

CNC ROUTER PARTS

Benchtop Standard

ASSEMBLY INSTRUCTIONS

Version 2016Q1.4

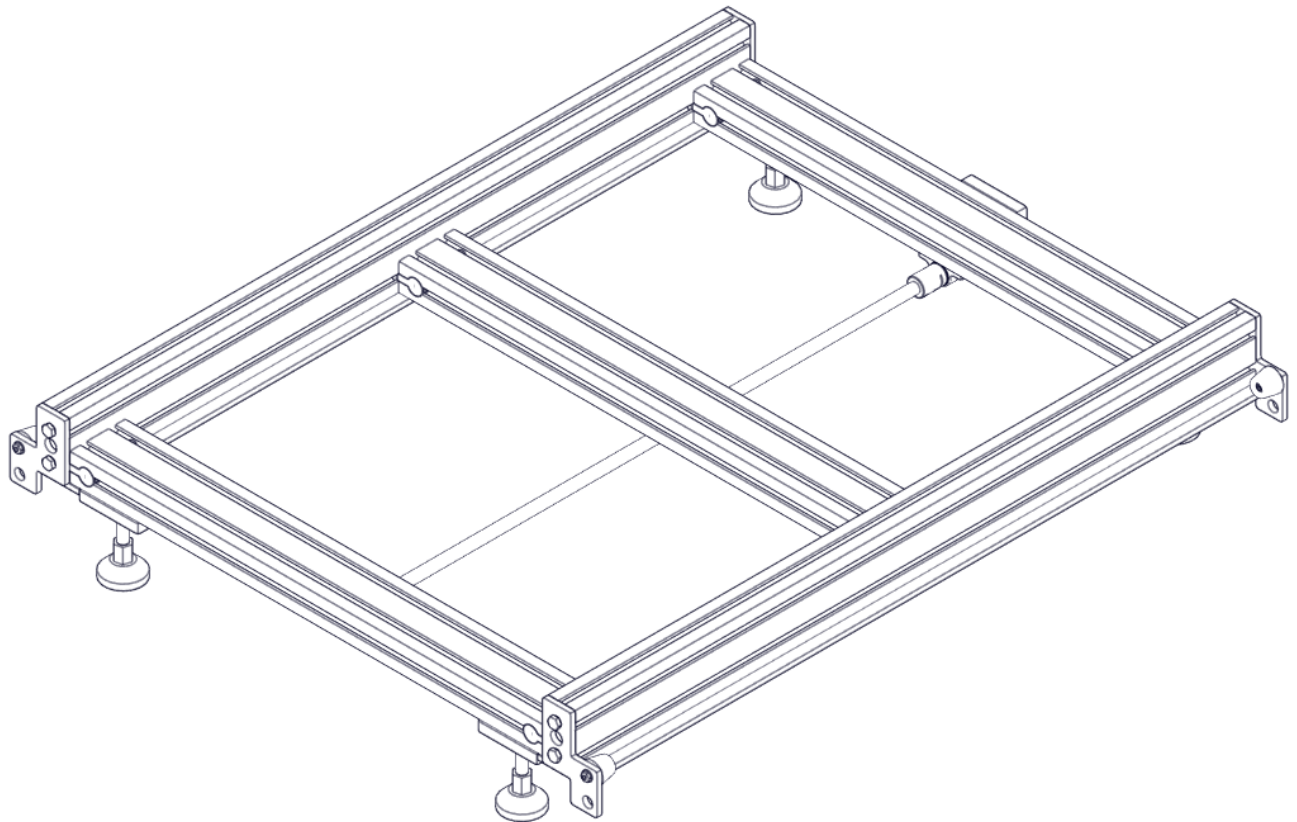
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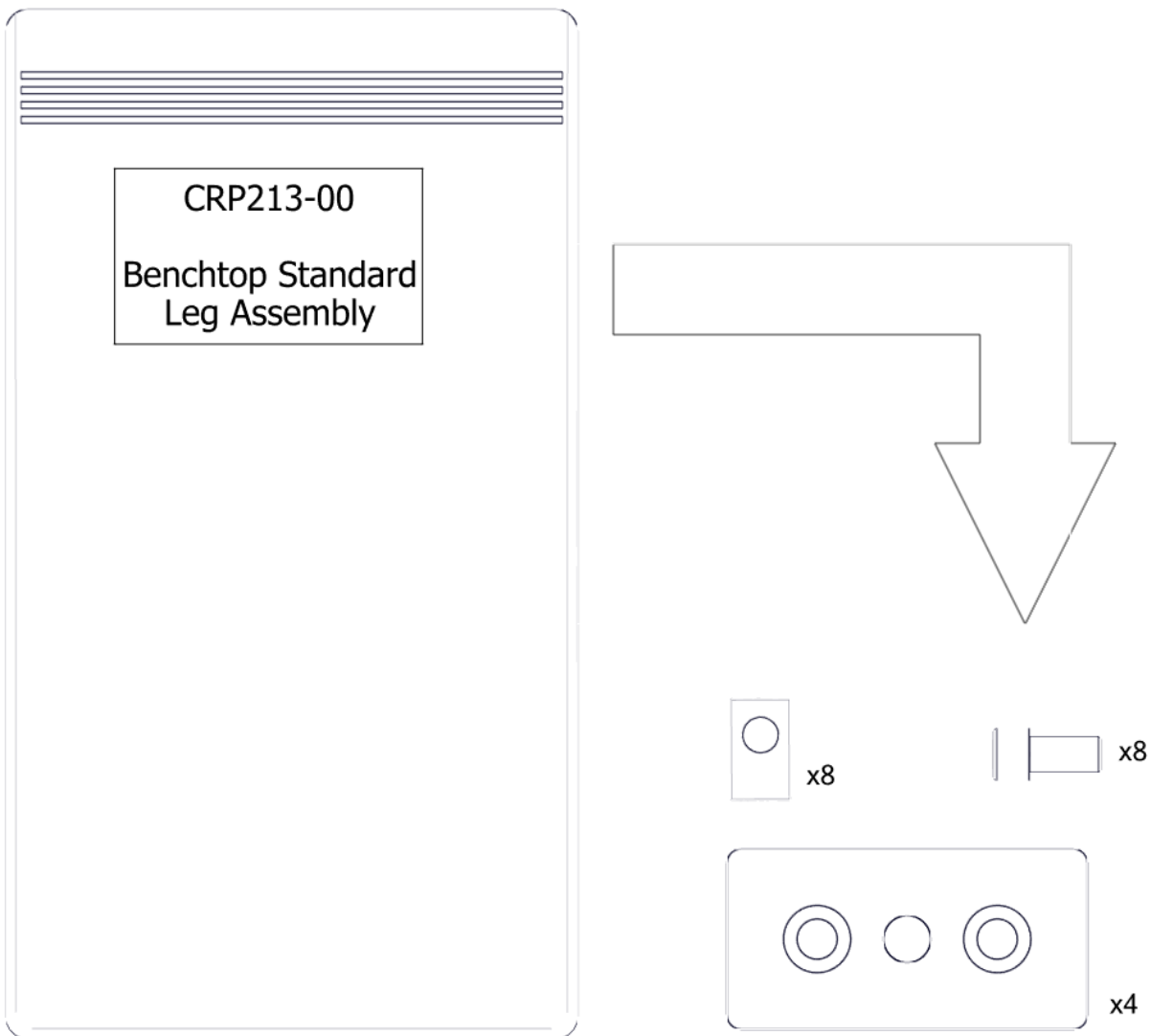
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1

Base Assembly



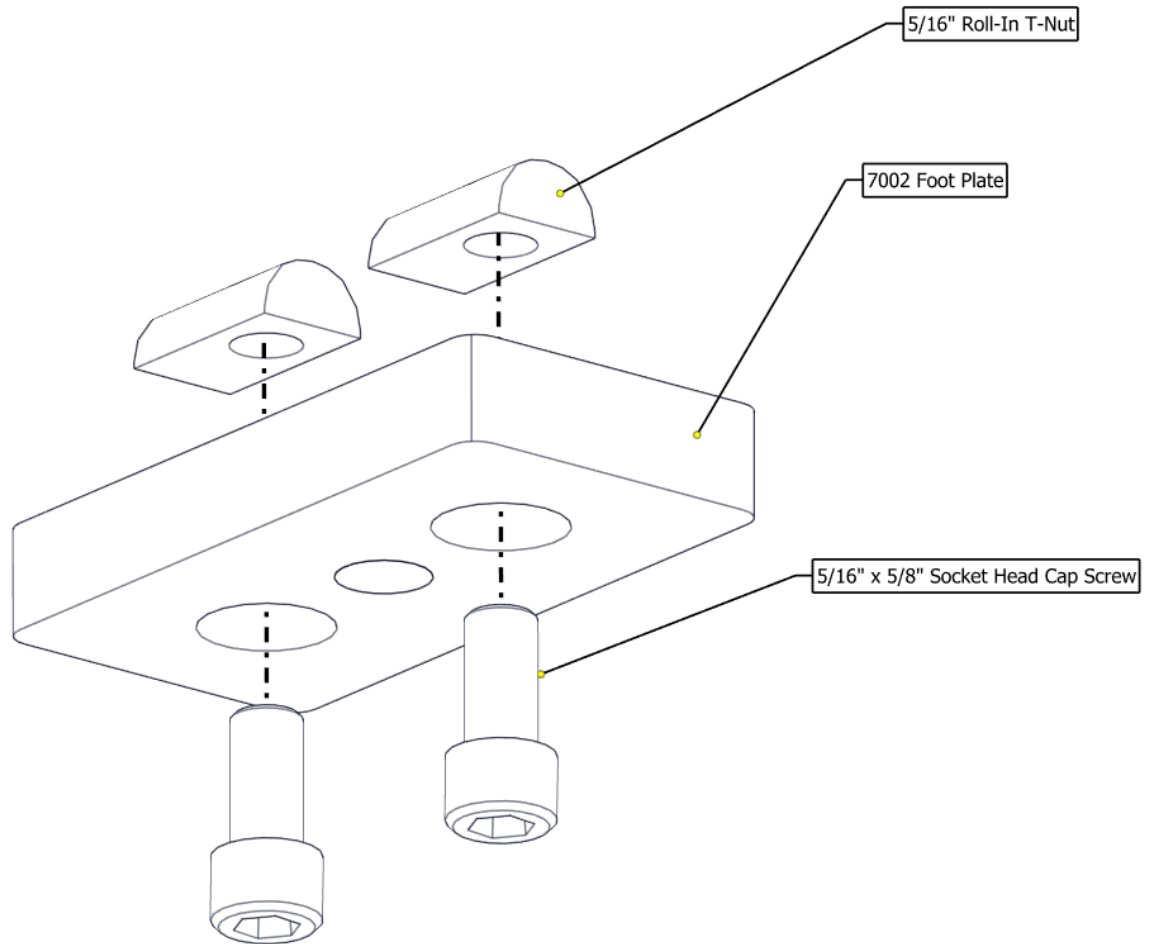
1.1 Foot Installation (A)



Parts Required:

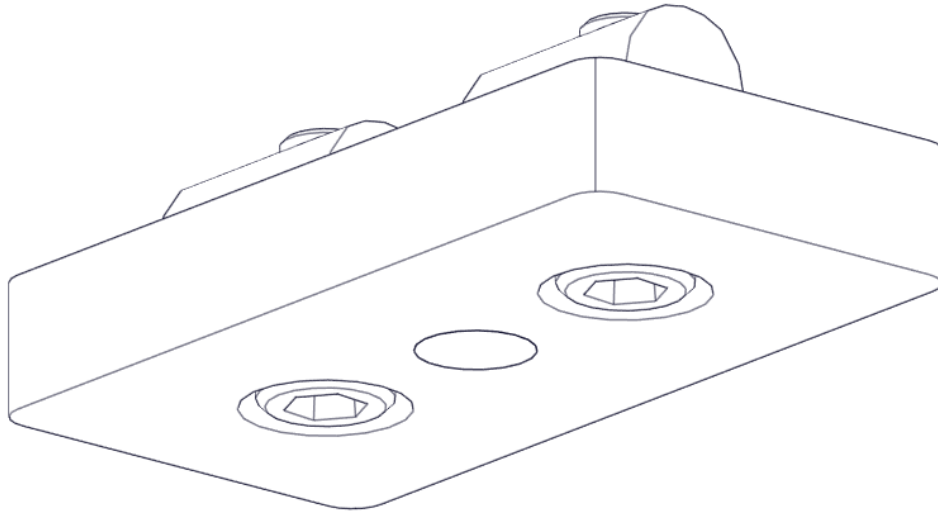
- (4) 7002 foot plates
- (8) 5/16" x 5/8" socket head cap screws
- (8) 5/16" roll-in t-nuts

Bag CRP213-00 will contain all parts necessary for this step.

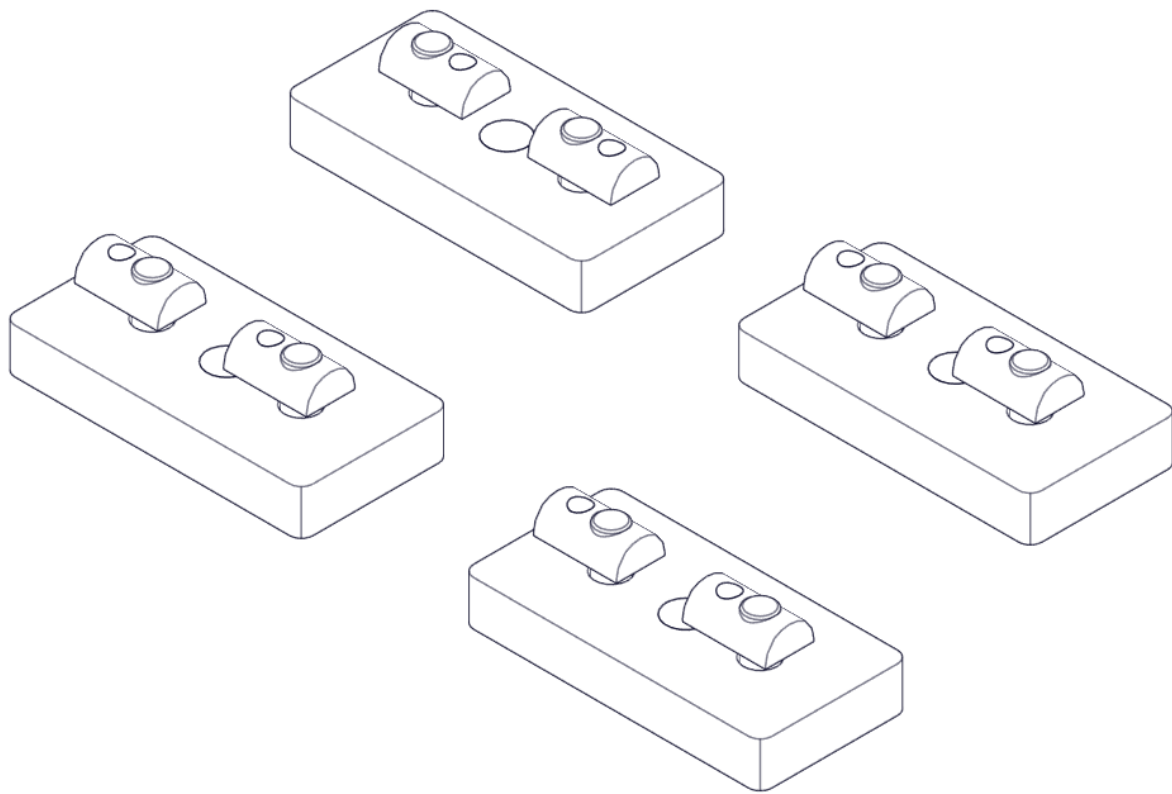


- Partially thread two 5/16" x 5/8" socket head cap screws into 5/16" roll-in t-nuts, through the 7002 foot plate.

Note: At this time, do not fasten the M12 mounting foot to the foot plate. (Not Shown)

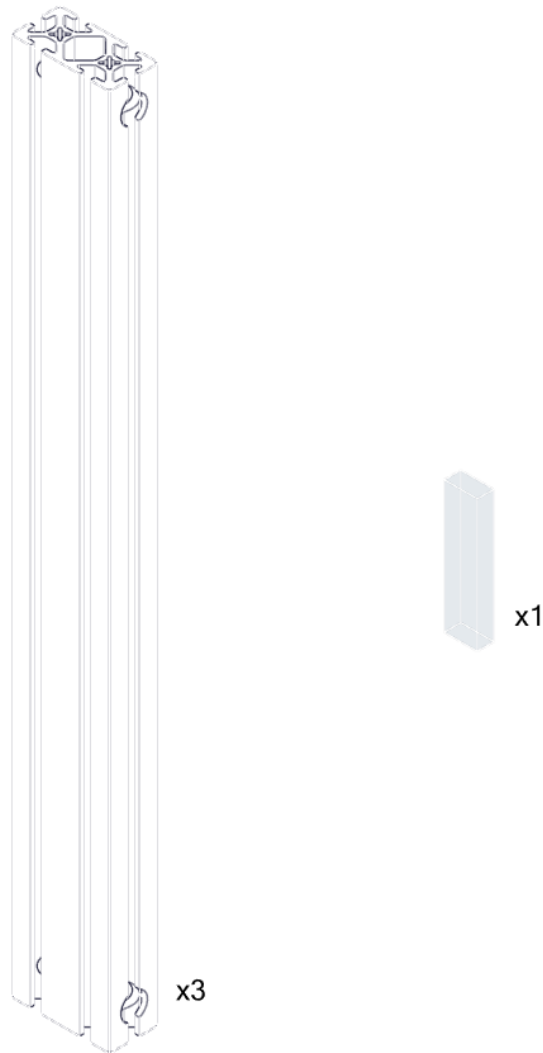


- Each **foot assembly** should now appear as above



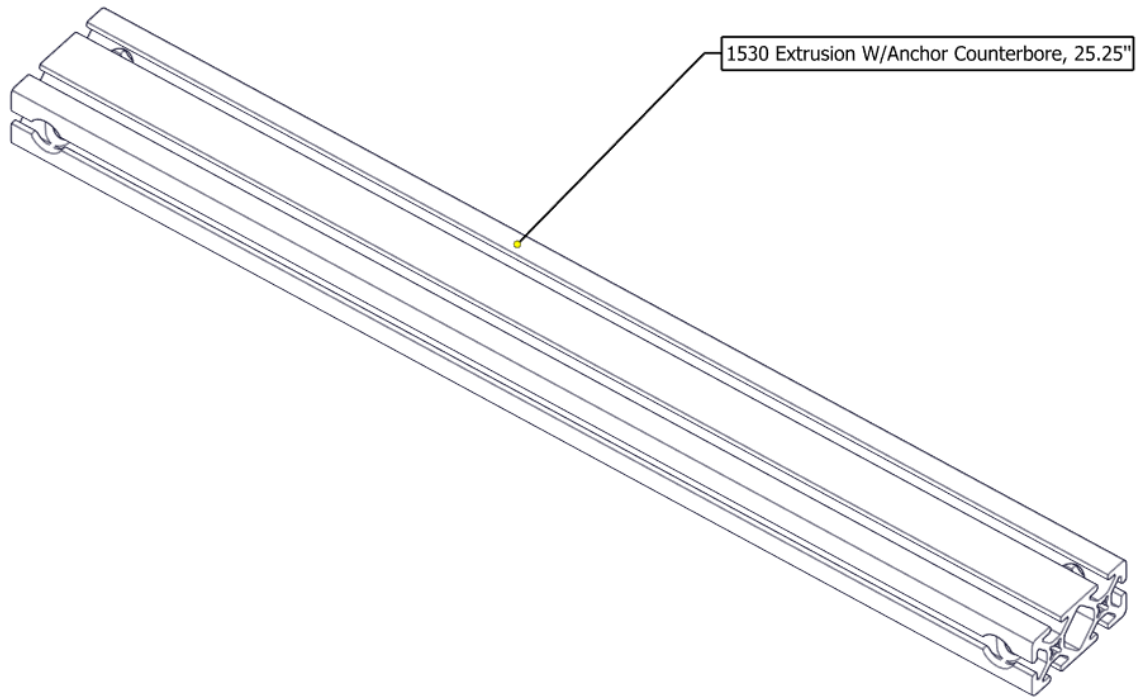
- Repeat the previous process for all (4) provided foot plates.

1.2 Foot Installation (B)

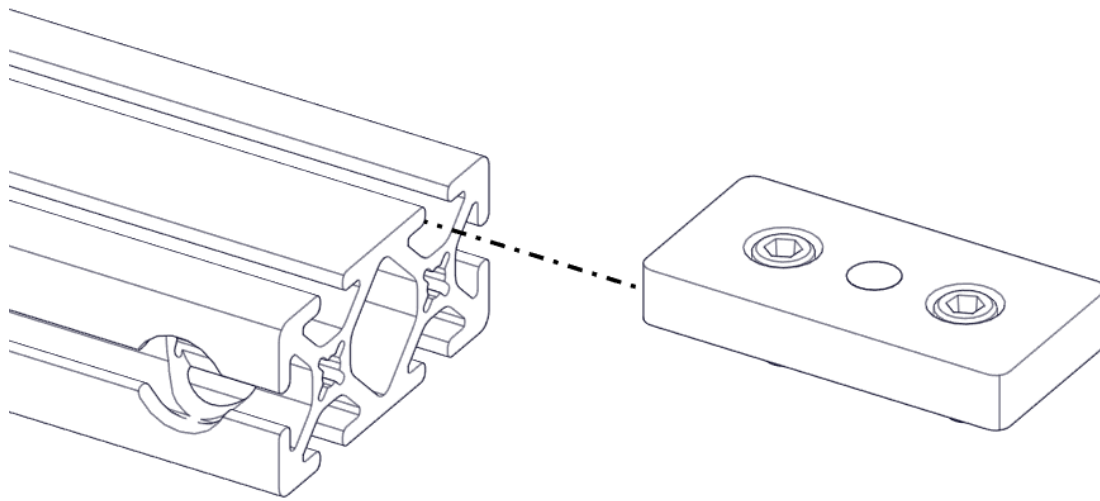


Parts Required:

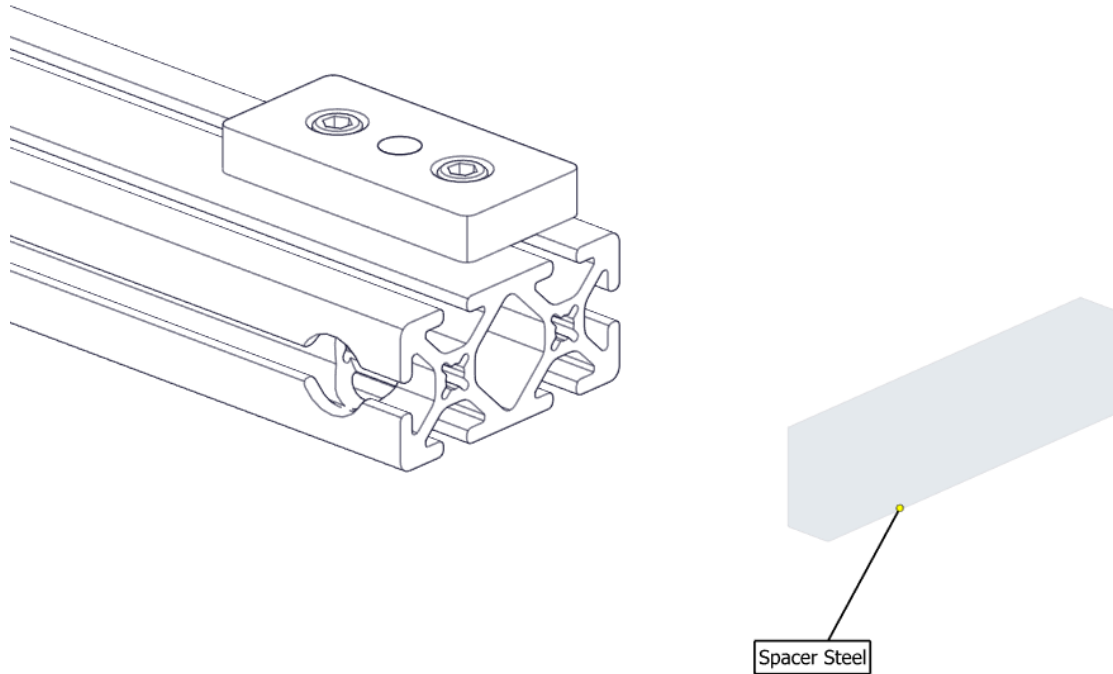
- (3) 25.25" pieces of 1530 crossmember extrusion
- (1) Steel spacer



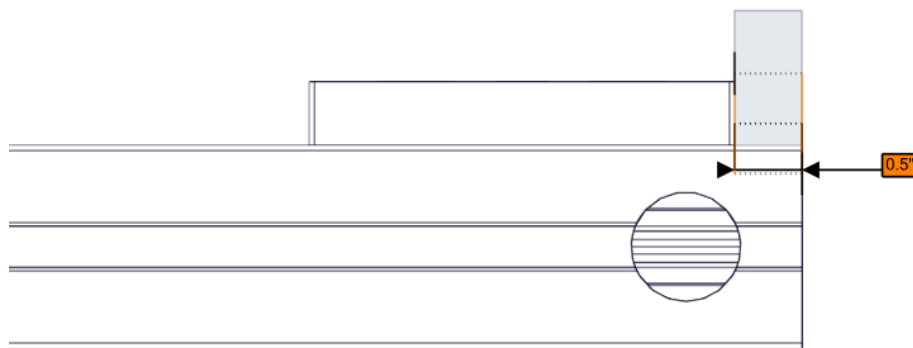
- All (3) crossmembers should have counter-bored holes at either end as above.



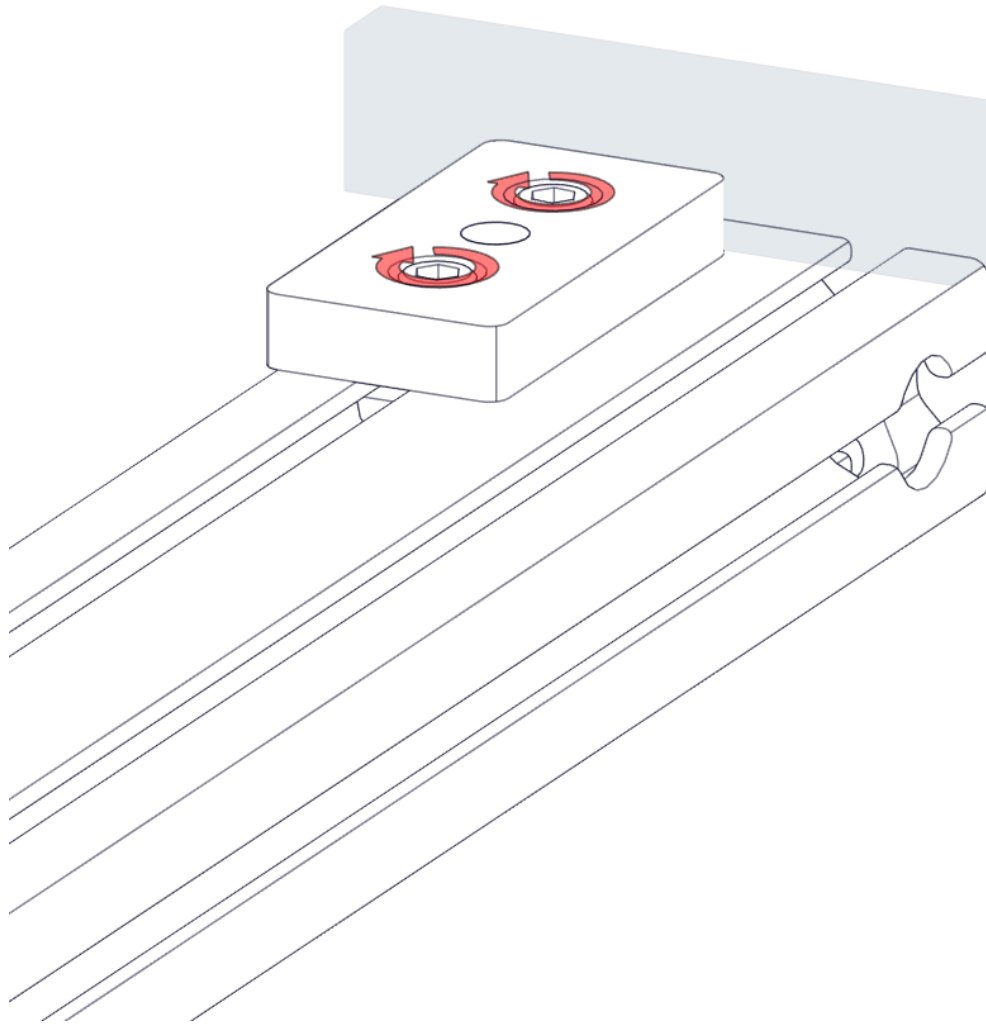
- Slide the t-nuts of a foot assembly into the indicated t-slot of a crossmember.



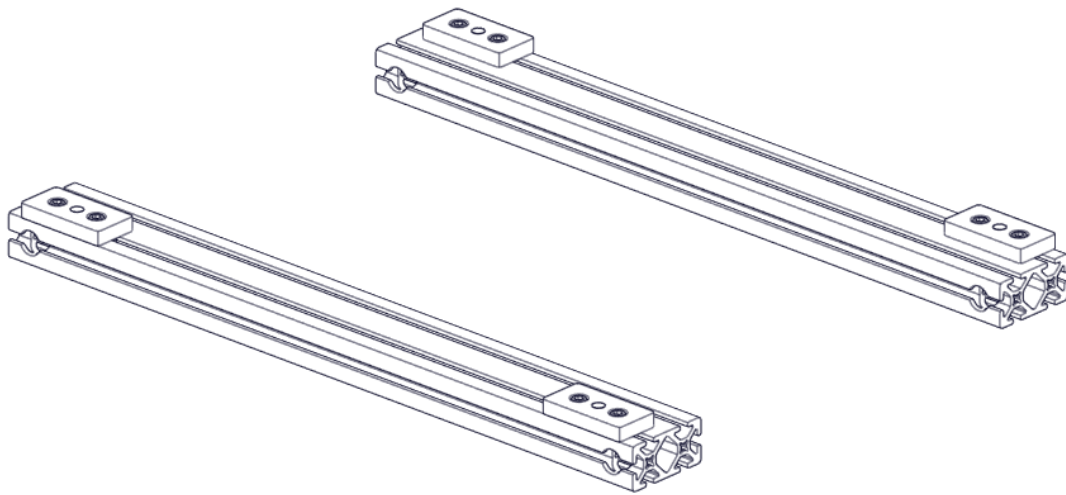
- Use the provided steel spacer to correctly position the foot assembly in the t-slot.



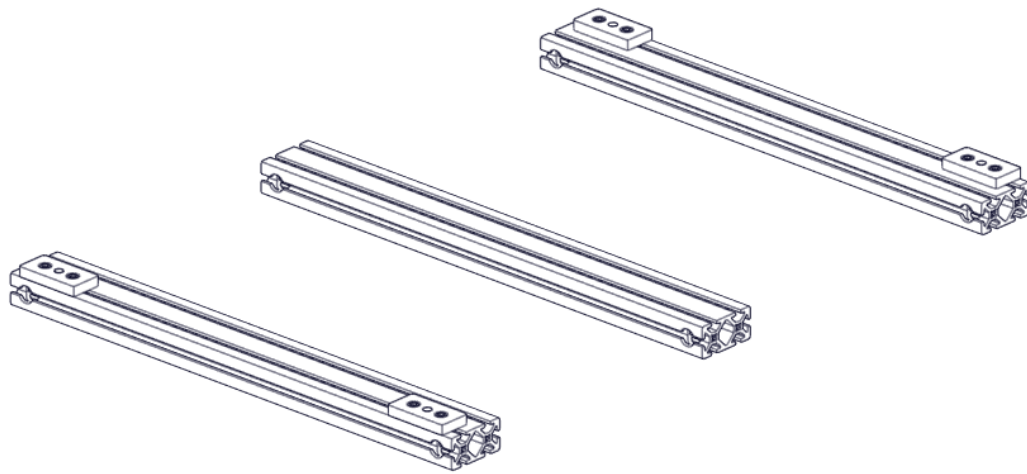
- Place the steel spacer between the foot assembly and the end of the crossmember. (The steel spacer should be flush with the crossmember.)



- Tighten the highlighted 5/16" x 5/8" socket head cap screws.
- Repeat the previous process to install an additional foot assembly into **same** t-slot as the first.
- Position the additional assembly at the opposite end of the crossmember using the steel spacer.

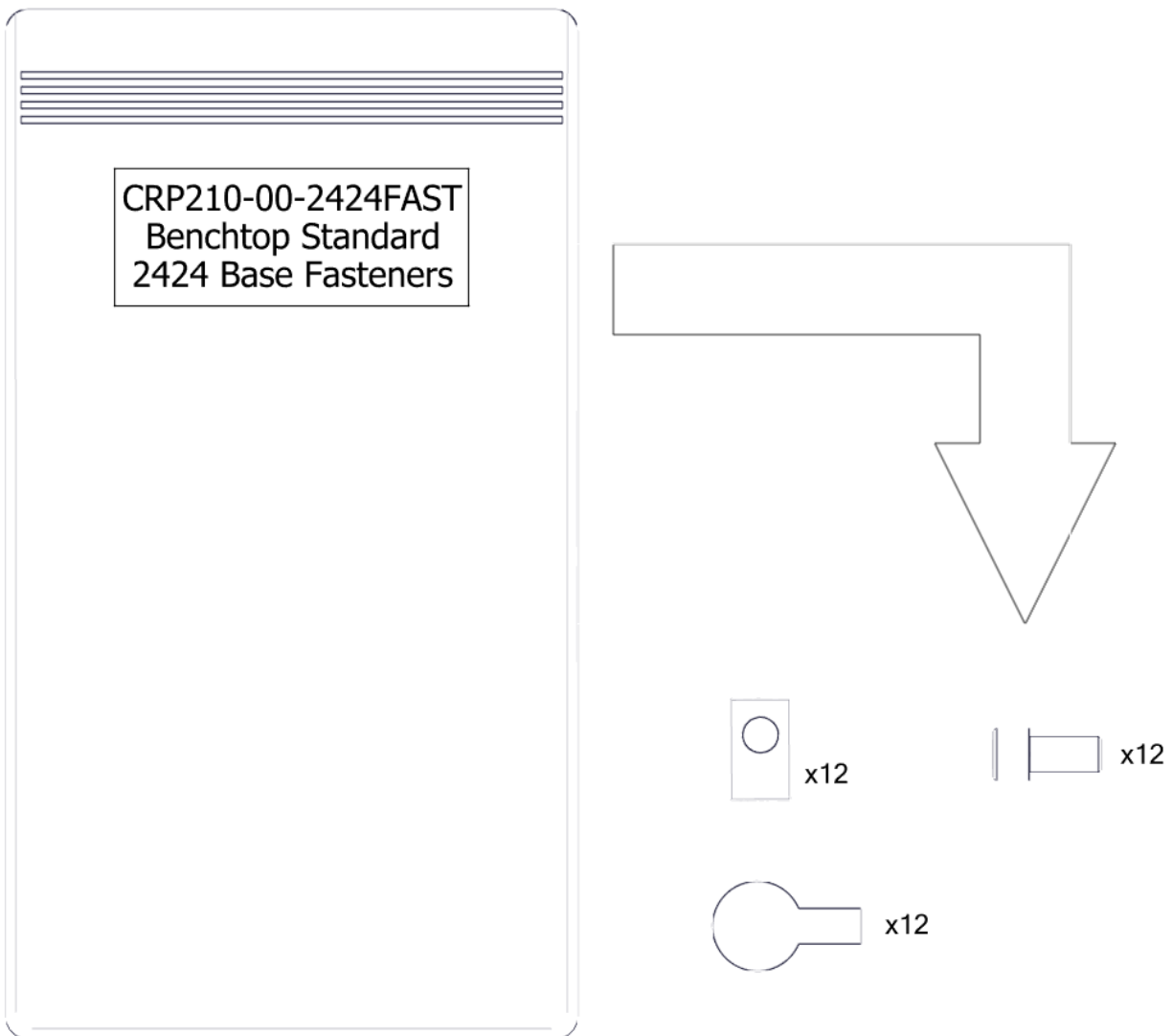


- Duplicate the assembled crossmember using the two remaining foot assemblies.



- All (3) 25.25" crossmembers are now complete.
- Orient them so the foot assemblies are in the outer t-slots as above.

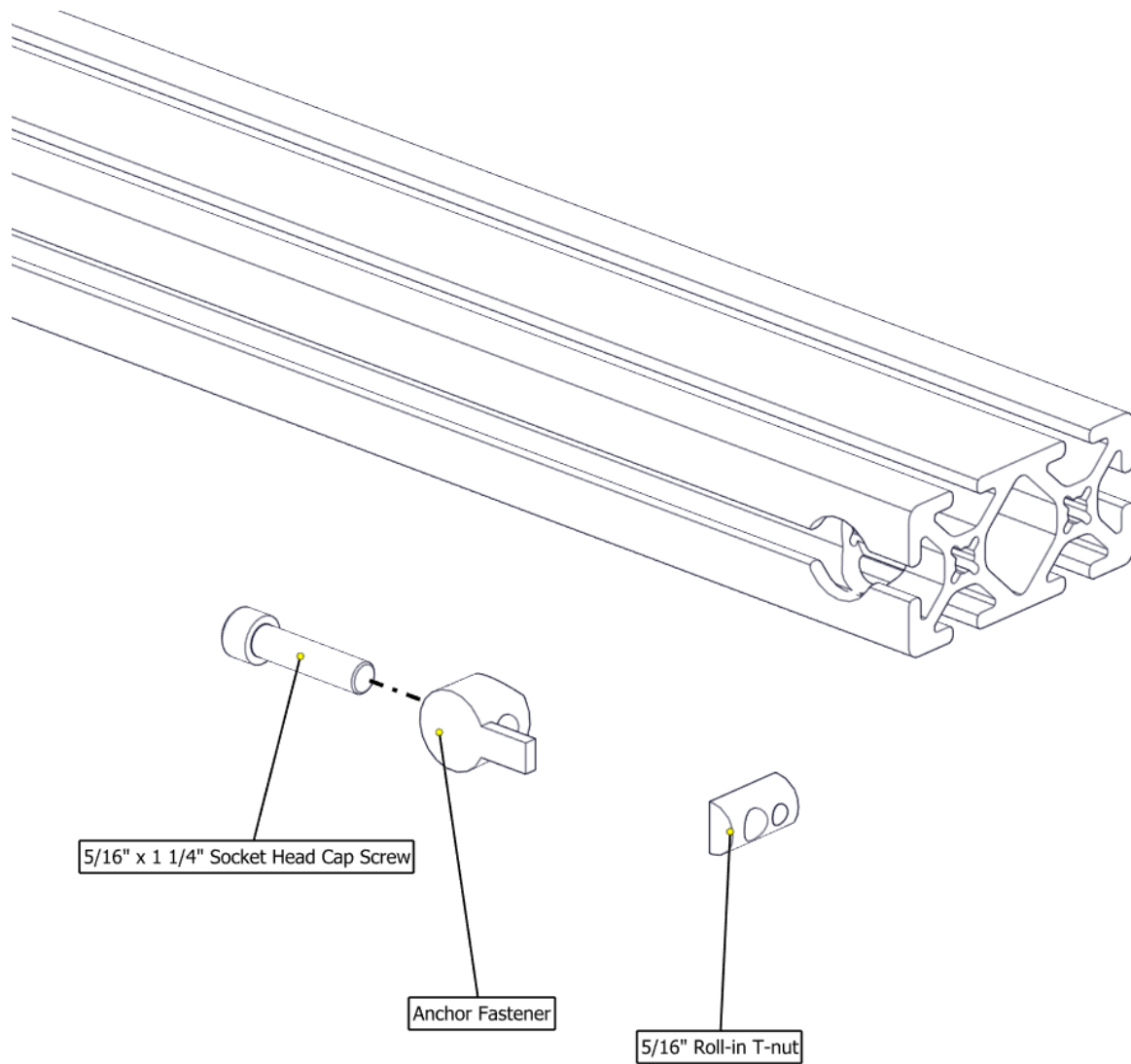
1.3 Anchor Assembly and Installation



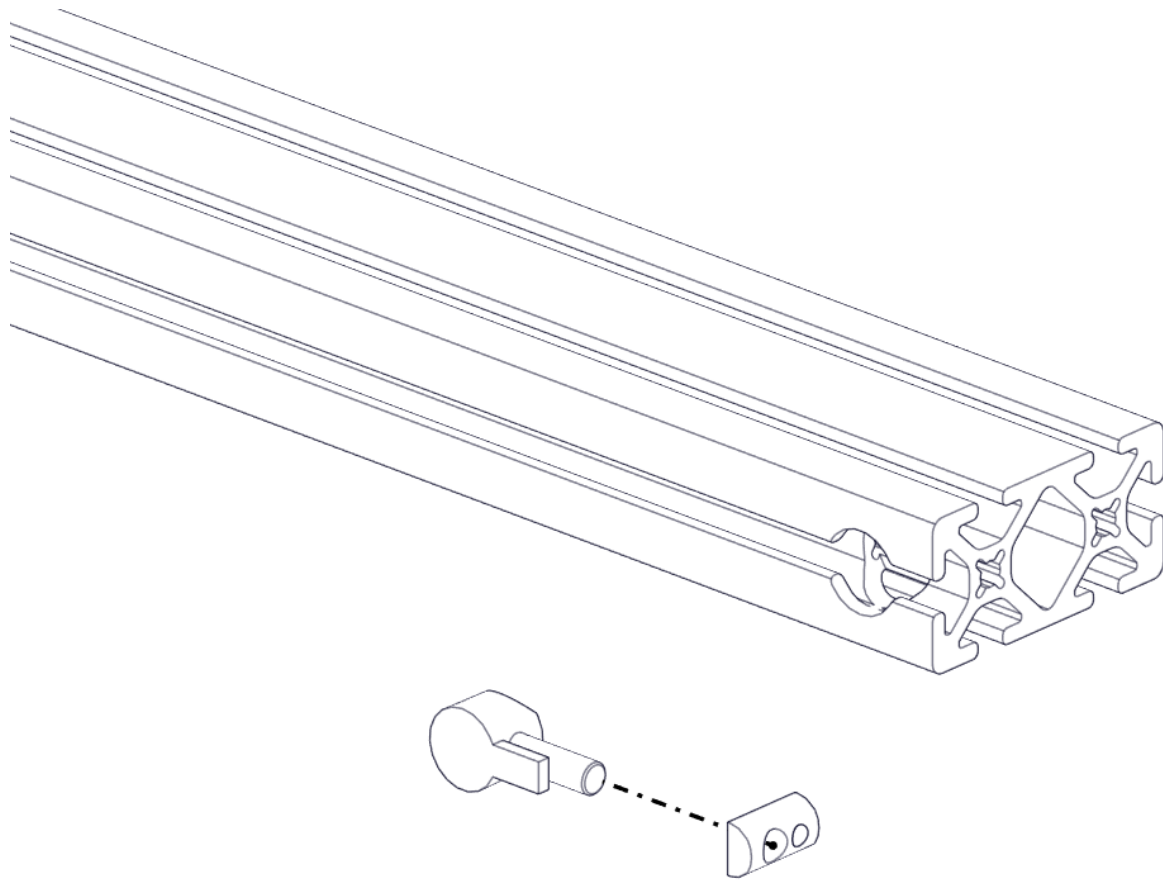
Parts Required:

- (12) Anchor fasteners
- (12) 5/16" roll-in t-nuts
- (12) 5/16" x 1 1/4" socket head cap screws

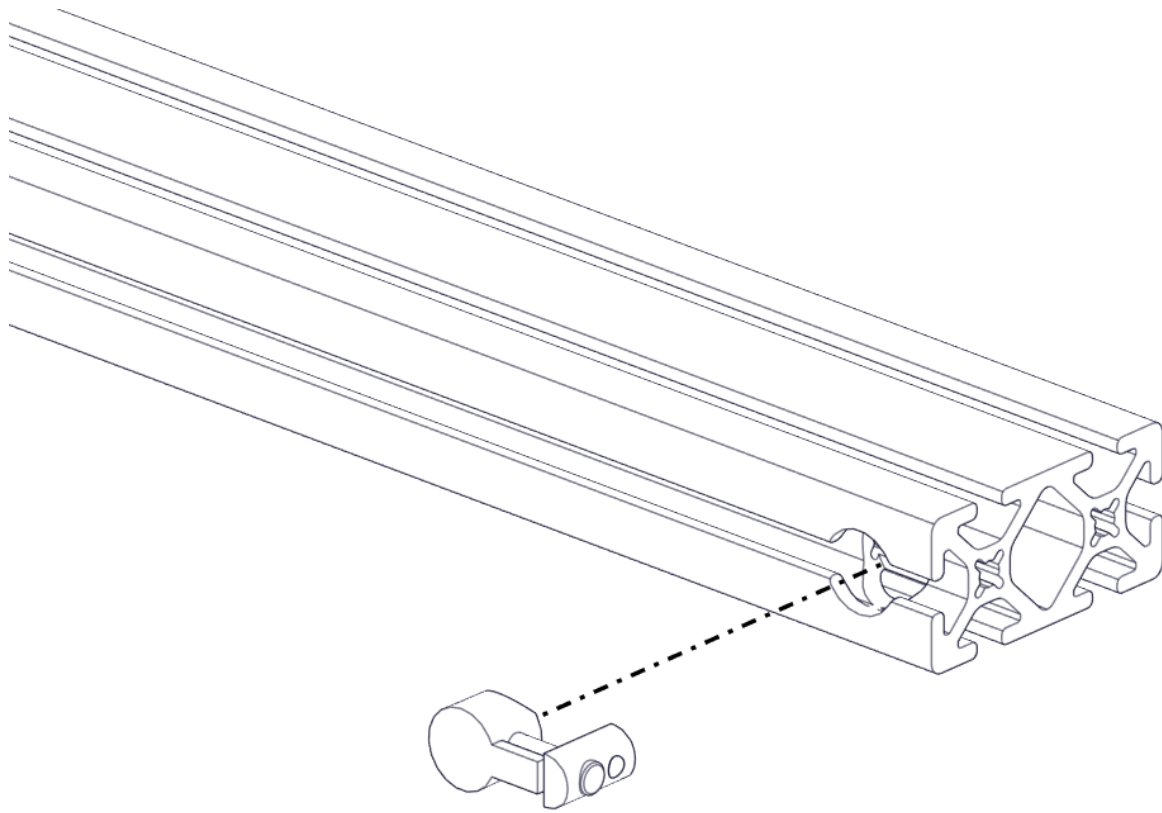
Bag CRP210-00-2424-FAST will contain all parts necessary for this step.
Bag CRP210-00-2424-FAST is in Bag CRP210-00-2424-HW.



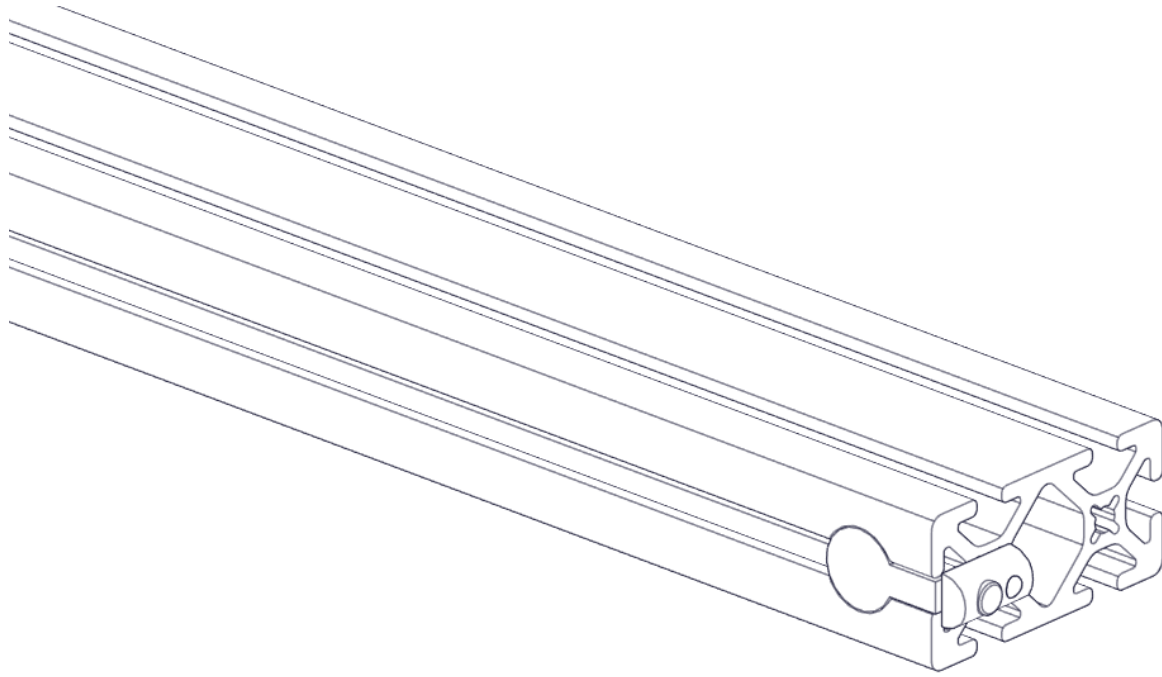
- Insert a 5/16" x 1 1/4" socket head cap screw into the counterbore of an anchor fastener as indicated.



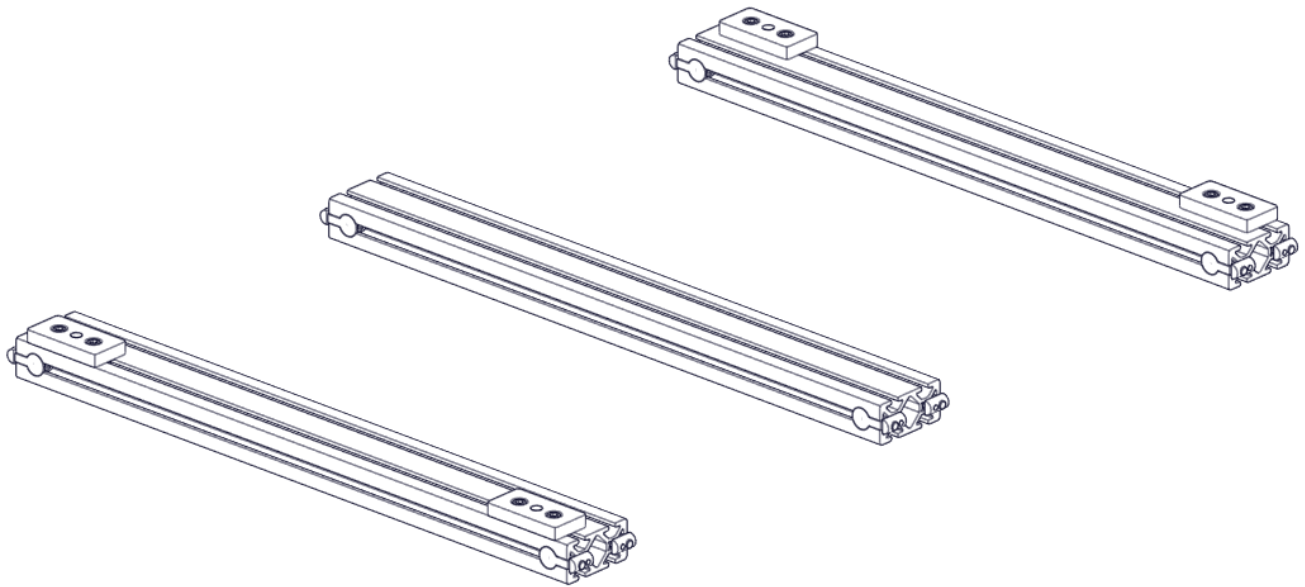
- Partially thread the 5/16" x 1 1/4" screw into a 5/16" t-nut.



- Insert the completed **anchor assembly** into the counterbored end of a 25.25" crossmember.



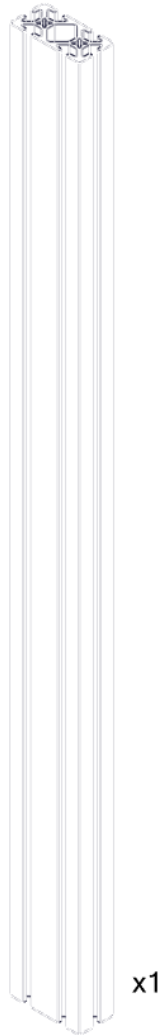
- The anchor assembly should sit loosely in the counterbored crossmember.



- Repeat the previous process until all (12) anchor assemblies are installed.

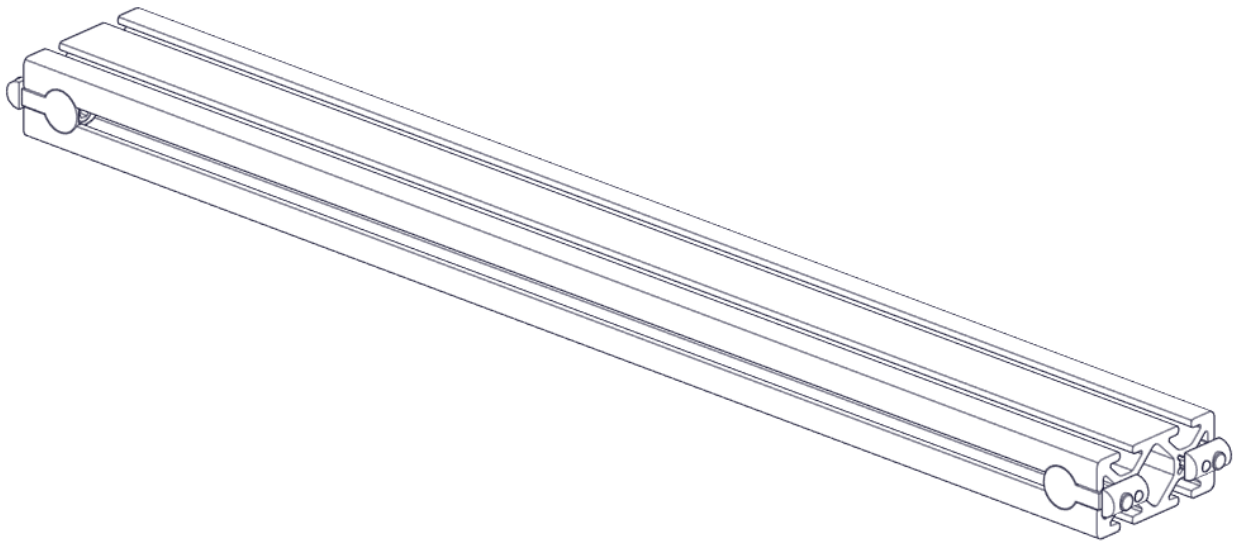
Note: Each crossmember should have four anchor assemblies, two at either end as above.

1.4 Crossmember to Frame Installation (A)

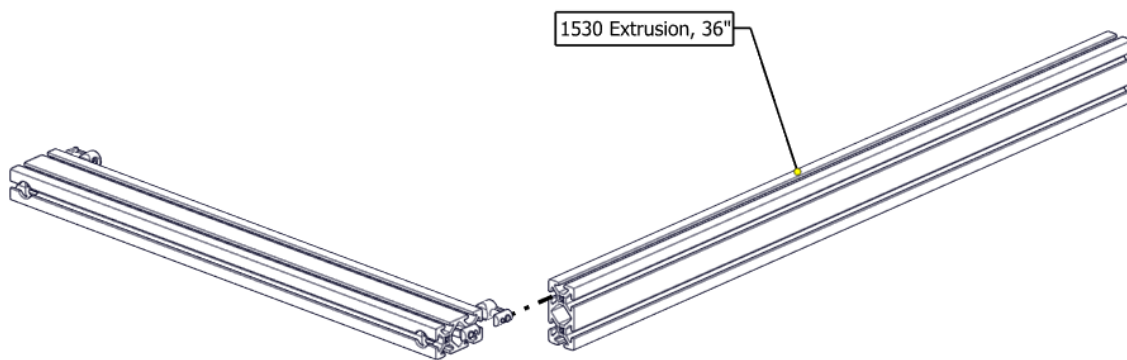


Parts Required:

- (1) 36" piece of 1530 frame extrusion



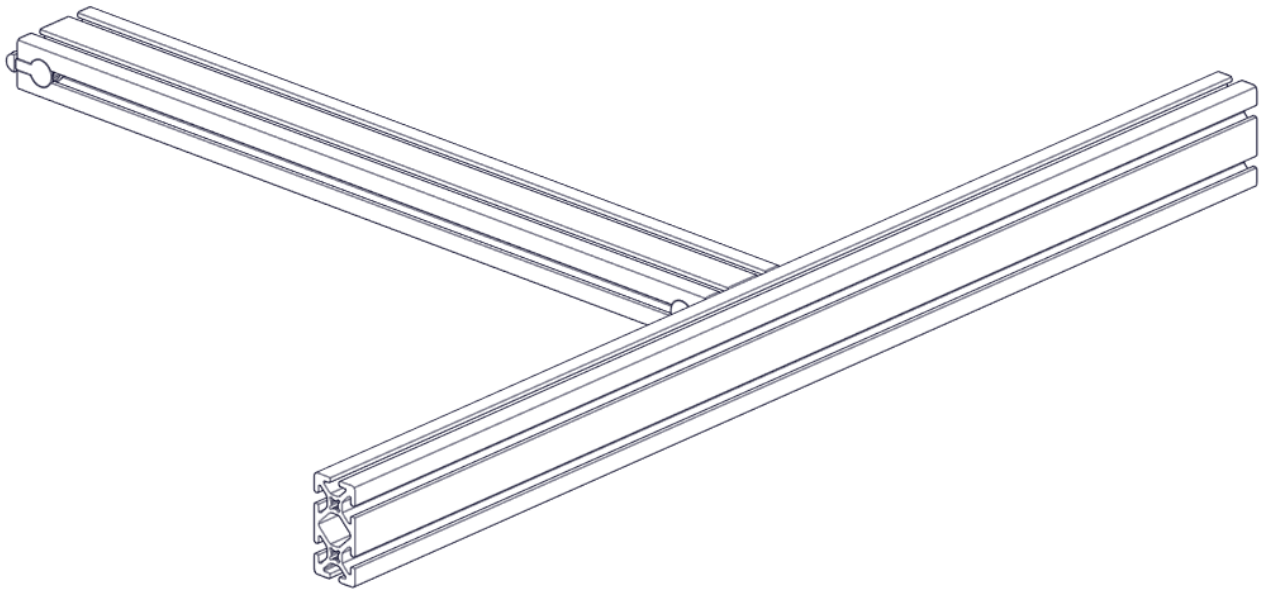
Note: The **middle crossmember** should have four anchor assemblies and no foot assemblies as above.



- Slide one end (two anchor assemblies) of the middle crossmember into the frame extrusion.

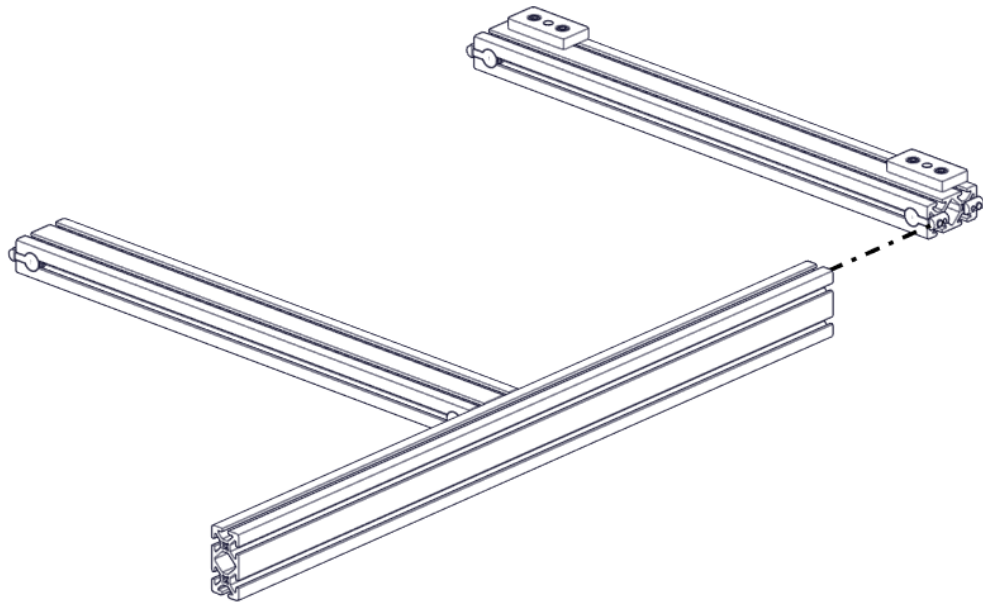
Note: The crossmember should be installed in the highest side t-slot of the frame extrusion as indicated.

Note: At this time **do not** tighten the anchor fasteners.



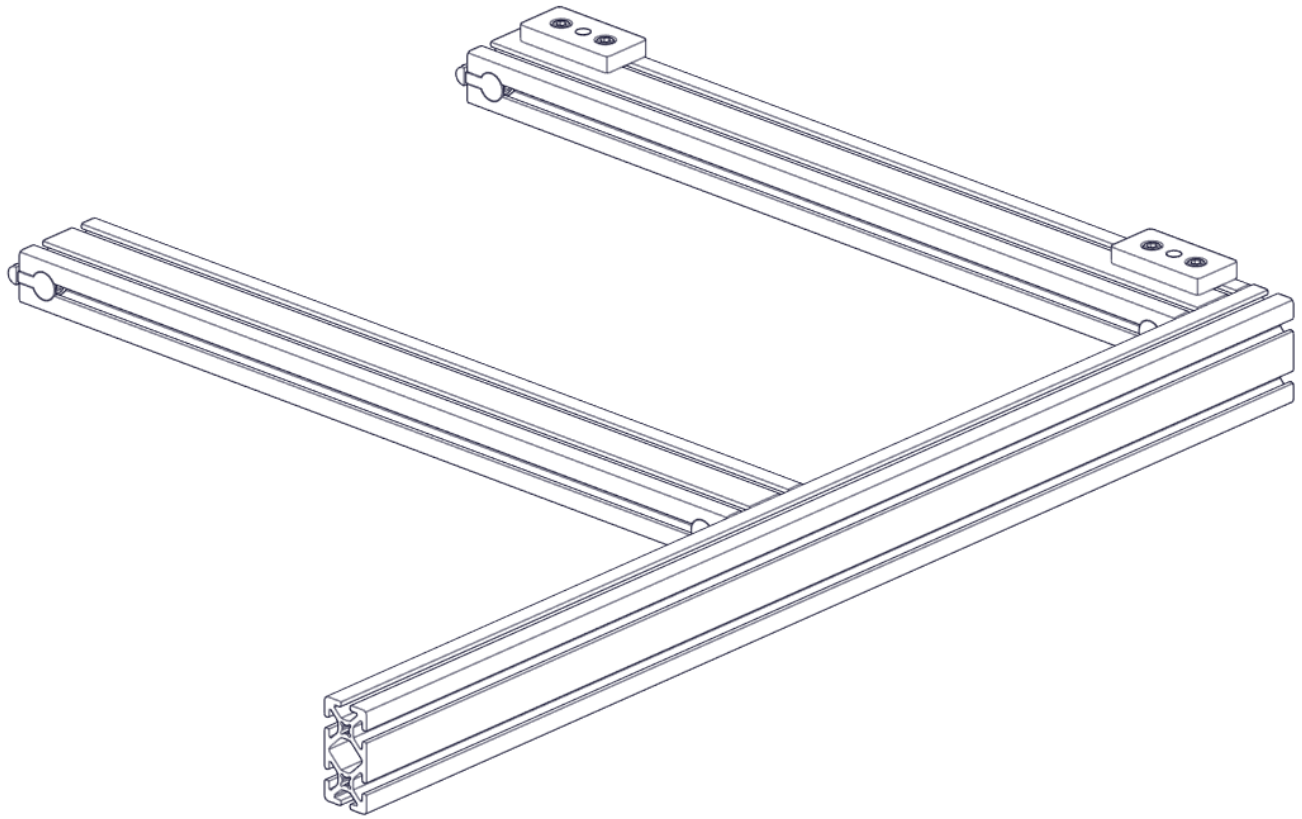
- Position the middle crossmember roughly in the middle of the frame extrusion

Note: At this time **do not** tighten the anchor fasteners.

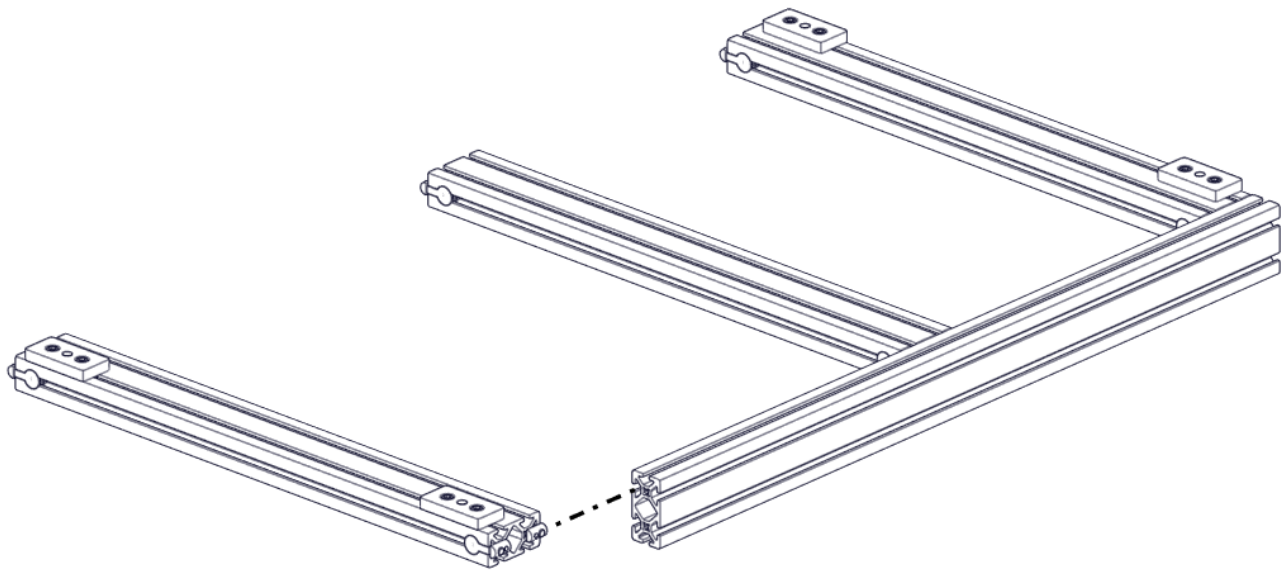


- Slide another crossmember (contains two foot assemblies) in the same t-slot as the middle crossmember.

Note: At this time **do not** tighten the anchor fasteners.

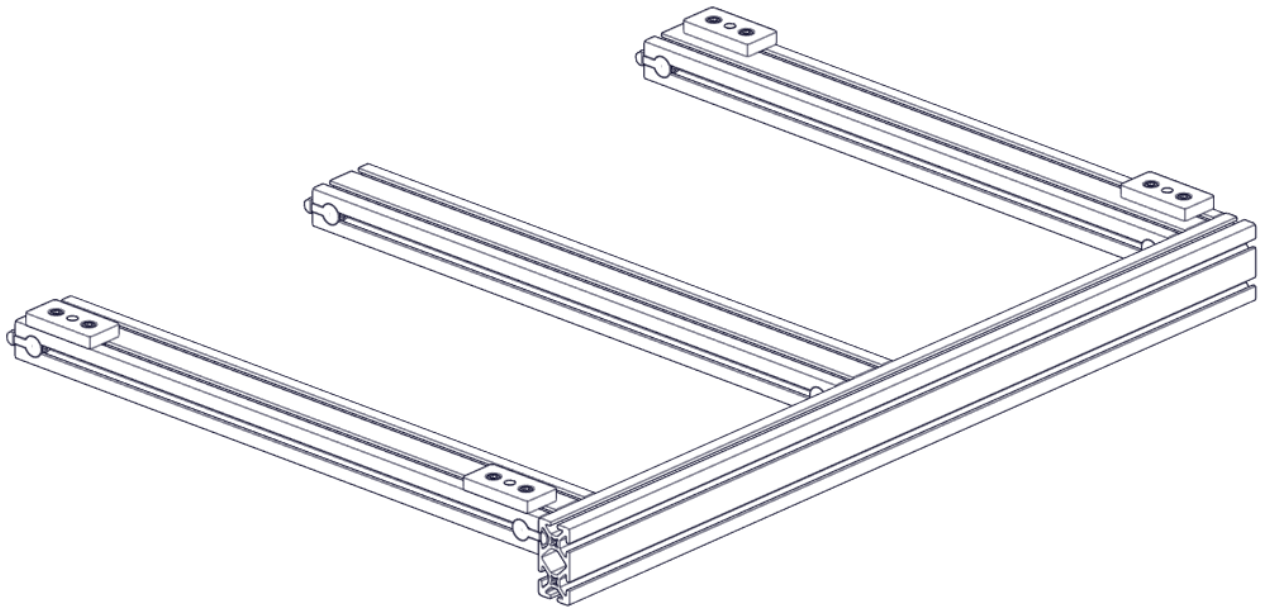


Note: The crossmembers should be positioned as above with foot assemblies oriented away from the center of the frame.

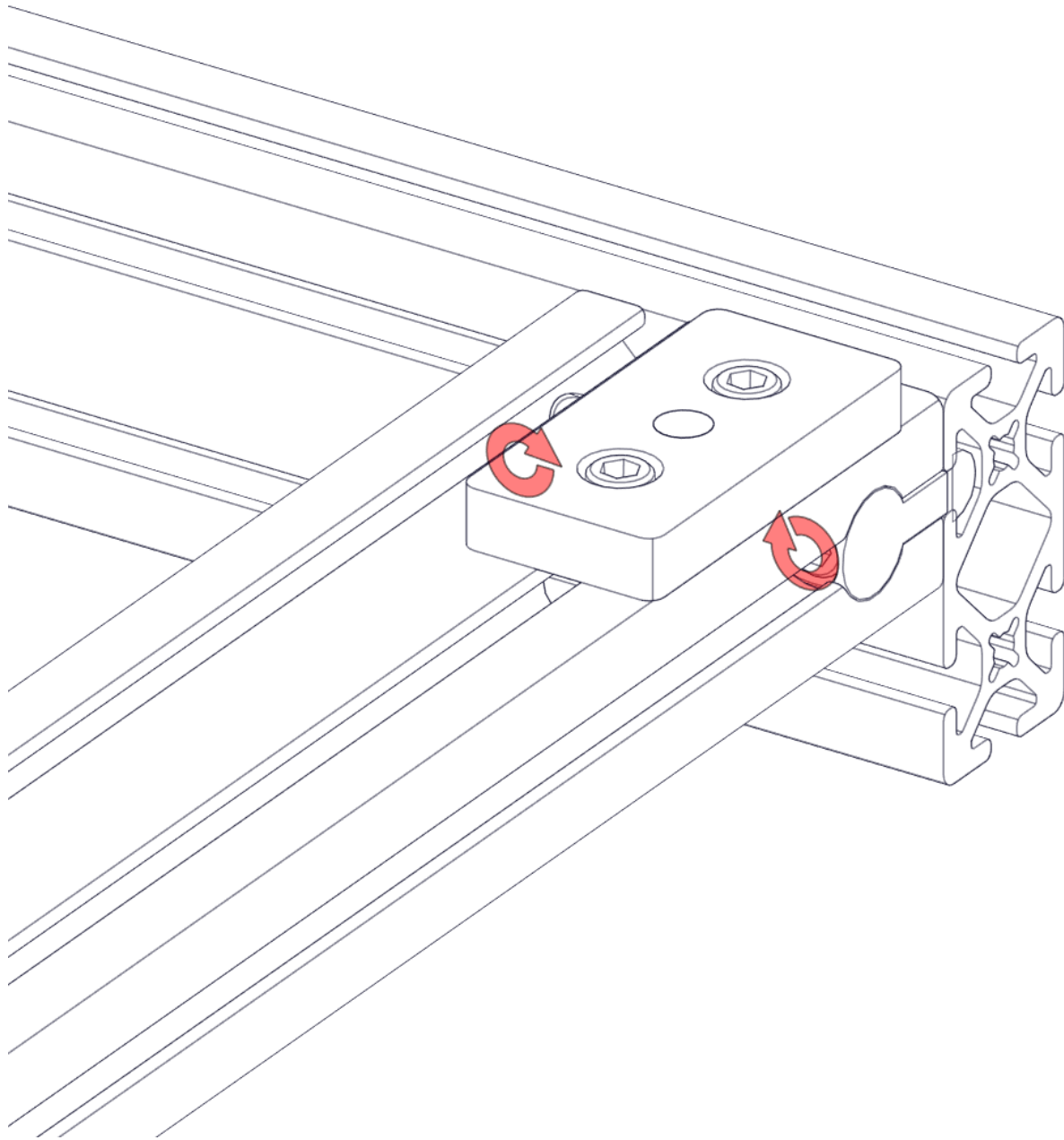


- Slide the final crossmember into the frame extrusion as indicated.

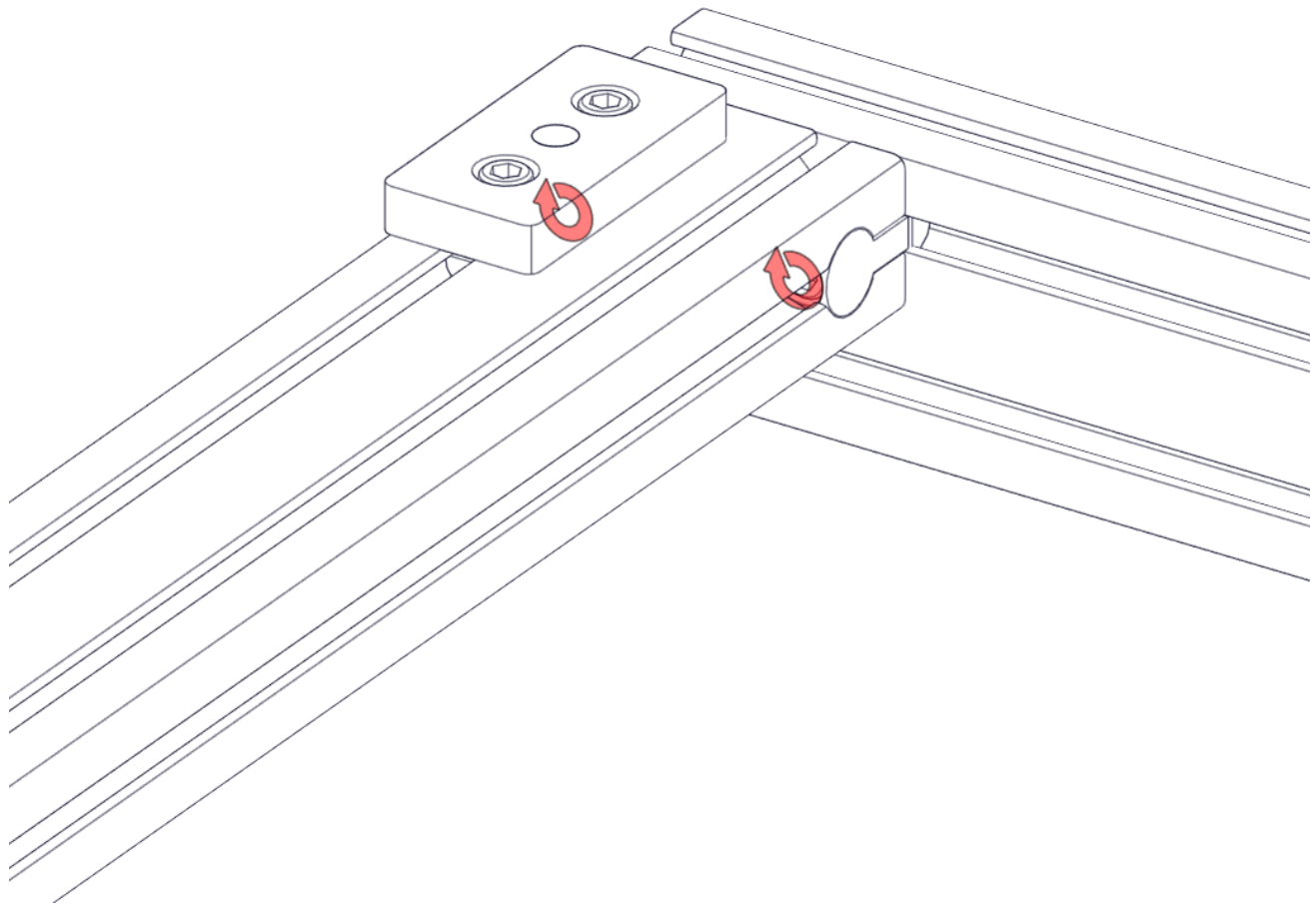
Note: All (3) crossmembers should be installed in the same frame t-slot.



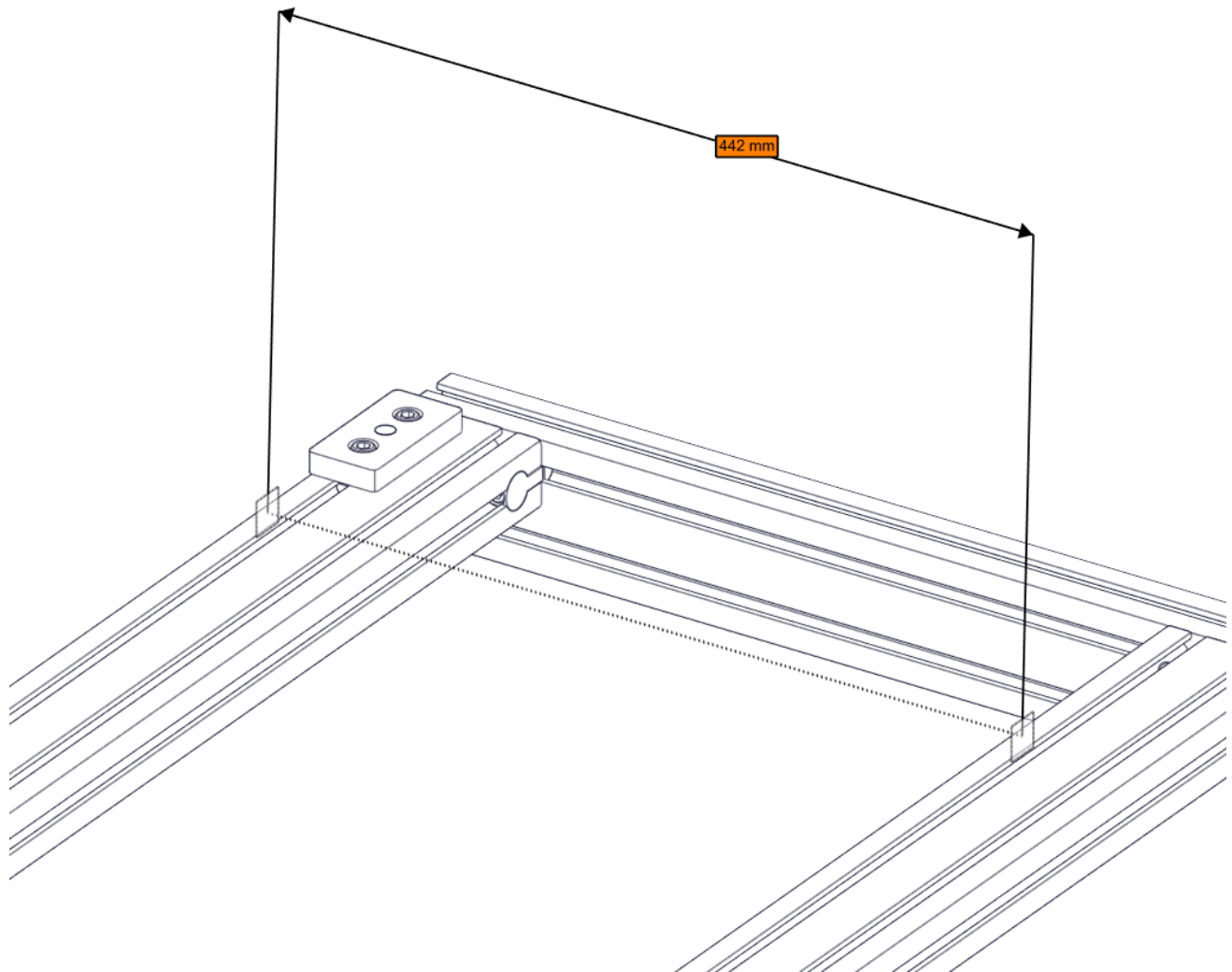
Note: The outer crossmembers should be positioned as above, with all (4) foot assemblies oriented away from the center of the frame.



- Position the crossmember flush with the frame as above.
- Tighten the highlighted anchor fasteners.

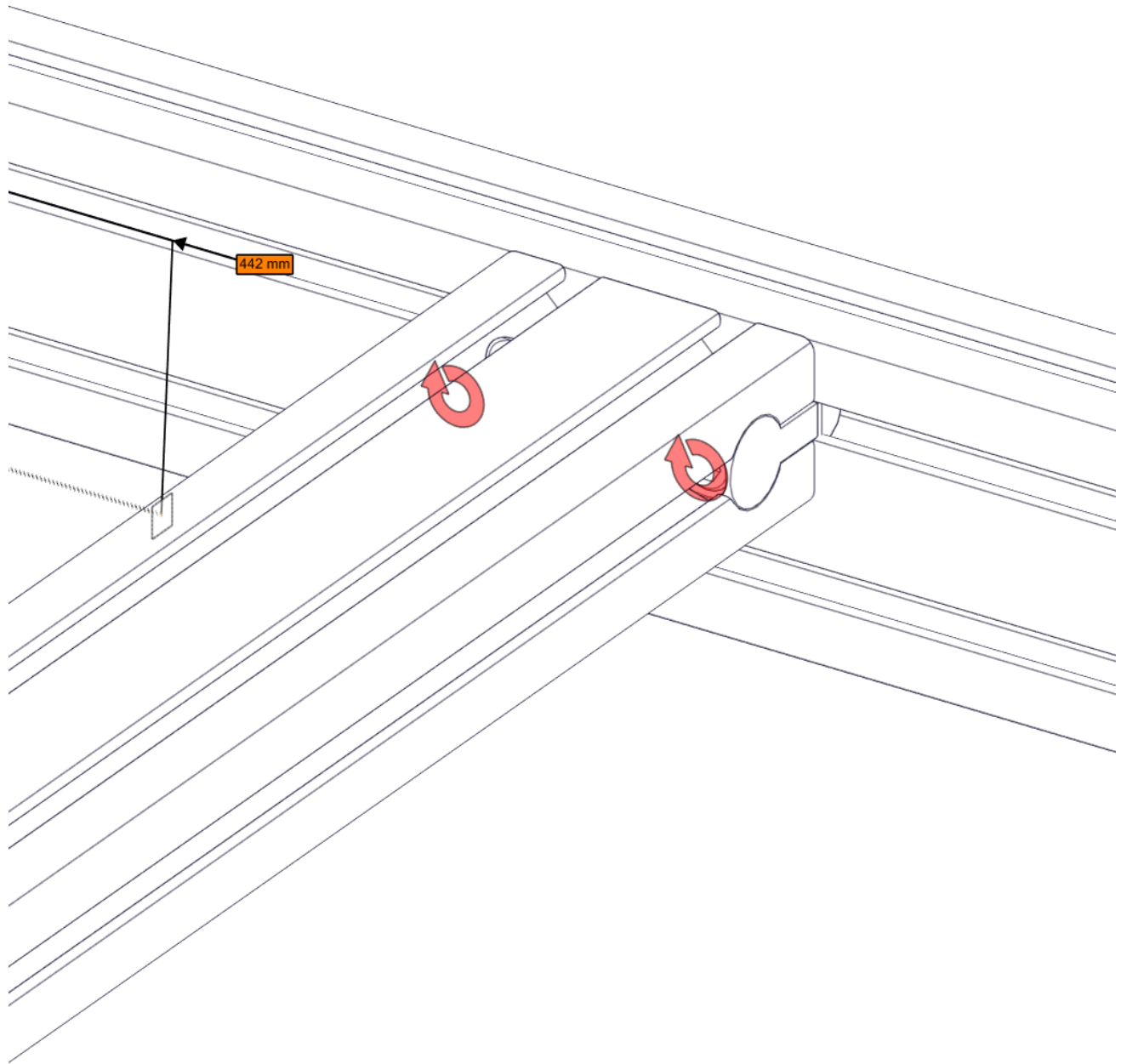


- Position the opposite crossmember flush with the frame as above.
- Tighten the highlighted anchor fasteners.

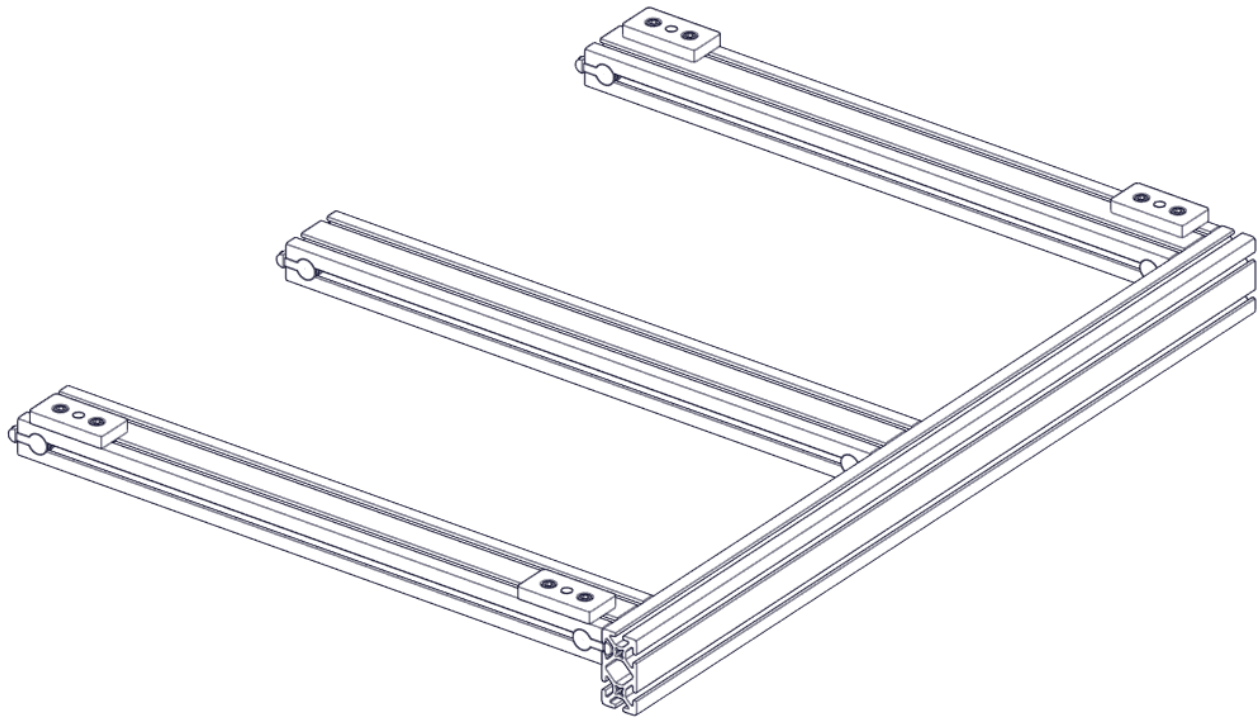


- Position the middle crossmember 442mm (17.4") from one end of the frame as above.

Note: The 442mm (17.4") measurement should be from the end of the frame to the inner edge of the middle crossmember.



- Tighten the highlighted anchor fasteners.



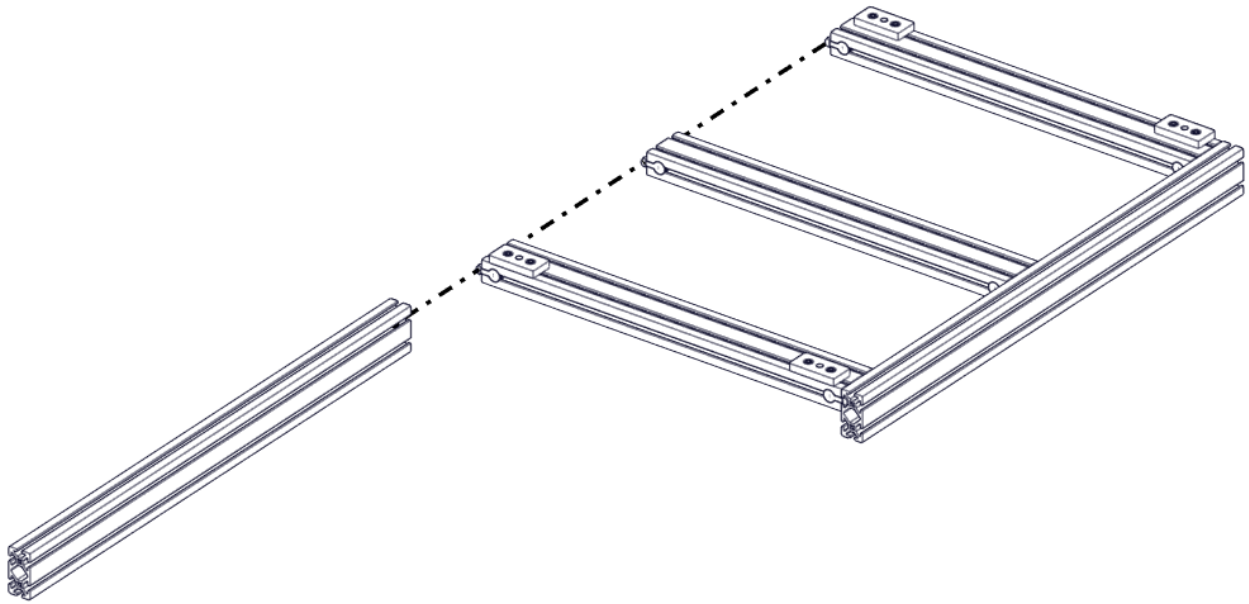
Note: The frame should appear as above and all (6) anchors seated in the frame should be tight.

1.5 Crossmember to Frame Installation (B)



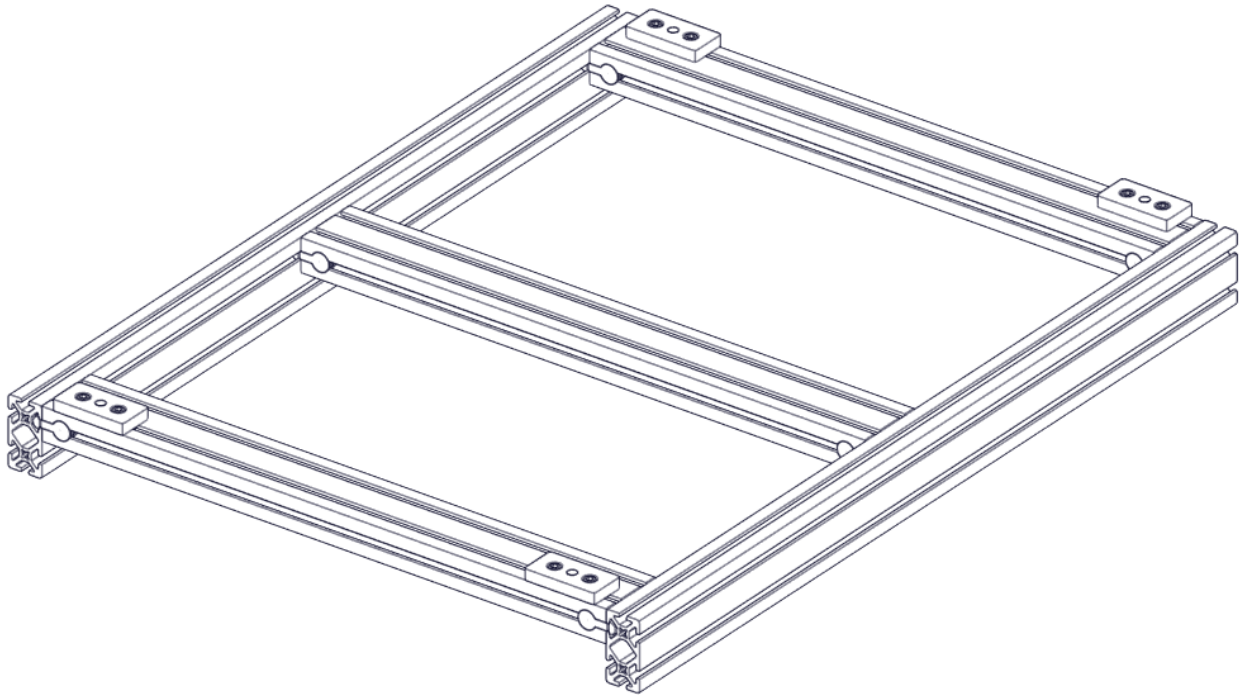
Parts Required:

- (1) 36" piece of 1530 frame extrusion

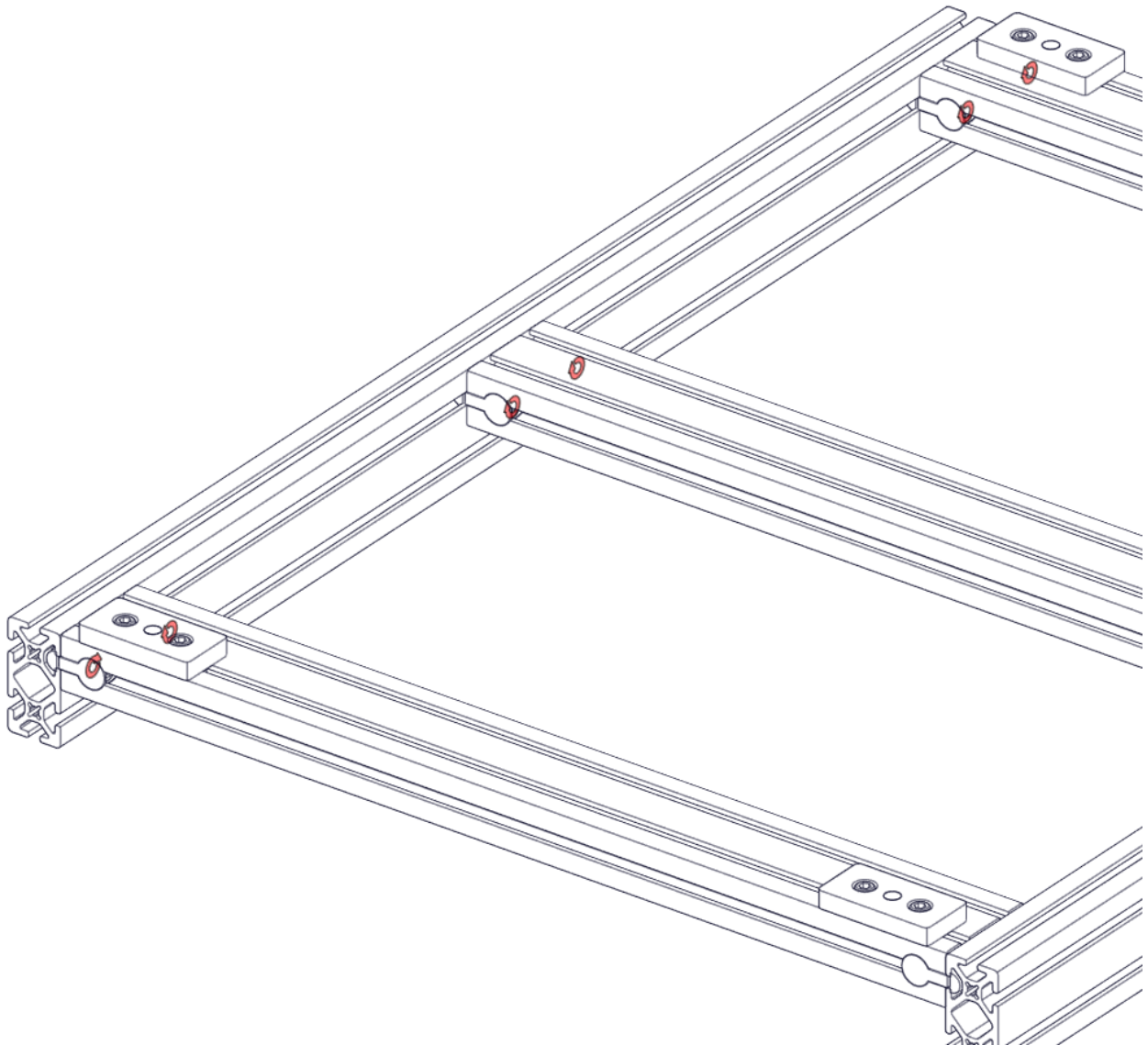


- Slide the opposite frame extrusion onto the anchor fasteners of the crossmembers as indicated.

Note: The anchors should be seated in the highest side t-slot of the frame extrusion.

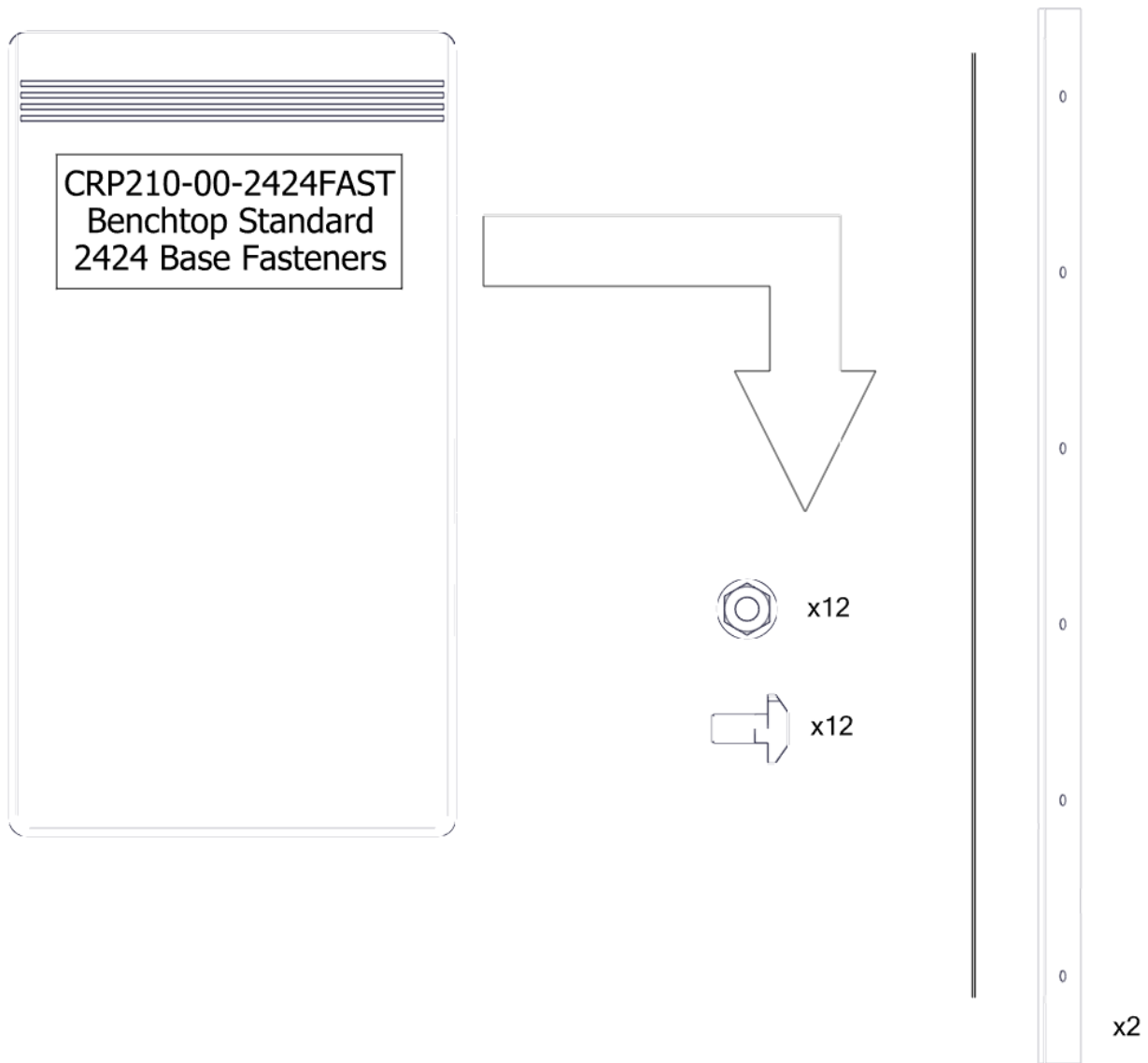


Note: The frame should be flush with the crossmembers at both ends.



- Tighten all (6) highlighted anchors.

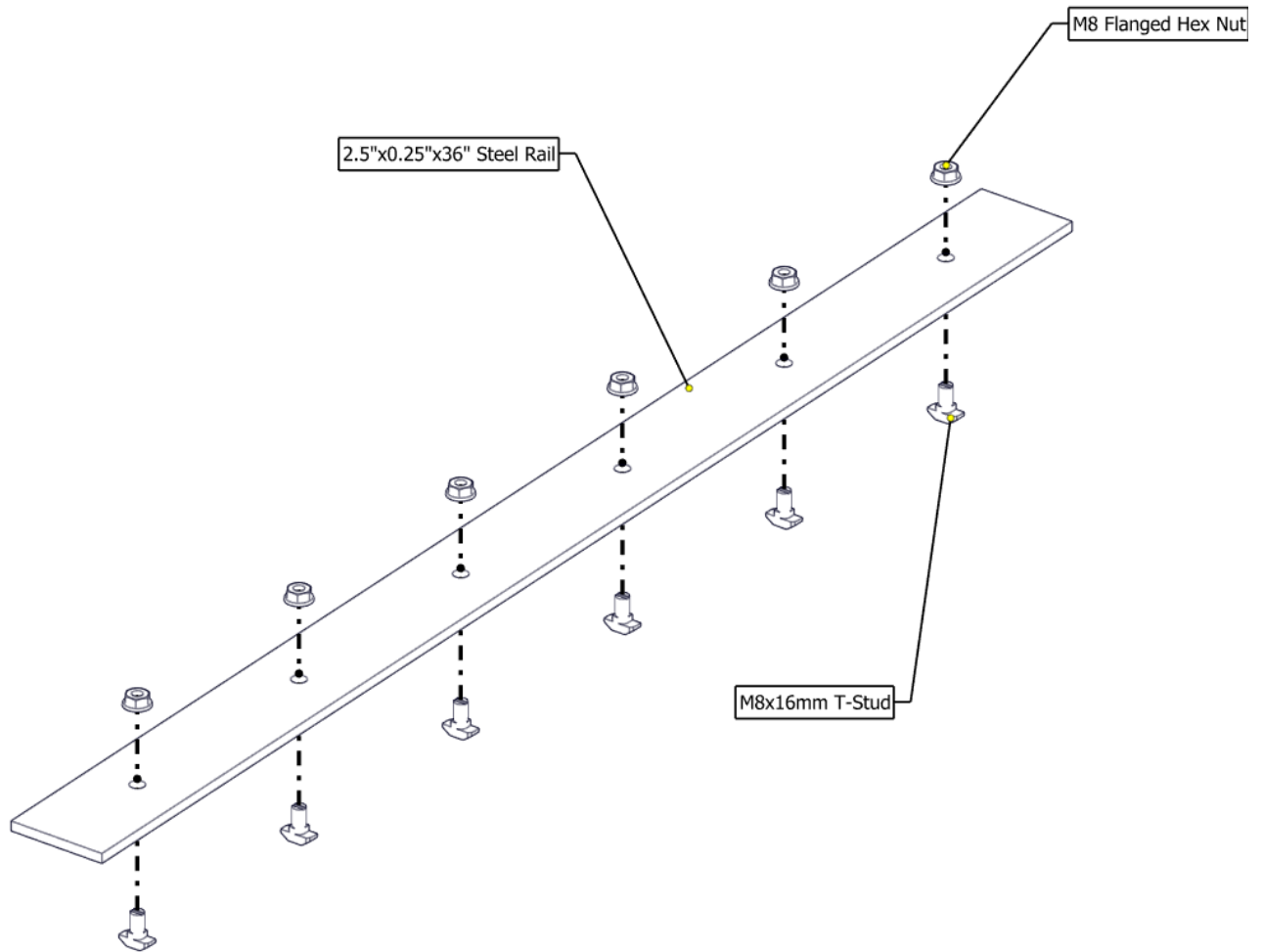
1.6 Steel Rail Installation



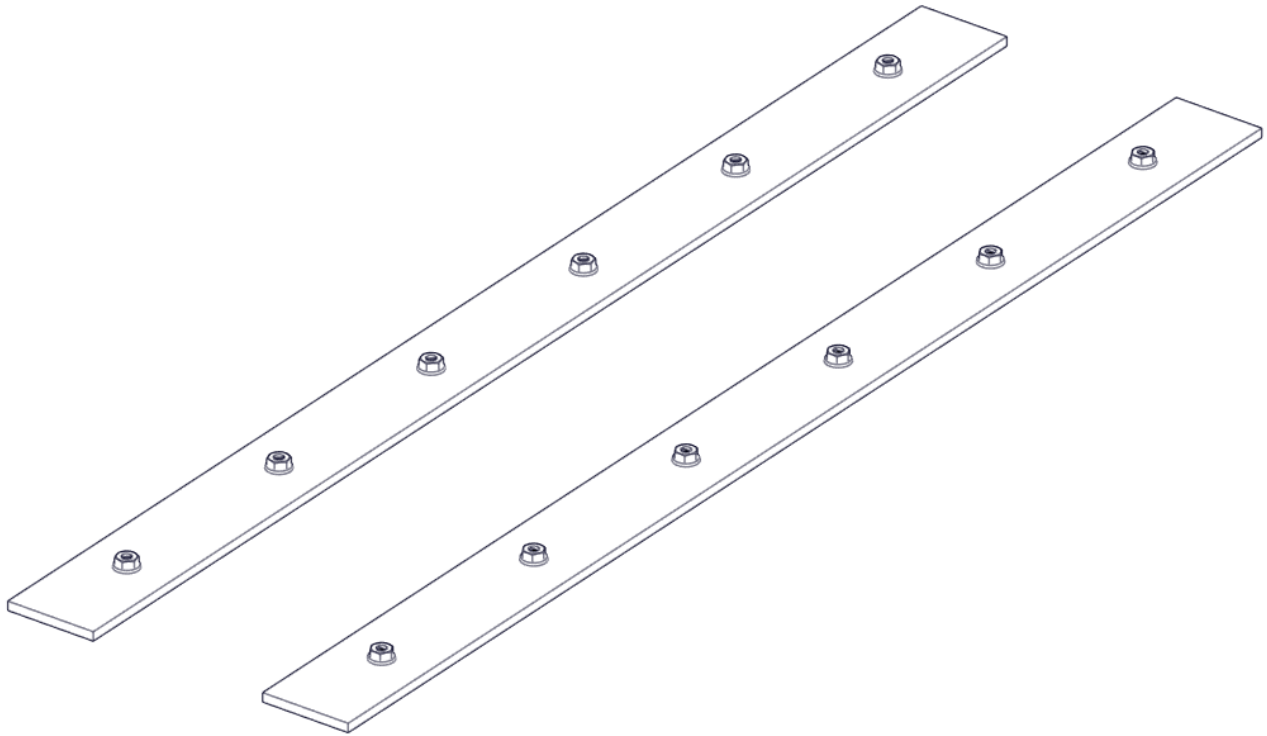
Parts Required:

- (12) M8x16mm t-studs
- (2) 2.5x0.25x36 steel rails
- (12) M8 flanged hex nuts

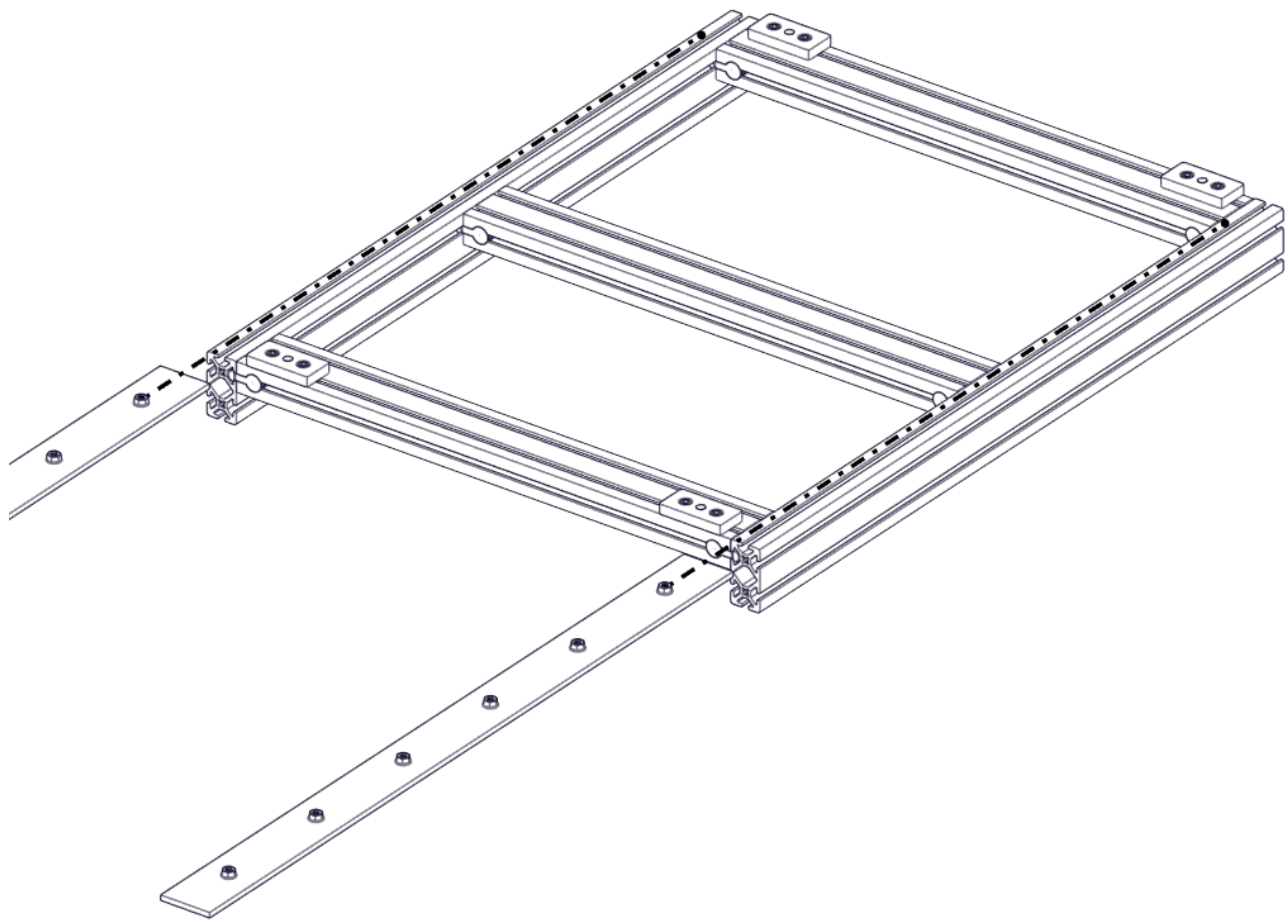
Bag CRP210-00-2424-FAST will contain all fasteners necessary for this step.
Bag CRP210-00-2424-FAST is in Bag CRP210-00-2424-HW.



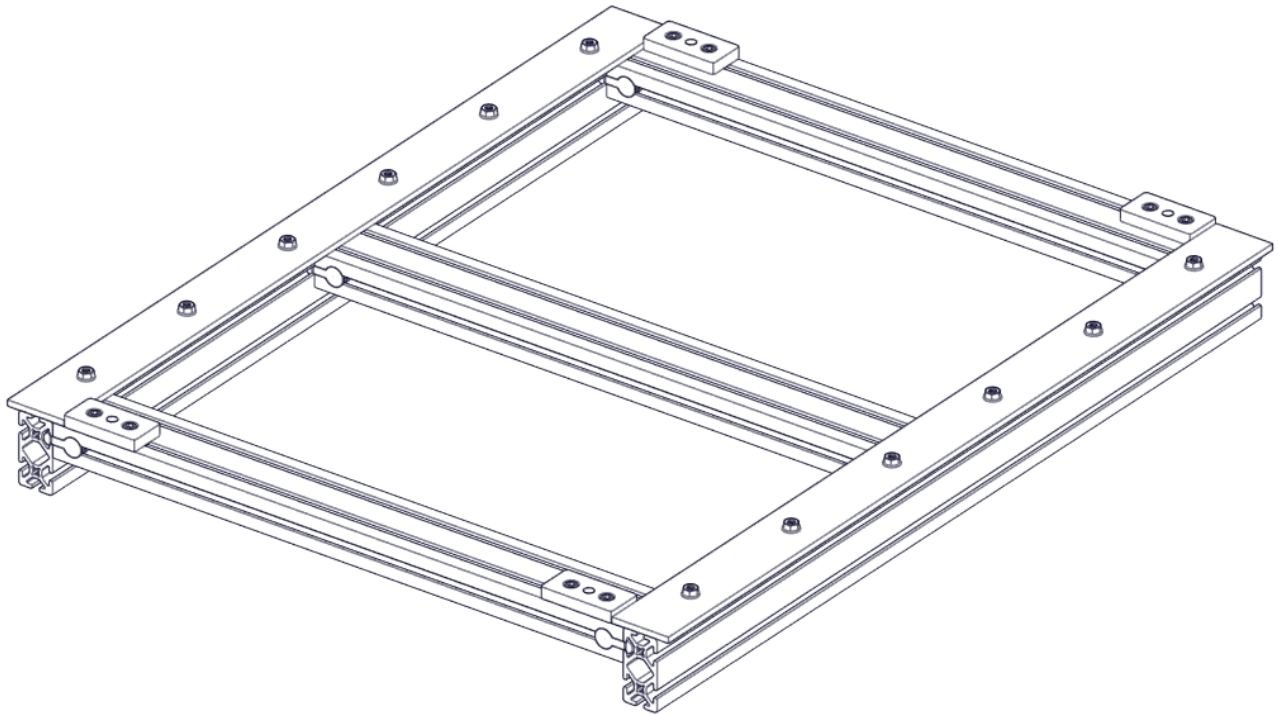
- Install six M8 x 16mm t-studs into the holes of a 36" steel rail.
- Partially thread M8 flanged hex nuts onto all (6) t-studs.



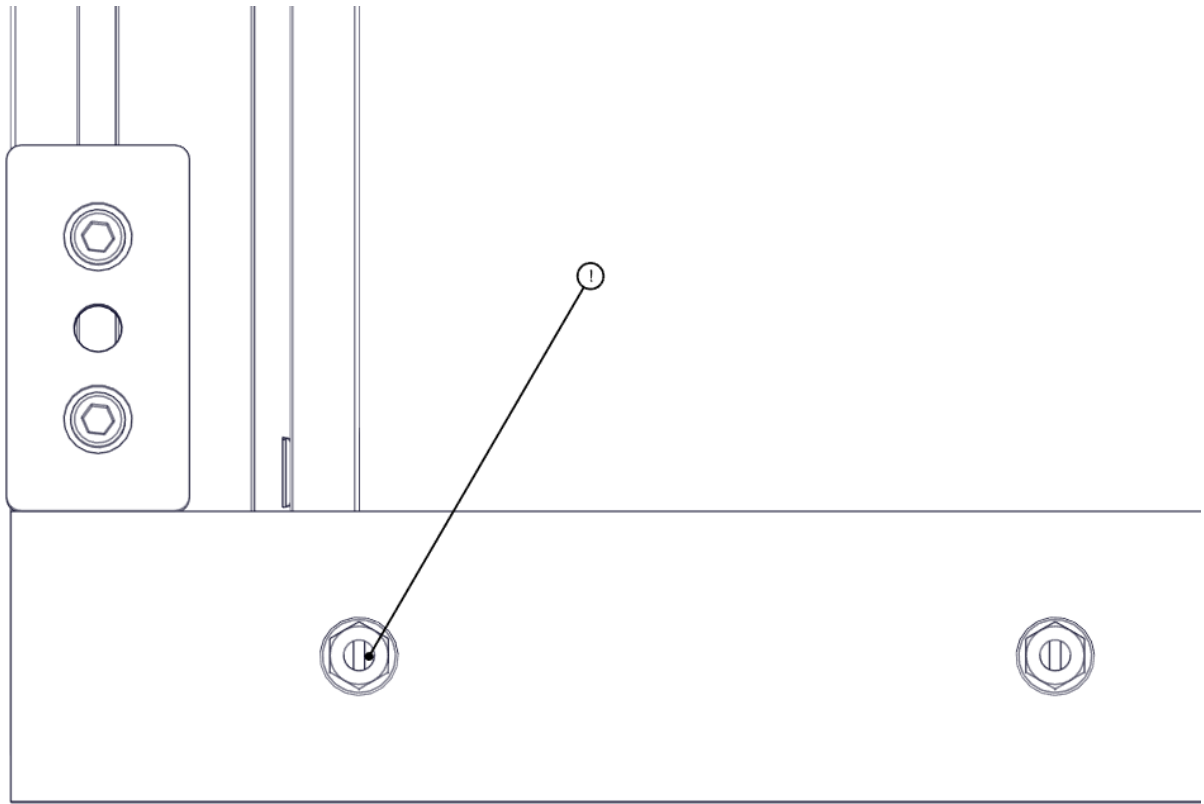
- Repeat the previous process to produce another 36" steel rail assembly.



- Slide the t-studs of the steel rail assemblies into the top t-slots of the indicated frame extrusion.



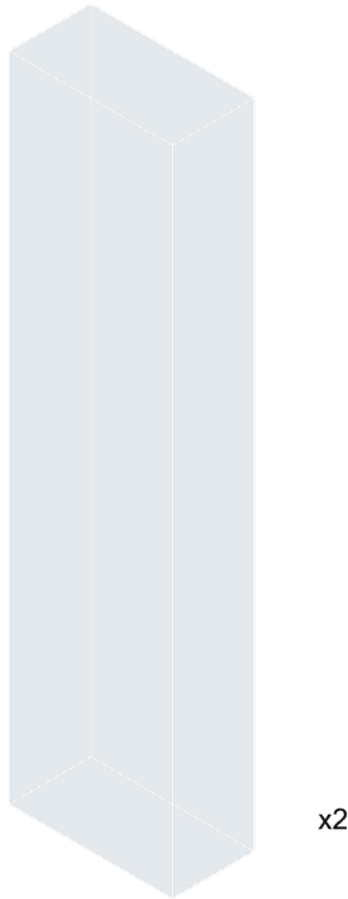
Note: The steel rails appear as above.



Note: The slot in the top of the t-stud indicates its alignment.

