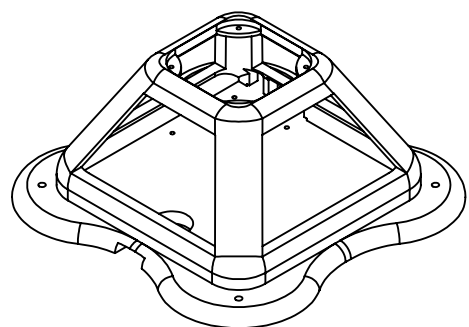


B

B



Scale: 1:5

R25 x 4
 $\phi 3$ x 4
R20.78 x 4

31.50

7.50

49

185

92.50

7.50

185

205

40

31.50

12.50

 $\phi 28$

R30 x 4

 $\phi 7.50$

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN MILLIMETERS

TOLERANCES: ± 3.0 INTERPRET GEOMETRIC
TOLERANCING PER:

MATERIAL

PLA

FINISH

N/A

DO NOT SCALE DRAWING

NAME

Ryan W.

DATE

4/22/2020

DRAWN

CHECKED

ENG APPR.

MFG APPR.

Q.A.

COMMENTS:

TITLE:

Manipulator Base

SIZE

A

REV

1.0

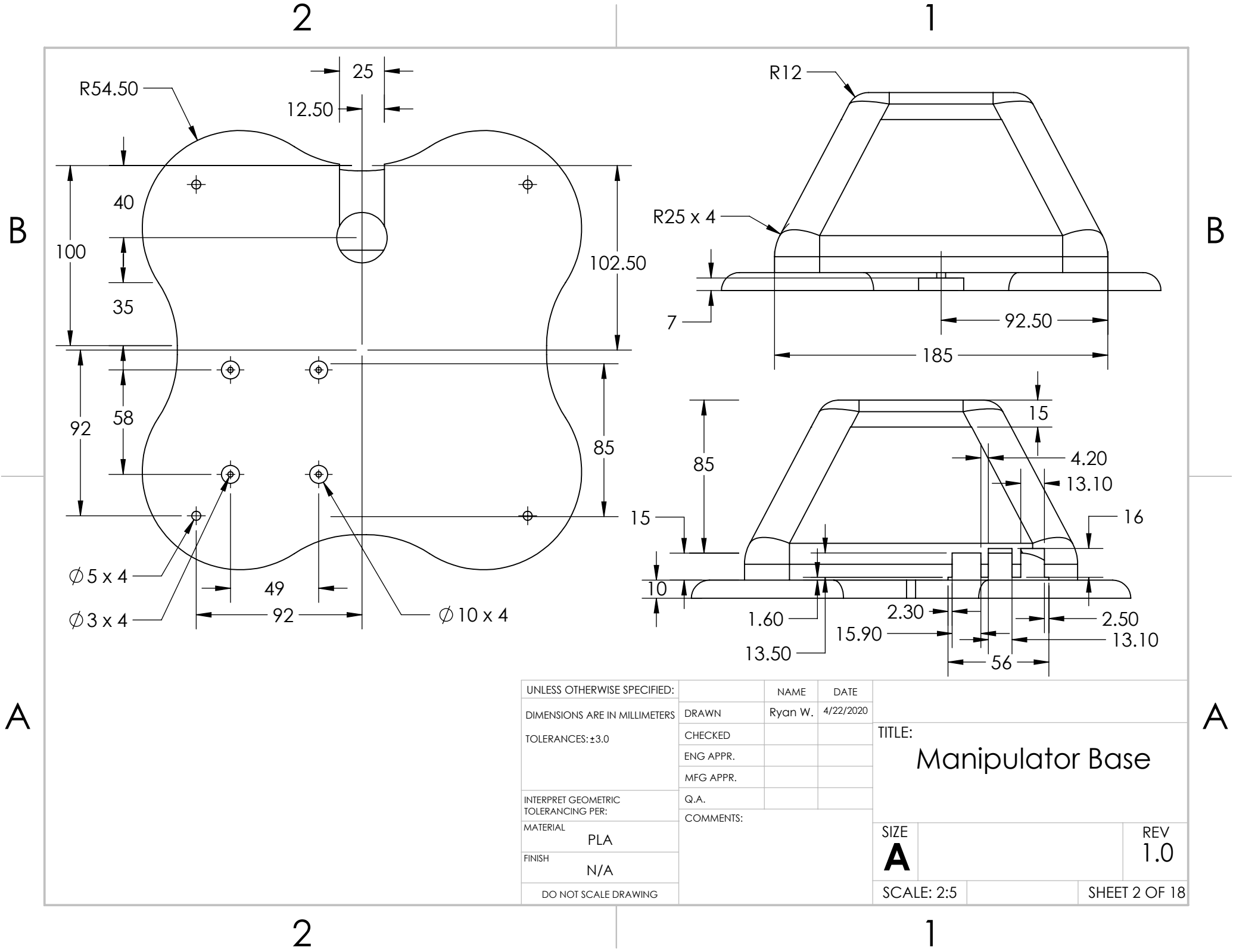
SCALE: 2:5

SHEET 1 OF 18

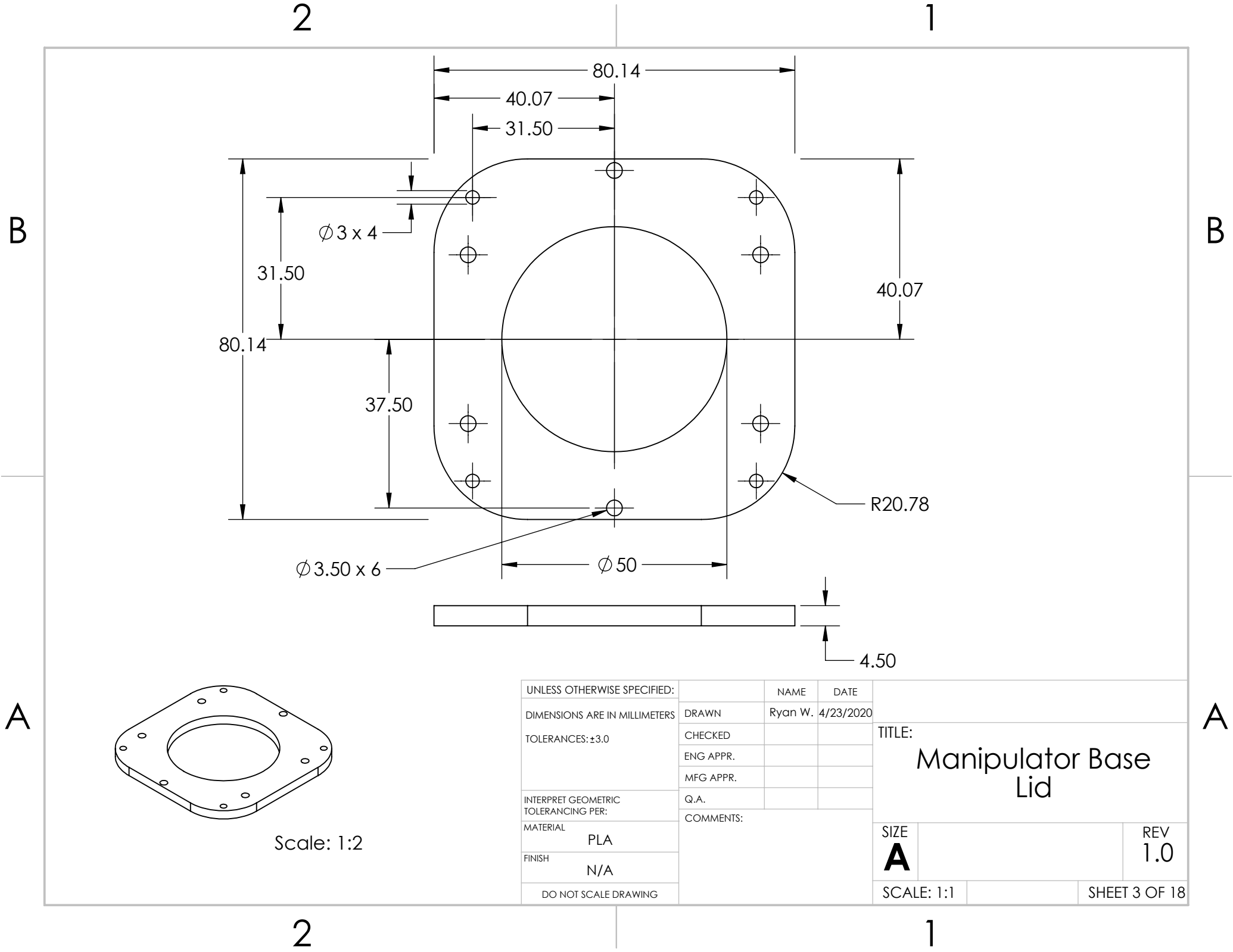
2

1

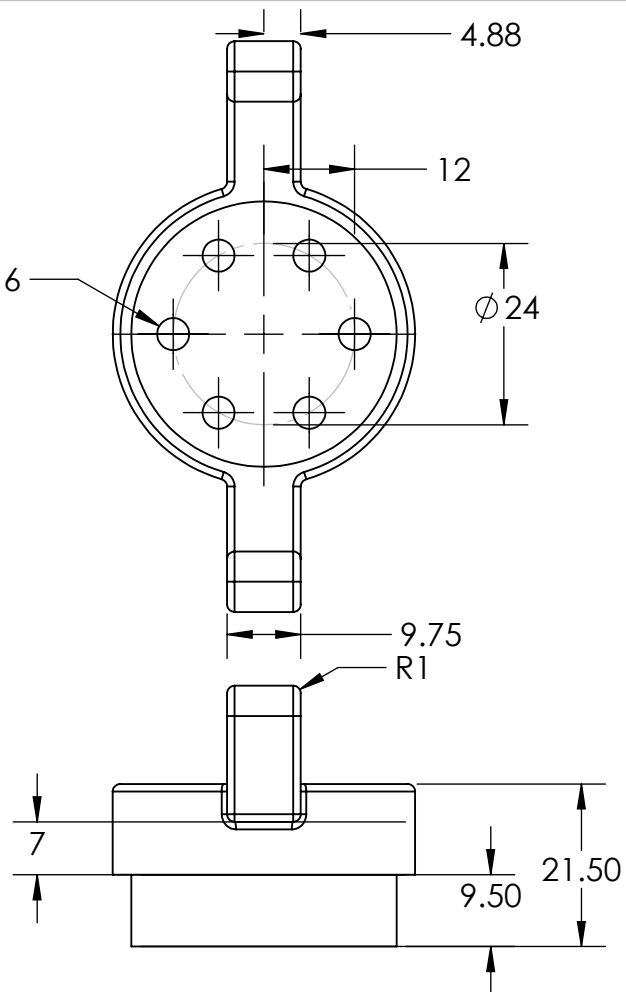
A



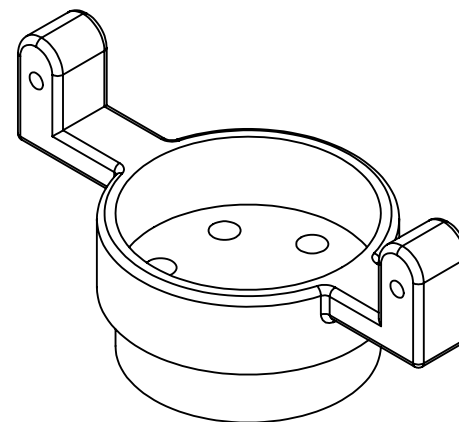
