

VORON2 2.4R2 BUILD GUIDE

We build space shuttles with gardening tools
so anyone can have a space shuttle of their own.

VERSION 2023-07-04



Before you begin on your journey, a word of caution.

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

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

Most of all, good luck!

THE VORON TEAM

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PART PRINTING GUIDELINES

The Voron Team has provided the following print guidelines for you to follow in order to have the best chance at success with your parts. There are often questions about substituting materials or changing printing standards, but we recommend you follow these:

3D PRINTING PROCESS

Fused Deposition Modeling (FDM)

MATERIAL

ABS

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

PRINT IT FORWARD (PIF)

Often times community members that have issues printing ABS will bootstrap themselves into a VORON using our Print It Forward program. This is a service where approved members with VORON printers can make you a functional set of parts to get your own machine up and running.

Check Discord if you have any interest in having someone help you out.

FILE NAMING

By this time you should have already downloaded our STL files from the Voron GitHub. You might have noticed that we have used a unique naming convention for the files. This is how to use them.

PRIMARY COLOR

Example `z_joint_lower_x4.stl`

These files will have nothing at the start of the filename.

ACCENT COLOR

Example `[a]_tensioner_left.stl`

We have added “[a]” to the front of any STL file that is intended to be printed with accent color.

QUANTITY REQUIRED

Example `[a]_z_belt_clip_lower_x4.stl`

If any file ends with “_x#”, that is telling you the quantity of that part required to build the machine.

HOW TO GET HELP

If you need assistance with your build, we're here to help. Head on over to our Discord group and post your questions. This is our primary medium to help VORON Users and we have a great community that can help you out if you get stuck.



<https://discord.gg/voron>

REPORTING ISSUES

Should you find an issue in the documentation or have a suggestion for an improvement please consider opening an issue on GitHub (<https://github.com/VoronDesign/Voron-2/issues>). When raising an issue please include the relevant page numbers and a short description; annotated screenshots are also very welcome. We periodically update the manual based on the feedback we get.

THIS IS JUST A REFERENCE

This manual is designed to be a simple reference manual. Building a Voron can be a complex endeavour and for that reason we recommend downloading the CAD files off our Github repository if there are sections you need clarification on. It can sometimes be easier to follow along when you have the whole assembly in front of you.

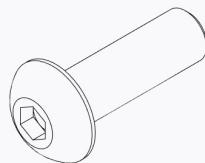


<https://github.com/vorondesign>

<https://docs.vorondesign.com/>

HARDWARE REFERENCE

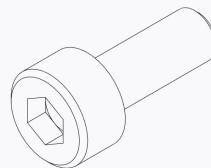
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BUTTON HEAD CAP SCREW (BHCS)

Metric fastener with a domed shape head and hex drive. Most commonly found in locations where M5 fasteners are used.

ISO 7380-1



SOCKET HEAD CAP SCREW (SHCS)

Metric fastener with a cylindrical head and hex drive. The most common fastener used on the Voron.

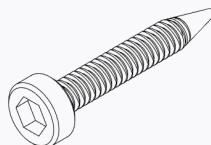
ISO 4762



FLAT HEAD COUNTERSUNK SCREW (FHCS)

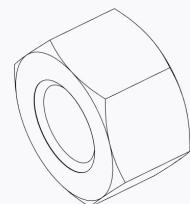
Metric fastener with a cone shaped head and a flat top.

ISO 10642



SELF TAPPING SCREW

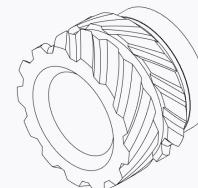
Fastener with a pronounced thread profile that is screwed directly into plastic.



HEX NUT

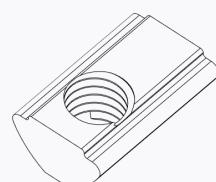
Hex nuts couple with bolts to create a tight, secure joint. You'll see these used in both M3 and M5 variants throughout this guide.

ISO 4032



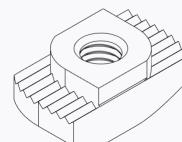
HEAT SET INSERT

Heat inserts with a soldering tip so that they melt the plastic when installed. As the plastic cools, it solidifies around the knurls and ridges on the insert for excellent resistance to both torque and pull-out.



POST INSTALL T-SLOT NUT (T-NUT)

Nut that can be inserted into the slot of an aluminium profile. Used in both M3 and M5 variants throughout this guide. Often also called "roll-in t-nut".

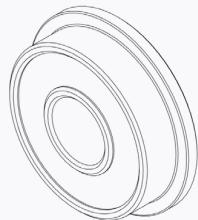


HAMMERHEAD NUT

Nut that can be inserted into the slot of an aluminium profile. Used exclusively for panel mounting, all other components use T-Slot nuts.

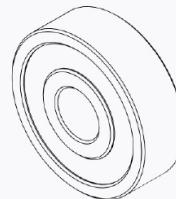
HARDWARE REFERENCE

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F695 BEARING

A ball bearing with a flange used in various gantry locations.



625 BEARING

A ball bearing used on the Voron Z drives.



SHIM

Not to be confused with stamped washers. These are used in all M5 call-out locations in this manual.

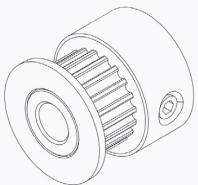
DIN 988



WASHER

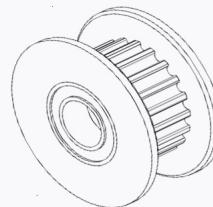
Usually stamped from sheet metal this type of spacer is not as consistent in thickness as the shims are. Only used in M3 size.

DIN 125



PULLEY

GT2 pulley used on the motion system of the Voron.



IDLER

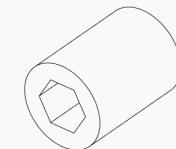
GT2 idler used in the motion system of the Voron.



THUMB NUT

Used in the print bed as a spacer.

DIN 466-B



SET SCREW

Small headless screw with an internal drive. Used in pulleys and other gears. Also called a grub screw.

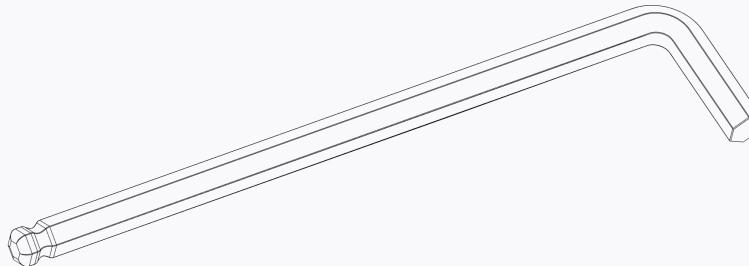
ISO 4026

INTRODUCTION

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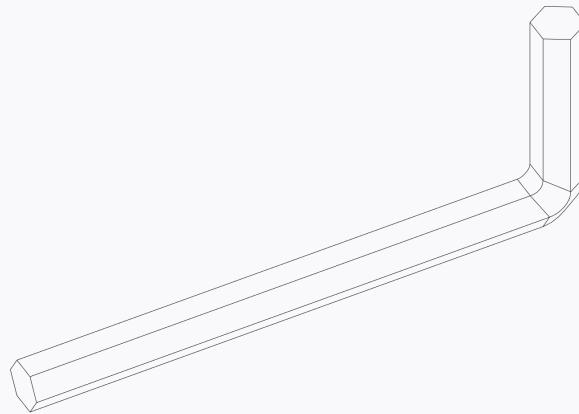
BALL-END DRIVER

Some parts of this design require the use of a ball-end hex driver for assembly. We recommend you get a 2.0mm, 2.5mm and 3mm one.



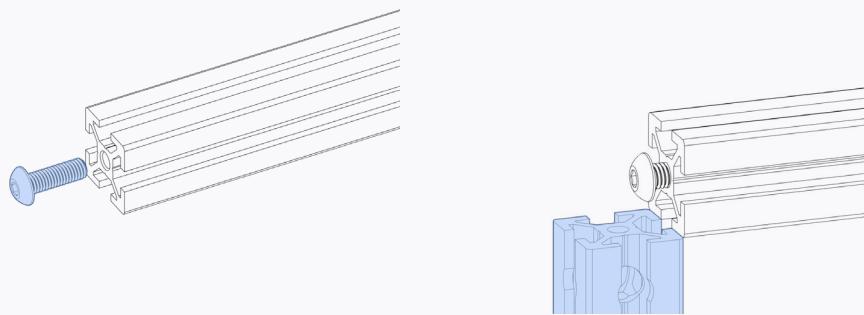
2.5MM HEX DRIVER

The 2.5mm hex driver will see a lot of use in this build. A quality driver is strongly recommended. Refer to the sourcing guide for suggestions.



ADDITIONAL TOOLS

We provide additional tool recommendations in our sourcing guide. Visit https://vorondesign.com/sourcing_guide and switch to the “Voron Tools” tab at the bottom of the page.



BLIND JOINT BASICS

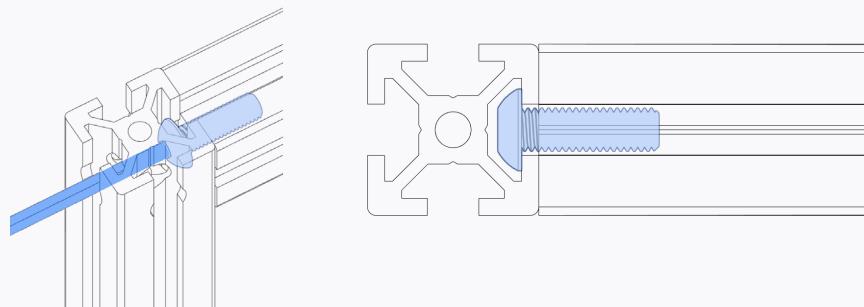
Blind Joints provide a cost effective and rigid assembly method.

The head of the BHCS is slid into the channel of another extrusion and securely fastened through a small access hole in the extrusion.

If you've never assembled one before we recommend you watch the linked guide.



<https://voron.link/onjwmcd>



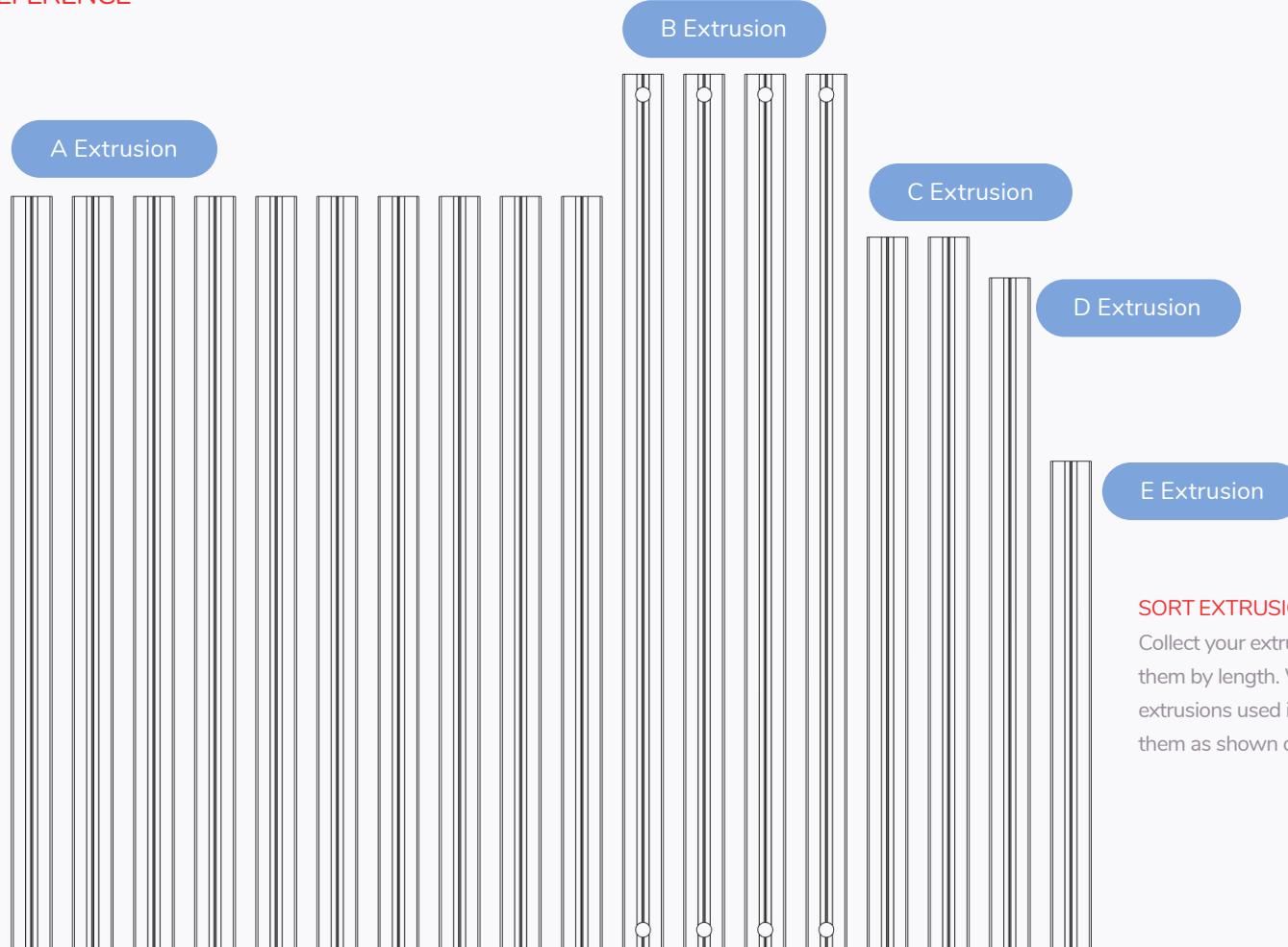
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The first Voron printer was released to the public on March 10 2016.

FRAME

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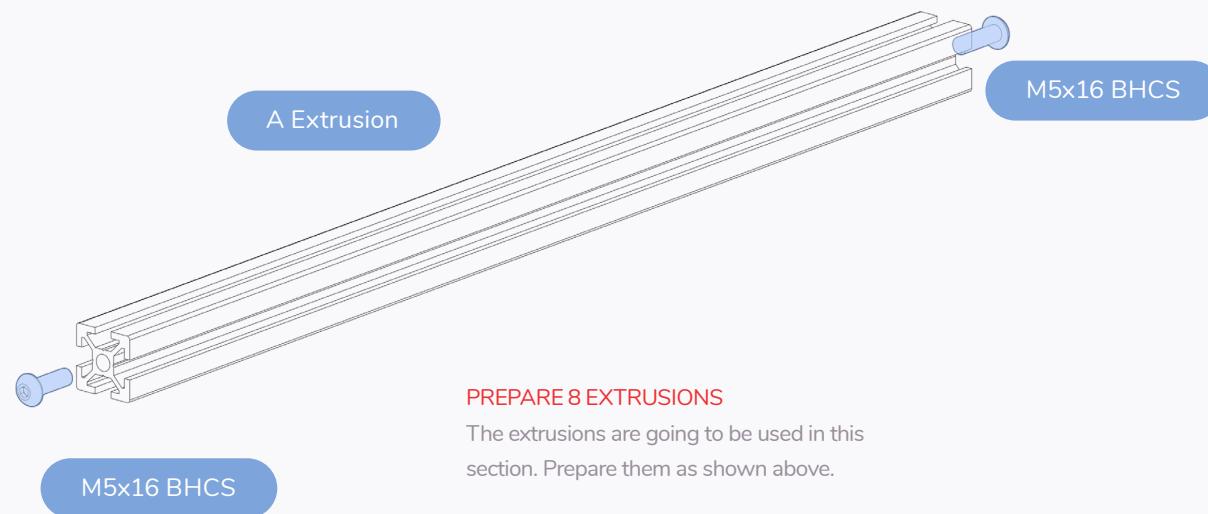
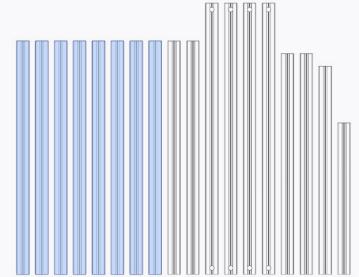


SORT EXTRUSIONS

Collect your extrusions and sort them by length. We will highlight the extrusions used in each step and label them as shown on this page.

FRAME

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PREPARE 8 EXTRUSIONS

The extrusions are going to be used in this section. Prepare them as shown above.

FRAME

FRAME ASSEMBLY

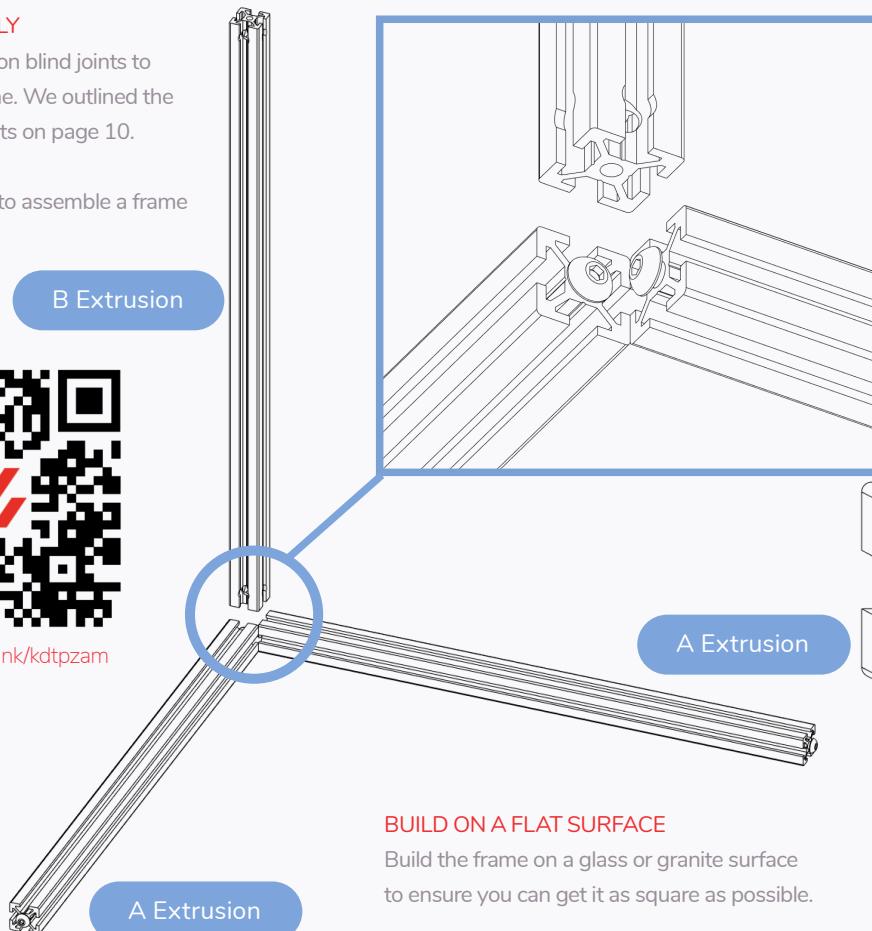
This design relies on blind joints to assemble the frame. We outlined the basics of blind joints on page 10.

More tips on how to assemble a frame are linked below.

B Extrusion



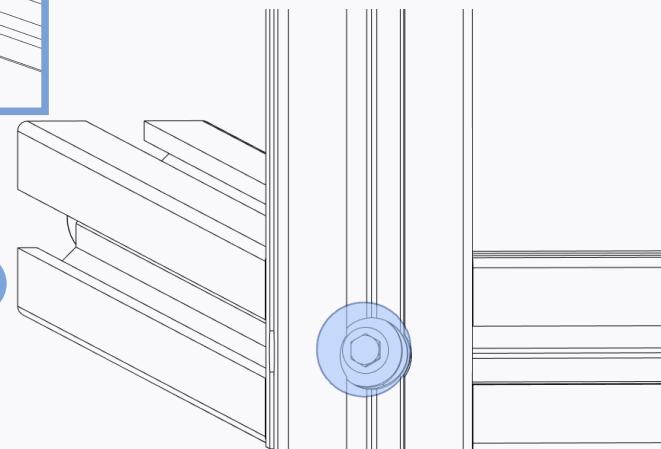
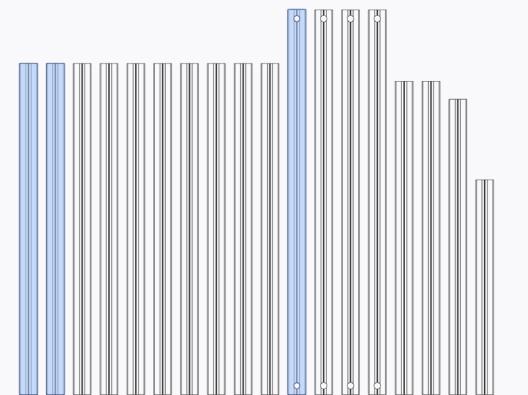
<https://voron.link/kdtpzam>



BUILD ON A FLAT SURFACE

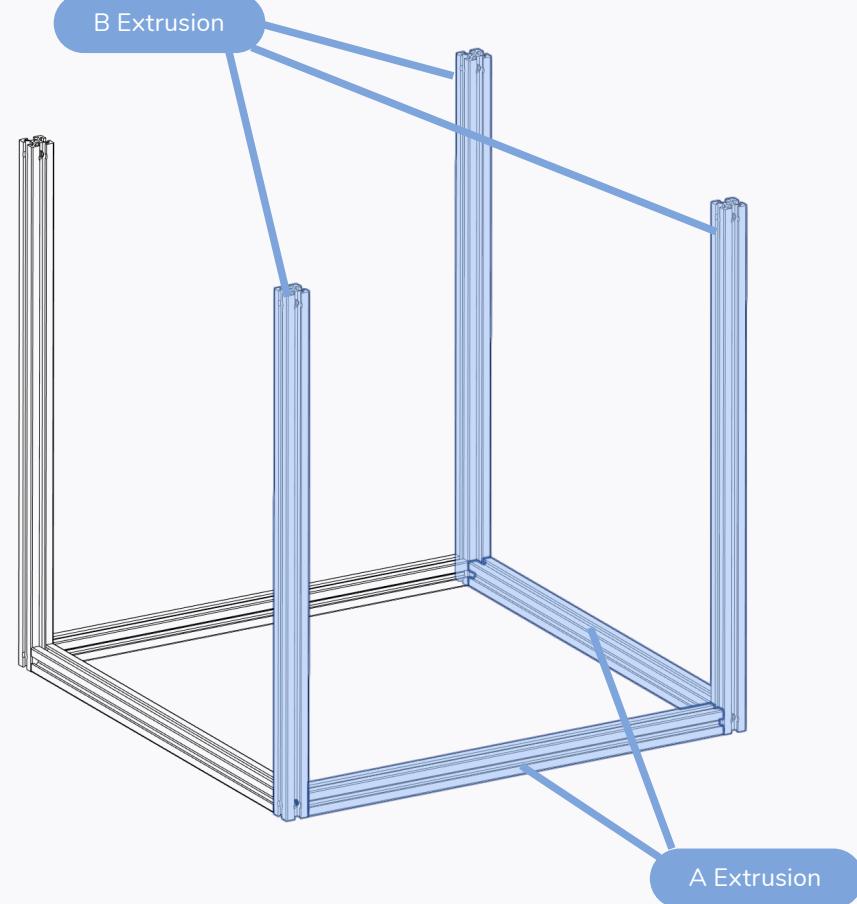
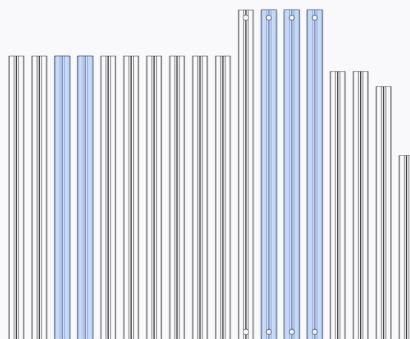
Build the frame on a glass or granite surface to ensure you can get it as square as possible.

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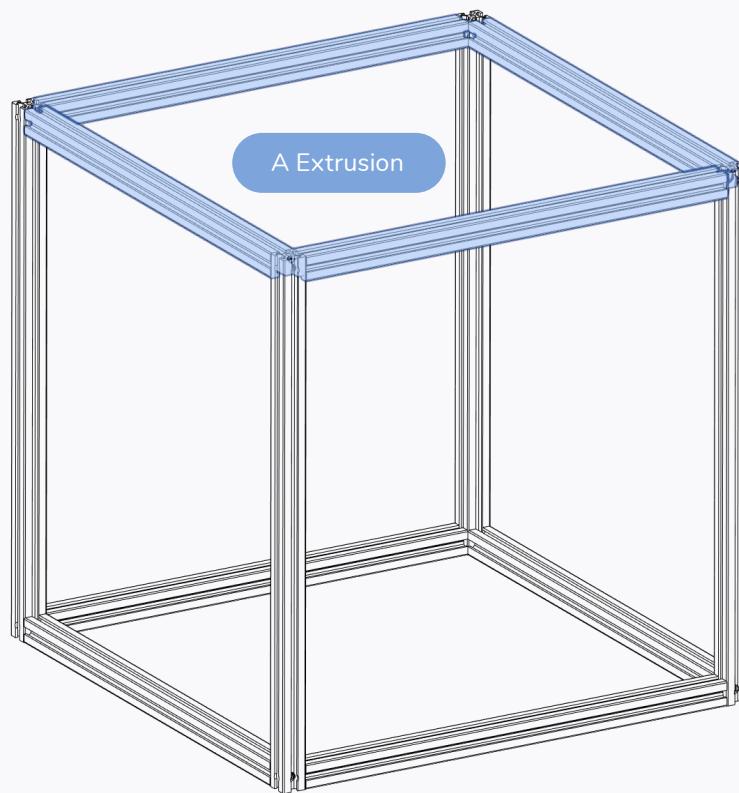


FRAME

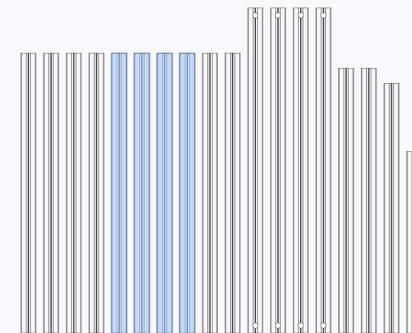
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FRAME

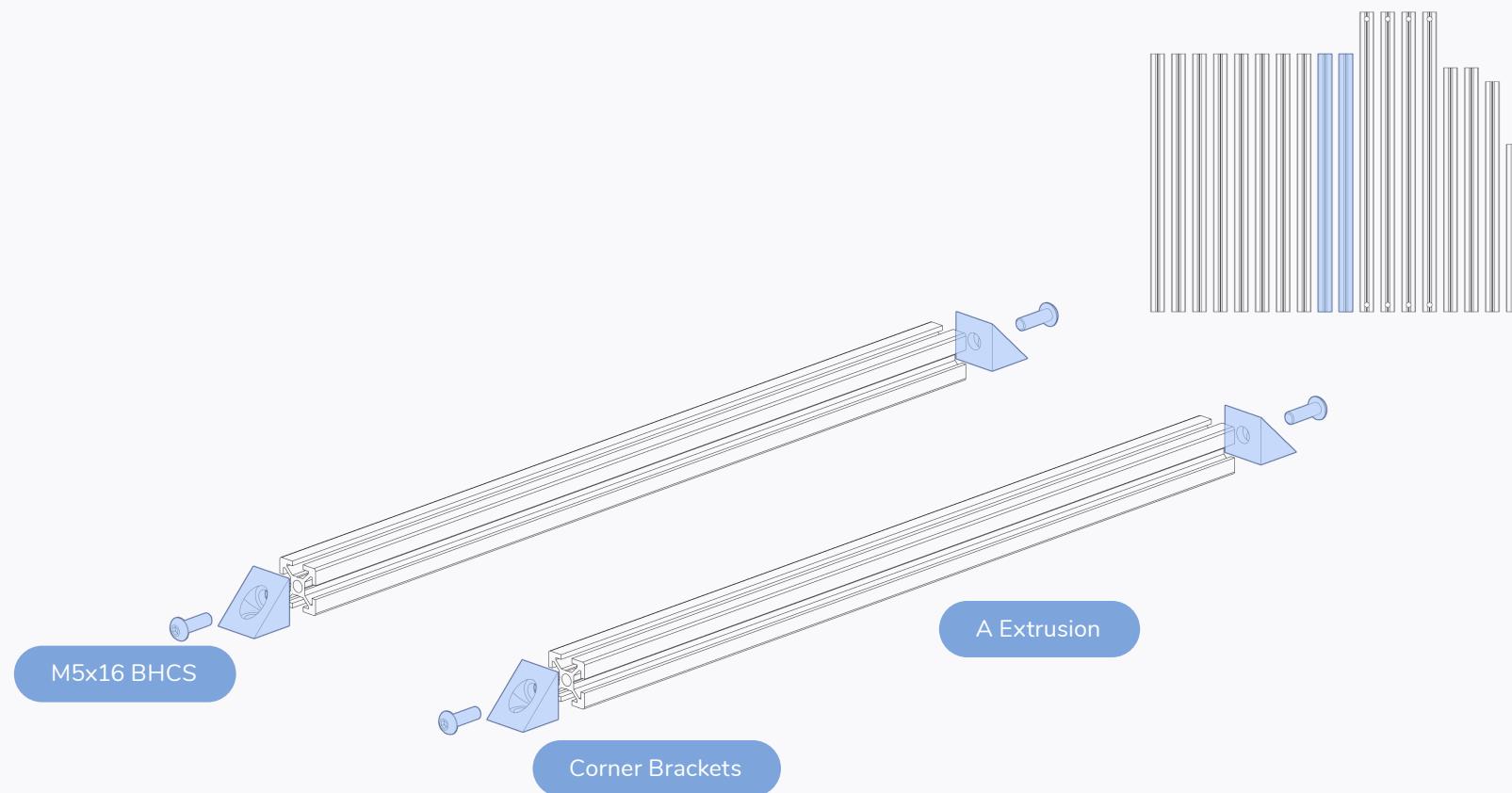


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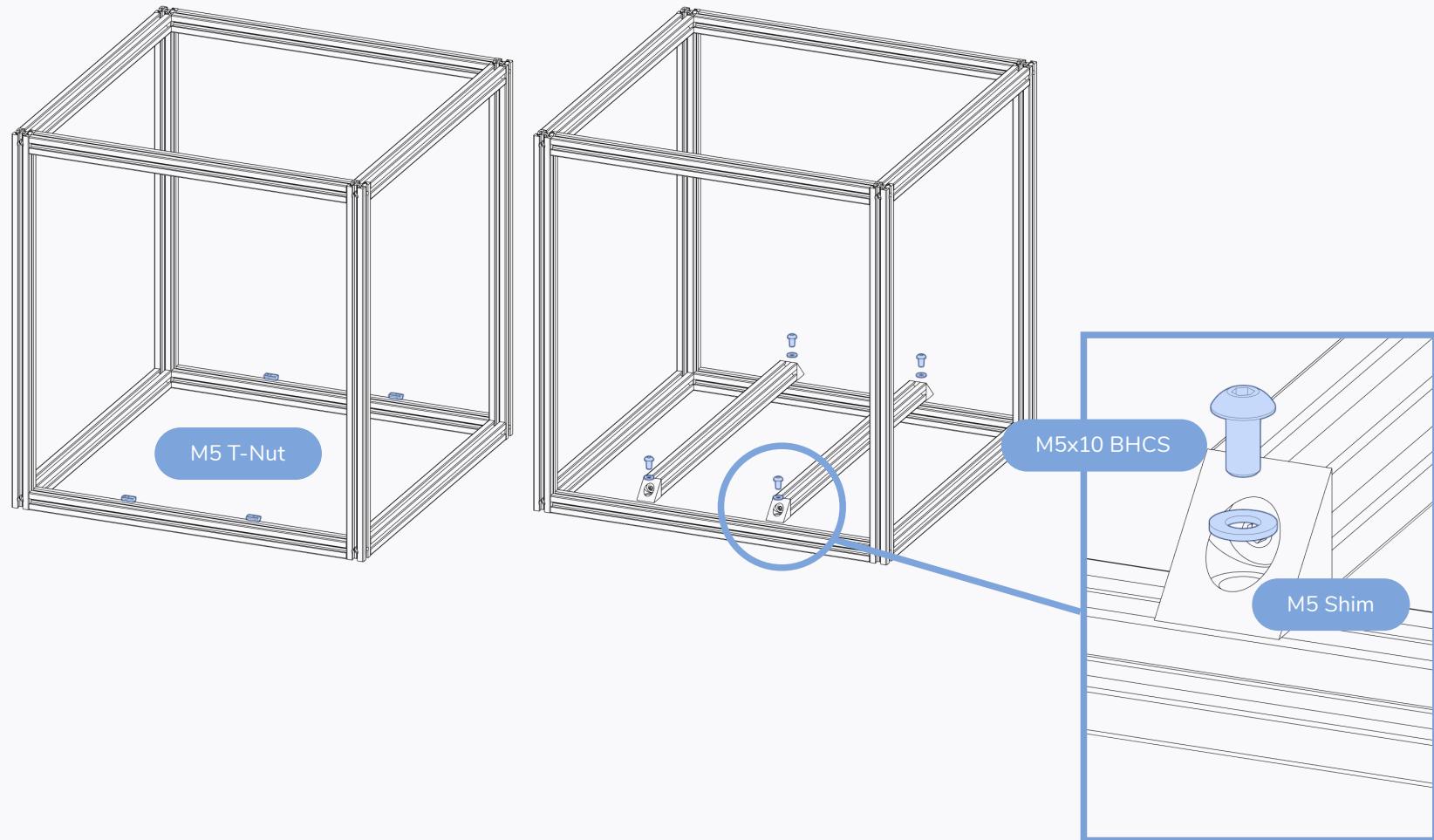
FRAME

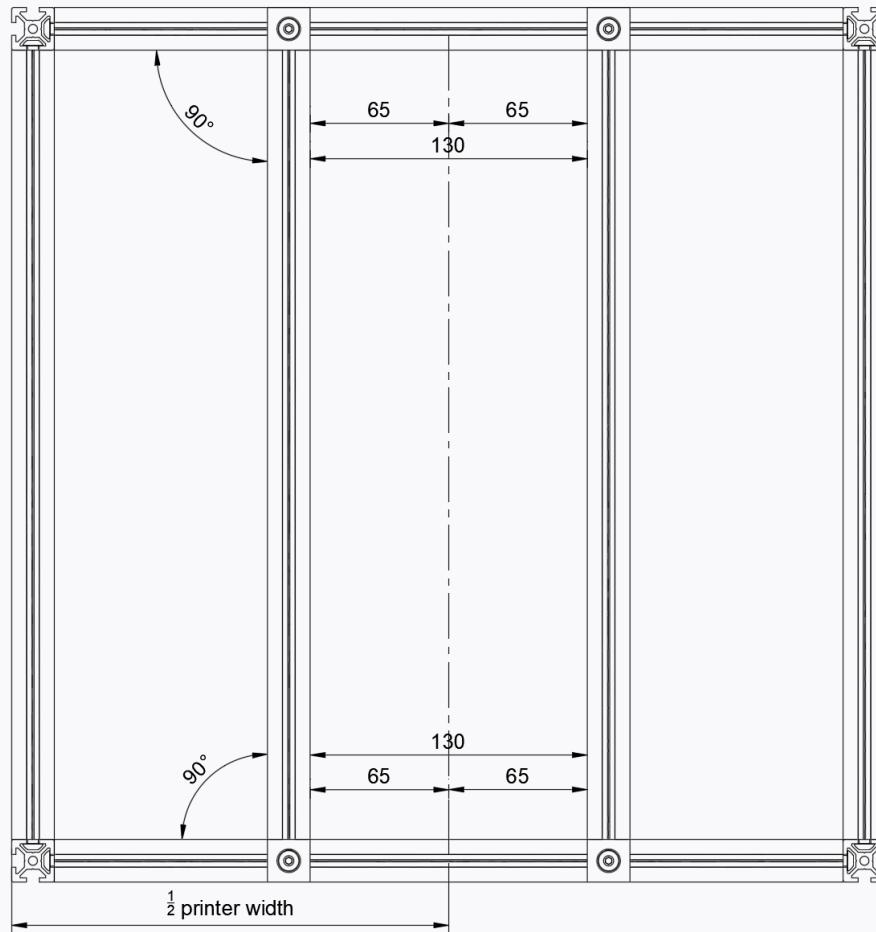
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FRAME

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POSITION BED EXTRUSIONS

Find the centreline of the printer and position the bed extrusions as shown in the diagram to the left. The distance between the extrusions is 130mm centred on the centreline of the printer.

1/2 printer width for standard sizes:

250 spec 205mm

300 spec 230mm

350 spec 255mm

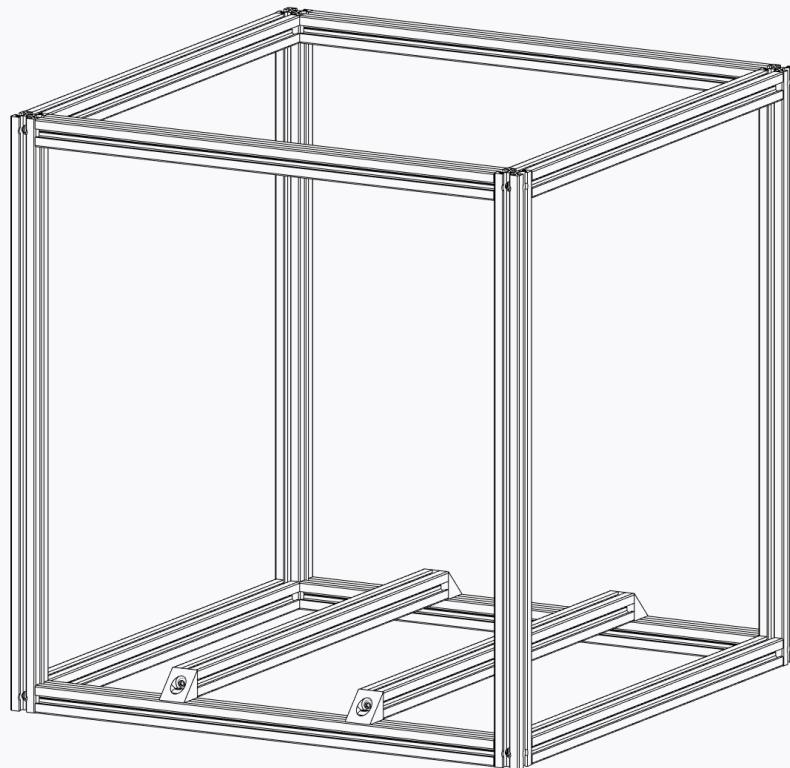
ALL UNITS ARE METRIC

If a unit is not specified assume it's metric.

