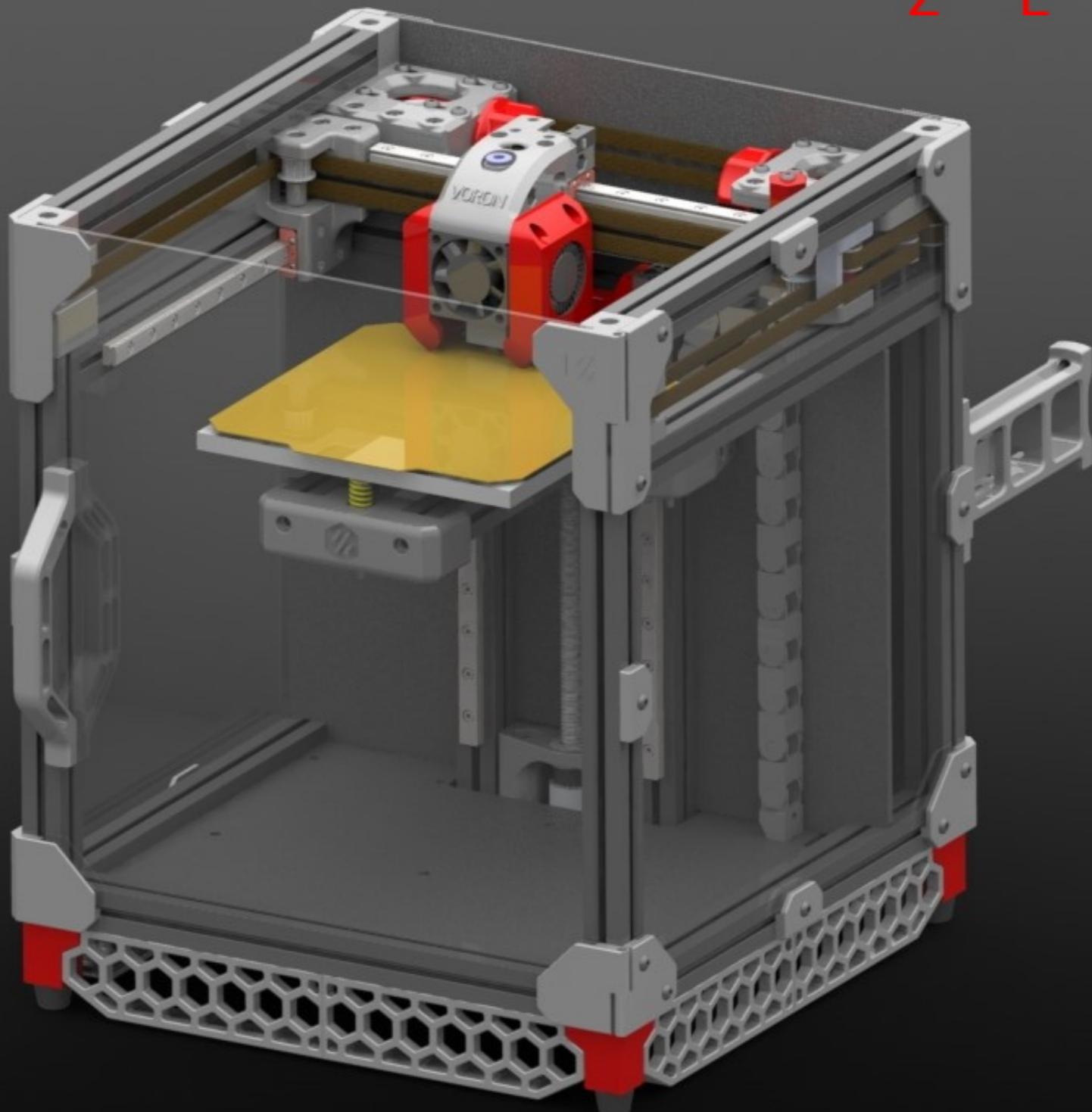


VORON
Z E R O



Assembly Manual



Before you begin on your journey, a word of caution. In the comfort of your own home you are about to assemble a robot. This machine can **maim**, **burn**, and **electrocute** you if you are not careful. Please do not become the first VORON fatality. There is no special Reddit flair for that.

Please, read the **entire manual** before you start assembly. As you begin wrenching, please check our Discord channel (#voron_v0_questions) for any tips and questions that may halt your progress.

Most of all, good luck!

- The VORON Development Team

File Key / Part Printing Guidelines and Standards

File Key	
Primary Color	nothing at start of file name
Accent Color	[a]_ at start of file name
Quantity Required	_x# near end of file name

Part Printing Guidelines and Standards	
Approved FDM Materials	ABS or ABS+ Only
Layer Height	0.2mm
Extrusion Width	Forced 0.4mm
Infill Percentage	40% minimum
Infill Type	Grid, Gyroid, Honeycomb, Triangle or Cubic
Wall Count	4 minimum
Solid Top/Bottom Layers	5 minimum

Very Important Steps

Fastener Size/Type Part

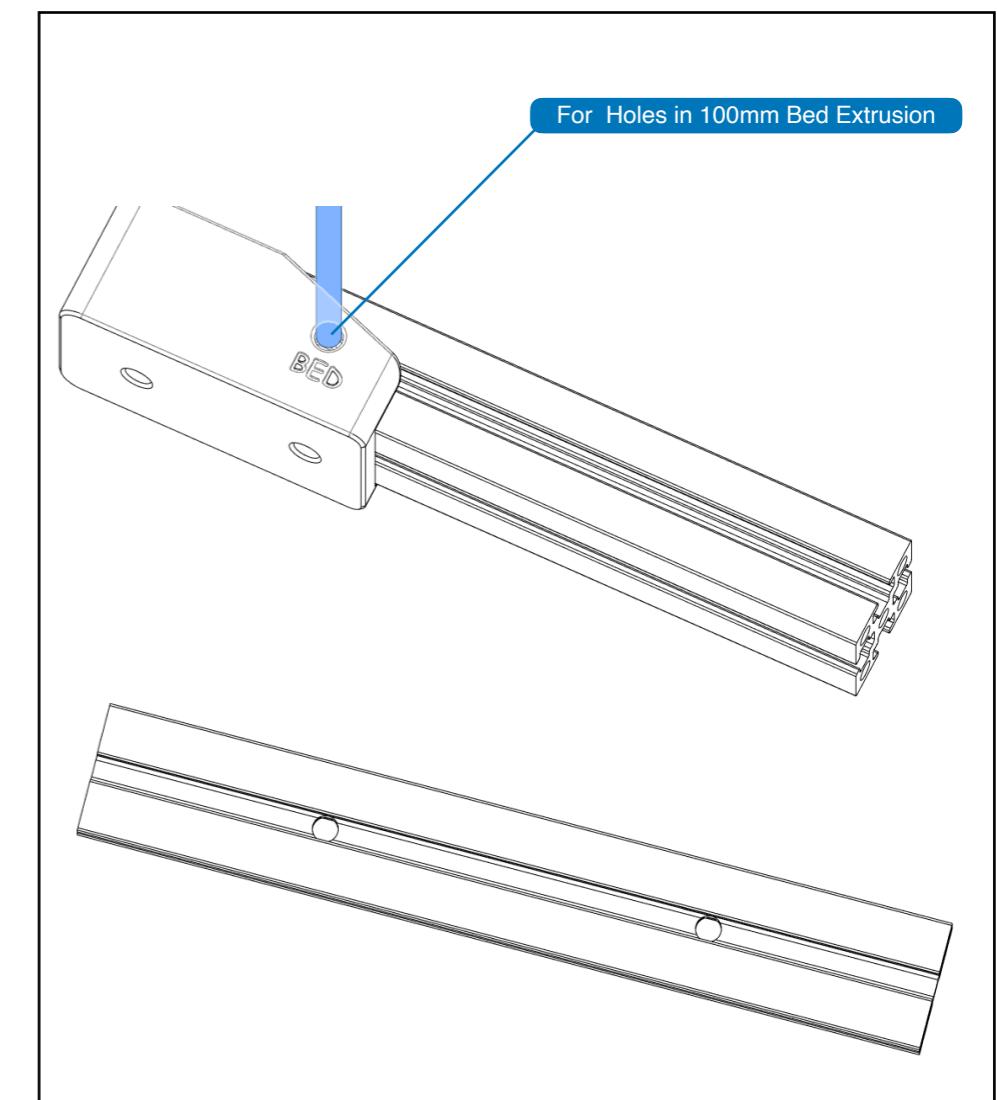
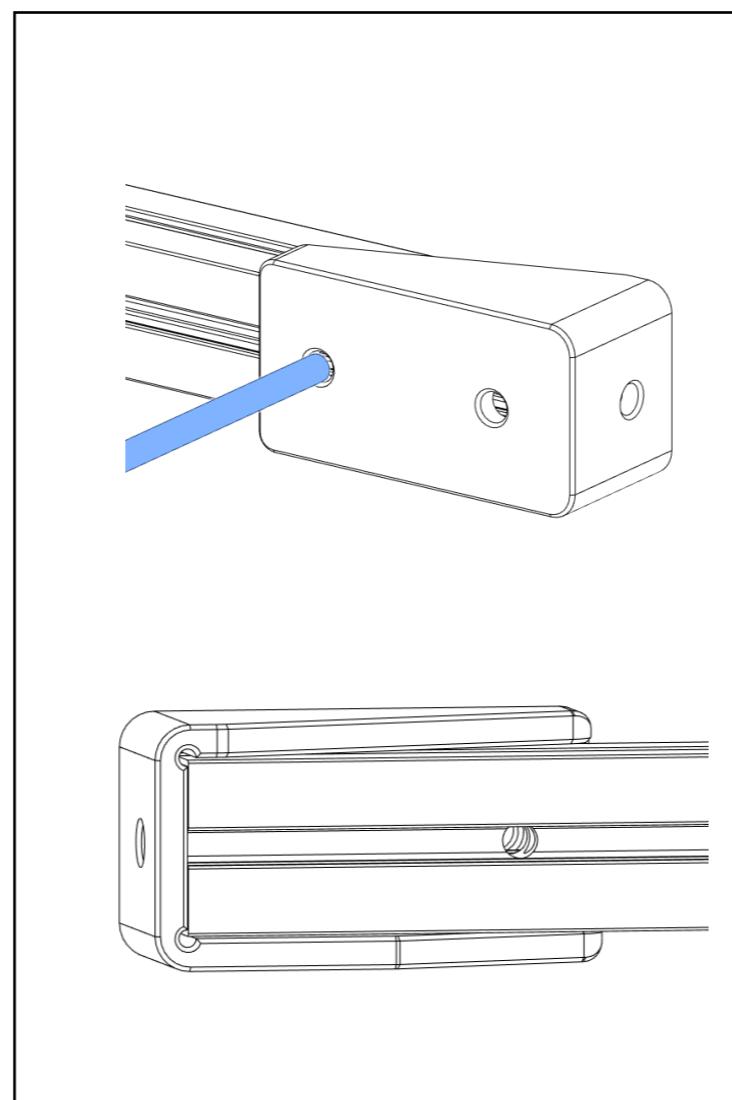
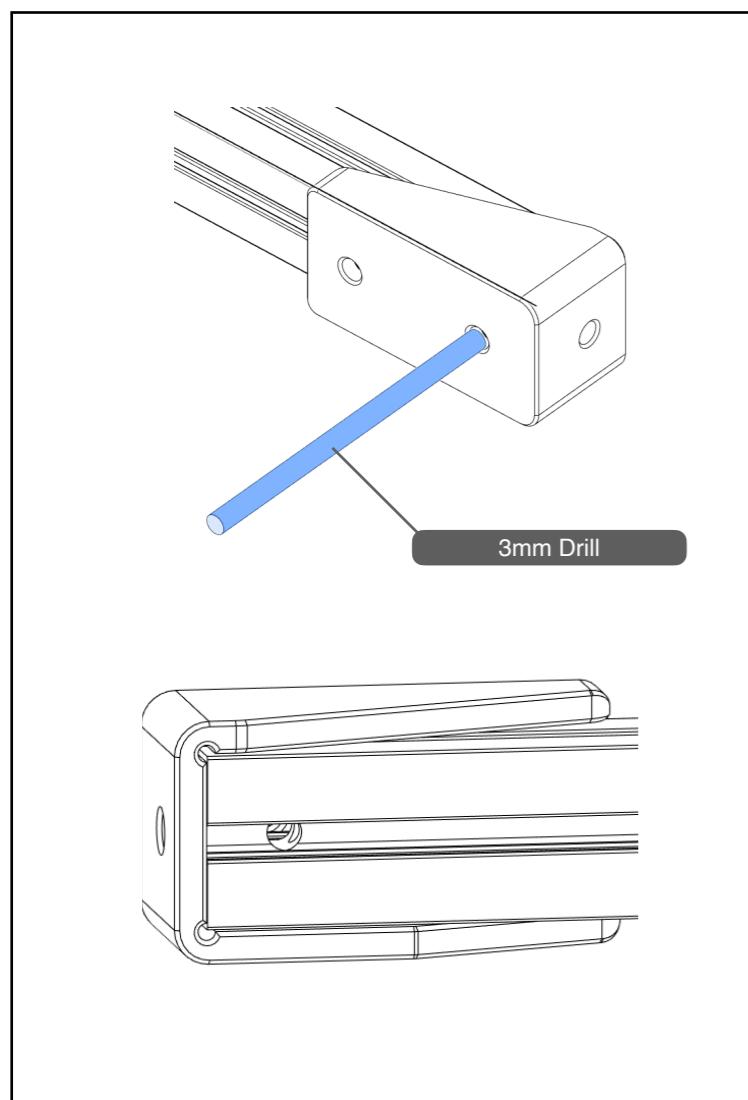
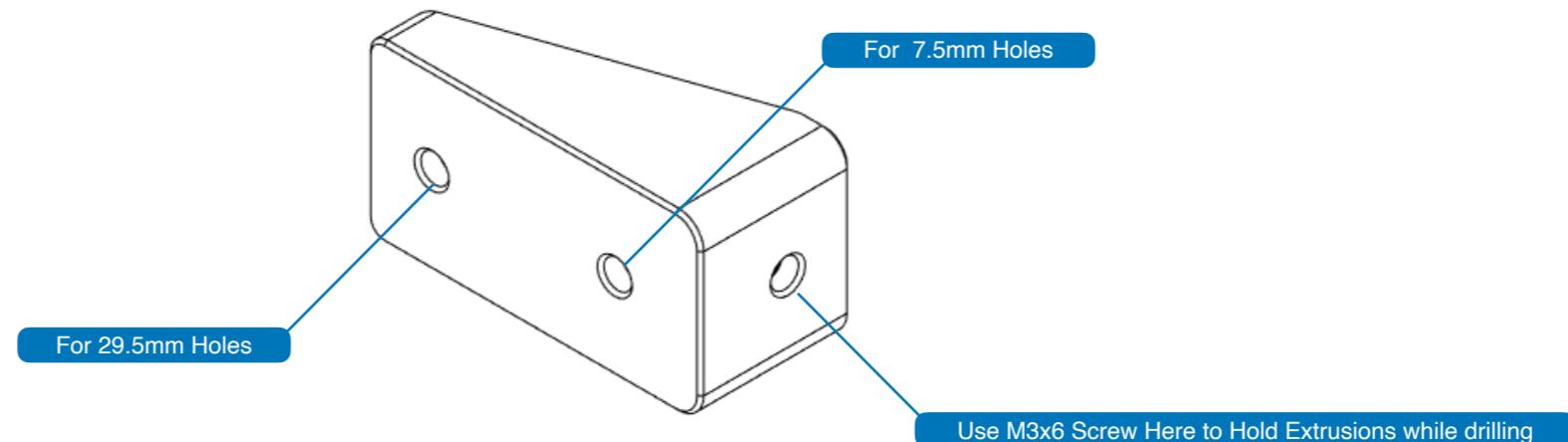
Notes and Tips

Preloaded M3 Nuts

Important Definitions and Adhesives List

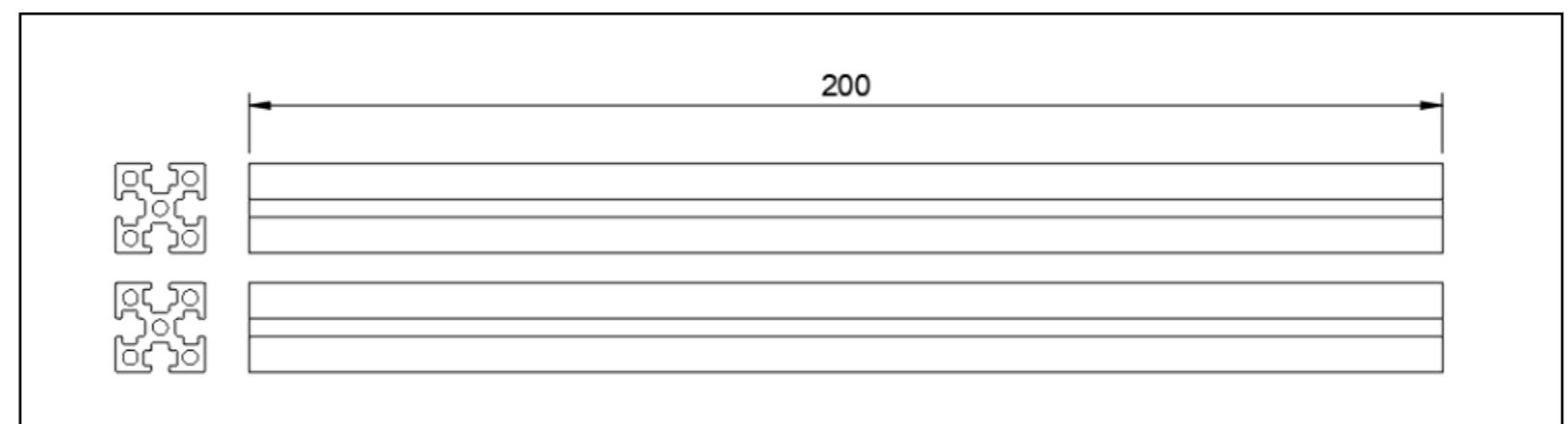
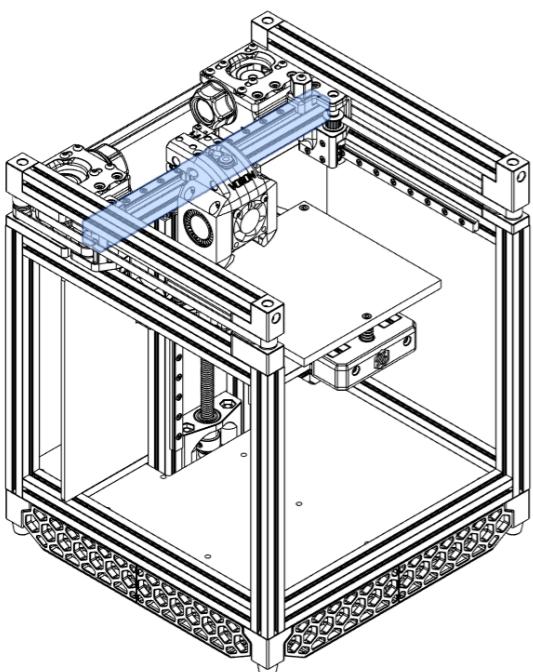
Callout	Definition
BHCS	Button Head Cap Screw (ISO 7380-1)
SHCS	Socket Head Cap Screw (ISO 4762/DIN 912)
Shim	Shim Ring (DIN 988)
Nut	DIN934 or equivalent
Thumb Nut	DIN 467 or equivalent
Low Strength Thread Locker	Loctite 222 (aka "Purple")
#x	This callout means you need to add the specified number of M3 nuts into the indicated slot at this step to be used by a fastener later in the assembly at which point adding a nut in will not be possible

Frame Drilling Guide

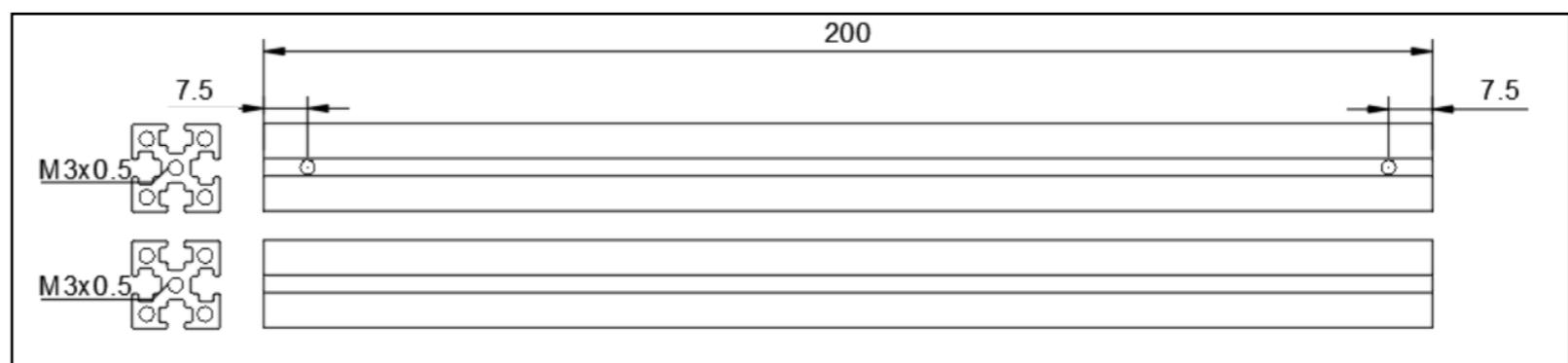
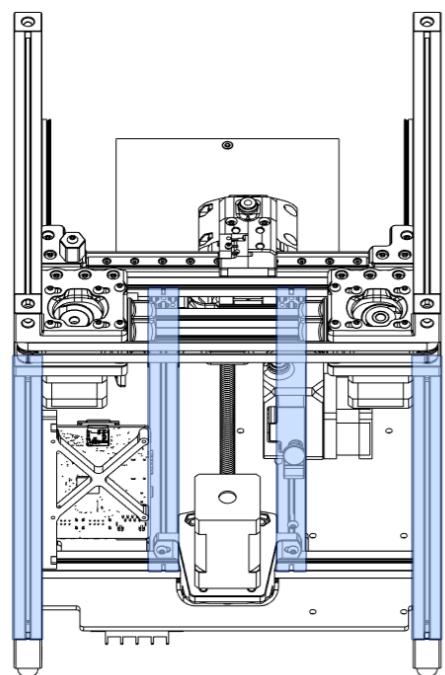
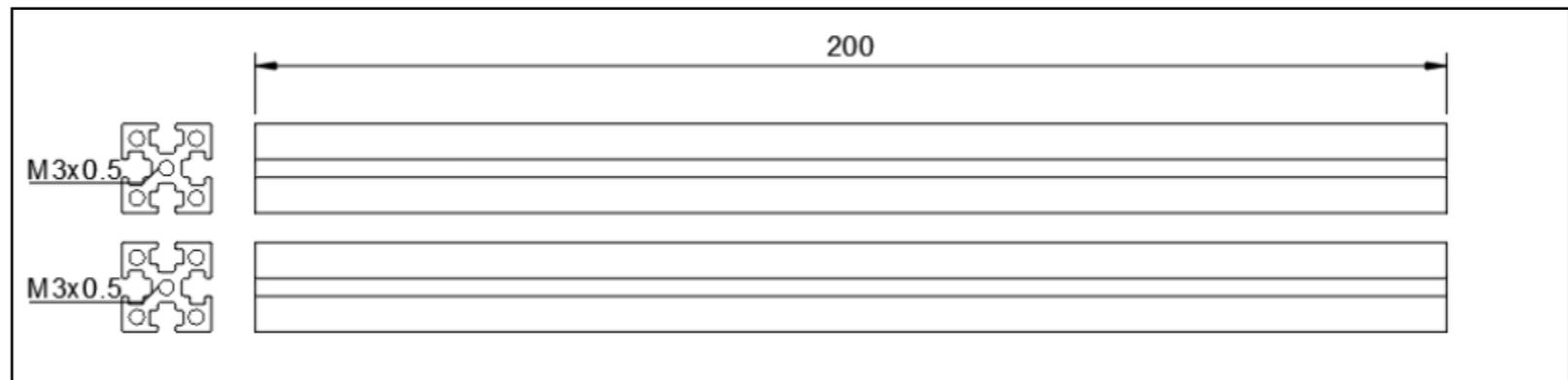
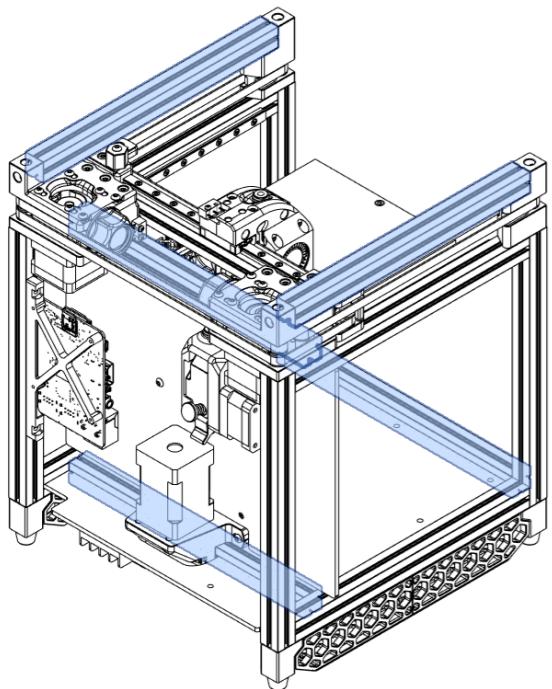


Frame Drilling

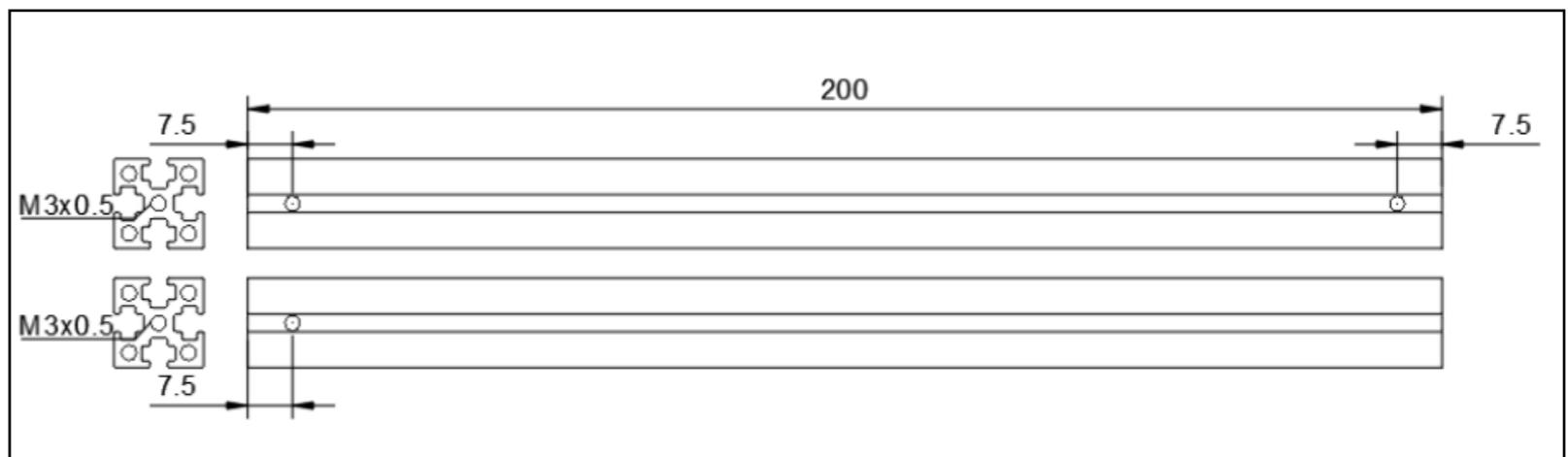
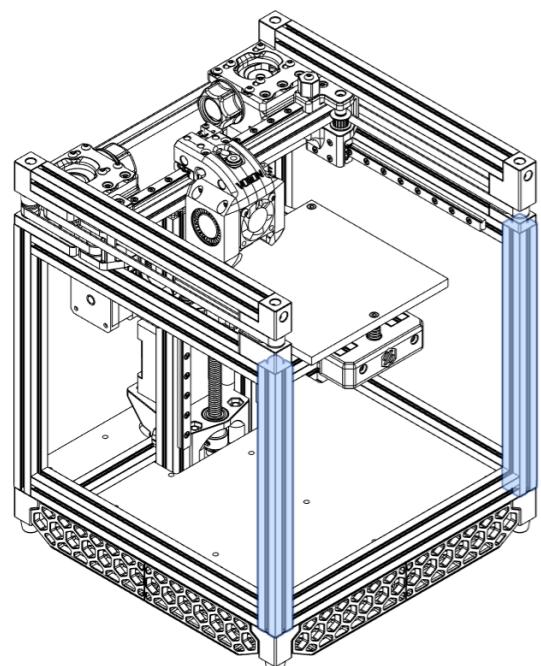
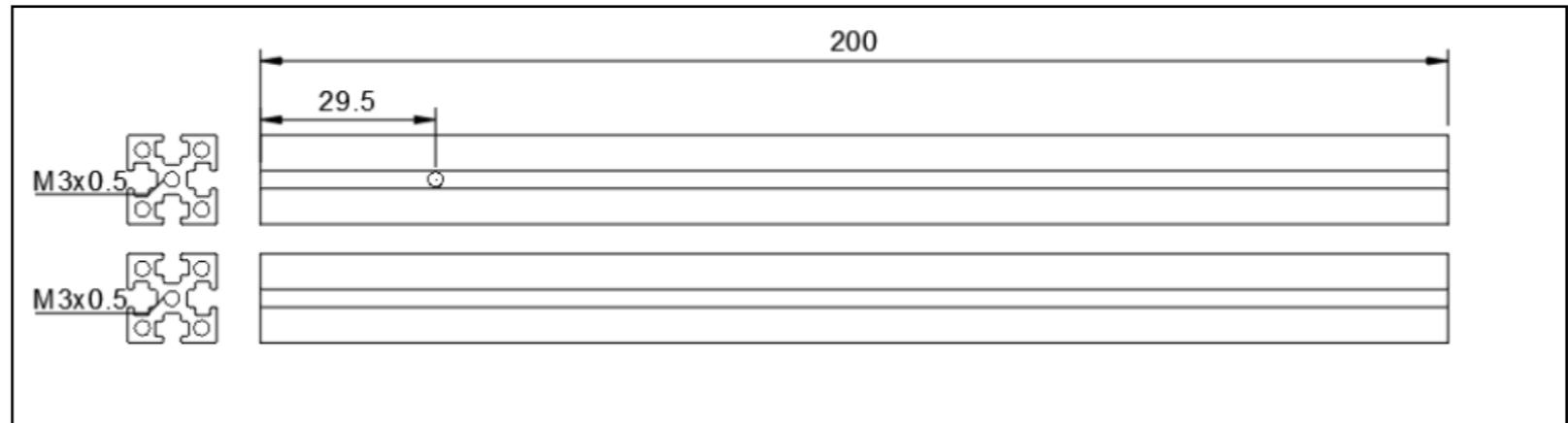
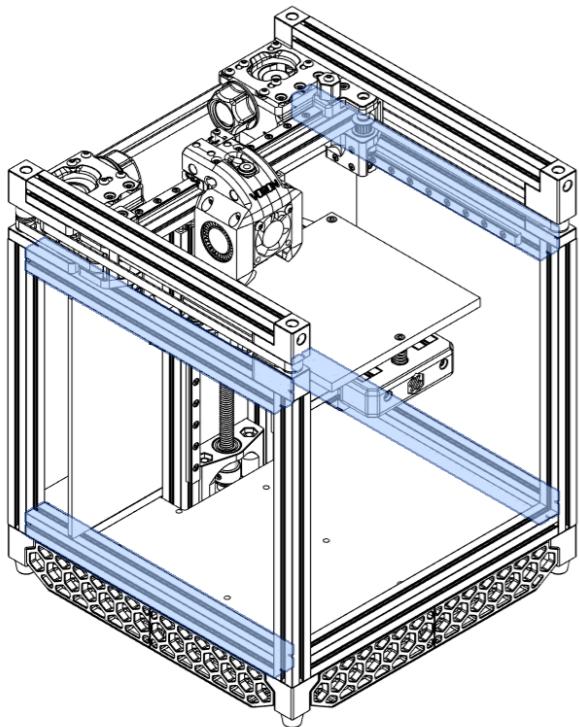
Drilled holes are for hex wrench access only they are not required to be precision holes.



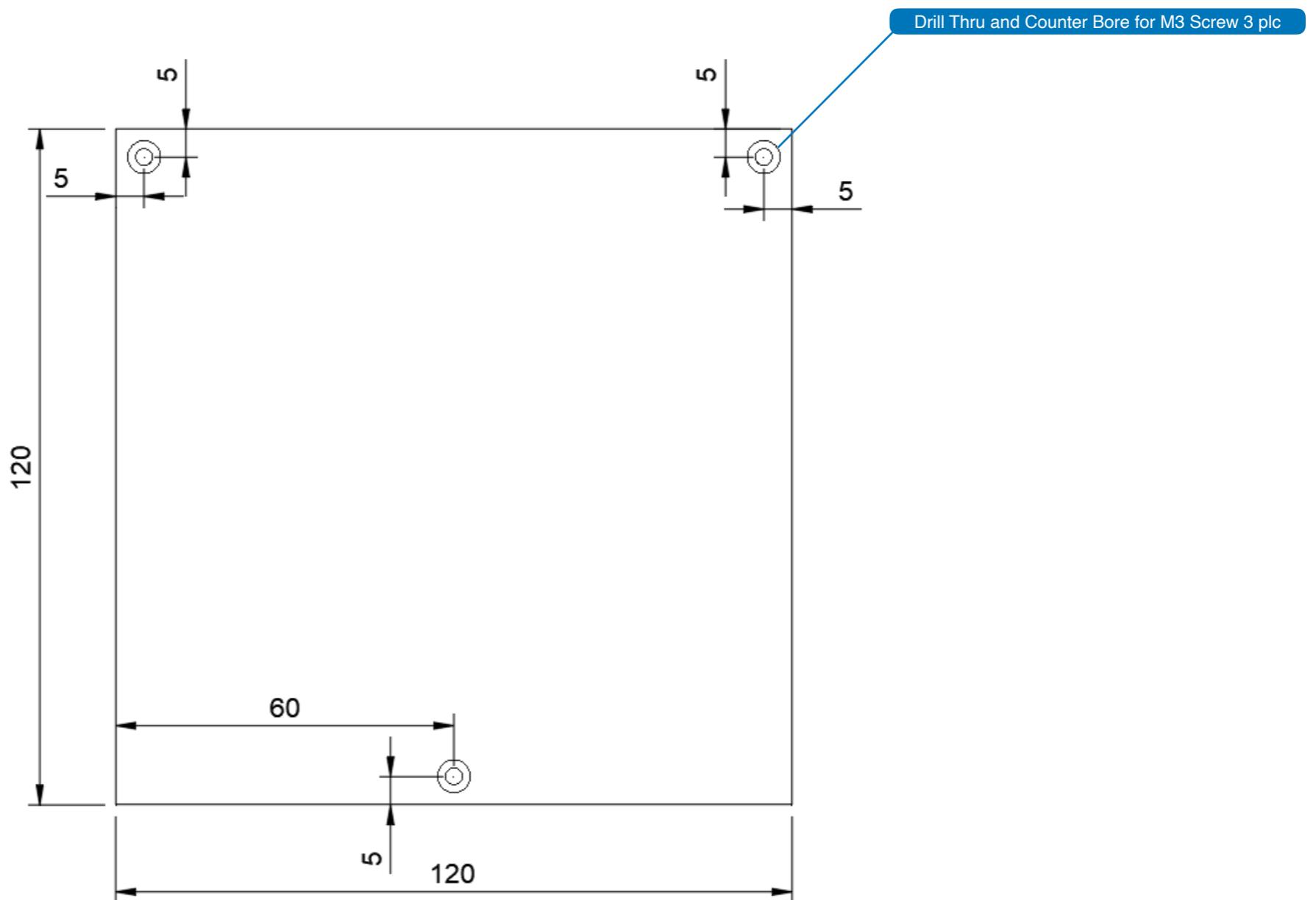
Frame Drilling



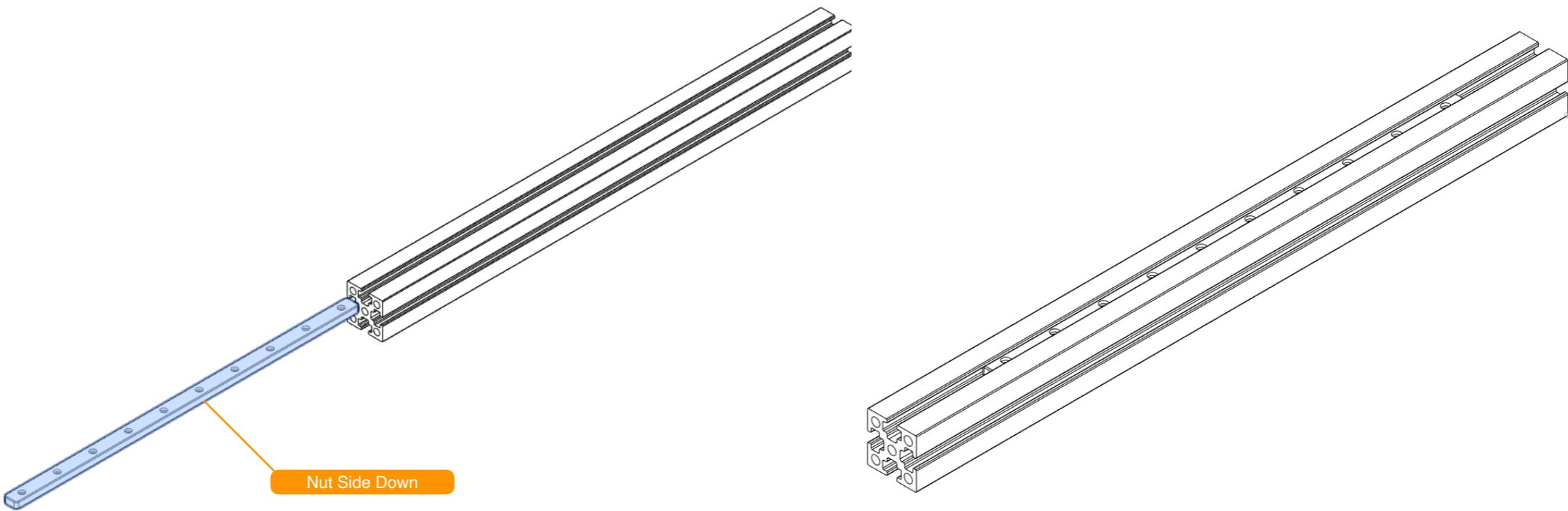
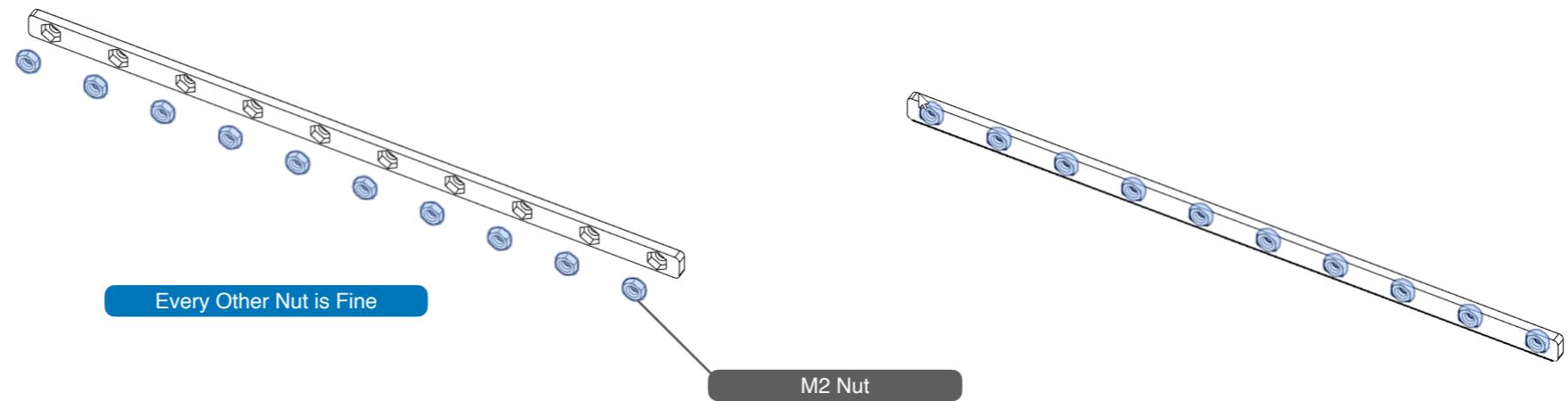
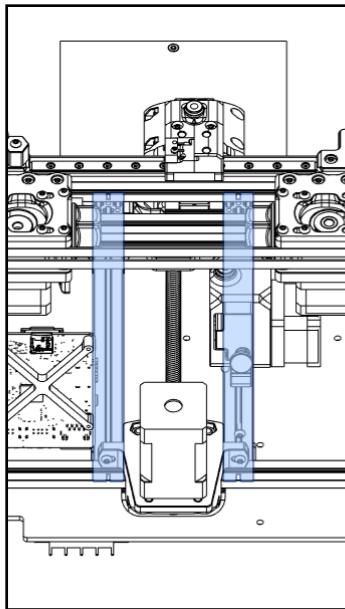
Frame Drilling



Bed Assembly



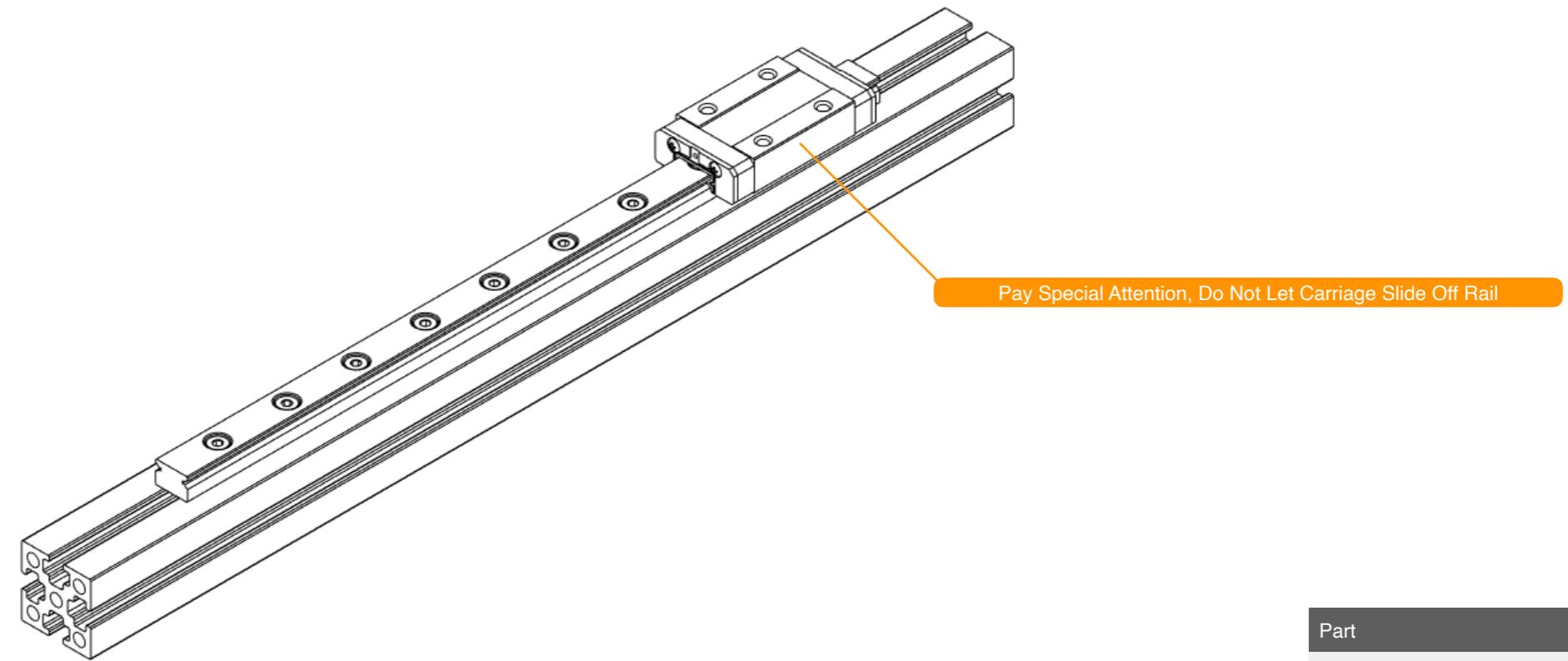
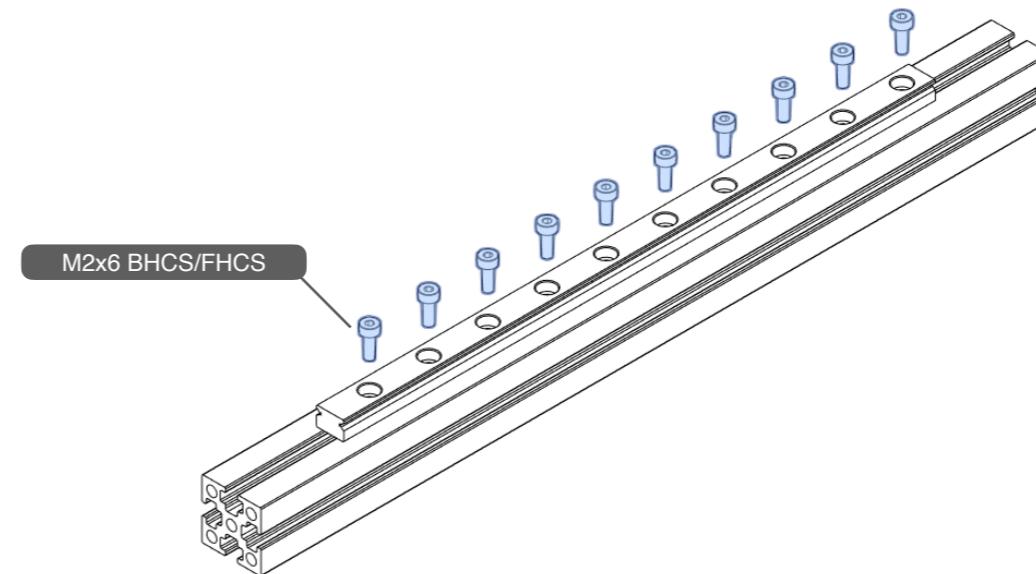
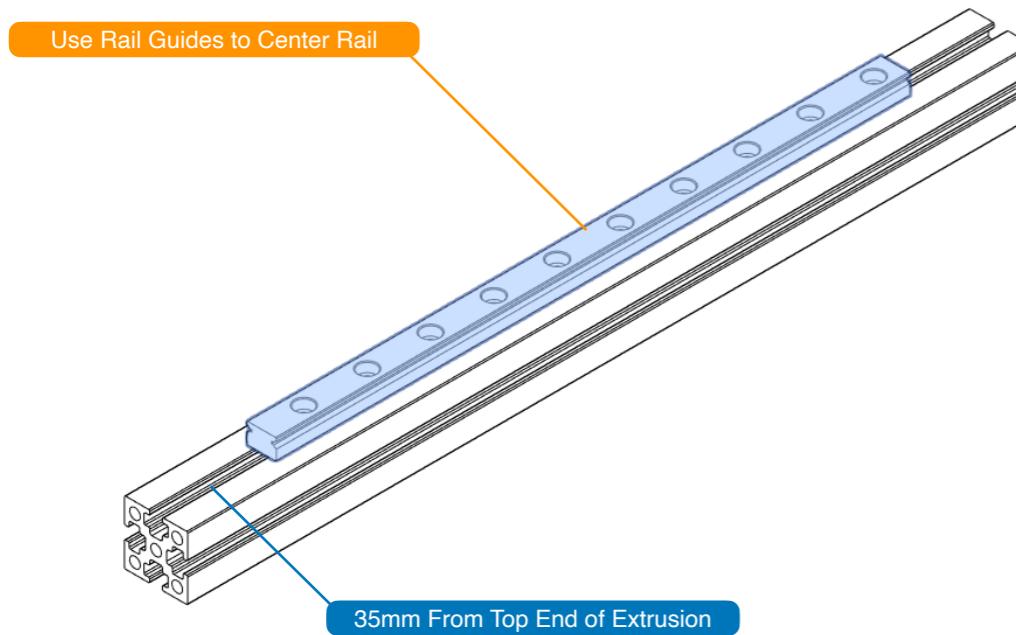
Z Rail Installation



Part	Qty
M2 Nut	5-10
15x15x200 Extrusion	2

Z Rail Installation

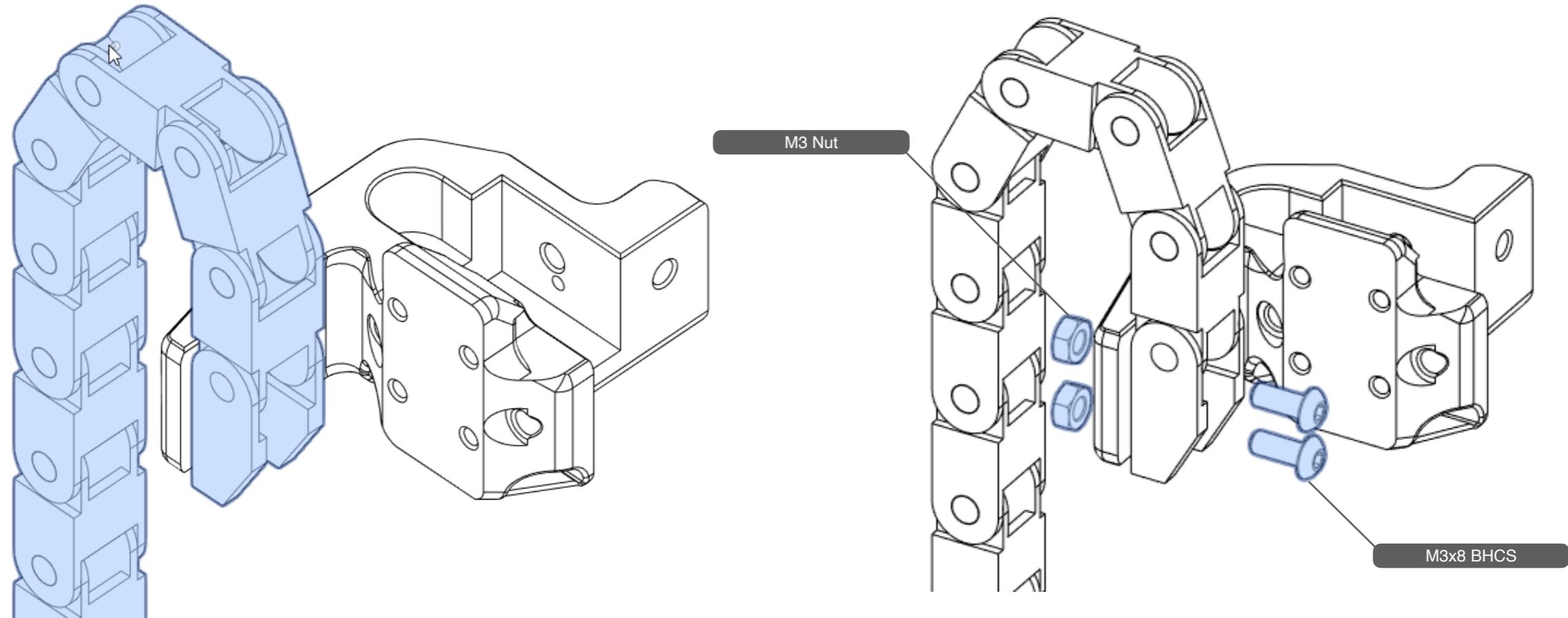
2x



Part	Qty
M2x6	5-10
MGN7R	2

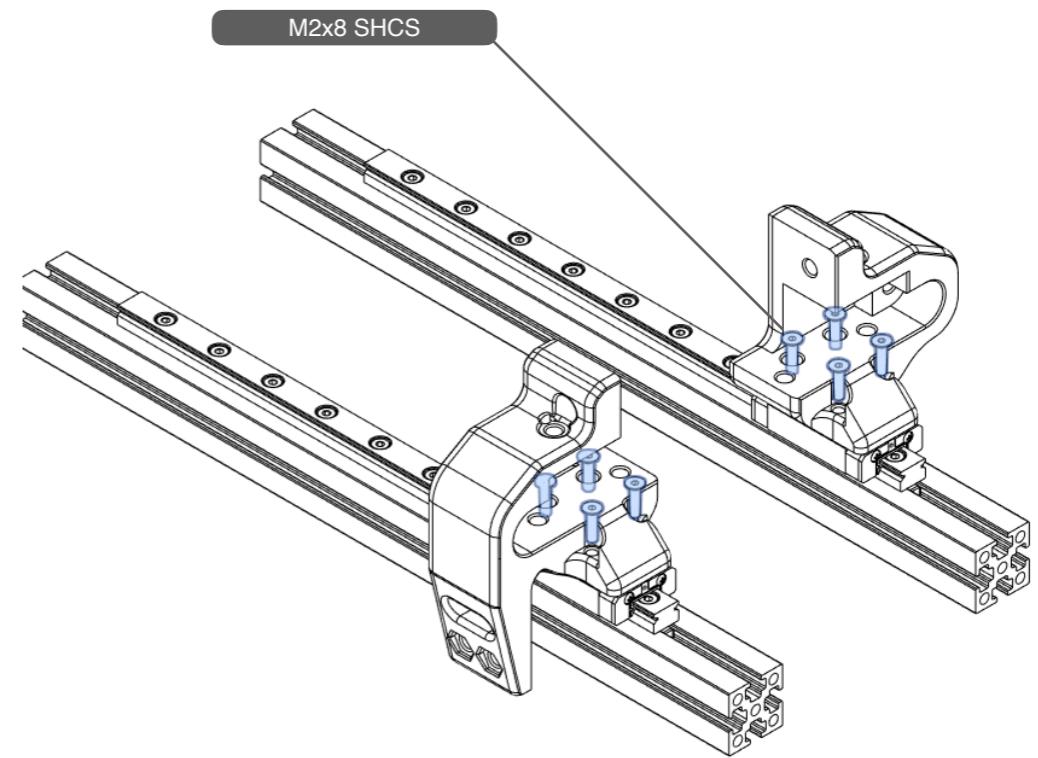
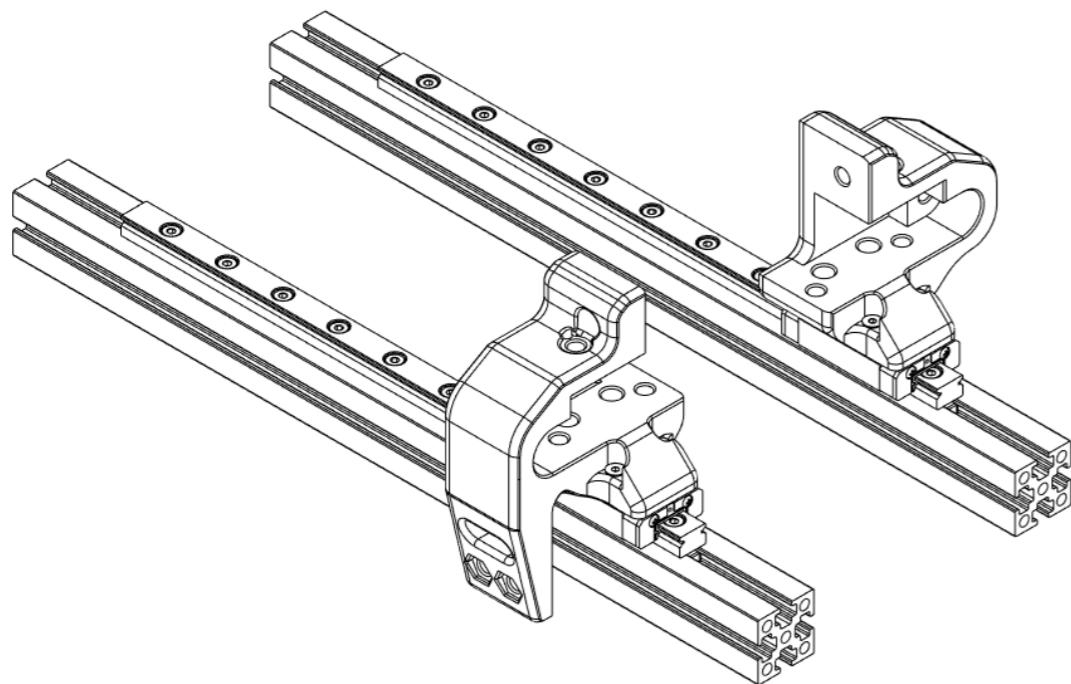
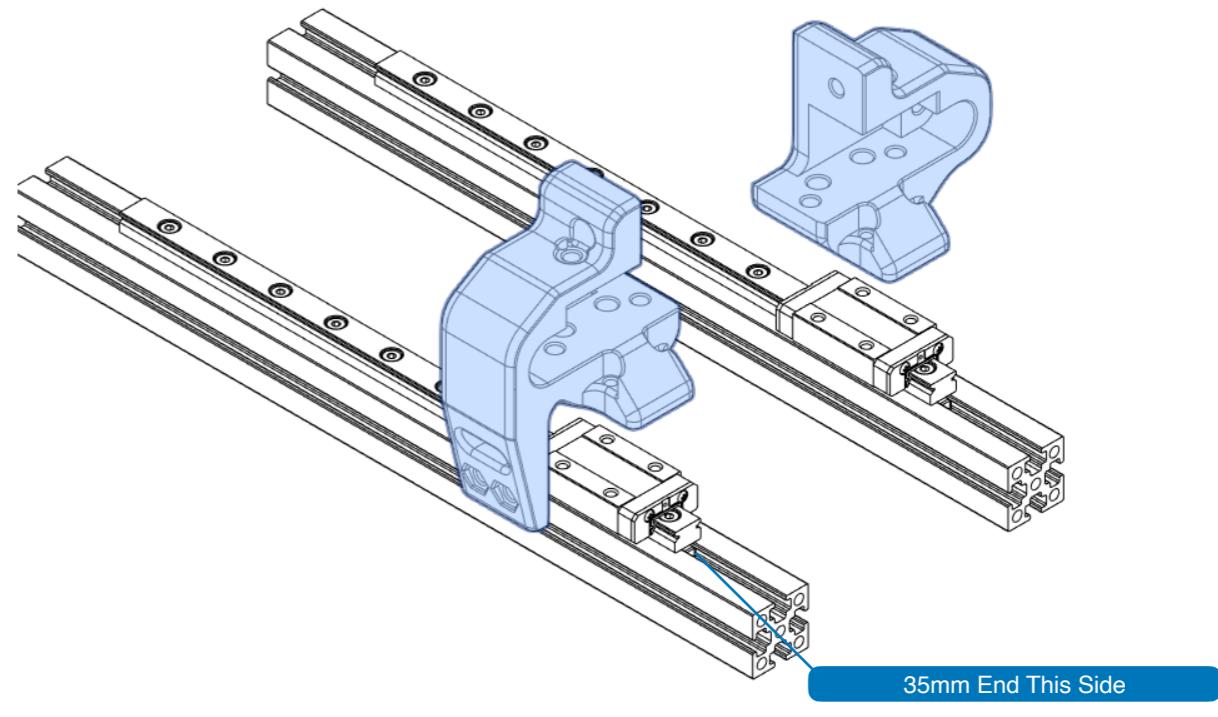
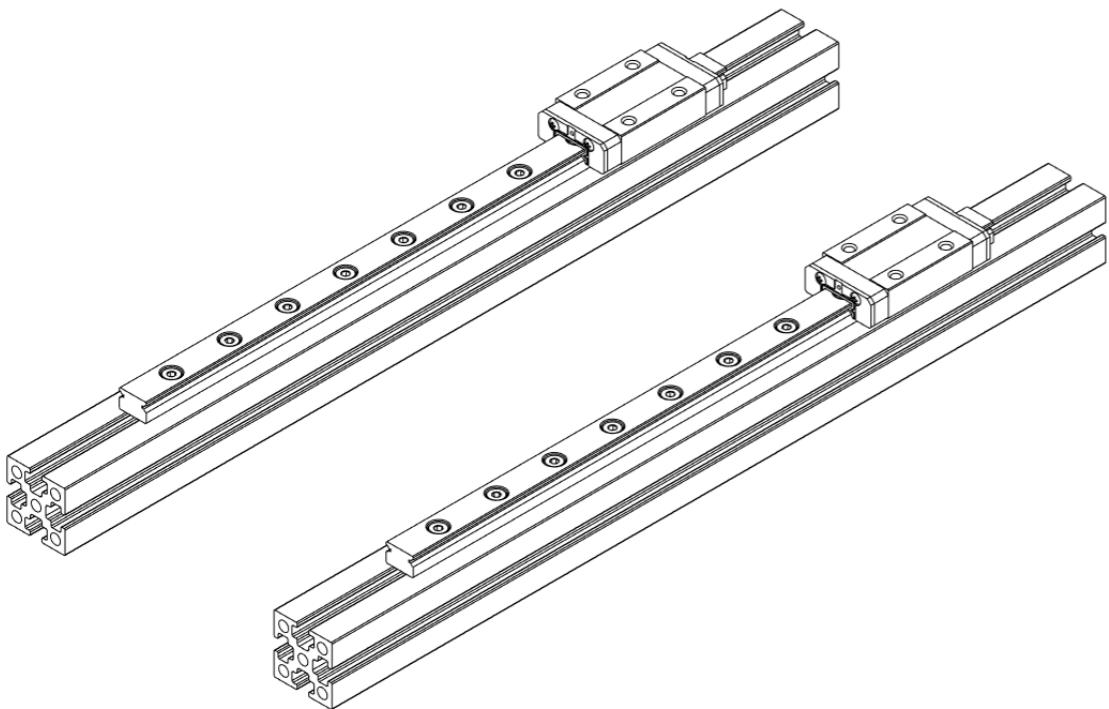
Bed Frame Assembly

Chain Purposely Not Shown In Later Images



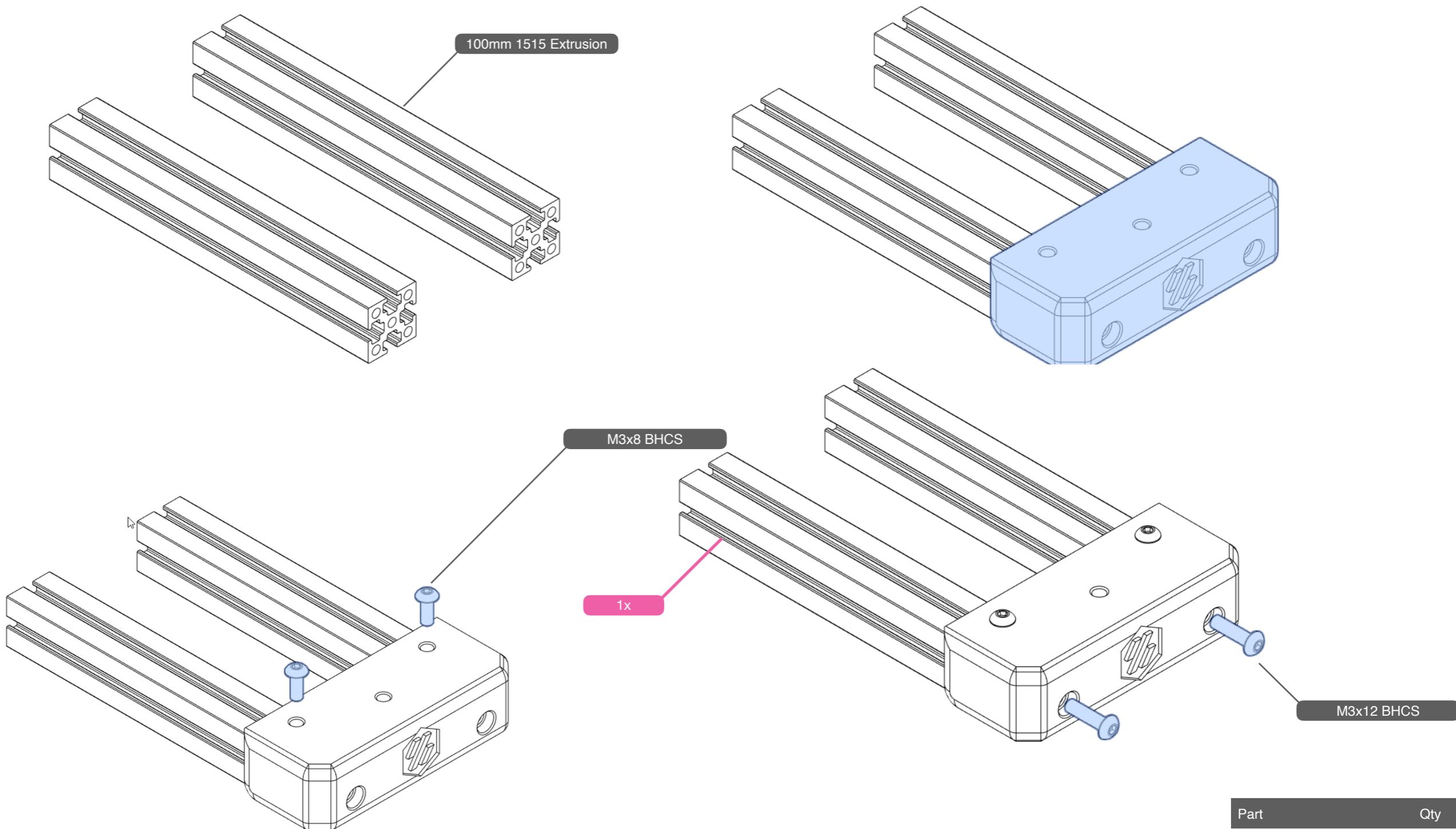
Part	Qty
M3x8 BHCS	2
M3 Nut	2

Bed Frame Assembly



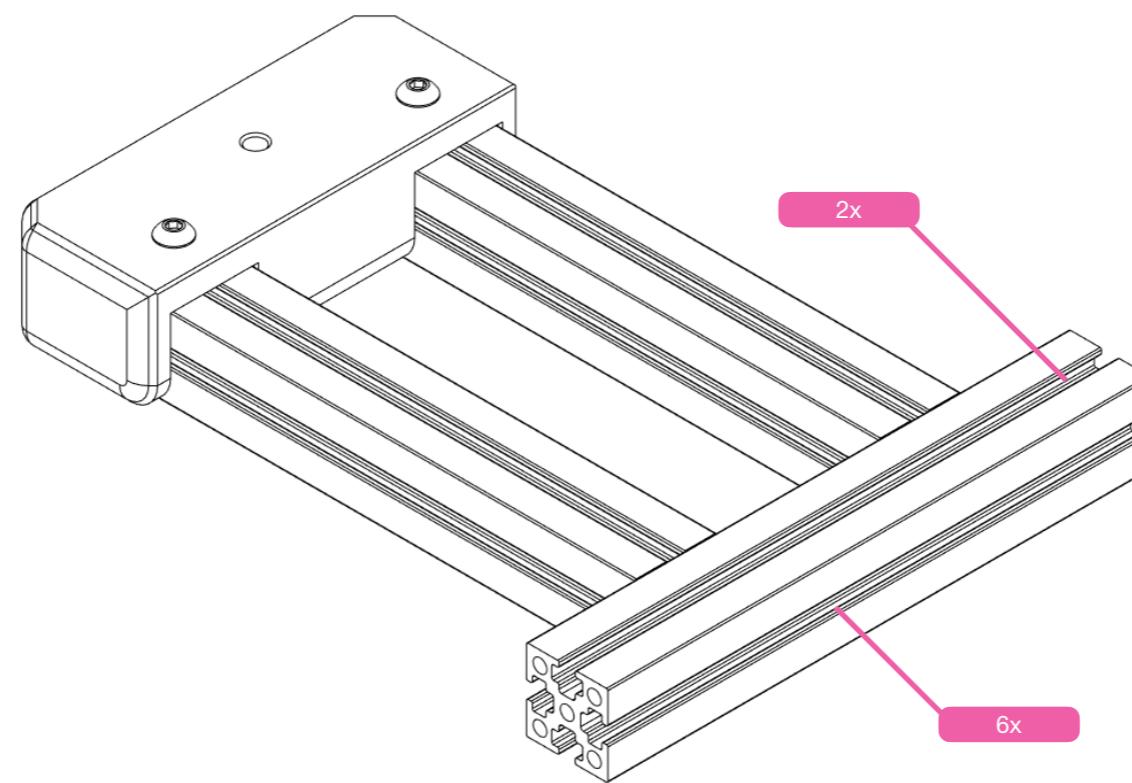
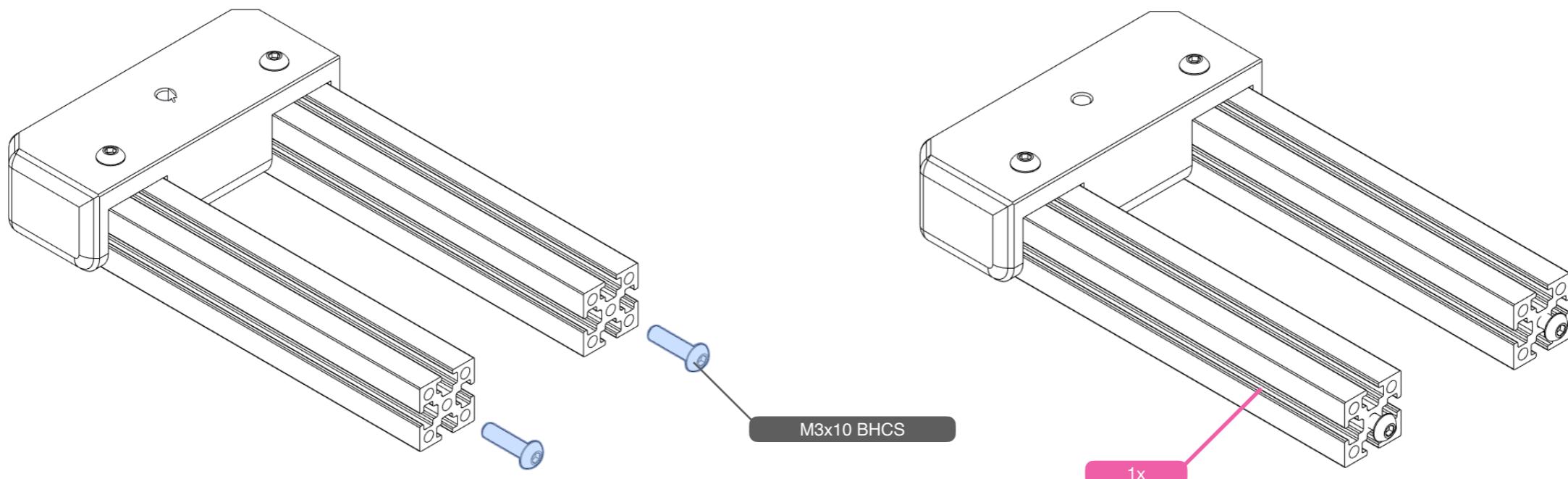
Part	Qty
M2x8 SHCS	8

Bed Frame Assembly



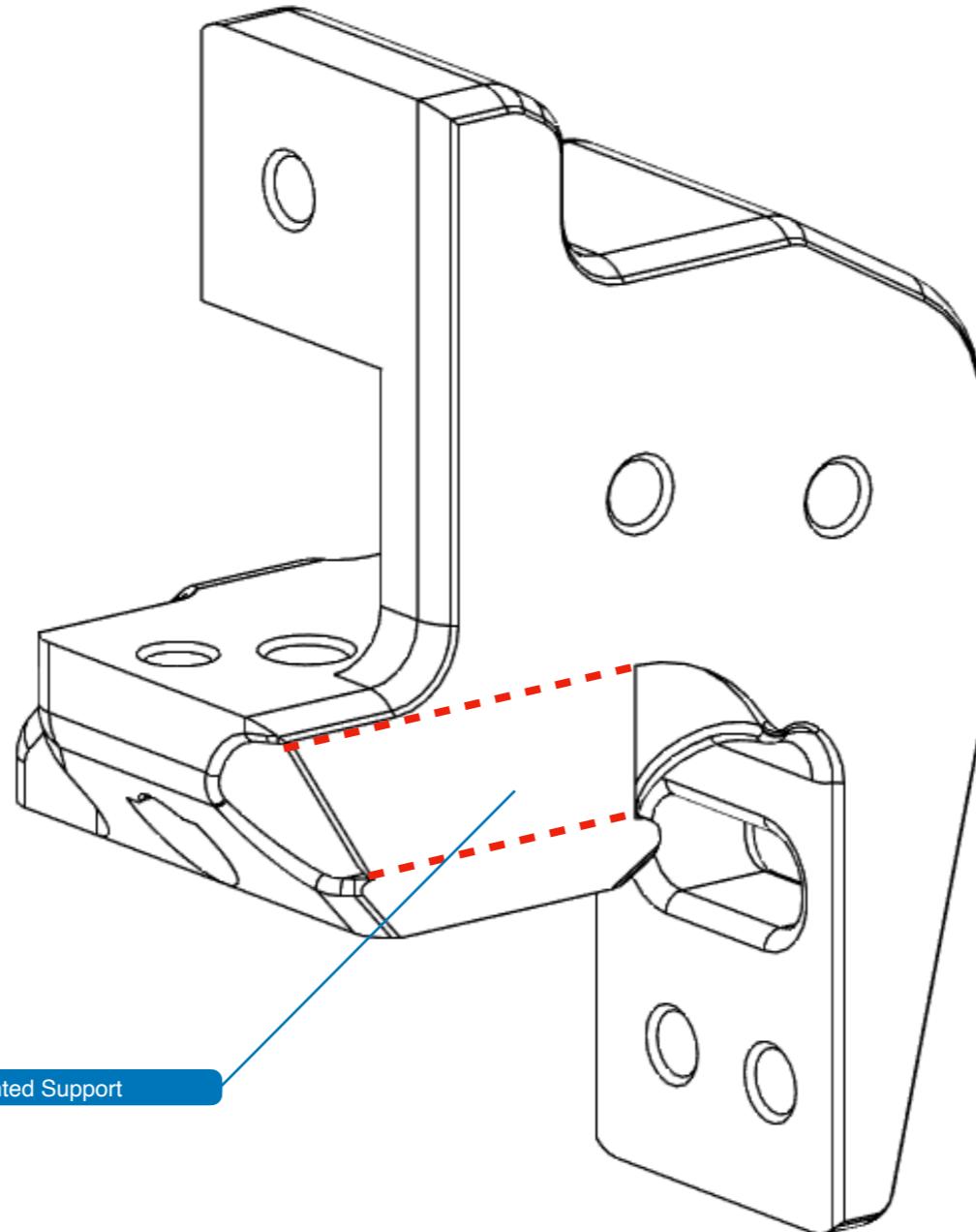
Part	Qty
100mm Extrusion	2
M3x8 BHCS	2
M3x12 BHCS	2
M3 Nut	3

Bed Frame Assembly



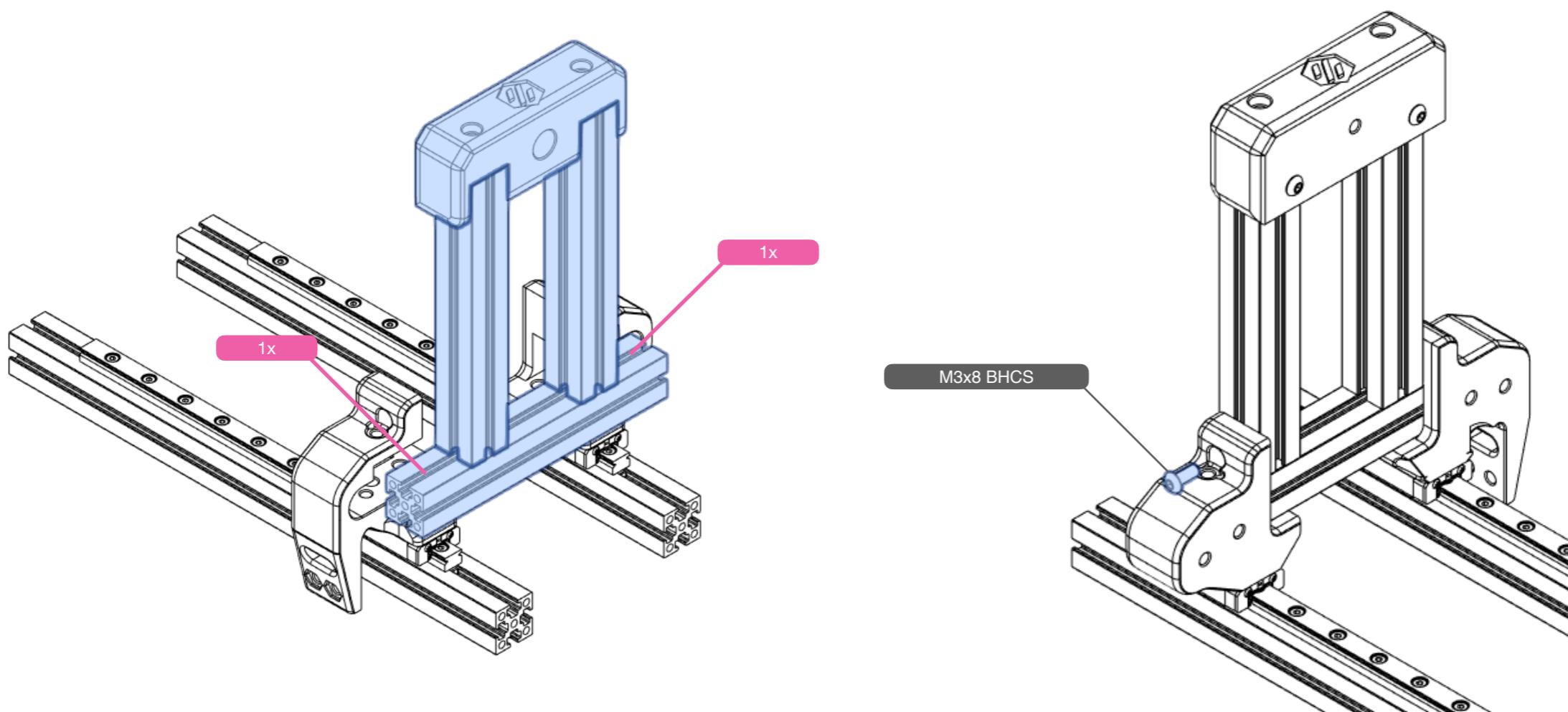
Part	Qty
100mm Extrusion	1
M3x10 BHCS	2
M3 Nut	9

Bed Frame Assembly



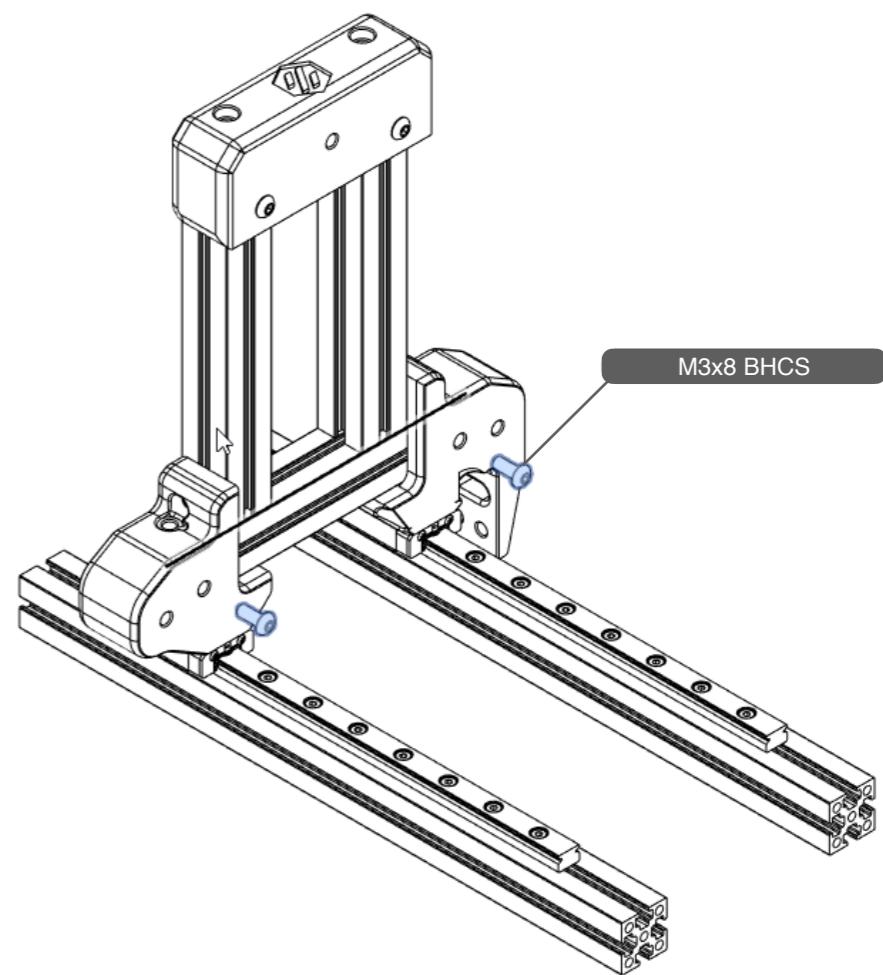
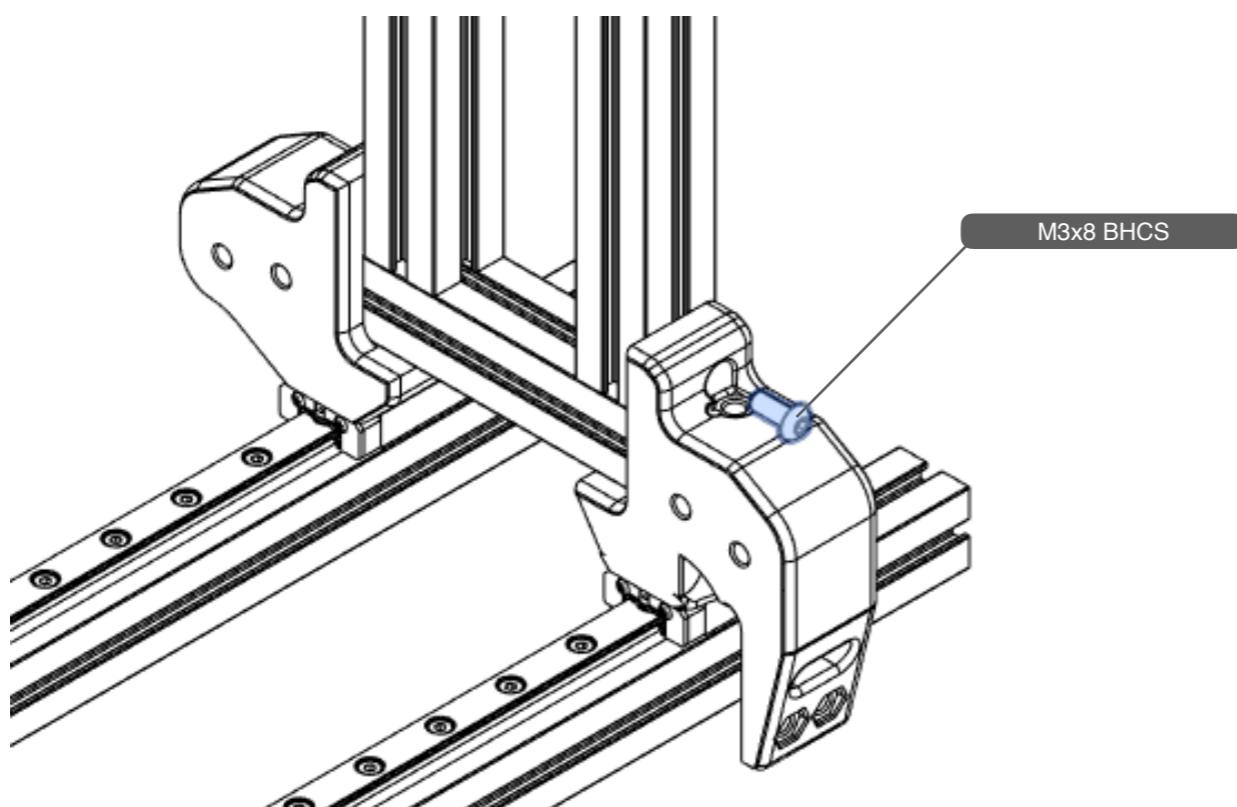
Trim Out Printed Support

Bed Frame Assembly



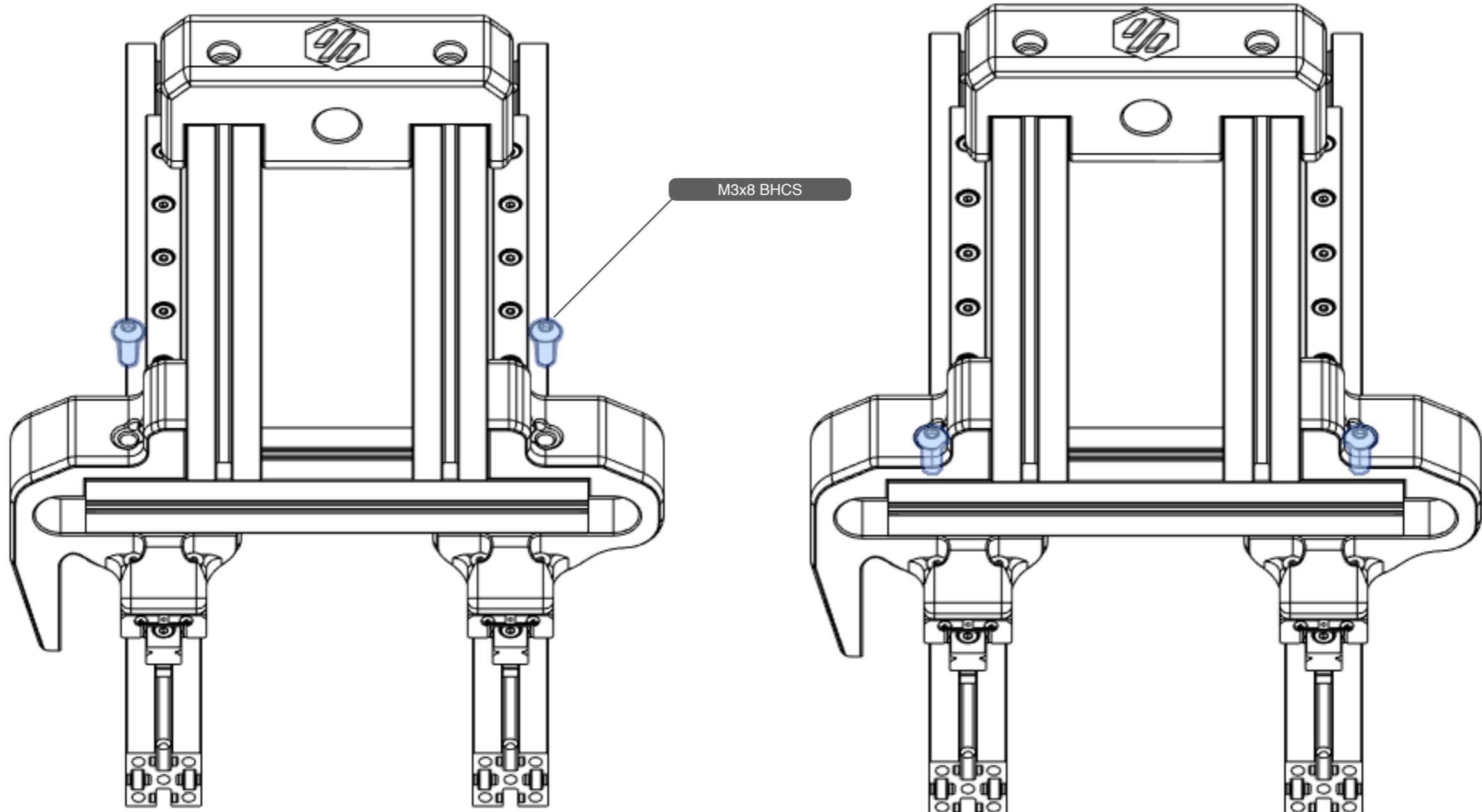
Part	Qty
M3x8 BHCS	2
M3 Nut	2

Bed Frame Assembly



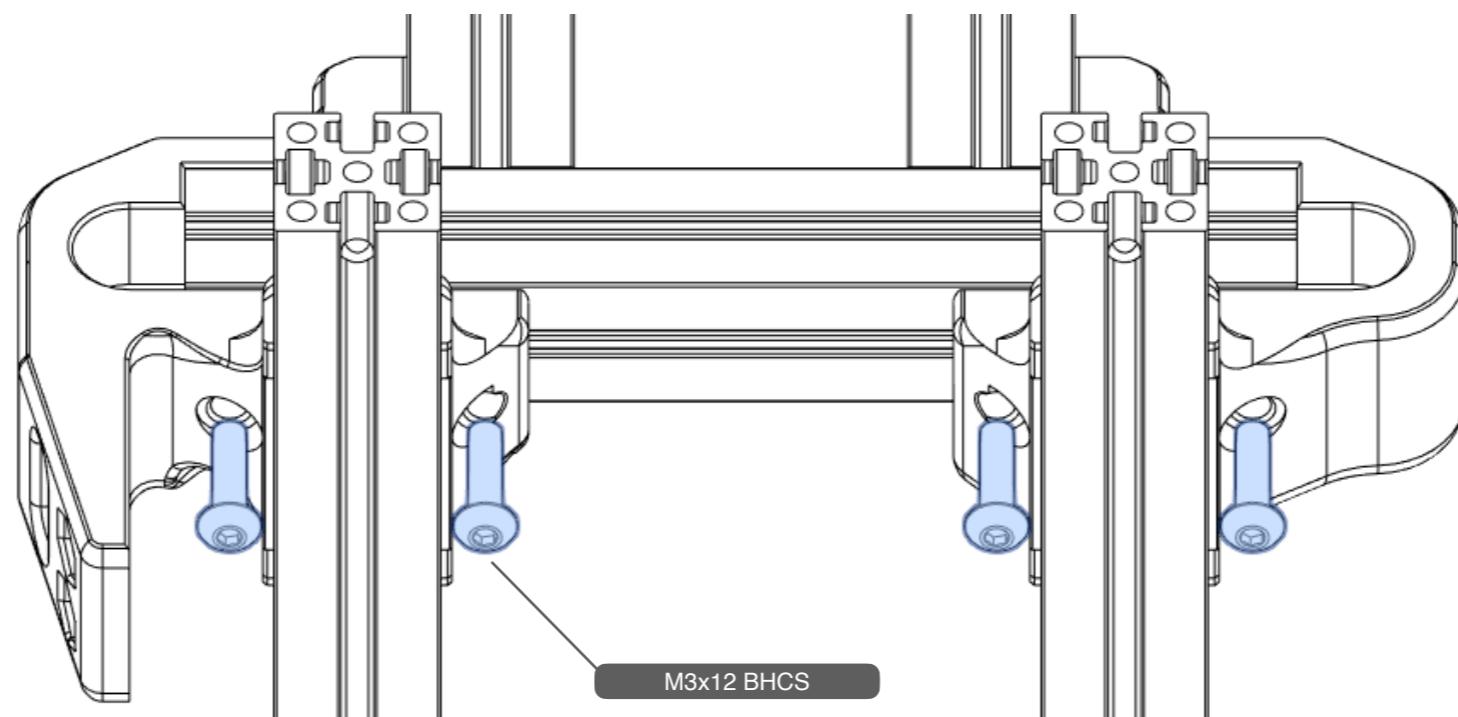
Part	Qty
M3x8 BHCS	3

Bed Frame Assembly



Part	Qty
M3x8 BHCS	2

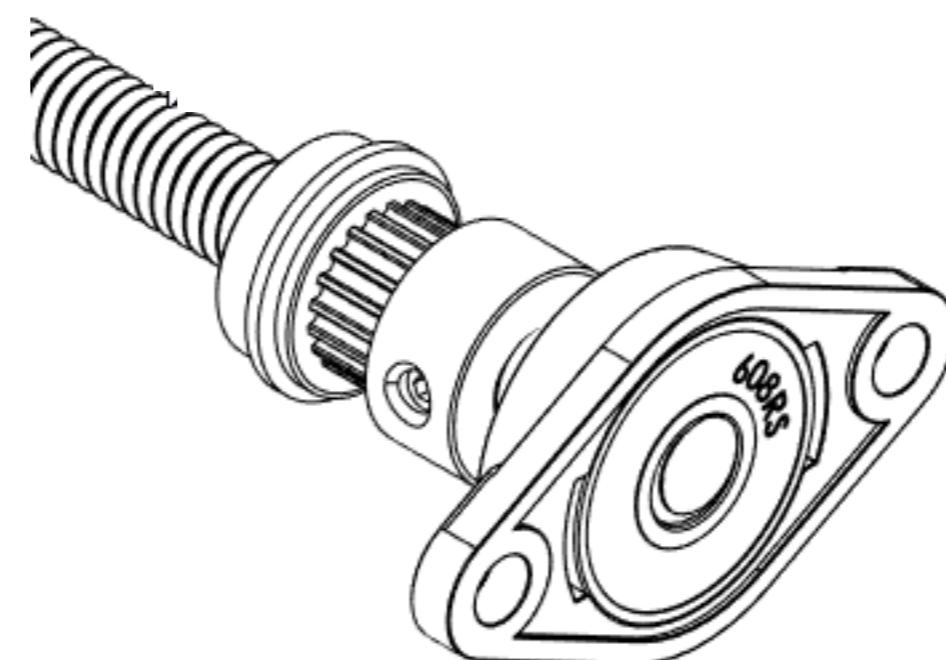
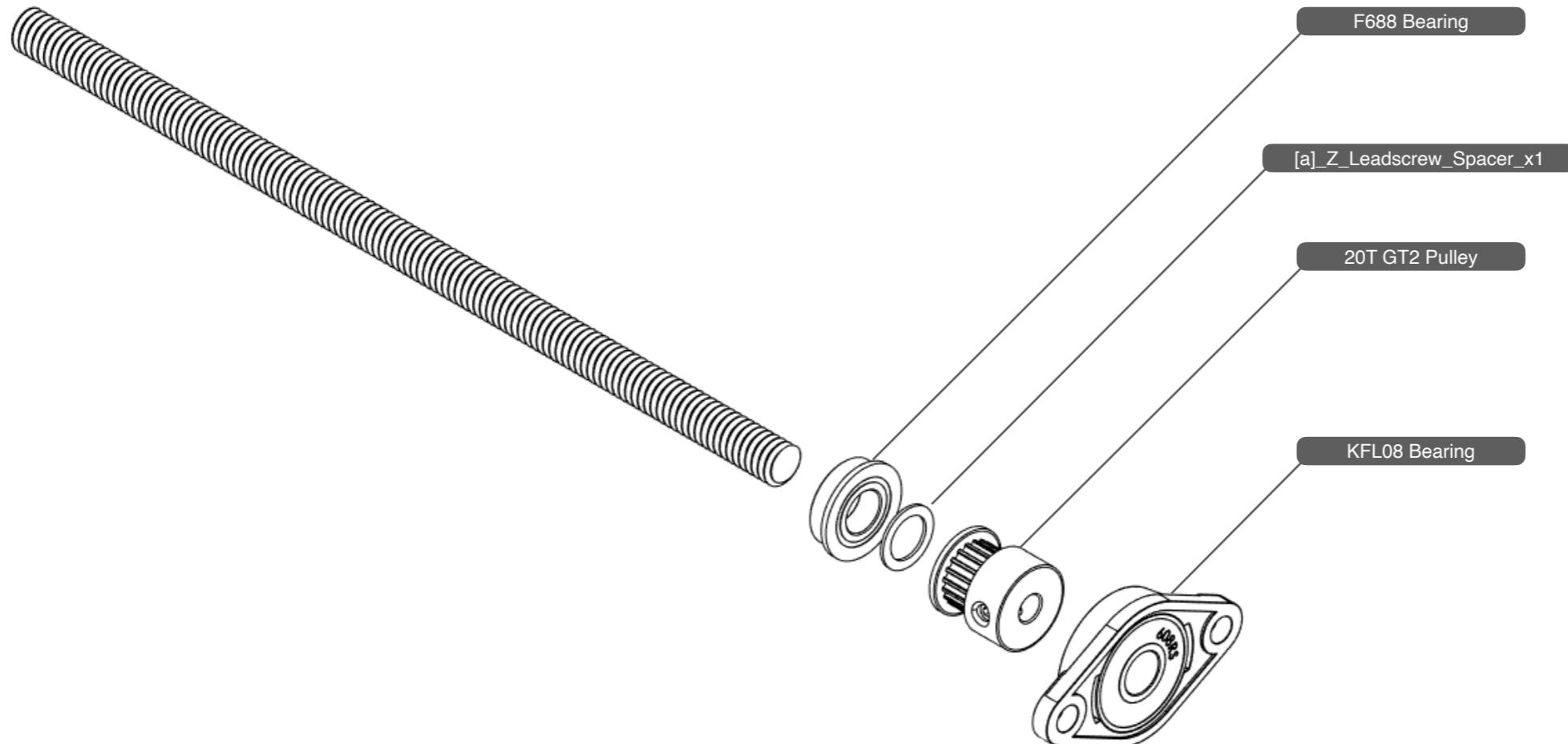
Bed Frame Assembly