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Manipulator Base		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/22/2020			
TOLERANCES: ±3.0	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL	COMMENTS:					
FINISH						
DO NOT SCALE DRAWING				SCALE: 2:5		SHEET 2 OF 18



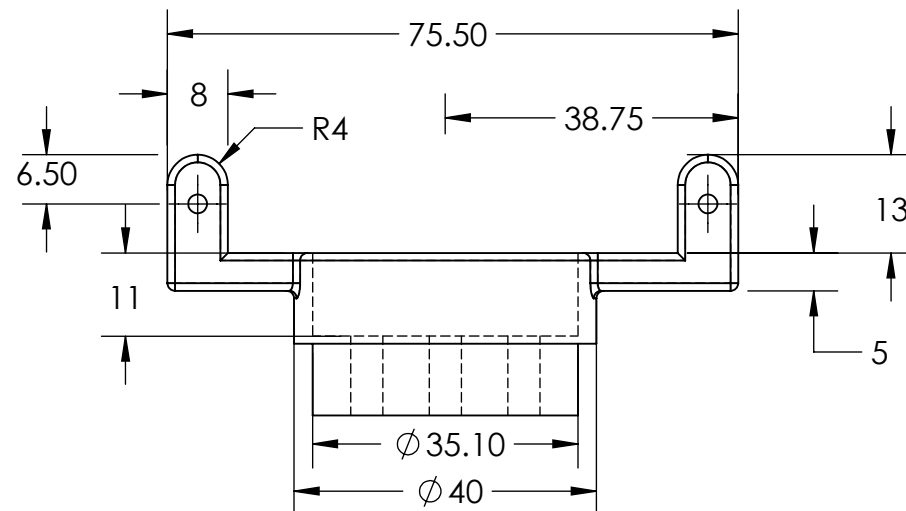
B



1



B



A

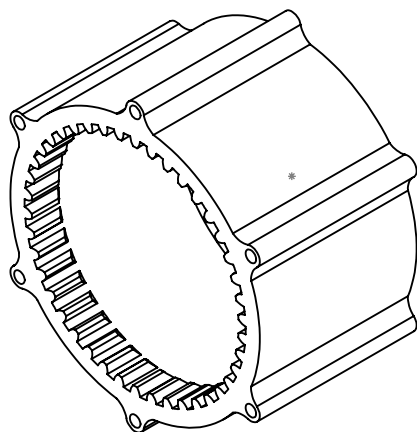
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: <div>Harmonic Gearbox U-Bar</div>			
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020				
TOLERANCES: ±3.0	CHECKED						
	ENG APPR.						
	MFG APPR.						
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE <div>A</div>			
MATERIAL	COMMENTS:						
FINISH							
DO NOT SCALE DRAWING					SCALE: 1:1		SHEET 4 OF 18