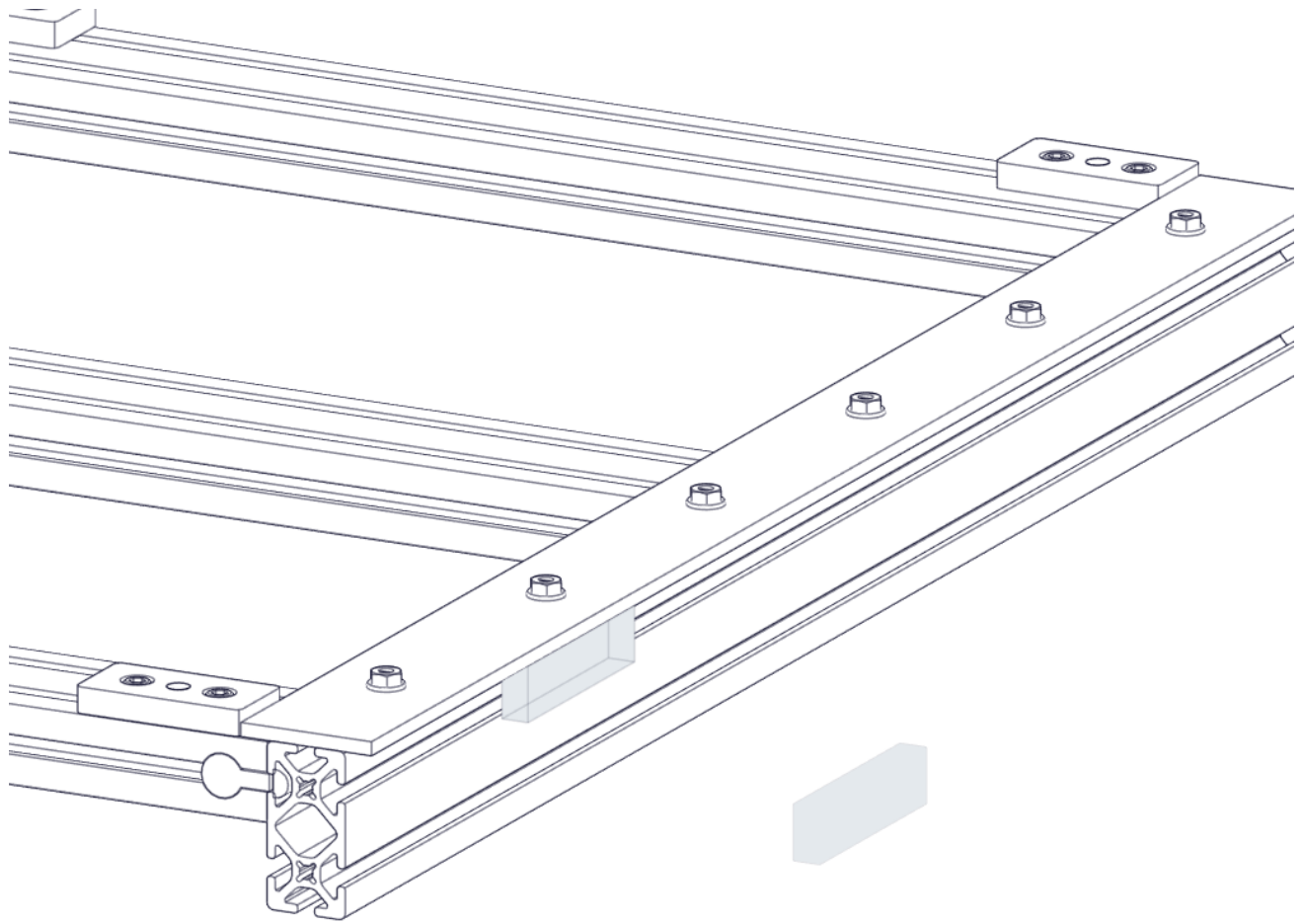
- Orient each t-stud so it is perpendicular to the t-slot as above —either by hand tightening or using a small screwdriver.

1.7 Steel Rail Alignment (A)



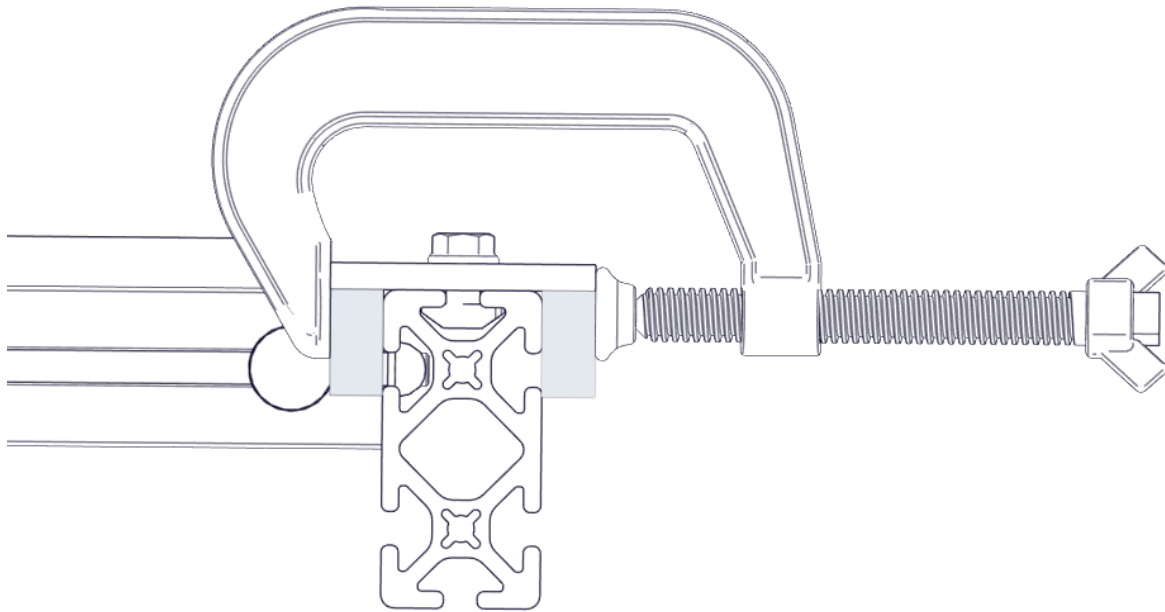
Parts Required:

- Two steel spacers

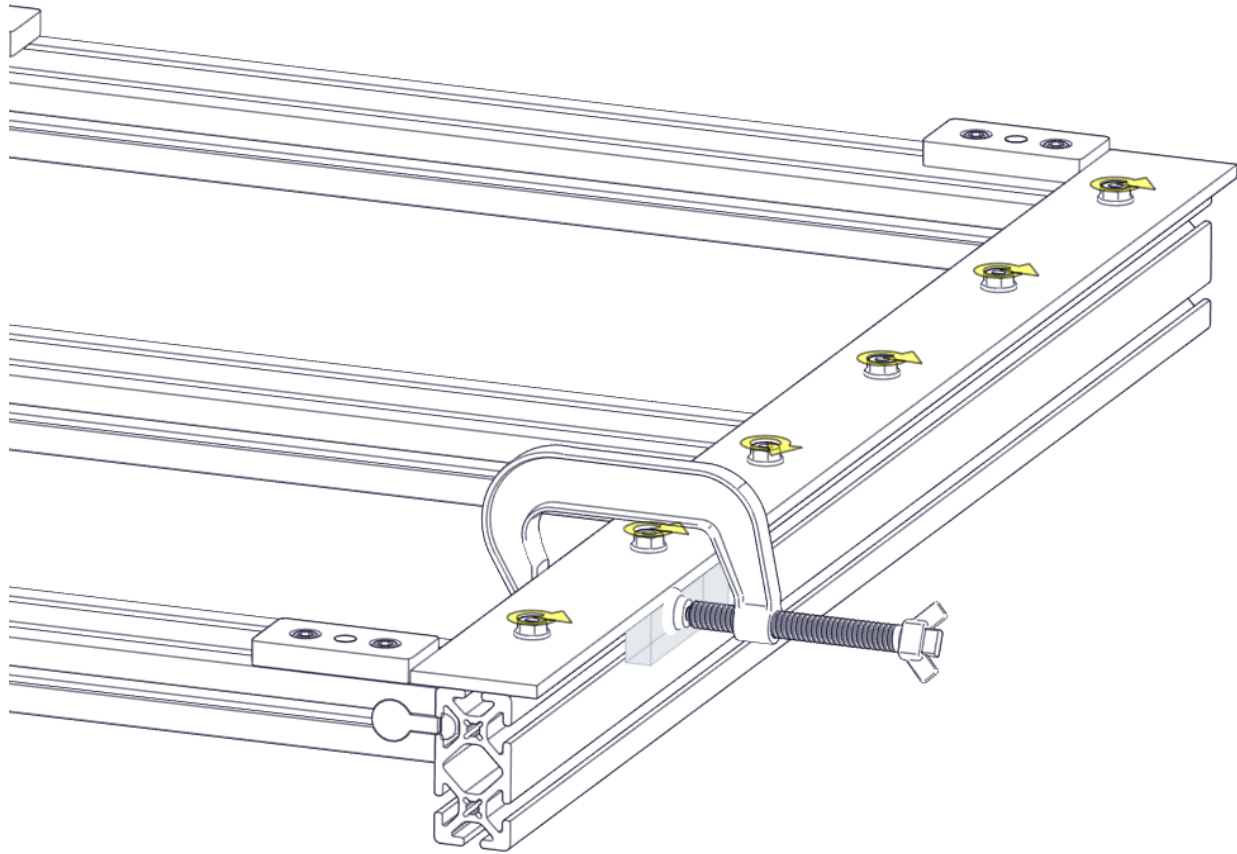


- Place the spacers on either side of the frame extrusion, underneath the steel rail.

Note: A C-Clamp is recommended but not required.

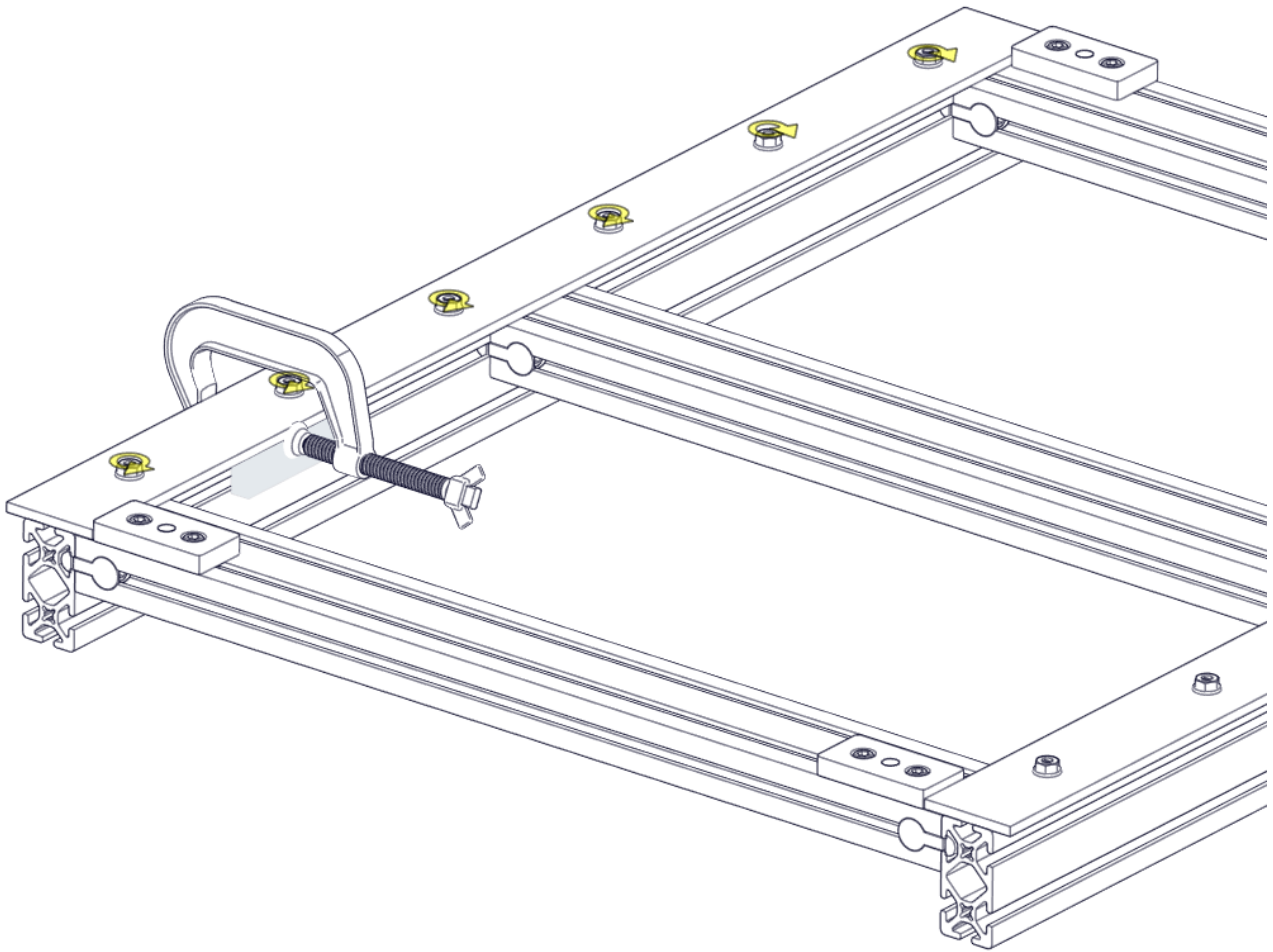


- Confirm the alignment of the steel rail ensuring it is flush along its entire length.



- To adjust the steel rail so it is completely flush:
 - Partially tighten all hex nuts.
 - At the point where the steel overhangs the spacers, place a c-clamp across spacers and steel.
 - The pads of the c-clamp should bridge the spacer and steel rail on both sides.
 - Tighten the c-clamp to pull steel rail into alignment.

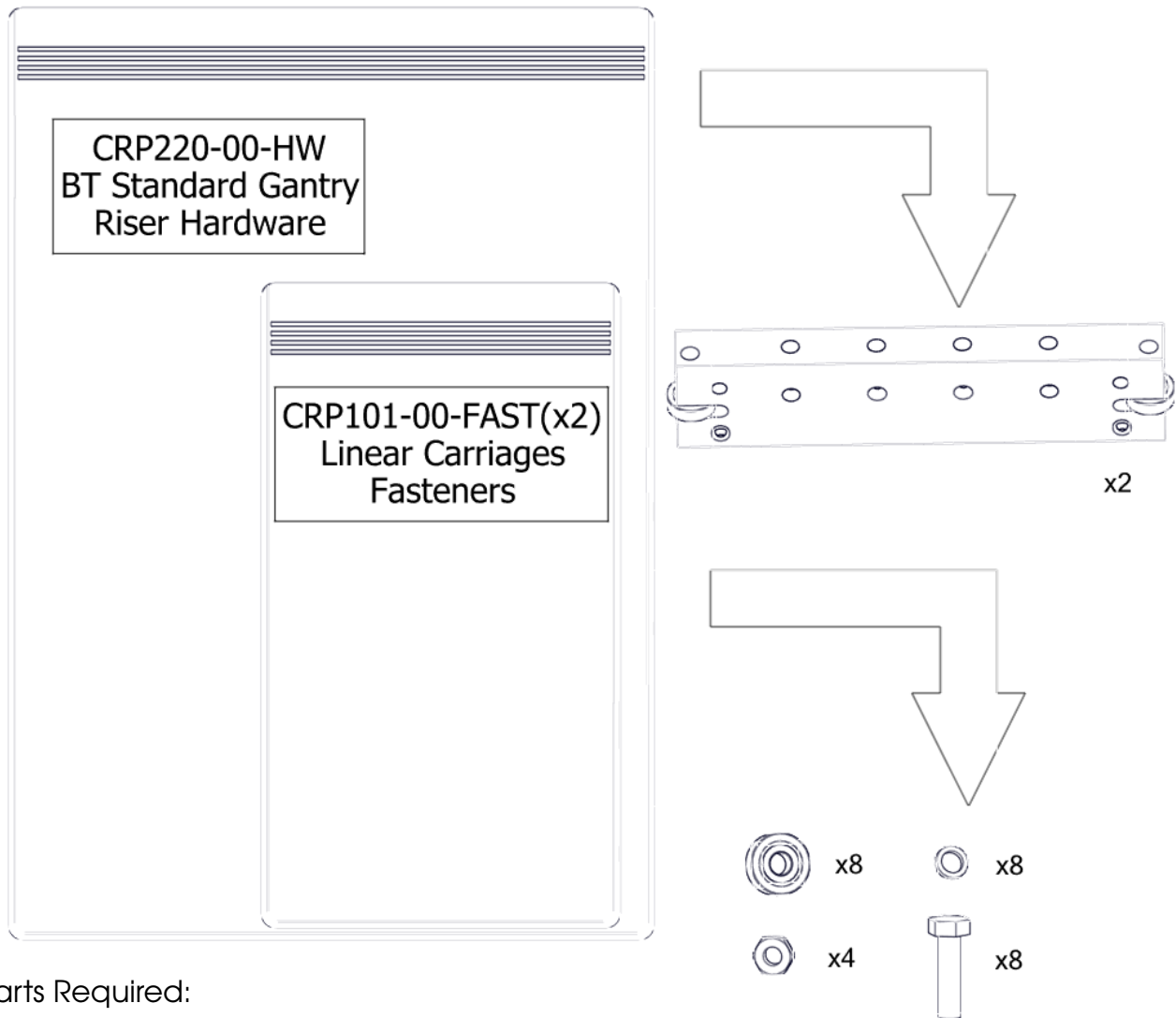
Note: At this time hex nuts should only be tight enough to retain steel position, do not fully tighten the nuts.



- Repeat the previous process for the opposite steel rail.

Note: Do not fully tighten any hex nuts.

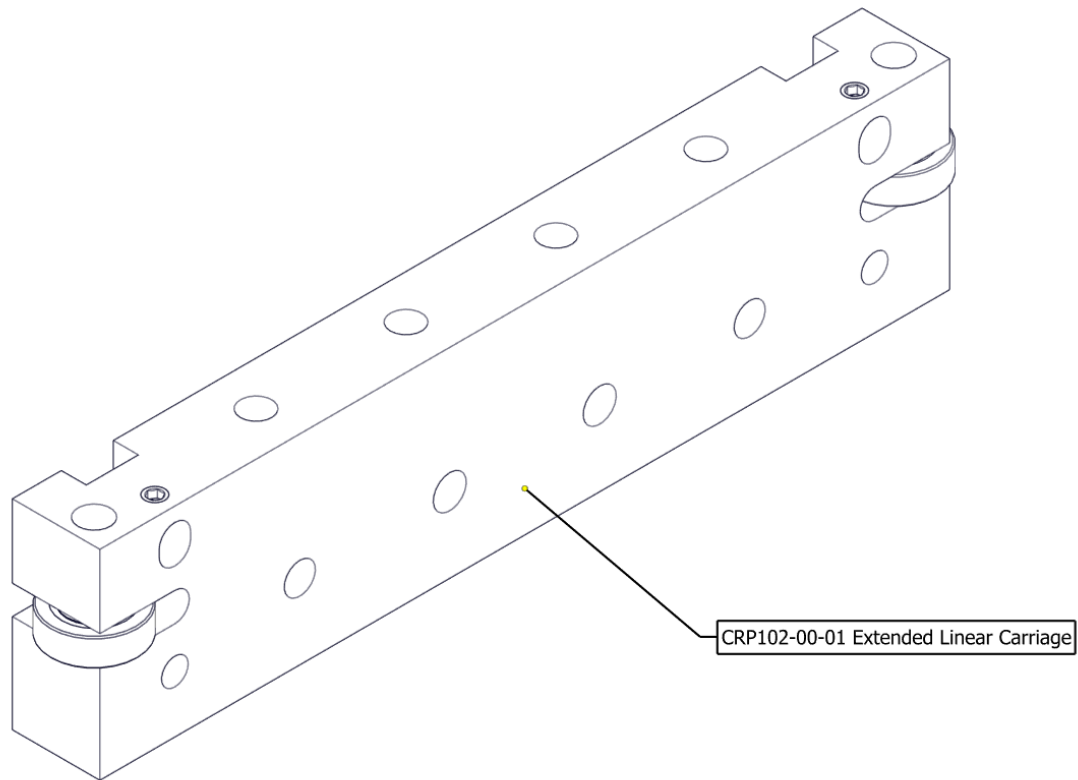
1.8 Extended Linear Carriage (ELC) Assembly



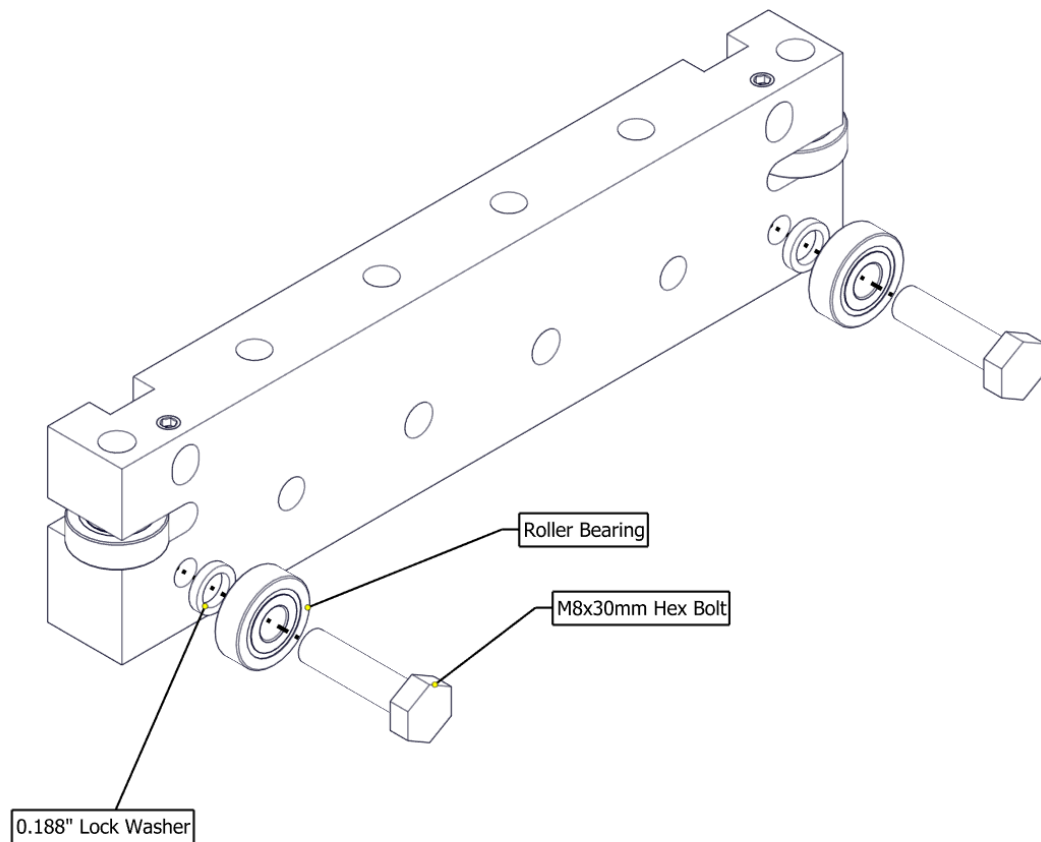
Parts Required:

- (2) Extended linear carriage bodies
- (8) Roller bearings
- (8) M8 x 30mm hex bolts
- (8) Lock washers
- (4) Hex jam nuts

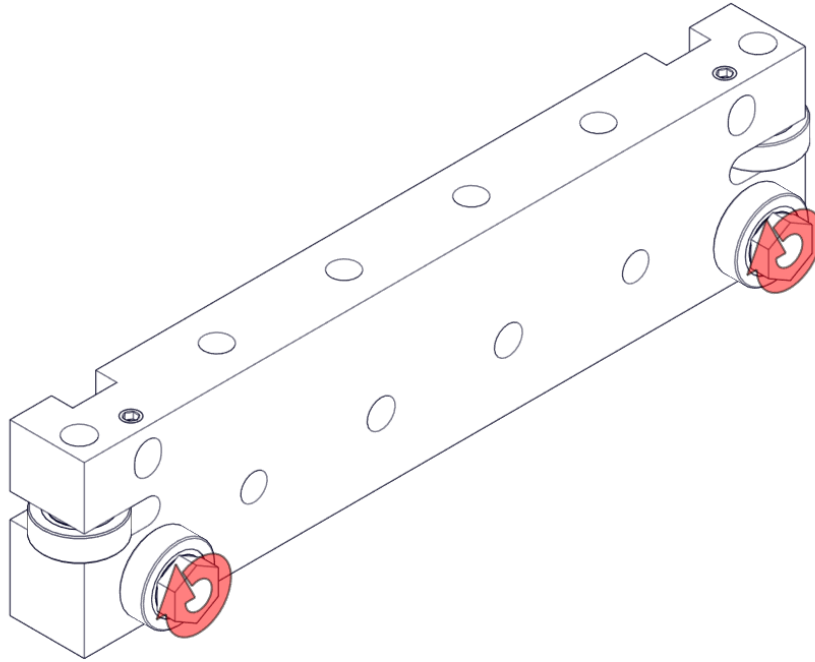
Bag CRP101-00-FAST will contain all fasteners necessary for this step.
Two extended linear carriage bodies will be necessary for this step.
Bag CRP220-00-HW contains the above parts and bags.
Bag CRP220-00-HW is in bag CRP220-2410.



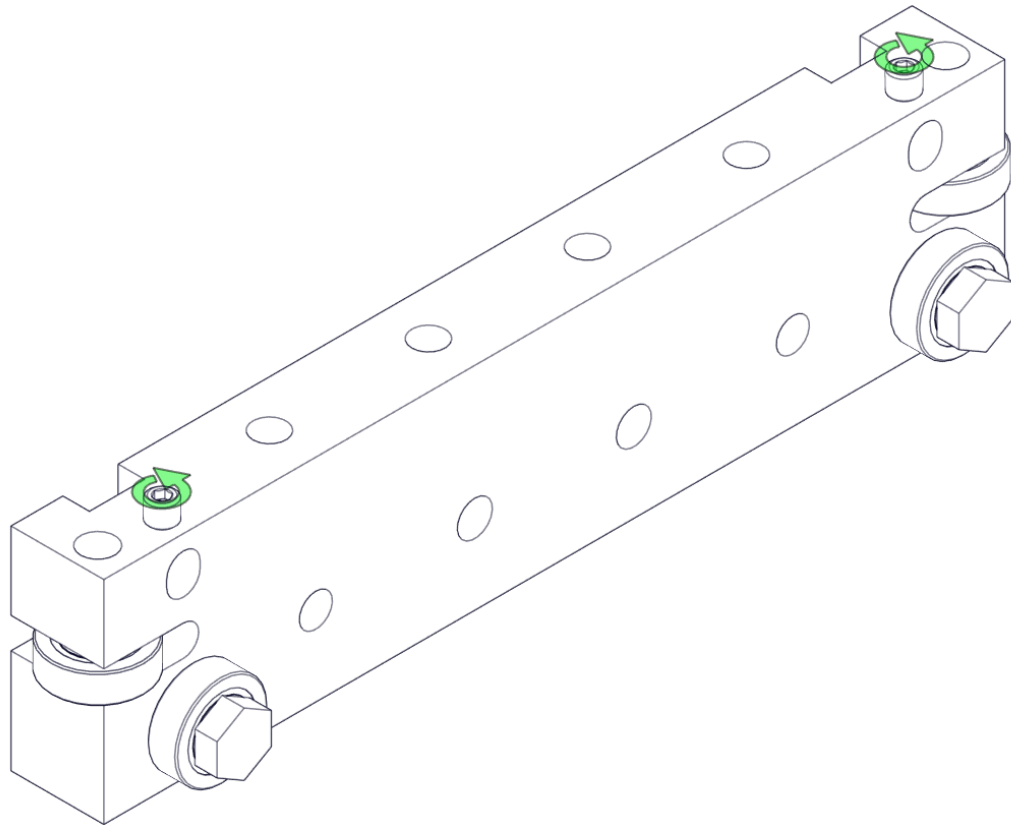
Note: The extended linear carriage (**ELC**) will already have two bearings pre-installed.



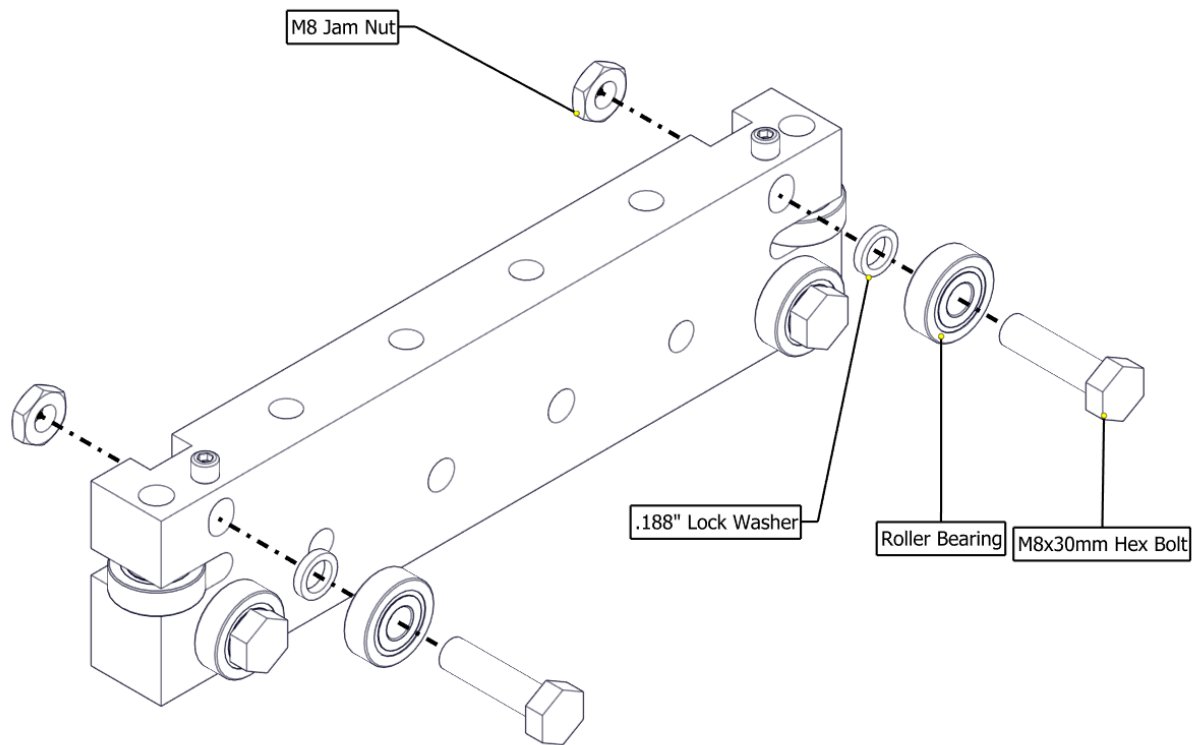
- Install a roller bearing and lock washer onto an M8 x 30mm hex bolt as indicated.
- Thread the M8 x 30mm hex bolt assembly into the ELC body as indicated. The roller bearing should be on the same side of the ELC as the pre-installed bearing.
- Repeat this process for the opposite end of the ELC with another M8 x 30mm hex bolt assembly.



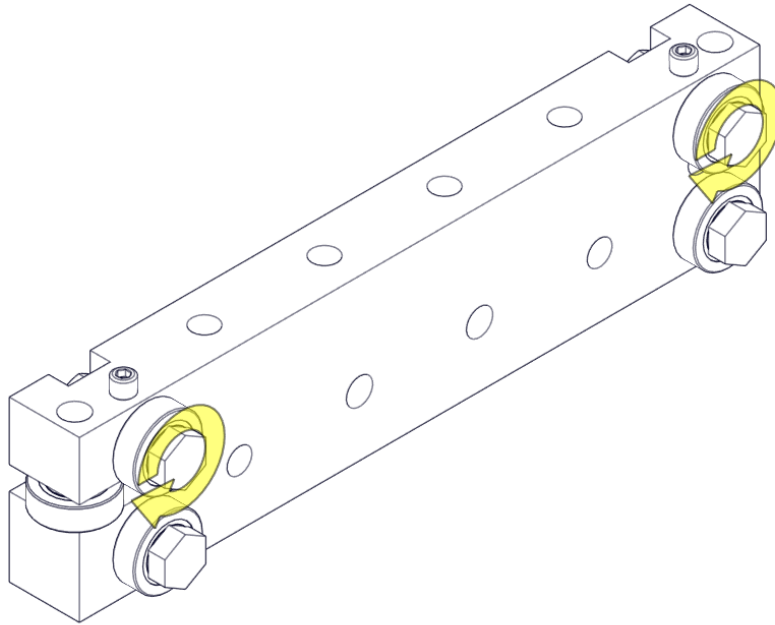
- Tighten the highlighted M8 x 30mm bolts.



- Loosen the pre-installed $\frac{1}{4}$ -20 x $\frac{1}{4}$ " set screws but do not remove them.

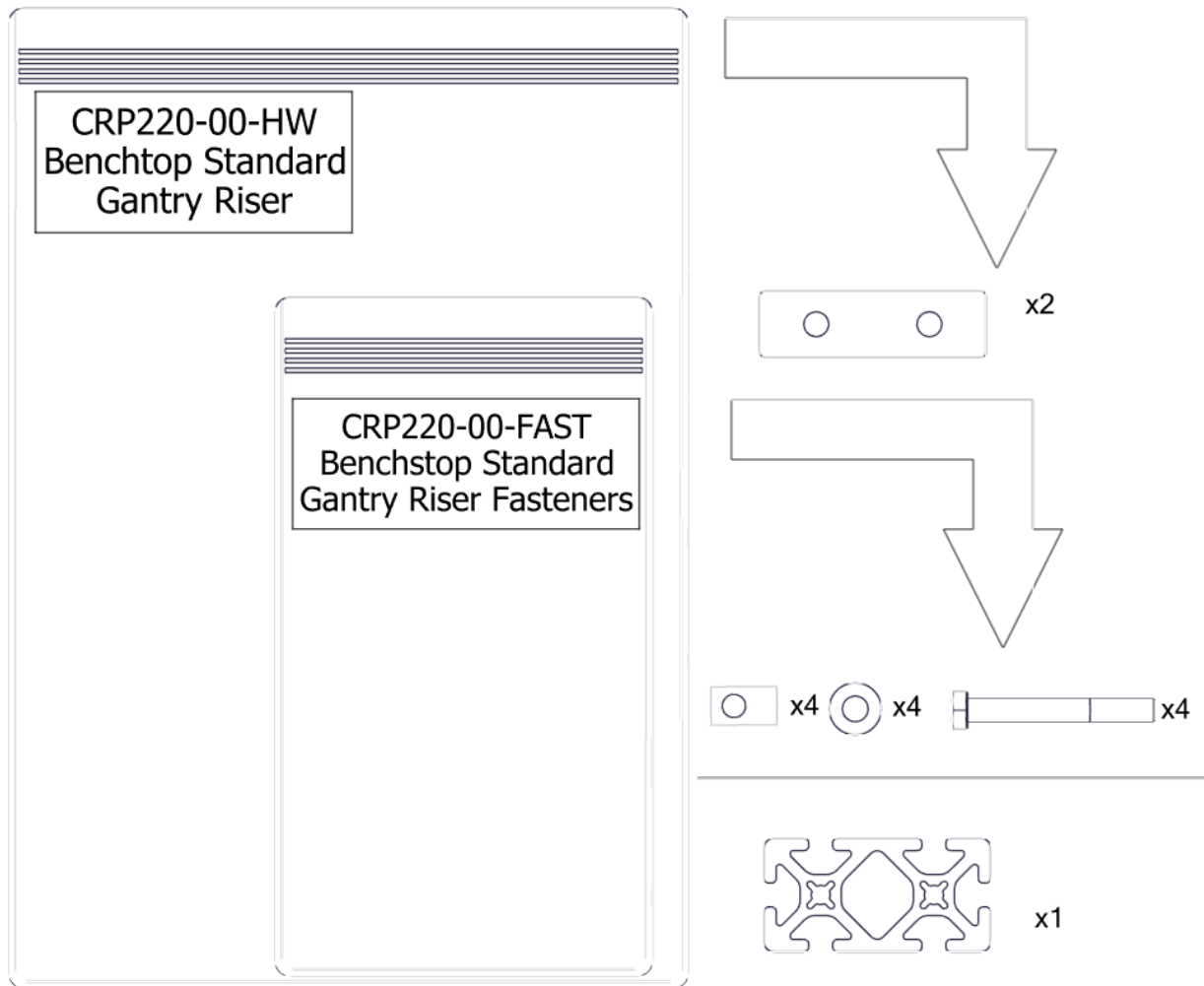


- Place provided M8 jam nuts into both clearance slots at either end of the ELC.
- Install a roller bearing and lock washer onto an M8 x 30mm hex bolt as indicated.
- Thread the M8 x 30mm hex bolt assembly into the ELC body as indicated.
- Repeat this process for the opposite end of the ELC with another M8 x 30mm hex bolt assembly.



- Partially tighten the highlighted M8 x 30mm bolts.

1.9 Extended Linear Carriage (ELC) Installation

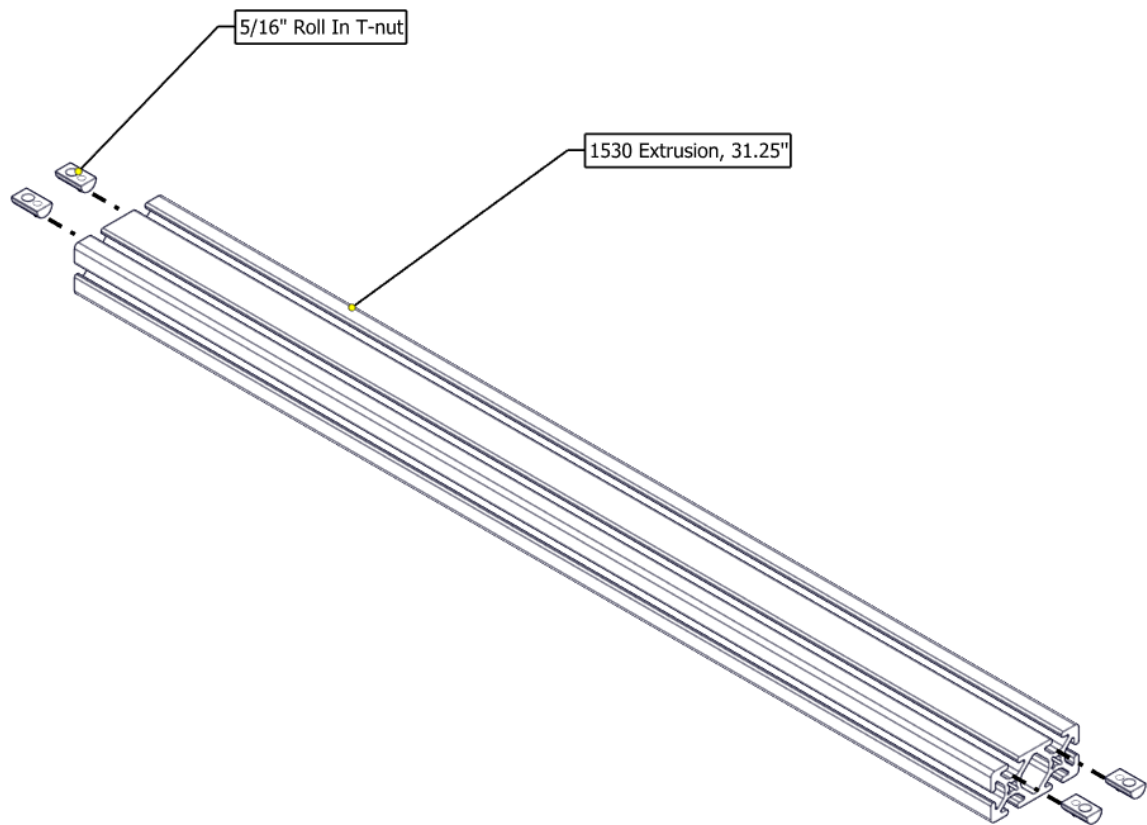


Parts Required:

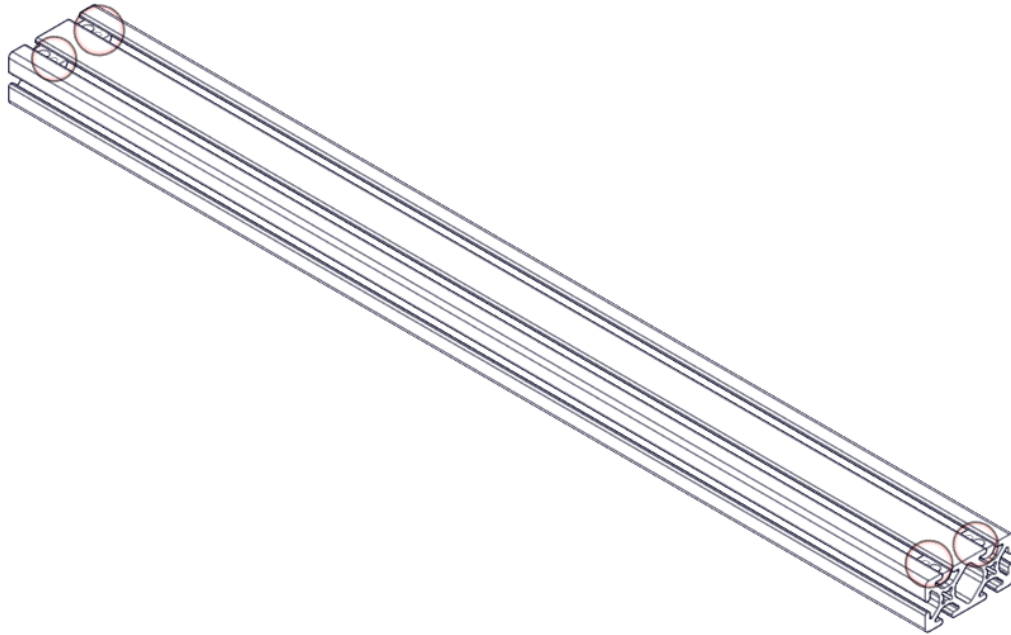
- (1) 31.25" piece of 1530 gantry crossbar extrusion
- (2) CRP220-03 riser spacers
- (4) Roll-in t-nuts
- (4) 5/16" x 2 3/4" hex bolts
- (4) 5/16" flat washers

Bag CRP220-00-FAST will contain all fasteners necessary for this step.

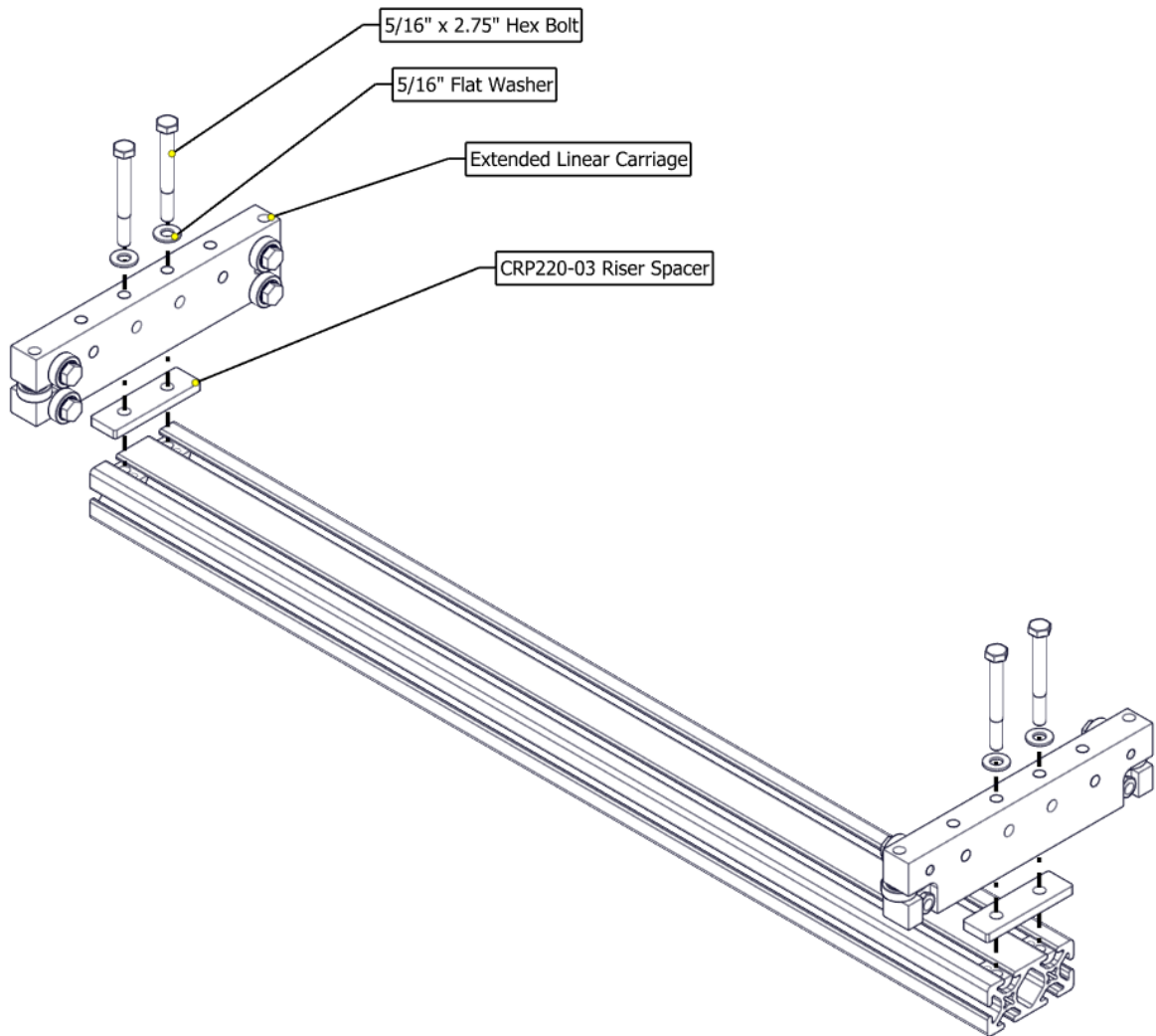
Bag CRP220-00-HW contains bag CRP220-00-FAST, and the CRP220-03 riser spacers. The 1530 extrusion is packed separately.



- Install four t-nuts into the gantry crossbar as indicated.
- Orient the long ends of the t-nuts towards the center of the extrusion as above.



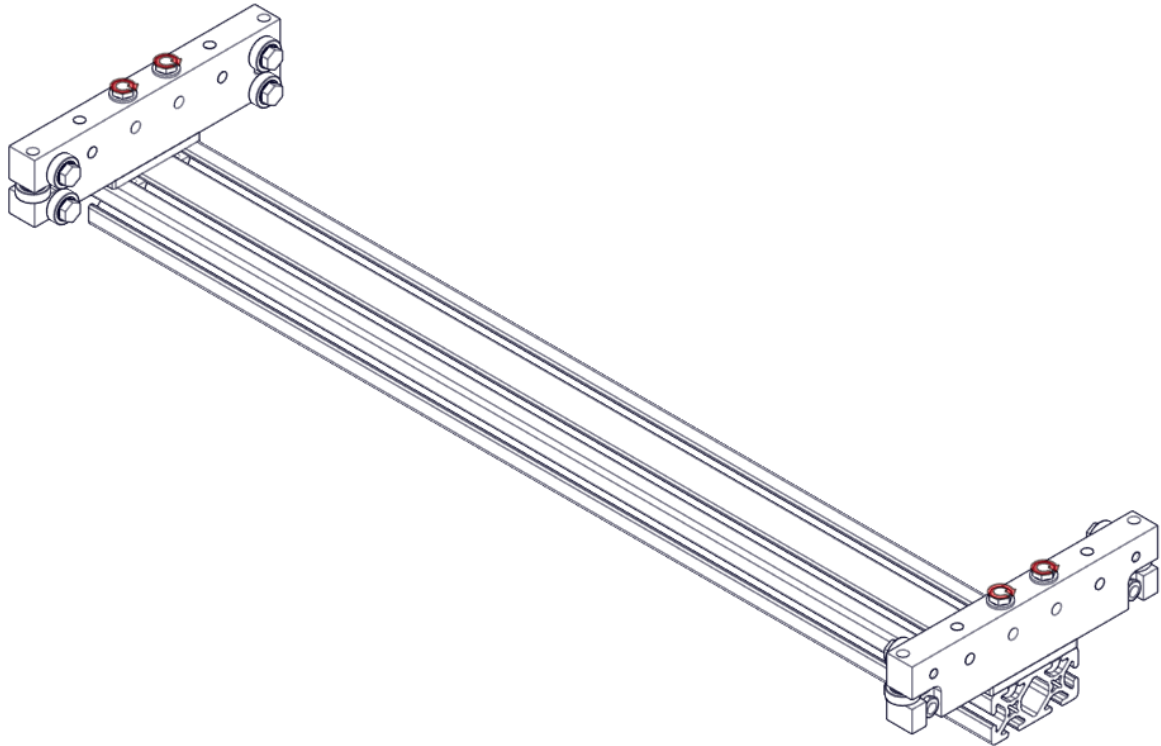
- Position all (4) t-nuts at the ends of the gantry crossbar as above.



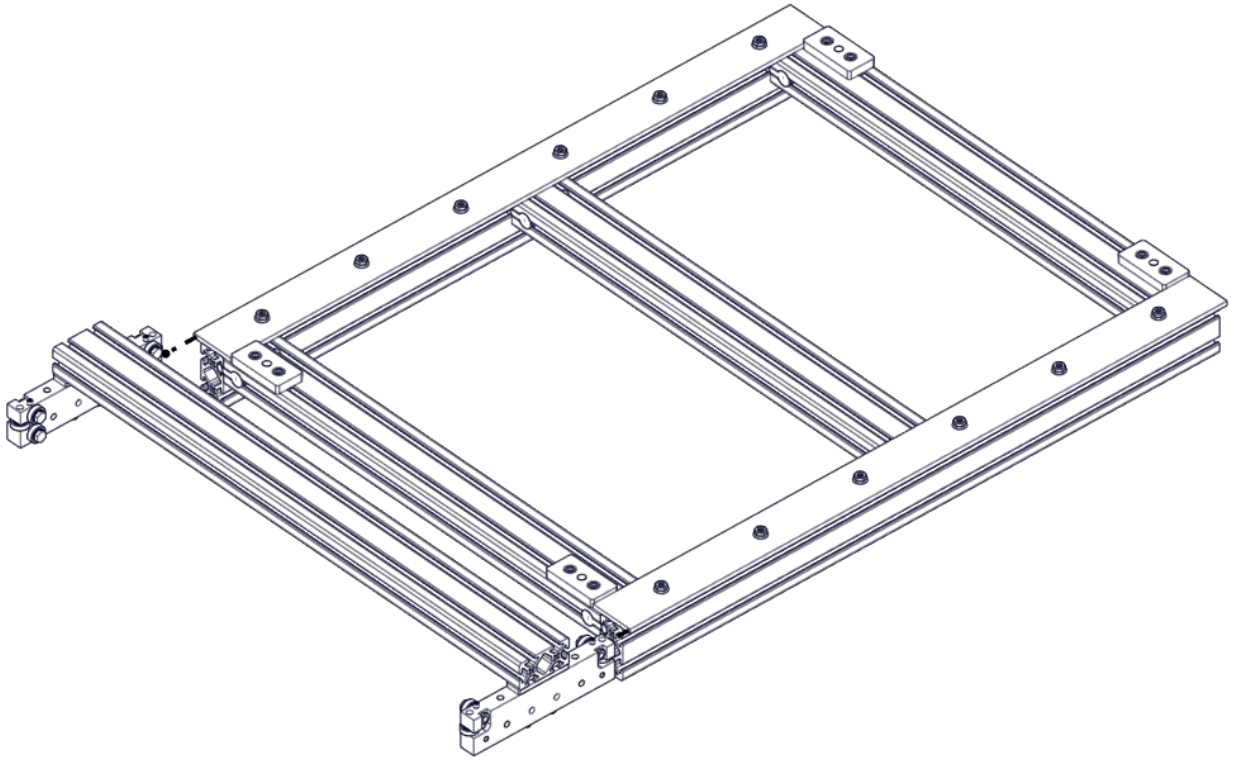
- Install 5/16" x 2³/₄" hex bolts through the following components in the following order:
 1. 5/16" flat washer
 2. ELC Body
 3. CRP220-03 riser spacer

Note: The bolts should be installed in the middle holes of the ELC as indicated.

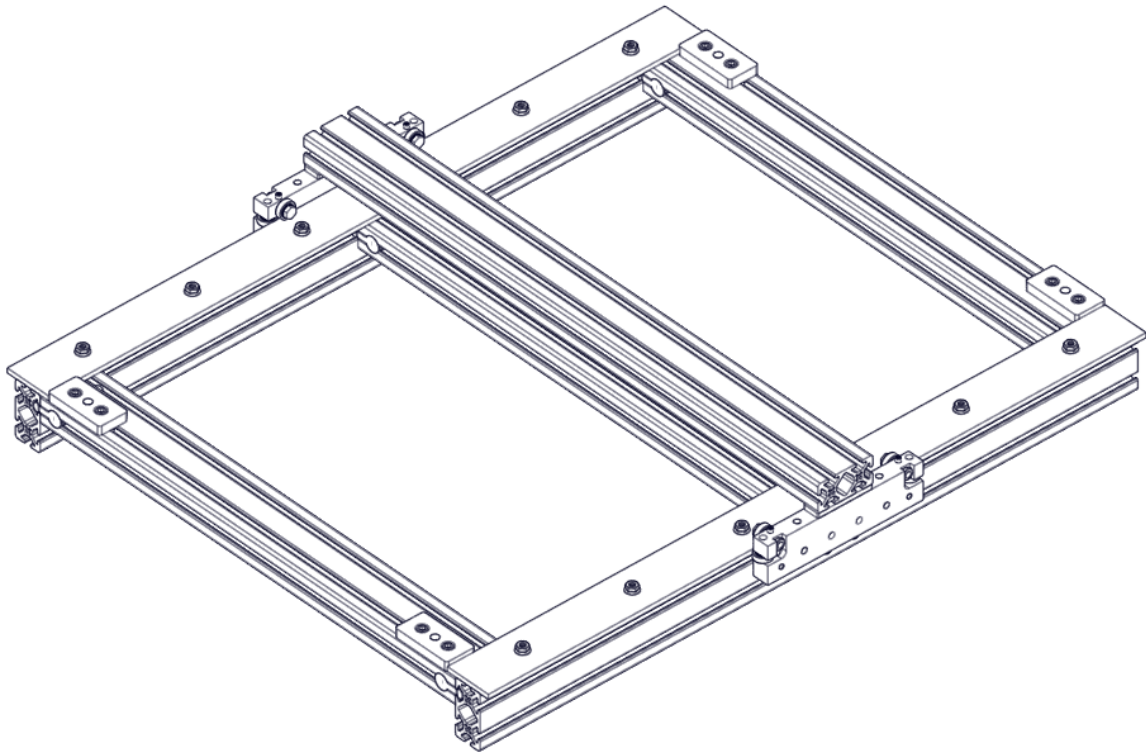
Note: The ELCs should be oriented with their adjustable (slotted) side towards the extrusion and their roller bearings towards the center of the gantry crossbar as above.



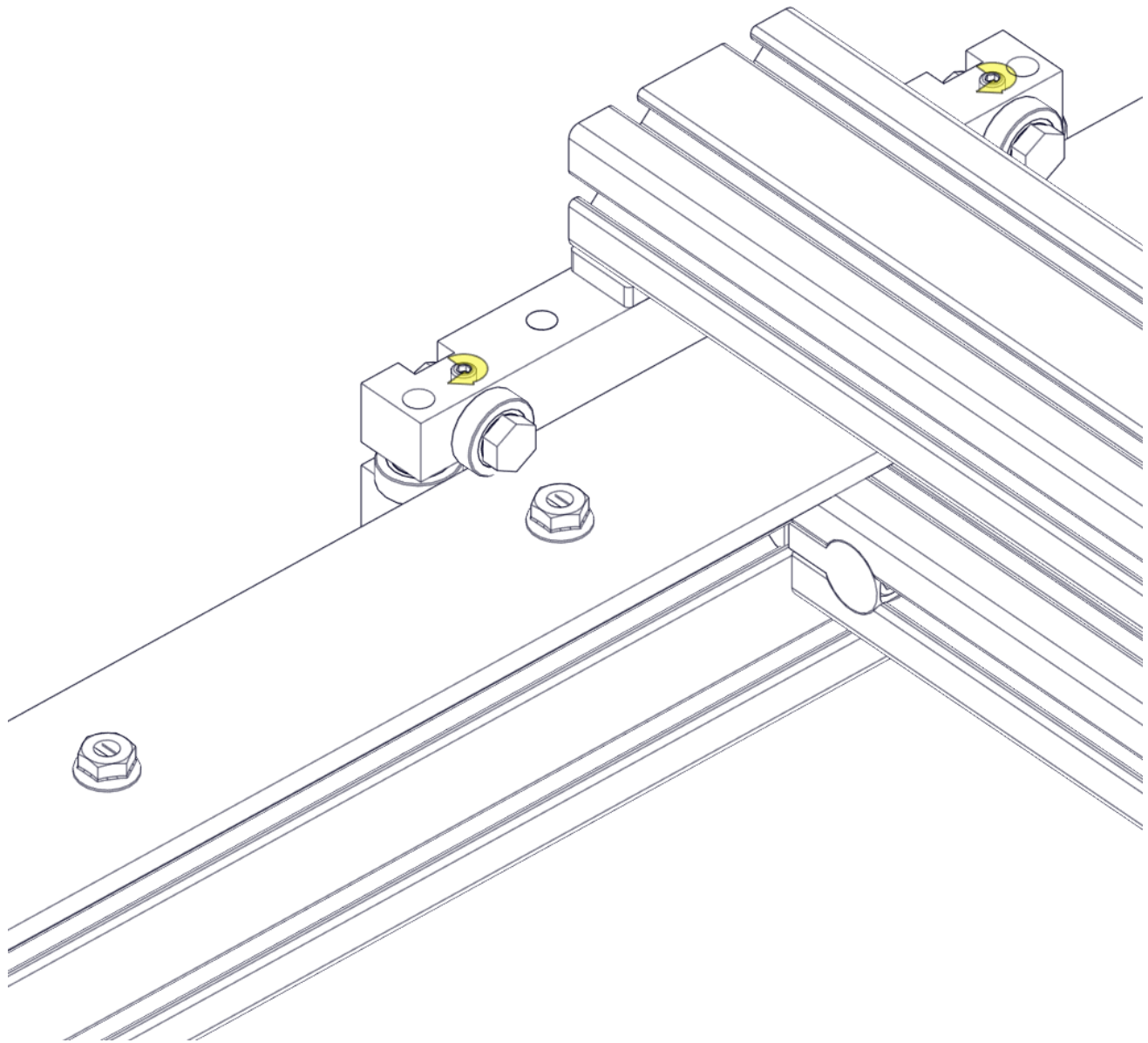
- Position the ELC assemblies so they are flush with the ends of the extrusion.
- Tighten the 5/16" x 2³/₄" bolts into the previously installed 5/16" t-nuts.



- Invert the **riser assembly** (extrusion and ELCs).
- Slide the riser assembly onto the steel rails of the frame.

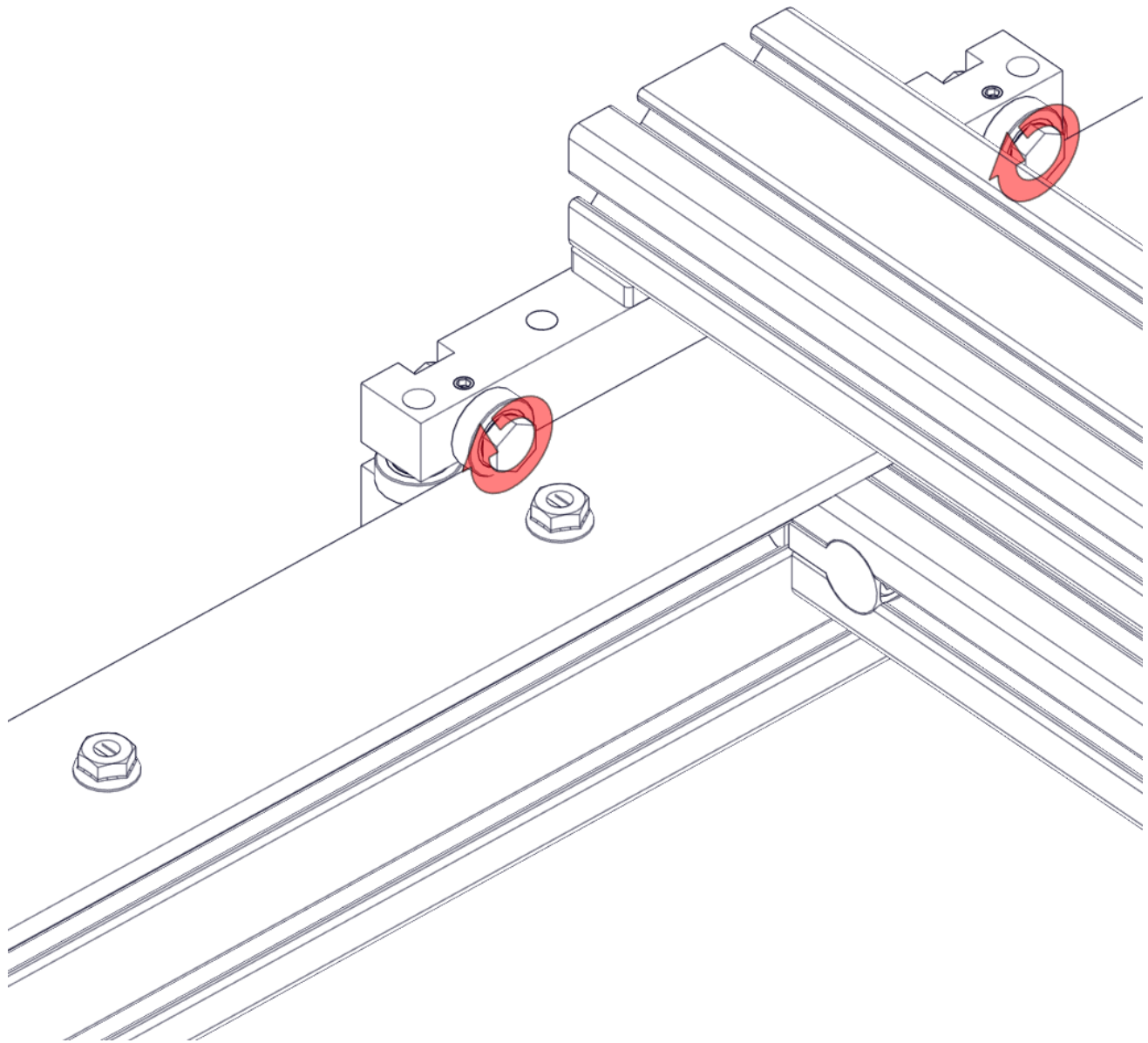


Note: The steel rail should be seated between the top and bottom roller bearings of the riser assembly.

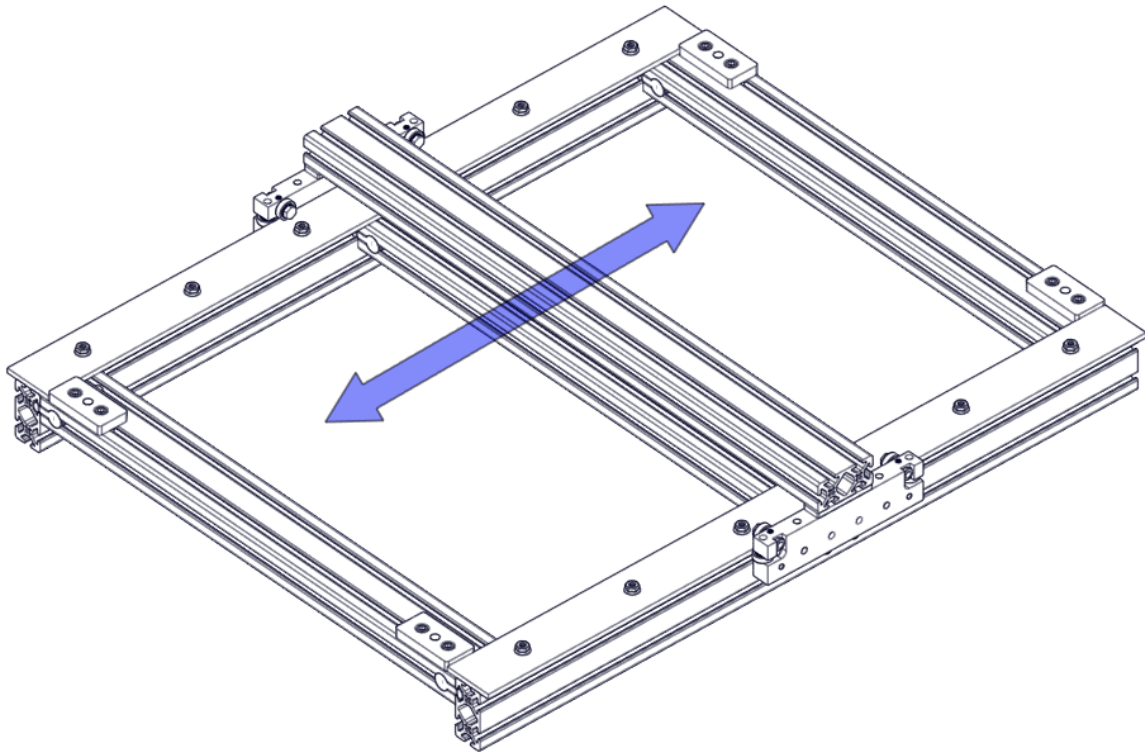


- Tighten the highlighted set screws until the roller bearings make contact on top and bottom of the steel rail.

Note: Be careful not to overtighten set screws as bearing damage may result.

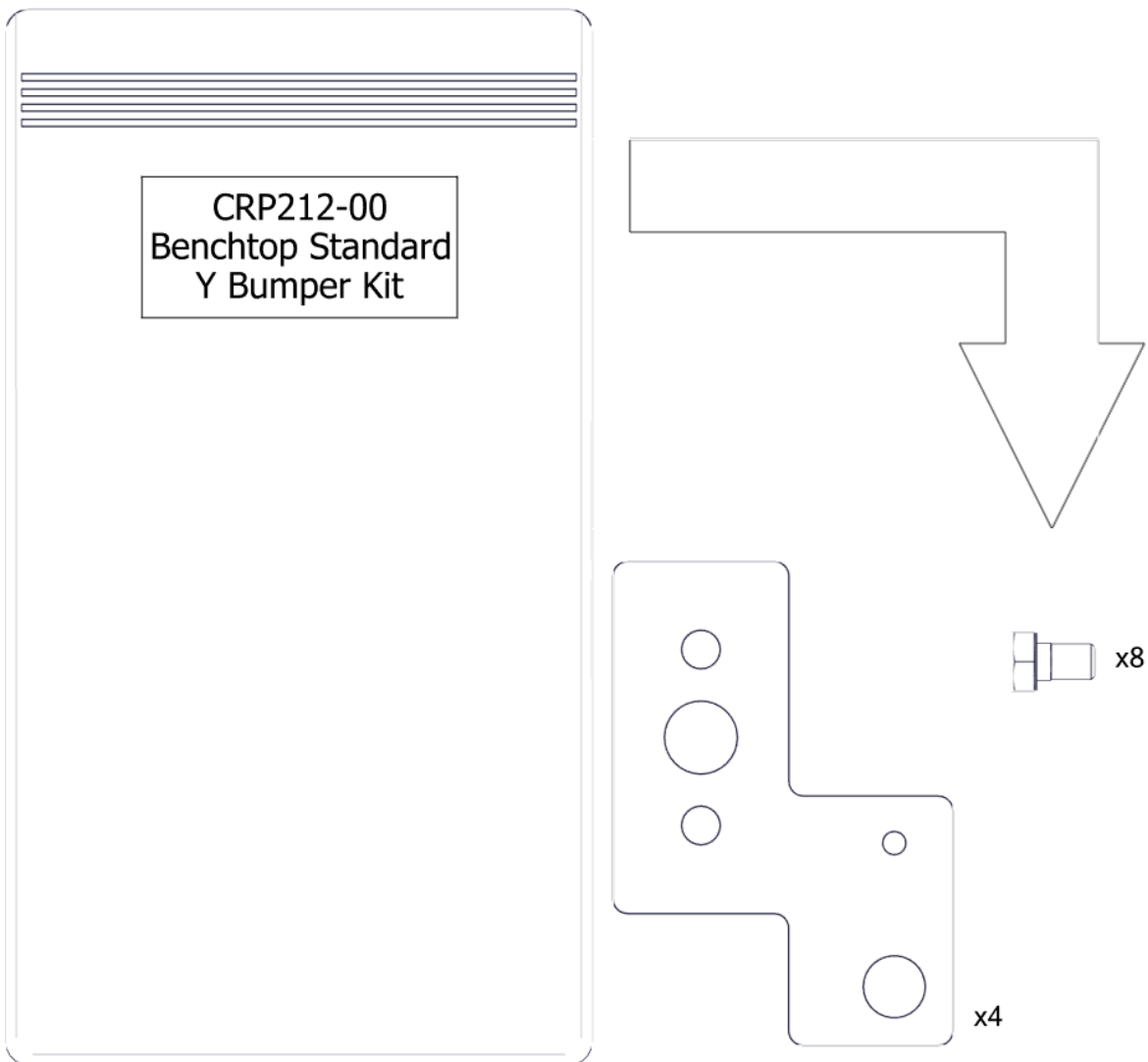


- Fully tighten the highlighted hex bolts.



- Slide riser assembly back and forth to ensure the motion is smooth.

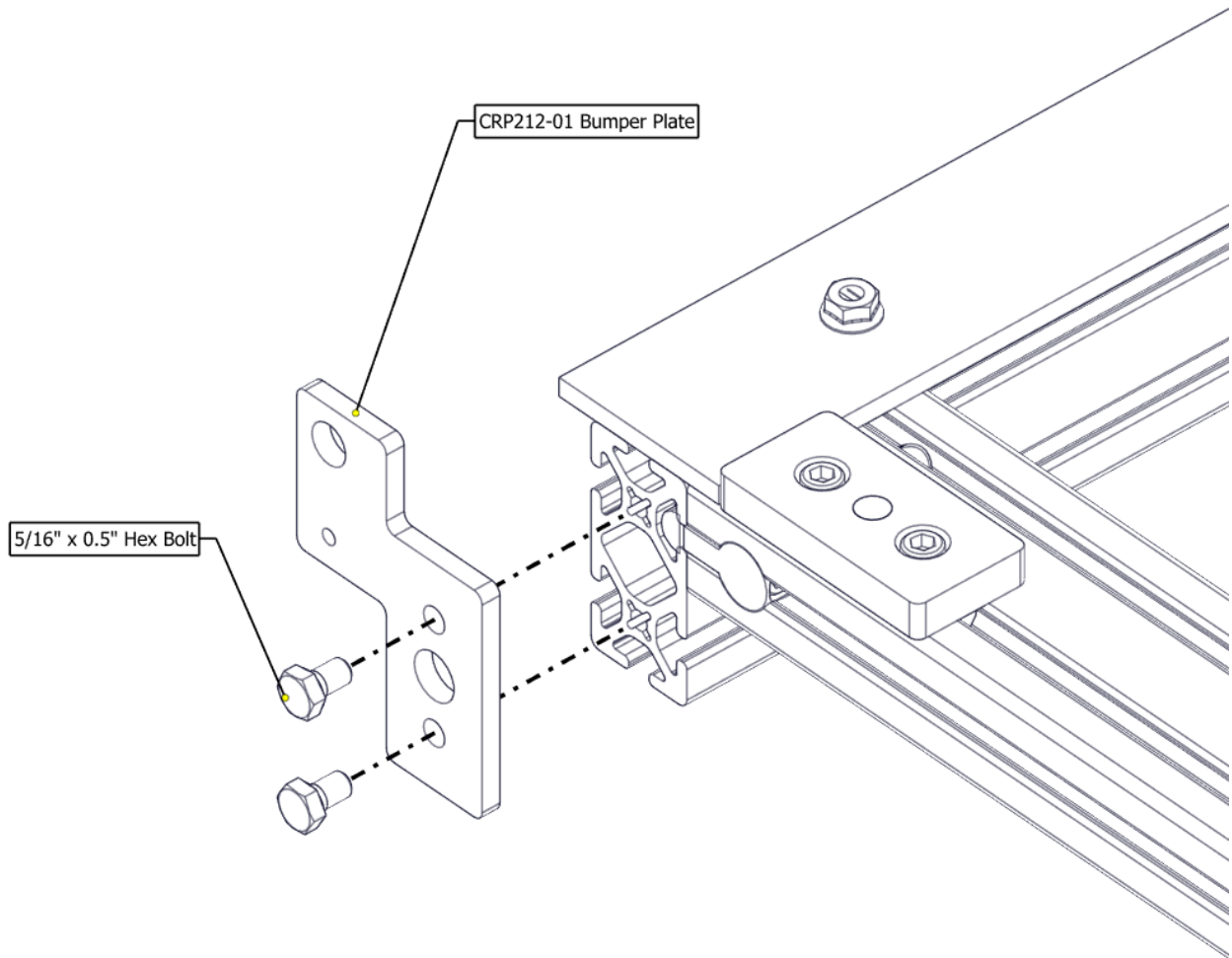
1.10 Bumper Installation (A)



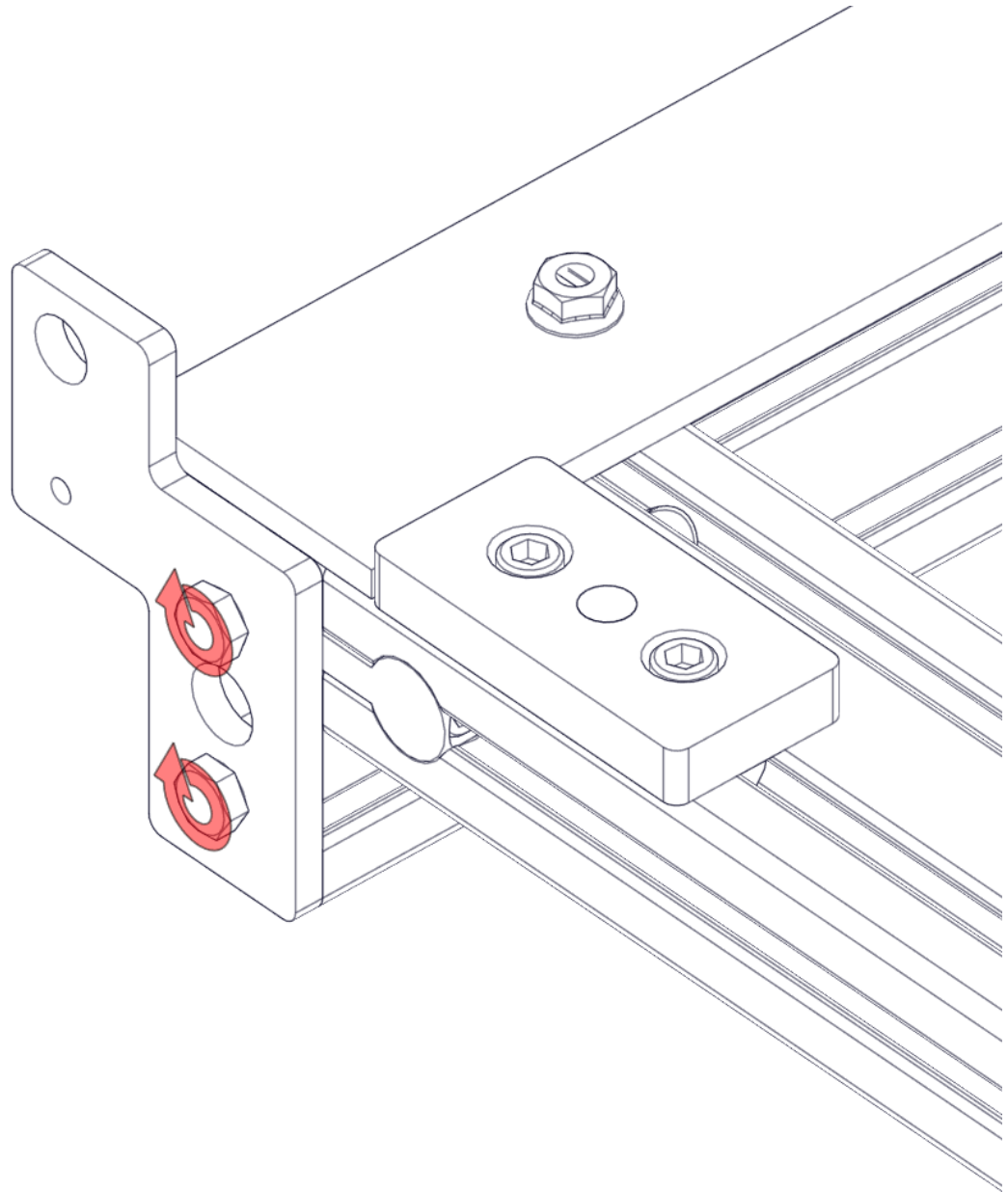
Parts Required:

- (4) CRP212-01 bumper plates
- (8) 5/16" x 1/2" hex bolts

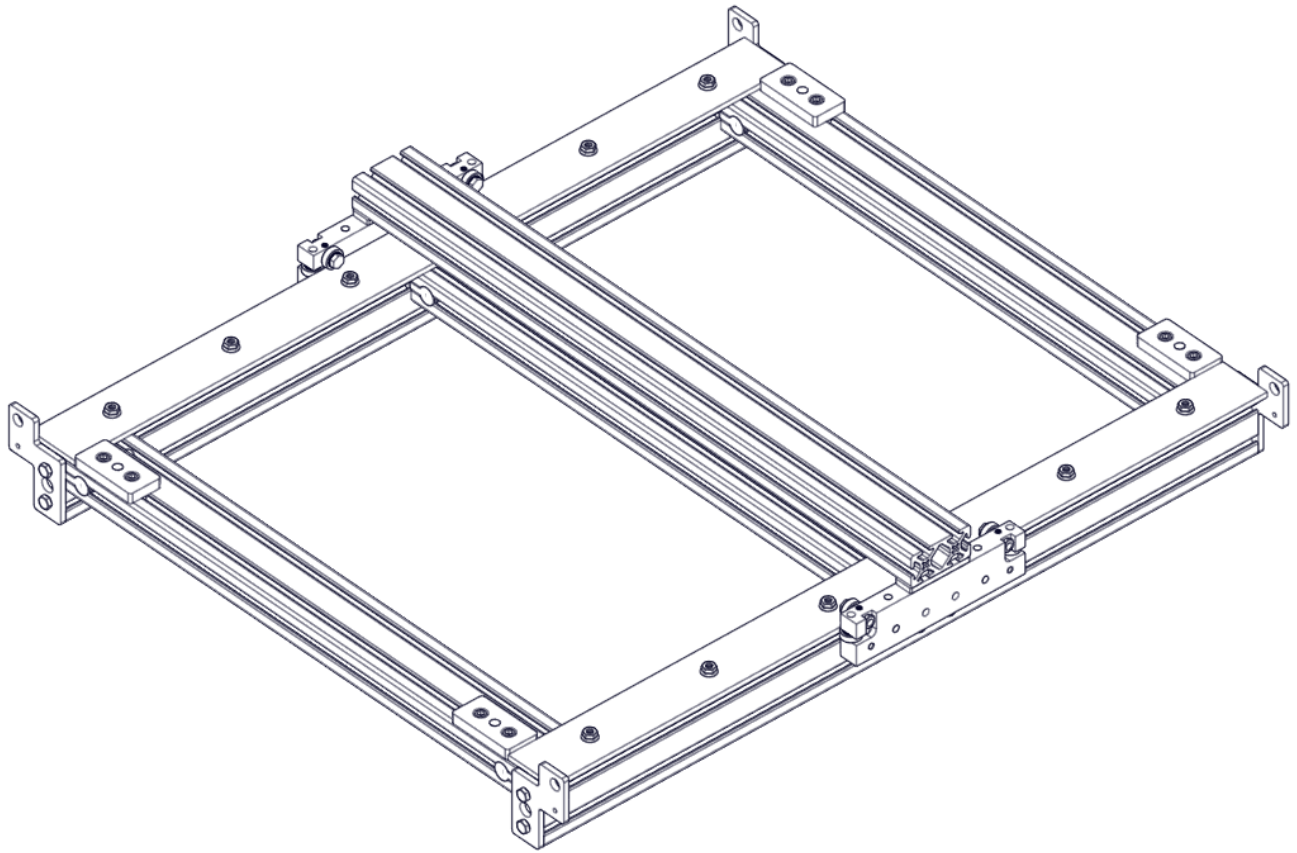
Bag CRP212-00 will contain all parts necessary for this step.
Bag CRP210-00-2424-HW contains bag CRP212-00.



- Orient the CRP212-01 **bumper plate** so it overhangs the outer edge of the frame as above.
- Install 5/16" x 1/2" hex bolts into the bumper plate as indicated.
- Thread the hex bolts into the end of the frame extrusion.



- Tighten the 5/16" x 1/2" hex bolts.

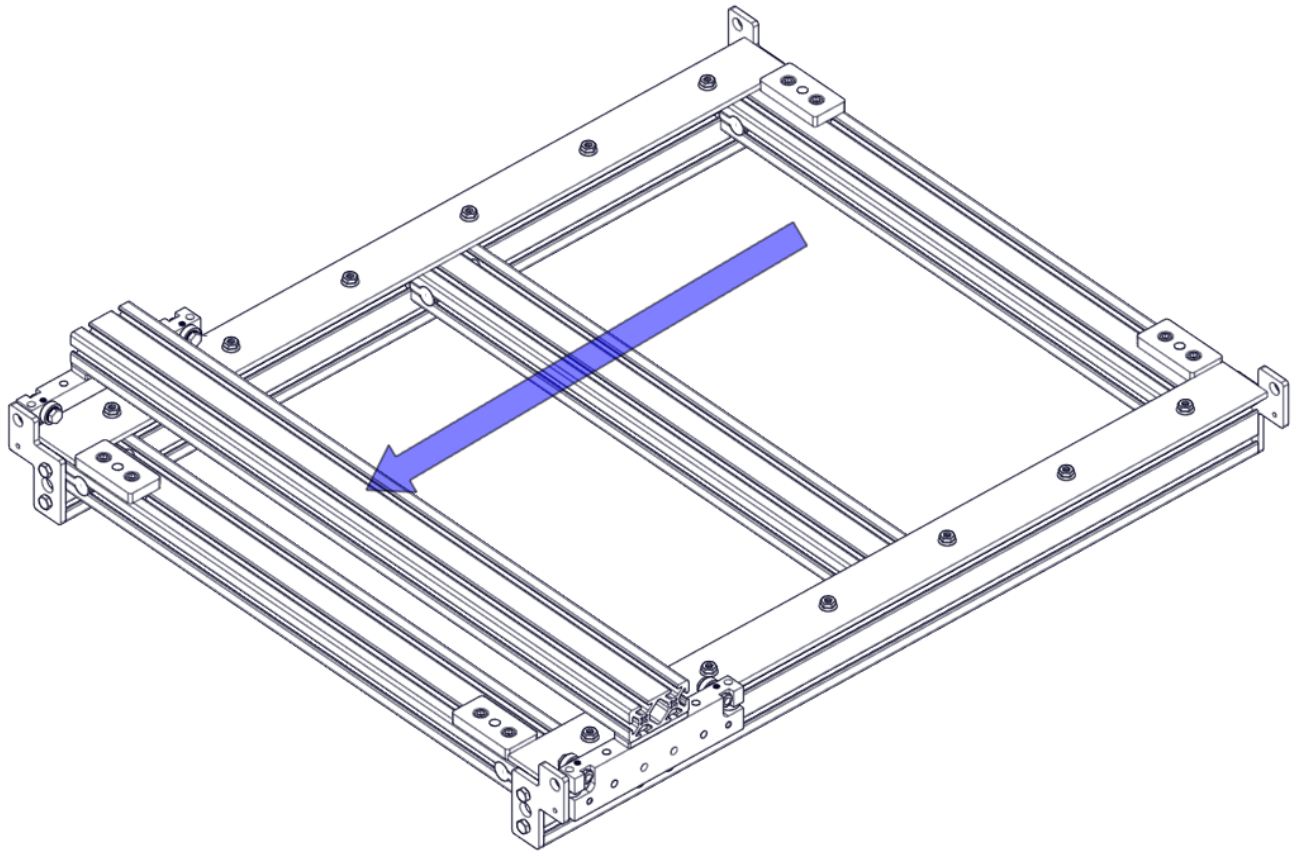


- Repeat the previous process for all four corners of the frame.

Note: The bumper plates should overhang away from the center of the frame at all corners as above.

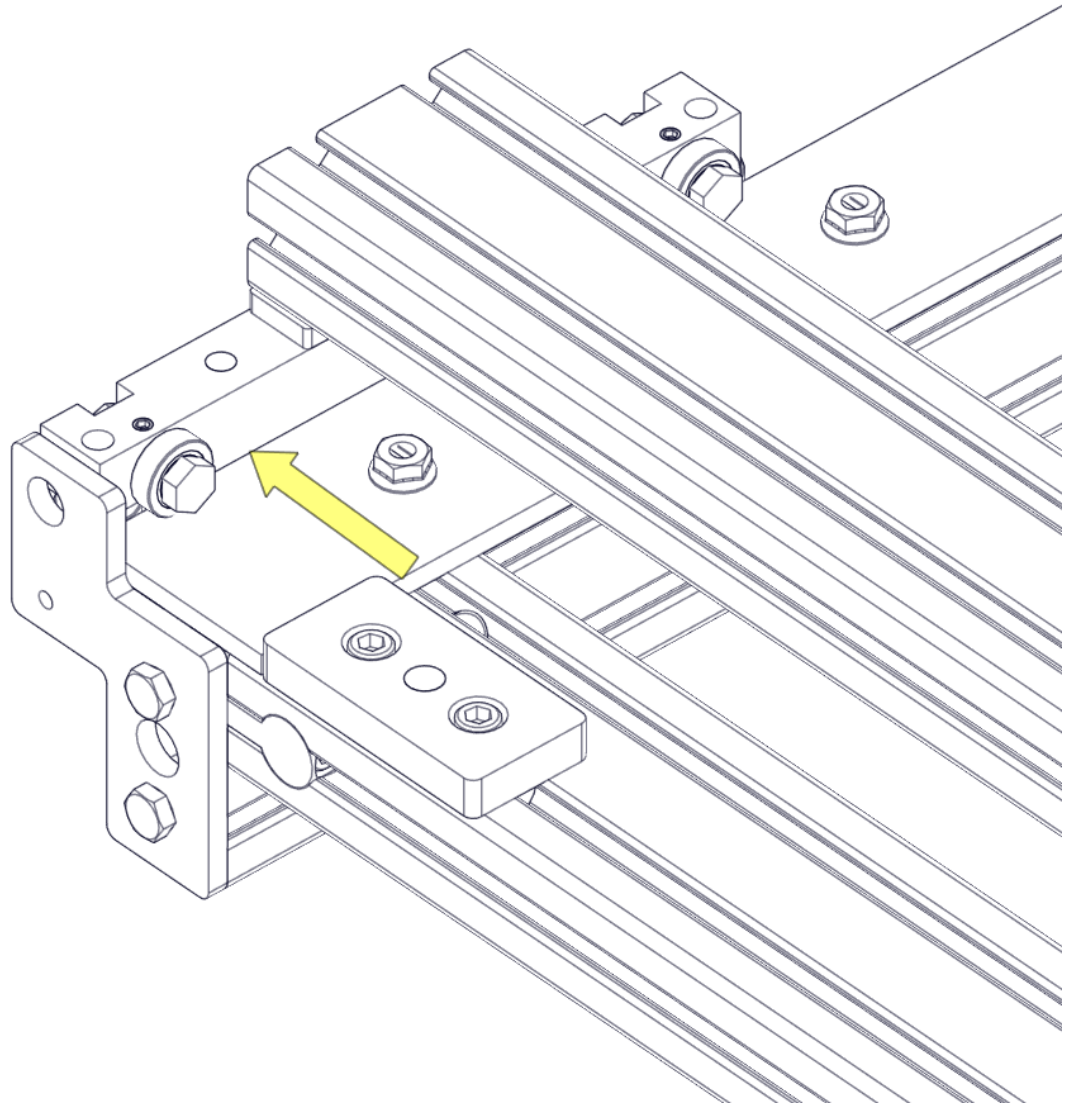
1.11 Steel Rail Alignment (B)

No additional parts are necessary for this step.

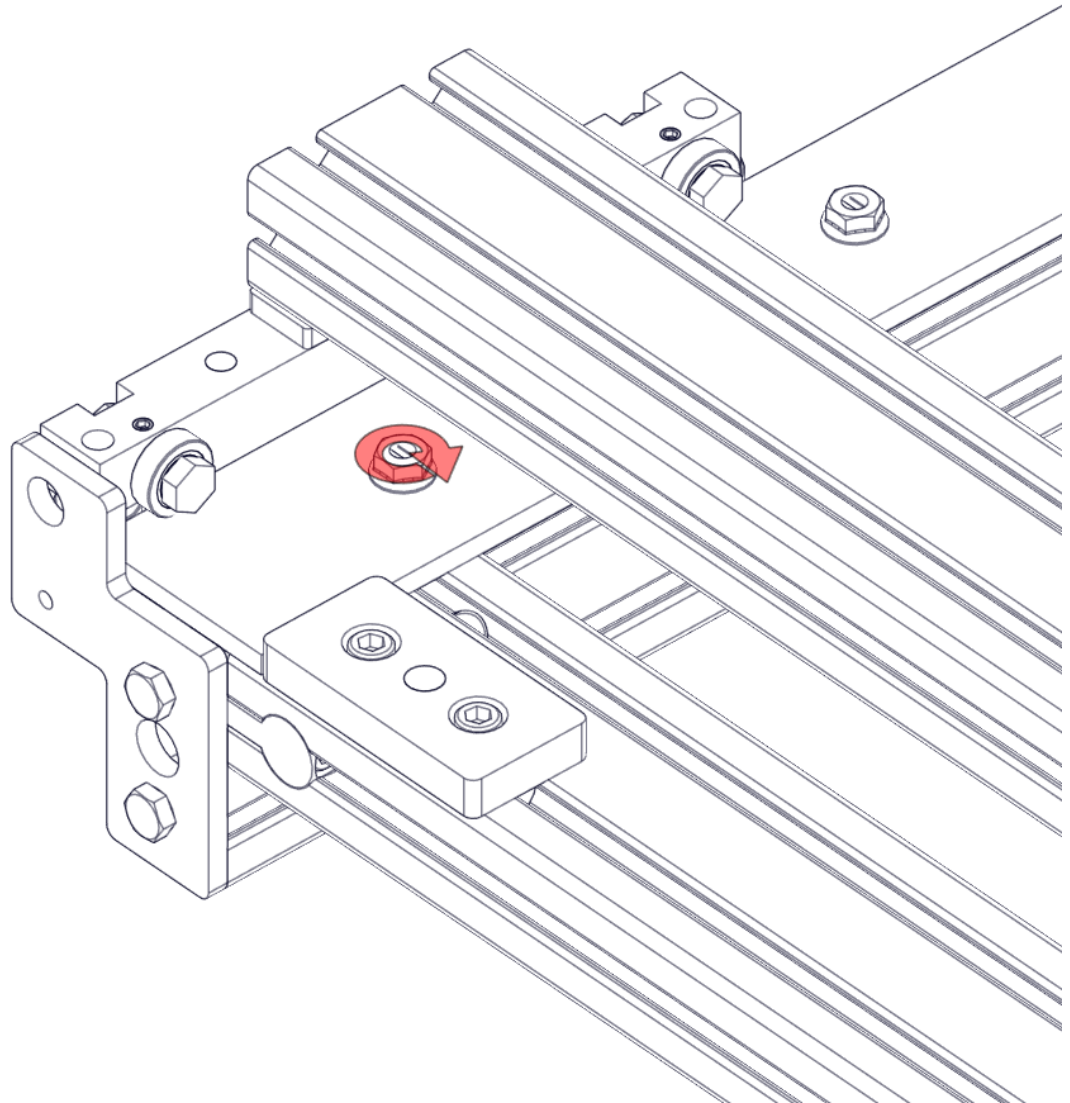


- Slide the riser assembly to one end of the frame.

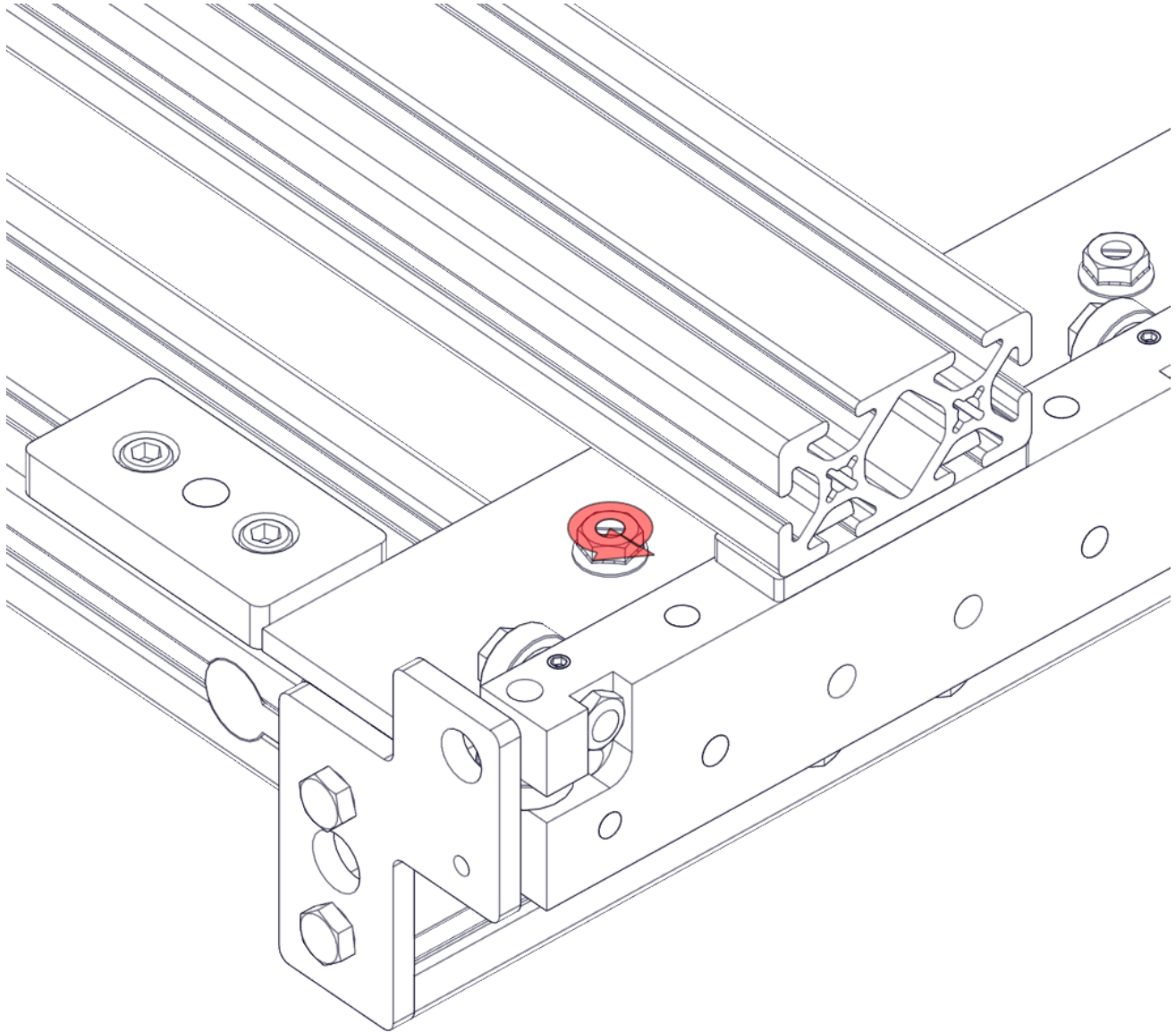
Note: The ELC bodies should be flush with the bumper plates as above.



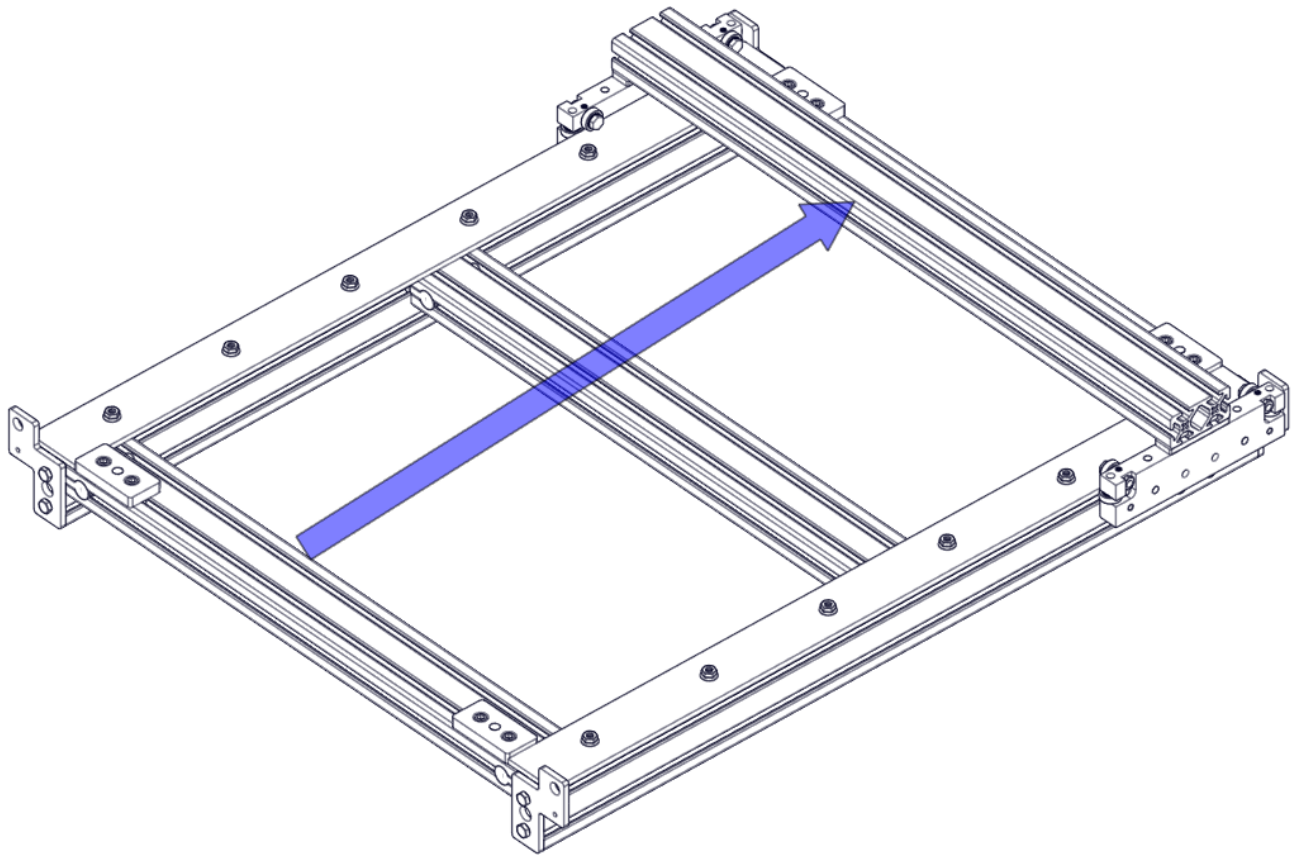
- If the edge of the steel rail does not contact both roller bearings of the ELC, loosen the flange nuts of the steel rail and move the rail to contact them as indicated.



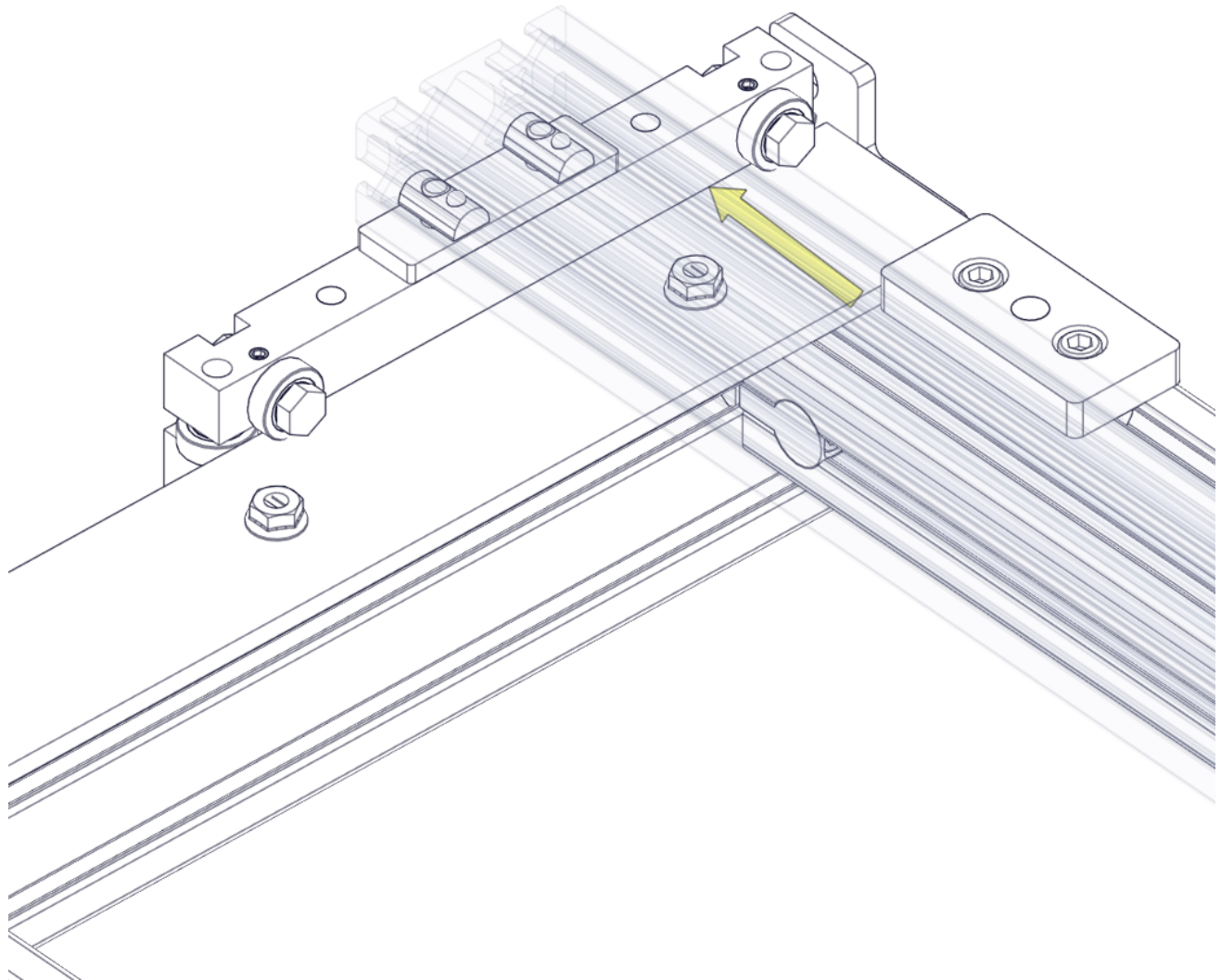
- Fully tighten the highlighted flange nut.



- Fully tighten the highlighted flange nut.

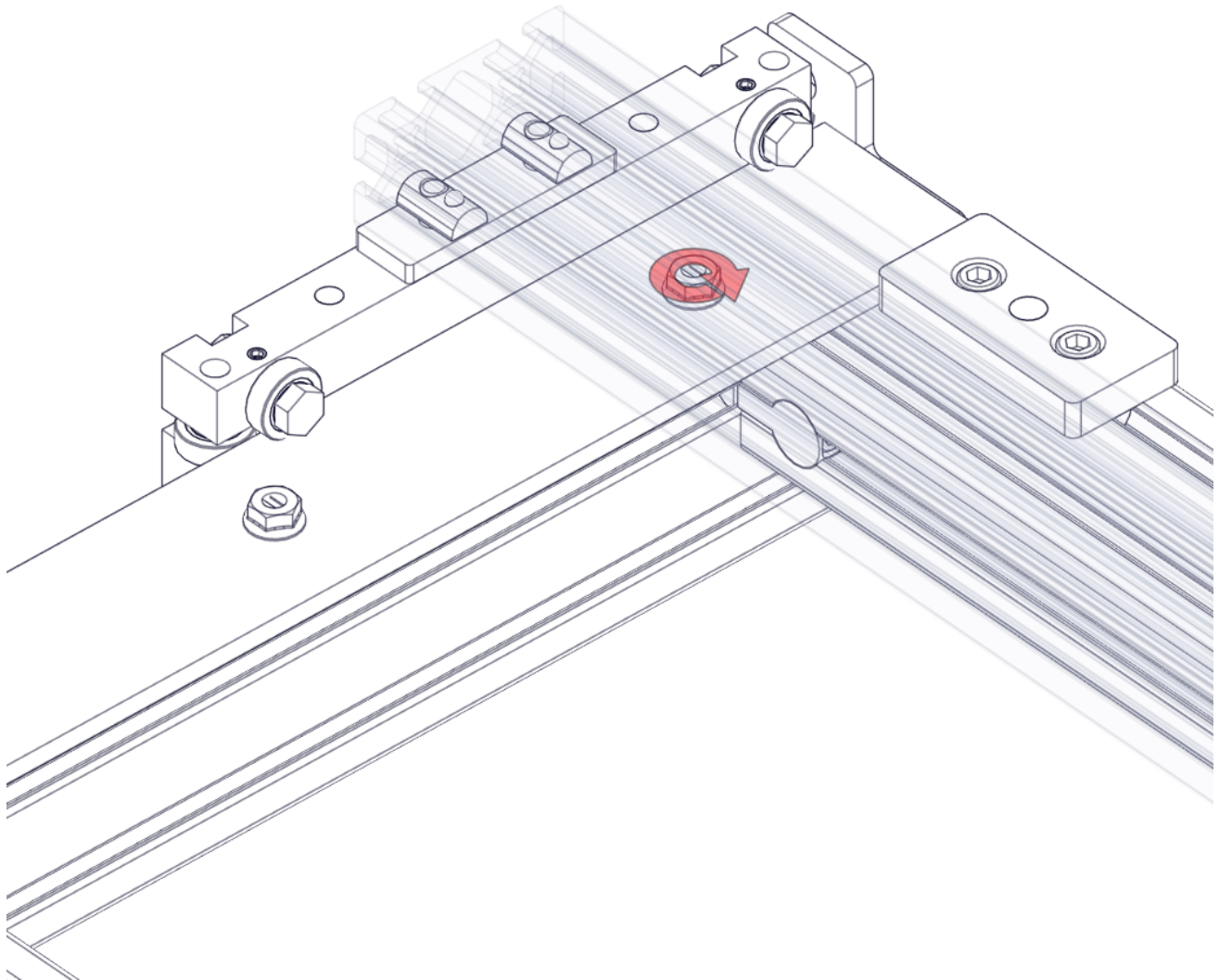


- Slide the riser assembly to the opposite end of the frame.

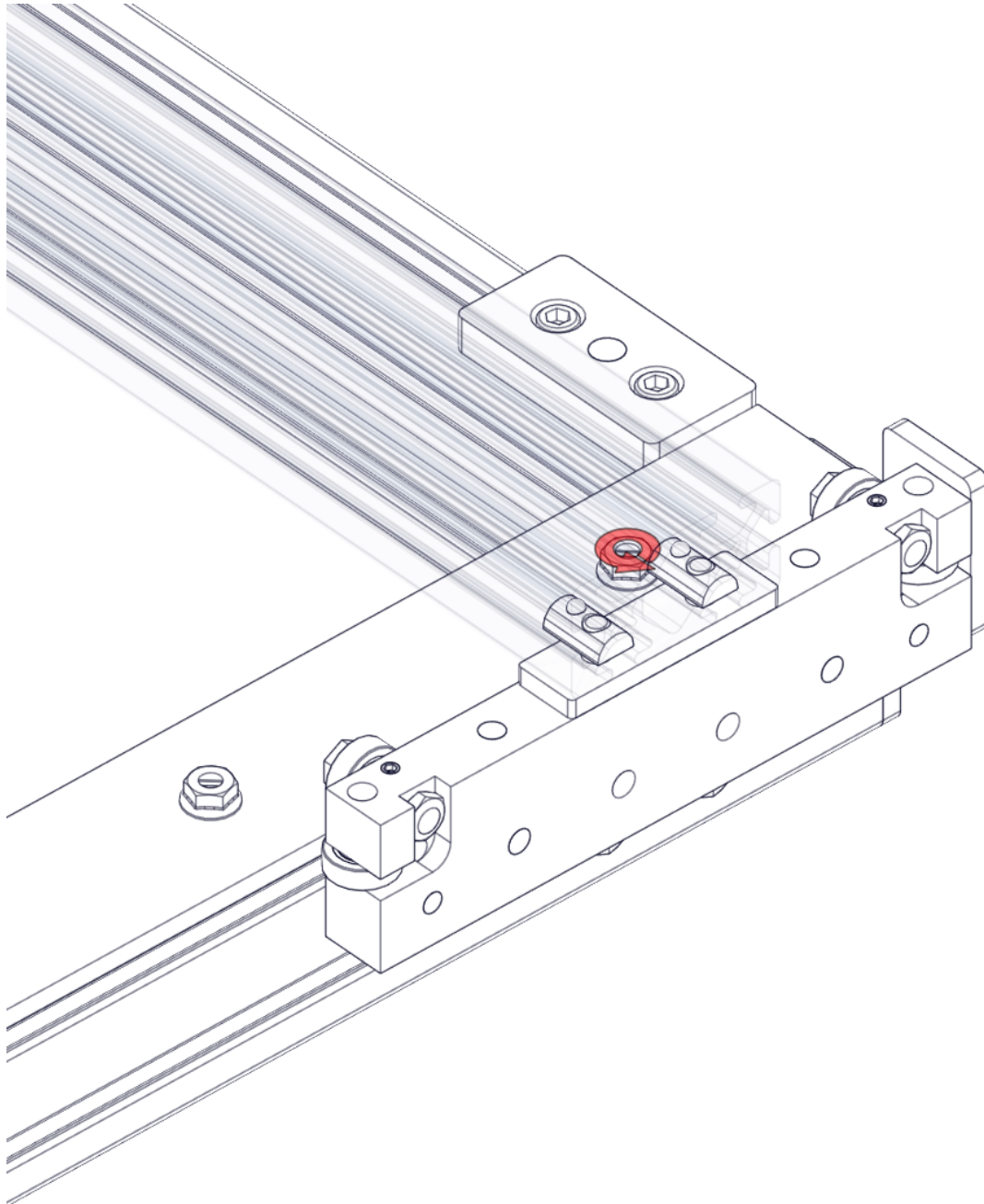


- Repeat previous steel rail alignment process.

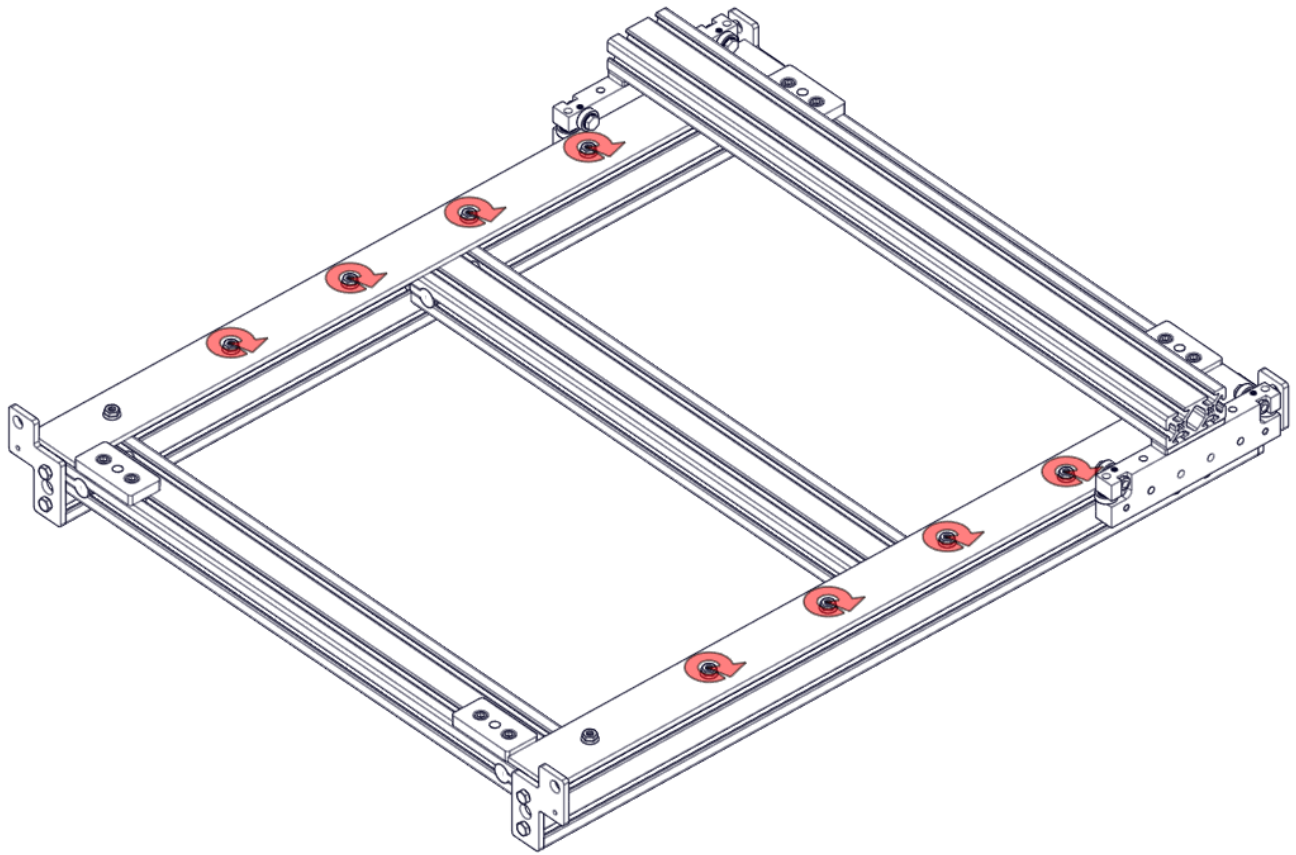
Note: Steel rail edge should contact both ELC roller bearings.



- Fully tighten the highlighted flange nut.

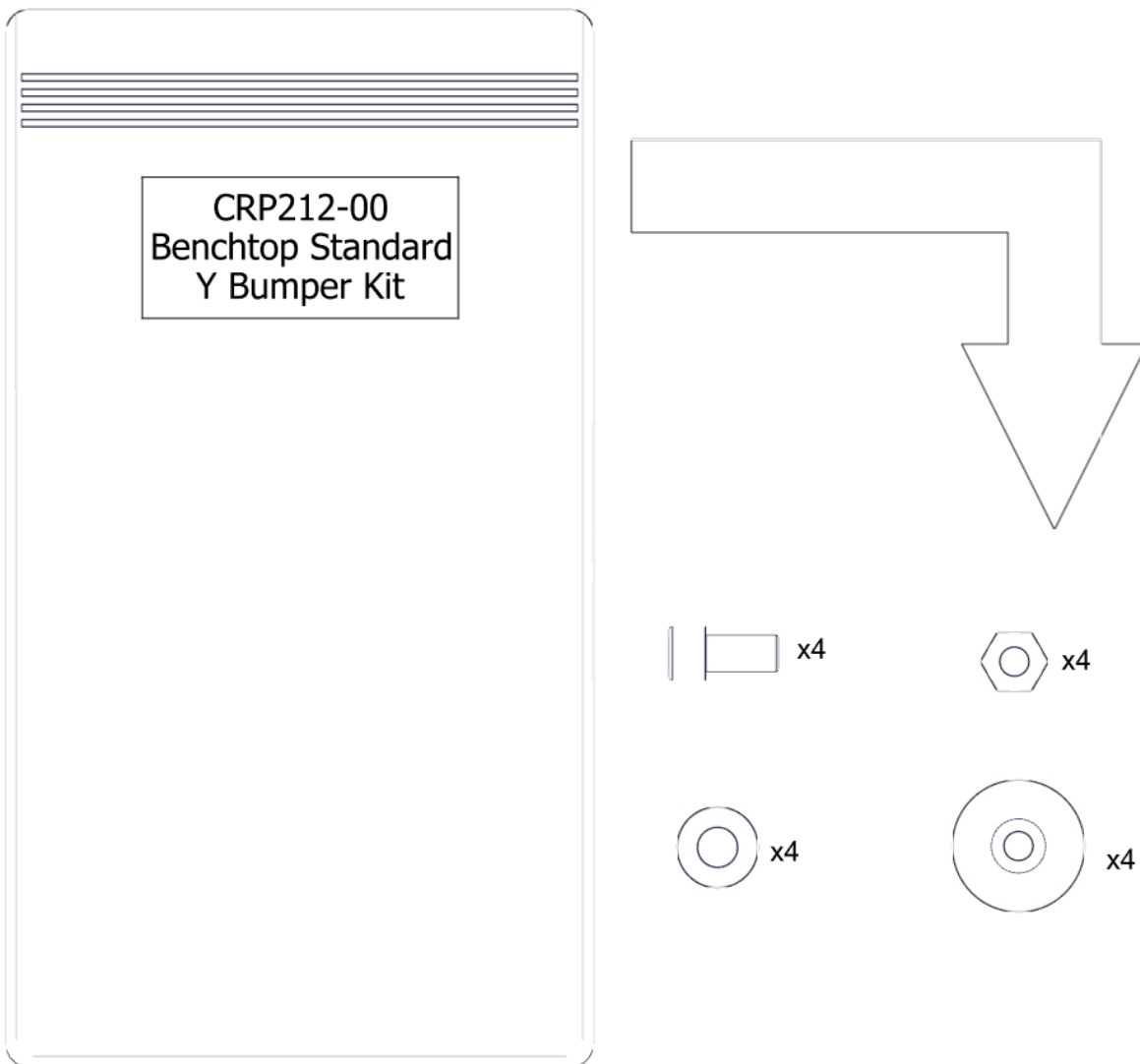


- Fully tighten the highlighted flange nut on the opposite steel rail.



- All (6) ELC roller bearings should contact the steel rail throughout the entire ELC travel.
- Fully tighten all (12) highlighted flange nuts.

