



High performance FDM 3D printing

ANNEX ENGINEERING

Trad Rack Beta Assembly Manual – Alpha 0.1

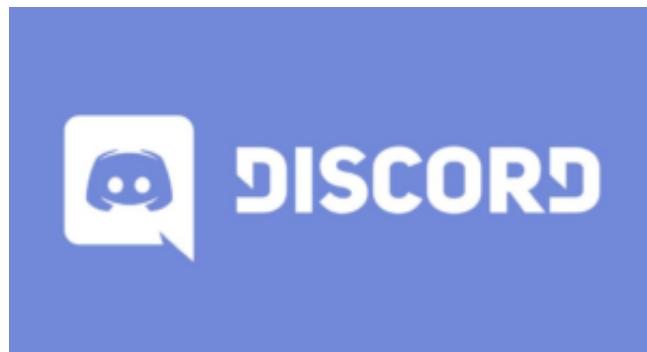
About Us

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 Content*

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Warnings



Before you begin

Read carefully and understand the following warnings

- **Electrical Safety:**
 - Always disconnect the power supply and ensure the printer is turned off before working on the extruder or any electrical components.
 - Follow proper grounding and electrical safety guidelines to prevent electrical shocks or accidents.
- **Maintenance and Cleaning:**
 - Regularly clean the extruder nozzle and surrounding areas to prevent clogs and maintain optimal print quality.
 - Follow the manufacturer's instructions for proper maintenance procedures, such as lubrication or replacing worn-out parts.
 - 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.
- **Bill of Materials**
 - 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)	0.4 to 0.5mm	3 minimum
Material	Infill Percentage	Solid Top/Bottom Layers
ASA	40% minimum (at 0.6mm width)	5 minimum (at 0.2mm height)
Nozzle size	Infill Type	
0.4 or 0.5mm recommended	Grid, Gyroid, Honeycomb, Triangle, or Cubic	
Layer Height		
0.1 or 0.2mm		

FAQ

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. To use eDrawings, simply open the software and load the 3D model file. From there, 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.

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."

Should I buy OEM or from AliExpress?

It is recommended to source OEM parts from Bondtech rather than purchasing clones from AliExpress due to their superior quality, compatibility, and reliable customer support.

What type of lube is recommended?

For needle bearings, it is advised to exclusively utilize lithium-based grease. Apply it in moderation to prevent the accumulation of dust and debris. Additionally, make sure to avoid contact with plastic components. It is crucial not to use silicone or PTFE-based lubricants.

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.

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.

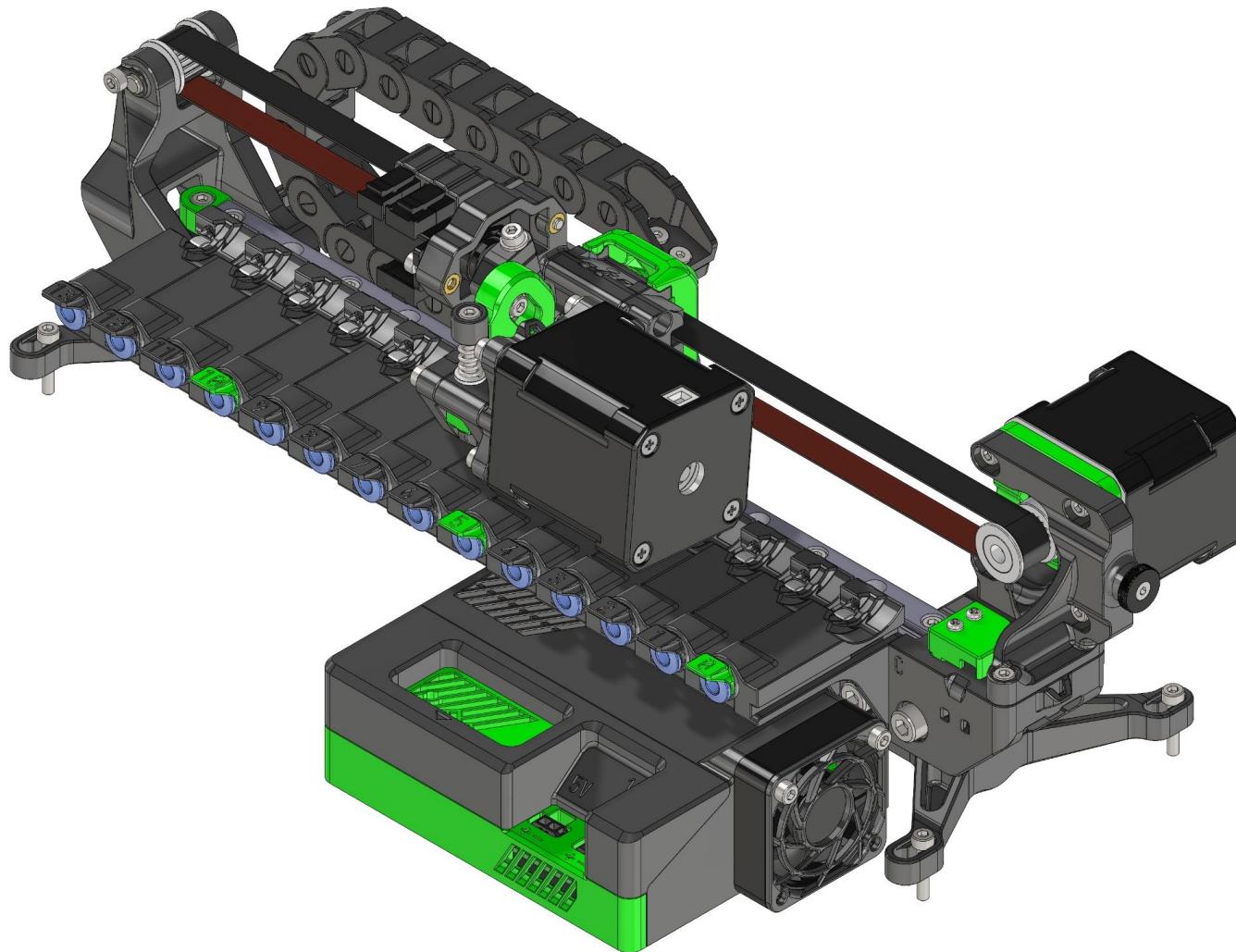
Metric Bolt Size	Goes through material A	Into Material B	Torque (Nm)
M2	Plastic	Plastic	0.25
M2.5	Metal	Metal	0.4
M3	Metal	Brass Insert	1
M3	Plastic	Plastic	0.4
M3	Metal	Metal	1
M5	Metal	Brass Insert	0.4
M5	Metal	Metal	3
M5	Metal	Plastic	1
M5	Metal	Brass Insert	3



Tip

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

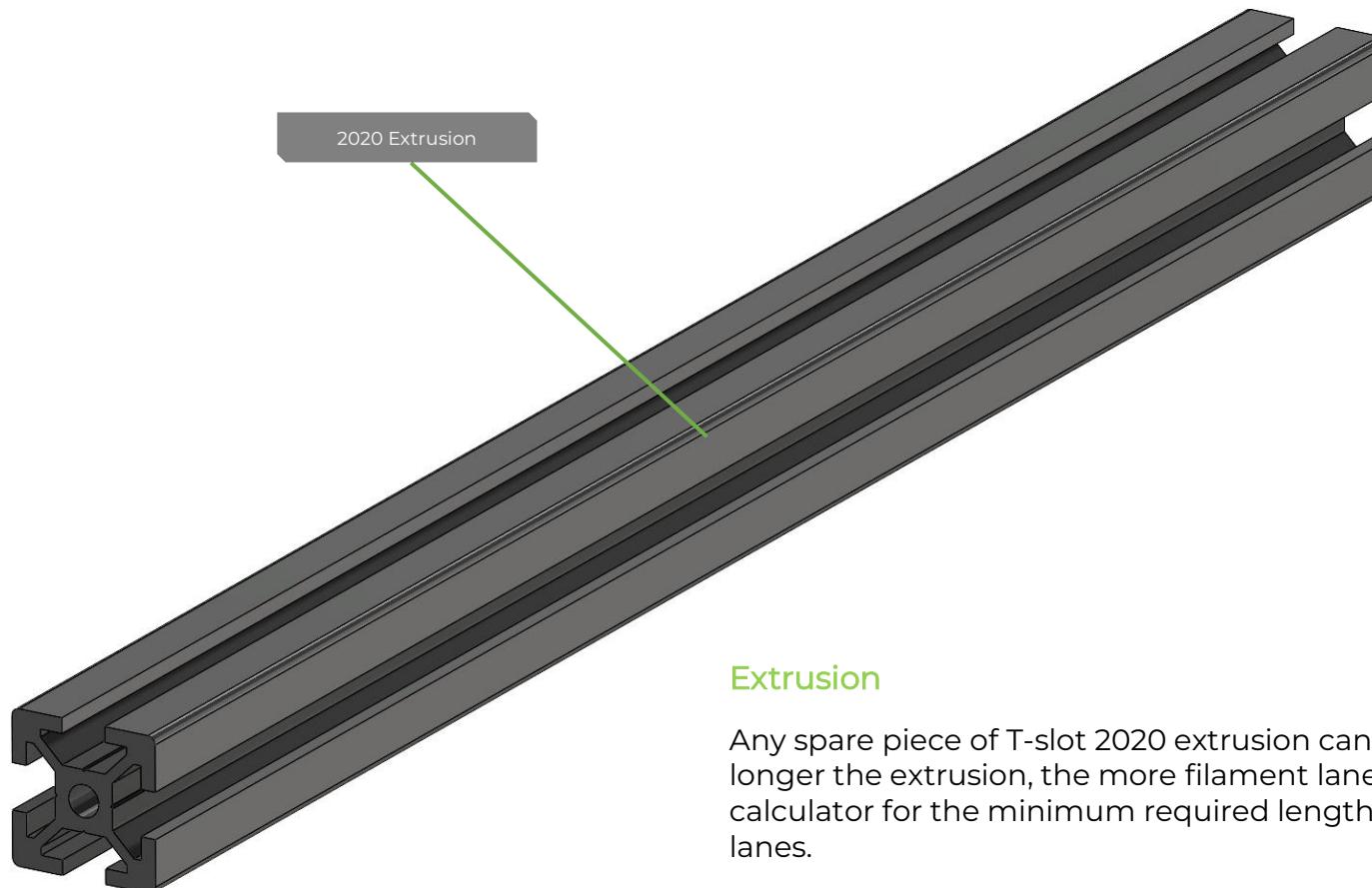
Trad Rack – Overview



Base Frame - Overview



Base Frame - Assembly

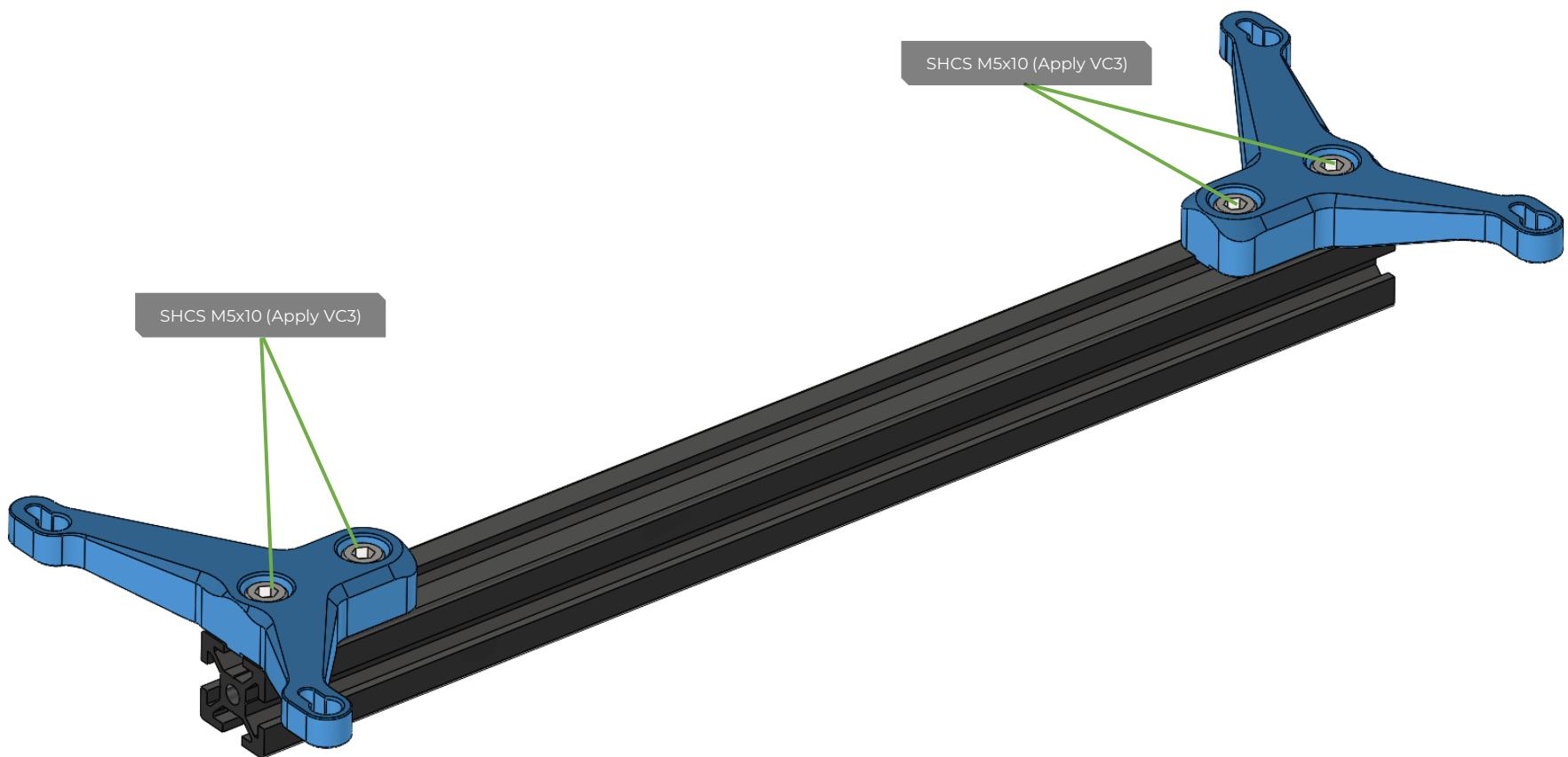


Extrusion

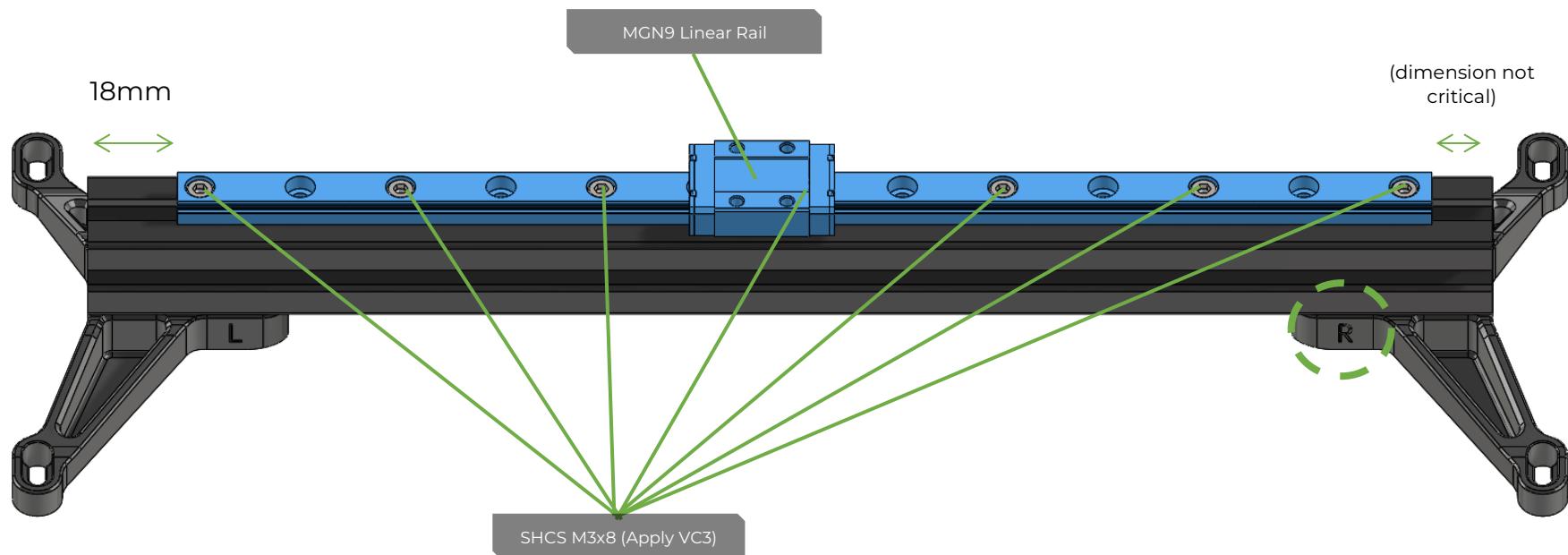
Any spare piece of T-slot 2020 extrusion can be used for Trad Rack. The longer the extrusion, the more filament lanes can be added. Reference the calculator for the minimum required length for a given number of filament lanes.

Depending on how your Trad Rack will be mounted, it may be useful to use a longer extrusion than required. For example, a minimum length of 280mm is recommended for mounting on the side of a K3.

Base Frame - Assembly



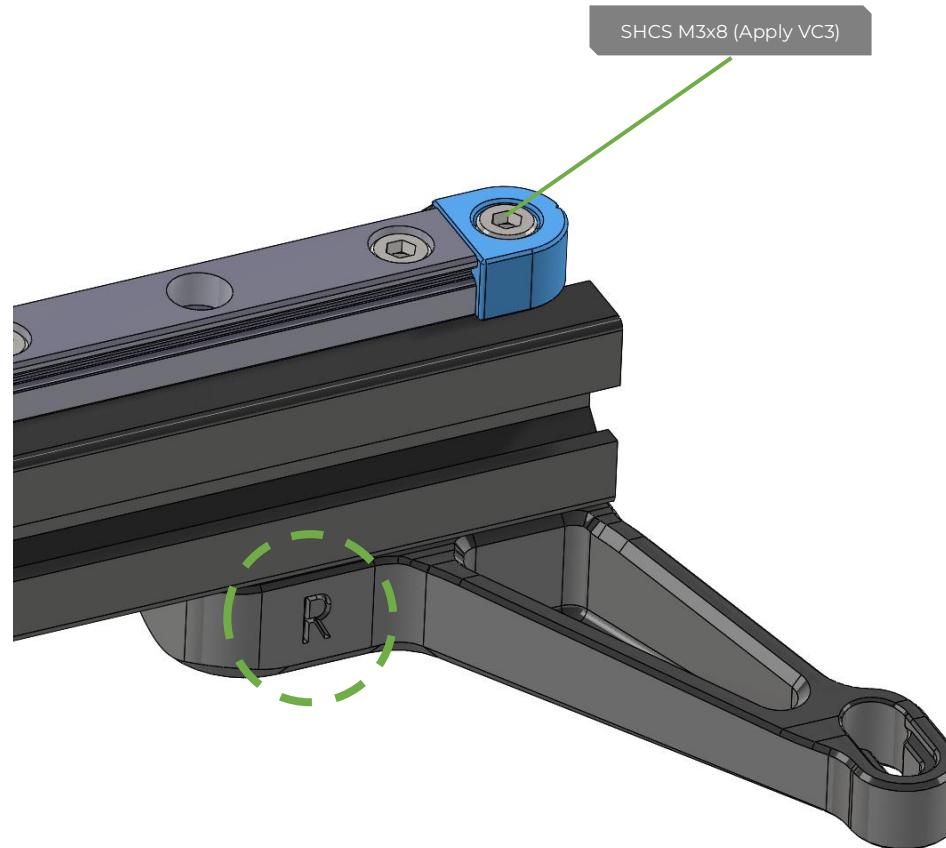
Base Frame - Assembly



Tip

For a more convenient installation process, utilize the printed MGN9 alignment tools.