All distances are called out in millimeters.

FRAME

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CHECK FOR SQUARENESS

Verify the angle of all corners and the overall squareness by measuring the diagonals. Refer to the second half of the linked video for additional information.

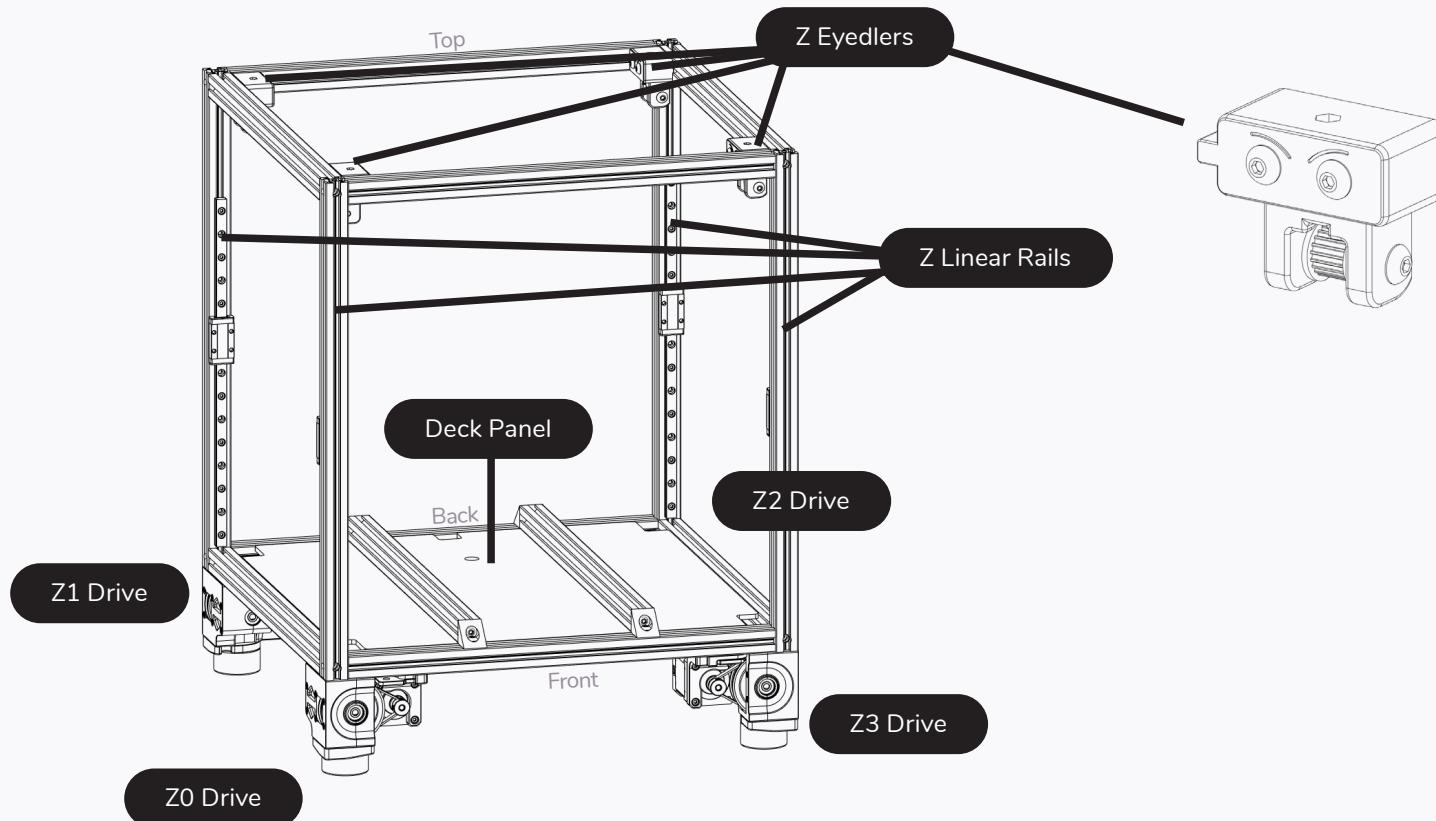


<https://voron.link/kdtpzam>

Z DRIVES

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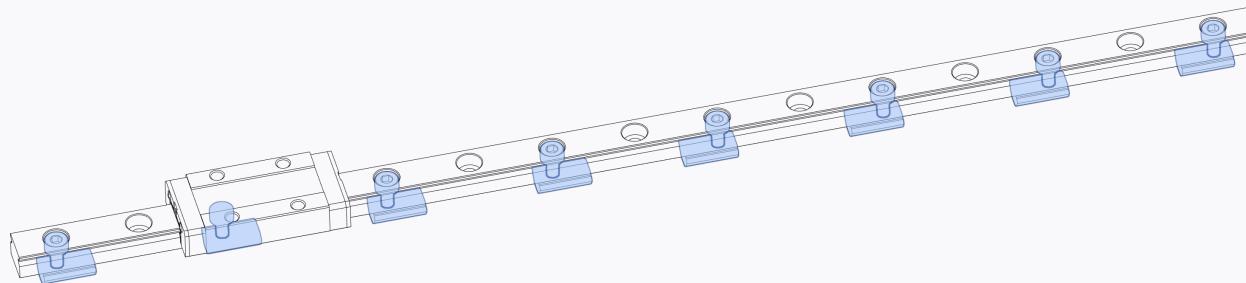
OVERVIEW

Individual chapters start with an overview of the components that will be built/added to the printer in the chapter.

HANDLE WITH CARE

The carriage can slide off the rail if not handled properly. Dropping the carriage will likely damage it.

Any marks, dents or nicks might cause the linear rail to misbehave in operation.



LINEAR RAILS - PREPARATION AND MOUNTING

Most linear rails arrive with shipping oil. To ensure a smooth gliding motion and long service life, this oil needs to be removed and its rail carriage greased. See the Voron sourcing guide for a recommended list of lubricants. We attached a link to a video guide to get you started.

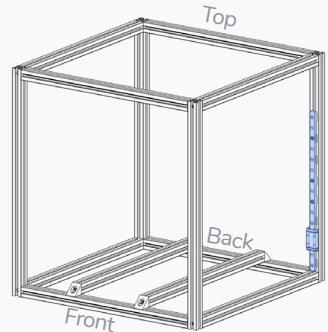
We opted to skip every other mounting hole in the linear rail when designing the mounting pattern for this printer. This cuts down on mounting hardware and still meets the requirements for our use case.

When tightening the bolts tighten them from the center outward to ensure that the rail sits flush on the extrusion.



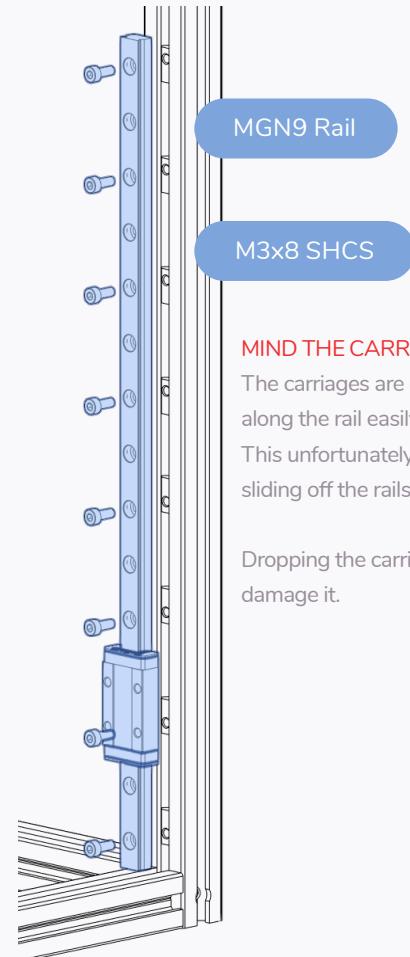
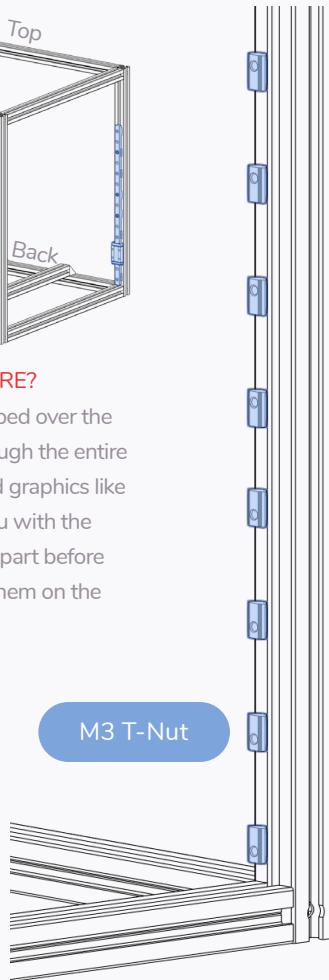
Z RAILS

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WHY IS THIS HERE?

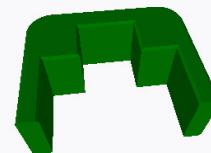
As you likely skipped over the advice to flip through the entire manual we added graphics like these to assist you with the orientation of the part before you actually put them on the printer.



MIND THE CARRIAGE

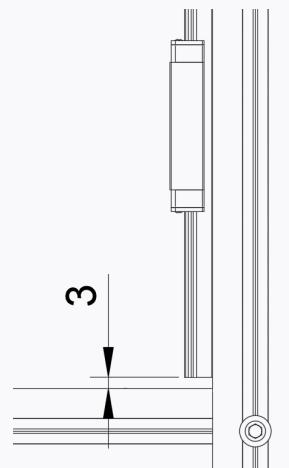
The carriages are designed to slide along the rail easily. This unfortunately also includes sliding off the rails.

Dropping the carriage will likely damage it.



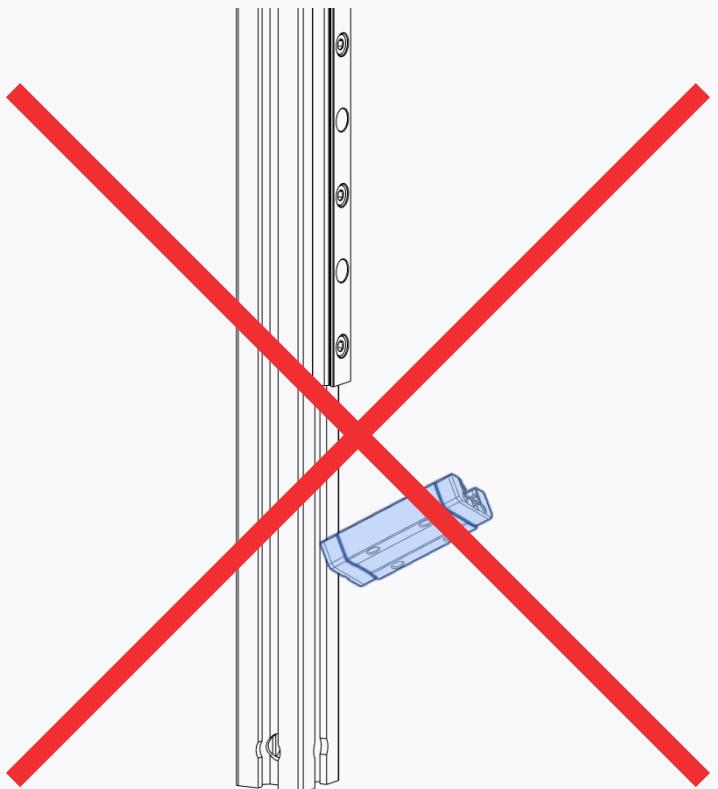
CENTRED RAIL INSTALLATION GUIDE

Use the MGN9 guides to position the rail in the center of the extrusion prior to fastening the screws.



BOTTOM GAP

Leave a gap between the printer frame and the rail. ~3mm is fine.

**RAIL SAFETY**

As we will turn the printer upside down during further assembly make sure to fix each carriage in position with a piece of sticky tape.

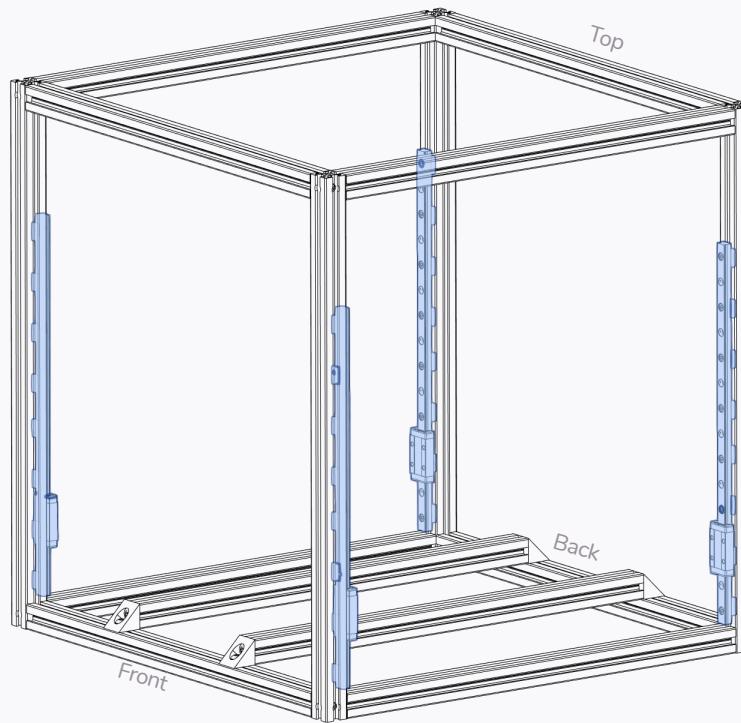
If your rails were delivered with plastic stoppers you can also temporarily reinstall them to prevent carriages from falling off their rails and spilling their bearing balls..

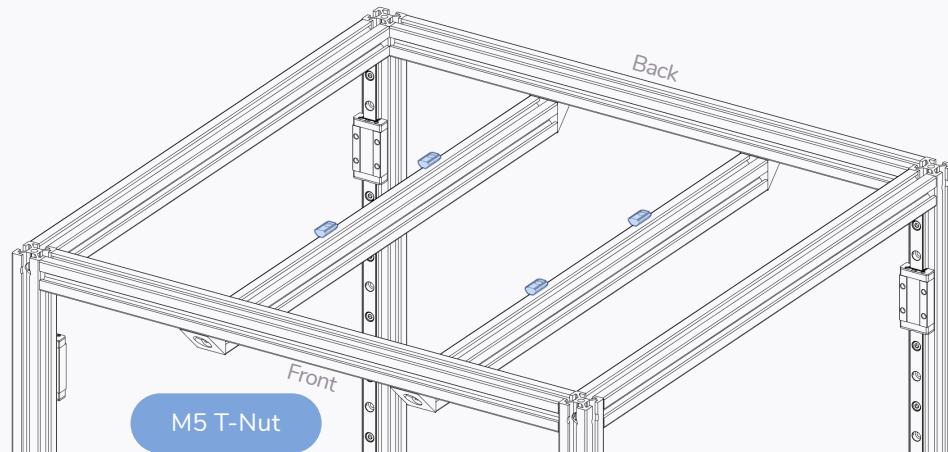
For illustration purposes only. Do not attempt to replicate.

INSTALL REMAINING Z RAILS

Add the remaining Z rails
following the same instructions.

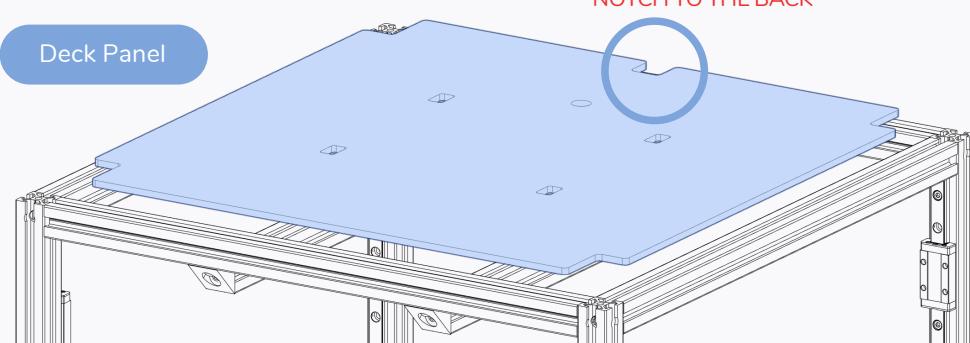
Make sure the rails face each
other as shown in the graphic.

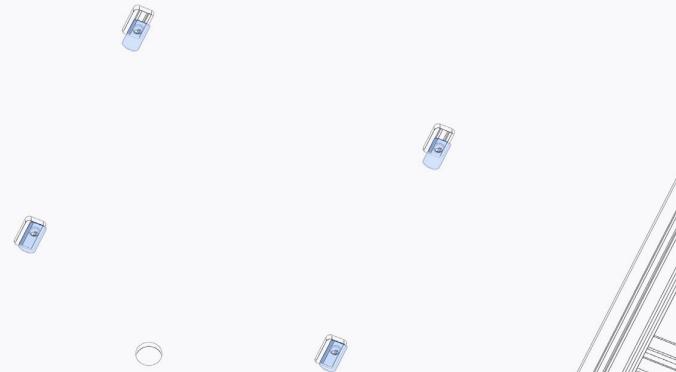


**FLIP PRINTER UPSIDE DOWN**

It's easier working with gravity than against it. But make sure the rail carriages are secure before doing so.

Deck Panel

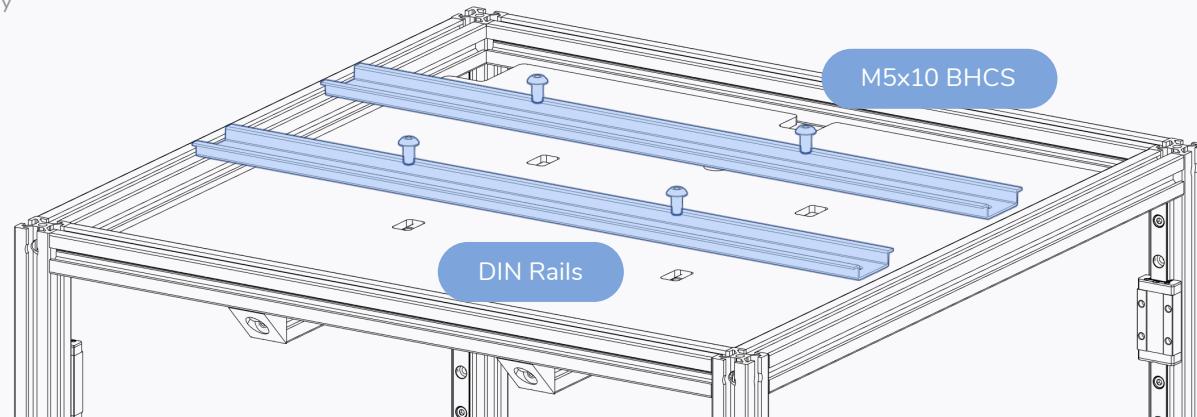
NOTCH TO THE BACK

**ALIGN T-NUTS WITH HOLES**

Position the 4 T-nuts so they are directly below the 4 holes in the deck panel.

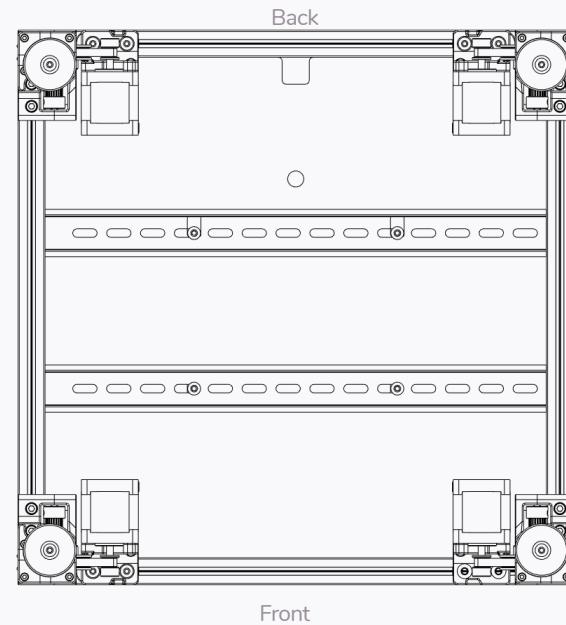
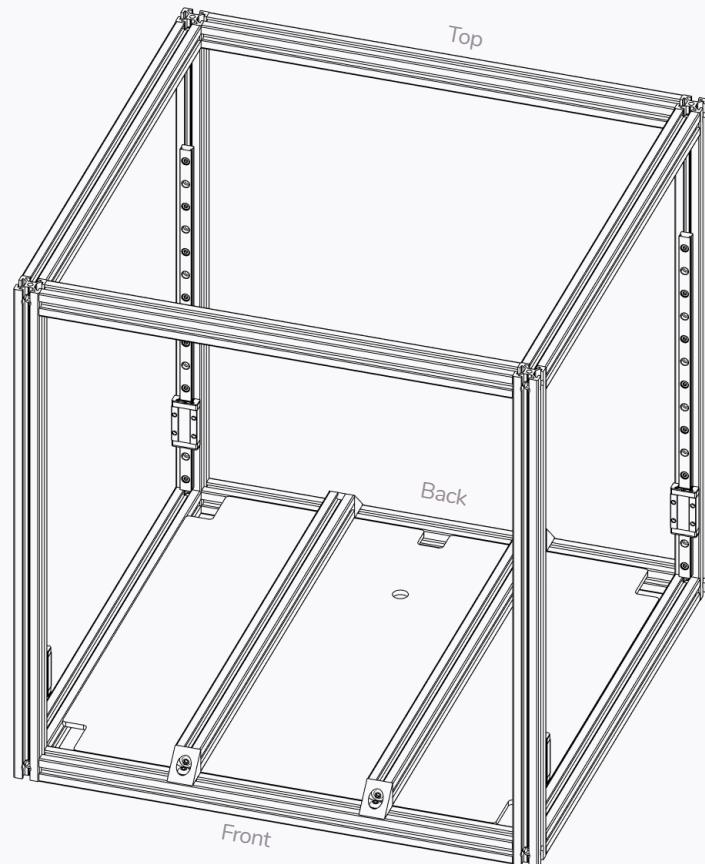
DIN RAIL SLOTS

If the slots in the rails do not line up with the t-nut you can shorten the DIN rails by a few mm.



ORIENTATION

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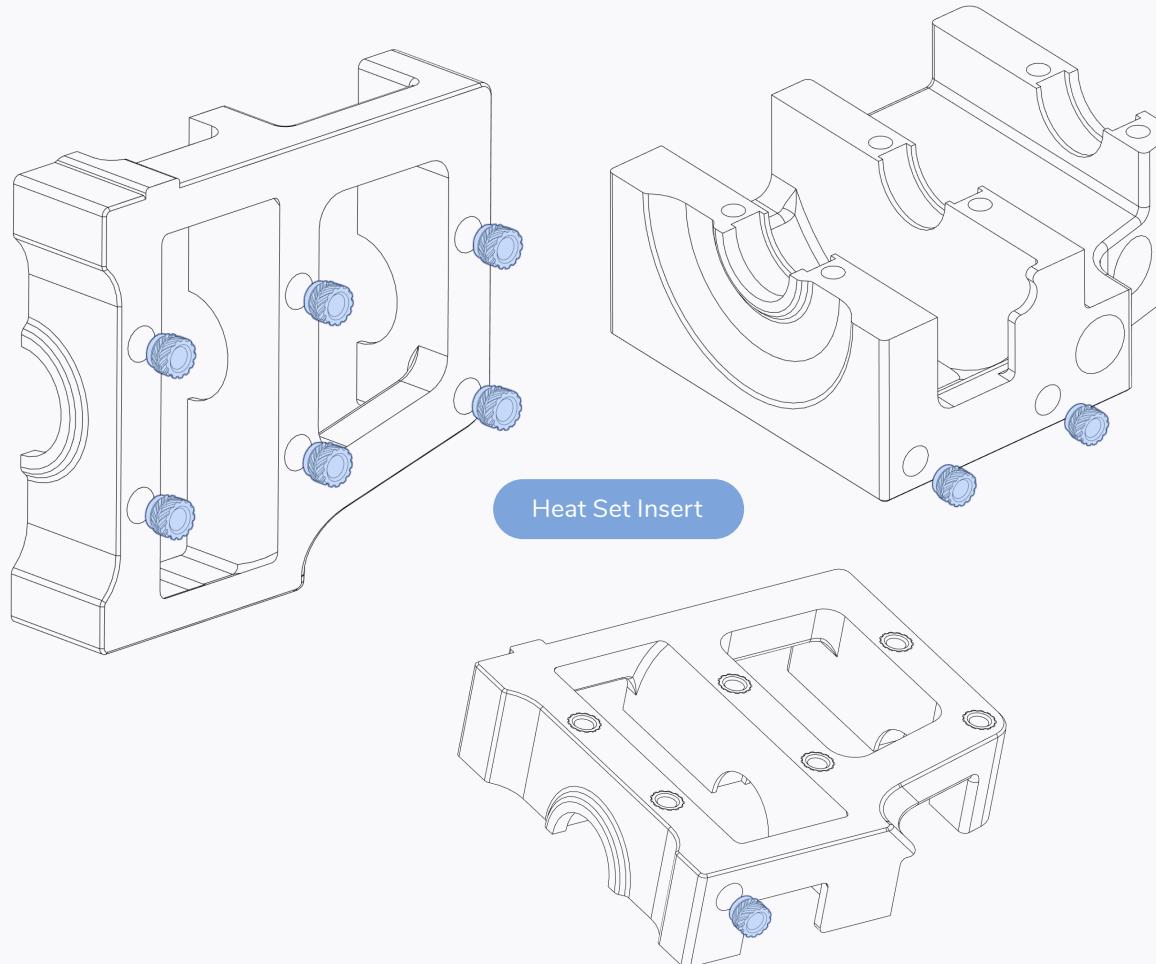


PRINTER ORIENTATION

We regularly insert graphics like the ones above to help you along the build process. The sides are labeled to make it easier to keep track.

PREPARATION

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HEAT SET INSERTS

This design relies heavily on heat set inserts. Make sure you have the proper inserts (check the hardware reference for a close up picture and the BOM for dimensions).

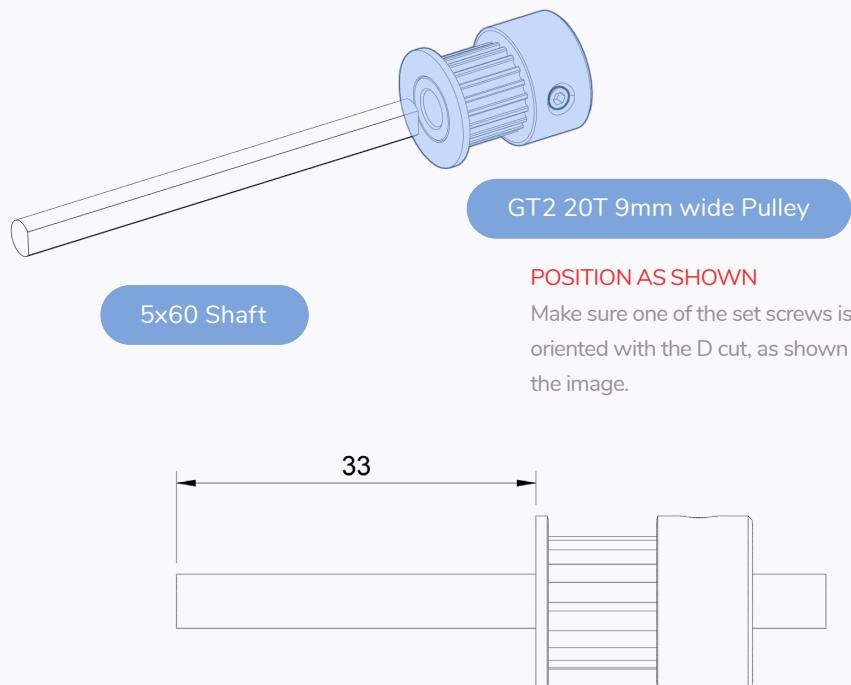
If you've never worked with heat set inserts before we recommend you watch the linked guide.



<https://voron.link/m5ybt4d>

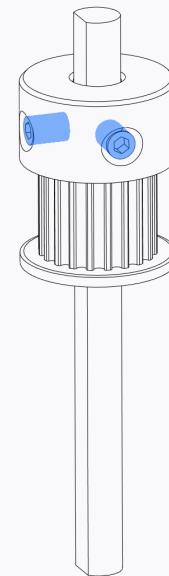
BELT DRIVE ASSEMBLY

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POSITION AS SHOWN

Make sure one of the set screws is oriented with the D cut, as shown in the image.



SET SCREWS

AKA THE ROOT OF ALL ISSUES

Insert both set screws and use thread locker on all set screws.

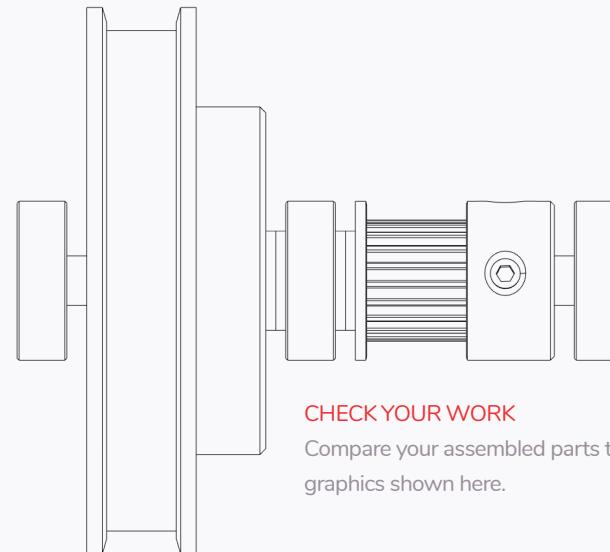
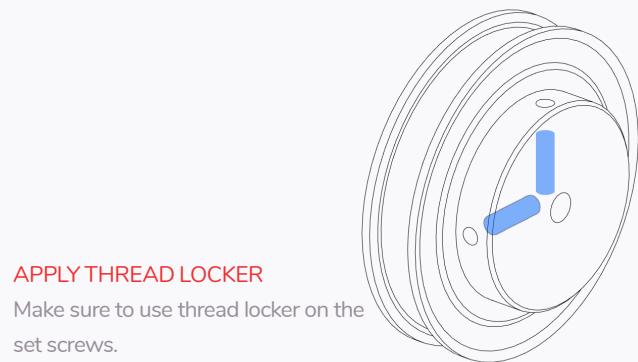
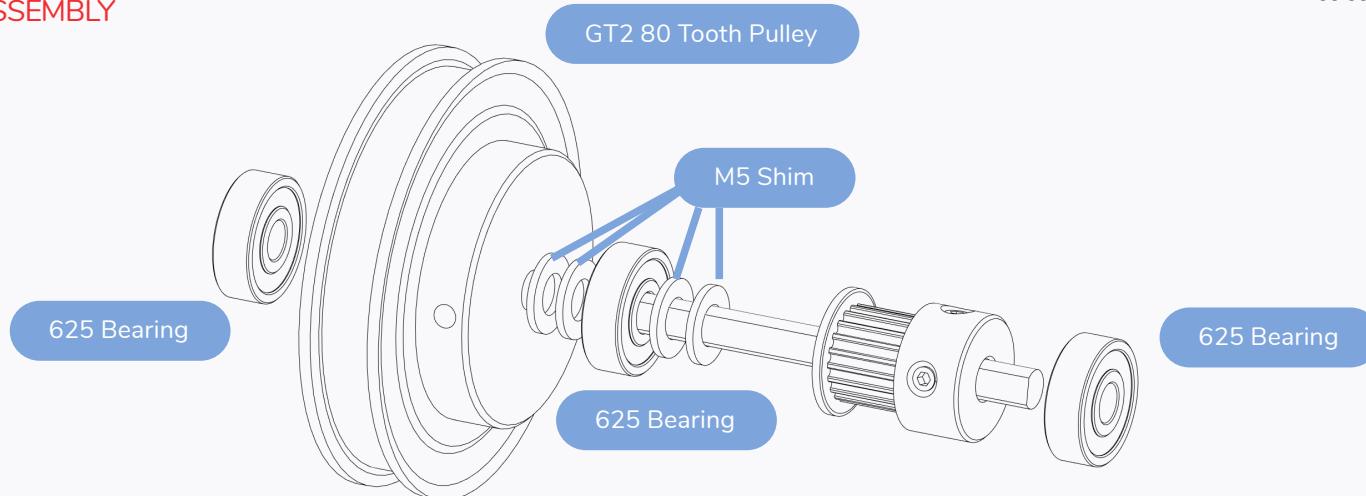
Use a high quality hex driver to prevent the hex profile from stripping. Ball-end drivers are not recommended.

Loose set screws account for the majority of issues that our users report. Save yourself hours of troubleshooting and apply thread locker to all set screws during the build.

See the product's application notes for instructions - keep away from printed parts.

BELT DRIVE ASSEMBLY

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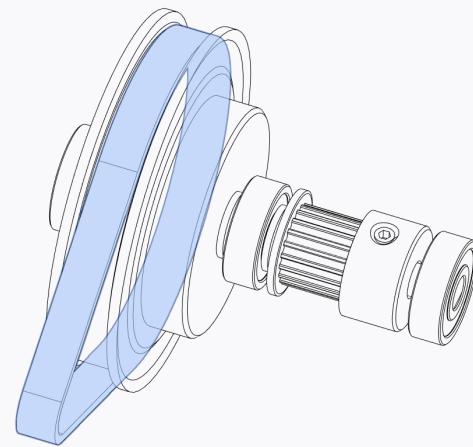


CHECK YOUR WORK

Compare your assembled parts to the graphics shown here.

Z DRIVE

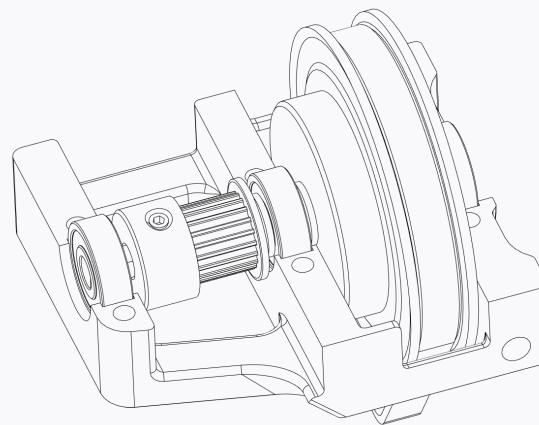
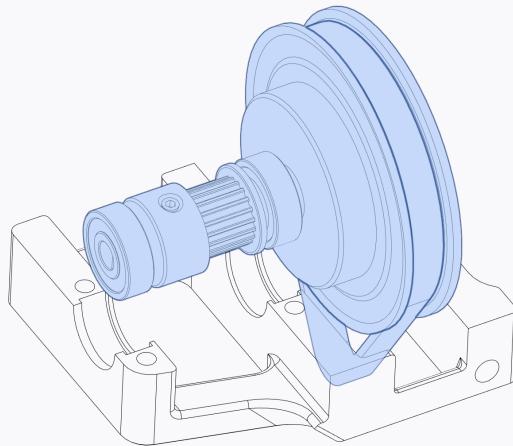
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GT2 188mm Belt Loop

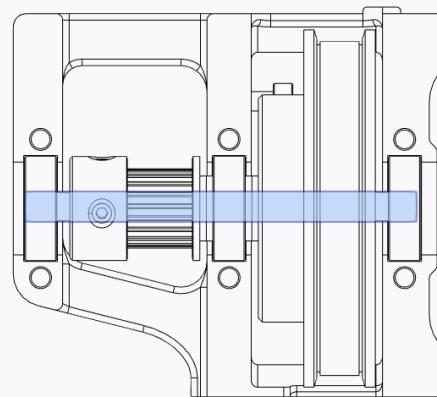
Z DRIVE

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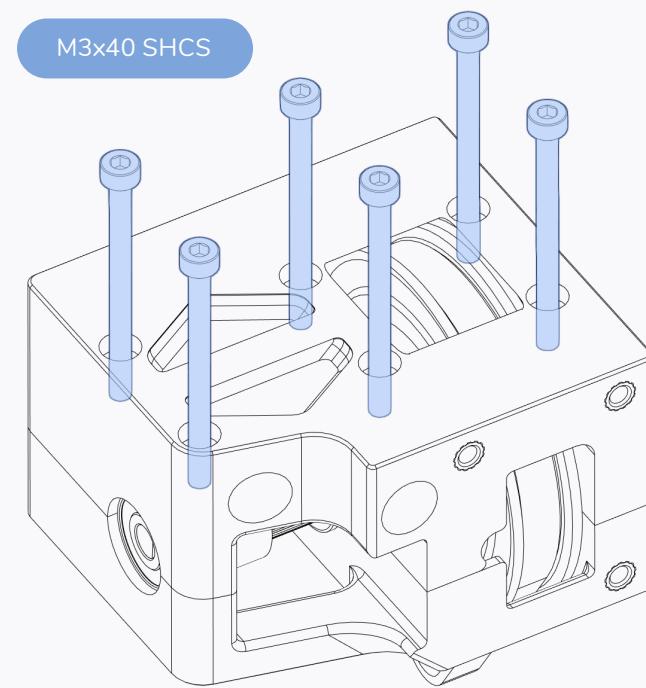
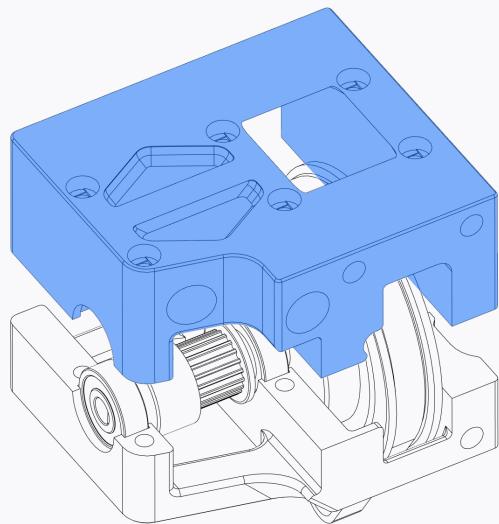
CHECK SHAFT POSITION

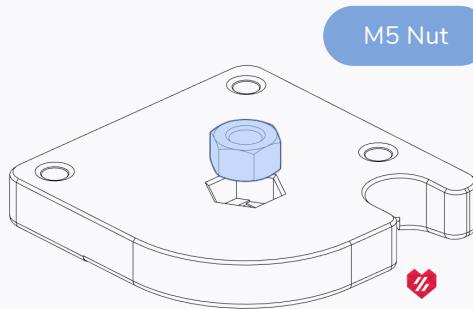
Compare your assembled parts to the graphics shown here.



