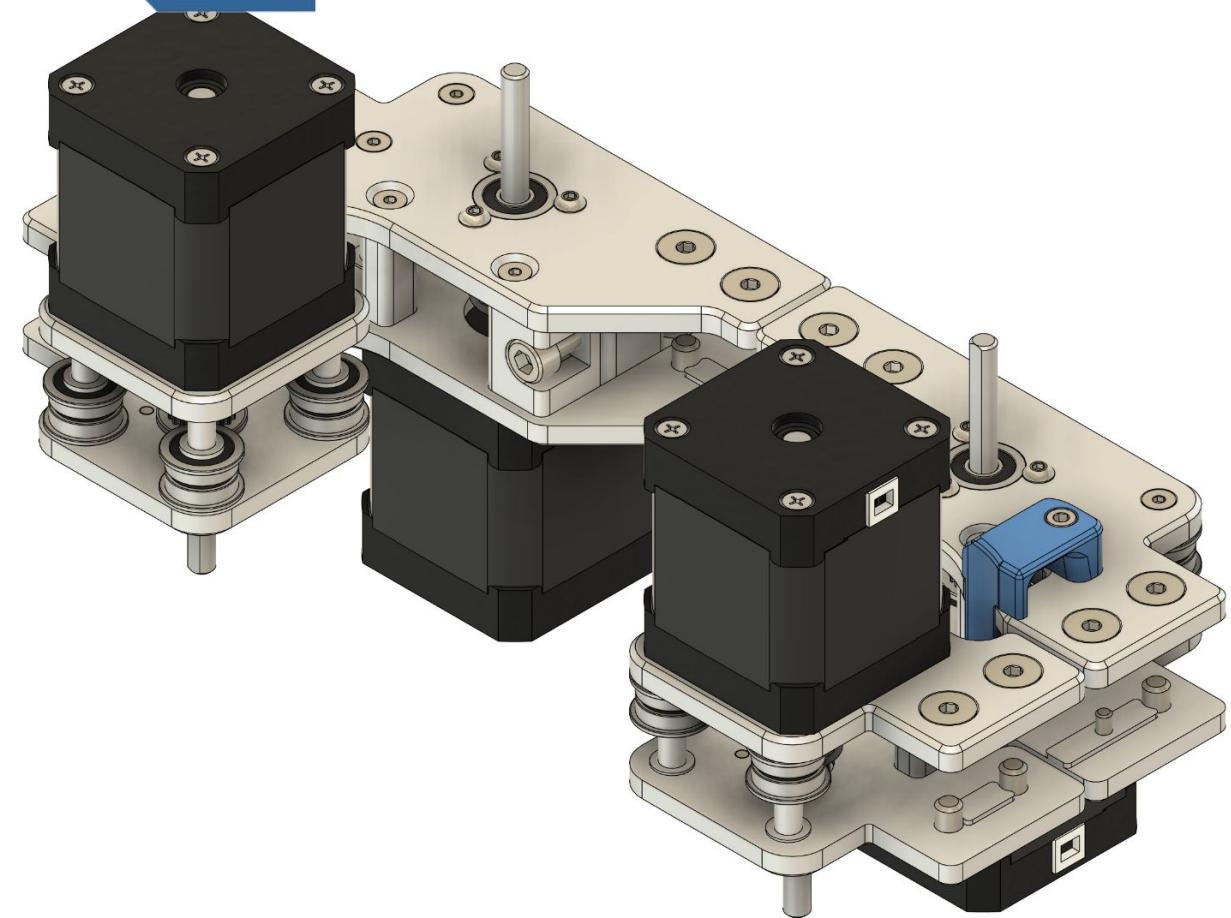




LDO MOTORS



Voron Trident AWD

Designed in collaboration with aTinyShellScript and
Mastur_Mynd for your Voron Trident

VERSION 2025-07-21

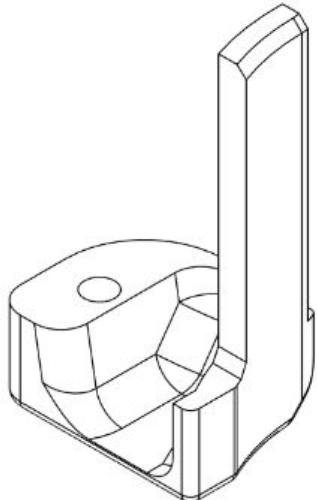
Introduction	03
Tensioner Slides	11
Rear Drive Frames	15
Front Drive Frames	37
A/B Belts	56
Finishing Touches	75

CNC AWD For Your Voron Trident

This manual picks up right after the assembly of the frame. If you have not already, follow the instructions in the Voron Design Trident assembly manual.

The cable cover and front Z motor mounts should be printed using the settings below

These printed parts can be found at https://github.com/VCProjects/LDO_AWD/tree/main/Voron-Trident/STL



[a]_wire_cover

3D PRINTING PROCESS

Fused Deposition Modeling (FDM)

MATERIAL

ABS/ASA

LAYER HEIGHT

Recommended: 0.2mm

EXTRUSION WIDTH

Recommended: Forced 0.4mm

INFILL TYPE

Grid, Gyroid, Honeycomb, Triangle or Cubic

INFILL PERCENTAGE

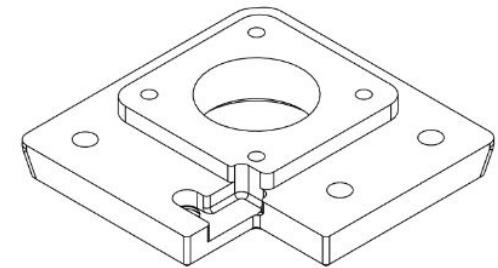
Recommended: 40%

WALL COUNT

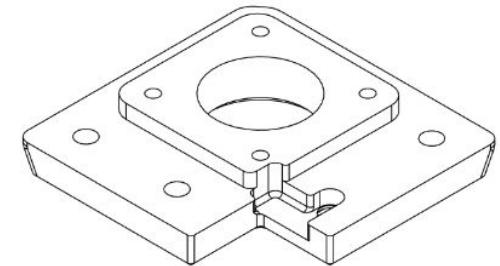
Recommended: 4

SOLID TOP/BOTTOM LAYERS

Recommended: 5



z_stepper_left



z_stepper_right

Common Callouts

Throughout this manual a few key references are made multiple times. This page illustrates their use.

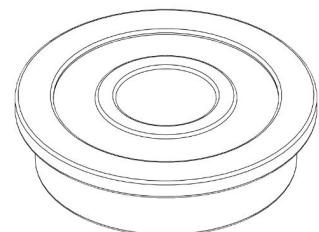
Spaced Bearing Stack

This design uses bearing stacks with a 1mm shim between the bearings. This separates the flanges by 7mm rather than the more common 6mm. The intention is to reduce wear at the edges of the belt. When belts are made there is a tolerance window which could make them thicker than 6mm in some areas.

Kit Parts

Parts called out with a blue background as pictured below are included with this kit. The next pages will have further details about these parts and should be reviewed to make sure all parts are accounted for.

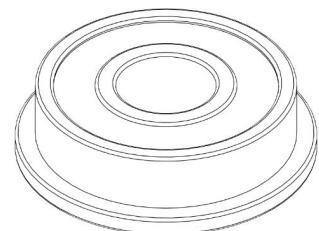
F695-2RS Bearing



5x8x1mm Shim



F695-2RS Bearing



M5x10 FHCS

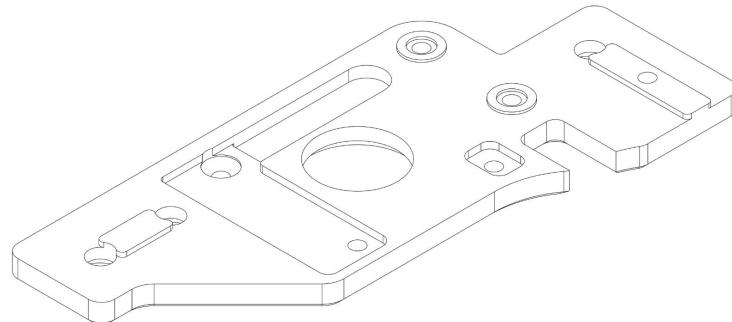
Not Included

Parts called out with a red background as pictured below are not included with this kit. These will be parts that came in your printer kit or would have been sourced while gathering components for your printer.

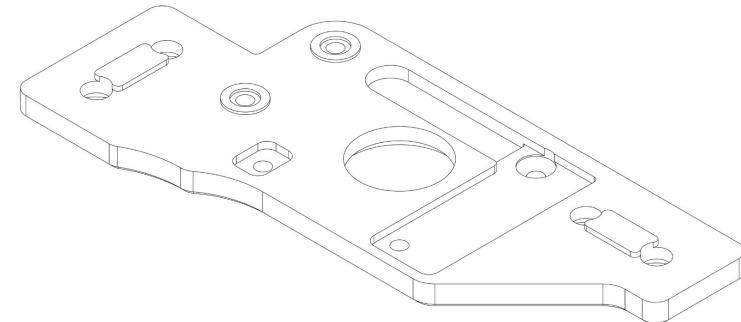
M5 T-Nut

Contents

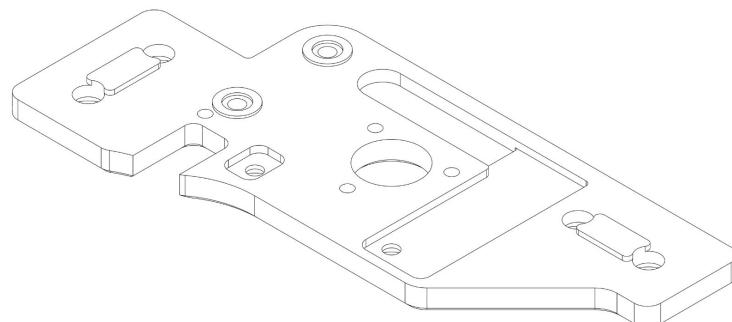
A Drive Frame Rear Lower



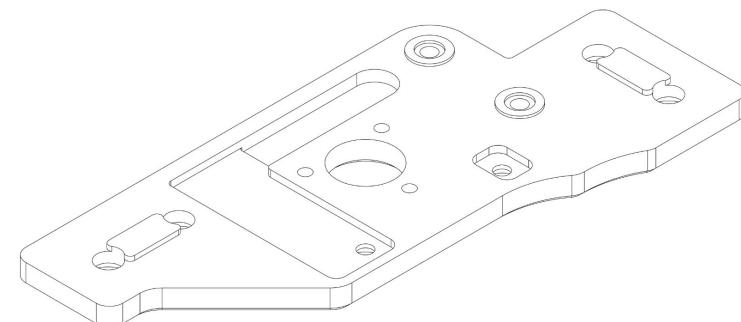
B Drive Frame Rear Lower



A Drive Frame Rear Upper

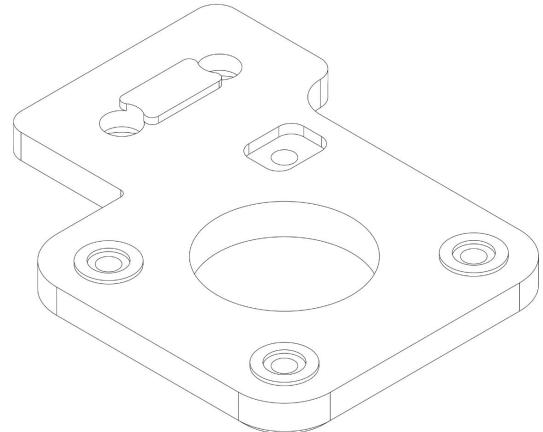


B Drive Frame Rear Upper

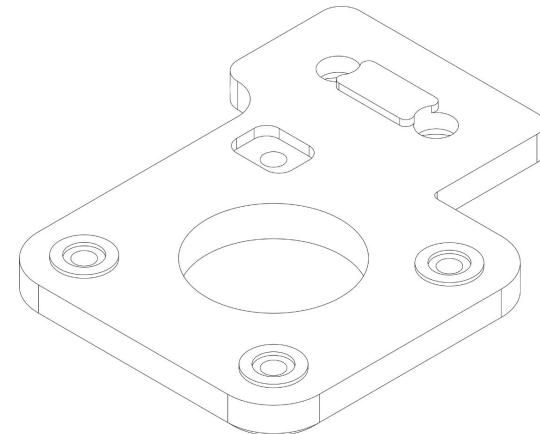


Contents Cont.

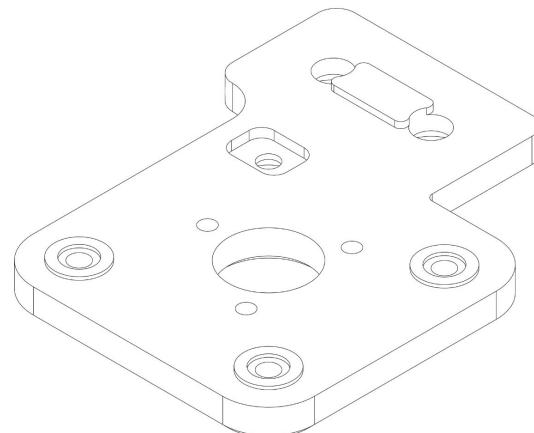
B Drive Frame Front Lower



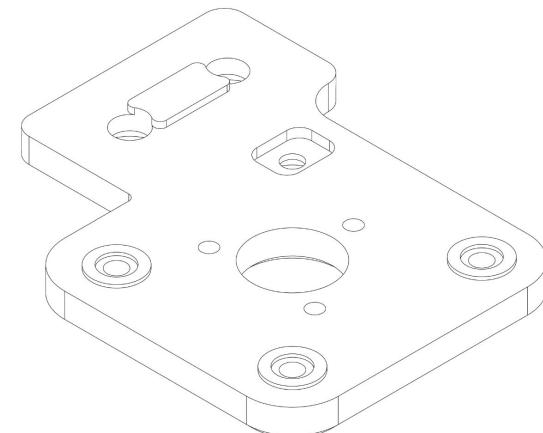
A Drive Frame Front Lower



B Drive Frame Front Upper

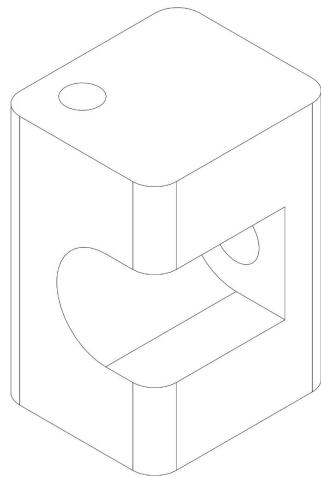


A Drive Frame Front Upper

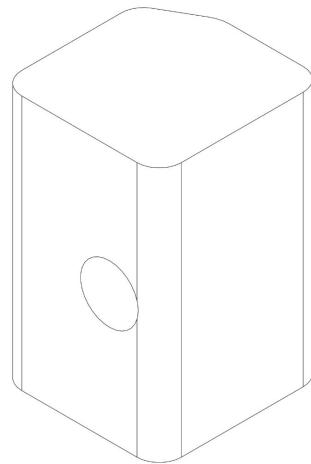


Contents Cont.

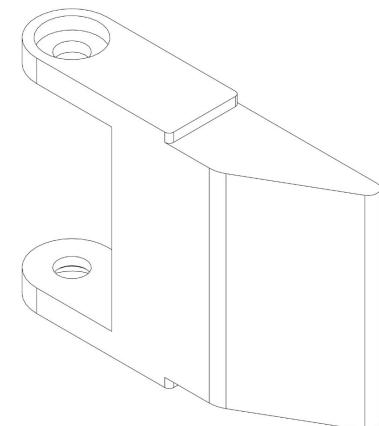
Tensioner Block x 2



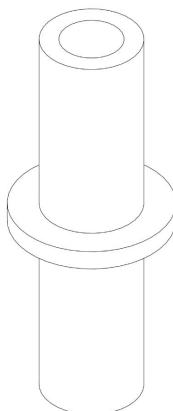
Tensioner Wedge x 2



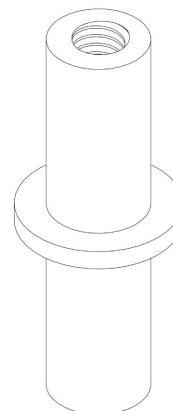
Tensioner Slide x 2



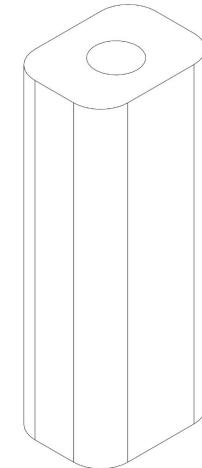
Shim Pin - Unthreaded x 4



Shim Pin - Threaded x 8

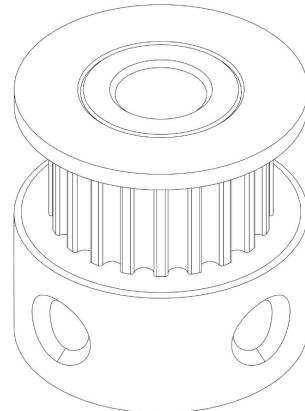


Standoff x 4

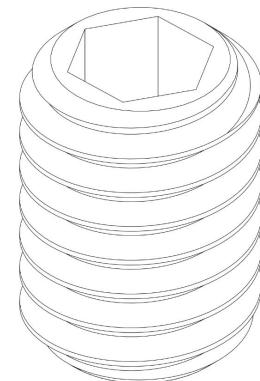


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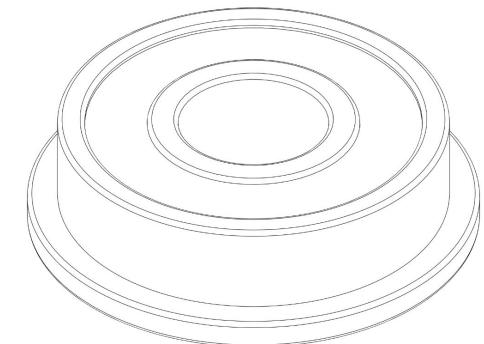
GT2 20T Pulley x 4



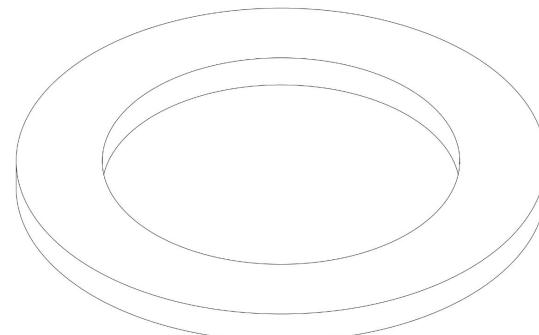
M3x4 Grub Screw x 8



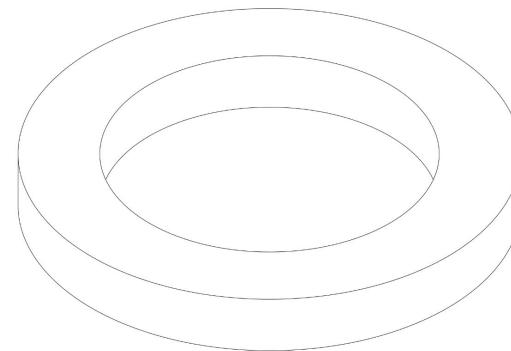
F695-2RS Bearing x 28



5x8x0.5mm Shim x 2

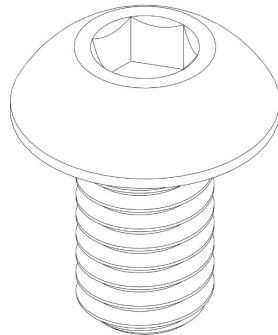


5x8x1mm Shim x 12

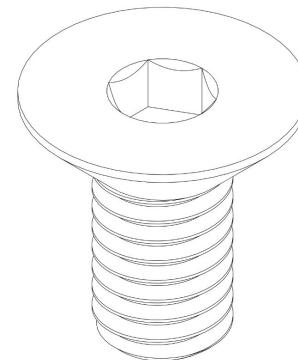


Contents Cont.

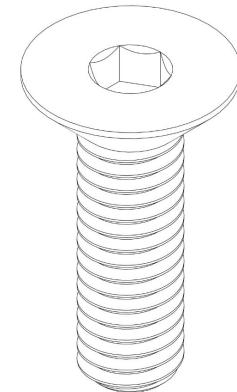
M3x5 BHCS x 12



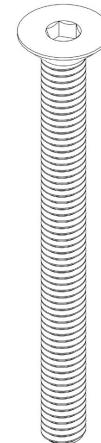
M3x6 FHCS x 2



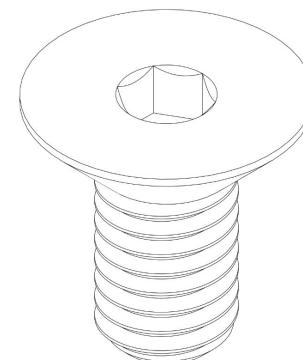
M3x10 FHCS x 13



M3x32 FHCS x 10

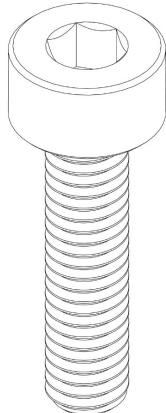


M5x10 FHCS x 23

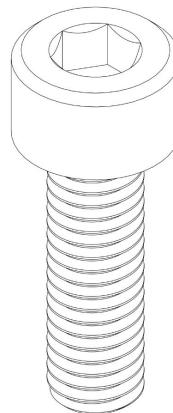


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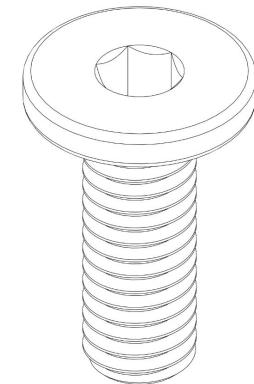
M3x12 SHCS



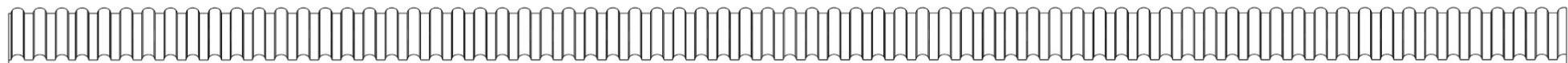
M5x16 SHCS x 2

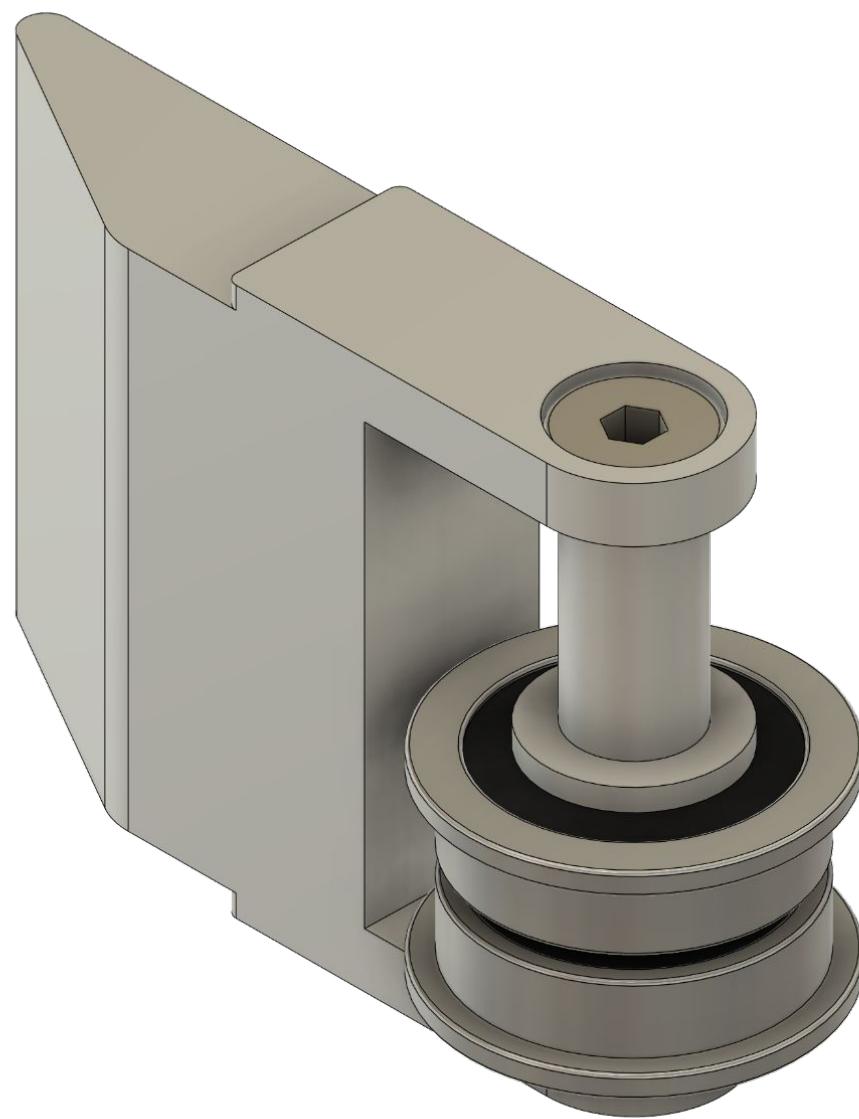


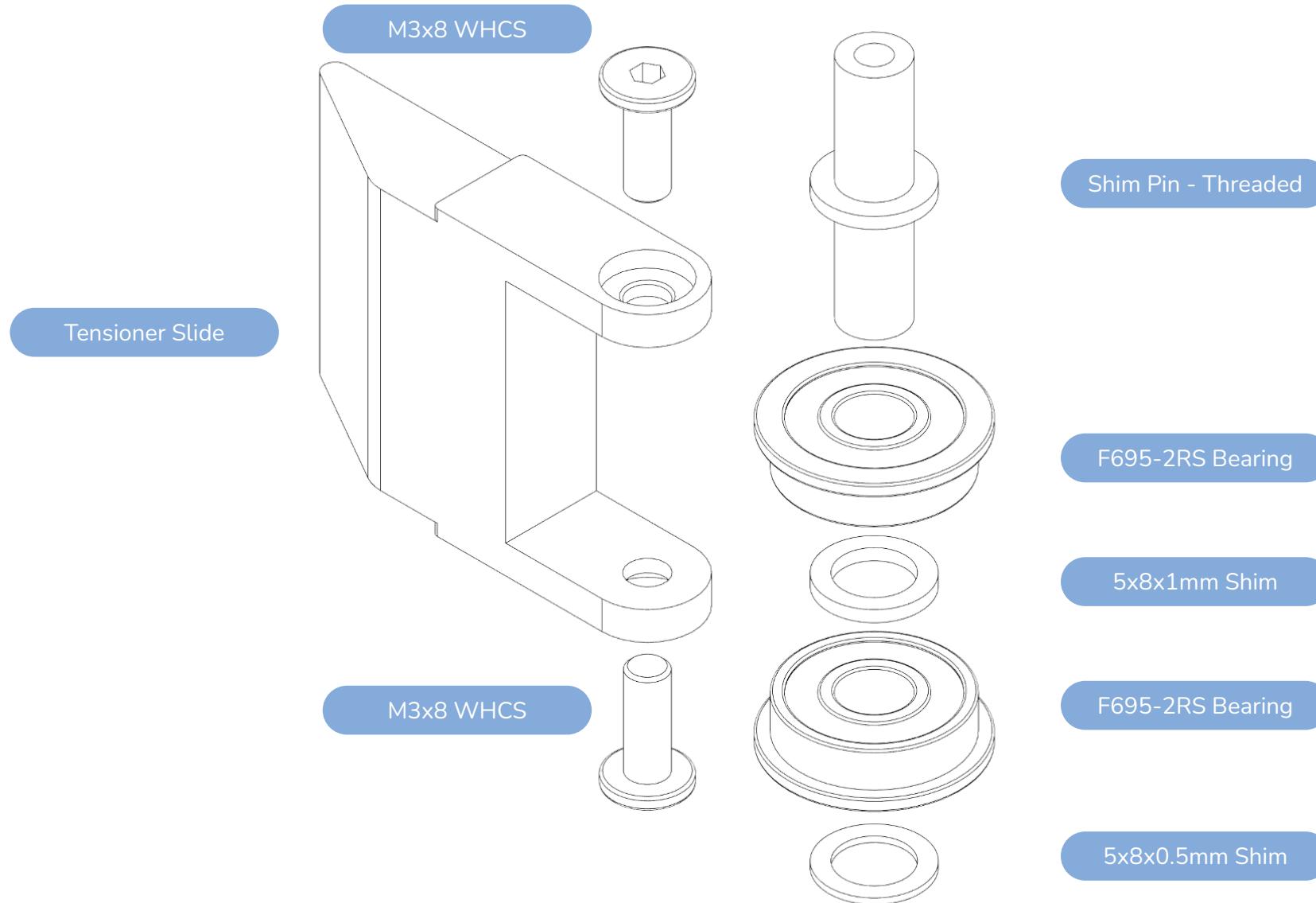
M3x8 WHCS x 4

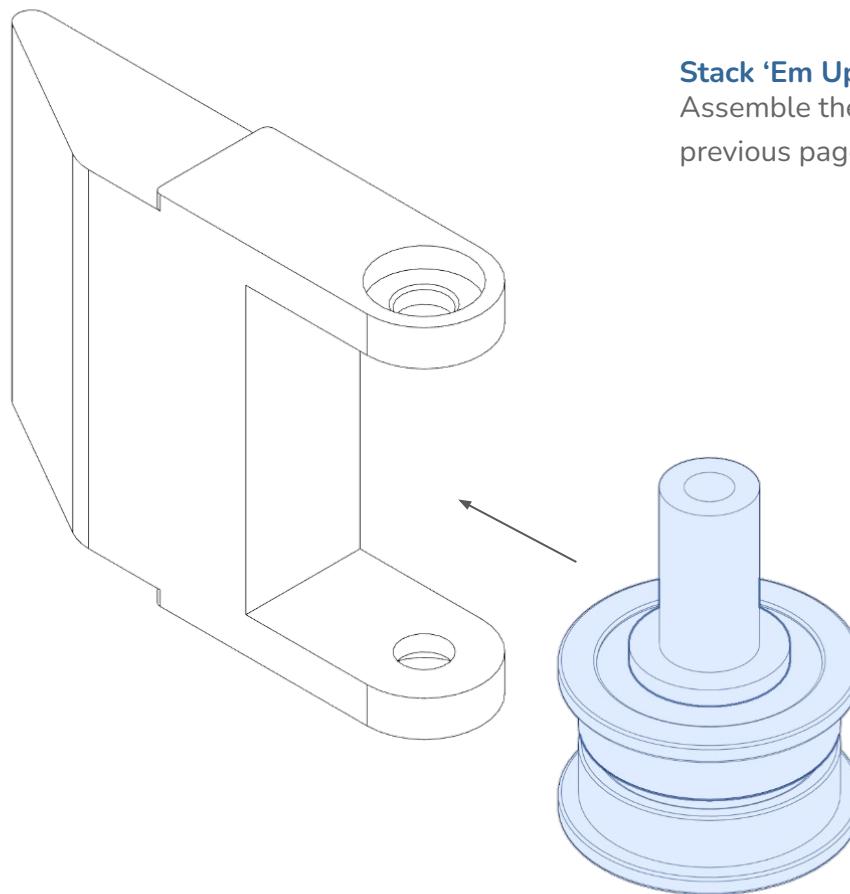


GT2 Open Belt 6mm x 6m





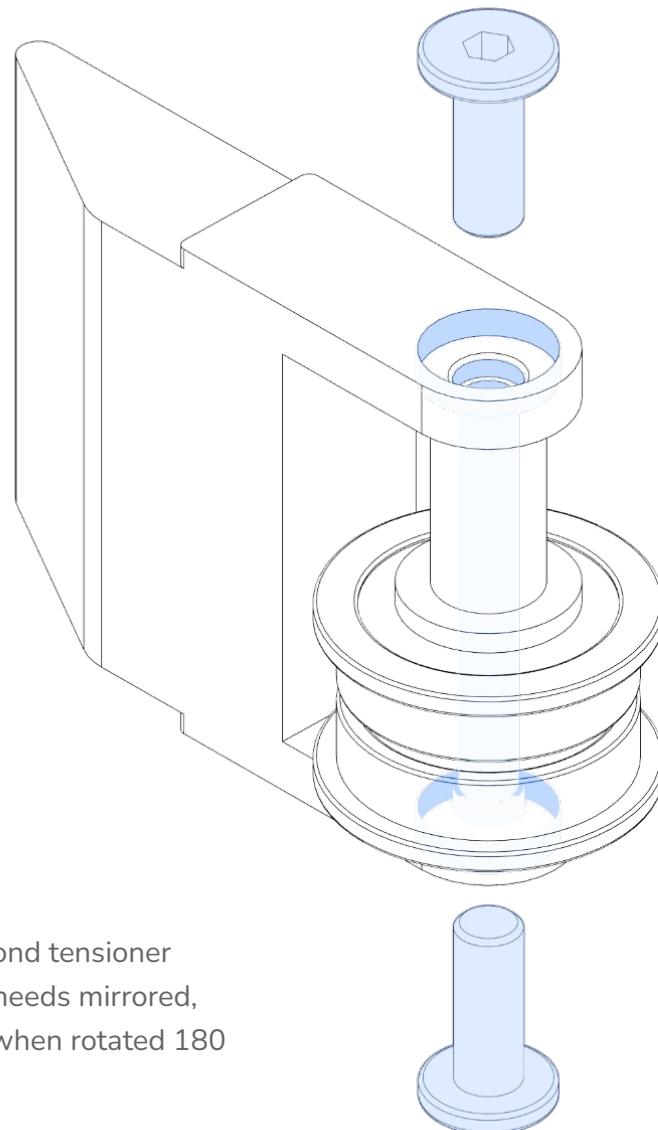


**Stack 'Em Up**

Assemble the spaced bearing stack as outlined in the previous page (bearing, 1mm shim, bearing, 0.5mm shim).

Tight Fit

There may be some resistance when inserting the bearing assembly into the tensioner slide.



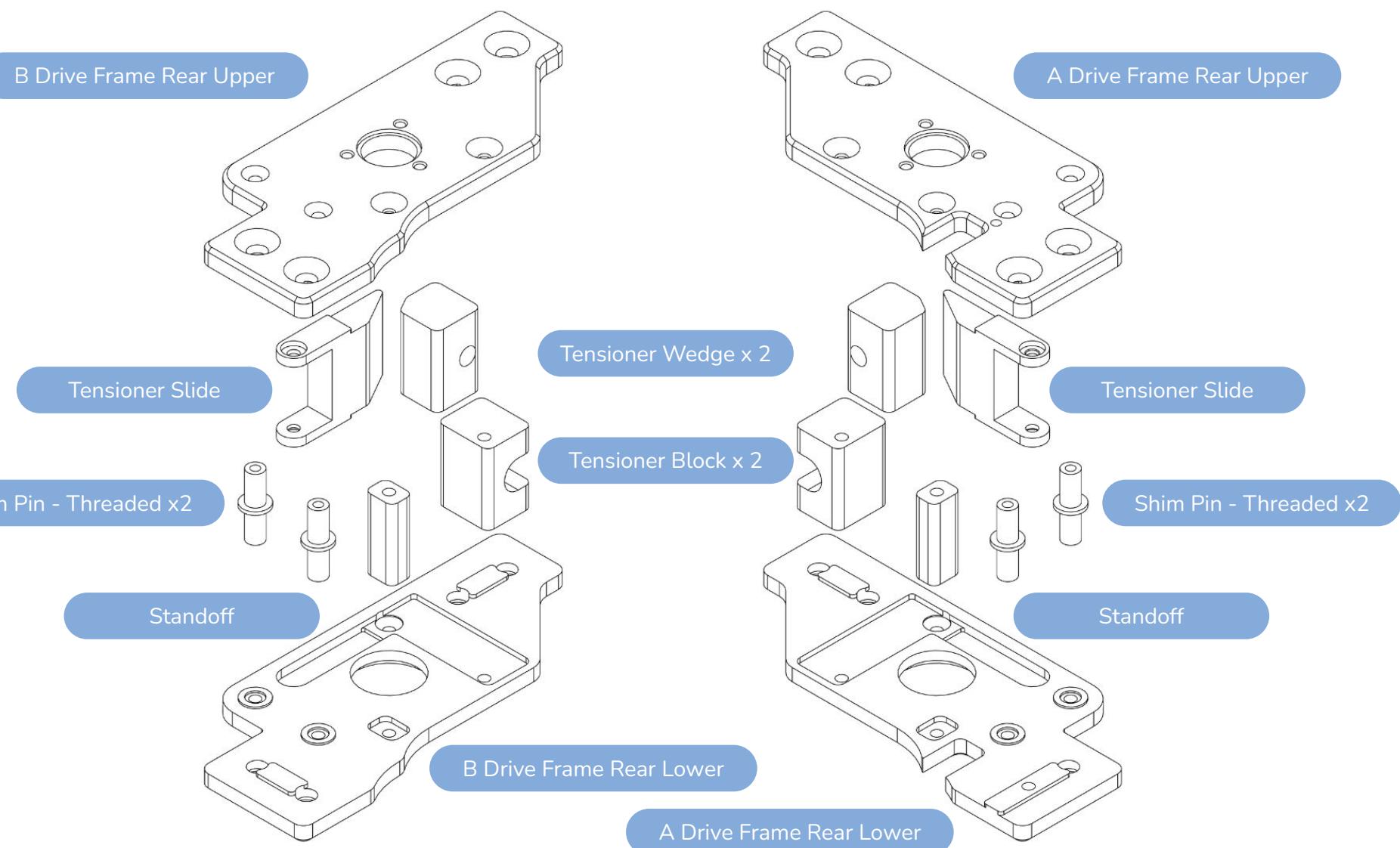
Lock In

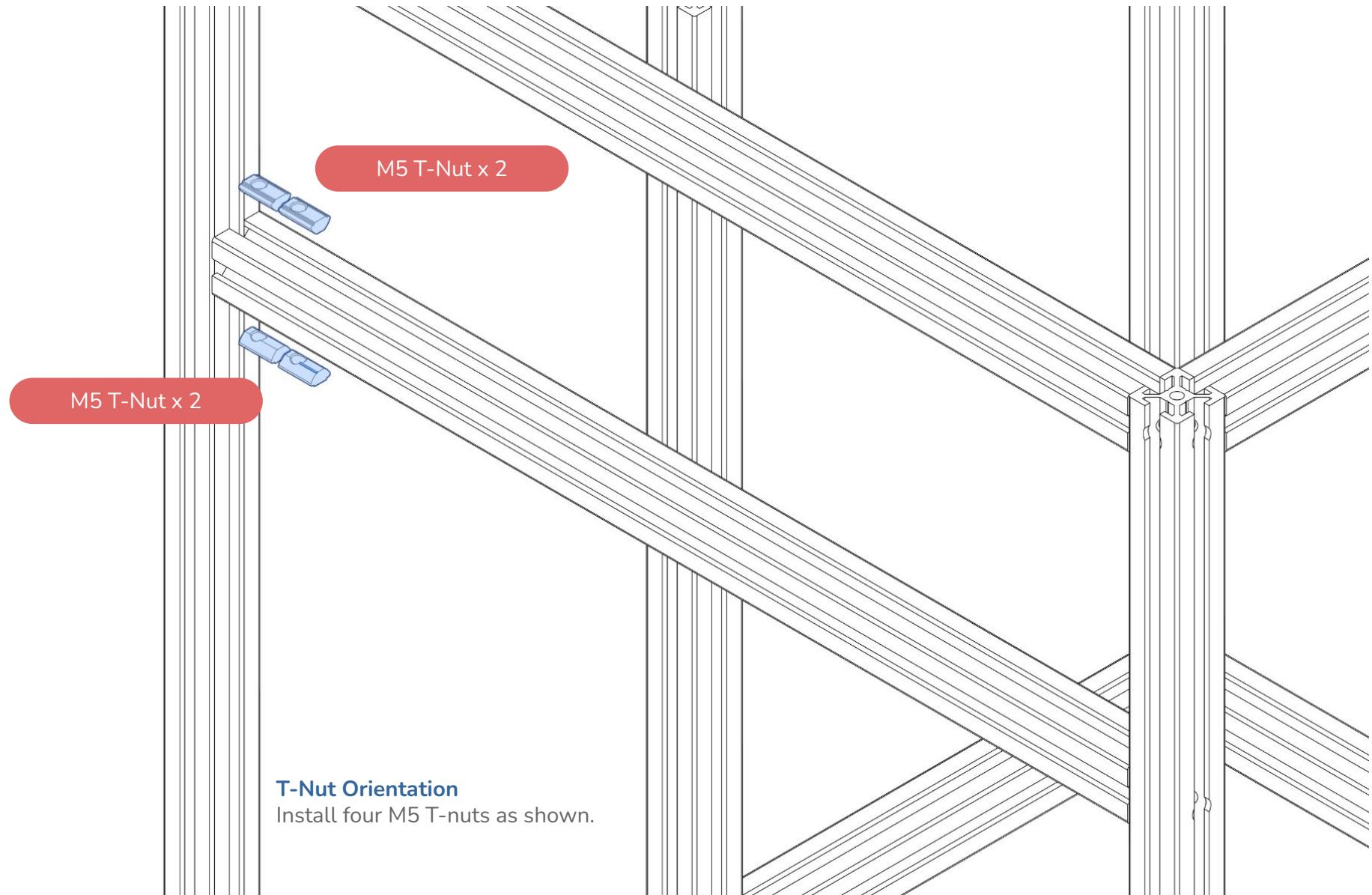
It may be difficult to line up both ends of the shim pin to the through holes in the tensioner slide due to tight tolerances and anodizing. It's recommended to line up the bottom (where the bearing stack is) and insert the fastener first, then apply light pressure to line up the top.