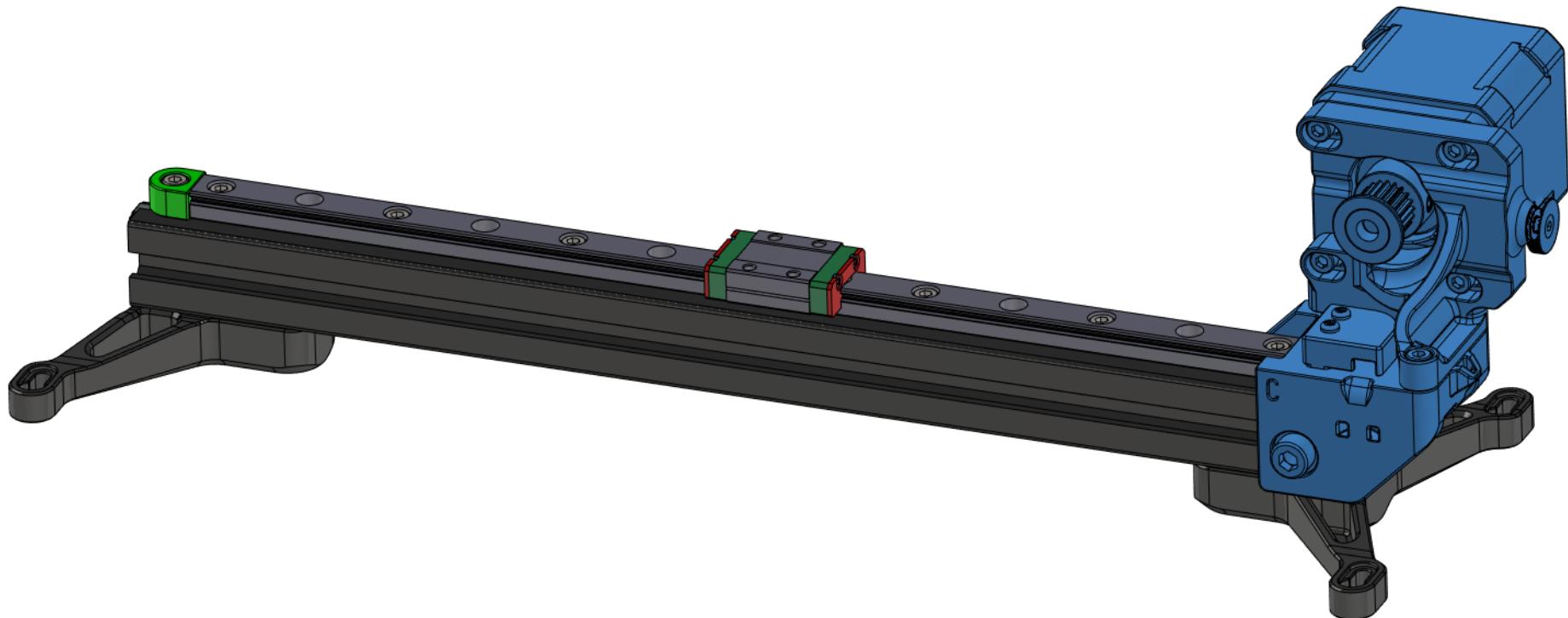
Base Frame - Assembly



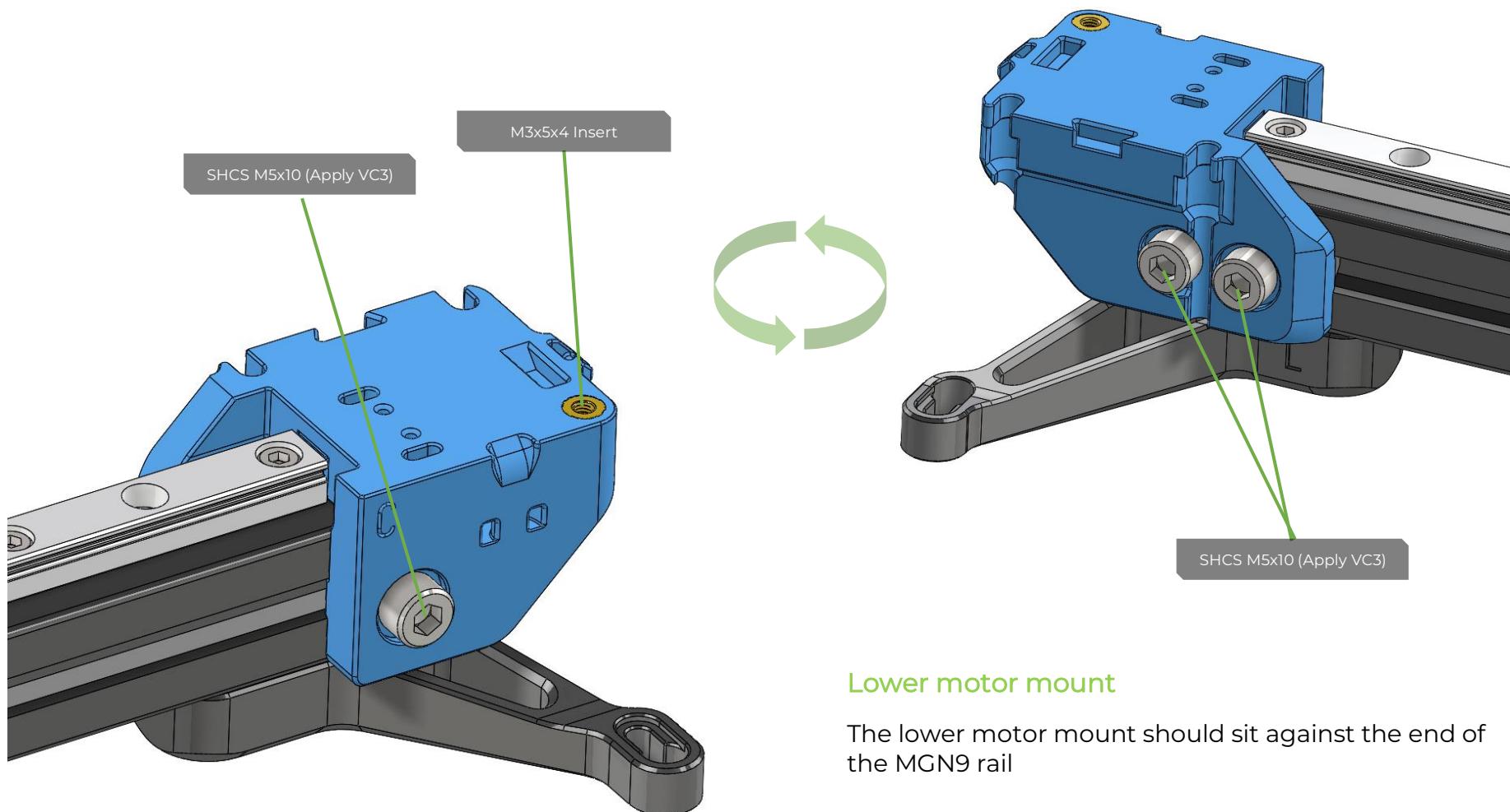
Pay attention to Left and Right markings on legs

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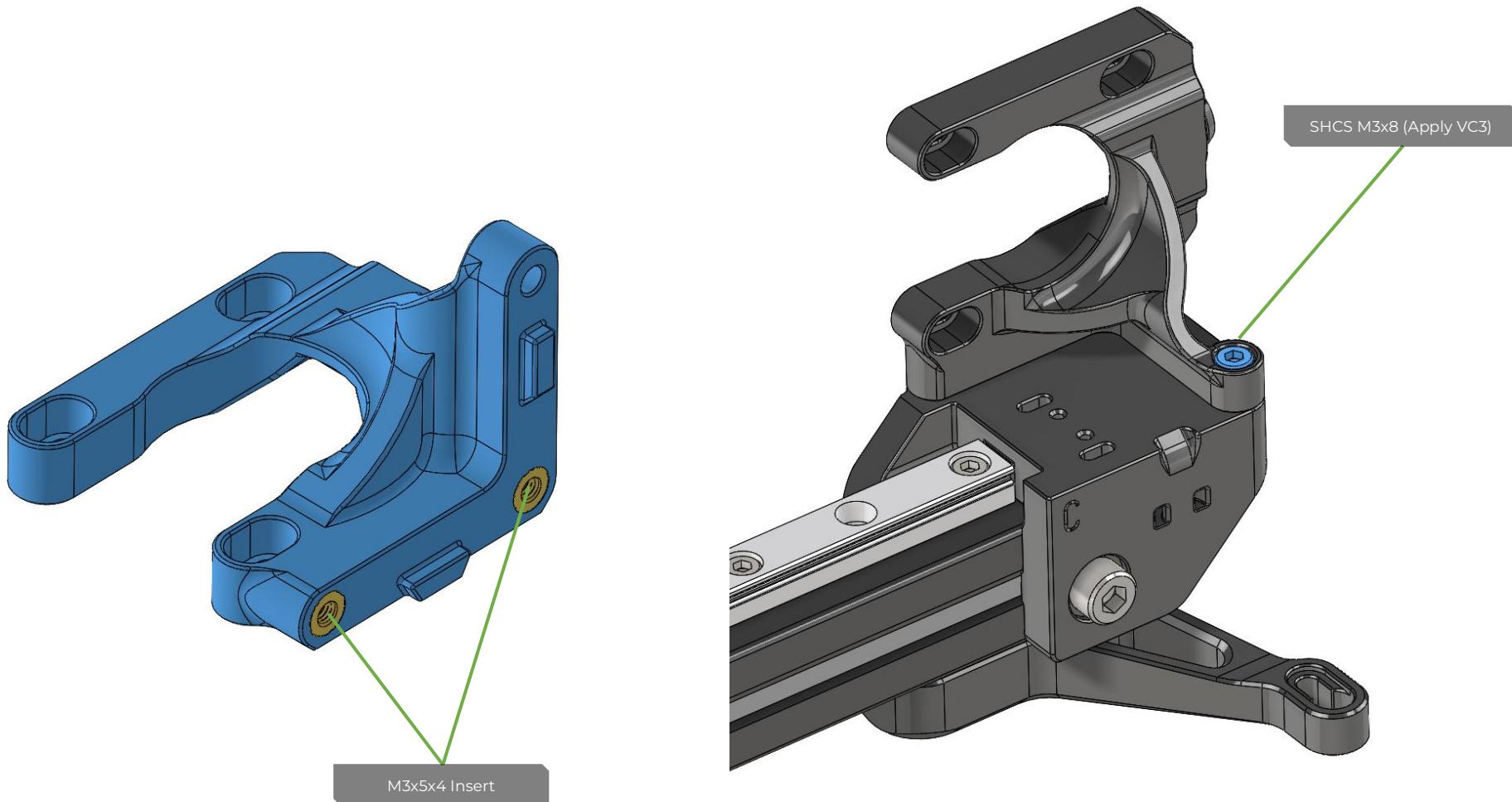
Selector Drive End - Overview



