



Figure (1) Pre-assessing for the water jet DXF files of Brackets

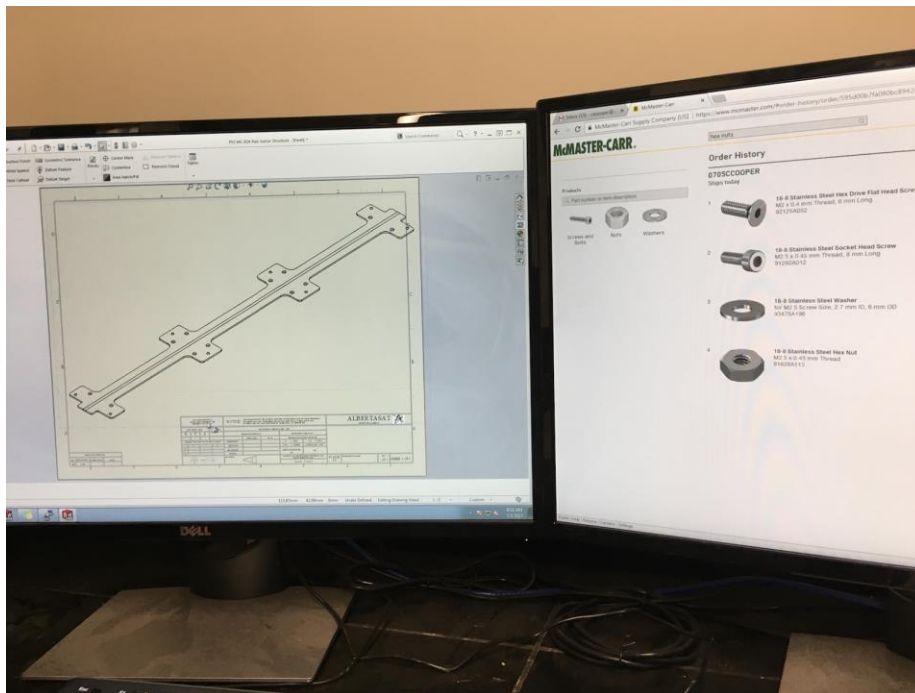


Figure (2) Formatting the rails for the water jet DXF file and ordering parts from McMaster-CARR



Figure (3) Abby Lacson Machining the holes in Thoracic, Cervical and Lumbar Brackets using a drill press in the maker space in the physics machine shop at the University of Alberta



Figure (4) Picture of Lumbar and Thoracic Brackets

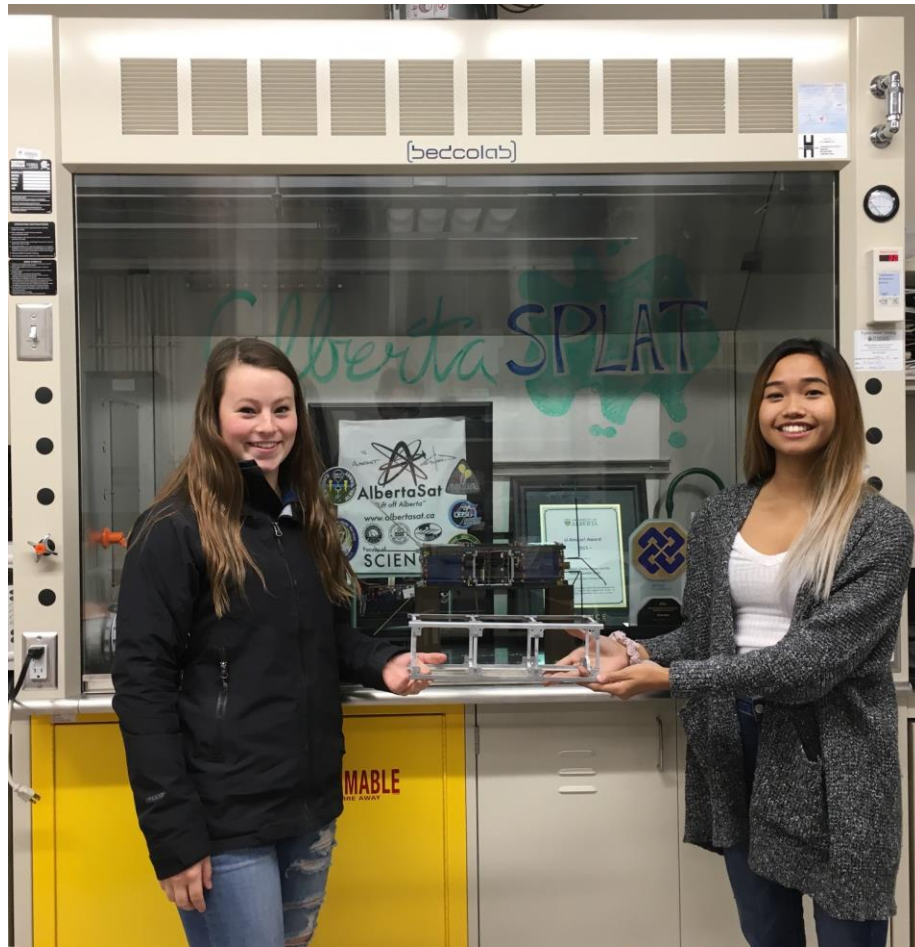
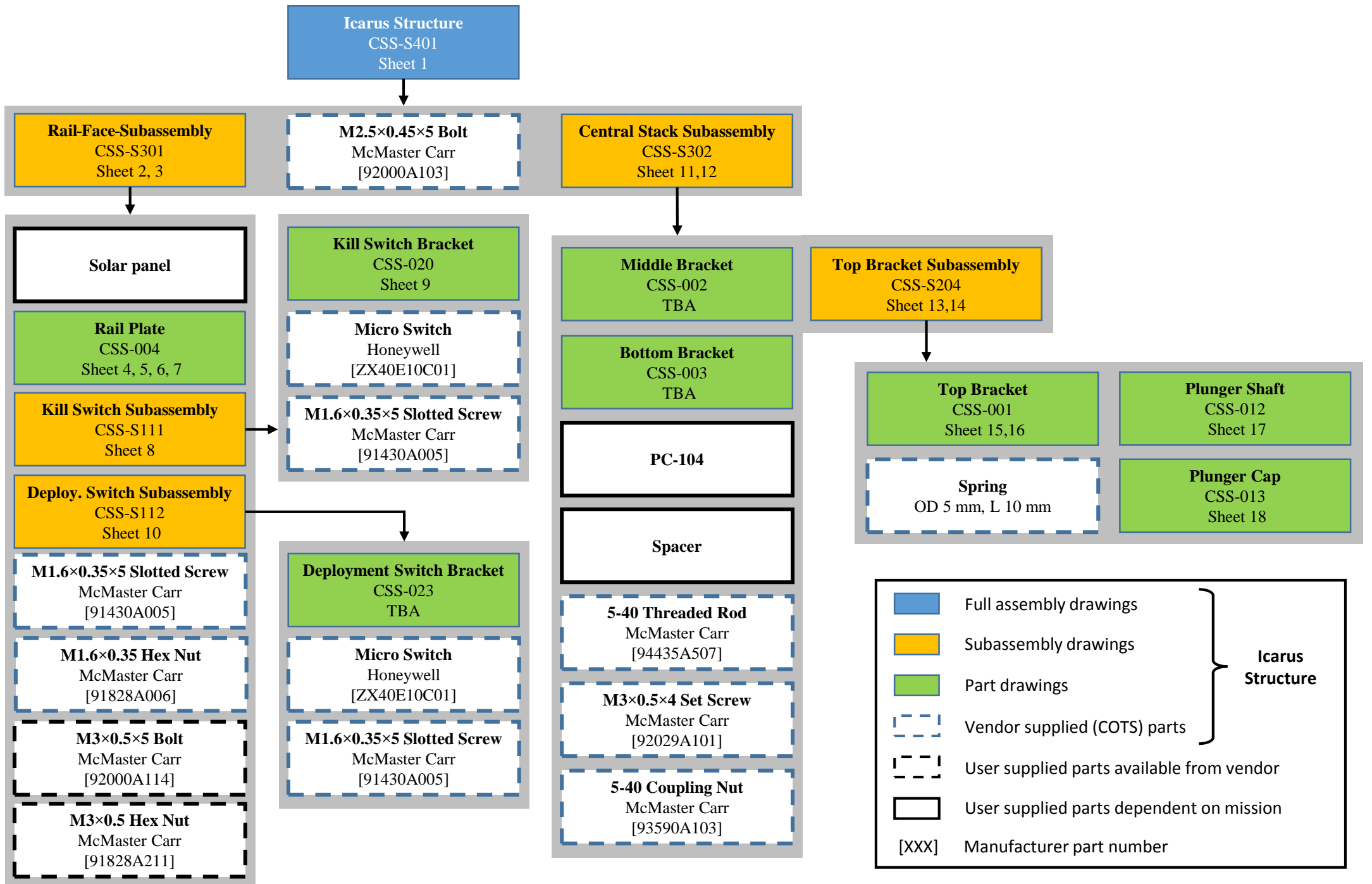
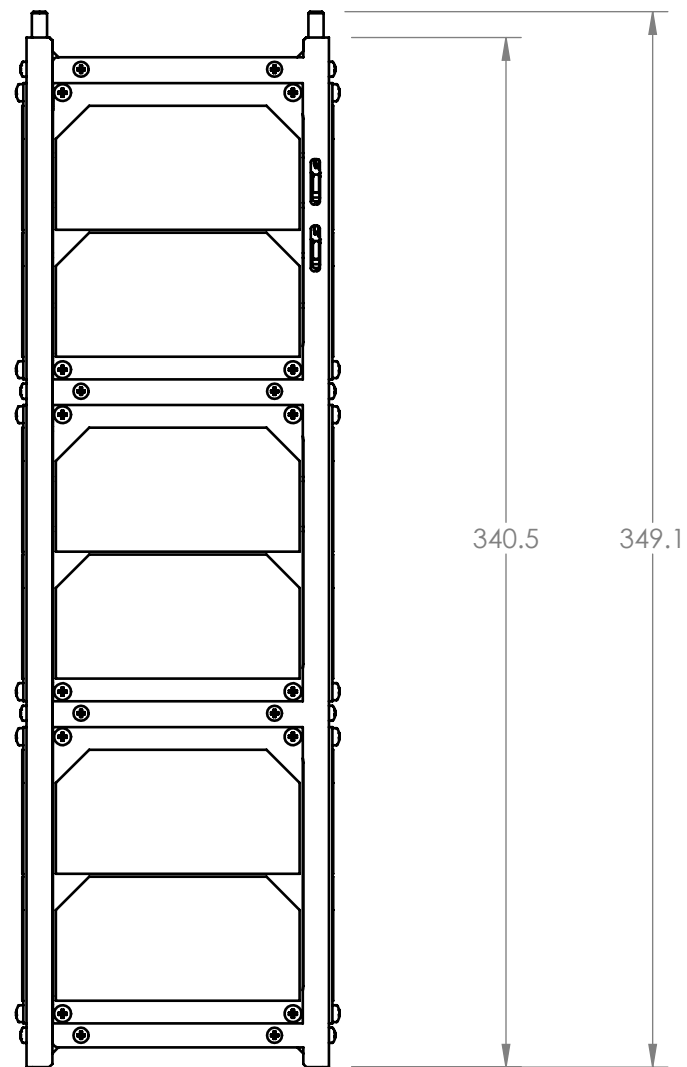
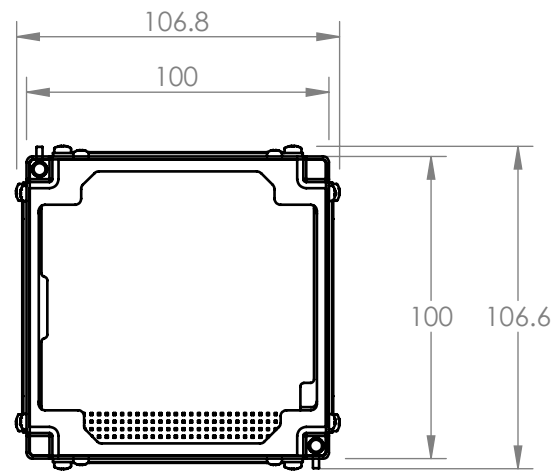


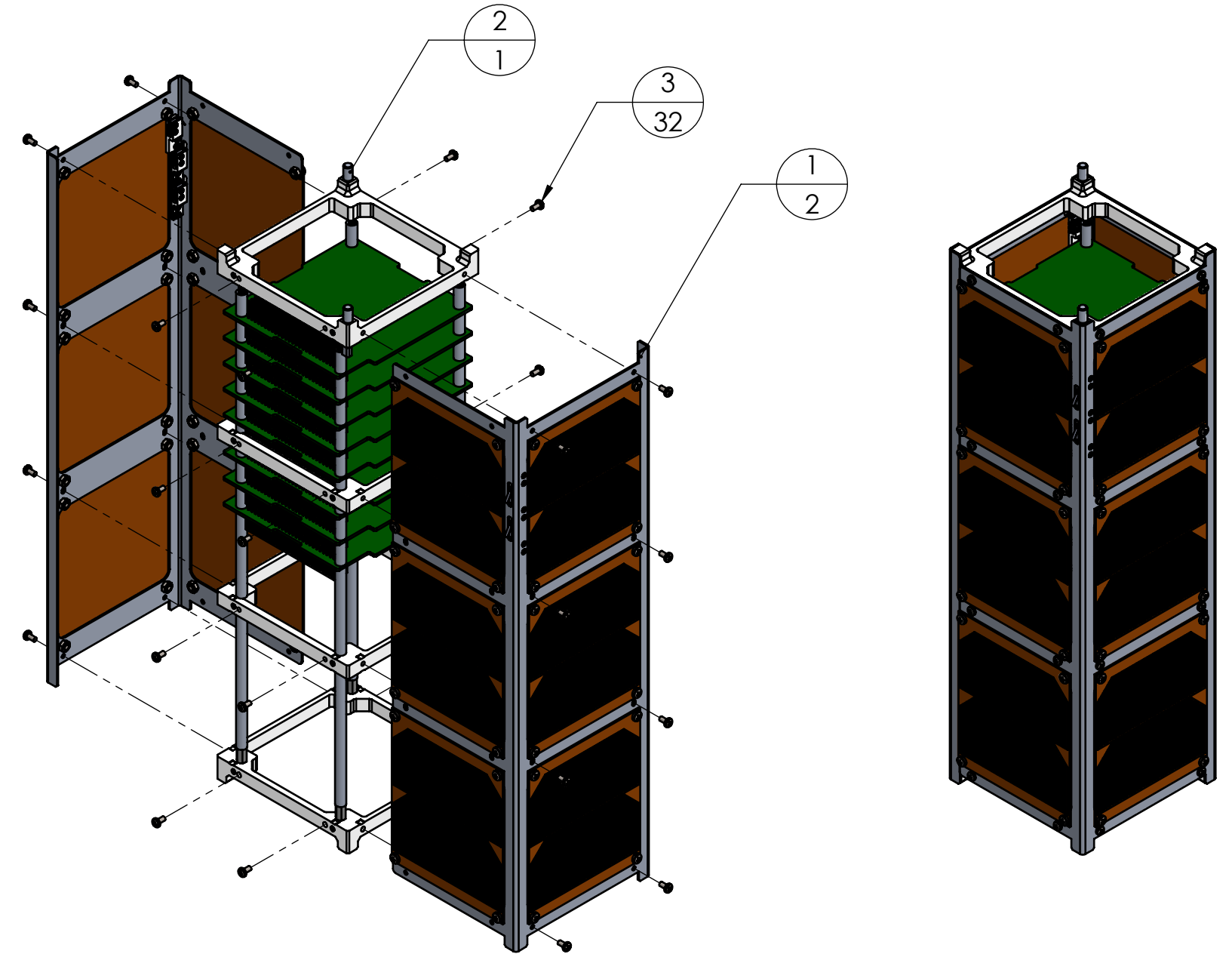
Figure (5) Casia McLeod and Abby Lacson holding the Icarus Prototype Structure



