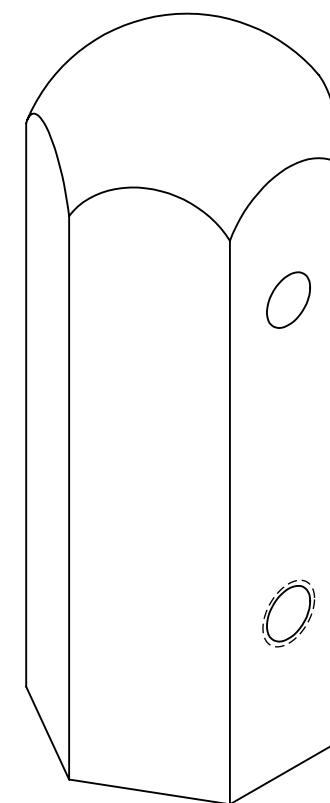
TEAM 5

CYLINDER

SIZE    PART NO.  
**B**      9

REV  
1

SCALE: 2:1   WEIGHT: 0.25   SHEET 1 OF 1



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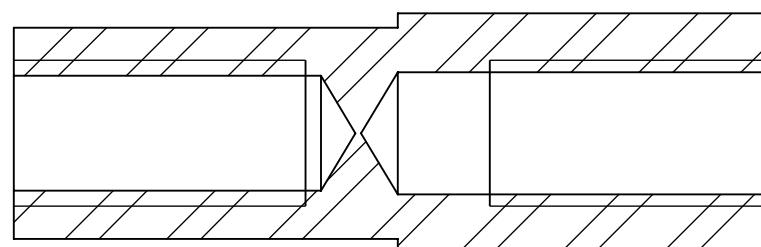
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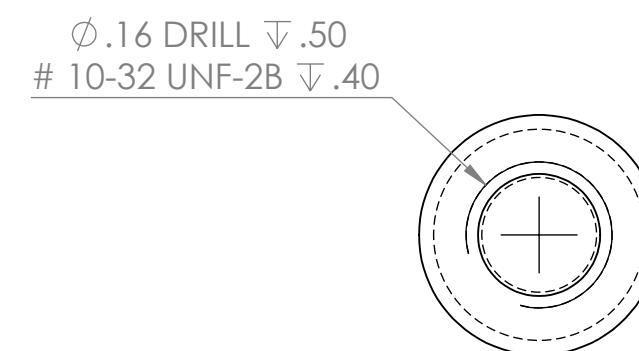
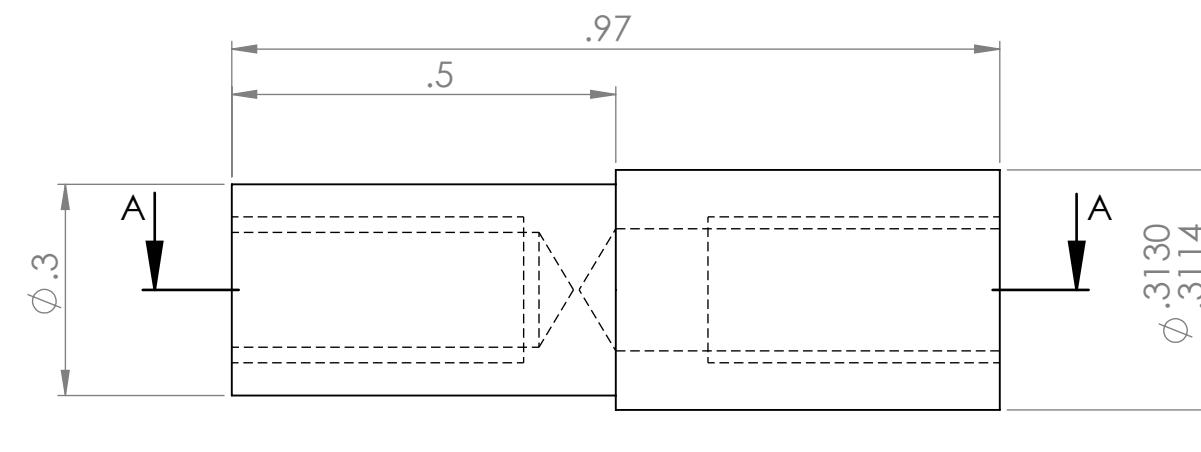
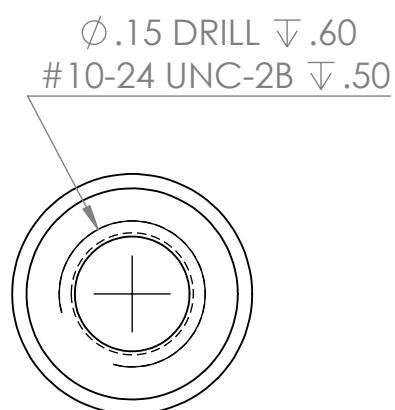
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B