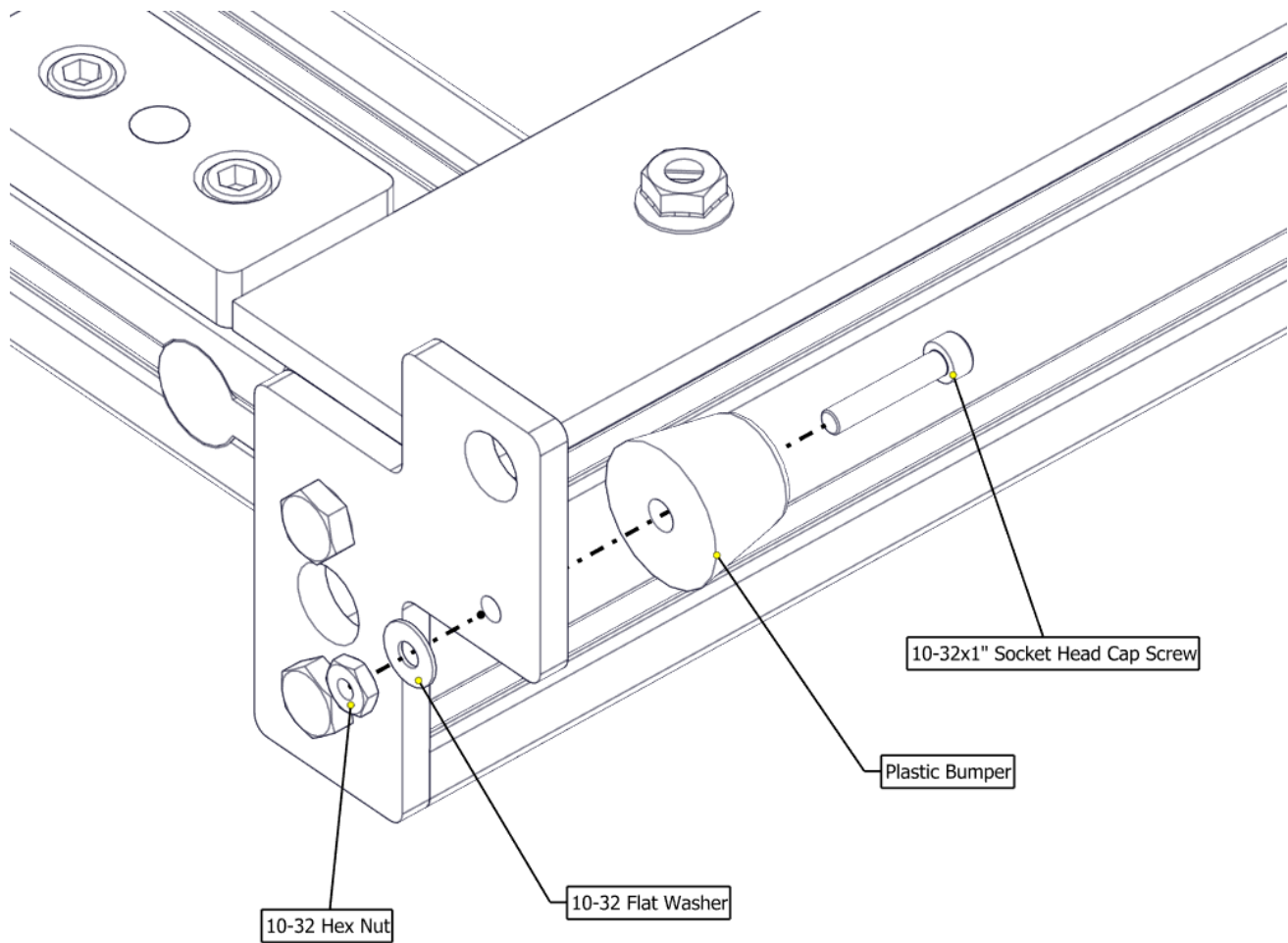
1.12 Bumper Installation (B)



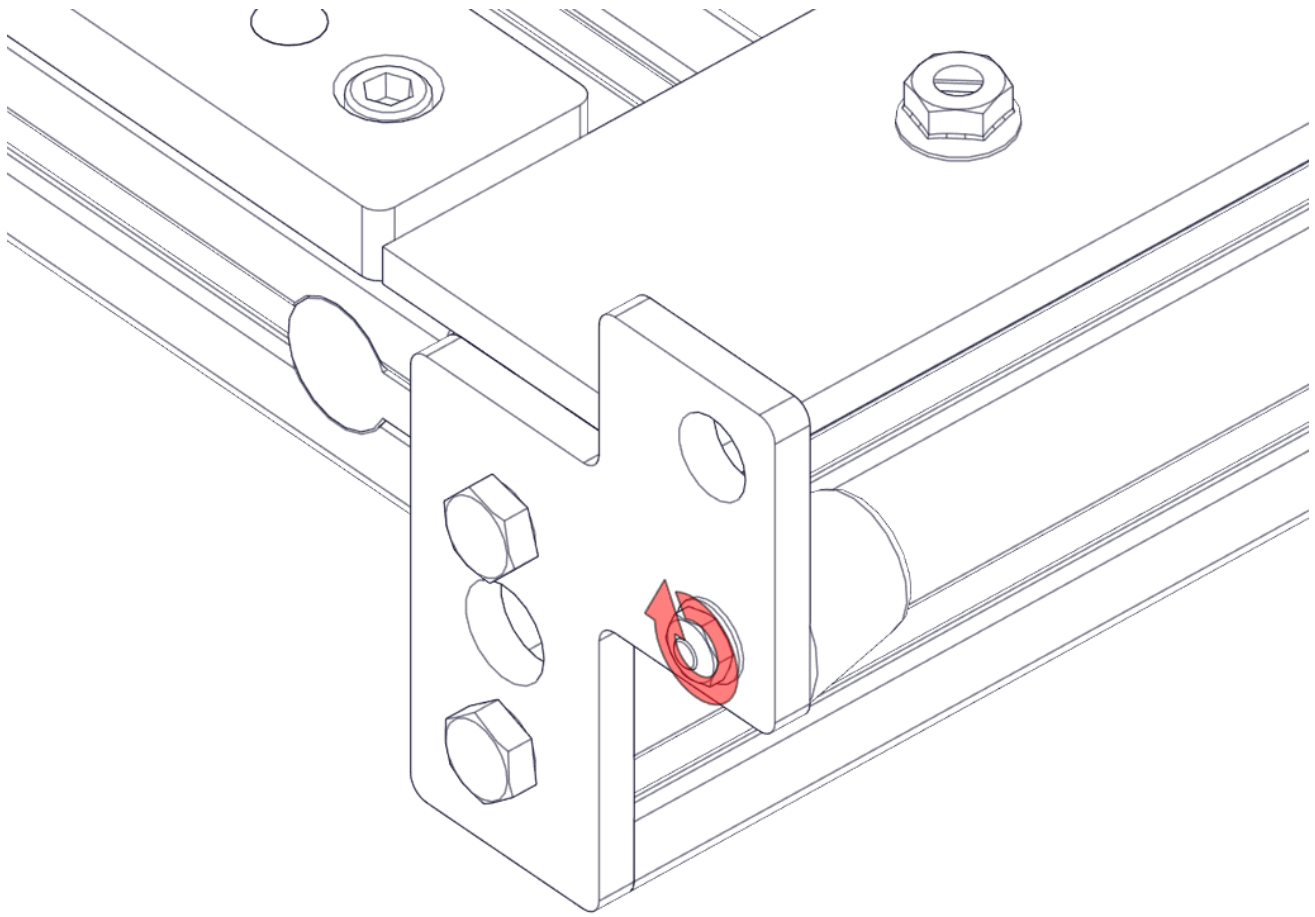
Parts Required:

- (4) 10-32 hex nuts
- (4) 10-32 x 1" socket head cap screws
- (4) Plastic bumpers
- (4) 10-32 flat washers

Bag CRP212-00 will contain all parts necessary for this step.
Bag CRP210-00-2424-HW contains all above parts.

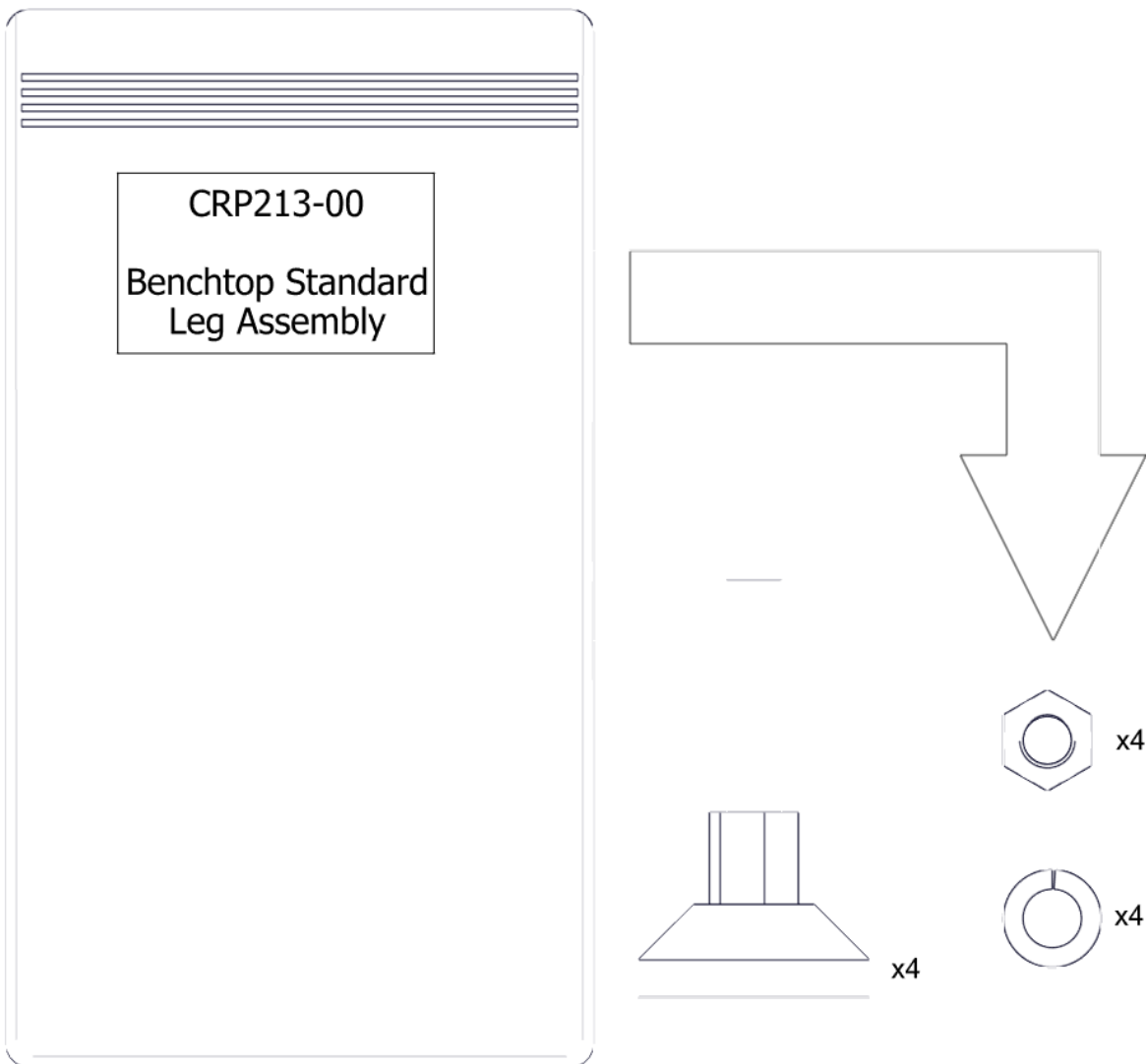


- Install a 10-32 x 1" socket head cap screw into a plastic bumper as indicated.
- Install this assembly into the smaller of the holes in overhanging face of the bumper plate.
- Install a 10-32 flat washer over the 10-32.
- Thread a 10-32 hex nut onto the 10-32 screw as above.



- Tighten the 10-32 washer and screw.
- Repeat the previous process for each bumper at each corner of the base assembly.

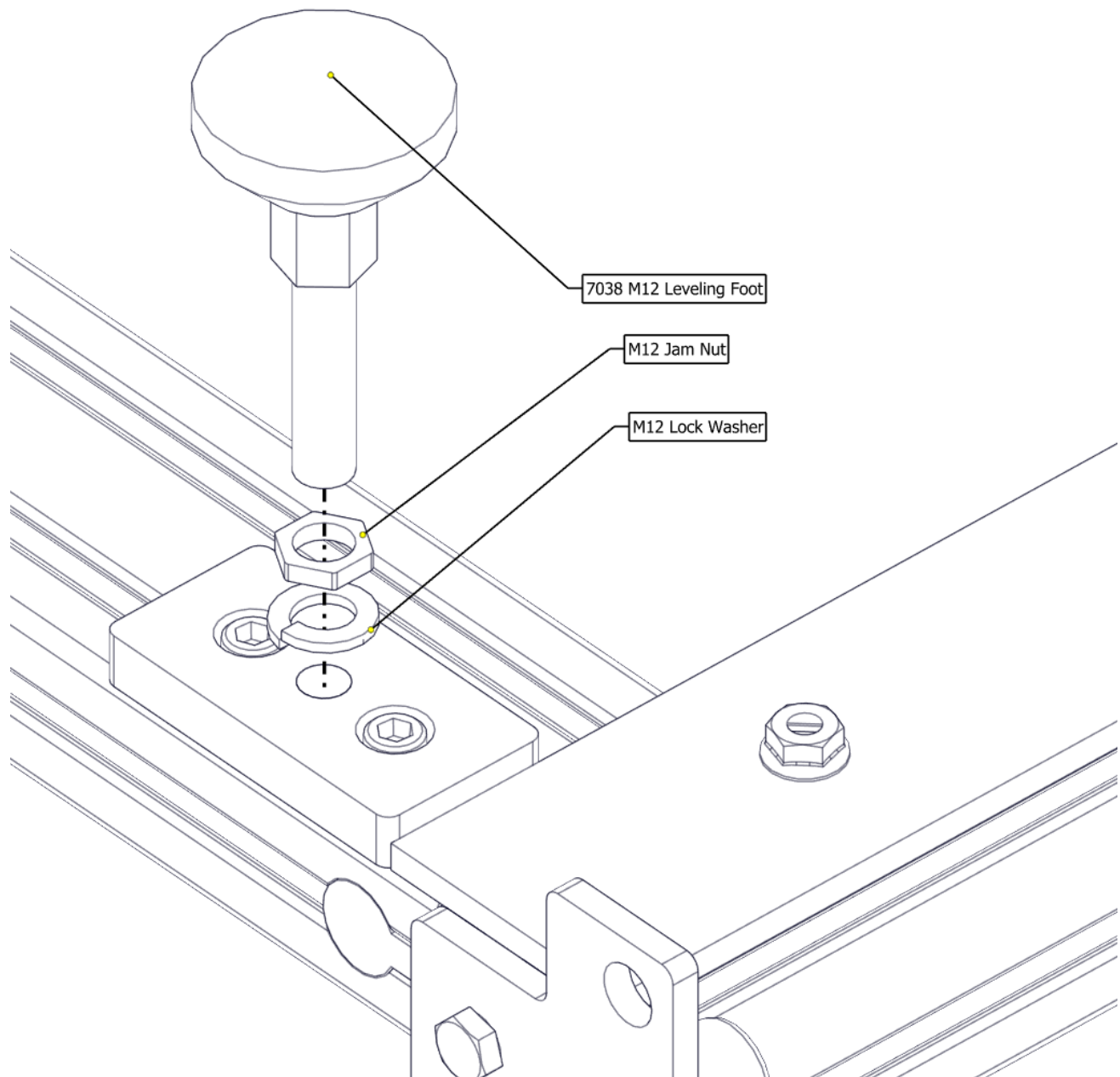
1.13 Foot Installation (C)



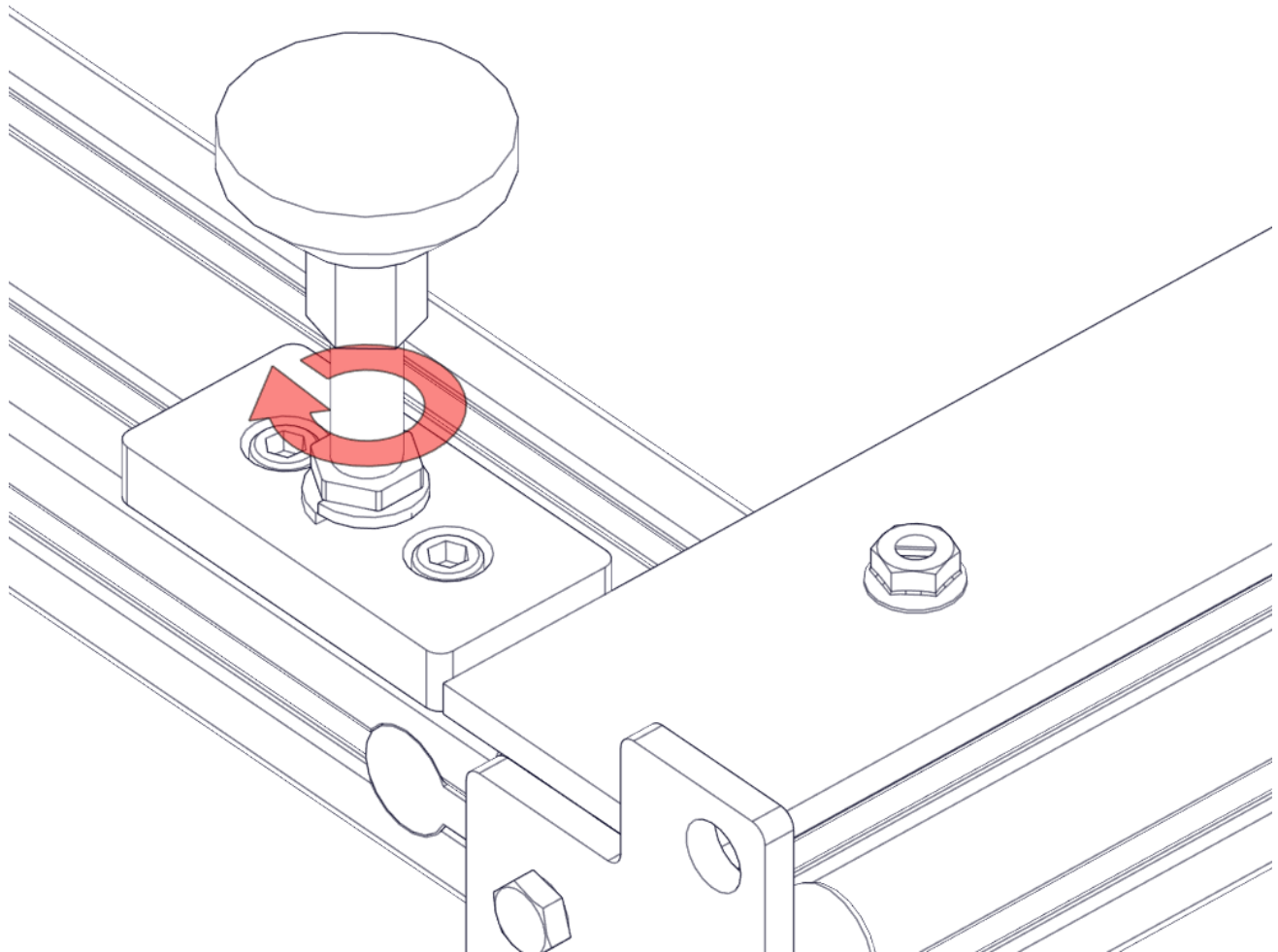
Parts Required:

- (4) M12 leveling feet
- (4) M12 lock washers
- (4) M12 jam nuts

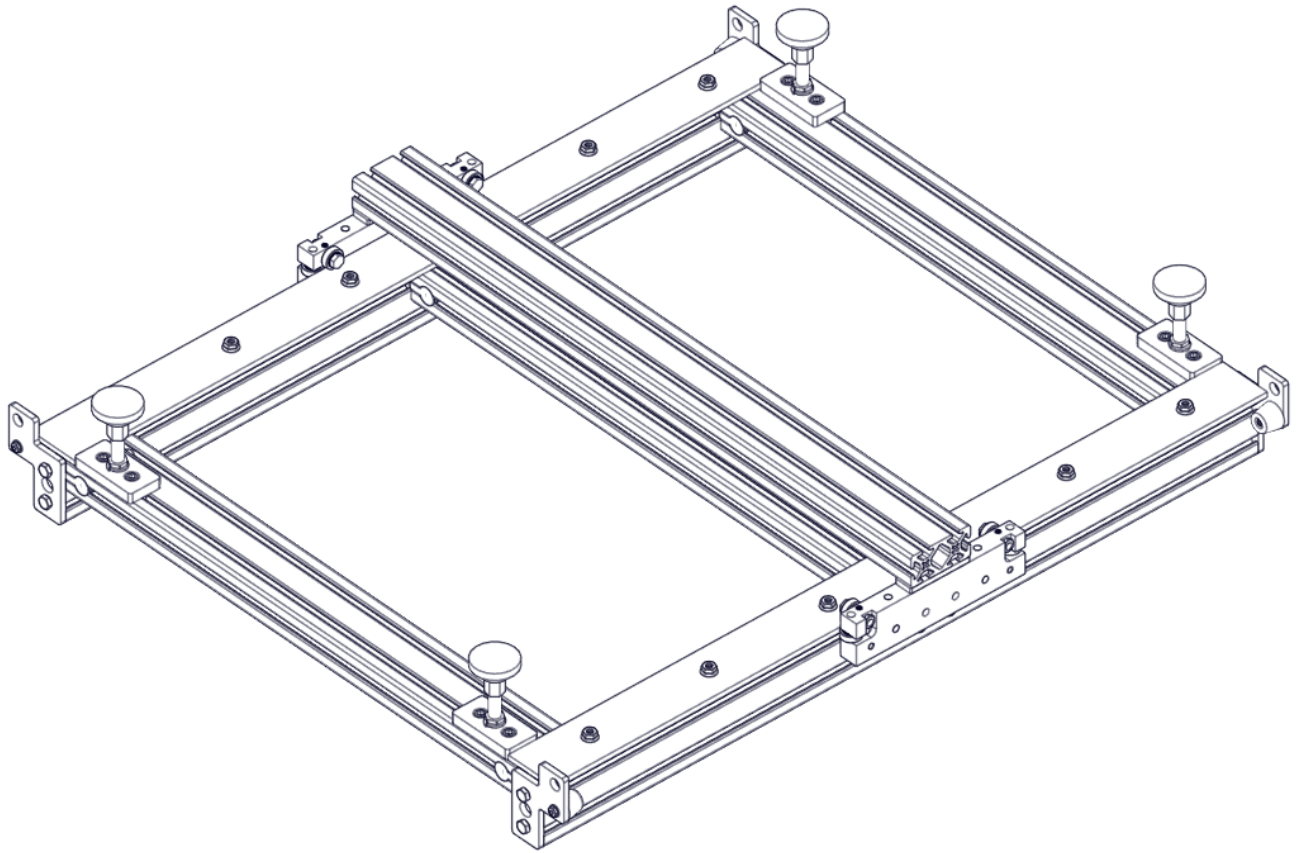
Bag CRP213-00 will contain all parts necessary for this step.



- Thread an M12 levelling foot into a previously installed foot plate

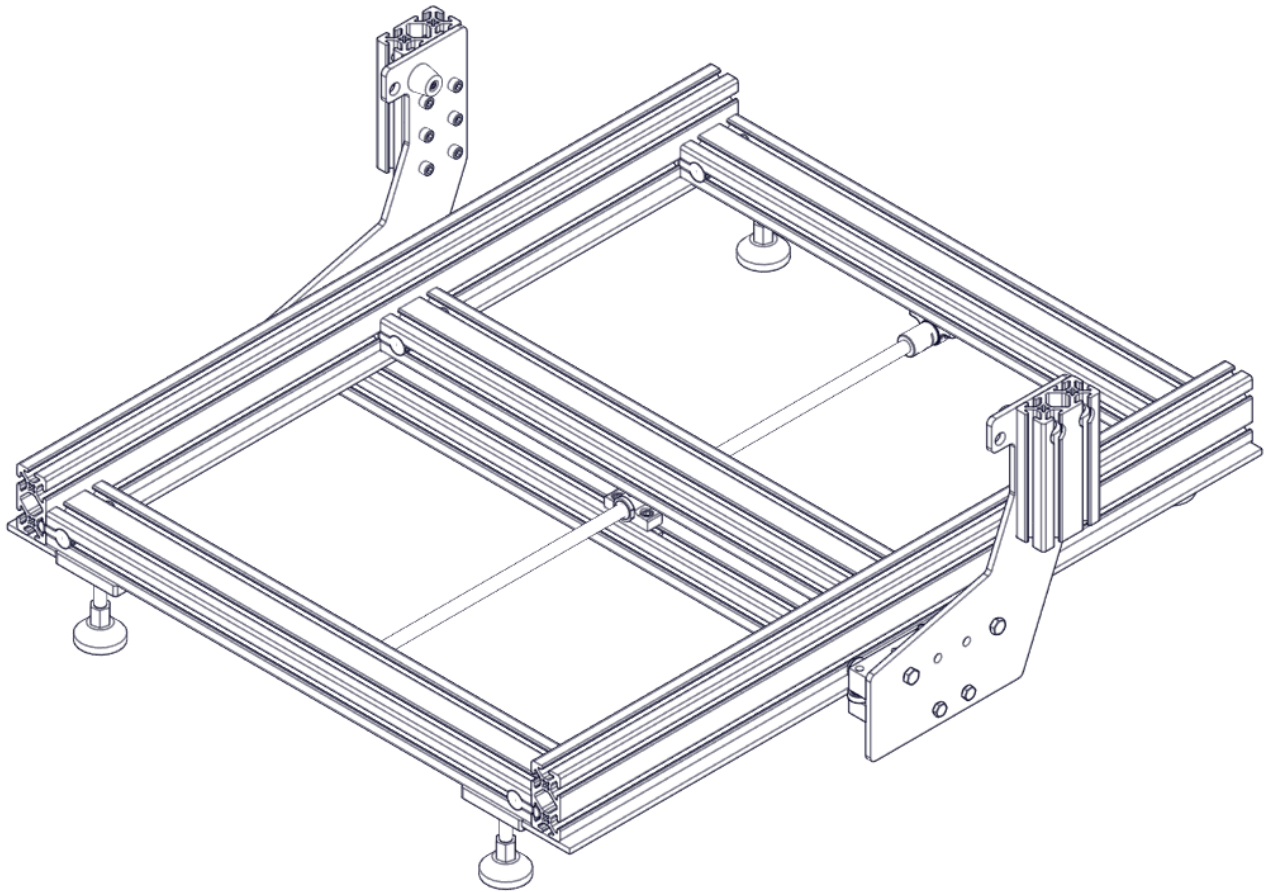


- Tighten the foot into the foot plate until it bottoms out.
- Tighten the lock washer between the jam nut and foot plate.

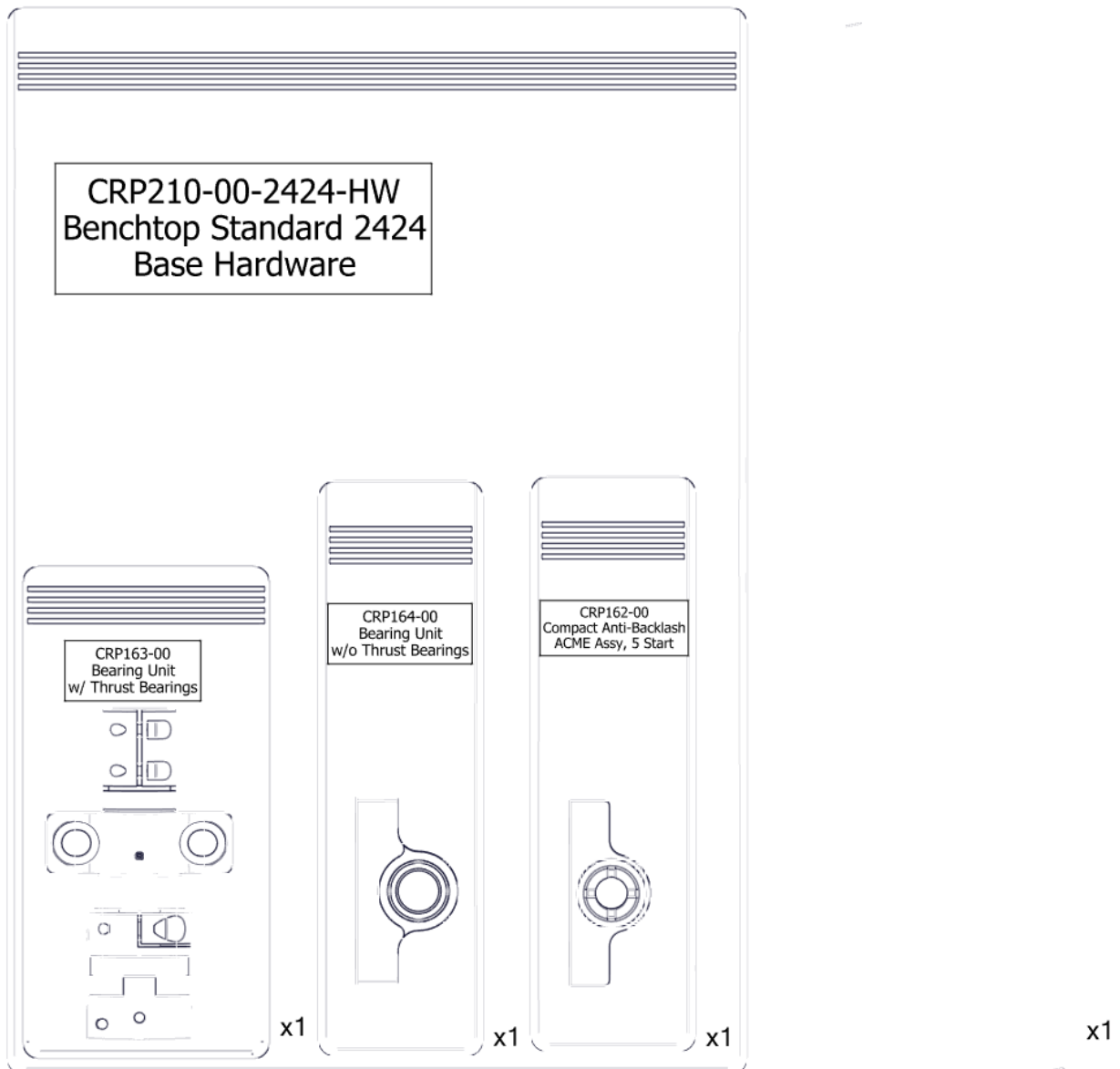


- Repeat the previous process for all (4) M12 levelling feet as above.

Y-Acme and Riser Assembly



2.1 Base Acme Installation (A)

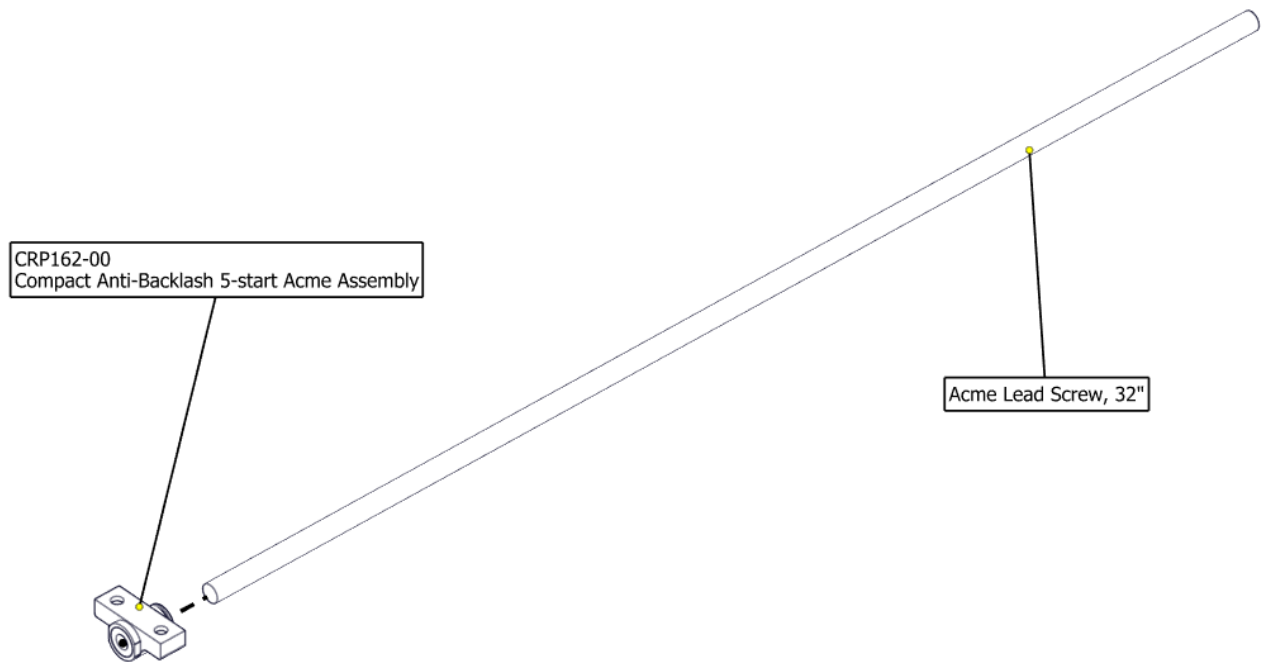


Parts Required:

- (1) 32" Acme lead screw
- (1) CRP162-00 assembly
- (1) CRP163-00 assembly
- (1) CRP164-00 assembly

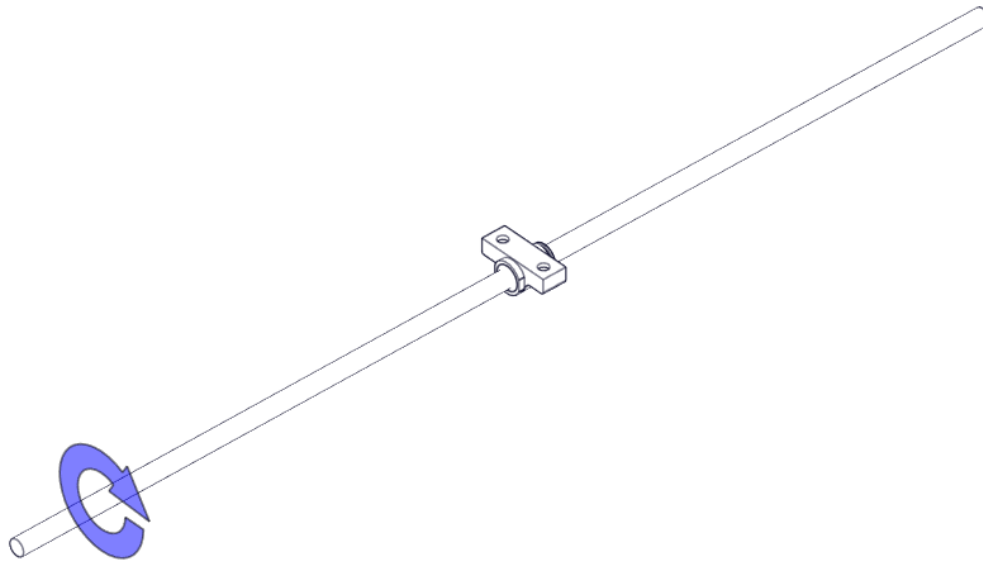
All of the above parts except the lead screw are individually bagged within bag CRP210-00-2424-HW.

The CRP162-00 Bag also includes two screws that will be used in the next section.

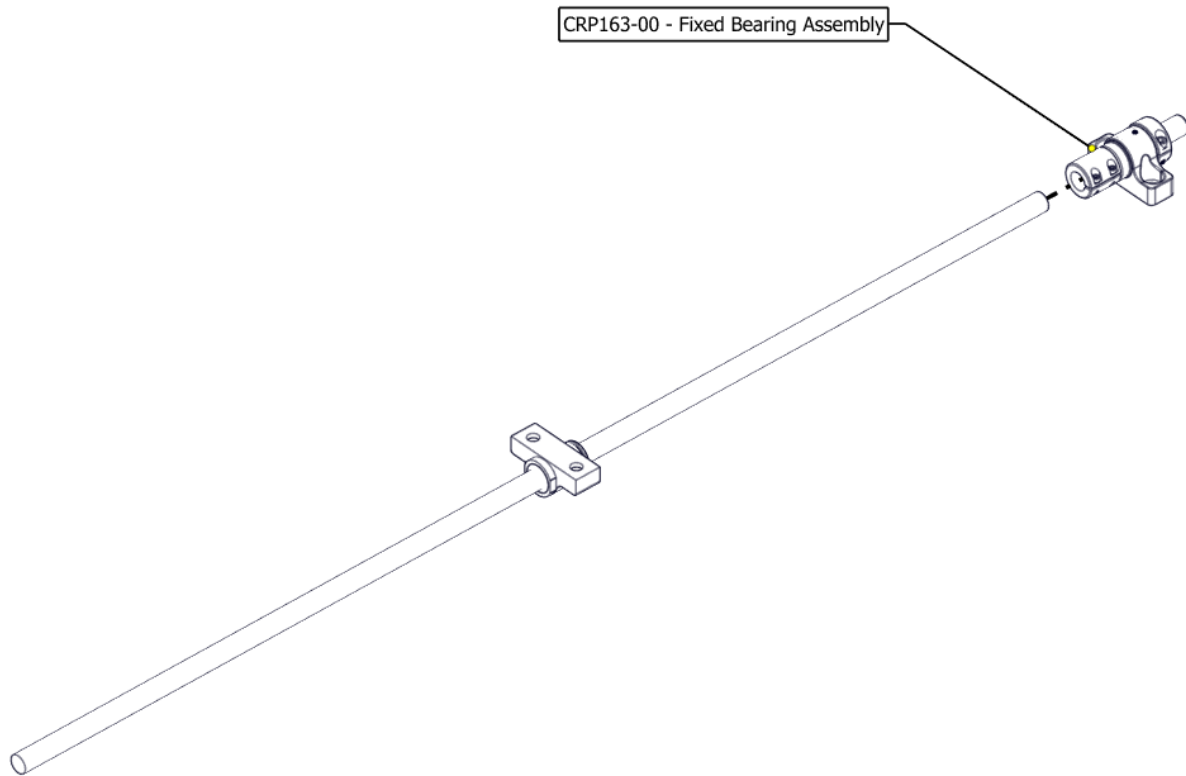


- Thread the CRP162-00 assembly (Acme nut) onto a 32" Acme lead screw.

Note: To make this process easier, manually compress the nut collar.

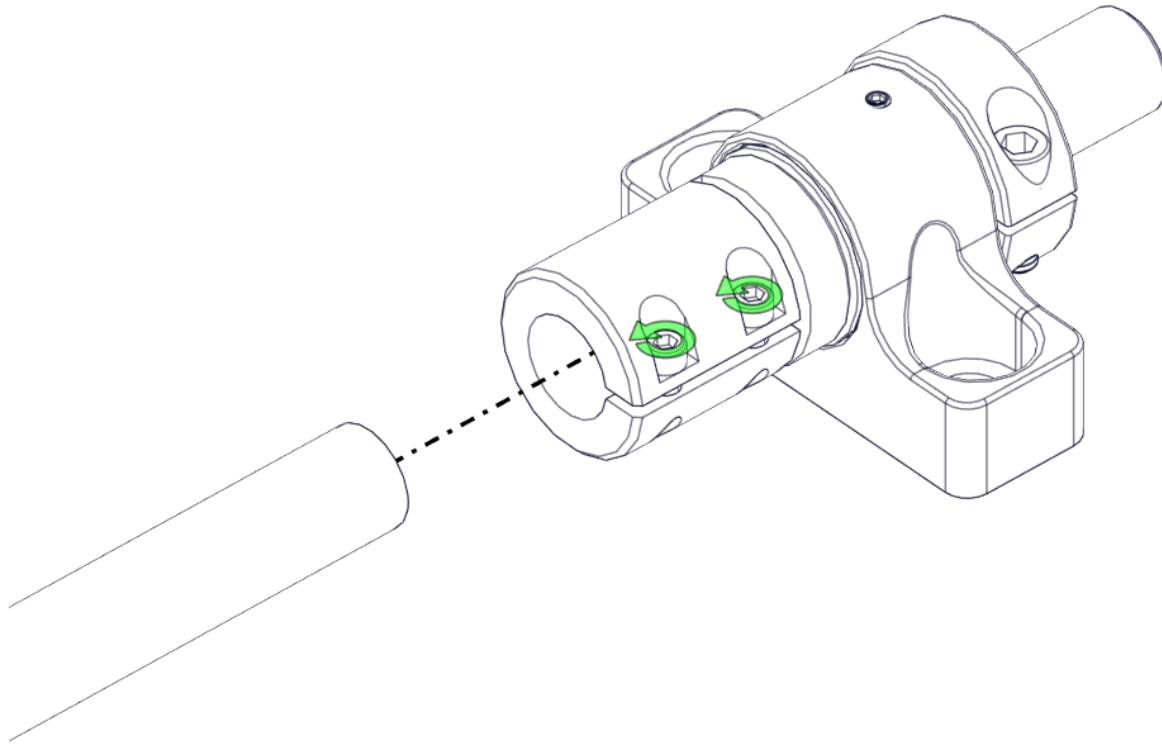


- Position the Acme nut roughly in the middle of the lead screw.

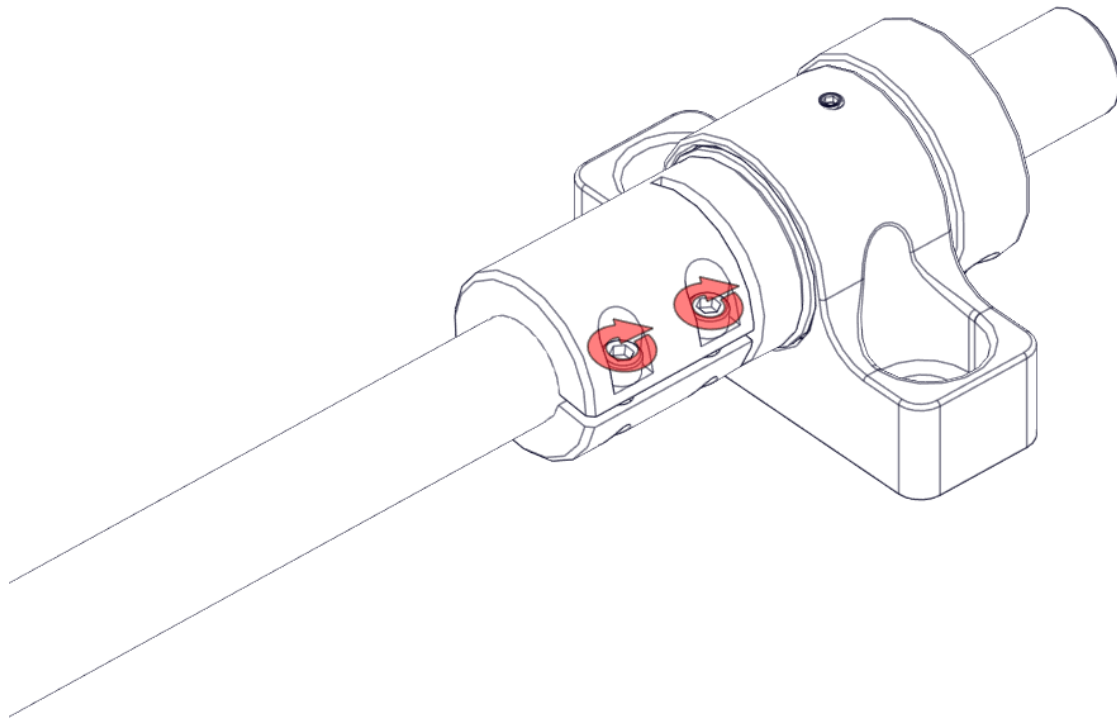


- Slide the shaft adapter of the CRP163-00 assembly onto the Acme lead screw.

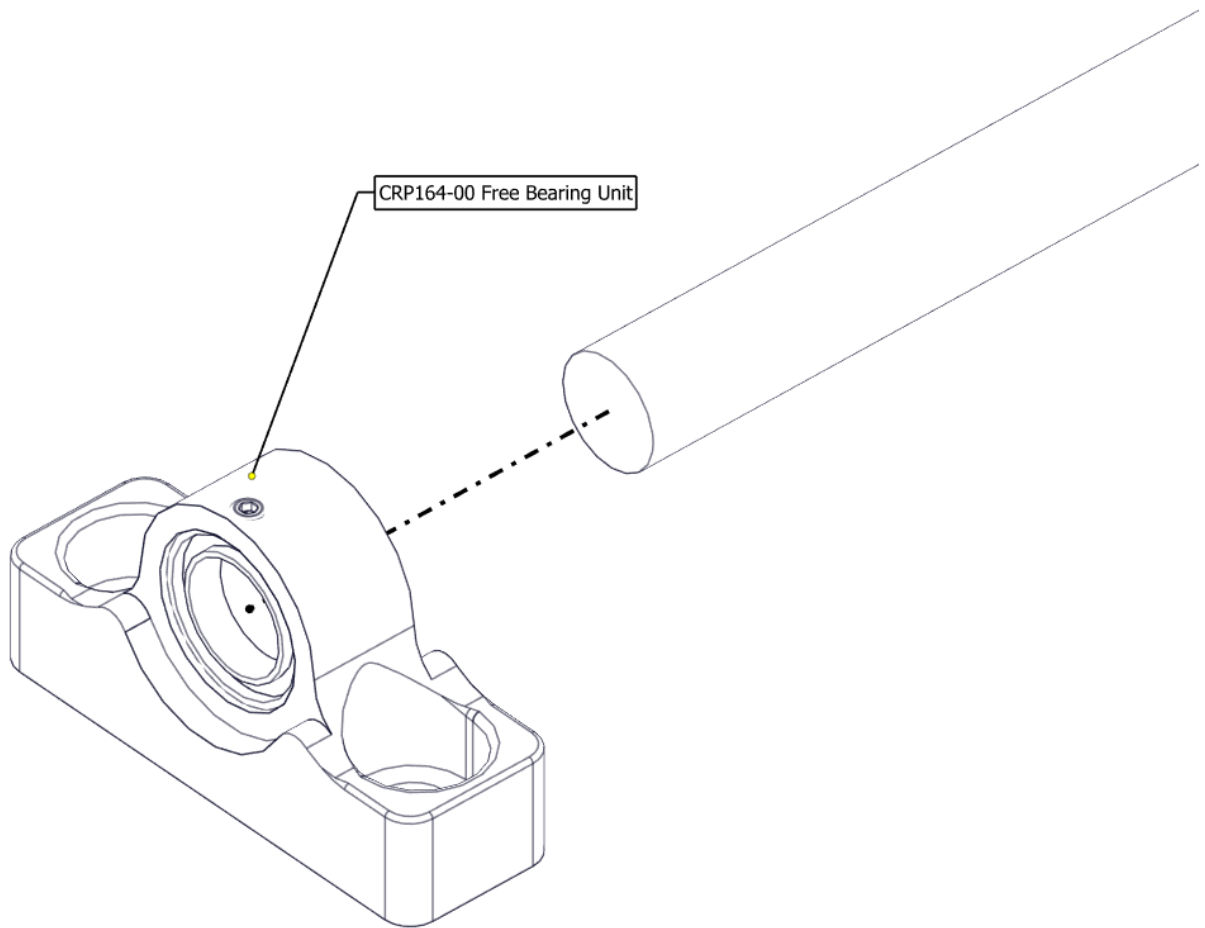
Note: The shaft adapter should face the sprung end of the Acme nut.



- If the shaft adapter does not slide onto the rod easily, loosen the clamping screws.

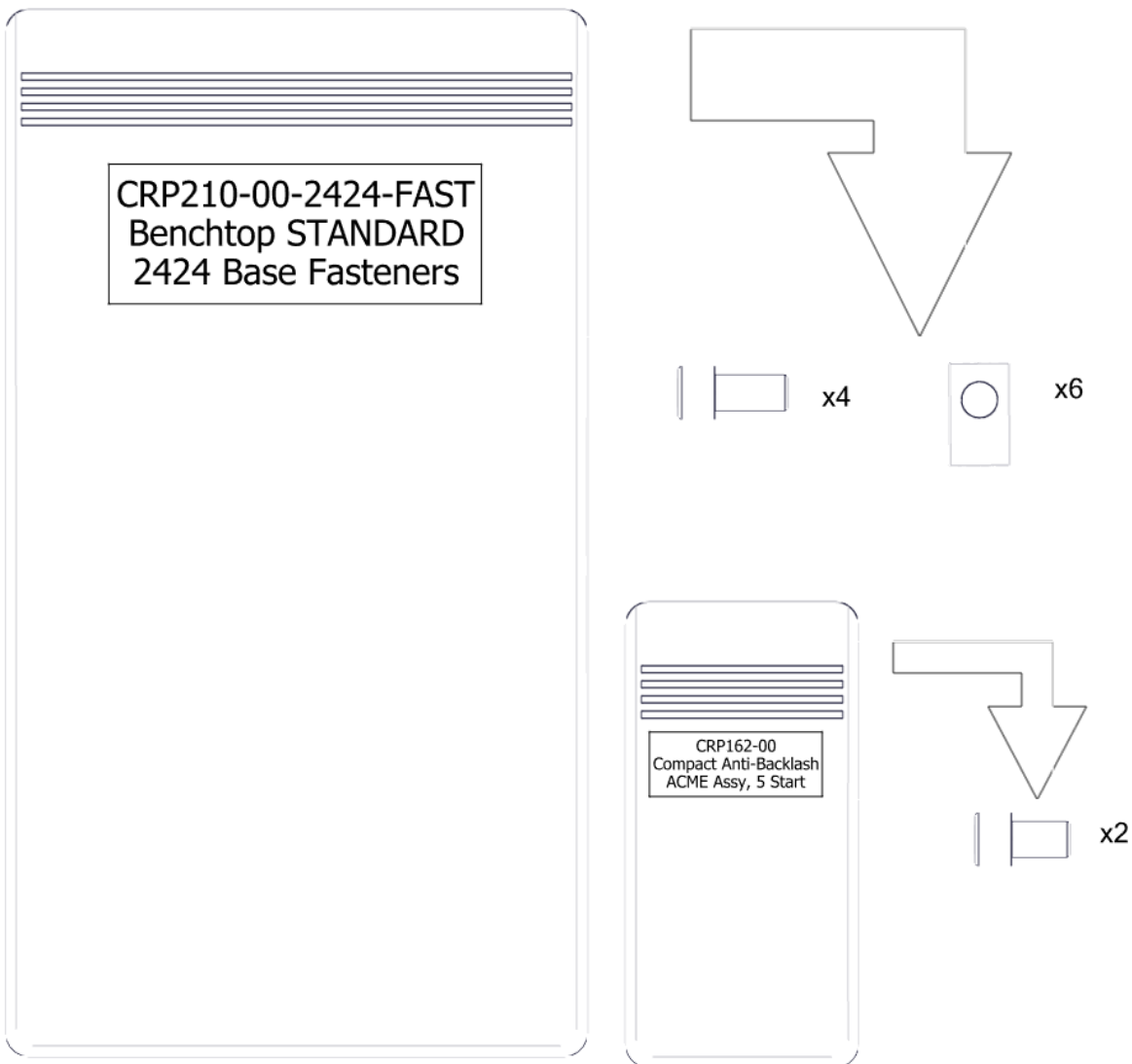


- Bottom out the shaft adapter on the Acme rod.
- Tighten the highlighted clamping screws.



- Install the CRP164-00 assembly onto the opposite end of the lead screw from the CRP163-00.

2.2 Base Acme Installation (B)



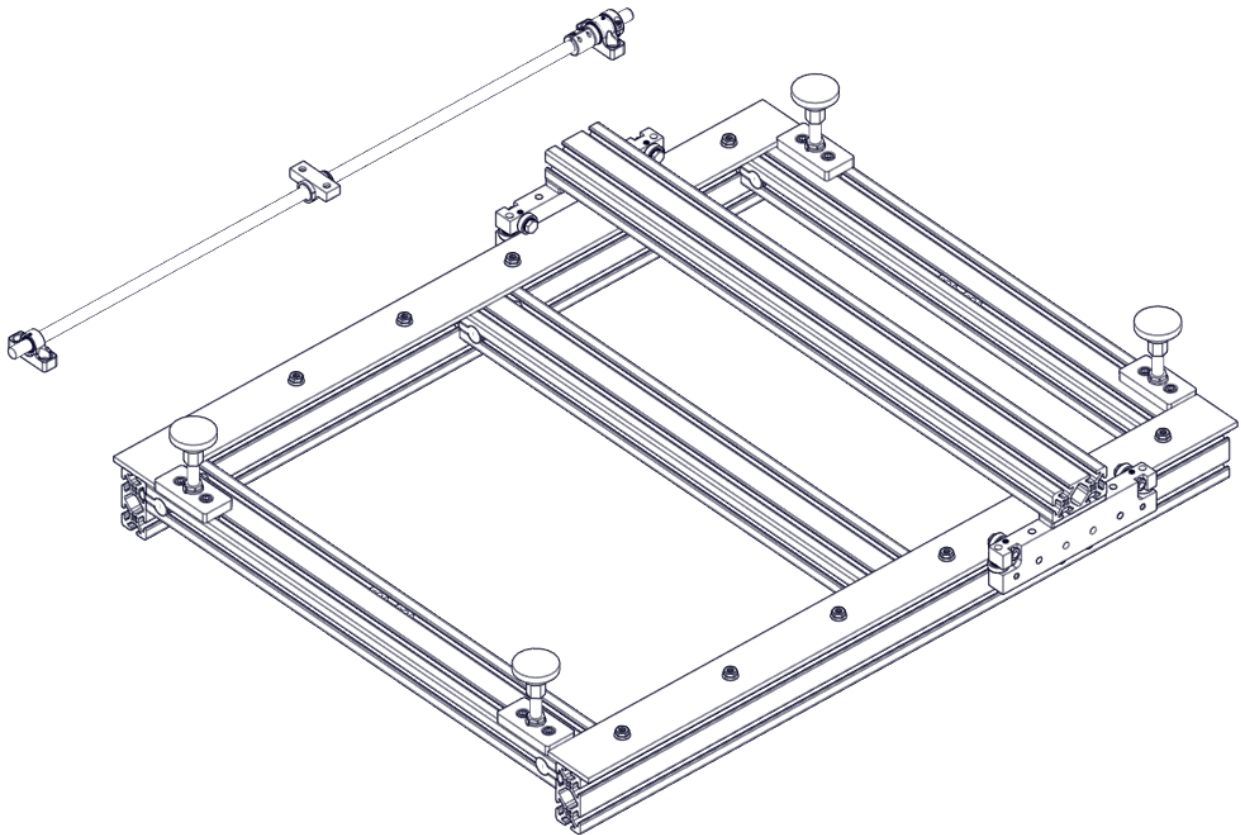
Parts Required:

1. (6) Roll-in t-nuts
2. (4) 5/16" x 5/8" socket head cap screw
3. (2) 5/16" x 1/2" socket head cap screw

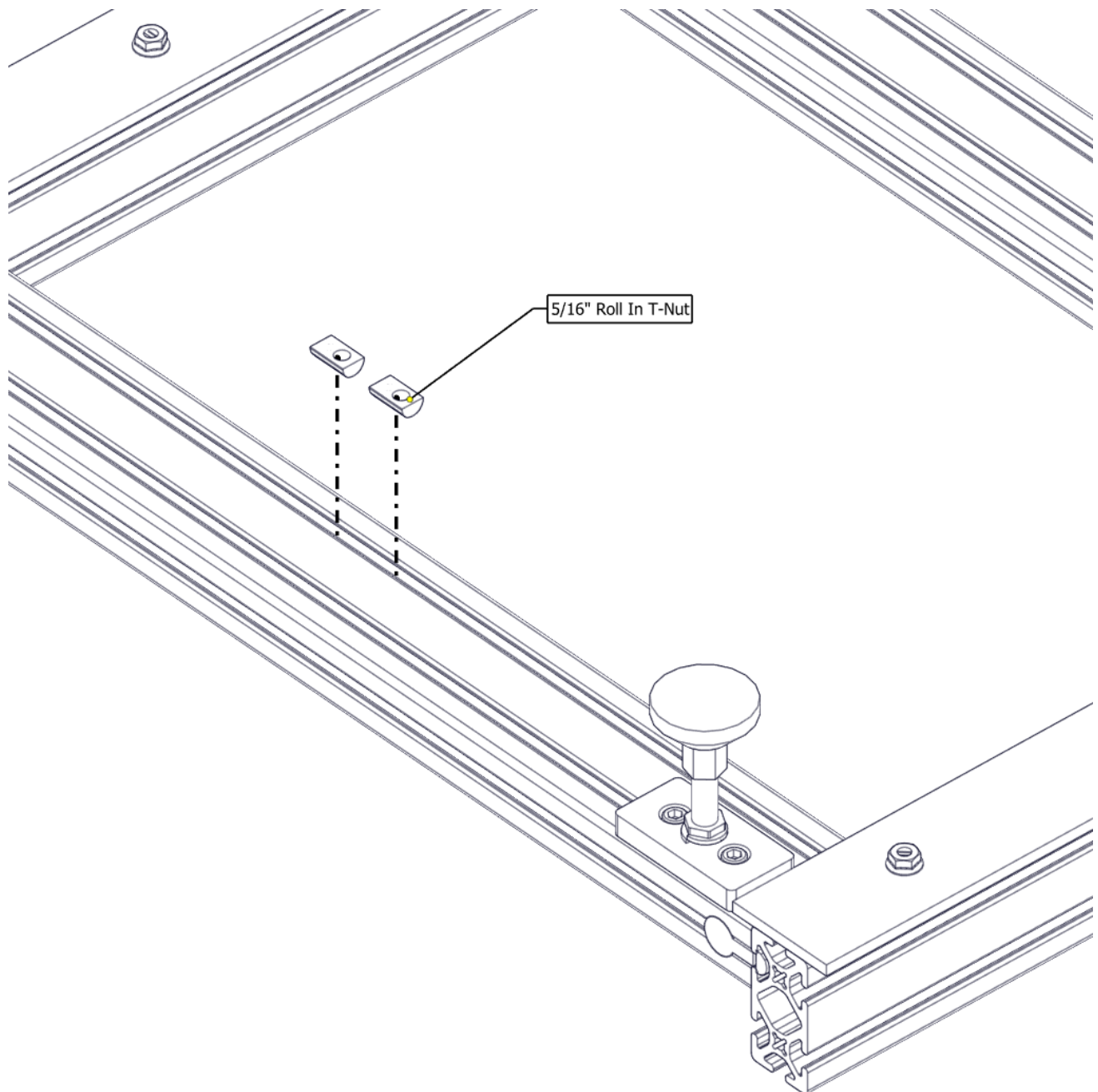
Bag CRP210-00-2424-FAST will contains items 1 and 2.

Bag CRP162-00 contains item 3.

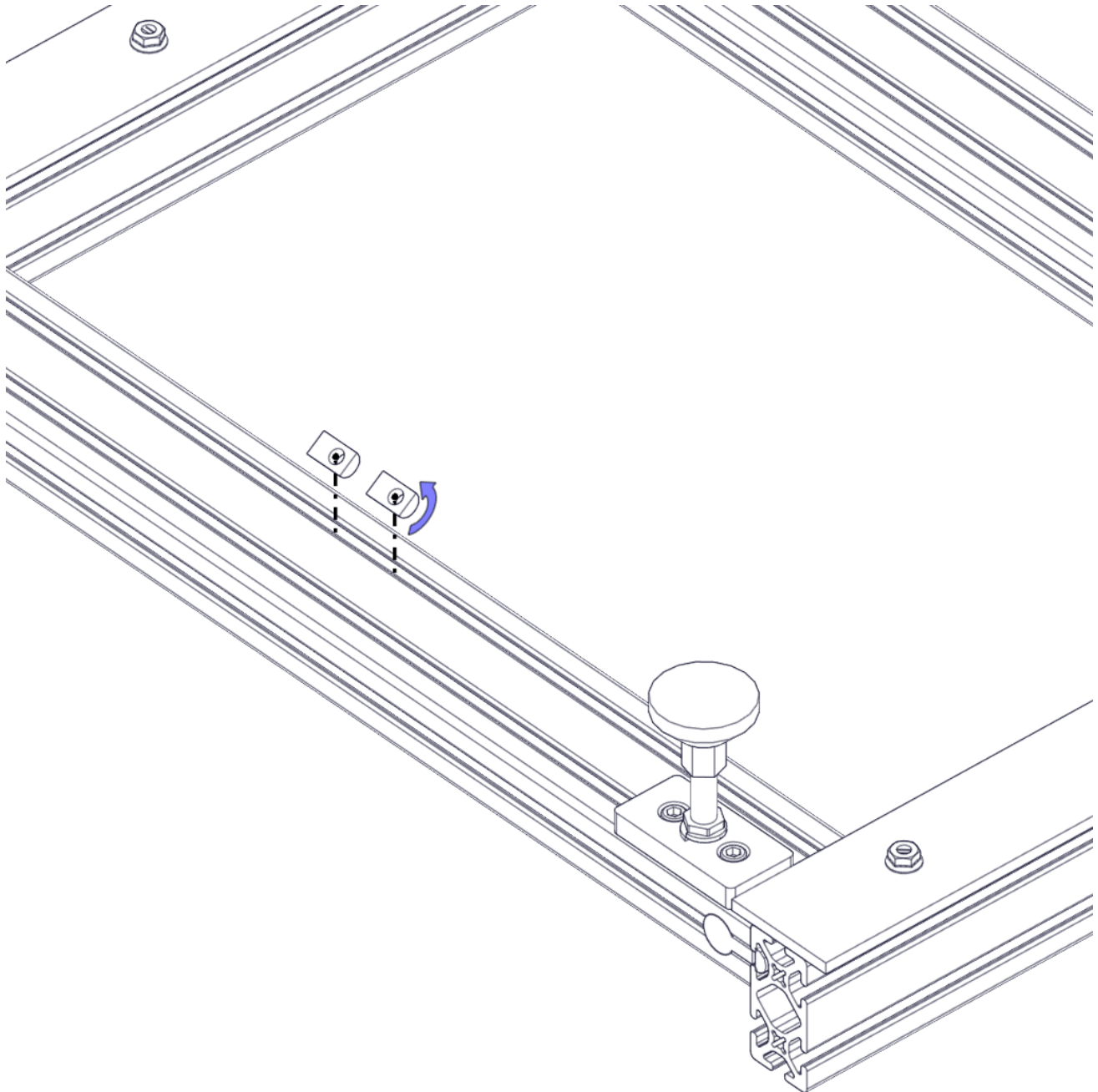
Bag CRP210-00-2424-HW contains the above bags.



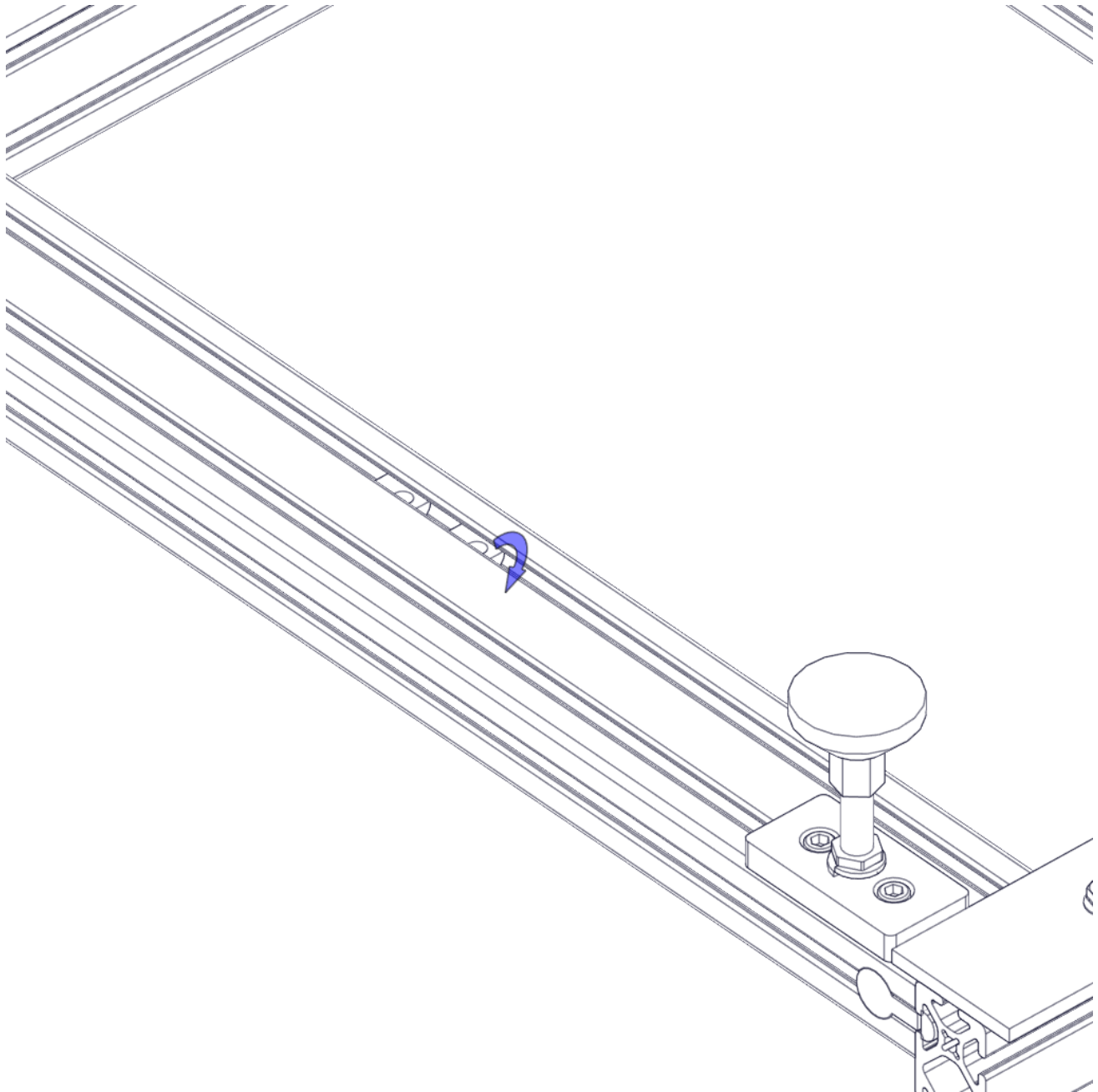
- Set the Acme assembly aside.



- **Roll** two t-nuts into the **inner** t-slot of an outer crossmember.
- Position the t-nuts in the middle of the crossmember.

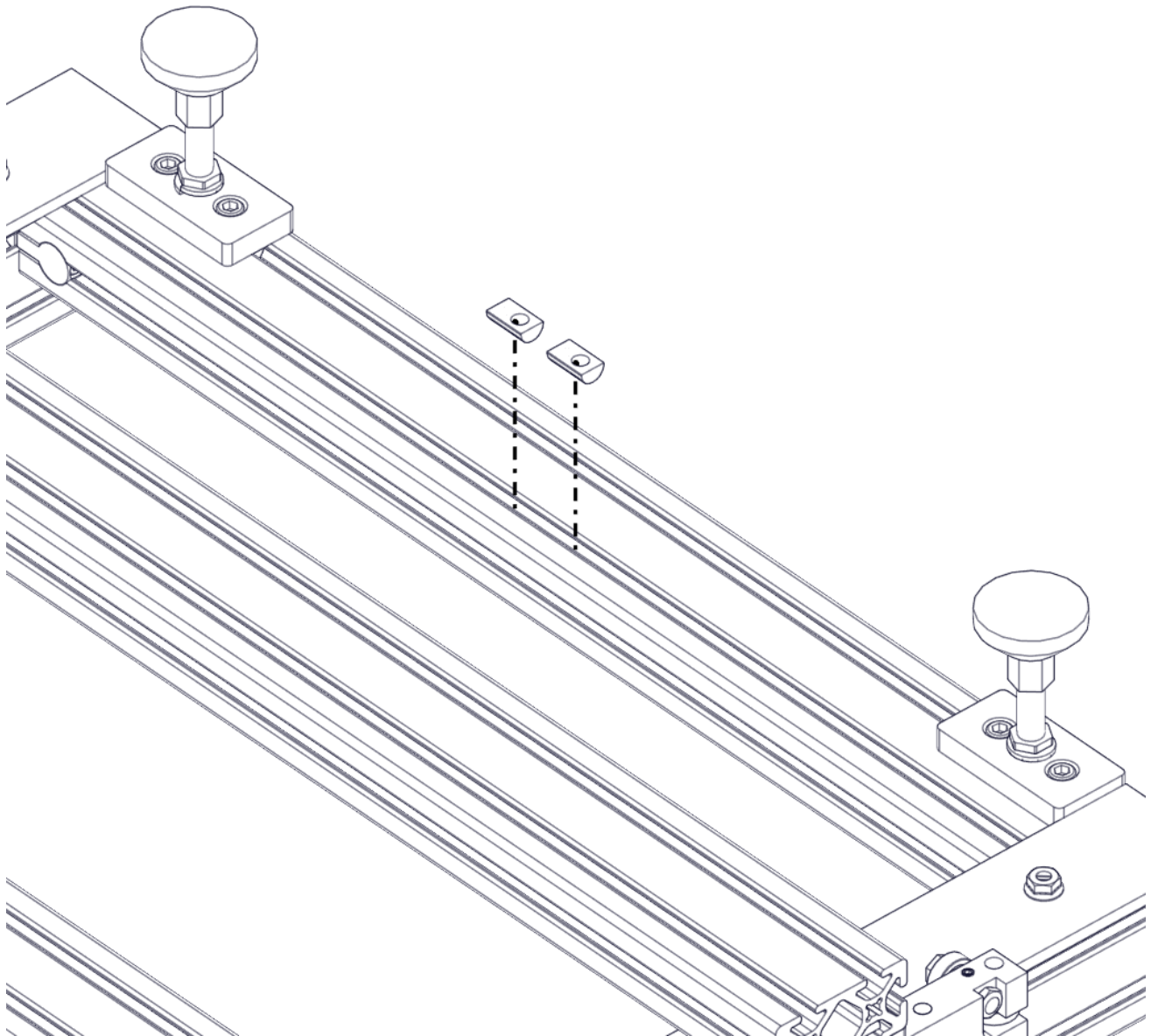


- Install the t-nuts into the t-slot at an angle so their edge is in the bottom of the slot as indicated.

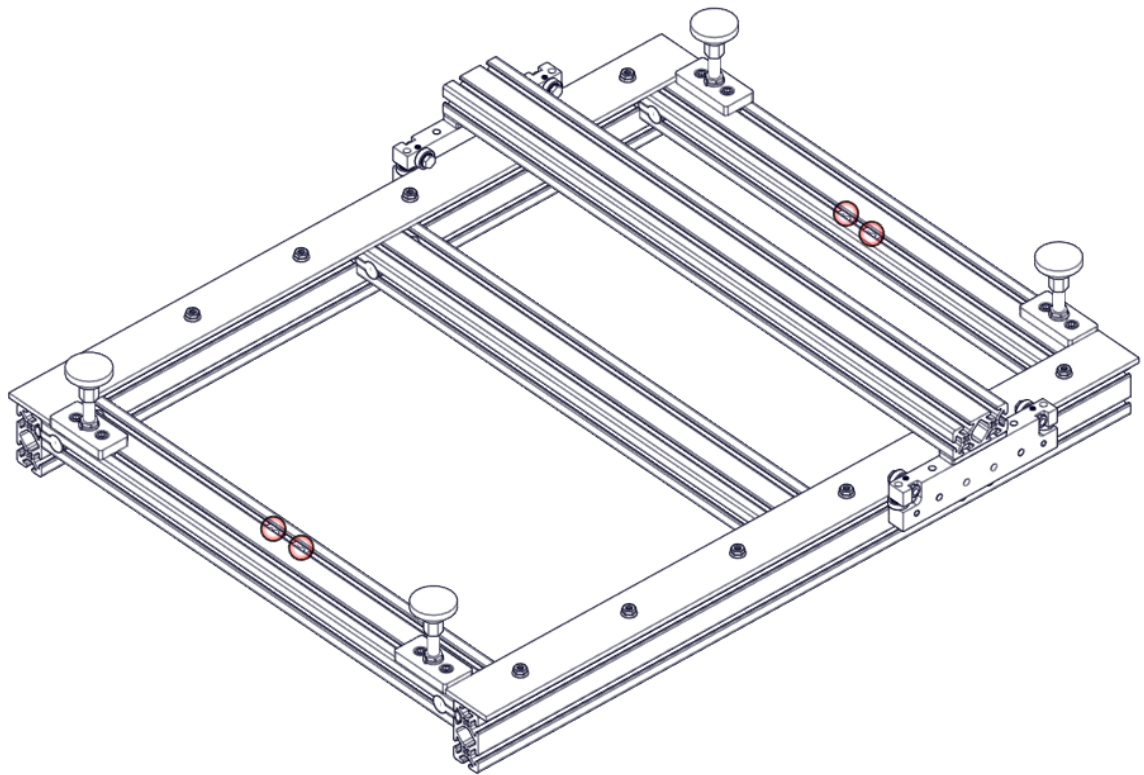


- Roll the t-nuts down into the slot so their flat side faces up as above.

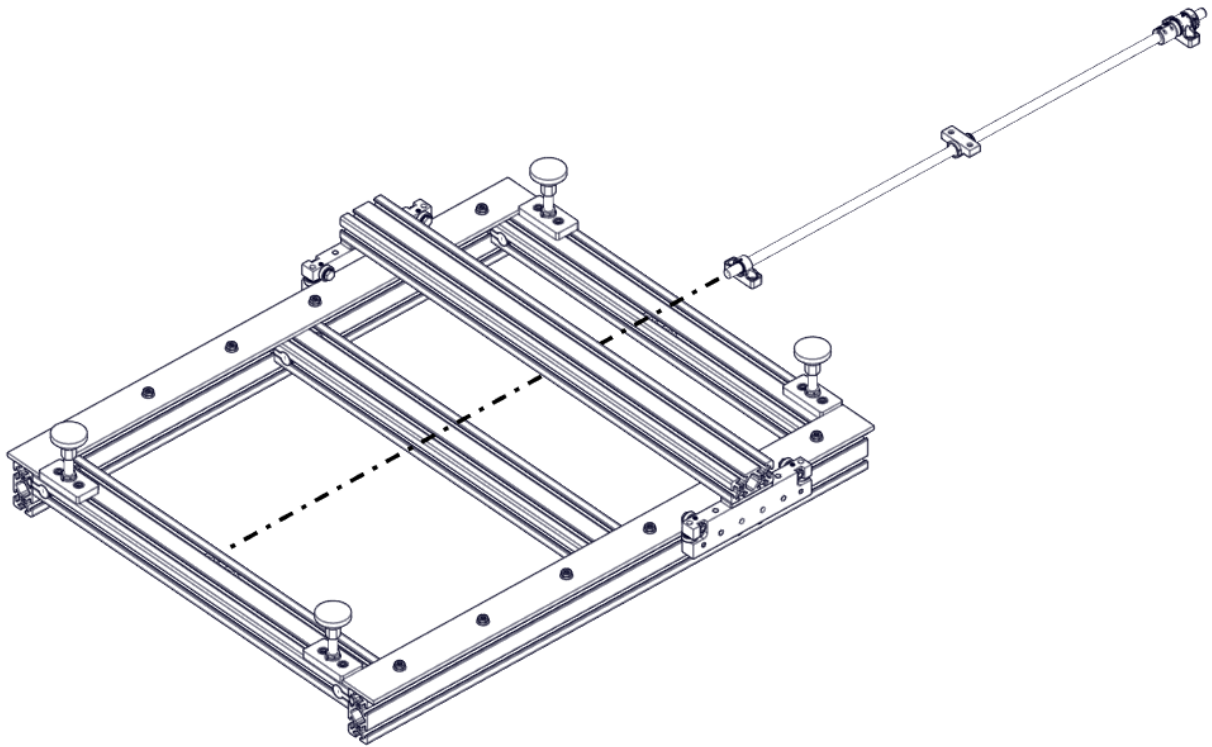
Note: A small screw driver or allen wrench can make this easier.



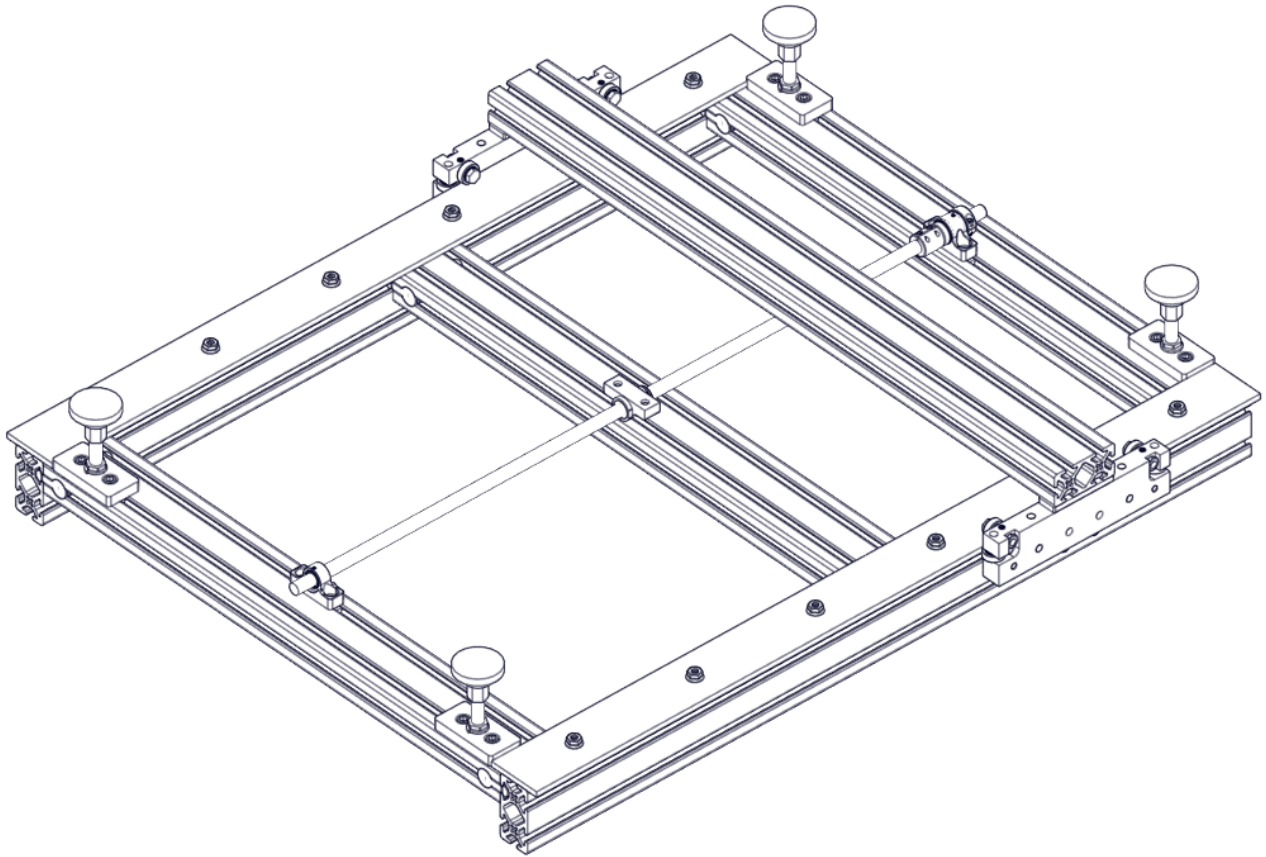
- Repeat the previous process at the opposite end of the base assembly.



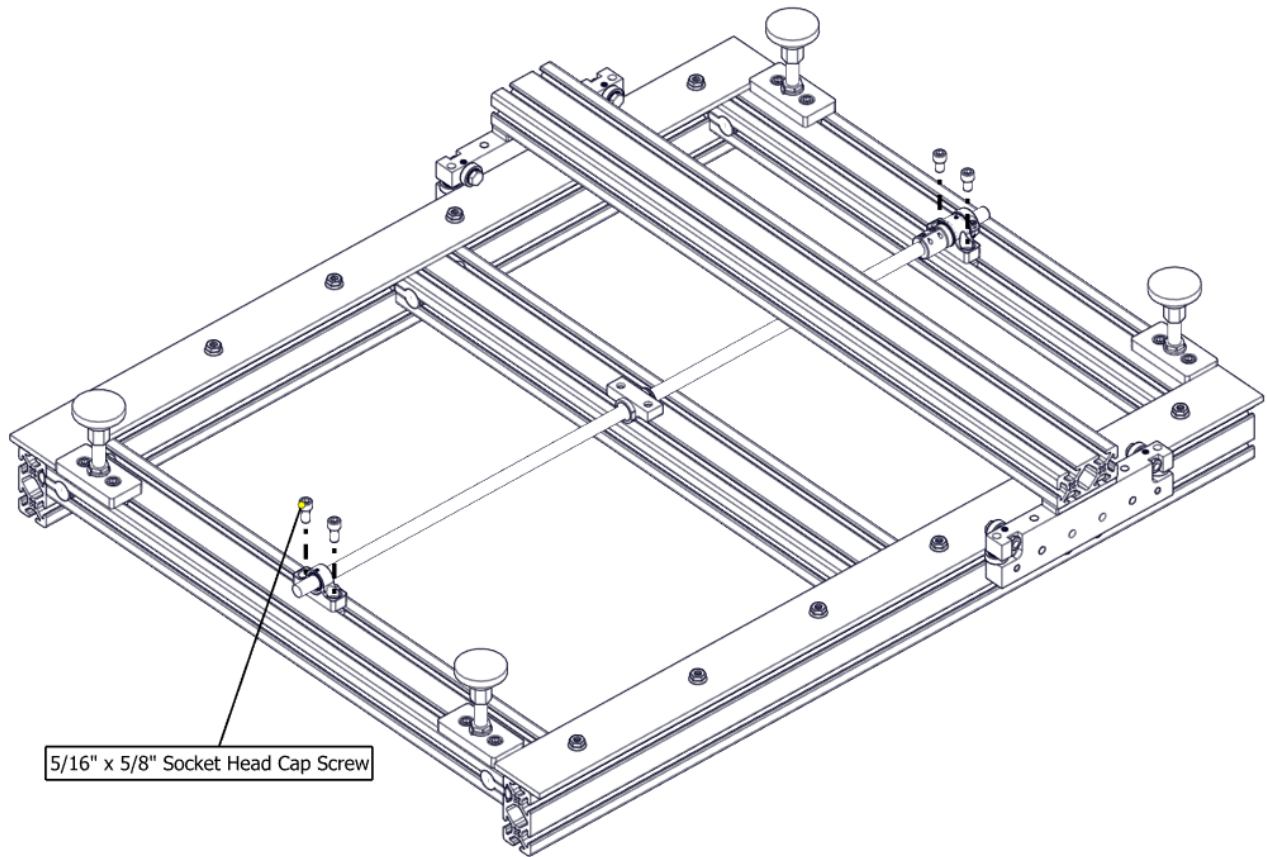
Note: Two 5/16" t-nuts should be fully seated in the **inner** t-slots of each outer crossmember.



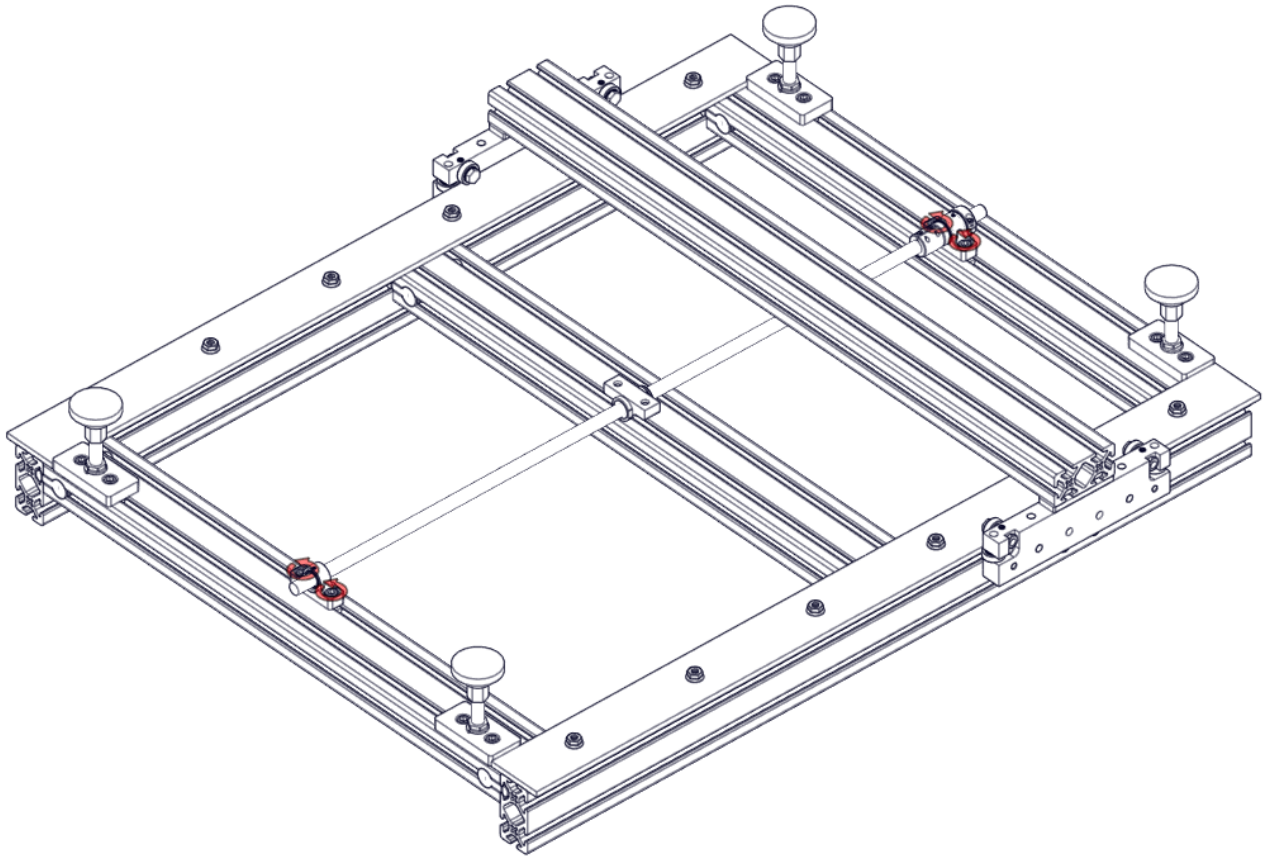
- Slide the Acme assembly between the frame and the gantry crossbar as indicated.



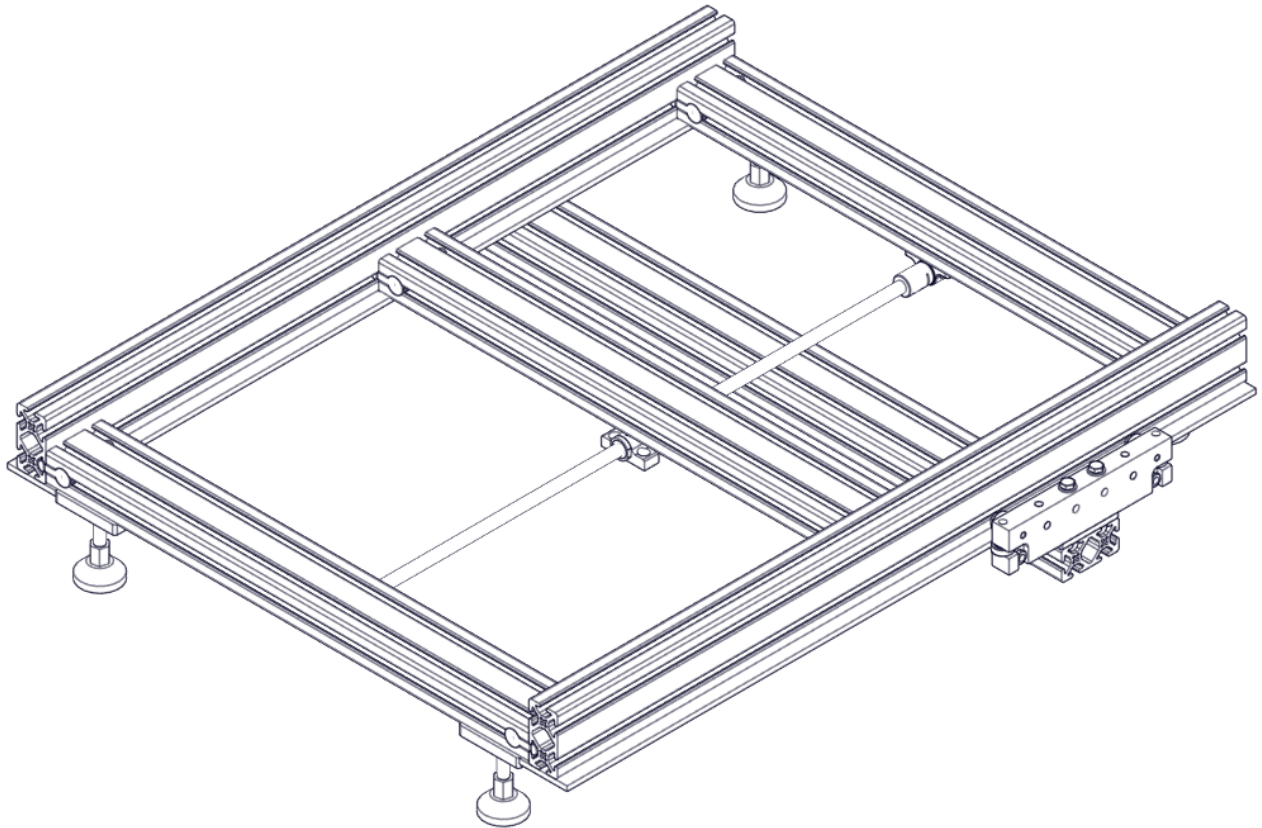
- Position the CRP163-00 and CRP164-00 bearing block assemblies over the inner t-slots of the outer crossmembers.
- Align bearing blocks to previously installed 5/16" t-nuts.



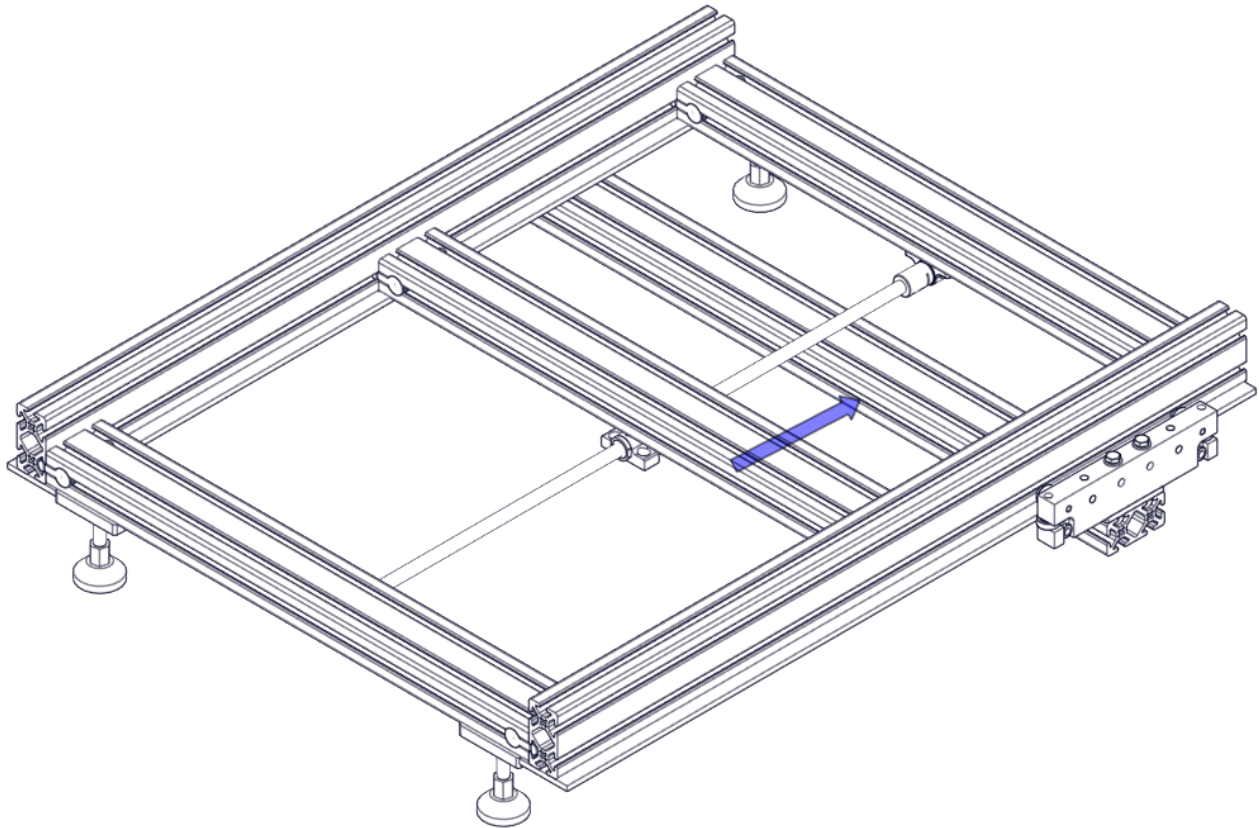
- Install two 5/16" x 5/8" socket head cap screws into each bearing block.



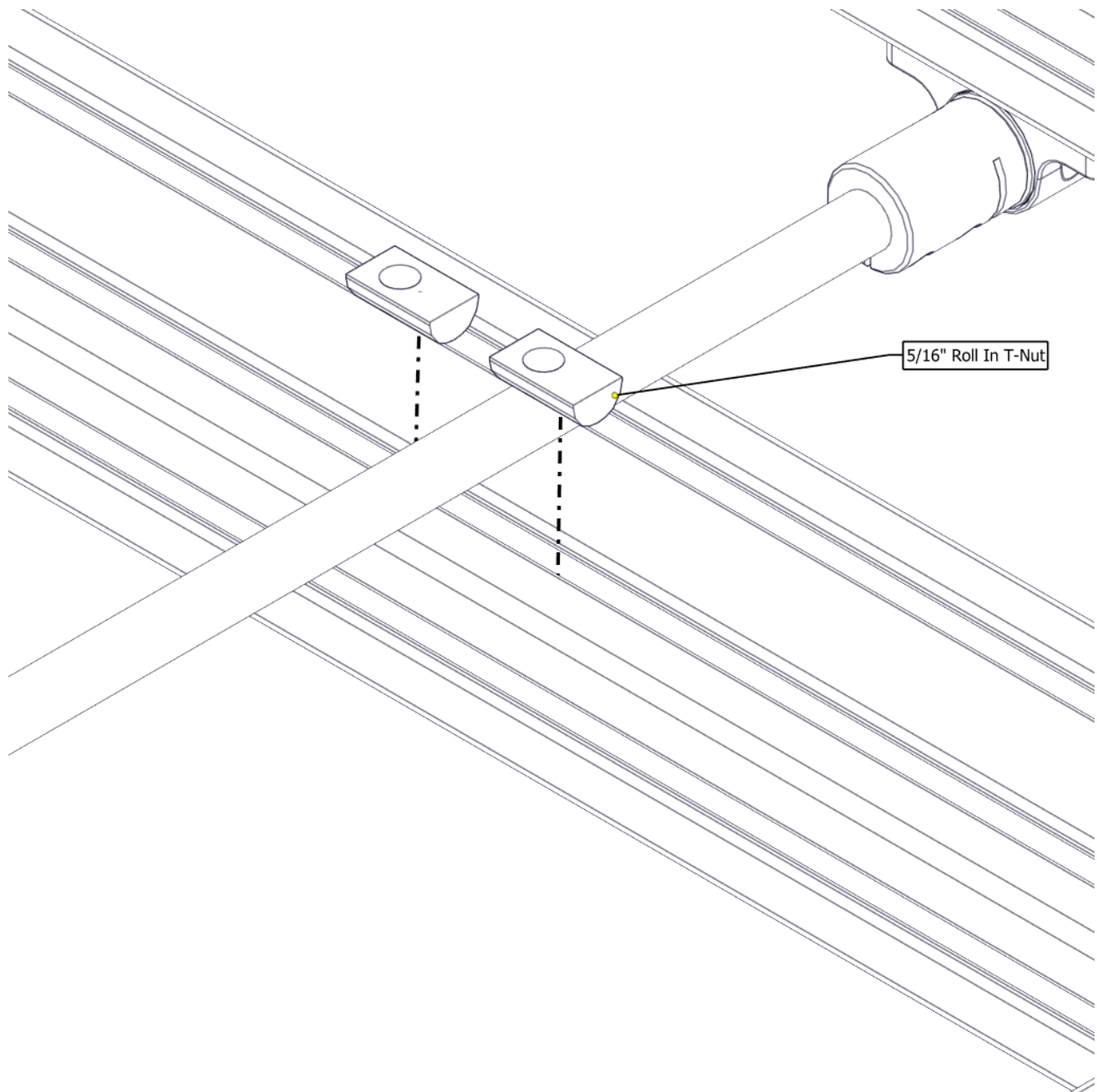
- Center bearing blocks on the crossmembers.
- Tighten the 5/16" x 5/8" screws into the previously installed 5/16" t-nuts.



- Flip the base assembly onto its feet.

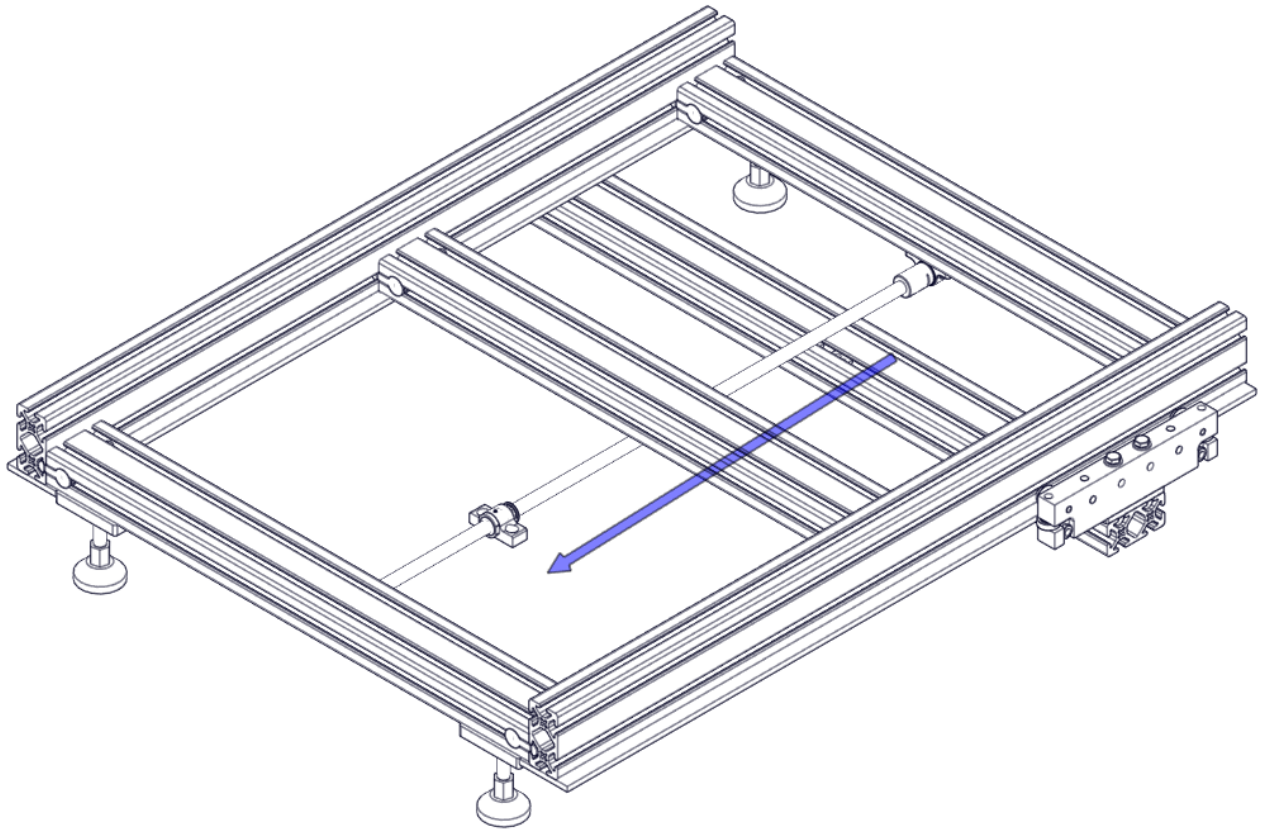


- Position the gantry crossbar so it does not overlap a crossmember.

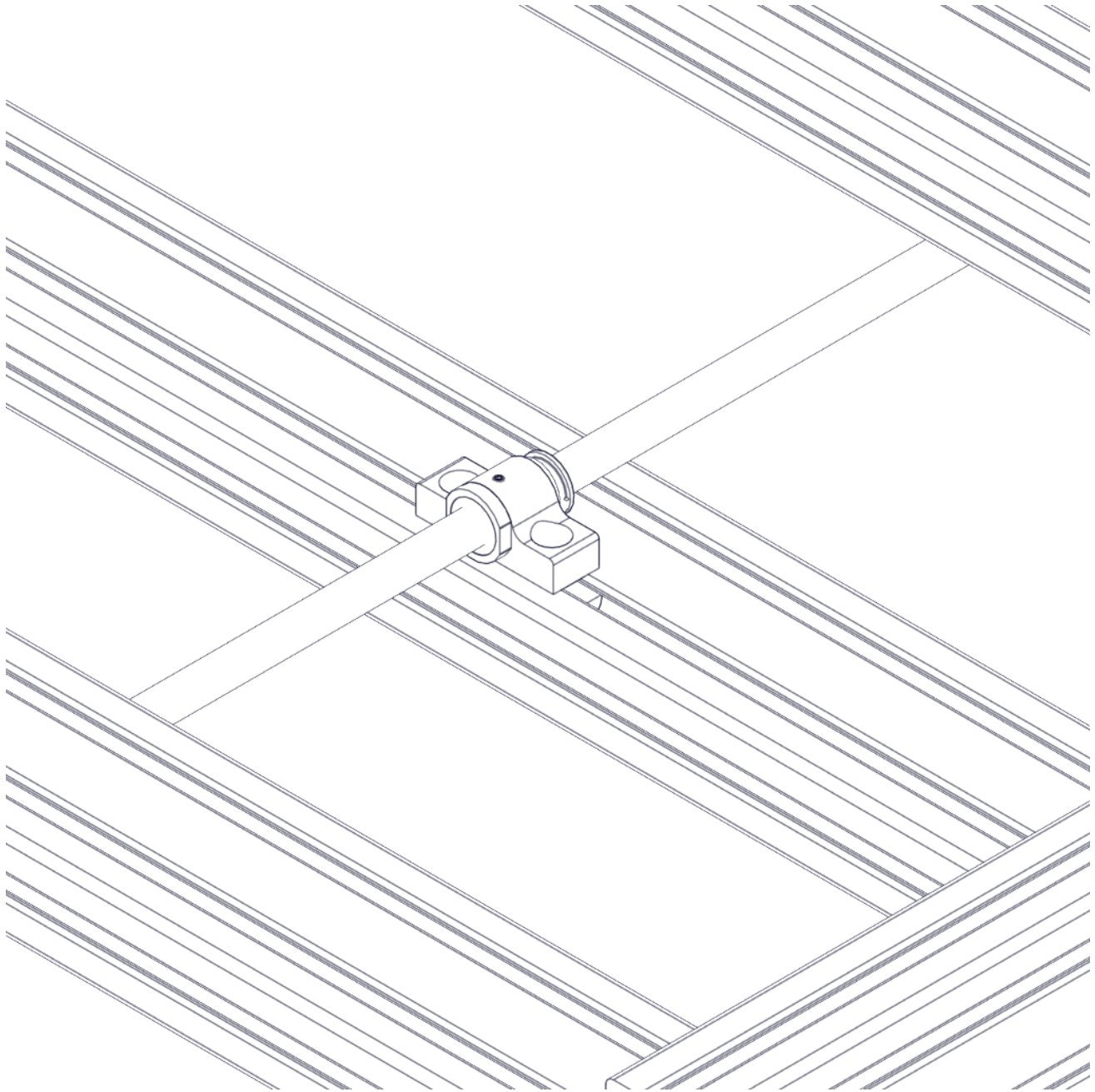


- Roll two 5/16" t-nuts into the gantry crossbar as indicated.

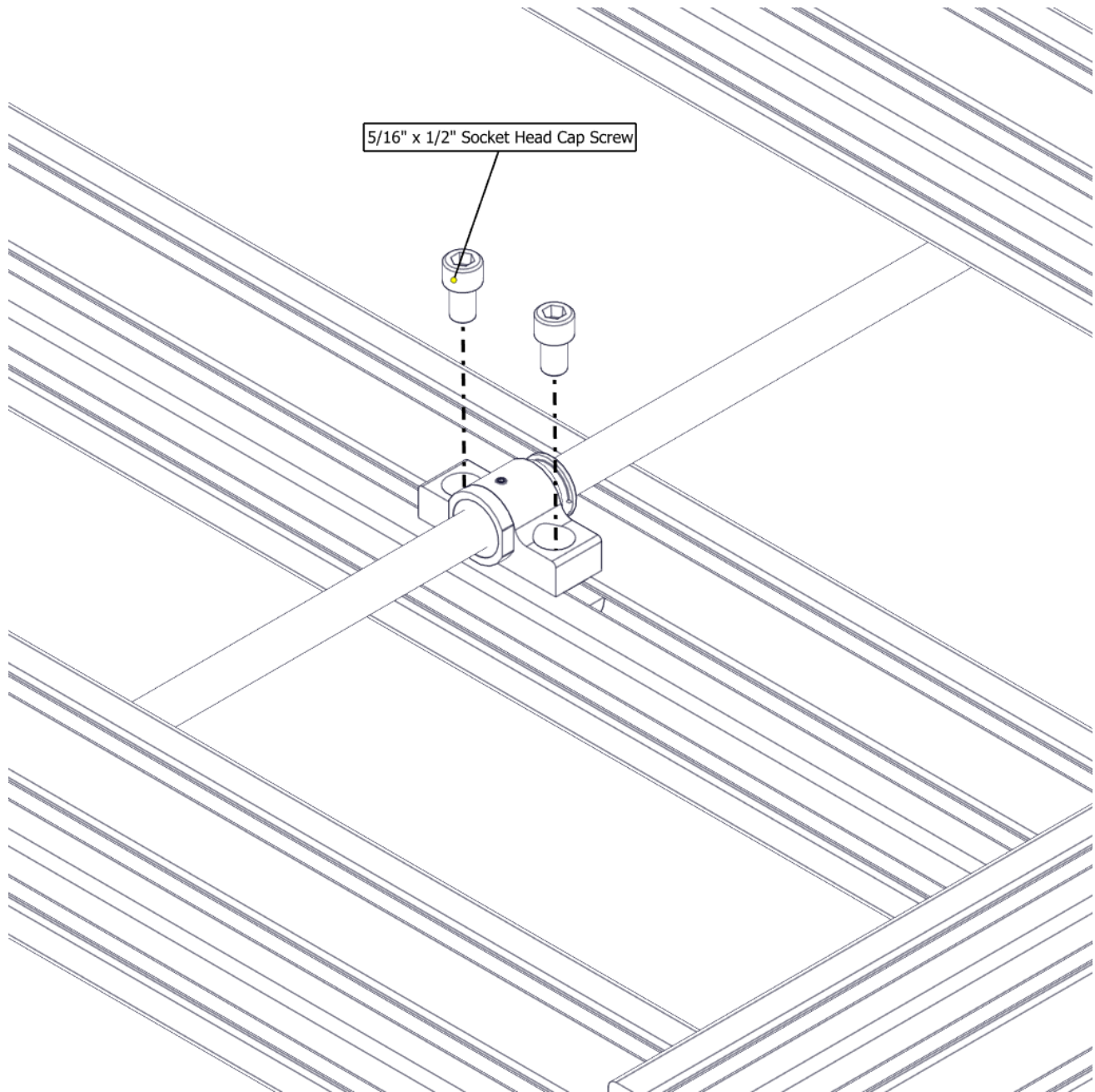
Note: T-nuts should be installed into the t-slot closest to the front of the base assembly and furthest from the CRP163-00 assembly.



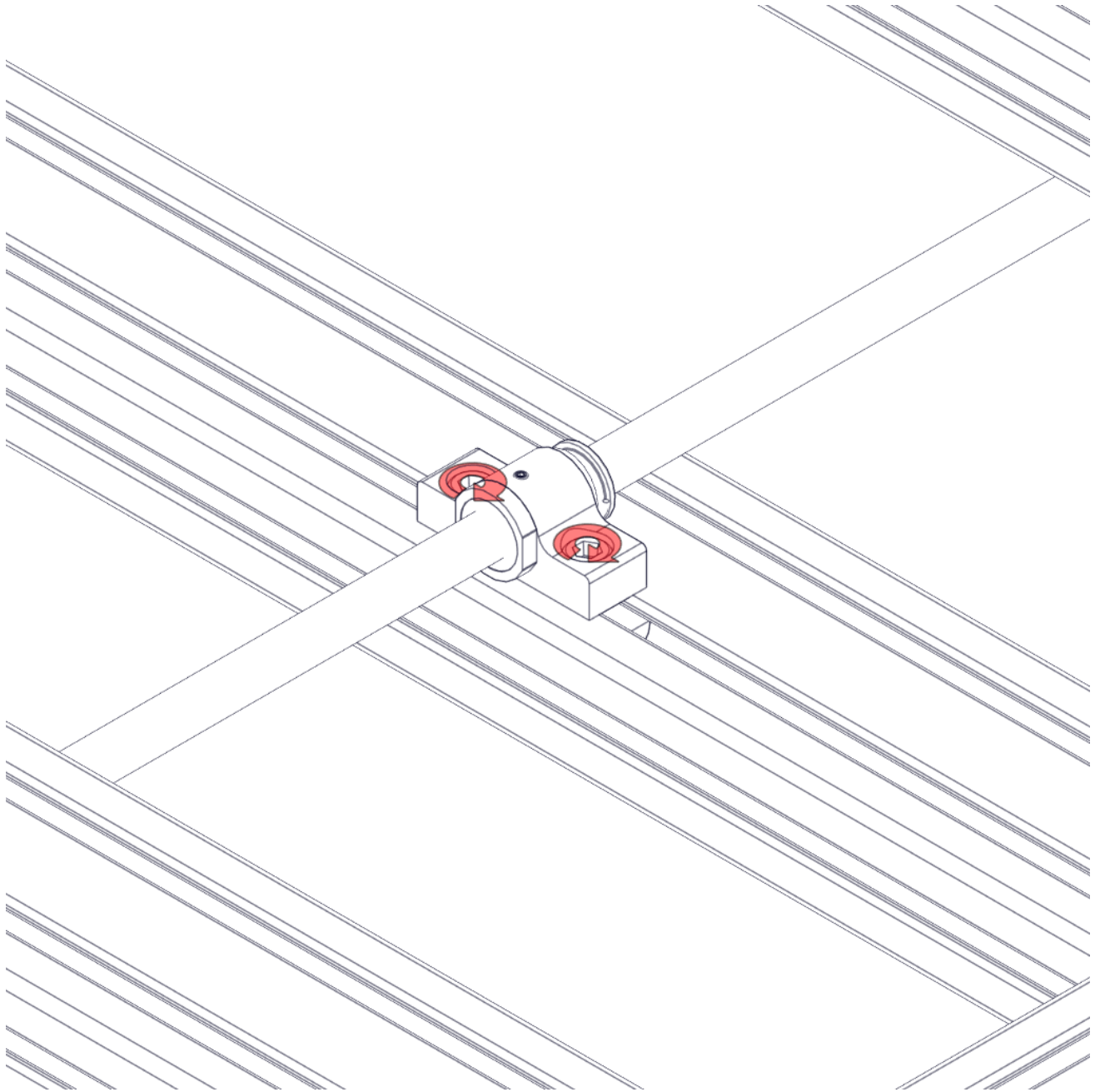
- Position the gantry crossbar under the CRP162-00 Acme nut assembly.



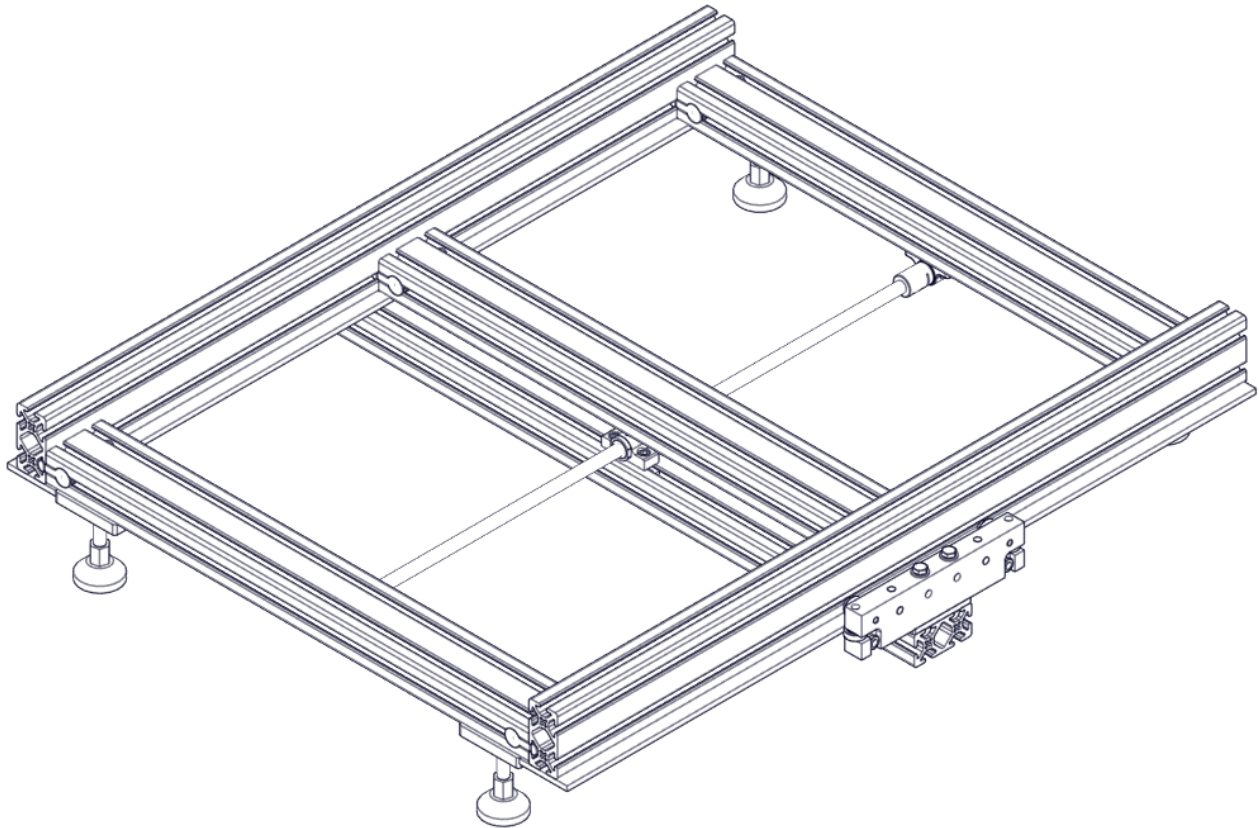
- Align the mounting holes of the Acme nut assembly to the previously installed 5/16" t-nuts.



- Install two 5/16" x 1/2" socket head cap screws into the mounting holes of the Acme nut assembly.



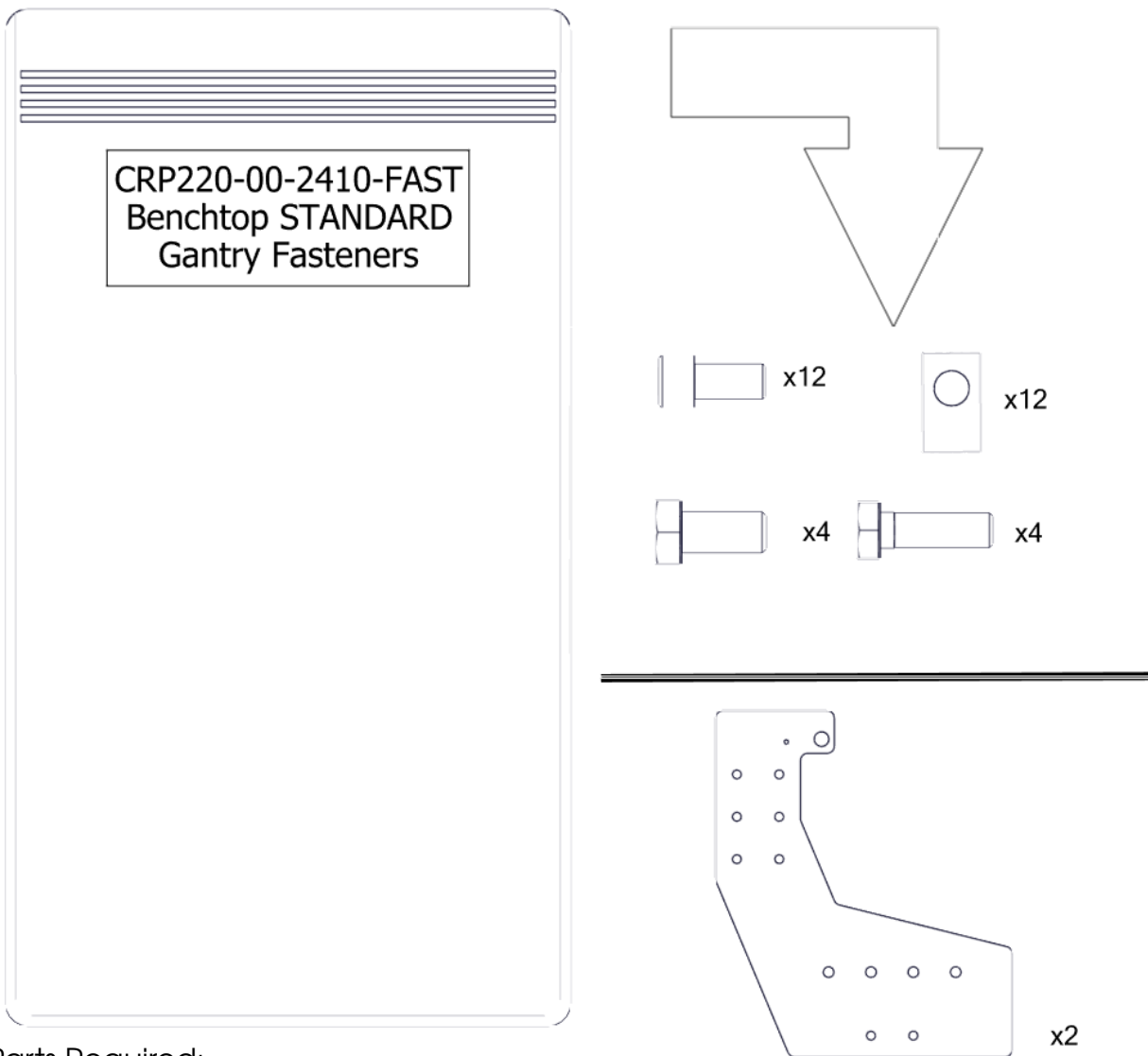
- Tighten the highlighted screws into the previously installed 5/16" t-nuts.



- If play exists between the bearings and the steel rails repeat step [1.11](#).

Note: The gantry crossbar should not slide freely.