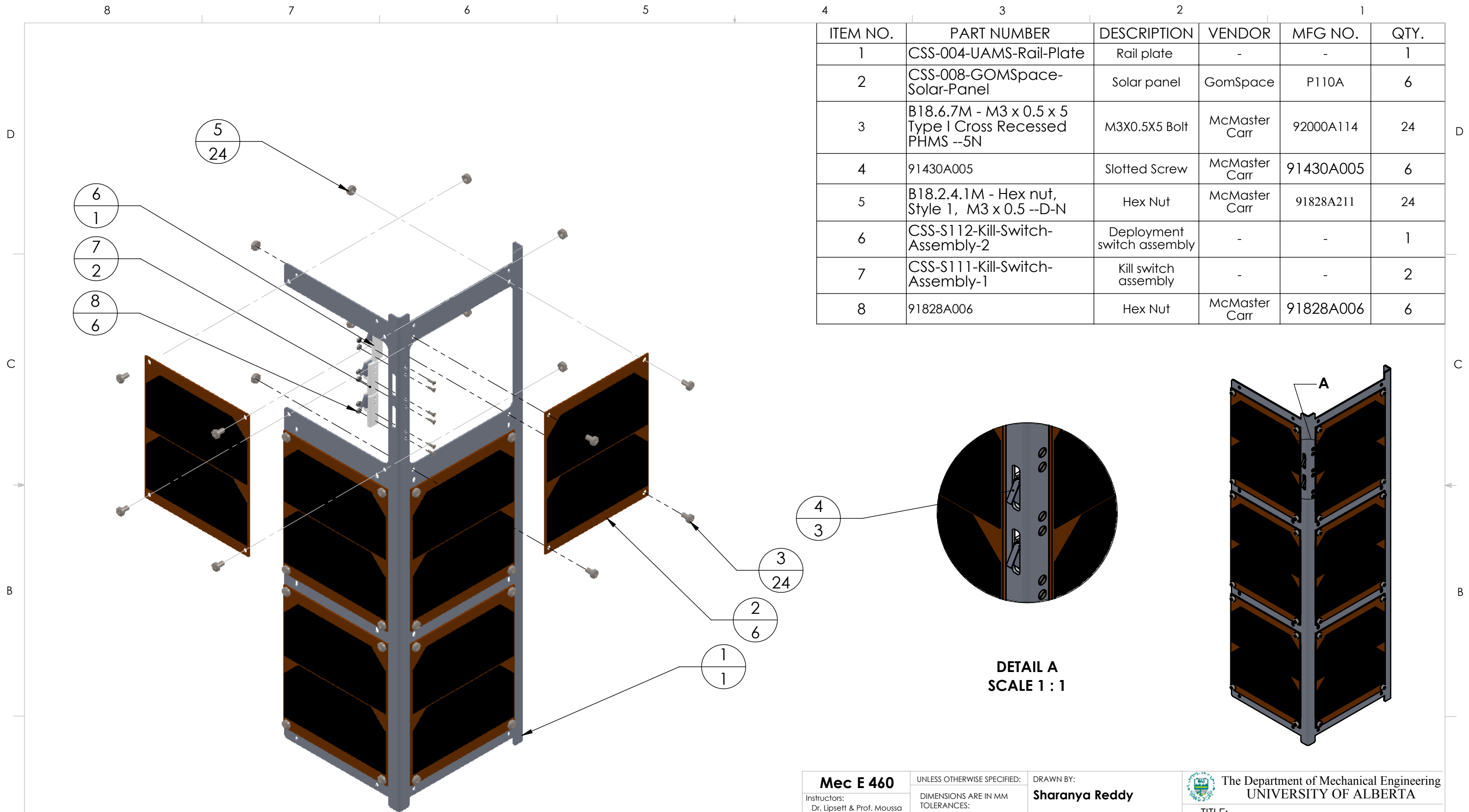


2D REPRESENTATION
SCALE: 1:2.5

ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR	MFG NO.	QTY.
1	CSS-S301-Rail-Plate-Solar-Panel-Subassembly	Rail Plate Subassembly with solar panels	-	-	2
2	CSS-S302-Central-Stack	Central Stack Subassembly with PCBs	-	-	1
3	B18.6.7M - M2.5 x 0.45 x 5 Type I Cross Recessed PHMS --5N	M2.5x0.45x5 Bolt	McMaster Carr	92000A103	32



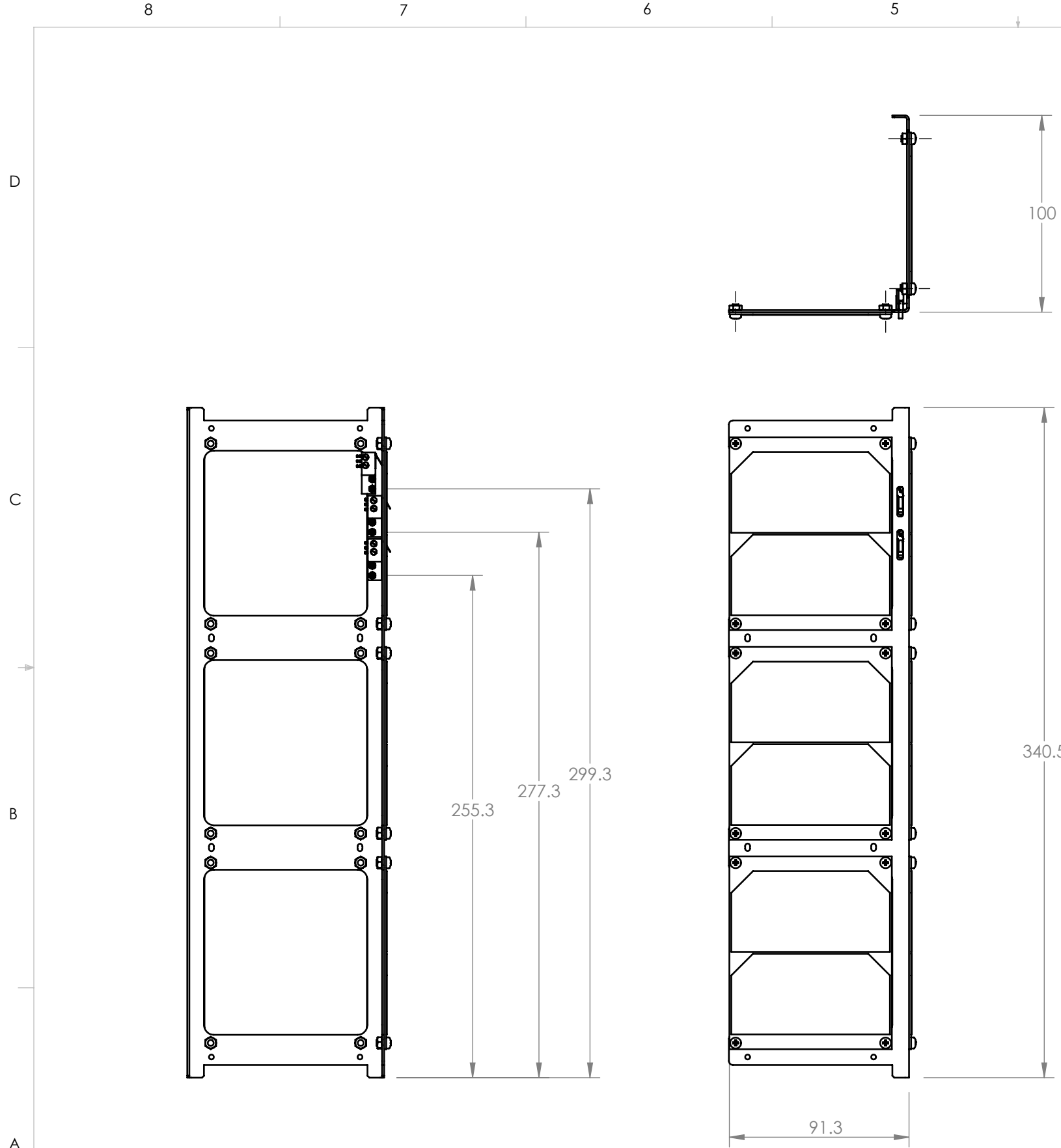
Mec E 460		UNLESS OTHERWISE SPECIFIED:		DRAWN BY: Tejiri Binifie-Cassidy		The Department of Mechanical Engineering UNIVERSITY OF ALBERTA	
Instructors: Dr. Lipsett & Prof. Moussa Fall 2016		DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: ± 0.5° LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025		Group name 		TITLE: Icarus Structure	
Comments:		SURFACE FINISH µm 0.6 ✓		Group number 6		SIZE B	
MATERIAL: Various		DO NOT SCALE DRAWING		SM By Shi An, Corbin Cooper		Part supplier/manufacturer Various	
FILE NAME: CSS-S401-Full-Assembly		Reviewed by Corbin Cooper, Shaan Muhammad		Monday, December 05, 2016 11:47:06 AM Friday, October 21, 2016 5:36:49 PM		REV 2	
				SCALE: 1: 2.5		Mass: 712.42	
						SHEET 1 OF 18	



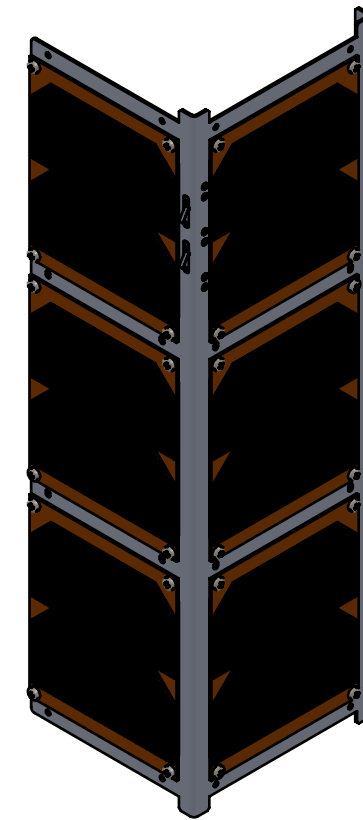
ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR	MFG NO.	QTY.
1	CSS-004-UAMS-Rail-Plate	Rail plate	-	-	1
2	CSS-008-GOMSpace-Solar-Panel	Solar panel	GomSpace	P110A	6
3	B18.6.7M - M3 x 0.5 x 5 Type I Cross Recessed PHMS --5N	M3X0.5X5 Bolt	McMaster Carr	92000A114	24
4	91430A005	Slotted Screw	McMaster Carr	91430A005	6
5	B18.2.4.1M - Hex nut, Style 1, M3 x 0.5 --D-N	Hex Nut	McMaster Carr	91828A211	24
6	CSS-S112-Kill-Switch-Assembly-2	Deployment switch assembly	-	-	1
7	CSS-S111-Kill-Switch-Assembly-1	Kill switch assembly	-	-	2
8	91828A006	Hex Nut	McMaster Carr	91828A006	6

DETAIL A
SCALE 1 : 1

Mec E 460 Instructors: Dr. Lipsett & Prof. Moussa Fall 2016 Comments:	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: ± 0.5° LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025 SURFACE FINISH μm 0.6 ✓ DO NOT SCALE DRAWING	DRAWN BY: Sharanya Reddy	The Department of Mechanical Engineering UNIVERSITY OF ALBERTA		
		Group name 	TITLE: Rail Face Subassembly		
MATERIAL: Various	Group number 6	SM By Shi An, Corbin Cooper	SIZE B	Part supplier/manufacturer Various	REV 2
FILE NAME: CSS-S301-Rail-Plate-Solar-Panel-Subassembly	Reviewed by Shi An, Shaan Muhammad	Monday, December 05, 2016 3:03:59 AM Saturday, November 12, 2016 7:07:16 PM	SCALE: 1:5	Mass: 132.46	SHEET 2 OF 18



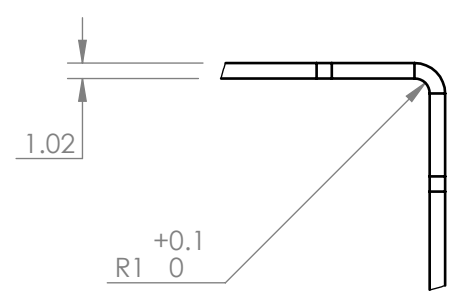
ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR	MFG NO.	QTY.
1	CSS-004-UAMS-Rail-Plate	Rail plate	-	-	1
2	CSS-008-GOMSpace-Solar-Panel	Solar panel	GomSpace	P110A	6
3	B18.6.7M - M3 x 0.5 x 5 Type I Cross Recessed PHMS --5N	M3X0.5X5 Bolt	McMaster Carr	92000A114	24
4	91430A005	Slotted Screw	McMaster Carr	91430A005	6
5	B18.2.4.1M - Hex nut, Style 1, M3 x 0.5 --D-N	Hex Nut	McMaster Carr	91828A211	24
6	CSS-S112-Kill-Switch-Assembly-2	Deployment switch assembly	-	-	1
7	CSS-S111-Kill-Switch-Assembly-1	Kill switch assembly	-	-	2
8	91828A006	Hex Nut	McMaster Carr	91828A006	6



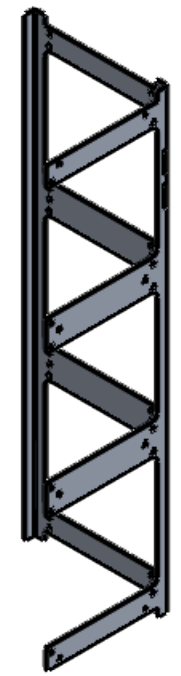
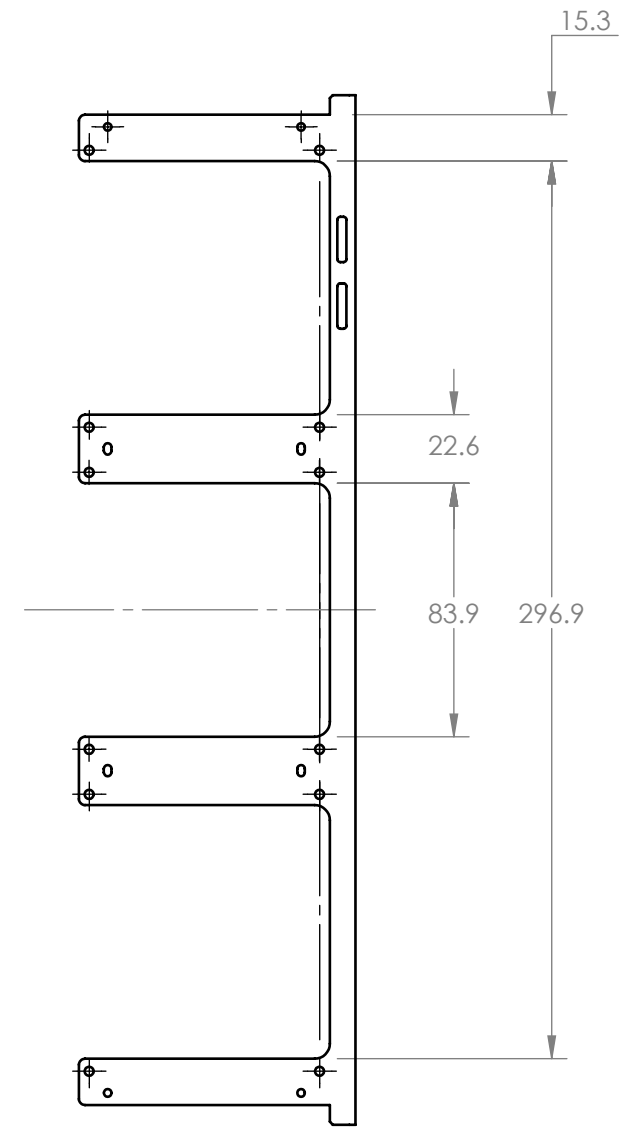
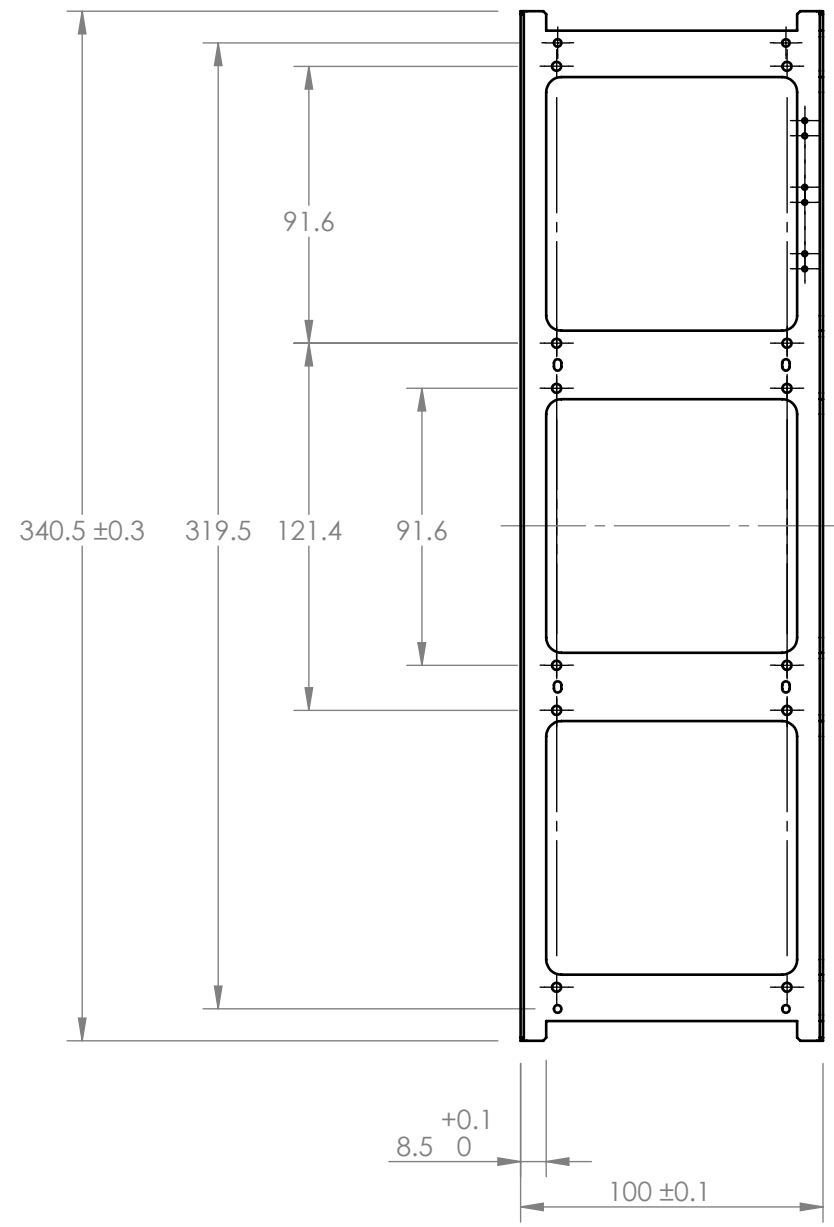
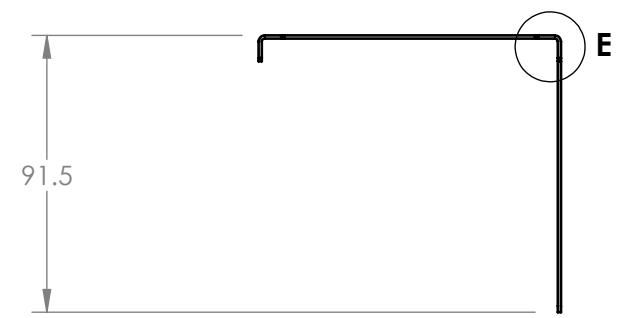
Mec E 460 Instructors: Dr. Lipsett & Prof. Moussa Fall 2016 Comments:	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: $\pm 0.5^\circ$ LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025 SURFACE FINISH μm 0.6 DO NOT SCALE DRAWING	DRAWN BY: Sharanya Reddy	The Department of Mechanical Engineering UNIVERSITY OF ALBERTA		
		Group name 	TITLE: Rail Face Subassembly		
MATERIAL: Various	Group number 6	SM By Shi An, Corbin Cooper	SIZE B	Part supplier/manufacturer Various	REV 2
FILE NAME: CSS-S301-Rail-Plate-Solar-Panel-Subassembly	Reviewed by Shi An, Shaan Muhammad	Monday, December 05, 2016 3:03:59 AM Saturday, November 12, 2016 7:07:16 PM	SCALE: 1:5	Mass: 132.46	SHEET 3 OF 18