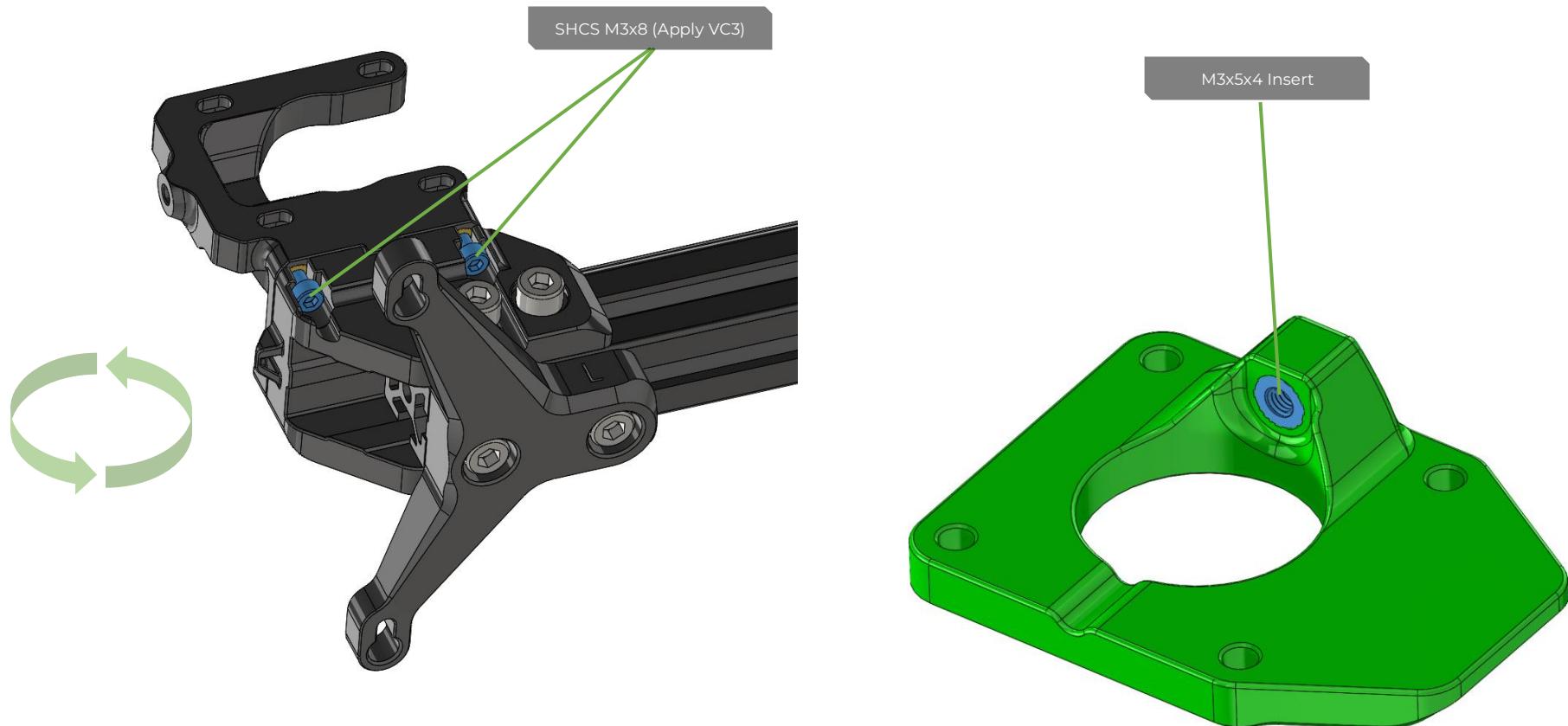
Selector Drive End – Assembly



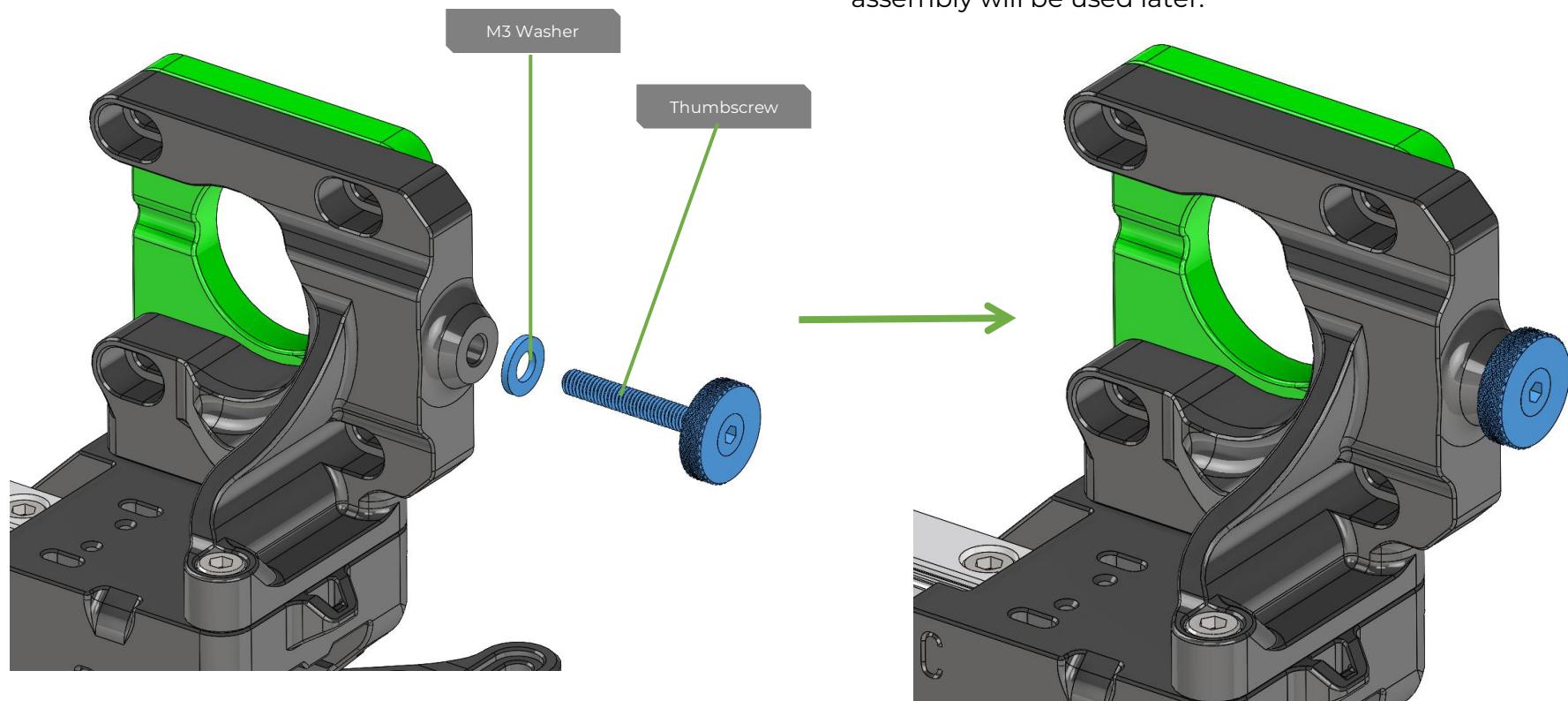
Selector Drive End – Assembly



Selector Drive End – Assembly



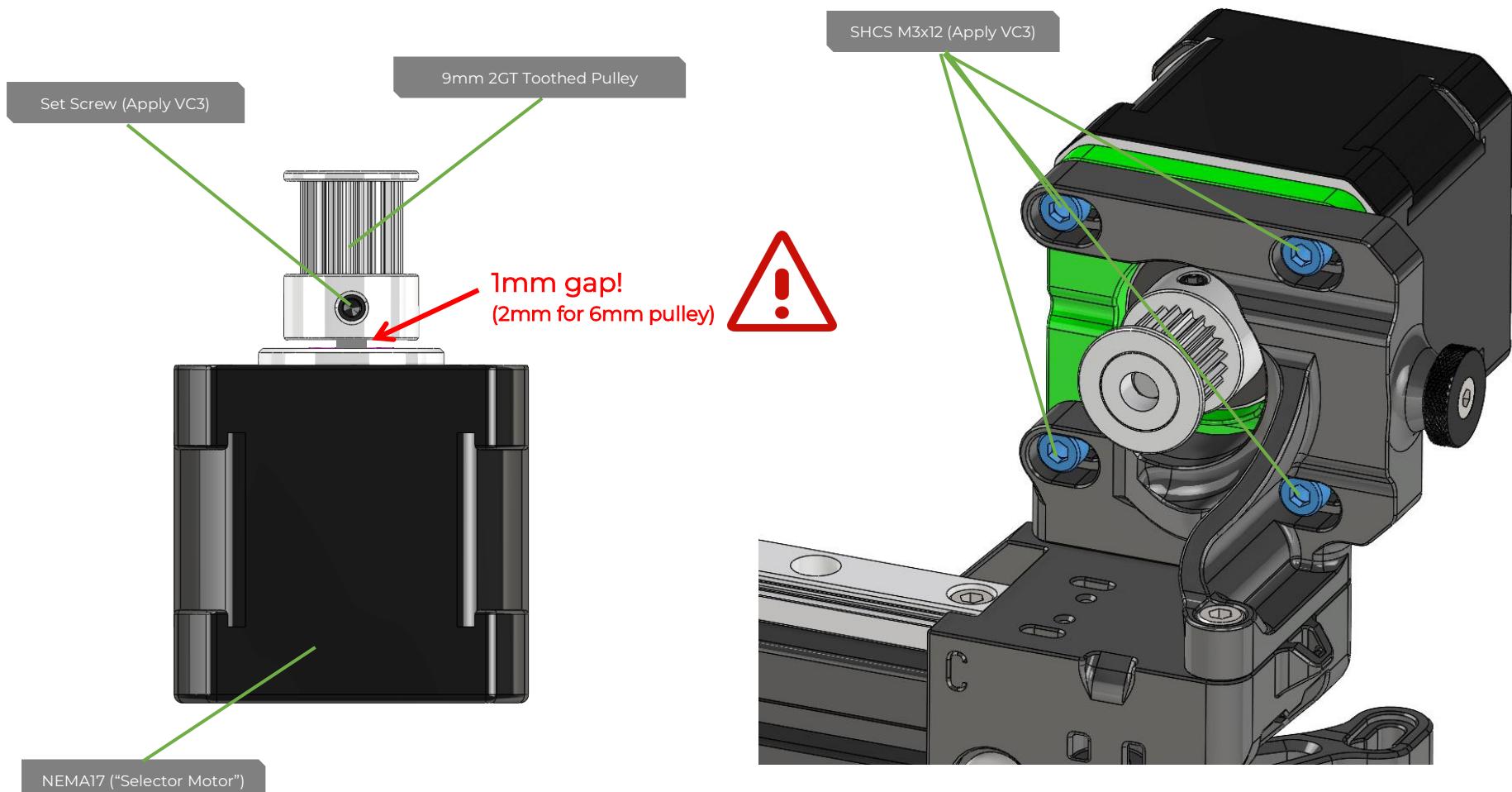
Selector Drive End – Assembly



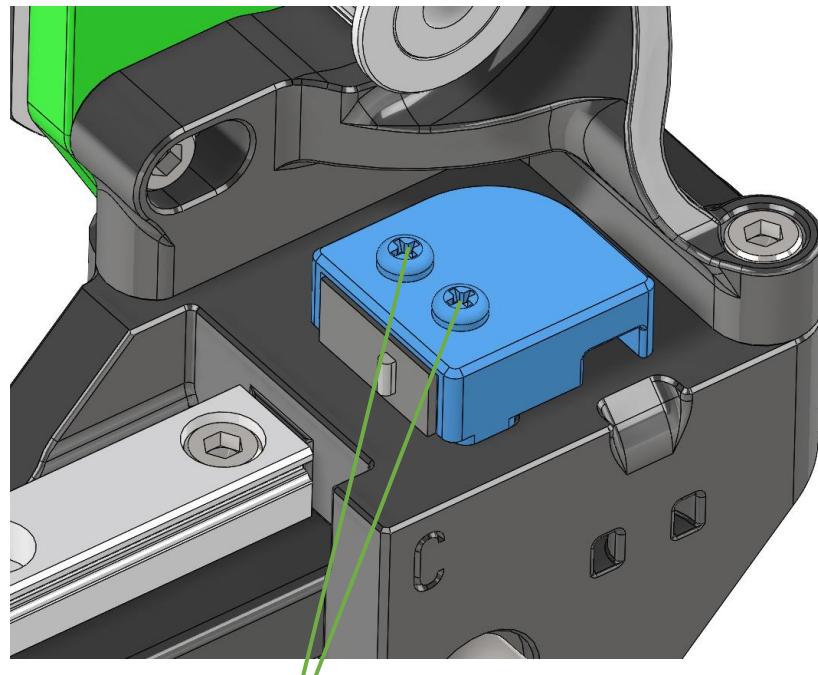
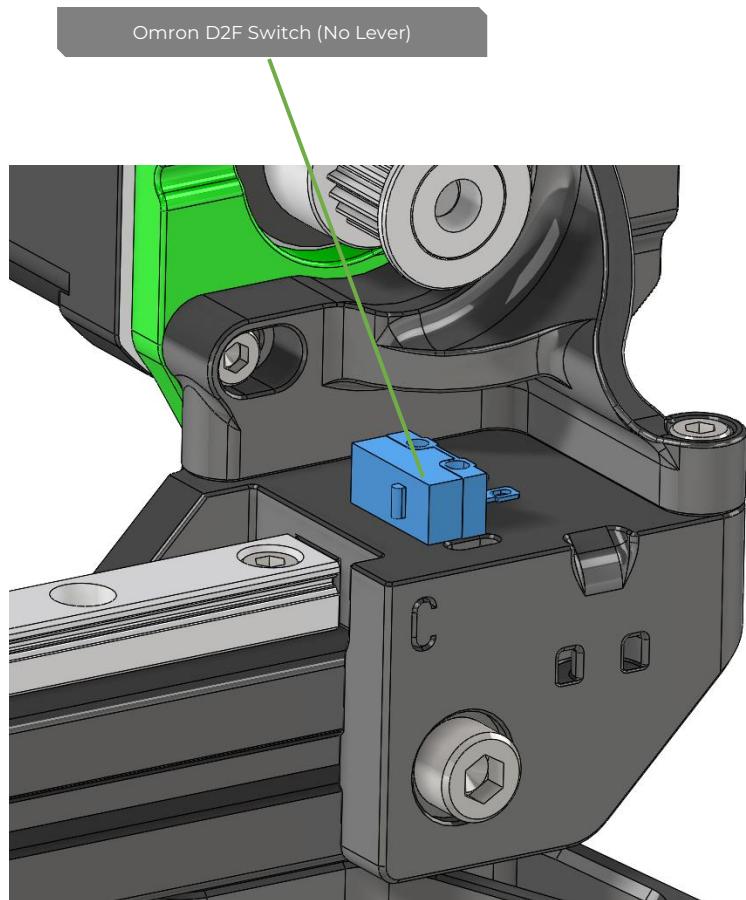
Thumbscrew

The thumbscrew comes from the BMG thumbscrew assembly. The rest of the assembly will be used later.

Selector Drive End – Assembly



Selector Drive End – Assembly

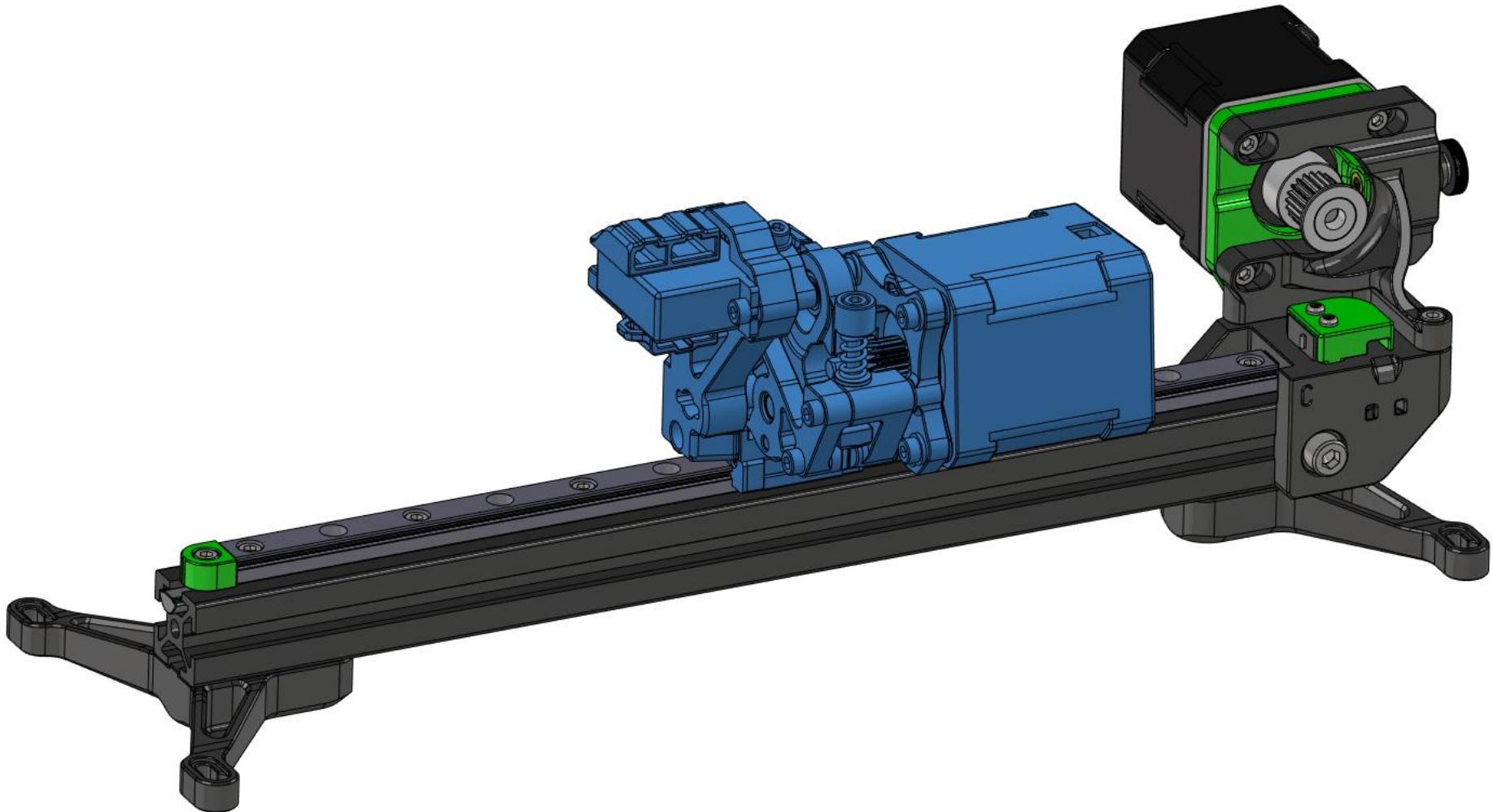


Tip

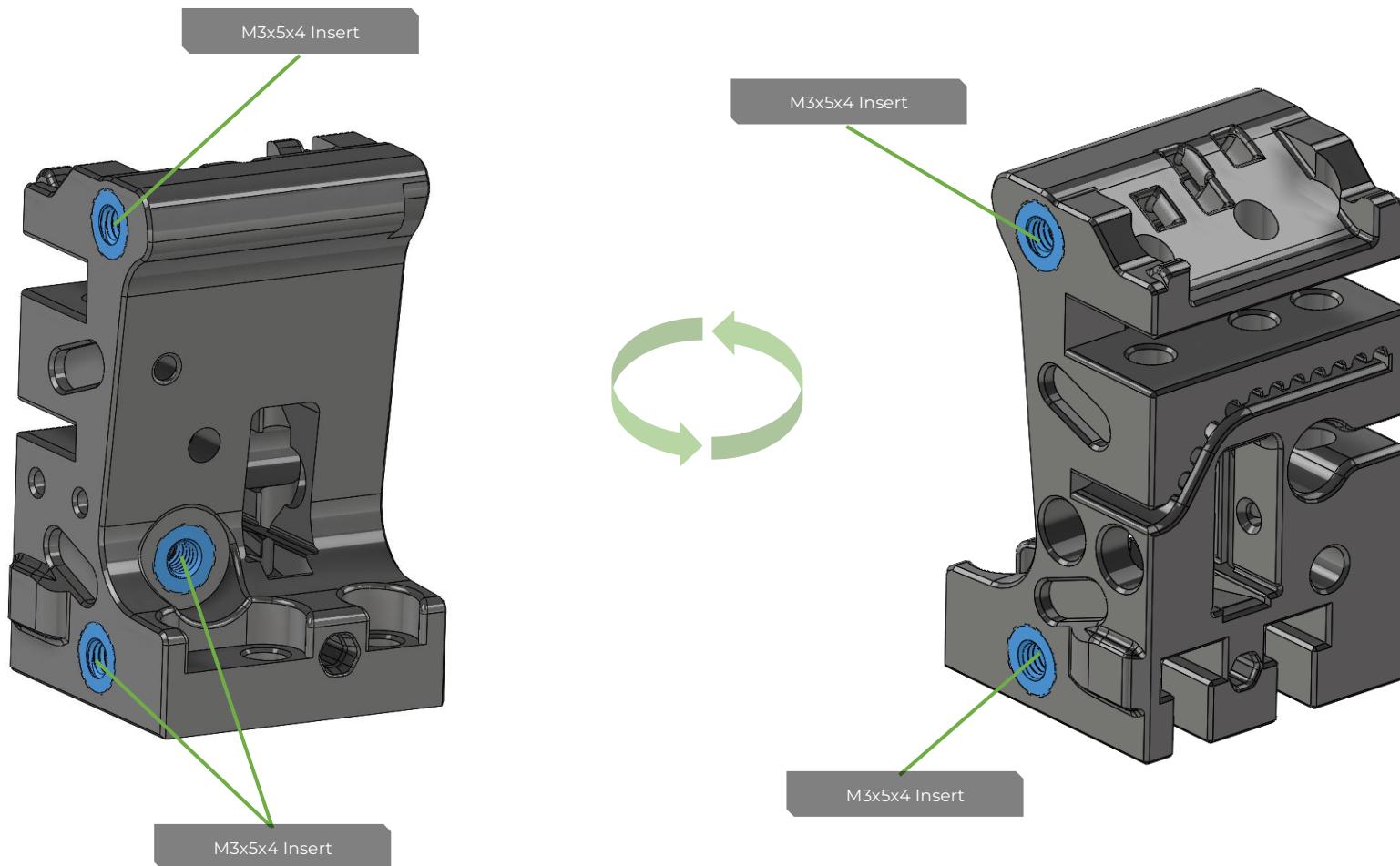
Solder two wires to the outer legs of the switch before assembly

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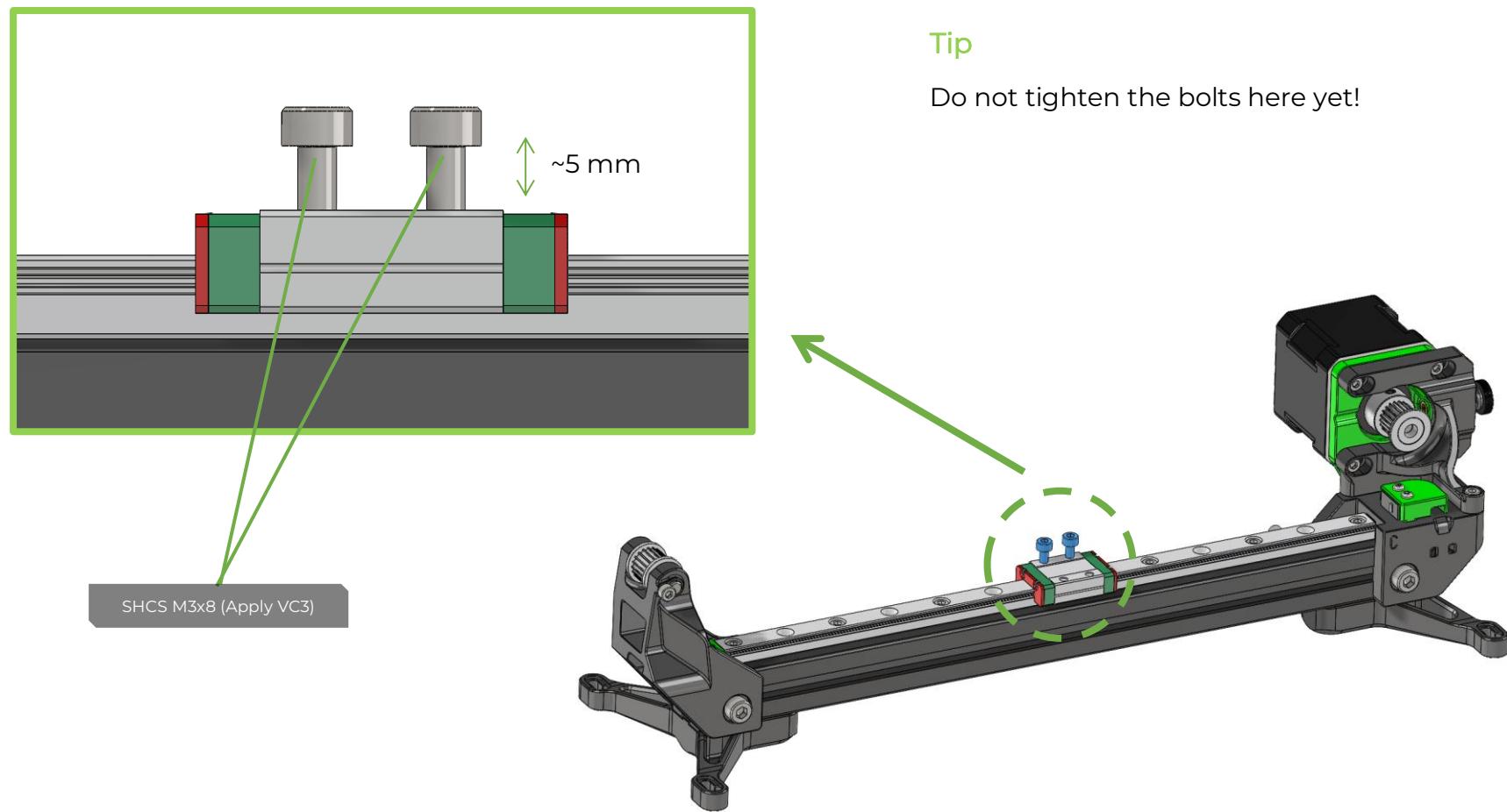
Selector Module – Overview



Selector Module – Assembly



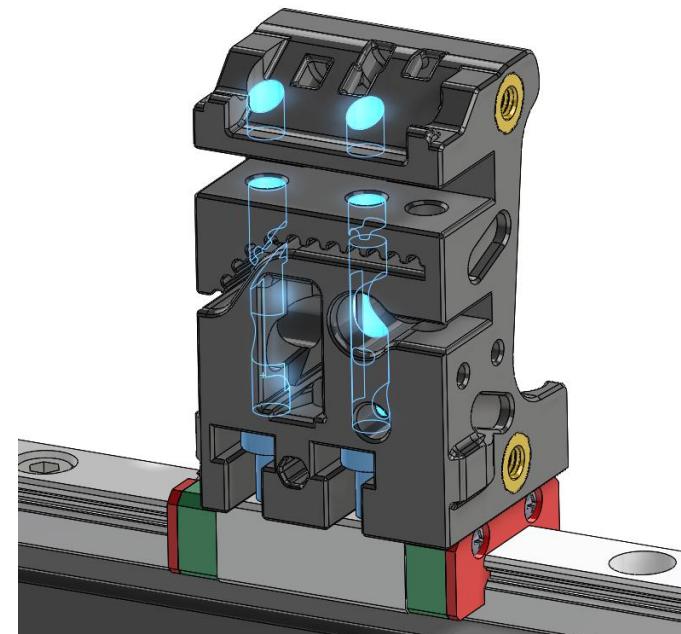
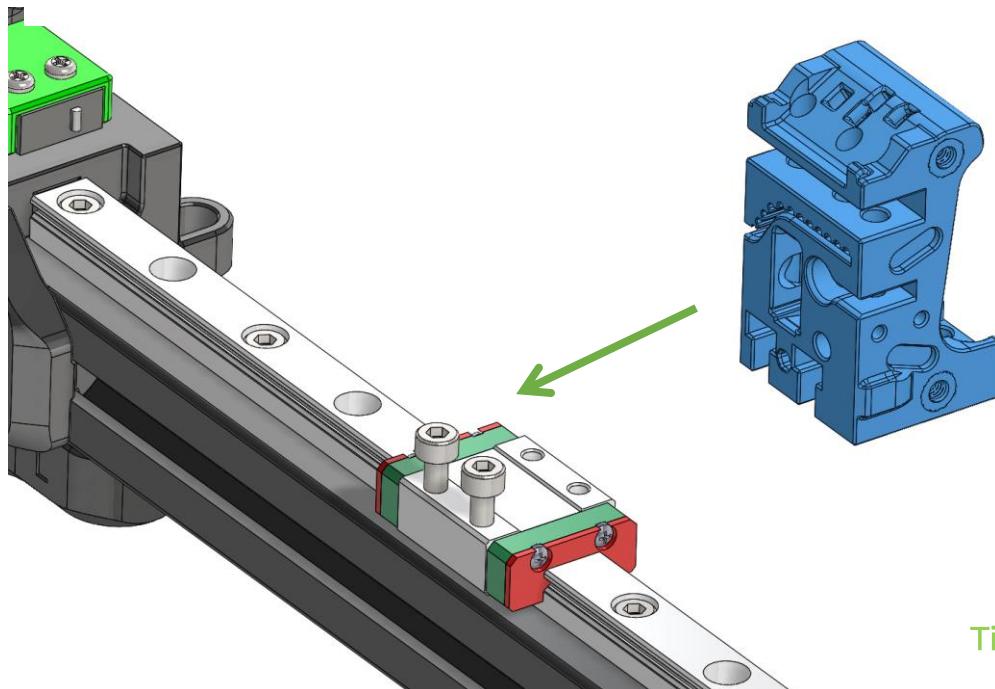
Selector Module – Assembly



Selector Module – Assembly

Mounting the selector

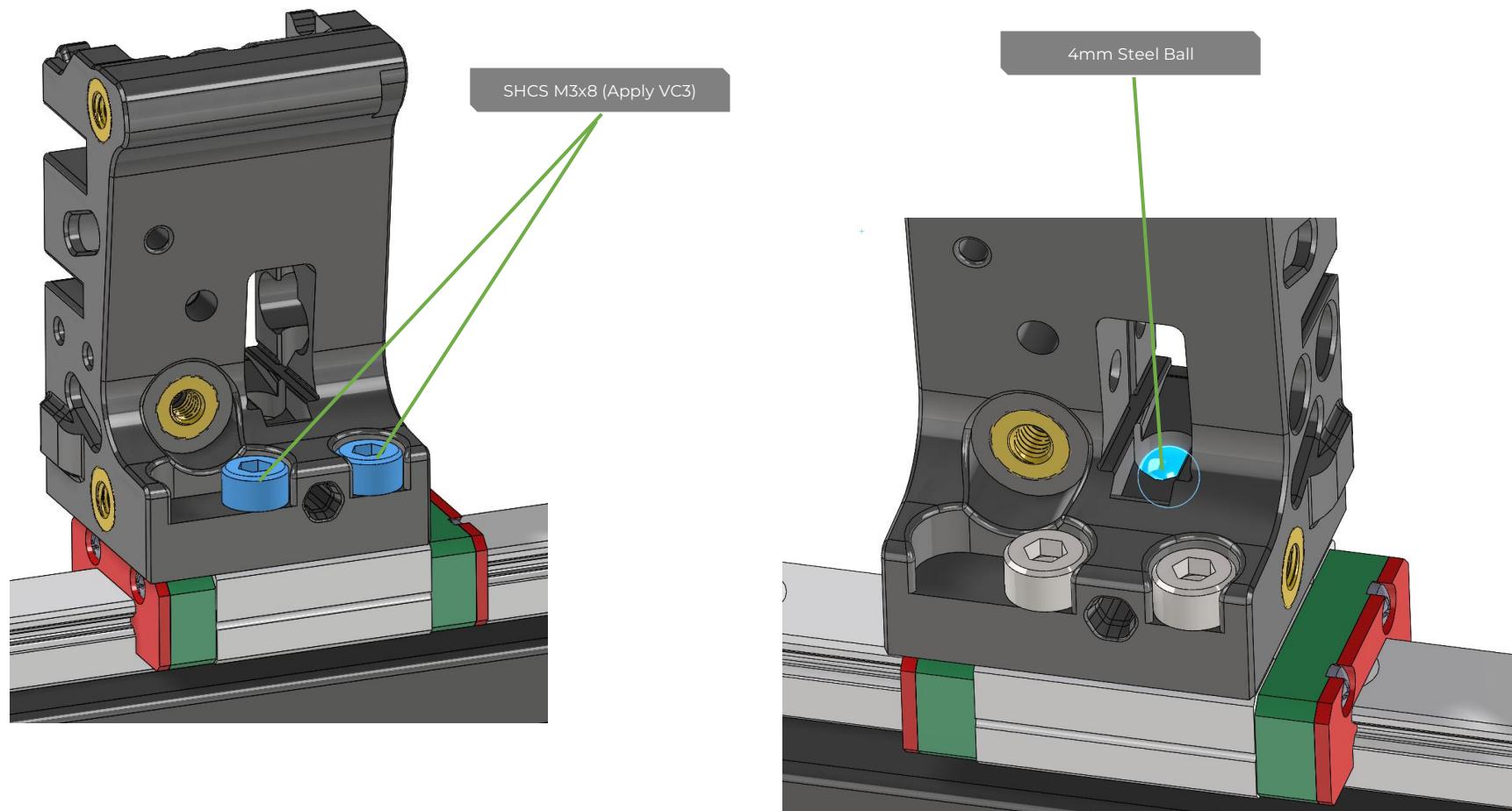
Slide the printed main selector body over the two bolts.