A

2

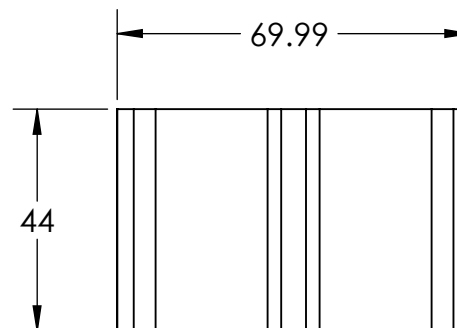
1

B

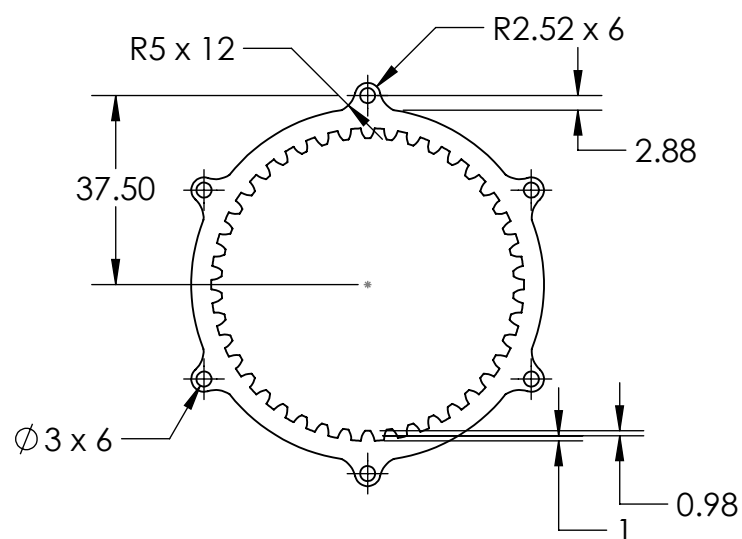


2

1



B



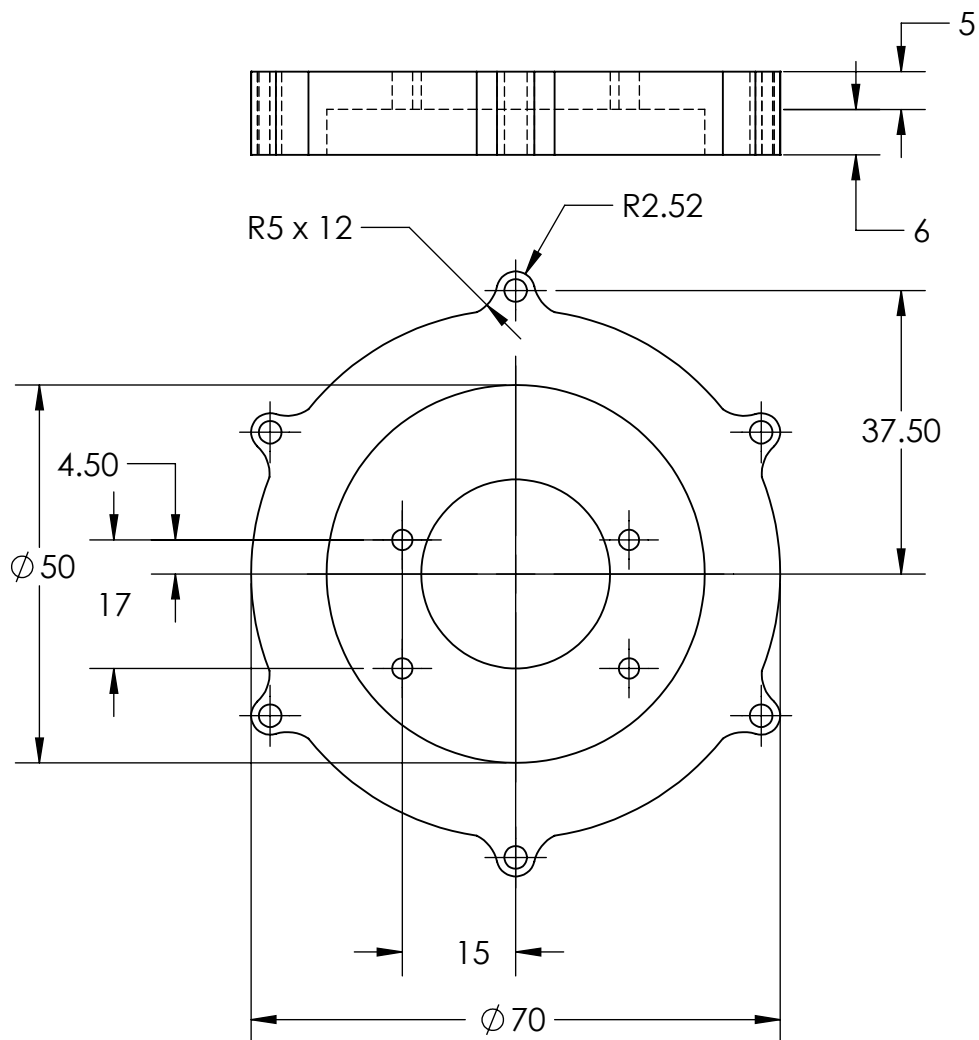
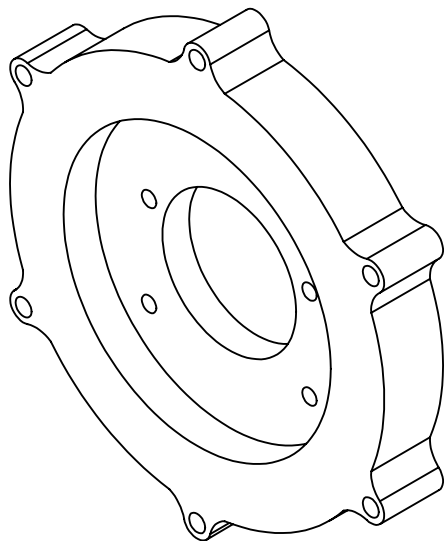
A

UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: 1:20 Harmonic Housing		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±3.0	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL PLA	COMMENTS:					
FINISH N/A						
DO NOT SCALE DRAWING				SCALE: 2:3		SHEET 5 OF 18

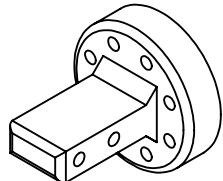
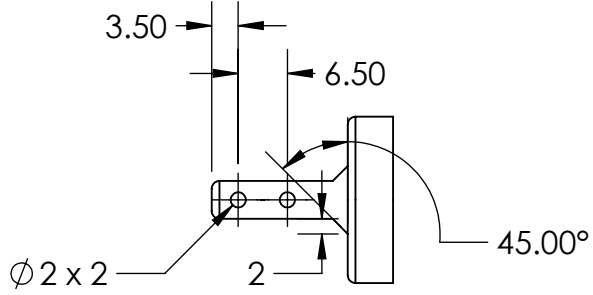
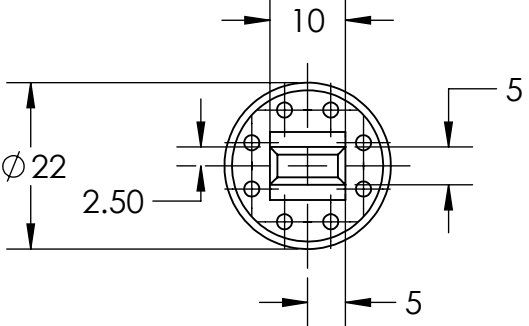
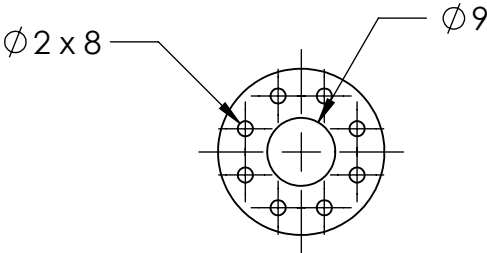
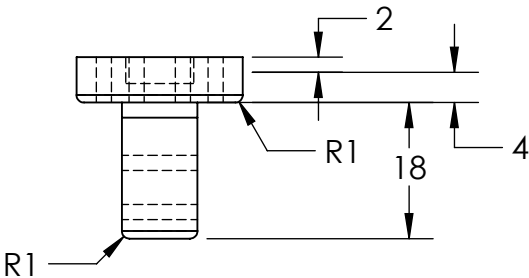
A

2

1



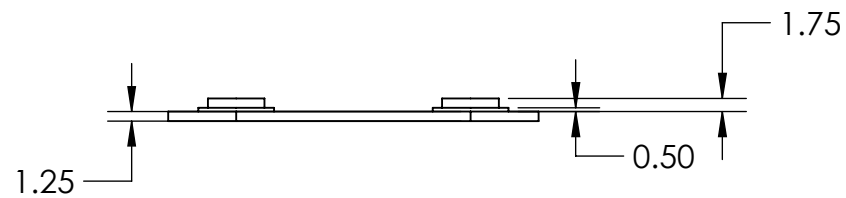
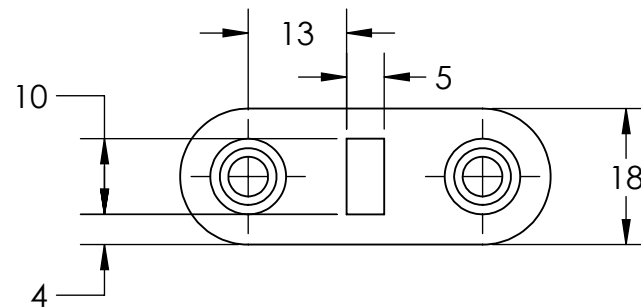
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: 1:20 Harmonic Gearbox Servo Mount		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±3.0	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL PLA	COMMENTS:					
FINISH N/A						
DO NOT SCALE DRAWING				SCALE: 1:1		SHEET 6 OF 18



UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Harmonic Servo-Head		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±0.15	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL	COMMENTS:					
Tough Resin						
FINISH				REV 1.0		
N/A						
DO NOT SCALE DRAWING				SCALE: 1:1		SHEET 7 OF 18