8 7 6 5 4 3 2 1

D
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B
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DETAIL E
SCALE 2 : 1

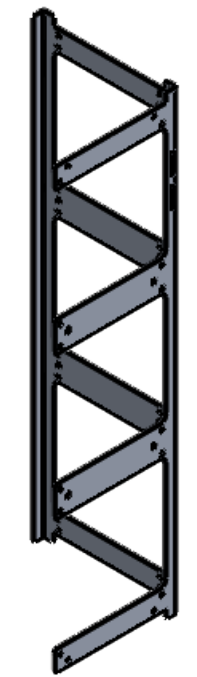
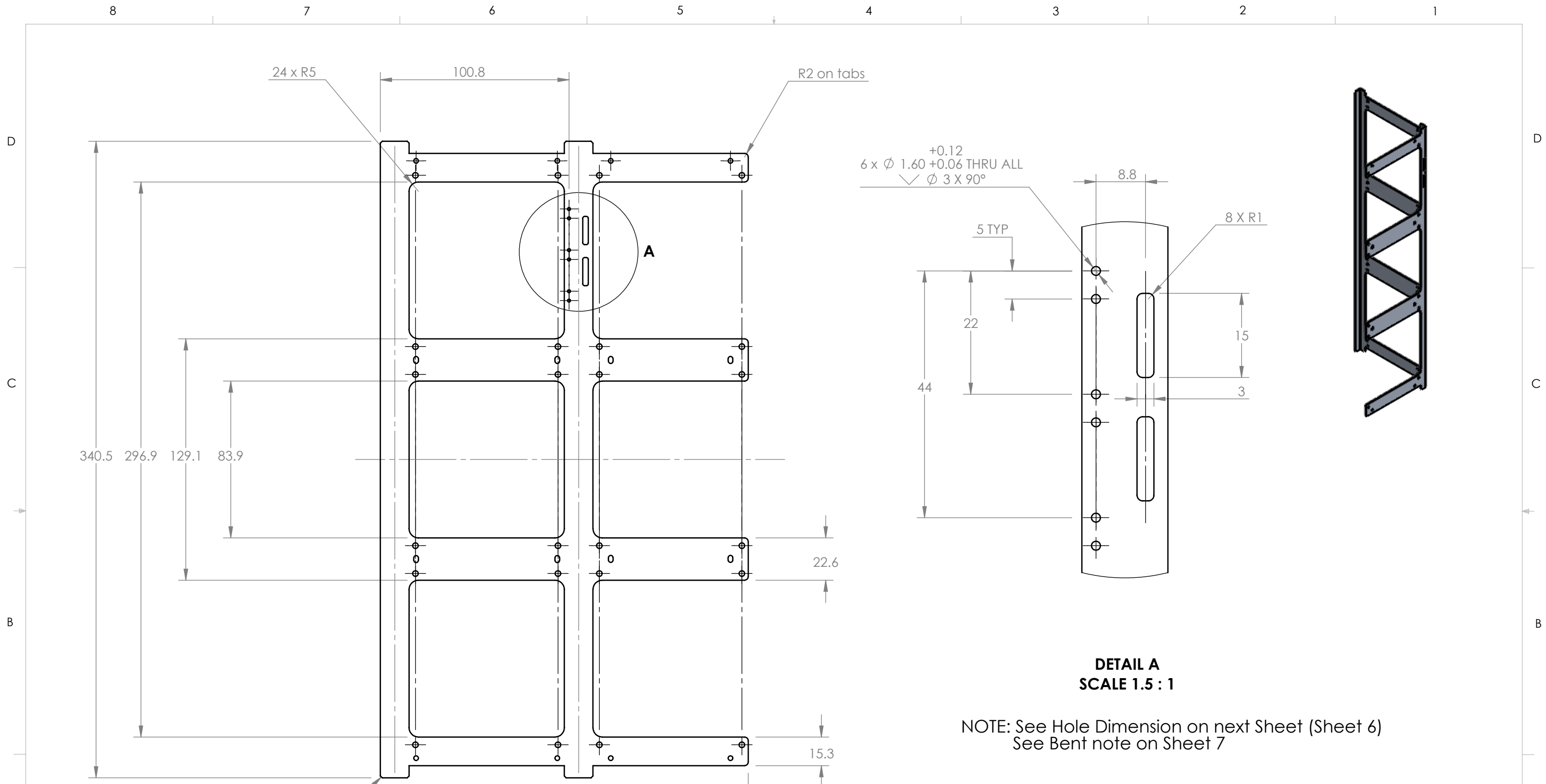




D
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Mec E 460 Instructors: Dr. Lipsett & Prof. Moussa Fall 2016 Comments: The aluminum is 0.04" thick		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: ± 0.5° LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025 SURFACE FINISH μm 0.6 ✓ DO NOT SCALE DRAWING	DRAWN BY: Sharanya Reddy Group name  Group number 6 SM By Shi An, Corbin Copper Reviewed by Shaan Muhammad Monday, December 05, 2016 3:03:59 AM Monday, October 17, 2016 10:37:18 PM	The Department of Mechanical Engineering UNIVERSITY OF ALBERTA TITLE: <h1>Rail Plate</h1>	
MATERIAL: Aluminum 5052		SIZE B		Part supplier/manufacturer Machine Shop	REV 1
FILE NAME: CSS-004-UAMS-Rail-Plate		SCALE: 1: 2.5		Mass: 62.13	SHEET 4 OF 18

8 7 6 5 4 3 2 1

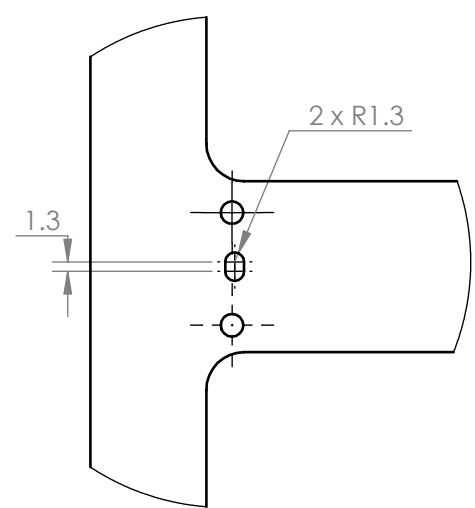
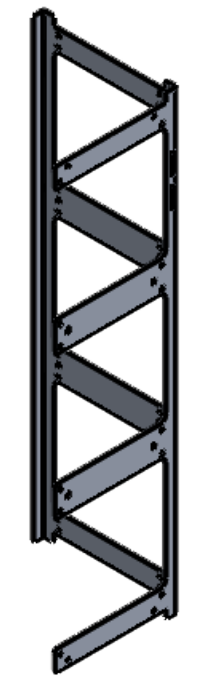
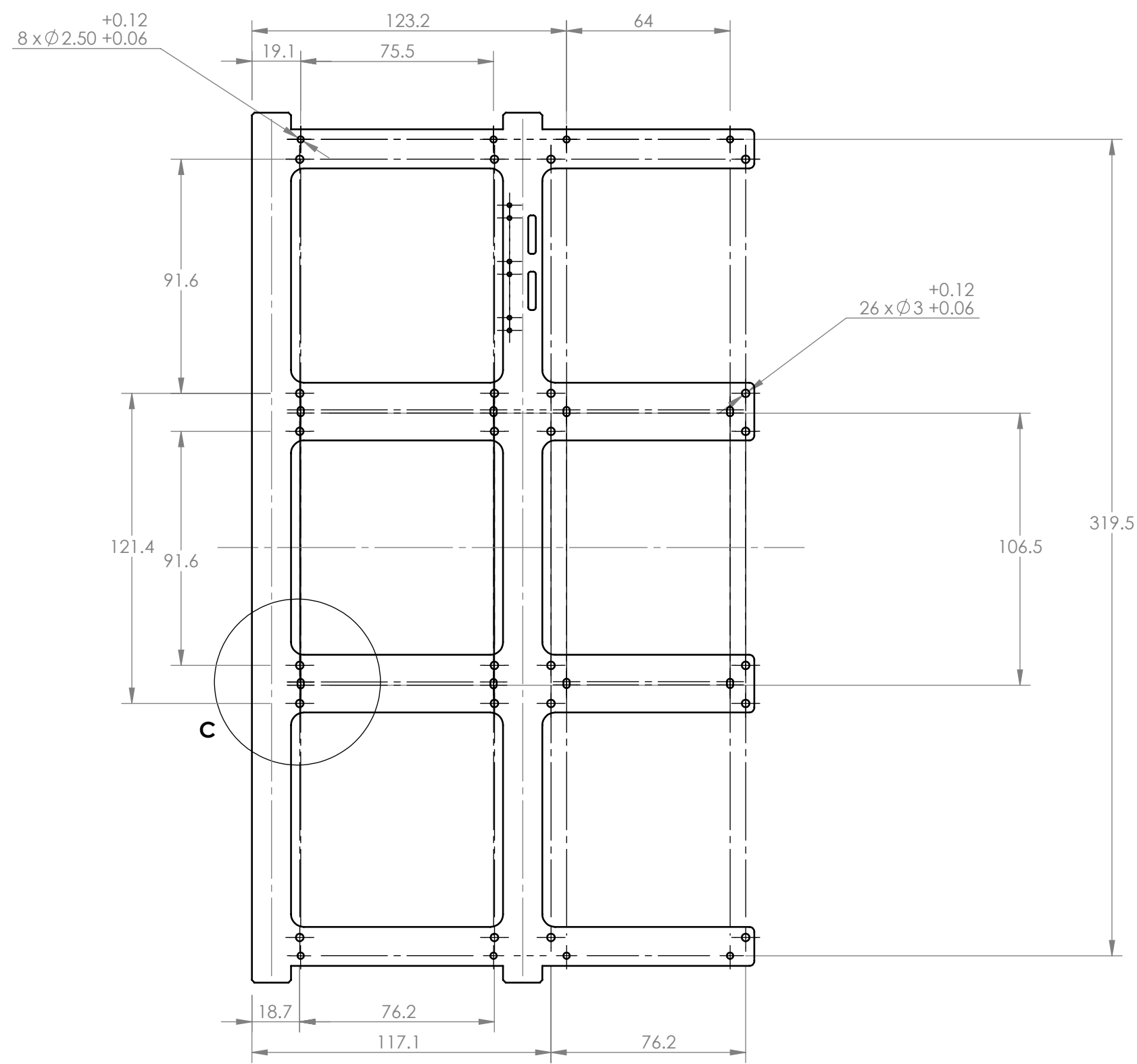


Mec E 460 Instructors: Dr. Lipsett & Prof. Moussa Fall 2016 Comments: The tthe aluminum is 0.04" thick		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: ± 0.5° LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025 SURFACE FINISH µm 0.6 ✓ DO NOT SCALE DRAWING		DRAWN BY: Sharanya Reddy Group name  Group number 6 SM By Shi An, Corbin Copper Reviewed by Shi An Monday, December 05, 2016 10:45:39 AM Monday, October 17, 2016 10:37:18 PM		 The Department of Mechanical Engineering UNIVERSITY OF ALBERTA TITLE: <h1>Rail Plate</h1>	
MATERIAL: Aluminum 5052 FILE NAME: CSS-004-UAMS-Rail-Plate		SIZE B		Part supplier/manufacturer Machine Shop		REV 1	
		SCALE: 1: 2		Mass: 62.13		SHEET 5 OF 18	

8 7 6 5 4 3 2 1

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C
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A

D
C
B
A



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Mec E 460 Instructors: Dr. Lipsett & Prof. Moussa Fall 2016 Comments: The aluminum is 0.04" thick		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: $\pm 0.5^\circ$ LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025 SURFACE FINISH μm 0.6 DO NOT SCALE DRAWING	DRAWN BY: Sharanya Reddy Group name: Group number: 6 SM By: Shi An, Corbin Copper Reviewed by: Shi An Monday, December 05, 2016 10:45:39 AM Monday, October 17, 2016 10:37:18 PM	The Department of Mechanical Engineering UNIVERSITY OF ALBERTA TITLE: <h1>Rail Plate</h1>
MATERIAL: Aluminum 5052 FILE NAME: CSS-004-UAMS-Rail-Plate		SIZE B Part supplier/manufacturer Machine Shop	REV SCALE: 1: 2 Mass: 62.13 SHEET 6 OF 18	

