UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

DO NOT SCALE

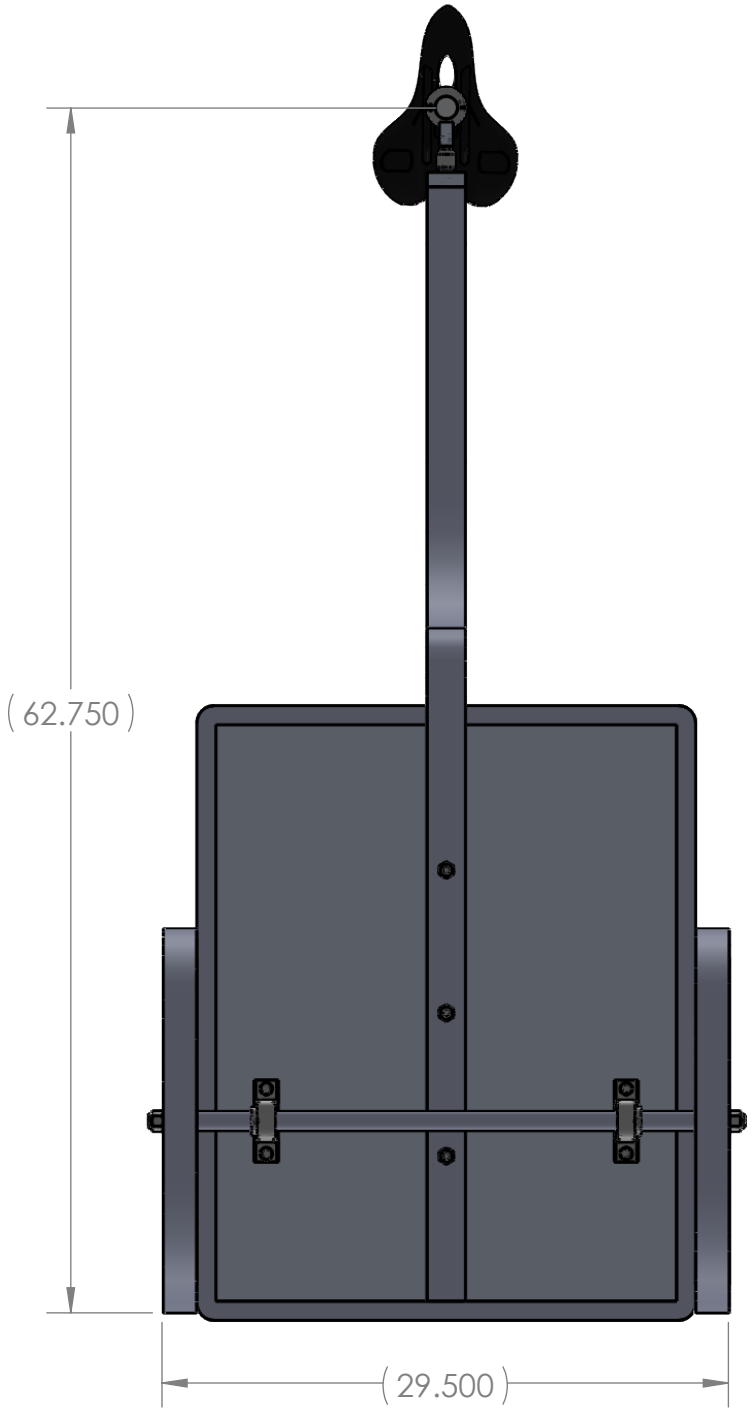
SHEET 1 OF 3

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE:
BIKE CART ASSEMBLY

SIZE:	DATE:	DRAWN BY:
A	11/24/2019	MATTHEW CONSTABLE

MATERIAL:	PART #:	REV:
VARIOUS	A-160G20-001	0



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

DO NOT SCALE

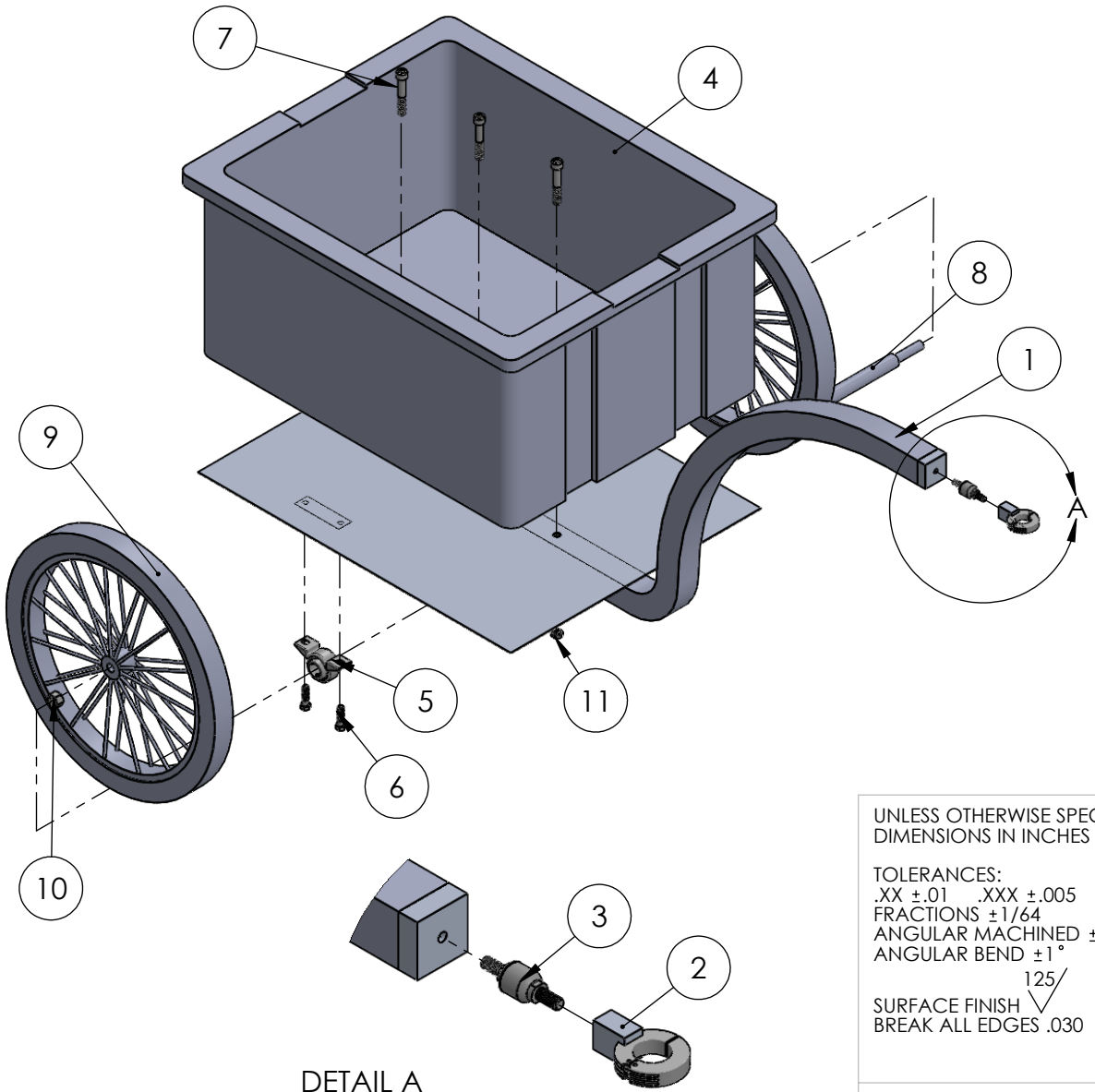
SHEET 2 OF 3

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE:
BIKE CART UNDERCARRIAGE

SIZE:	DATE:	DRAWN BY:
A	11/24/2019	MATTHEW CONSTABLE

MATERIAL:	PART #:	REV:
VARIOUS	A-160G20-001	0



DETAIL A
SCALE 1 : 5

Item No.	Part Number	Description	Quantity
1	SA-160G20-002	Cart Subassembly	1
2	SA-160G20-001	Seat Attachment Subassembly	1
3	P-160G20-003	Ball and Socket Joint	1
4	M-160G20-009	Container	1
5	P-160G20-006	Ball Bearings	2
6	P-160G20-004	Bearing Bolt	4
7	P-160G20-001	Plate Screws	3
8	M-160G20-005	Axle	1
9	P-160G20-007	Bike Wheel	2
10	P-160G20-002	Axle Locknut	2
11	P-160G20-005	Plate Locknut	3