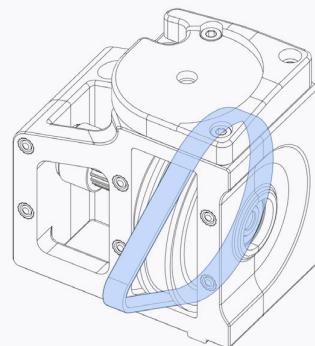
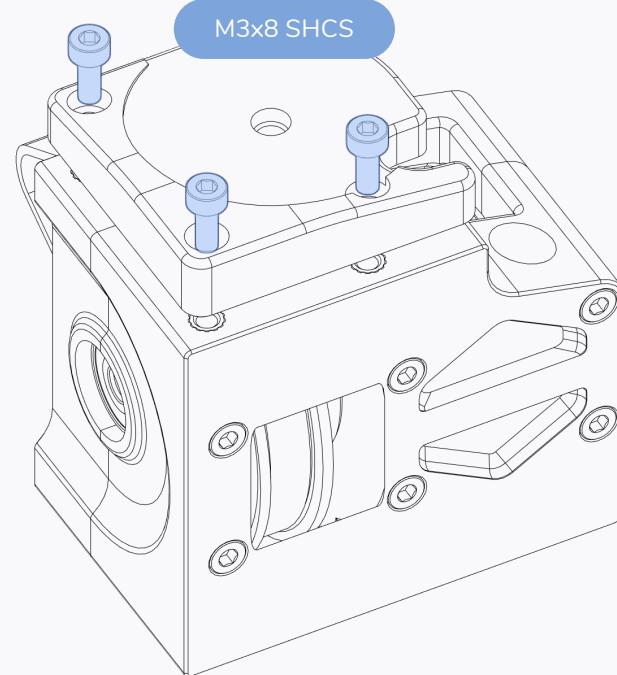
Z DRIVE

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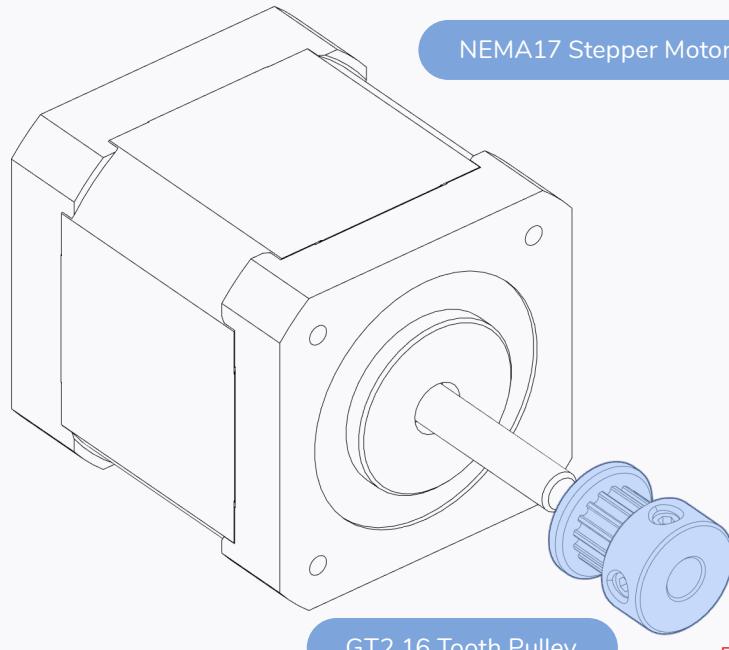


**ACCENT PART?**

Look for Voron heart next to the part.
It indicates that this is an accent part.

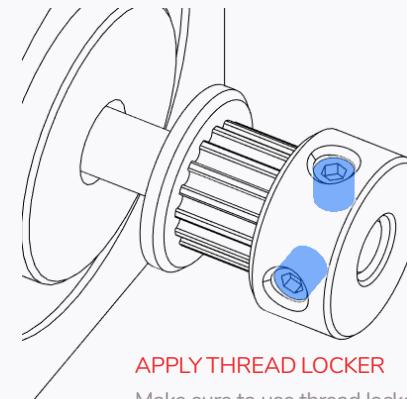
**CHECK FOR BELT**

Make sure the closed belt loop is in the part.



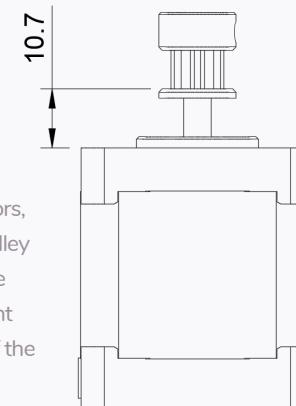
16 TOOTH PULLEYS

The Z drive motors are the only place in the printer that use 16 tooth pulleys!
Remove the pulleys from your work surface after you finish this chapter.



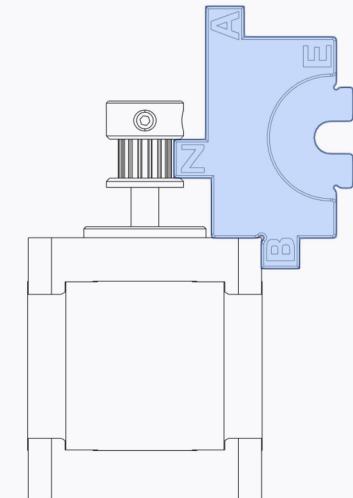
APPLY THREAD LOCKER

Make sure to use thread locker on the set screws. Ensure that at least one of the set screws is contacting the flat section of the drive shaft.

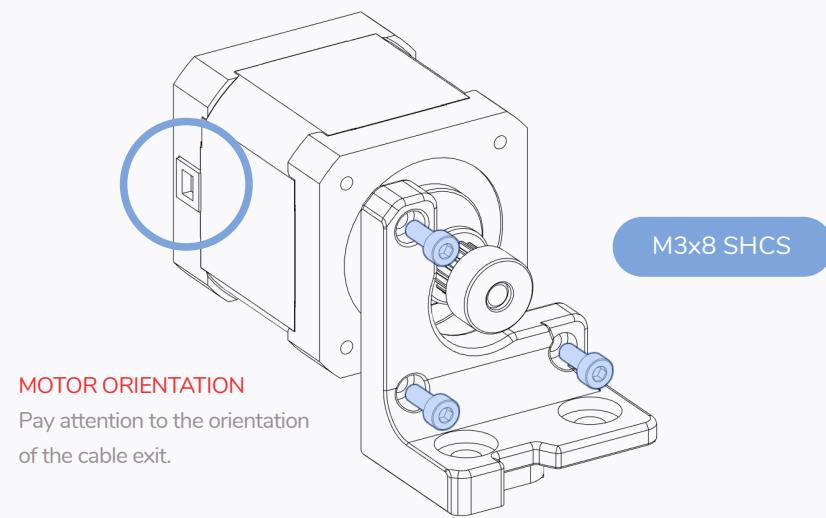
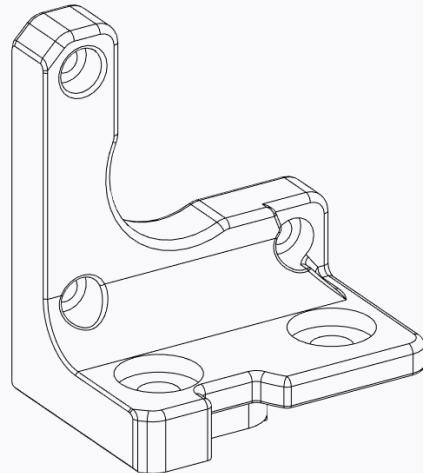


PULLEY POSITION

Depending on your motors, you may find that the pulley sits better in the opposite orientation. The important thing is the placement of the actual teeth.

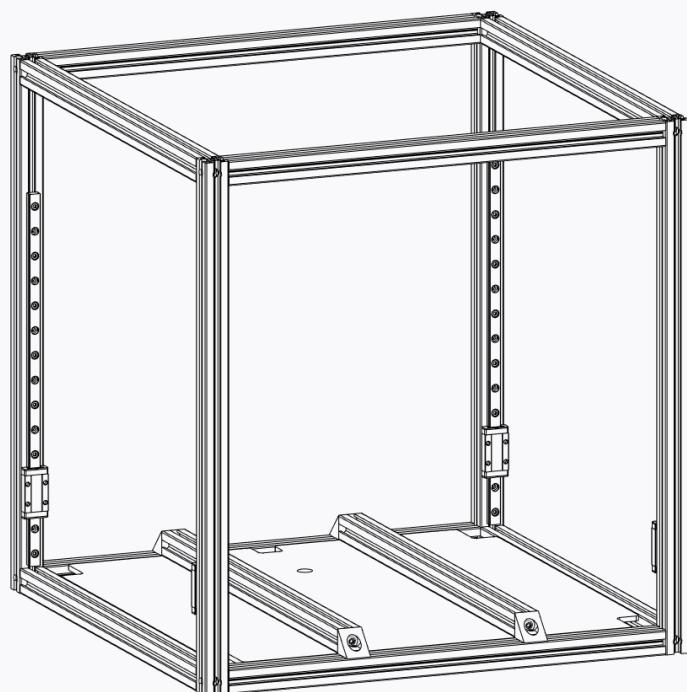


<https://voron.link/fx10m8e>



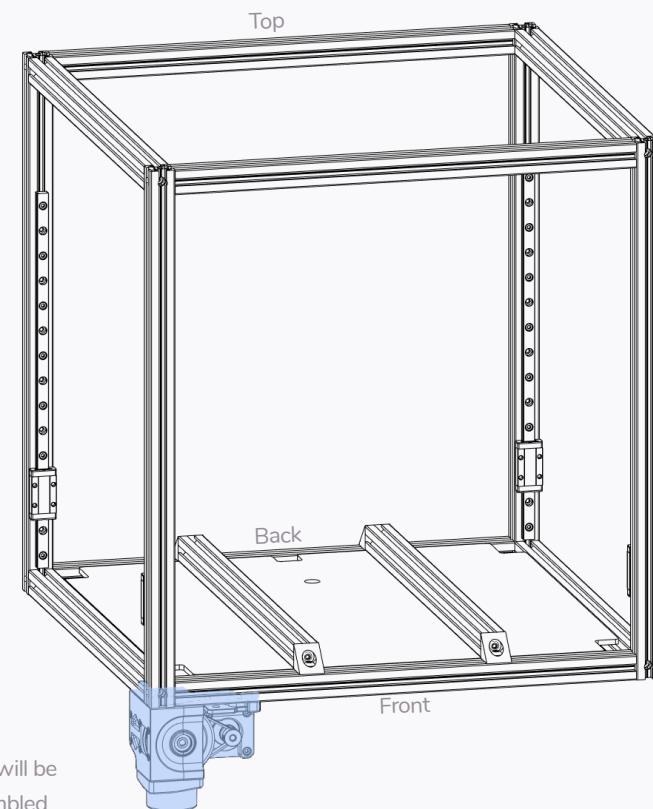
ORIENTATION

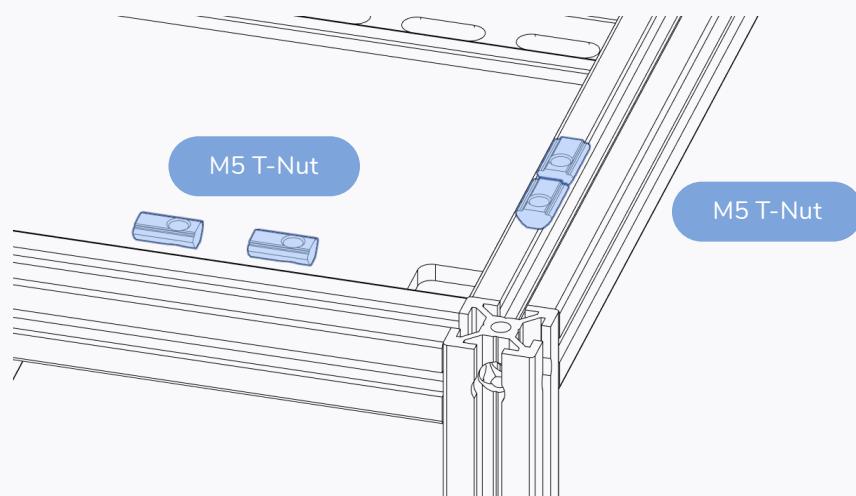
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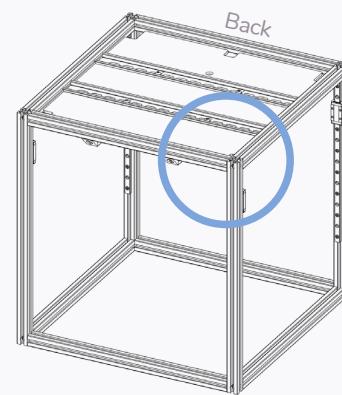
PICTURE FOR ORIENTATION

The Z0 drive is the first Z drive that will be added to the printer. The fully assembled Z Drive is highlighted in blue.

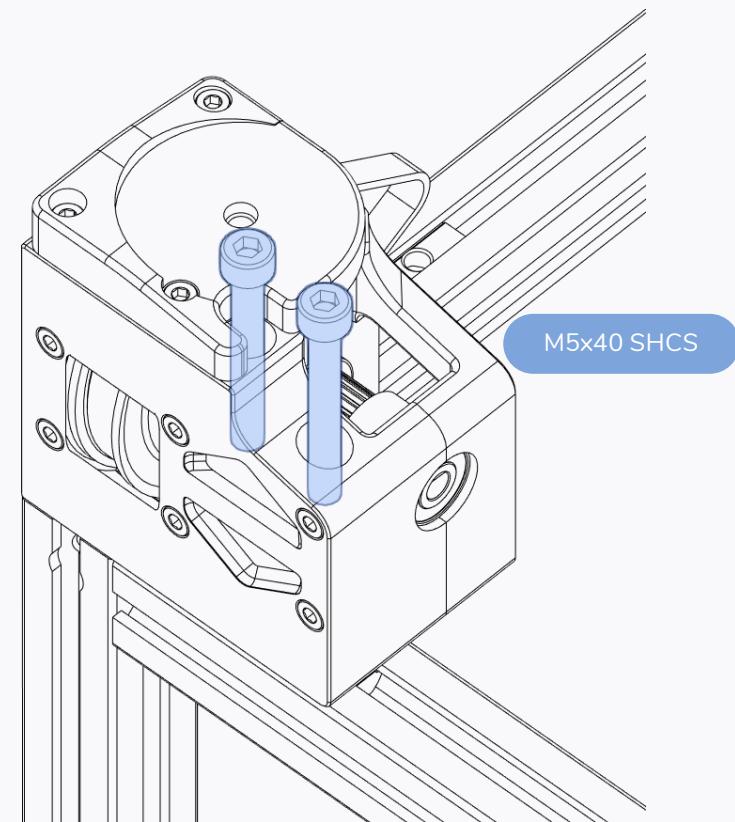


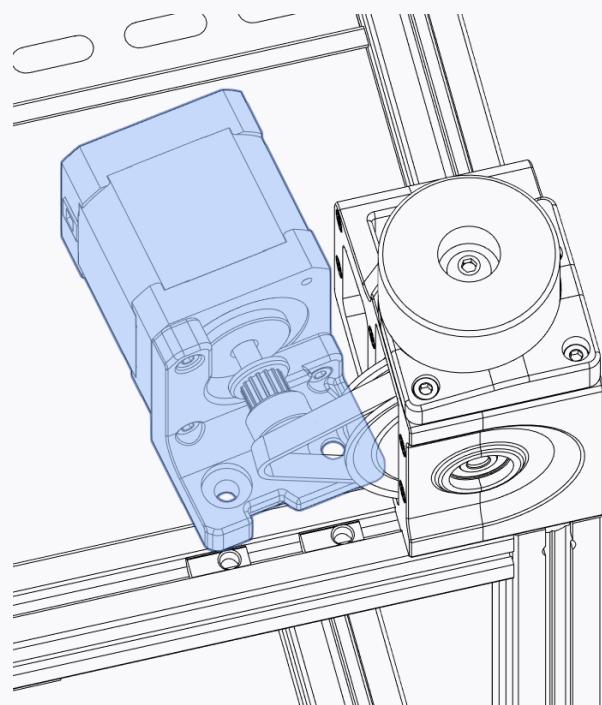
**WHICH CORNER IS THIS?**

We highlighted the corner with a circle.

**UPSIDE DOWN ASSEMBLY**

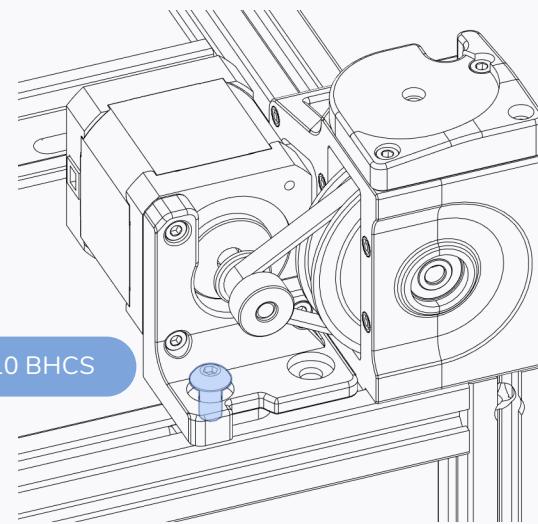
For ease of assembly we recommend flipping the printer on its head for the next steps.





SLIDE INTO PLACE

Insert at an angle and slide into place.

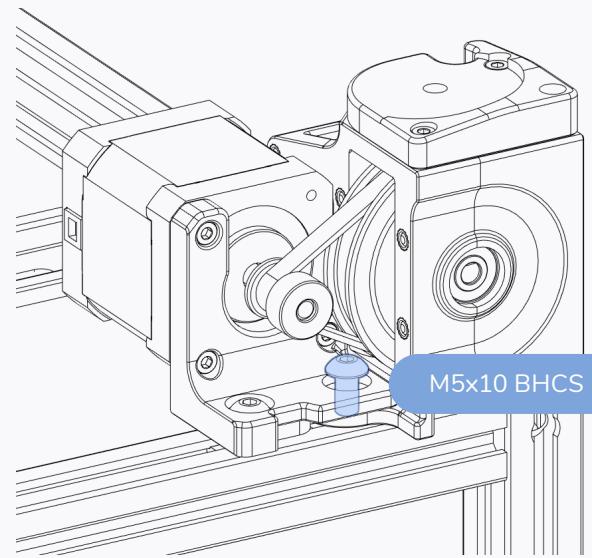
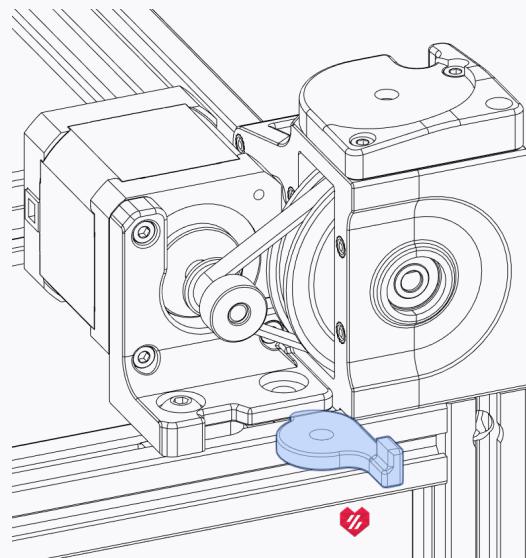


DON'T TIGHTEN

Leave the bolt loose for the next step.

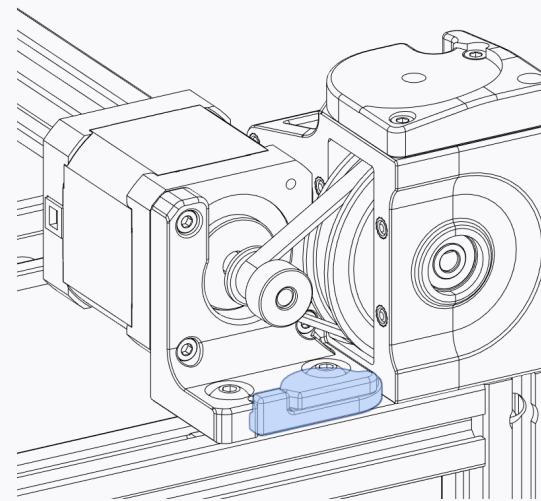
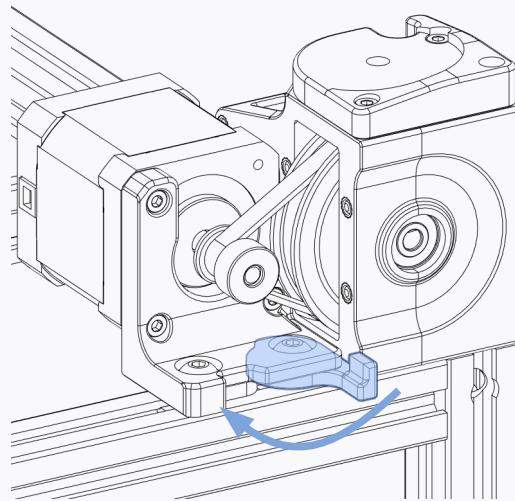
Z DRIVE

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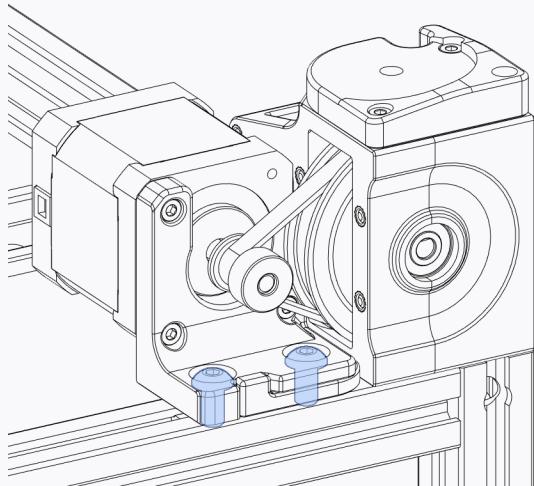
DON'T TIGHTEN

Leave the bolt loose for the next step.



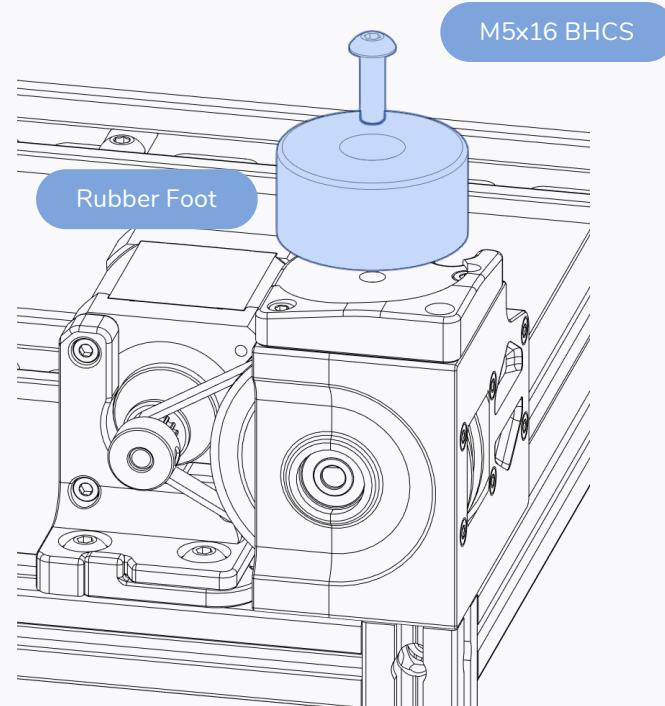
CLOSE THE BELT TENSIONER

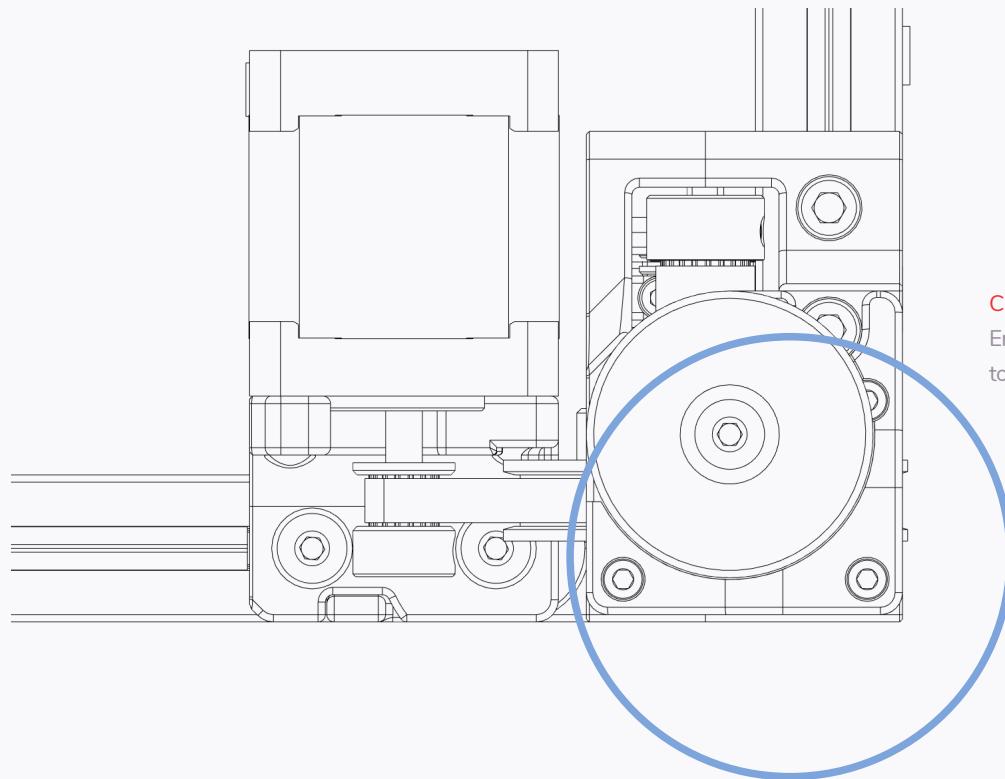
Flip the belt tensioner latch closed.



TIGHTEN BOLTS

After closing the tensioner the M5 bolts can be properly fastened.



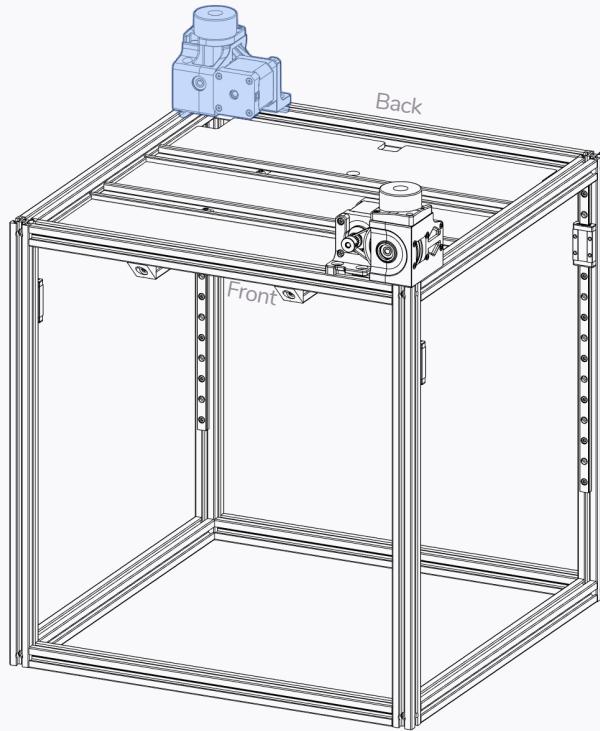


CHECK POSITION

Ensure that closing the belt tensioner did not cause the Z Drive to move/shift. If it did undo the bolts and realign.

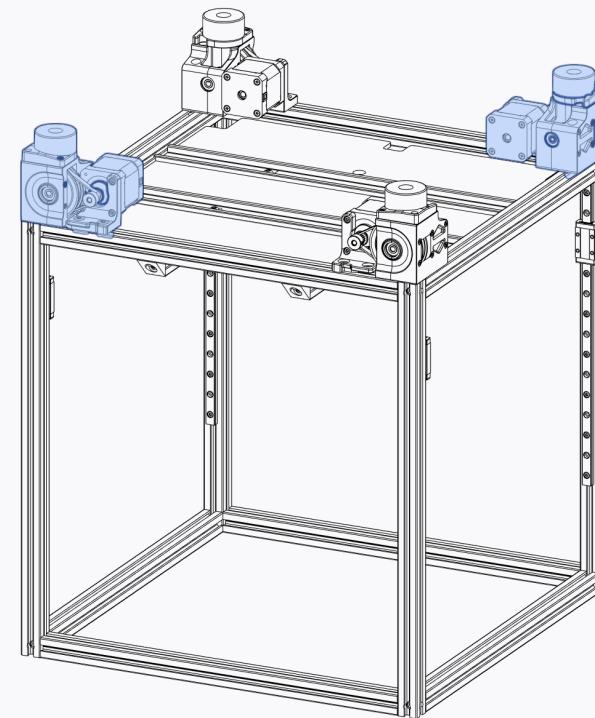
OTHER Z DRIVES

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REPEAT INSTRUCTIONS FOR OPPOSING CORNER

Build another Z drive, following the same instructions.

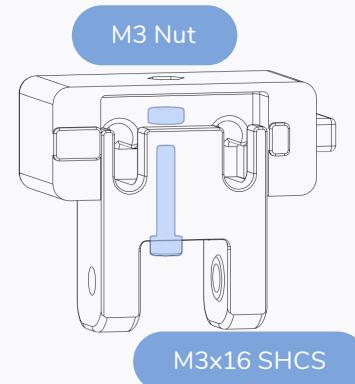
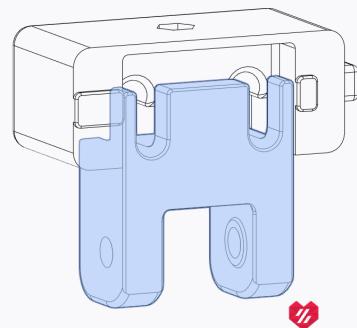
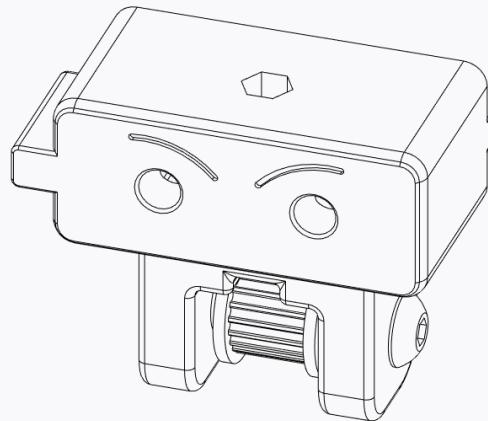


REPEAT INSTRUCTIONS FOR THE MIRRORED DRIVES

Build two more Z drives following the instructions that came before. The printed parts are mirrored.

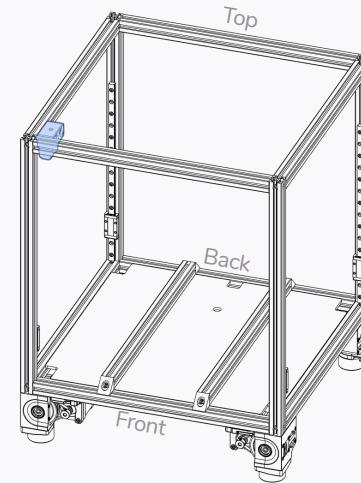
Z IDLER

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Z IDLER

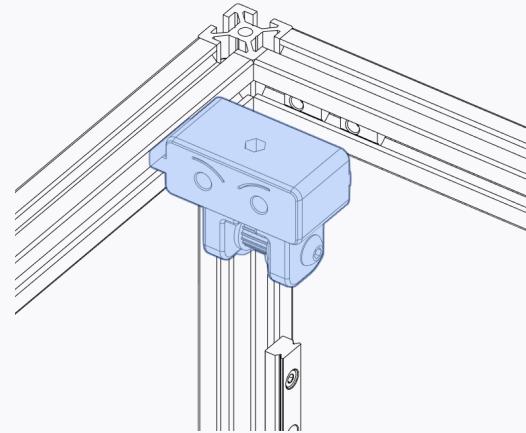
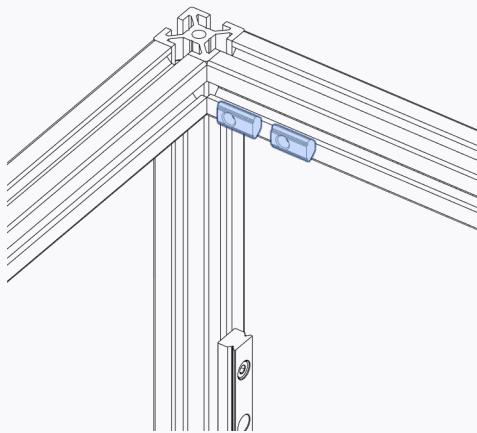
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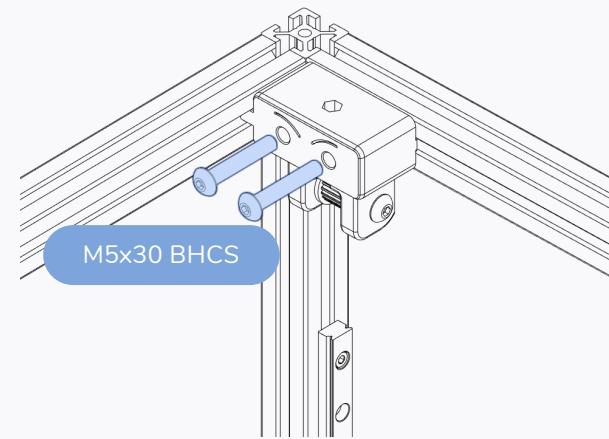
IDLER ORIENTATION

Mind the idler orientation. The idler must face in the same orientation as the pulley in the drive below it.

M5 T-Nut

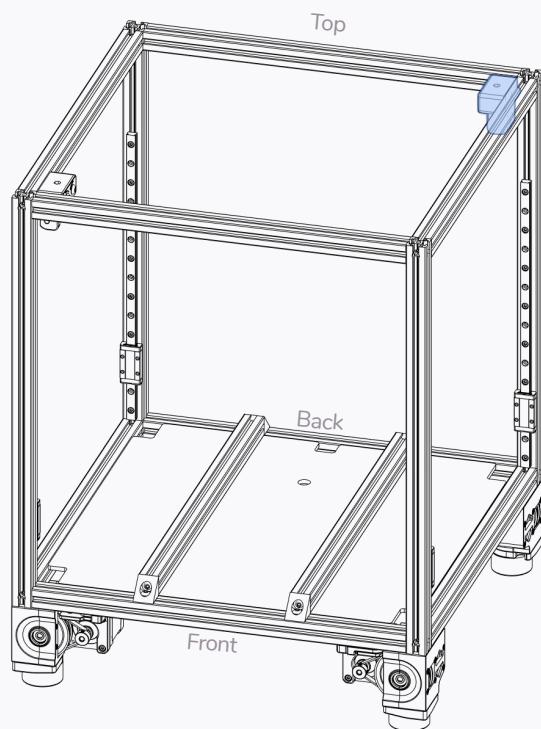


M5x30 BHCS



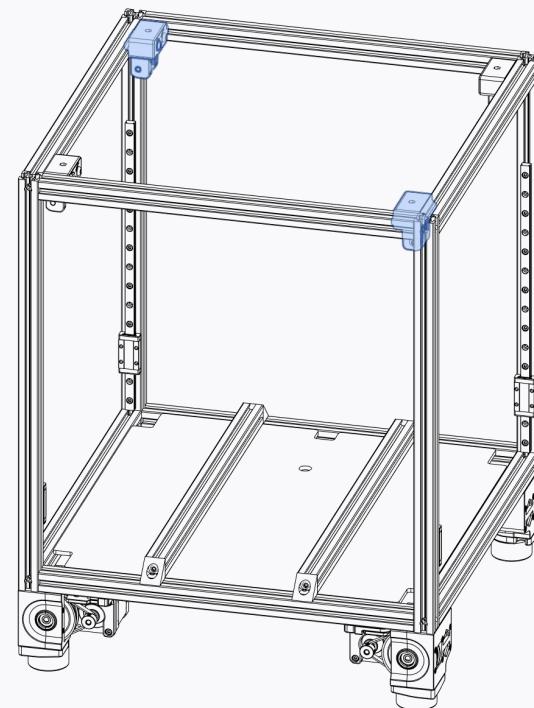
OTHER Z IDLERS

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REPEAT INSTRUCTIONS FOR OPPOSING CORNER

Build another Z idler following the same instructions.



REPEAT INSTRUCTIONS FOR THE MIRRORED DRIVES

Build two more Z idlers following the instructions that came before. The printed parts are mirrored.

The first design released under the name Voron was the “Voron Geared Extruder”. This was on January 28 2015.