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

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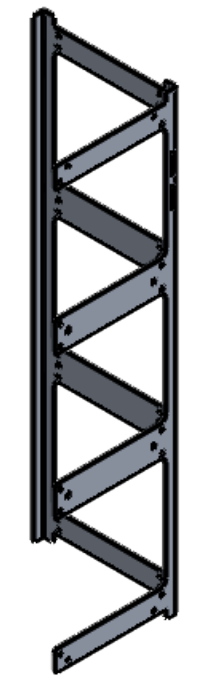
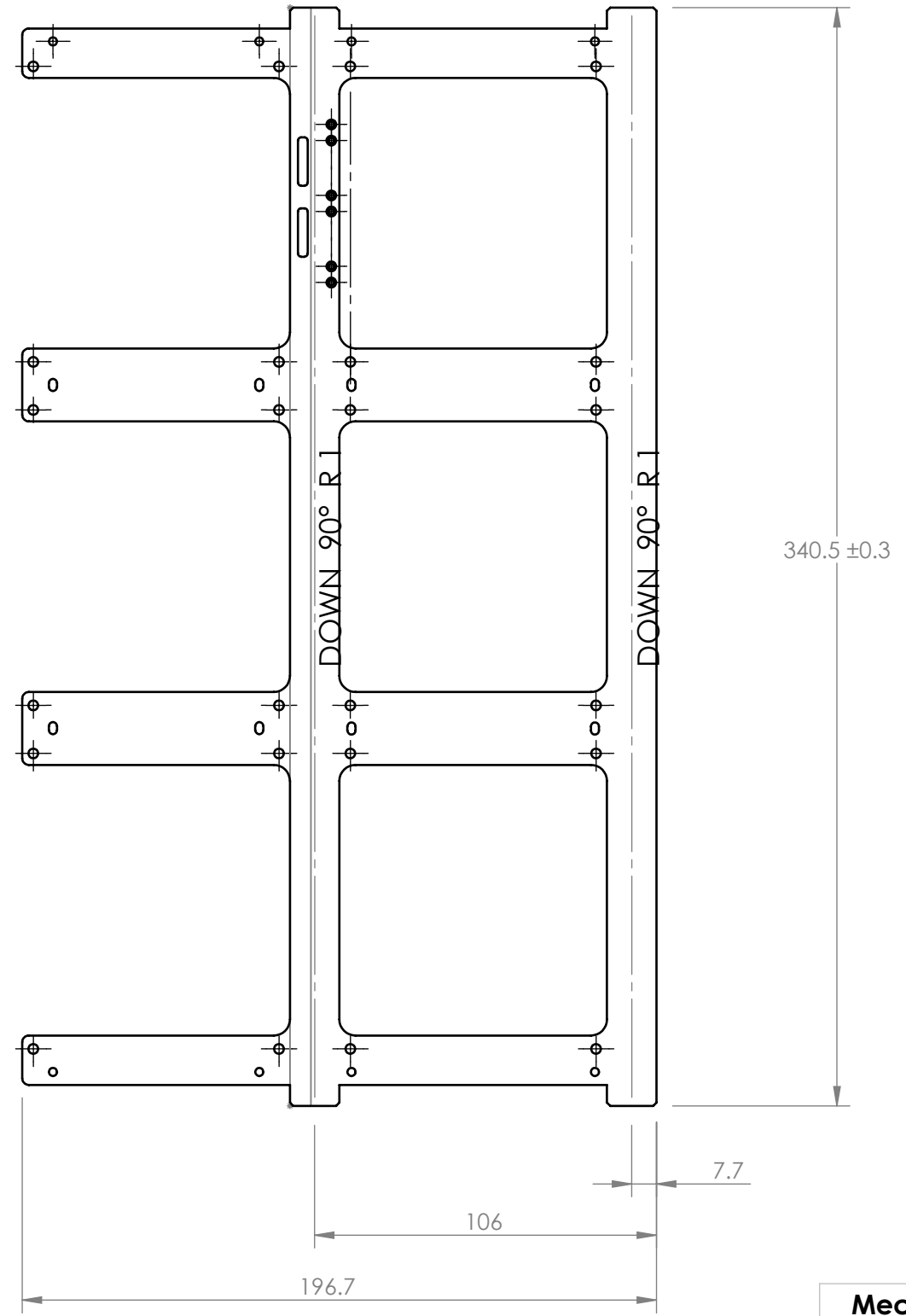
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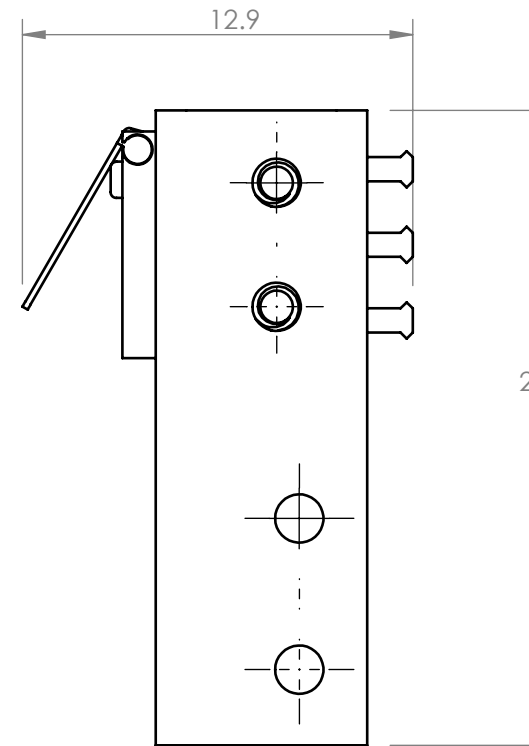
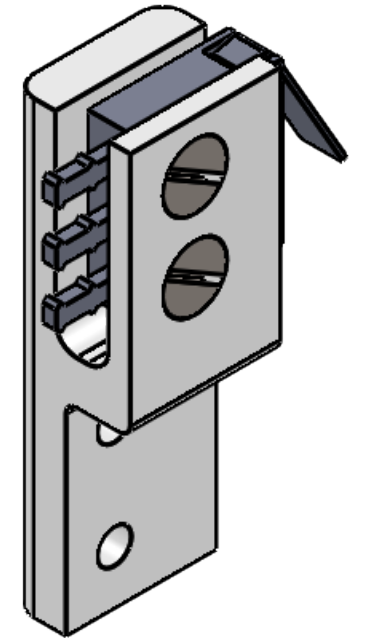
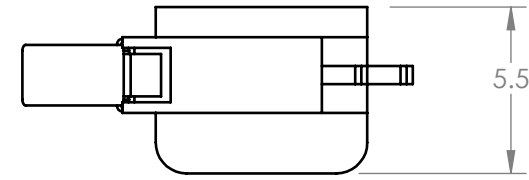
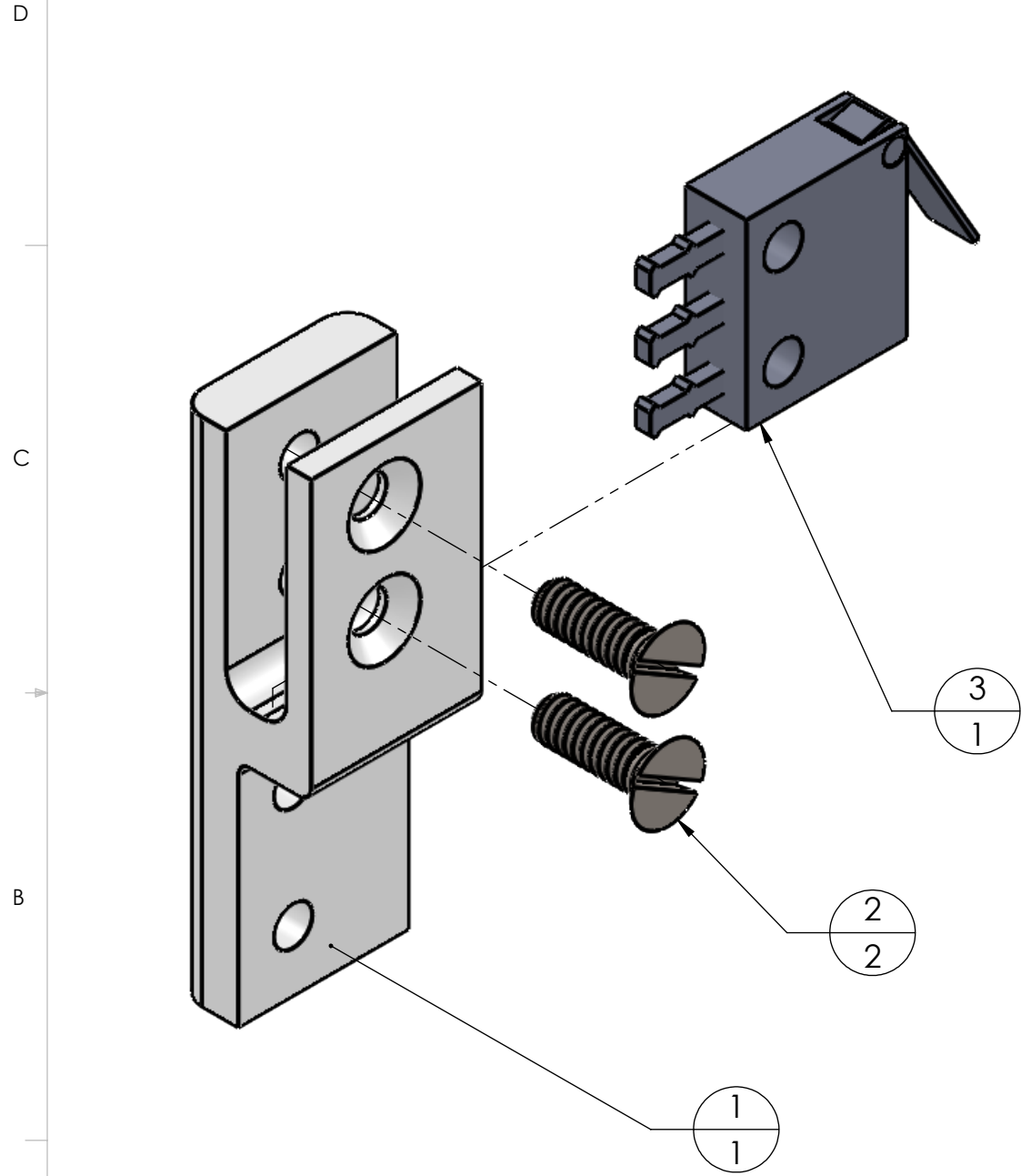


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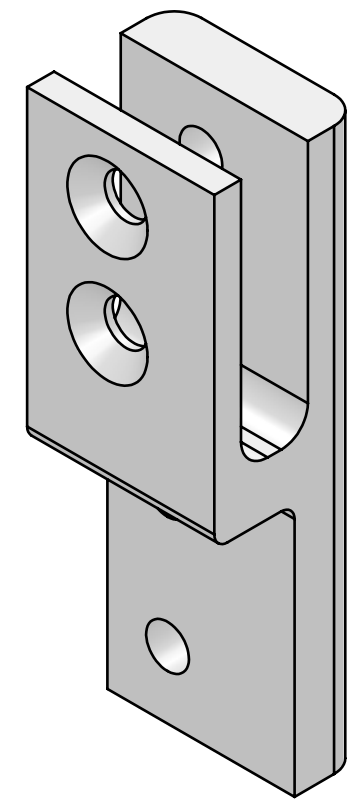
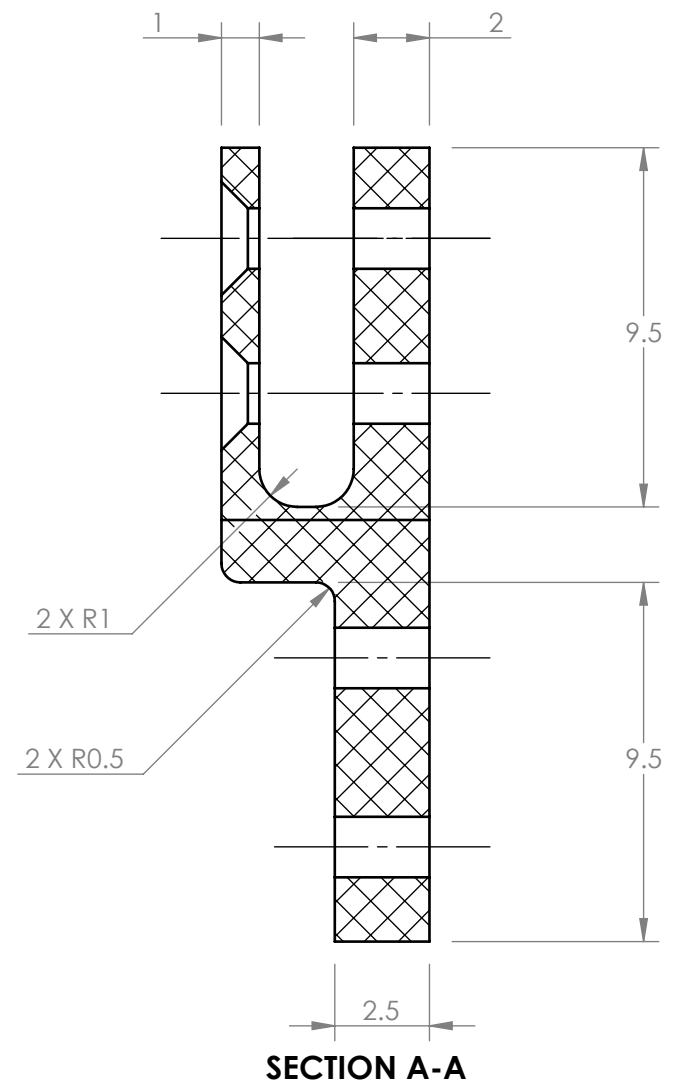
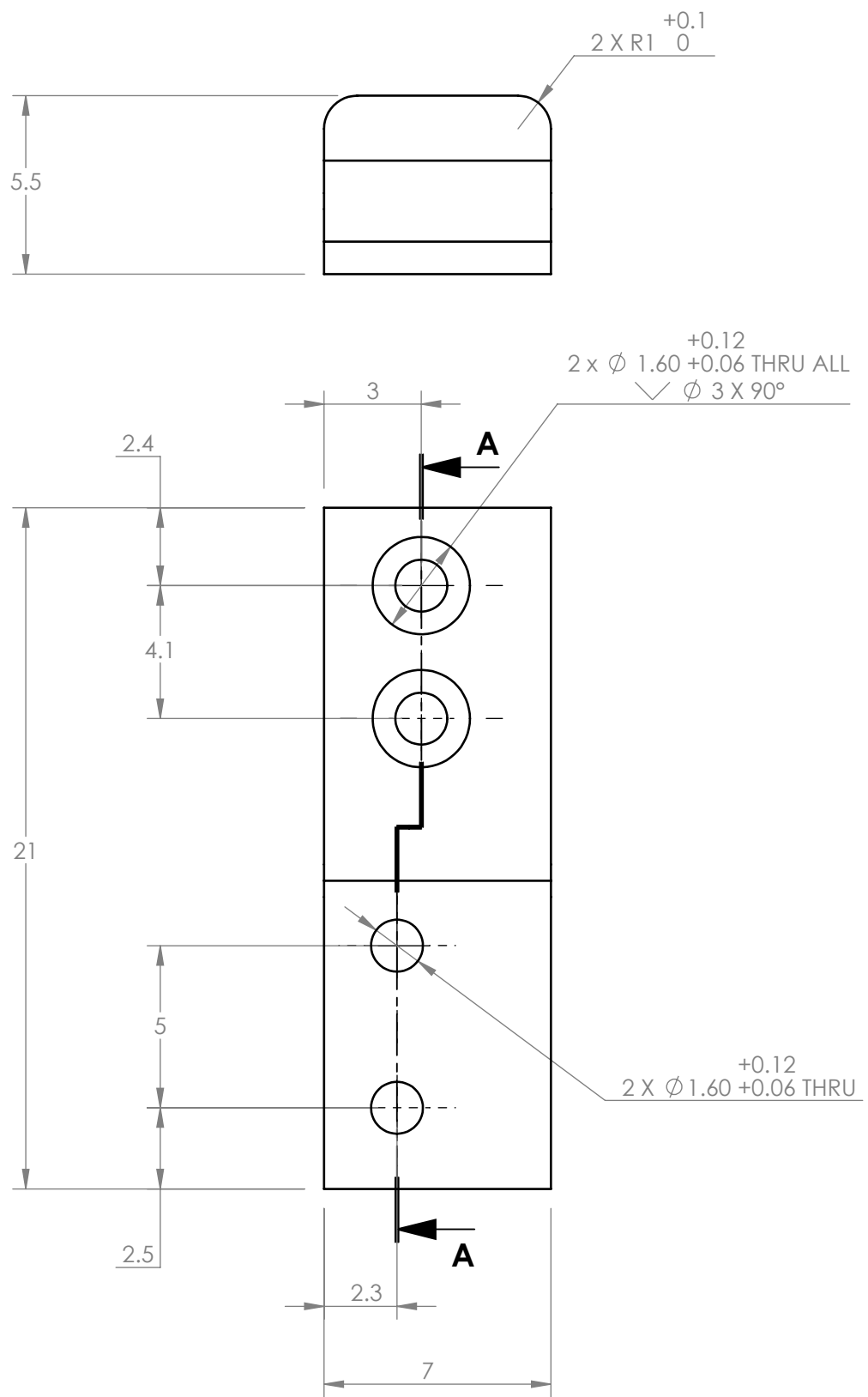
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Instructors: Dr. Lipsett & Prof. Moussa Fall 2016		DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: ± 0.5° LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025		Sharanya Reddy		TITLE:	
Comments: The aluminum is 0.04" thick		SURFACE FINISH µm 0.6 ✓		Group name 		Rail Plate	
		DO NOT SCALE DRAWING		Group number 6		Part supplier/manufacturer	
MATERIAL: Aluminum 5052				SM By Shi An, Corbin Copper		REV 1	
FILE NAME: CSS-004-UAMS-Rail-Plate				Reviewed by Shi An		Machine Shop	
				Monday, December 05, 2016 10:45:39 AM Monday, October 17, 2016 10:37:18 PM		SCALE: 1: 2	
						Mass: 62.13	
						SHEET 7 OF 18	

8 7 6 5 4 3 2 1

ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR	MFG NO.	QTY.
1	CSS-020-UAMS-Switch-Mount-1	Kill Switch Bracket	Machine Shop	-	1
2	91430A005	M1.6 x 0.35 Bolt	McMaster Carr	91430A005	2
3	CSS-019-ISIS-Kill-Switch	Micro switch	Honywell	ZX40E10C01	1