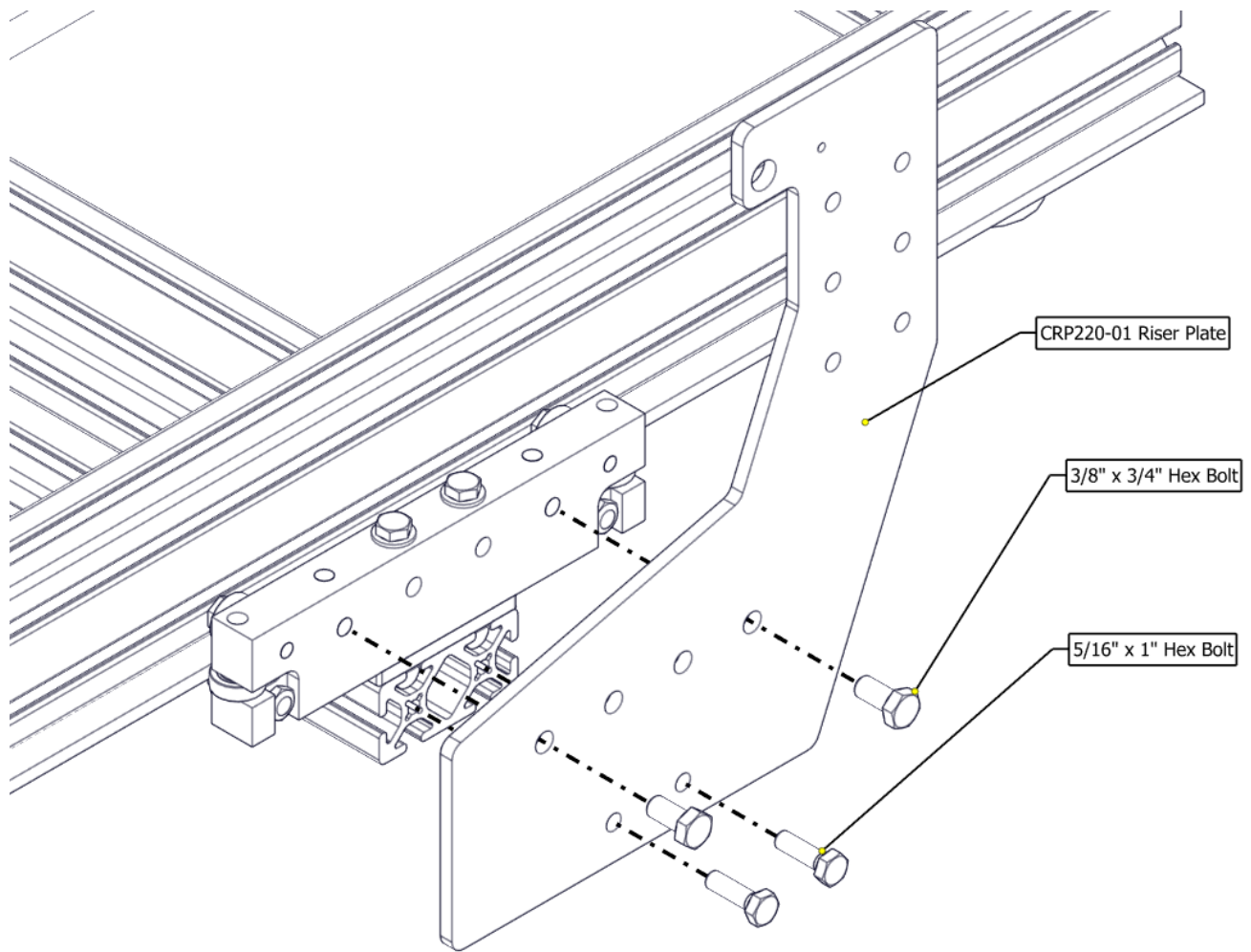
2.3 Riser Assembly



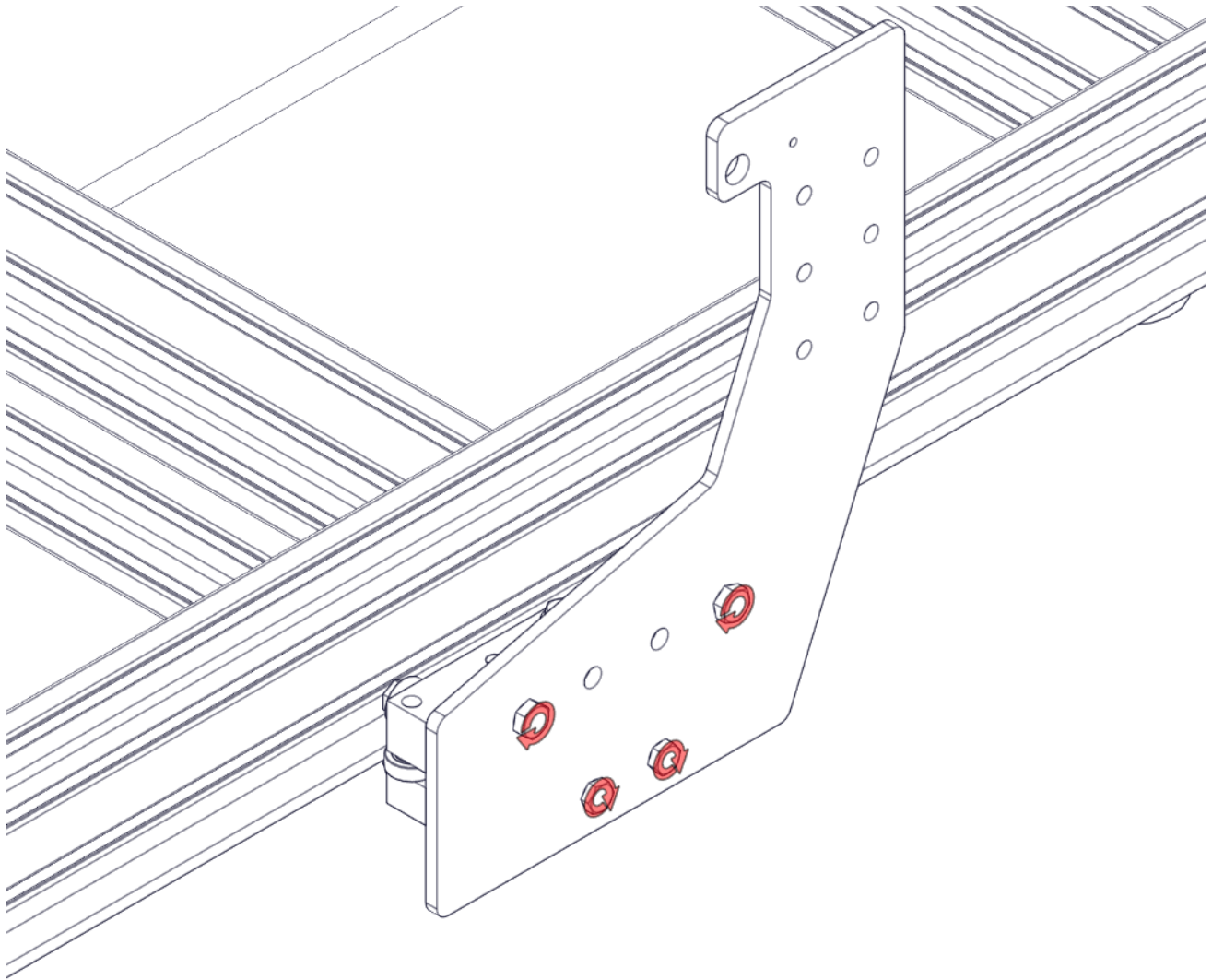
Parts Required:

- (2) CRP220-01 riser plates
- (4) 3/8" x 3/4" hex bolts
- (4) 5/16" x 1" hex bolts
- (12) 5/16" x 5/8" socket head cap screws
- (12) Roll-in t-nuts

Bag CRP220-00-FAST contains all fasteners necessary for this step.
 Bag CRP220-00-2410 contains bag CRP220-00-FAST.

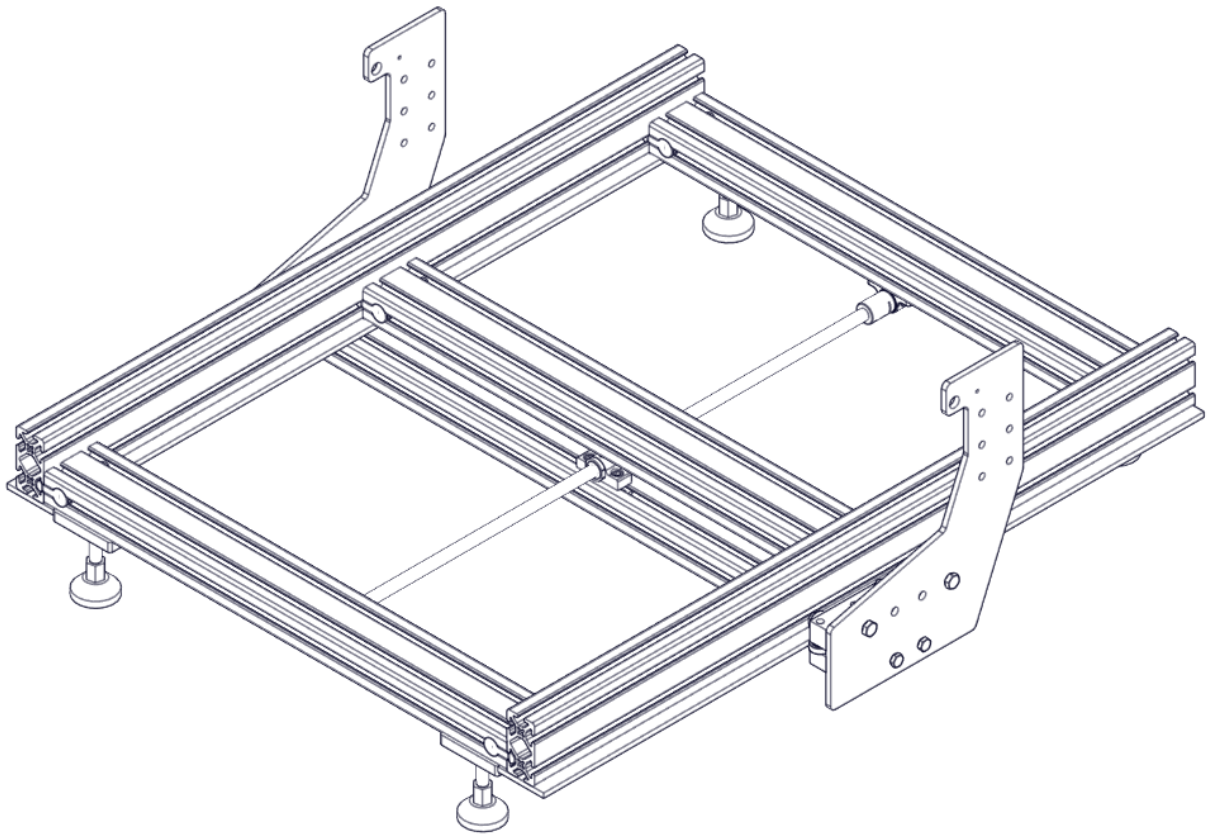


- Install two 3/8" x 3/4" hex bolts through the CRP220-01 **riser plate** as indicated.
- Install two 5/16" x 1" hex bolts through the riser plate as indicated.
- Thread the 3/8" hex bolts into the ELC body.
- Thread the 5/16" hex bolts into the end of the gantry crossbar extrusion.

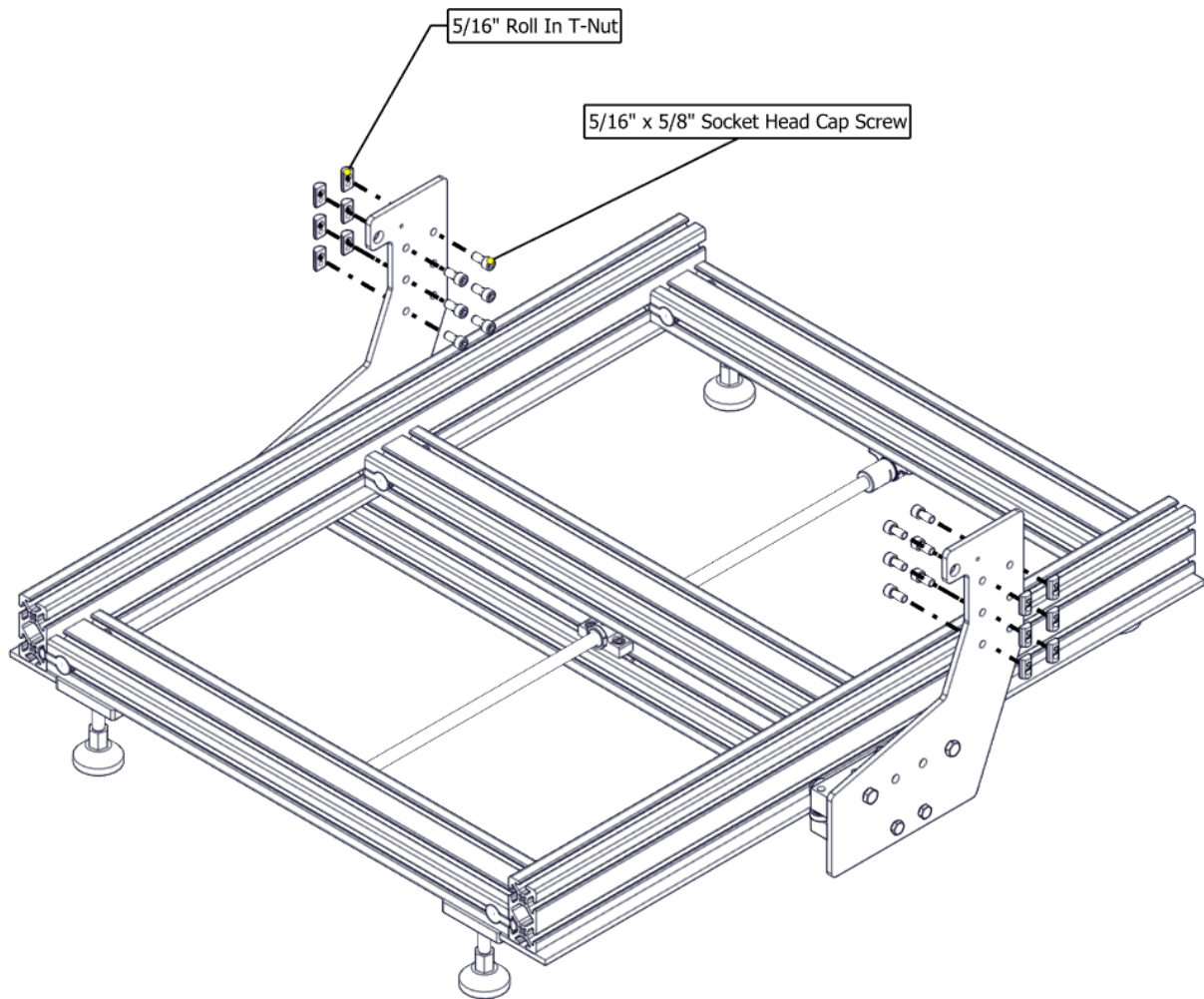


- Tighten the highlighted bolts in the CRP220-01 riser plate.

Note: The riser plate should be flush to the ELC and gantry crossbar extrusion.



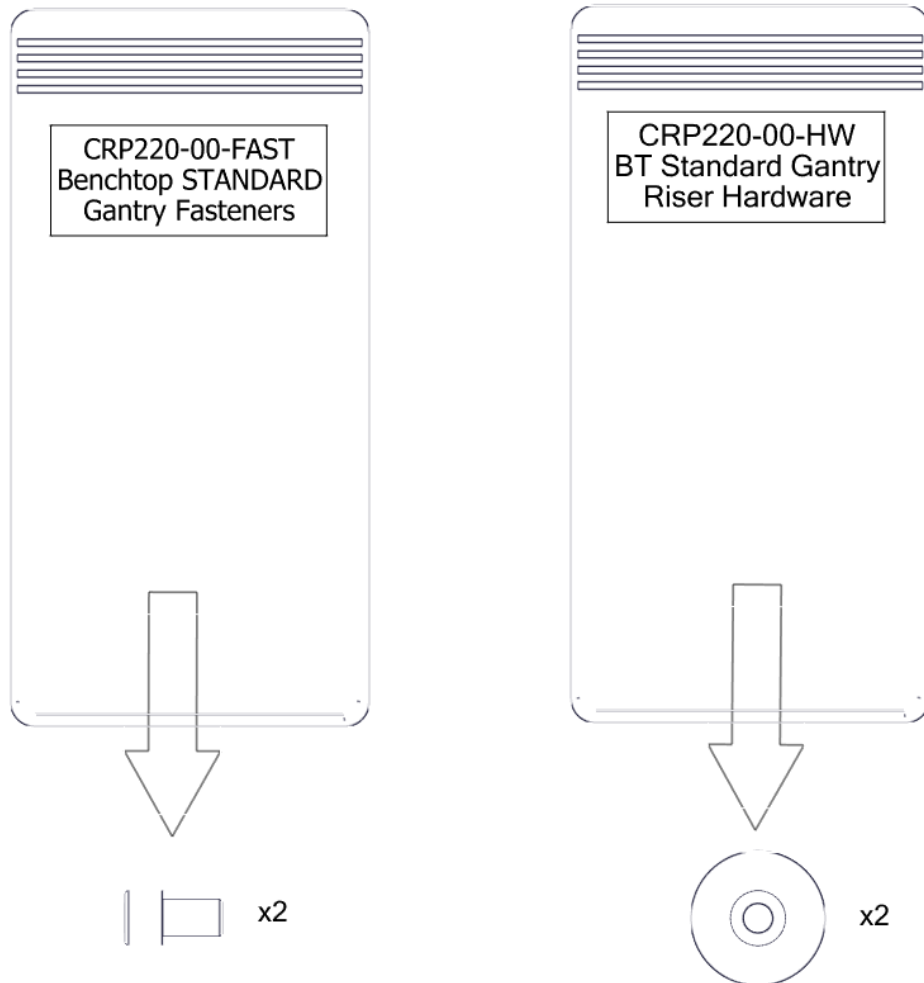
- Repeat the previous process on the opposite end of the gantry crossbar.



- Install six 5/16" x 5/8" socket head cap screws through each riser plate as indicated.
- Partially thread 5/16" t-nuts onto each screw.

Note: The heads of all bolts should face the inside of the frame.

2.4 Riser Bumpers



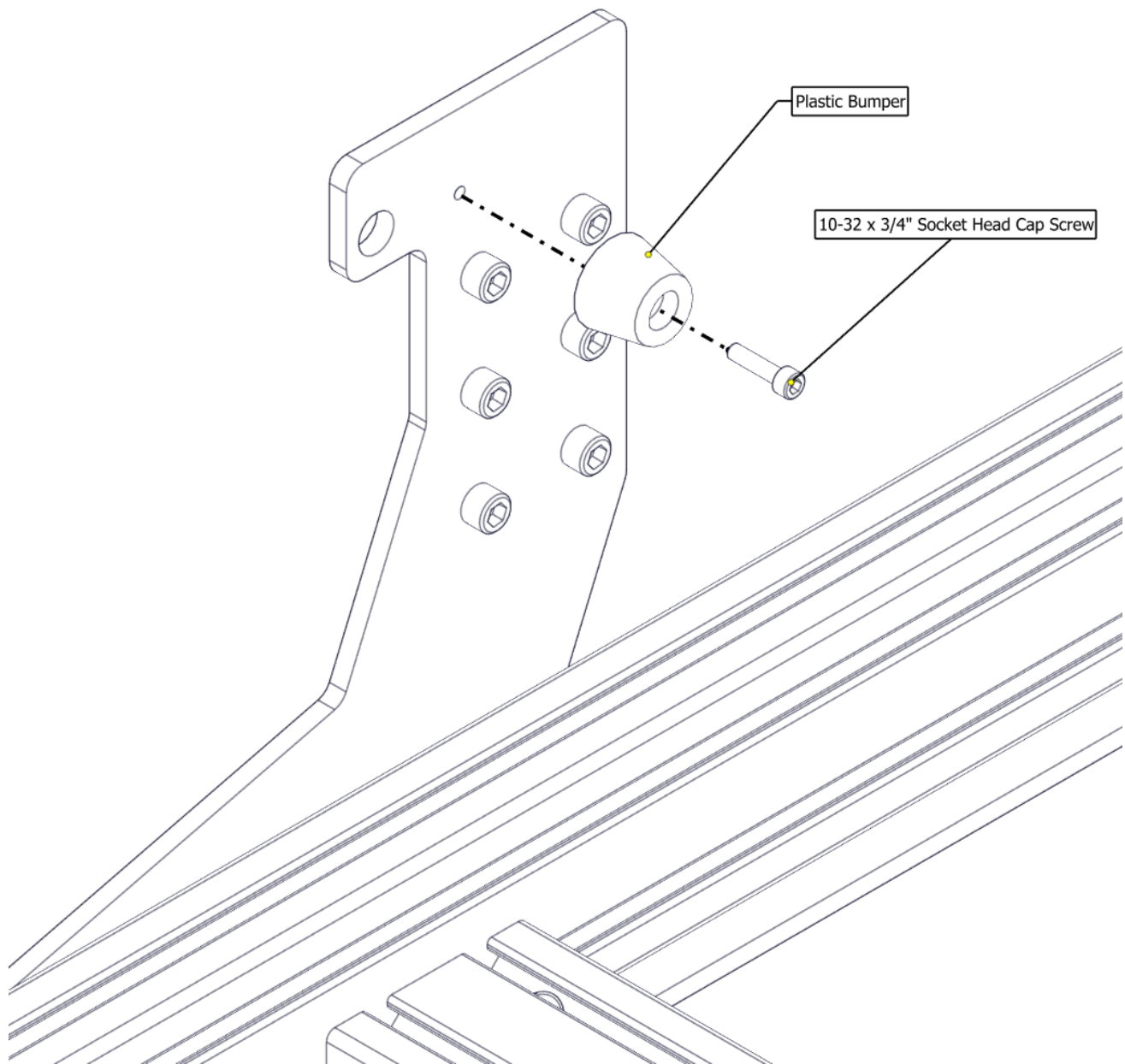
Parts Required:

1. (2) Plastic bumpers
2. (2) 10-32 x 1/2" socket head cap screw

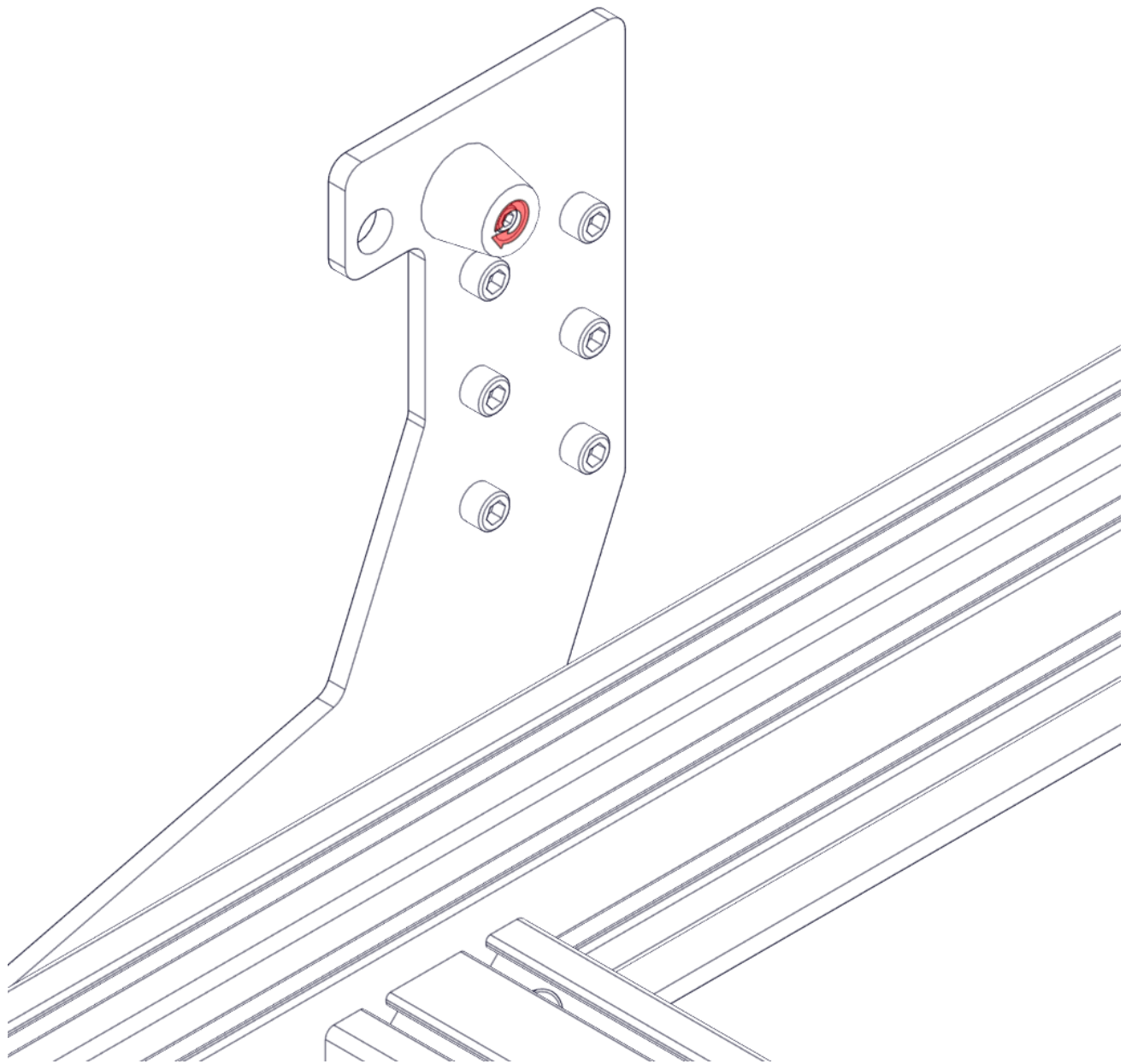
Bag CRP220-00-HW contains item 1.

Bag CRP220-00-FAST contains item 2.

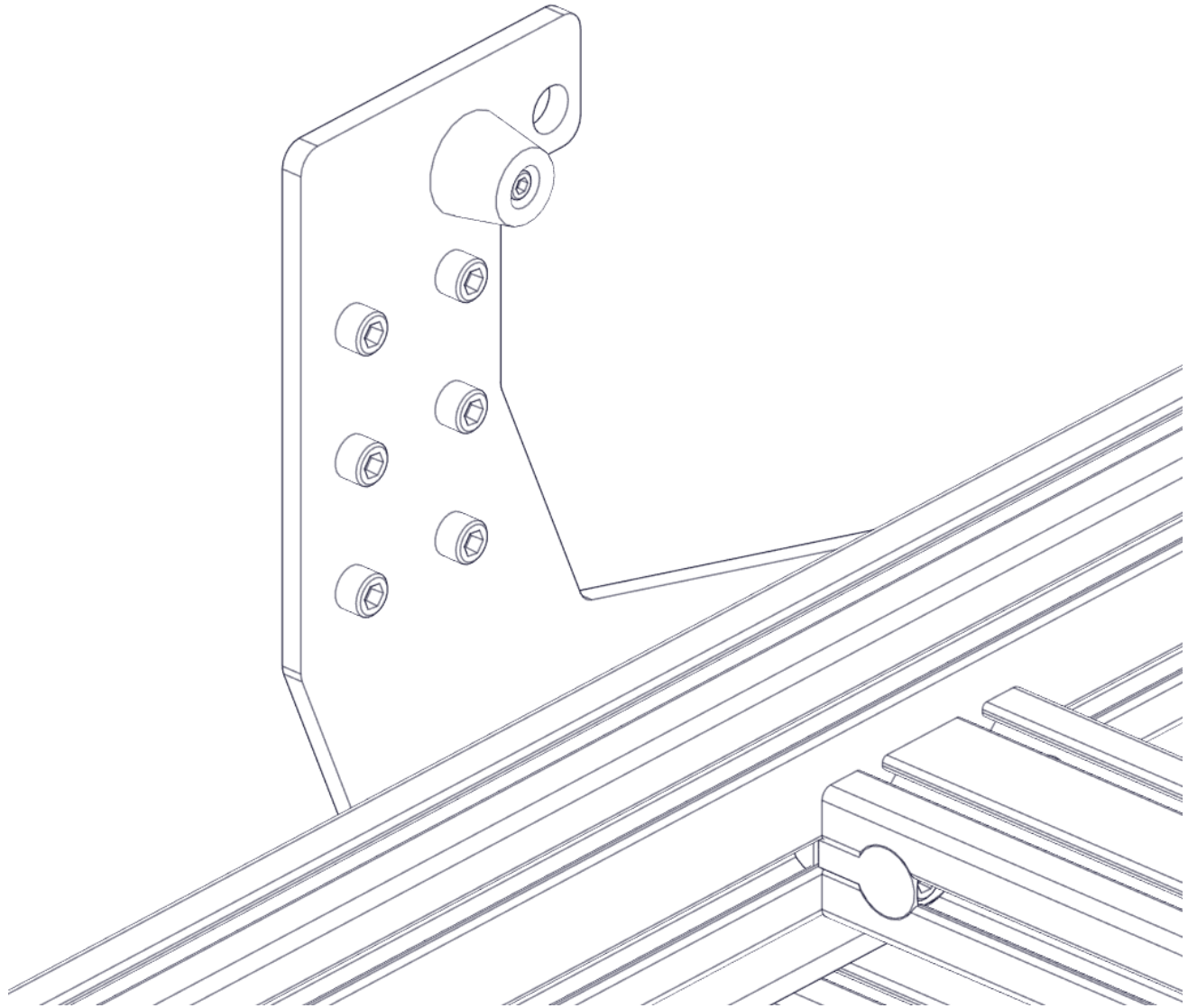
Bag CRP220-00 contains the above bags.



- Install a 10-32 x 1/2" socket head cap screw into a plastic bumper as indicated.
- Thread the socket head cap screw into the 10-32 tapped hole of the riser plate as above.

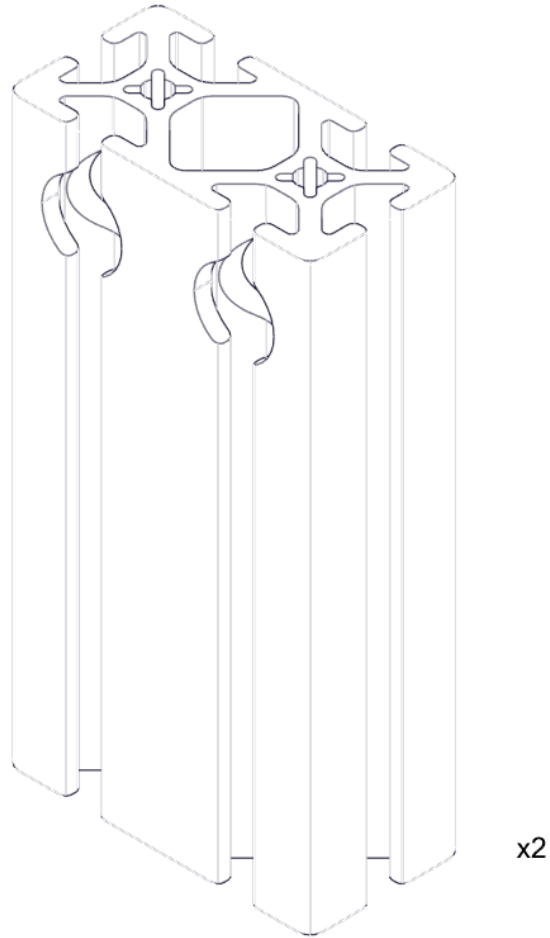


- Fully tighten the highlighted 10-32 screw.



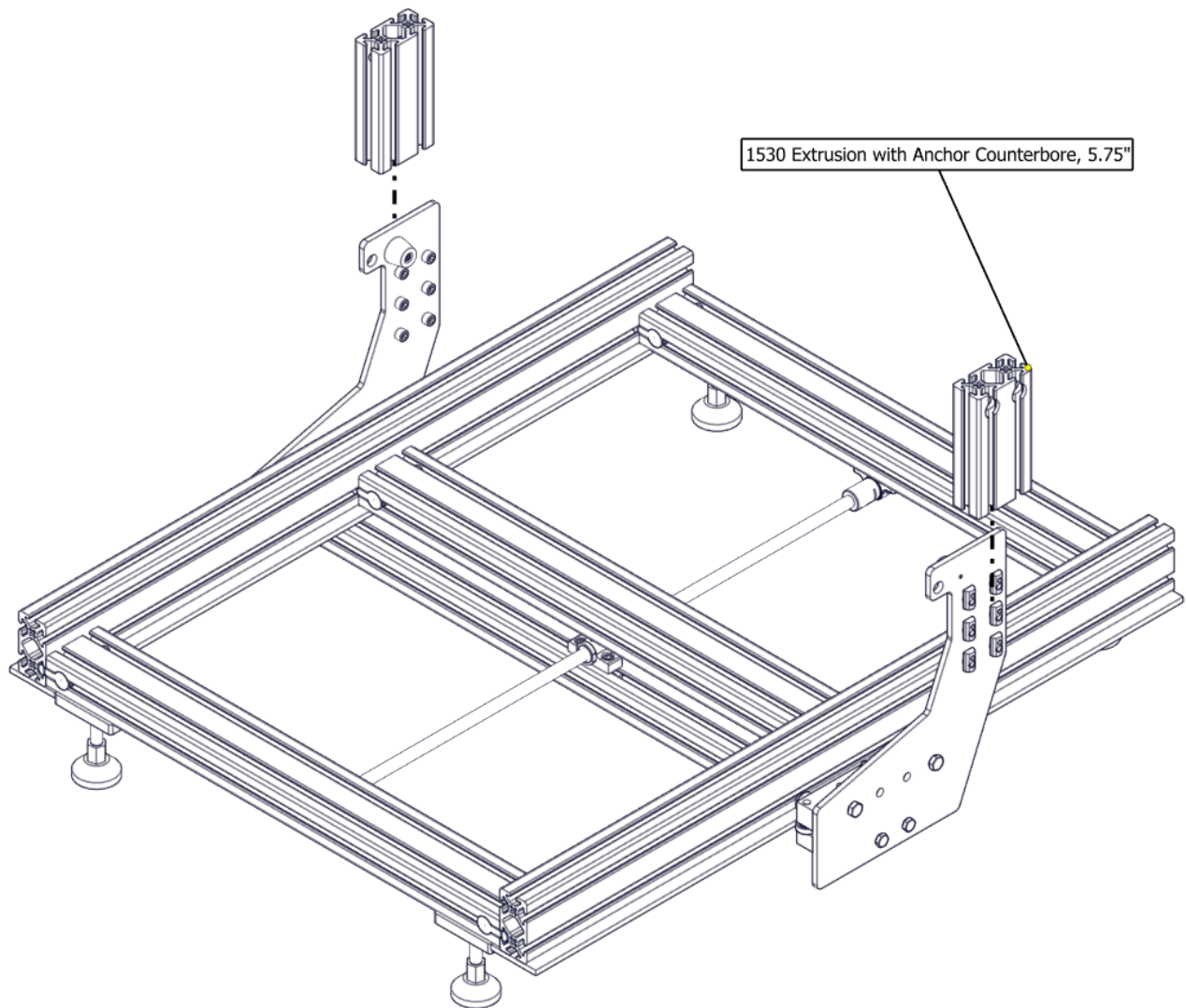
- Repeat the previous steps to install a bumper on the other riser.

2.5 Riser Extrusion

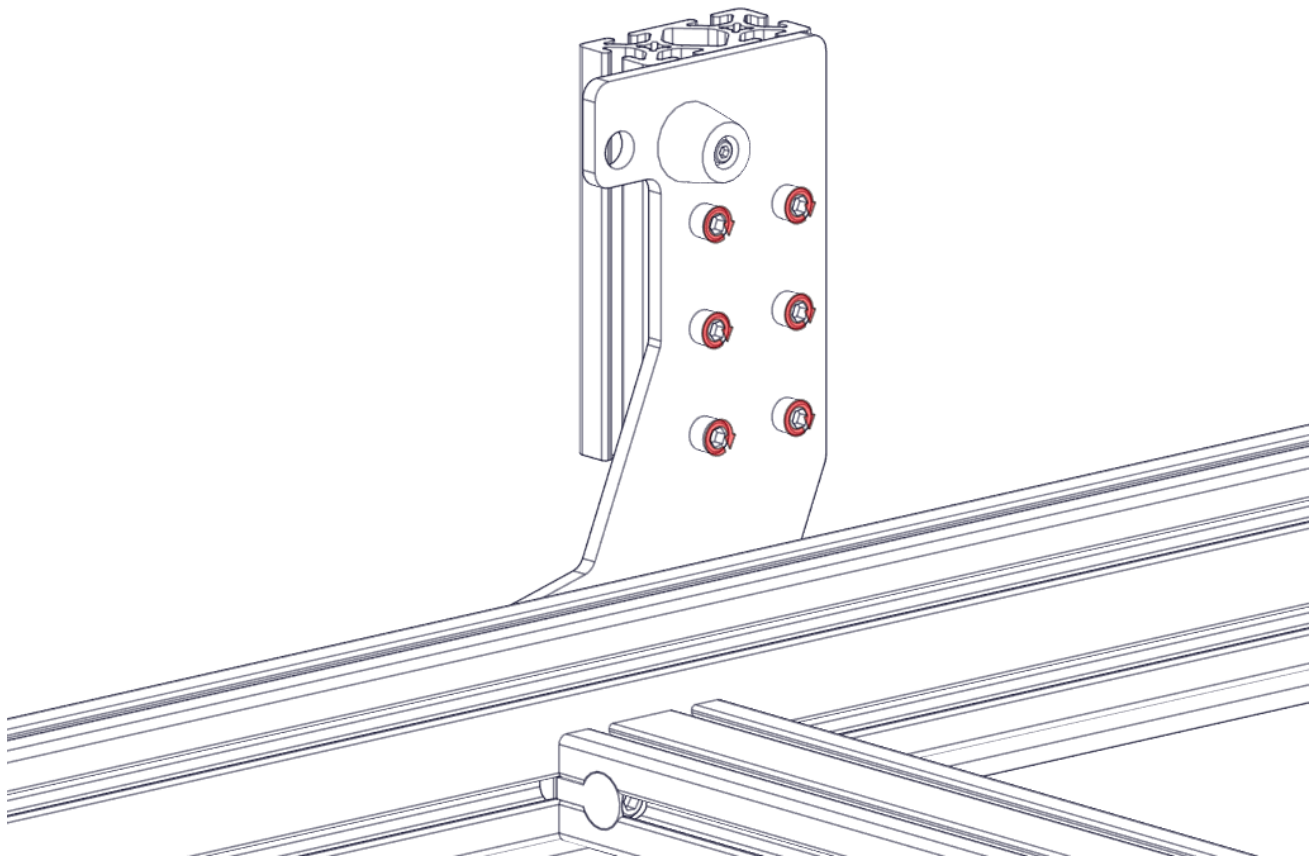


Parts Required:

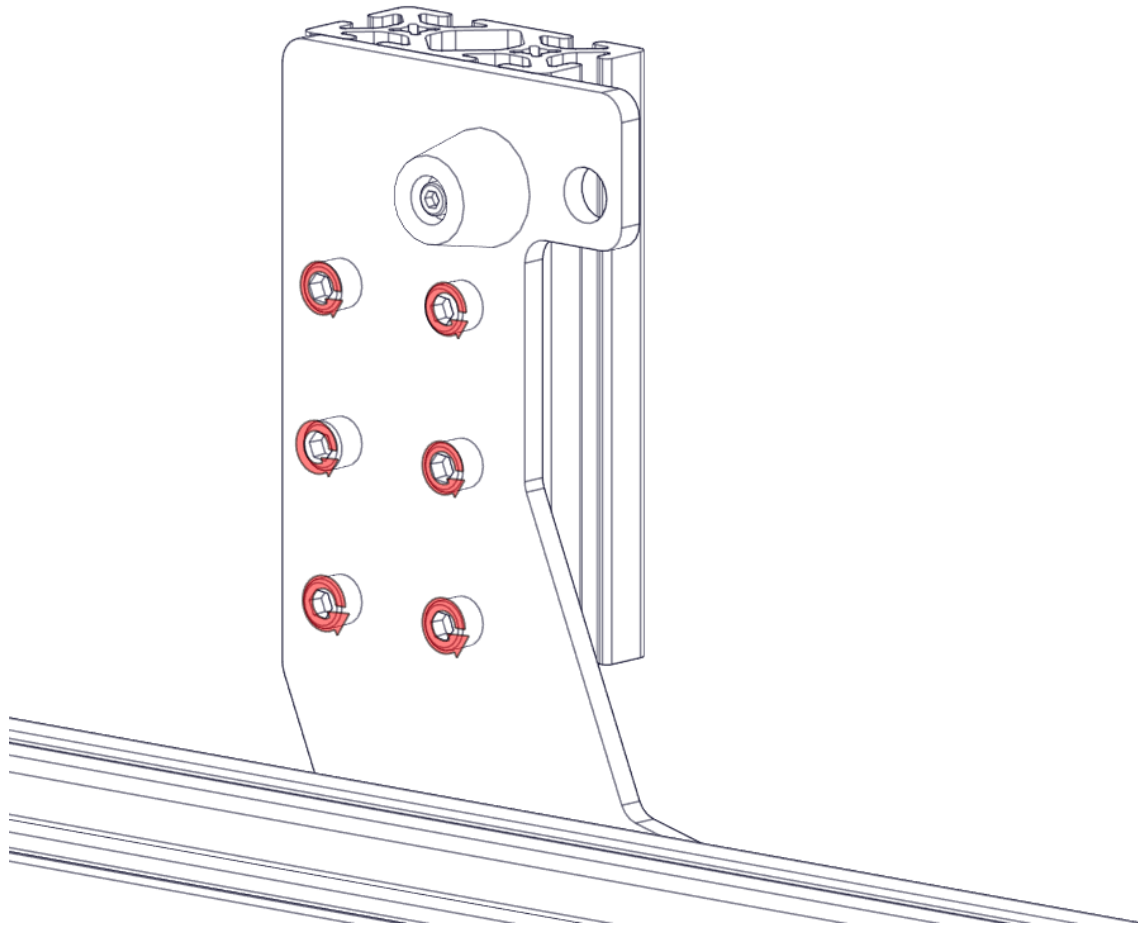
- (2) 5.75" 1530 riser extrusion pieces



- Slide a 5.75" riser extrusion piece onto either riser plate.
- The roll-in t-nuts of each riser plate should be installed into the t-slots of the riser extrusion.



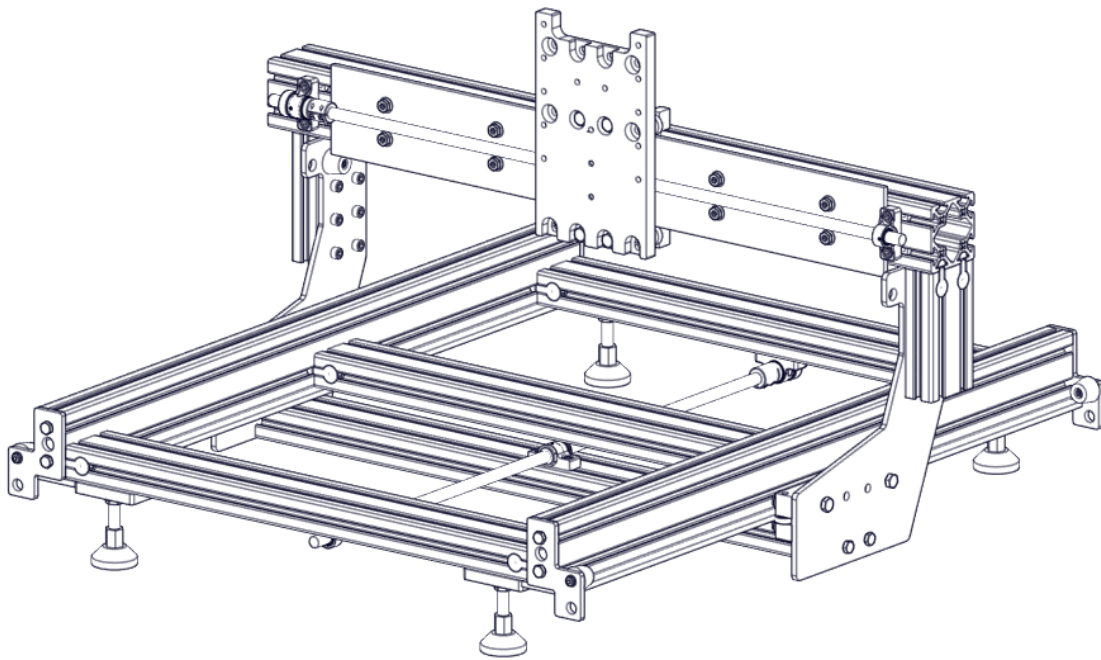
- Position the riser extrusion flush with the top of the riser plate.
- Fully tighten the highlighted socket head cap screws.



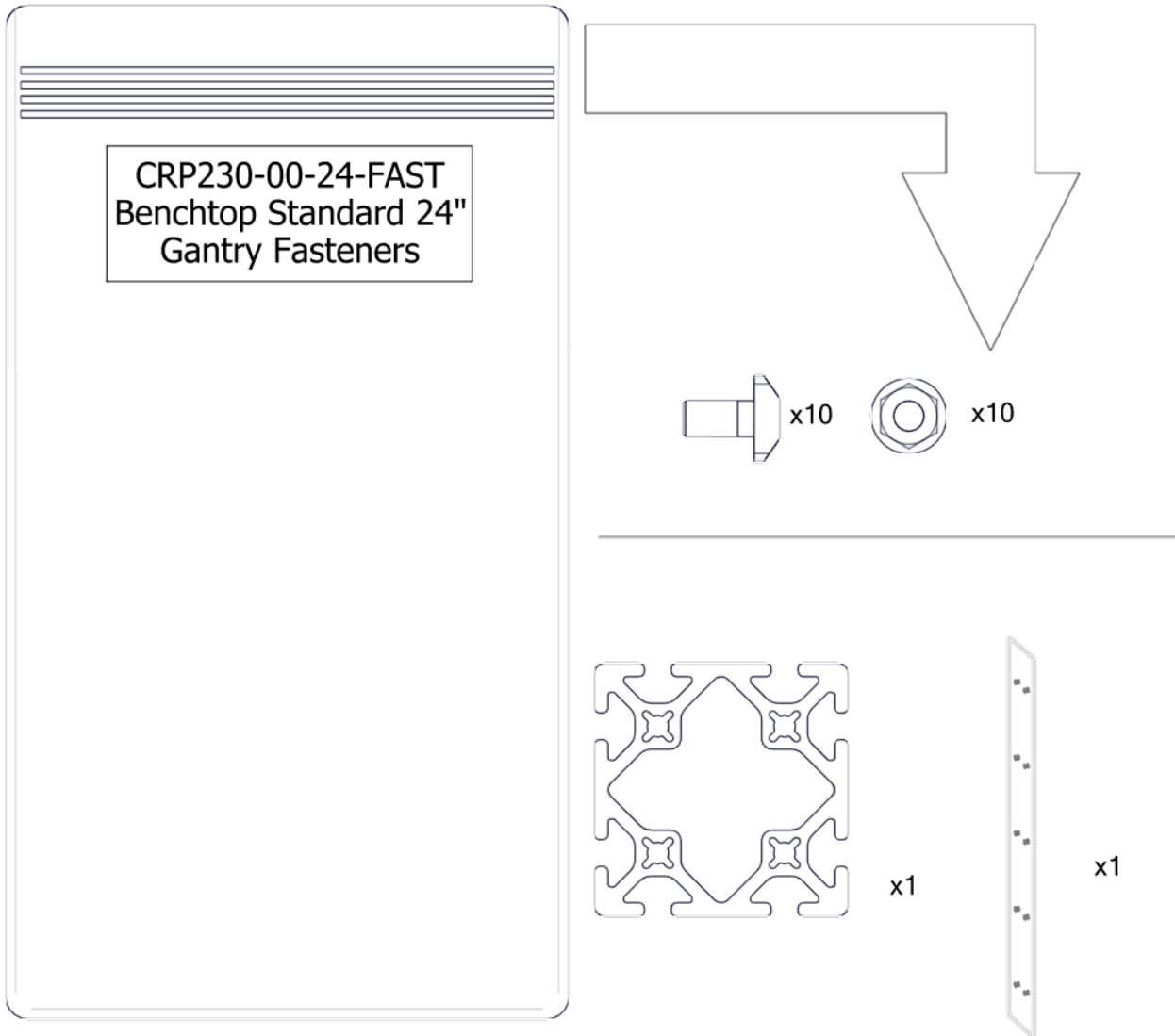
- Repeat this process for the opposite riser.

3

Gantry Assembly



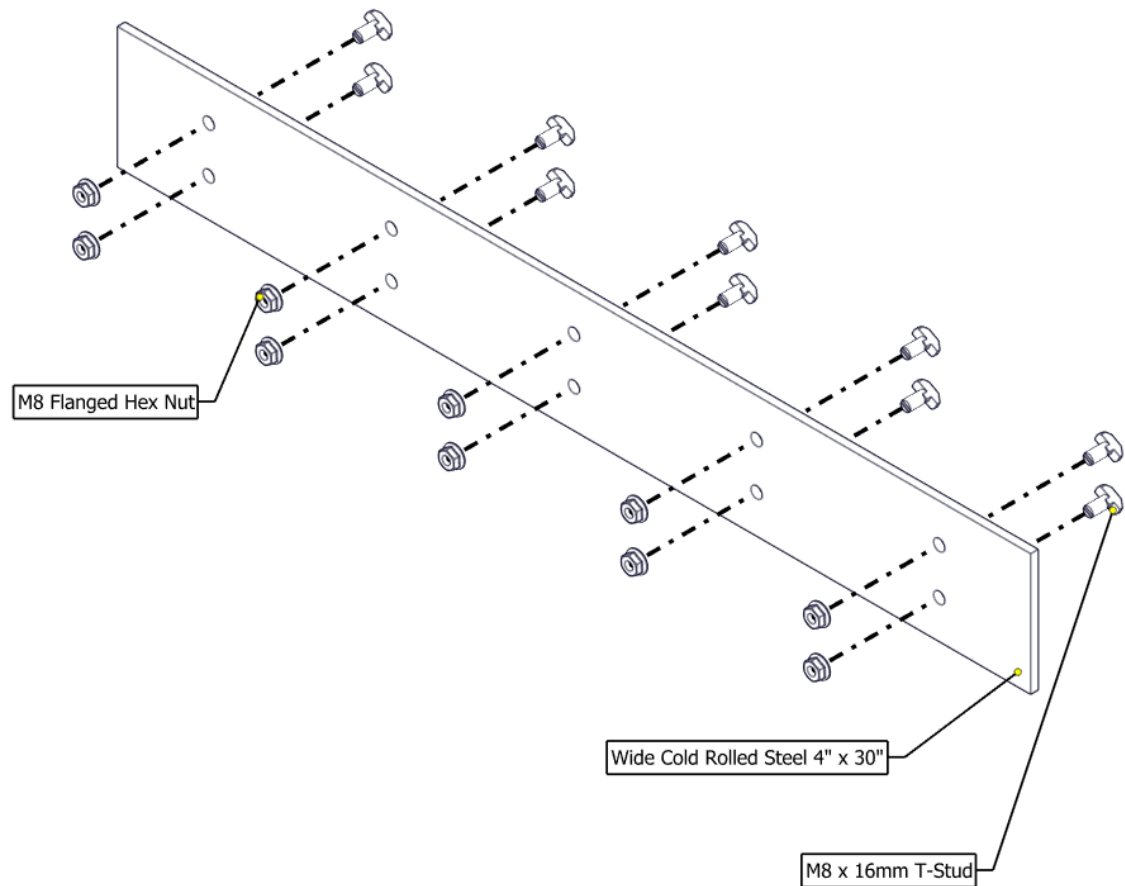
3.1 Gantry Steel Installation



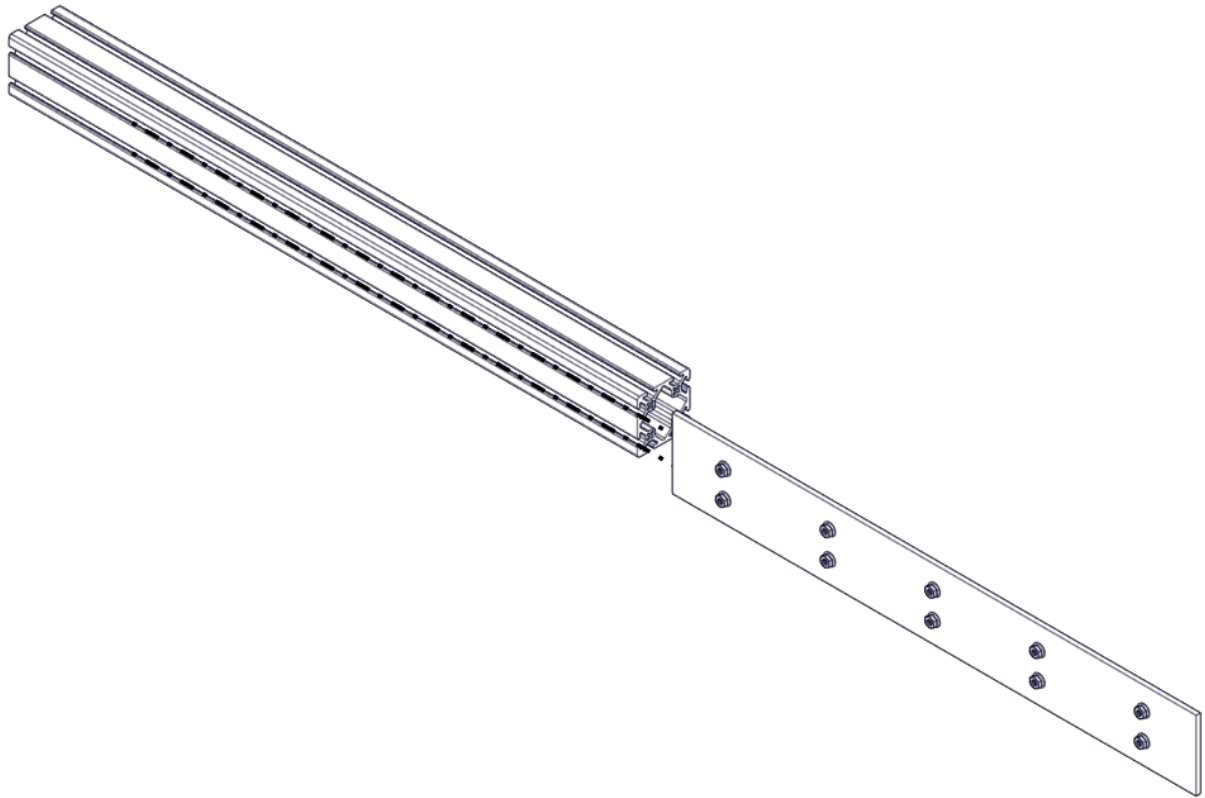
Parts Required:

- (1) 36" 3030 gantry extrusion
- (1) 4"x30" steel rail
- (10) M8 flanged hex nuts
- (10) M8 x 16mm T-Studs

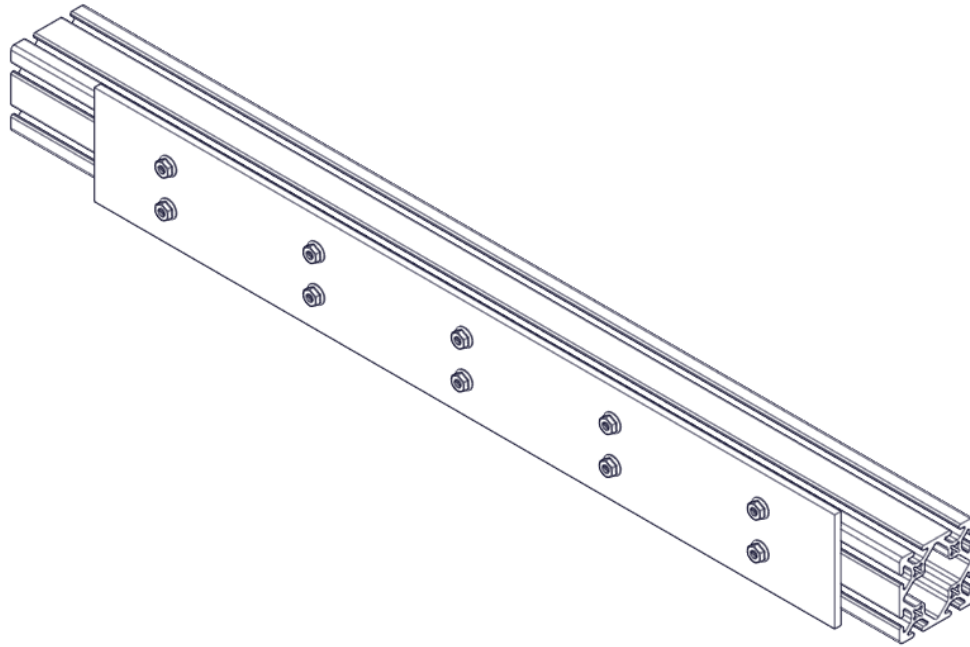
Bag CRP230-00-24-FAST will contain all fasteners necessary for this step.
Bag CRP230-00-24-HW contains Bag CRP230-00-24-FAST.



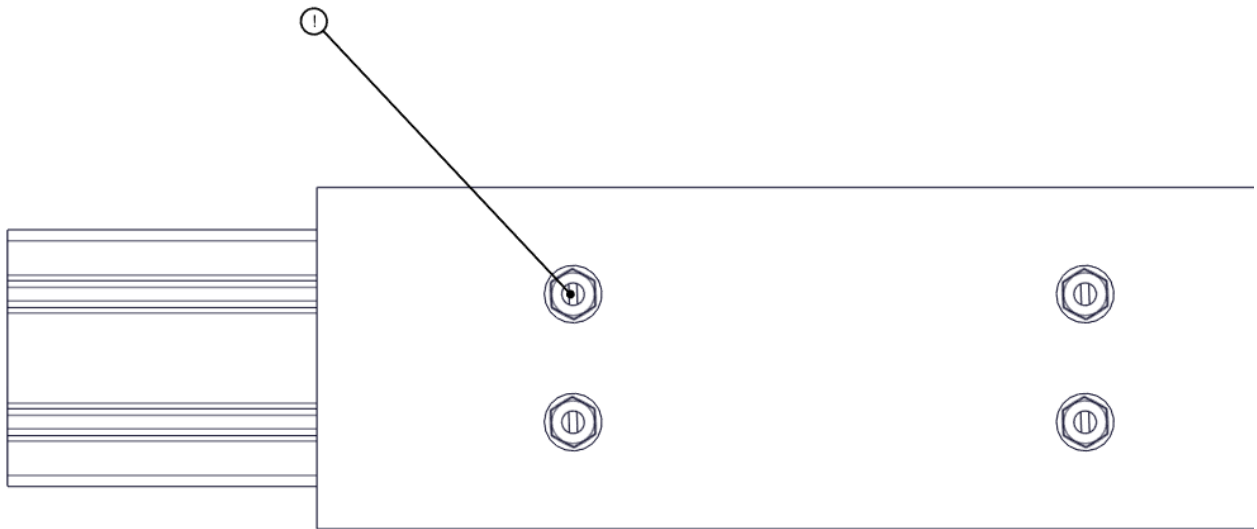
- Install M8 x 16mm t-studs in all (10) holes of the 4" x 30" gantry steel rail.
- Partially thread M8 flanged hex nuts onto each t-stud as in step [1.6](#) – Steel Rail Installation



- Slide the gantry steel t-studs into the front t-slots of the gantry extrusion.



Note: The gantry assembly should appear as above.



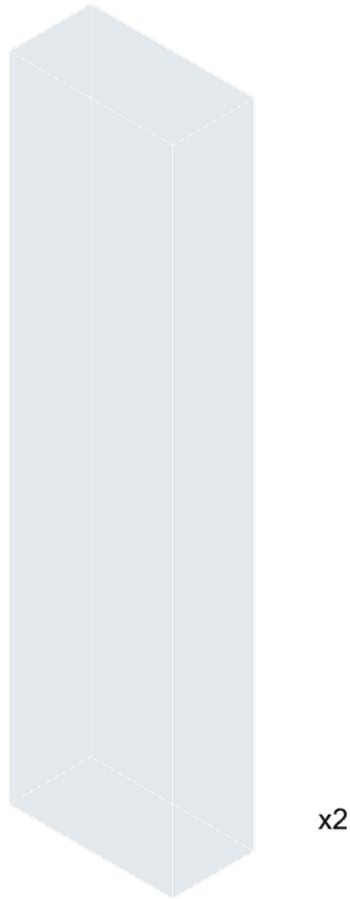
- Orient the slit in the top of all (12) t-studs perpendicular to the t-slot as above.

Note: A small flathead screwdriver may make this easier.



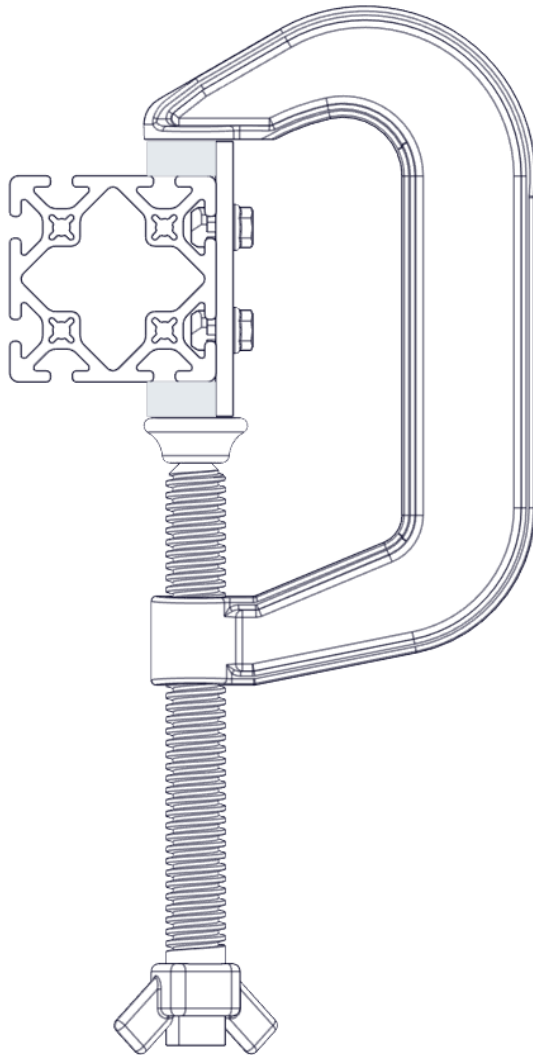
- Position the gantry steel $3\frac{5}{8}$ " from one end of the gantry extrusion.

3.2 Gantry Steel Alignment

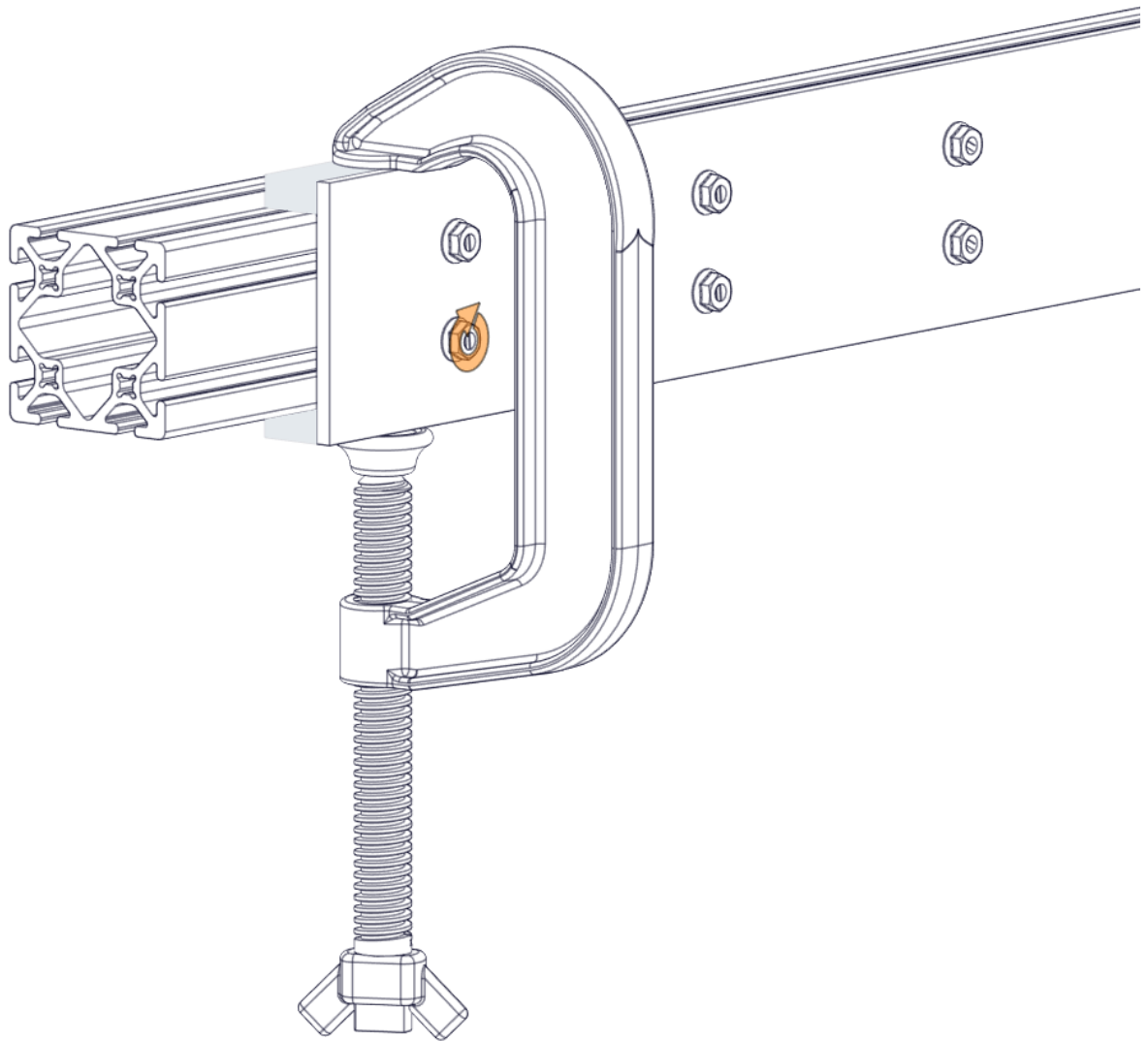


Parts Required:

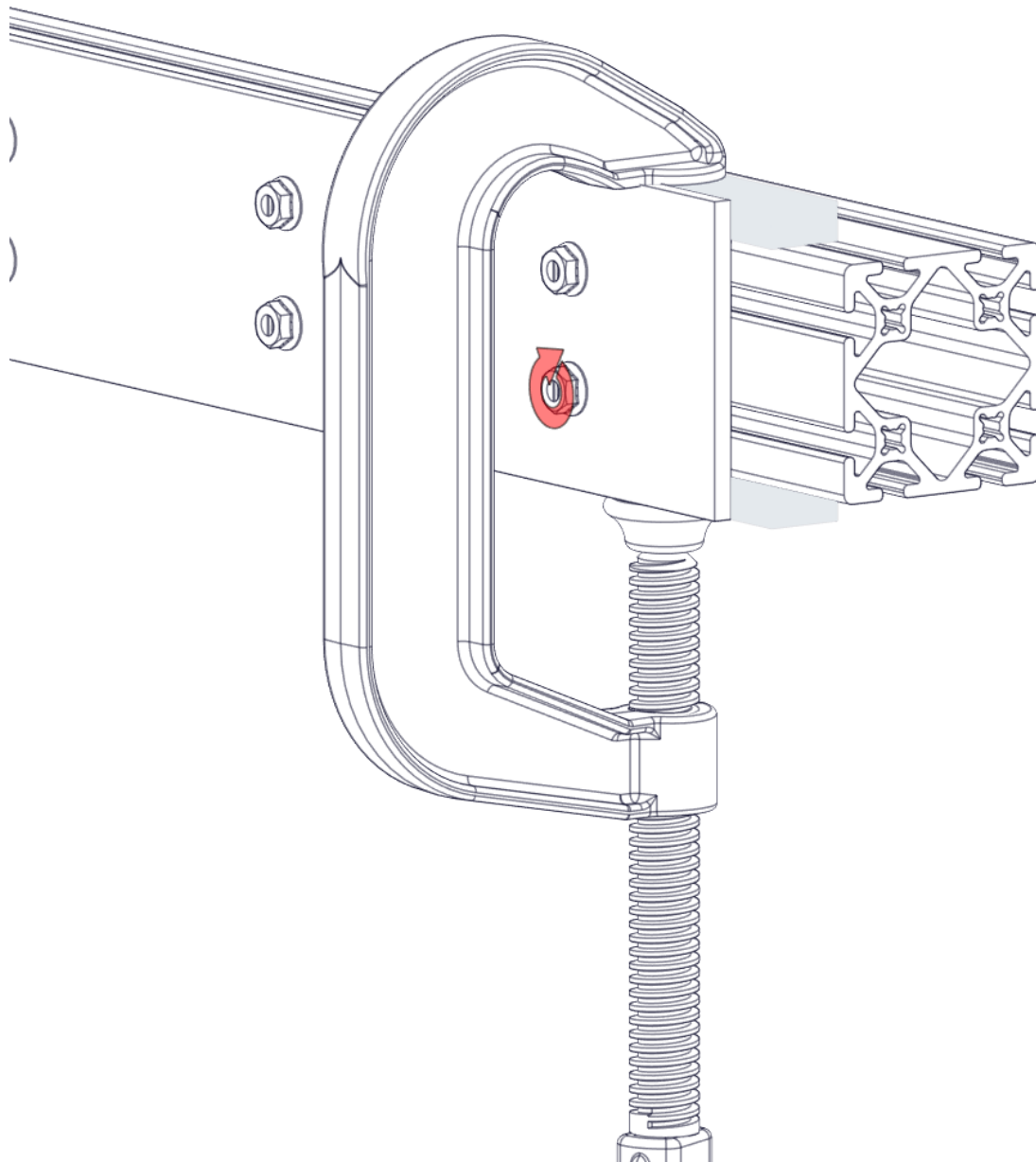
- Two steel spacers are required for this step.



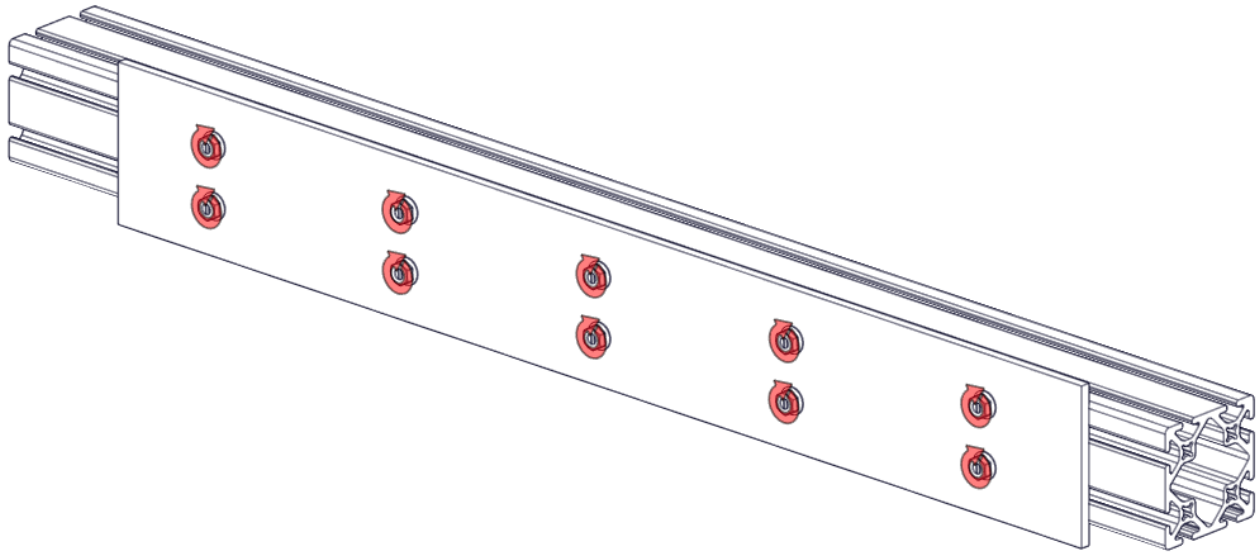
- As in step 1.7 – Steel Rail Alignment (A), use a C-Clamp to position the gantry steel flush to both spacers.



- Partially tighten the M8 hex nuts where the steel has been aligned.



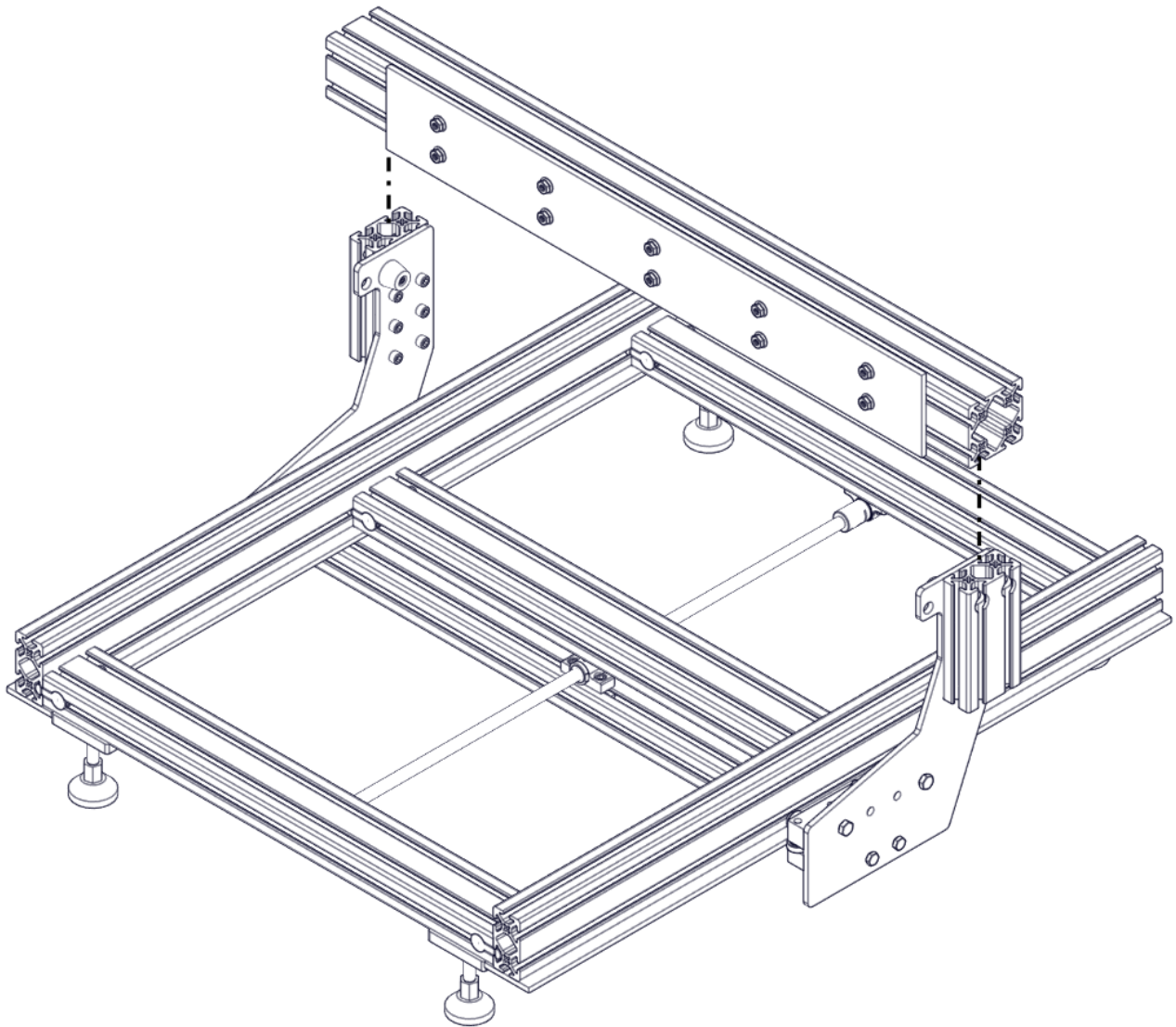
- Repeat the previous process at the opposite end of the gantry.
- Fully tighten the highlighted M8 hex nut.



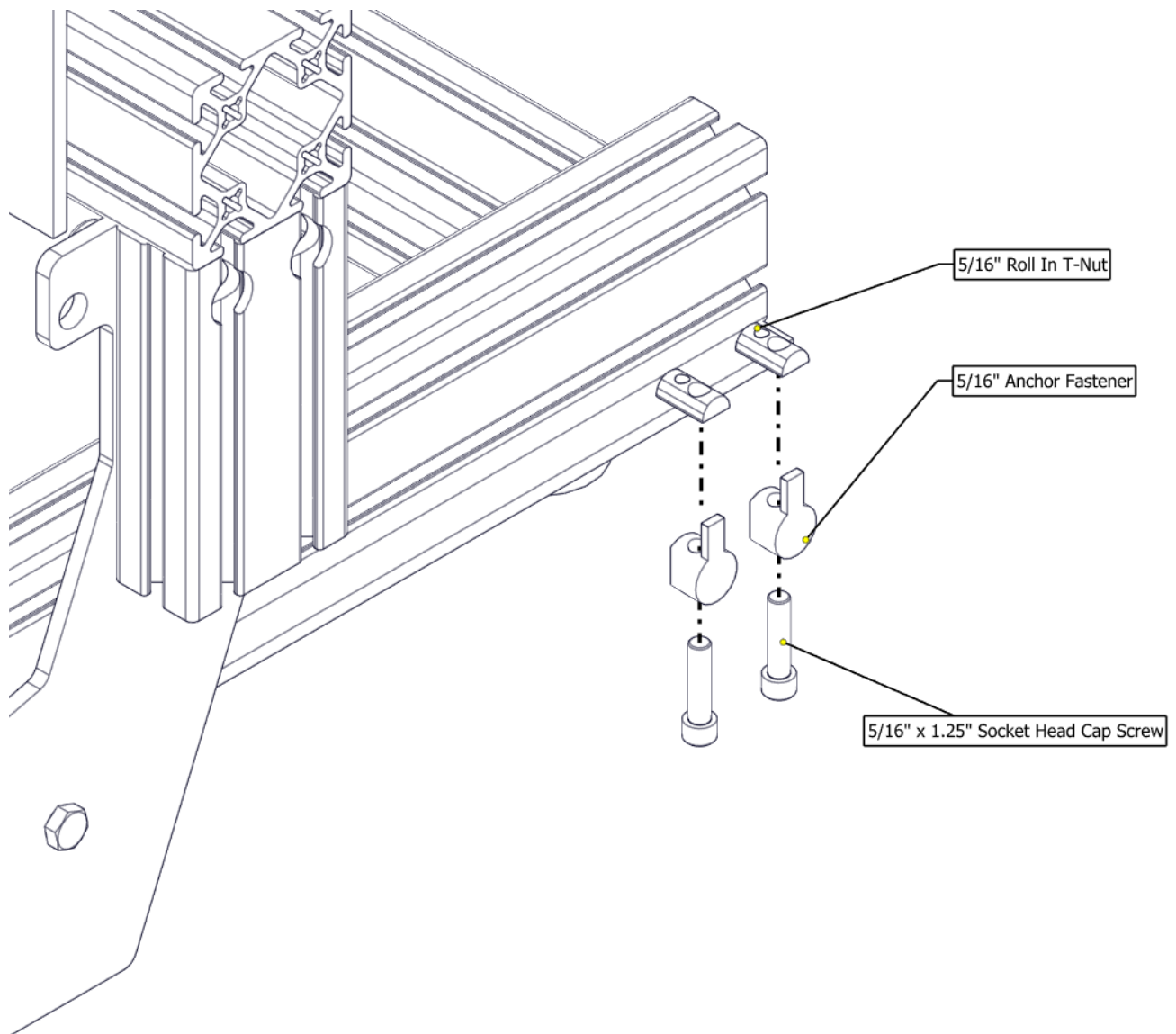
- Confirm the gantry steel is flush to the spacers along the entire gantry, adjusting if needed.
- Once steel is straight, fully tighten all (12) M8 hex flanged nuts.

3.3 Gantry Installation

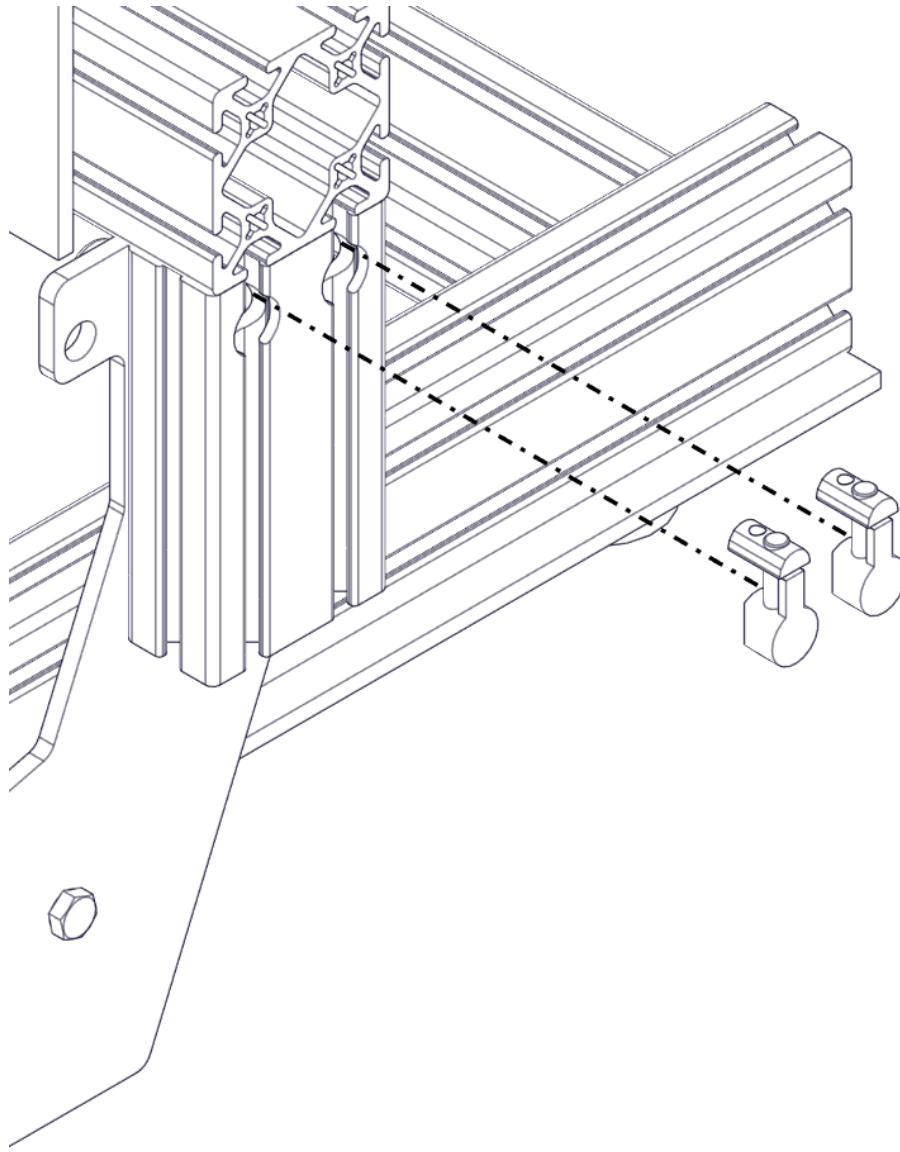
No new parts are necessary for this step.



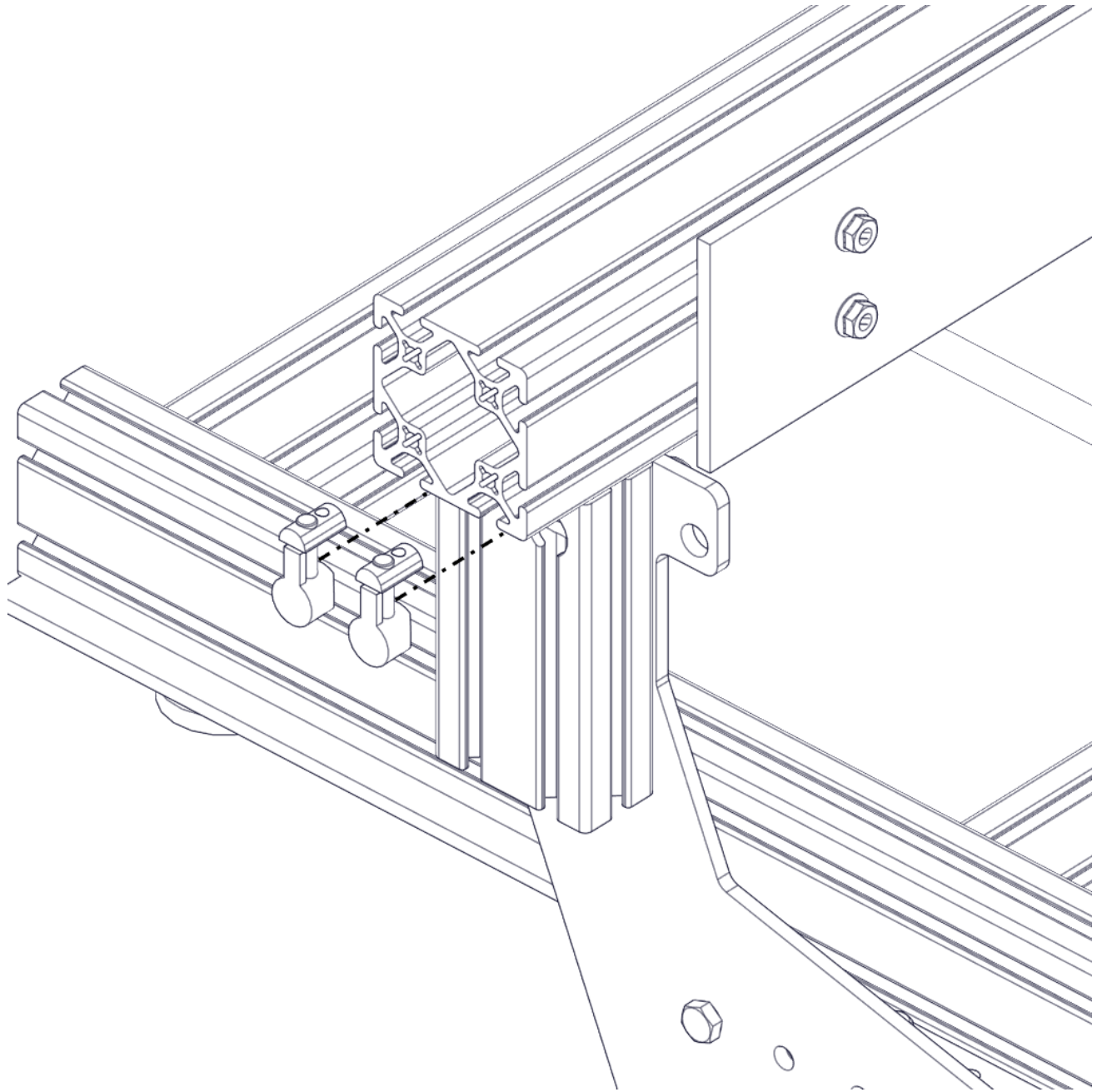
- Lower the **Gantry Assembly** onto the risers as indicated.



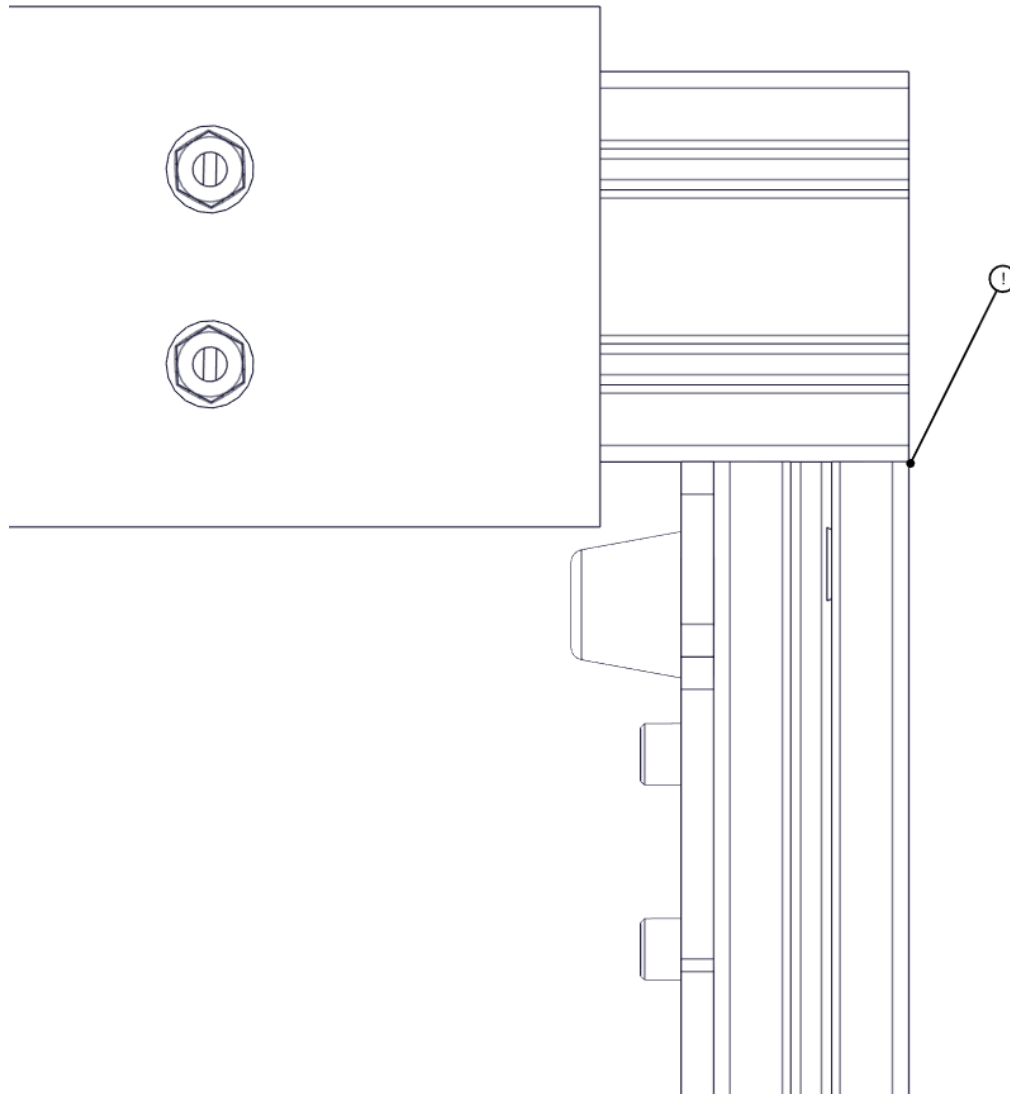
- Insert two 5/16" x 1 1/4" socket head cap screws into anchor fasteners, and partially thread through t-nuts as indicated.



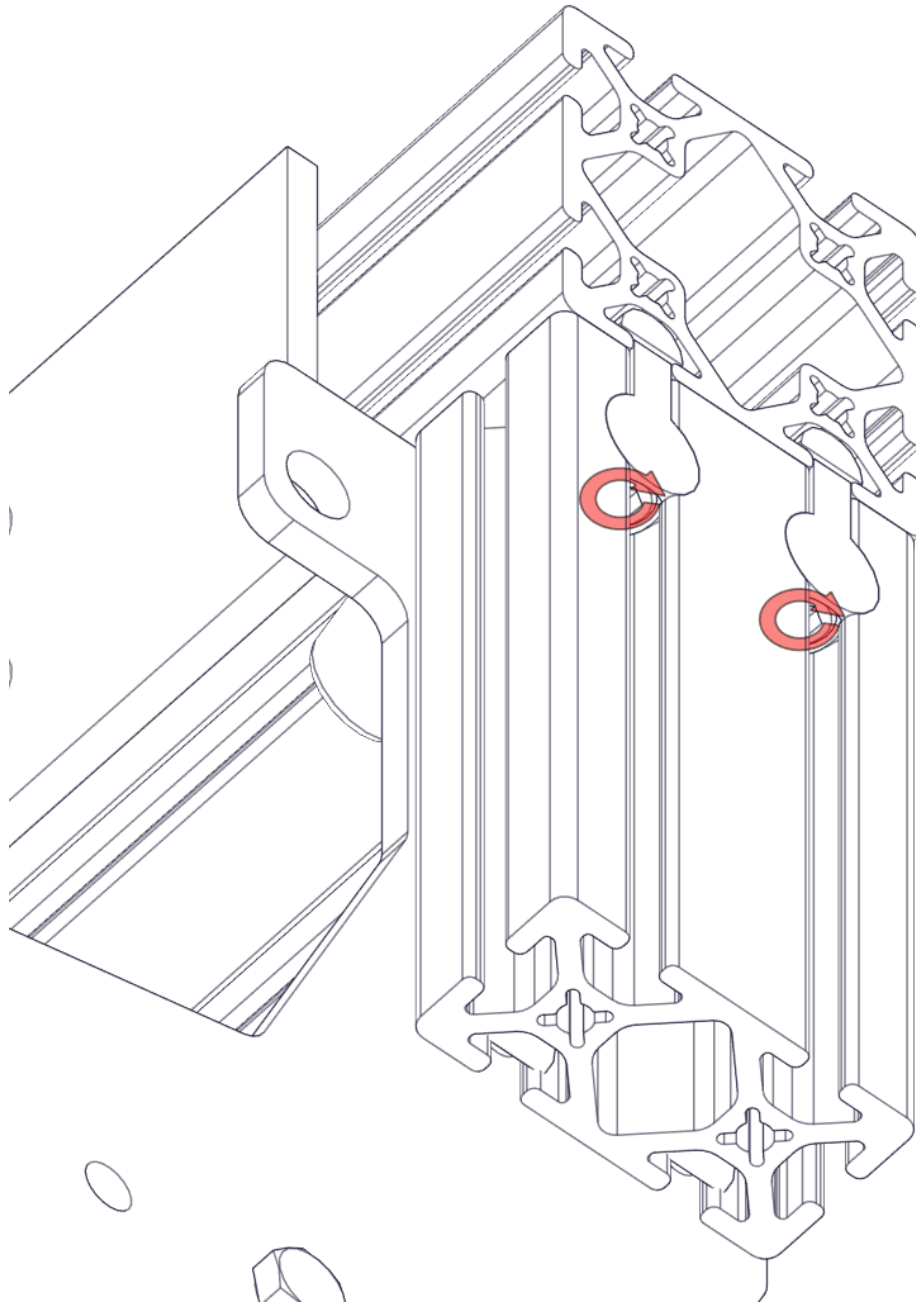
- Insert the anchor assemblies into the riser extrusion as indicated.



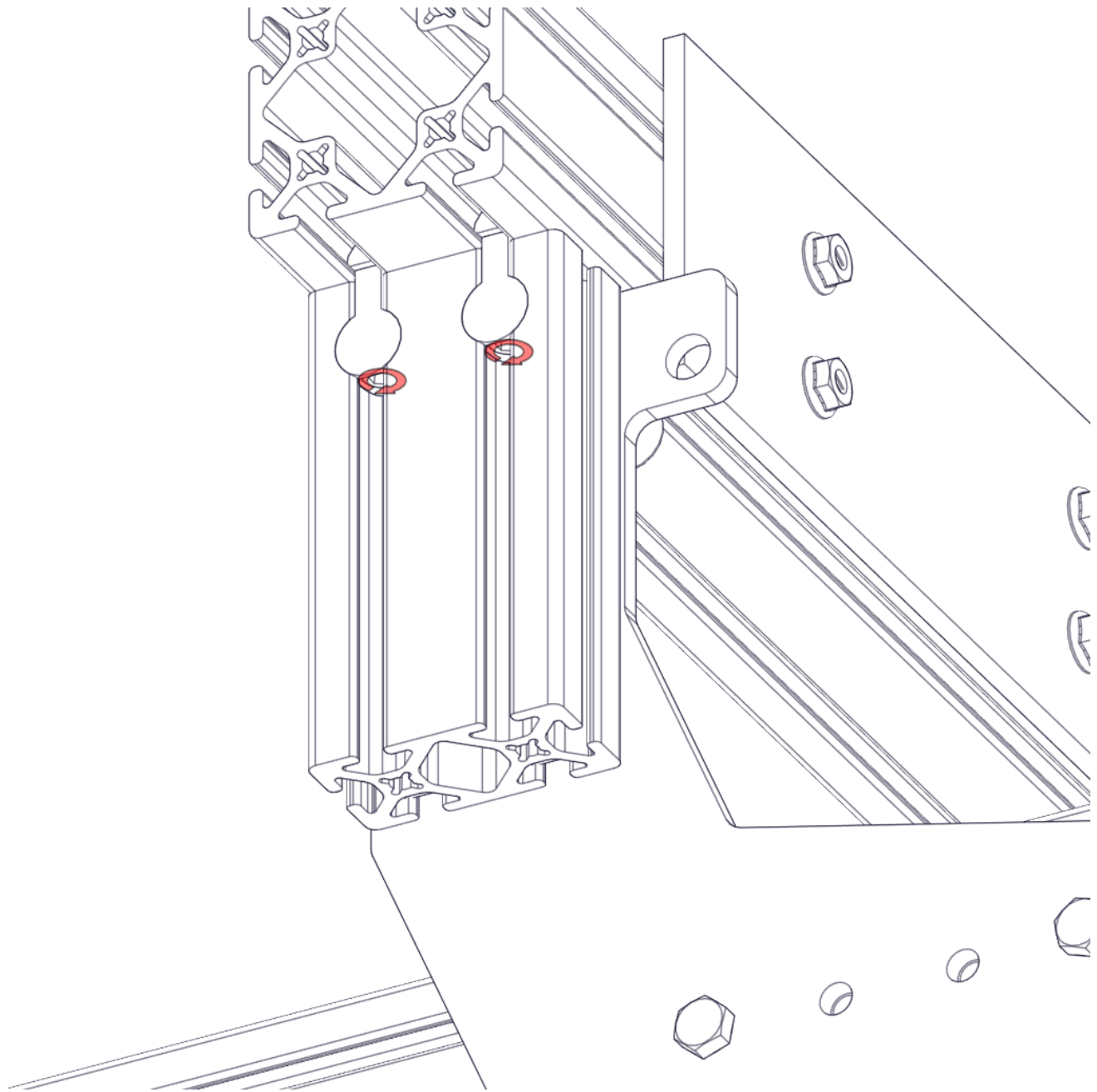
- Repeat the previous two steps on the other side of the gantry.



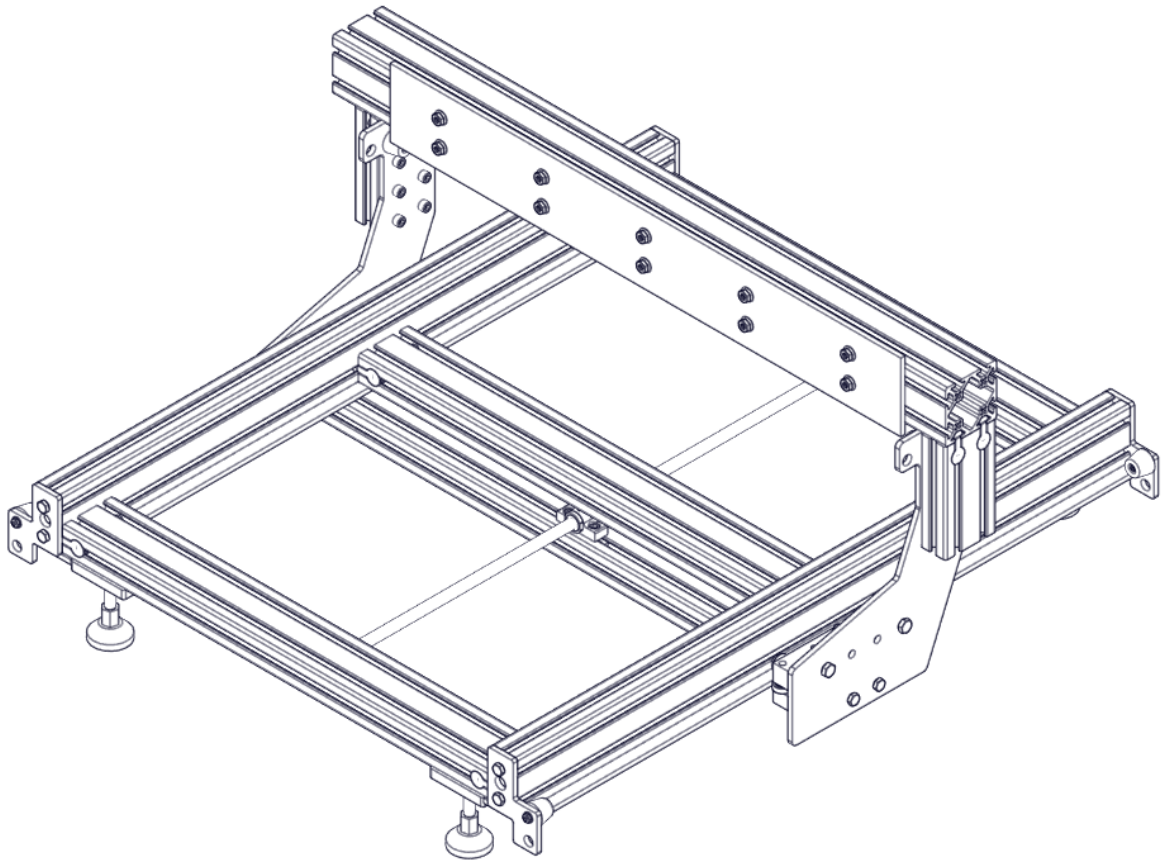
- Confirm that the indicated side of the gantry is flush with the riser extrusion.



- Fully tighten the anchor assemblies as above.

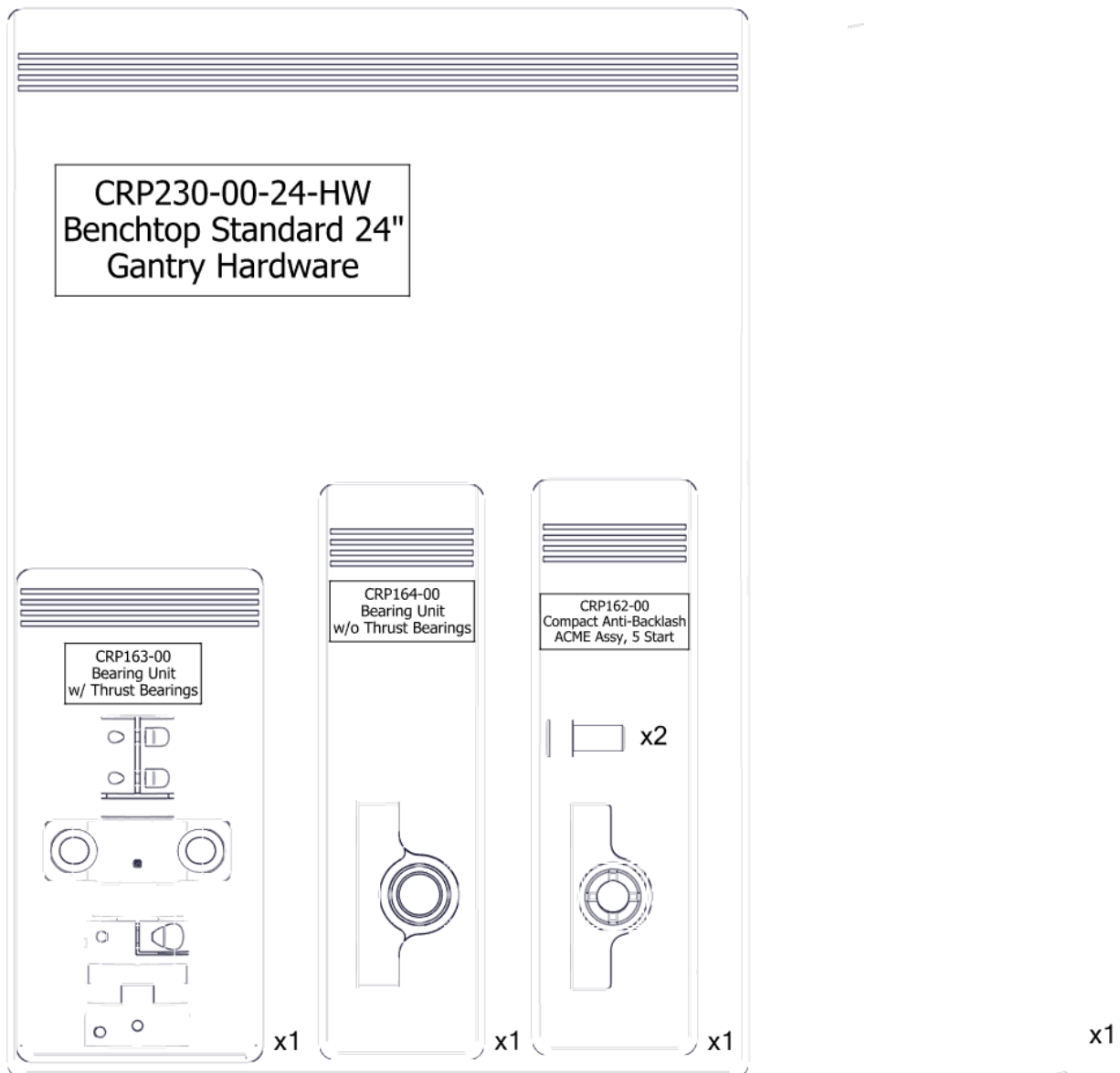


- Fully tighten the anchor assemblies as above.



Note: The machine should now appear as above.

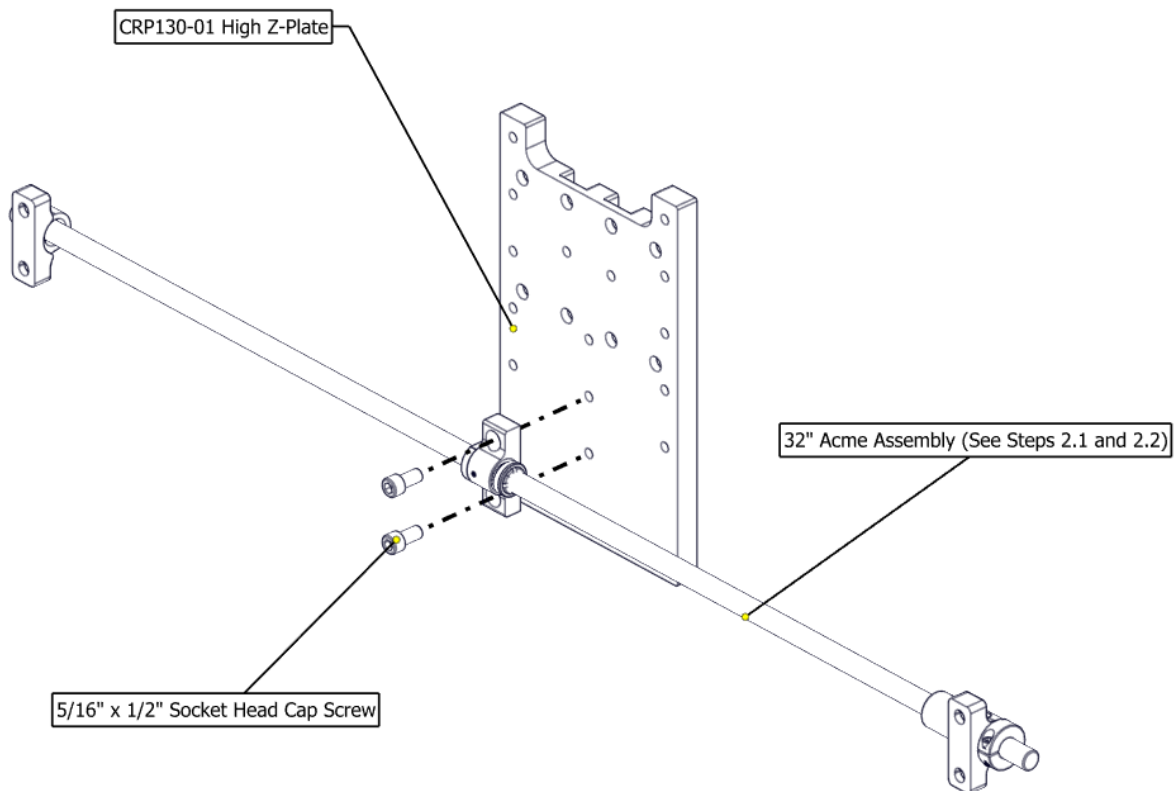
3.4 Gantry Acme Assembly



Parts Required:

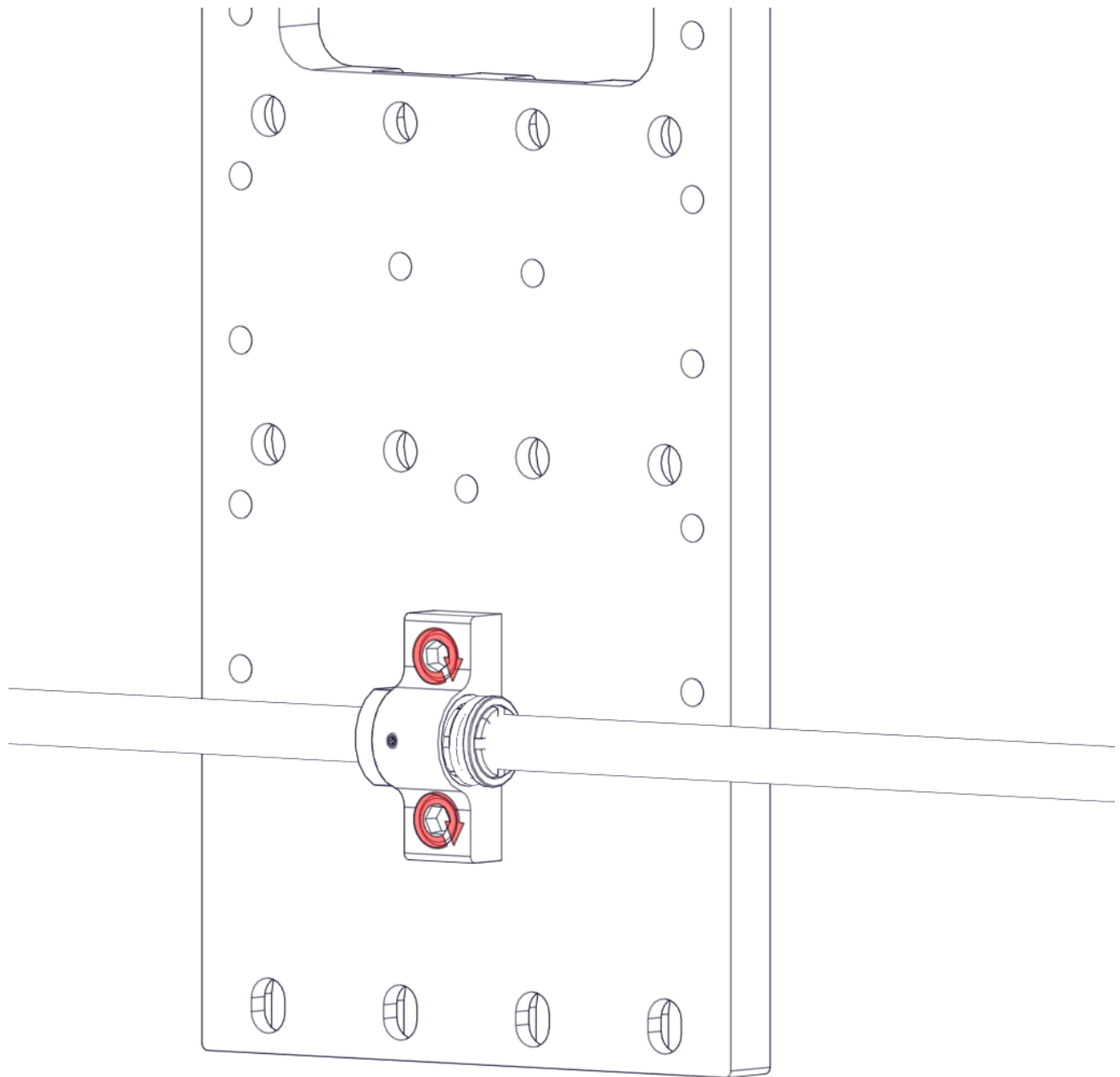
- (1) 32" Acme lead screw
- (1) CRP162-00 assembly
- (1) CRP163-00 assembly
- (1) CRP164-00 assembly
- (2) 5/16" x 1/2" socket head cap screw

The CRP16X assemblies are individually bagged within bag CRP230-00-24-HW. The CRP162-00 Bag contains the socket head screws. The leadscrew is packaged separately.



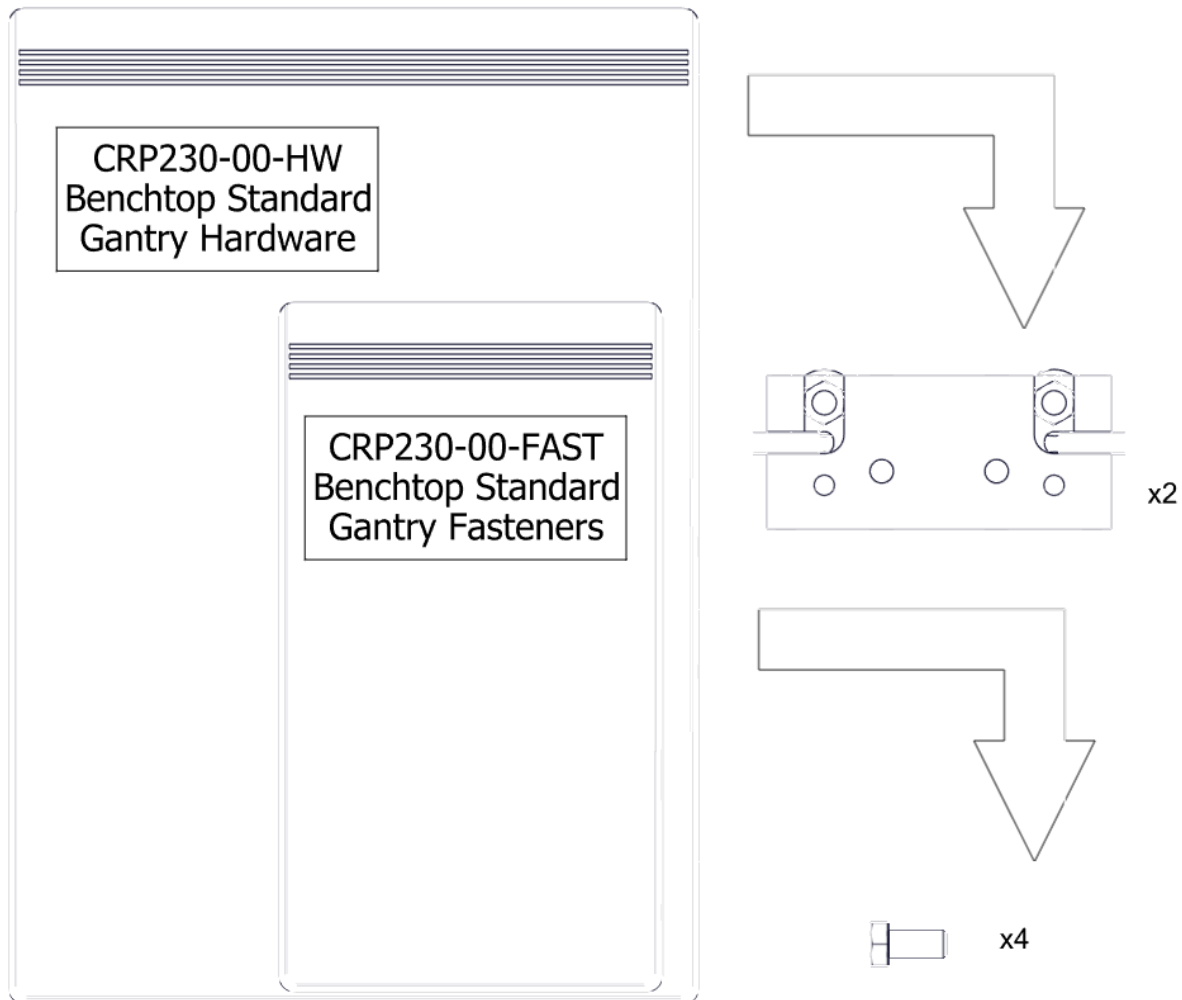
- Repeat steps 2.1 and 2.2 to create another 32" Acme assembly
- Install two 5/16" x 1/2" socket head cap screws into the CRP130 **High Z-Plate** through the CRP162-00 assembly.

Note: Confirm the orientation of the High Z-Plate is as above



- Tighten the highlighted screws.