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

DO NOT SCALE

SHEET 3 OF 3

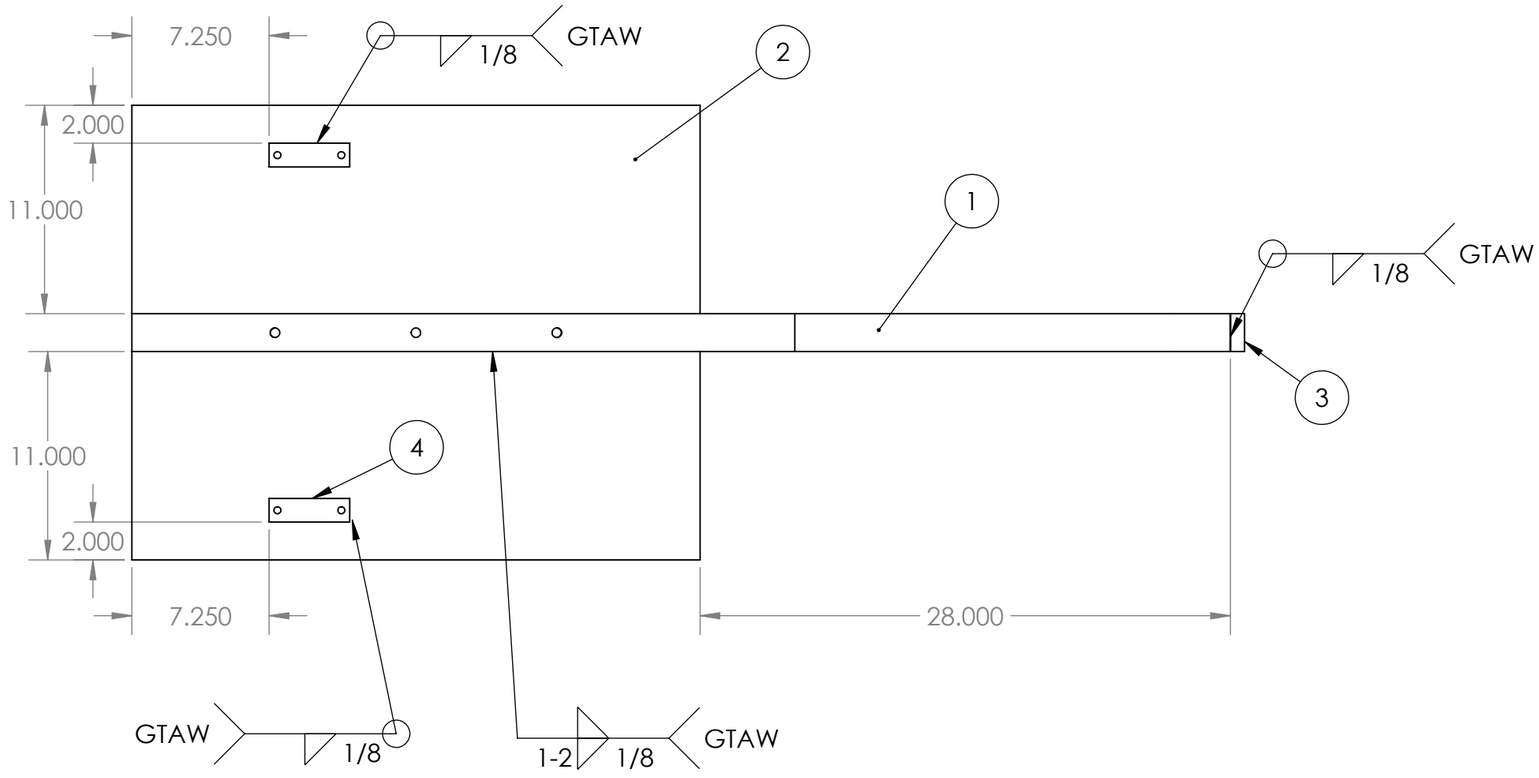
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

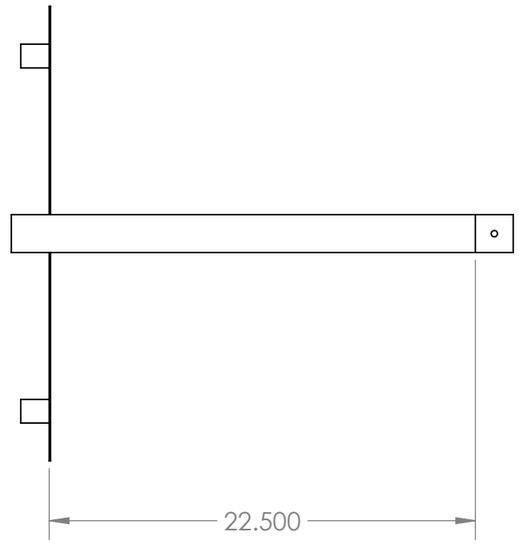
TITLE: BIKE CART

SIZE:	DATE:	DRAWN BY:
A	11/24/2019	MATTHEW CONSTABLE

MATERIAL:	PART #:	REV:
VARIOUS	A-160G20-001	0

Item Number	Part Number	Description	Quantity
1	M-160G20-008	Arm	1
2	M-160G20-003	Base Plate	1
3	M-160G20-002	Arm Adapter	1
4	M-160G20-004	Bearing Buffer	2





UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°

SURFACE FINISH 125
BREAK ALL EDGES .030

DO NOT SCALE

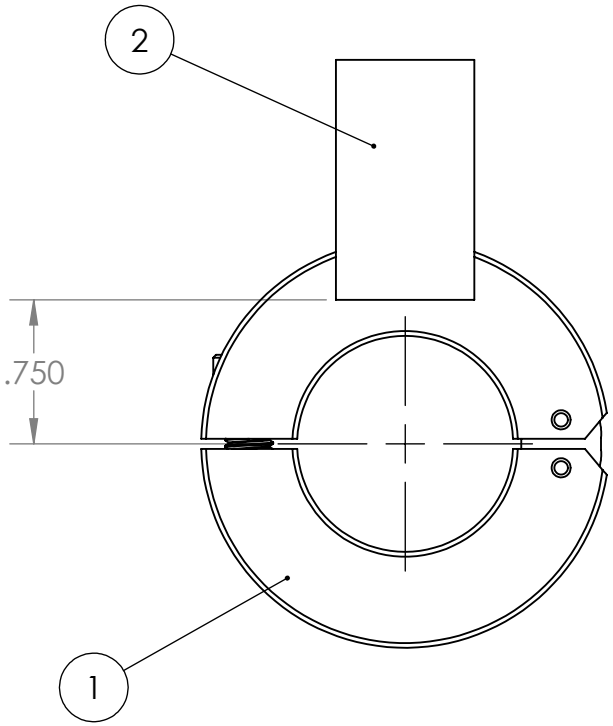
SHEET 1 OF 1

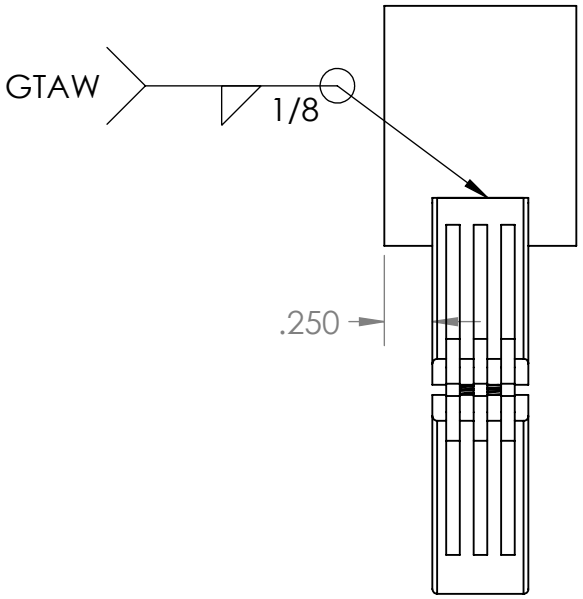
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

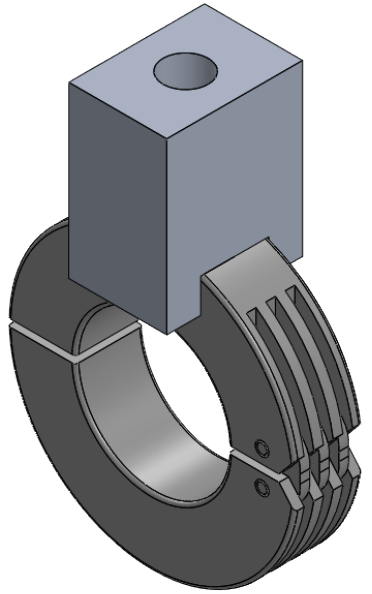
TITLE: CART SUB-ASSEMBLY

SIZE:	DATE:	DRAWN BY:	
B	11/25/2019	MATTHEW CONSTABLE	
MATERIAL:		PART #:	REV:
Al 6061 T6		SA-160G20-002	0

Item Number	Part Number	Description	Quantity
1	M-160G20-007	Shaft Collar	1
2	M-160G20-001	Collar Adapter	1







UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

DO NOT SCALE

SHEET 1 OF 1

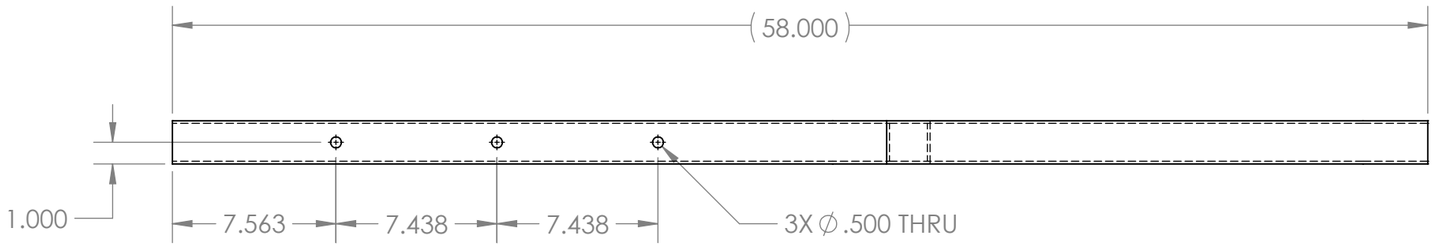
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