SECTION A-A



BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DEFAULT TOLERANCES: $x.x = \pm .02$ $x.xx = \pm .01$ $x.xxx = \pm .005$ ANGULAR: $x.x = \pm 1$	DRAWN J. PATTEN 06 AUG 2024	NAME M.S. KEYES 06 AUG 2025	DATE
COMMENTS:			
MATERIAL AISI 1018 STEEL			
FINISH COLD ROLLED / MACHINED			
DO NOT SCALE DRAWING			

TEAM 5

ROCKER PIN

SIZE	PART NO.	REV
<b>B</b>	10	1
SCALE: 4:1	WEIGHT: .01	SHEET 1 OF 1

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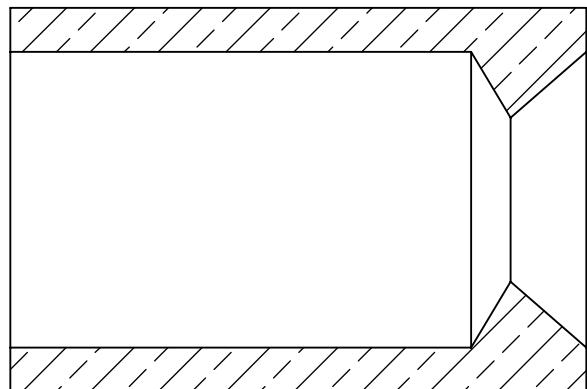
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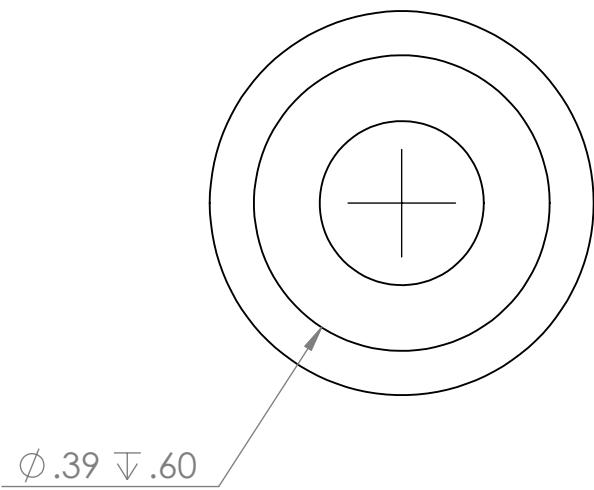
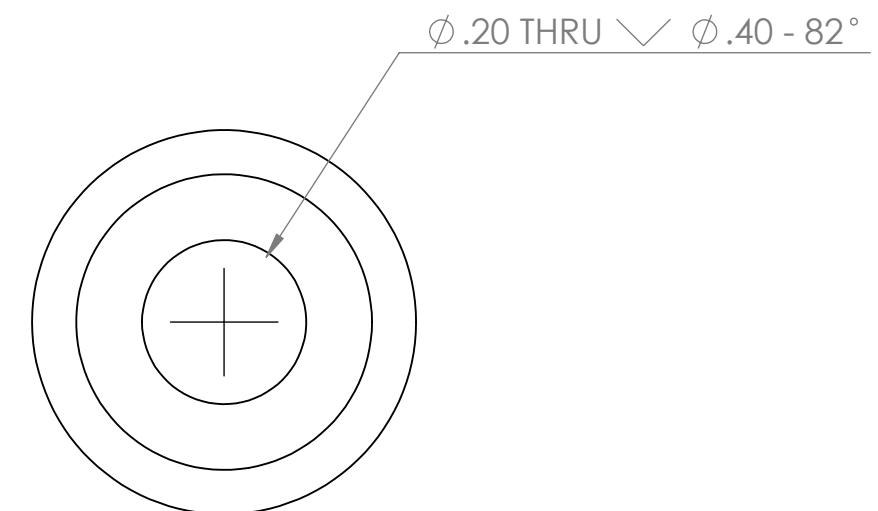
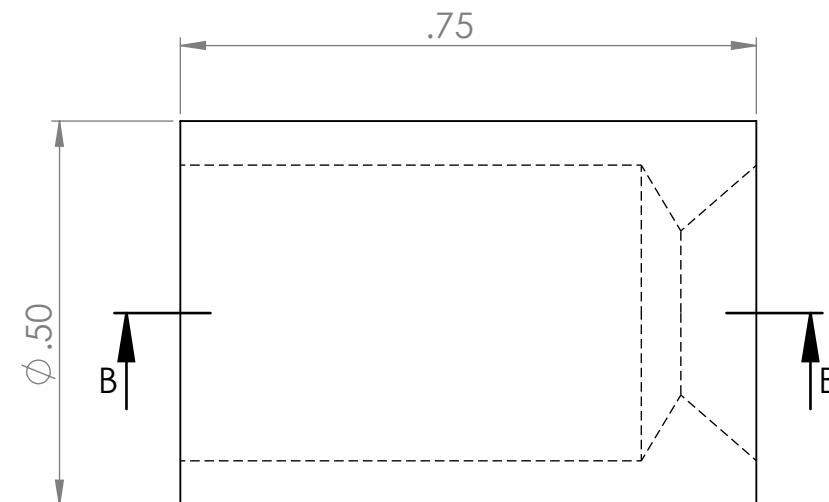
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B