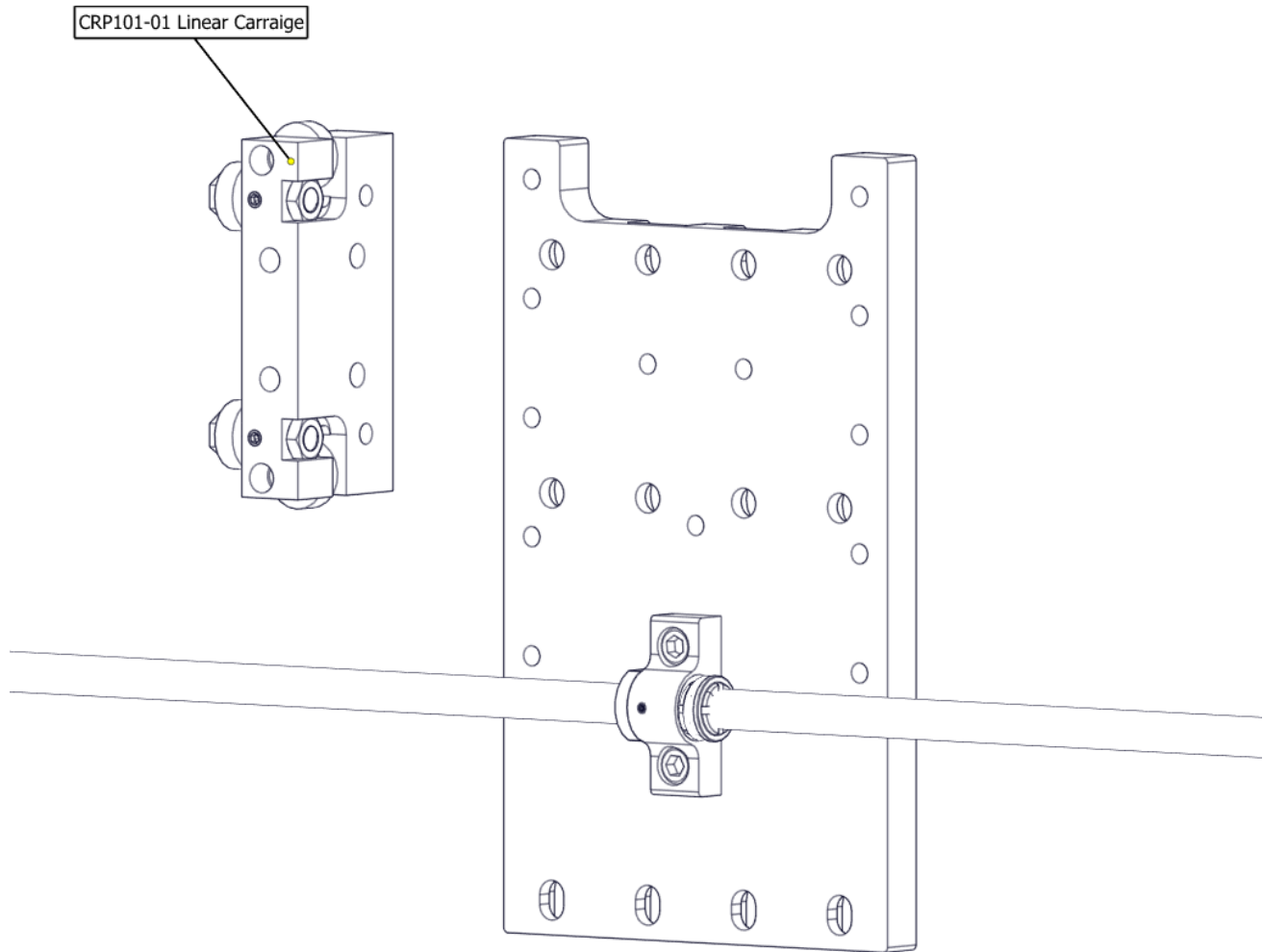
3.5 High-Z Linear Carriage Installation



Parts Required:

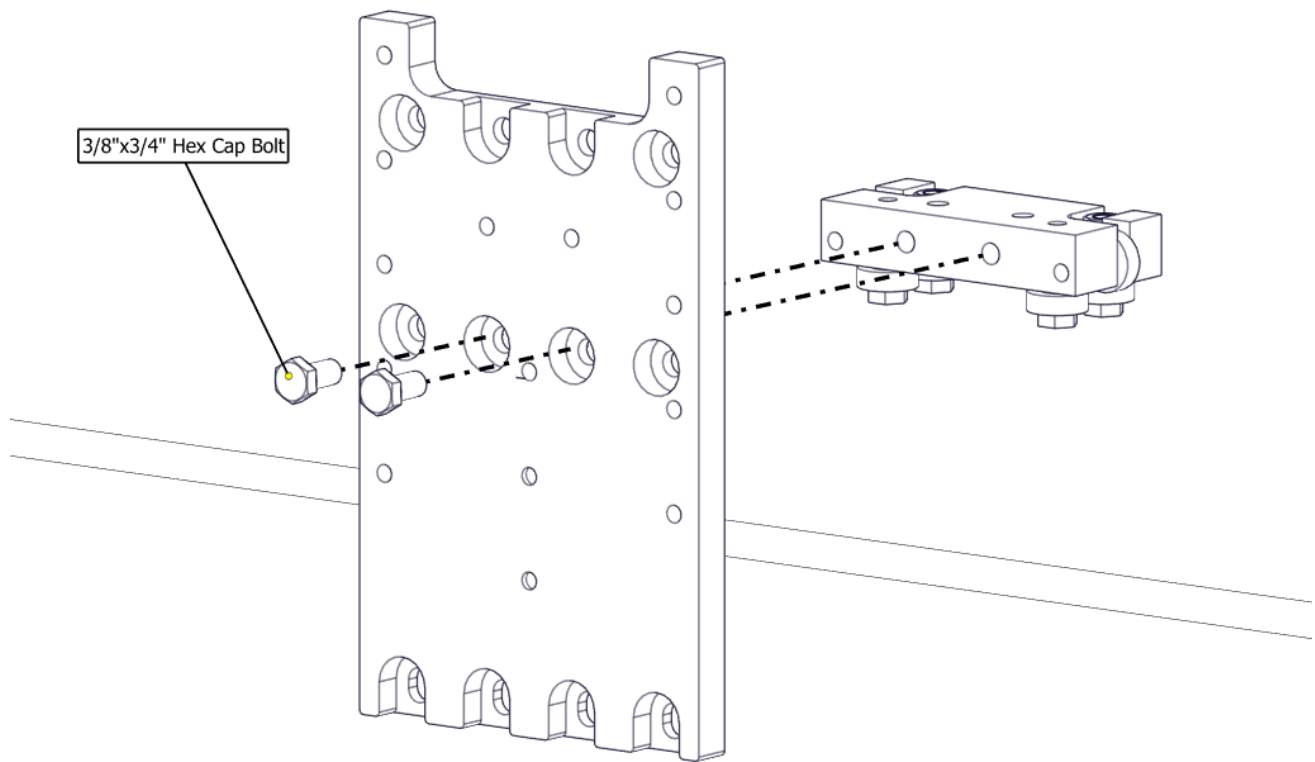
- (2) CRP101-01 linear carriage
- (4) 3/8" x 3/4" hex cap bolts

Bag CRP101-00-FAST will contain all parts necessary for assembling the linear carriages. The 3/8" hex cap bolts are in bag CRP230-00-FAST. Both of these bags and the linear carriage bodies are in bag CRP230-00-HW.

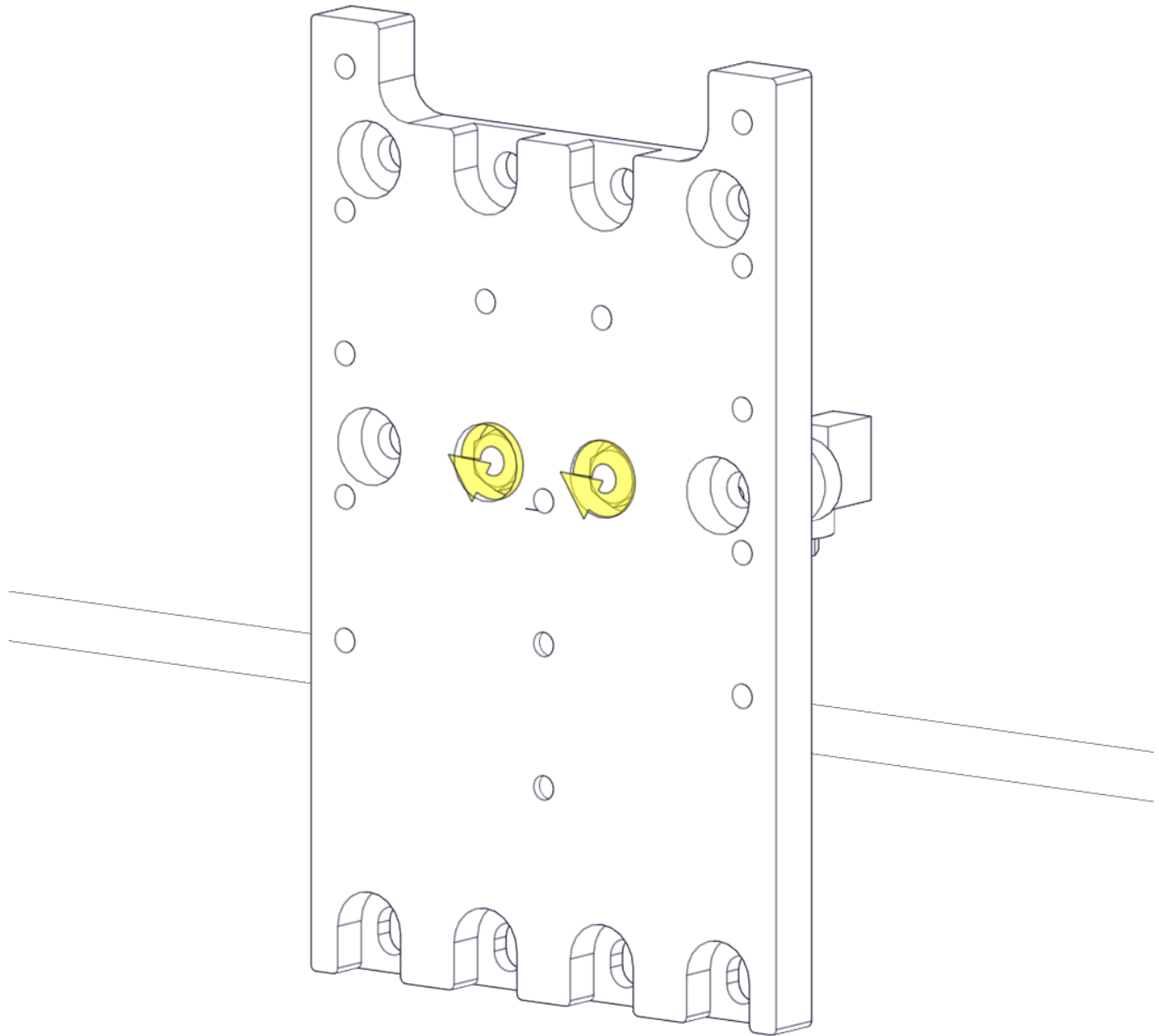


- Assemble two CRP101-01 **linear carriages** as in step 1.8 – Extended Linear Carriage (ELC) Assembly.

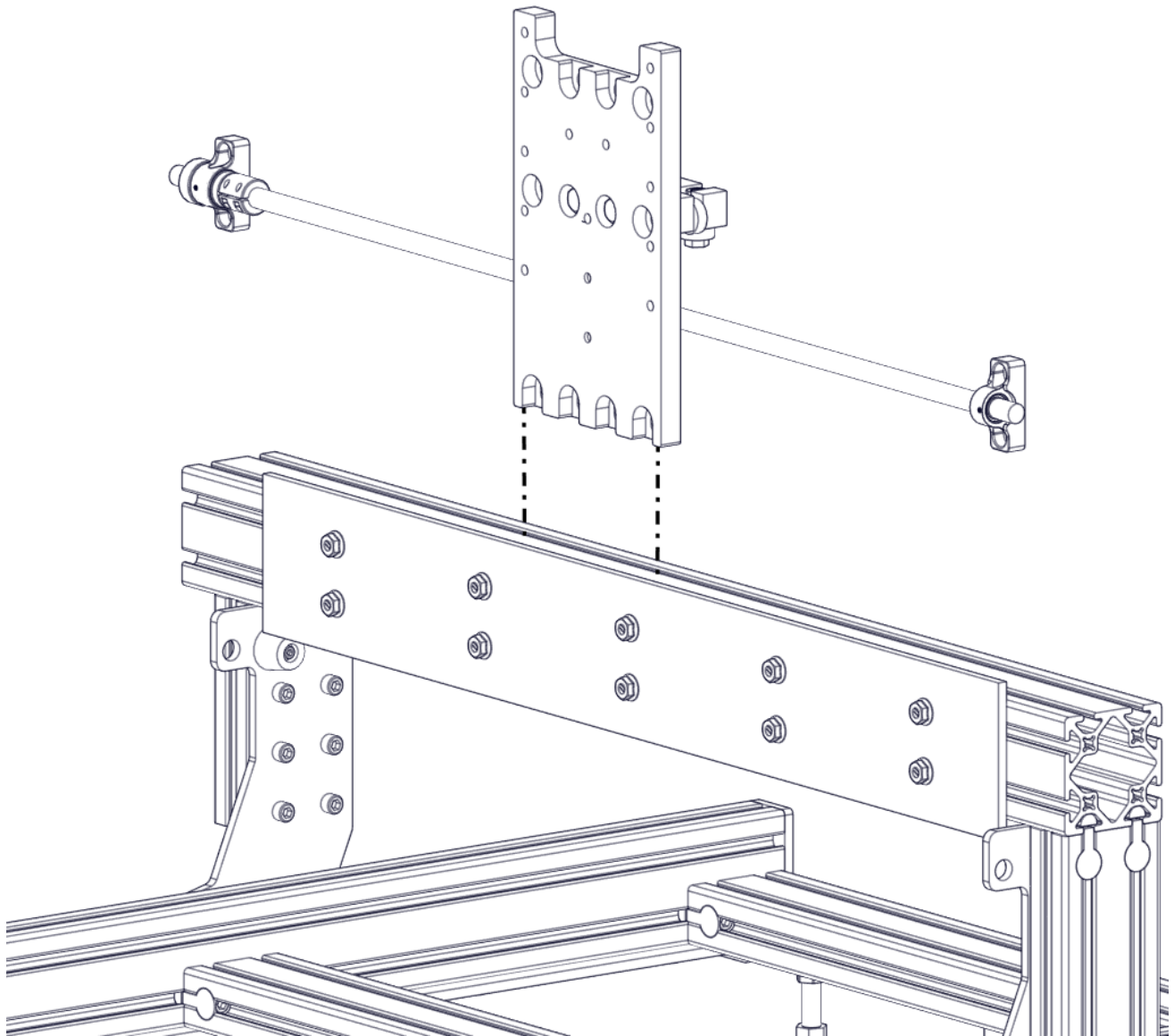
Note: The linear carriage in this step is shorter than the extended linear carriage of step 1.8 however the assembly process is the same.



- Orient the gantry Acme assembly and linear carriage as above.
- Orient the linear carriage so the set screws face away from the high Z-plate.
- Install 3/8" x 3/4" hex cap bolts through the high Z-plate as indicated.
- Thread the 3/8" x 3/4" bolts into the body of the linear carriage as indicated.

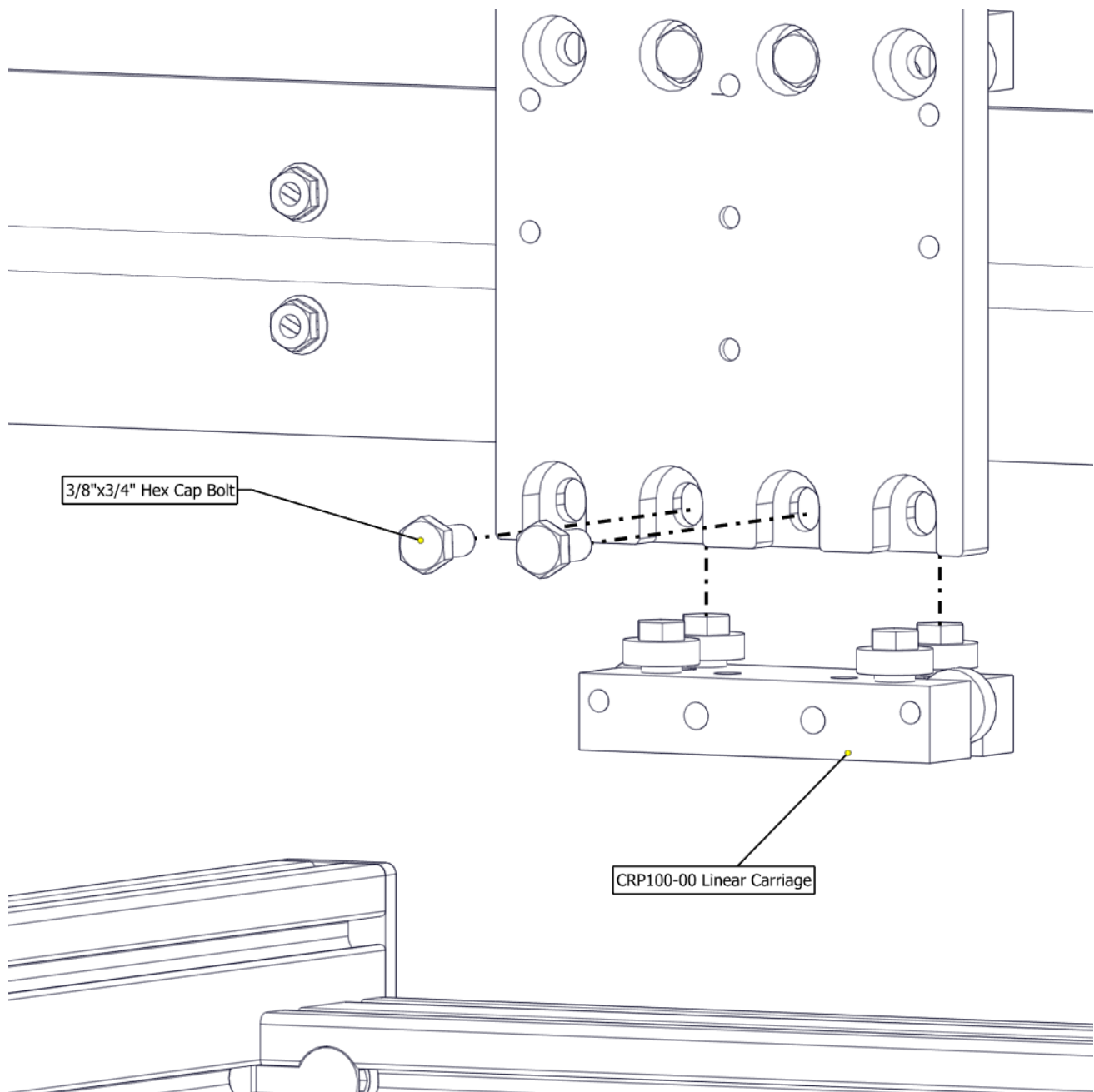


- Partially tighten the highlighted 3/8" x 3/4" hex bolts.

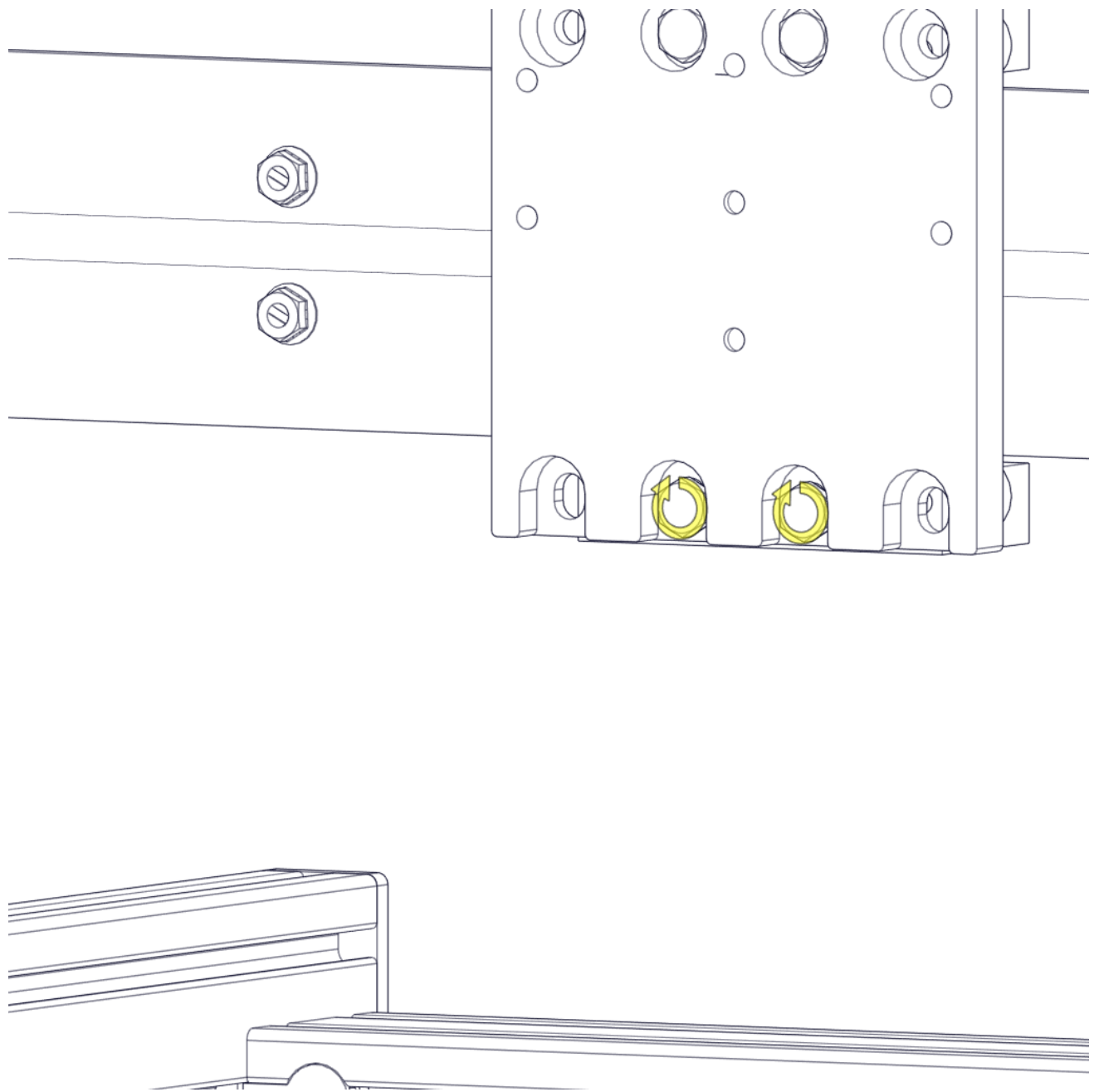


- Position the linear carriage of the high-z assembly so its roller bearings ride on the gantry steel.

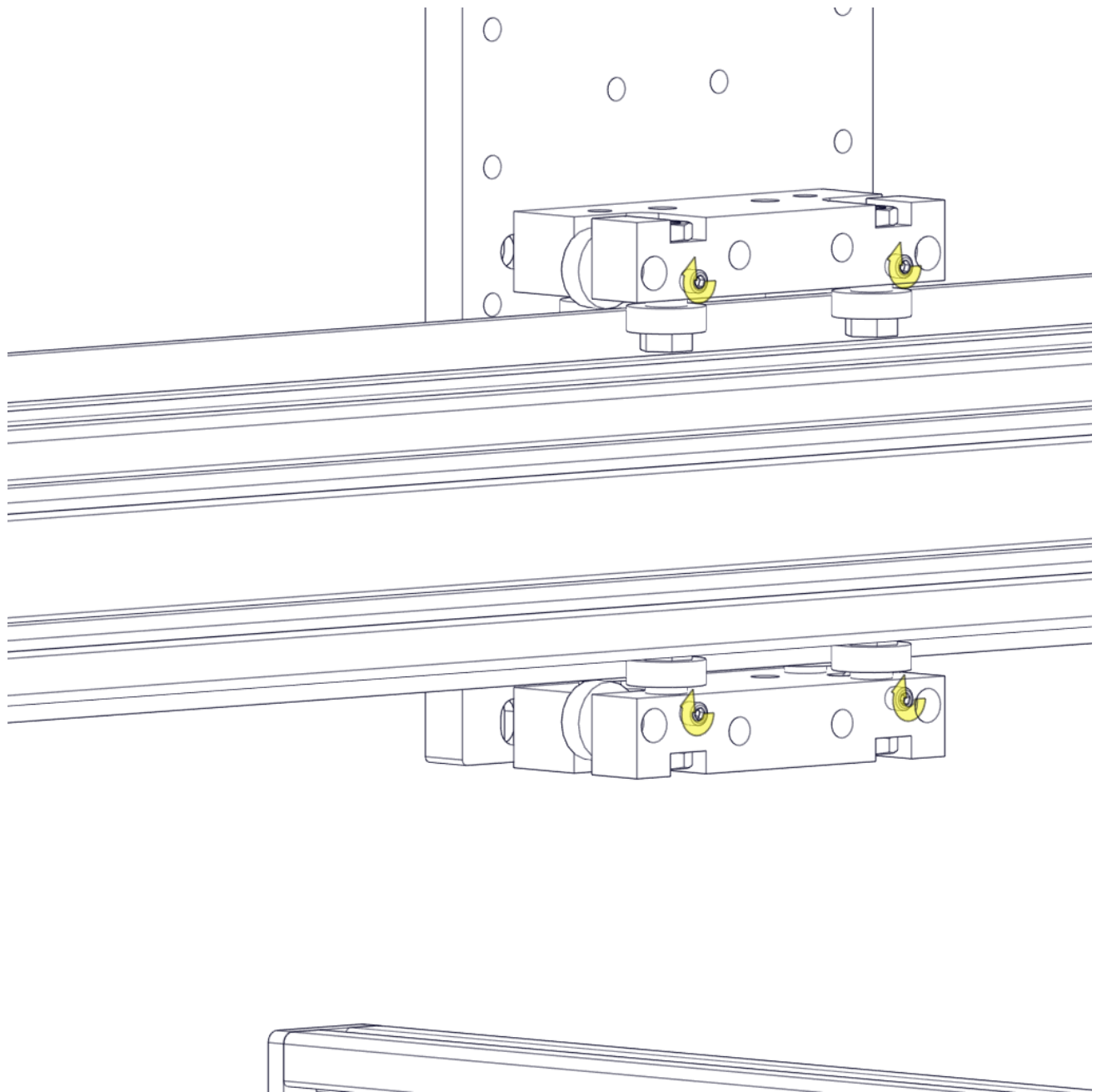
Note: Fully seat gantry steel between roller bearings of linear carriage.



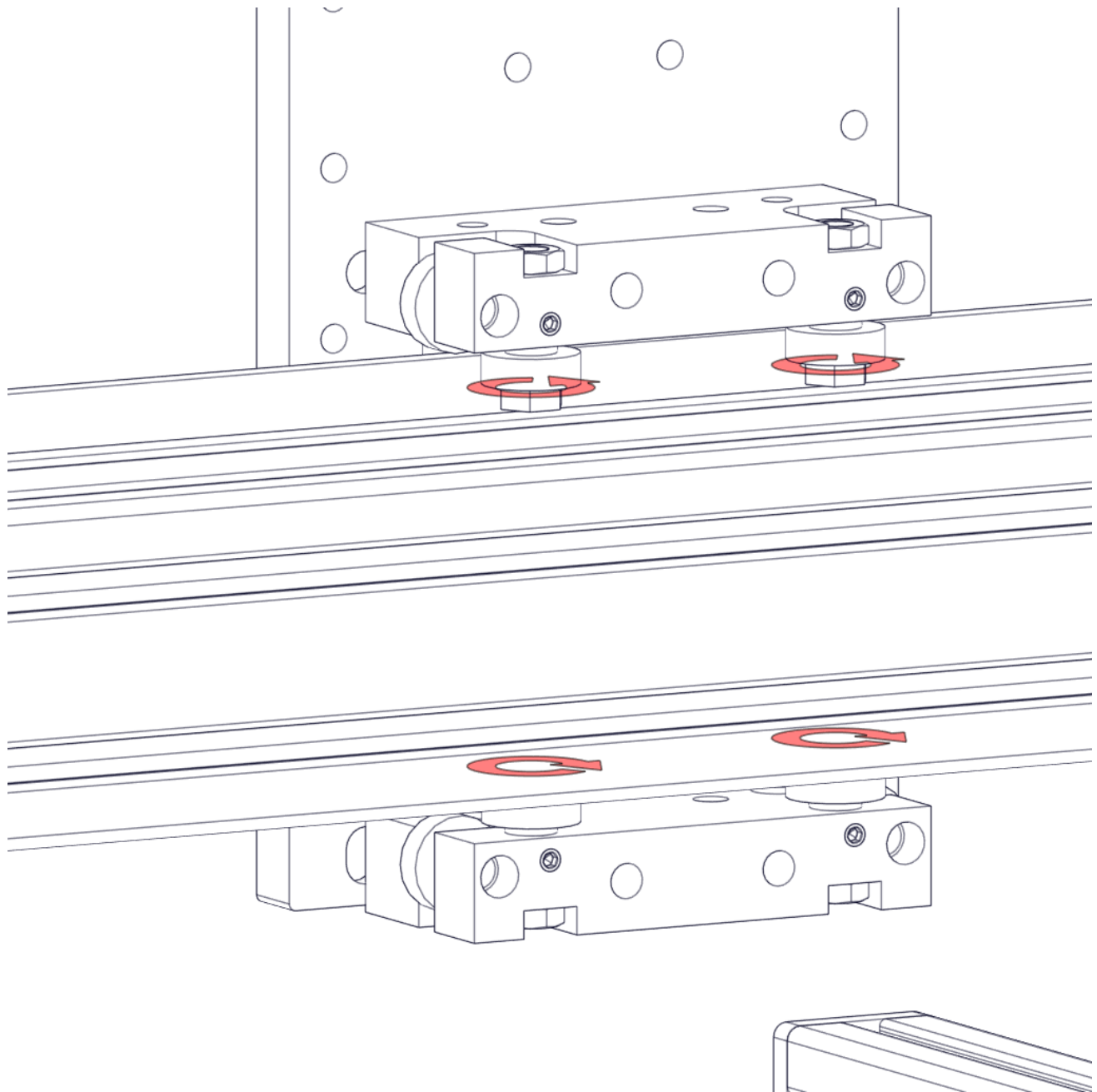
- Orient a previously assembled linear carriage as above, with set screws facing away from high Z-plate.
- Install two 3/8" x 3/4" hex cap bolts through the high Z-plate and into the linear carriage.



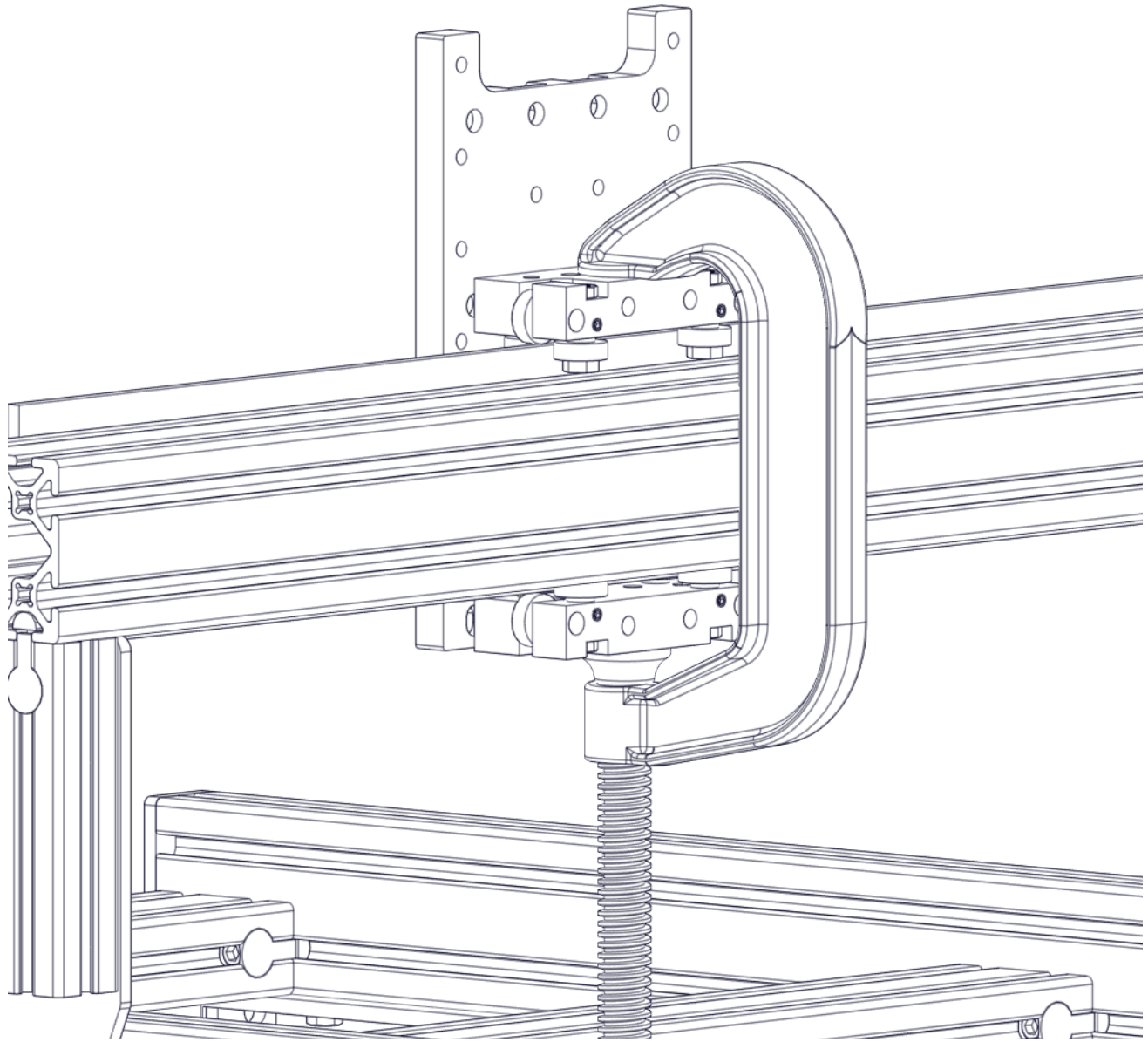
- Partially tighten the highlighted 3/8" hex bolts.



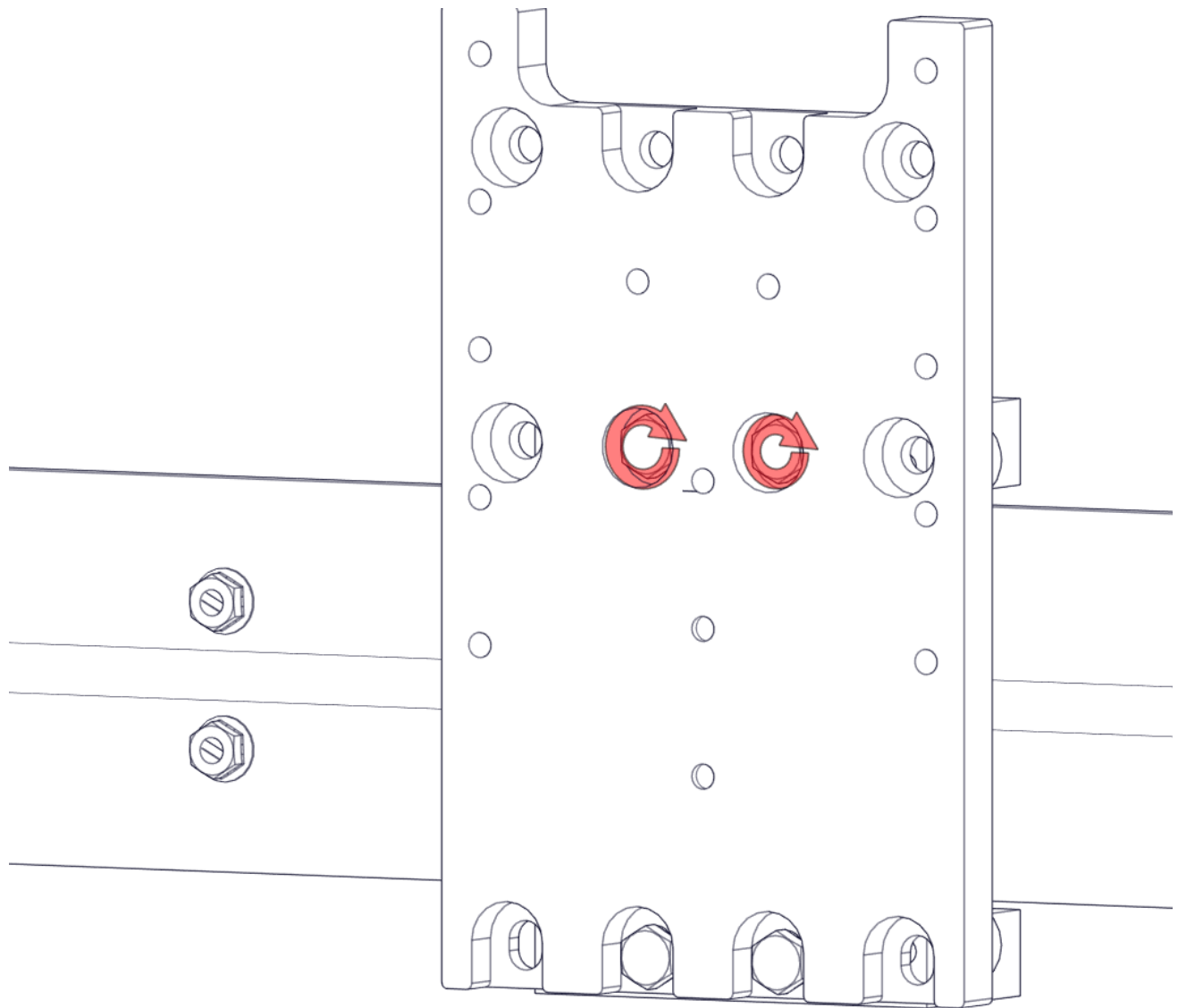
- Confirm the adjustable roller bearings of the linear carriage are not fully tightened.
- Partially tighten the highlighted set screws to bring the adjustable roller bearings into contact with the gantry steel.



- Fully tighten all (4) highlighted adjustable roller bearings.

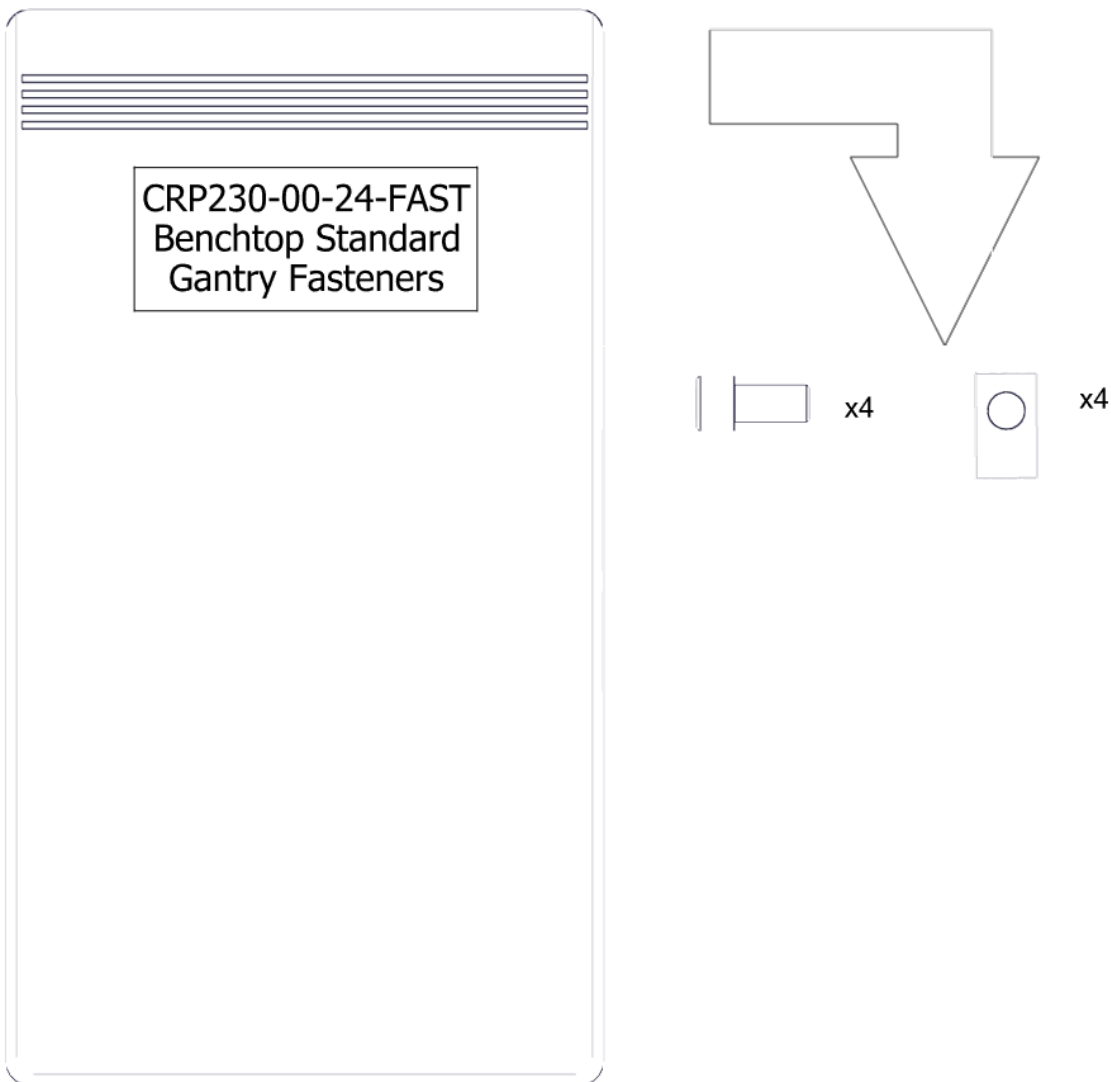


- Apply clamping force across the Linear Carriages until their roller bearings contact the edge of the gantry steel as indicated.



- Fully tighten the highlighted 3/8" hex bolts.
- Remove clamping force.

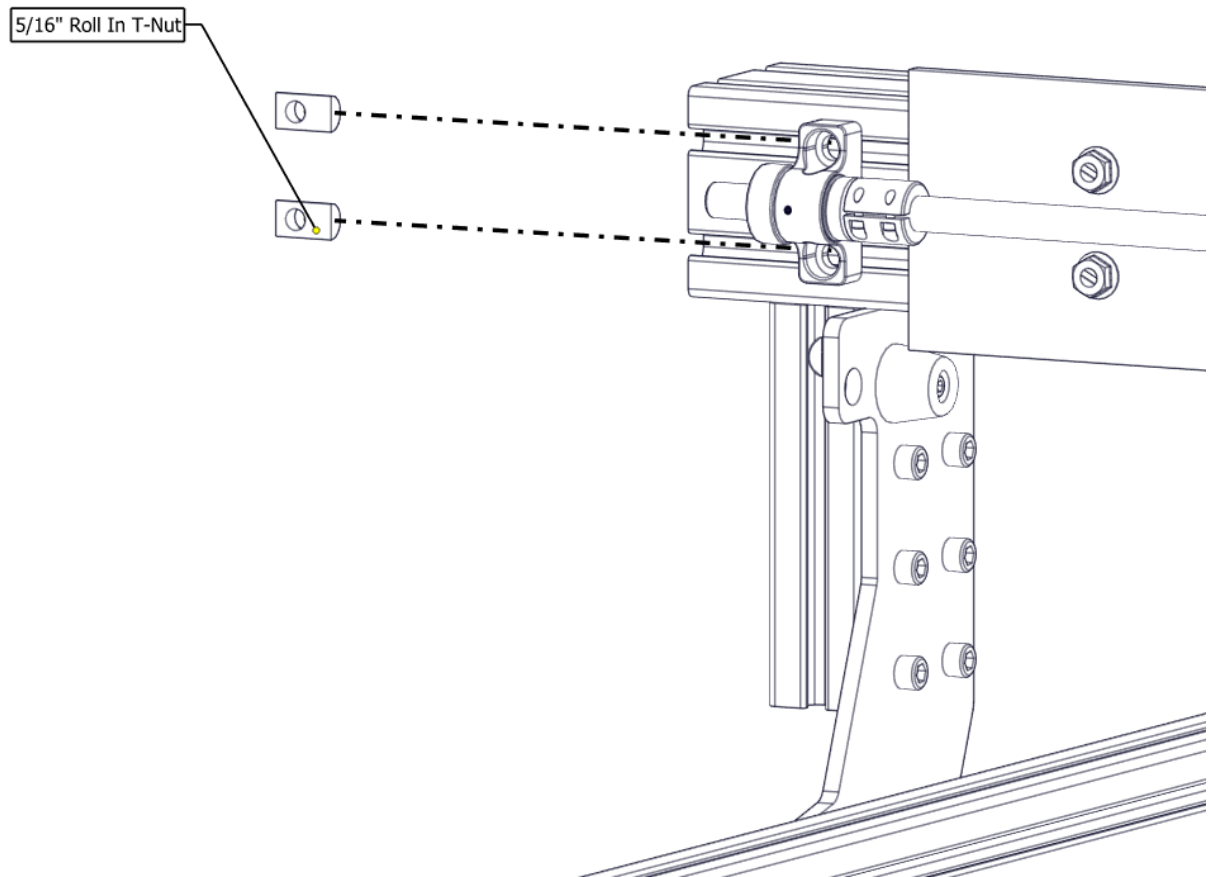
3.6 Gantry Acme Installation



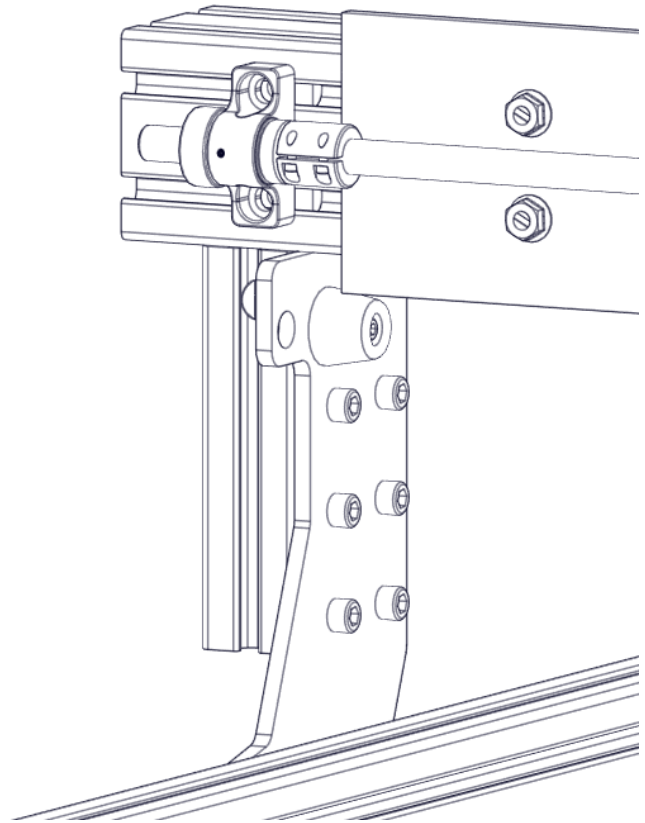
Parts Required:

- (4) 5/16" x 5/8" socket head cap screw
- (4) 5/16" Roll-in t-nuts

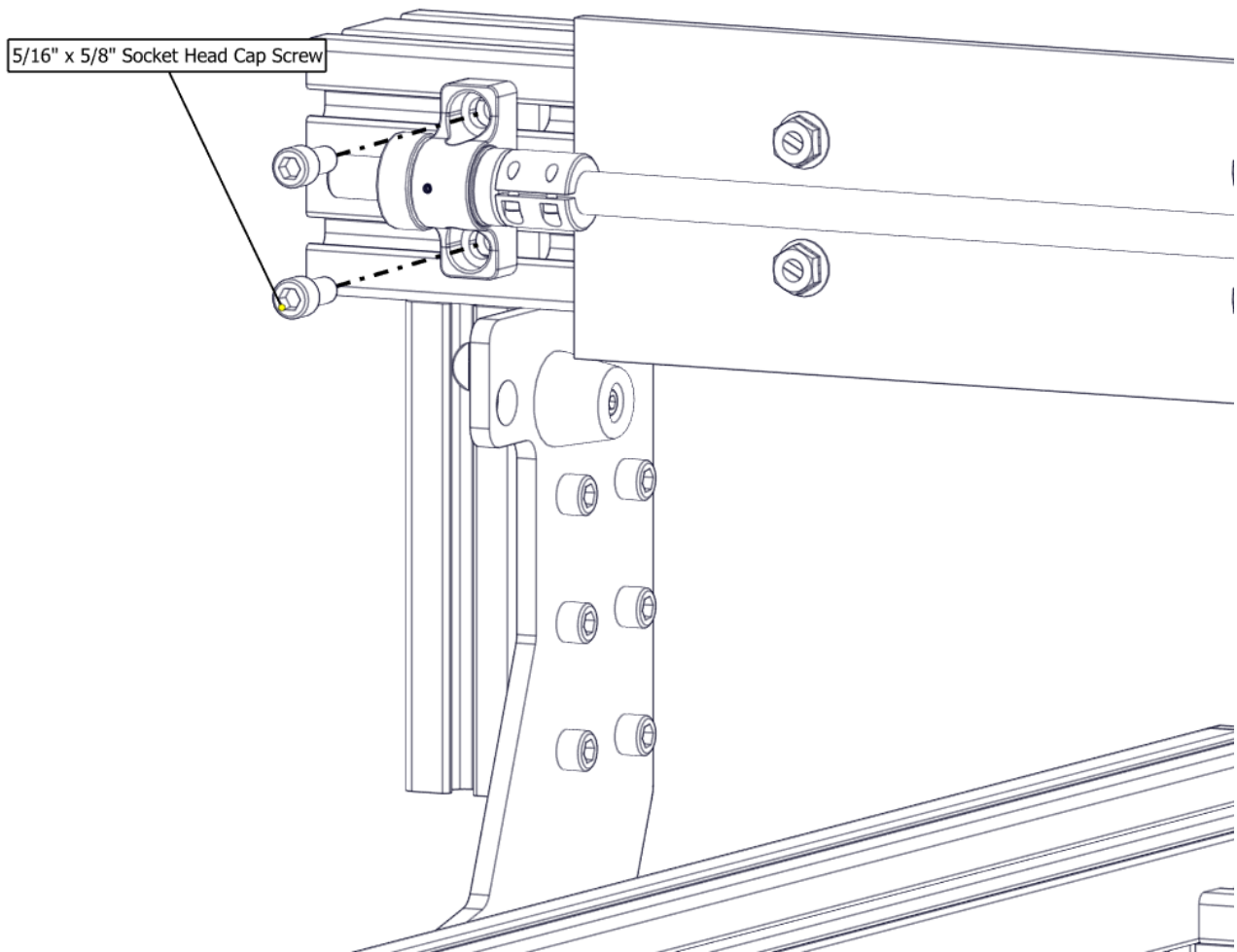
Bag CRP230-00-24-FAST will contain the above parts.



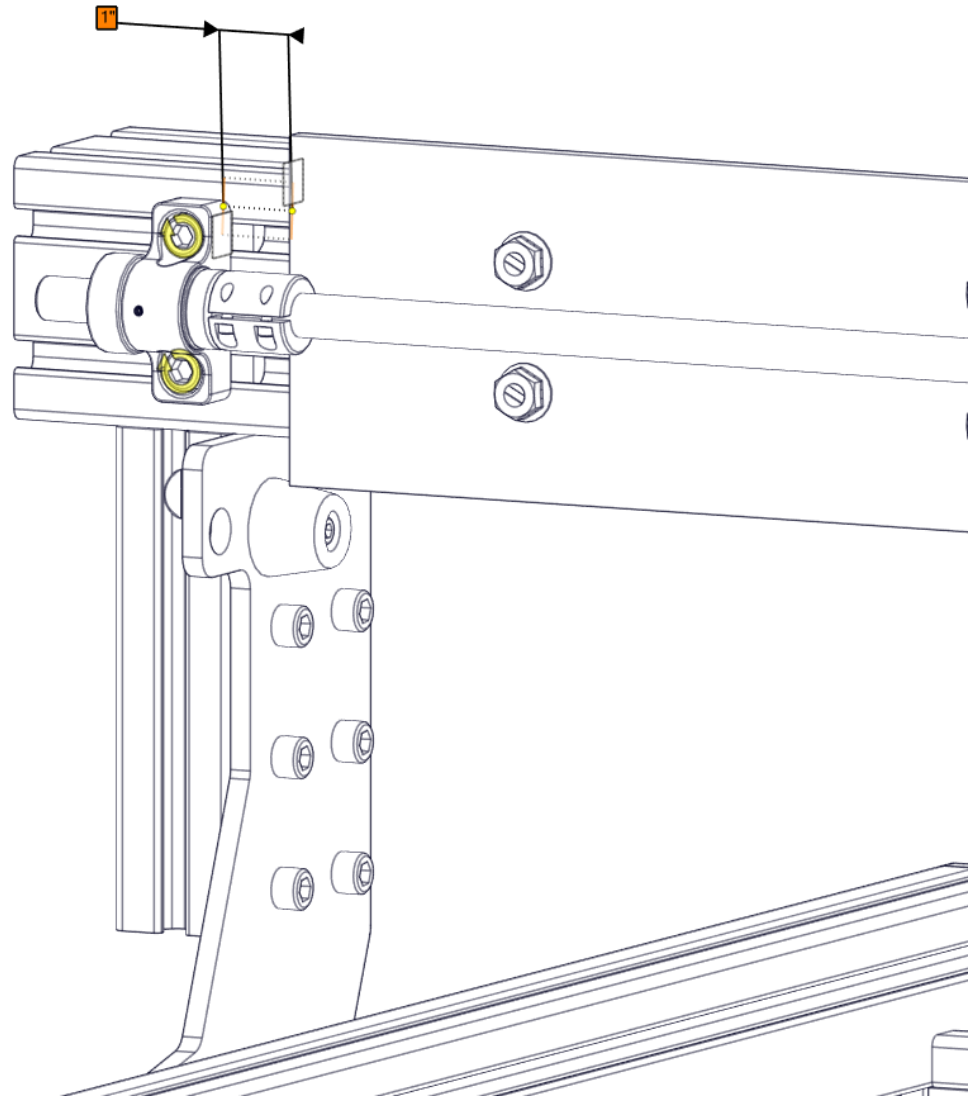
- Install two 5/16" t-nuts into the gantry extrusion as indicated.



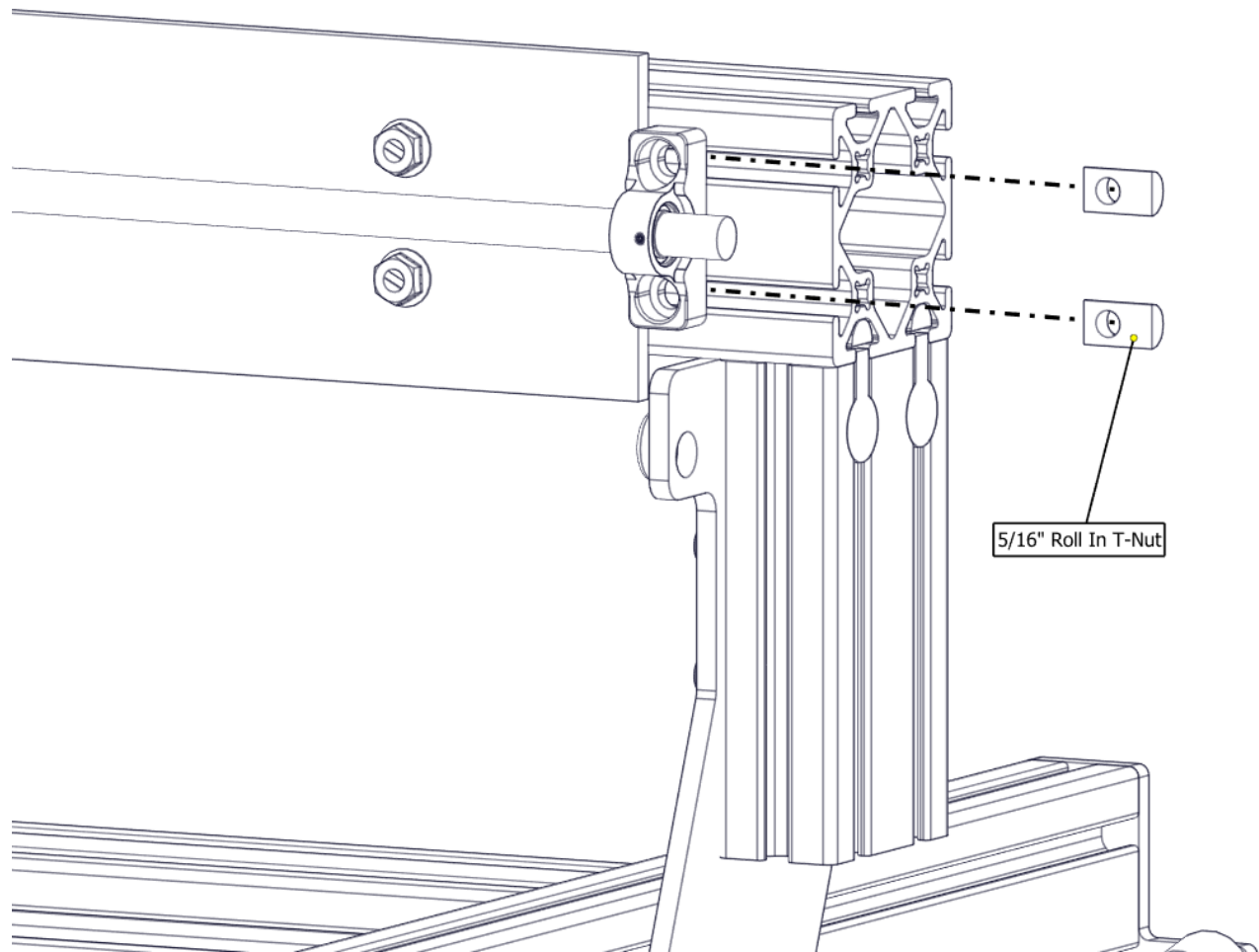
- Position the t-nuts underneath the mounting holes of the CRP163-00 assembly.



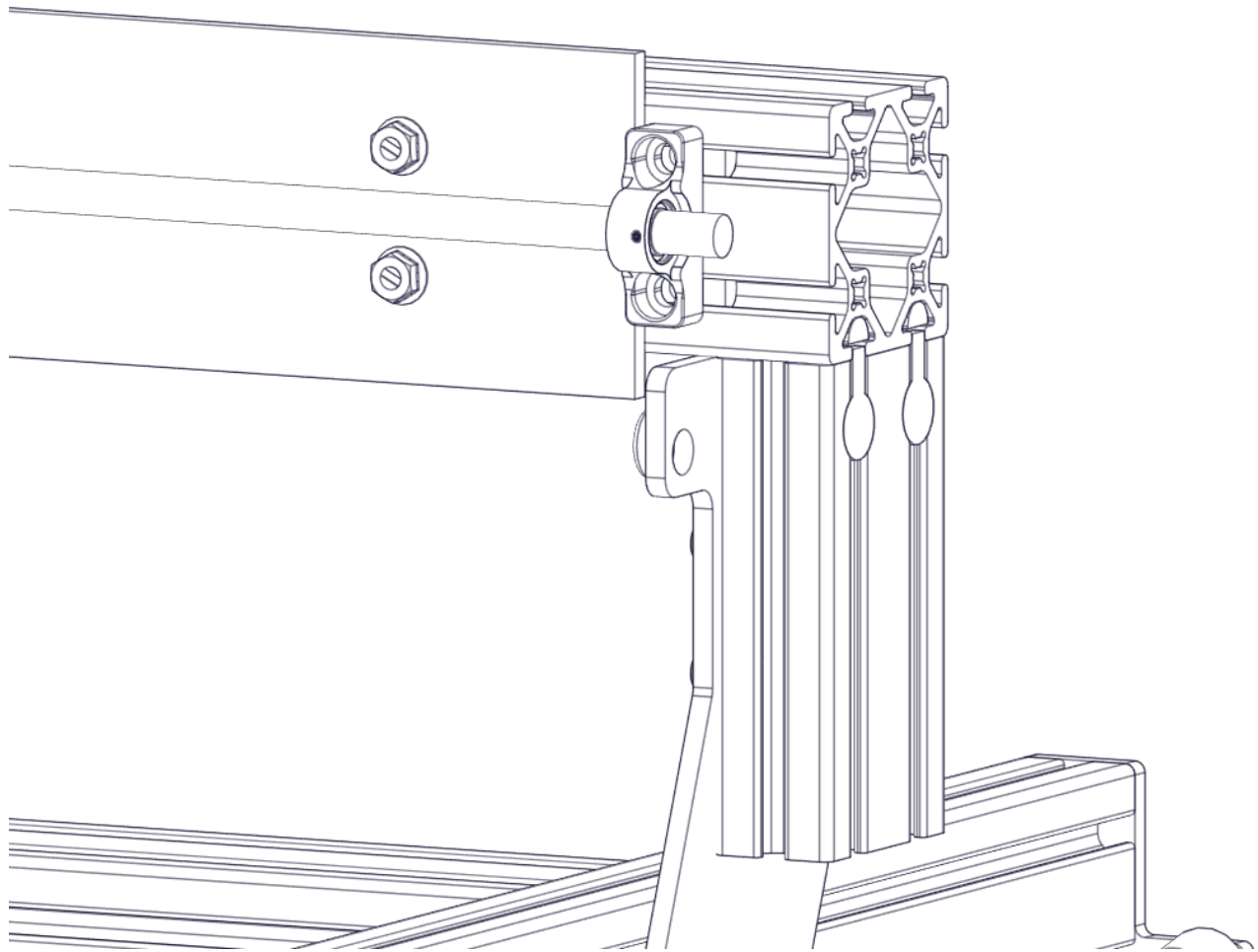
- Install a 5/16" x 5/8" socket head cap screw in each mounting hole of the CRP163-00 assembly.



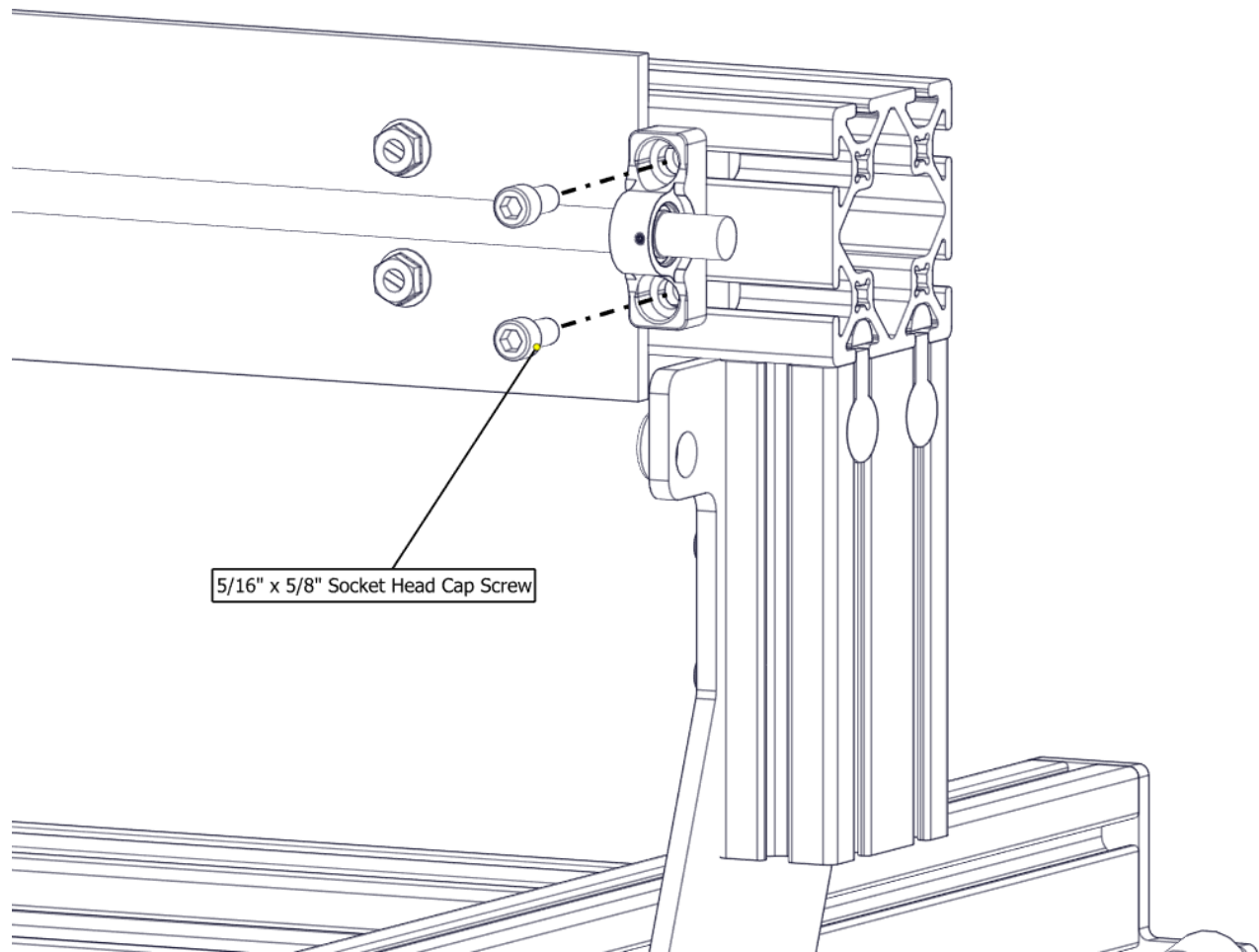
- Adjust the acme rod assembly such that the CRP163-00 assembly is spaced approximately 1" from the steel rail, as indicated.
- Partially tighten the highlighted screws into the previously installed 5/16" t-nuts.



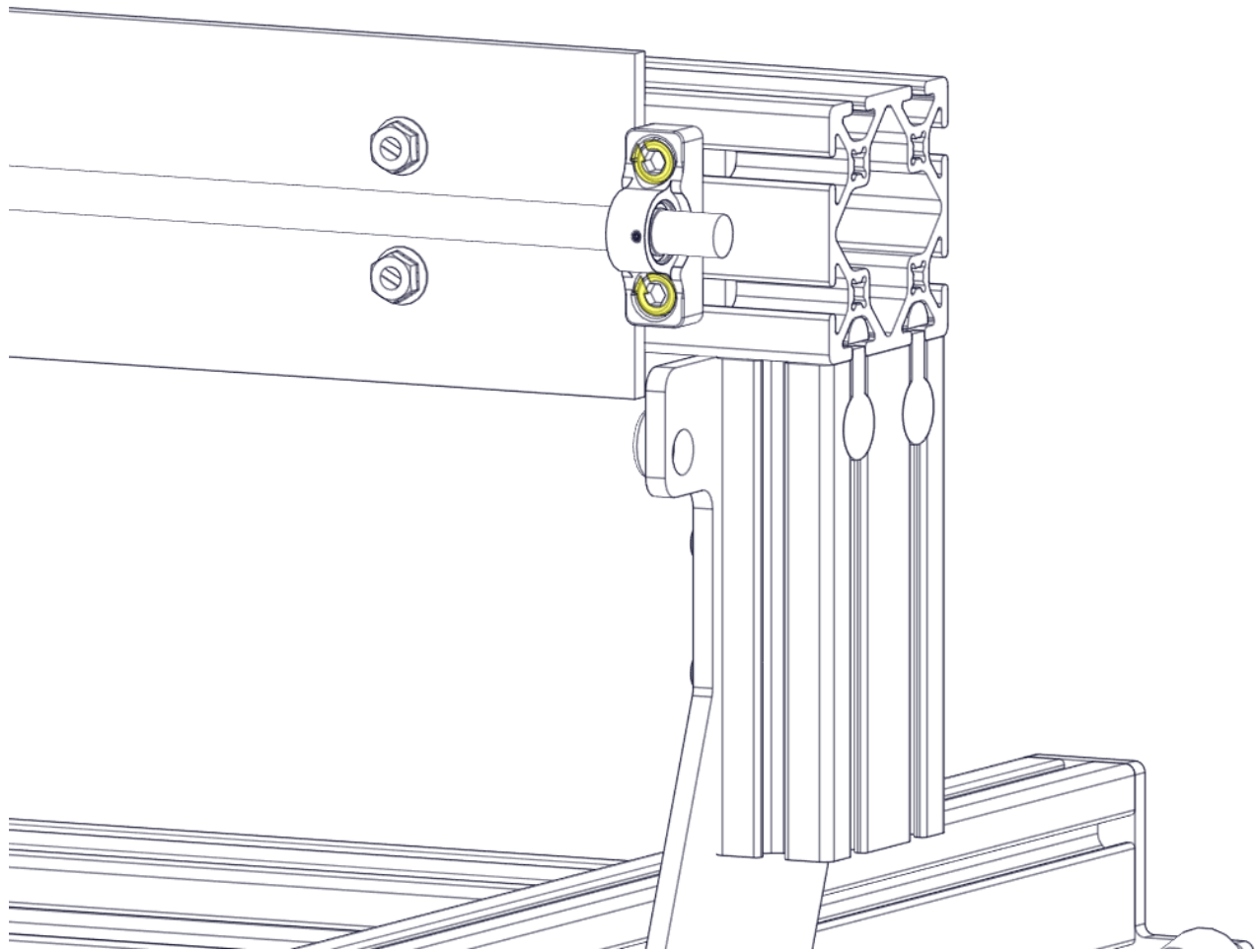
- Install two 5/16" t-nuts into the gantry extrusion as indicated.



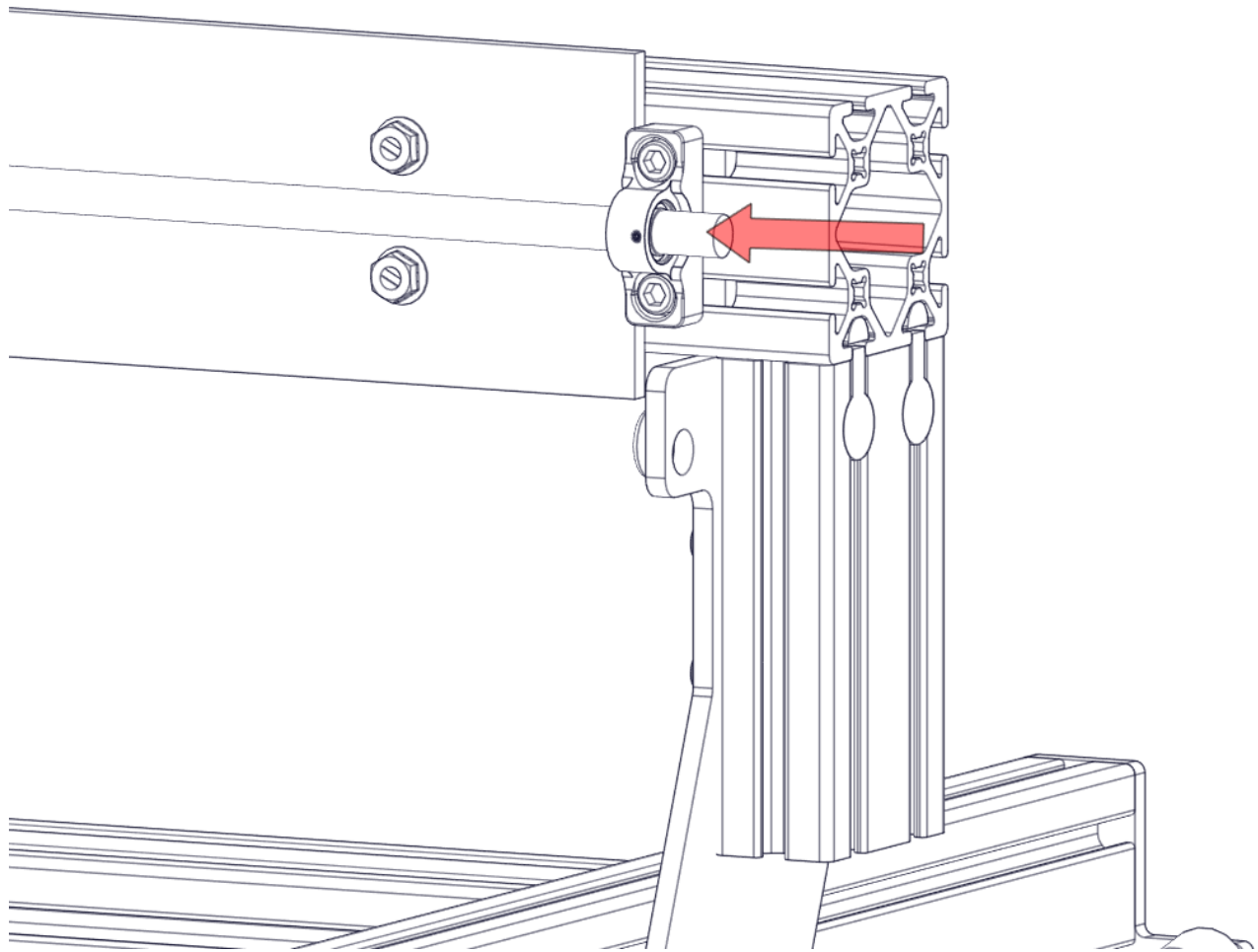
- Position the t-nuts underneath the mounting holes of the CRP164-00 assembly.



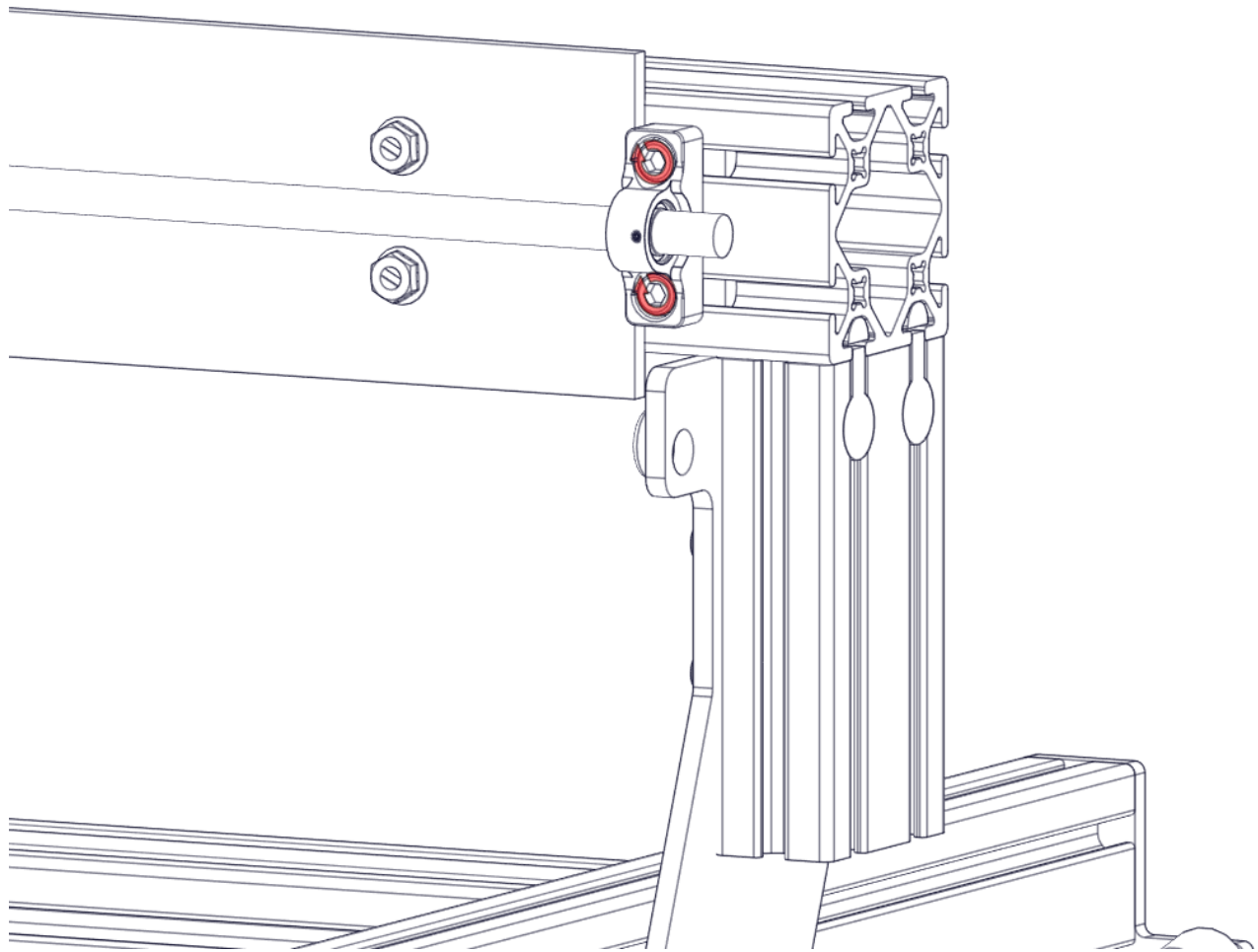
- Install a 5/16" x 5/8" socket head cap screw in each mounting hole of the CRP164-00 assembly.



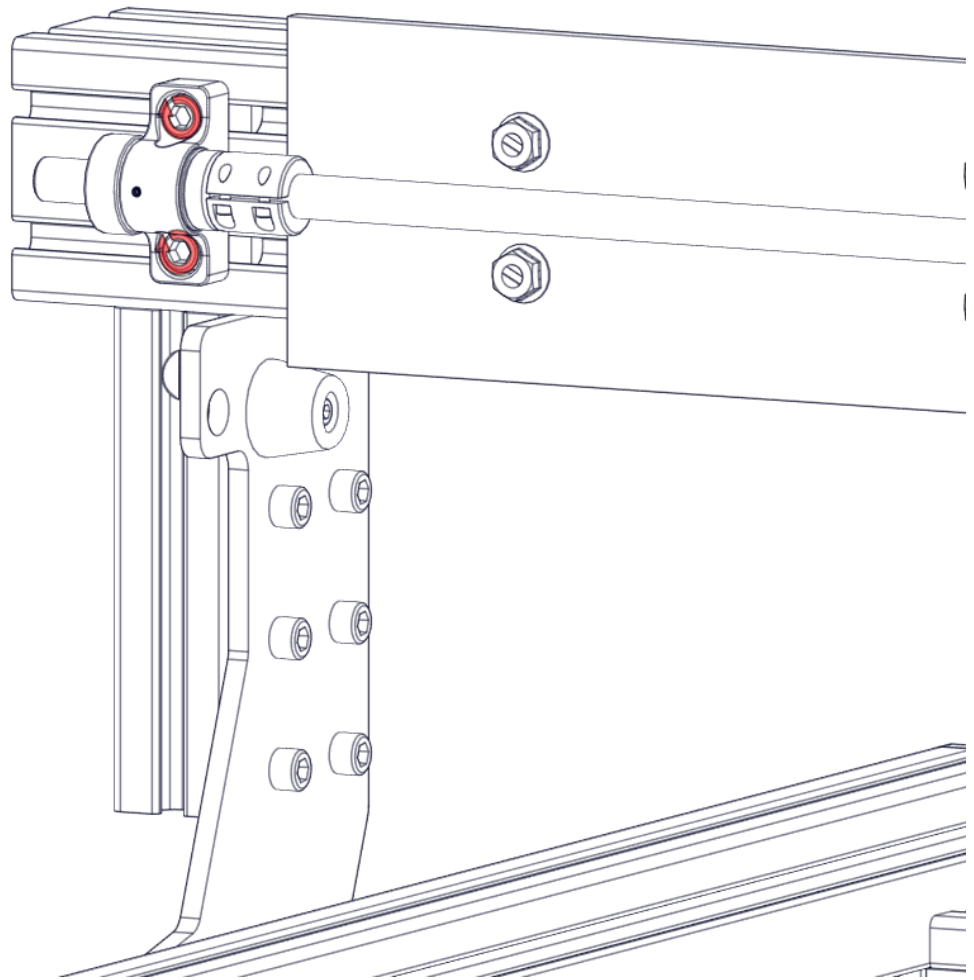
- Partially tighten the socket head cap screws into the previously installed 5/16" t-nuts.



- Slide the CRP164-00 assembly towards the gantry steel until they are flush.



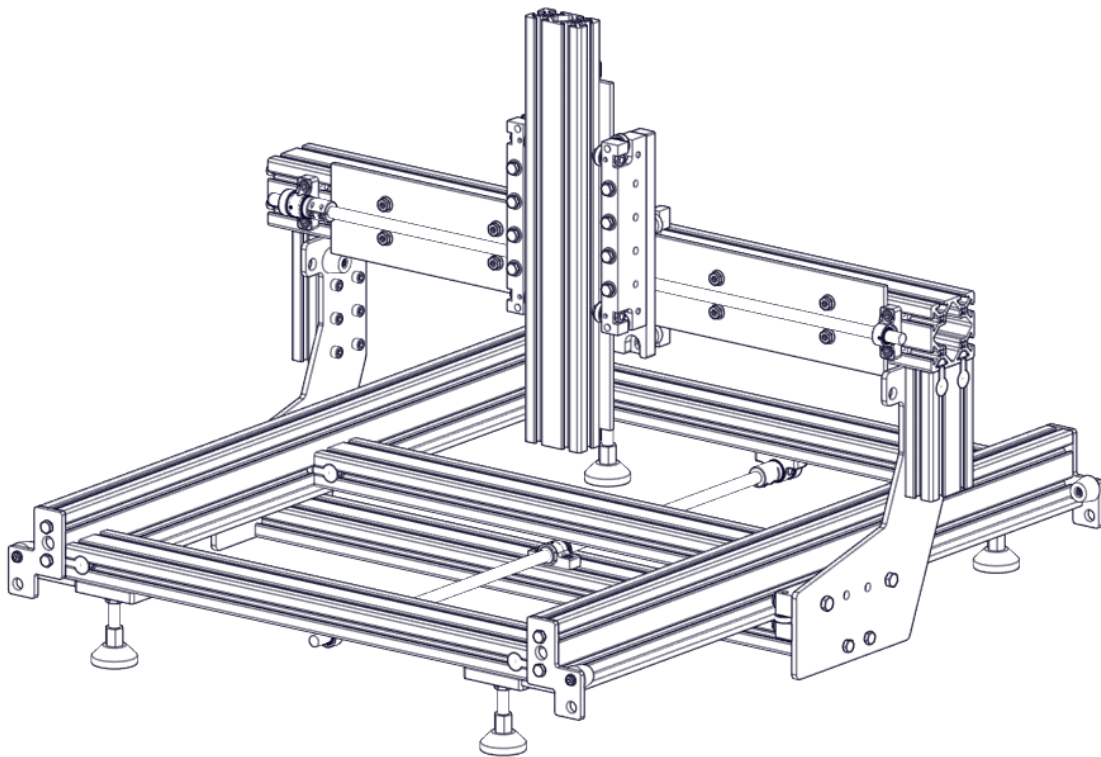
- Fully tighten the highlighted screws.



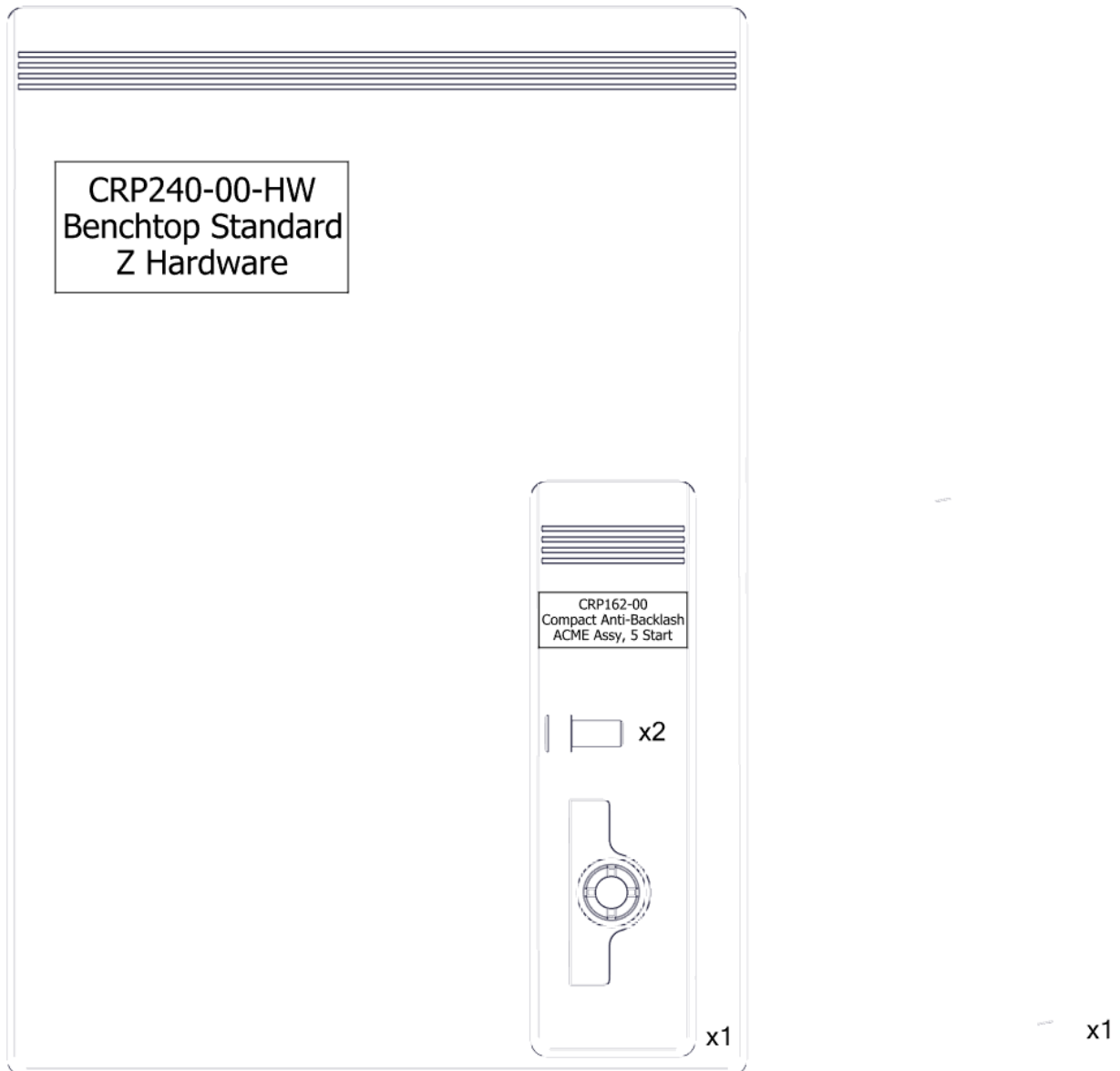
- Fully tighten the highlighted screws.

4

Z-Axis Assembly



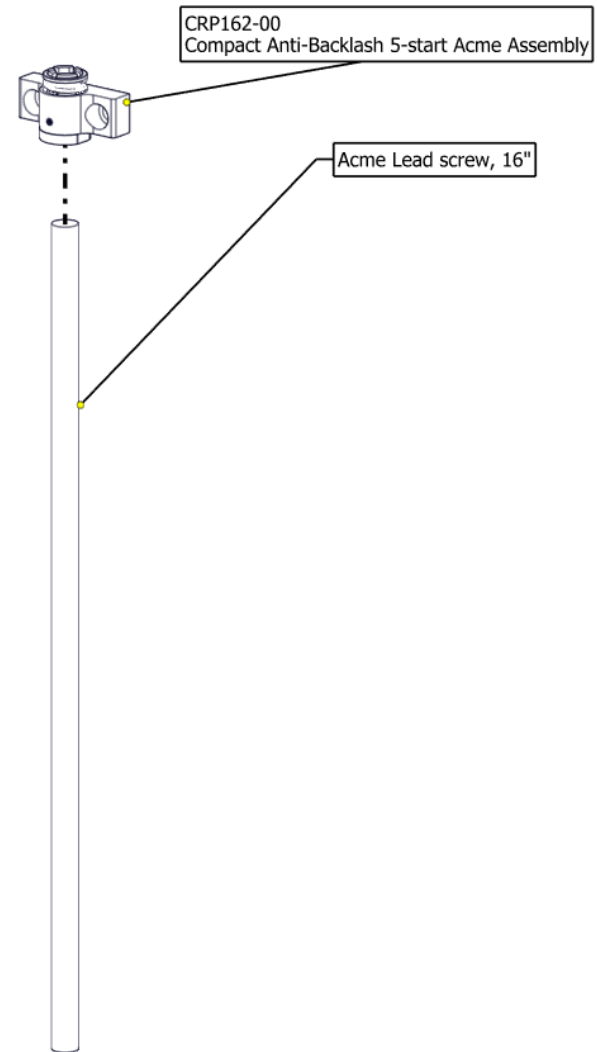
4.1 Z Axis Acme Installation (A)



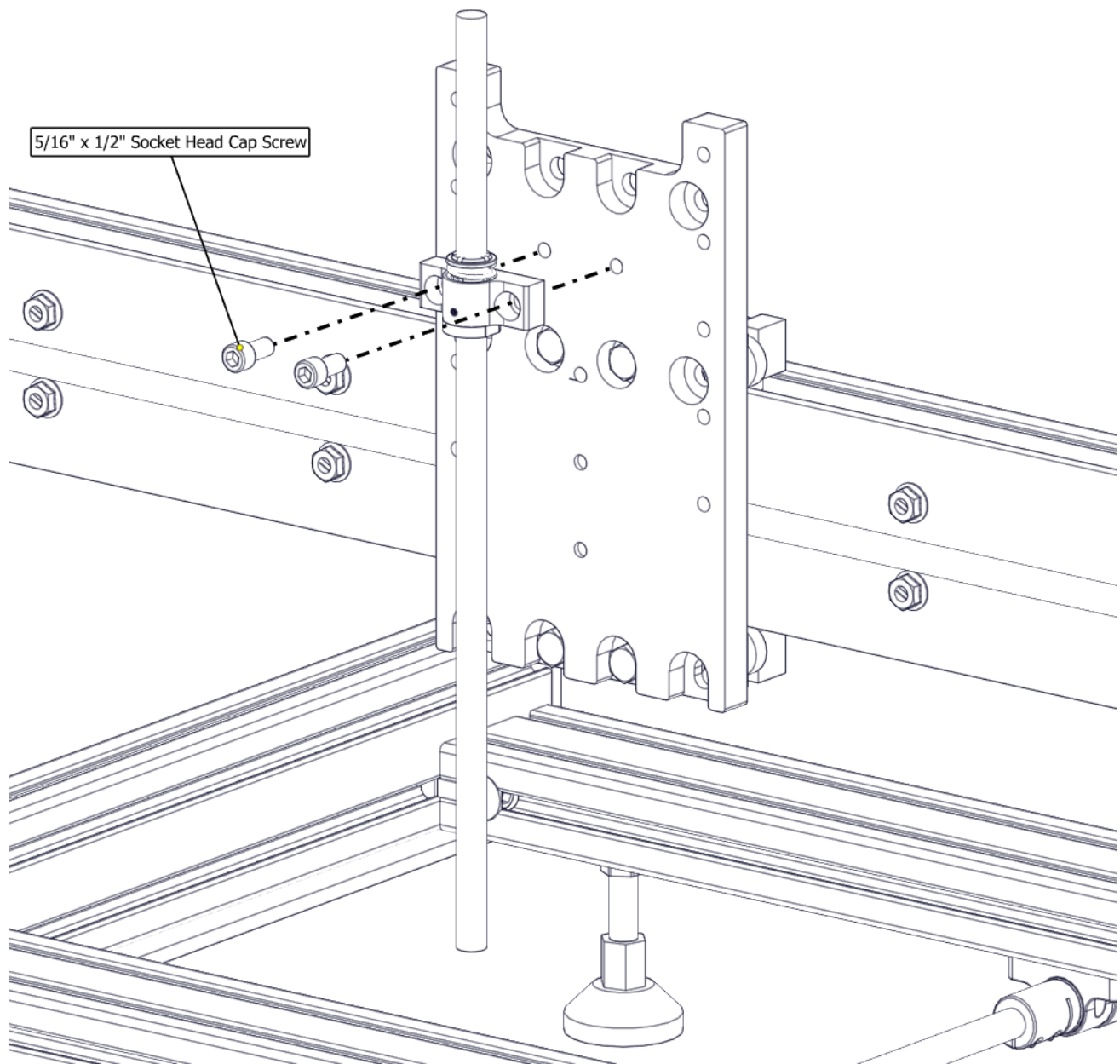
Parts Required:

- (2) 5/16" x 1/2" socket head cap screw
- (1) CRP162-00 assembly
- (1) 16" Acme Lead Screw

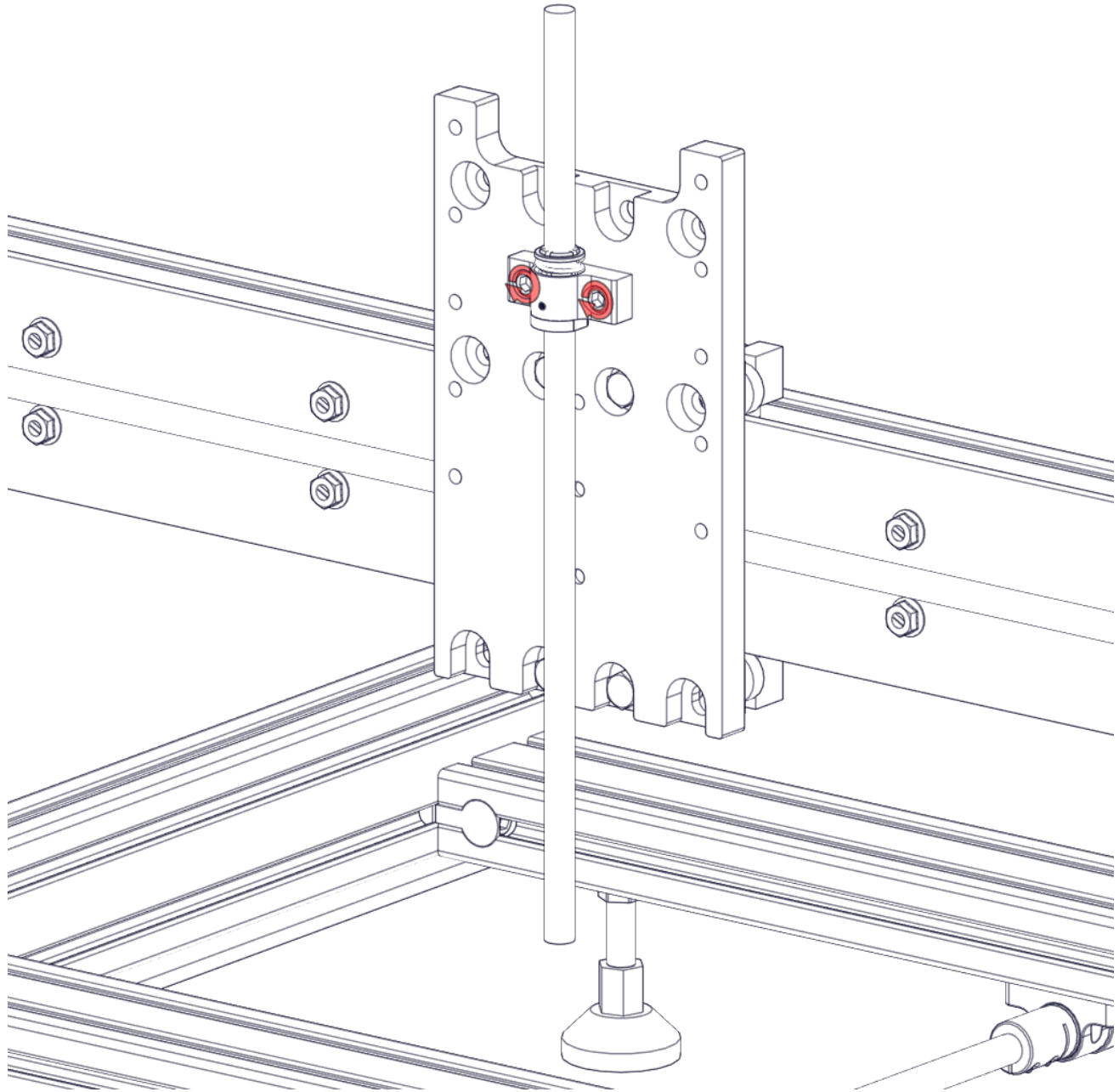
Bag CRP162-00 will contain all parts necessary for this step.
A 16" Acme lead screw will be necessary for this step.



- Thread the CRP162-00 assembly (Acme nut) onto a 16" Acme lead screw.
- Manually compress the Acme nut collar to make this process easier.

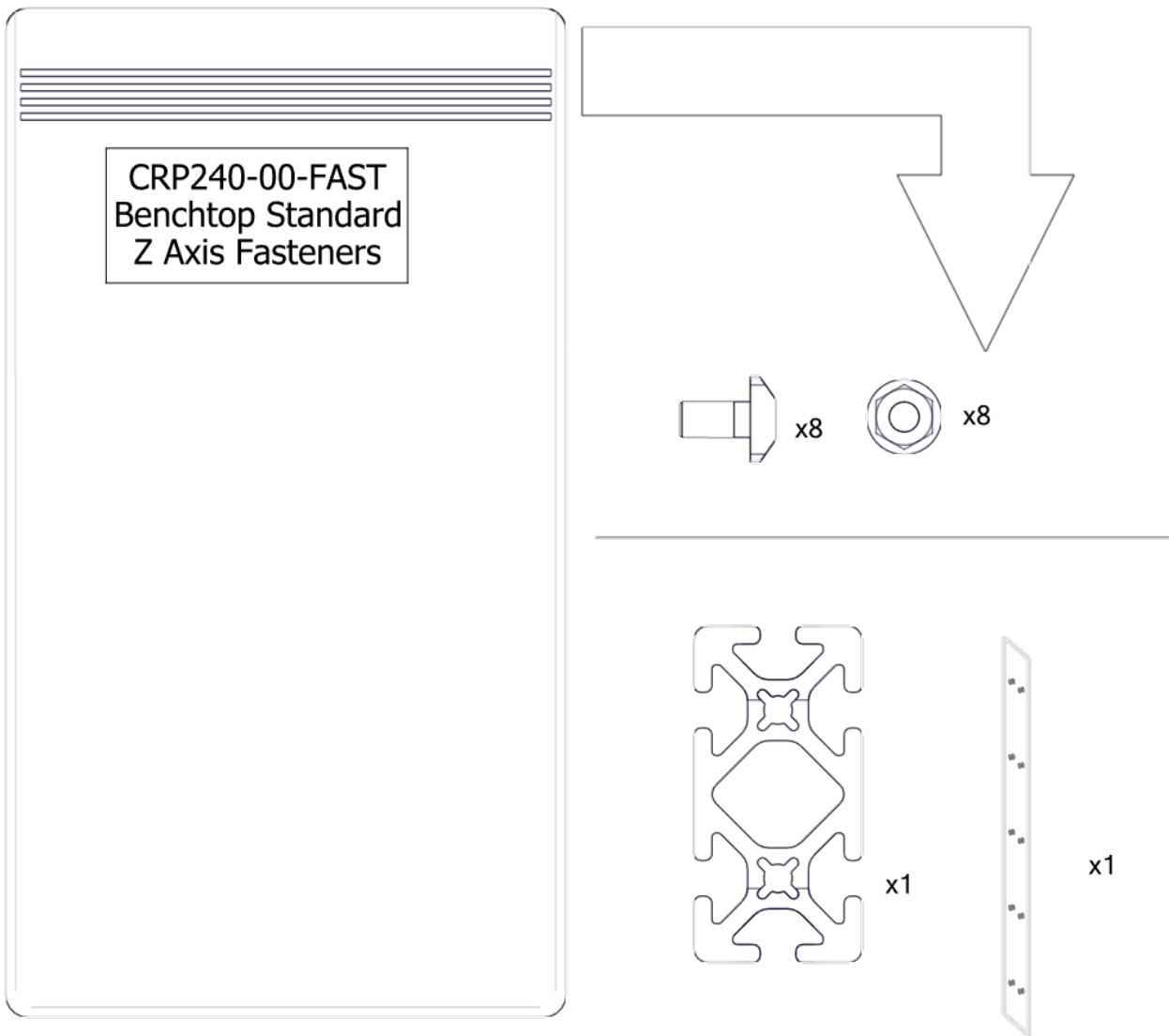


- Install 5/16" x 1/2" socket head cap screws into the mounting holes of the CRP162-00 assembly.
- Thread the socket head cap screws into the high-z plate as indicated.



- Tighten the highlighted screws.

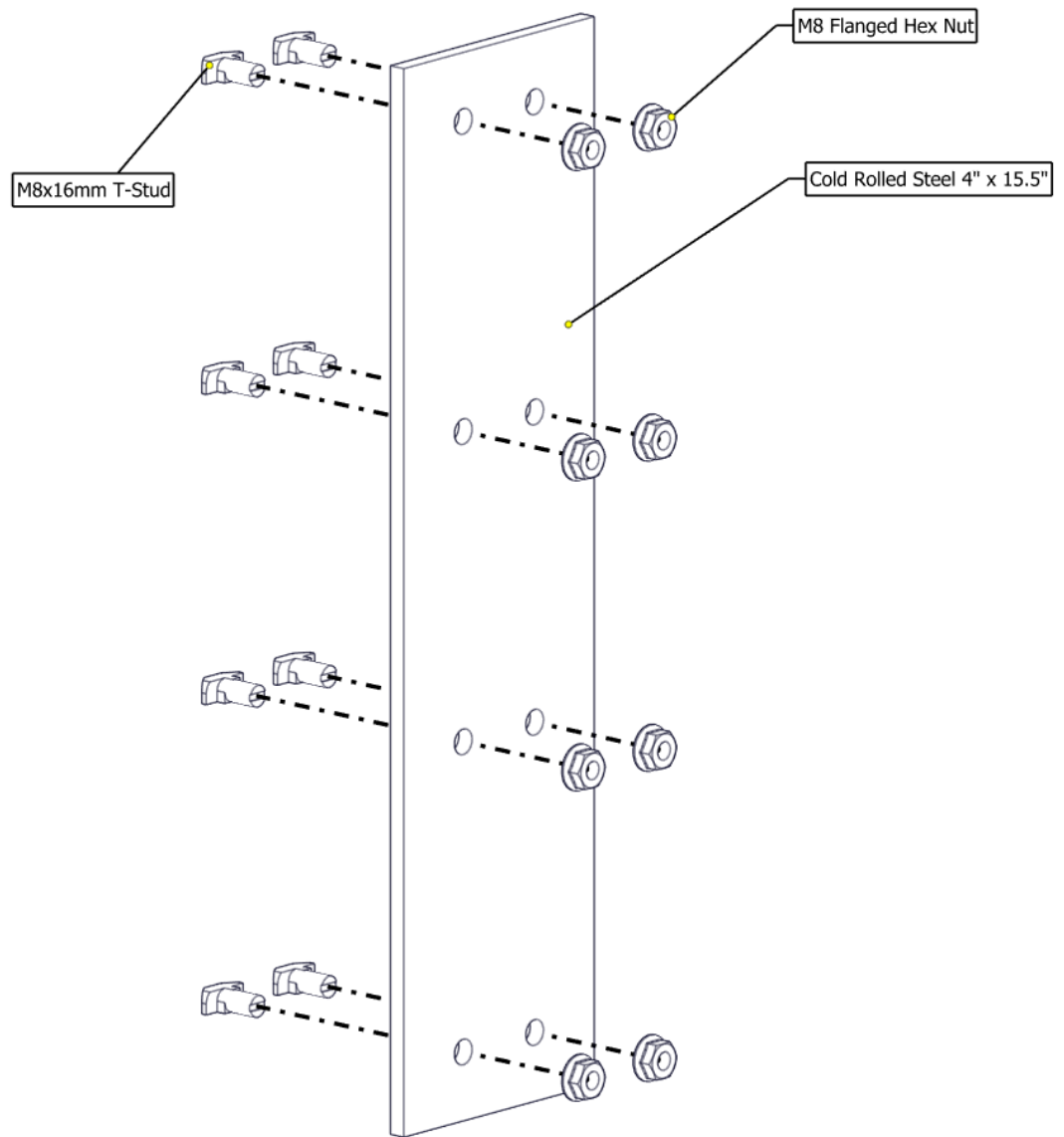
4.2 Z Axis Steel Installation (A)



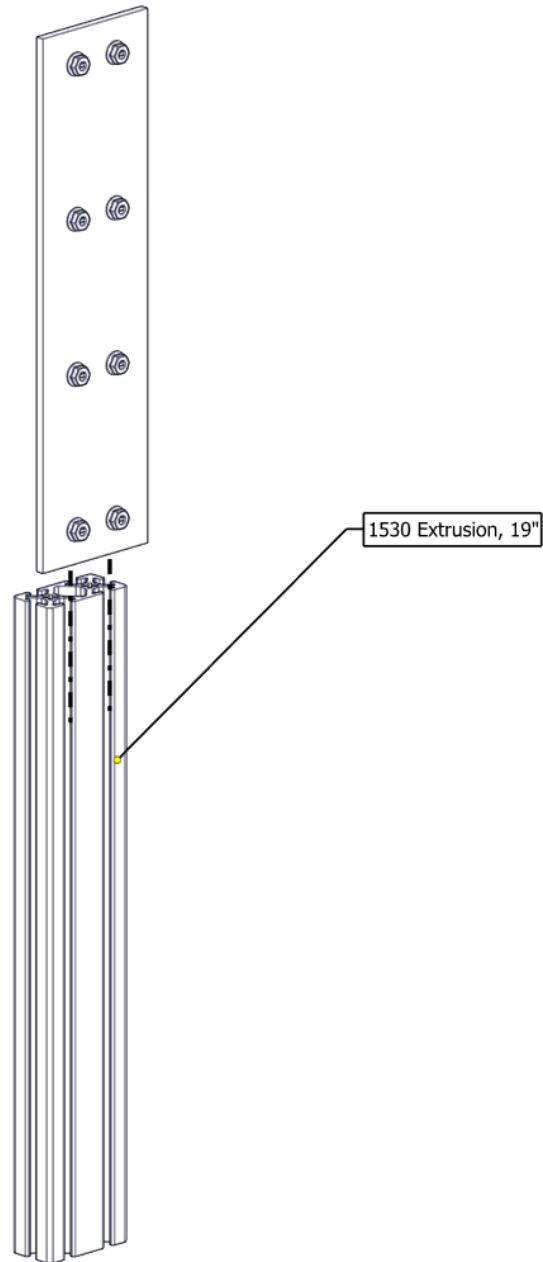
Parts Required:

- (1) 4" x 15.5" steel rail will be necessary for this step.
- (1) 19" piece of 1530 z-axis extrusion will be necessary for this step.
- (8) M8 x 16mm t-stud
- (8) M8 flanged hex nut

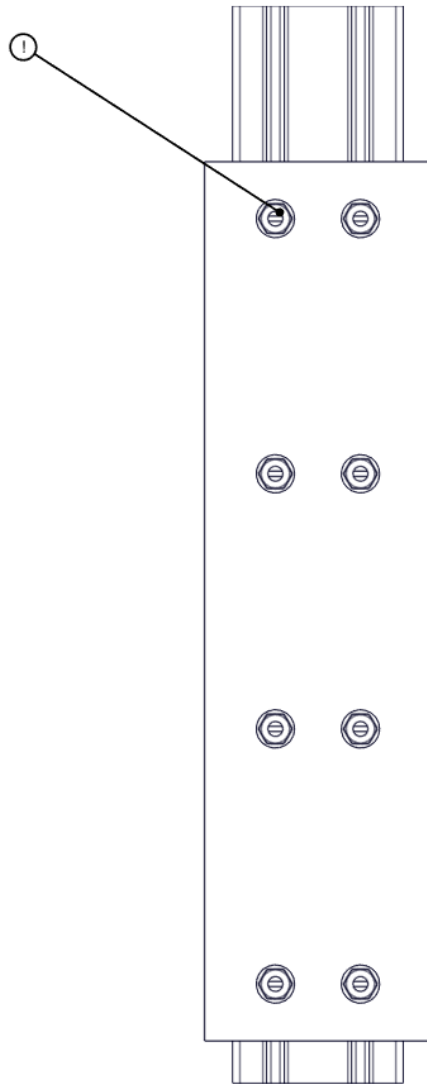
Bag CRP240-00-FAST will contain all fasteners necessary for this step.
Bag CRP240-00-HW will contain Bag CRP240-00-FAST.



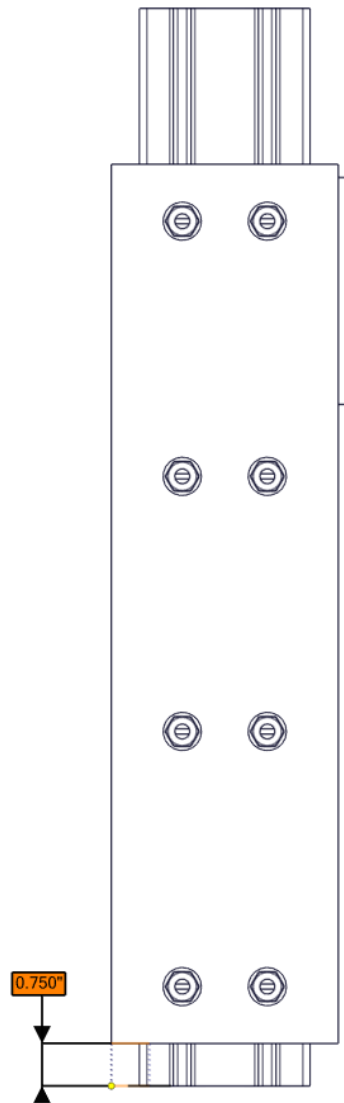
- Install an M8 x 16mm t-stud into all (8) holes of the 4" x 15.5" **z-axis steel**.
- Partially thread a M8 flanged hex nut onto each t-stud.



- Slide the t-studs of the z-axis steel assembly into the z-axis extrusion as indicated.

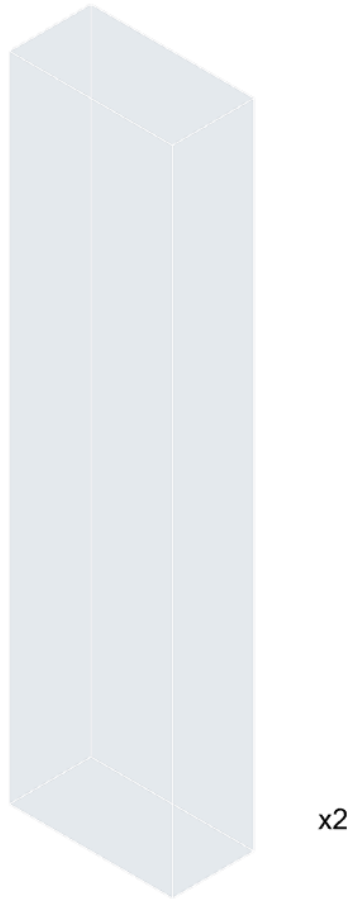


- Confirm the slits in the top of the t-studs are perpendicular to the t-slot as above.



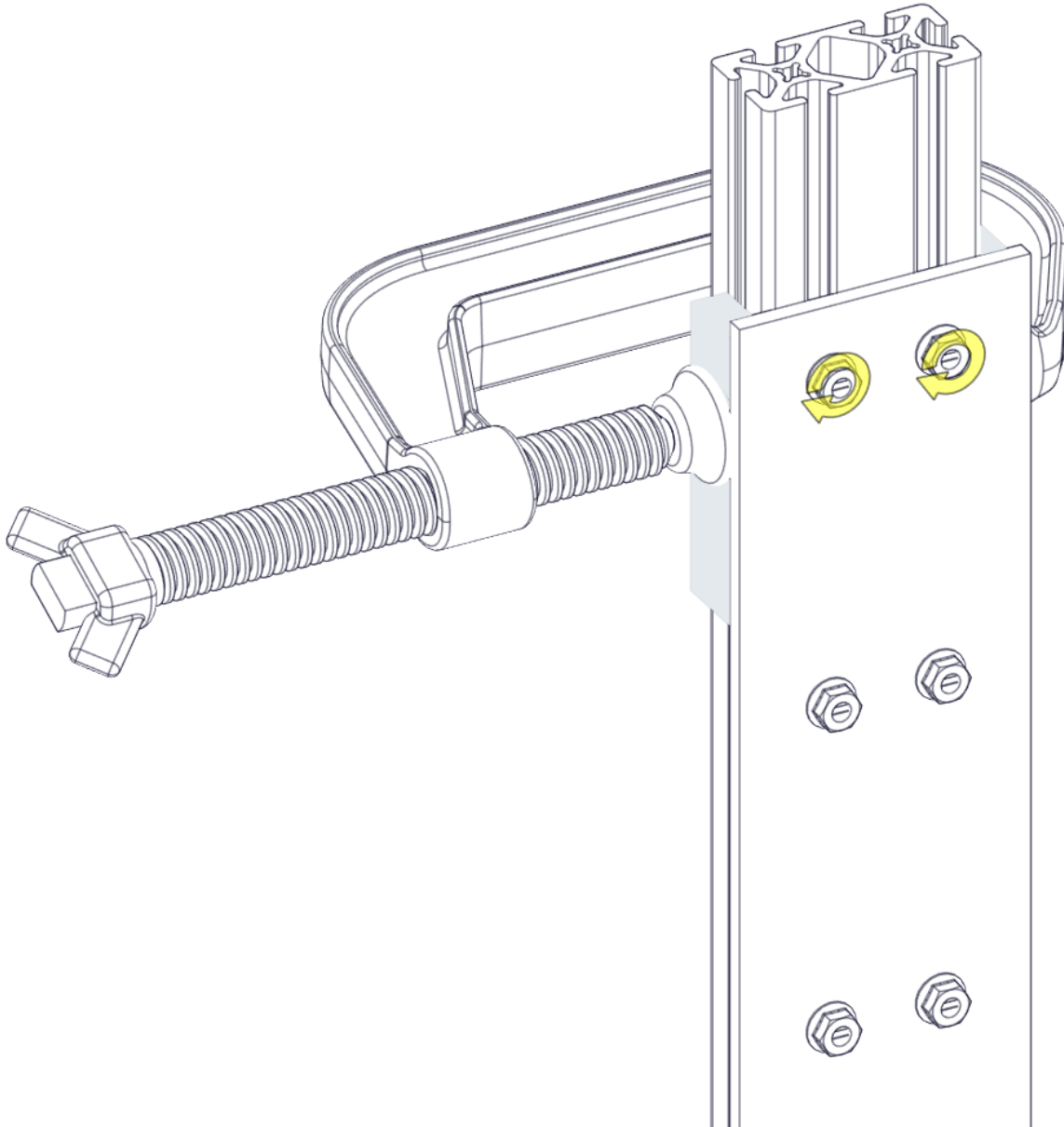
- Position the z-axis steel 0.75" from the end of the 19" z-axis extrusion as indicated.

4.3 Z-Axis Steel Alignment

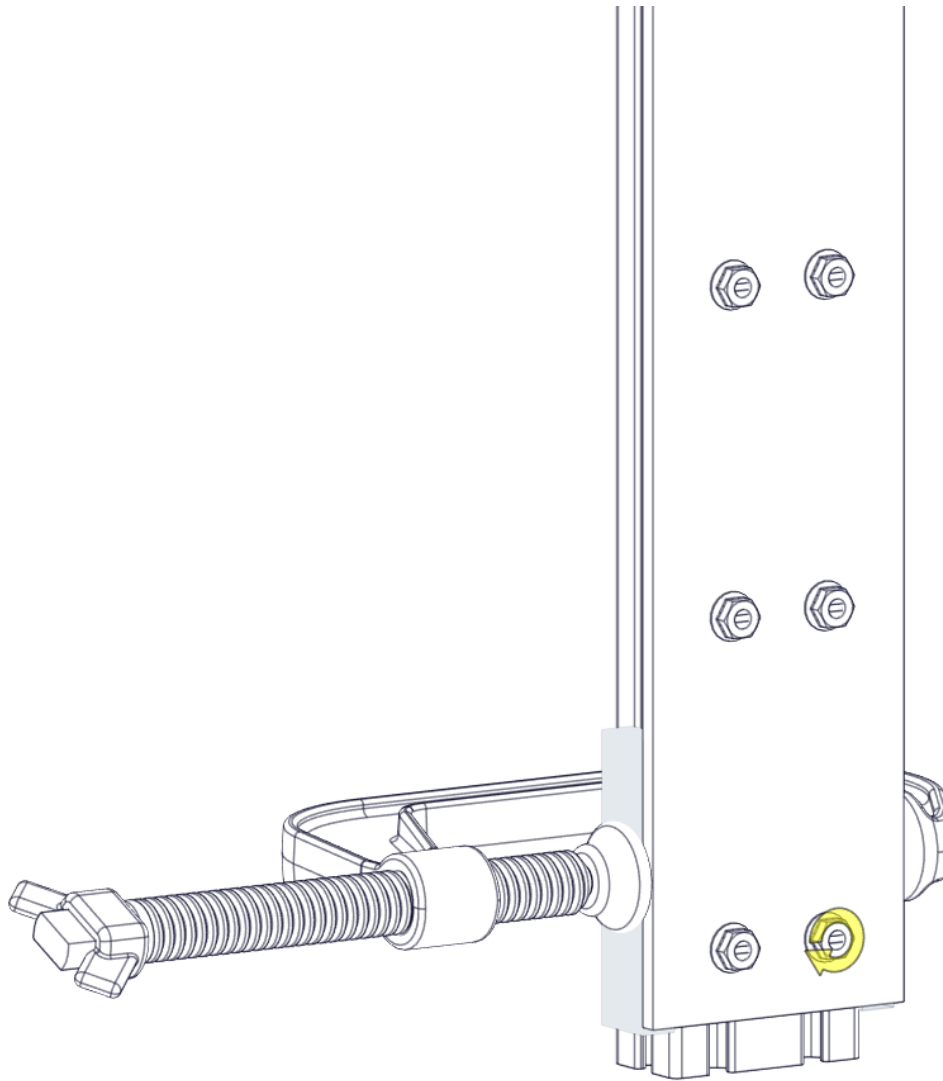


Parts Required:

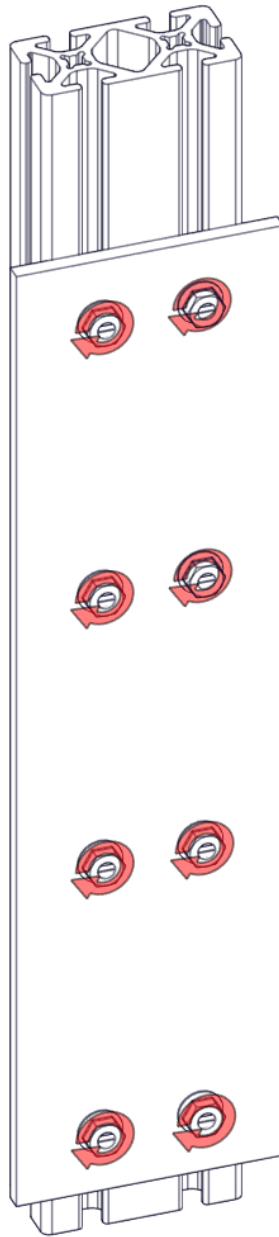
- Two steel spacers



- Position the steel spacers on either side of the z-axis extrusion but behind the z-axis steel as above.
- Clamp across the steel spacers and z-axis steel to pull it into alignment as above.
- Partially tighten the highlighted M8 hex flanged nuts.

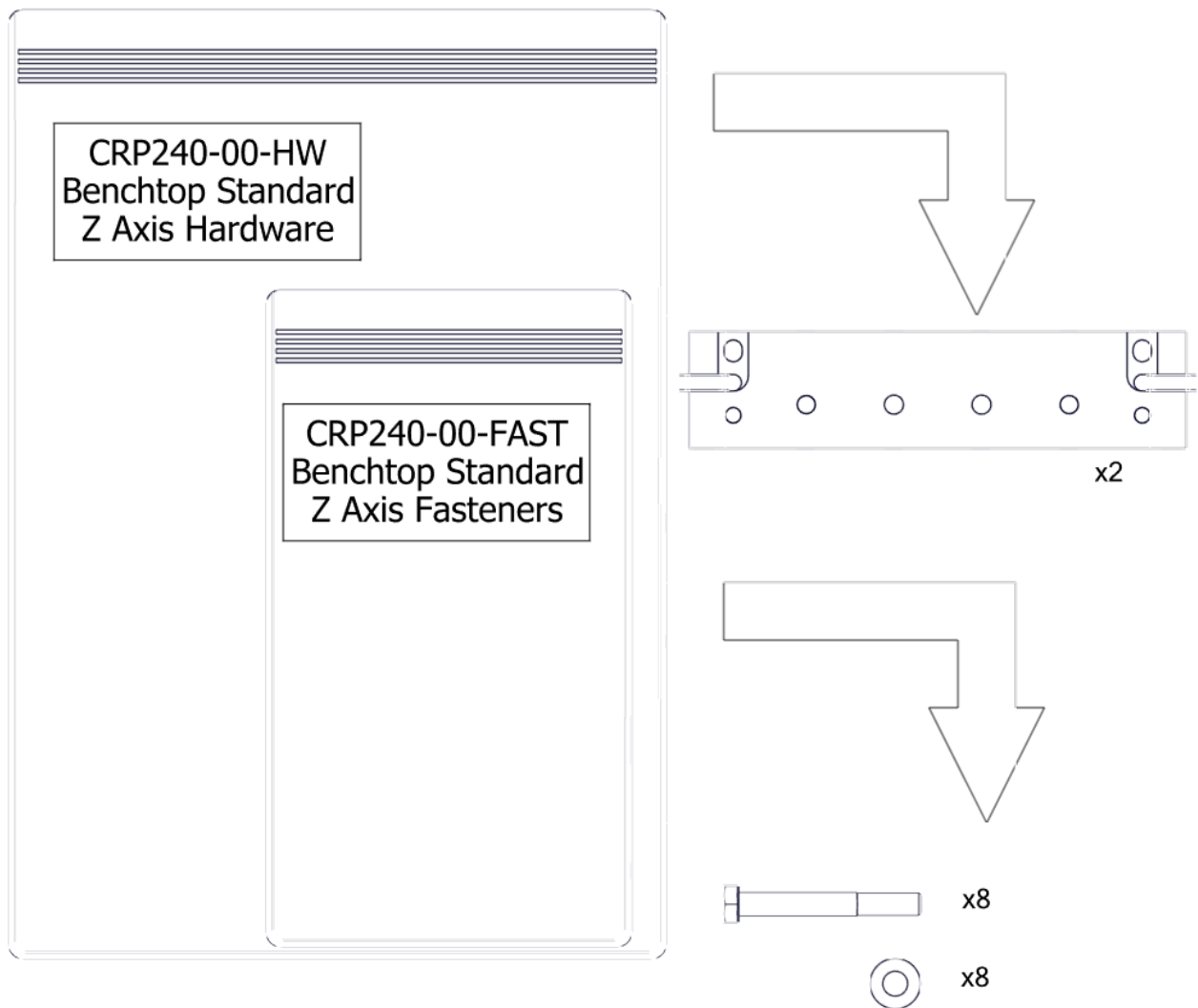


- Repeat the alignment process at the bottom of the z-axis steel.
- Partially tighten the highlighted M8 flanged hex nuts.