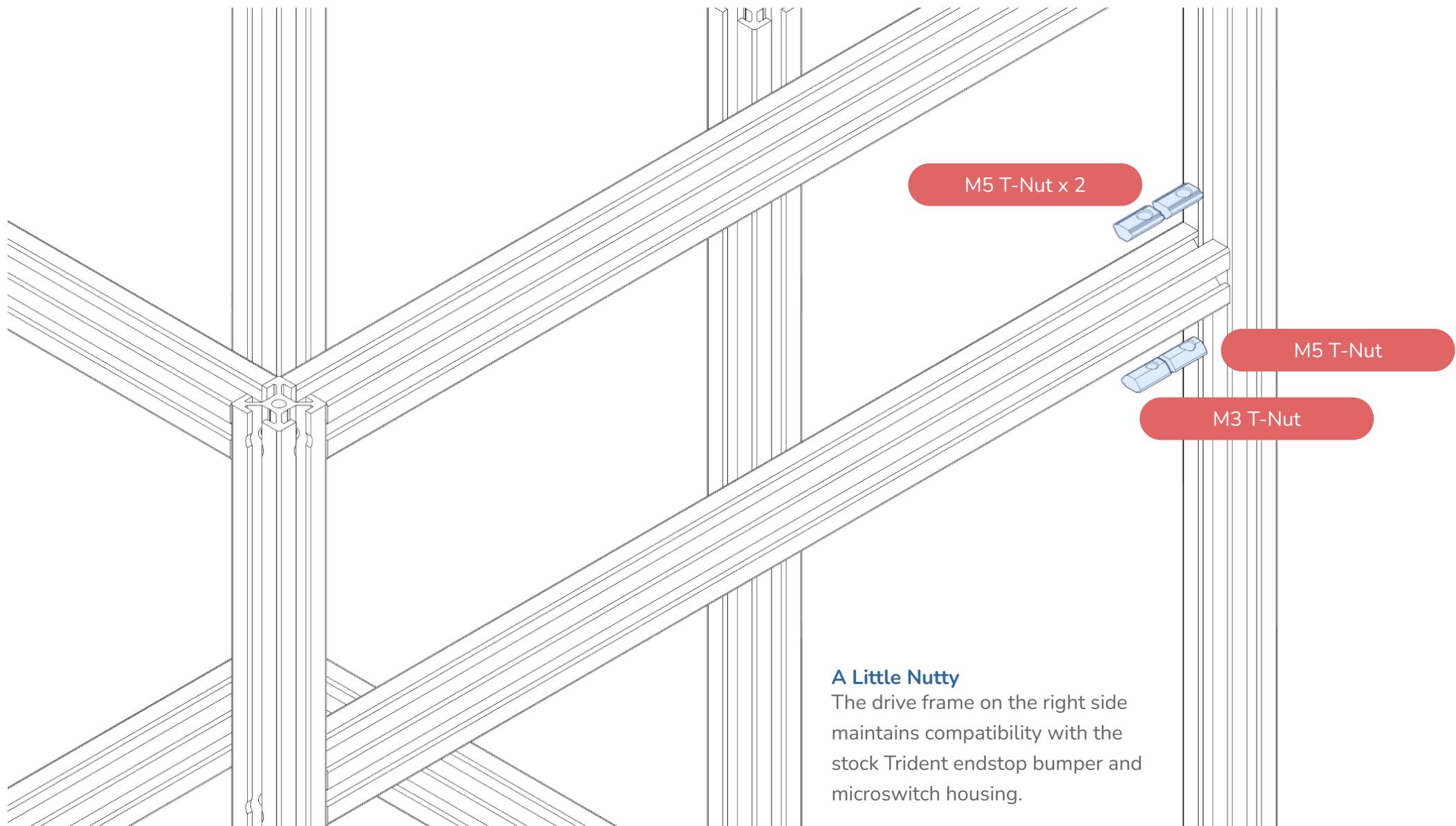
Mirror, Mirror?

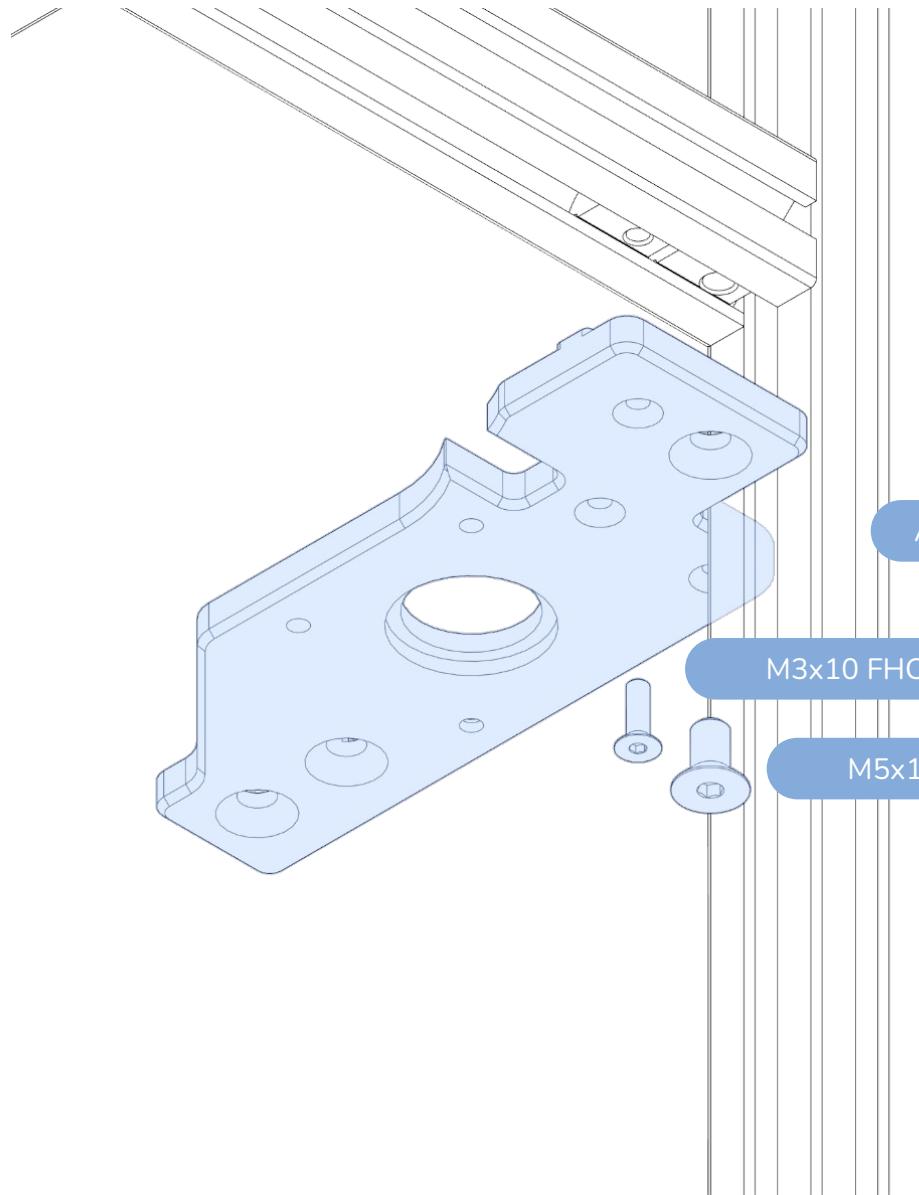
Repeat these steps **EXACTLY** for the second tensioner slide. Although the slide may look like it needs mirrored, the bearing stack will end up on the top when rotated 180 degrees to fit the other drive frame.











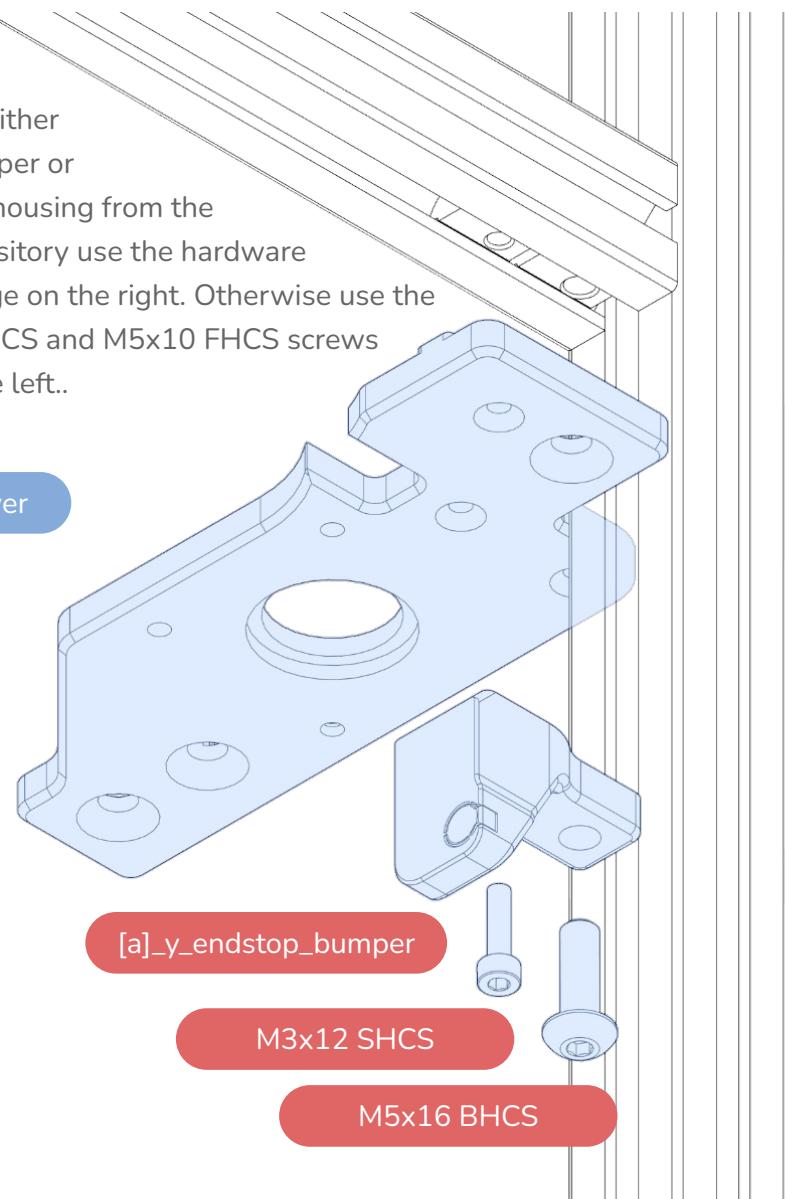
A Drive Frame Rear Lower

M3x10 FHCS

M5x10 FHCS

Mechanical Stop

If you're installing either [a]_y_endstop_bumper or [a]_y_microswitch_housing from the official Trident repository use the hardware outlined in the image on the right. Otherwise use the included M3x10 FHCS and M5x10 FHCS screws as illustrated on the left..



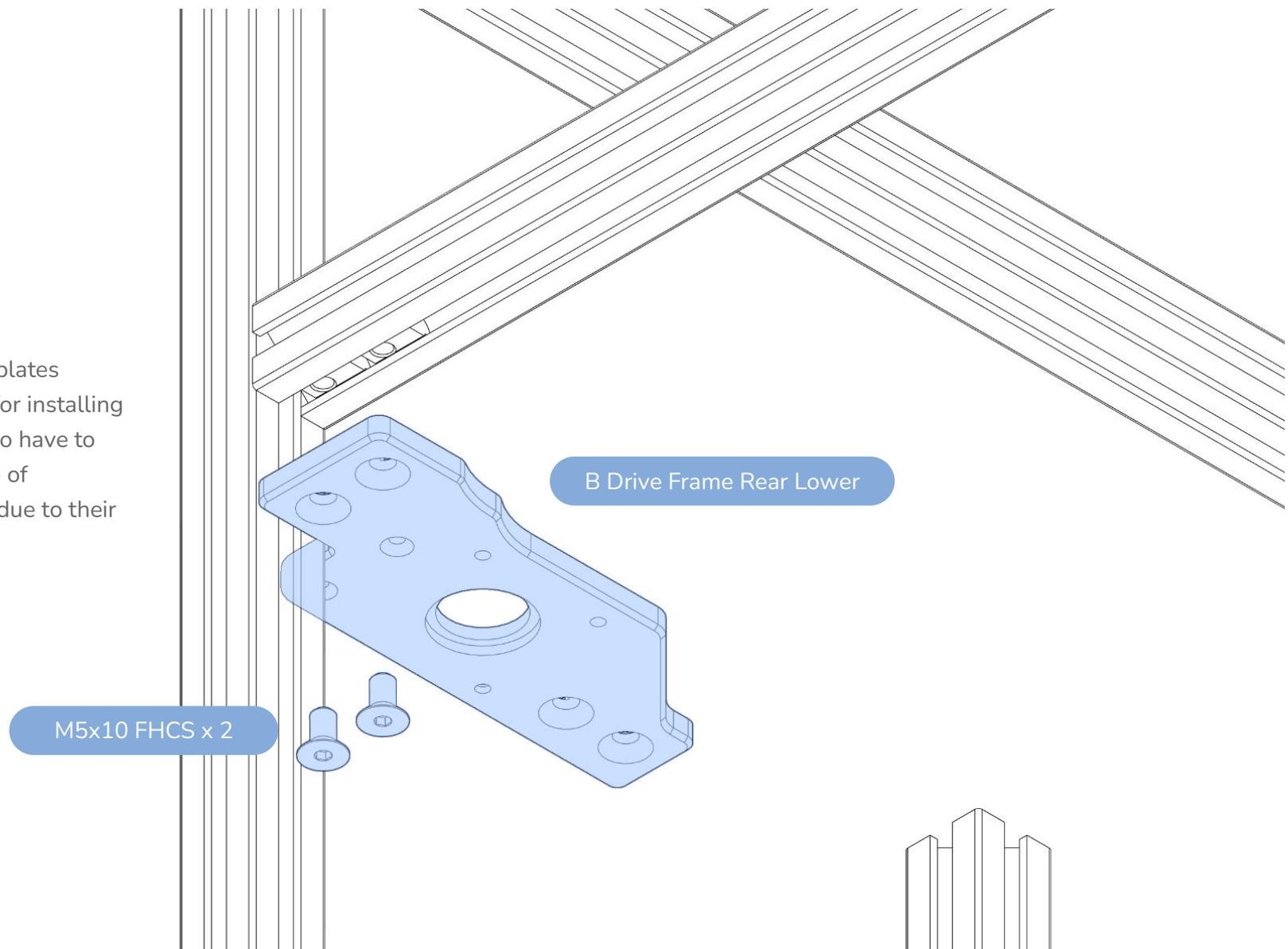
[a]_y_endstop_bumper

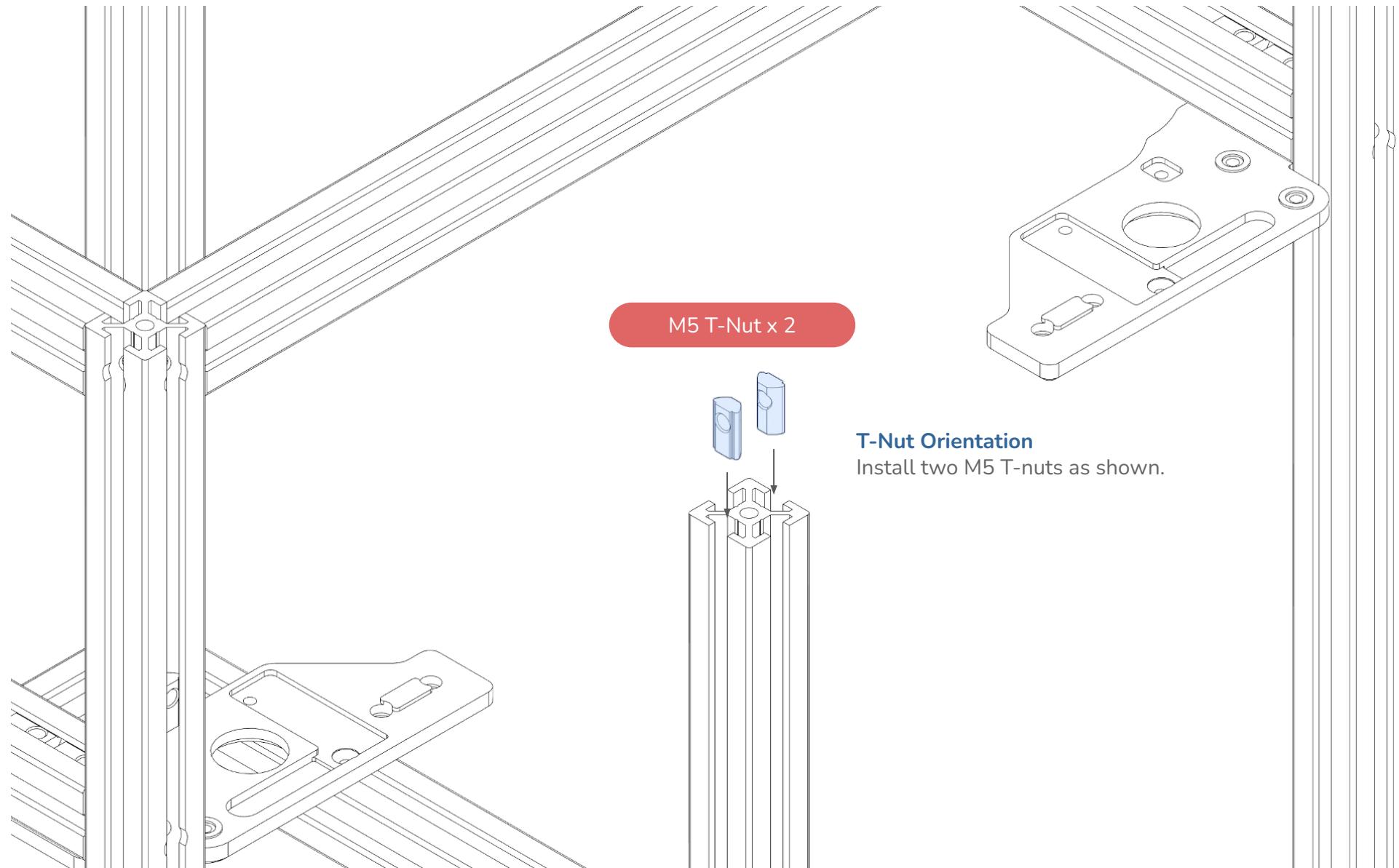
M3x12 SHCS

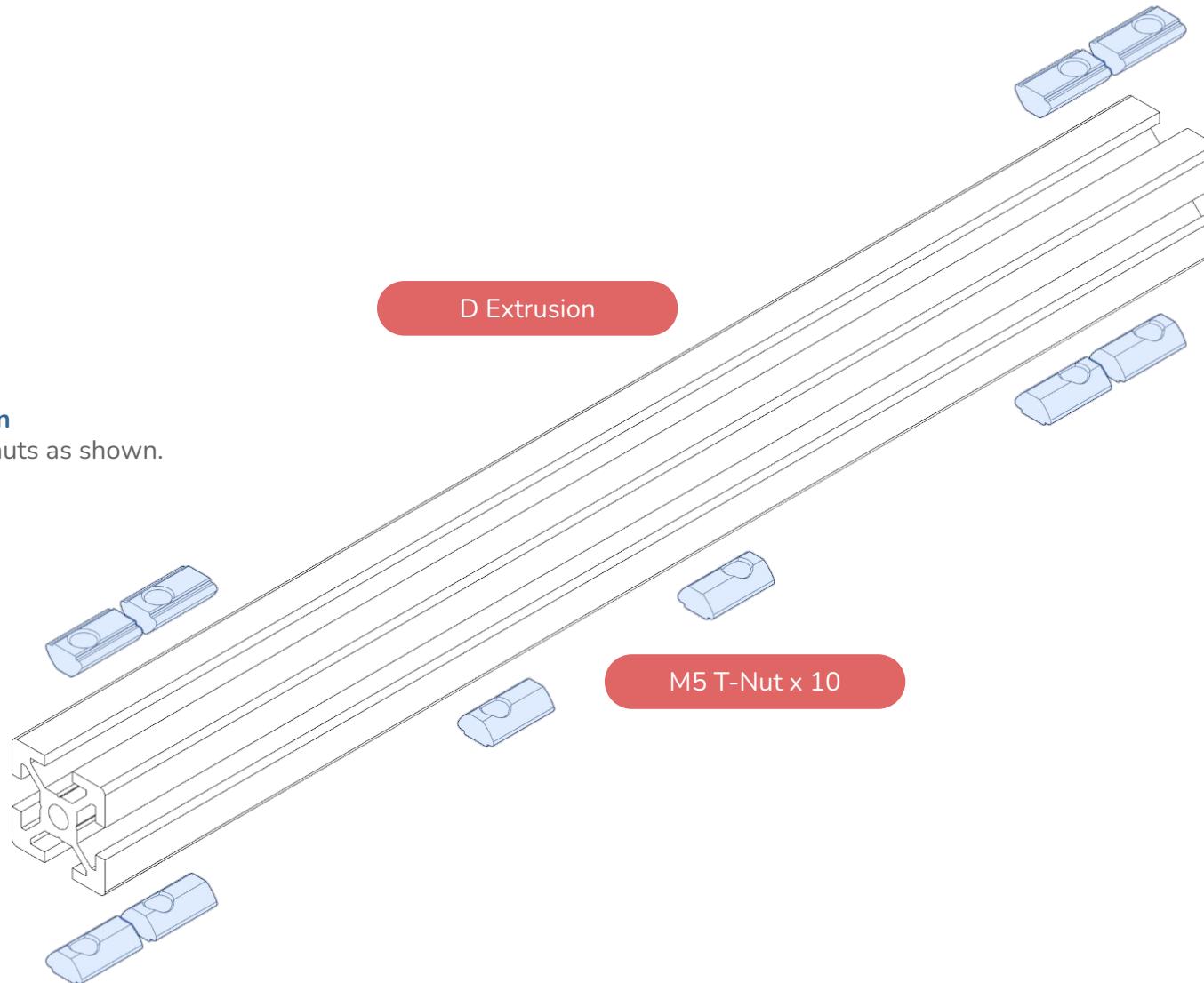
M5x16 BHCS

Building Foundations

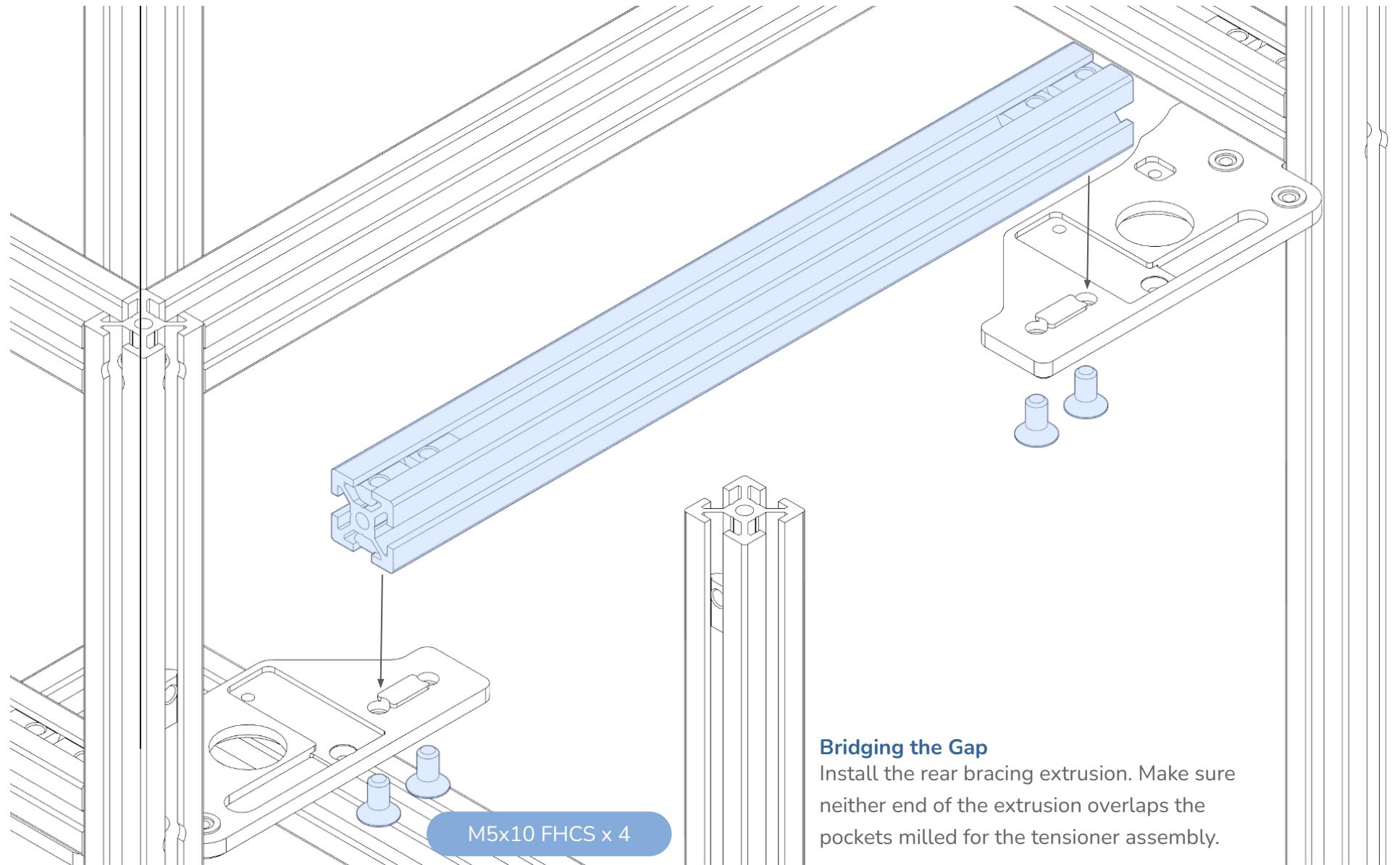
Installing both lower drive frame plates ensures we'll have a stable base for installing the rear bracing extrusion. We also have to install this extrusion in the middle of assembling the rear drive frames due to their rigidity.

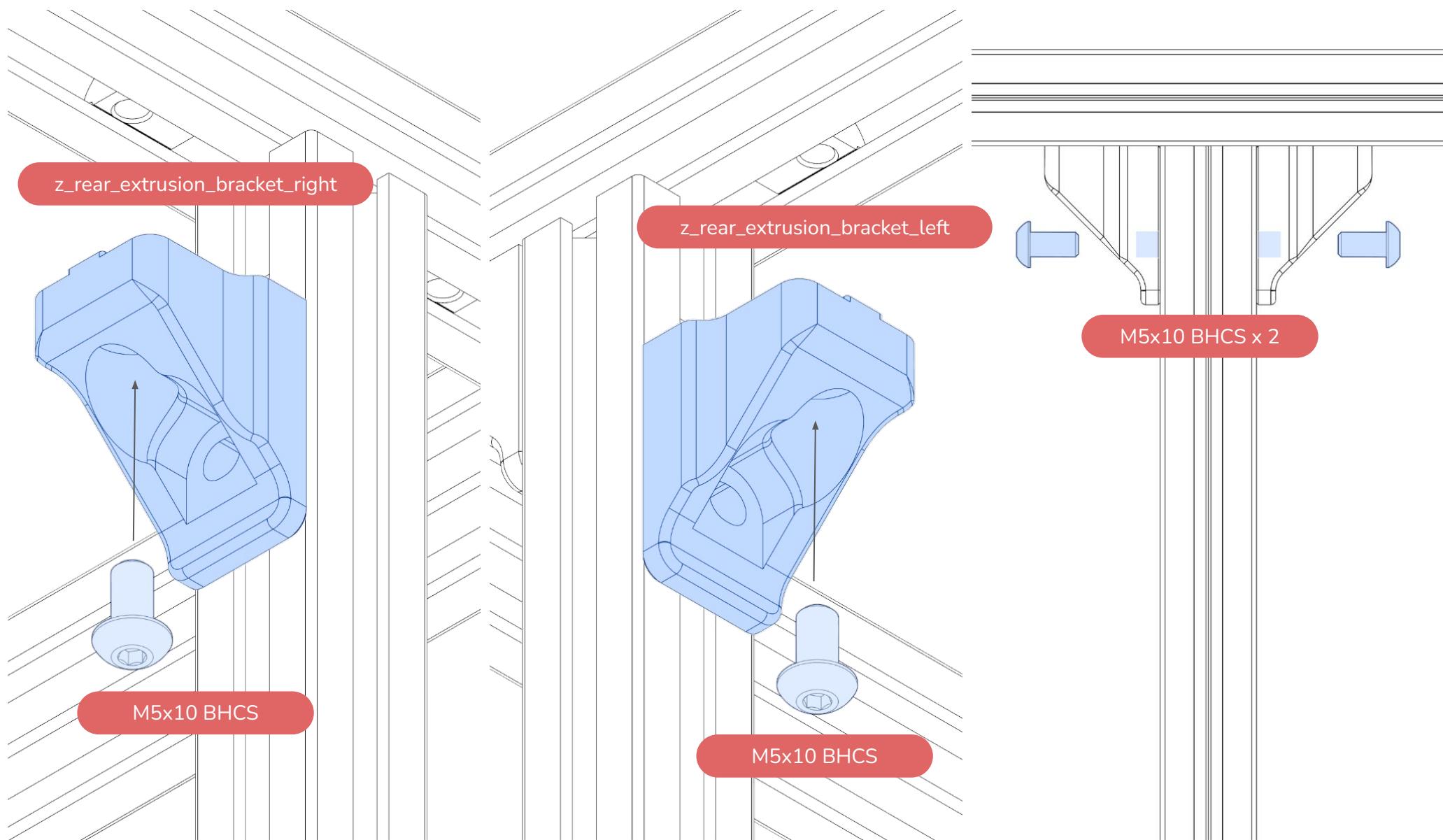


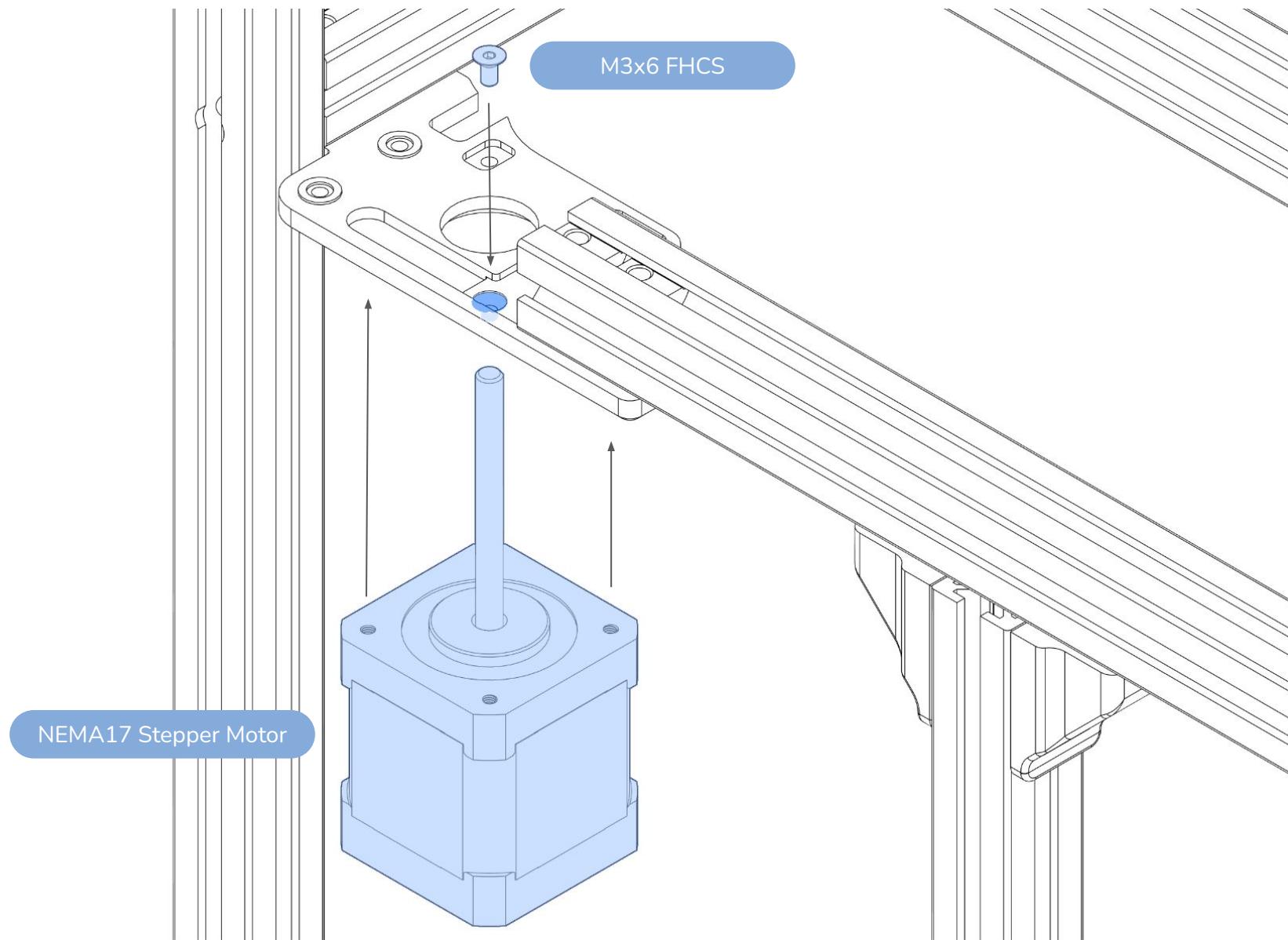


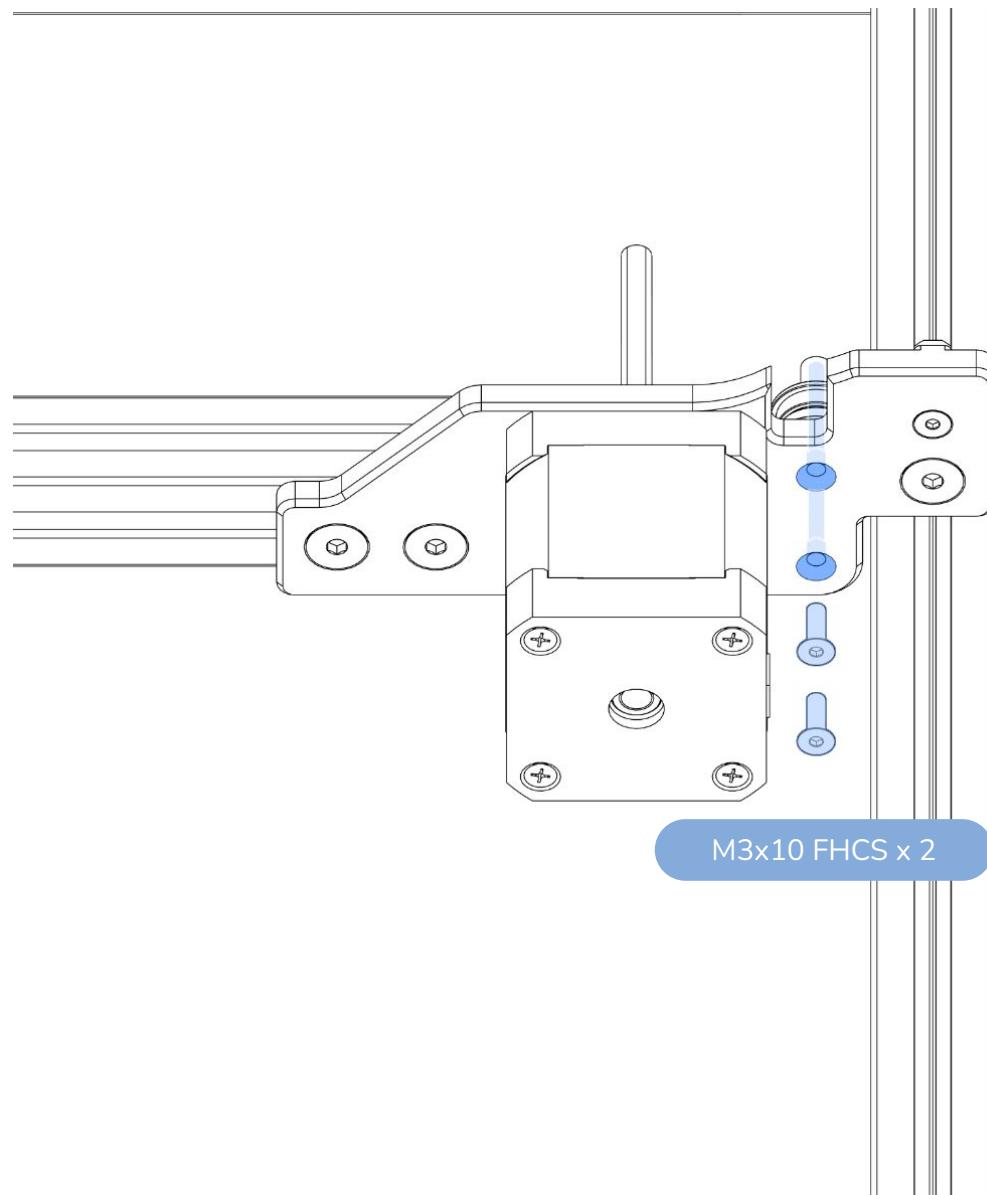
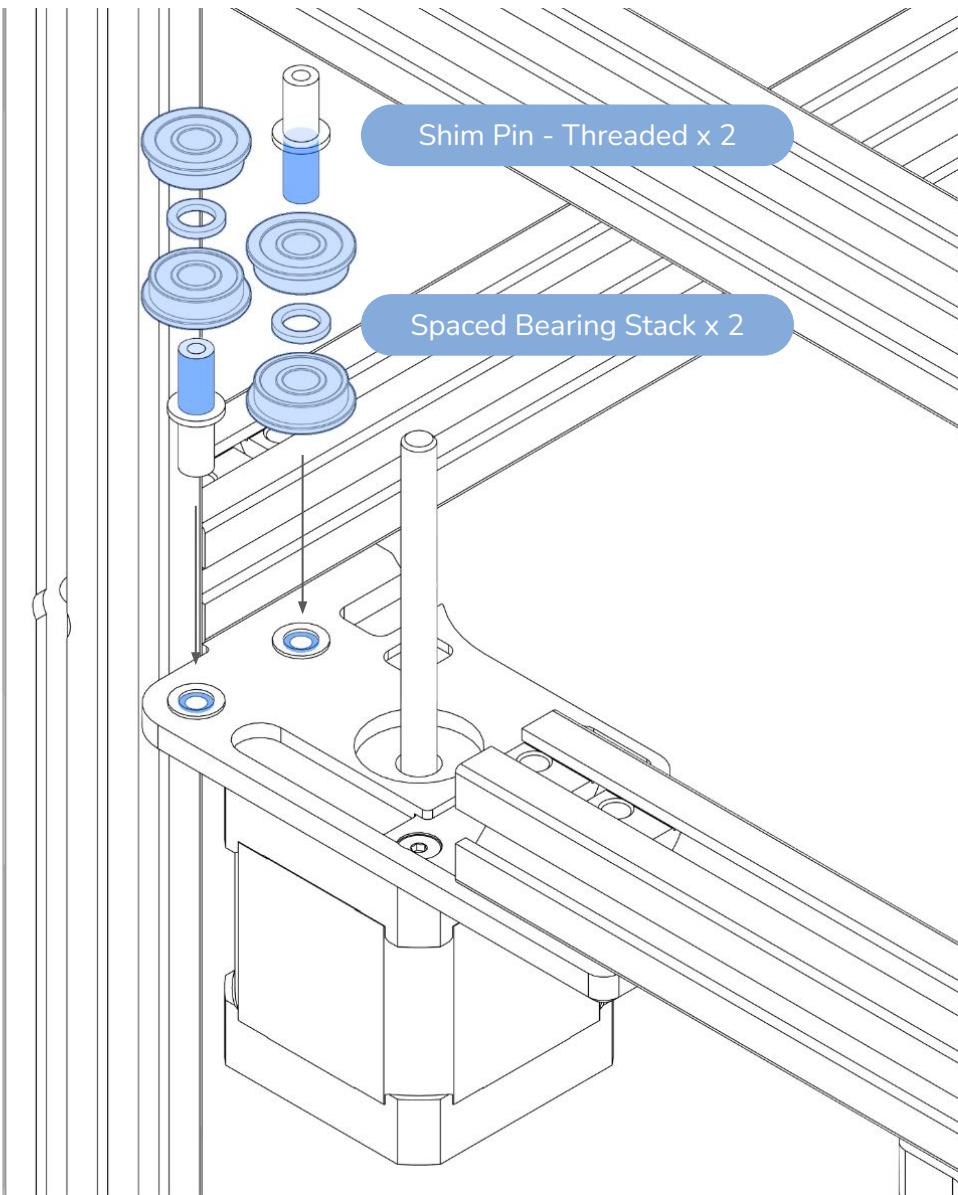
**T-Nut Orientation**

