Project 8.1 Model A Button Maker

Introduction

Interpreting dimensioned drawings is an important engineering skill. Using drawings to create a computer model of a part or product is also important. Communicating information effectively allows a group of people to function as a design team.

In this project you will further develop your modeling skills and your ability to use a computer as an efficient communication tool. The skills that you learned earlier in this course will be systematically applied to model and sub-assemble the parts of the Button Maker. These sub-assemblies will be used later to create the final assembly and an assembly drawing for the Button Maker.

Equipment

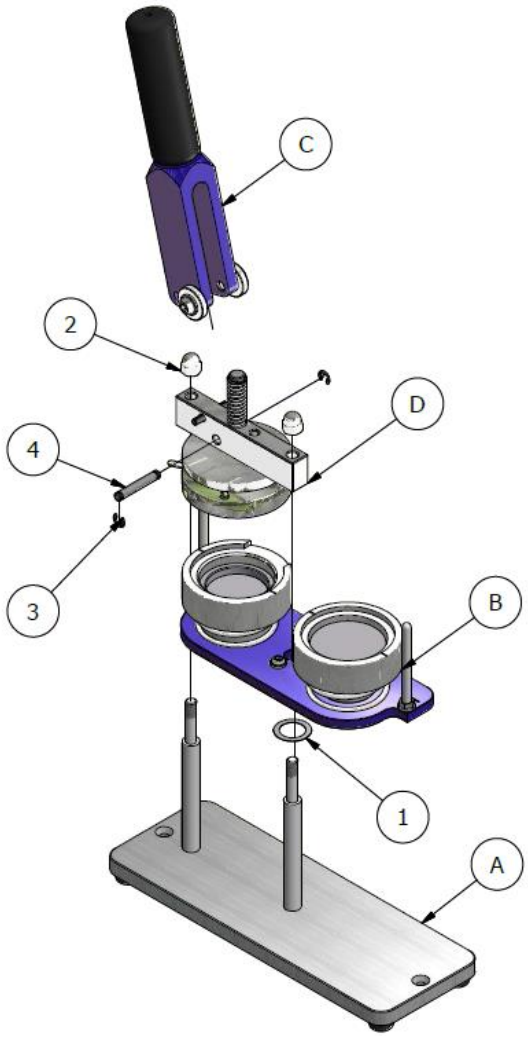
- Computer with 3D CAD solid modeling program
- Engineering notebook
- CAD Files (Teacher will provide as applicable)

Procedure

1. Model the button maker parts required as noted by the word Model in the **Required** column of the following table. You may have already modeled some of these parts in earlier activities. Crete models of other parts (Optional) as required by your instructor.
2. Create subassemblies as indicated in the table and drawings below. Use the parts you have created and/or part model files provided to you.

Sub Assembly	Item	PART NUMBER	Required	Optional
Bottom Press Assembly			Assemble	
	1	BASE BEARING		Model
	2	1/4 – 20 CAP NUT		Model
	3	SMALL SNAP RING		Model
	4	HANDLE PIVOT PIN		Model
	A	BASE SUB-ASSEMBLY A	Assemble	
	B	LOWER DIE SUB-ASSEMBLY B	Assemble	
	C	HANDLE SUB-ASSEMBLY C	Assemble	
	D	UPPER DIE SUB-ASSEMBLY D	Assemble	
Base Sub-Assembly A			Assemble	
	1	BASE PLATE	Model	
	2	RUBBER FOOT	Model	
	3	8-32 X 3/8 UNC SCREW		Model
	4	VERTICAL SUPPORT	Model	
	5	5/16-18 HEX NUT		Model
	5	5/16-18 X 9/16 BUTTON CAP SCREW		Model
	6	RUBBER HANDLE SLEEVE	Model	
	7	METAL HANDLE INSERT		Model
	8	7/16-14 X 1 3/8 SOCKET SET SCREW		Model
Lower Die Sub-Assembly B			Assemble	
	1	BOTTOM DIE PLATE	Model	
	2	5/16-18 HEX NUT		Model
	3	SEQUENCE LEVER ARM		Model
	4	¼ WASHER		Model
	5	¼-20 X 5/16 BUTTON CAP SCREW		Model
	6	LOWER DIE 1 OUTER RING		Model
	7	LOWER DIE 1 CENTER		Model
	8	¼-20 X ¾ SOCKET HEAD SCREW		Model
	9	LOWER DIE 2 CENTER		Model

	10	LOWER DIE 2 OUTER RING		Model
	11	LOWER DIE 2 SPACER		Model
	12	BOTTOM DIE SPRING		Model
Handle Sub-Assembly C			Assemble	
	1	HANDLE BODY	Model	
	2	ROLLER SPACER		Model
	3	ROLLER INNER BEARING		Model
	4	ROLLER OUTER BEARING		Model
Upper Die Sub-Assembly D			Assemble	
	1	UPPER DIE CENTER SUPPORT		Model
	2	LARGE SNAP RING		Model
	3	HANDLE RETENTION PIN		Model
	4	UPPER DIE CENTER PIN		Model
	5	UPPER DIE SPRING		Model
	6	UPPER OUTER RING		Model
	7	UPPER DIE PRESSURE RING	Model	
	8	#8-32 X 0.7 SCREW		Model
	9	UPPER DIE CENTER	Model	
	10	¼-20 X 1 3/16 SOCKET HEAD SCREW		Model



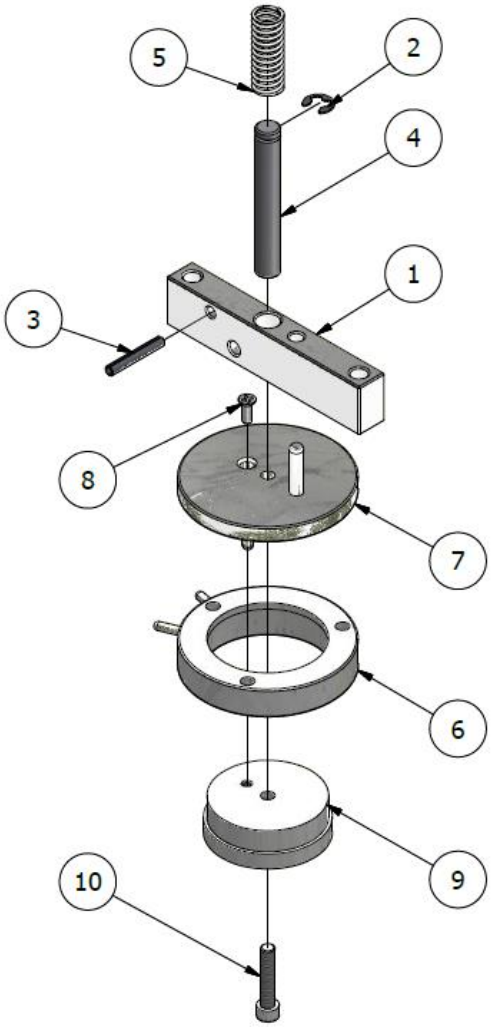
BUTTON PRESS ASSEMBLY

SCALE = 1:4

PARTS LIST			
ITEM	QTY	PART NUMBER	MATERIAL
1	1	BASE BEARING	Steel
2	2	1/4-20 CAP NUT	Steel
3	2	SMALL SNAP RING	Steel
4	1	HANDLE PIVOT PIN	Steel
A	1	BASE SUB-ASSEMBLY A	VARIES
B	1	LOWER DIE SUB-ASSEMBLY B	VARIES
C	1	HANDLE SUB-ASSEMBLY C	VARIES
D	1	UPPER DIE SUB-ASSEMBLY D	VARIES

Button Press Tolerances
All parts have the following tolerances:
X.X = +/- .020
X.XX = +/- .010
X.XXX = +/- .005

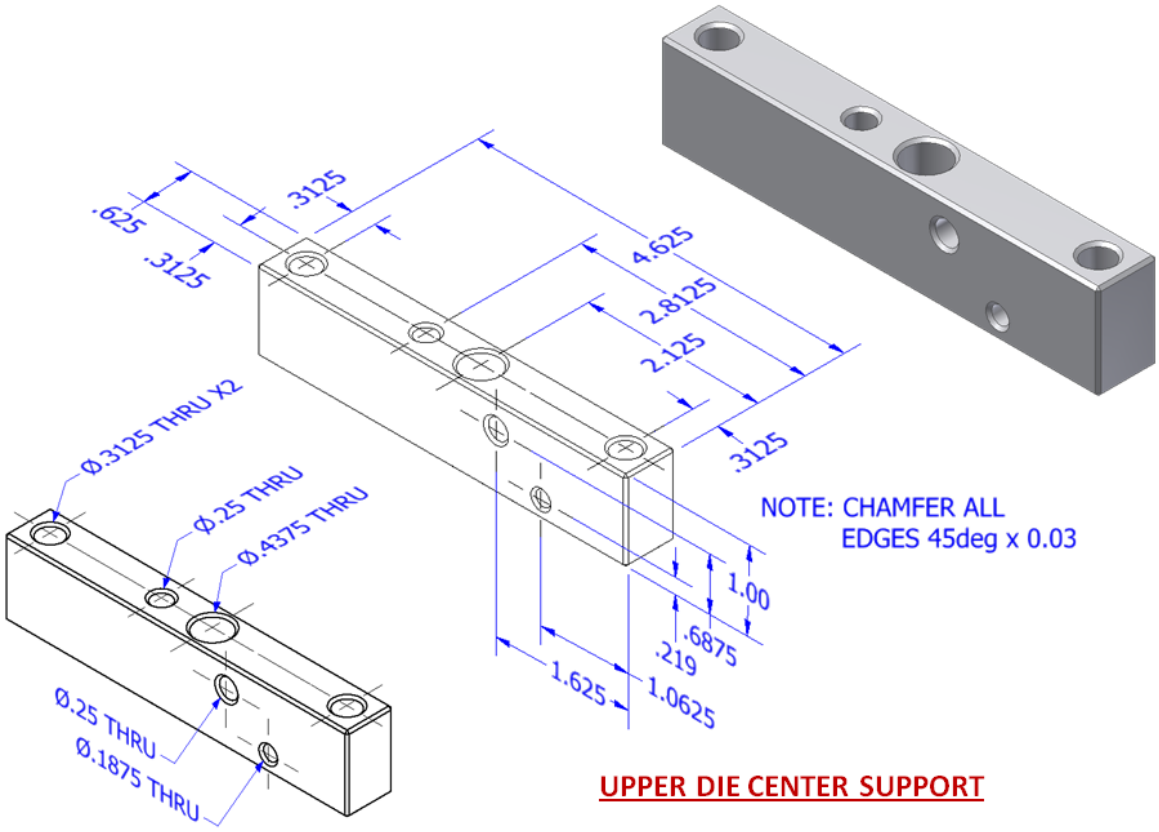
a. Model and assemble the following subassembly using the drawings provided.