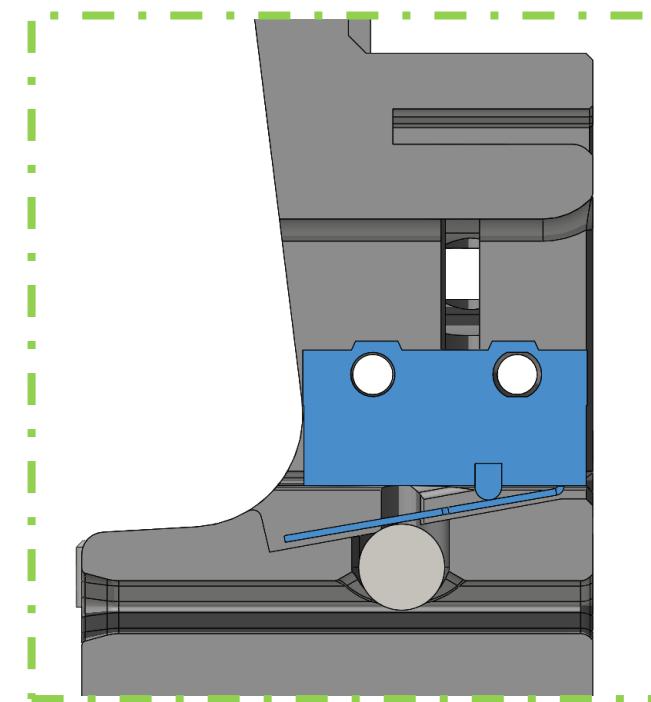
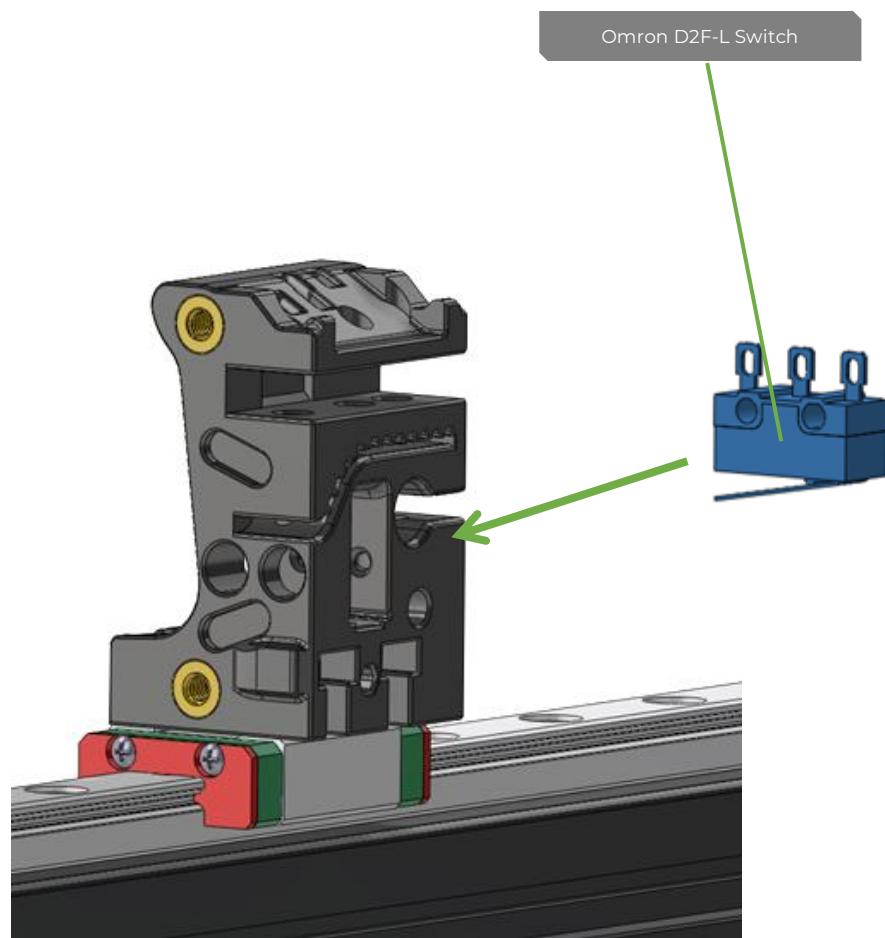
Tighten bolts

Use a long hex key to access the bolts from the top to tighten them

Selector Module – Assembly



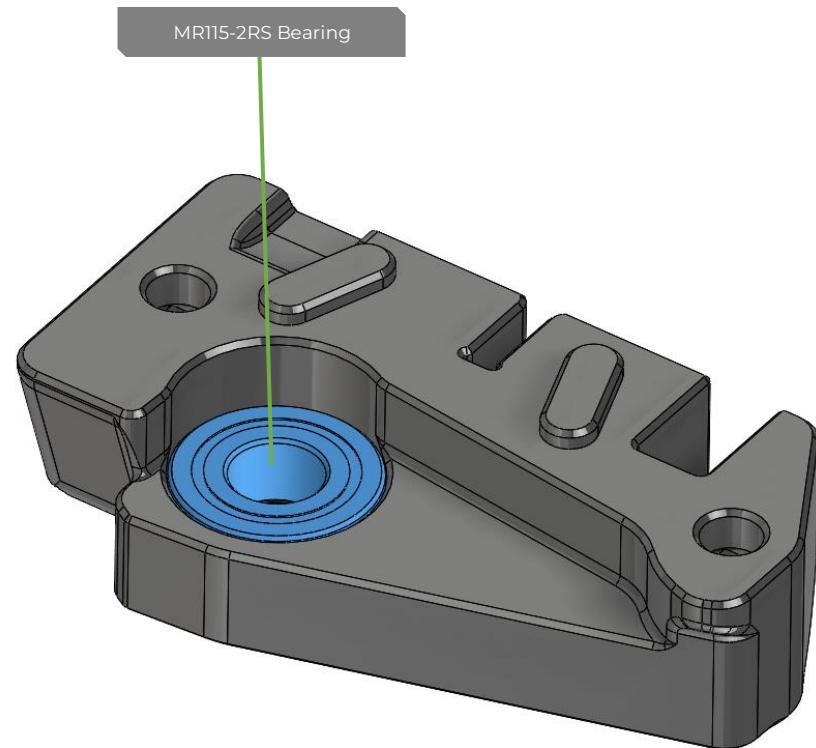
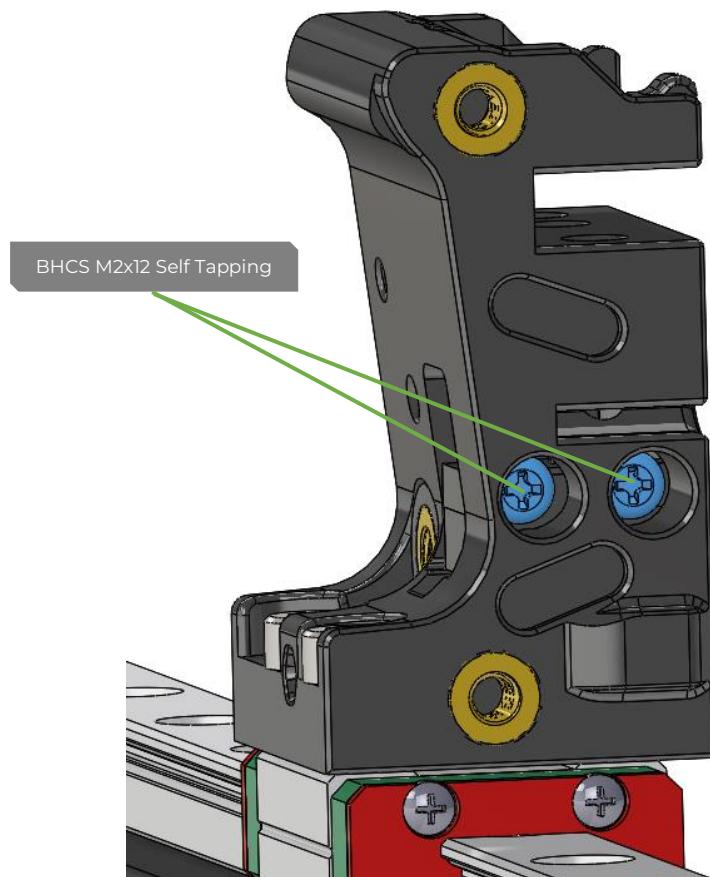
Selector Module – Assembly



Filament Switch

Place the filament switch into the body. Pay attention to the lever!