B



SECTION B-B

 $\phi .39 \downarrow .60$ 

BREAK ALL SHARP EDGES AND REMOVE ALL BURRS.

UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN INCHES  
DEFAULT TOLERANCES:  
 $x.x = \pm .02$   
 $x.xx = \pm .01$   
 $x.xxx = \pm .005$   
ANGULAR:  $x.x = \pm .005$

MATERIAL

BRASS

FINISH

MACHINED

DRAWN	J. PATTEN	01 AUG 2025
CHECKED	M.S. KEYES	05 AUG 2025
COMMENTS:		

TEAM 5

TITLE:  
SPRING COVER

SIZE	PART NO.	REV
<b>B</b>	11	1

DO NOT SCALE DRAWING  
SCALE: 4:1 WEIGHT: .02 SHEET 1 OF 1

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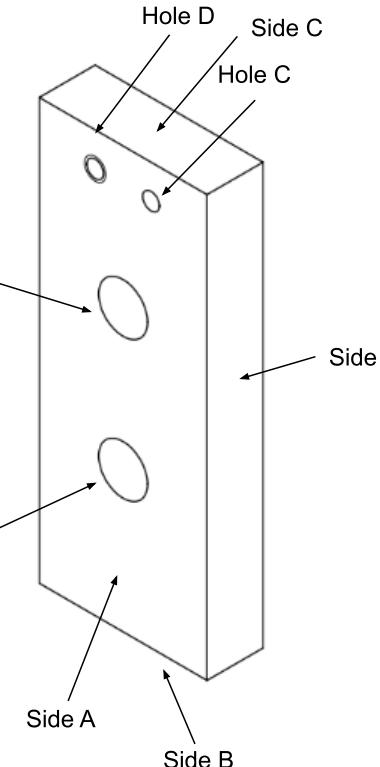
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# Manufacturing Process Sheet

Part No. 1 Part Name Baseplate Model Pipsqueak Engine Sheet 1 of 1  
Team Name 5 Mach Name Mill Loc. EB 117 Material Aluminum 6061-T6  
Prepared By. B. W. Coon Date 07/30/25 Approved By. J. Patten