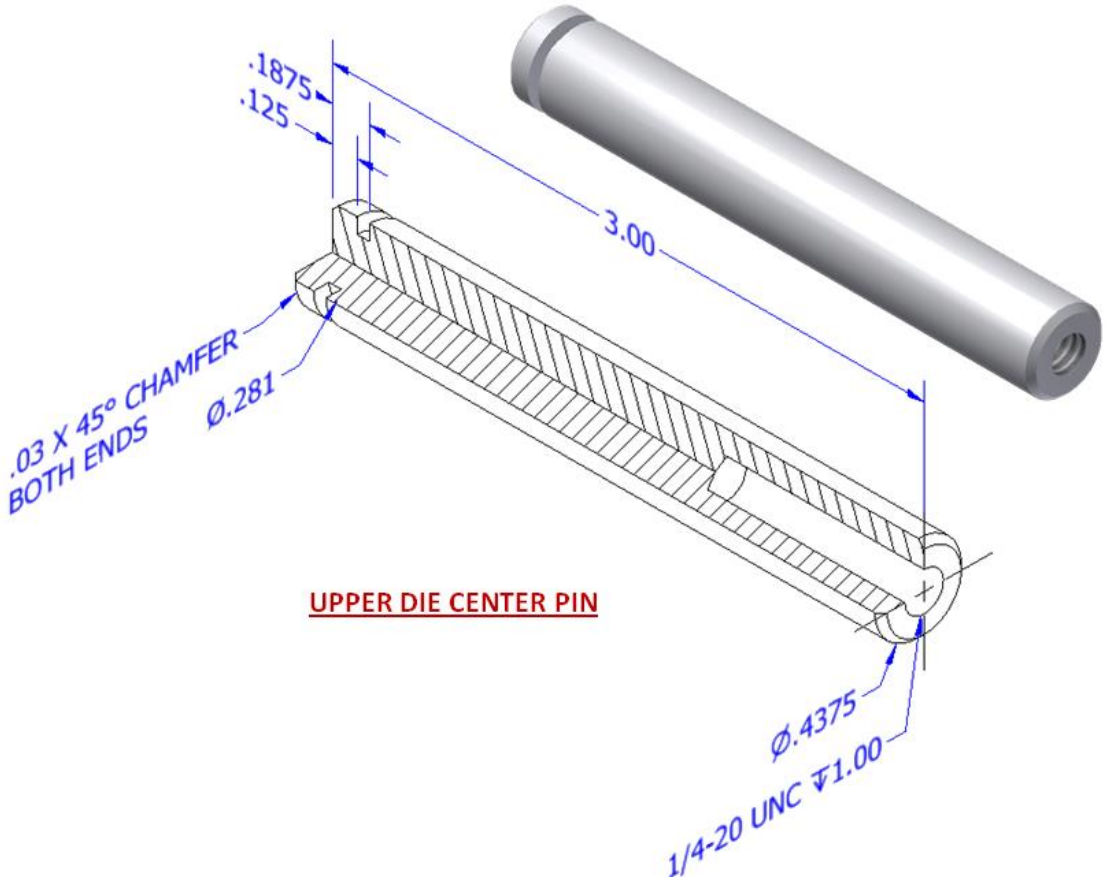
UPPER DIE SUB-ASSEMBLY

SCALE = 3:8

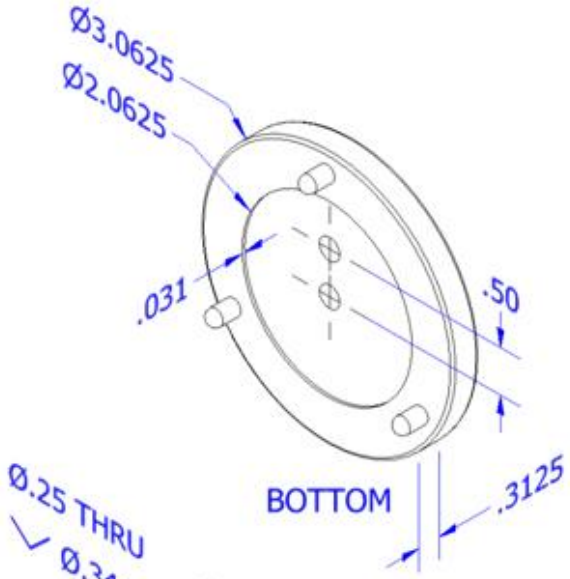
PARTS LIST			
ITEM	QTY	PART NUMBER	MATERIAL
1	1	UPPER DIE CENTER SUPPORT	Steel
2	1	LARGE SNAP RING	Steel
3	1	HANDLE RETENTION ROLL PIN	Spring Steel
4	1	UPPER DIE CENTER PIN	Steel
5	1	UPPER DIE SPRING	Spring Steel
6	1	UPPER DIE OUTER RING	Steel
7	1	UPPER DIE PRESSURE RING	Steel
8	1	#8-32 x 0.7 SCREW	Steel
9	1	UPPER DIE CENTER	Aluminum-6061
10	1	1/4-20 x 1 3/16 SOCKET HEAD SCREW	Steel