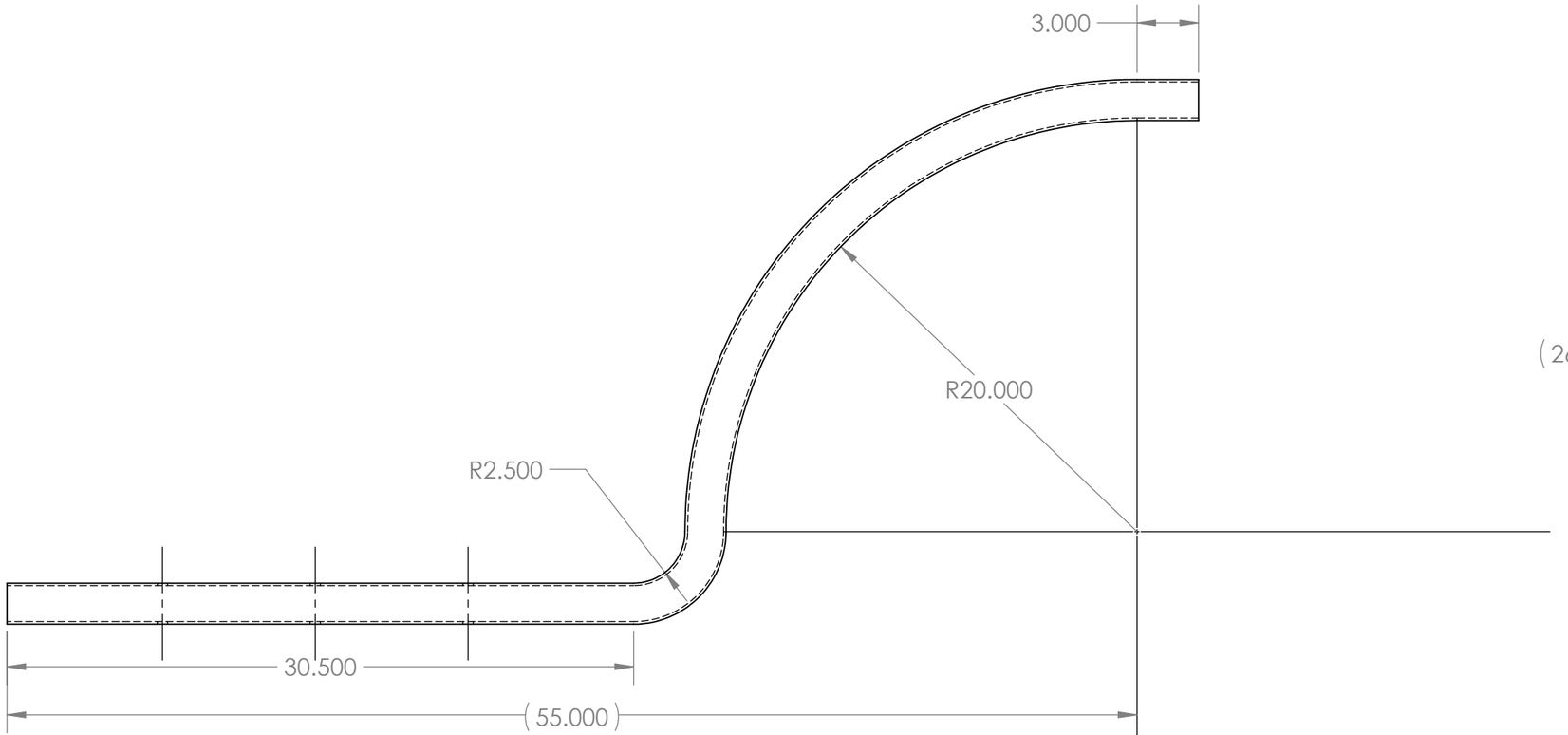
TITLE: SEAT ATTACHMENT SUB-ASSEMBLY

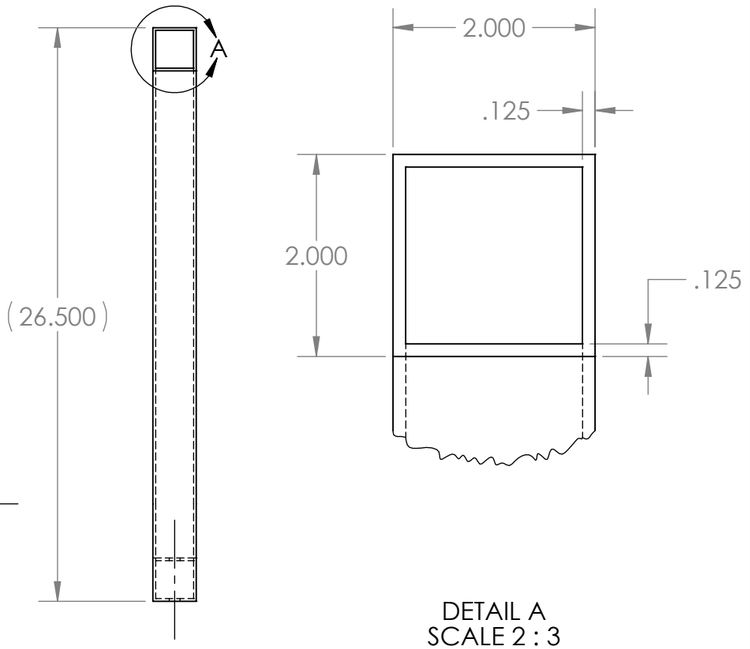
SIZE:	DATE:	DRAWN BY:
A	11/22/2019	MATTHEW CONSTABLE

MATERIAL:	PART #:	REV:
VARIOUS	SA-160G20-001.	0

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
1	RADII AND LENGTHS ADJUSTED TO MORE MANUFACTURABLE SIZES & CLEVIS PIN HOLE REMOVED & BOLT HOLES ADDED TO ATTACH ARM TO CONTAINER	11/24/2019	A. MIYAKE







DETAIL A
SCALE 2 : 3

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°

SURFACE FINISH 125
BREAK ALL EDGES .030

DO NOT SCALE

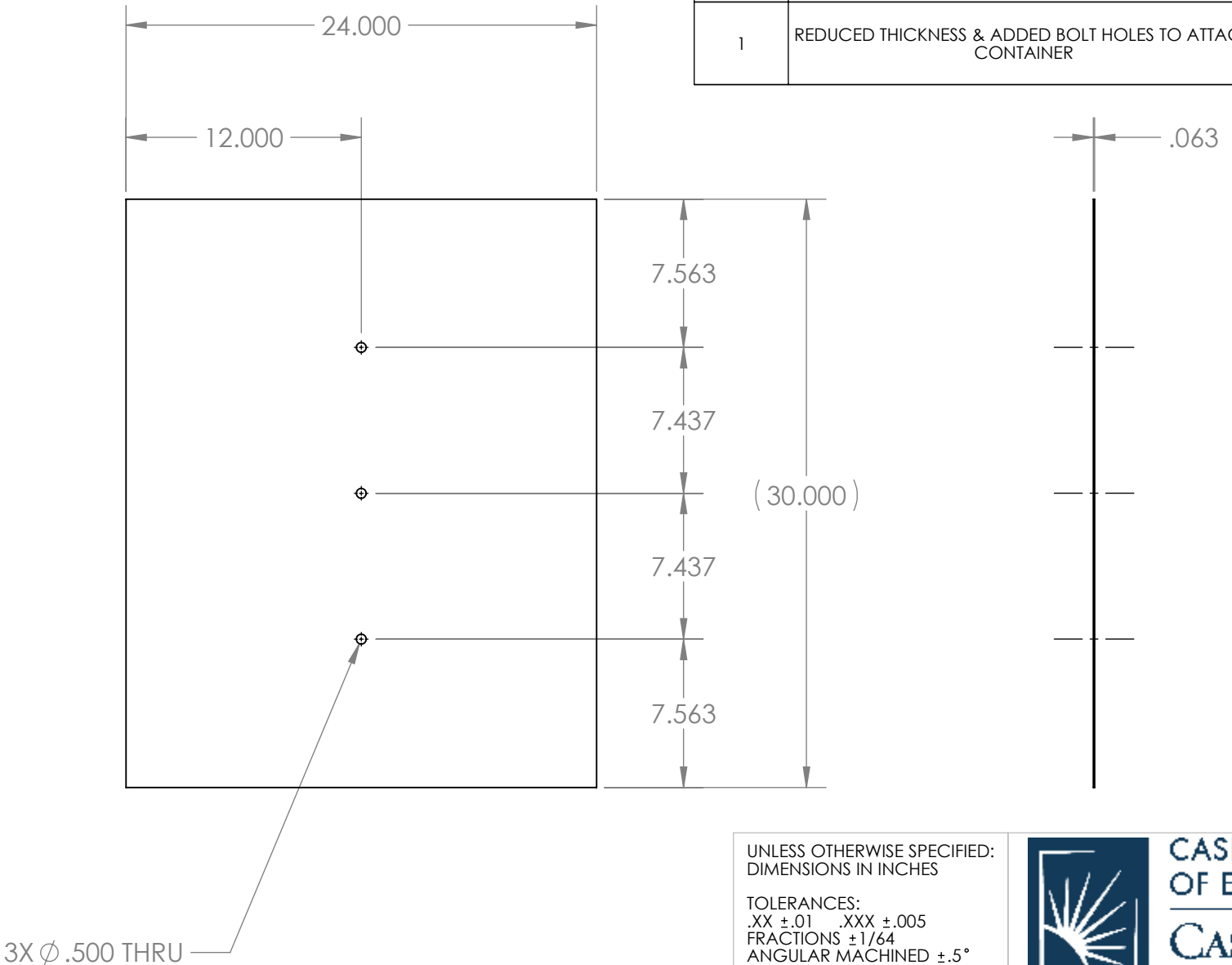
SHEET 1 OF 1

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: ARM

SIZE:	DATE:	DRAWN BY:	
B	11/24/2019	A. MIYAKE	
MATERIAL:		PART #:	REV:
AL 6061-T6		M-160G20-008	1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
1	REDUCED THICKNESS & ADDED BOLT HOLES TO ATTACH CONTAINER	11/24/2019	A. MIYAKE



