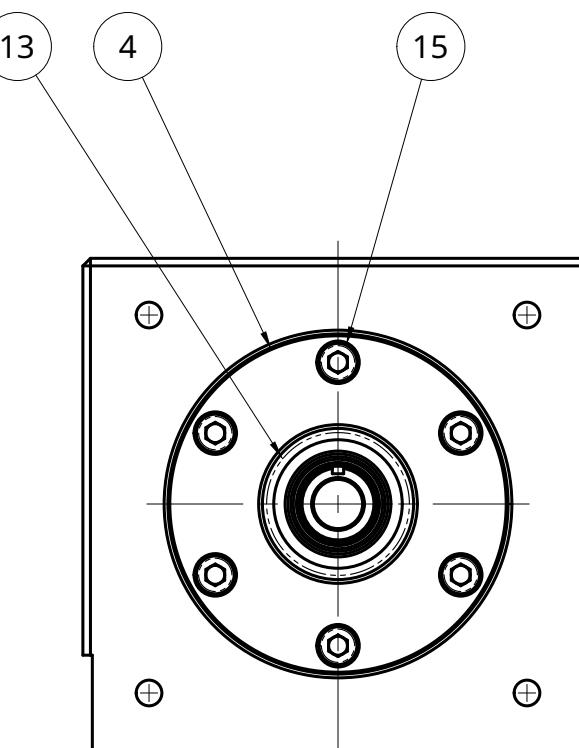
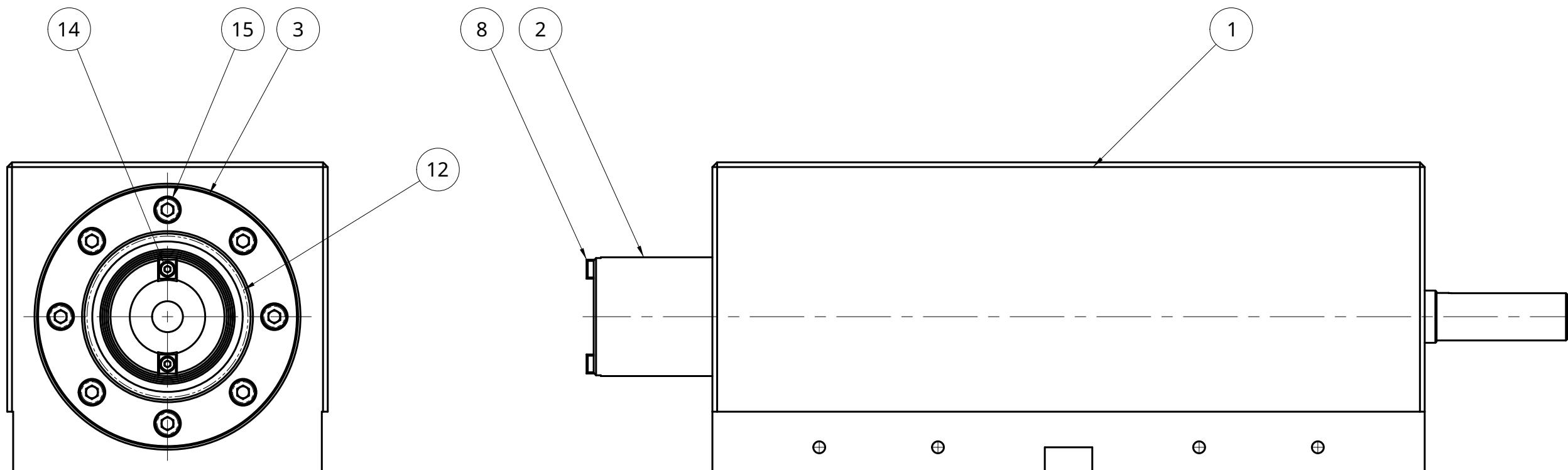
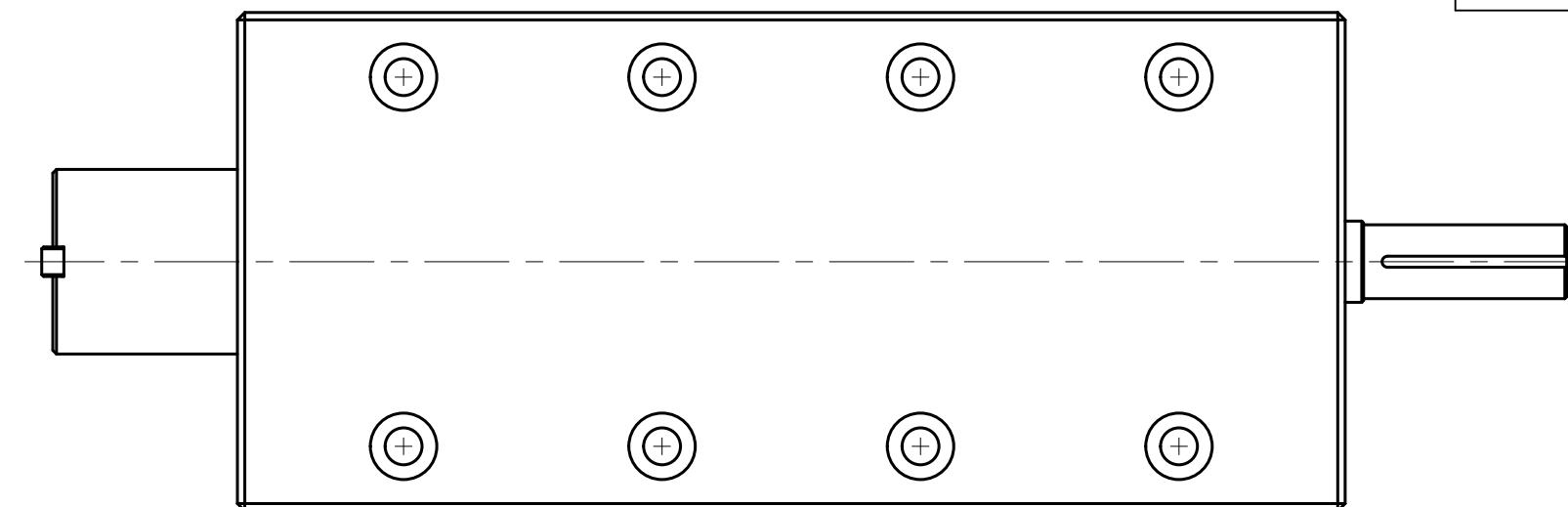


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Item No.	Quantity	Description	Material	Part number
1	1	Spindle Housing	Cast iron	BR-549-A-001
2	1	Spindle Shaft	Steel 8620	BR-549-A-002
3	1	Front Bearing Stop	Steel 4130	BR-549-A-003
4	1	Rear Bearing Sleeve	Steel 4130	BR-549-A-004
5	1	Inner Bearing Spacer	Steel 1020	BR-549-A-005
6	1	Front Fitting Spacer	Steel 1020	BR-549-A-006
7	1	Rear Fitting Spacer	Steel 1020	BR-549-A-007
8	2	Anti-Rotate Key	Steel 4130	BR-549-A-008
9	2	Bearing Asm 7306BTN1CN Timken	N/A	
10	1	Bearing Asm 7305BTN1CN Timken	N/A	
11	1	Locknut KVT GUK 25x1.5	Steel	
12	1	Seal SKF 50x70x10 HMSA10 V	Steel	
13	1	Seal SKF 22x40x10 HMSA10 V	Steel	
14	2	M3 x 6 Hex socket head cap screw	Steel	
15	14	M6 x 25 Hex socket head cap screw	Steel	



SEE SHEET 2 FOR A FULL FRONT SECTION VIEW

UNLESS OTHERWISE SPECIFIED, .XX ± .0-. .XXX ± .00-. .XXXX ± .000-	NAME DRAWN BRIAN BRADY	DATE 10/15/2019
ANGULAR ± ° FRCTIONAL ± #	CHECKED	
SURFACE FINISH ✓	APPROVED	
DO NOT SCALE DRAWING		
BREAK ALL SHARP EDGES AND REMOVE BURRS		
THIRD ANGLE PROJECTION	MATERIAL	VOLUME XXXXXX mm <sup>3</sup>
SCALE 1:2	WEIGHT X.XXX kg	HEET 1 of 3

Ferris State University  
DRILL UNIT  
SPINDLE ASSEMBLY  
BOM AND STANDARD VIEWS  
SIZE C DWG NO. BR-549-A REV.  
C 1:2 X.XXX kg 1 of 3