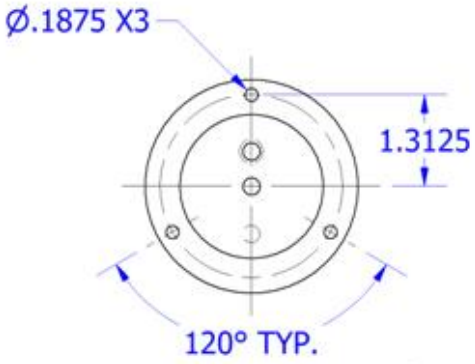


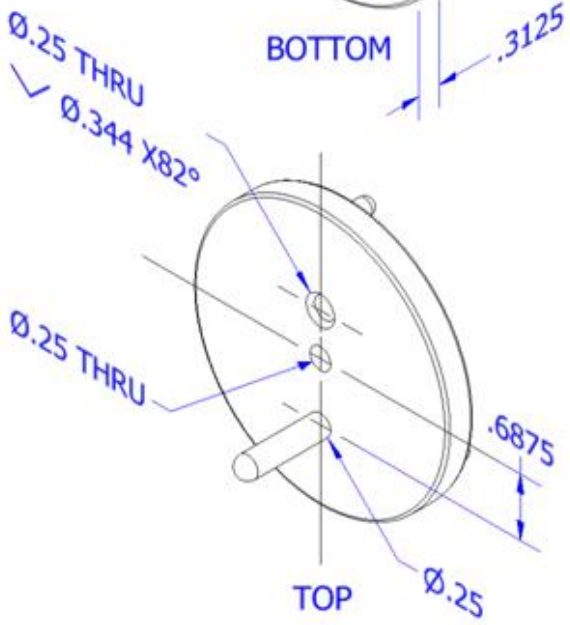
UPPER DIE CENTER SUPPORT

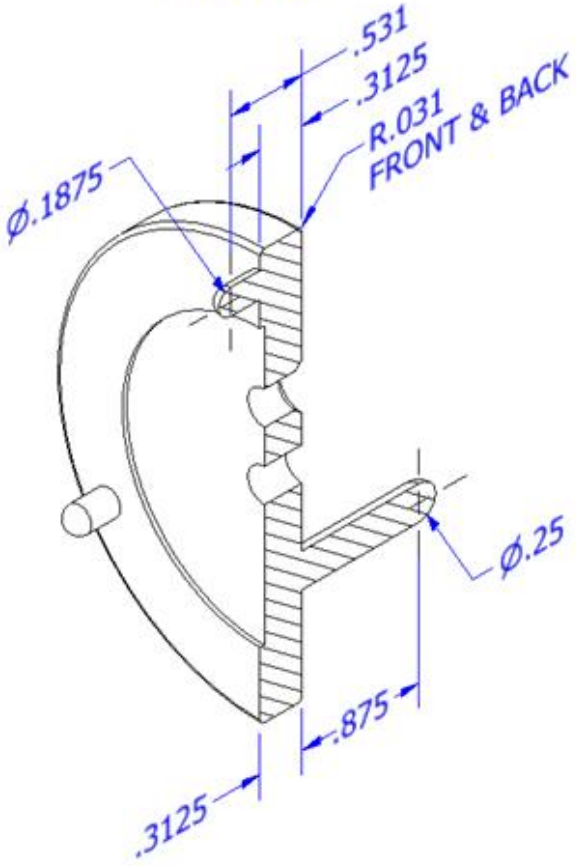


UPPER DIE CENTER PIN

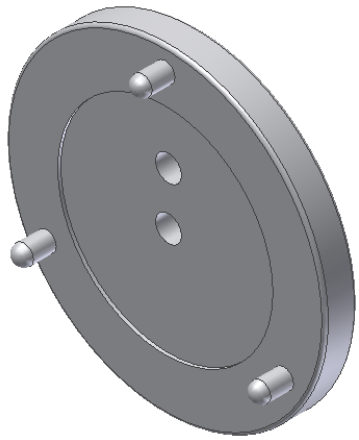


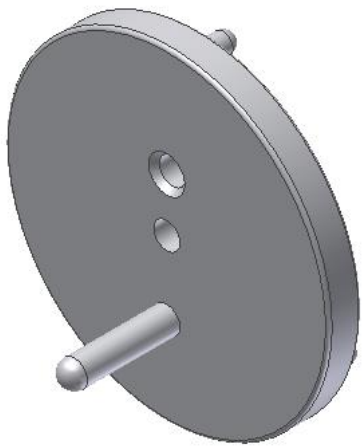


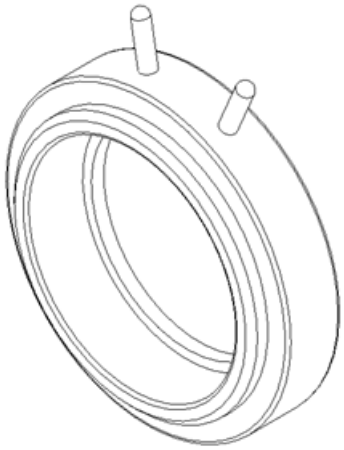




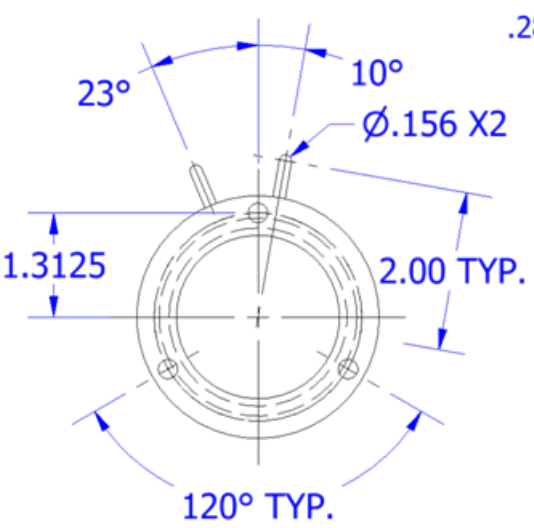
UPPER DIE PRESSURE RING

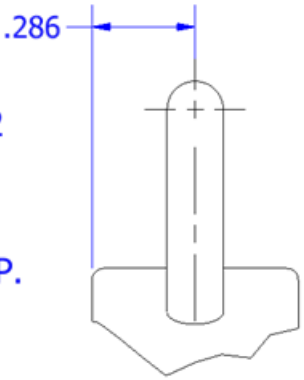


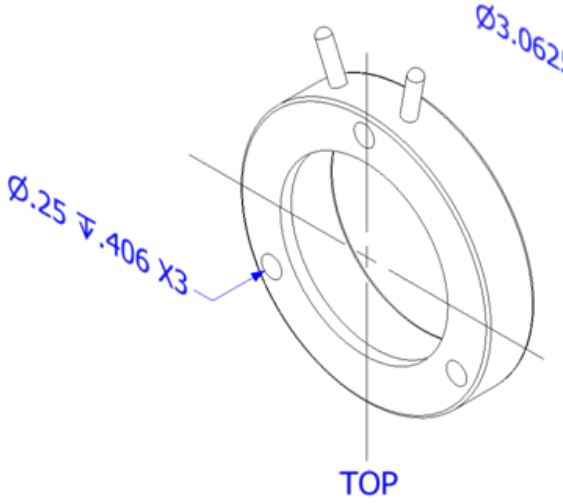


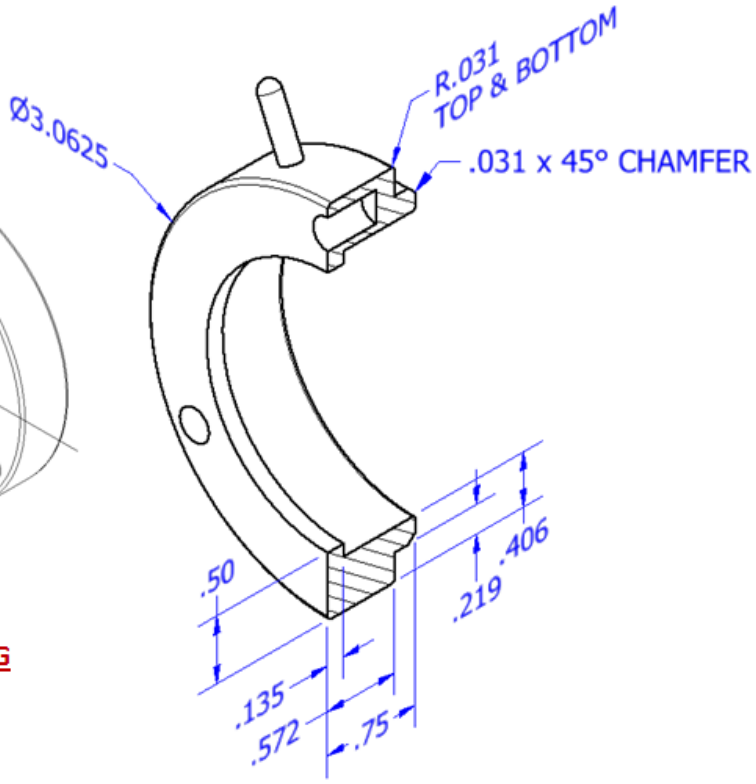


BOTTOM

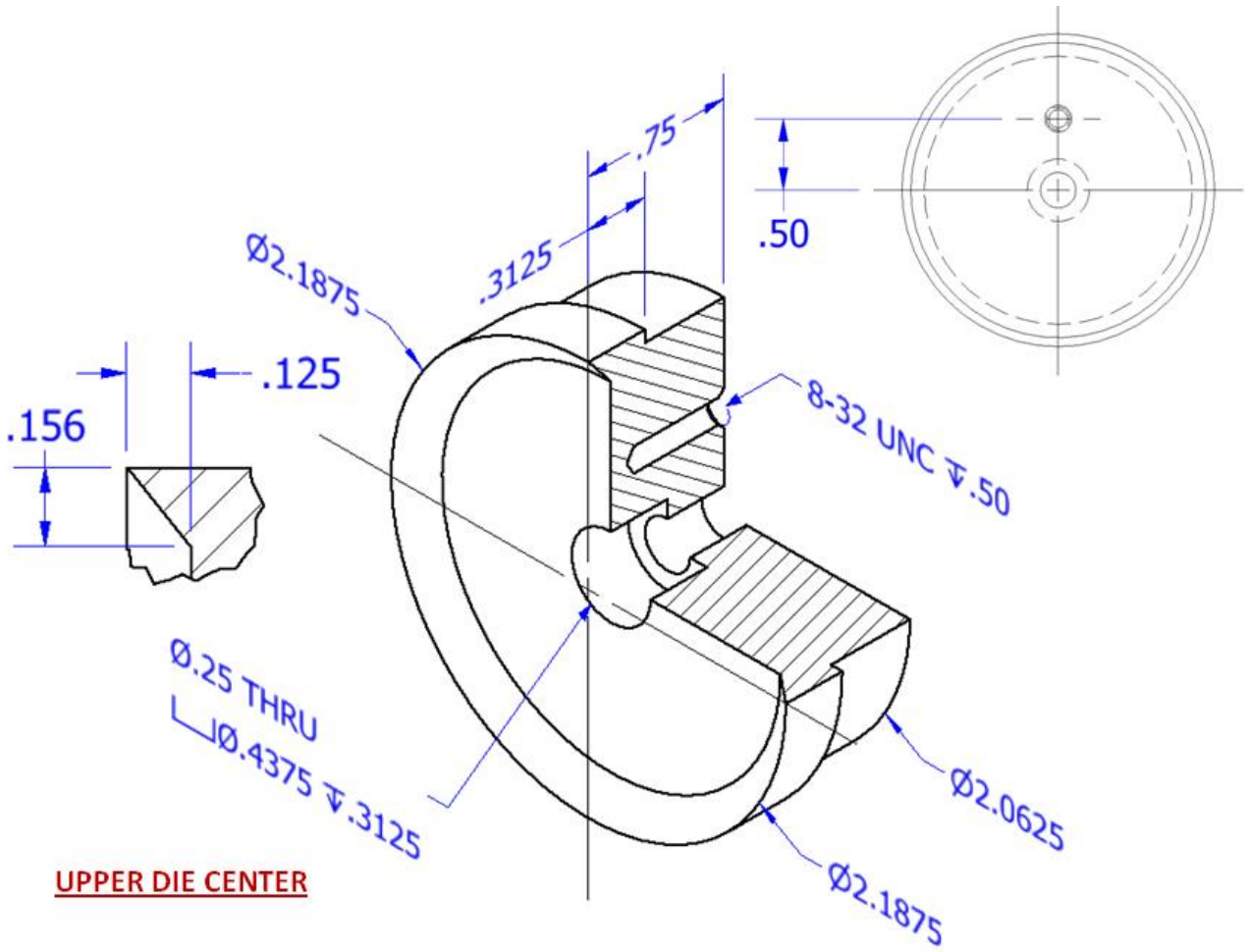


