



A N N E X

High performance FDM 3D printing

# ANNEX ENGINEERING

Gasherbrum K3 R1.1 Assembly Manual – Alpha 0.1

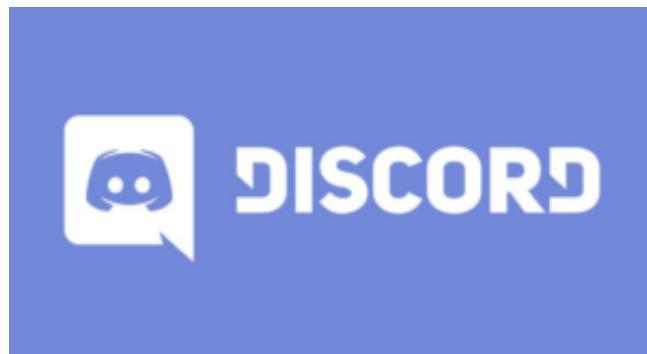
## About Us

# Pushing the boundaries for self sourced 3D-printers

Annex Engineering is a tight knit team active across the globe, working on a diverse portfolio of projects. From extruders to bed probing, hotends to motion systems, we cover it all. We apply real engineering skills such as fluid simulations, deflection analysis, and systems and control to gain the most out of our designs.

We have a community around Annex, which can be found on Discord.

Come join us!



Get started with building on our Github.



## Assembly Manual - *Table of Contents*

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# Warnings



## Before you begin

Read carefully and understand the following warnings

- **AC Power (110v / 220v):**
  - This printer operates on household mains power. If you are unfamiliar with handling AC power, it is strongly advised to seek assistance from a qualified professional for wiring.
  - Improper wiring can result in serious injury or even loss of life.
- **A 3D printer is a robot:**
  - A 3D printer simply follows instructions and carries out tasks precisely as commanded.
  - Failure to set up correctly can result in fire, explosions, self-damage, or damage to components. It is highly recommended to conduct the tests specified in the manual before initiating the first print.
  - Consider reading the entire manual before commencing printer assembly.
  - For assistance, consult the appropriate channels of Annex Engineering.
- **Stick to the BOM:**
  - The items listed in the BOM are recommended for a reason. Adhering to it as much as possible helps prevent premature or unexpected failures.
  - Extensive research has been conducted to ensure that the specified parts meet our expectations for performance.
  - Using the correct parts ensures satisfactory service intervals.

# Introduction

## Printed Parts Guideline

The Annex Engineering Team has offered a set of print guidelines for you to adhere to, in order to maximize your chances of success with your printed parts. While there may be inquiries regarding material substitutions or alterations to printing standards, we strongly advise following these recommendations. The provided STLs are already in the correct orientation.

Manufacturing type	Extrusion Width	Wall count
Fused Deposition Modeling (FDM)	FORCED 0.4mm	3 minimum
Material	Infill Percentage	Solid Top/Bottem Layers
ASA	40% minimum (at 0.6mm width)	5 minimum (at 0.2mm height)
Nozzle size	Infill Type	
0.4 or 0.6 recommended	Grid Gyroid, Honeycomb, Triangle or Cubic	
Layer Height		
0.1 or 0.2mm		

## File Variations

Before embarking on the printing process for all the parts, it is important to take note of the following variations. These include the choice between M5 or M6 holes extrusions for components such as feet, motor mounts, and bed frame mounts. Additionally, you have the option of using either 6.0 or 6.5mm thick MGN9 rails for the XY gantry parts. It is worth noting that accent parts can be identified by the marking [a].stl. Lastly, there are different hotend options available for the toolhead.

# FAQ

## Why do your printers have funny names?

Every printer is named after a "famous" mountain somewhere on the/a planet. Usually picked to be a pun on something about the printer or designer.

## Why use ASA and not ABS?

ASA is generally considered better than ABS due to its superior UV resistance, weather resistance, chemical resistance, and dimensional stability. It is a more durable and reliable choice for our application.

## What is the name of the motion system you are using?

The motion system we are utilizing is called CartesianXY. While we did not invent this design, it has become our signature printer design. It features four motors, direct driven motion, and linear rails, among other components. It is worth noting that our design is heavily influenced by the Hypercube Overkill project, which has since transitioned to corexy.

## What are eDrawings? And how do I use them?

eDrawings is a software application that allows users to view and interact with 3D models of projects. It serves as a helpful guide during the building process. You can navigate and explore the model, zoom in and out, rotate, measure dimensions, and even make annotations. It provides a convenient way to visualize and understand the project before and during construction. The latest eDrawing can be found on the K3 GitHub.

## What is VC3 or VC125?

Vibra-Tite VC3 or VC125 is a liquid adhesive that prevents fastener loosening caused by vibration. It provides a secure bond and is easy to disassemble without component damage.

## Can K3 scale beyond 180mm<sup>3</sup>?

We have reached the maximum capabilities of MGN9 rails, so there is no further room for expansion. However, the upcoming K3+ model will offer a larger 235mm<sup>3</sup> build volume, achieved by utilizing MGN12 rails instead.

## Why is there not CAD out for product\_x?

CAD files are made available for products only when they have reached the "Release" status. This approach enables us to uphold a high standard of quality and minimize the likelihood of individuals who choose to fork our projects from duplicating efforts.

## When annex releases source files, why don't we release step files instead of parasolid?

In the CAD world, the STEP format is known to be lossy, as it can lead to corruption and loss of surfaces, resulting in an incomplete model. On the other hand, Parasolid files are native CAD files with the feature tree removed for easier sharing. This ensures that the end user experiences the closest possible "native experience."

## How can I get more help?

Join our Discord at <https://discord.gg/MzTR3zE>

# Torque Reference Table

## Torqueing

To maintain the integrity and safety of mechanical assemblies, it is essential to properly tighten bolts to the specified torque values. This prevents them from becoming loose over time, which could lead to potential failures or accidents. Torque refers to the amount of rotational force applied to a bolt, usually measured in newton meters (Nm).

When referencing the torque chart, it is important to note any additional instructions or recommendations. Some pages may specifically indicate the use of threadlocker, a substance that helps secure bolts by preventing them from loosening due to vibrations or other external forces. Threadlocker is typically applied to the bolt threads before tightening.

Metric Bolt Size	Goes through material A	Into Material B	Torque (Nm)
M2	Plastic	Plastic	0.25
M2.5	Metal	Metal	0.4
M3	Metal	Brass Insert	1
M3	Plastic	Plastic	0.4
M3	Metal	Metal	1
M5	Metal	Brass Insert	0.4
M5	Metal	Metal	3
M5	Metal	Plastic	1
M5	Metal	Brass Insert	3



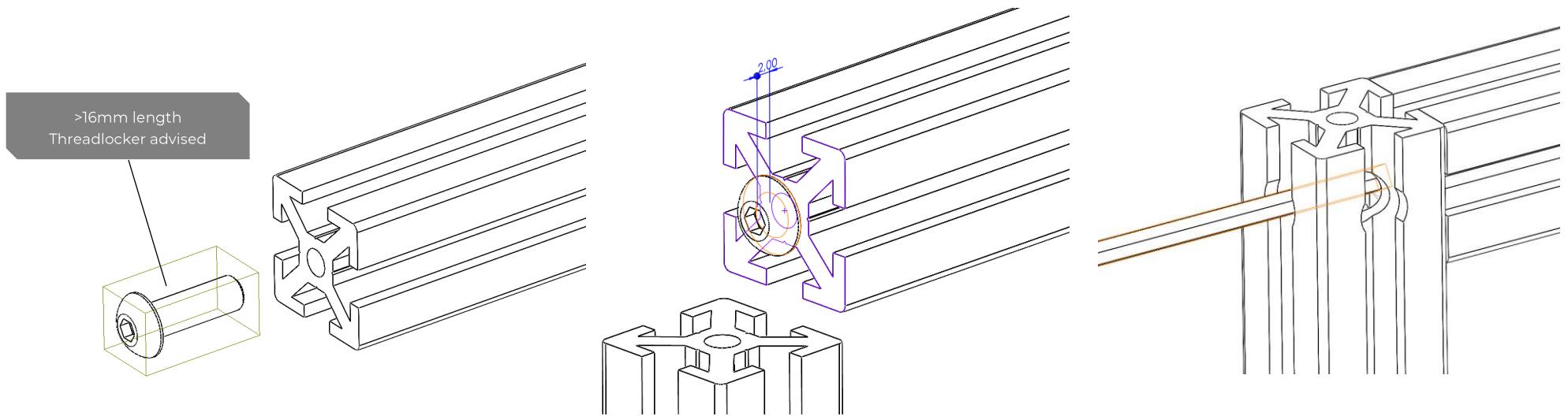
### Tip

For easy reference during the assembly process this page can be printed out.

# Getting ready

## Blind Joints

Blind joints offer a cost-effective and robust method for assembly. The head of the button-head cap screw (BHCS) is inserted into the channel of another extrusion and firmly secured through a small access hole in the extrusion. To torque and untorque, it is recommended to use a non ball-end hex key. The use of a ball-end hex key increases the likelihood of slightly stripping or damaging the screw head.

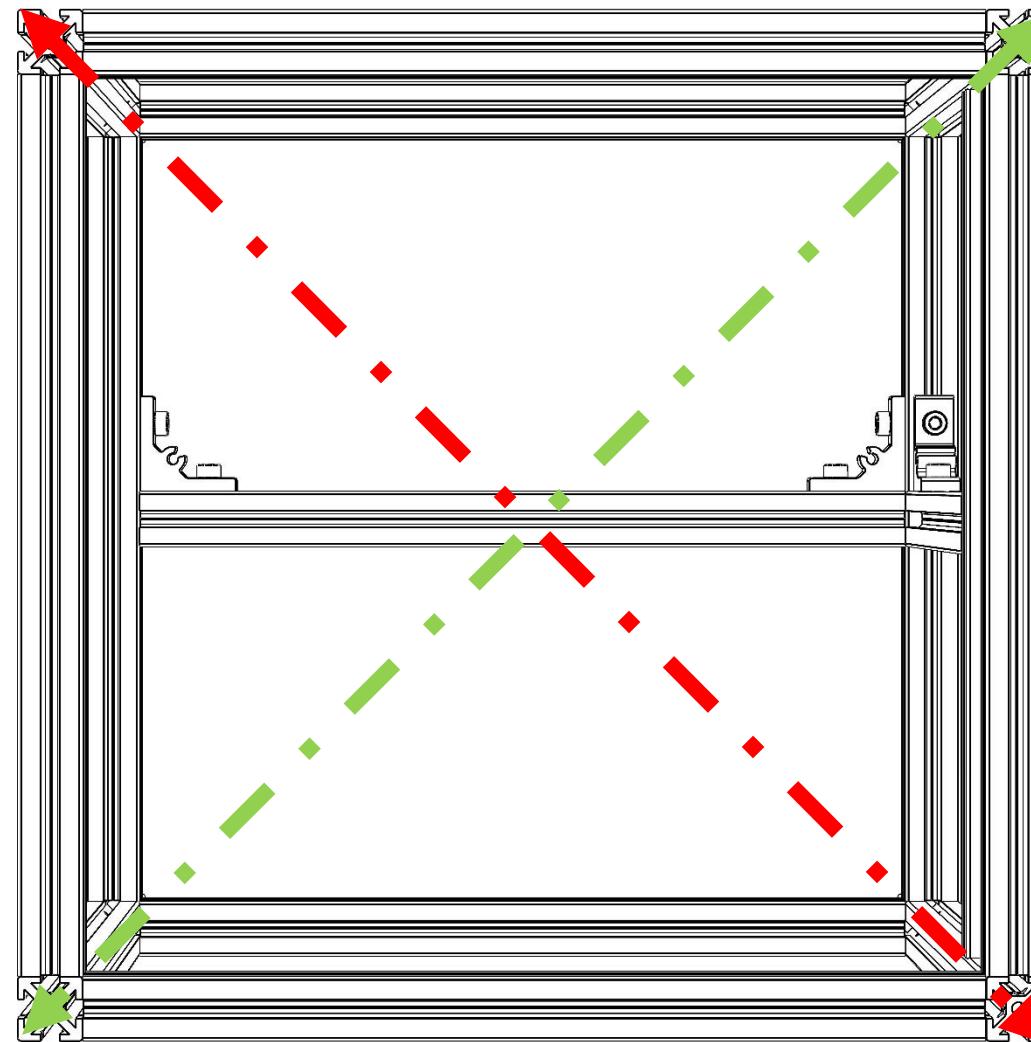


## Tapping Extrusion Ends

In order to enable blind joining as previously described, it may be necessary to tap threads into the ends of certain extrusions. The need for tapping will vary depending on the specific extrusion, and not all extrusions require tapping at the ends. Depending on the type of extrusions you acquire, you will need to tap either an M5 or an M6 hole into the extrusion.

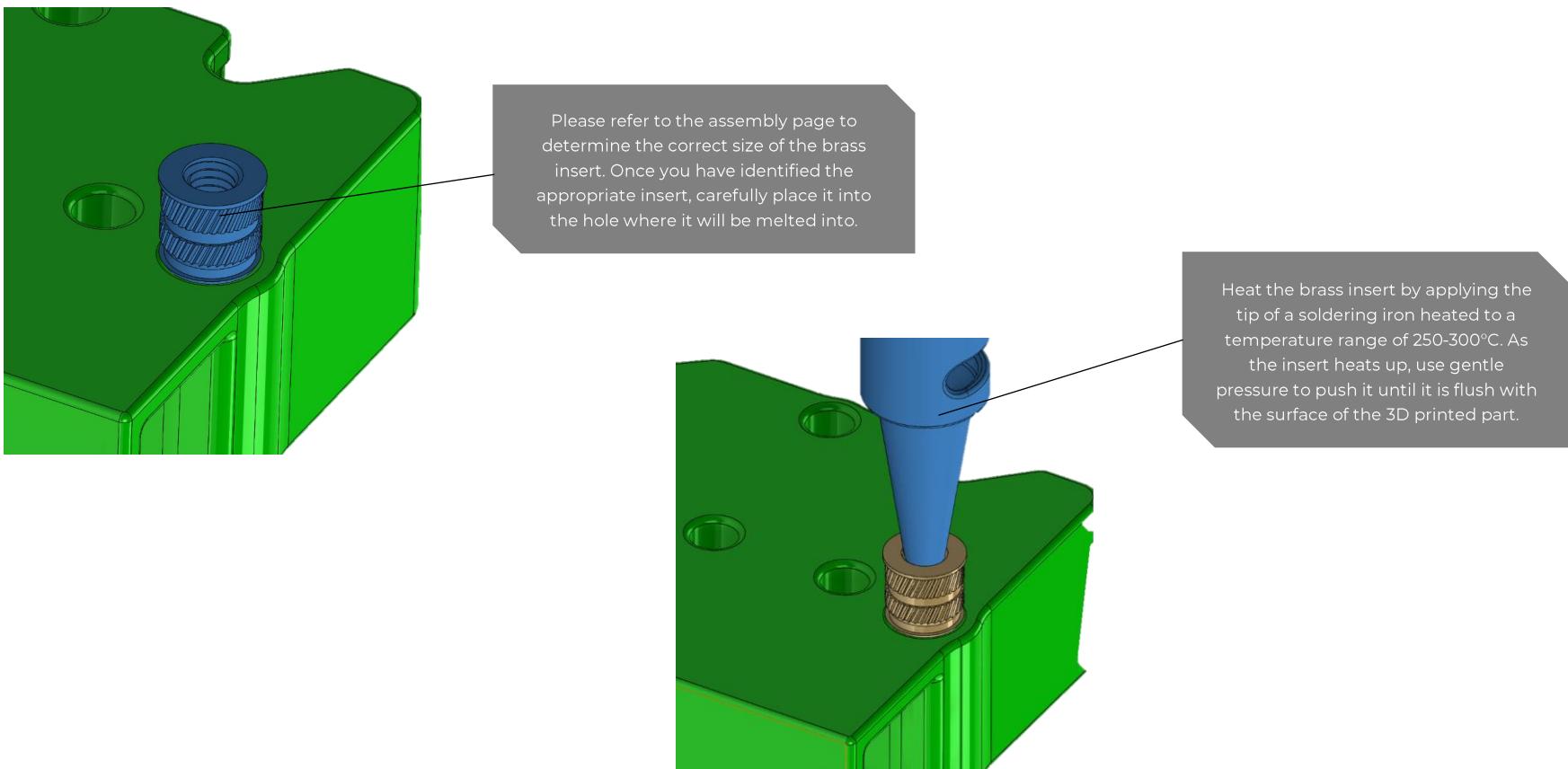
## Squaring the frame

Use a small machine square to ensure frame squareness while fastening the extrusions. Check squareness in every direction and consider building on a glass or granite surface. Measure opposite corners to verify squareness and re-square if needed. The distance measured by both the dotted red and green lines should be equal.

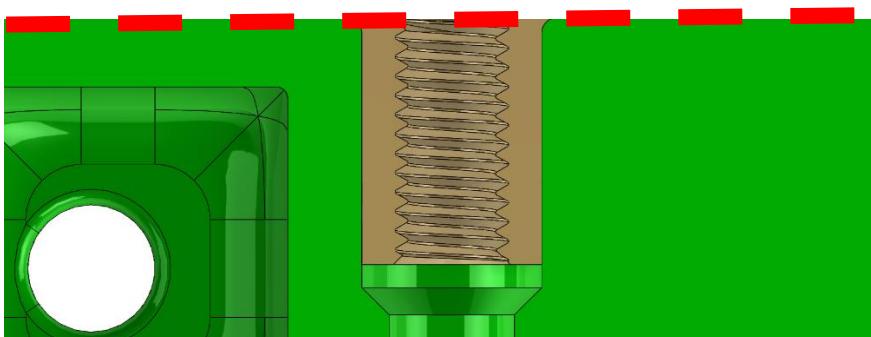


## Using brass inserts

A brass insert for 3D printing is a metal component that is used to reinforce threaded connections in 3D printed plastic parts. It is typically a cylindrical piece made of brass with internal threads that match the desired screw or bolt size. The insert is designed to be inserted into a pre-designed hole in the 3D printed part, where it provides a strong and secure anchor for screws or bolts. This allows for a more reliable and durable connection between the plastic part and other components. Brass inserts are commonly used in 3D printing to enhance the strength, stability, and functionality of printed objects, especially when they require repeated assembly and disassembly.



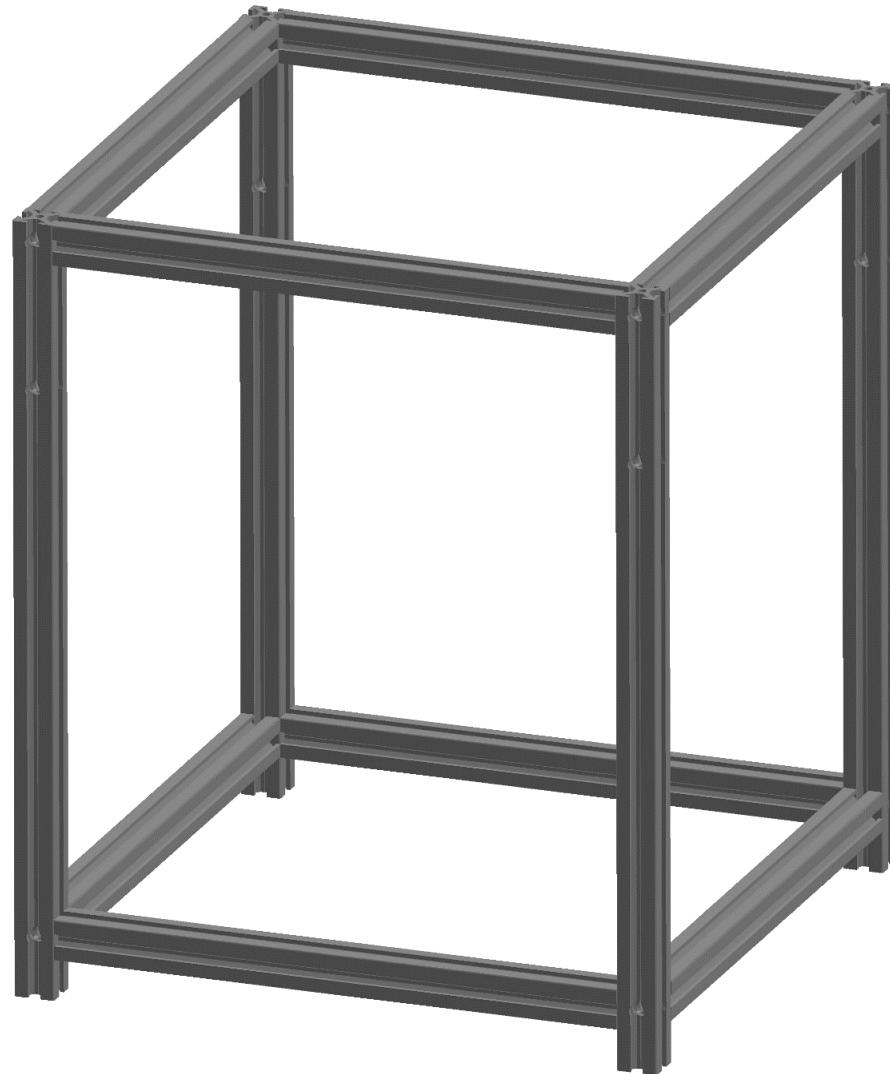
## Using brass inserts



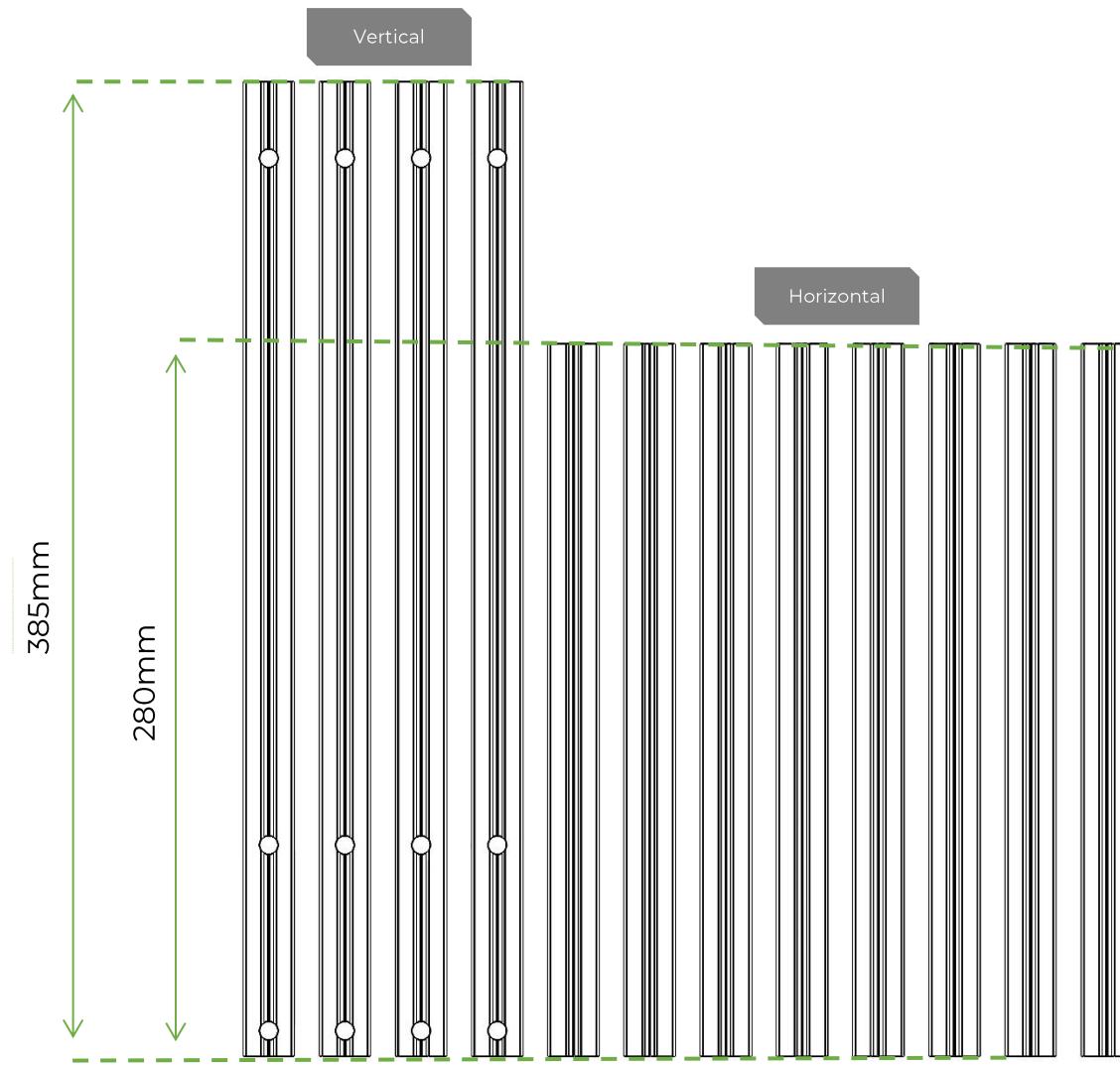
### Tip

It is important to always verify that the insert is flush with the surface. To achieve this, you can utilize a flat object, such as a glass plate, to carefully push the insert until it is flush while it is still warm. It is crucial to ensure the insert is flat, as any irregularities may result in poorly fitting parts, gaps, or compromised assembly strength.

## Base Frame - Overview



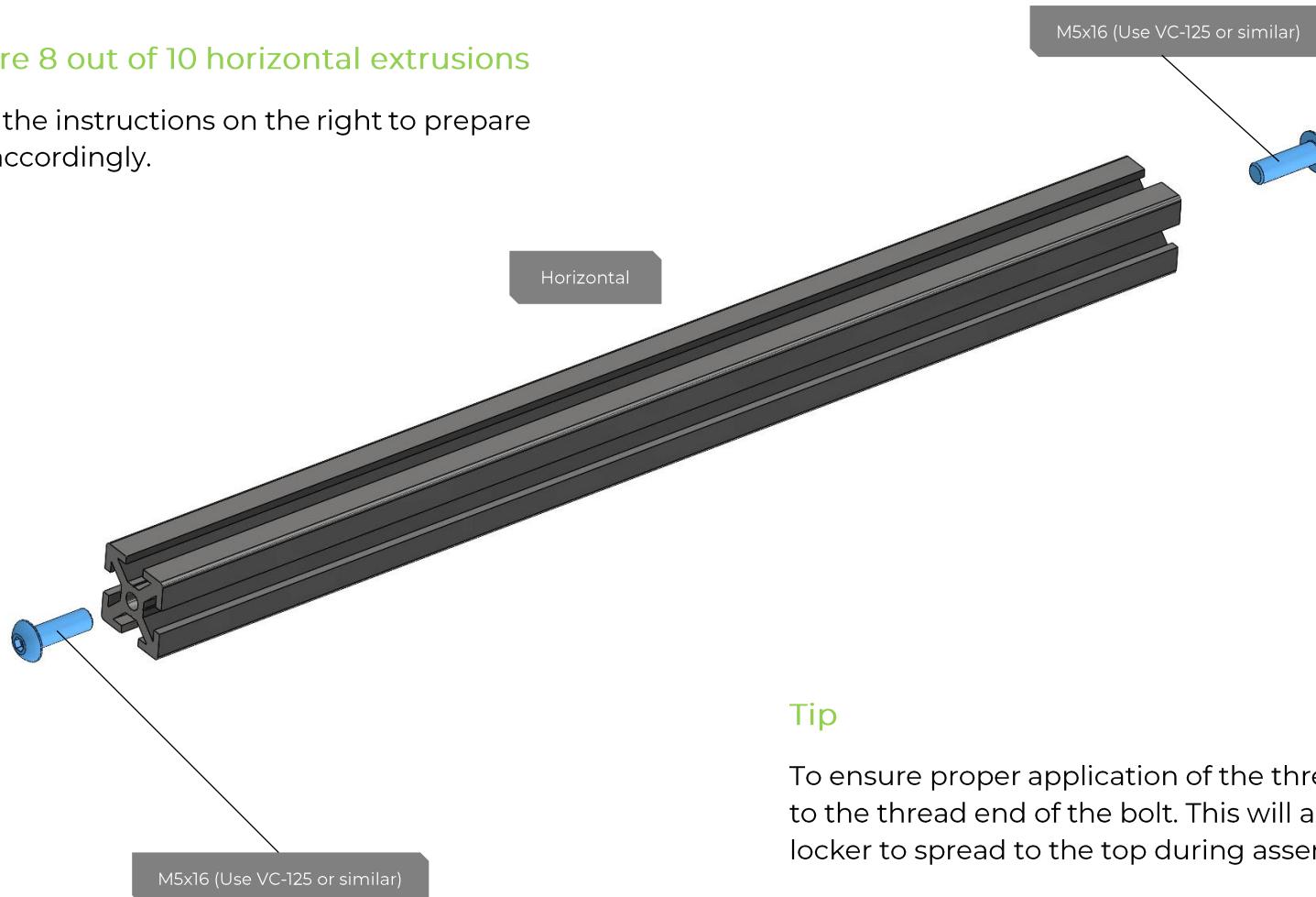
## Frame – Required Extrusions from kit



## Frame –Extrusion preparations

### Prepare 8 out of 10 horizontal extrusions

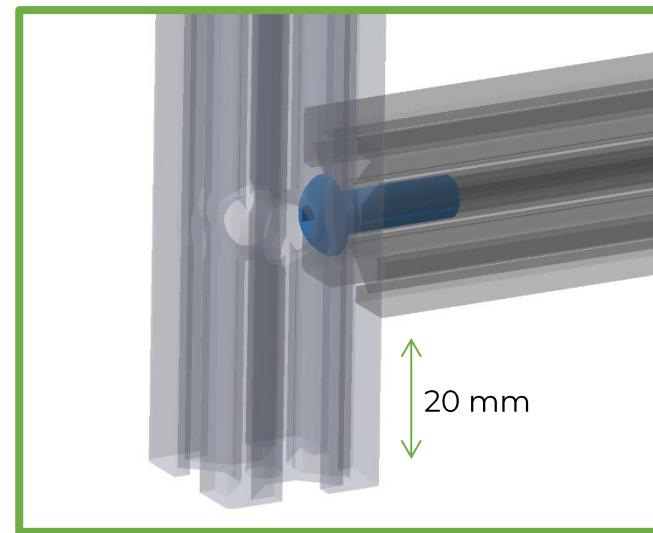
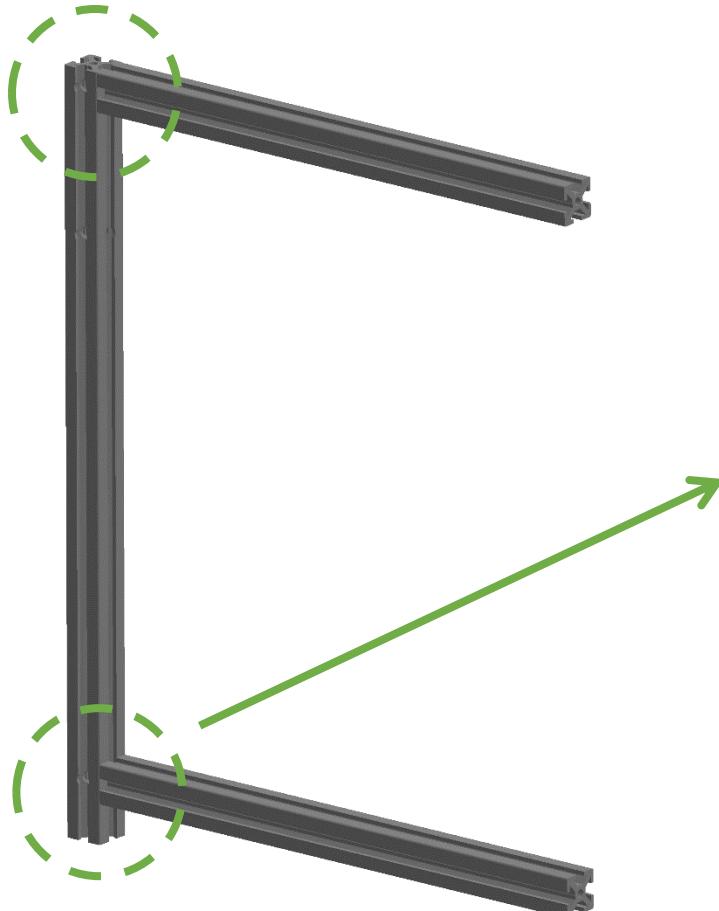
Follow the instructions on the right to prepare them accordingly.



### Tip

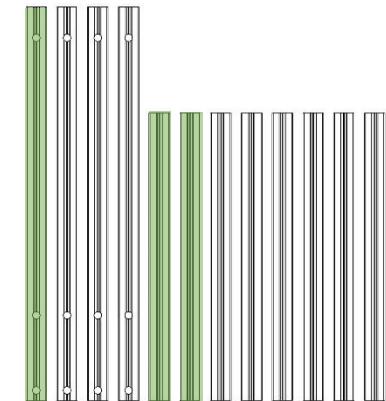
To ensure proper application of the thread locker, apply it to the thread end of the bolt. This will allow the thread locker to spread to the top during assembly.

## Frame Assembly – Part A

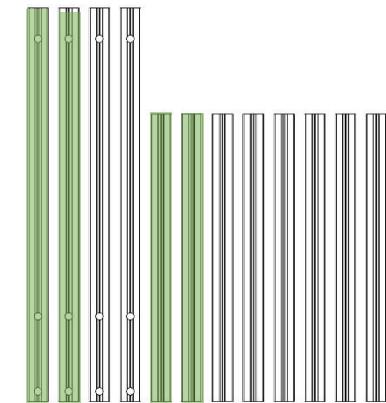
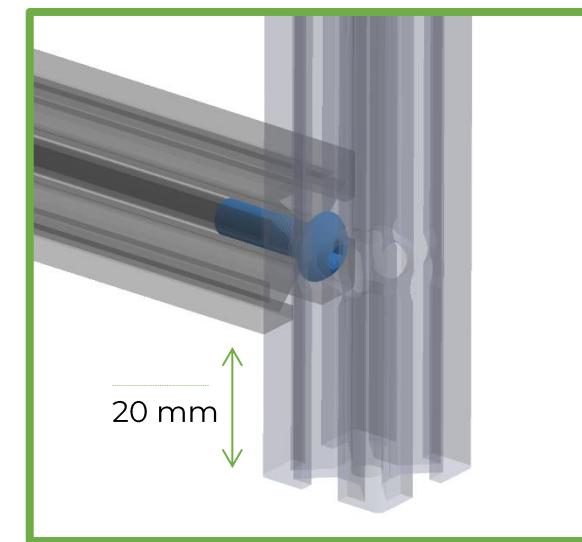
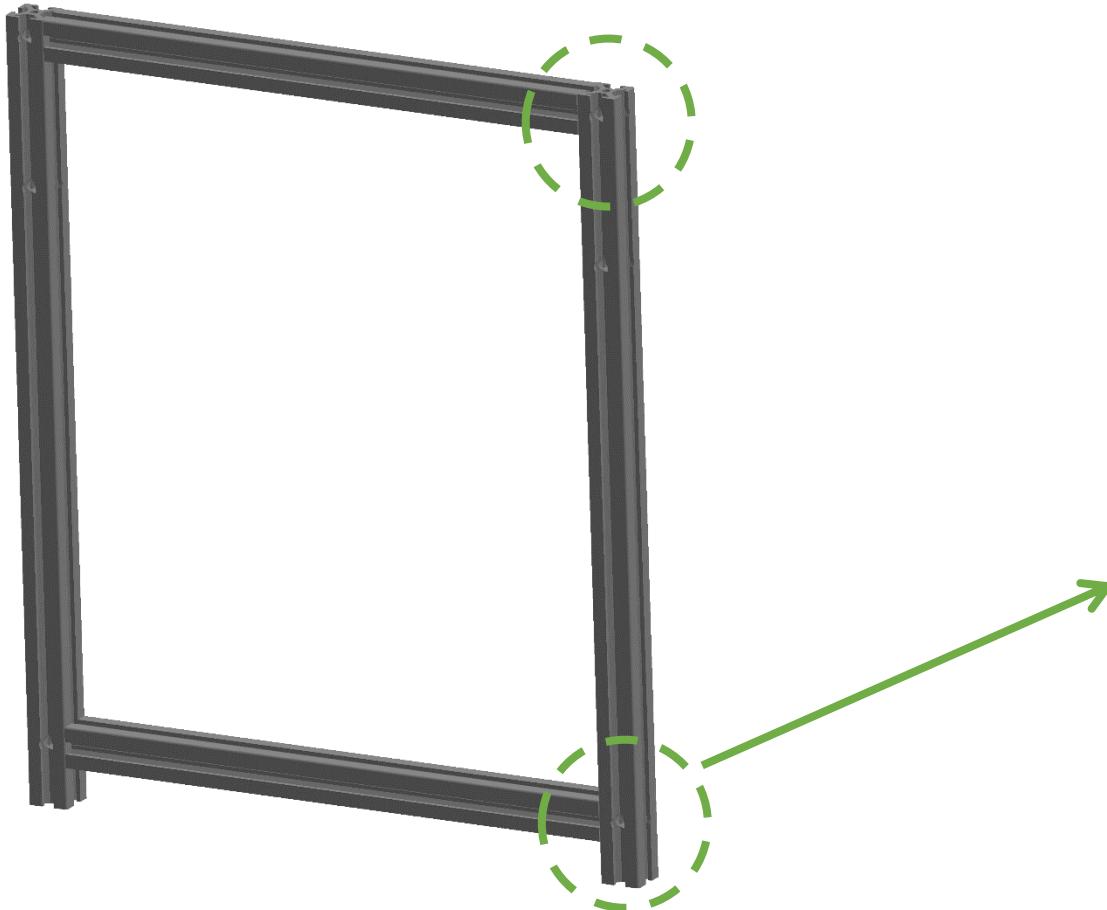


### Tip

For optimal squareness, it is recommended to construct the frame on a flat surface such as glass or granite. Additionally, using spare extrusion can assist in aligning or offsetting the extrusions, further enhancing the alignment and ensuring precise assembly.

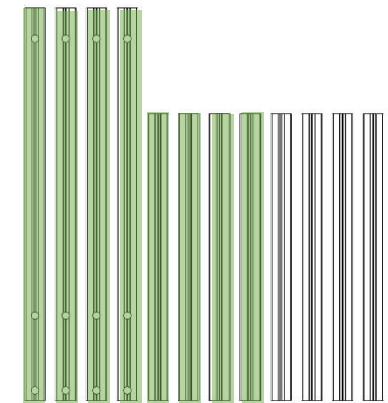


## Frame Assembly – Part A

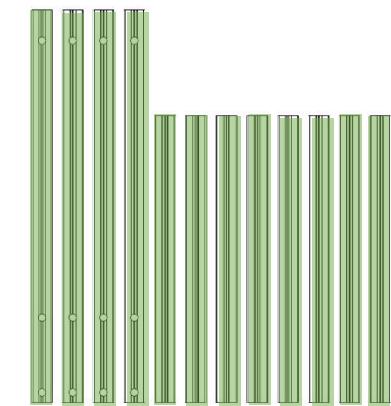
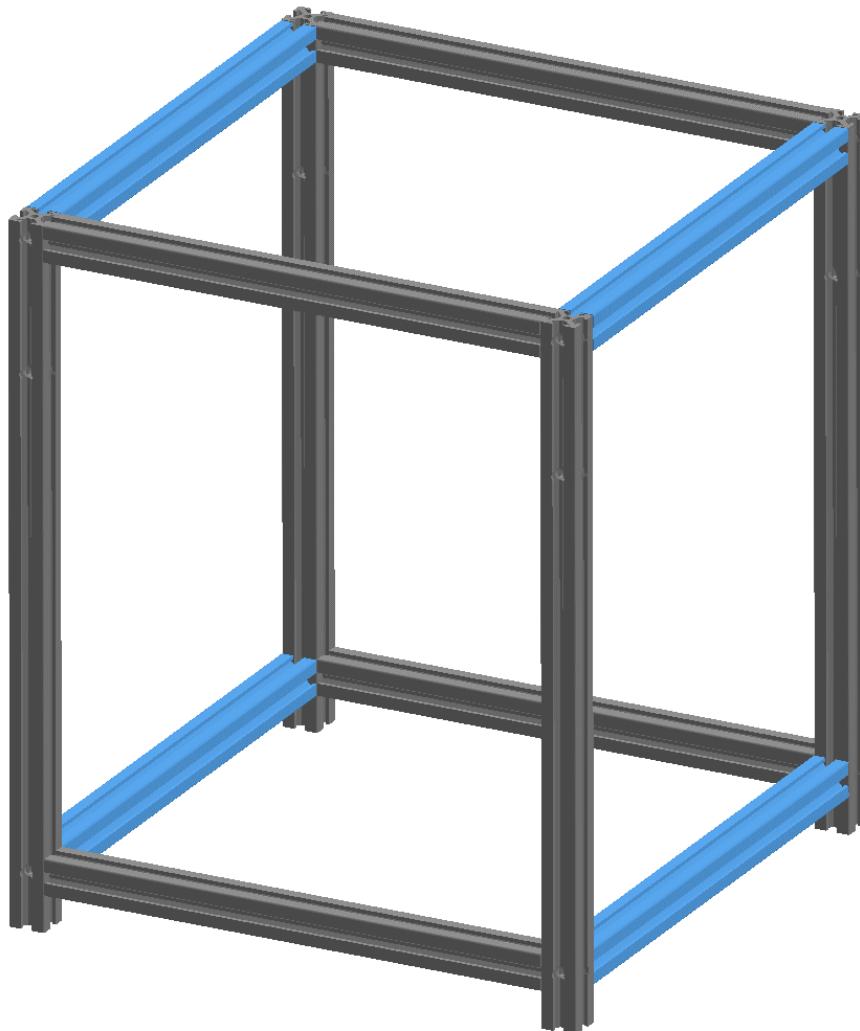


## Frame Assembly – Part A

2x



## Frame Assembly – Part B



### Combining

Join the two parts A together by connecting four vertical extrusions, as indicated by the blue markings using blind joints. Refer to page 8 and 12 if additional clarification is required.



Verify squareness of frame  
assembly before continuing!

## Frame Assembly – Top Linear Rails

### Installing XY gantry rails

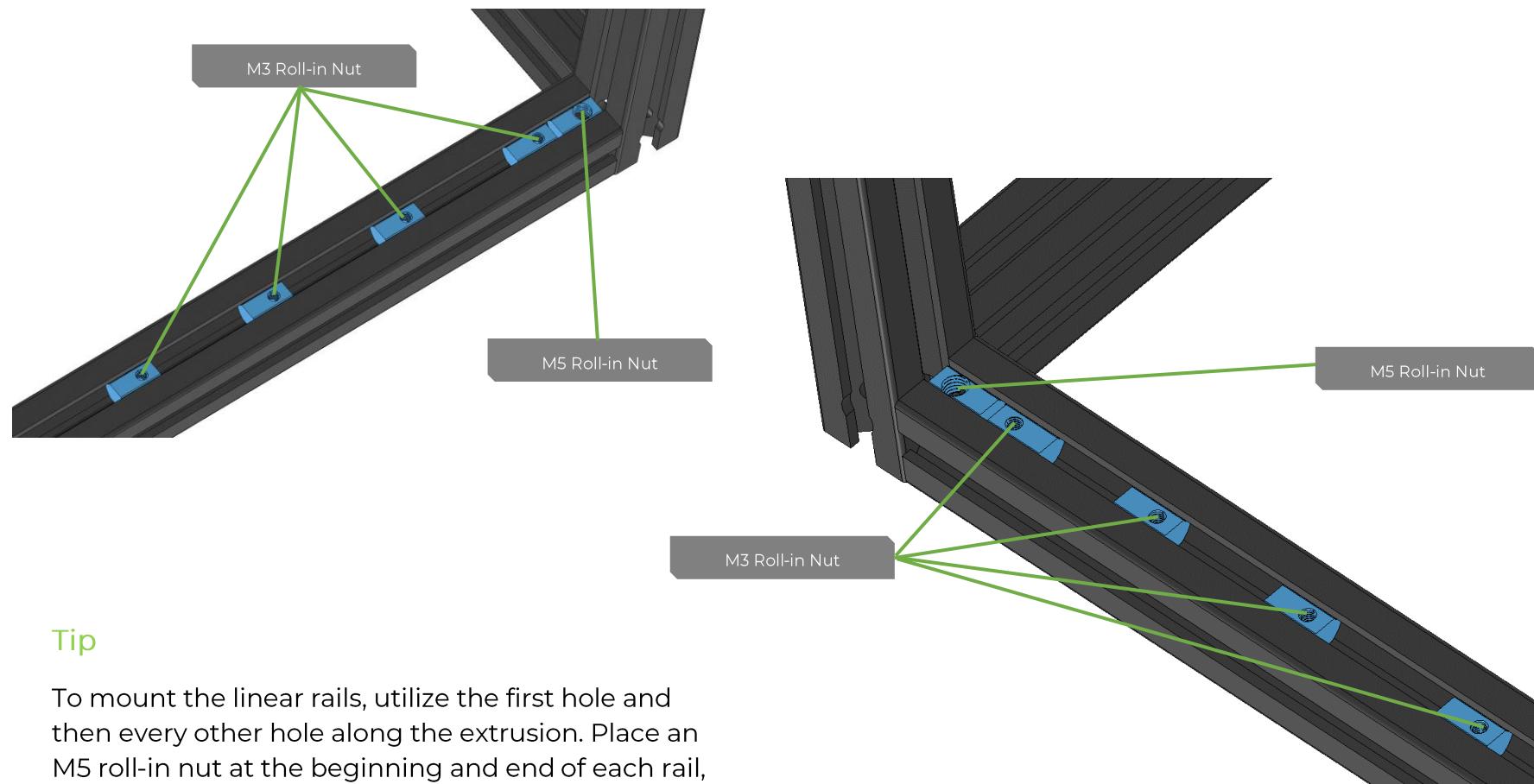
Attach four 250mm MGN9C rails to the extrusion, ensuring they are centered. Leave a 15mm gap on both the left and right sides. Use M3x8 screws with Vibra-Tite 125, VC3, or a similar adhesive, tightening them to 1 Nm.



### Tip

For a more convenient installation process, utilize the printed MGN9C alignment tool.

## Frame Assembly – Top Linear Rails



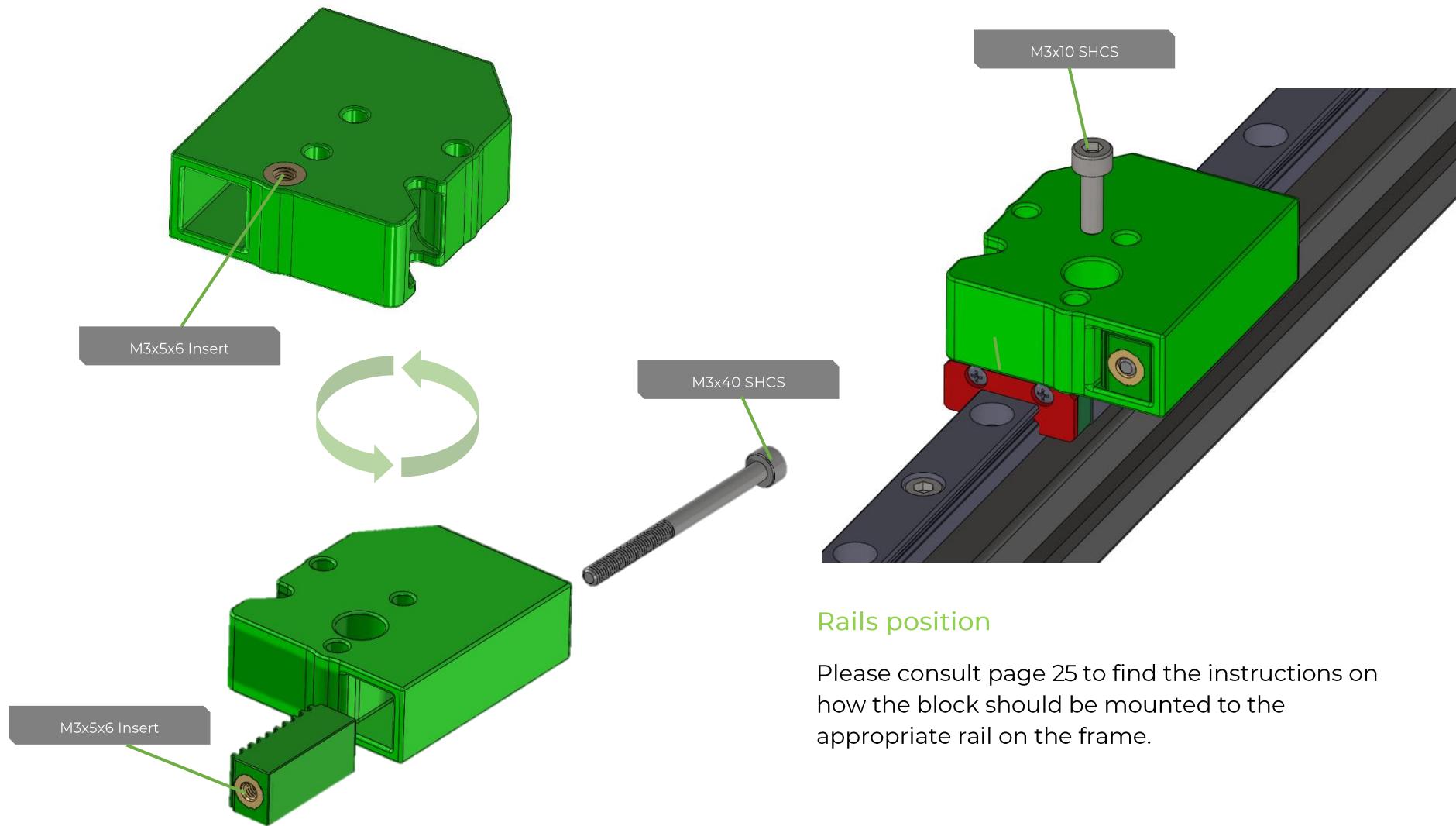
### Tip

To mount the linear rails, utilize the first hole and then every other hole along the extrusion. Place an M5 roll-in nut at the beginning and end of each rail, as shown in the picture.

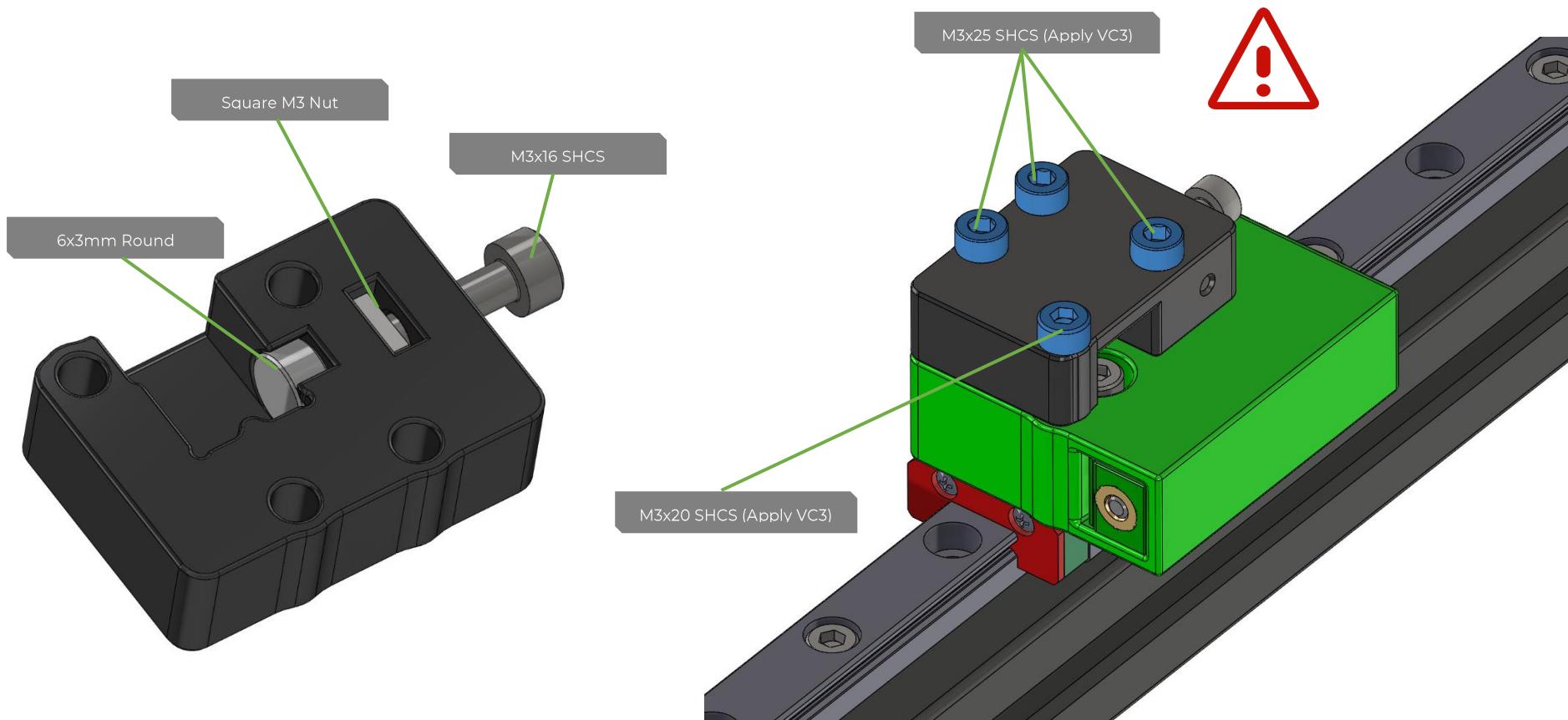
## XY Gantry – X Axis Overview



## XY Gantry – X Axis



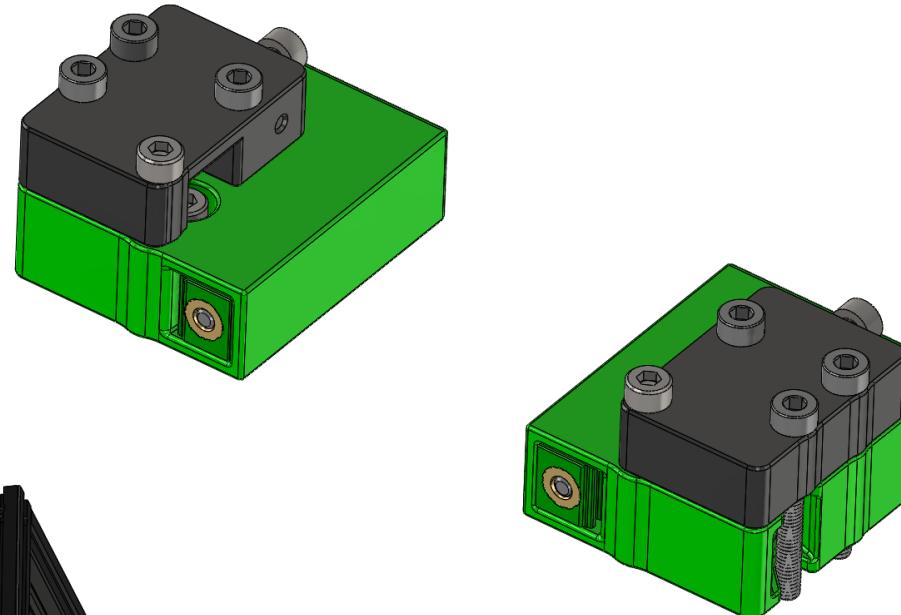
## XY Gantry – X Axis



## XY Gantry – X Axis

### Build Mirror Part

Construct the mirrored component of the x-axis using the printed parts that have been mirrored, and utilize the identical hardware as demonstrated.



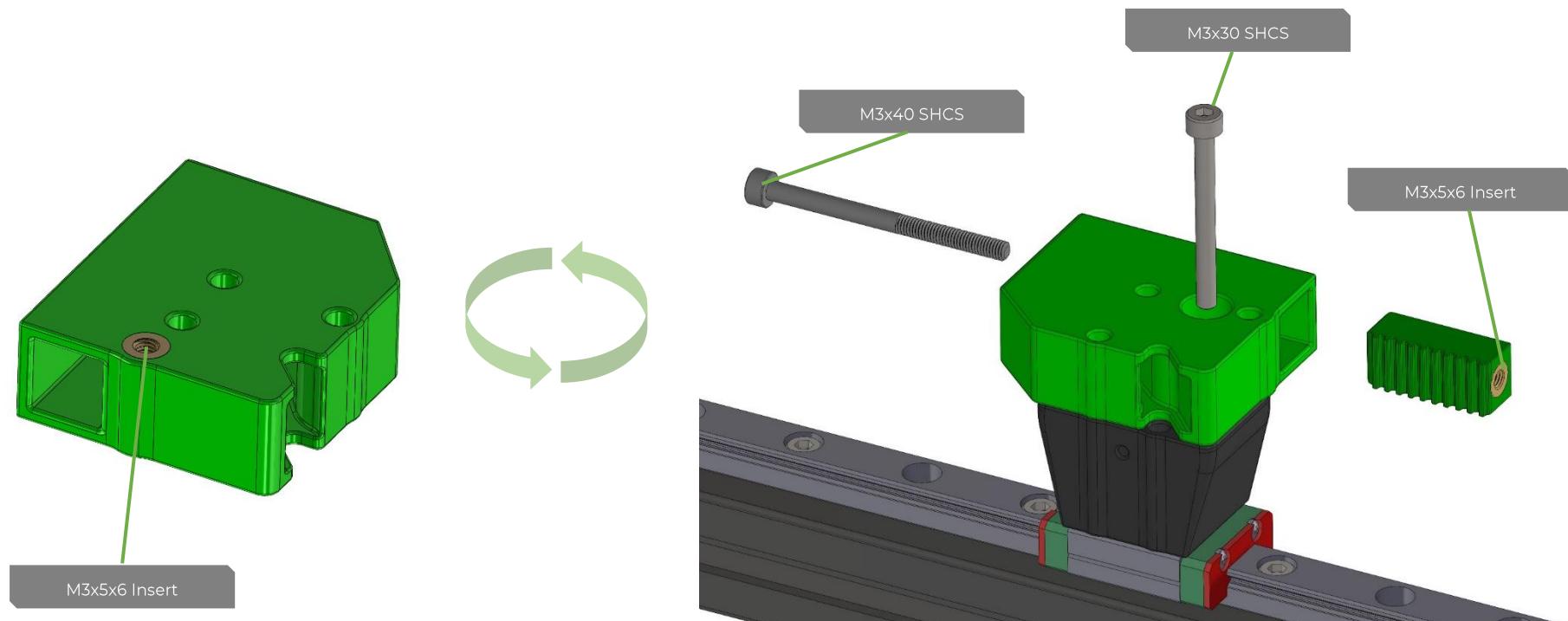
### Installing the linear rail

Prior to fully mounting the X axis onto the frame, begin by installing the 300mm mgn9c rail for the tool head with the cart facing towards the ground. It is advised not to tighten the bolts that secure the tool head rail completely at this point. Point the cart **DOWN to the floor**.

## XY Gantry – Y Axis Overview



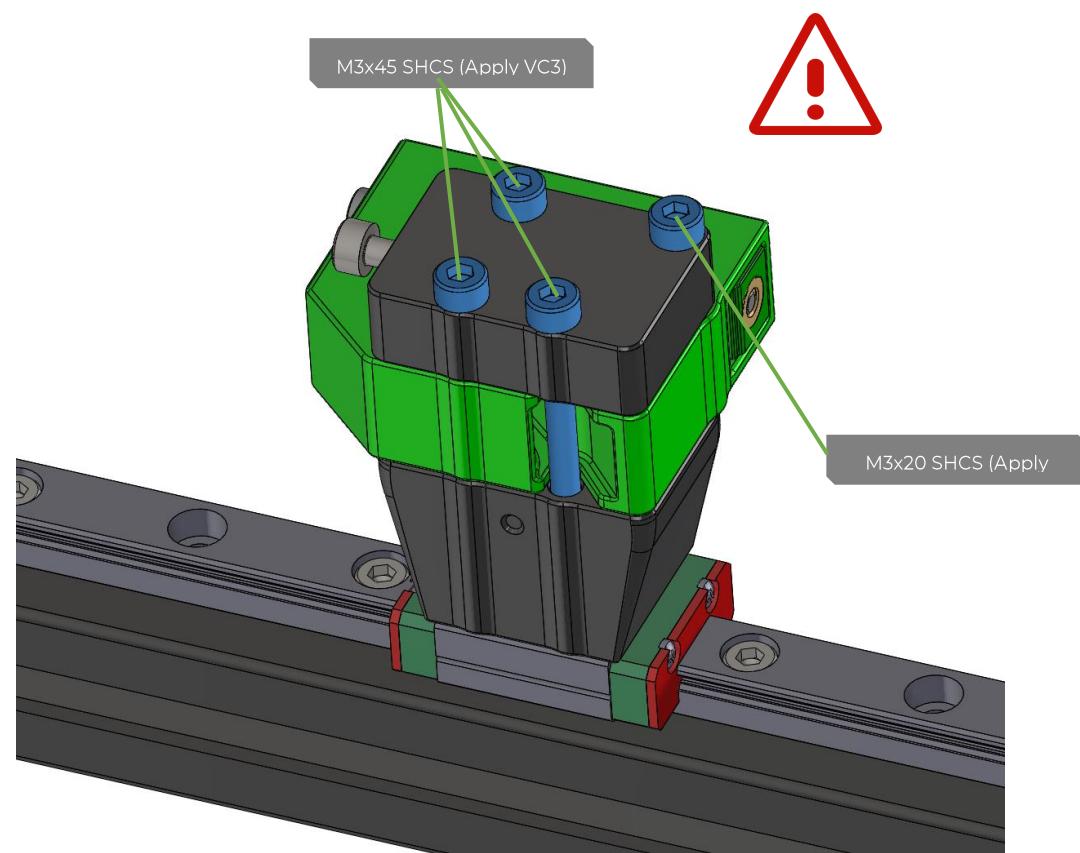
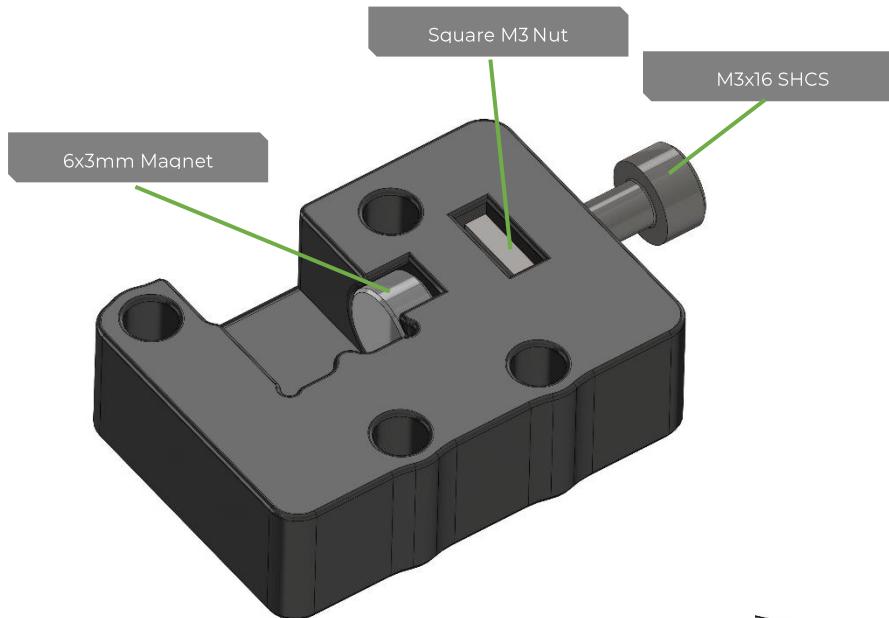
## XY Gantry – Y Axis



### Rails position

Please consult page 26 to find the instructions on how the block should be mounted to the appropriate rail on the frame.

## XY Gantry – Y Axis



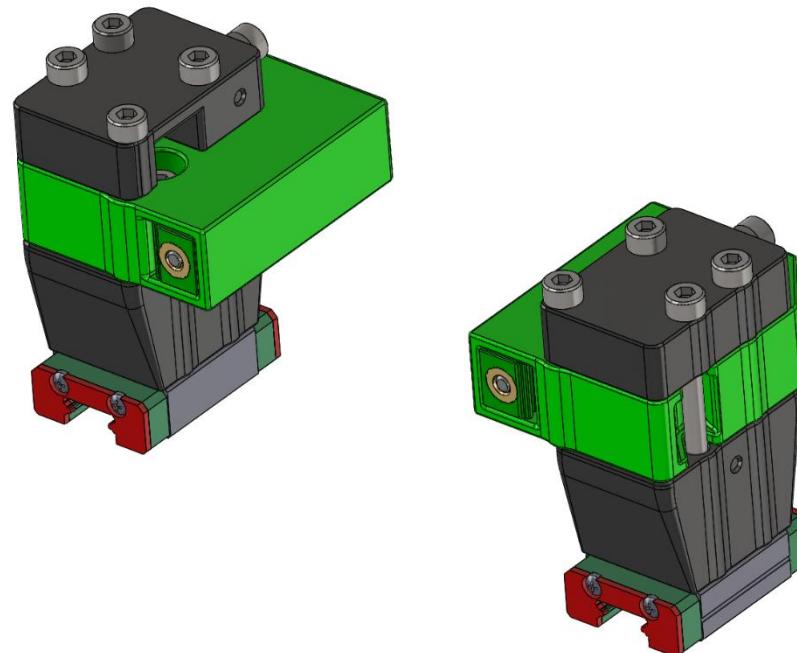
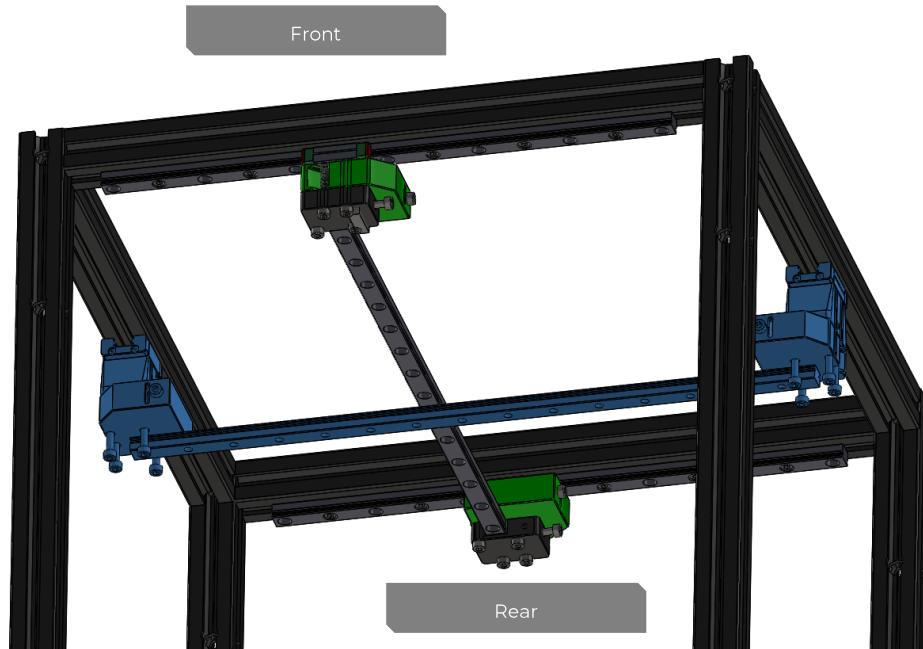
### Build Mirror Part

Construct the mirrored component of the x-axis using the printed parts that have been mirrored, and utilize the identical hardware as demonstrated.

## XY Gantry – Y Axis

### Build Mirror Part

Construct the mirrored component of the y-axis using the printed parts that have been mirrored, and utilize the identical hardware as demonstrated.