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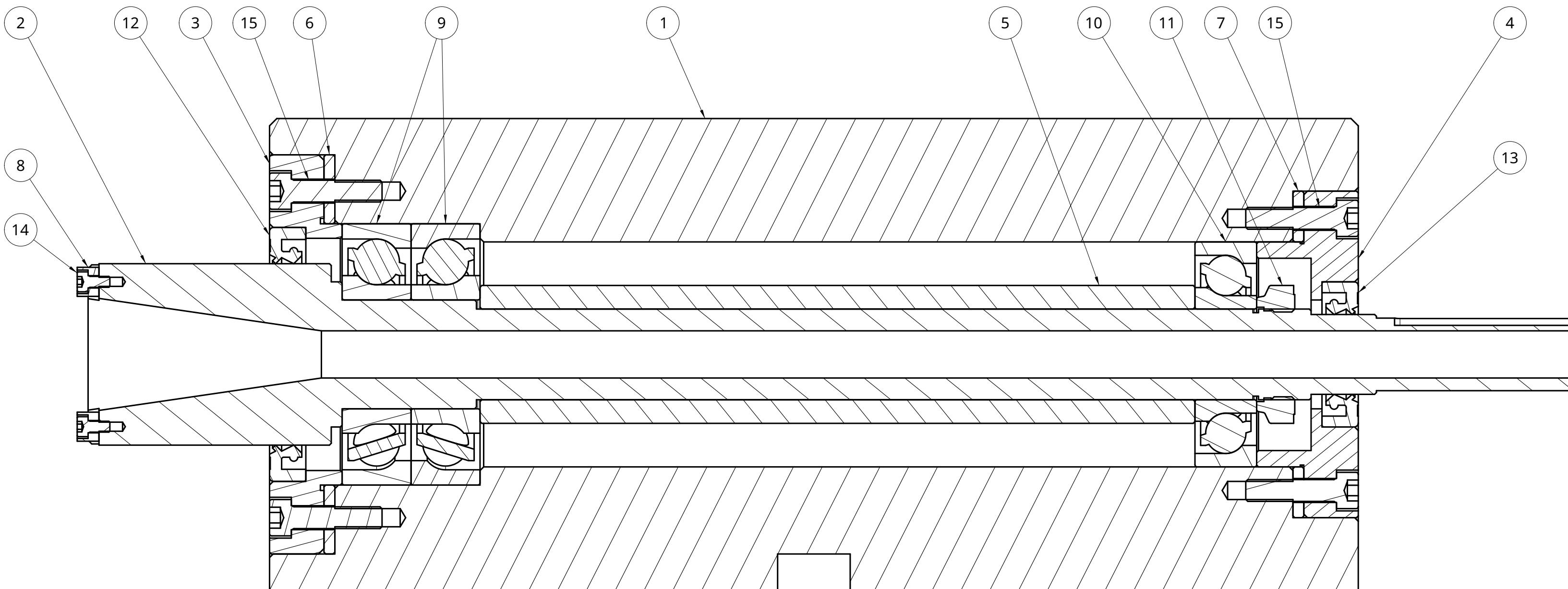
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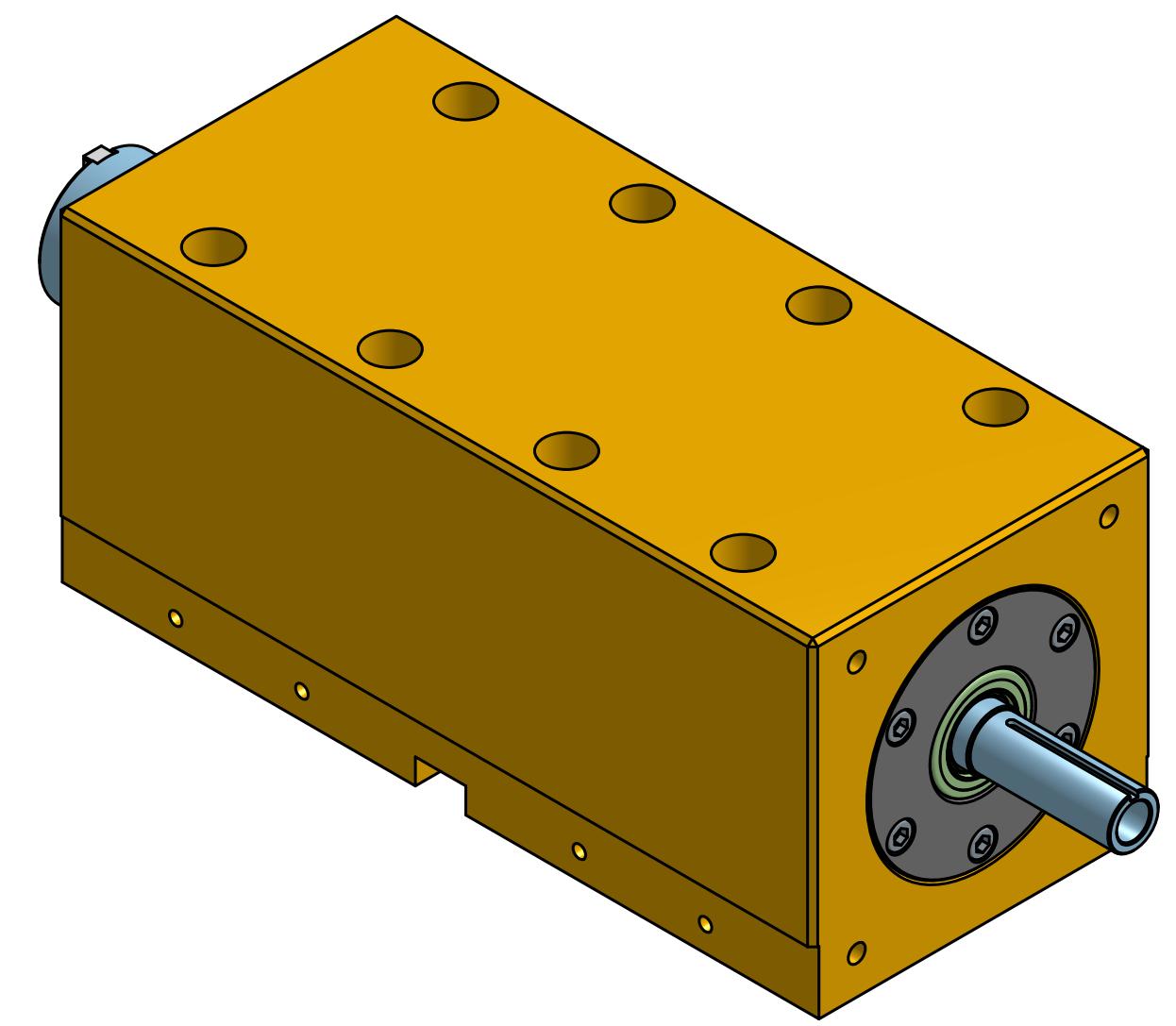
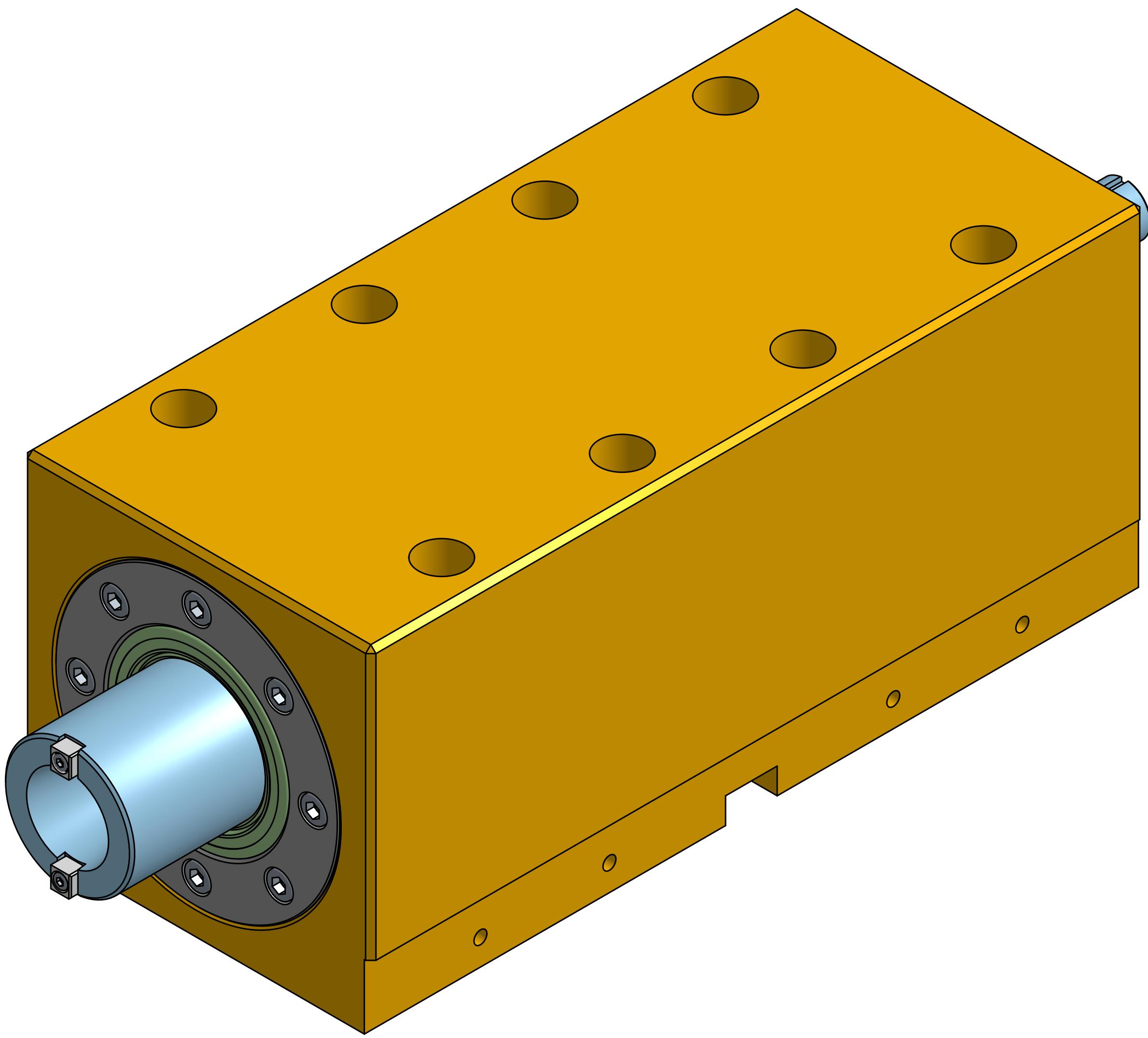
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UNLESS OTHERWISE SPECIFIED, .XX ±.00-. .XXX ±.00-. XXXX ±.000-. SURFACE FINISH		NAME DRAWN CHECKED APPROVED	DATE 10/15/2019
<b>Ferris State University</b>			
DO NOT SCALE DRAWING			
BREAK ALL SHARP EDGES AND REMOVE BURRS			
THIRD ANGLE PROJECTION	MATERIAL	VOLUME XXXXXX mm <sup>3</sup>	REV.
SIZE <b>C</b>	DWG NO. <b>BR-549-A</b>		
SCALE 1:1	WEIGHT X.XXX kg	SHEET 2 of 3	