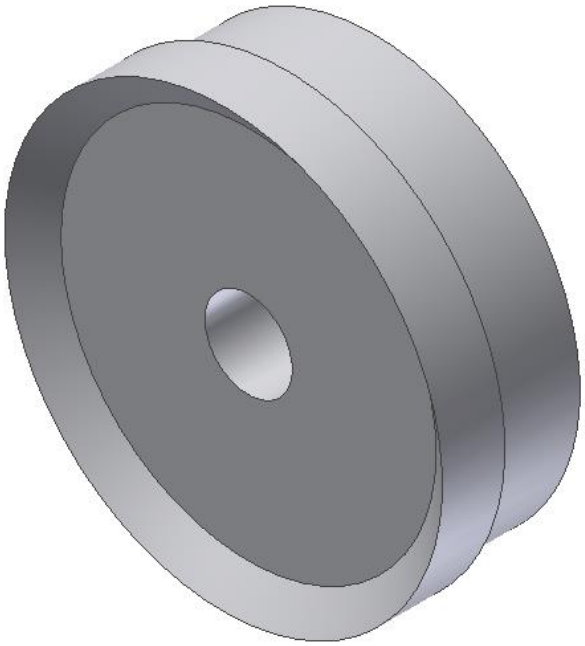




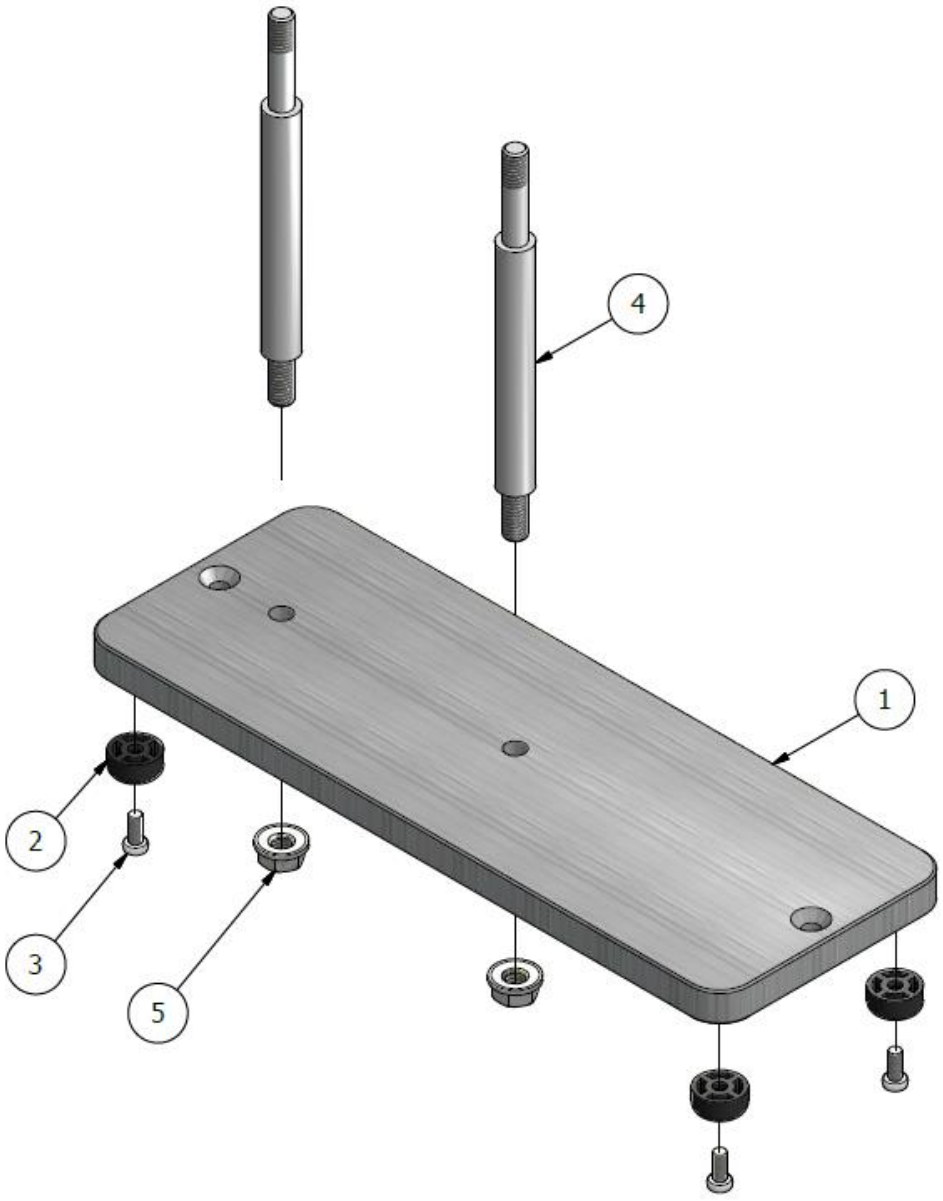


UPPER DIE OUTER RING





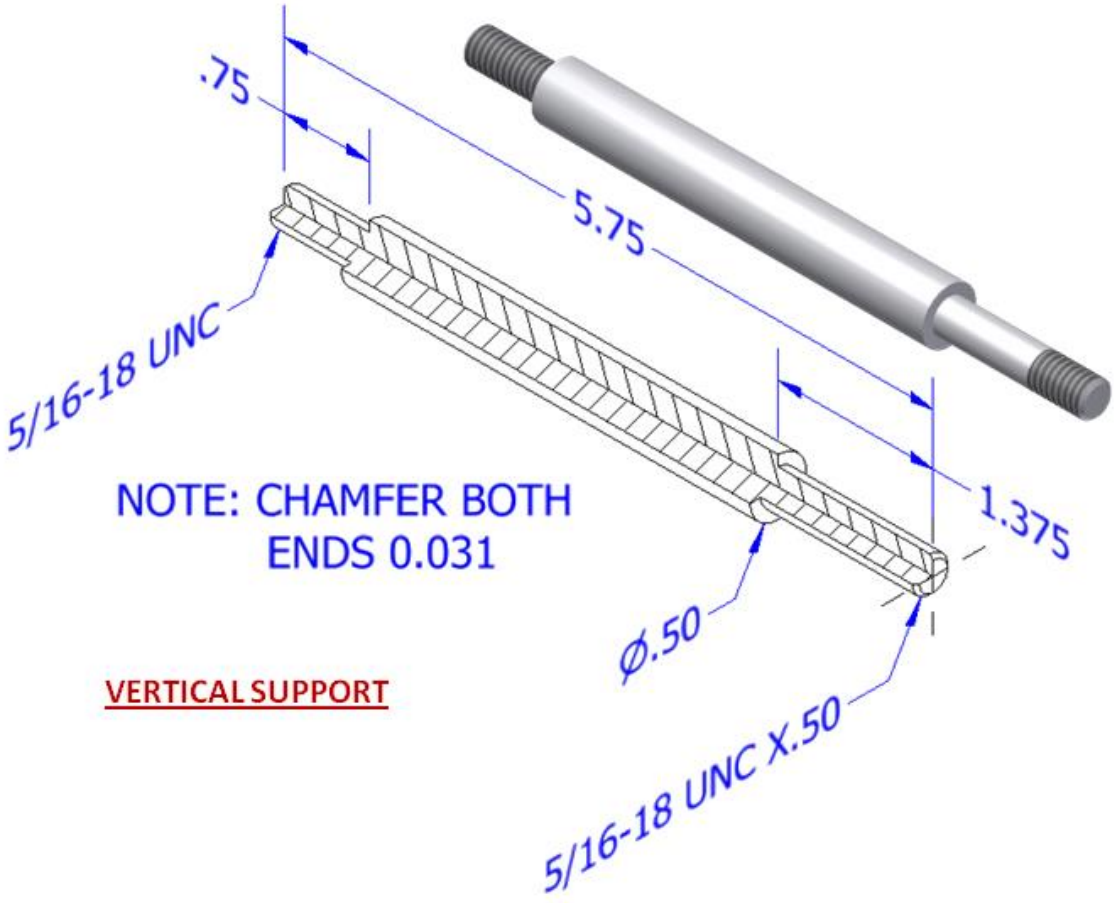
b. Model and assemble the following subassembly using the drawings provided.

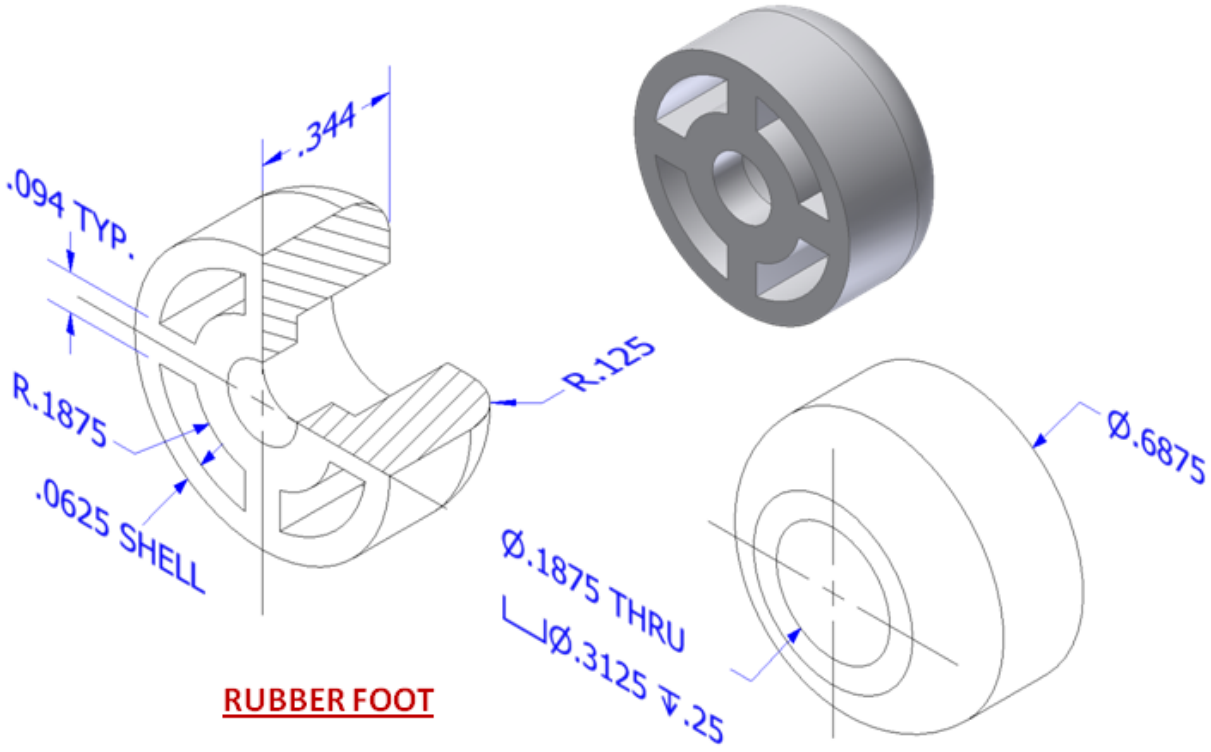


BASE SUB-ASSEMBLY

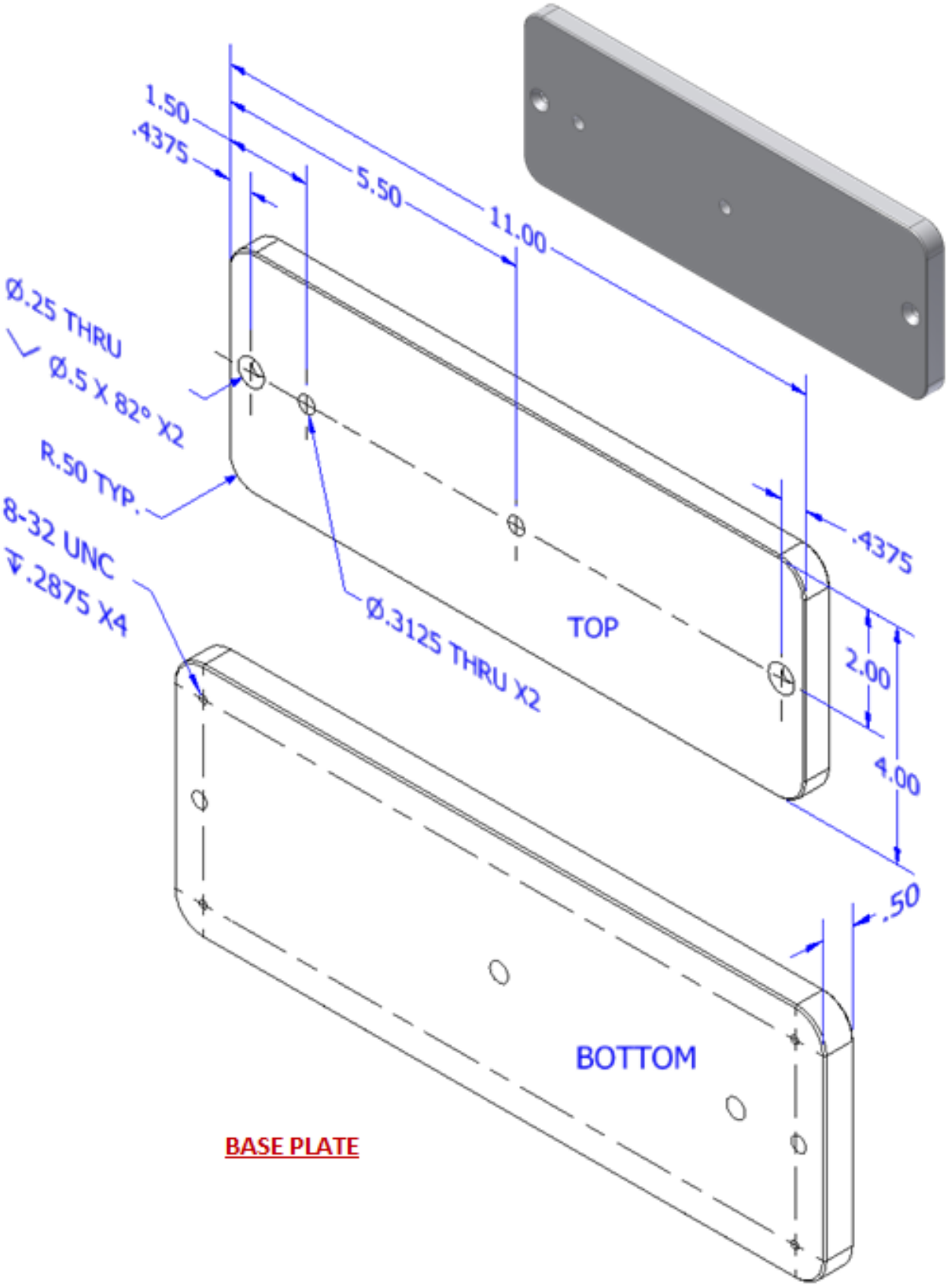
SCALE = 1:2

PARTS LIST			
ITEM	QTY	PART NUMBER	MATERIAL
1	1	BASE PLATE	Aluminum-6061
2	4	RUBBER FOOT	Rubber
3	4	8-32 x 3/8 UNC Screw	Steel
4	2	VERTICAL SUPPORT	Steel
5	2	5/16-18 HEX NUT	Steel