M3x12 BHCS

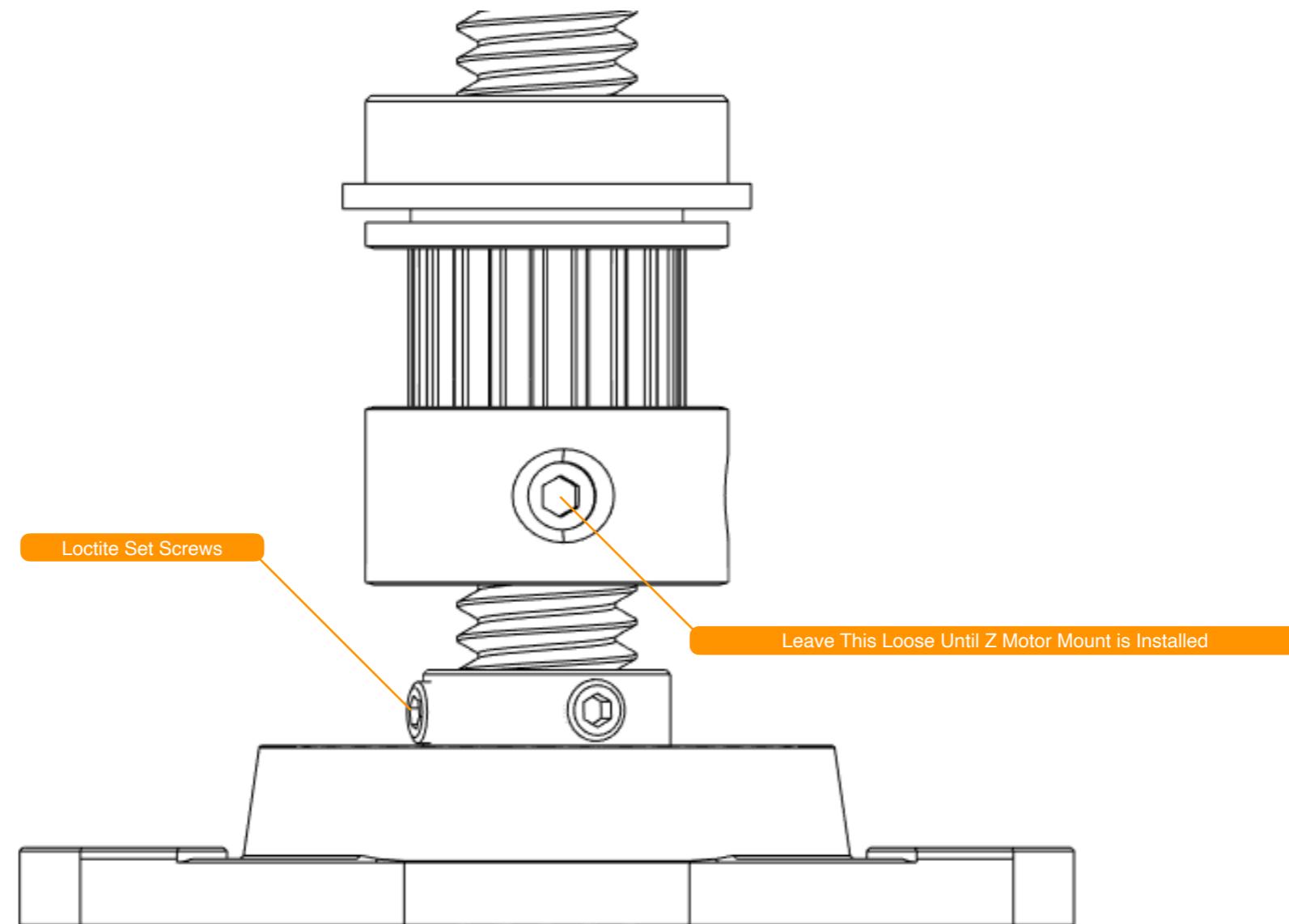
Part	Qty
M3x12 BHCS	4

Z Motor Assembly

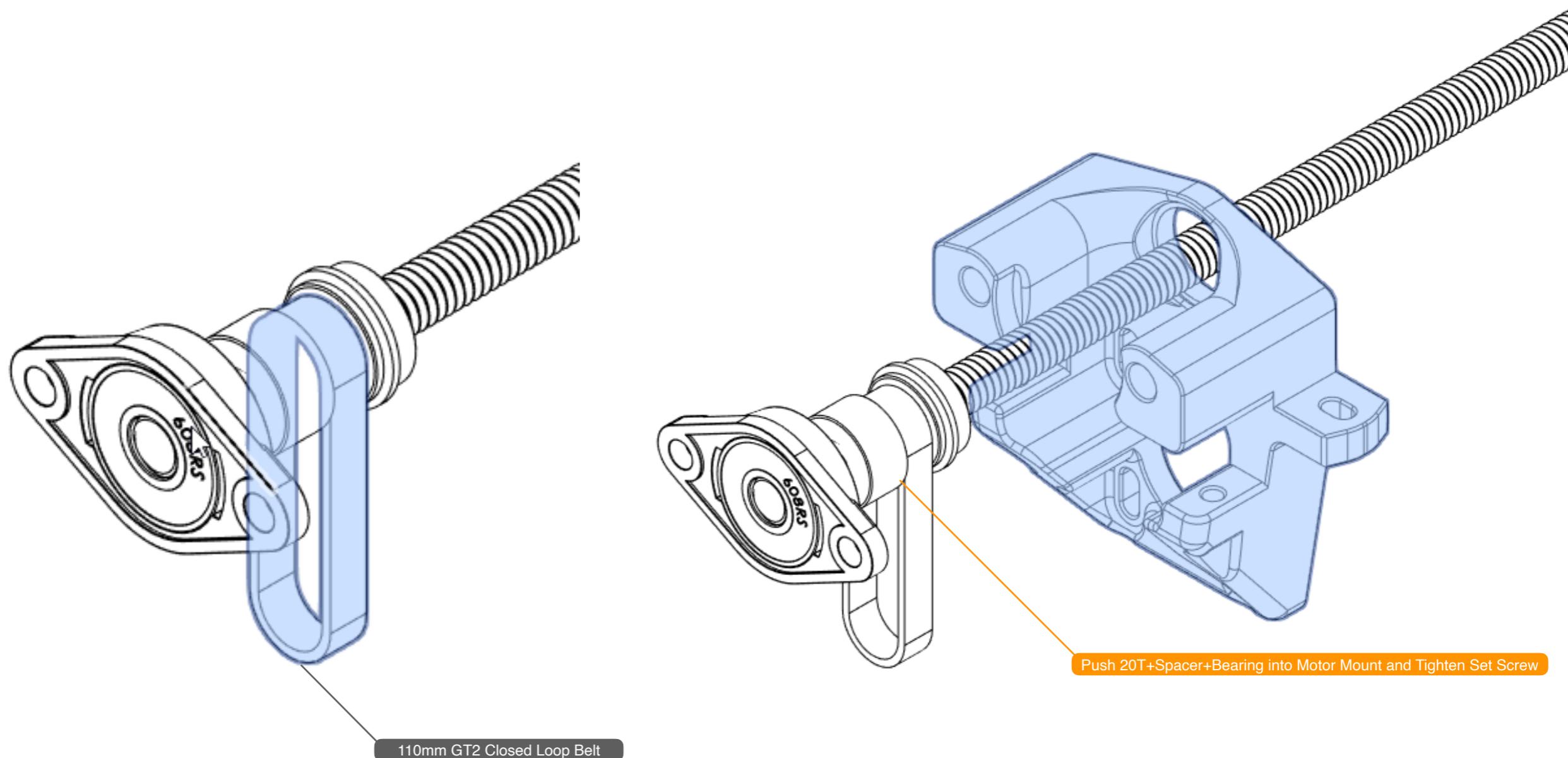


Part	Qty
20T GT2 Pulley	1
F688	1
KFL08	1
T8x2 ACME	1

Z Motor Assembly

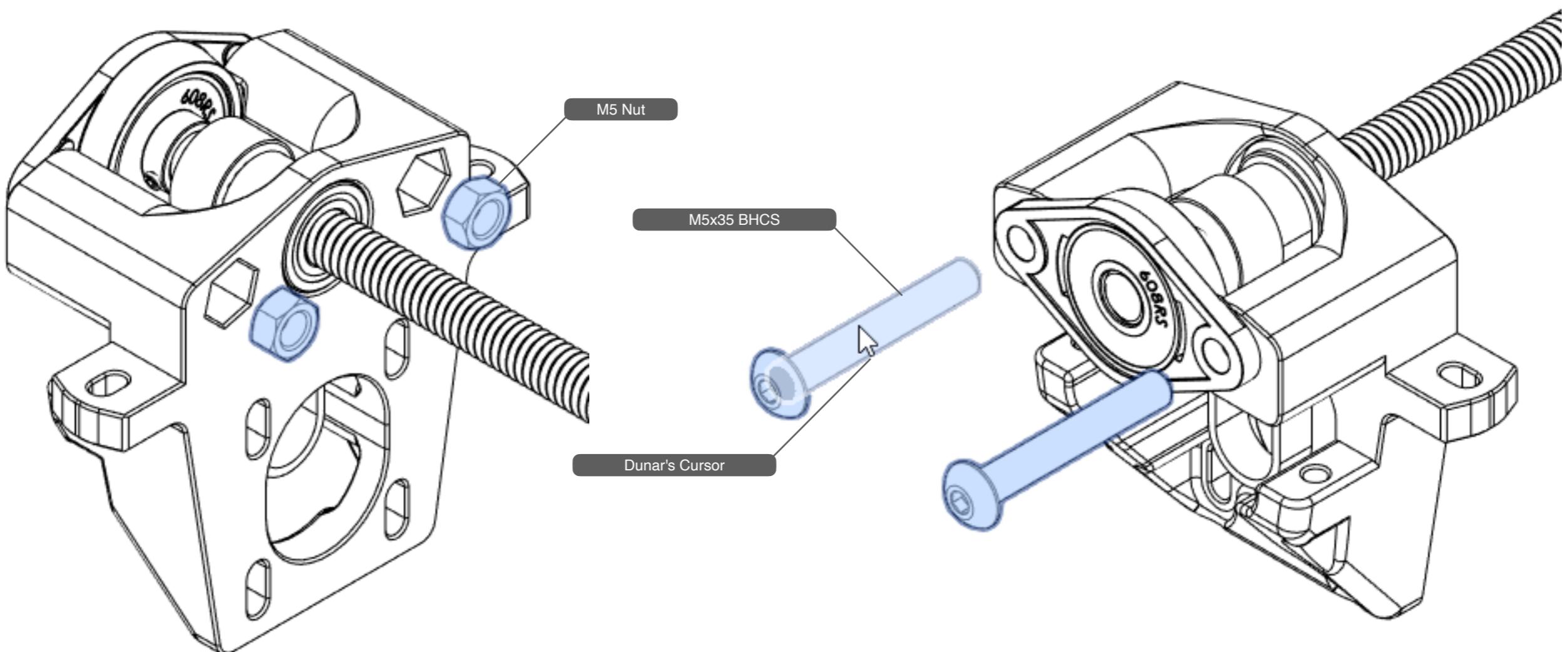


Z Motor Assembly



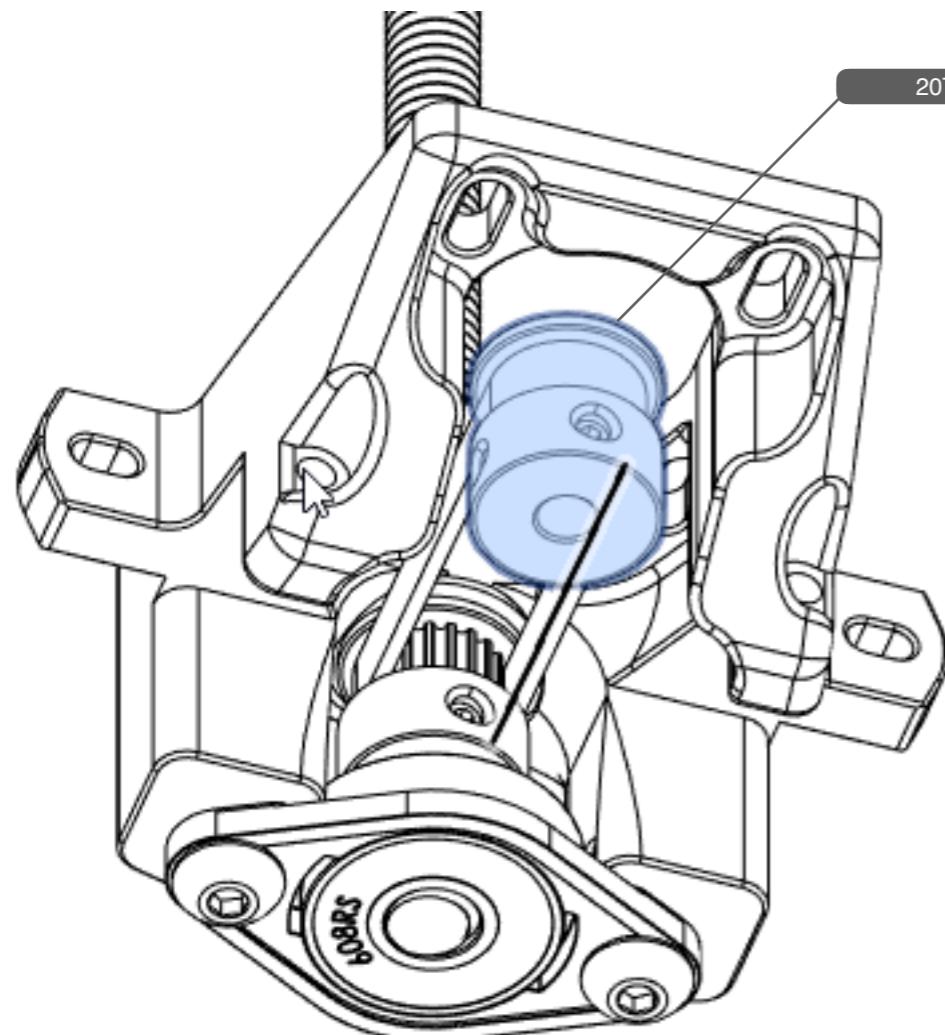
Part	Qty
110mm GT2 Loop	1

Z Motor Assembly

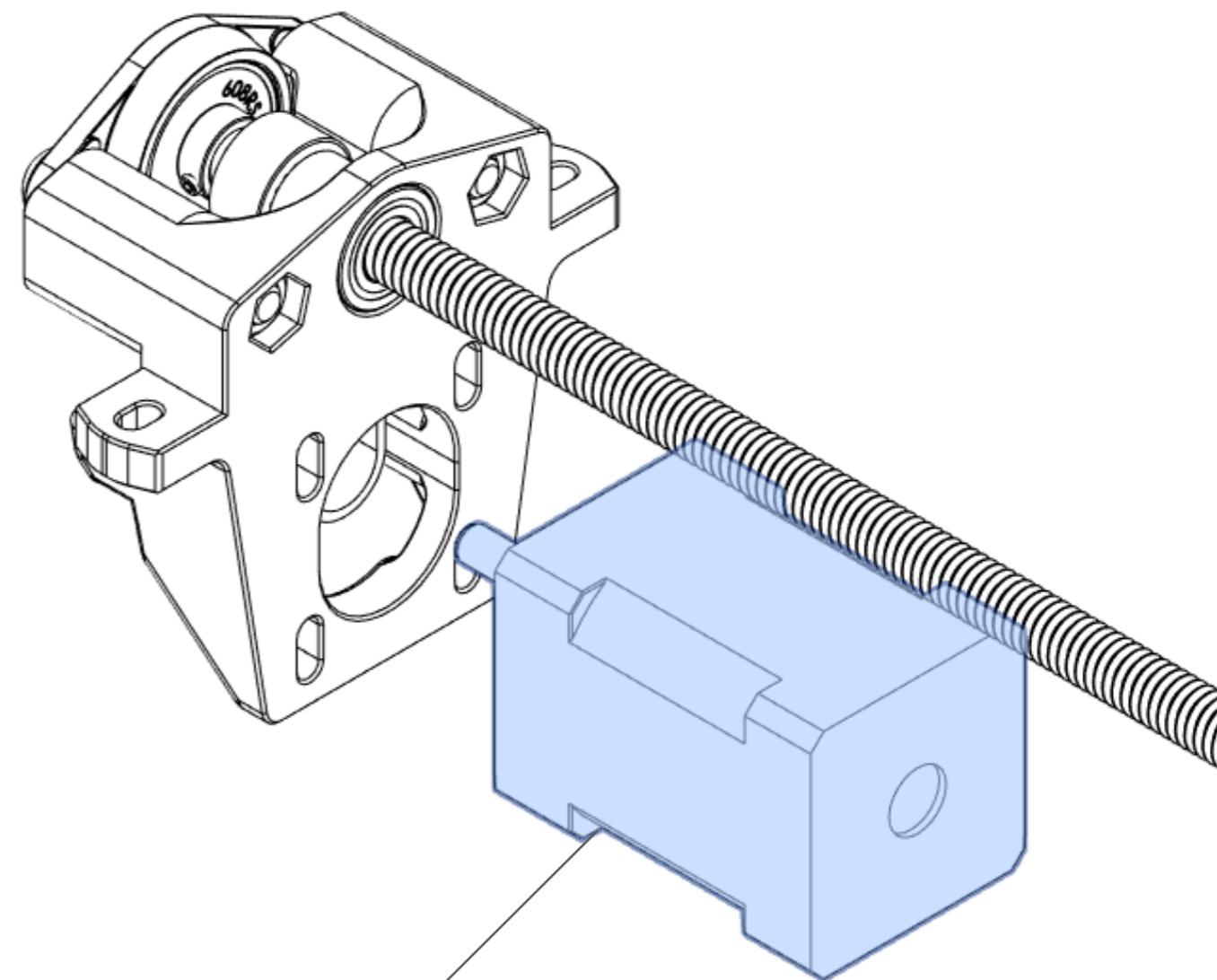


Part	Qty
M5x35 BHCS	2
M5 Nut	2

Z Motor Assembly



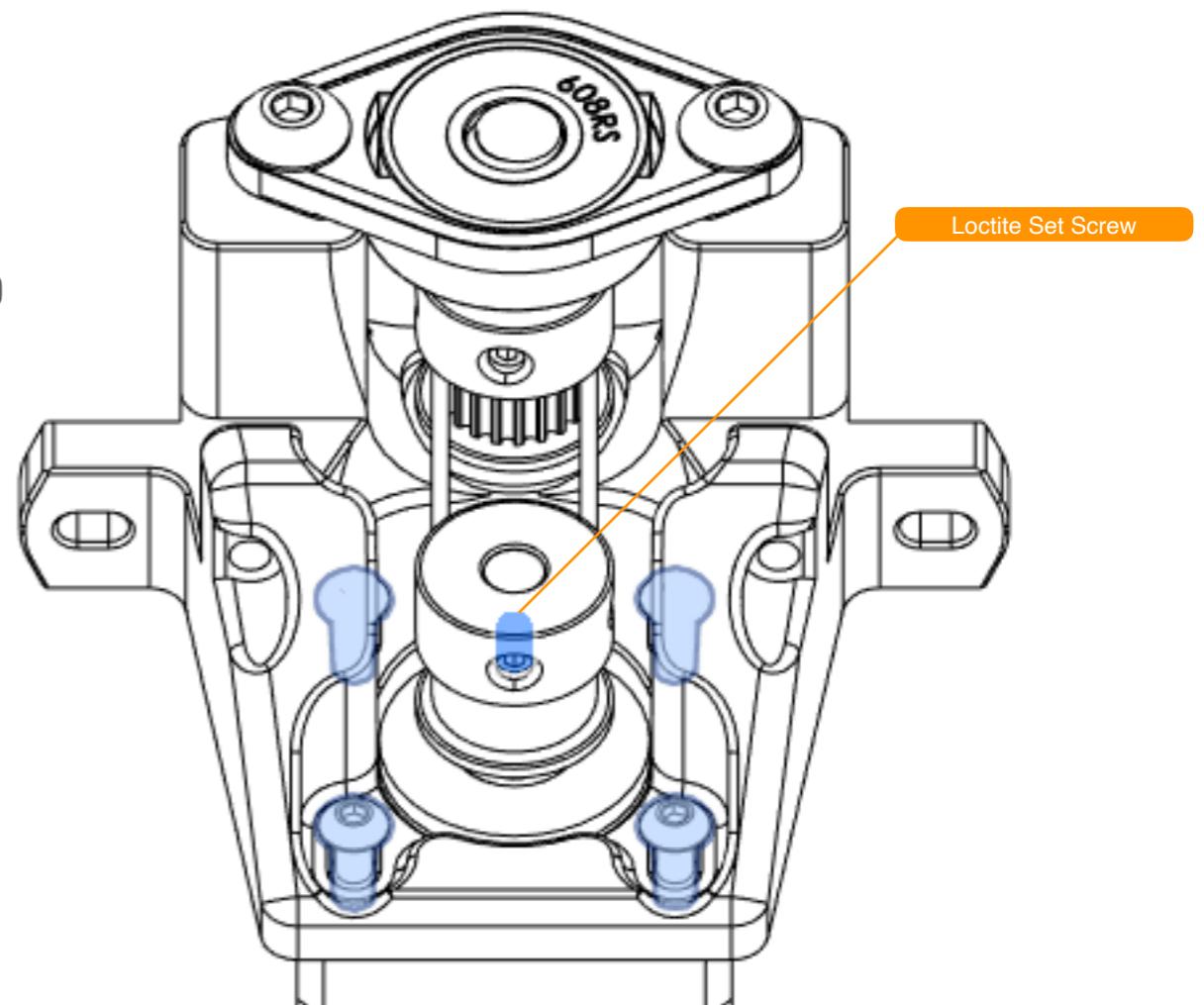
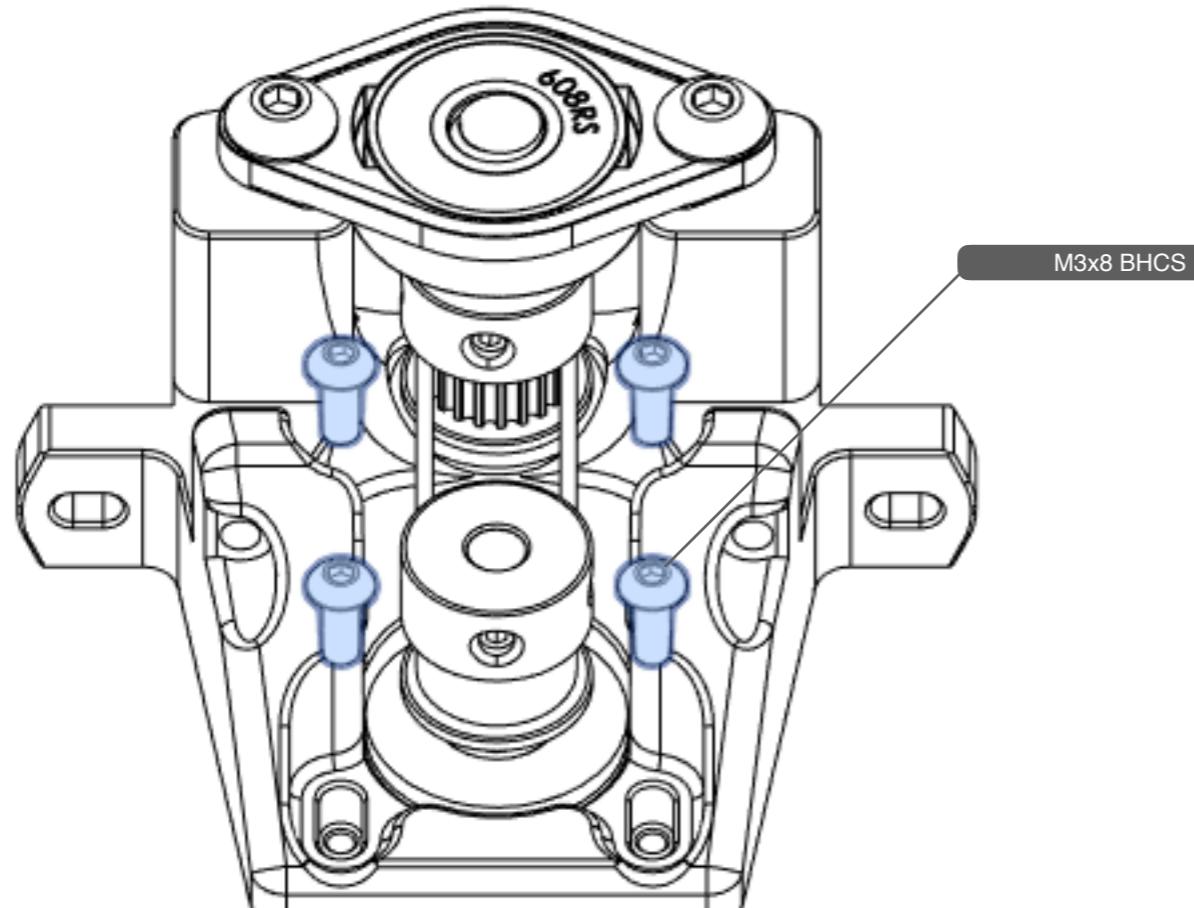
20T GT2 Pulley



NEMA 14

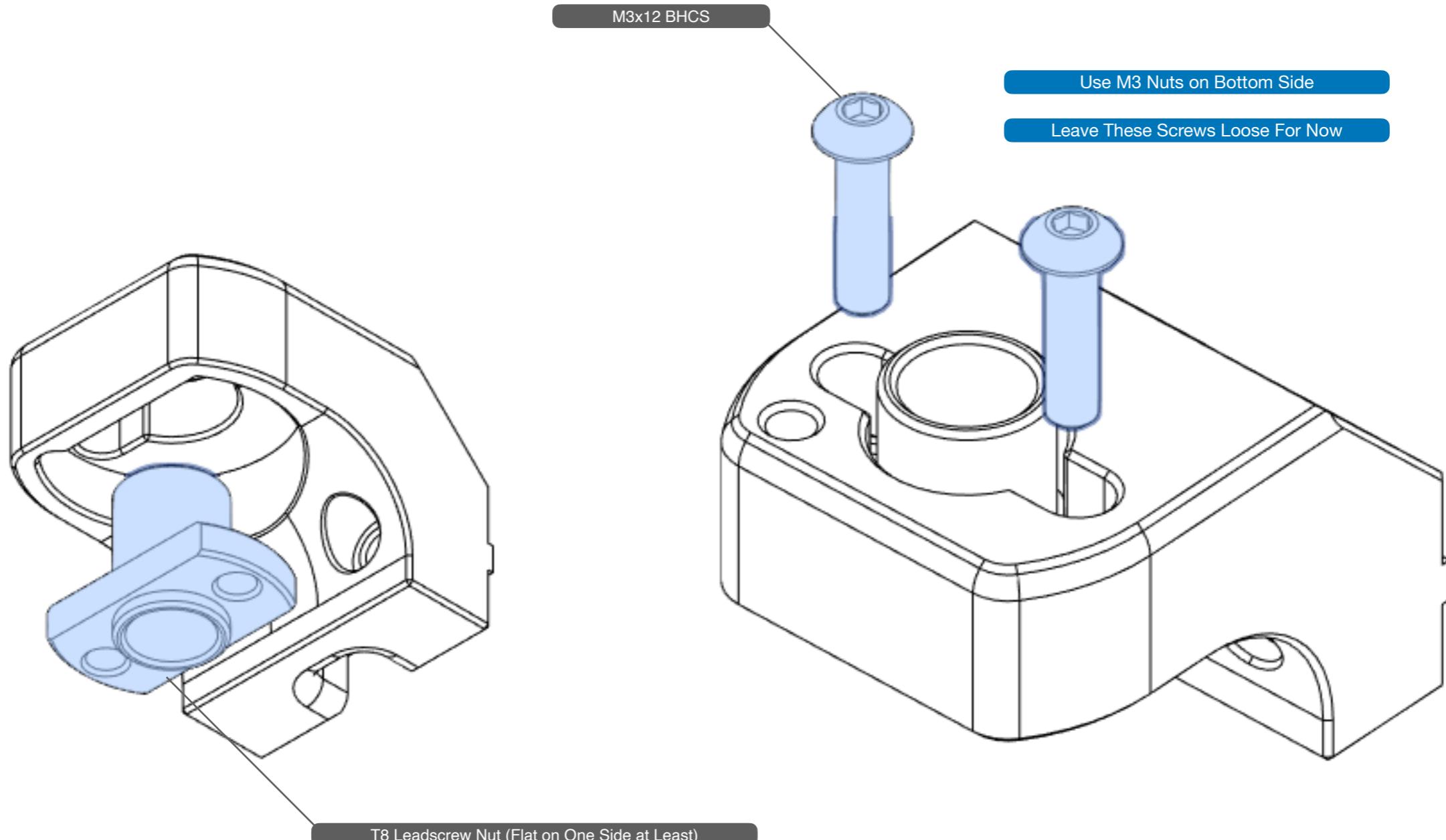
Part	Qty
20T GT2 Pulley	1
NEMA14	1

Z Motor Assembly



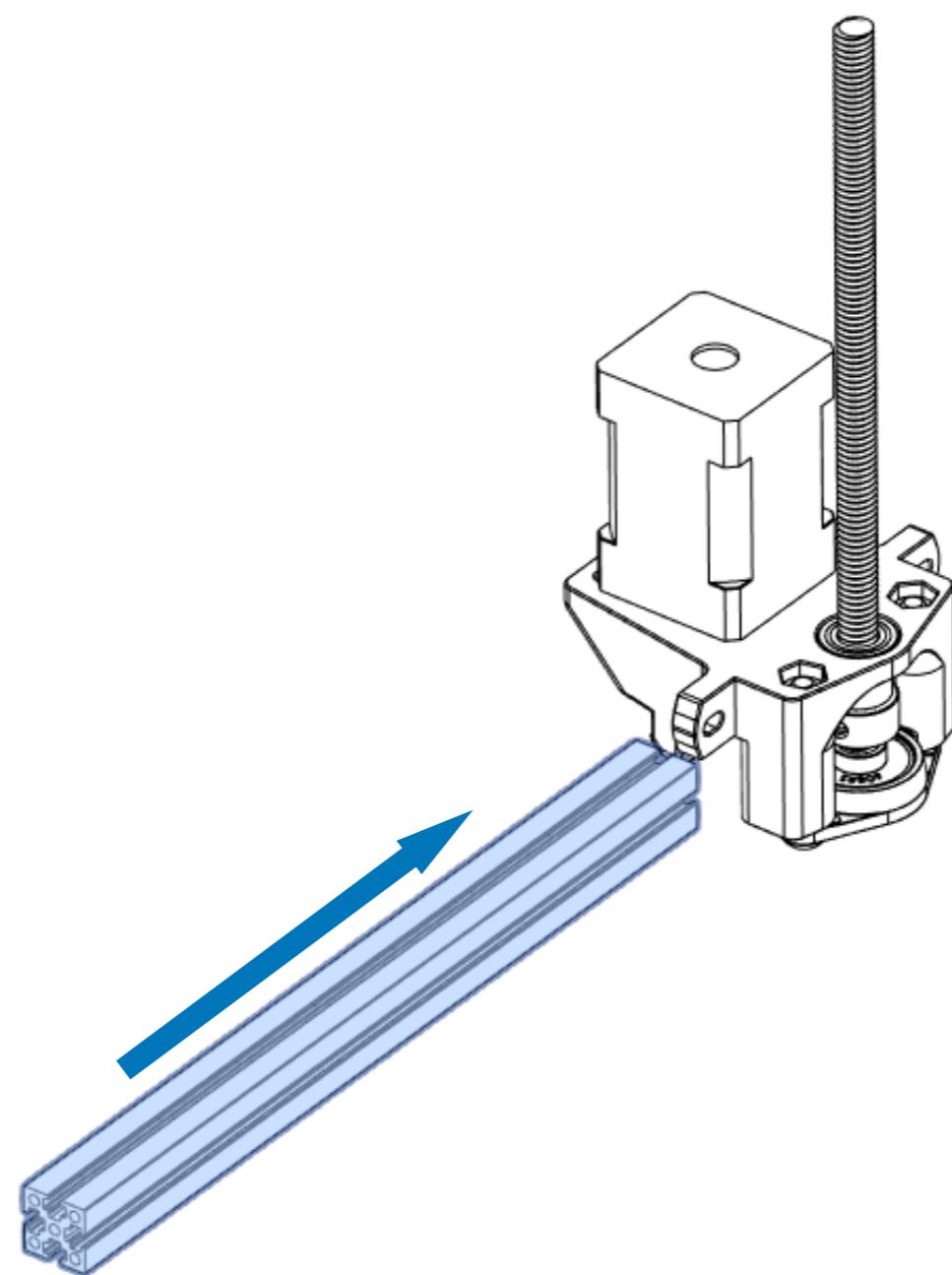
Part	Qty
M3x8 BHCS	4

Z Motor Assembly

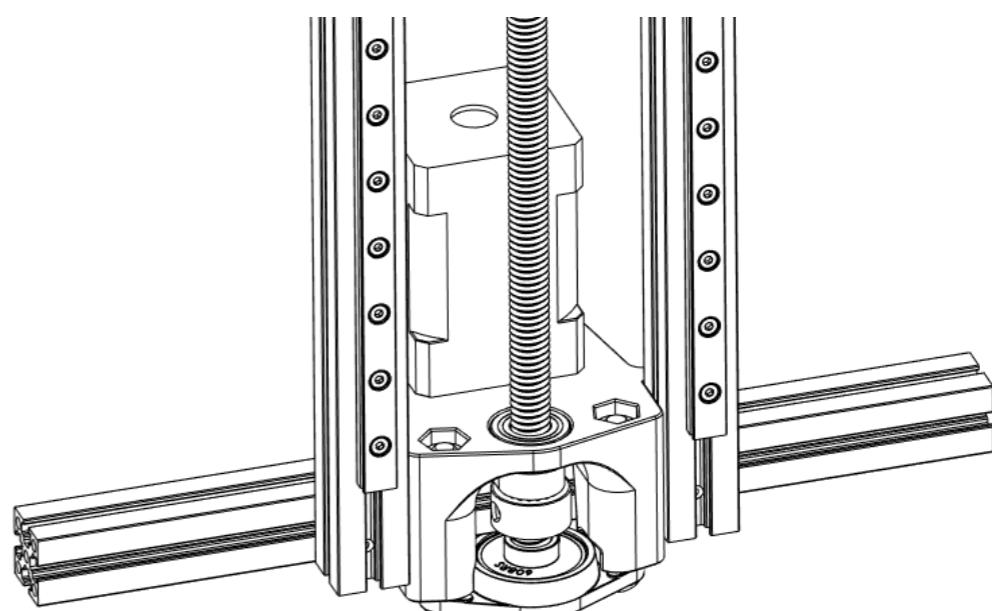
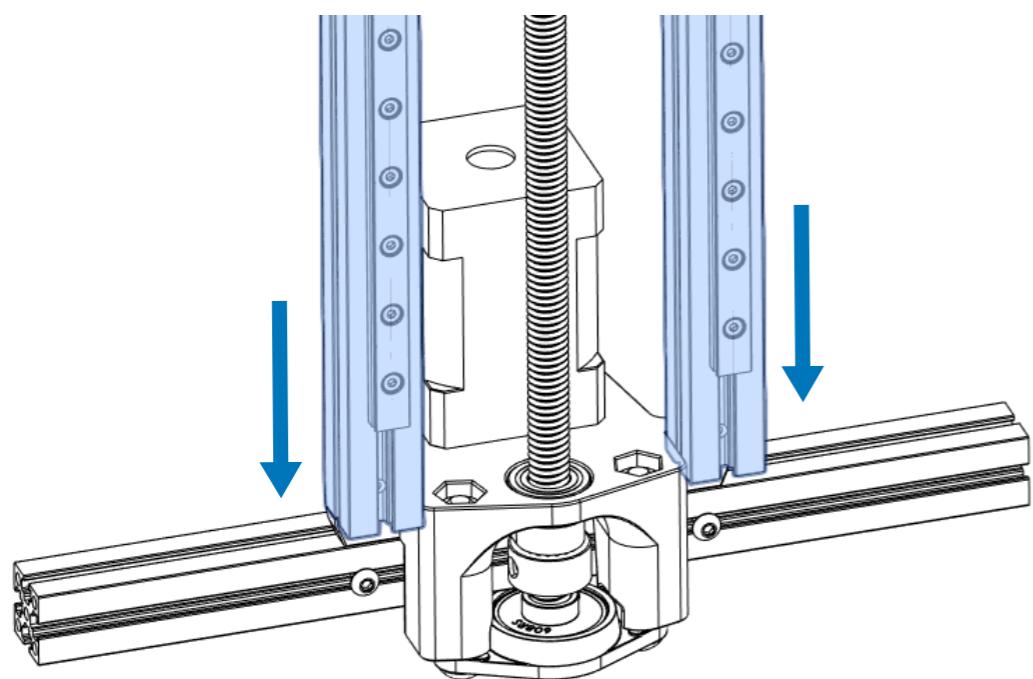
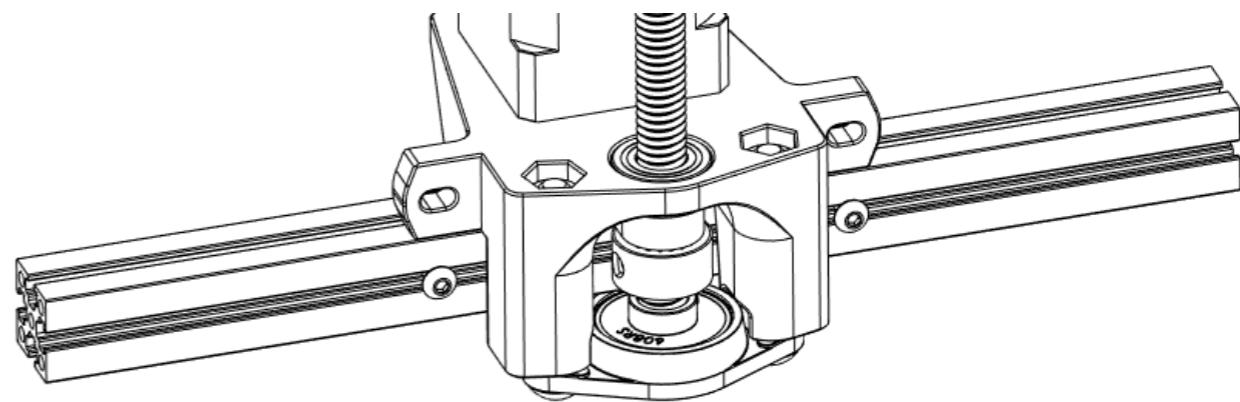
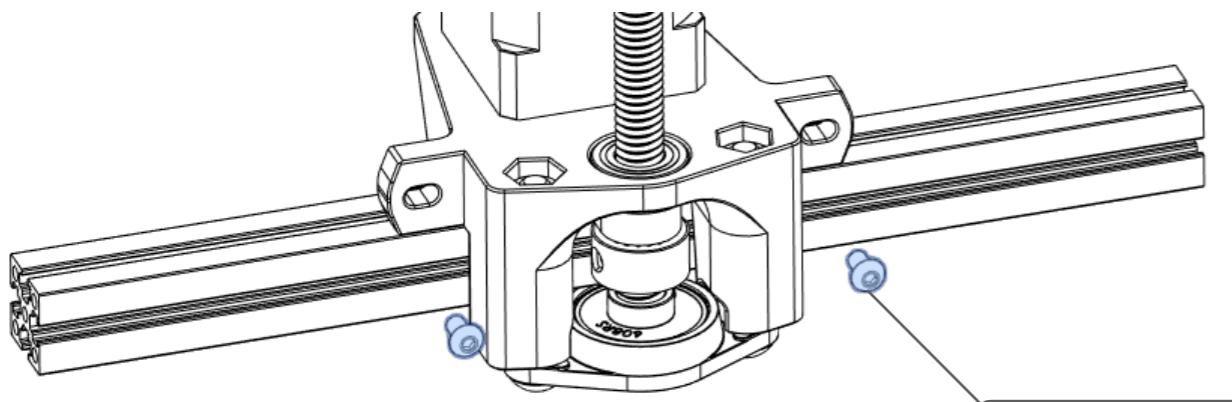


Part	Qty
M3x12 BHCS	2
T8x2 Nut	1

Z Motor Assembly

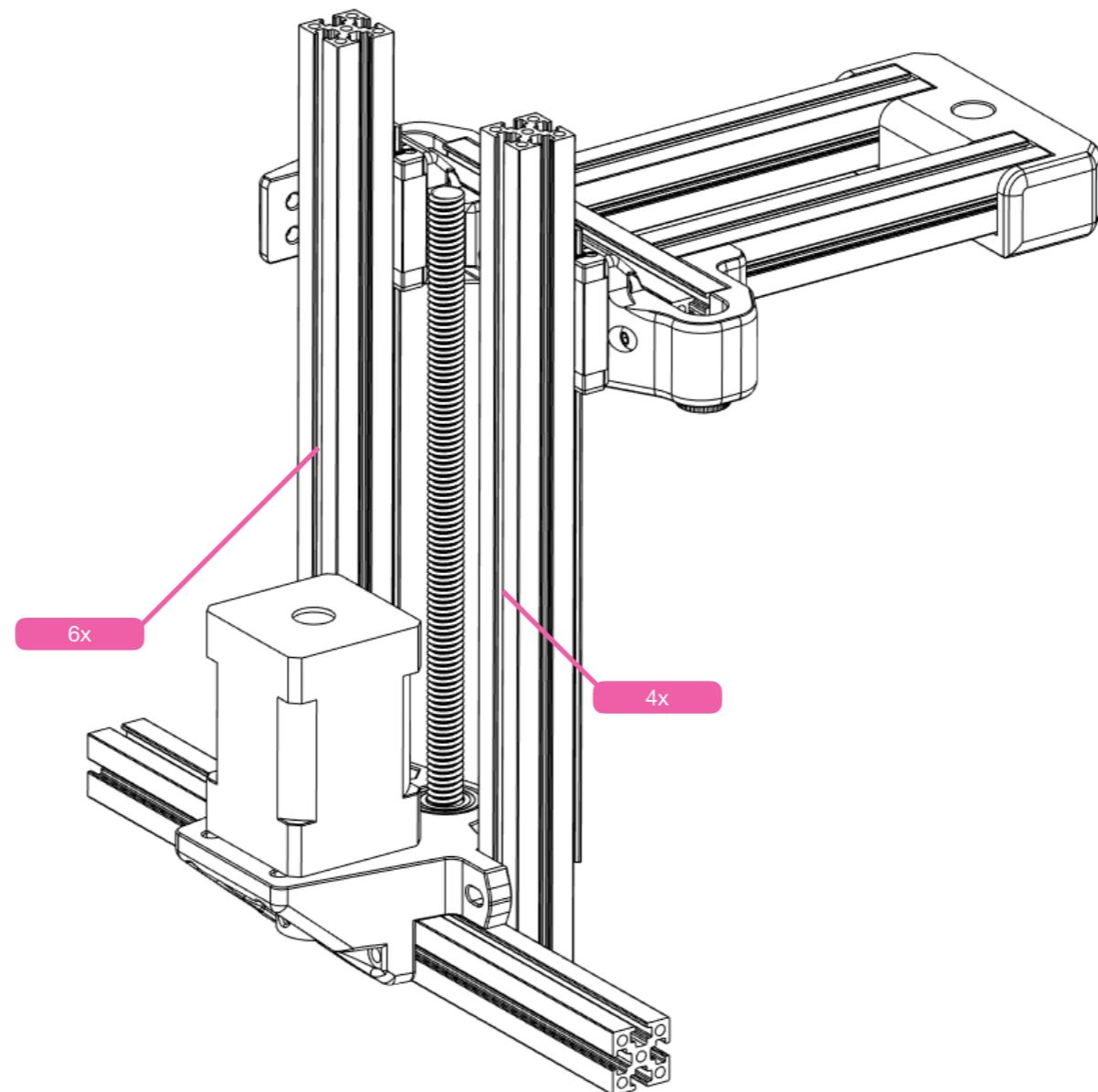


Z Motor Assembly



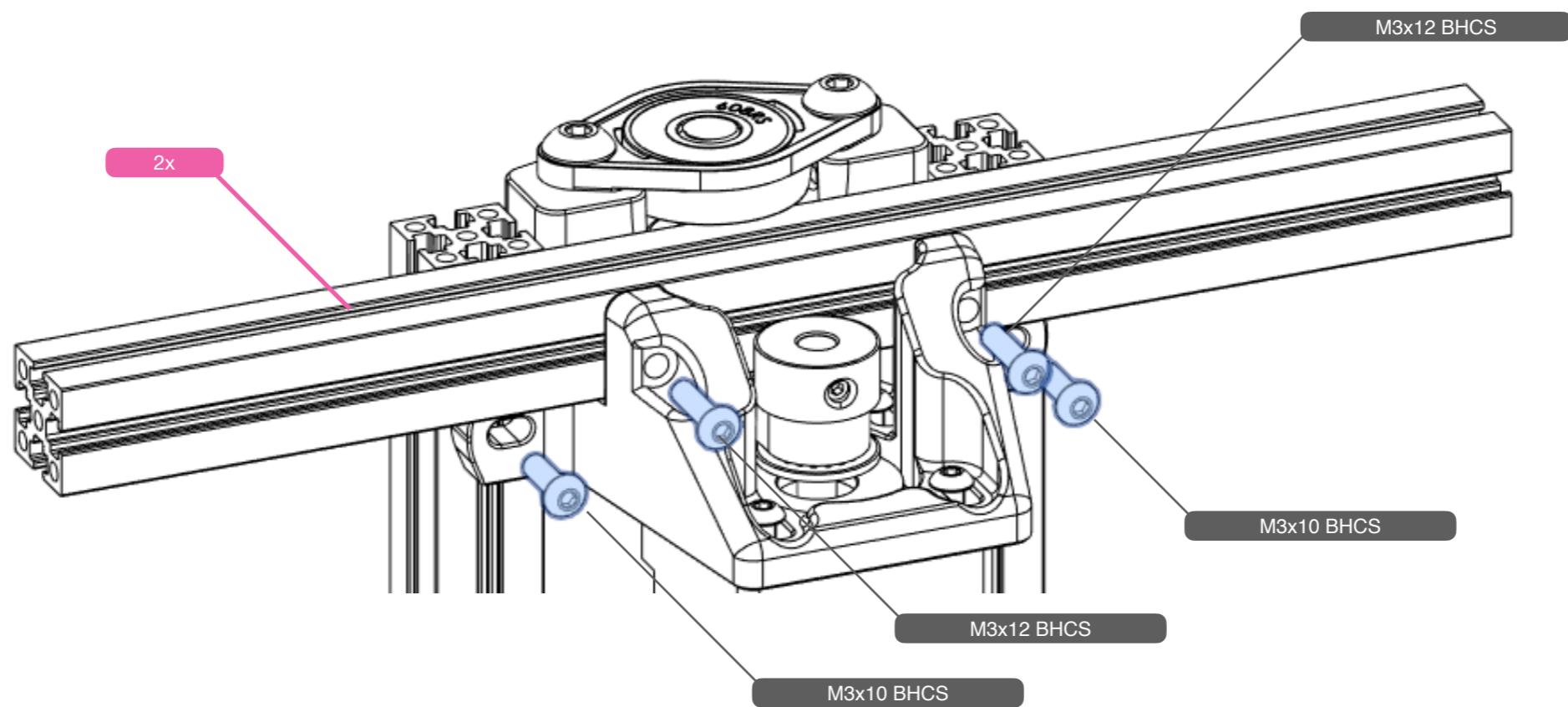
Part	Qty
M3x6 BHCS	2

Z Motor Assembly



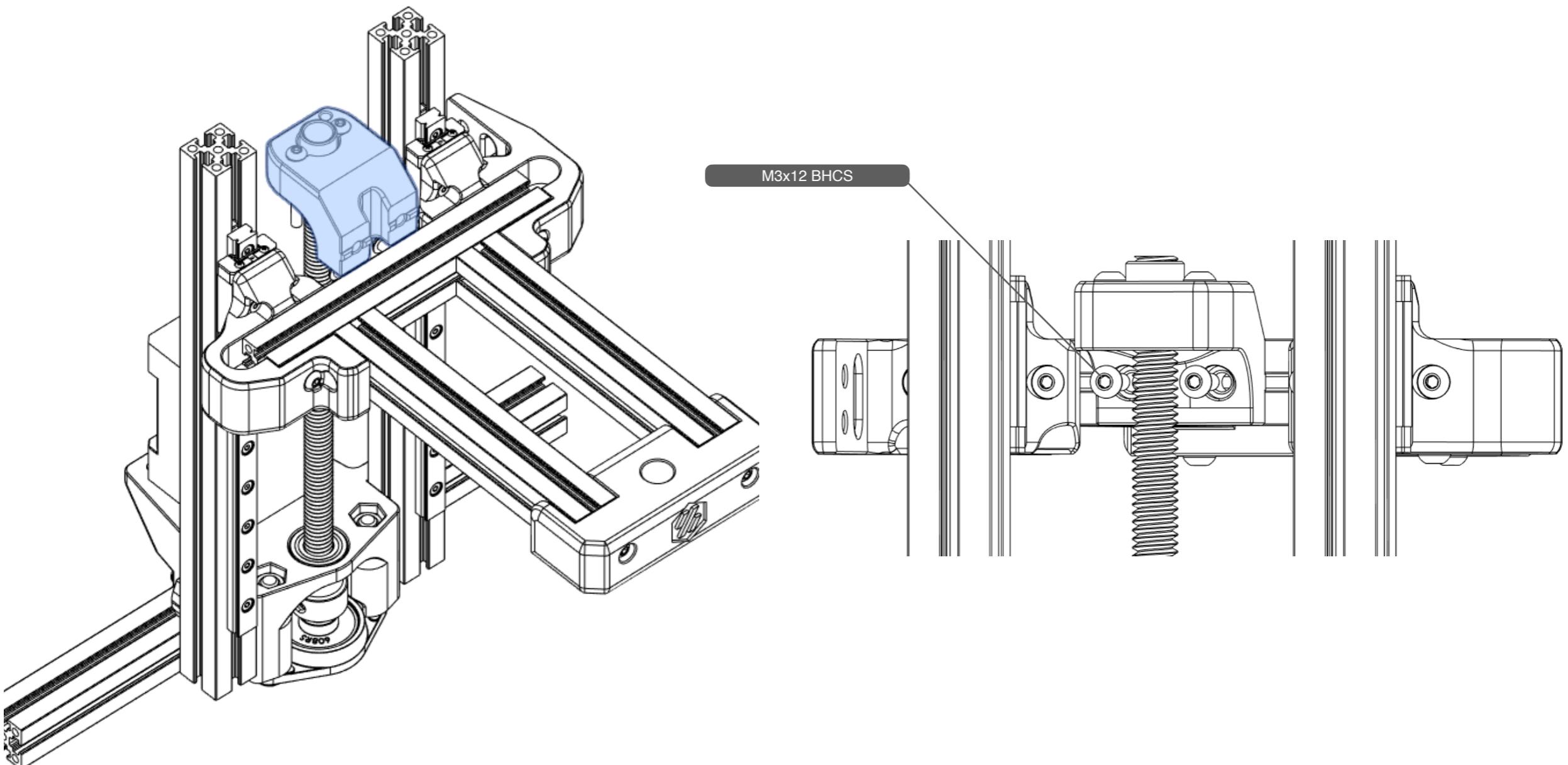
Part	Qty
M3 Nut	10

Z Motor Assembly



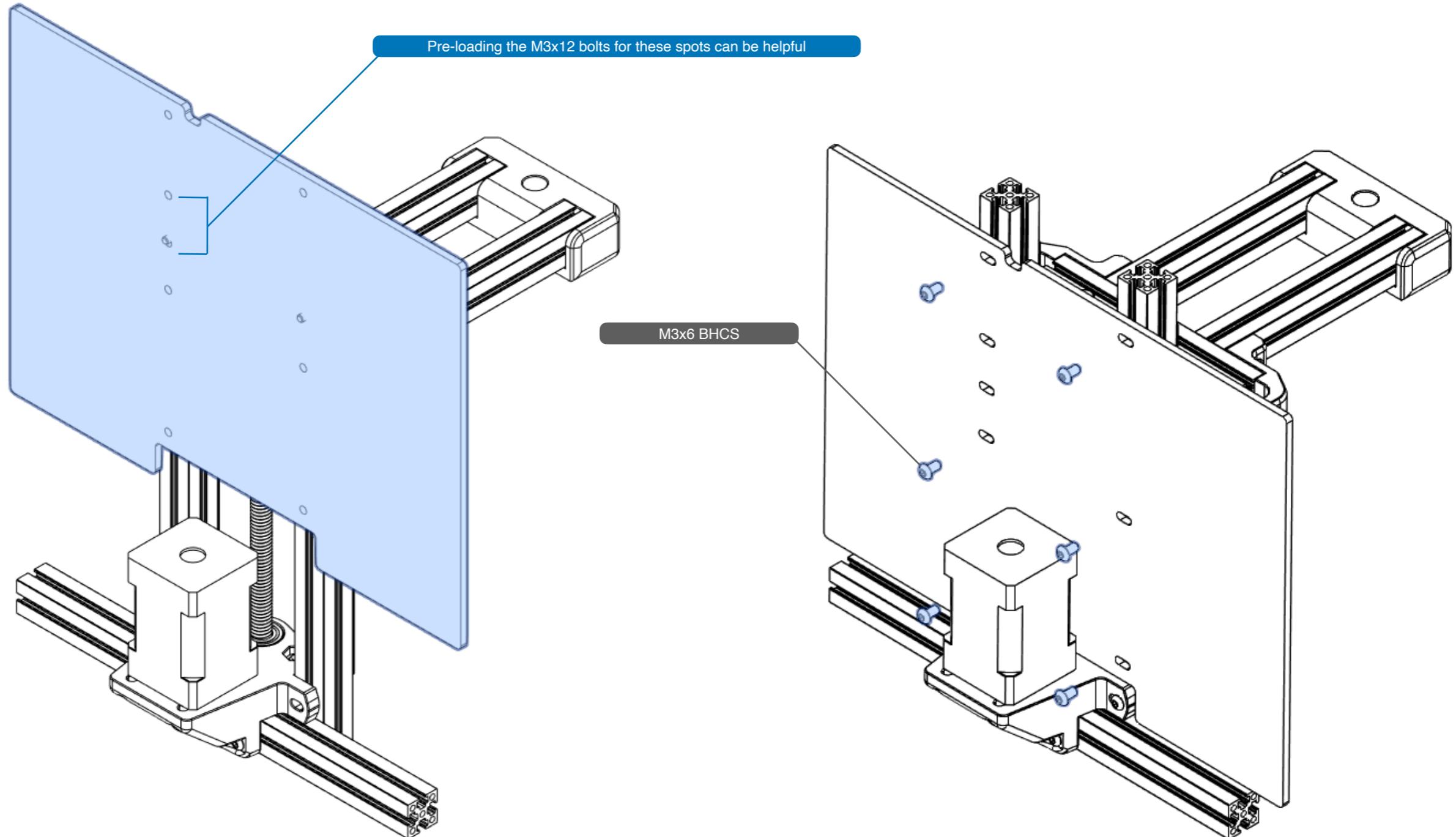
Part	Qty
M3x10 BHCS	2
M3x12 BHCS	2
M3 Nut	2

T8 Nut Block



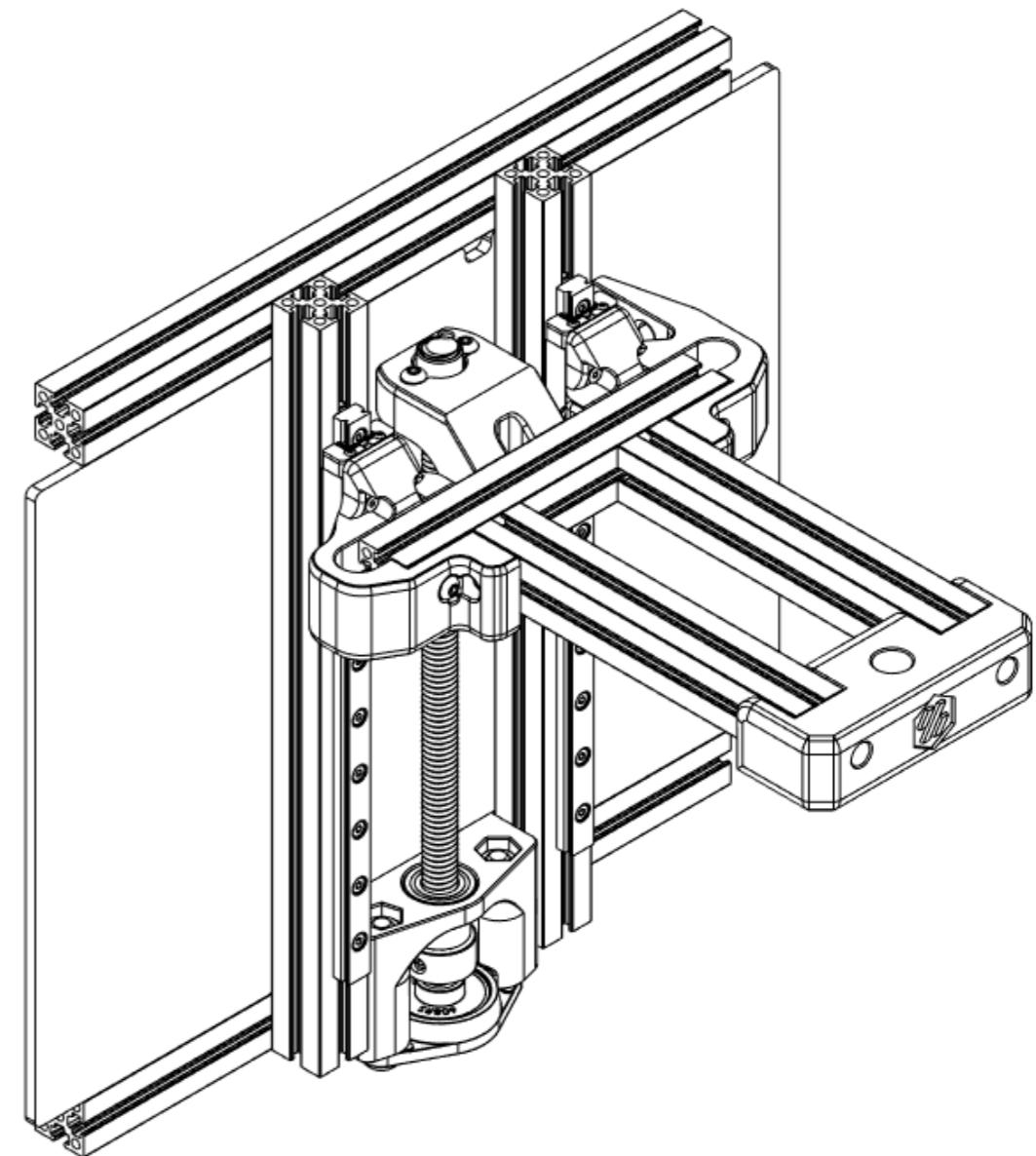
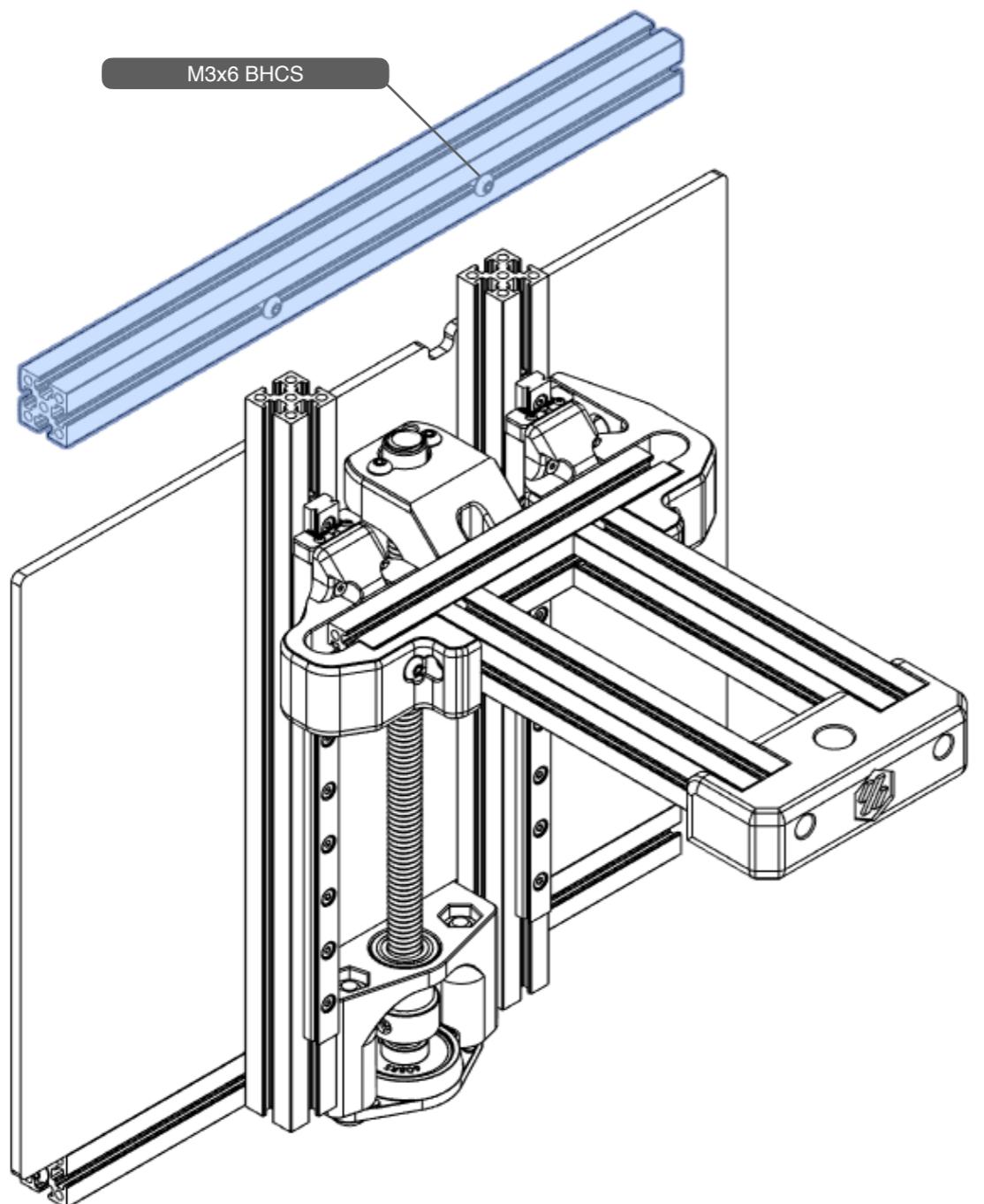
Part	Qty
M3x12 BHCS	2

Mid Panel Installation



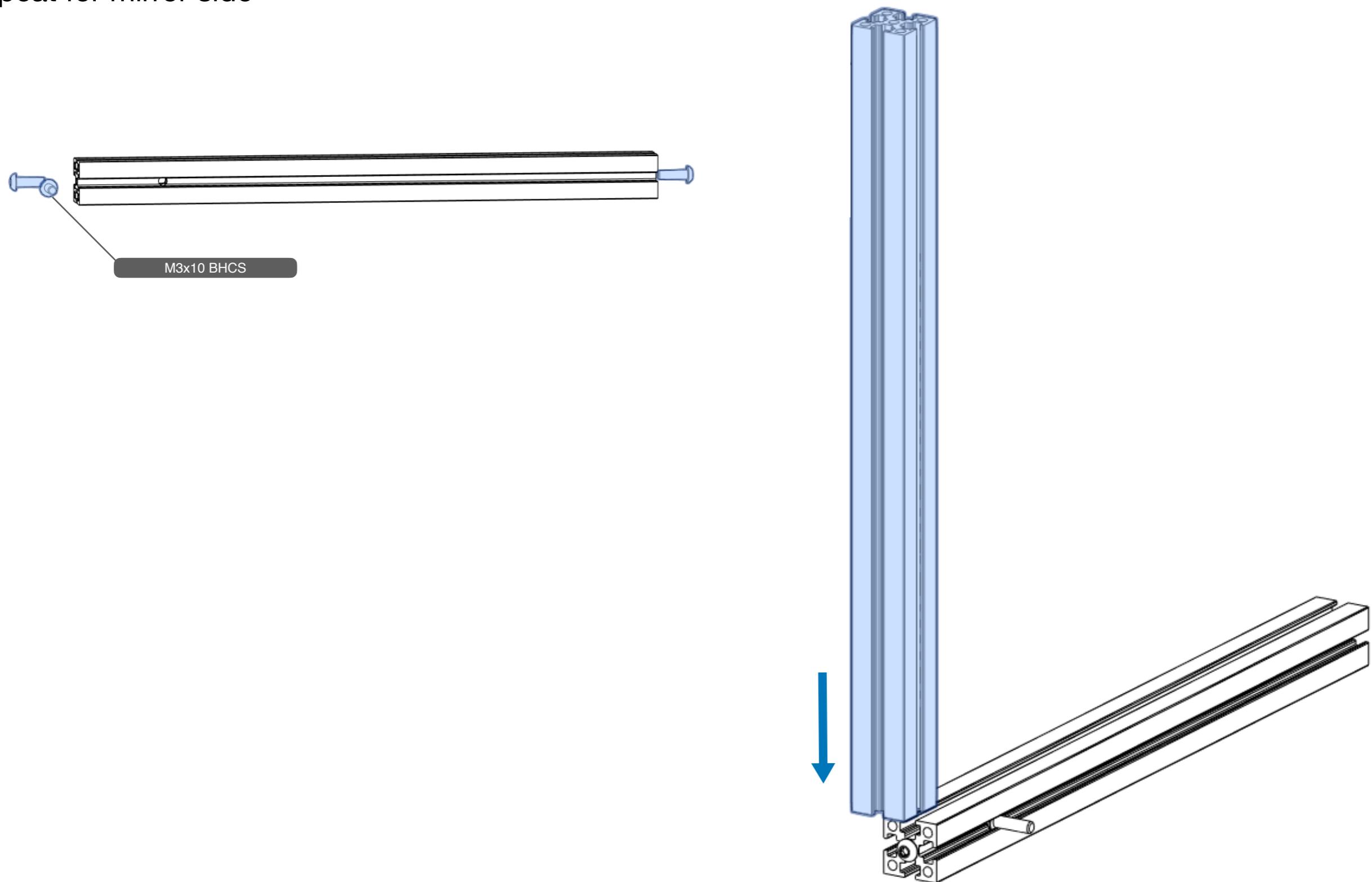
Part	Qty
M3x6 BHCS	6

Frame Assembly



Part	Qty
M3x6 BHCS	2

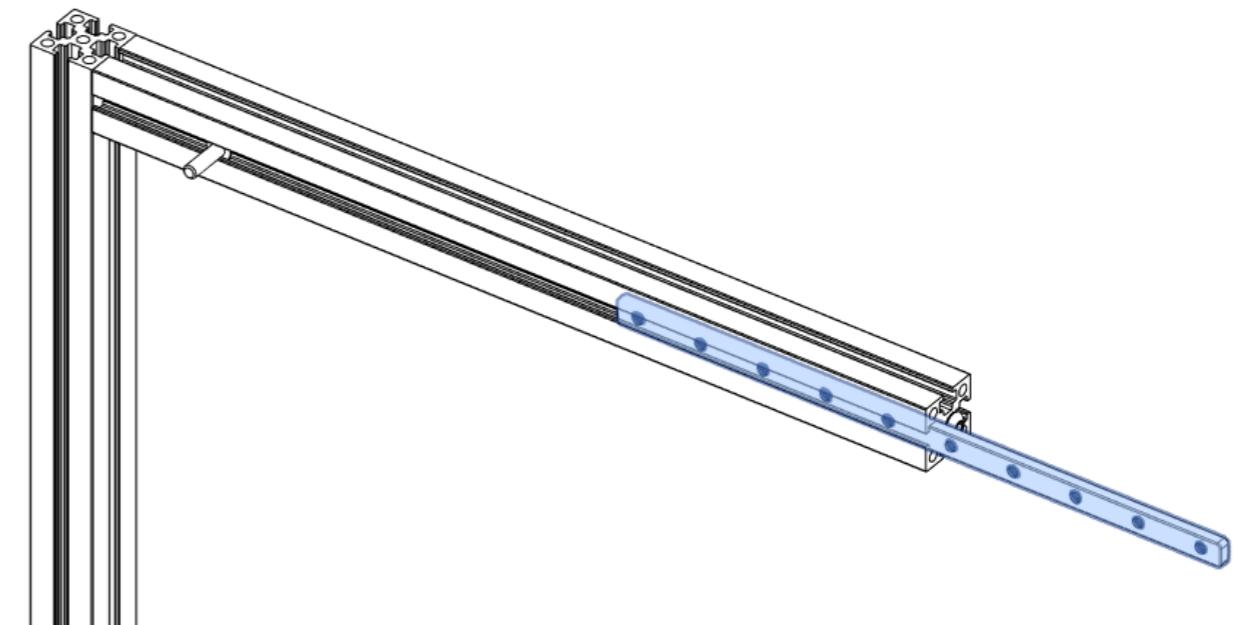
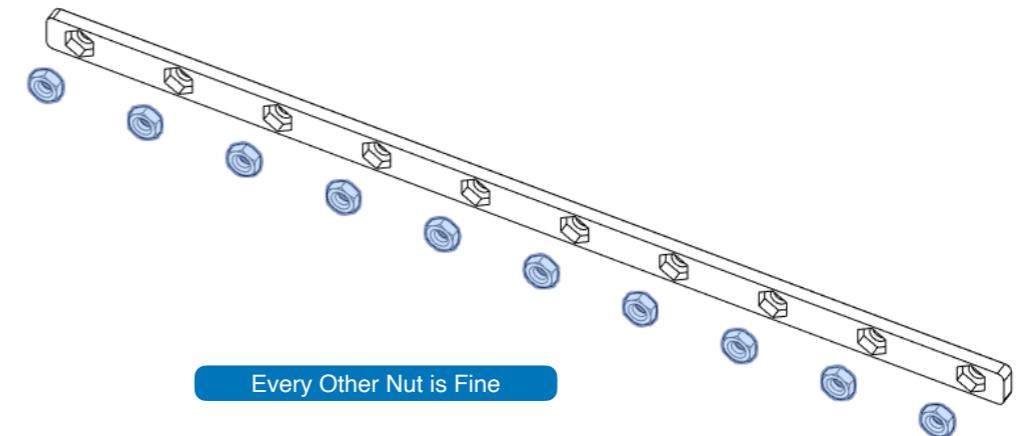
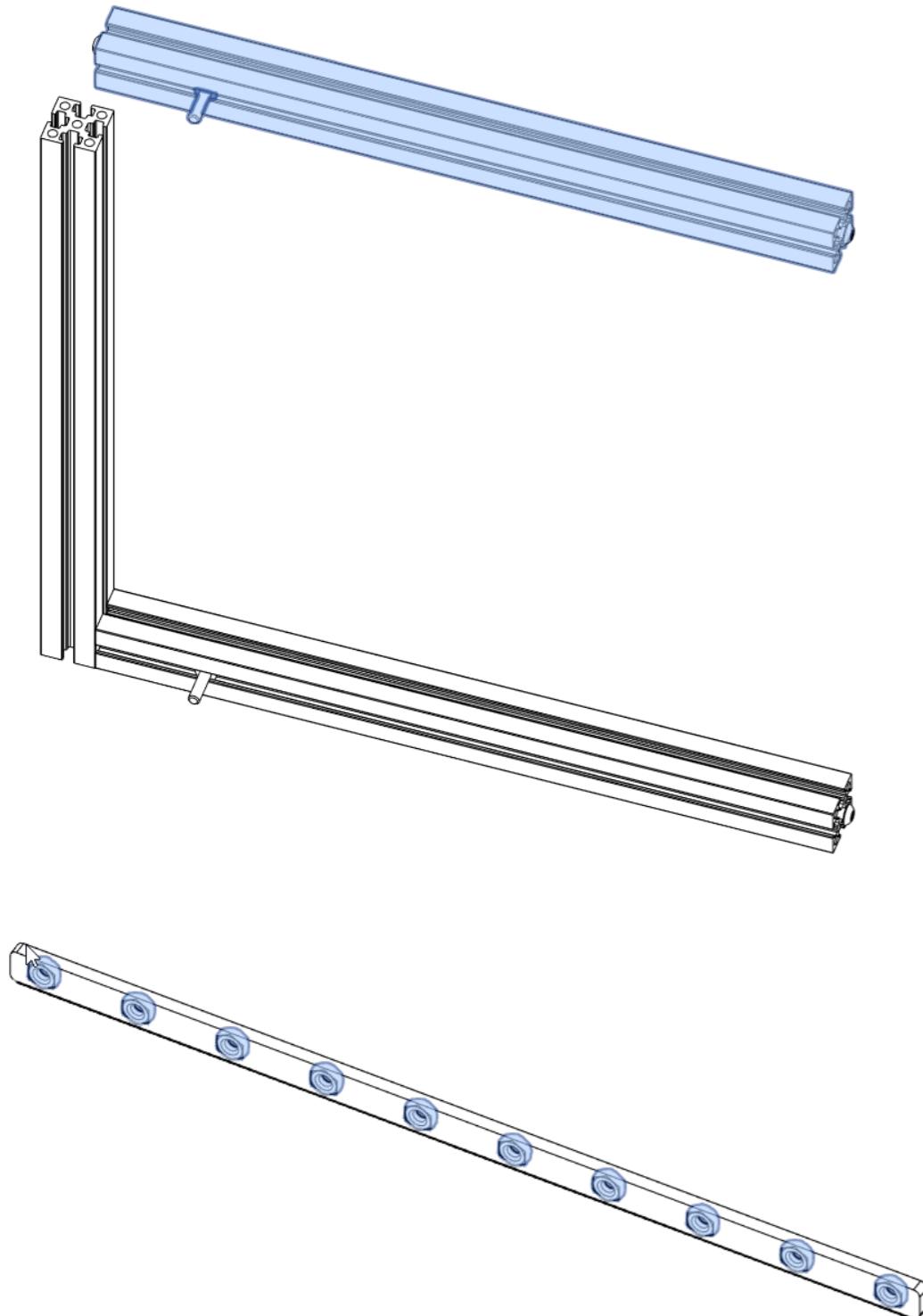
Repeat for mirror side



Part	Qty
M3x10 BHCS	6

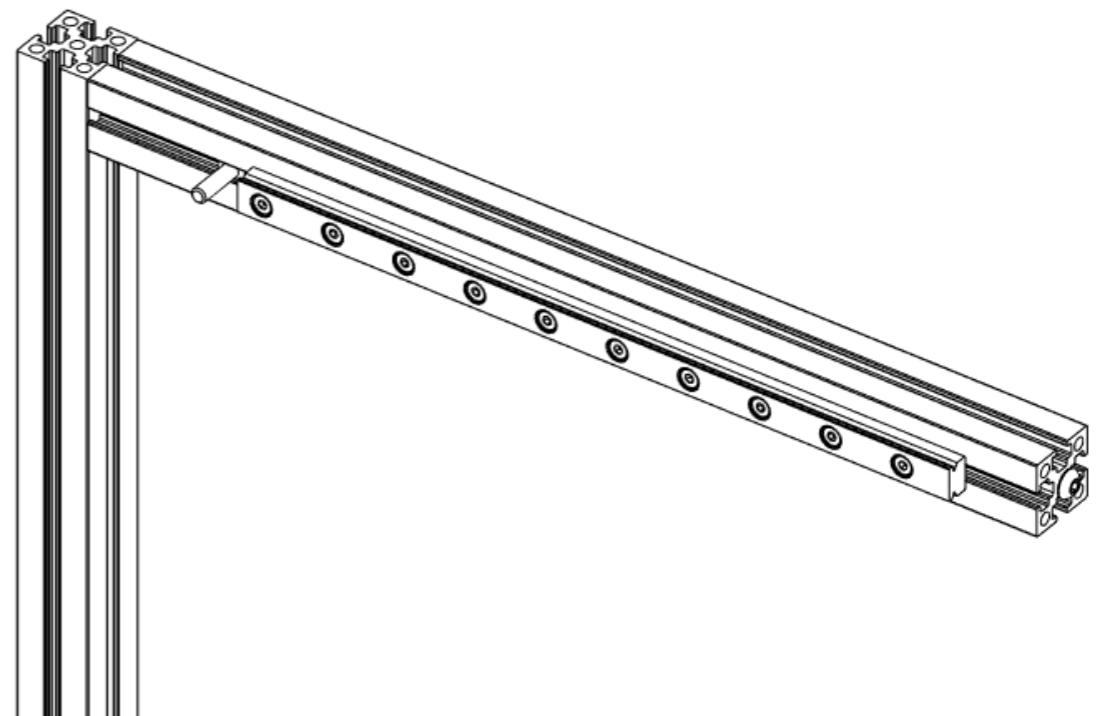
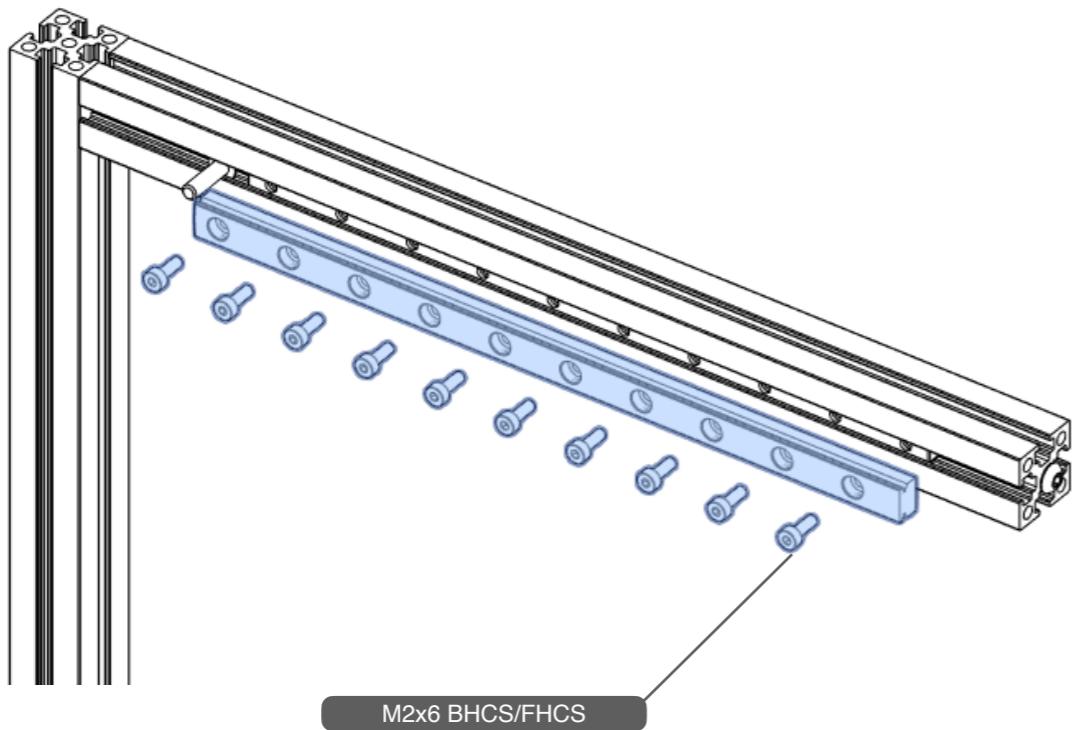
Frame Assembly

Repeat for mirror side



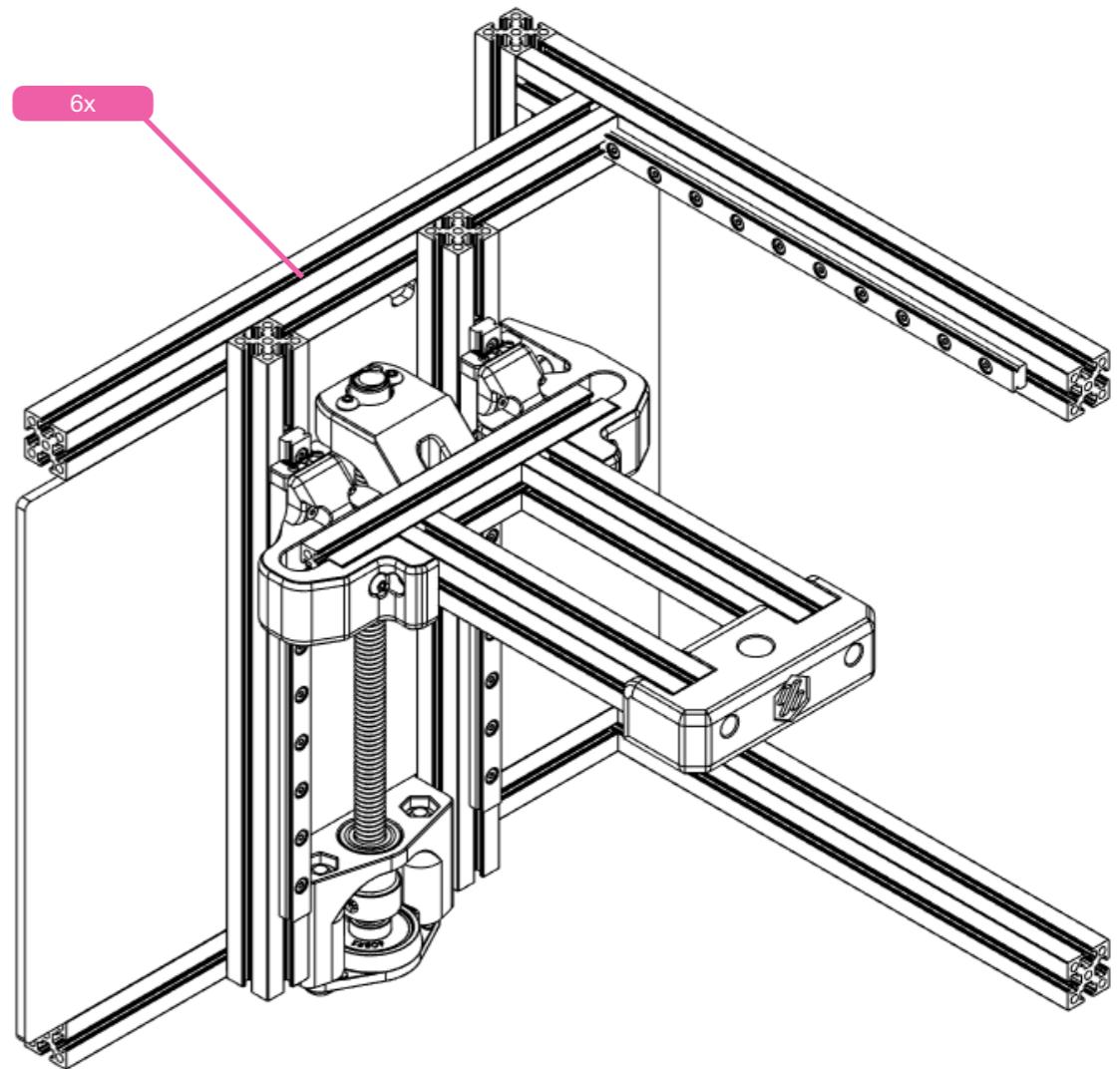
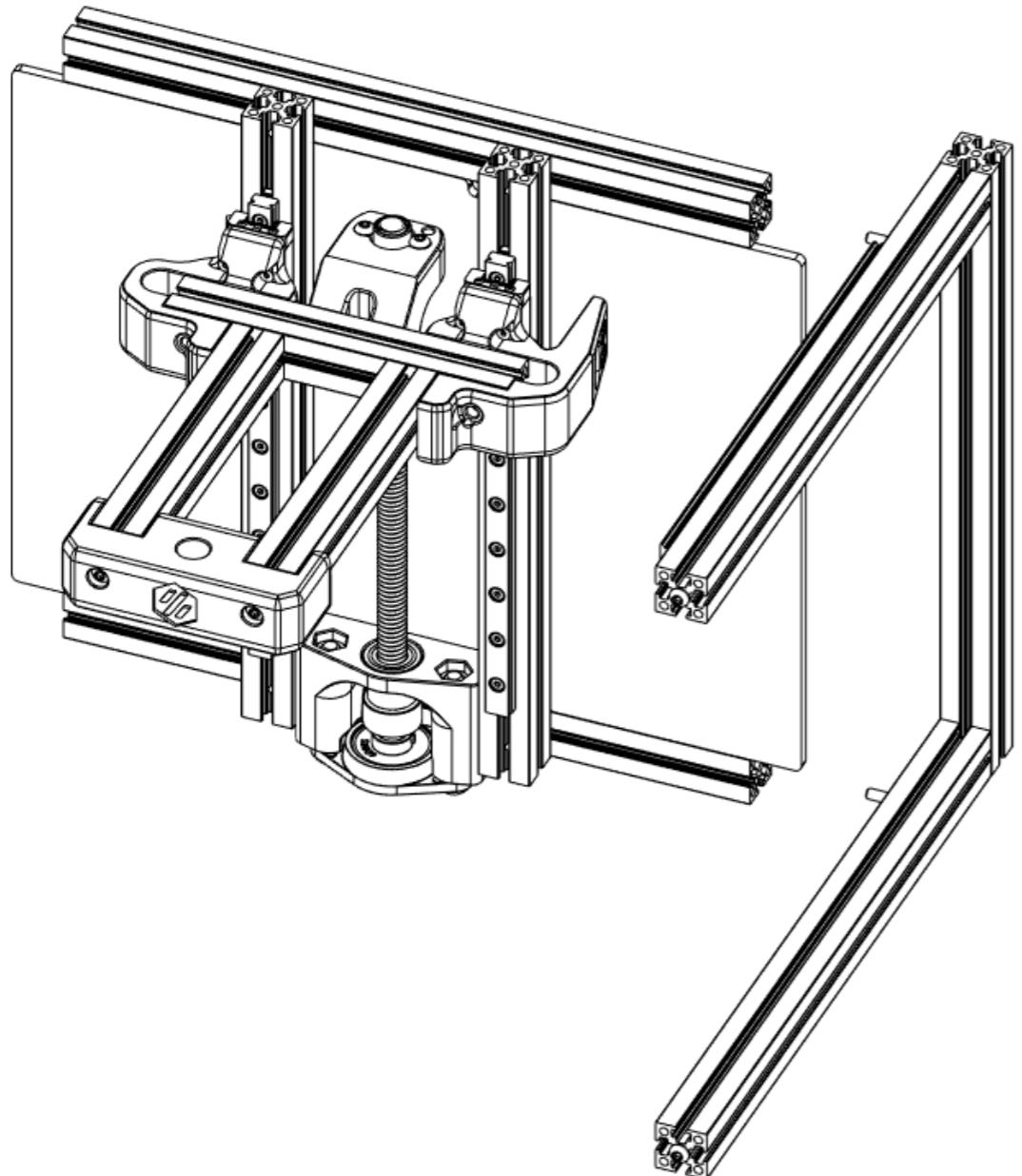
Part	Qty
M2 Nut	5-10
M3x10 BHCS	6

Repeat for mirror side



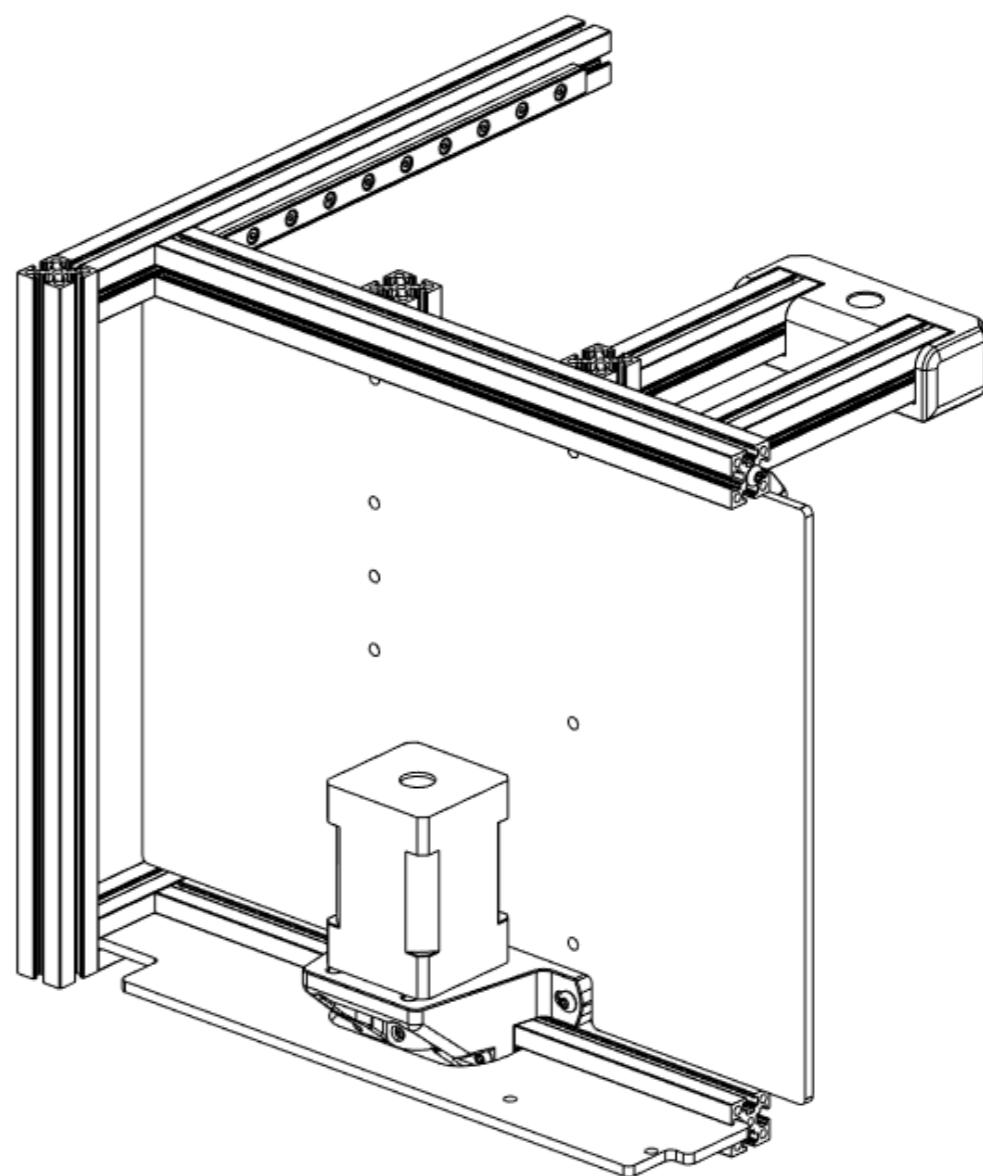
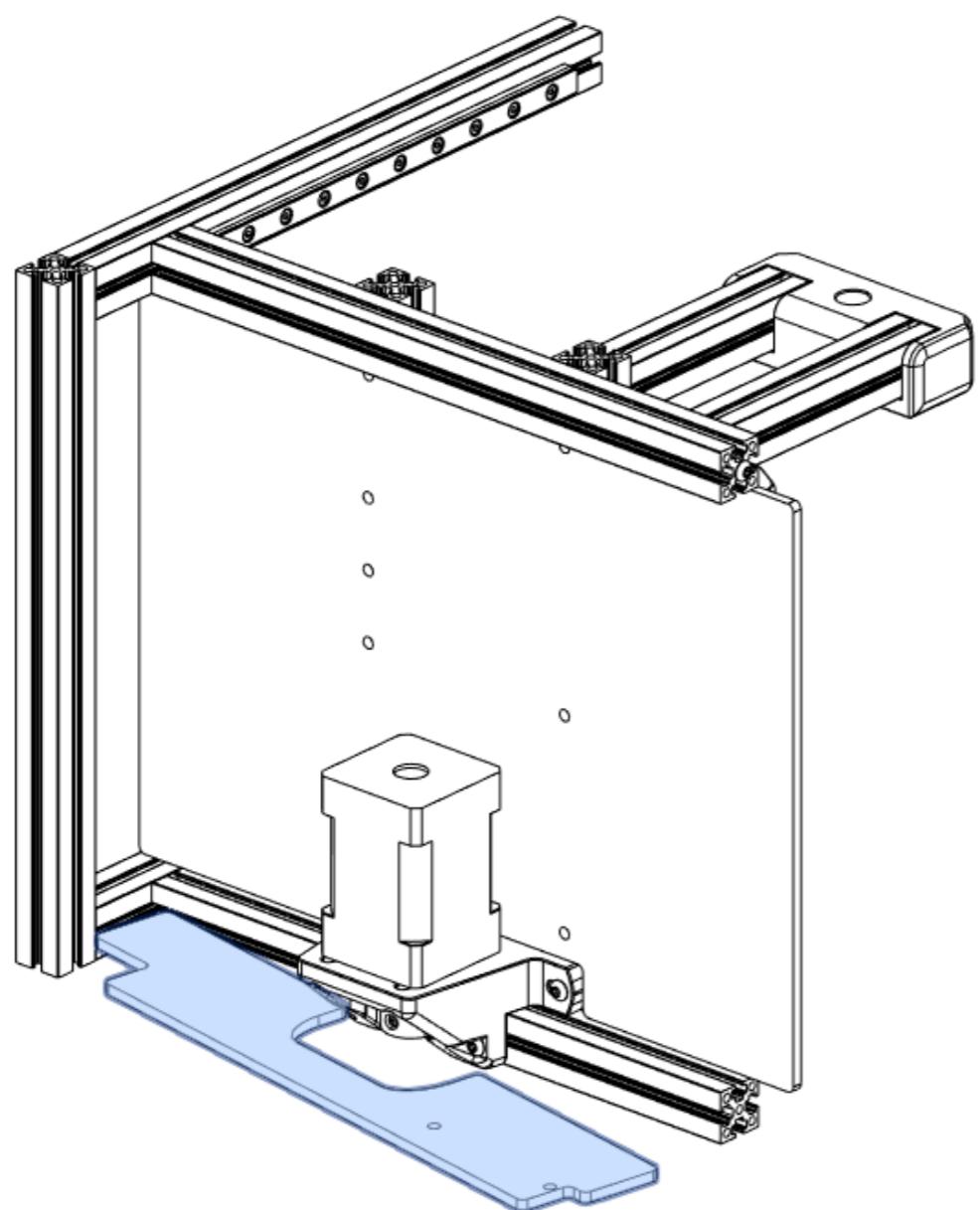
Part	Qty
M2x6	5-10
MGN7R	2

Frame Assembly

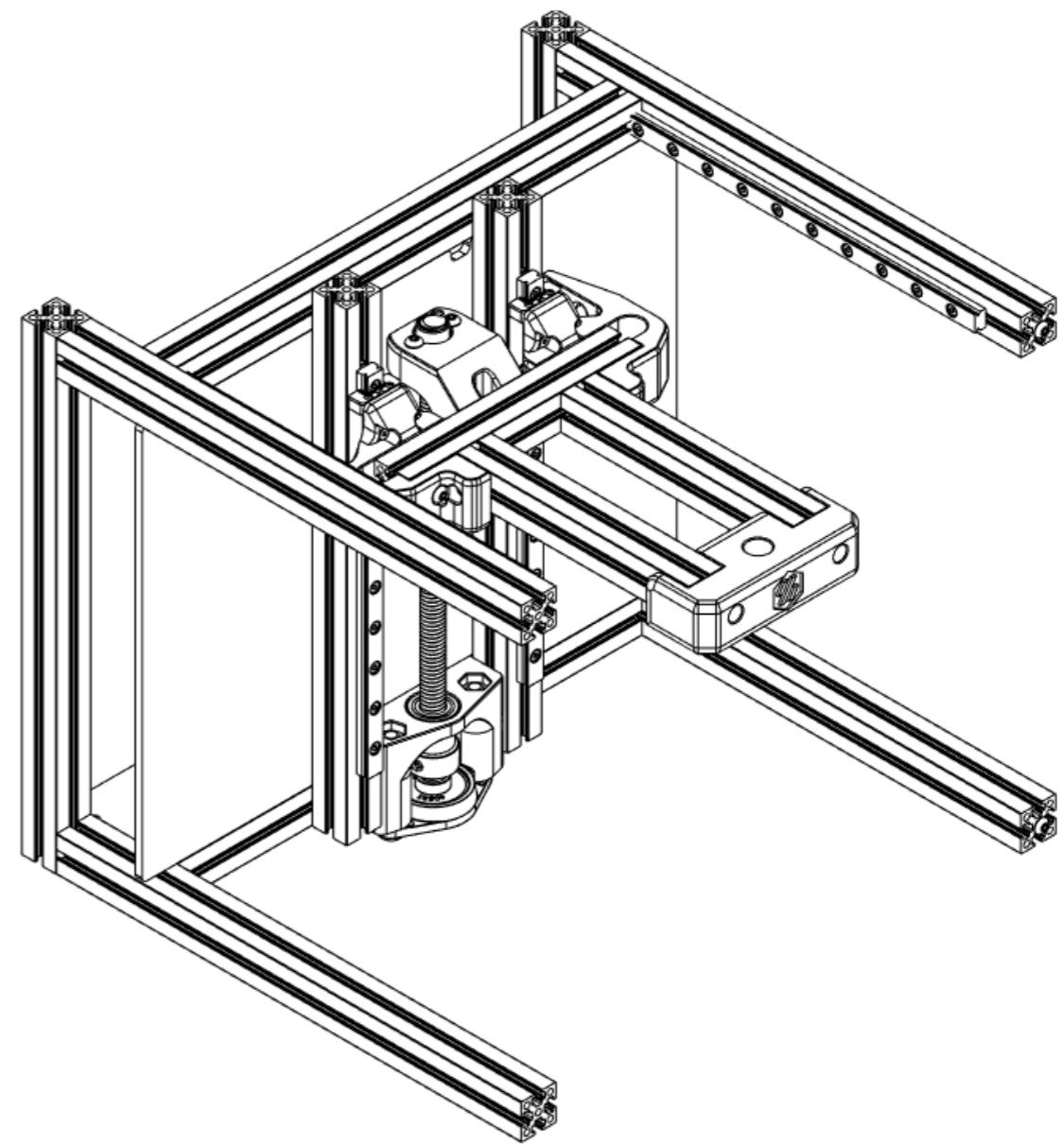
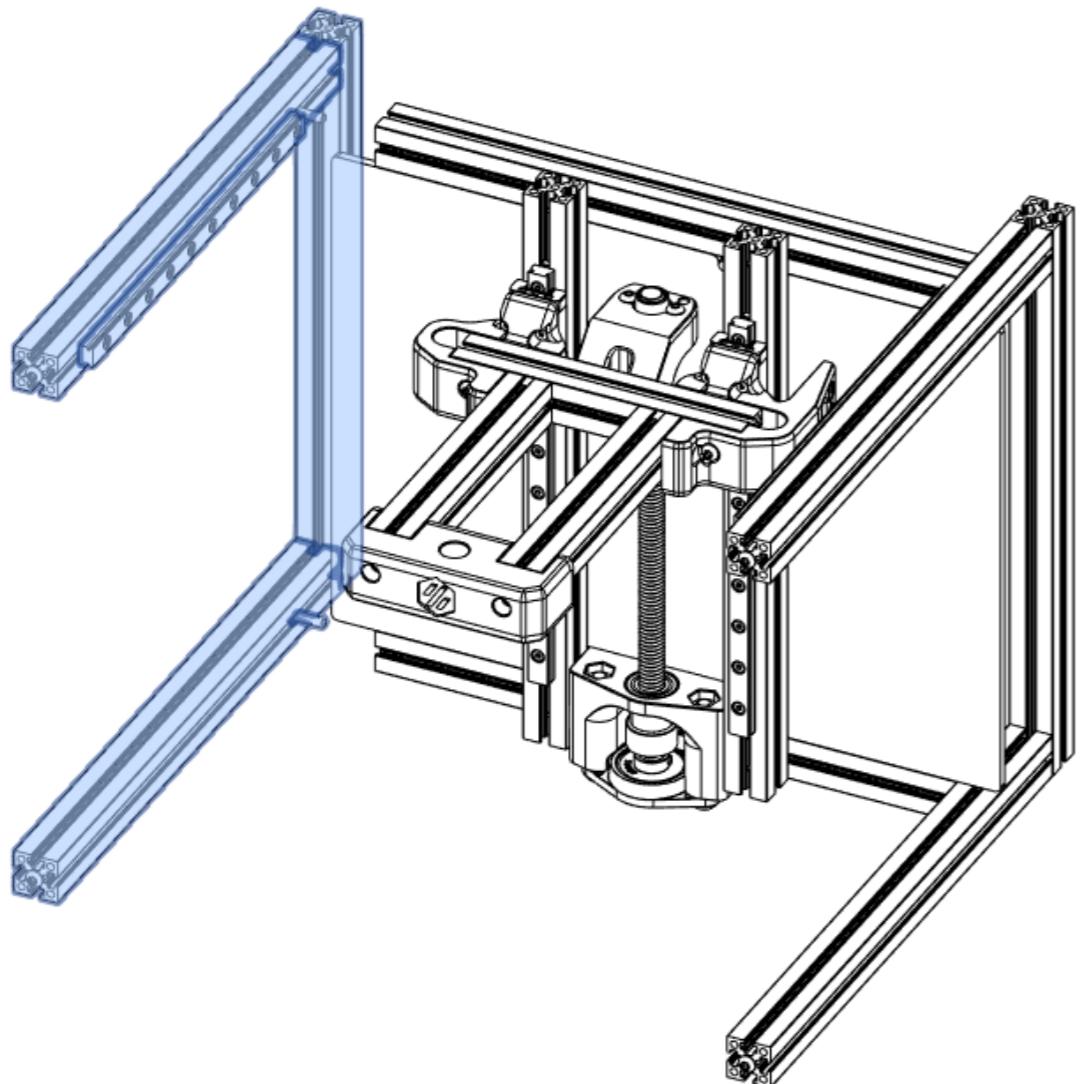