4

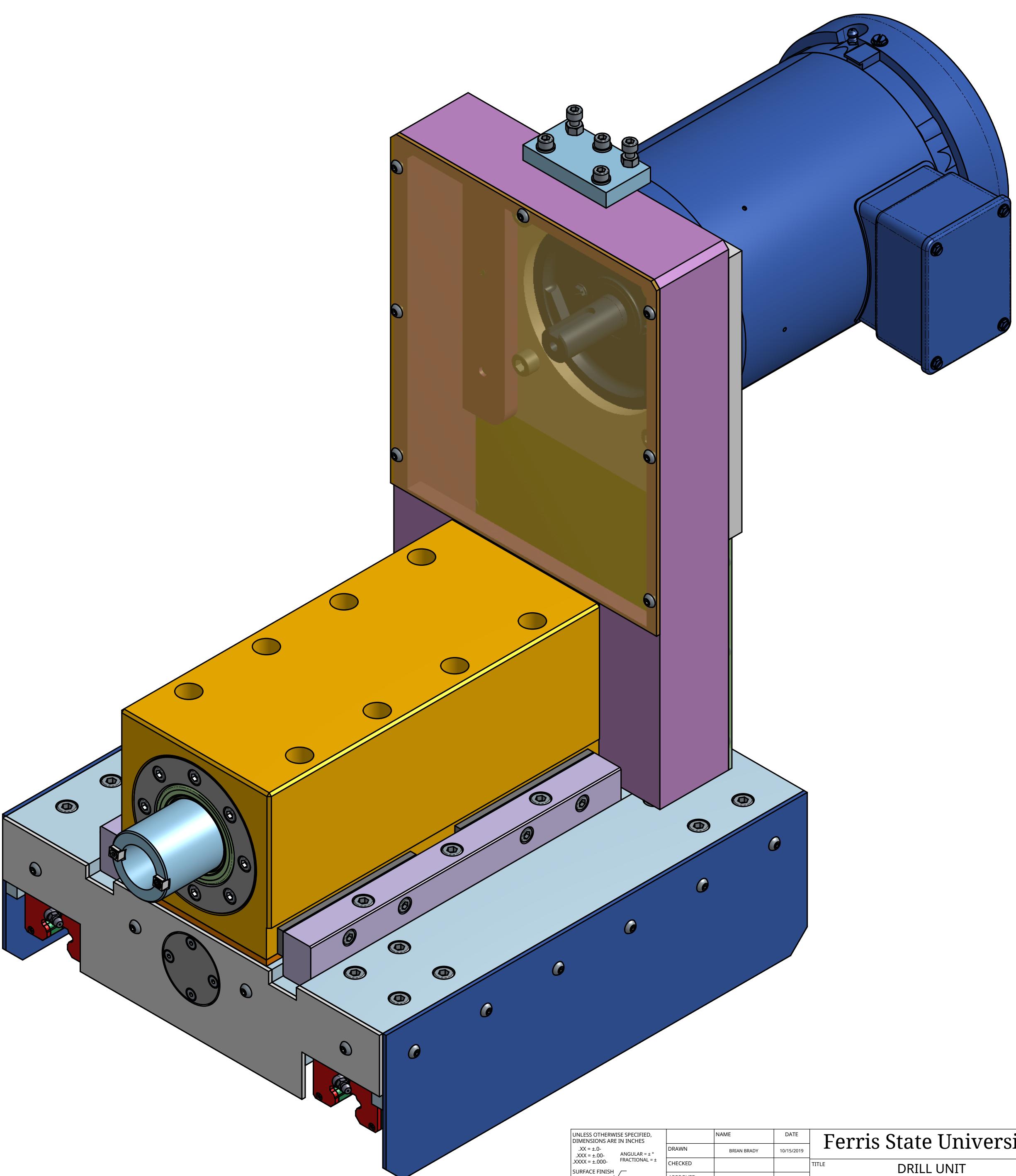
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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES $.XX = \pm 0-$ $.XXX = \pm 00-$ $.XXXX = \pm 000-$ SURFACE FINISH $\checkmark$		NAME	DATE	<b>Ferris State University</b> <b>DRILL UNIT</b> <b>SPINDLE ASSEMBLY</b> <b>SHADED ISOMETRIC VIEWS</b>			
	DRAWN	BRIAN BRADY	10/15/2019				
	CHECKED						
	APPROVED						
DO NOT SCALE DRAWING				SIZE		DWG NO.	REV.
BREAK ALL SHARP EDGES AND REMOVE BURRS				C		BR-549-A	
THIRD ANGLE PROJECTION		MATERIAL	VOLUME	SCALE		WEIGHT	SHEET
			XXXXX mm <sup>3</sup>	1:3		X.XXX kg	3 of 3

Item No.	Quantity	Description	Material	Part number
1	1	Slide Plate	Steel 8620	BR-549-B-001
2	1	20 x 18 x 90 Key	Steel 4130	BR-549-B-002
3	2	Housing Fitting Spacer	Steel 1020	BR-549-B-003
4	2	Push-Pull Block	Steel 1020	BR-549-B-004
5	4	Push-Pull Fitting Spacer	Steel 1020	BR-549-B-005
6	1	Spindle Motor Mounting Frame	Steel 1020	BR-549-B-006
7	1	Motor Mounting Plate	Steel 8620	BR-549-B-007
8	1	Motor Adjuster Block	Steel 1020	BR-549-B-008
9	2	Medium Slide Key	Steel 4130	BR-549-B-009
10	1	Front Chip Cover	Steel 1010	BR-549-B-010
11	1	Ball Screw Hole Cover	Steel 1010	BR-549-B-011
12	2	Side Chip Cover	Steel 1010	BR-549-B-012
13	1	Lower Cover Plate - Motor	Polycarbonate	BR-549-B-013
14	1	Upper Cover Plate - Motor	Polycarbonate	BR-549-B-014
15	1	Spindle Assembly	N/A	BR-549-A
16	1	Motor ABB 35LYQ175_12.99		
17	1	Ball Nut HIWIN GBS-2R25		
18	4	Slide Block Asm HGH30 HIWIN	N/A	
19	4	M10 x 35 Hex socket head cap screw	Steel	
20	8	M8 x 80 x 28 thread Hex socket head cap screw	Steel	
21	16	M8 x 50 x 28 thread Hex socket head cap screw	Steel	
22	6	M8 x 40 Hex socket head cap screw	Steel	
23	12	M8 x 25 Hex socket head cap screw	Steel	
24	1	M6 x 40 Hex socket head cap screw	Steel	
25	2	M6 x 35 Hex socket head cap screw	Steel	
26	8	M6 x 30 Hex socket head cap screw	Steel	
27	6	M6 x 25 Hex socket head cap screw	Steel	
28	2	M6 x 20 Hex socket head cap screw	Steel	
29	2	M6 x 12 Hex socket head cap screw	Steel	
30	29	M5 x 10 Socket button head screw	Steel	
31	4	M4 x 6 Hex socket countersunk head screw	Steel	
32	4	M10 Hex nut (chamfered) grade A & B ISO 4033	Steel	
33	2	M6 Hex nut (chamfered) grade A & B ISO 4033	Steel	
34	20	M8 Plain washer normal grade A ISO 7089	Steel	
35	3	M6 Plain washer normal grade A ISO 7089	Steel	
36	4	8mm Spring lock washer DIN B20	Steel	
37	4	10mm Spring lock washer DIN B20	Steel	



UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX = ±.00-. .XXX = ±.000-. XXXX = ±.0000-		NAME	DATE
		DRAWN	BRIAN BRADY
		CHECKED	
		APPROVED	
DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS			
THIRD ANGLE PROJECTION		MATERIAL	VOLUME XXXXXX mm <sup>3</sup>
SCALE	1:6	WEIGHT	X.XXX kg
		Ferris State University	
		DRILL UNIT	
		SLIDE PLATE ASSEMBLY	
		BOM AND SHADED ISOMETRIC	
SIZE	DWG NO.	BR-549-B	
REV.			
		1 of 4	

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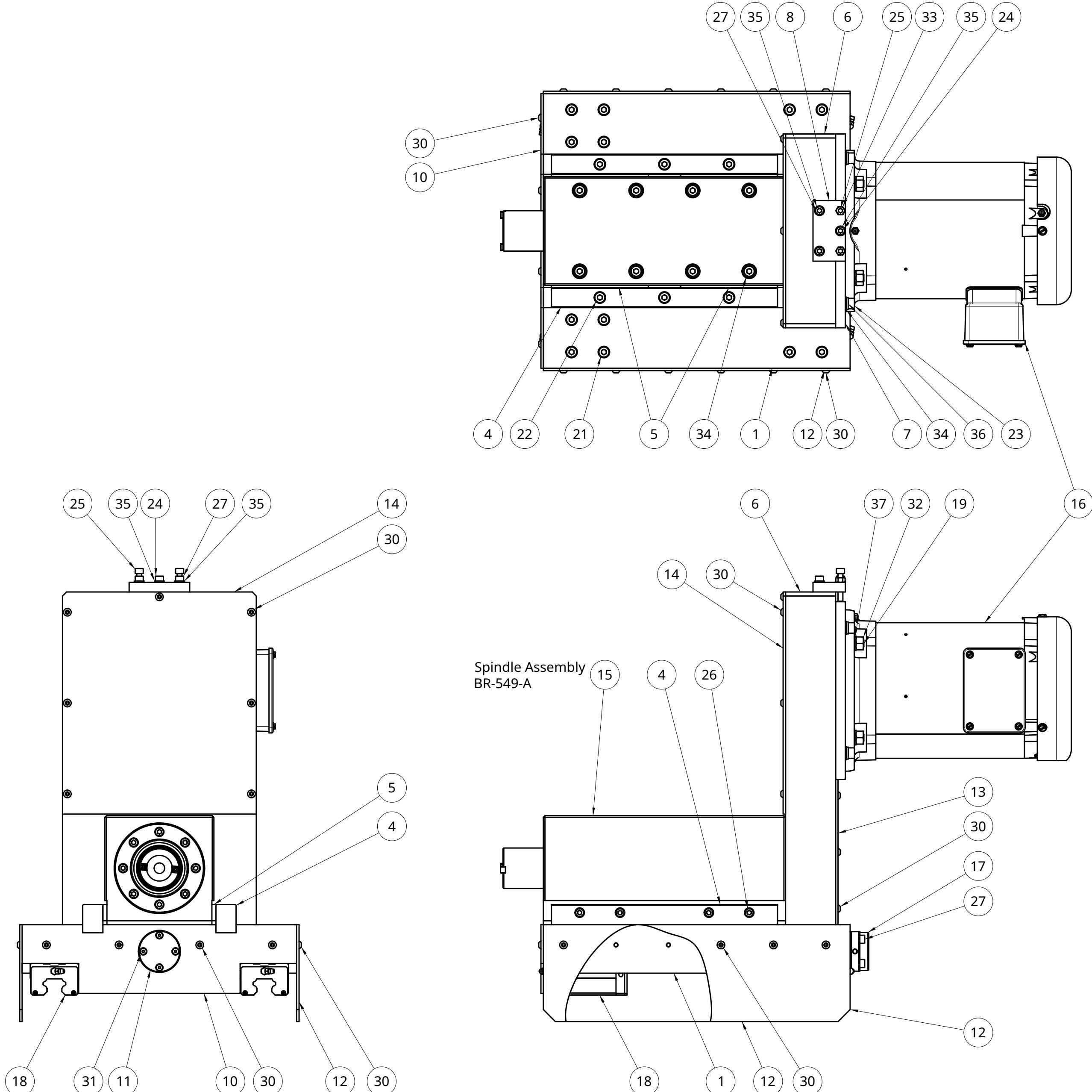
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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES .XX ± .XX .XXX ± .XX .XXXX ± .XXXX		NAME DRAWN CHECKED APPROVED	DATE 10/15/2019
ANGULAR ± XX° FRCTIONAL ± XX/XX		SURFACE FINISH	
DO NOT SCALE DRAWING			
BREAK ALL SHARP EDGES AND REMOVE BURRS			
THIRD ANGLE PROJECTION	MATERIAL	VOLUME XXXXXX mm <sup>3</sup>	REV.
(Cone icon)			
SCALE 1:4	WEIGHT X.XXX kg	SHEET 2 of 4	