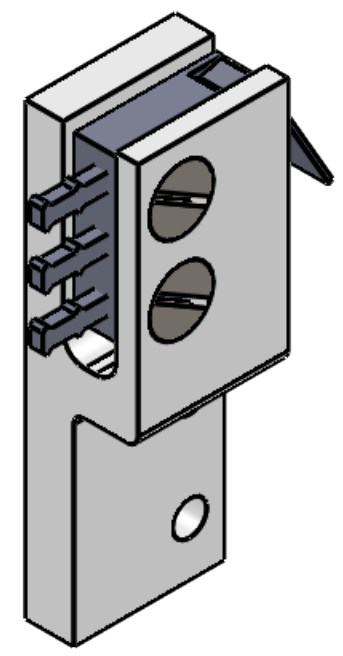
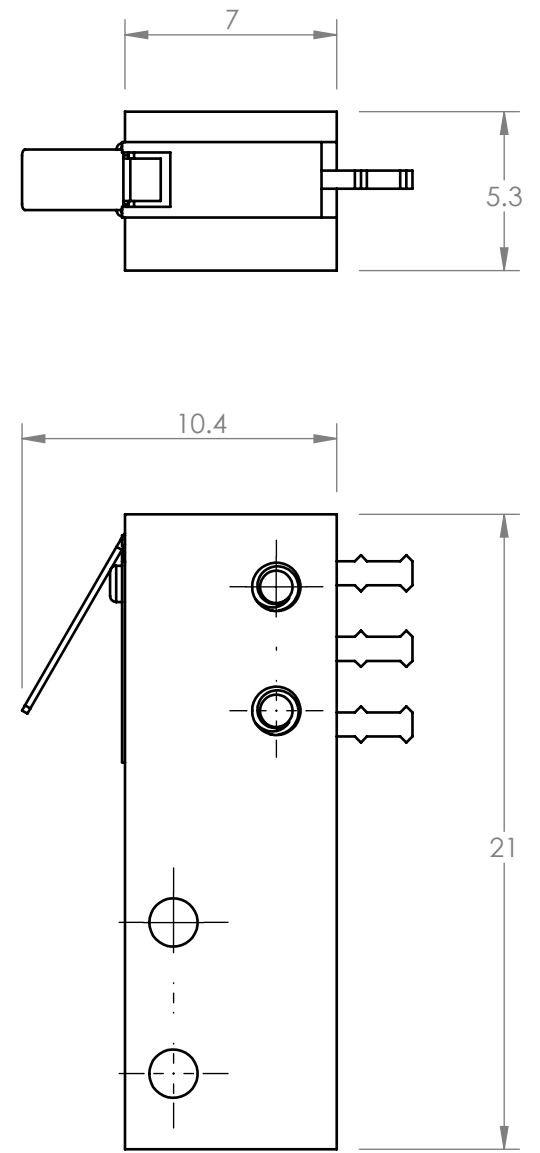
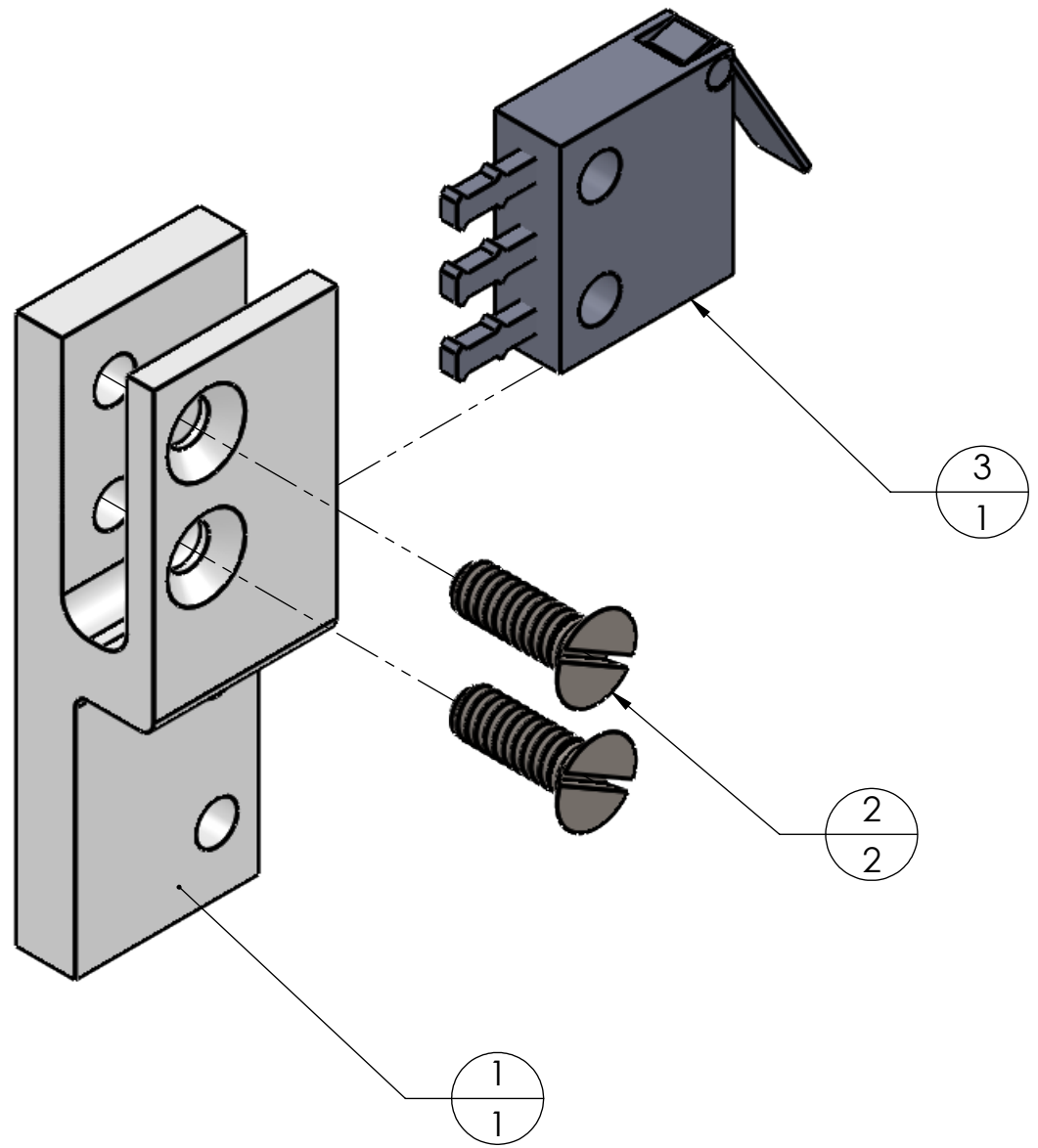
Mec E 460 Instructors: Dr. Lipsett & Prof. Moussa Fall 2016 Comments:	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: $\pm 0.5^\circ$ LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025 SURFACE FINISH μm 0.6 ✓ DO NOT SCALE DRAWING	DRAWN BY: Sharanya Reddy	The Department of Mechanical Engineering UNIVERSITY OF ALBERTA		
		Group name 		TITLE: Kill Switch Subassembly	
MATERIAL: Various	Group number 6	SM By Shi An	SIZE B	Part supplier/manufacturer Various	REV 1
FILE NAME: CSS-S111-Kill-Switch-Assembly-1	Reviewed by Shi An	Sunday, December 04, 2016 7:56:19 PM Monday, November 21, 2016 6:30:49 PM	SCALE: 4:1	Mass: 0.68	SHEET 8 OF 18



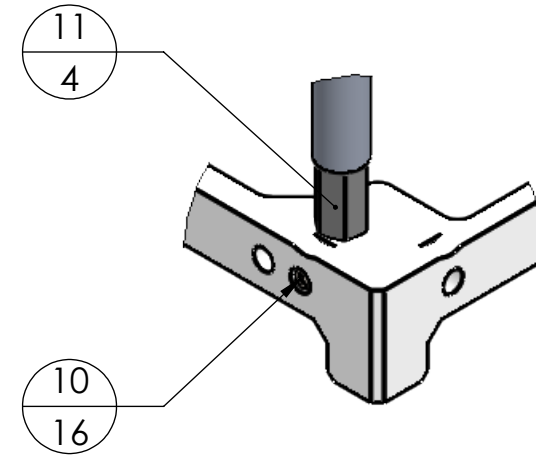
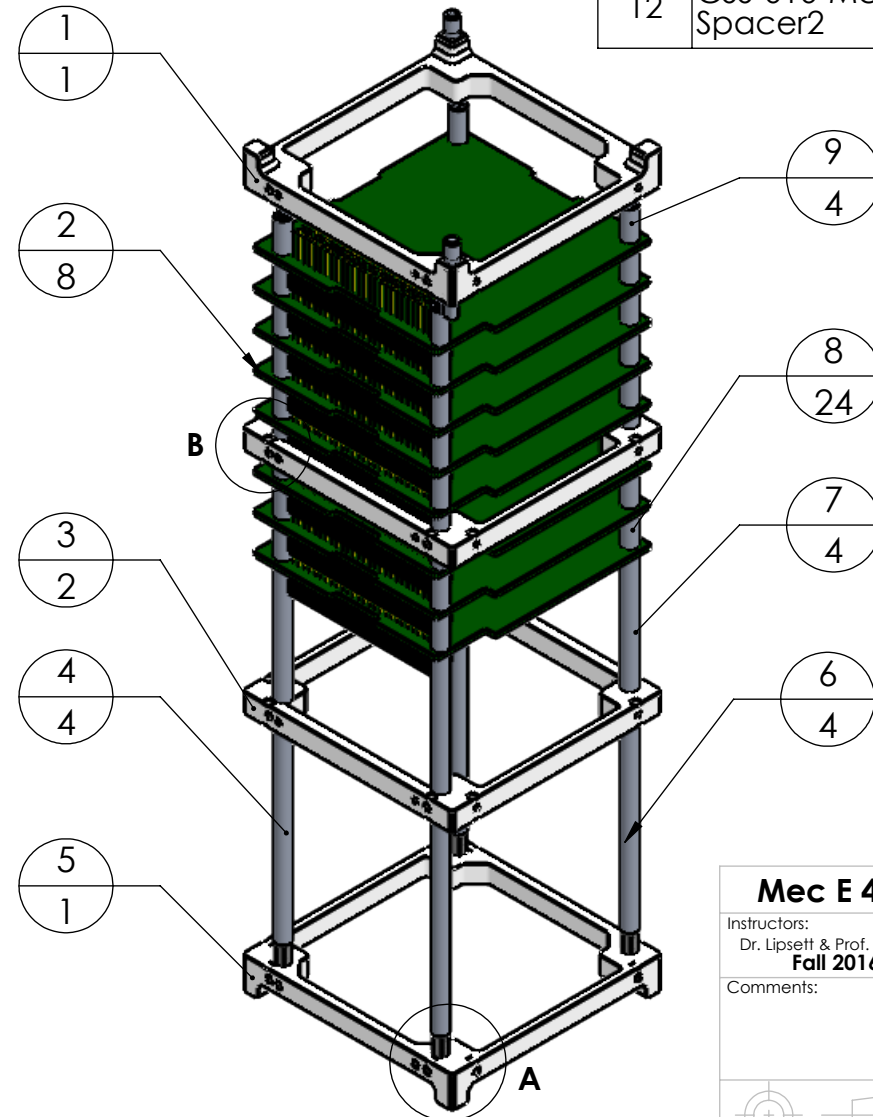
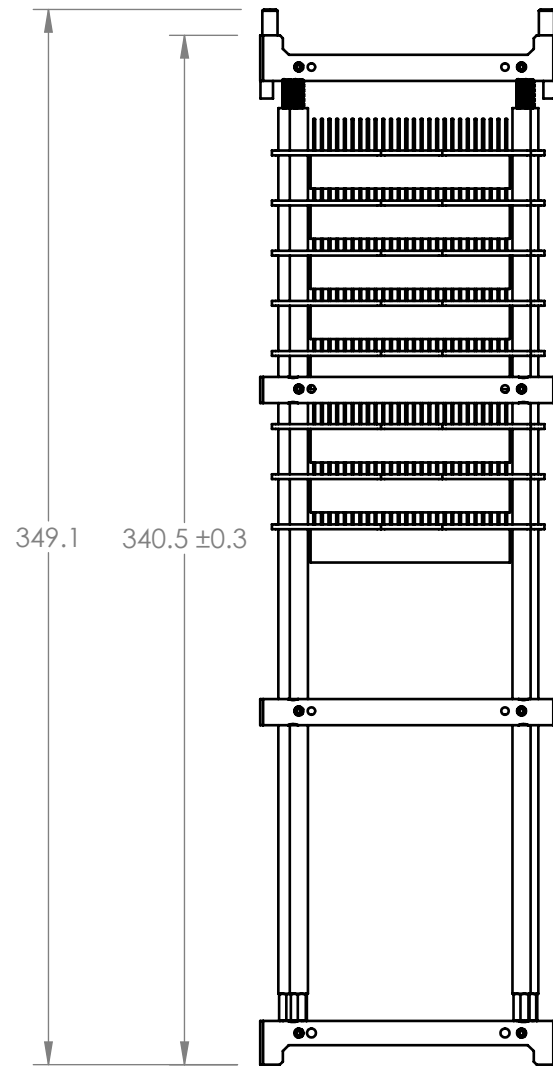
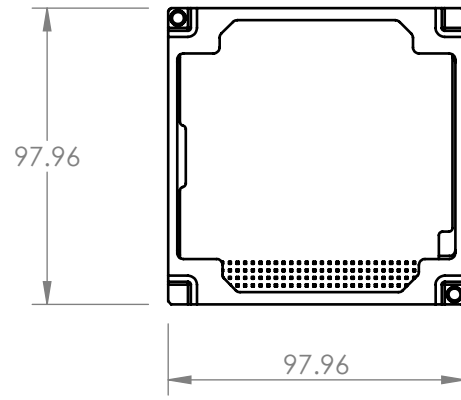
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Mec E 460		UNLESS OTHERWISE SPECIFIED:		DRAWN BY:		The Department of Mechanical Engineering UNIVERSITY OF ALBERTA	
Instructors: Dr. Lipsett & Prof. Moussa Fall 2016		DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: $\pm 0.5^\circ$ LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025		Sharanya Reddy		TITLE:	
Comments: The part is 3D printed		SURFACE FINISH μm 0.6		Group name		Kill Switch Bracket	
		DO NOT SCALE DRAWING				SIZE	
MATERIAL: ABS				Group number		Part supplier/manufacturer	
FILE NAME: CSS-020-UAMS-Switch-Mount-1				SM By		Machine Shop	
				Reviewed by		REV	
				Shi An		1	
				Sunday, December 04, 2016 8:15:21 PM Monday, November 21, 2016 6:18:31 PM		SCALE: 5:1	
						Mass: 0.42	
						SHEET 9 OF 18	

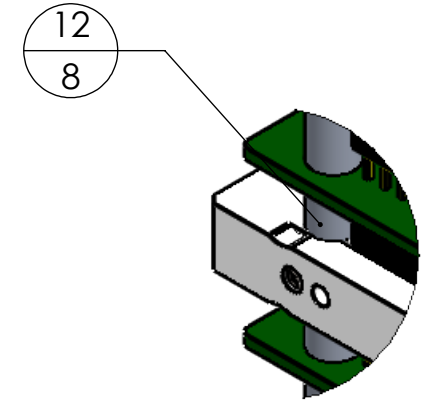
ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR	MFG NO.	QTY.
1	CSS-023-UAMS-Switch-Mount-2	Deployment switch bracket	-	-	1
2	91430A005	M1.6 X 0.35 Bolt	McMaster	91430A005	2
3	CSS-019-ISIS-Kill-Switch	Micro Switch	Honywell	ZX40E10C01	1



Mec E 460 Instructors: Dr. Lipsett & Prof. Moussa Fall 2016 Comments:	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: $\pm 0.5^\circ$ LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025 SURFACE FINISH μm 0.6 DO NOT SCALE DRAWING	DRAWN BY: Sharanya Reddy	The Department of Mechanical Engineering UNIVERSITY OF ALBERTA		
		Group name 	TITLE: Deployment Switch Subassembly		
MATERIAL: Various	Group number 6	SM By Shi An	SIZE B	Part supplier/manufacturer Various	REV 1
FILE NAME: CSS-S112-Kill-Switch-Assembly-2	Reviewed by Shi An	Sunday, December 04, 2016 8:41:23 PM Monday, November 21, 2016 6:30:49 PM	SCALE: 4:1	Mass: 0.66	SHEET 10 OF 18