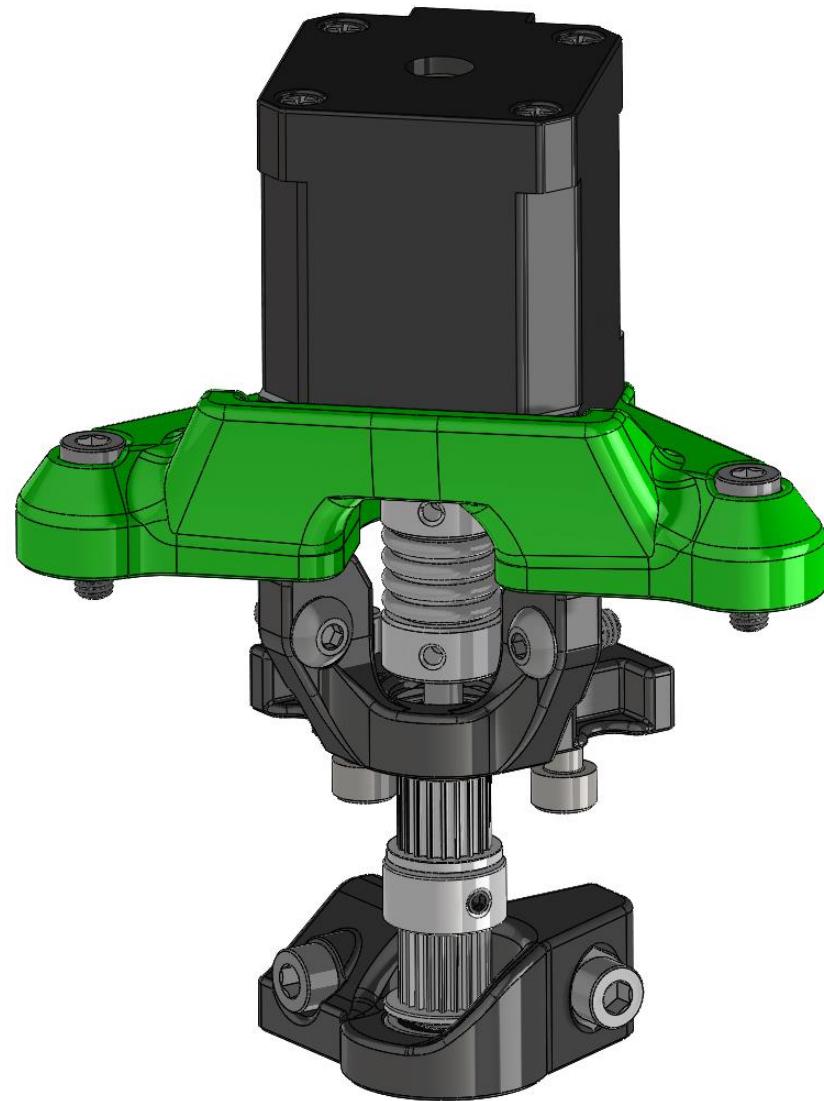
### Installing the linear rail

Prior to fully mounting the Y axis onto the frame, begin by installing the linear rail for the tool head. It is advised not to tighten the bolts that secure the tool head rail completely at this point. Point the cart **UP to the sky**.

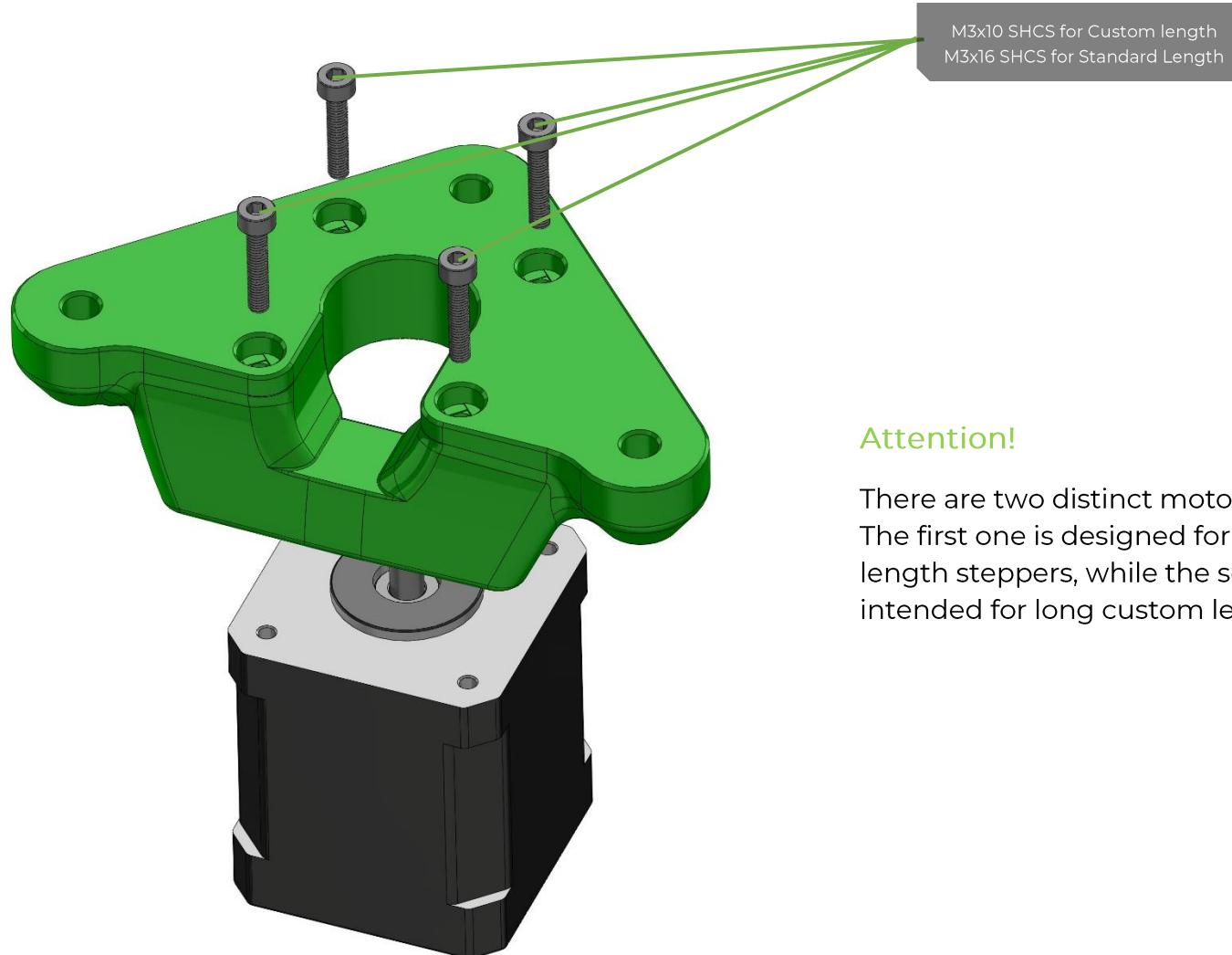


Verify X and Y Axis mounting orientation  
onto the frame before continuing!

## XY Corner Tower - Overview



## XY Corner Tower – Assembly

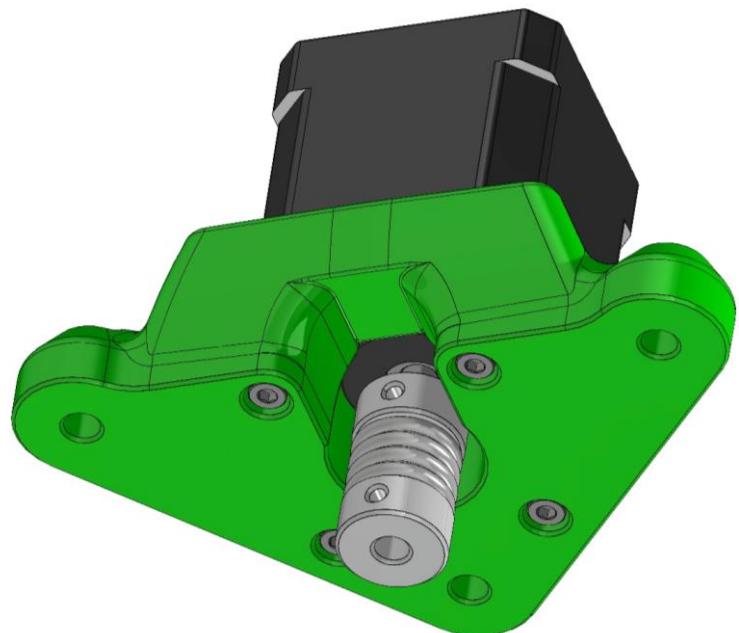


### Attention!

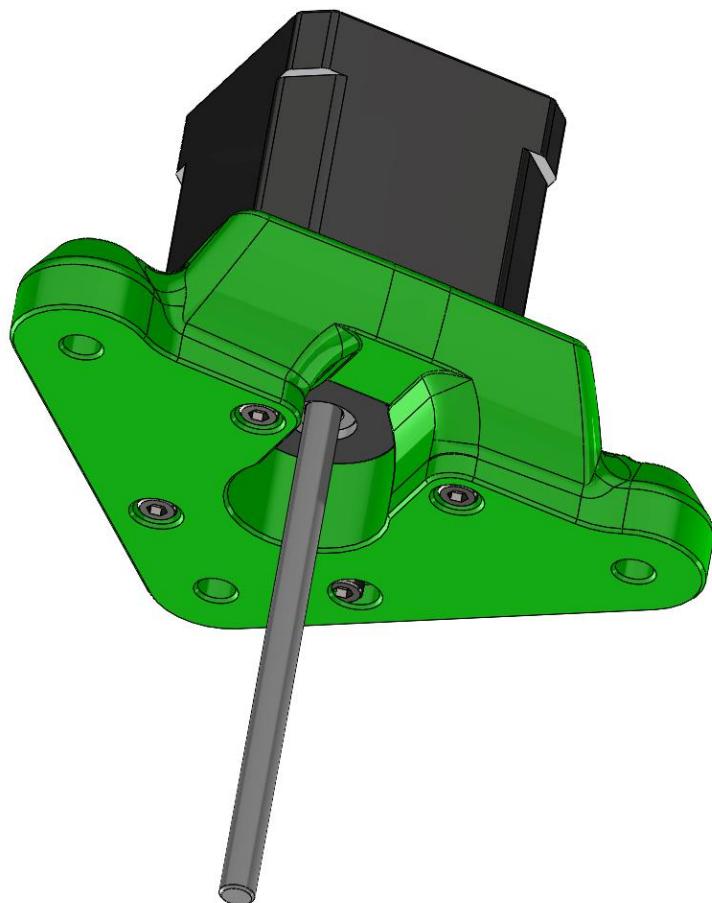
There are two distinct motor brackets available. The first one is designed for standard shaft length steppers, while the second one is intended for long custom length steppers.

## XY Corner Tower - Assembly

Standard Length - Coupler



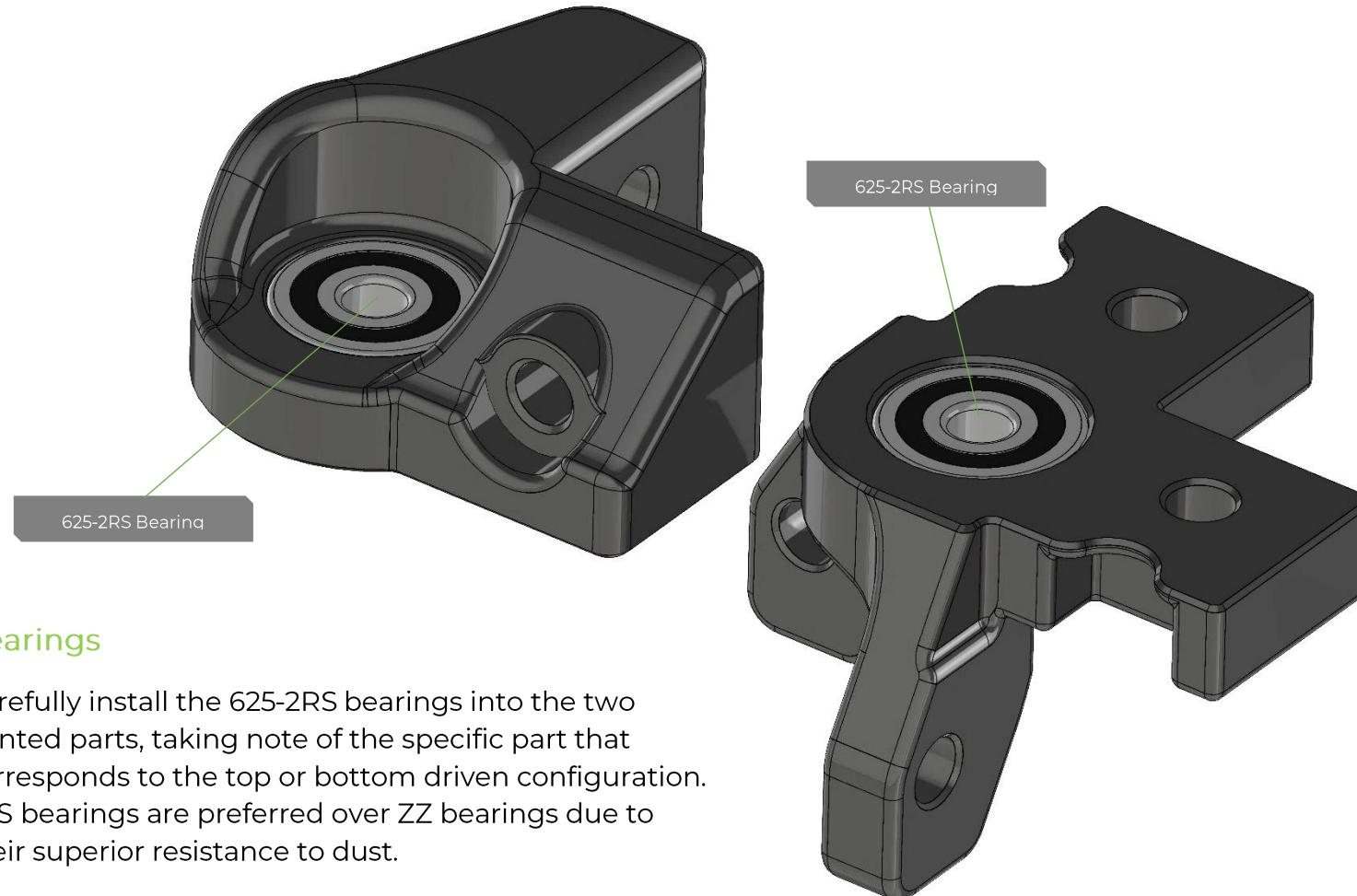
Custom Length - LDO



### Intermediate step

When using a standard-length shaft stepper,  
install the coupler without permanently fixing it in  
place using thread locker just yet.

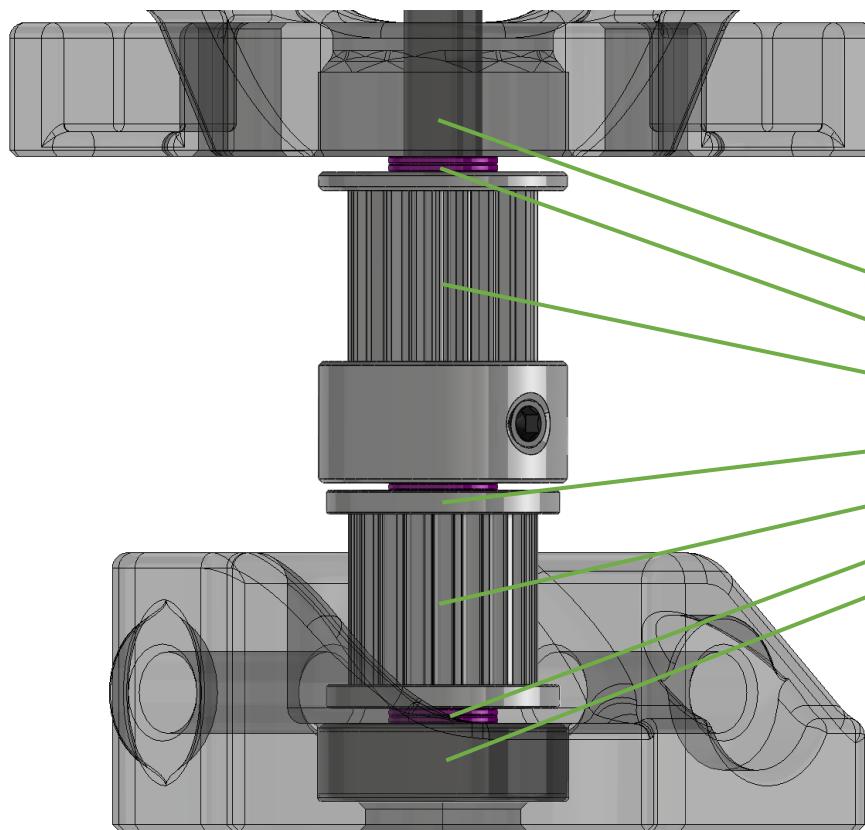
## XY Corner Tower - Assembly



### Bearings

Carefully install the 625-2RS bearings into the two printed parts, taking note of the specific part that corresponds to the top or bottom driven configuration. 2RS bearings are preferred over ZZ bearings due to their superior resistance to dust.

## XY Corner Tower - Type Top Driven

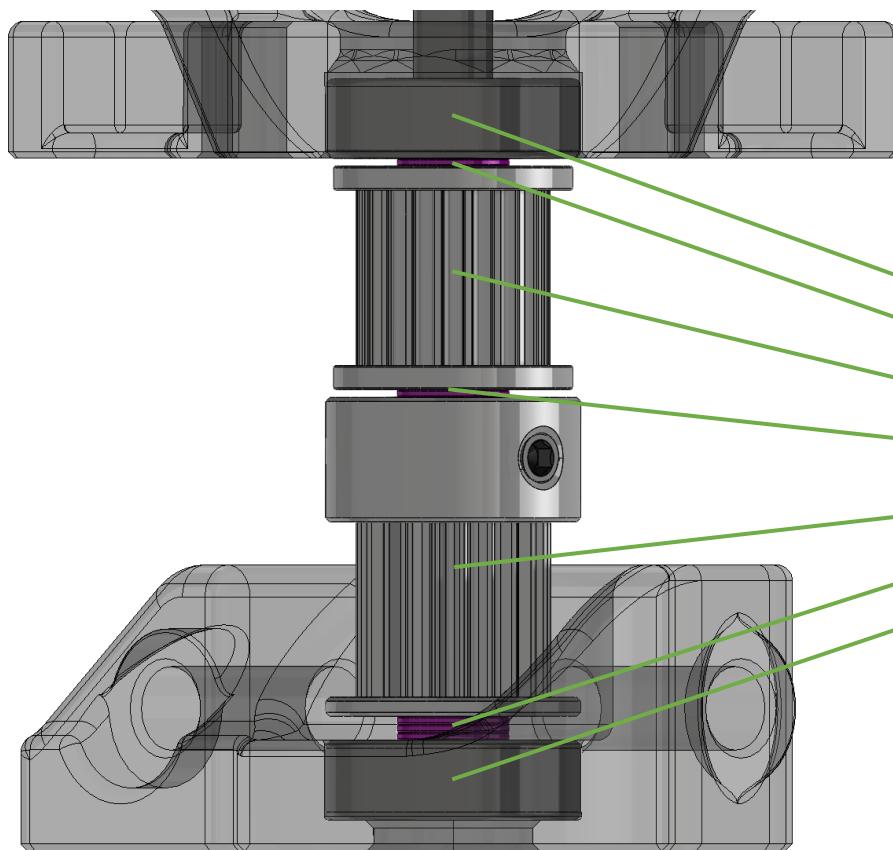


### Stack – Top Driven

Build the stack in order from top to bottom. Regardless of whether a custom or standard-length stepper is used, the configuration below remains unchanged. Do not tighten the grubscrews yet!

13mm Idlers	14mm Idlers
625-2RS bearing	625-2RS bearing
1mm washer stack	1mm washer stack
2GT 9mm pulley	2GT 9mm pulley
0.5mm washer stack	0.5mm washer stack
13mm toothed Idler	14mm toothed Idler
2mm washer stack	1mm washer stack
625-2RS bearing	625-2RS bearing

## XY Corner Tower - *Type bottom Driven*



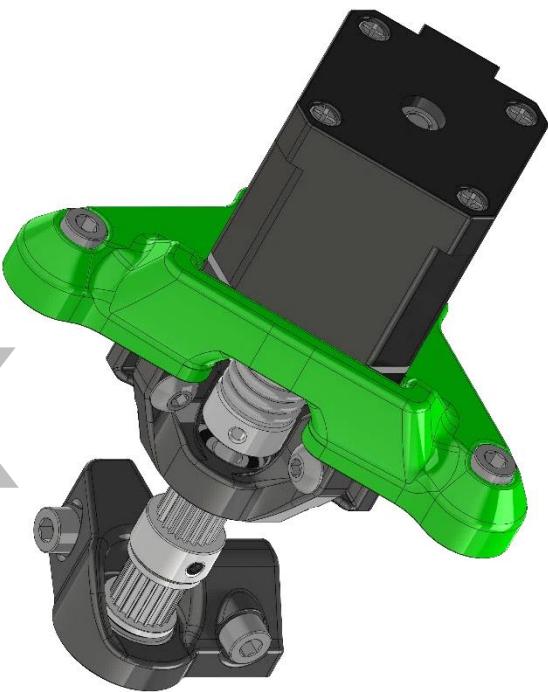
### Stack – Bottom Driven

Build the stack in order from top to bottom. Regardless of whether a custom or standard-length stepper is used, the configuration below remains unchanged. Do not tighten the grubscrews yet!

13mm Idlers	14mm Idlers
625-2RS bearing	625-2RS bearing
1.5mm washer stack	0.5mm washer stack
13mm toothed Idler	14mm toothed Idler
0.5mm washer stack	0.5mm washer stack
2GT 9mm pulley	2GT 9mm pulley
1.5mm washer stack	1.5mm washer stack
625-2RS bearing	625-2RS bearing

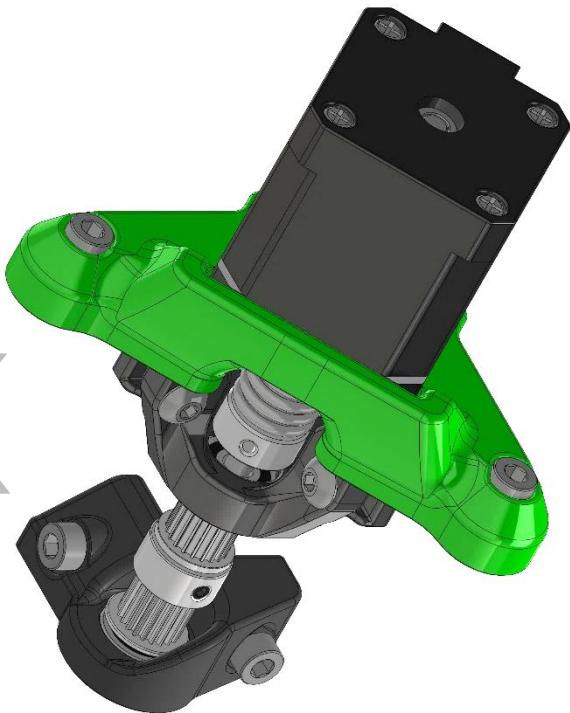
## XY Corner Tower - Assembly

2X



Stack – Top Driven

+ 2X

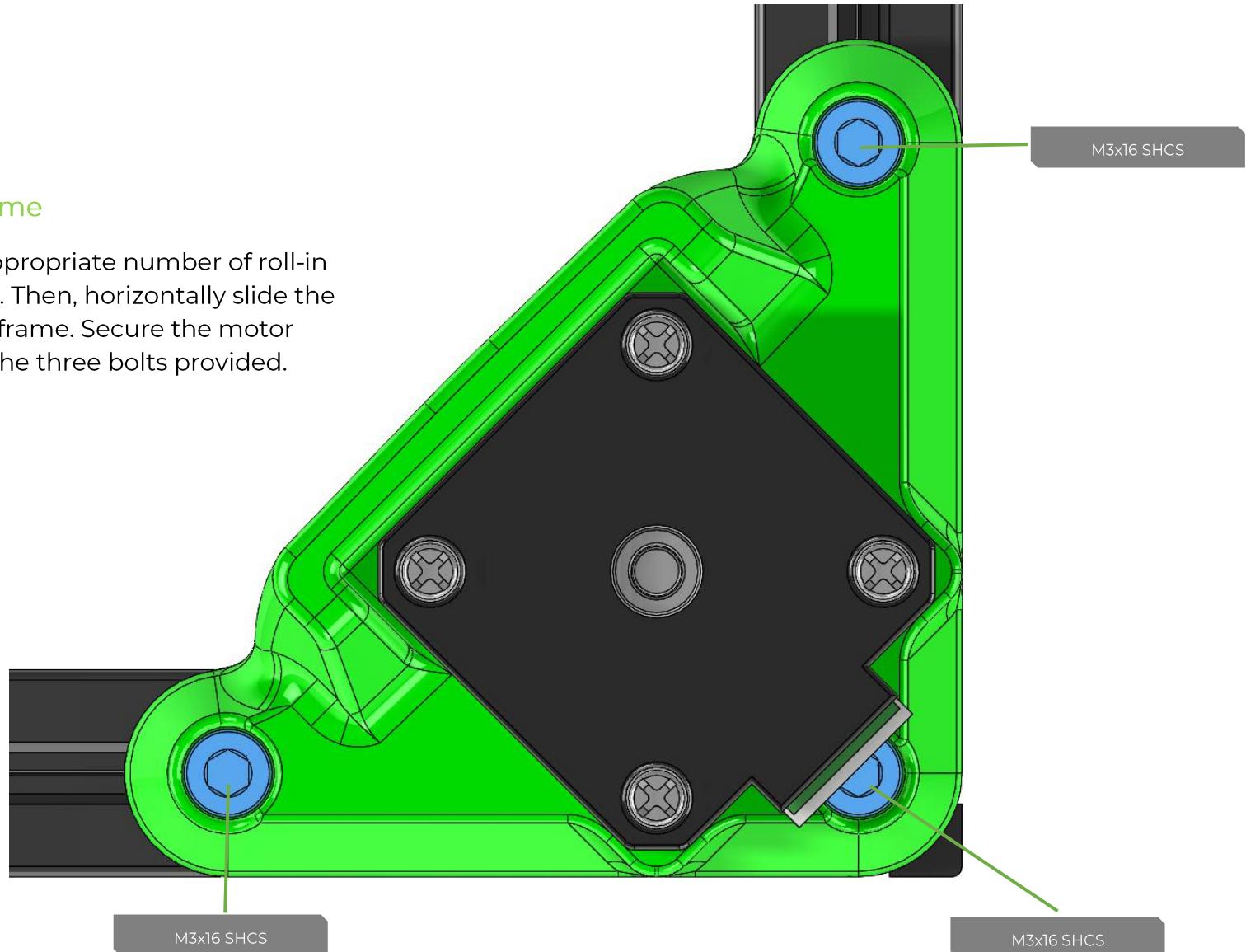


Stack – Bottom Driven

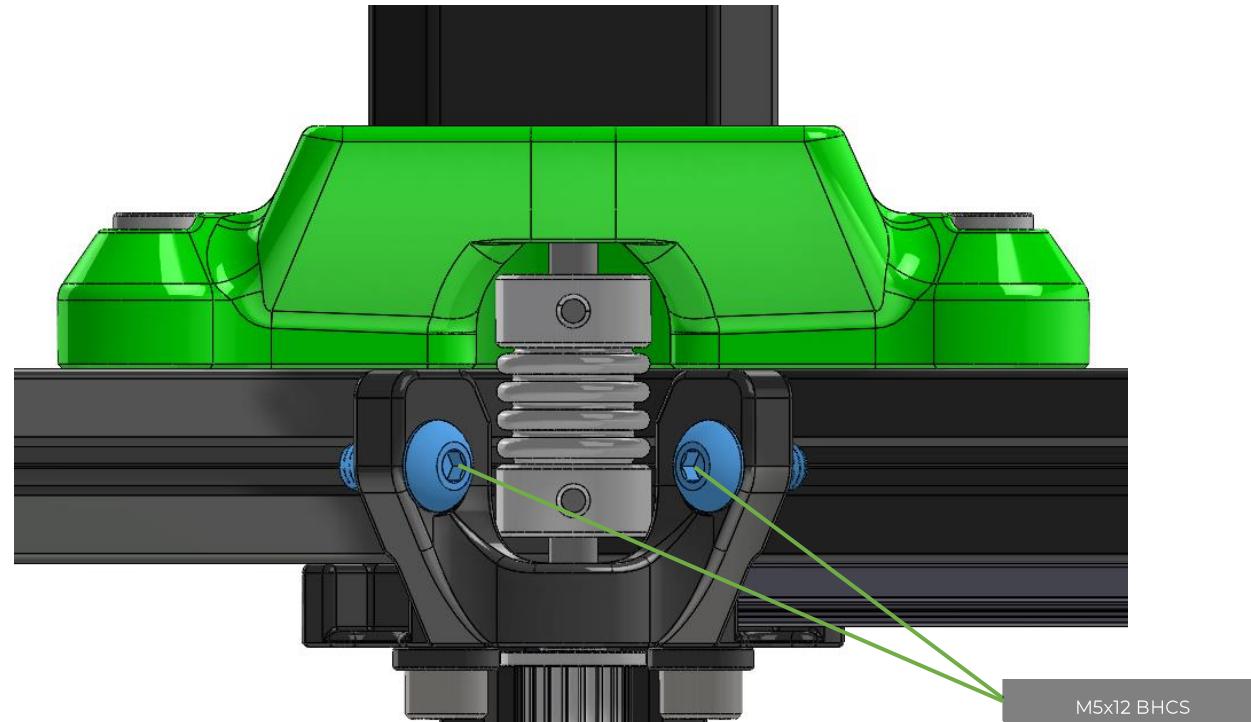
## XY Corner Tower - Assembly

### Mounting to the frame

Begin by sliding the appropriate number of roll-in nuts into the extrusion. Then, horizontally slide the corner tower onto the frame. Secure the motor mount in place using the three bolts provided.

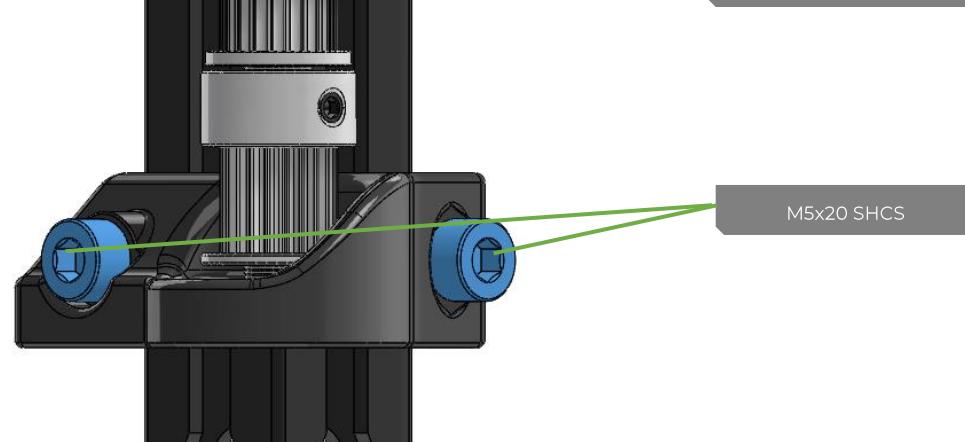


## XY Corner Tower - Assembly

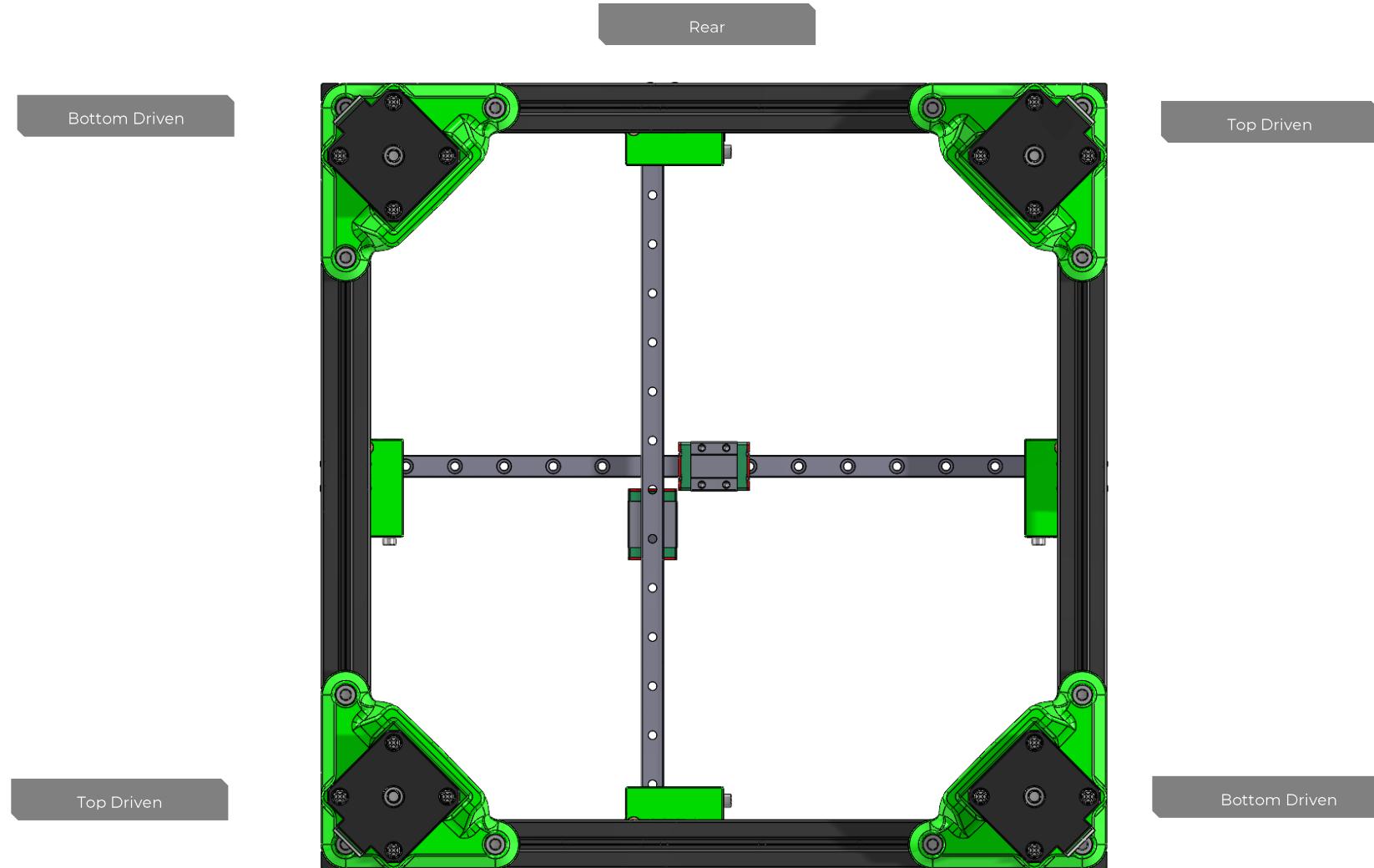


### Mounting to the frame

Secure the corner tower in place by tightening four additional bolts on the inside. Once the corner tower is in place, you can secure the coupler and grub screws to its final position.



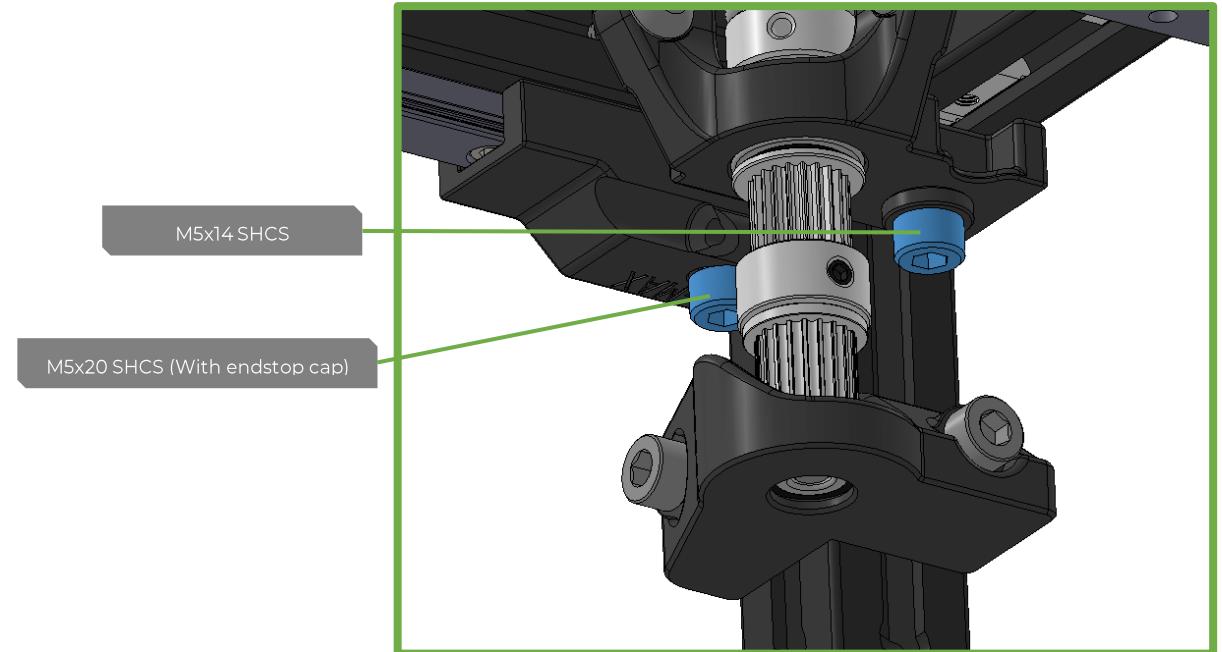
## XY Corner Tower - Assembly



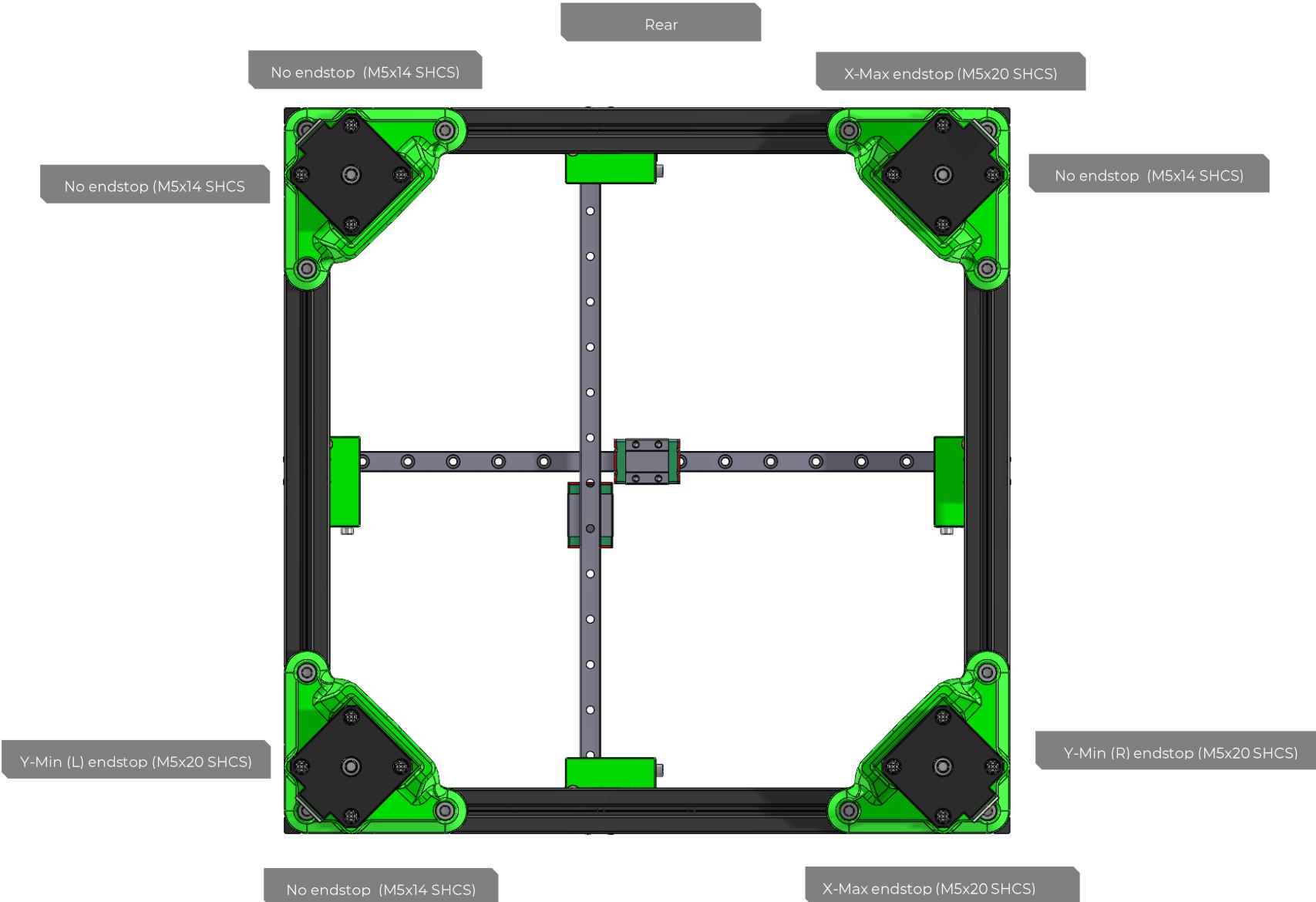
## XY Corner Tower – Endstop Caps

### Endstop Caps

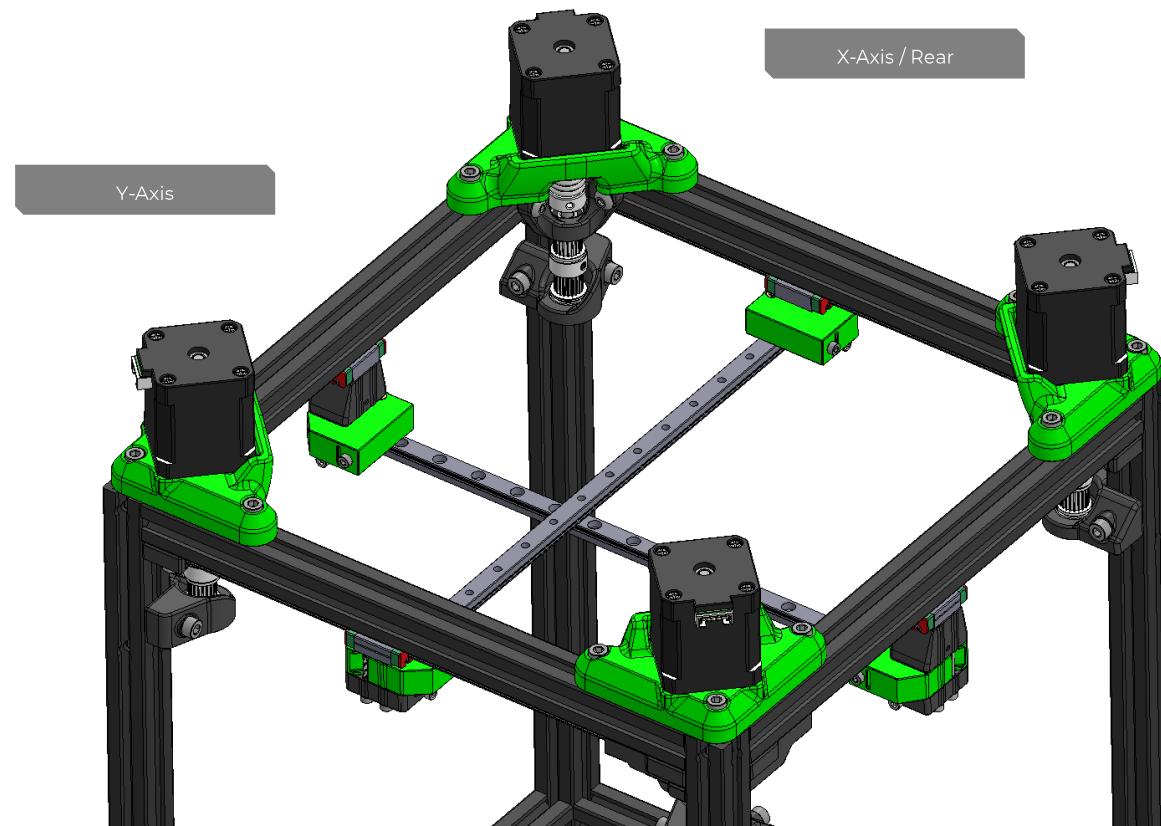
Proceed with the installation of the endstop caps, following the labelling on the printed parts and referring to the image on the this and next page for guidance.



## XY Corner Tower – Endstop Caps



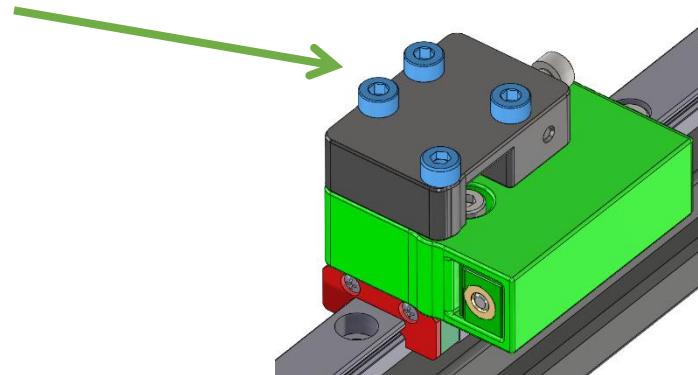
## XY Gantry - Overview



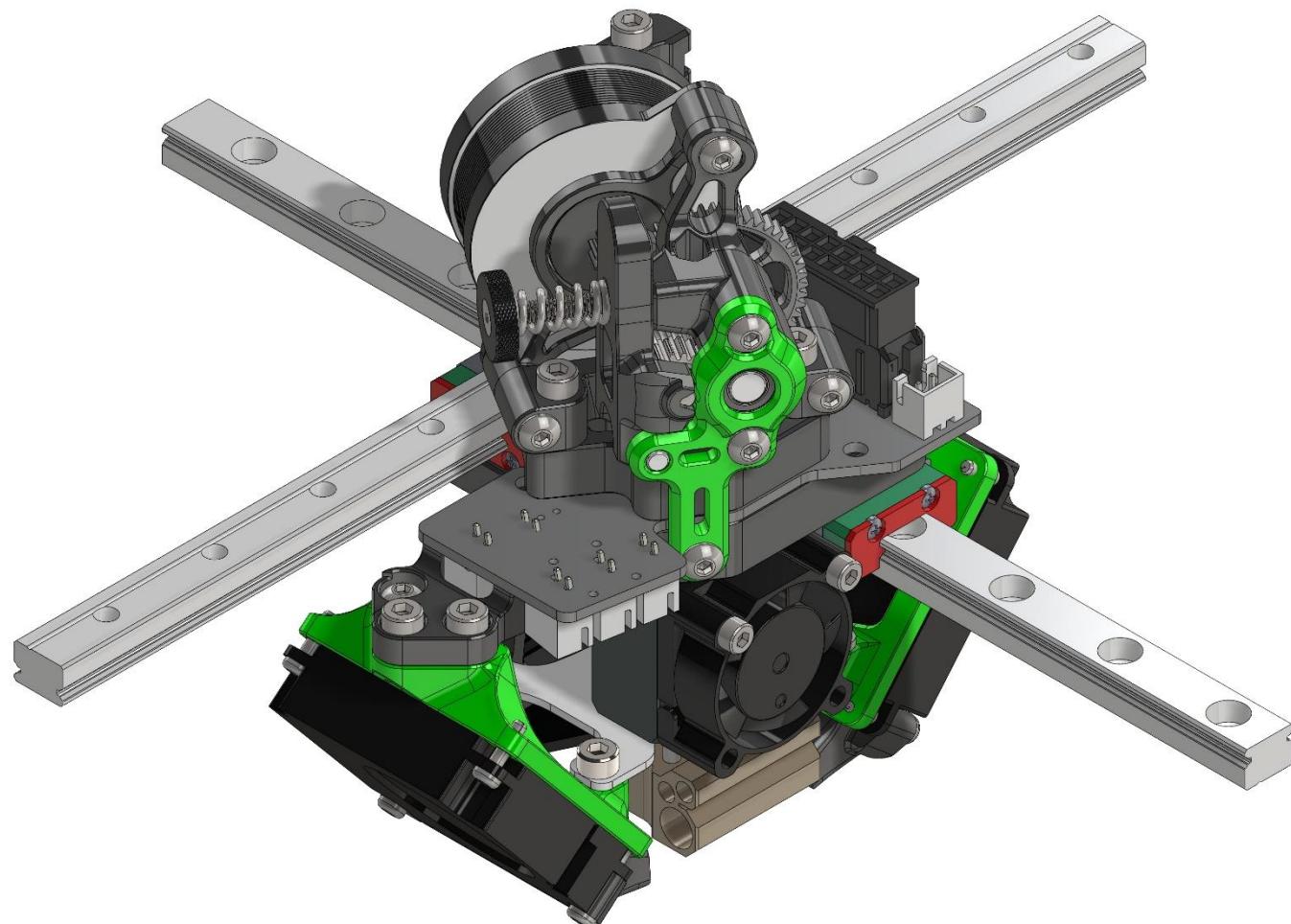
## XY Gantry – Deracking

To ensure that the cross rails are perpendicular to each other, please follow the detailed recommendation:

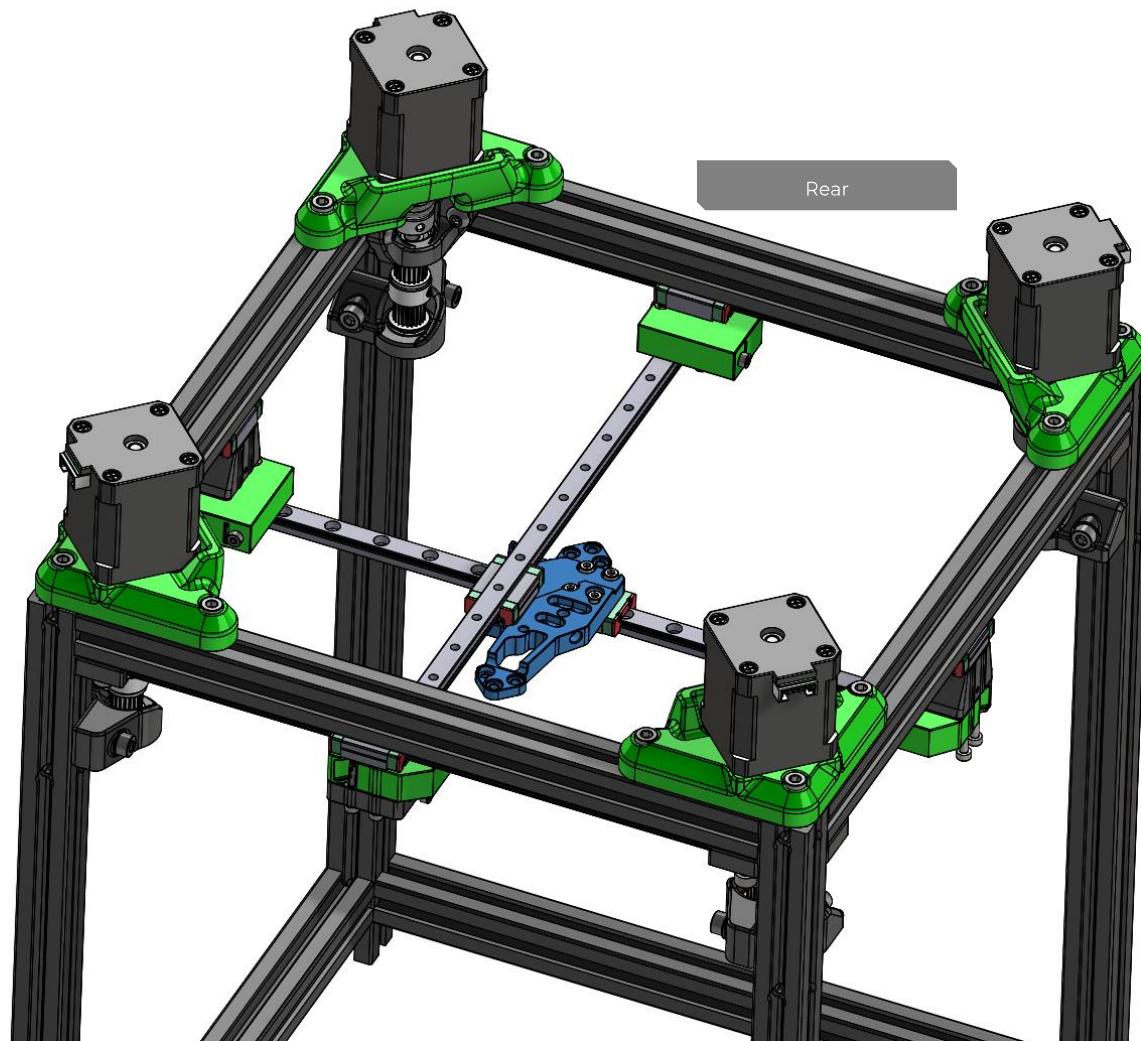
1. Begin by loosening one of the two rail carts on the x or y axis by unscrewing the bolts a few turns
2. Next, move both axes against the endstops carefully.
3. Once the axes are properly positioned, tighten the rail cart that was previously loosened.
4. Finally, thoroughly check for smooth and fluid motion to ensure that the rails are aligned correctly.



## Toolhead – Overview



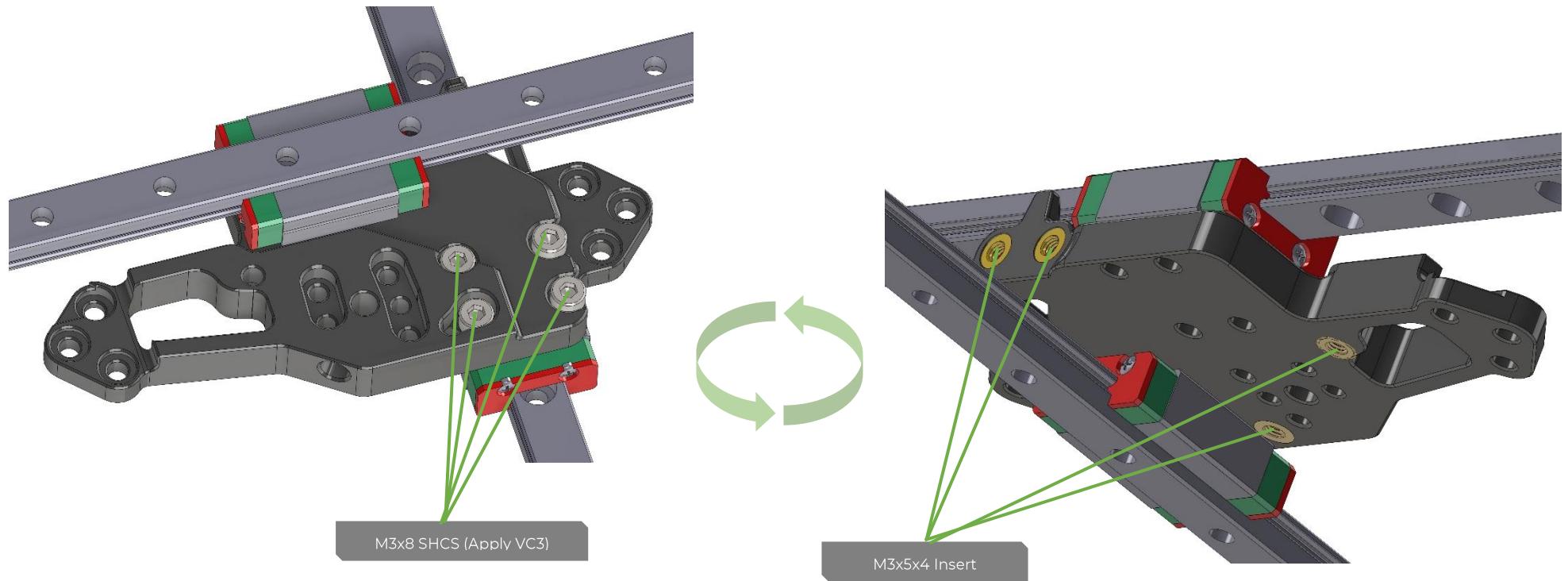
## Toolhead – Assembly



### Tip

To start assembling the toolhead, begin by attaching the party plate from the desired toolhead onto the linear rails.

## Toolhead – Party Plate



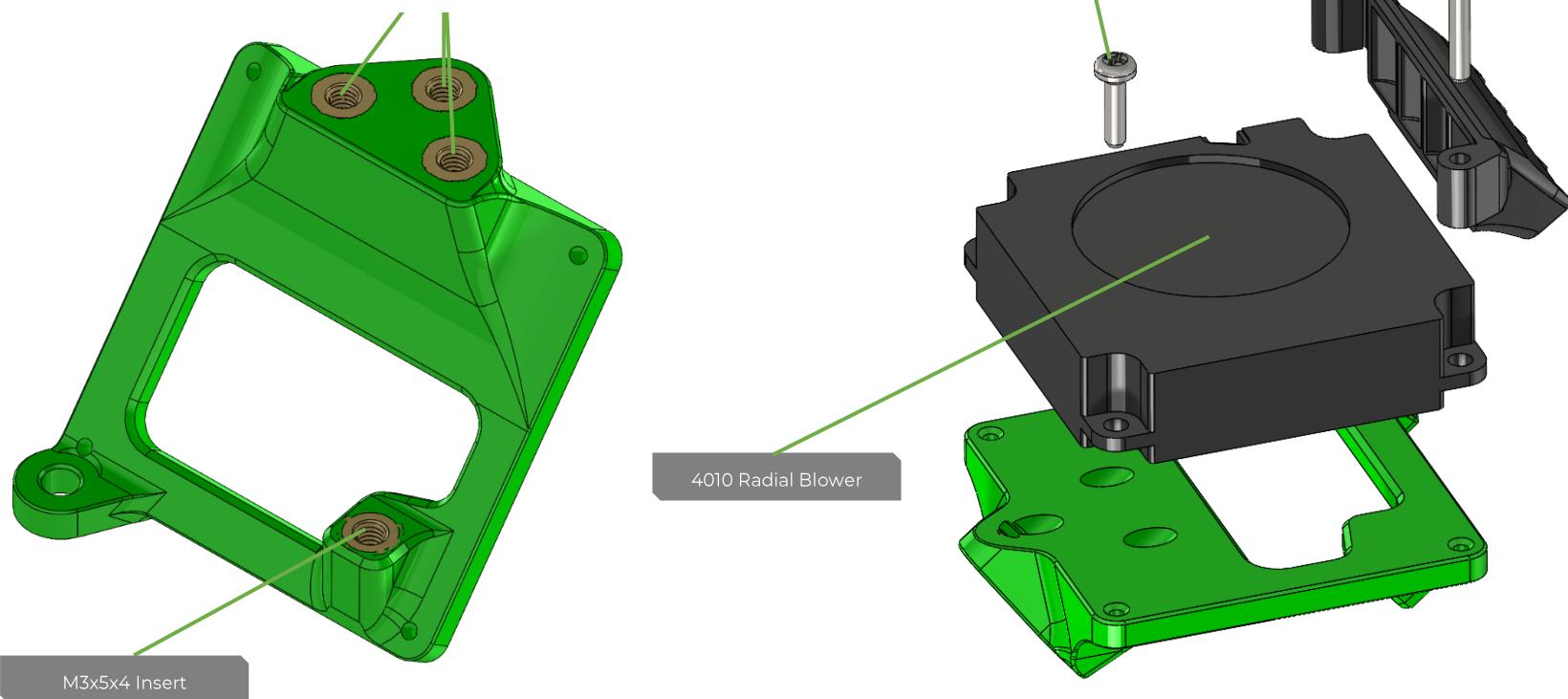
### Tip

Make sure to align the toolhead (aka party plate) with the gantry and ensure it is square when tightening the M3x8 bolts.

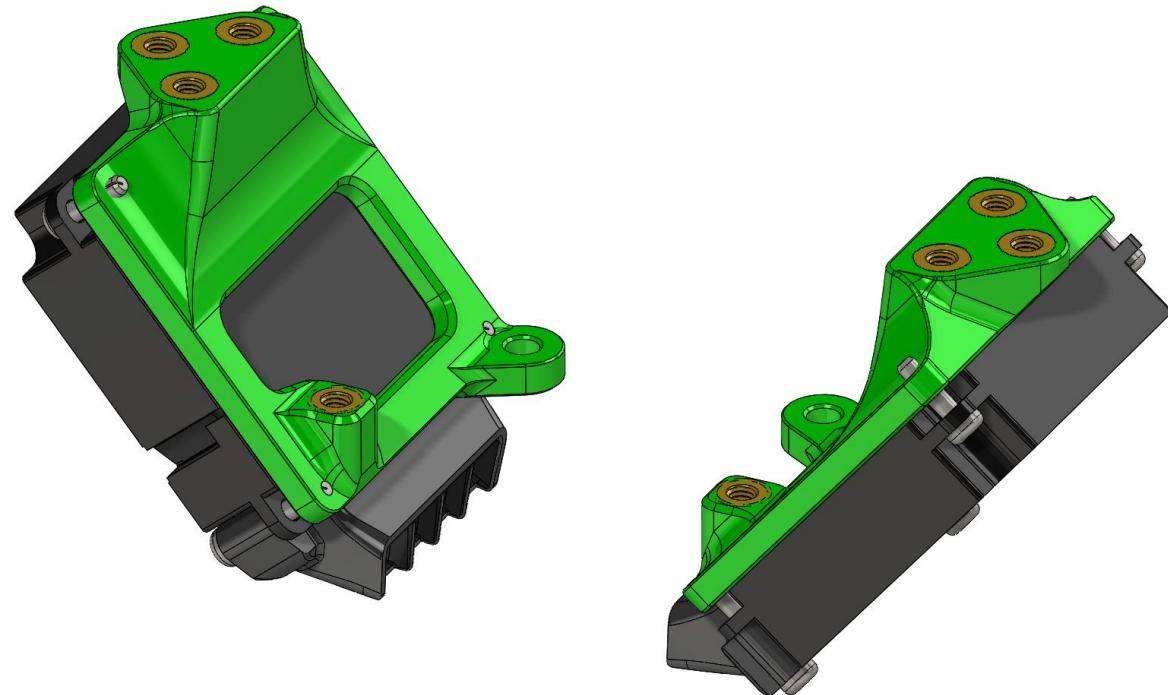
## Toolhead – Party Cooling Fans

### Tip

Avoid applying excessive force when tightening the M2x8 self-tapping screws to prevent the risk of breaking off the fan tabs.



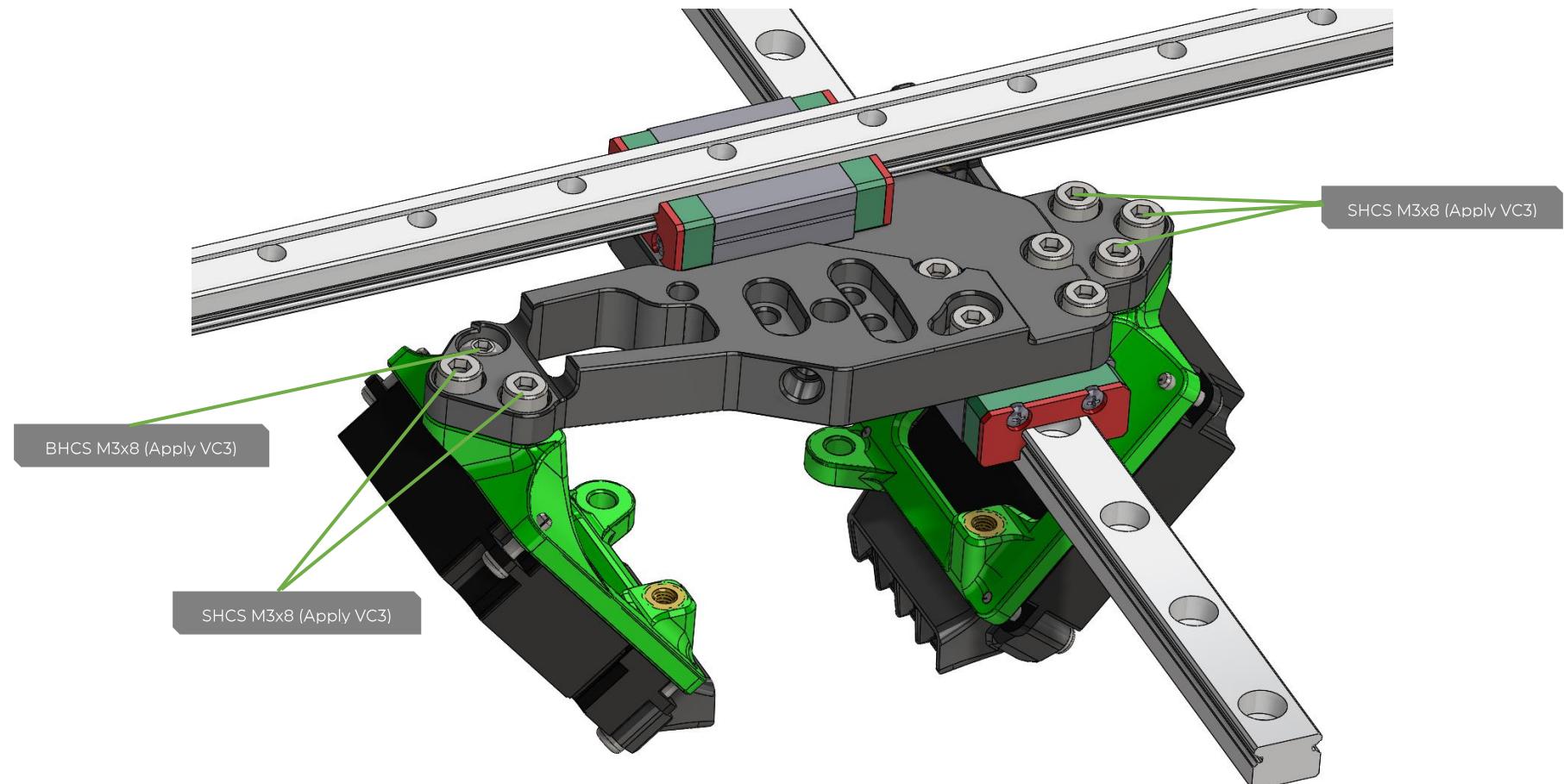
## Toolhead – Party Cooling Fans



### Tip

To ensure optimal performance and durability, it is recommended to use high-quality fans exclusively from Delta. These fans are known for their superior performance, durability, and minimal rattling during

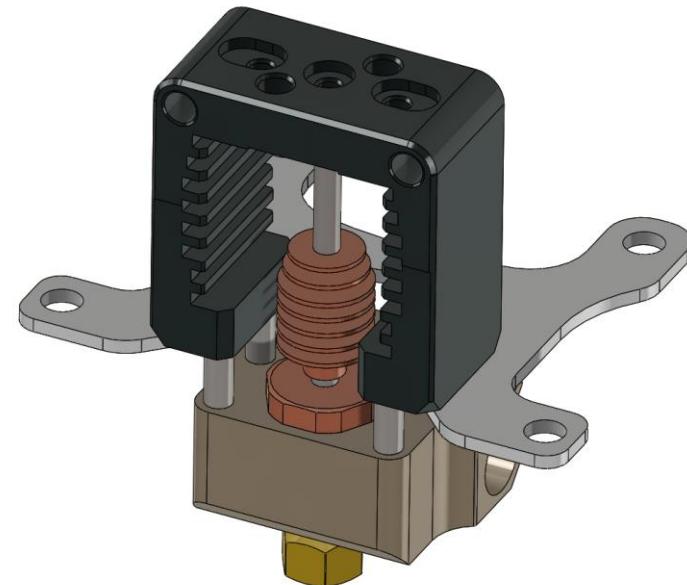
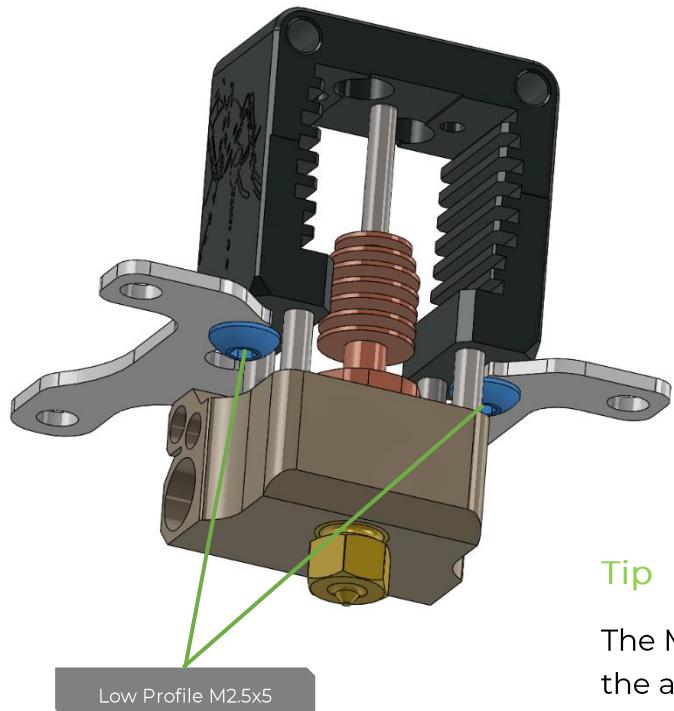
## Toolhead – Party Cooling Fans



### Part cooling fan exhaust

Ensure that the part cooling fans are angled towards the front of the toolhead.