Part	Qty
M3 Nut	6

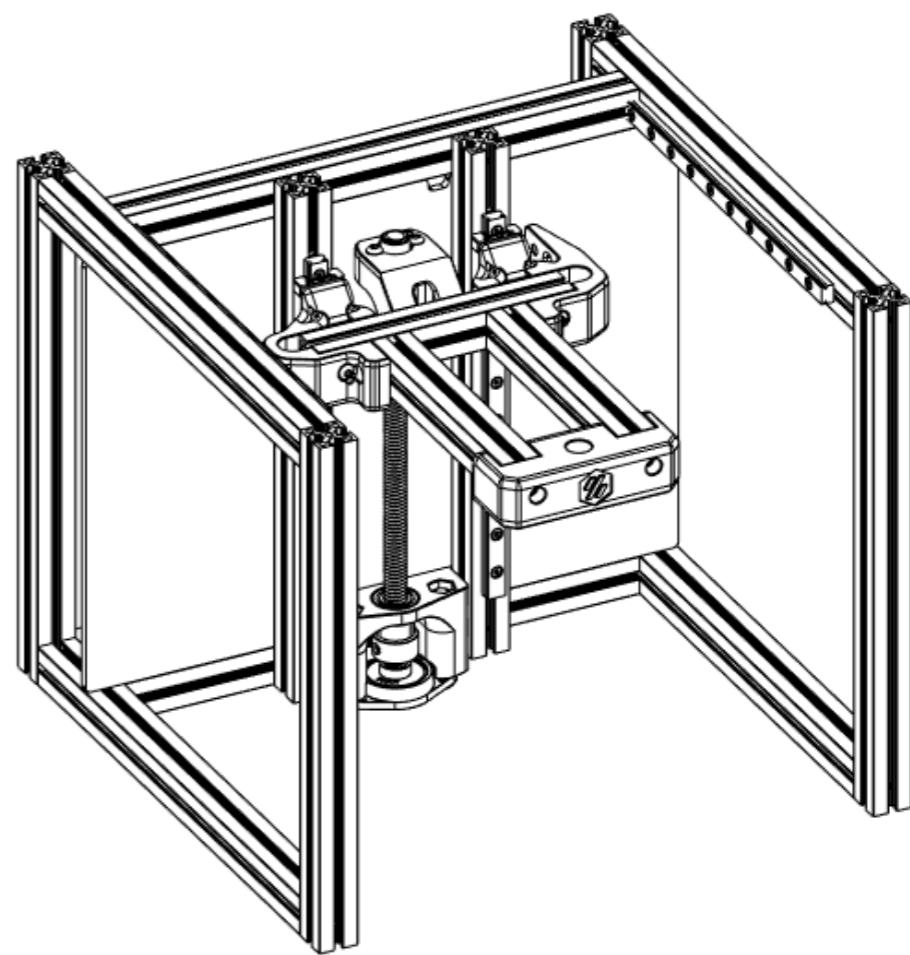
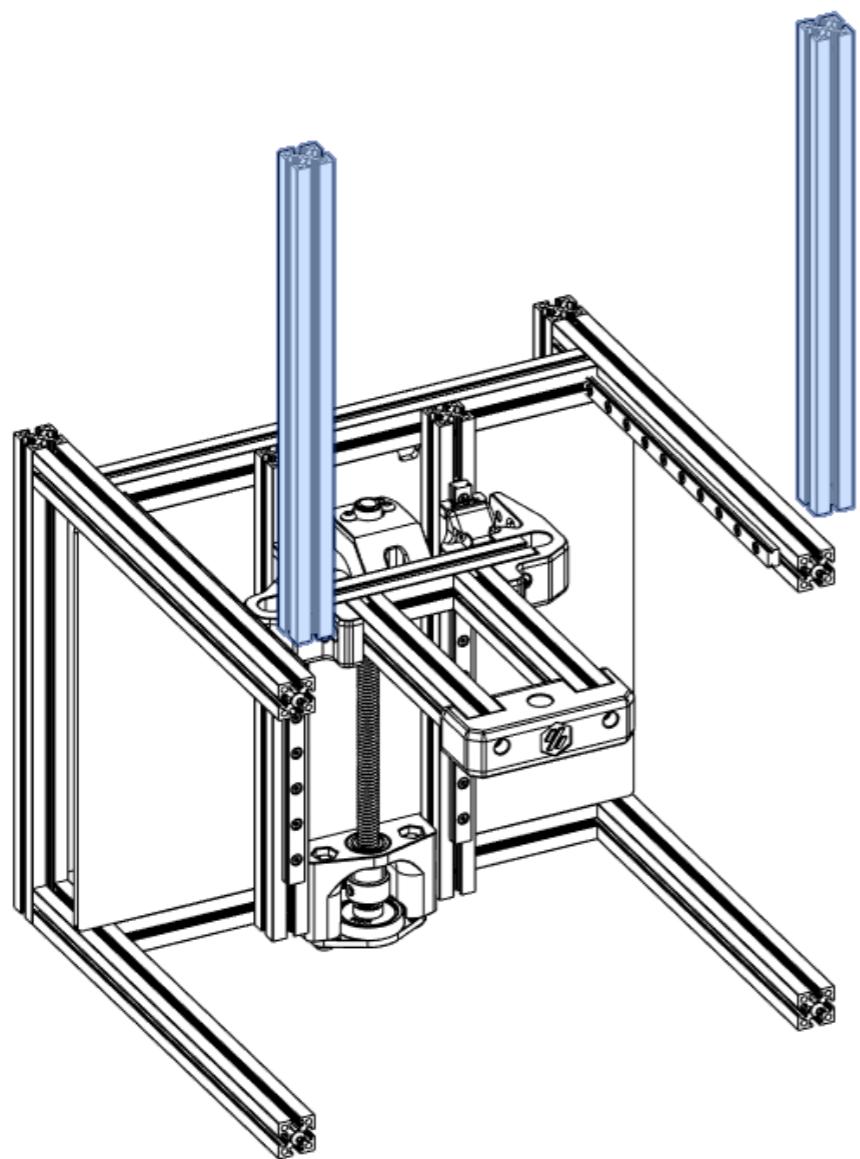
Rear Deck Installation



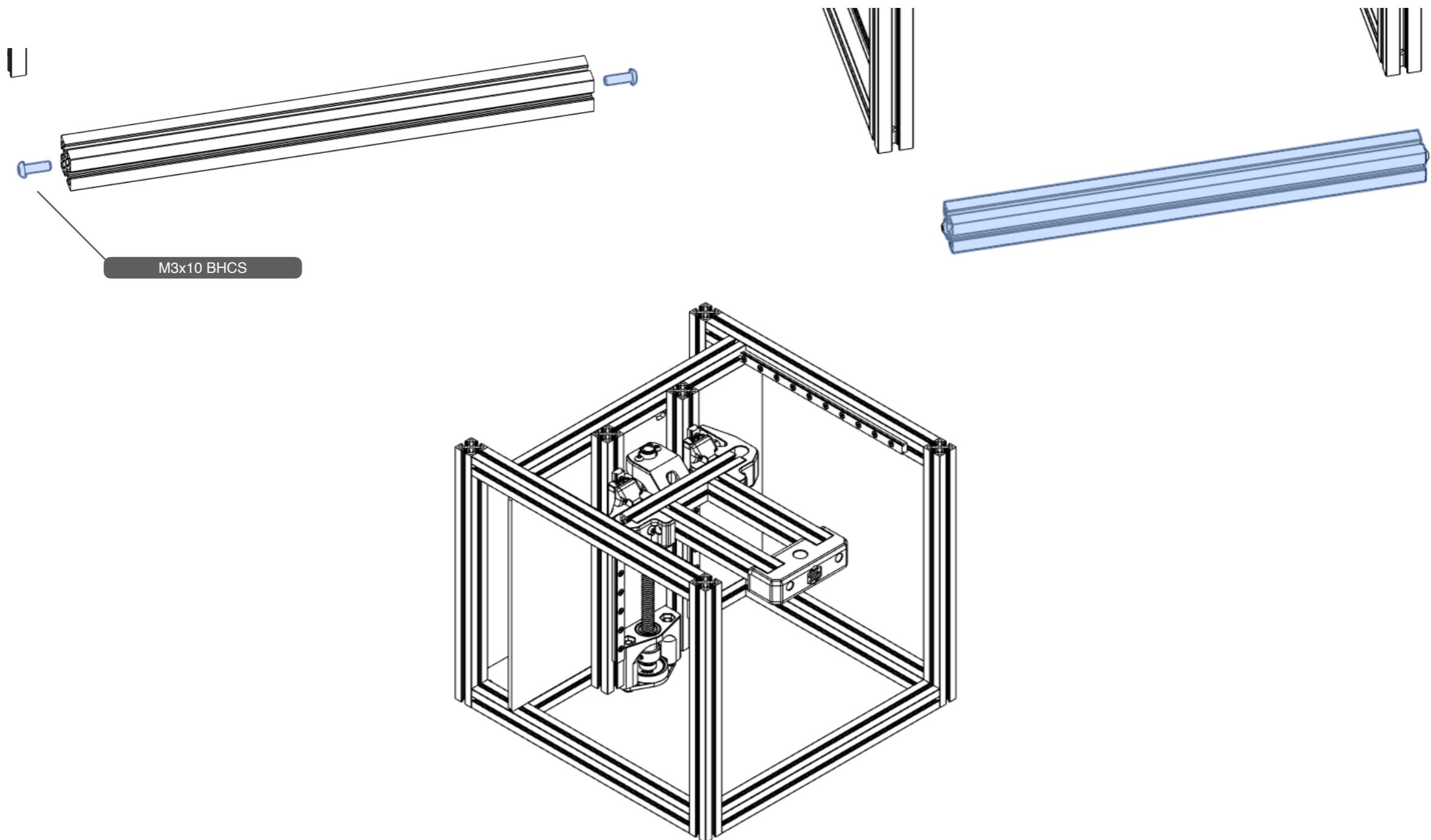
Y Rail Installation



Front Beams

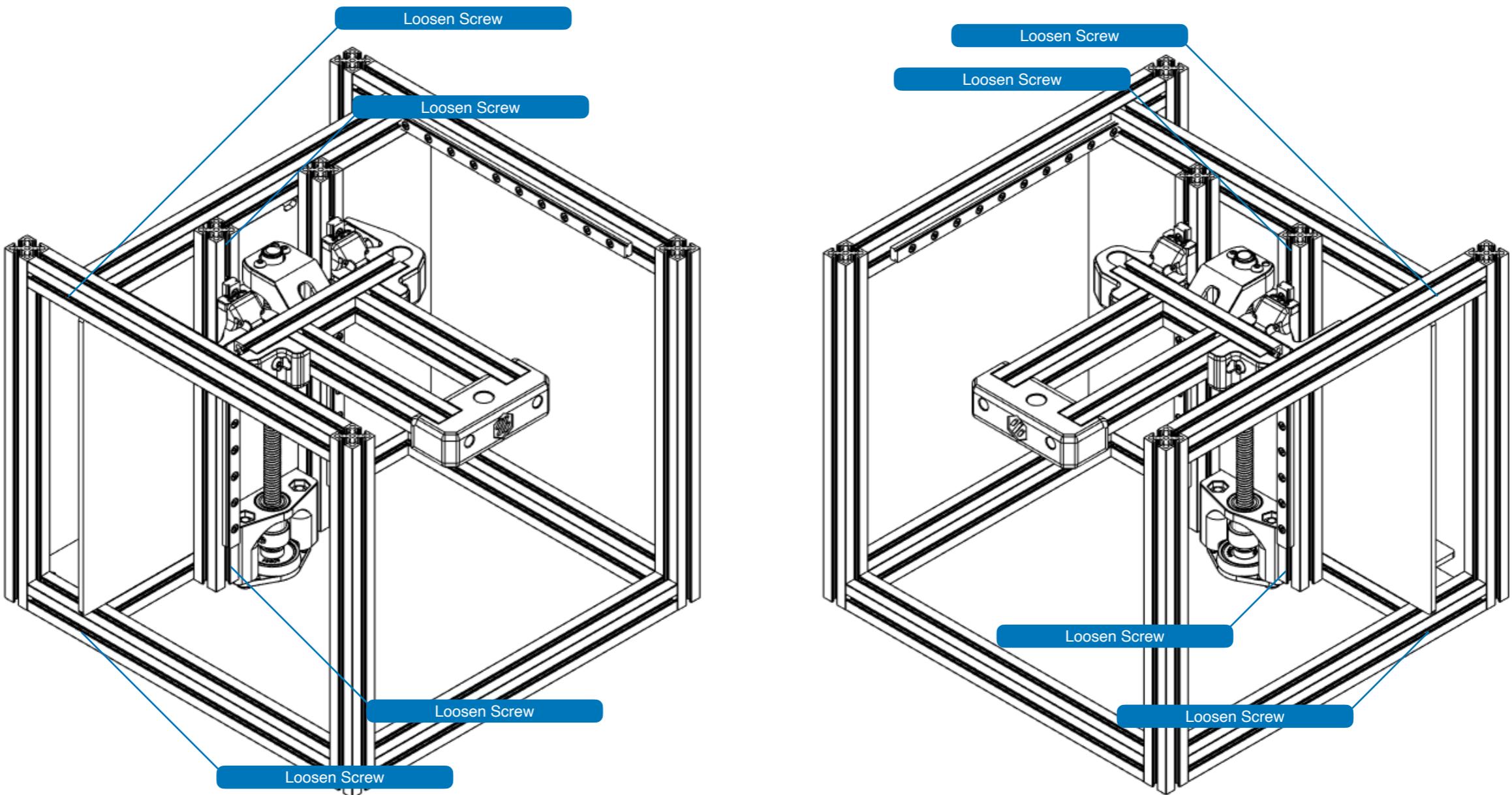


Front Beams

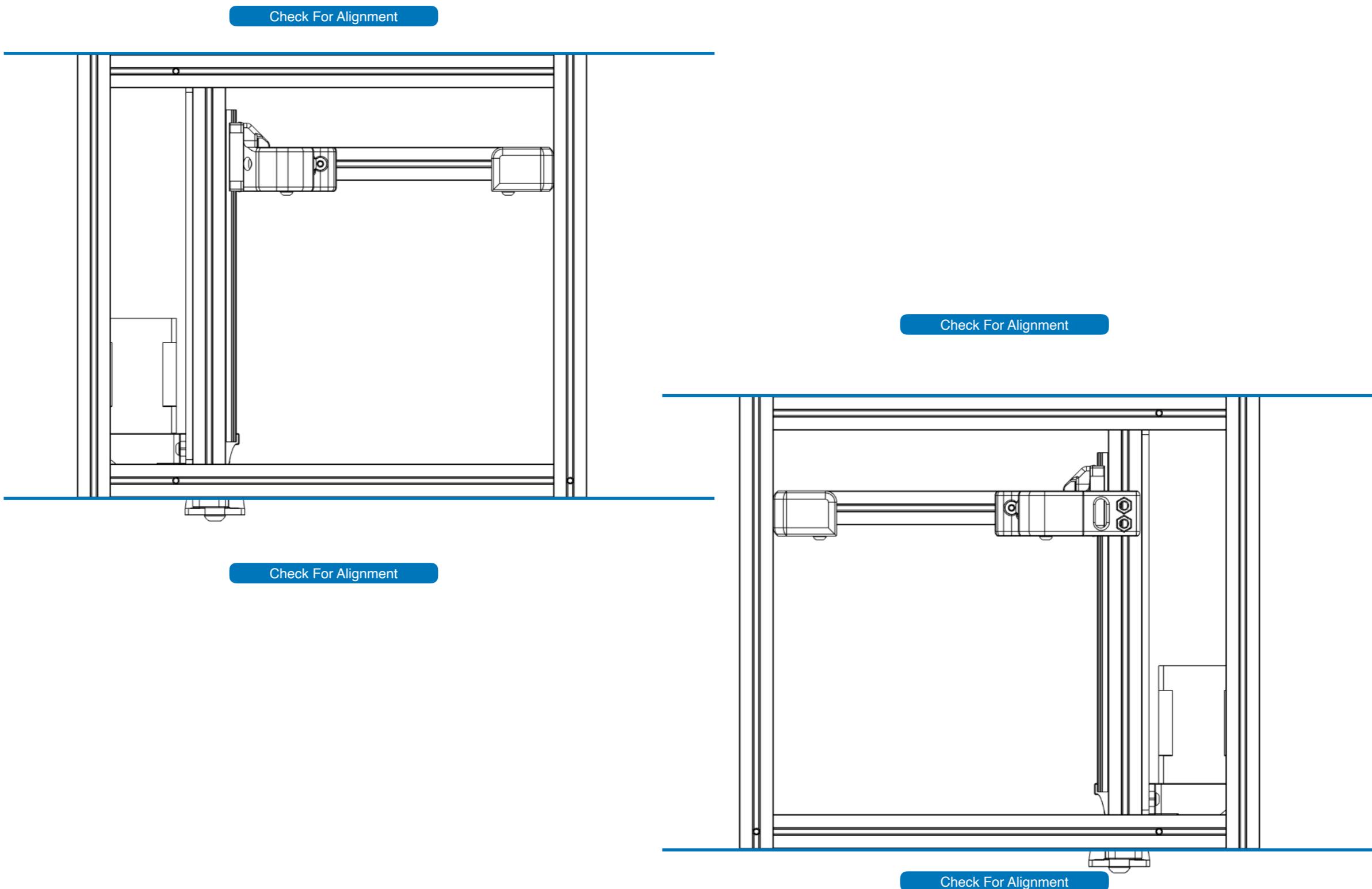


Part	Qty
M3x10 BHCS	2

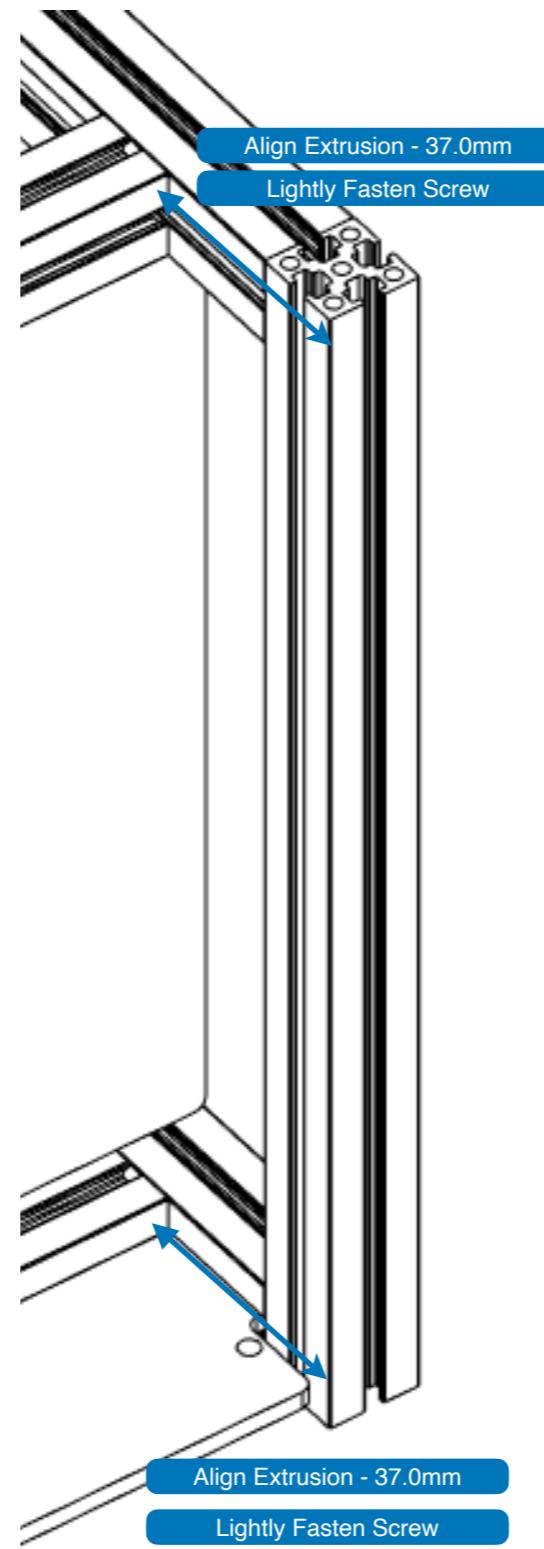
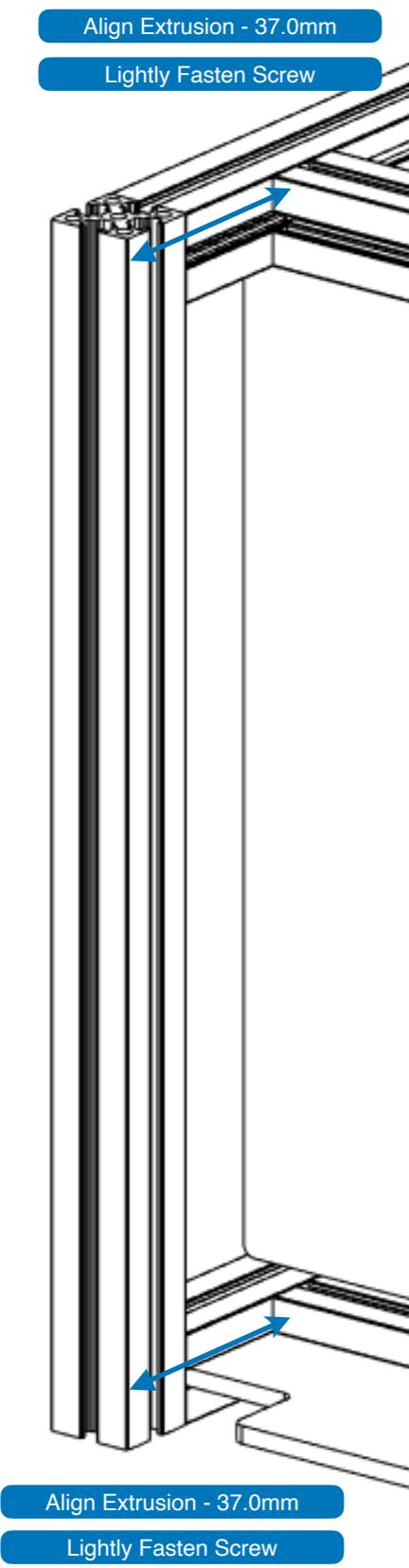
Frame Alignment



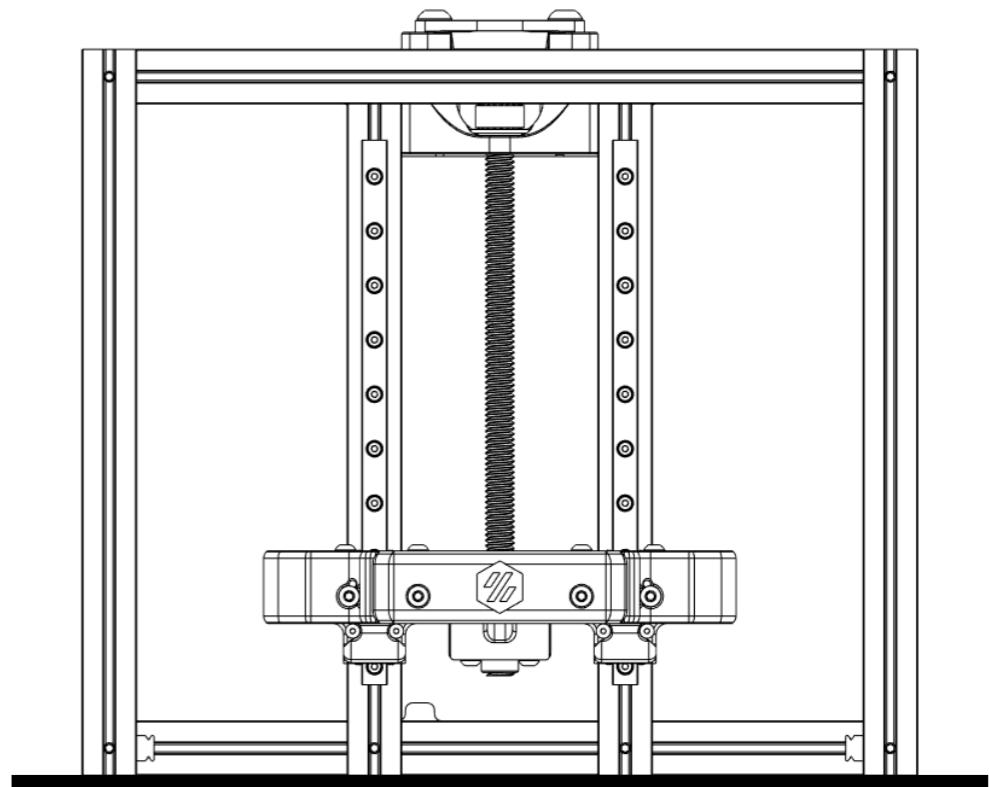
Frame Alignment



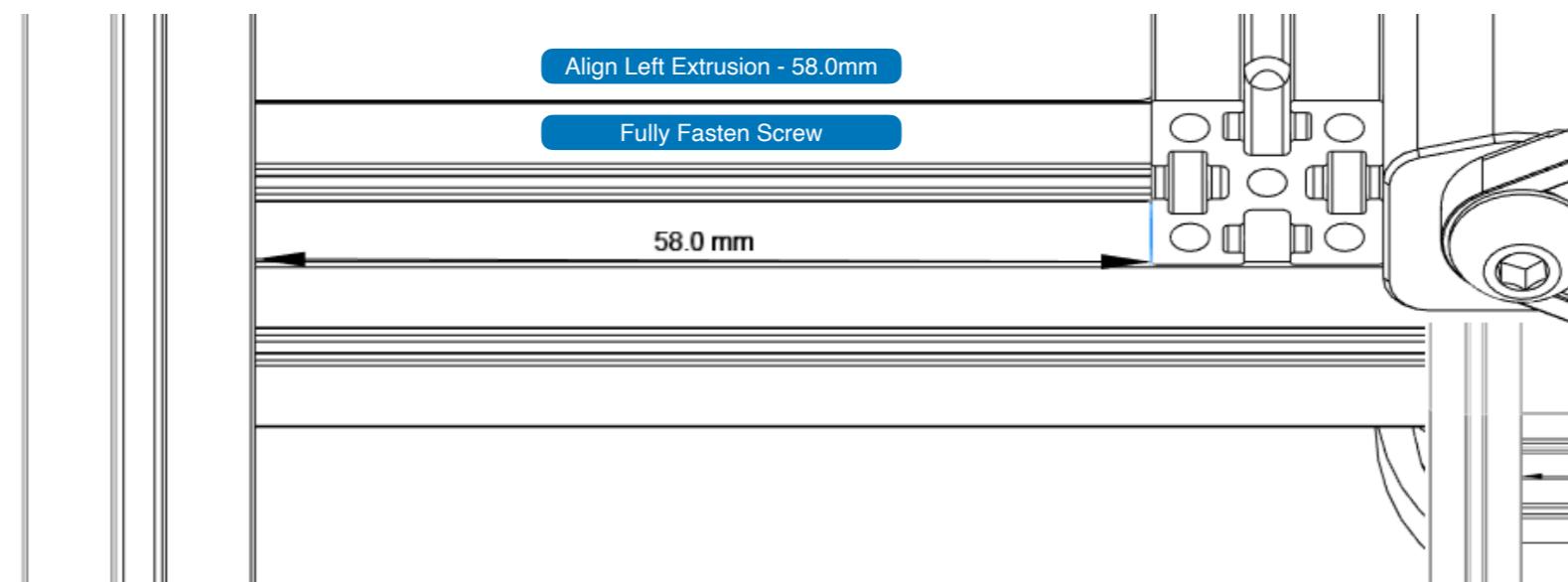
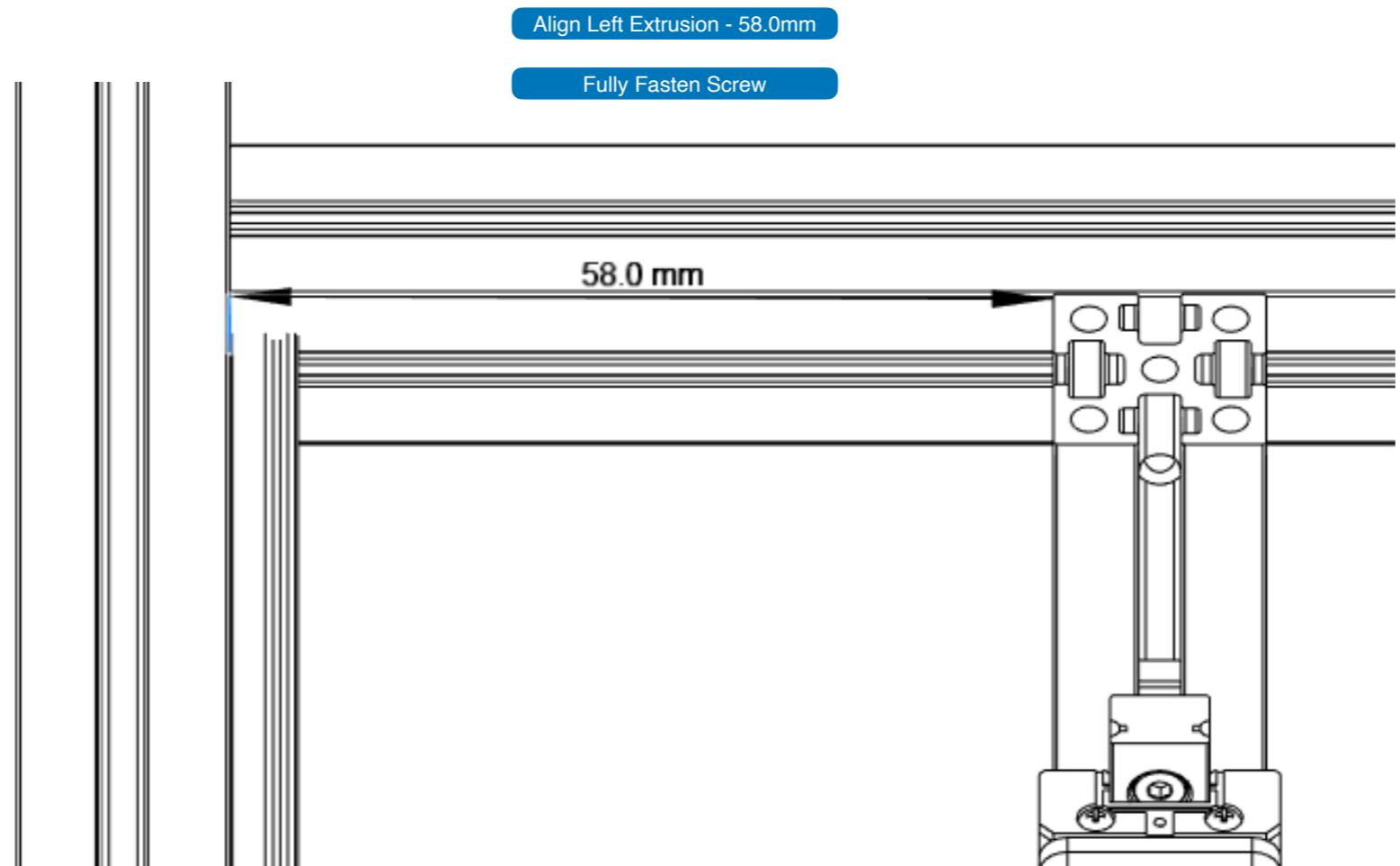
Frame Alignment



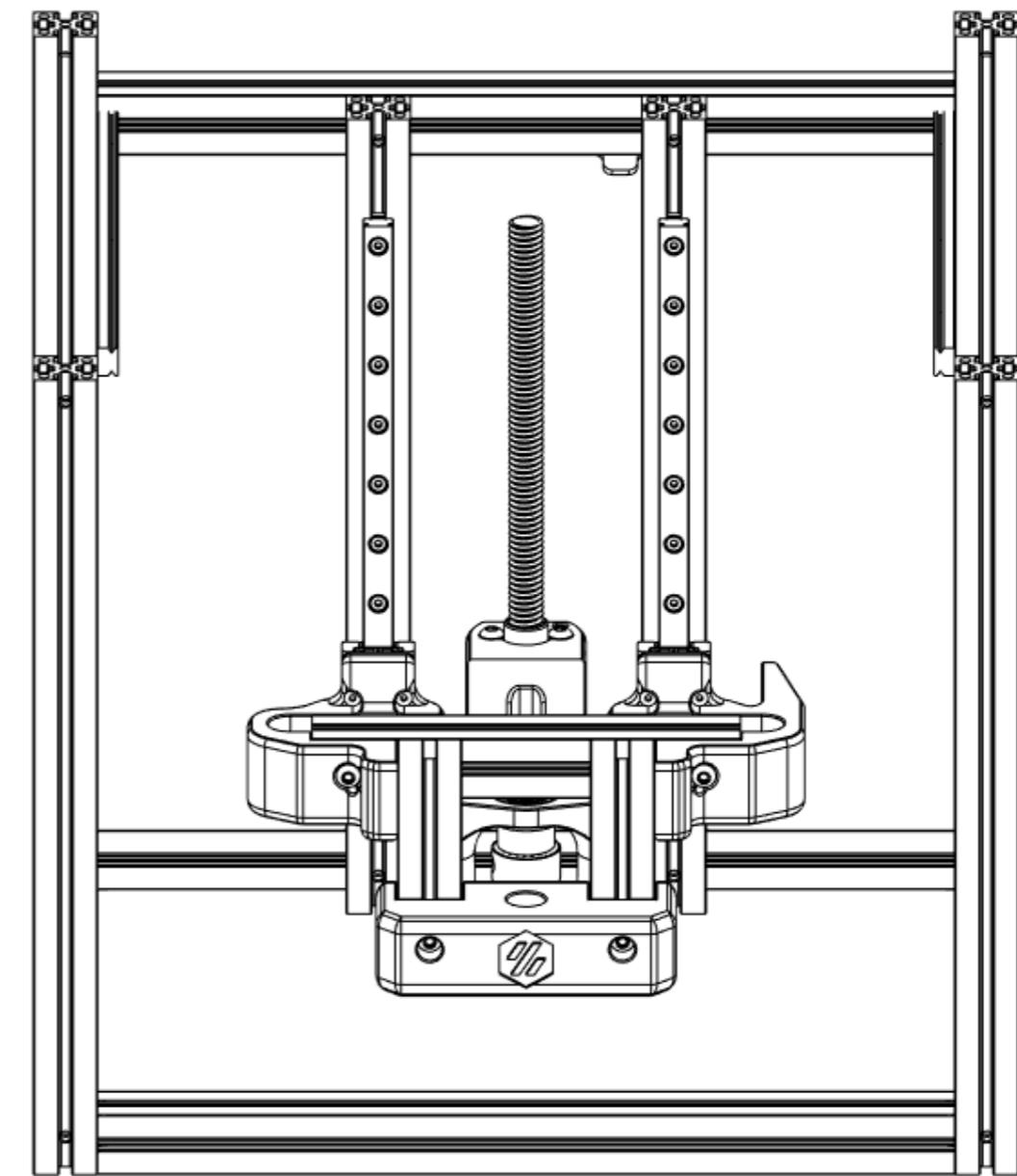
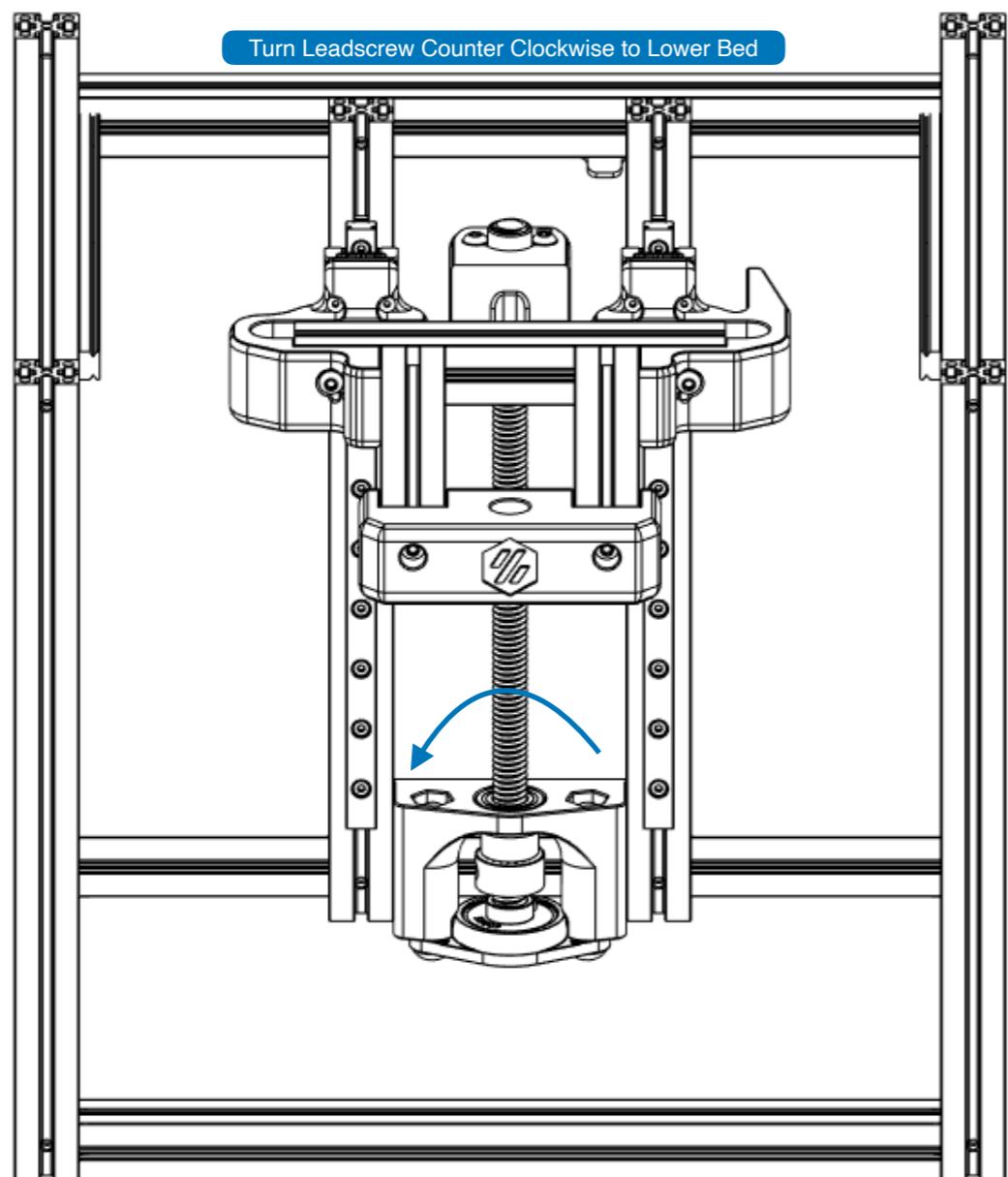
Carefully Flip Printer Upside Down
Place On Flat Surface And Fully Fasten Screws



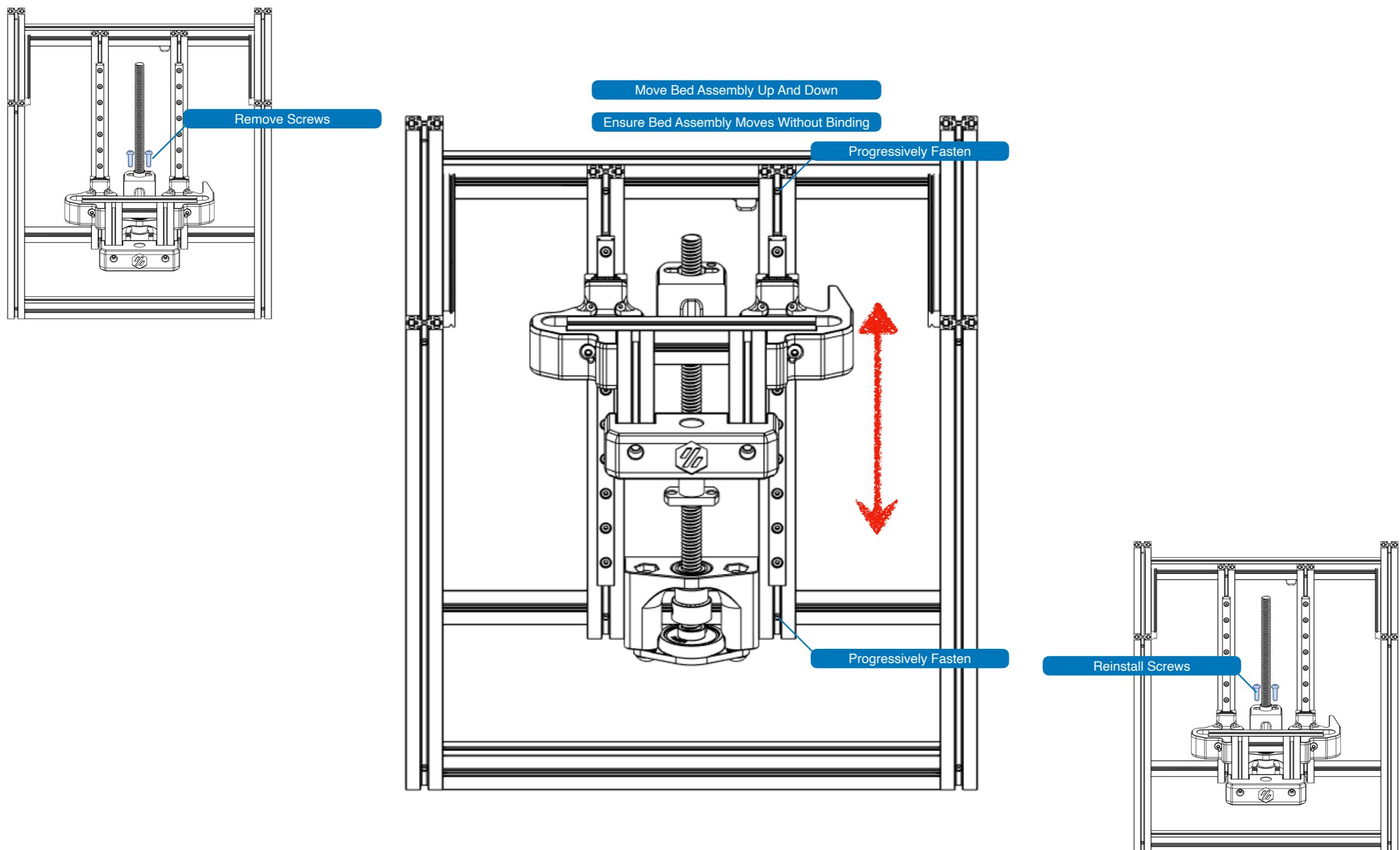
Frame Alignment



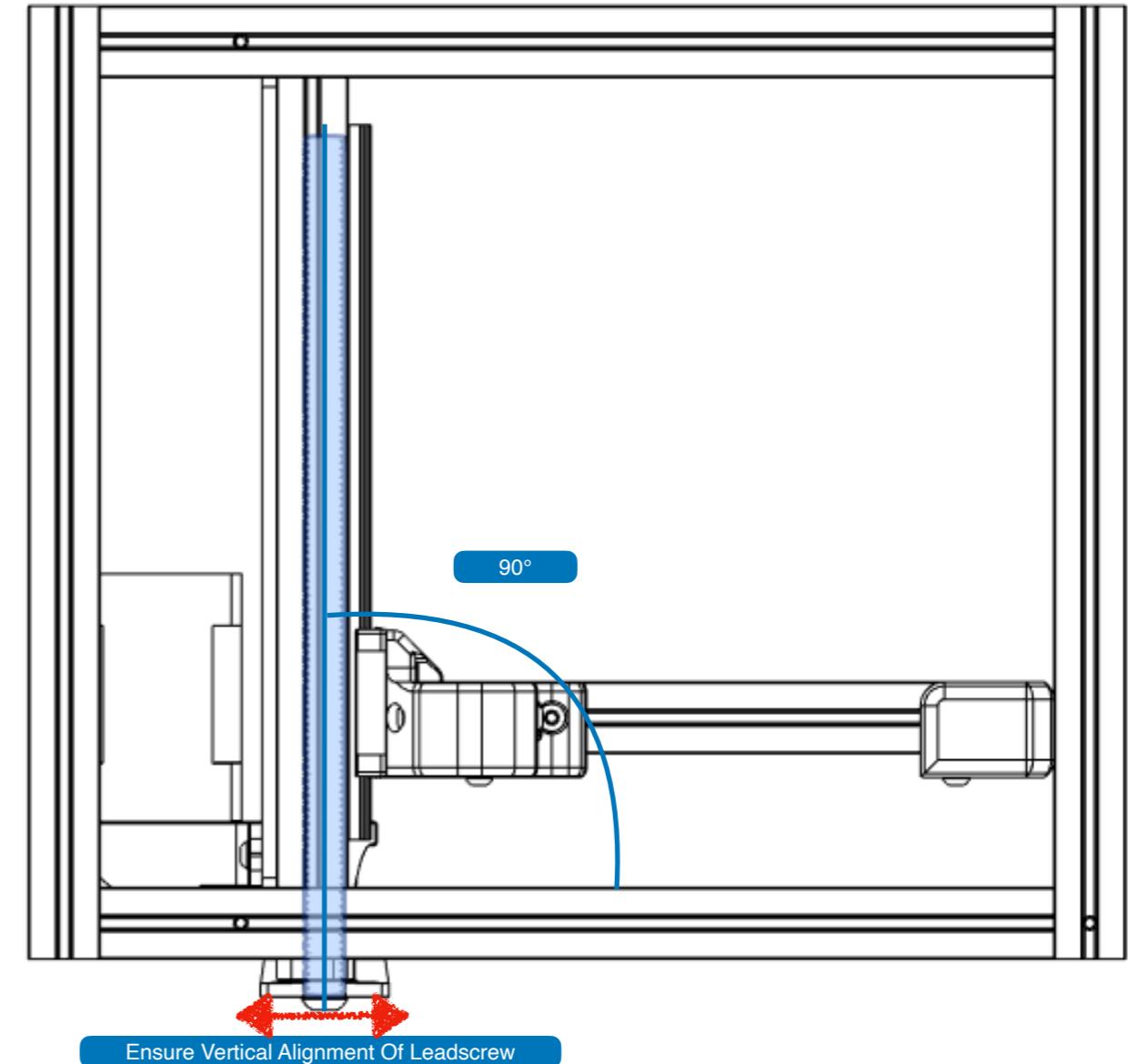
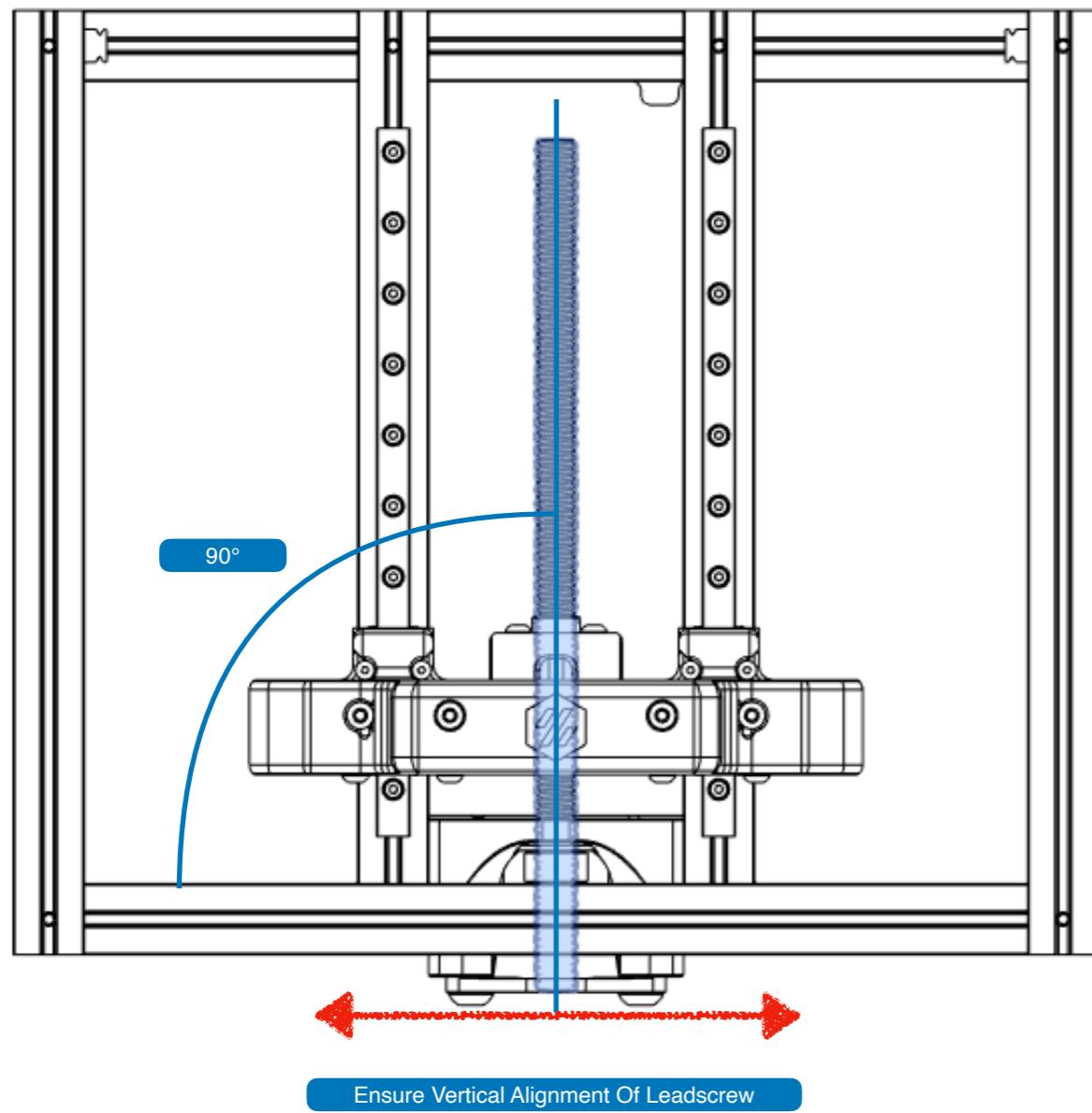
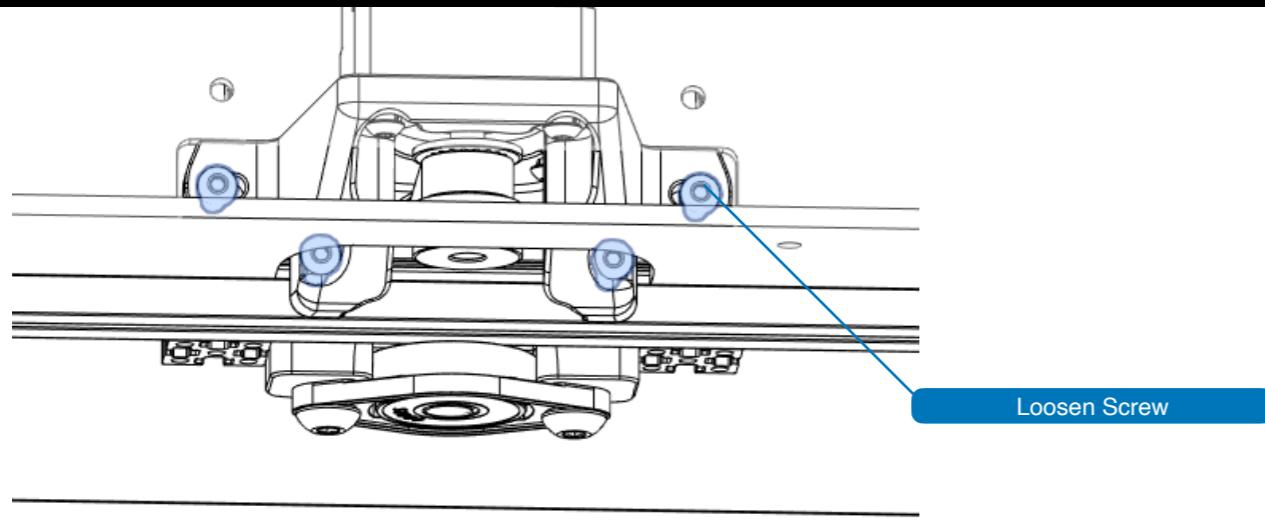
Frame Alignment



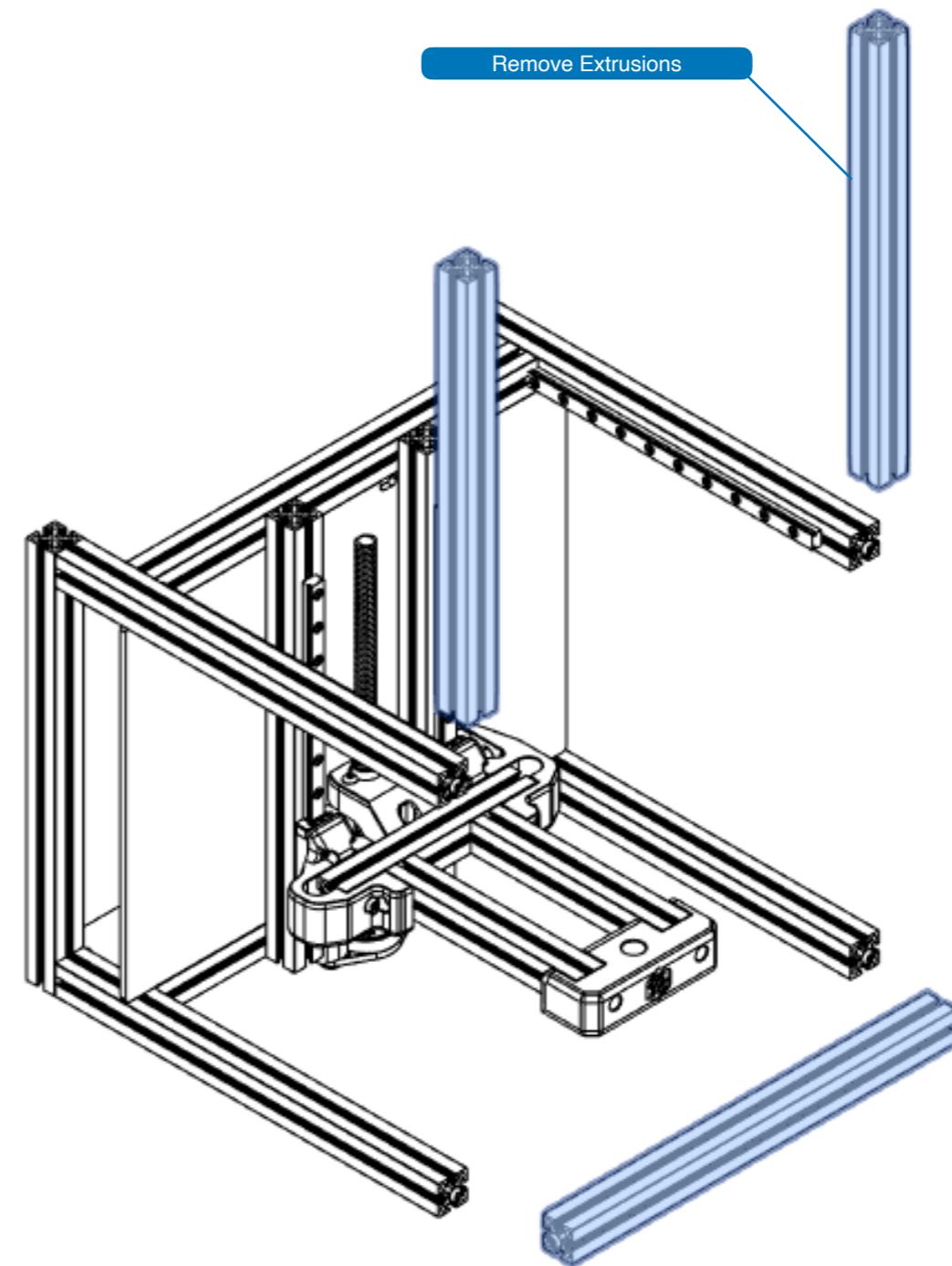
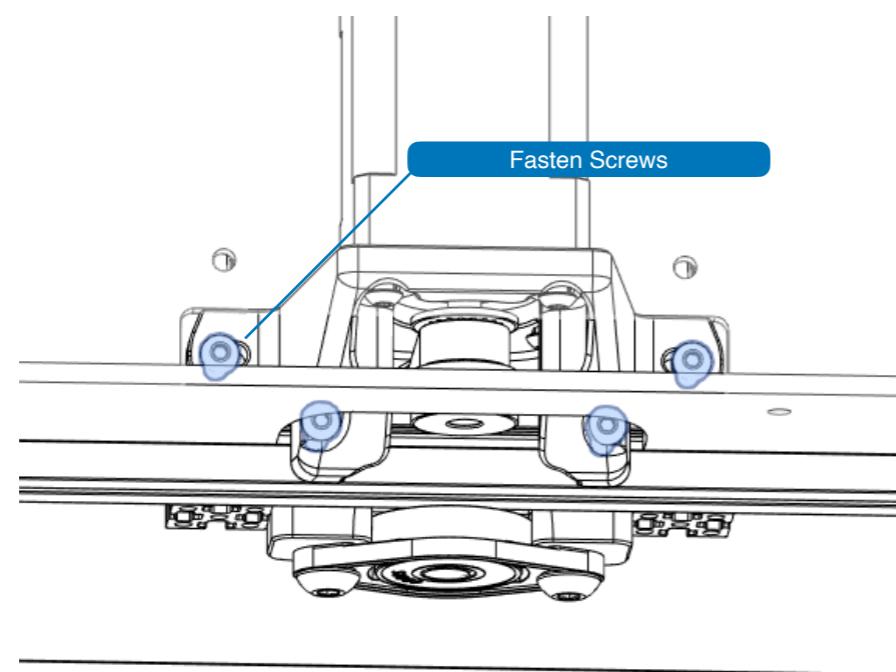
Bed Assembly Tramming



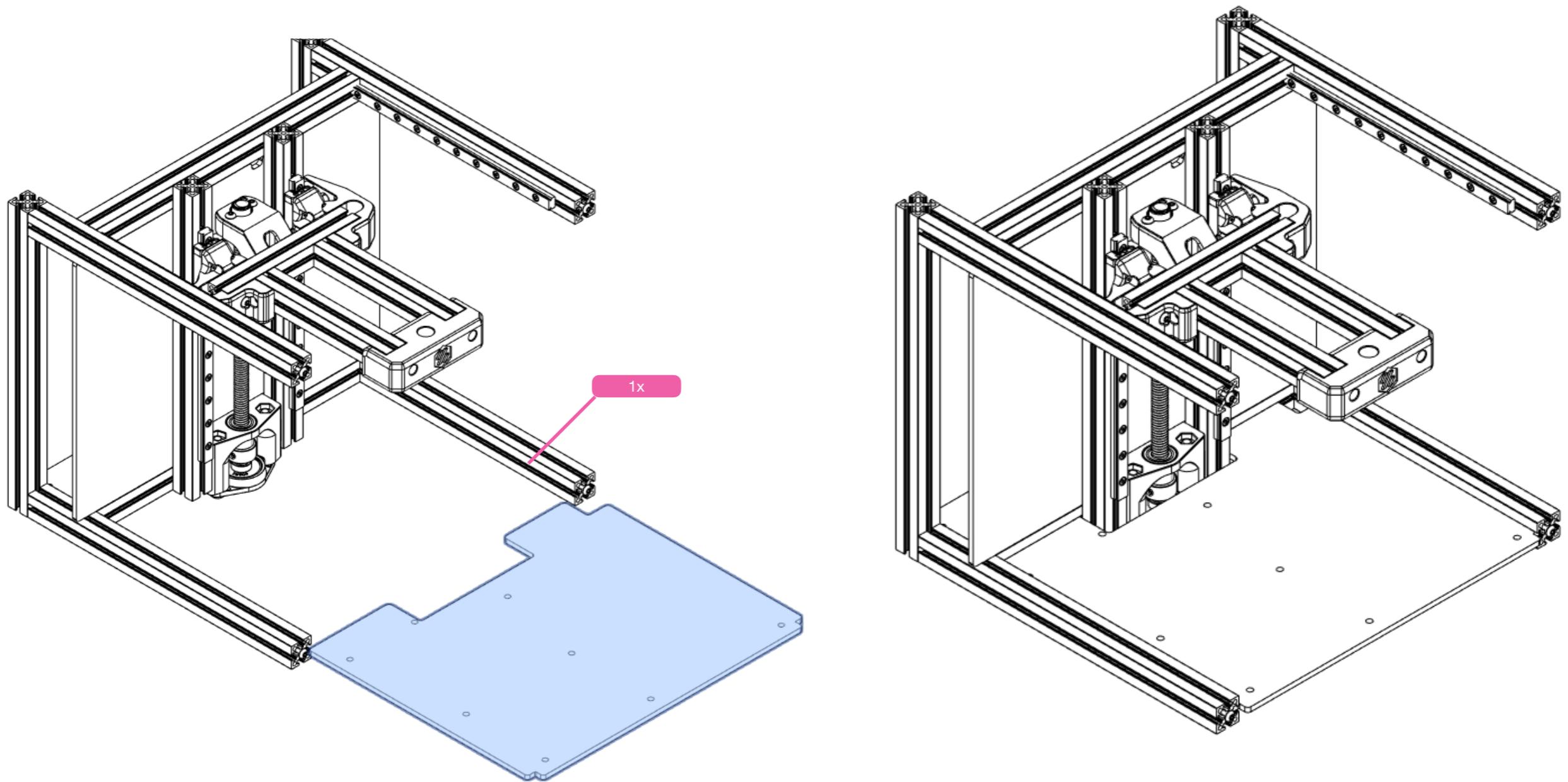
Leadscrew Alignment



Frame Aligned

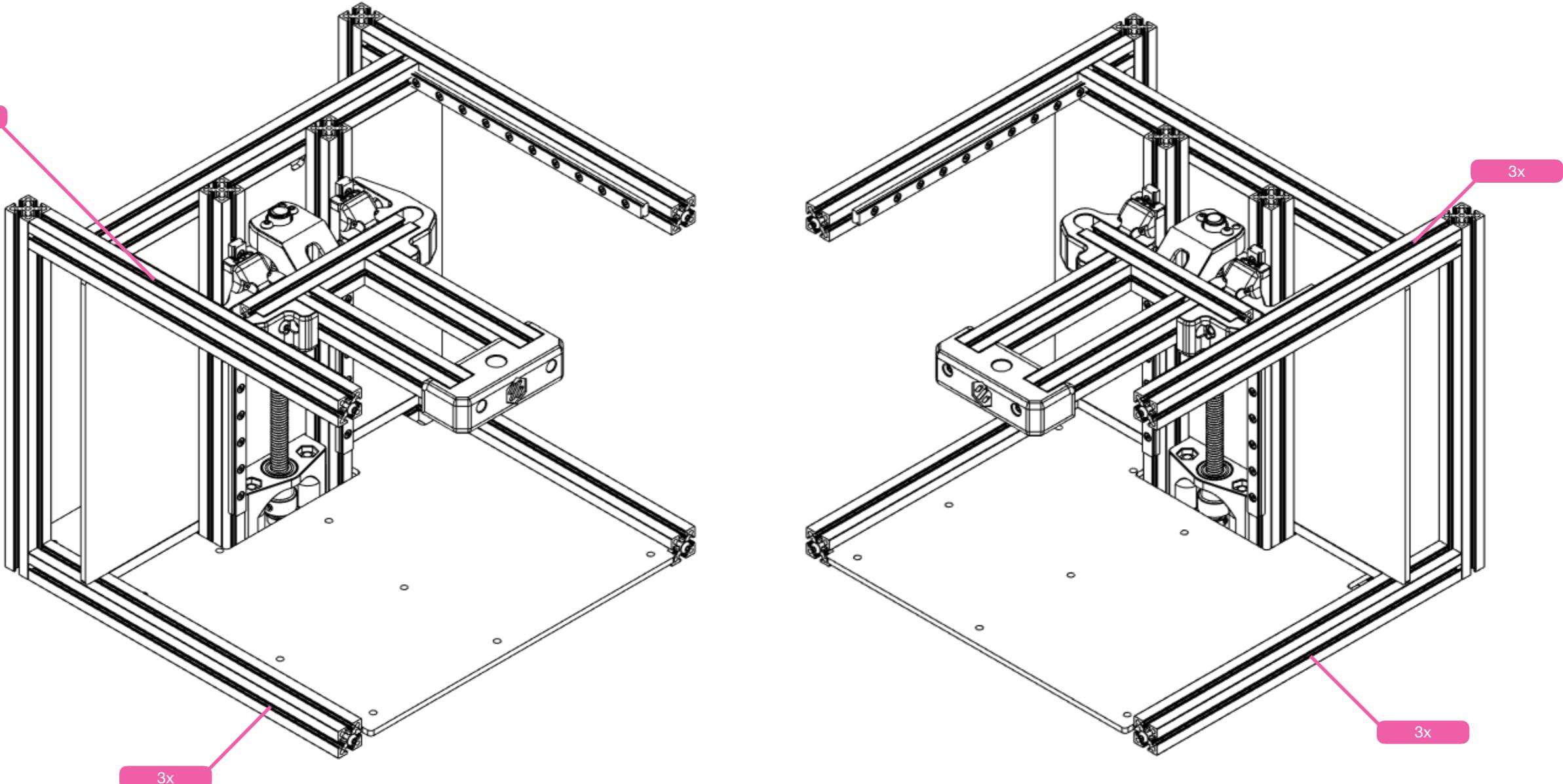


Deck Panel Installation



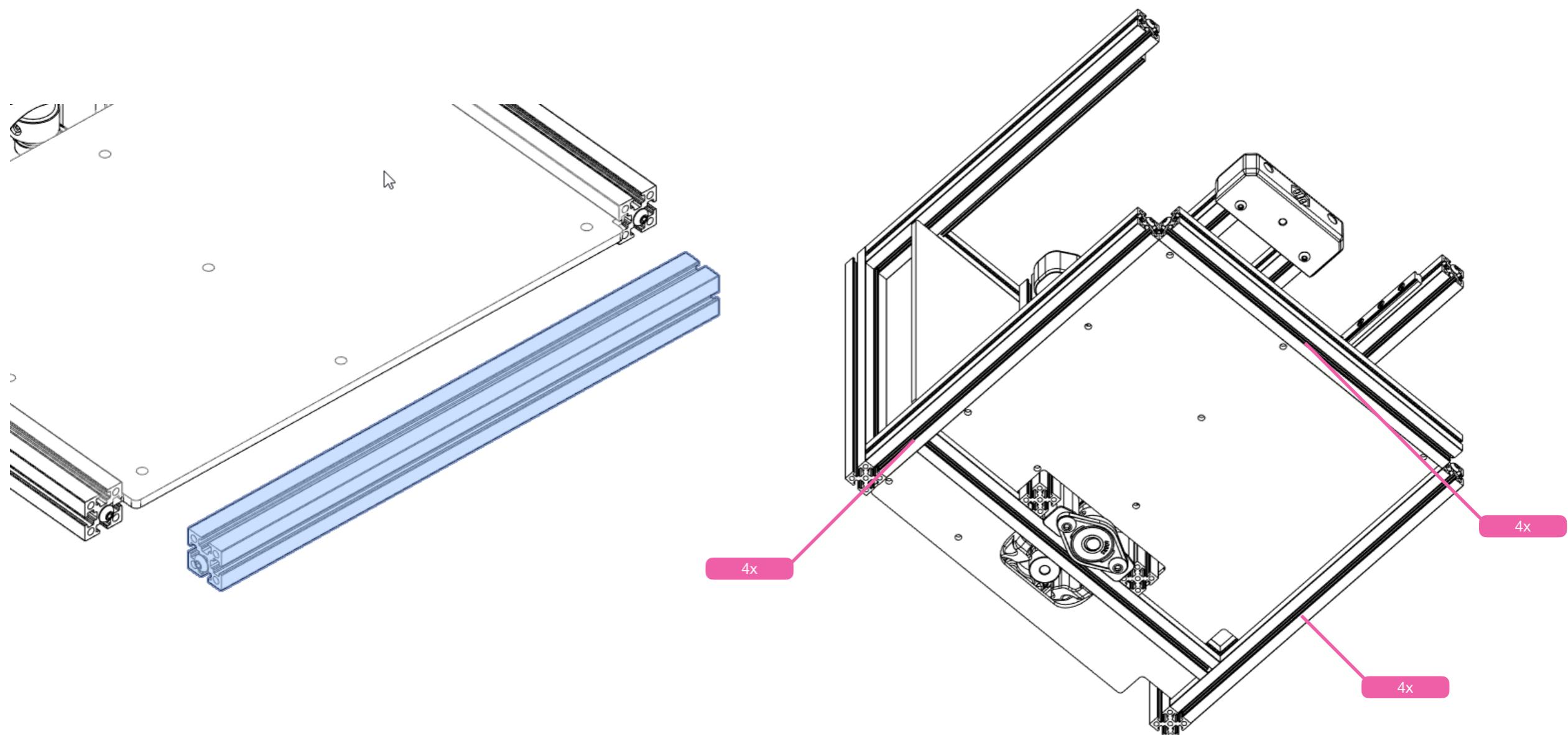
Part	Qty
M3 Nut	1

Frame Assembly



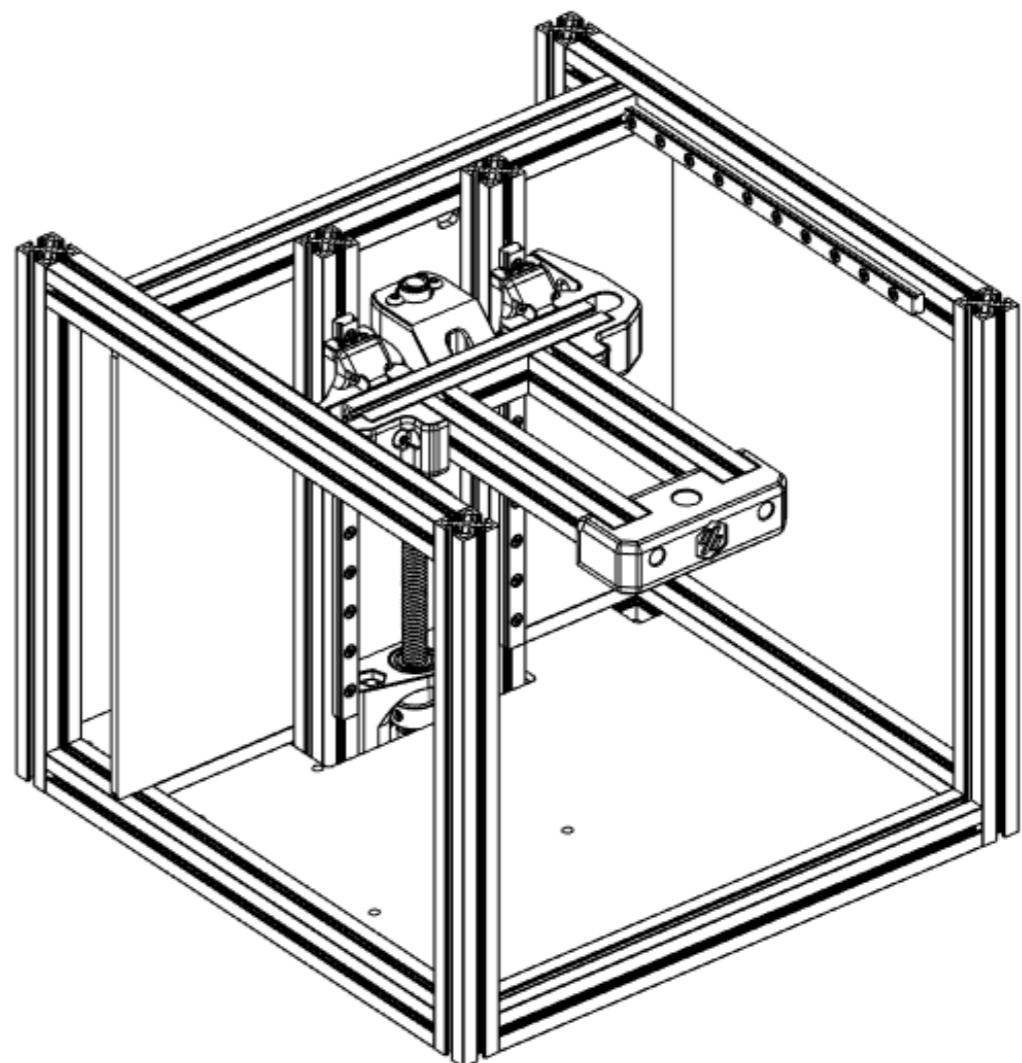
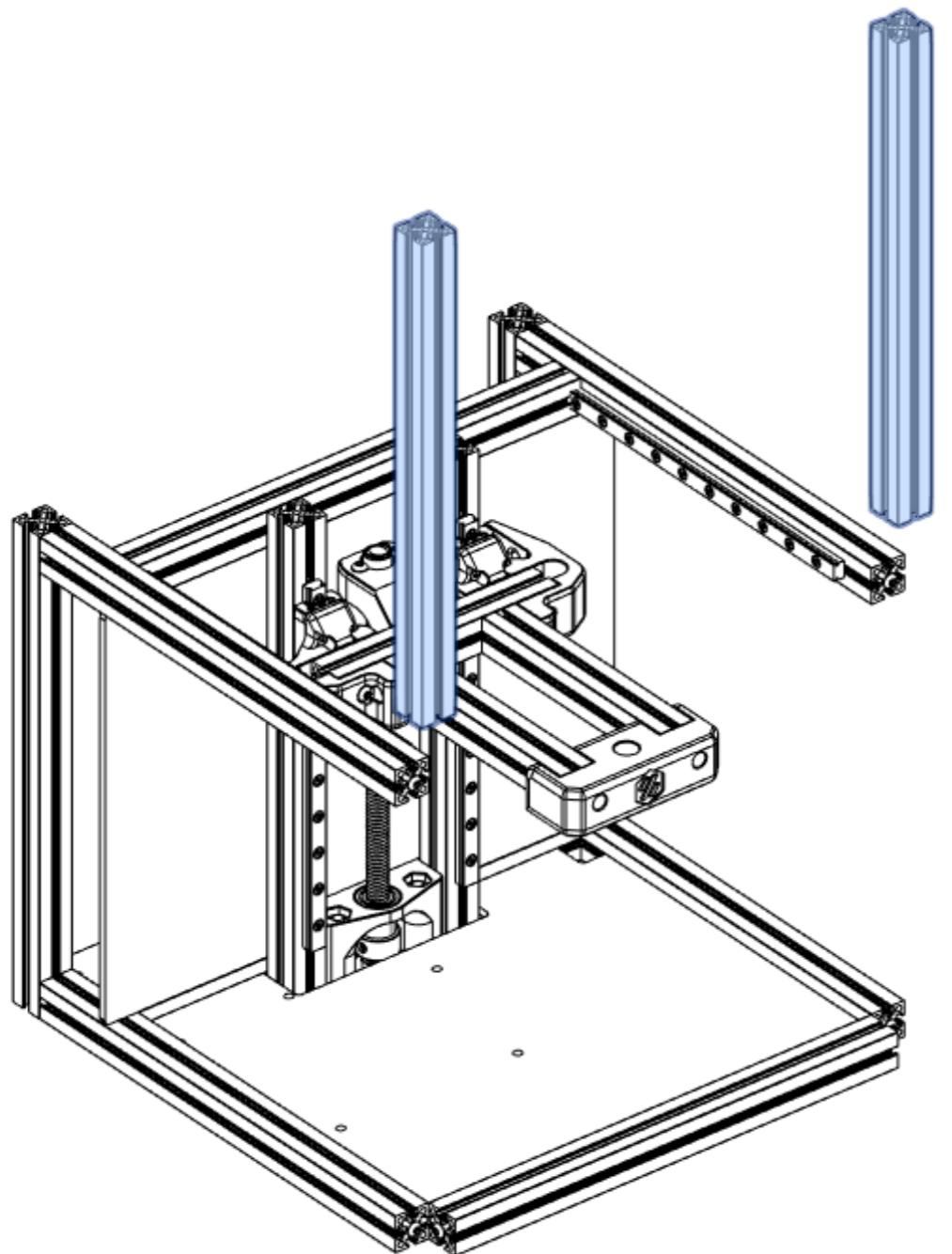
Part	Qty
M3 Nut	12

Frame Assembly

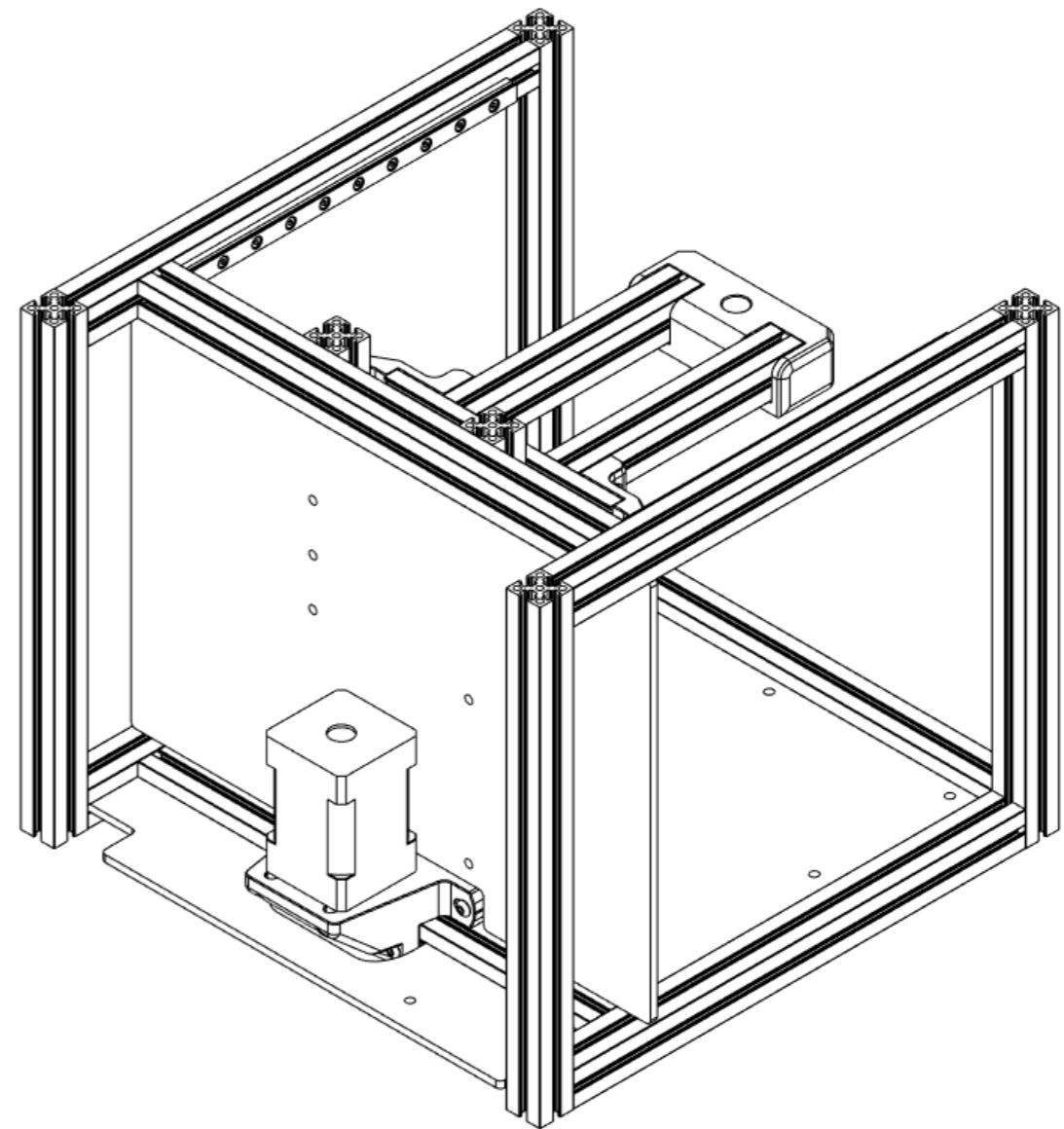
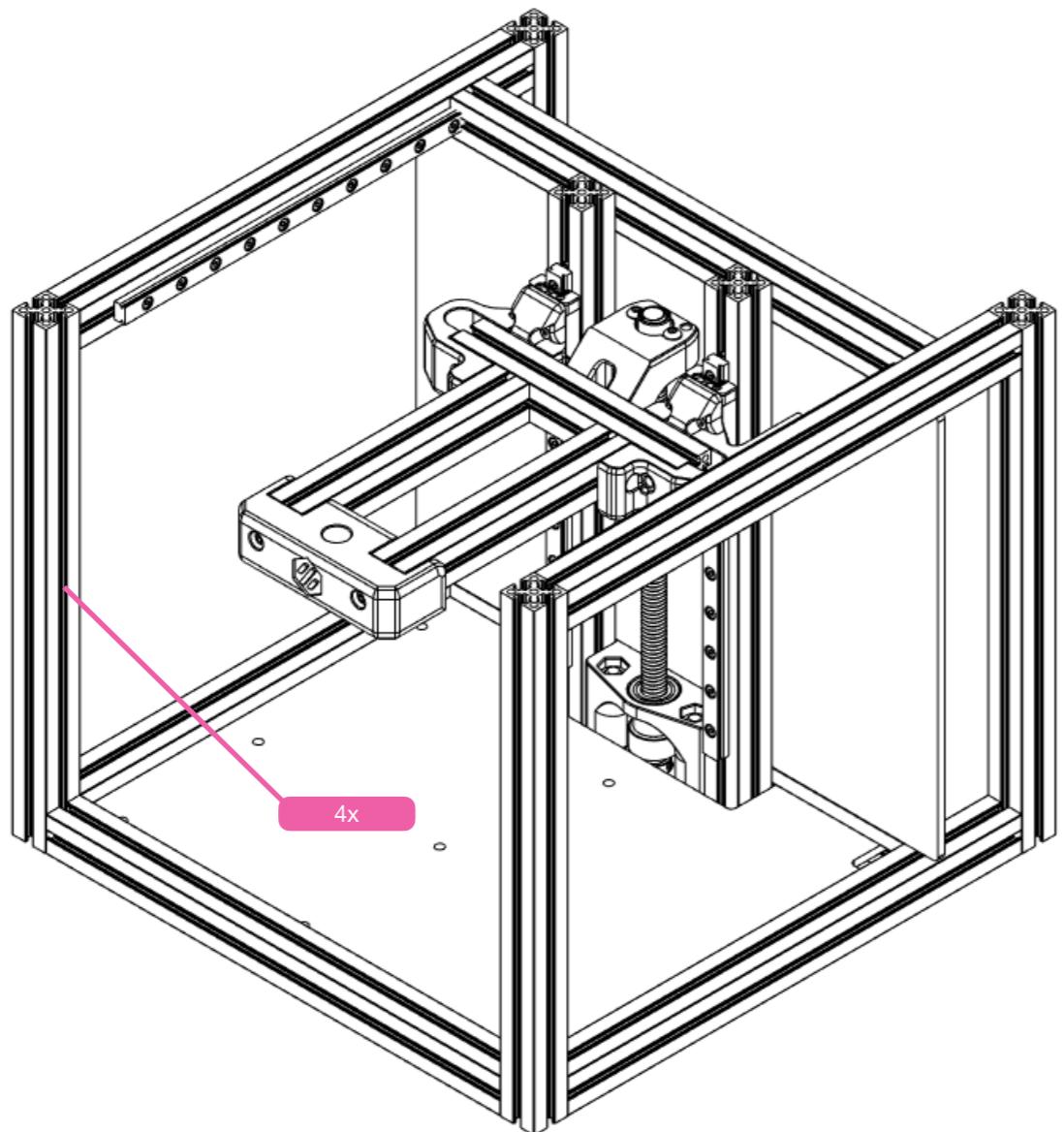


Part	Qty
M3 Nut	12

Frame Assembly

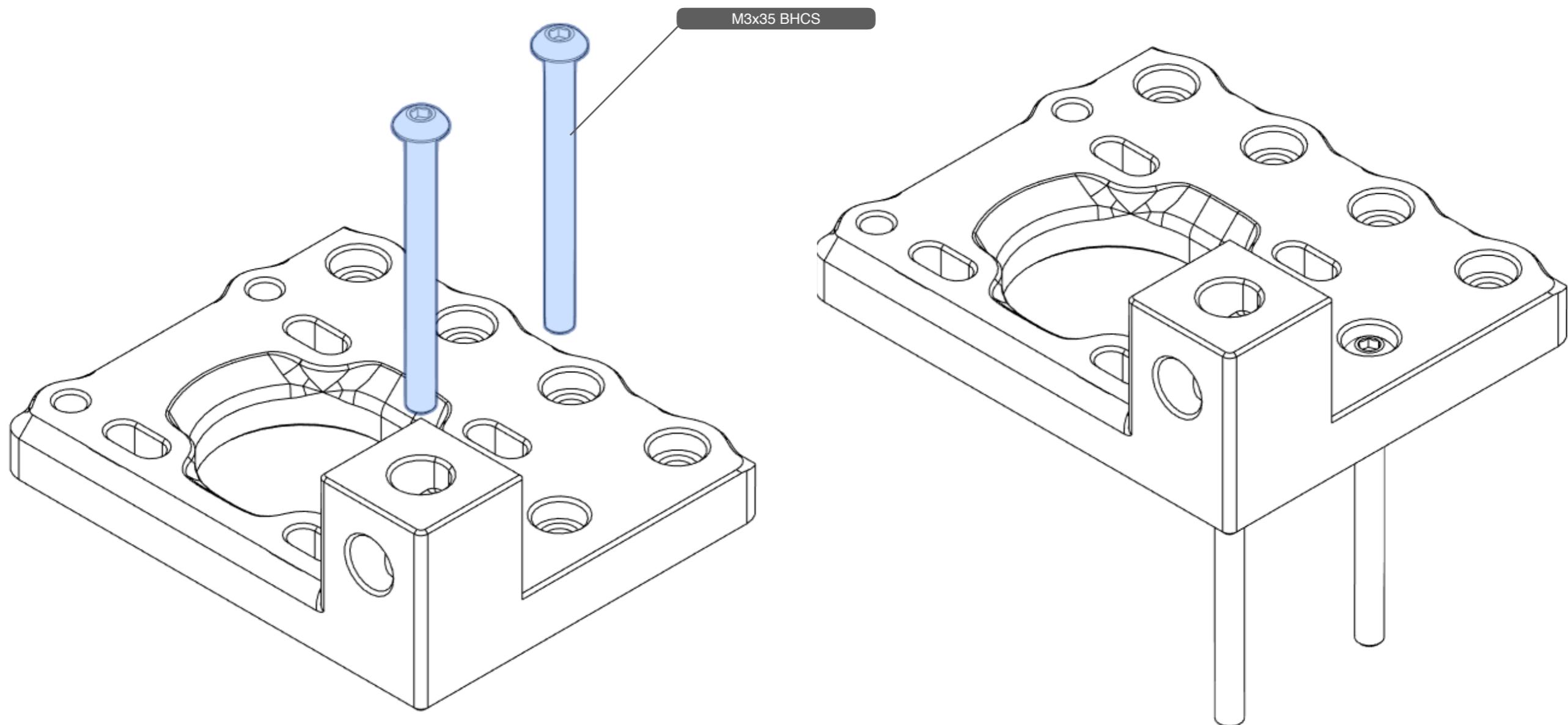


Frame Assembly



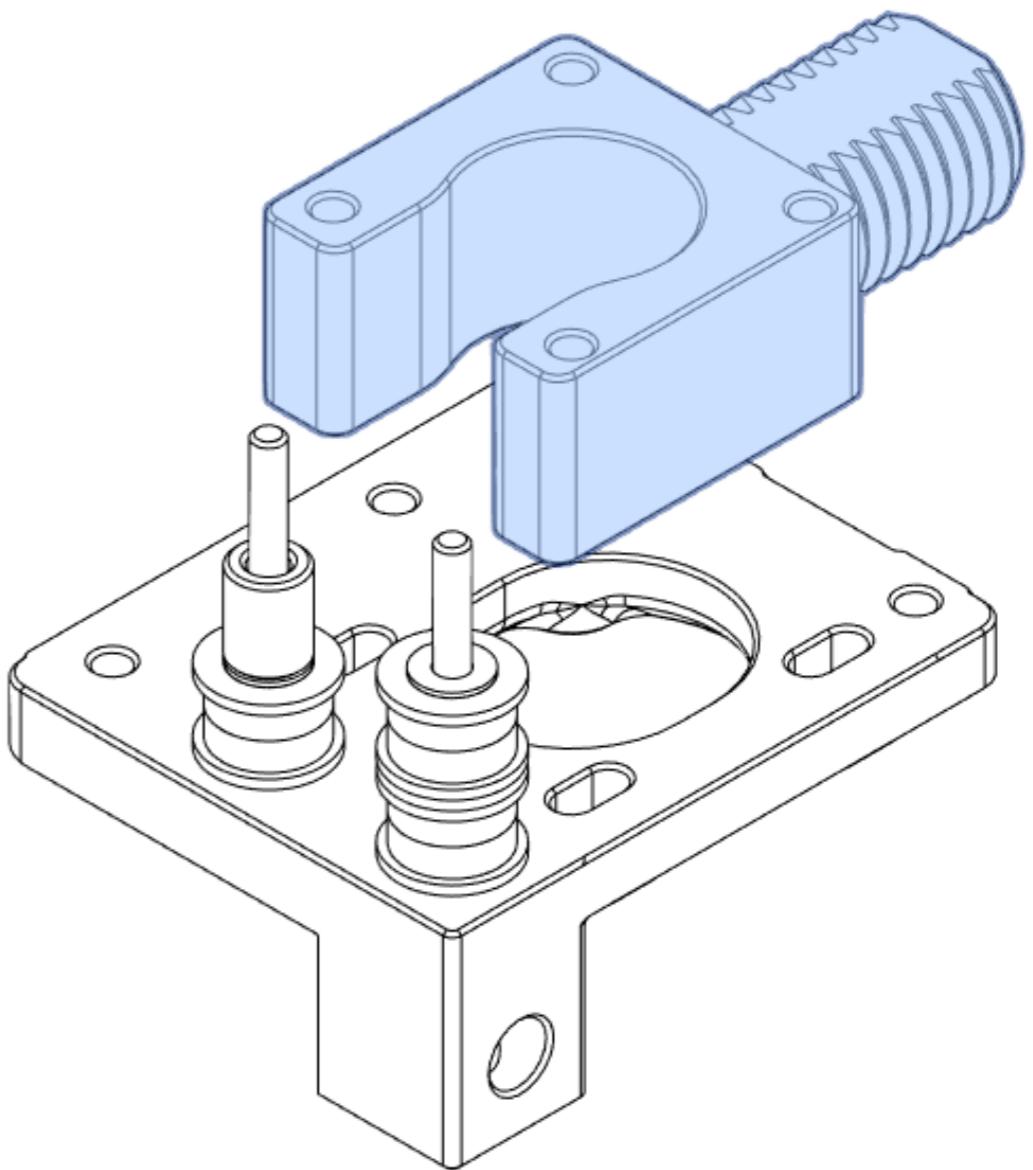
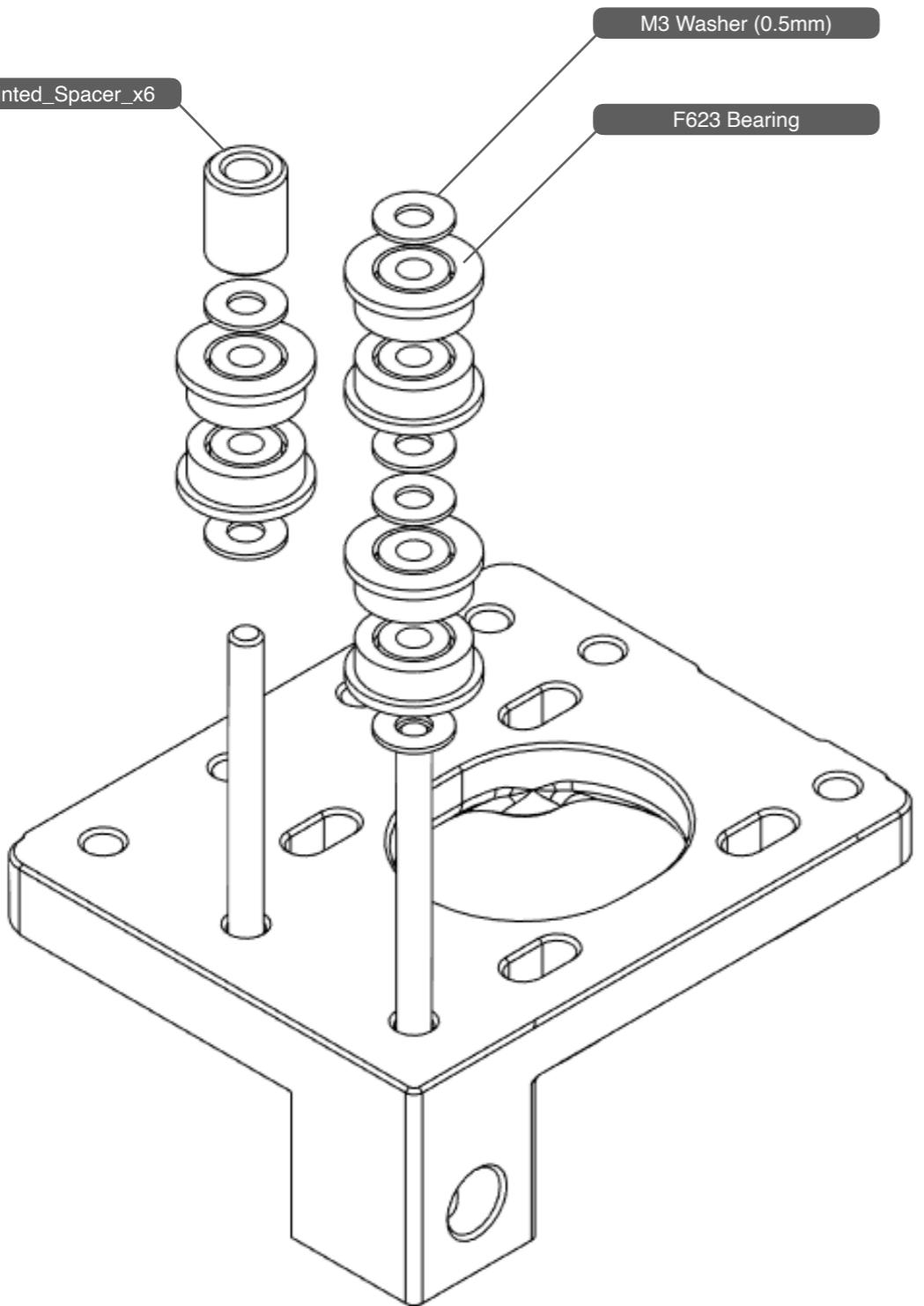
Part	Qty
M3 Nut	4