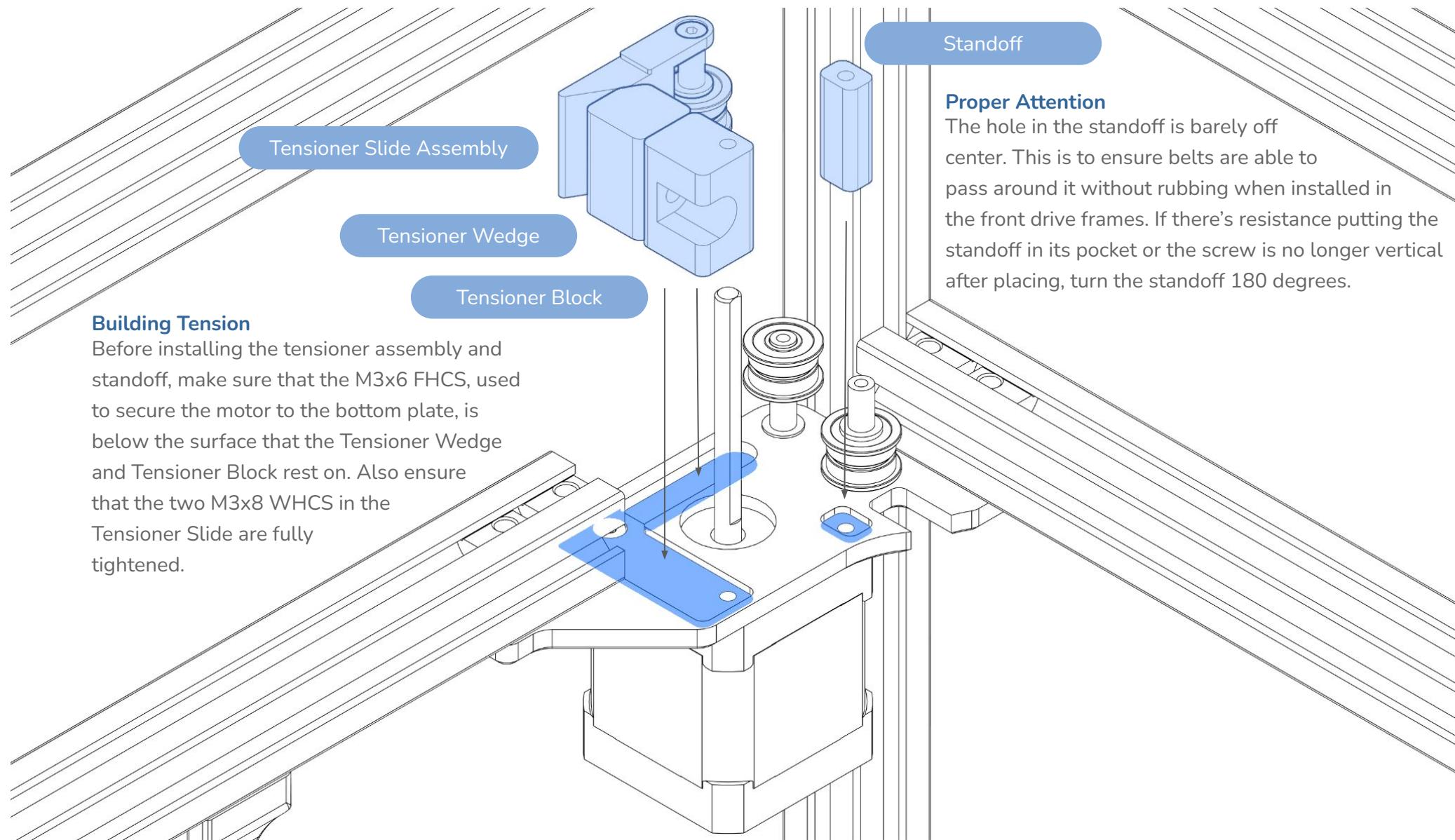
Install ten M5 T-nuts as shown.

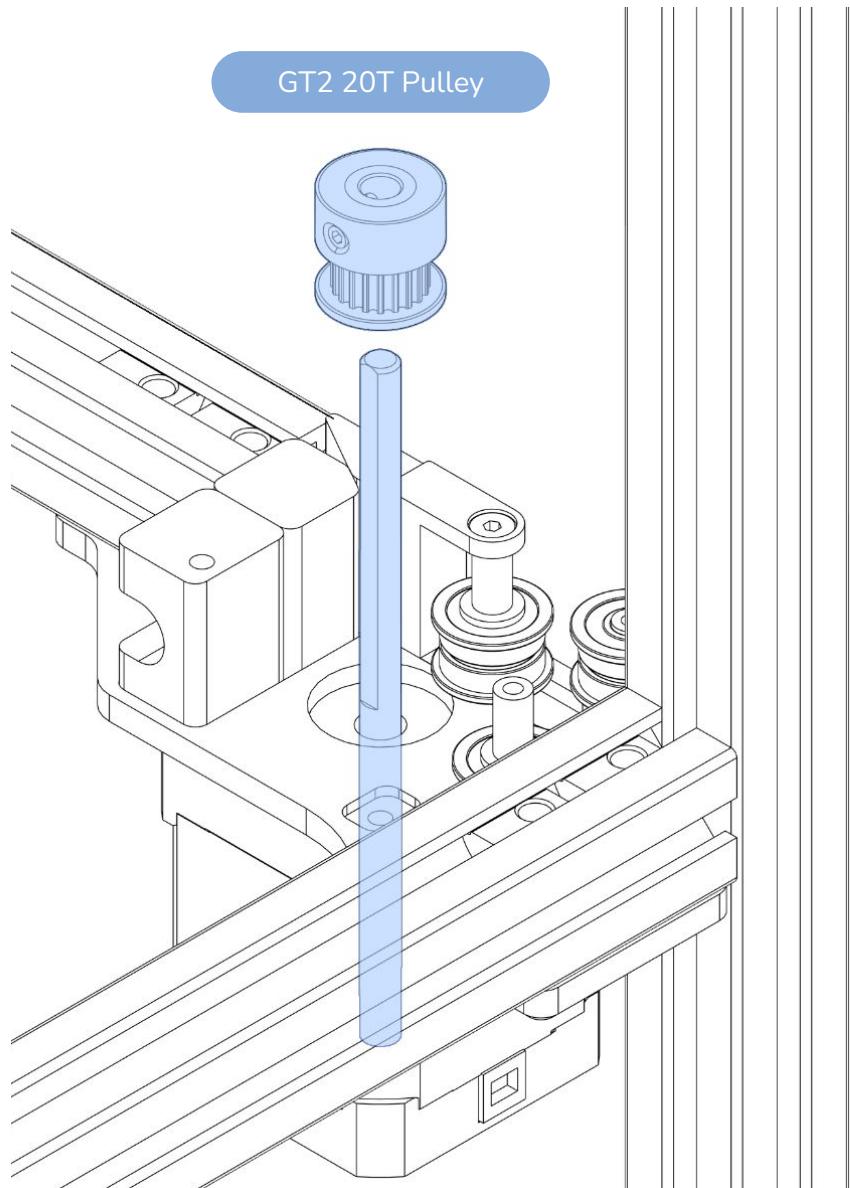






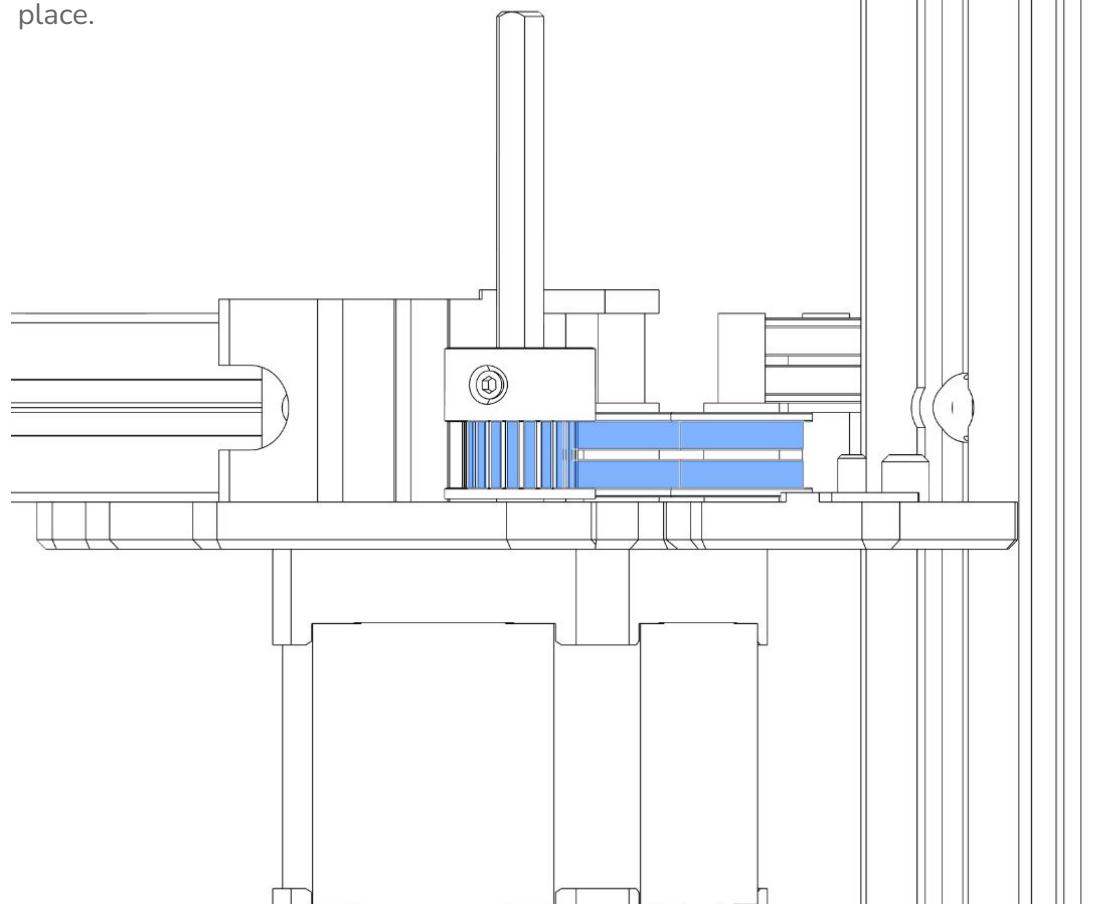


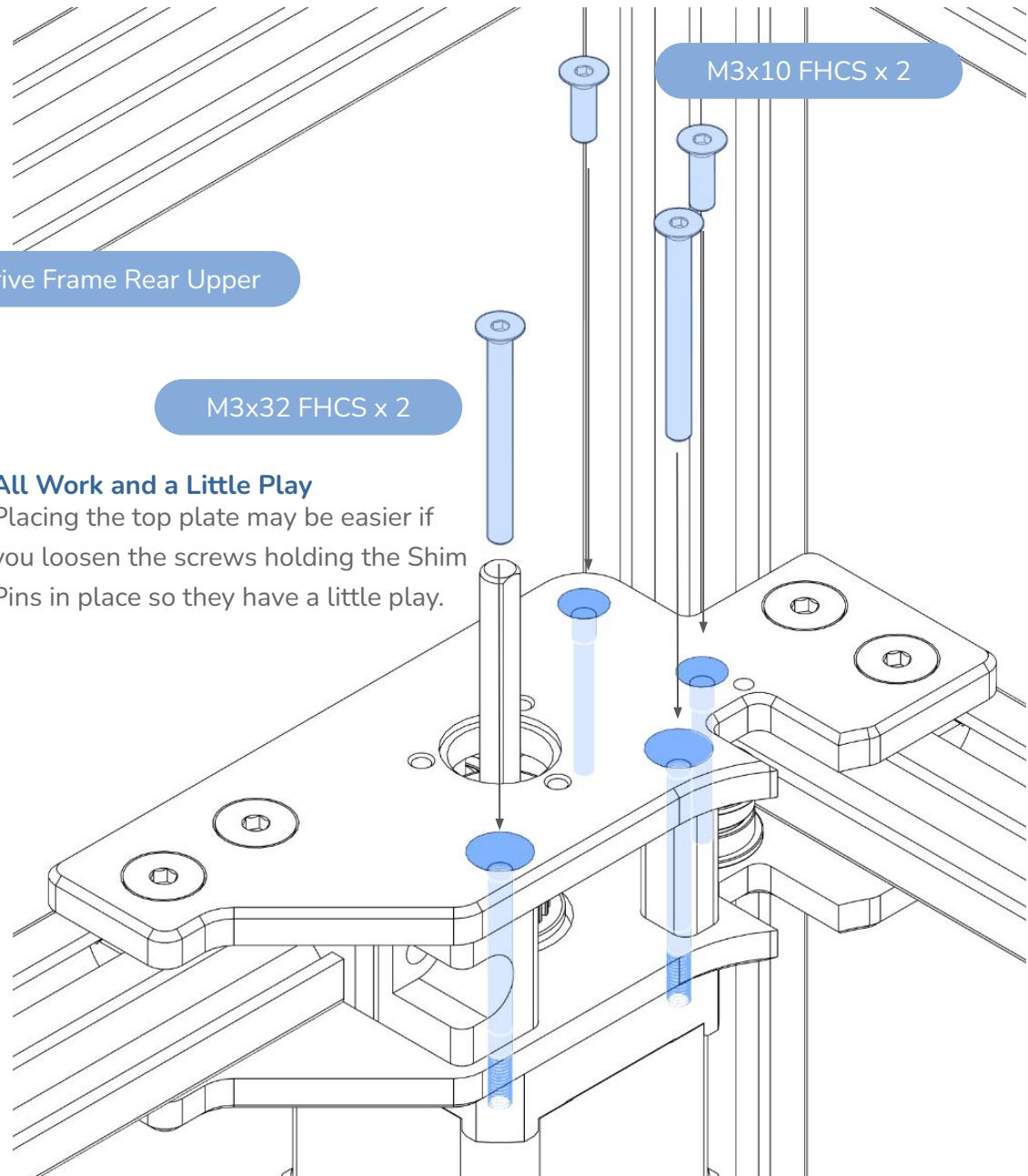
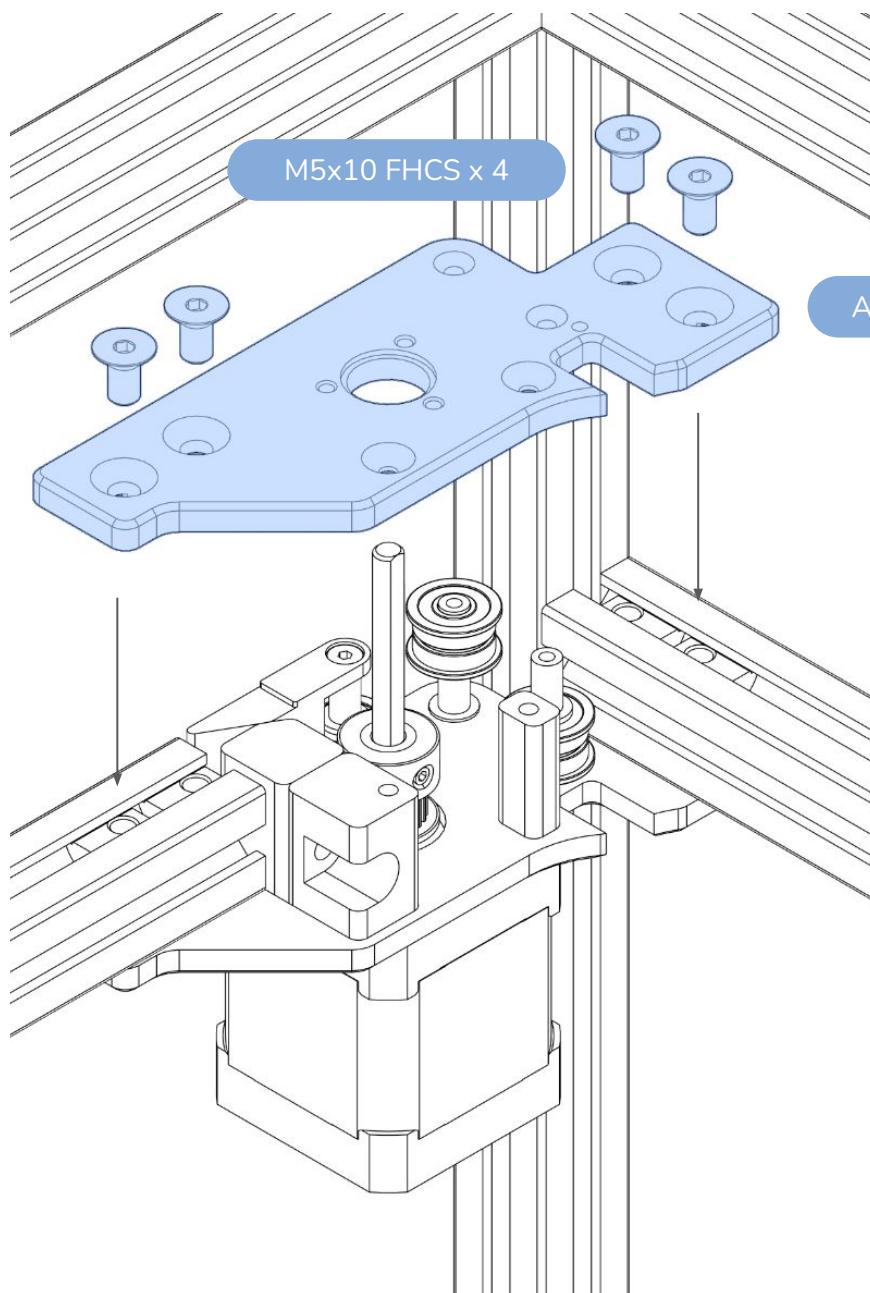


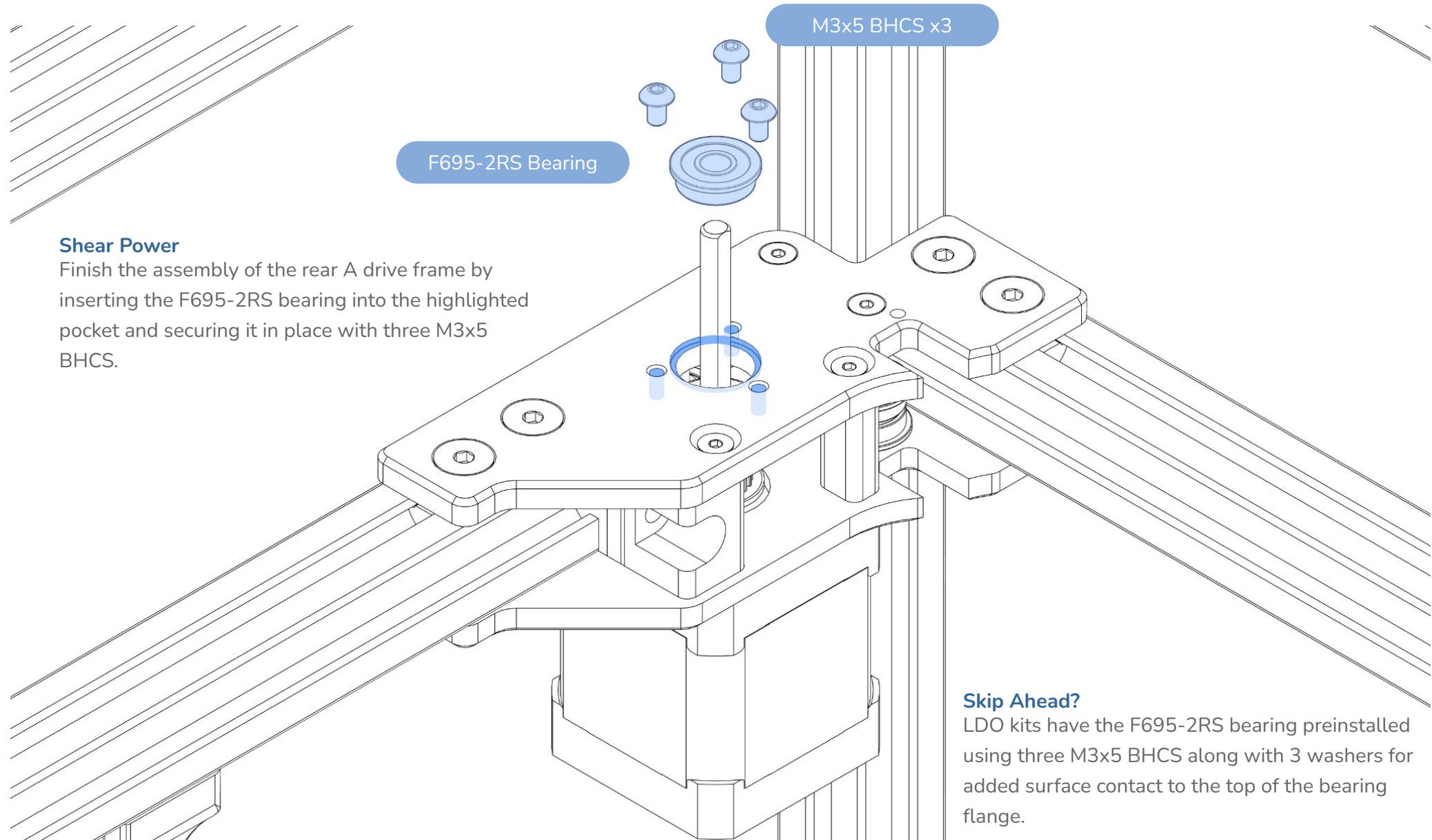


The Slots Align

Do your best to line up the drive gear teeth to match the area between the flanges on the idler and tensioner bearings. The distance from the end of the hub to the surface of the lower plate should be around 16.35mm. Once aligned, apply threadlocker to the grub screws and secure the pulley in place.



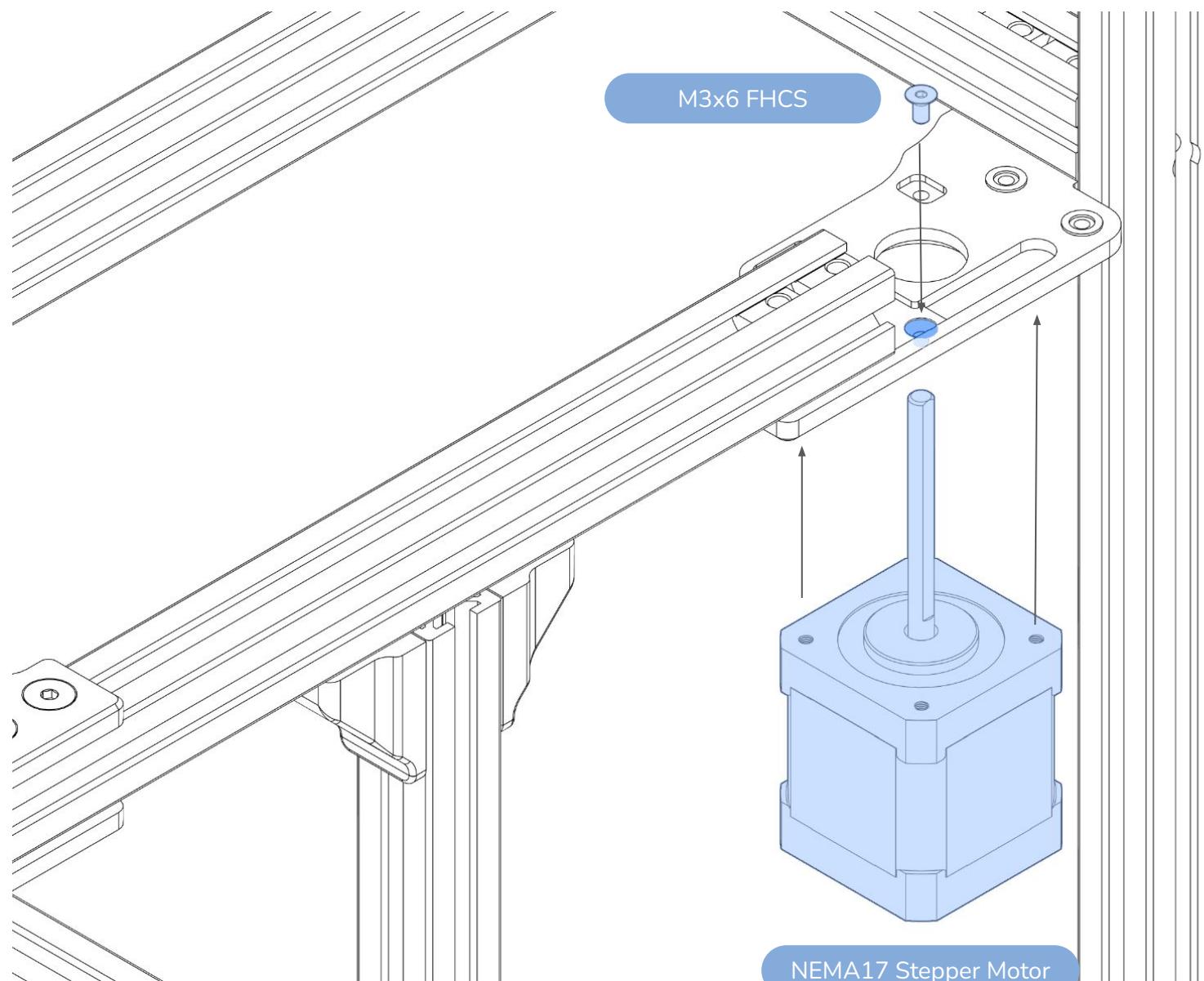


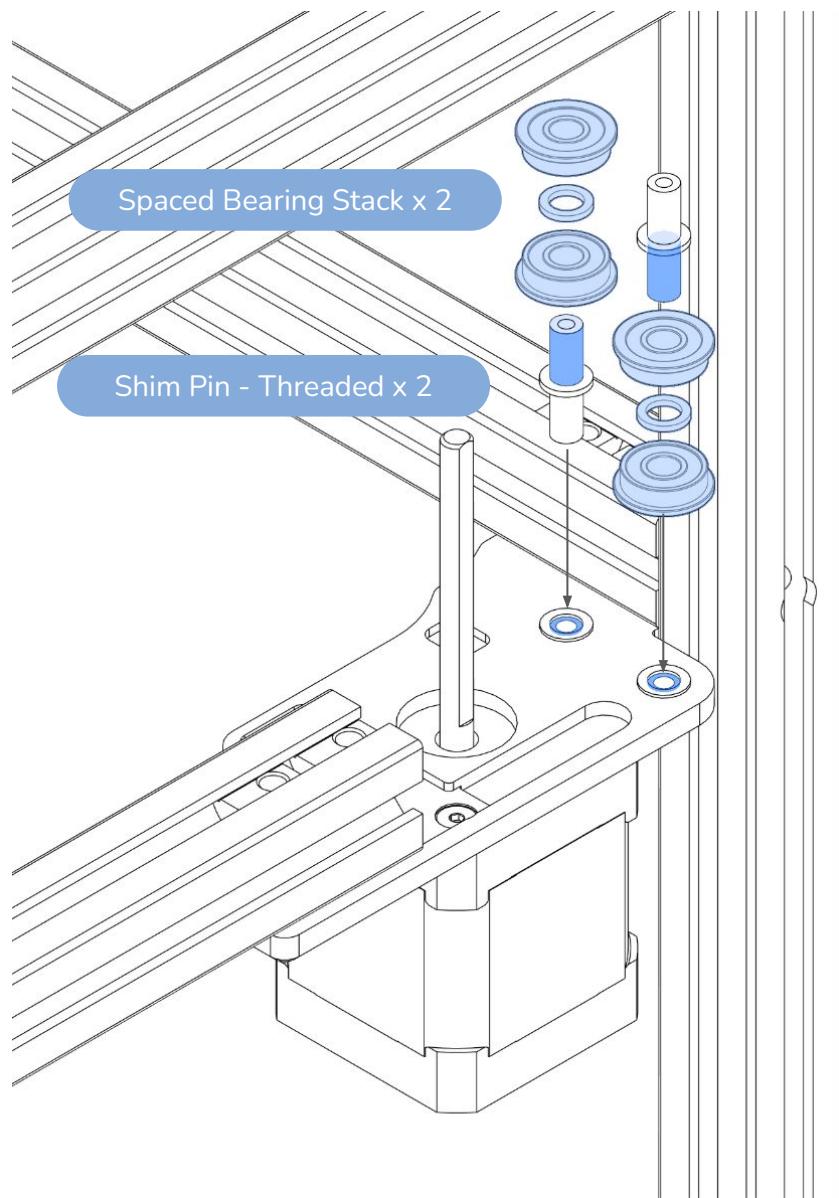
**Shear Power**

Finish the assembly of the rear A drive frame by inserting the F695-2RS bearing into the highlighted pocket and securing it in place with three M3x5 BHCS.

Skip Ahead?

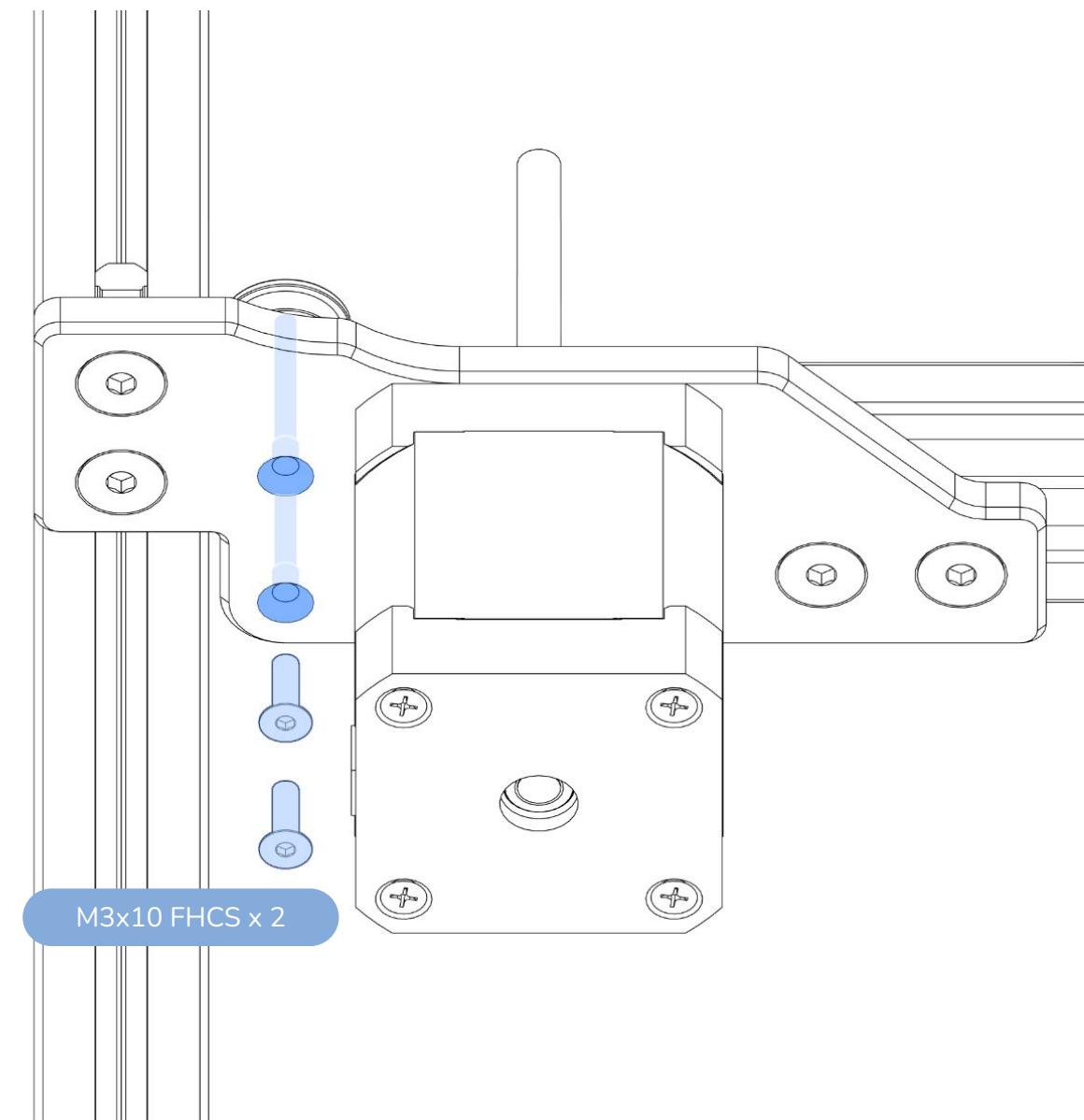
LDO kits have the F695-2RS bearing preinstalled using three M3x5 BHCS along with 3 washers for added surface contact to the top of the bearing flange.