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

DO NOT SCALE

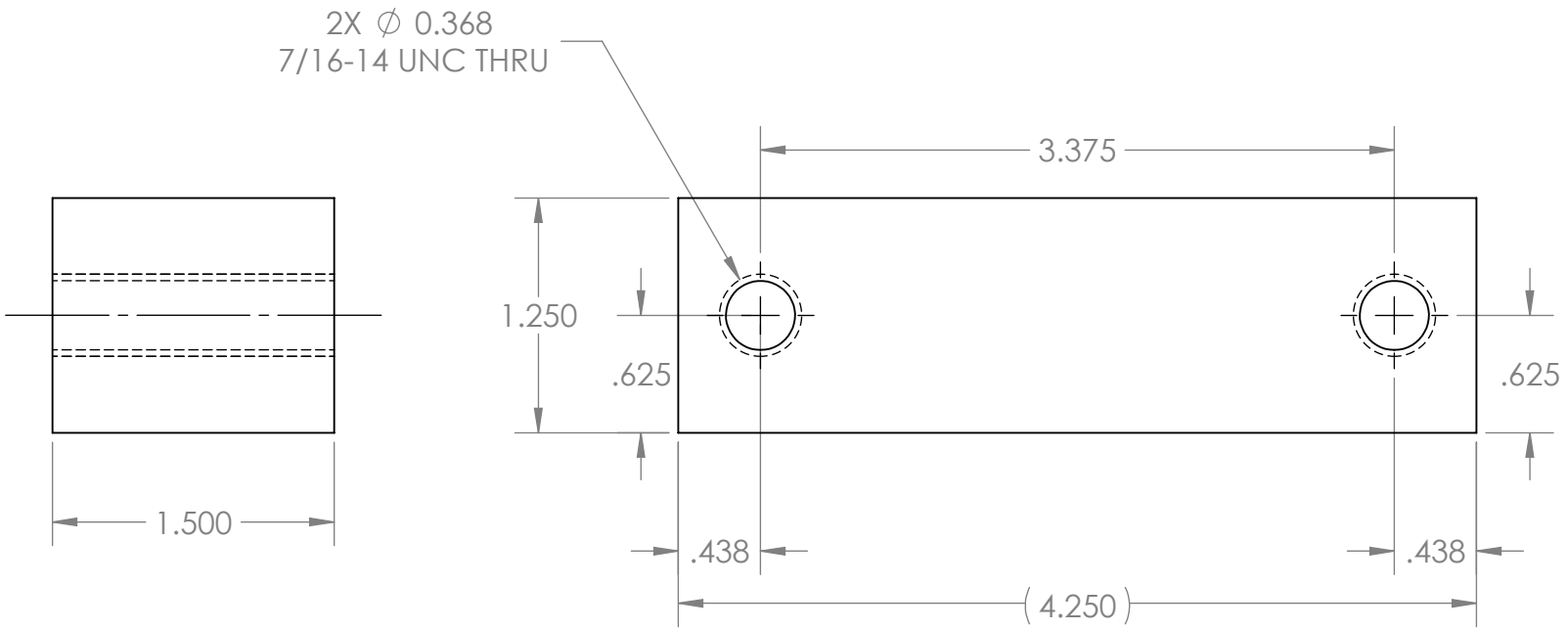
SHEET 1 OF 1

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: BASE PLATE

SIZE:	DATE:	DRAWN BY:	
A	11/24/2019	A. MIYAKE	
MATERIAL:		PART #:	REV:
AL 6061-T6		M-160G20-003	1

REVISIONS			
1	ADDED THRU AND CHANGED LENGTH FOR NEW BEARINGS	11/24/2019	MTC



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

DO NOT SCALE

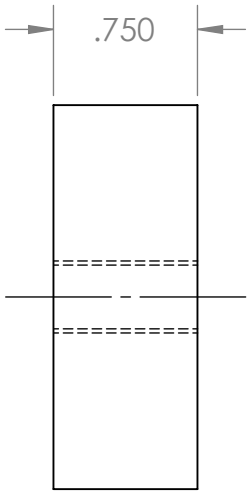
SHEET 1 OF 1

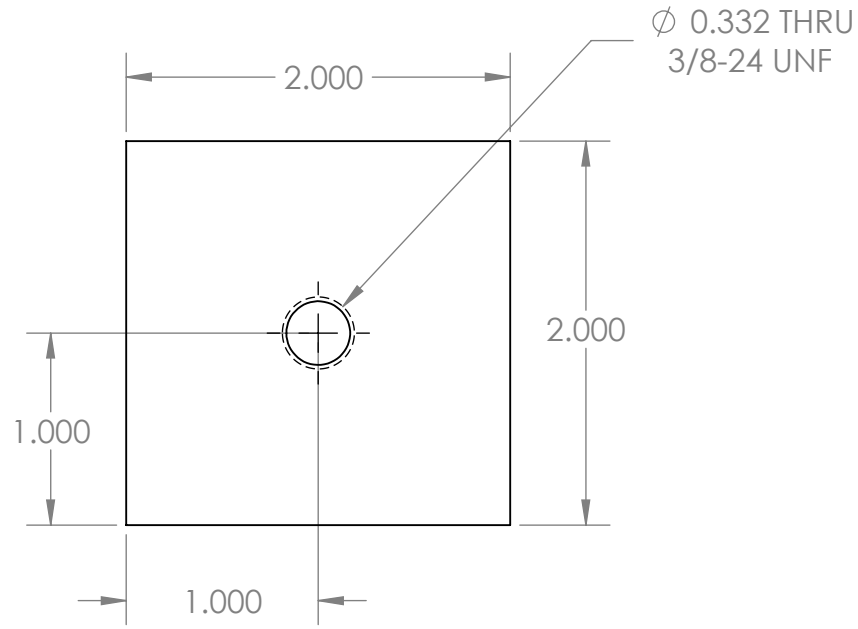
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: BEARING BUFFER

SIZE:	DATE:	DRAWN BY:
A	11/24/2019	LILLIANA DZIAGWA

MATERIAL:	PART #:	REV:
Al 6061 T6	M-160G20-004	1





UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH
BREAK ALL EDGES .030

DO NOT SCALE

SHEET 1 OF 1

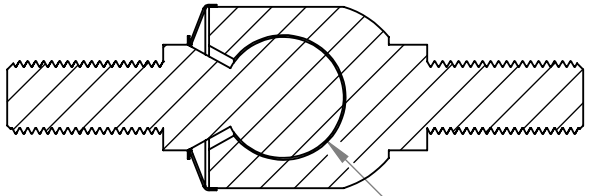
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

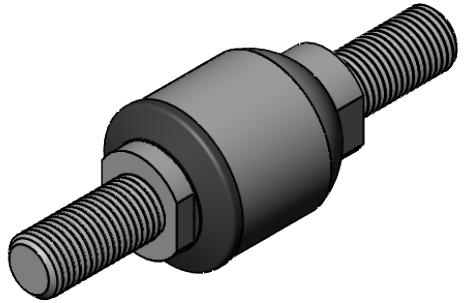
TITLE:
ARM ADAPTER

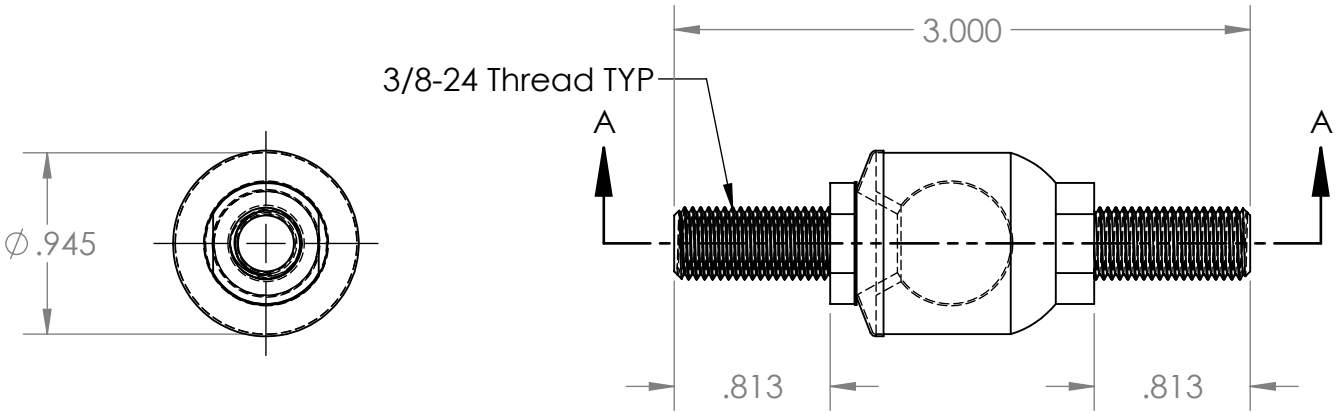
SIZE:	DATE:	DRAWN BY:
A	11/21/2019	LILLIANA DZIAGWA

MATERIAL:	PART #:	REV:
AL 6061-T6	M-160G20-002	0

Swivel Angle: 30 deg







McMaster Carr Part Number 8412K43

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

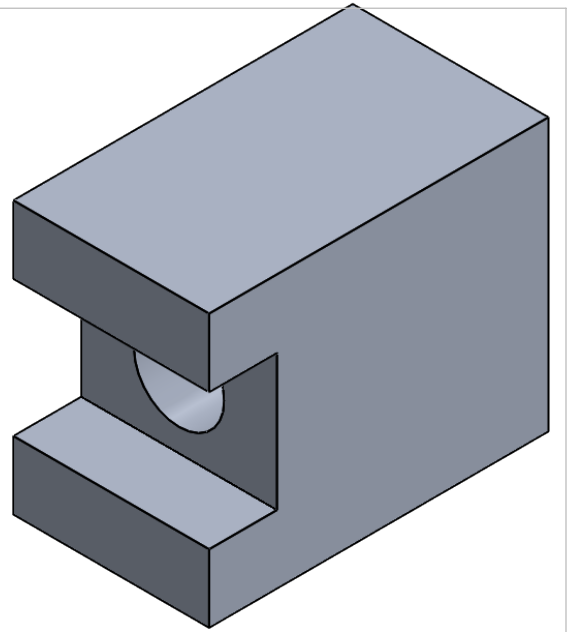
TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