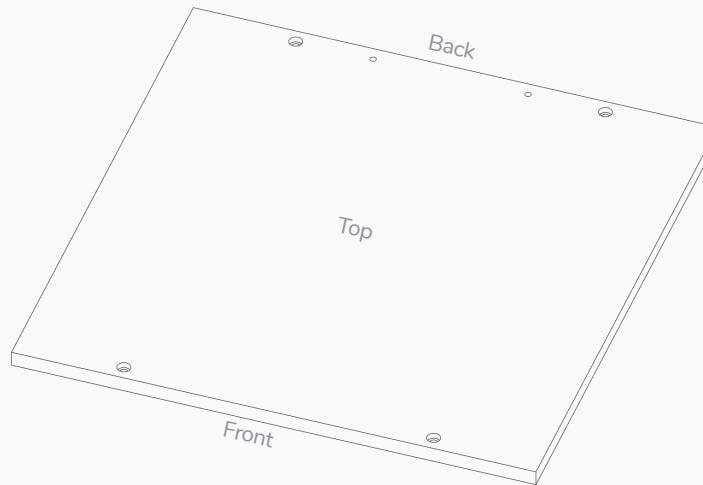
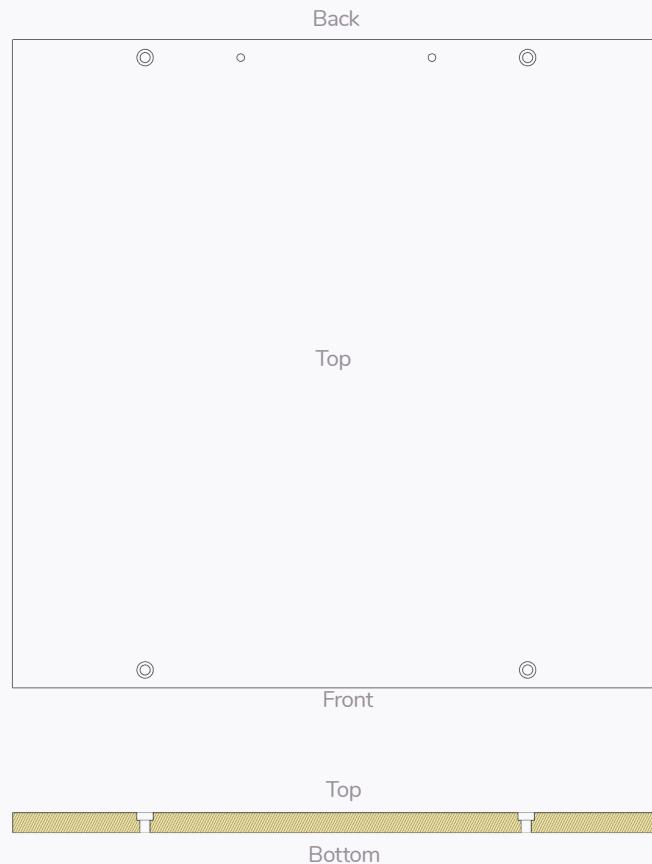
PRINT BED

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OVERVIEW

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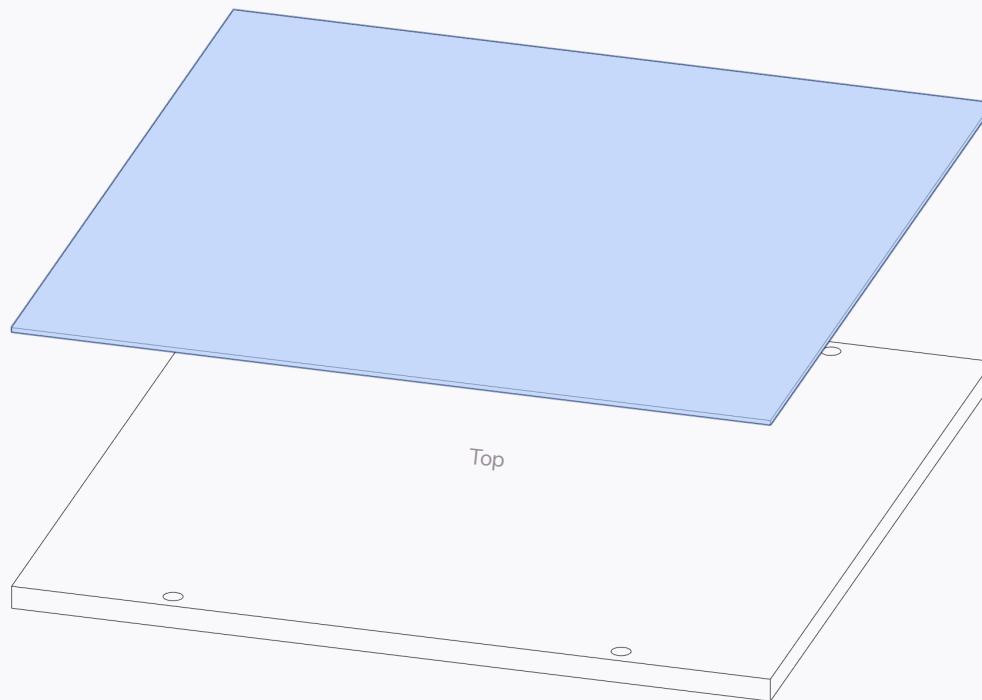


WHICH SIDE IS WHICH?

The top of the plate has mounting holes with bores that allow boltheads to sit flush/below the surface.

The plate has additional tapped holes to secure the Protective Earth (PE) connection and a thermal fuse, those are on the back side of the plate.





MAGNET APPLICATION

Clean the plate with isopropyl alcohol or similar cleaner prior to applying the magnet.

Use the edge of a plastic object or a small roller to firmly press the magnet on the plate to get a good bond from the adhesive backing.

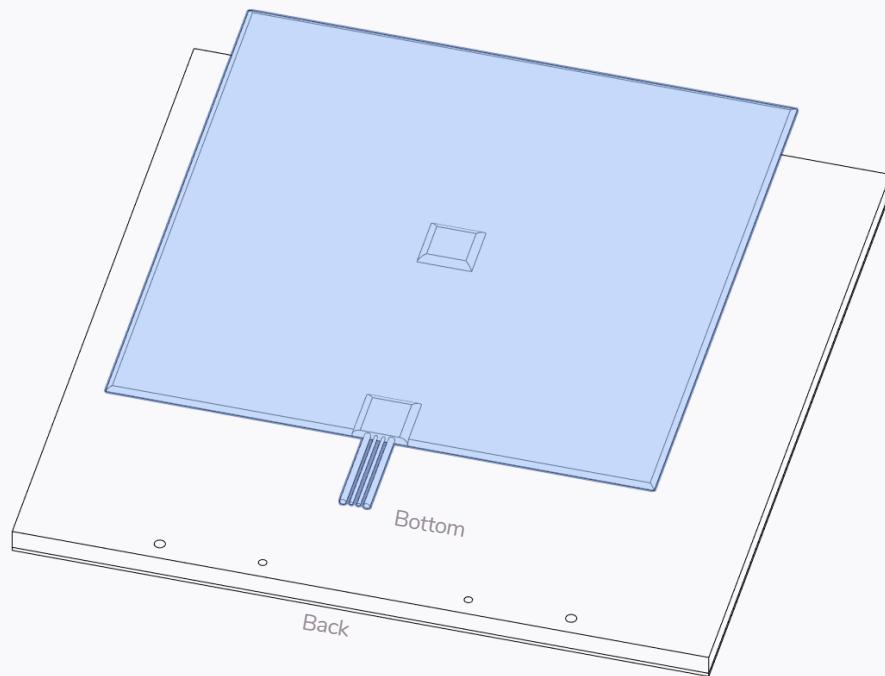
If you have never done this before we recommend you watch the linked guide.



<https://voron.link/rm6tpld>

HEATED BED

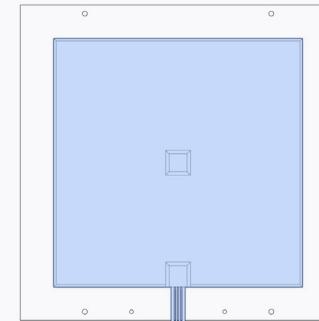
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HEATER APPLICATION

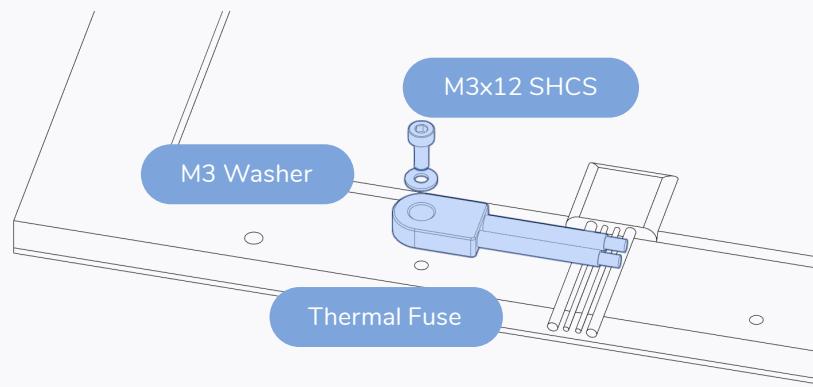
The heater is installed in the same fashion as the magnet.

Centre it on the bottom side of the build plate and make sure to firmly press it onto the build plate.



HEATED BED

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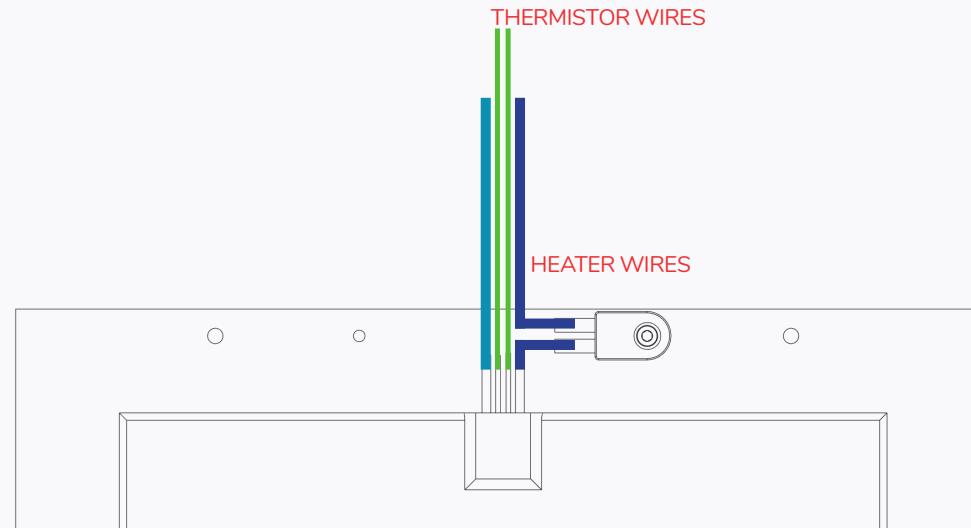


THERMAL FUSE

While not required to operate the printer, a thermal fuse attached to the build plate adds an additional layer of protection against potentially dangerous malfunctions.

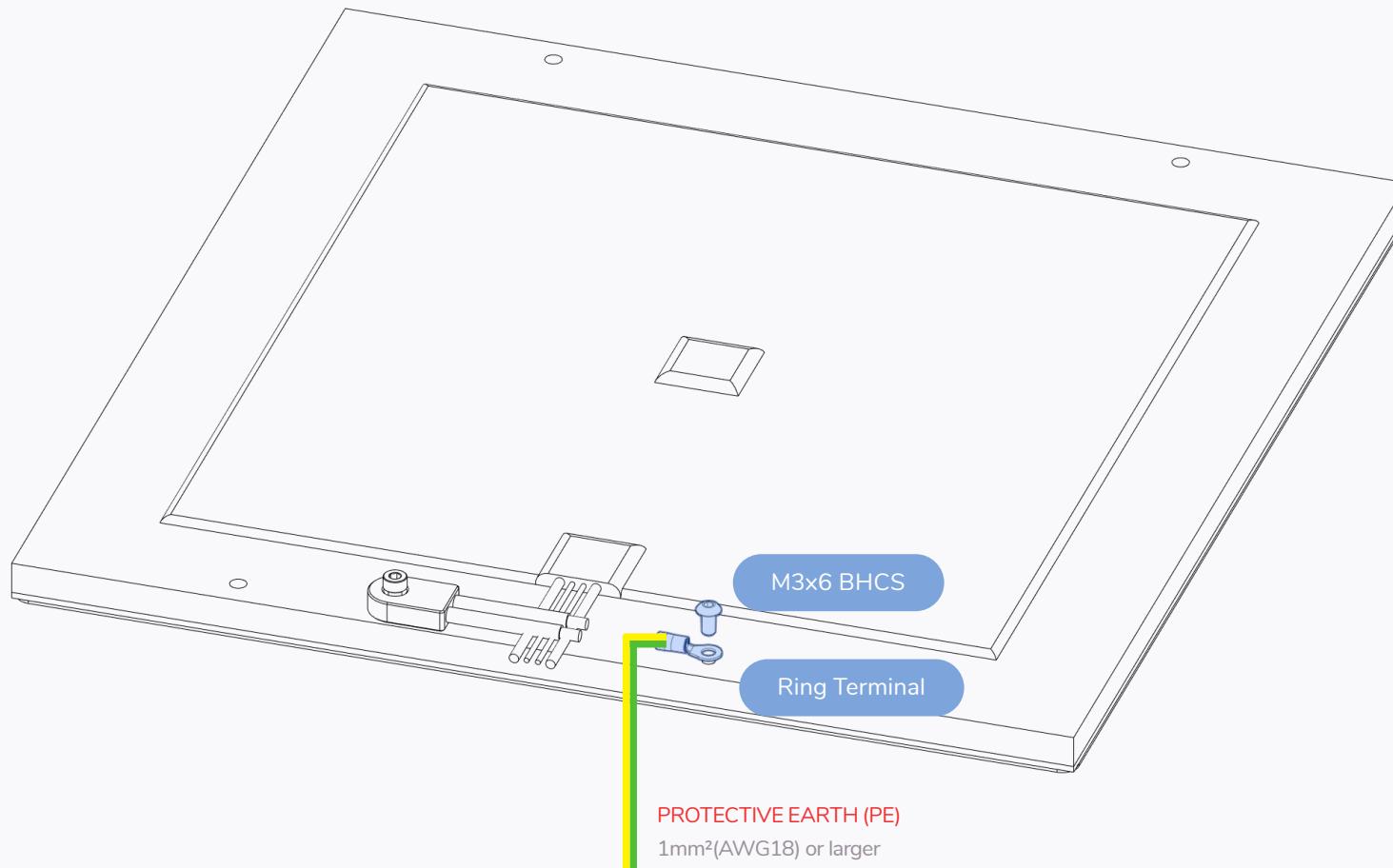
The thermal fuse is wired in-line with the heater wires.

Depending on the tapped holes in the plate you may need to use a shorter bolt.



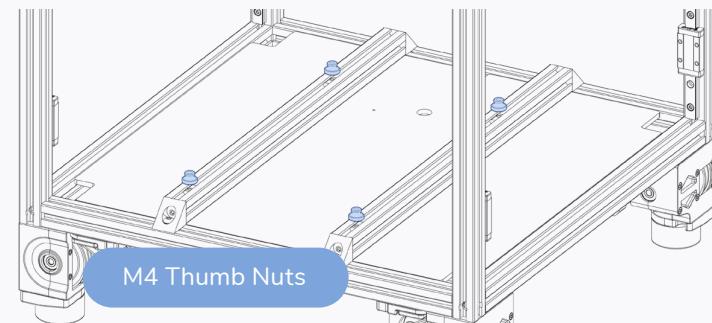
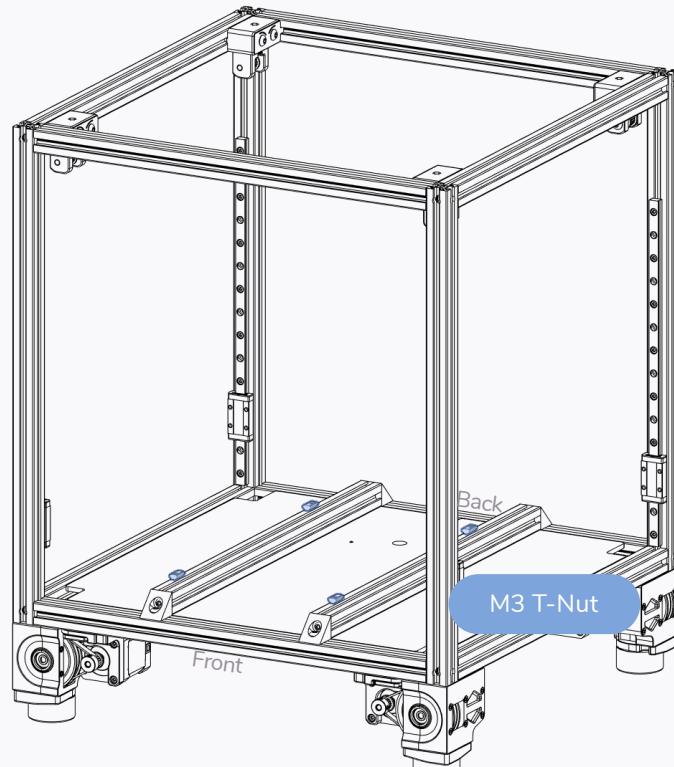
HEATED BED

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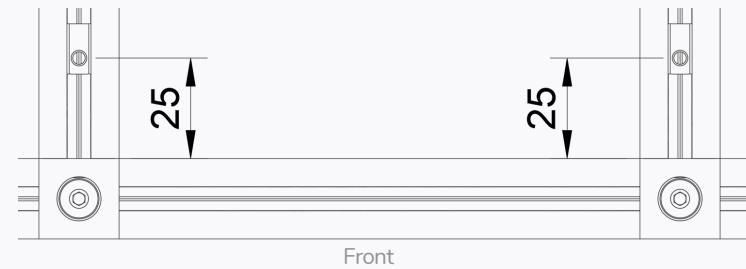
HEATED BED

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M4 NUT FOR A M3 BOLT?

We use the thumb nuts as spacers. You can replace them with different heat resistant spacers of the same length.



HEATED BED

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DON'T TIGHTEN

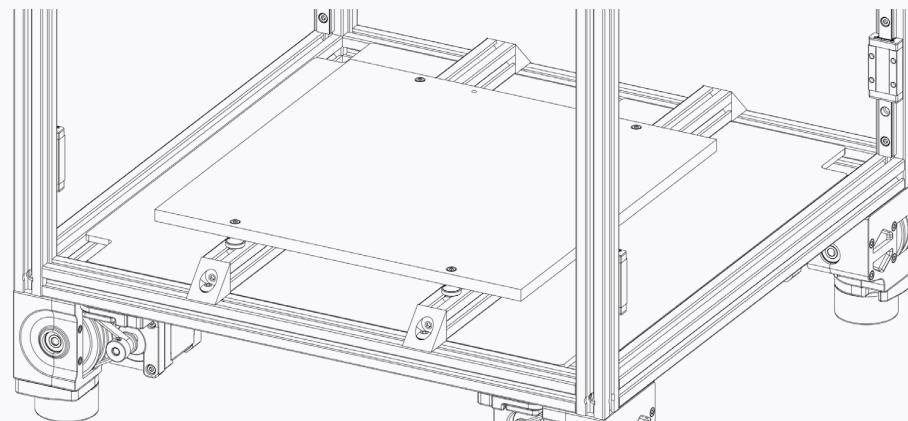
Only tighten one bolt fully.

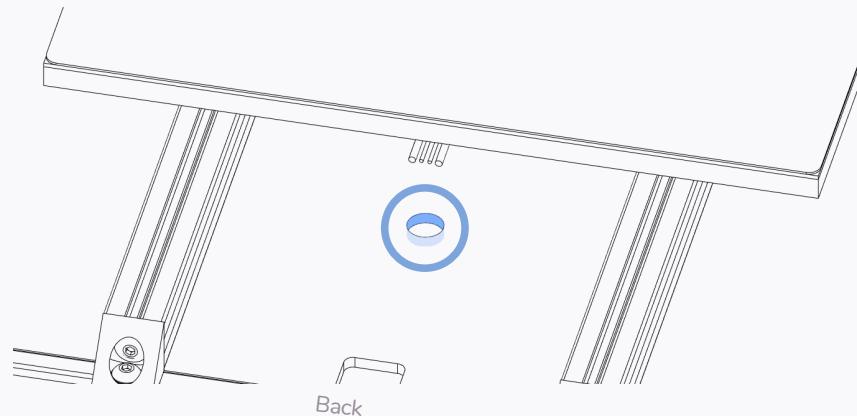
Leave the remaining bolts slightly loose.

This will allow for thermal expansion without putting additional stress on the plate.

BED AND SPACER THICKNESS

Depending on the combination of bed and spacer thickness you may need to use longer bolts to secure the bed.



**WIRE PASSTHROUGH**

Feed the bed related wires through the opening in the deck plate.

**VERIFY PLATE PLACEMENT**

The front edge of the print plate should sit 38mm behind the front edge of the frame.

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The Voron Legacy is a modernized design true to the spirit of the original Voron 1.0.

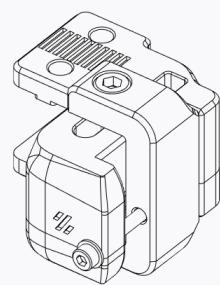
A/B DRIVES AND IDLERS

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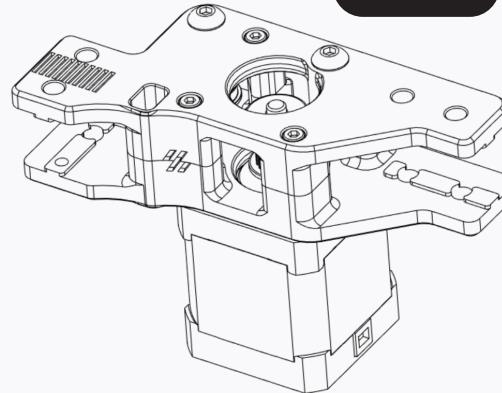


OVERVIEW

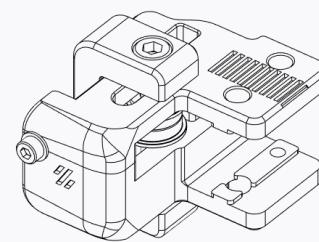
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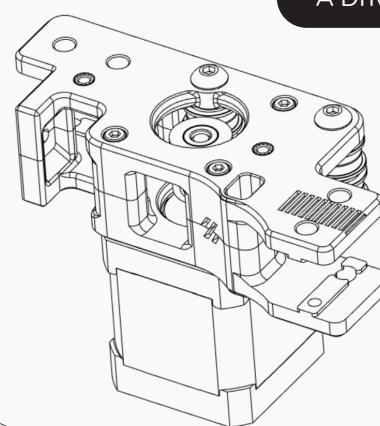
B Idler



B Drive



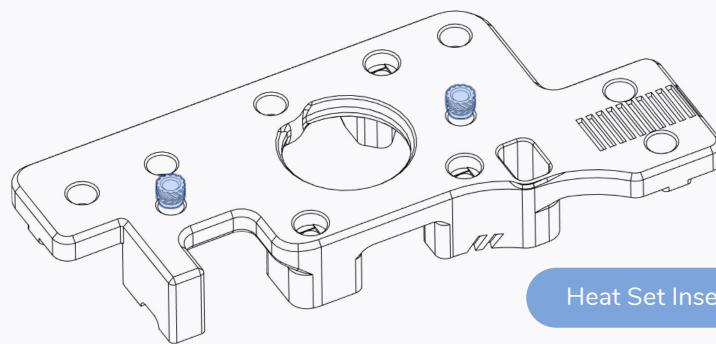
A Idler



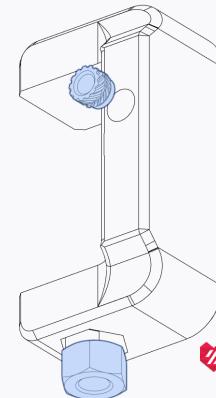
A Drive

PREPARATION

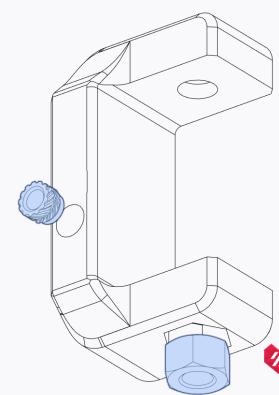
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Heat Set Insert

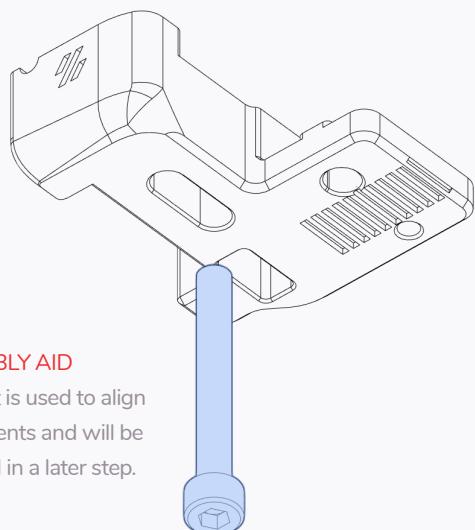


M5 Nut



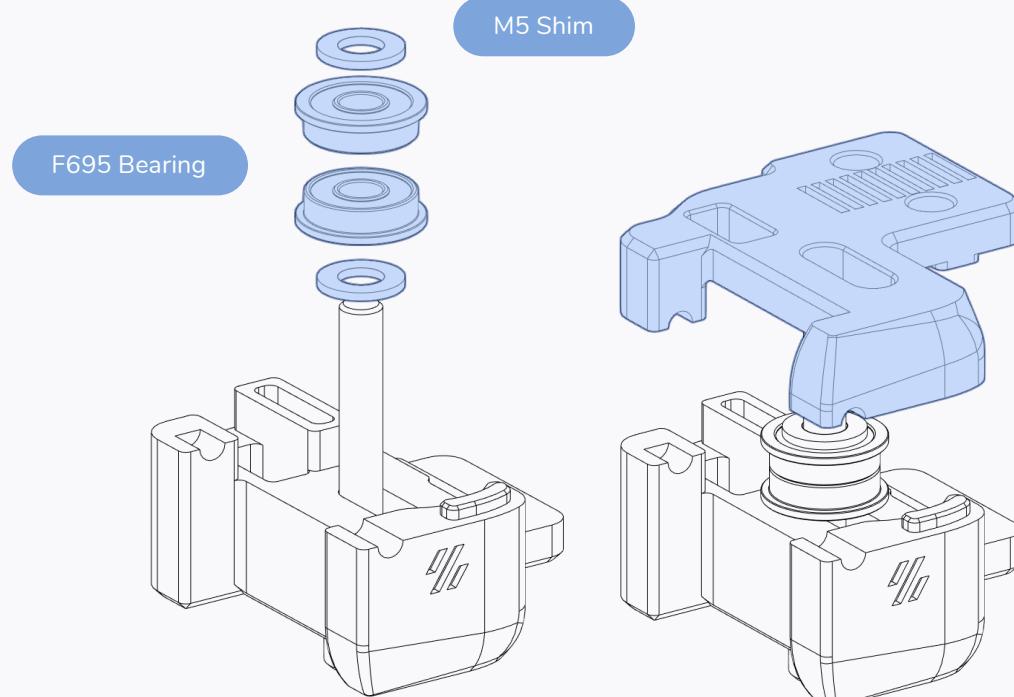
A IDLER

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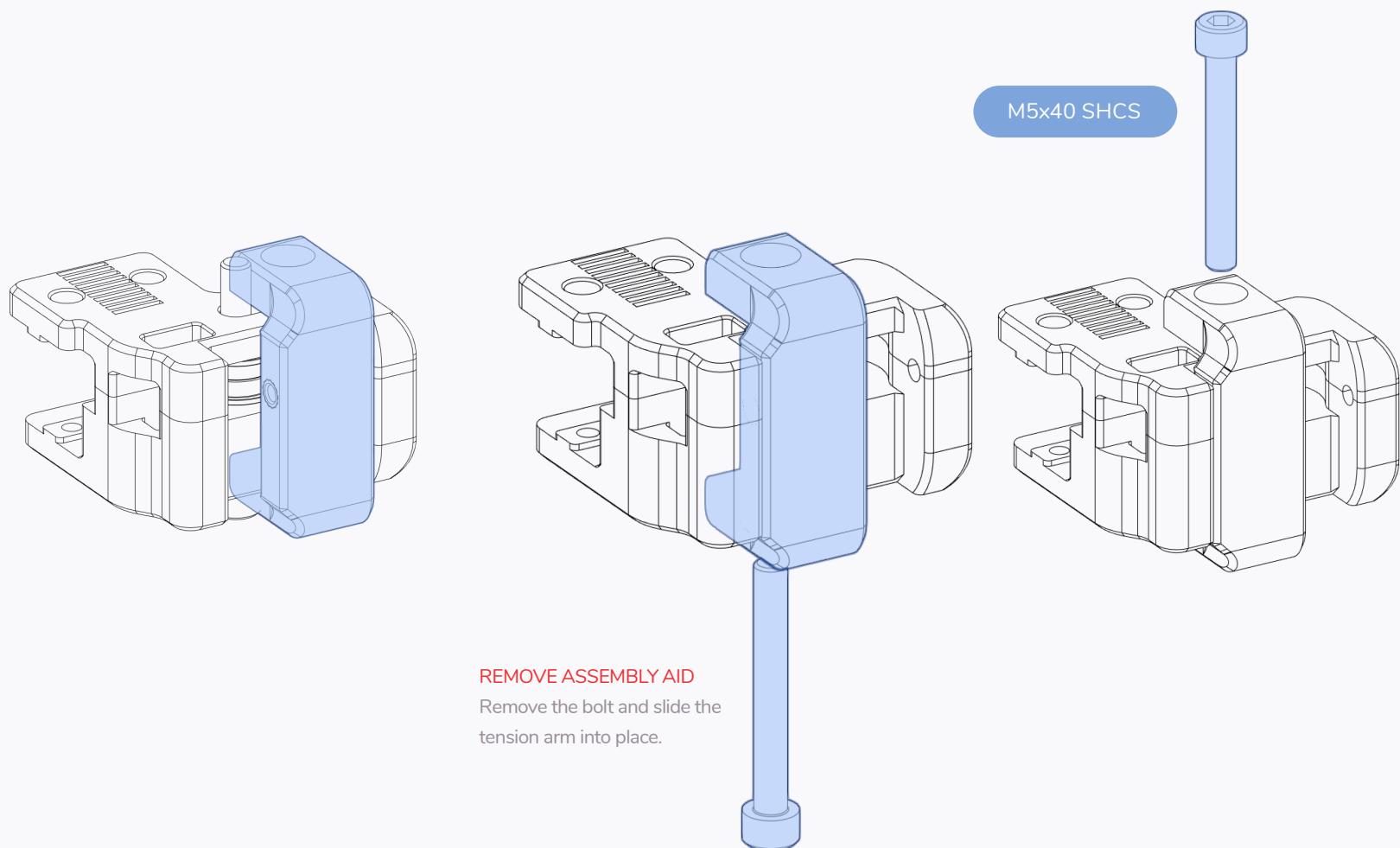


ASSEMBLY AID

This bolt is used to align components and will be removed in a later step.

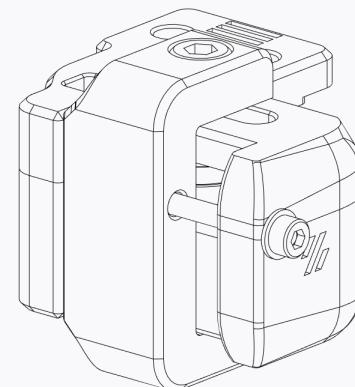
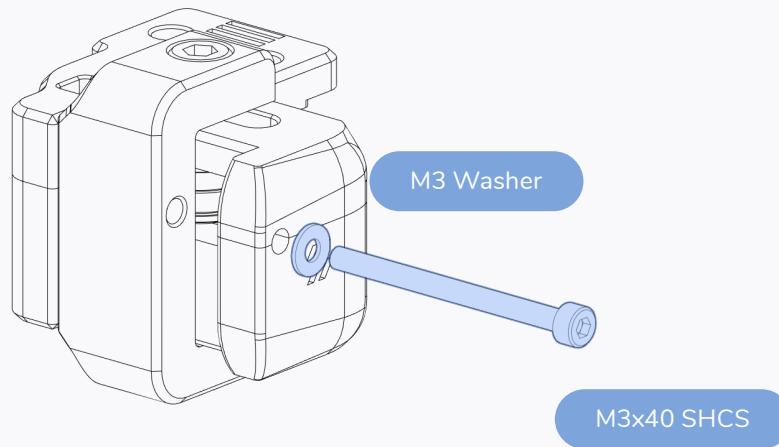


M5x40 SHCS



A IDLER

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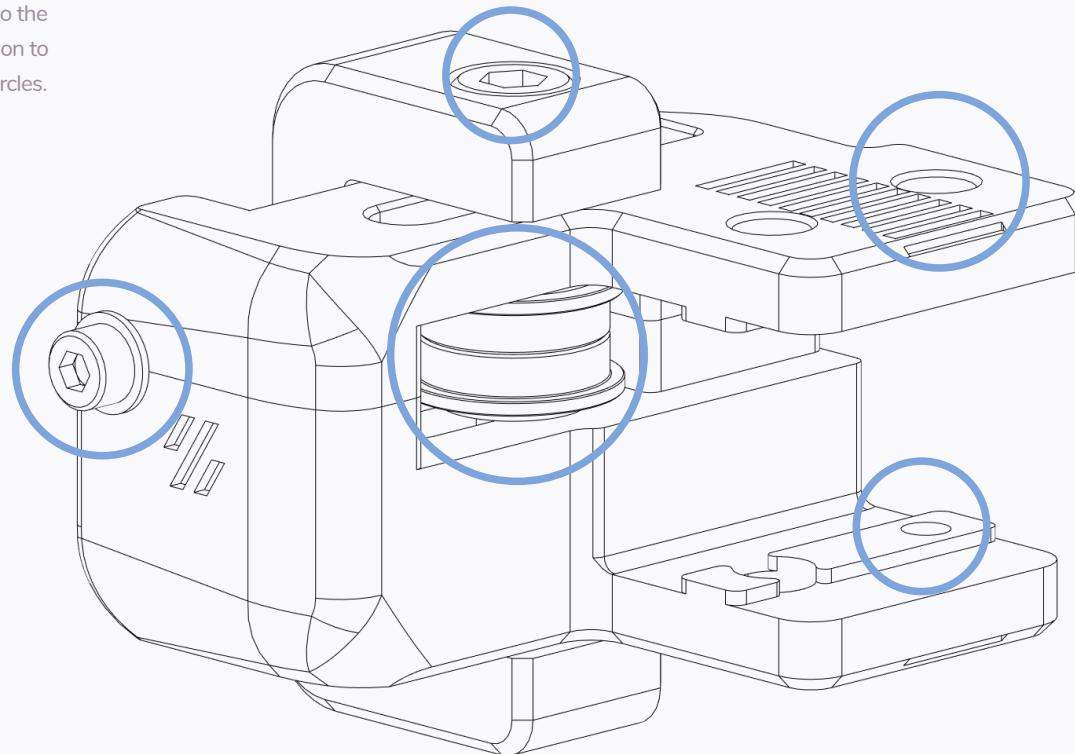


A IDLER

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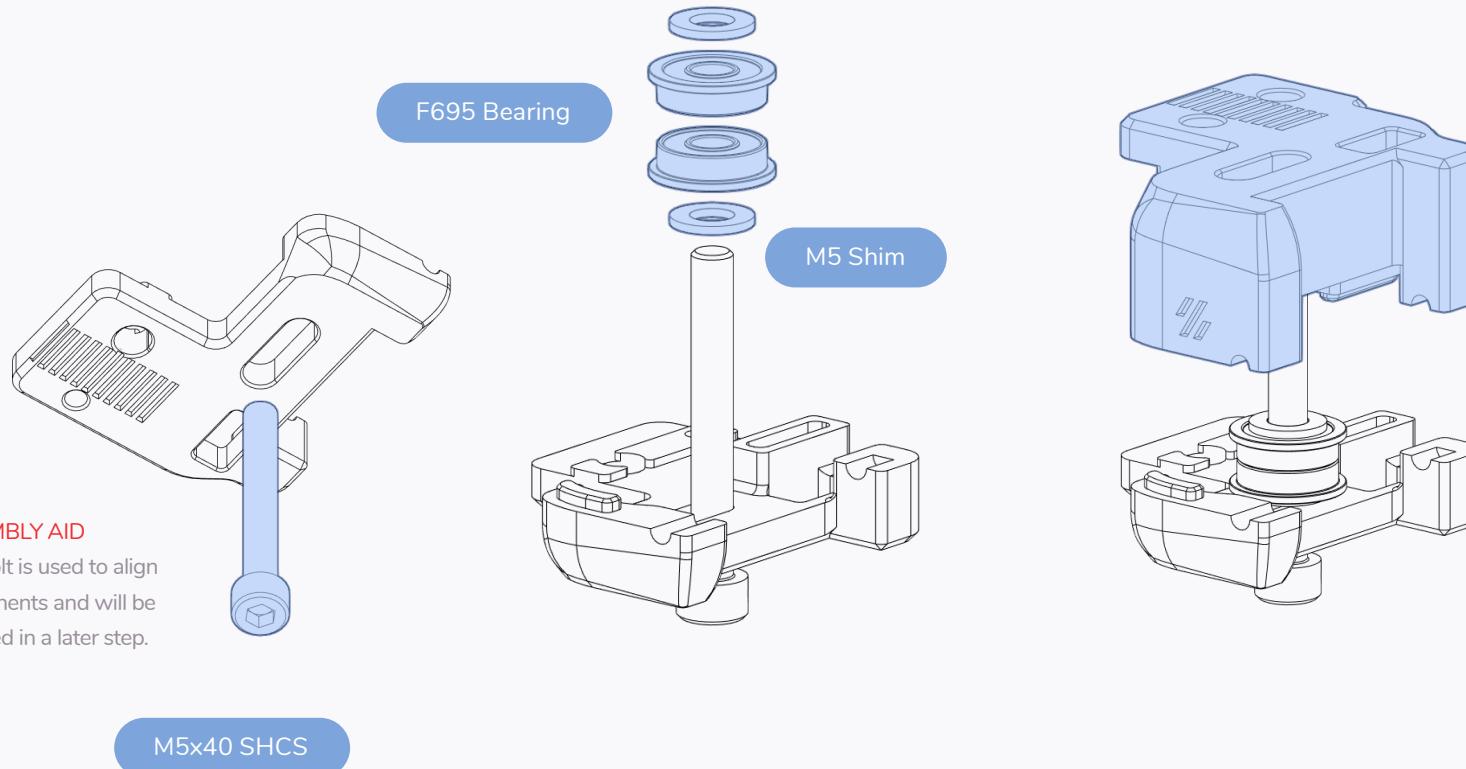
CHECK YOUR WORK

Compare your assembled parts to the graphics shown here. Pay attention to the features highlighted by the circles.