# Manufacturing Process Sheet

Part No. 2 Part Name Main Upright Model Pipsqueak Engine Sheet 1 of 1  
 Team Name 5 Mach Name Mill Loc. EB 117 Material Aluminum 6061-T6  
 Prepared By. J. Patten Date 07/10/25 Approved By. B. W. Coon

Note-Follow Sketch for Manufacturing	Oper. Seq.	Description of Operation		RPM	Feed Rate	Name of Tool	Tool No.		
Obtain 1/2" x 3/2" x 3.75" Aluminum 6061-T6 Barstock									
Position stock on mill so side A is parallel to the ground. Use vice grips, 1/8" of stock should be above vise.									
	1	Set datum X to Side C	1000	By hand	Edge finder	1			
	2	Set datum Y to Side D	1000	By hand	Edge finder	1			
	3	End Mill Side B to Length	800	By hand	1/2" End Mill	2			
	4	Center drill Holes A, B, C, and D	1400	By hand	#3 Center Drill	3			
	5	Drill Hole A	575	By hand	27/64 Drill	4			
	6	Drill Hole B	575	By hand	27/64 Drill	4			
	7	Ream Hole A	575	By hand	7/16 Reamer	5			
	8	Drill Hole B	575	By hand	7/16 Reamer	5			
	9	Drill Hole C	1450	By hand	# 25 Drill	6			
	10	Drill Hole D	1450	By hand	# 21 Drill	7			
	11	Tap Hole D	By hand	By hand	#10-32 UNF-2B	8			
	Reposition stock in mill so side B is parallel to the ground and face up								
	12	Set datum X to Side A	1000	By hand	Edge finder	1			
	13	Set datum Y to Side D	1000	By hand	Edge finder	1			
	14	Center drill side B holes	1400	By hand	#3 Center Drill	3			
	15	Drill side B holes	1400	By hand	#21 Drill	7			
	16	Tap side B holes	By hand	By hand	#10-32 UNF-2B	8			
Perform finishing operations (deburring, polishing, etc)									

# Manufacturing Process Sheet

Part No. 3  
Team Name 5  
Prepared By. J. Winters

Part Name	Small Upright		Model	Pipsqueak Engine	
Mach Name	Mill	Loc.	EB 117	Material	Aluminum 6061-T6
Date	7/29/2025	Approved By:	M. S. Keyes		

Sheet 1 of 1

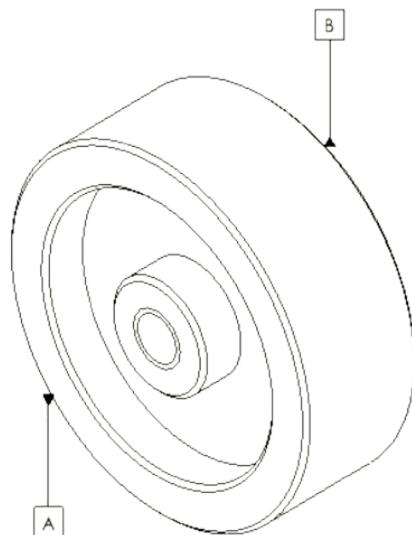
# Manufacturing Process Sheet

Part No. 4 Part Name Rocker Pin Model Pipsqueak Engine Sheet 1 of 1  
Team Name 5 Mach Name Lathe Loc. EB 117 Material AISI 1018 STEEL  
Prepared By. J. Patten Date 07/29/25 Approved By. M. S. Keyes

# Manufacturing Process Sheet

Part No. 5 Part Name Flywheel Model Pipsqueak Engine Sheet 1 of 1  
 Team Name 5 Mach Name Mill/Lathe/Press Loc. EB 117 Material Aluminum 6061 Alloy/Brass  
 Prepared By. M. Keyes Date 8/582025 Approved By. J. Patten