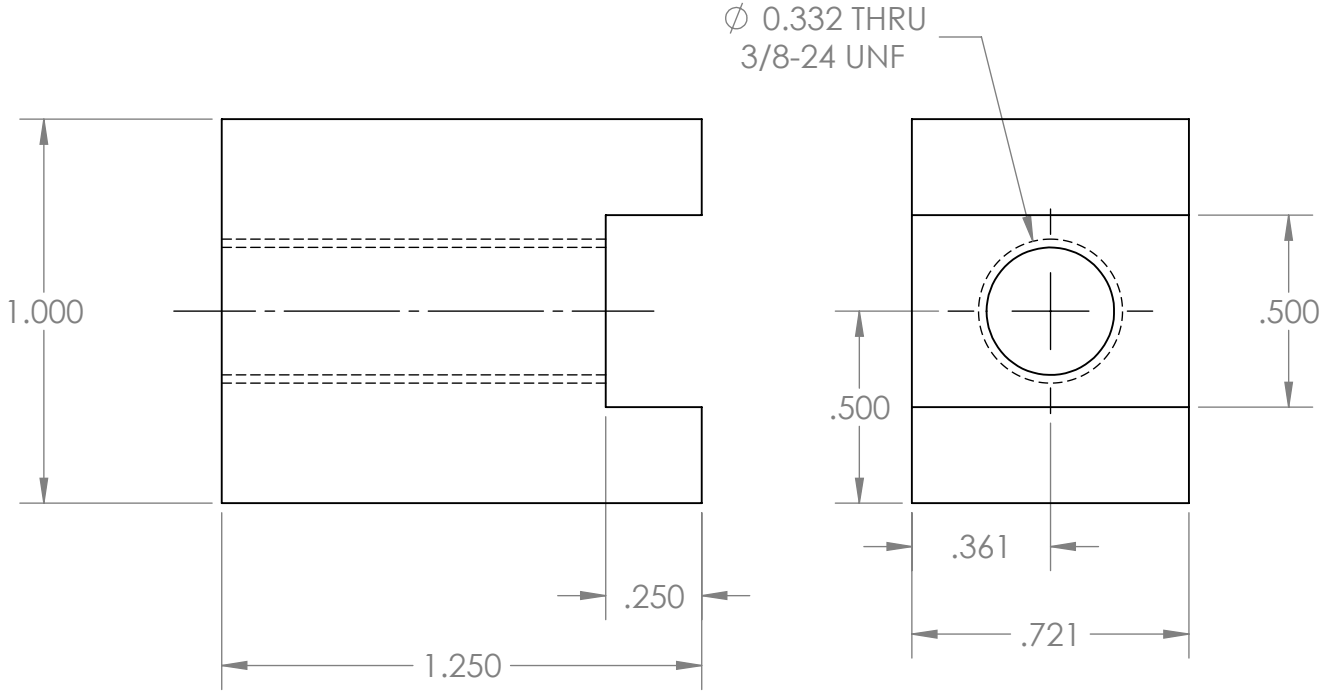
DO NOT SCALE

SHEET 1 OF 1

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: Ball and Socket Joint			
SIZE: A	DATE: 11/12/2019	DRAWN BY: Matthew Constable	
MATERIAL: Zinc Plated Carbon Steel		PART #: P-160G20-003	REV: 0





UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

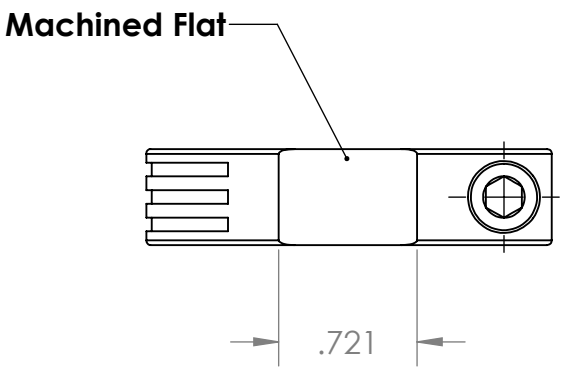
TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

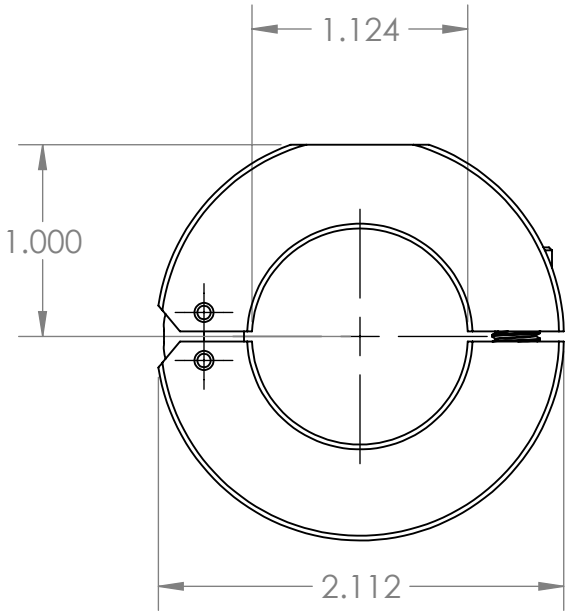
DO NOT SCALE

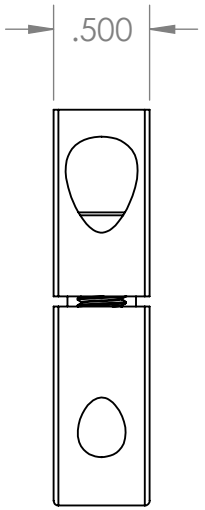
SHEET 1 OF 1

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: SHAFT COLLAR ADAPTER			
SIZE: A	DATE: 11/22/2019	DRAWN BY: MATTHEW CONSTABLE	
MATERIAL: Al 6061-T6		PART #: M-160G20-001	REV: 0







Modified McMaster Carr
Part Number: 57145K77

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

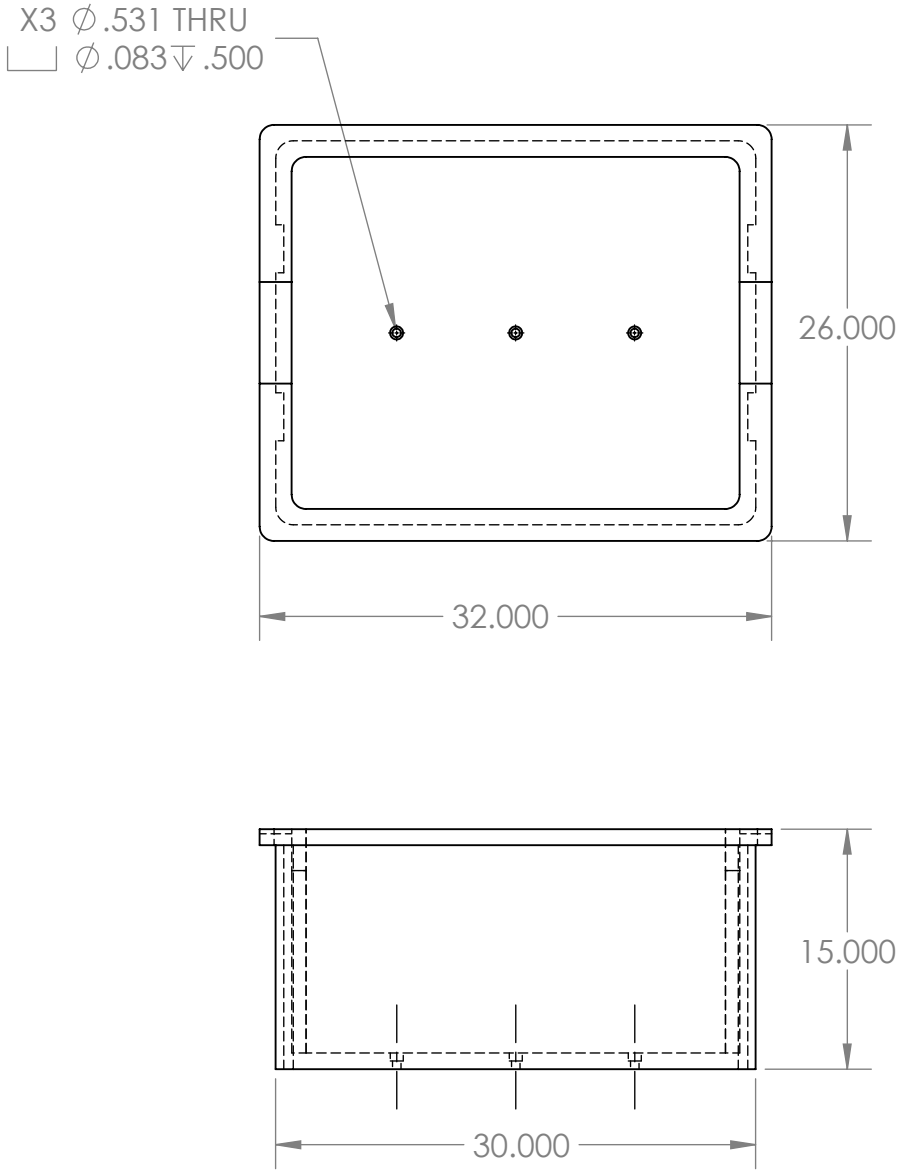
TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