A/B Drive Units



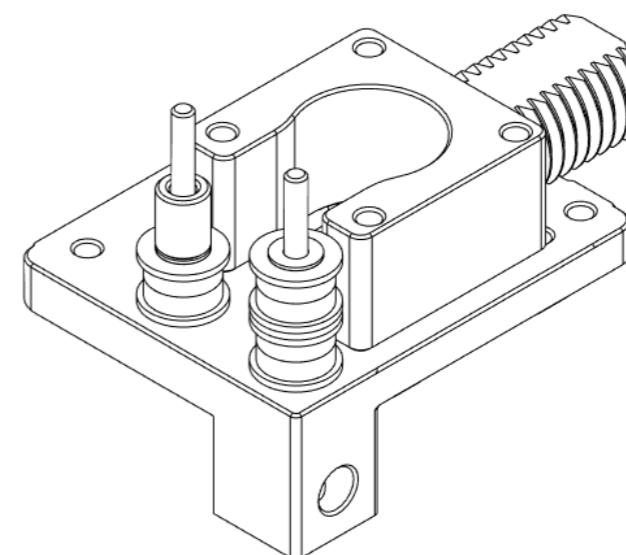
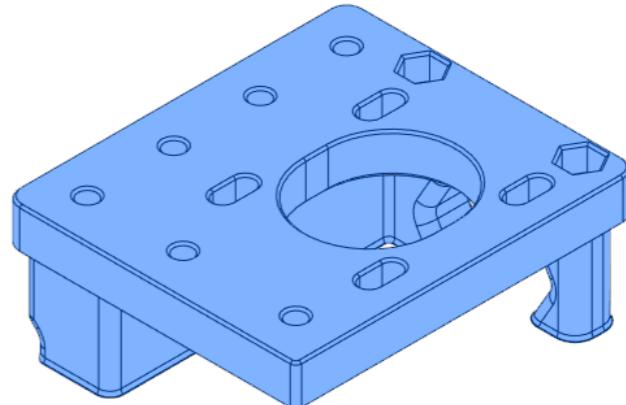
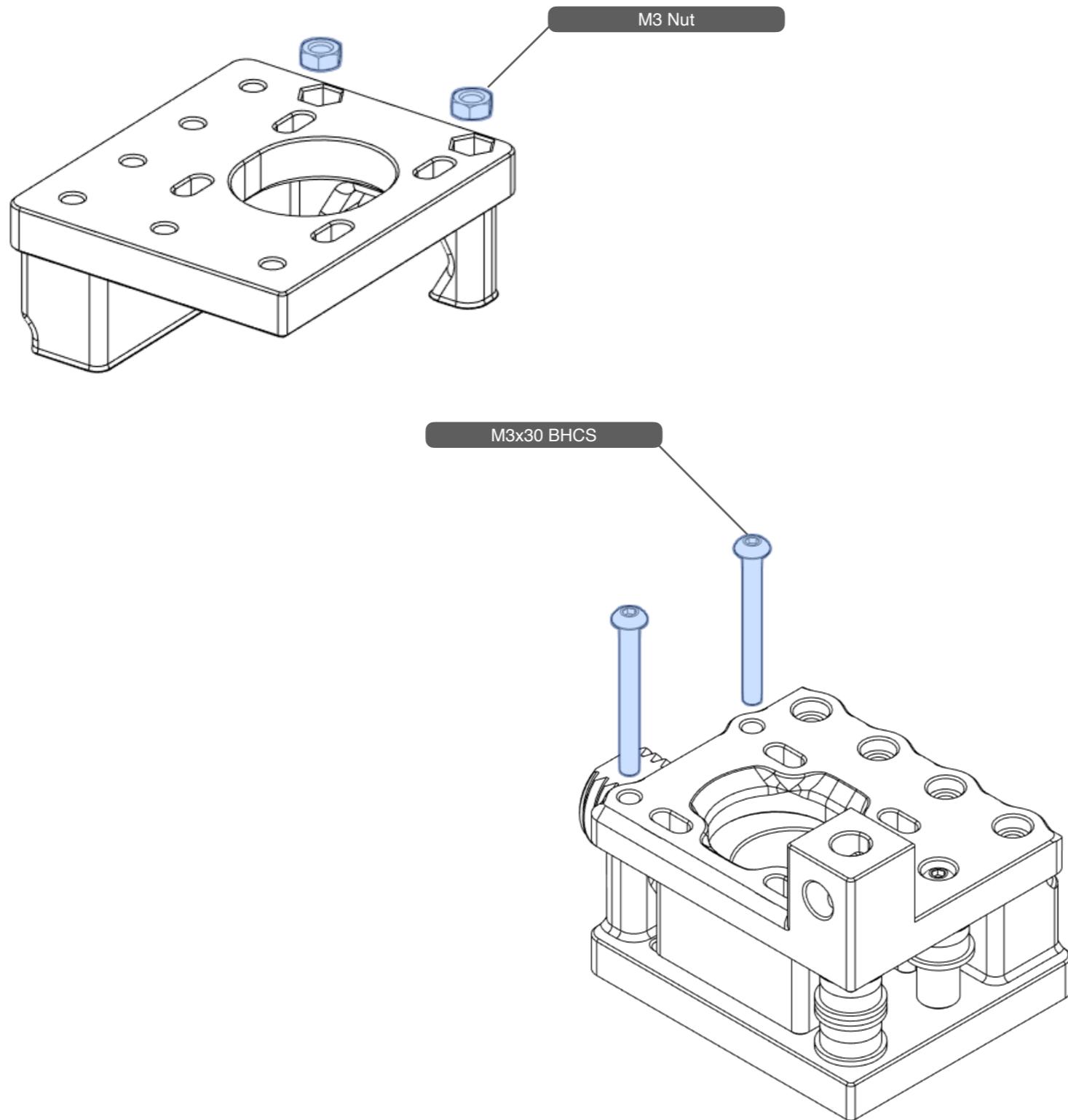
Part	Qty
M3x35 BHCS	2

A/B Drive Units



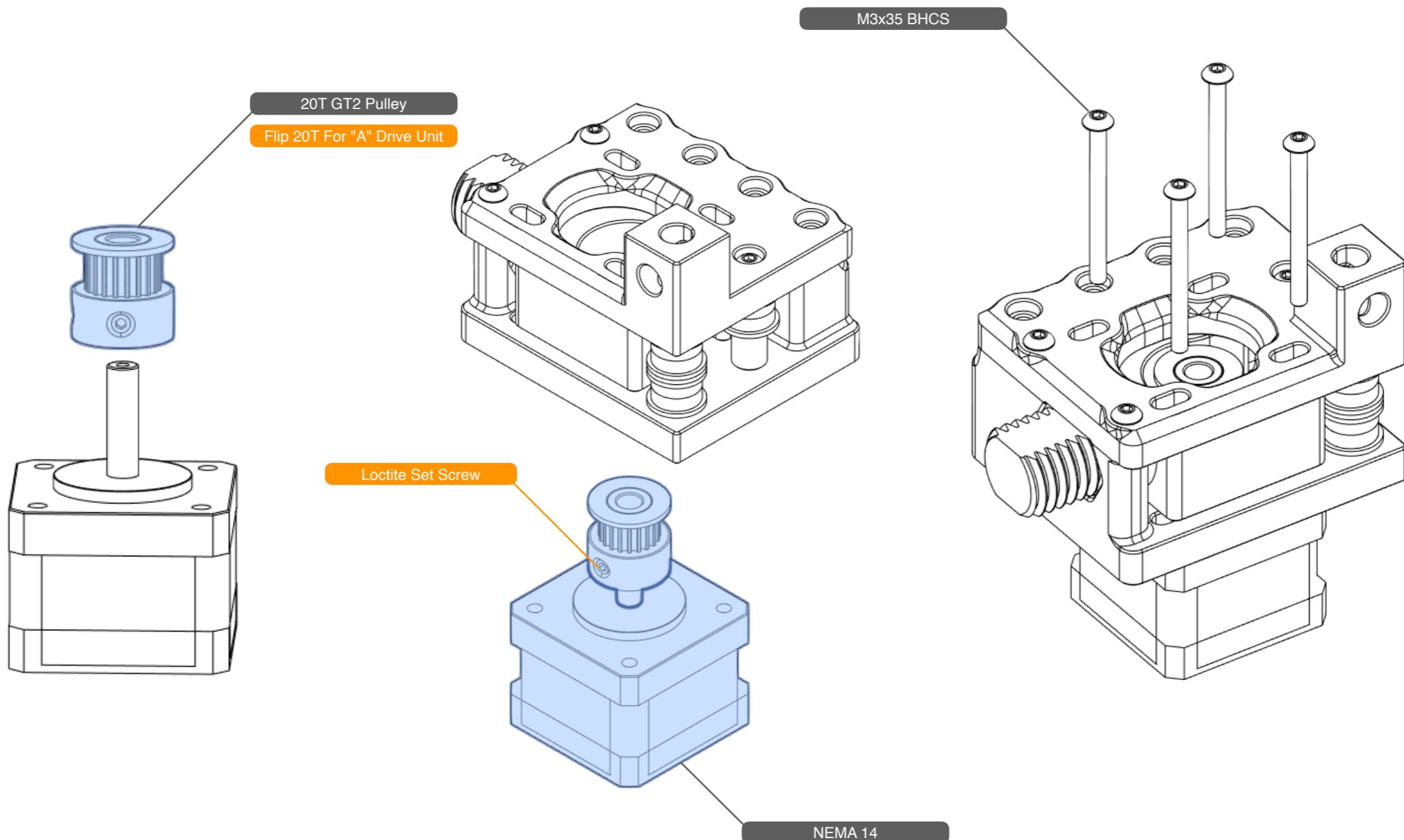
Part	Qty
F623	12
M3 Washer	12

A/B Drive Units



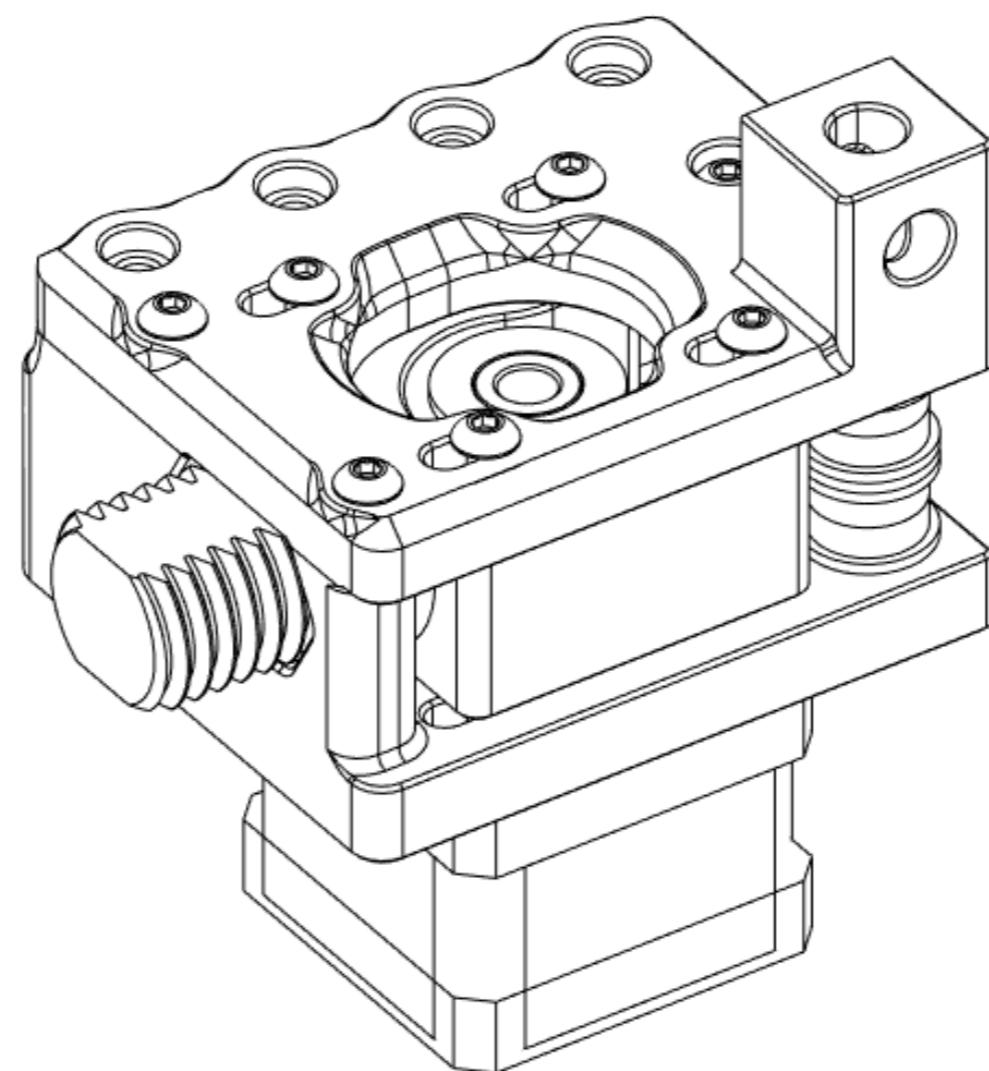
Part	Qty
M3x30 BHCS	4
M3 Nut	4

A/B Drive Units

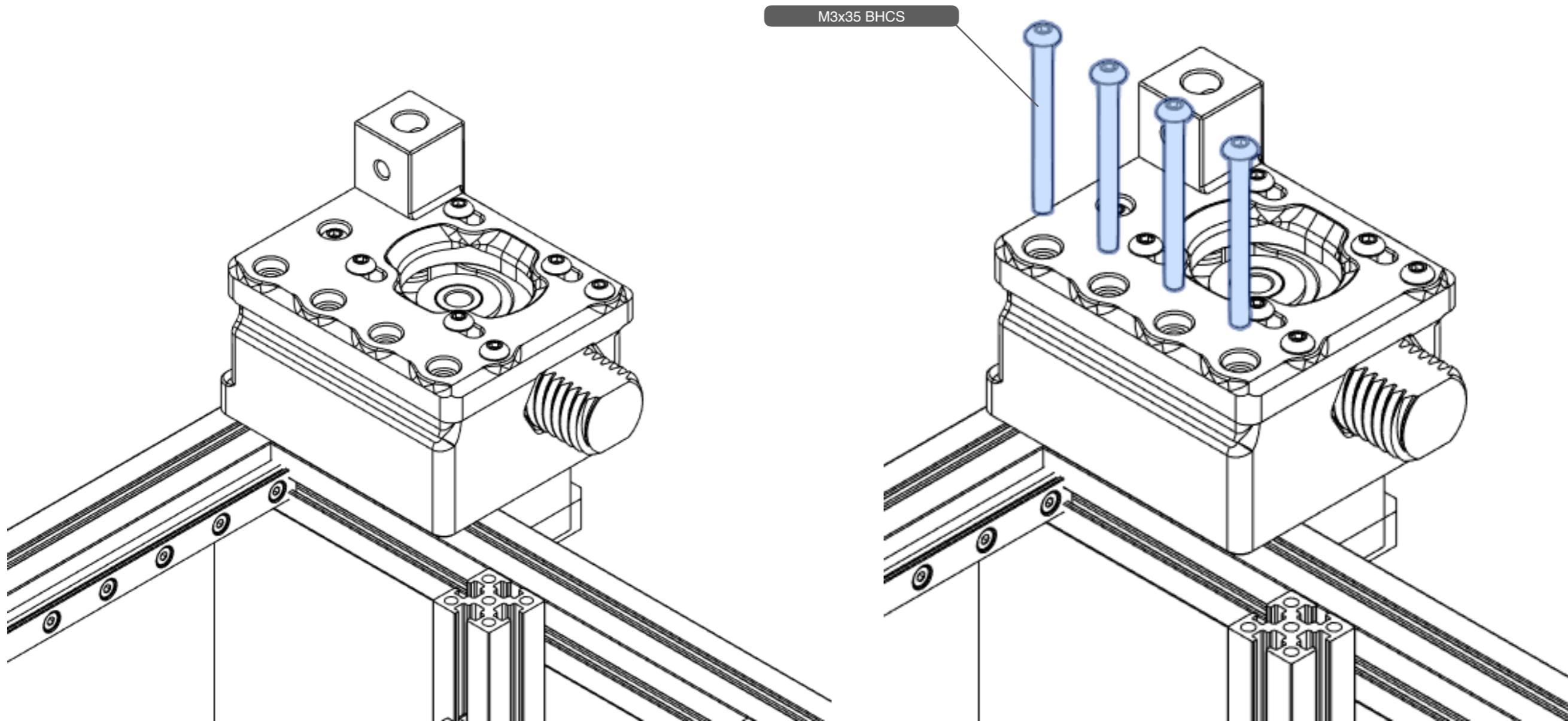


Part	Qty
20T GT2 Pulley	2
M3x35 BHCS	8
NEMA 14	2

A/B Drive Units

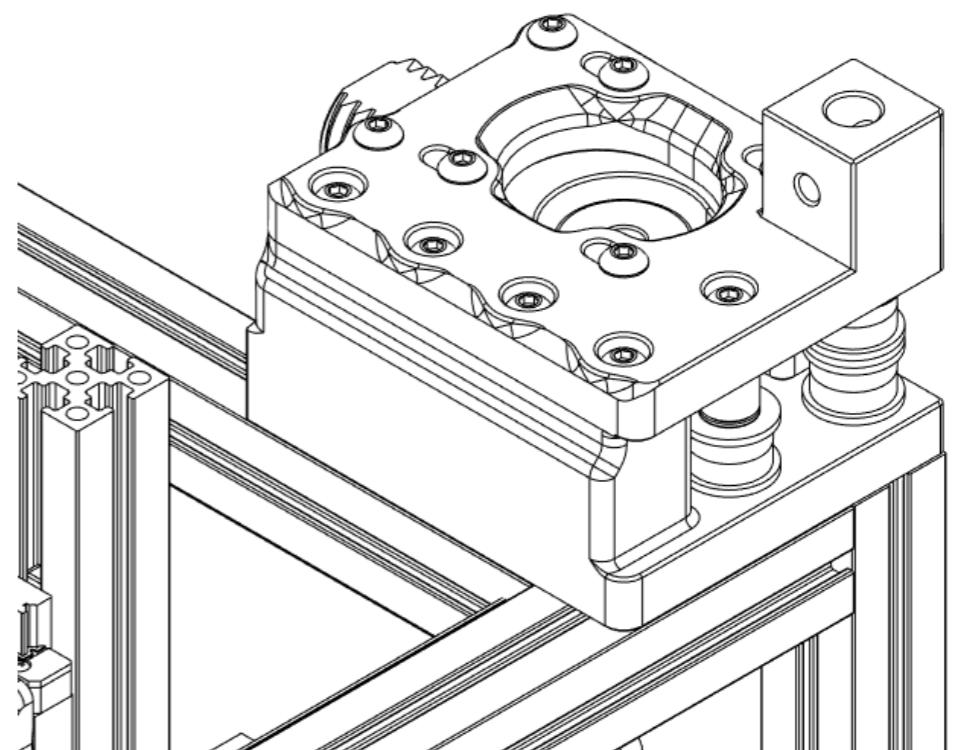
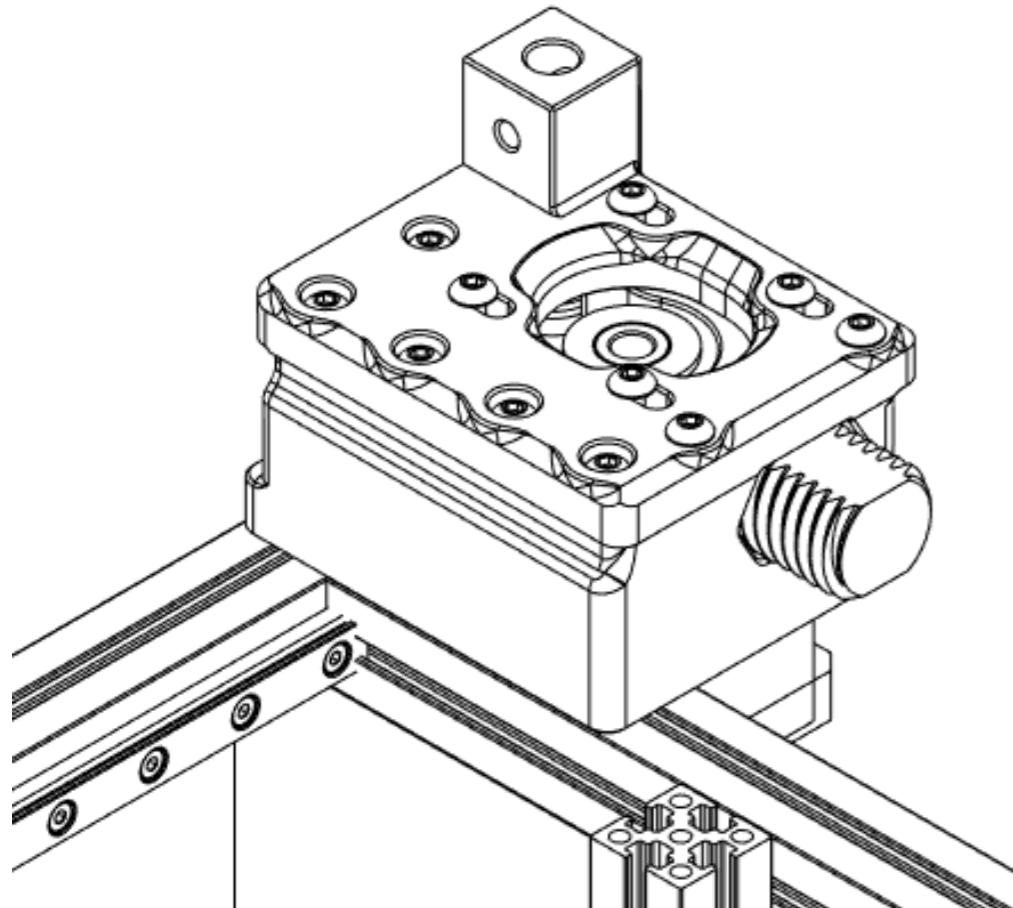


A/B Drive Units



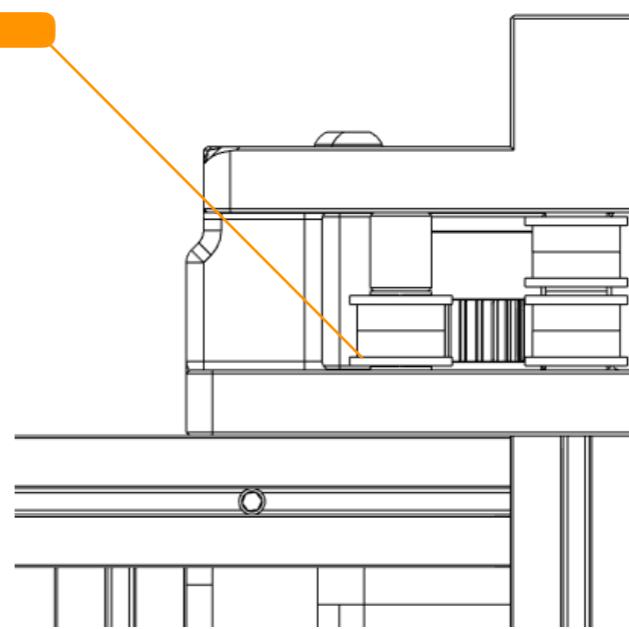
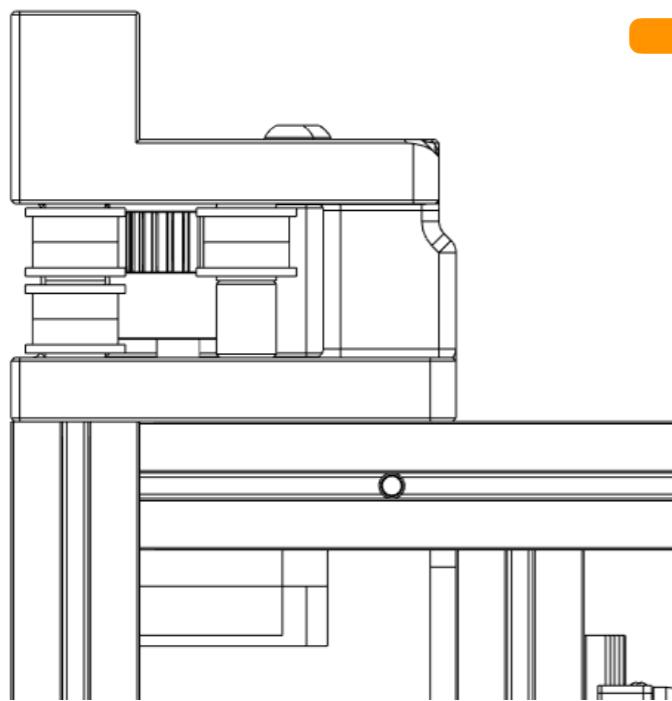
Part	Qty
M3x35 BHCS	8

A/B Drive Units

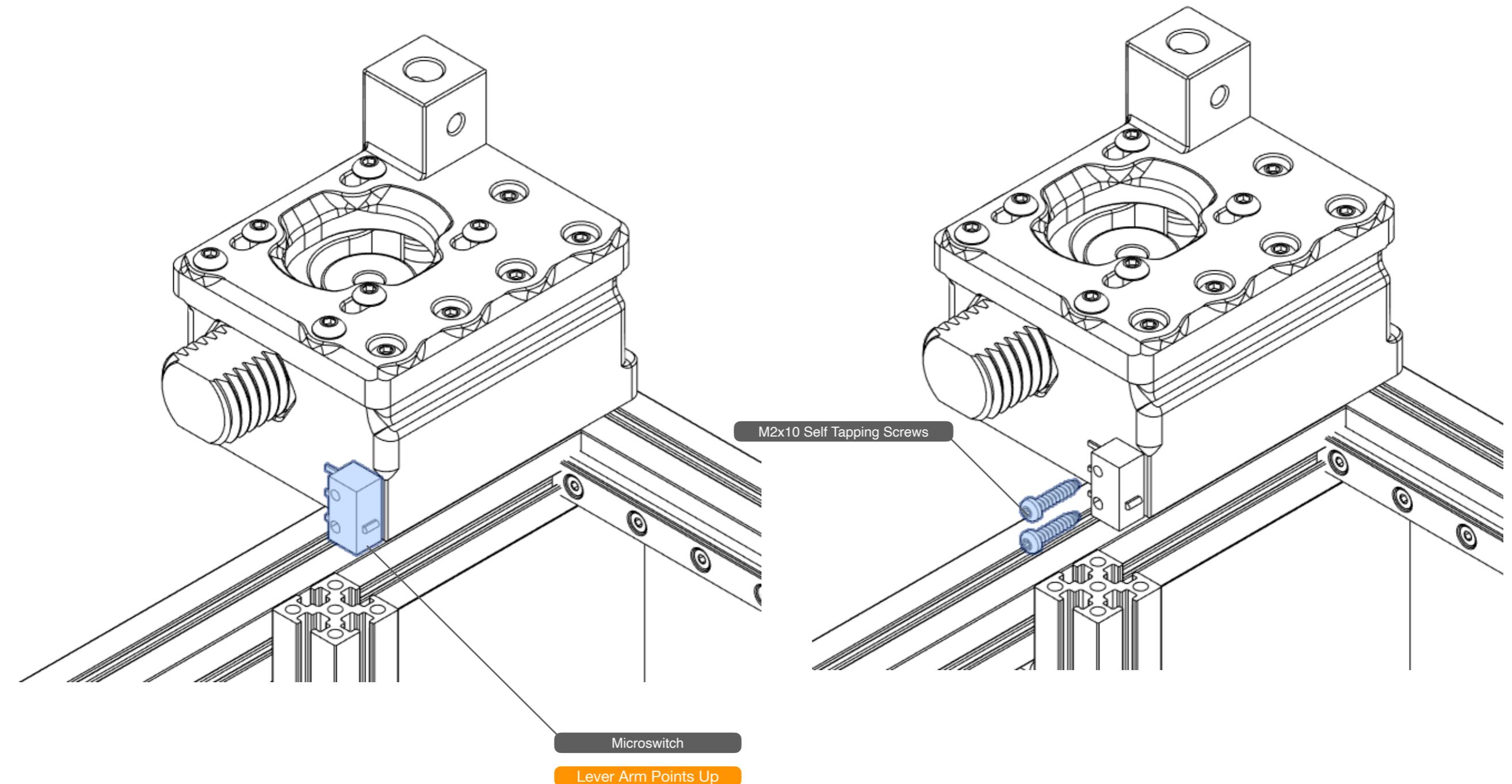


Repeat Drive Assembly Instructions For A Drive Unit

Note Bearing and Spacer Stackup Order For A drive

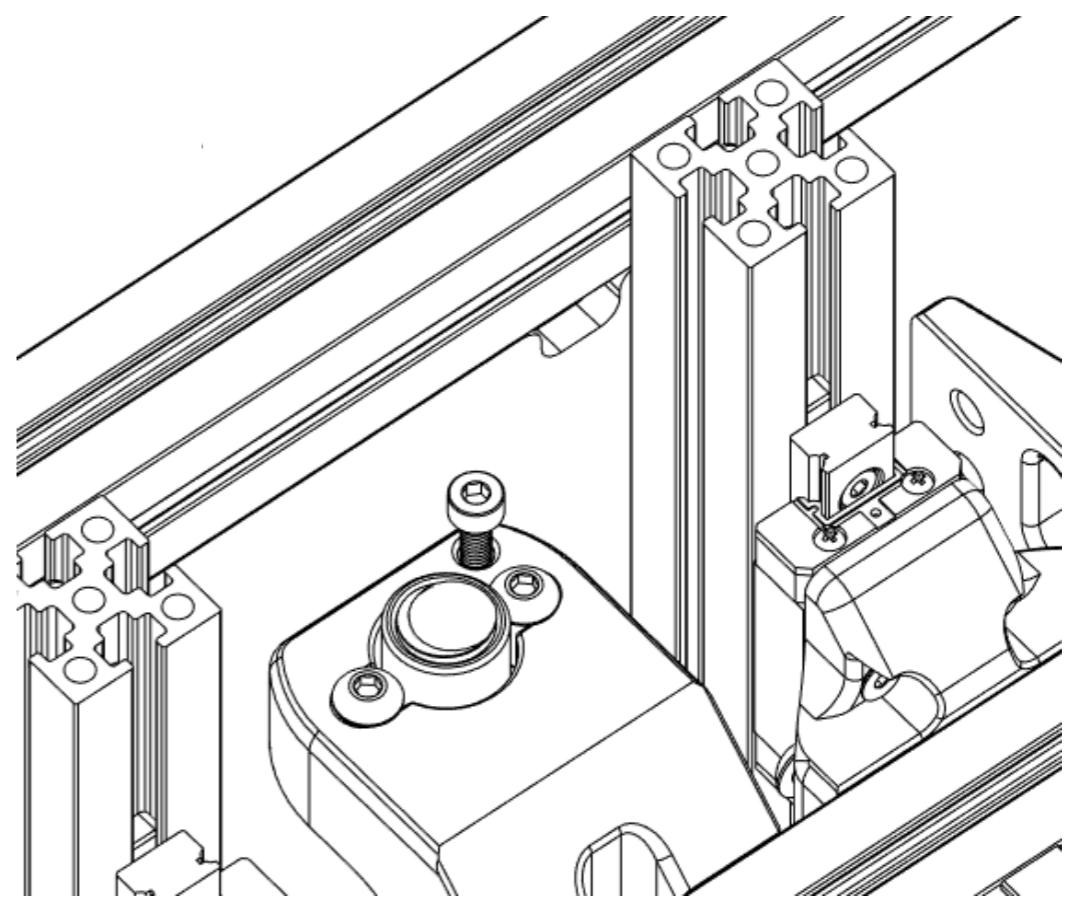
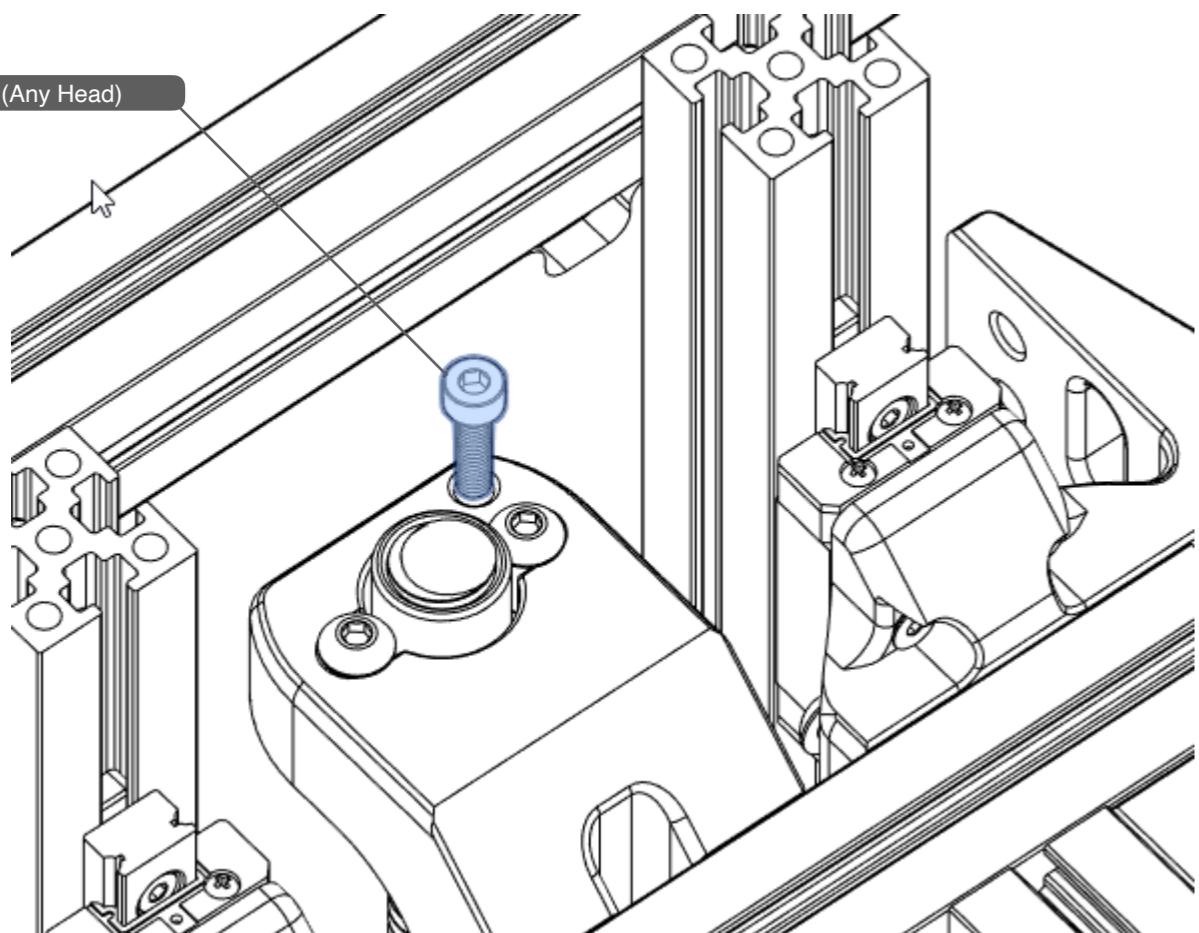


Y Endstop



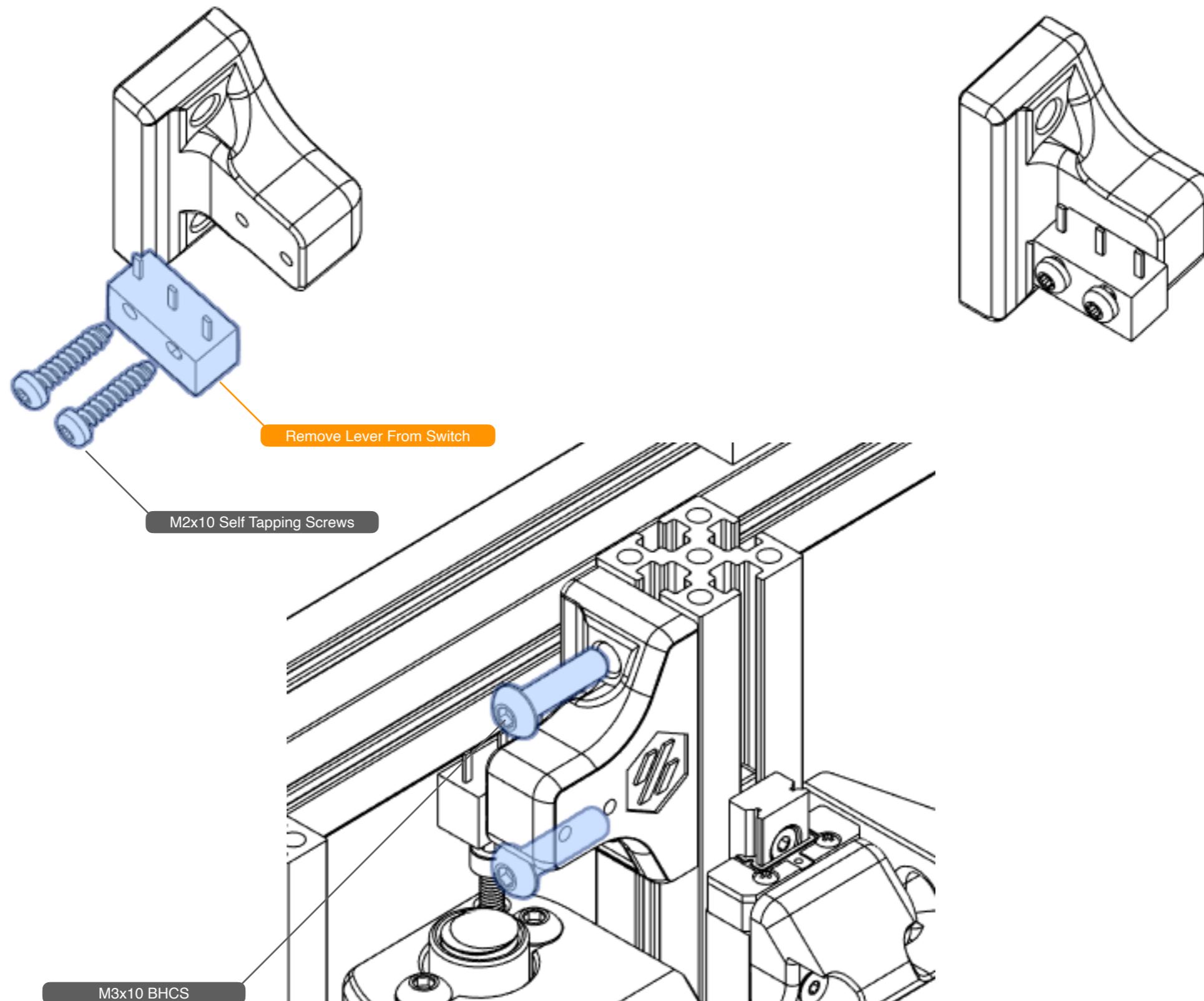
Part	Qty
M2x10 Self Tapping	2
Microswitch w/lever	1

Z Endstop



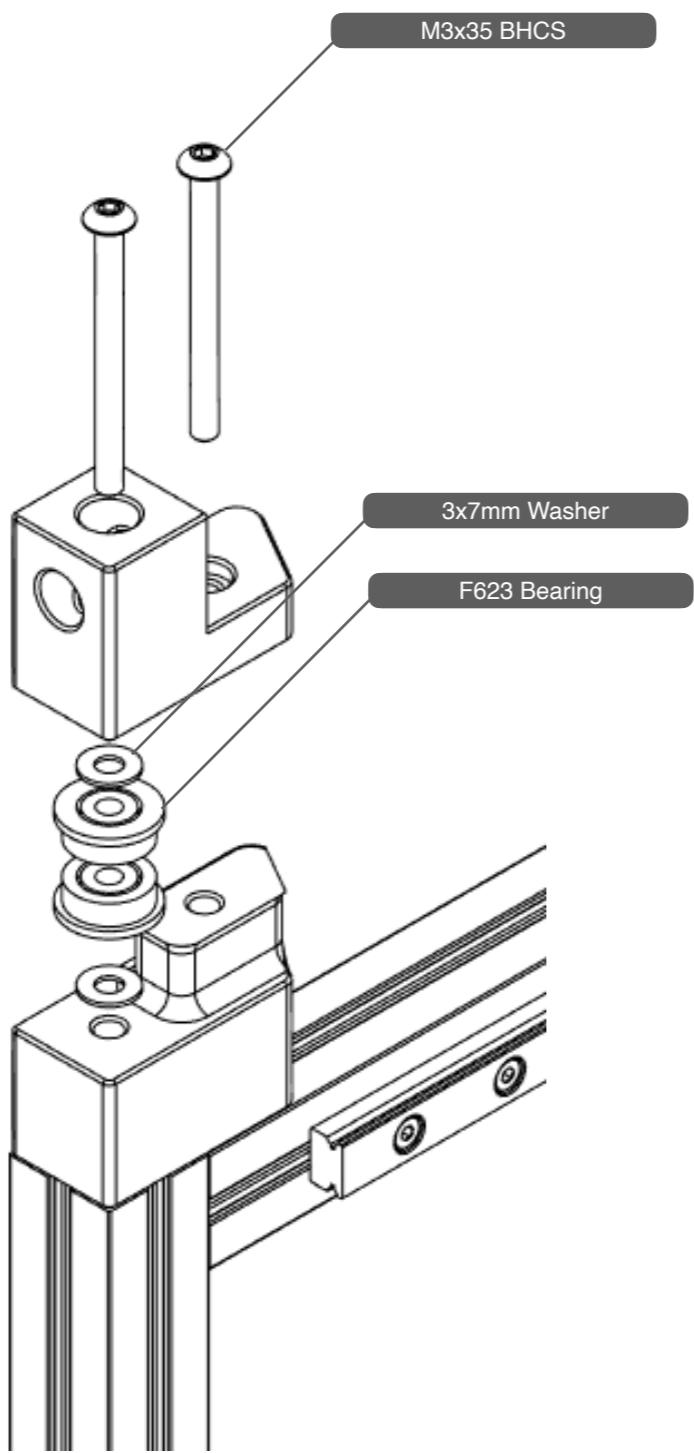
Part	Qty
M3x12 SHCS	1

Z Endstop

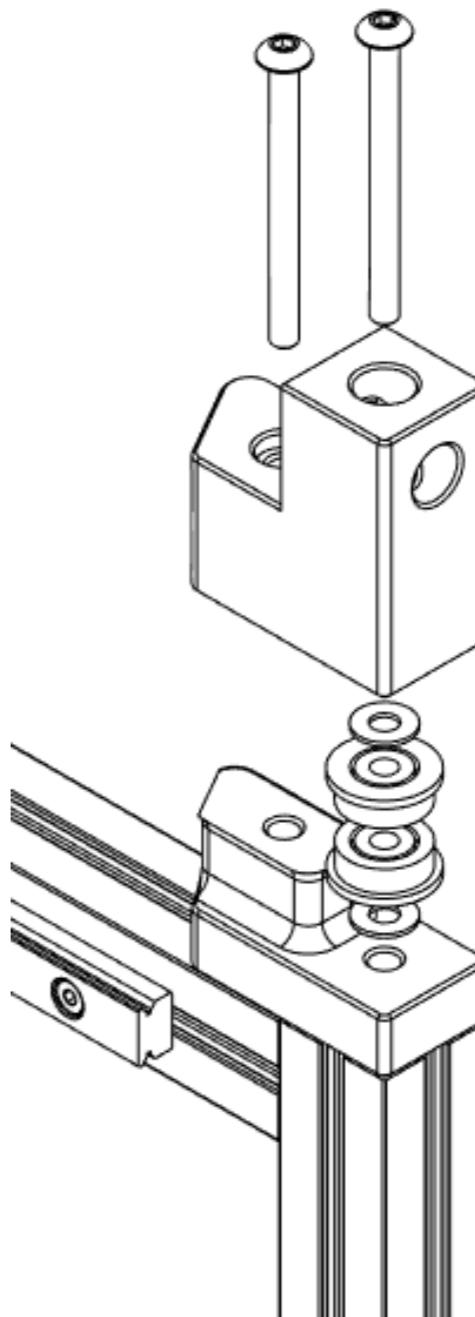


Part	Qty
M2x10 Self Tapping	2
M3x10 BHCS	2
Microswitch	1

Idlers



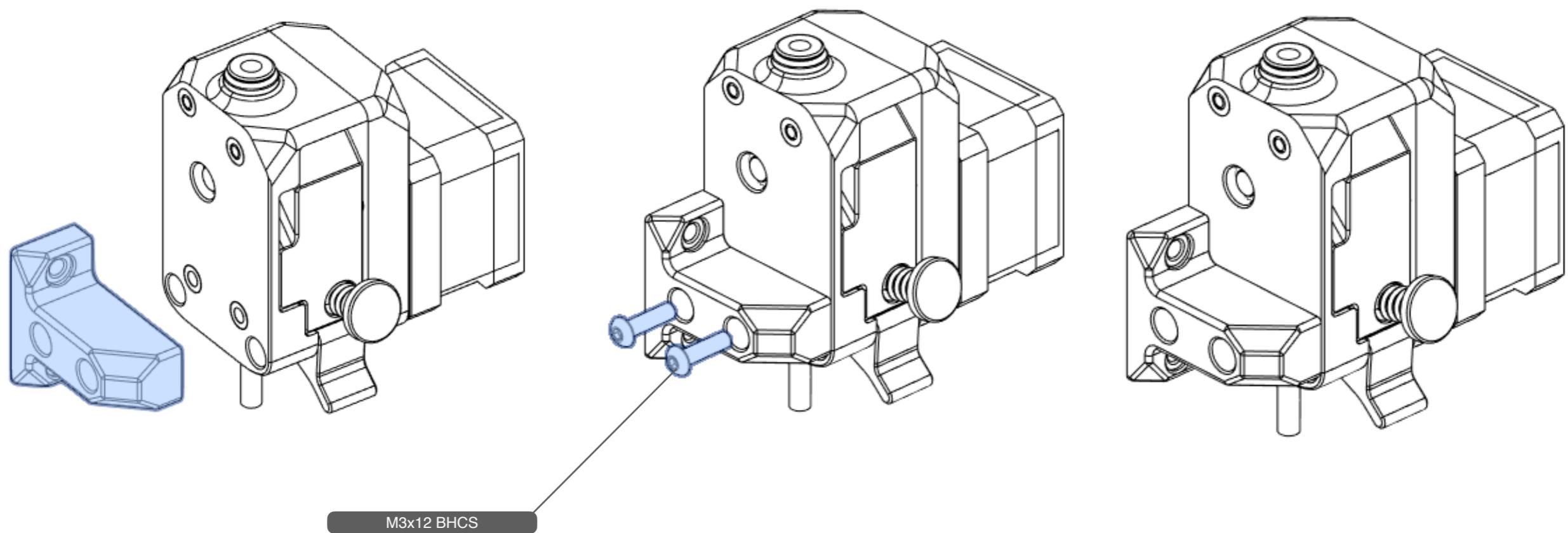
B Idler



A Idler

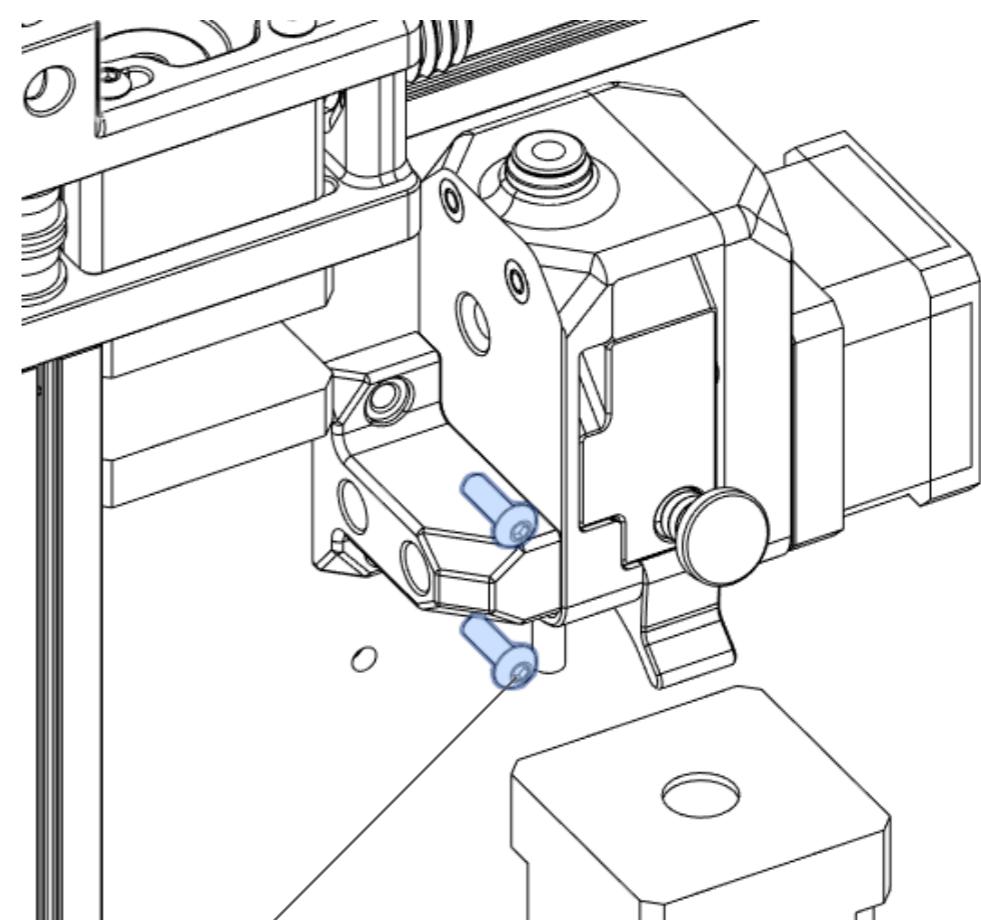
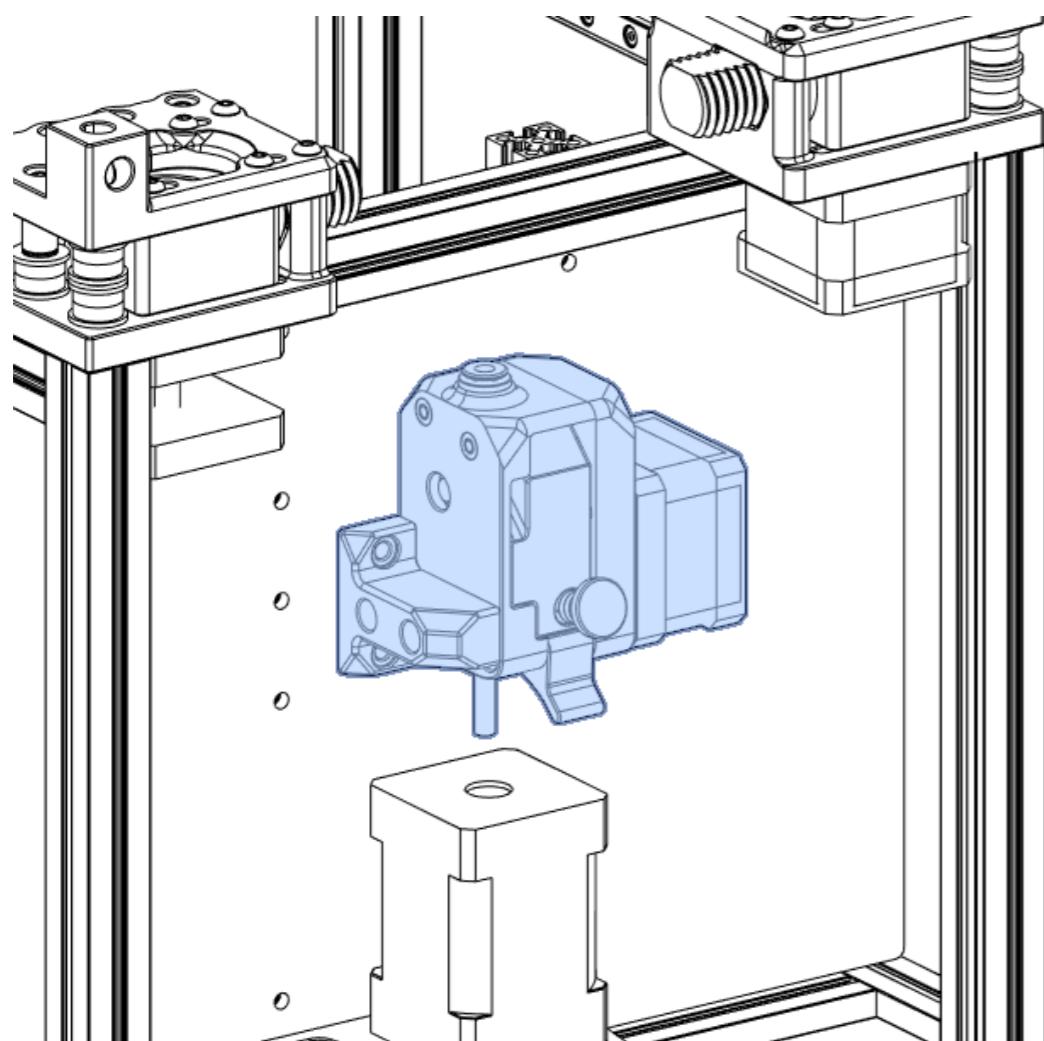
Part	Qty
M3x35 BHCS	4
M3 Washer	4
F623	4

Extruder



Part	Qty
M3x12 BCHCS	2

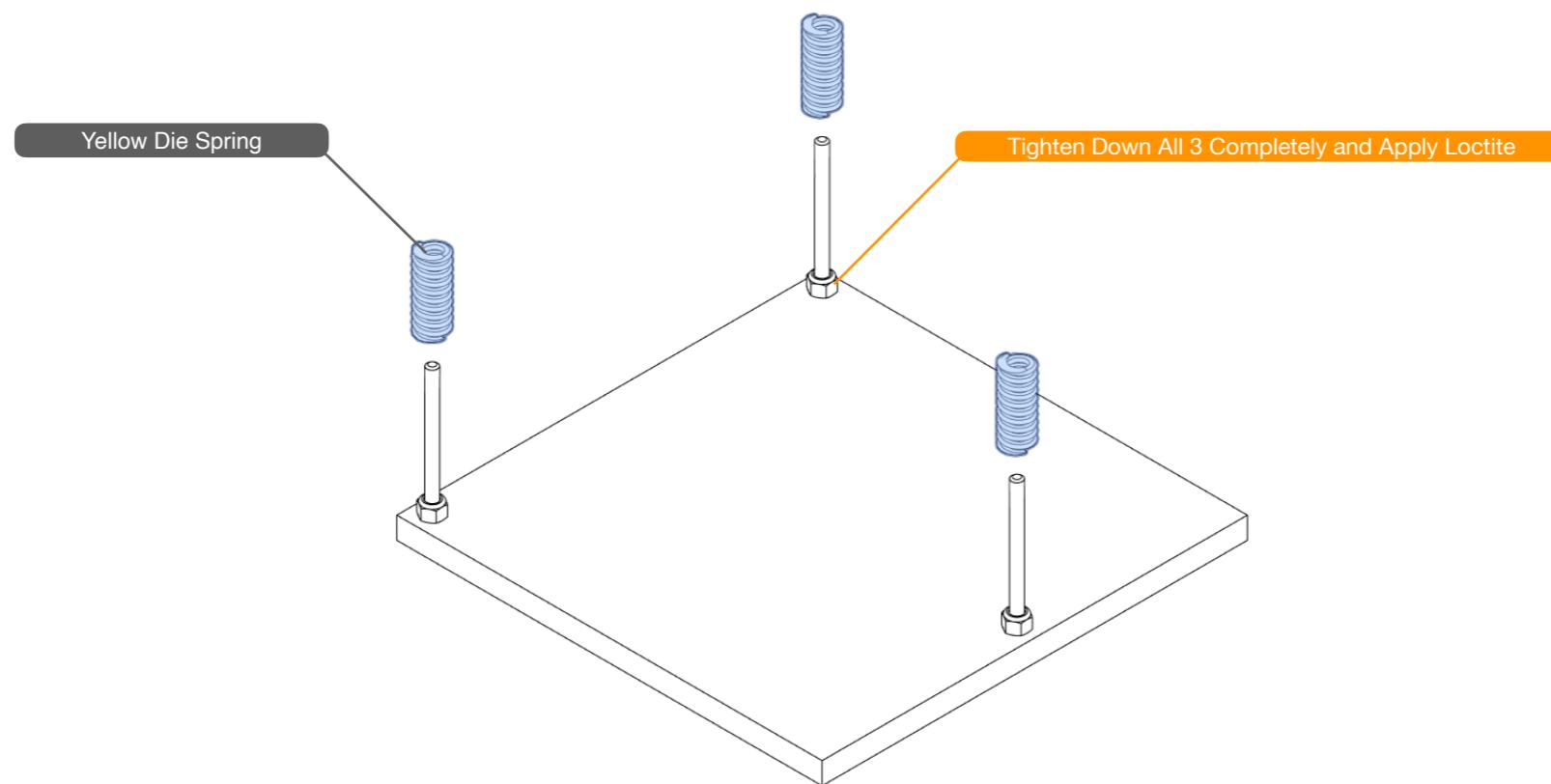
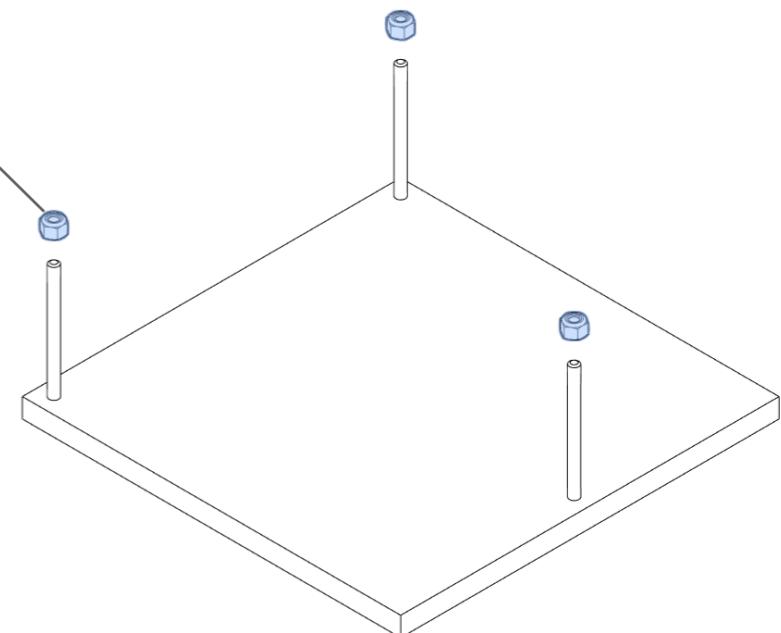
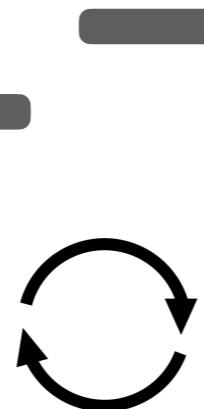
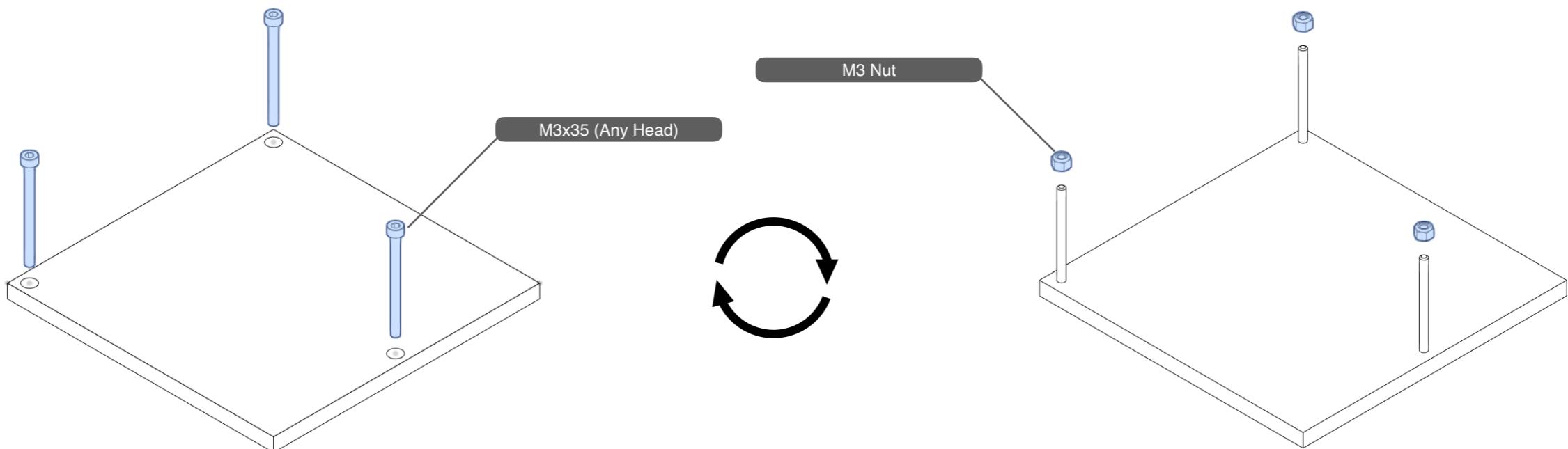
Extruder



M3x12 BHCS

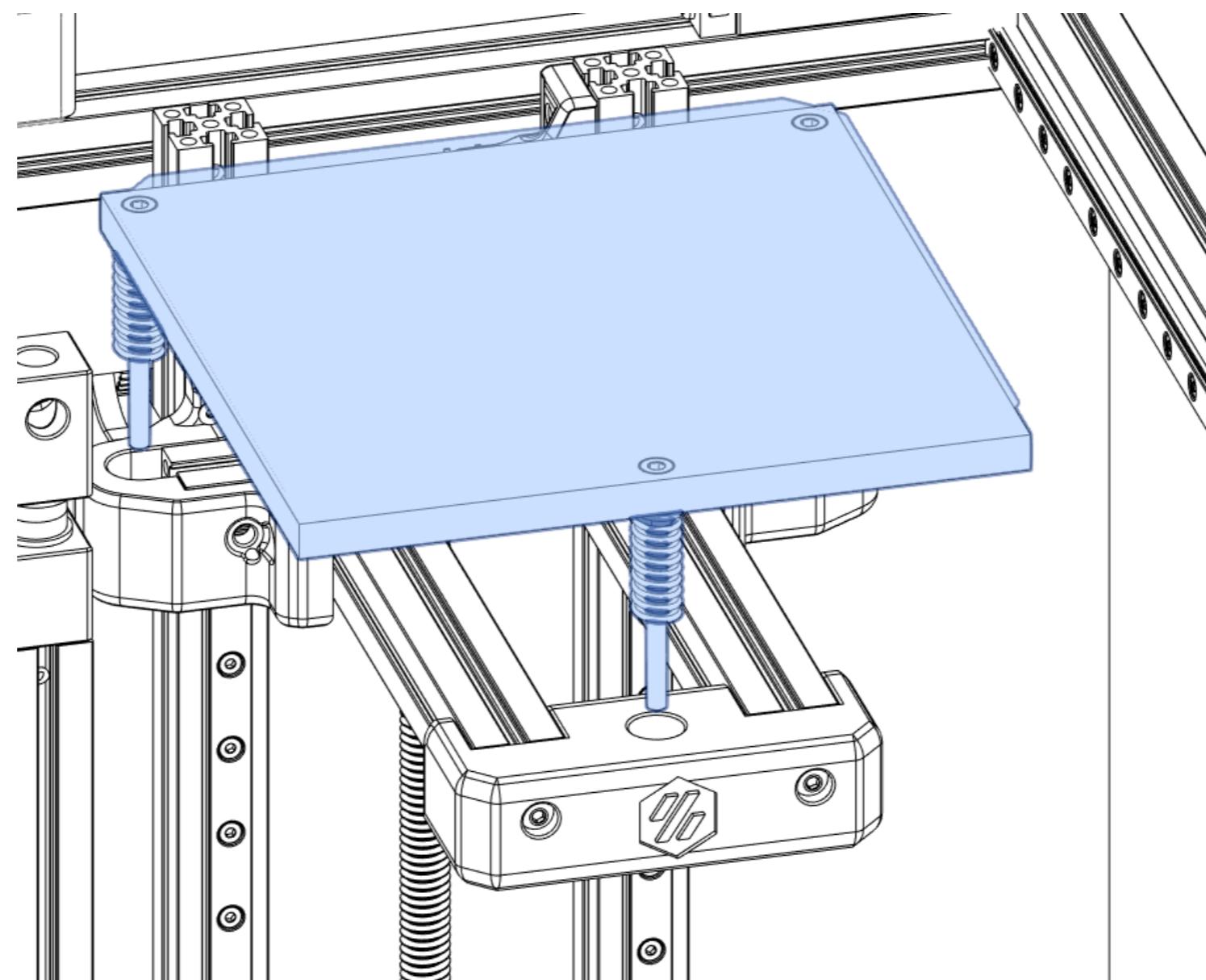
Part	Qty
M3x12 BCHCS	2

Bed Assembly

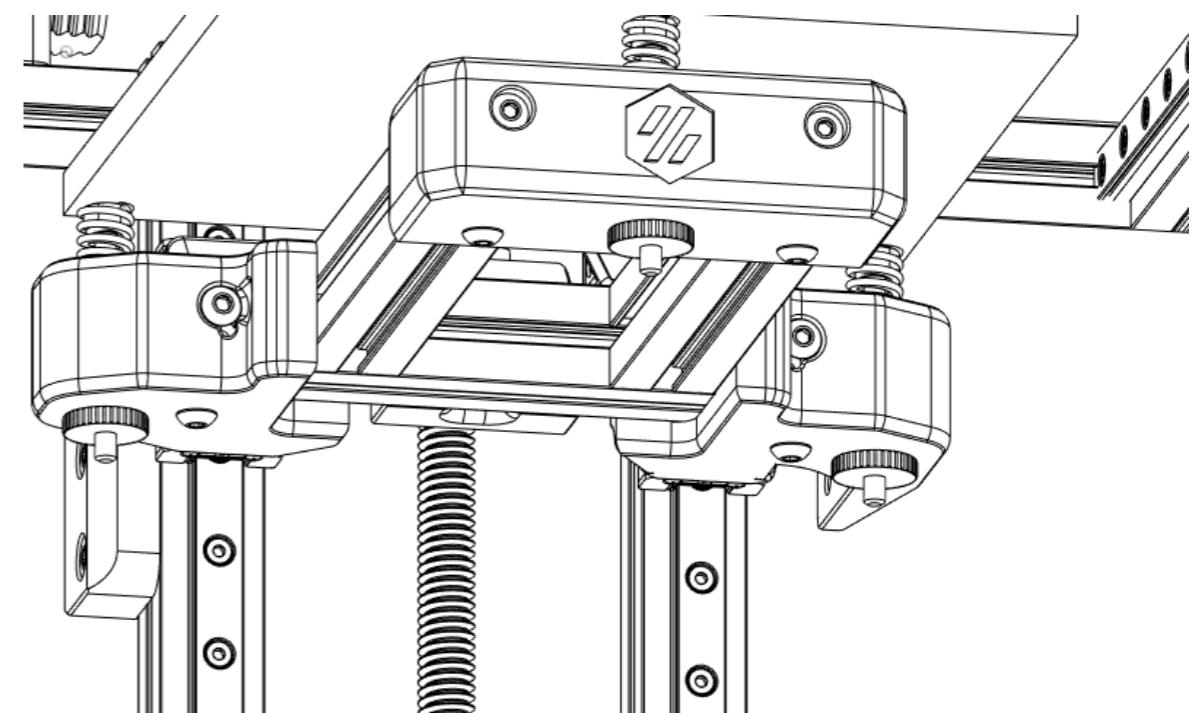
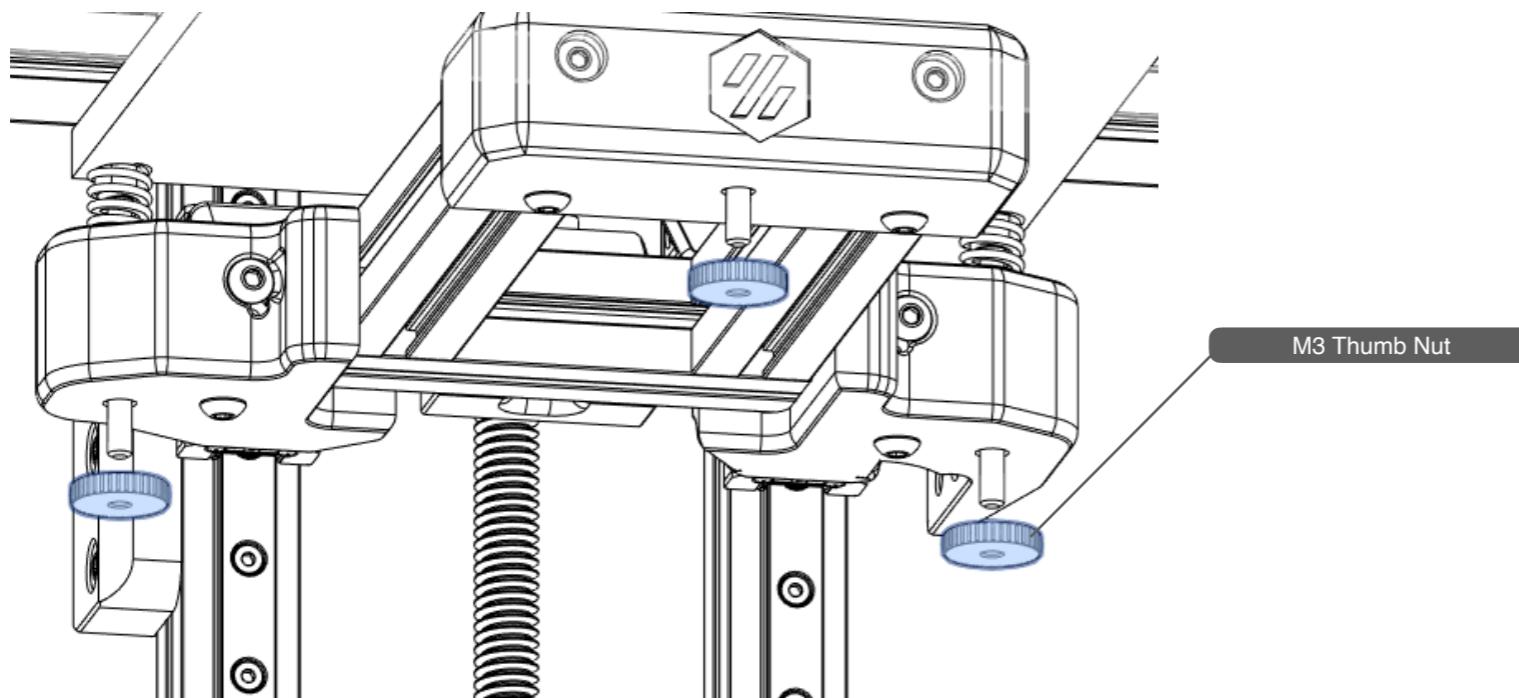


Part	Qty
M3x35 BHCS	3
M3 Nut	3
Yellow Die Spring	3

Bed Assembly

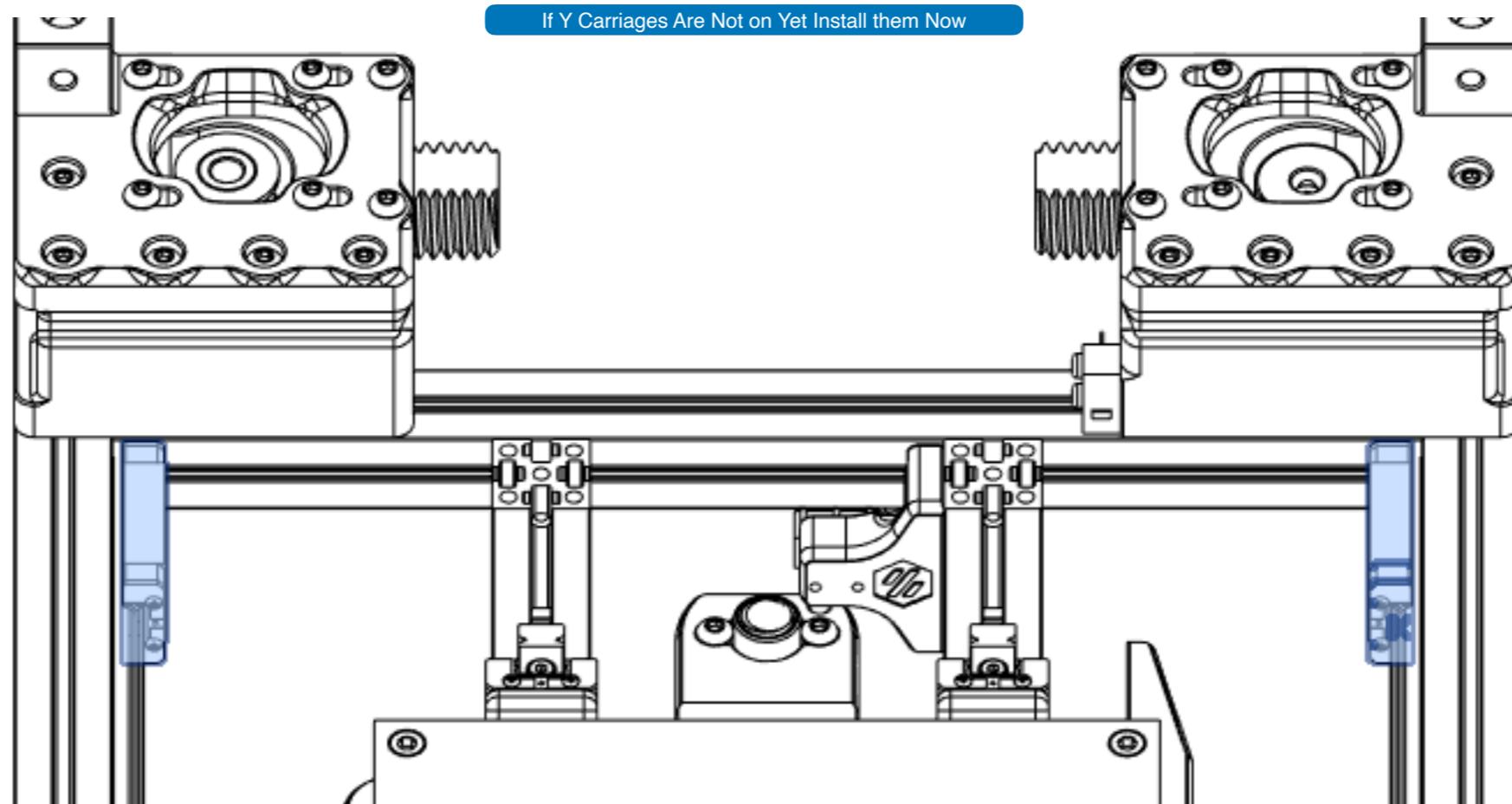


Bed Assembly

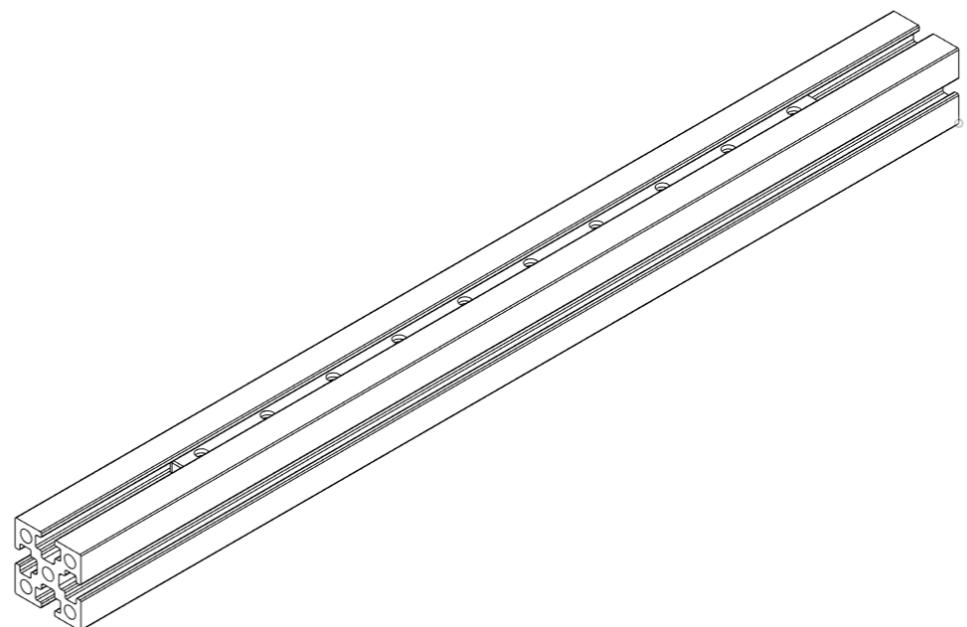
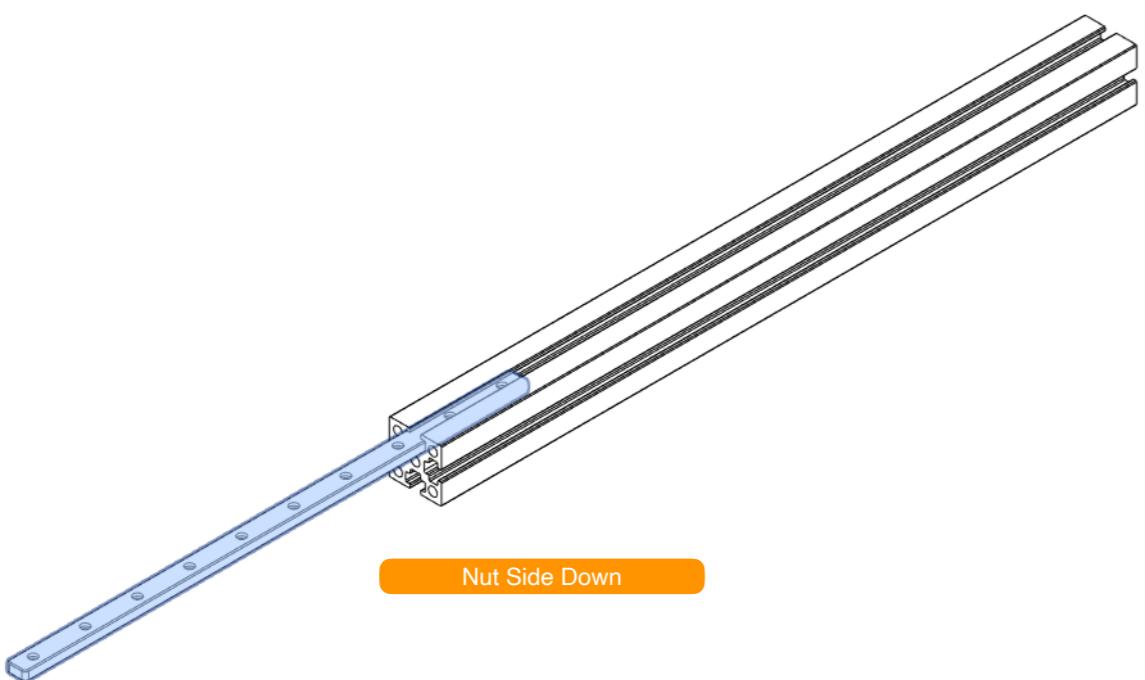
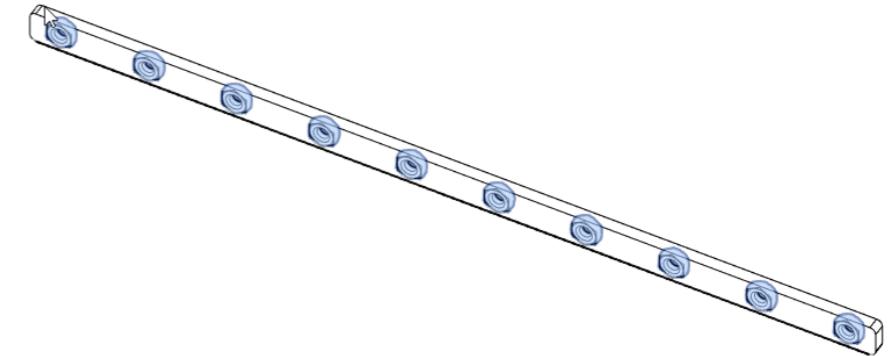
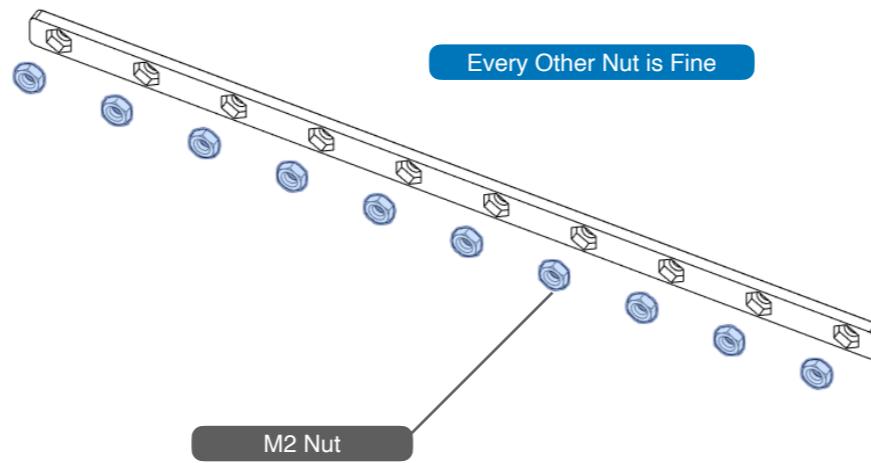
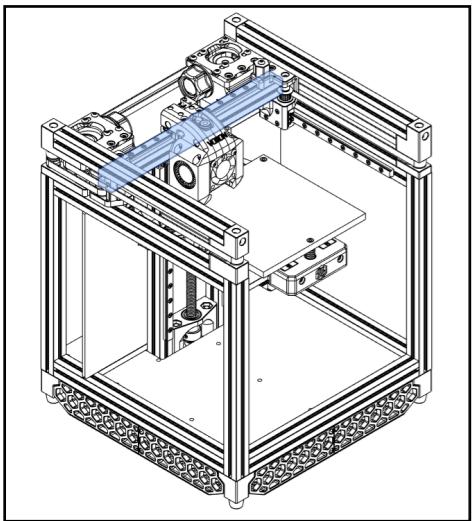


Part	Qty
M3 Thumb Nut	3

Gantry Assembly

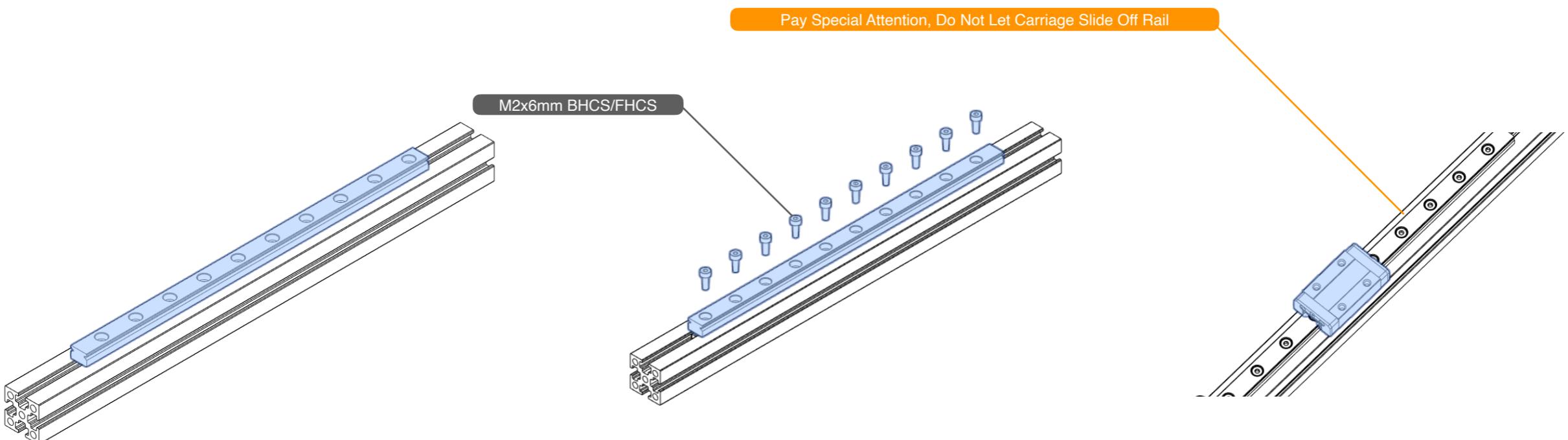


Gantry Assembly



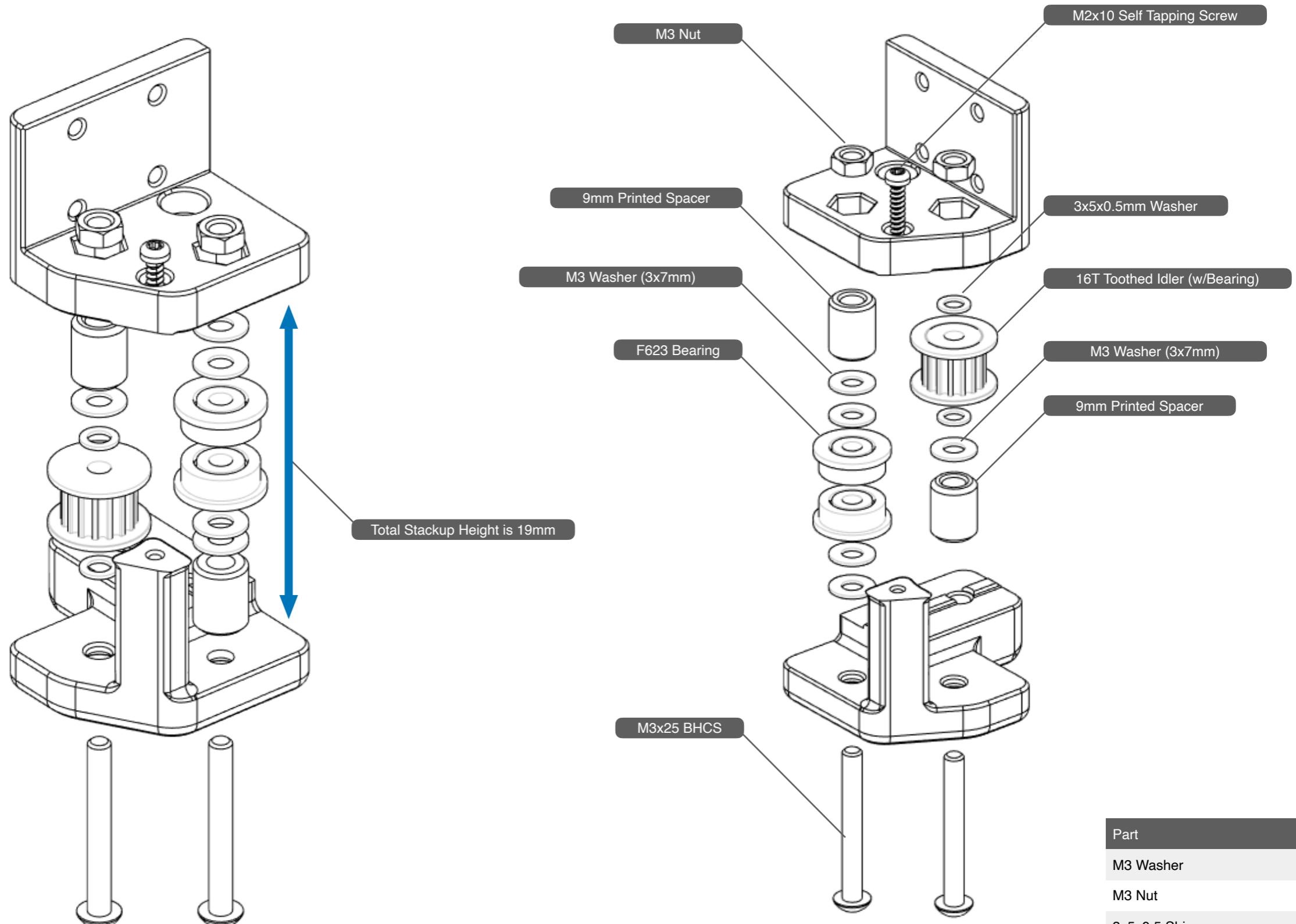
Part	Qty
M2 Nut	5-10

Gantry Assembly



Part	Qty
M2x6	5-10
MGN7R	1

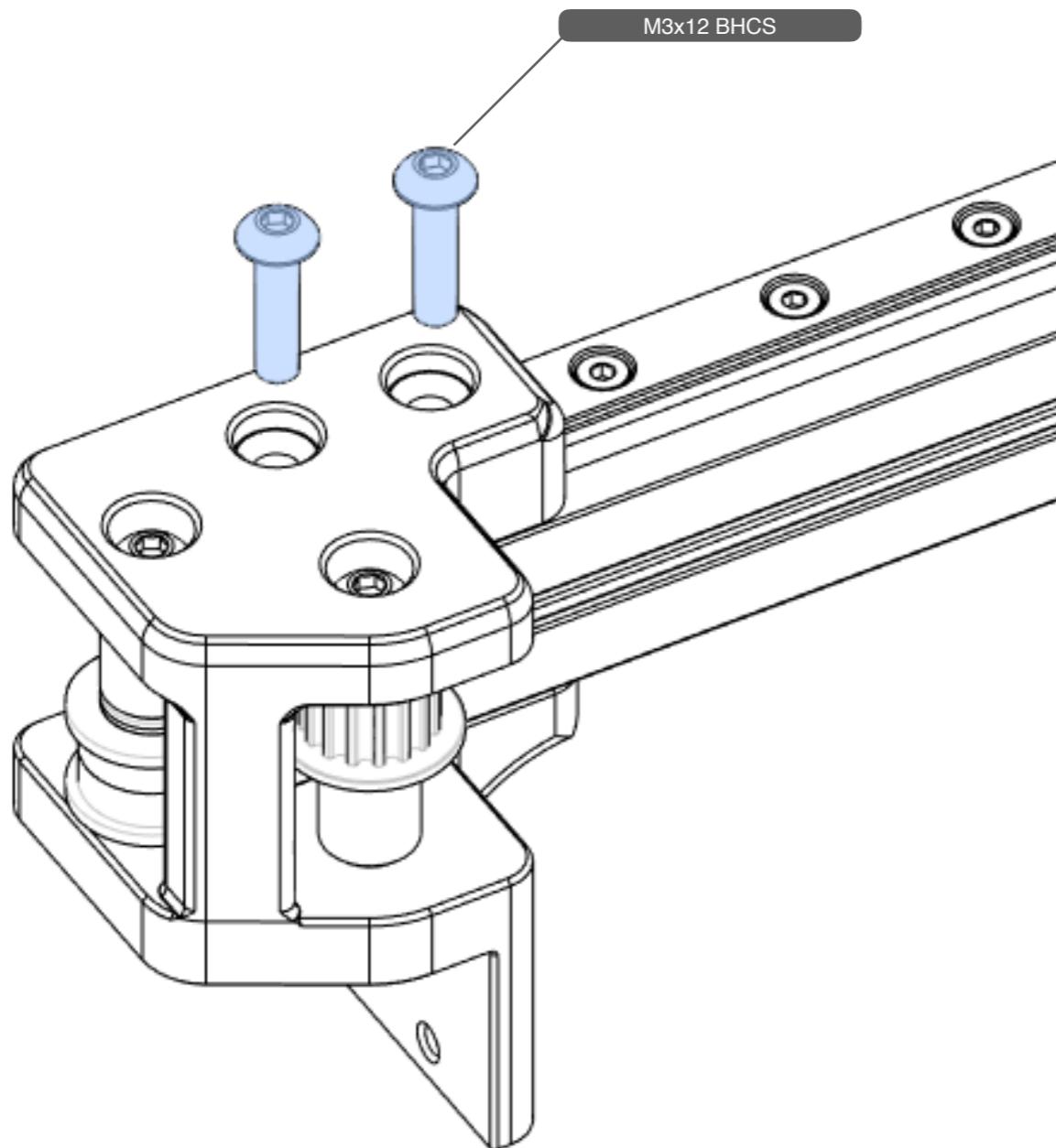
XY Joint Assembly



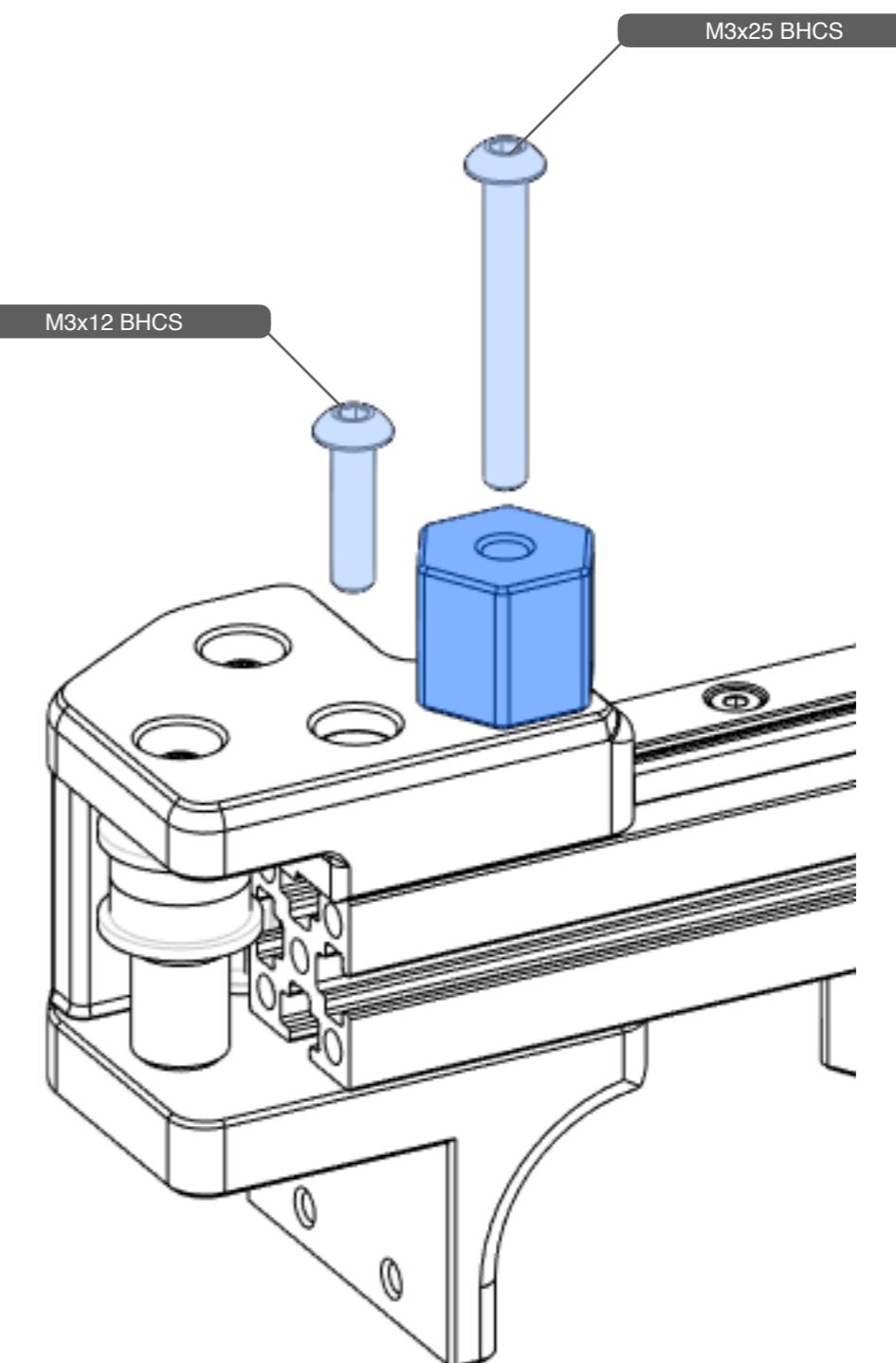
Part	Qty
M3 Washer	10
M3 Nut	4
3x5x0.5 Shim	4
F623	4
M3x25 BHCS	4
16T Toothed Idler	2
M2x10 Self Trapping	2

Gantry Assembly

Leave all Gantry Bolts Loose For Now



Left XY Joint

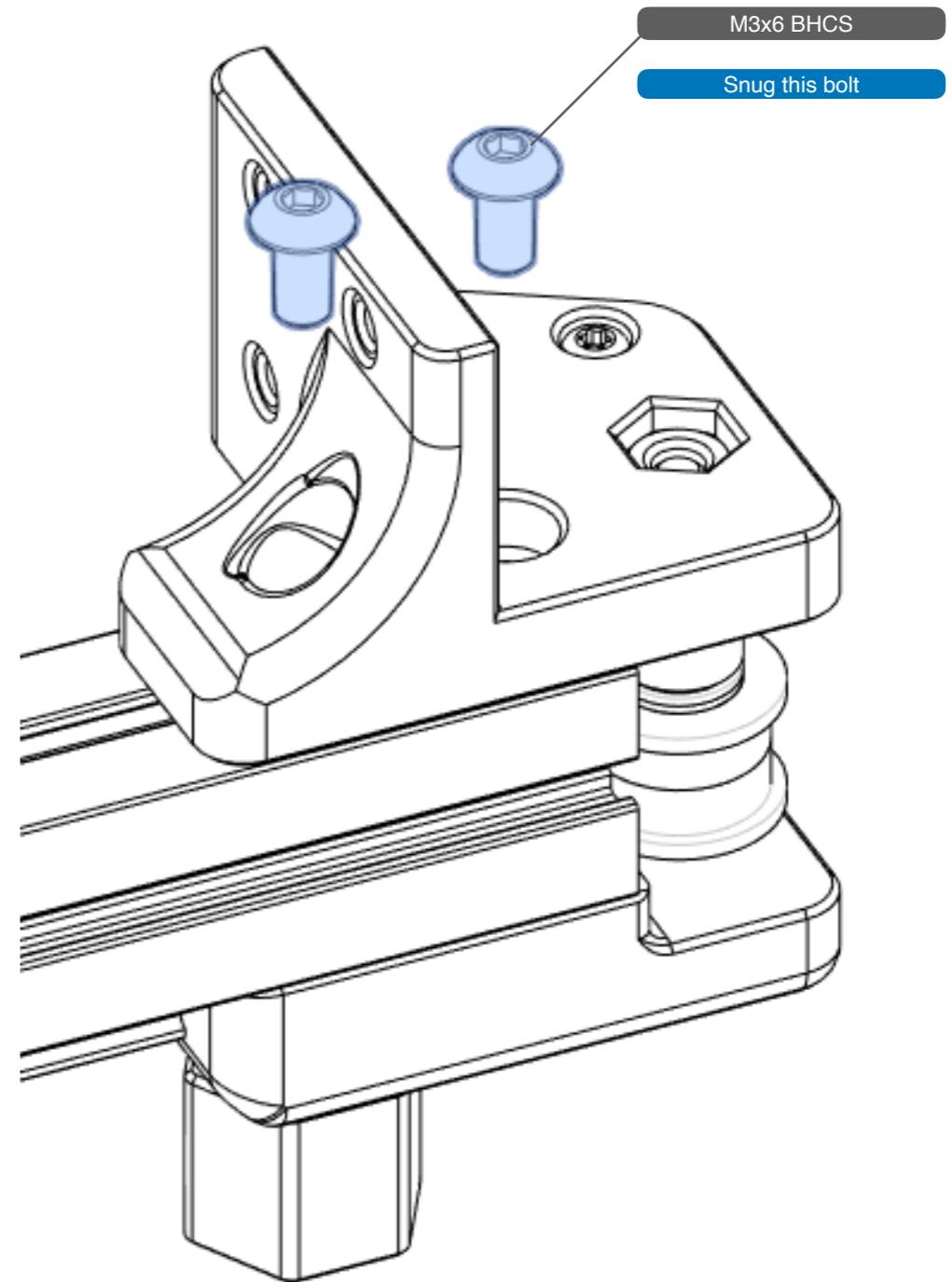
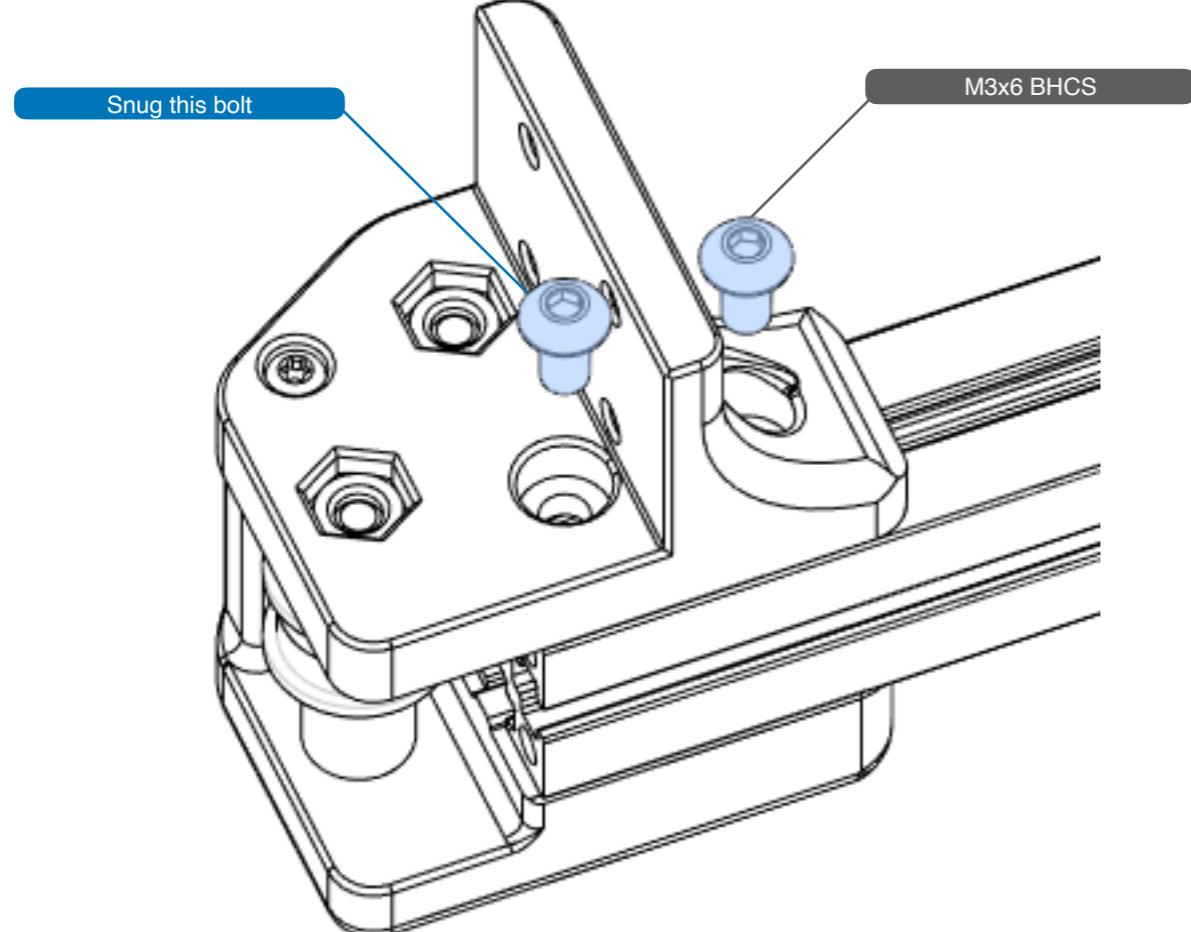