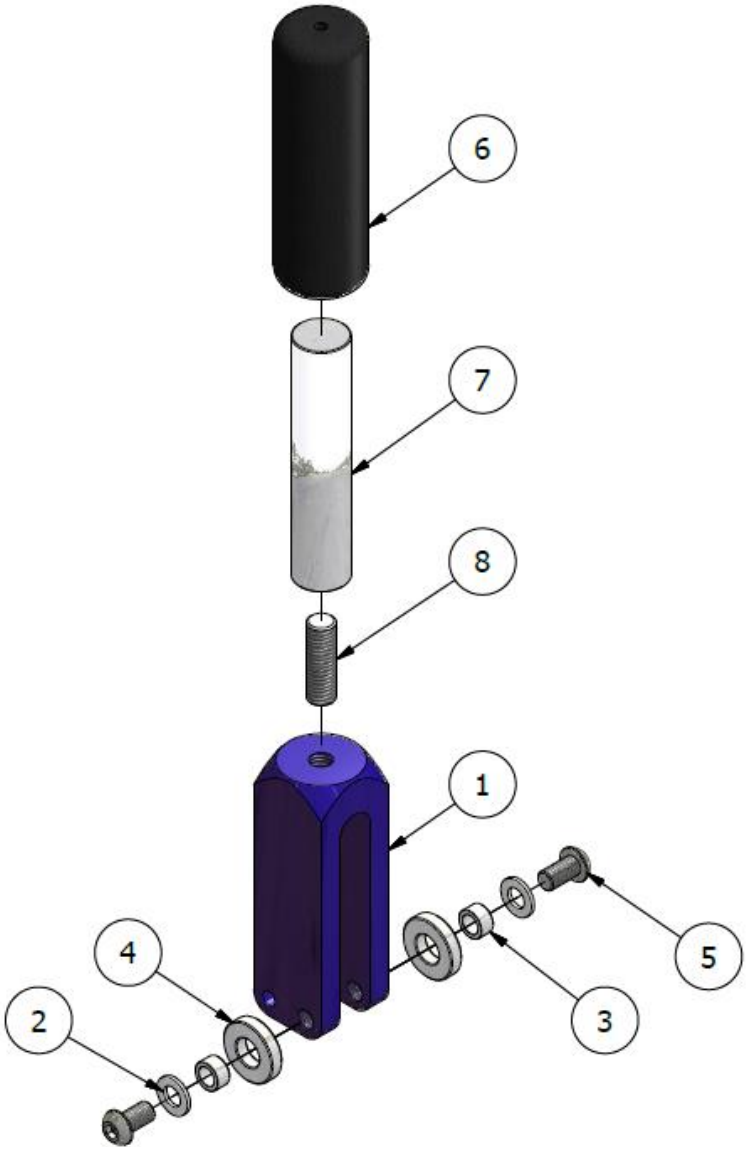


RUBBER FOOT


1.50
.4375
5.50
11.00
Ø.25 THRU
Ø.5 X 82° X2
R.50 TYP.
8-32 UNC
↧.2875 X4
Ø.3125 THRU X2
TOP
.4375
2.00
4.00
.50
BOTTOM

BASE PLATE

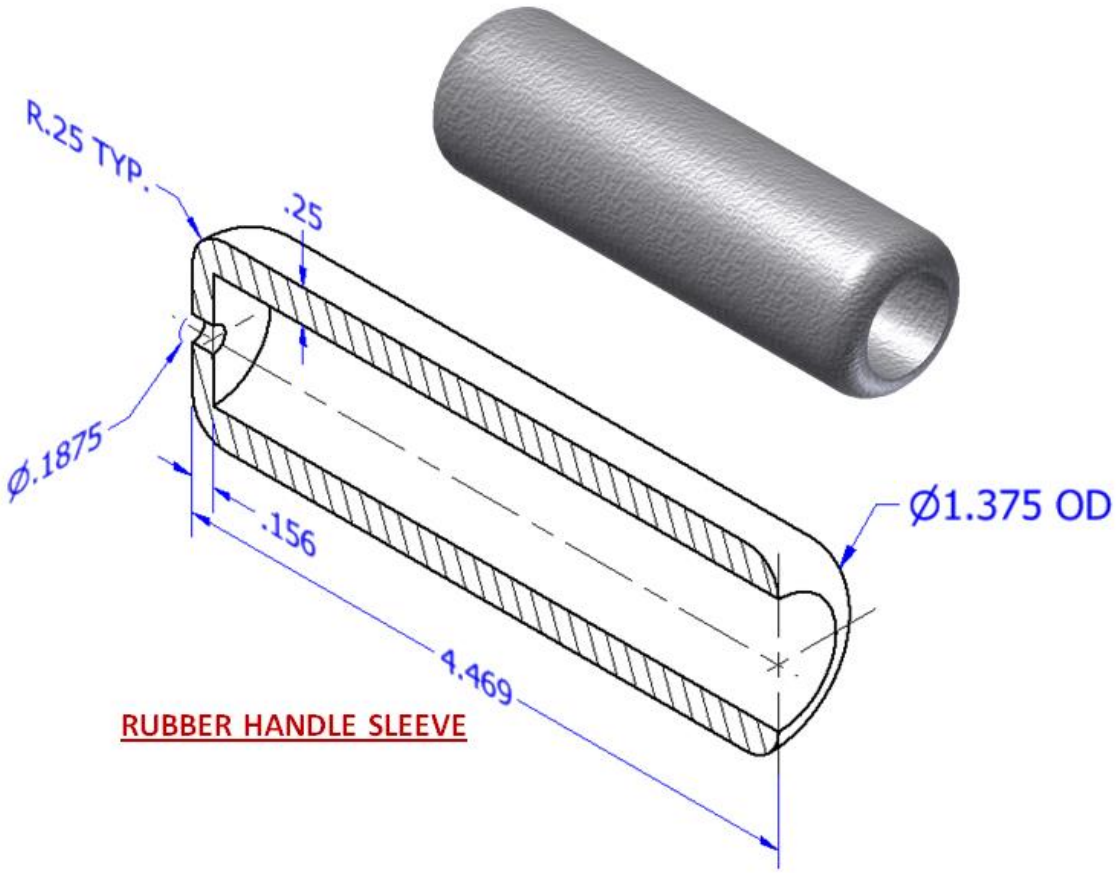
c. Model and assemble the following subassembly using the drawings provided.