Ferris State University

DRILL UNIT  
SLIDE PLATE ASSEMBLY

BR-549-B

4

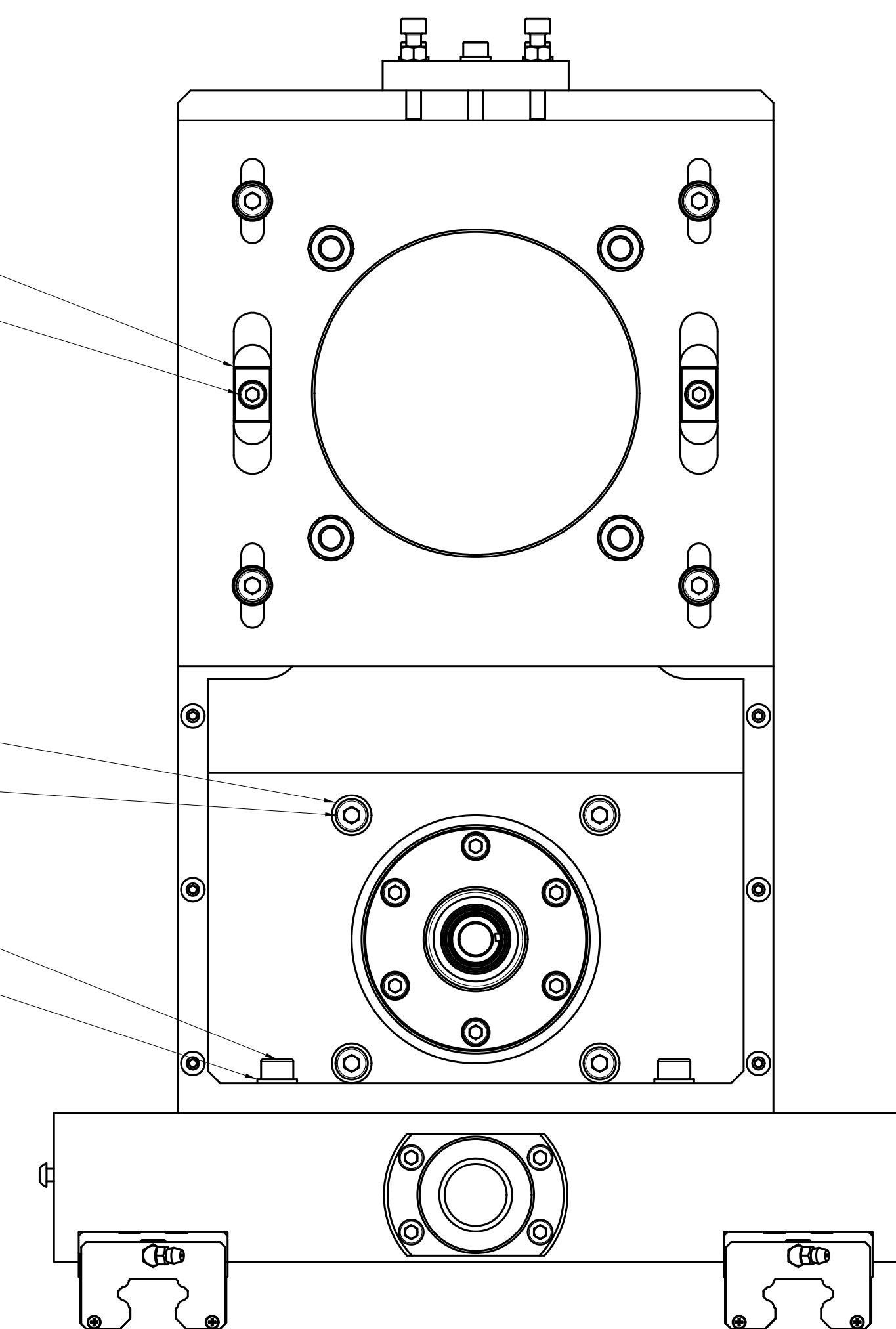
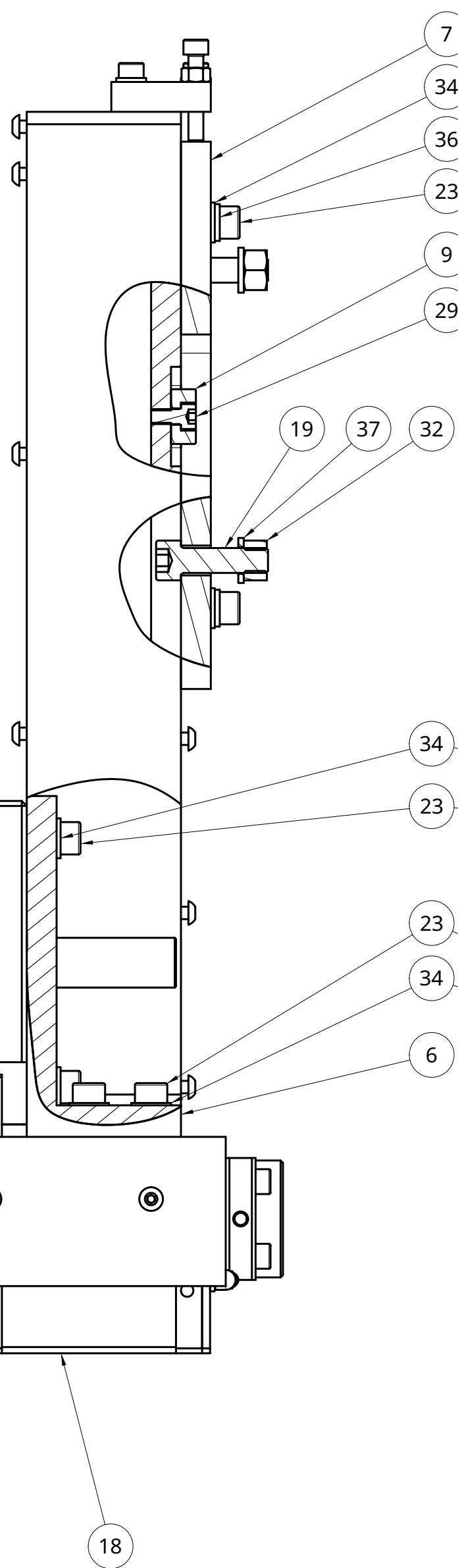
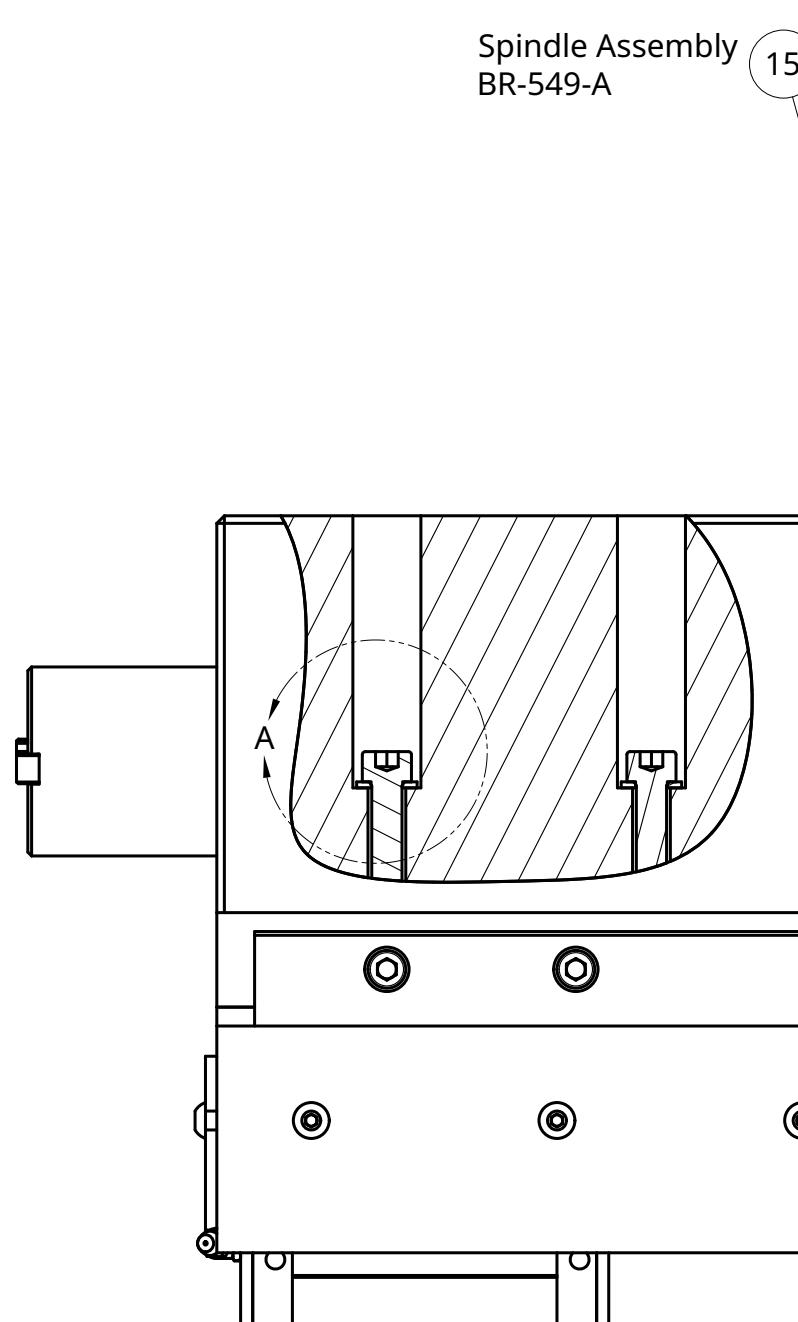
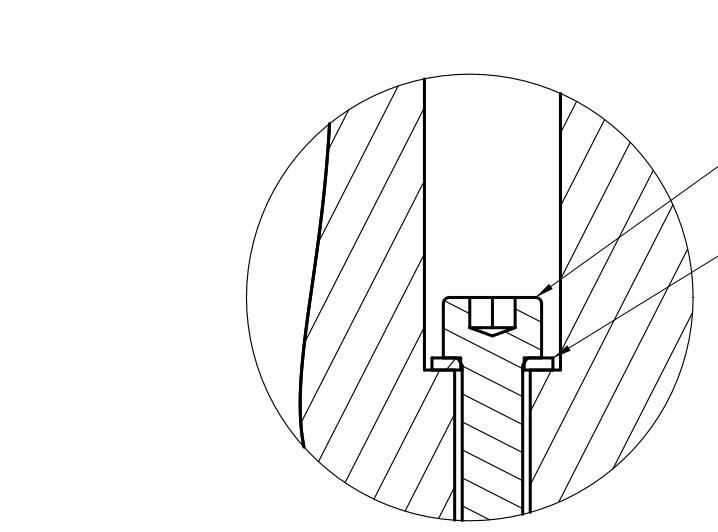
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UNLESS OTHERWISE SPECIFIED, .XX ± .0-. .XXX ± .00-. .XXXX ± .000-		NAME	DATE
DRAWN	BRIAN BRADY	10/15/2019	
CHECKED			
APPROVED			
DO NOT SCALE DRAWING			
BREAK ALL SHARP EDGES AND REMOVE BURRS			
THIRD ANGLE PROJECTION	MATERIAL	VOLUME	XXXXX mm <sup>3</sup>
(Cylindrical icon)			

Ferris State University

DRILL UNIT  
SLIDE PLATE ASSEMBLY  
COVERS REMOVED

SIZE C DWG NO. BR-549-B REV.