## Toolhead – Mosquito Net



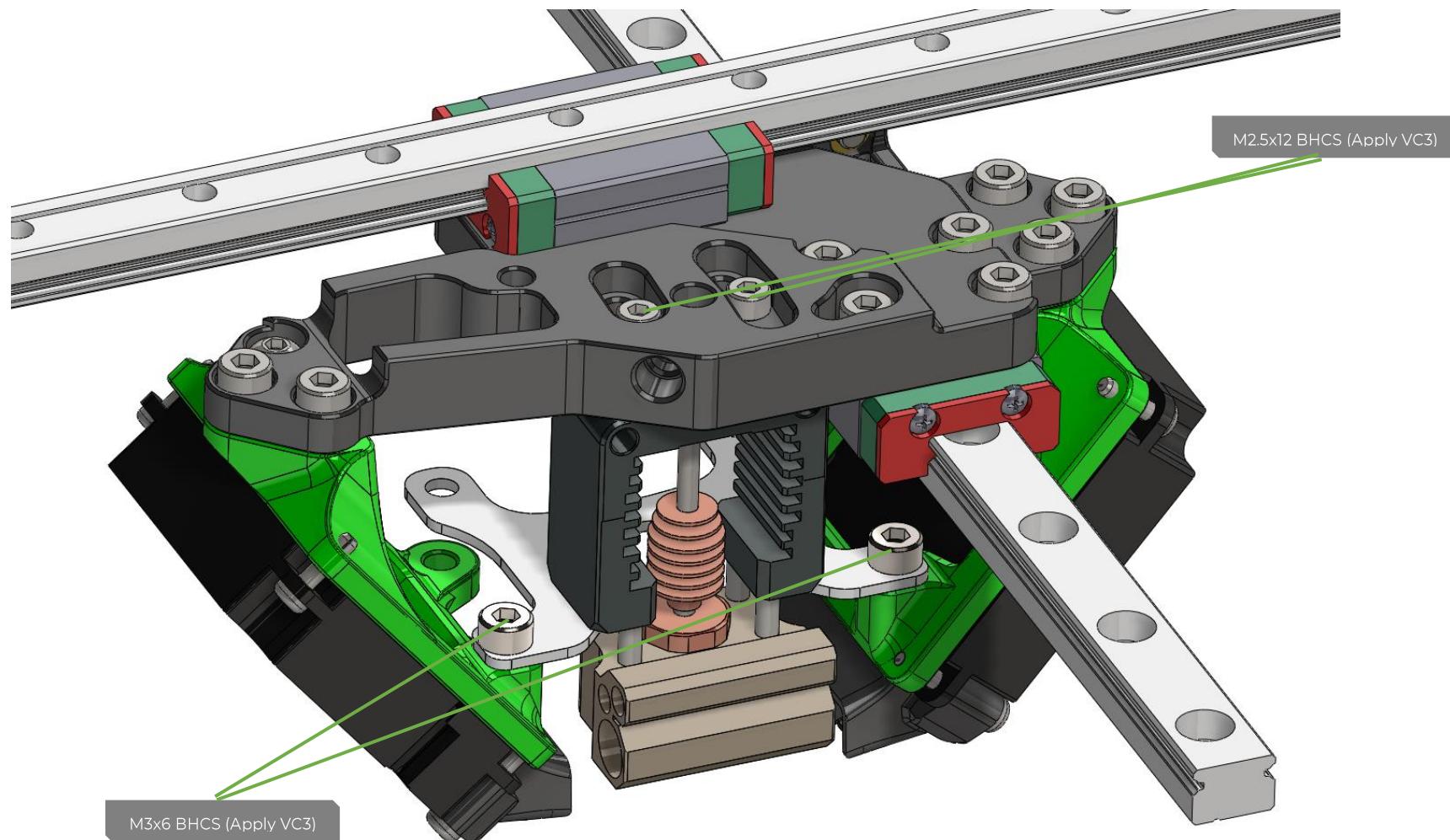
### Tip

The Mosquito Net is available for purchase in stainless steel or black FR4 through the approved Annex vendor channels. While not essential, this component significantly enhances the stability of the lower section of the toolhead.

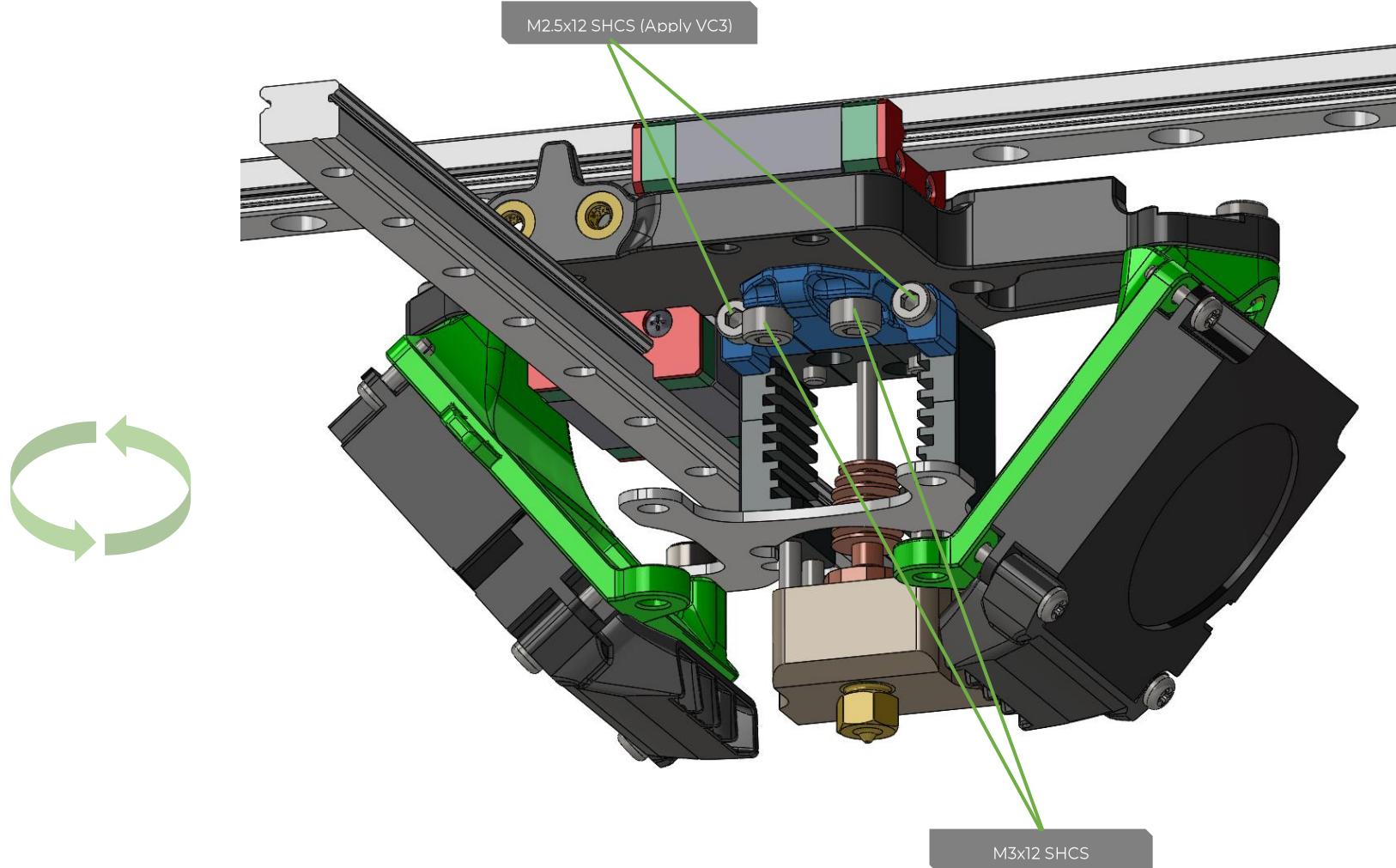


Avoid using VC3 in this area due to the high temperatures.

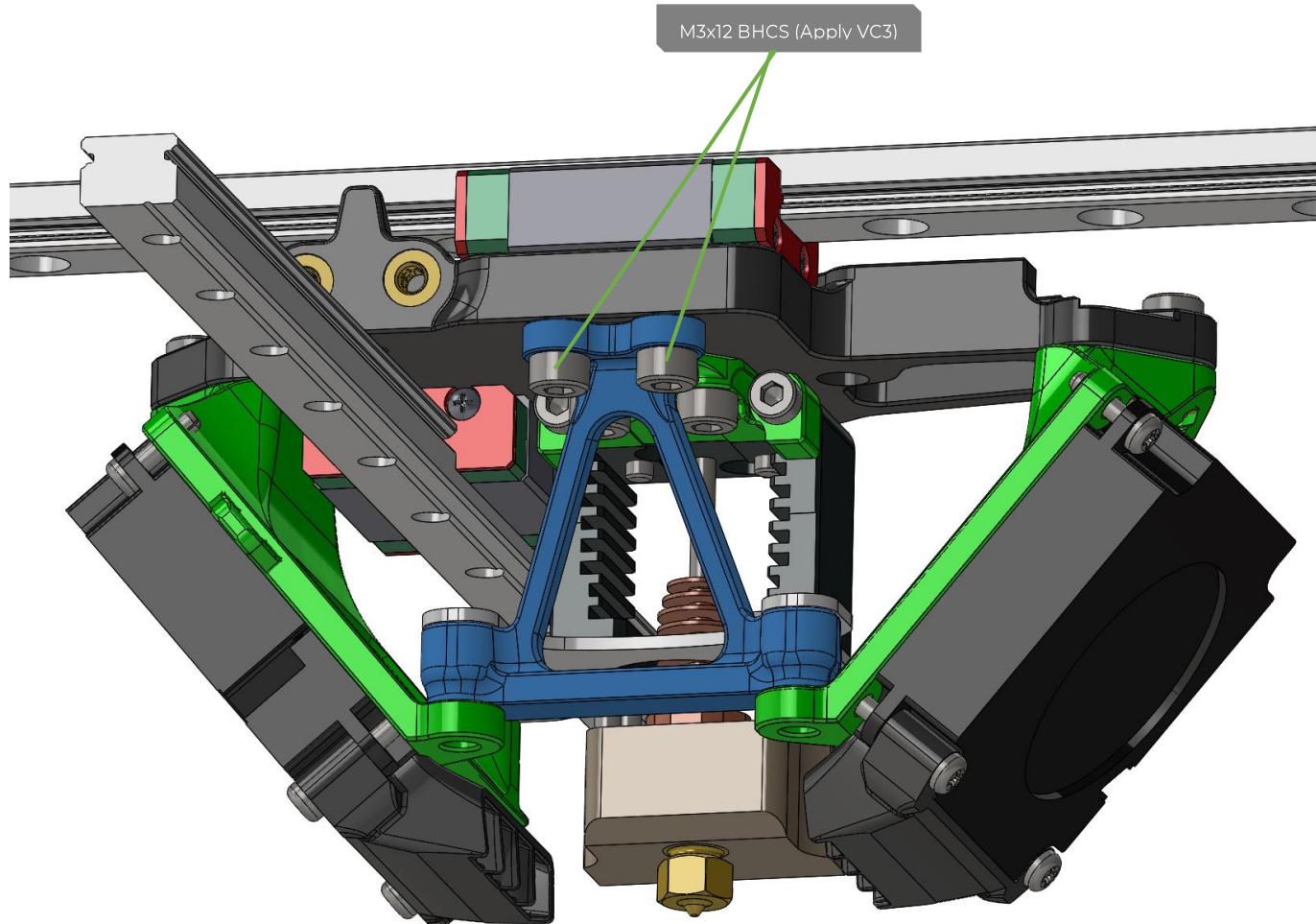
## Toolhead – Mosquito Hotend



## Toolhead – Hotend Reinforcement

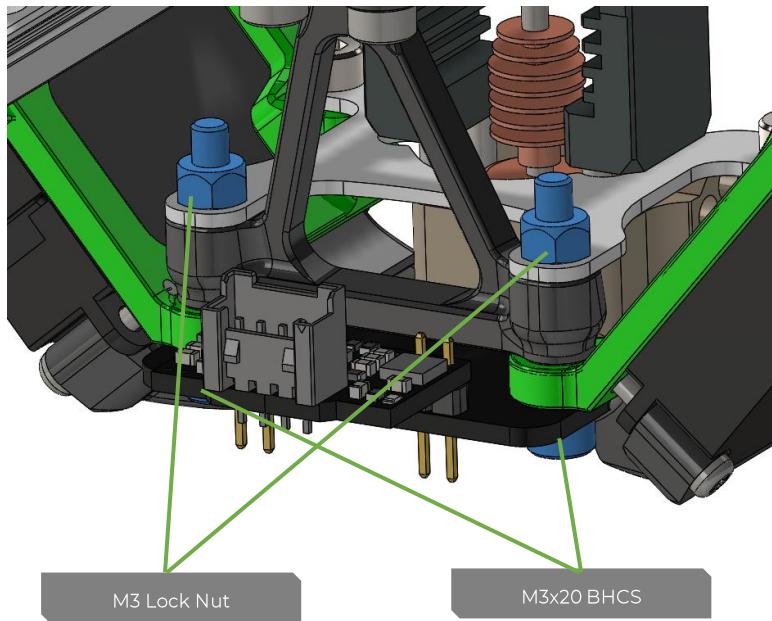


## Toolhead – Rear Brace

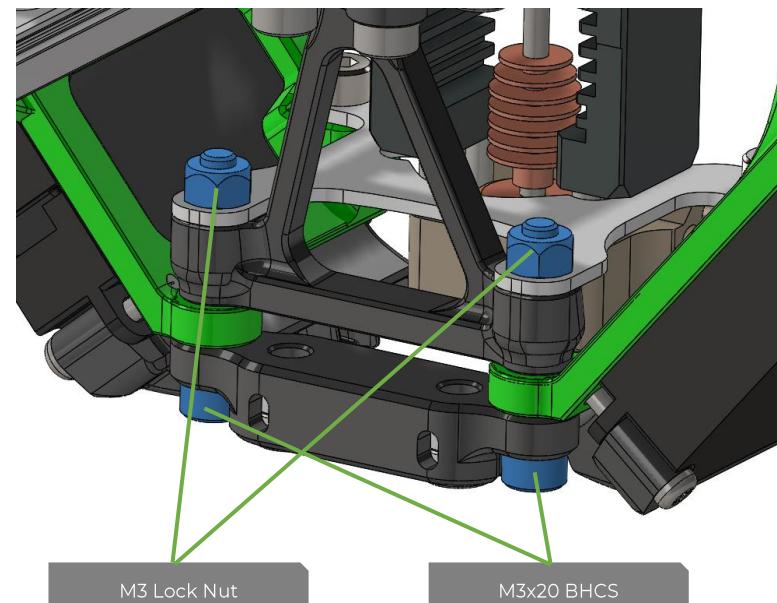


## Toolhead – Probes

Beacon3D Scanner (recommended)

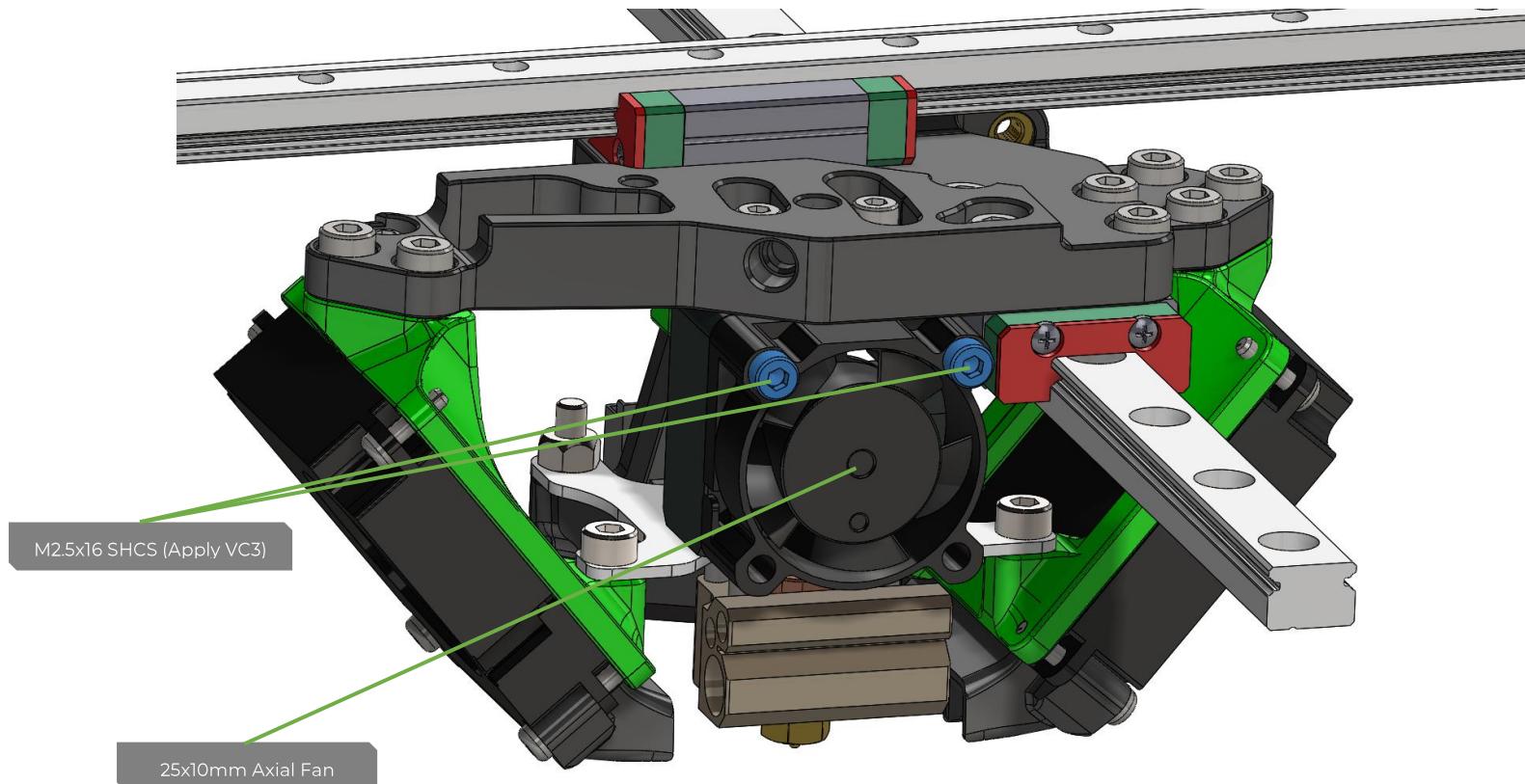


QuickDraw V2

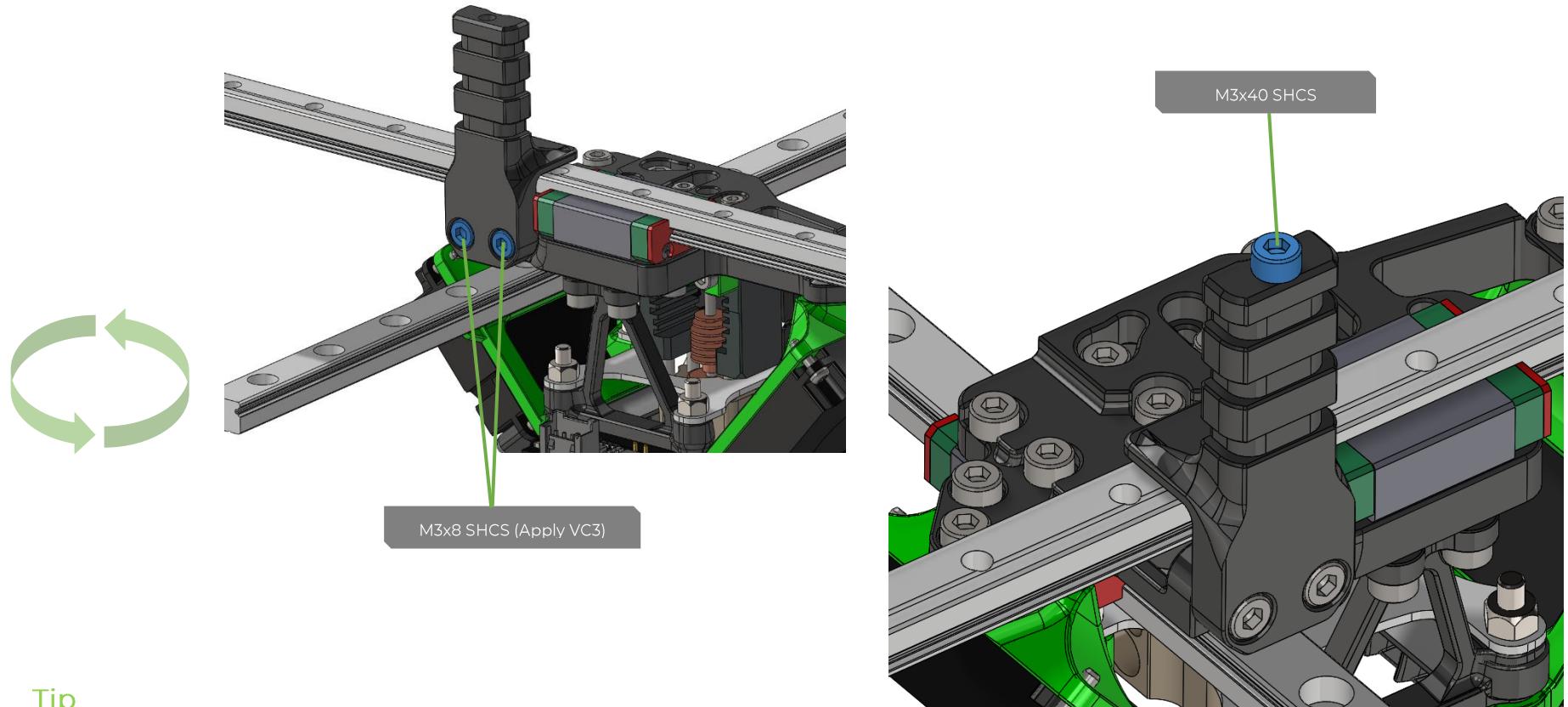


VC3 is not necessary when using a locknut in this situation.

## Toolhead – Hotend Fan



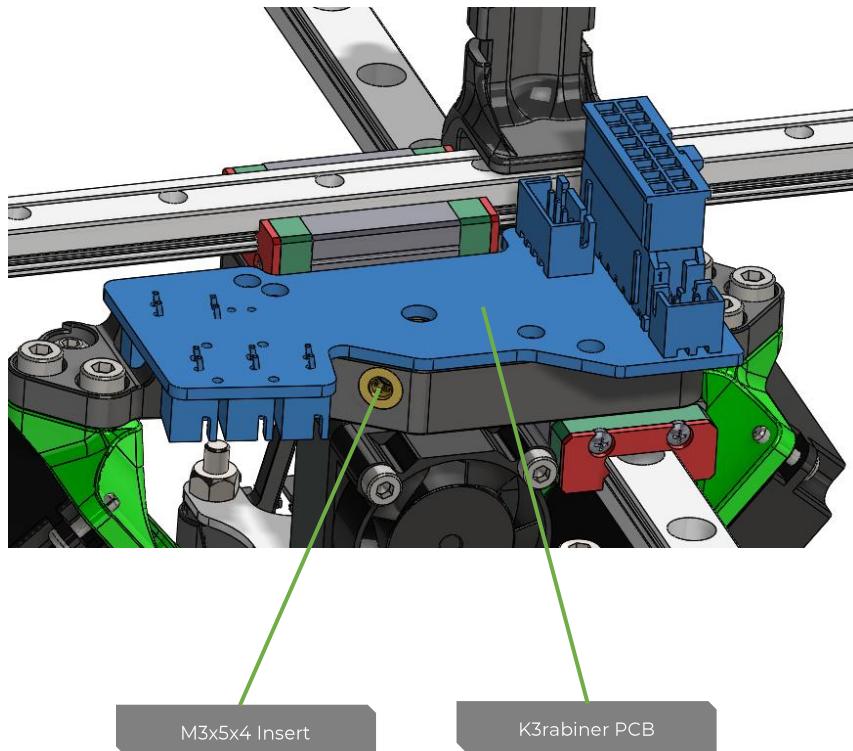
## Toolhead – Umbilical Anchor



### Tip

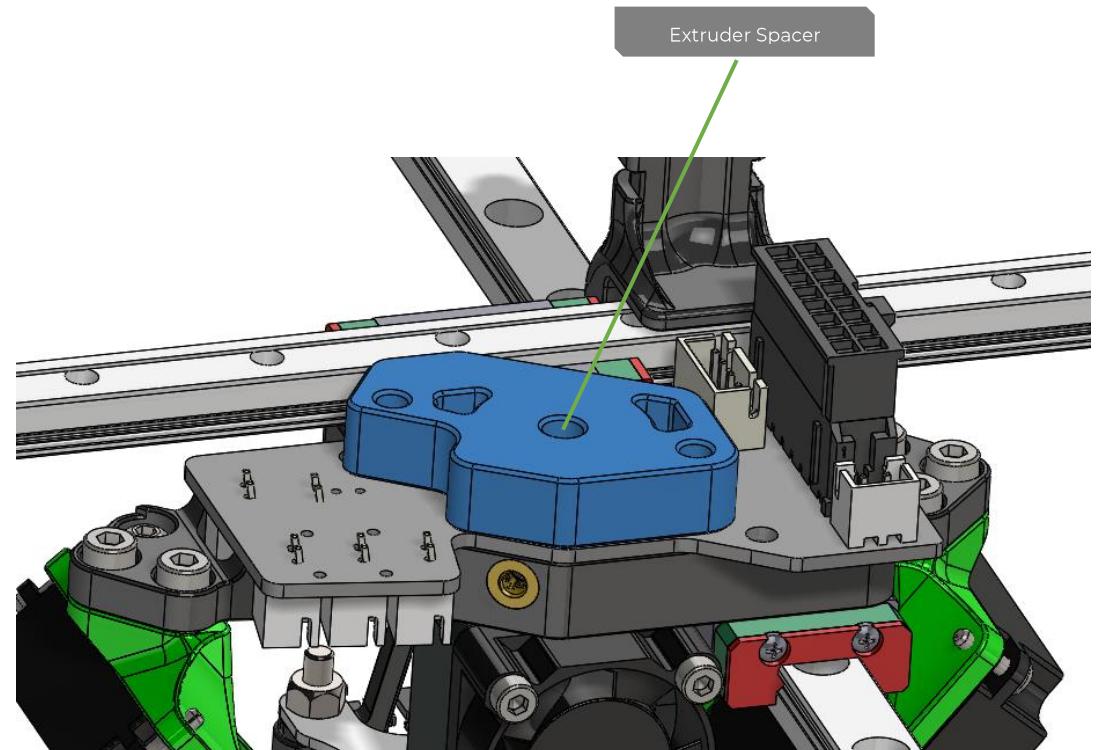
The printed umbilical anchor is reinforced by the M3x40 bolt.

## Toolhead – K3rabiner



### Tip

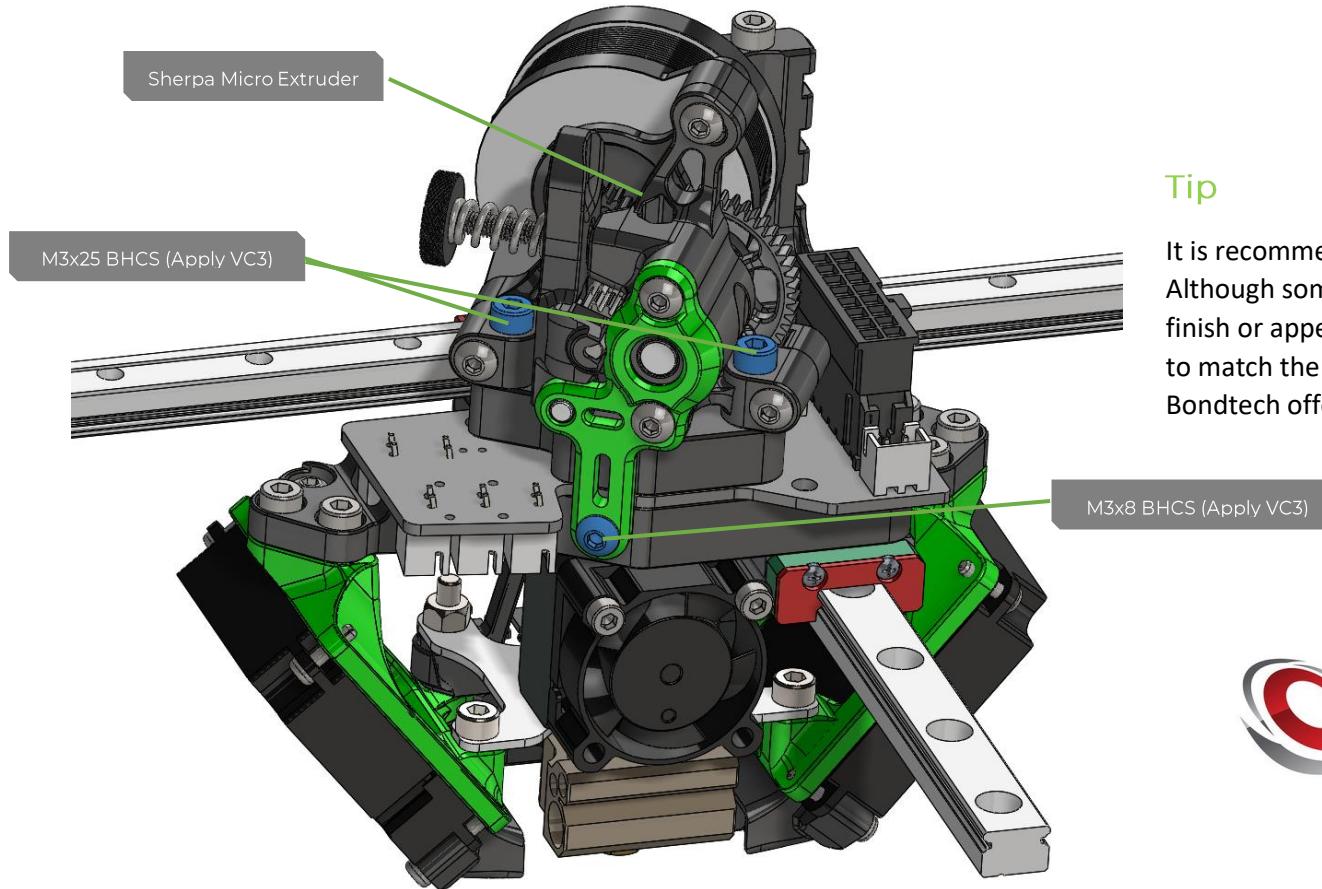
Ensure that no socket heads are in contact with the bottom of the K3rabiner. If necessary, use button heads instead.



### Tip

The K3rabiner PCB is available for purchase from the approved Annex vendors. It is important to ensure, during assembly, that no bolts are causing a short circuit on the bottom of the PCB.

## Toolhead – Extruder

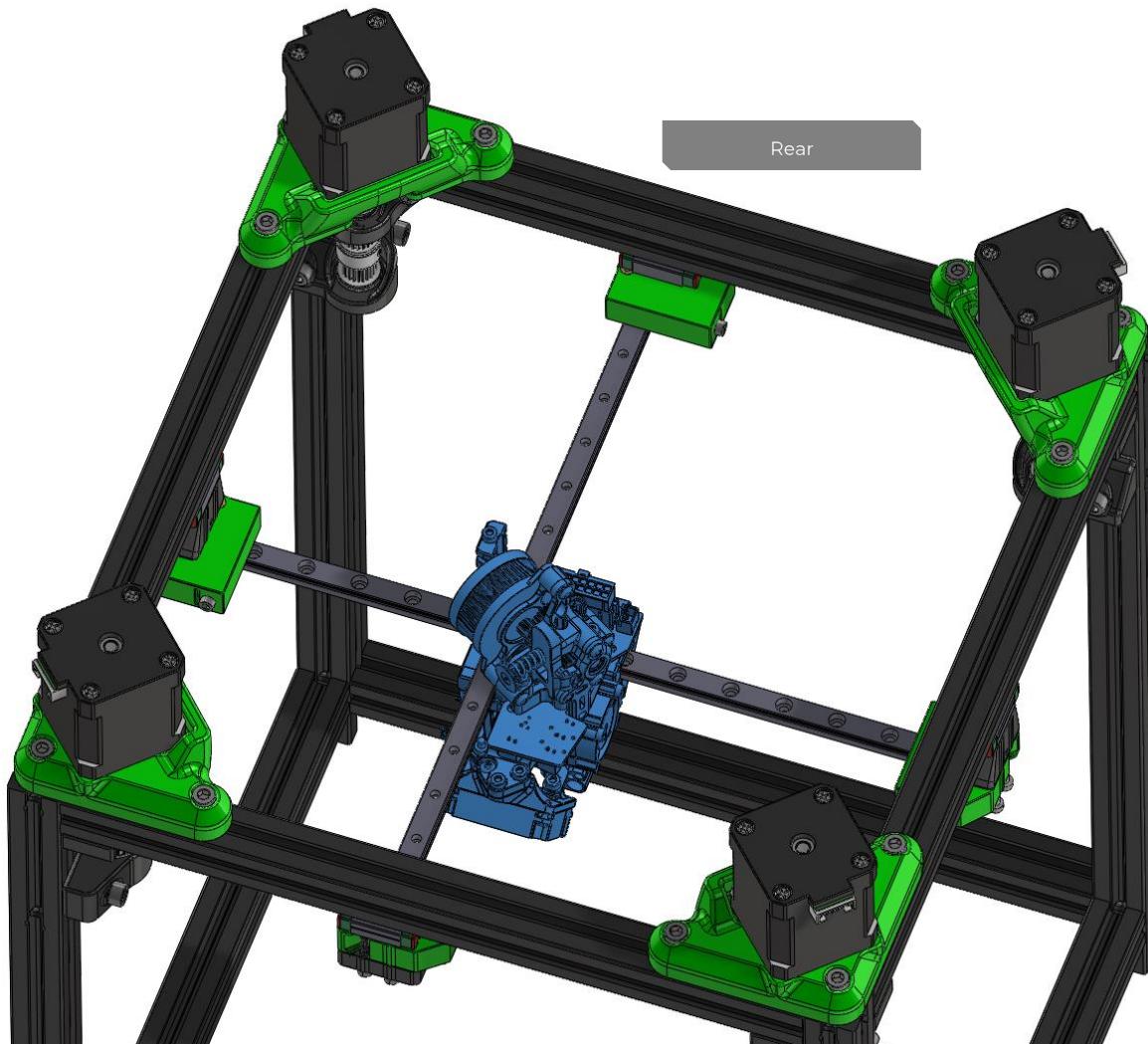


### Tip

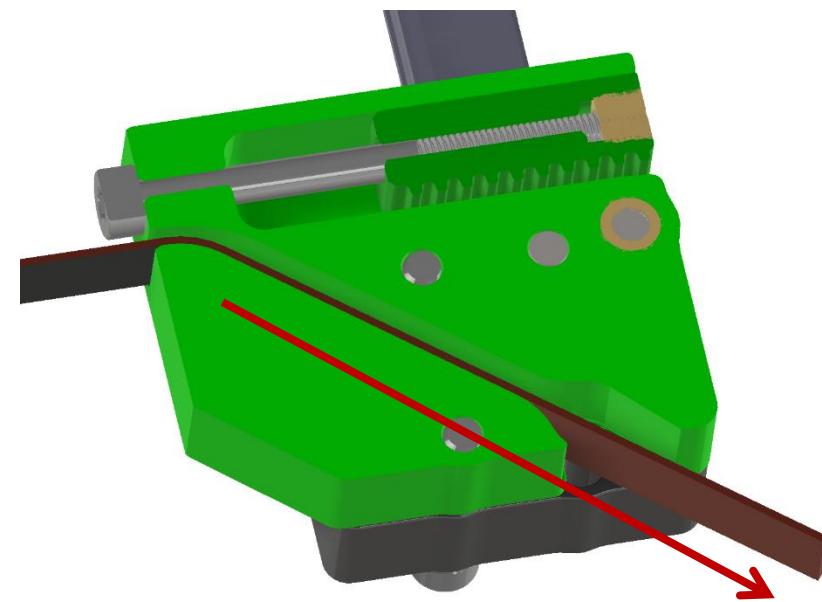
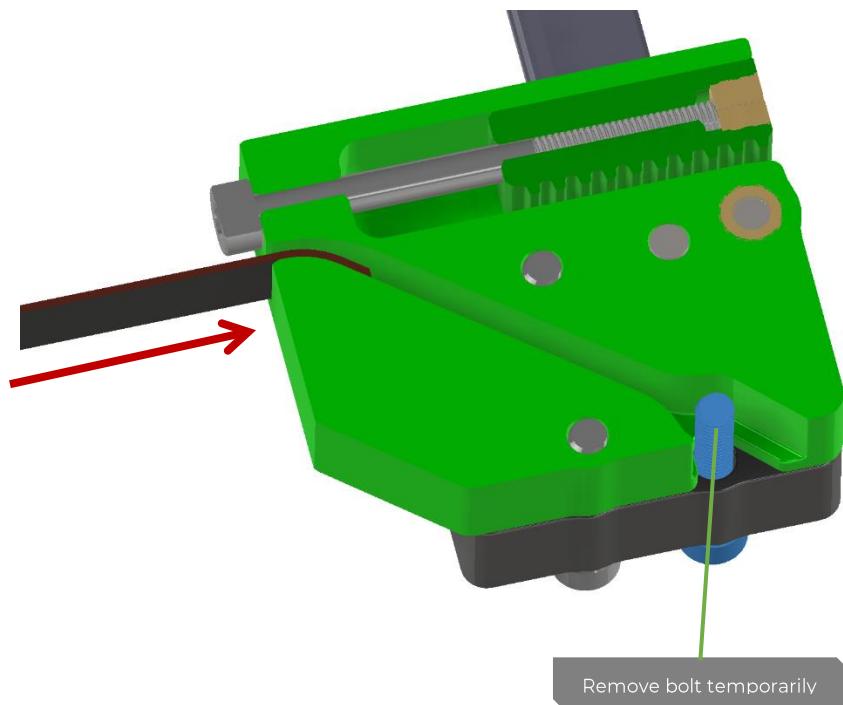
It is recommended to only use authentic Bondtech gears. Although some clones may have a more visually appealing finish or appealing marketing, they have never been able to match the teeth grip engagement of the genuine parts. Bondtech offers kits for Annex extruders.



## Toolhead – Overview



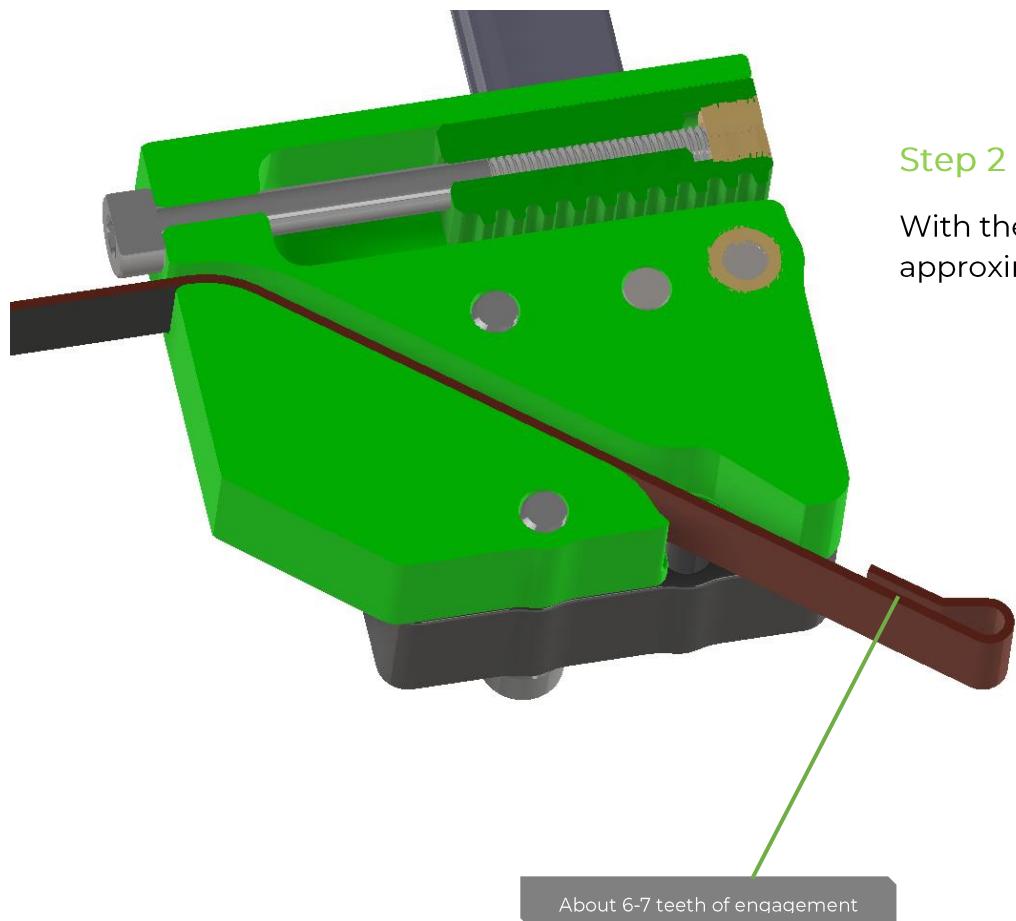
## Belting - XY



### Step 1 - Entry

For the XY motion, use a 60cm 2GT 9mm belt. Begin by temporarily removing the bolt as indicated. Then, insert the belt into the plastic component until it emerges again.

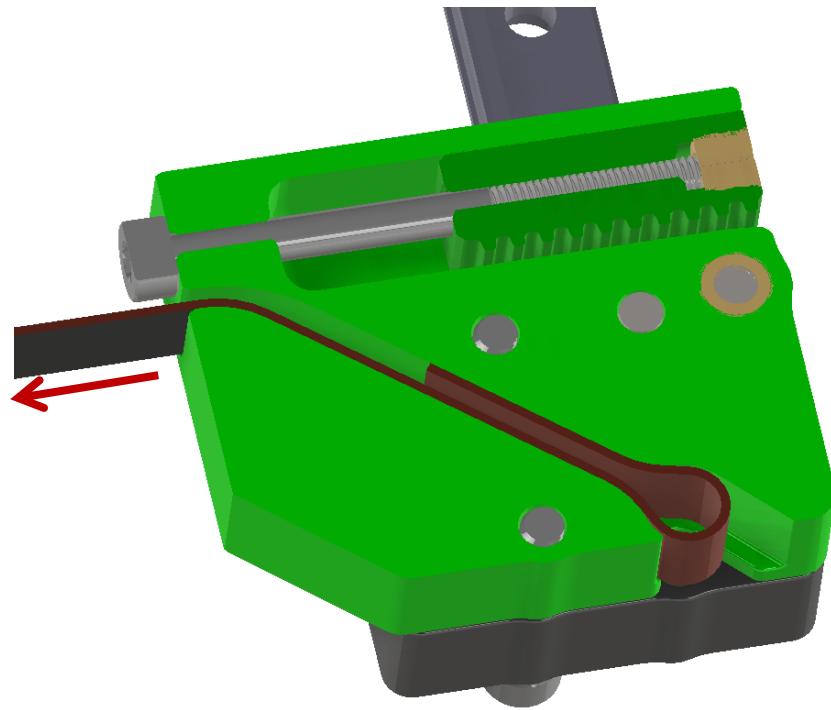
## Belting - XY



### Step 2 - Loop

With the belt emerged, fold it tooth to tooth, ensuring approximately 6-7 teeth are engaged.

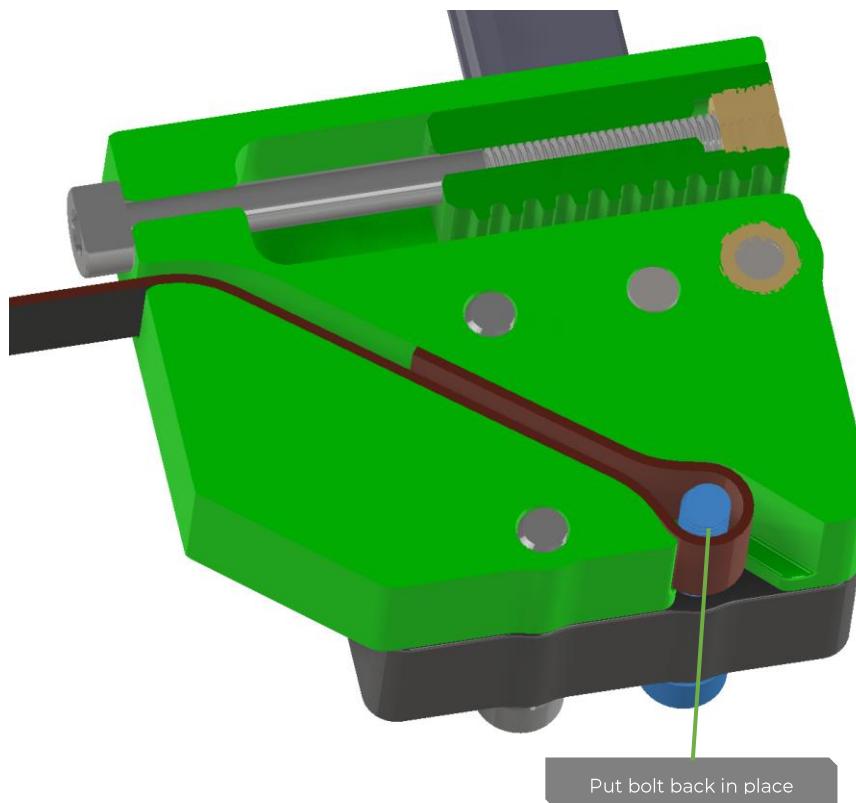
## Belting - XY



### Step 3 - Flush

Pull the loop until it is flush with the plastic part, making sure to keep the belt pinched with your finger. Then, pull the belt where it exits the plastic part.

## Belting - XY



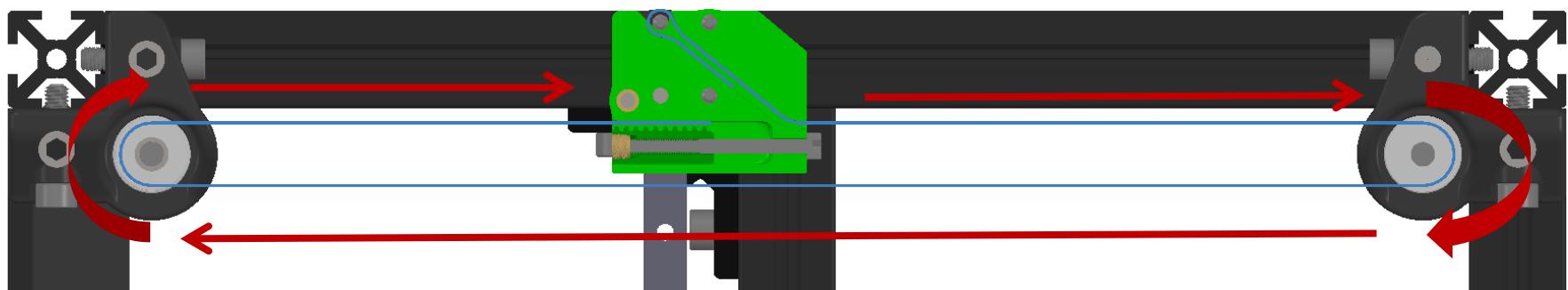
### Step 4 – Anchor Bolt

Lastly, secure the belt in place by reinserting the bolt into the cart.

## Belting - XY

### Step 5 – Routing the Axis

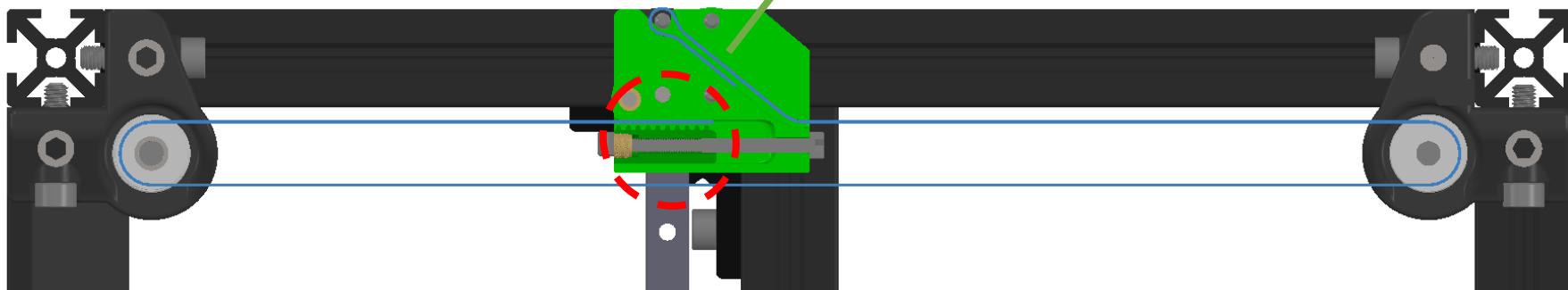
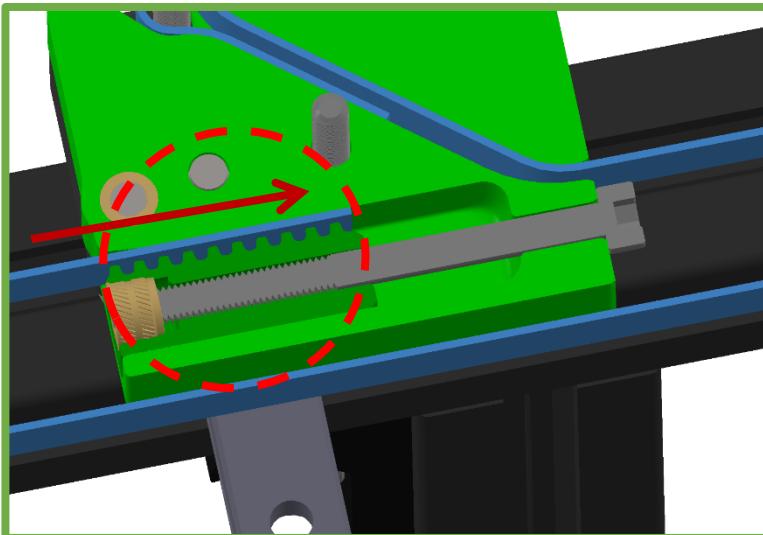
As shown in the picture below, bring the loop around the pulleys.  
Ensure that the loop only passes over one pulley and one idler.



## Belting - XY

### Step 6 - Tensioner

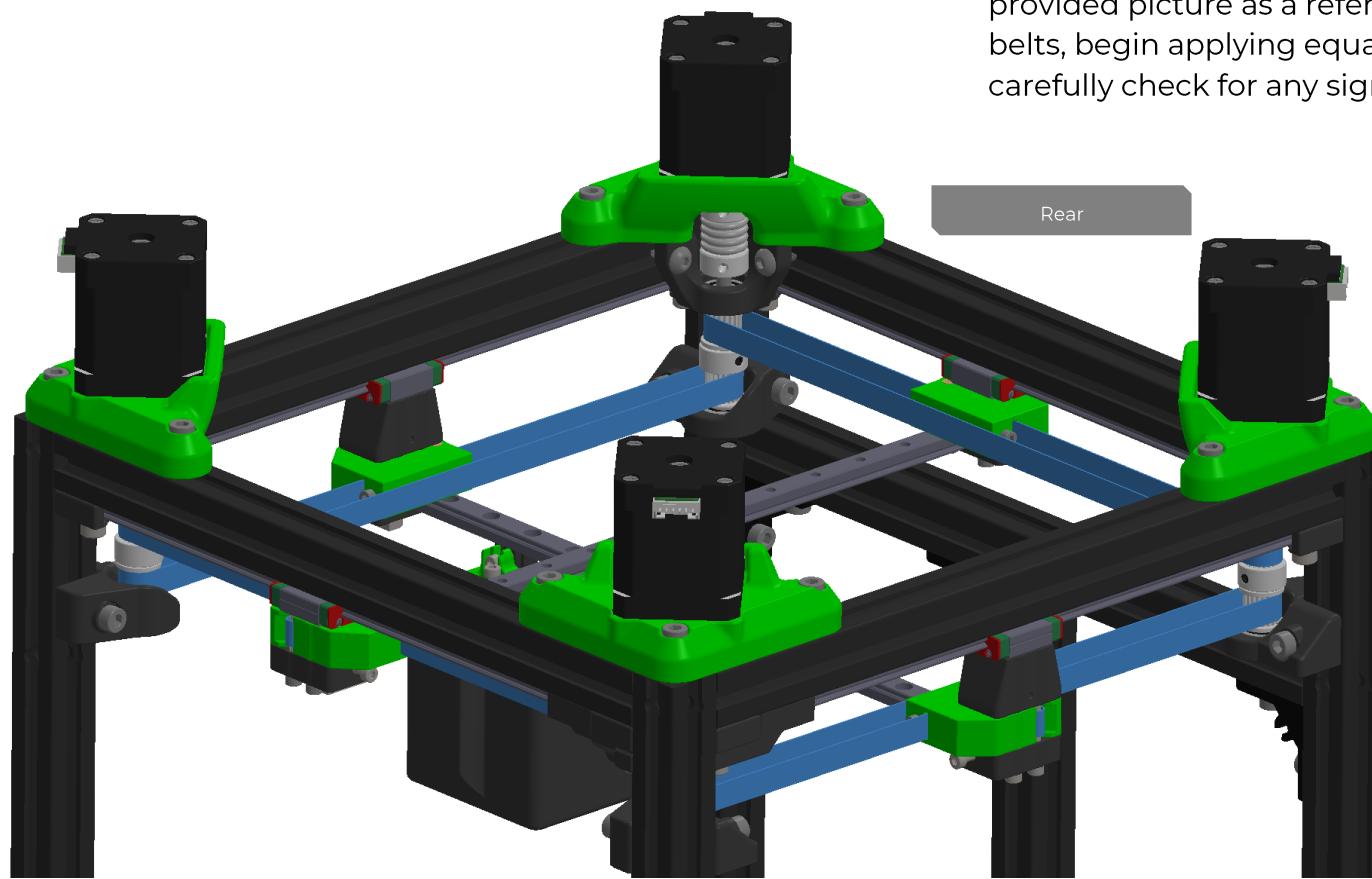
Make sure to align and connect **all** the teeth with the printed tensioner part. The belt can then be tightened further using the M3 bolt. A frequency of 130hz should be aimed for tightness of the XY belts.



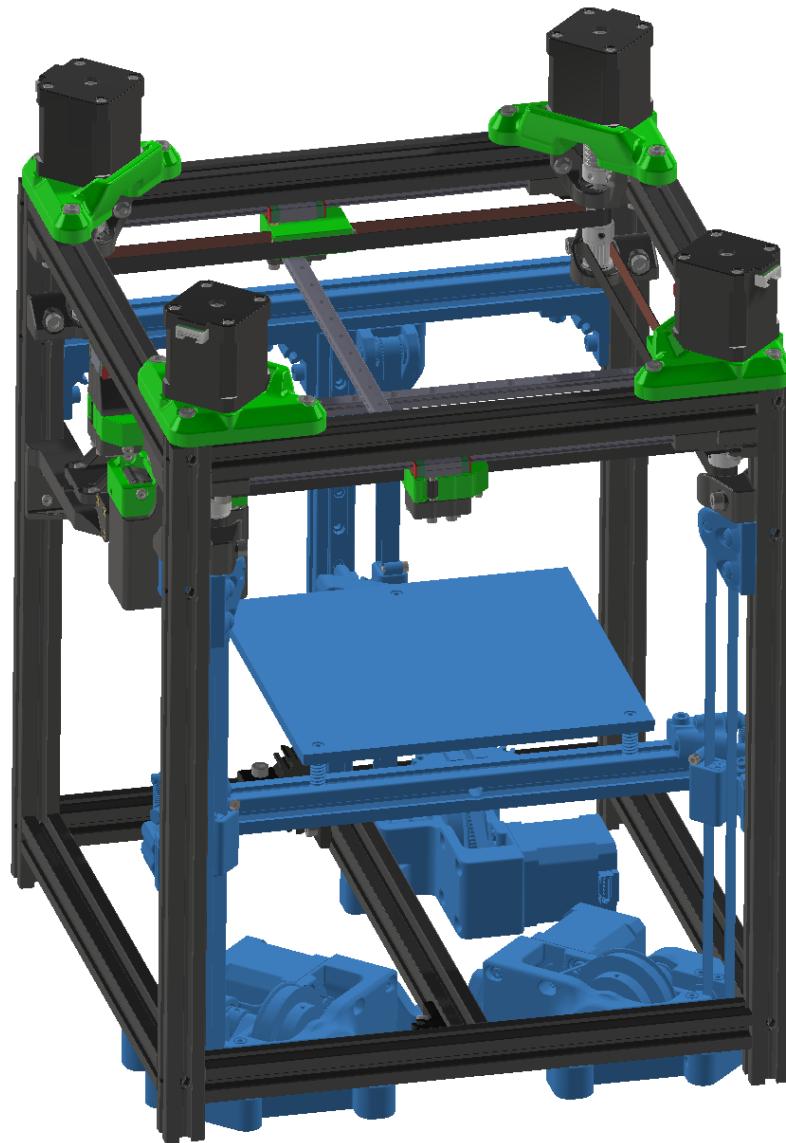
## Belting - XY

### Repeat

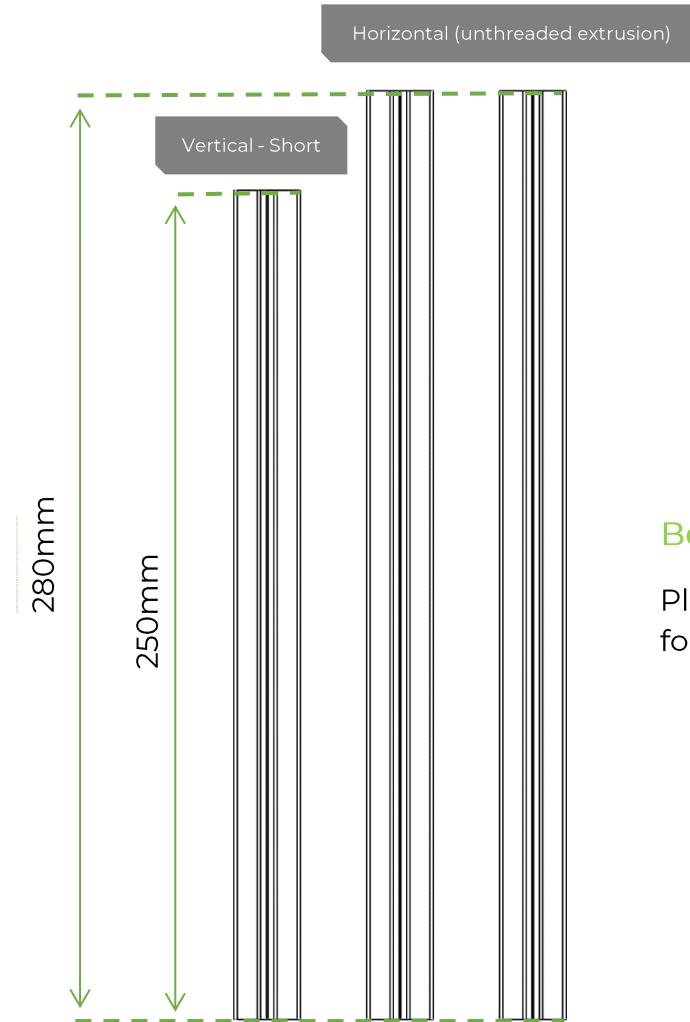
Repeat the belting process outlined in steps 1 to 6 for all four belts required for the XY motion, following the provided picture as a reference. After installing all four belts, begin applying equal tension to each belt and carefully check for any signs of racking.



## Z motion – Overview



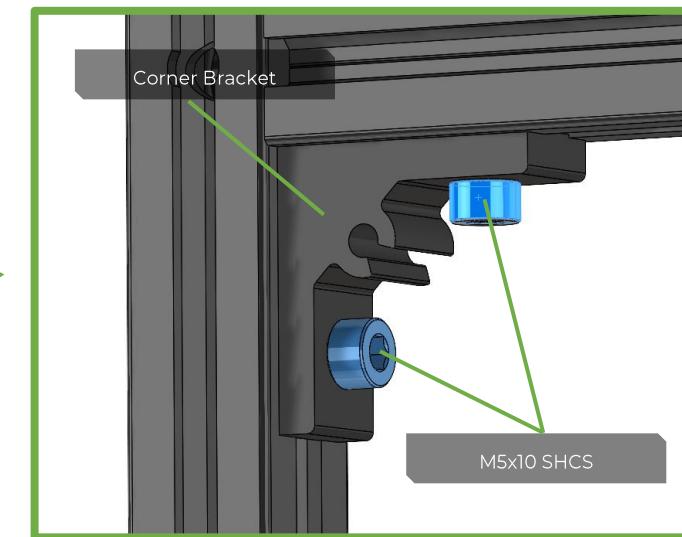
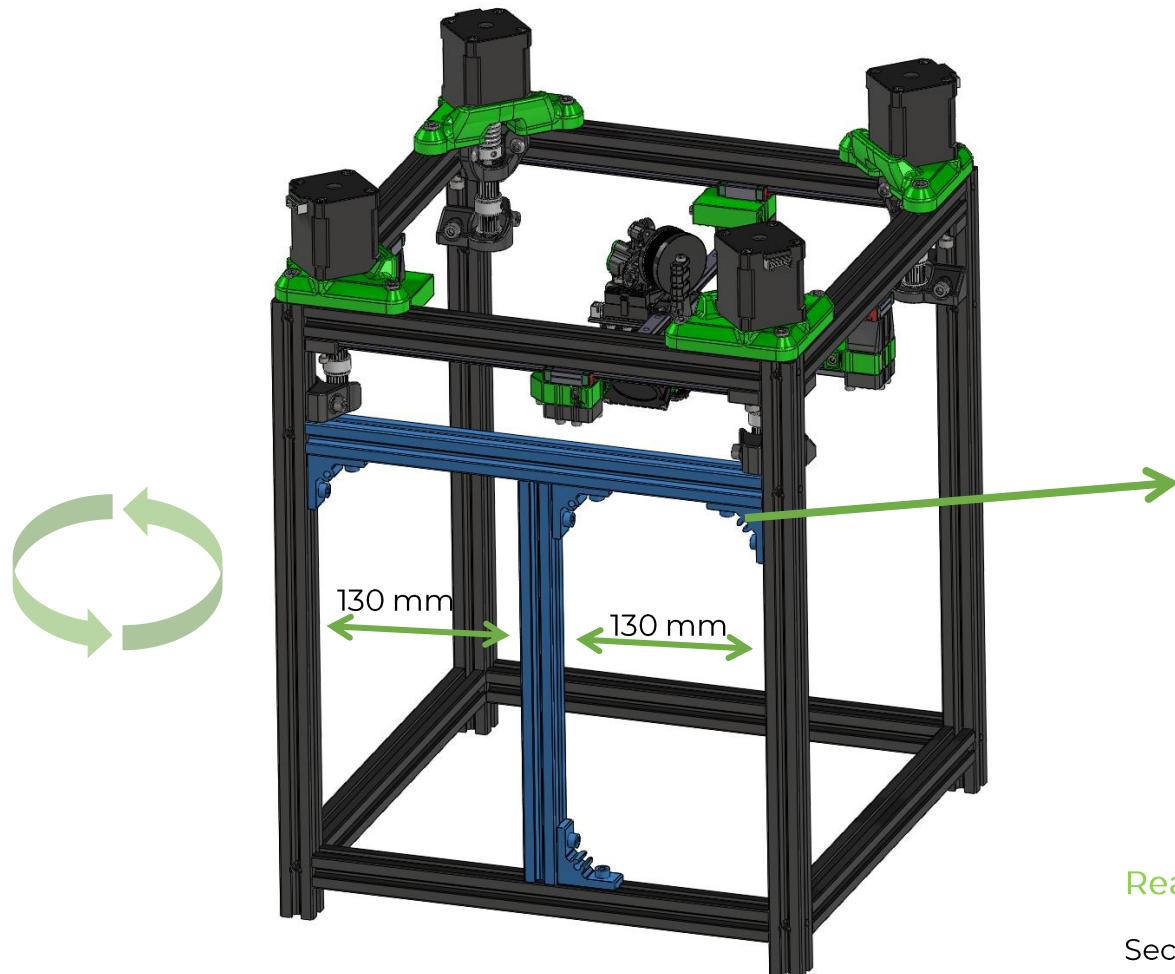
## Z motion – Required Extrusions from kit



### Bed Extrusion

Please locate the three extrusions required for the rear and bottom assembly.

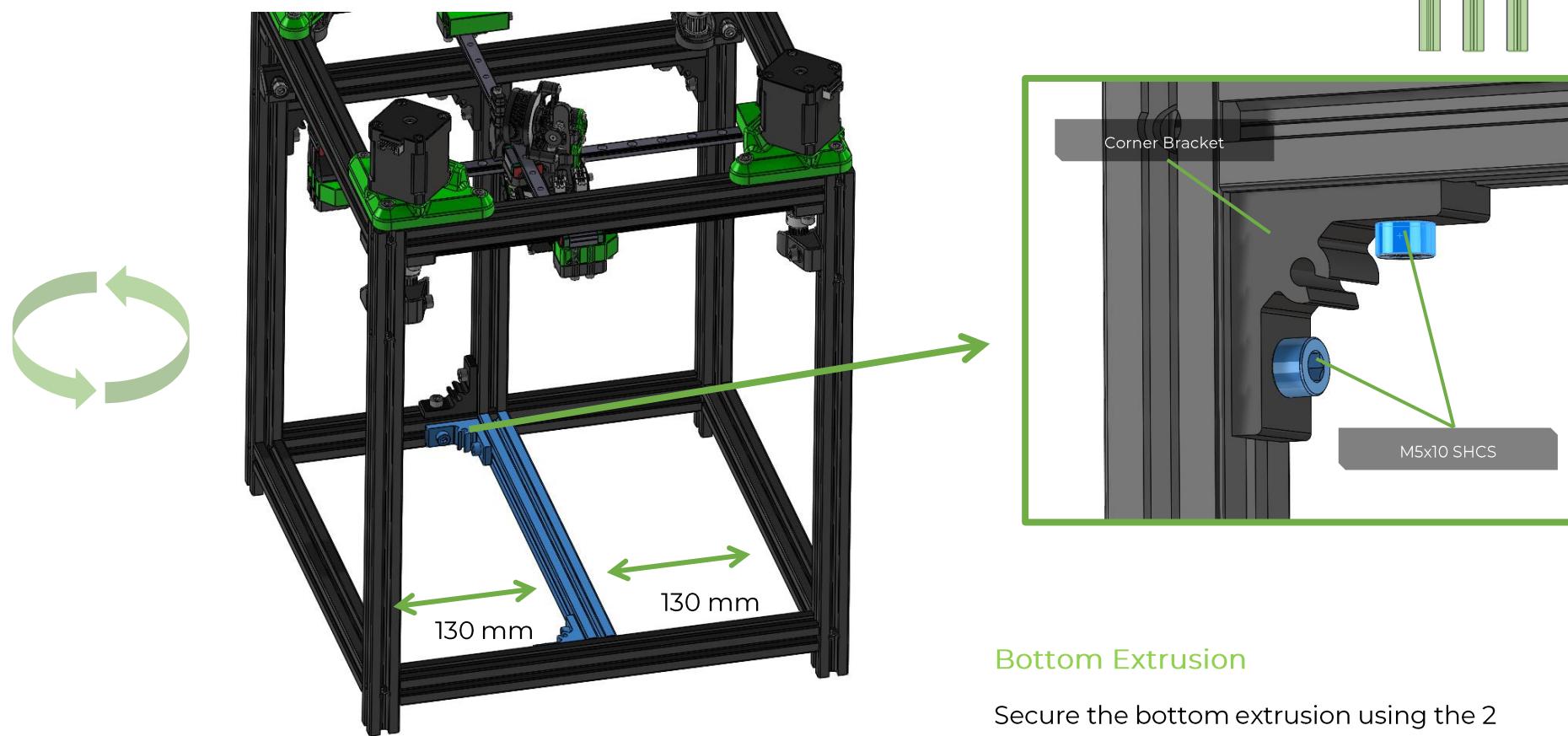
## Z motion – Rear Extrusion



### Rear extrusion

Secure the rear extrusion using the 4 Misumi corner brackets.