DETAIL A
SCALE 1.25 : 1



DETAIL B
SCALE 1.25 : 1

ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR	MFG. NO.	QTY.
1	CSS-S204	Top Bracket Subassembly	-	-	1
2	CSS-006-PCB	Printed Circuit Board	ISIS Space	-	8
3	CSS-002	Middle Bracket	Machine Shop	-	2
4	CSS-016	88.86 mm Spacer	McMaster Carr	94669A019	4
5	CSS-003-UAMS-Bottom-Bracket	Bottom Bracket	Machine Shop	-	1
6	CSS-005-McMasterCarrRod	1/8" Threaded Rod	McMaster Carr	98920A006	4
7	CSS-017-McMasterCarr-PCB-Spacer5	56.14 mm Spacer	McMaster Carr	94669A019	4
8	CSS-007-McMasterCarr-PCB-Spacer	15 mm Spacer	McMaster Carr	94669A019	24
9	CSS-011-McMasterCarr-PCB-Spacer3	14.01 mm Spacer	McMaster Carr	94669A019	4
10	92029A101	M3x0.5 Set Screw	McMaster Carr	92029A101	16
11	93590A103	5-40 Hex Nut	McMaster Carr	93590A103	4
12	CSS-010-McMasterCarr-PCB-Spacer2	7 mm Spacer	McMaster Carr	94669A019	8

Mec E 460

Instructors:
Dr. Lipsett & Prof. Moussa
Fall 2016

Comments:



MATERIAL: Various

FILE NAME: CSS-S302-Central-Stack

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN MM
TOLERANCES:
ANGULAR: ± 0.5°
LINEAR
X = ± 0.5
X.X = ± 0.1
X.XX = ± 0.025

SURFACE FINISH
µm 0.6

DO NOT SCALE DRAWING

DRAWN BY:

Shi An

Group name



Group number

6

SM By

Corbin Cooper, Shi An

Reviewed by

Sharanya Reddy

Monday, December 05, 2016 2:09:11 AM
Saturday, December 03, 2016 1:35:34 PM



The Department of Mechanical Engineering
UNIVERSITY OF ALBERTA

TITLE:
Central Stack Subassembly

SIZE

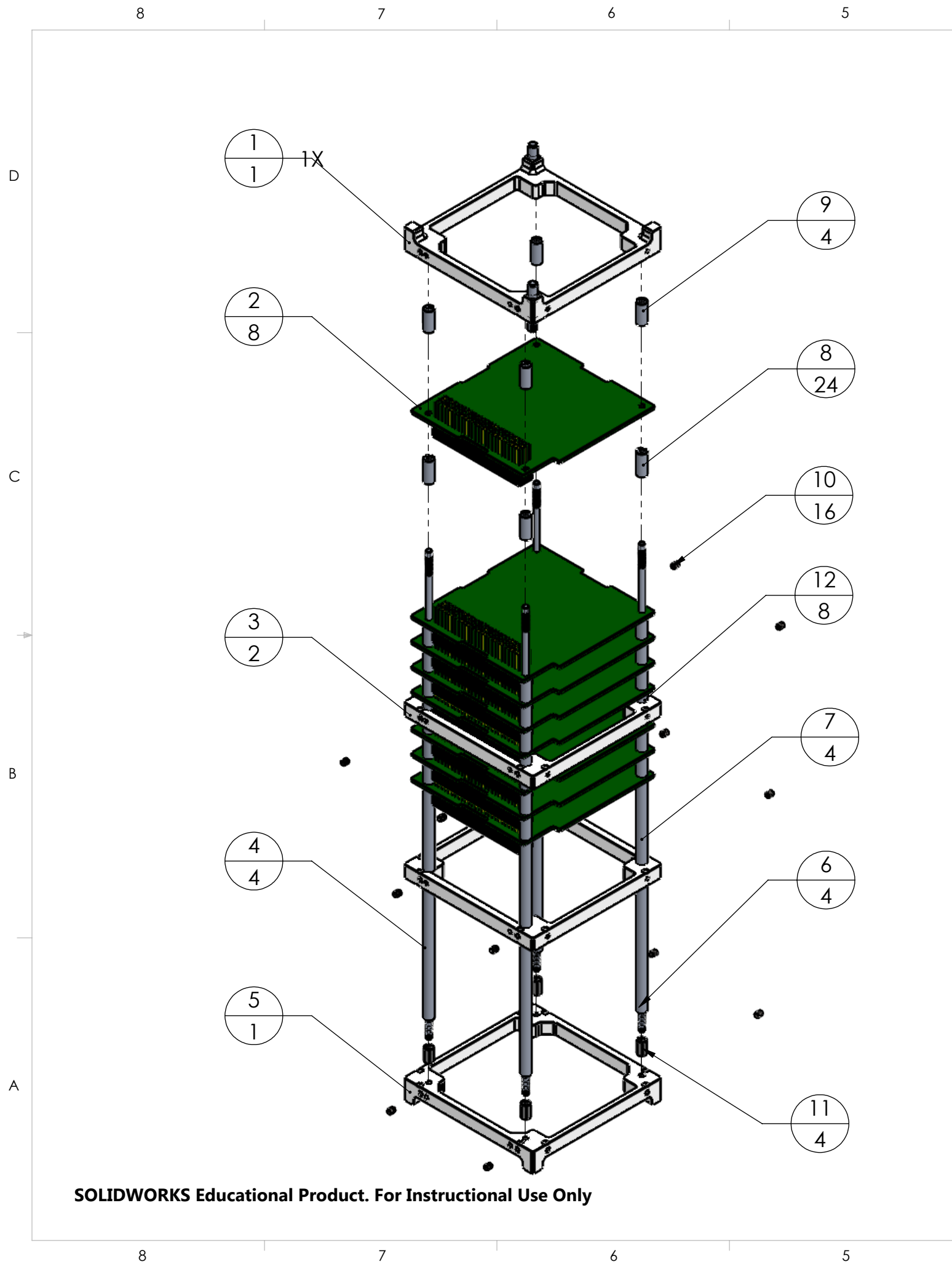
Part supplier/manufacturer

REV

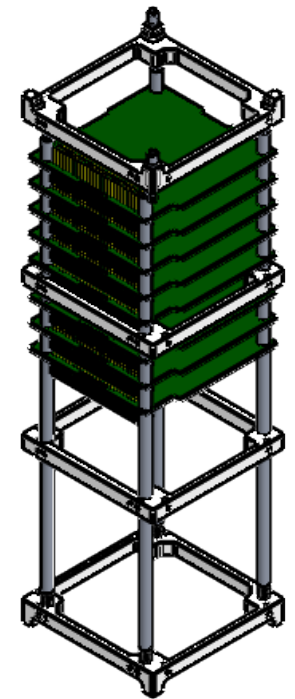
B

Various

1



ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR	MFG. NO.	QTY.
1	CSS-S204	Top Bracket Subassembly	-	-	1
2	CSS-006-PCB	Printed Circuit Board	ISIS Space	-	8
3	CSS-002	Middle Bracket	Machine Shop	-	2
4	CSS-016	88.86 mm Spacer	McMaster Carr	94669A019	4
5	CSS-003-UAMS-Bottom-Bracket	Bottom Bracket	Machine Shop	-	1
6	CSS-005-McMasterCarrRod	1/8" Threaded Rod	McMaster Carr	98920A006	4
7	CSS-017-McMasterCarr-PCB-Spacer5	56.14 mm Spacer	McMaster Carr	94669A019	4
8	CSS-007-McMasterCarr-PCB-Spacer	15 mm Spacer	McMaster Carr	94669A019	24
9	CSS-011-McMasterCarr-PCB-Spacer3	14.01 mm Spacer	McMaster Carr	94669A019	4
10	92029A101	M3x0.5 Set Screw	McMaster Carr	92029A101	16
11	93590A103	5-40 Hex Nut	McMaster Carr	93590A103	4
12	CSS-010-McMasterCarr-PCB-Spacer2	7 mm Spacer	McMaster Carr	94669A019	8

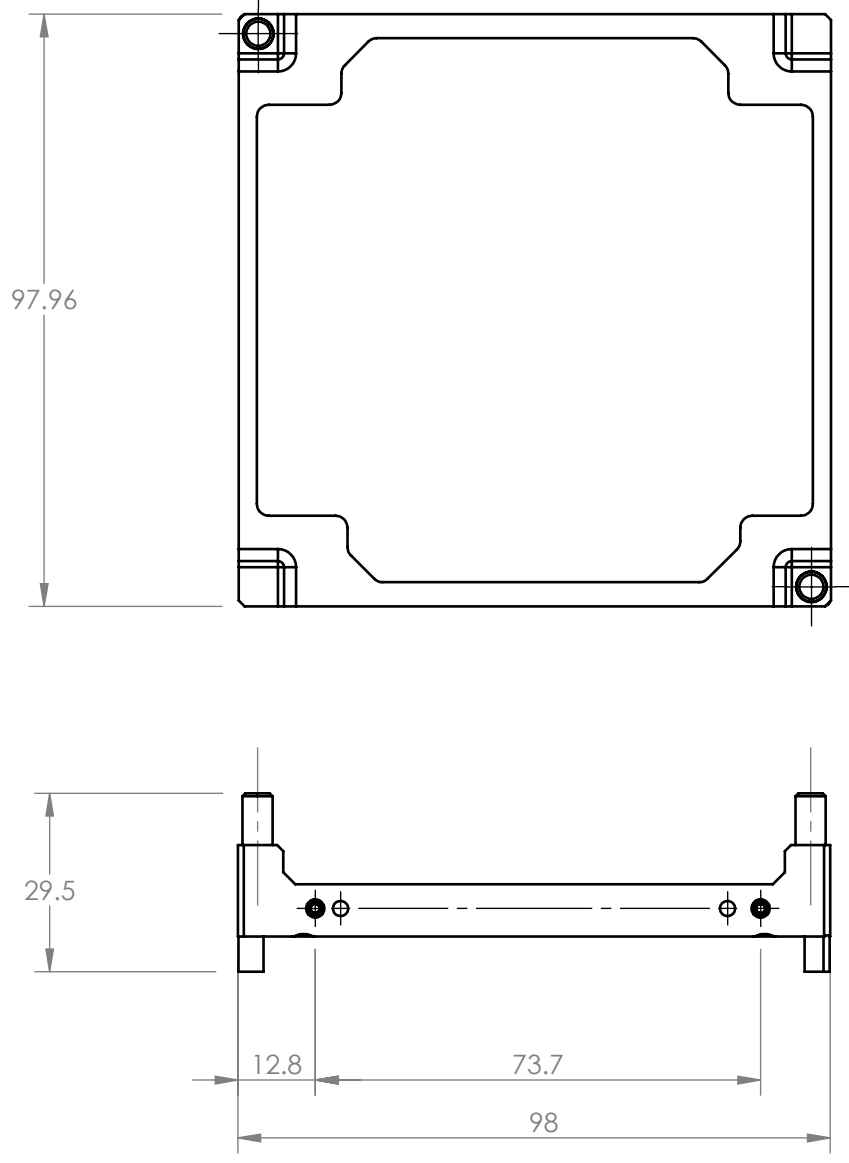
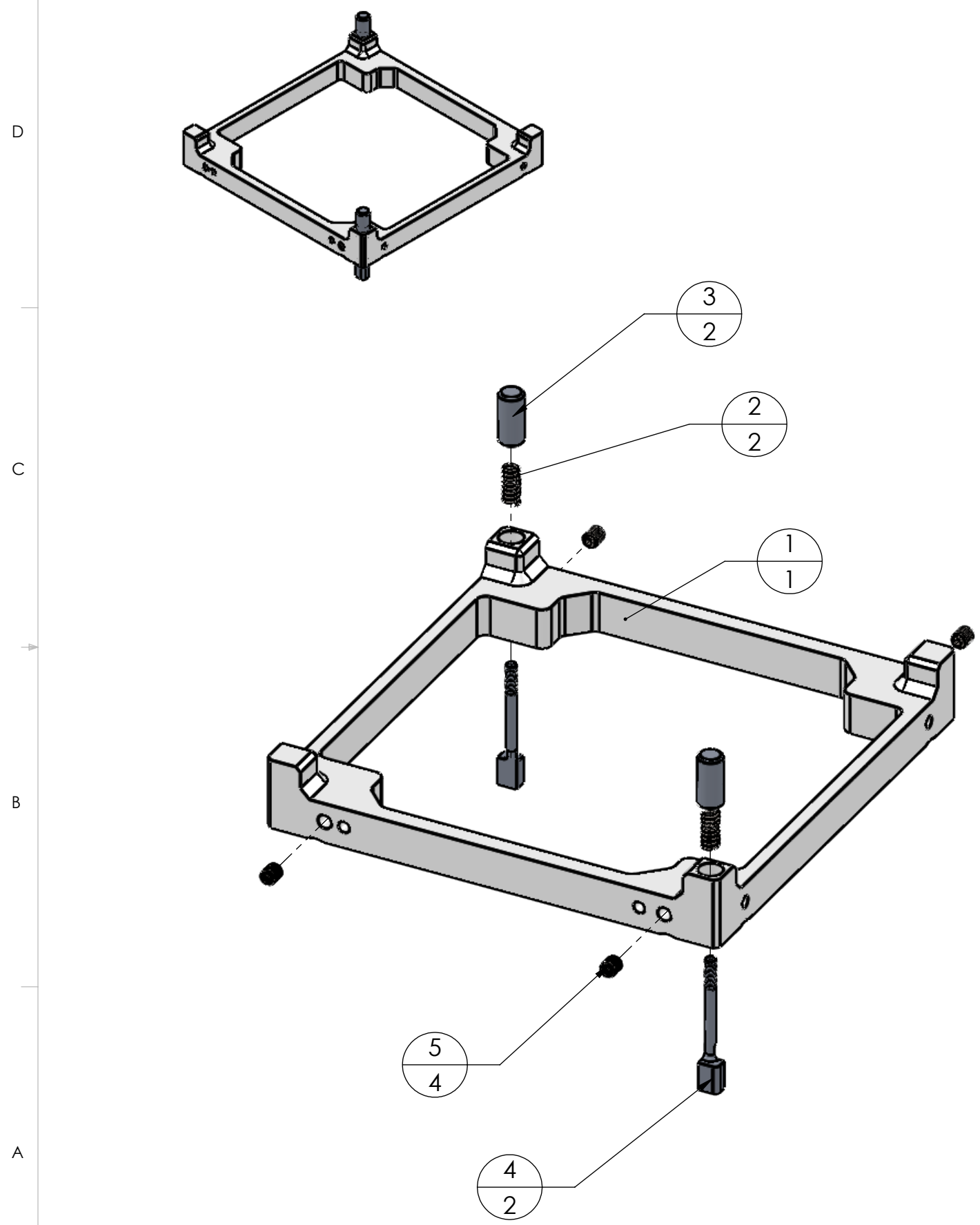


Mec E 460 Instructors: Dr. Lipsett & Prof. Moussa Fall 2016 Comments:		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: $\pm 0.5^\circ$ LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025 SURFACE FINISH μm 0.6 DO NOT SCALE DRAWING		DRAWN BY: Shi An Group name: Group number: 6 SM By: Corbin Cooper, Shi An Reviewed by: Sharanya Reddy Monday, December 05, 2016 2:09:11 AM Saturday, December 03, 2016 1:35:34 PM		 The Department of Mechanical Engineering UNIVERSITY OF ALBERTA TITLE: Central Stack Subassembly			
MATERIAL: Various		FILE NAME: CSS-S302-Central-Stack		SIZE B		Part supplier/manufacturer Various		REV 1	
SCALE: 1:2.5				Mass: 445.72 g		SHEET 12 OF 18			




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8 7 6 5 4 3 2 1

ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR	MFG. NO.	QTY.
1	CSS-S204-Top-Bracket-Subassembly	Top Bracket	Machine shop	-	1
2	CSS-014-Spring	Compression spring	-	-	2
3	CSS-013-UAMS-Planger	Cap for deploym. switch	Machine shop	-	2
4	CSS-012-UAMS-Shaft	Plunger shaft	Machine shop	-	2
5	92029A101	M3 set screw	McMaster Carr	92029A101	4



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Mec E 460 Instructors: Dr. Lipsett & Prof. Moussa Fall 2016 Comments:  MATERIAL: Various FILE NAME: CSS-S204-Top-Bracket-Subassembly	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: $\pm 0.5^\circ$ LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025 SURFACE FINISH μm 0.6 DO NOT SCALE DRAWING	DRAWN BY: Shi An	 The Department of Mechanical Engineering UNIVERSITY OF ALBERTA		
		Group name 	TITLE: Top Bracket Subassembly		
		Group number 6	Size B	Part supplier/manufacturer Various	REV 1
		SM By Corbin Cooper, Shi An	SCALE: 1:1	Mass: 20.09	SHEET 13 OF 18
		Reviewed by Sharanya Reddy Monday, December 05, 2016 3:19:38 AM Saturday, December 03, 2016 8:06:00 PM			