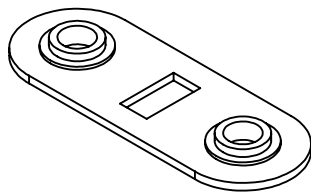
B

B



A

A

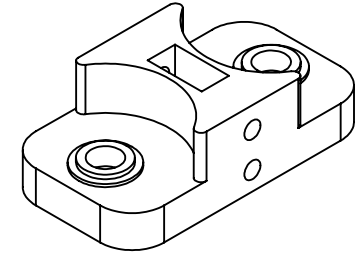
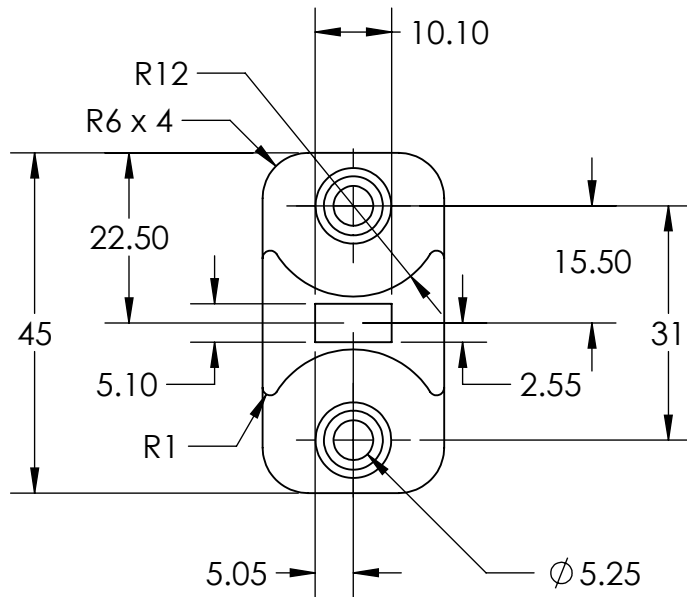


UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Harmonic Inner Bearing Holder (a)		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±0.15	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL Tough Resin	COMMENTS:					
FINISH N/A						
DO NOT SCALE DRAWING				SCALE: 1:1		SHEET 8 OF 18

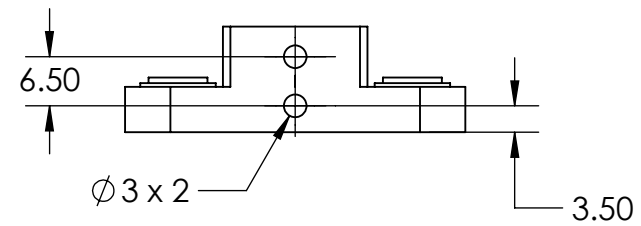
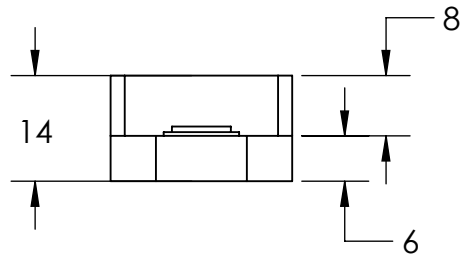
2

1

B



B



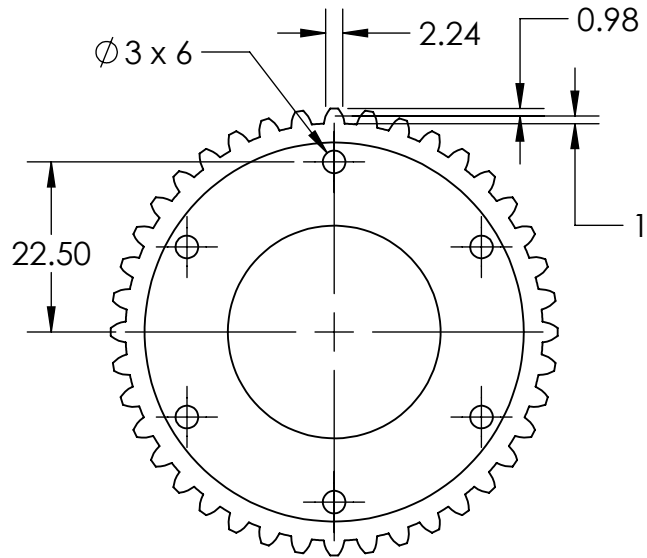
A

UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Harmonic Inner Bearing Holder (b)		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±0.15	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL Tough Resin	COMMENTS:					
FINISH N/A						
DO NOT SCALE DRAWING				SCALE: 1:1		SHEET 9 OF 18