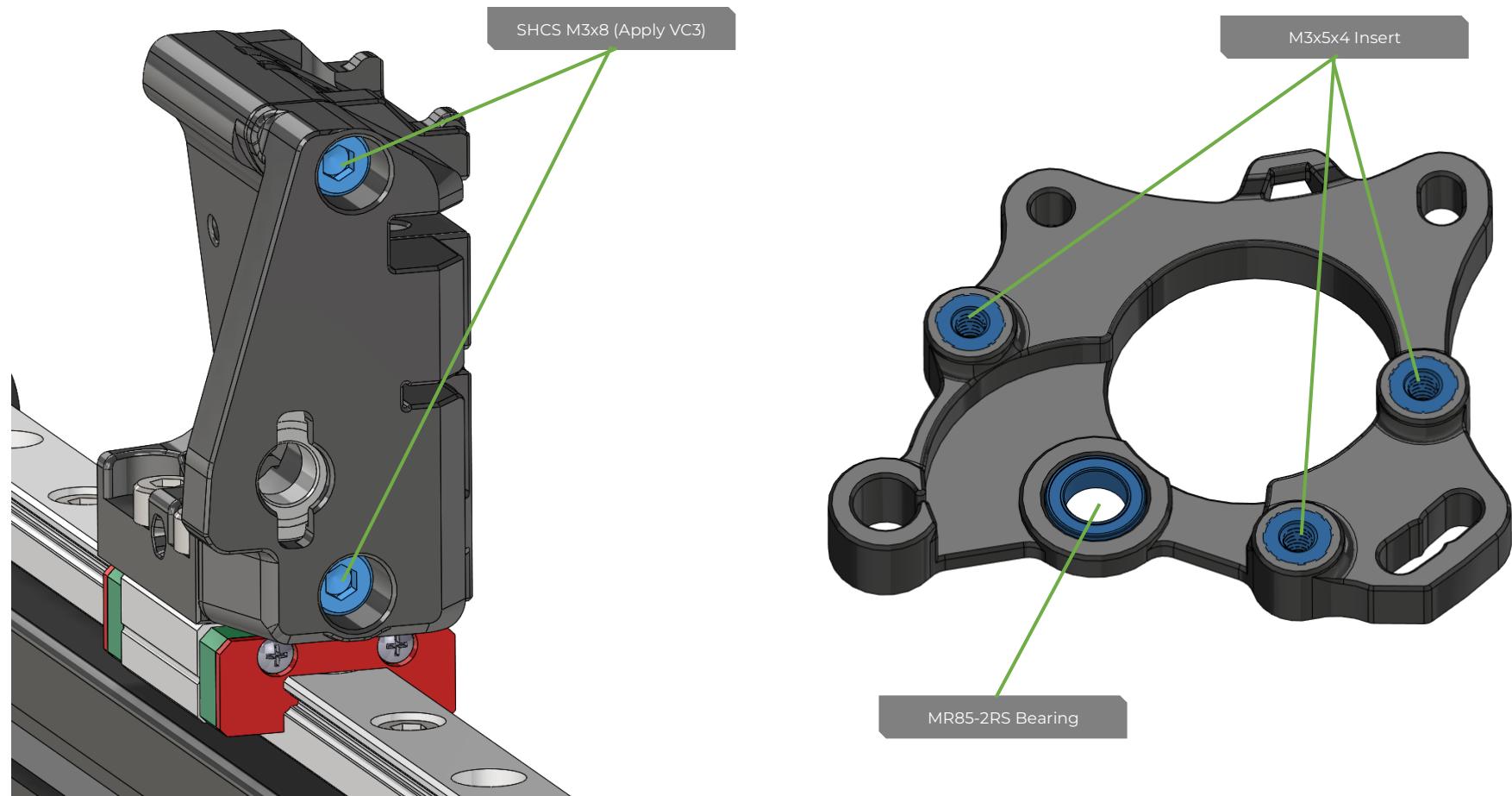
Selector Module – Assembly



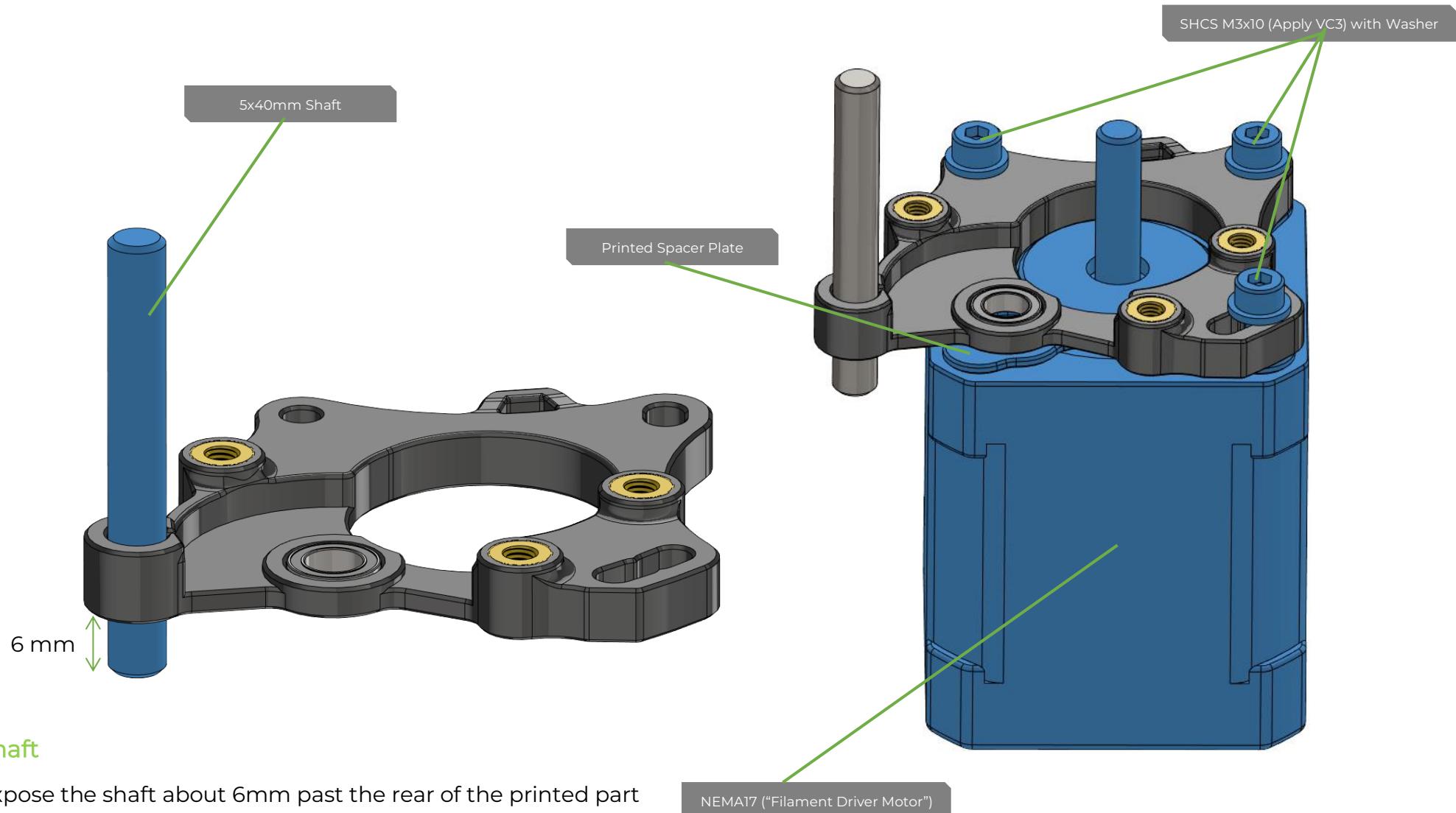
Tip

The bearing should go in the printed part with a light press

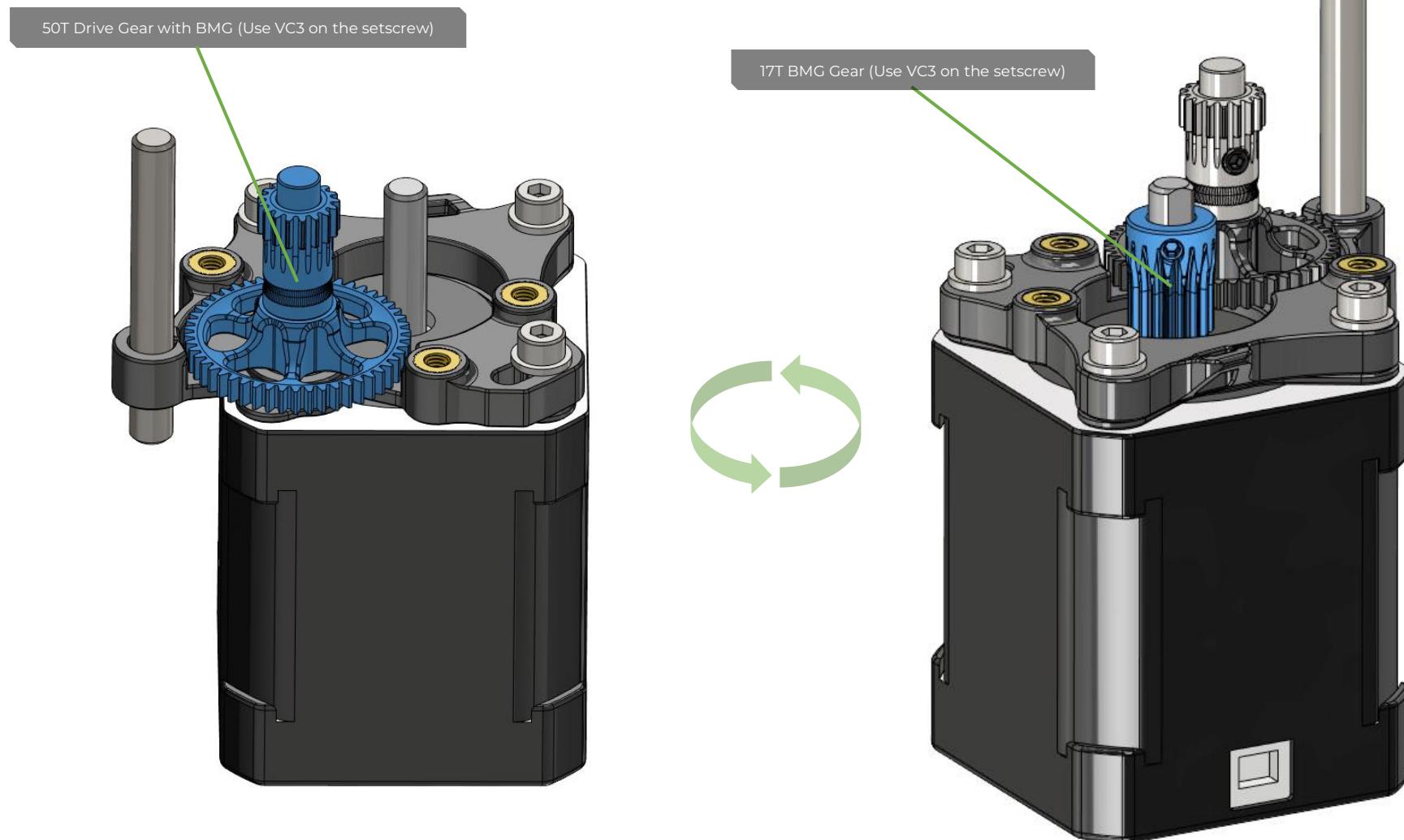
Selector Module – Assembly



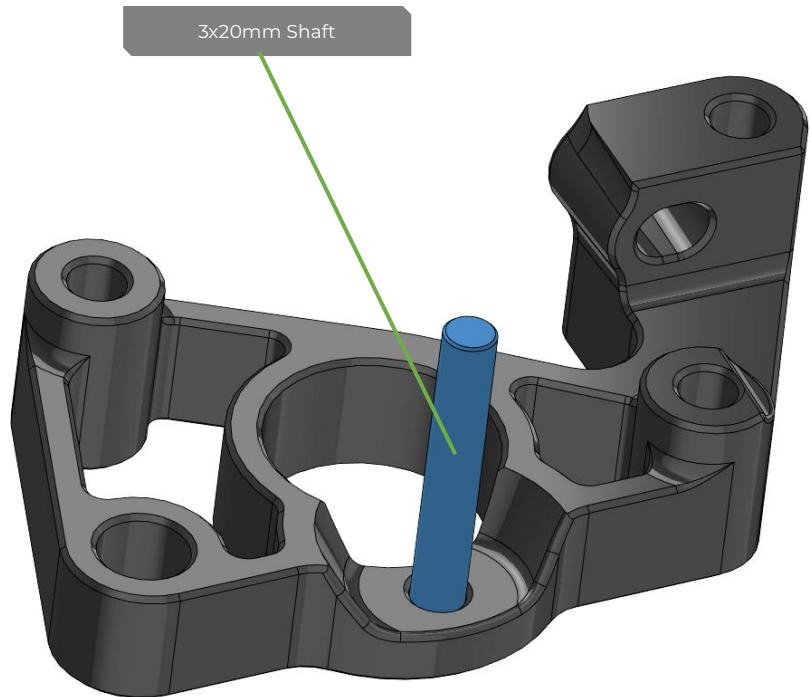
Selector Module – Assembly



Selector Module – Assembly

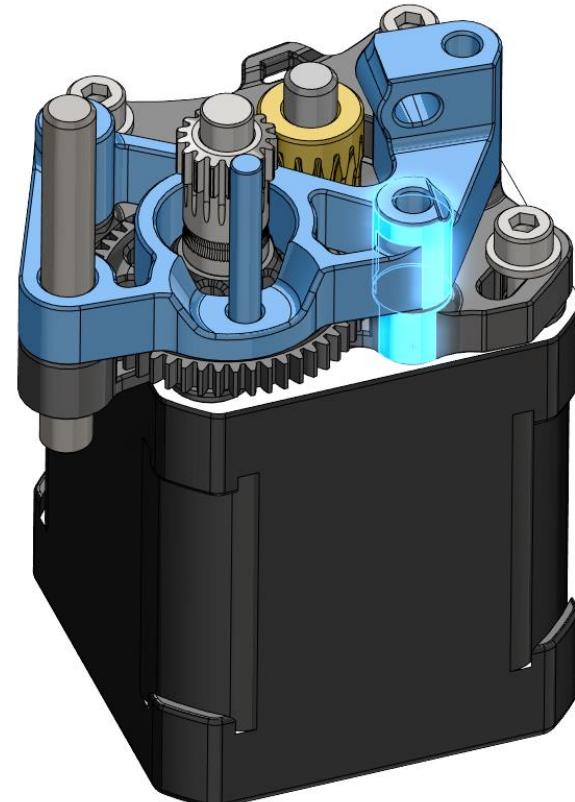


Selector Module – Assembly

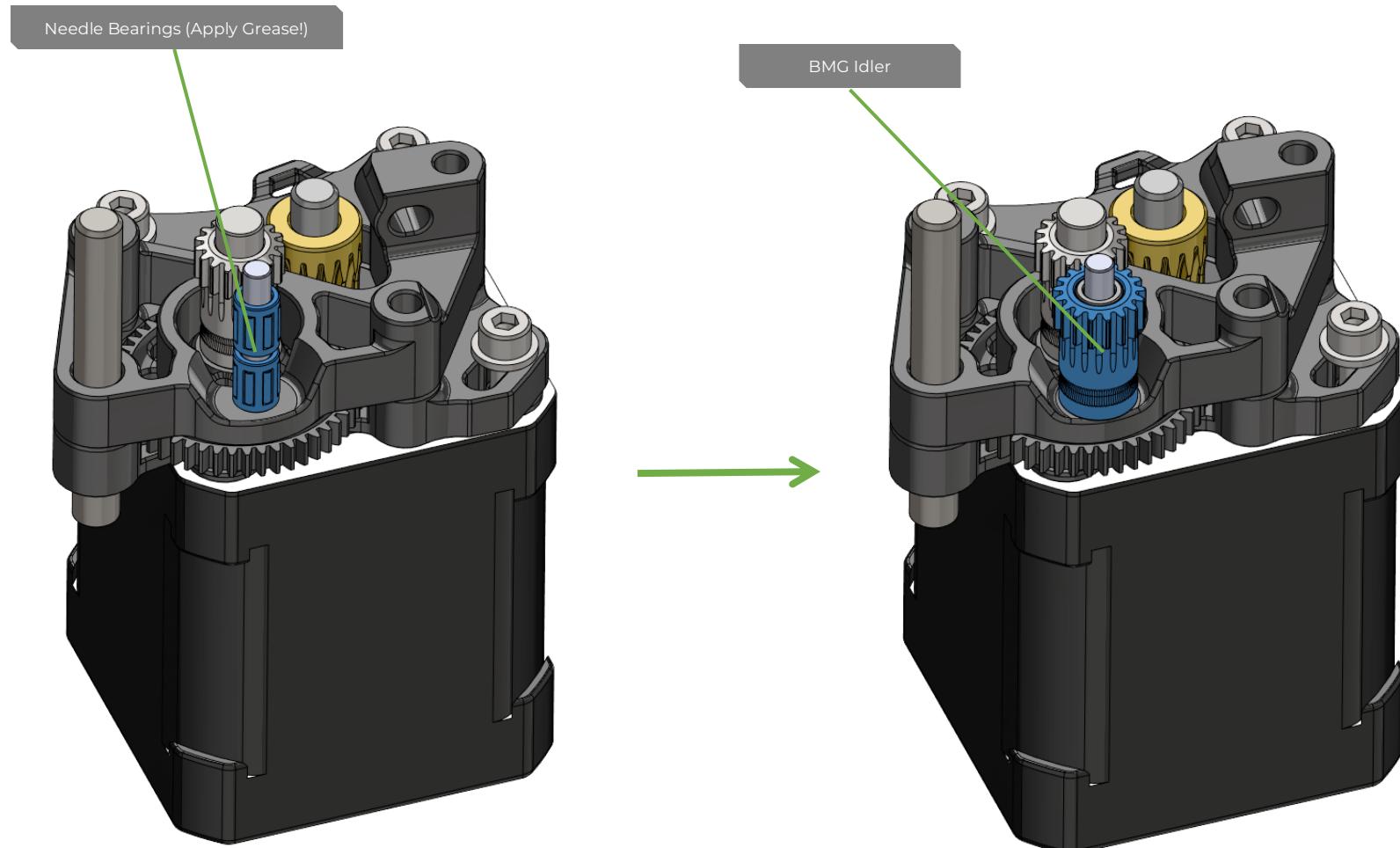


Gear Casing

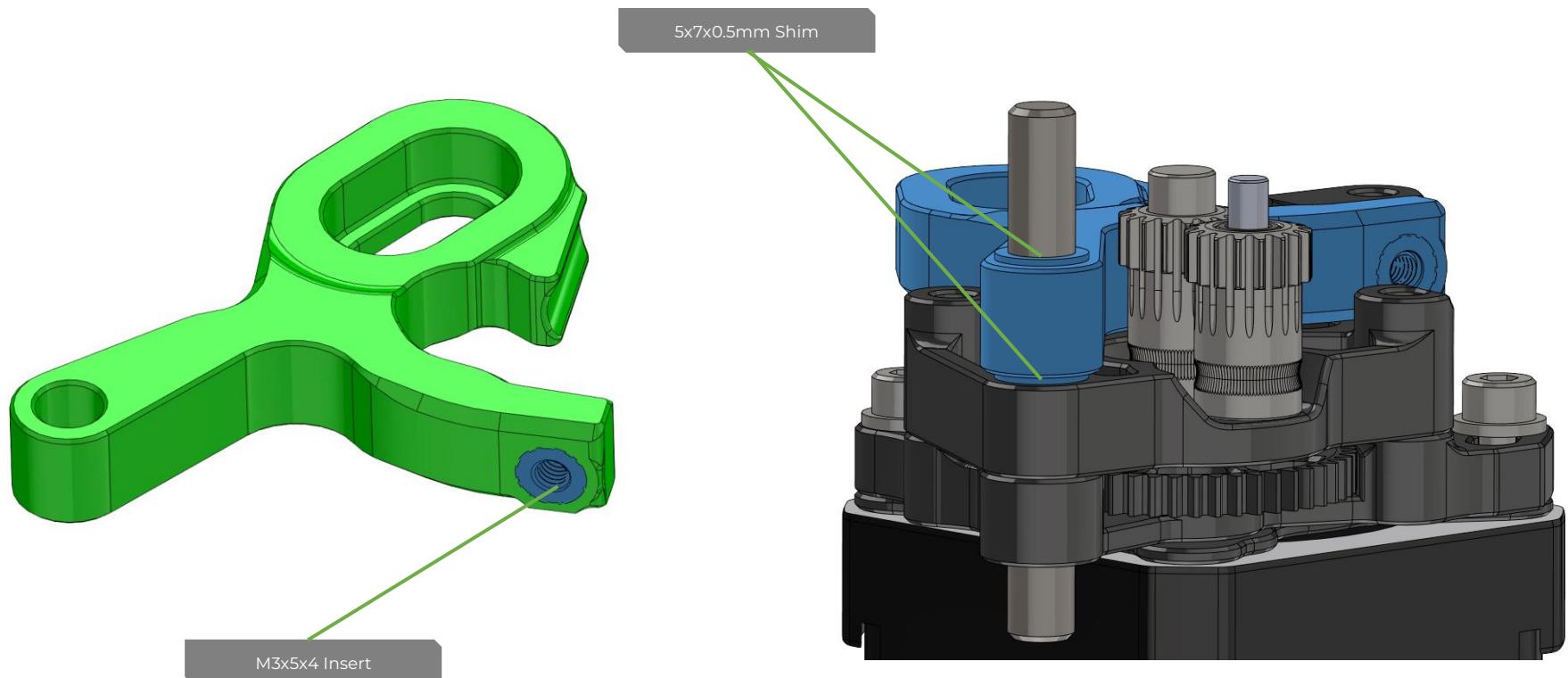
Place the gear casing with 3x20mm shaft over the main assembly.
Align the holes marked light blue.



Selector Module – Assembly



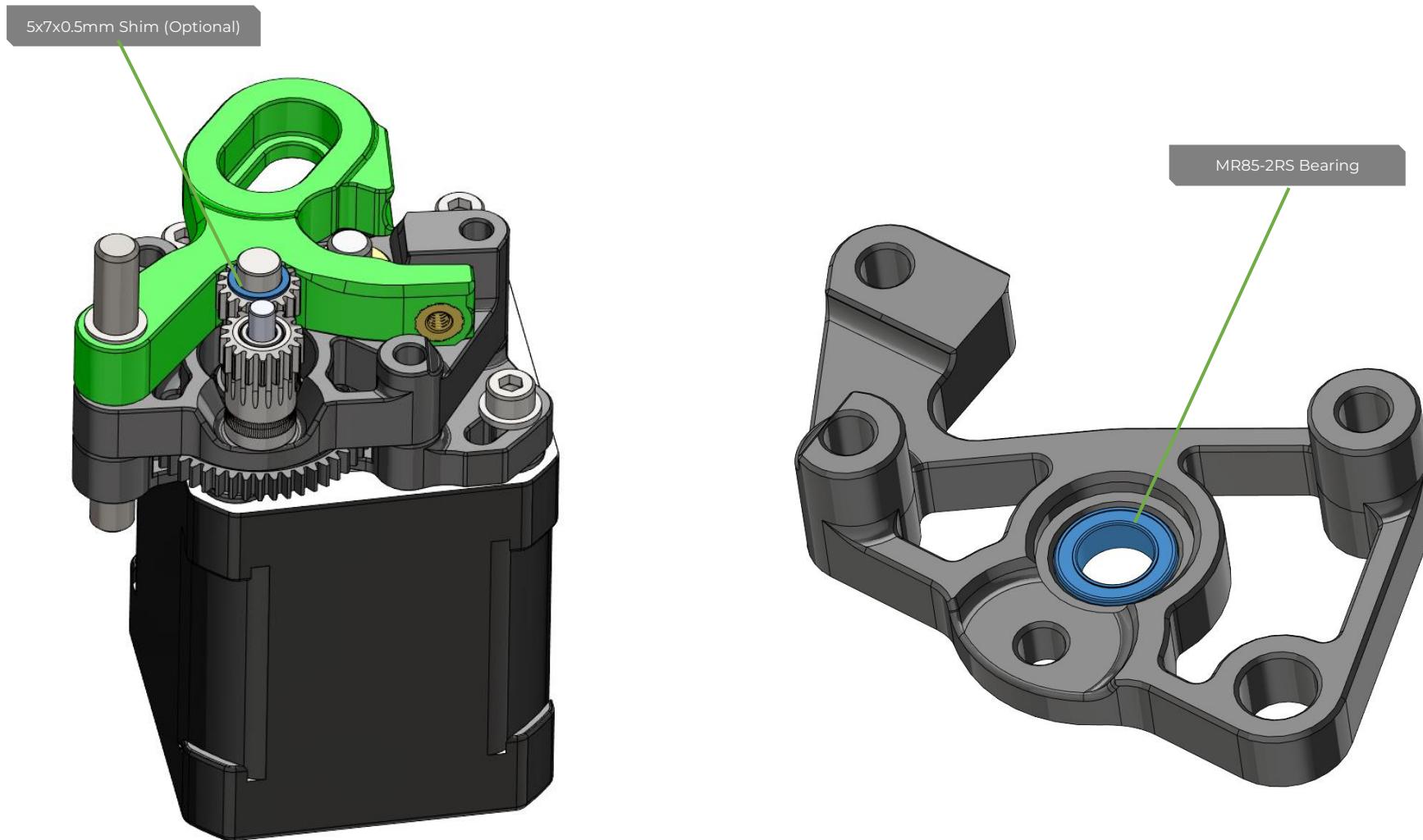
Selector Module – Assembly



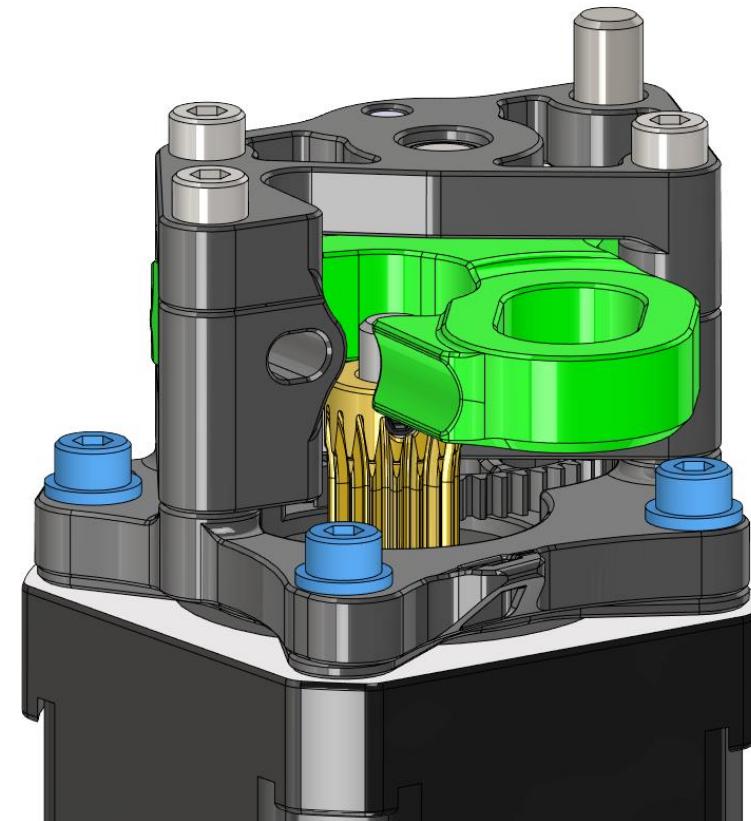
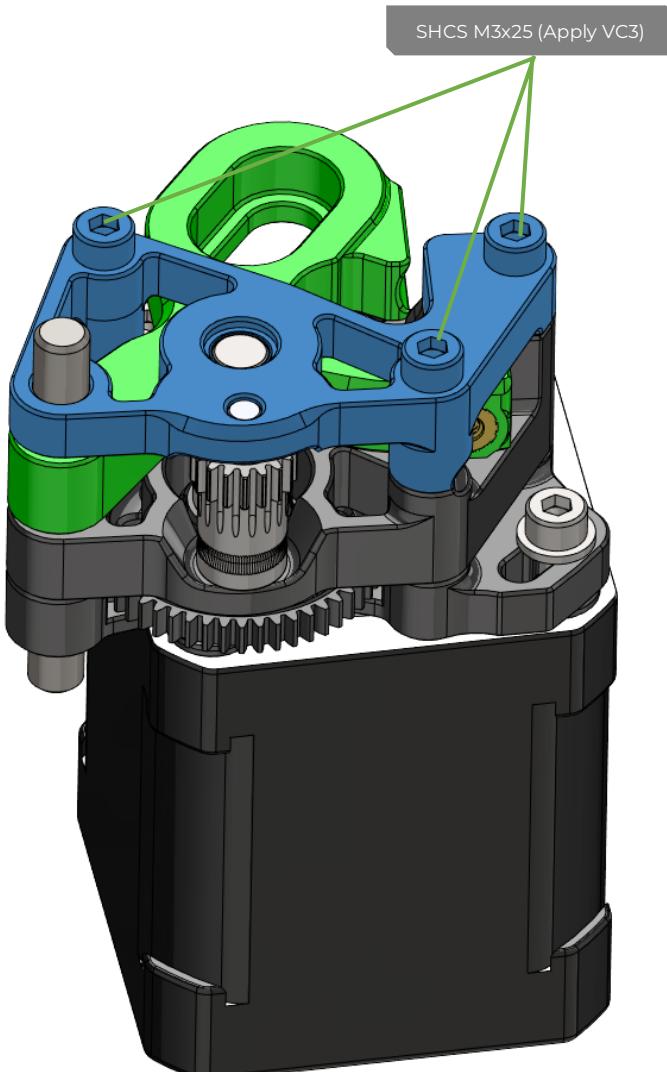
Shaft assembly