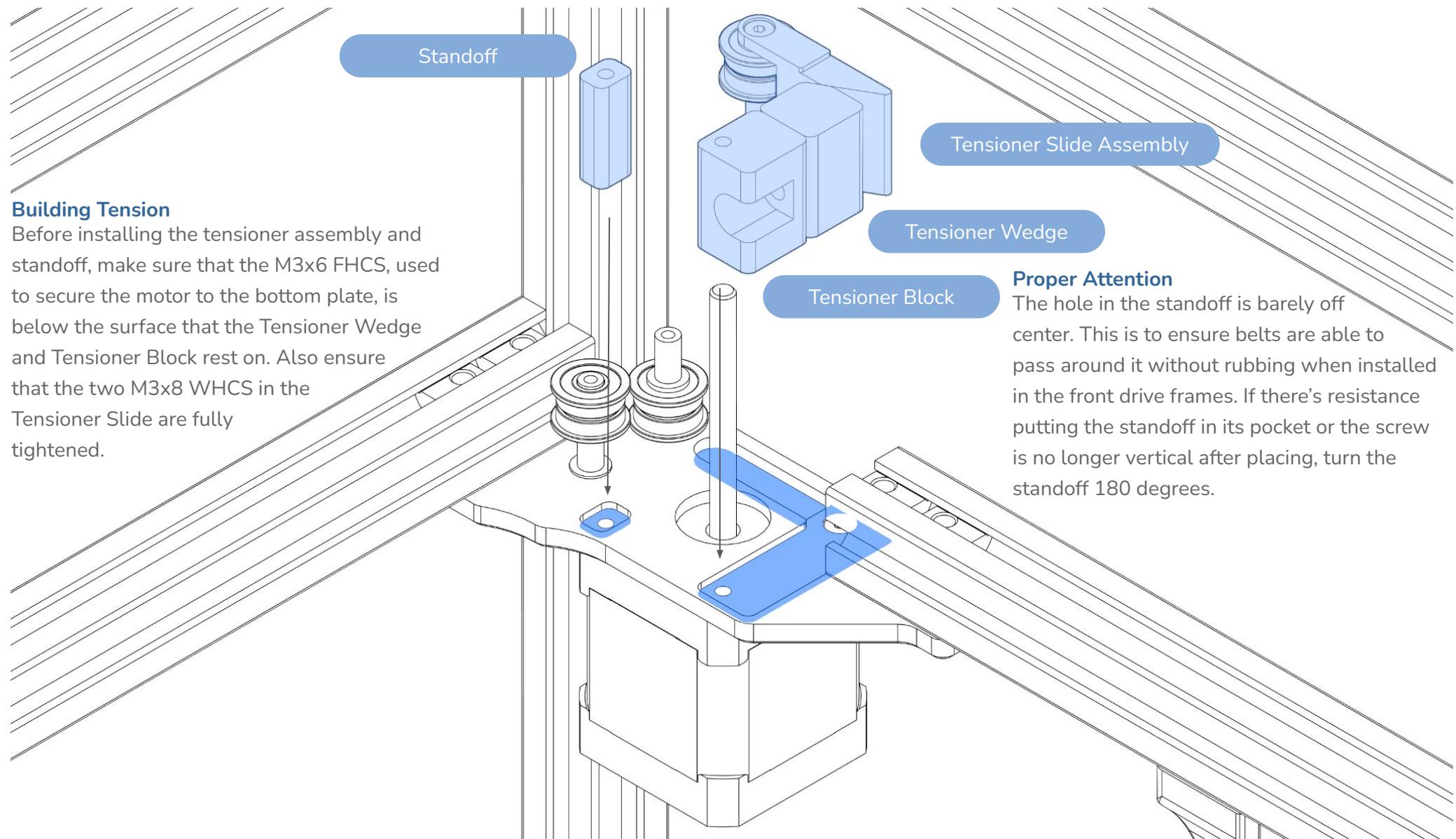


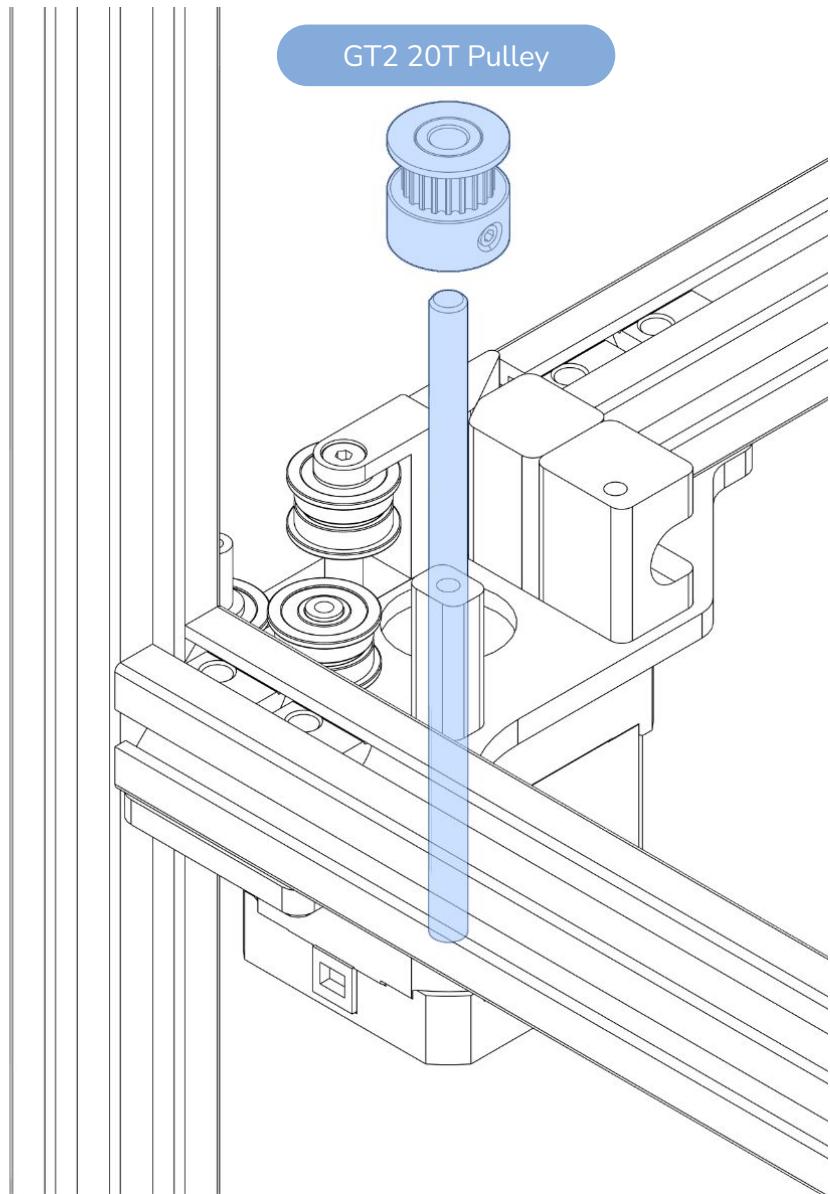
Spaced Bearing Stack x 2

Shim Pin - Threaded x 2



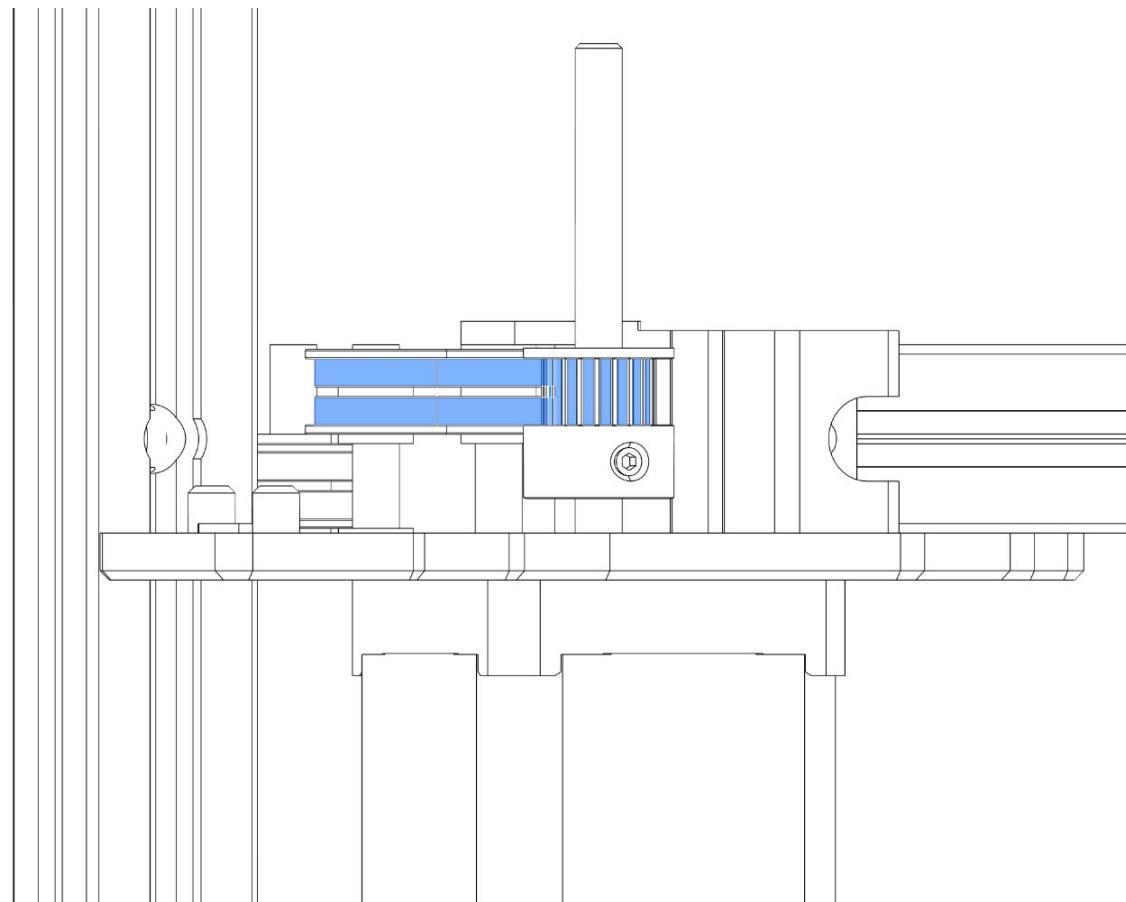
M3x10 FHCS x 2

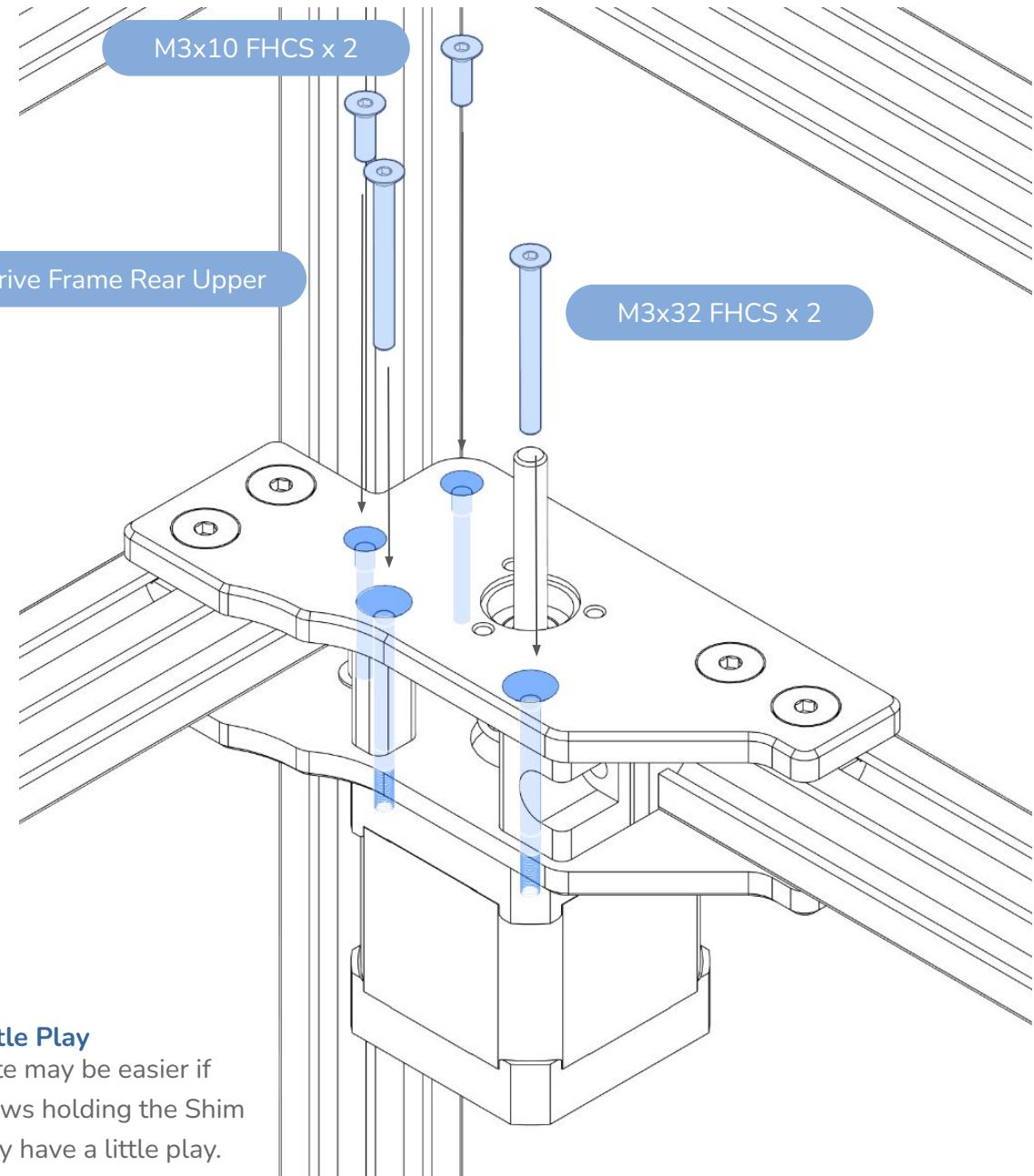
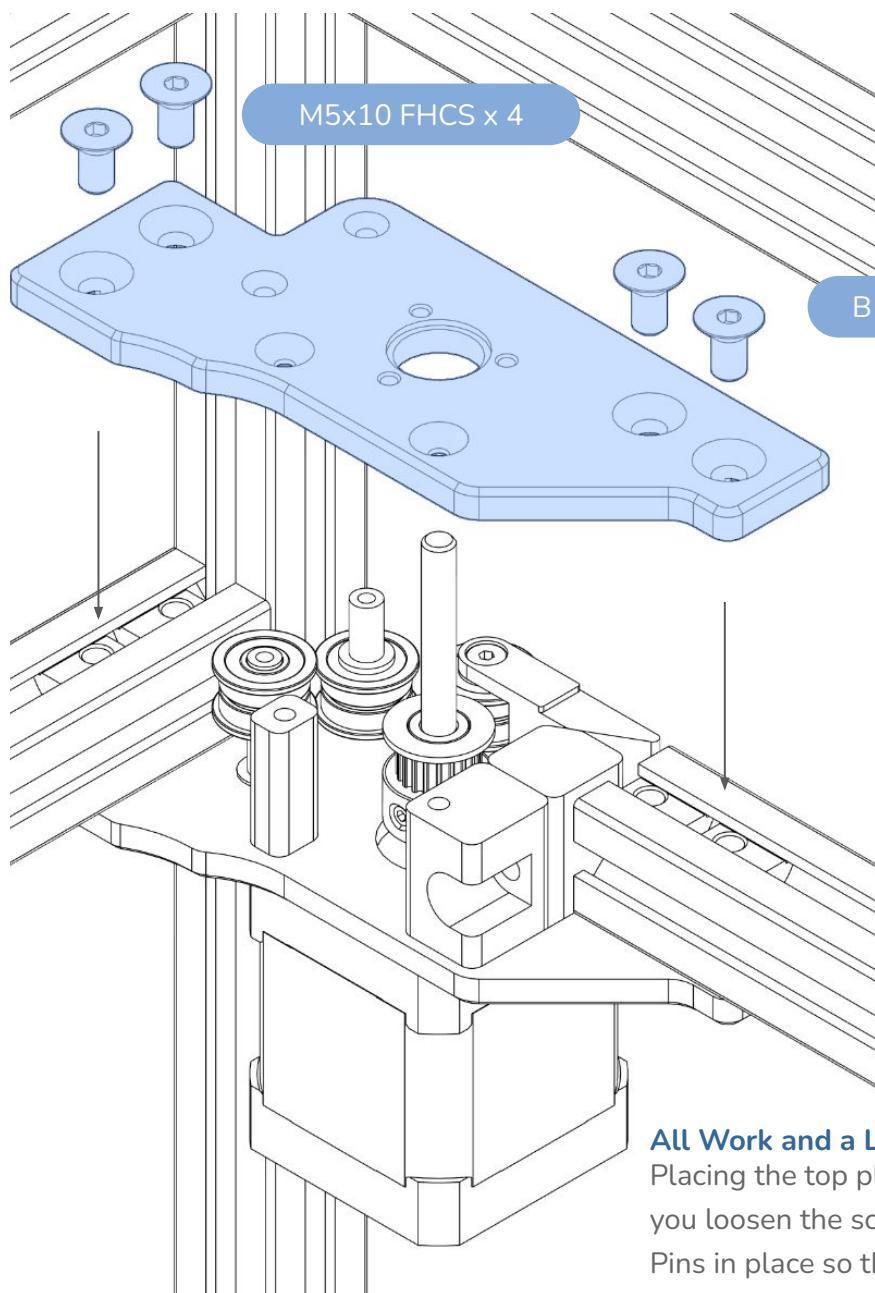




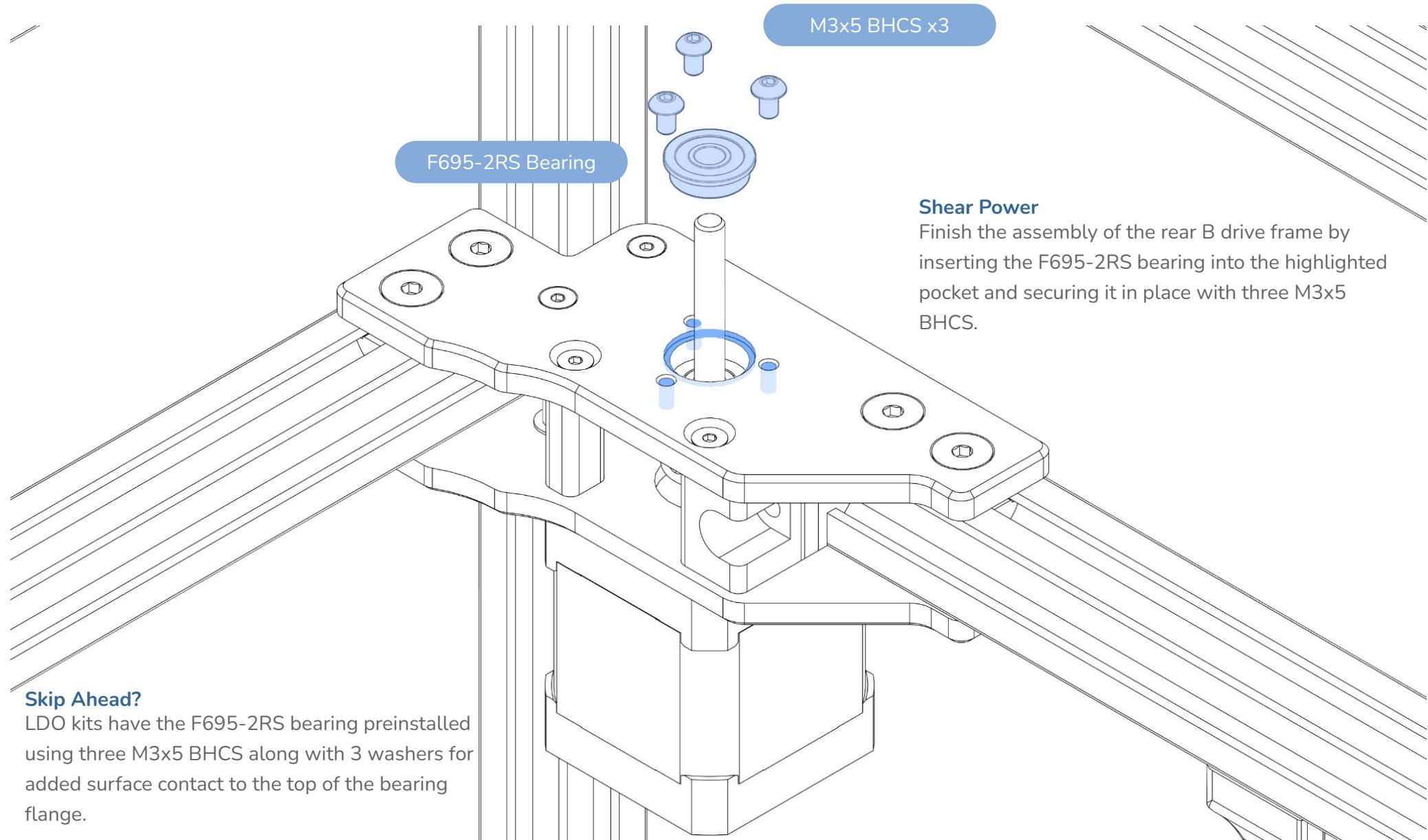
The Slots Align

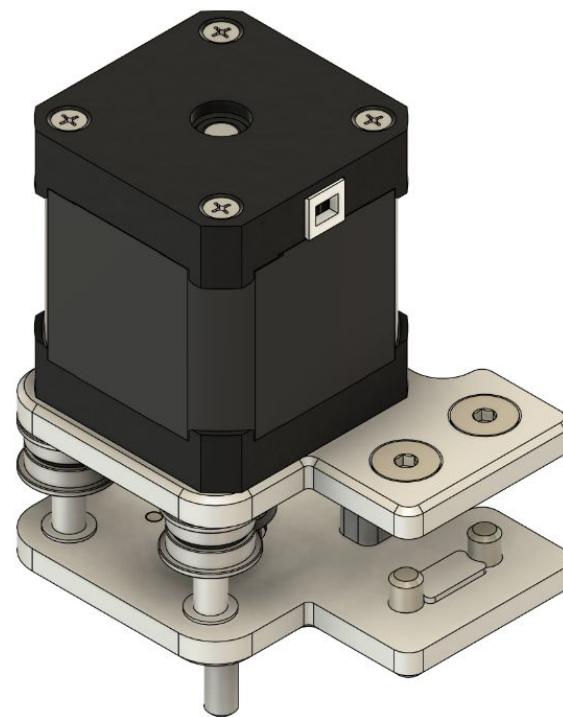
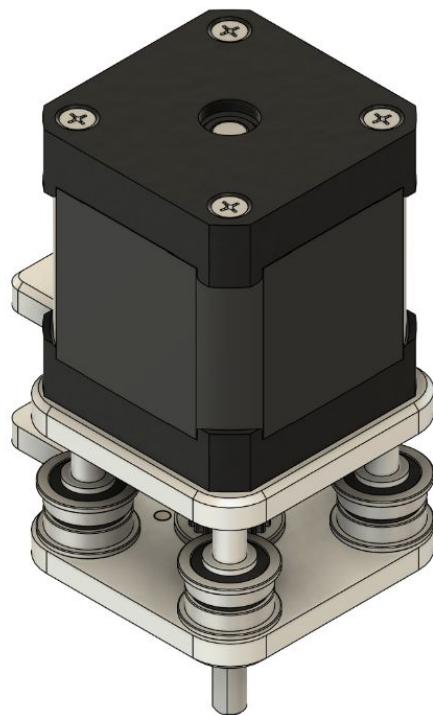
Do your best to line up the drive gear teeth to match the area between the flanges on the idler and tensioner bearings. The distance from the end of the flange to the surface of the lower plate should be around 19.65mm. Once aligned, apply threadlocker to the grub screws and secure the pulley in place.



**All Work and a Little Play**

Placing the top plate may be easier if you loosen the screws holding the Shim Pins in place so they have a little play.

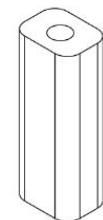
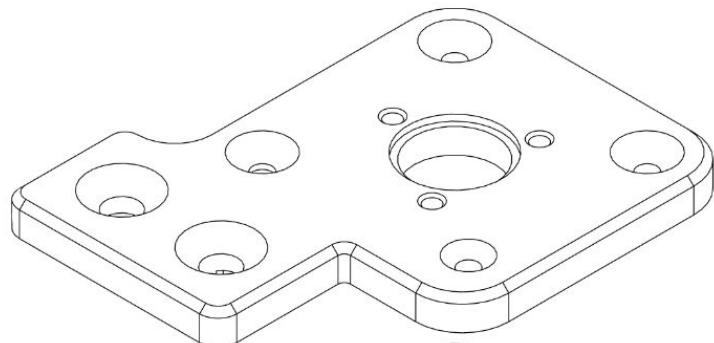




FRONT DRIVE FRAMES - OVERVIEW (SIMPLIFIED)

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B Drive Frame Front Upper



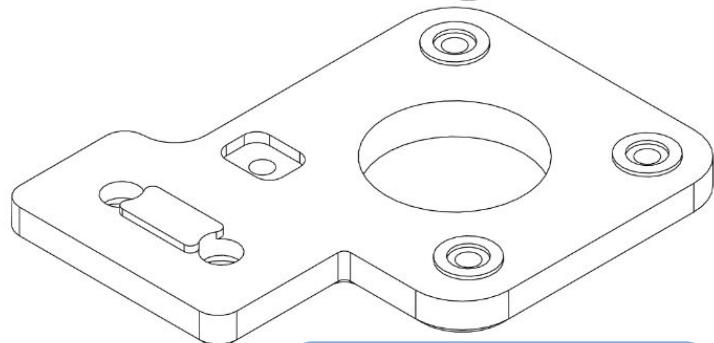
Standoff



Shim Pin - Unthreaded x2

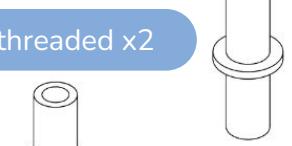
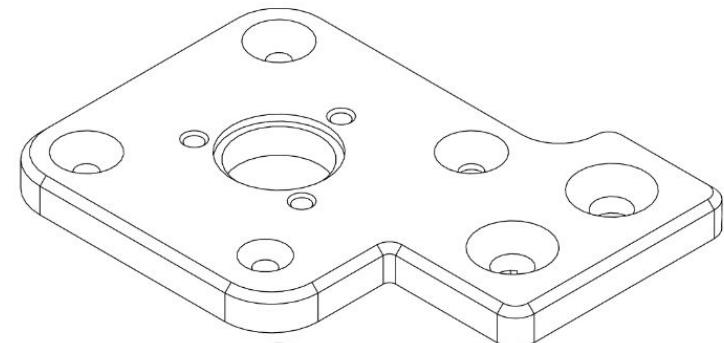


Shim Pin - Threaded

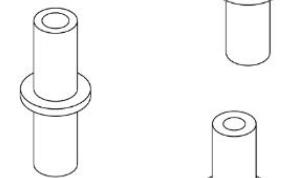


B Drive Frame Front Lower

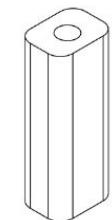
A Drive Frame Front Upper



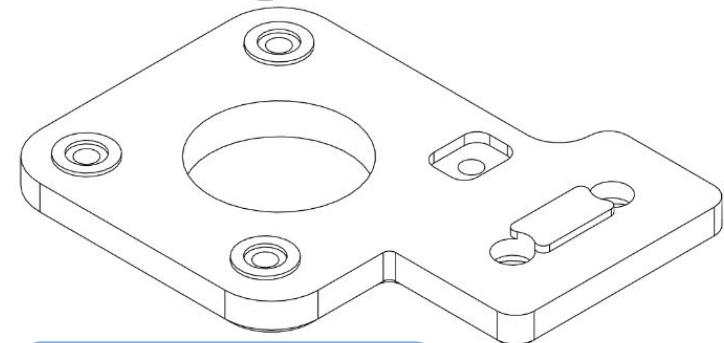
Shim Pin - Unthreaded x2



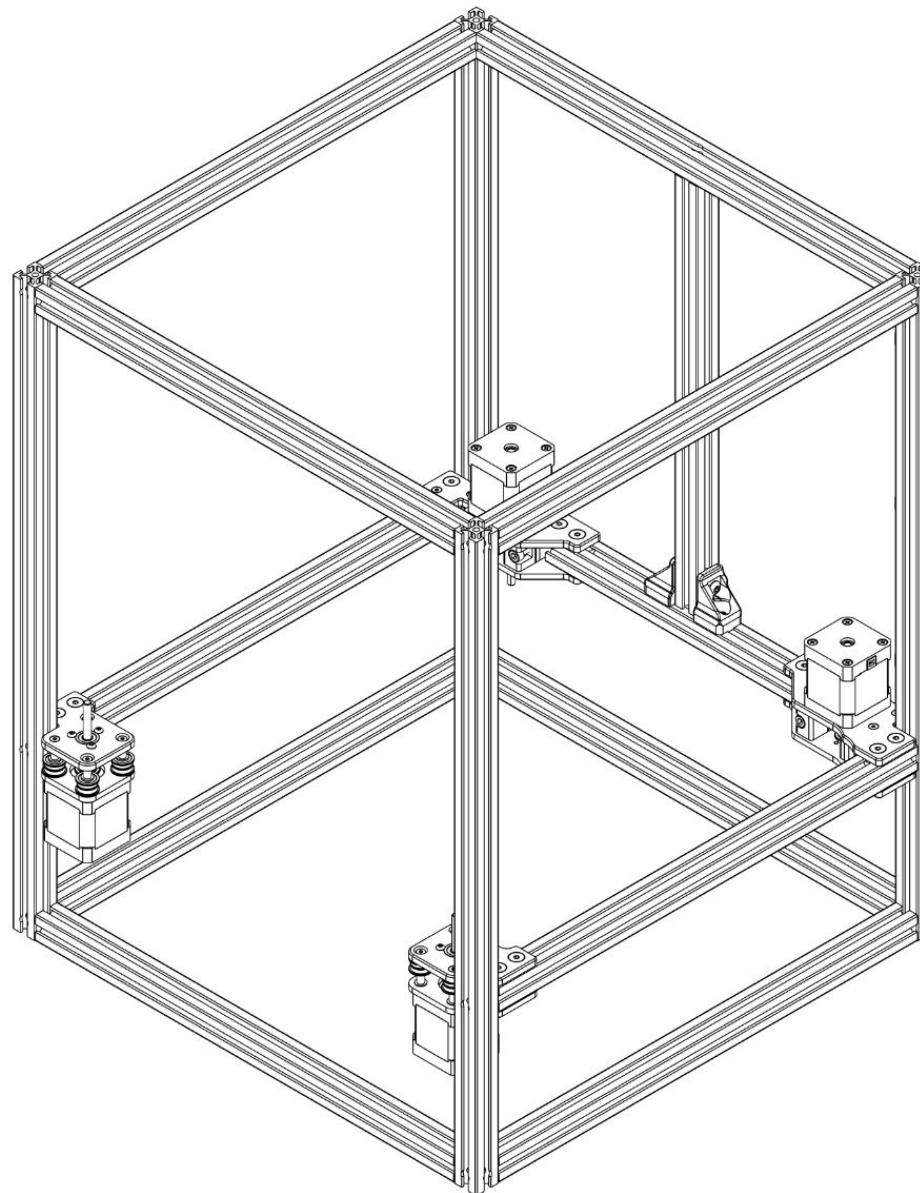
Shim Pin - Threaded



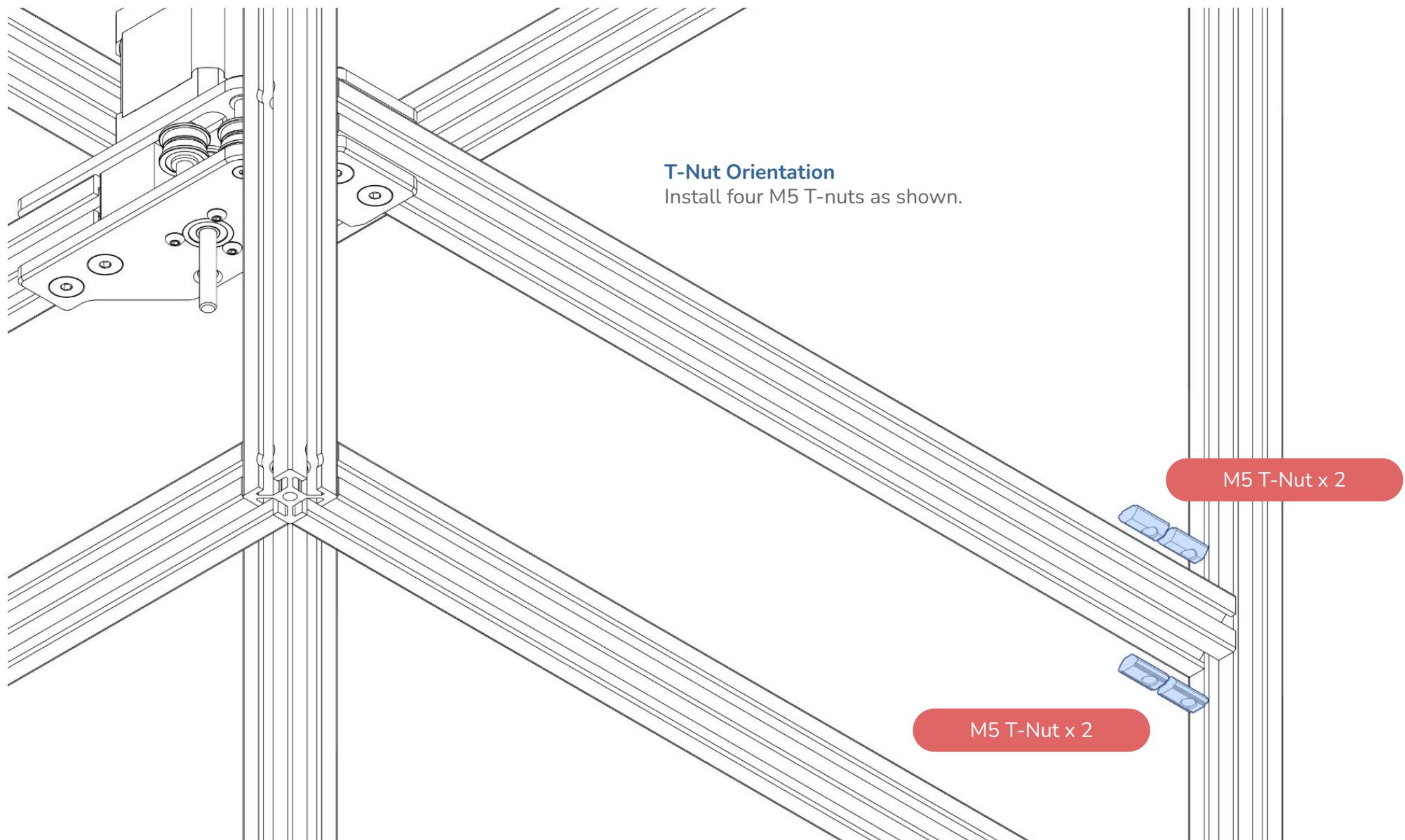
Standoff

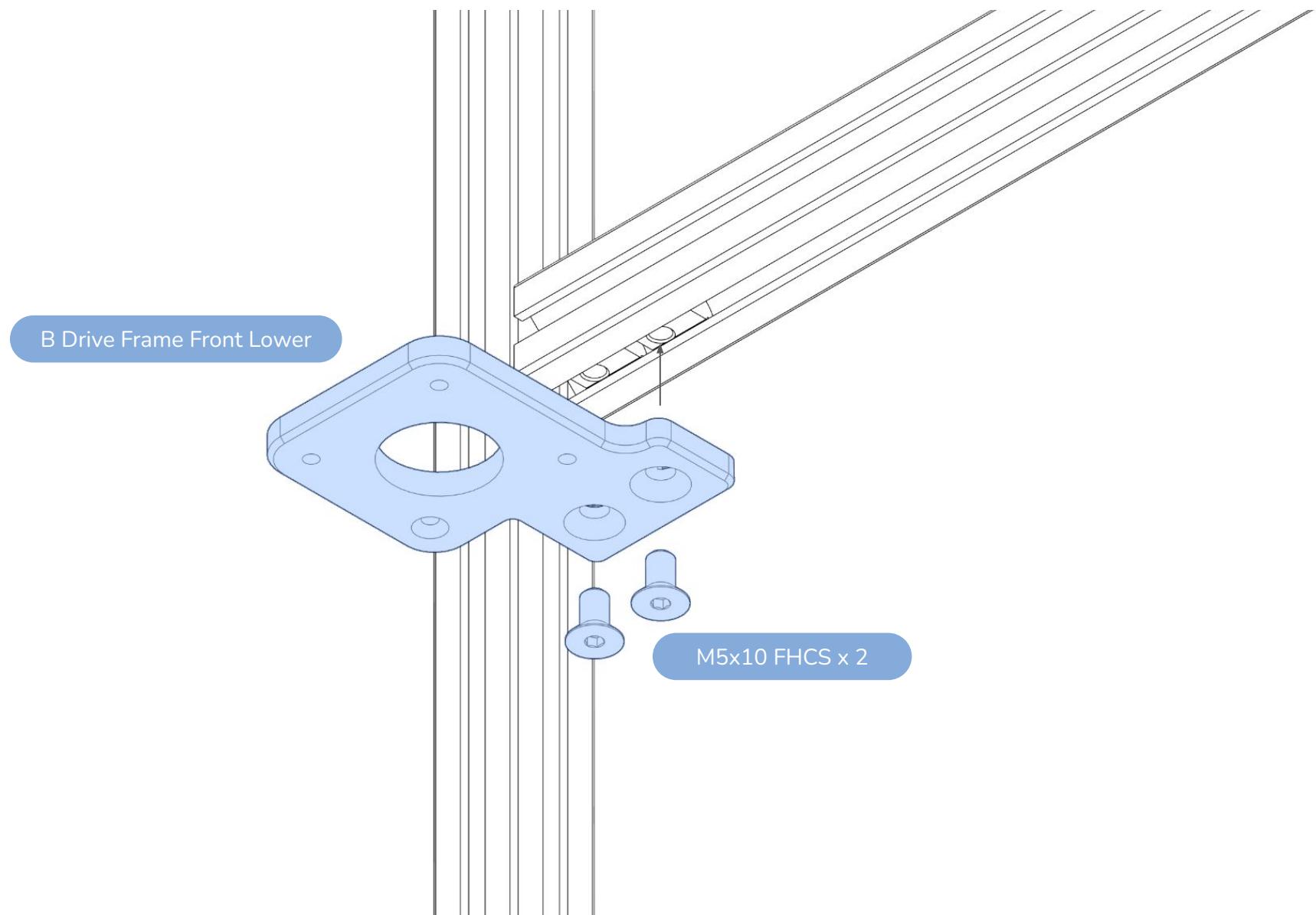


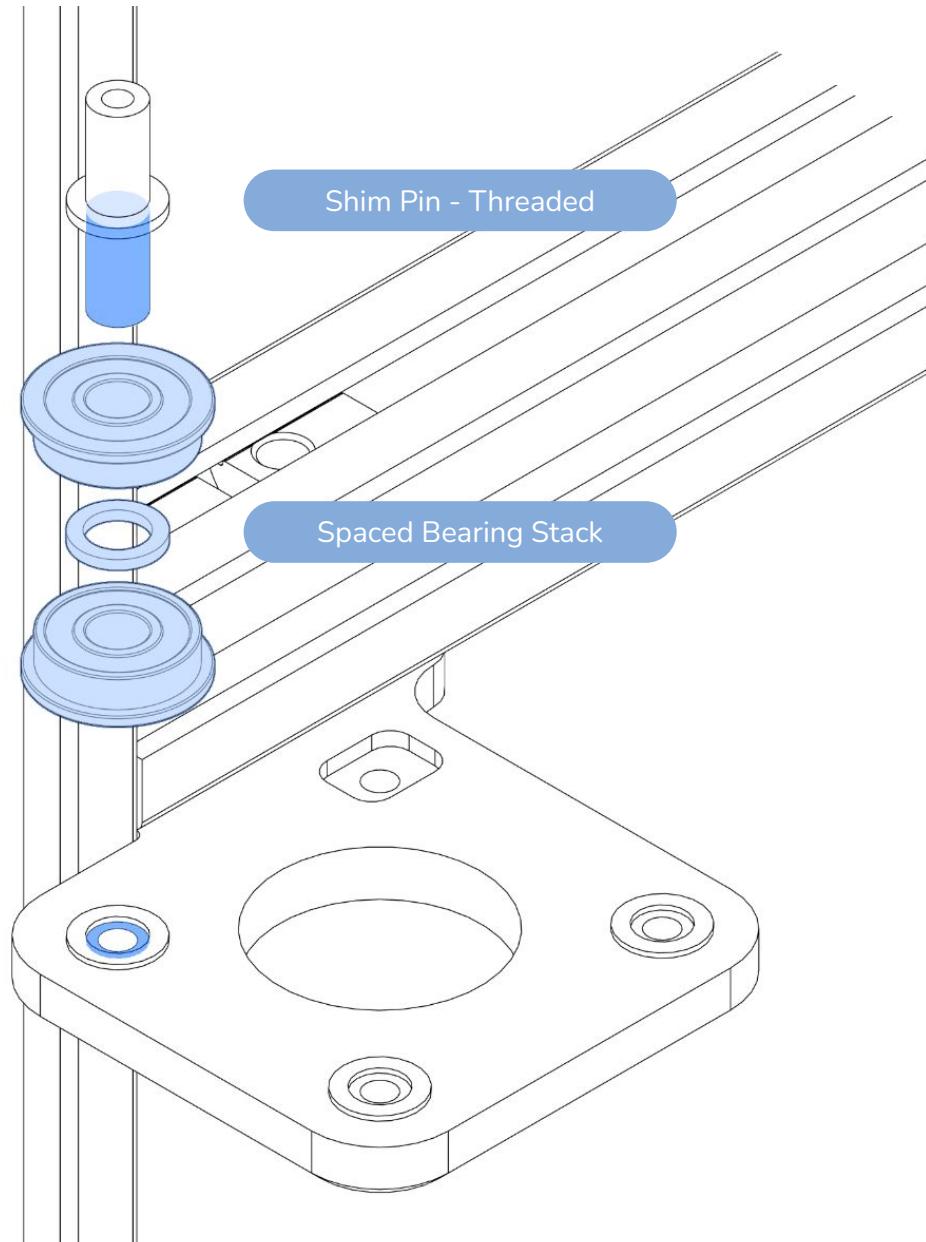
A Drive Frame Front Lower

**Inverted Expectations**

Installing the front drive frames is easiest with the printer flipped upside down.