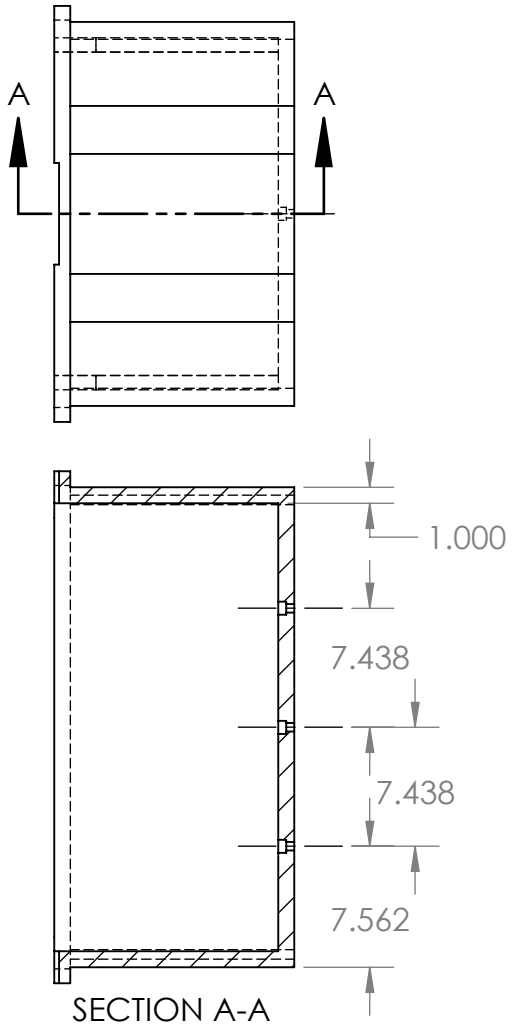
DO NOT SCALE

SHEET 1 OF 1

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: SHAFT COLLAR			
SIZE: A	DATE: 11/22/2019	DRAWN BY: MATTHEW CONSTABLE	
MATERIAL: Black-Oxide 1215 Carbon Steel		PART #: M-160G20-007	REV: 0





SECTION A-A

Purchased Part with added holes
Uline Part Number S-19694

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

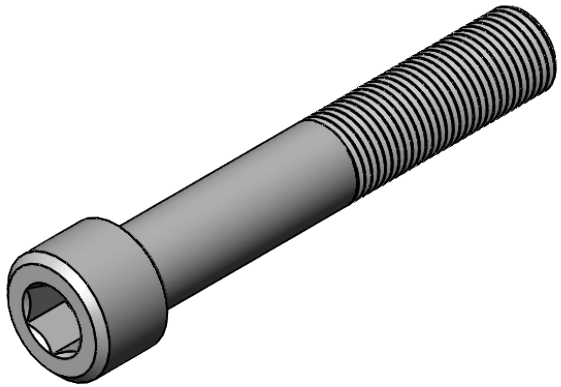
TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH
BREAK ALL EDGES .030

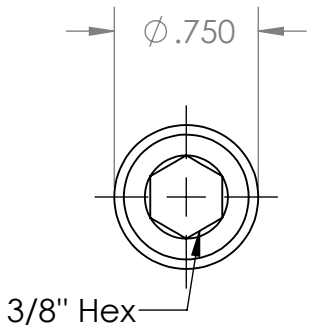
DO NOT SCALE

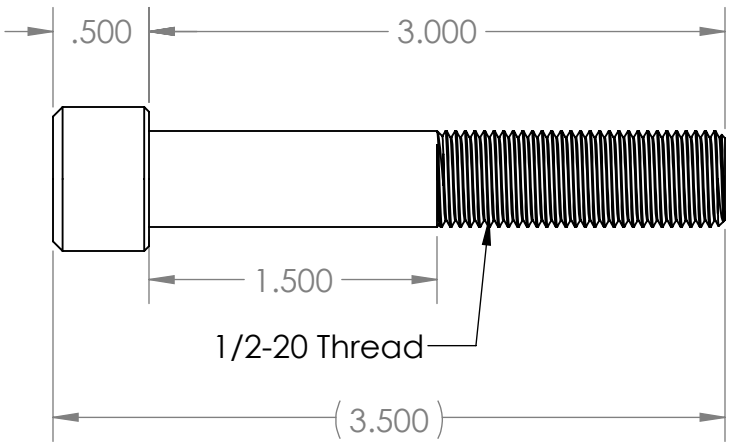
SHEET 1 OF 1

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: CONTAINER			
SIZE: A	DATE: 11/22/2019	DRAWN BY: LILLIANA DZIAGWA	
MATERIAL: PLASTIC		PART #: M-160G20-009	REV: 0







UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

DO NOT SCALE

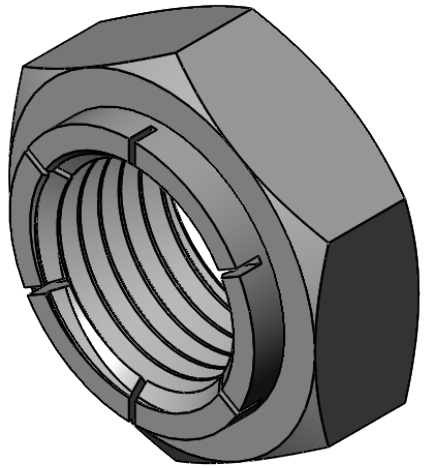
SHEET 1 OF 1

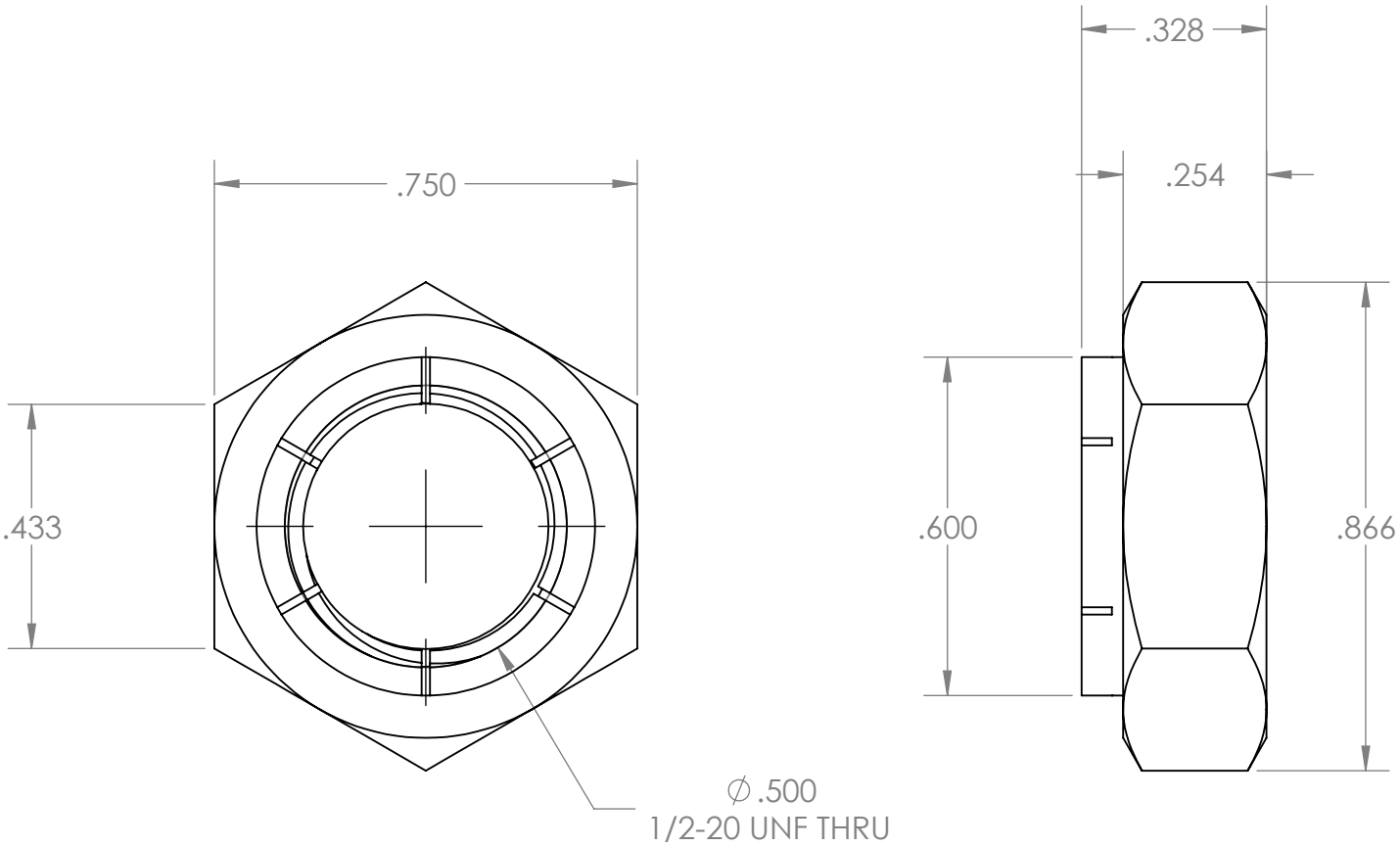
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: Plate Screw

SIZE:	DATE:	DRAWN BY:
A	11/22/2019	MATTHEW CONSTABLE

MATERIAL:	PART #:	REV:
Black Oxide Alloy Steel	P-160G20-001	0





McMaster Carr Part Number 94830A550

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

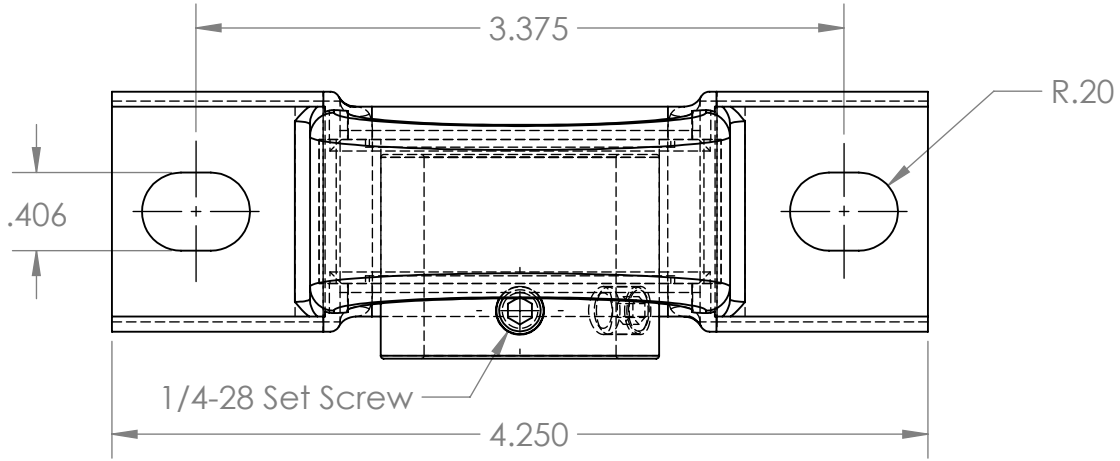
TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