Place the accent part on the shaft with a shim underneath and on top

Selector Module – Assembly



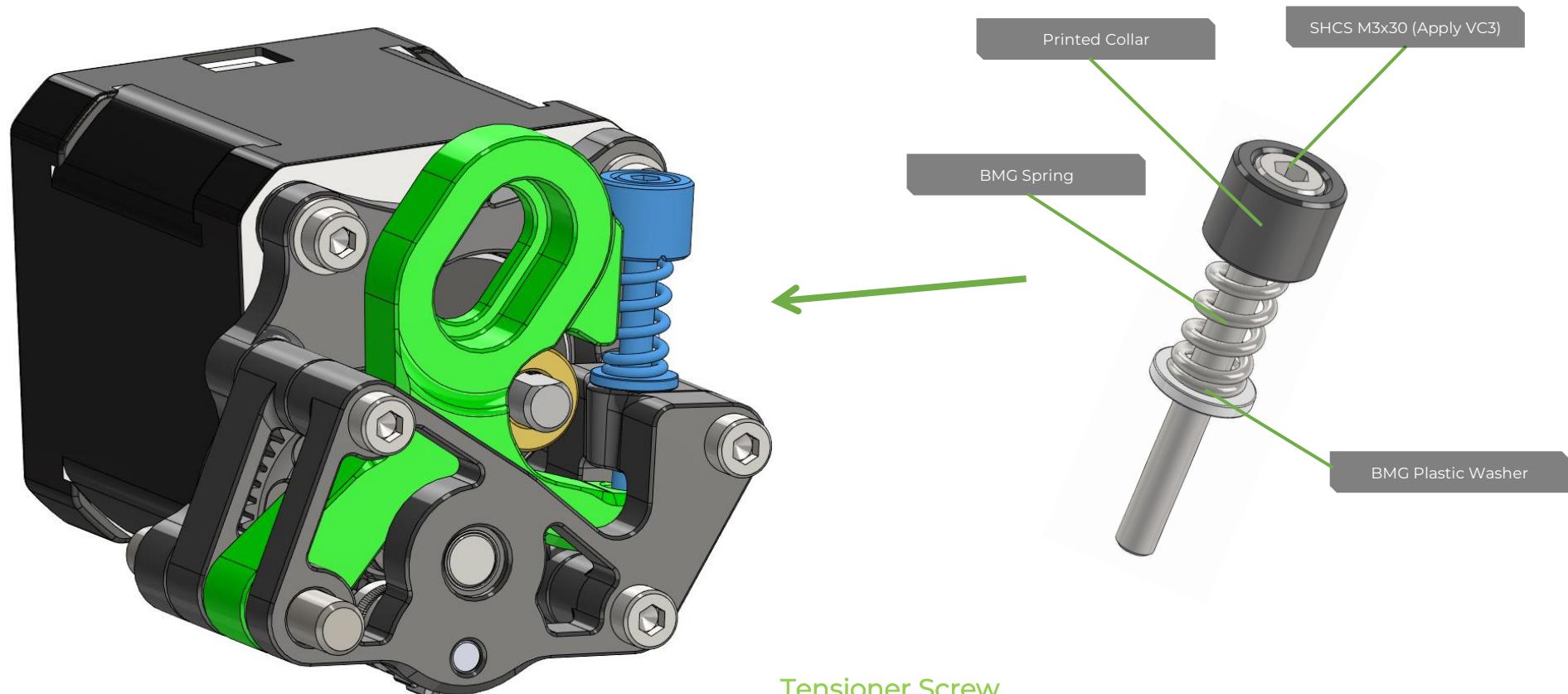
Selector Module – Assembly



Meshing

Adjust gear meshing with the bolts as necessary

Selector Module – Assembly



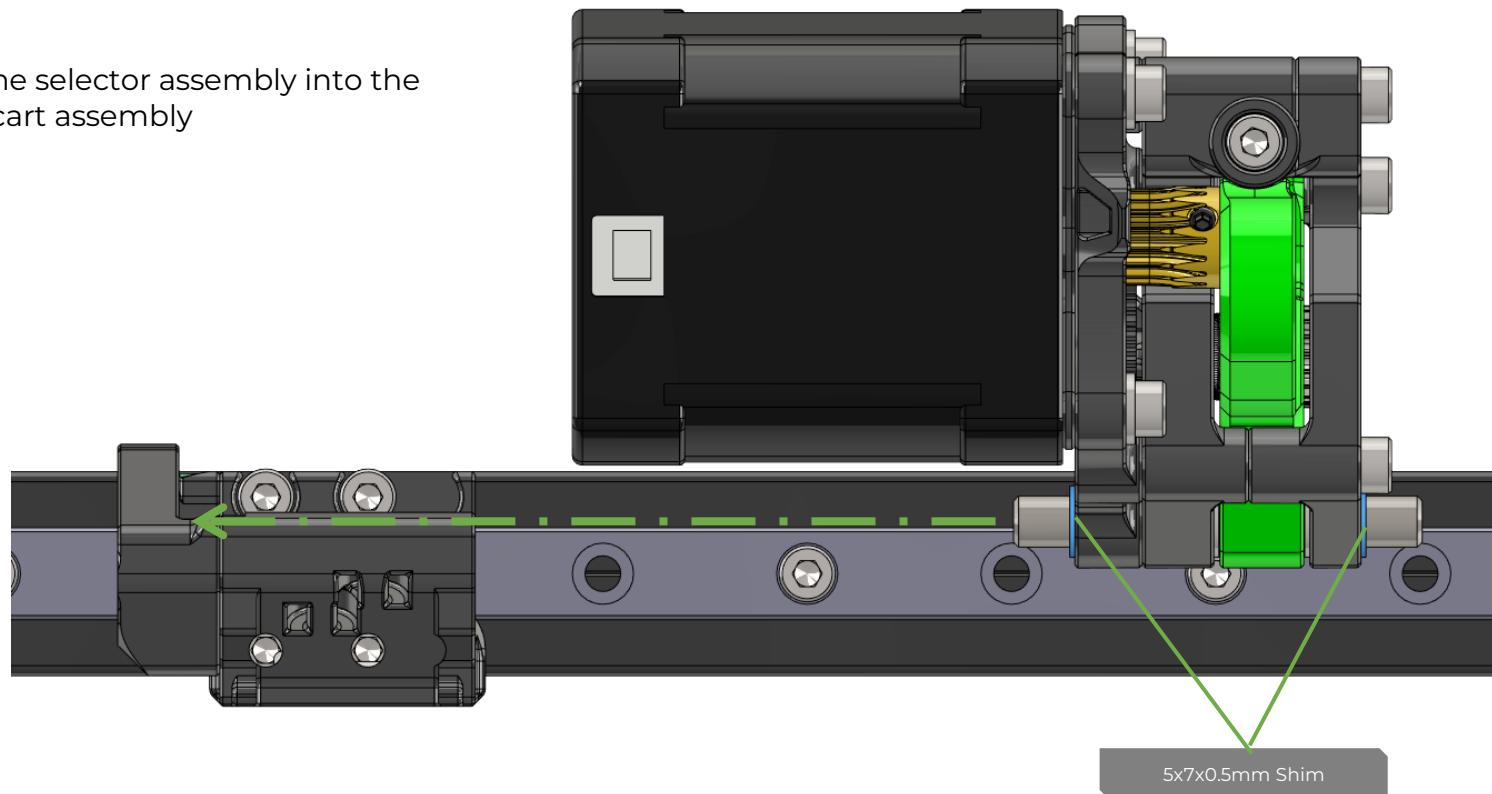
Tensioner Screw

The spring and plastic washer come from the BMG thumbscrew assembly. However, make sure to use an M3x30 screw and printed collar instead of the included thumbscrew.

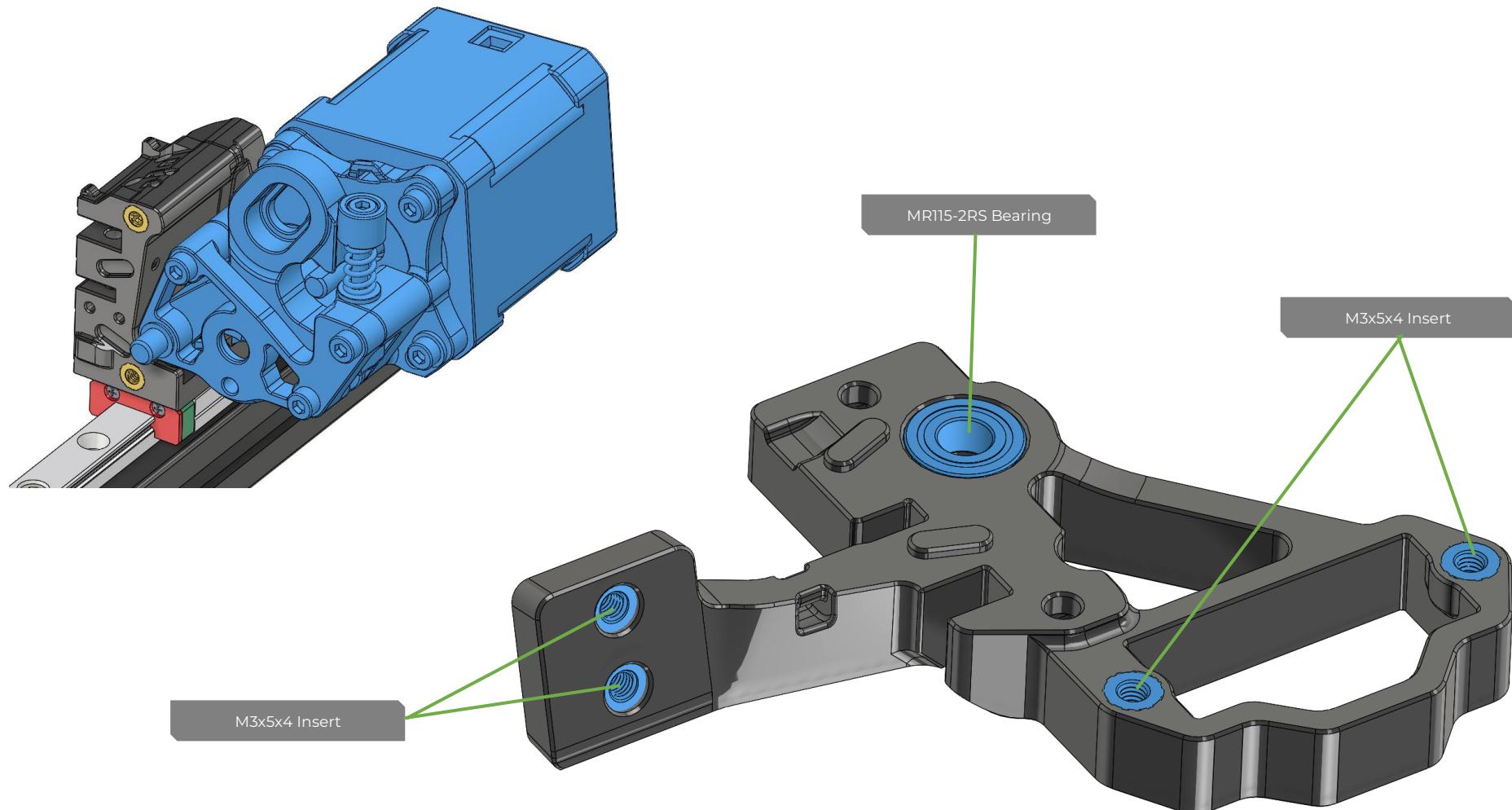
Selector Module – Assembly

Instruction

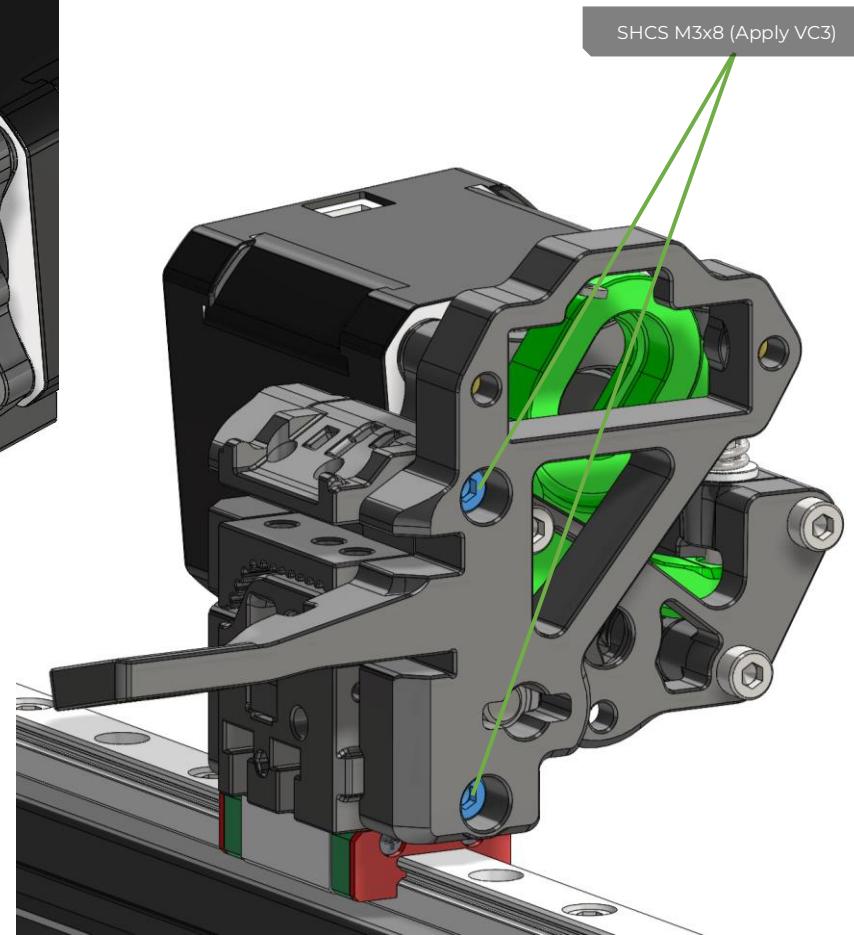
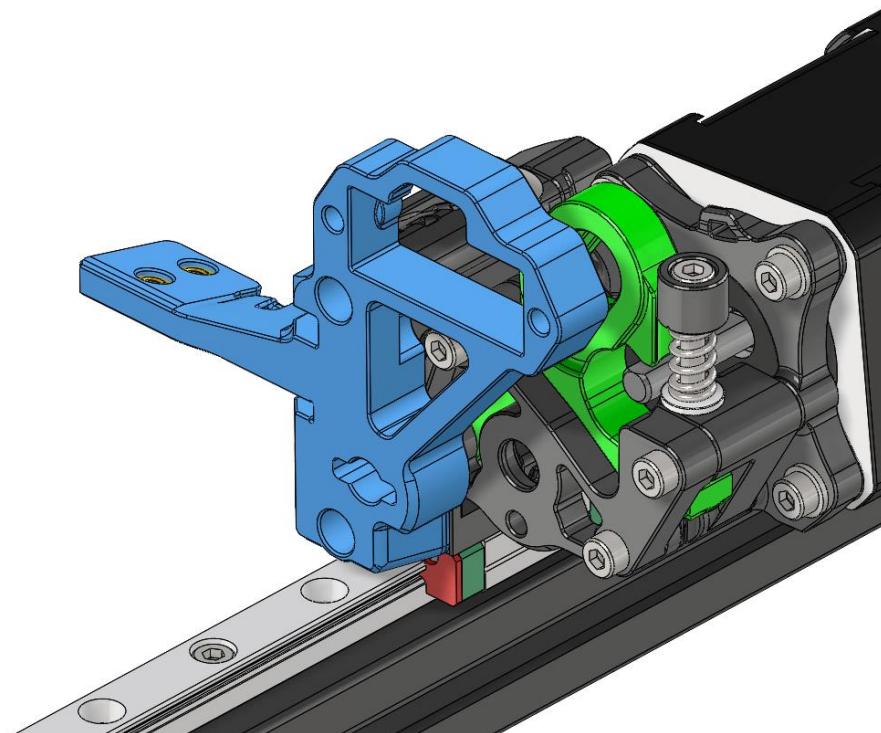
Slide the shaft from the selector assembly into the large bearing on the cart assembly



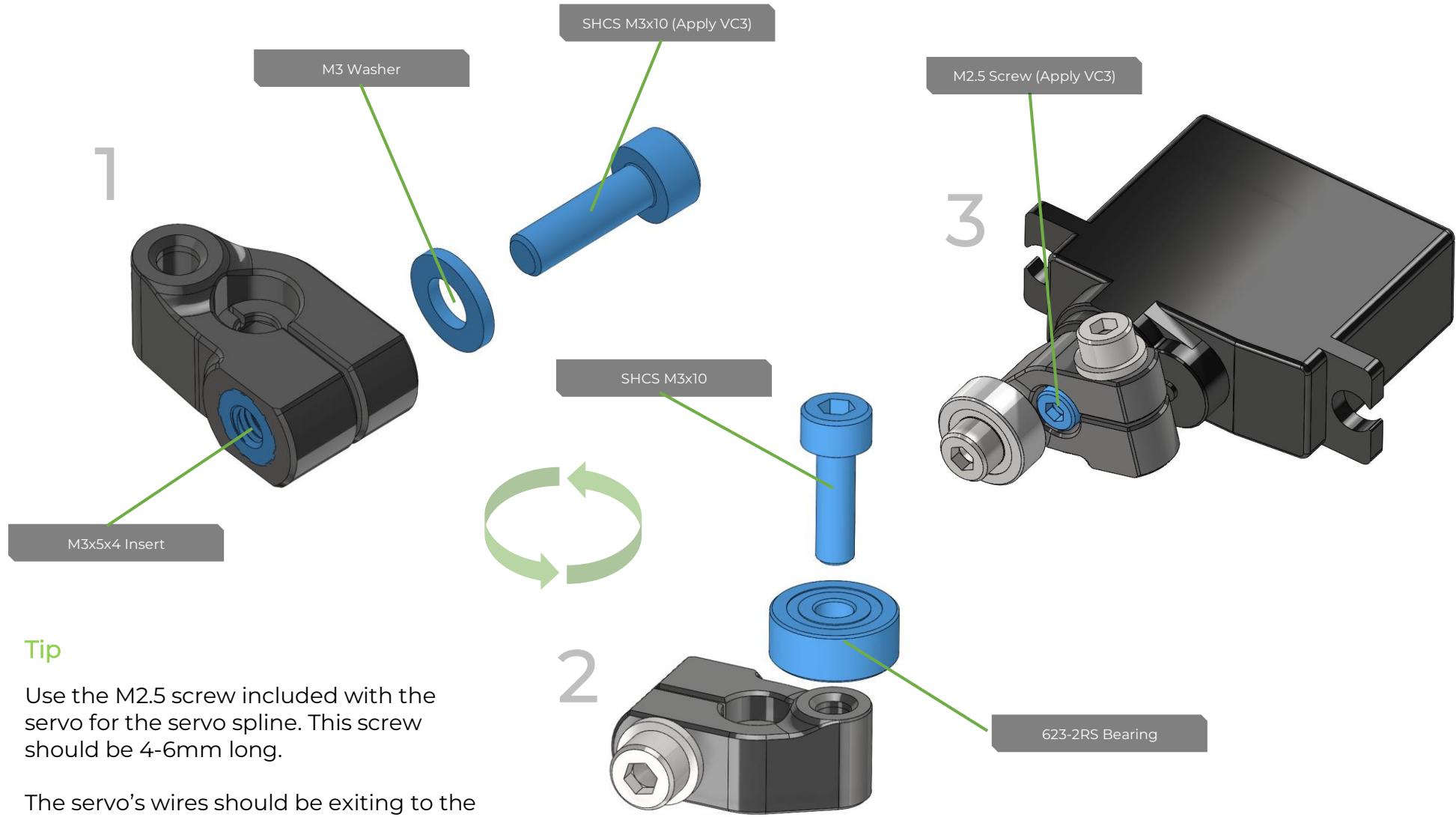
Selector Module – Assembly



Selector Module – Assembly



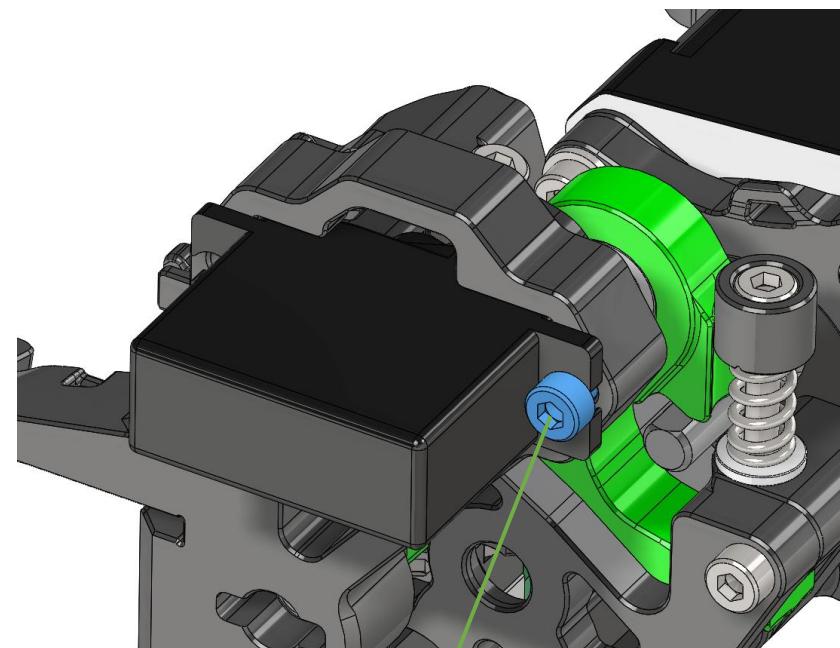
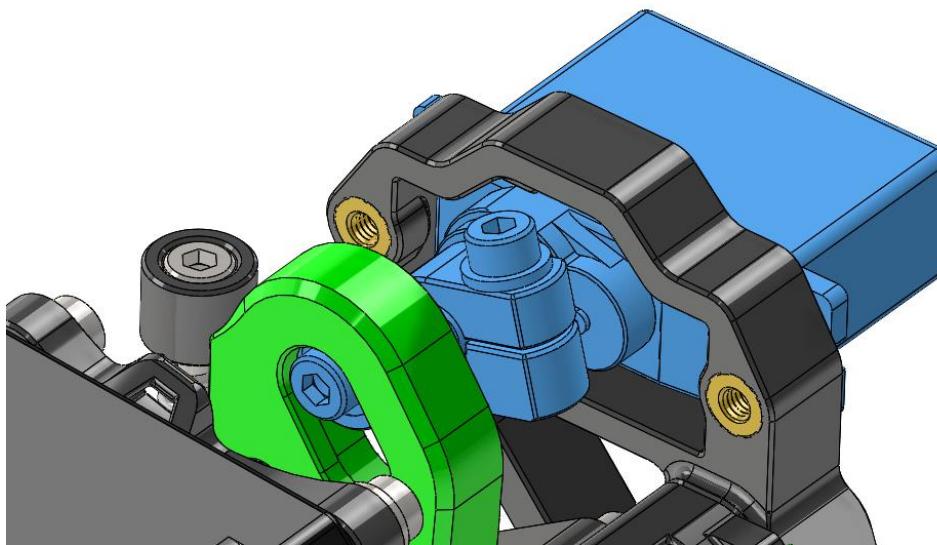
Selector Module – Assembly