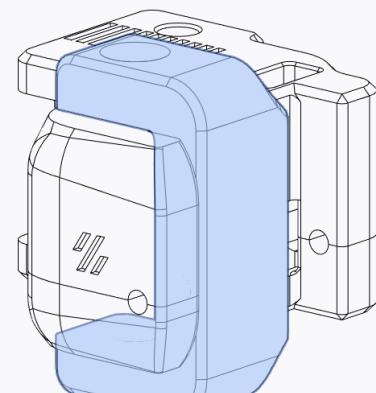
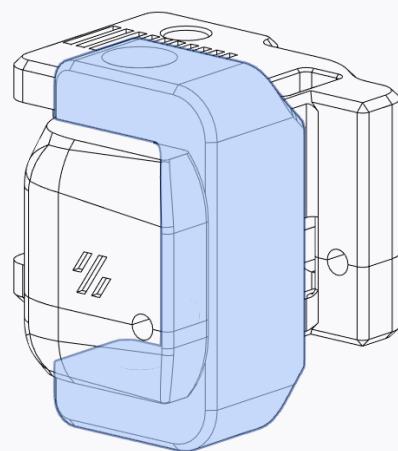
B IDLER

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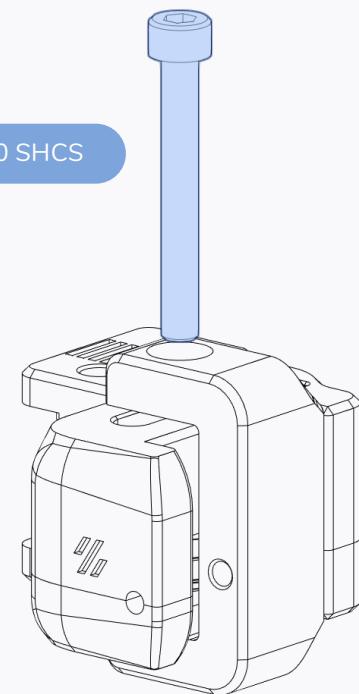


B IDLER

WWW.VORONDESIGN.COM



M5x40 SHCS



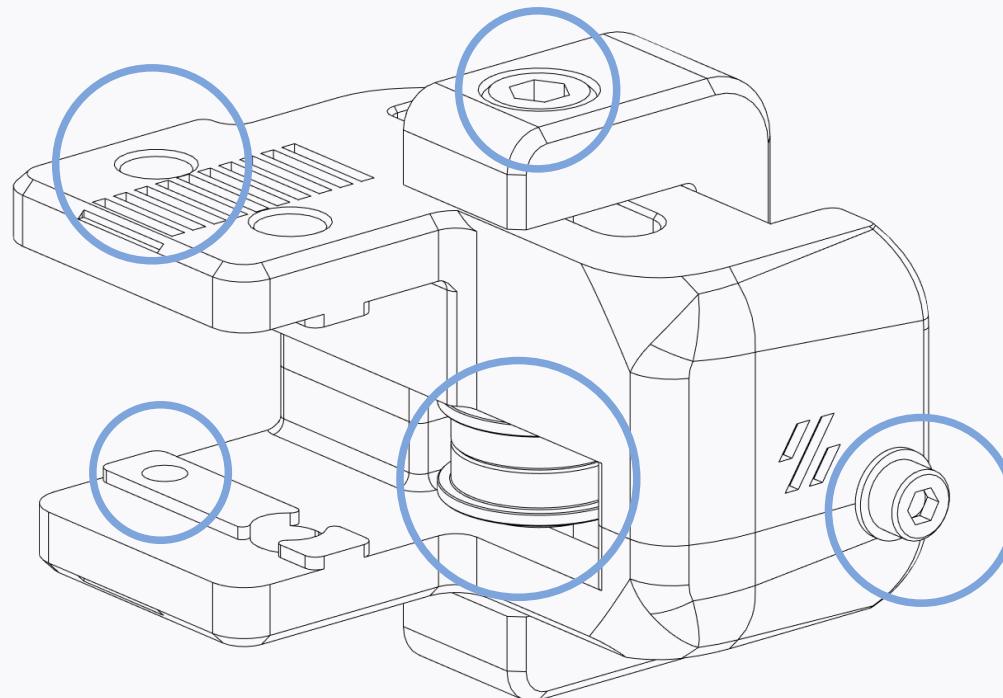
REMOVE ASSEMBLY AID

Remove the bolt and slide the tension arm into place.

B IDLER

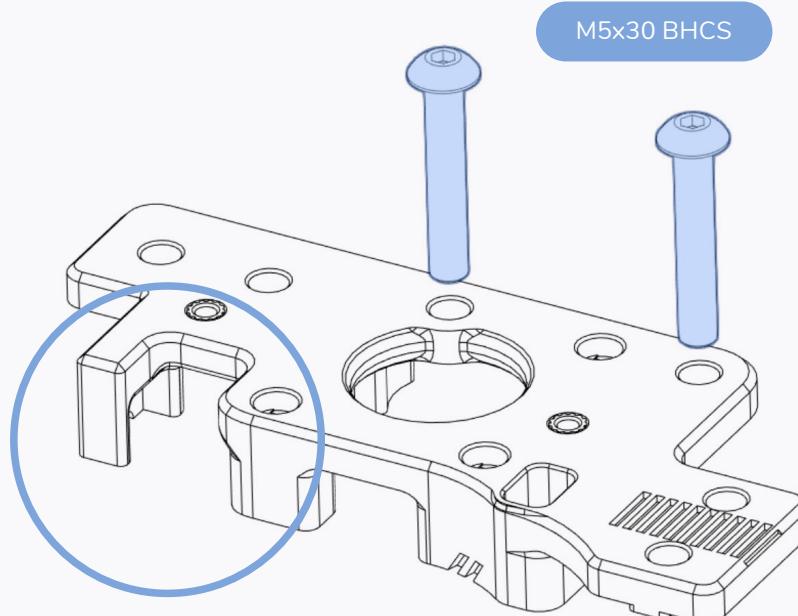
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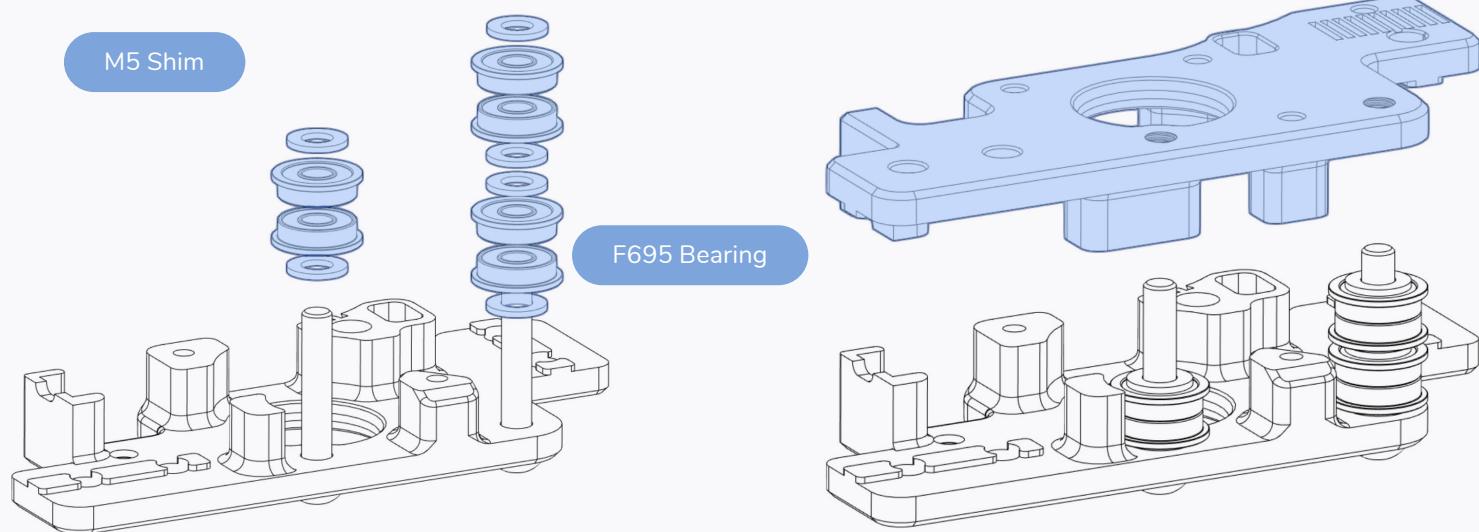
CHECK YOUR WORK

Compare your assembled parts to the graphics shown here. Pay attention to the features highlighted by the circles.



CUTOUT

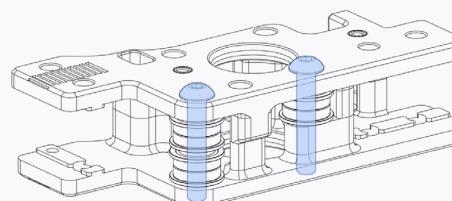
The printed parts for the A drive
have a cutout.

**UPSIDE DOWN ASSEMBLY**

For ease of assembly we recommend to assemble the A and B drives upside down.

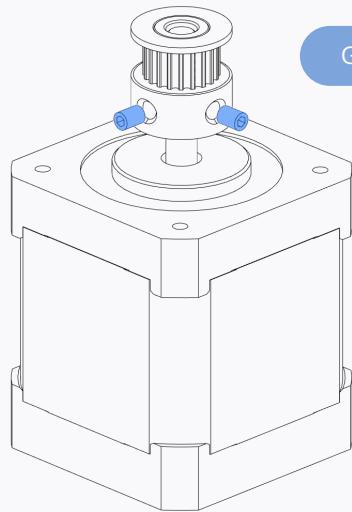
DON'T OVER TIGHTEN

The M5 bolts are threaded directly into plastic.



A DRIVE

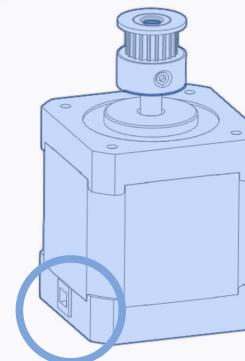
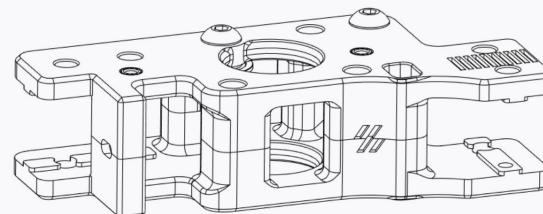
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GT2 20 Tooth Pulley

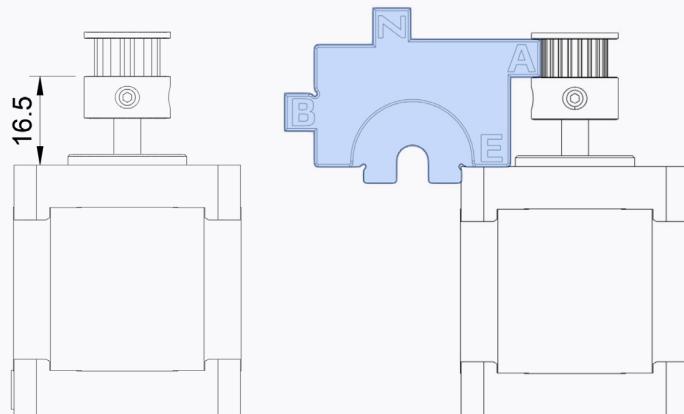
APPLY THREAD LOCKER

Make sure to use thread locker on the set screws.



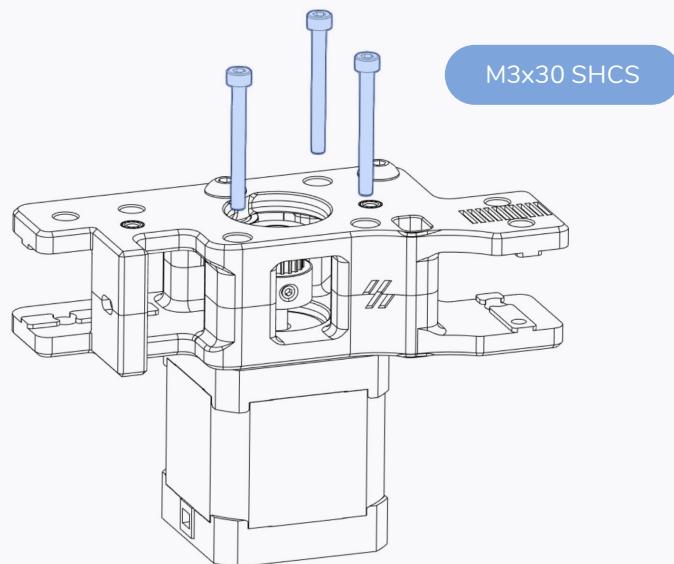
MOTOR ORIENTATION

Pay attention to the orientation of the cable exit. The wires from the motors will be pointing towards each other once fully assembled.

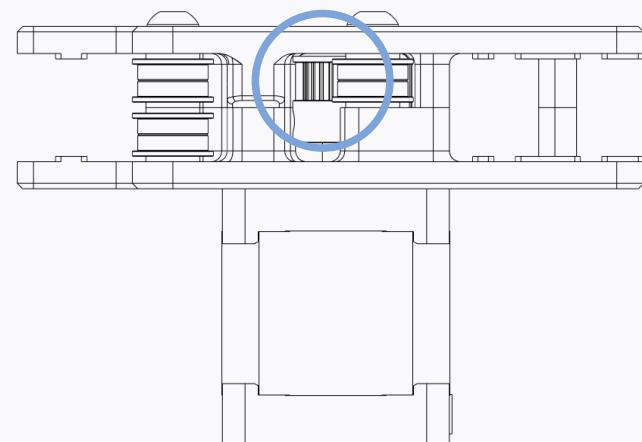


A DRIVE

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M3x30 SHCS



CHECK YOUR WORK

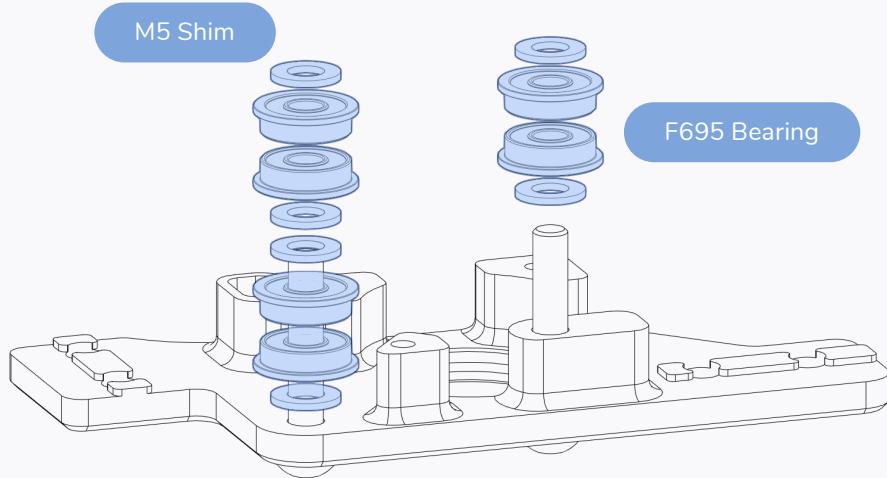
Compare your assembled part to the graphic shown here.

Pay attention to the pulley orientation and alignment with the bearing stack ups.

B DRIVE

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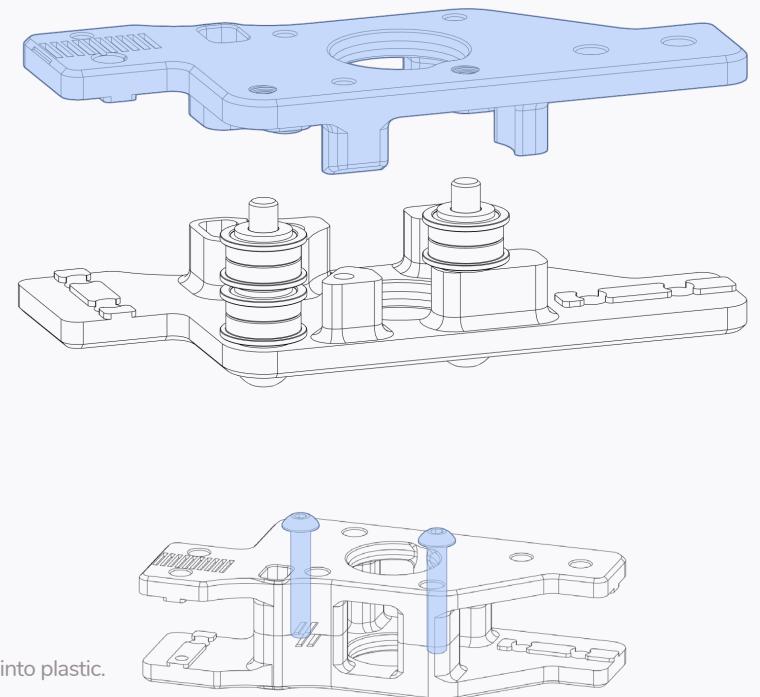


UPSIDE DOWN ASSEMBLY

For ease of assembly we recommend to assemble the A and B drives upside down.

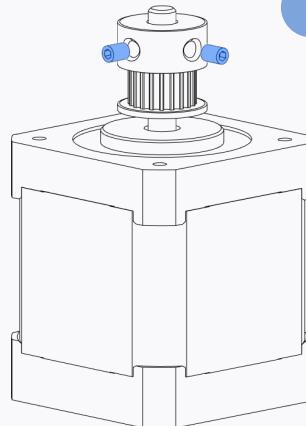
DON'T OVER TIGHTEN

The M5 bolts are threaded directly into plastic.



B DRIVE

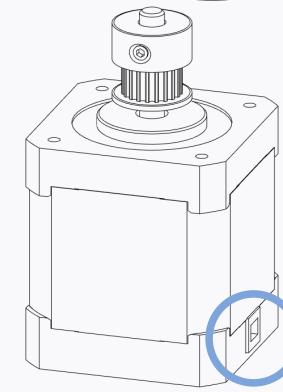
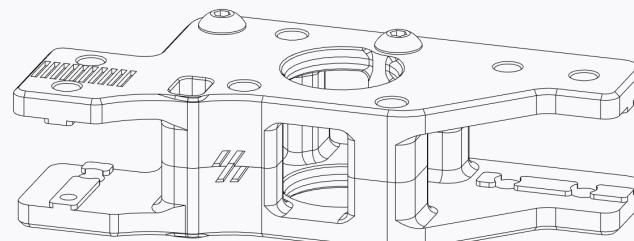
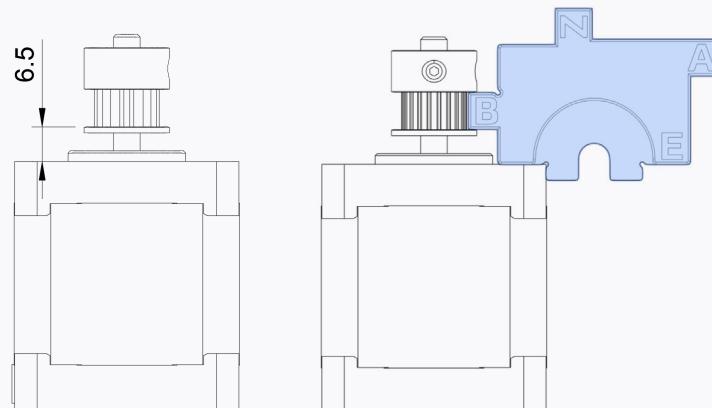
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GT2 20 Tooth Pulley

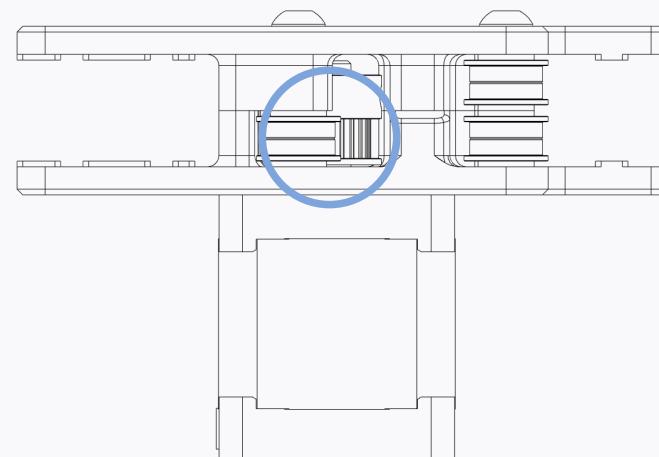
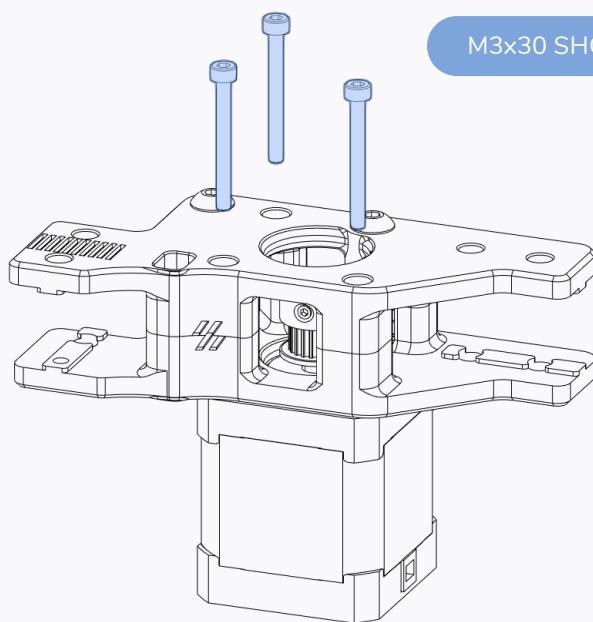
APPLY THREAD LOCKER

Make sure to use thread locker on the set screws.



MOTOR ORIENTATION

Pay attention to the orientation of the cable exit.

**CHECK YOUR WORK**

Compare your assembled part to the graphic shown here.

Pay attention to the pulley orientation and alignment with the bearing stacks.

V24 (not V2.4) was an experimental design, only 2 have ever been built. It's design became the basis for the Voron2.

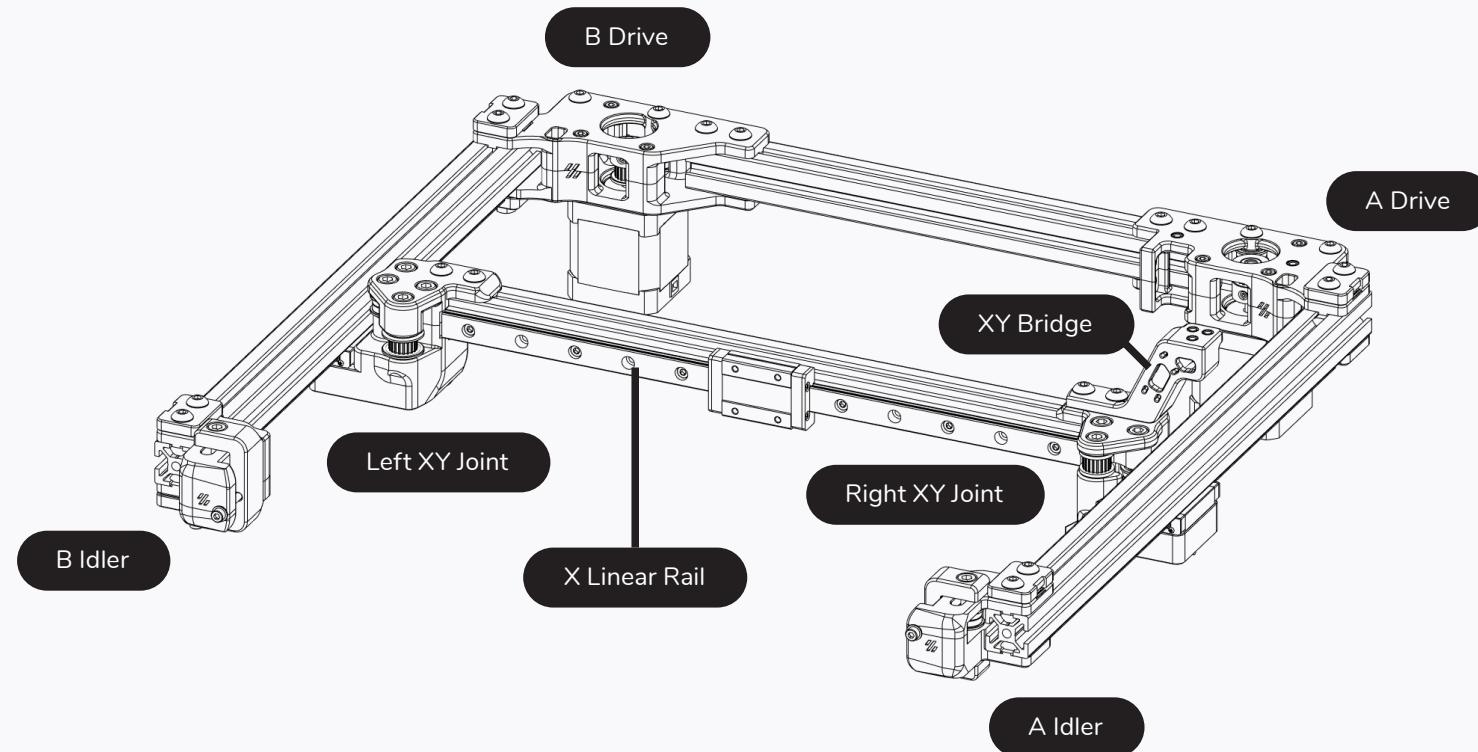
GANTRY

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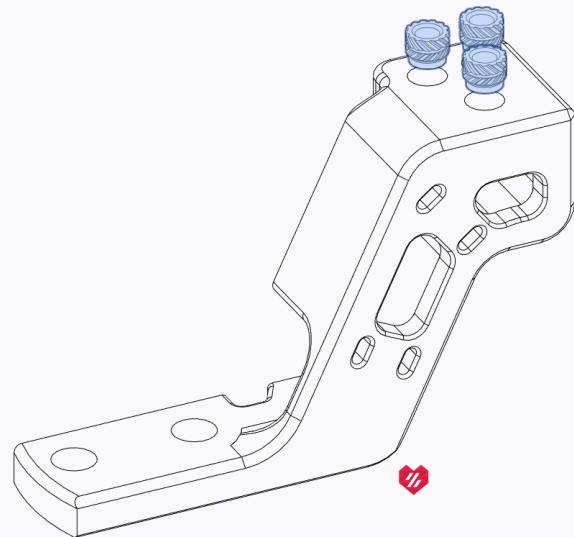
OVERVIEW

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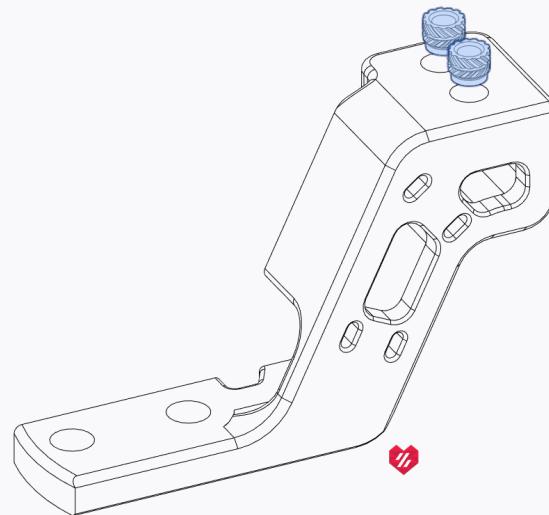


GENERIC CABLE CHAINS

The 3 hole pattern is usually found on generic cable chains.

**IGUS CABLE CHAINS**

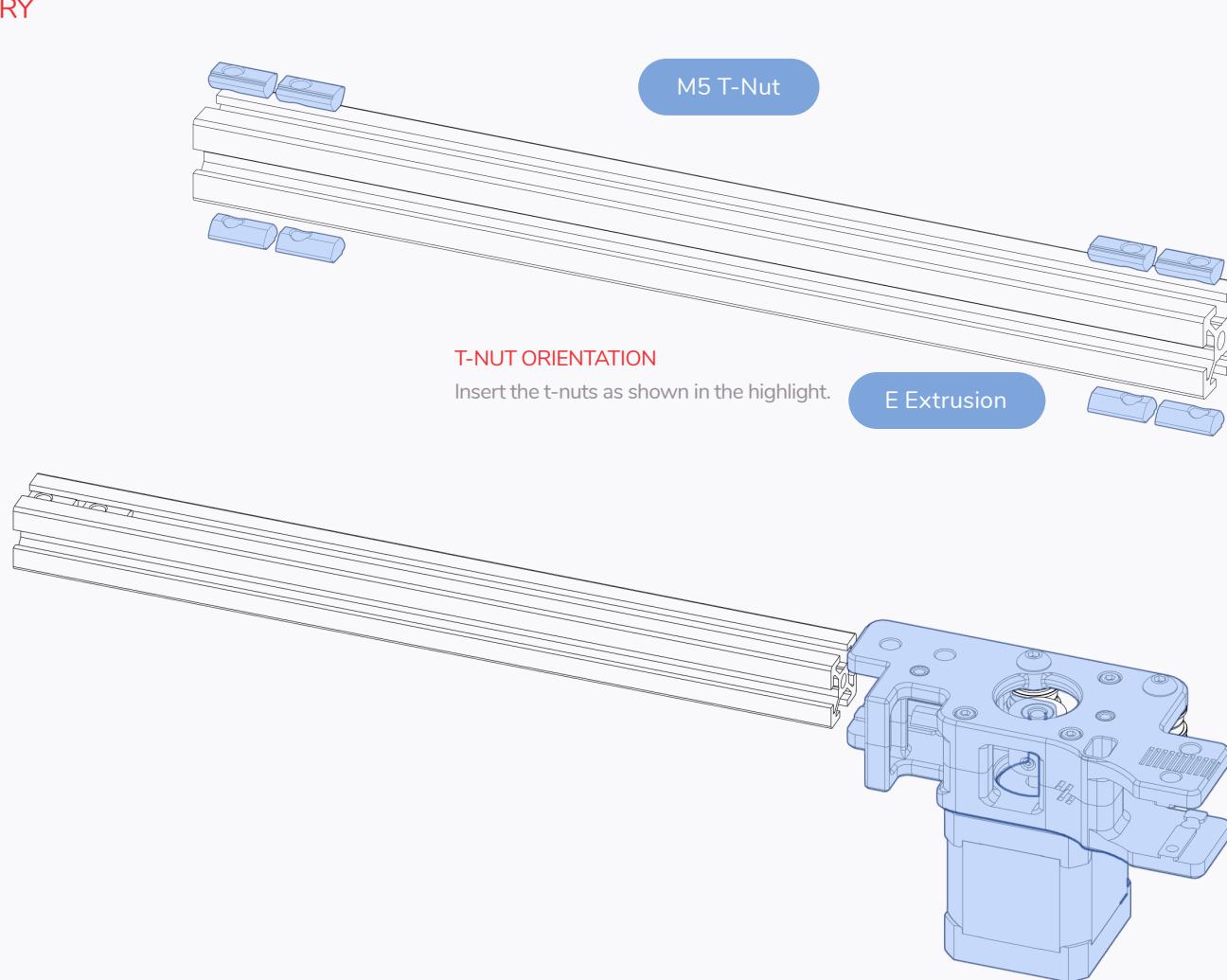
IGUS chains have 2 mounting holes.

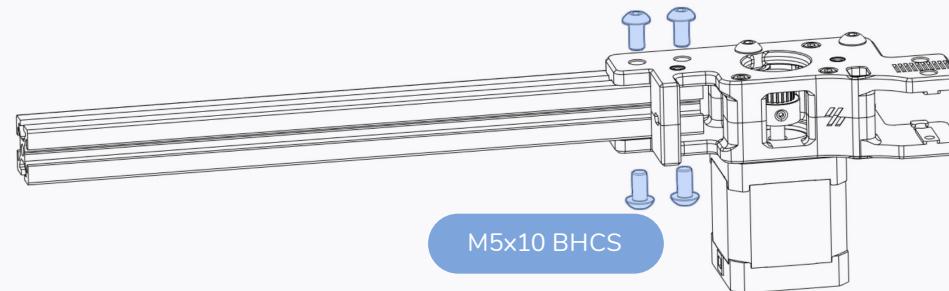
**WHICH TO CHOOSE?**

Pick the style that matches the mounting pattern of your cable chains.

GANTRY

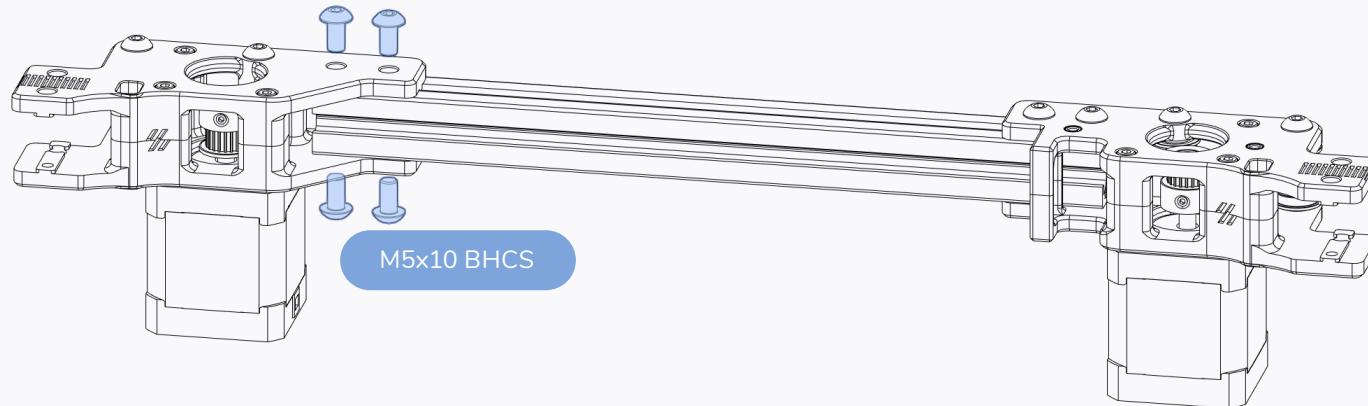
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GANTRY

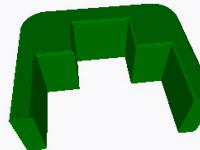
WWW.VORONDESIGN.COM



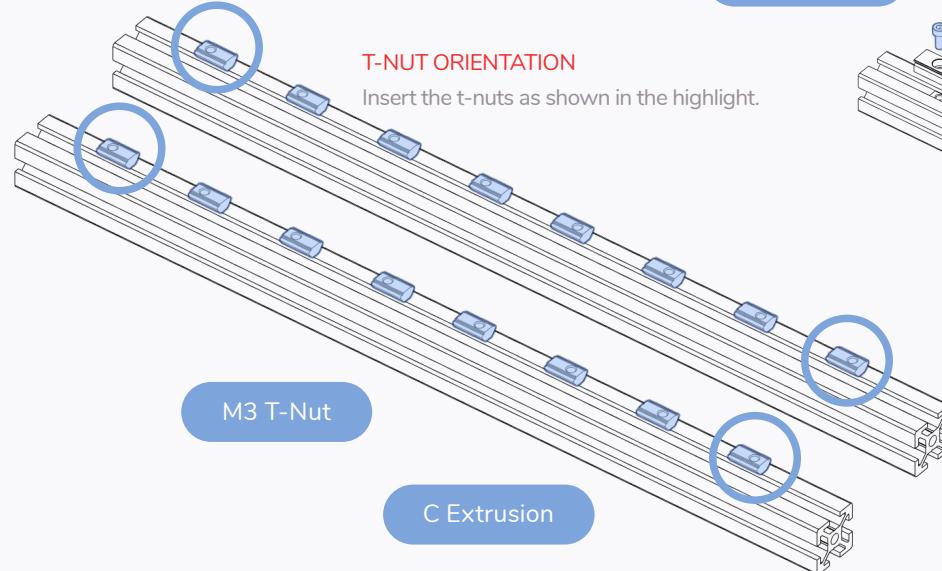
Y AXIS

CENTRED RAIL INSTALLATION GUIDE

Use the MGN9 guides to position the rail in the centre of the extrusion prior to fastening the screws.

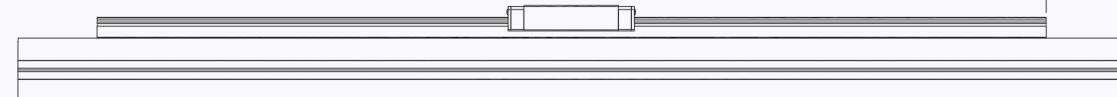
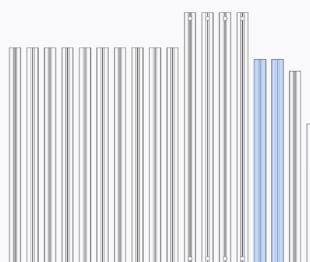


MGN9 Rail



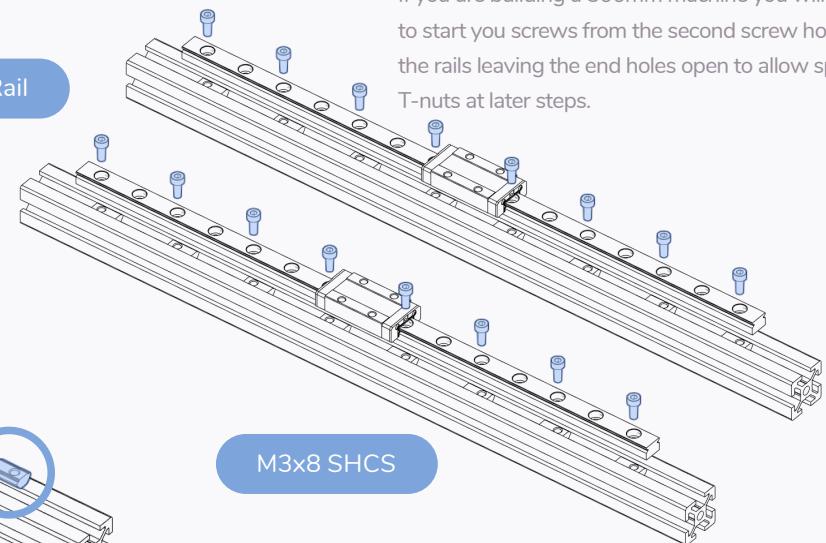
M3 T-Nut

C Extrusion



300MM BUILDS

If you are building a 300mm machine you will need to start you screws from the second screw hole in the rails leaving the end holes open to allow space for T-nuts at later steps.