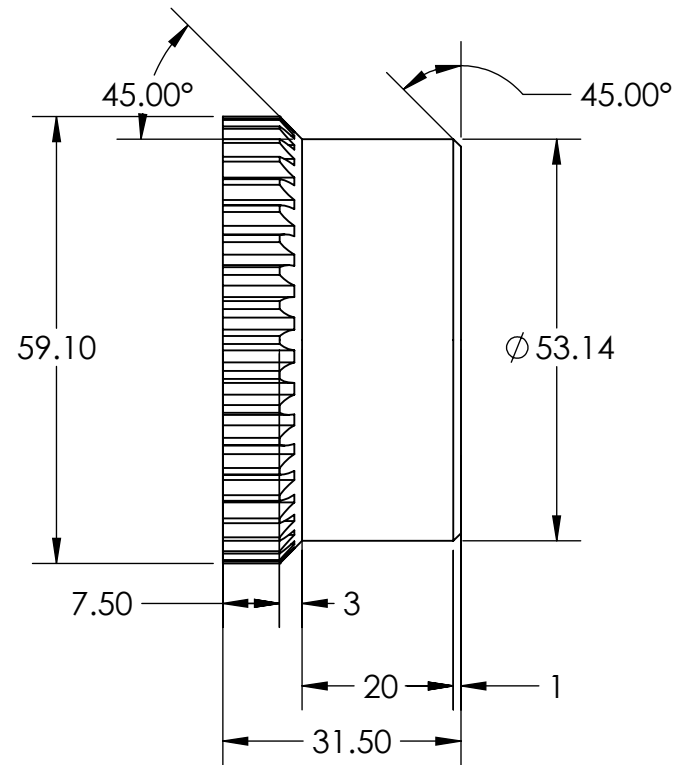
2

1

B

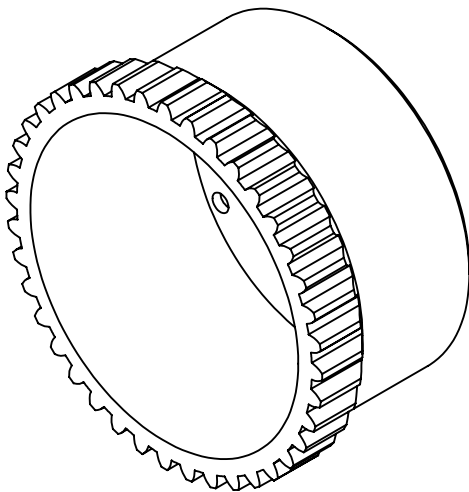


1



B

A

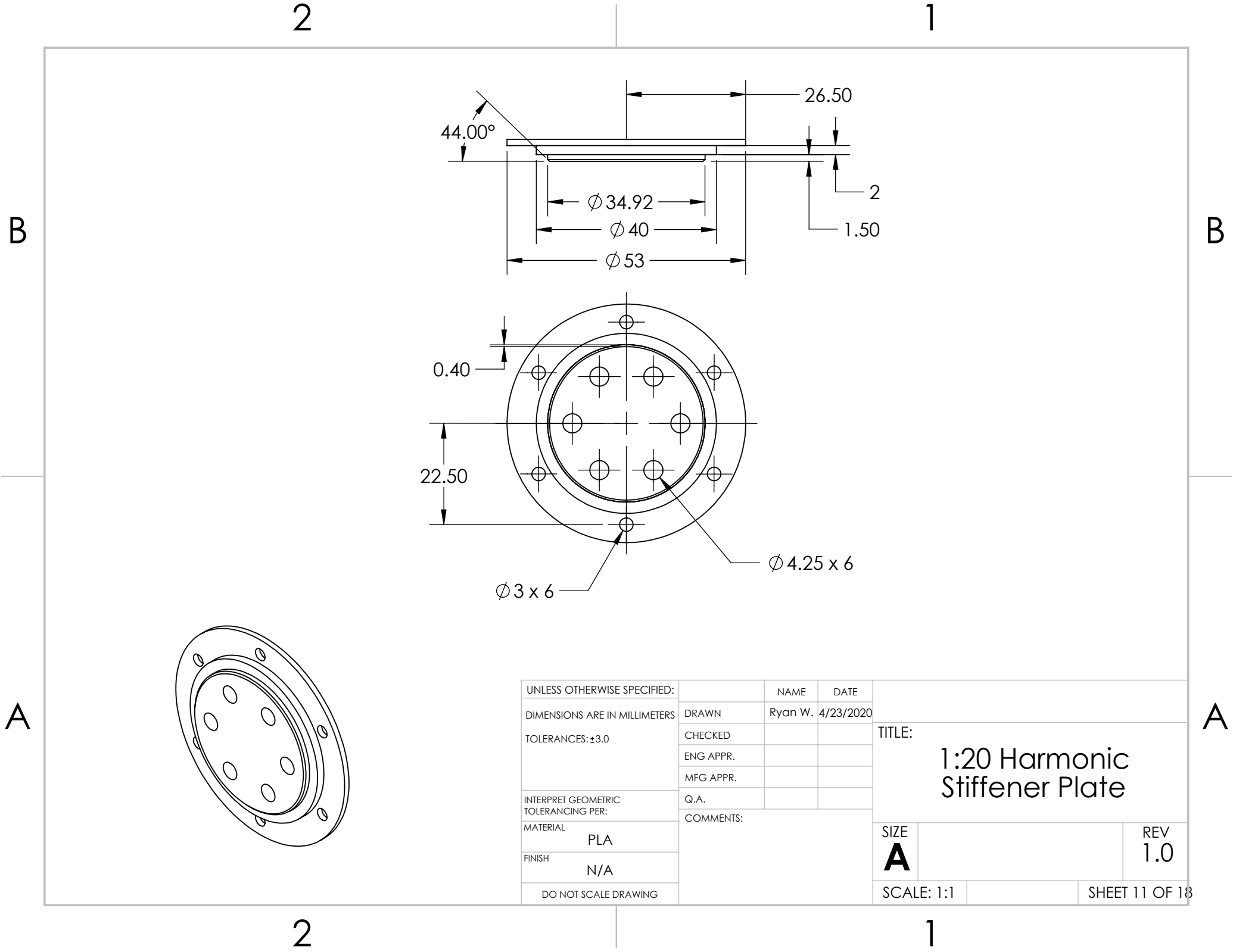


2

UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Flexgear				
DIMENSIONS ARE IN MILLIMETERS		DRAWN	Ryan W.					3/23/2020
TOLERANCES: ±3.0		CHECKED						
		ENG APPR.						
		MFG APPR.						
INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.			REV 1.0			
MATERIAL		COMMENTS:						
TPU								
FINISH					SCALE: 1:1		SHEET 10 OF 13	
DO NOT SCALE DRAWING								

1

A



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN MILLIMETERS

TOLERANCES: ± 3.0

INTERPRET GEOMETRIC
TOLERANCING PER:

MATERIAL

PLA

FINISH

N/A

DO NOT SCALE DRAWING

NAME

Ryan W. 4/23/2020

DATE

DRAWN

CHECKED

ENG APPR.

MFG APPR.

Q.A.

COMMENTS:

TITLE:

1:20 Harmonic
Stiffener Plate

SIZE

A

REV

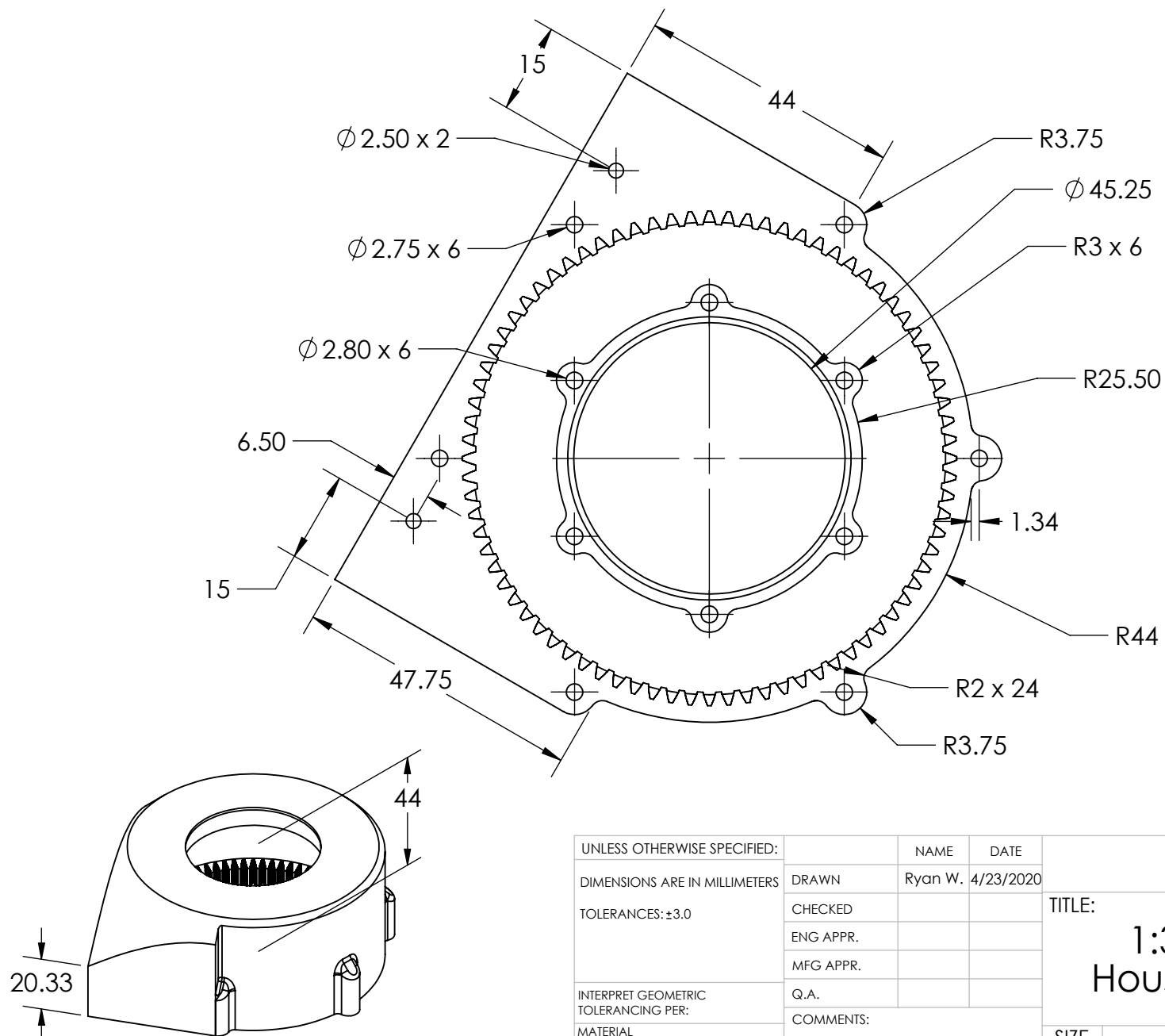
1.0

SCALE: 1:1

SHEET 11 OF 18

B

B



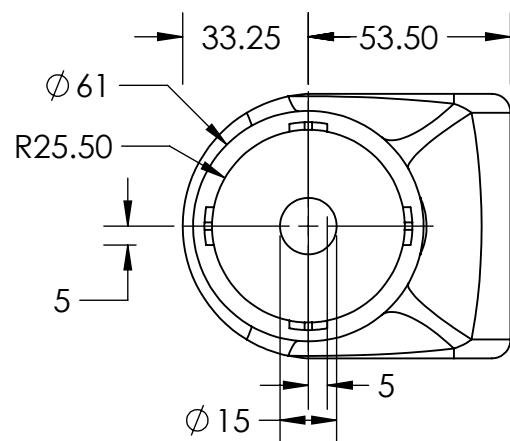
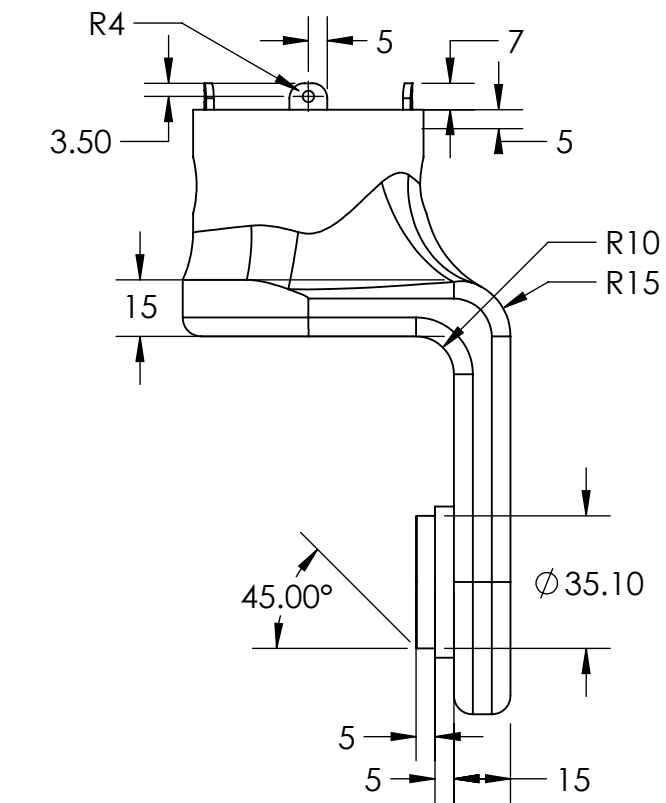
A