Selector Module – Assembly

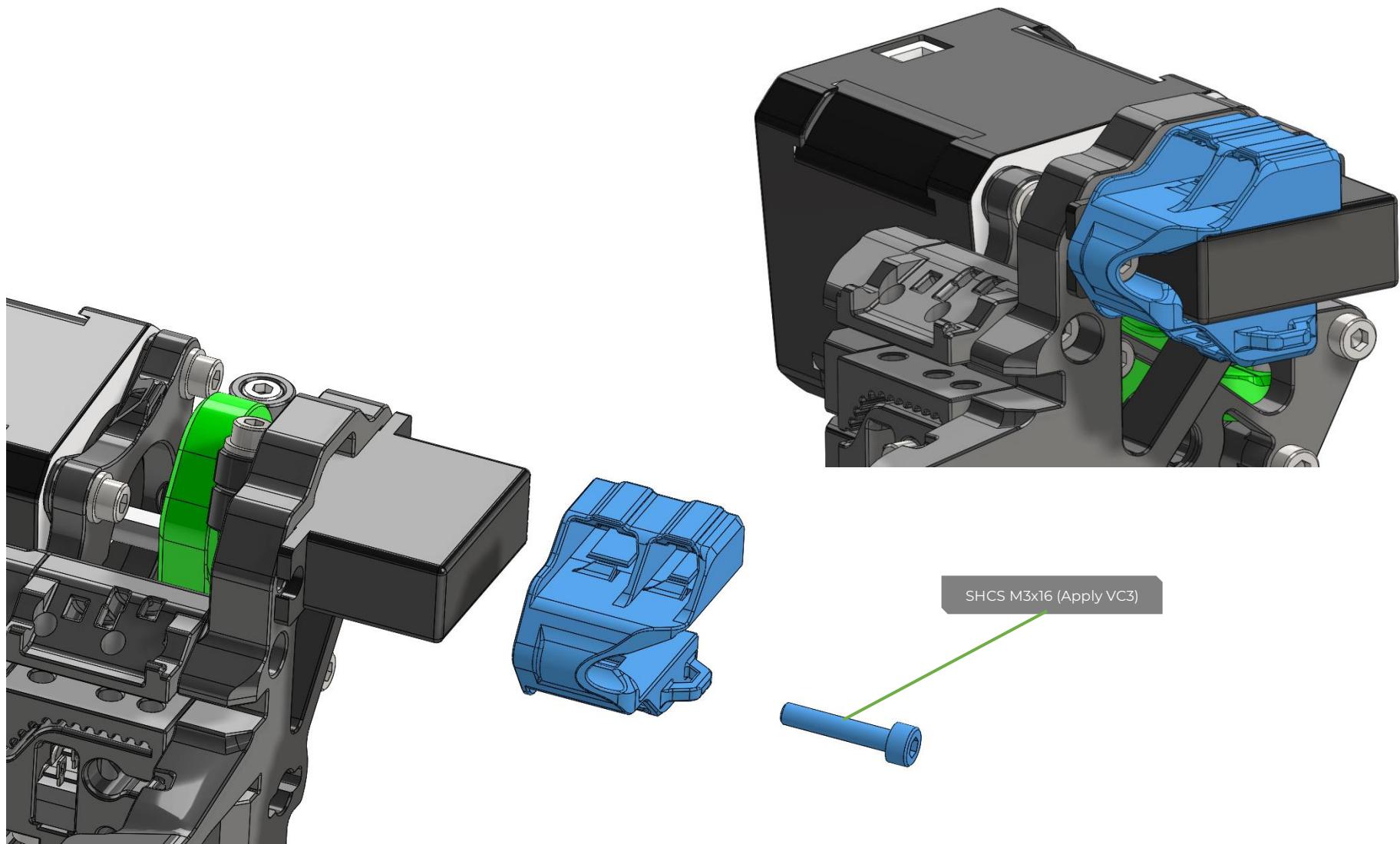
Instruction

The servo can be put in place into the frame



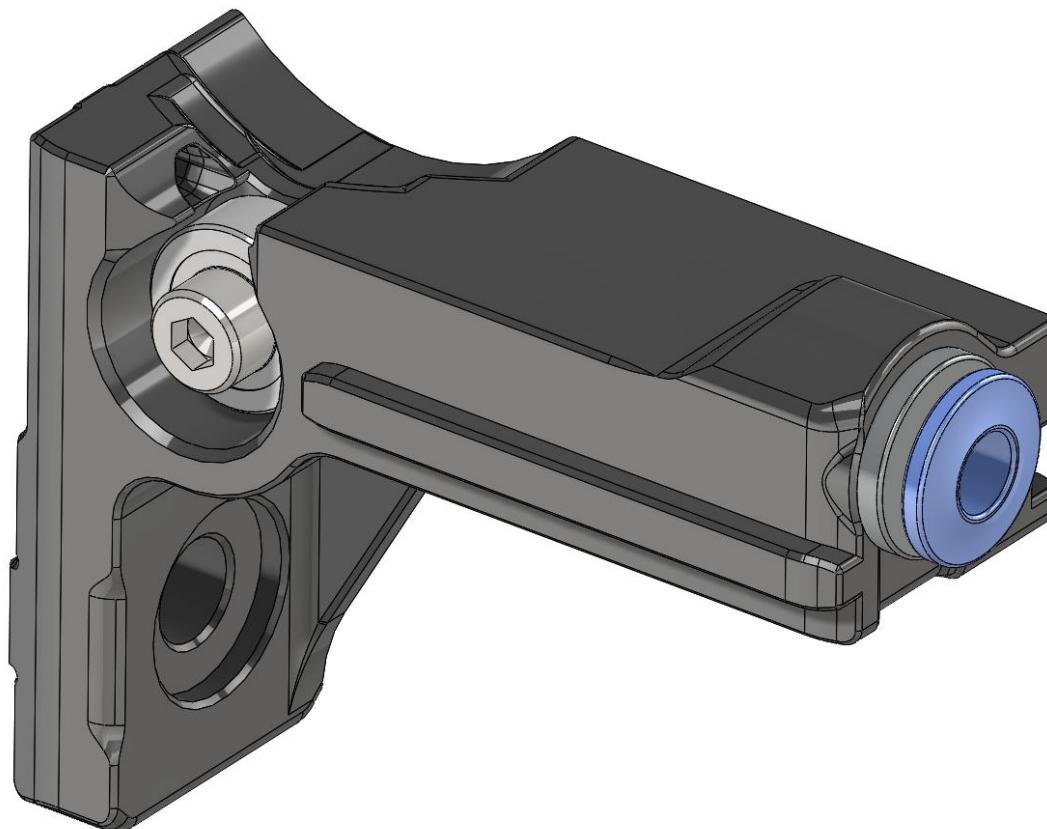
SHCS M3x10 (Apply VC3)

Selector Module – Assembly

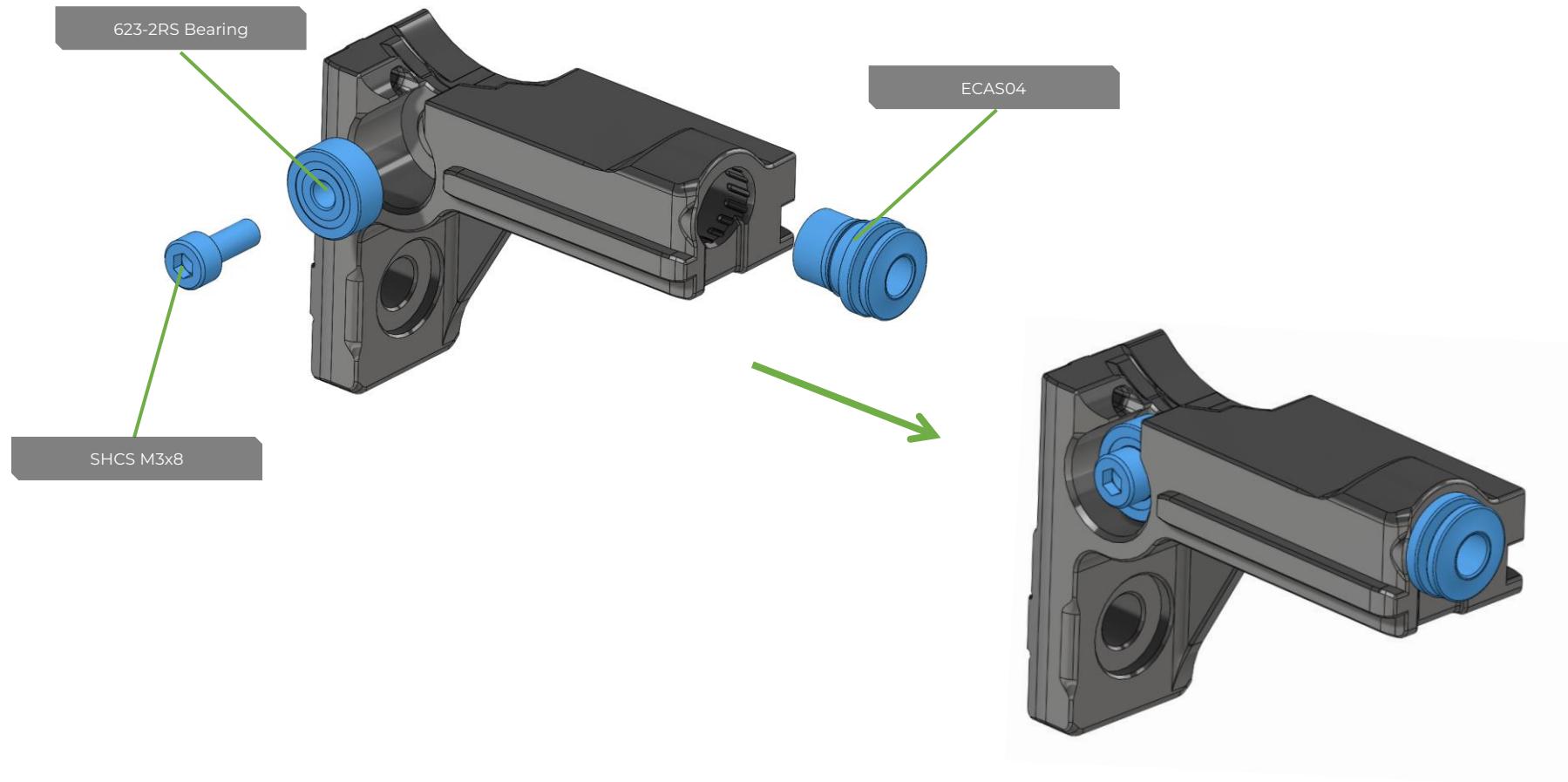


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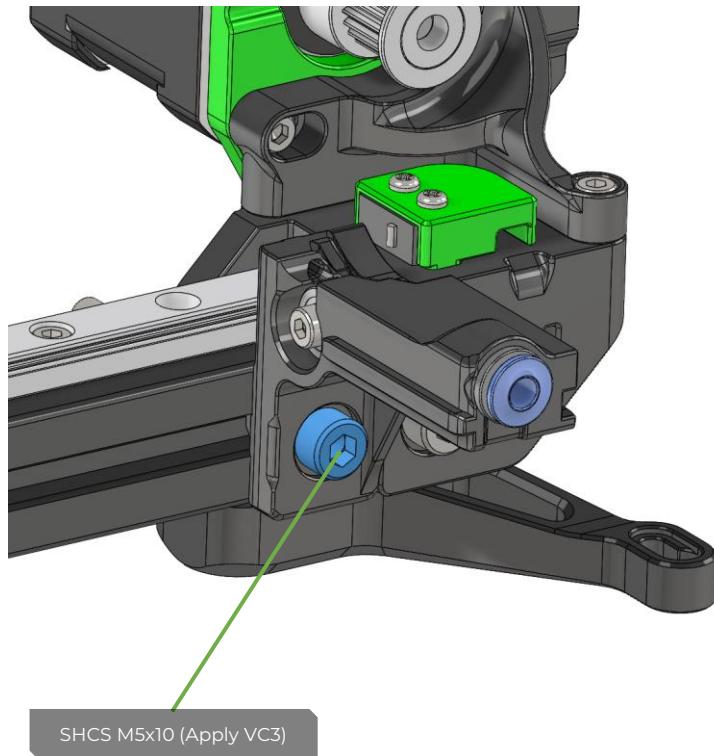
Filament Lane Module – Overview



Filament Lane Module – Assembly

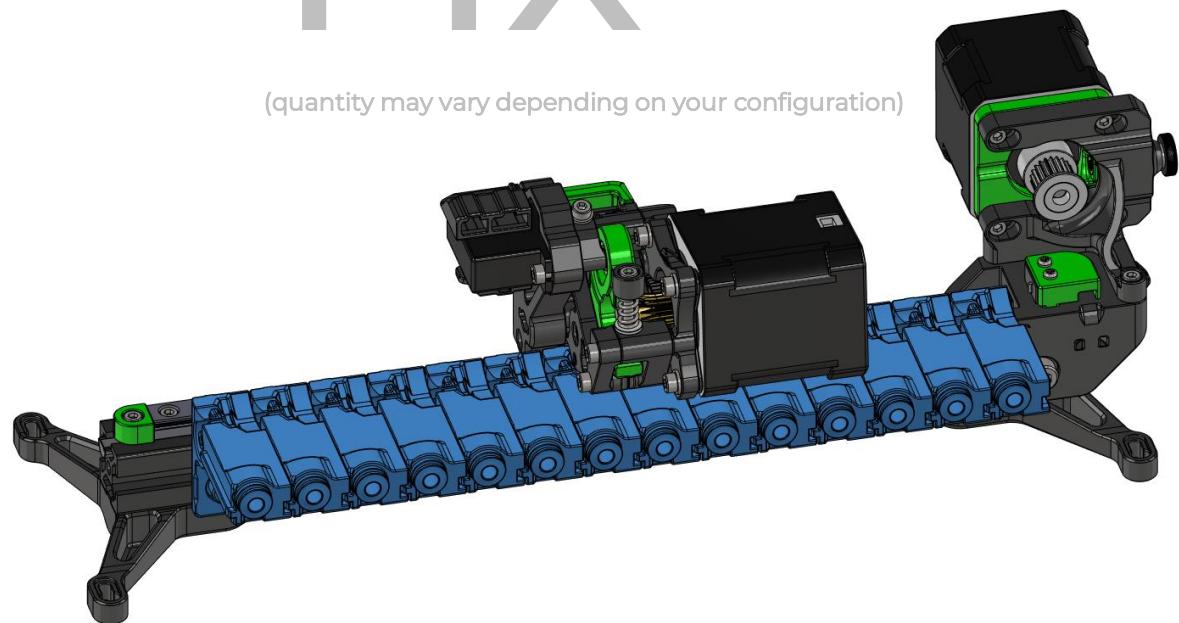


Filament Lane Module – Assembly

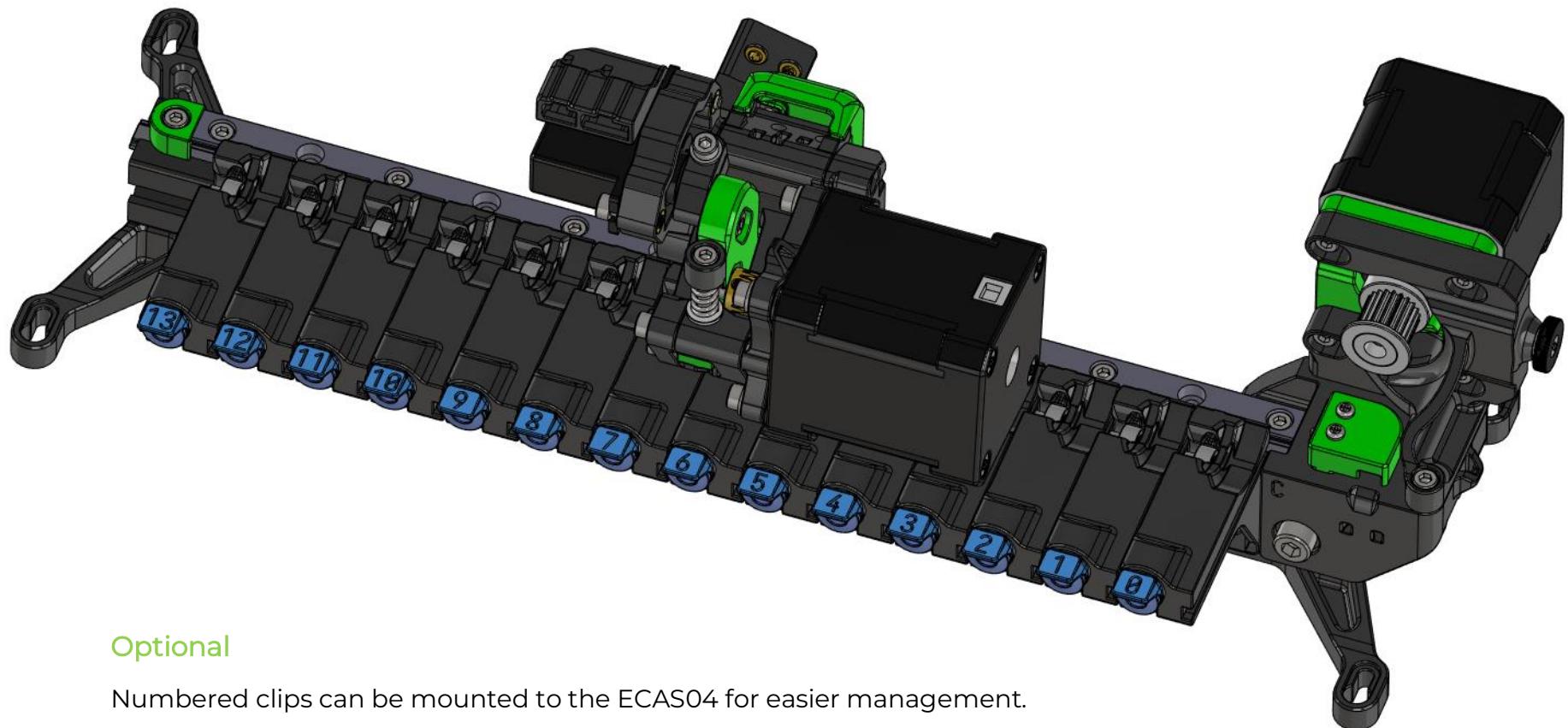


14X

(quantity may vary depending on your configuration)