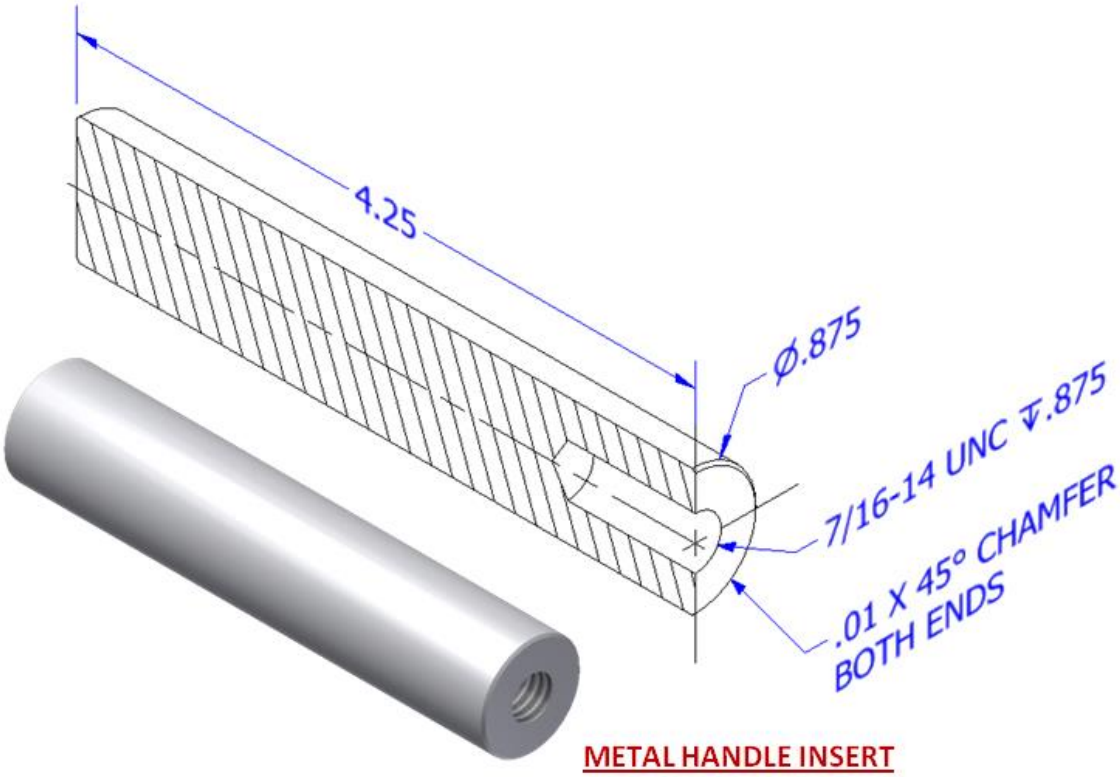
HANDLE SUB-ASSEMBLY

SCALE = 3:8

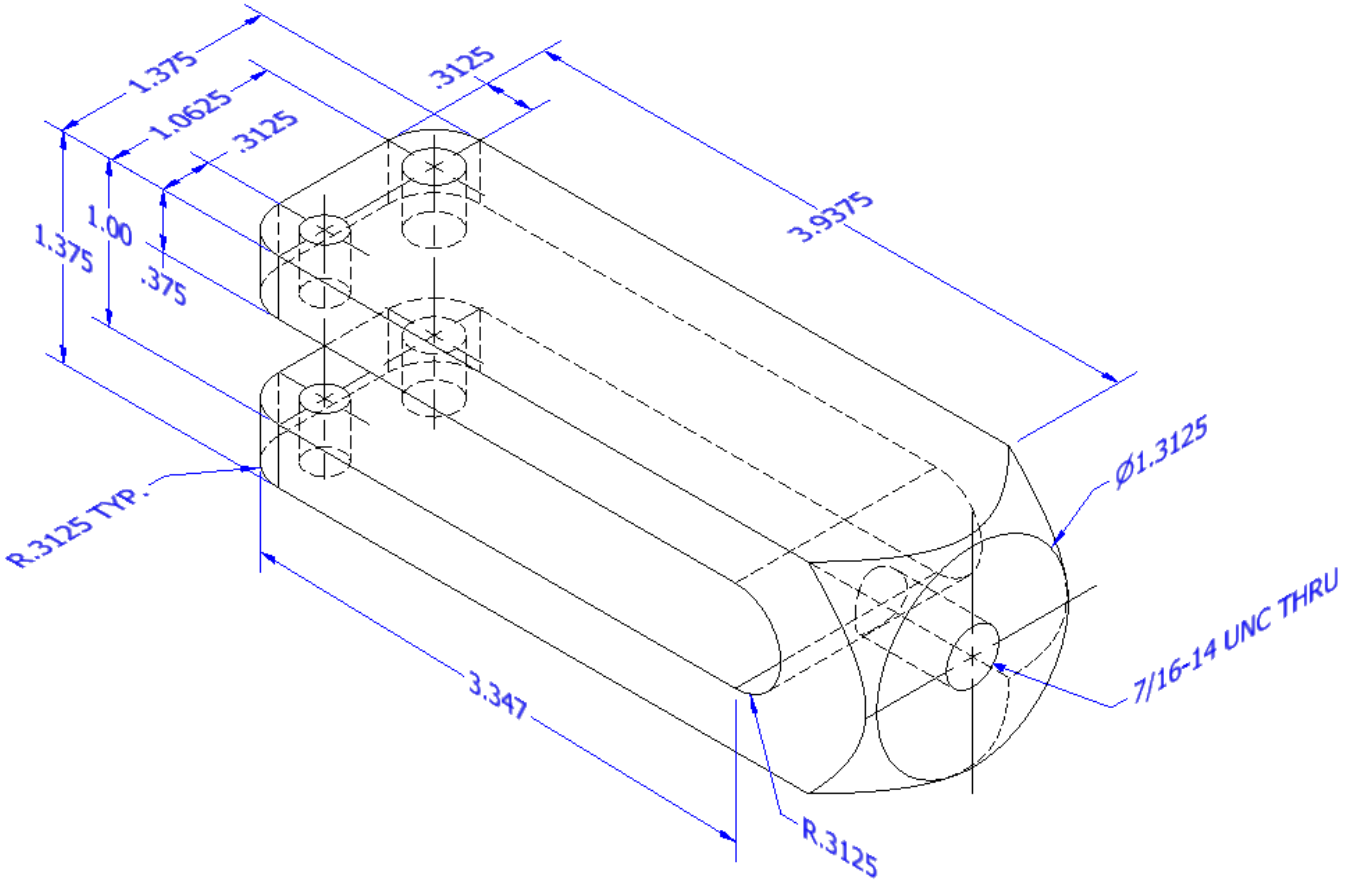
PARTS LIST			
ITEM	QTY	PART NUMBER	MATERIAL
1	1	HANDLE BODY	Aluminum-6061
2	2	ROLLER SPACER	Steel
3	2	ROLLER INNER BEARING	Steel
4	2	ROLLER OUTER BEARING	Steel
5	2	5/16-18 x 9/16 BUTTON CAP SCREW	Steel
6	1	RUBBER HANDLE SLEEVE	Rubber
7	1	METAL HANDLE INSERT	Aluminum-6061
8	1	7/16-14 x 1 3/8 SOCKET SET SCREW	Steel



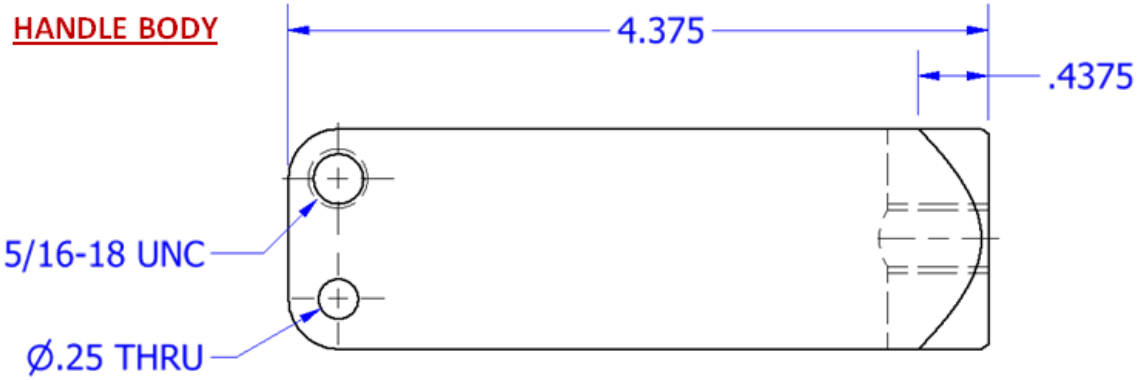
RUBBER HANDLE SLEEVE



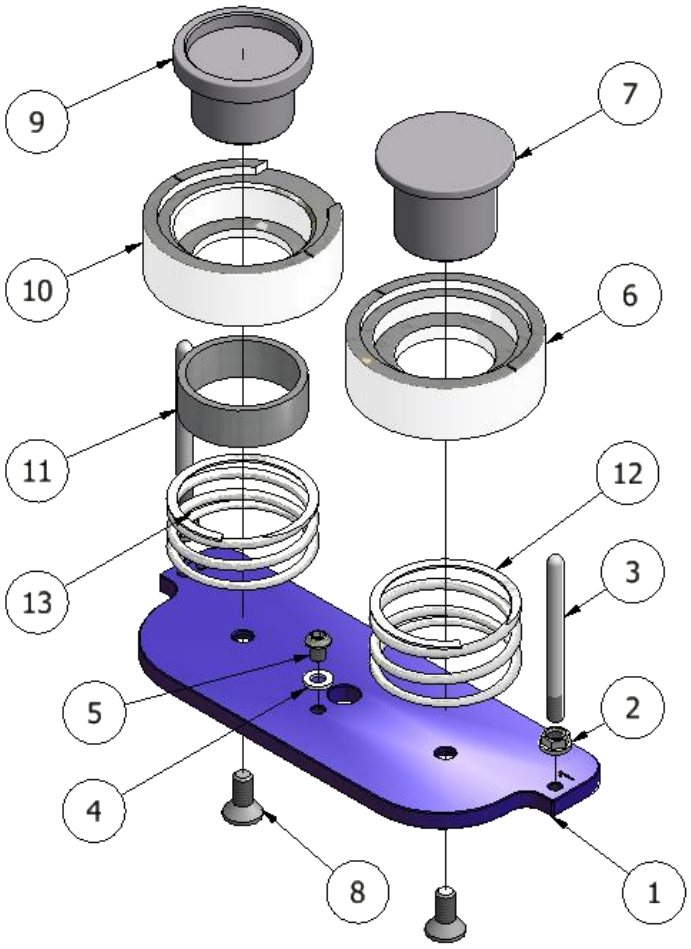
METAL HANDLE INSERT


1.375
1.0625
.3125
.3125
1.375
1.00
.375
3.9375
R.3125 TYP.
Ø1.3125
7/16-14 UNC THRU
3.347
R.3125

HANDLE BODY


4.375
.4375
5/16-18 UNC
Ø.25 THRU

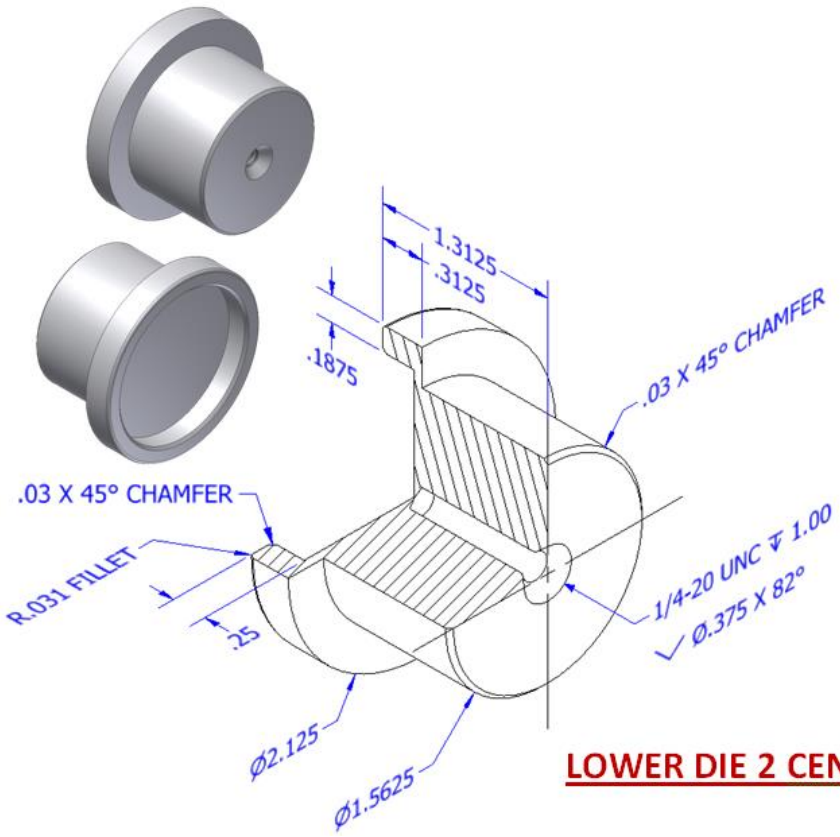
d. Model and assemble the following subassembly using the drawings provided.