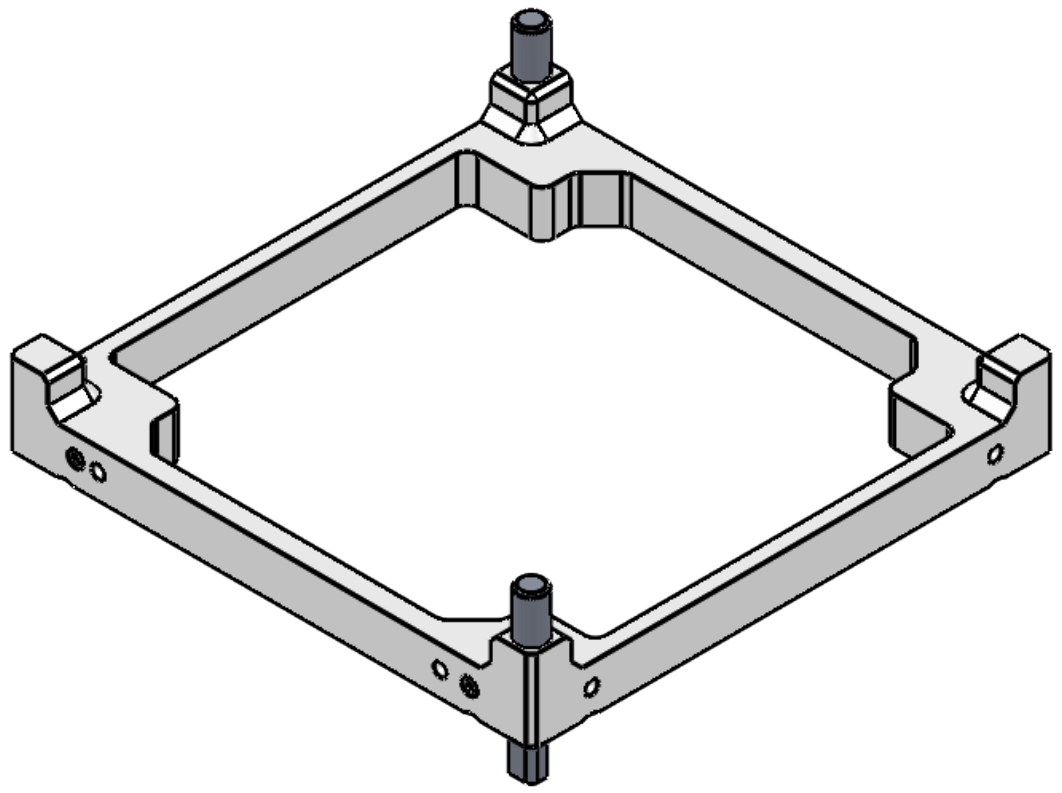
8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

ITEM NO.	PART NUMBER	DESCRIPTION	VENDOR	MFG. NO.	QTY.
1	CSS-S204-Top-Bracket-Subassembly	Top Bracket	Machine shop	-	1
2	CSS-014-Spring	Compression spring	-	-	2
3	CSS-013-UAMS-Planger	Cap for deploy. switch	Machine shop	-	2
4	CSS-012-UAMS-Shaft	Plunger shaft	Machine shop	-	2
5	92029A101	M3 set screw	McMaster Carr	92029A101	4

D

D

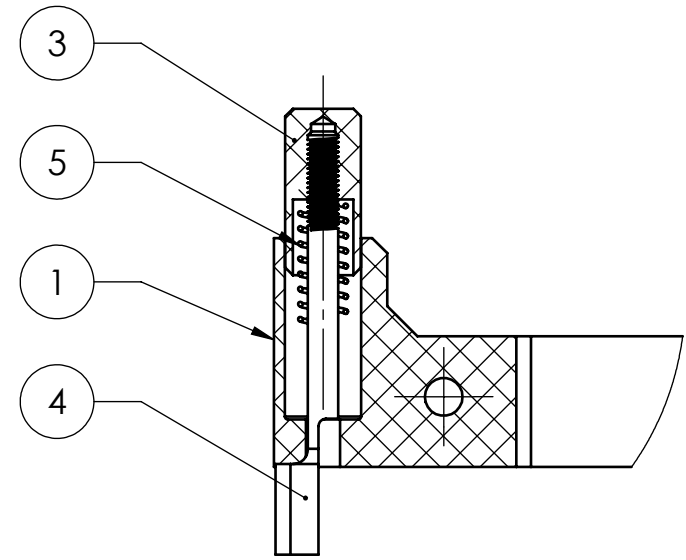
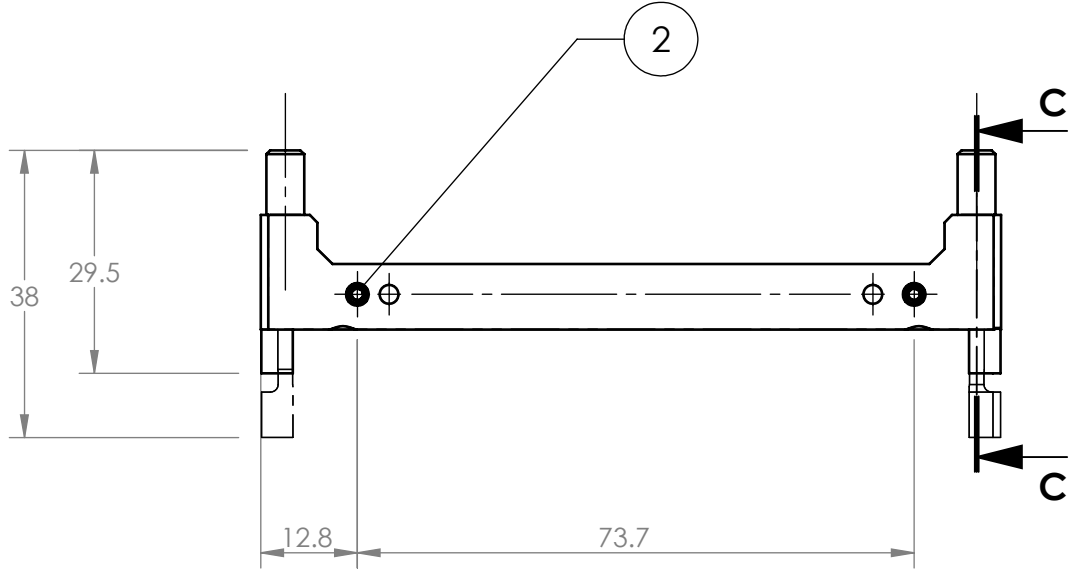


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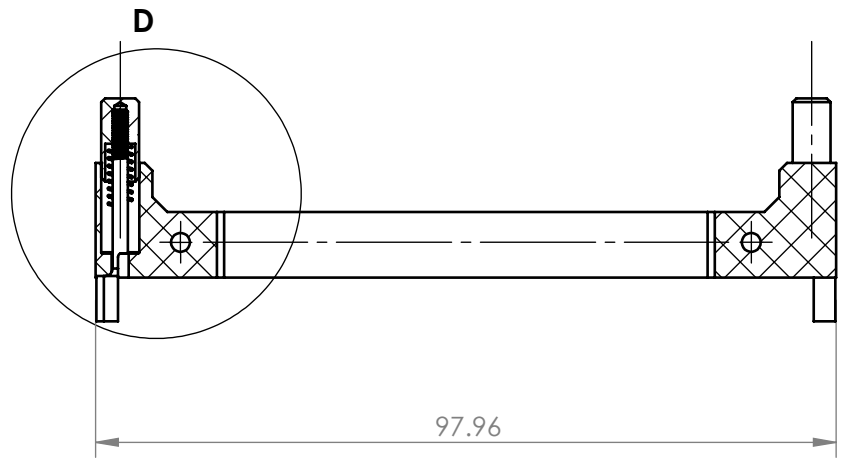
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B

B



DETAIL D
SCALE 2 : 1



SECTION C-C
SCALE 1 : 1

A

A

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Mec E 460		UNLESS OTHERWISE SPECIFIED:		DRAWN BY:		The Department of Mechanical Engineering UNIVERSITY OF ALBERTA	
Instructors: Dr. Lipsett & Prof. Moussa Fall 2016		DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: ± 0.5° LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025		Shi An		TITLE: Top Bracket Subassembly	
Comments:		SURFACE FINISH µm 0.6		Group name 		Part supplier/manufacturer	
		DO NOT SCALE DRAWING		Group number 6		REV 1	
MATERIAL: Various				SM By Corbin Cooper, Shi An		SIZE B	
FILE NAME: CSS-S204-Top-Bracket-Subassembly				Reviewed by Sharanya Reddy		Various	
				Monday, December 05, 2016 3:19:38 AM Saturday, December 03, 2016 8:06:00 PM		SCALE: 1:1	
						Mass: 20.09	
						SHEET 14 OF 18	

8 7 6 5 4 3 2 1

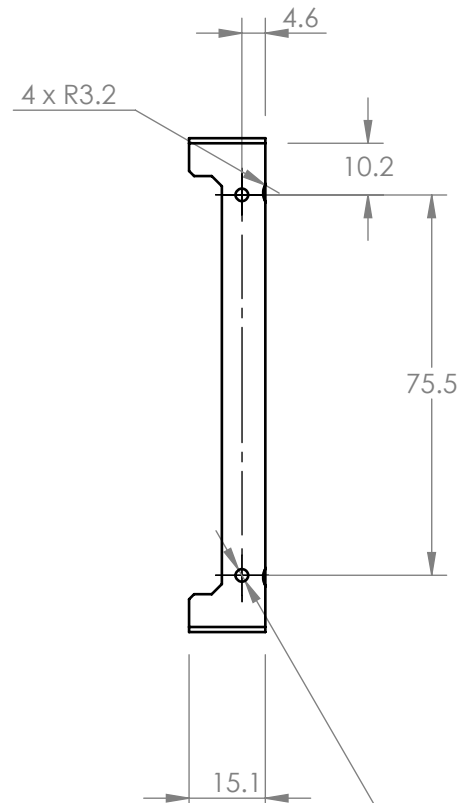
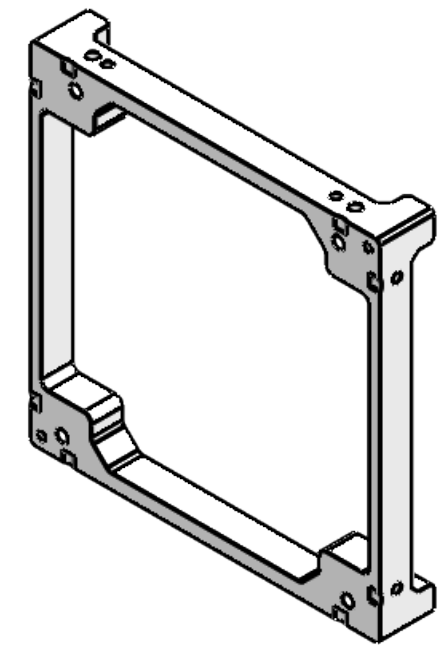
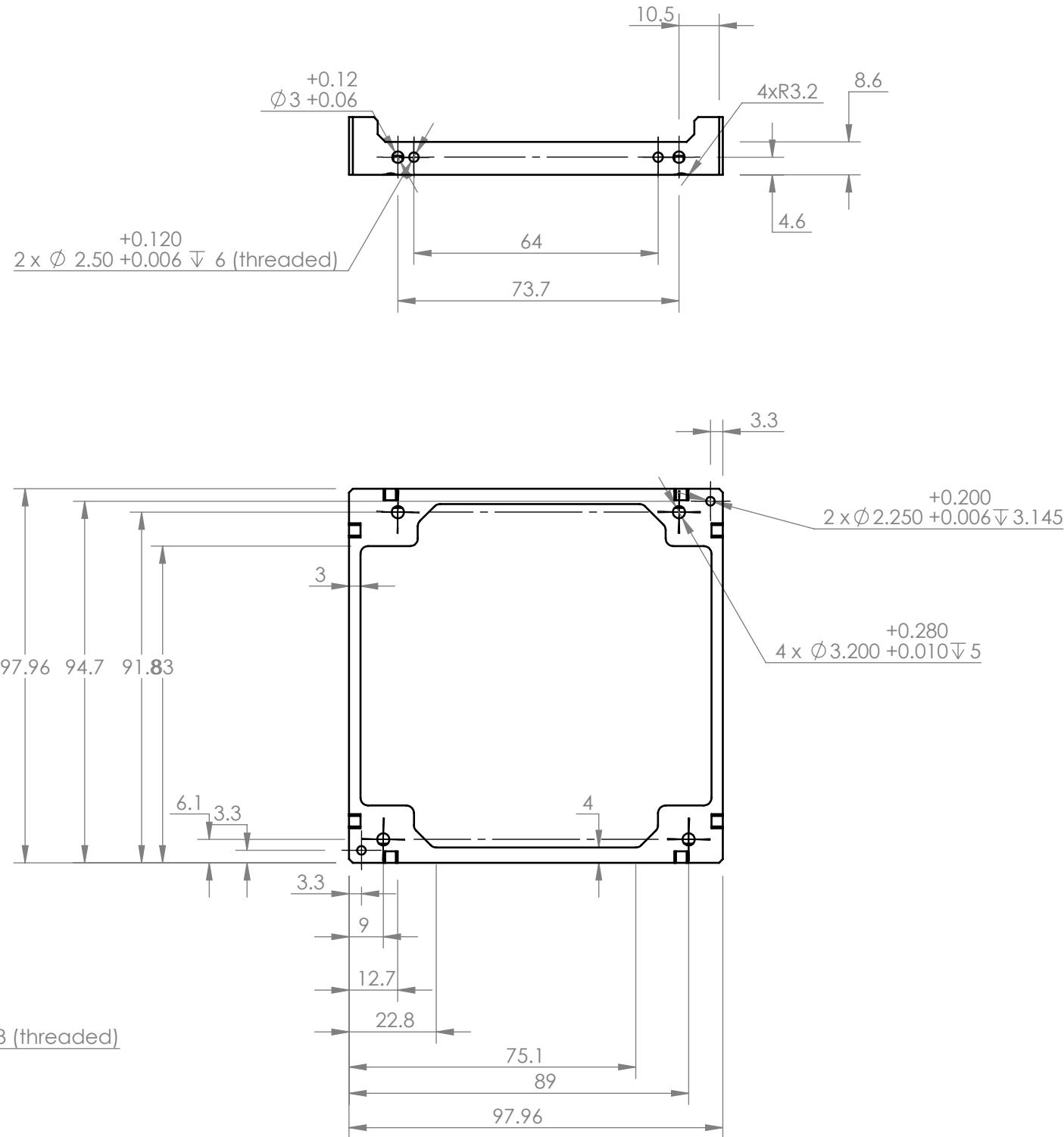
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D