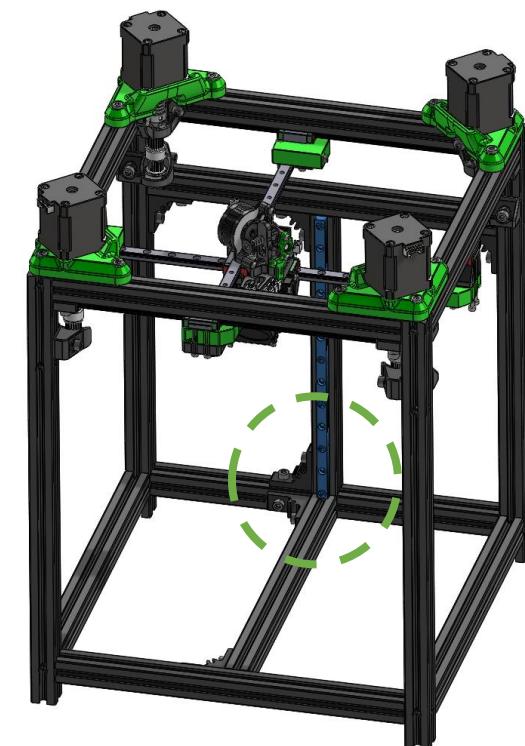
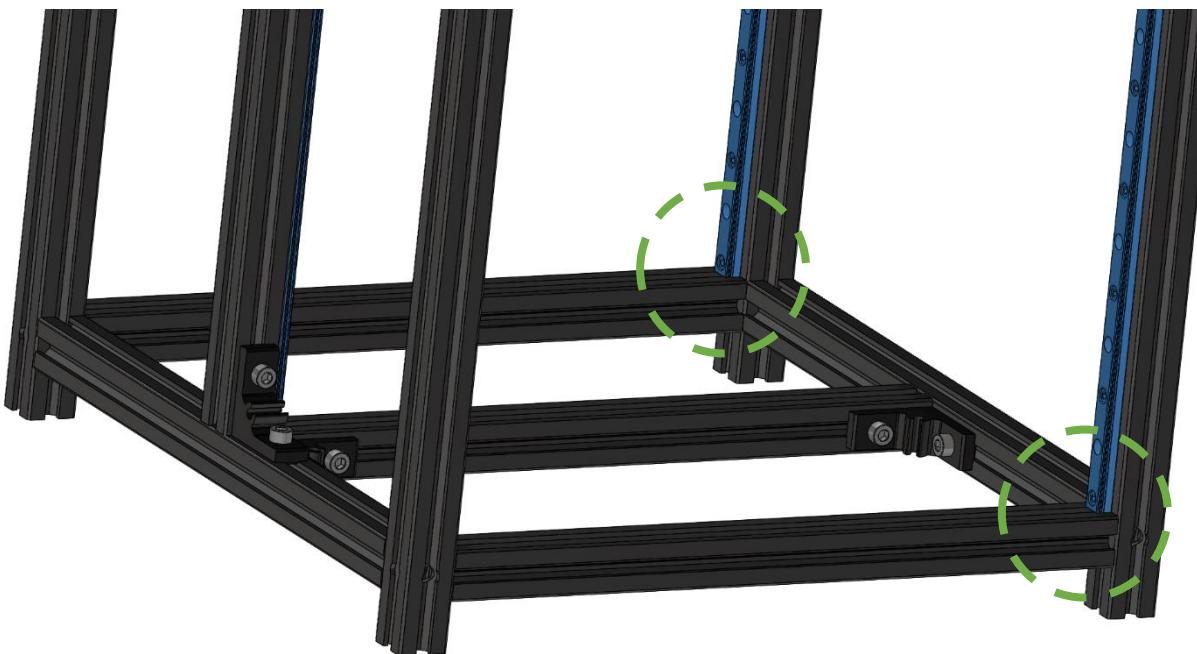
## Z Motion – Bottom Extrusion



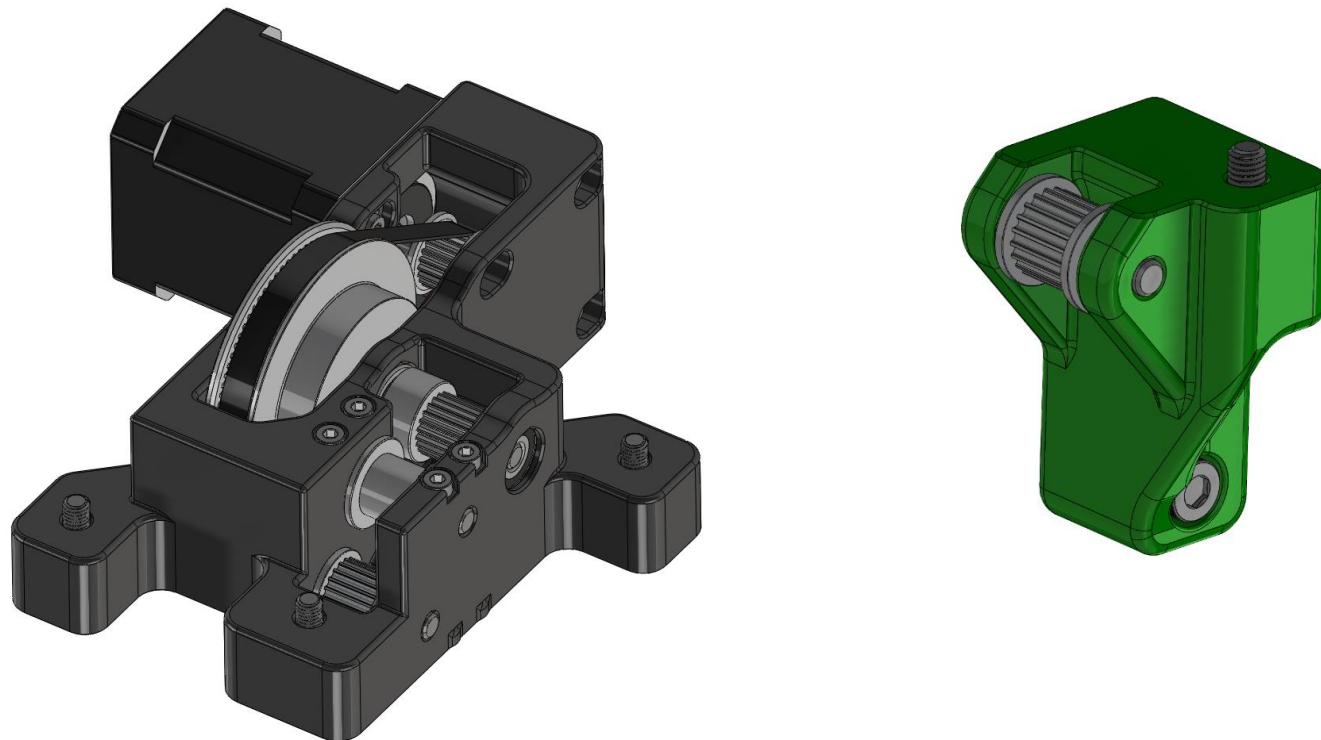
## Z Motion – Linear Rail Assembly

### Installing Z rails

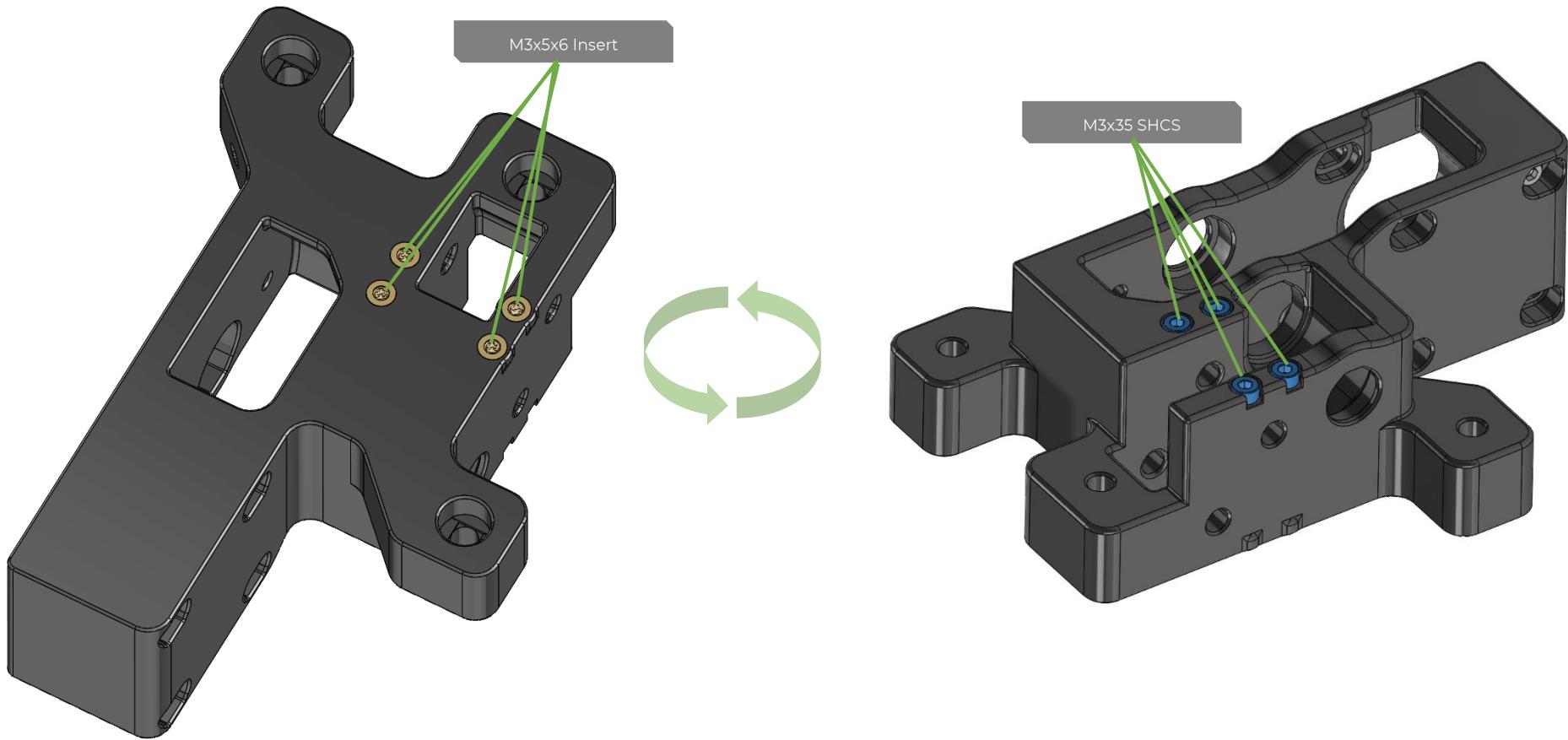
Securely attach the 3x 250mm MGN9C rails in the center of the extrusion, ensuring they are flush with the bottom. Use M3x8 screws with VC3 or a similar thread locker. The amount of roll-in nuts for a rail can be found back on page 21.



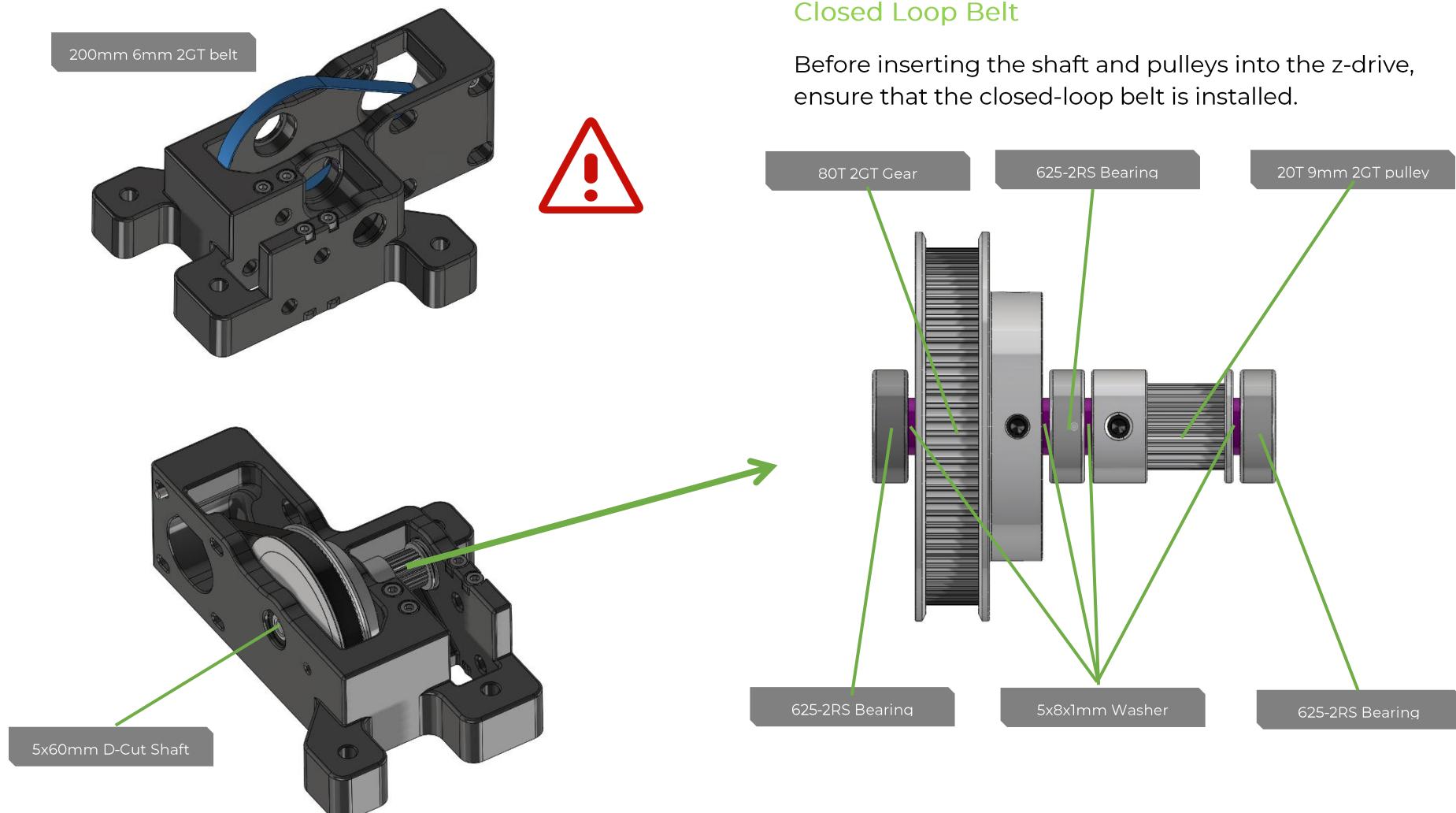
## Z-axis – Overview



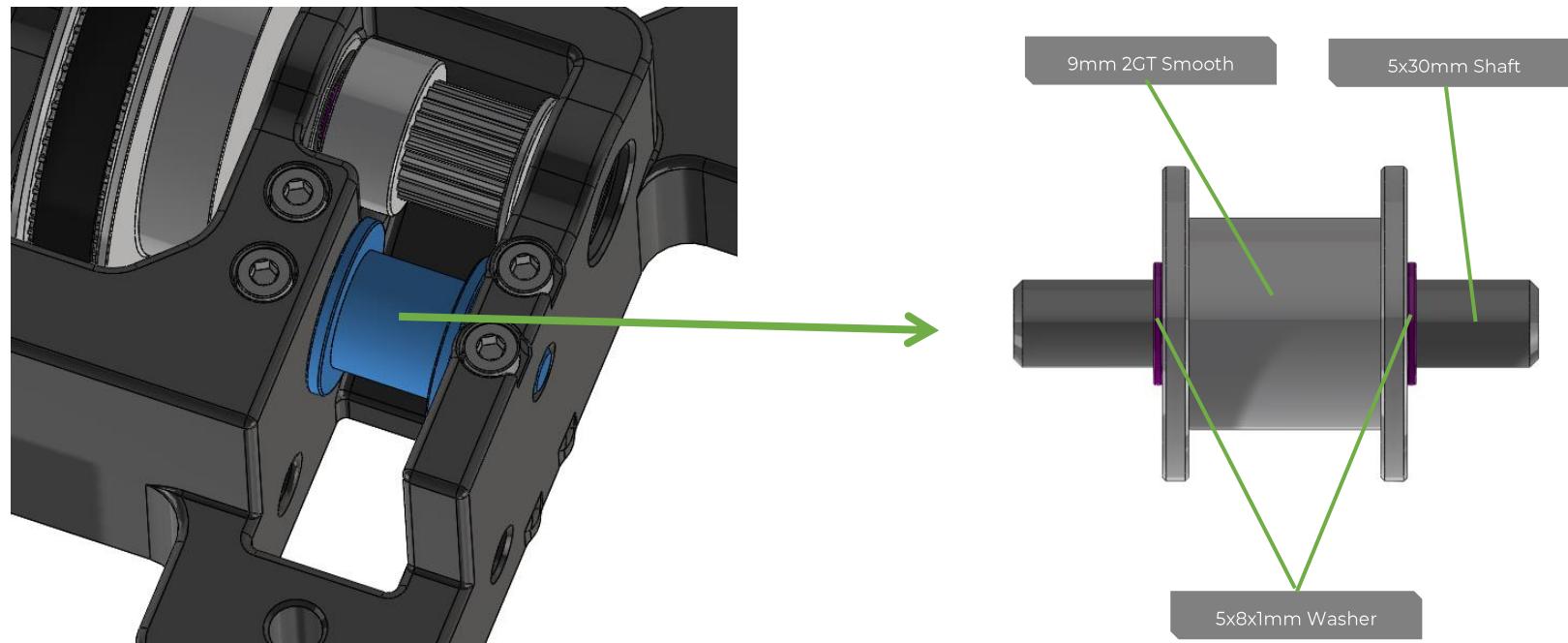
## Z-axis – Rear Drive Assembly



## Z-axis – Rear Drive Assembly



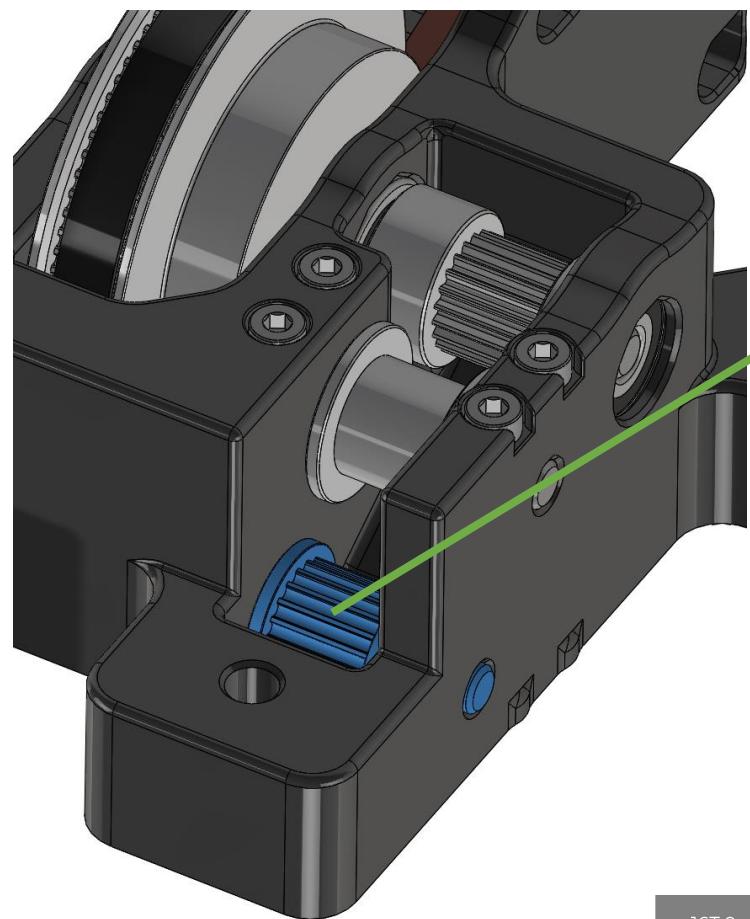
## Z-axis – Rear Drive Assembly



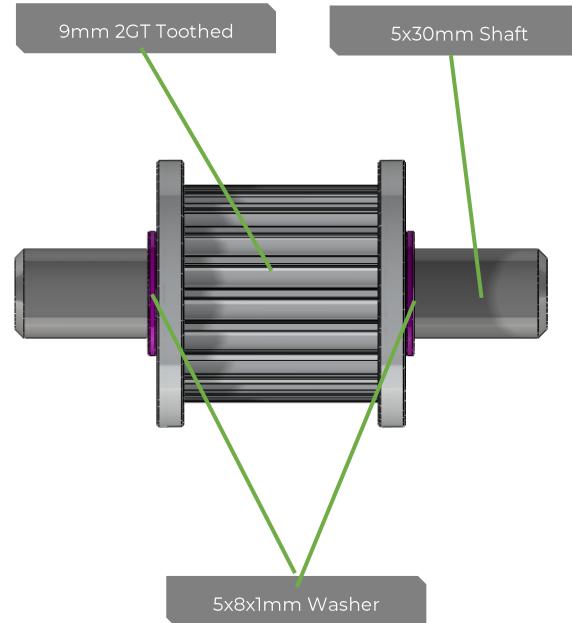
### Tip

Before installing the pulley in the printed part,  
ensure that it slides properly onto the shaft.

## Z-axis – Rear Drive Assembly



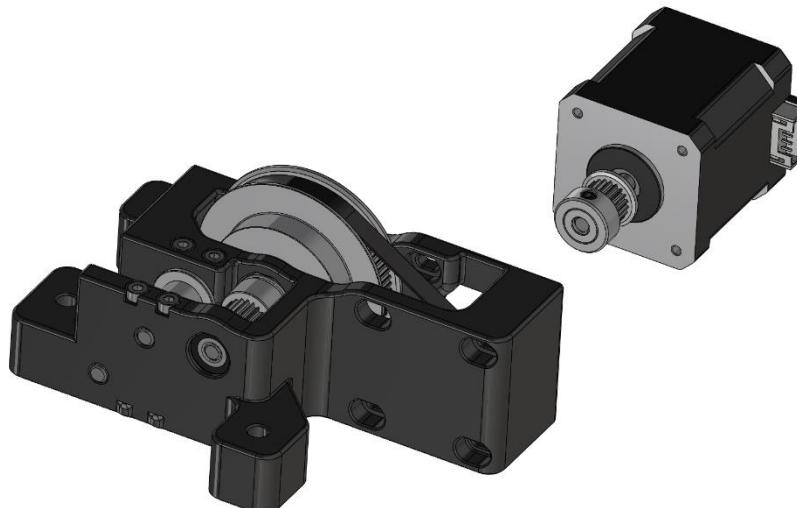
16T 9mm 2GT pulley



5.5 mm

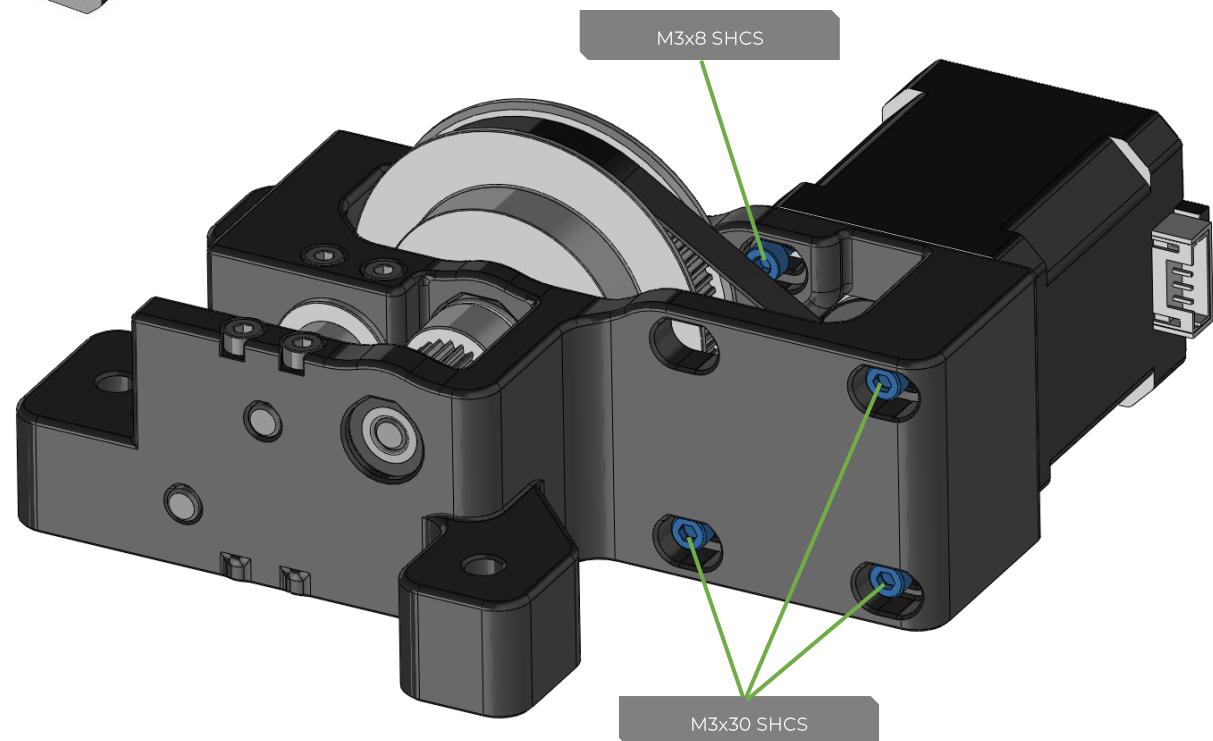


## Z-axis – Rear Drive Assembly

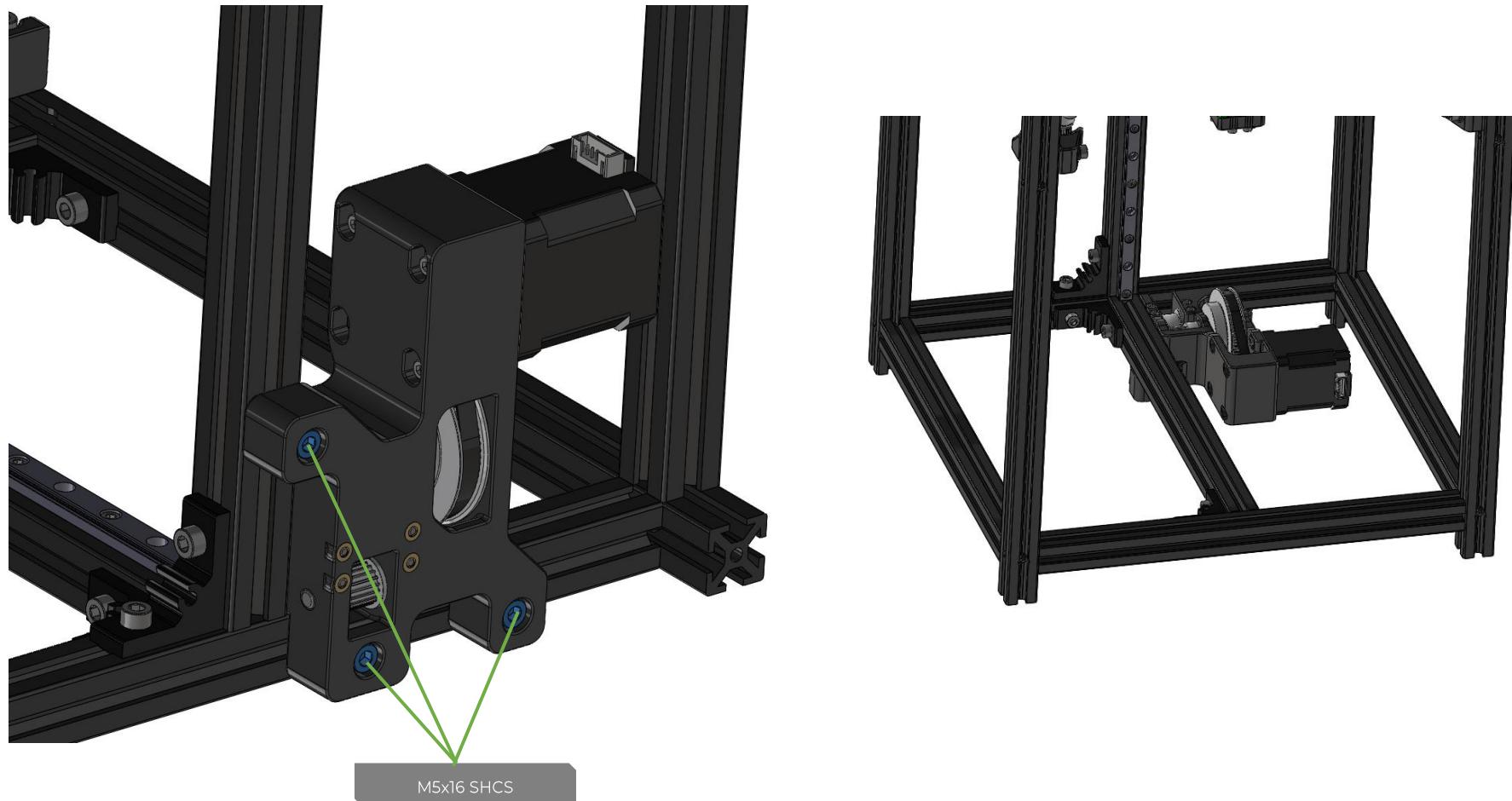


### Closed Loop Belt Tensioning

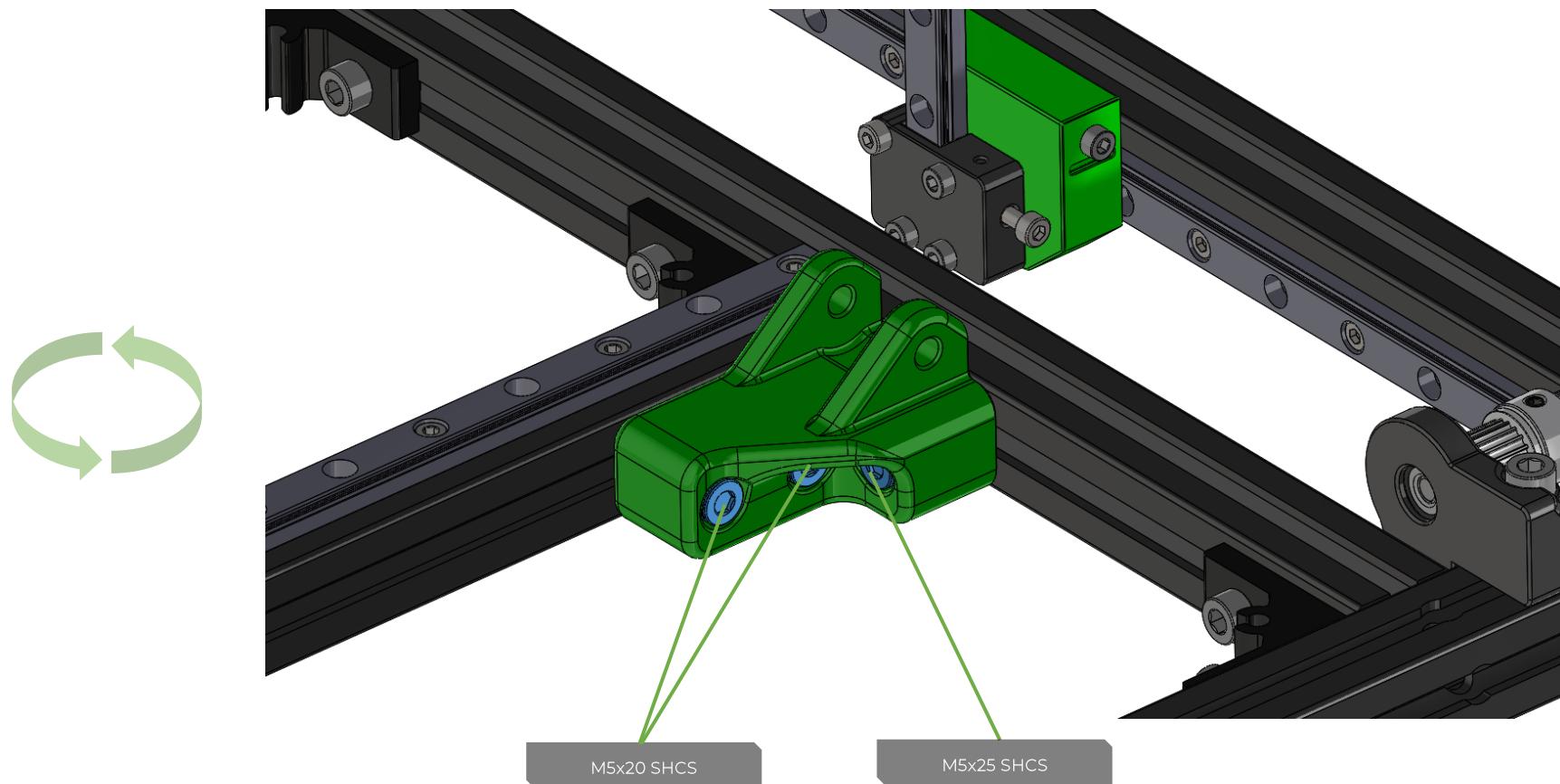
To tighten the belt, push the stepper to create tension, and then secure it by tightening the four bolts, as shown in the diagram below.



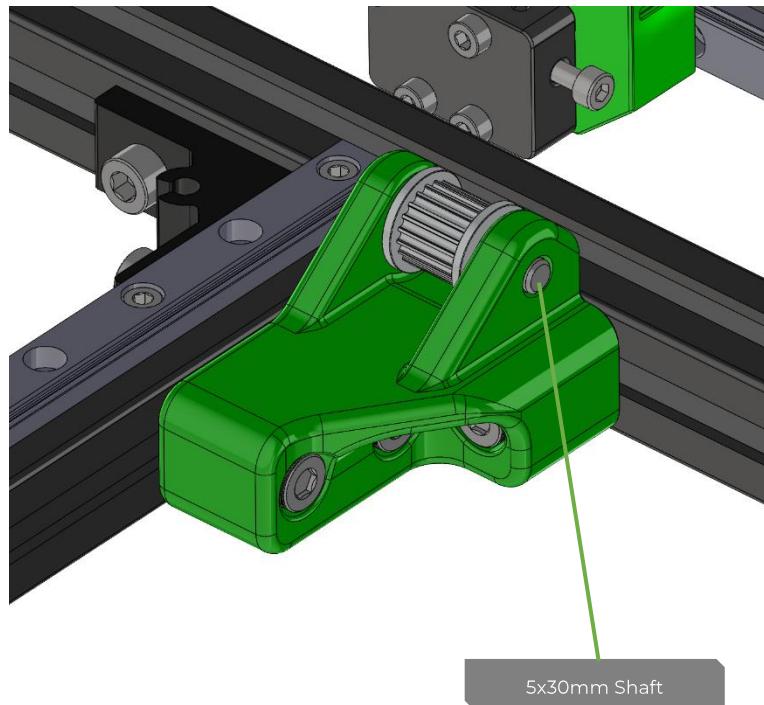
## Z-axis – Rear Drive Assembly



## Z-axis – Rear Drive Assembly

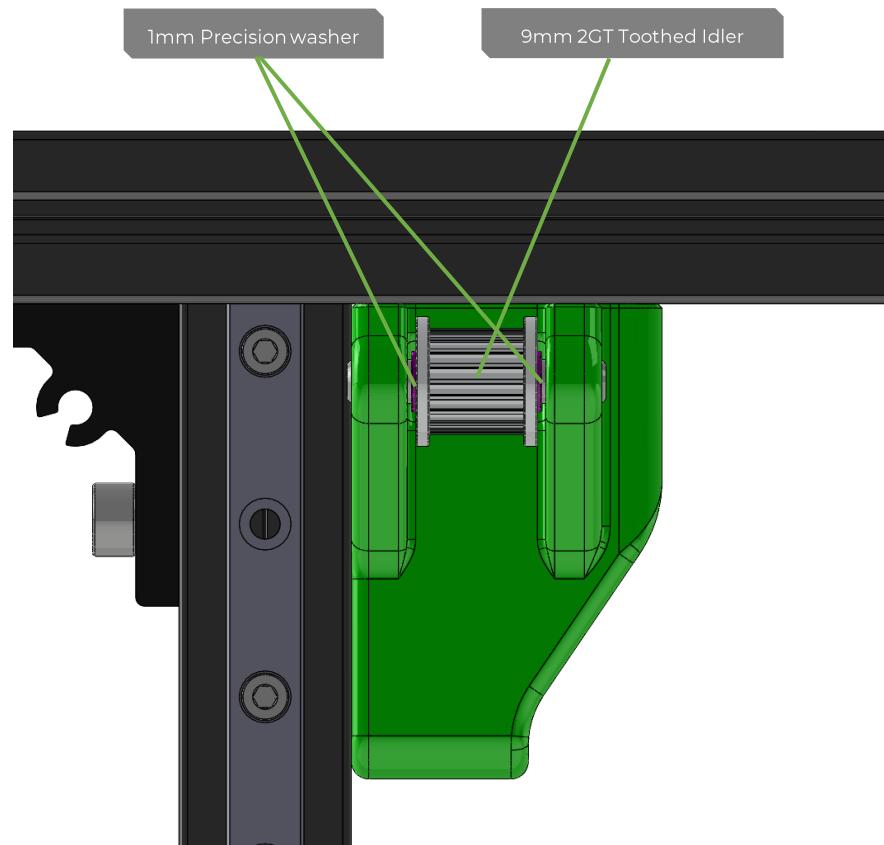


## Z-axis – Rear Drive Assembly

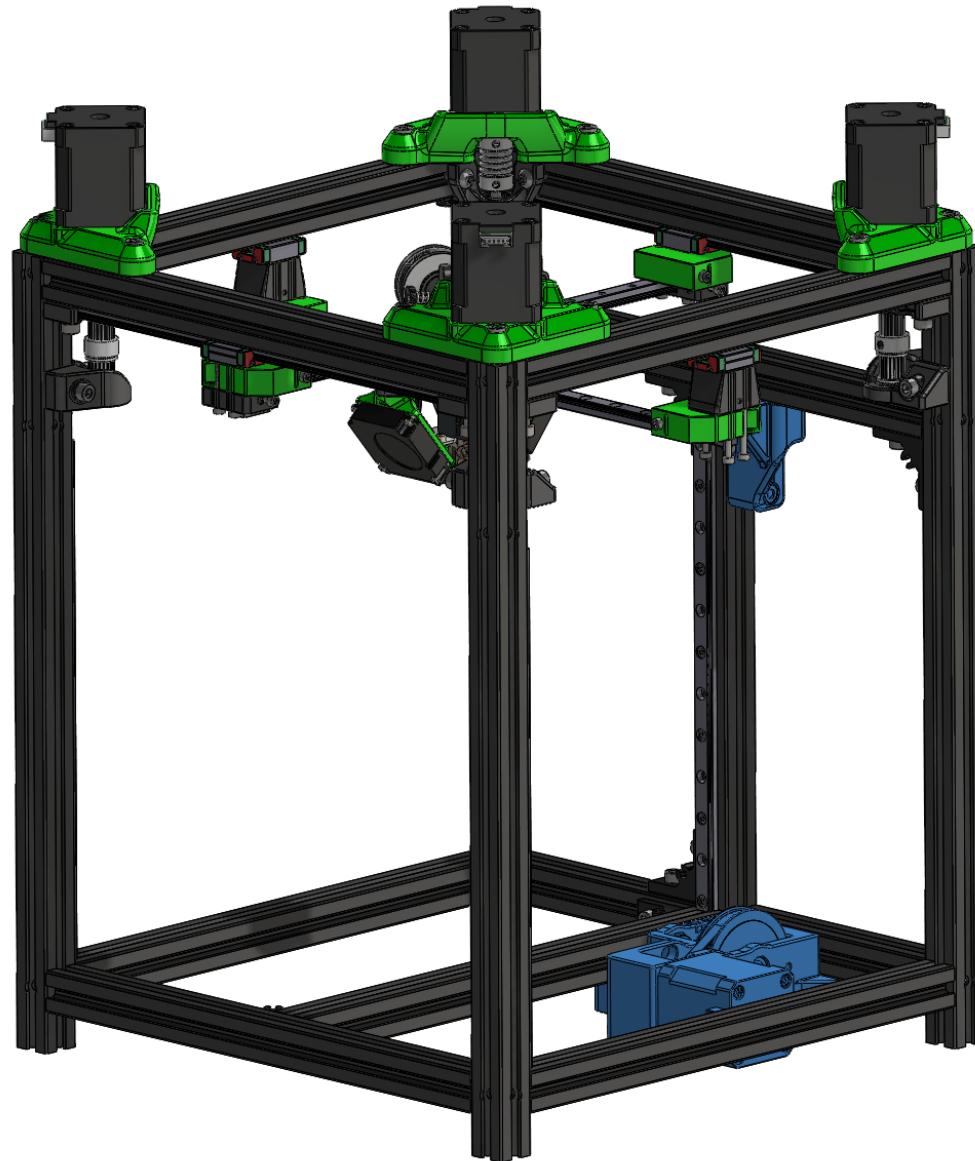


### Tip

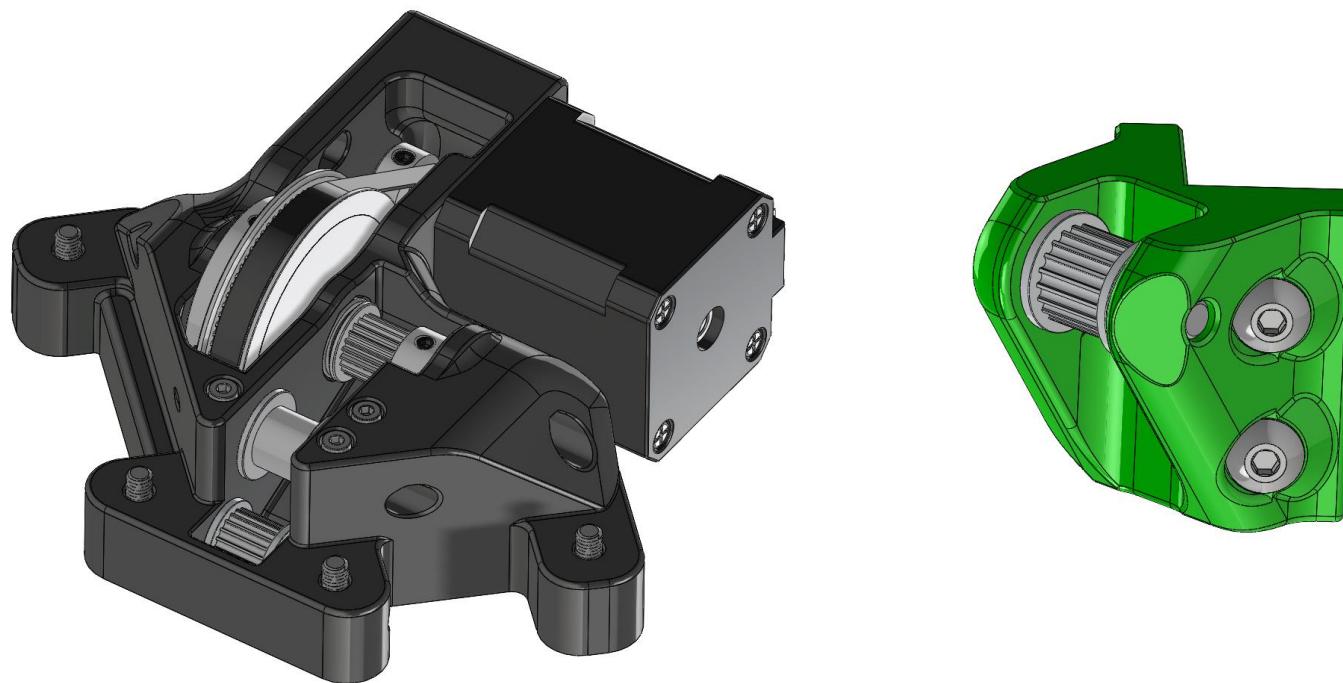
Before installing the pulley in the printed part, ensure that it slides properly onto the shaft.



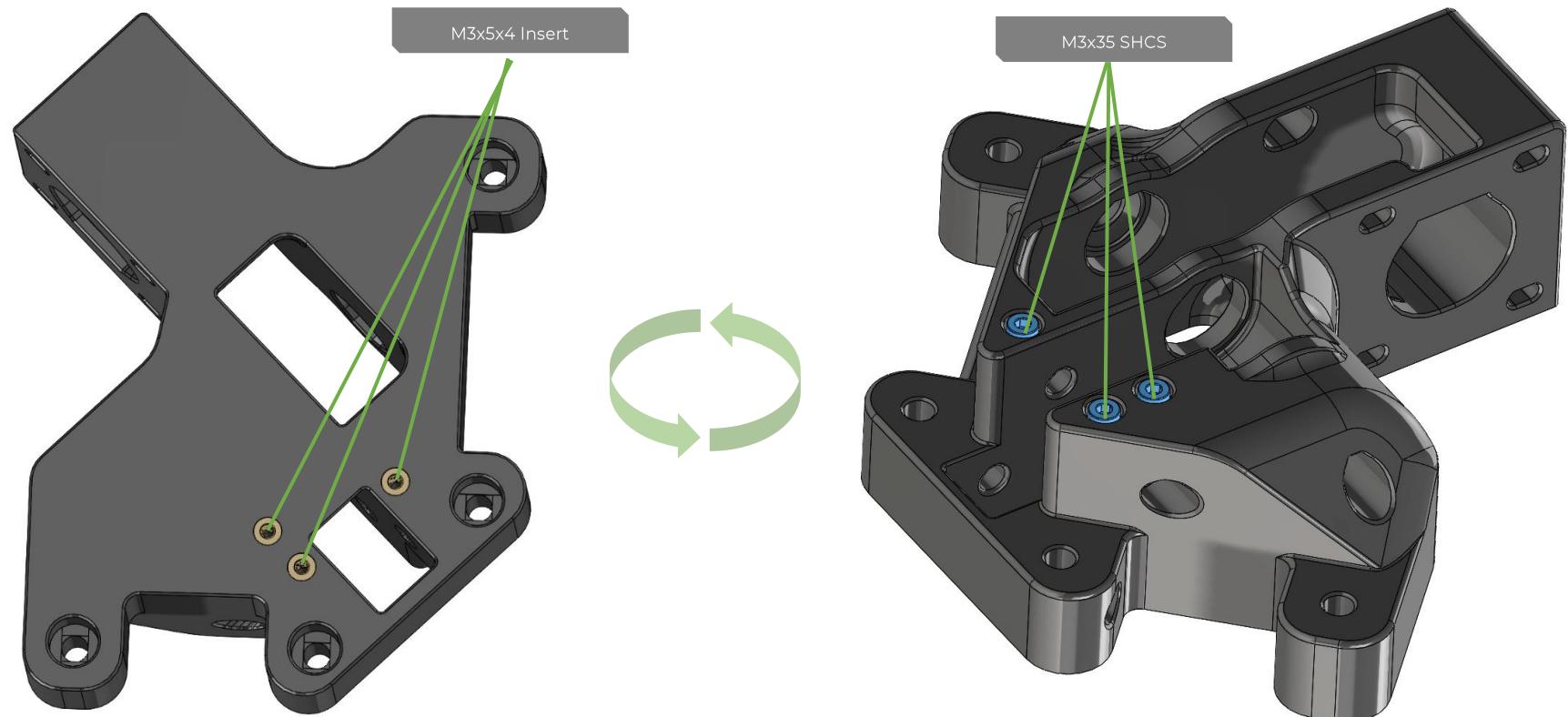
## Z-axis – Rear Drive Overview



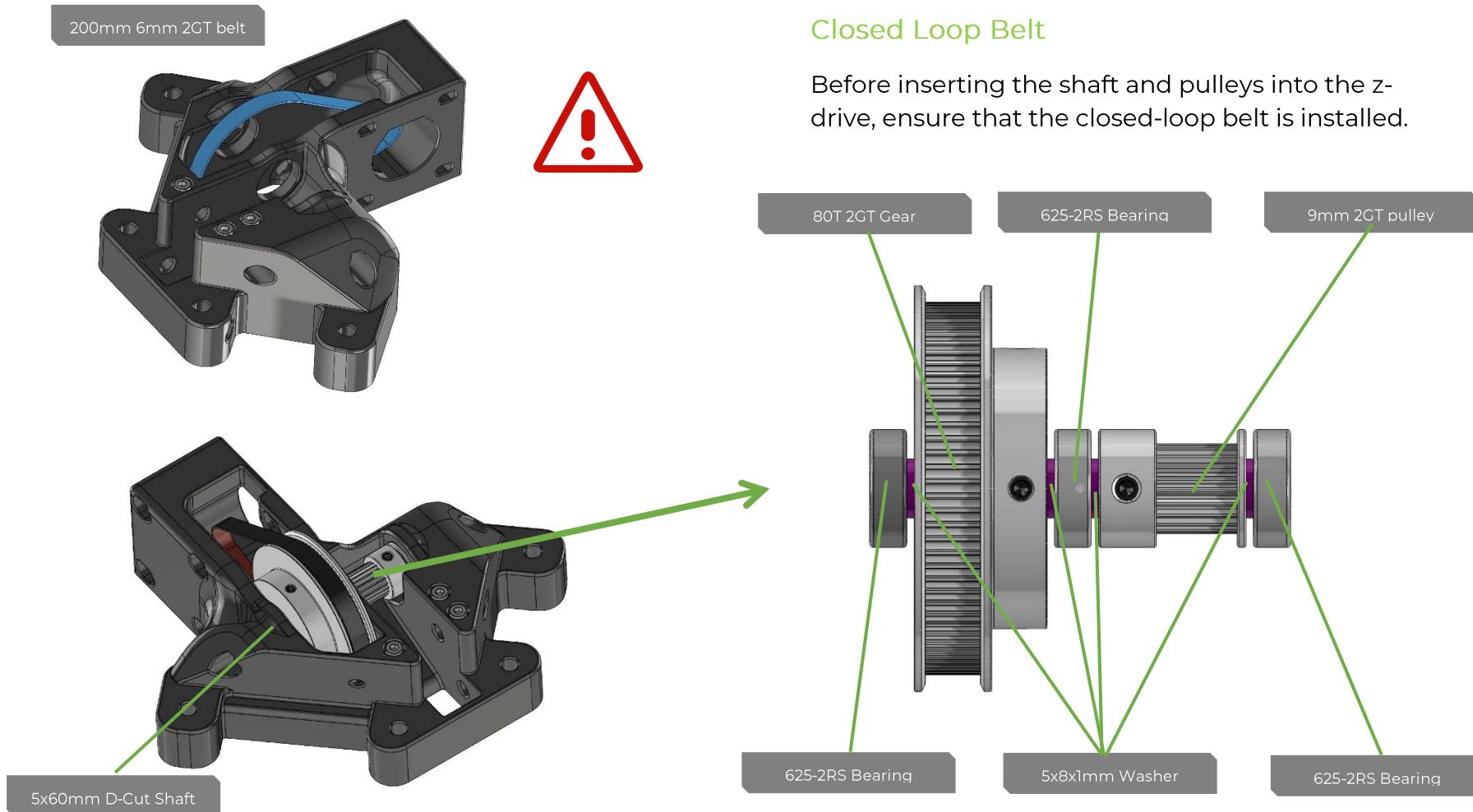
## Z-axis – Front Right Drive Overview



## Z-axis – Front Right Drive Assembly



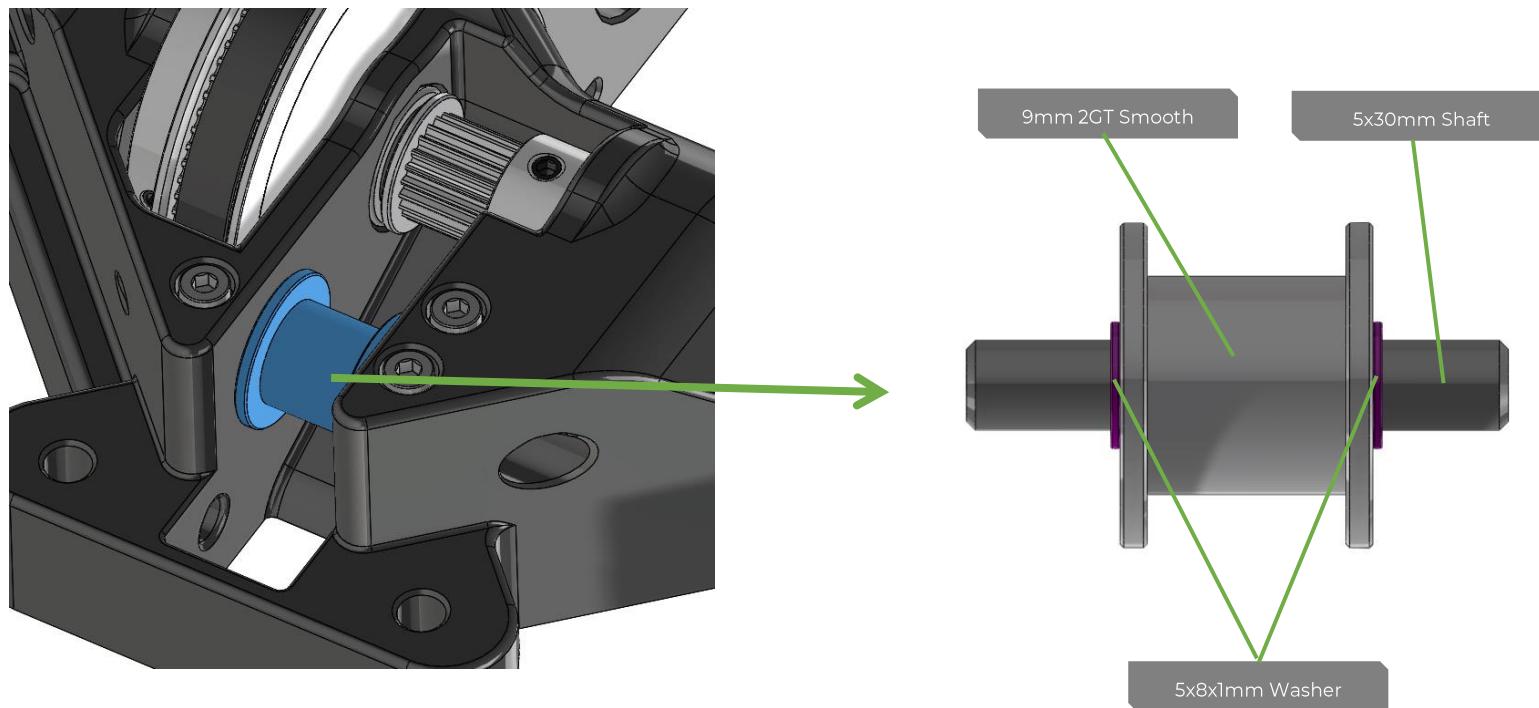
## Z-axis – Front Right Drive Assembly



### Closed Loop Belt

Before inserting the shaft and pulleys into the z-drive, ensure that the closed-loop belt is installed.

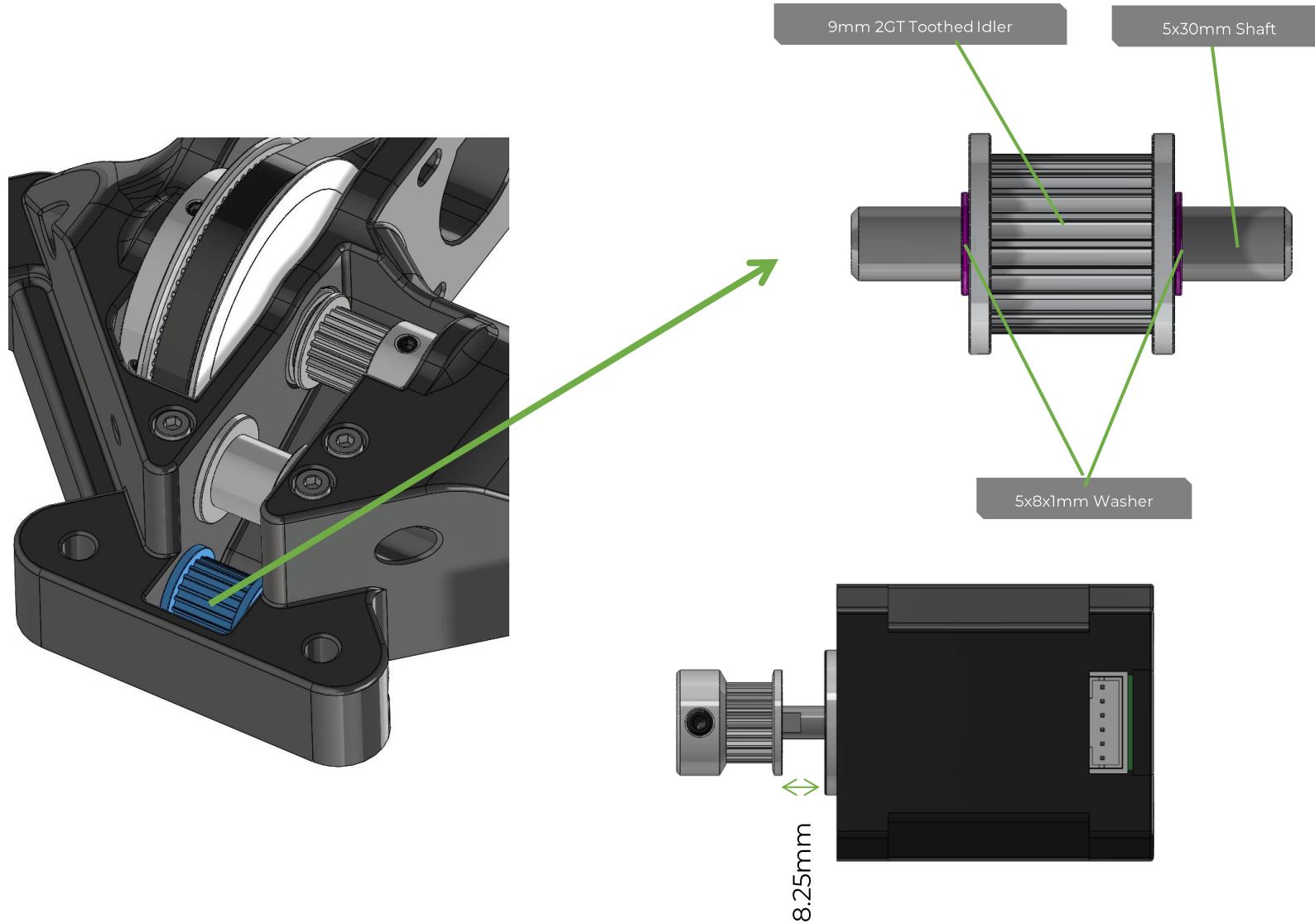
## Z-axis – Front Right Drive Assembly



### Tip

Before installing the pulley in the printed part, ensure that it slides properly onto the shaft.

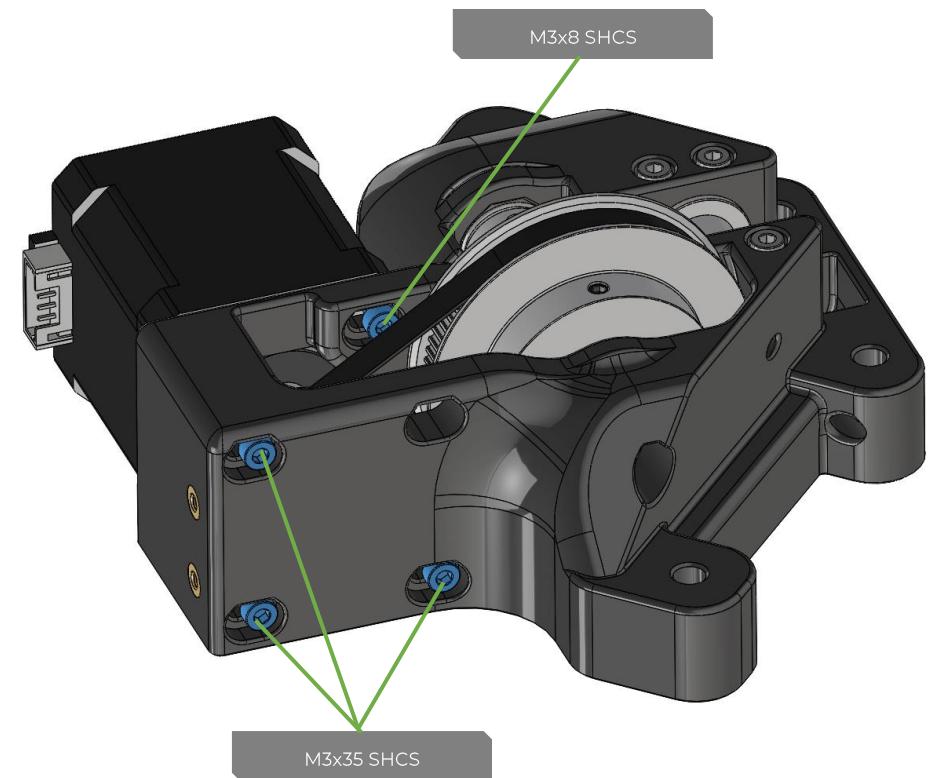
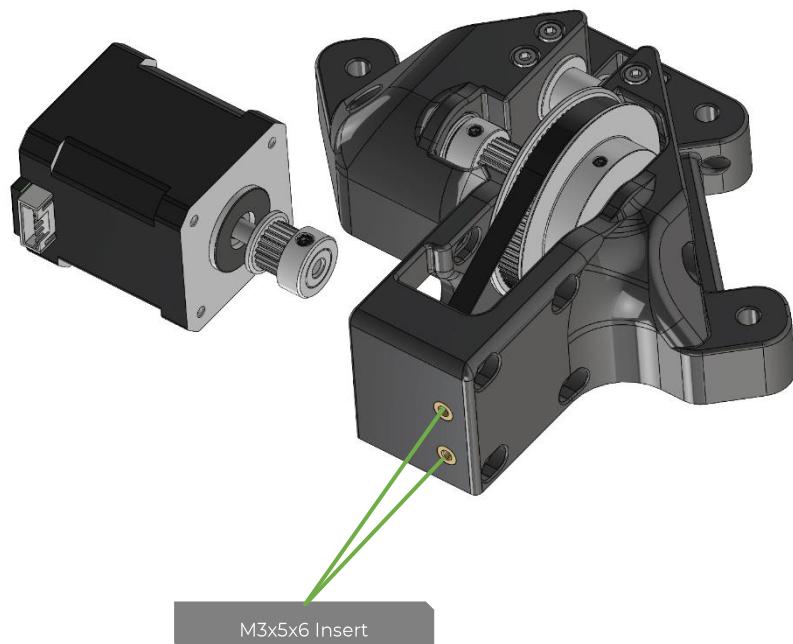
## Z-axis – Front Right Drive Assembly



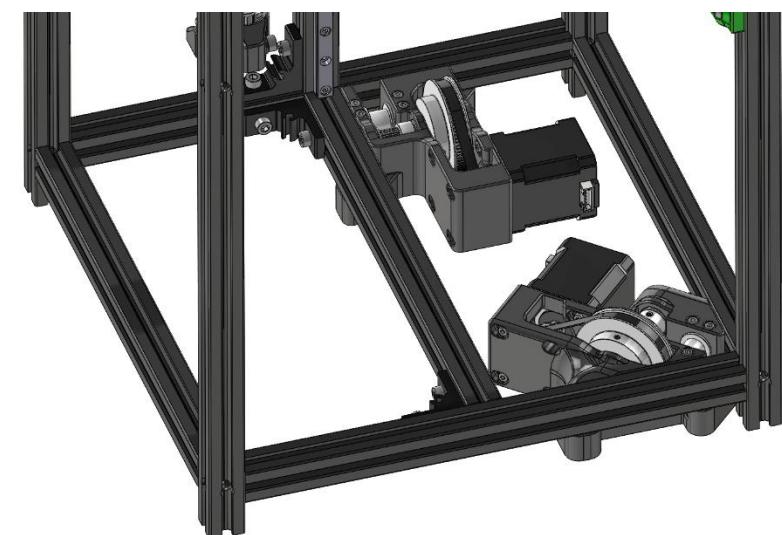
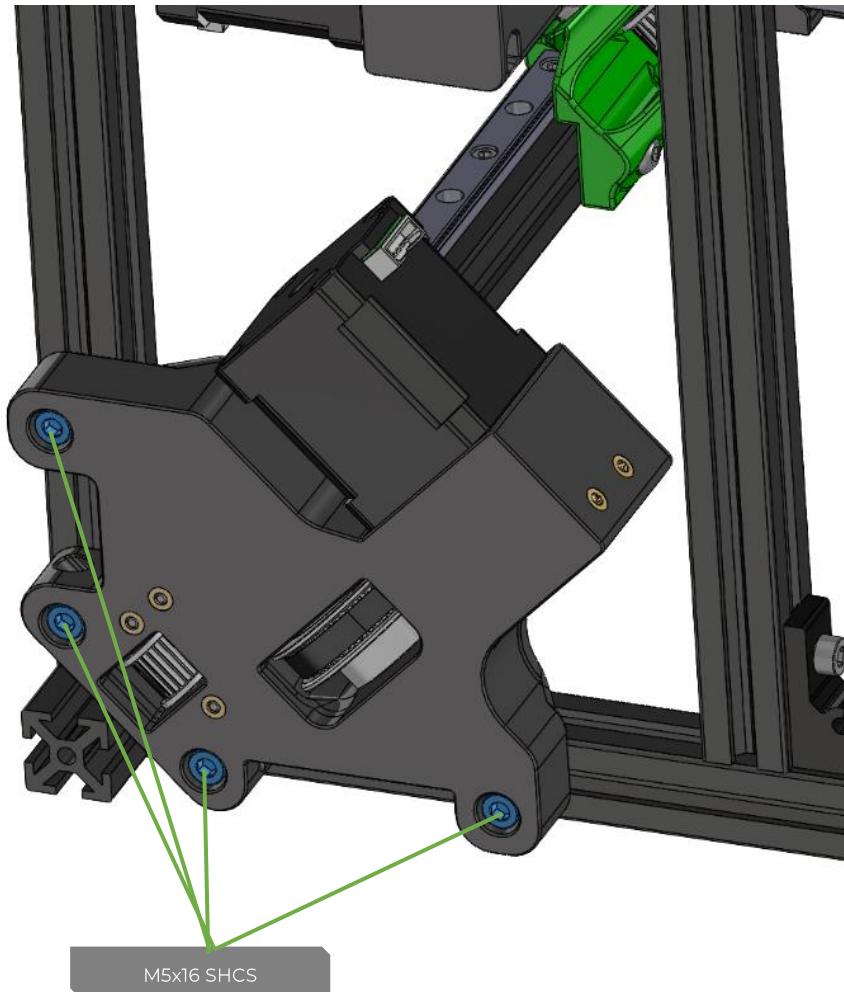
## Z-axis – Front Right Drive Assembly

### Closed Loop Belt Tensioning

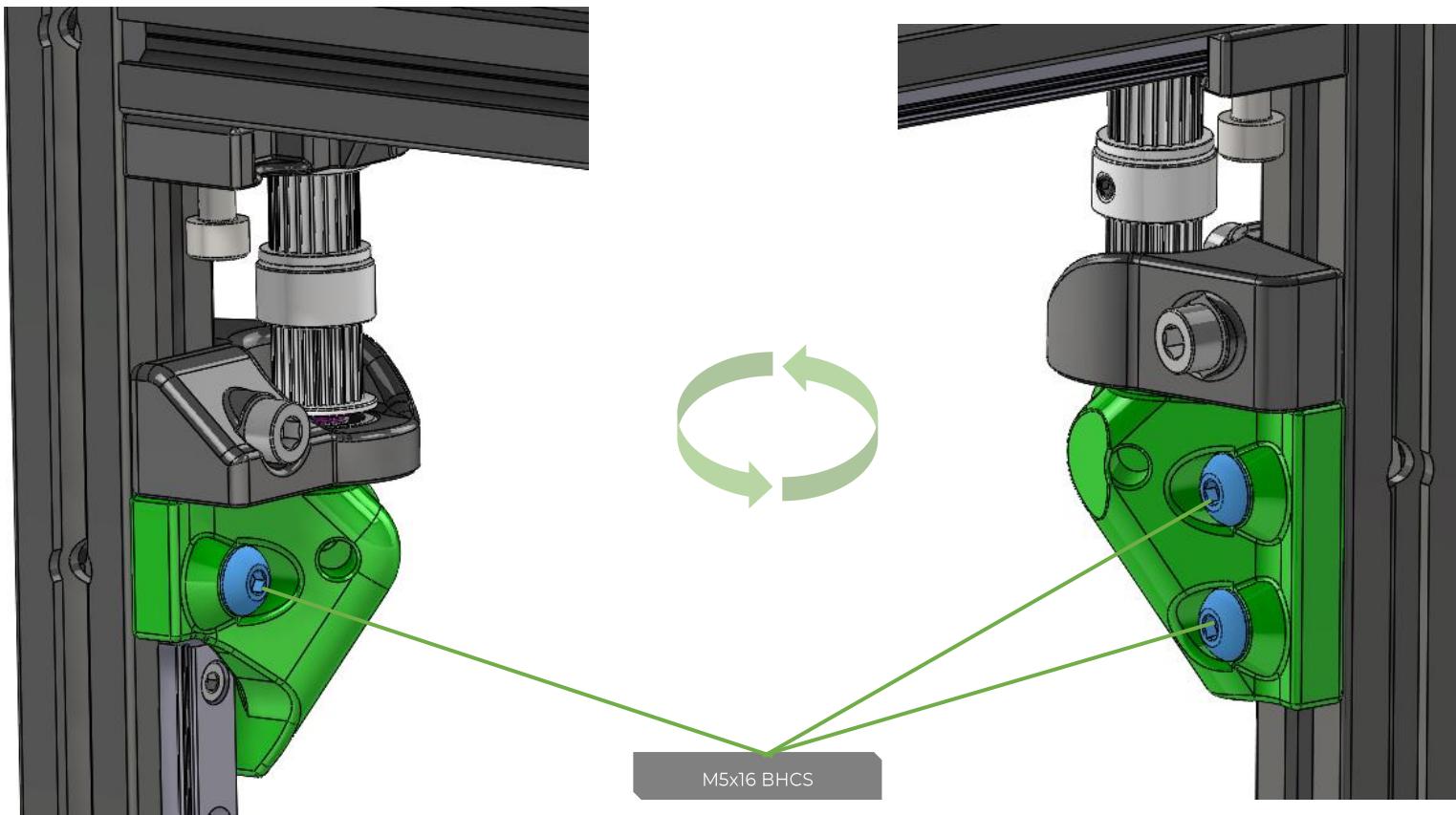
To tighten the belt, push the stepper to create tension, and then secure it by tightening the four bolts, as shown in the diagram below.