SCALE 1:4 WEIGHT X.XXX kg SHEET 3 of 4

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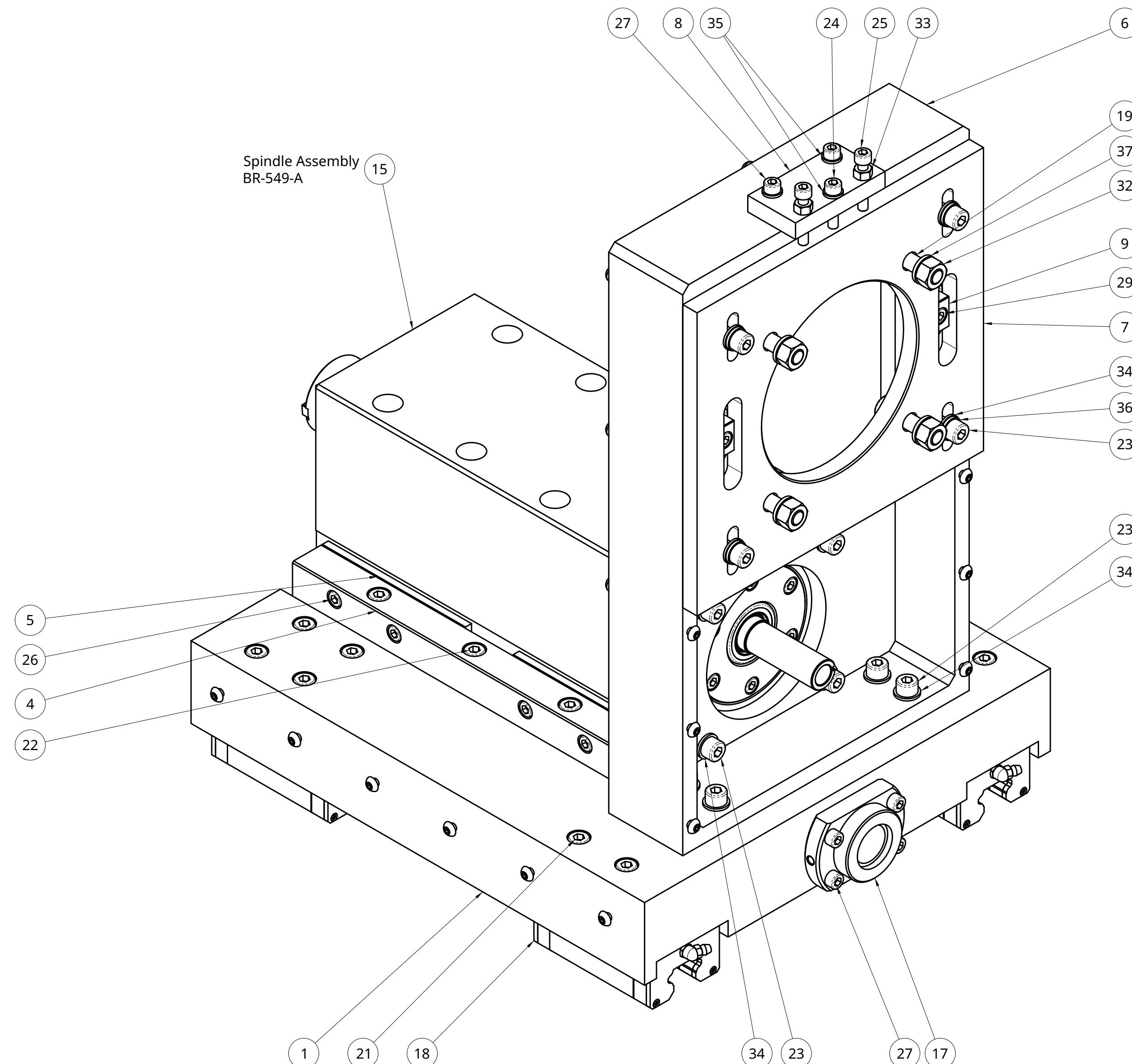
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C

C

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UNLESS OTHERWISE SPECIFIED, .XX ± .D. .XXX ± .00. .XXXX ± .000. SURFACE FINISH		NAME DRAWN CHECKED APPROVED	DATE 10/15/2019
DO NOT SCALE DRAWING BREAK ALL SHARP EDGES AND REMOVE BURRS			
THIRD ANGLE PROJECTION		MATERIAL	VOLUME XXXXX mm <sup>3</sup>
SHEET 4 of 4	SIZE C	DWG NO. BR-549-B	REV.
SCALE 1:6	WEIGHT X.XXX kg		

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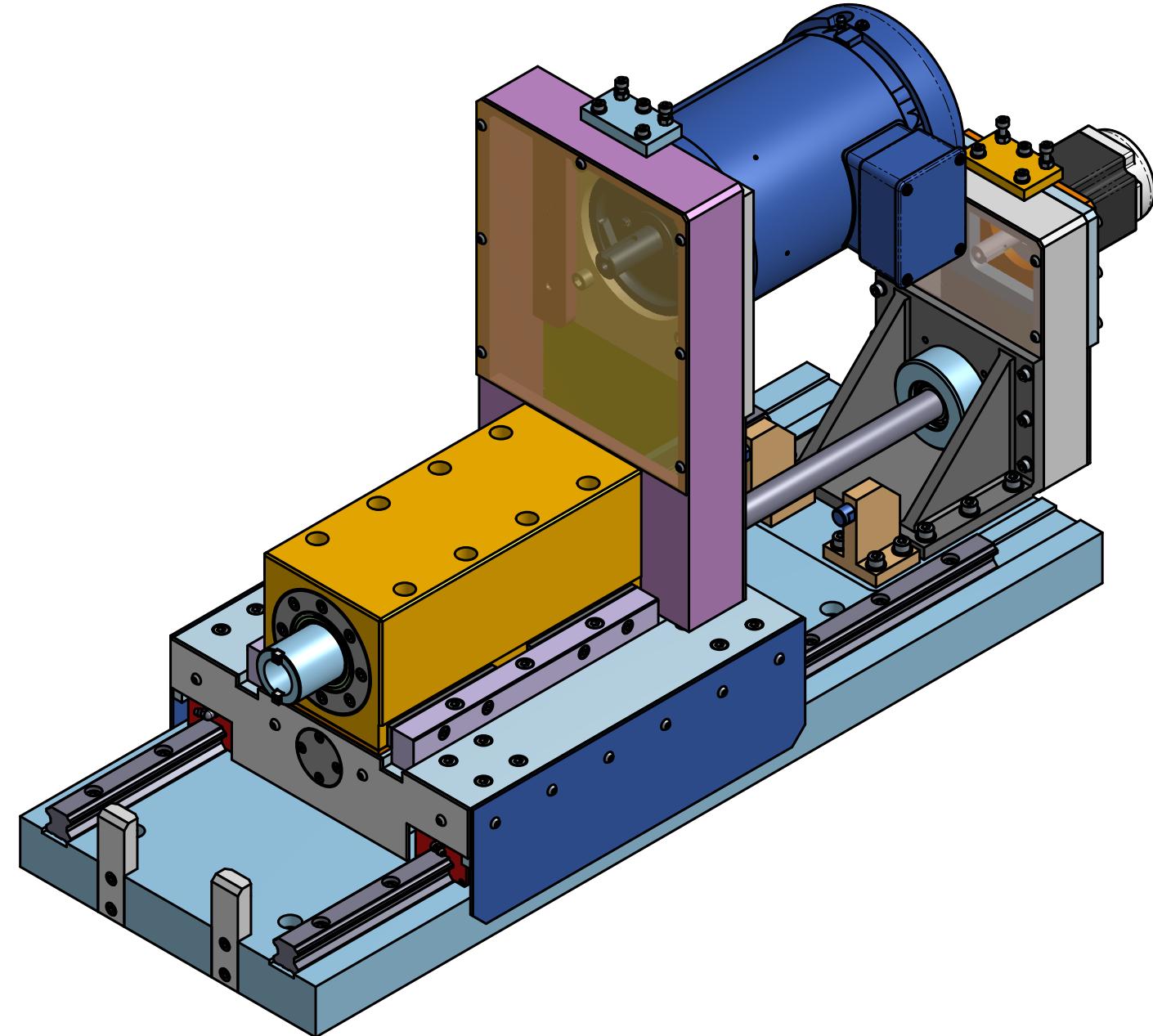
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Item No.	Quantity	Description	Material	Part number
1	1	Base Plate	Steel 8620	BR-549-C-001
2	1	Ball Screw Support Bracket	Steel 1020	BR-549-C-002
3	1	Ball Screw Bearing Housing	Steel 4130	BR-549-C-003
4	1	Ball Screw Bearing Cap	Steel 4130	BR-549-C-004
5	1	Ball Screw Bearing Spacer	Steel 1020	BR-549-C-005
6	1	Ball Screw - HIWIN Altered	Steel 8620	BR-549-C-006
7	1	15 x 10 x 100 Key	Steel 4130	BR-549-C-007
8	1	Servo Belt Housing	Steel 1020	BR-549-C-008
9	1	Servo Adjuster Block	Steel 1020	BR-549-C-009
10	1	Servo Motor Adapter	Steel 8620	BR-549-C-010
11	1	Servo Mounting Plate	Steel 8620	BR-549-C-011
12	1	Upper Cover Plate - Servo	Polycarbonate	BR-549-C-012
13	1	Lower Cover Plate - Servo	Polycarbonate	BR-549-C-013
14	2	Small Slide Key	Steel 4130	BR-549-C-014
15	2	Stop Bracket - Rear	Steel 1020	BR-549-C-015
16	2	Stop Button	Steel 4130	BR-549-C-016
17	2	Stop Bar - Front	Steel 4130	BR-549-C-017
18	1	Slide Plate Assembly	N/A	BR-549-B
19	2	Hiwin Rail 800mm		
20	1	Locknut KVT GUK 20x1	Steel	
21	2	Bearing Asm 7304BTN1CN Timken	N/A	
22	1	Servo Motor Asm Rockwell	N/A	
23	34	M8 x 30 Hex socket head cap screw	Steel	
24	3	M6 x 30 Hex socket head cap screw	Steel	
25	20	M6 x 25 Hex socket head cap screw	Steel	
26	6	M6 x 20 Hex socket head cap screw	Steel	
27	4	M6 x 16 Hex socket head cap screw	Steel	
28	2	M6 x 12 Hex socket head cap screw	Steel	
29	4	M5 x 10 Hex socket head cap screw	Steel	
30	8	M5 x 8 Socket button head screw	Steel	
31	2	M4 x 12 Hex socket head cap screw	Steel	
32	2	M6 Hex nut (chamfered) grade A & B ISO 4033	Steel	
33	14	M8 Plain washer normal grade A ISO 7089	Steel	
34	13	M6 Plain washer normal grade A ISO 7089	Steel	



UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES  $.XX = \pm 0$ $.XXX = \pm 00$ $.XXXX = \pm 000$  SURFACE FINISH $\checkmark$		NAME	DATE	<b>Ferris State University</b>  <b>DRILL UNIT</b> <b>MAIN ASSEMBLY</b> <b>BOM AND SHADED ISOMETRIC</b>		
DRAWN	BRIAN BRADY		10/14/2019			
CHECKED			TITLE			
APPROVED						
DO NOT SCALE DRAWING						
BREAK ALL SHARP EDGES AND REMOVE BURRS						
THIRD ANGLE PROJECTION		MATERIAL	VOLUME	SIZE	DWG NO.	REV.
			XXXXX mm <sup>3</sup>	B	BR-549-C	
		SCALE	1:15	WEIGHT	X.XXX kg	SHEET
						1 of 6

4

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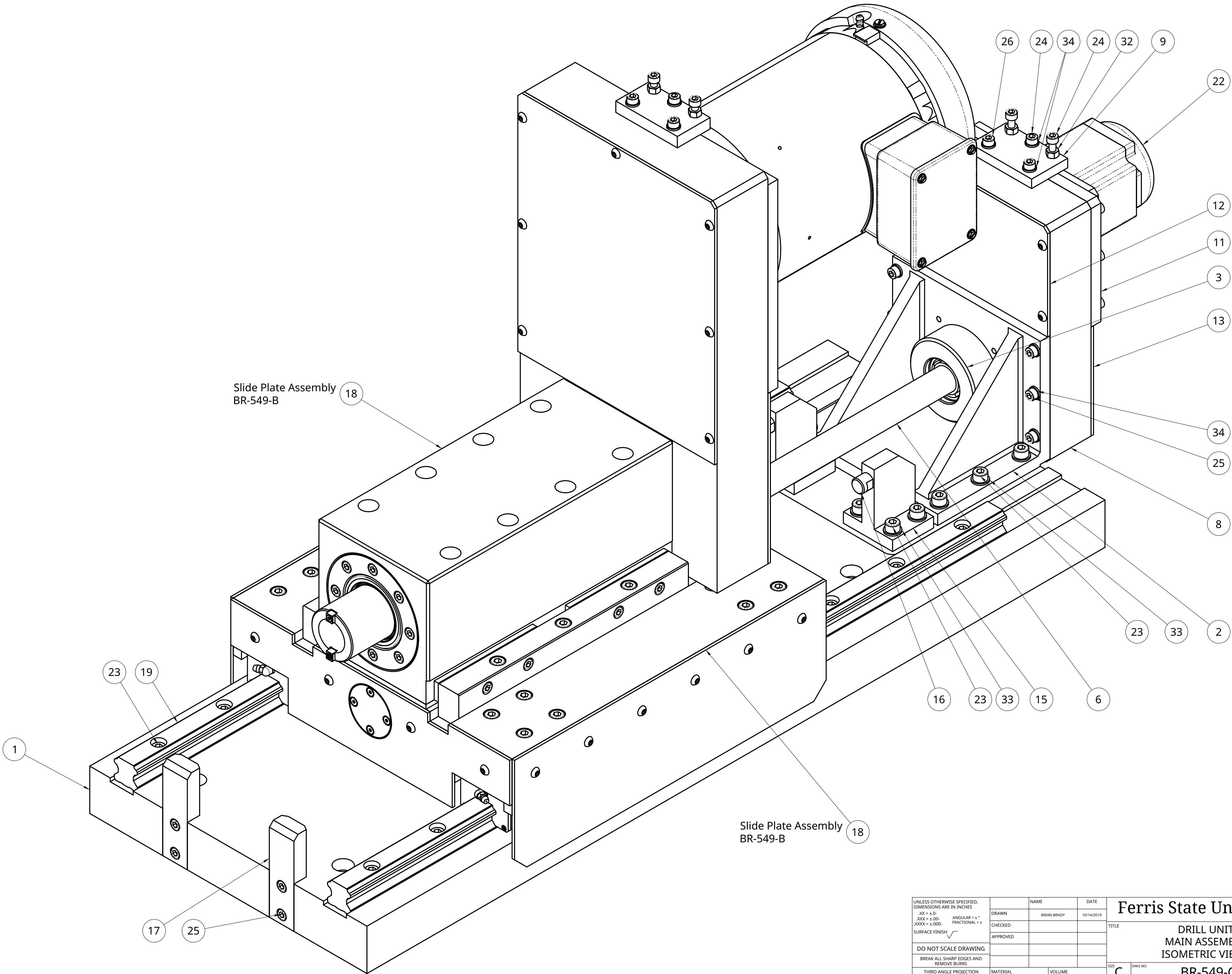
C

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UNLESS OTHERWISE SPECIFIED, .XX ± .00 .XXX ± .00 .XXXX ± .0000		NAME DRAWN BRIAN BRADY	DATE 10/14/2019
ANGULAR ± ° SURFACE FINISH		CHECKED	
FRACTIONAL ± 1/8		APPROVED	
<b>Ferris State University</b>			
<b>DRILL UNIT MAIN ASSEMBLY ISOMETRIC VIEW 1</b>			
SIZE <b>C</b>	DWG NO.	<b>BR-549-C</b>	
SCALE 1:12	WEIGHT	X.XXX kg	REV. Sheet 2 of 6

4

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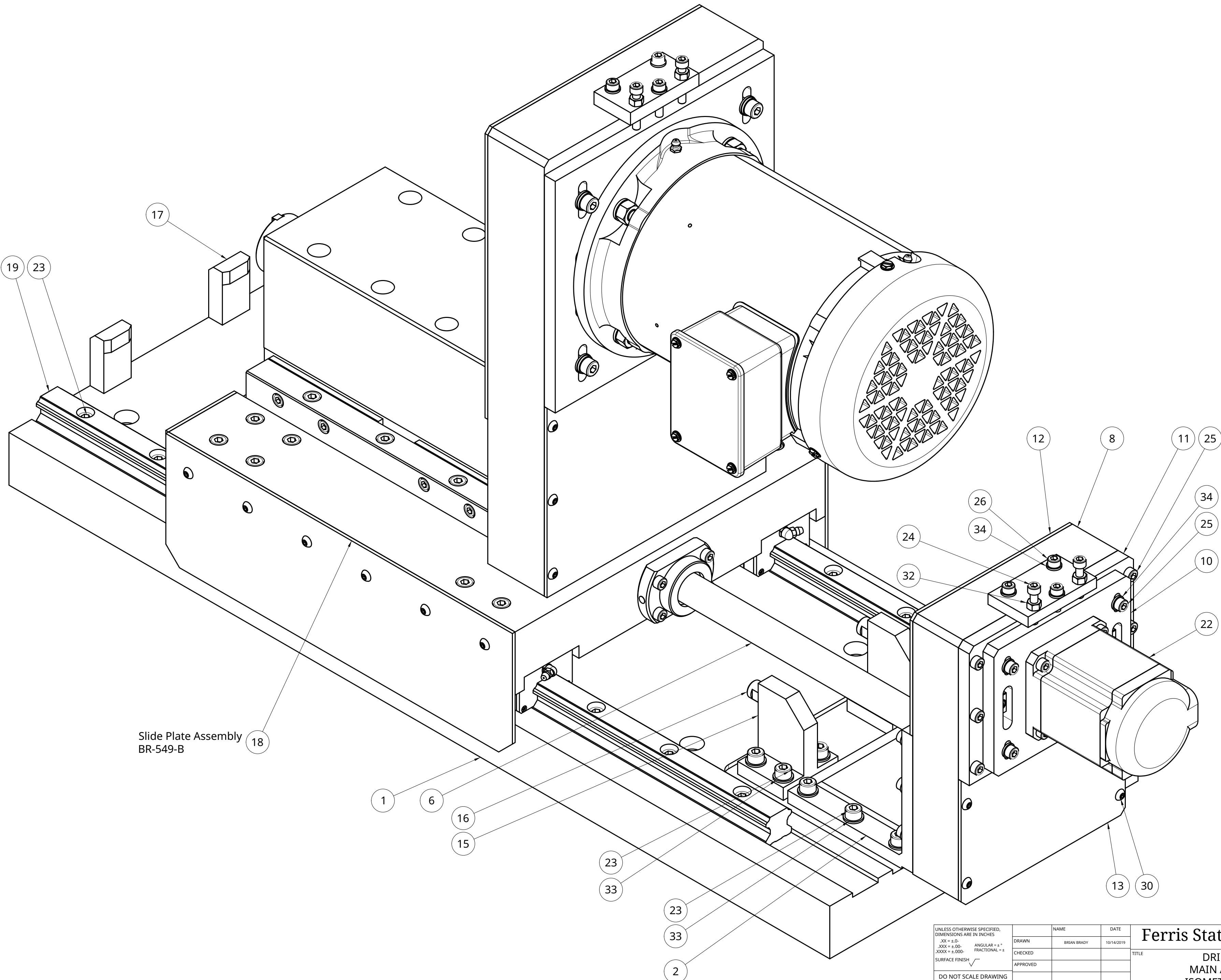
C

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UNLESS OTHERWISE SPECIFIED, .XX ± .0- .XXX ± .00- .XXXX ± .000- SURFACE FINISH	NAME DRAWN CHECKED APPROVED	DATE 10/14/2019
DO NOT SCALE DRAWING		
BREAK ALL SHARP EDGES AND REMOVE BURRS		
THIRD ANGLE PROJECTION	MATERIAL	VOLUME XXXXX mm <sup>3</sup>

Ferris State University

DRILL UNIT  
MAIN ASSEMBLY  
ISOMETRIC VIEW 2

SIZE C DWG NO. BR-549-C REV.