Right XY Joint

Part	Qty
M3x12 BHCS	3
M3x25 BHCS	1

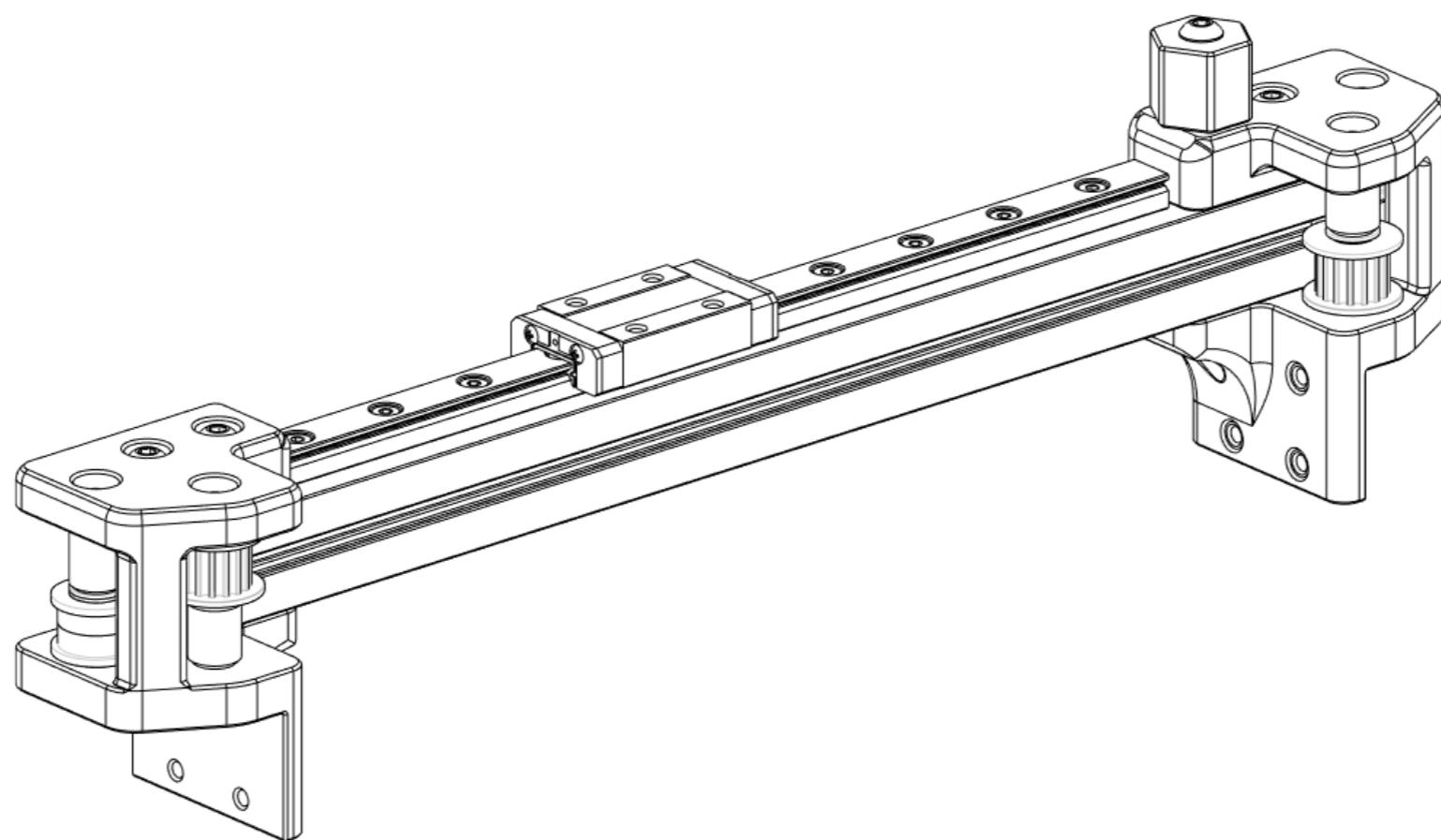
Gantry Assembly

Leave all Gantry Bolts Loose For Now

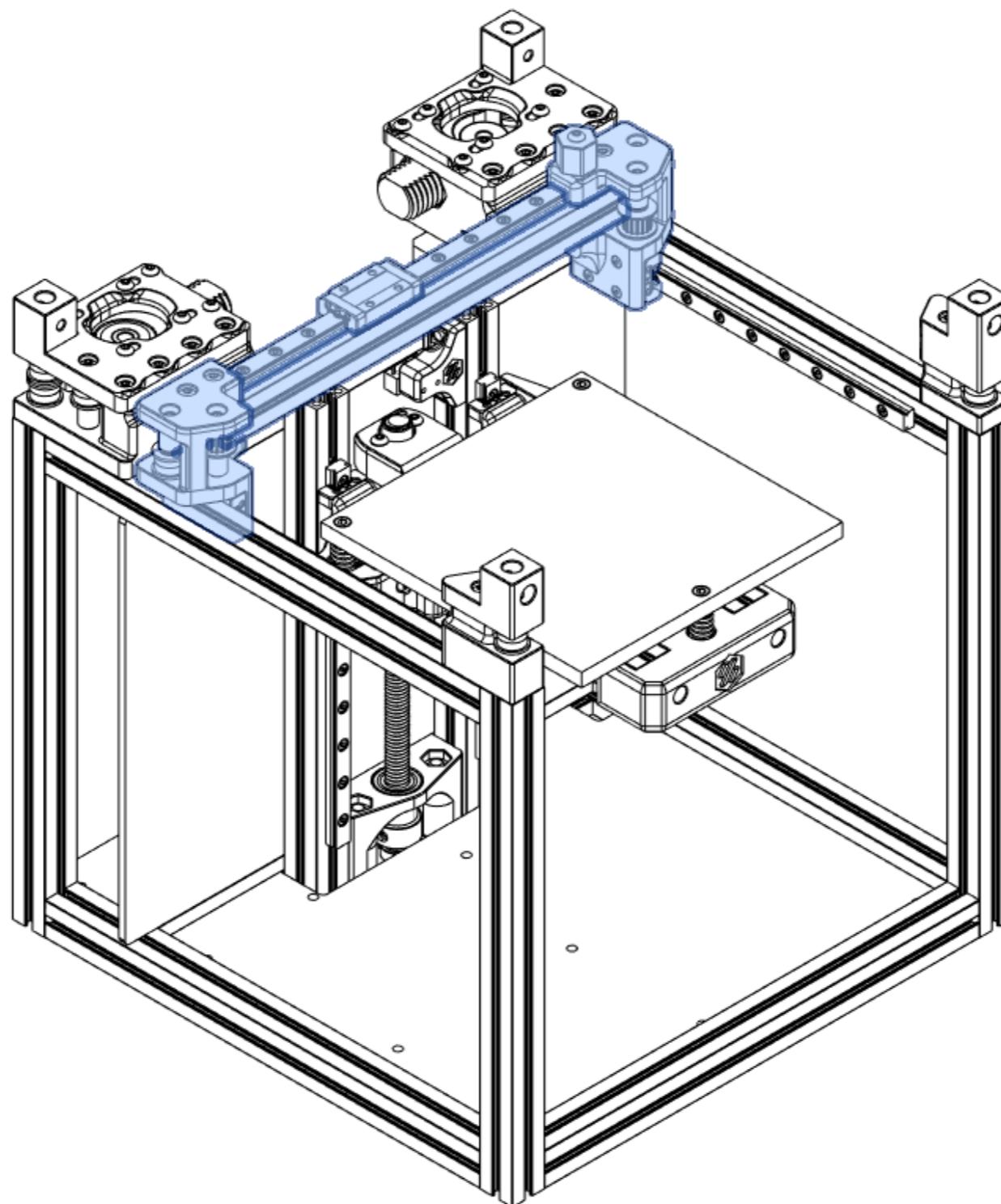


Part	Qty
M3x6 BHCS	4

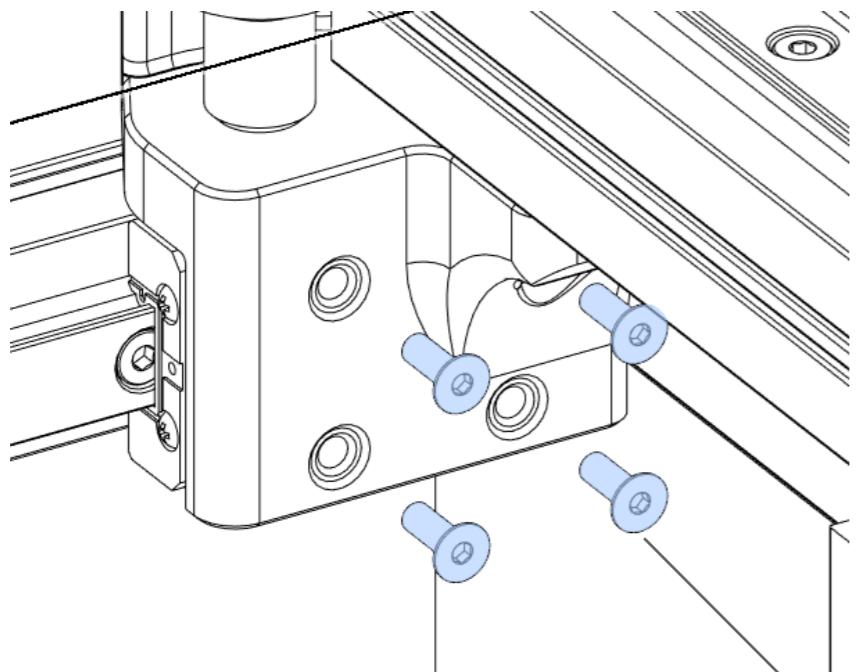
Gantry Assembly



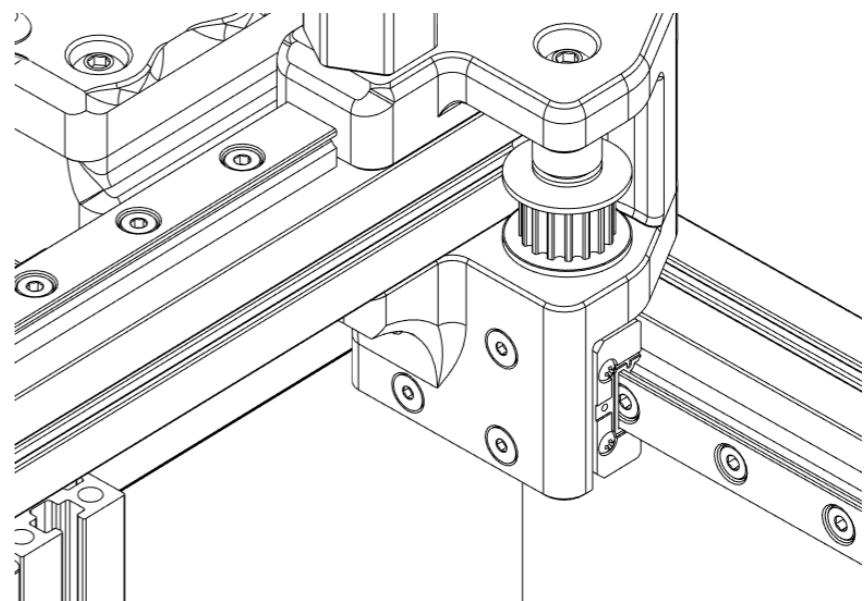
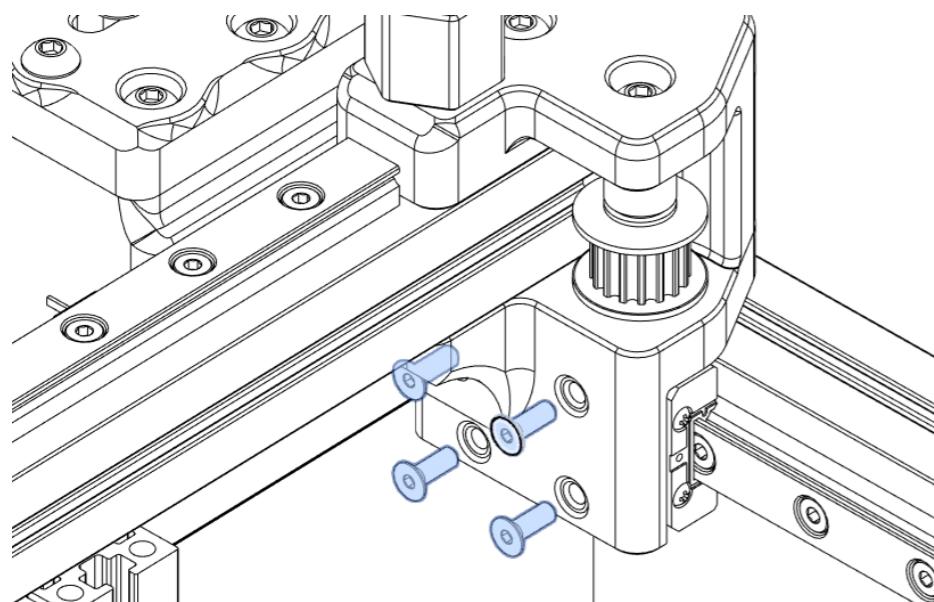
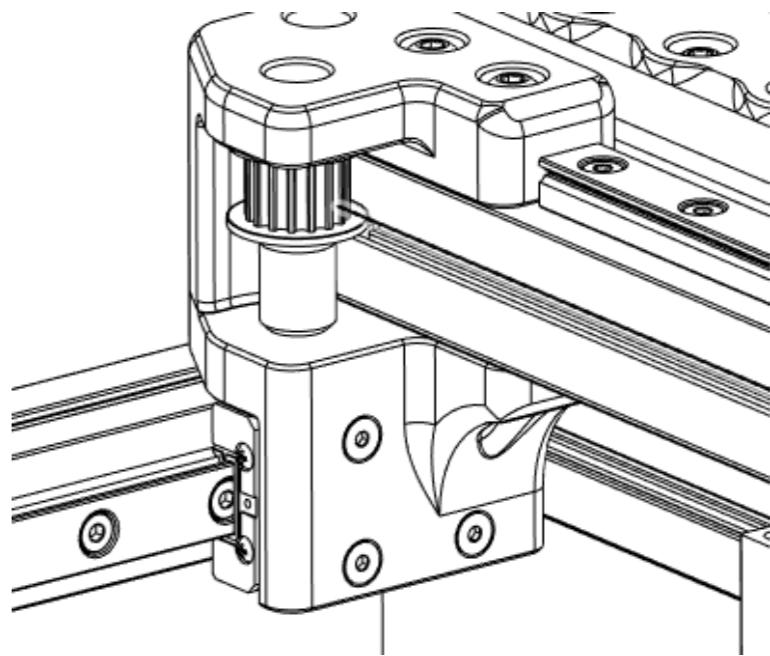
Gantry Assembly



Gantry Assembly



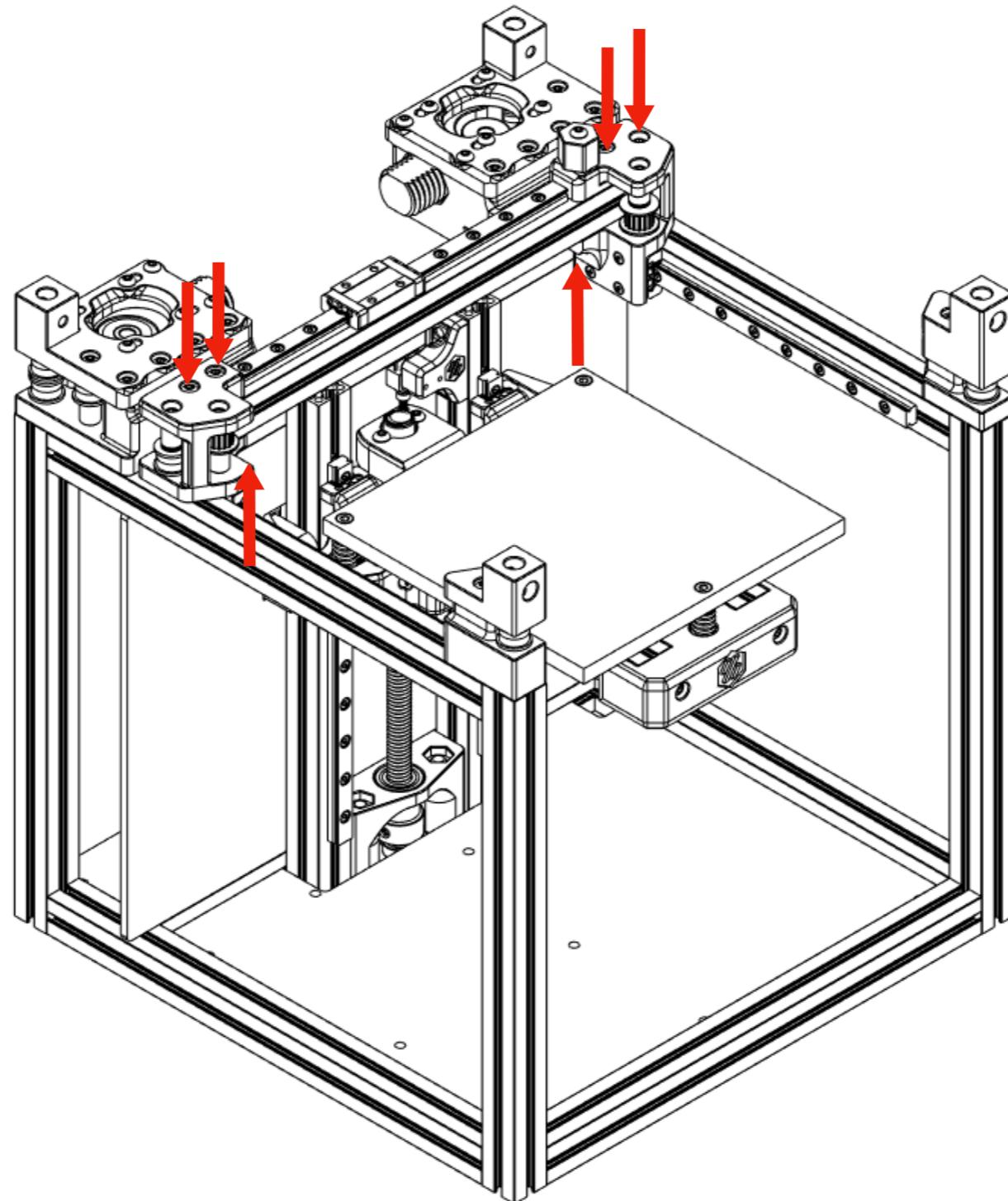
M2x6 BHCS/FHCS



Part	Qty
M2x6 BHCS	8

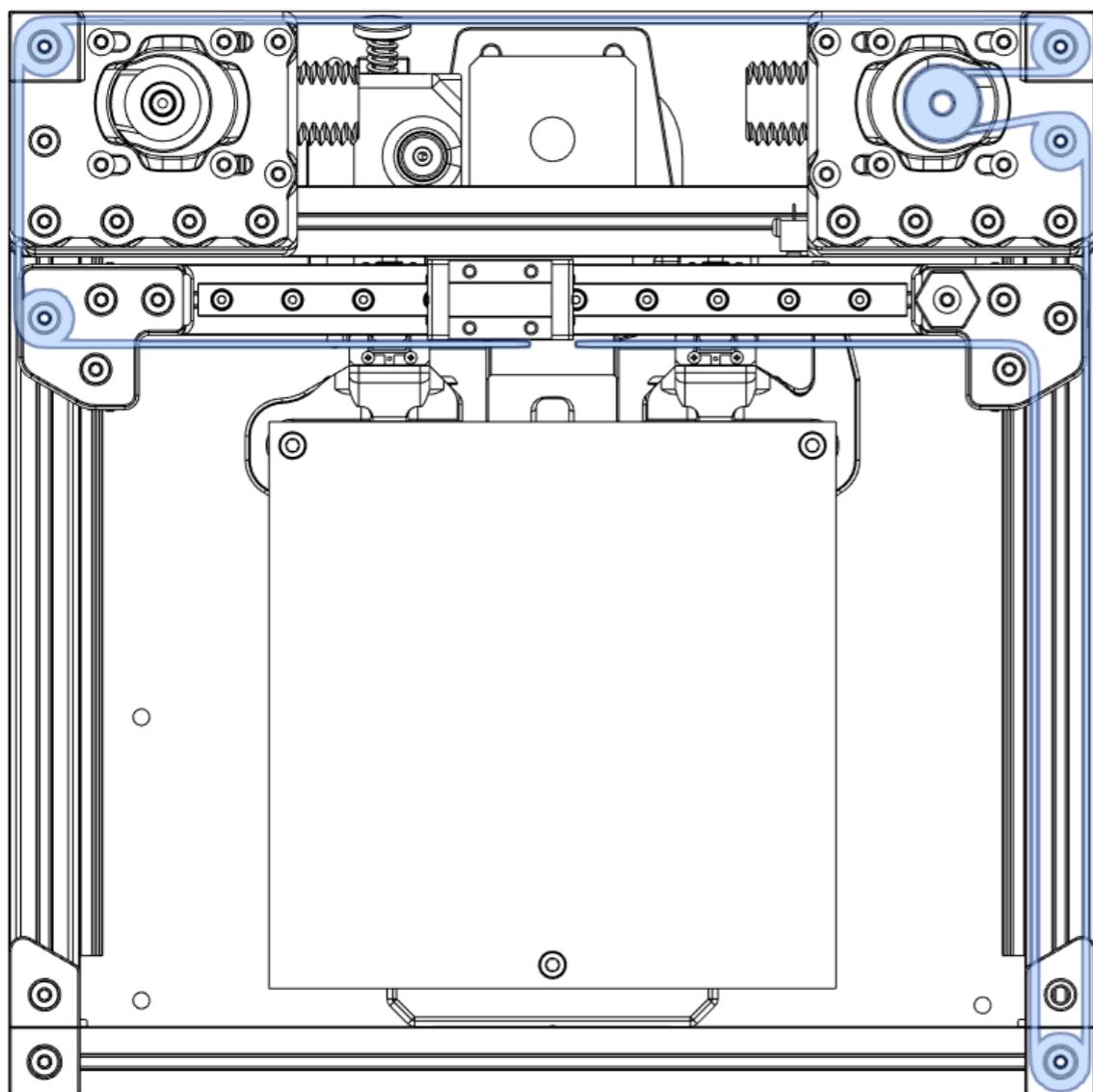
Gantry Assembly

Tighten Loose Gantry Bolts Now

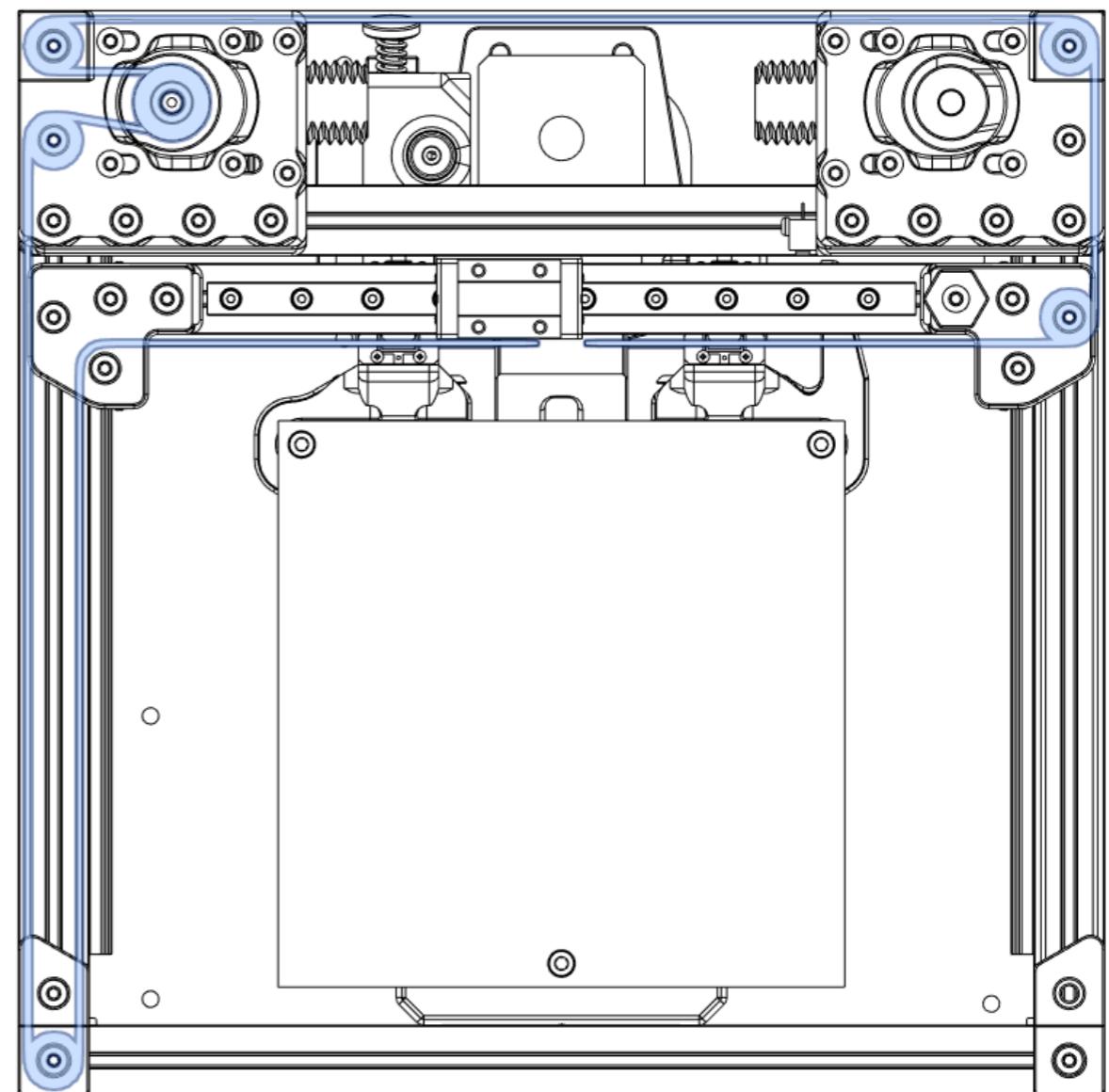


Belt Paths

A Belt Path

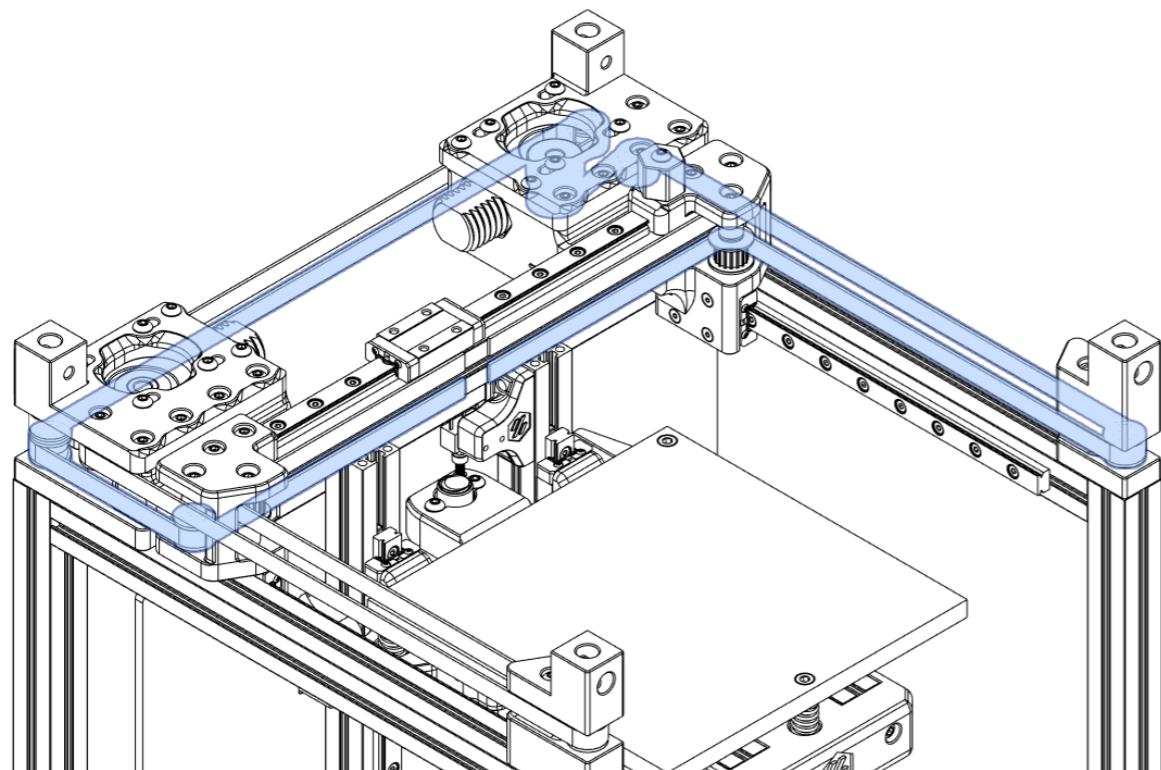


B Belt Path

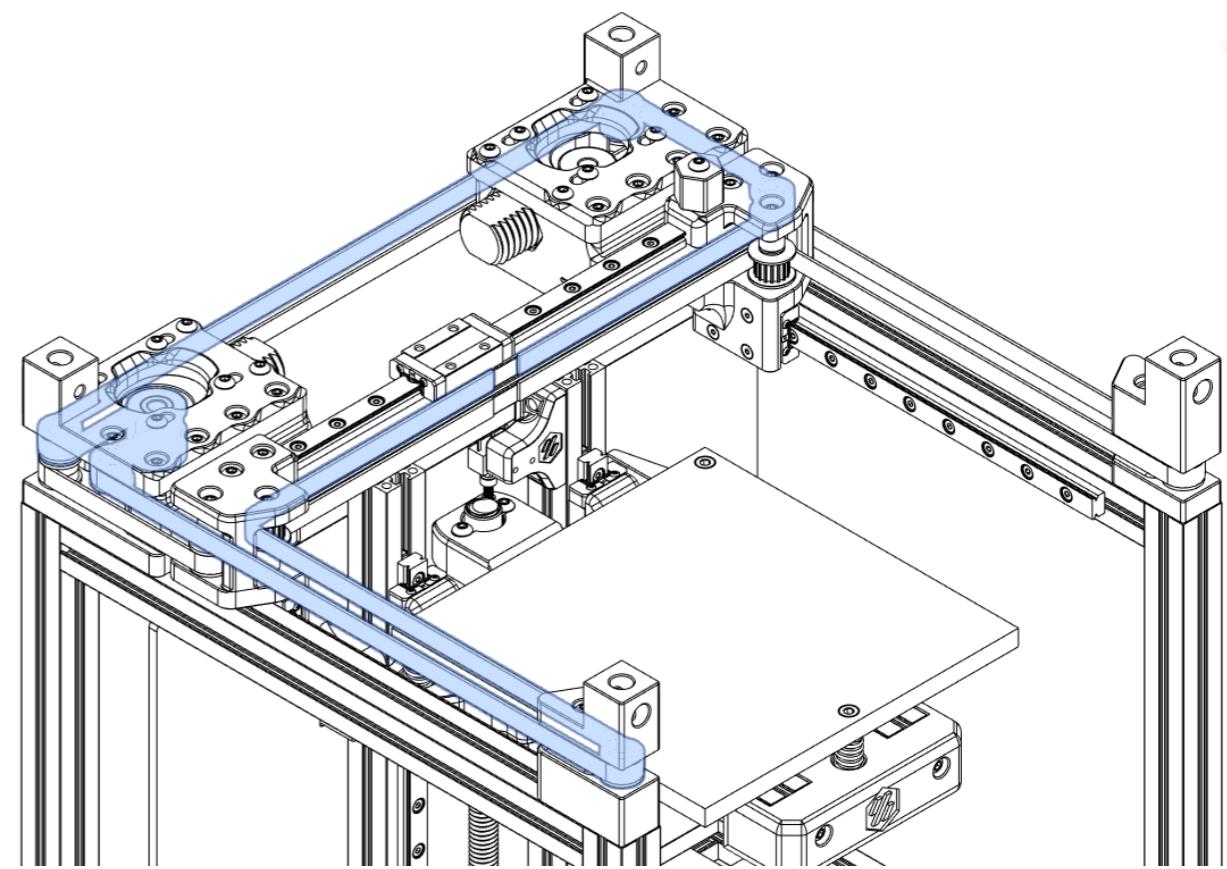


Belt Paths

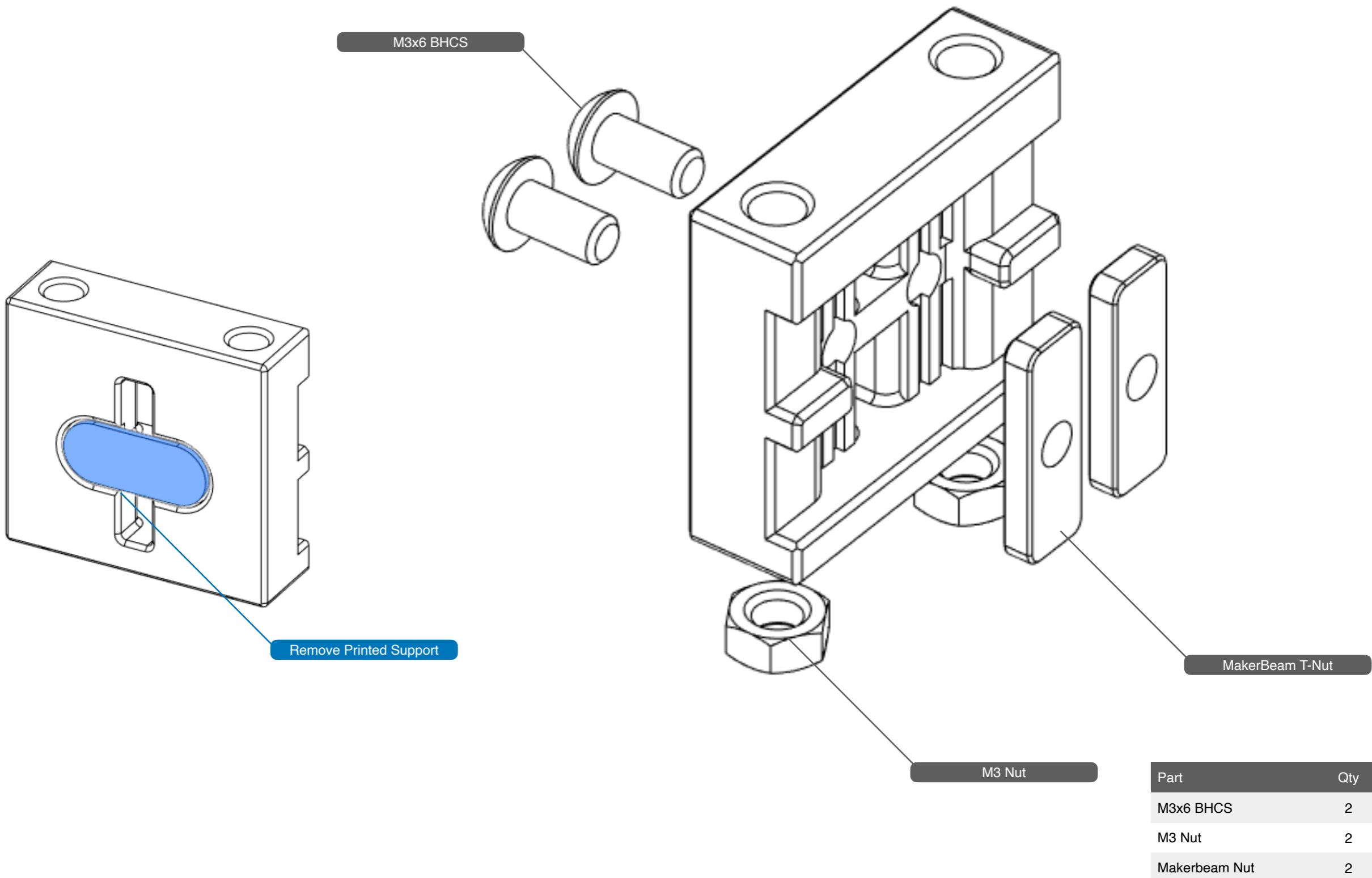
A Belt Path



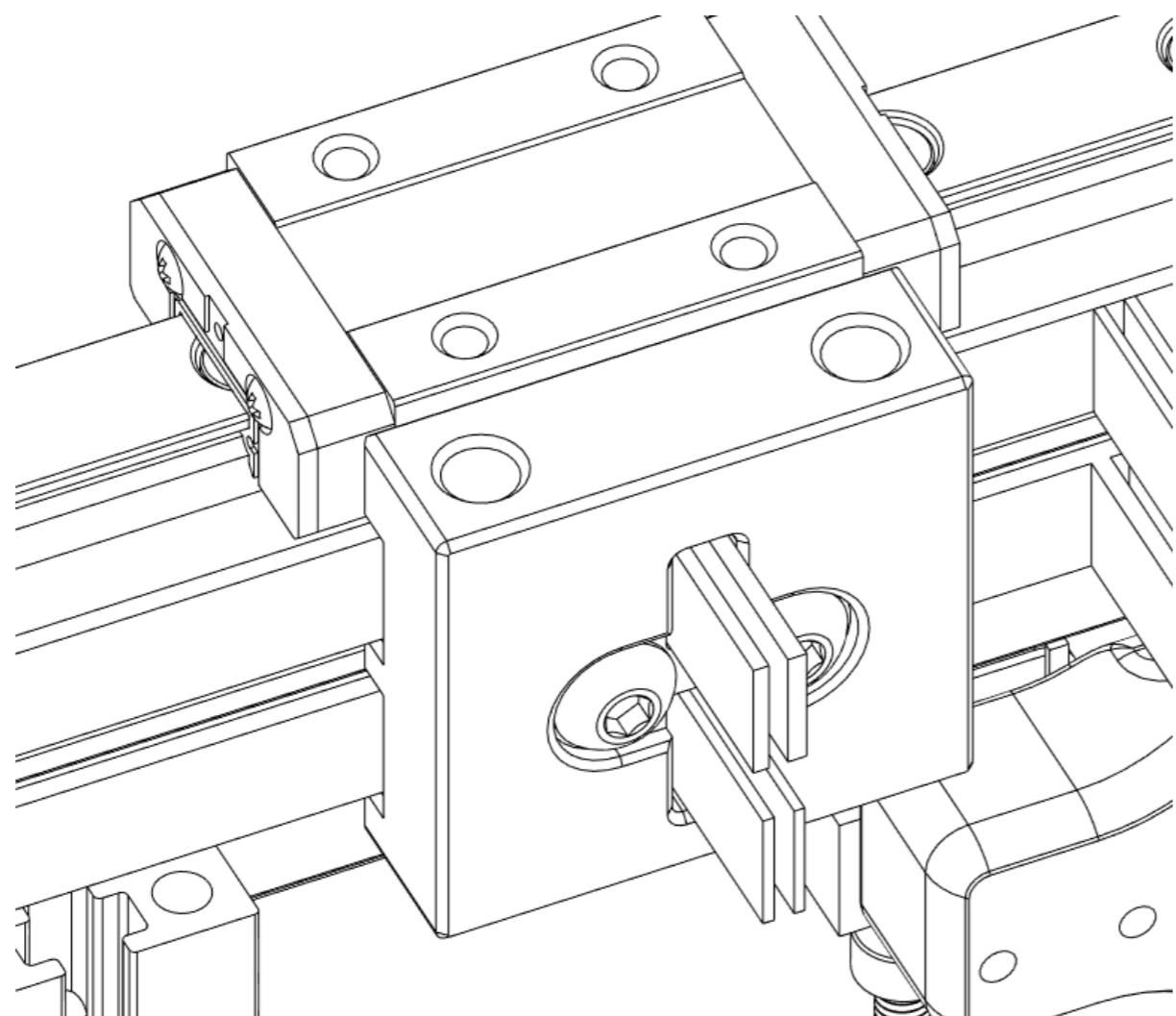
B Belt Path



Belt Retention



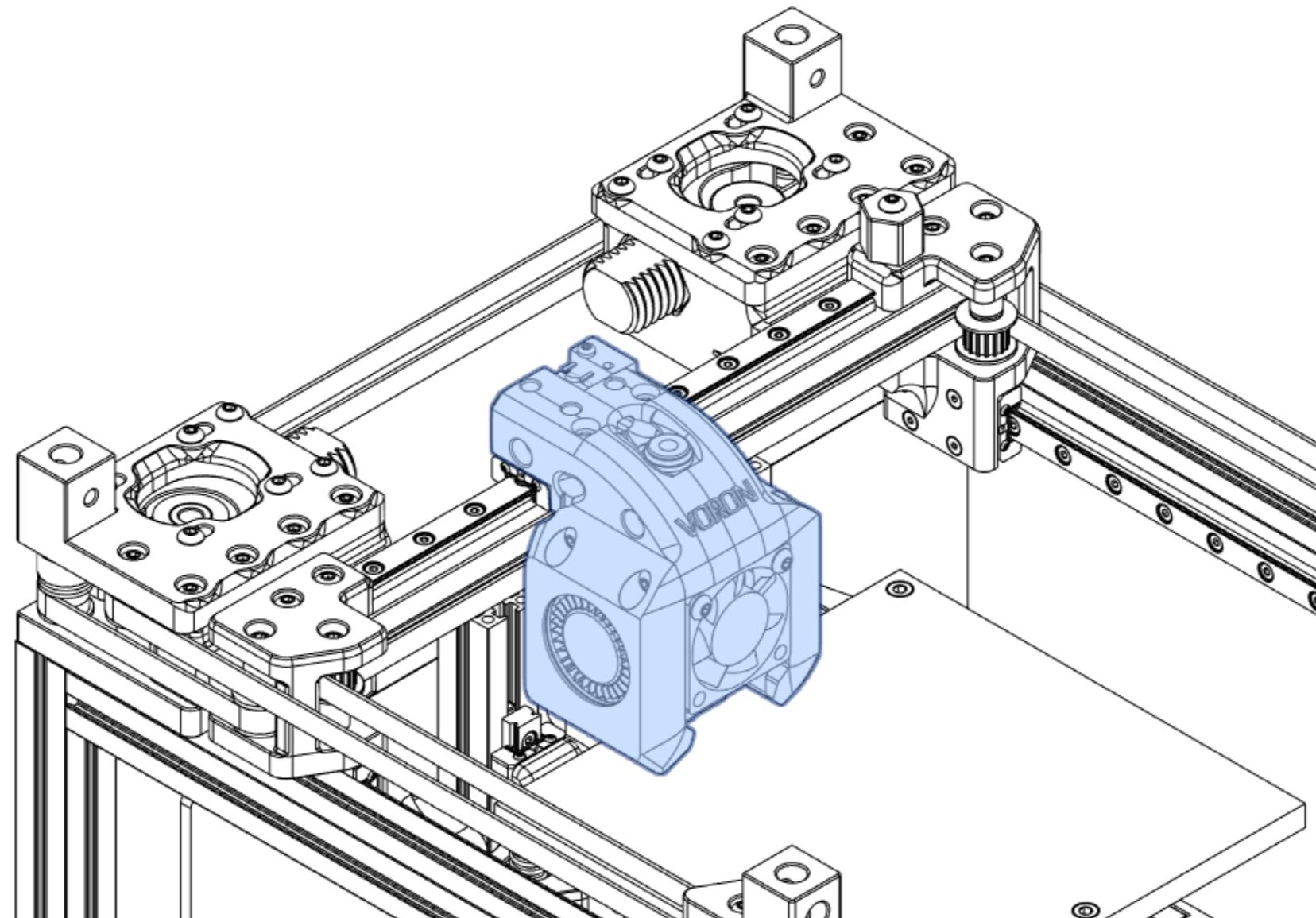
Belt Retention



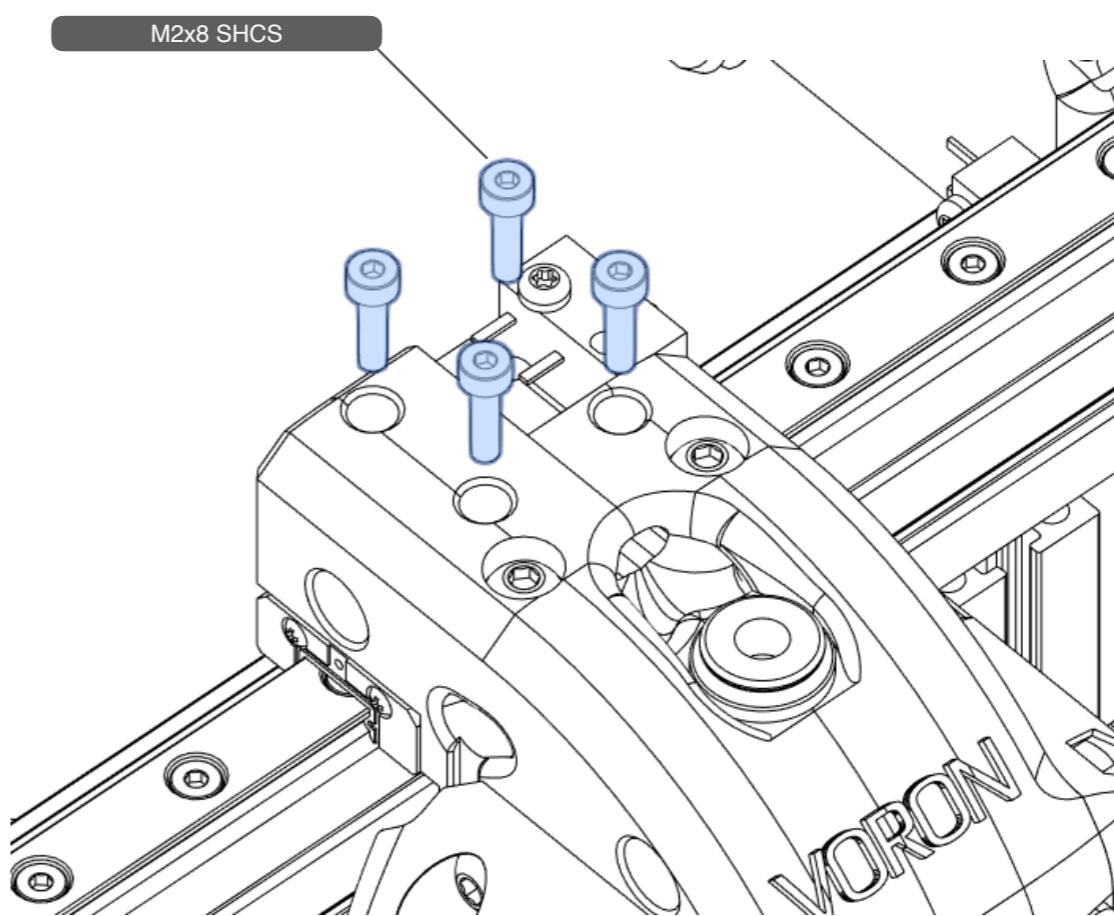
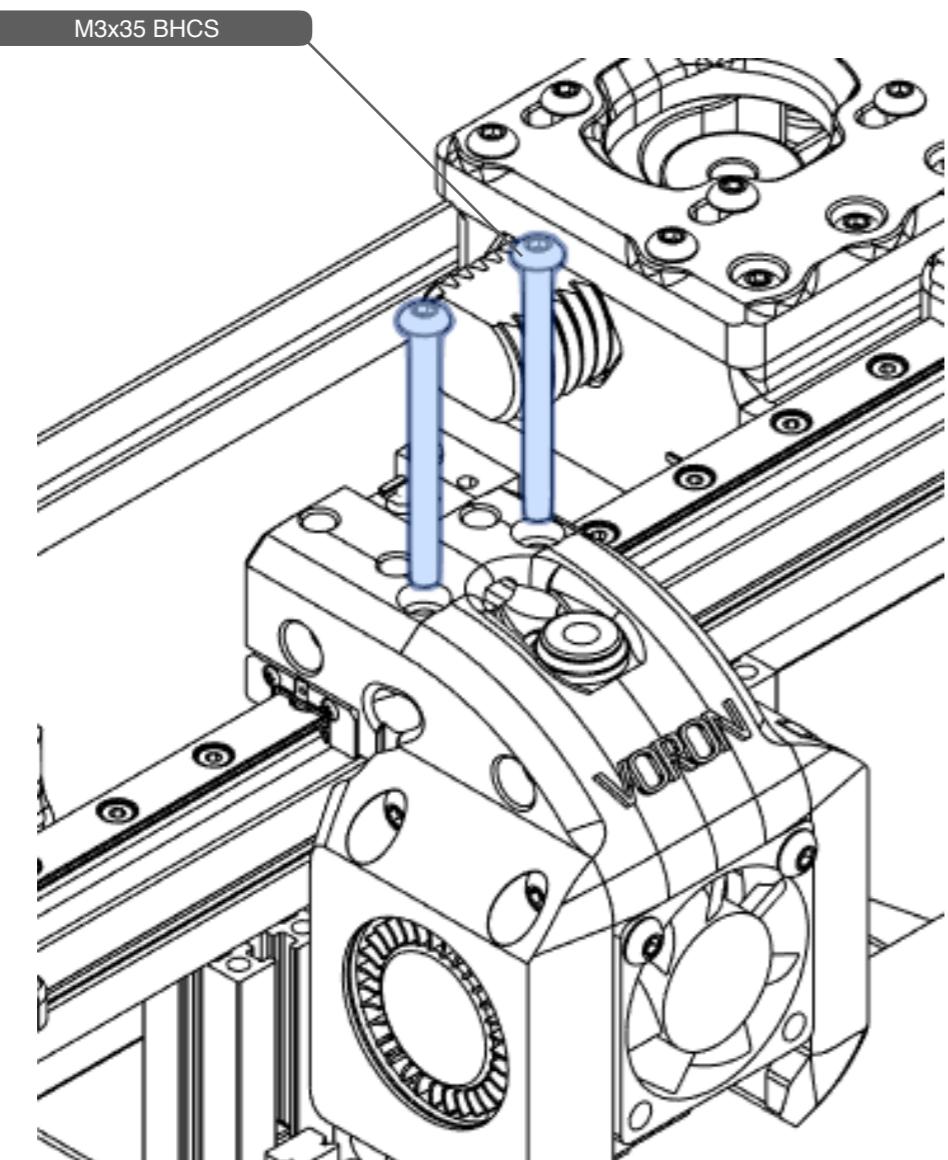
Instructions for belt tightening:
belts MUST be tight, like
not kinda tight, fully tight
use a pliers to pull the
belt ends while the t-nuts
are semi tight so you can
feel the teeth clicking
through the retention
block. pull them as tight
as you can without
tearing the belts only
then should you move to
tensioning with the knobs
on the drives. if you dont
you're going to run out of
travel on the drive
tensioners. after tension
is set then you can trim
the belts flush, theres no
going back after that
step, re-tensioning after
cutting the belts is almost
impossible. take your
time and get it right

Toolhead

See Appendix for Toolhead Assembly

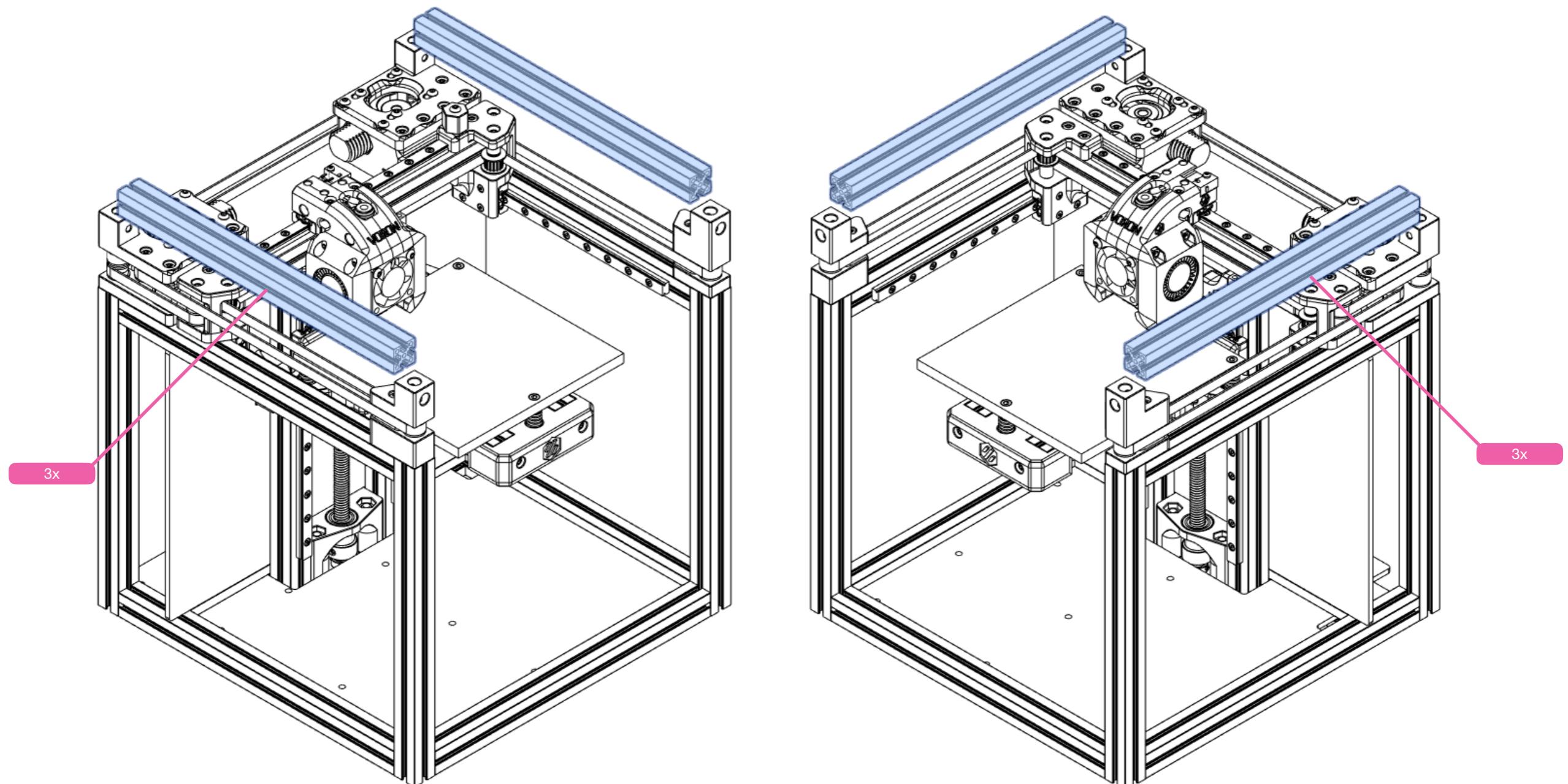


Toolhead



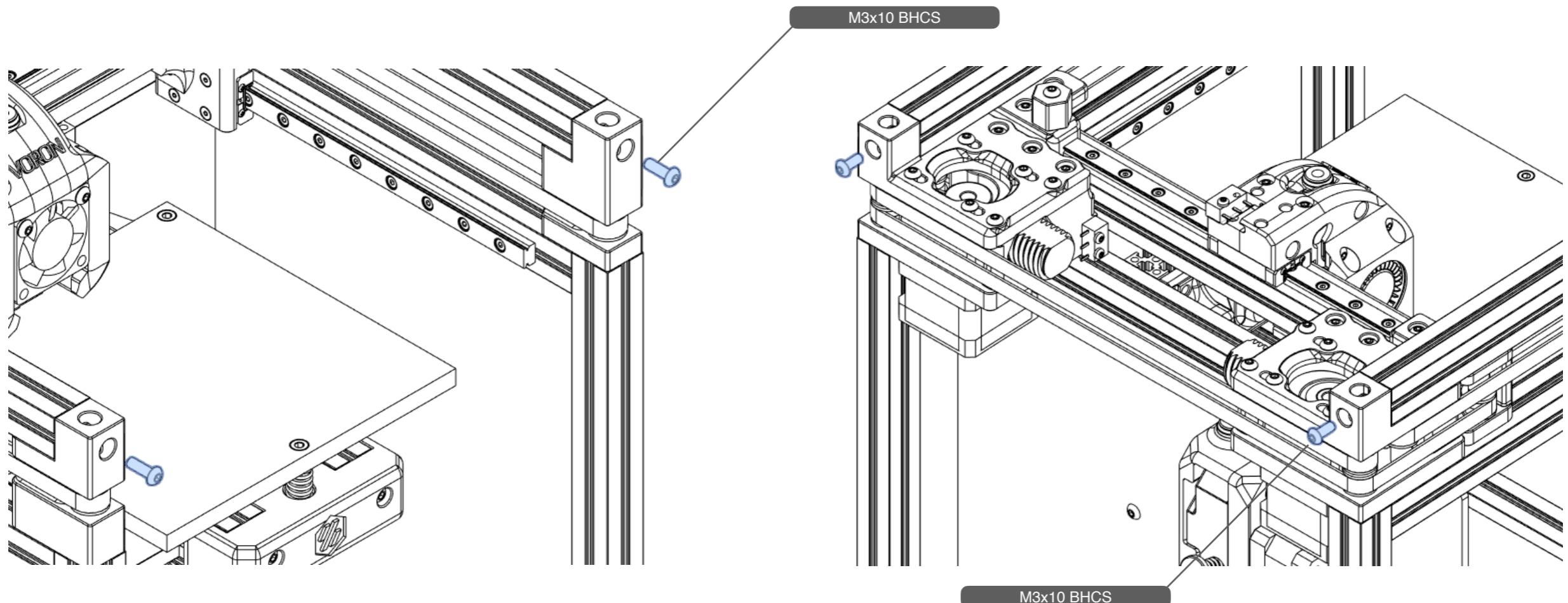
Part	Qty
M2x8 SHCS	4
M3x25 BHCS	2

Frame Assembly



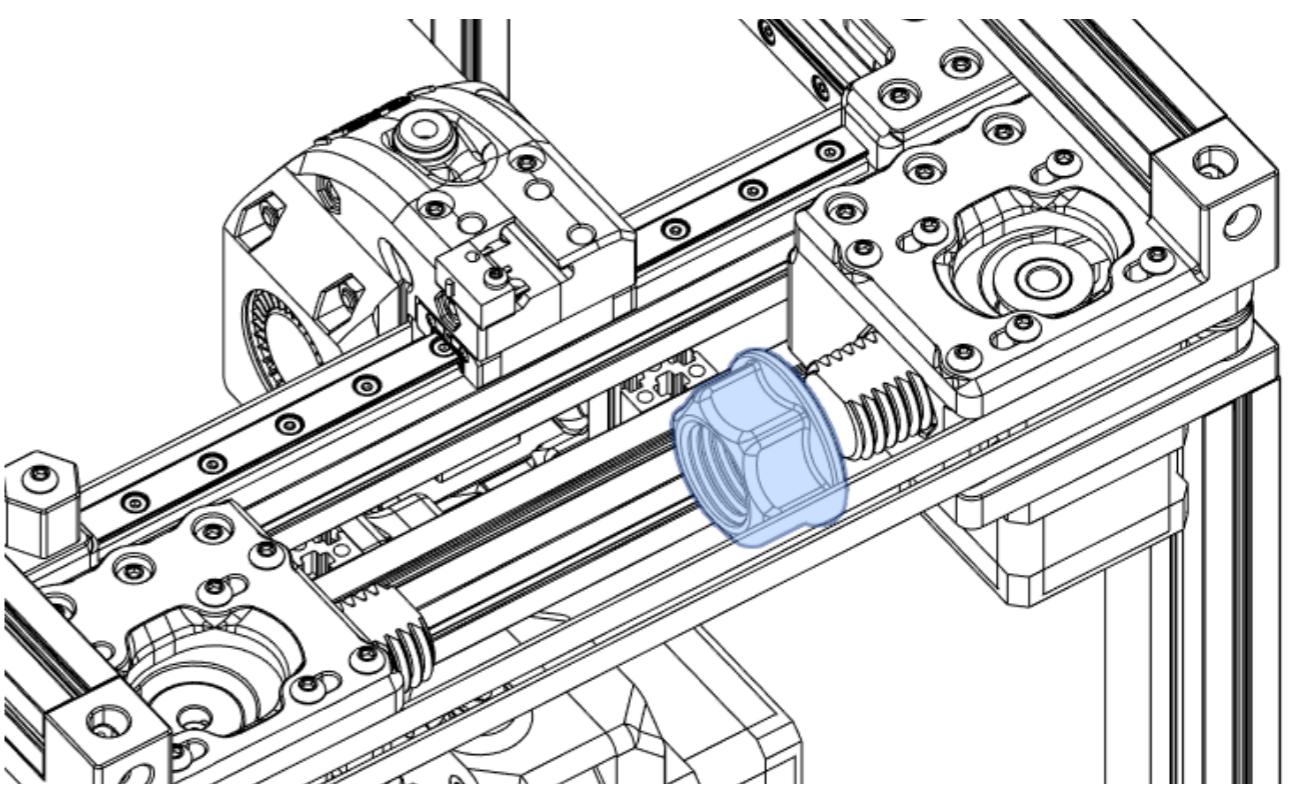
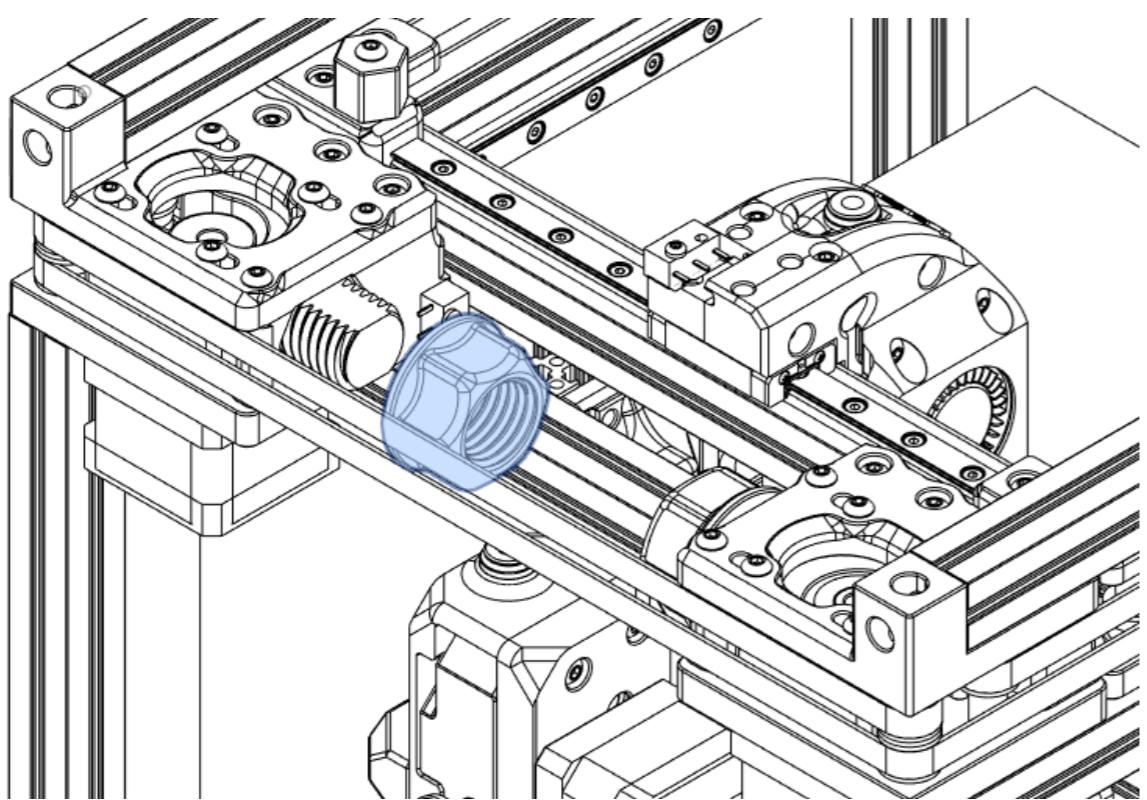
Part	Qty
M3 Nut	6

Frame Assembly

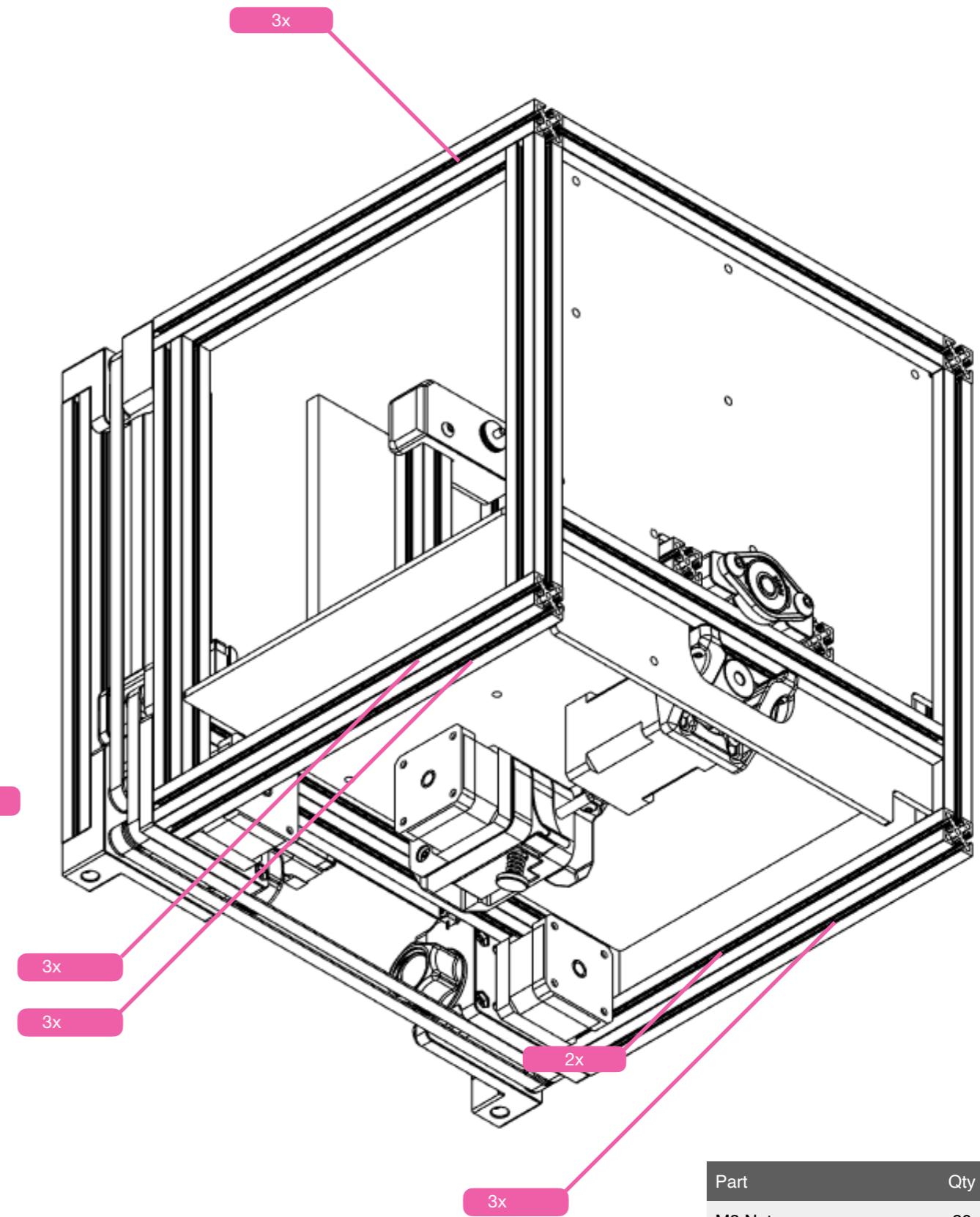
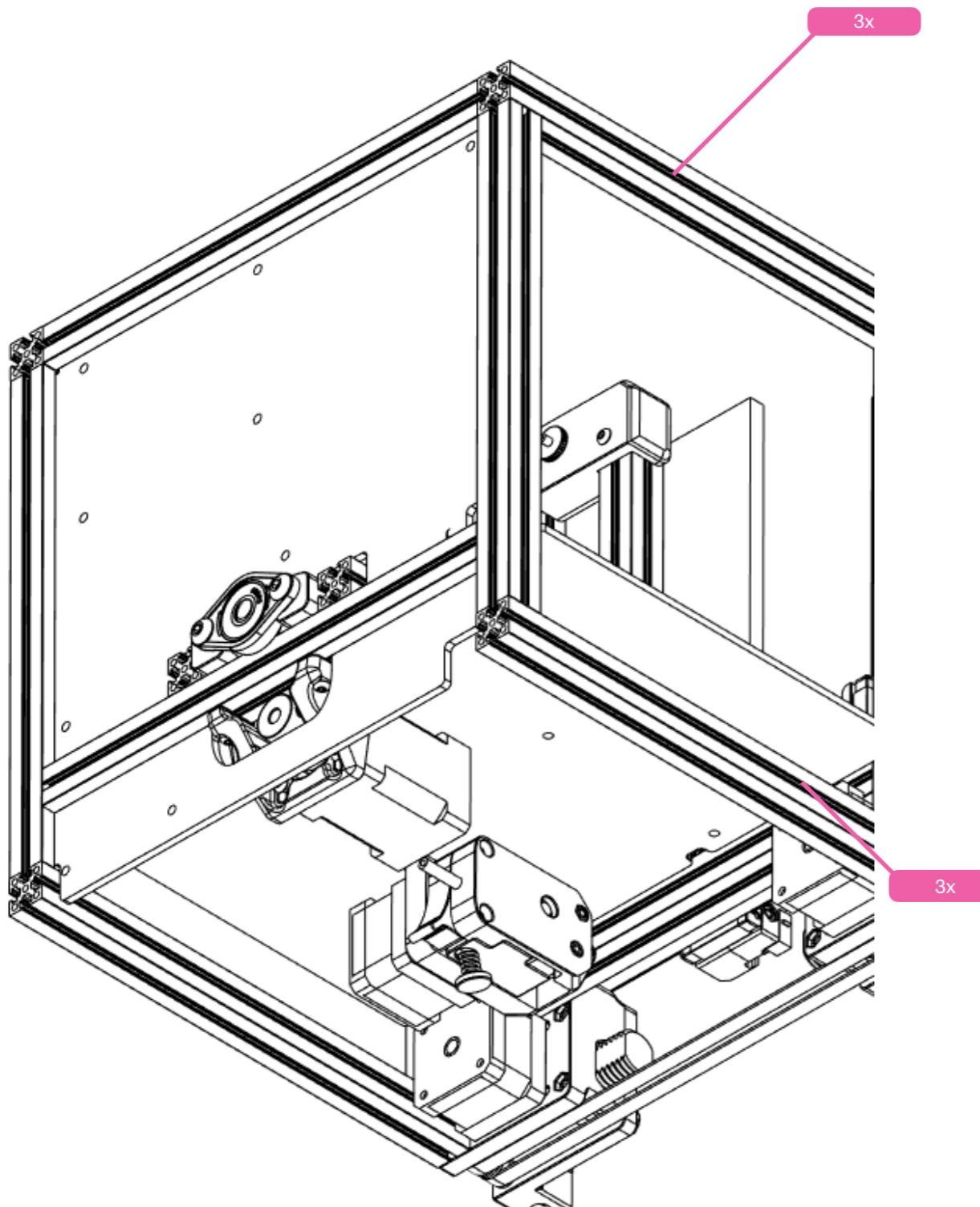


Part	Qty
M3x10 BHCS	4

Tension Knobs

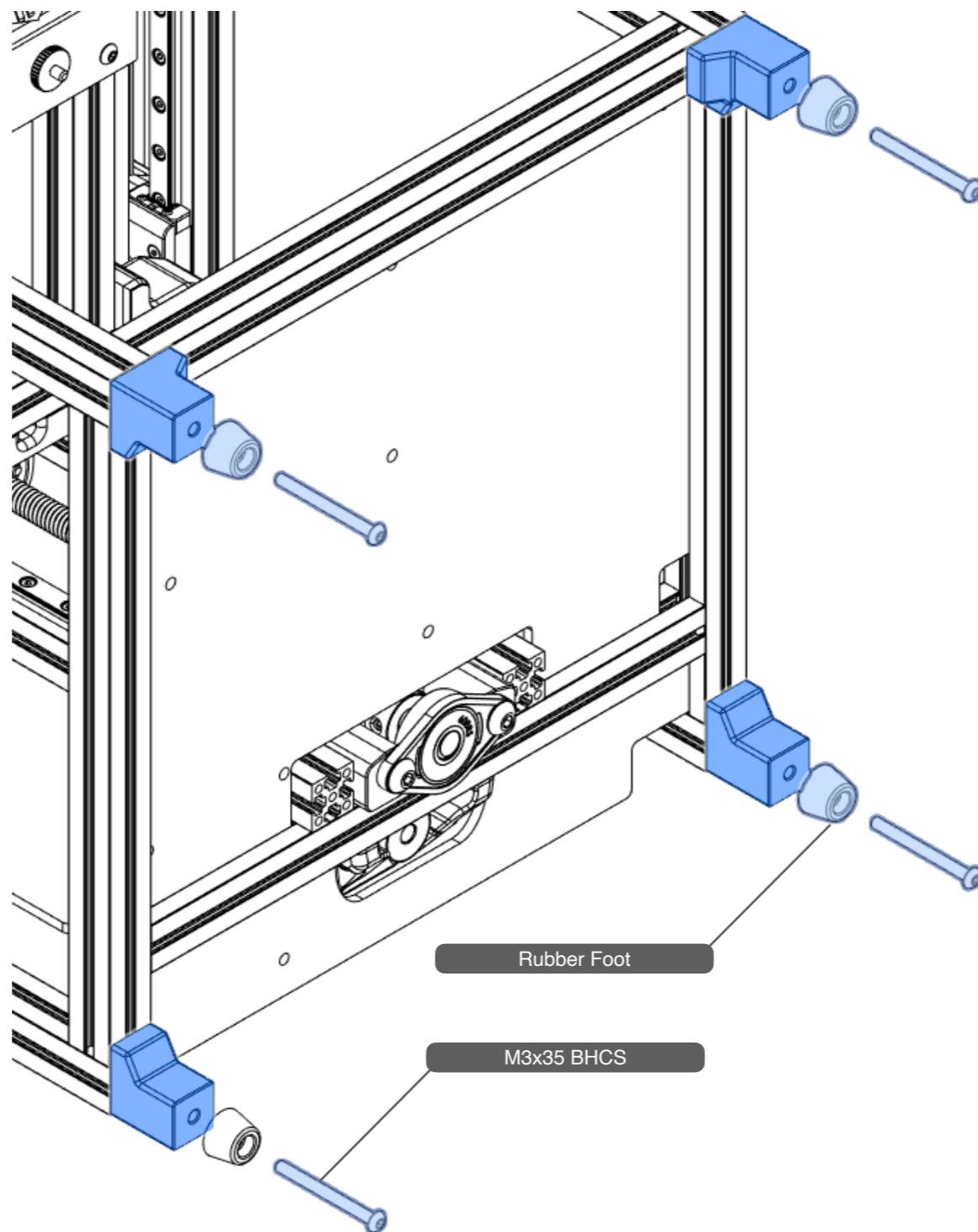


Pre-Load Nuts



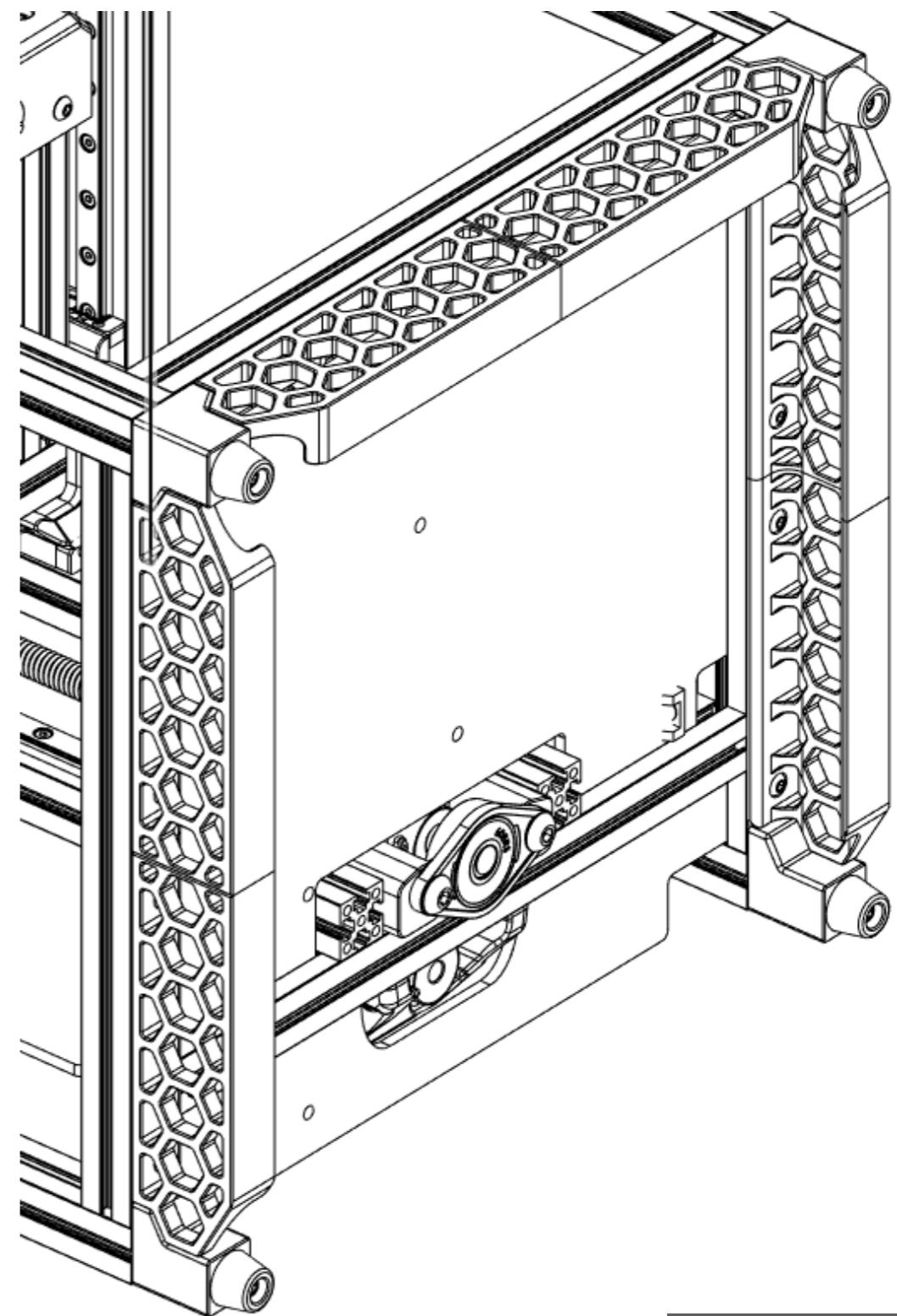
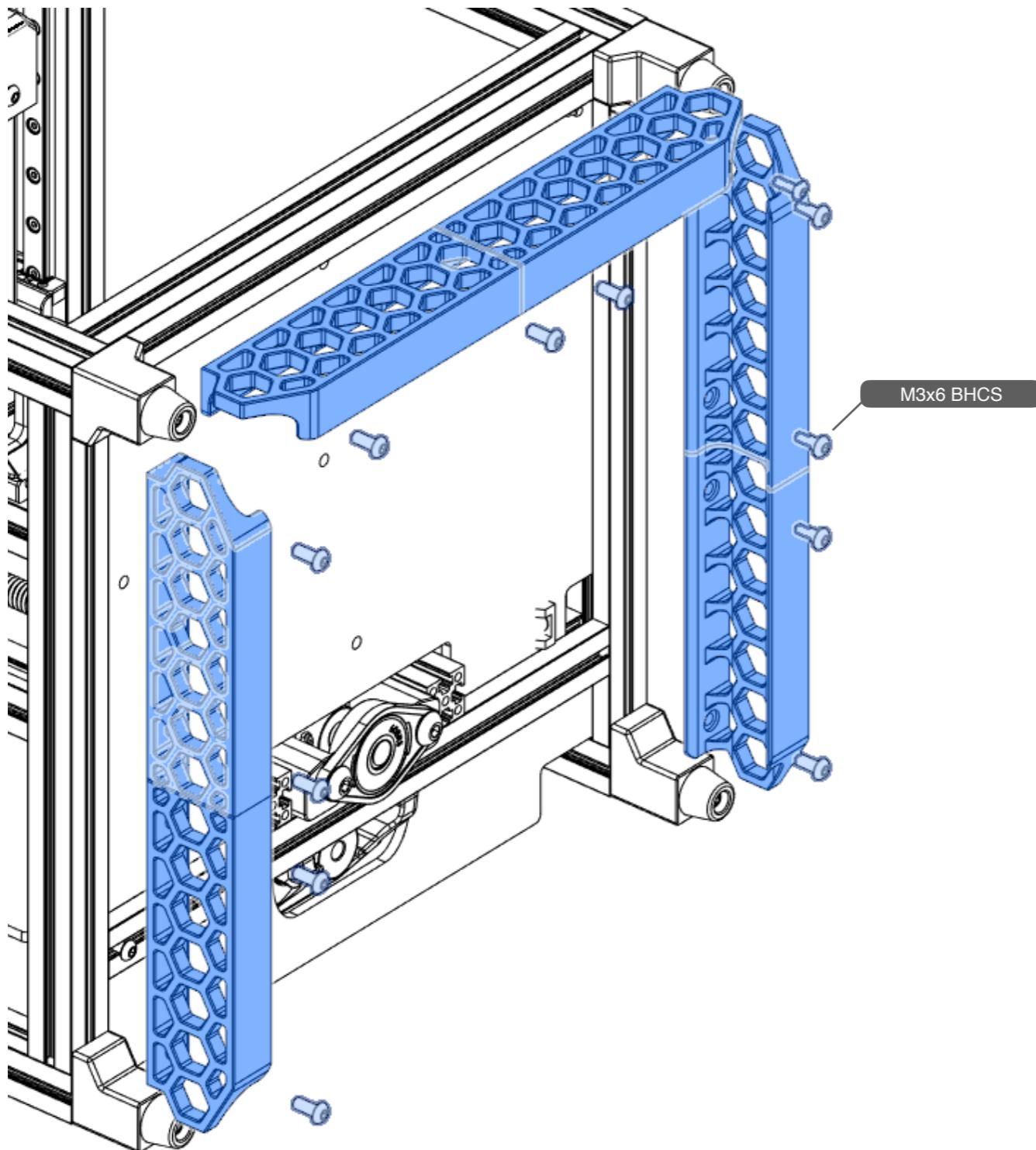
Part	Qty
M3 Nut	20

Feet/Skirts



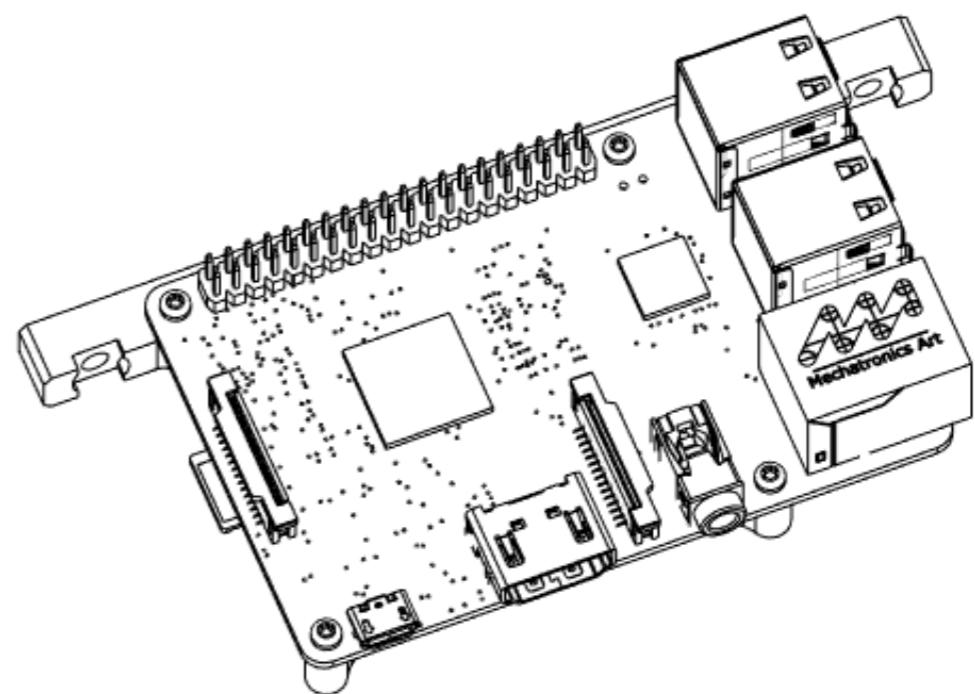
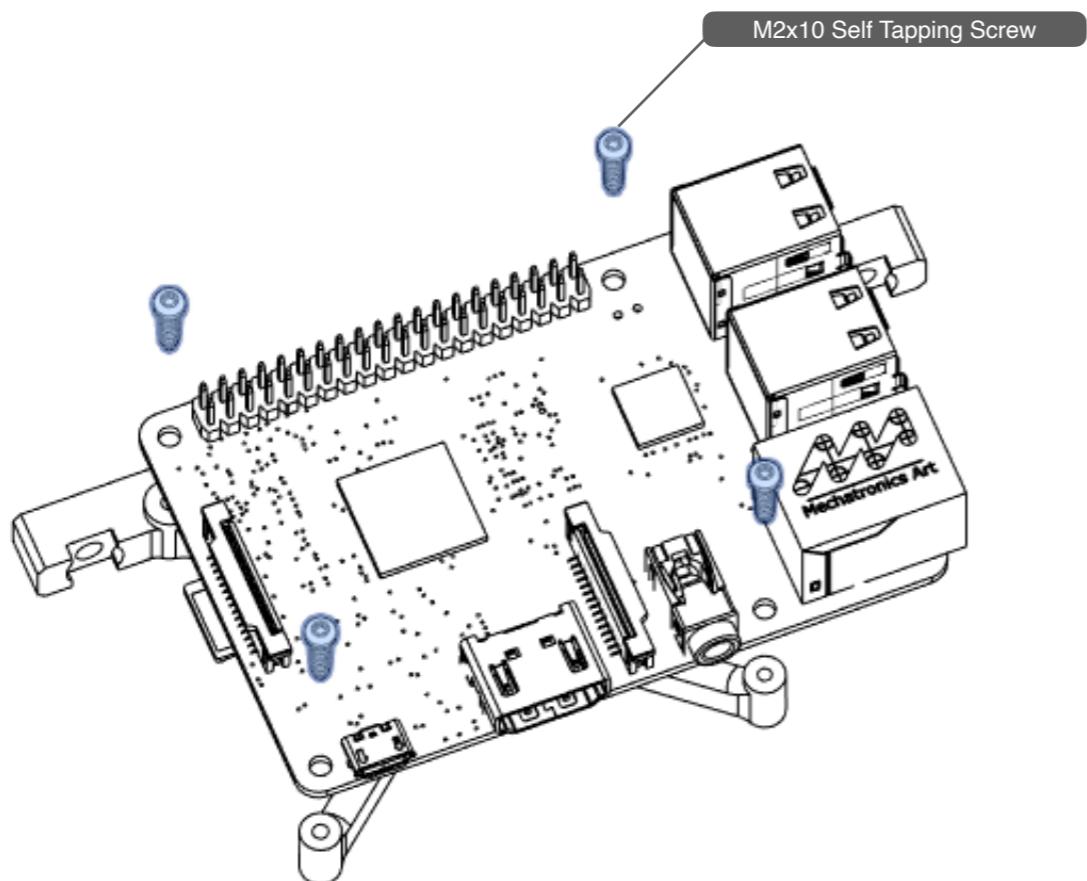
Part	Qty
M3x35 BHCS	4
Rubber Foot	4

Feet/Skirts

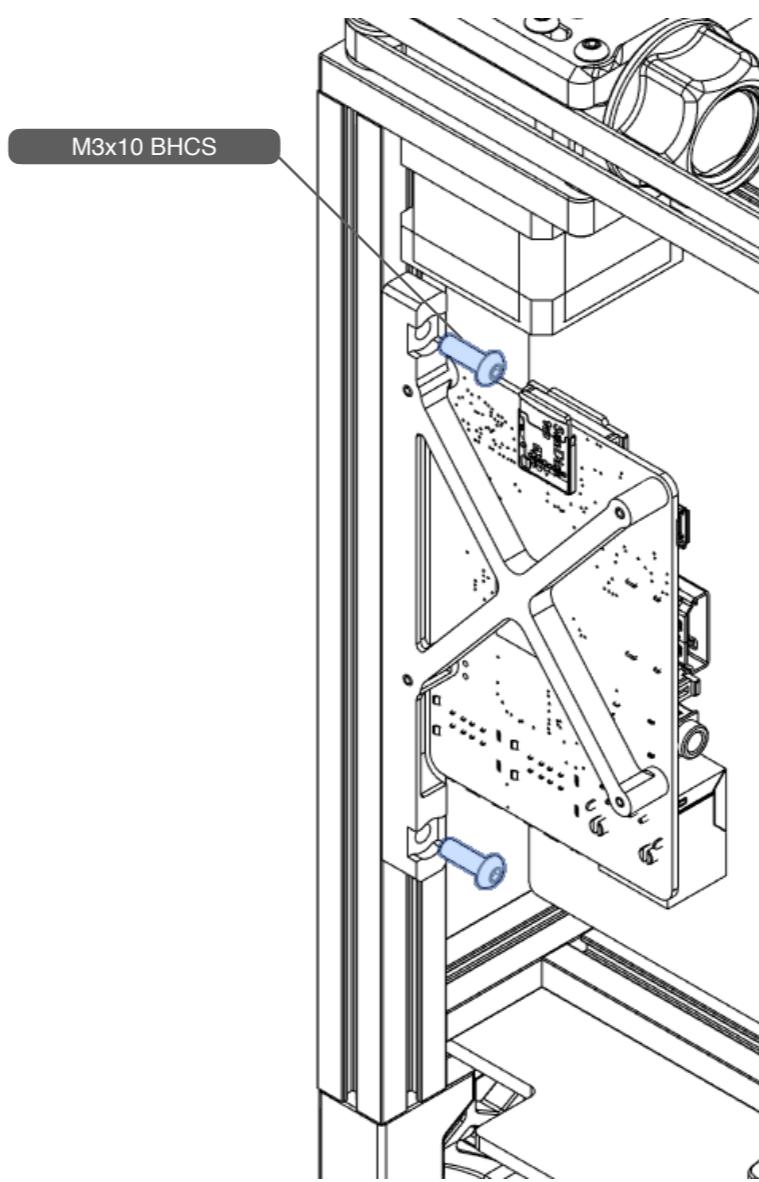
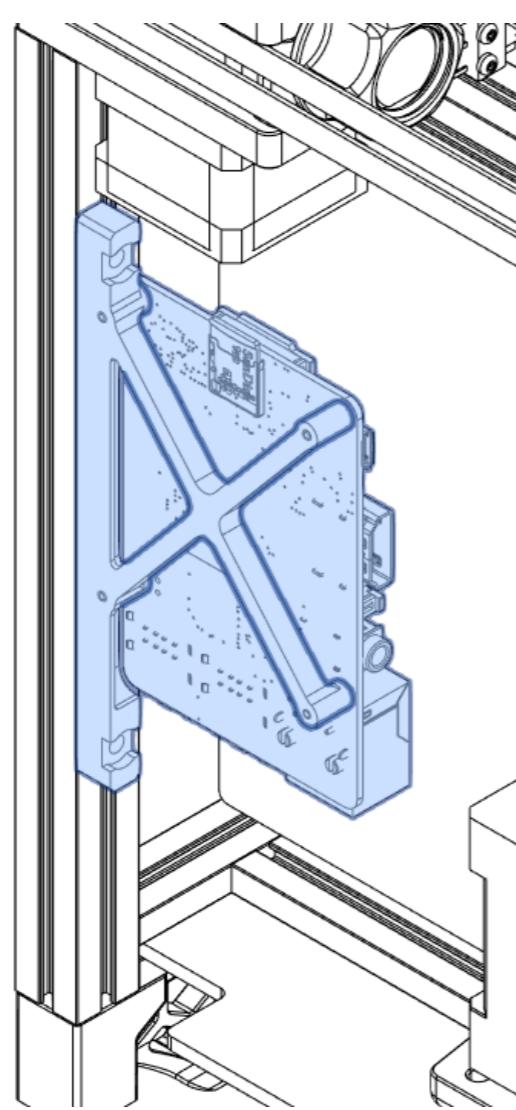