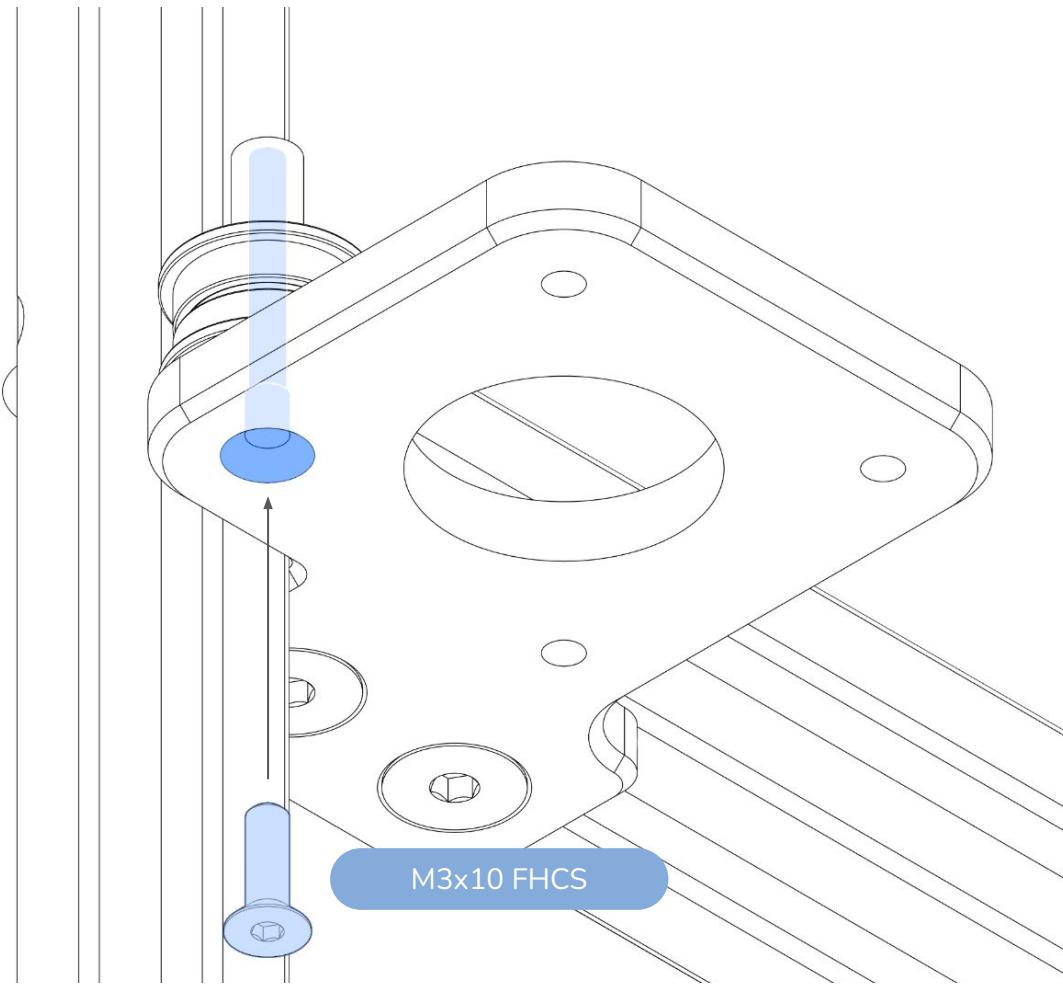


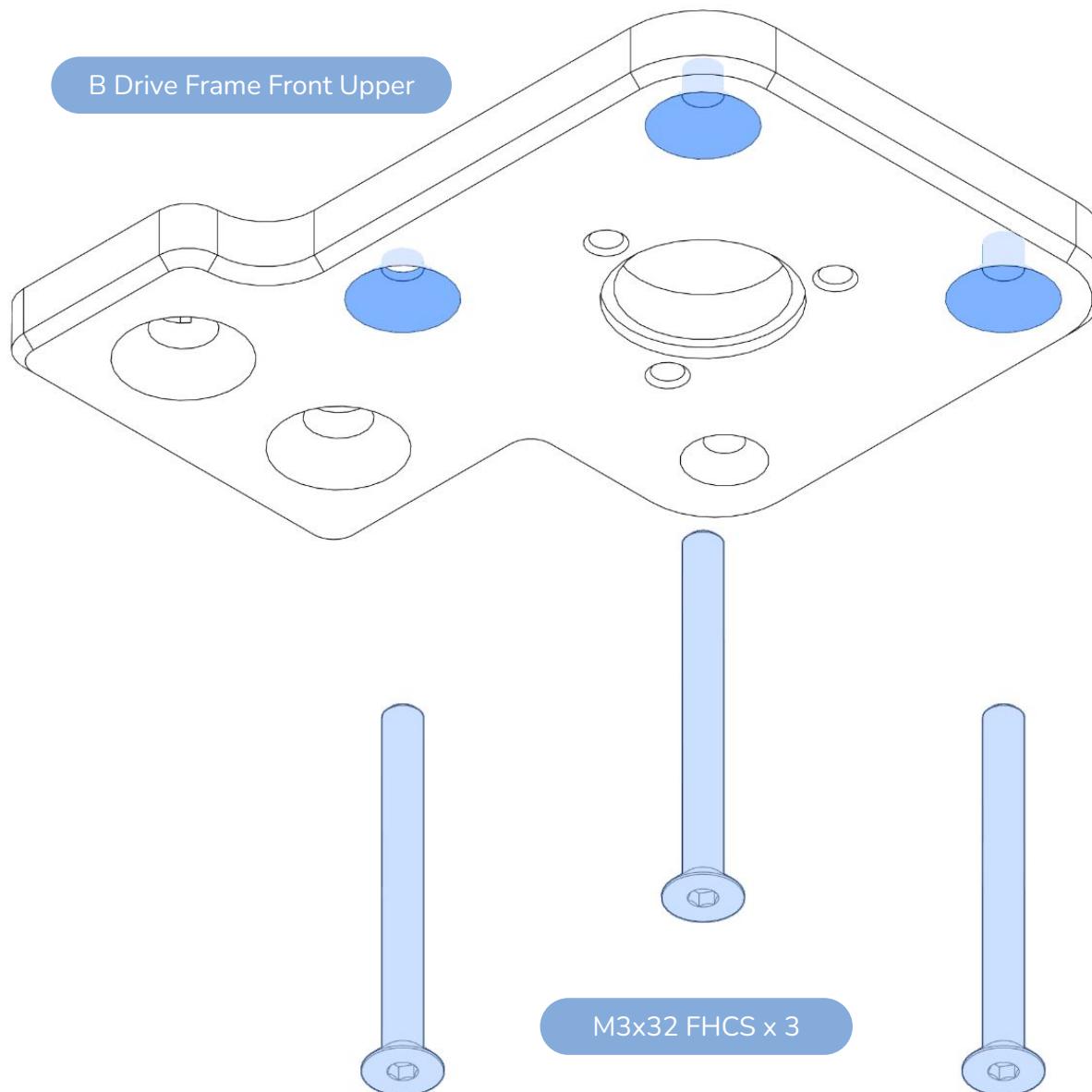




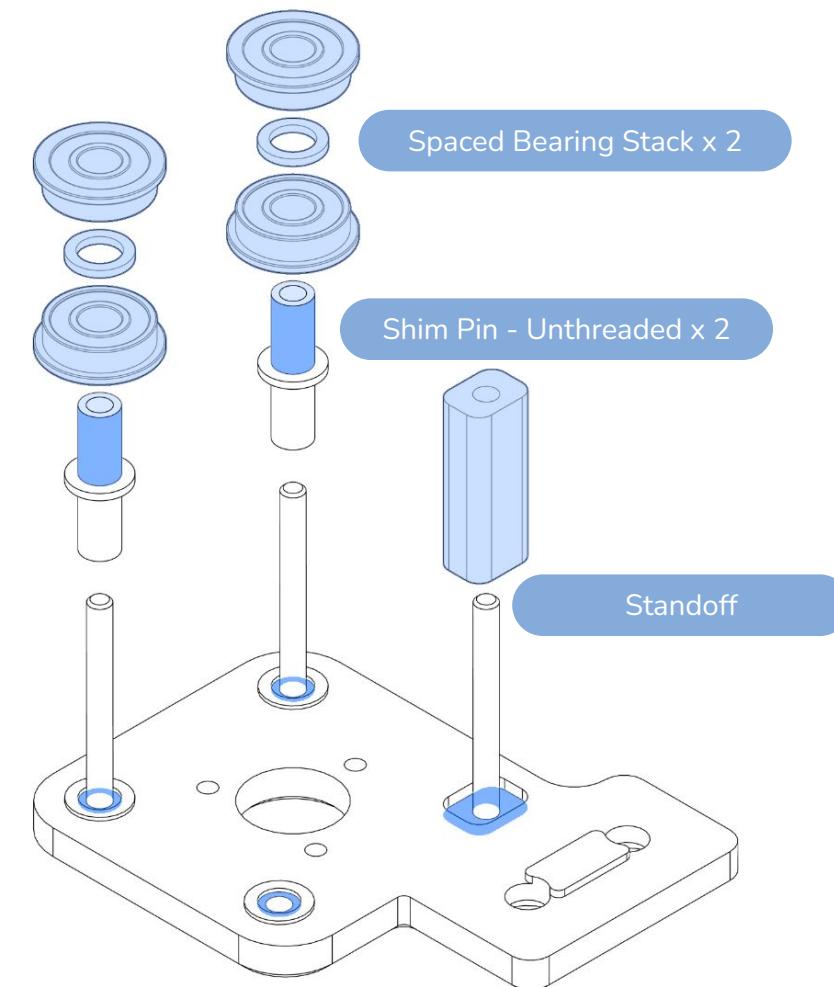
Saving Sanity

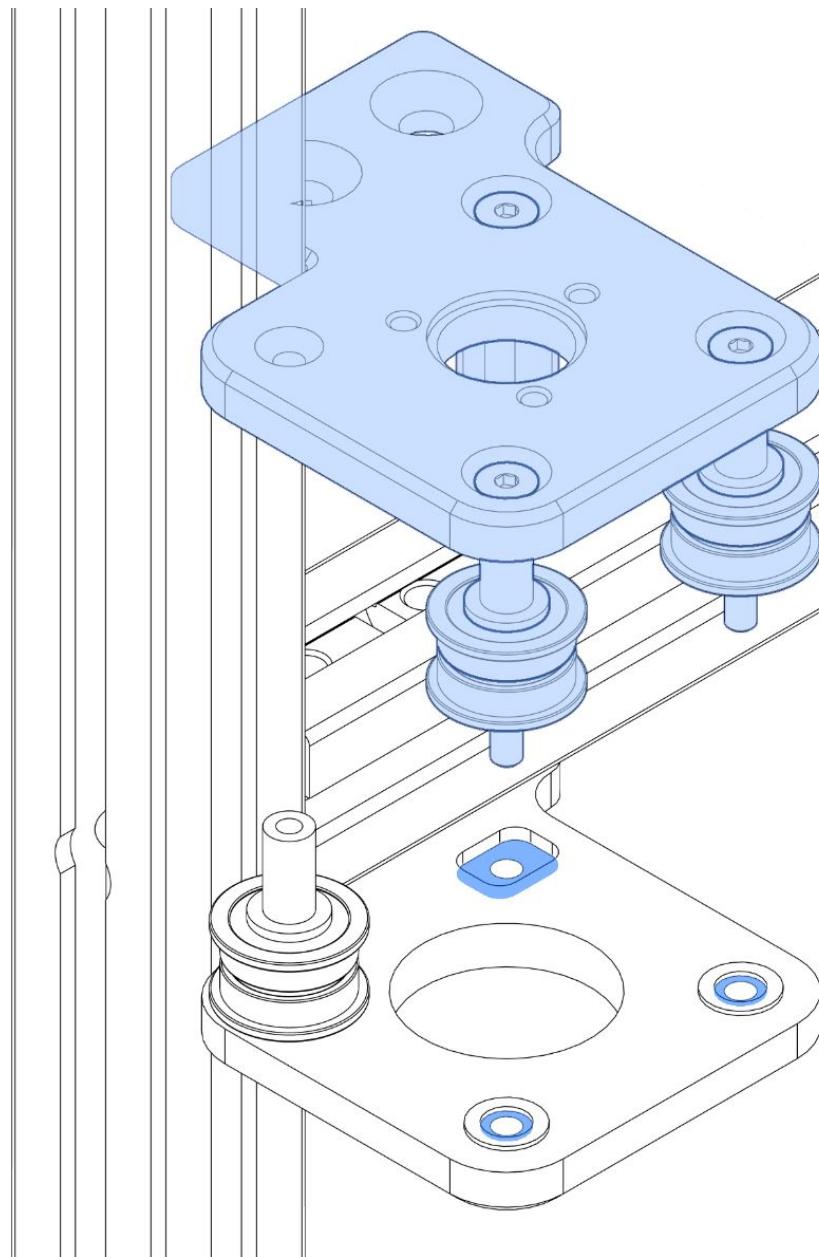
It is easiest to install this idler assembly to the lower drive plate since the B belt path is on the upper half of the gantry. This makes sure you have one less thing to keep track of when installing the upper drive assembly



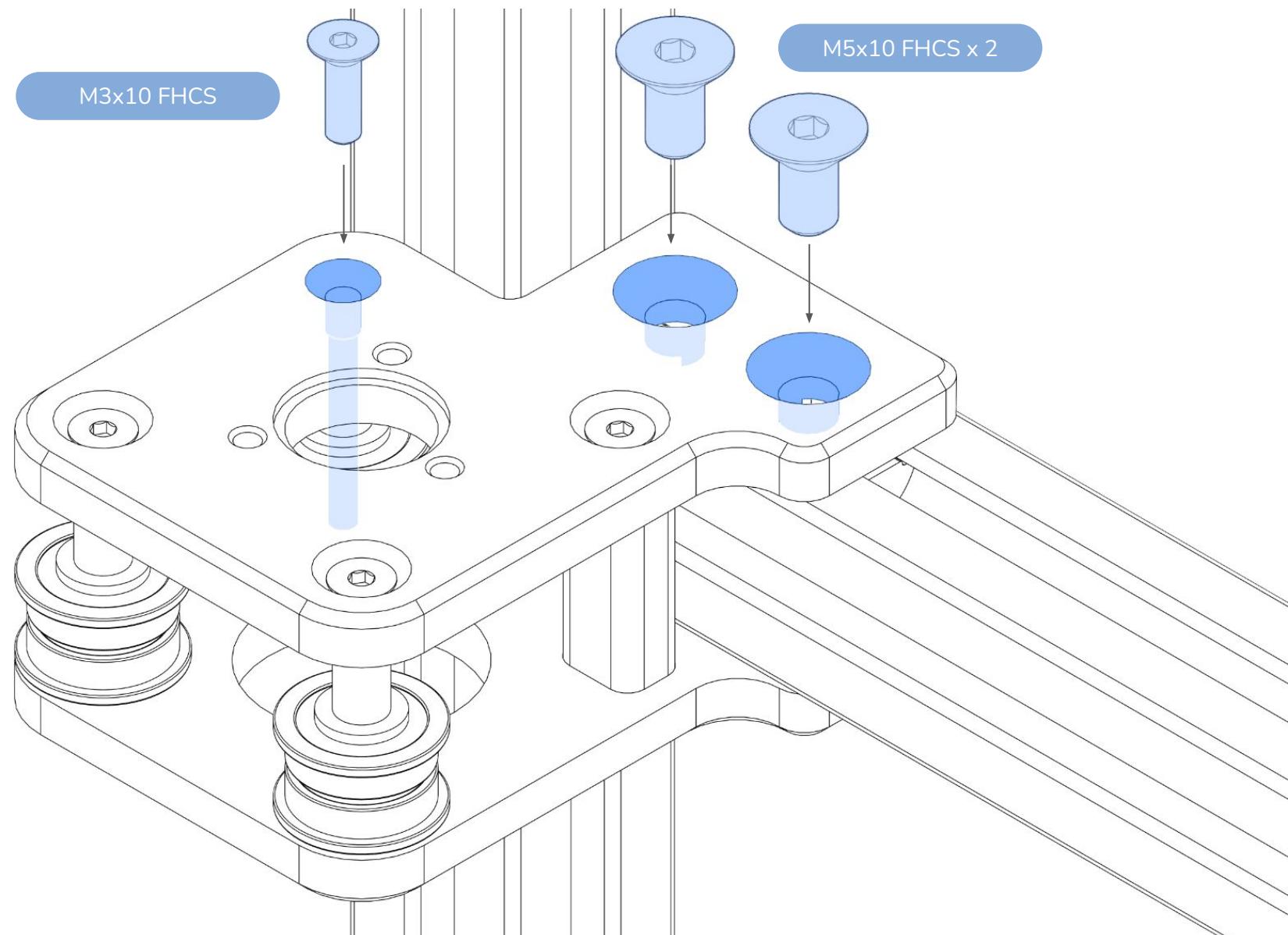
**Loose Guide**

Slot three M3x32 FHCS into the highlighted countersunk holes. These screws will be loose for now, but will act as a stabilizing guide for most components.

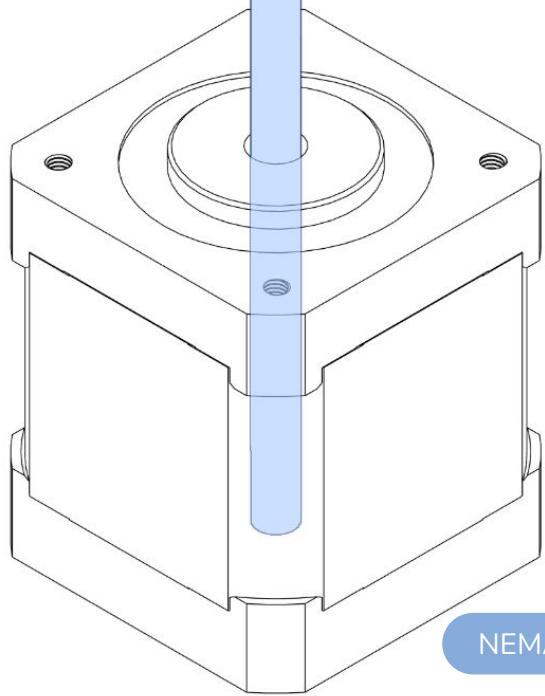
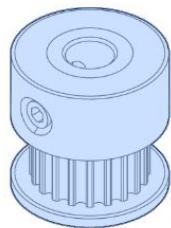


**Easy Does It**

Lower the upper B drive assembly onto the already installed lower plate. Try to keep pressure on the Shim Pins and Standoff to keep them from slide off the screws. Once the screws have made it into their respective holes you may need to adjust each component to seat properly in their respective features.



GT2 20T Pulley

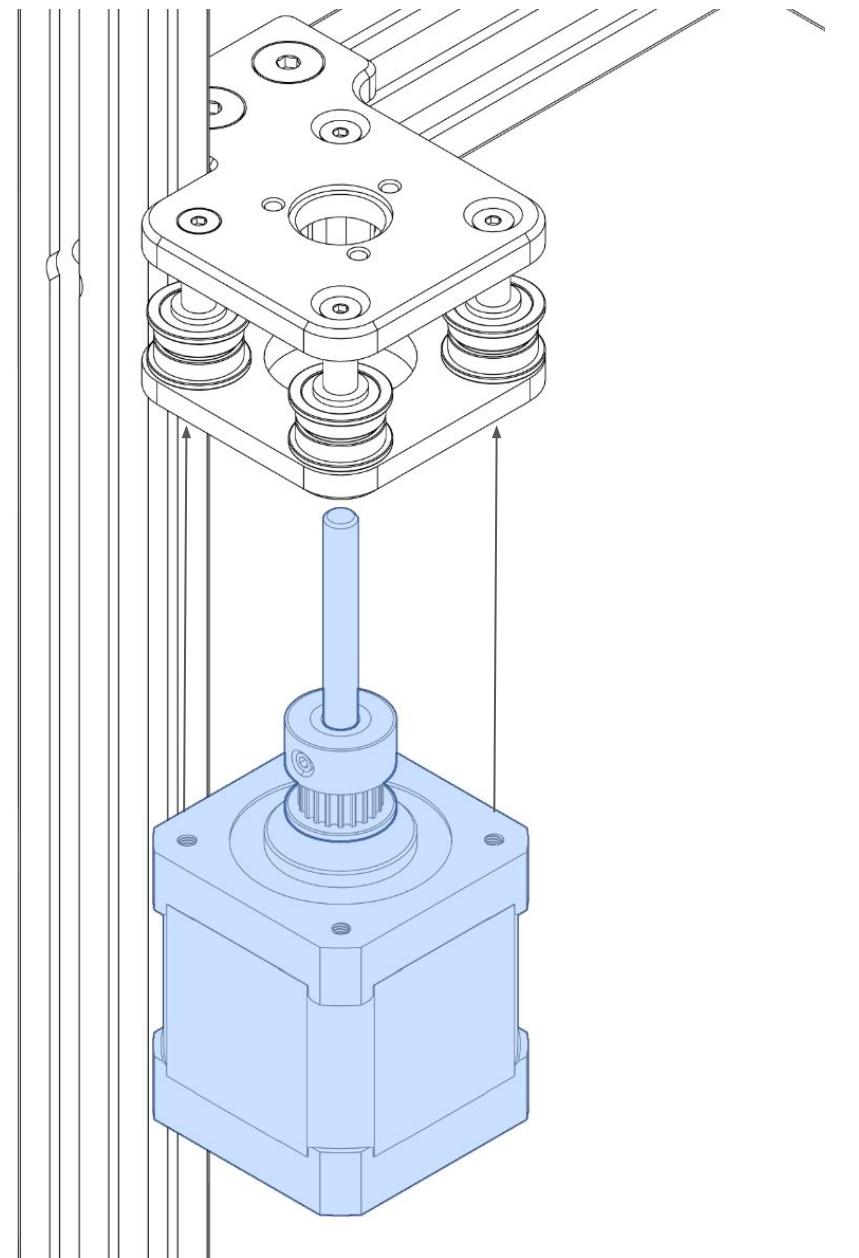


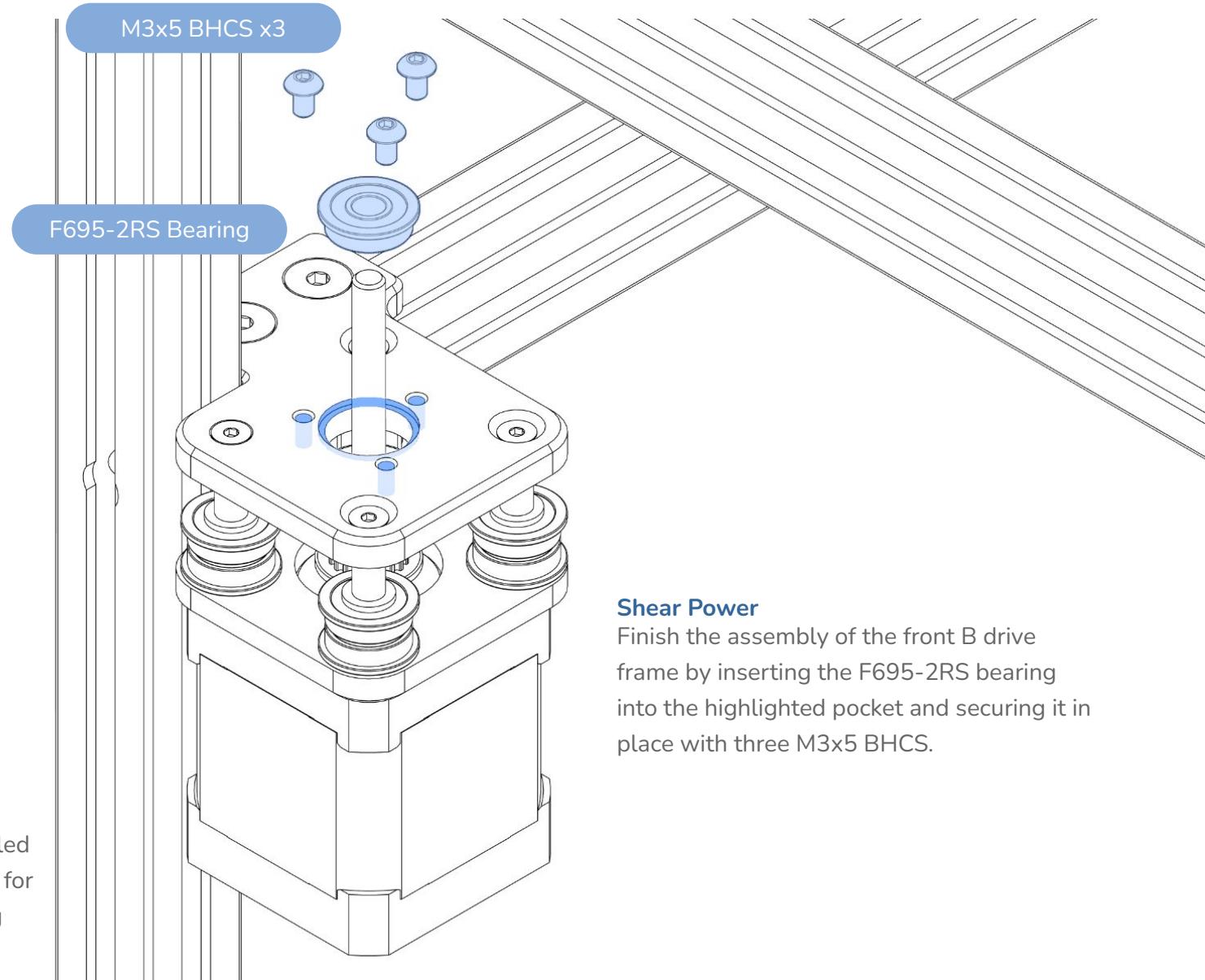
NEMA17 Stepper Motor

Almost There!

Slide the pulley onto the NEMA17 stepper motor's drive shaft before slotting the motor into the lower plate of the B drive frame. Install the motor with the motor wires facing to the left (outward) then tighten the three M3x32 FHCS to secure it in place.

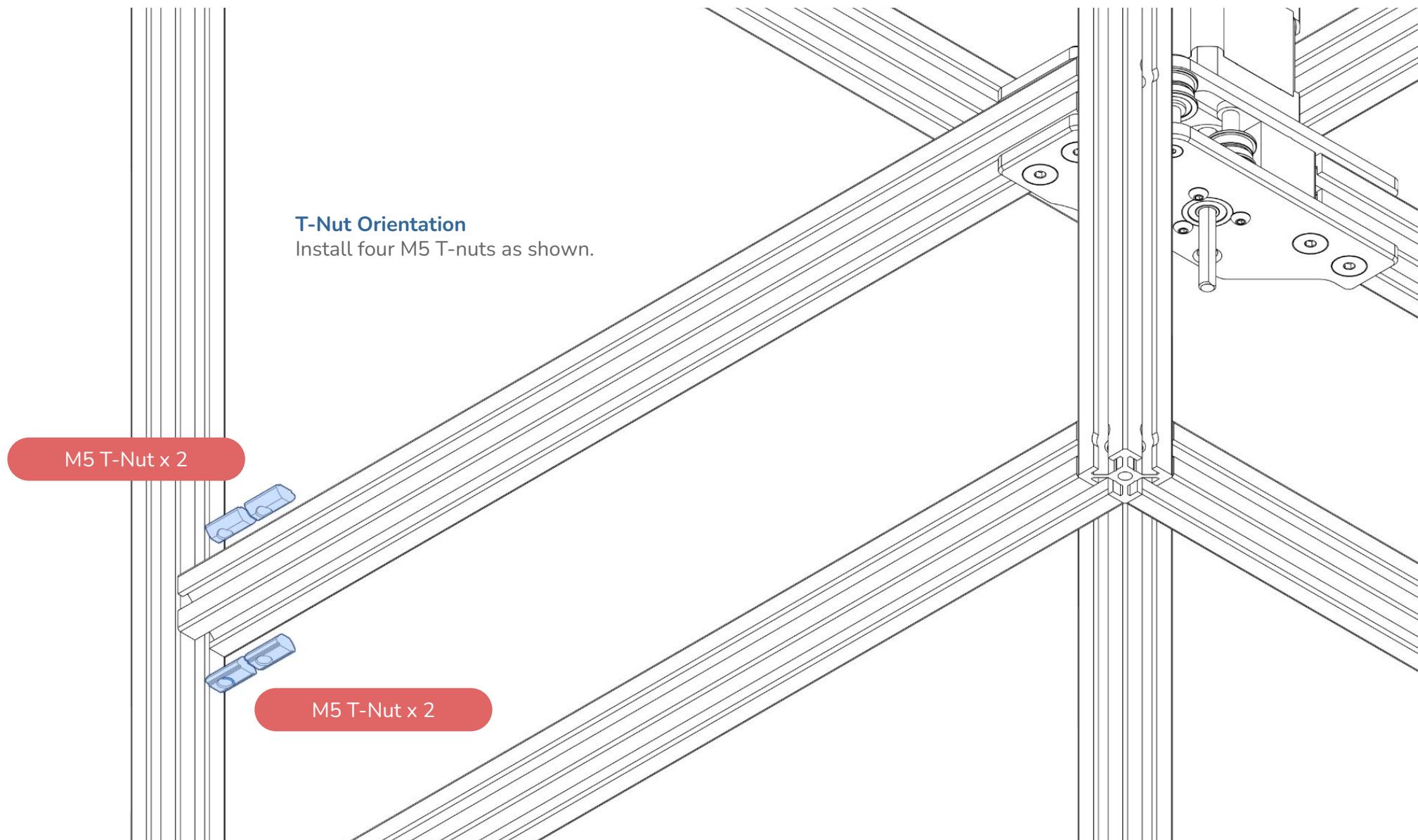
We'll be leaving the front pulleys loose for the time being. It's best not to secure them to the shaft until the belts have been run and tightened.

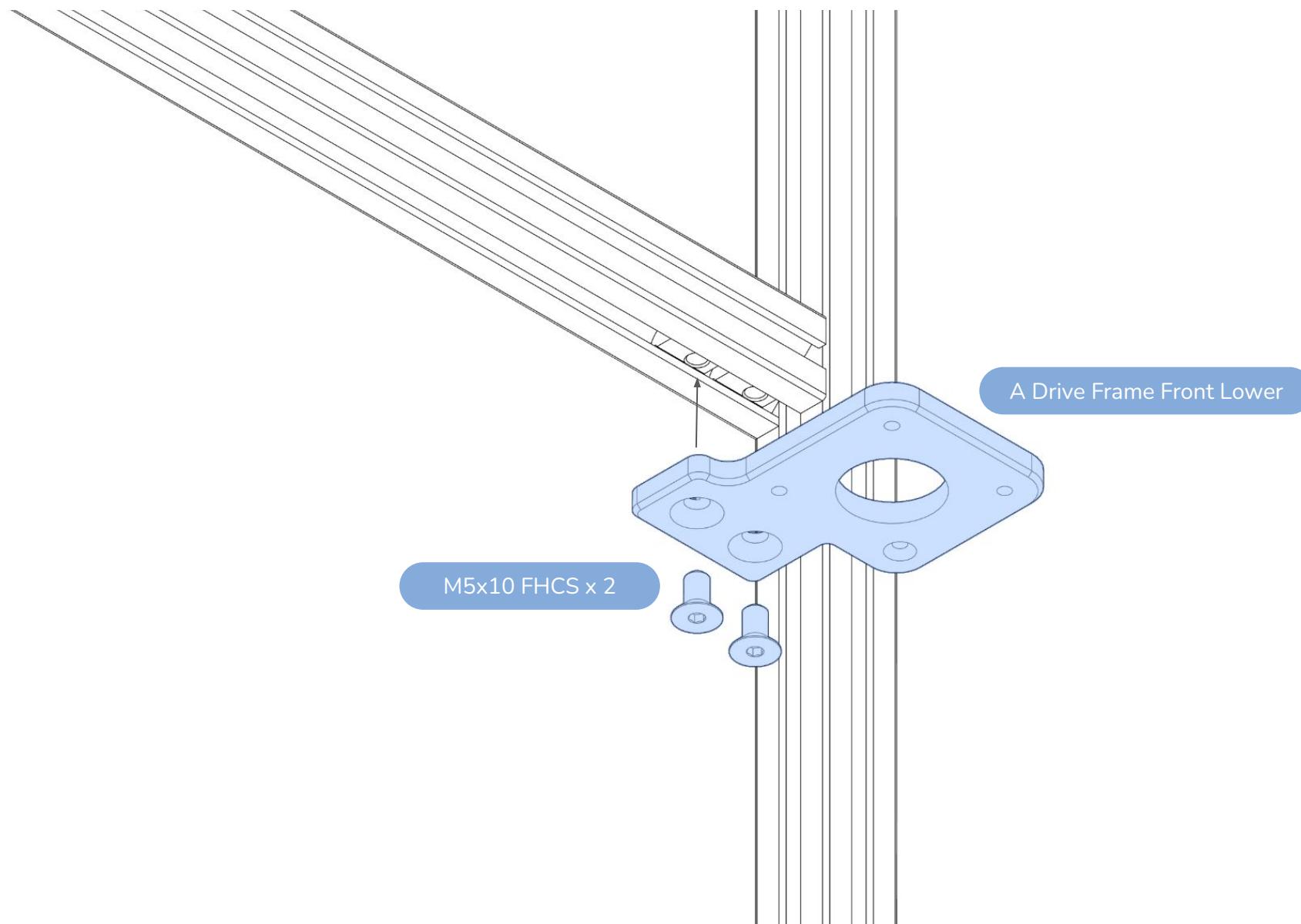


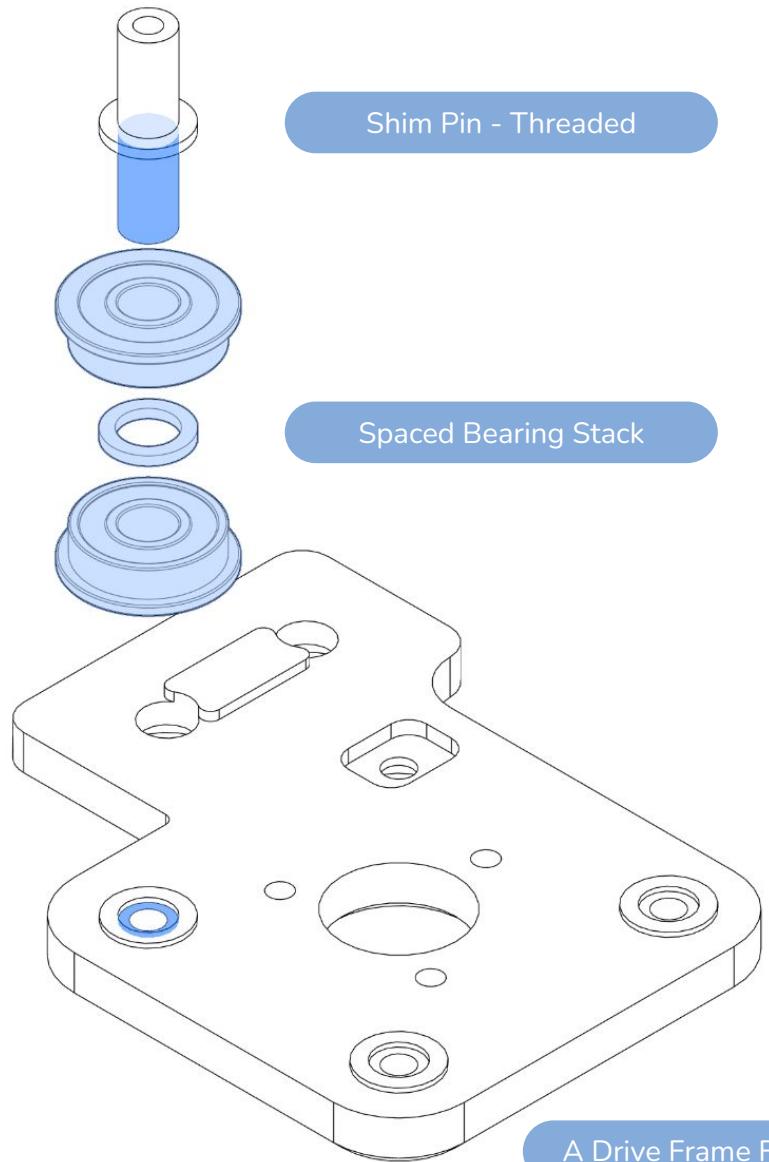


Skip Ahead?

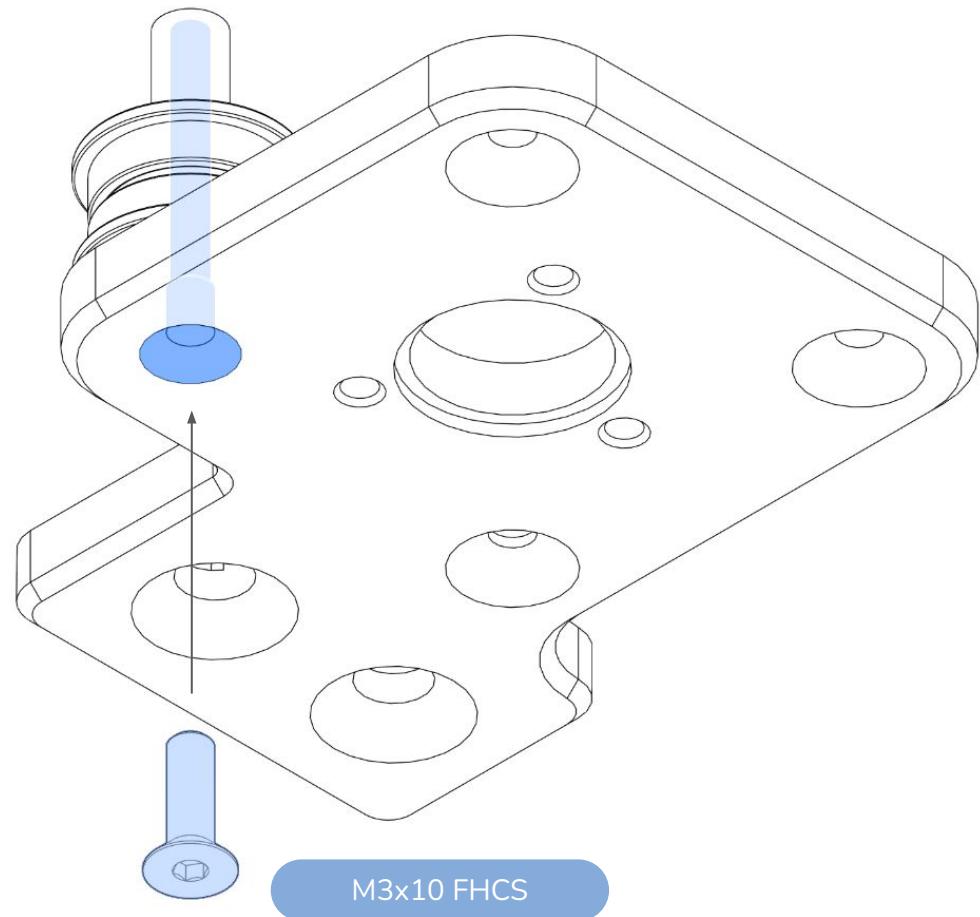
LDO kits have the F695-2RS bearing preinstalled using three M3x5 BHCS along with 3 washers for added surface contact to the top of the bearing flange.