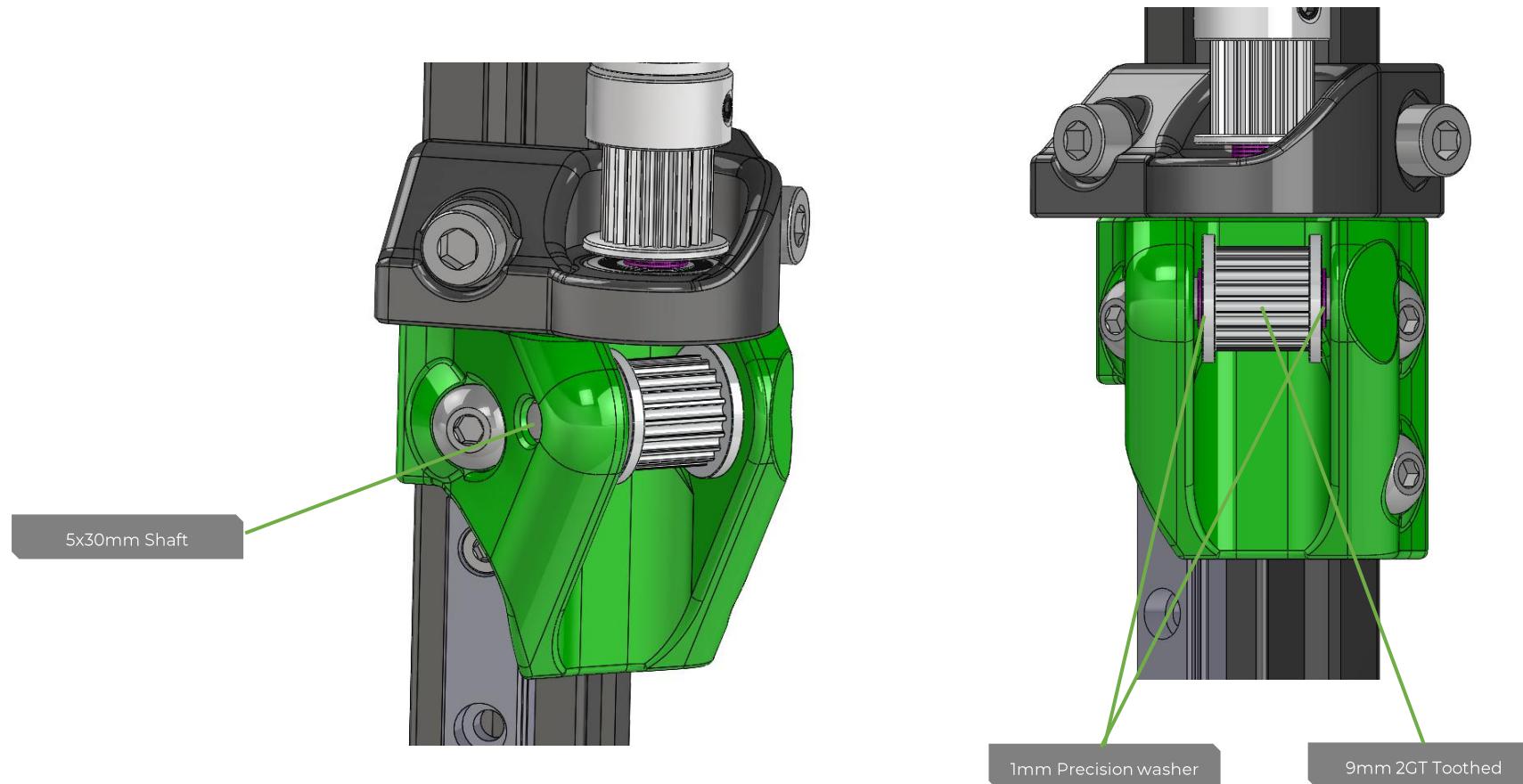
## Z-axis – Front Right Drive Assembly



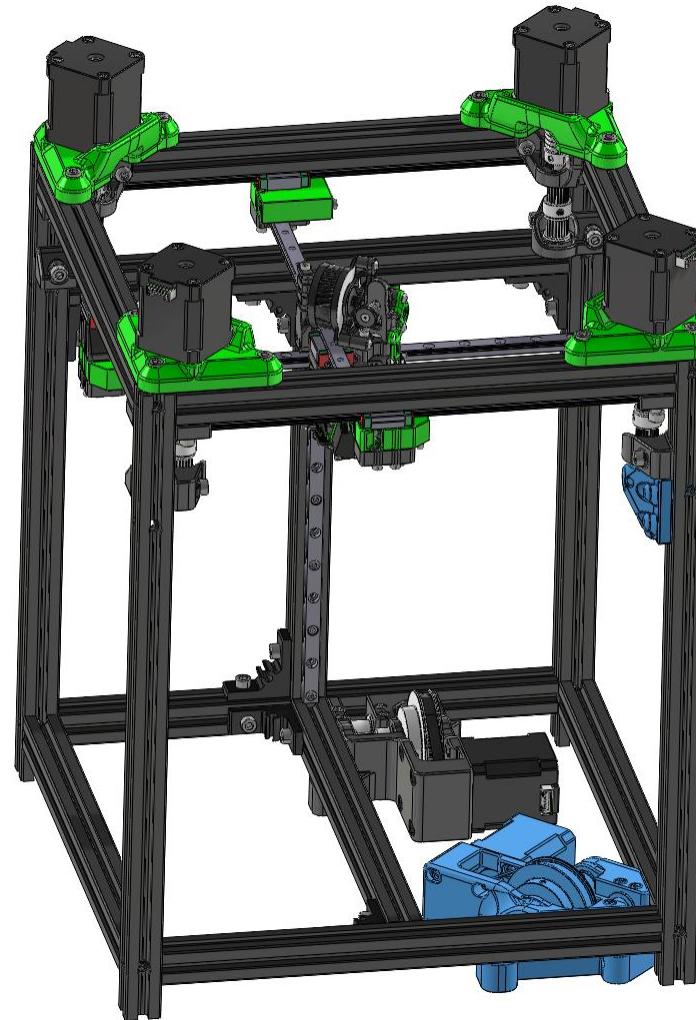
## Z-axis – Front Right Drive Assembly



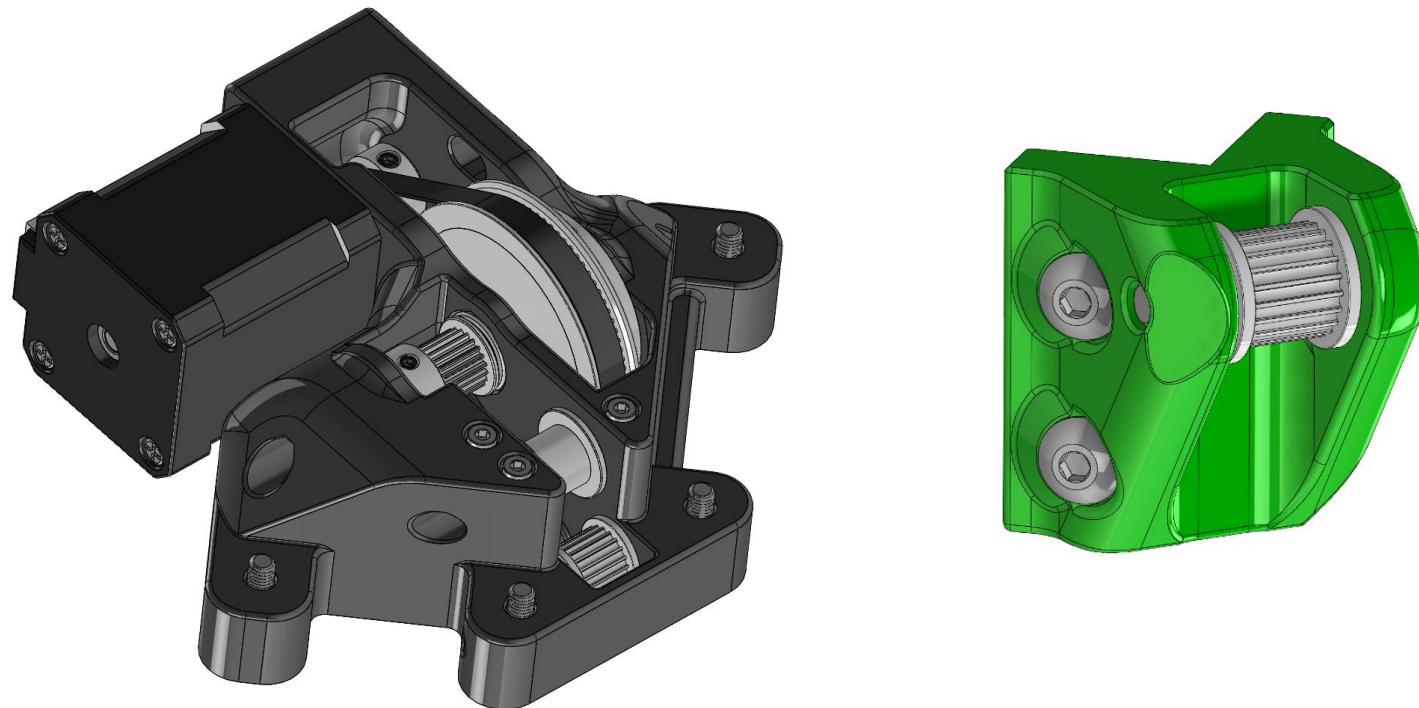
## Z-axis – Front Right Drive Assembly



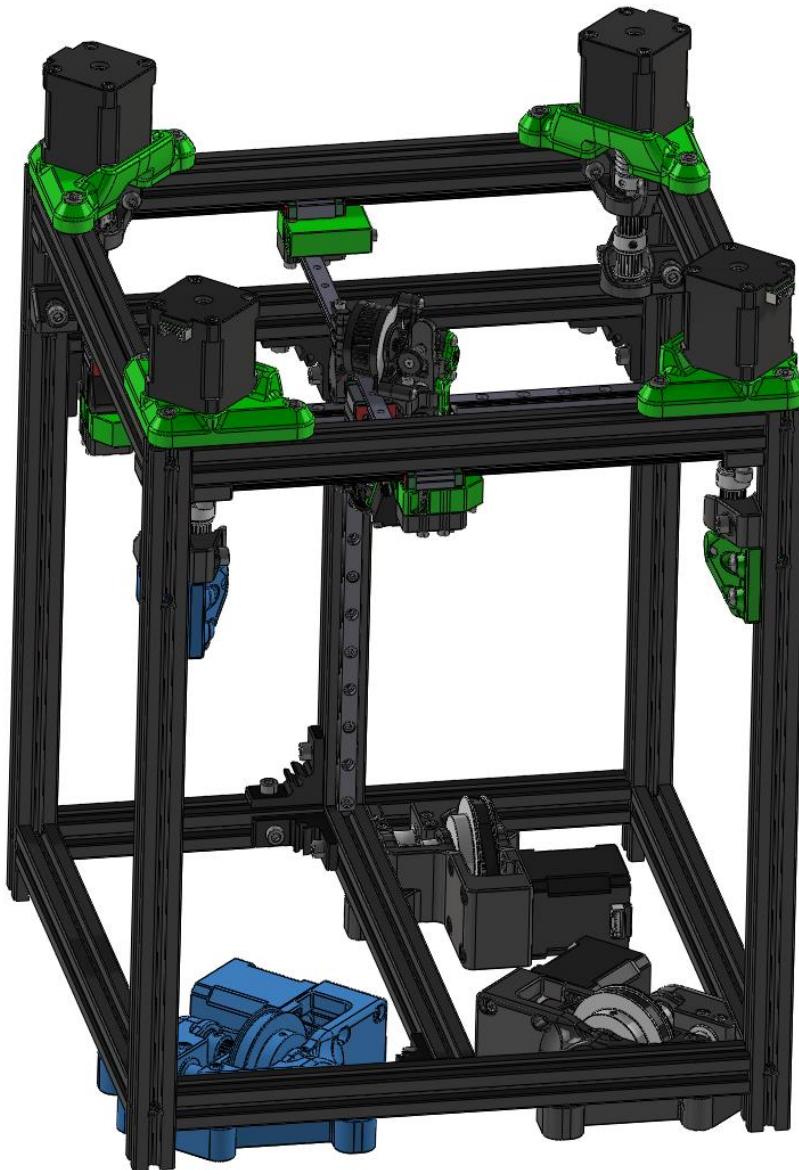
## Z-axis – Front Right Drive Overview



## Z-axis – Front Left Drive Overview



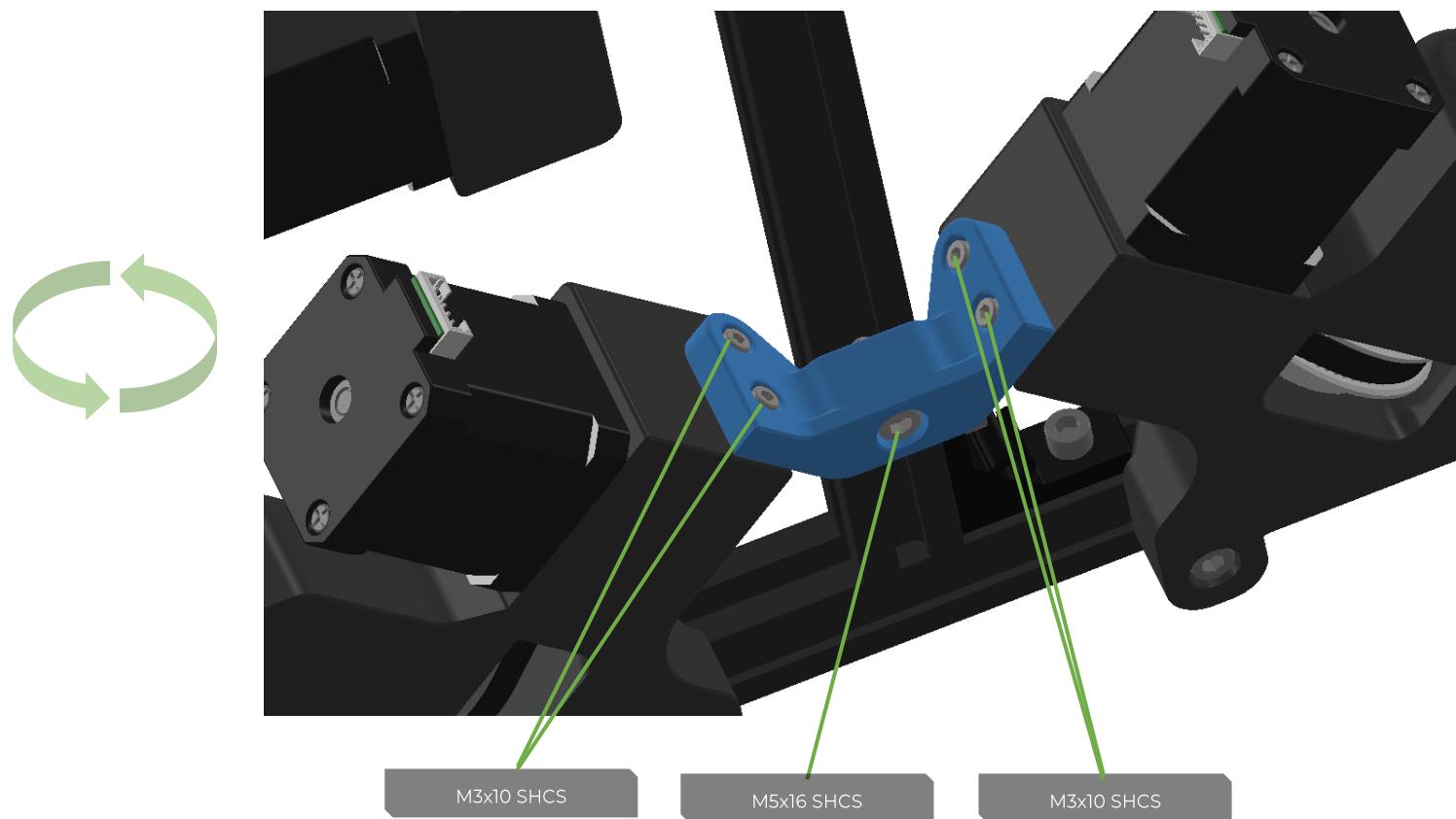
## Z-axis – Front Left Drive Overview



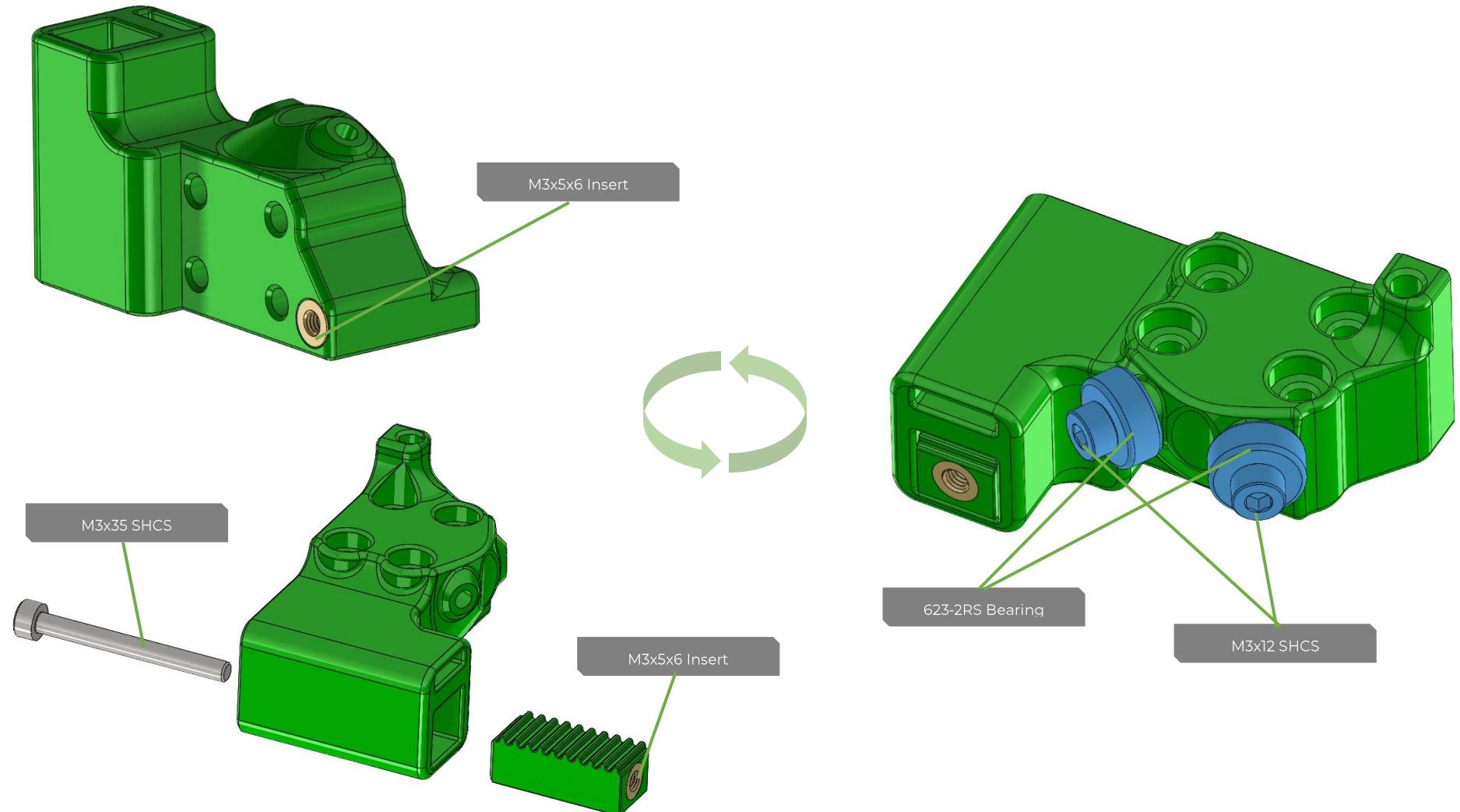
### Mirrored parts

Assemble the front left drive assembly using the same hardware as the front right drive, but for the mirrored parts.

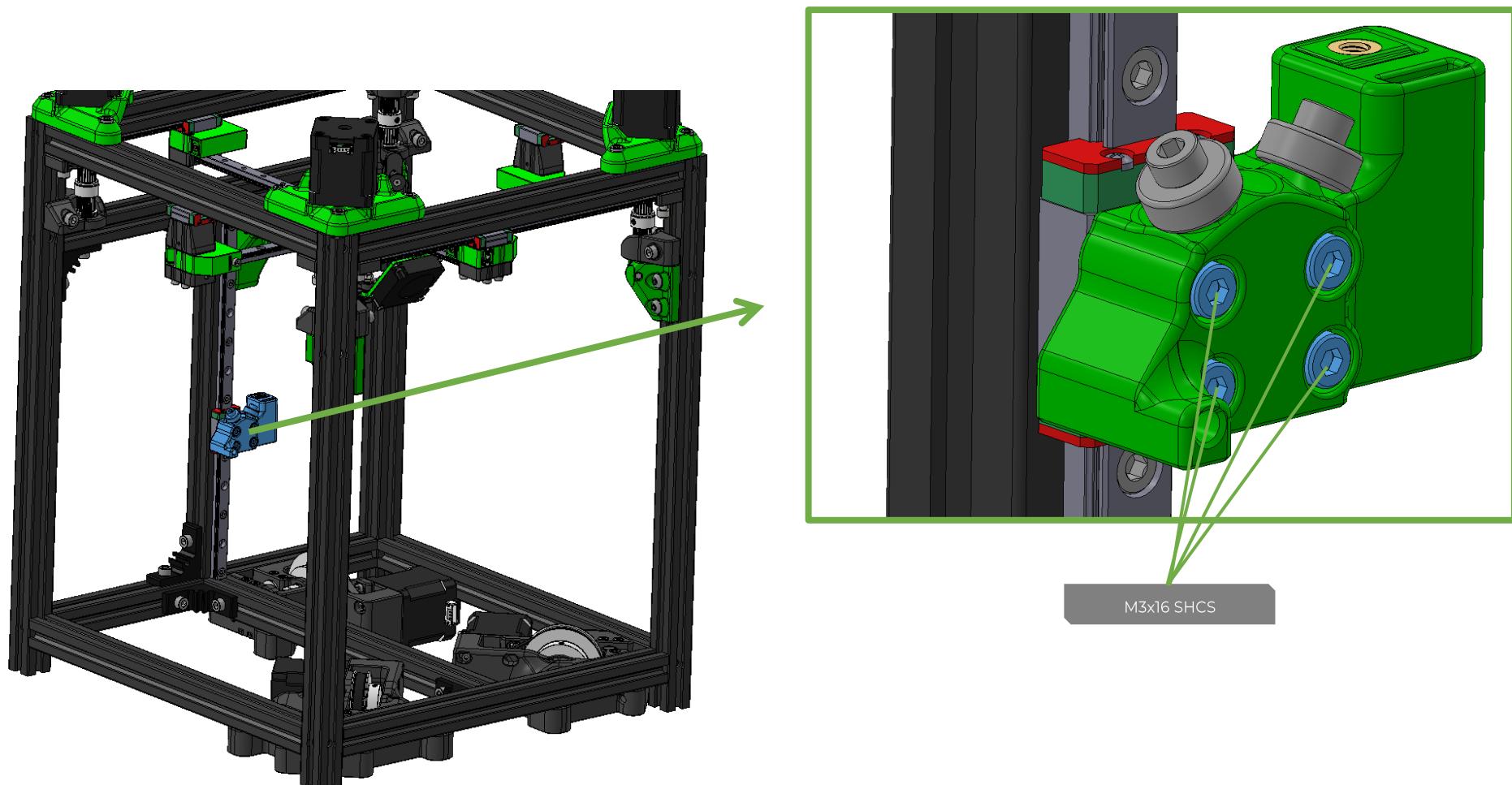
## Z-axis – Front Drives Brace



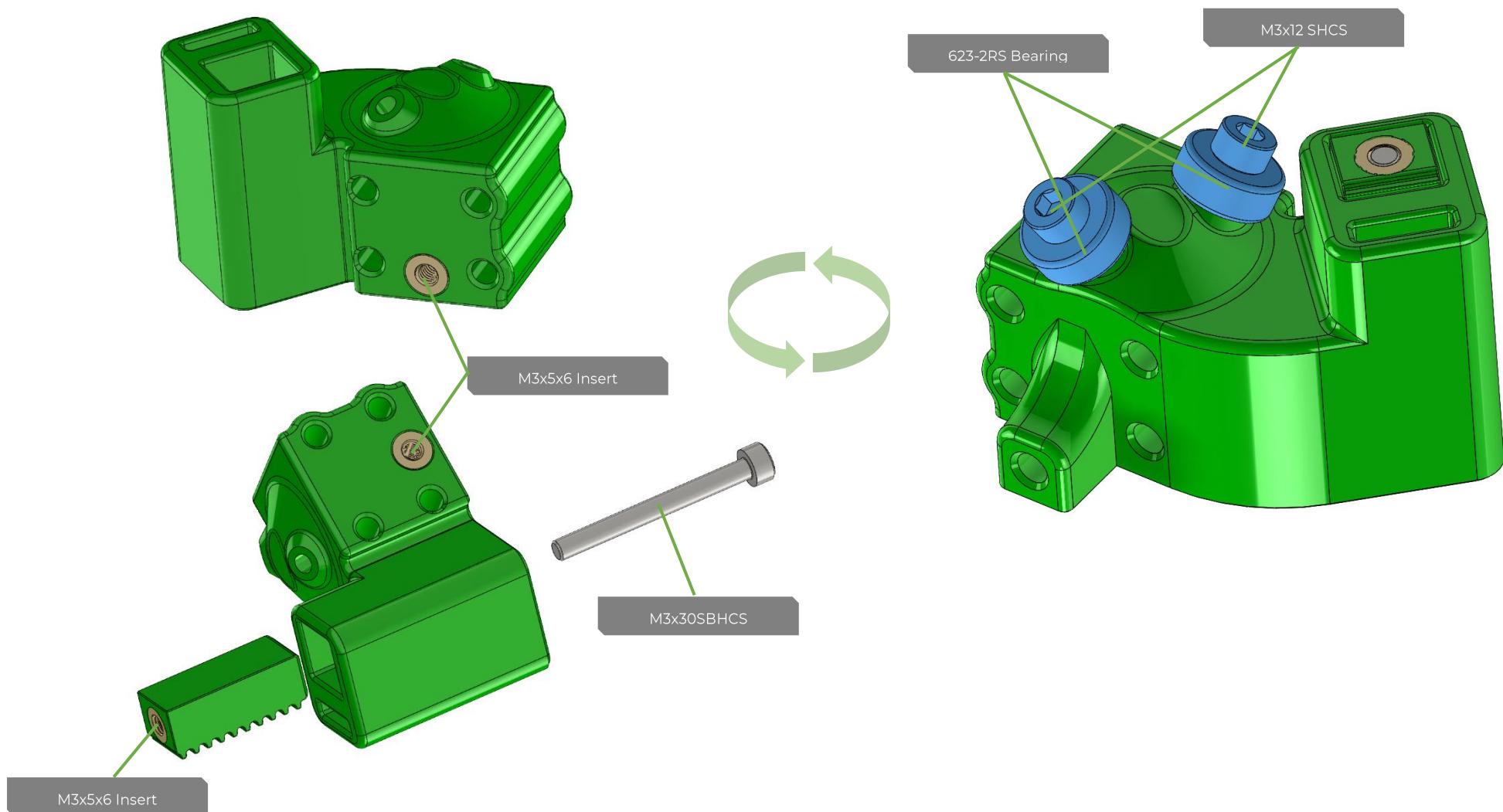
## Z-axis – Rear Kinematic Platform Assembly



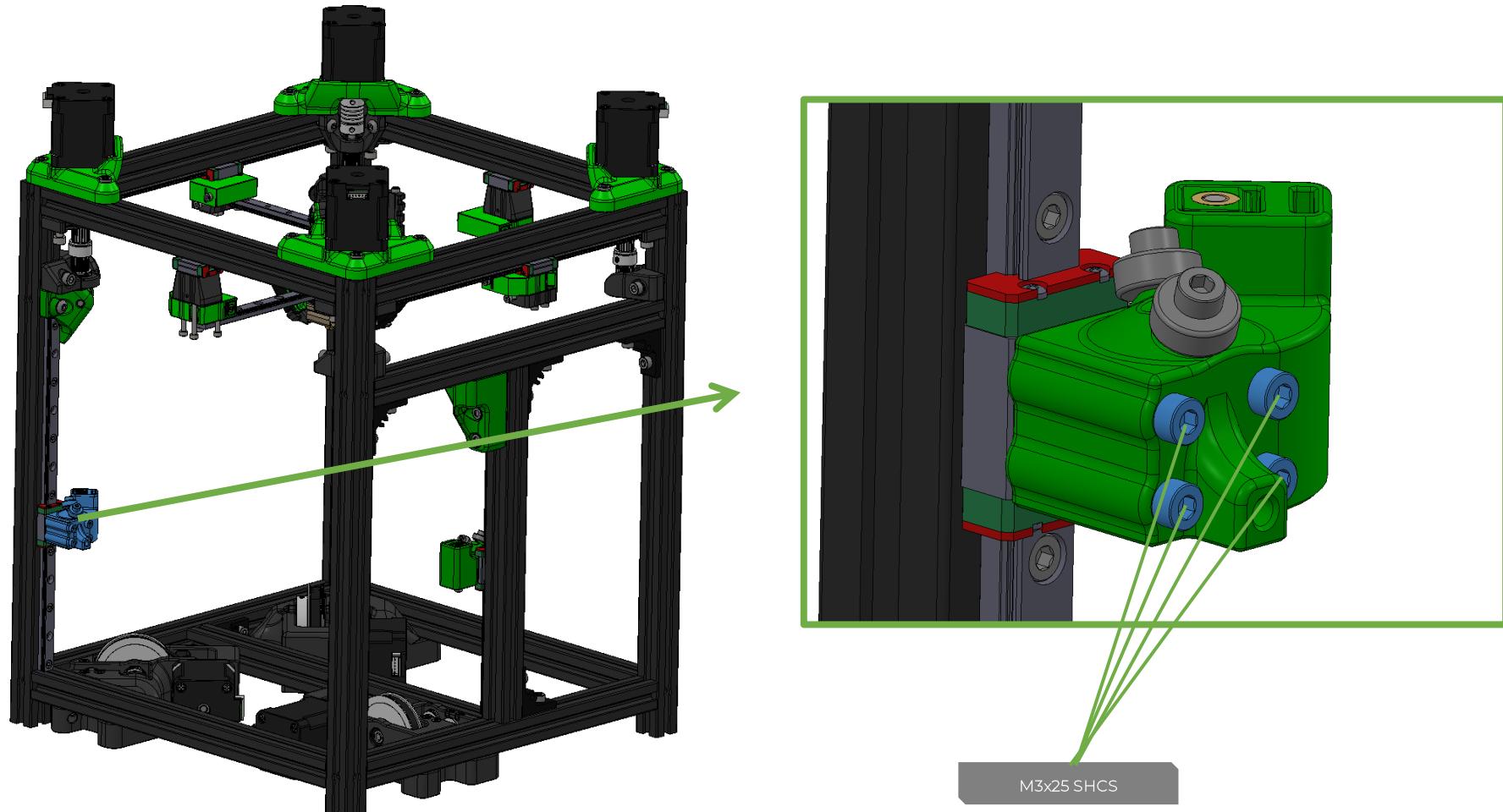
## Z-axis – Rear Kinematic Platform Assembly



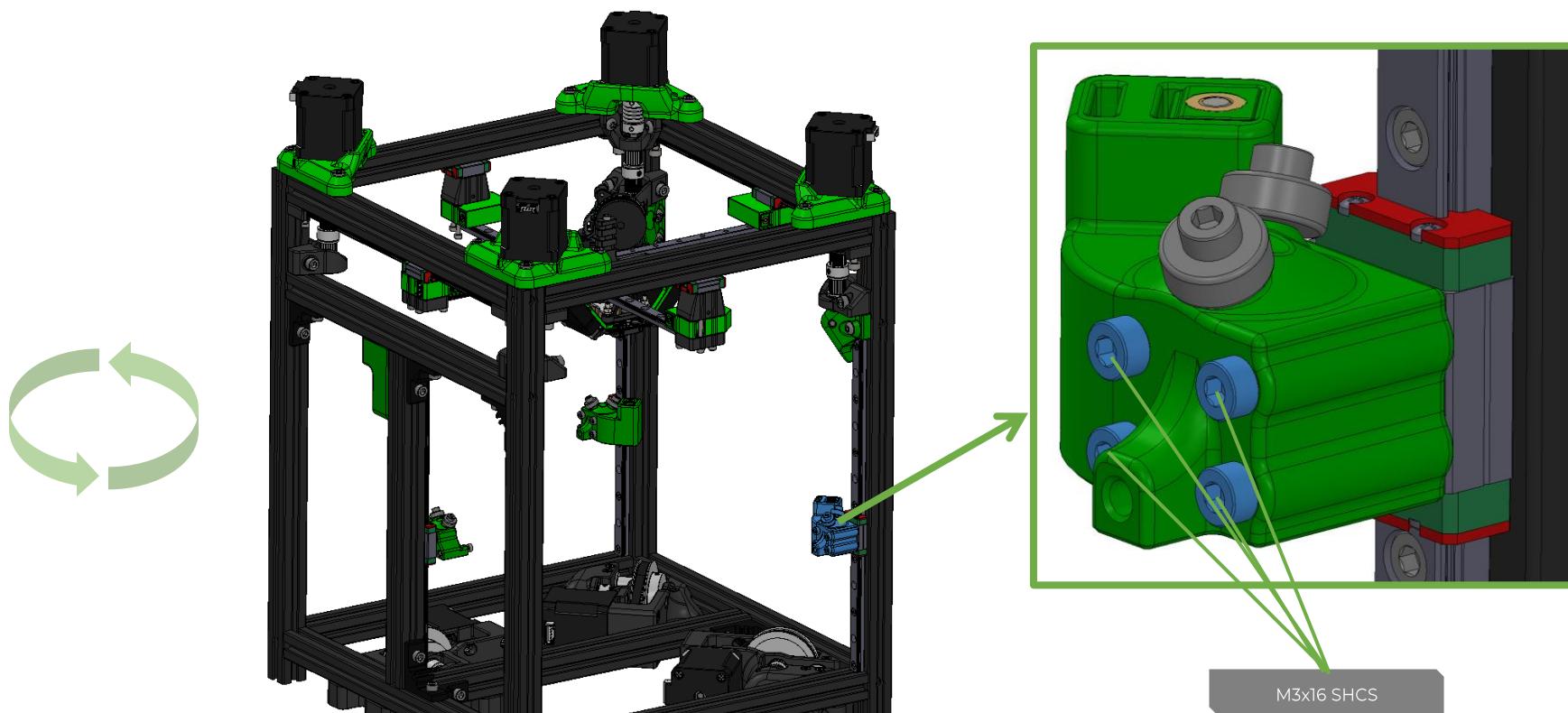
## Z-axis – Front Kinematic Platform Assembly



## Z-axis – Front Kinematic Platform Assembly



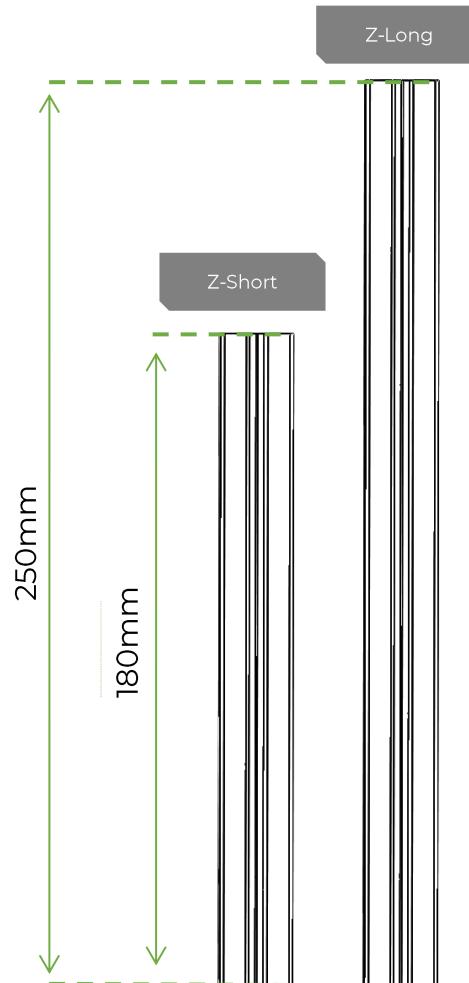
## Z-axis – Front Kinematic Platform Assembly



### Mirrored parts

To assemble the second front Z joint, utilize the same hardware as used for the first front Z joint, but for the mirrored parts.

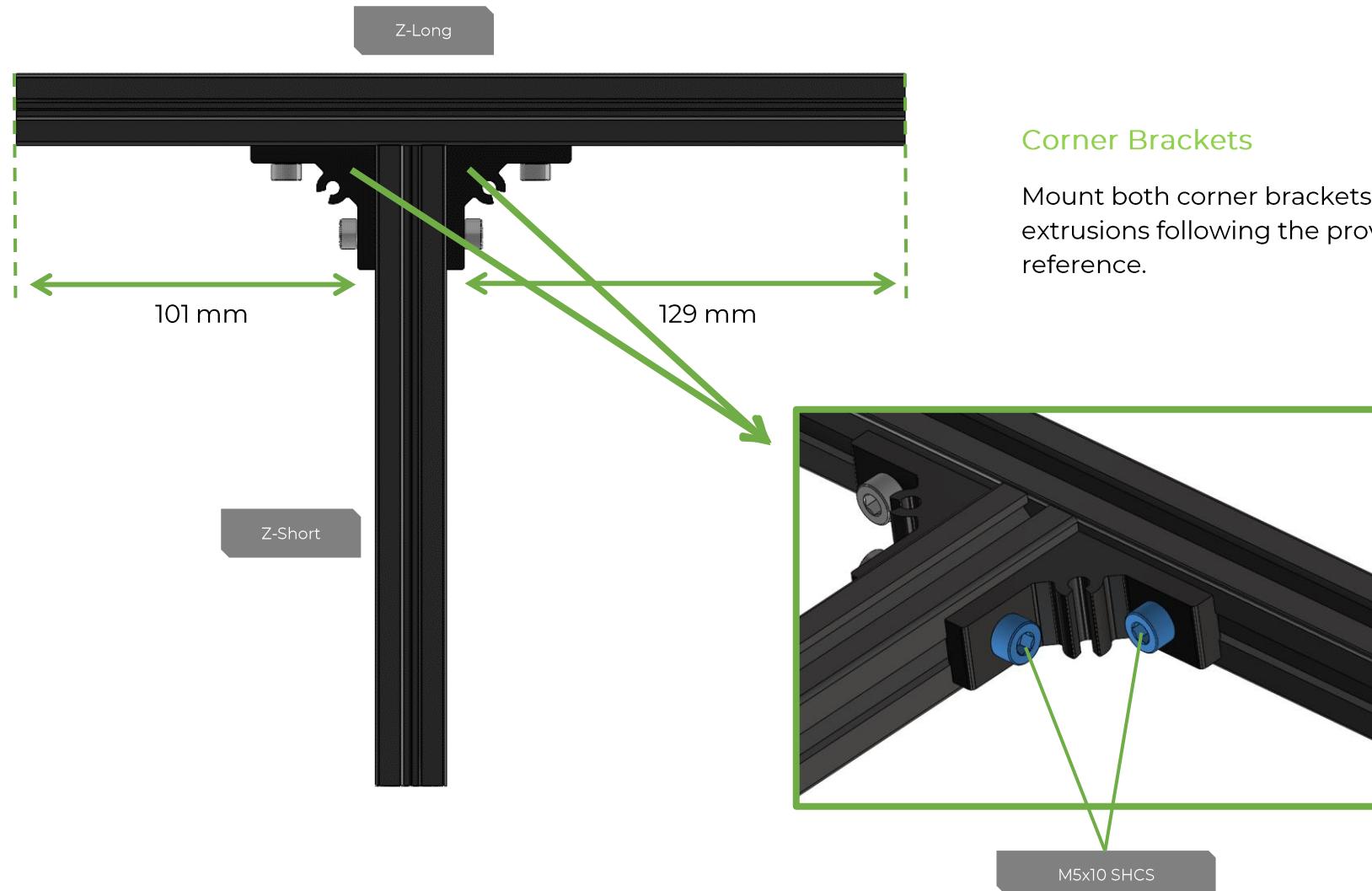
## Z-axis Bed – Required Extrusions from kit



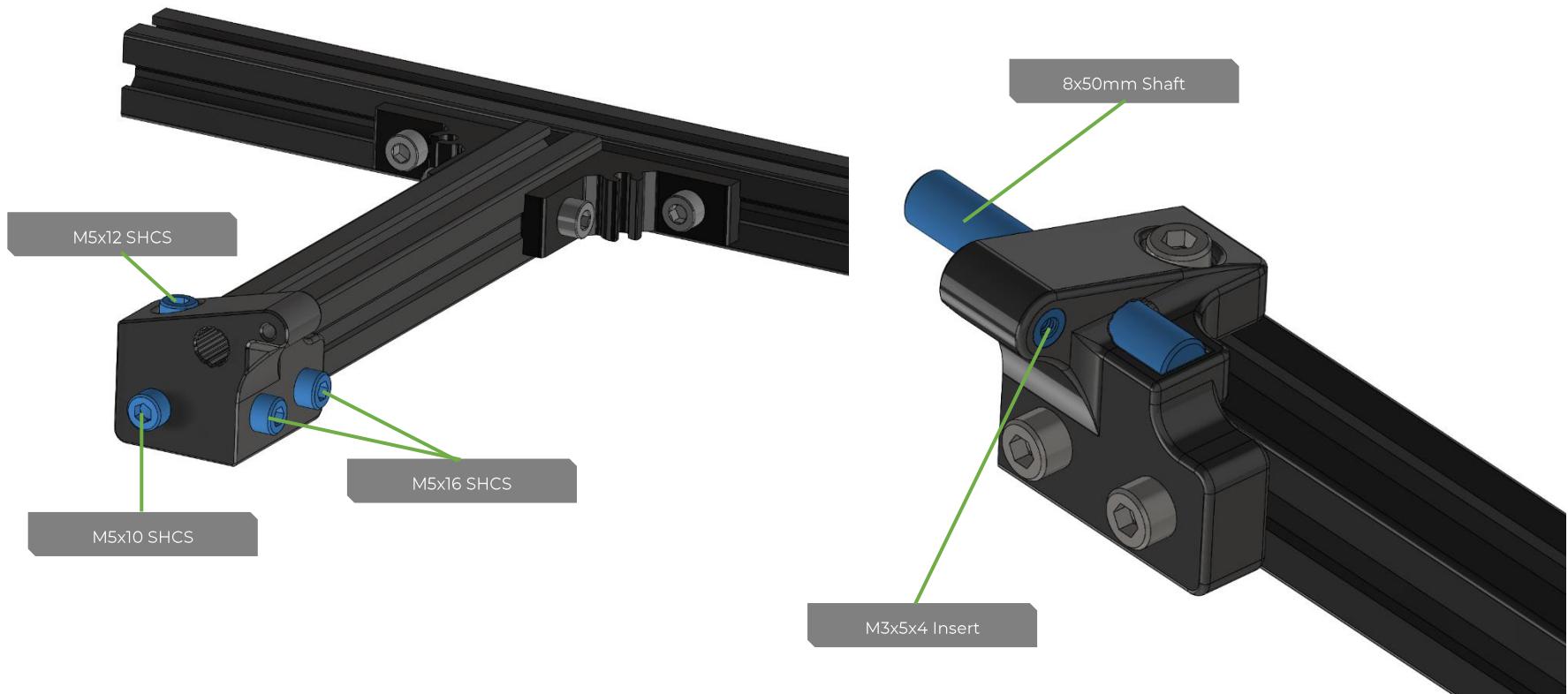
### Bed Extrusion

Please locate the two extrusions required for the bed frame assembly.

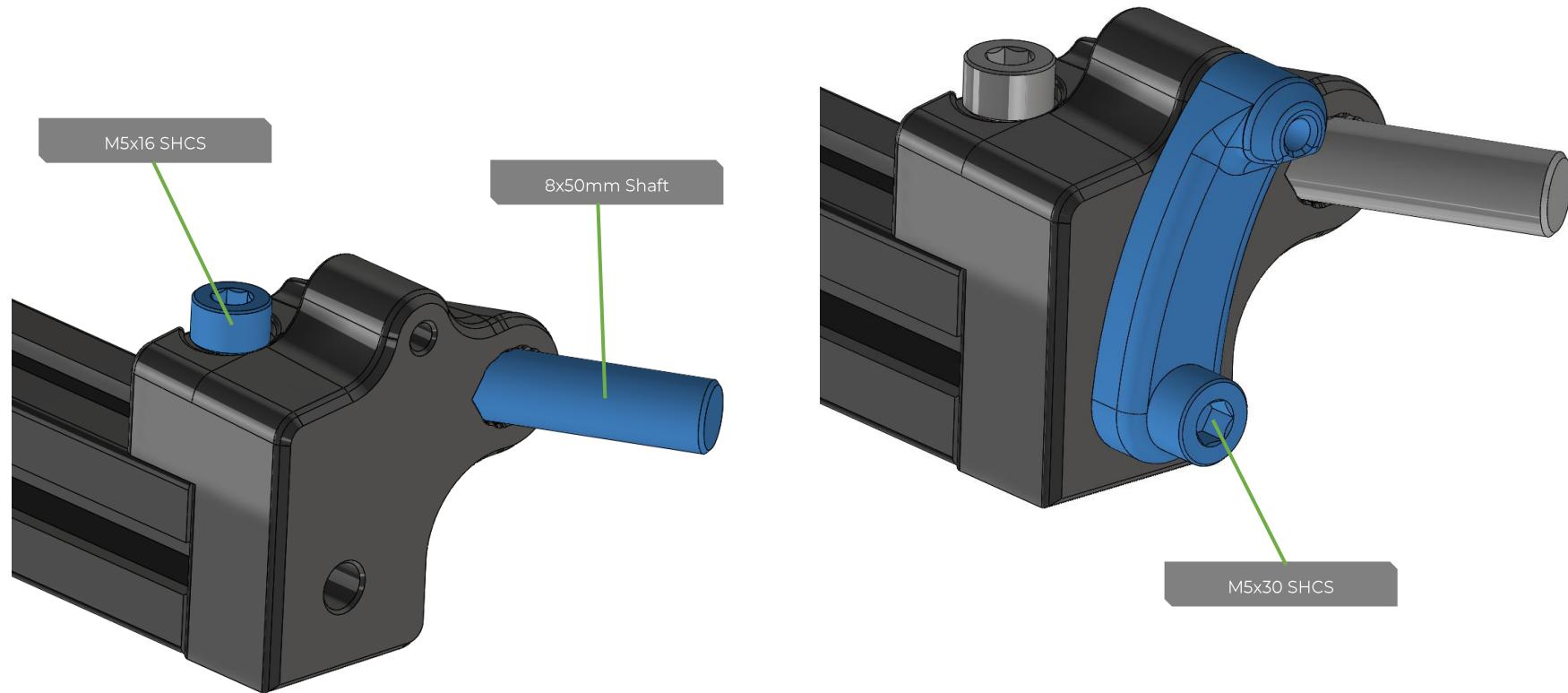
## Z-axis – Bed Platform Assembly



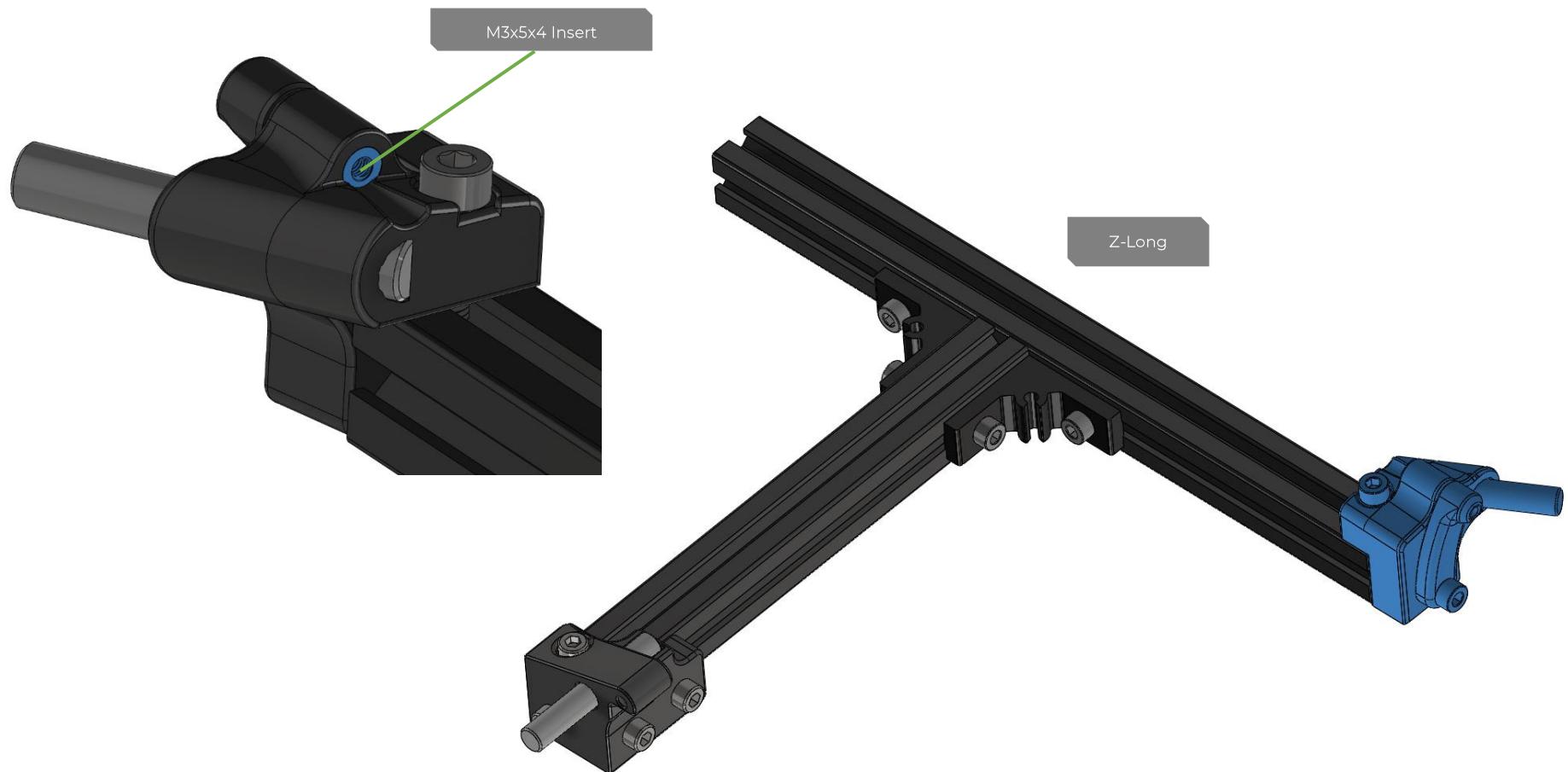
## Z-axis – Bed Platform Assembly



## Z-axis – Bed Platform Assembly



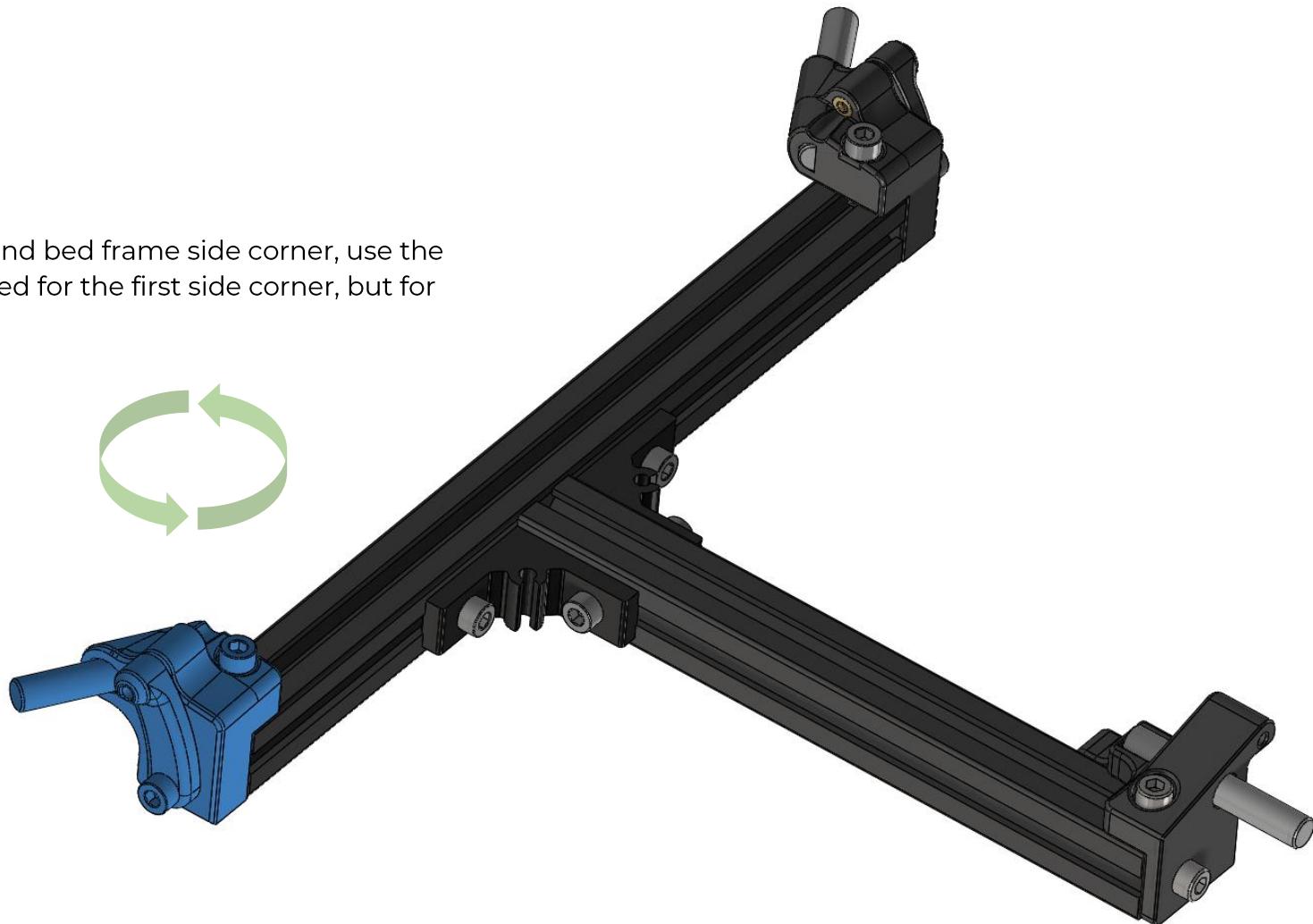
## Z-axis – Bed Platform Assembly



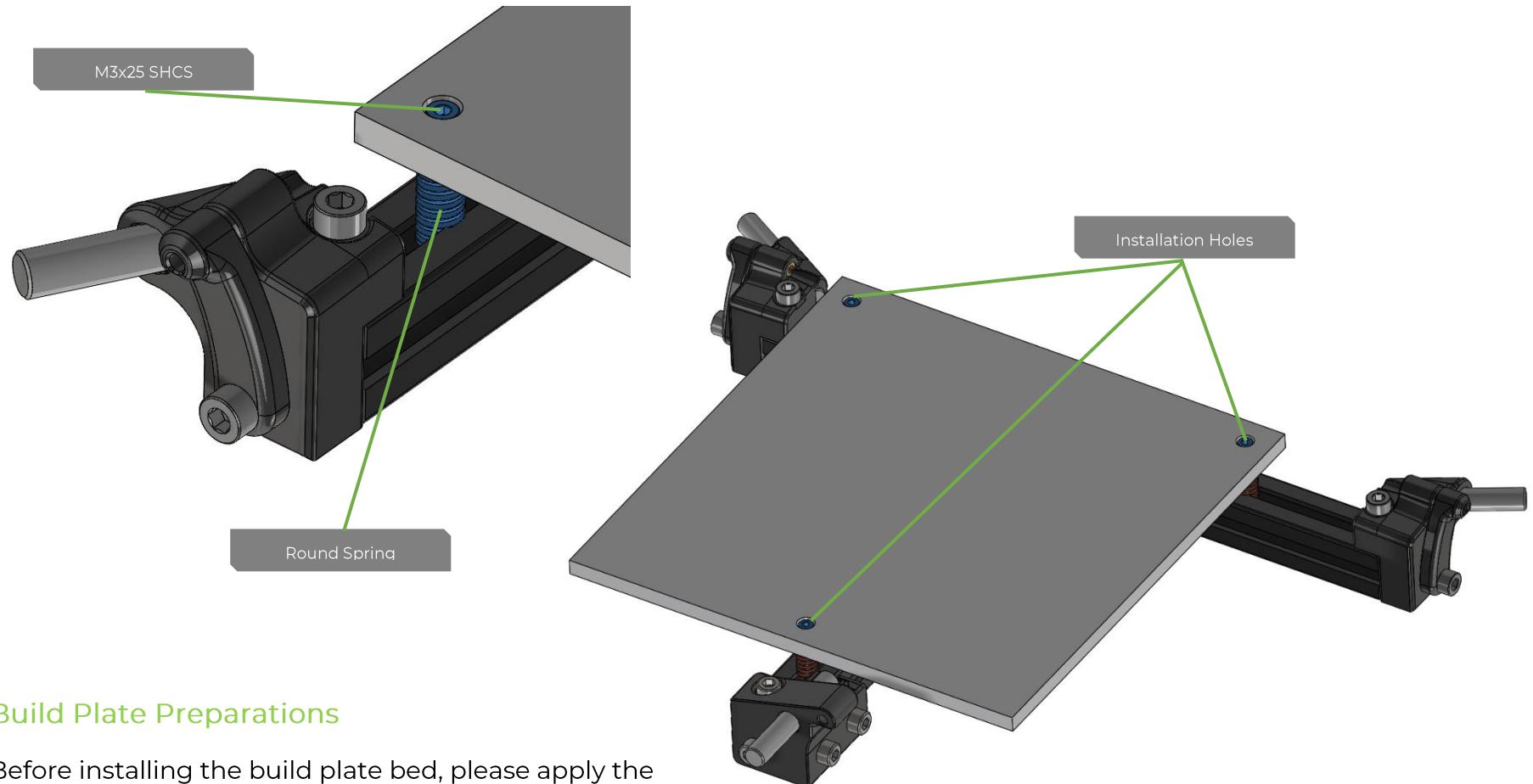
## Z-axis – Bed Platform Assembly

### Mirrored parts

To assemble the second bed frame side corner, use the same hardware as used for the first side corner, but for the mirrored parts.



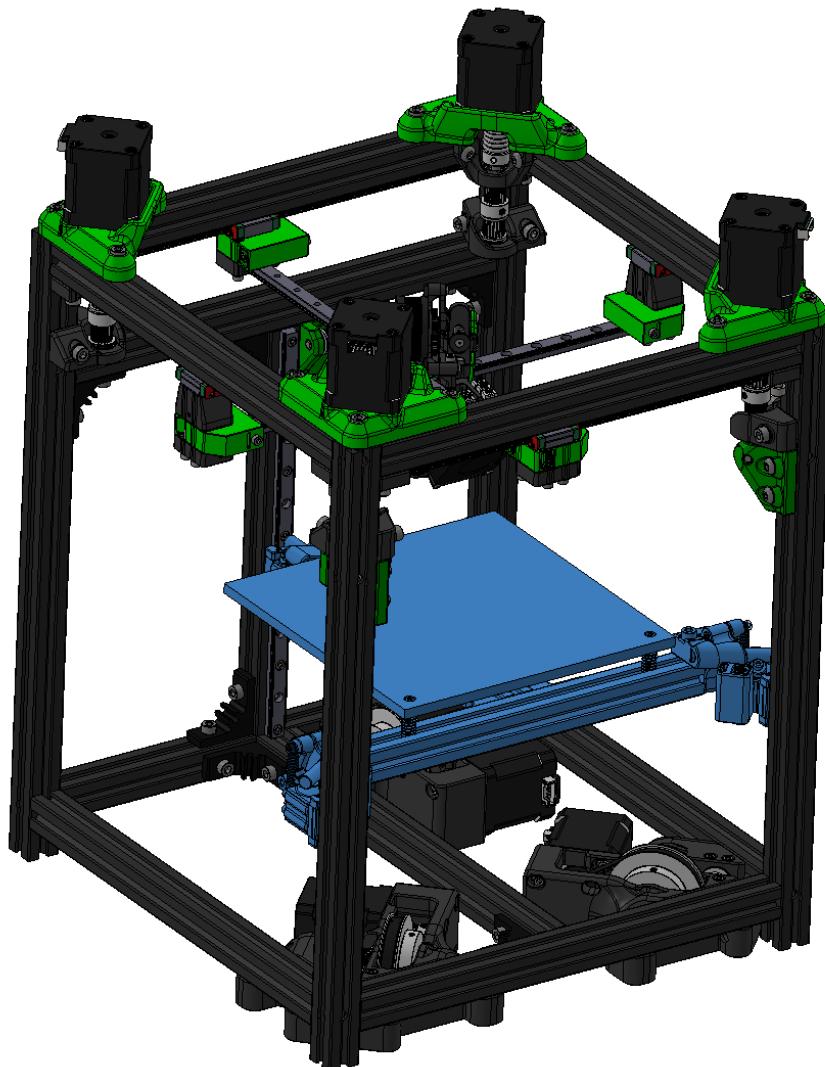
## Z-axis – Bed Platform Assembly



### Build Plate Preparations

Before installing the build plate bed, please apply the heater and optional PEI.

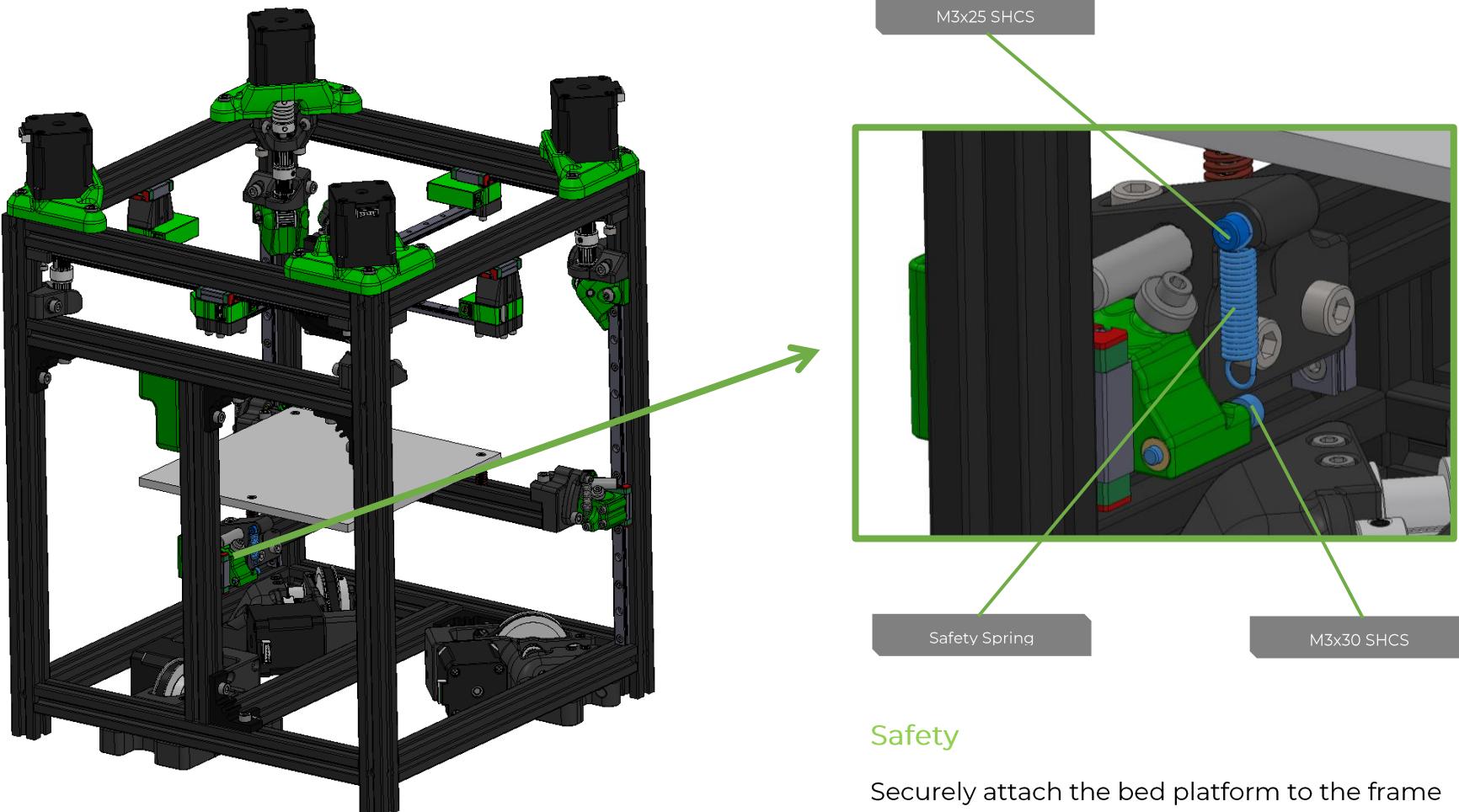
## Z-axis – Bed Platform Assembly



### Installation into frame

Ensure that the bed assembly is placed in the K3 frame with caution, taking care to ensure that the 8mm shafts are resting smoothly on the 623 bearings.