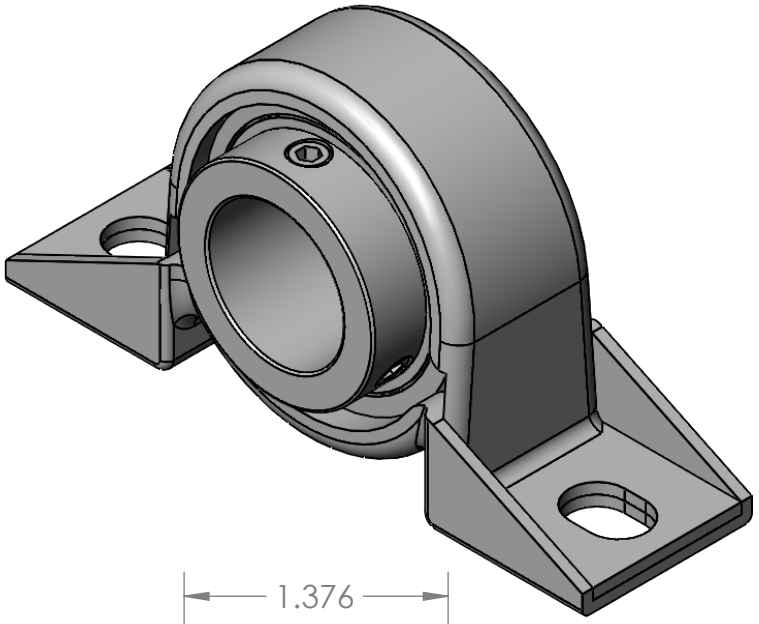
DO NOT SCALE

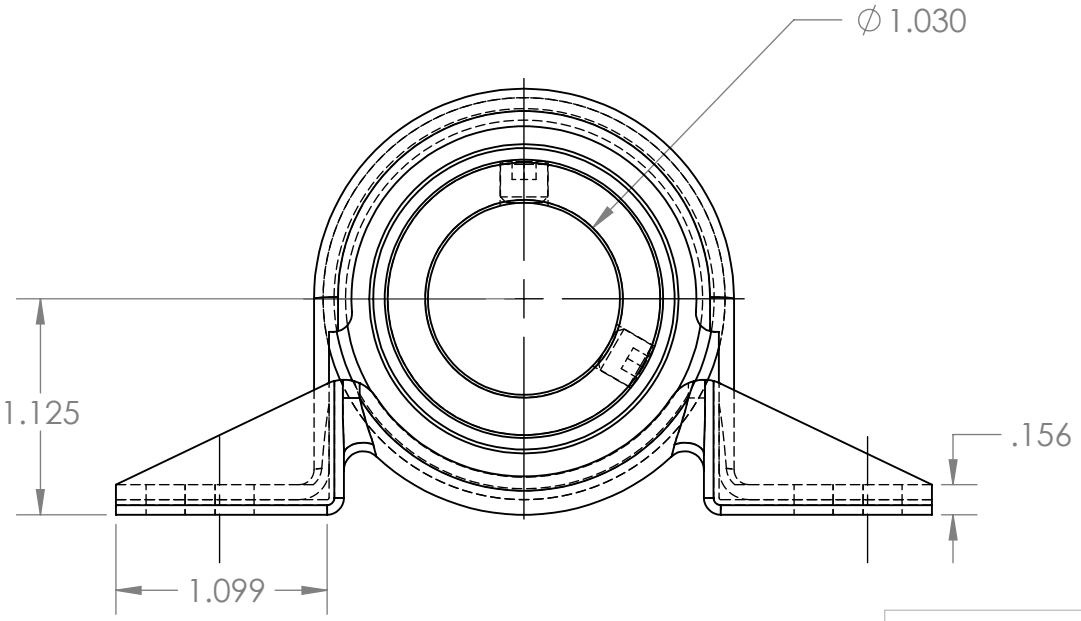
SHEET 1 OF 1

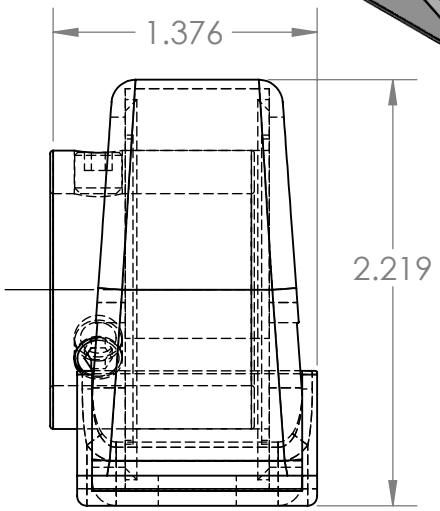
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: BASE PLATE LOCKNUT			
SIZE: A	DATE: 11/24/2019	DRAWN BY: A. MIYAKE	
MATERIAL: CAD-PLATED STEEL		PART #: P-160G20-005	REV: 0









McMaster Carr Part Number 5913K64

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH
BREAK ALL EDGES .030

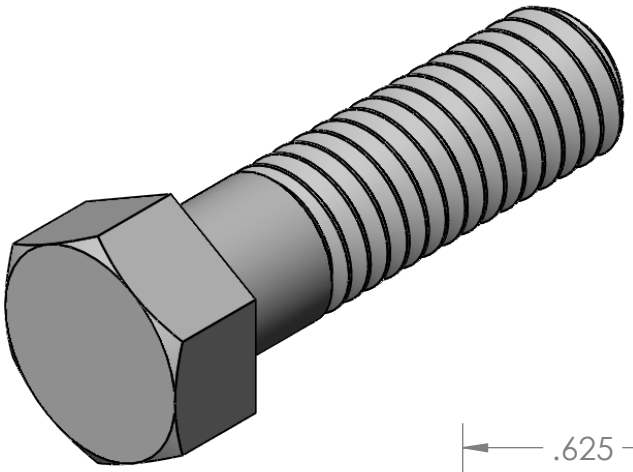
DO NOT SCALE

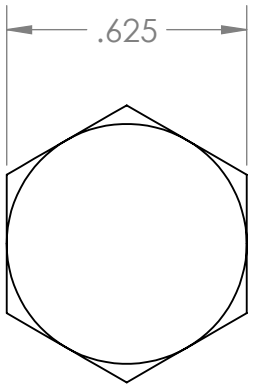
SHEET 1 OF 1

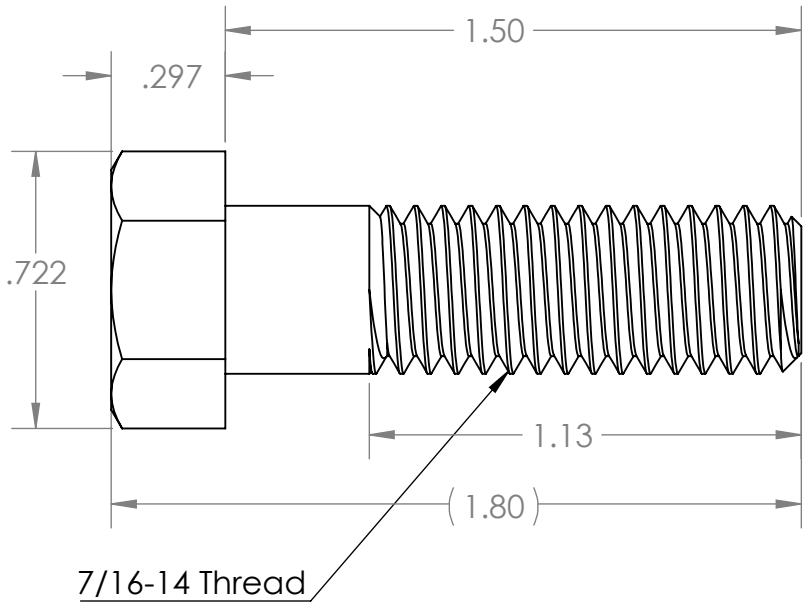
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE:			
BEARING			
SIZE: A	DATE: 11/22/2019	DRAWN BY: LILLIANA DZIAGWA	
MATERIAL: STEEL		PART #: P-160G20-006	REV: 0

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
1	DRAFTING STANDARD CHANGED FROM ISO TO ANSI & REMOVED UNNECESSARY DIMENSIONS	11/22/2019	A. MIYAKE