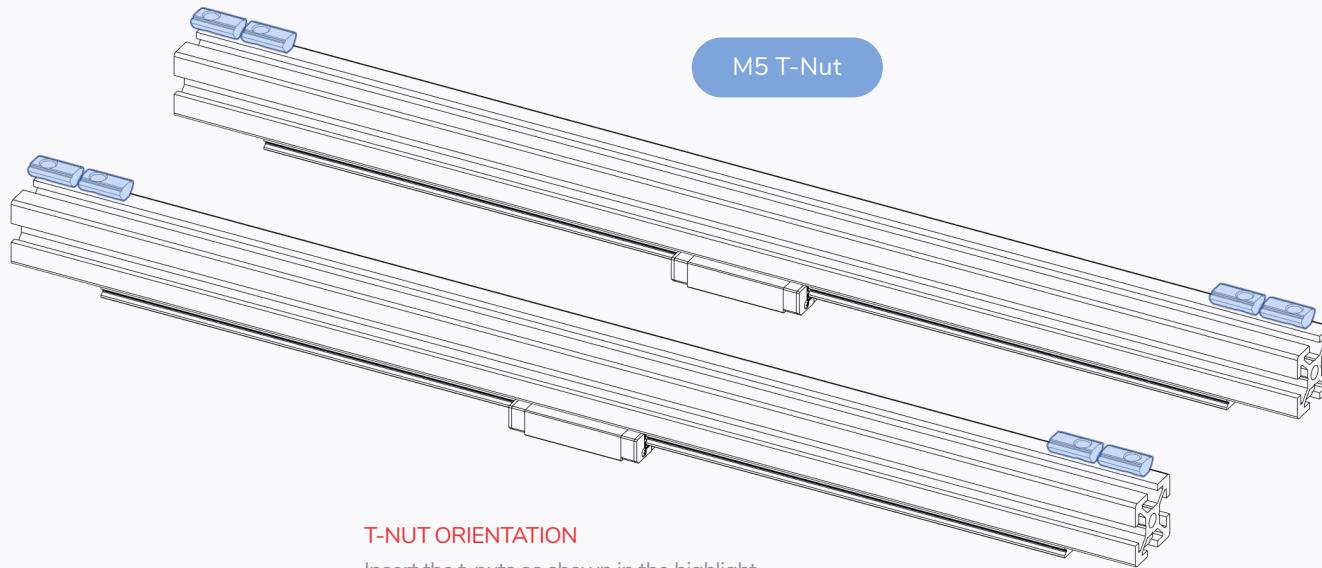


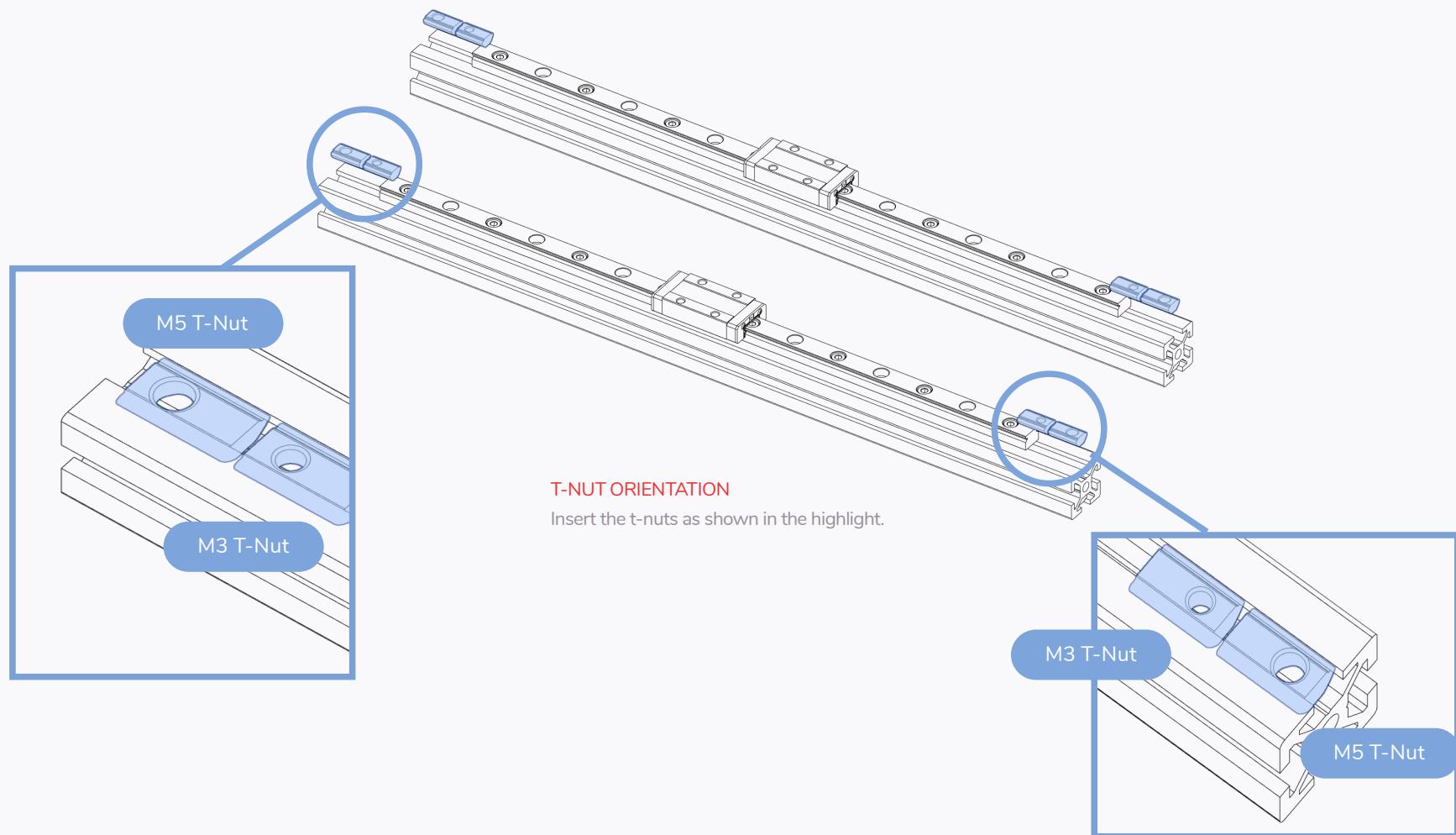
M3x8 SHCS

MIND THE CARRIAGE

The carriages are designed to slide along the rail easily. This unfortunately also includes sliding off the rails.

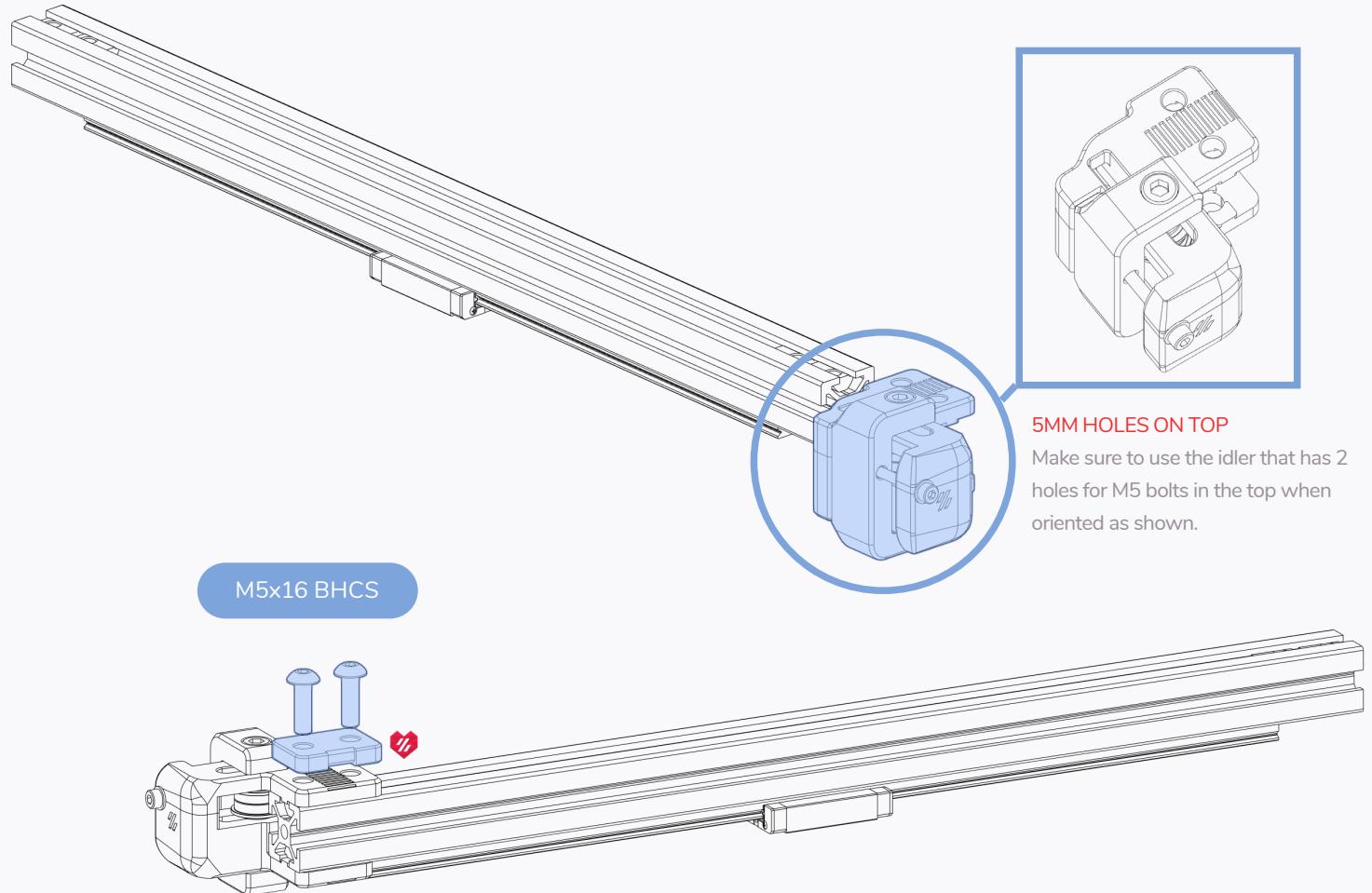
Dropping the carriage likely irreparably damages it.





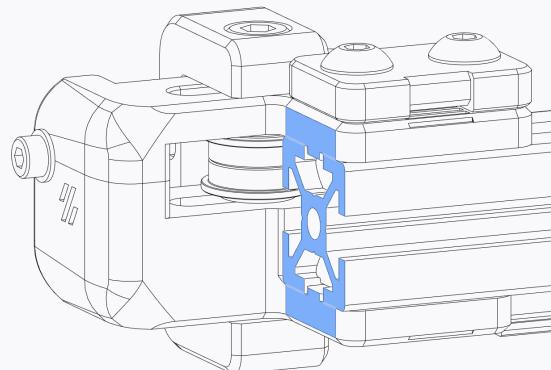
Y AXIS

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5MM HOLES ON TOP

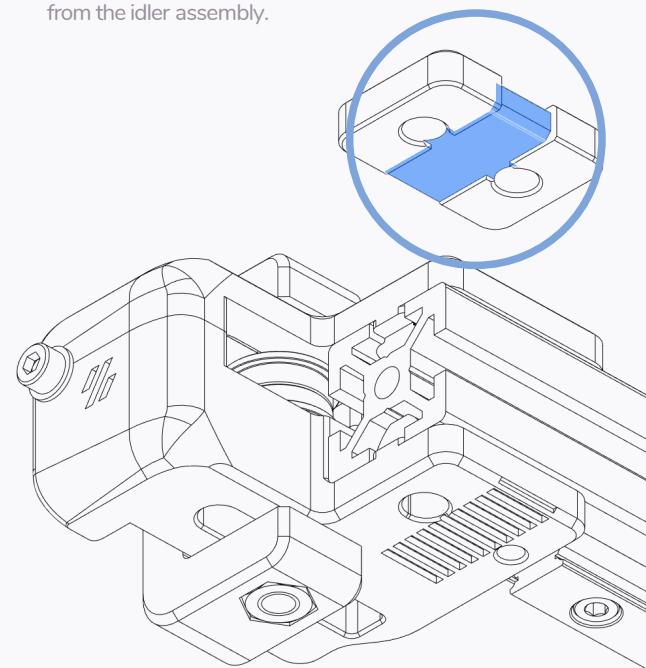
Make sure to use the idler that has 2 holes for M5 bolts in the top when oriented as shown.

**FLUSH INSTALL**

Make sure the plastic part sits flush with the end of the extrusion. If not flush check if you installed the correct idler.

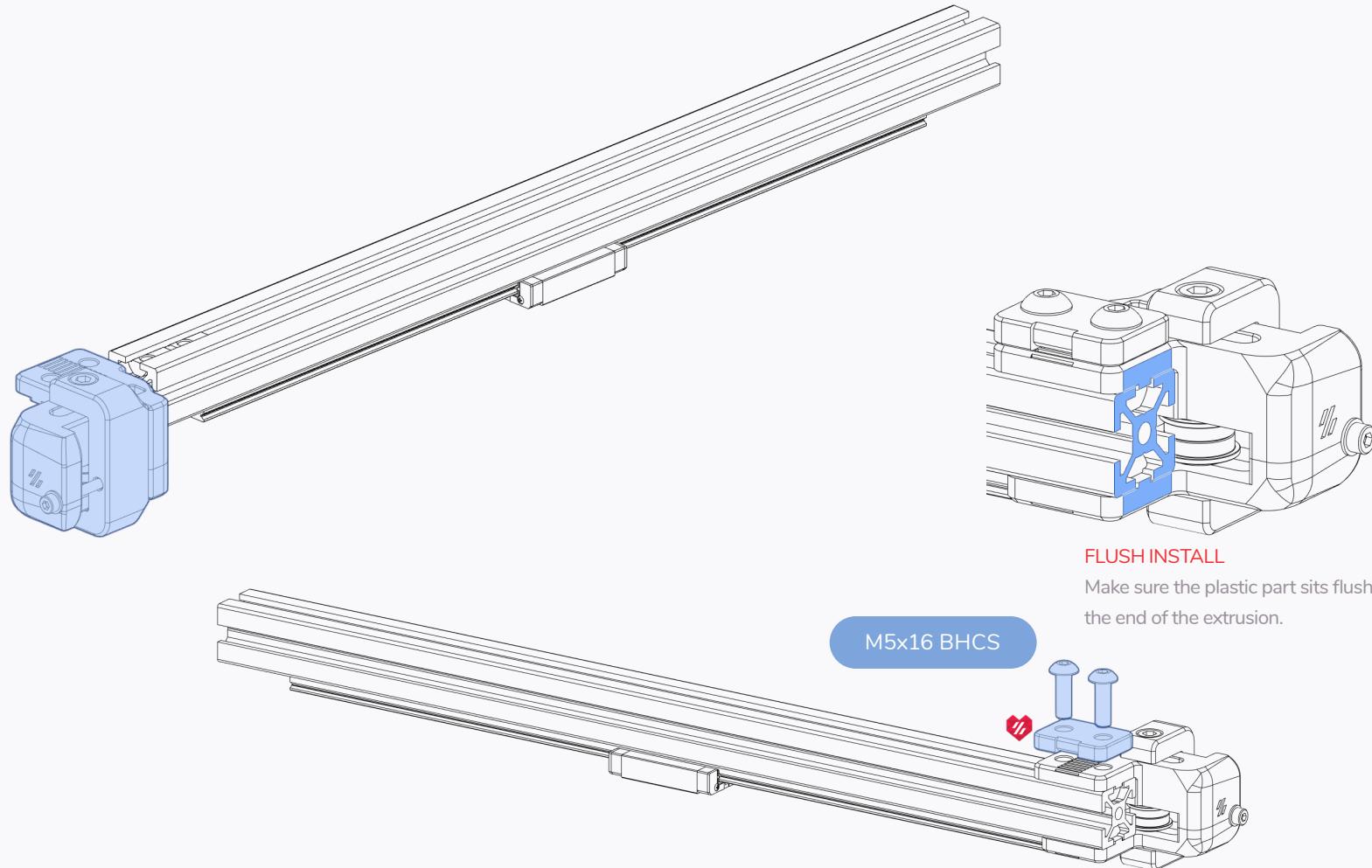
NOTCH ORIENTATION

The indentation along the part is designed to clamp on the belt. The notch points away from the idler assembly.



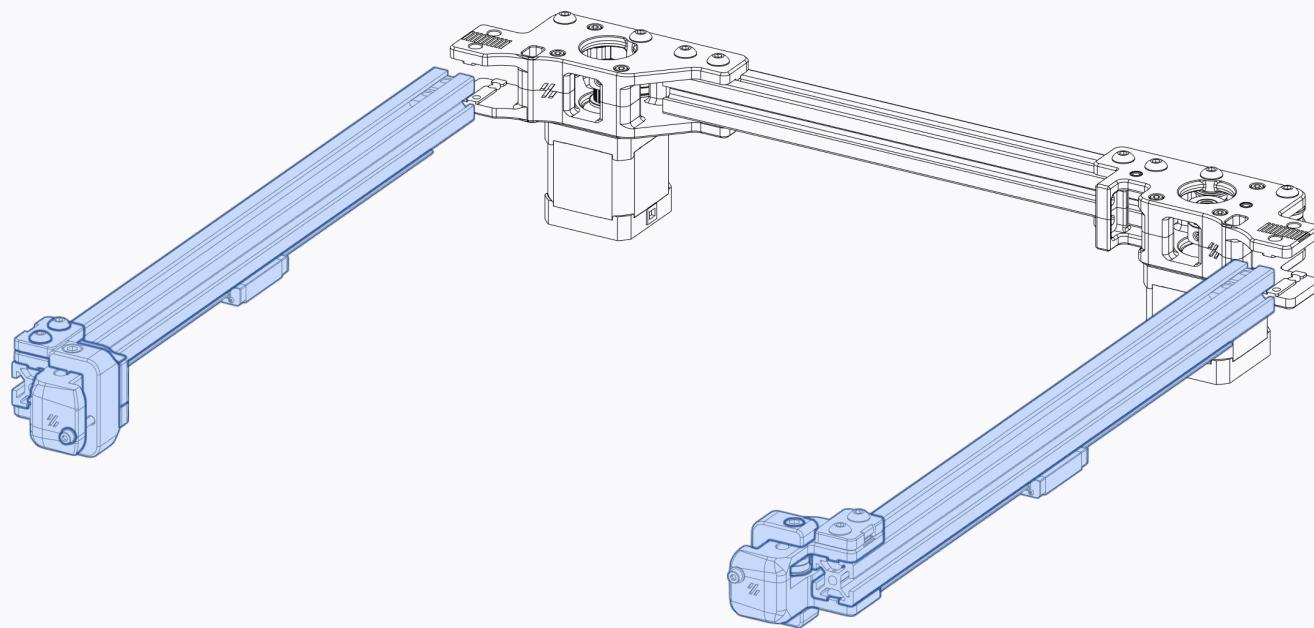
Y AXIS

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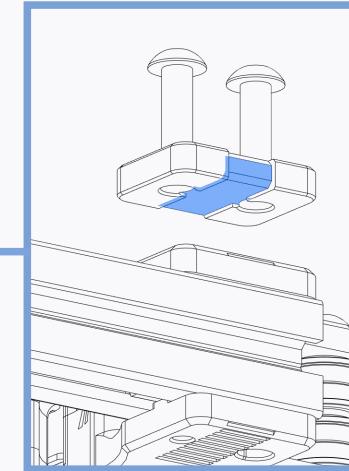
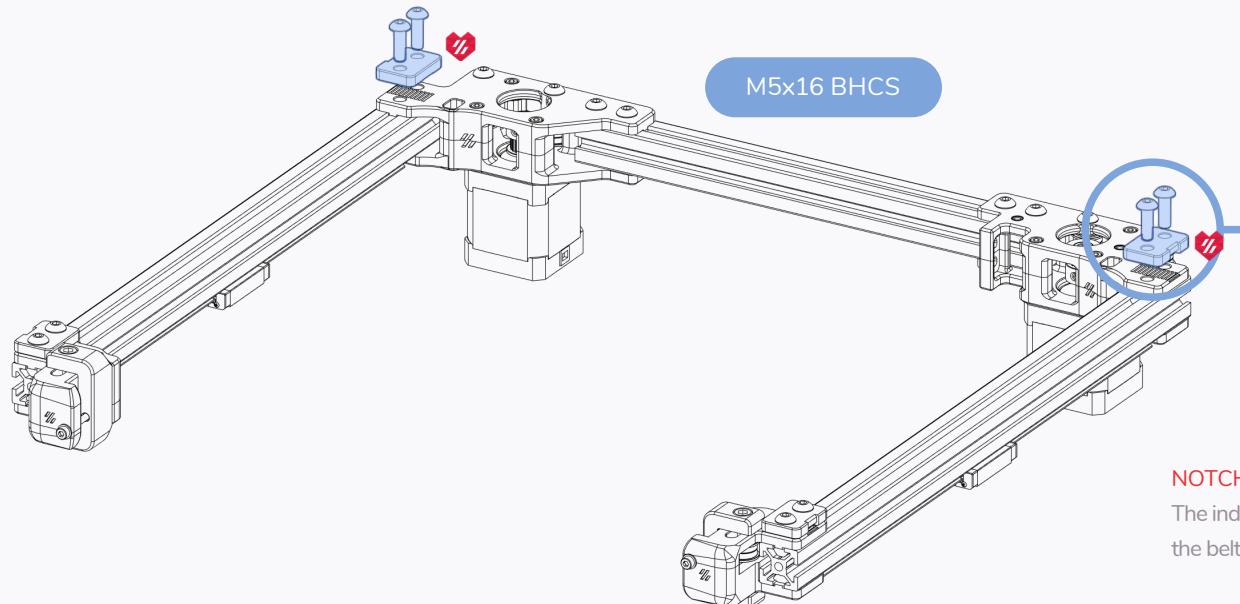
GANTRY

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GANTRY

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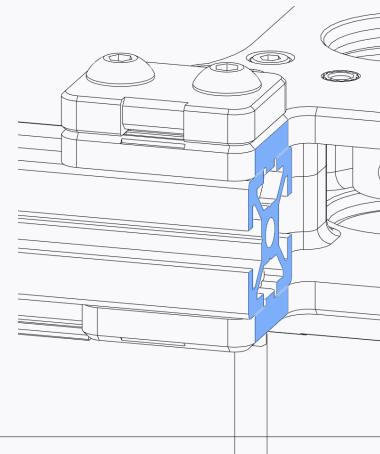


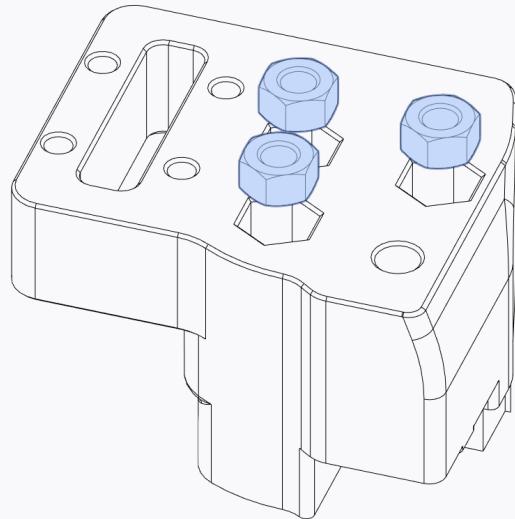
NOTCH ORIENTATION

The indentation along the part is designed to clamp on the belt. The notch points away from the drive assembly.

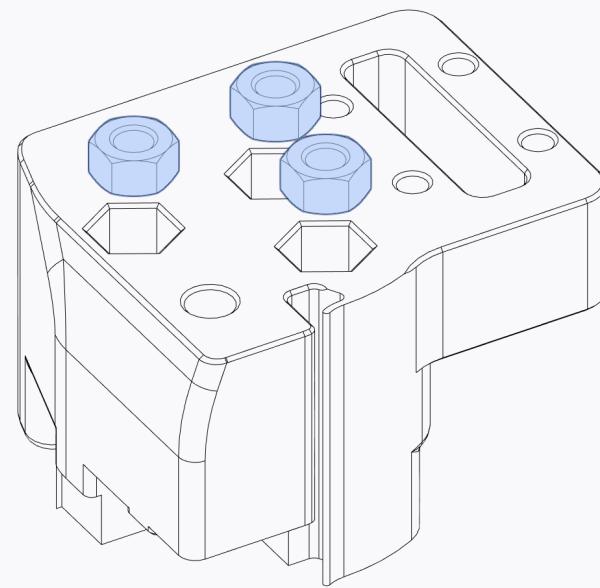
FLUSH INSTALL

Make sure the plastic part sits flush with the end of the extrusion.





M5 Nut

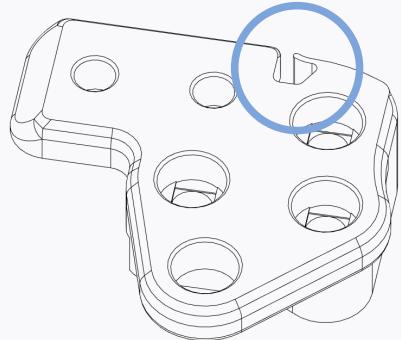


RIGHT XY JOINT

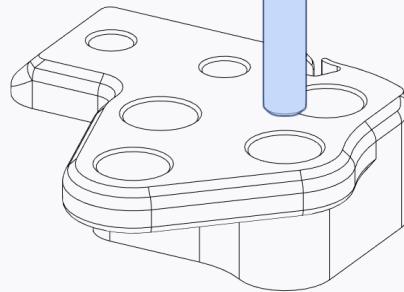
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CABLE PATH

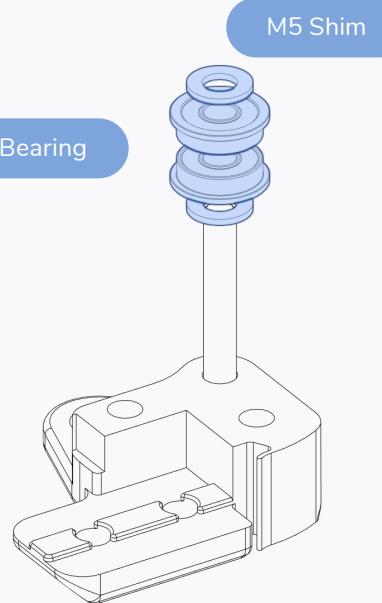
The printed parts for the right XY joint have a small channel to guide the end stop wires.



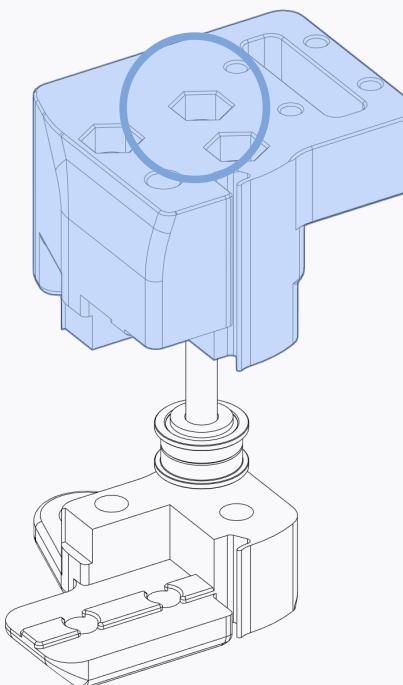
M5x40 SHCS



F695 Bearing

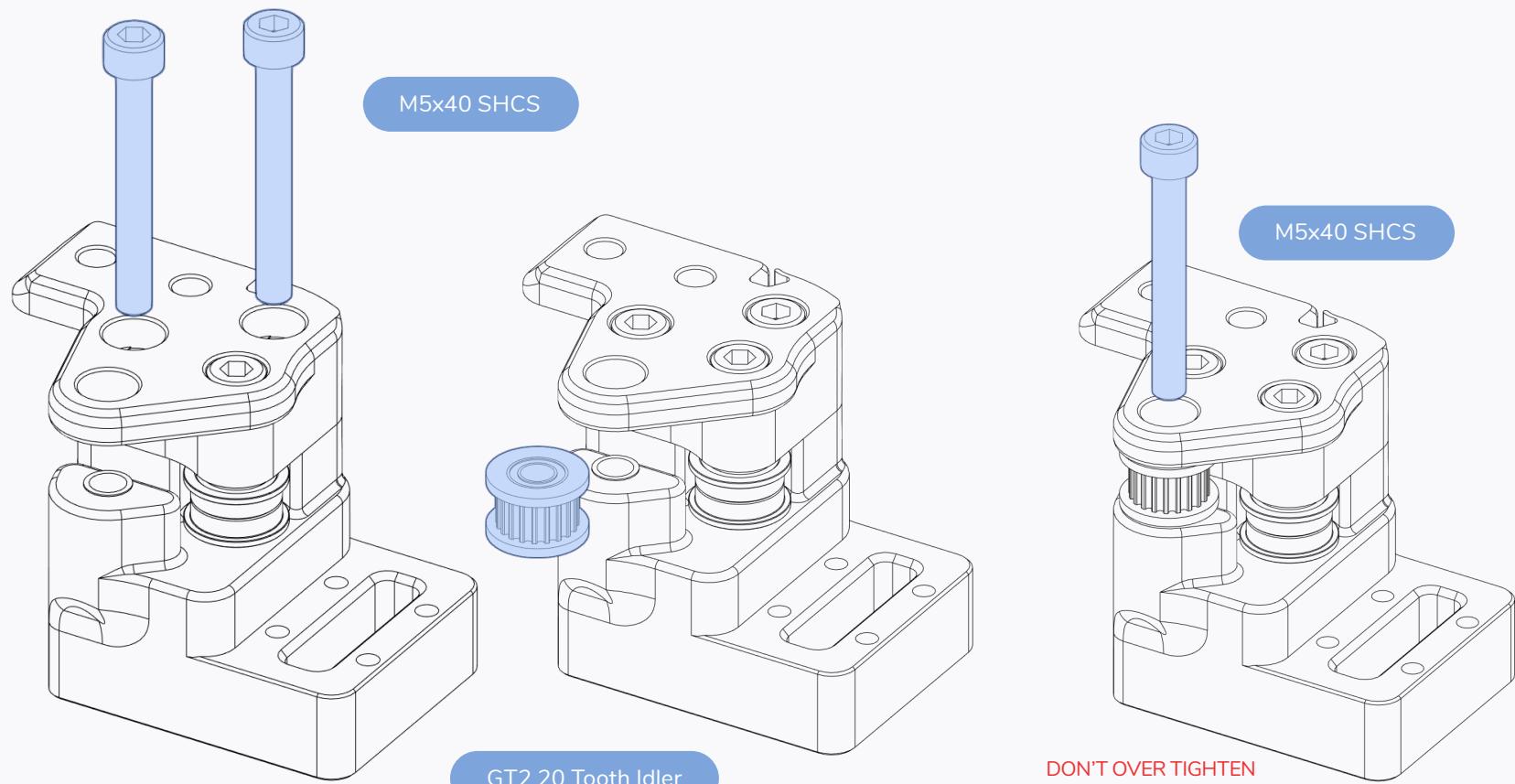


M5 Shim



RIGHT XY JOINT

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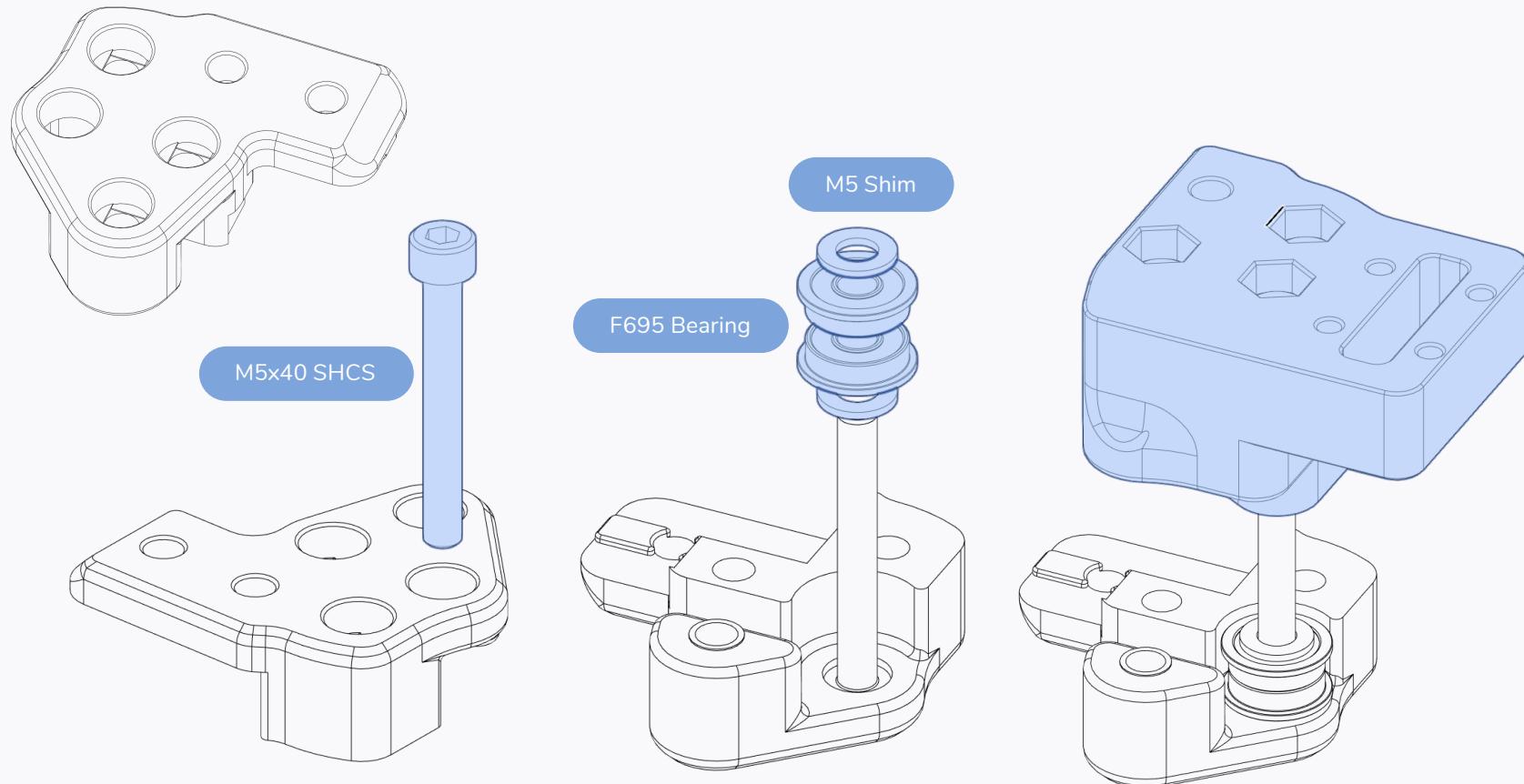
DON'T OVER TIGHTEN

The bolt is used to position the idler and is screwed directly into plastic.

The idler must spin freely.

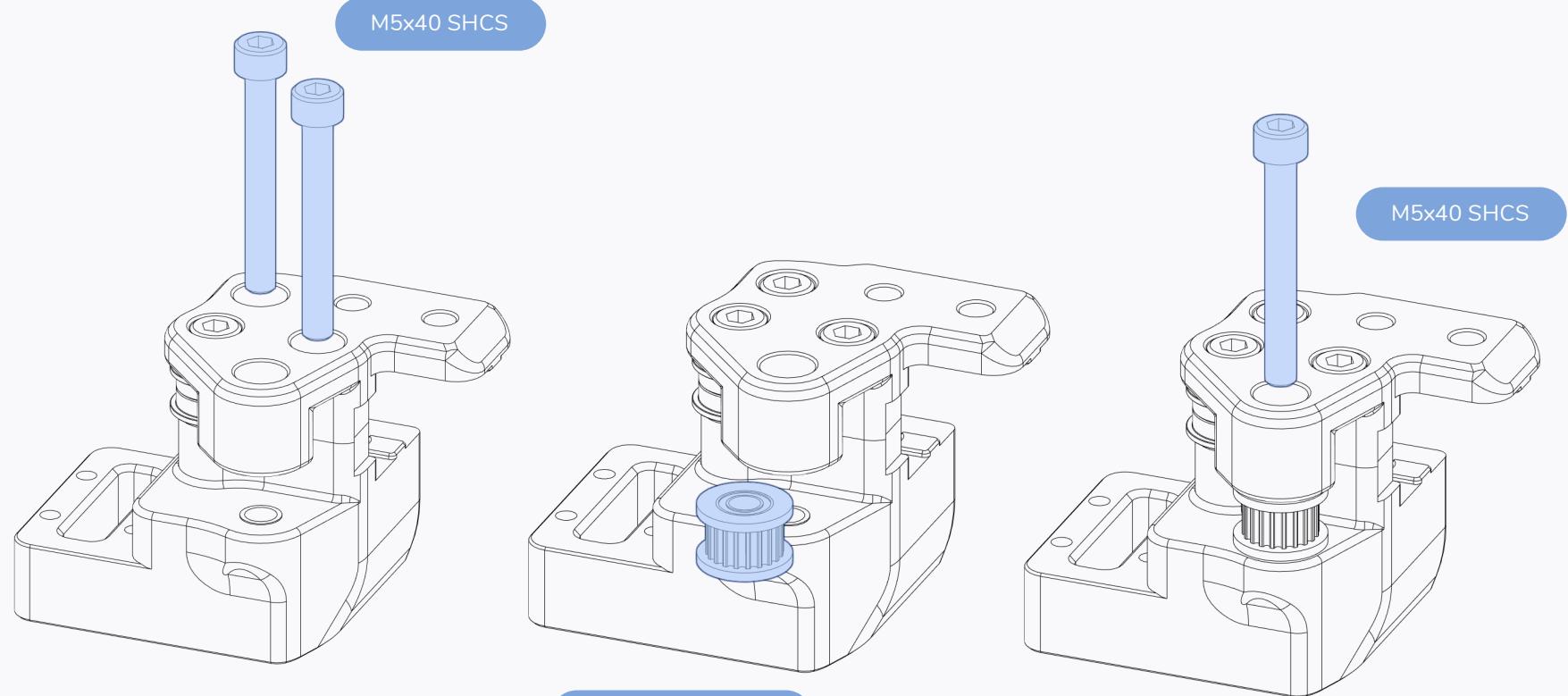
LEFT XY JOINT

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LEFT XY JOINT

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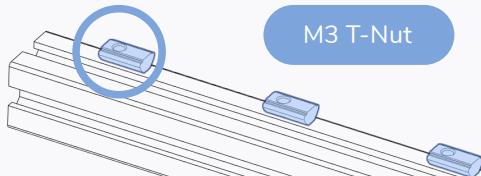
DON'T OVER TIGHTEN

The bolt is used to position the idler and is screwed directly into plastic.