- The z-axis steel should be flush to both spacers along its entire length.
- Fully tighten all (8) highlighted M8 flanged hex nuts.

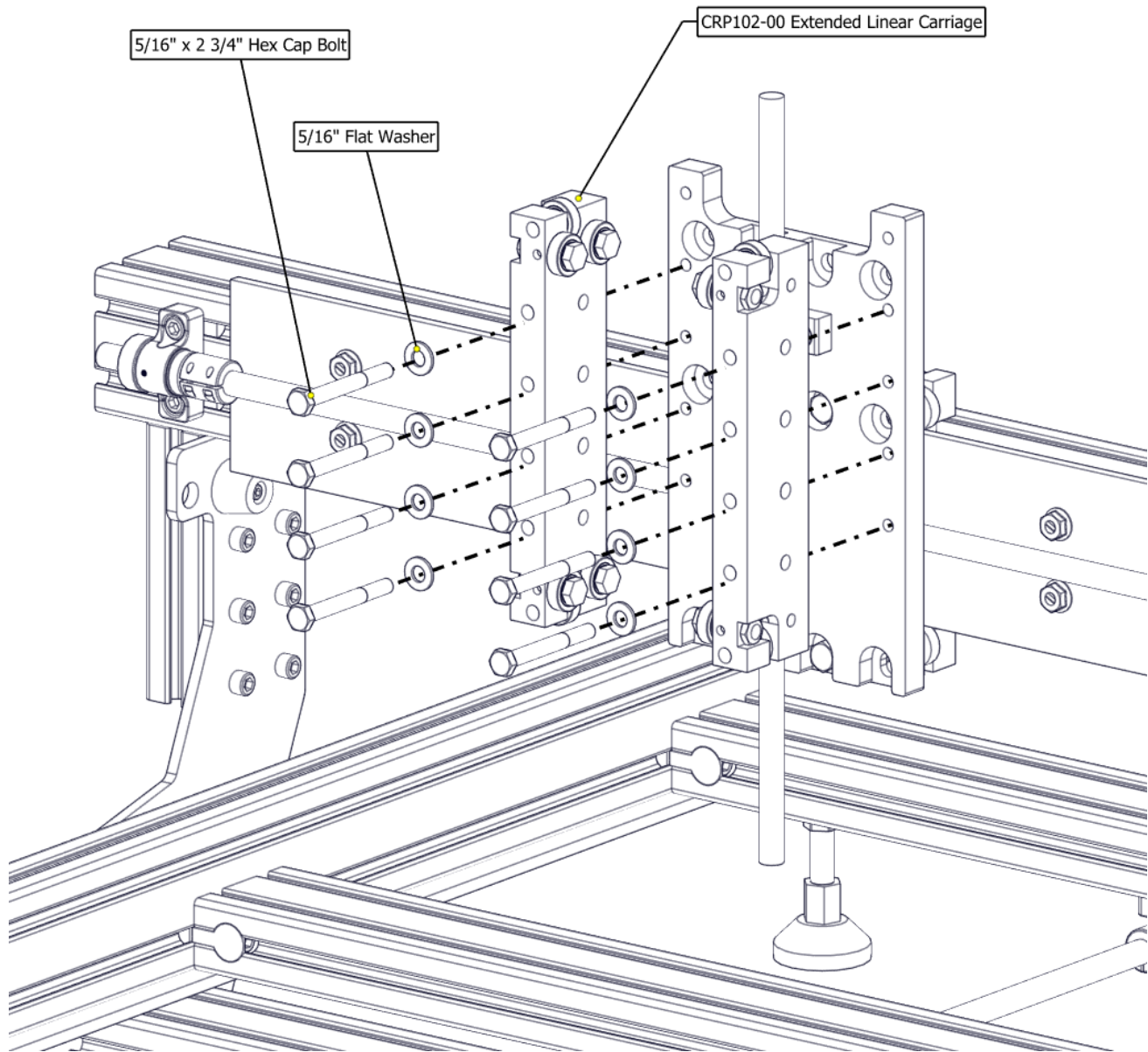
4.4 Z Axis ELC Installation



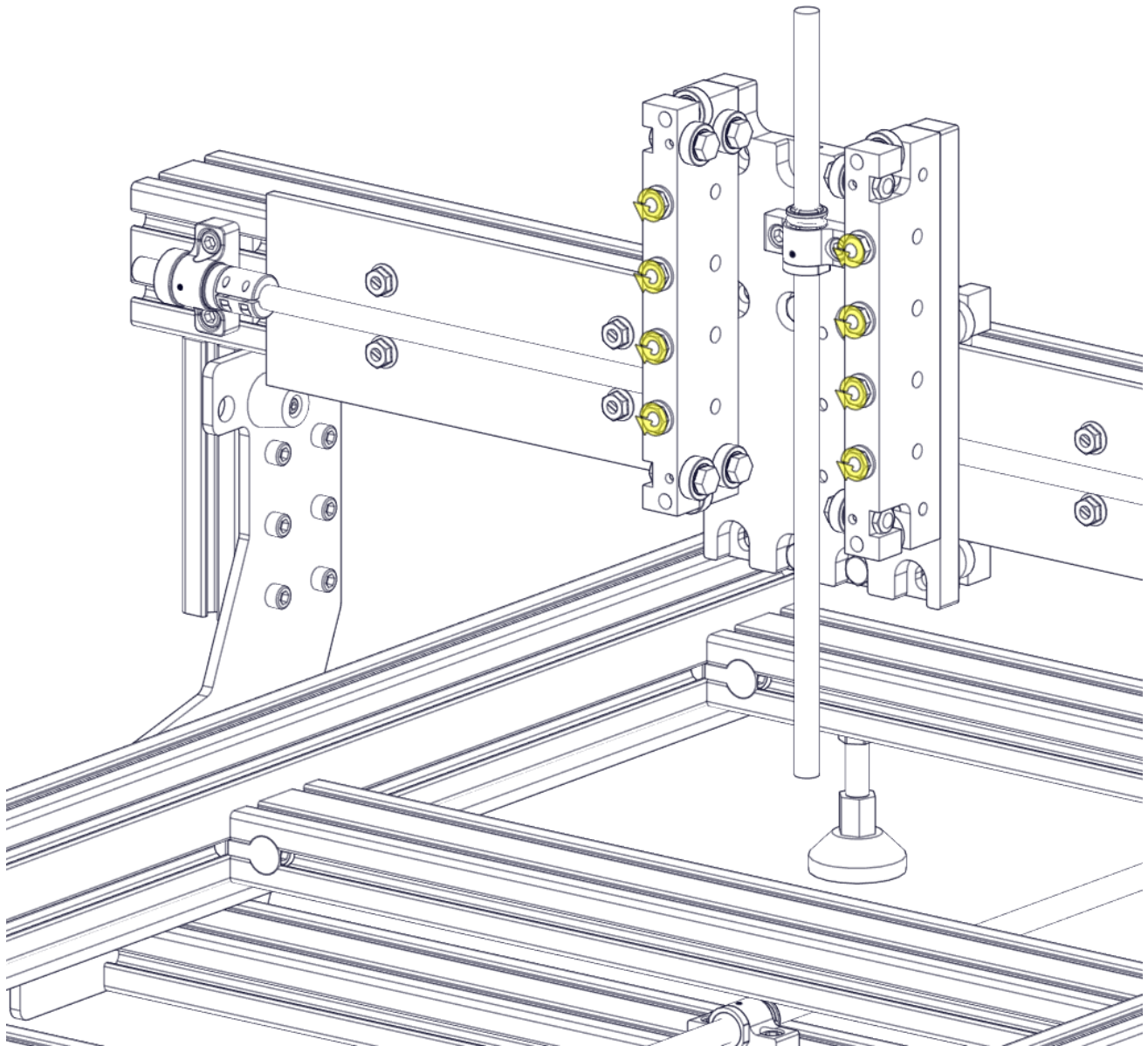
Parts Required:

- (8) 5/16" x 2³/₄" hex cap bolts
- (8) 5/16" flat washers
- (2) Extended linear carriage assemblies

Bag CRP101-00-FAST will contain all parts necessary for assembling the linear carriages. The 5/16" hex cap bolts and washers are in bag CRP230-00-FAST. Bag CRP101-00-FAST, two CRP101-01 Extended Linear Carriage Bodies and bag CRP240-00-FAST are in bag CRP240-00-HW.

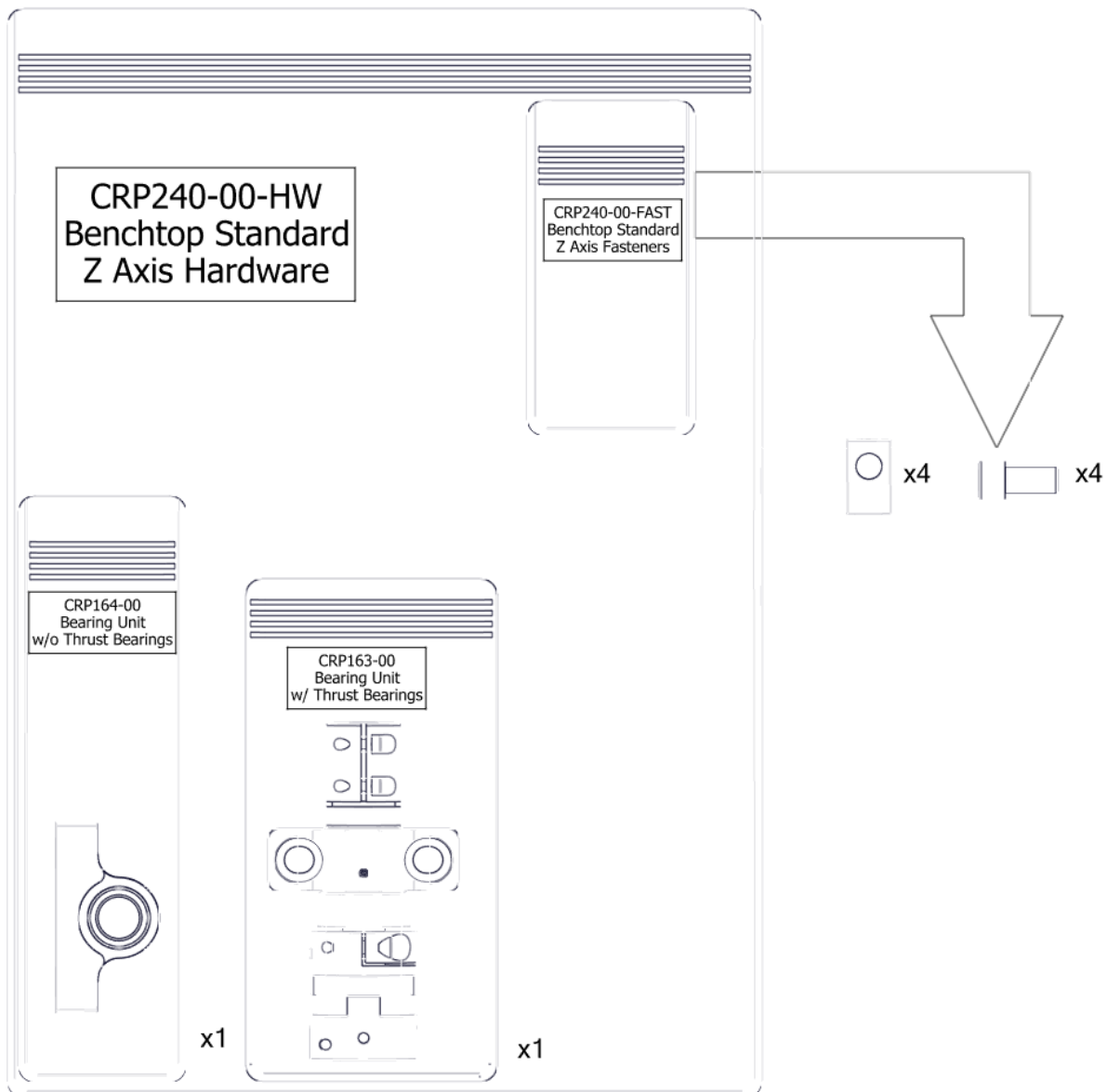


- Assemble two Extended Linear Carriages (ELCs) as in Step 1.8 – Extended Linear Carriage (ELC) Assembly
- Orient the ELCs as above.
 - Set screws should face away from the high-z plate.
 - Roller bearings must face in towards Acme assembly.
- Install four 5/16" x 2³/₄" hex cap bolts through 5/16" flat washers and into each ELC as indicated.
- Thread the 5/16" x 2³/₄" hex cap bolts into the high-z plate as above.



- Partially tighten all 5/16" x 2³/₄" hex cap bolts.

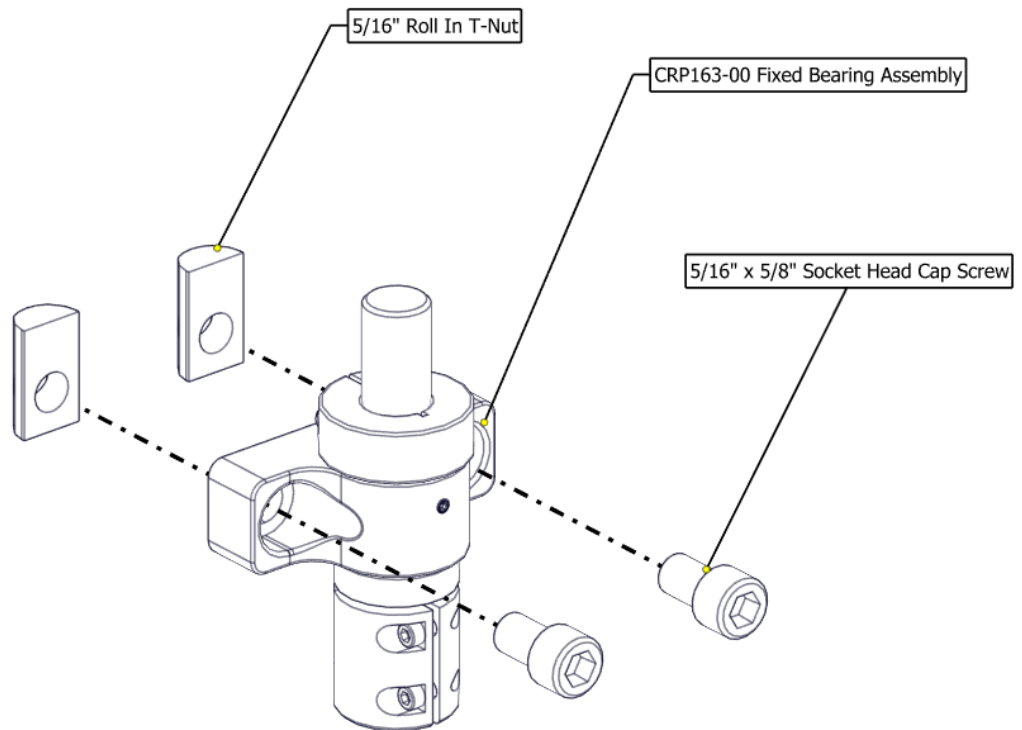
4.5 Z Axis Acme Installation (B)



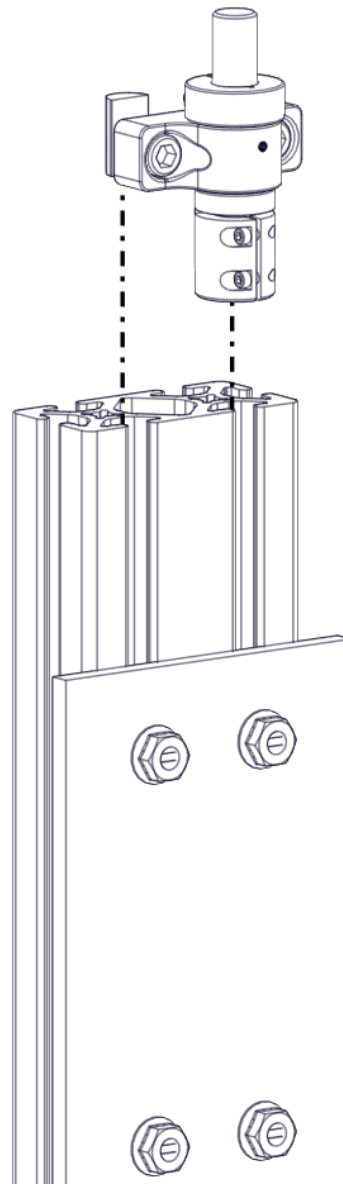
Parts Required:

1. (4) 5/16" x 5/8" socket head cap screw
2. (4) 5/16" t-nut
3. (1) CRP163-00 Assembly
4. (1) CRP164-00 Assembly

Items 1 and 2 are in bag CRP240-00-FAST, which is in bag CRP240-00-HW. Items 3 and 4 are individually packaged within bag CRP240-00-HW.

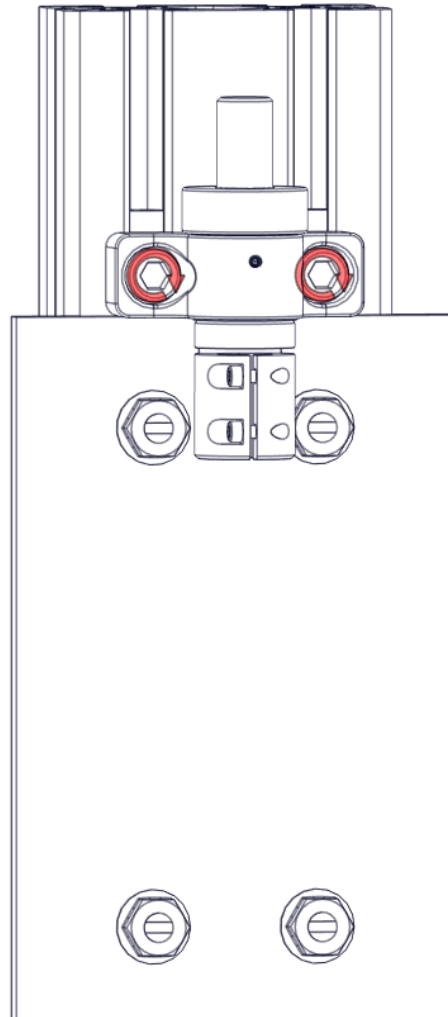


- Install a 5/16" x 5/8" socket head cap screw into the mounting holes of a CRP163-00 assembly.
- Loosely thread a 5/16" t-nut onto both socket head cap screws.

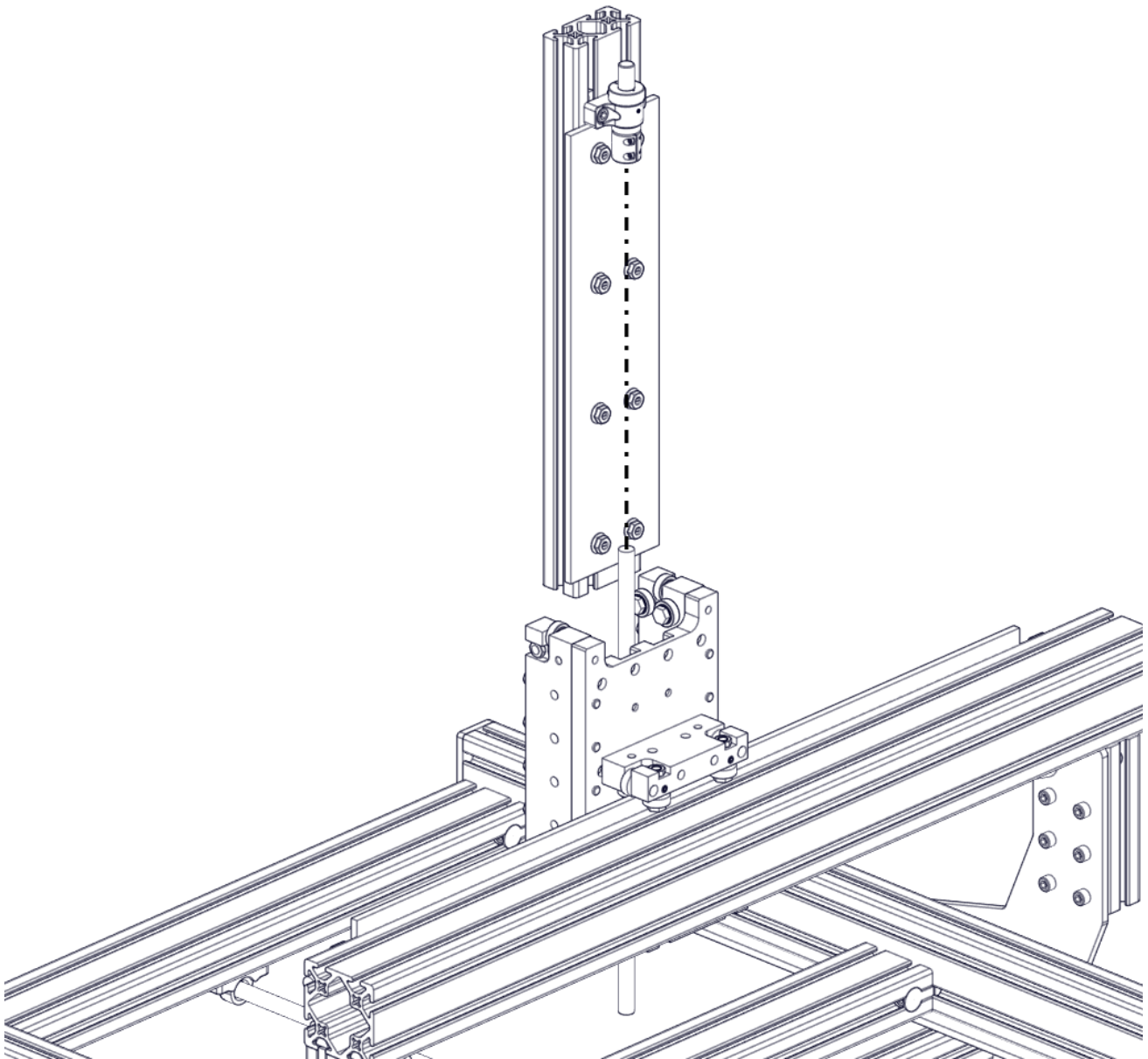


- Orient the z-axis assembly as above.
- Slide the CRP163-00 assembly into the z-axis extrusion as indicated.

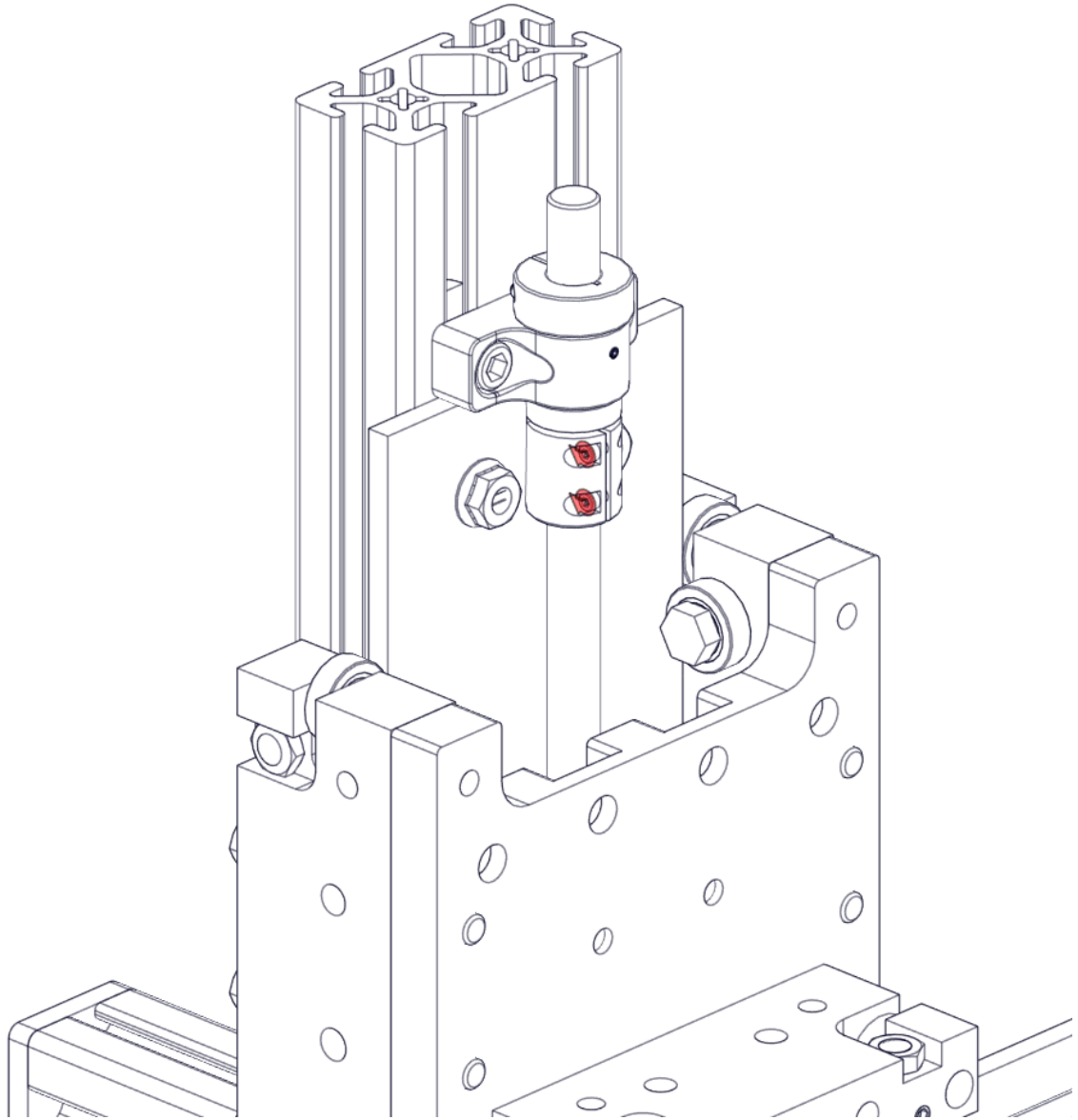
Note: The clamping end of the CRP163-00 assembly should face the z-axis steel as above.



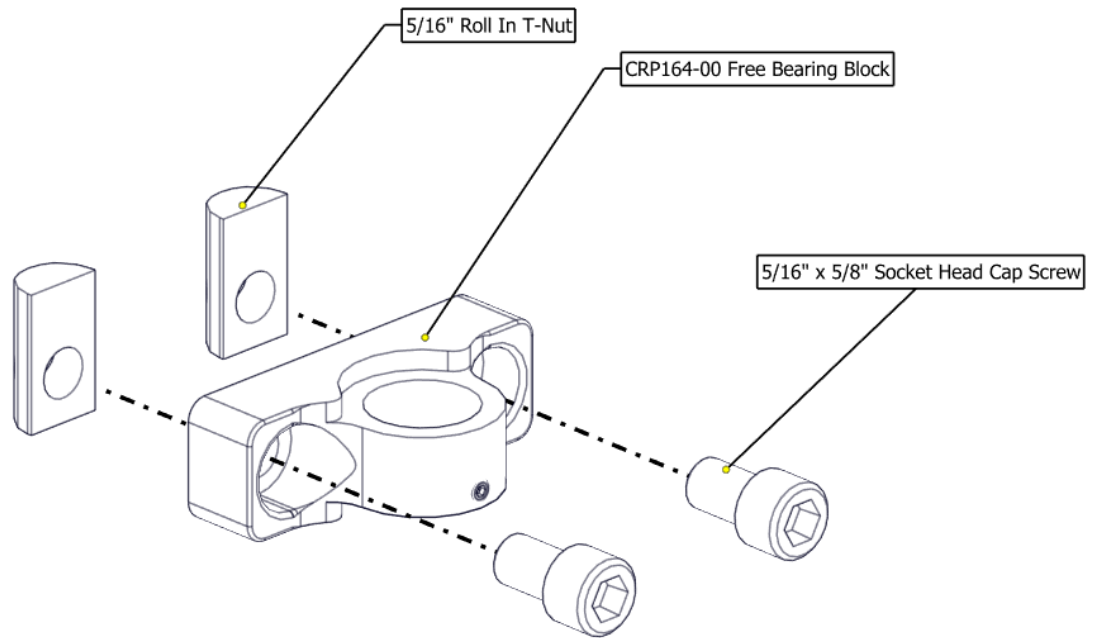
- Slide the CRP163-00 assembly towards the z-axis steel until they are flush.
- Fully tighten the socket head cap screws of the CRP163-00 assembly.



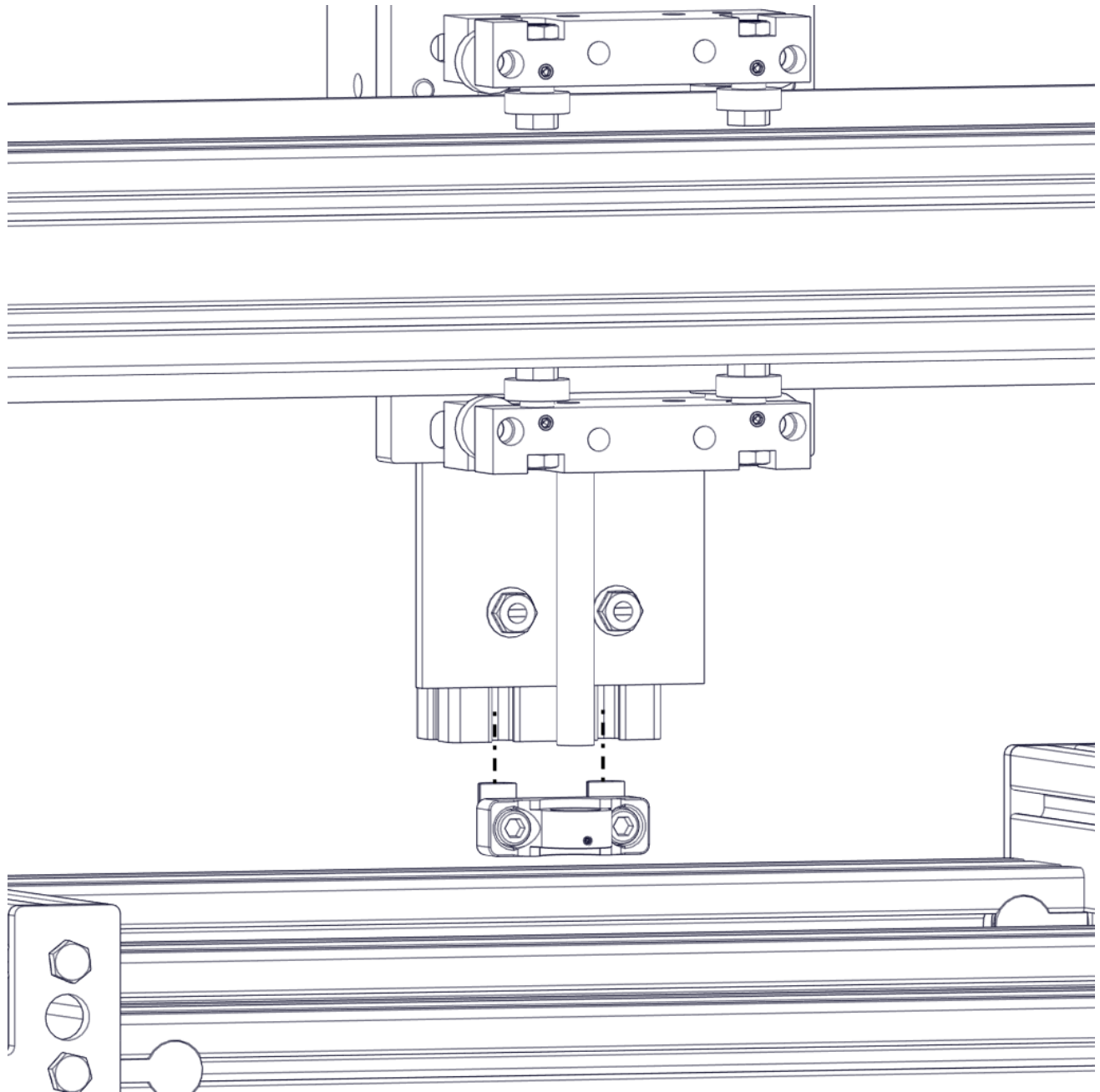
- Slide the z-axis steel between the roller bearings of the ELCs
- Slide the shaft adapter of the CRP163-00 assembly onto the z-axis Acme lead screw as indicated.



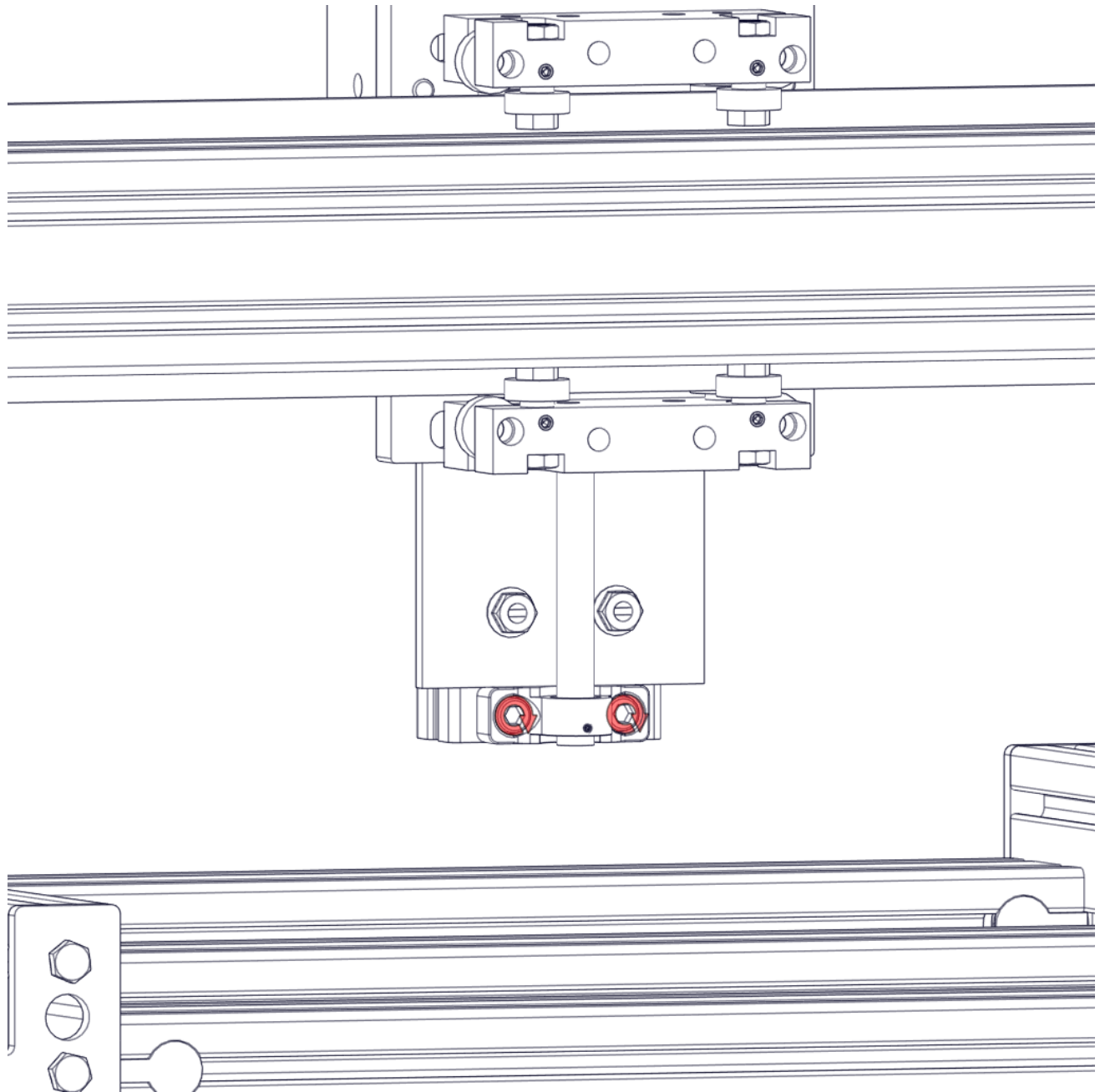
- Confirm the Acme lead screw bottoms out inside the shaft adapter.
- Tighten the highlighted bolts of the clamping shaft adapter.



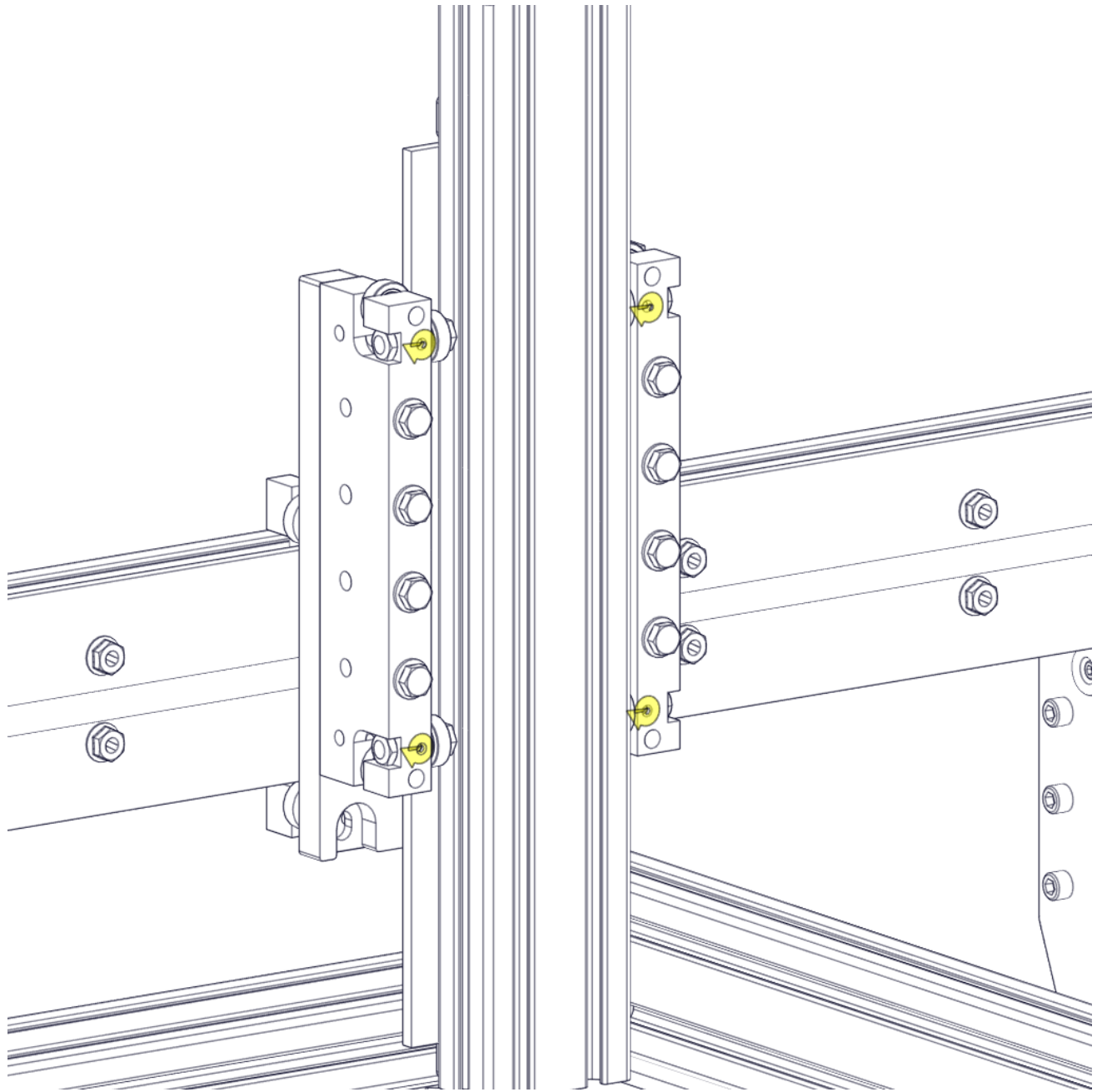
- Install a 5/16" x 5/8" socket head cap screw into the mounting holes of a CRP164-00 assembly.
- Partially thread a 5/16" t-nut onto both socket head cap screws.



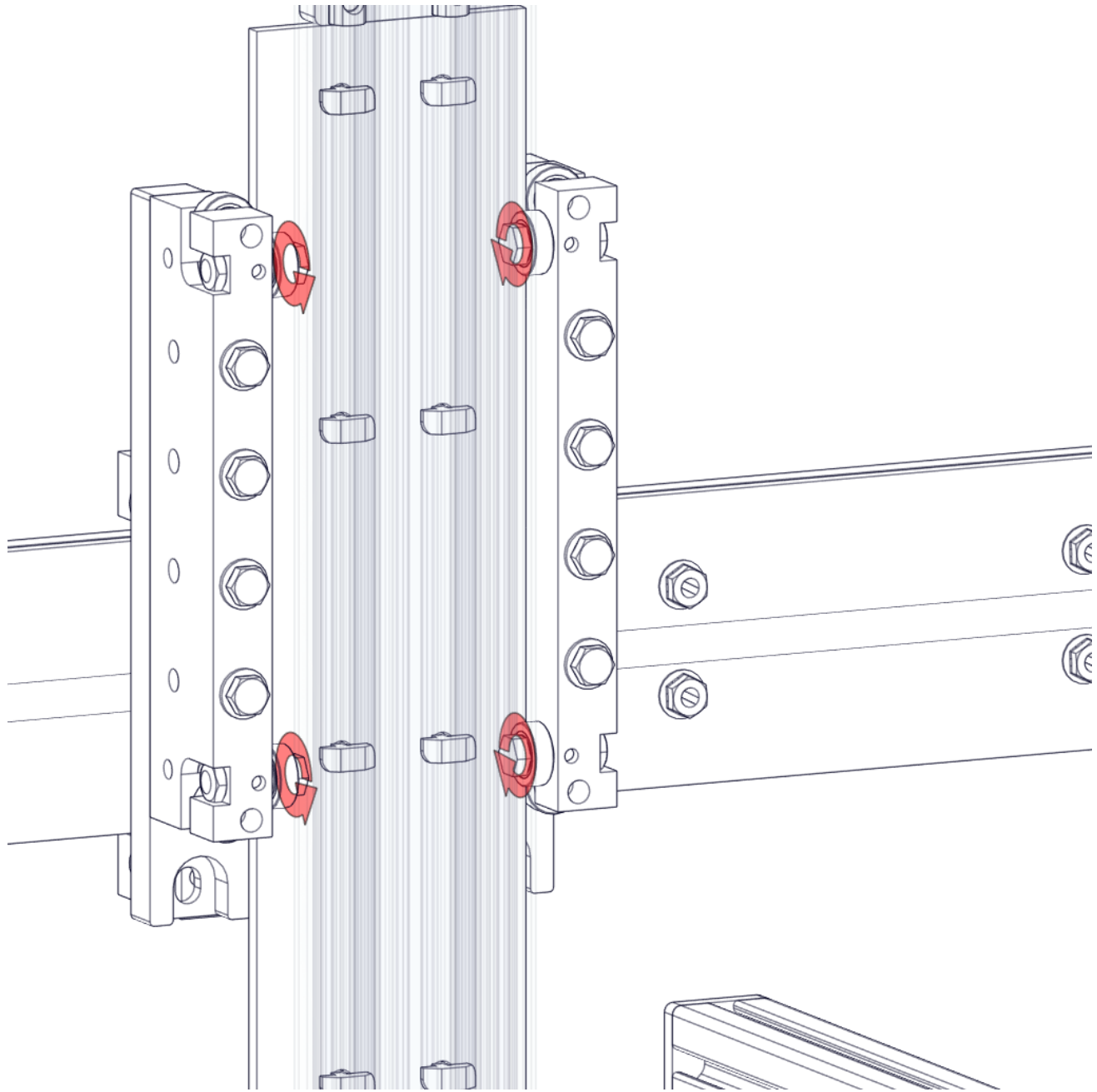
- Slide the CRP164-00 assembly into the bottom of the z-axis extrusion and onto the Acme lead screw as indicated.



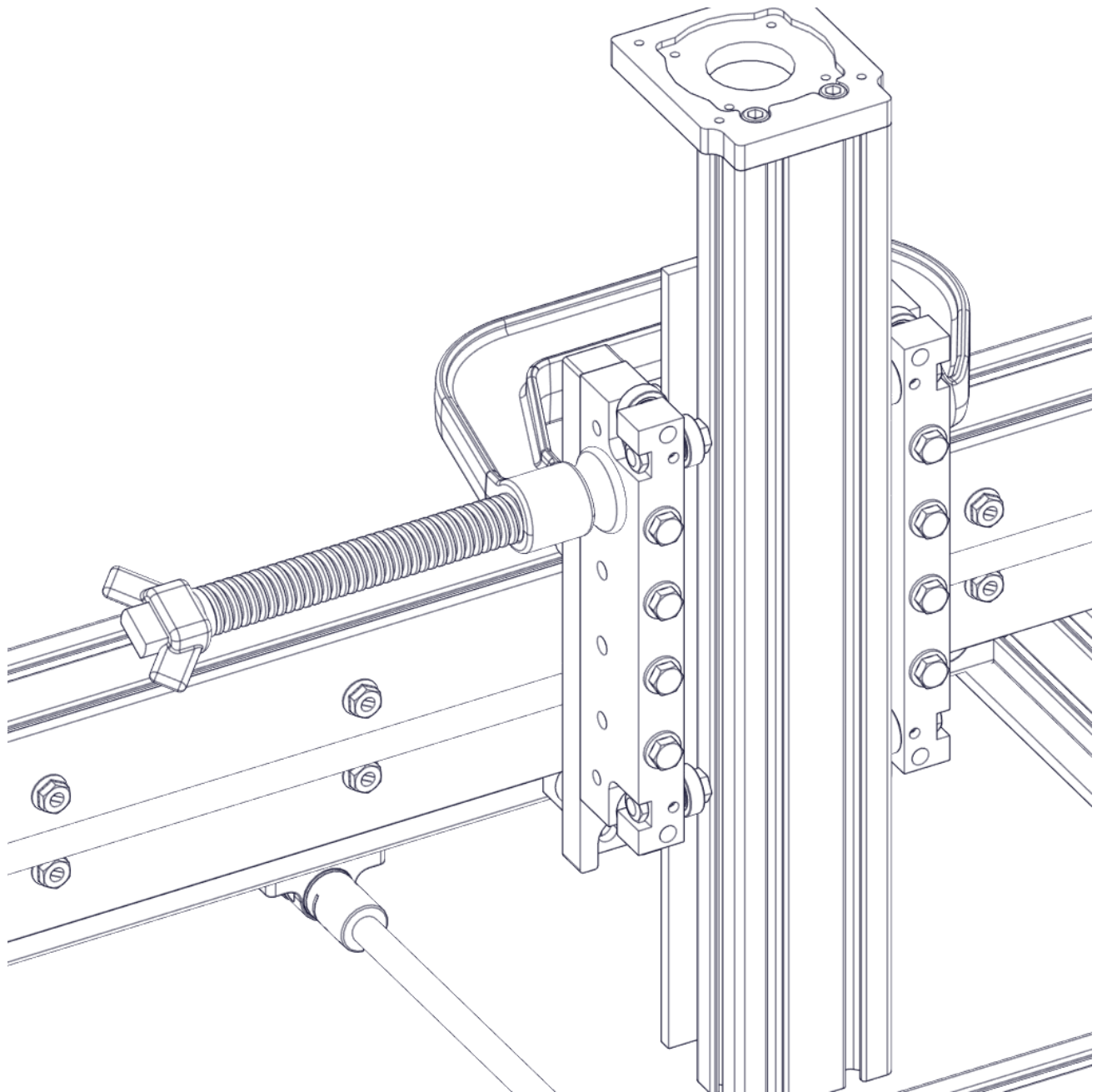
- Slide the CRP164-00 assembly towards the z-axis steel until they are flush.
- Fully tighten the highlighted socket head cap screws.



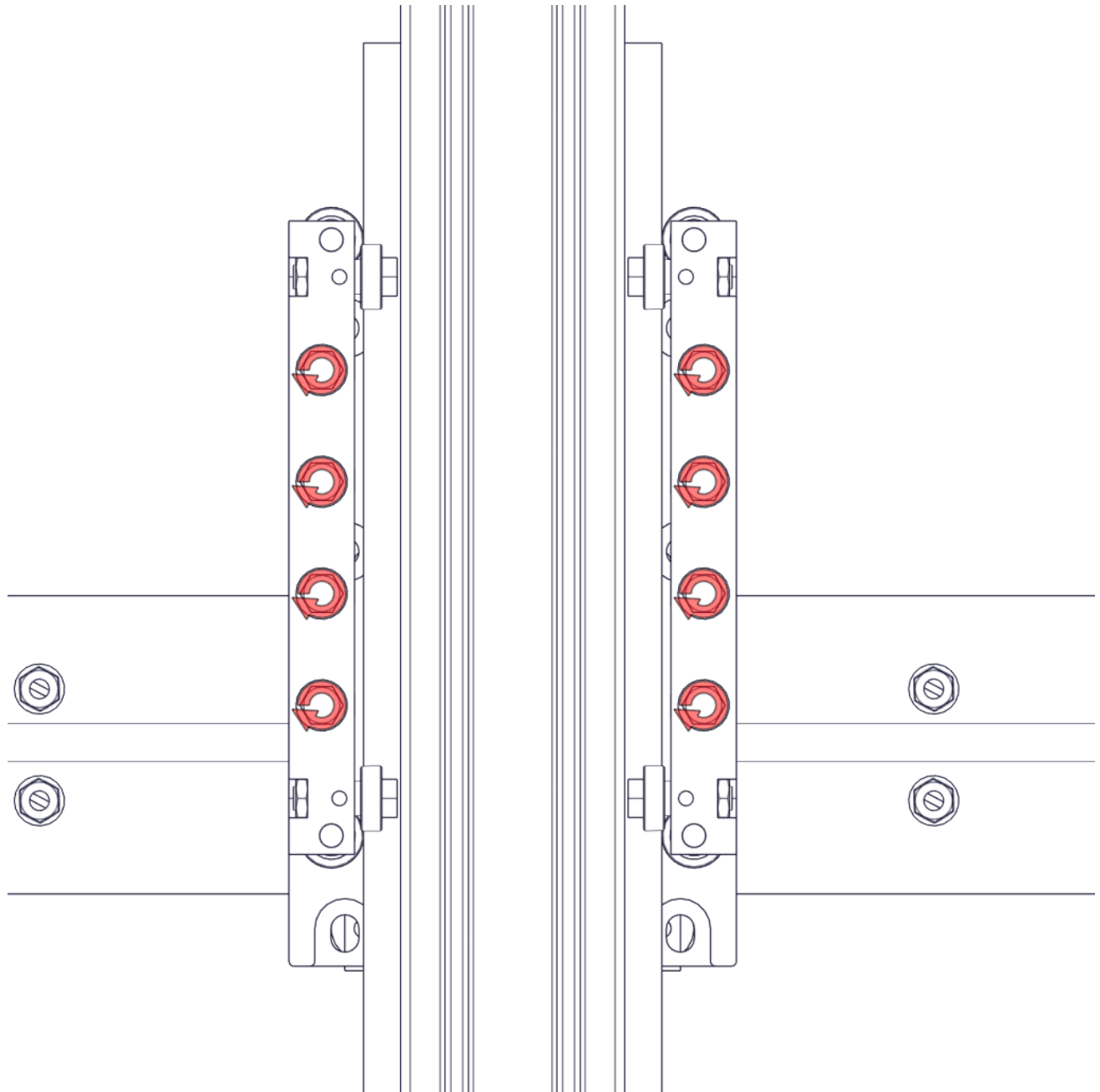
- Confirm adjustable roller bearings of ELCs are not fully tightened.
- Tighten the highlighted set screws until the adjustable roller bearings of the ELCs contact the z-axis steel.



- Fully tighten all (4) highlighted adjustable roller bearings.



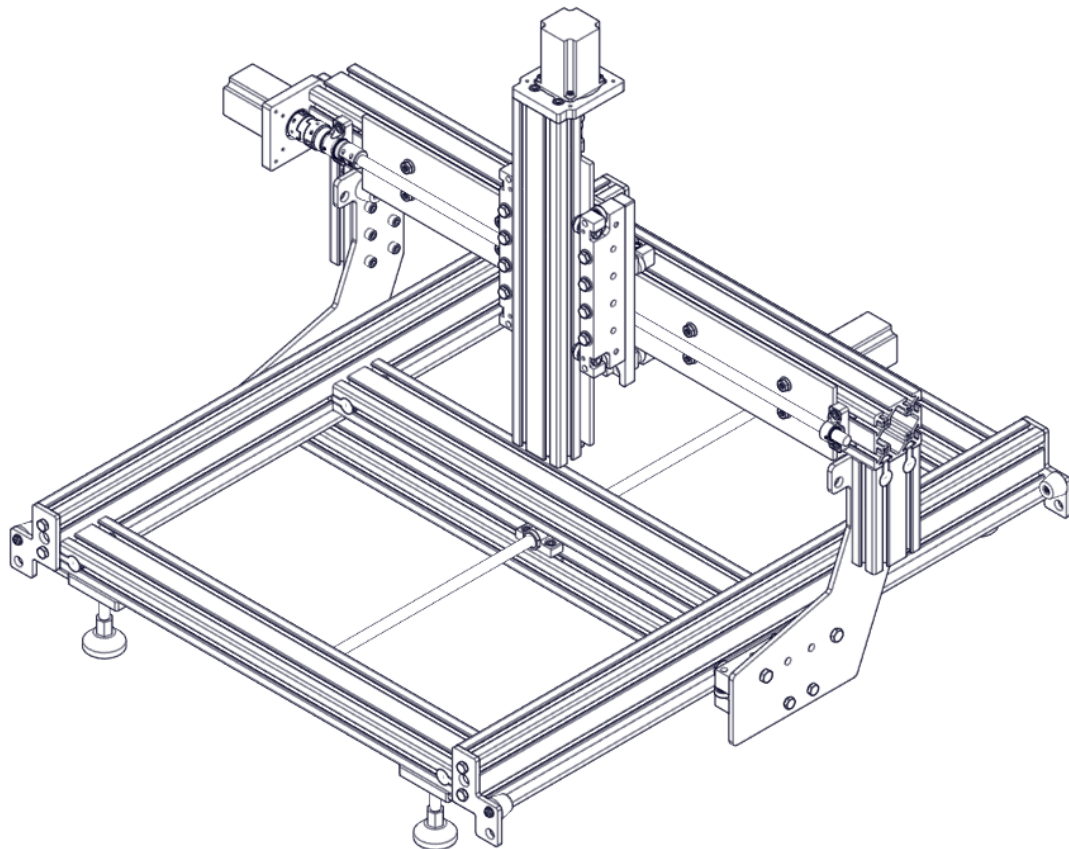
- Apply clamping force across the Linear Carriages until their roller bearings contact the edge of the gantry steel as indicated.



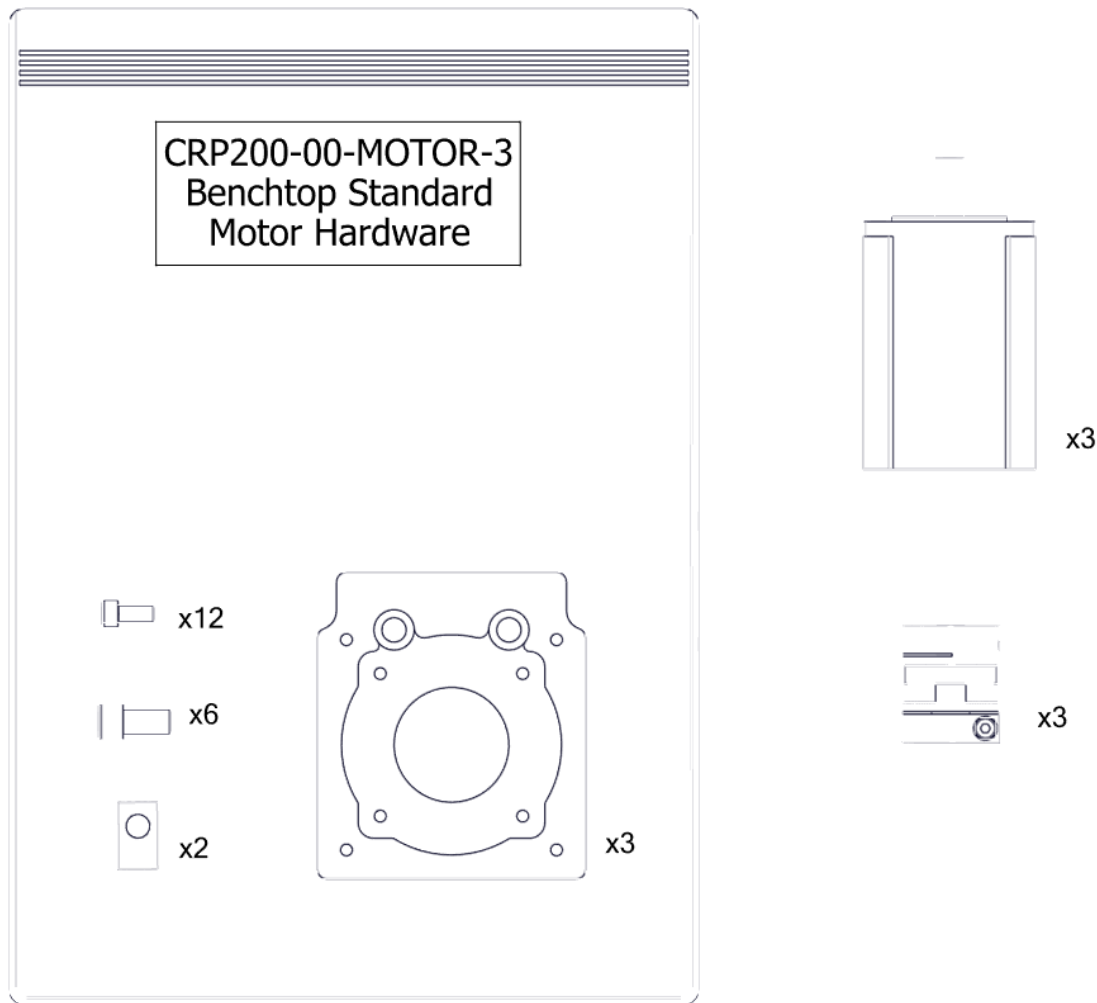
- Fully tighten the highlighted 3/8" hex bolts.
- Remove clamping force.

5

Motor Installation



5.1 Motor Installation

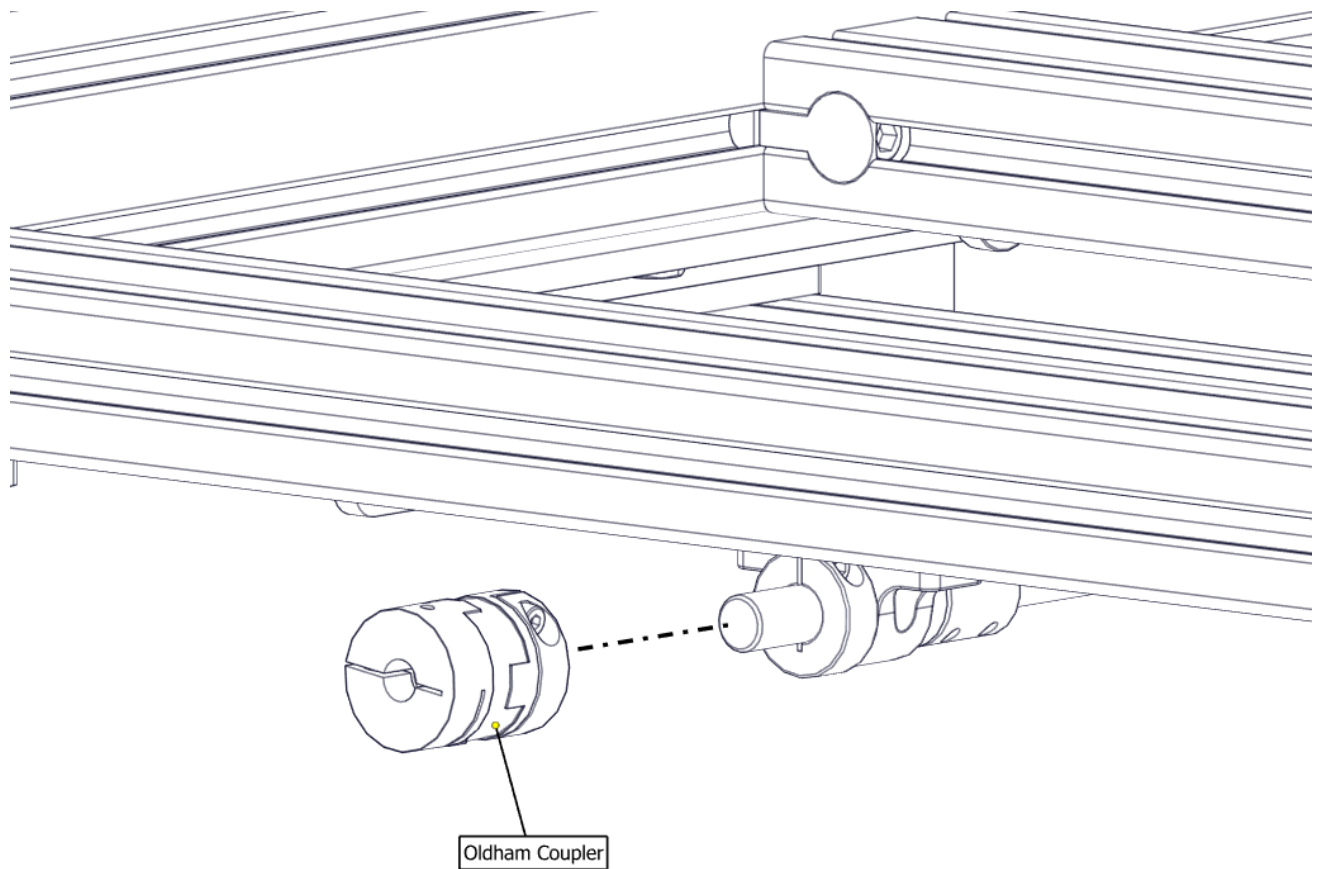


Parts Required:

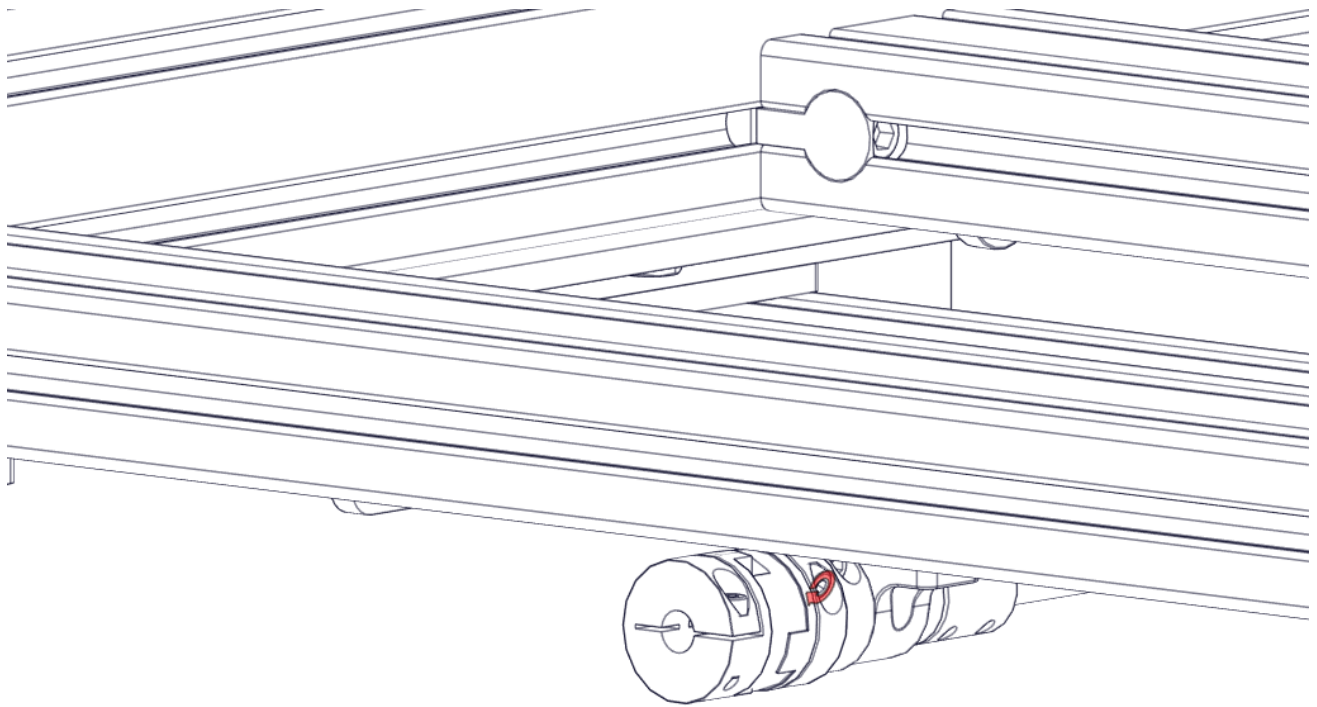
1. (3) NEMA 23 Motor
2. (3) Oldham Coupler Assembly
3. (12) 10-32 x 5/8" socket head cap screws
4. (6) 5/16" x 5/8" socket head cap screws
5. (2) 5/16" t-nuts
6. (3) CRP206-01 motor mount plate

Items 1 and 2 are packaged separately.

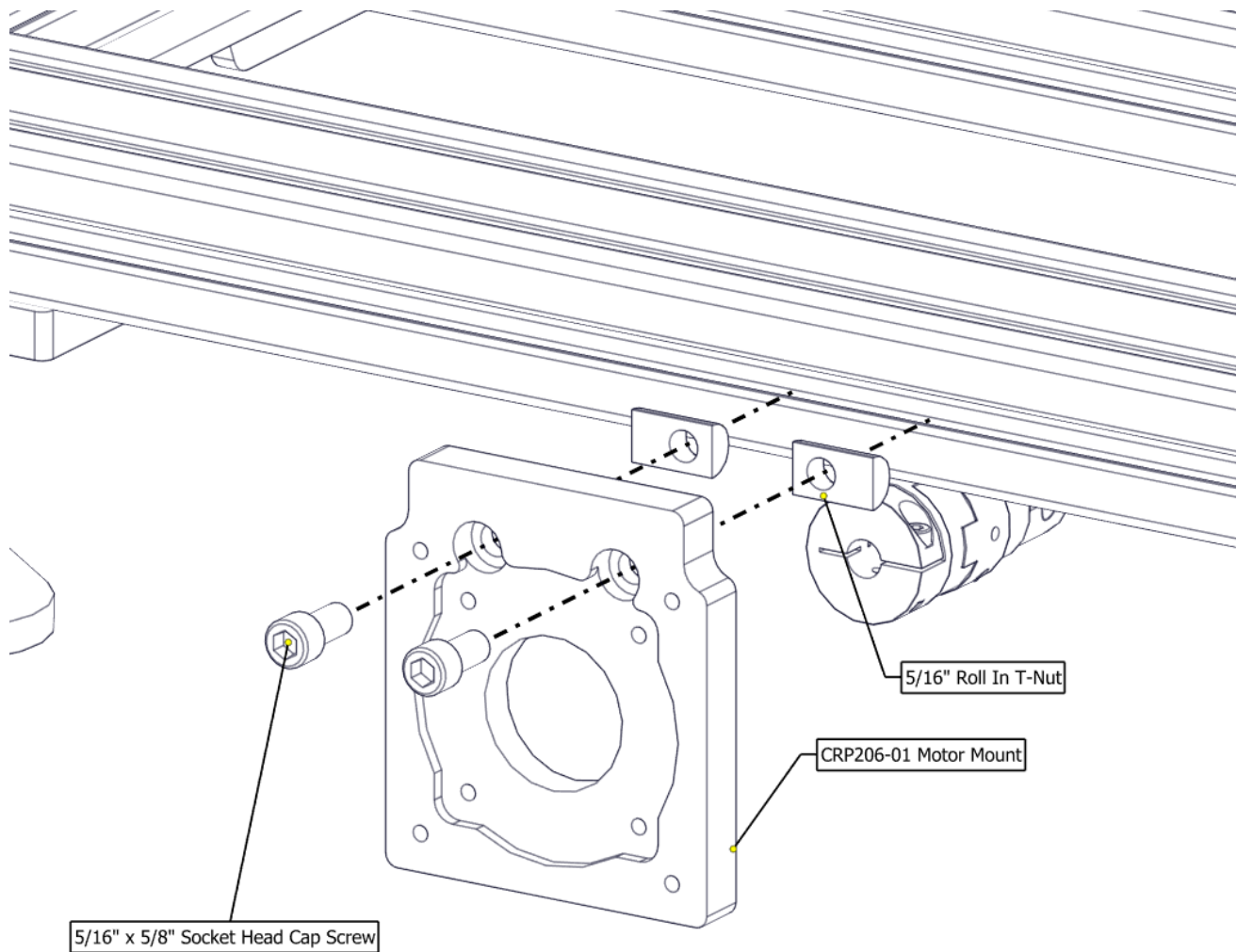
Items 3 through 6 are packaged in bag CRP200-00-MOTOR-3



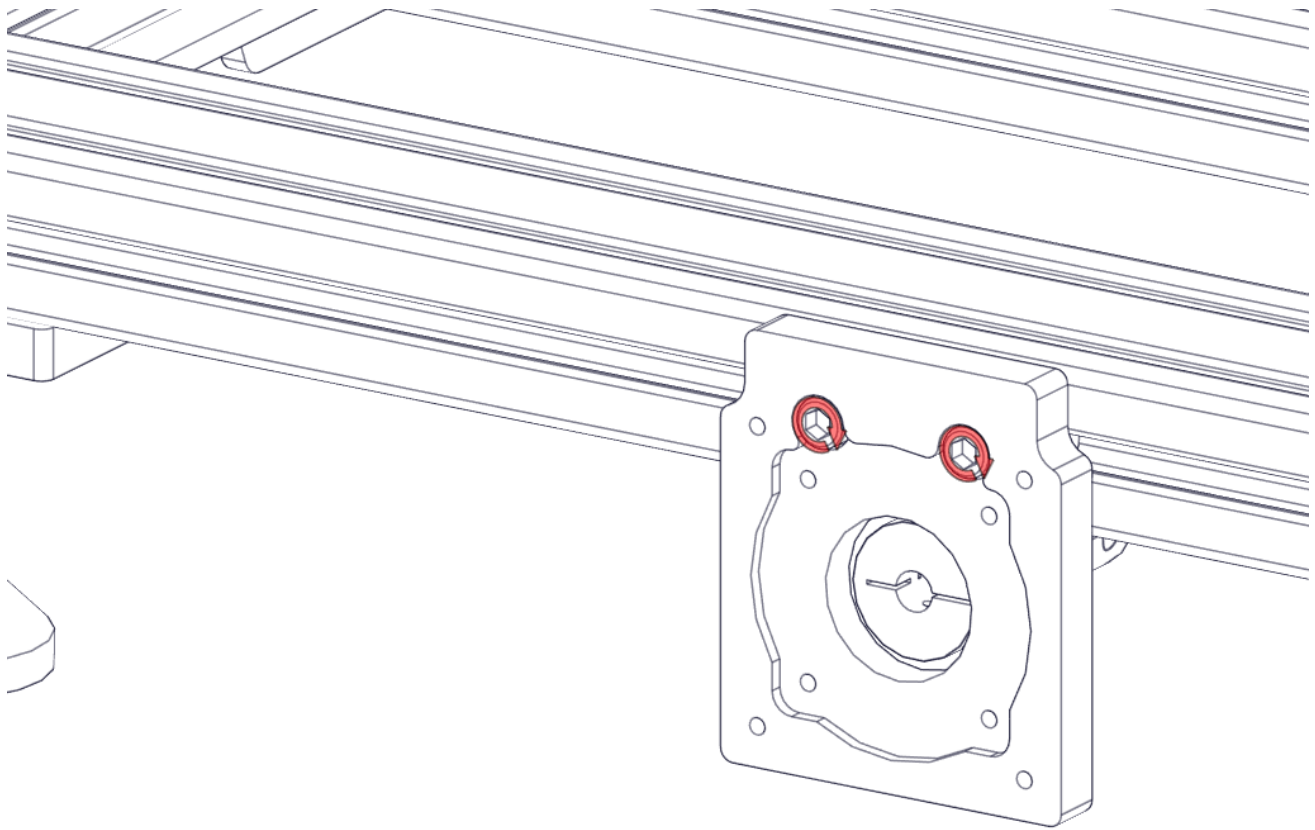
- Install an Oldham coupler onto the shaft adapter.



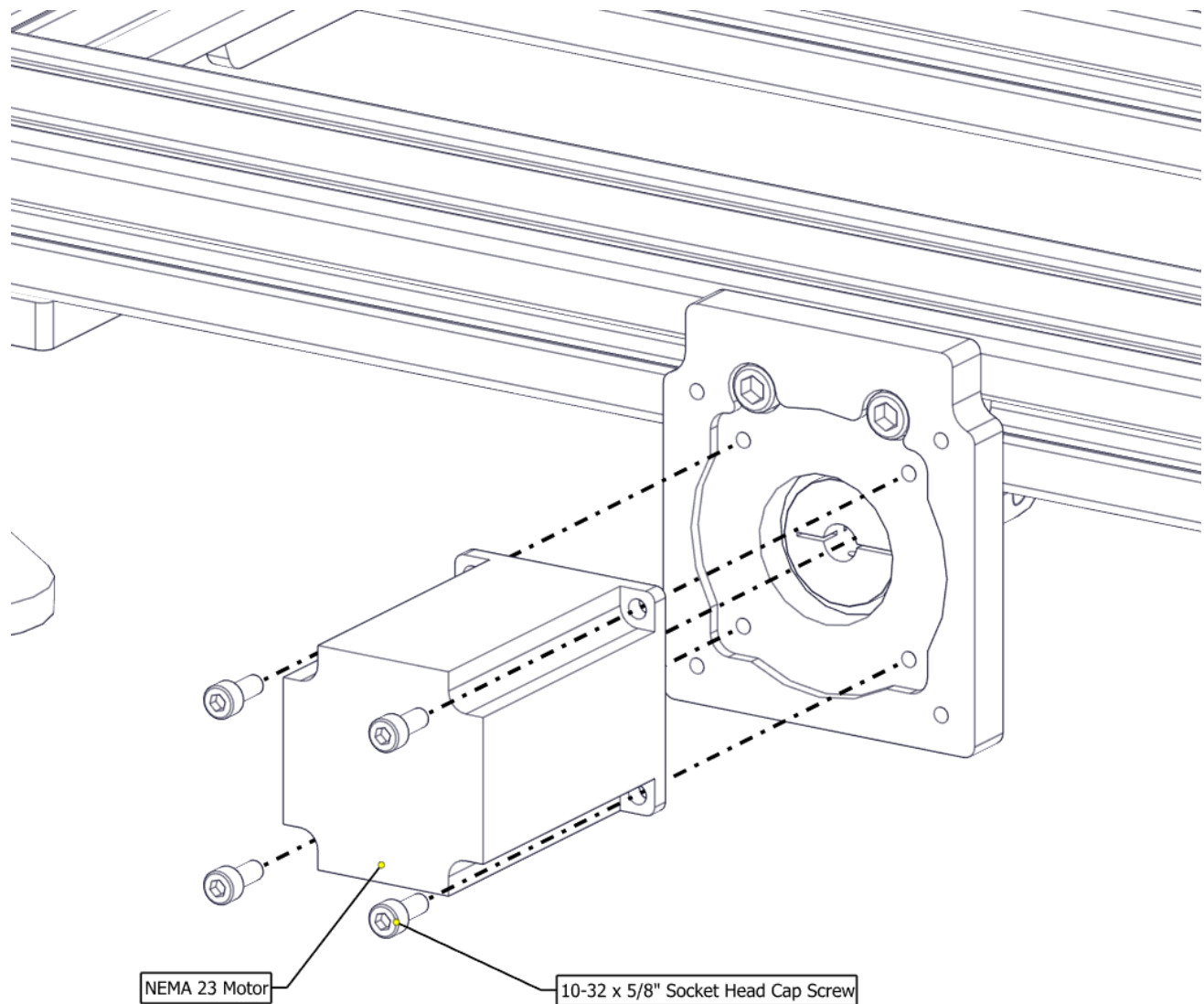
- Tighten the highlighted clamping screw.



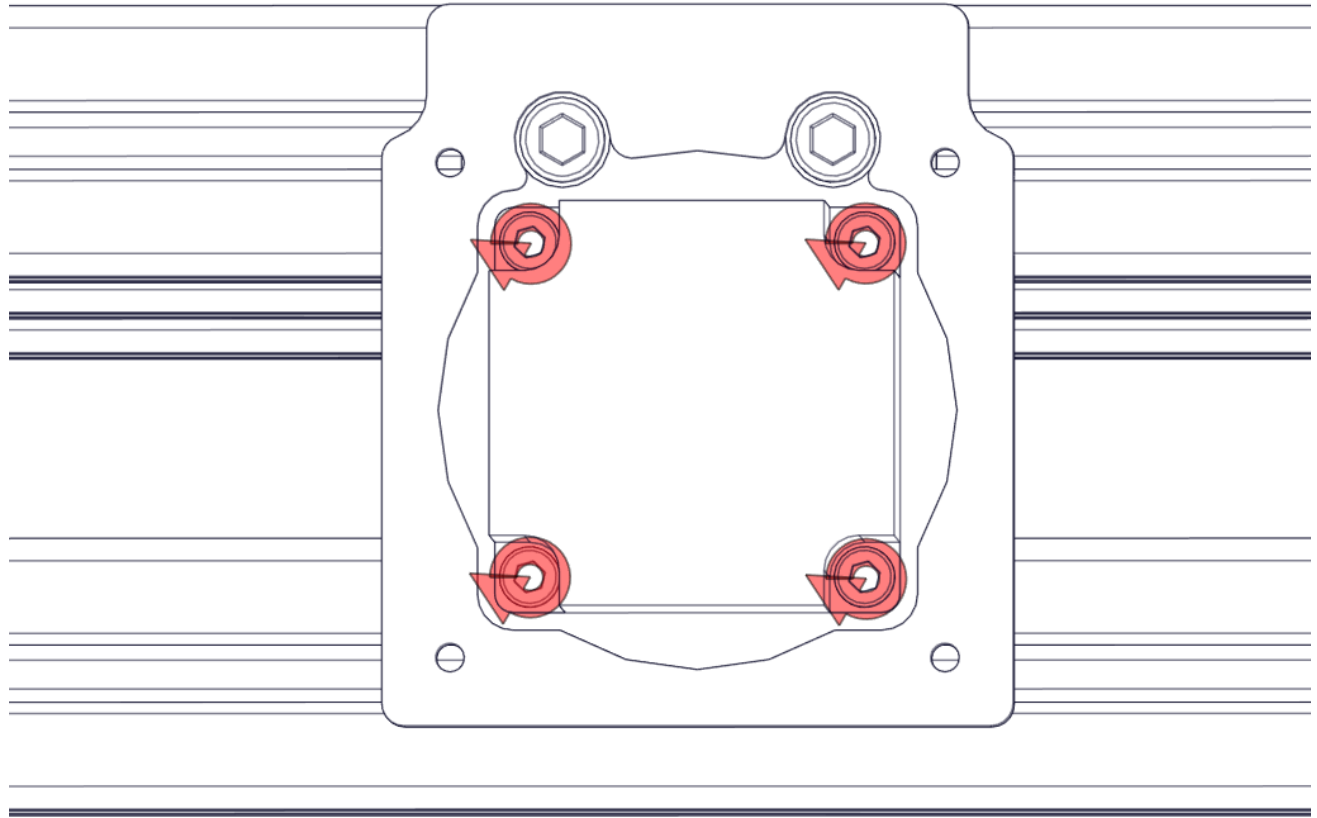
- Roll two 5/16" t-nuts into the indicated t-slot.
- Thread two 5/16" x 5/8" socket heap cap screws through a CRP206-01 motor mount plate and into the previously installed t-nuts as above.



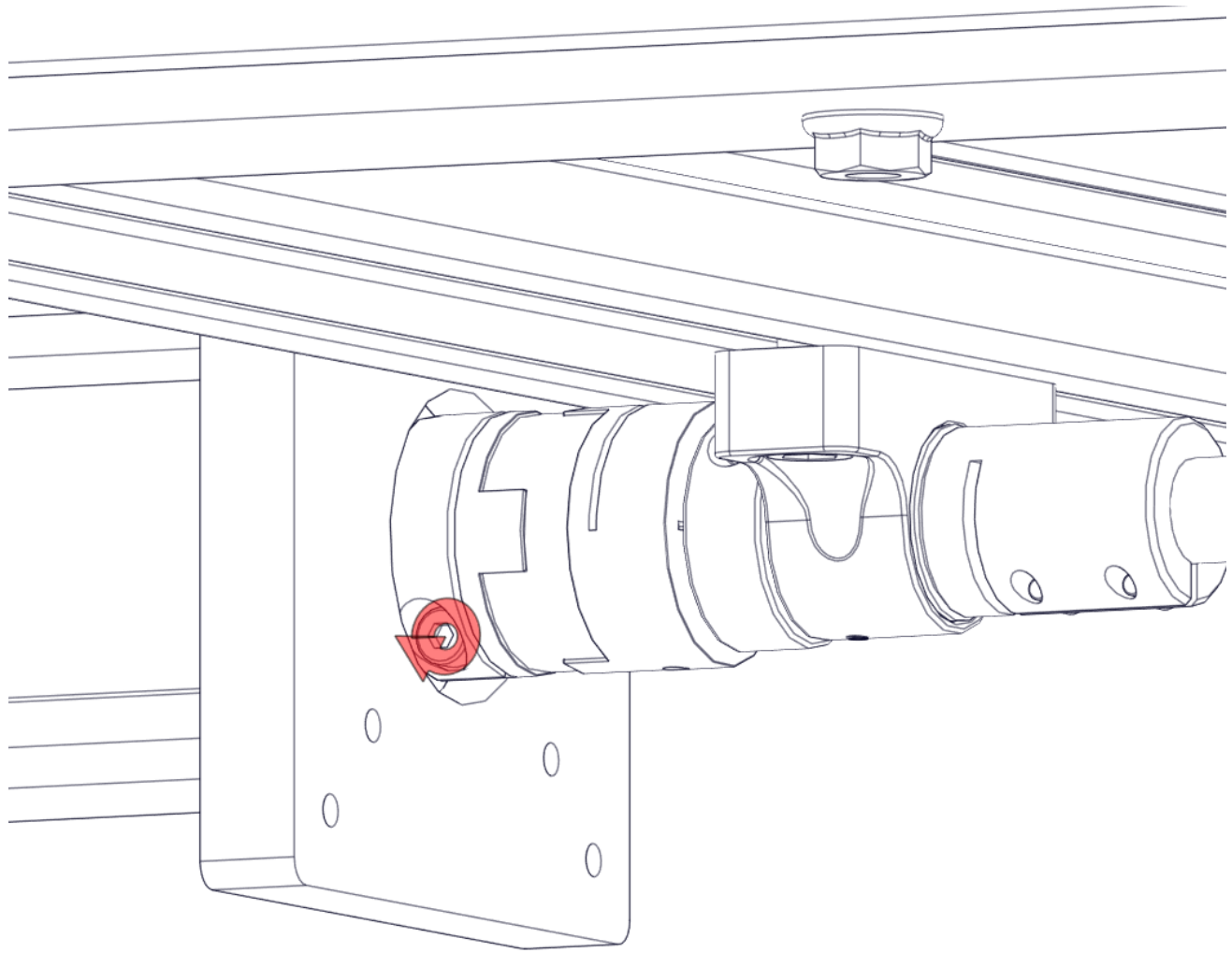
- Align the motor mount with the Acme assembly.
- Tighten the highlighted 5/16" socket head cap screws.



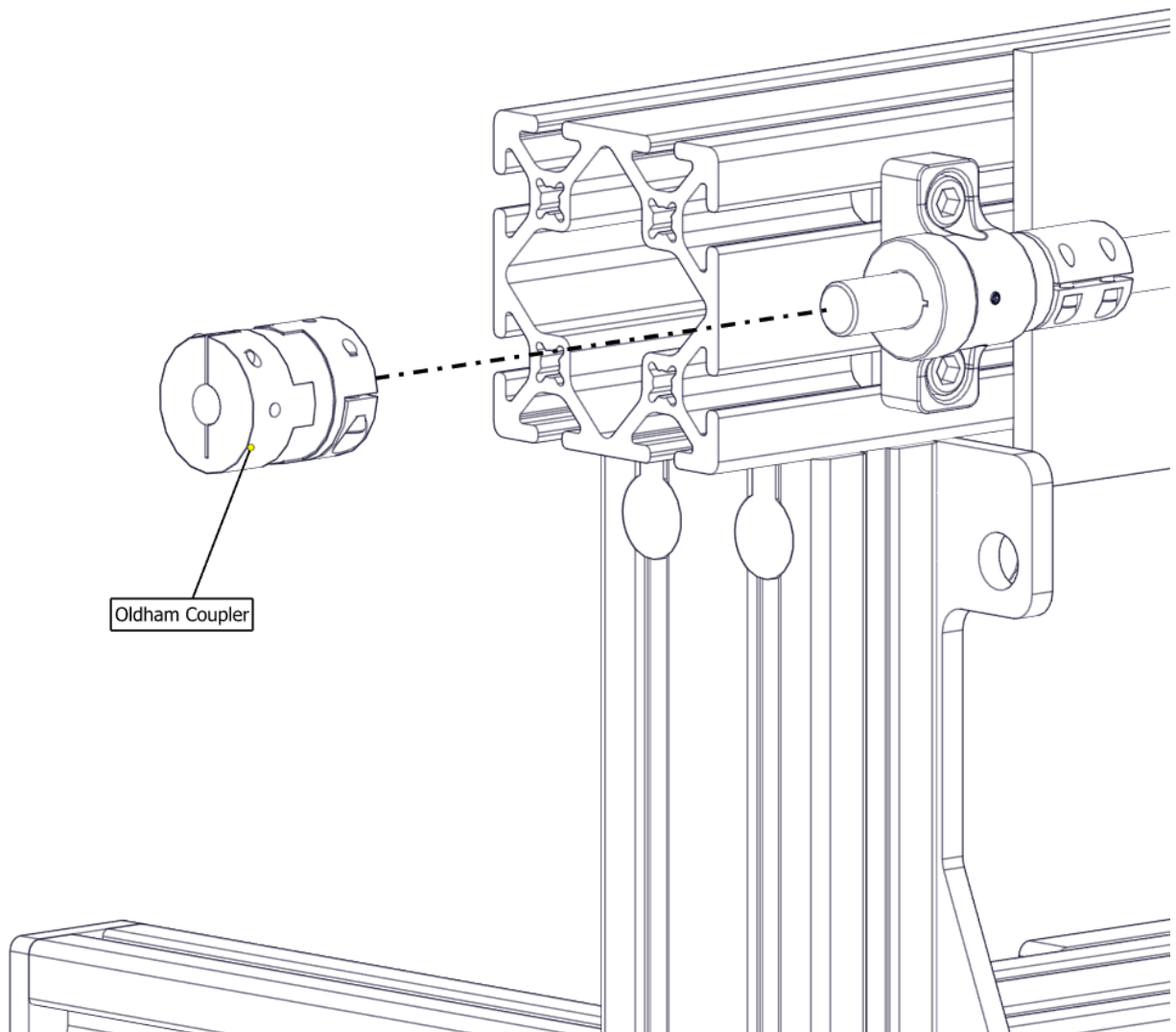
- Attach the motor to the motor mount using four 10-32 x 5/8" socket head cap screws.



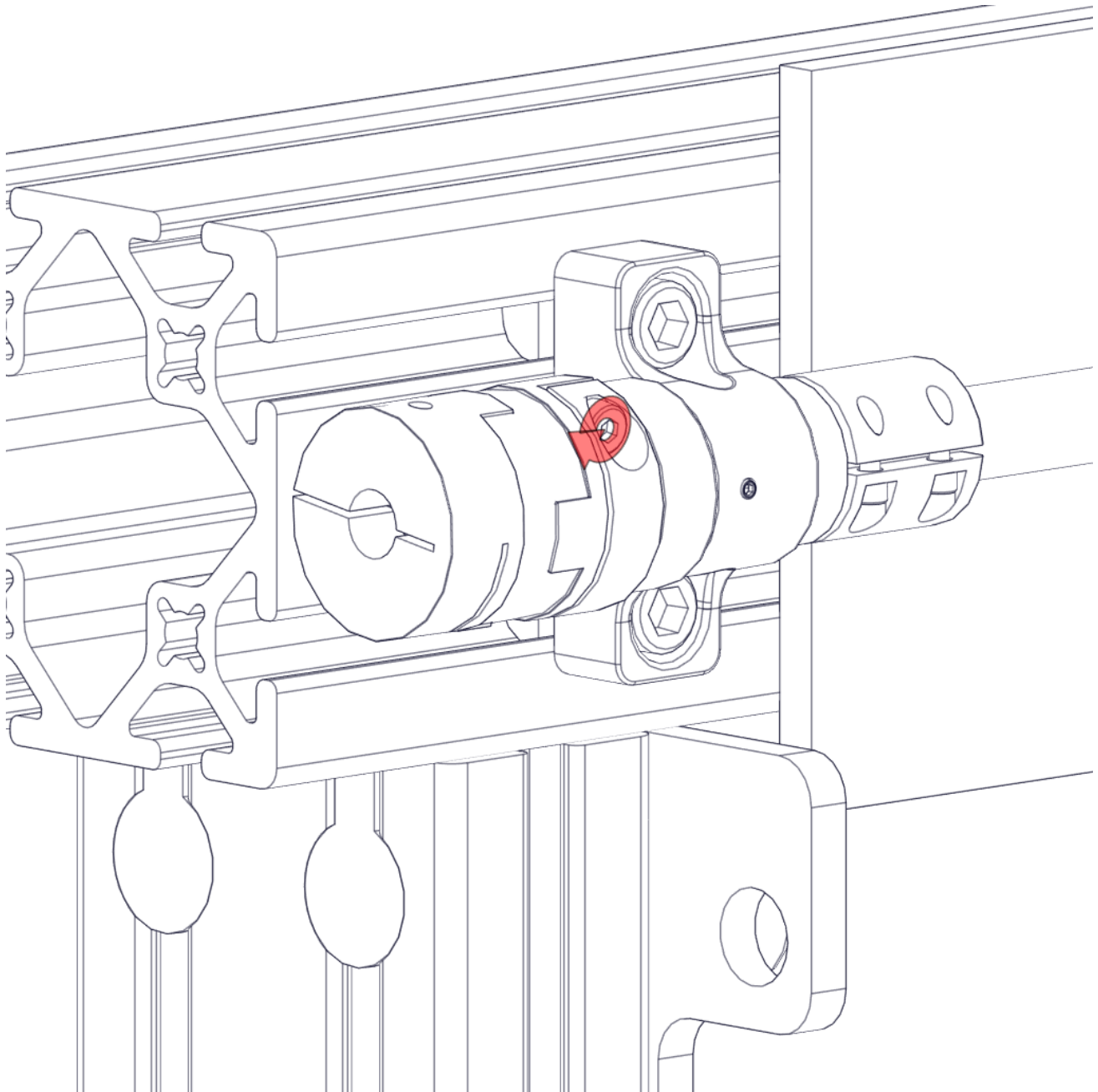
- Tighten the highlighted screws.



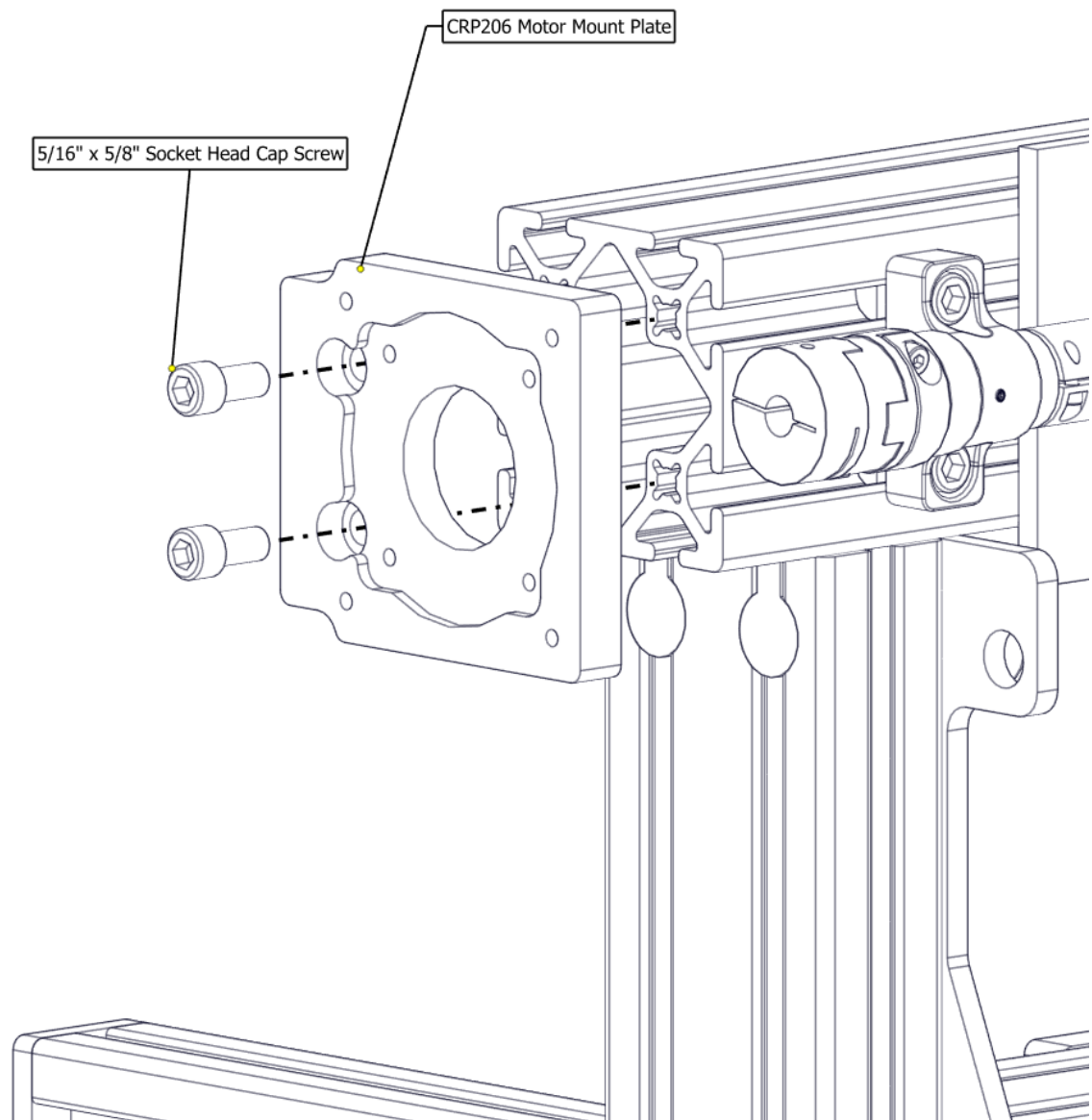
- Tighten the highlighted screw.



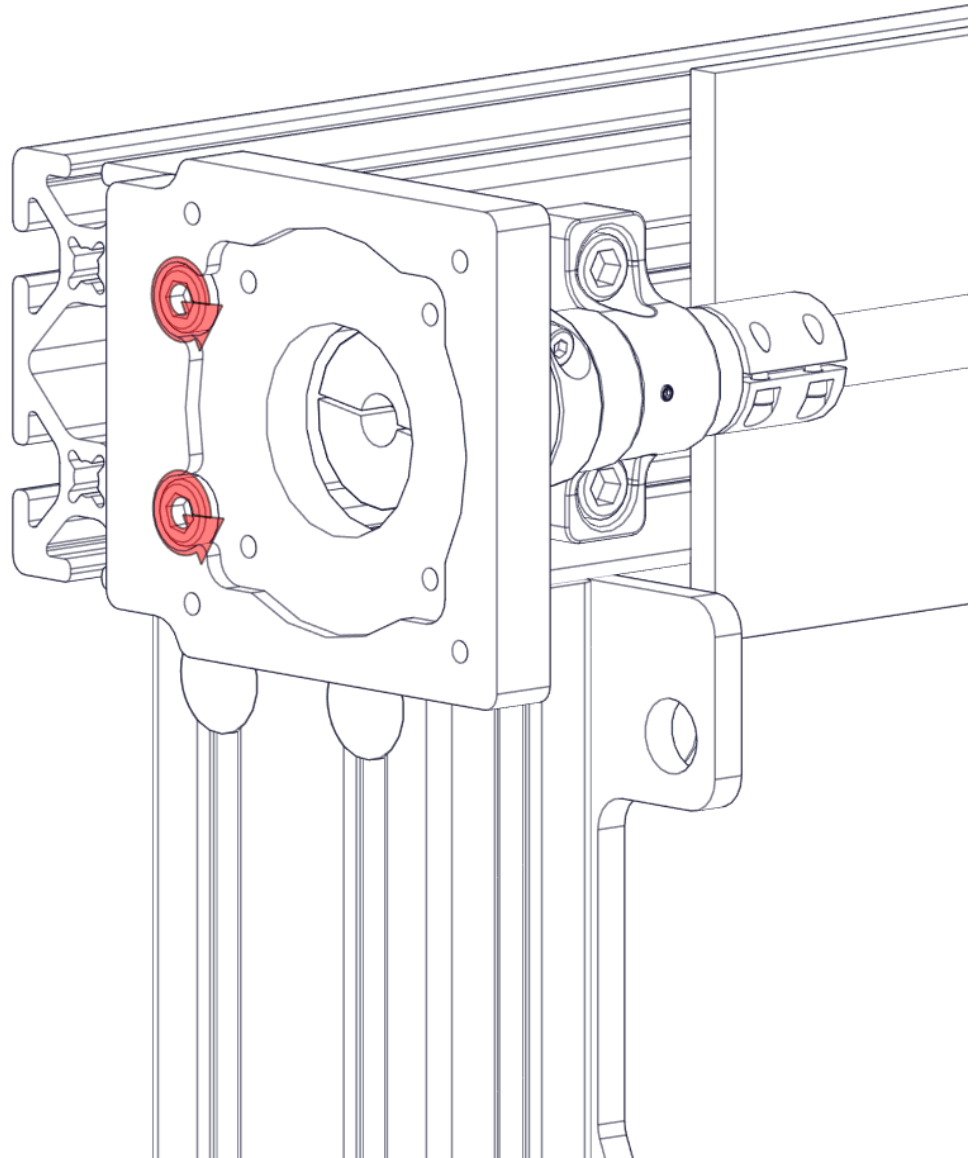
- Install an Oldham coupler half onto the shaft adapter.



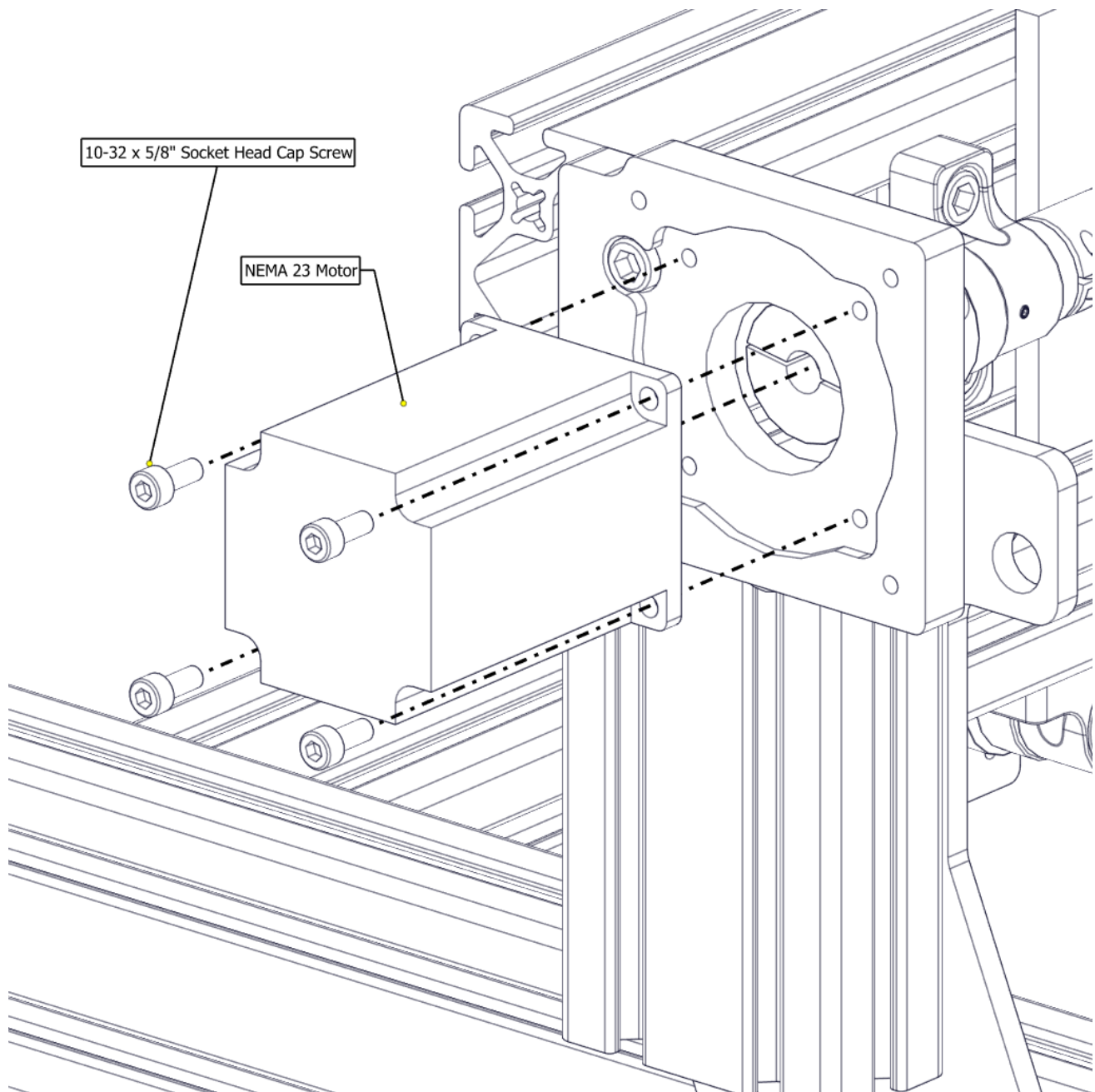
- Tighten the highlighted clamping screw.



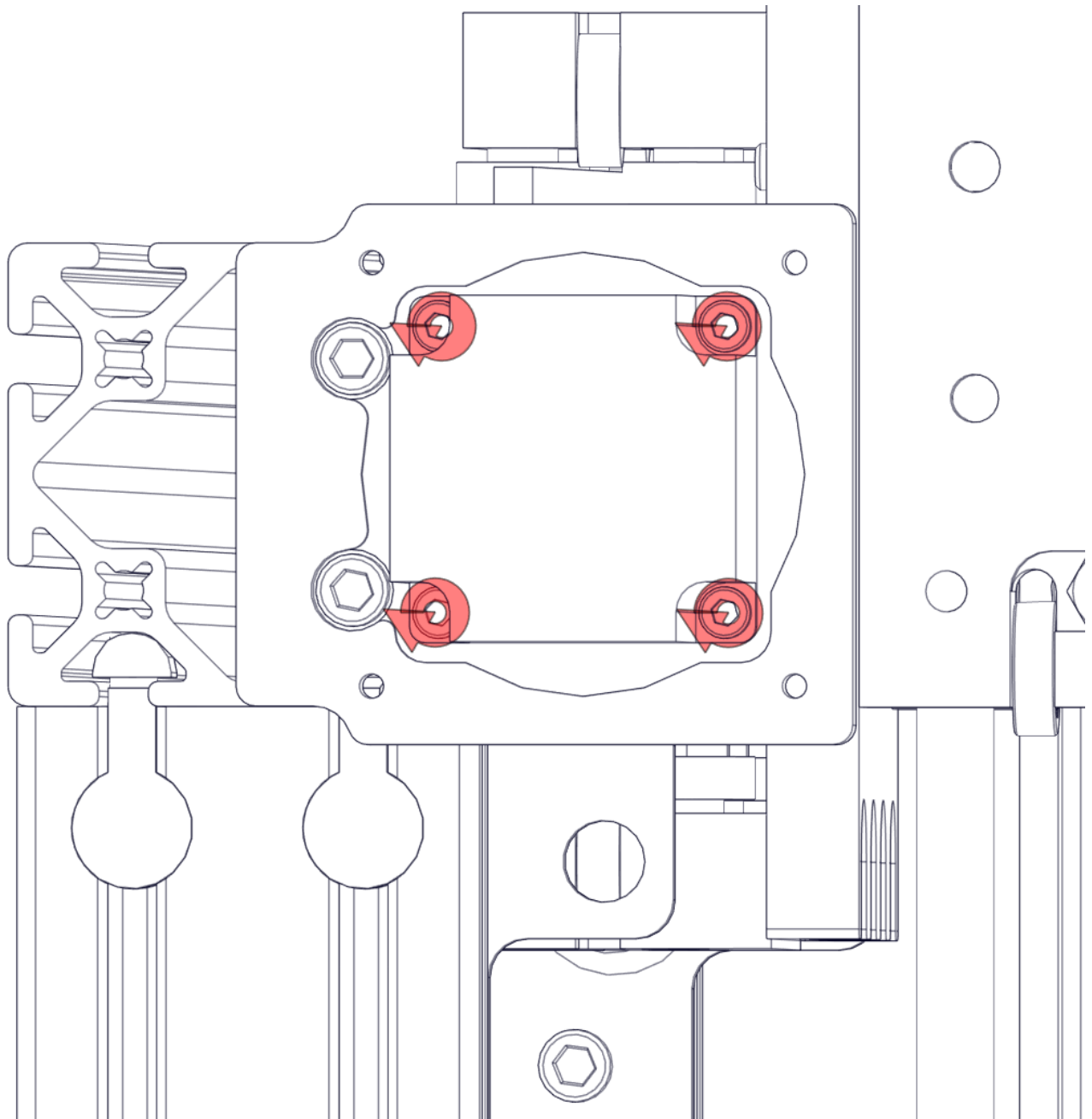
- Thread two 5/16" x 5/8" socket heap cap screws through a CRP206-01 motor mount plate and into the end of the gantry extrusion as above.



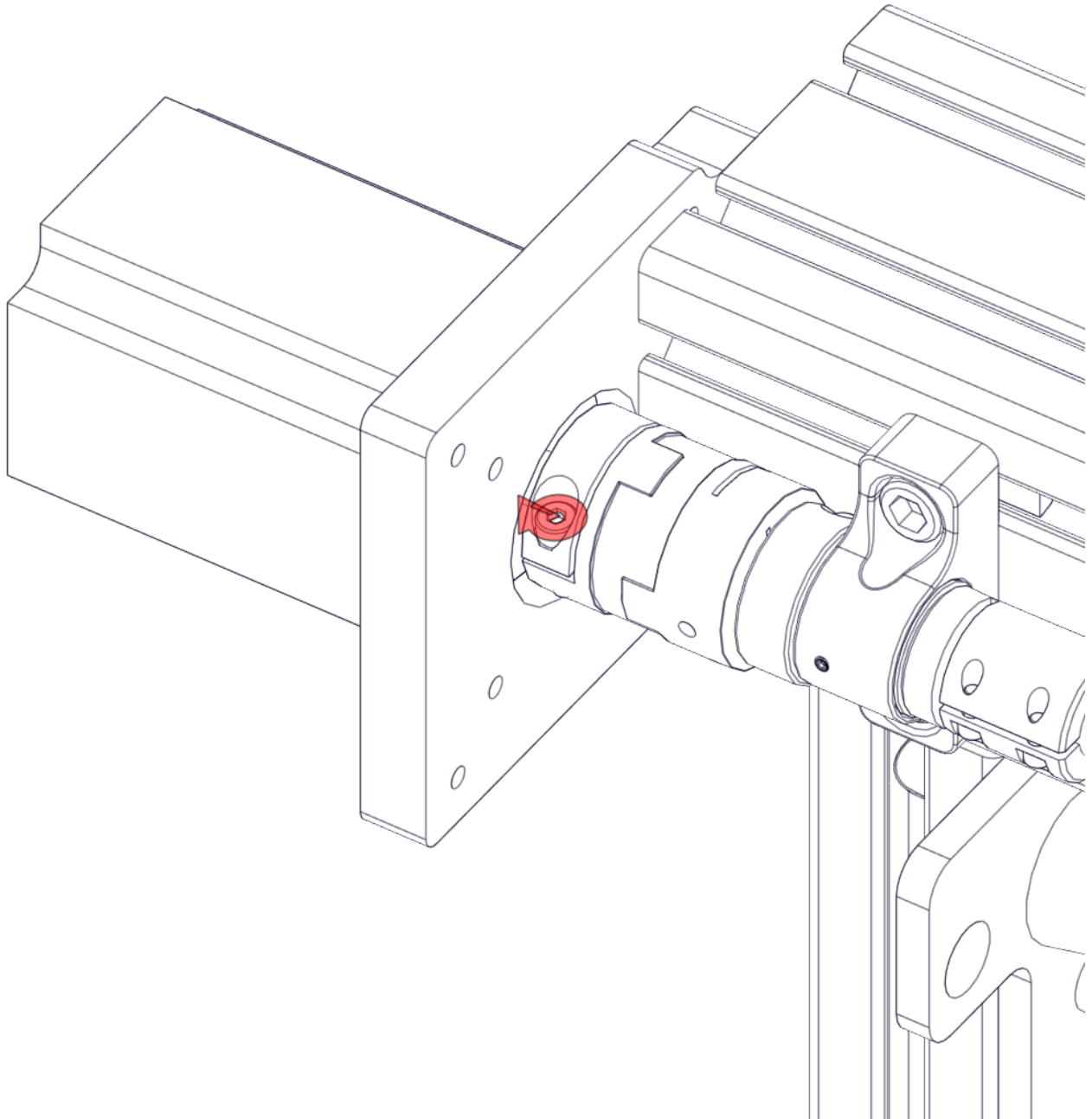
- Tighten the highlighted 5/16" socket head cap screws.



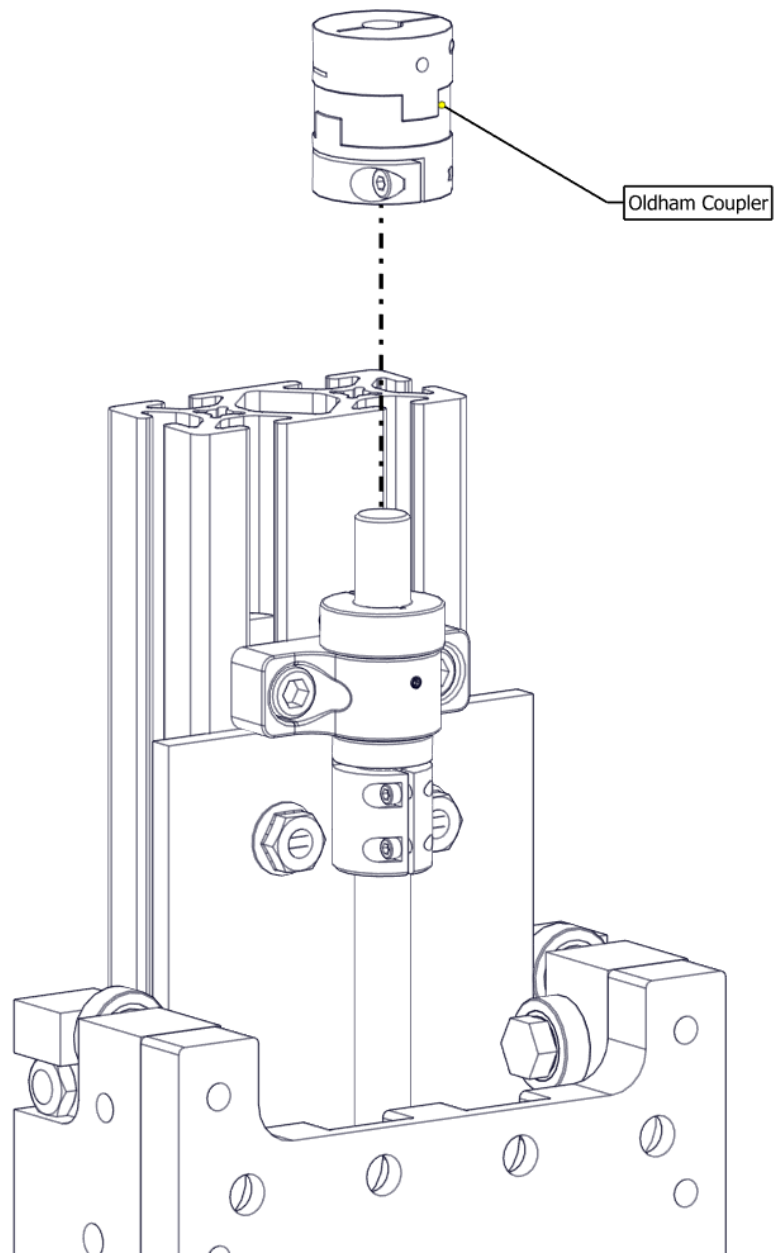
- Attach the motor to the motor mount using four 10-32 x 5/8" socket head cap screws.



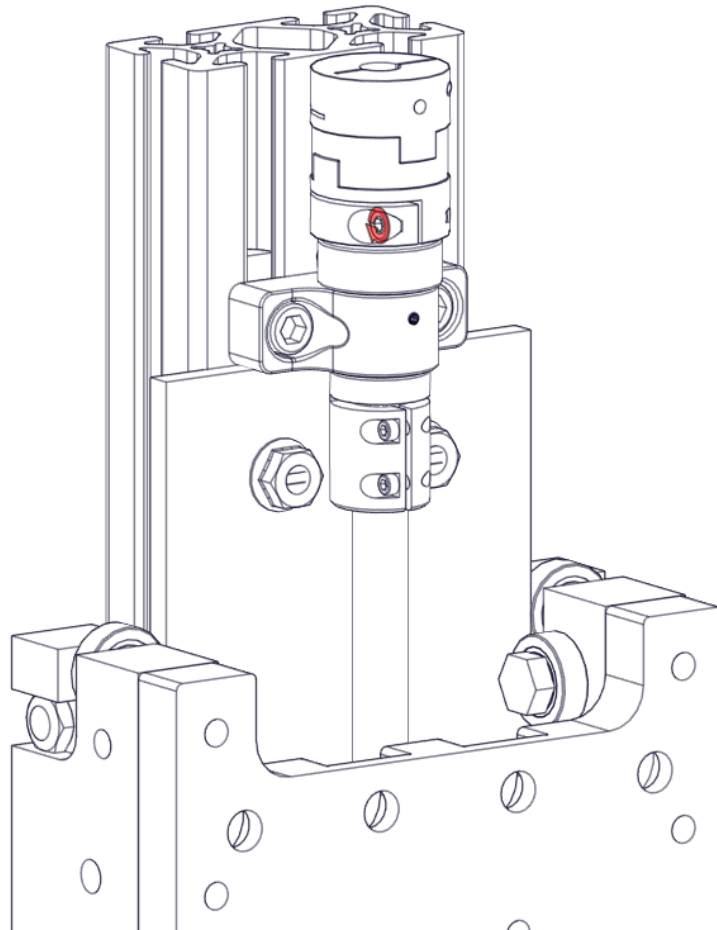
- Tighten the highlighted screws.



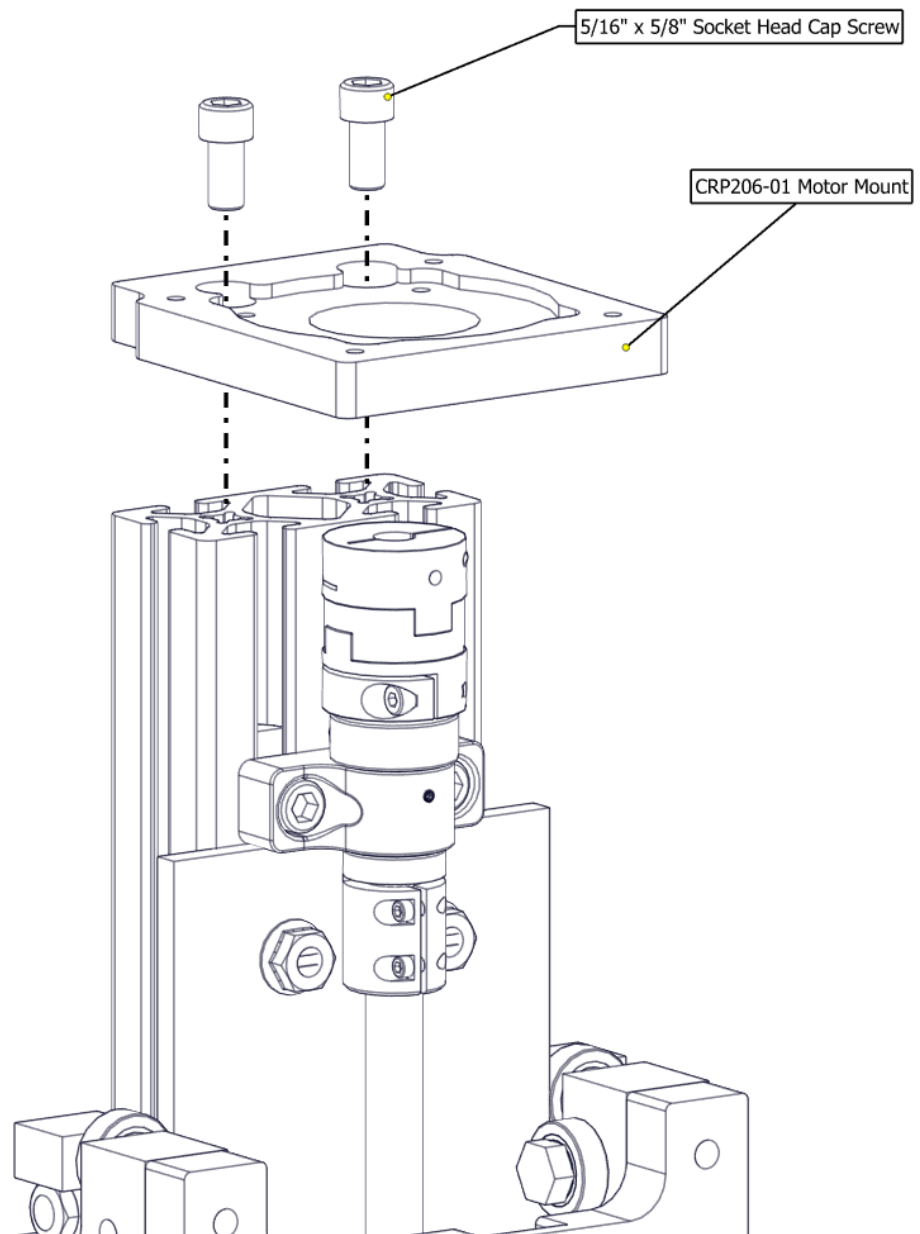
- Tighten the highlighted screw.