MCMASTER CARR
PART NUMBER
91309A673

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH
BREAK ALL EDGES .030

DO NOT SCALE

SHEET 1 OF 1

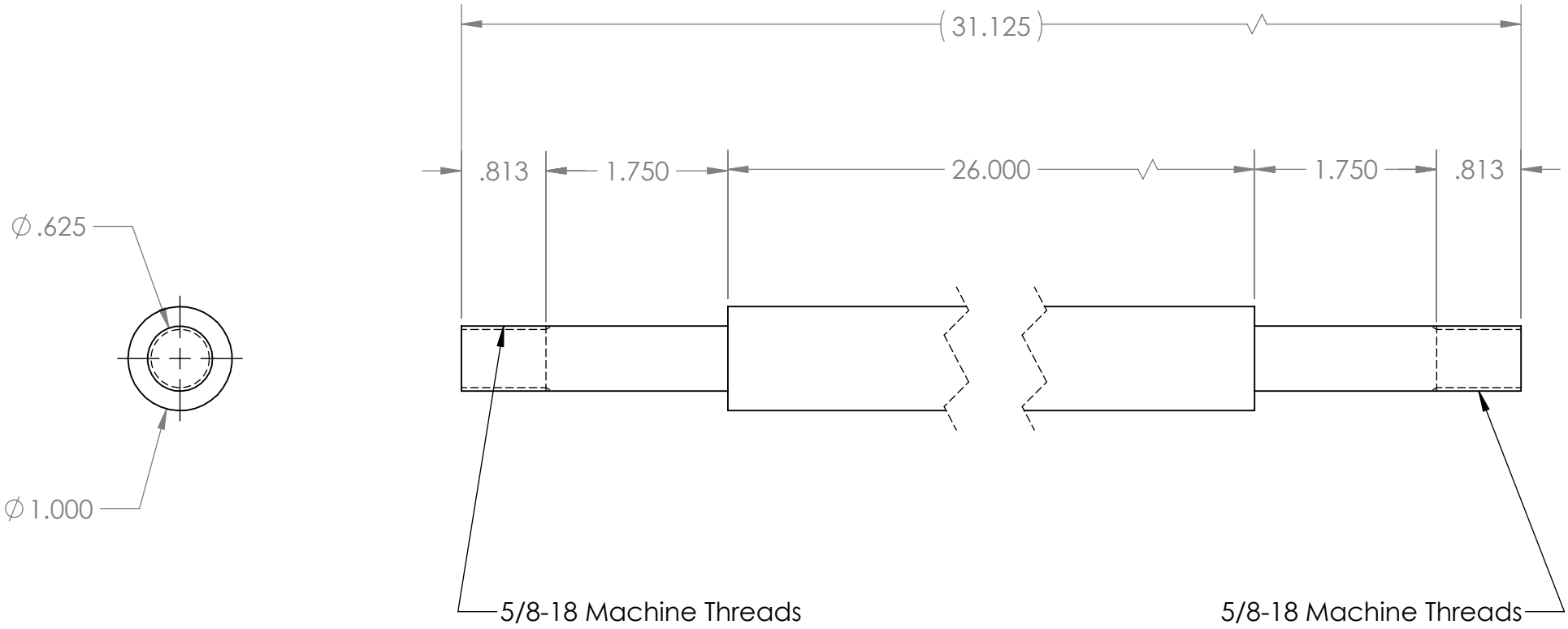
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: BEARING BOLT

SIZE:	DATE:	DRAWN BY:
A	11/10/2019	S. TANAKADATE

MATERIAL:	PART #:	REV:
Low Strength Steel	P-160G20-004	1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
1	FIXED THREAD CALL-OUT & SHORTENED THE TAPERED ENDS TO ACCOMODATE THE NEW WHEEL HUB WIDTH	11/22/2019	A. MIYAKE



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

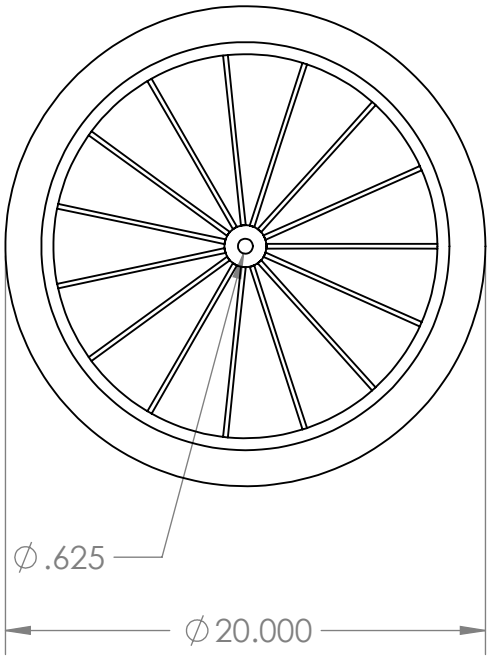
DO NOT SCALE

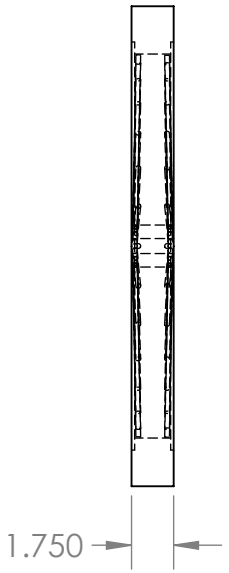
SHEET 1 OF 1

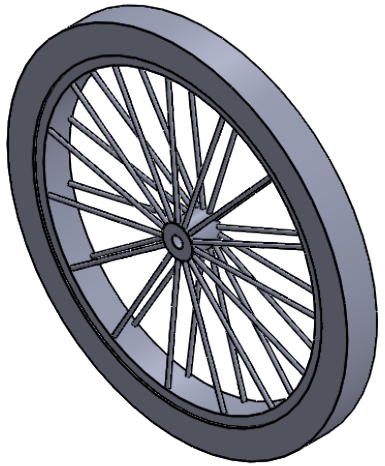
CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: AXLE

SIZE:	DATE:	DRAWN BY:	
A	11/12/2019	A. MIYAKE	
MATERIAL:		PART #:	REV:
AL 6061-T6		M-160G20-005	1







McMaster Carr Part Number
2893T72

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

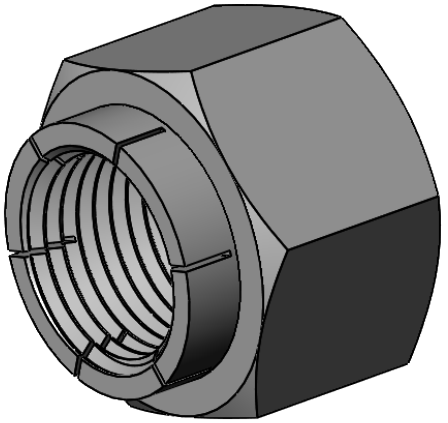
TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH 125
BREAK ALL EDGES .030

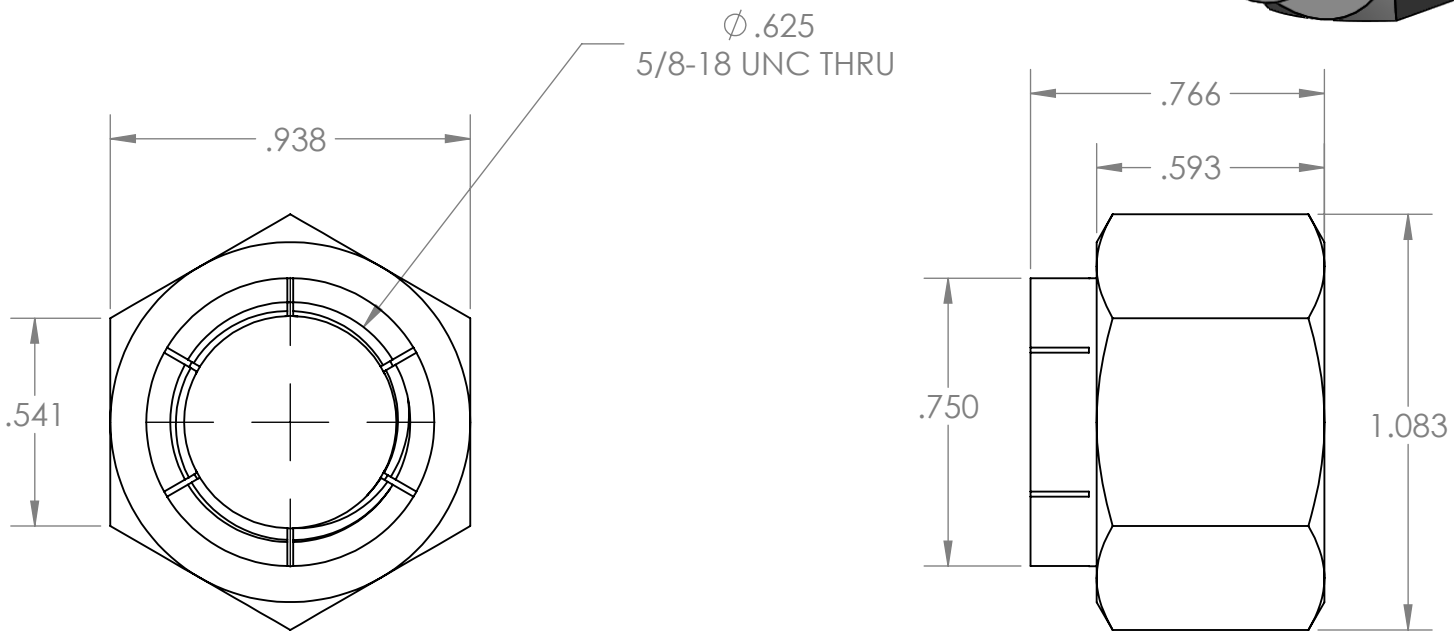
DO NOT SCALE

SHEET 1 OF 1

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE:			
Bike Wheel			
SIZE:	DATE:	DRAWN BY:	
A	11/25/2019	MATTHEW CONSTABLE	
MATERIAL:		PART #:	REV:
Rubber and Zinc Plated Steel		P-160G20-007	0





McMaster Carr Part Number 94820A255

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS IN INCHES

TOLERANCES:
.XX ±.01 .XXX ±.005
FRACTIONS ±1/64
ANGULAR MACHINED ±.5°
ANGULAR BEND ±1°
SURFACE FINISH
BREAK ALL EDGES .030

DO NOT SCALE

SHEET 1 OF 1

CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

TITLE: AXLE LOCKNUT			
SIZE: A	DATE: 11/10/2019	DRAWN BY: LILLIANA DZIAGWA	
MATERIAL: CAD-PLATED STEEL		PART #: P-160G20-002	REV: 0