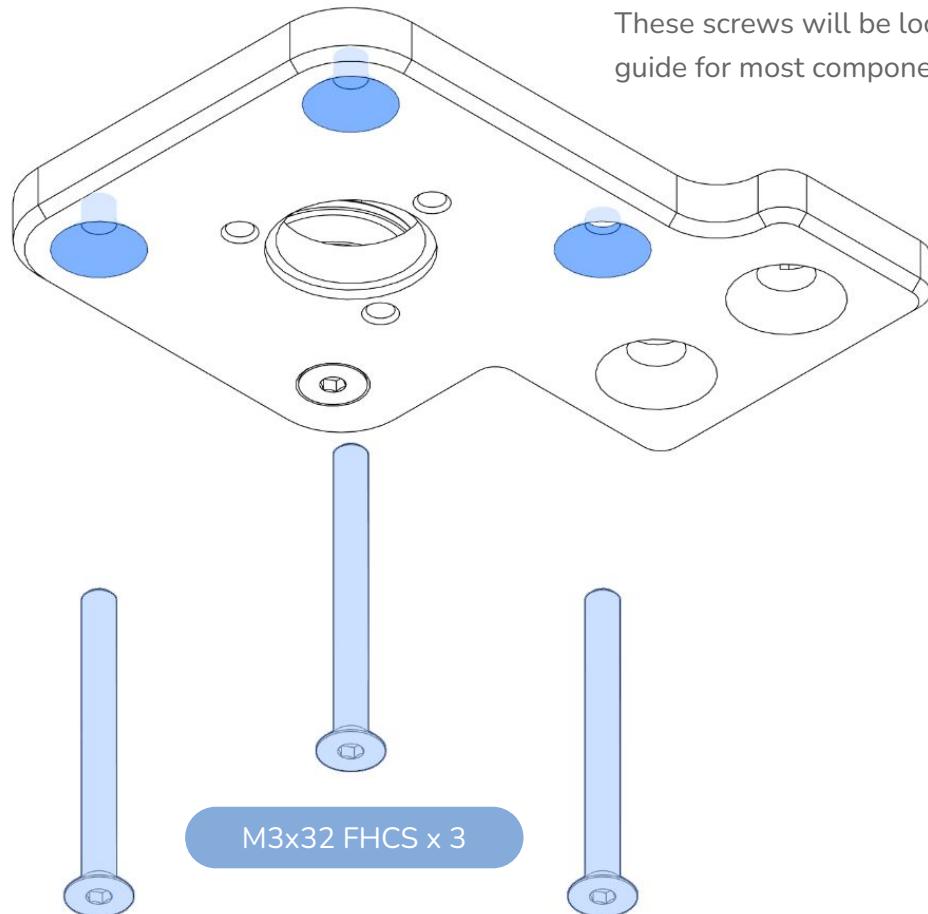




**Short Detour**

To make things a little easier, we'll assemble the bulk of the front drive frames outside of the printer.



**Loose Guide**

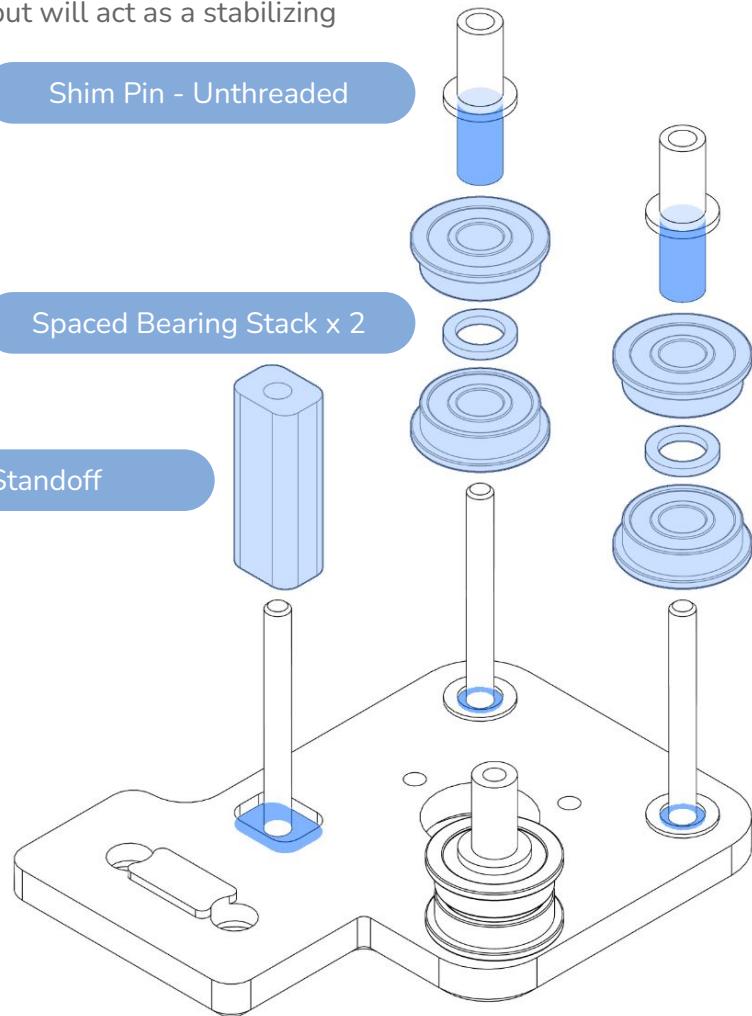
Slot three M3x32 FHCS into the highlighted countersunk holes.

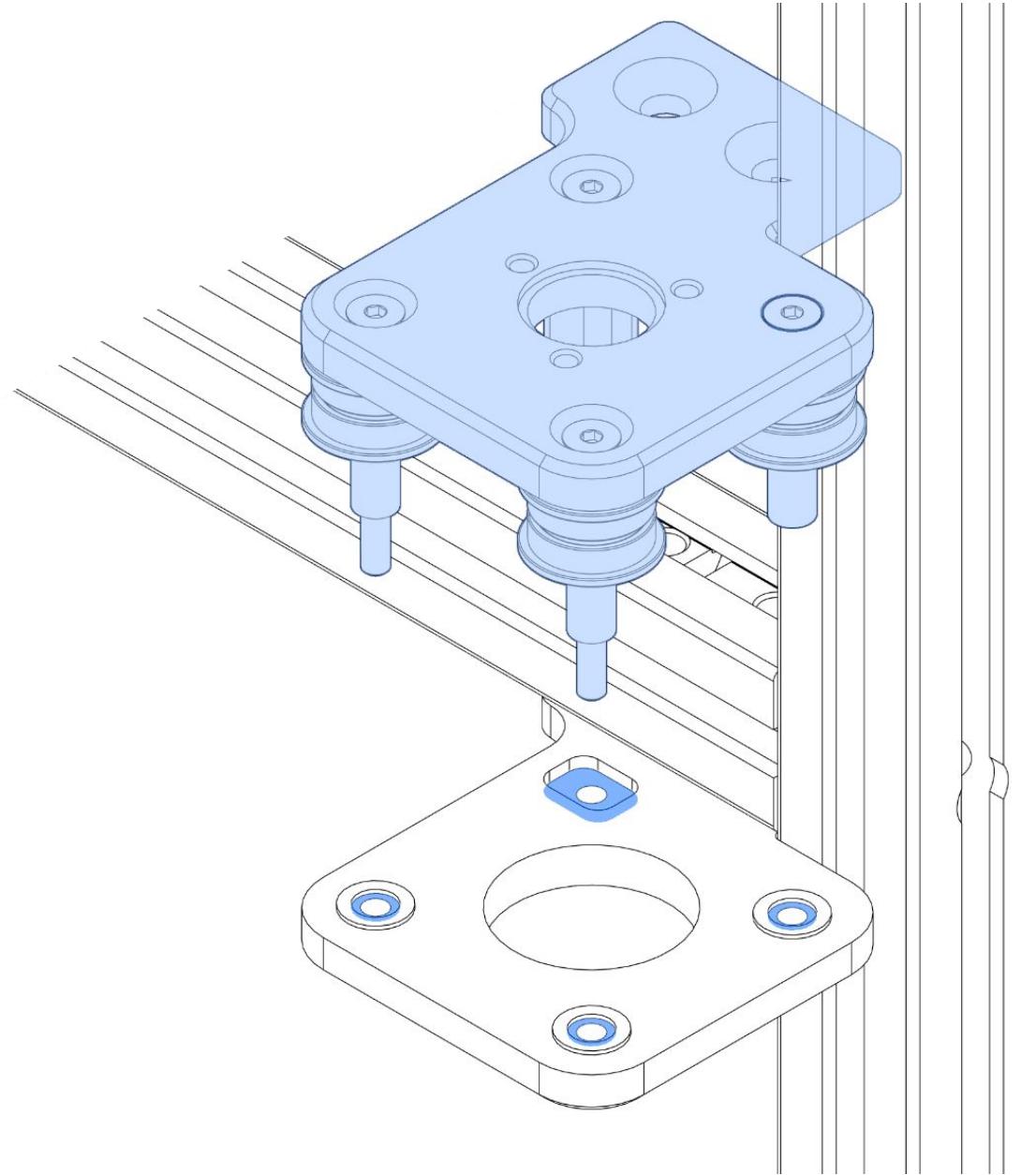
These screws will be loose for now, but will act as a stabilizing guide for most components.

Shim Pin - Unthreaded

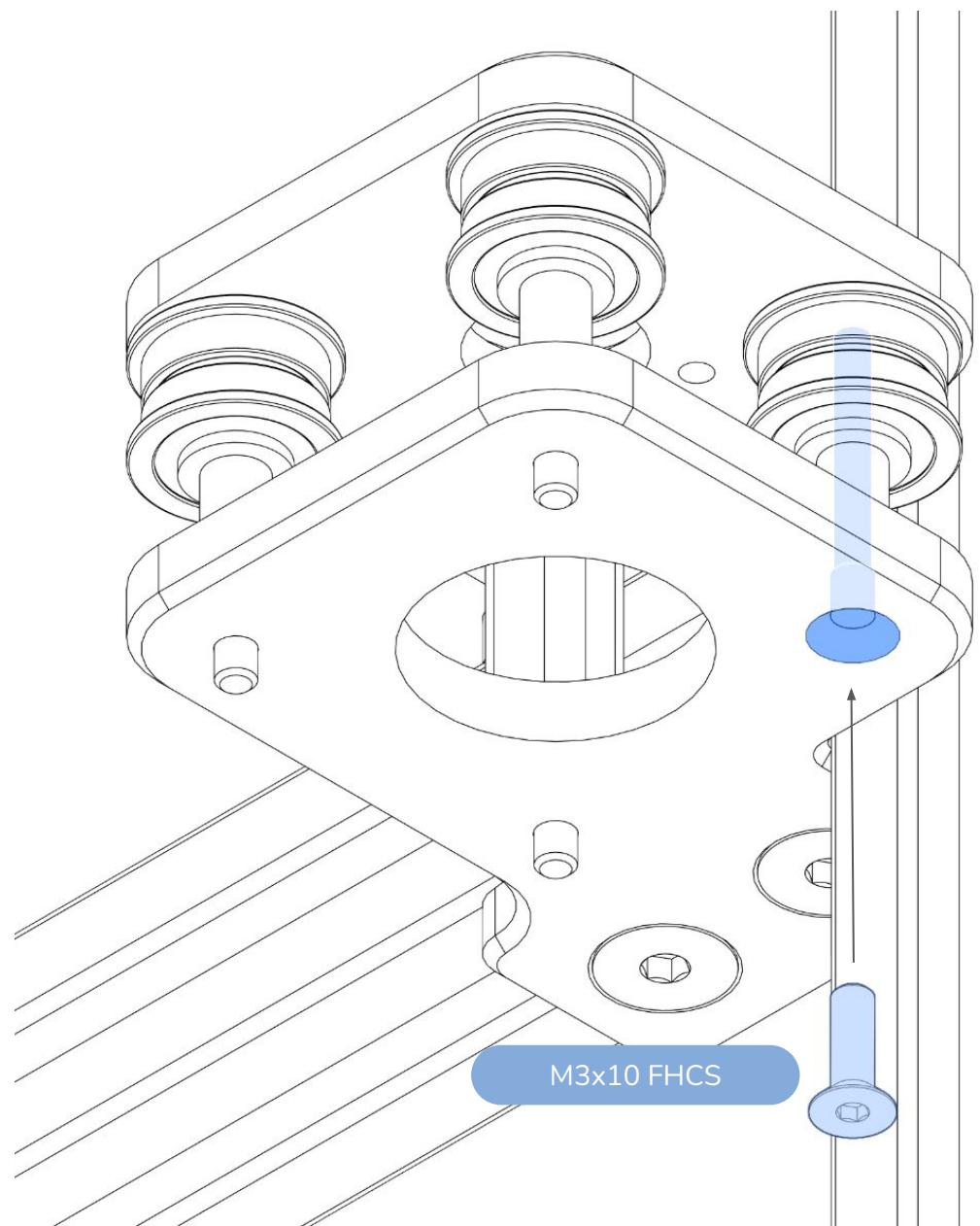
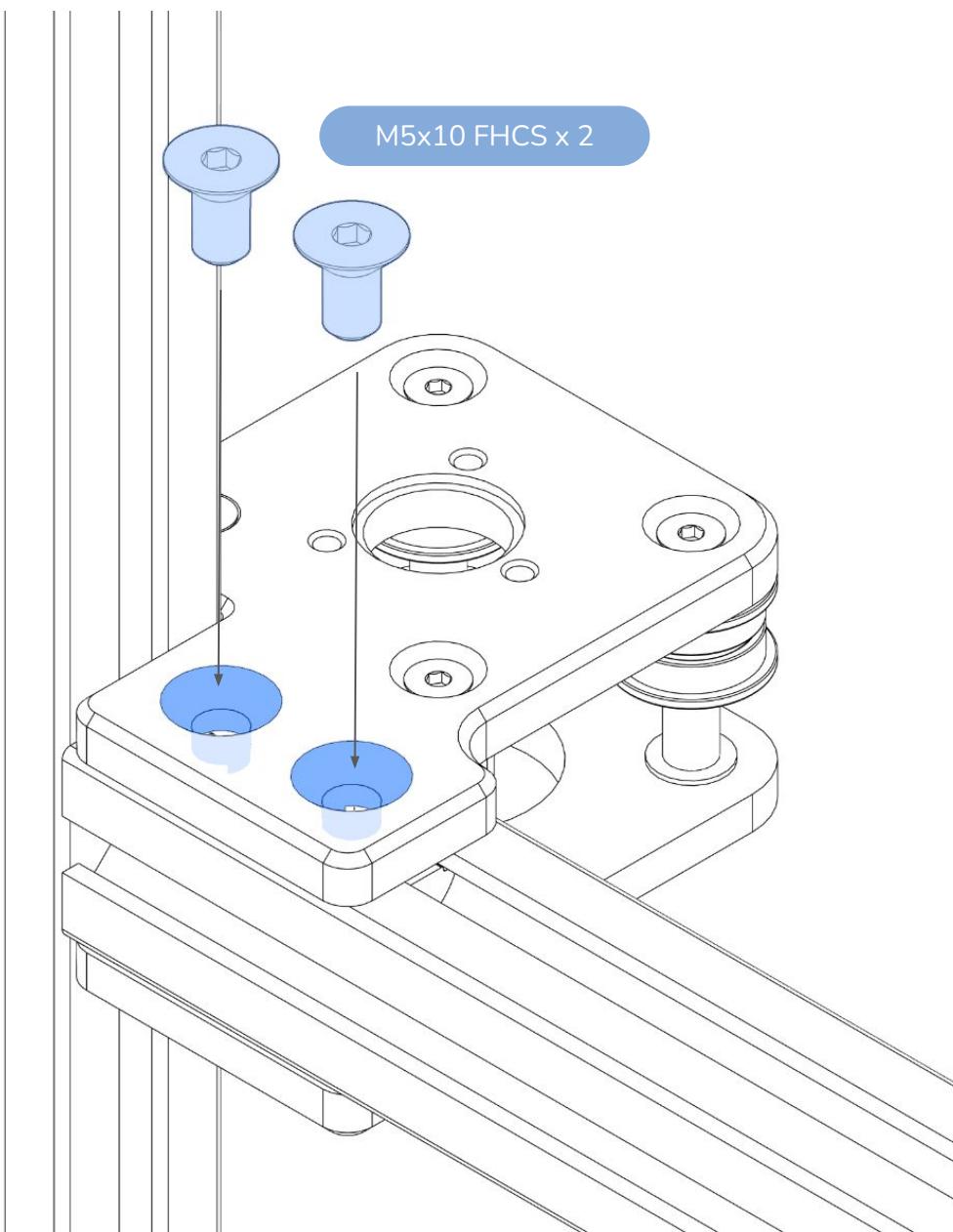
Spaced Bearing Stack x 2

Standoff

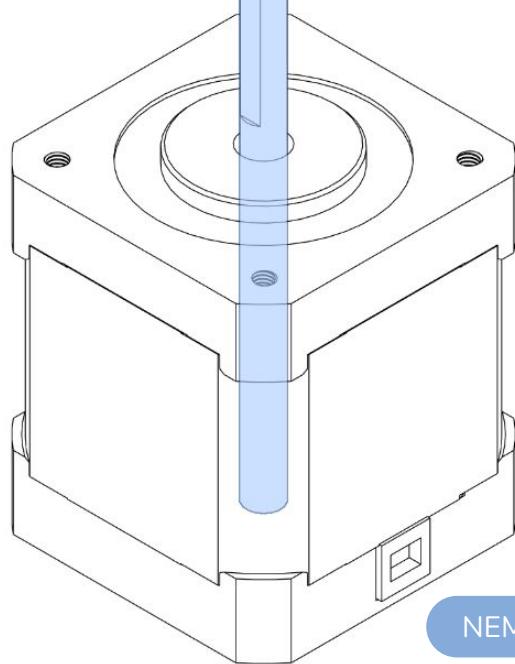
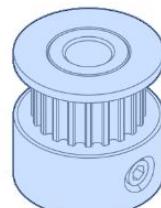


**Easy Does It**

Lower the upper A drive assembly onto the already installed lower plate. Try to keep pressure on the Shim Pins and Standoff to keep them from slide off the screws. Once the screws have made it into their respective holes you may need to adjust each component to seat properly in their respective features.



GT2 20T Pulley

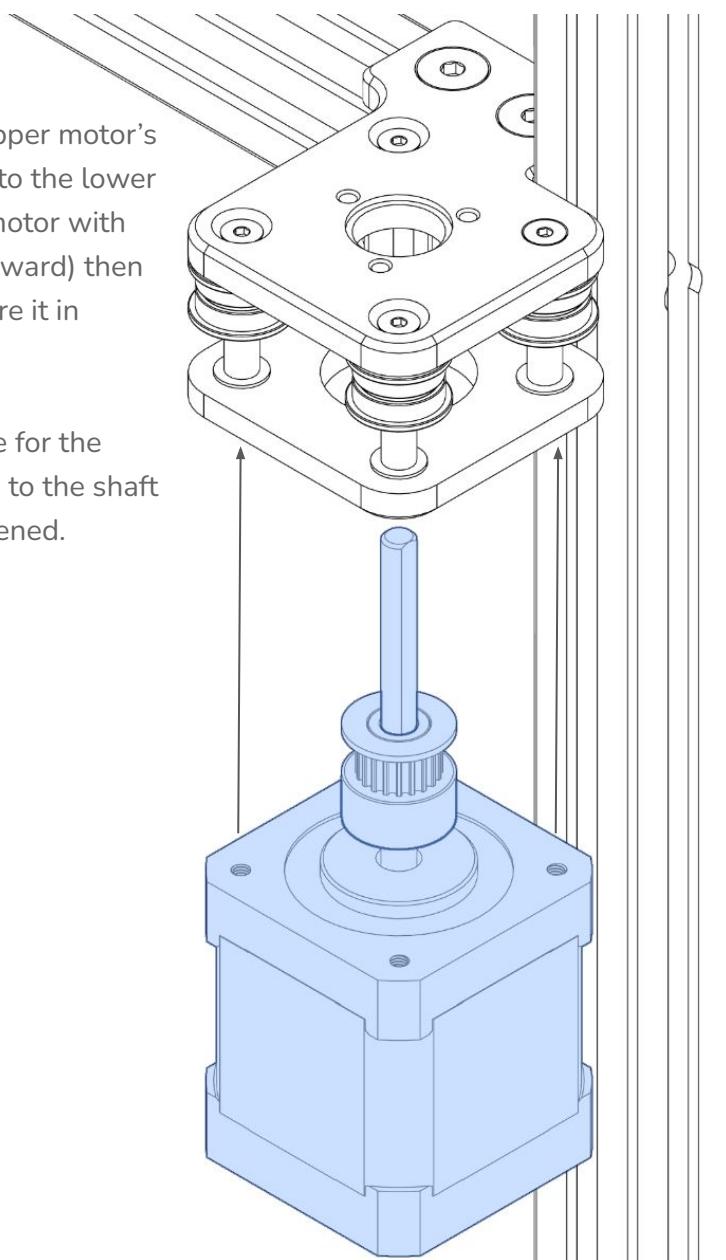


NEMA17 Stepper Motor

Almost There!

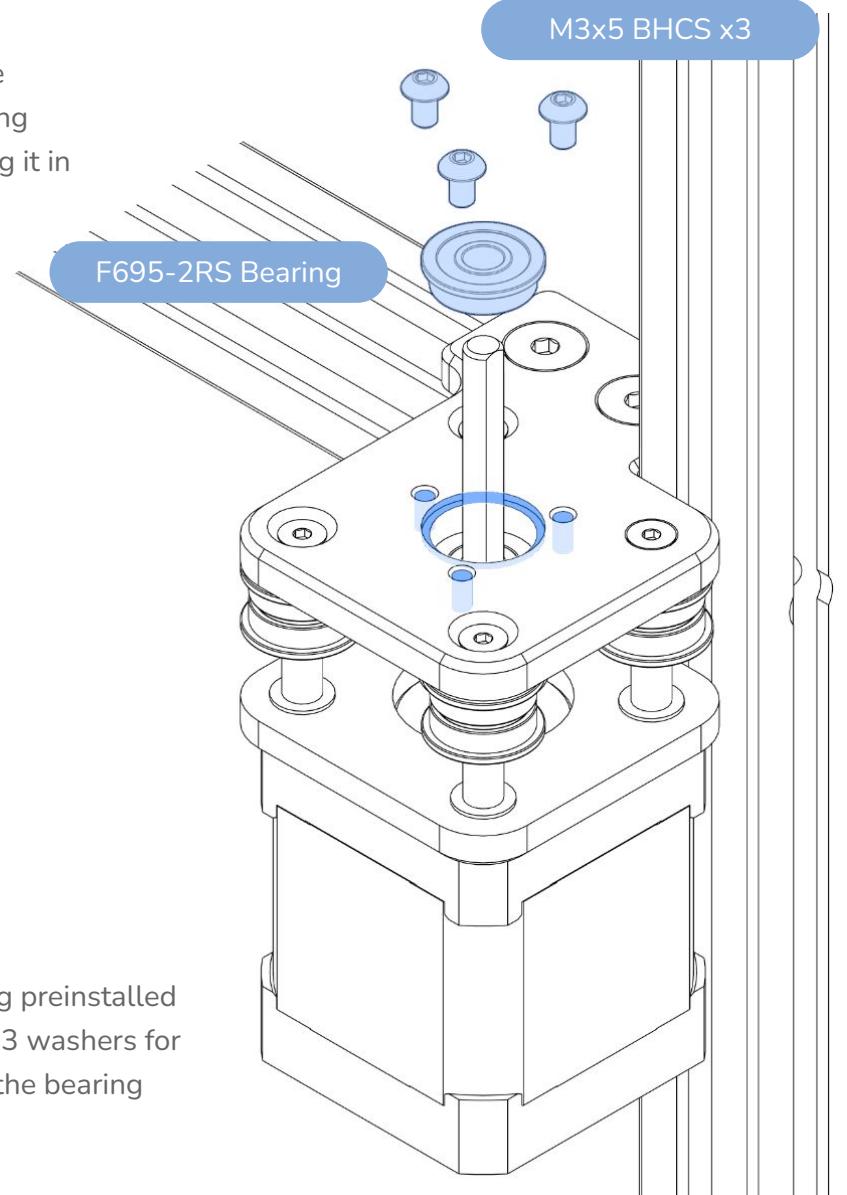
Slide the pulley onto the NEMA17 stepper motor's drive shaft before slotting the motor into the lower plate of the A drive frame. Install the motor with the motor wires facing to the right (outward) then tighten the three M3x32 FHCS to secure it in place.

We'll be leaving the front pulleys loose for the time being. It's best not to secure them to the shaft until the belts have been run and tightened.

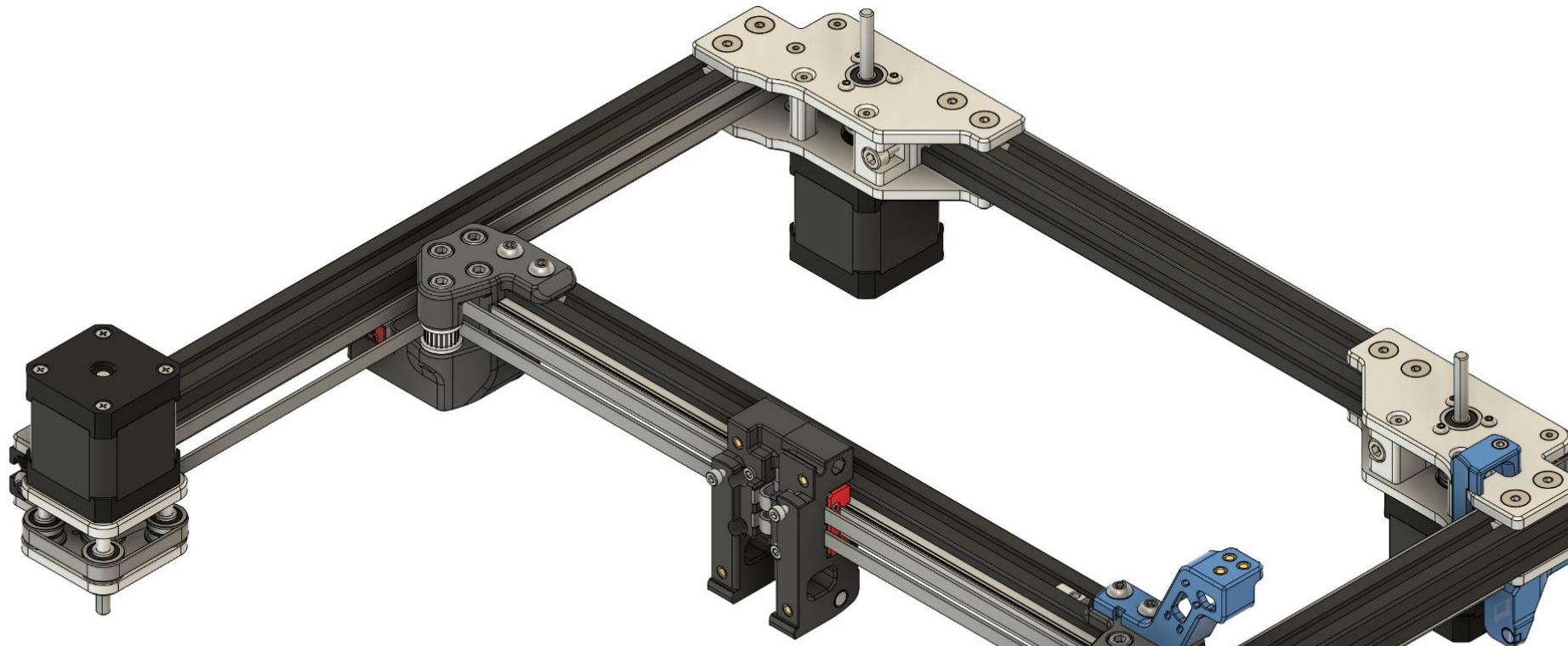


Shear Power

Finish the assembly of the front A drive frame by inserting the F695-2RS bearing into the highlighted pocket and securing it in place with three M3x5 BHCS.

**Skip Ahead?**

LDO kits have the F695-2RS bearing preinstalled using three M3x5 BHCS along with 3 washers for added surface contact to the top of the bearing flange.



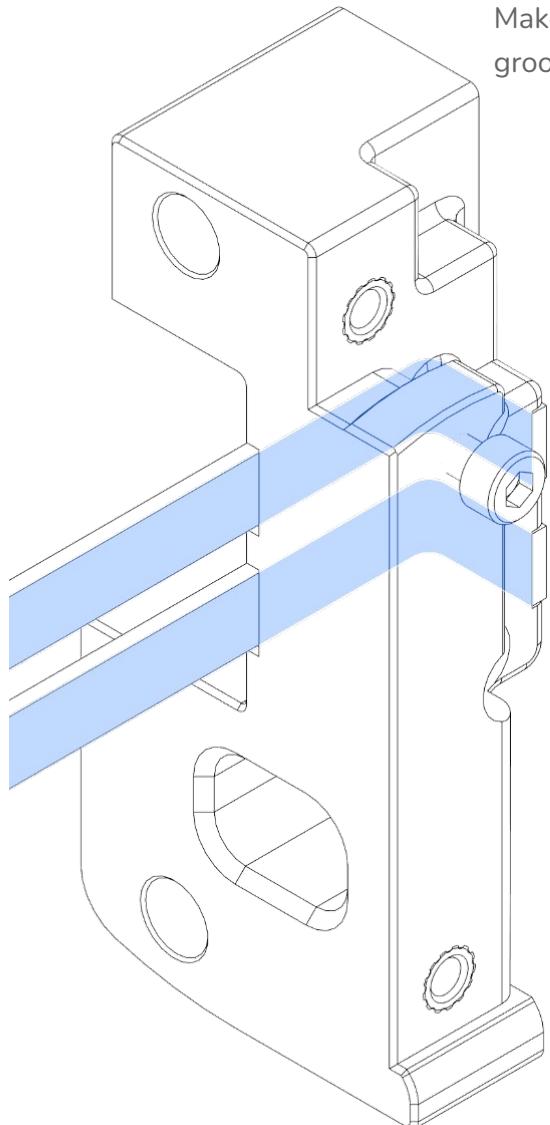
Finishing Touches

Installing the belts and cable routing will be the last steps this manual covers, however we'll need to take a detour to the VoronDesign Trident manual to get the X assembly prepared (starting on page 98), complete the necessary steps and come back for belt routing!

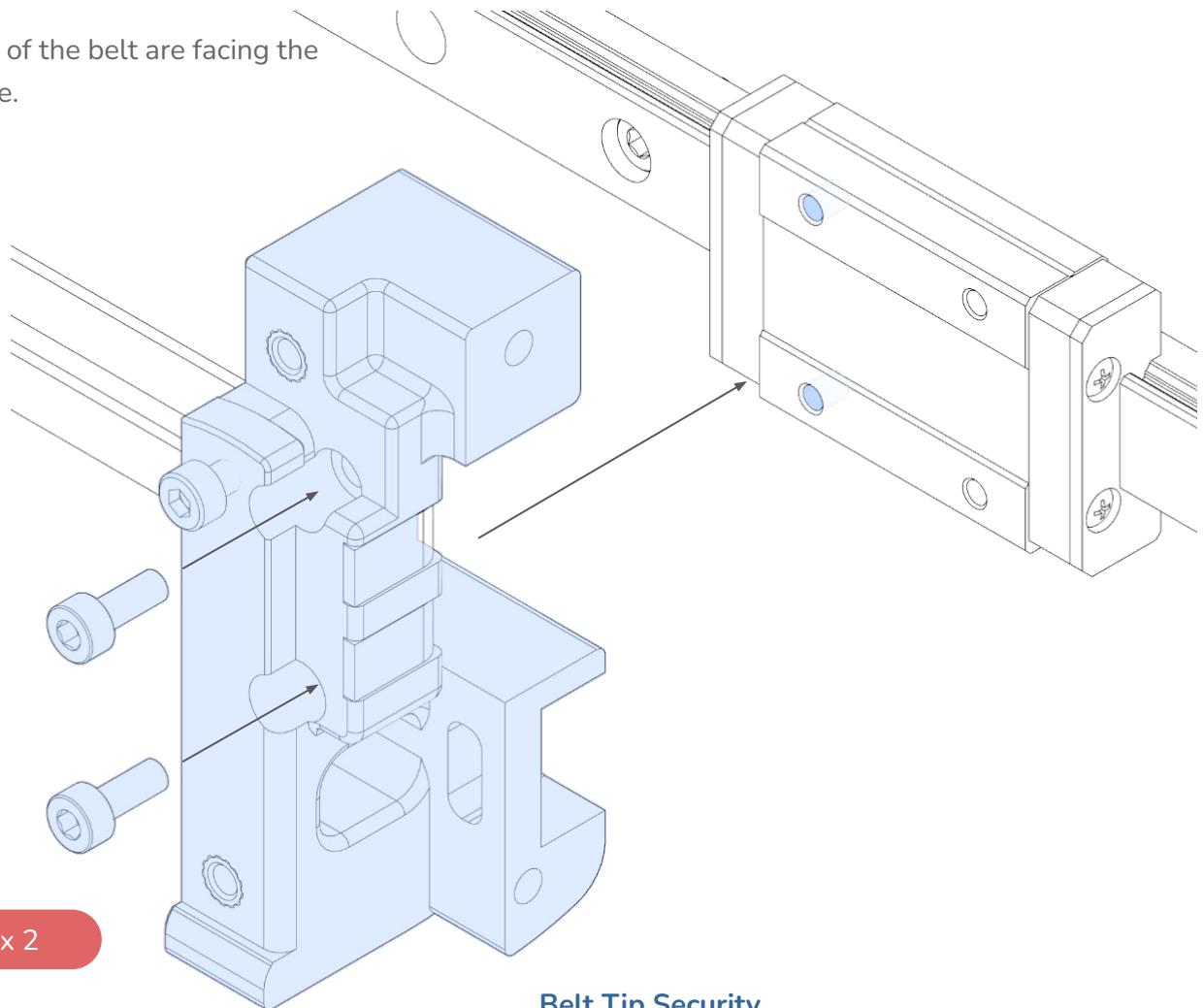


Belt Orientation

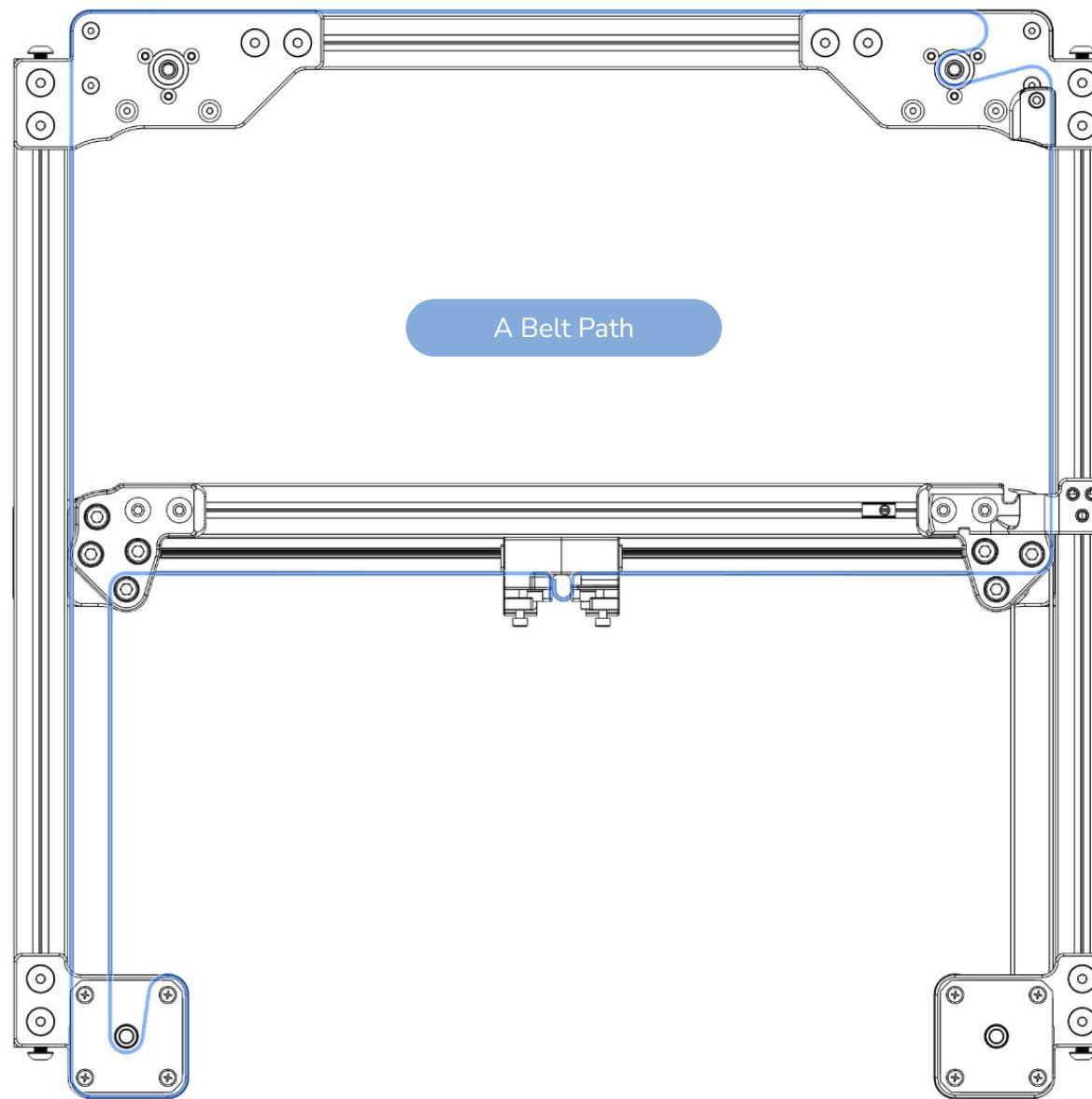
Make sure that the teeth of the belt are facing the grooves on the X carriage.