UNLESS OTHERWISE SPECIFIED:		NAME		DATE		TITLE: 1:39 Harmonic Housing - Shoulder					
DIMENSIONS ARE IN MILLIMETERS		DRAWN		Ryan W.						4/23/2020	
TOLERANCES: ±3.0		CHECKED									
		ENG APPR.									
		MFG APPR.									
INTERPRET GEOMETRIC TOLERANCING PER:		Q.A.						SIZE A			
MATERIAL		COMMENTS:									
FINISH											
DO NOT SCALE DRAWING						SCALE: 1:1		SHEET 12 OF 13			

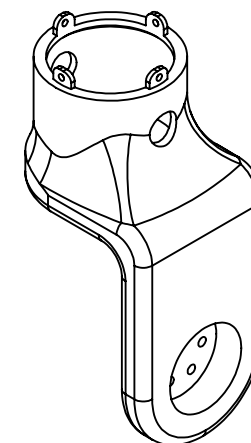
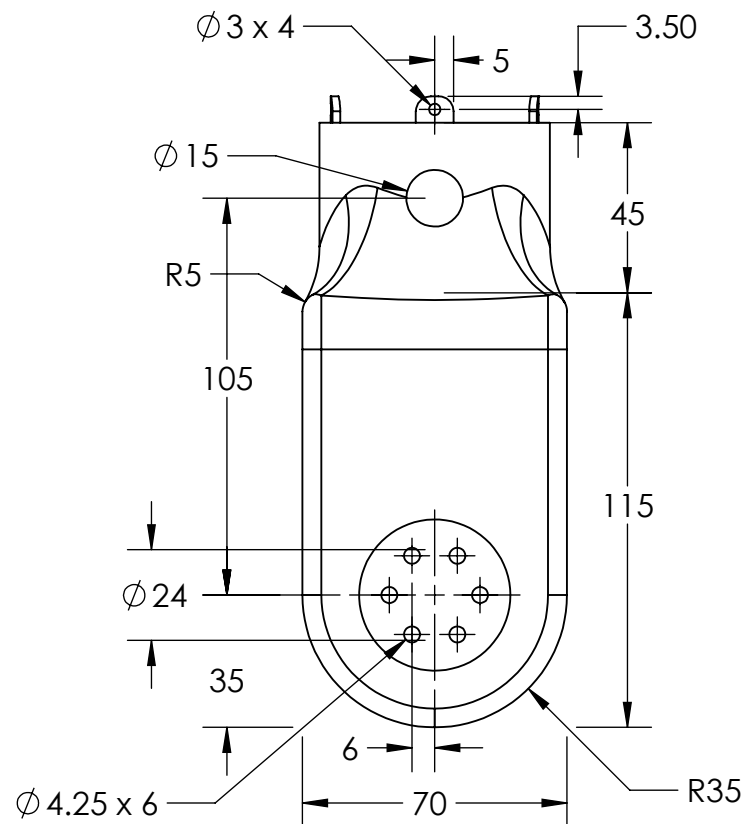
2

1

B



1



Scale 1:3

B

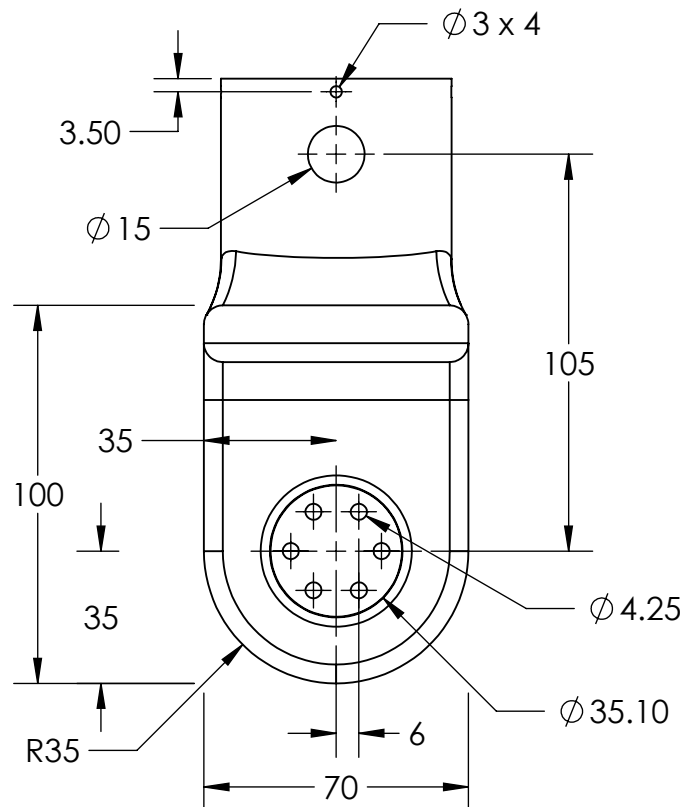
A

UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Link 1 (a)		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±3.0	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		REV 1.0
MATERIAL	COMMENTS:					
PLA						
FINISH						
N/A				SCALE: 1:2		SHEET 13 OF 18
DO NOT SCALE DRAWING						

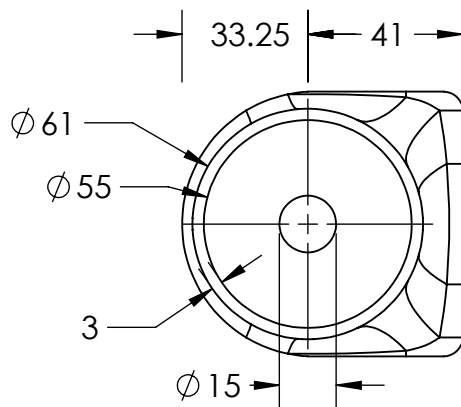
2

1

B

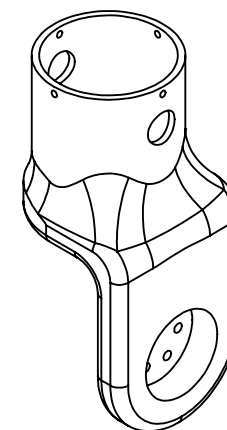
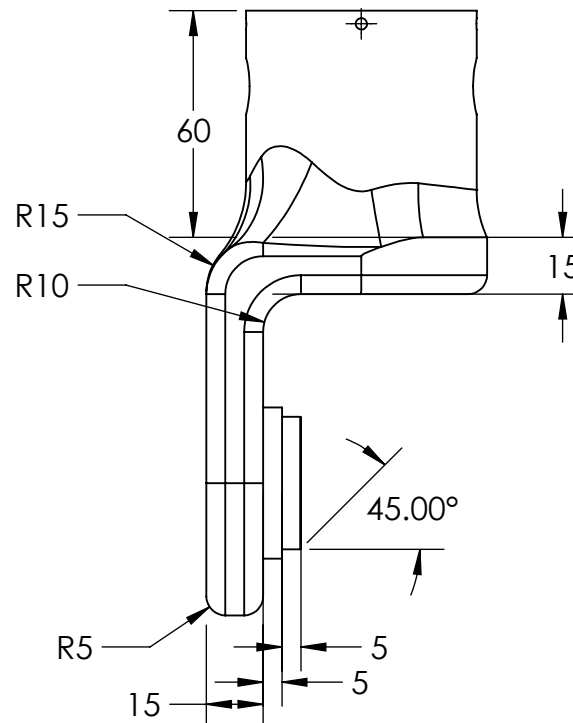