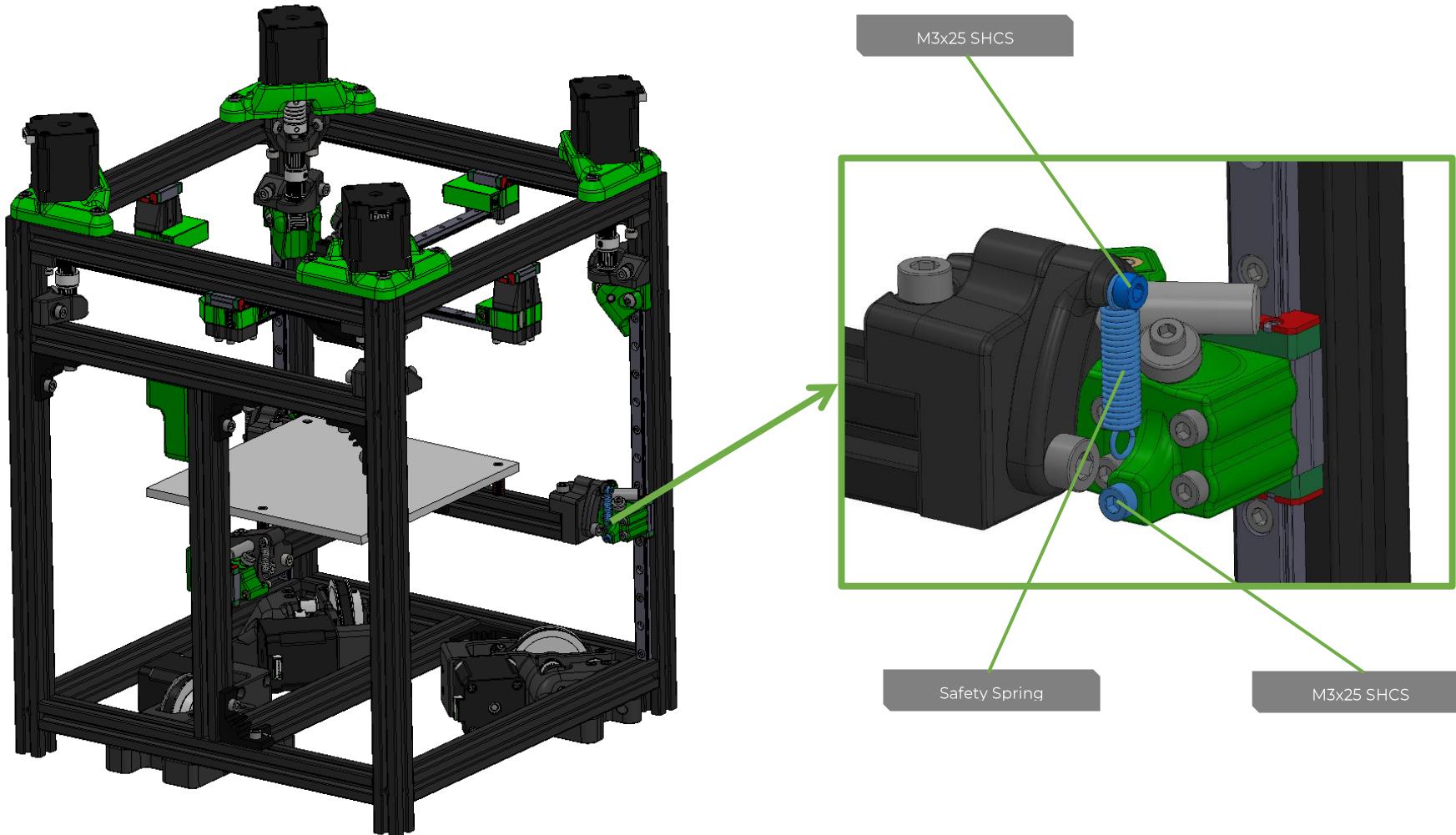
## Z-axis – Bed Platform Assembly



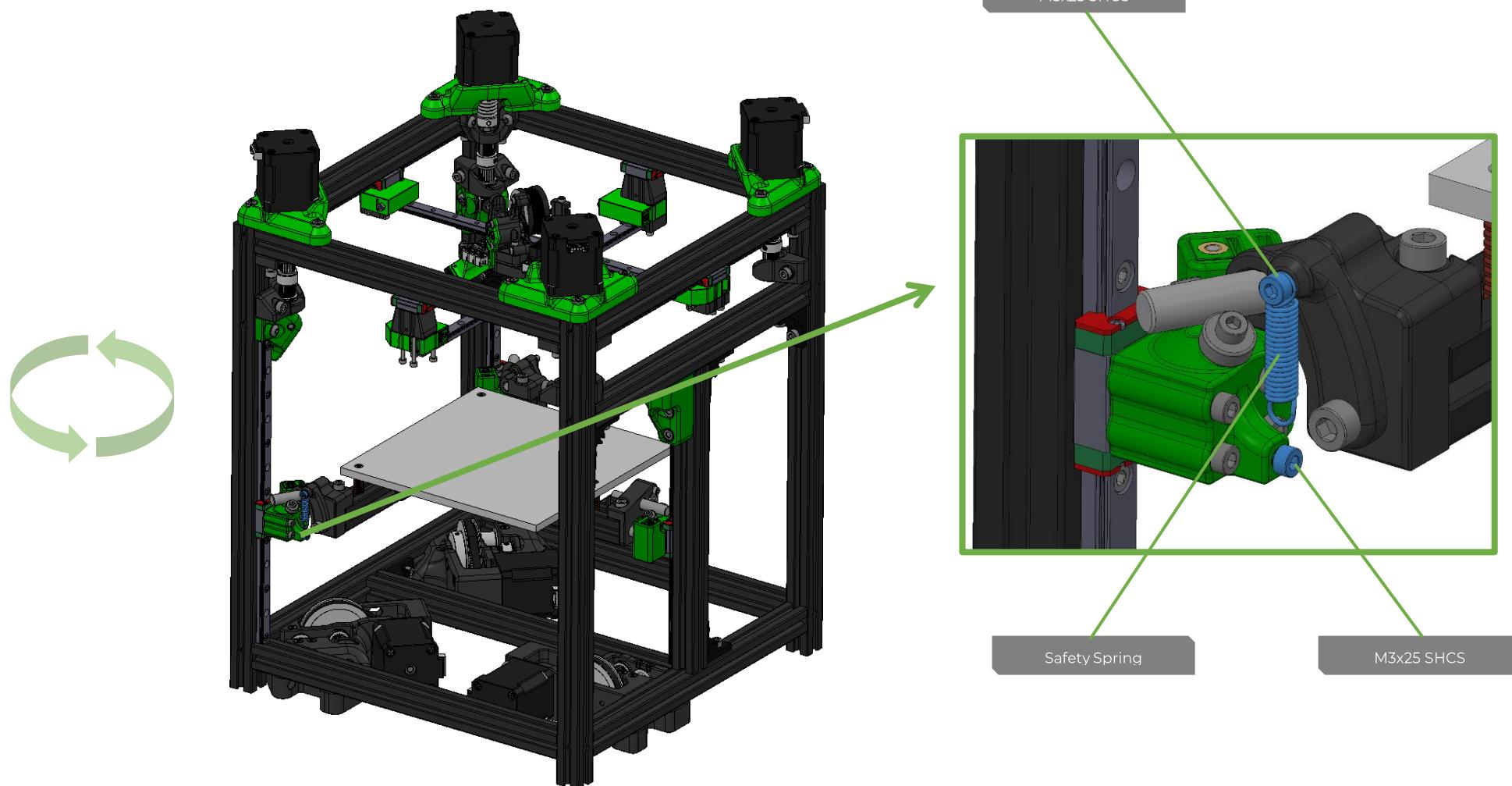
### Safety

Securely attach the bed platform to the frame by installing the **three** safety springs.

## Z-axis – Bed Platform Assembly



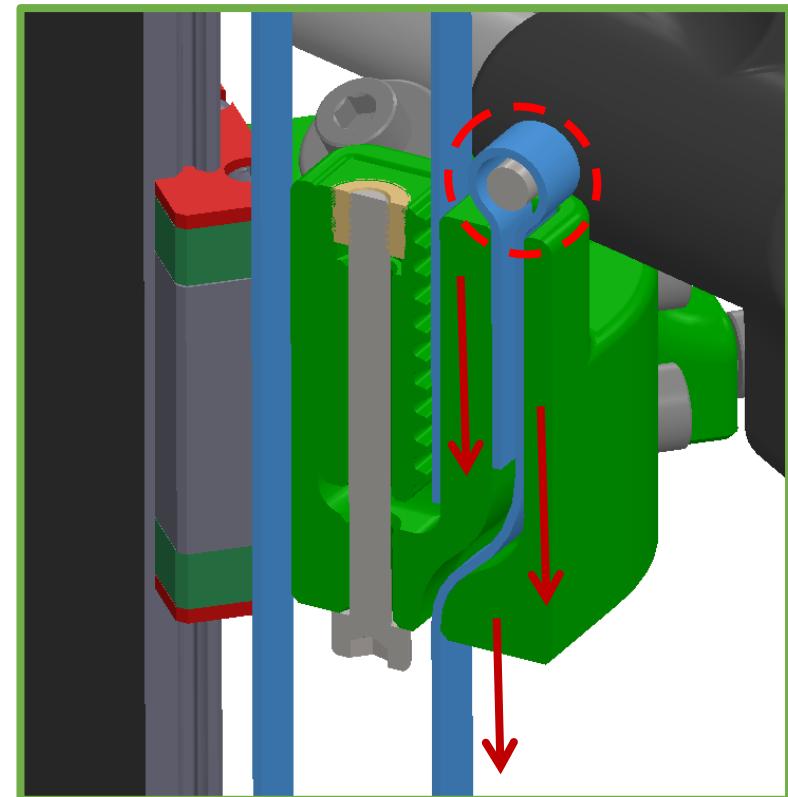
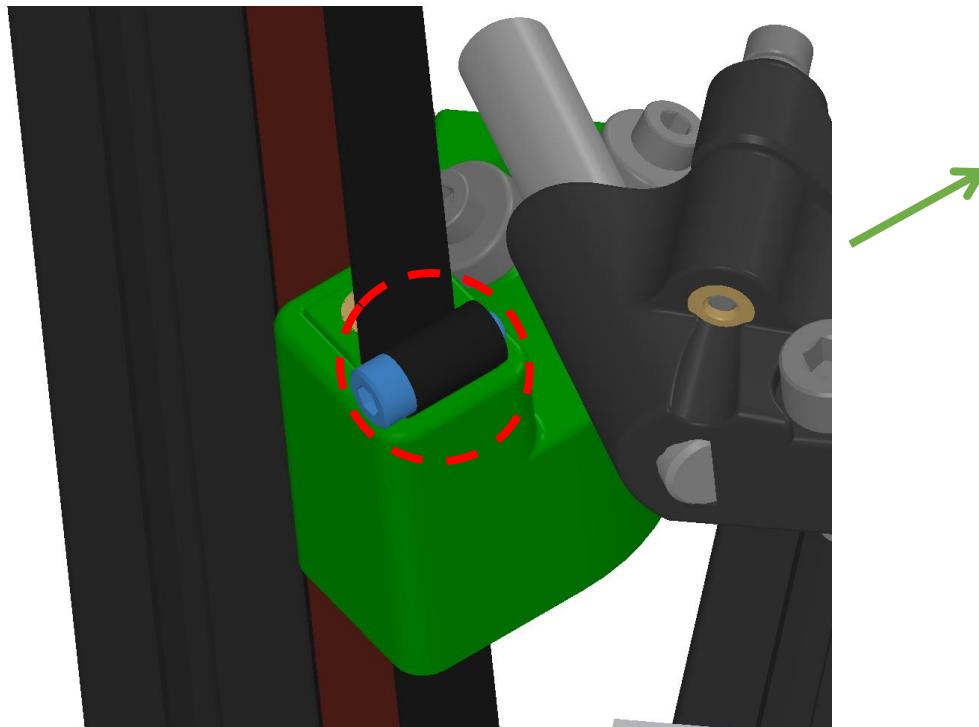
## Z-axis – Bed Platform Assembly



## Belting - Z

### Step 1 - Anchoring

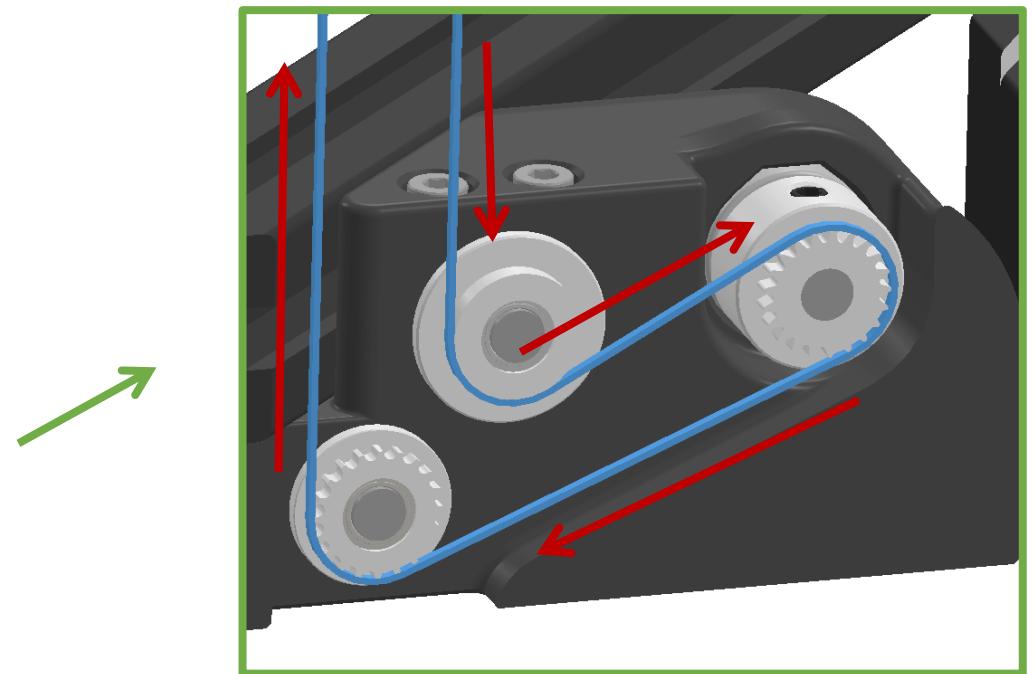
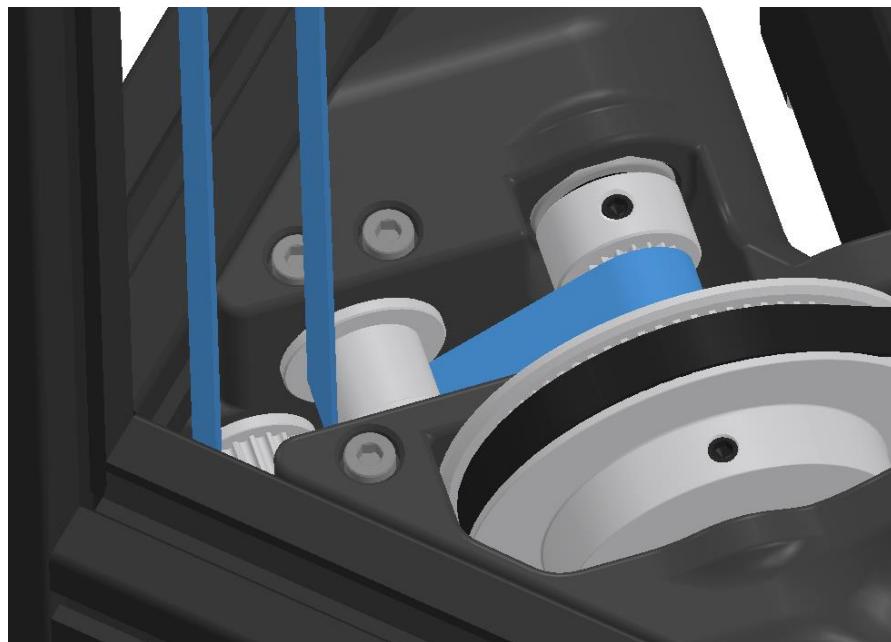
For the Z motion, use a 75cm 2GT 9mm belt. Secure the first end by wrapping it around an M3x10 SHCS bolt circled red, making sure the teeth face each other to create a secure loop.



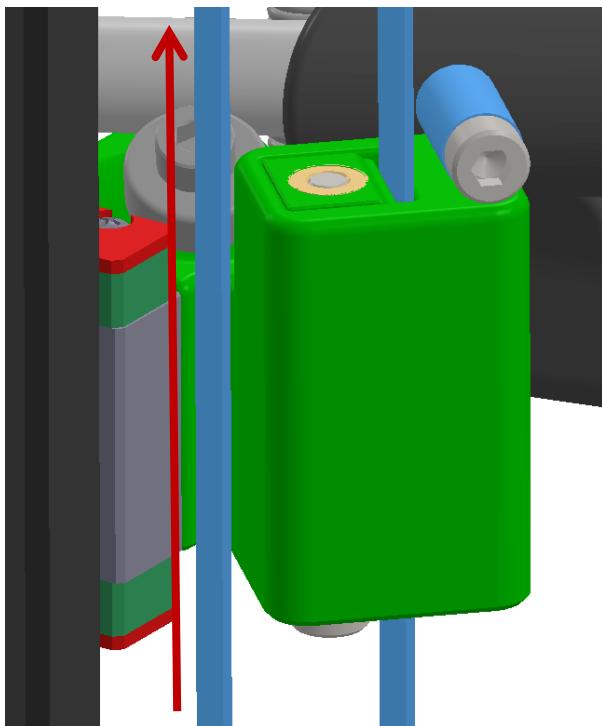
## Belting - Z

### Step 2 – Z drive

Proceed with routing the belt downwards into the z drive, following the indicated direction on the right. Utilize an allen wrench or a similar tool to assist in smoothly maneuvering the belt around corners.

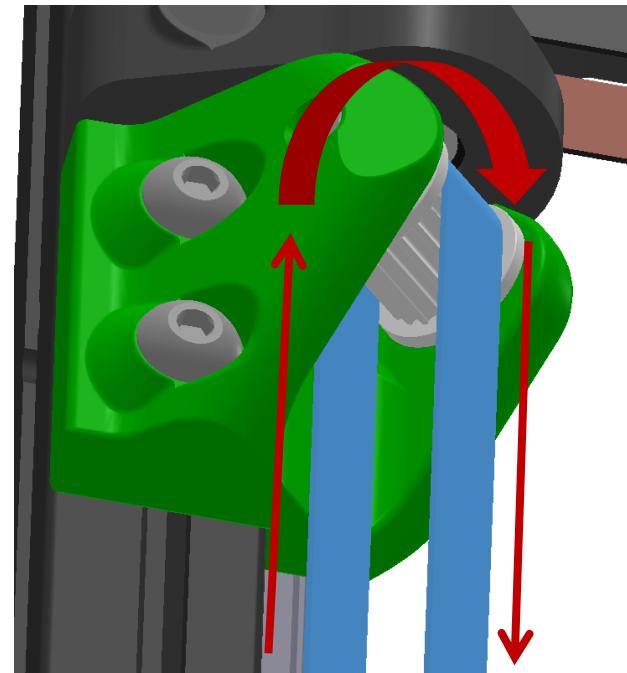


## Belting - z



### Step 3 – Idler

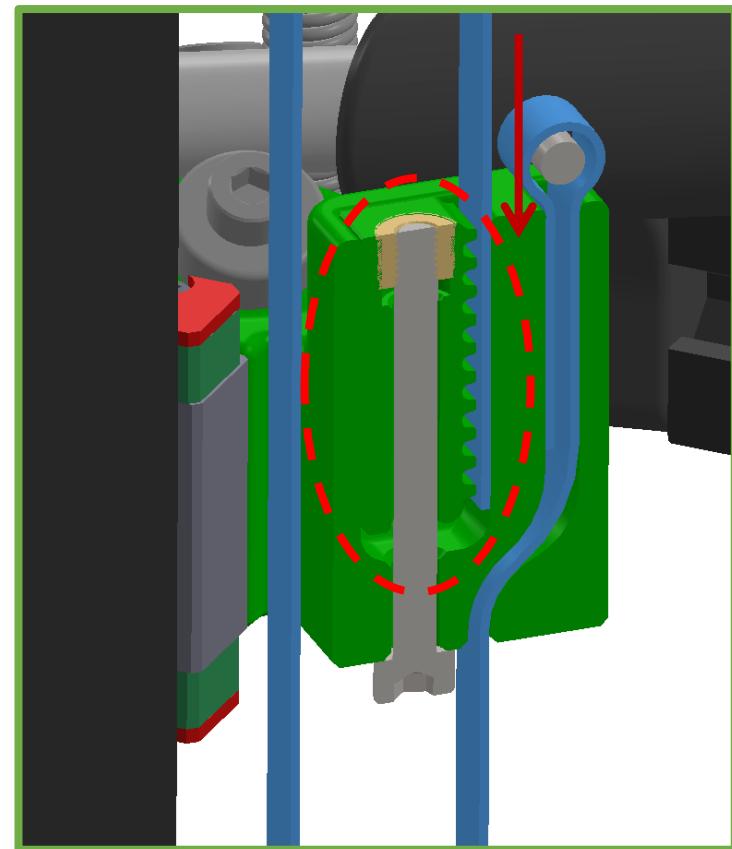
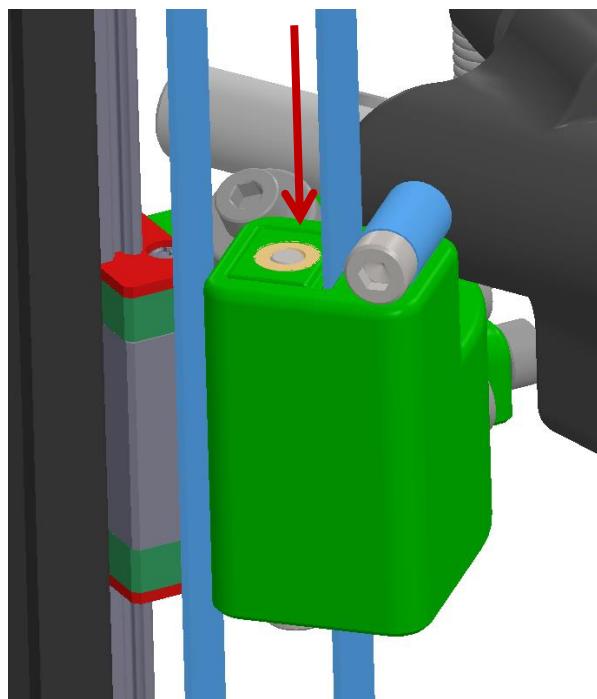
Starting from the z drive, guide the belt upwards and around the z idler, and then downwards once again.



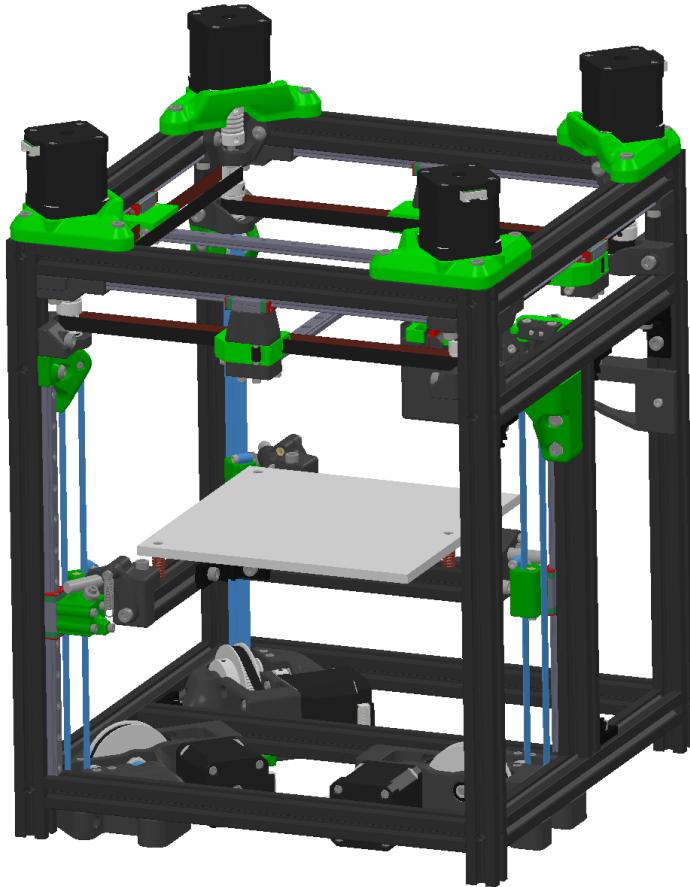
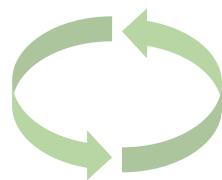
## Belting - Z

### Step 4 - Tensioner

Secure the second end by sliding the belt along with the printed tensioner inside the gantry block. Use the M3 bolt to further tighten. Do not fully tighten yet till all 3 belts are installed! A frequency of 80hz should be aimed for tightness of the Z belts.



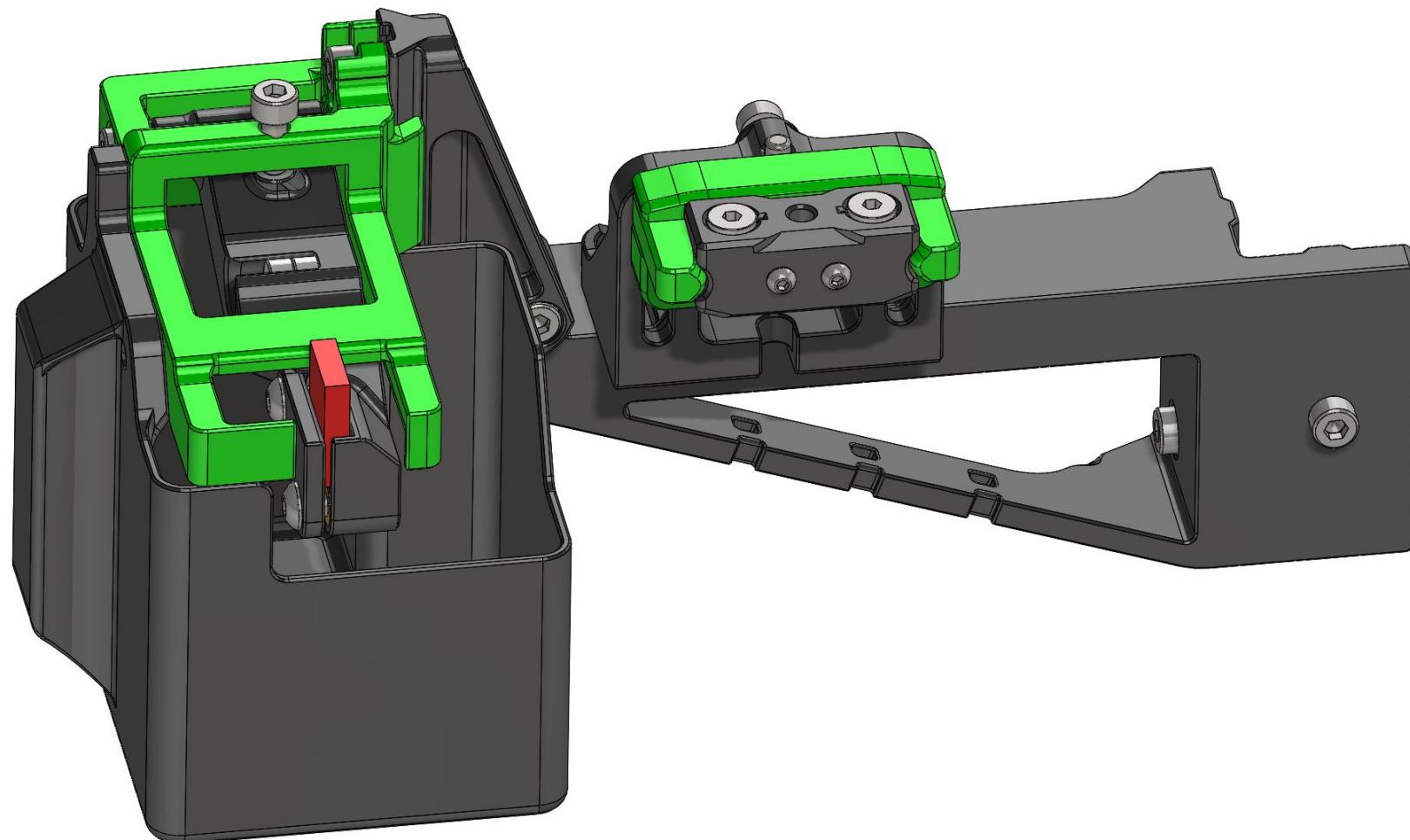
## Belting - Z



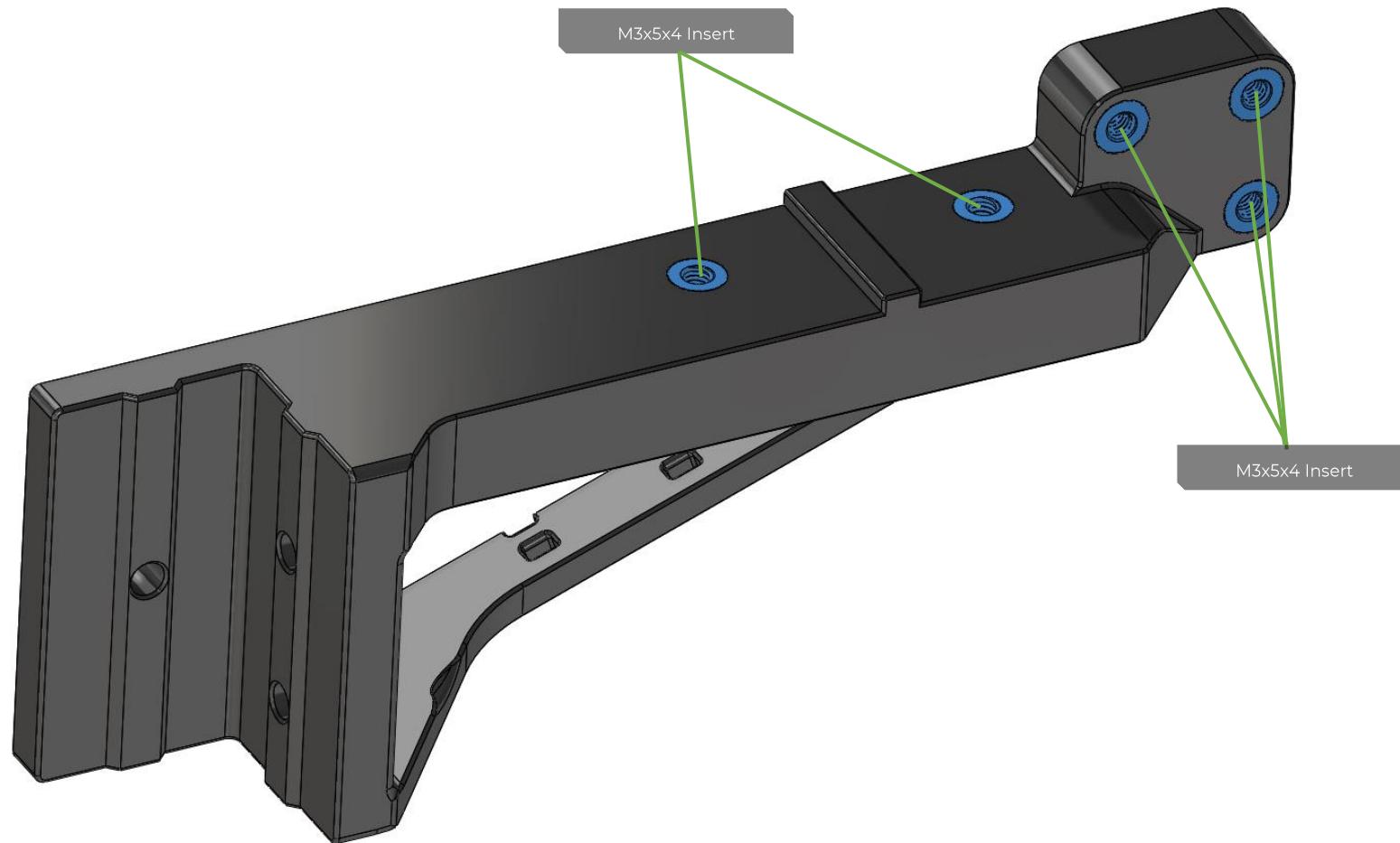
### Repeat

Repeat the belting process outlined in steps 1 to 4 for all three belts required for the Z motion, following the provided picture as a reference. After installing all three belts, begin applying equal tension to each belt.

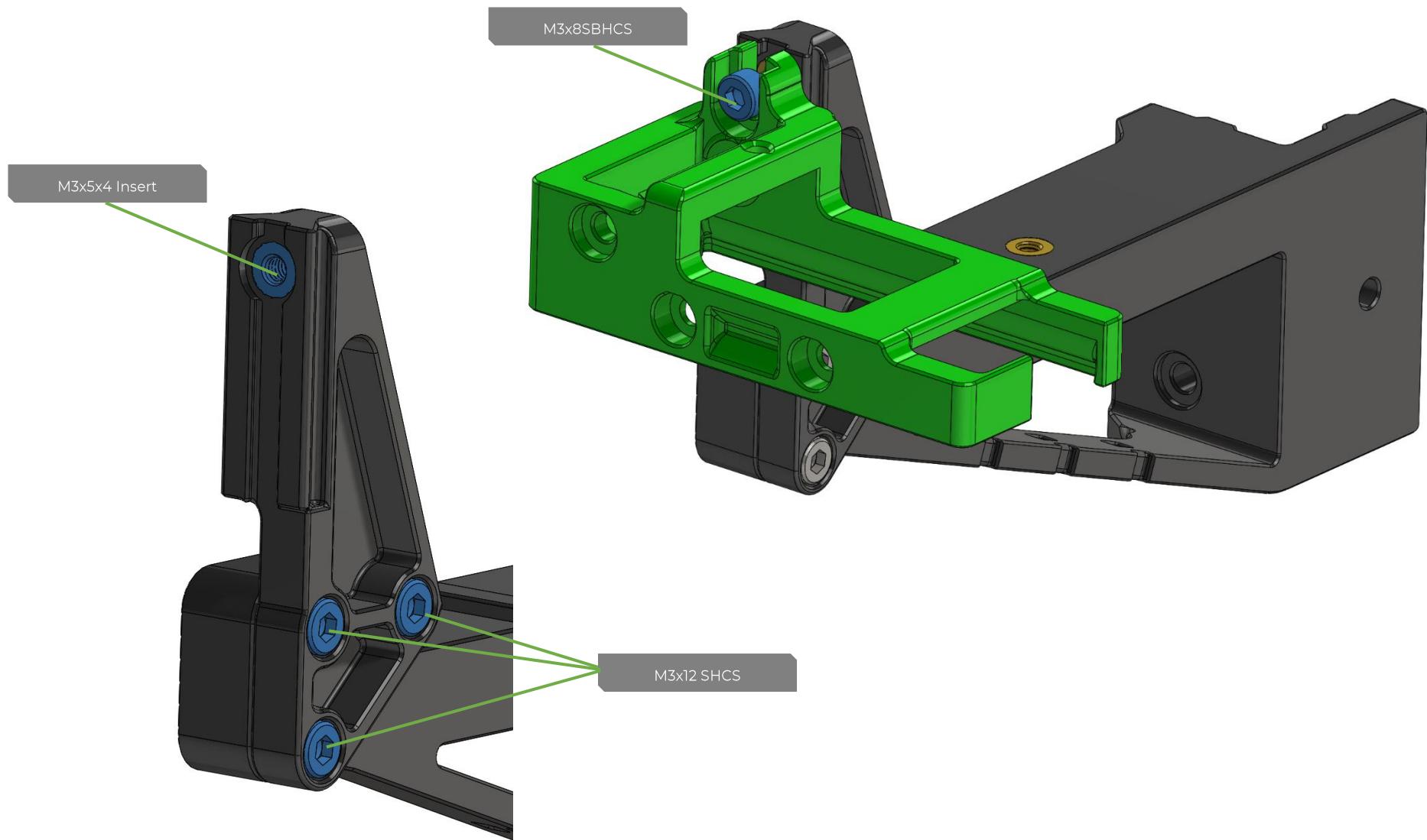
## Purge Bucket - Overview



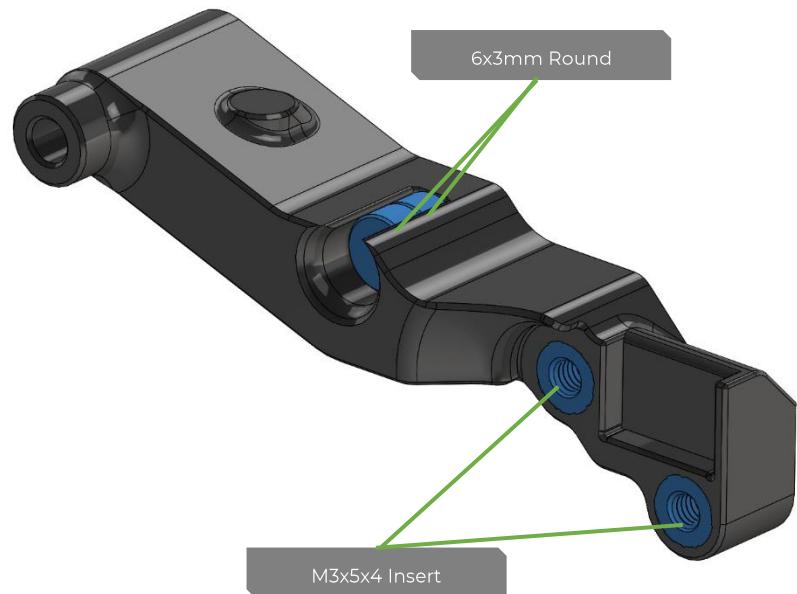
## Purge Bucket - Assembly



## Purge Bucket - Assembly



## Purge Bucket - Assembly

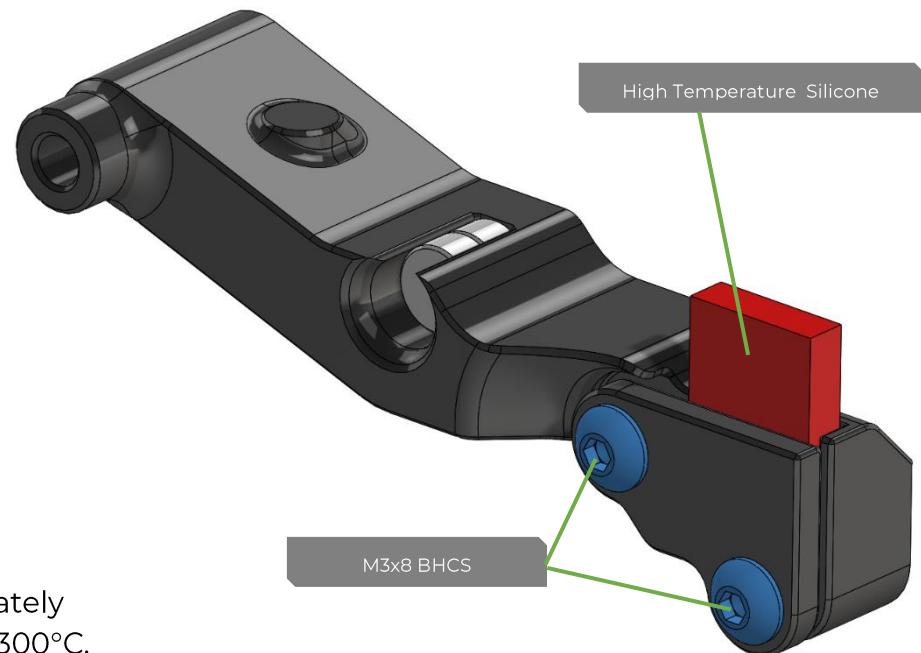


### Wiper

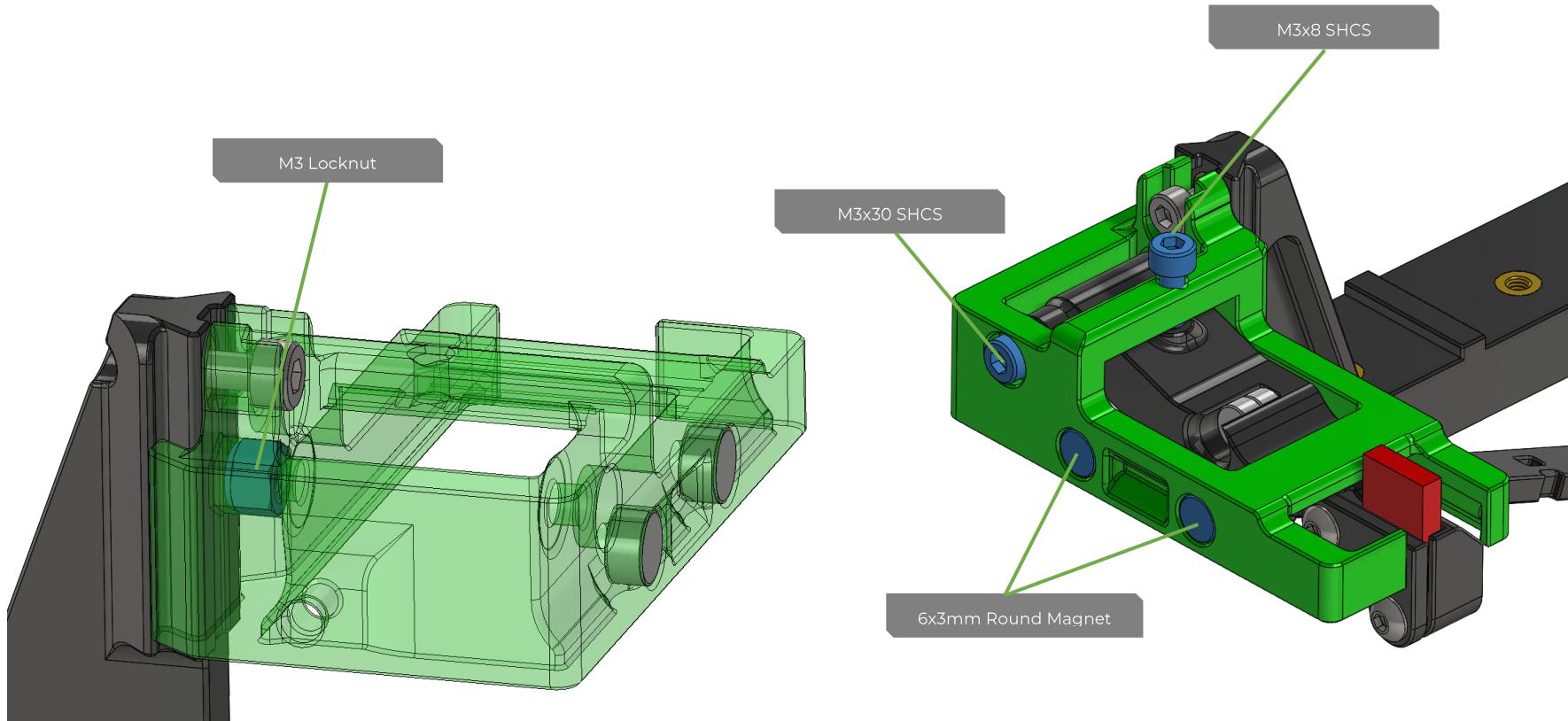
Utilize a high-temperature silicone measuring approximately 3x10x14mm, ensuring its safe at temperatures of at least 300°C.

### Magnets

Adjust the wiper's attraction force by adding or removing magnets to achieve the desired level of fine-tuning.



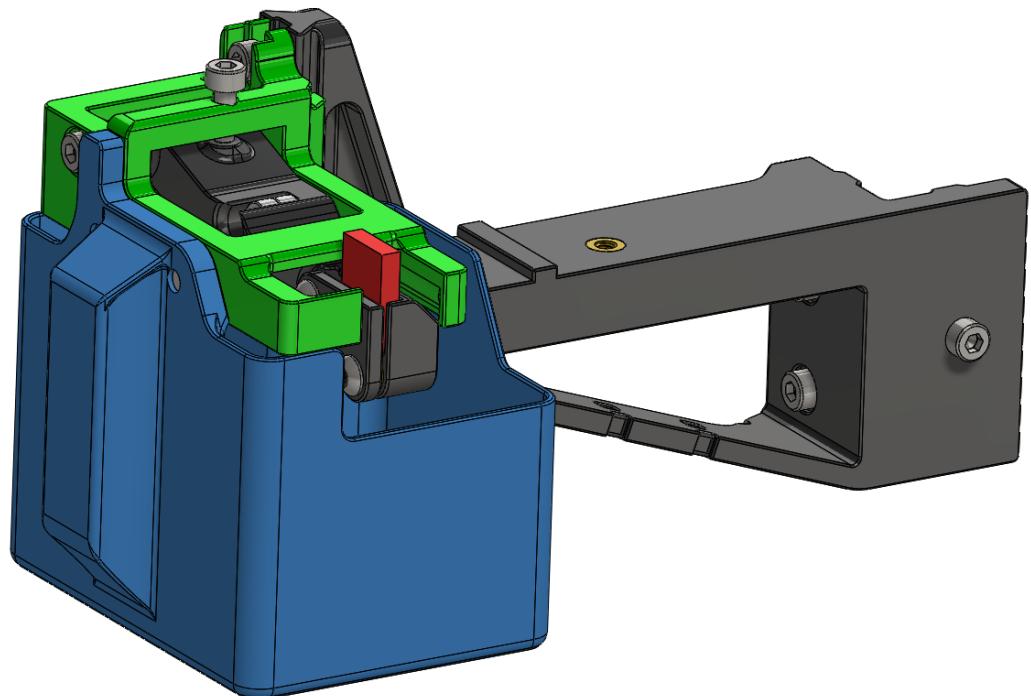
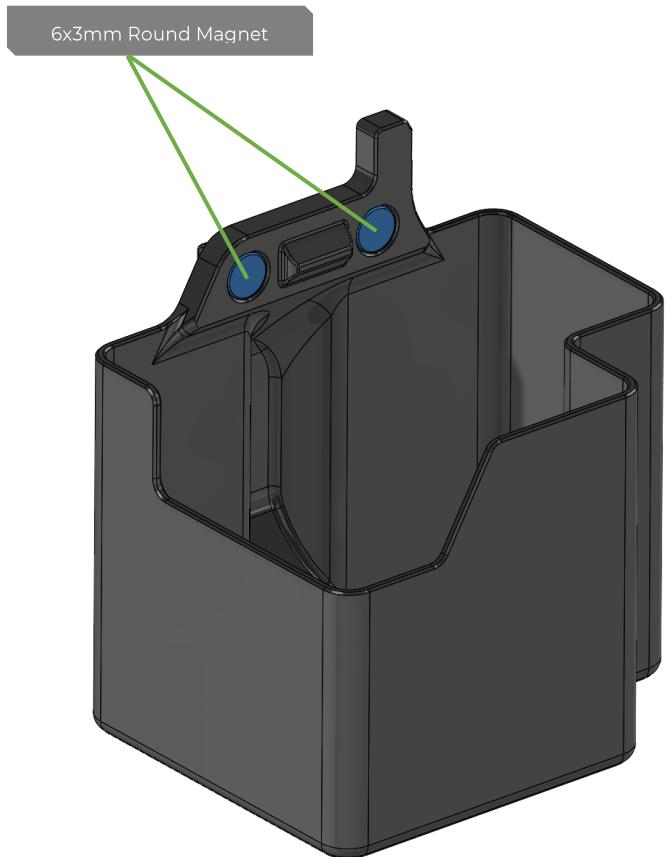
## Purge Bucket - Assembly



### Glue

For a secure mounting of the 6x3mm round magnets glue is recommended.

## Purge Bucket - Assembly



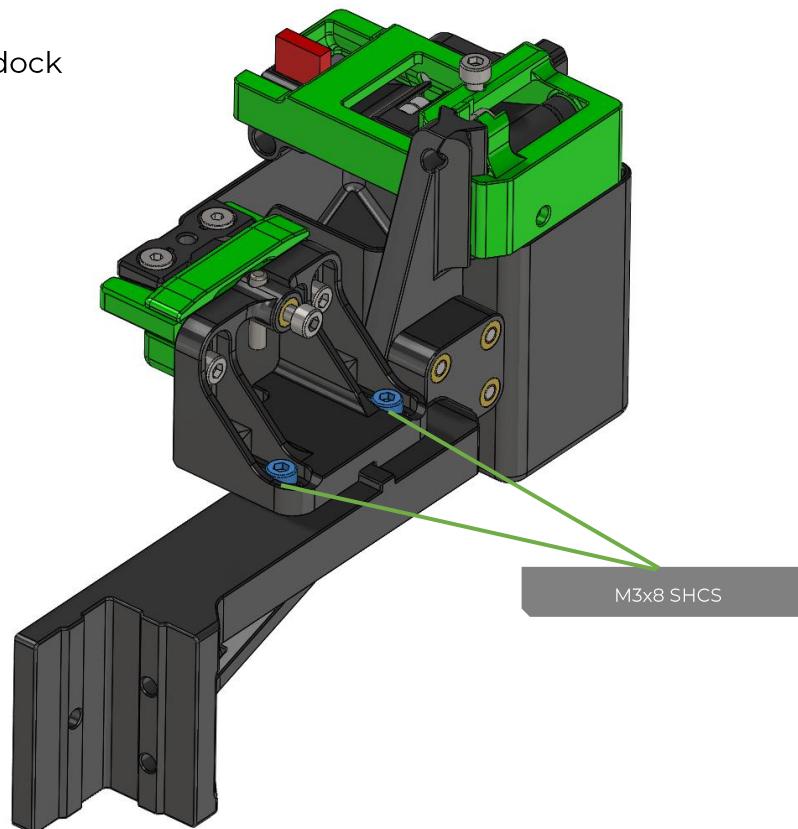
### Tip

Check magnet polarity before installation.

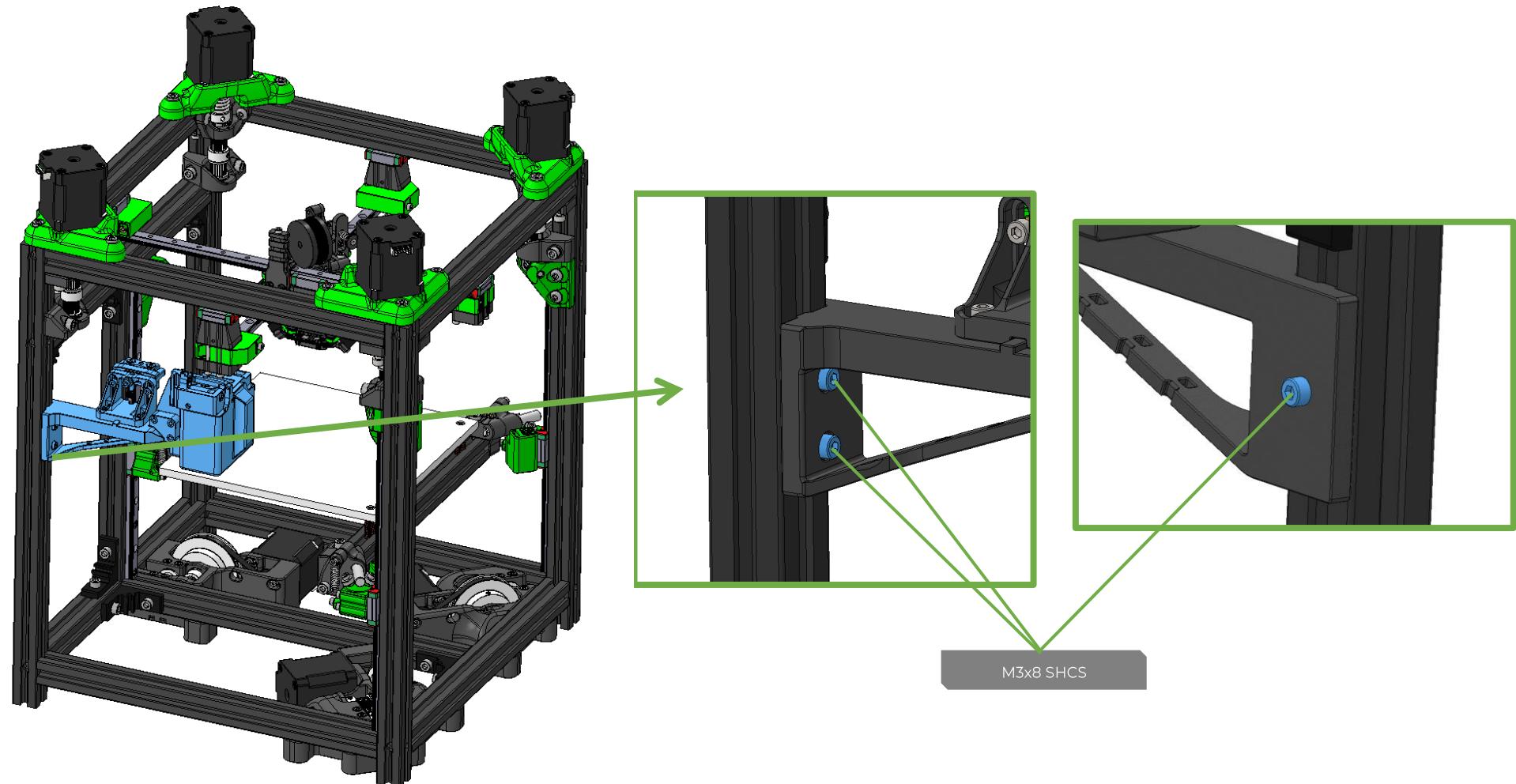
## Purge Bucket - Assembly

### Optional

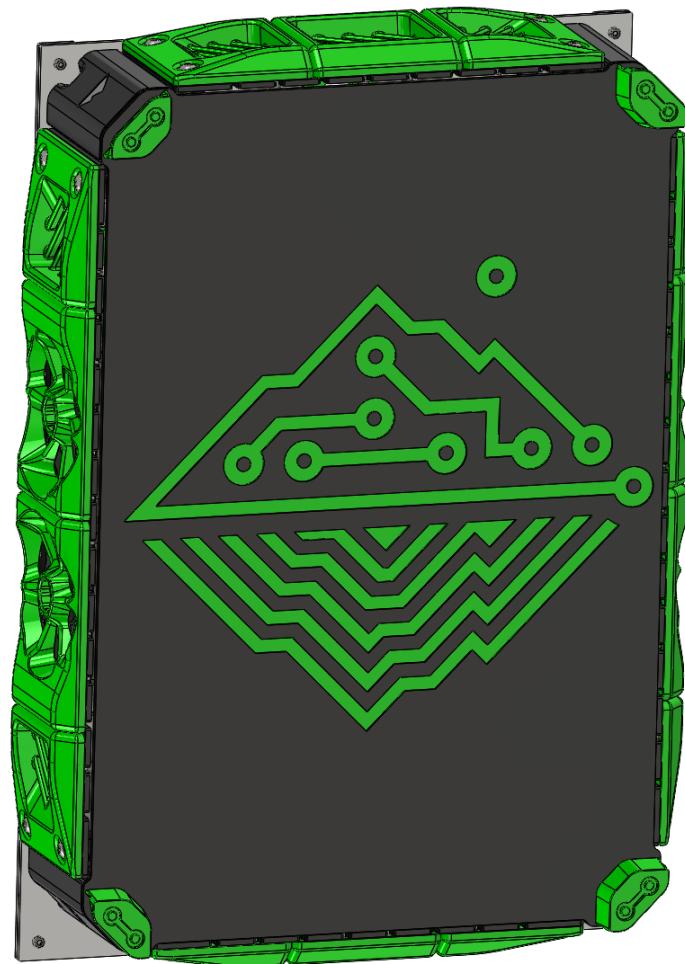
When selecting the Quickdraw probe, install the dock according to the provided image.



## Purge Bucket - Assembly



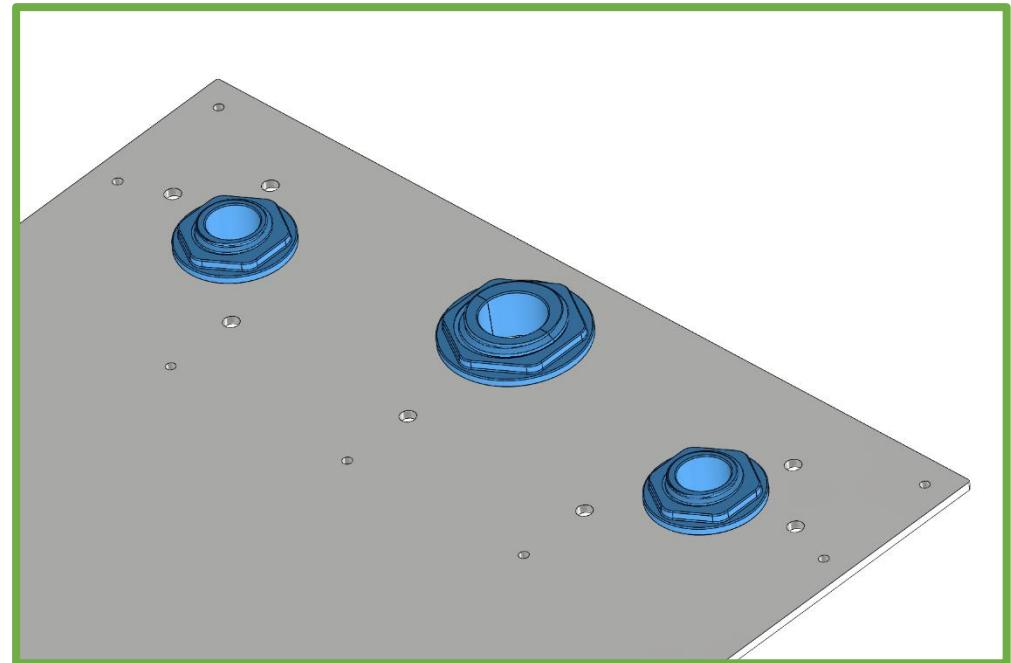
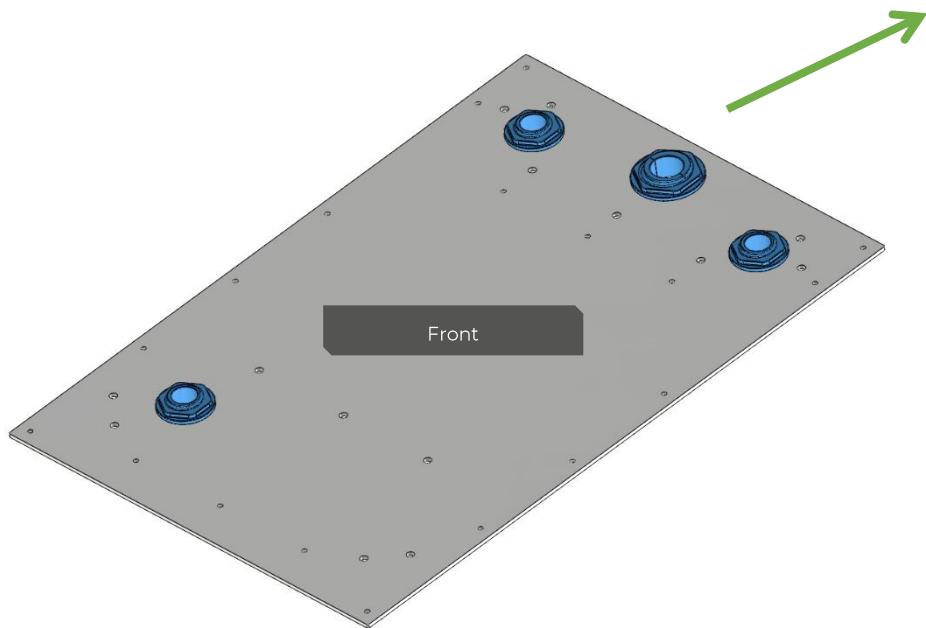
## Backpack - Overview



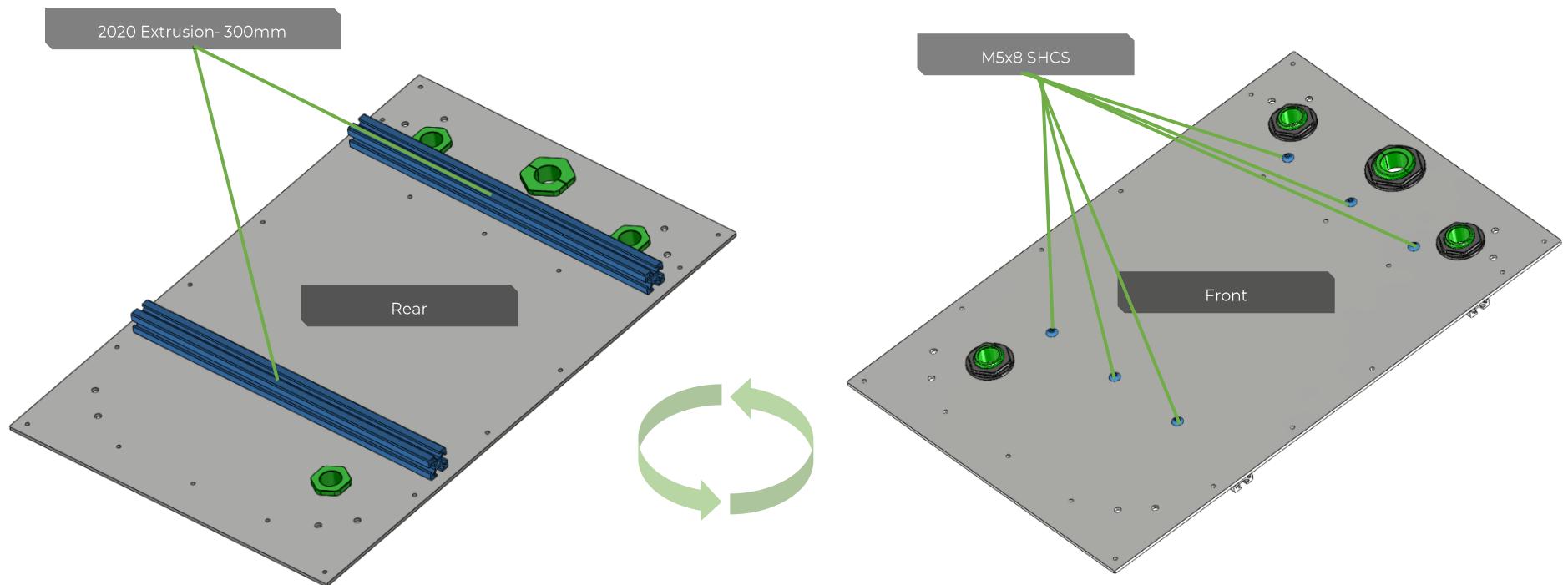
## Backpack - Assembly

### Printed Grommets

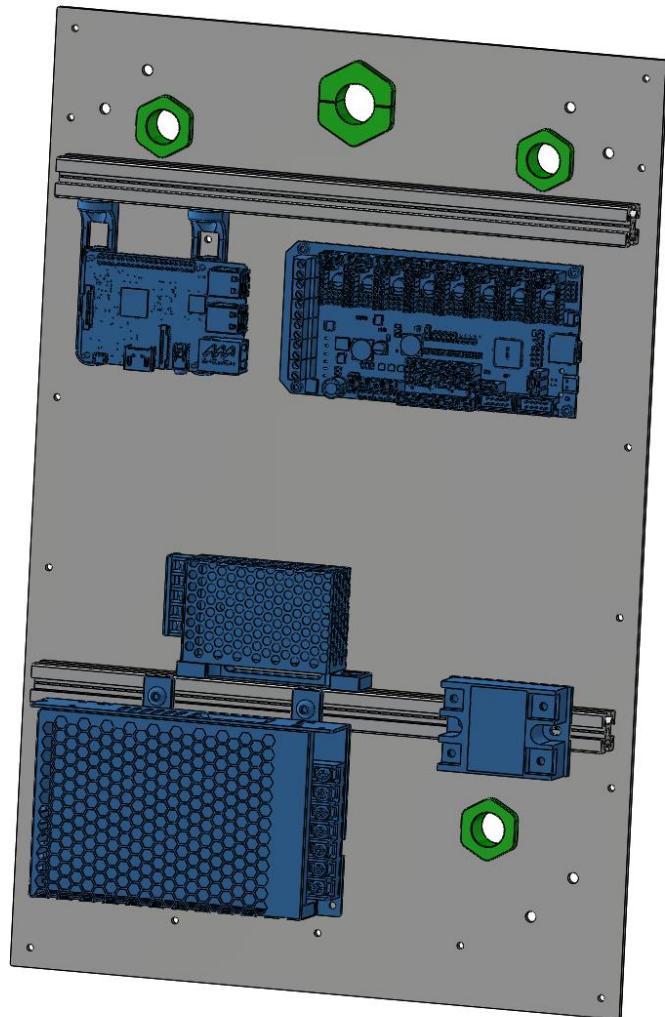
Install the printed grommets according to the provided picture. Use the split variant in the center. The split variant can accommodate large connectors such as the premade 16p wiring harness.