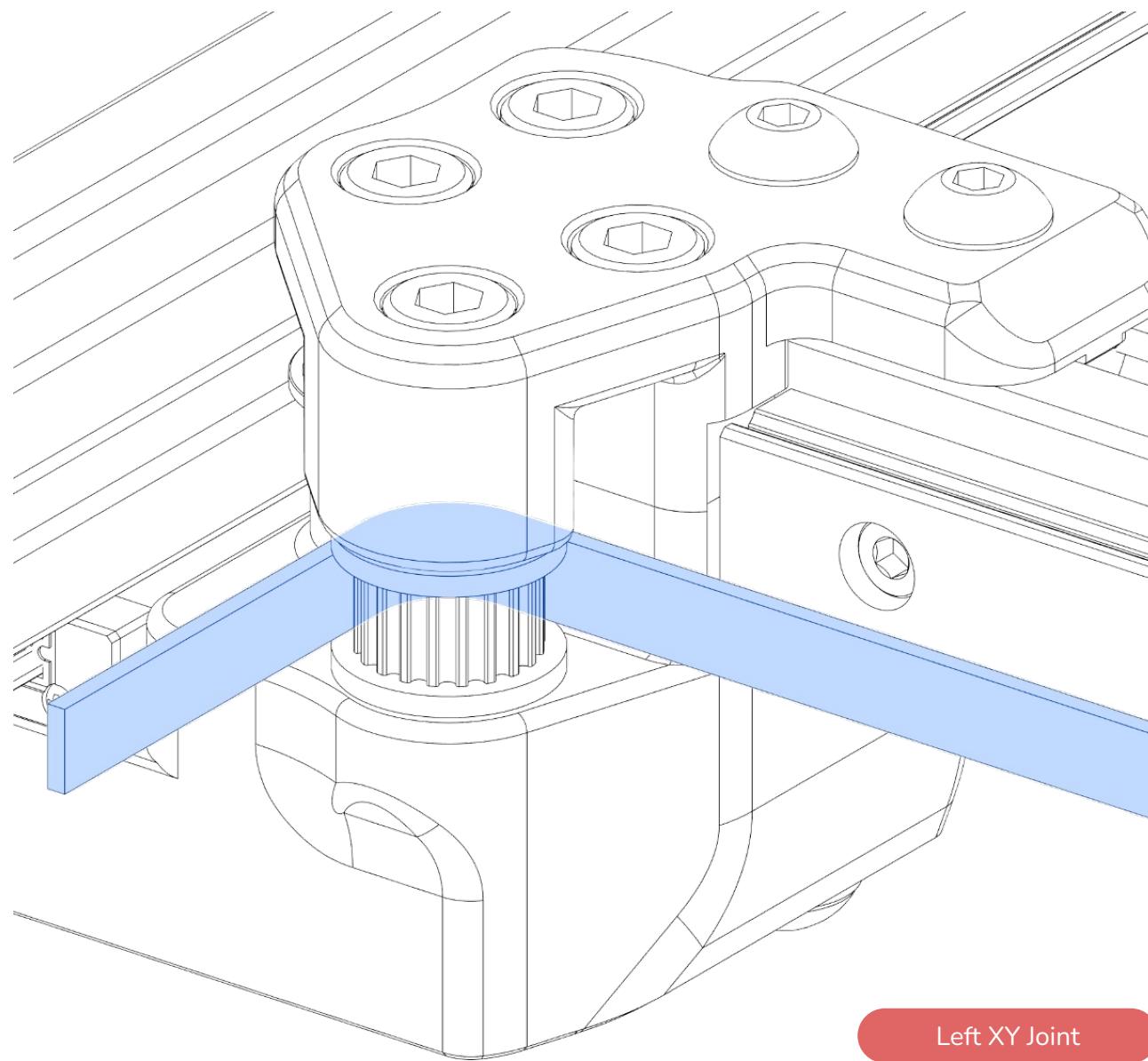


M3x8 SHCS x 2

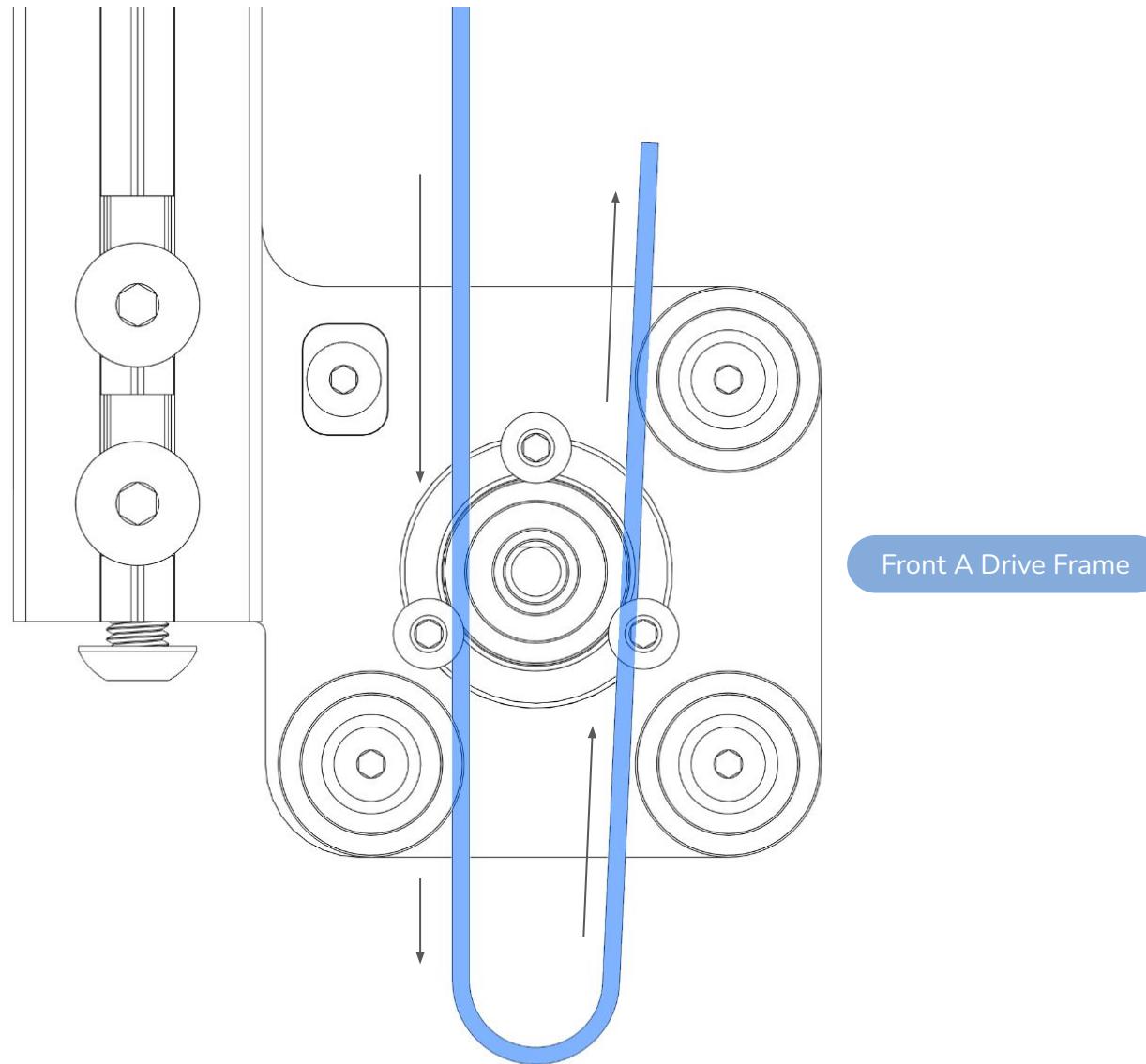
**Belt Tip Security**

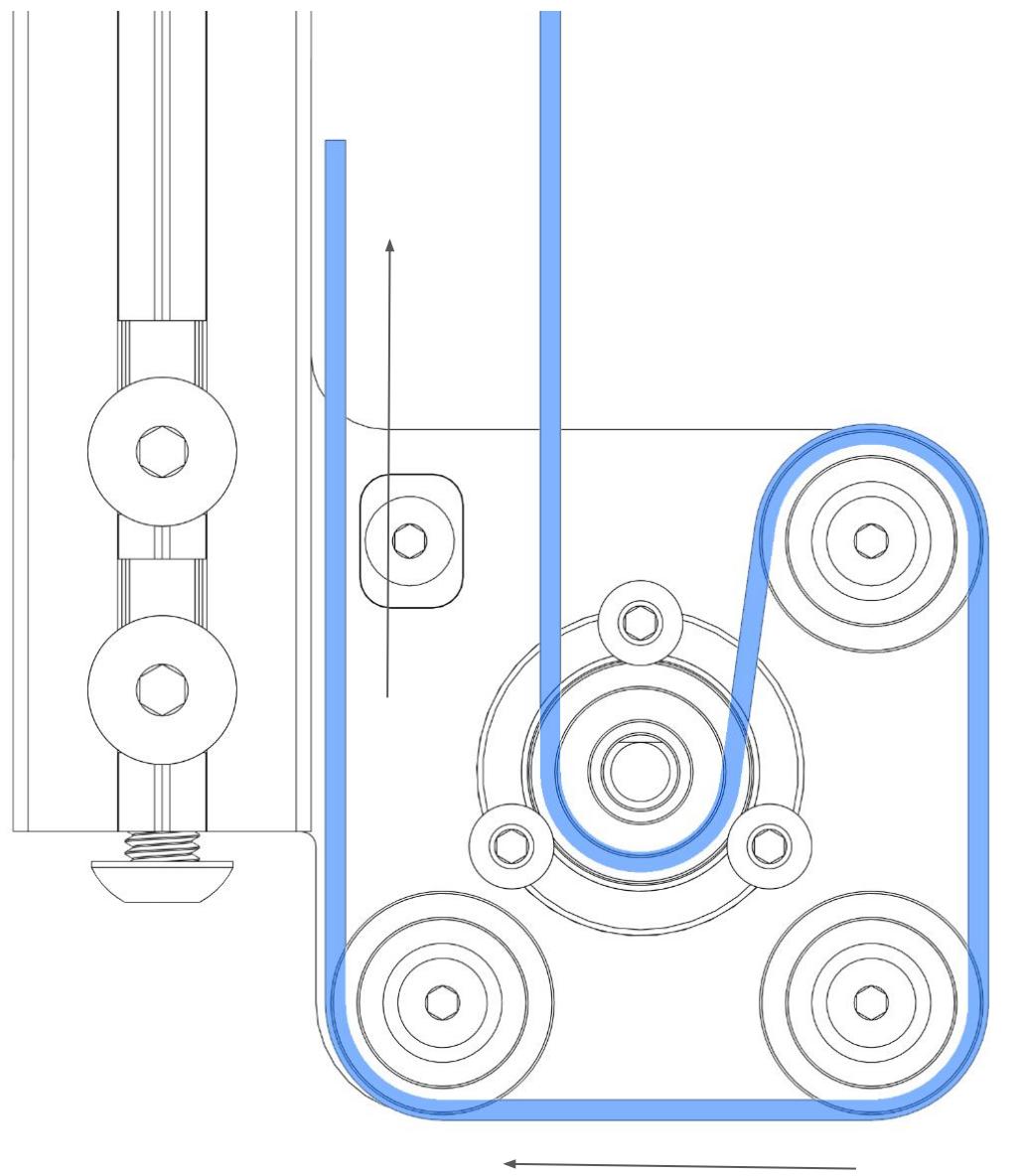
Use two M3x8 SHCS from your printer's fasteners to secure the X carriage and belt to the X rail's carriage block.

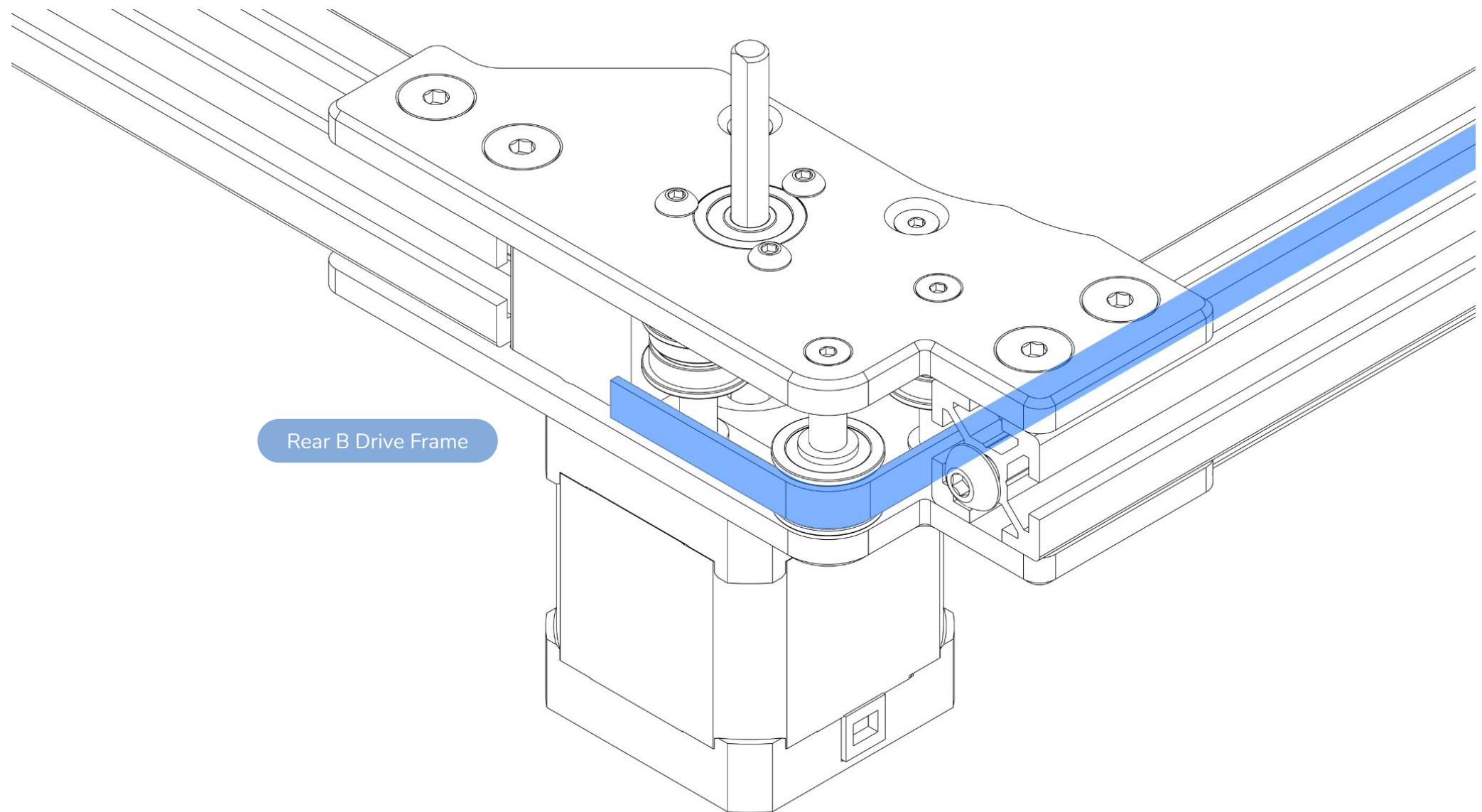




Left XY Joint

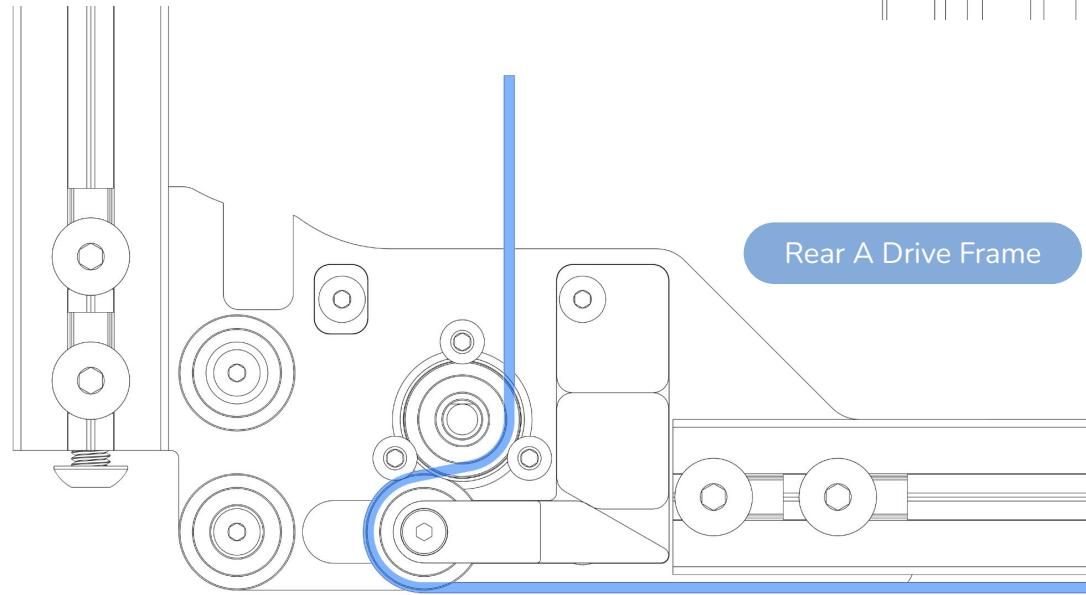
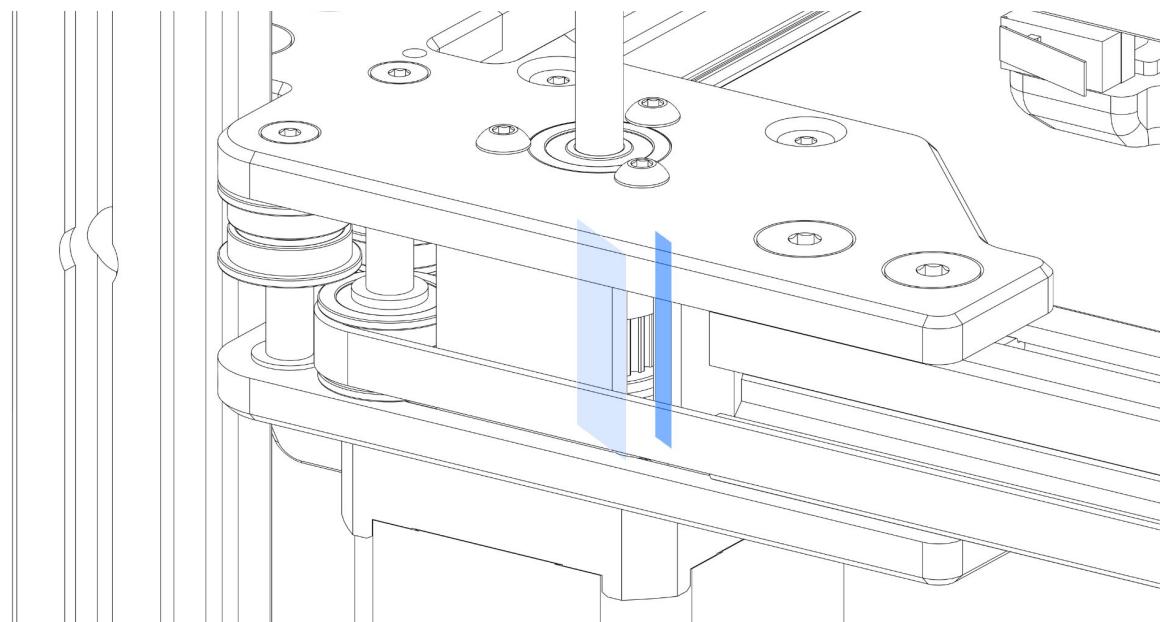






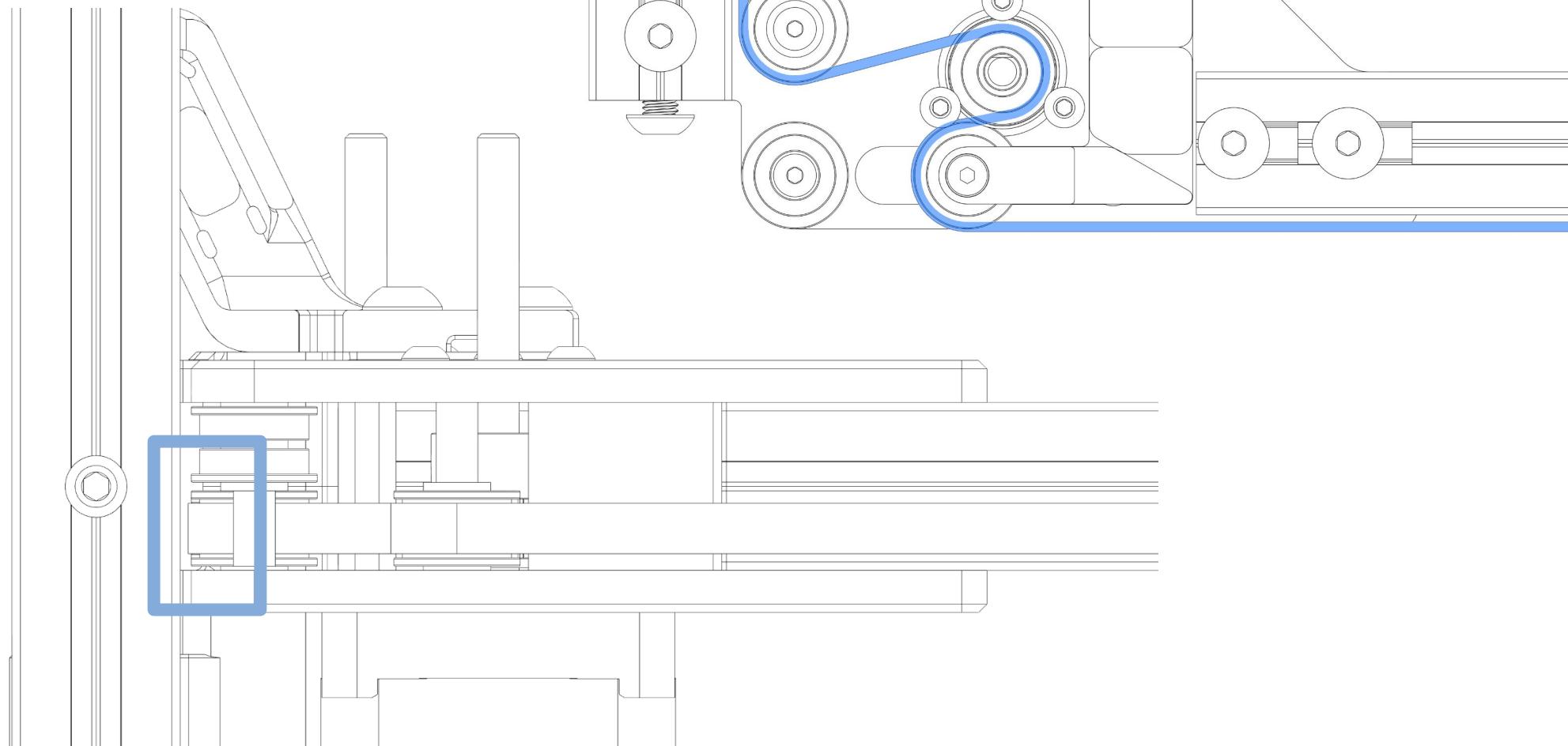
Mind the Gap

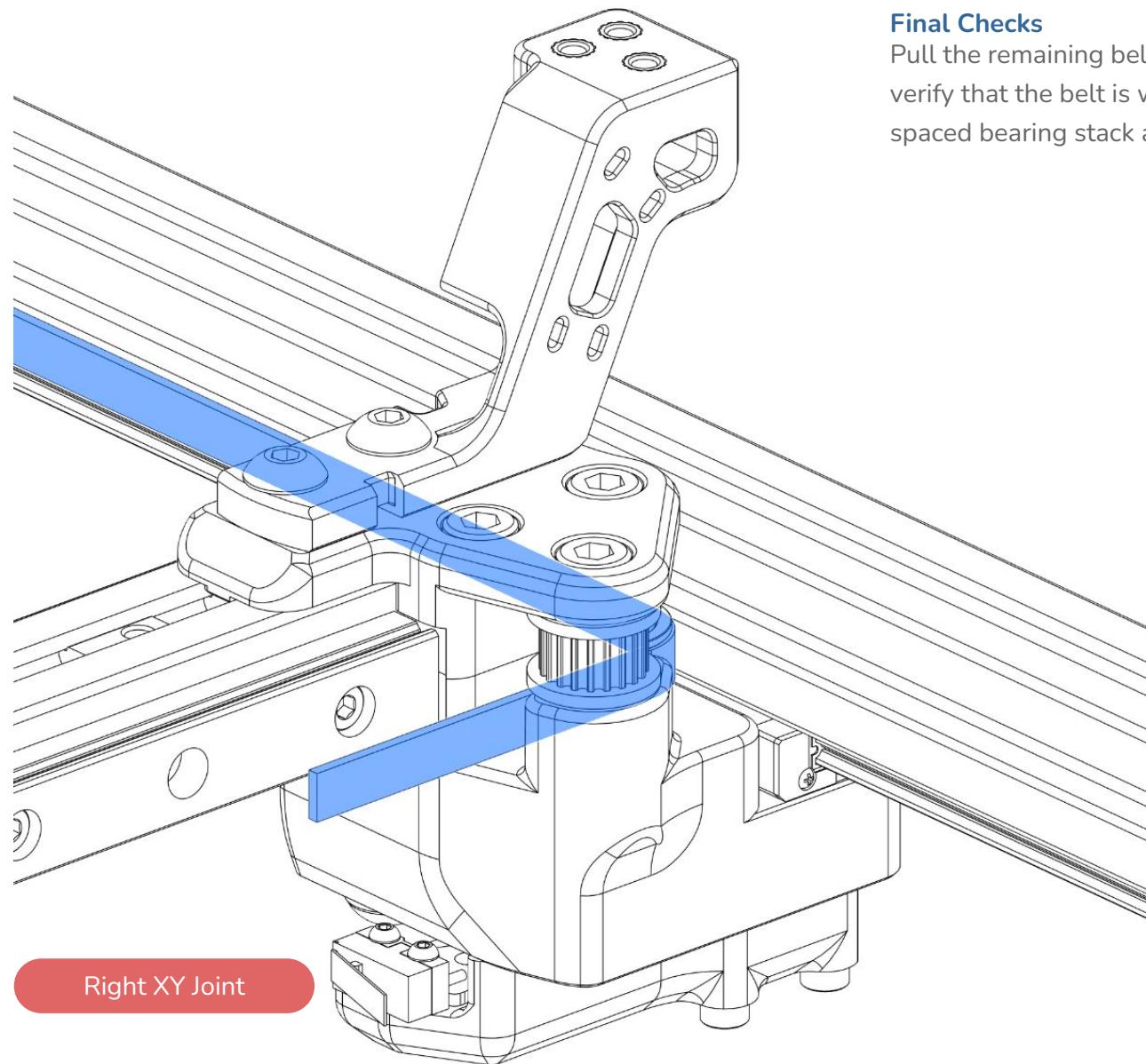
Use this gap between the Tensioner Wedge and Tensioner Slide along with a small hex key to route the belt around the drive pulley.



Tight Squeeze

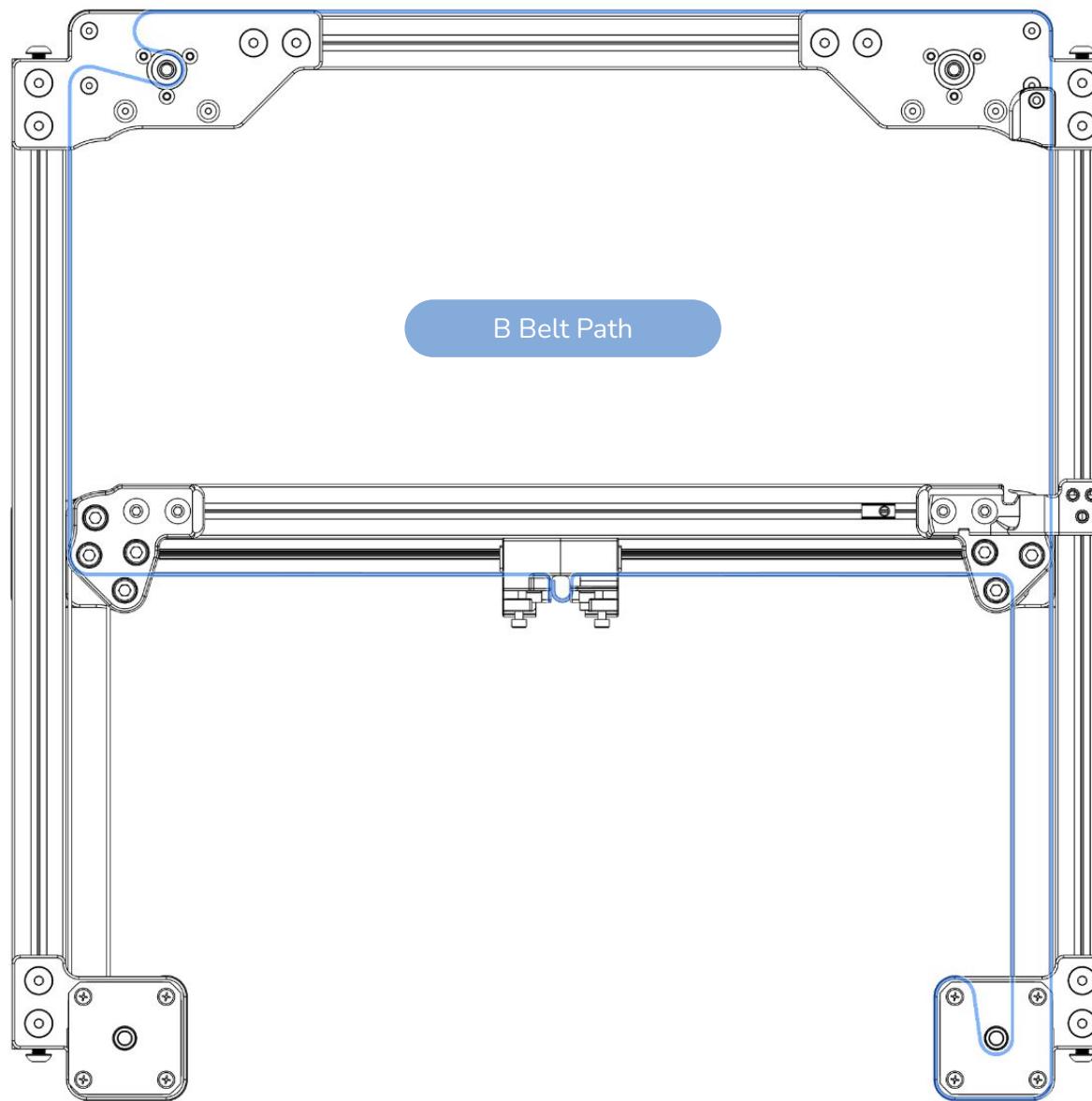
Feed the belt towards the outer extrusion, between the idlers as shown. Using a small hex key, push the belt around the front most idler until it passes out the front of the drive frame. The gap between the rear shim pin and the extrusion is plenty of room to reroute.

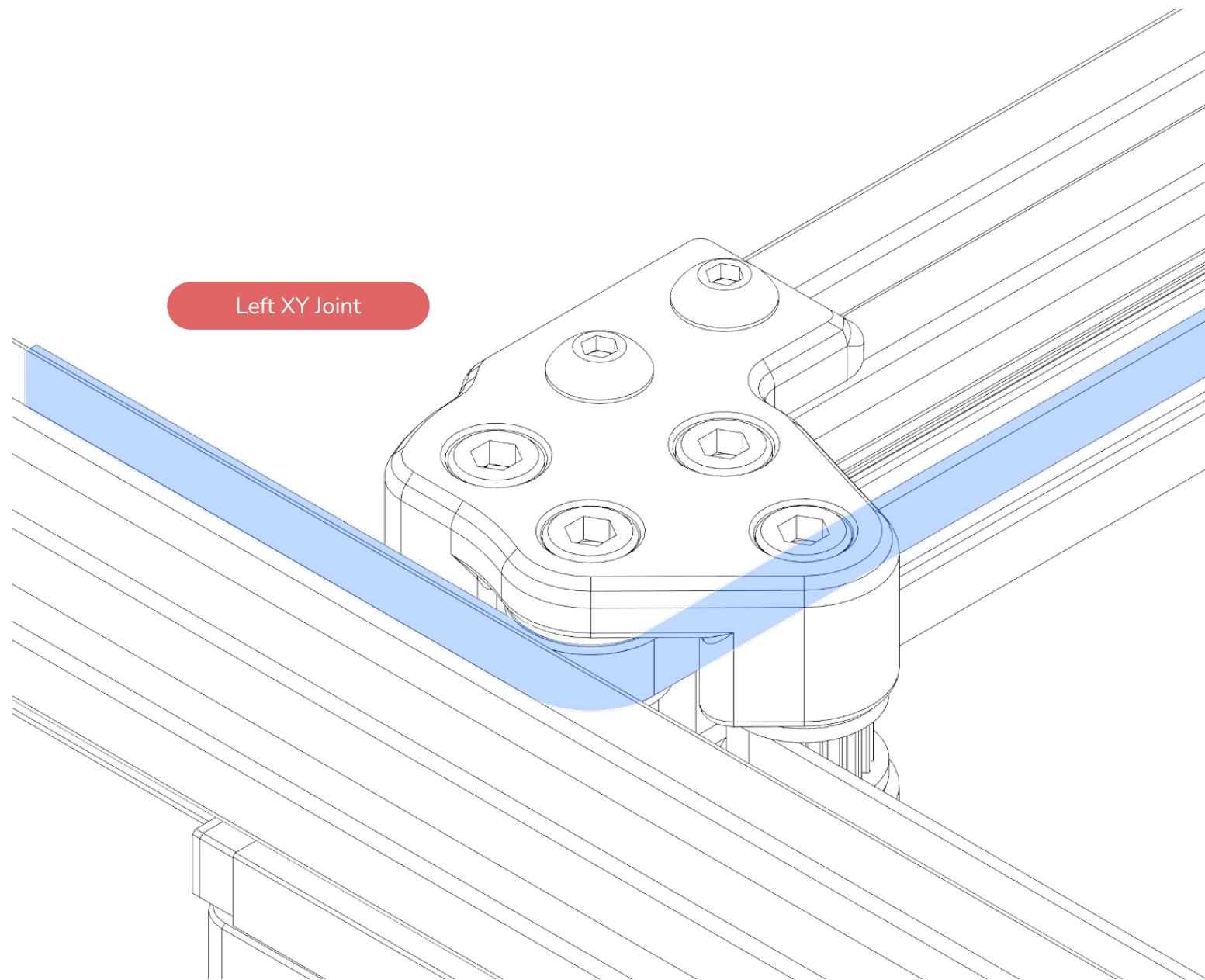




Final Checks

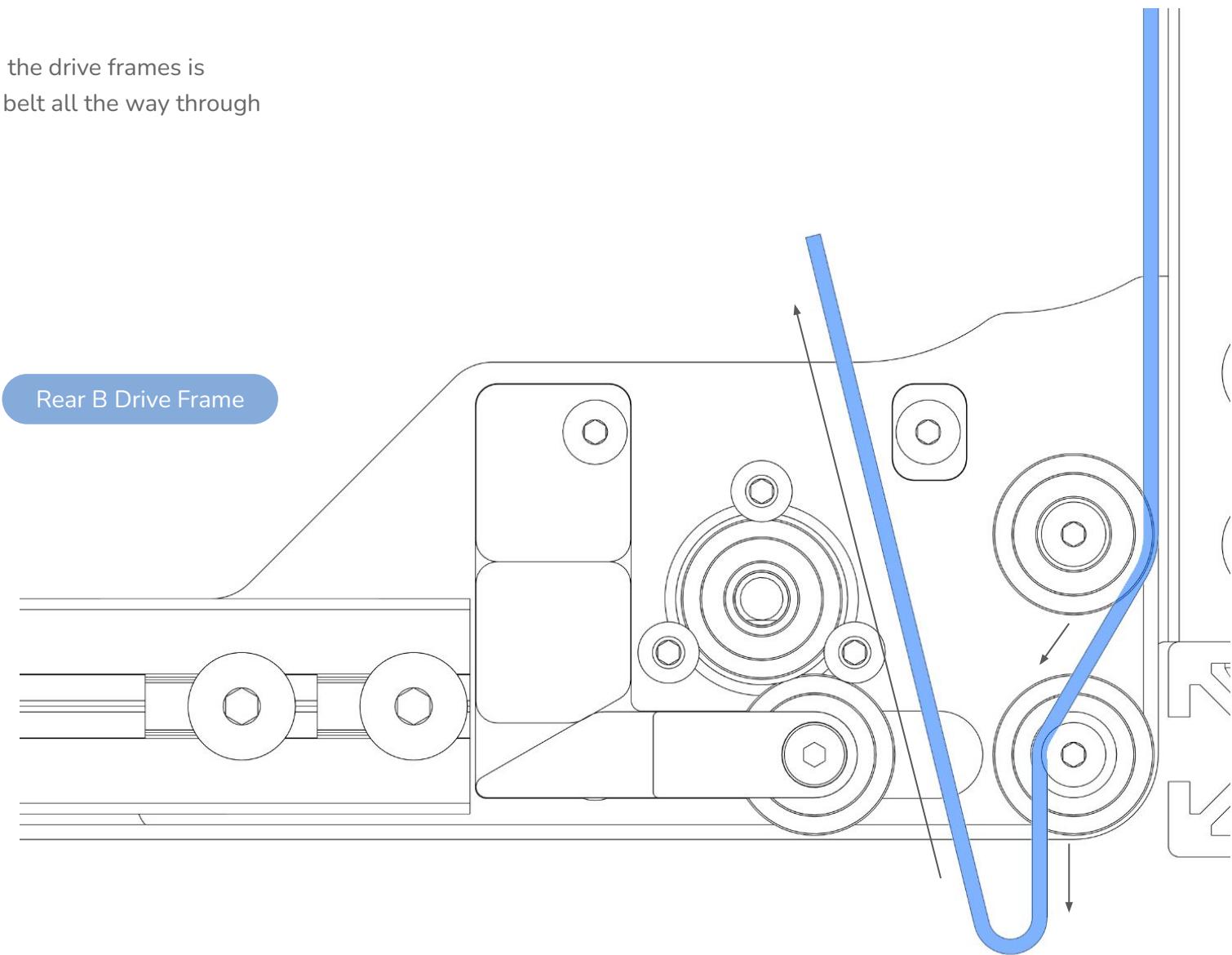
Pull the remaining belt past the XY joint and verify that the belt is within the flanges of each spaced bearing stack and pulley.

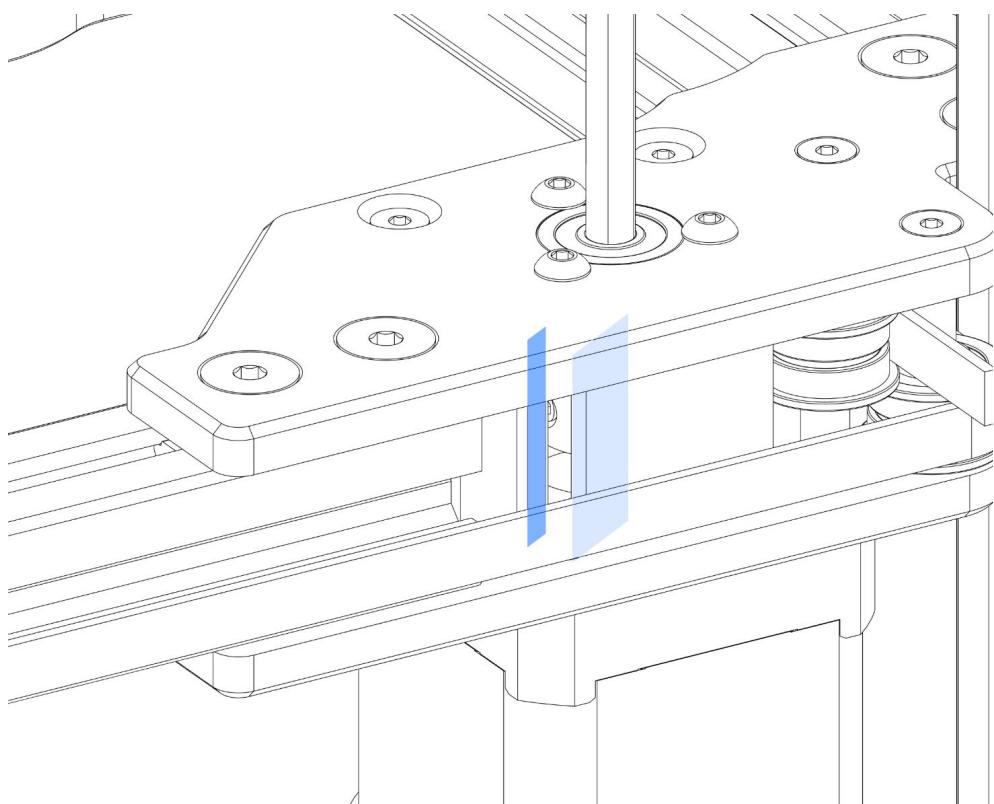




Hook or Loop?