A



2

1



Scale: 1:3

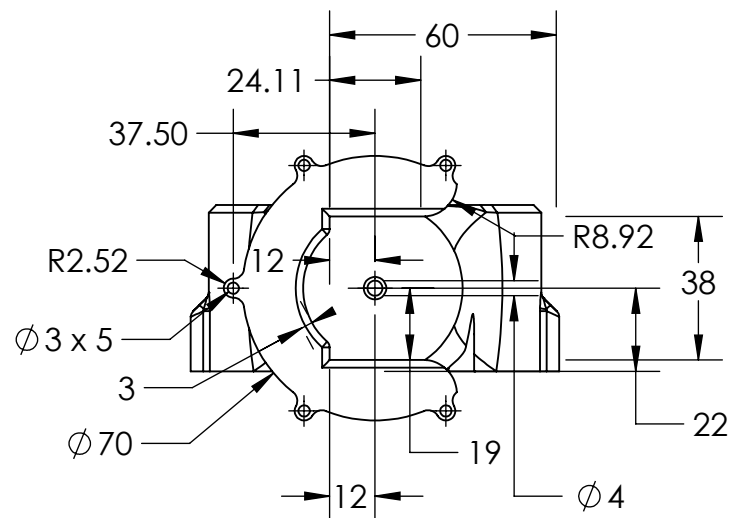
B

A

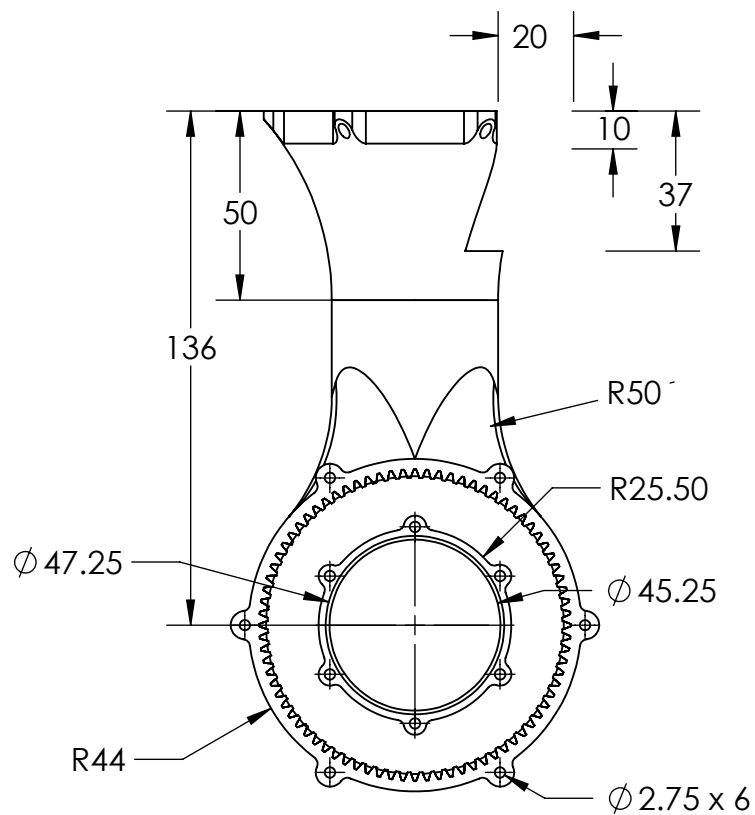
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Link 1 (b)		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±3.0	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL	COMMENTS:					
FINISH						
DO NOT SCALE DRAWING				SCALE: 1:2		SHEET 14 OF 18

1

B

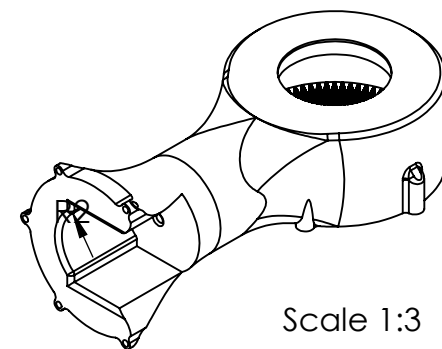
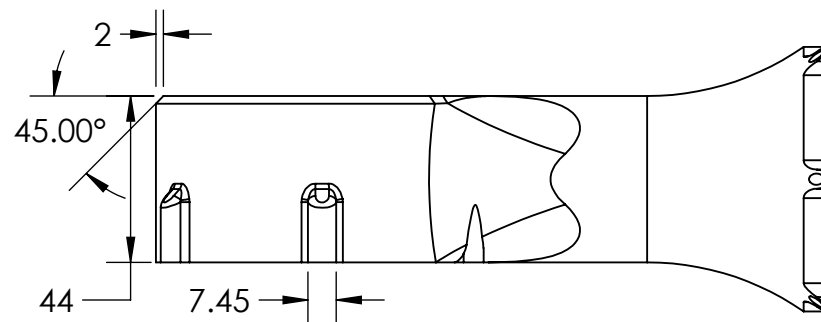


A



2

1



B

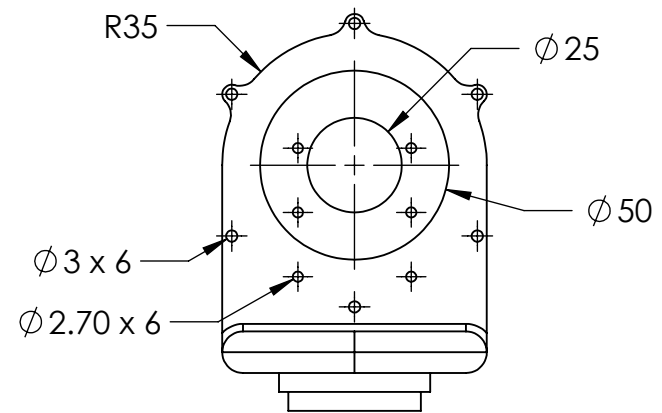
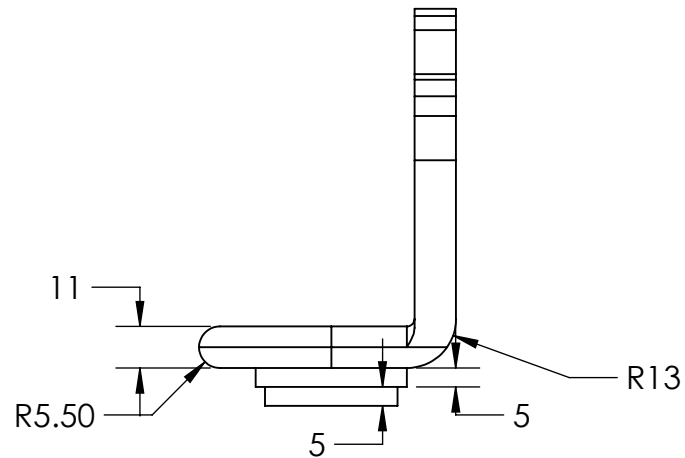
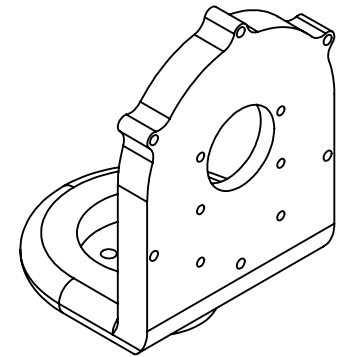
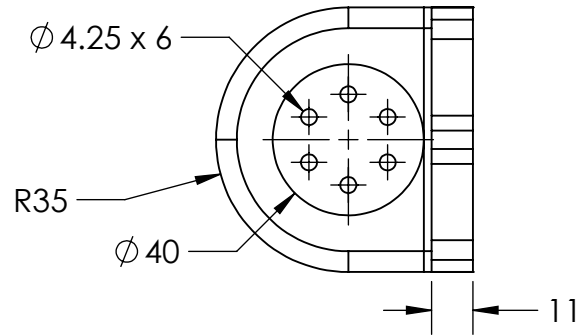
A

UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Link 2		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±3.0	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL	COMMENTS:					
FINISH						
DO NOT SCALE DRAWING		SCALE: 1:2			REV 1.0	SHEET 15 OF 18

1

B

B



A

UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Wrist (a)		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±3.0	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL PLA	COMMENTS:					
FINISH N/A						
DO NOT SCALE DRAWING				SCALE: 1:2		SHEET 16 OF 18