C

B

A



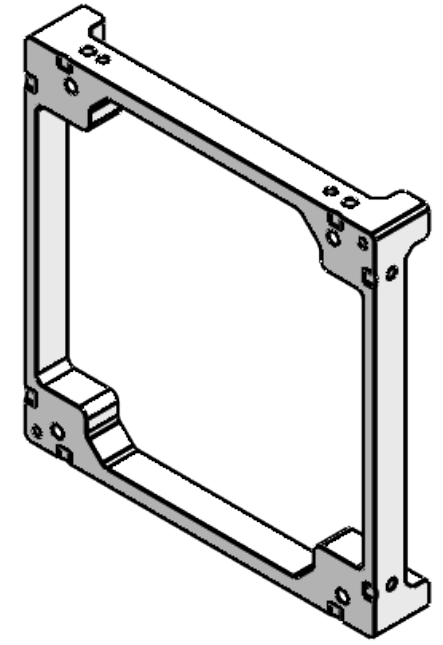
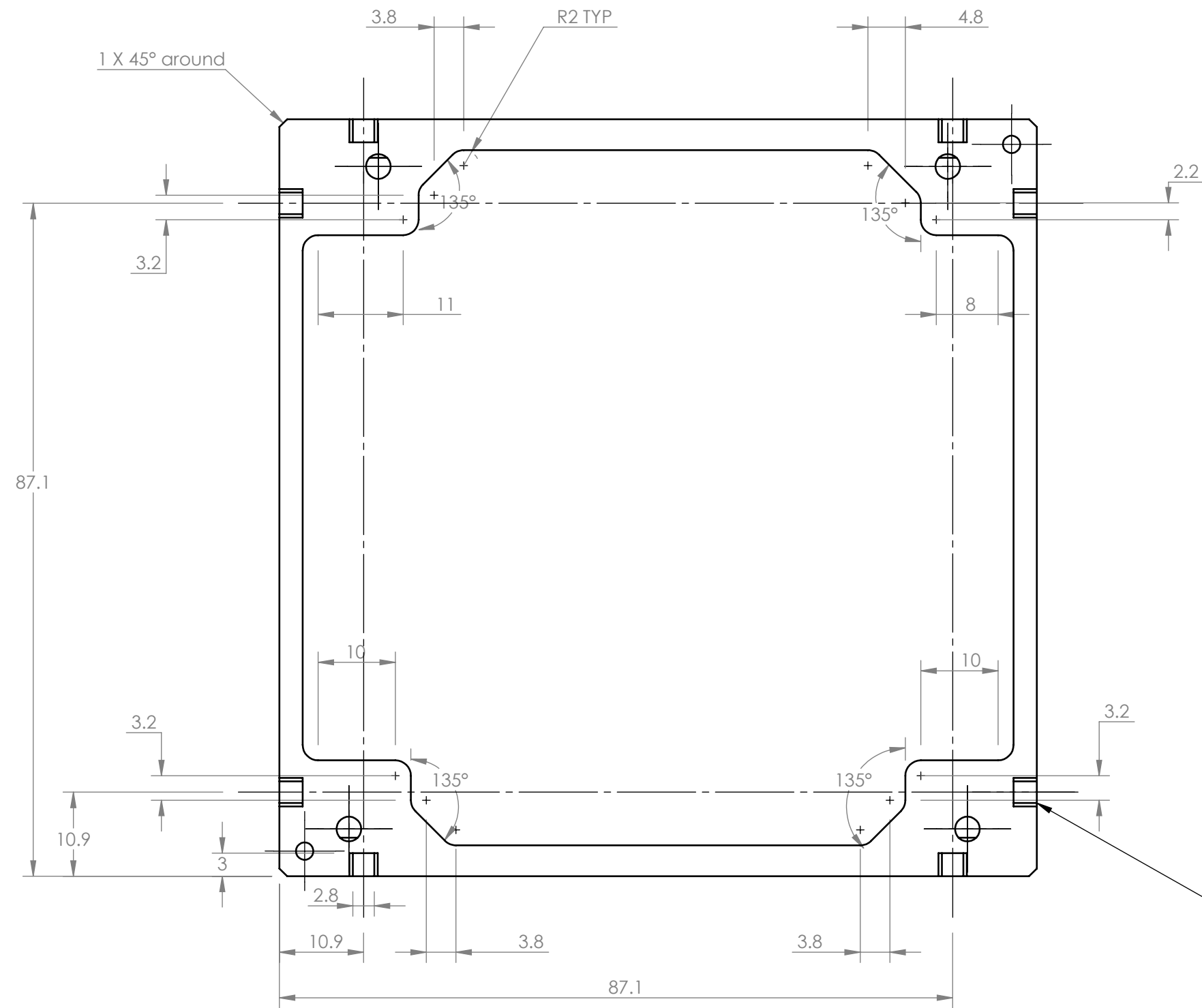
Note: This is a verification of all dimensions for 3D printed parts, consequently small details are not captured.

Note: The pilot holes are threaded after 3D printing.

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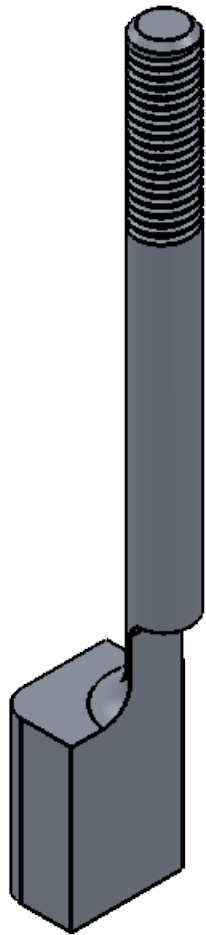
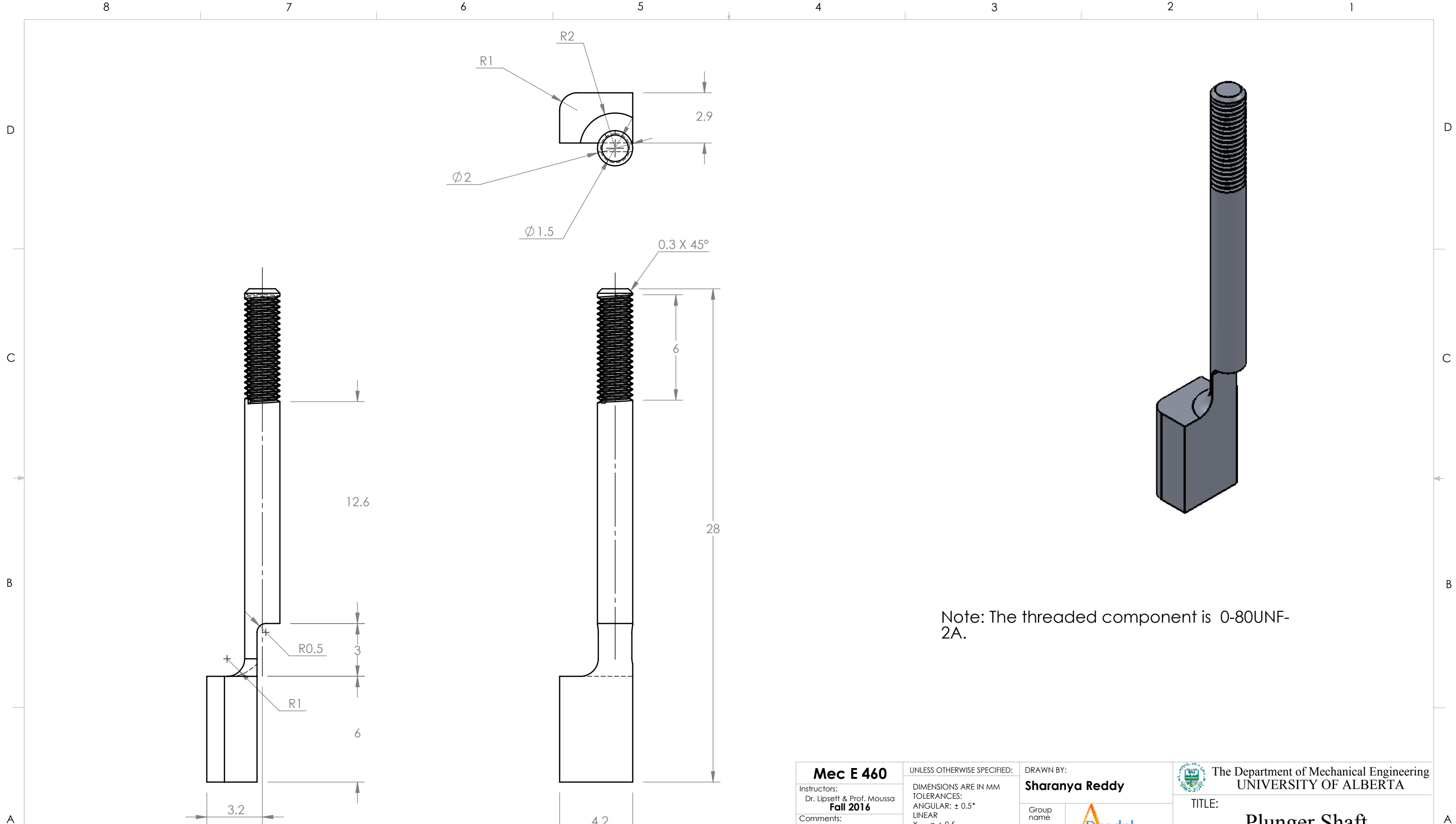
Mec E 460		UNLESS OTHERWISE SPECIFIED:		DRAWN BY:		The Department of Mechanical Engineering UNIVERSITY OF ALBERTA	
Instructors: Dr. Lipsett & Prof. Moussa Fall 2016		DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: $\pm 0.5^\circ$ LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025		Sharanya Reddy		TITLE:	
Comments:		SURFACE FINISH μm 0.6		Group name		Top Bracket	
MATERIAL: ABS		DO NOT SCALE DRAWING		Group number		Part supplier/manufacturer	
FILE NAME: CSS-001-UAMS-Top-Bracket				SM By		REV	
				Reviewed by		Machine Shop	
				Monday, December 05, 2016 12:53:55 AM Friday, October 21, 2016 4:46:00 PM		SCALE: 1:1.5 Mass: 17.96 SHEET 15 OF 18	

8 7 6 5 4 3 2 1



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Mec E 460		UNLESS OTHERWISE SPECIFIED:		DRAWN BY:		The Department of Mechanical Engineering UNIVERSITY OF ALBERTA	
Instructors: Dr. Lipsett & Prof. Moussa Fall 2016		DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: ± 0.5° LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025		Sharanya Reddy		TITLE: Top Bracket	
Comments:		SURFACE FINISH µm 0.6 ✓		Group name 		SIZE B	
MATERIAL: ABS		DO NOT SCALE DRAWING		Group number 6		Part supplier/manufacturer Machine Shop	
FILE NAME: CSS-001-UAMS-Top-Bracket				SM By Corbin Cooper, Shi An		REV 1	
				Reviewed by Shaan Muhammed		SCALE: 1.5:1	
				Monday, December 05, 2016 12:53:55 AM Friday, October 21, 2016 4:46:00 PM		Mass: 17.96	
						SHEET 16 OF 18	



Note: The threaded component is 0-80UNF-2A.

Mec E 460		UNLESS OTHERWISE SPECIFIED:		DRAWN BY:		The Department of Mechanical Engineering UNIVERSITY OF ALBERTA	
Instructors: Dr. Lipsett & Prof. Moussa Fall 2016		DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: $\pm 0.5^\circ$ LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025		Sharanya Reddy		TITLE: Plunger Shaft	
Comments:		SURFACE FINISH μm 0.6 ✓		Group name 		SIZE B	
		DO NOT SCALE DRAWING		Group number 6		Part supplier/manufacturer Machine Shop	
MATERIAL: 6061 Alloy				SM By Shi An		REV 1	
FILE NAME: CSS-012-UAMS-Shaft				Reviewed by Shaan Muhammed		SCALE: 5:1	
				Monday, December 05, 2016 12:08:28 AM Sunday, November 20, 2016 5:08:34 PM		Mass: 0.35	
						SHEET 17 OF 18	

D

C

B

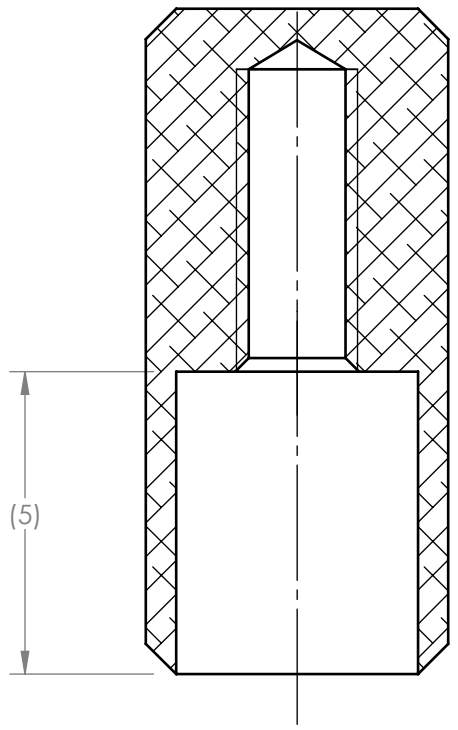
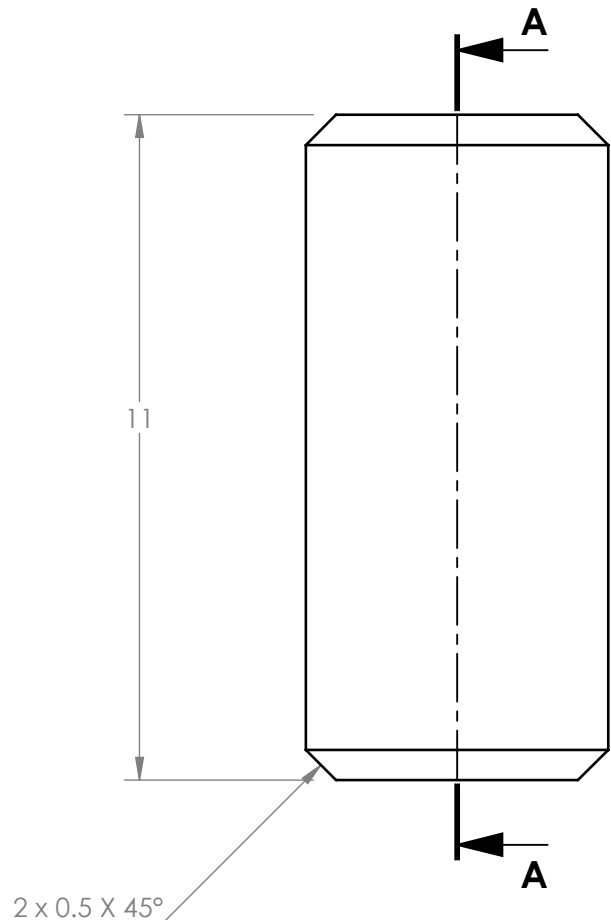
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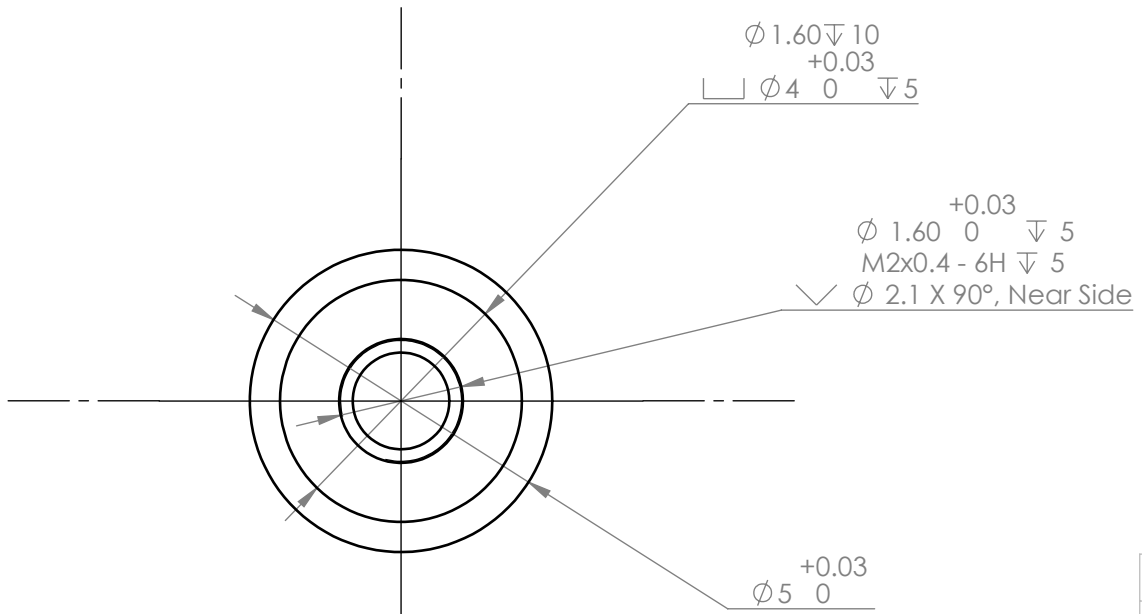
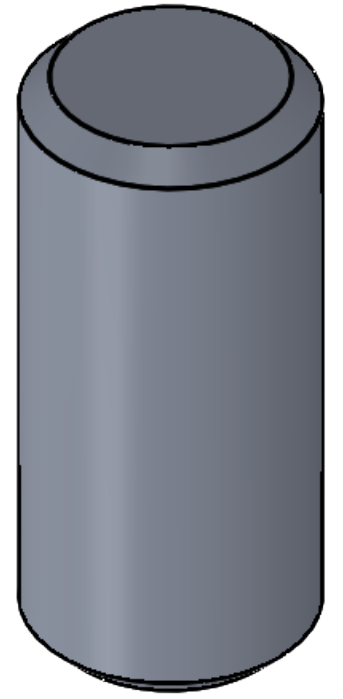
C

B

A



SECTION A-A
SCALE 8 : 1



Note: The cap can be milled out of round stock

Mec E 460		UNLESS OTHERWISE SPECIFIED:		DRAWN BY:		The Department of Mechanical Engineering UNIVERSITY OF ALBERTA	
Instructors: Dr. Lipsett & Prof. Moussa Fall 2016		DIMENSIONS ARE IN MM TOLERANCES: ANGULAR: ± 0.5° LINEAR X = ± 0.5 X.X = ± 0.1 X.XX = ± 0.025		Sharanya Reddy		TITLE: Plunger Cap	
Comments:		SURFACE FINISH µm 0.6		Group name 		SIZE B	
		DO NOT SCALE DRAWING		Group number 6		Part supplier/manufacturer Machine Shop	
MATERIAL: 6061 Alloy				SM By Shi An		REV 1	
FILE NAME: CSS-013-UAMS-Planger				Reviewed by Shaan Muhammed		SCALE: 8:1	
				Monday, December 05, 2016 10:55:37 AM Sunday, November 20, 2016 5:26:56 PM		Mass: 0.38	
						SHEET 18 OF 18	