## Backpack - Assembly



## Backpack - Assembly

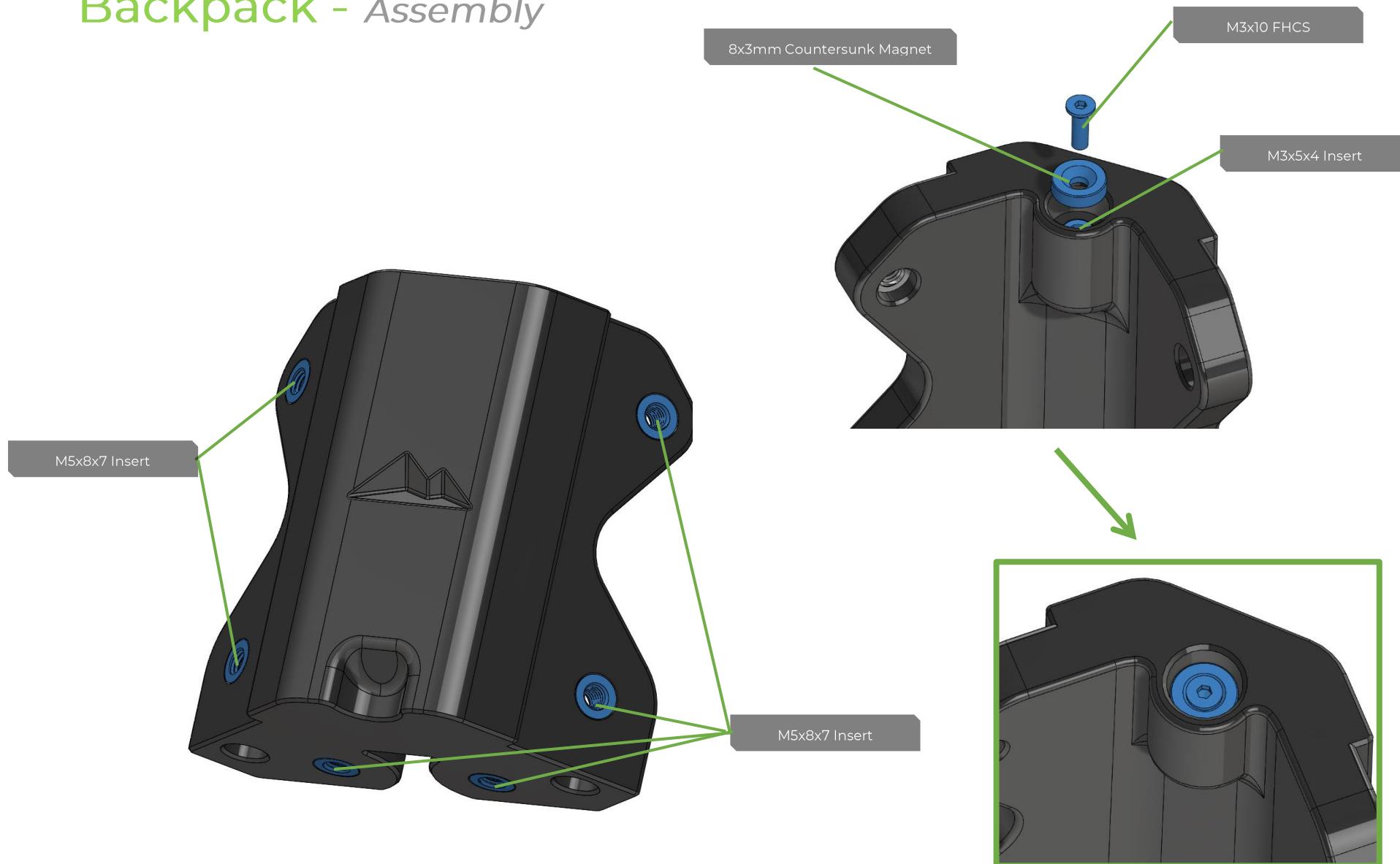


### Electronics

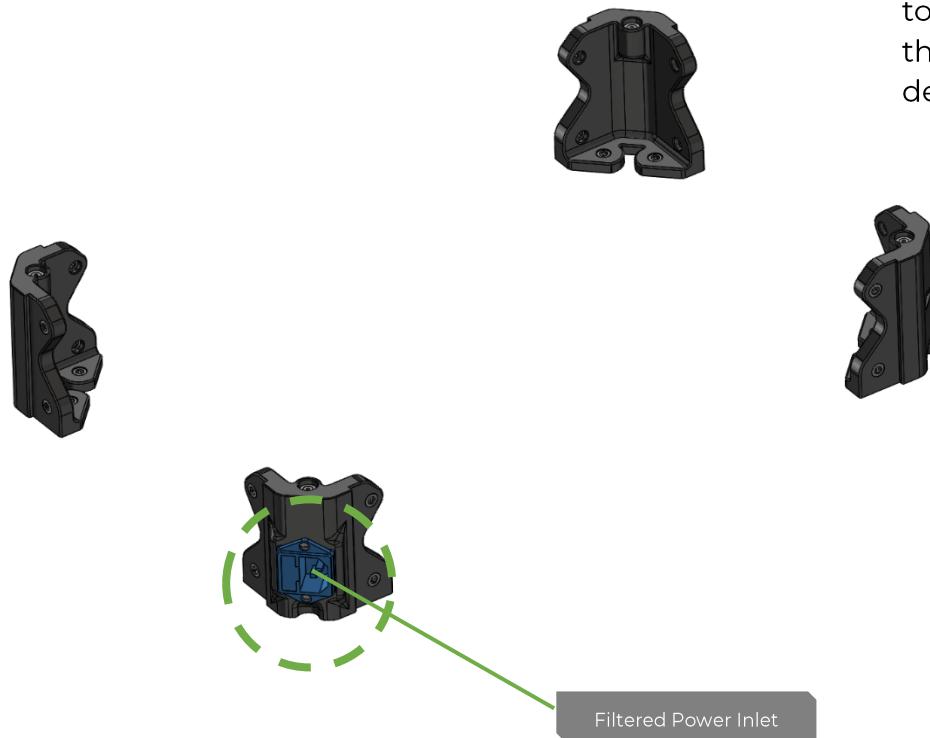
Mount your preferred choice of electronics onto the 2020 extrusion. Ensure that the brackets are not positioned too close to the edge, as this may cause overlap with the mounting holes in the panel. We recommend using the constellation hardware for your electronics.

<https://github.com/Annex-Engineering/Constellation>

## Backpack - Assembly



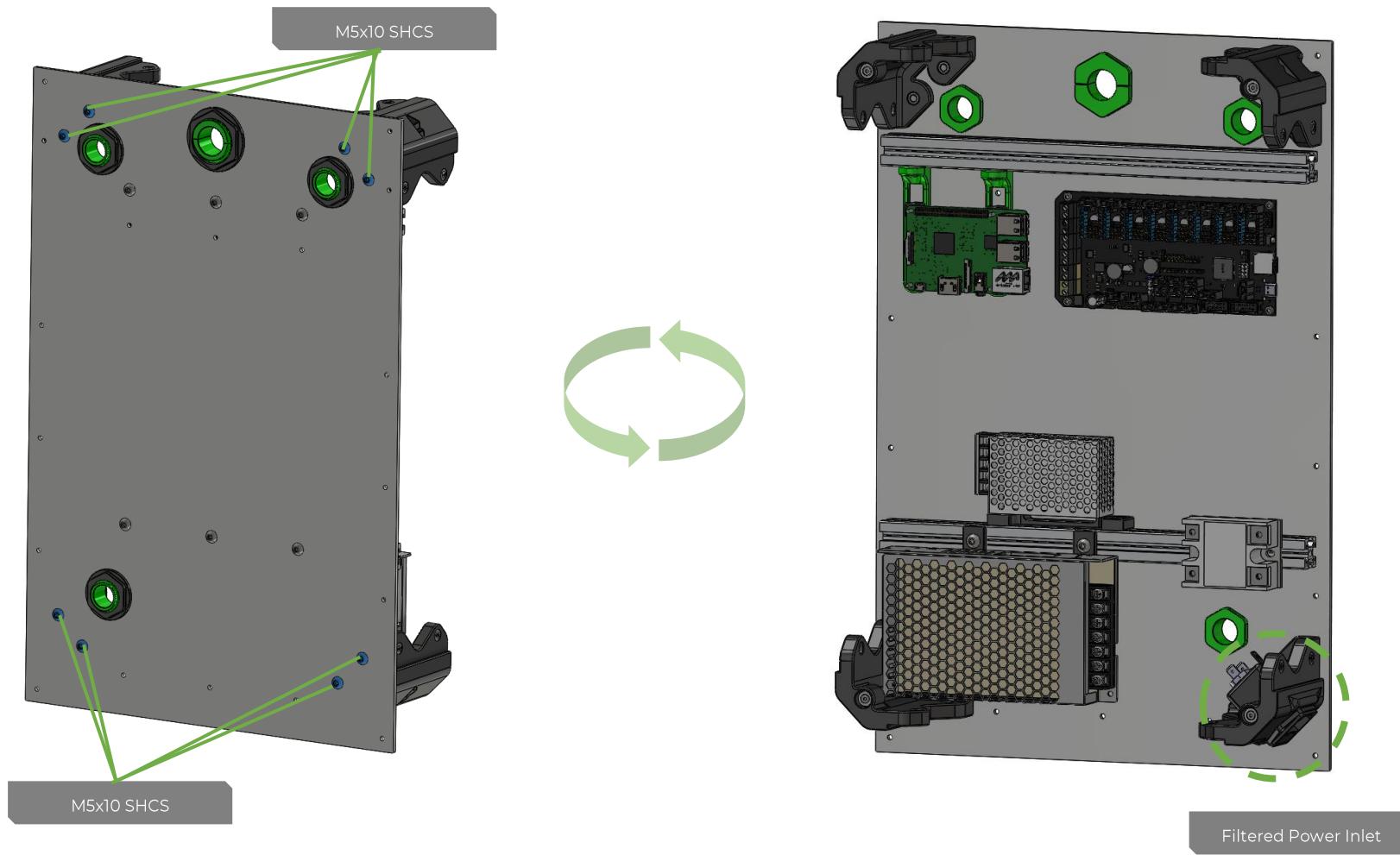
## Backpack - Assembly



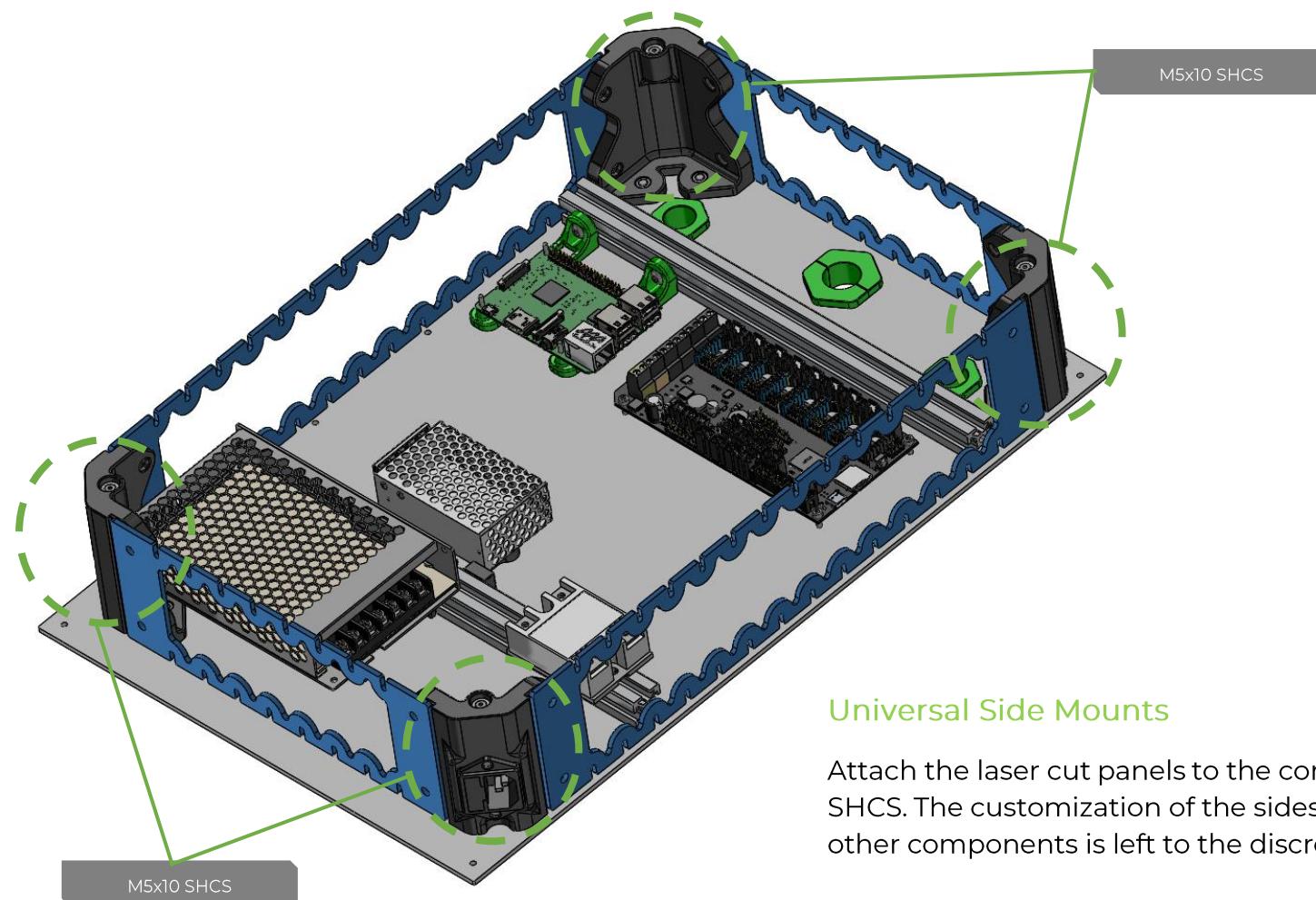
### Corner backpack brackets

Construct an additional three corners, resulting in a total of four corners. Pay attention to the corner where the power input is installed. Screws used for the inlet depend on the model bought.

## Backpack - Assembly



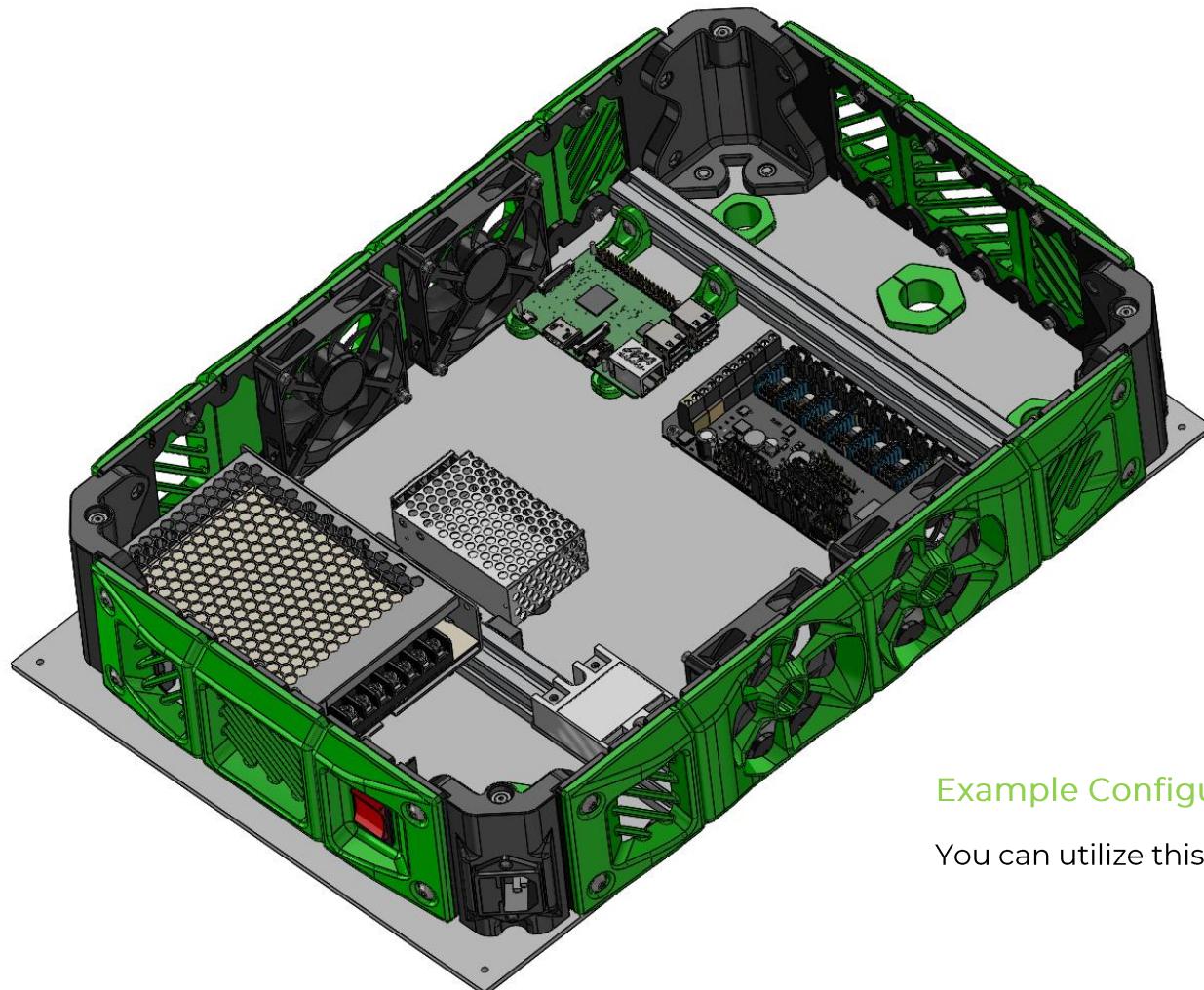
## Backpack - Assembly



### Universal Side Mounts

Attach the laser cut panels to the corner brackets with M5x10 SHCS. The customization of the sides with fans, connectors, and other components is left to the discretion of the user.

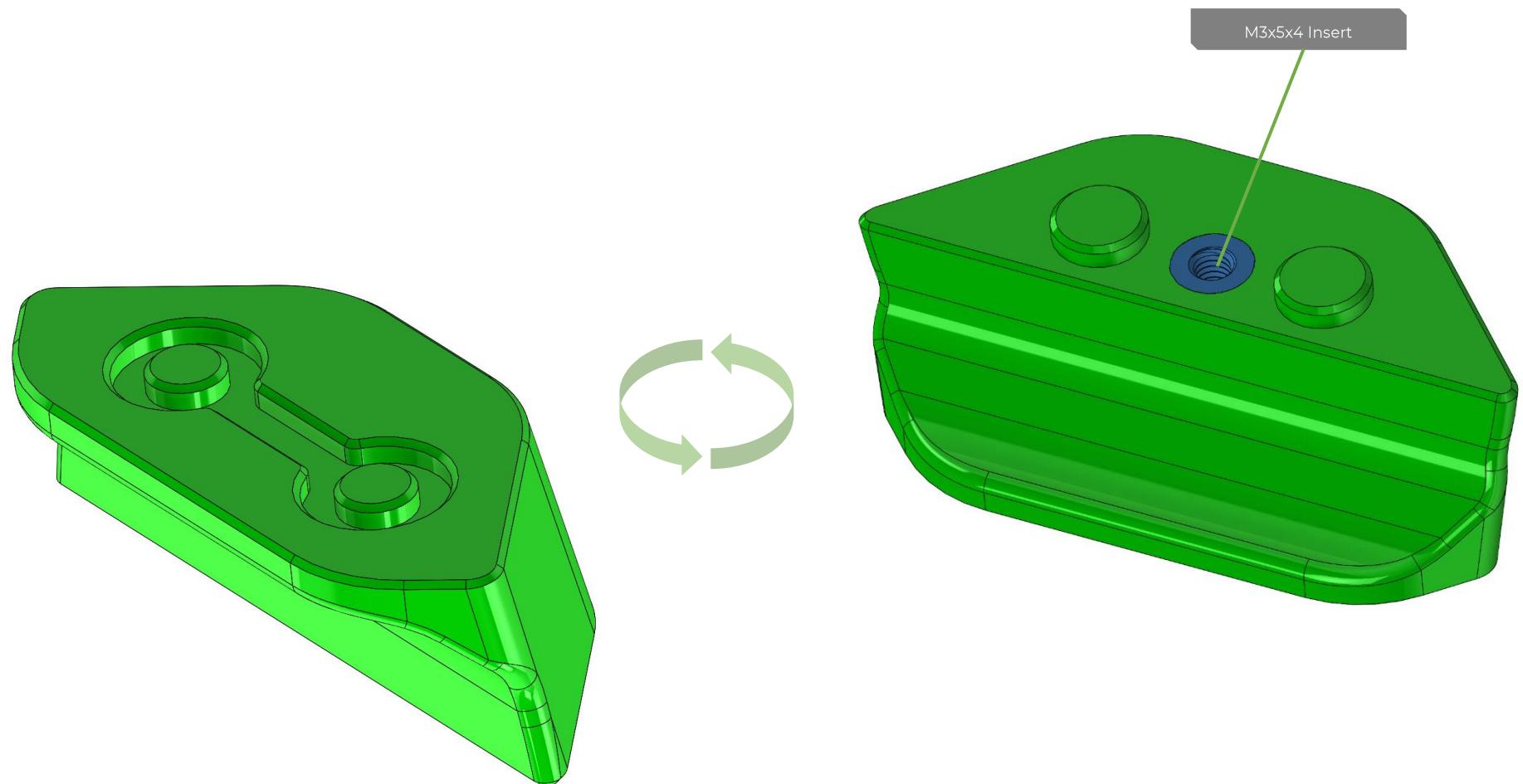
## Backpack - Assembly



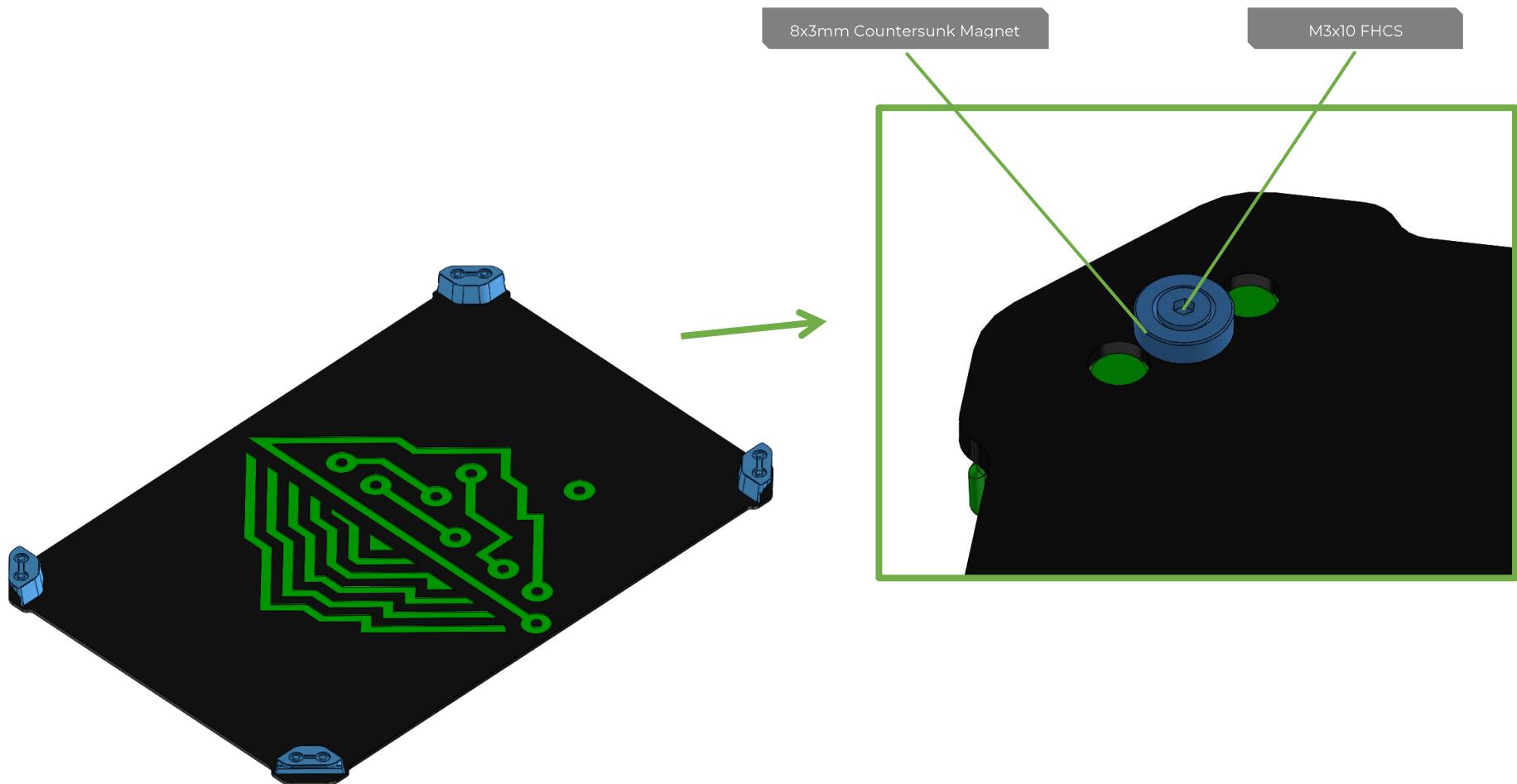
### Example Configuration

You can utilize this example configuration for your build.

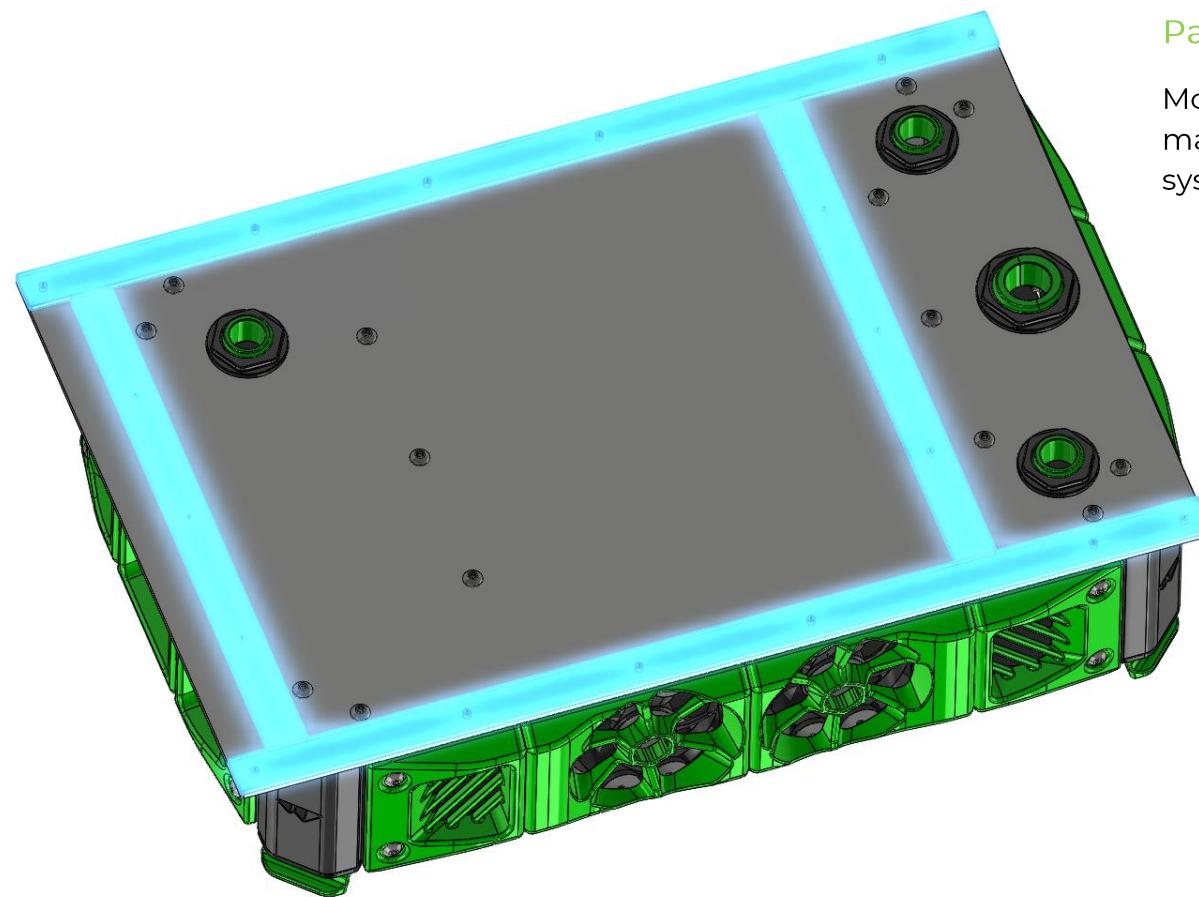
## Backpack – Removable Panel



## Backpack – Removable Panel



## Backpack - Assembly

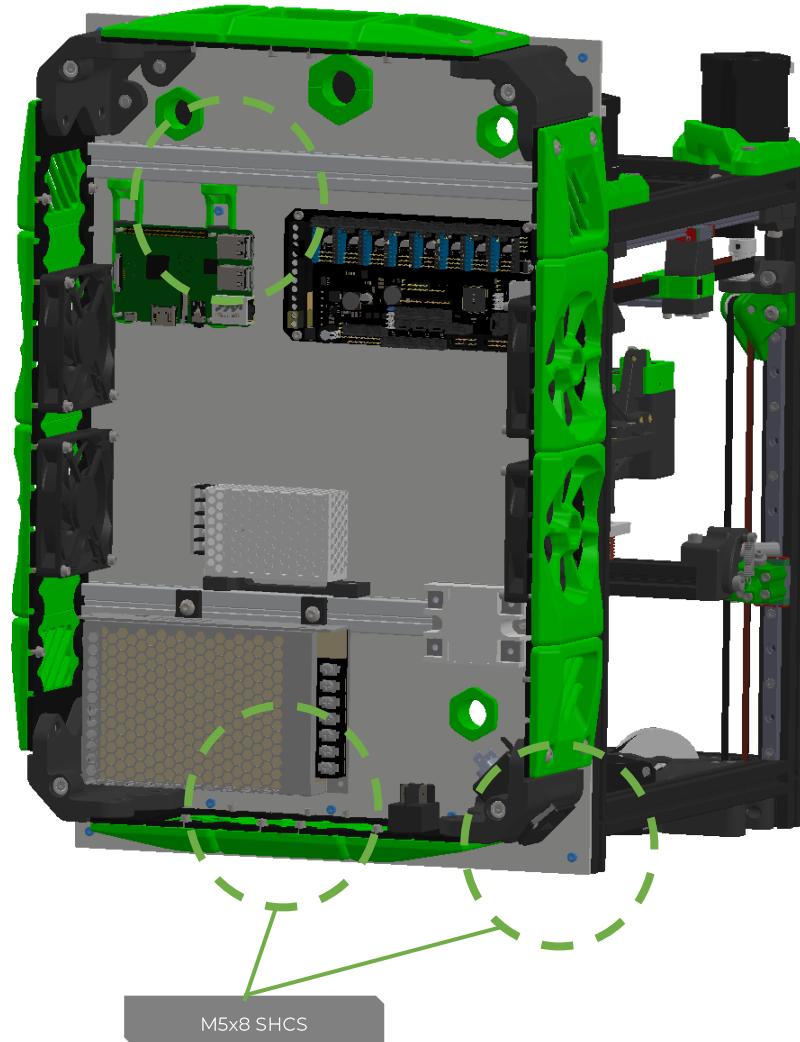


### Panel Spacers

Mount the lasercut spacer panels to offset the main panel, providing clearance for the motion system and preventing scratches and rattling.

## Backpack - Assembly

c

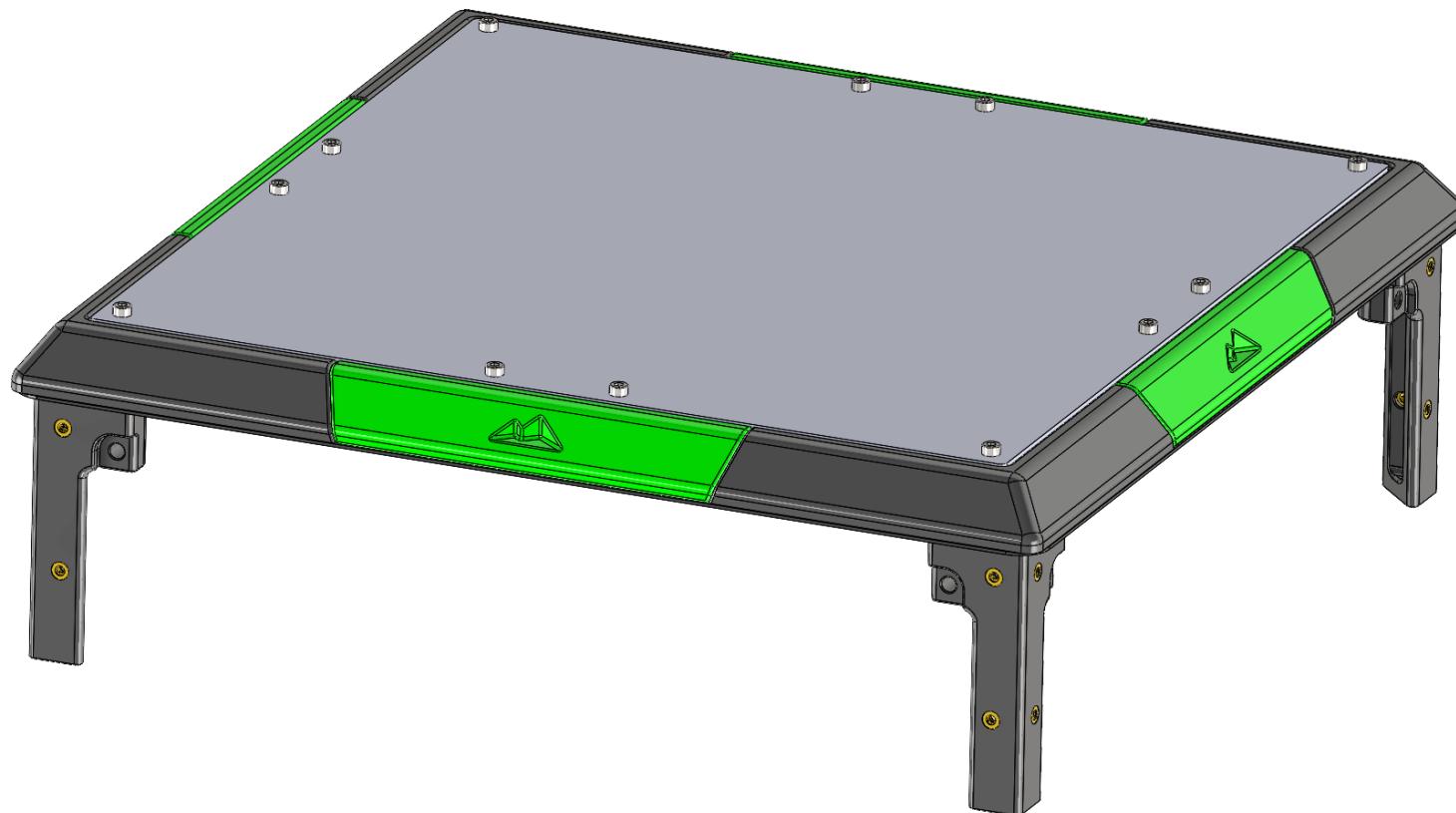


### Mounting The Backpack

Attach the backpack to the printer frame by utilizing all the holes in the panel along the edge and centre. The removable panel can be latched onto the backpack.

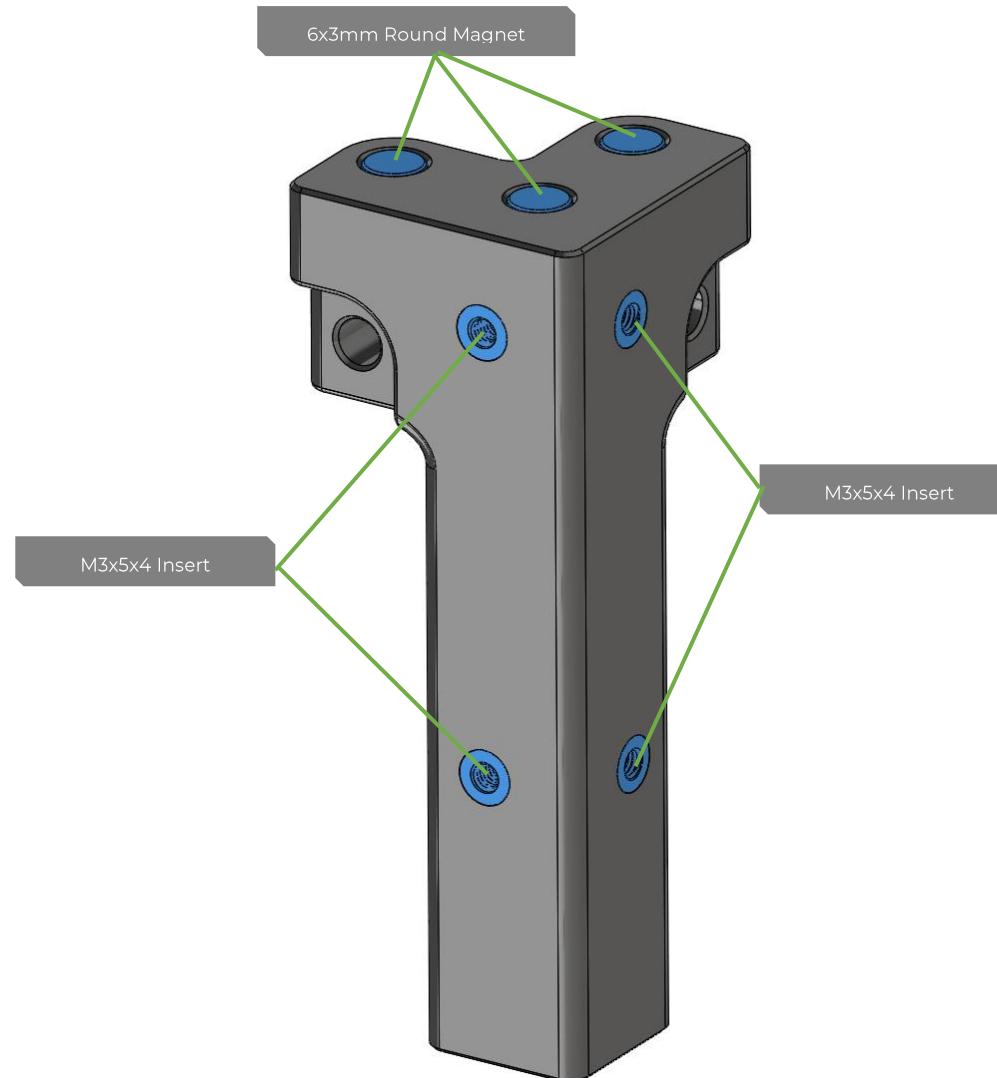


## Top Hat - Overview

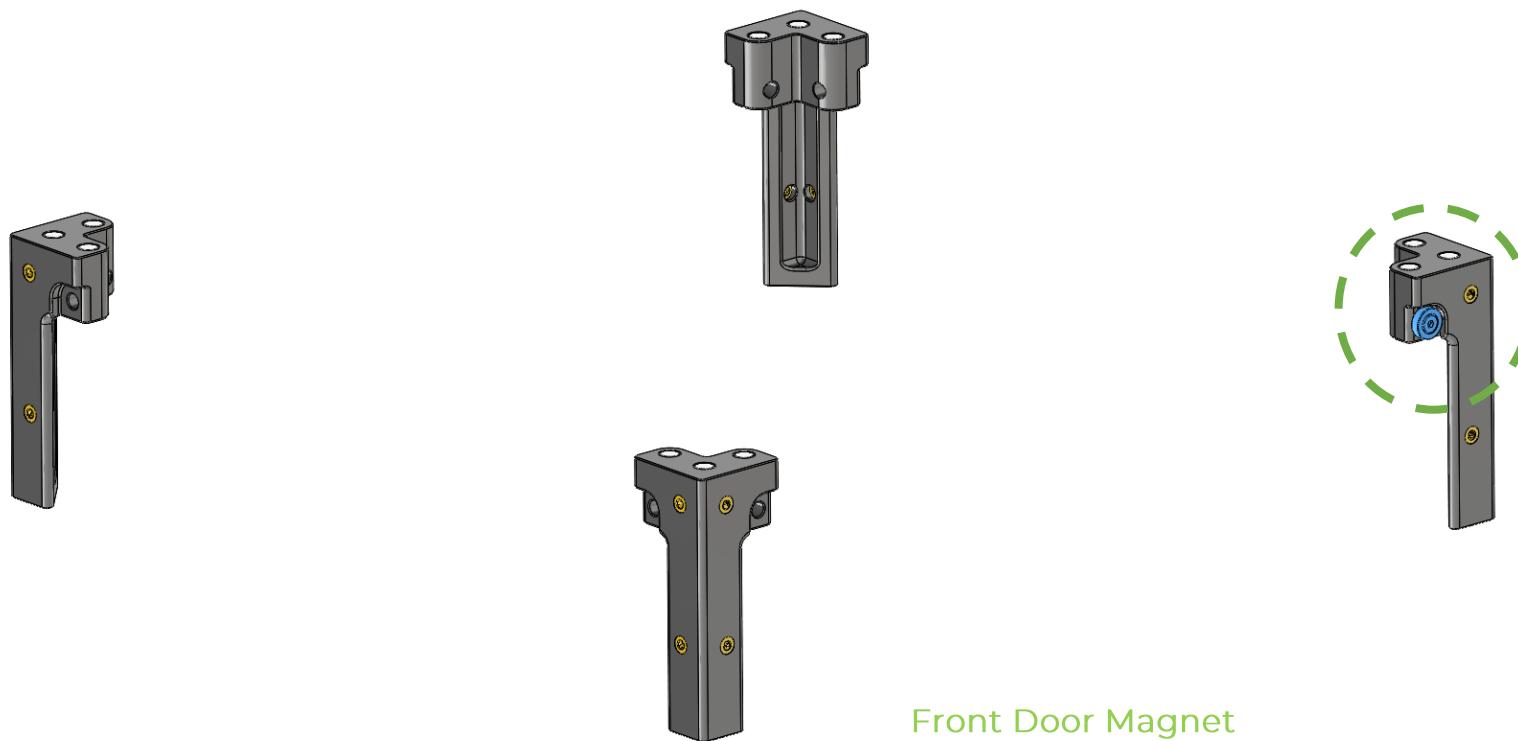


## Top Hat - Assembly

4X



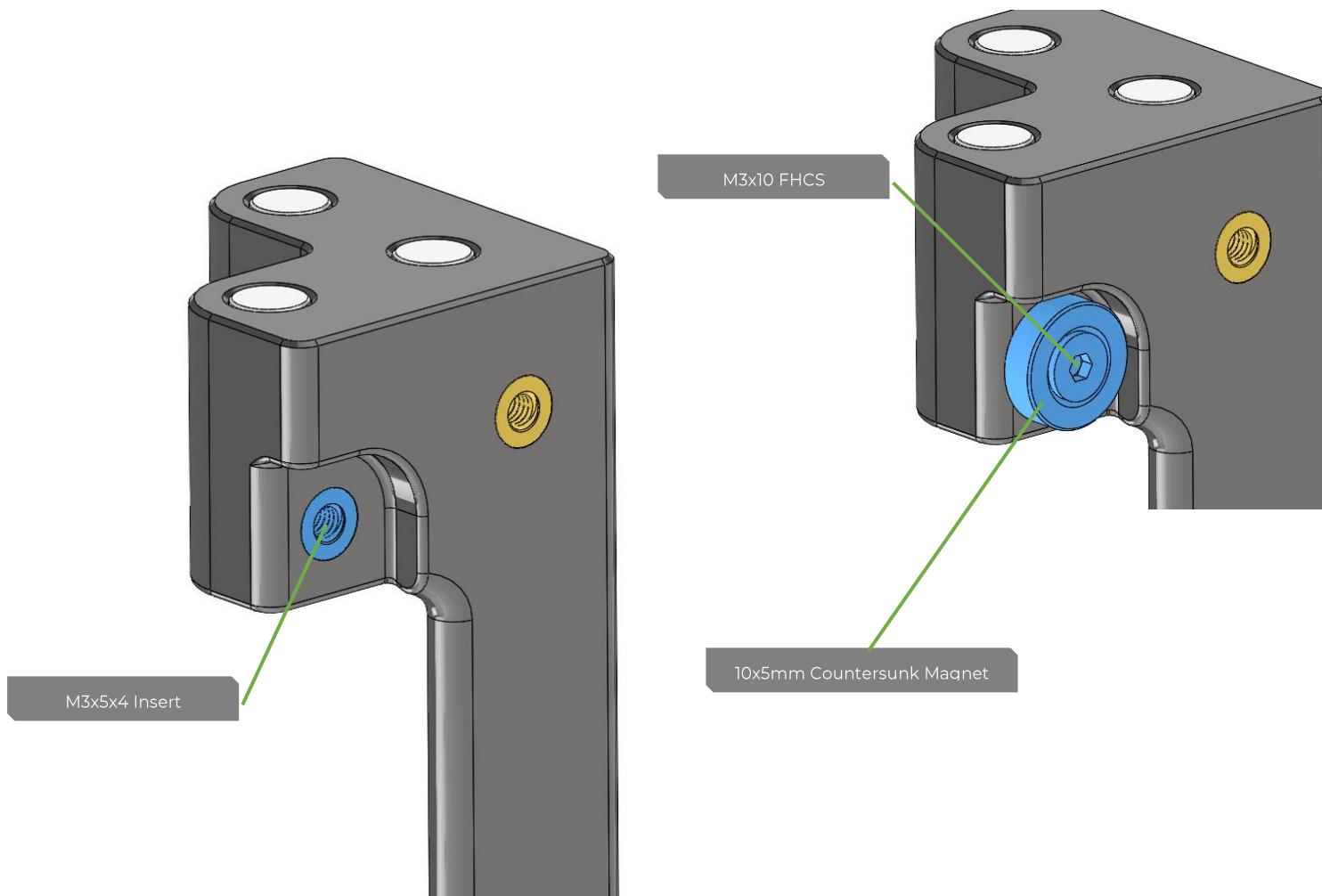
## Top Hat - Assembly



Front Door Magnet

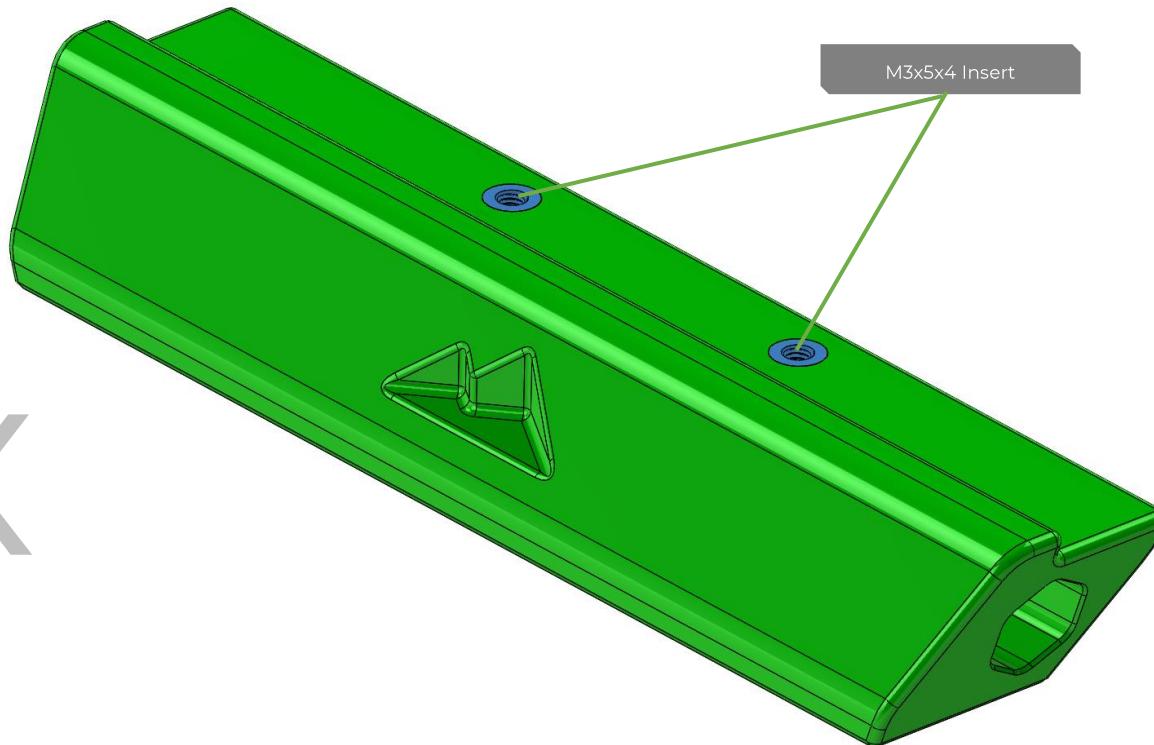
An additional magnet will be placed in one corner of the front door housing.

## Top Hat - Assembly



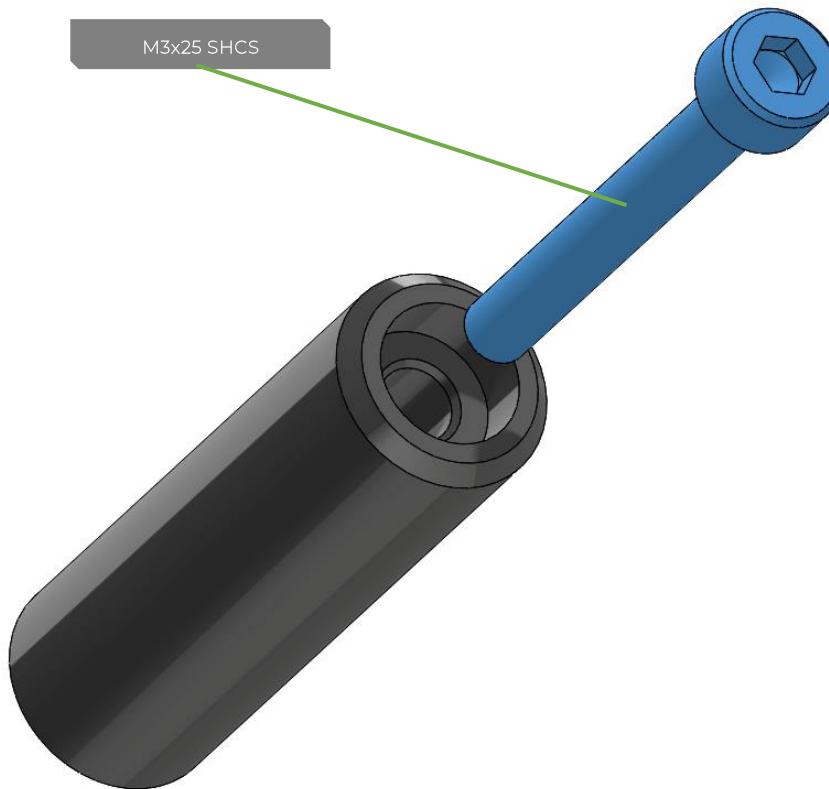
## Top Hat - Assembly

4X



## Top Hat - Assembly

8X

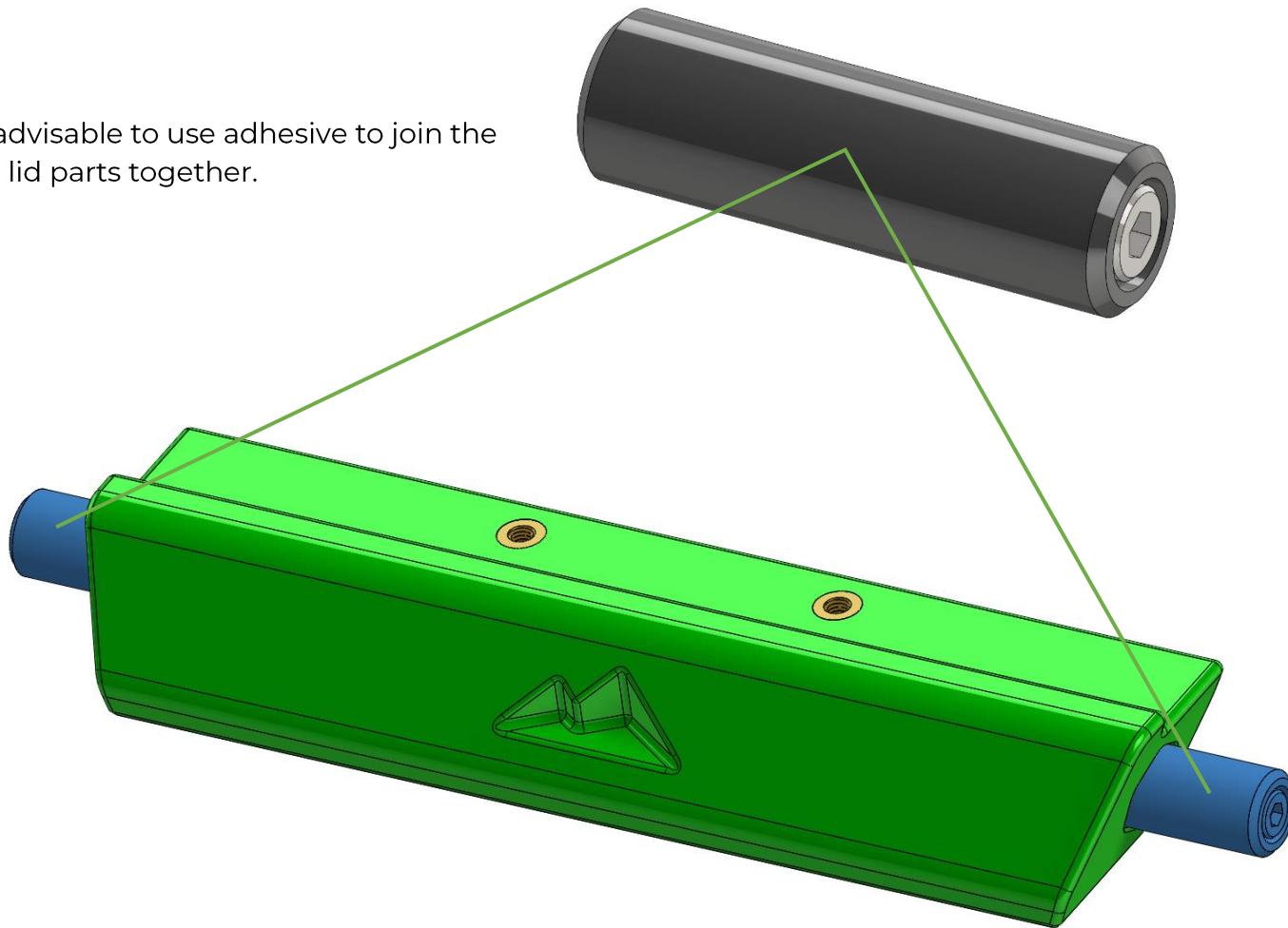


## Top Hat - Assembly

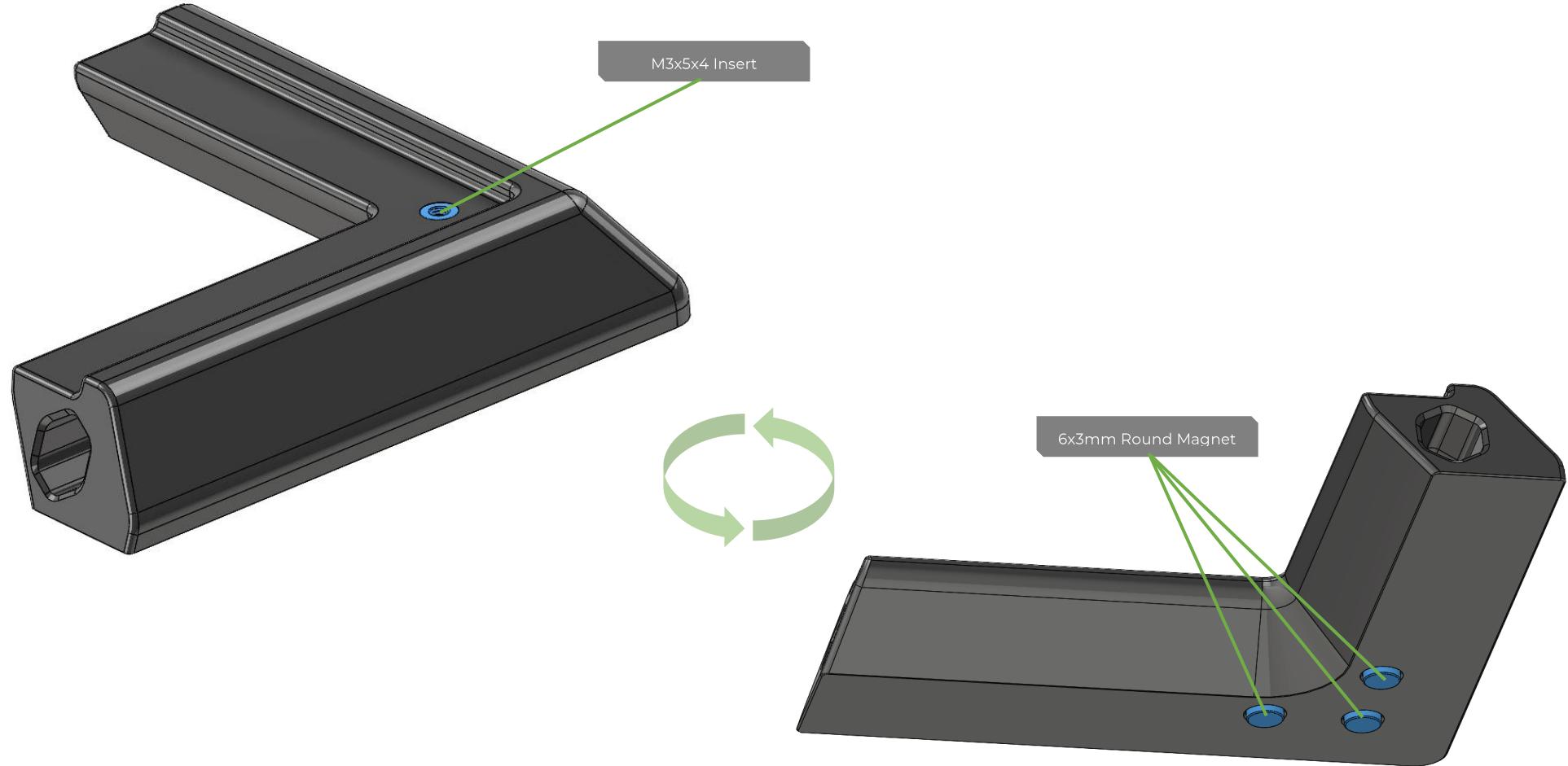


### Adhesive

It is highly advisable to use adhesive to join the printed top lid parts together.



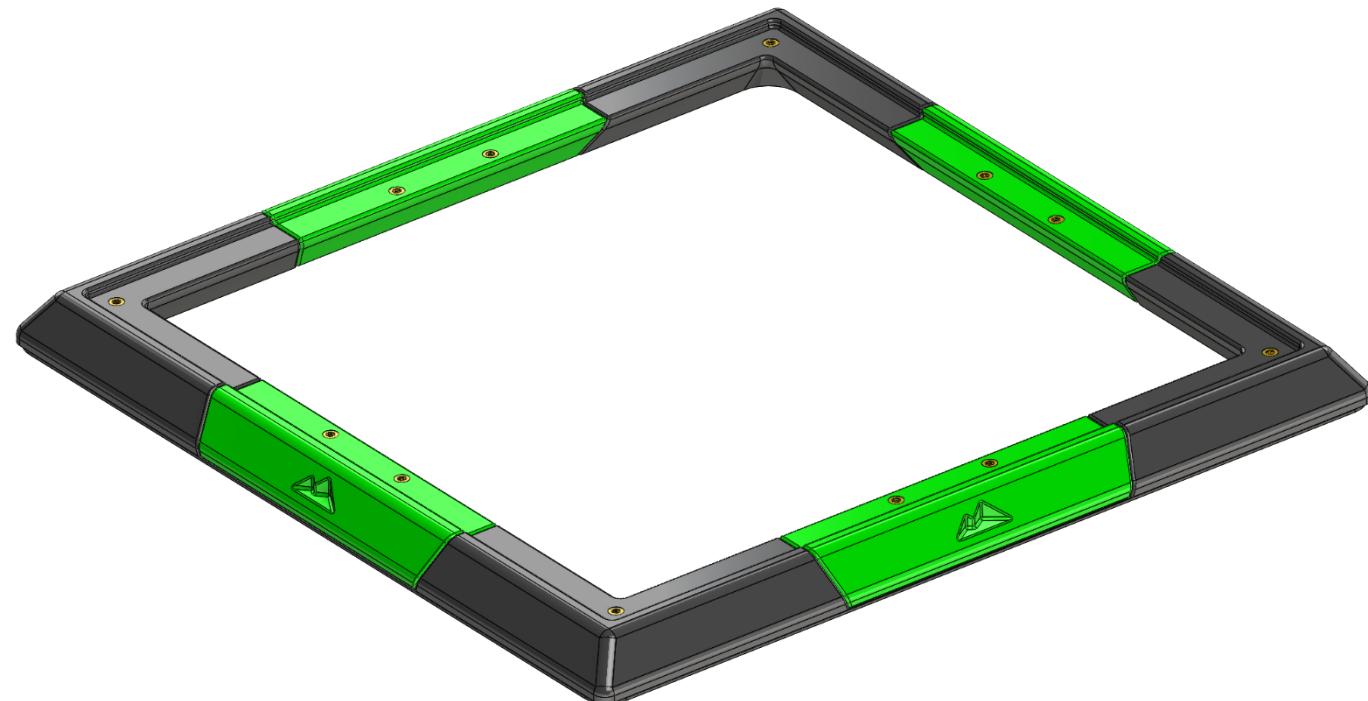
## Top Hat - Assembly



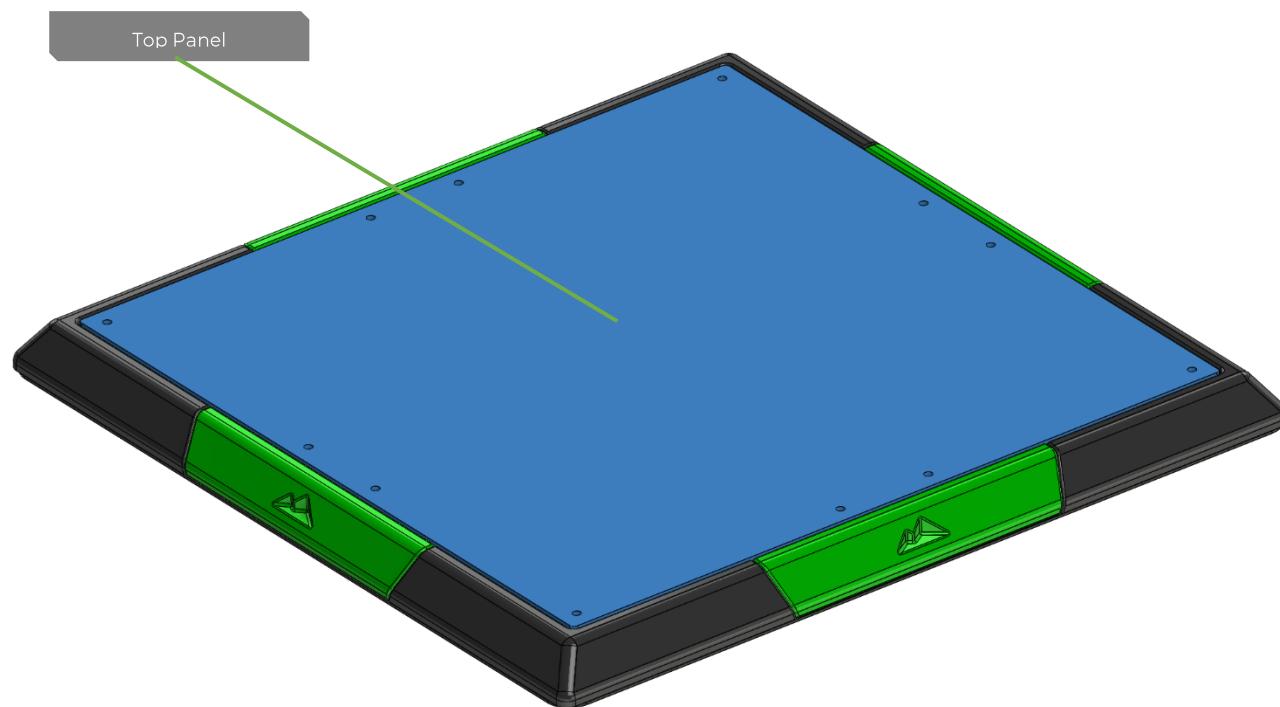
## Top Hat - Assembly

### Top Hat Edge

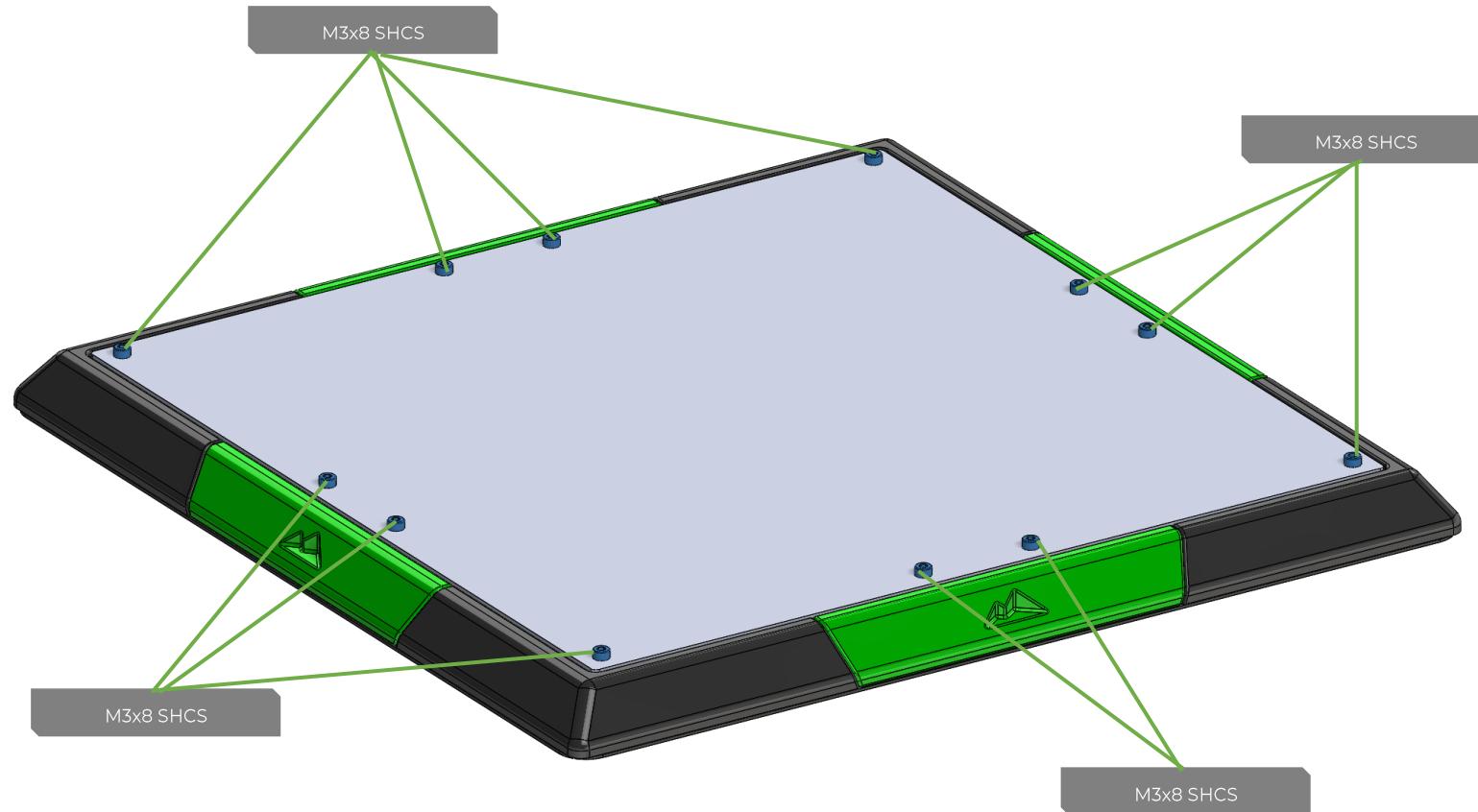
Connect all the separate elements to build a square.