The idler must spin freely.

X AXIS

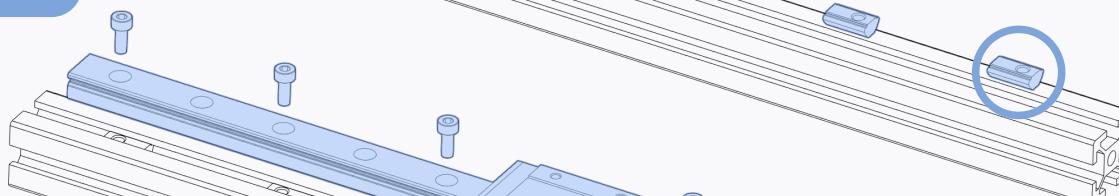
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T-NUT ORIENTATION

Insert the t-nuts as shown in the highlight.

M3x8 SHCS

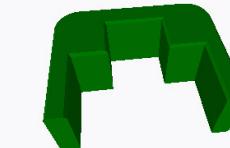


D Extrusion

MIND THE CARRIAGE

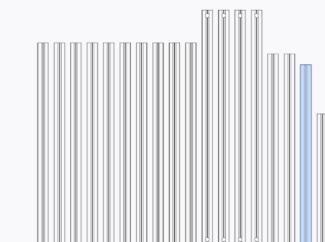
Temporarily secure the carriage with a piece of sticky tape to prevent it from sliding off the rail.

Dropping the carriage likely irreparably damages it.



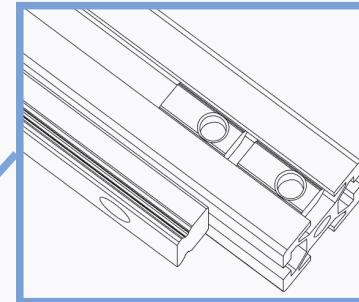
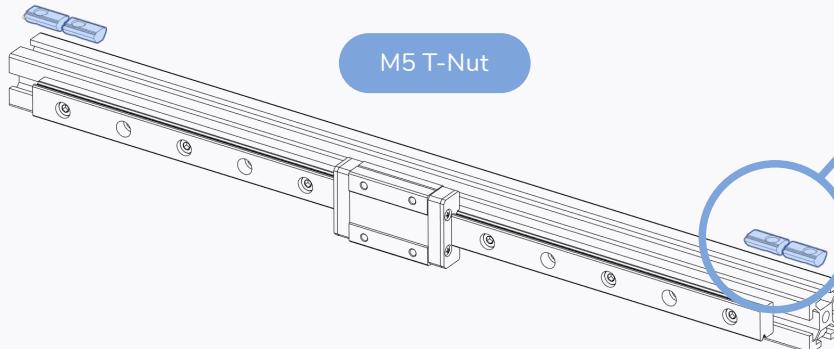
CENTRED RAIL INSTALLATION GUIDE

Use the MGN12 guides to position the rail in the center of the extrusion prior to fastening the screws.



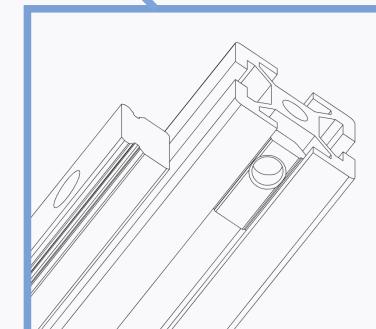
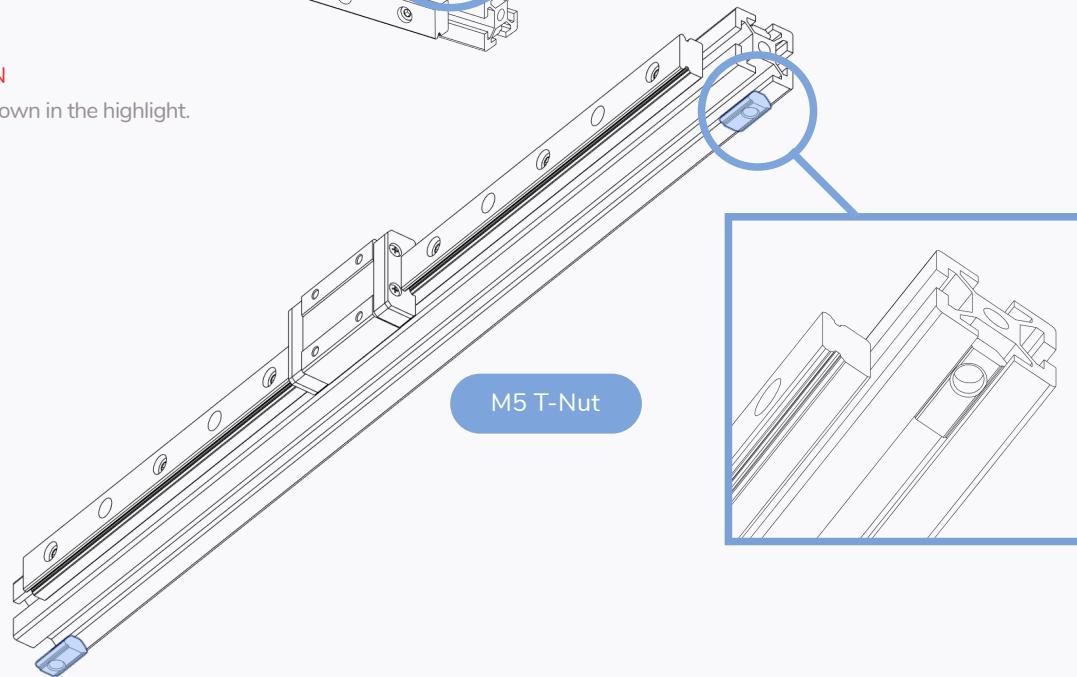
X AXIS

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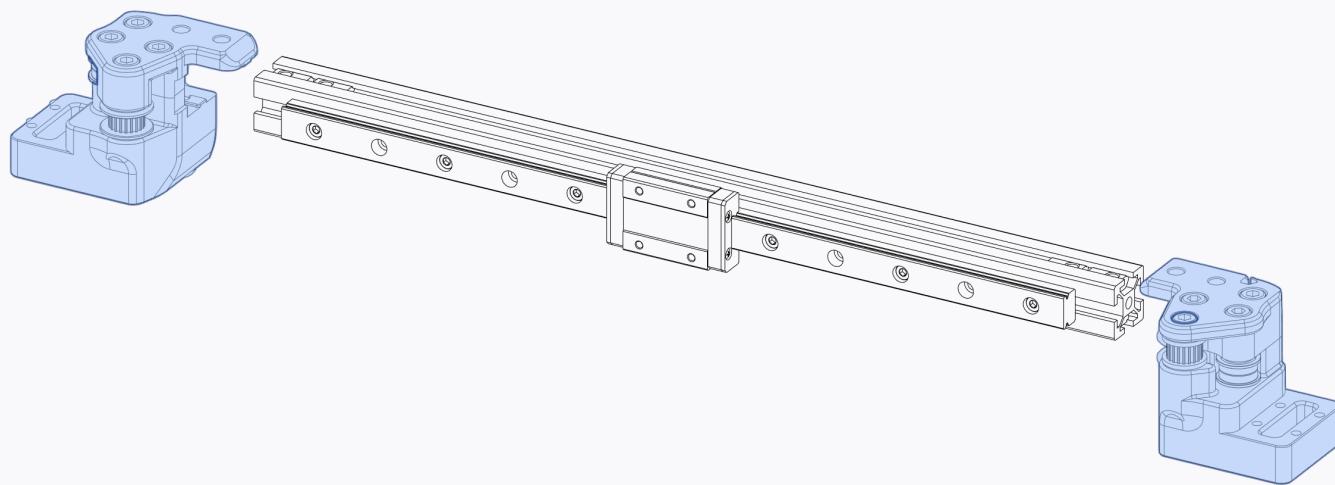
T-NUT ORIENTATION

Insert the t-nuts as shown in the highlight.



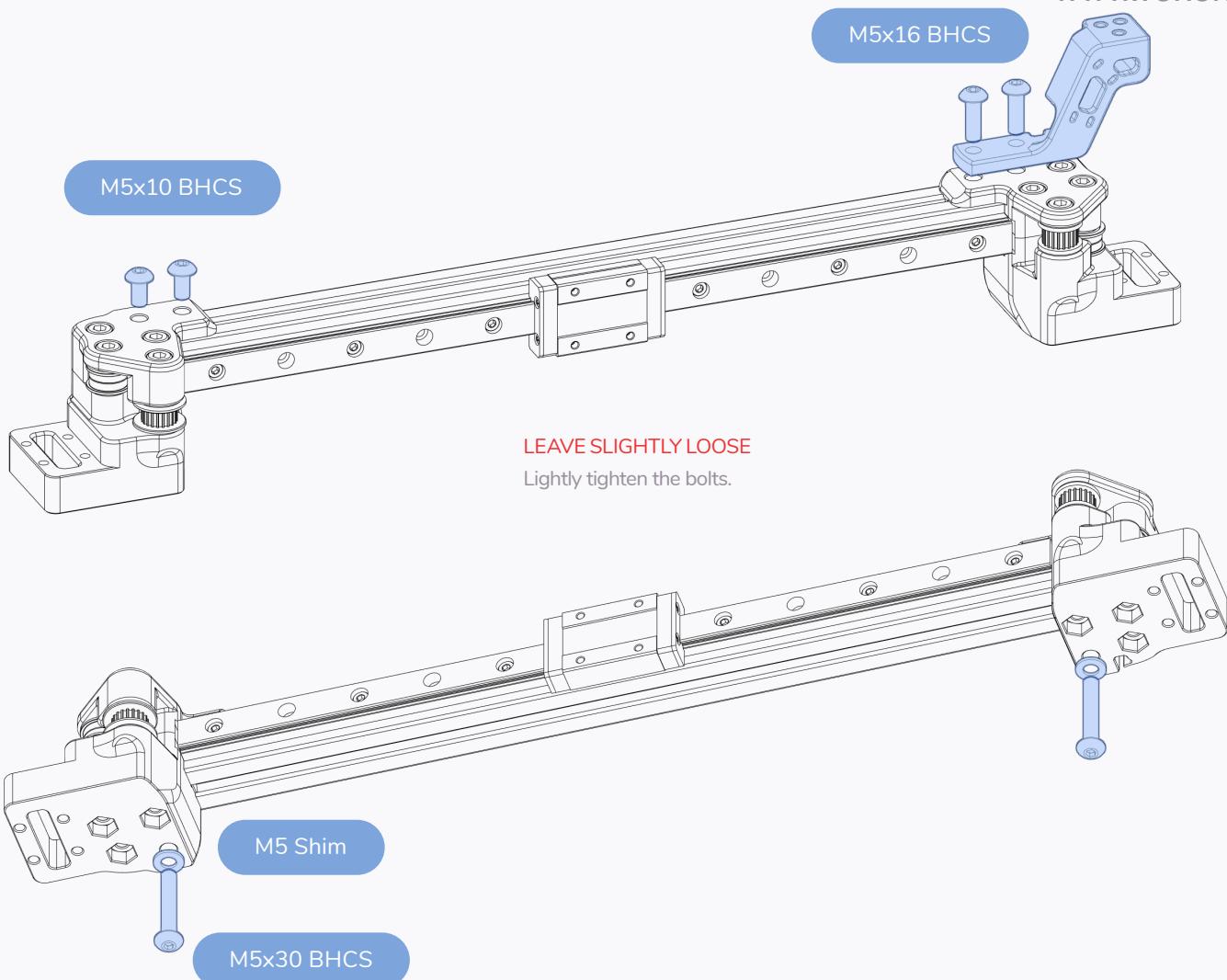
X AXIS

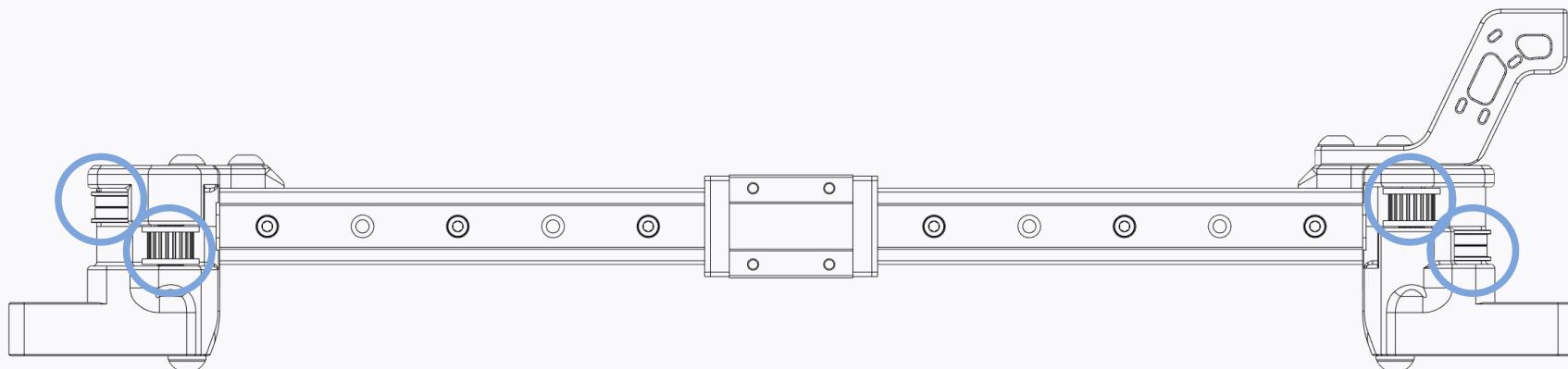
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X AXIS

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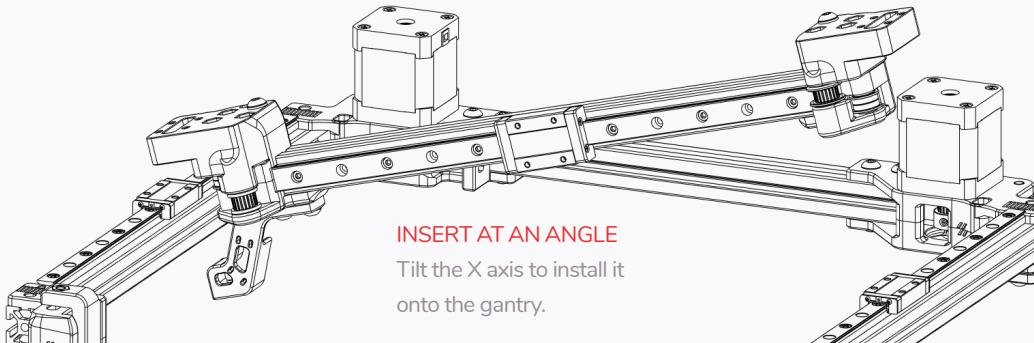
**CHECK YOUR WORK**

Compare your assembled part to the graphic shown here.

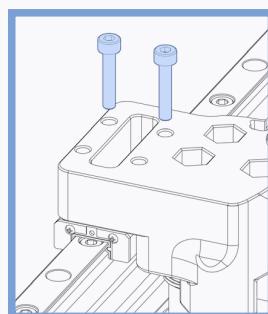
Pay attention to the pulley orientation and alignment with the bearing stack ups.

FLIP GANTRY

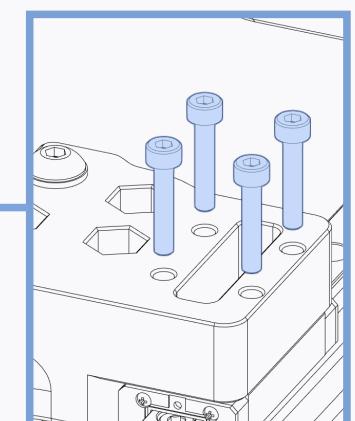
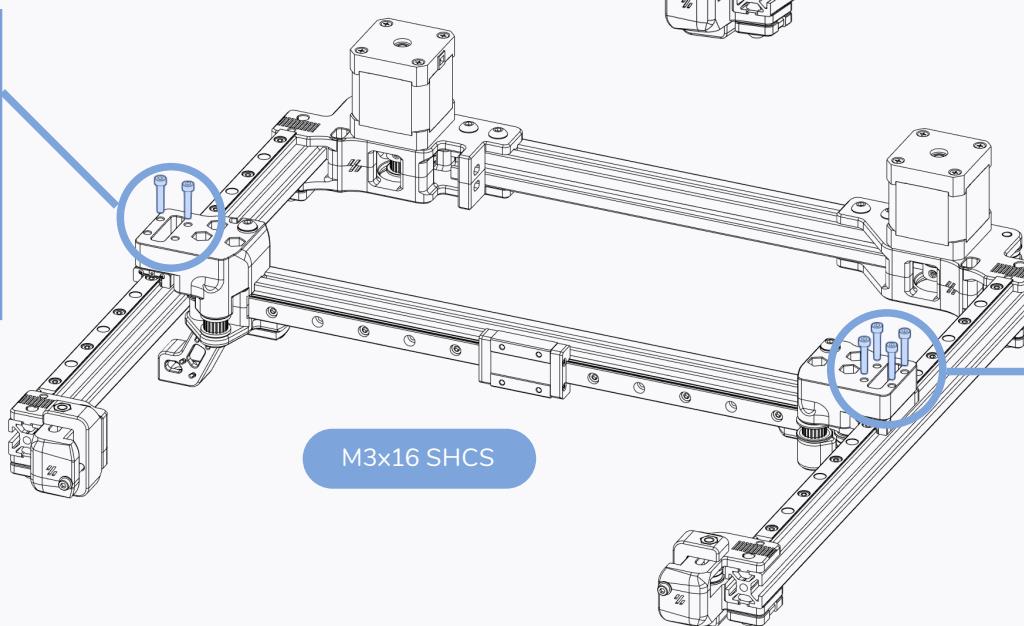
Turn the gantry around for the next step.

**INSERT AT AN ANGLE**

Tilt the X axis to install it onto the gantry.

**2X BOLT ONLY**

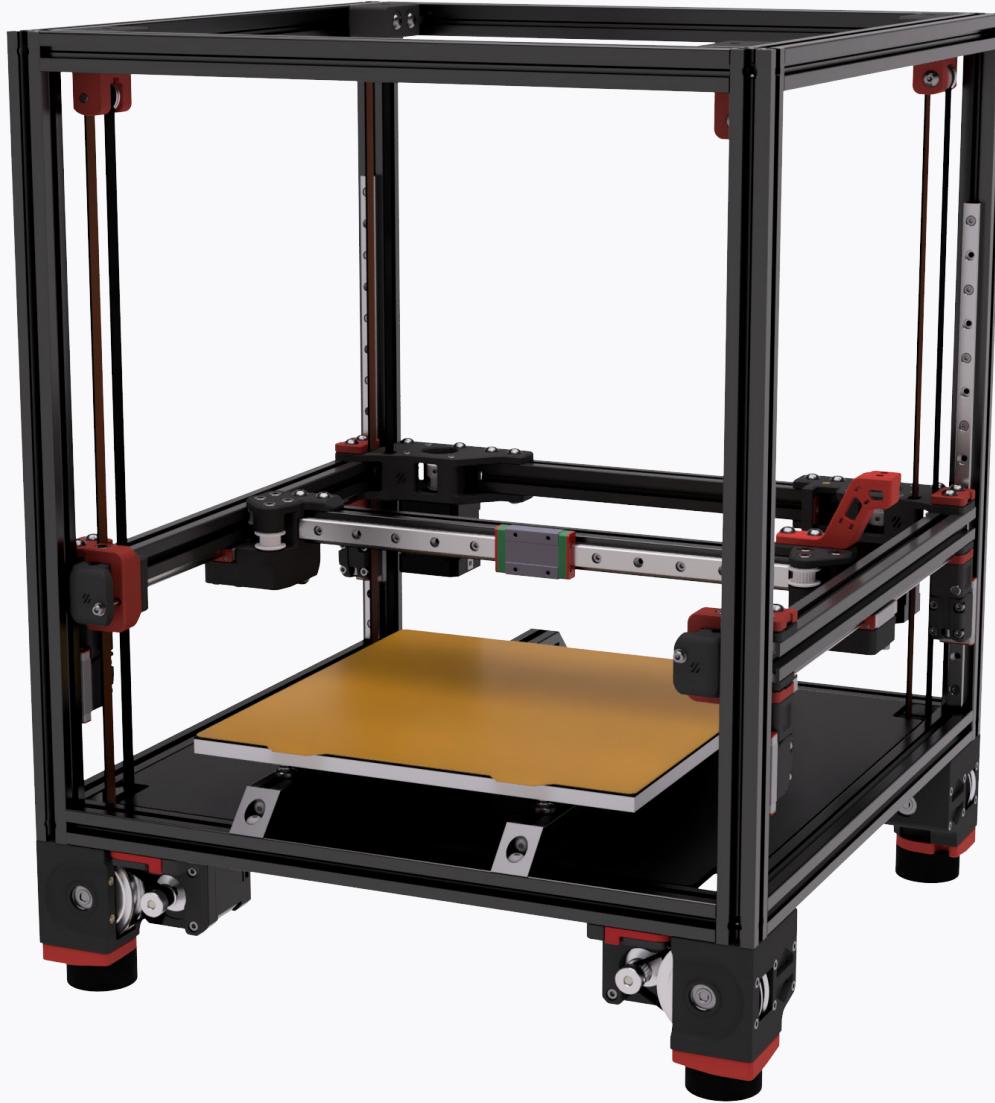
The remaining bolts will be installed during the end-stop installation.



V1 and V2 are not version numbers but the printer models/lines. We renamed the V1 to Voron Trident to address the confusion this caused.

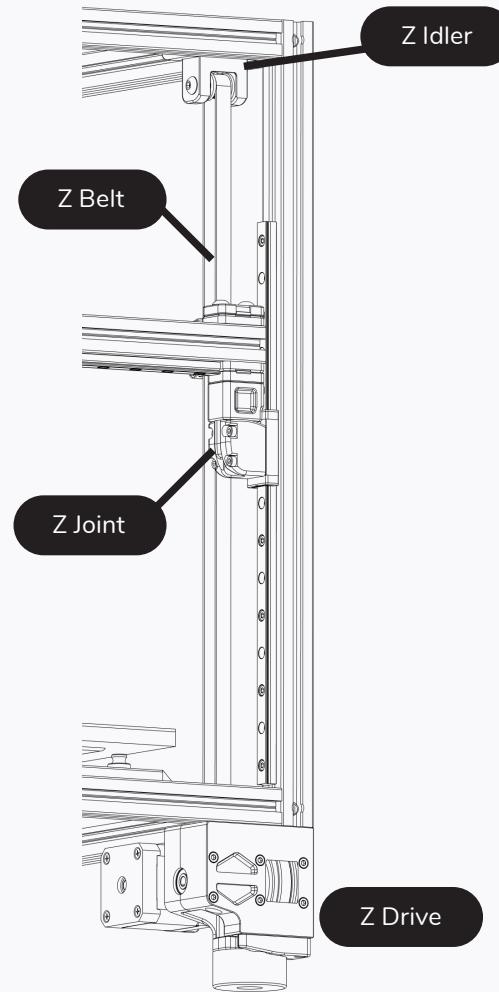
WWW.VORONDESIGN.COM

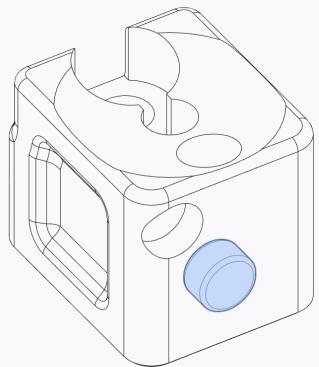
Z AXIS



OVERVIEW

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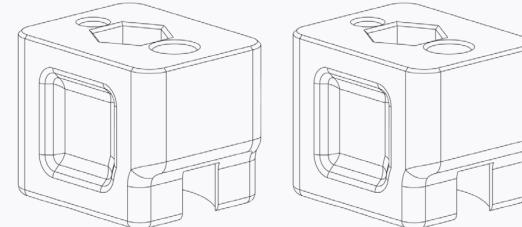
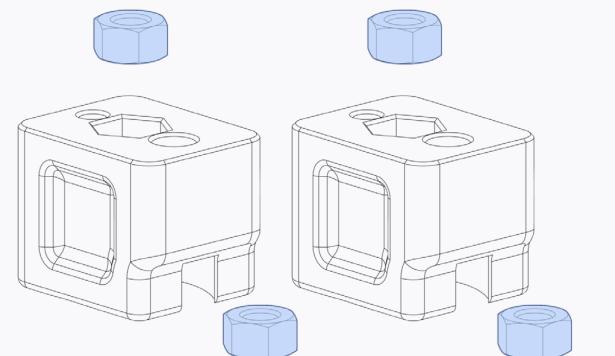


6x3 Magnet

OPTION: HALL EFFECT ENDSTOP

If you are building your printer with a Hall Effect Endstop add a magnet to the cutout.

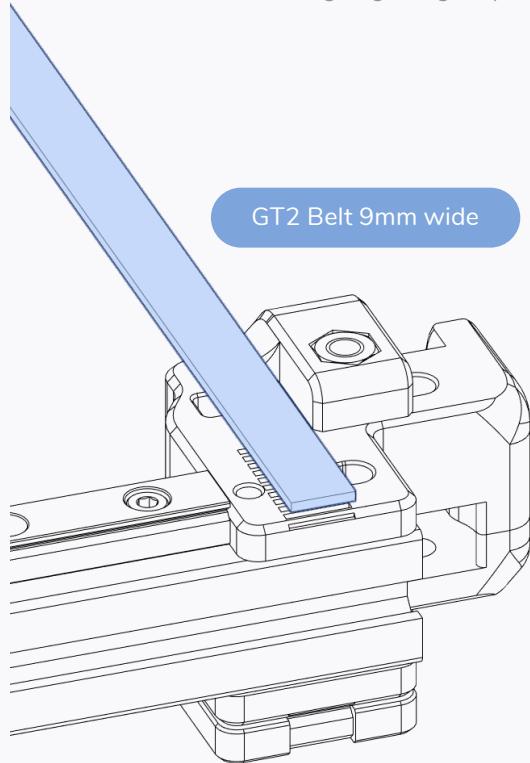
M5 Nut



Z BEARING BLOCKS

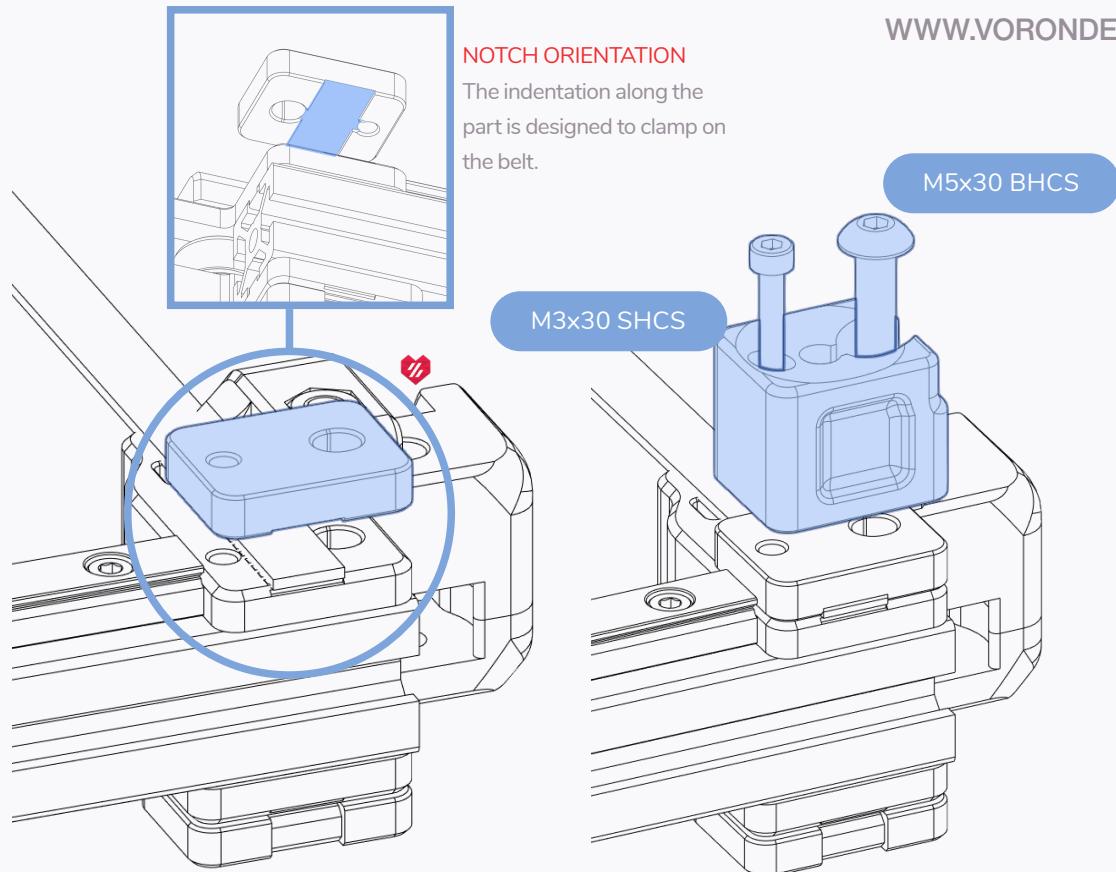
GANTRY IS STILL UPSIDE DOWN

It's a lot easier than fighting with gravity.



TEETH DOWN

The teeth of the belts are facing down into the serrations in the printed part.



MINIMUM RECOMMENDED BELT CUT LENGTH

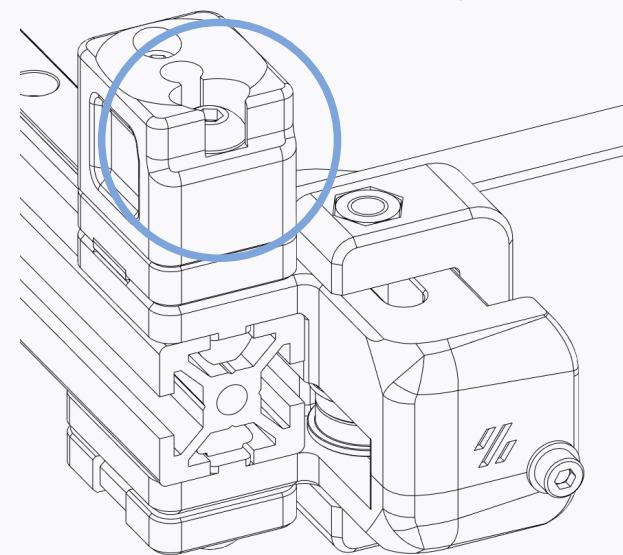
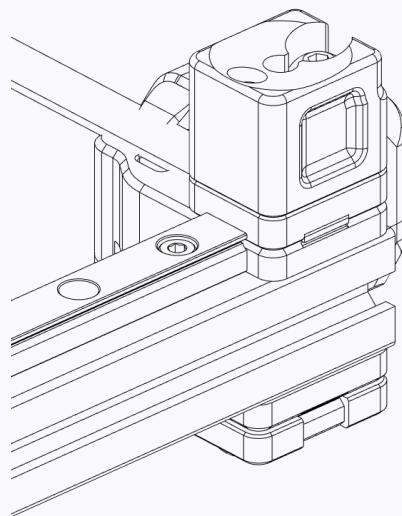
250 spec 1000mm

300 spec 1100mm

350 spec 1200mm

Z BEARING BLOCKS

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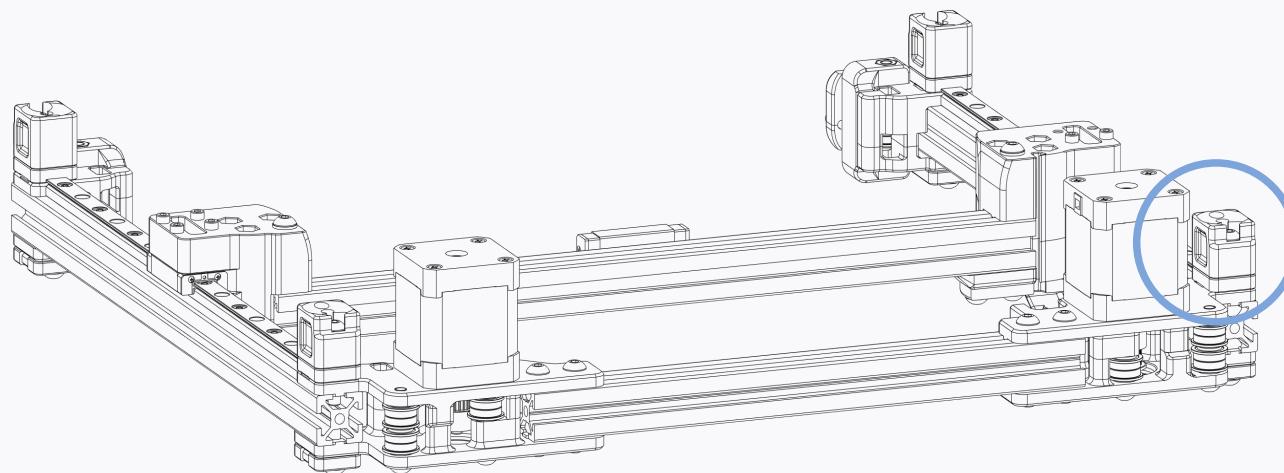
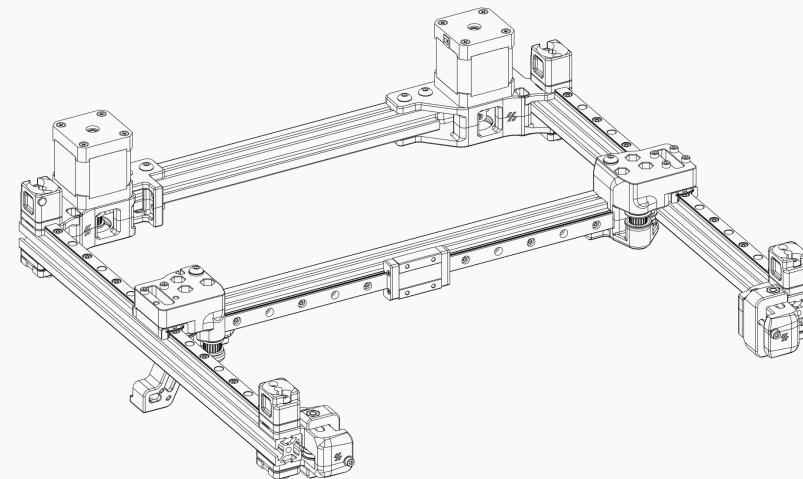


Z BEARING BLOCKS

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REPEAT BELT INSTALL FOR ALL 4 BLOCKS

We are not showing the belts in the pictures on this page.

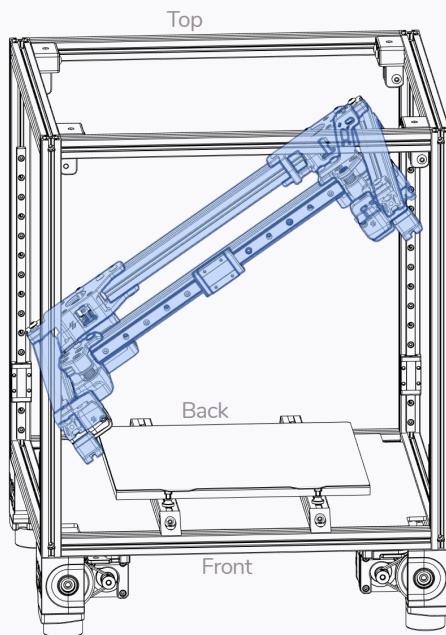


OPTION: HALL ENDSTOP

Install the block with the magnet in this position. The magnet faces the XY joint.

GANTRY INSTALL

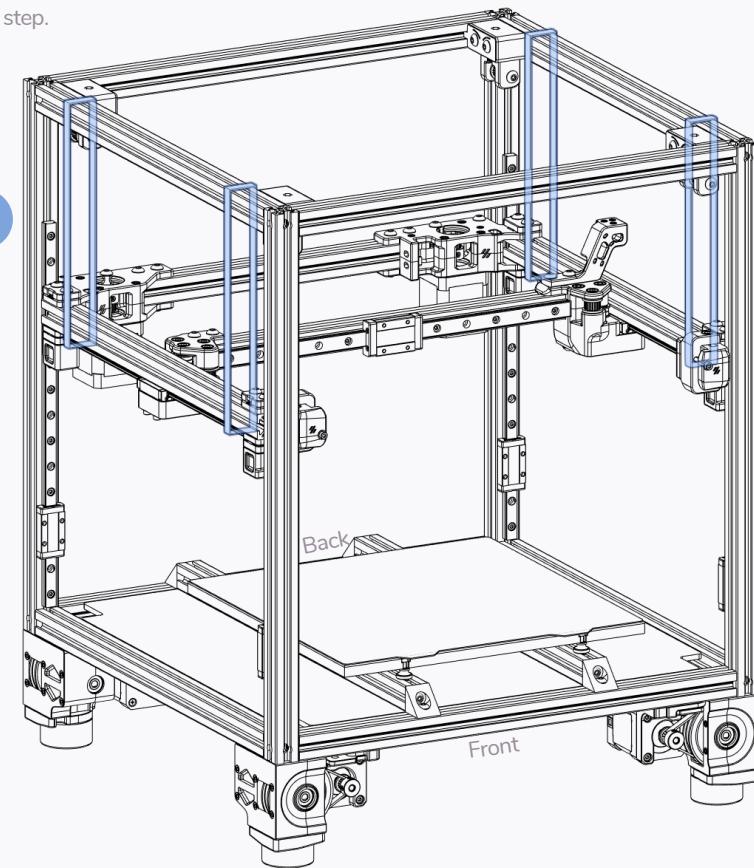
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INSERT AT AN ANGLE

Tilt the gantry to move it past the uprights.