SCALE 1:2 WEIGHT X.XXX kg SHEET 3 of 6

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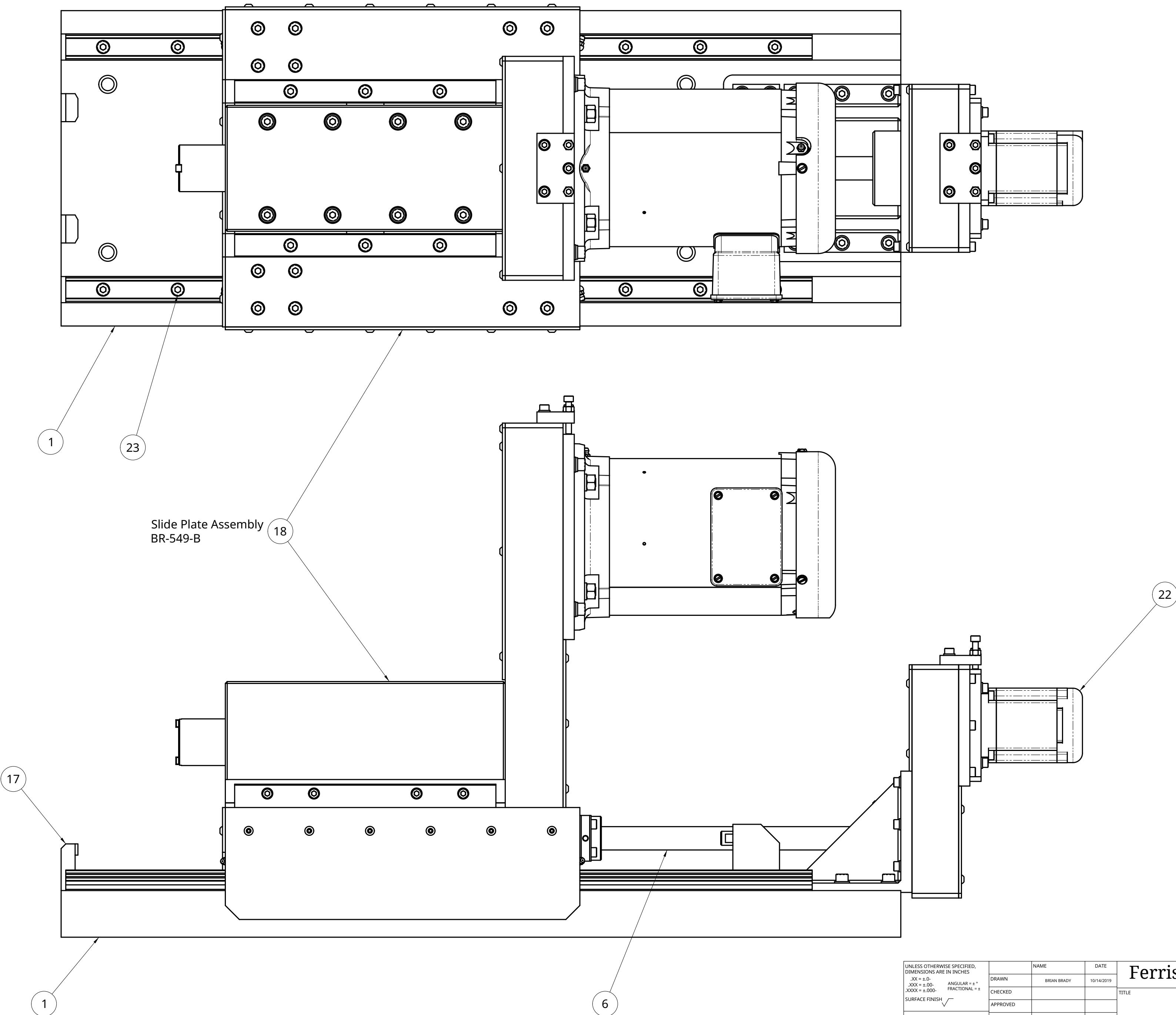
C

B

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UNLESS OTHERWISE SPECIFIED,  
DIMENSIONS ARE IN INCHES  
.XX +.0-.  
.XXX +.00-. ANGULAR = ± °  
.XXXX +.000-. FRACTIONAL = ±  
SURFACE FINISH ✓

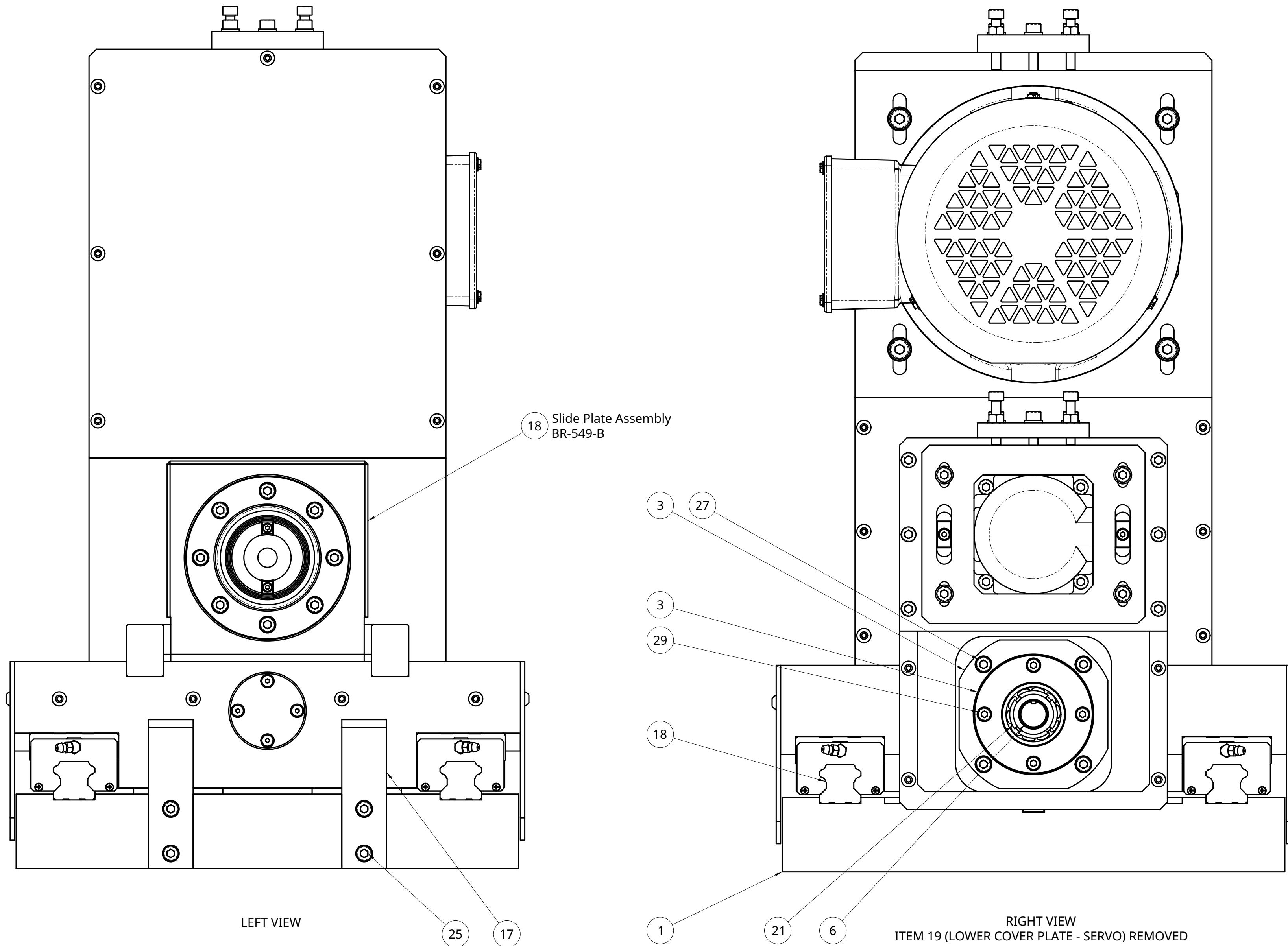
DRAWN	NAME	DATE
BRIAN BRADY		10/14/2019
CHECKED		
APPROVED		
DO NOT SCALE DRAWING		
BREAK ALL SHARP EDGES AND REMOVE BURRS		
THIRD ANGLE PROJECTION		
MATERIAL	VOLUME	XXXXX mm <sup>3</sup>

Ferris State University

DRILL UNIT  
MAIN ASSEMBLY  
FRONT AND TOP VIEWS

SIZE C DWG NO. BR-549-C REV.

SCALE 1:4 WEIGHT X.XXX kg SHEET 4 of 6



UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
.XX ± .XX	.XXX ± .XXX	BRIAN BRADY	10/14/2019
XXXX ± .XXX	ANGULAR ± *	FRACTIONAL ± *	
XXXX ± .000	SURFACE FINISH	CHECKED	
		APPROVED	
DO NOT SCALE DRAWING			
BREAK ALL SHARP EDGES AND REMOVE BURRS			
THIRD ANGLE PROJECTION		MATERIAL	VOLUME
			XXXXXX mm <sup>3</sup>
SCALE 1:2	WEIGHT X.XXX kg	SHEET 5 of 6	REV.

Ferris State University

DRILL UNIT  
MAIN ASSEMBLY  
RIGHT AND LEFT VIEWS

SIZE C DWG NO. BR-549-C REV.