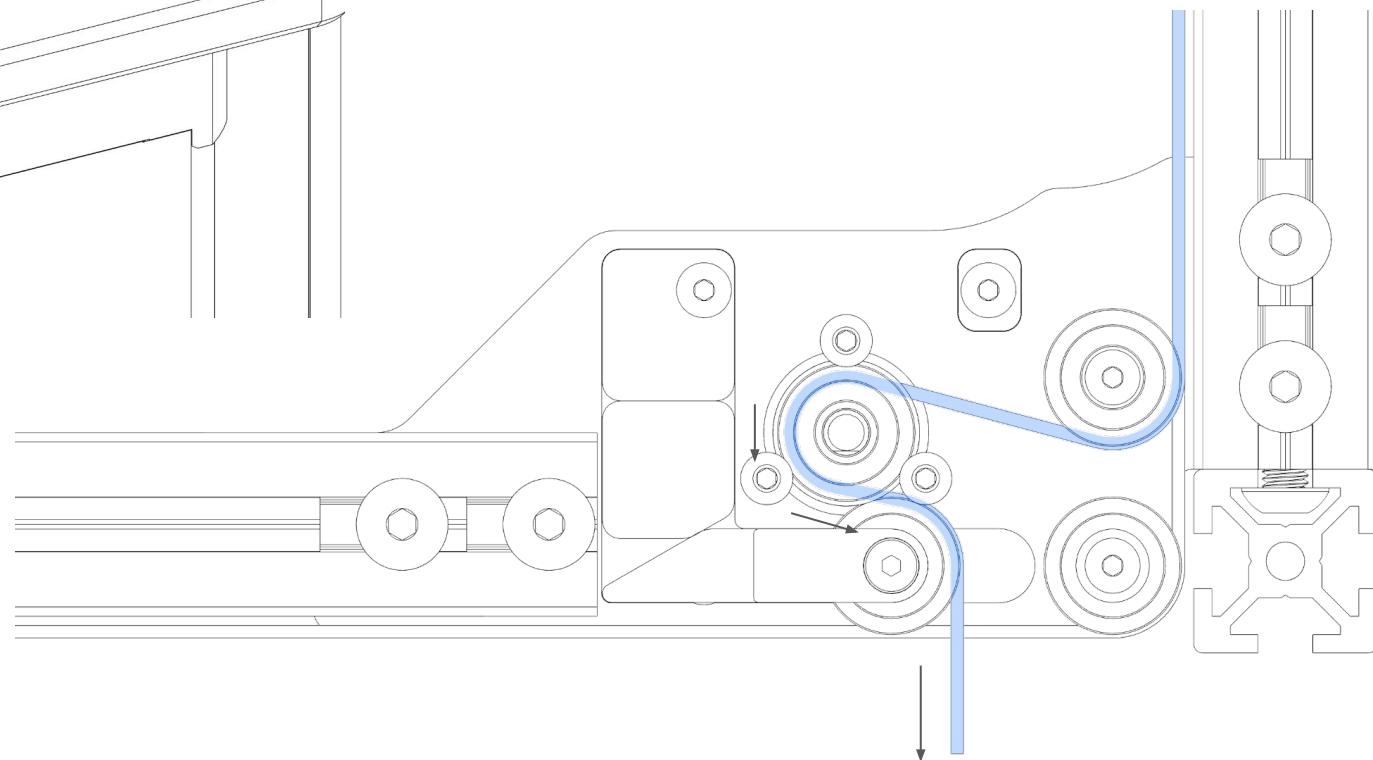
Routing the belts through the drive frames is easiest when passing the belt all the way through and then looping it back.





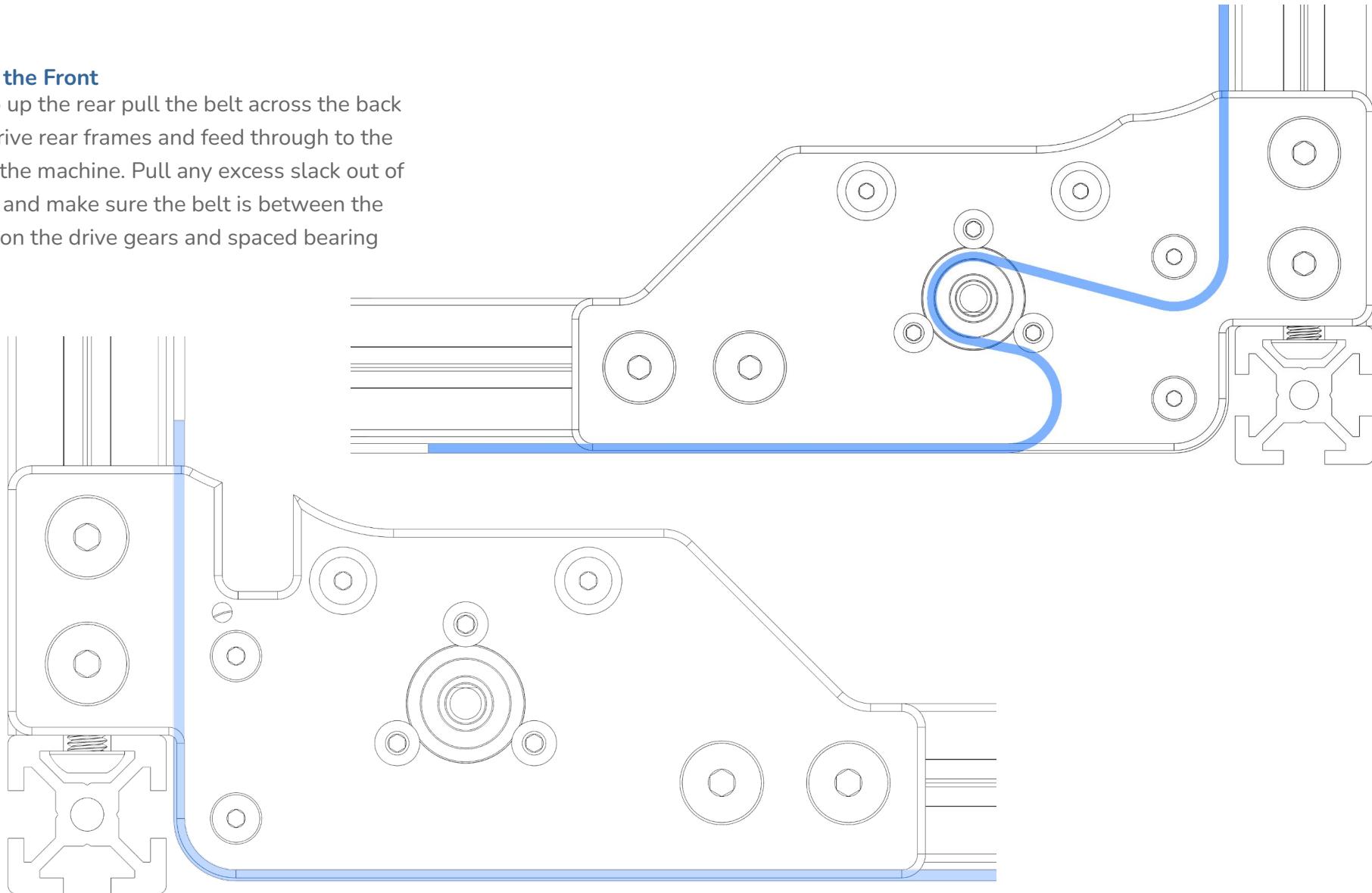
Thread the Needle

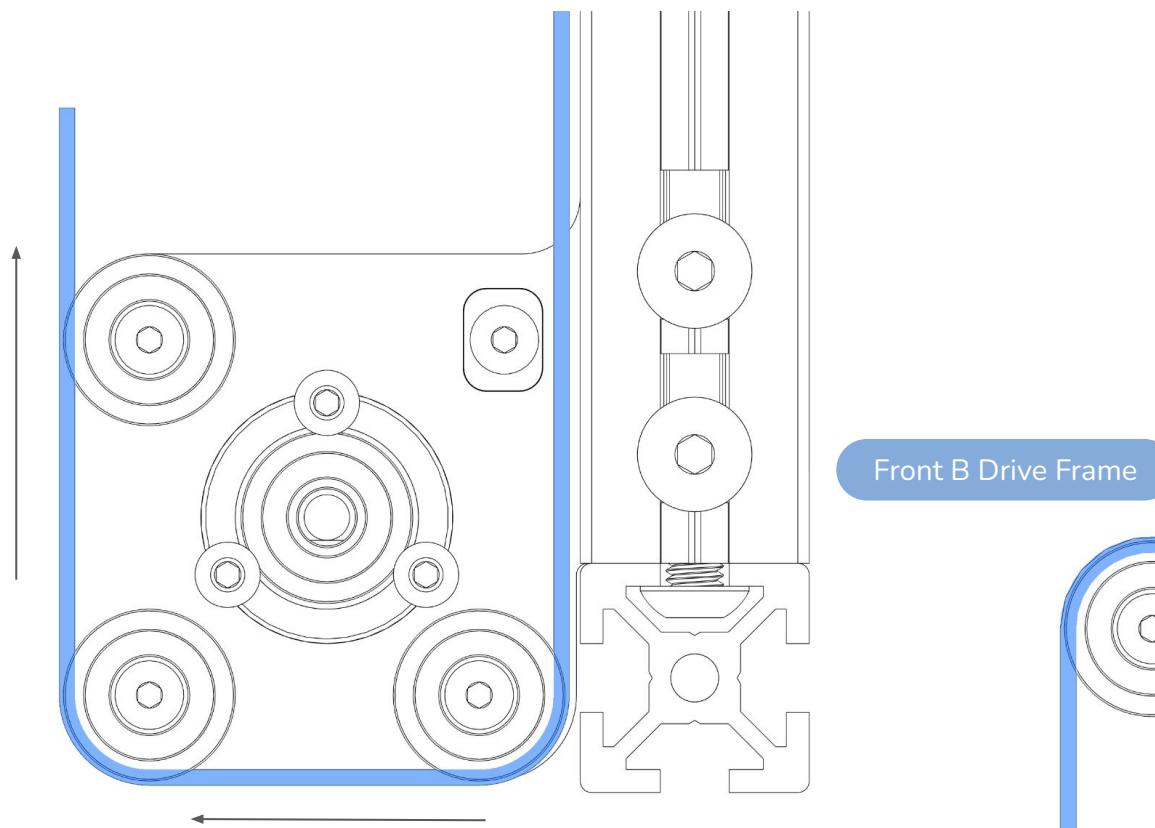
Slide a tool through the highlighted gap when feeding the belt around the drive gear to route the belt towards the tensioner idler. Then use a tool through the wide gap at the front of the drive frame to push the belt out the back of the drive frame.



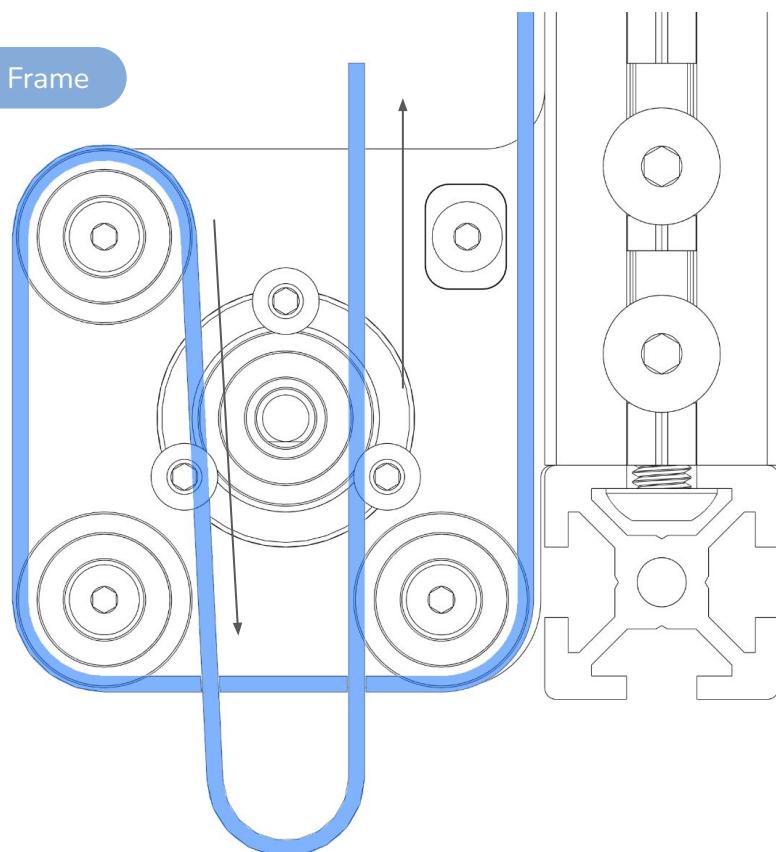
Back to the Front

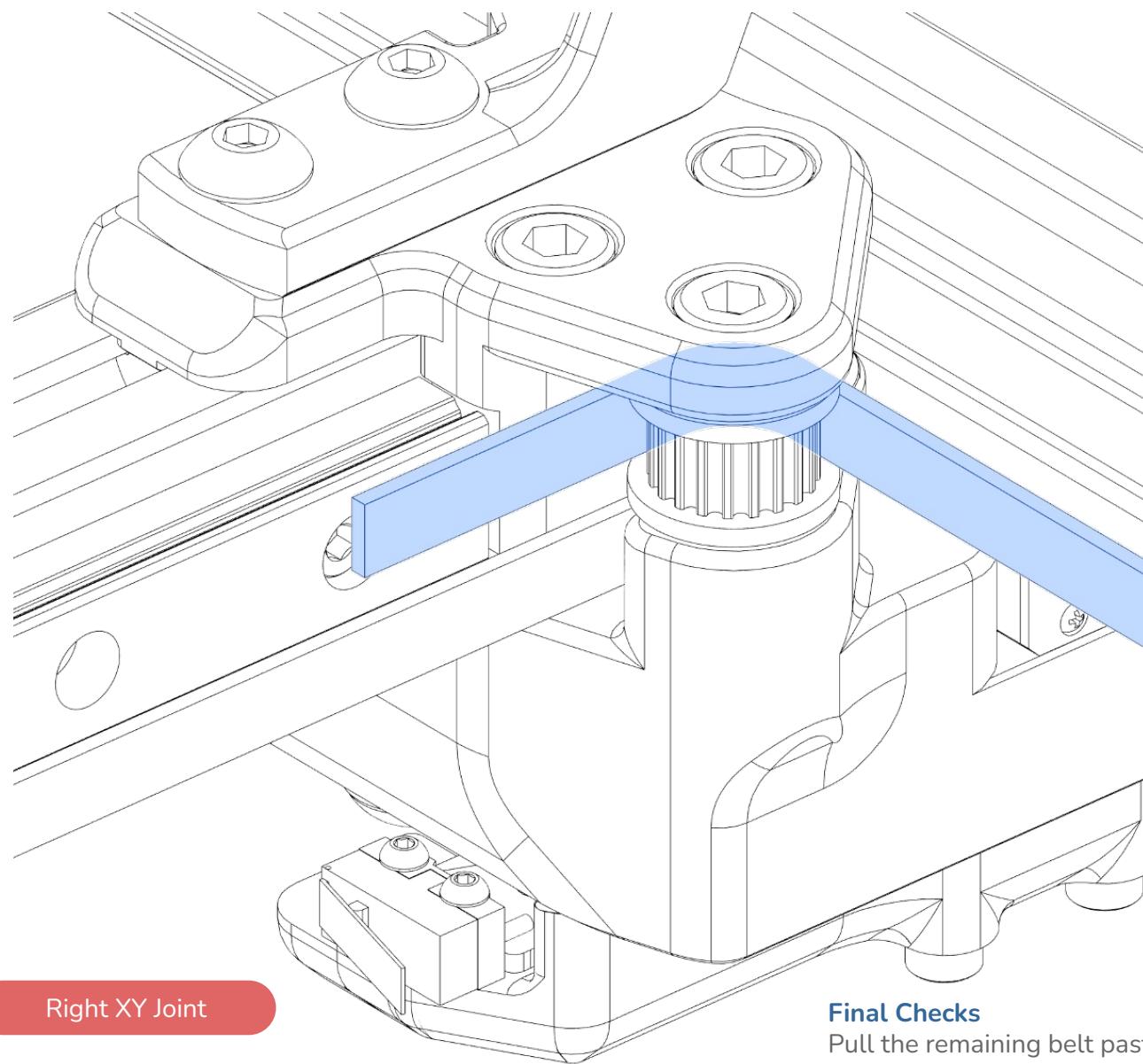
To wrap up the rear pull the belt across the back of the drive rear frames and feed through to the front of the machine. Pull any excess slack out of the belt and make sure the belt is between the flanges on the drive gears and spaced bearing stacks.



**Last Stretch**

Route the belts across the front spaced bearing stacks, around the drive gear, then out the back. Next we'll wrap around the final spaced bearing stack and around the live shaft idler. Use a small hex key through the highlighted gap to push the belt out of the drive frame.

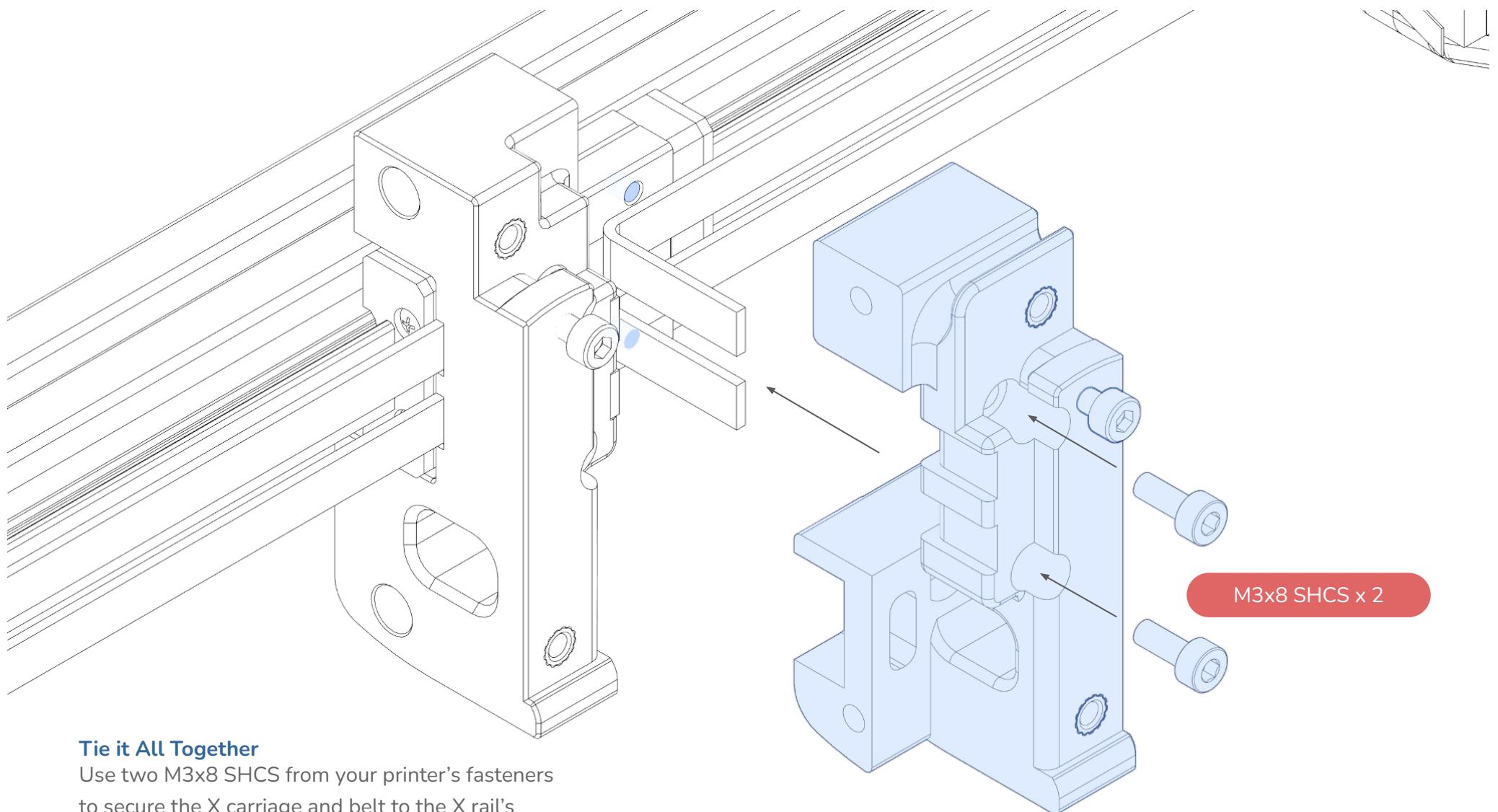




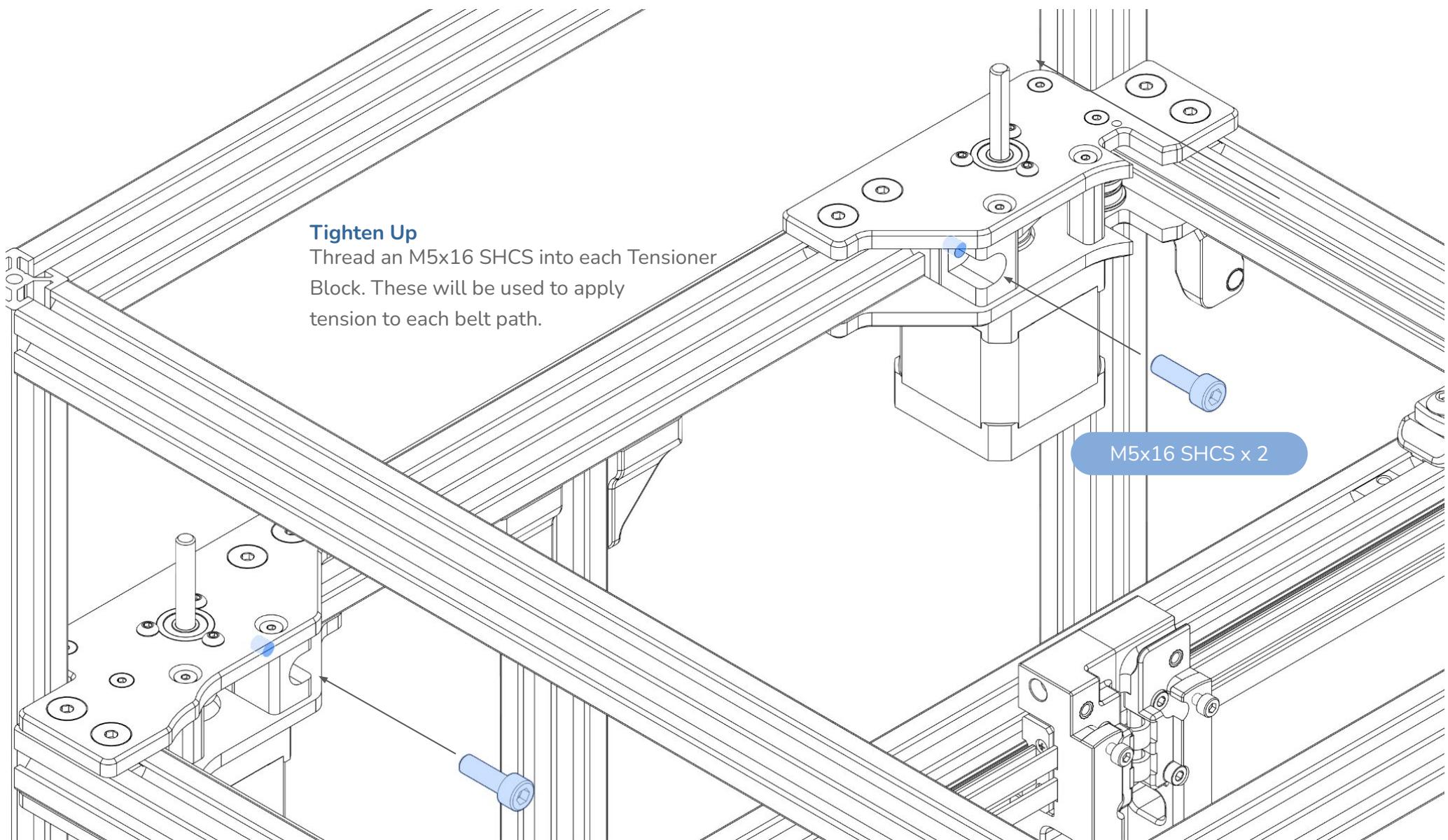
Right XY Joint

Final Checks

Pull the remaining belt past the XY joint and verify that the belt is within the flanges of each spaced bearing stack and pulley.

**Tie it All Together**

Use two M3x8 SHCS from your printer's fasteners to secure the X carriage and belt to the X rail's carriage block. Pull the belts tight before fully tightening the X carriage.

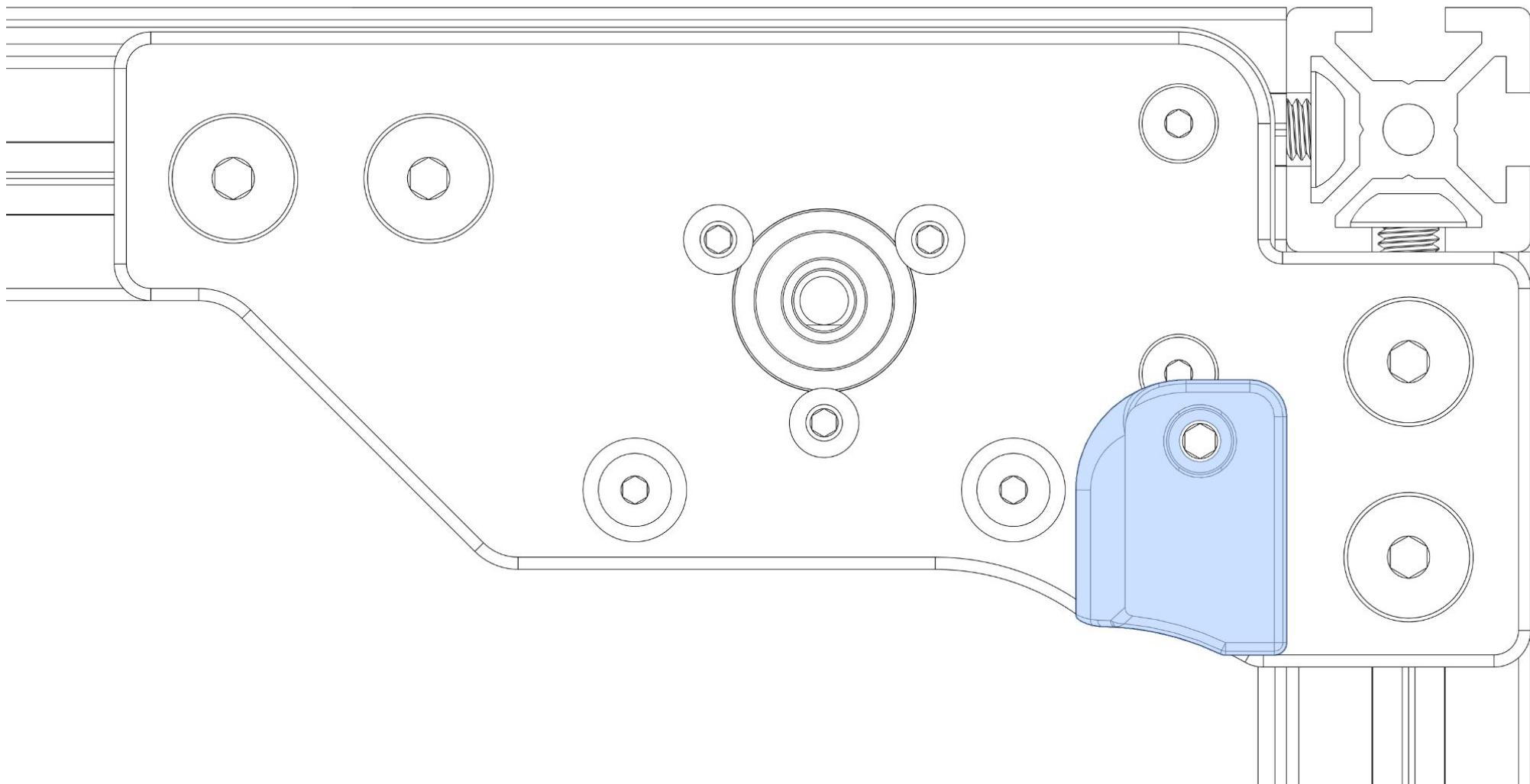


Final Stretch

The last few step should be completed as needed during wiring and after boot up and initial checks.

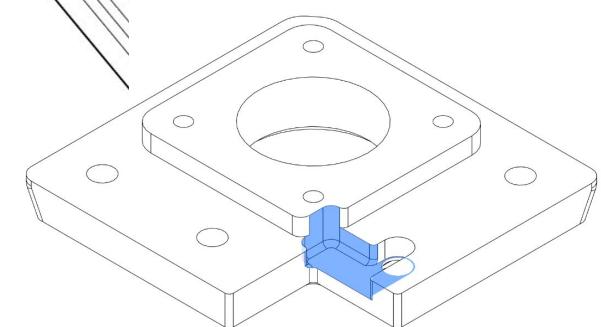
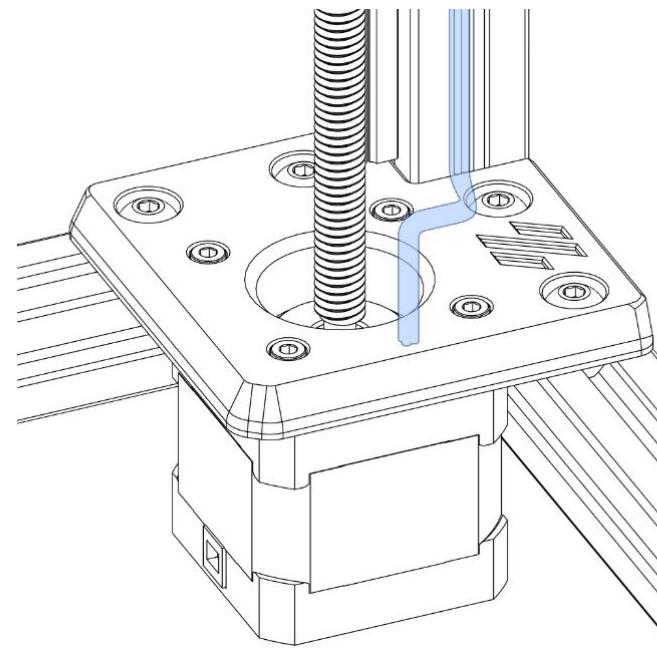
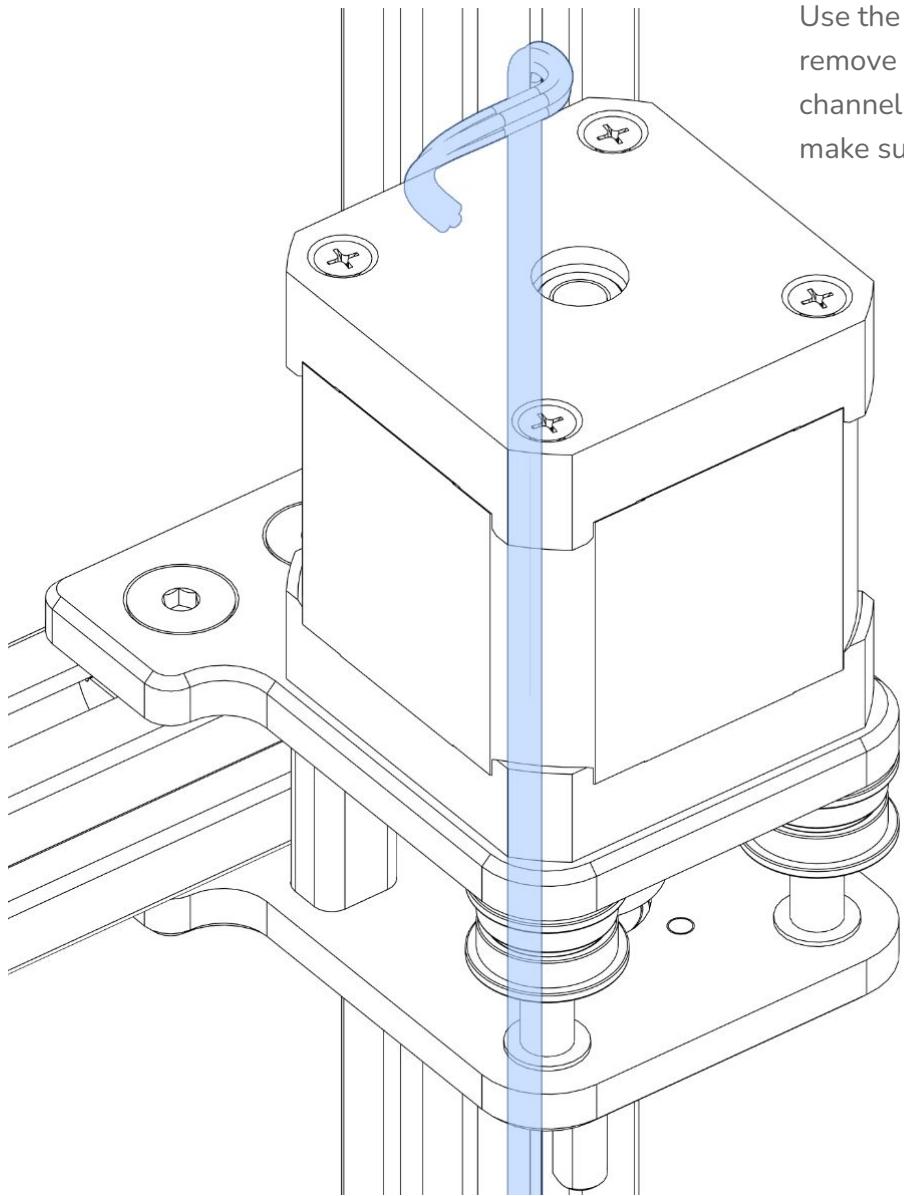
A Tidy Printer is a Happy Printer

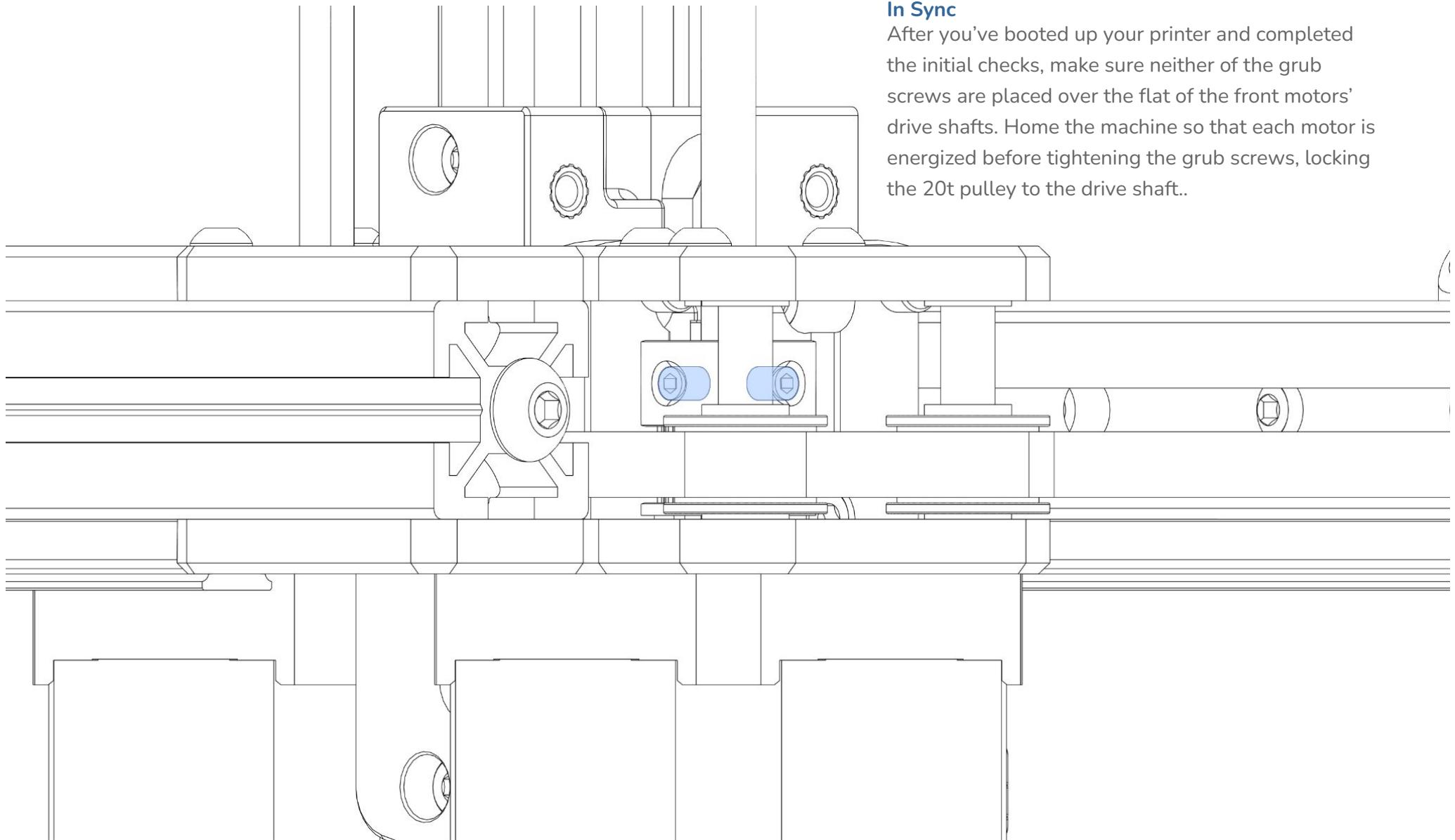
The top of the rear A drive frame has a mounting hole for a wire cover similar to the Voron Trident printed parts. A modified wire cover has been designed for use with this kit. Use a M3x12 SHCS to mount the printed part to the drive frame.



A Tidy Printer is a Happy Printer Pt 2

Use the extrusion channels to run your front motor wires to the base of your printer. From there, remove your motor mount (if already installed) and ensure the motor's wire is routed through the channel highlighted. As you install the motor mount give light tugs on the wire, back and forth, to make sure its not being pinched.



**In Sync**

After you've booted up your printer and completed the initial checks, make sure neither of the grub screws are placed over the flat of the front motors' drive shafts. Home the machine so that each motor is energized before tightening the grub screws, locking the 20t pulley to the drive shaft..