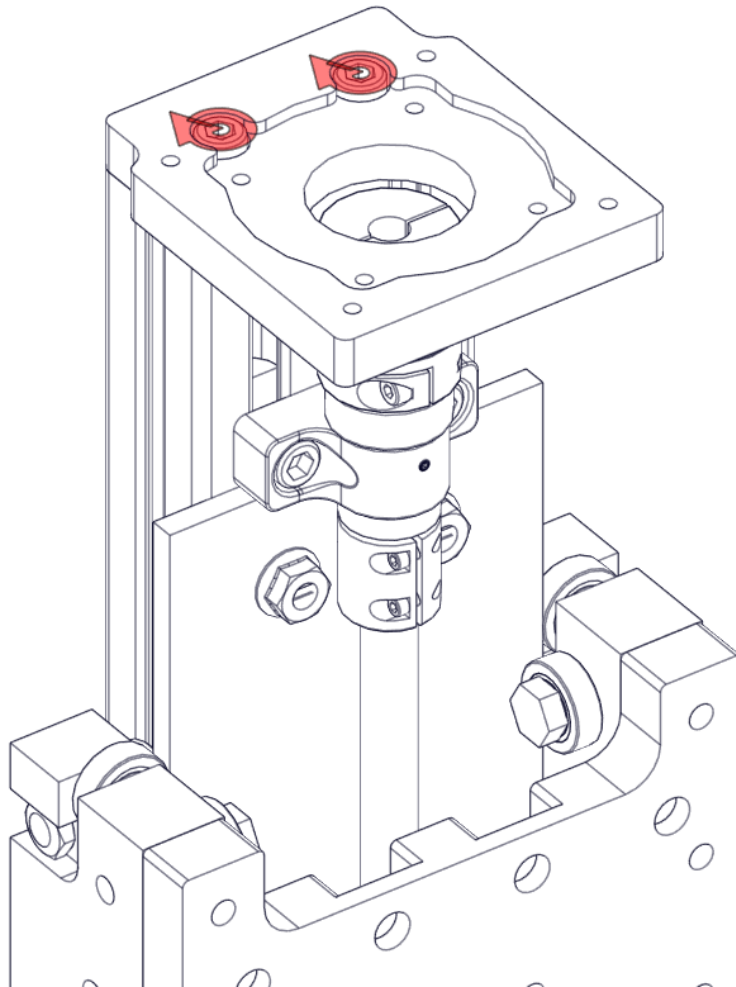
- Install an Oldham coupler onto the shaft adapter.



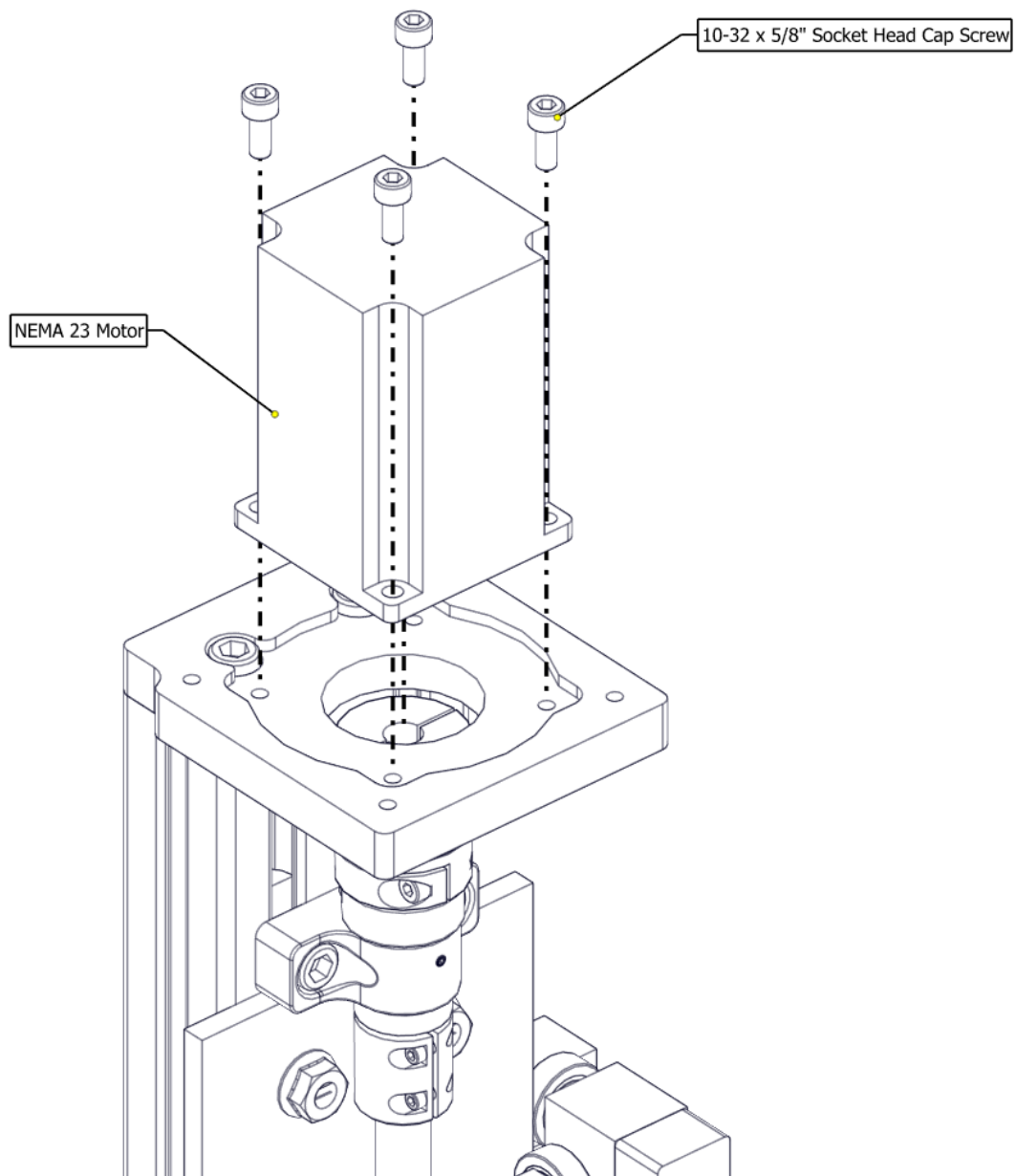
- Tighten the highlighted clamping screw.



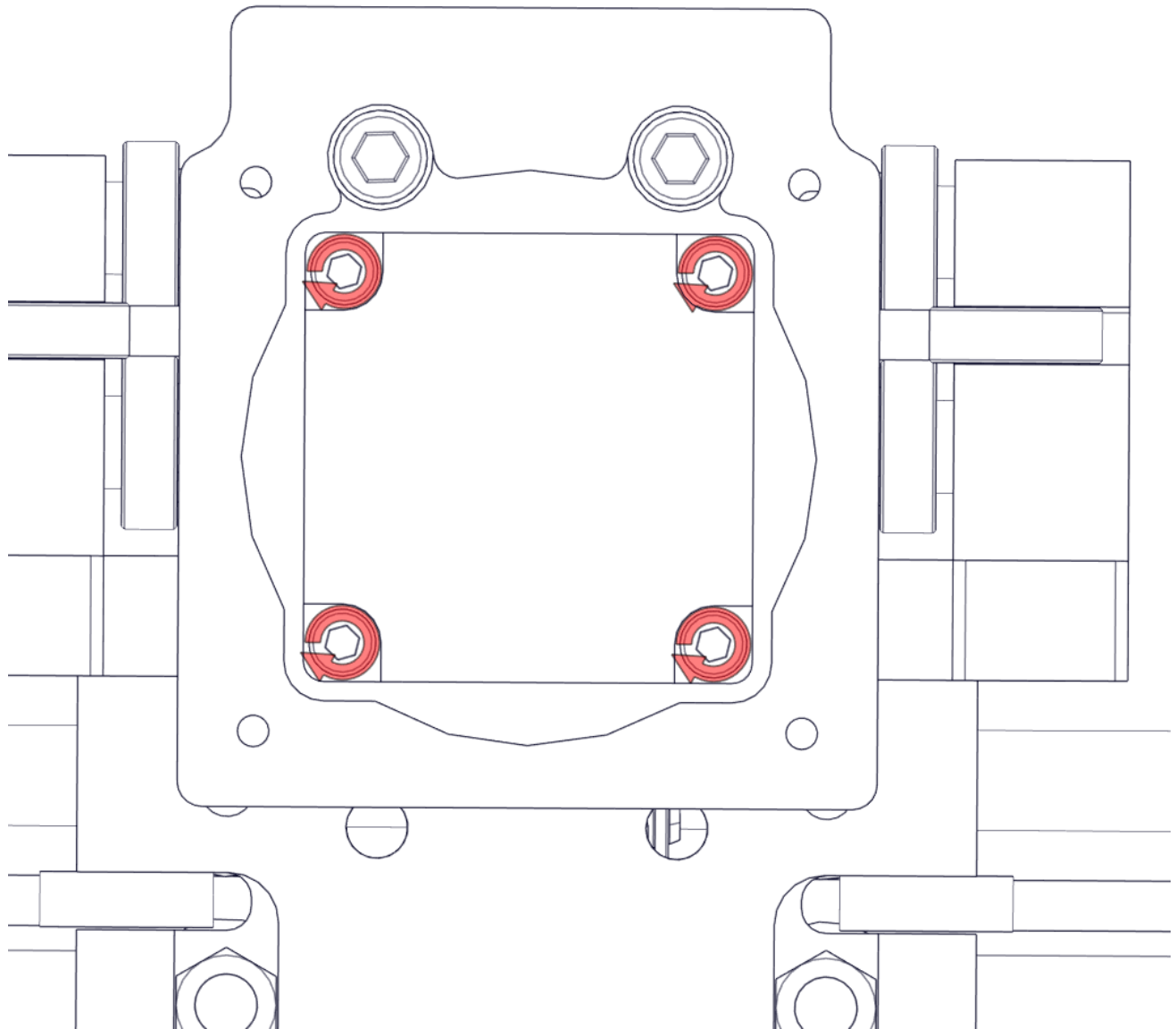
- Thread two 5/16" x 5/8" socket heap cap screws through a CRP206-01 motor mount plate and into the end of the 19" z-axis extrusion as indicated.



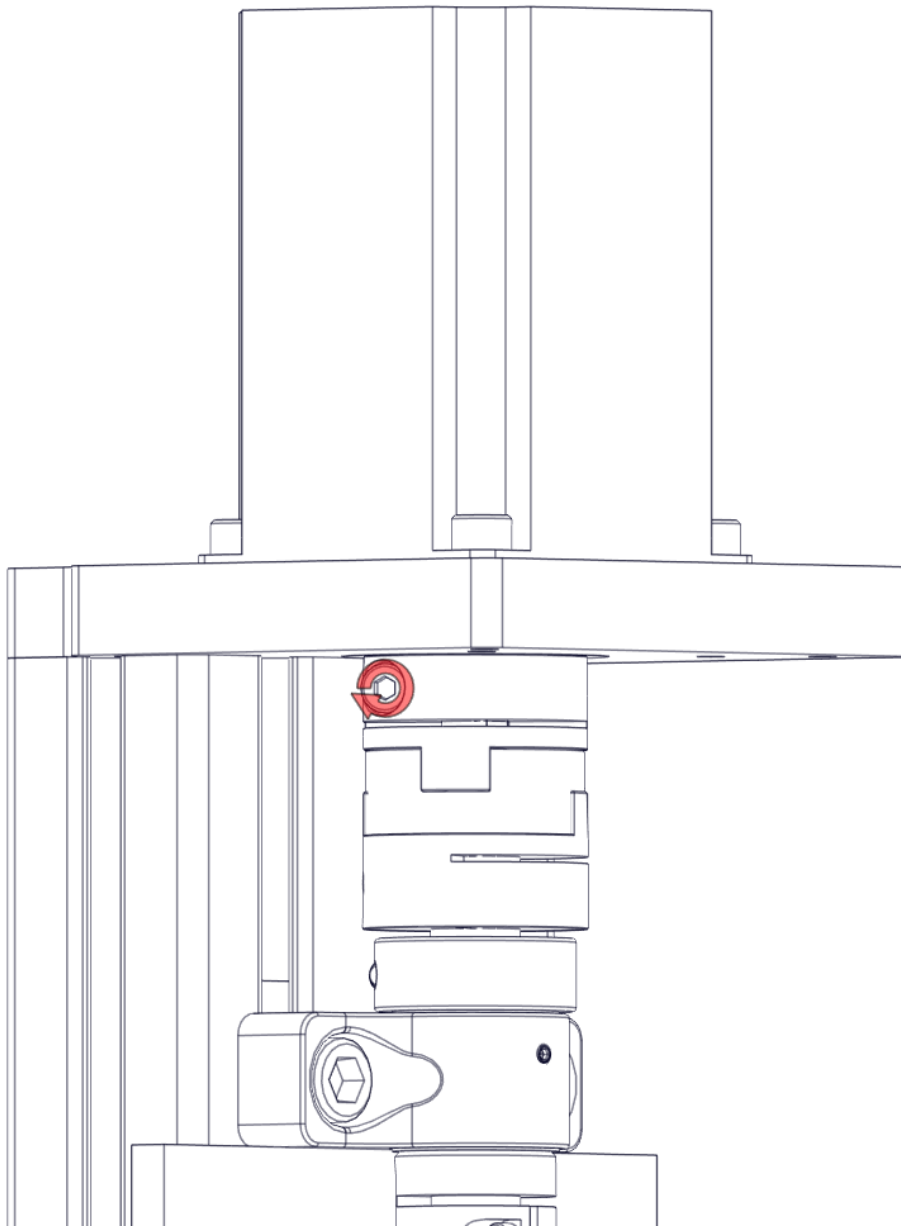
- Tighten the highlighted socket head cap screws.



- Attach the motor to the motor mount using four 10-32 x 5/8" socket head cap screws.

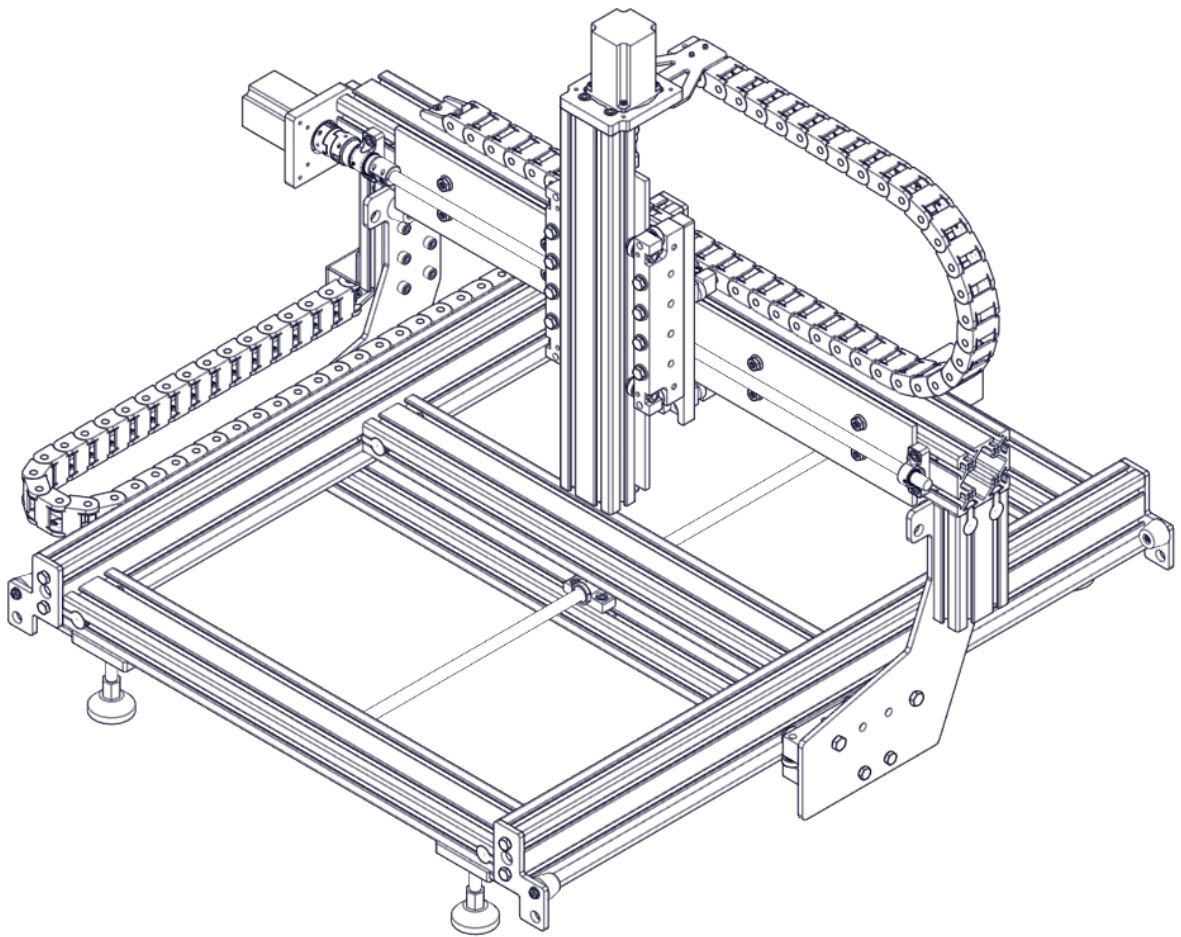


- Tighten the highlighted screws.

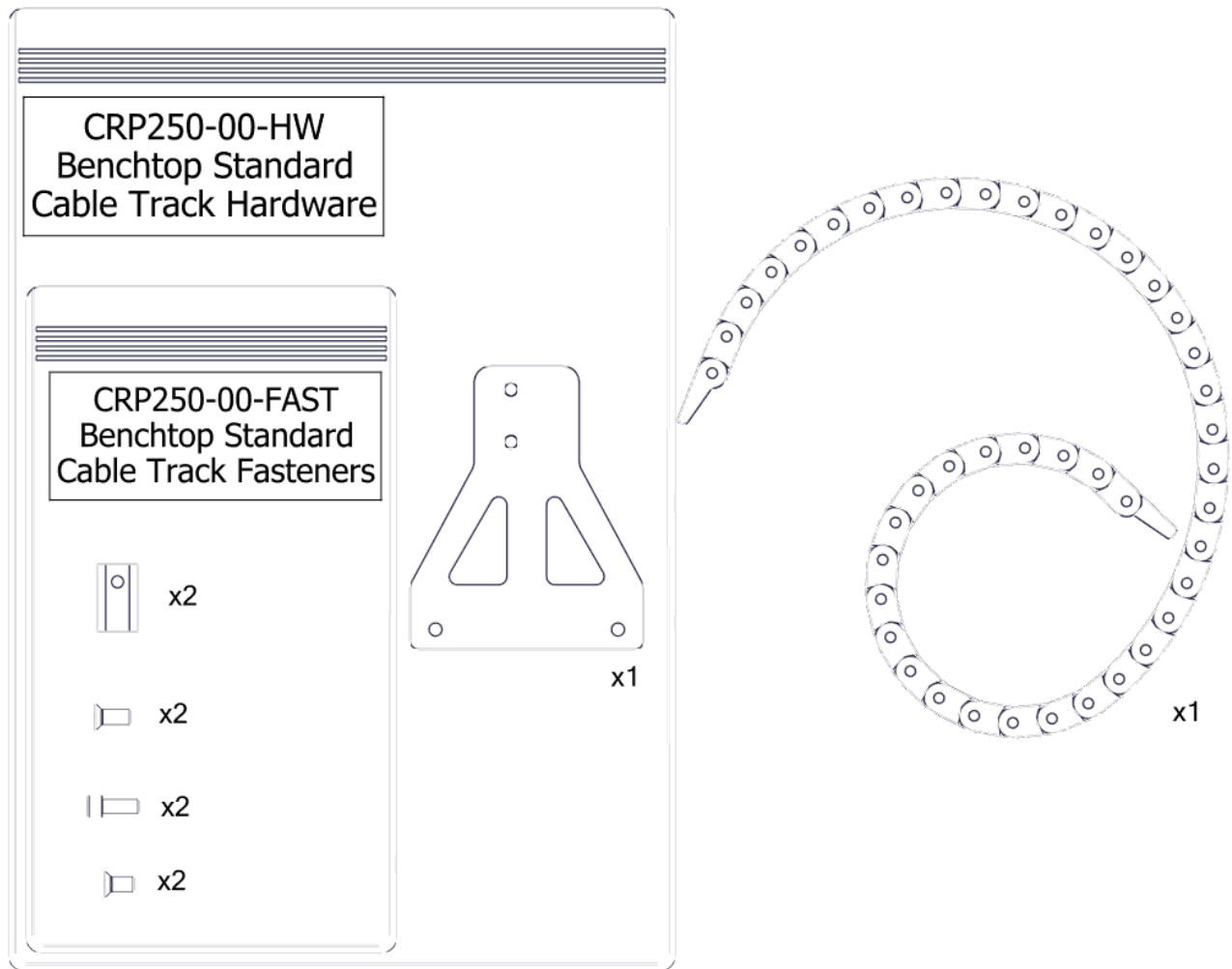


- Tighten the highlighted screw.

Cable Track Assembly



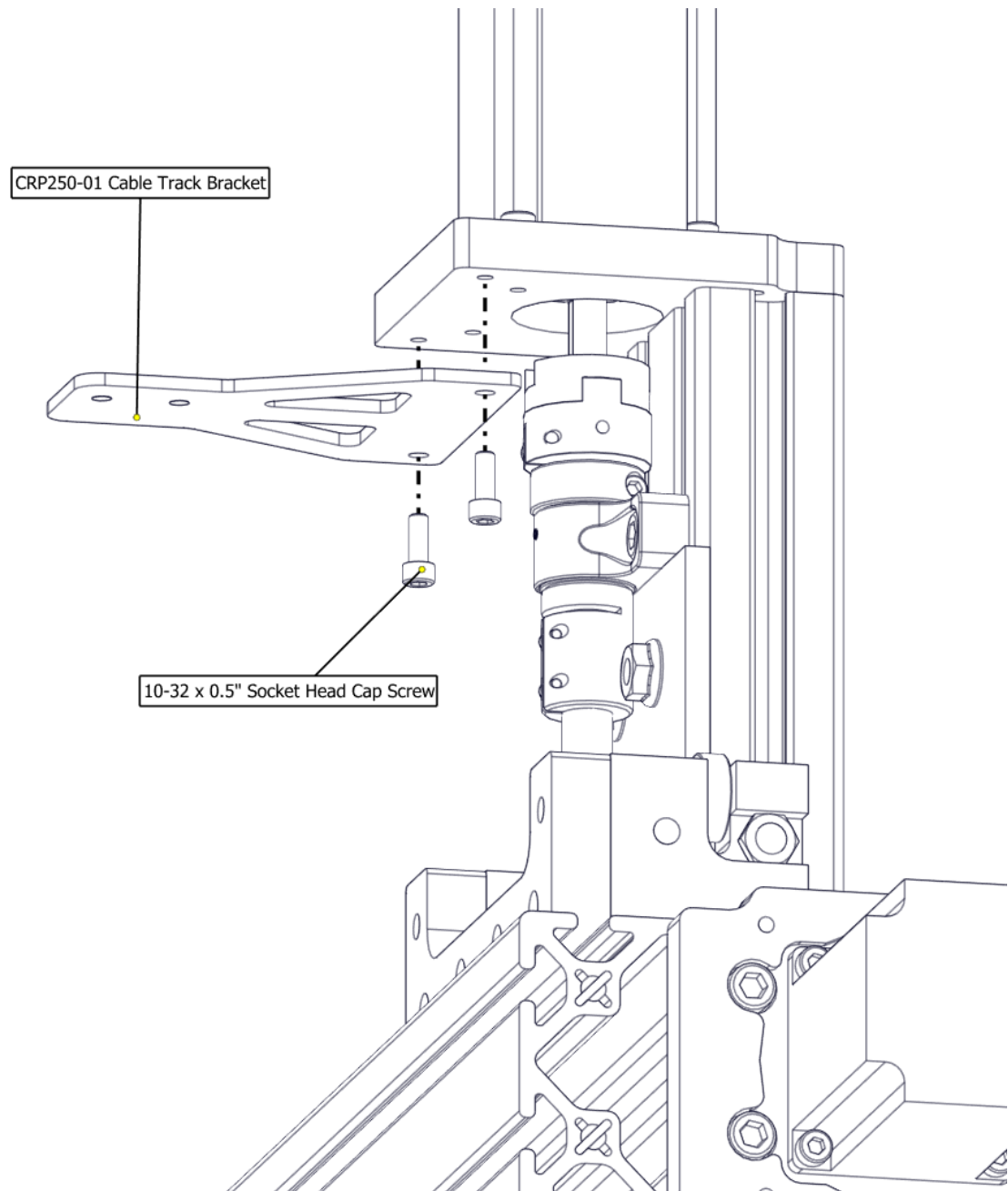
6.1 X/Z Cable Track Installation



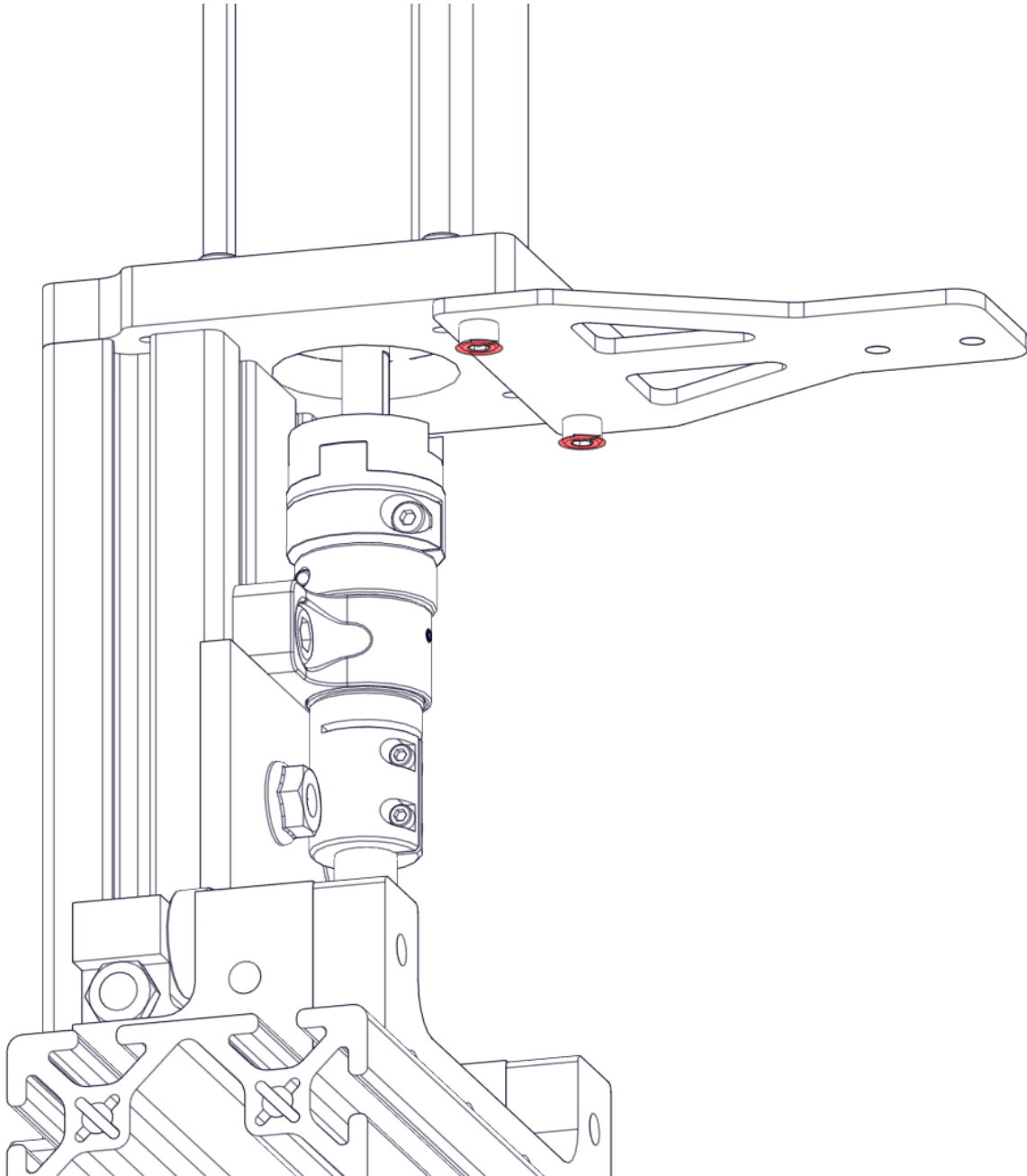
Parts Required:

- (1) Cable Track Section
- (1) CRP250-01 X/Z Cable Track Bracket
- (2) 10-32 x 1/2 socket head cap screws
- (1) M5 Roll-in t-nut
- (2) M5 x 10mm flat head screw
- (2) M5 x 16mm flat head screw

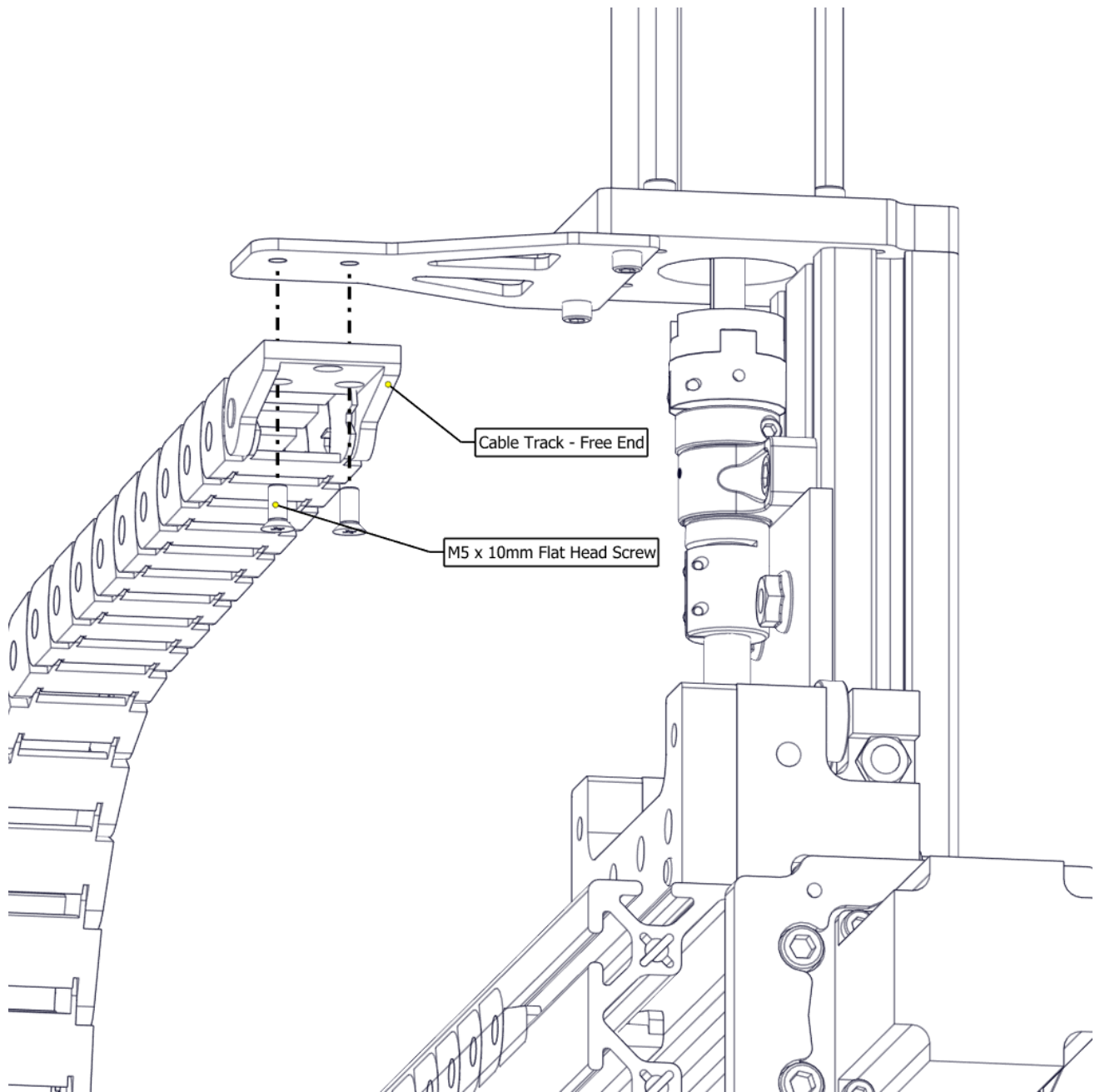
Bag CRP250-00 will contain all parts necessary, except the cable track section.



- Install two 10-32 x $\frac{1}{2}$ socket head cap screws through a CRP250-01 cable track bracket and into the z-axis motor mount as indicated.

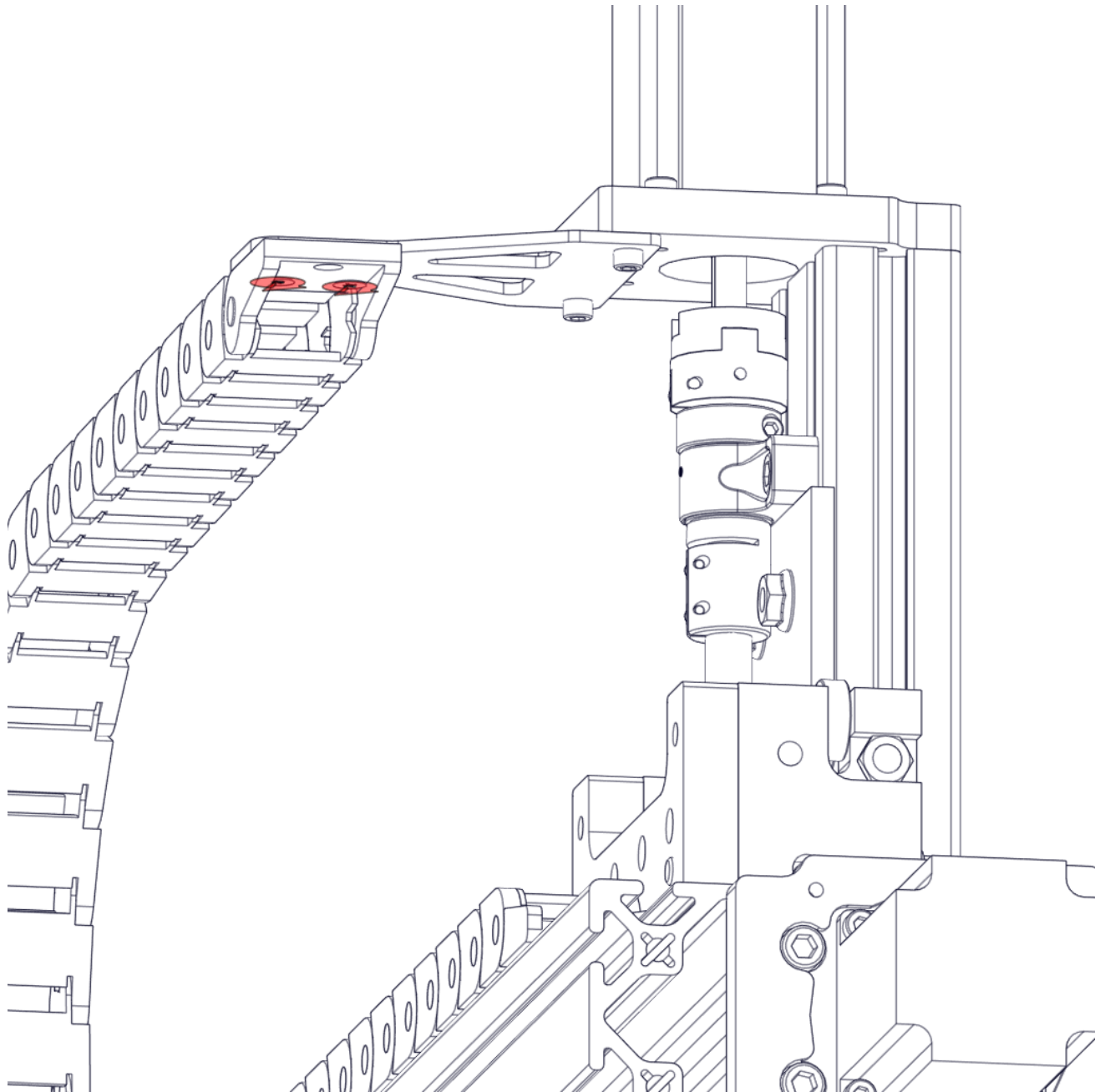


- Tighten the highlighted 10-32 socket head cap screws.

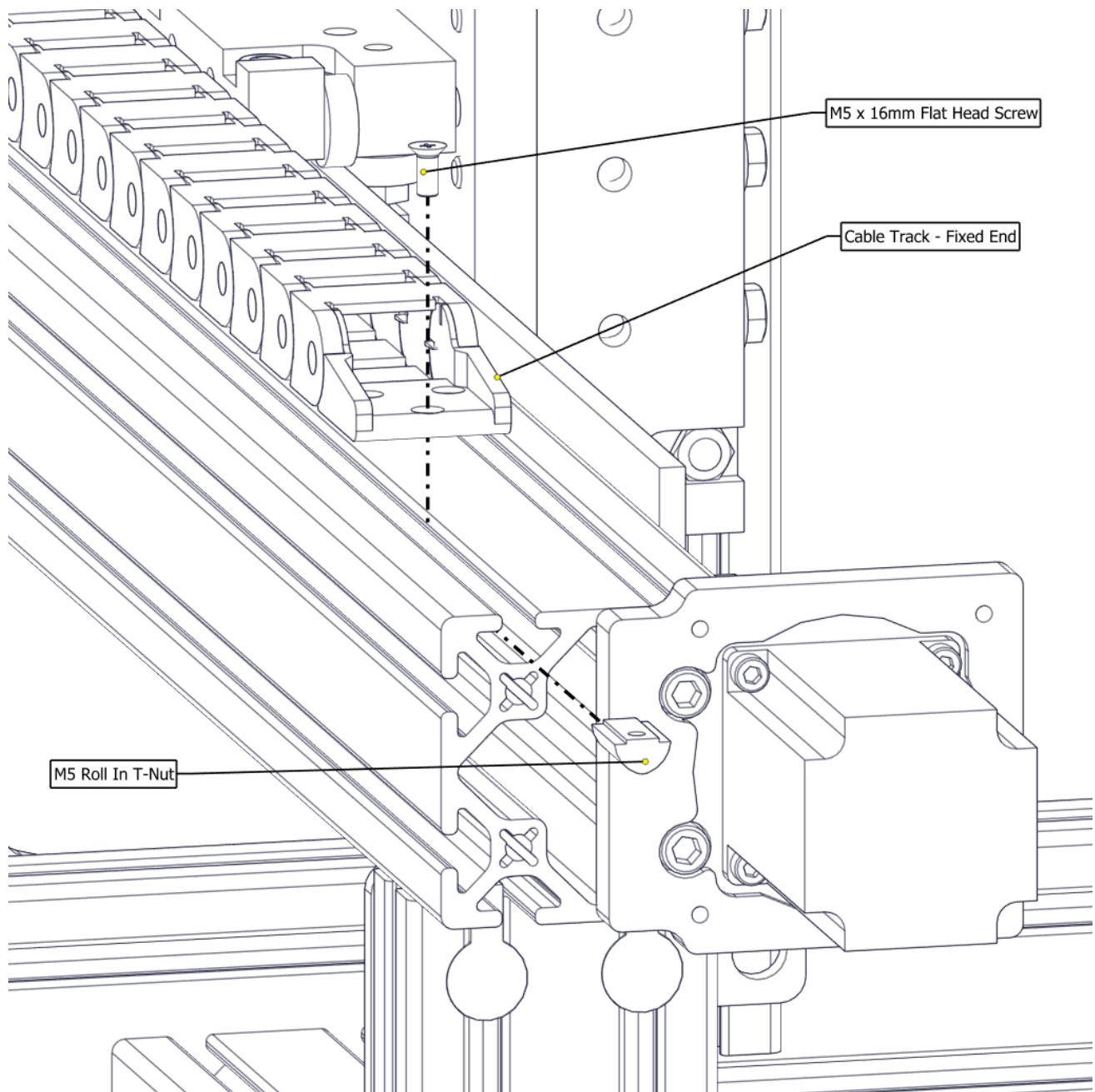


Note: Cable track is not symmetric, the last segment on one end rotates freely and the last segment on the opposite end is fixed.

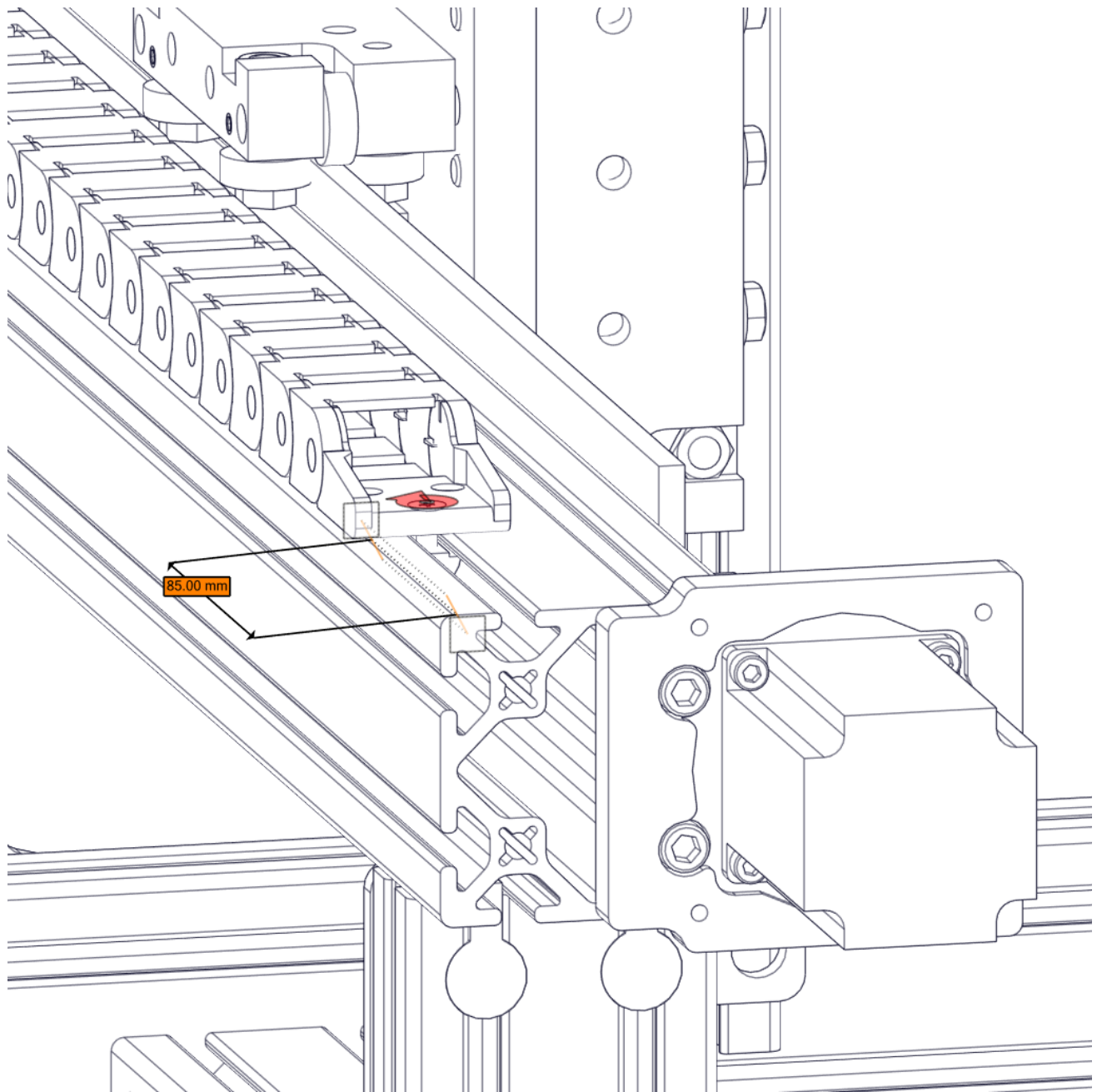
- Install two M5 x 10mm flat head screws through the free end of the cable track and into the CRP250-01 cable track bracket as indicated.



- Tighten the highlighted M5 flat head screws.

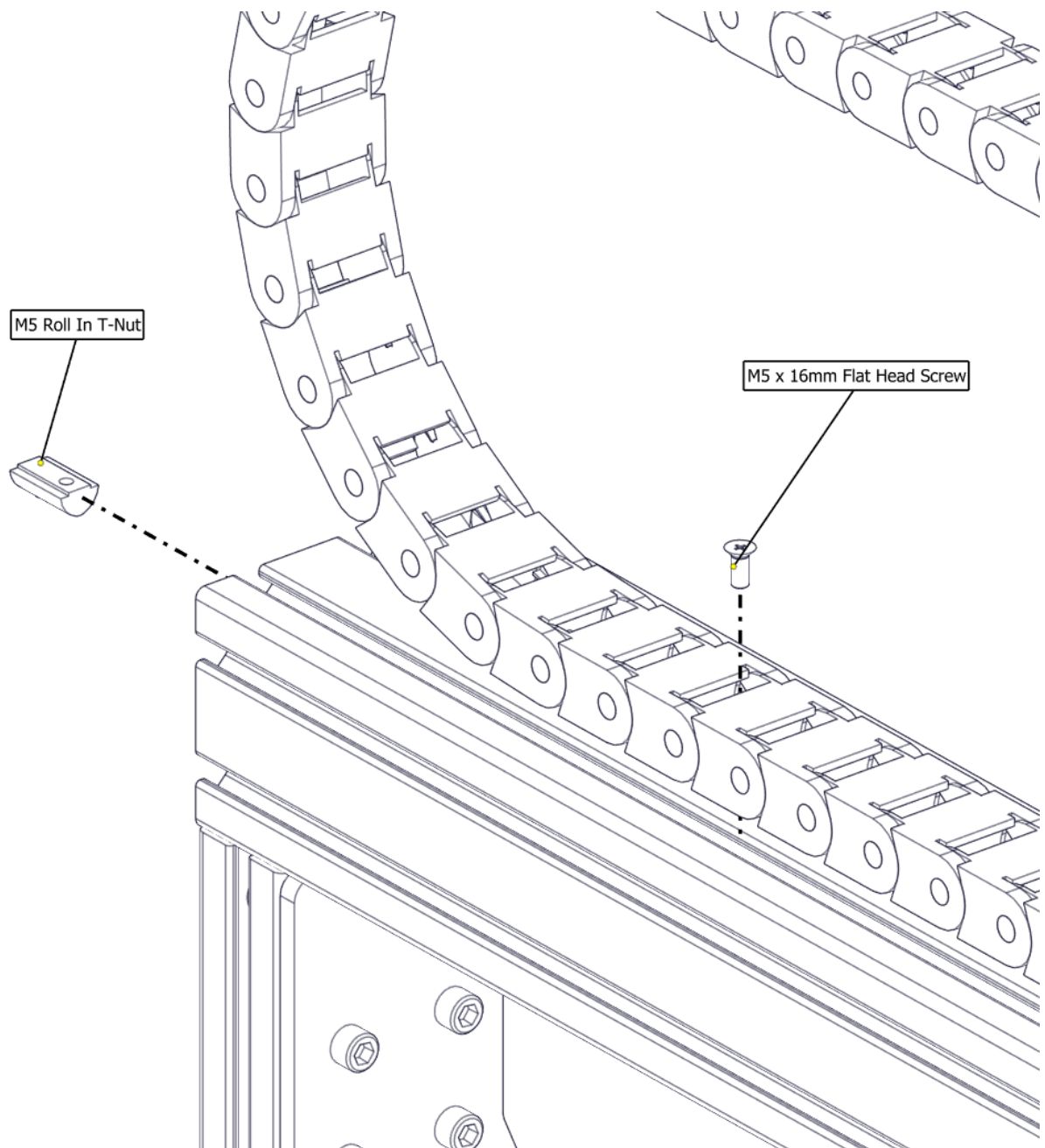


- Install an M5 roll-in t-nut into the gantry extrusion as indicated.
- Thread a single M5 x 16mm flat head screw through the fixed end of the cable track chain and into the M5 t-nut.



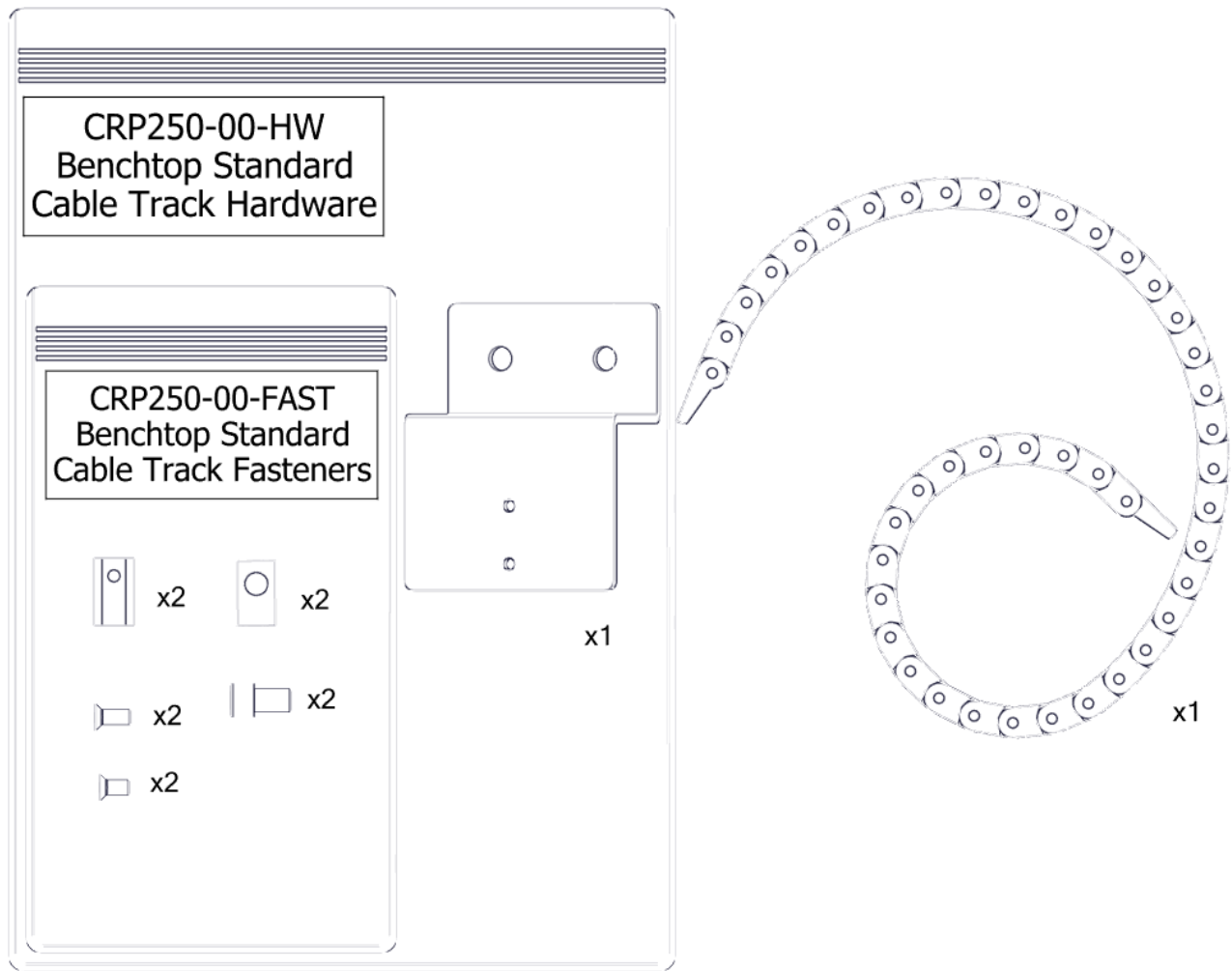
Note: The end of the cable track should be approximately 85 mm(3.3").

- Tighten the highlighted M5 flat head screw.



- Fasten the counterbored cable track link to the extrusion as indicated.

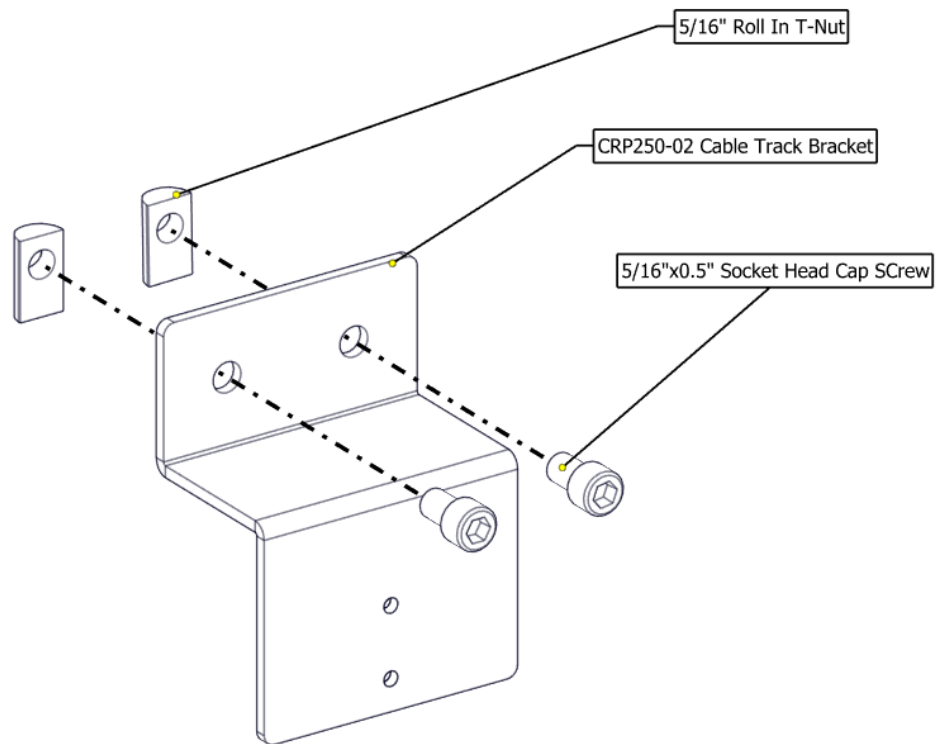
6.2 Y Cable Track Installation



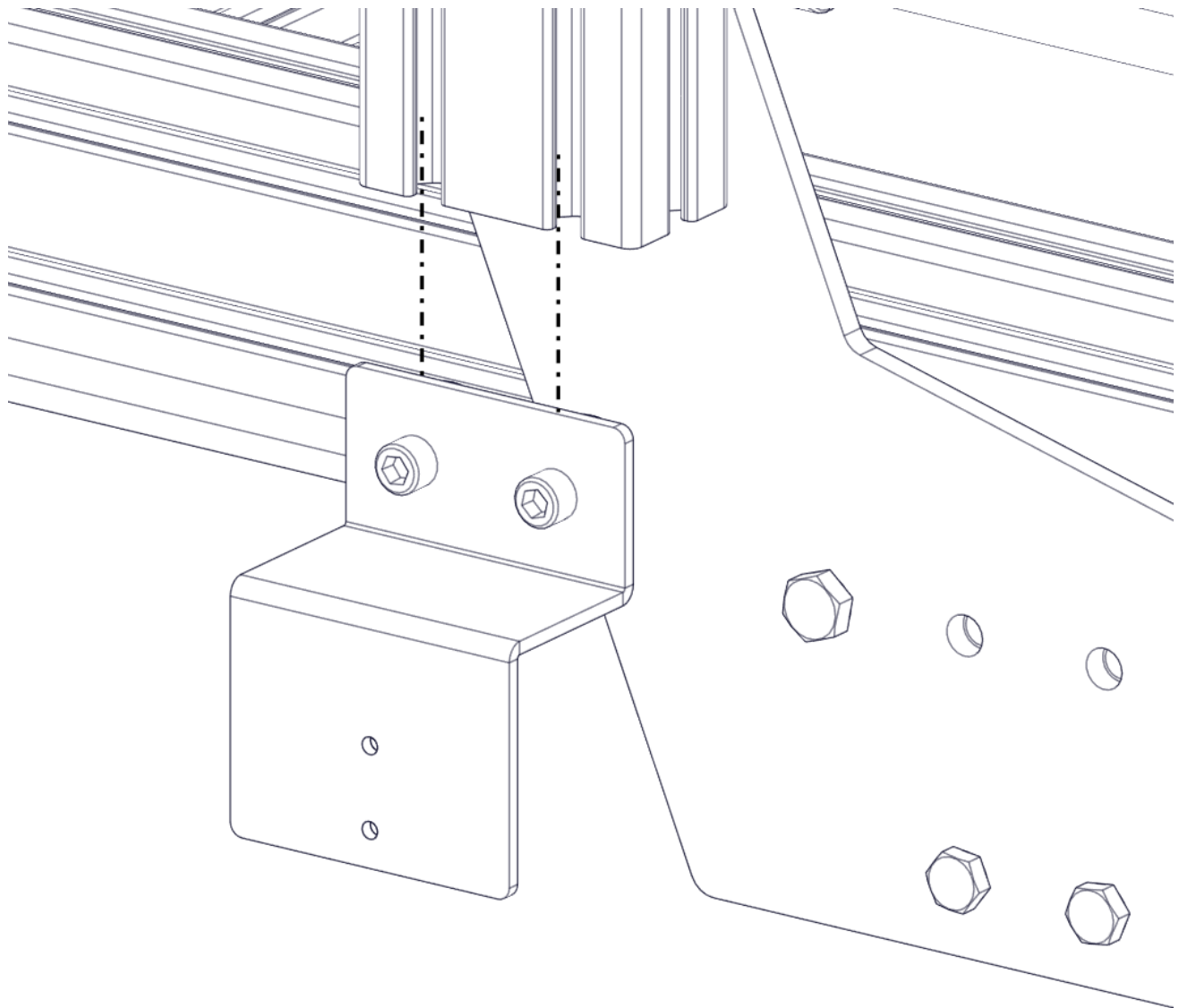
Parts Required:

- (1) Cable Track Section
- (1) CRP250-02 Y Cable Track Bracket
- (2) 5/16" x 1/2" socket head cap screw
- (2) 5/16" t-nut
- (1) M5 Roll-in t-nut
- (2) M5 x 10mm flat head screw
- (1) M5 x 16mm flat head screw

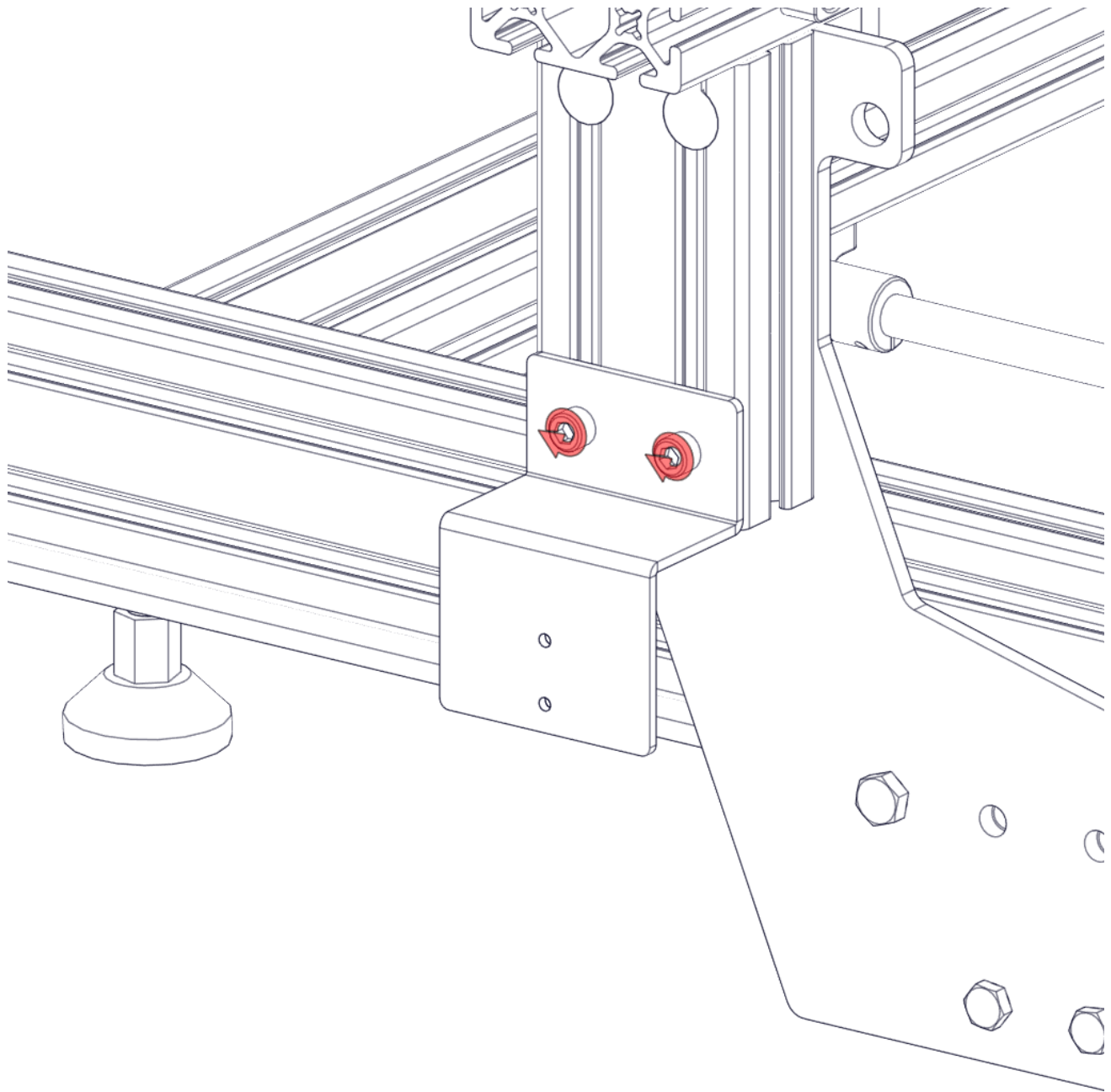
Bag CRP250-00 will contain all parts necessary, except the cable track section.



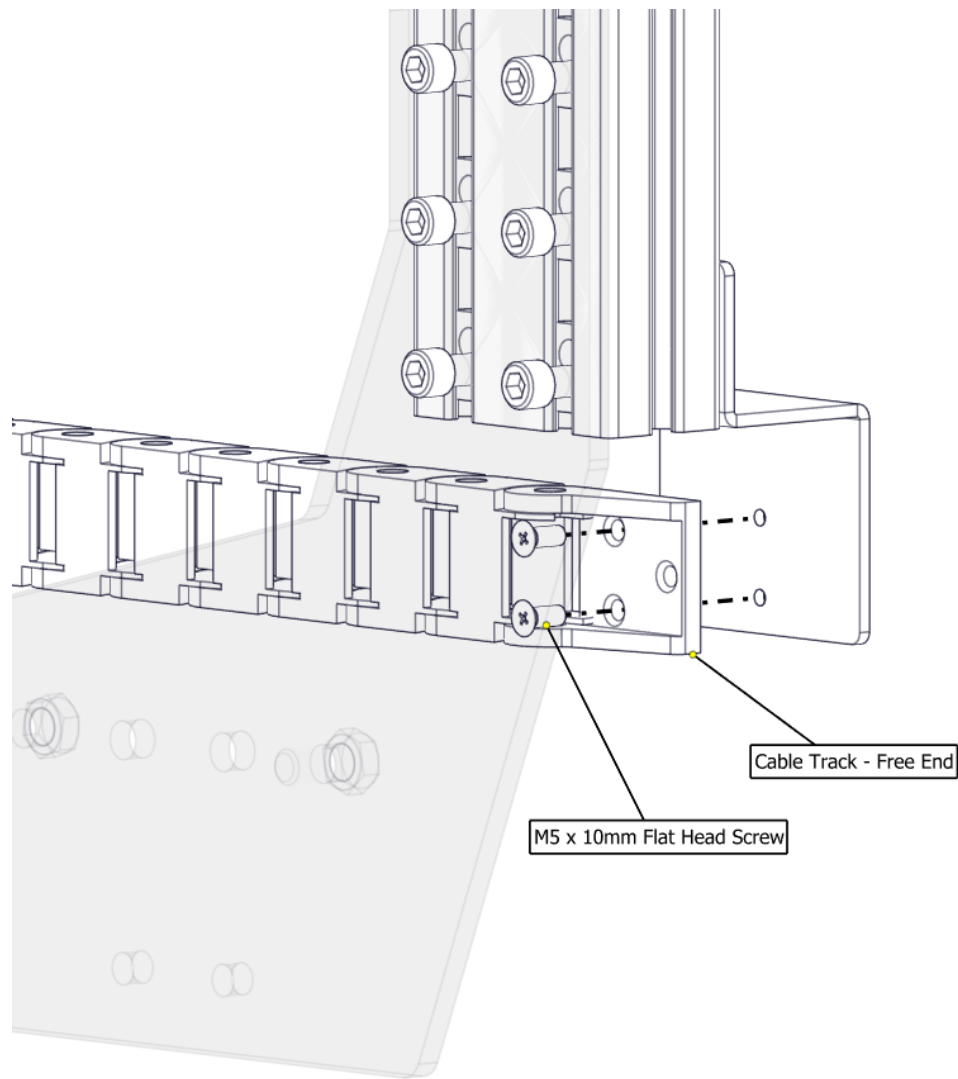
- Install a 5/16" x 1/2" socket head cap screw into both holes of a CRP250-02 **Y cable track bracket**.
- Partially thread a 5/16" t-nut onto both socket head cap screws.



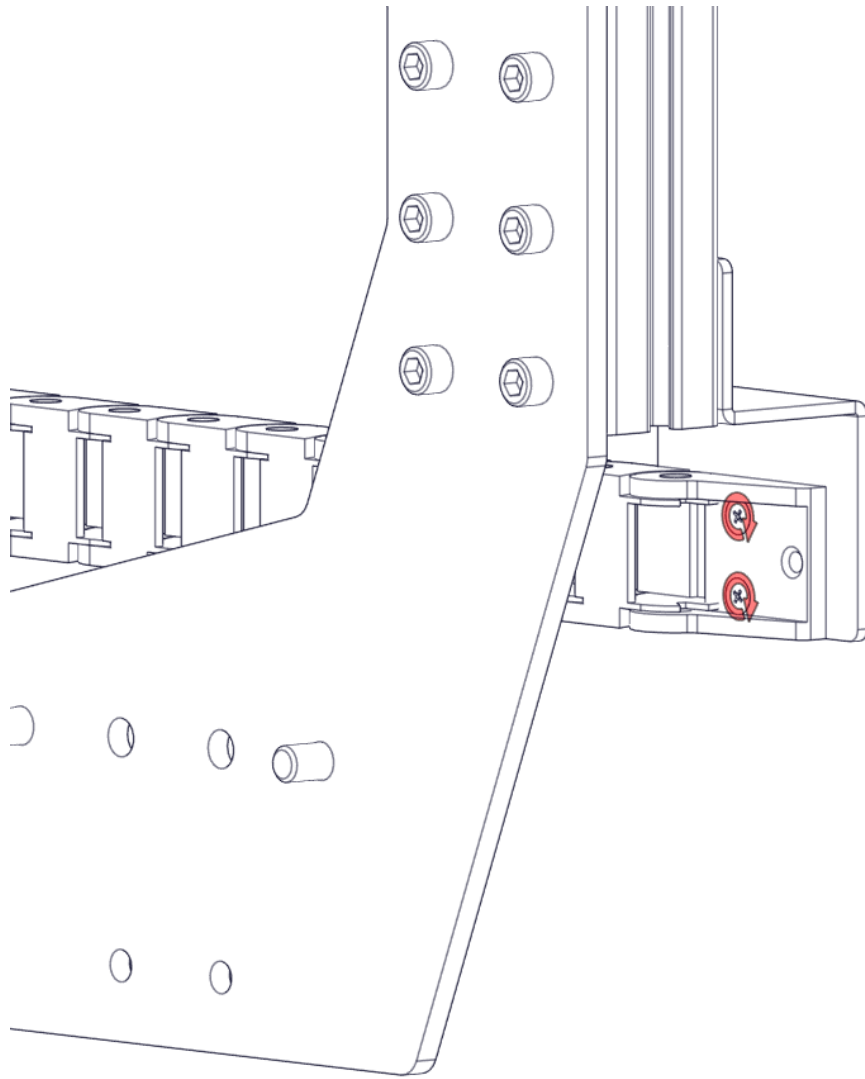
- Thread socket head cap screws through Y cable track bracket and into roll-in t-nuts as indicated.
- Slide Y cable track bracket assembly into riser extrusion as indicated.



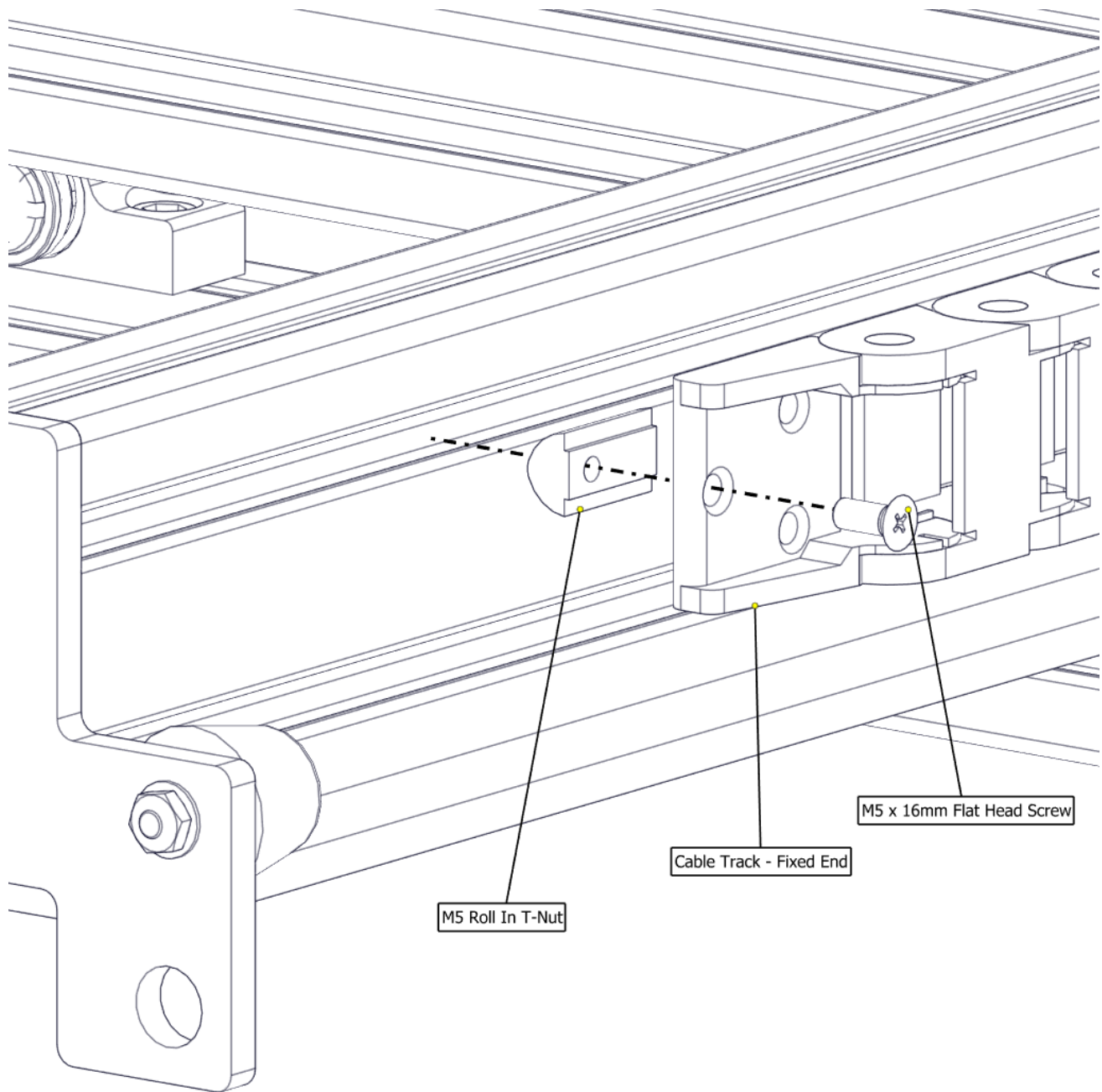
- Position the X cable track bracket so it is flush with the bottom of the riser extrusion as above.
- Tighten the highlighted 5/16" socket head cap screws.



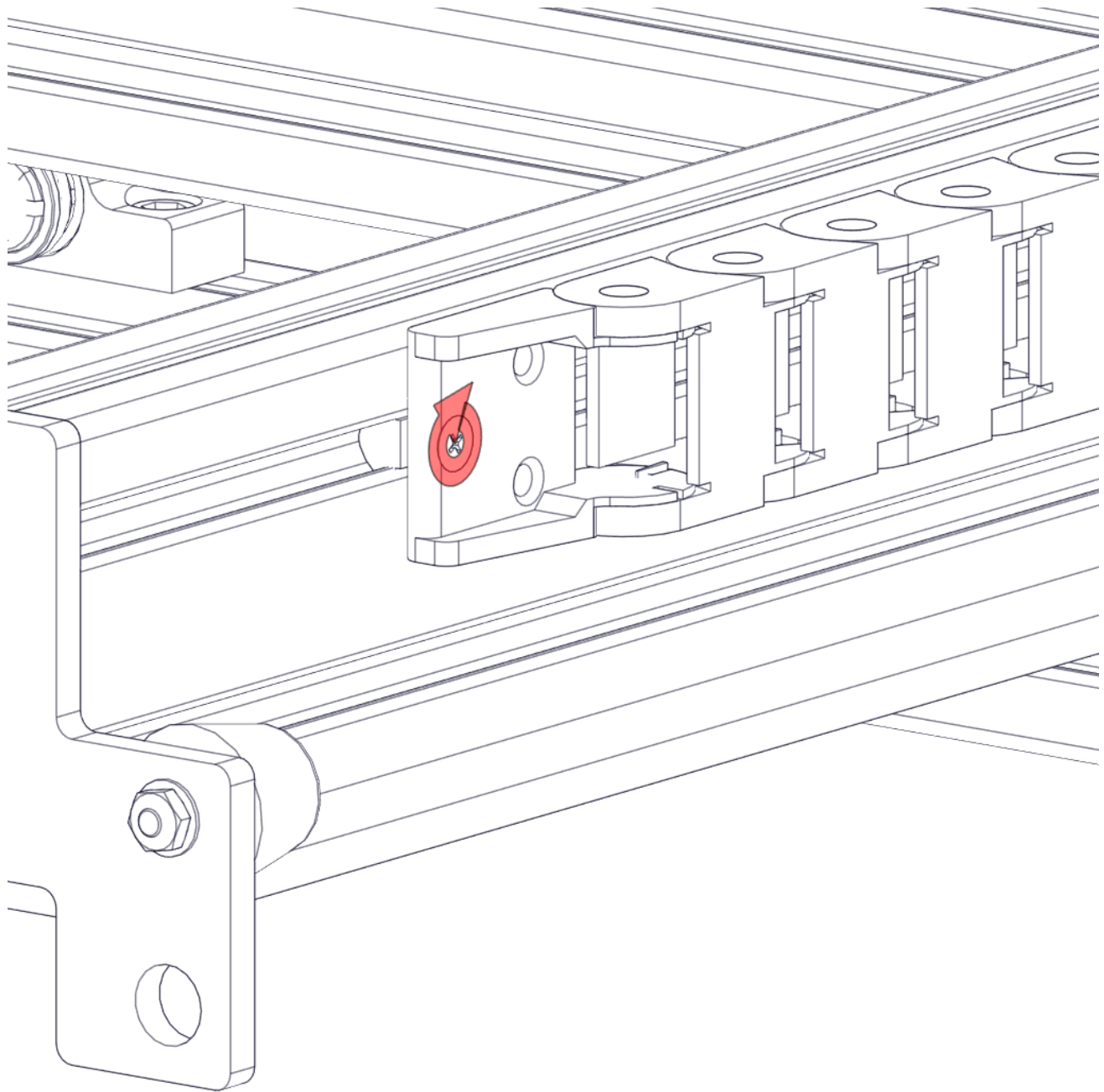
- Install two M5 x 10mm flat head screws through the free end of the cable track chain and into the Y cable track bracket as indicated.



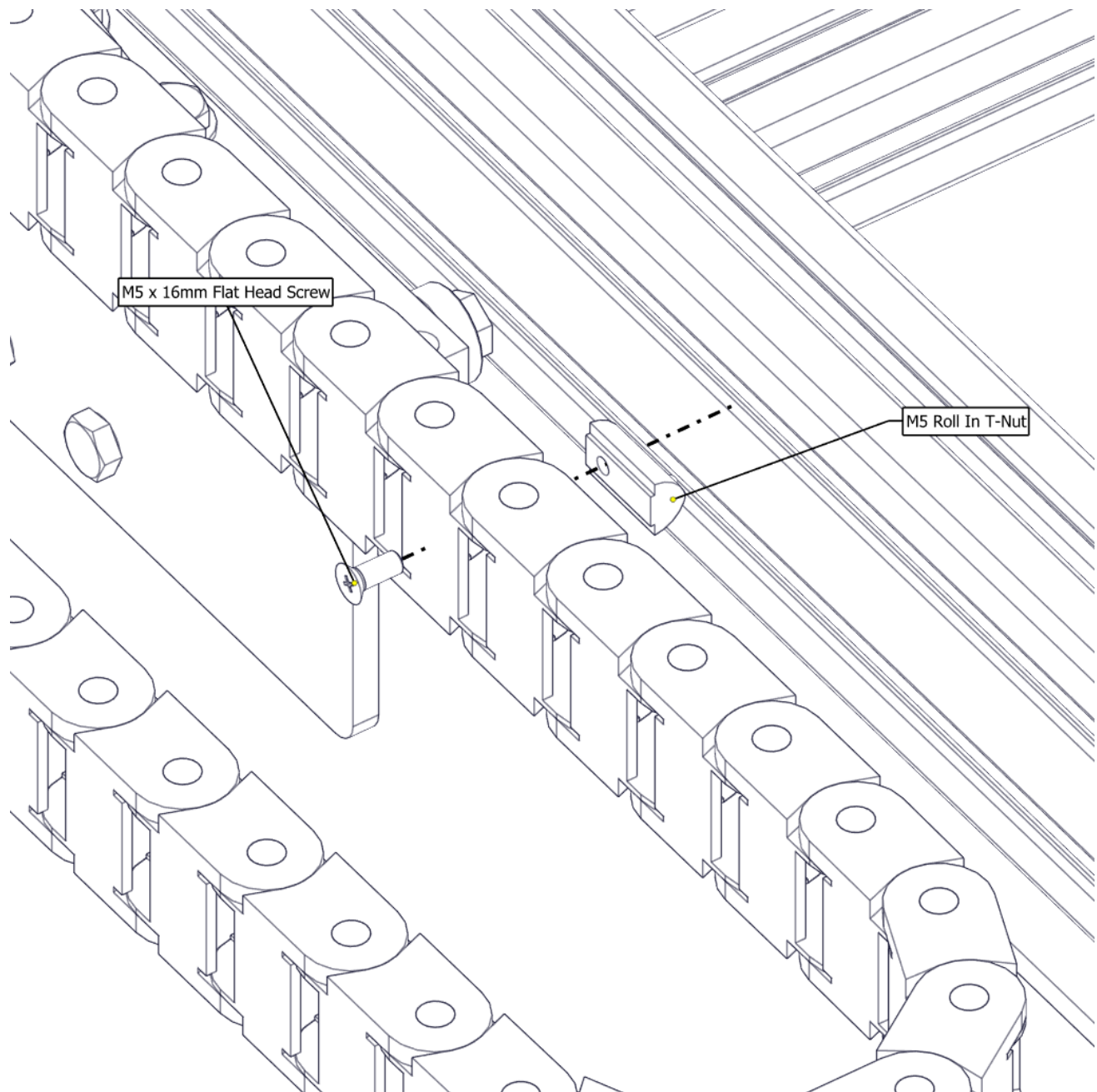
- Tighten the highlighted M5 flat head screws.



- Roll an M5 t-nut into frame extrusion as indicated.
- Thread a single M5 x 16mm through the fixed end of the cable track chain and into the M5 t-nut.

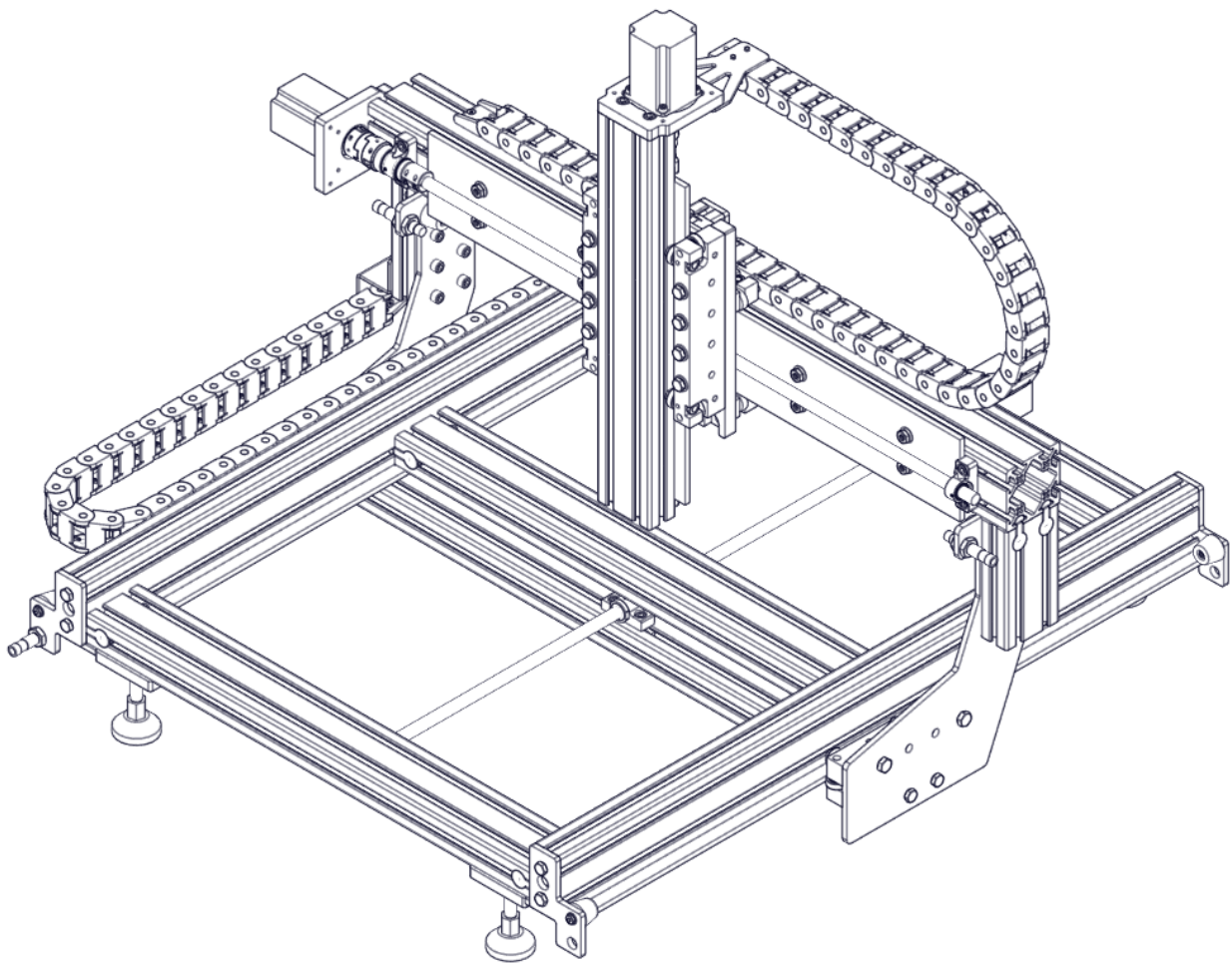


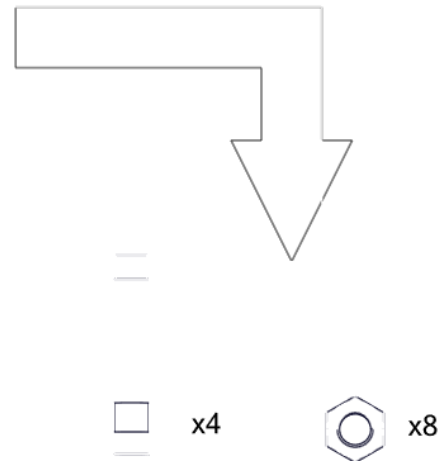
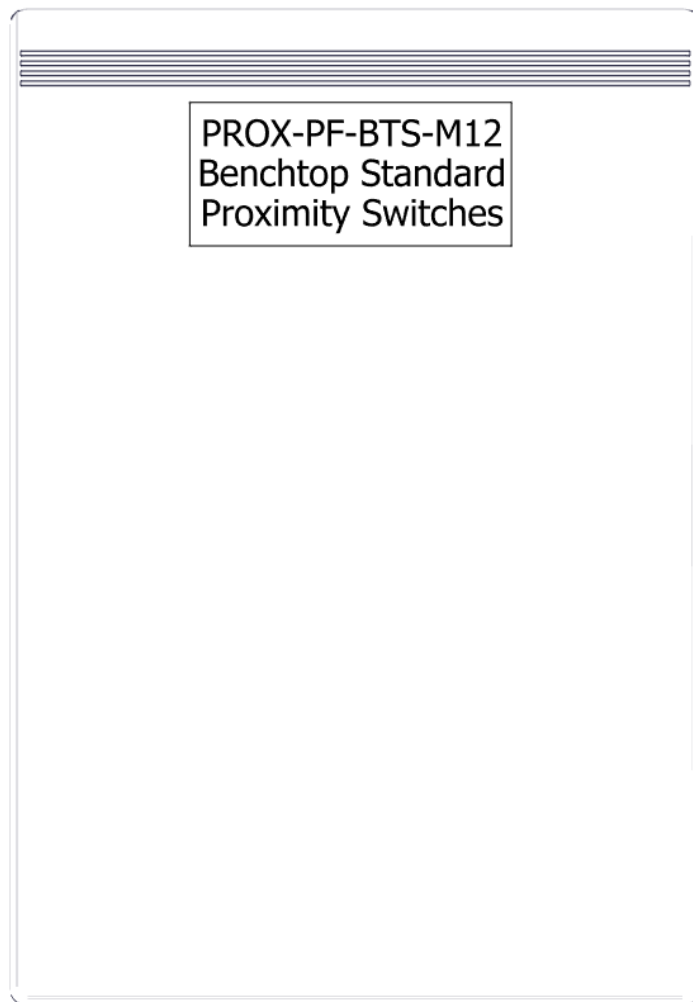
- Tighten the highlighted M5 flat head screw into the M5 t-nut.



- Fasten the counterbored cable track link to the extrusion as indicated.

(Optional) Proximity Switch Installation

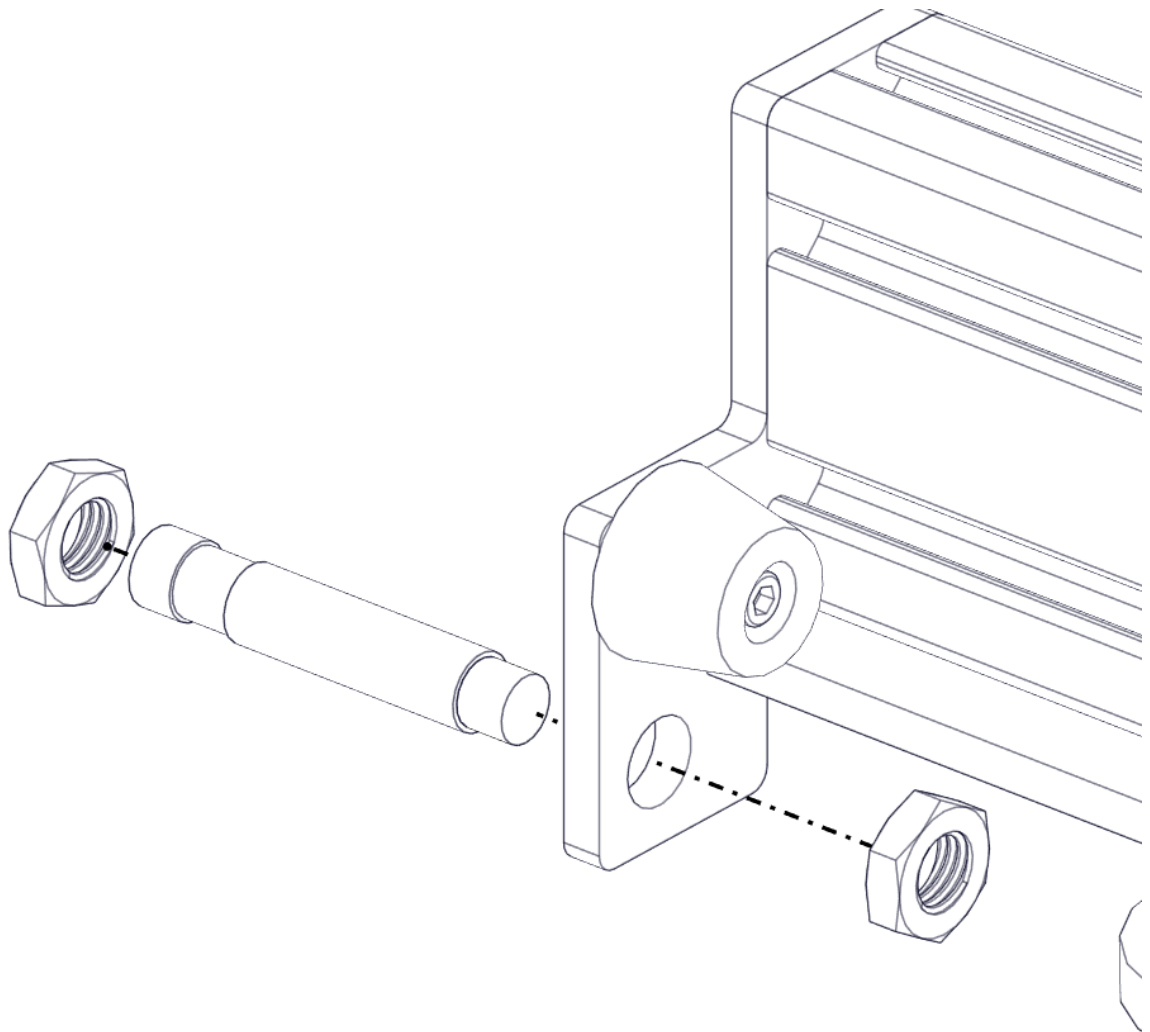




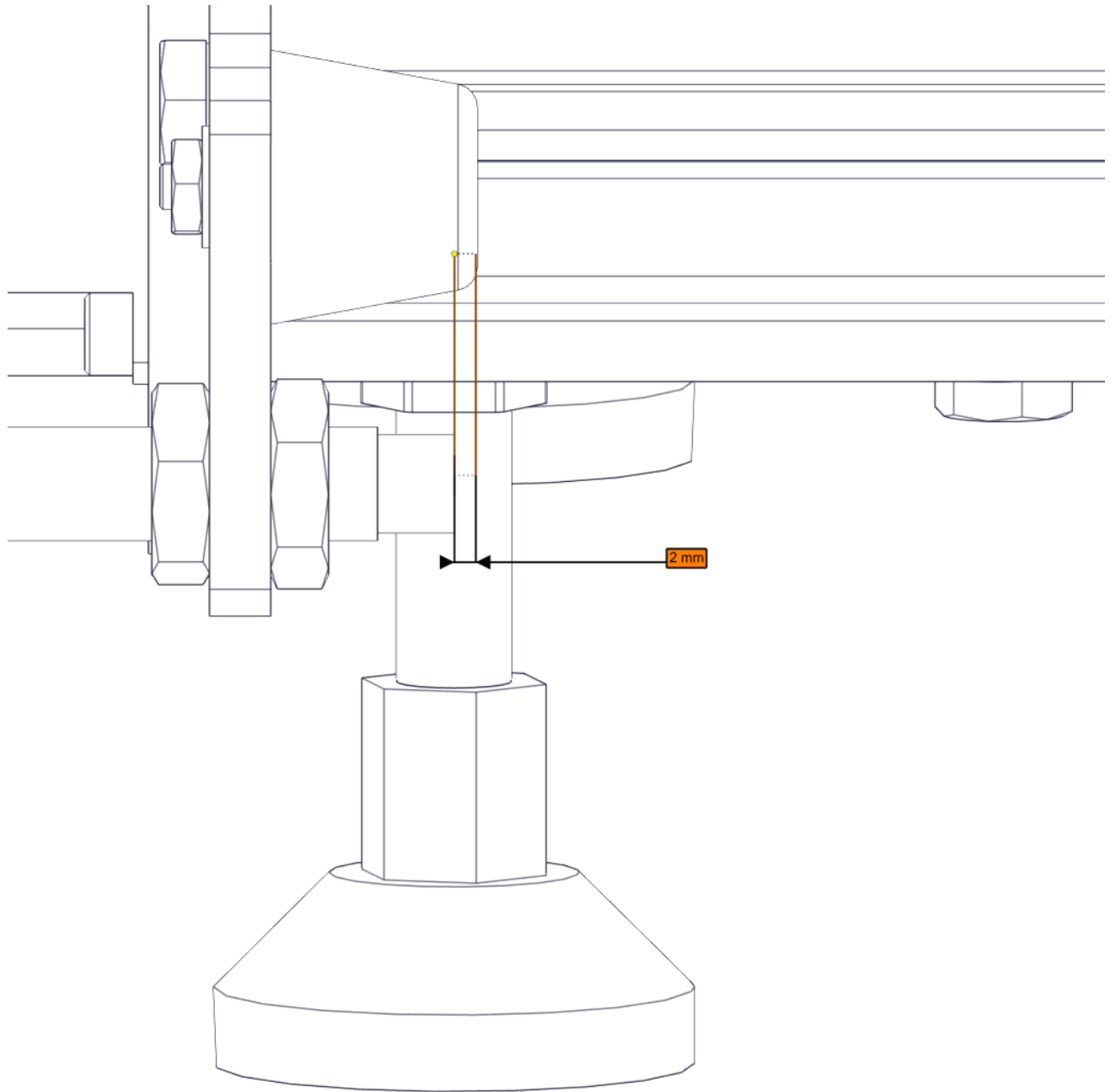
Parts Required:

- (4) Inductive Proximity Switches
- (8) M12X1.0 Hex Nuts

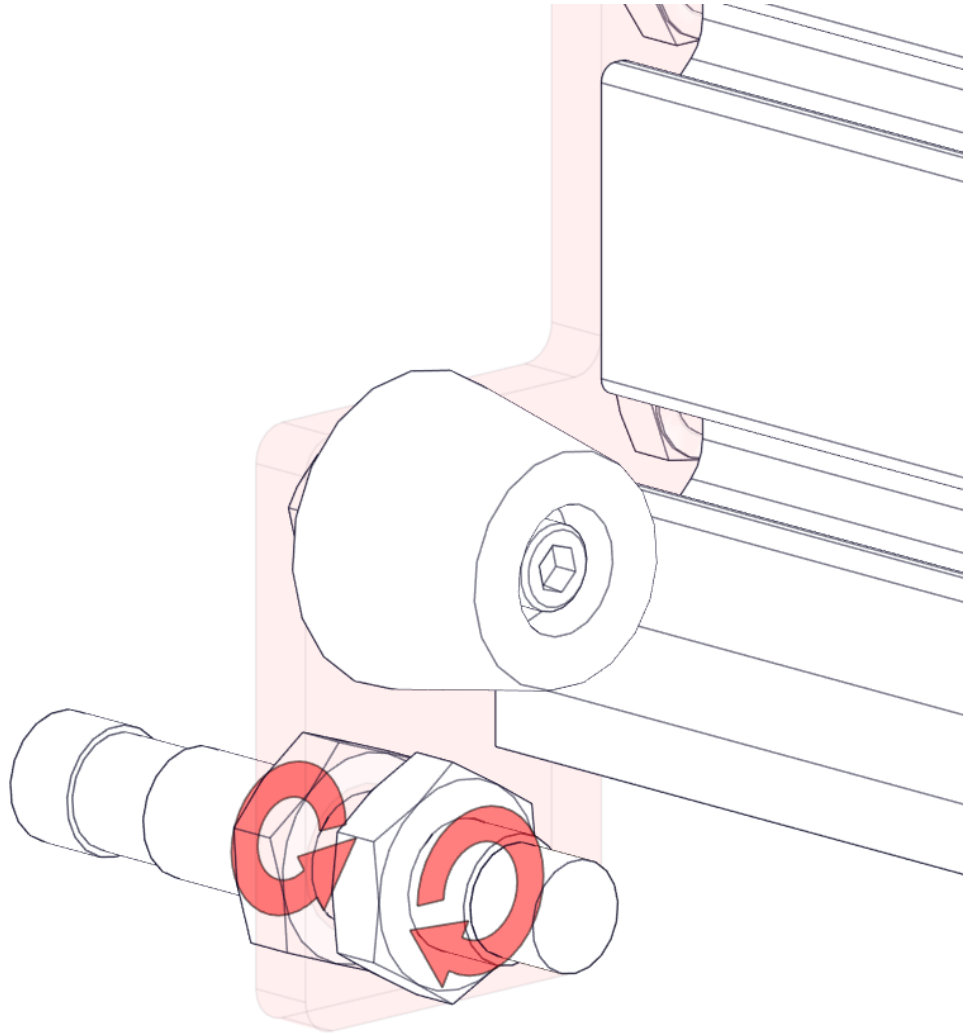
All parts for this step are in bag PROX-PF-BTS-M12



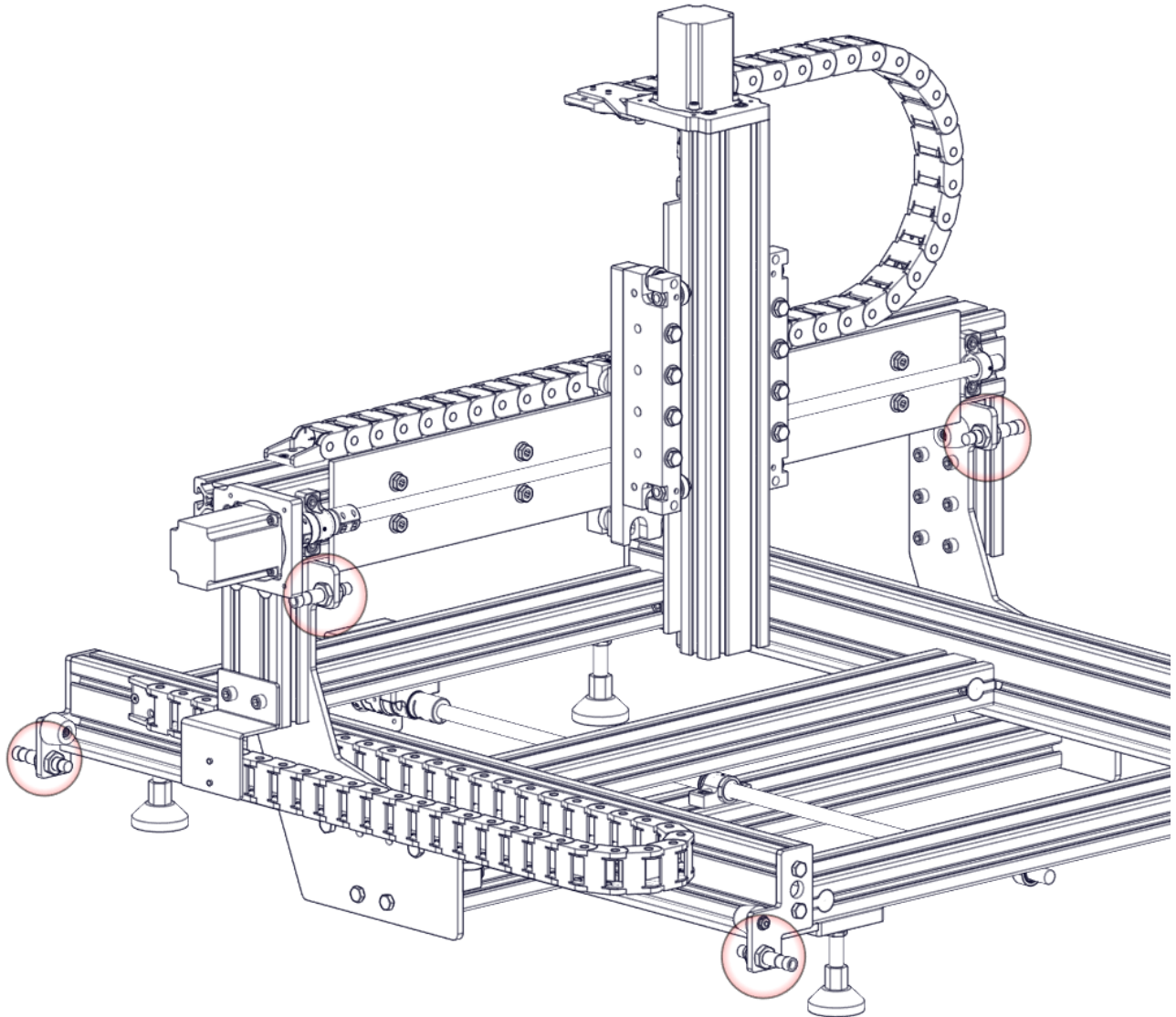
- Install the switch into the M12 tapped hole in the bumper bracket as indicated.



- Adjust the so that the end of the switch is about 2mm inside of the bumper.

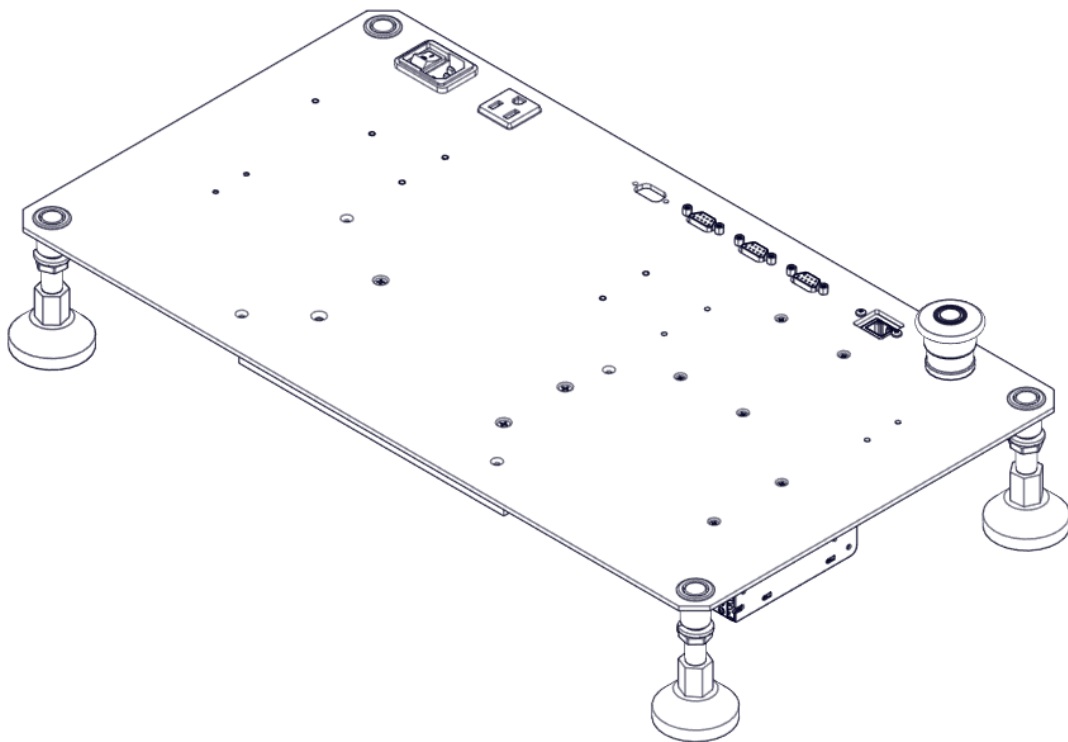


- Use the M12 Nuts to secure the switch to the bumper plate.



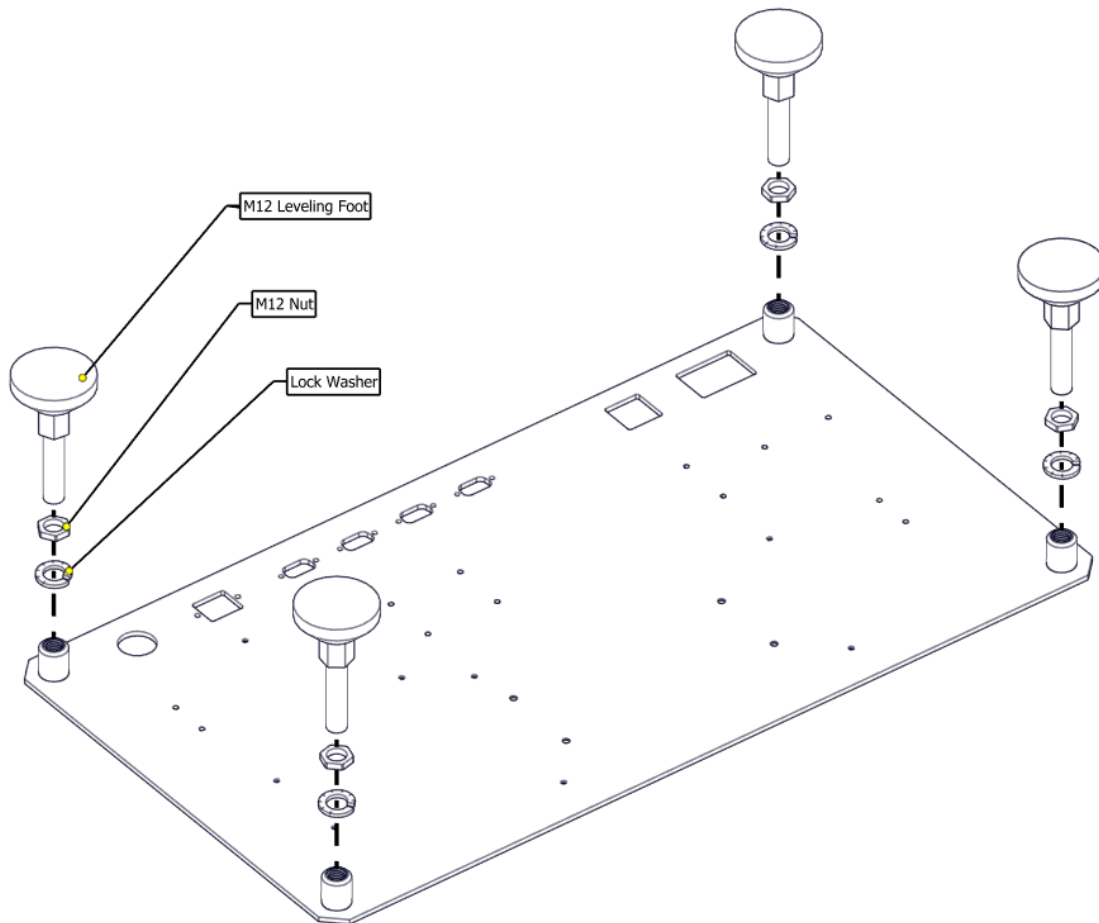
- Repeat the previous steps to install switches at the locations shown above.

(Optional) DIY Electronics Kit

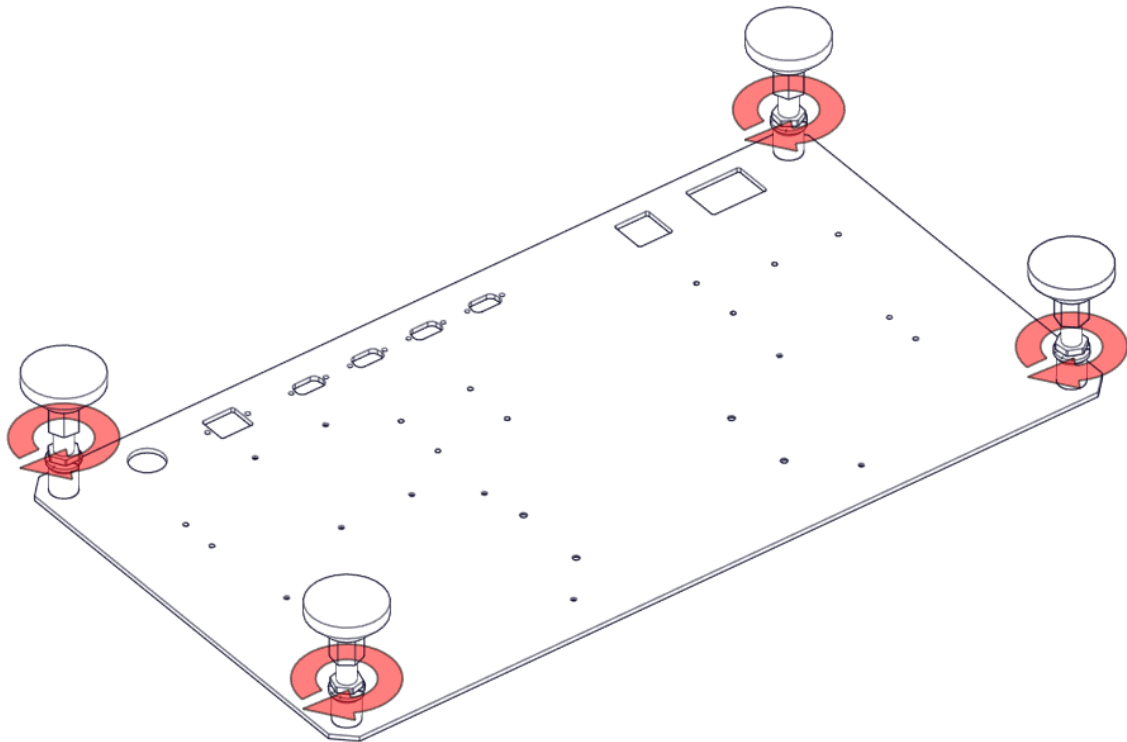


8.1 DIY Electronics Kit

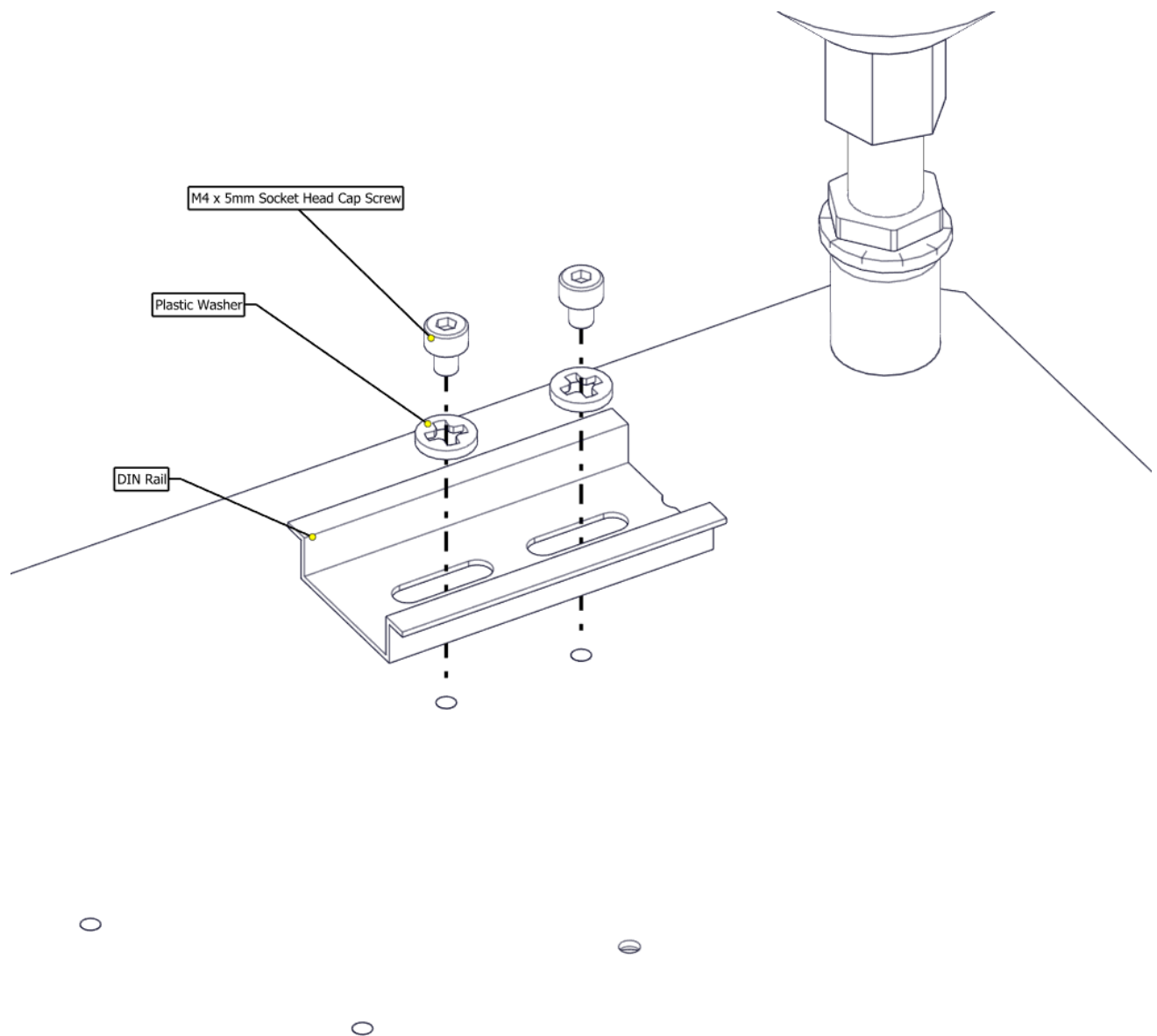
All parts for this section are included in the DIY Electronics kit.



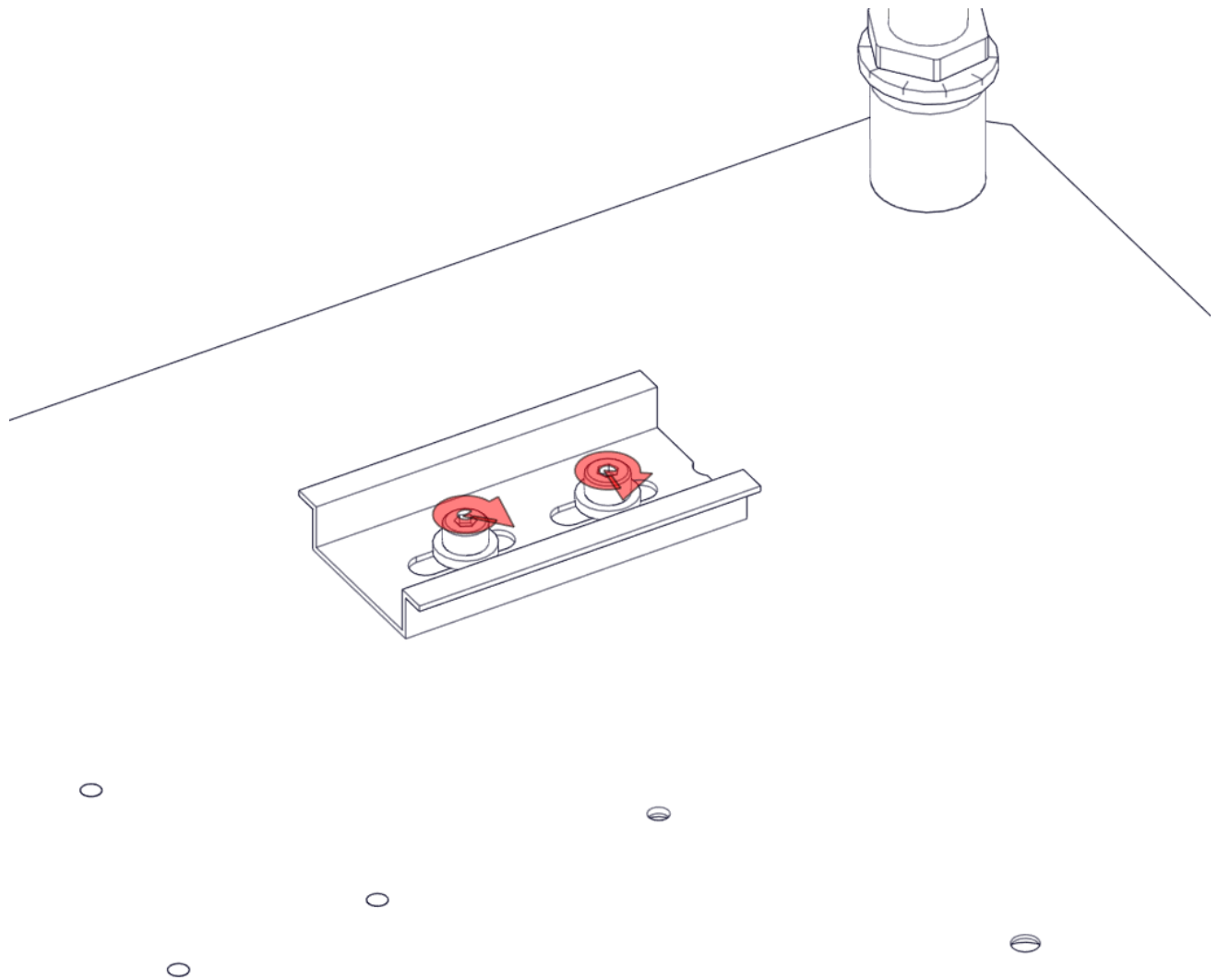
- Thread the M12 leveling feet into the rivnuts as indicated.