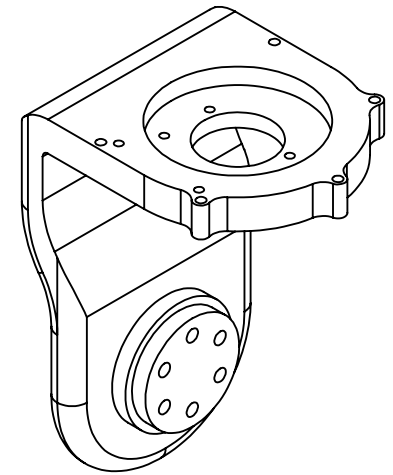
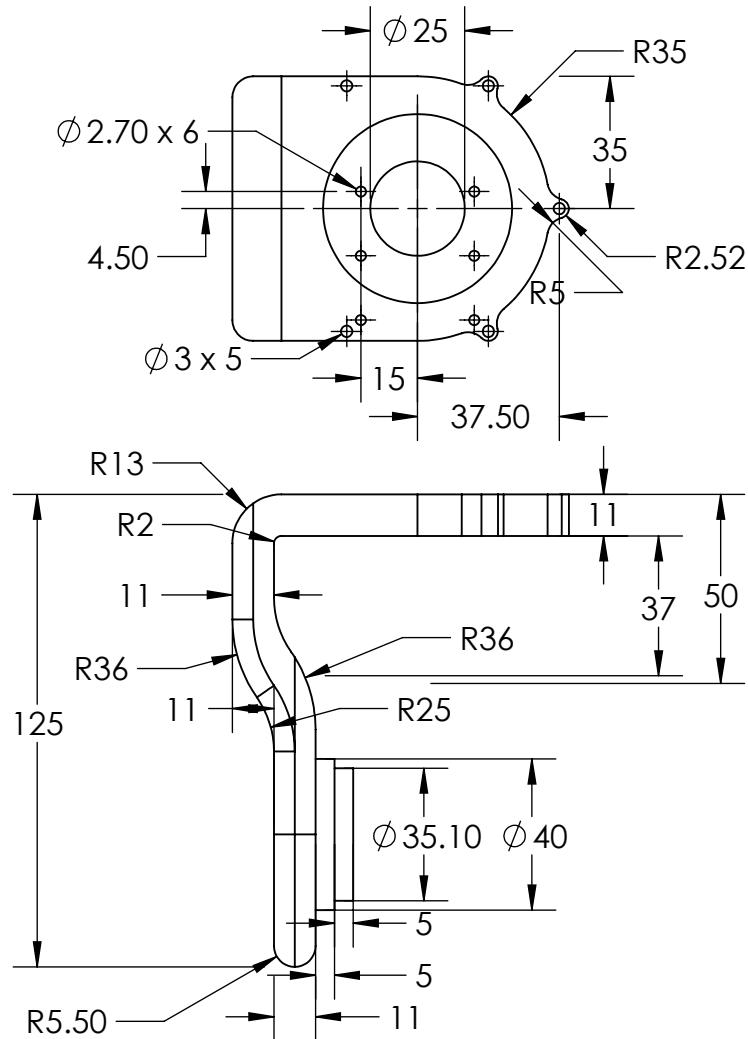
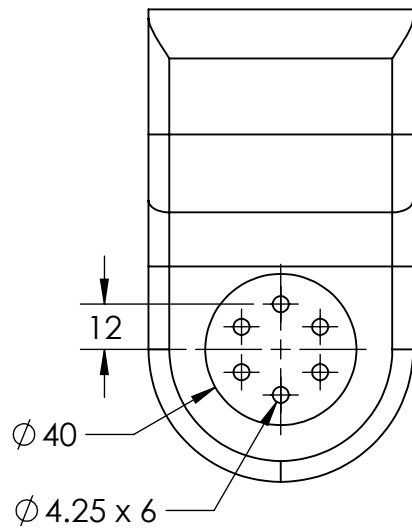
A

2

1

B

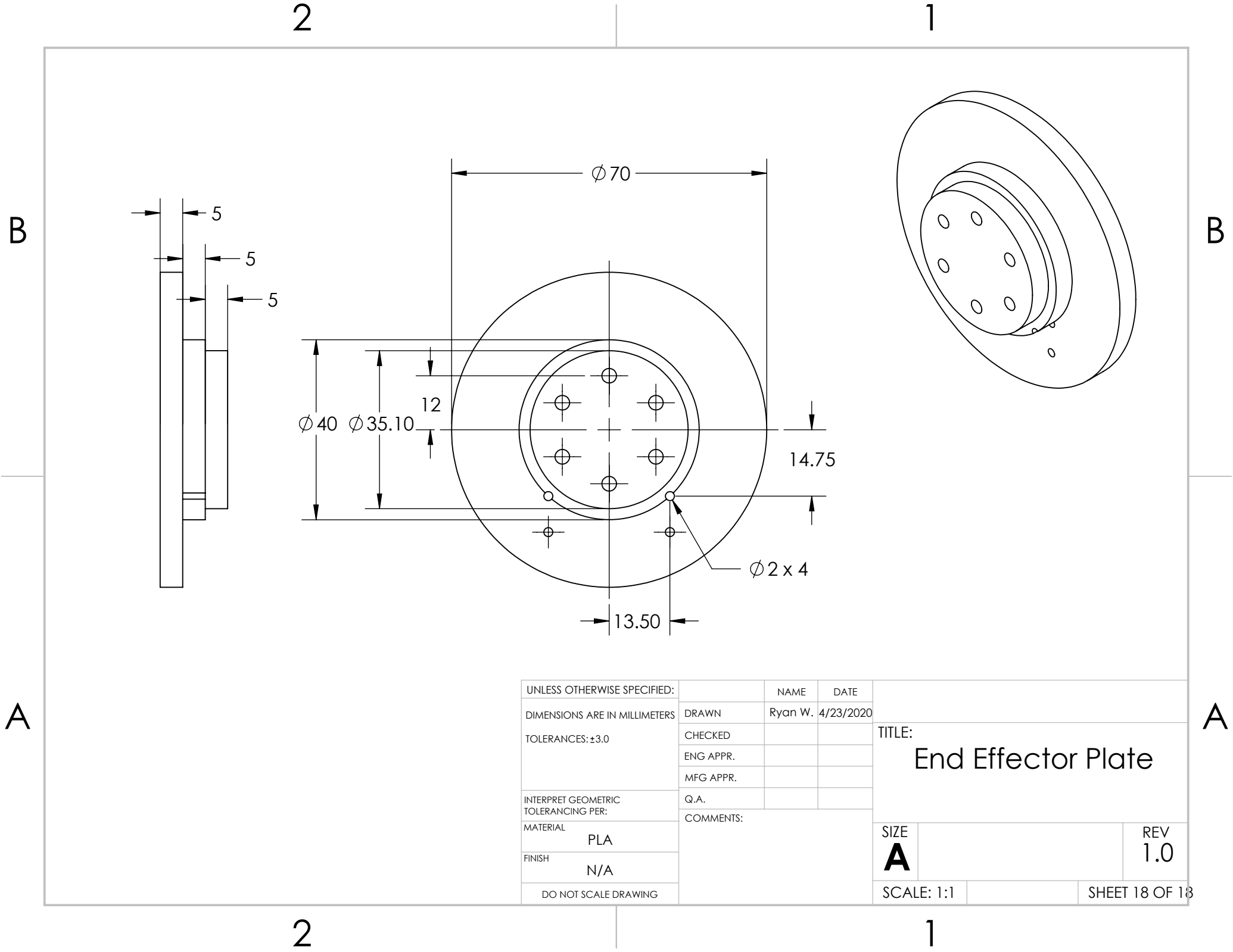
A



UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: Wrist (b)		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±3.0	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL	COMMENTS:					
FINISH						
DO NOT SCALE DRAWING				SCALE: 1:2		SHEET 17 OF 18

B

A



UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE: End Effector Plate		
DIMENSIONS ARE IN MILLIMETERS	DRAWN	Ryan W.	4/23/2020			
TOLERANCES: ±3.0	CHECKED					
	ENG APPR.					
	MFG APPR.					
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A		
MATERIAL PLA	COMMENTS:					
FINISH N/A						
DO NOT SCALE DRAWING				SCALE: 1:1		SHEET 18 OF 18