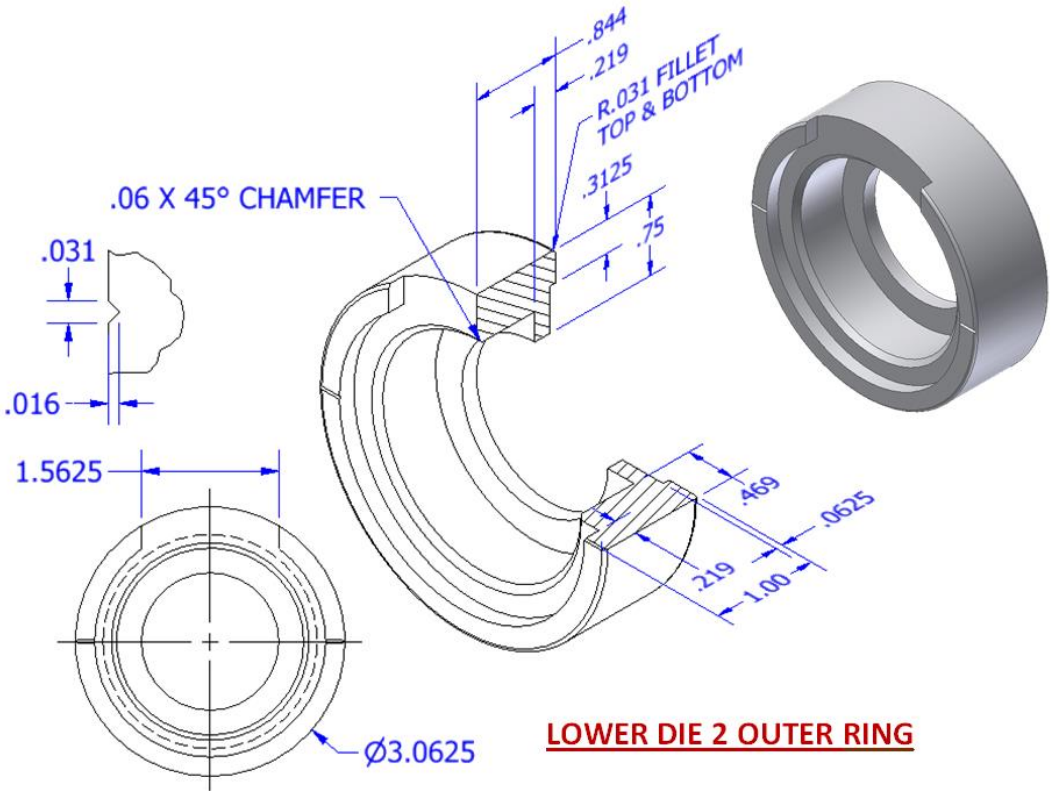
LOWER DIE SUB-ASSEMBLY

SCALE = 3:8

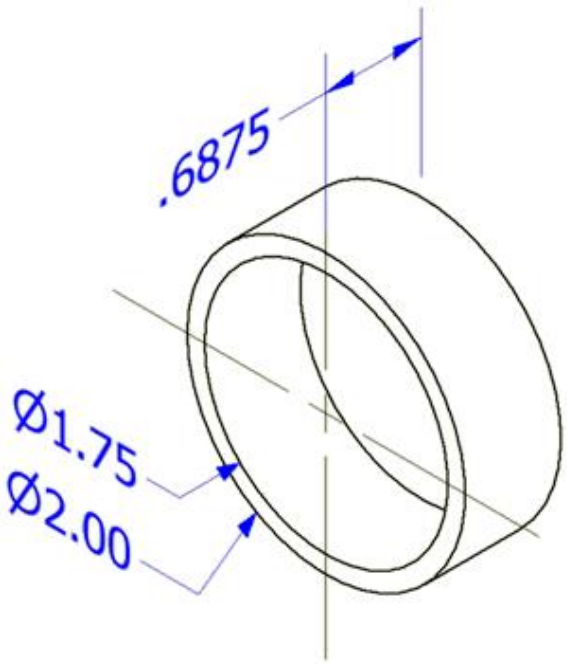
PARTS LIST			
ITEM	QTY	PART NUMBER	MATERIAL
1	1	BOTTOM DIE PLATE	Aluminum-6061
2	2	5/16-18 HEX NUT	Steel
3	2	SEQUENCE LEVER ARM	Stainless Steel
4	1	1/4 WASHER	Stainless Steel
5	1	1/4-20 x 5/16 BUTTON CAP SCREW	Steel
6	1	LOWER DIE 1 OUTER RING	Steel
7	1	LOWER DIE 1 CENTER	Steel
8	2	1/4-20 x 3/4 SOCKET HEAD SCREW	Steel
9	1	LOWER DIE 2 CENTER	Steel
10	1	LOWER DIE 2 OUTER RING	Steel
11	1	LOWER DIE 2 SPACER	Aluminum-6061
12	1	BOTTOM DIE SPRING 1	Spring Steel
13	1	BOTTOM DIE SPRING 2	Spring Steel