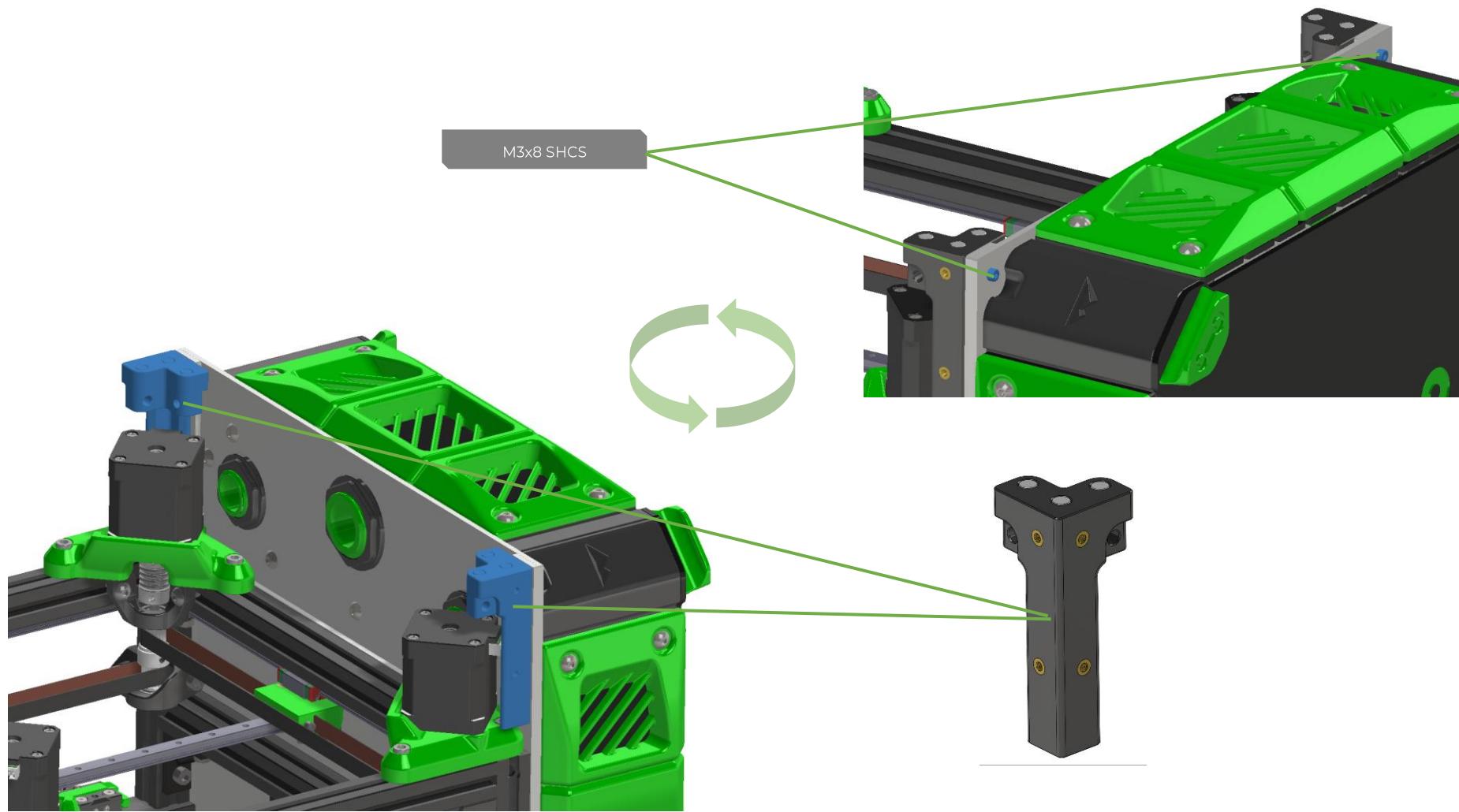
## Top Hat - Assembly



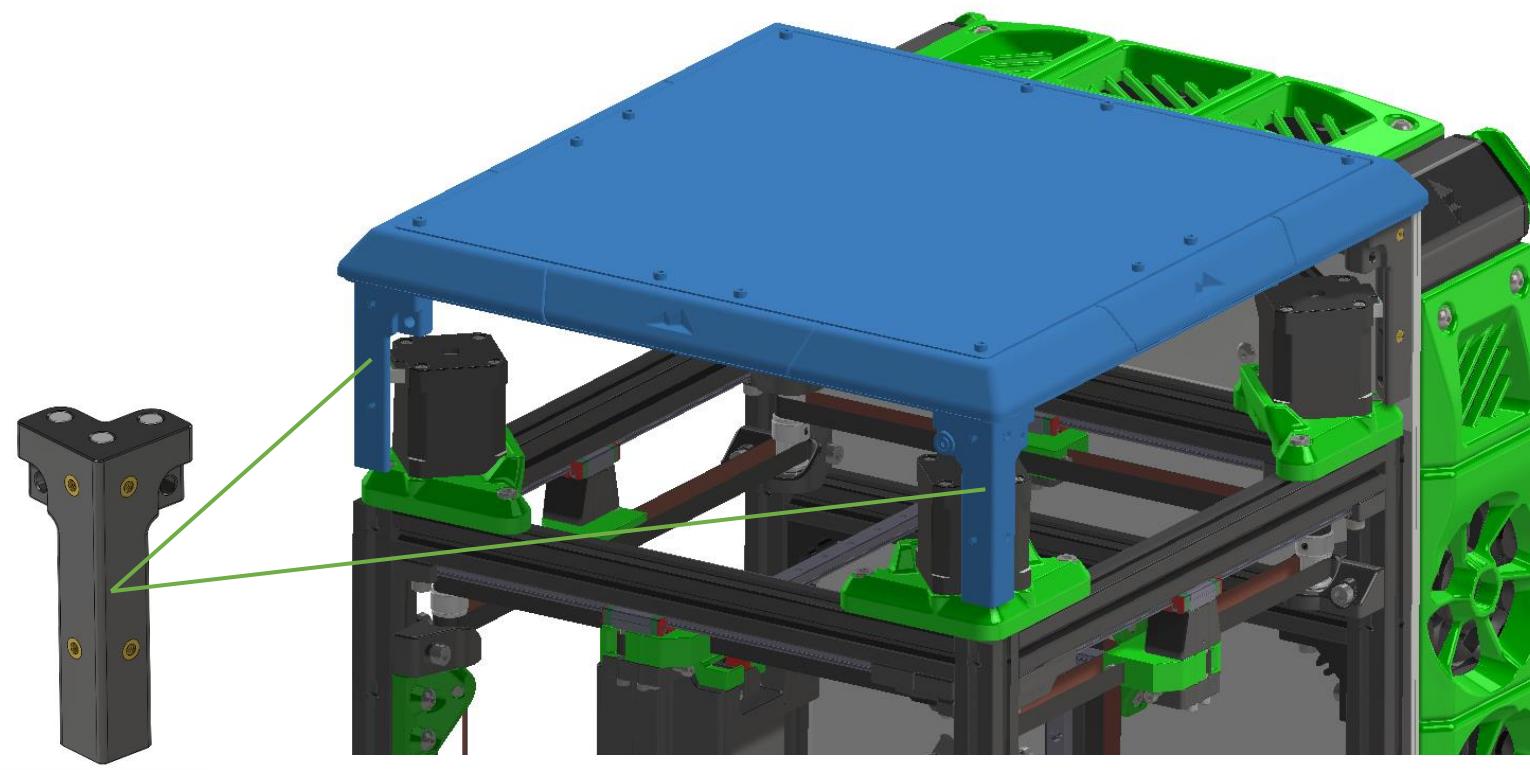
## Top Hat - Assembly



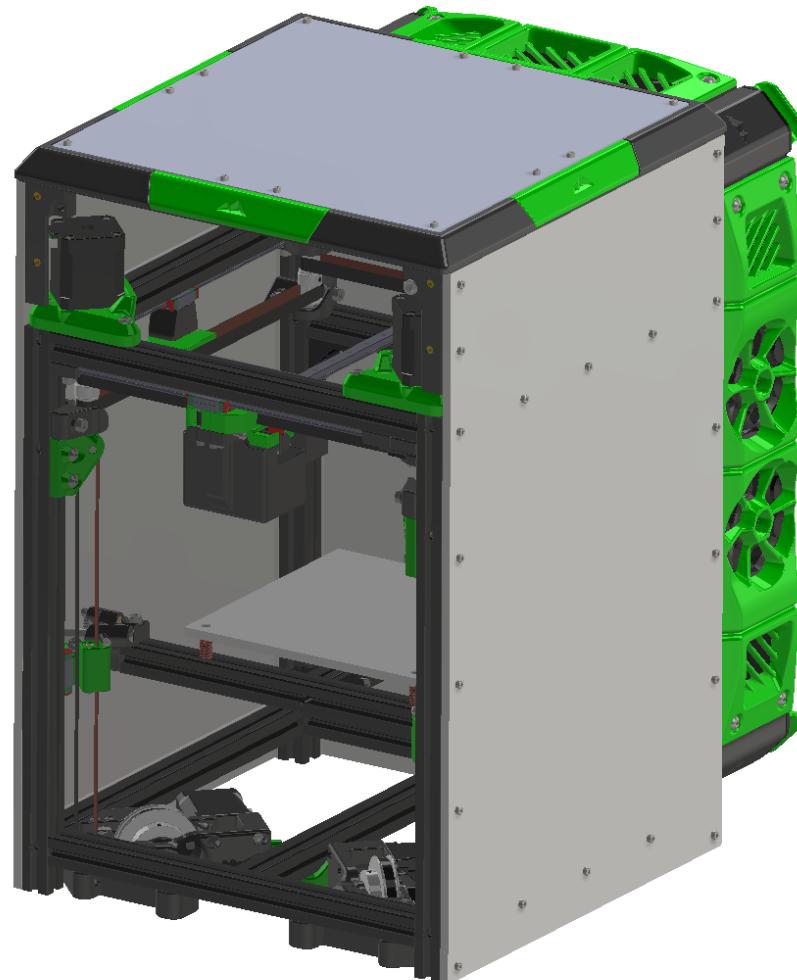
## Top Hat - Assembly



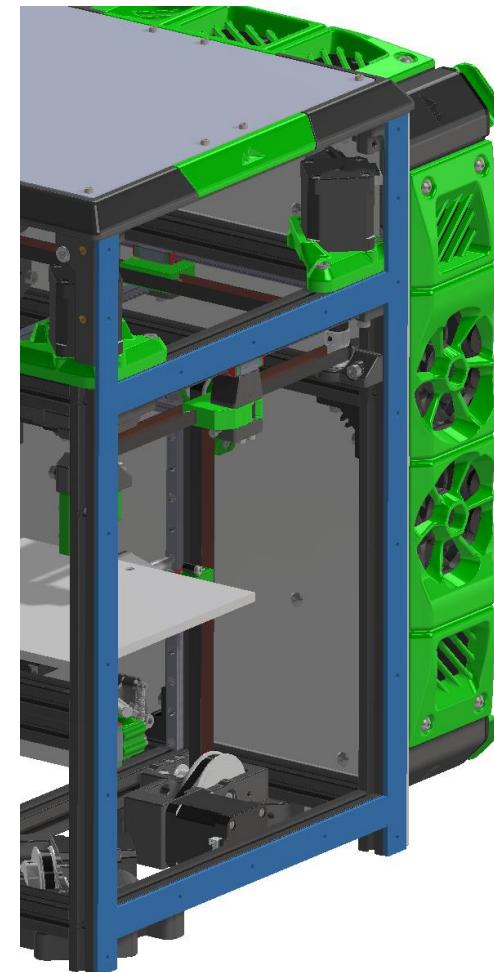
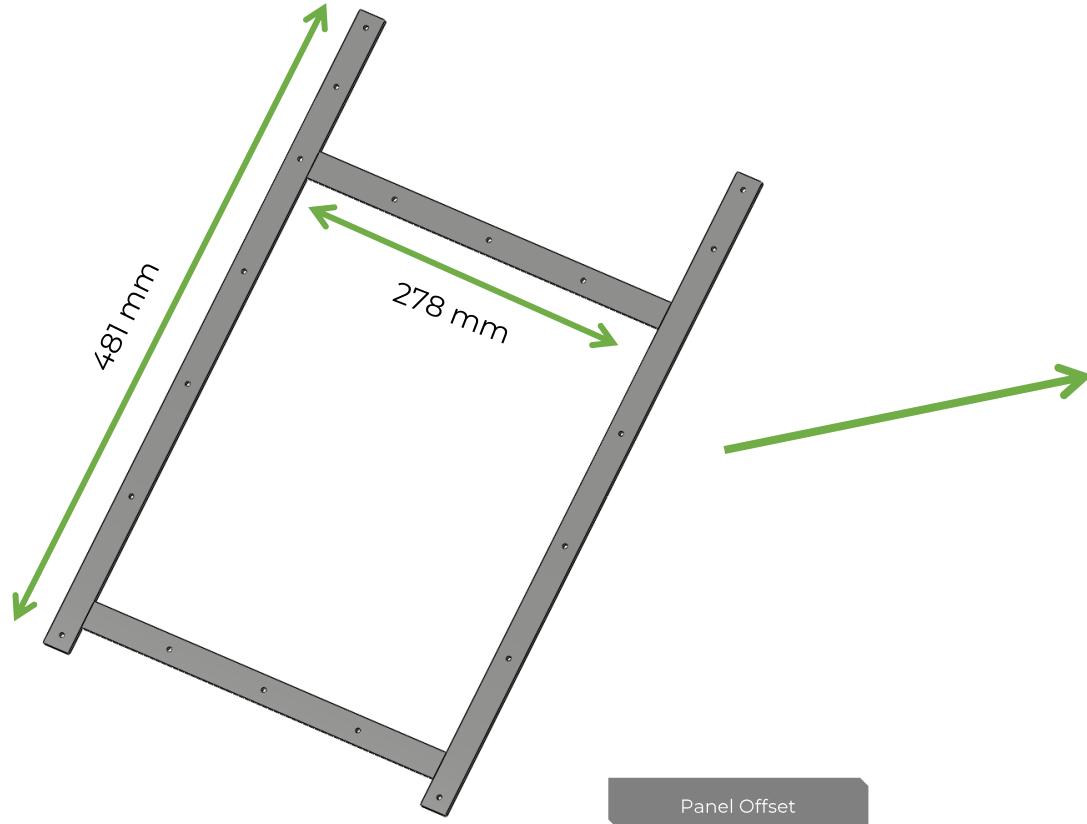
## Top Hat - Assembly



## Side Panels - Overview



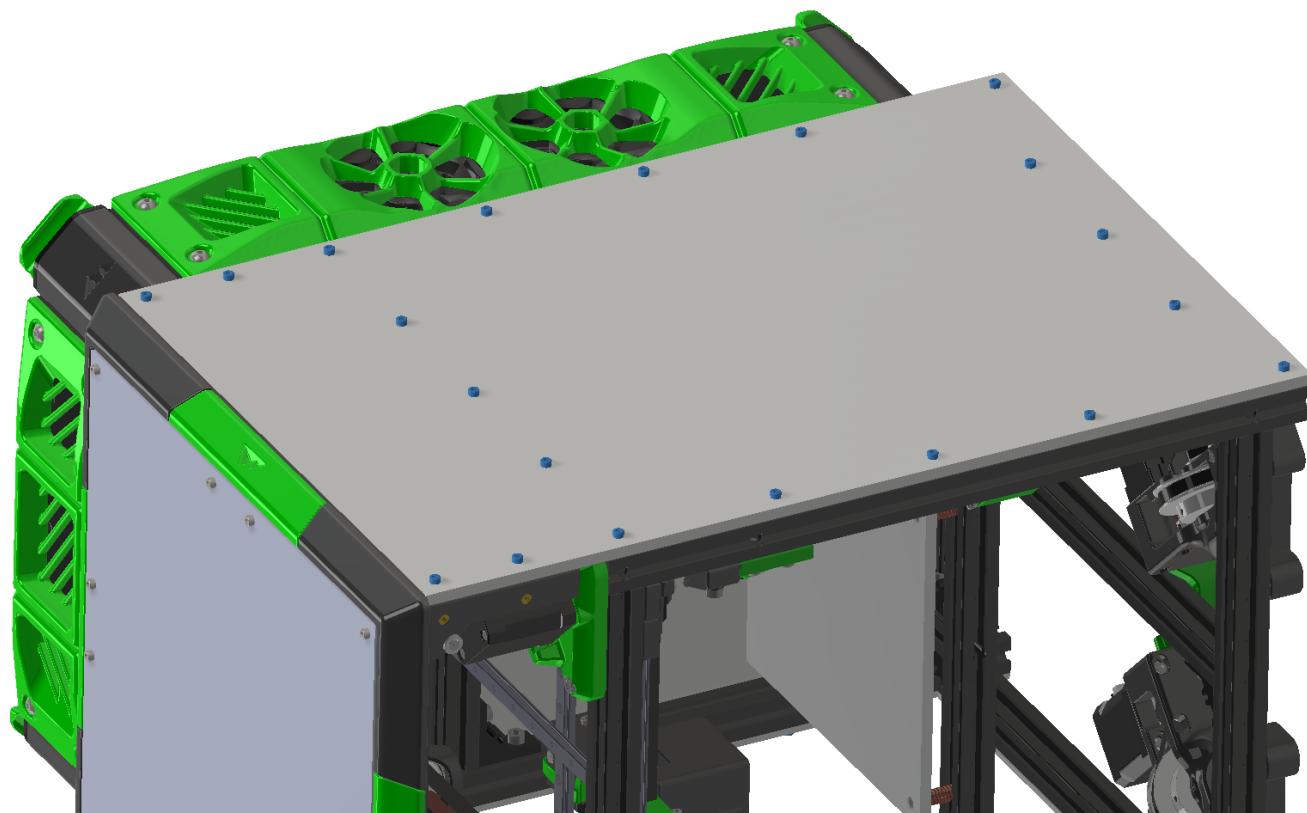
## Side Panels - Assembly



## Side Panels - Assembly

### Mounting the Panel

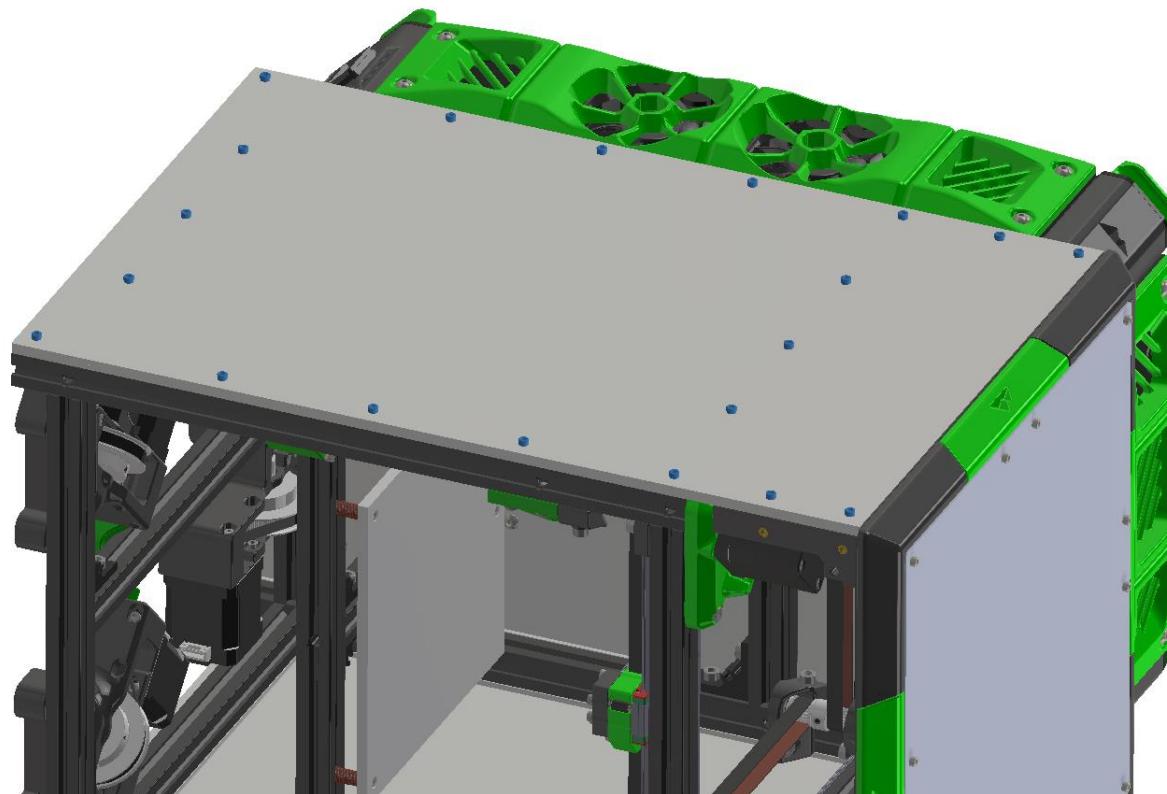
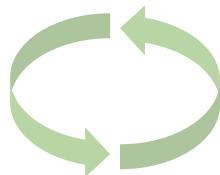
Use 20 M3x10 SHCS bolts to mount the panel



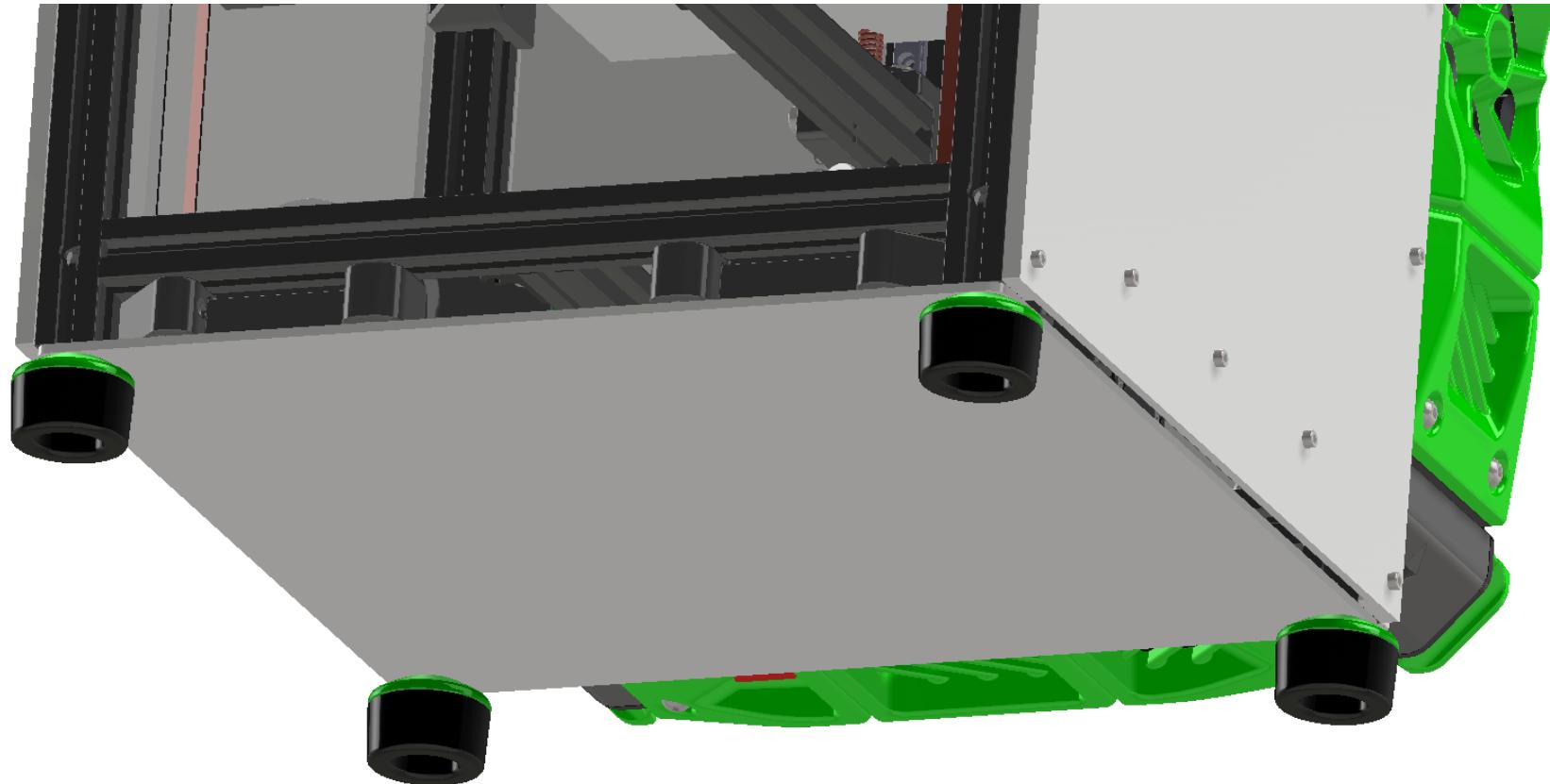
## Side Panels - Assembly

### Left Side

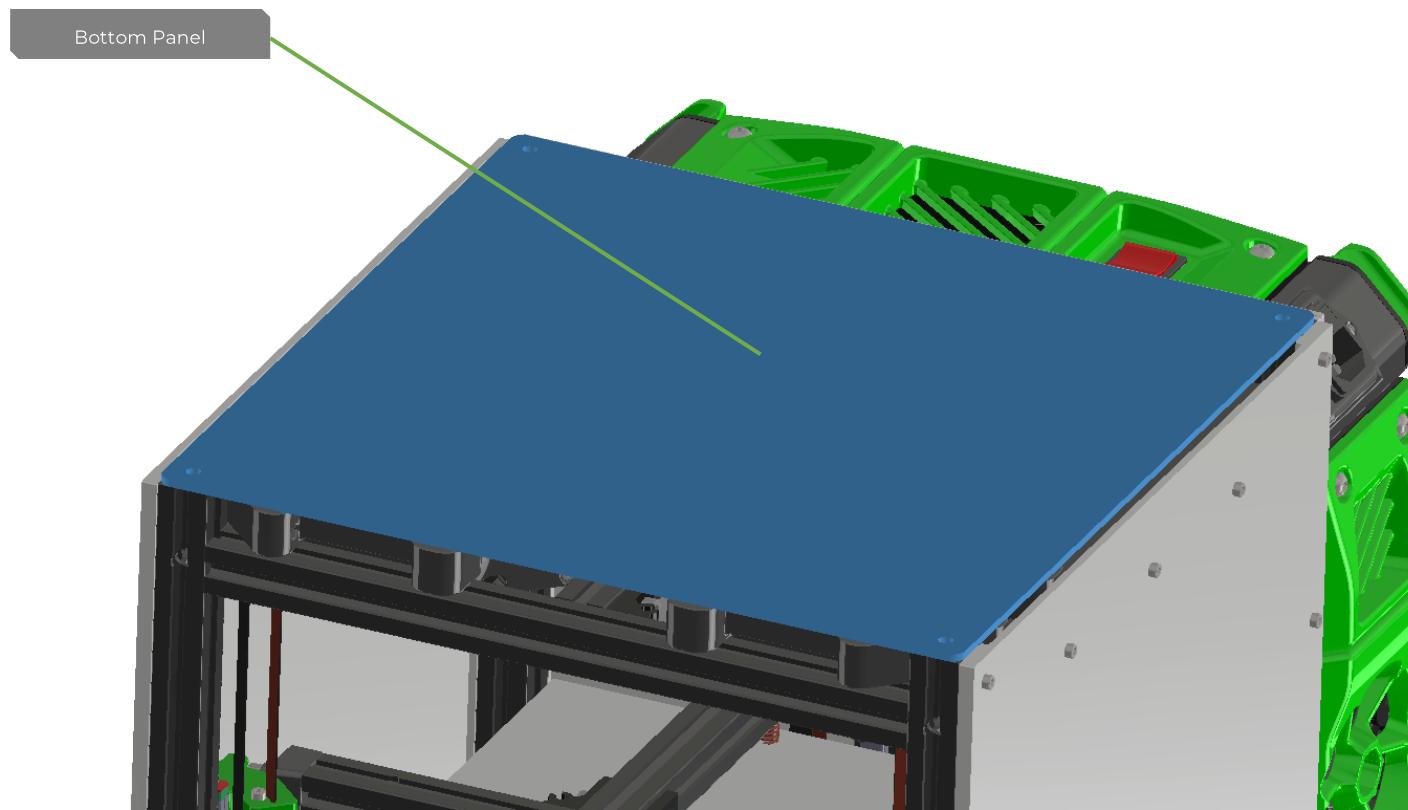
Replicate the steps for the left side panel as well.



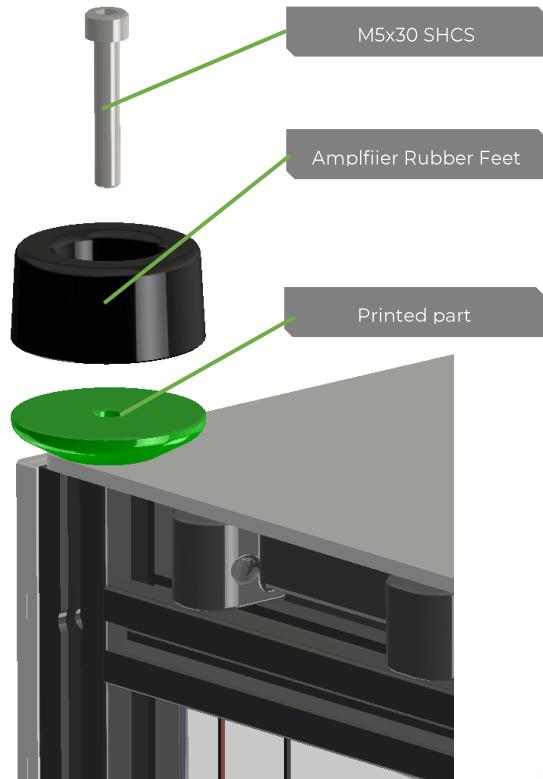
## Bottom Panels - Overview



## Bottom Panel - Assembly

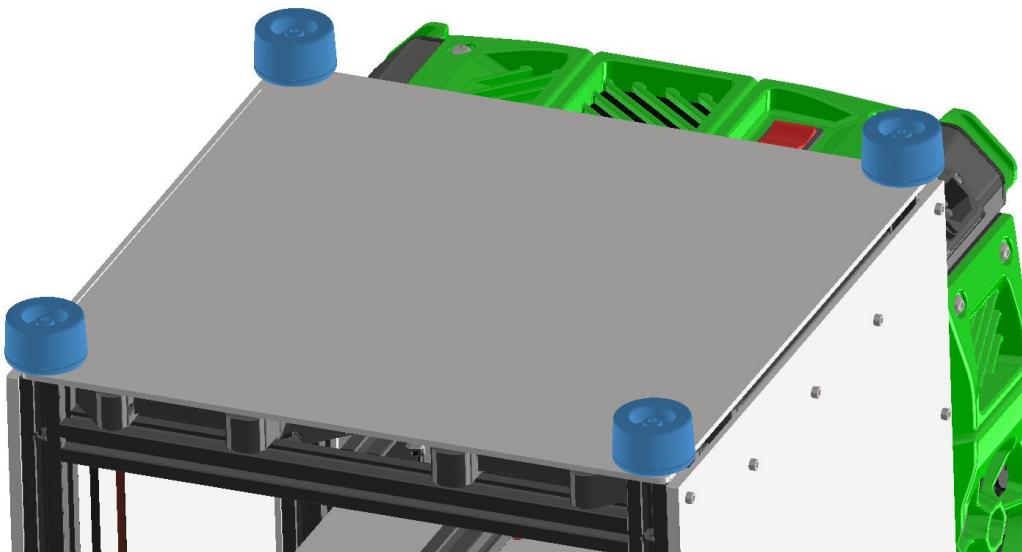


## Bottom Panel – Assembly

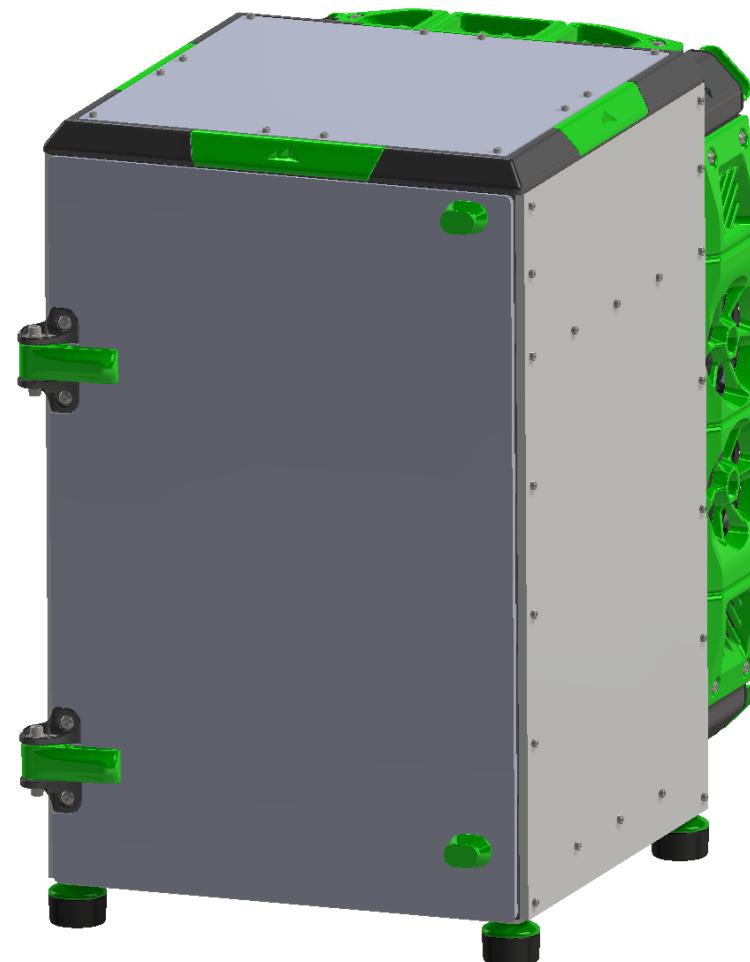


### Feet

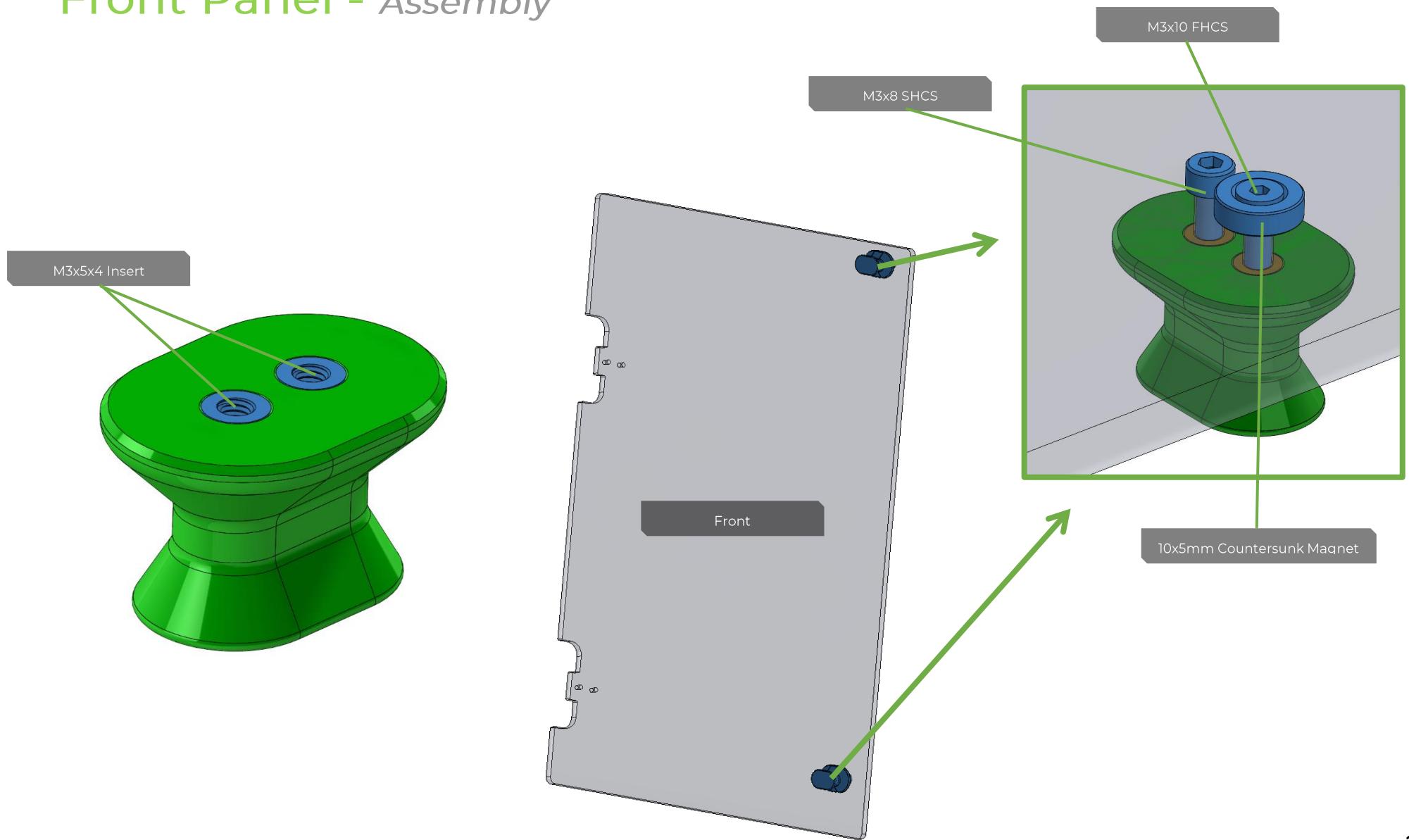
Assemble the four feet to the frame as pictured on the left



## Front Panel - Overview

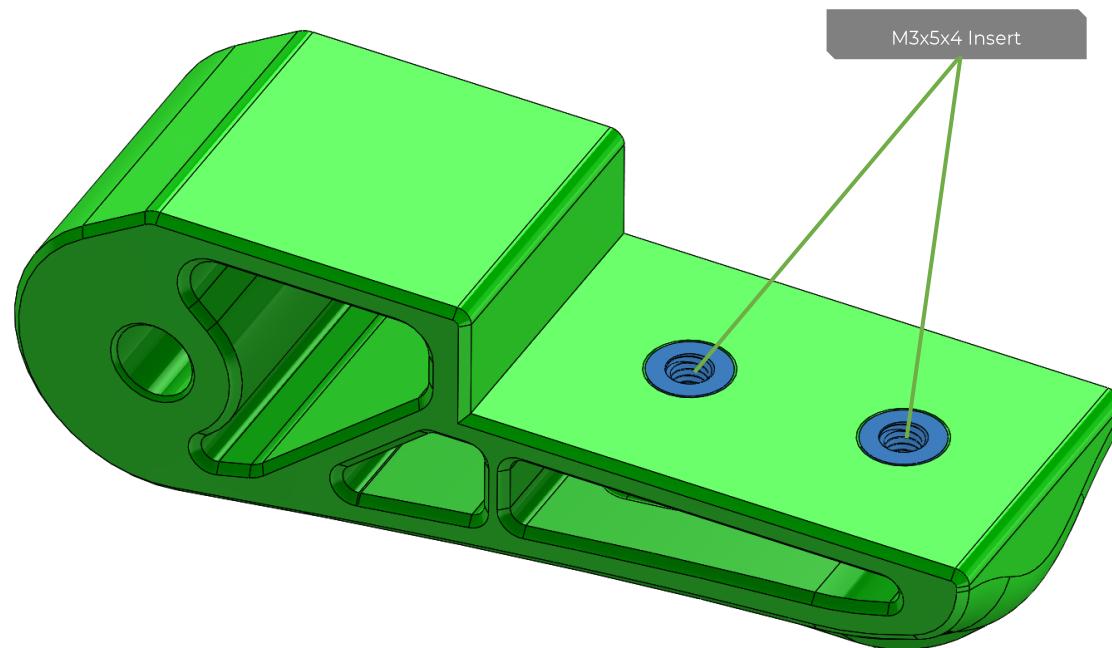


## Front Panel - Assembly

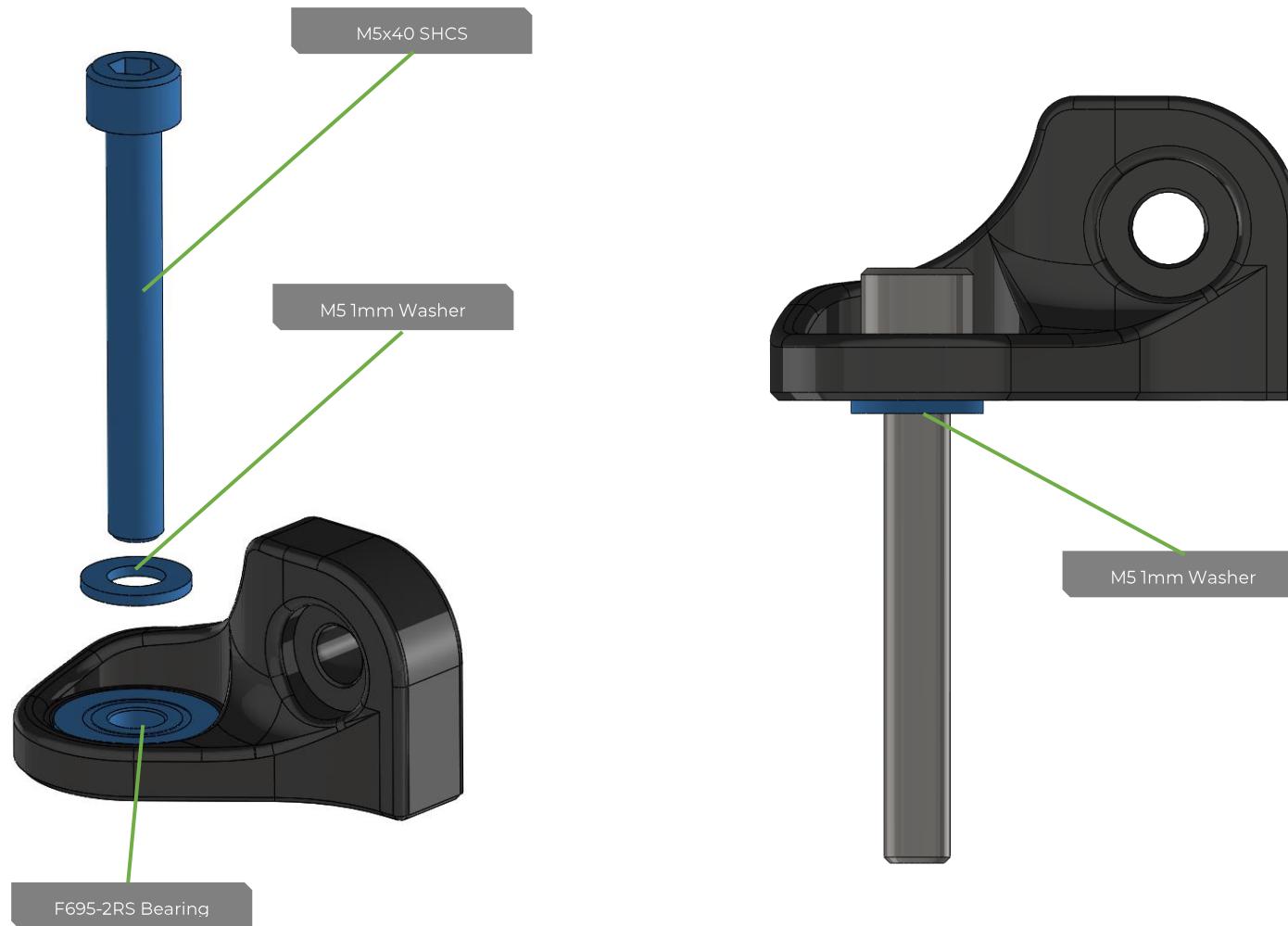


## Front Panel - Assembly

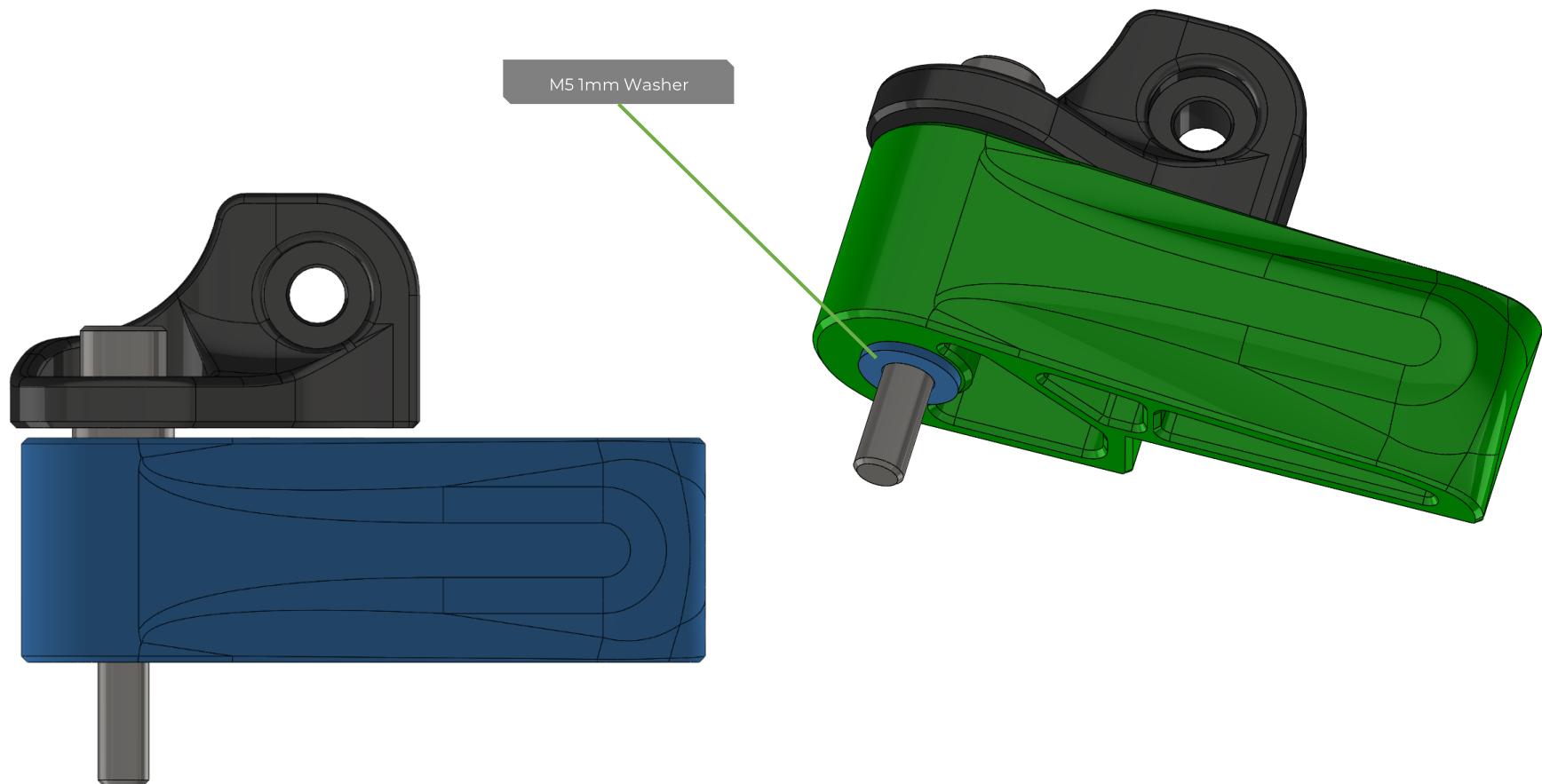
2x



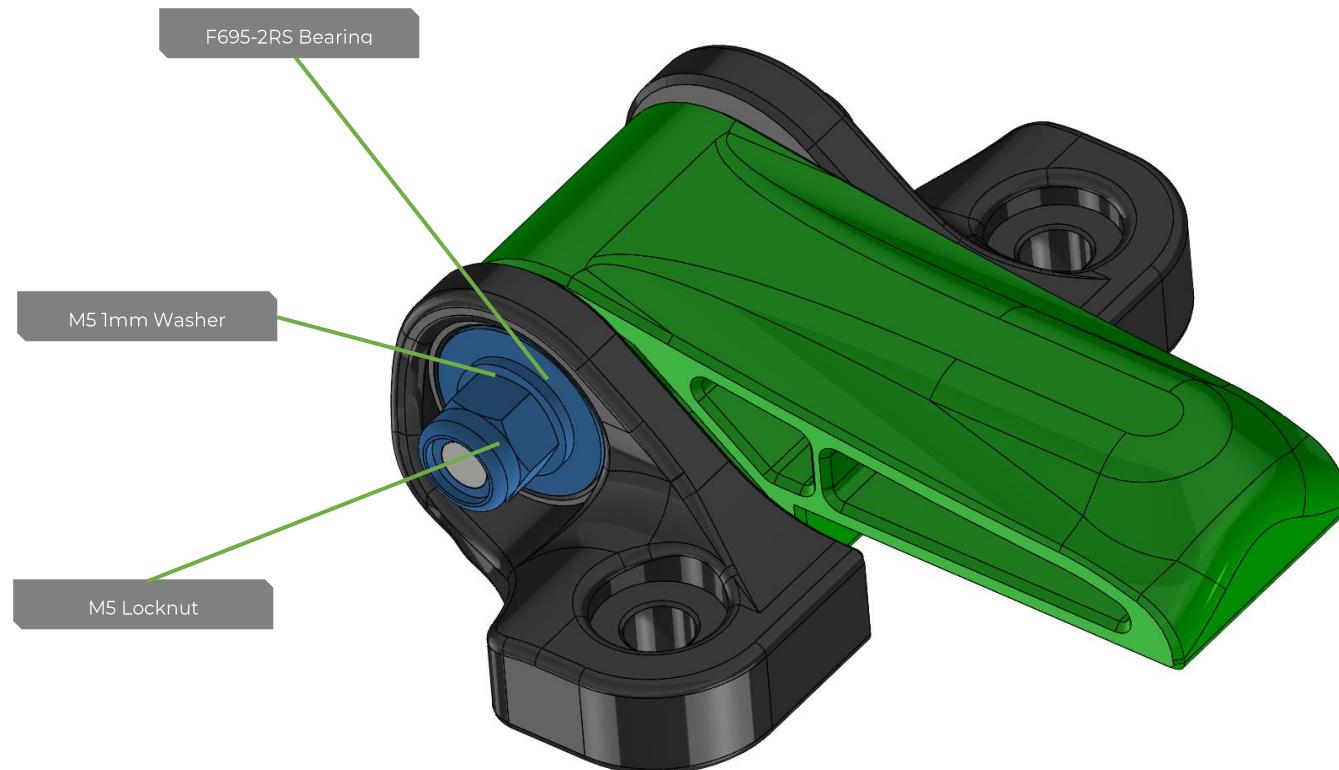
## Front Panel - Assembly



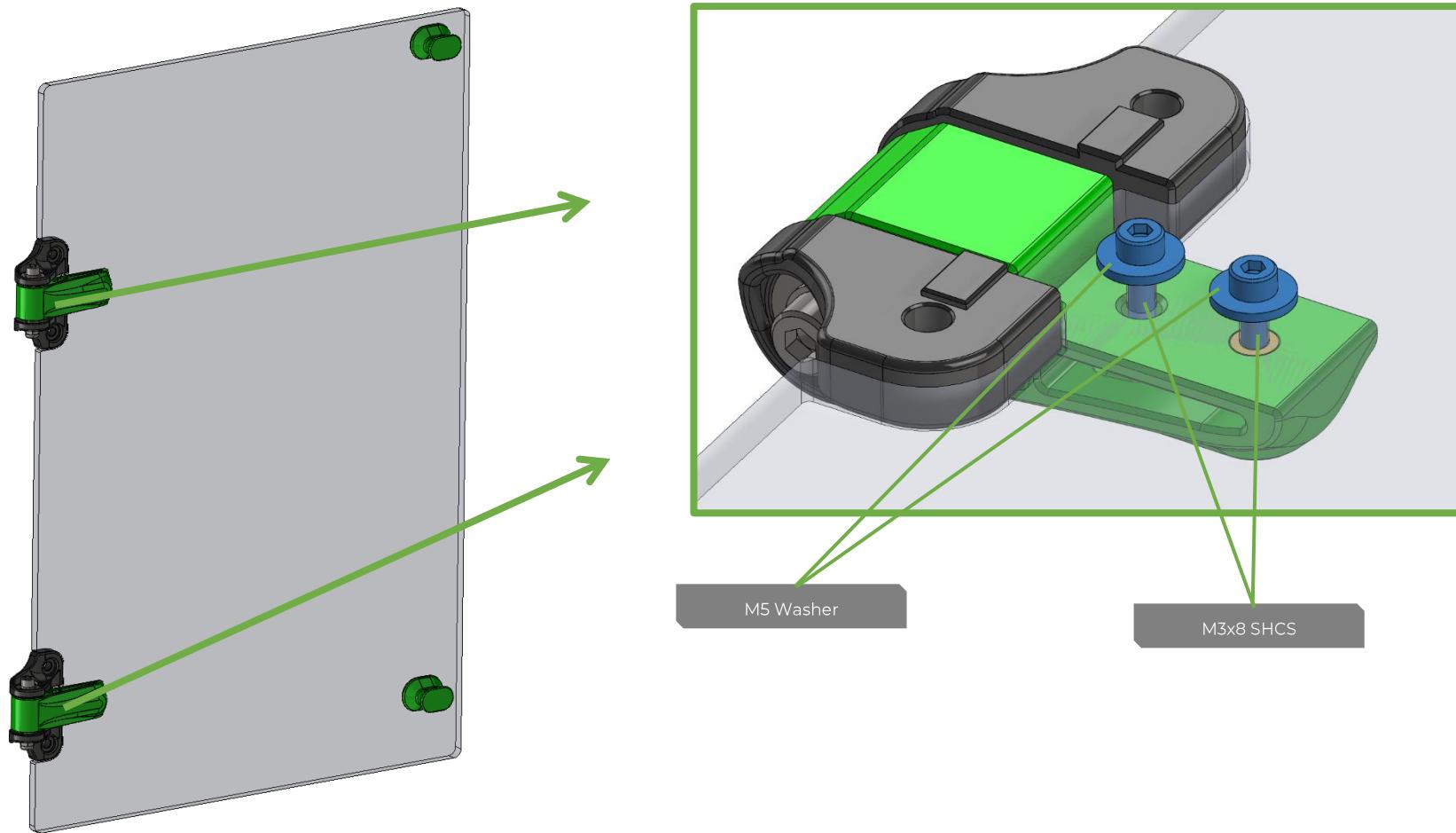
## Front Panel - Assembly



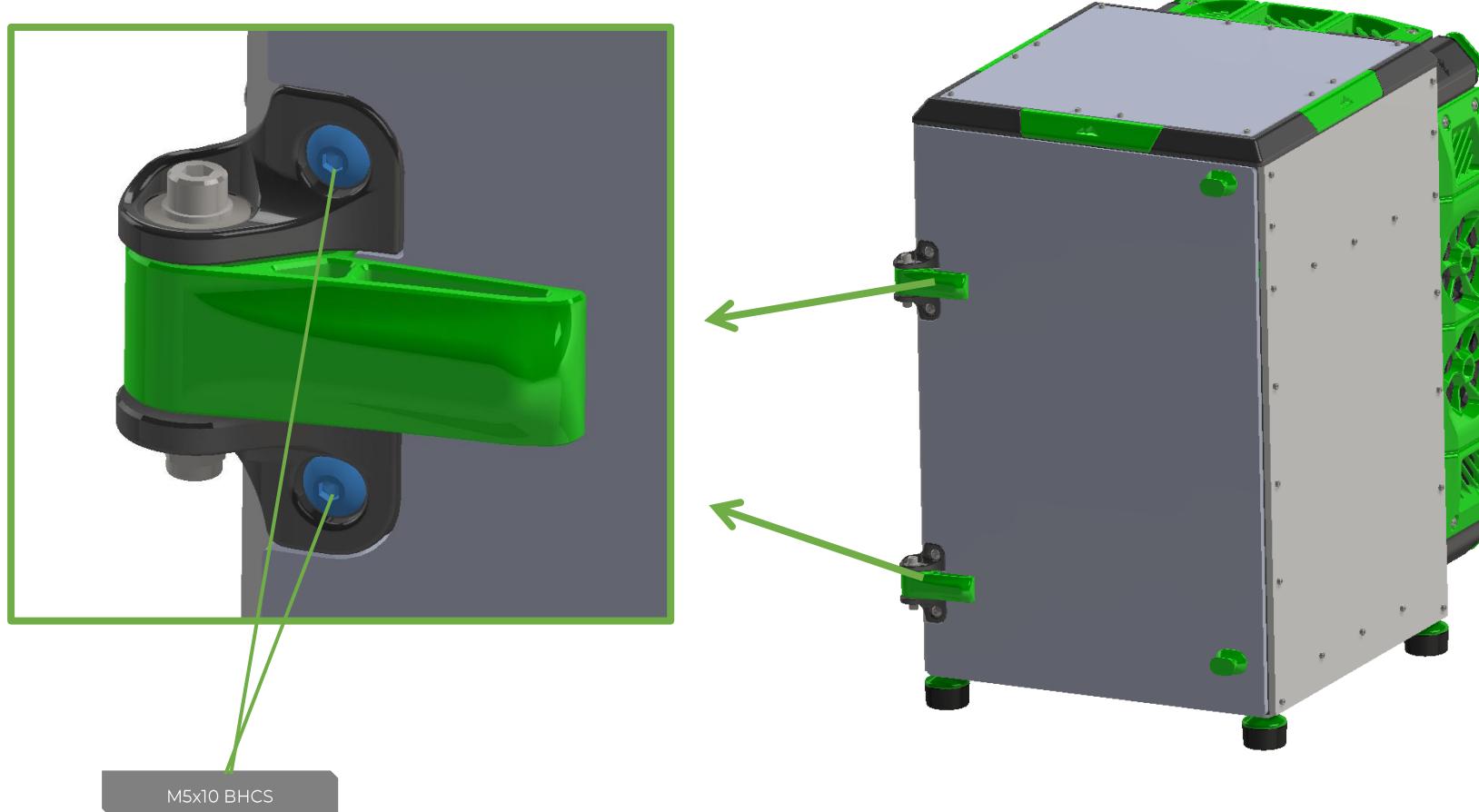
## Front Panel - Assembly



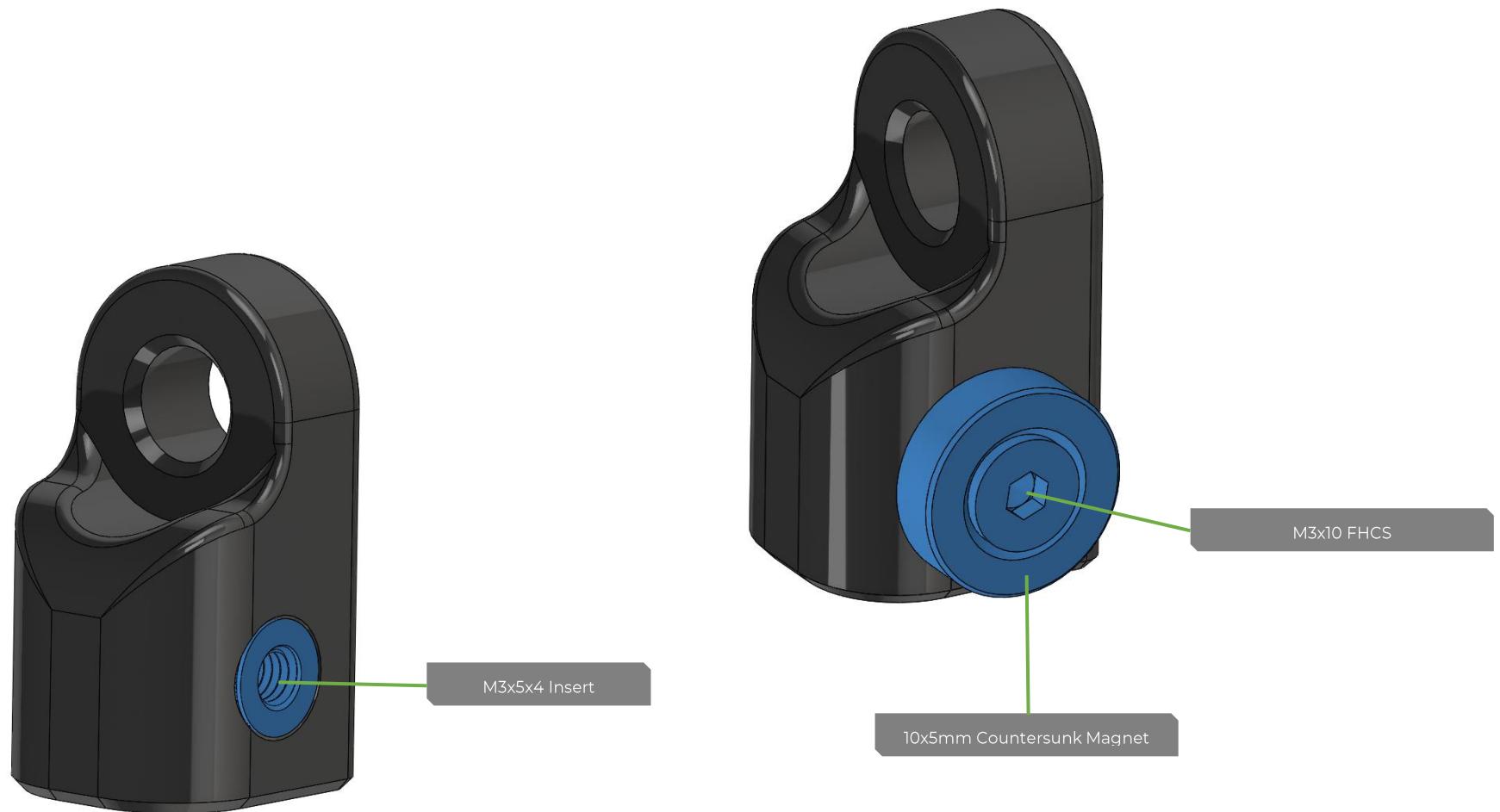
## Front Panel - Assembly



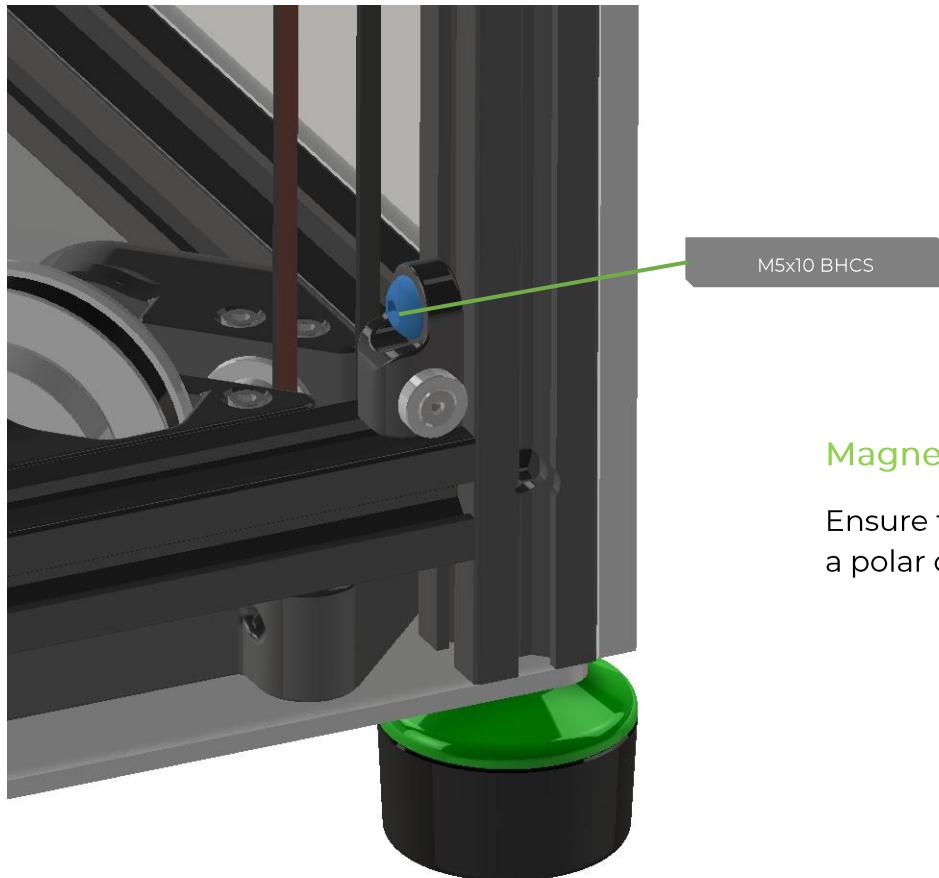
## Front Panel - Assembly



## Front Panel - Assembly



## Front Panel - Assembly



### Magnet Alignment

Ensure that the magnet is properly aligned and positioned as a polar opposite to the magnet attached to the front door.

# CONGRATULATIONS!

The K3 hardware assembly is now finished

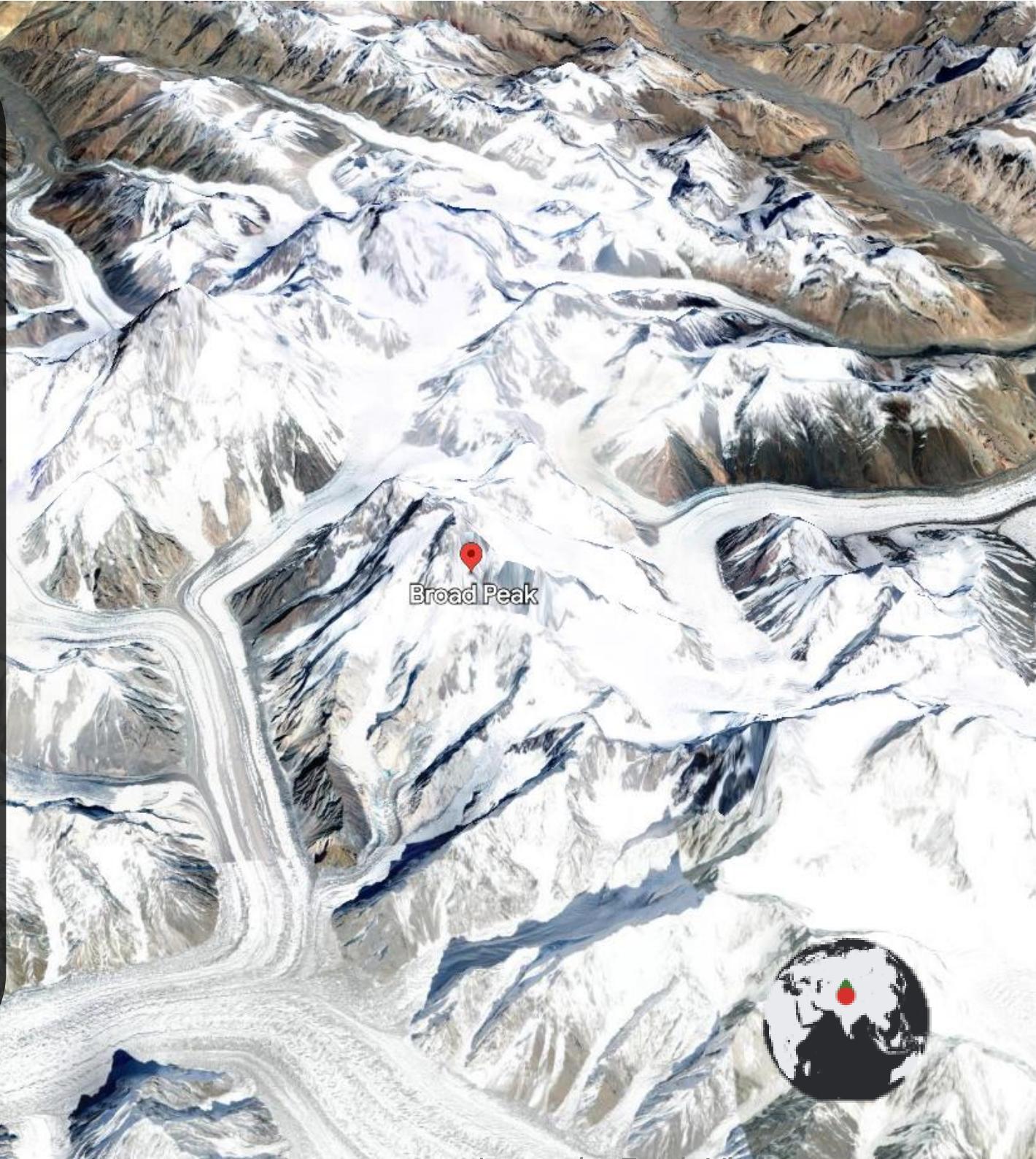


Gasherbrum K3, also known as Broad Peak Central, is a magnificent mountain located in the Karakoram range of the Himalayas. With an elevation of 7,942 meters (26,011 feet), it is the third-highest peak in the Gasherbrum mountain range and the 12th highest in the world. This awe-inspiring peak was first climbed on July 9, 1957, by an Italian expedition led by Walter Bonatti.

Gasherbrum K3 offers challenging terrain, including icy slopes, crevasses, and a daunting vertical rock face that mountaineers must navigate to reach the summit. Despite its difficulty, the peak provides breathtaking panoramic views of the surrounding Karakoram range, including neighbouring giants like K2.

Considered an excellent training ground for mountaineers preparing to tackle the world's highest peaks, Gasherbrum K3 attracts experienced climbers seeking a challenging and rewarding adventure. The name "Gasherbrum" translates to "beautiful mountain" in the local Balti language.

Over the years, many skilled climbers have successfully reached the summit of Gasherbrum K3, adding to its allure and mystique. The natural beauty and grandeur of this mountain continue to inspire adventurers from around the world to test their limits and conquer its majestic peak.



## Credits

Thank you for choosing the K3 by Annex Engineering. We would like to express our sincere appreciation to the individuals who have contributed to the development and creation of this product. While we cannot list them in a specific order, their efforts have been invaluable in bringing the K3 to life.

Alonso240	Cbon	Lastone	Kirby	Papejelly	Rincewind
Altvnk	Churls	Flukz	Lukes Lab	TorinoFermic	Ryan G
Anlin	Coffee	Trails	Mattthebaker	Przy	StrikeEagleCC
Boa	Dalegaard	Kmobs	Mental	Razgriz	Xile
C1Rob	Fermion	Ikirin	Newttwo	Rentable Socks	Yhaiovsky

We extend our gratitude to the entire Annex Engineering team for their dedication and hard work throughout the development process. Their expertise and commitment have played a crucial role in the successful creation of the K series. We would also like to thank our community for their continuous support and valuable feedback. Your input has been instrumental in helping us improve and refine the K3 to meet your needs and expectations.

Lastly, we would like to acknowledge and thank all those who have contributed to this manual. Your efforts have ensured that it provides comprehensive and accurate information to our users, enabling them to make the most of their K3 machine.

Sincerely,

The Annex Engineering Team