Long Zipties

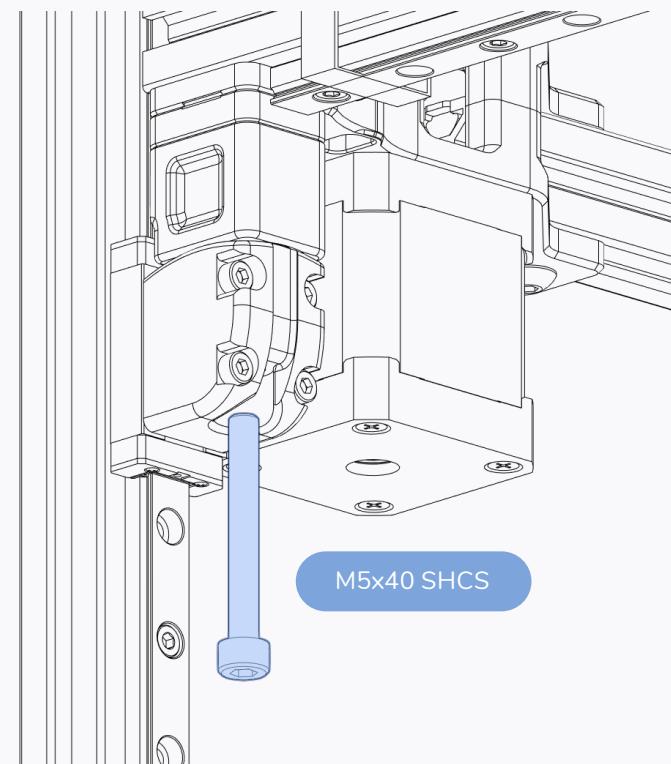
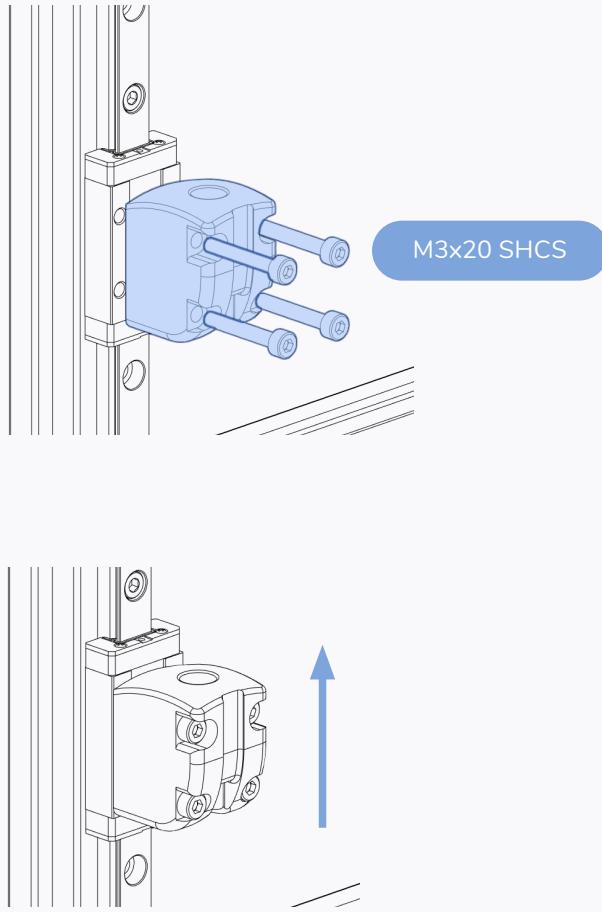


A HELPING HAND

Secure the gantry with long zipties or similar while the gantry is being installed. An extra pair of hands helps with this step.

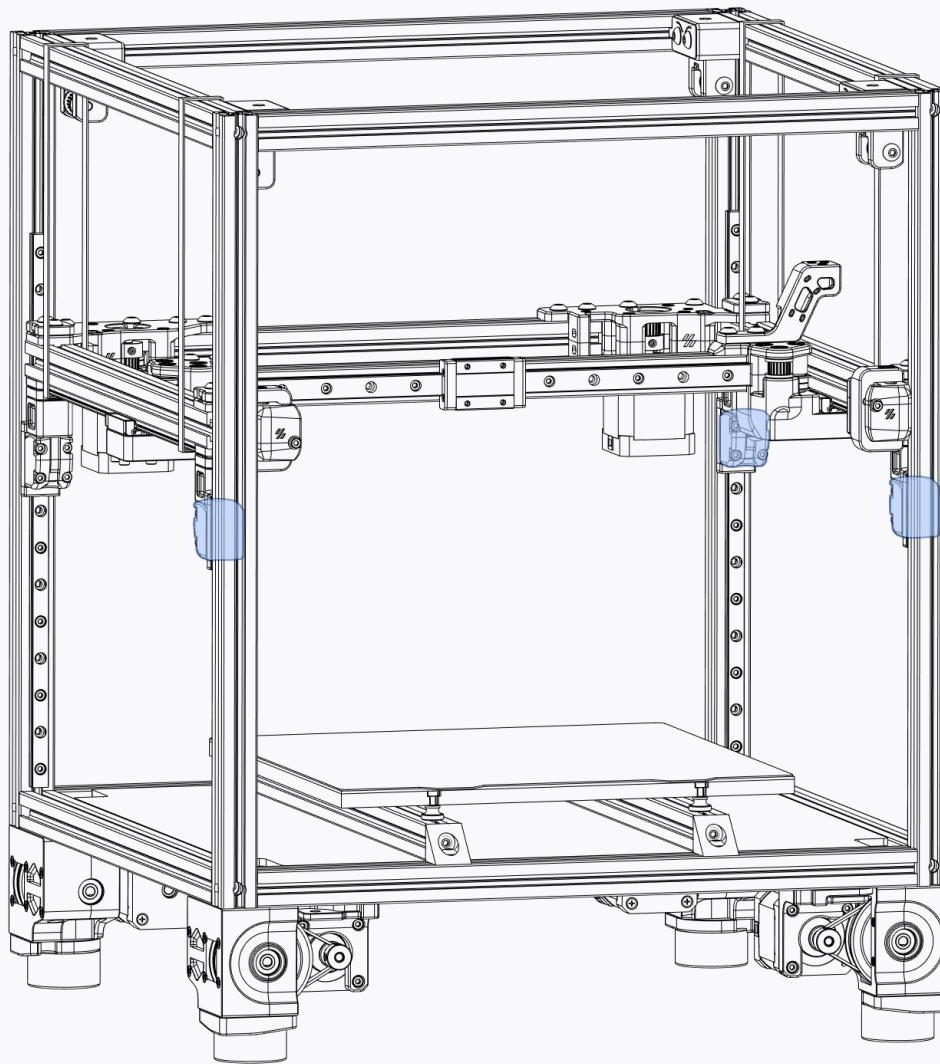
Z JOINTS

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Z JOINTS

WWW.VORONDESIGN.COM

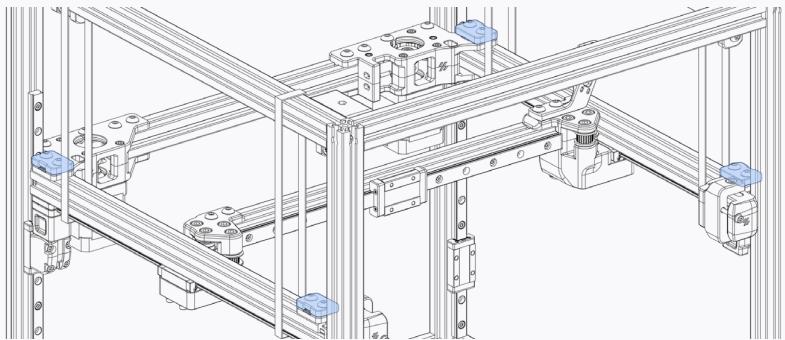


INSTALL REMAINING JOINTS

Add the other 3 joints repeating the same steps.

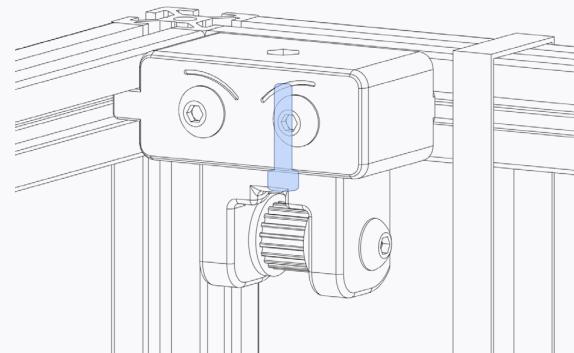
PREPARATION

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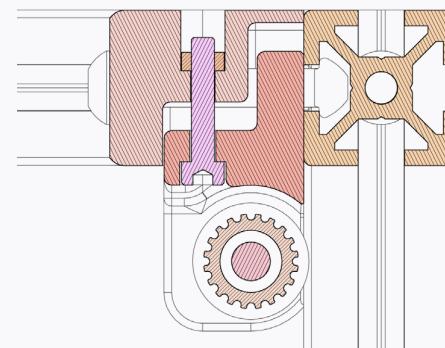
LOOSEN TOP BELT CLAMPS

Undo the top belt clamps, we'll be installing the belts in the next steps.

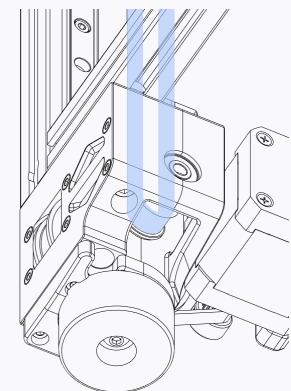
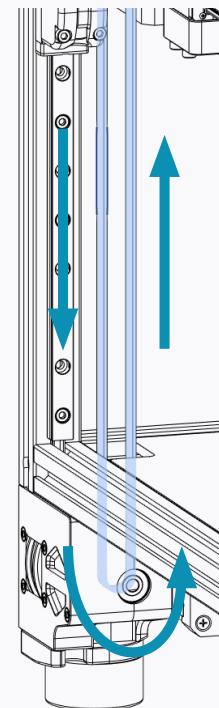
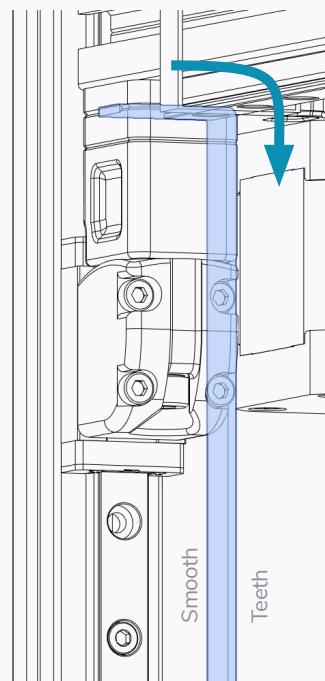
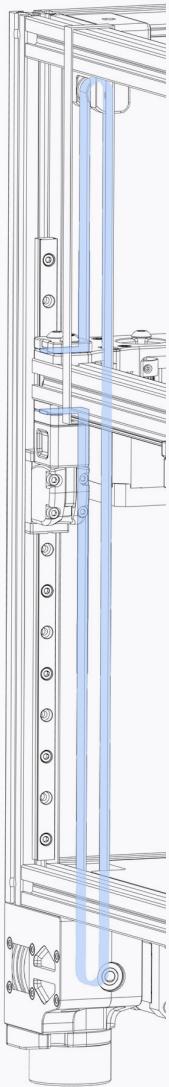


EXTEND IDLER

Loosen the idler bolt to extend the idler. Once extended to the maximum before becoming undone tighten 4 turns.
Repeat for all 4 idlers.



Z BELT



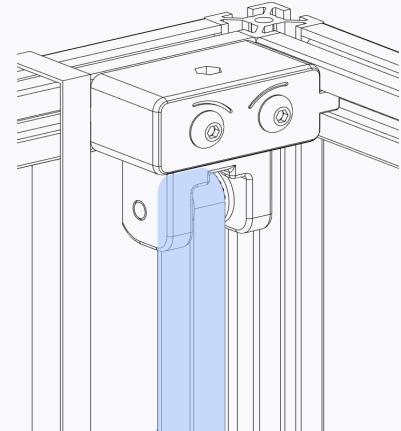
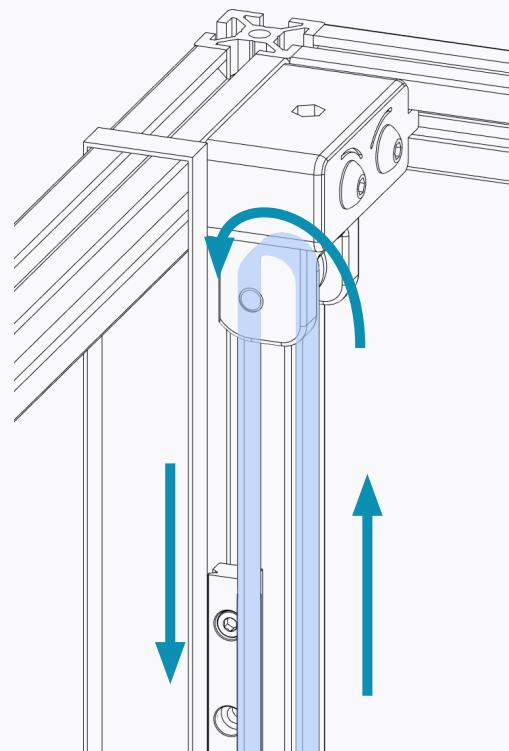
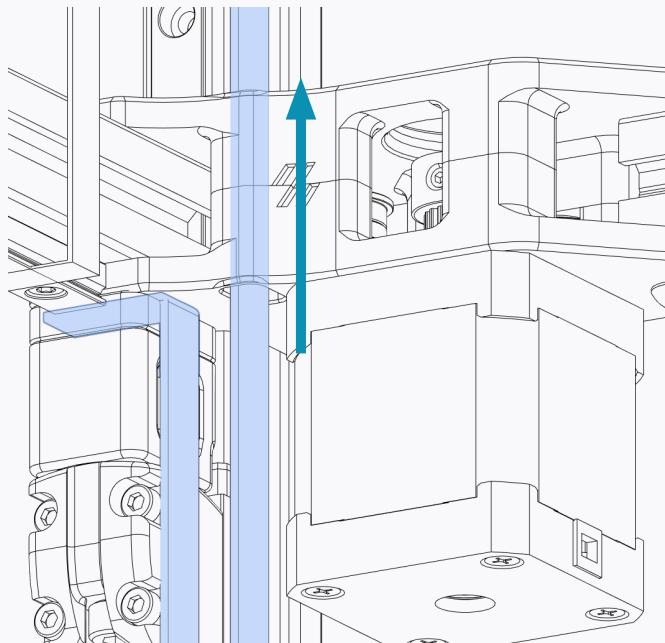
Z BELT ROUTING

Follow the path pointed out by the arrows.
Needle nose pliers, tweezers or similar tools
can help in this step.

The belt teeth are on the inside of the loop.

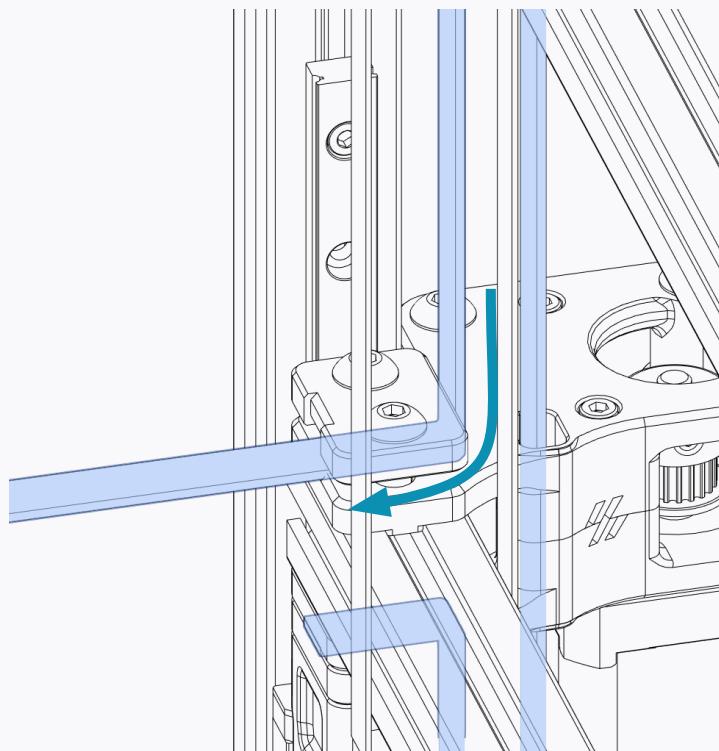
Z BELT

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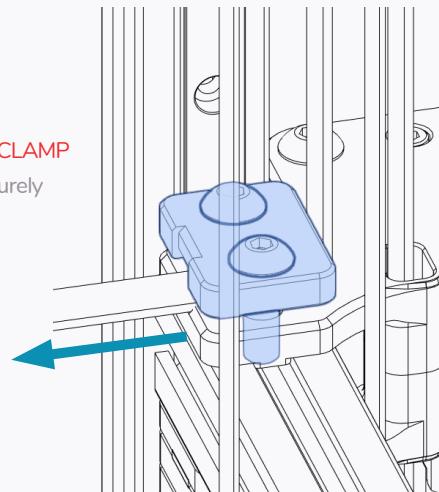
Z BELT

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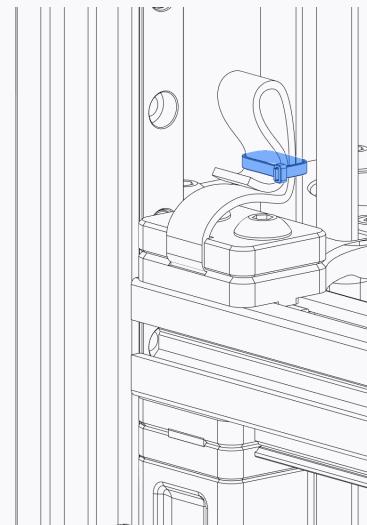
PULL TIGHT AND SECURE BELT CLAMP

Pull on the end of the belt and securely fasten the top belt clamp.



EXCESS BELT

Fold the excess belt over and use a small ziptie to secure the end.

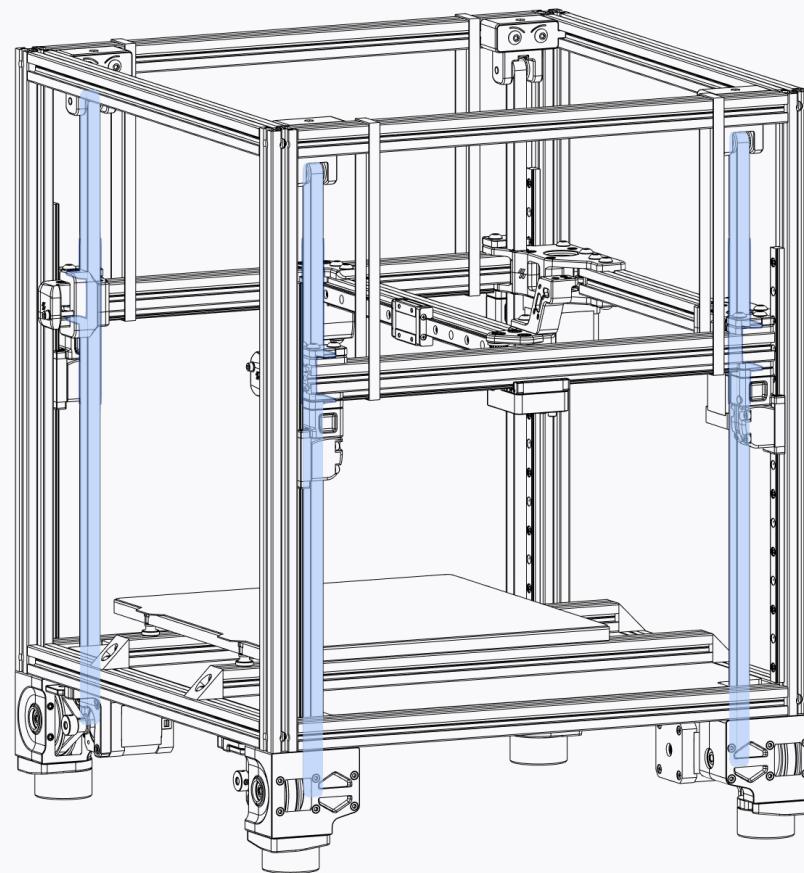


Z BELT

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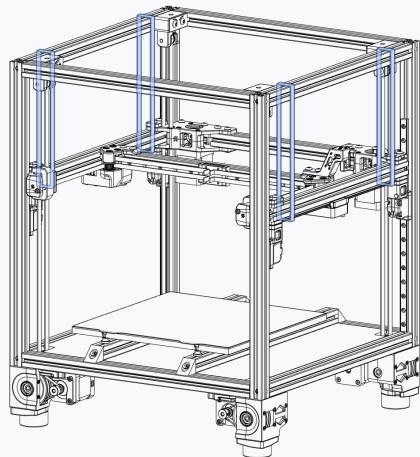
INSTALL REMAINING Z BELTS

Repeat the install instructions for the other 3 Z belts.



GANTRY ALIGNMENT

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REMOVE ZIPTIES

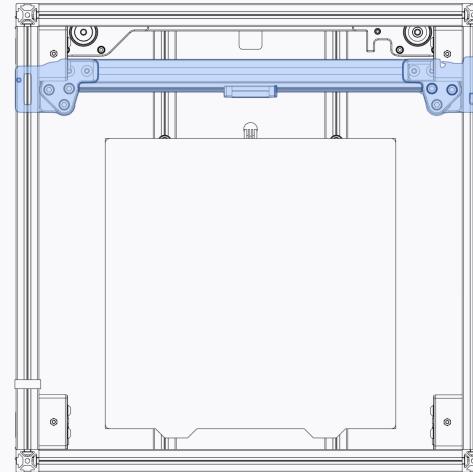
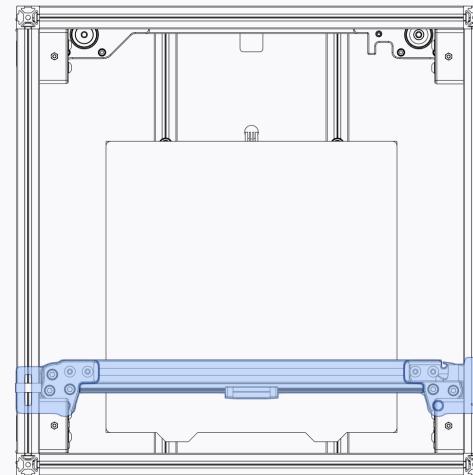
With the belts installed the gantry will stay in position.

SQUARING THE GANTRY

Move the gantry all the way back until it hits the A and B drive on both sides.

Fully tighten all screws on the X axis.

You may need to adjust the distance between the A and B drive to square the gantry. To do this loosen the bolts that secures the B drive to the rear gantry extrusion. Repeat the steps above and secure the fasteners again.



<https://voron.link/cekh81>

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Voron2.0 was never officially released.

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A/B BELTS



THE VORON BELT PATH

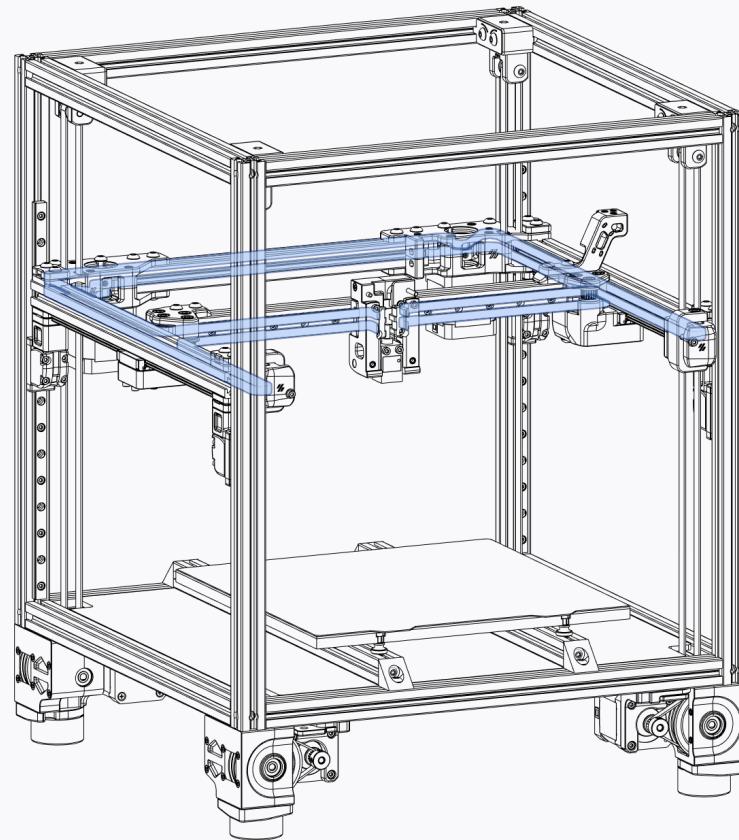
Voron printers use a belt path based on the popular CoreXY pattern.

The individual belt paths are stacked on top of each other and the crossing often found in CoreXY designs is omitted. Compared to many other implementations, the motors are moved to a less intrusive position. To learn more about the principles behind CoreXY visit <https://voron.link/ef72dd6>.

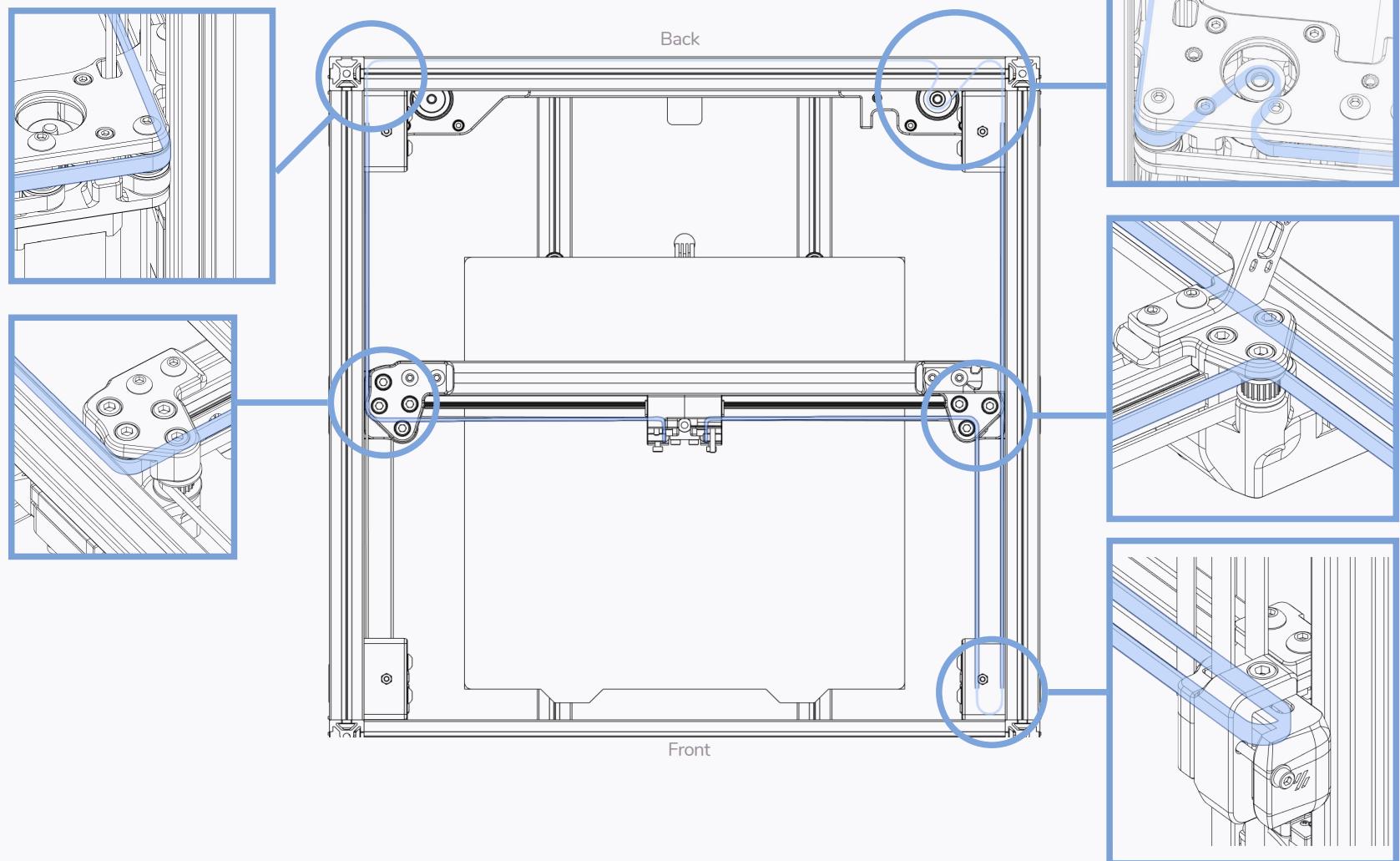
Equal belt tension is important to the proper function of a CoreXY motion system.

We recommend to run one belt to get the required length, remove the belt from the printer and cut the second belt to the exact same length.

As both belt paths have the same length this is an easy way of getting a consistent tension.

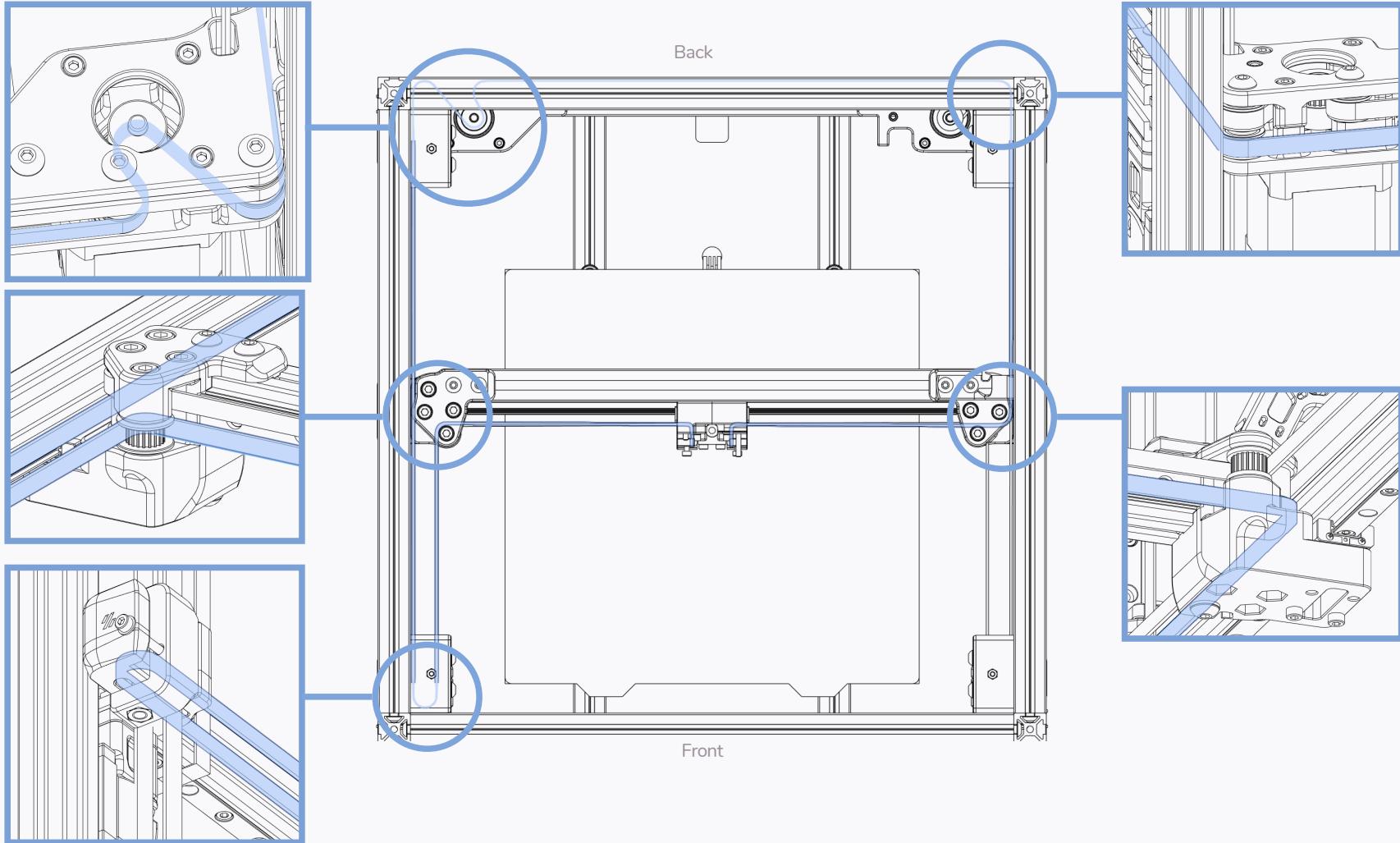


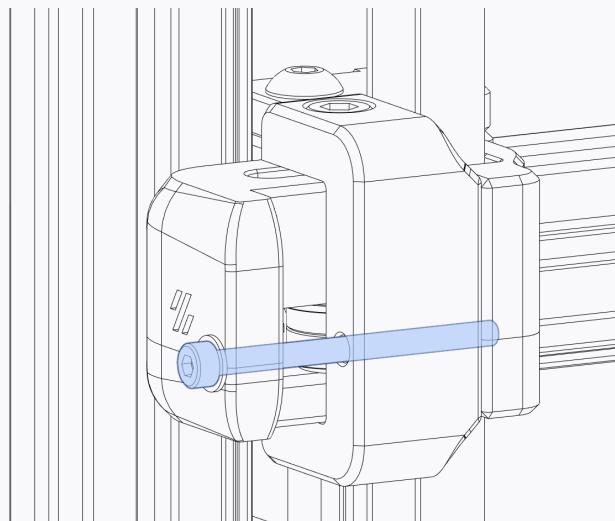
OVERVIEW - A BELT



OVERVIEW - B BELT

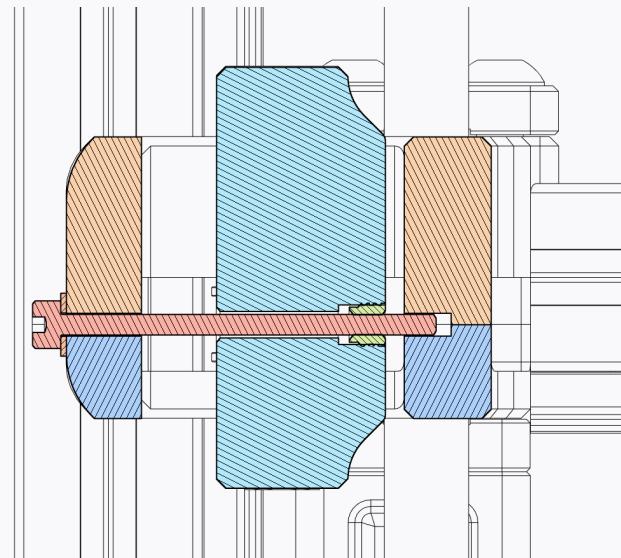
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**EXTEND IDLER**

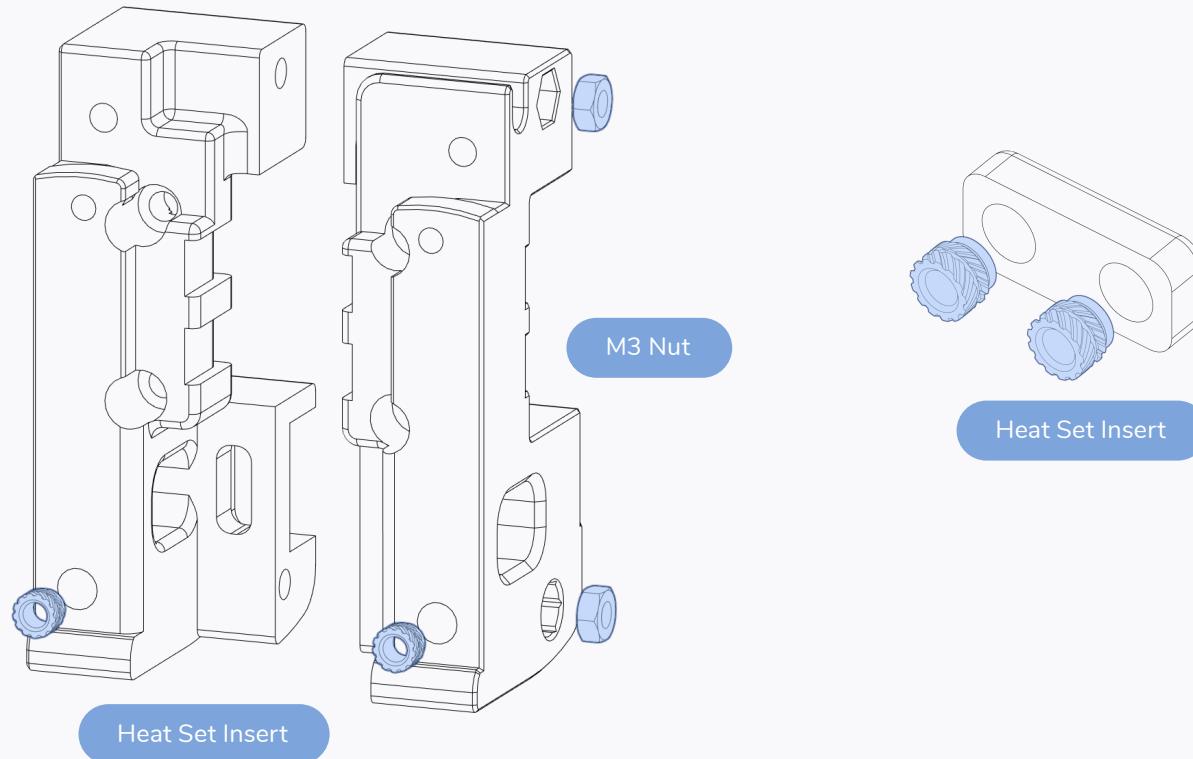
Loosen the idler bolt to extend the idler. Once extended to the maximum tighten 4 turns.

Repeat for the second idler.



PREPARATION

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X CARRIAGE

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