Part	Qty
M3x35 BHCS	4
Rubber Foot	4

Electronics Installation

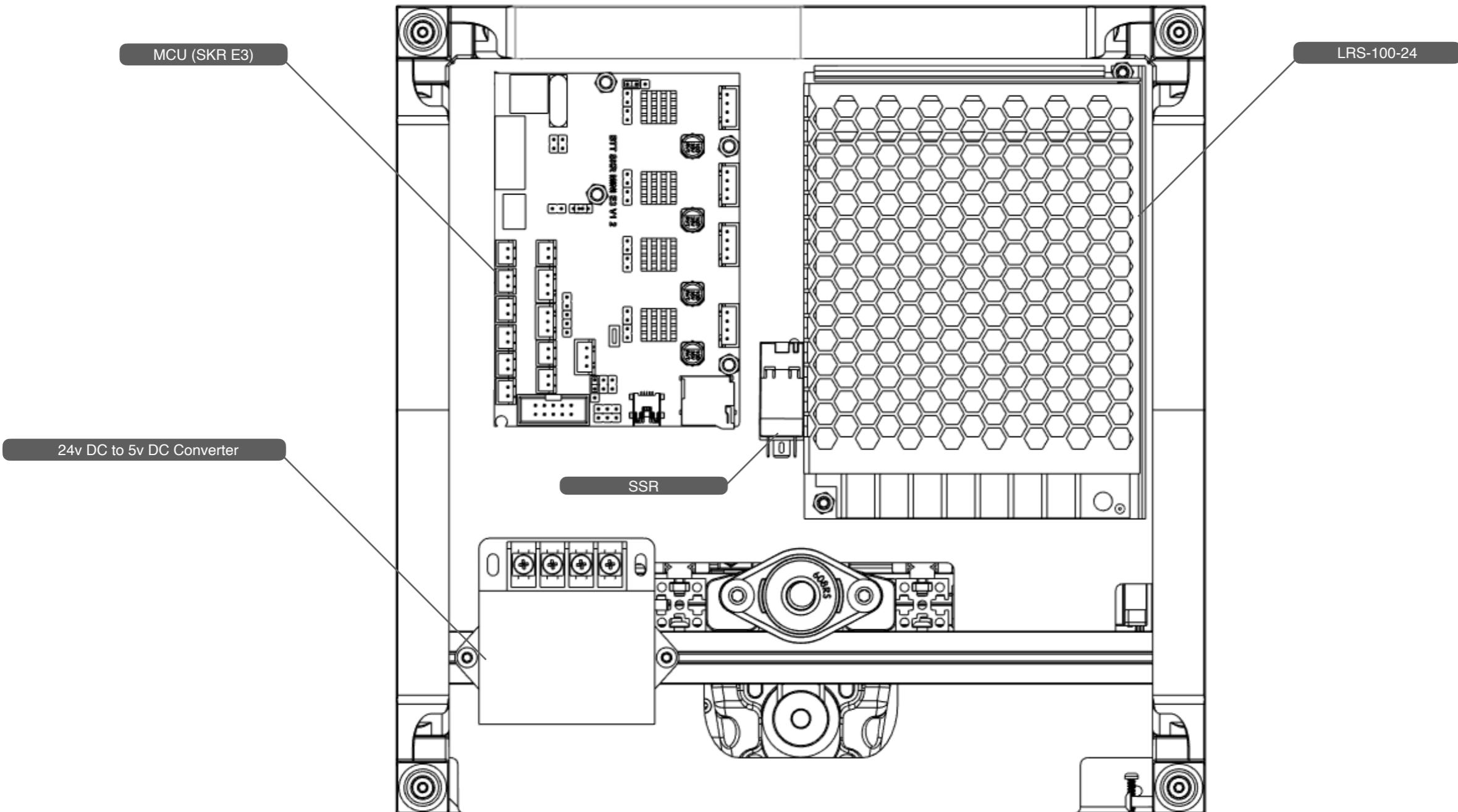


Part	Qty
M2x10 Self Tapping	4
Raspberry Pi	1

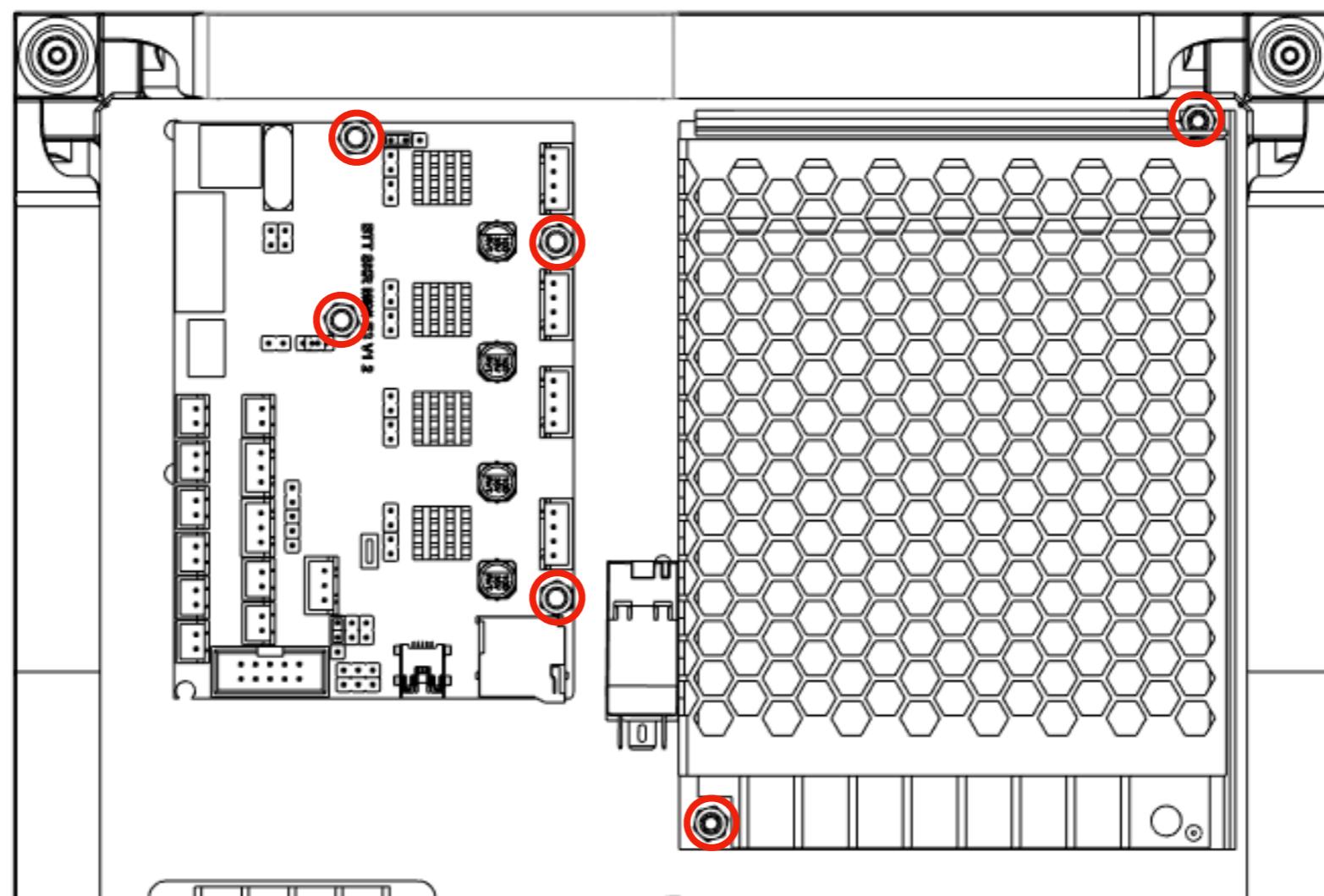


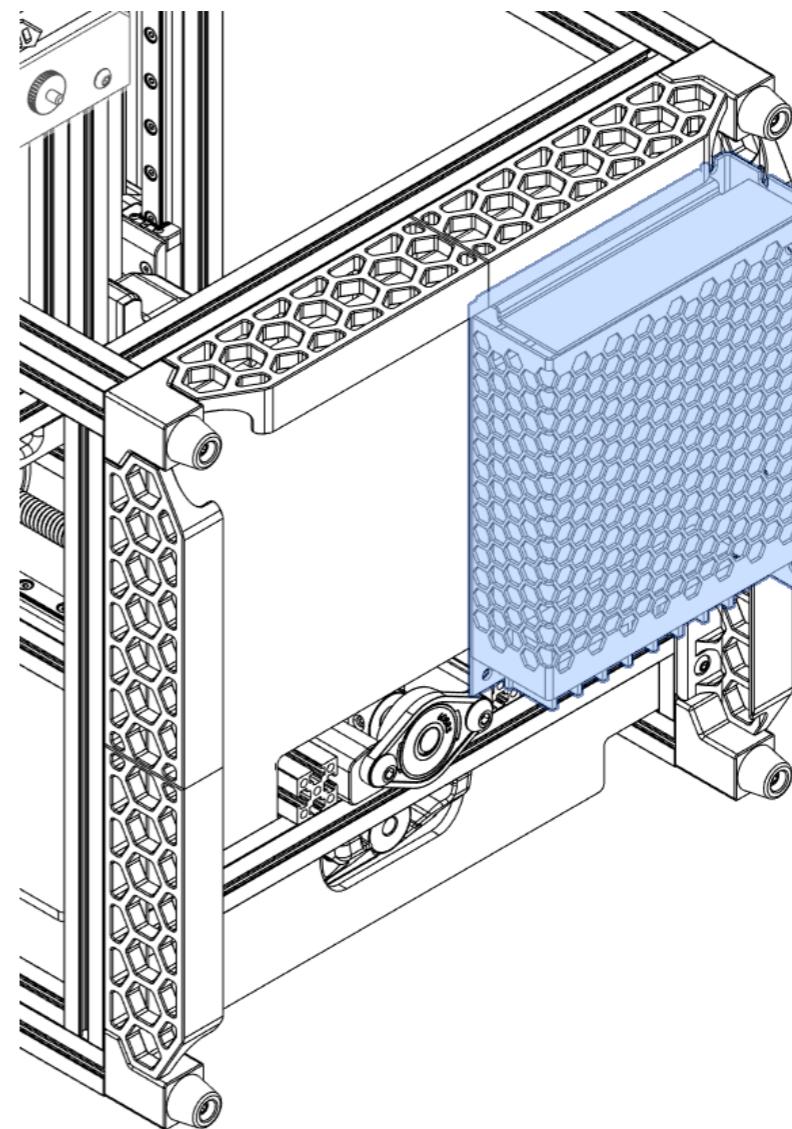
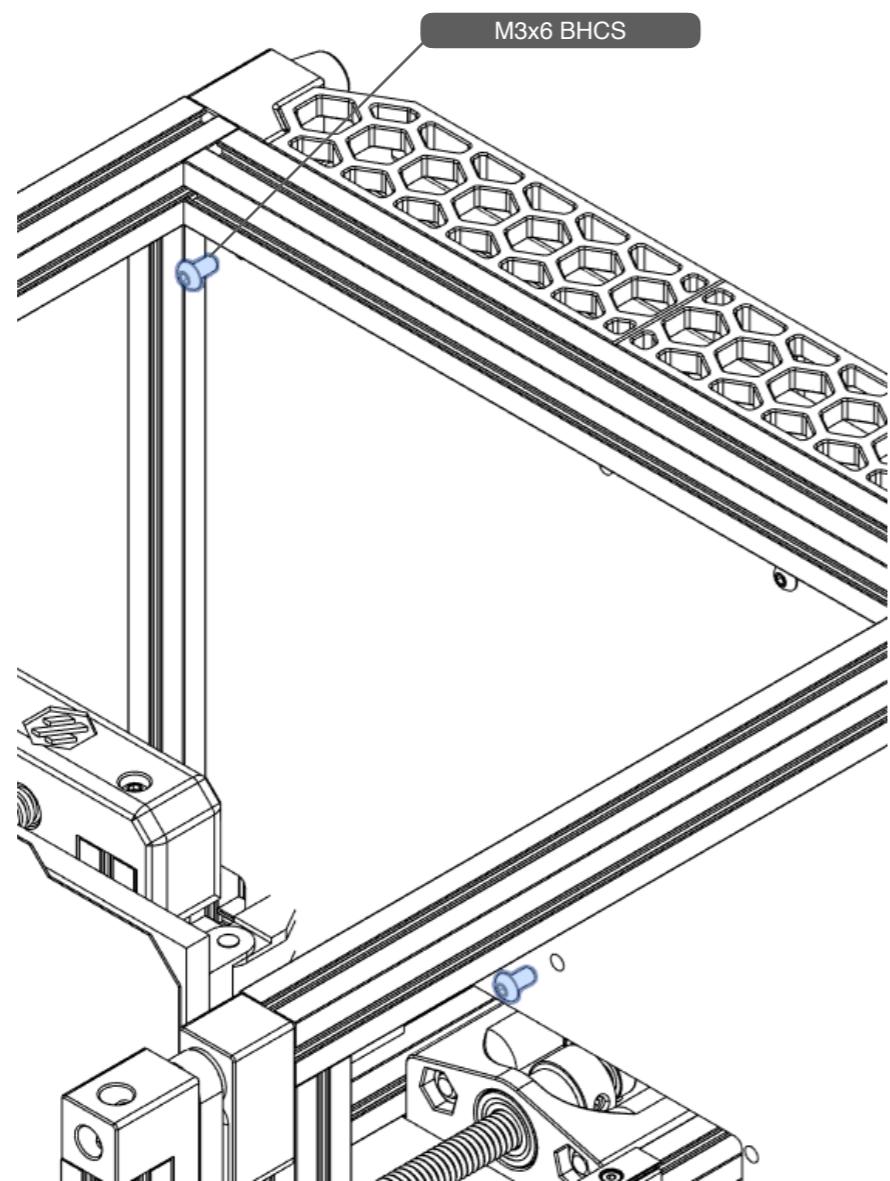
Part	Qty
M3x10 BHCS	2

Overview of Electronics Layout

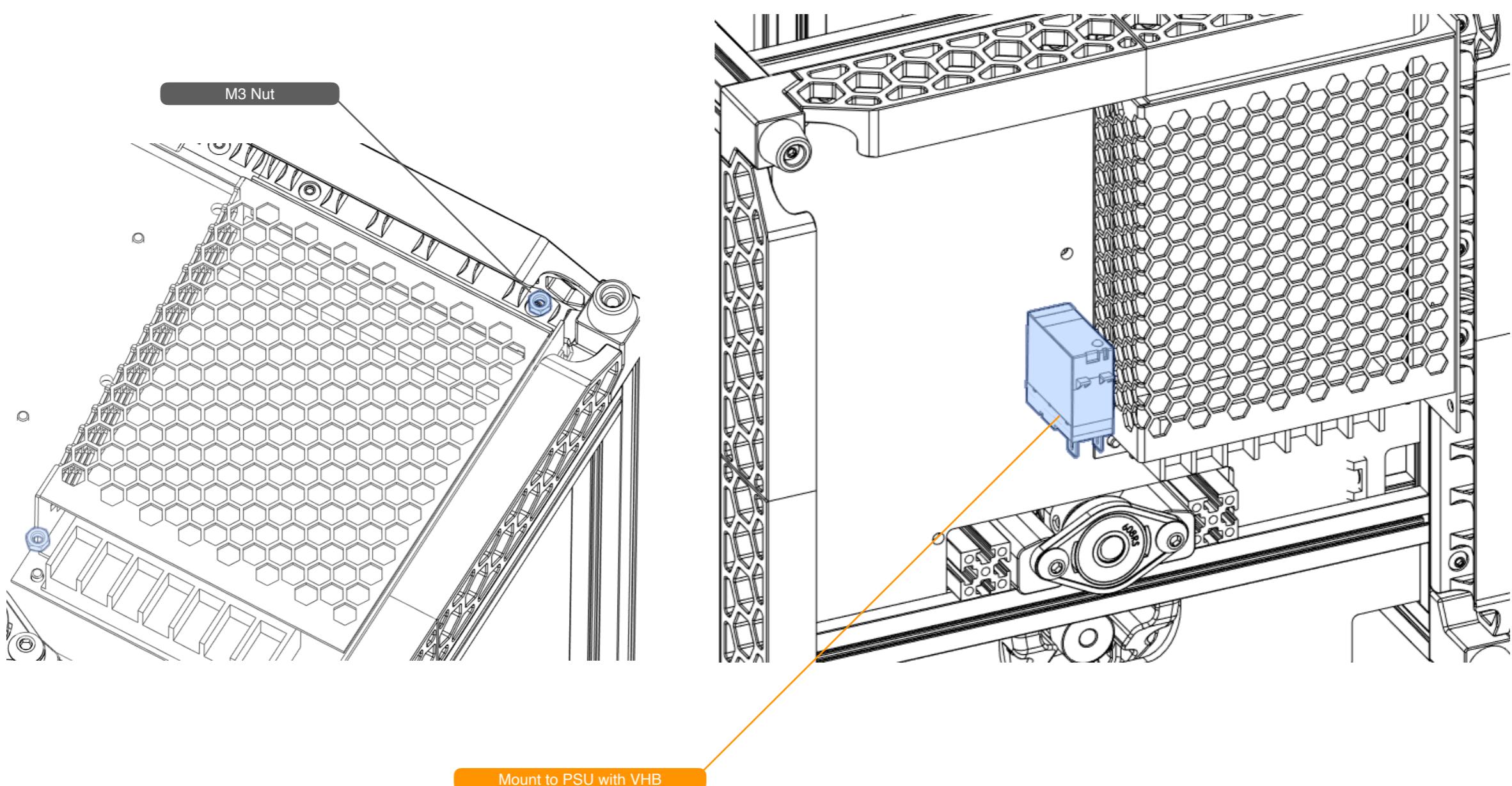


Layout, Mark, and Drill 3mm holes for PSU and MCU in Deck Panel



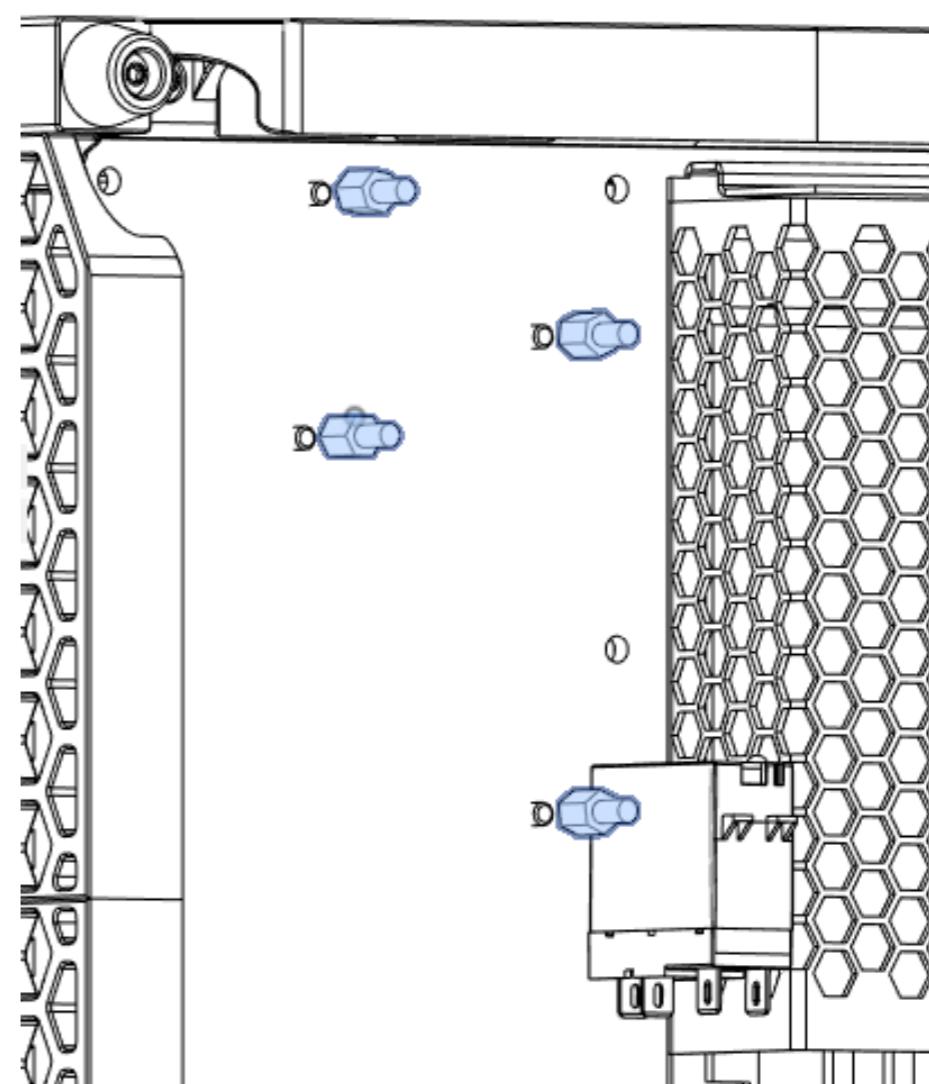
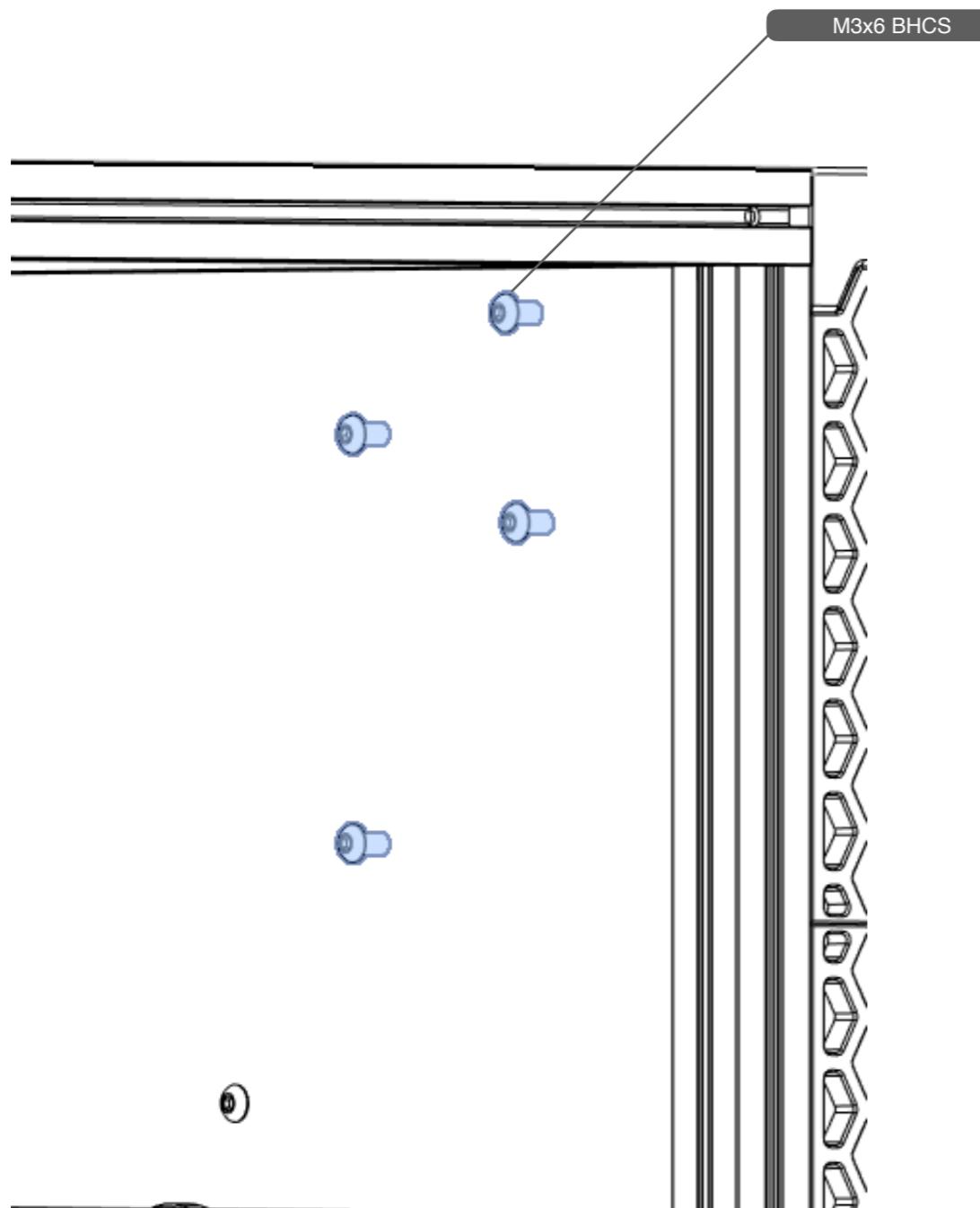


Part	Qty
M3x6 BHCS	2
LRS-100 PSU	1

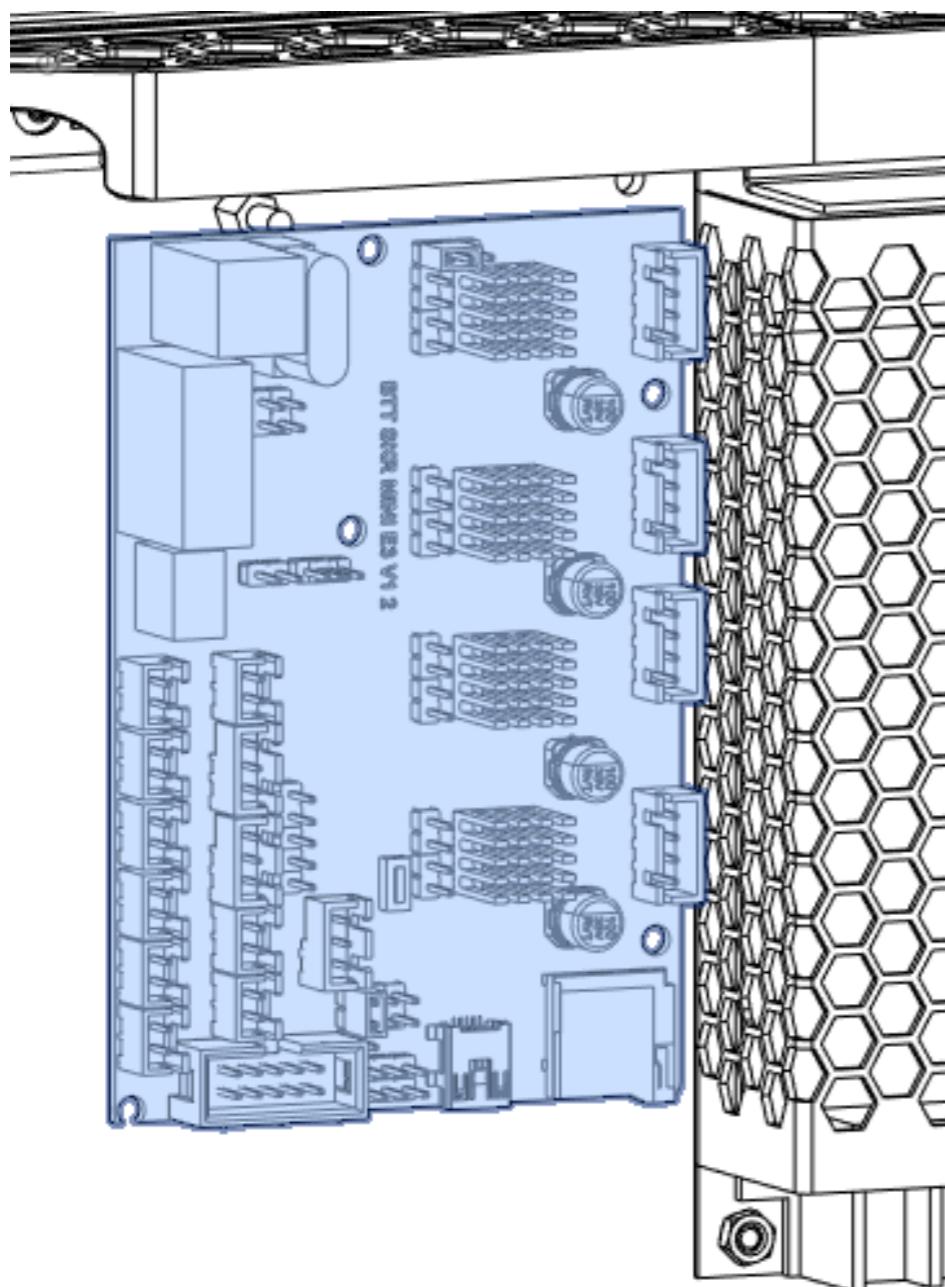


Part	Qty
M3 Nut	2
Crydom SSR	1

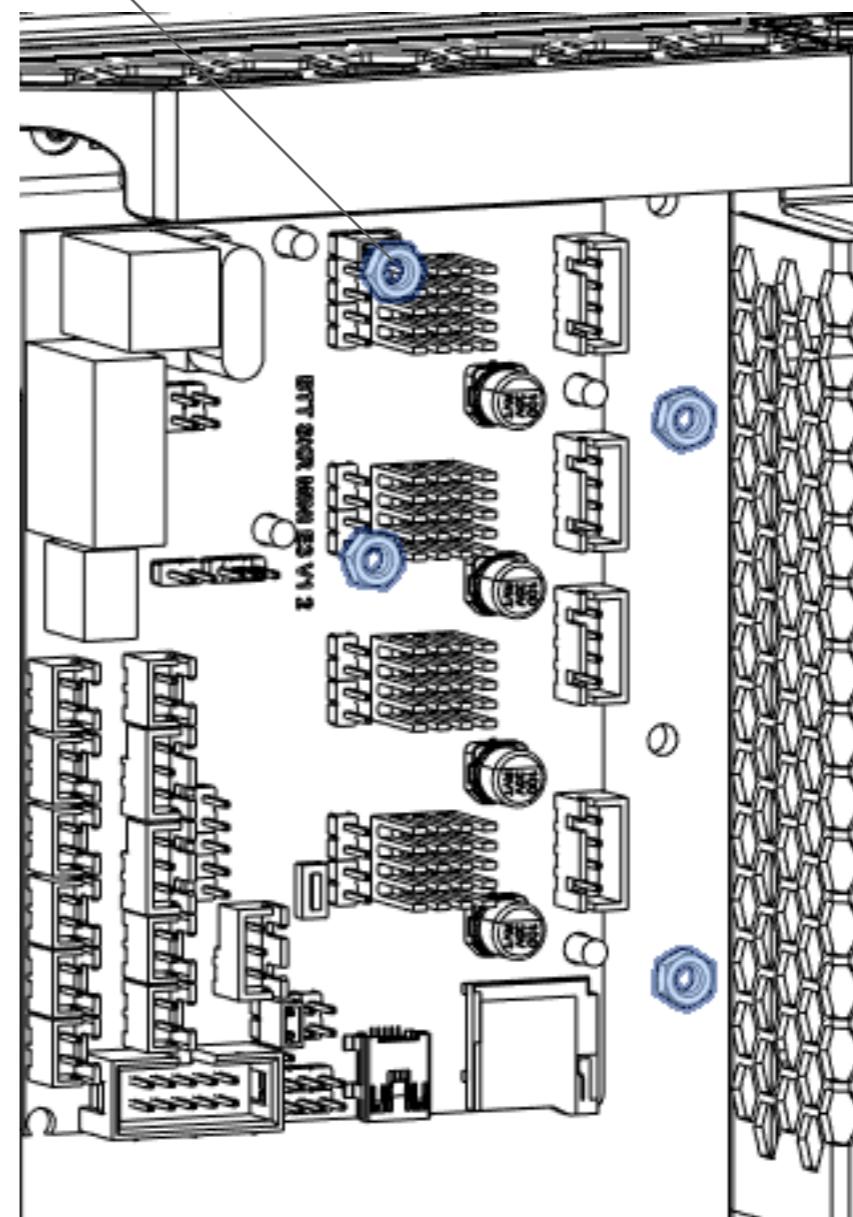
Electronics Installation



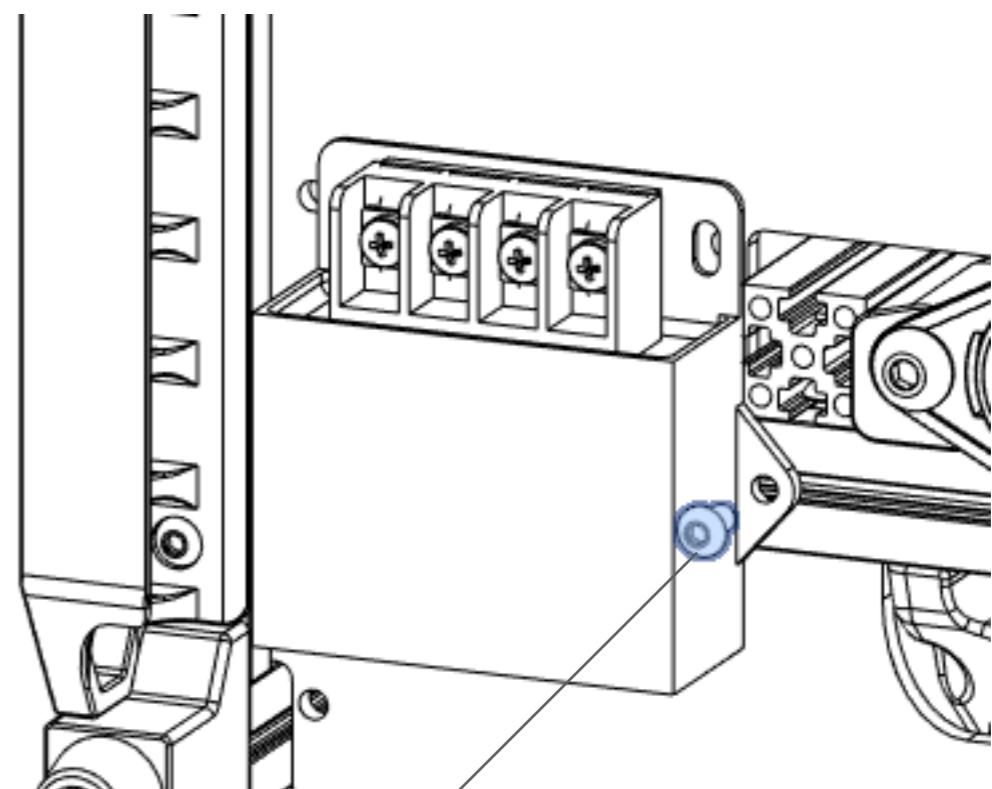
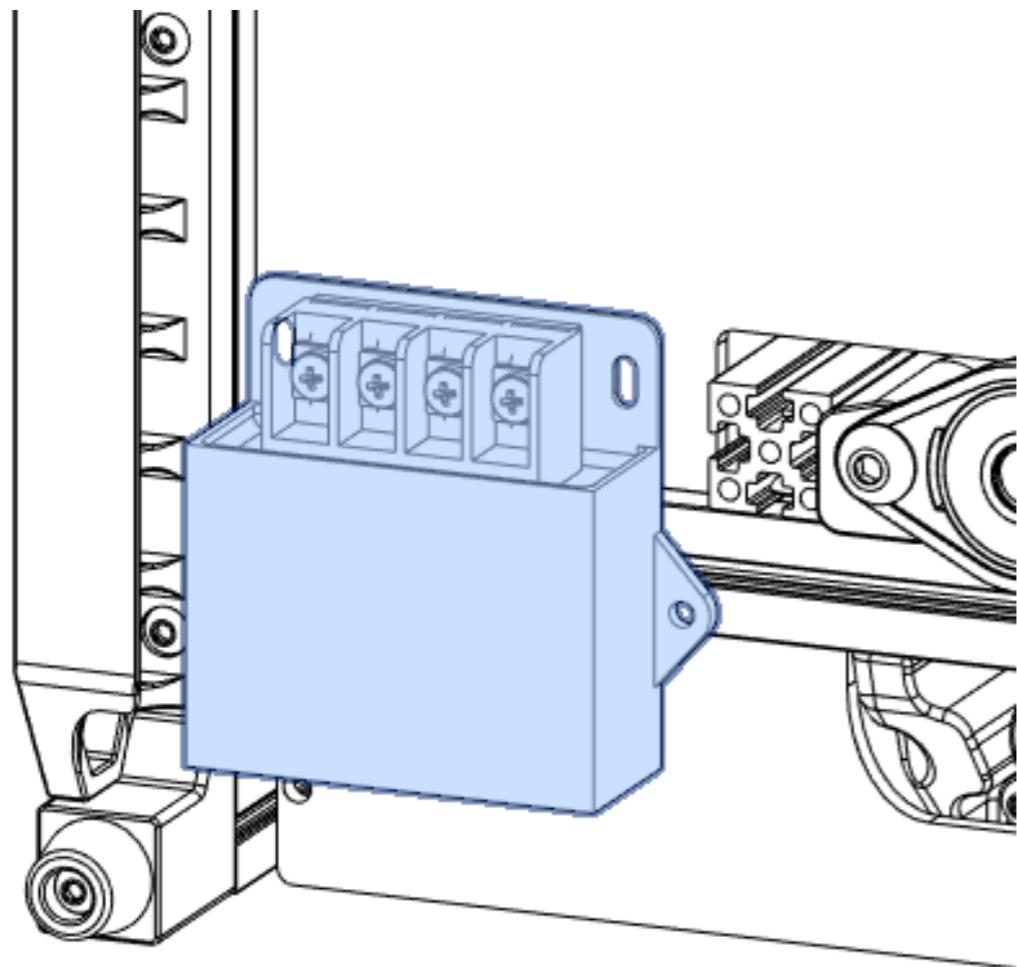
Part	Qty
M3x6 BHCS	4
M3 Nylon Standoffs	4



M3 Nut



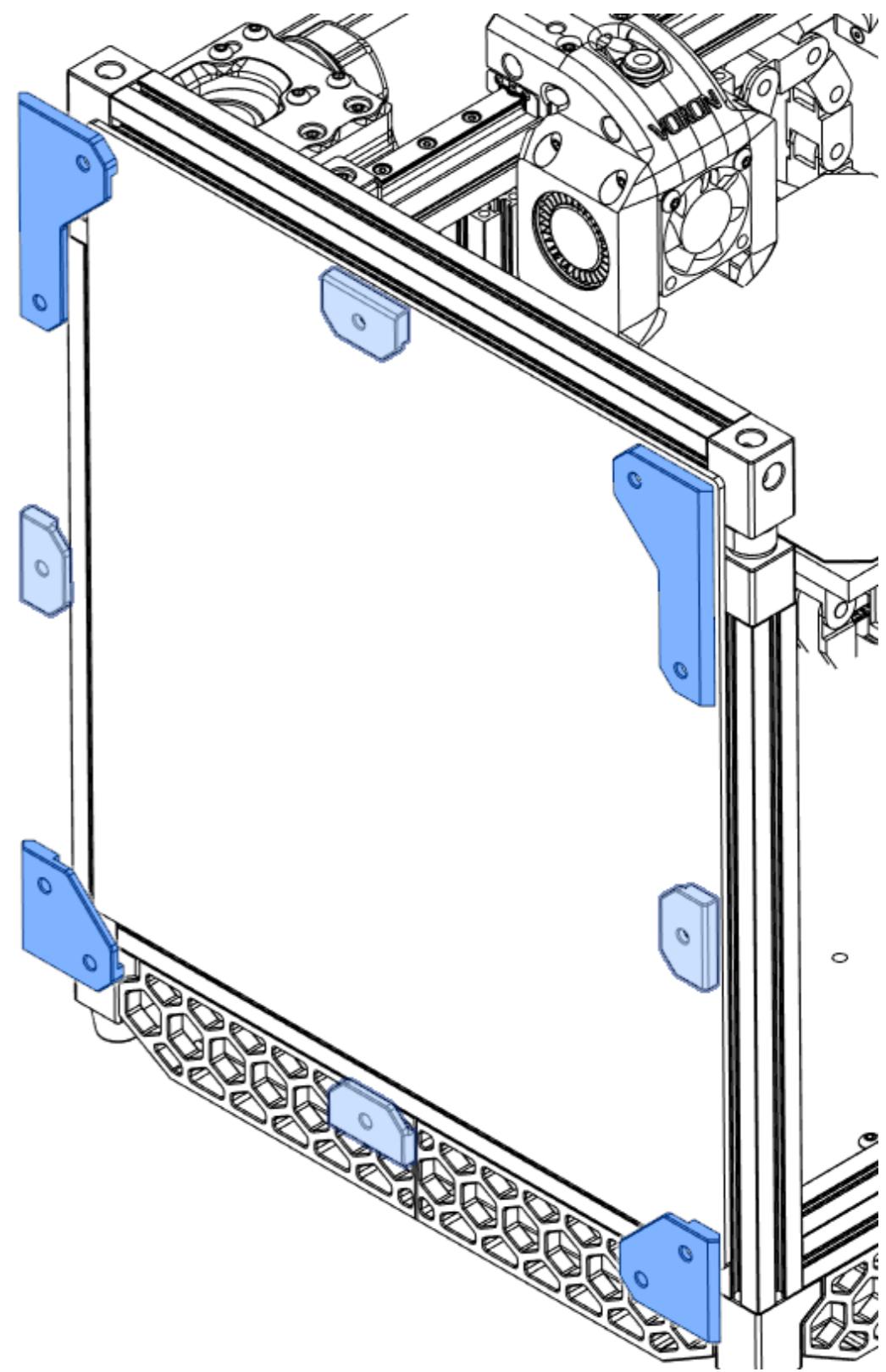
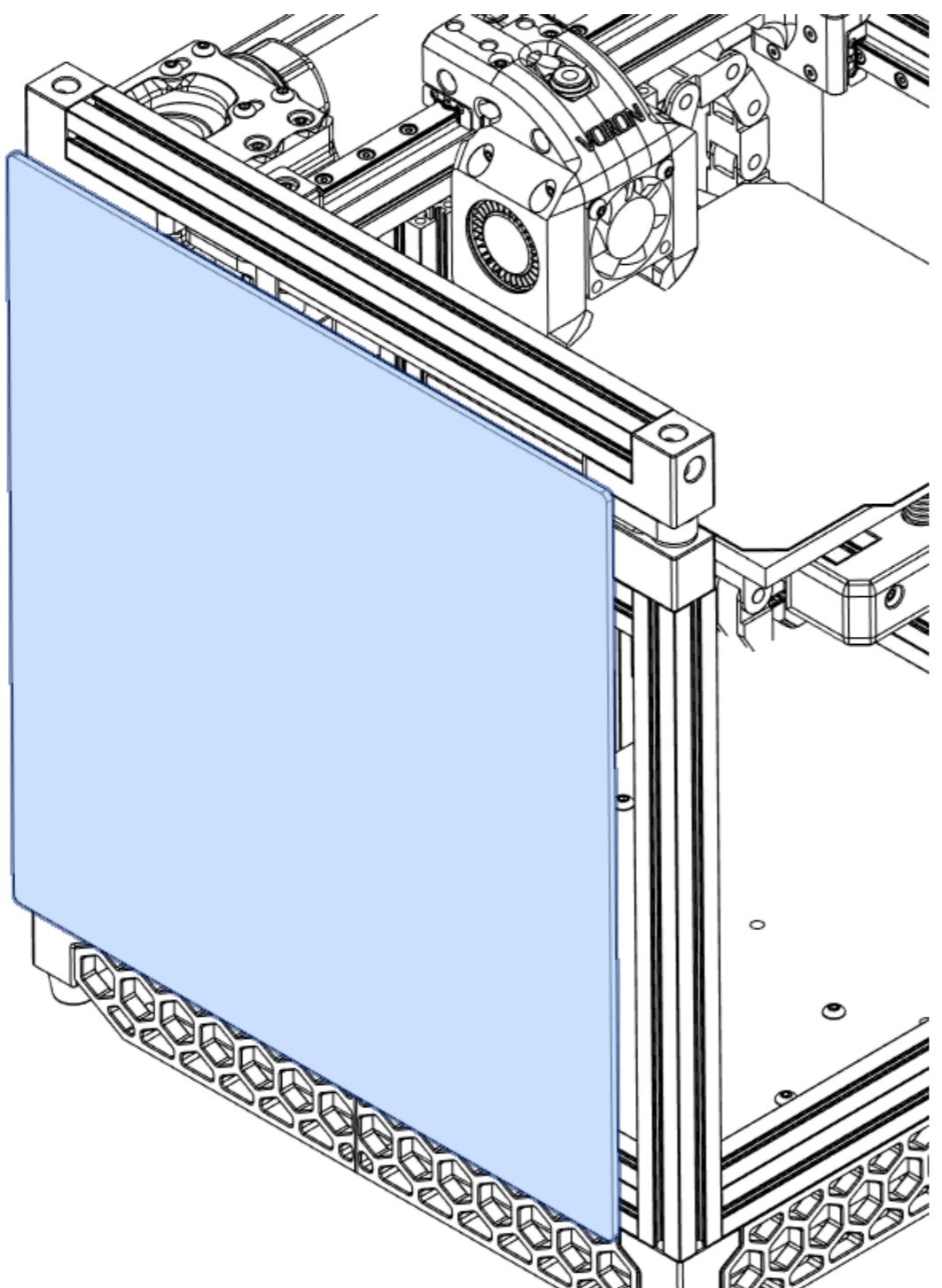
Part	Qty
M3 Nut (opt Nylon)	4



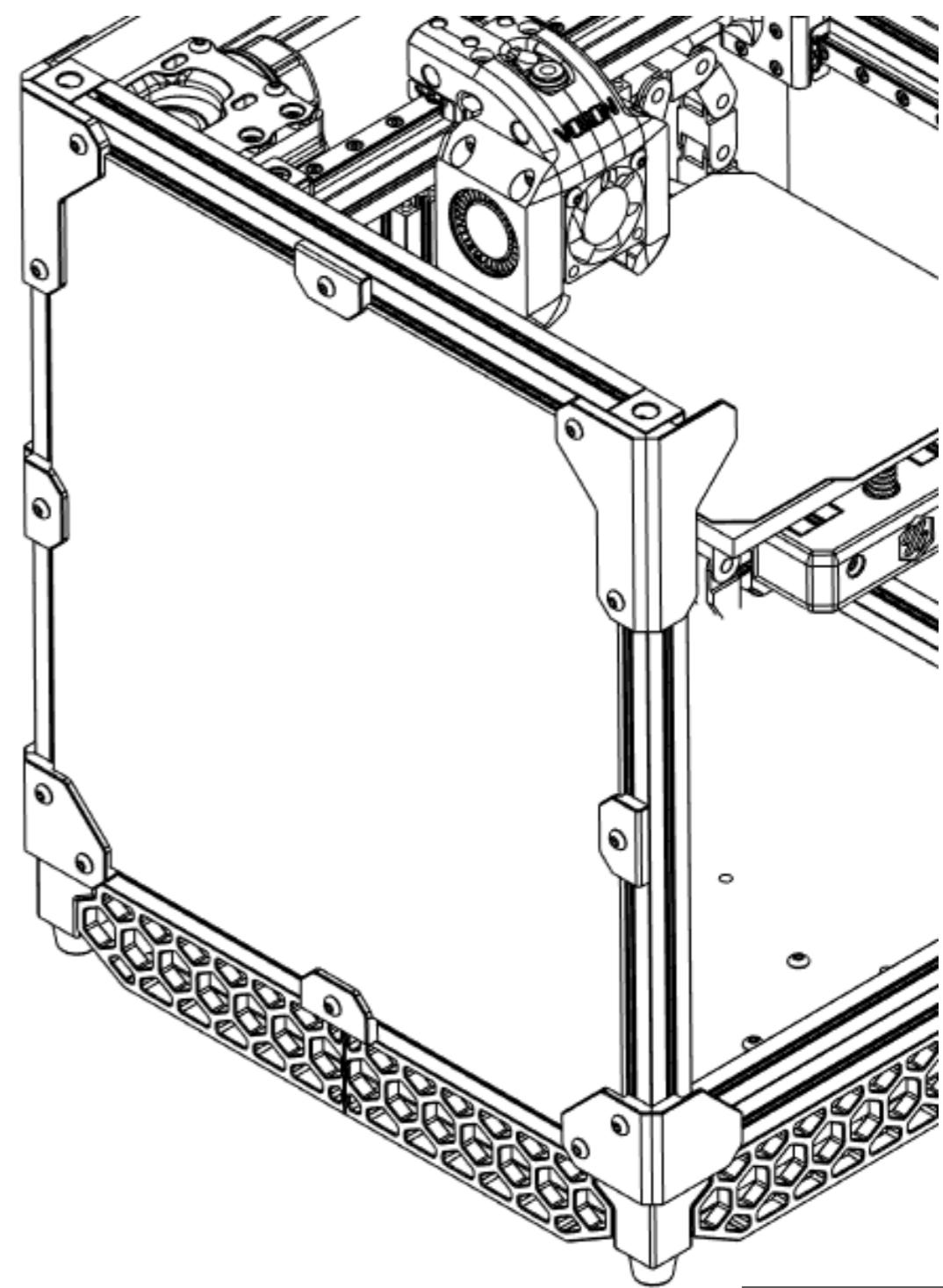
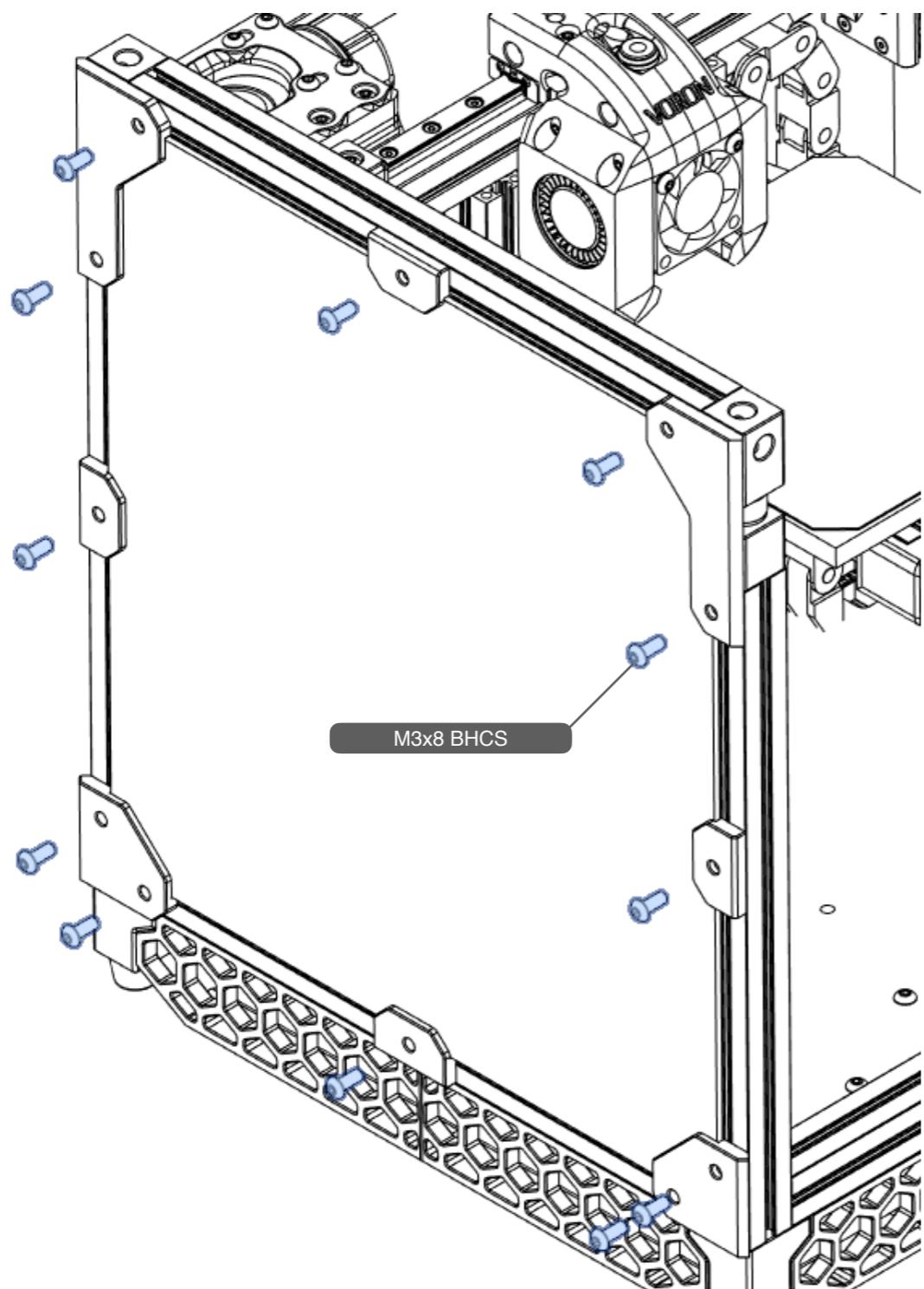
M3x6 BHCS

Part	Qty
DCDC Converter	1
M3x6 BHCS	2

Panels

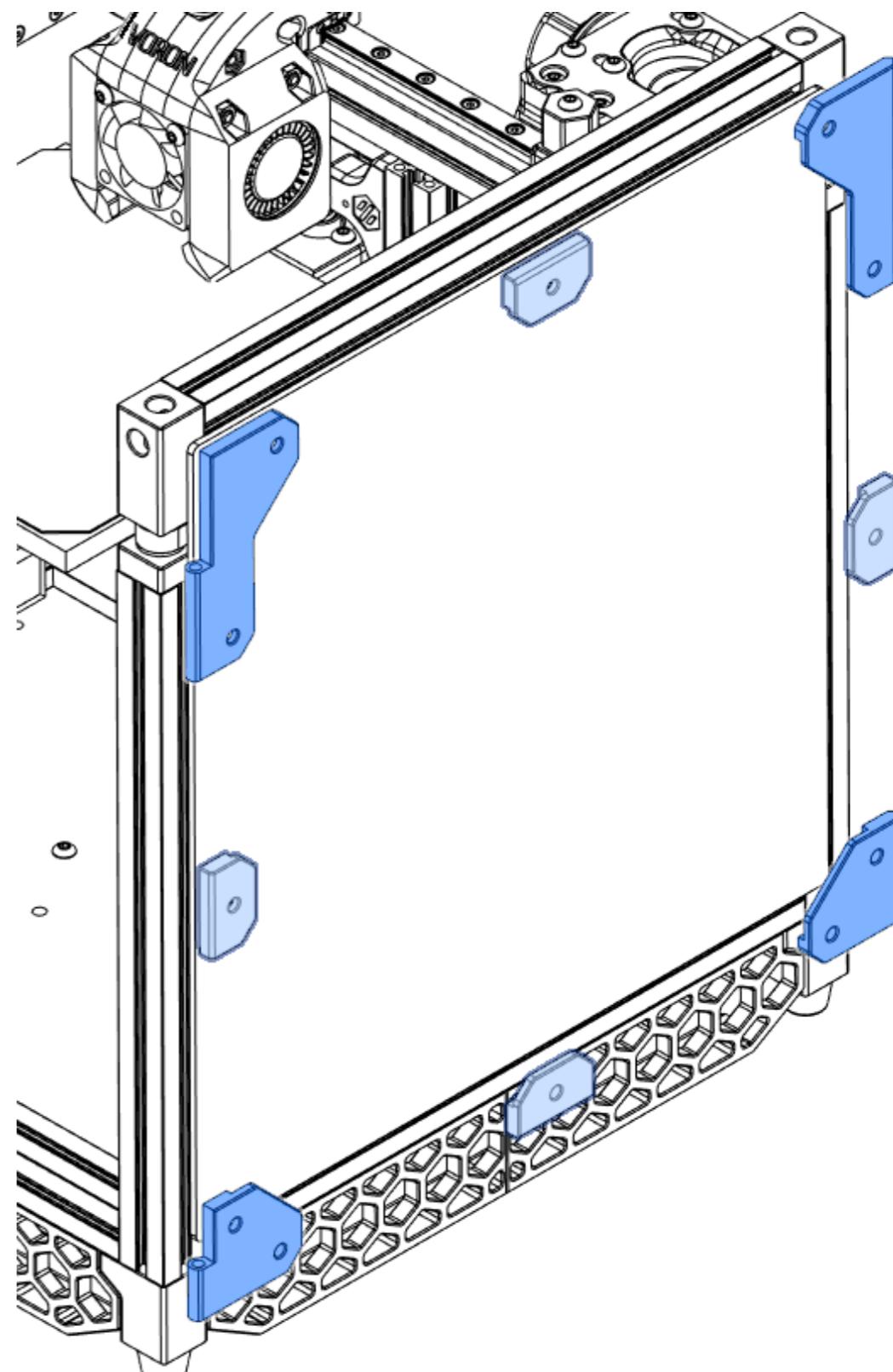
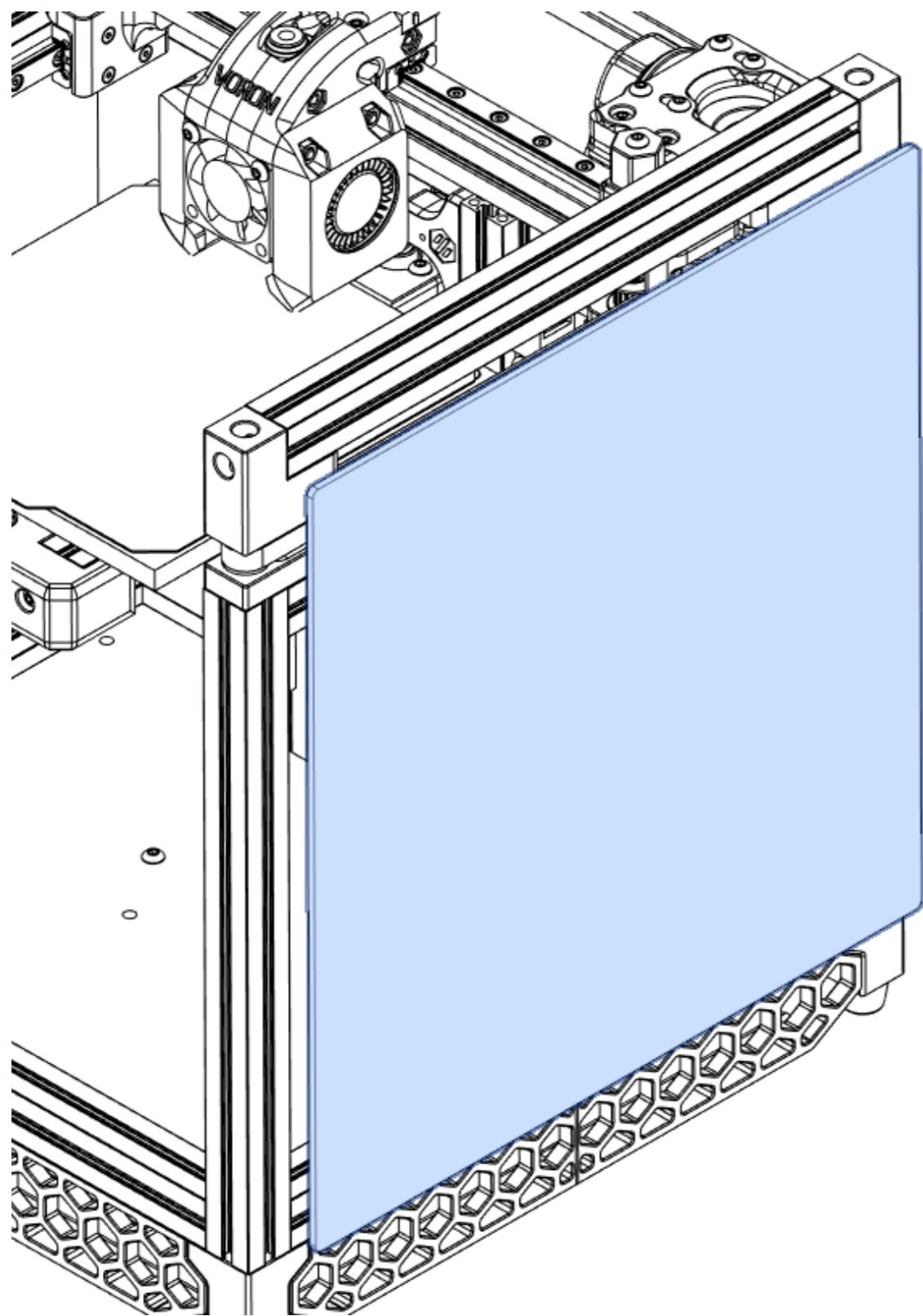


Panels

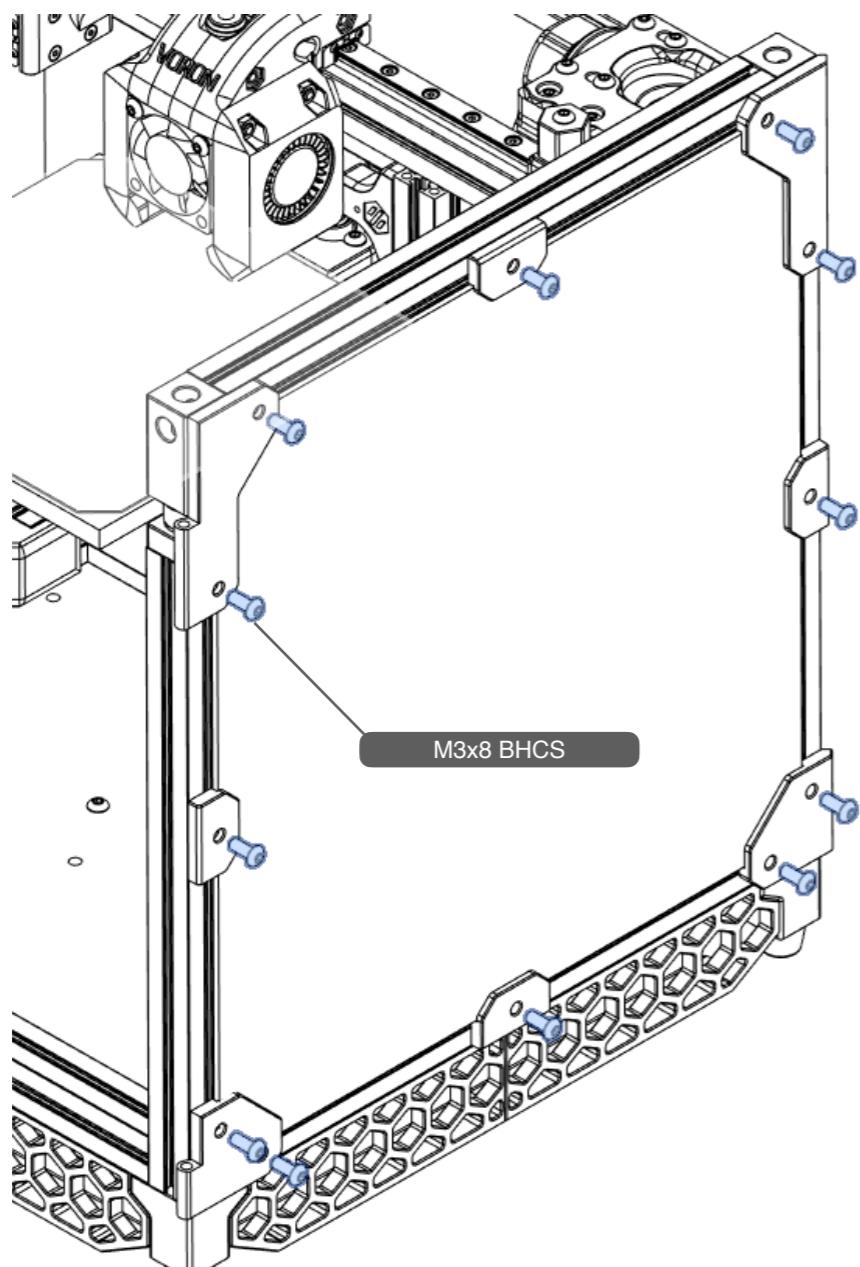


Part	Qty
M3x6 BHCS	12

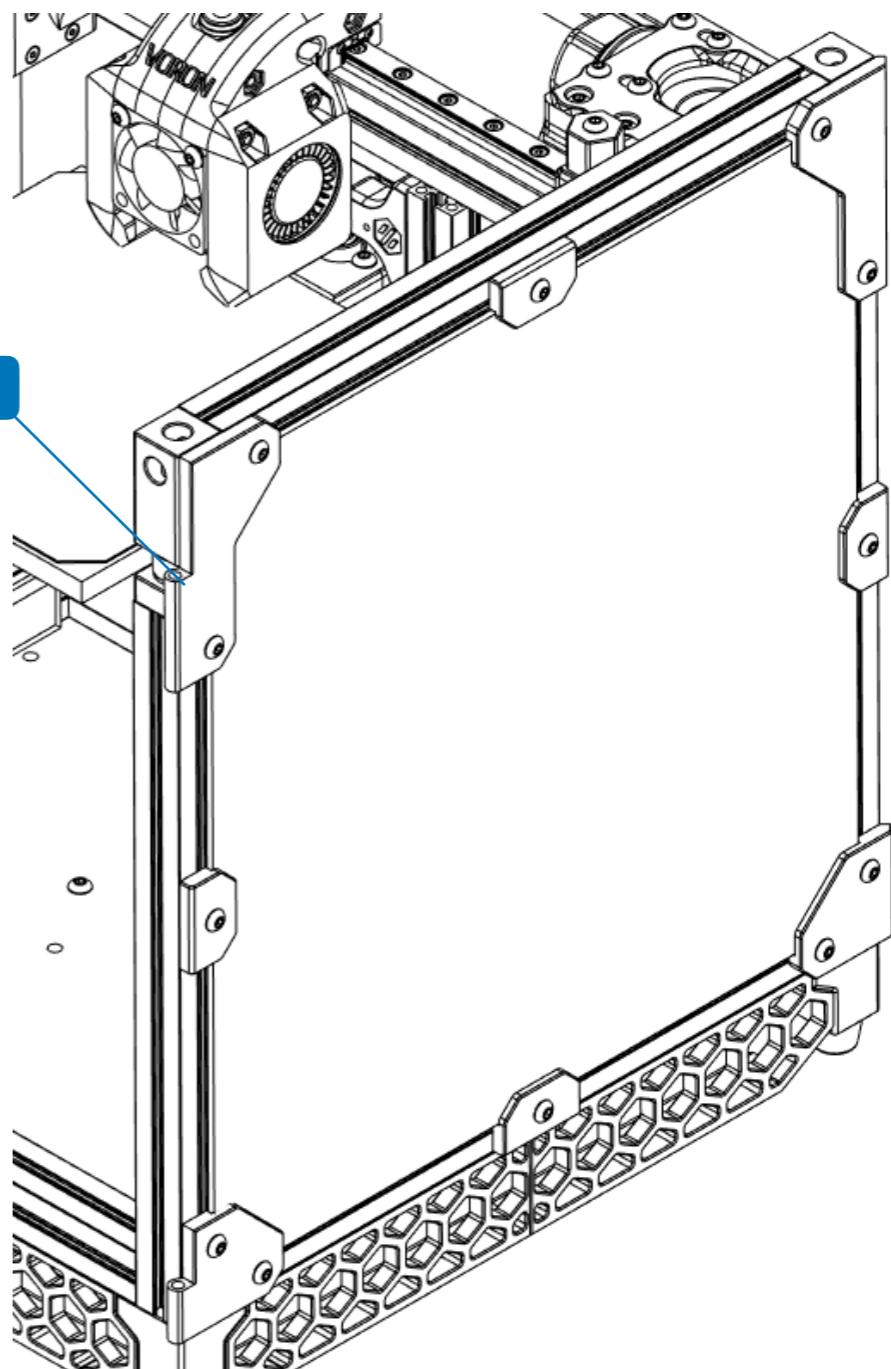
Panels



Panels

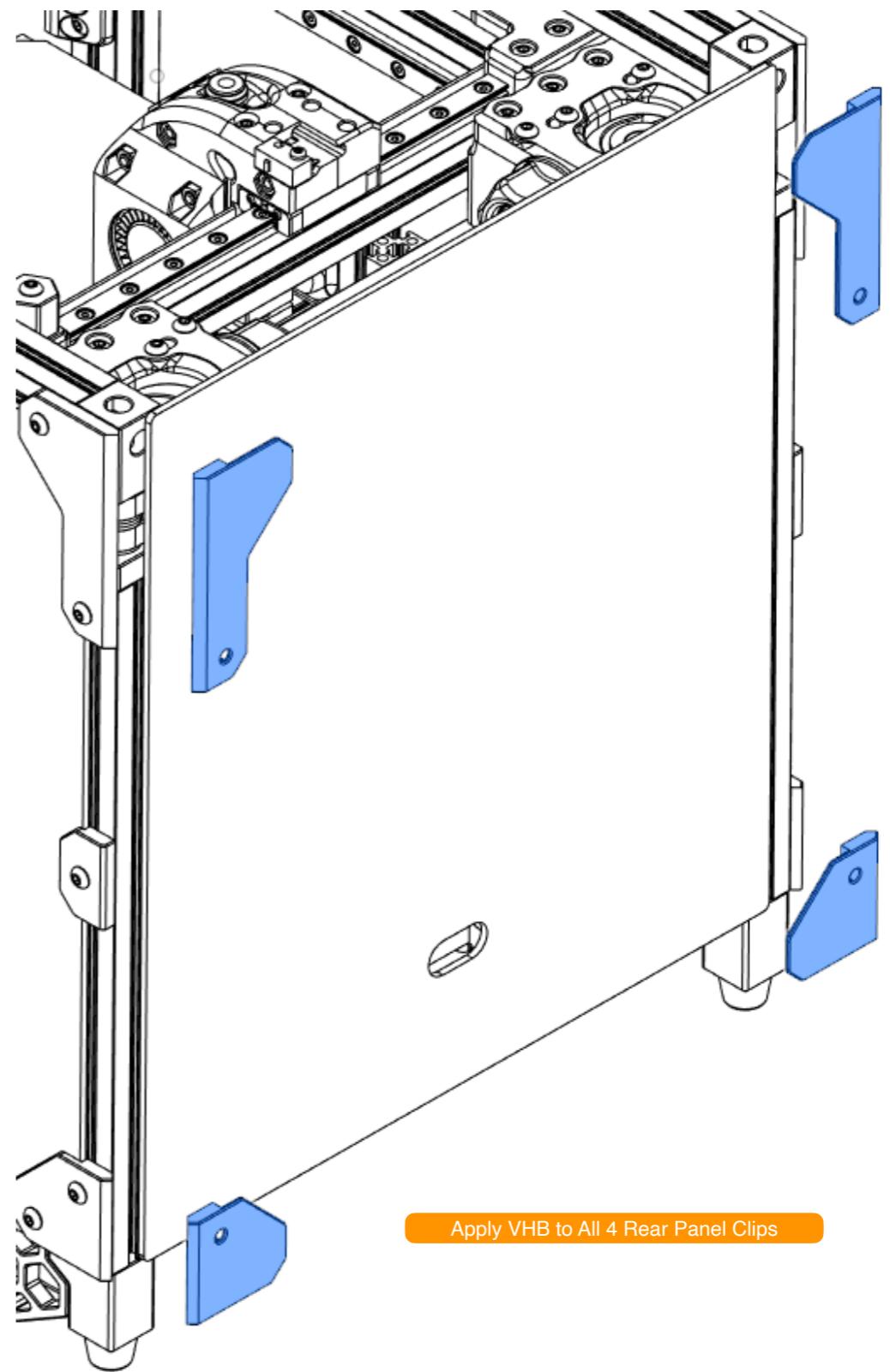
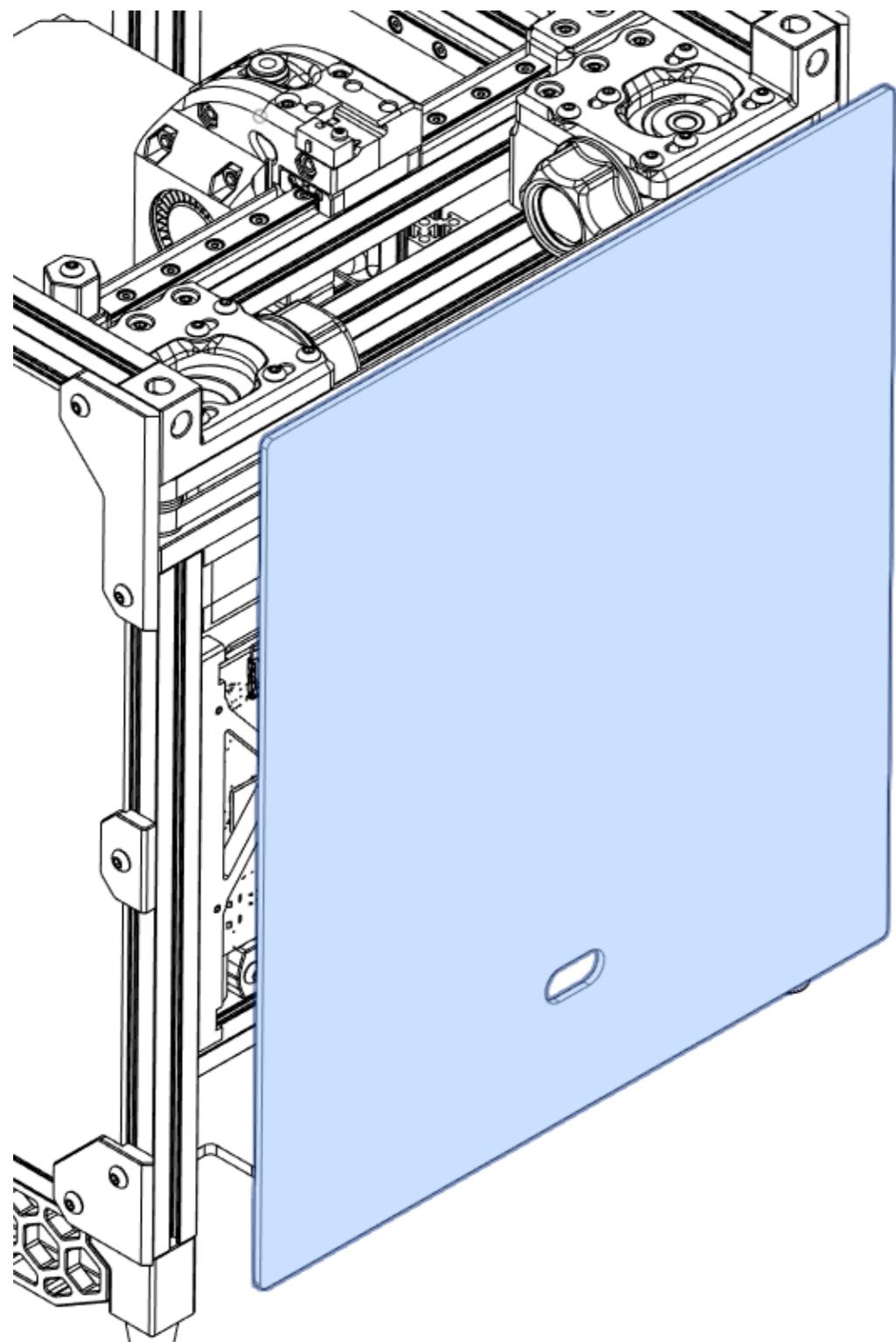


Use M3x40 BHCS as Hinge Pin
(screw down from top and then cut off bolt head)

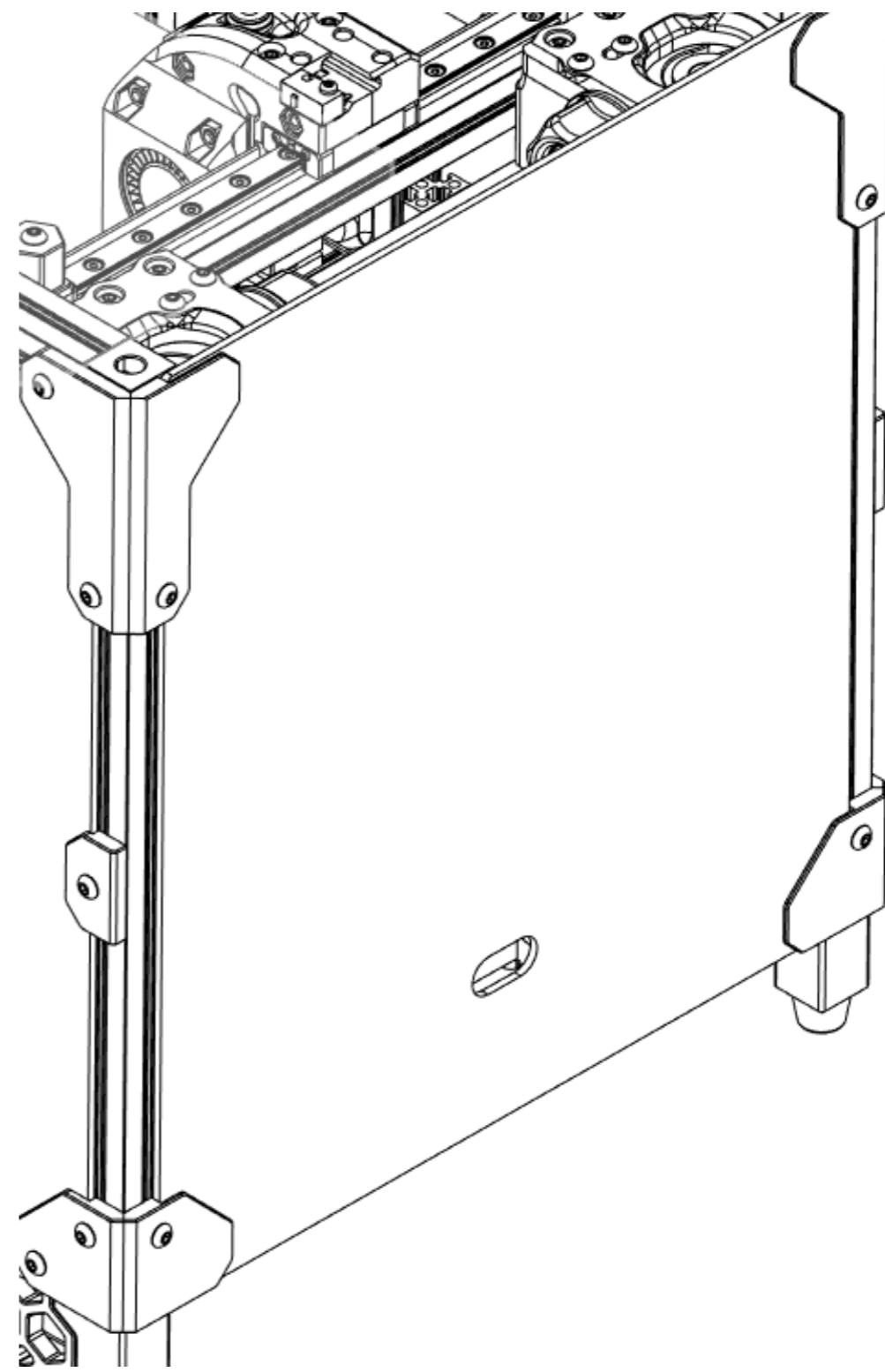
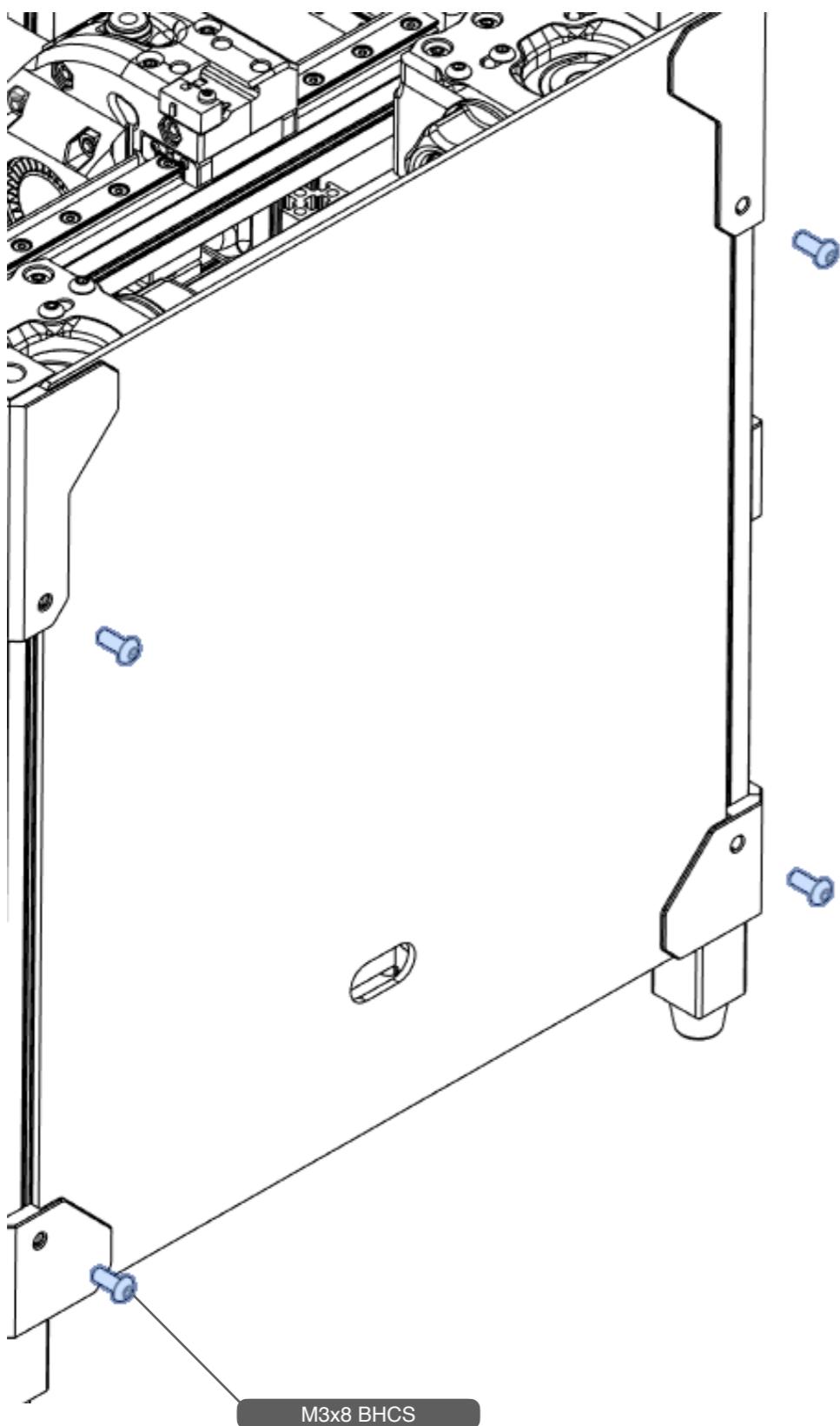


Part	Qty
M3x6 BHCS	12

Panels

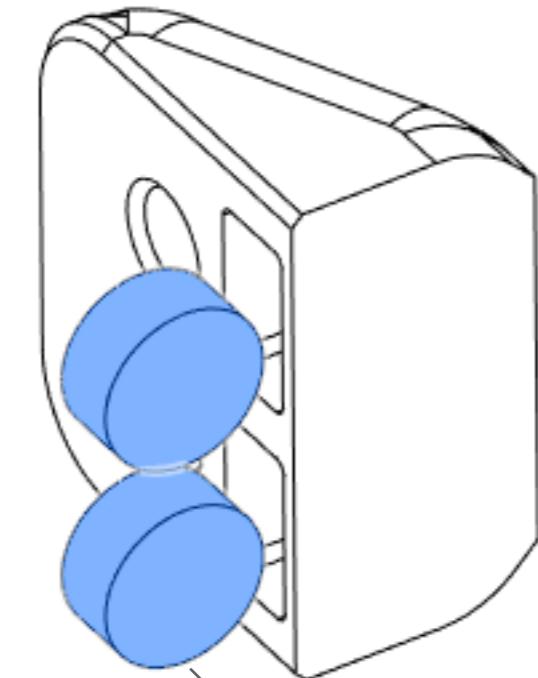


Panels

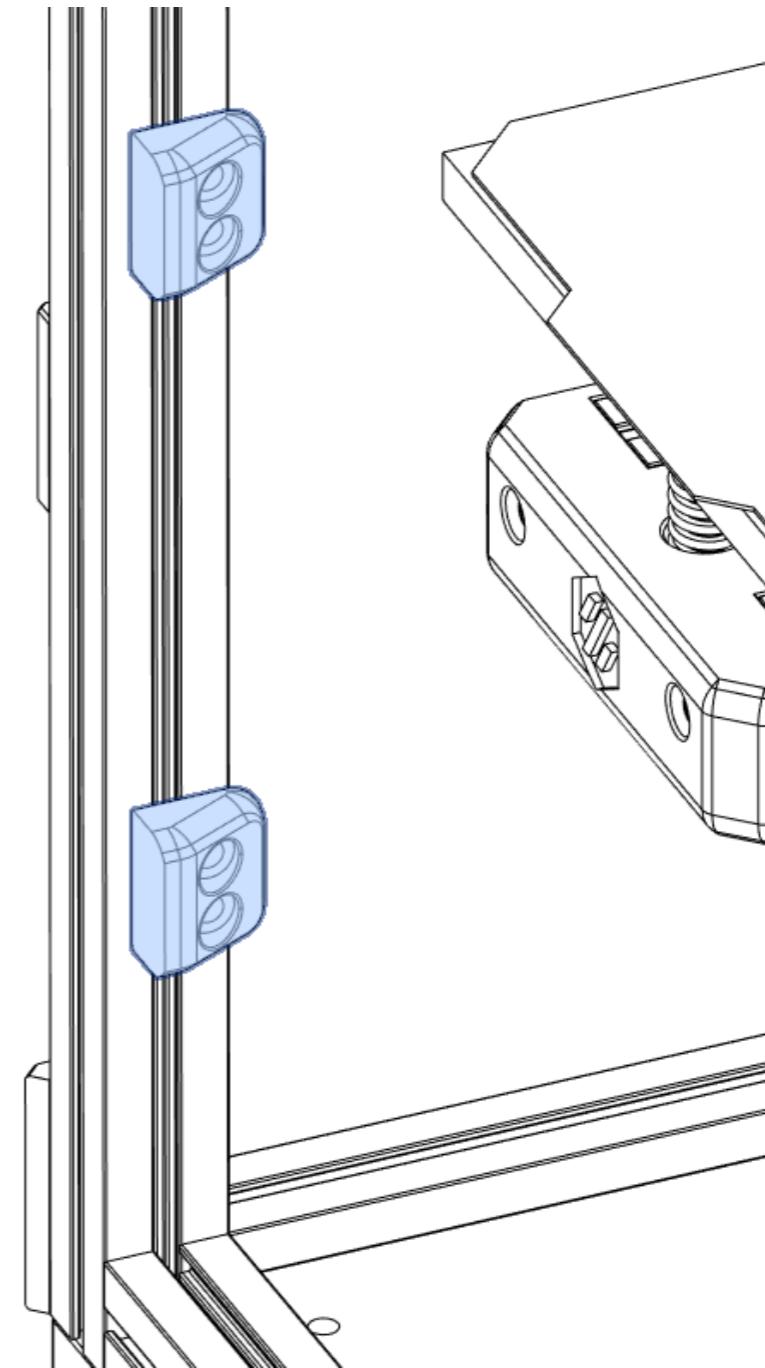
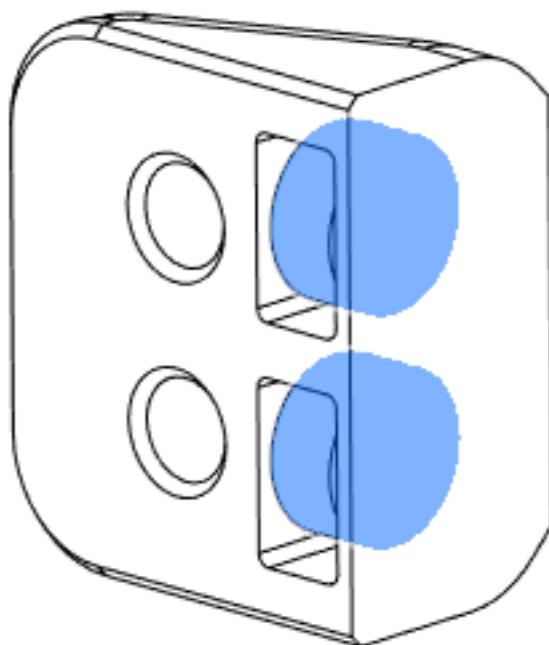


Part	Qty
M3x6 BHCS	4

Front Door

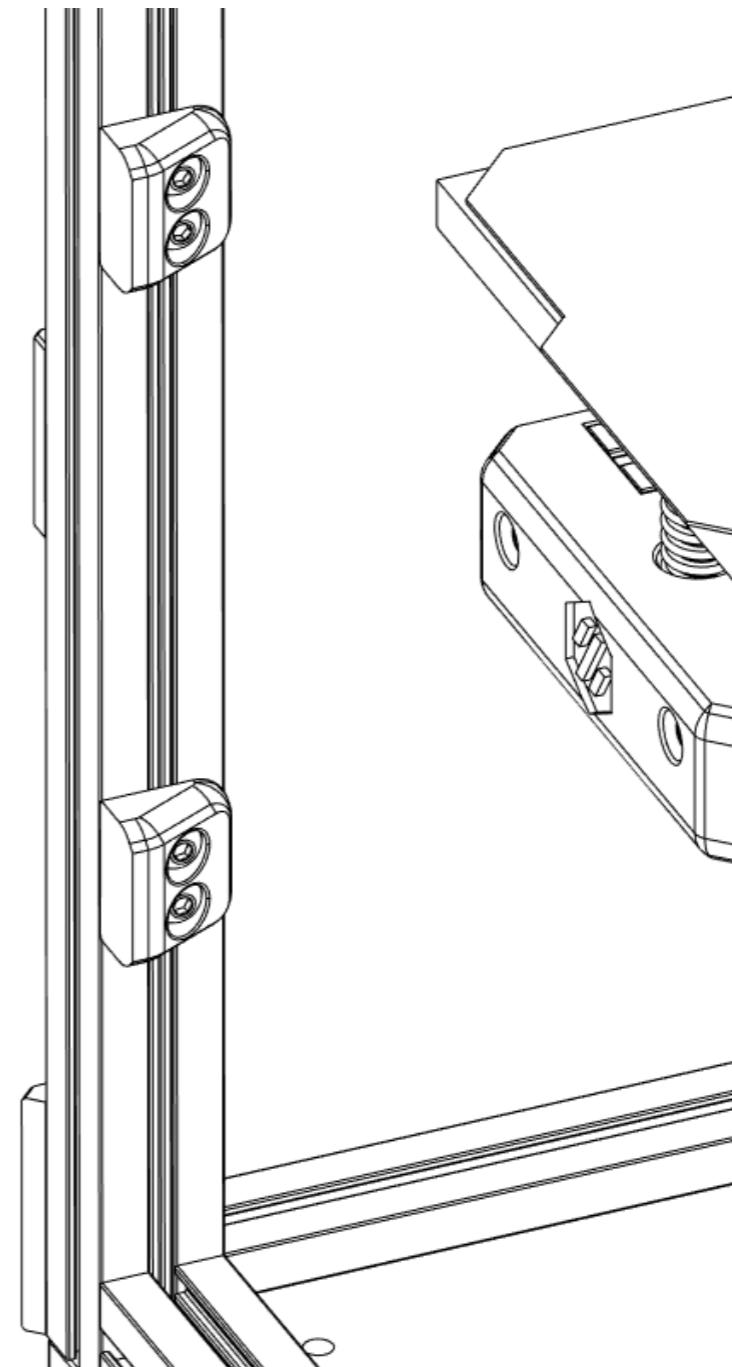
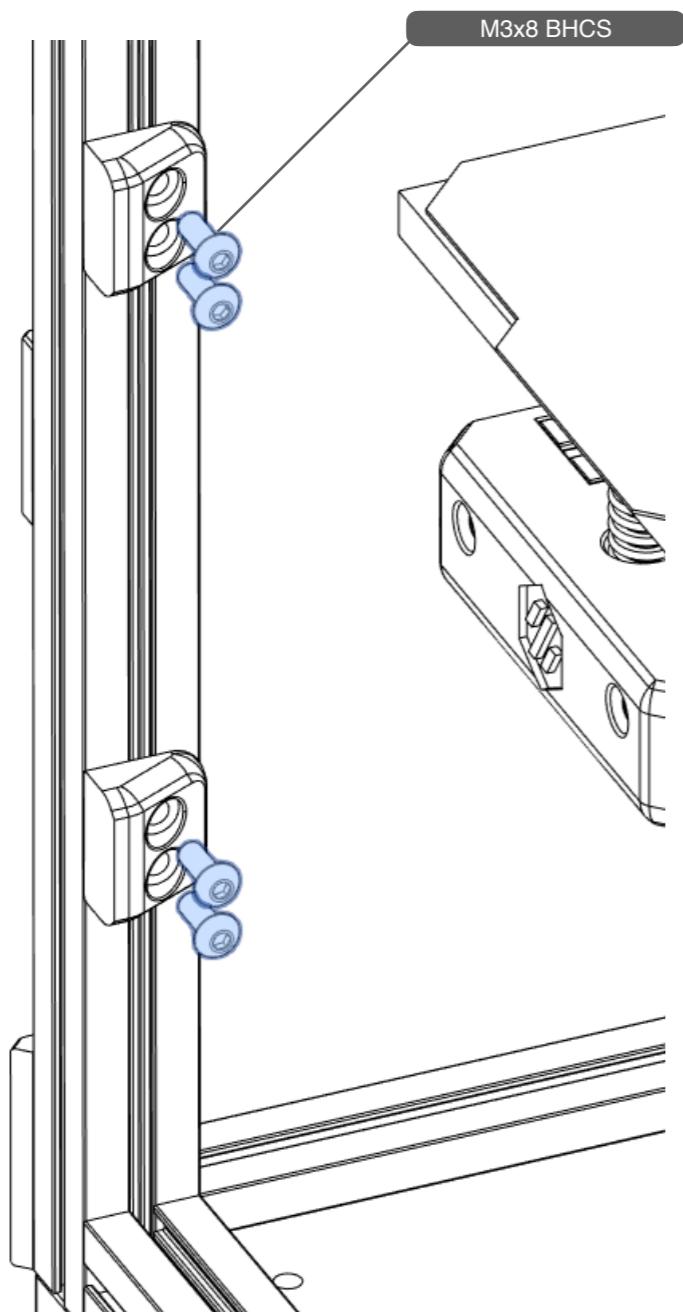


6x3mm Neodymium Magnets



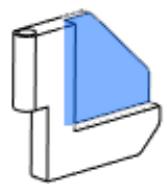
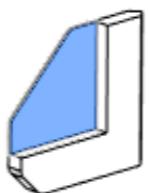
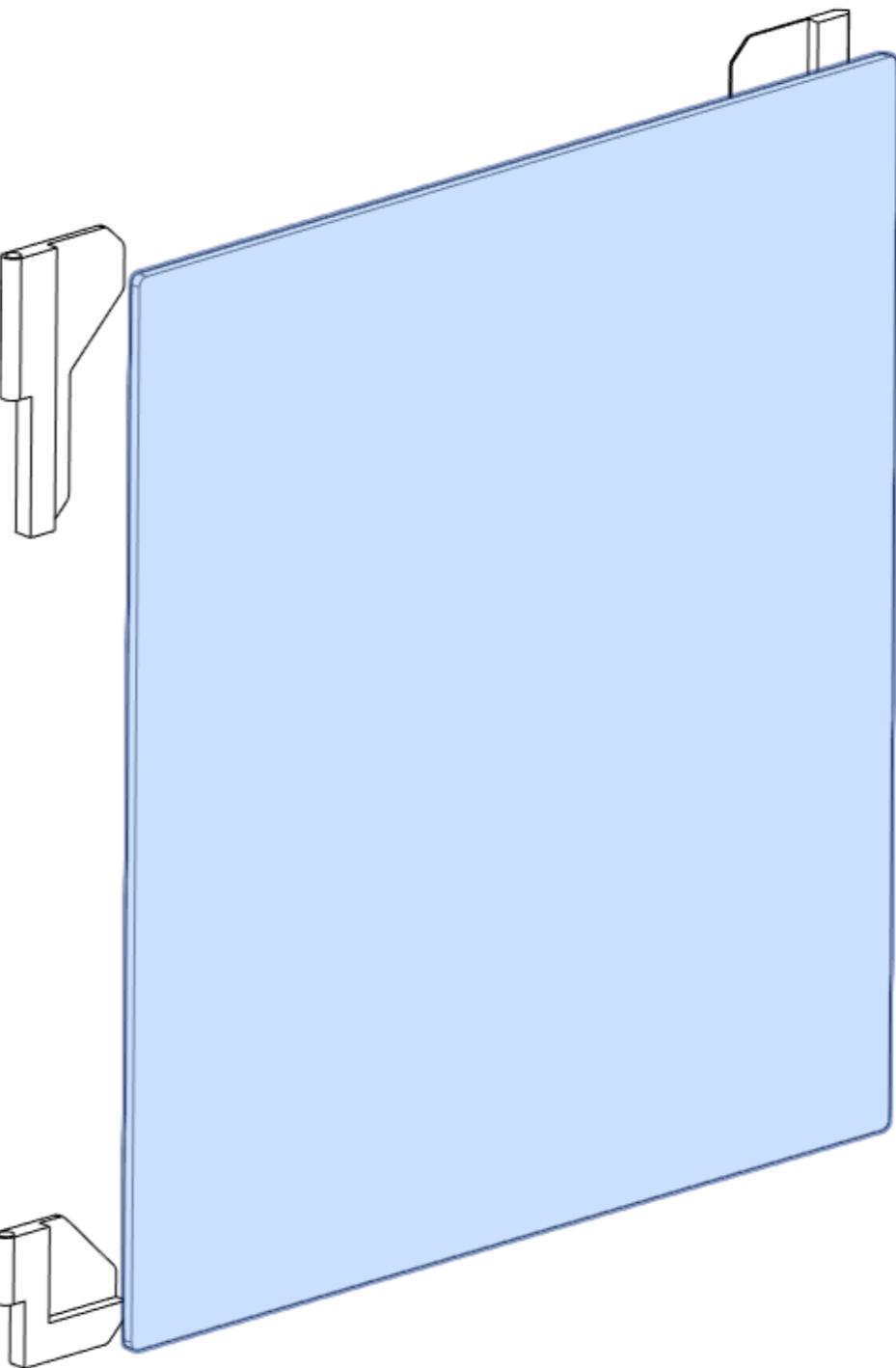
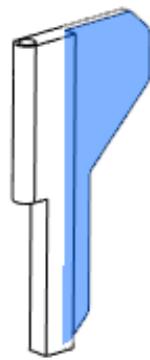
Part	Qty
6x3 Magnet	4