Note-Follow Sketch for Manufacturing		Oper. Seq.	Description of Operation	RPM	Feed Rate	Name of Tool	Tool No.
Place part in rotary table on mill with side A exposed							
		1	Face side A on rotary table	1500	12 IPM	1/4" End Mill	1
		2	Mill out the floors and walls using rotary table.	1500	12 IPM	1/4" End Mill	1
		3	Edge Find accross knob in middle	1000	N/A	Edge Finder	2
		4	Spot drill for center hole	1000	6 IPM	#3 Center Drill	3
		5	Drill center hole	1000	6 IPM	F Drill	4
		6	Hand tap center hole	N/A	N/A	5/16-18 UNC	5
Screw onto the to crank shaft							
Fixture in Lathe with either side exposed							
		7	Rough outside to 1.5"	1500	0.003 Inch/Rev	Lathe Tool	6
		8	Chamfer middle knob with compound	1500	0.003 Inch/Rev	Lathe Tool	6
Flip flywheel on crank shaft so other side is exposed.							
		9	Chamfer middle knob with compound	1500	0.003 Inch/Rev	Lathe Tool	6
Take flywheel off crank shaft and mount it back on rotary table side B up.							
		10	Face side B on rotary table	1500	12 IPM	1/4" End Mill	1
		11	Mill out the floors and walls using rotary table.	1500	12 IPM	1/4" End Mill	1
Put 1.75" diameter round brass stock in lathe.							
		12	Center drill center hole	500	0.003 Inch/Rev	#5 Center Drill	7
		13	Drill center hole	300	0.005 Inch/Rev	1 3/8" Drill	8
		14	Bore out Center to 1.5005"	1500	0.003 Inch/Rev	Boring Bar	9
Press the aluminum and brass pieces together on hydraulic press.							
Bandsaw to size if needed. Put flywheel in lathe.							
		16	Face off extra brass stock	1500	0.003 Inch/Rev	Lathe Tool	6
		17	Chamfer edges on side A	1500	0.003 Inch/Rev	90 degree lathe tool	10
Flip part around so side B is exposed.							
		18	Flip around and chamfer other side	1500	0.003 Inch/Rev	90 degree lathe tool	10
Sand Blast all sides							



# Manufacturing Process Sheet

Part No. 6 Part Name Crankwheel Model Pipsqueak Engine Sheet 1 of 1  
Team Name 5 Mach Name Mill/Lathe Loc. EB 117 Material Bronze UNS22000  
Prepared By. J. Winters Date 08/05/25 Approved By. M. S. Keyes

# Manufacturing Process Sheet

Part No. 7 Part Name Piston Model Pipsqueak Engine Sheet 1 of 1  
Team Name 5 Mach Name Mill/Lathe Loc. EB 117  
Material AISI 1018 Steel  
Prepared By. M. Keyes Date 08/05/25 Approved By. J. Patten

# Manufacturing Process Sheet

Part No.	<b>8</b>	Part Name	<b>Piston Rod Bushing</b>		Model	<b>Pipsqueak Engine</b>	Sheet	<b>1</b>	of	<b>1</b>
Team Name	<b>5</b>	Mach Name	<b>Lathe</b>	Loc.	<b>EB 117</b>	Material	<b>Brass</b>			
Prepared By.	<b>M. Keyes</b>	Date	<b>08/05/25</b>	Approved By.			<b>J. Patten</b>			

# Manufacturing Process Sheet

Part No. 9 Part Name Cylinder Model Pipsqueak Engine Sheet 1 of 1  
Team Name 5 Mach Name Mill / Lathe Loc. EB 117 Material Brass  
Prepared By. J. Patten Date 07/10/25 Approved By. B. W. Coon

# Manufacturing Process Sheet

Part No. 10 Part Name Rocker Pin Model Pipsqueak Engine Sheet 1 of 1  
Team Name 5 Mach Name Lathe Loc. EB 117 Material AISI 1018 STEEL  
Prepared By. J. Winters Date 07/29/25 Approved By. J. Patten

# Manufacturing Process Sheet

Part No. 11 Part Name Spring Cover Model Pipsqueak Engine Sheet 1 of 1  
Team Name 5 Mach Name Lathe Loc. EB 117 Material Brass  
Prepared By. J. Patten Date 07/29/25 Approved By. M. S. Keyes