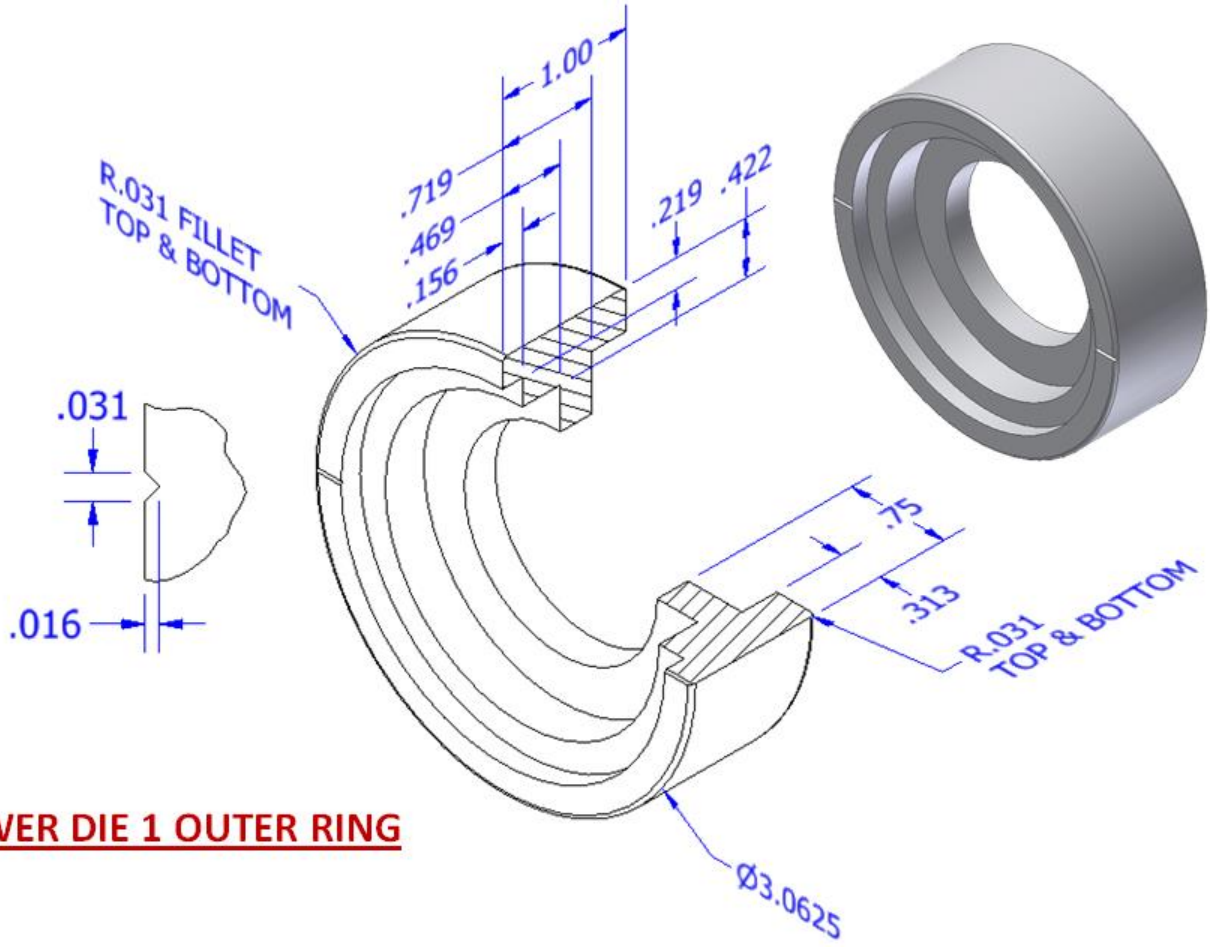
LOWER DIE 2 CENTER



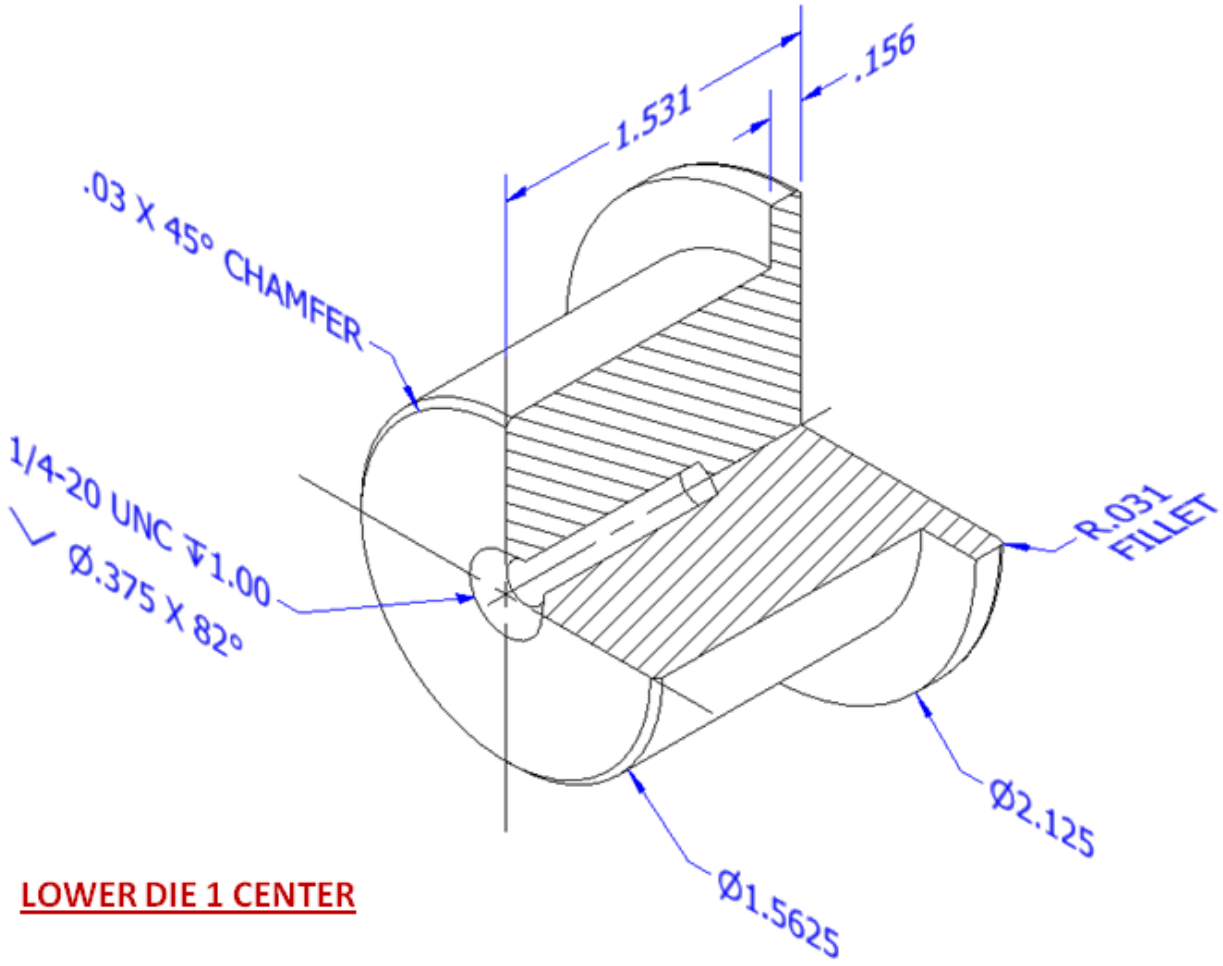
LOWER DIE 2 OUTER RING



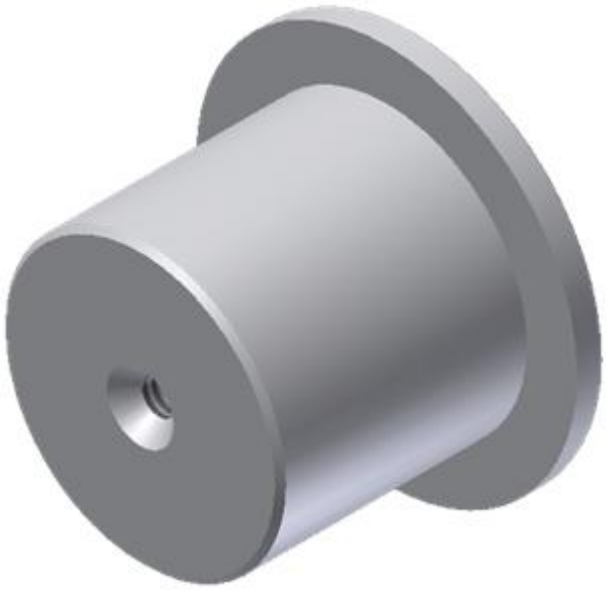
LOWER DIE 2 SPACER

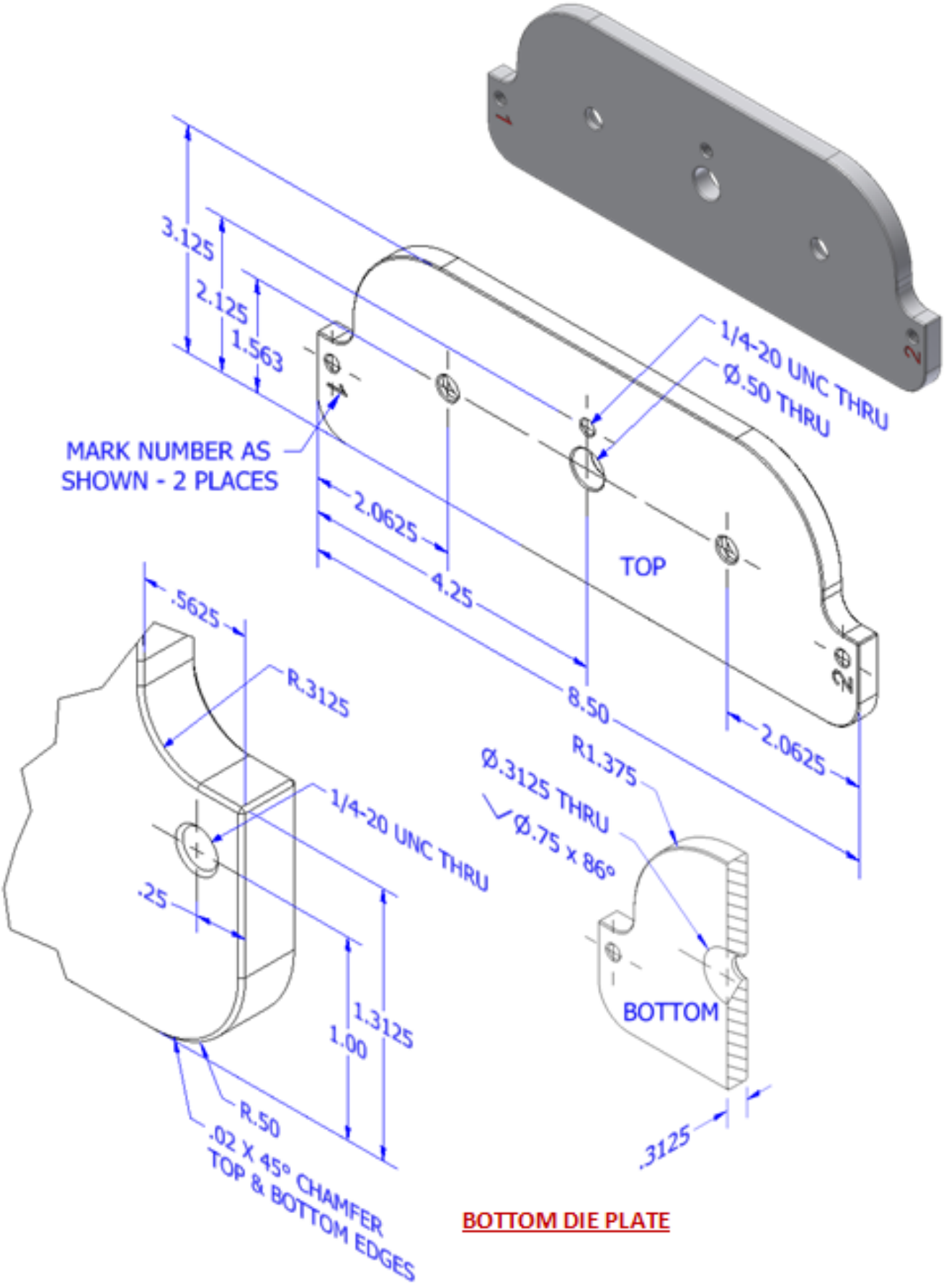


LOWER DIE 1 OUTER RING

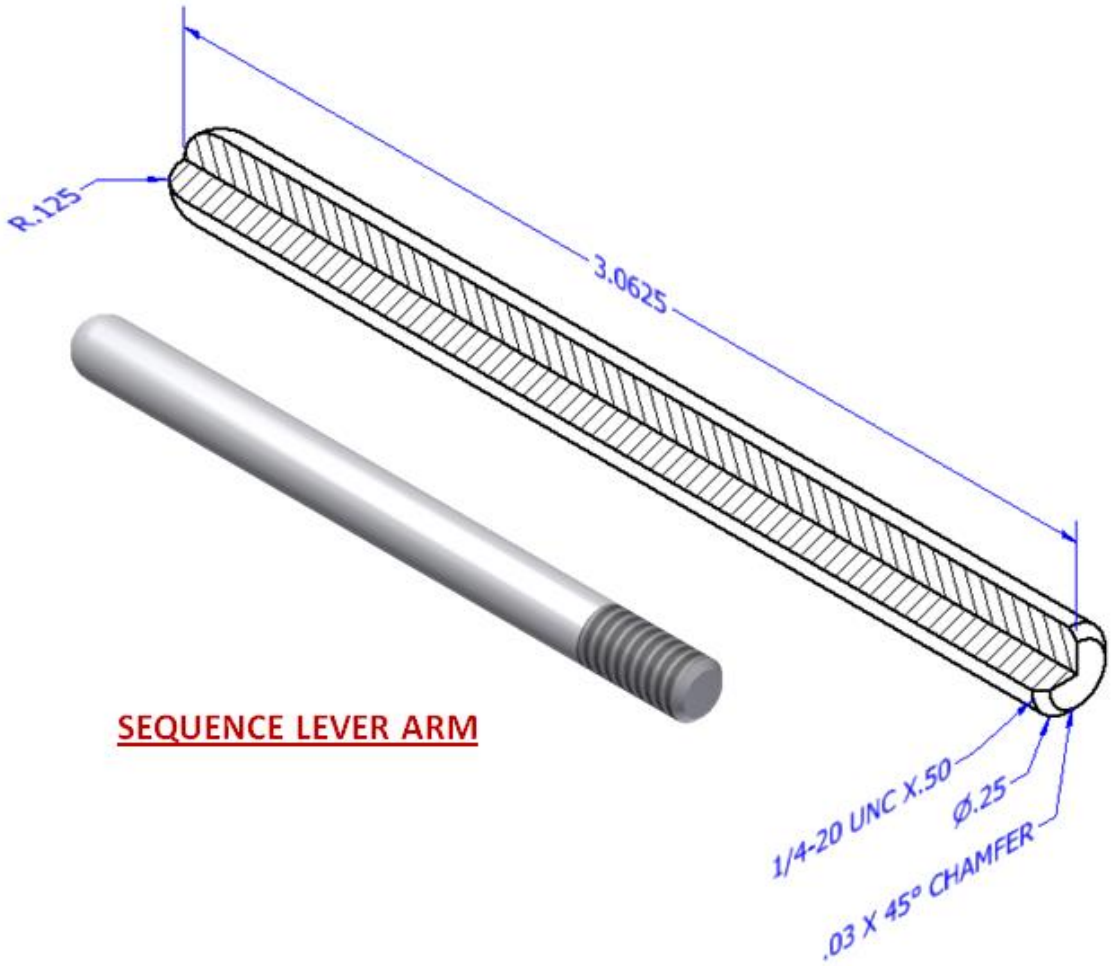


LOWER DIE 1 CENTER

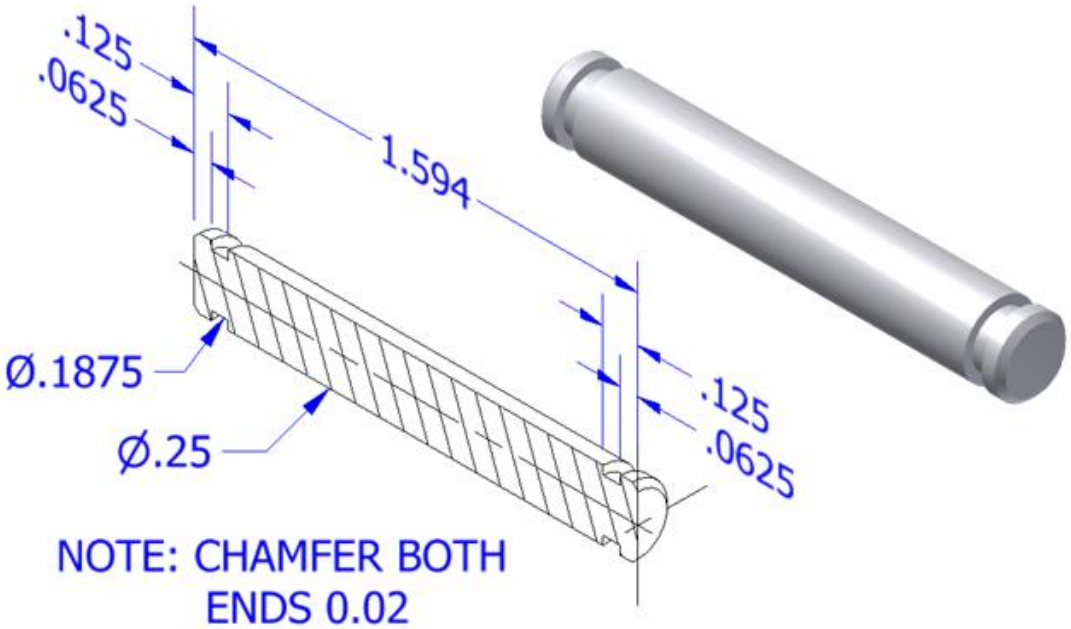




BOTTOM DIE PLATE



SEQUENCE LEVER ARM



HANDLE PIVOT PIN

Conclusion

1. What is an offset and how is it used?

2. What is the difference between a mate and flush constraint?

3. What is a subassembly?

4. What advantages does CAD have over technical sketching?

5. What advantage is there to using algebraic equations instead of numerical values when defining the dimensions of a CAD model?

6. What three types of constraints can be applied to CAD sketches or models?