Front Door



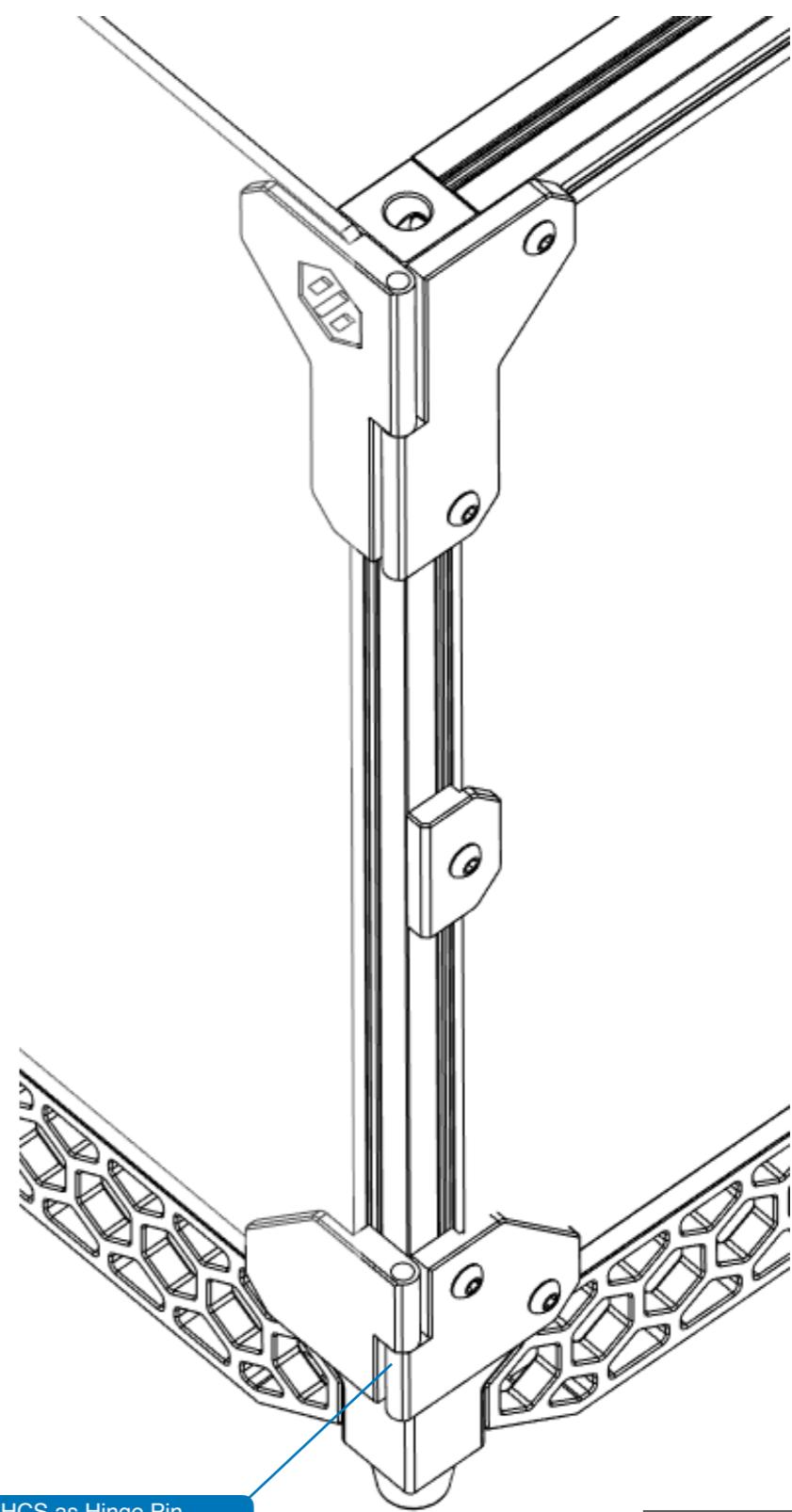
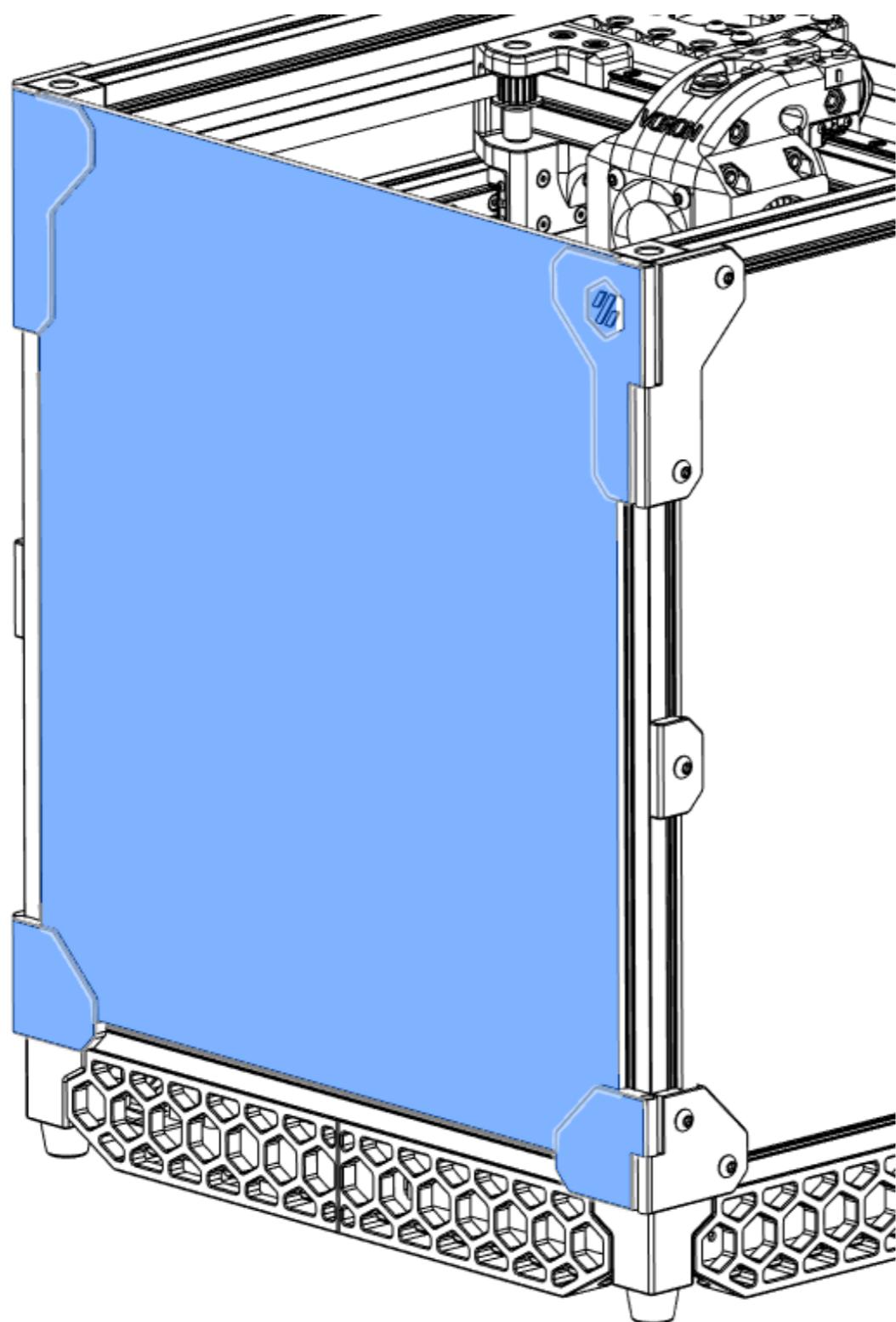
Part	Qty
M3x8 BHCS	4

Front Door



Apply VHB to All 4 Door Panel Clips

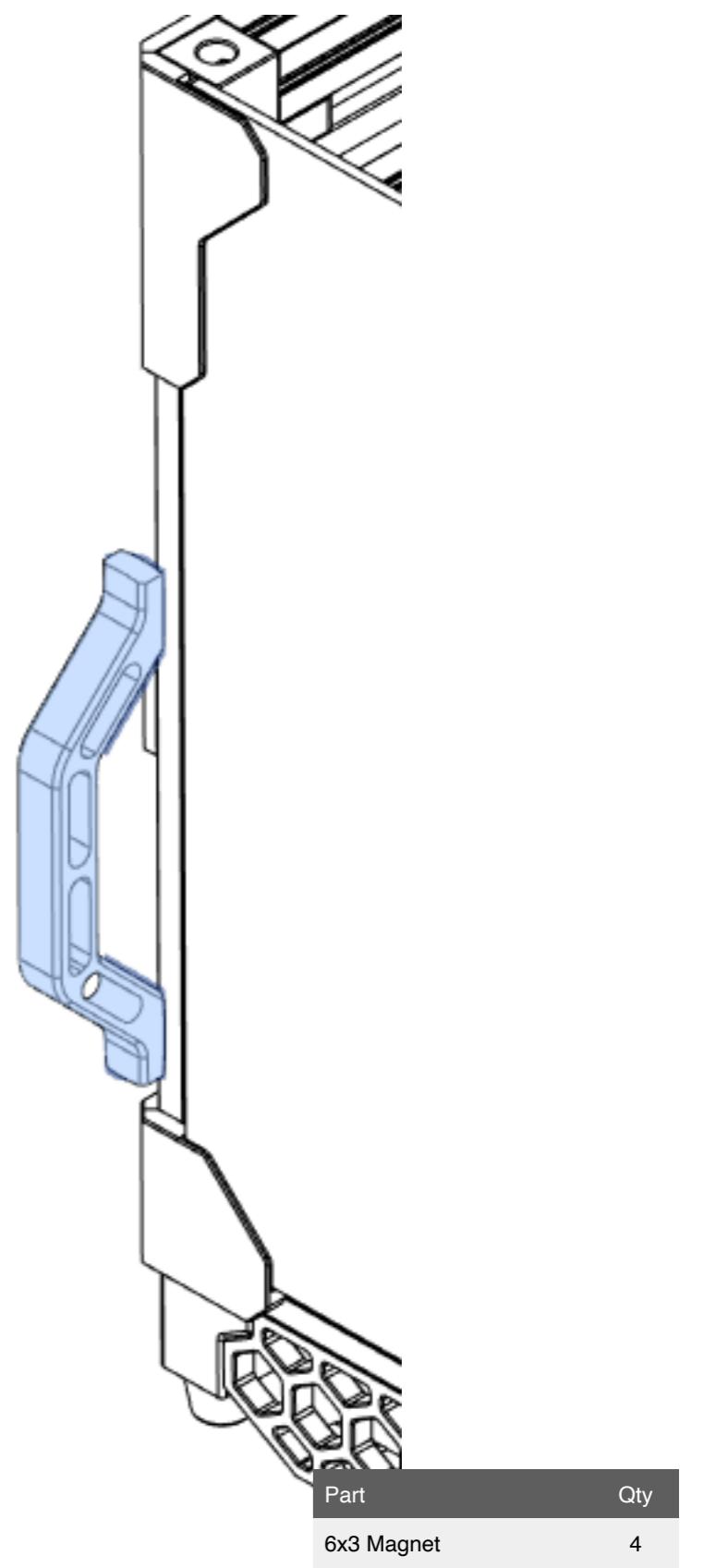
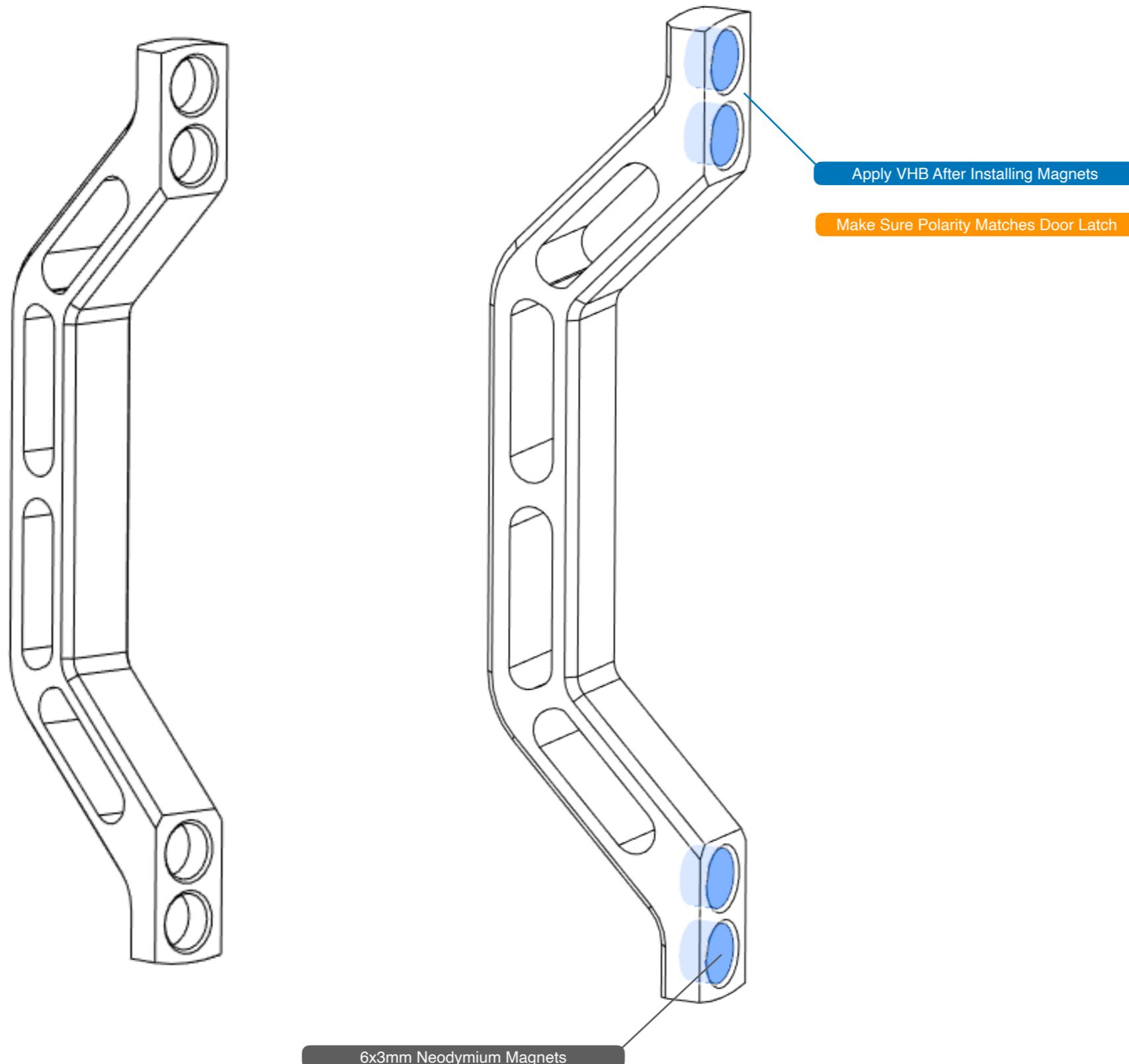
Front Door



Use M3x30 BHCS as Hinge Pin

Part	Qty
M3x30 BHCS	2

Front Door



6x3mm Neodymium Magnets

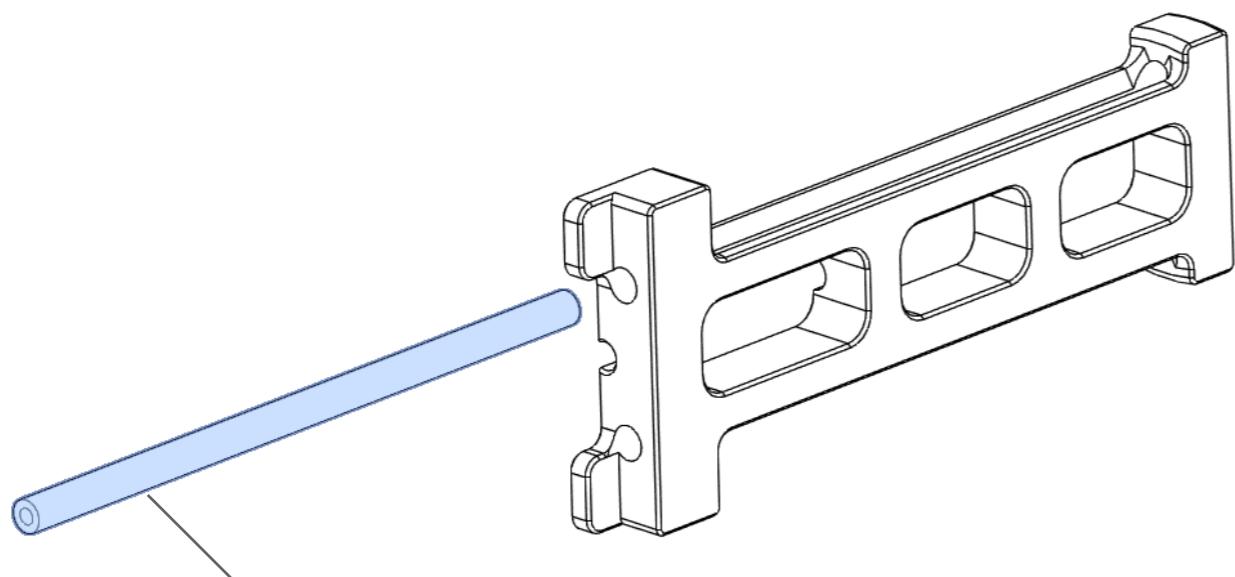
Part

6x3 Magnet

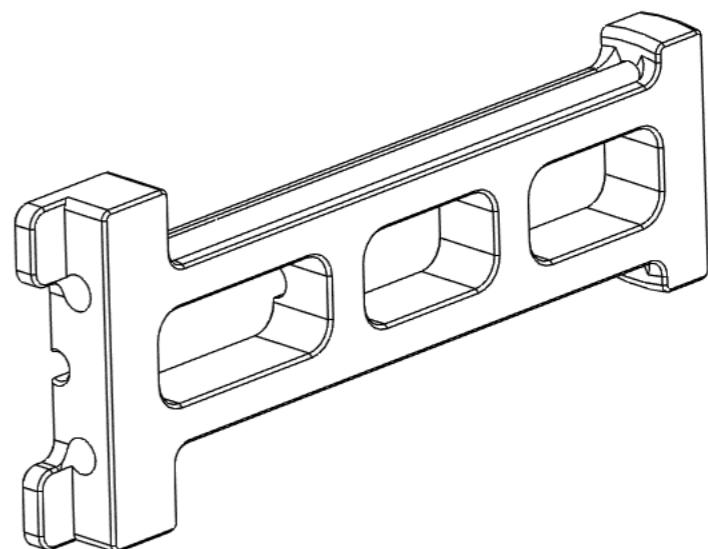
Qty

4

Spool Holder

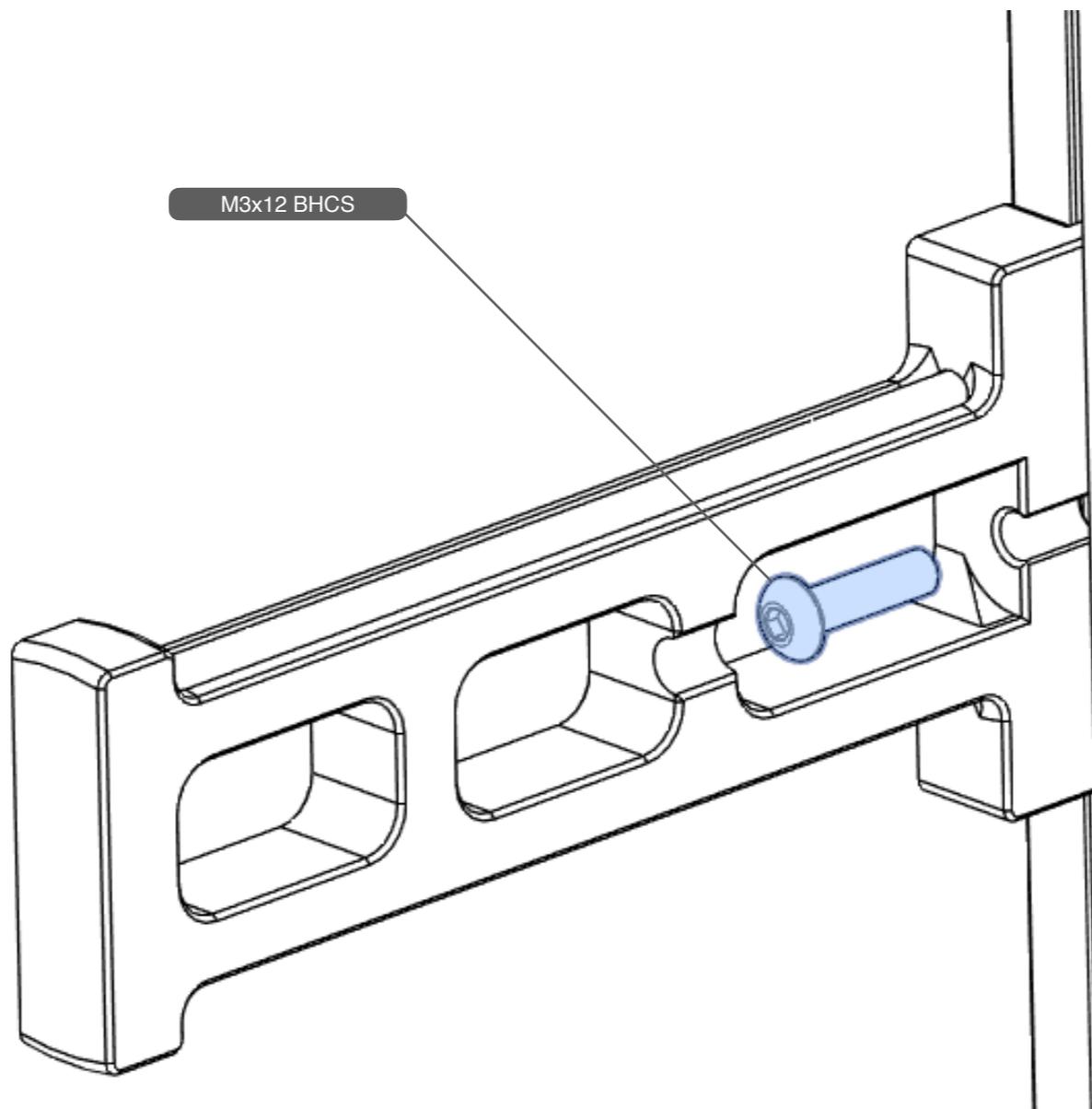


90mm Piece of Bowden Tube



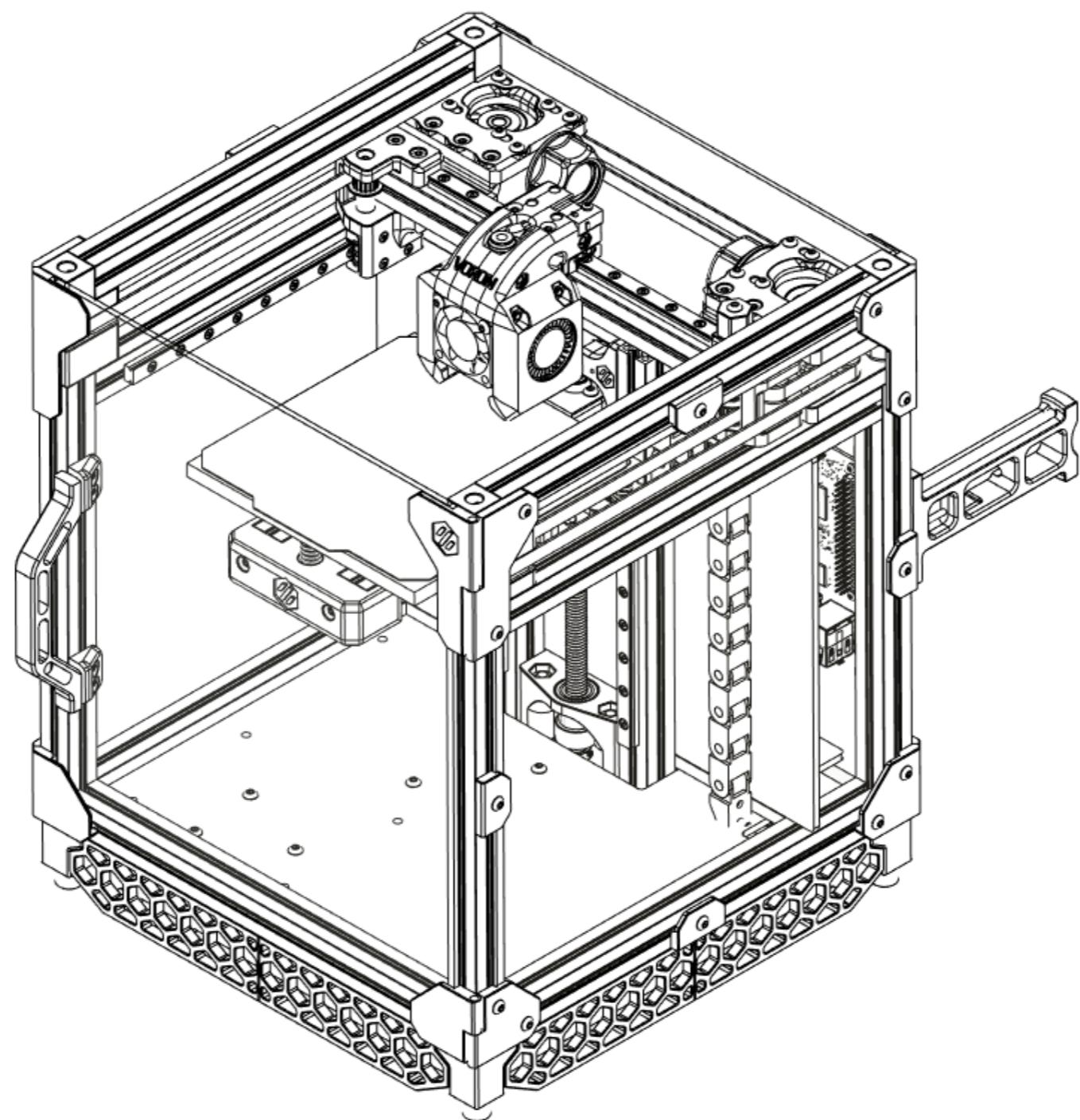
Part	Qty
Bowden Tube	1

Spool Holder

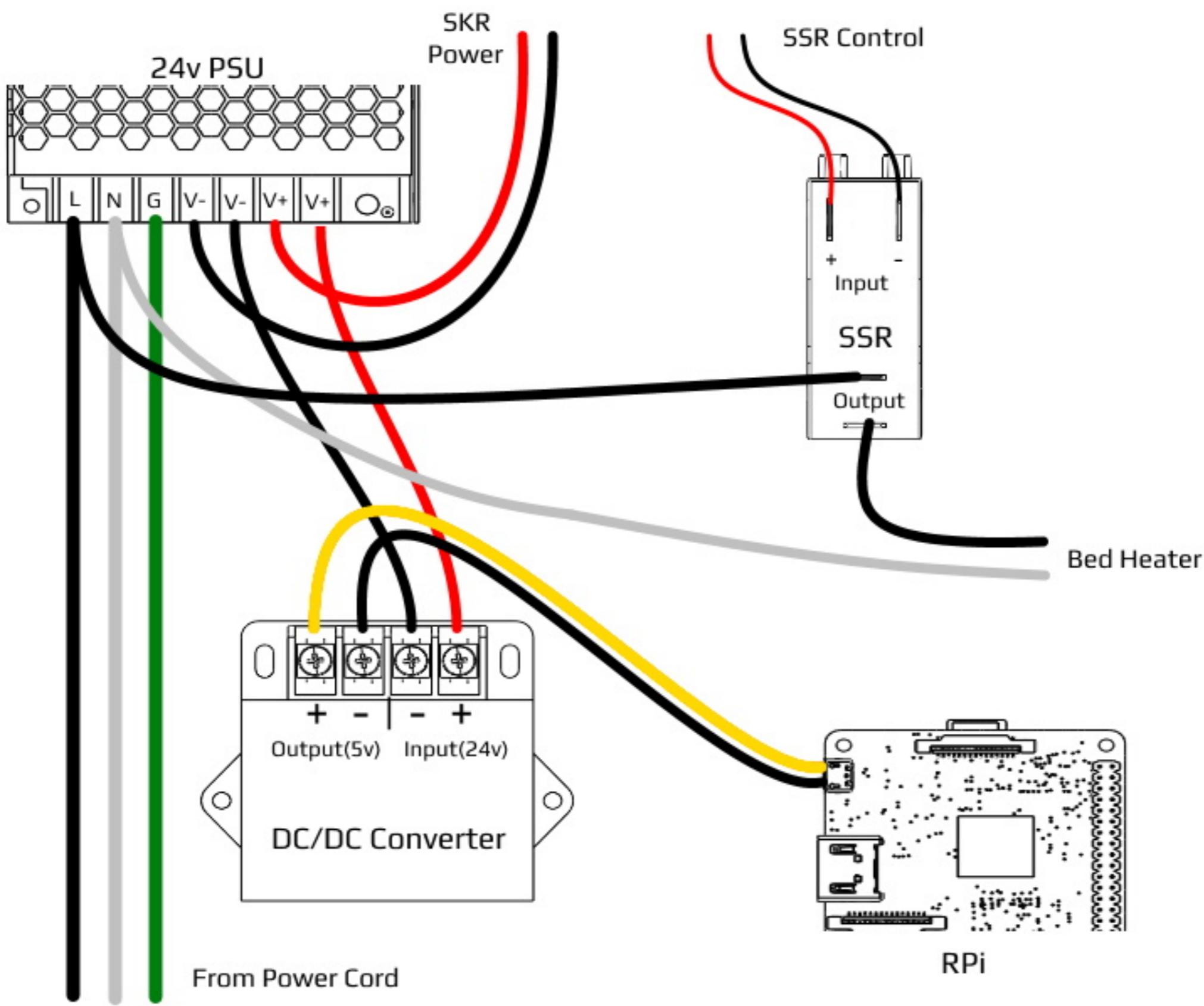


Part	Qty
M3x12 BHCS	1

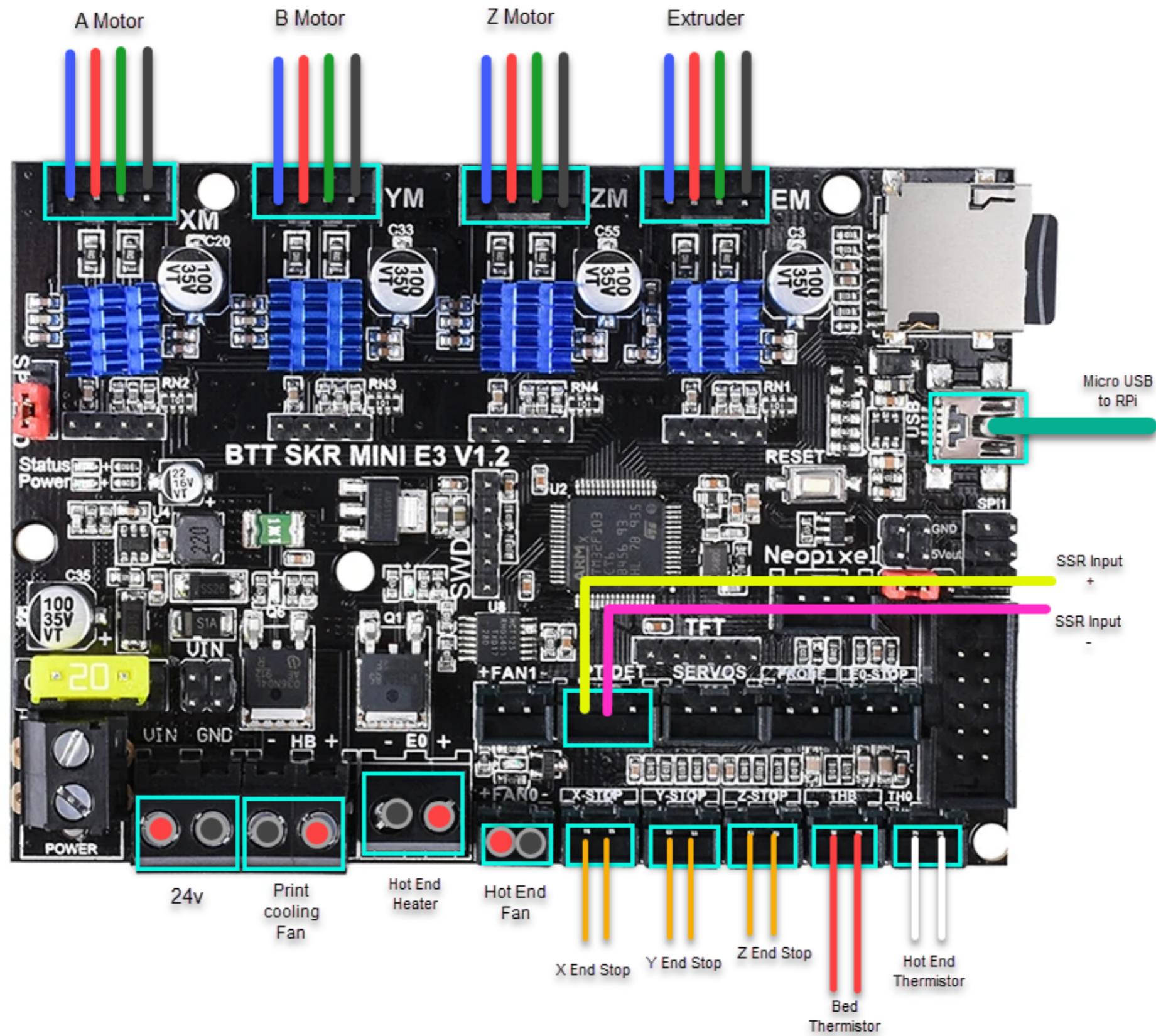
YAY!



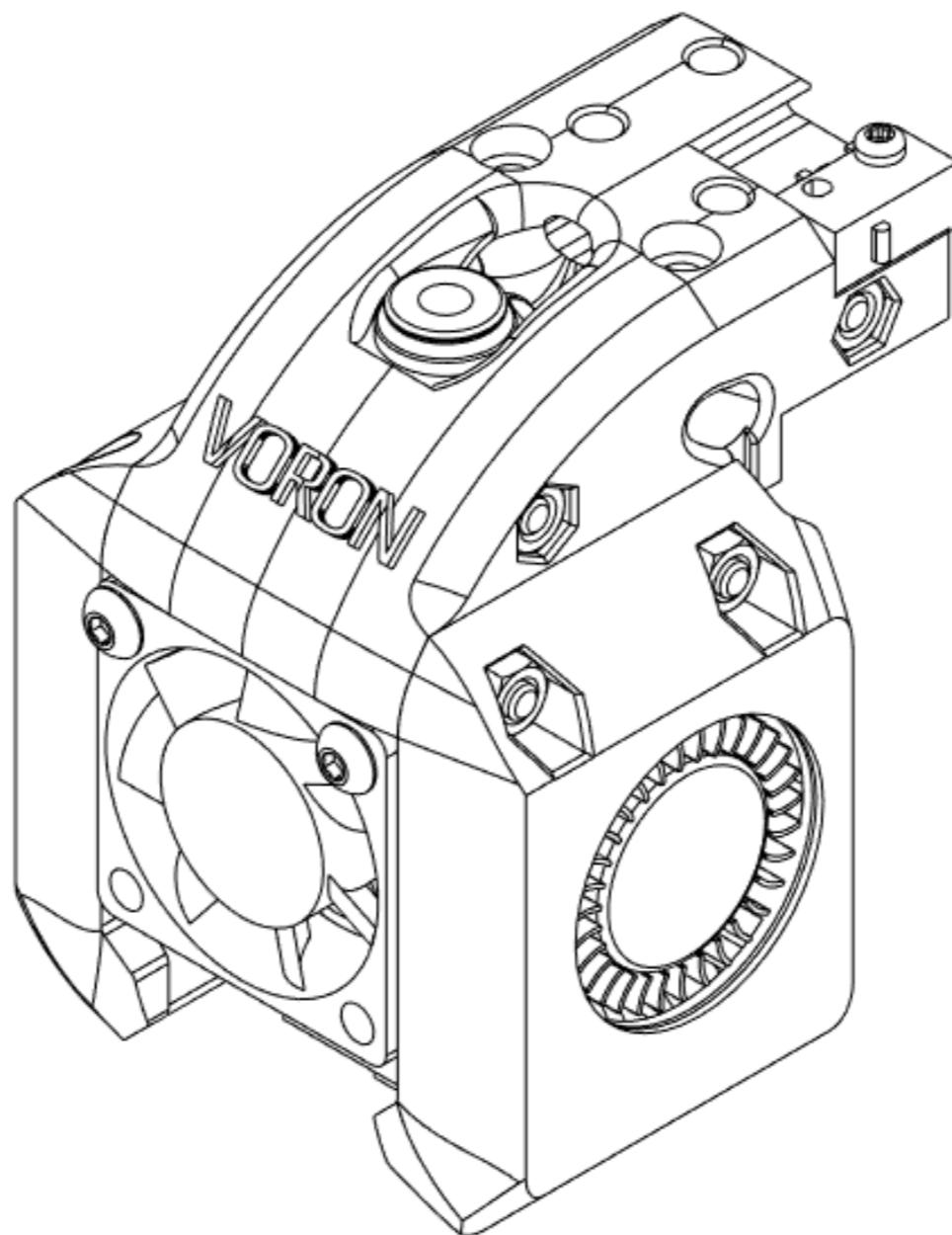
Mains Wiring



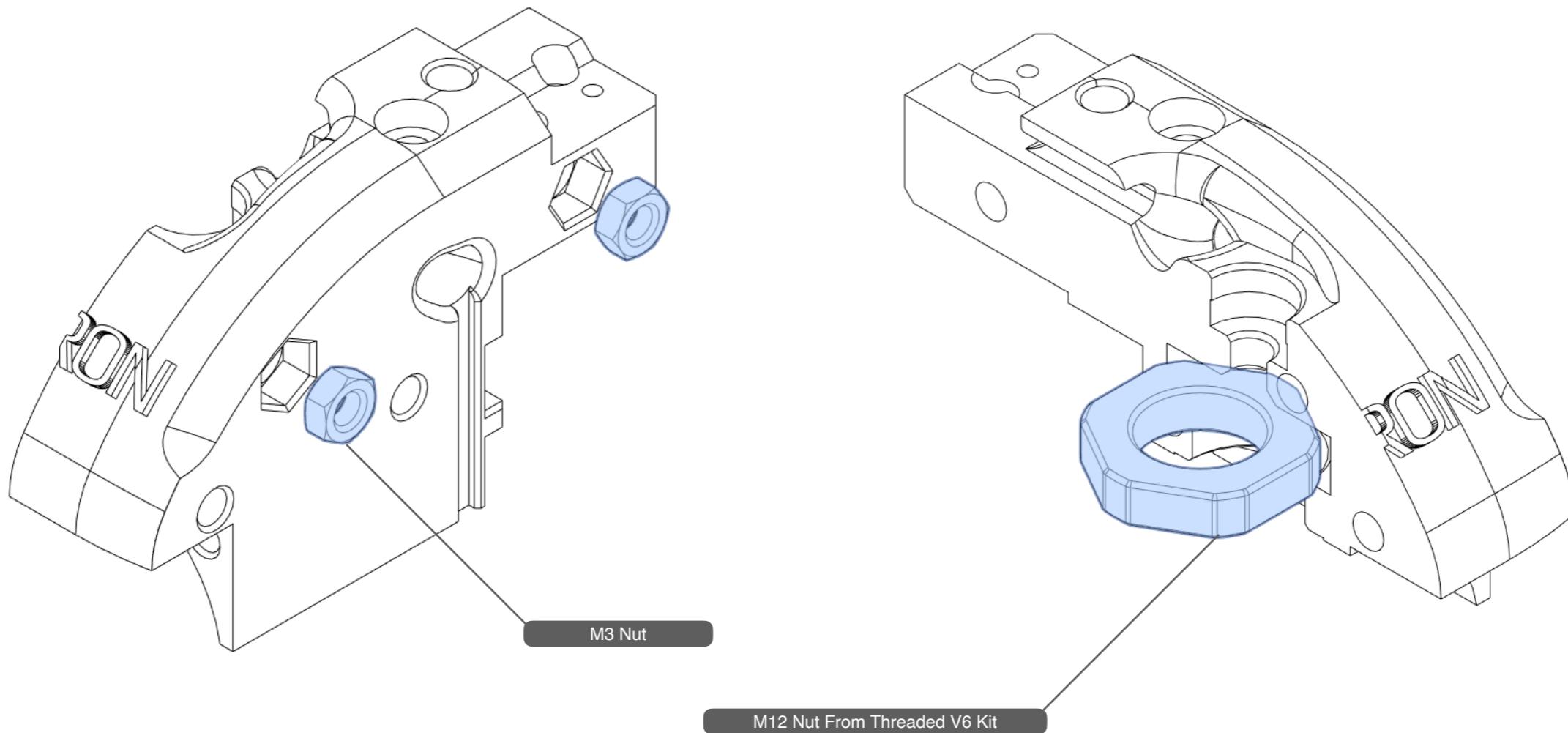
SKR E3 Wiring



Appendix A - Toolhead - E3D Threaded

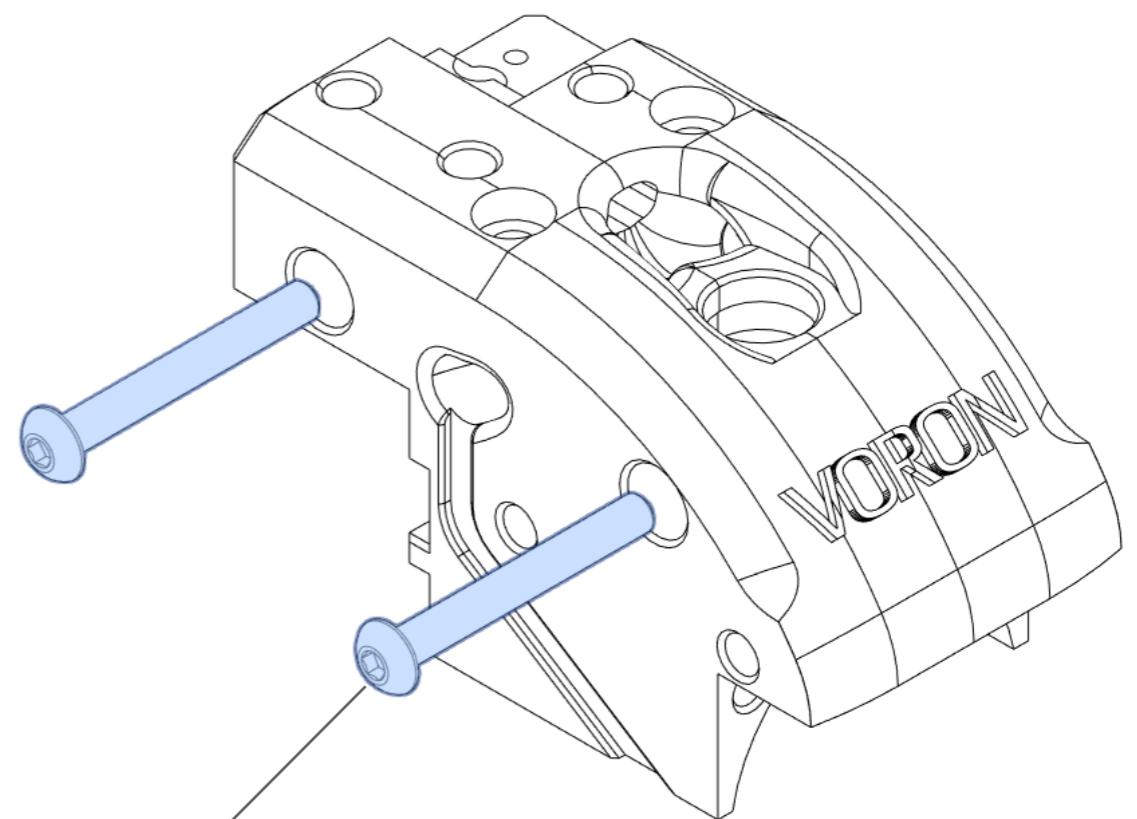
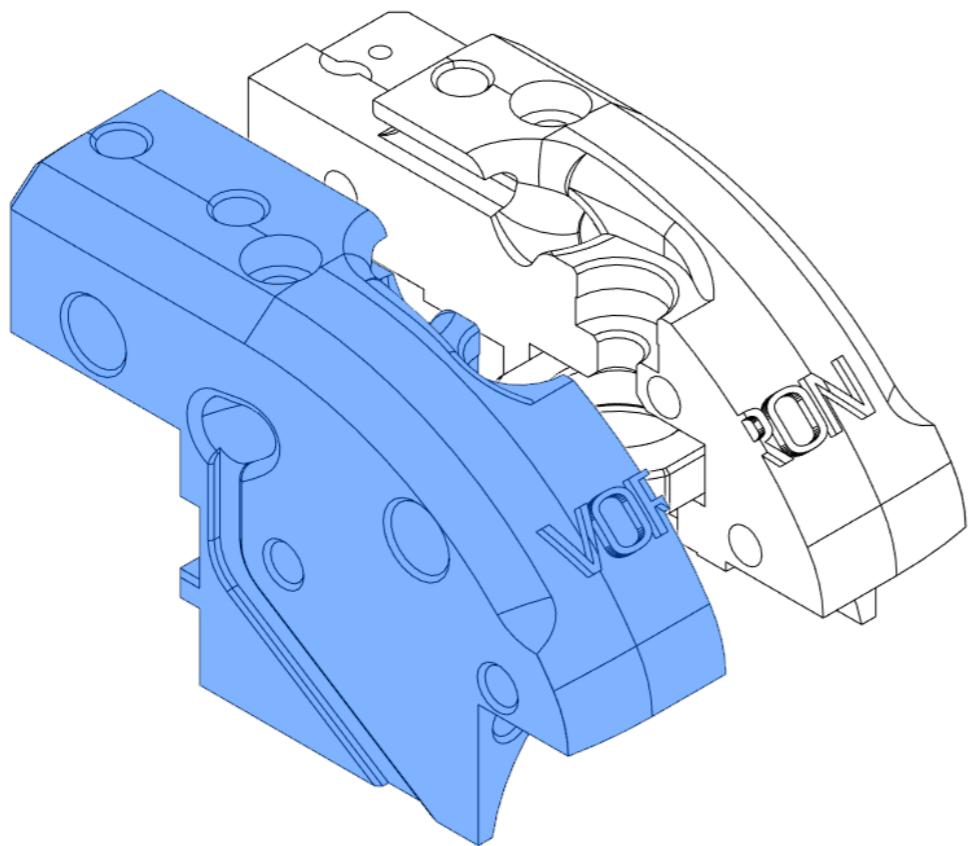


Appendix A - Toolhead - E3D Threaded



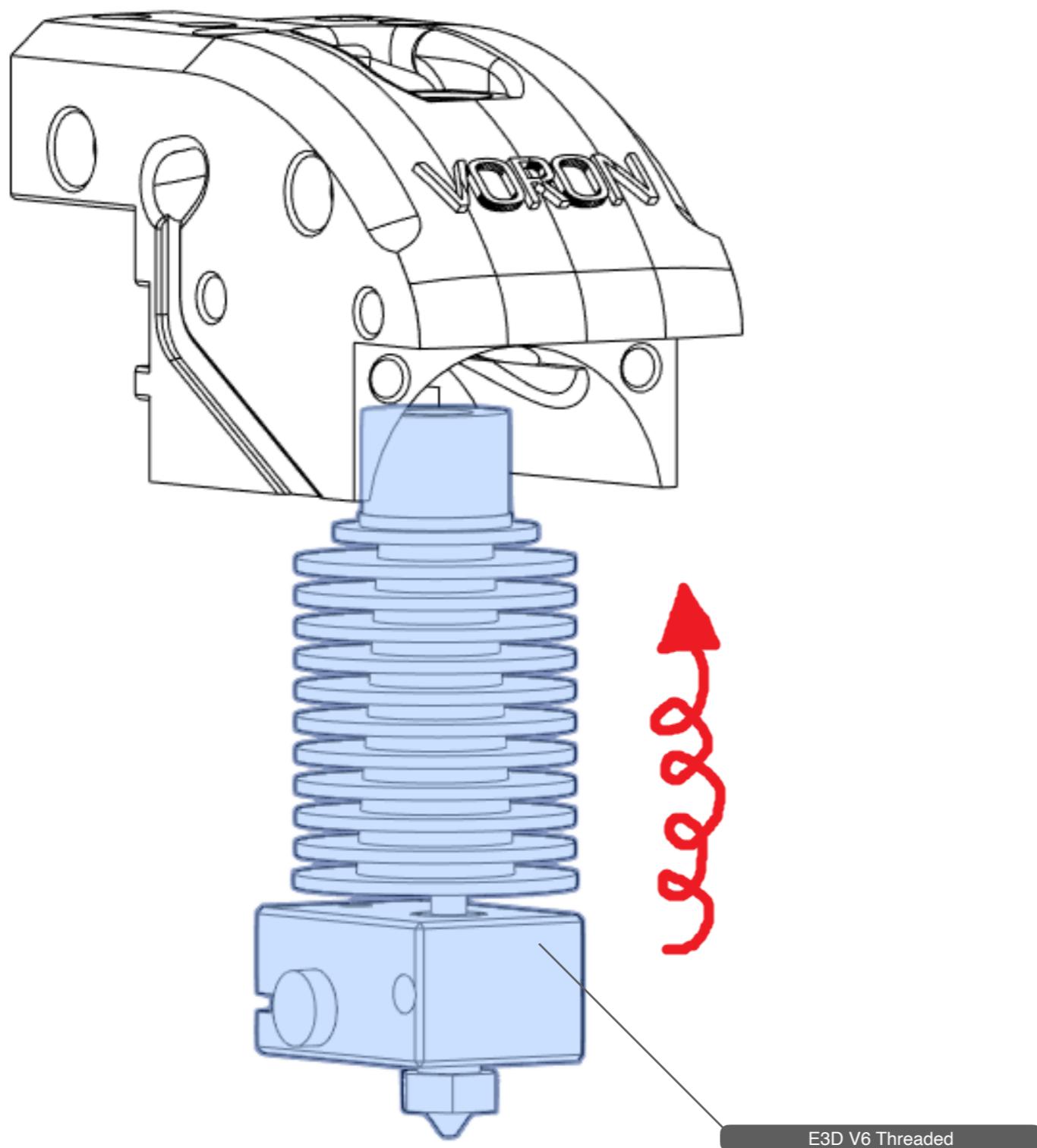
Part	Qty
M3 Nut	2
M12 Nut	1

Appendix A - Toolhead - E3D Threaded

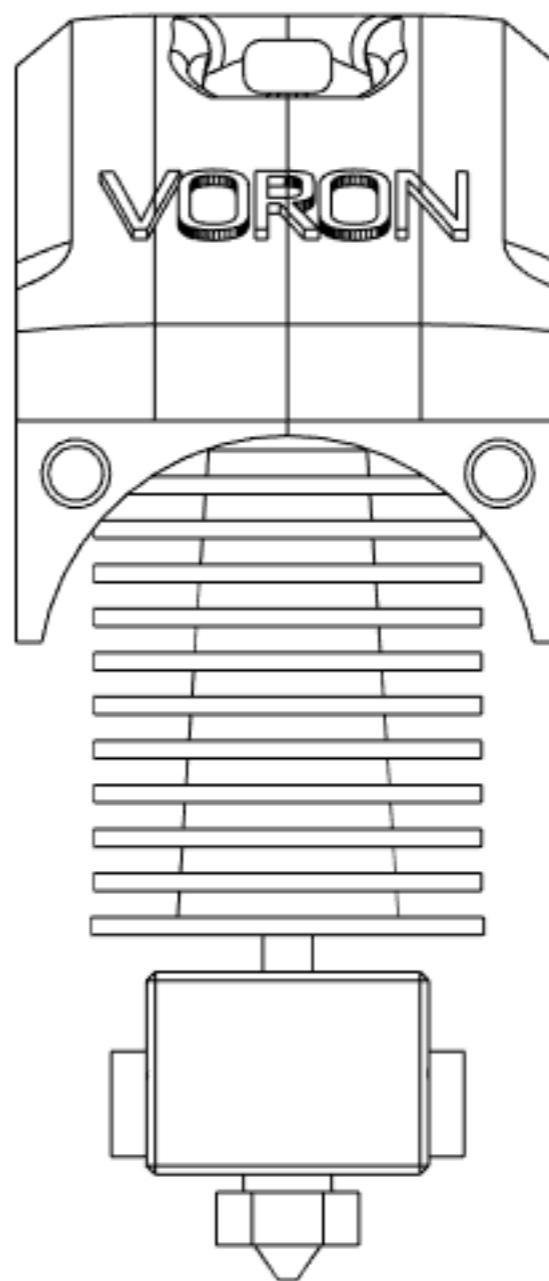


M3x25 BHCS

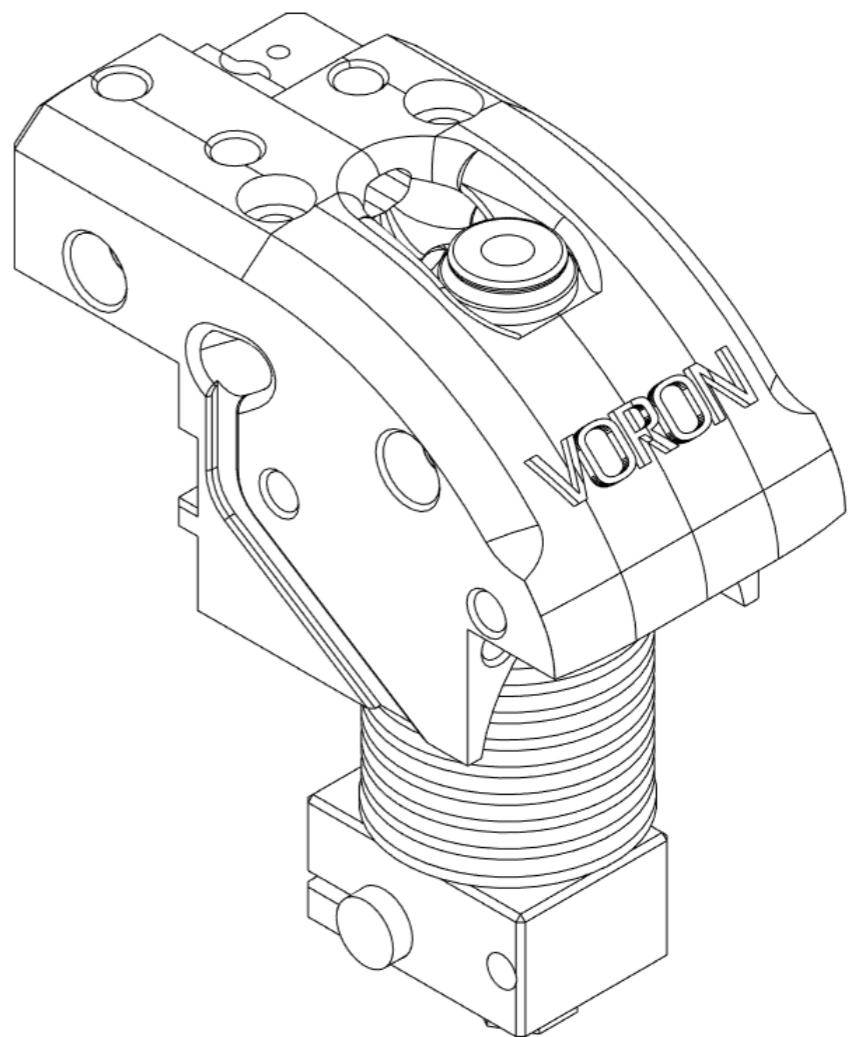
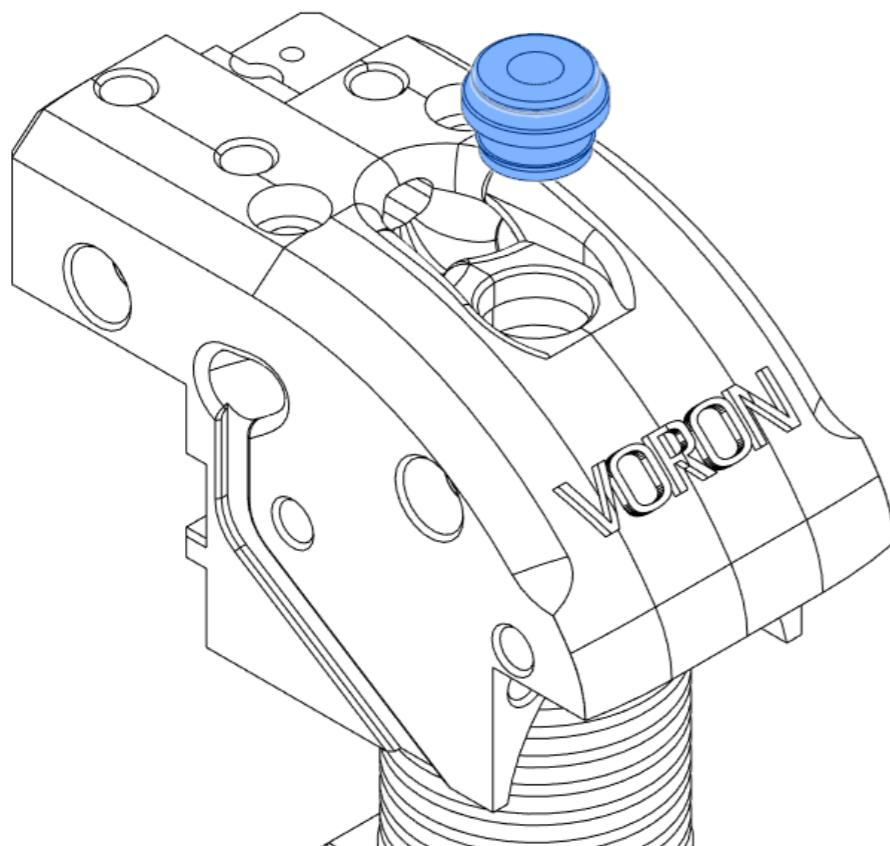
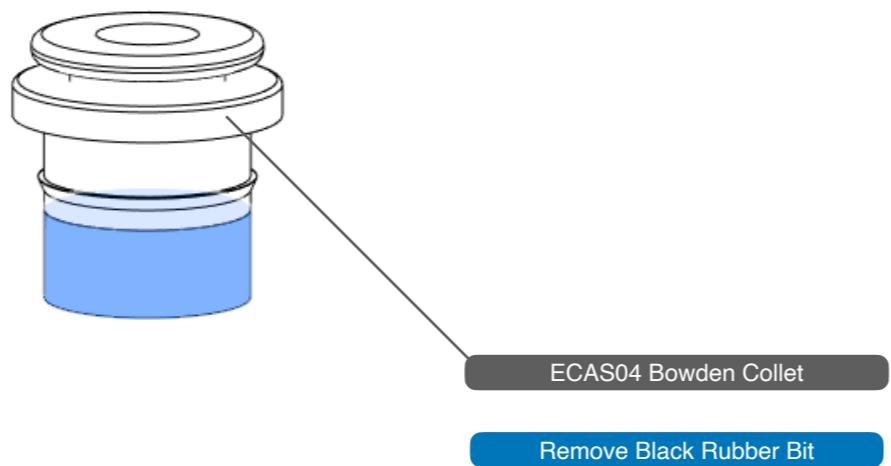
Part	Qty
M3x25 BHCS	2



E3D V6 Threaded

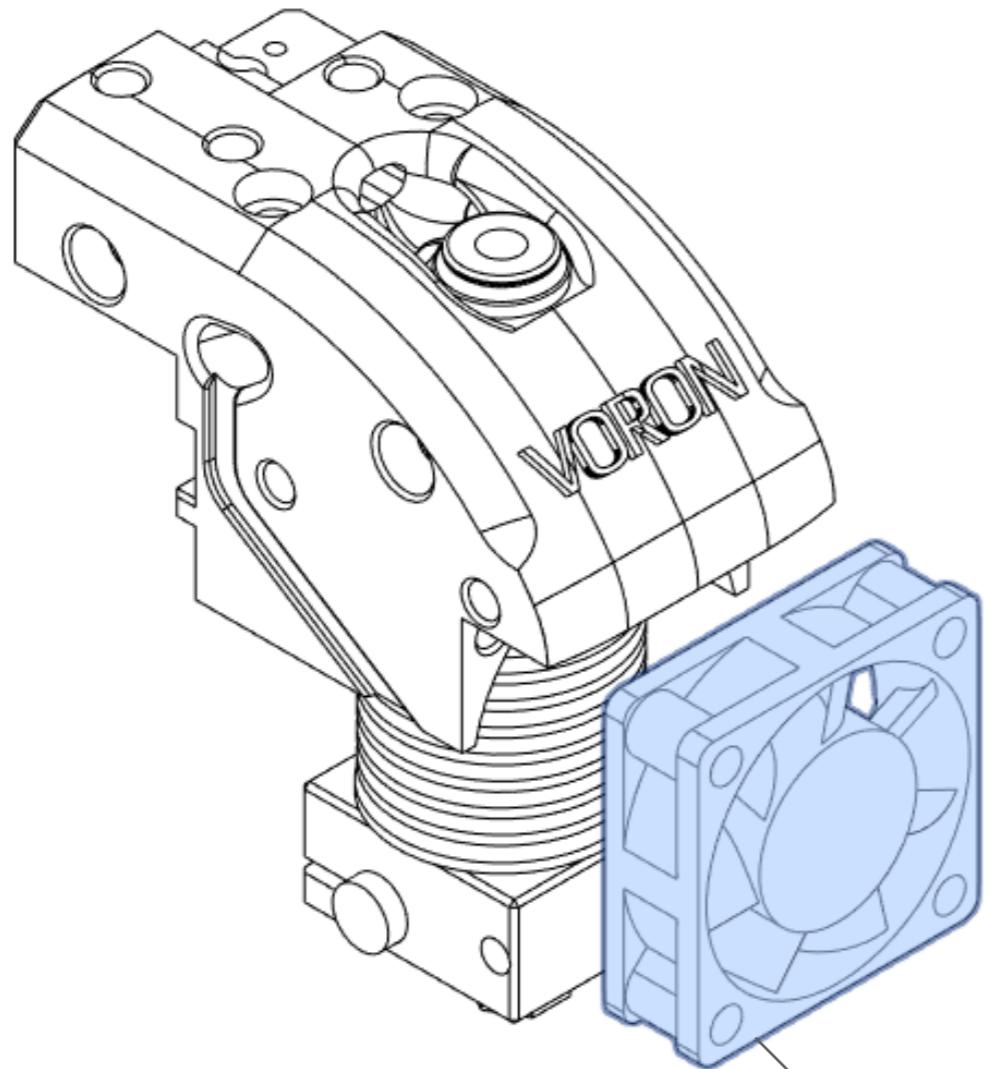


Part	Qty
E3D V6	1

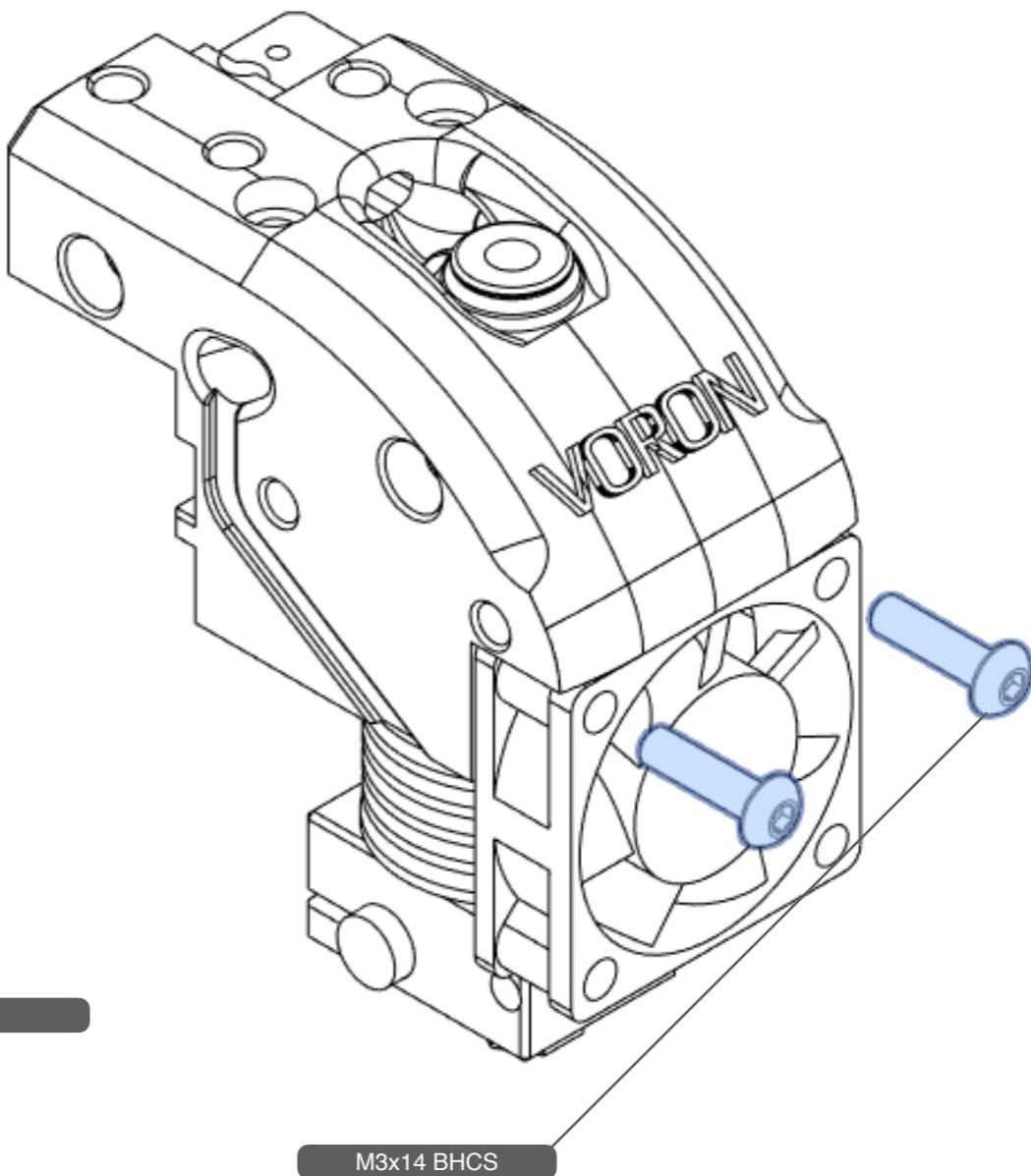


Part	Qty
ECAS04 Collet	1

Appendix A - Toolhead - E3D Threaded



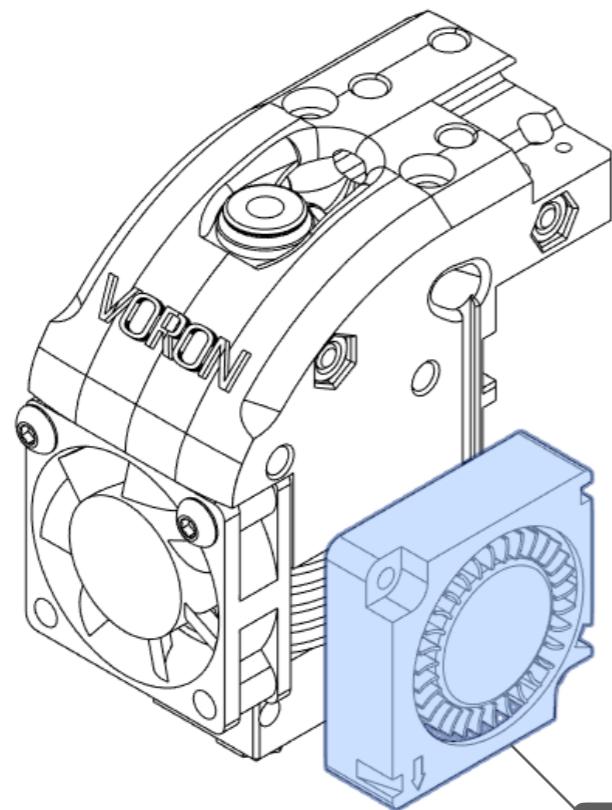
3010 Axial Fan



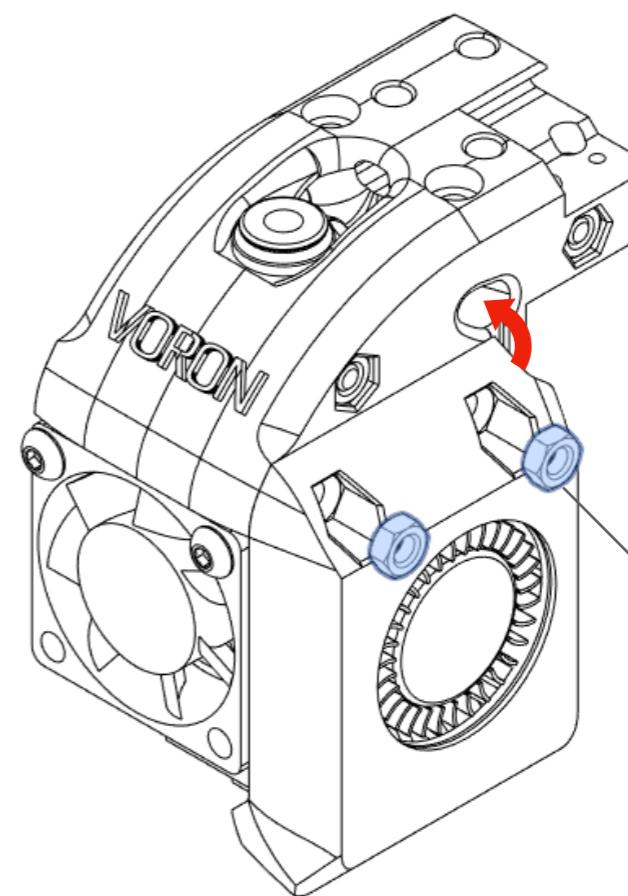
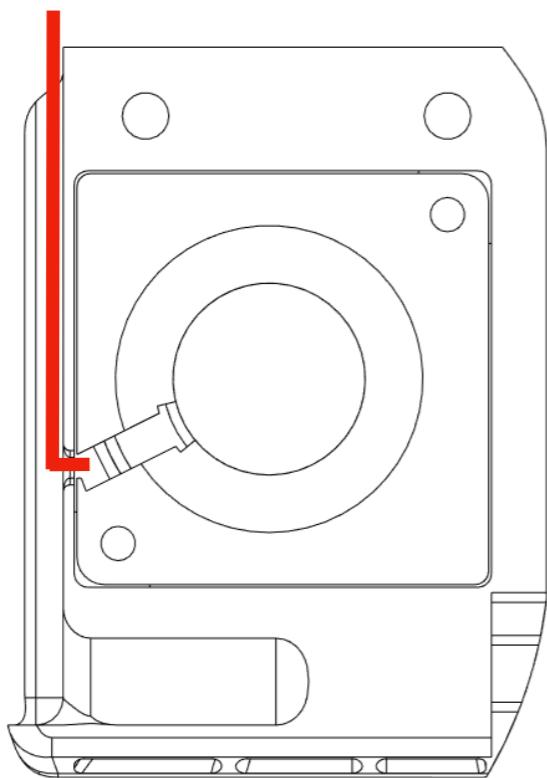
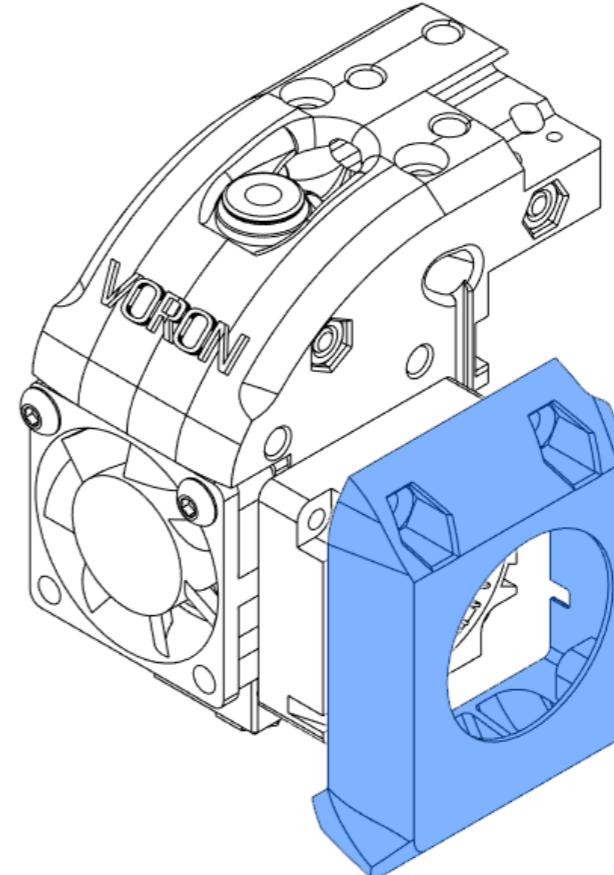
M3x14 BHCS

Part	Qty
M3x14 BHCS	2
3010 Axial Fan	1

Appendix A - Toolhead - E3D Threaded



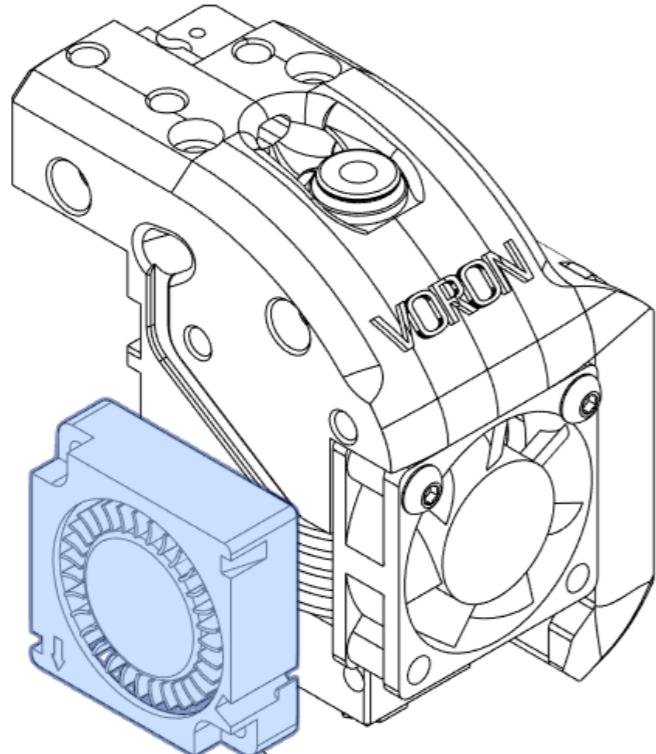
3010 Blower Fan



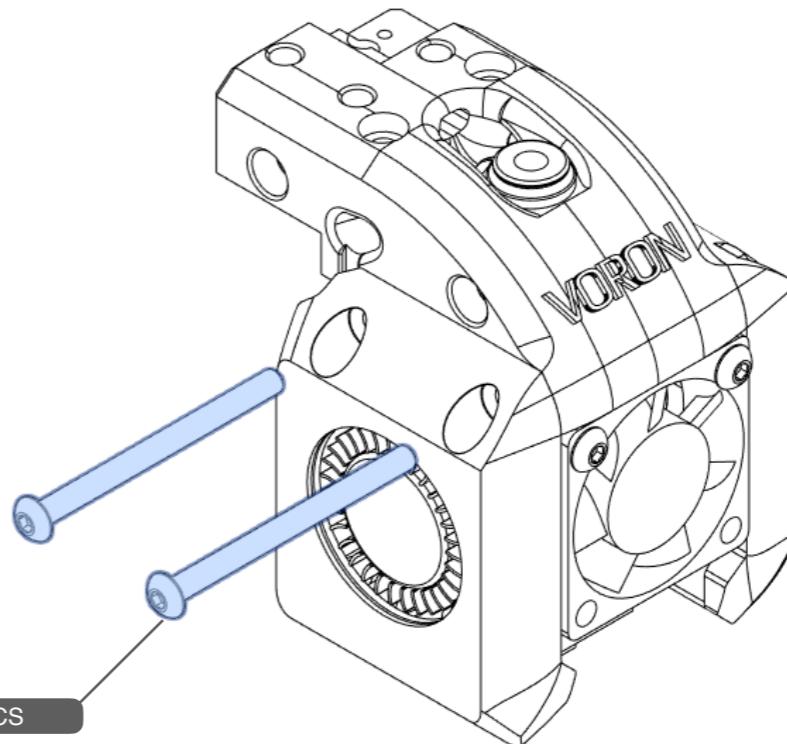
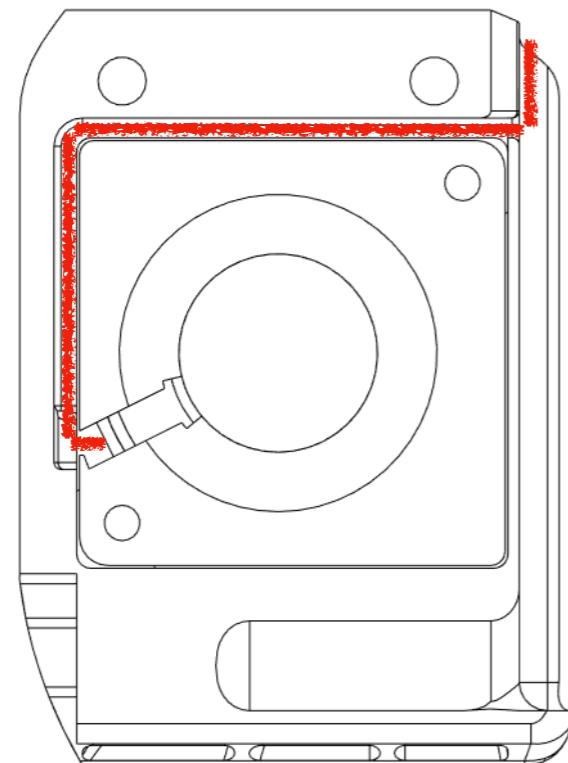
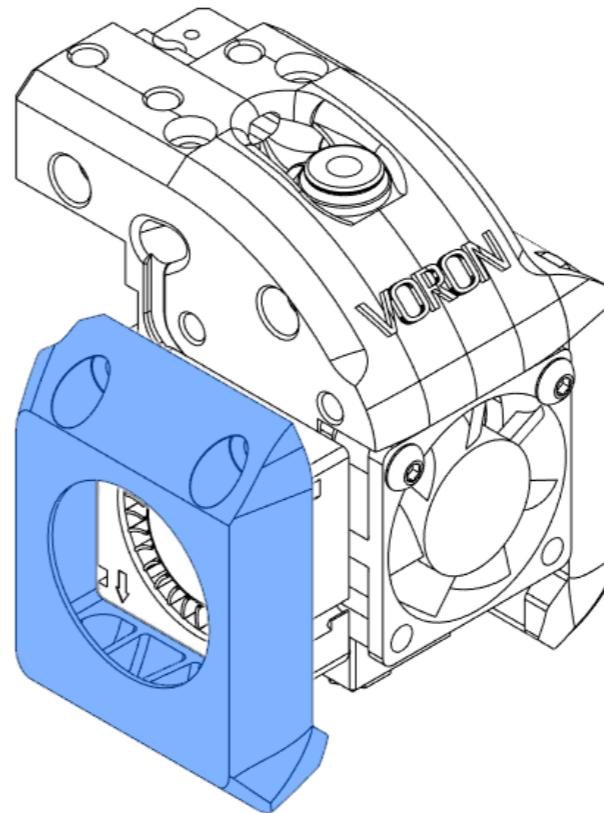
M3 Nut

Part	Qty
M3 Nut	2
3010 Radial Fan	1

Appendix A - Toolhead - E3D Threaded



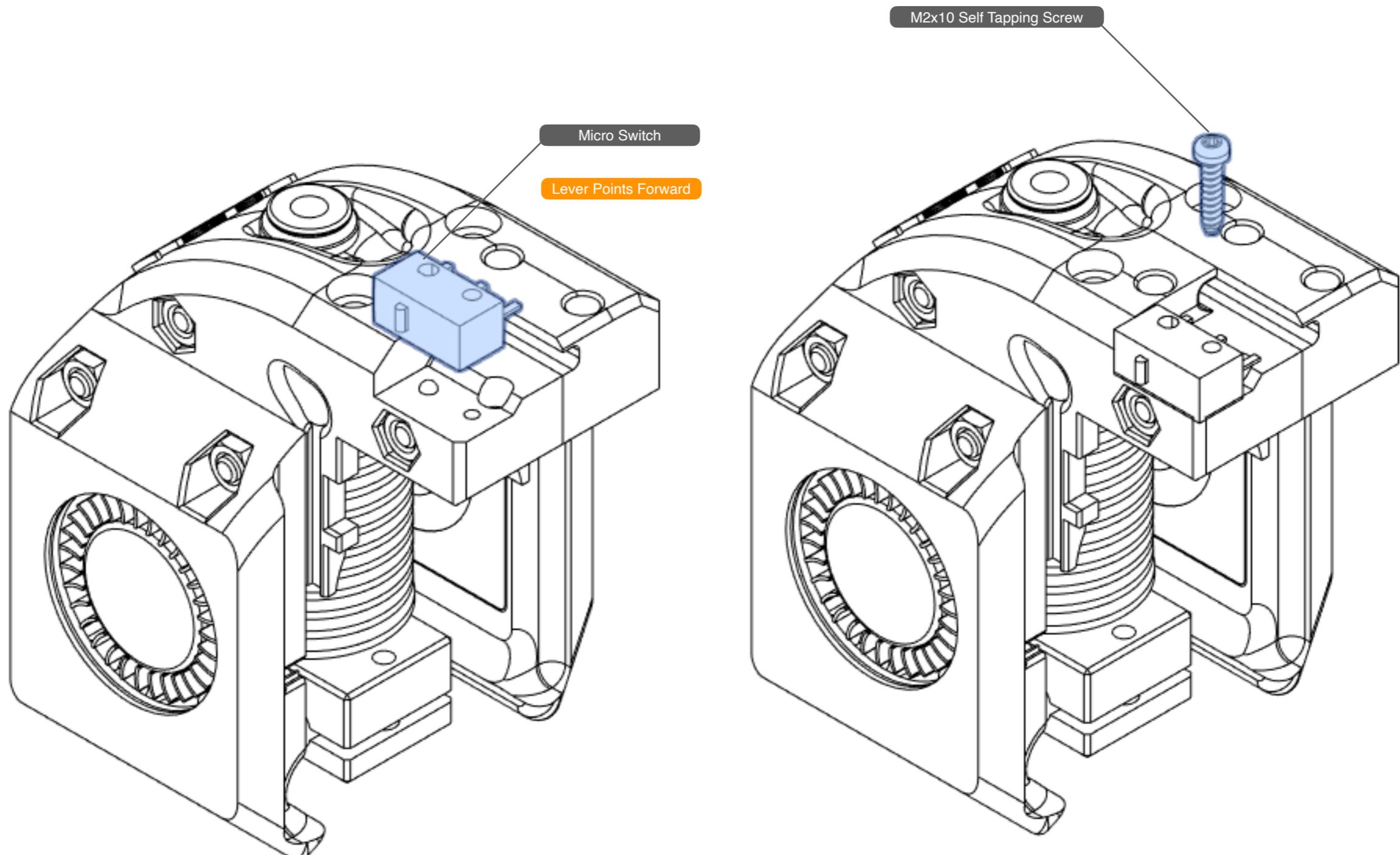
3010 Blower Fan



M3x40 BHCS

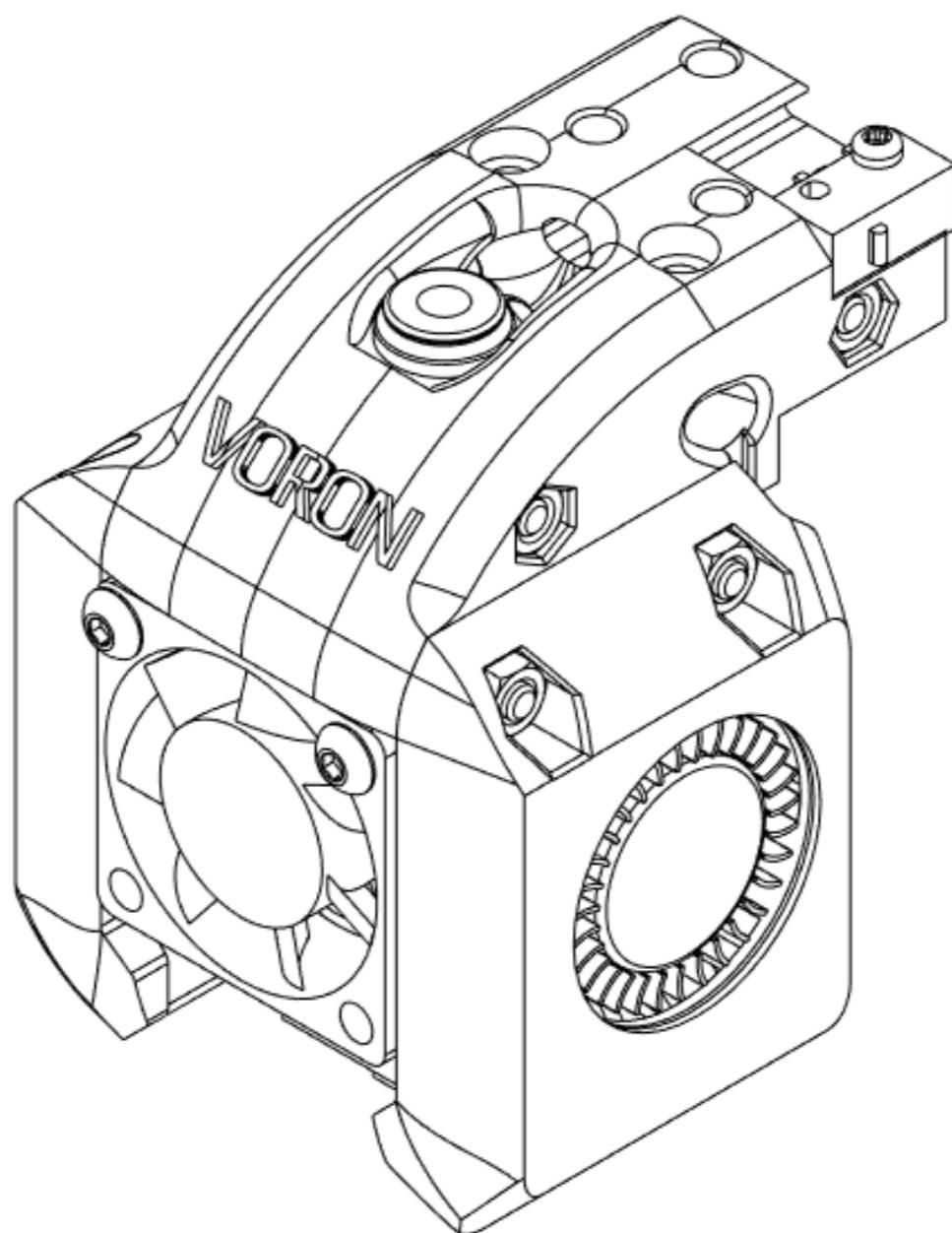
Part	Qty
M3x40 BHCS	2
3010 Radial Fan	1

Appendix A - Toolhead - E3D Threaded

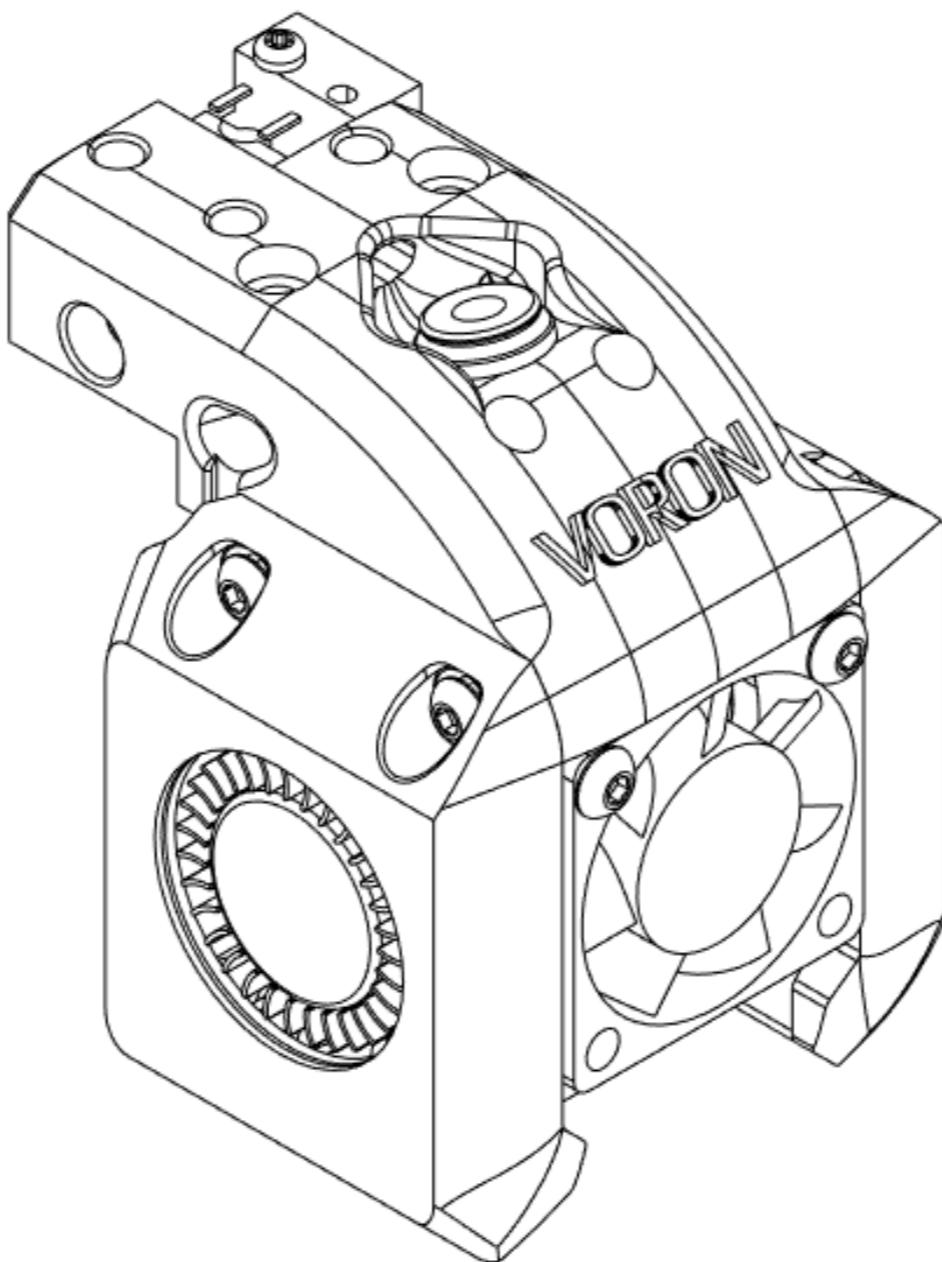


Part	Qty
M2x10 Self Tapping	1
Microswitch	1

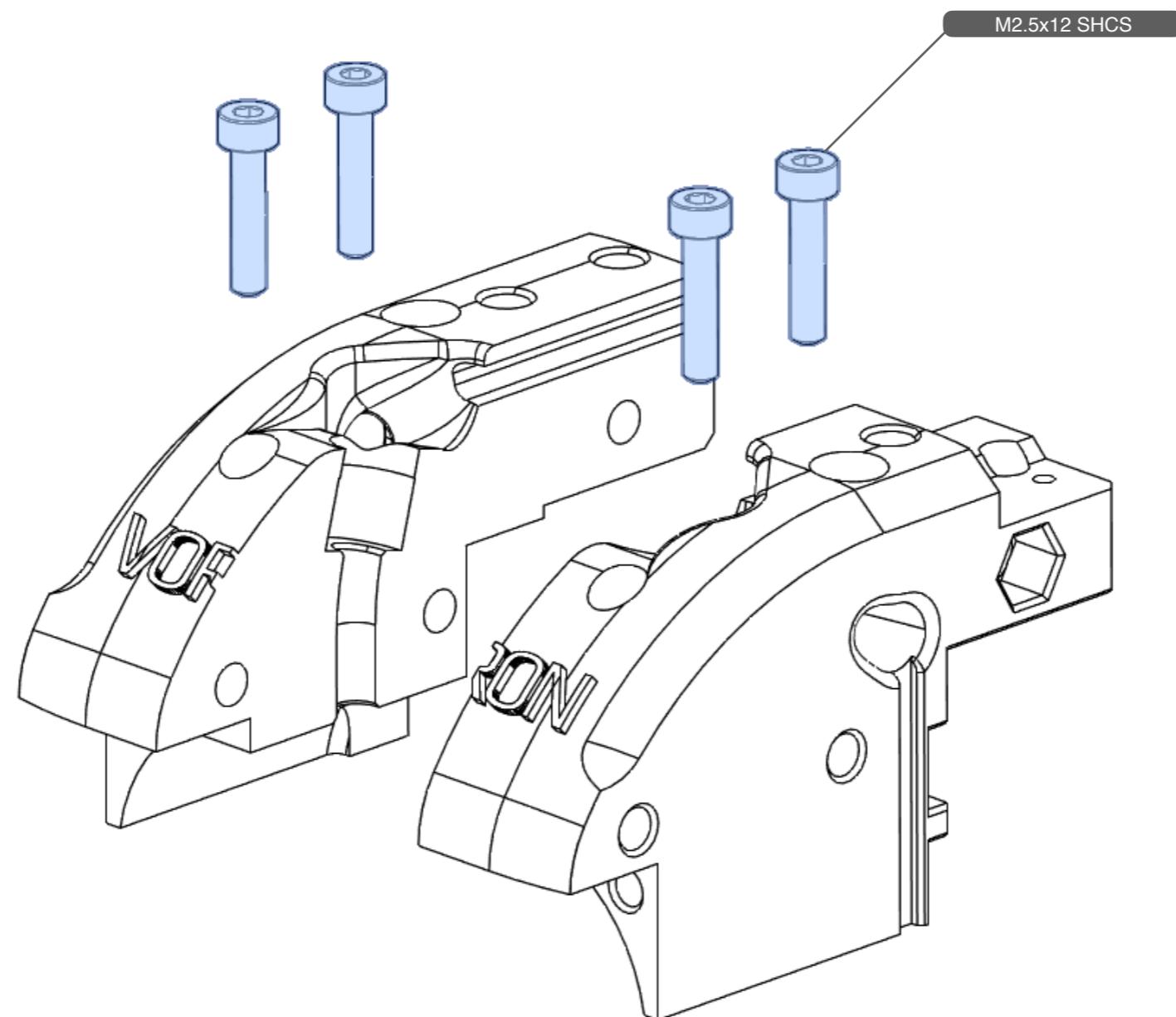
Appendix A - Toolhead - E3D Threaded



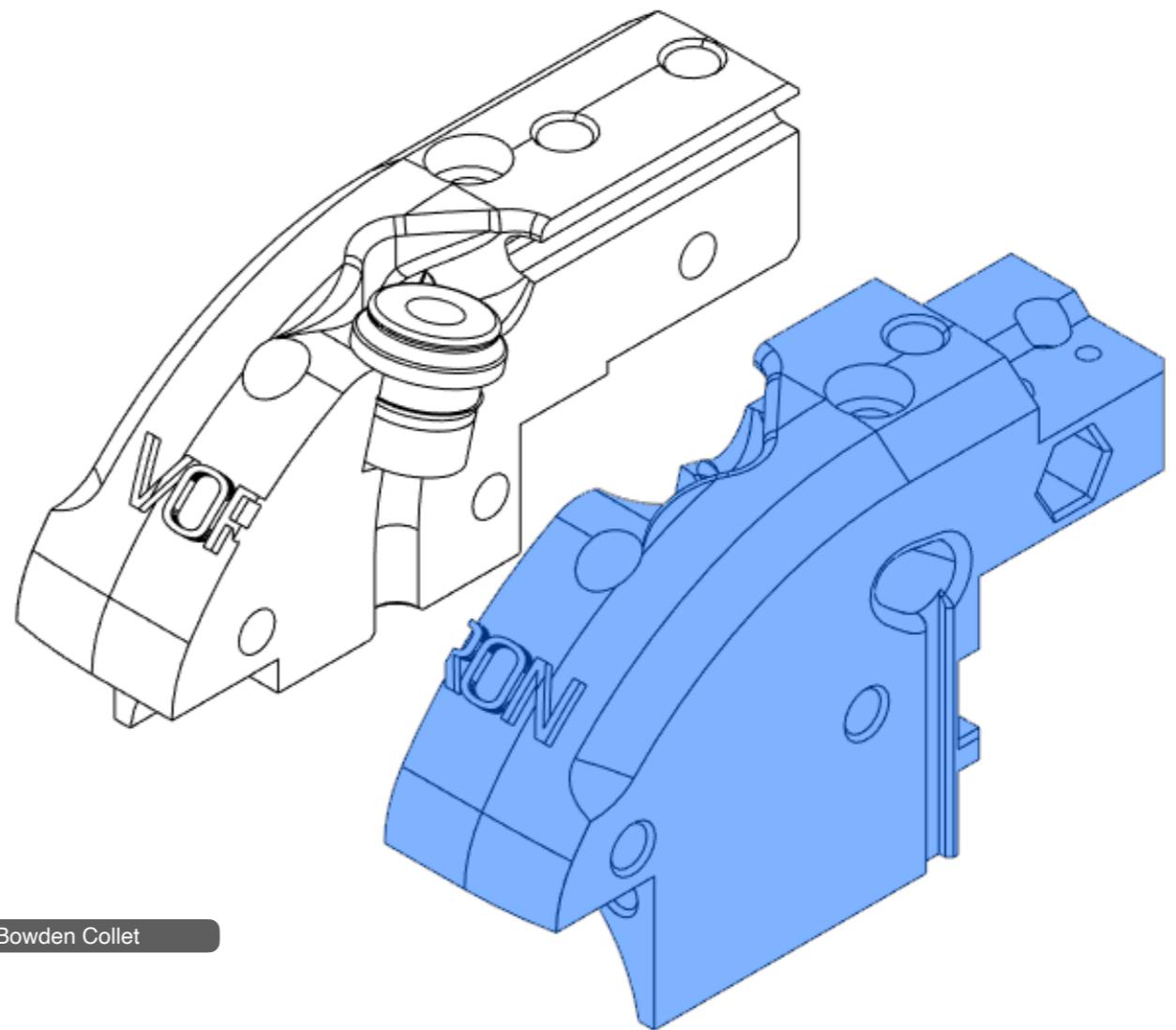
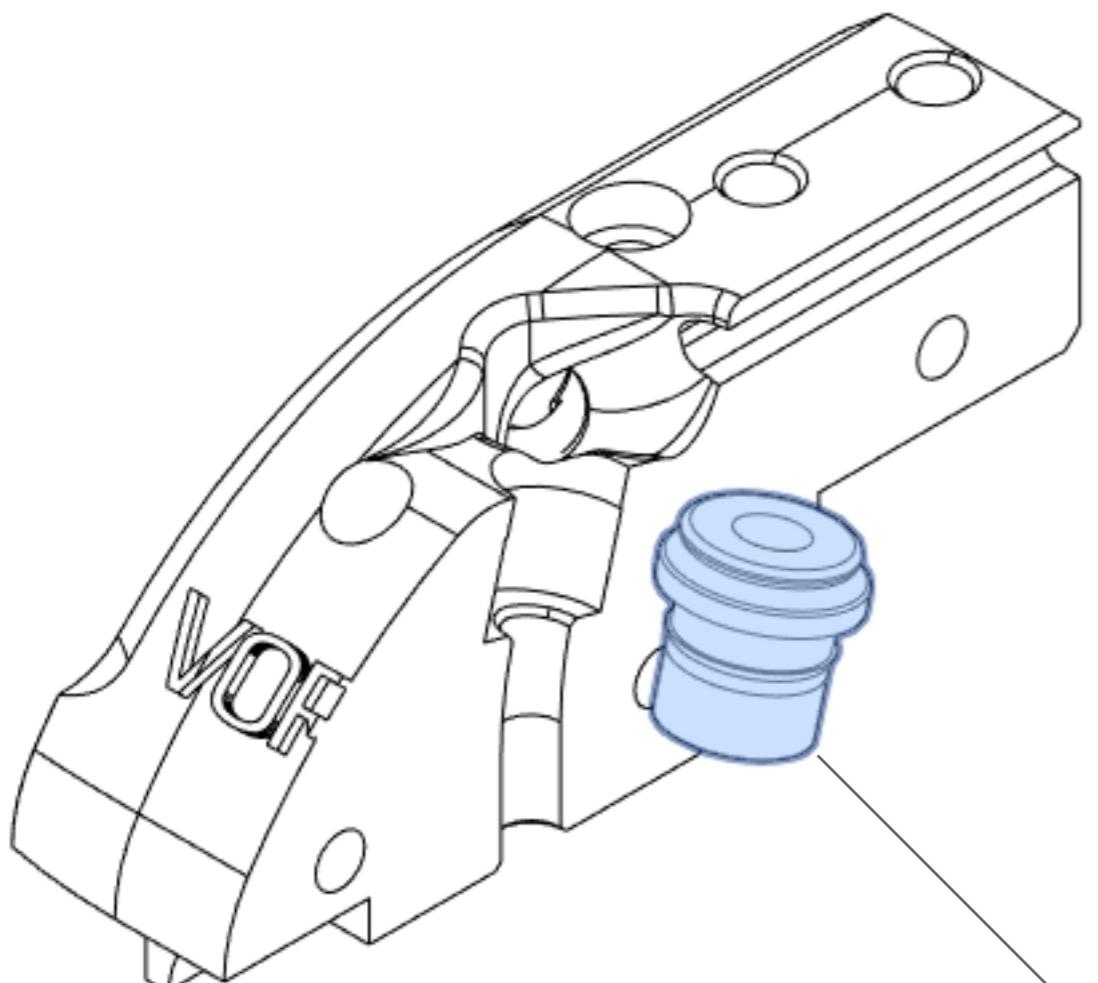
Appendix B - Toolhead - Dragon