4

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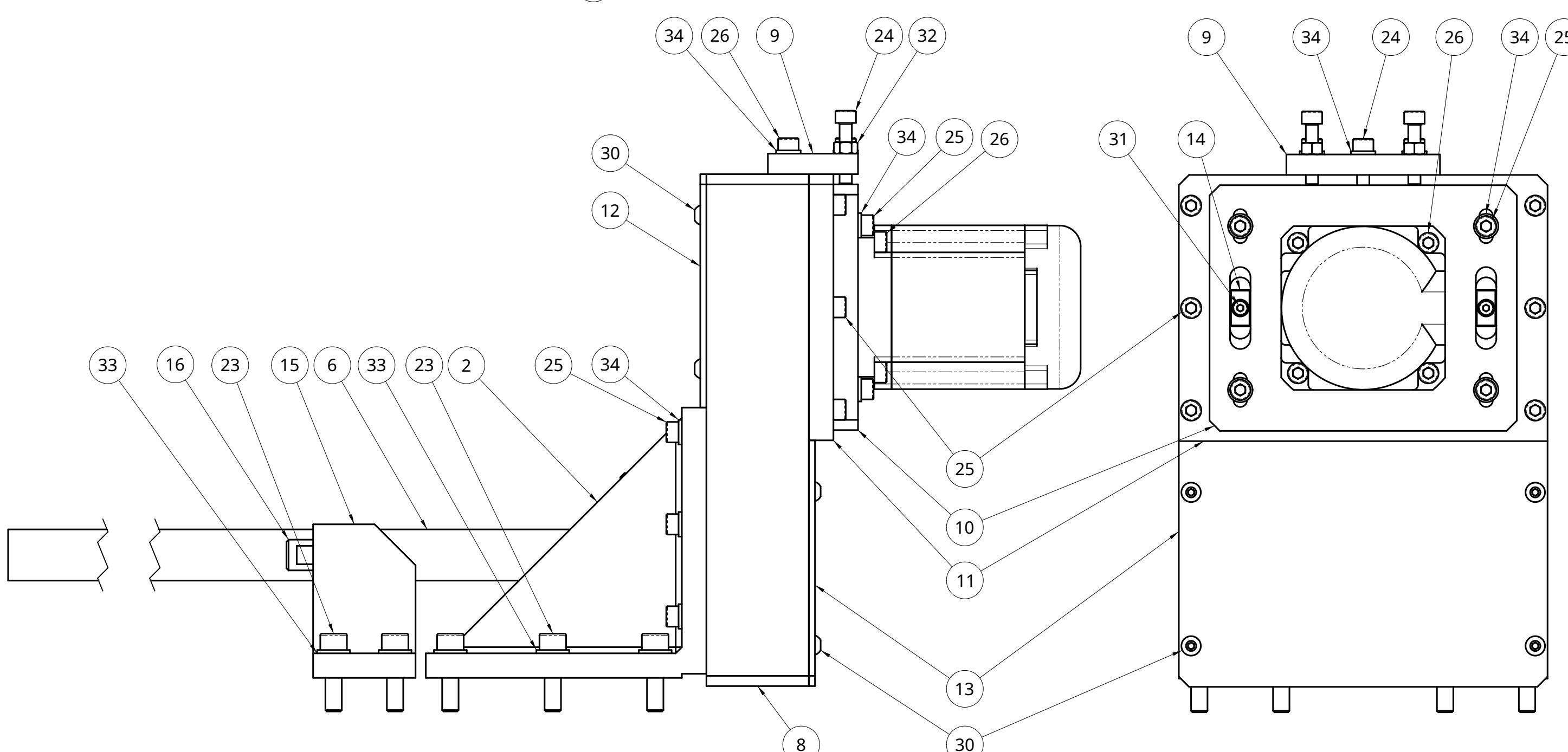
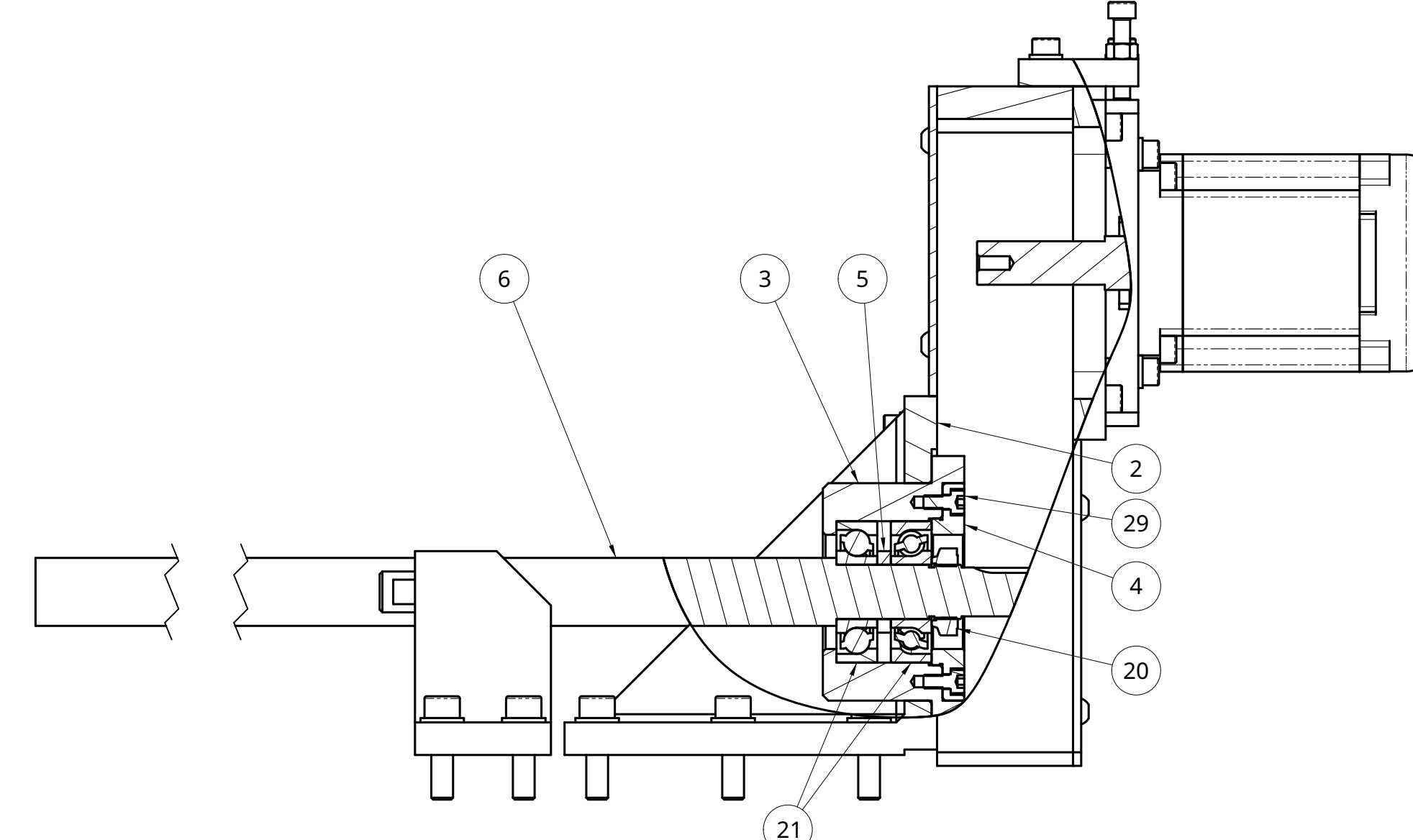
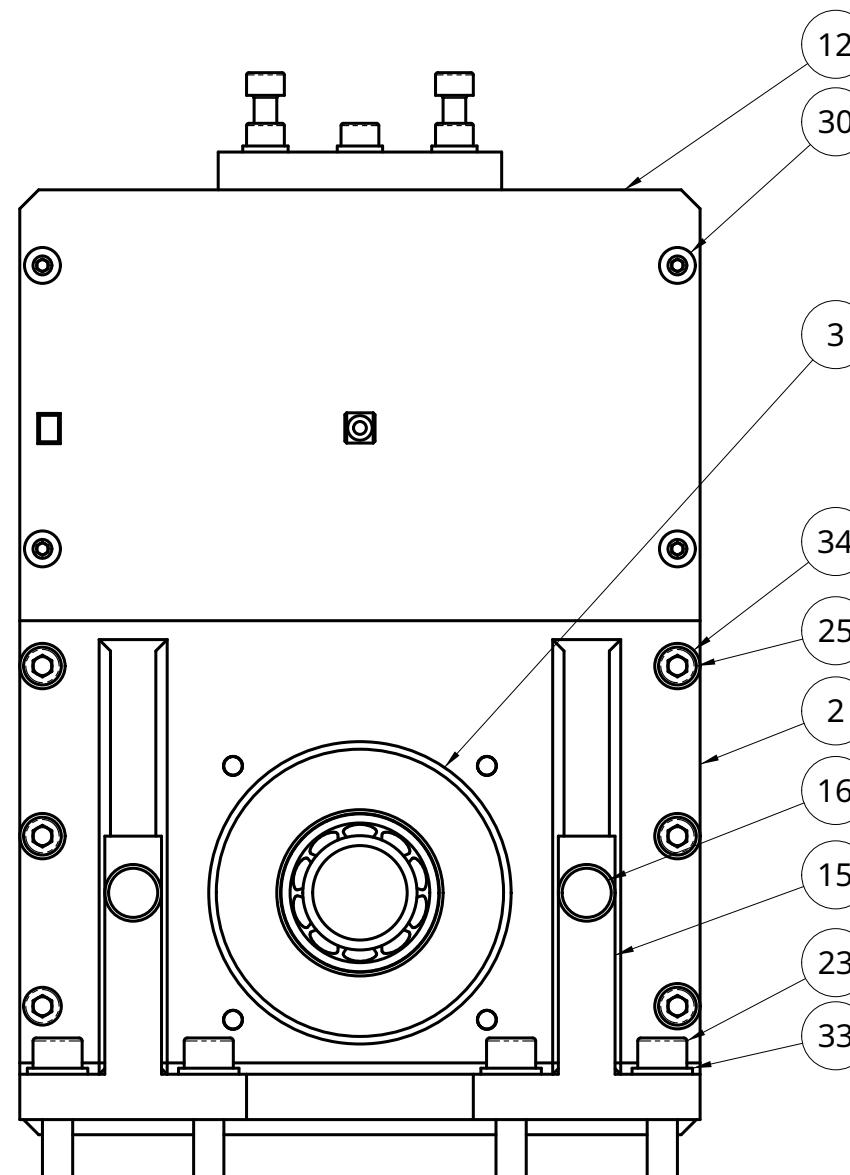
C

B

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UNLESS OTHERWISE SPECIFIED, .XX ± .XX .XXX ± .XXX .XXXX ± .XXXX	NAME DRAWN CHECKED APPROVED	DATE 10/14/2019
SURFACE FINISH		
DO NOT SCALE DRAWING		
BREAK ALL SHARP EDGES AND REMOVE BURRS		
THIRD ANGLE PROJECTION	MATERIAL	VOLUME XXXXXX mm <sup>3</sup>

Ferris State University  
DRILL UNIT  
MAIN ASSEMBLY  
BALL SCREW AND SERVO DETAILS  
SIZE C DWG NO. BR-549-C REV.  
SCALE 1:2 WEIGHT X.XXX kg SHEET 6 of 6

4

3

2

1