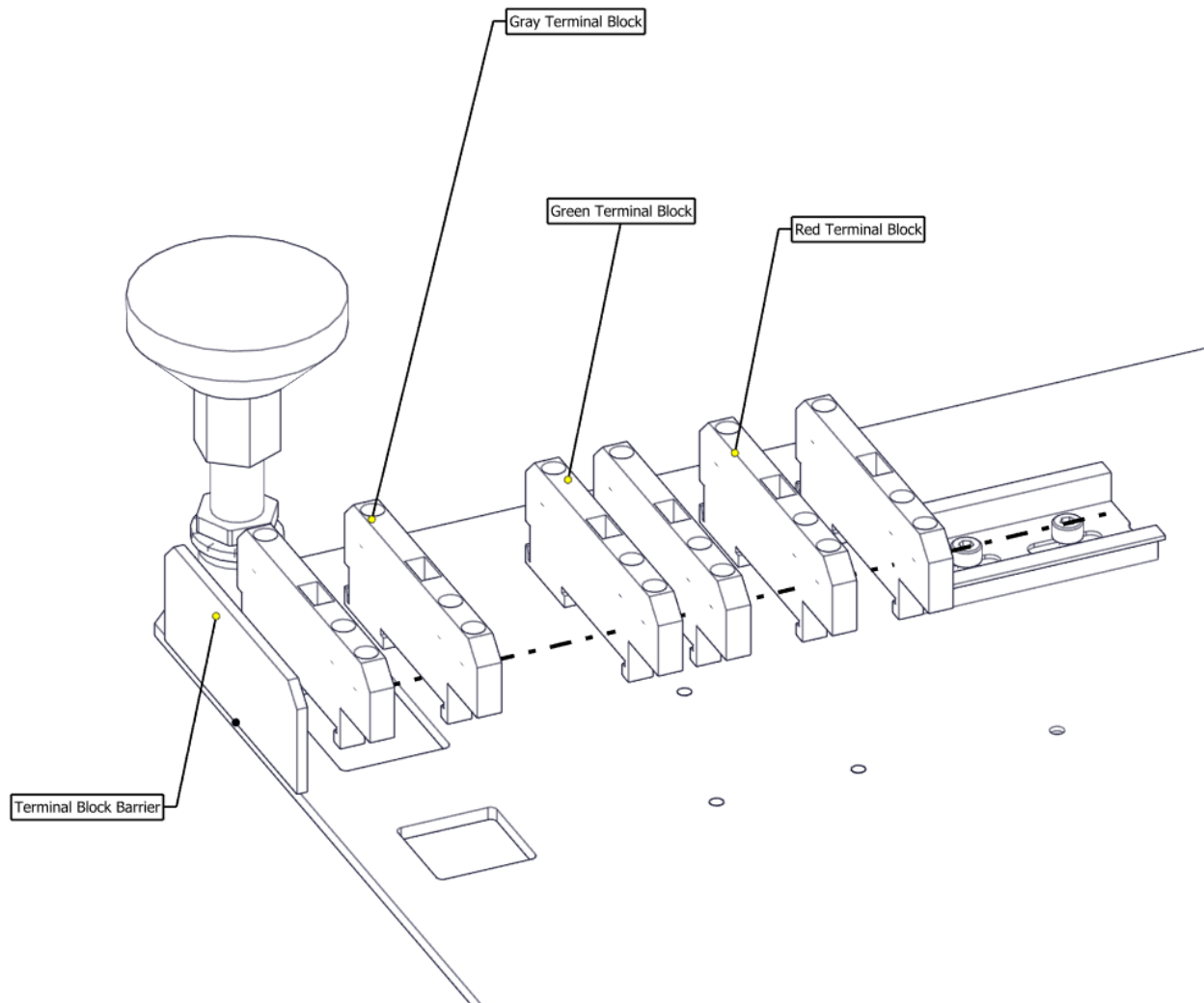
- Thread in feet until they are close to the top of the plate, then tighten the lock nuts.



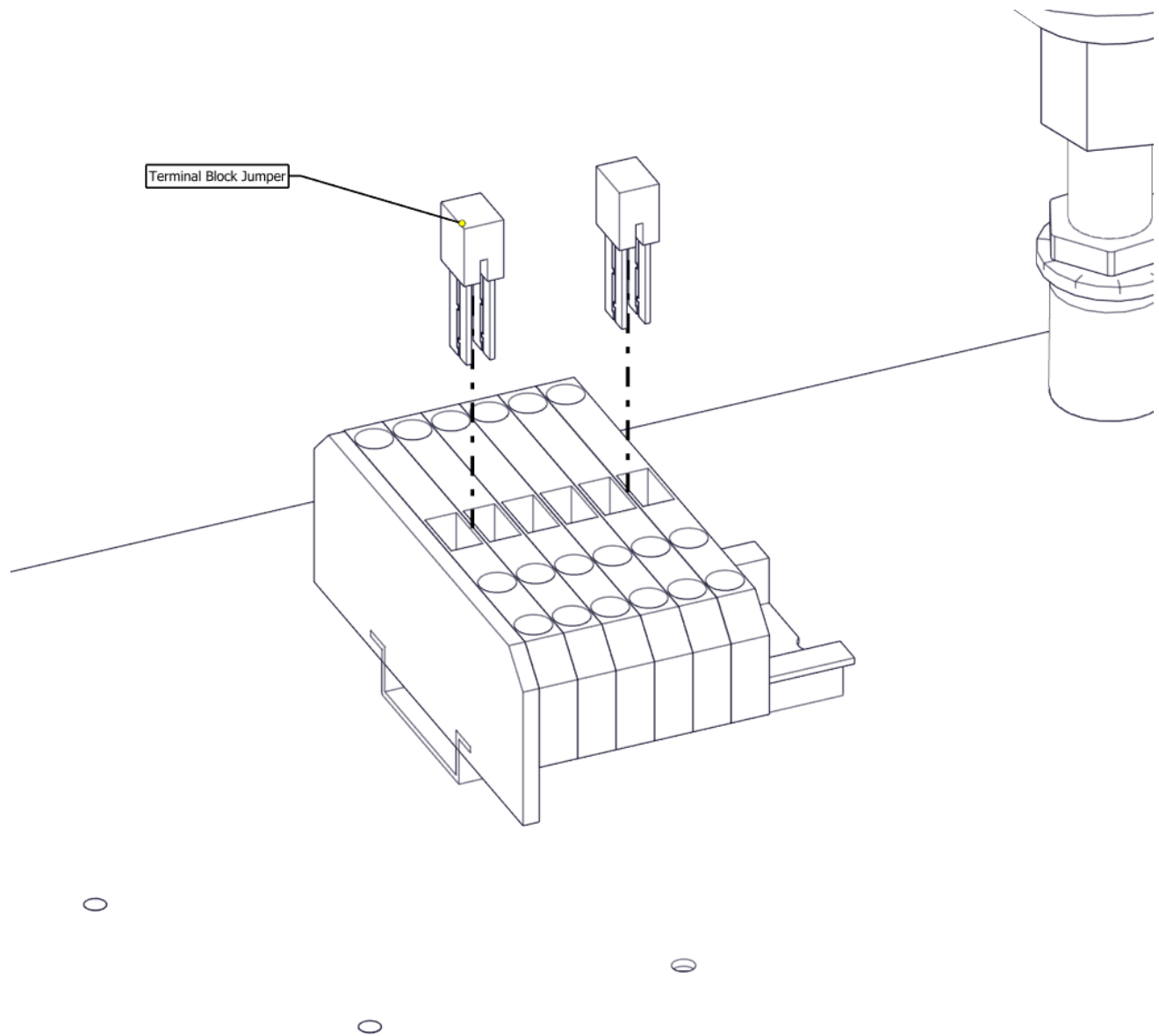
- Attach the DIN rail to the plate as indicated.



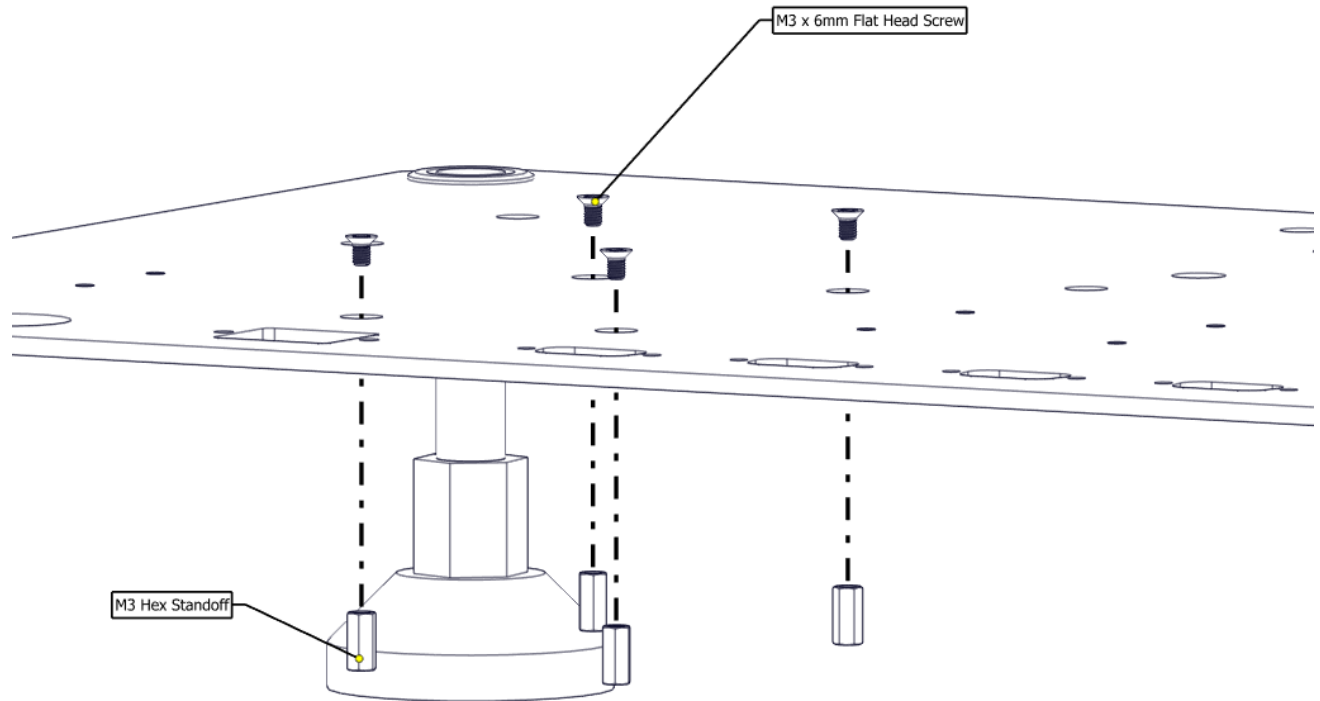
- Tighten the highlighted screws.



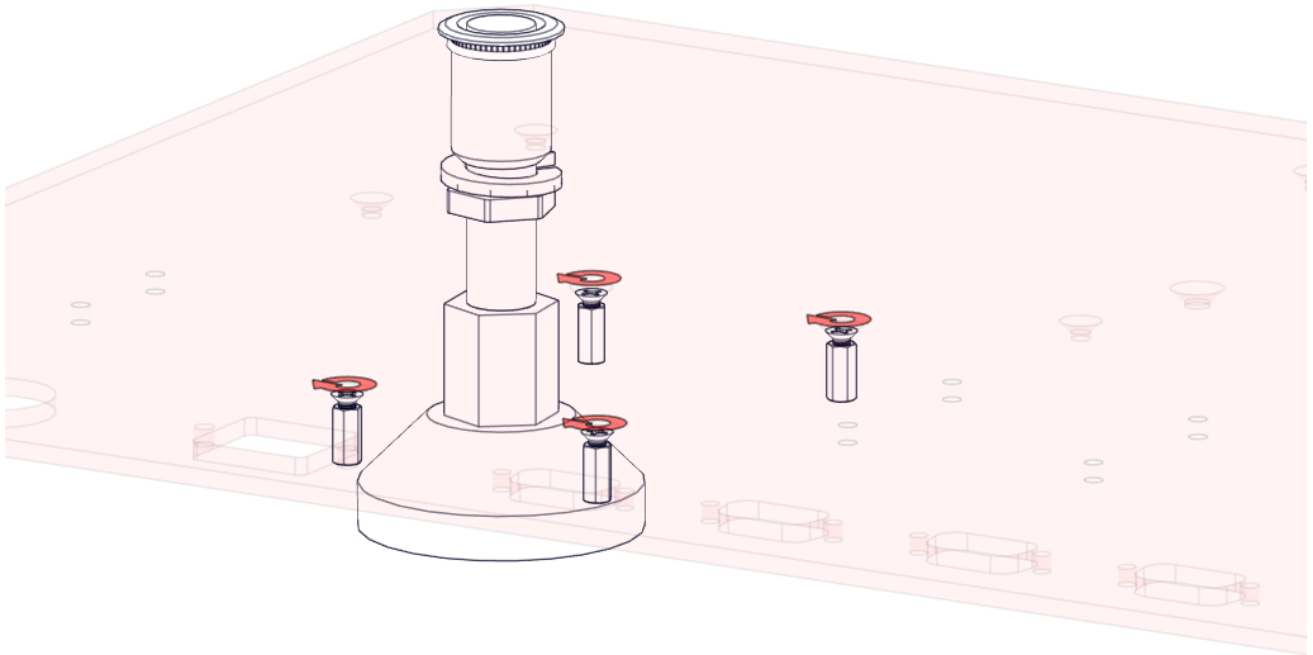
- Slide the DIN Rail Terminal Blocks onto the DIN rail as indicated.



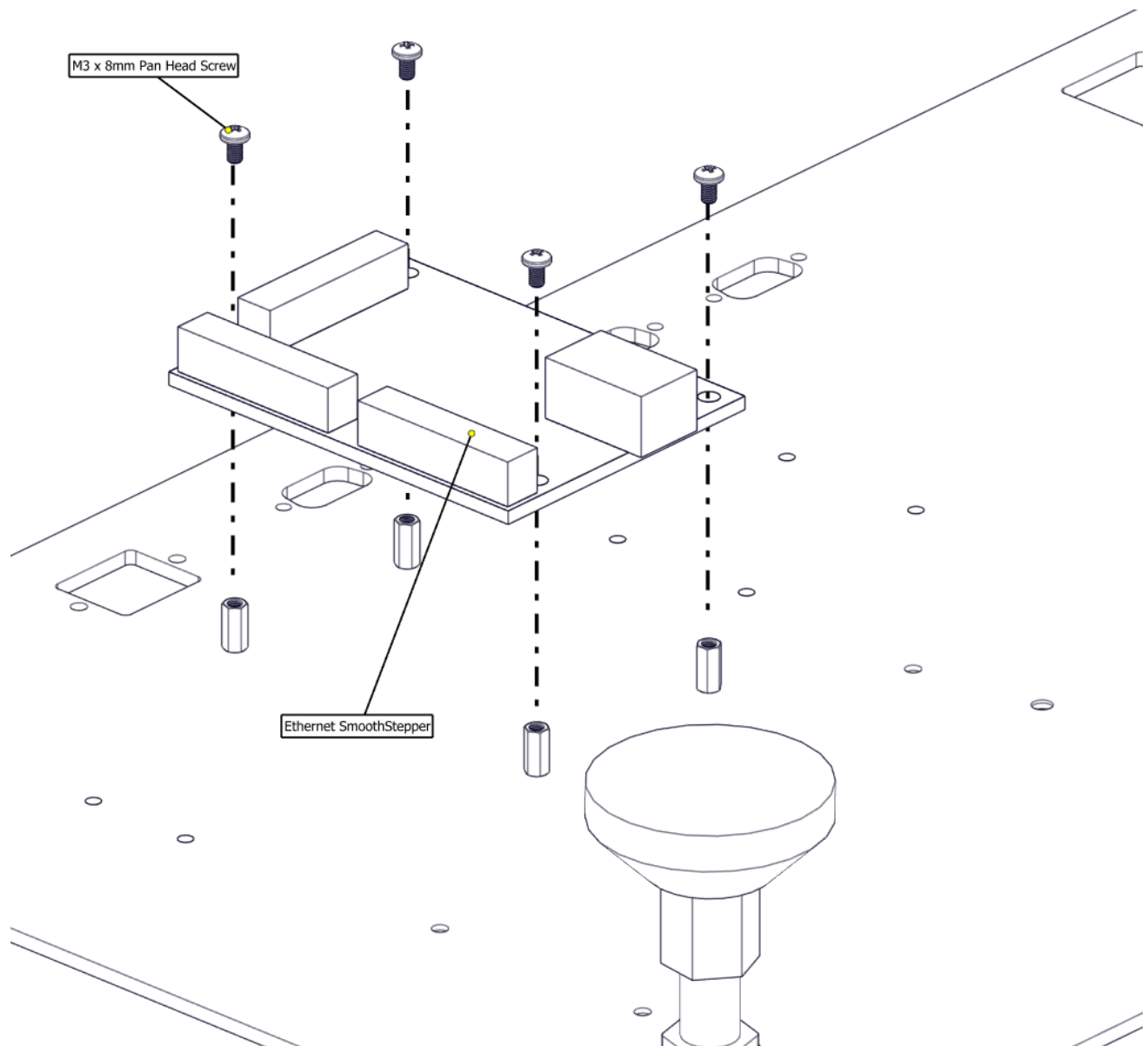
- Insert the Terminal Block Jumpers into the Terminal Blocks as indicated.



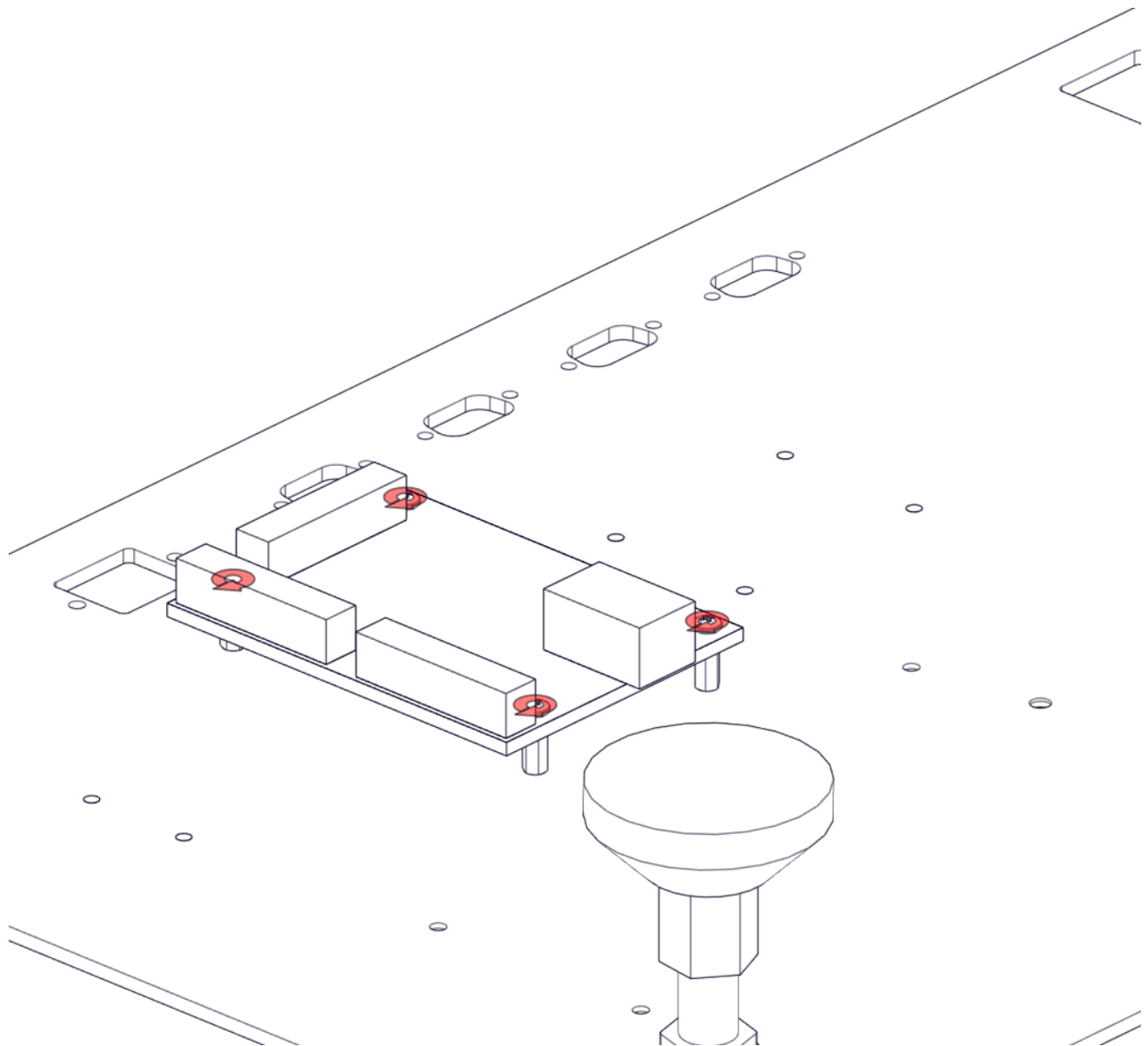
- Attach the hex standoffs as indicated.



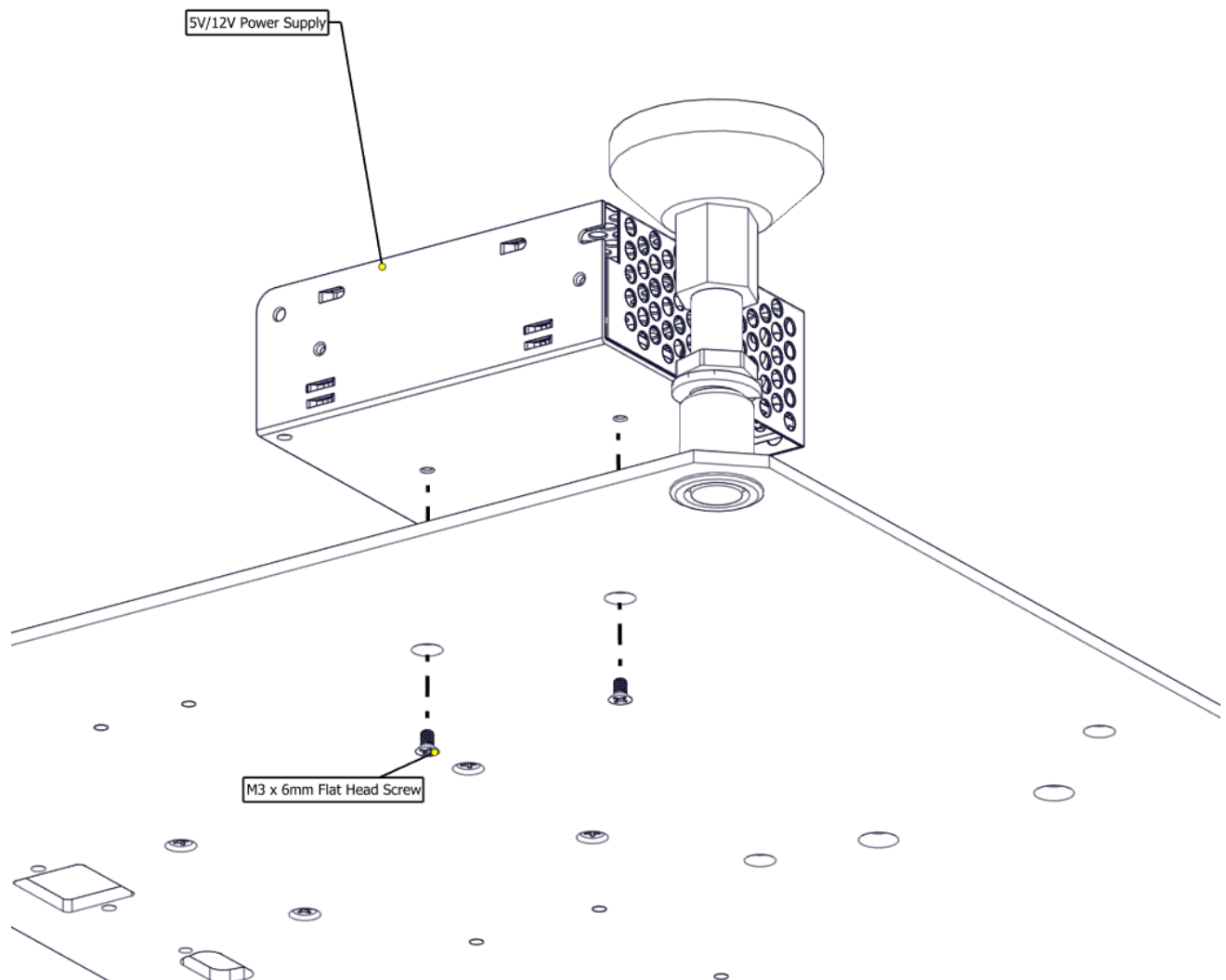
- Tighten the highlighted screws.



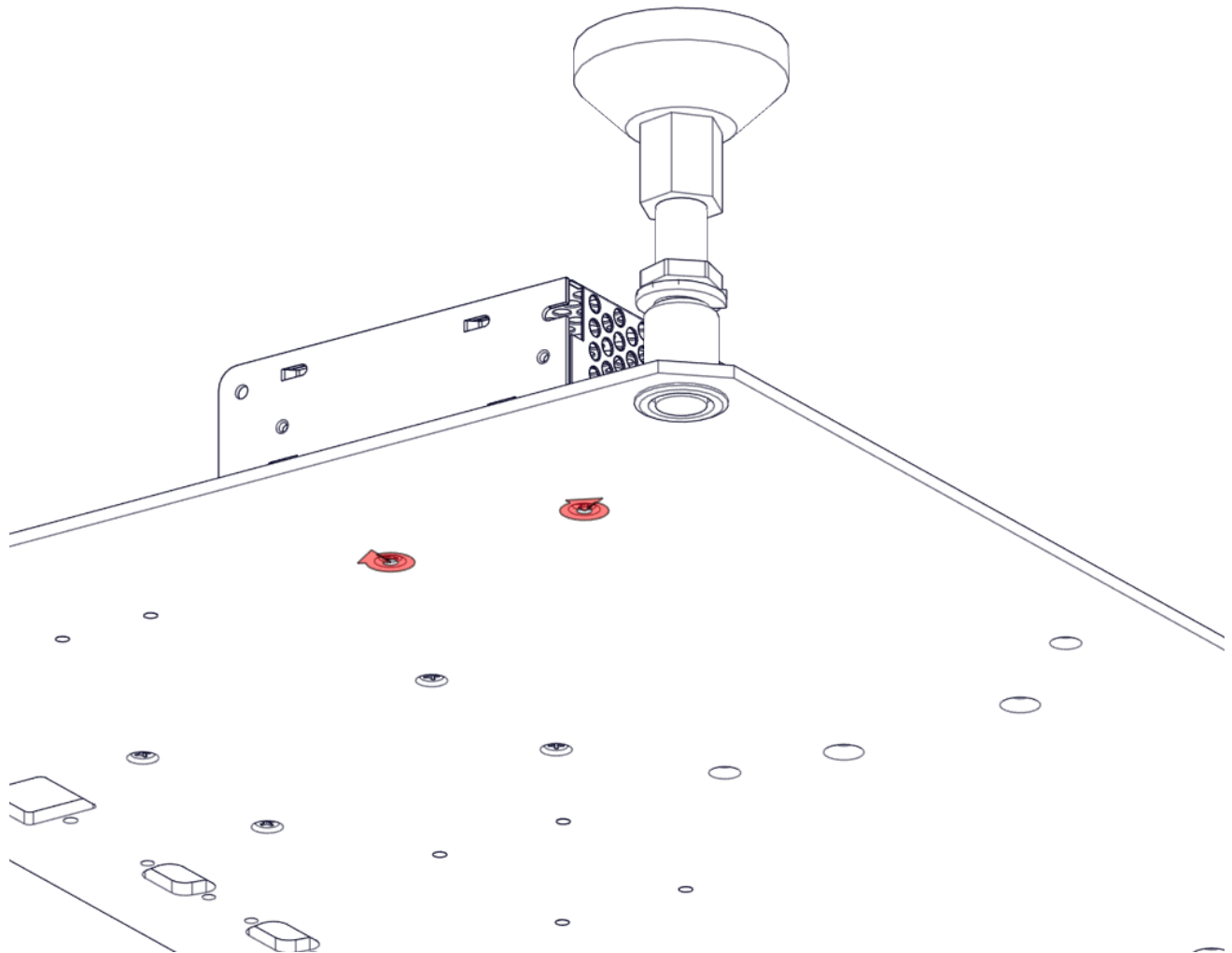
- Attach the Ethernet Smooth Stepper to the standoffs as indicated.



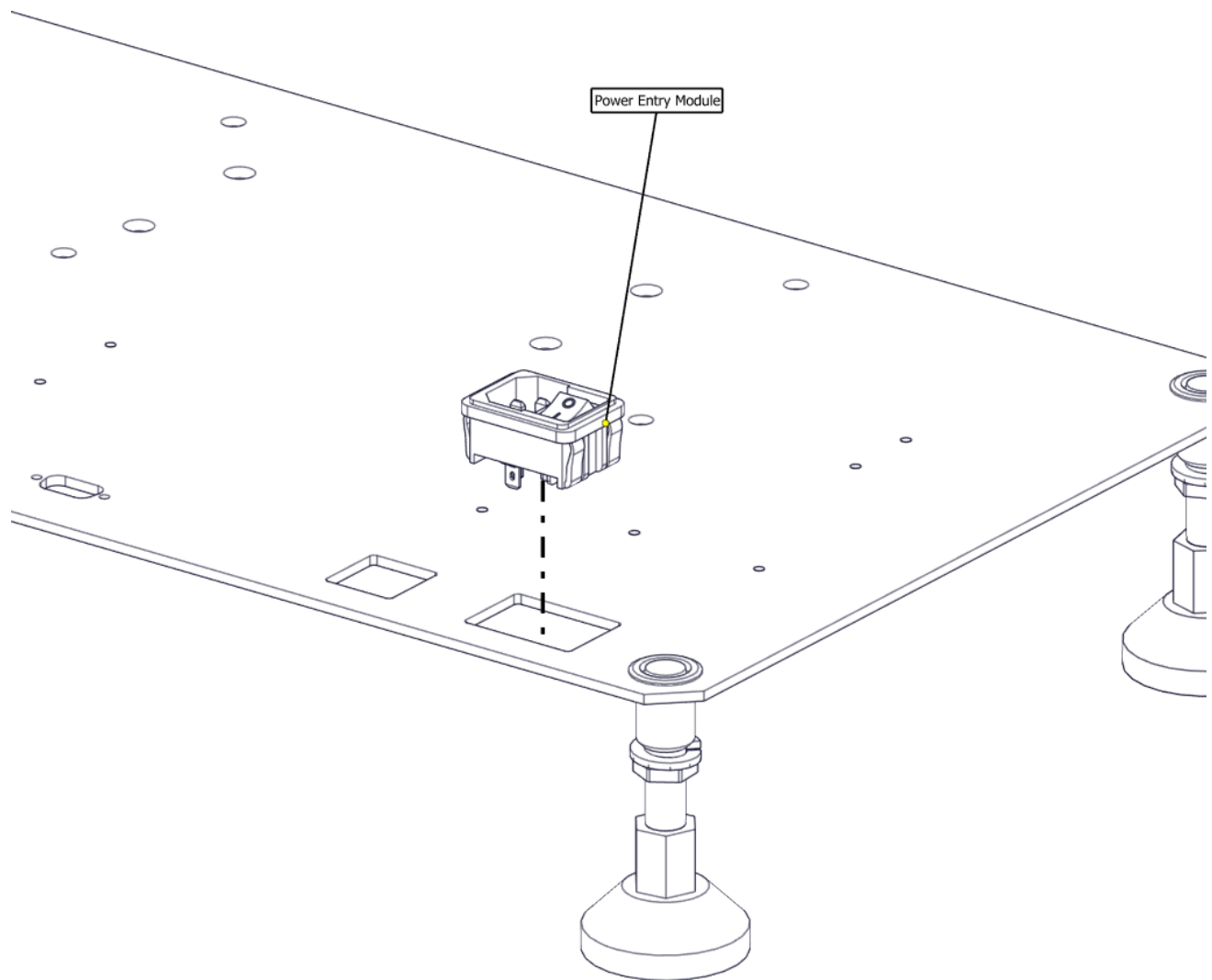
- Tighten the highlighted screws.



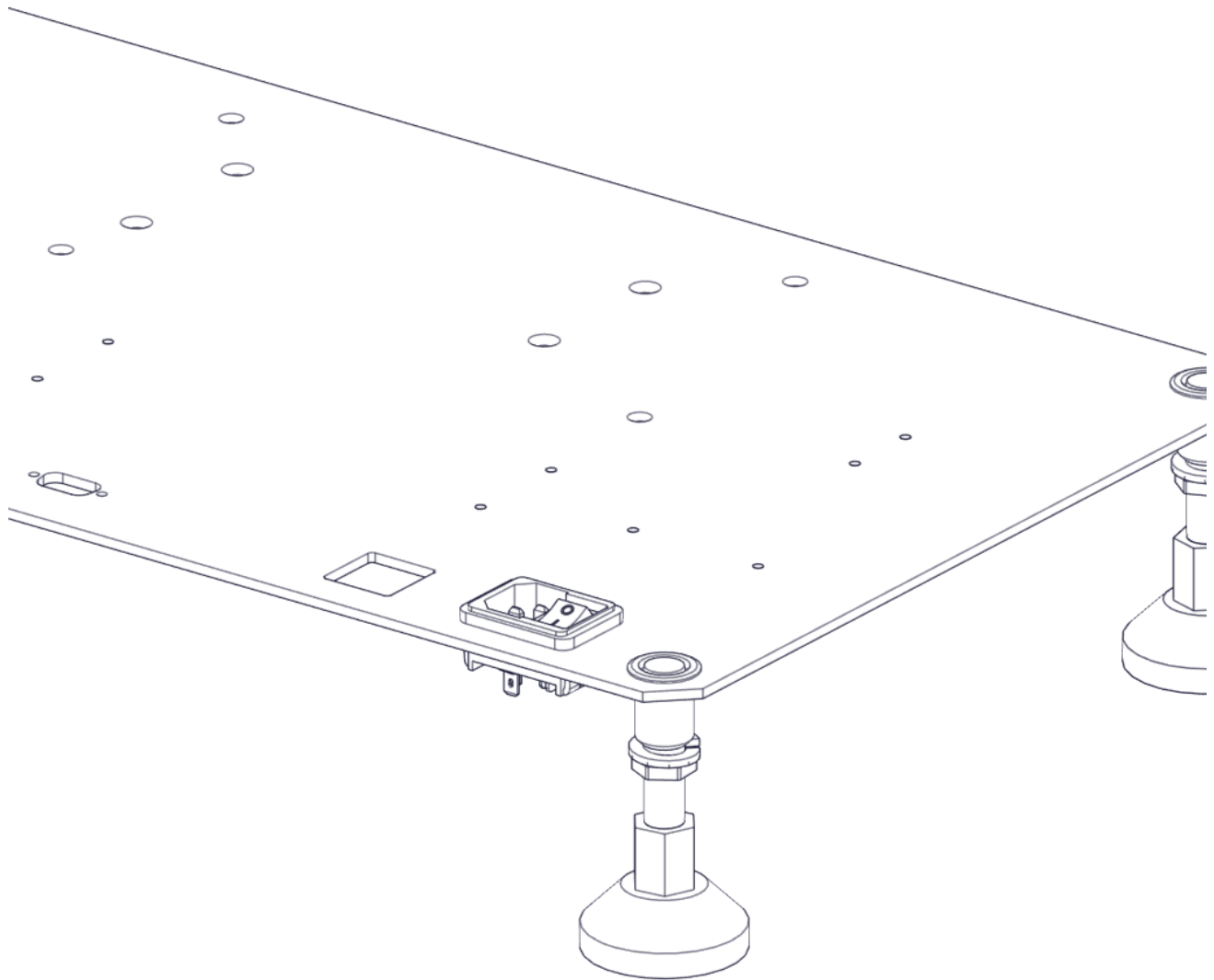
- Attach the 5/12V DC PSU as indicated.



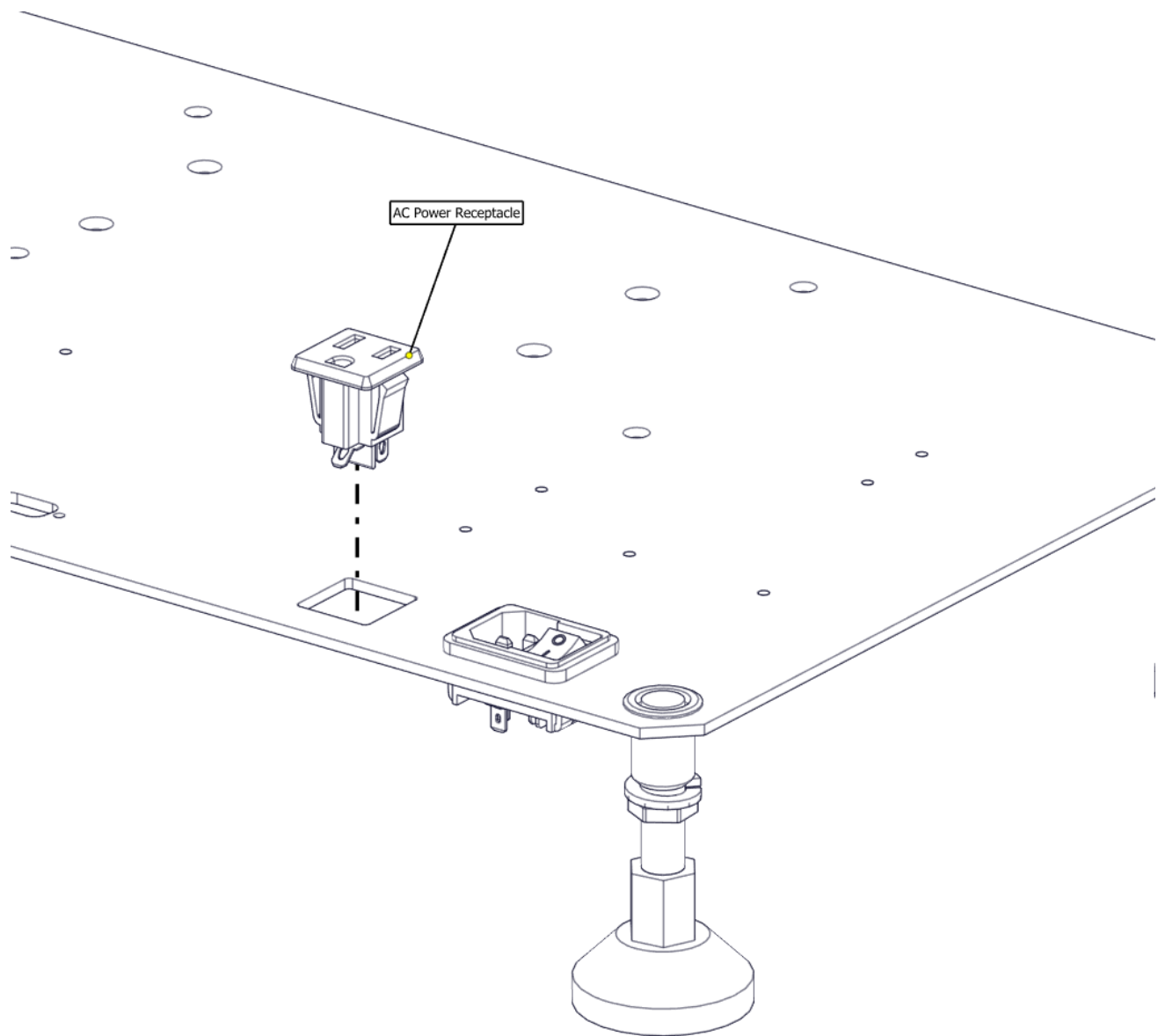
- Tighten the highlighted screws.



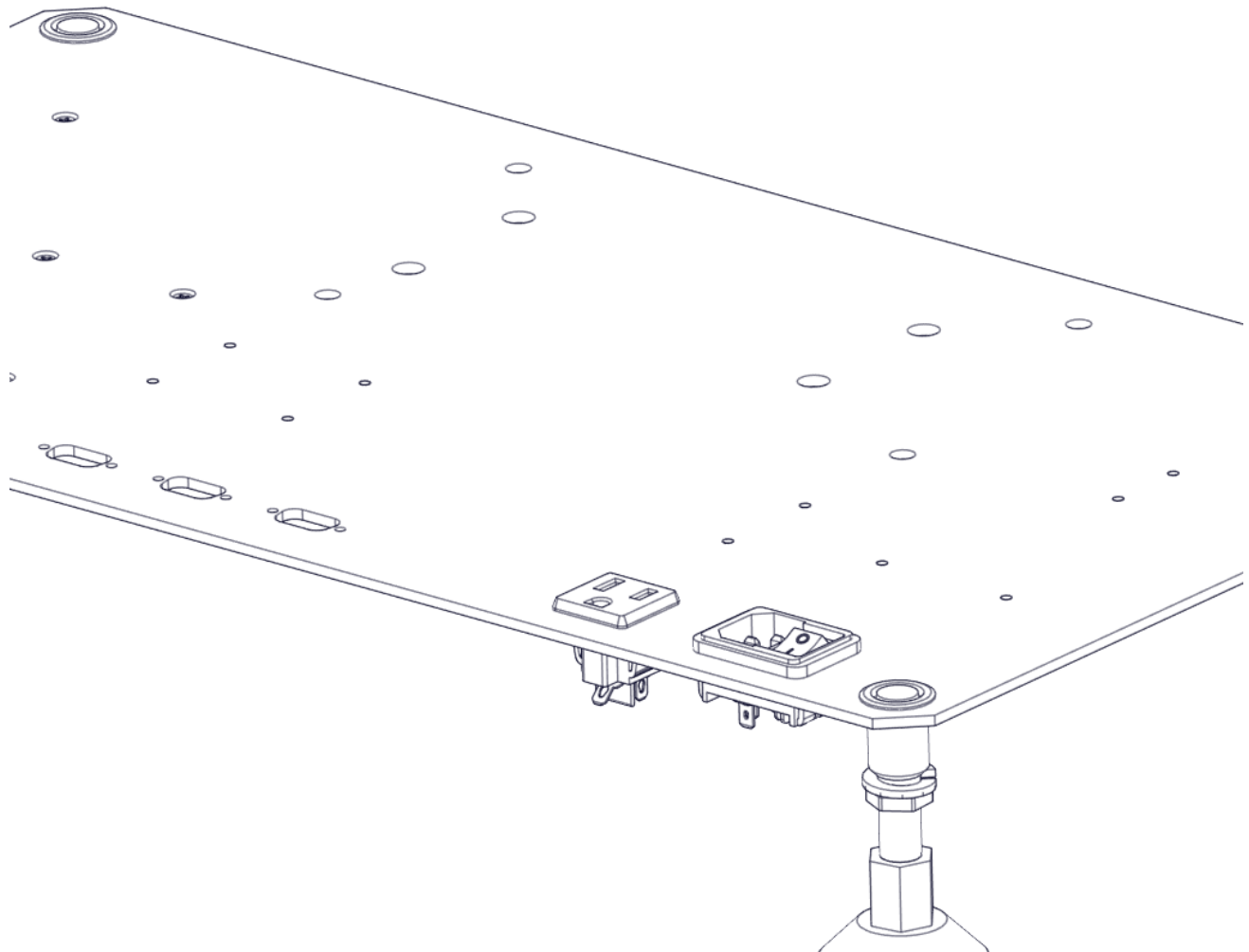
- Slide the Power Entry into the plate as indicated.



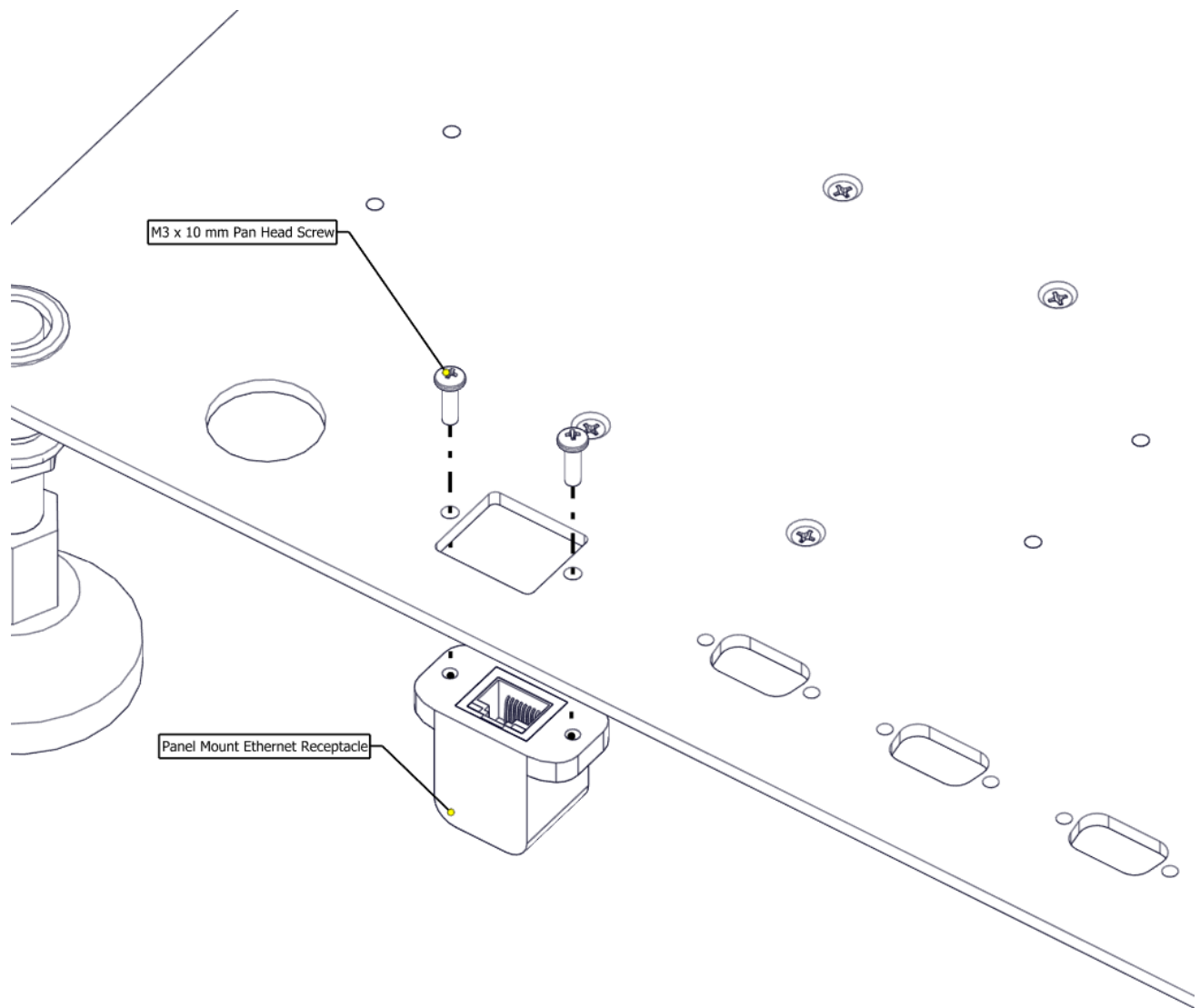
- The Power Entry will snap into the plate.



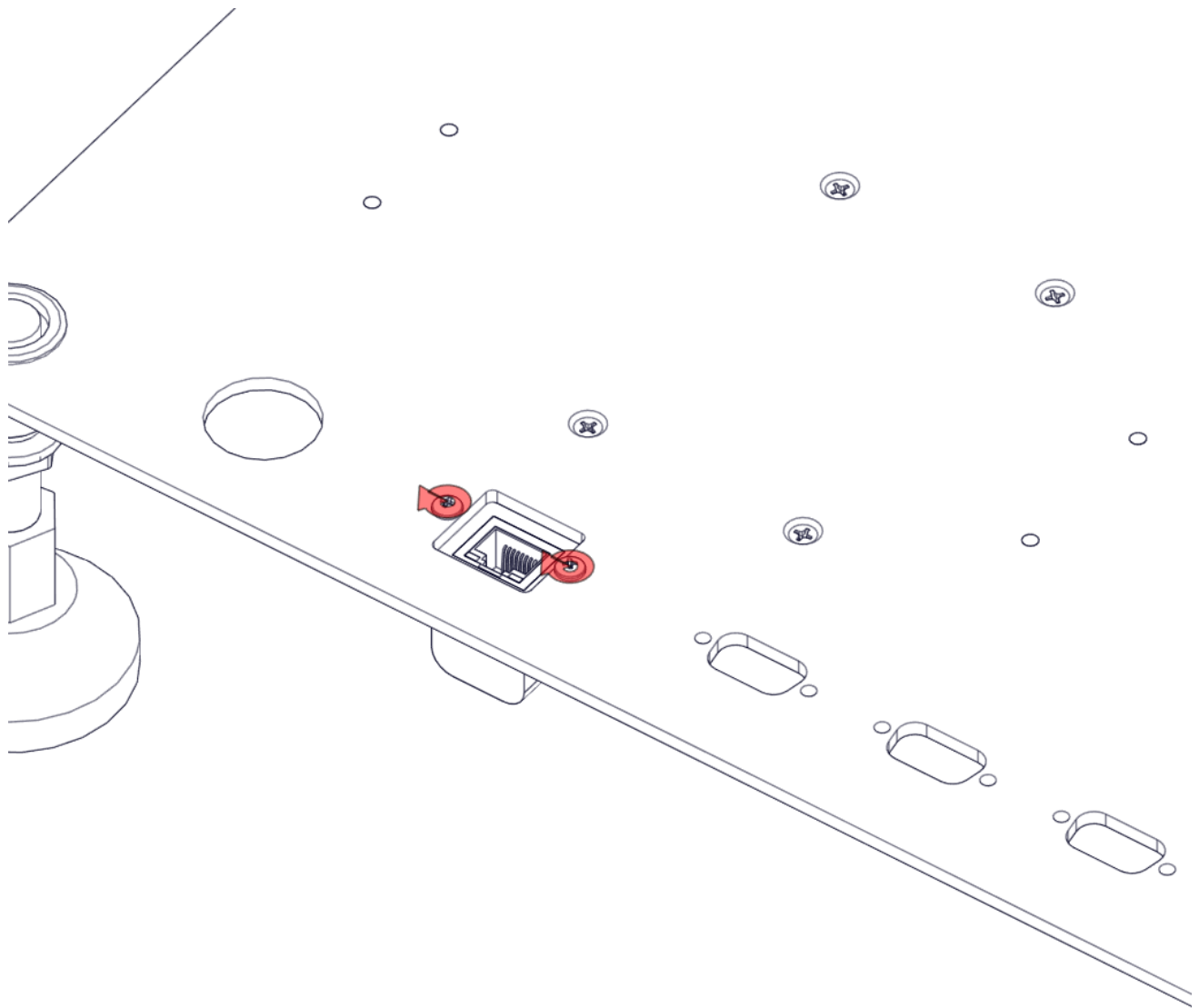
- Slide the Relay Power Receptacle into the plate as indicated.



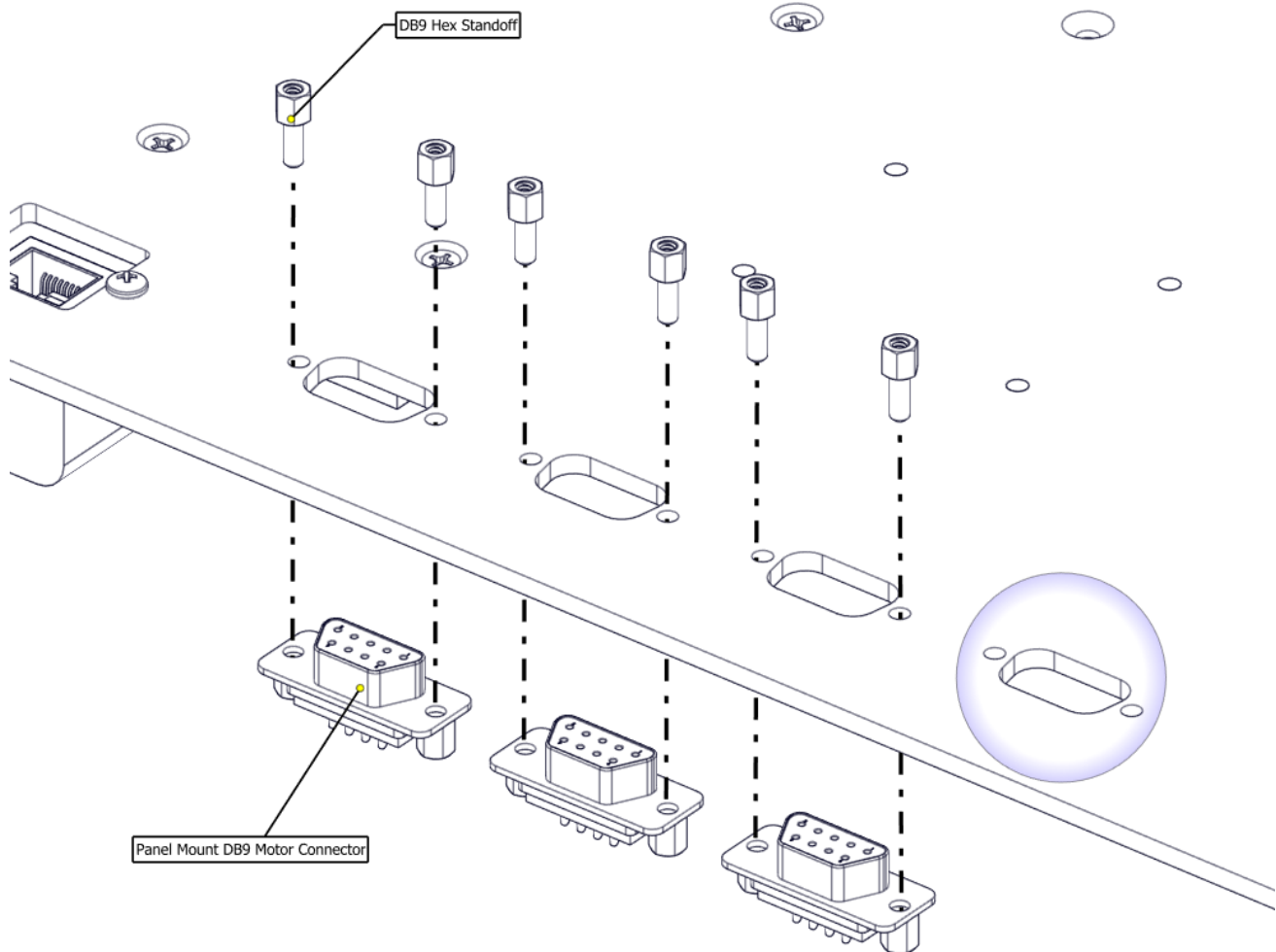
- The Relay Power Receptacle will also snap into the plate.



- Attach the Ethernet Receptacle onto the plate as indicated.

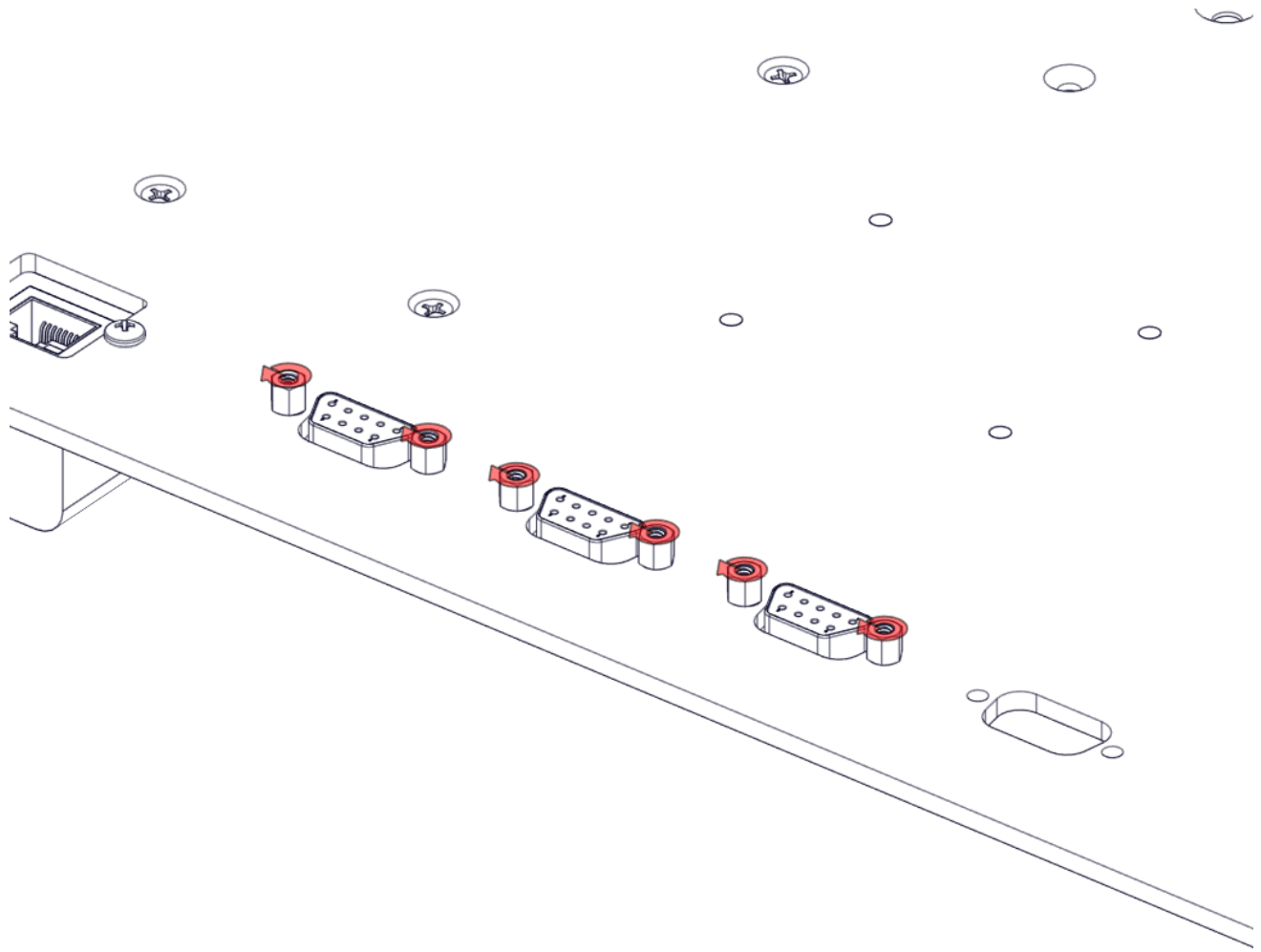


- Tighten the highlighted screws.



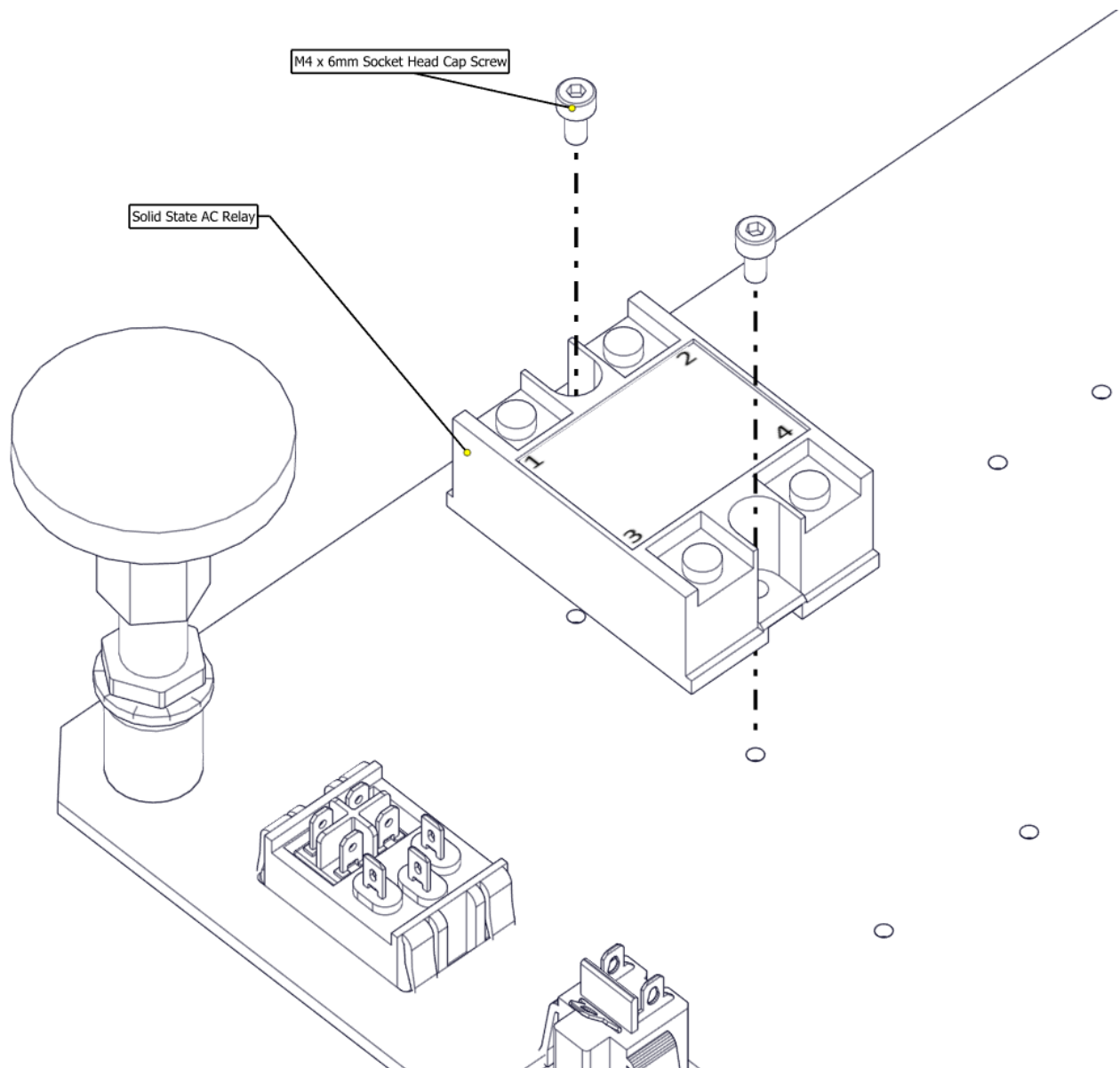
- Attach the Motor Connector Bulkheads onto the plate as indicated.

Note: 4 axis kits will have a 4th Motor Connector Bulkhead that attaches to the circled cutout.

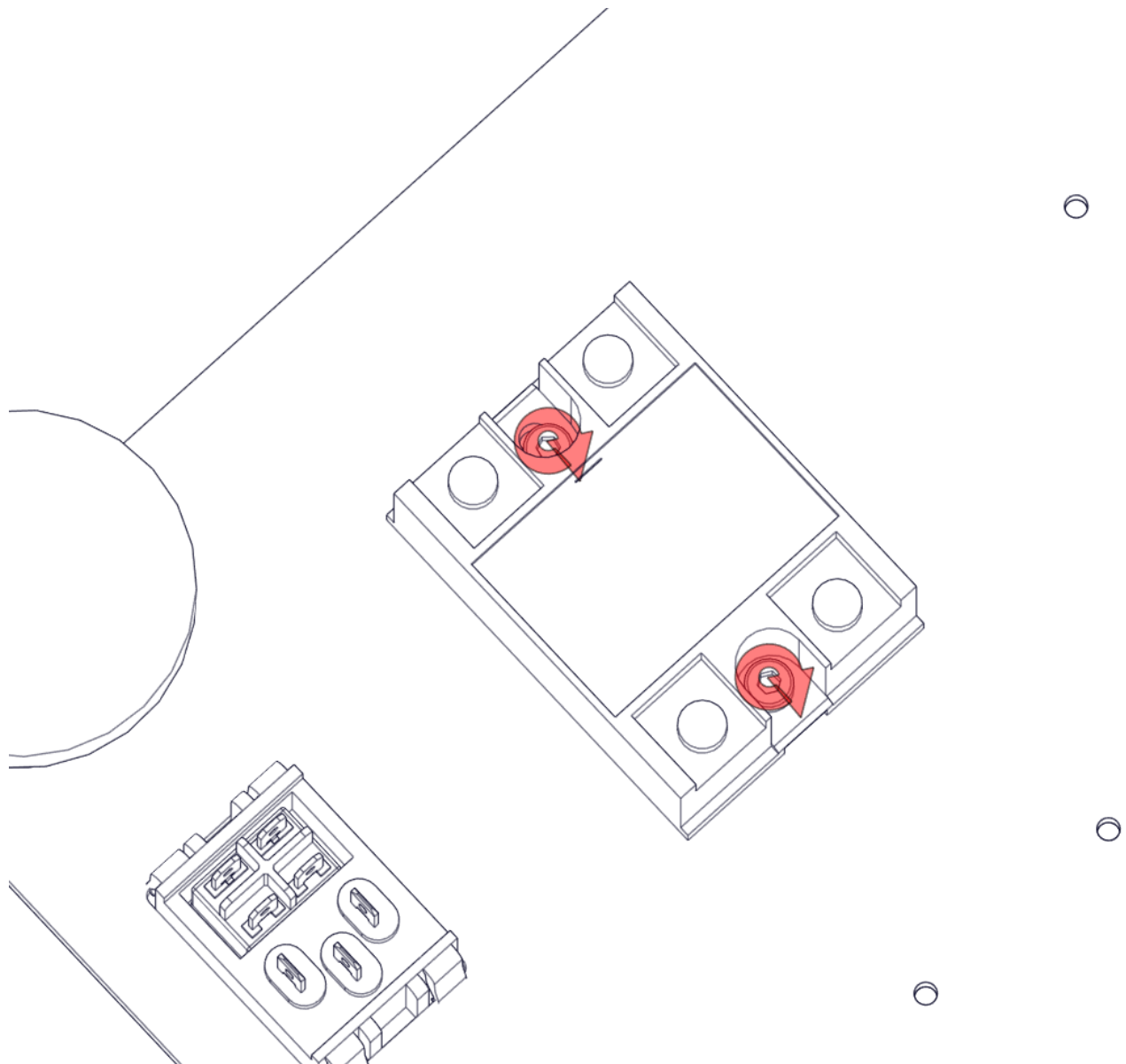


- Tighten the highlighted standoffs.

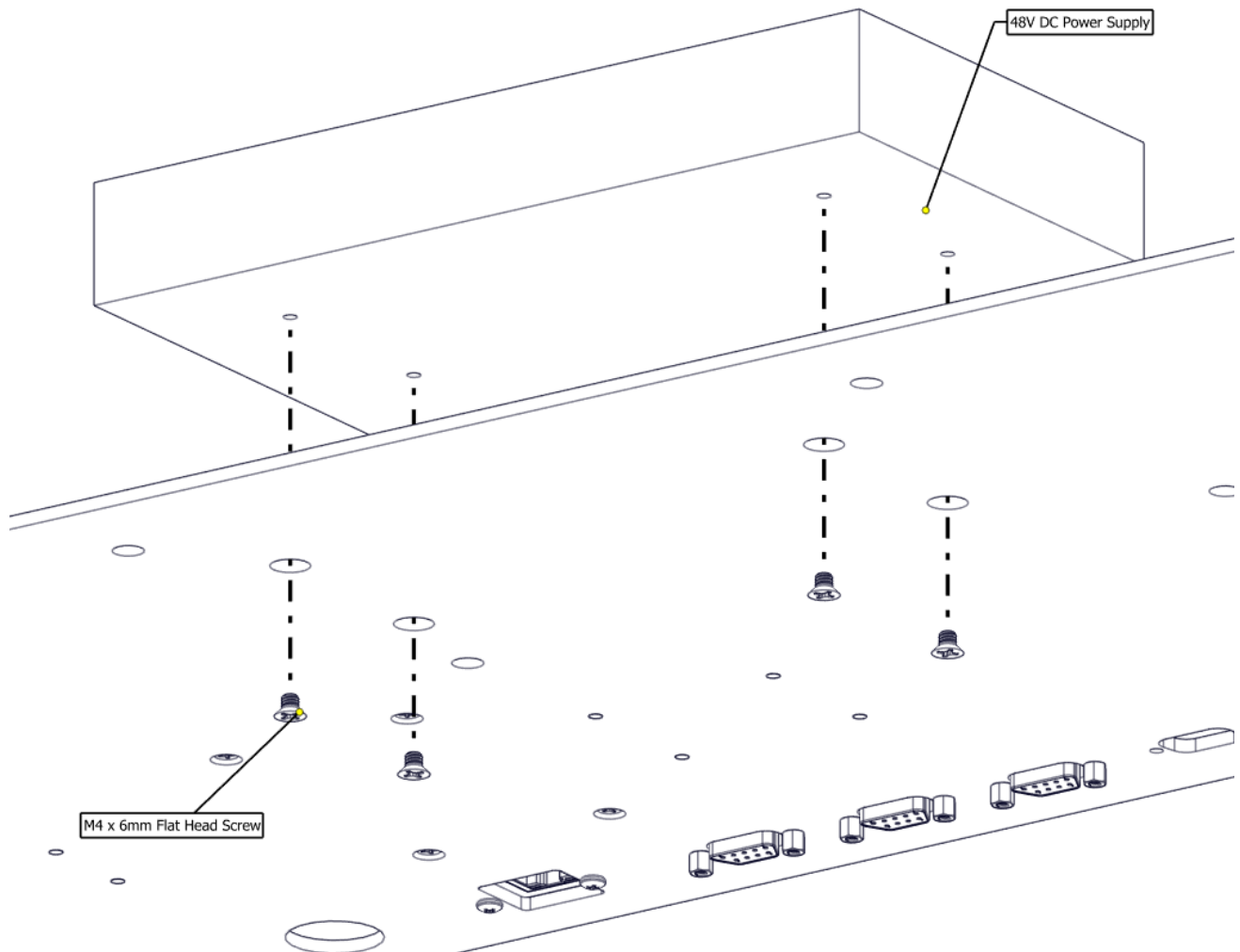
Note: Tighten the standoffs for the 4th Motor Connector Bulkhead if you have a 4 axis kit.



- Attach the Relay onto the plate as indicated.

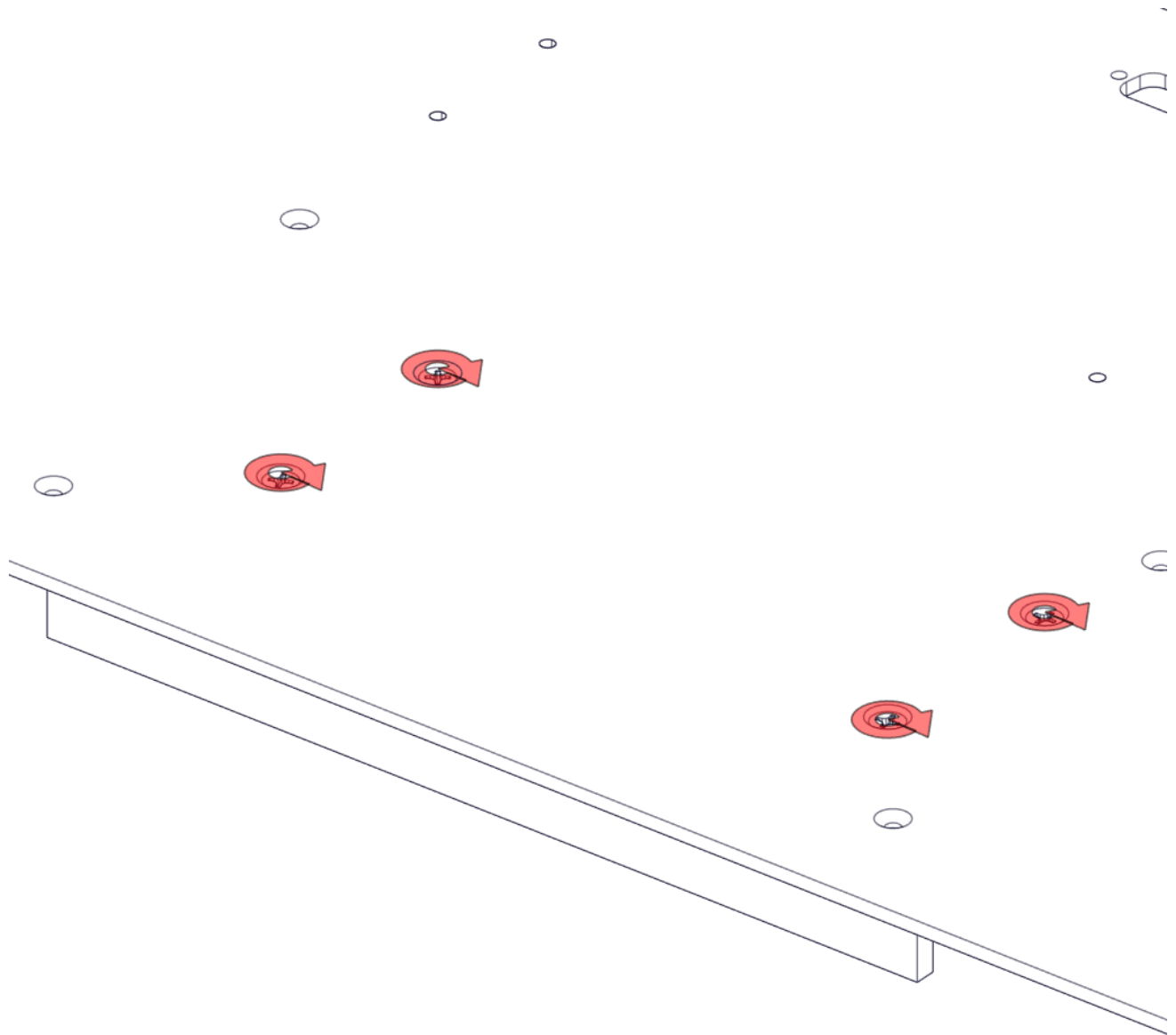


- Tighten the highlighted screws.



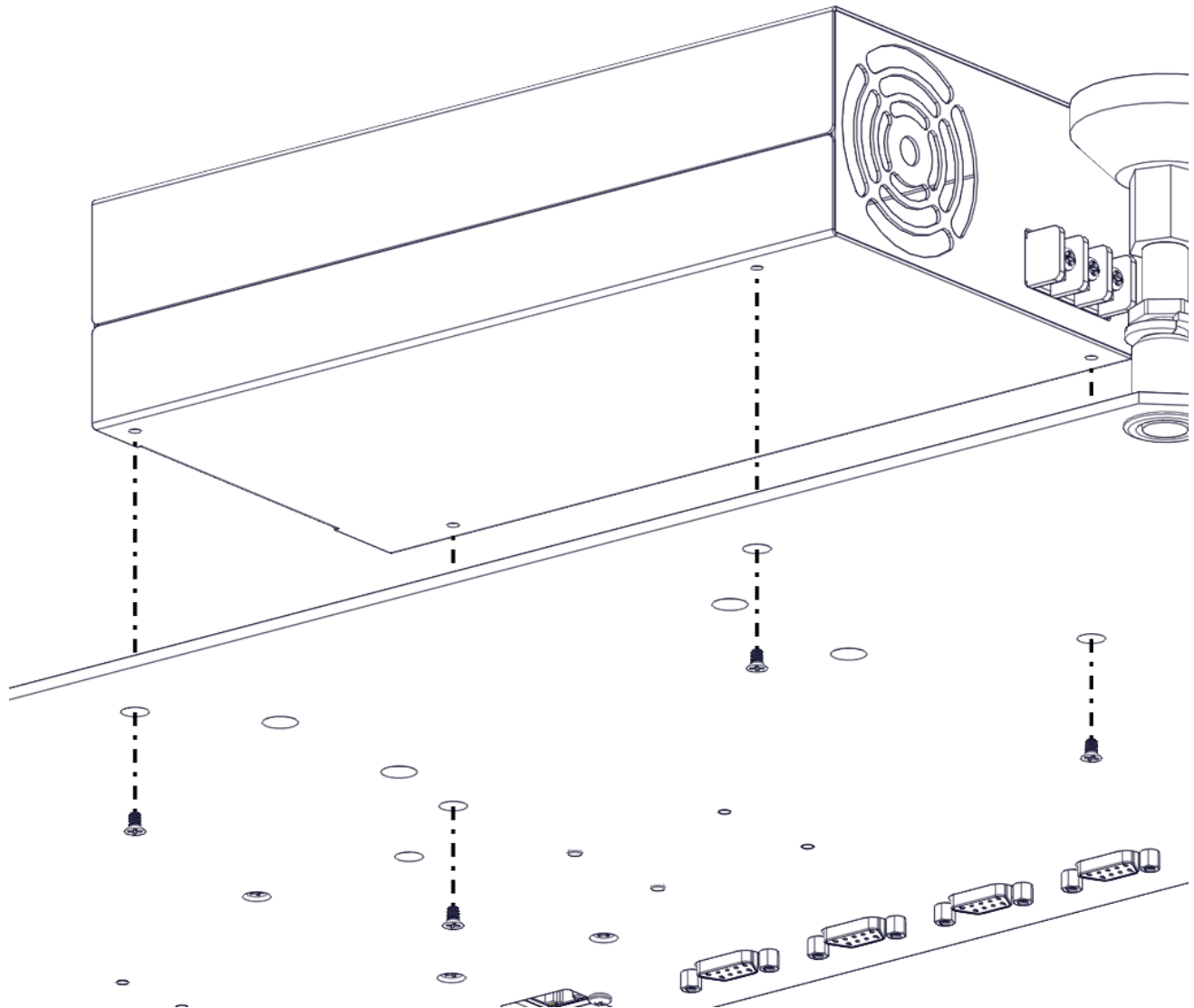
Note: This step applies only to the 3 axis kit; skip this step if you are assembling a 4 axis kit.

- Attach the 48V Power Supply as indicated.



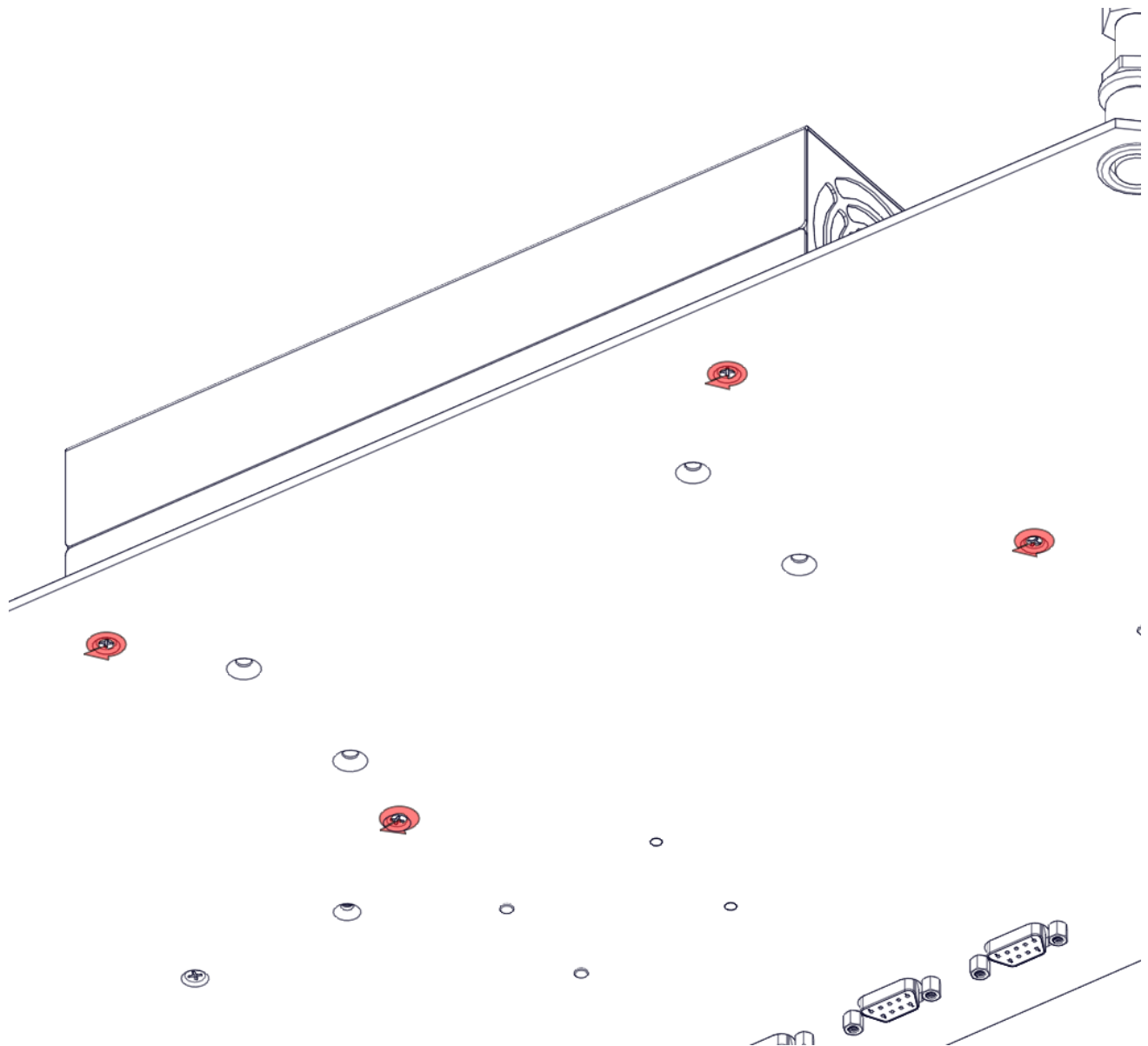
Note: This step applies only to the 3 axis kit; skip this step if you are assembling a 4 axis kit.

- Tighten the highlighted screws.



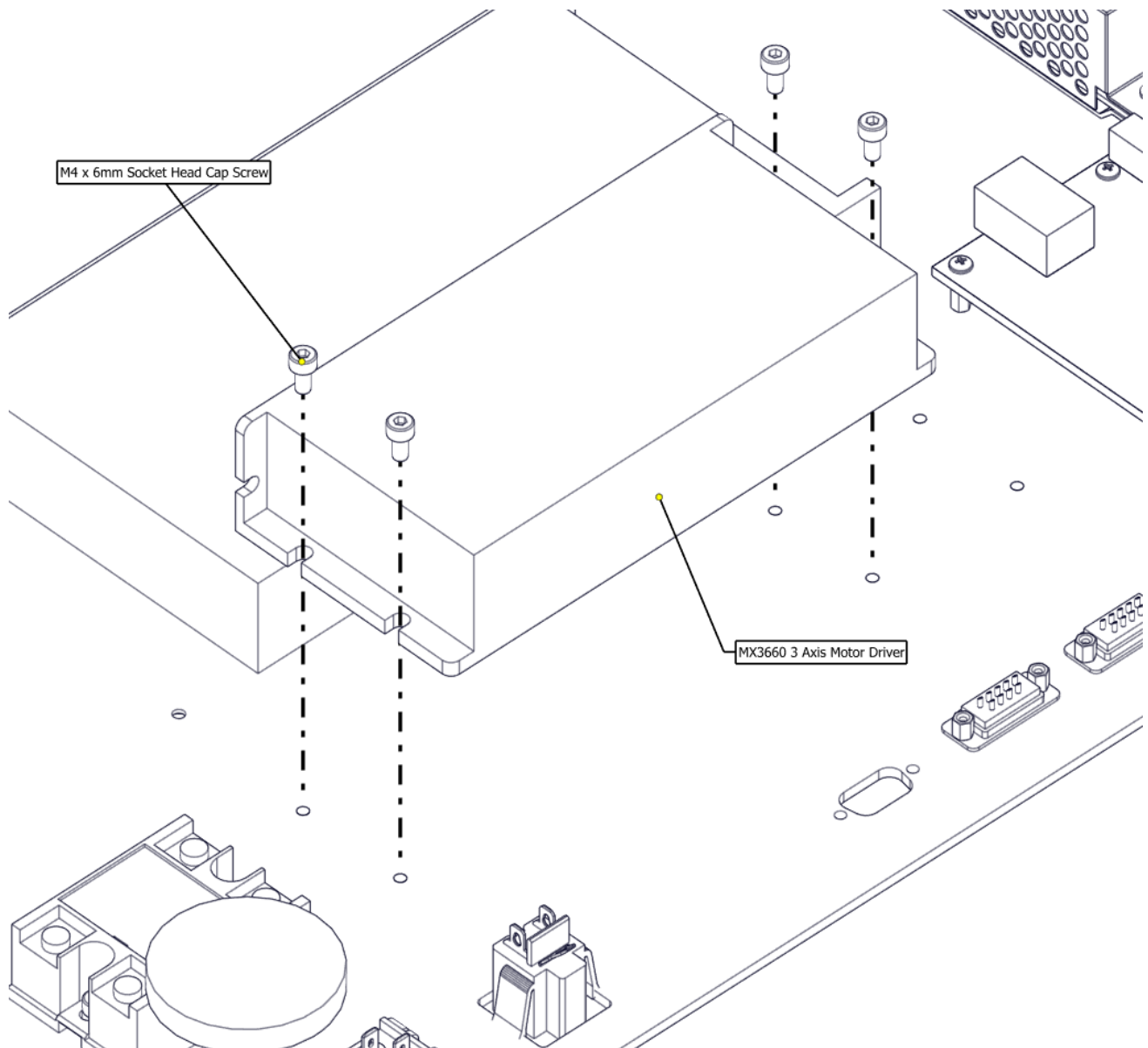
Note: This step applies only to the 4 axis kit; skip this step if you are assembling a 3 axis kit.

- Attach the 48V Power Supply as indicated.



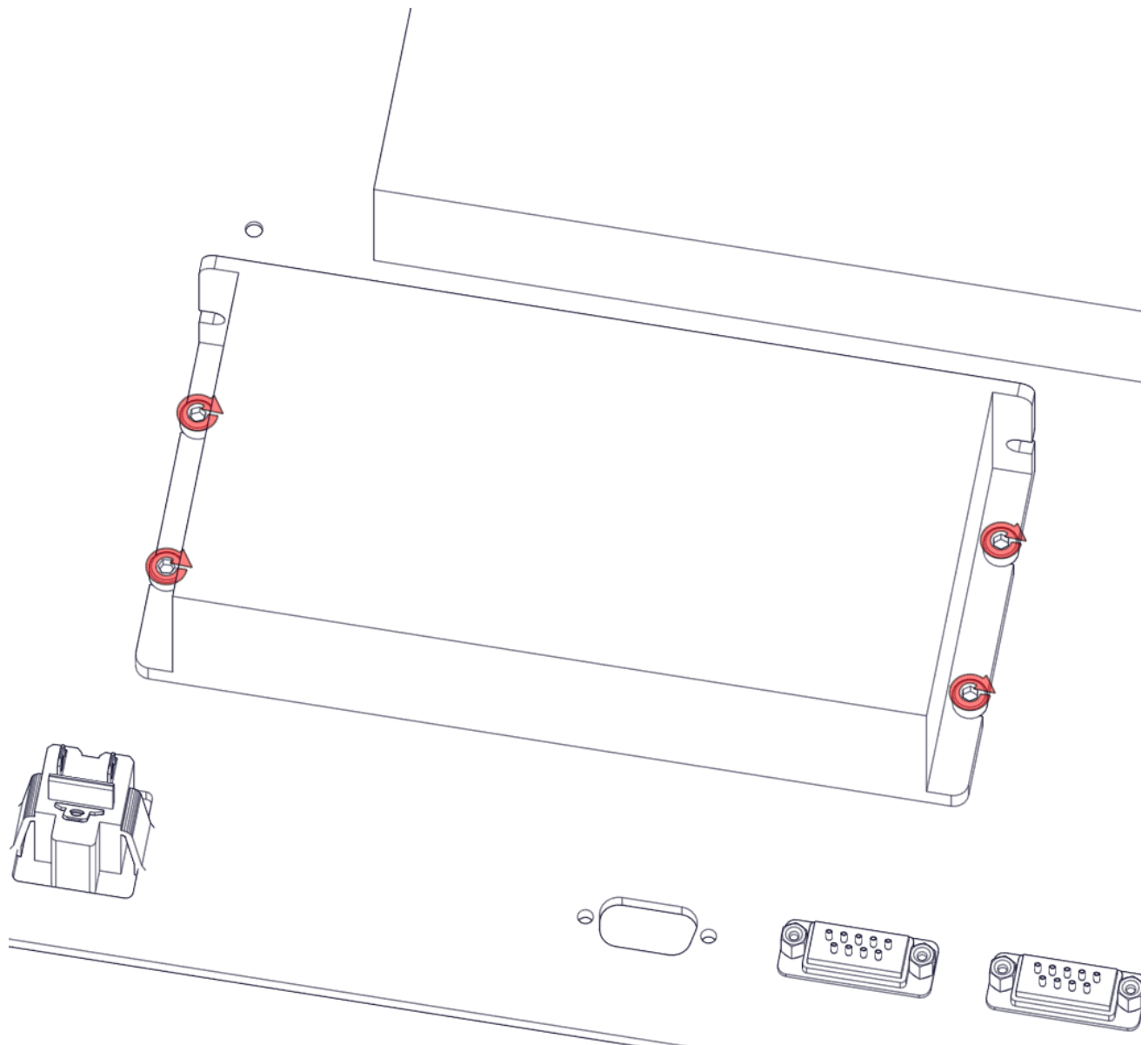
Note: This step applies only to the 4 axis kit; skip this step if you are assembling a 3 axis kit.

- Tighten the highlighted screws.



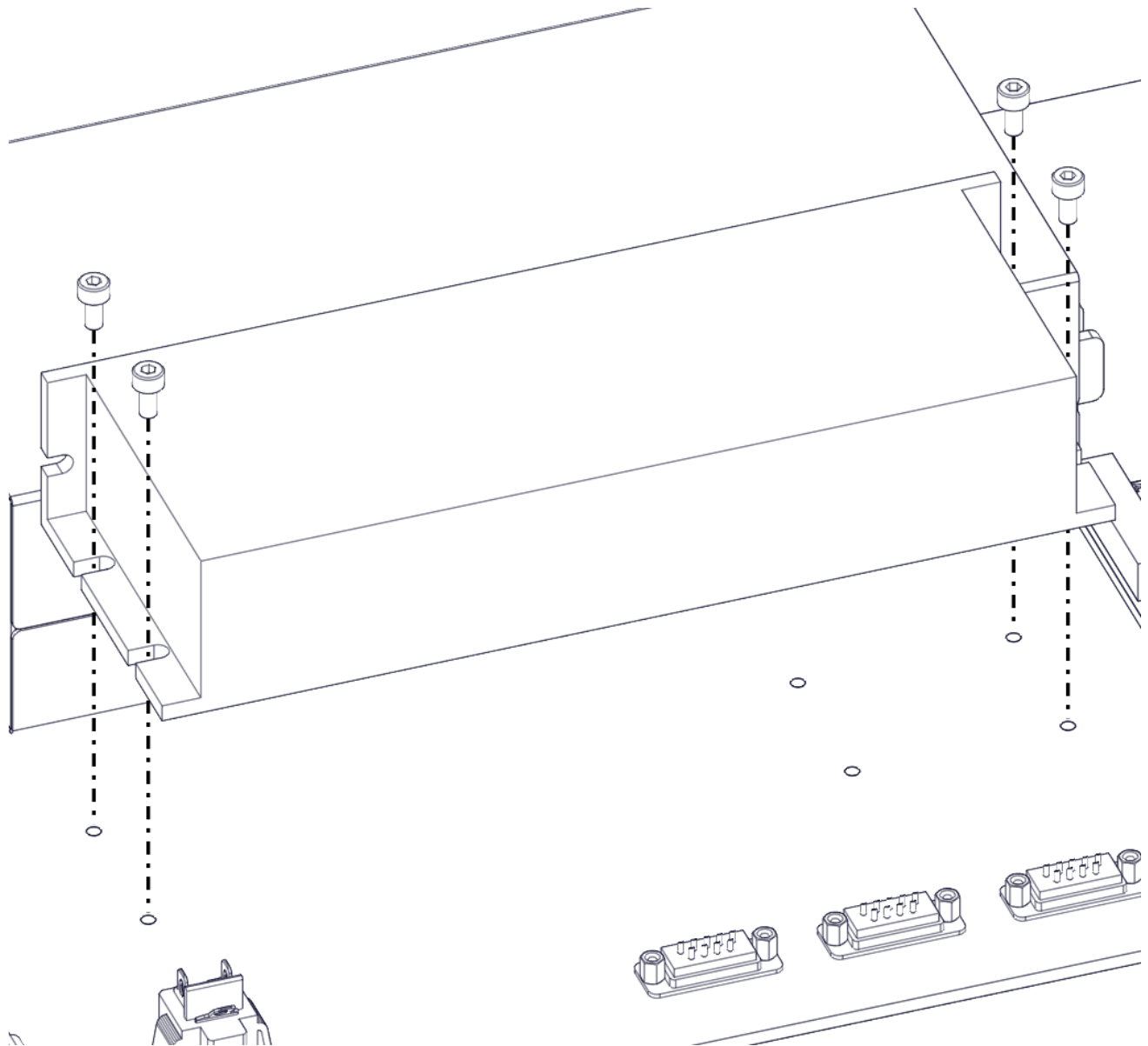
Note: This step applies only to the 3 axis kit; skip this step if you are assembling a 4 axis kit.

- Attach the MX3660 Motor Driver as indicated.



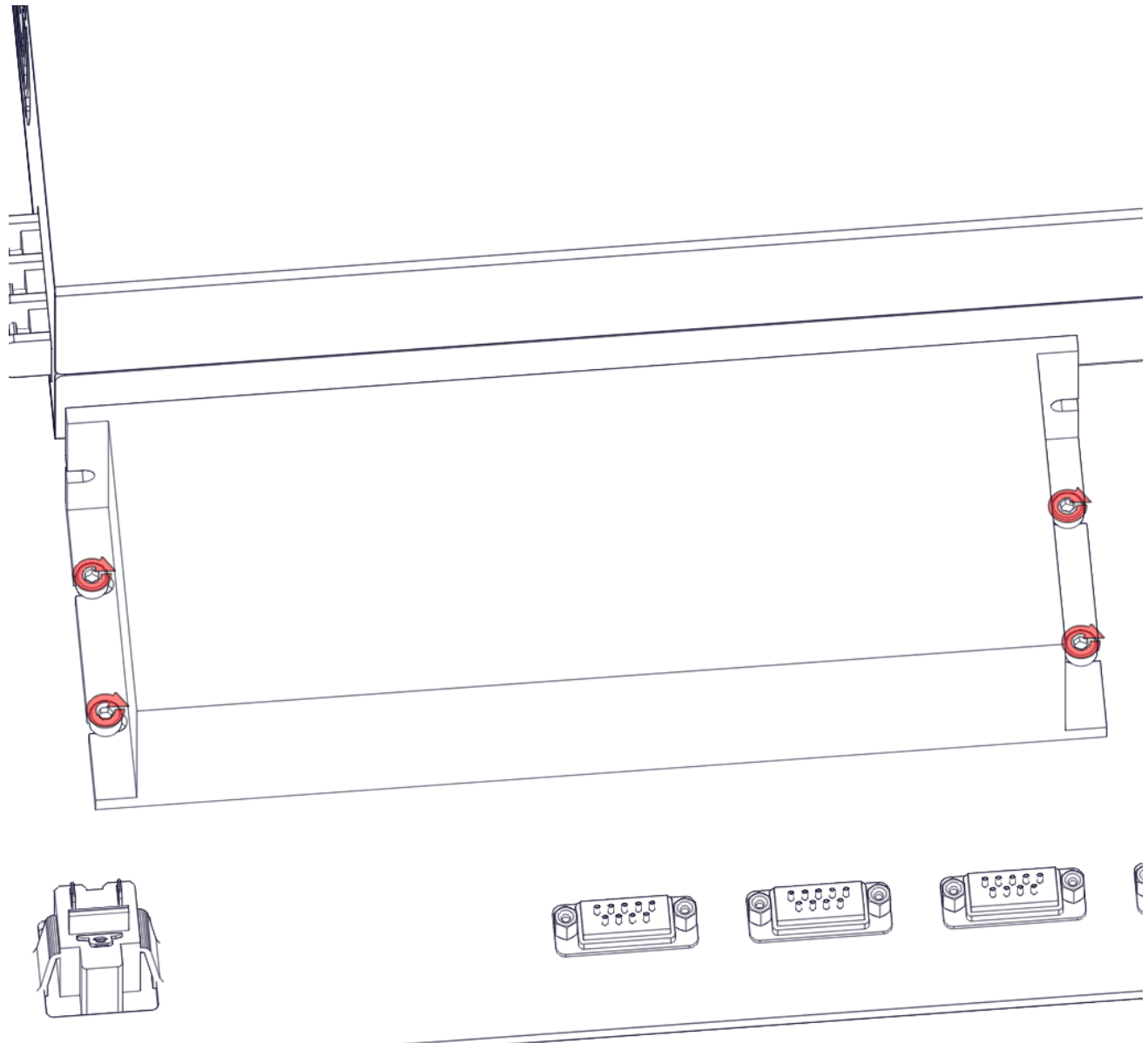
Note: This step applies only to the 3 axis kit; skip this step if you are assembling a 4 axis kit.

- Tighten the highlighted screws.



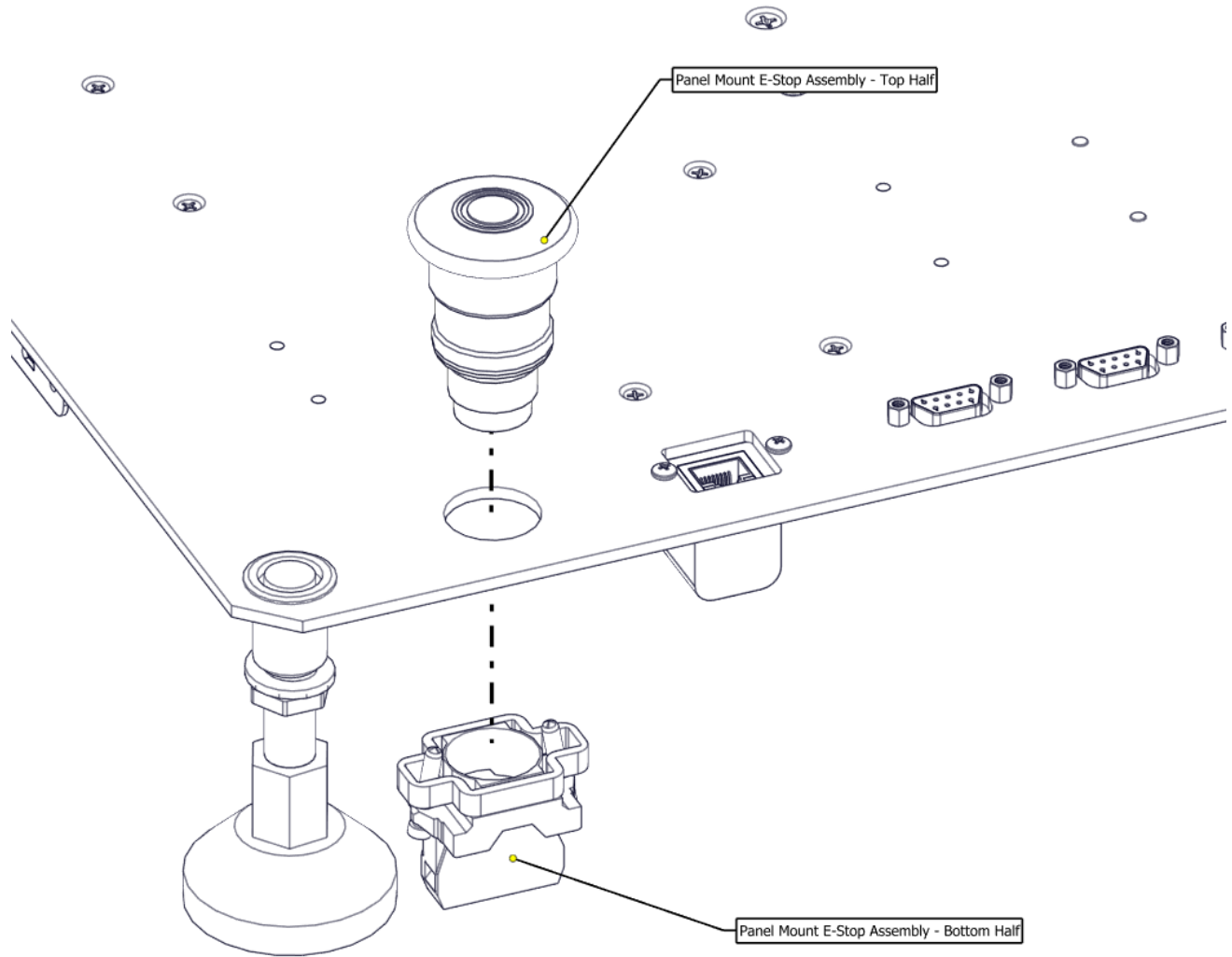
Note: This step applies only to the 4 axis kit; skip this step if you are assembling a 3 axis kit.

- Attach the MX4660 Motor Driver as indicated.

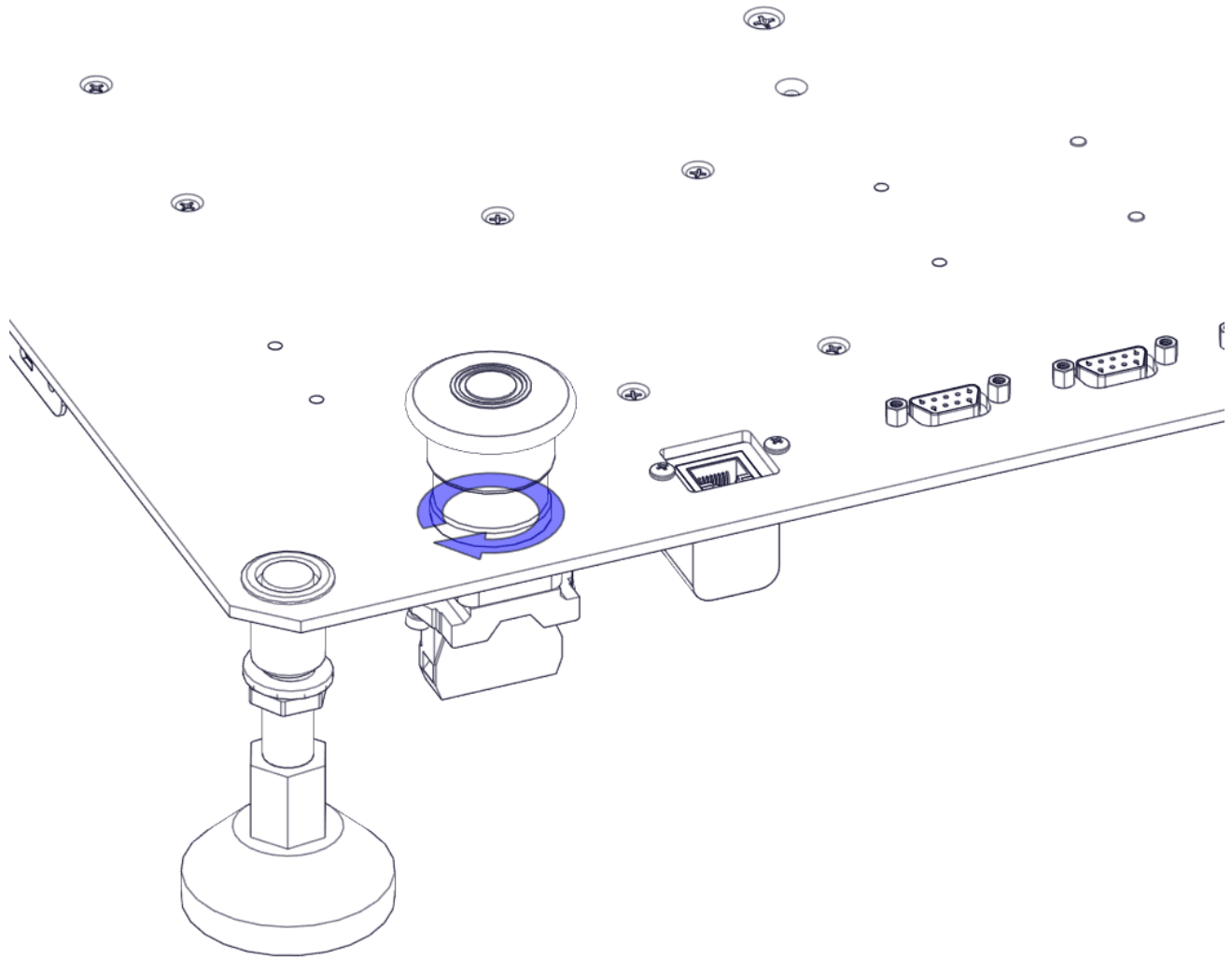


Note: This step applies only to the 4 axis kit; skip this step if you are assembling a 3 axis kit.

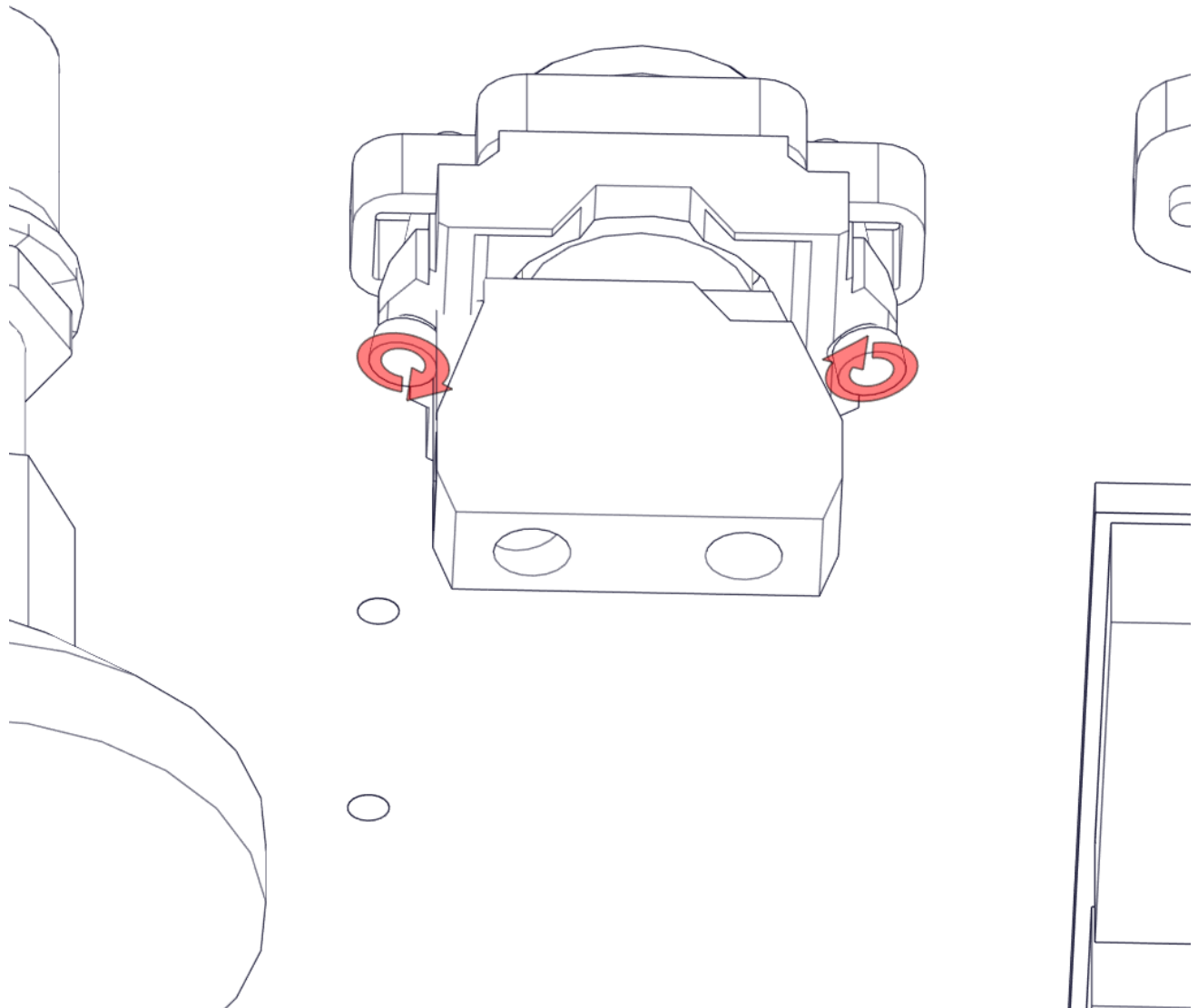
- Tighten the highlighted screws.



- Thread the two halves of the E-Stop assembly into the plate as indicated.

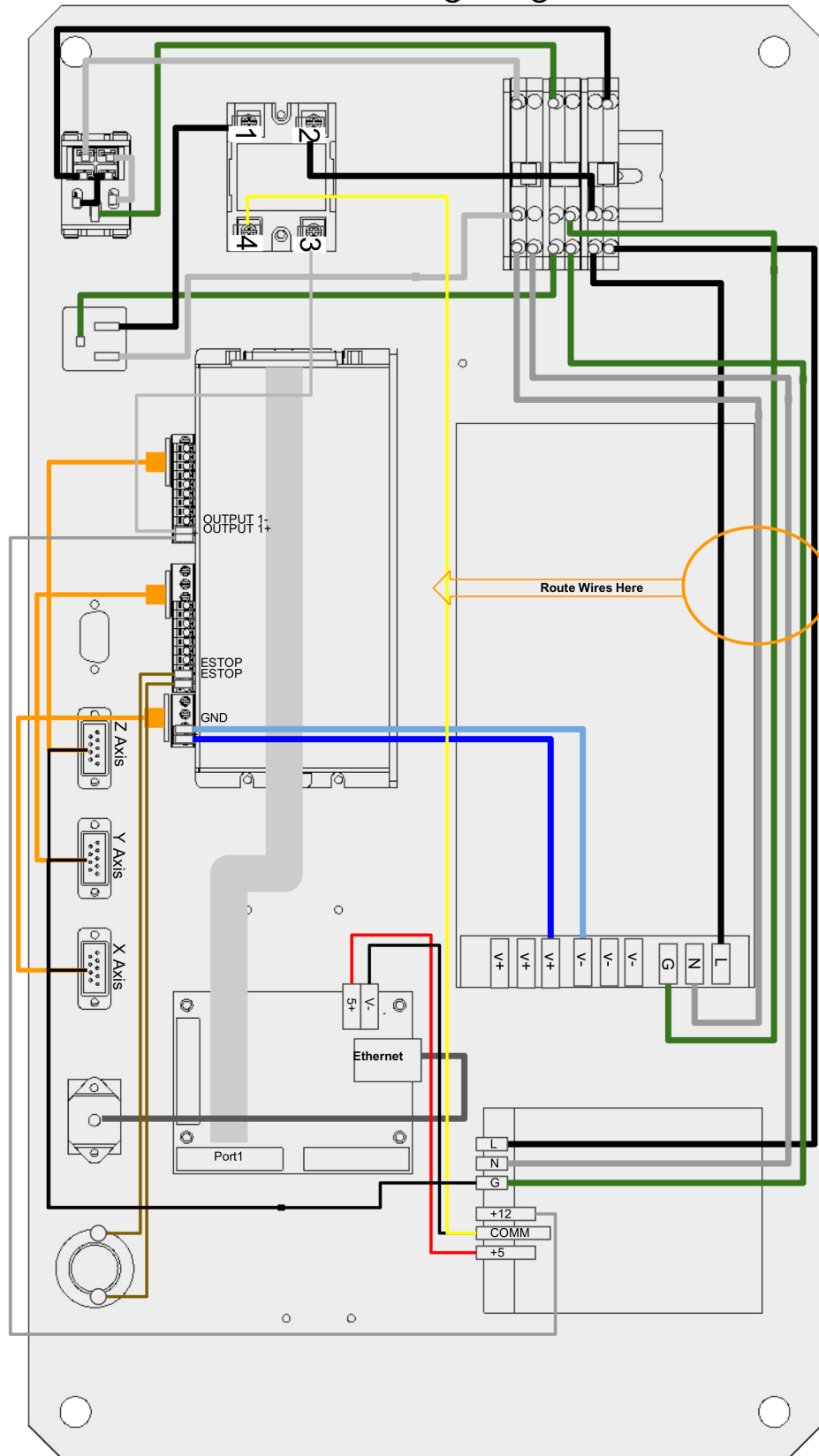


- Rotate the button portion of the assembly to lock the two pieces together.

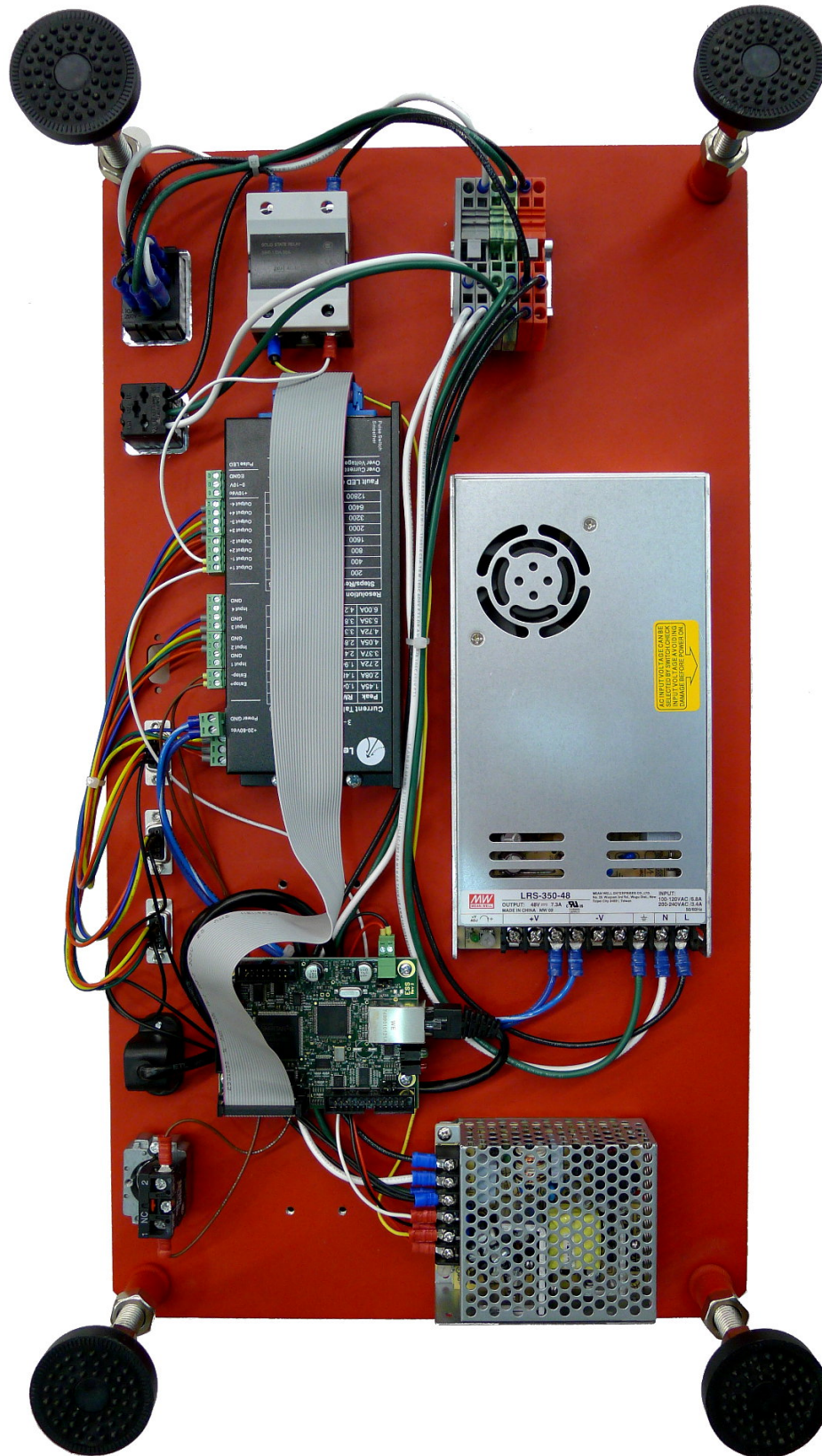


- Tighten the highlighted retaining screws to secure the E-Stop assembly.

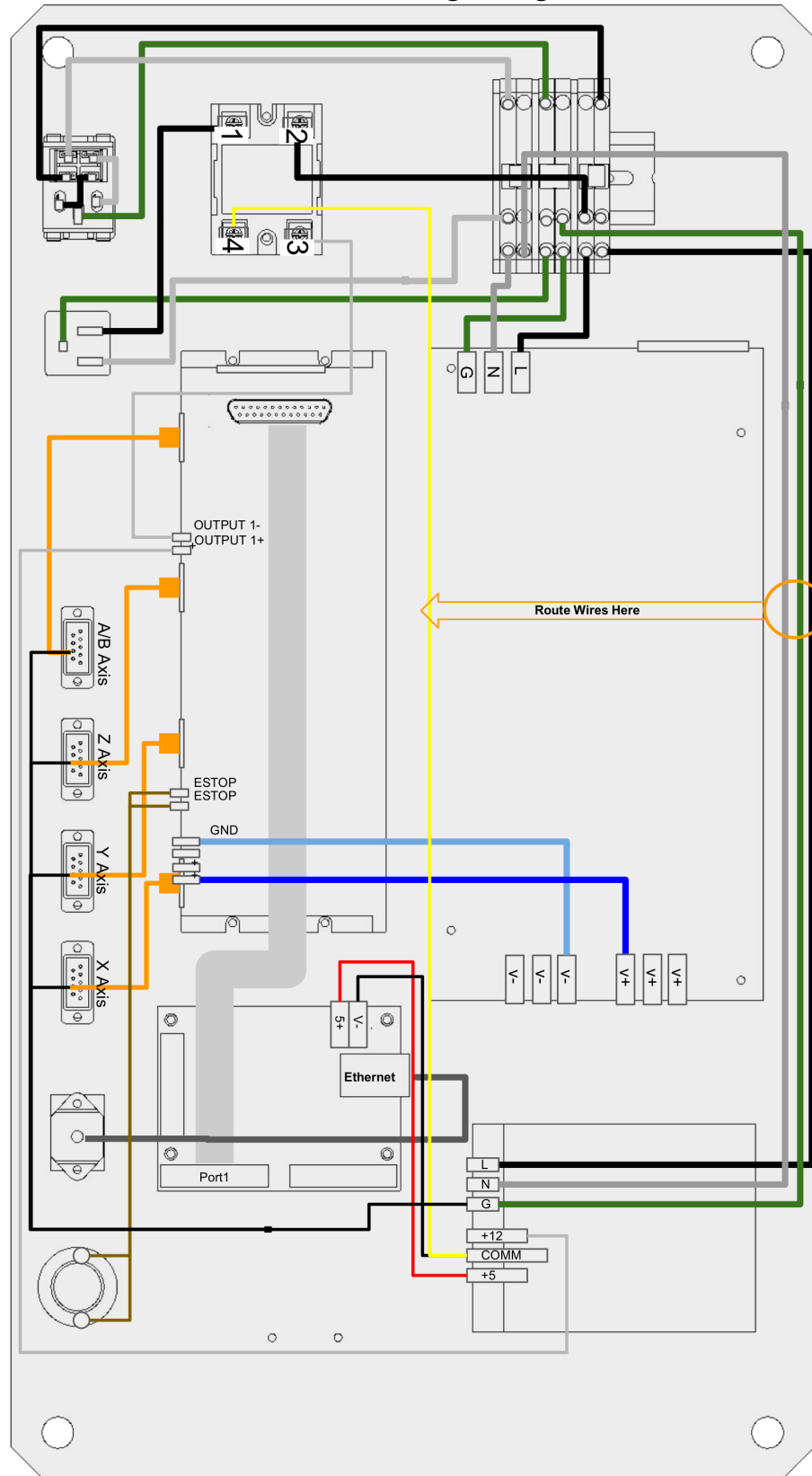
3 Axis Kit Wiring Diagram



3 Axis Kit Wiring Example



4 Axis Kit Wiring Diagram



4 Axis Kit Wiring Example