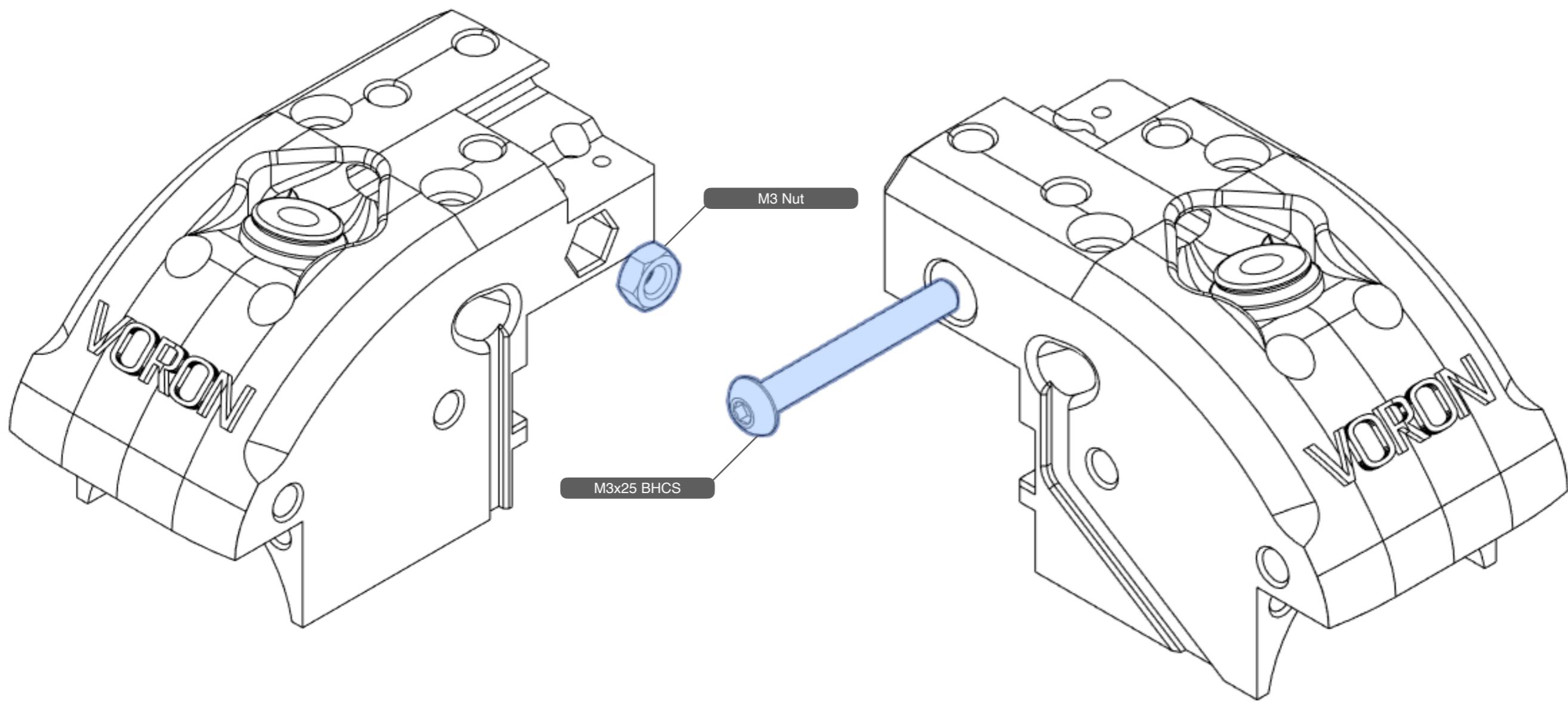
Appendix B - Toolhead - Dragon



Part	Qty
M2.5x12 SHCS	4

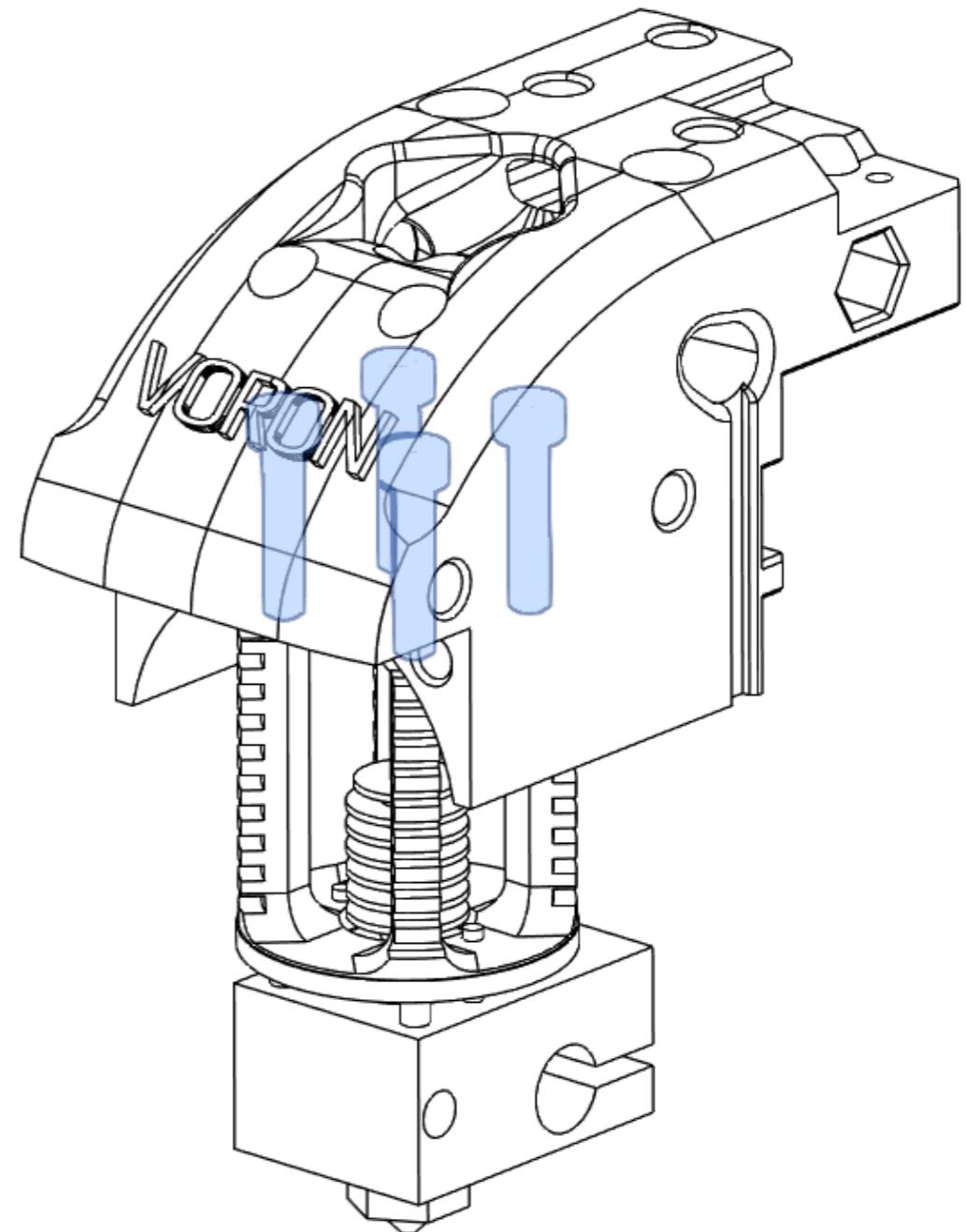
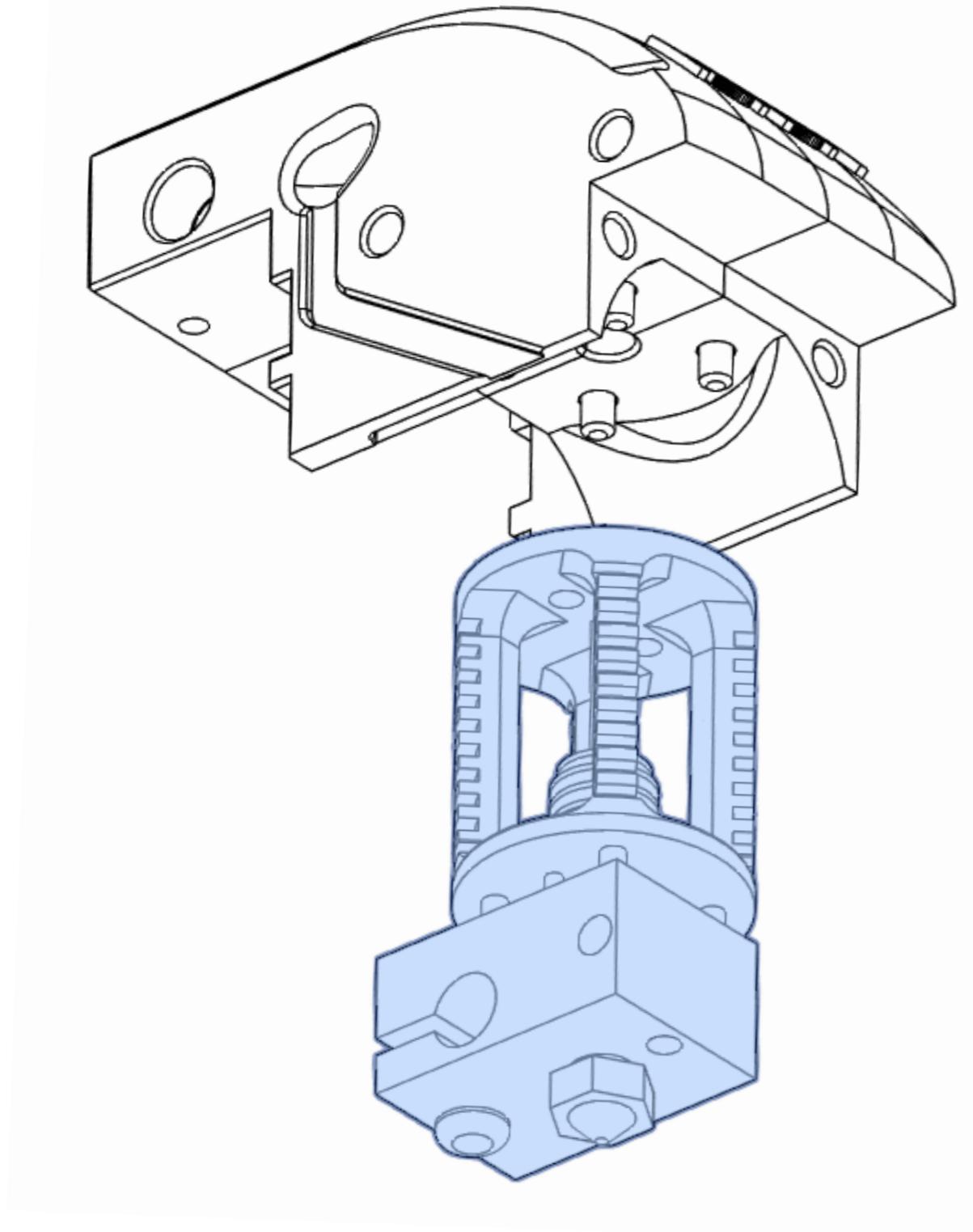


Part	Qty
ECAS04 Collet	1

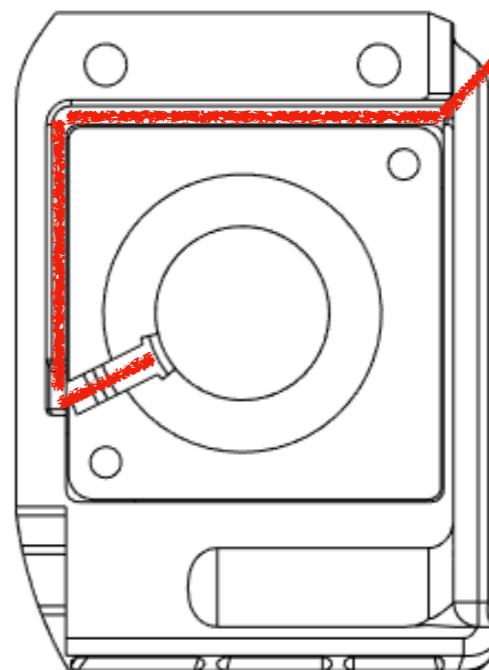
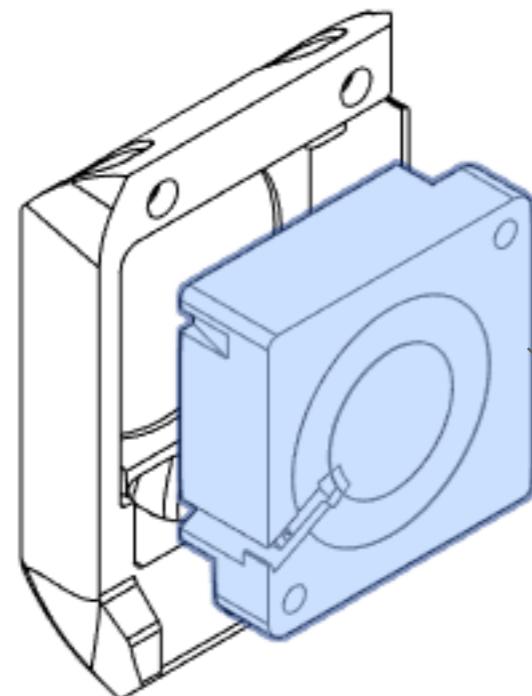
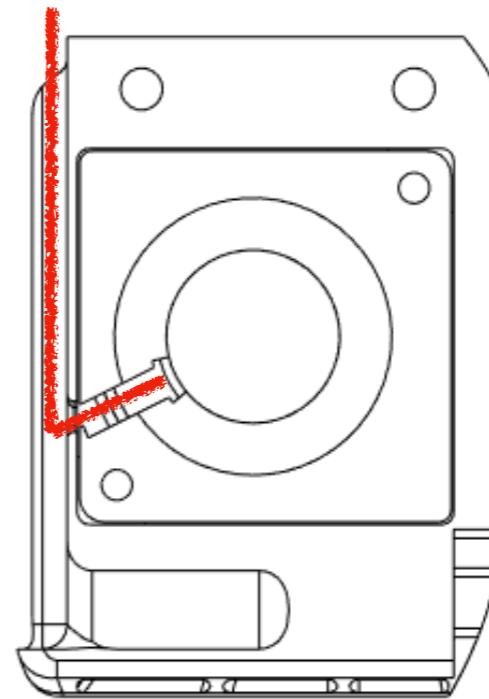
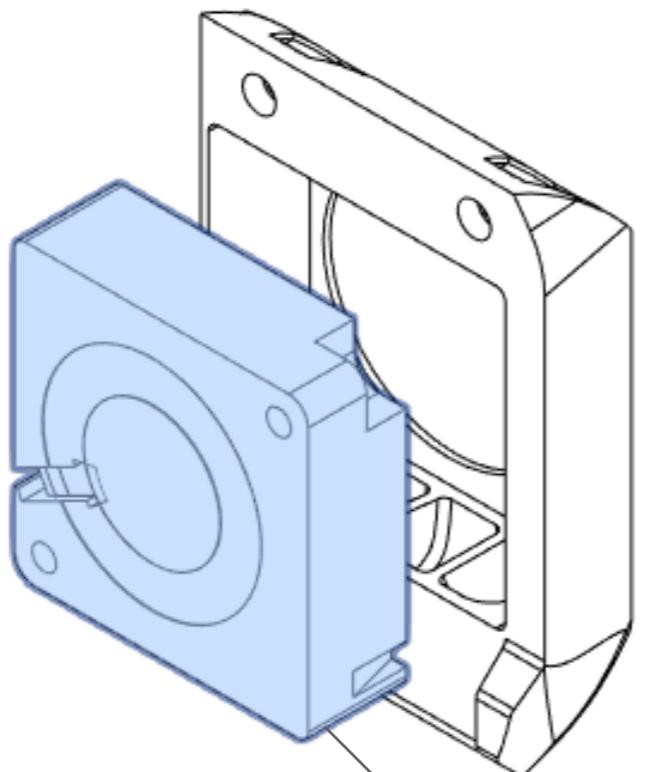


Part	Qty
M3x25 BHCS	1
M3 Nut	1

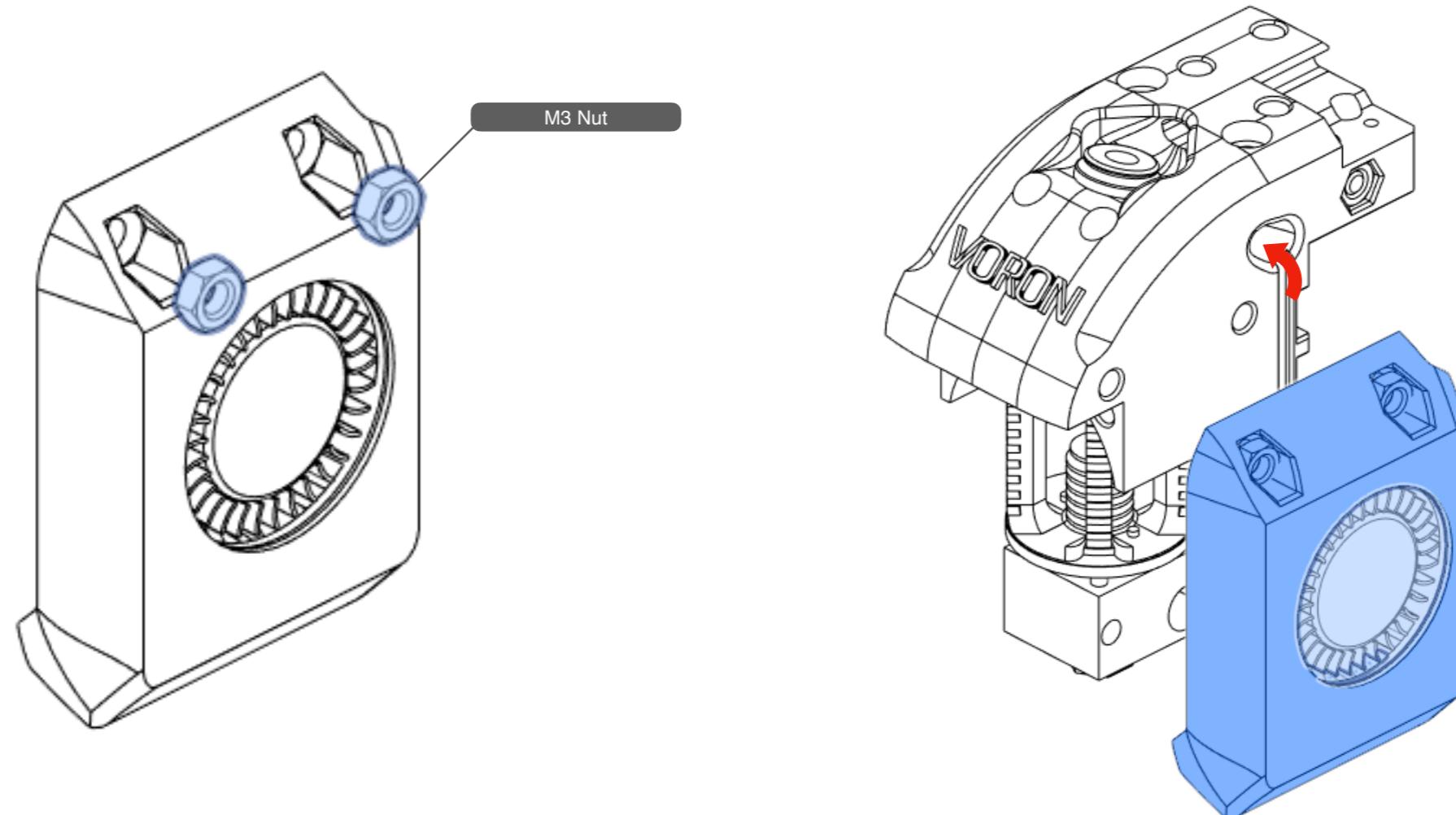
Appendix B - Toolhead - Dragon



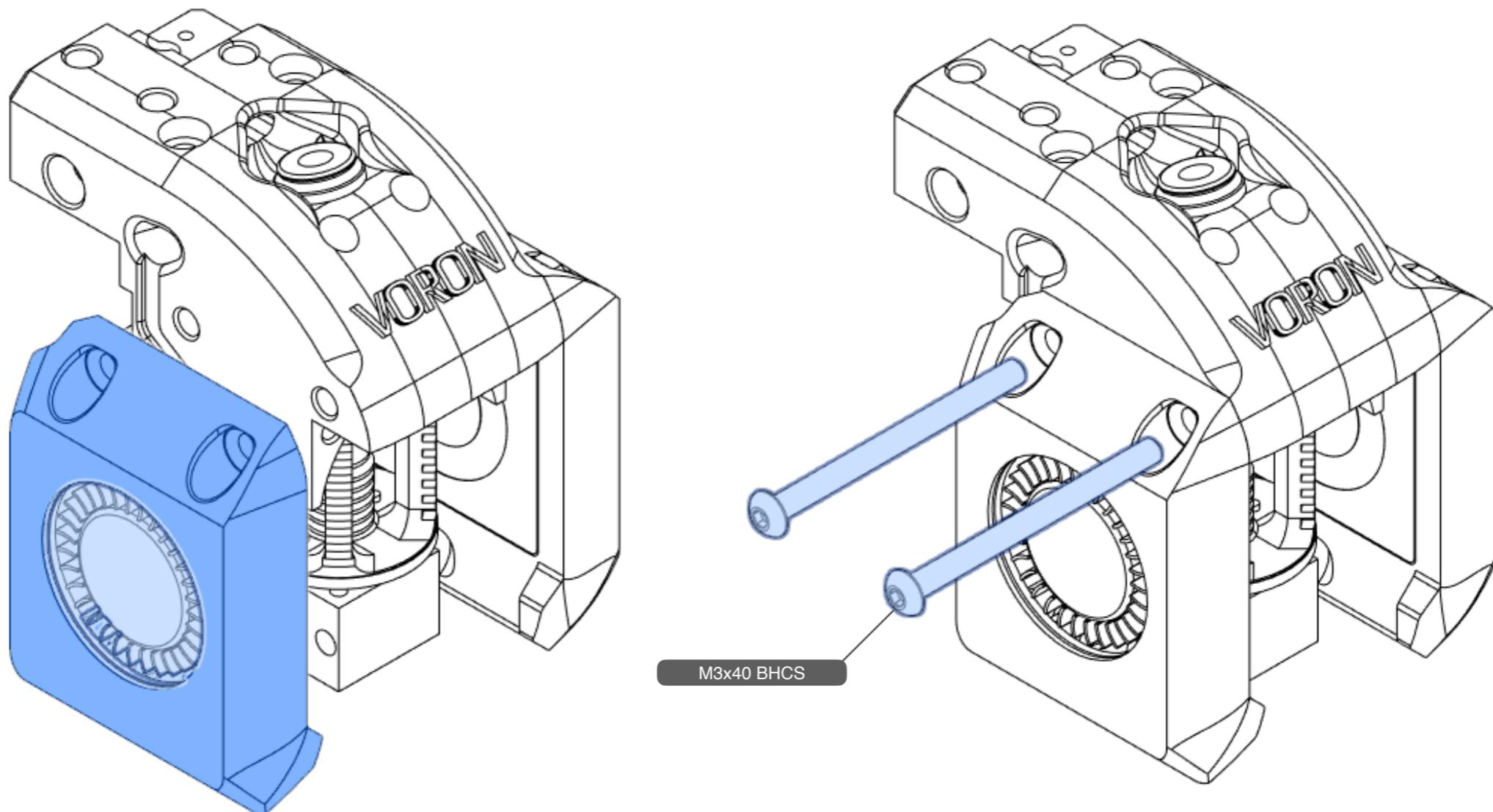
Part	Qty
Dragon Hotend	1



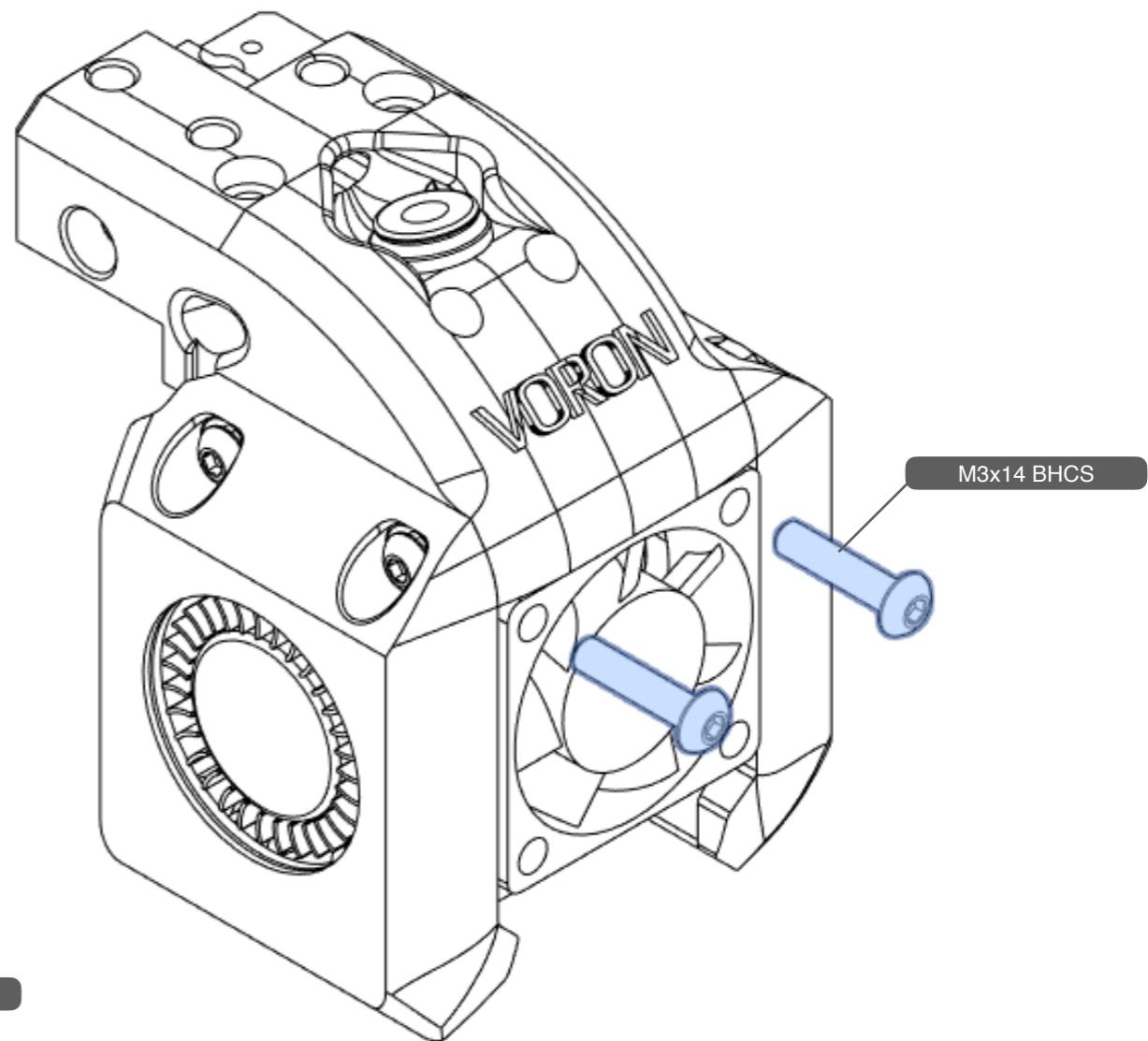
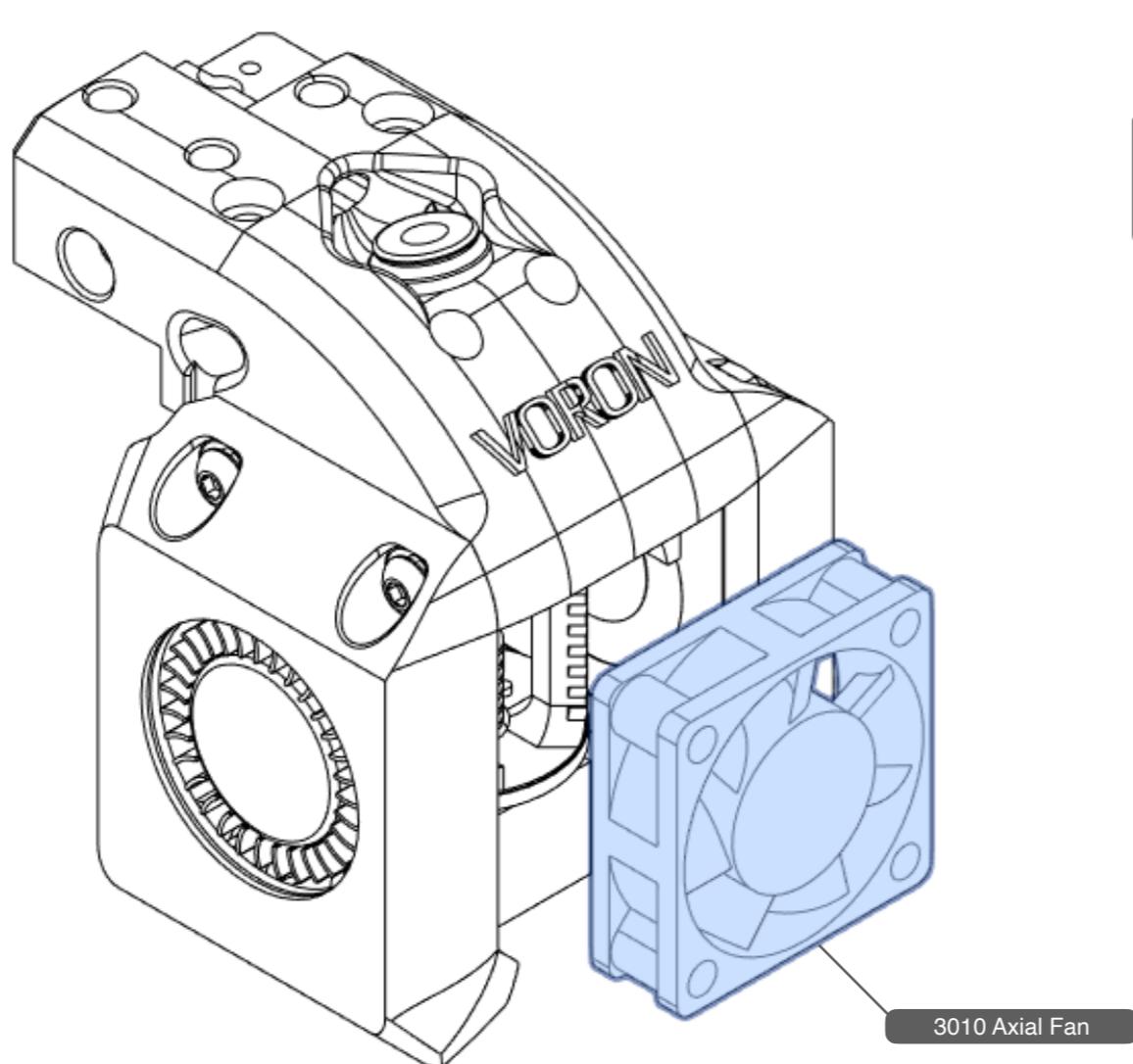
Part	Qty
3010 Radial Fan	2



Part	Qty
M3 Nut	2

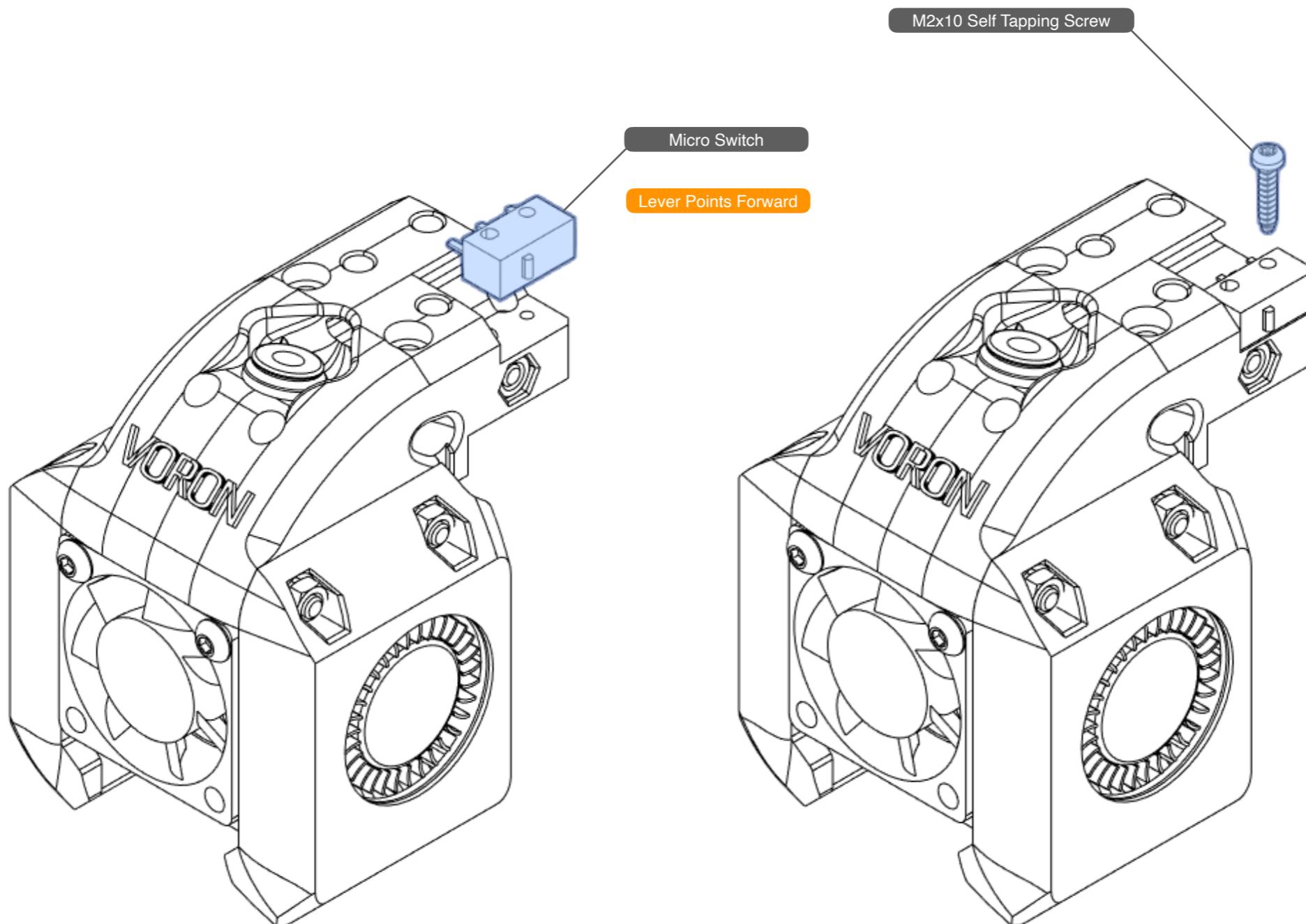


Part	Qty
M3x40 BHCS	2



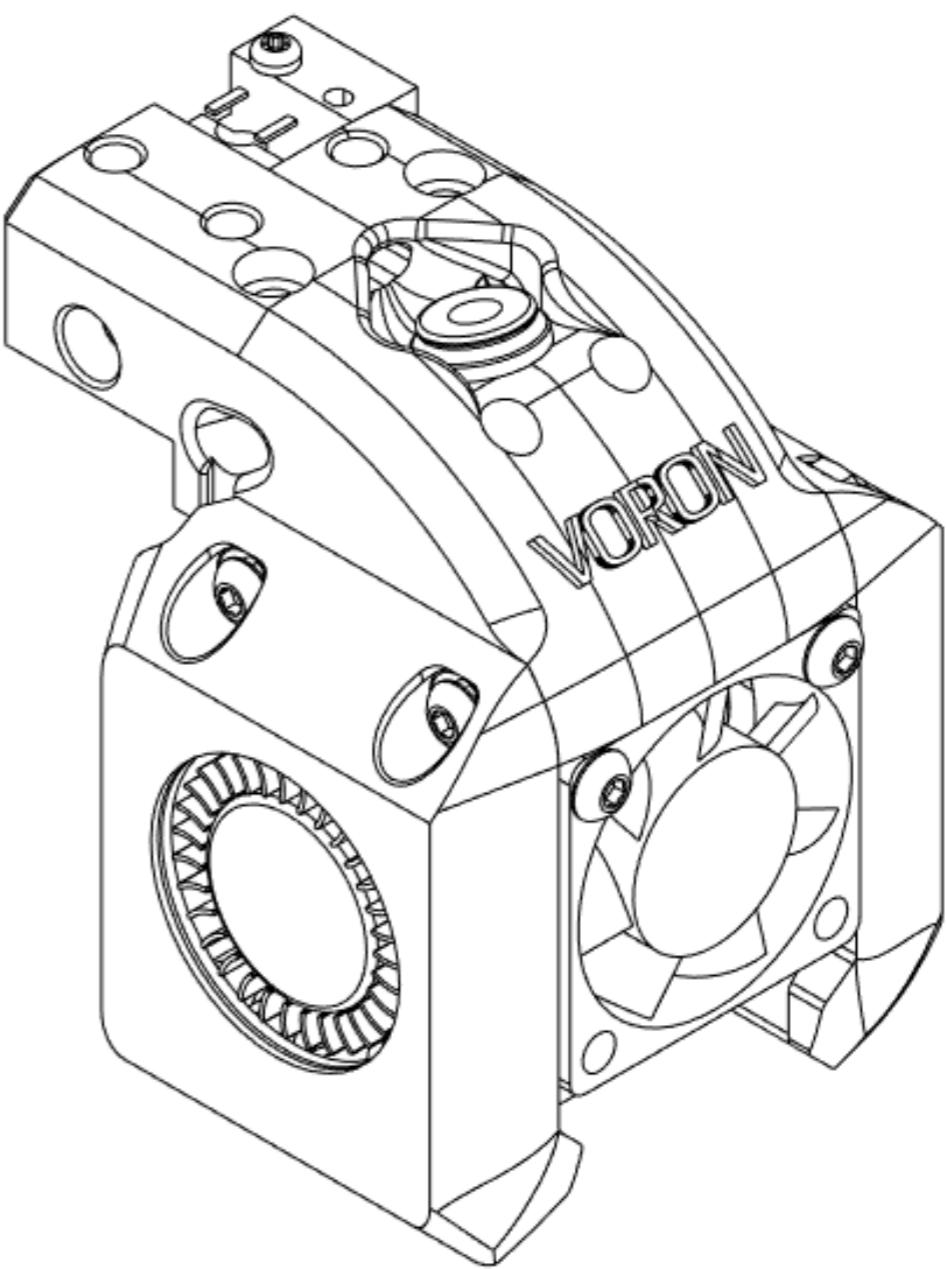
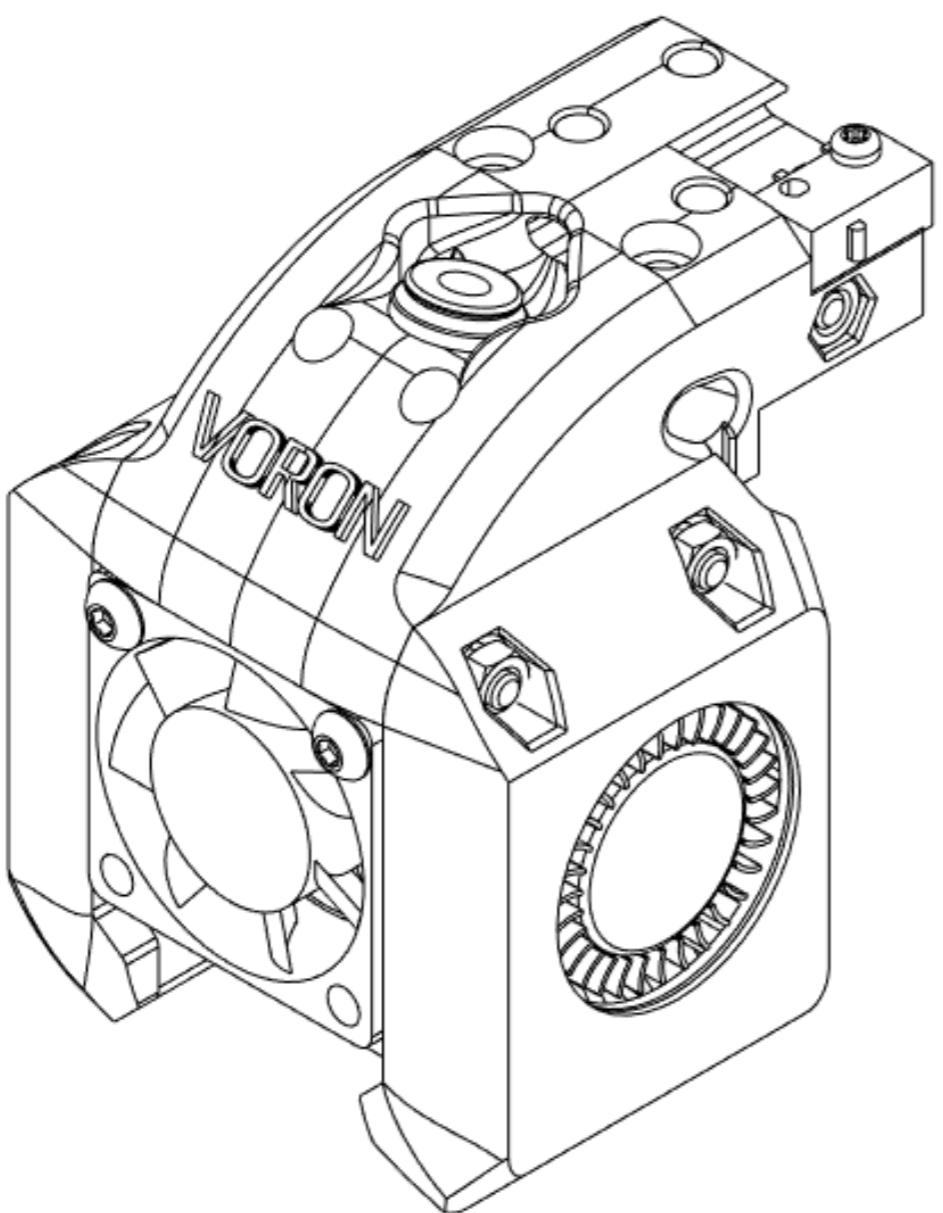
Part	Qty
M3x14 BHCS	2
3010 Axial Fan	1

Appendix B - Toolhead - Dragon

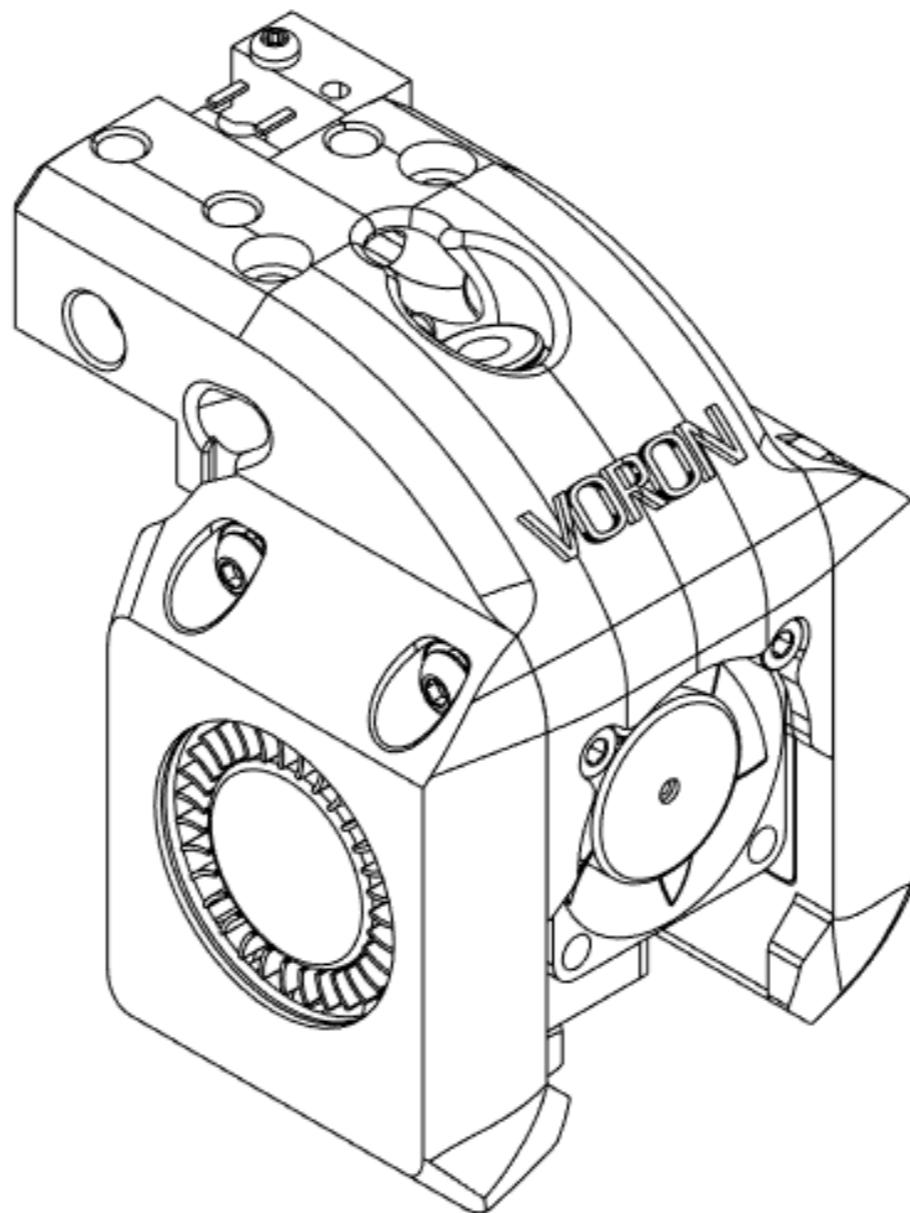


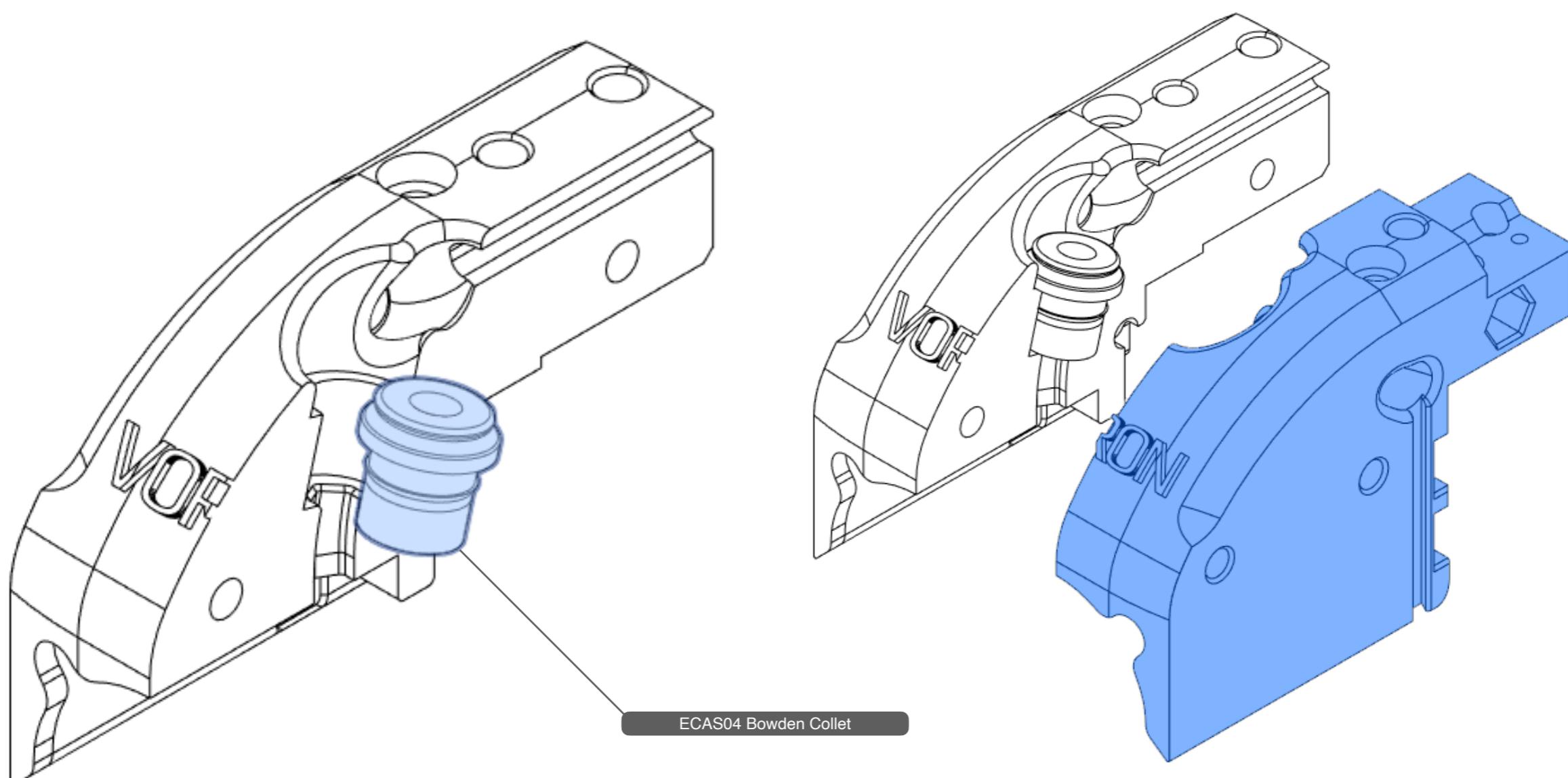
Part	Qty
Micro Switch	1
M2x10 Self Tapping	1

Appendix B - Toolhead - Dragon



Appendix B - Toolhead - Mosquito

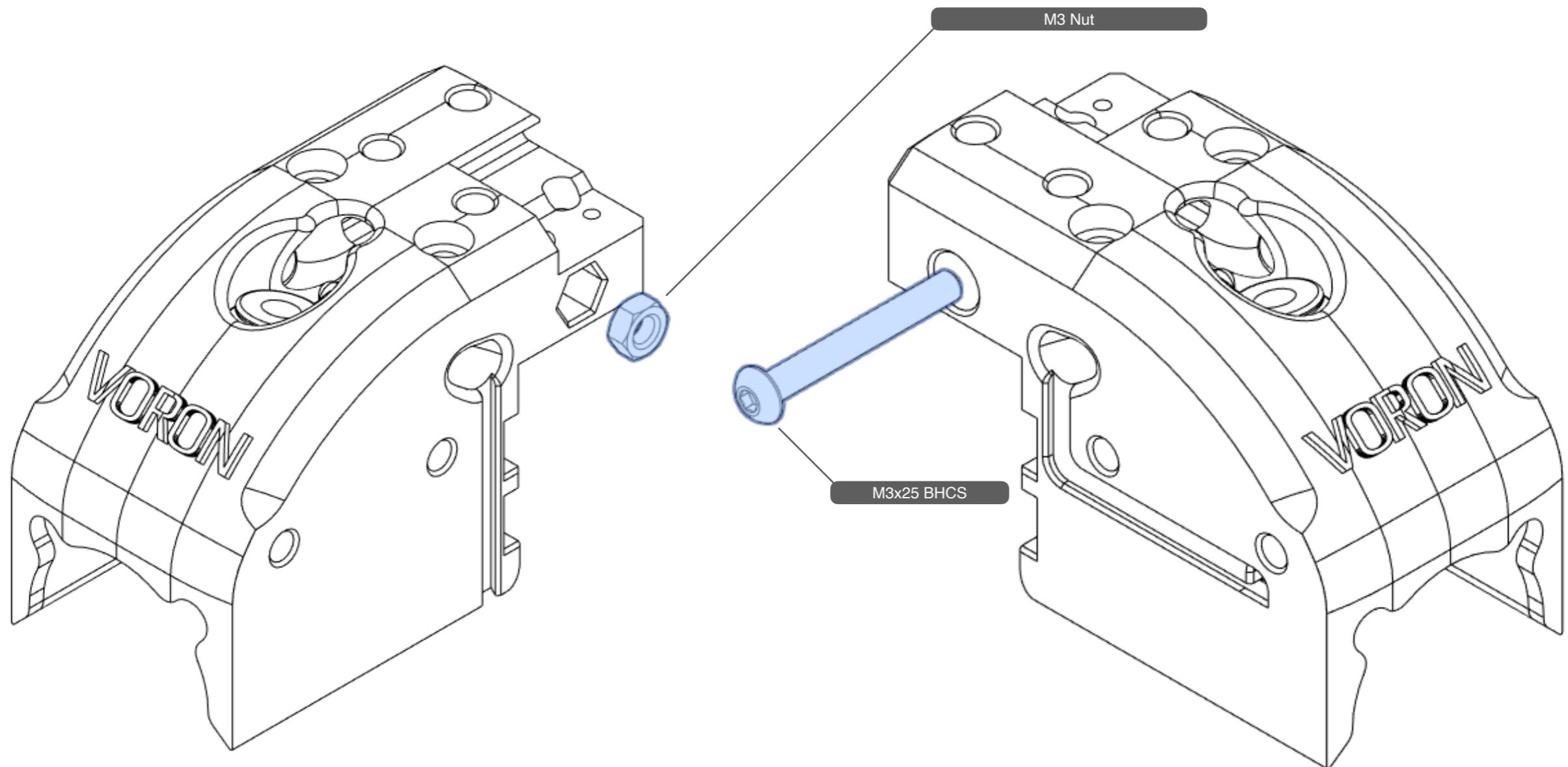




ECAS04 Bowden Collet

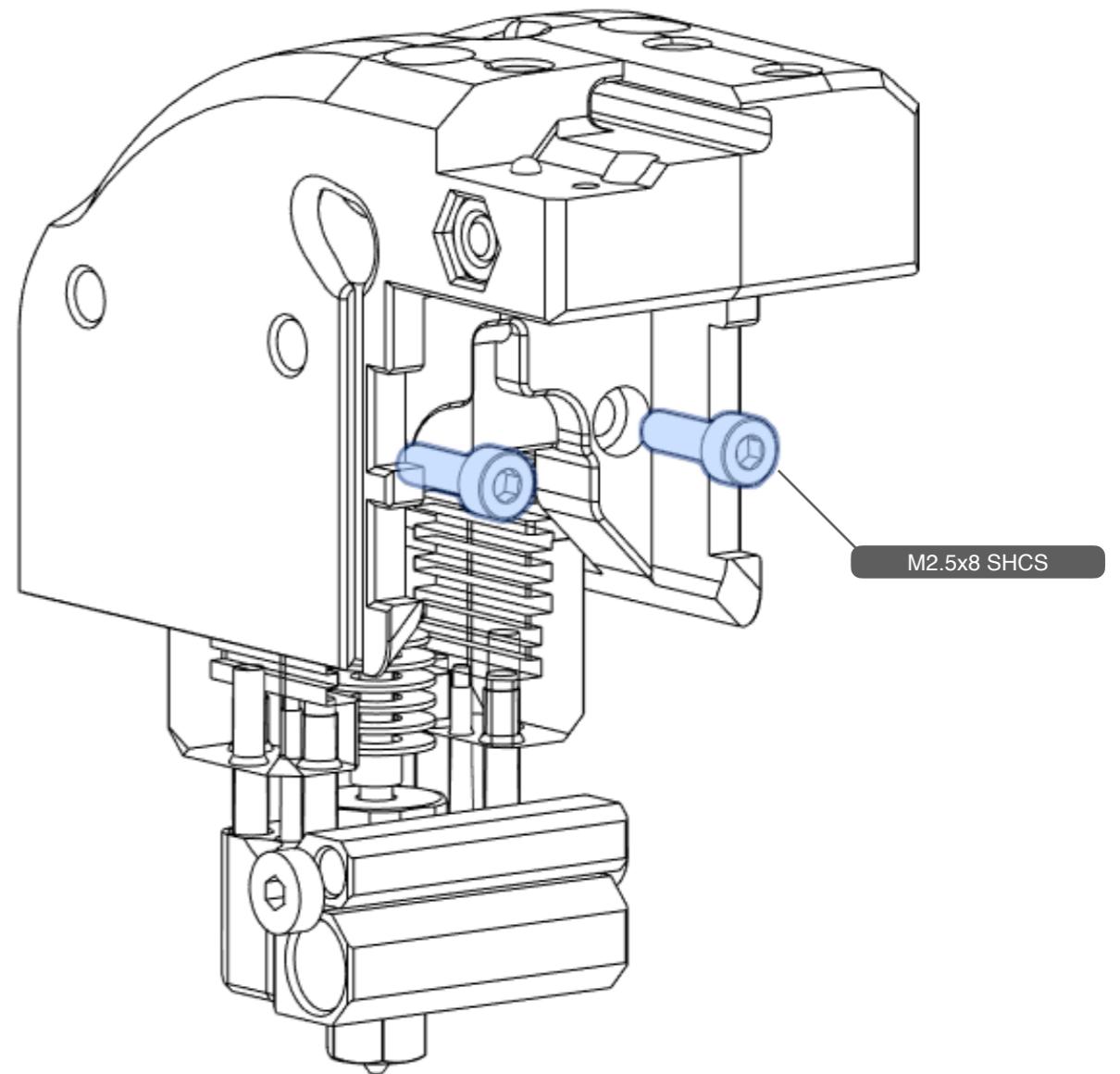
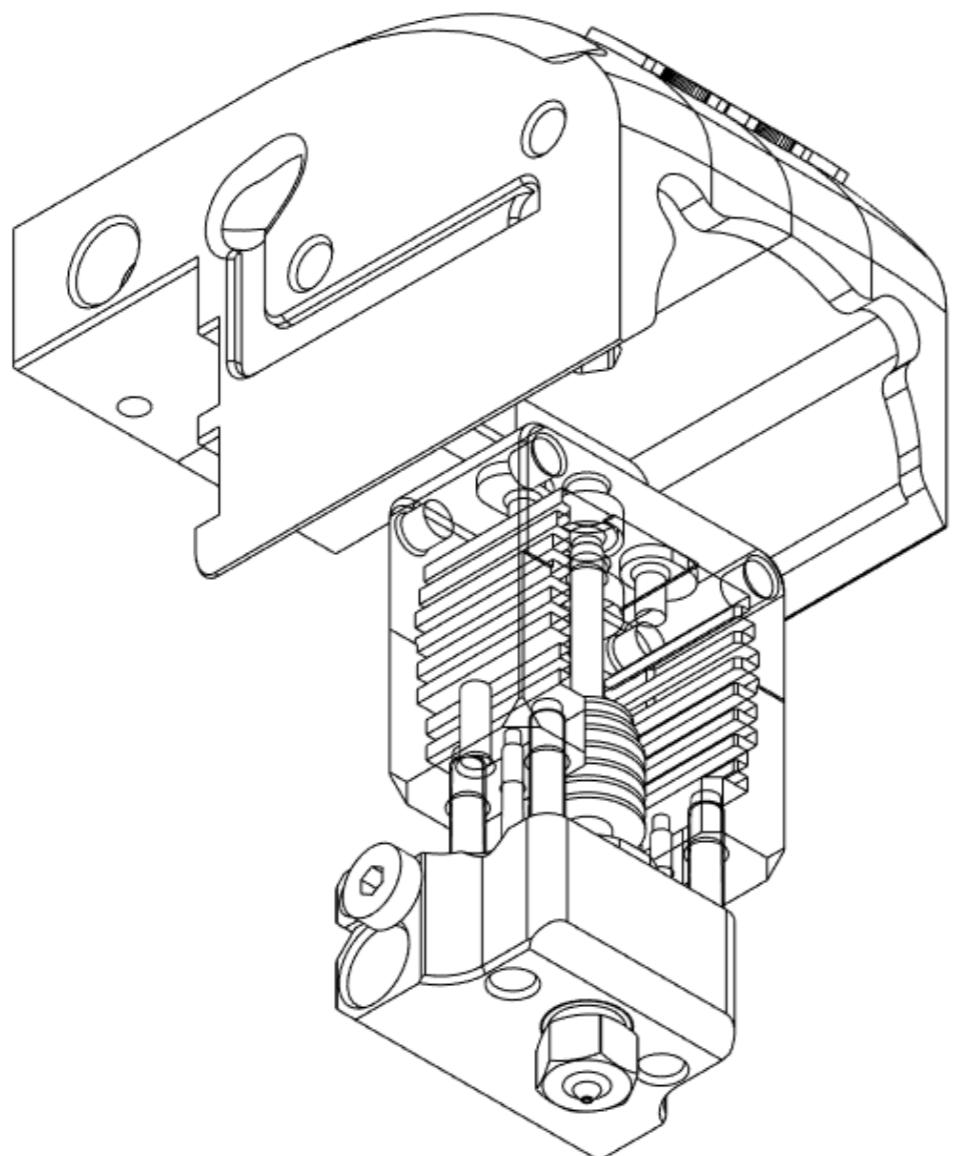
Part	Qty
ECAS04 Collet	1

Appendix B - Toolhead - Mosquito

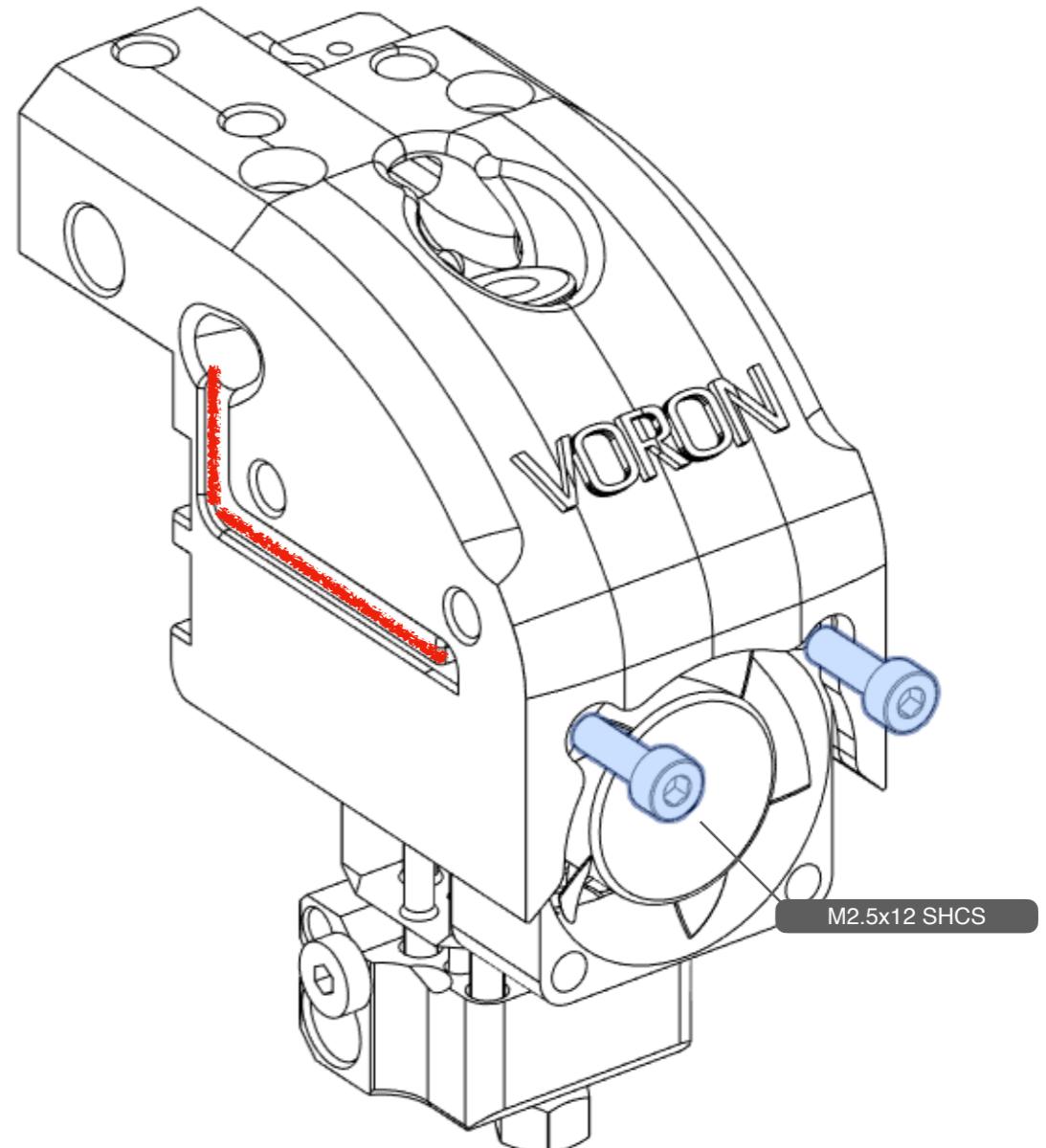
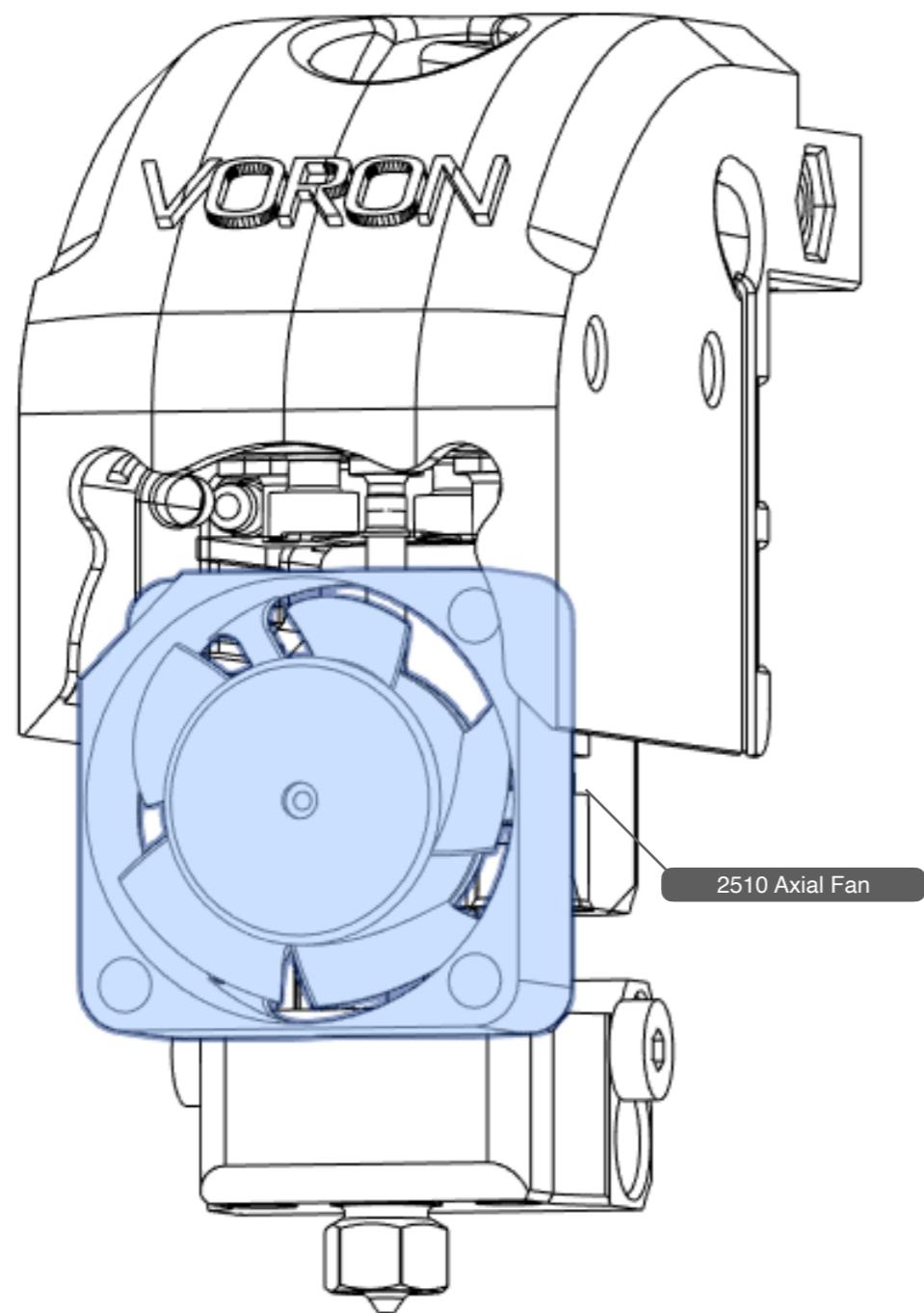


Part	Qty
M3x25 BHCS	1
M3 Nut	1

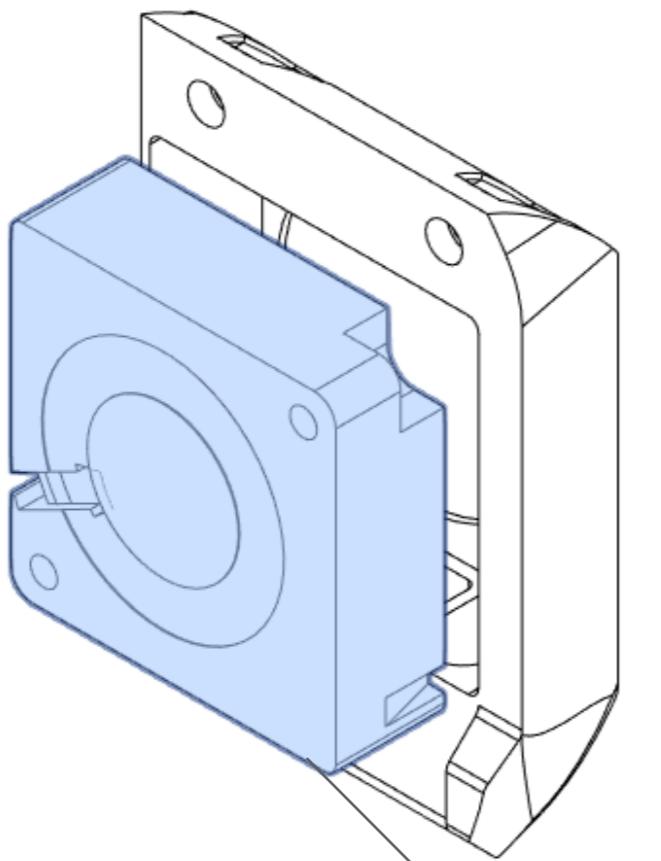
Appendix B - Toolhead - Mosquito



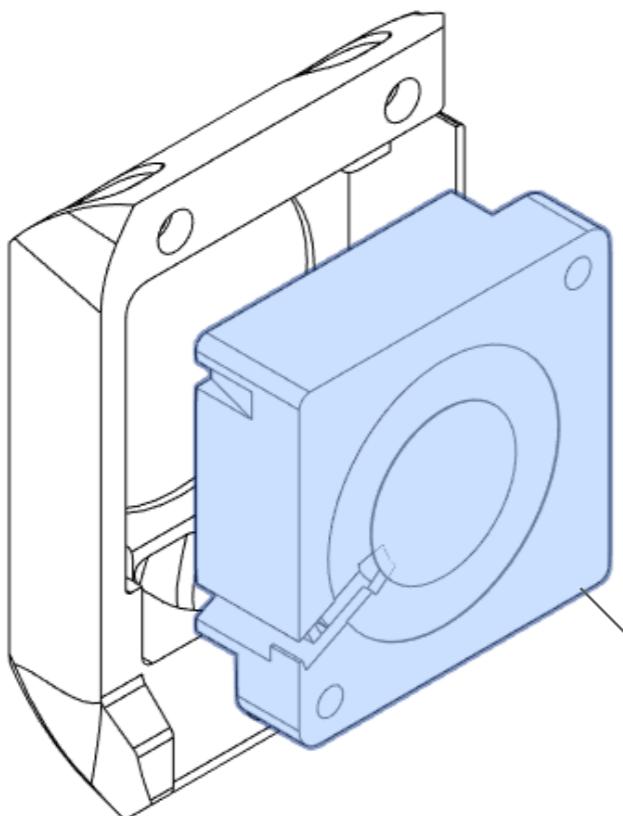
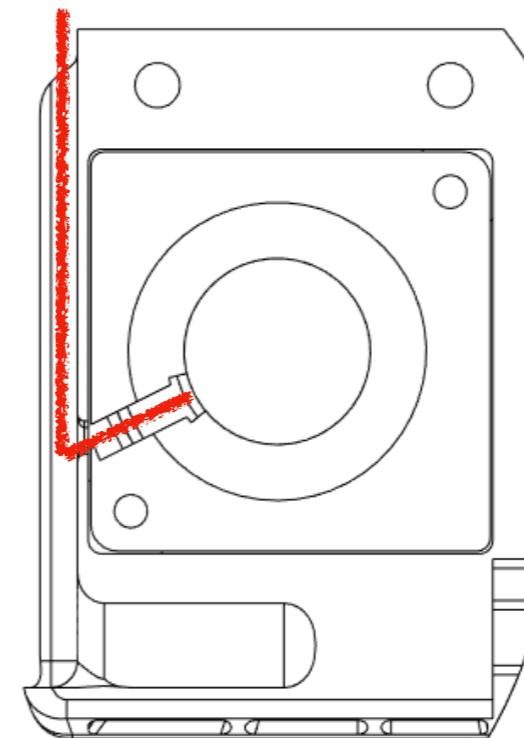
Part	Qty
M2.5x8 SHCS	2
Mosquito Hotend	1



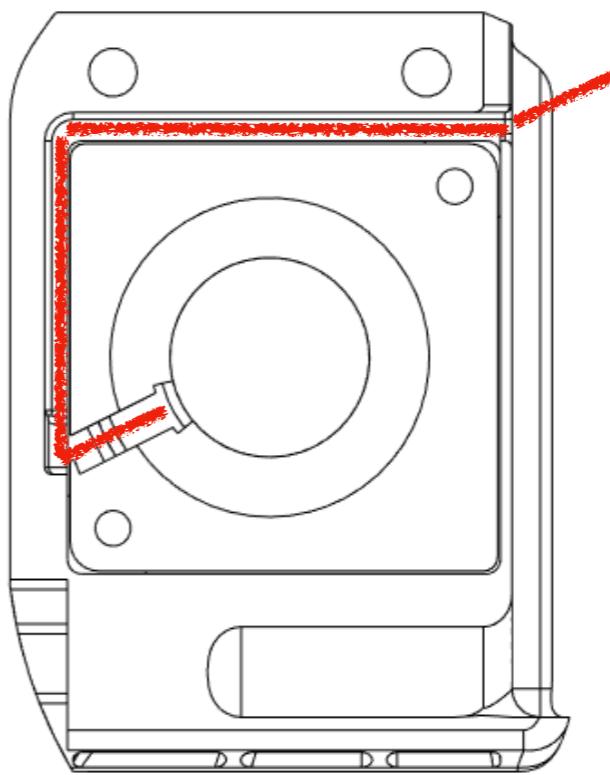
Part	Qty
M2.5x12 SHCS	2
2510 Axial Fan	1



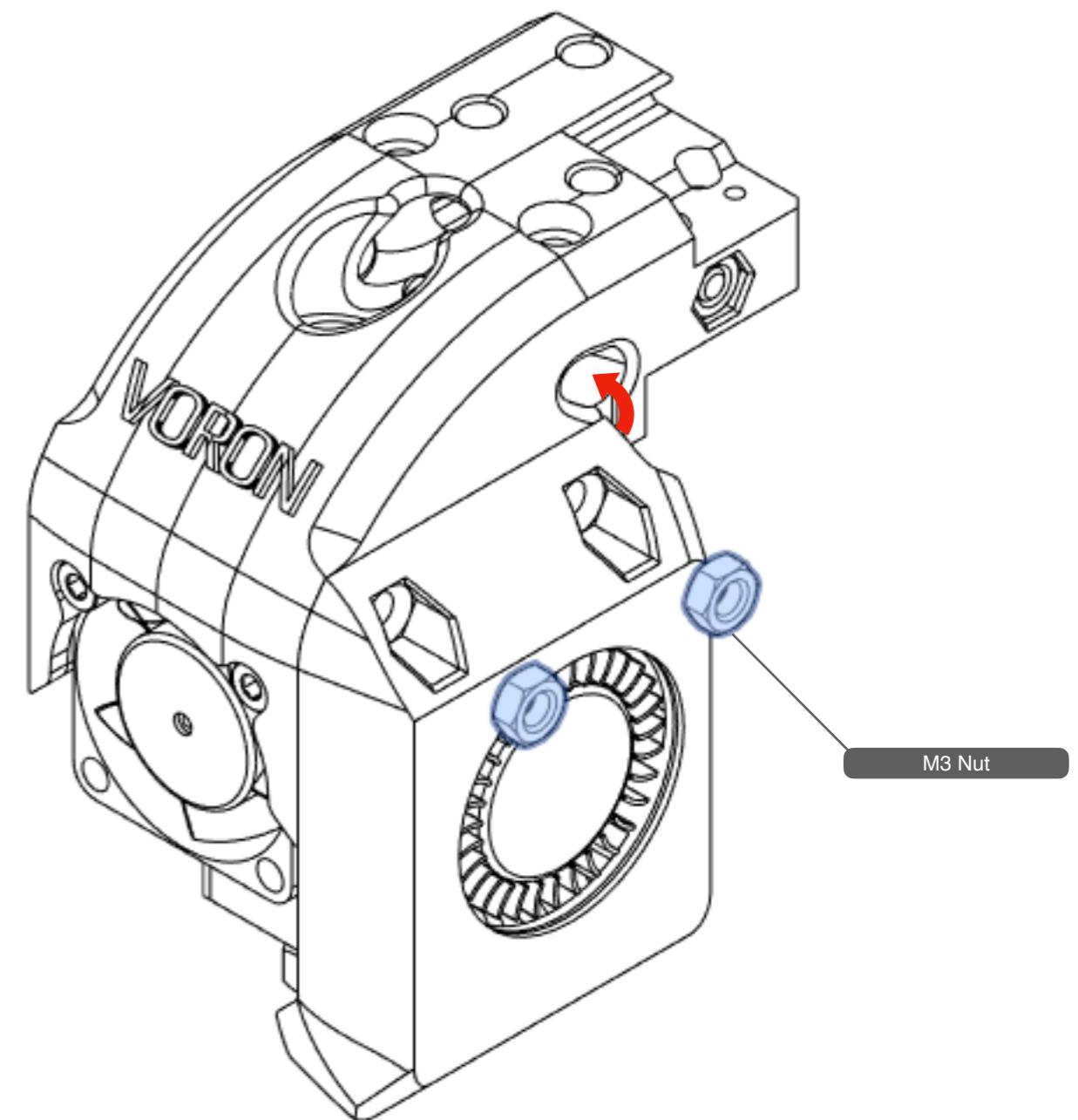
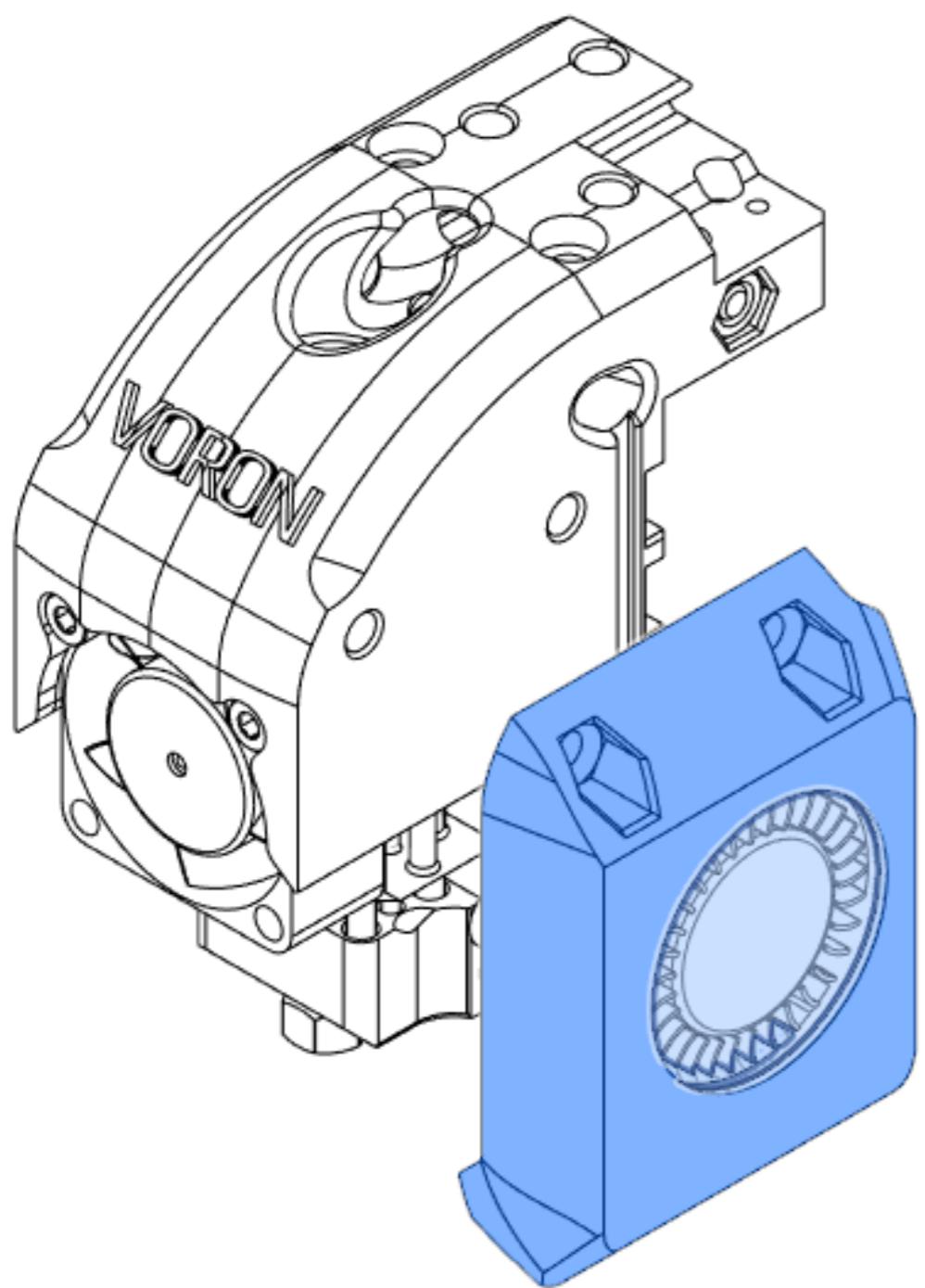
3010 Blower Fan



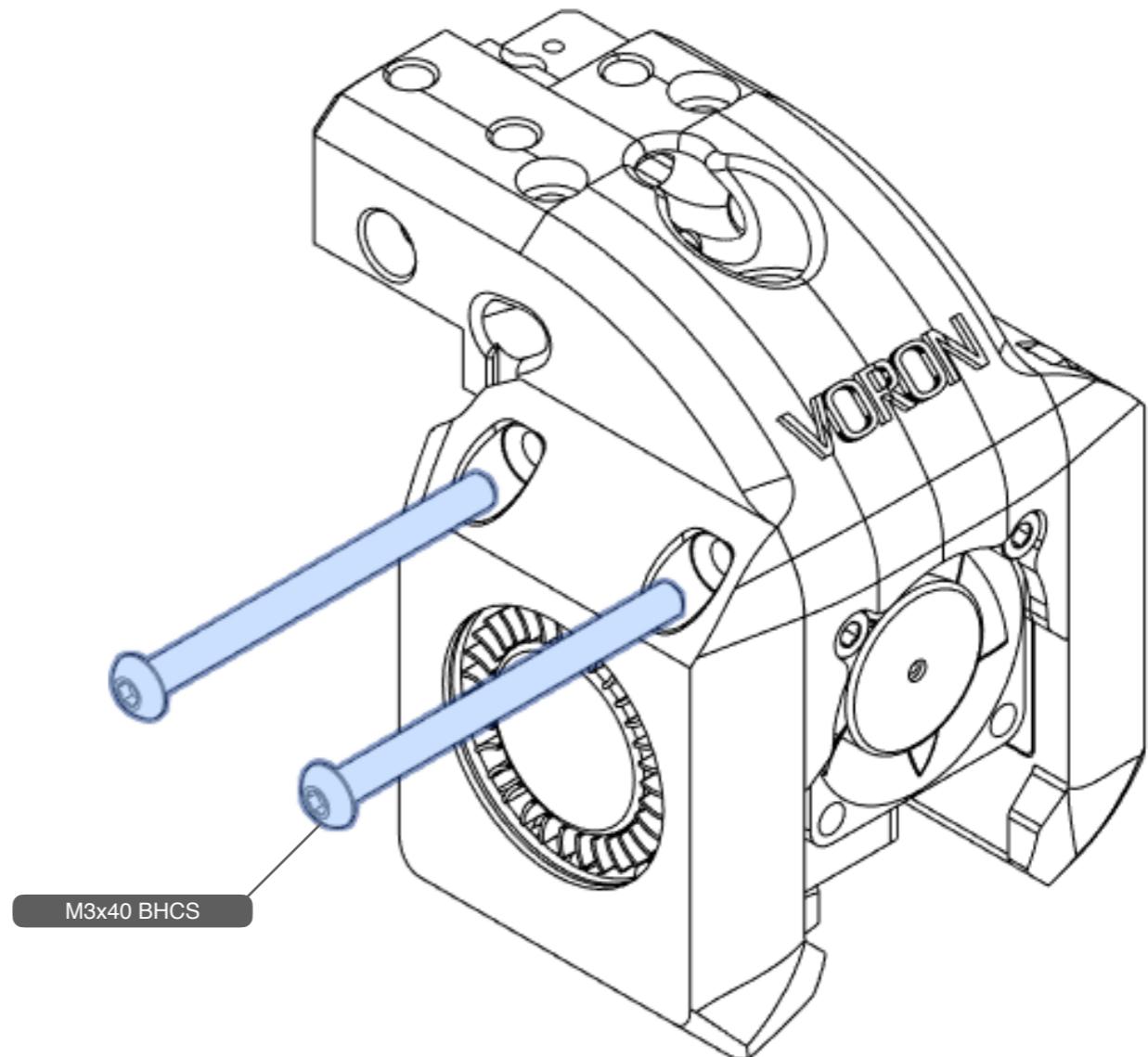
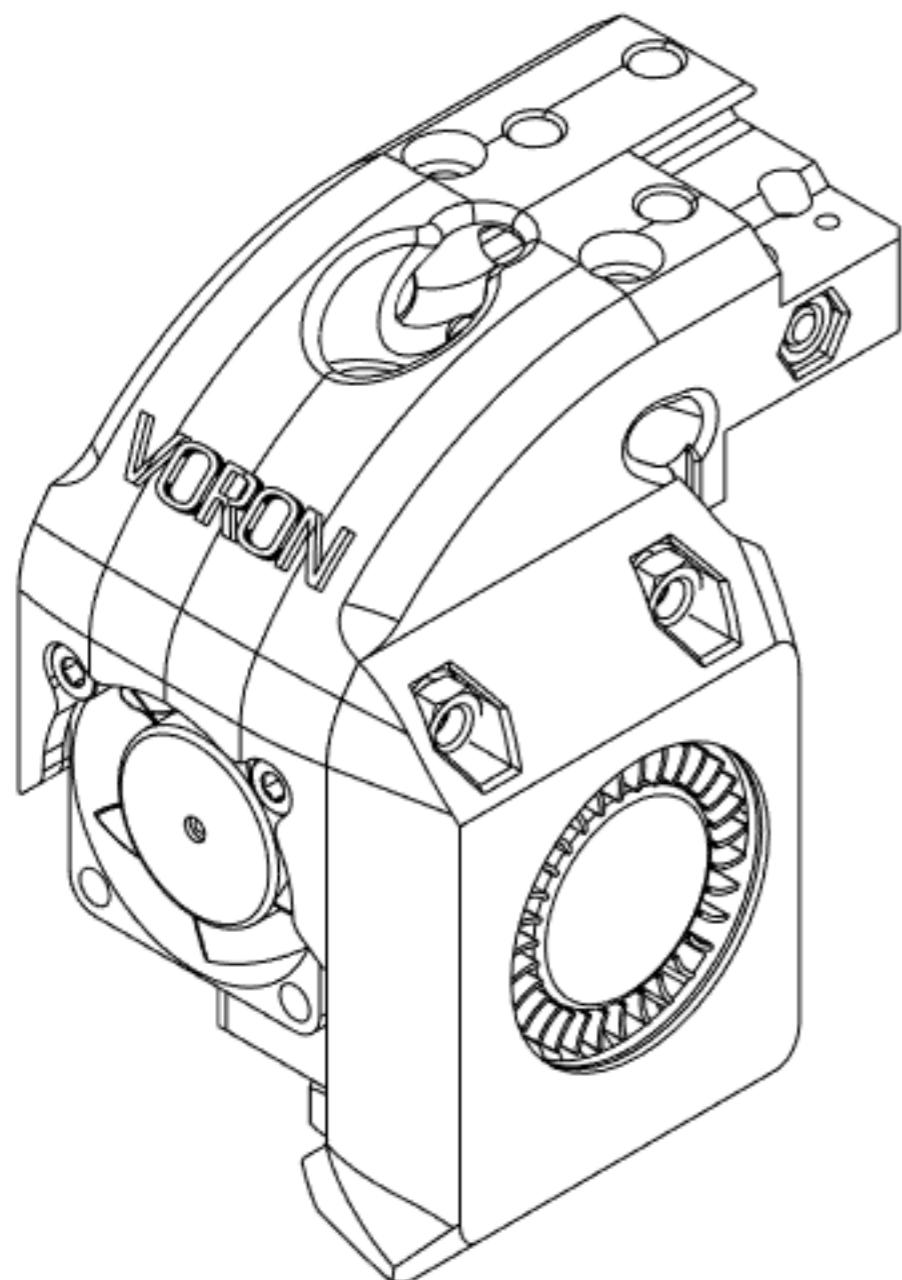
3010 Blower Fan



Part	Qty
3010 Radial Fan	2



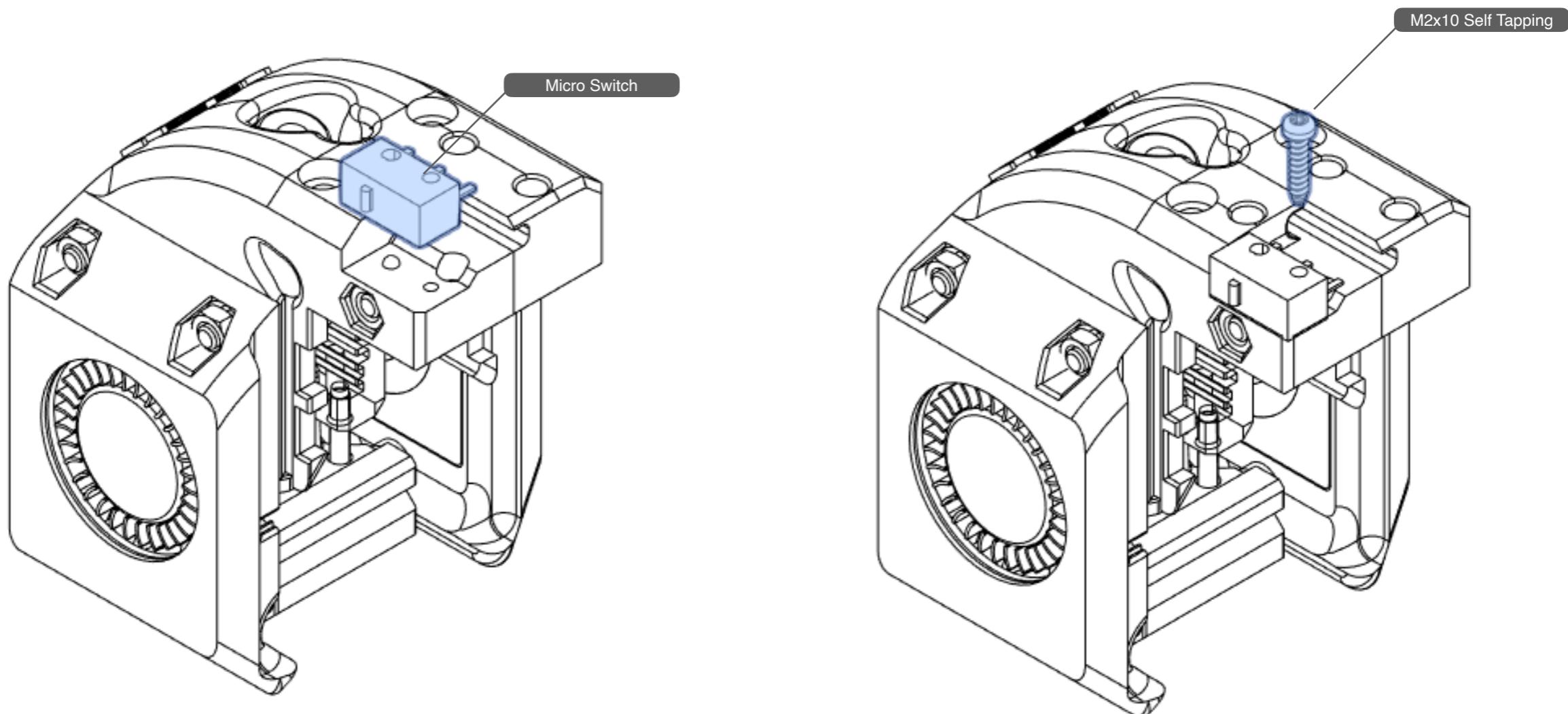
Part	Qty
M3 Nut	2



M3x40 BHCS

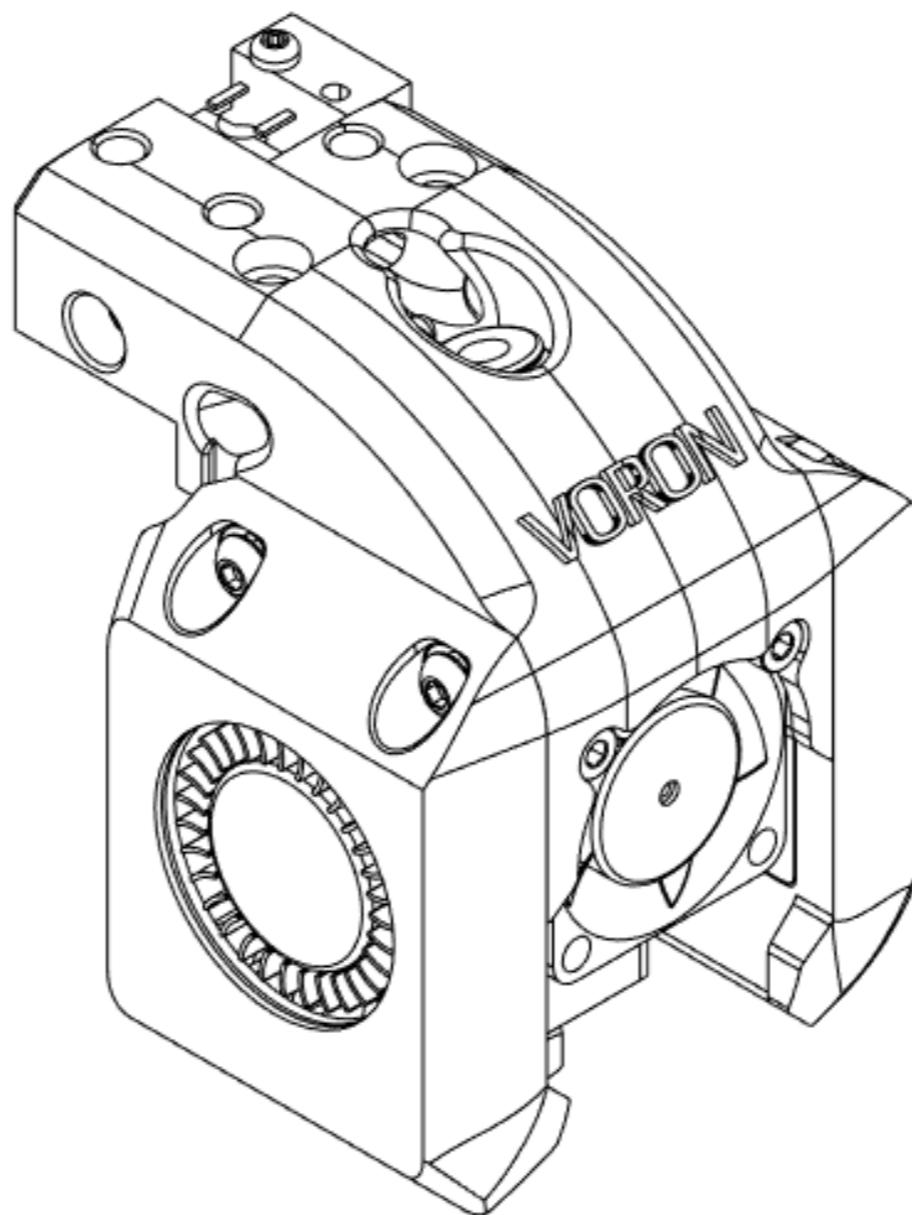
Part	Qty
M3x40 BHCS	2

Appendix B - Toolhead - Mosquito



Part	Qty
Microswitch	1
M2x10 Self Tapping	1

Appendix B - Toolhead - Mosquito



Thanks!

Brought To You By; In No Particular Order					
russiancatfood	Chron	etherwalker	Lolmodule	Strubinator	brick_sandwich
8Bit Poro	codeXmas	xanin	louielc	synlor	carnufex
aMpeX	daveidmx	fermion	Maglin	tameike	E.Lariviere
Andreq	Defib	fessyfoo	Medewsa	Thebrakshow	eddie
andylsun	dgcaste	fujimonster	Minasokoni	Timmit99	insurgus
Arksine	DocJeeves	Fulg	Nemgrea	tinpec	johnprime
ArmyAg08	doowrednu	Hackdoggo	pnewb	Trunkmonkey	resam
bahahah	Drbpgh	lakabos	pnokel	Ubernero	Stephan
Boff	dunar	Immutef	railgunner13f	_unregistered	wile.e.coyote
<i>our husbands/wives/children/pets/significant others: for putting up with our shit, and dealing with our aliexpress packages</i>					

VORON ZERO

Development Graveyard