Filament Lane Module – Assembly

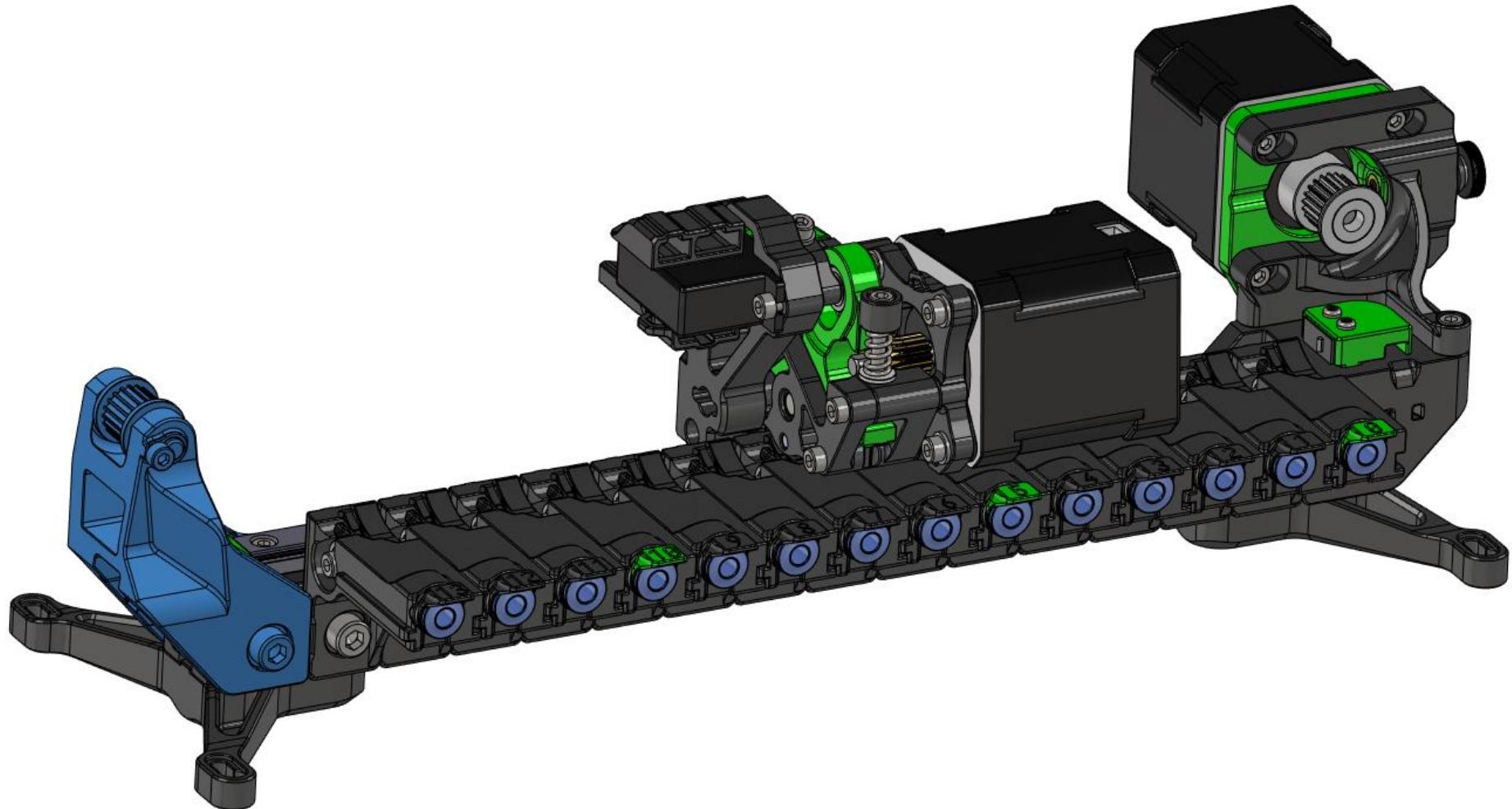


Optional

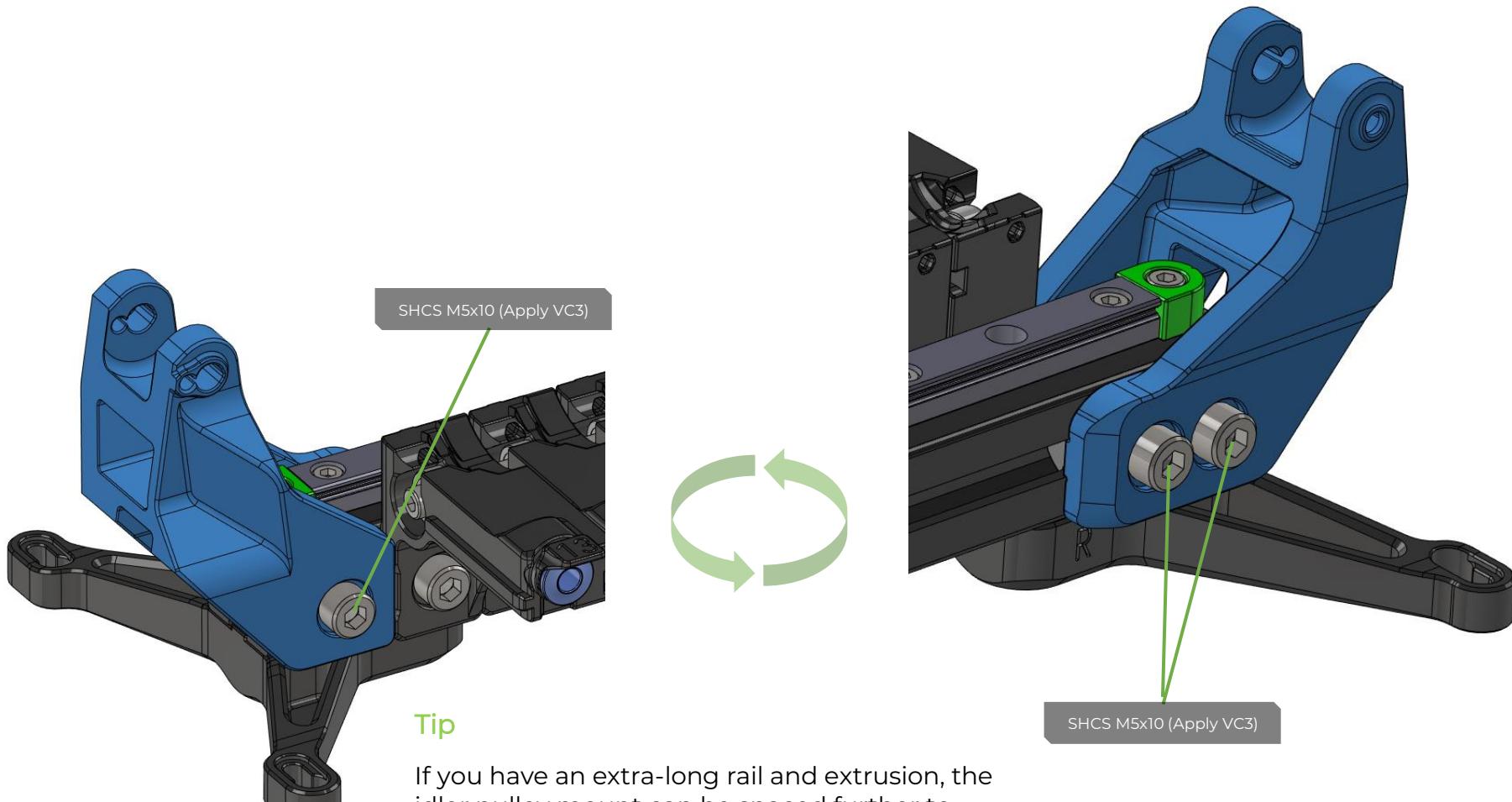
Numbered clips can be mounted to the ECAS04 for easier management.

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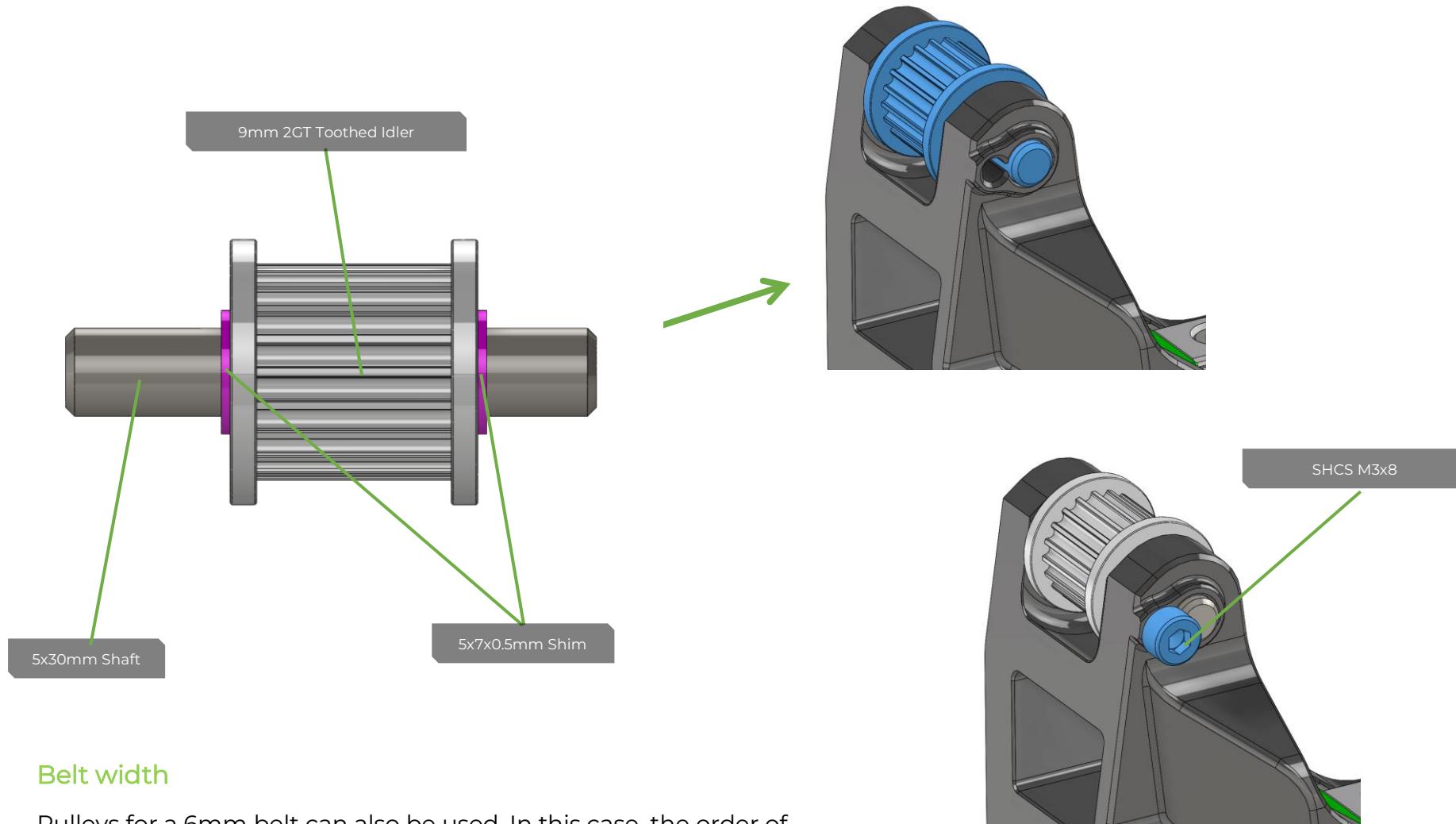
Selector Idler End - Overview



Selector Idler End – Assembly



Selector Idler End – Assembly

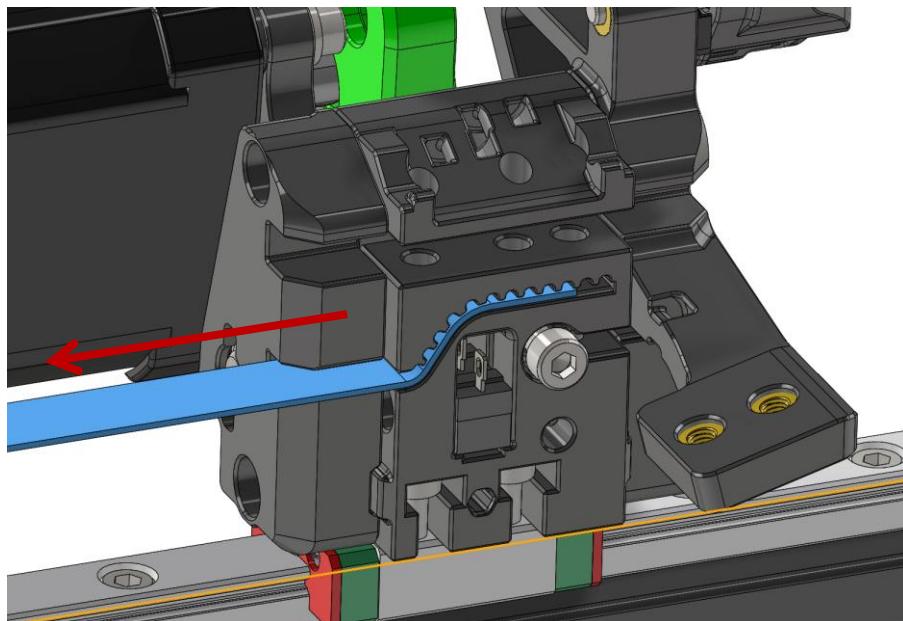


Belt width

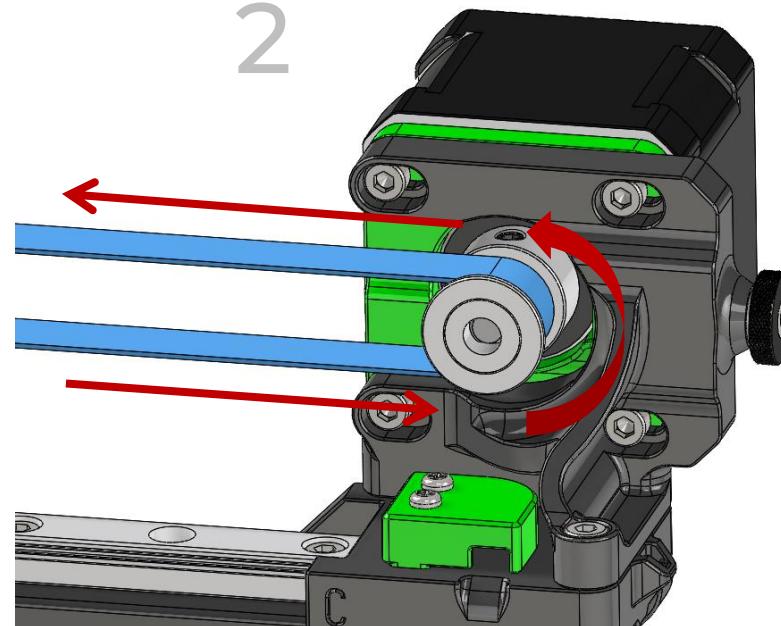
Pulleys for a 6mm belt can also be used. In this case, the order of parts on the shaft from right to left should be: printed idler spacer, 5x7x0.5mm shim, toothed idler, 2x 5x7x0.5mm shim.

Belting – Assembly

1



2

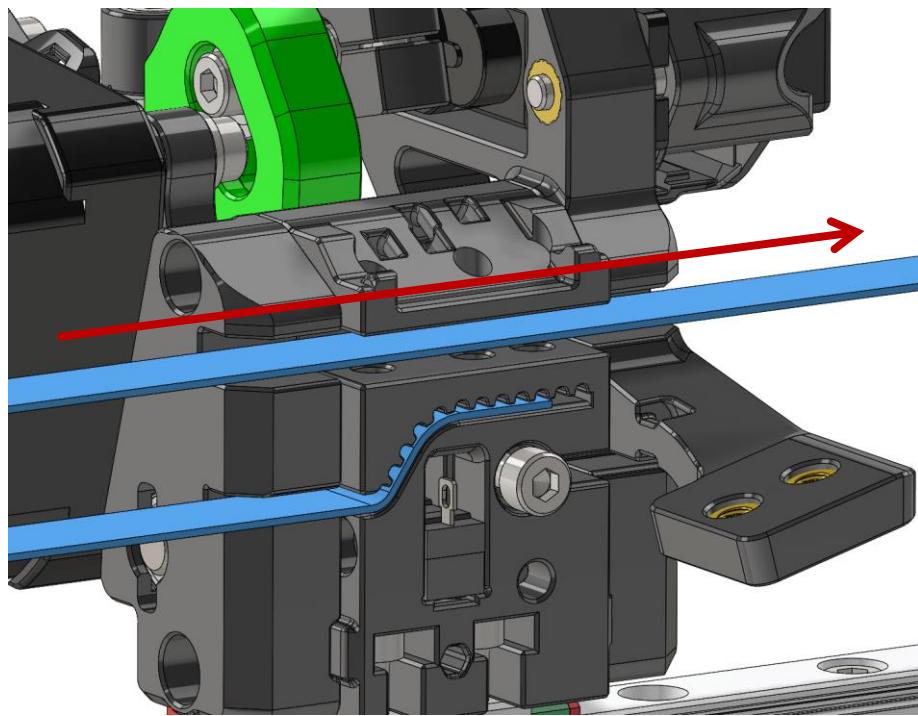


Belt Length

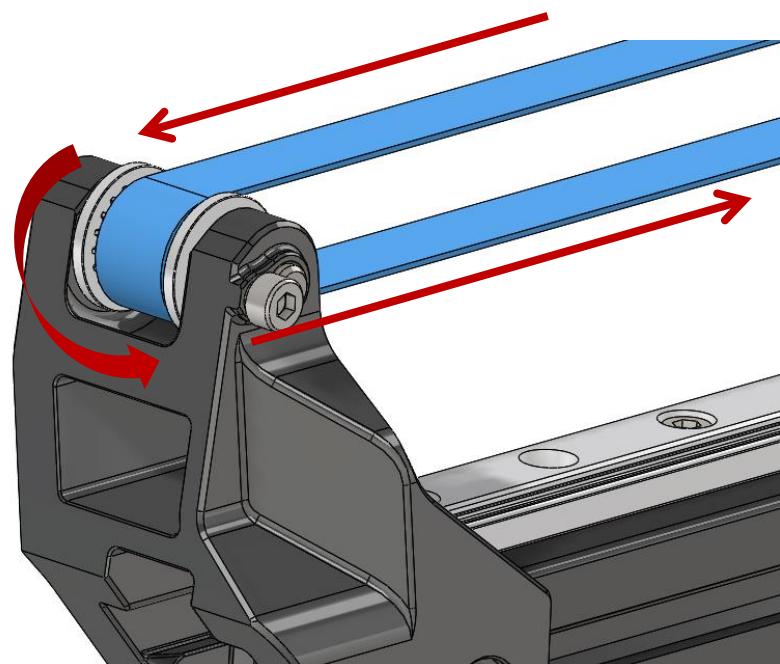
Reference the calculator again to find the recommended belt length for your length Trad Rack (or cut the belt to length after running it)

Belting – Assembly

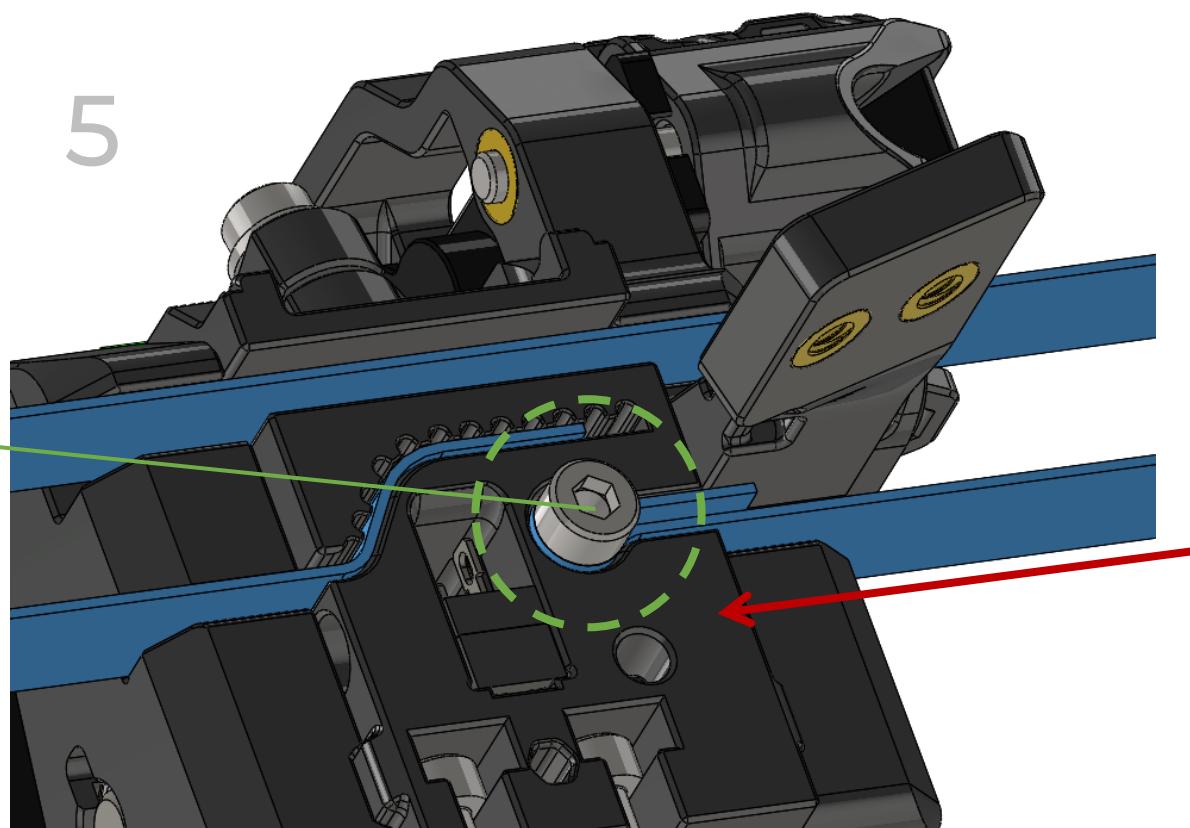
3



4



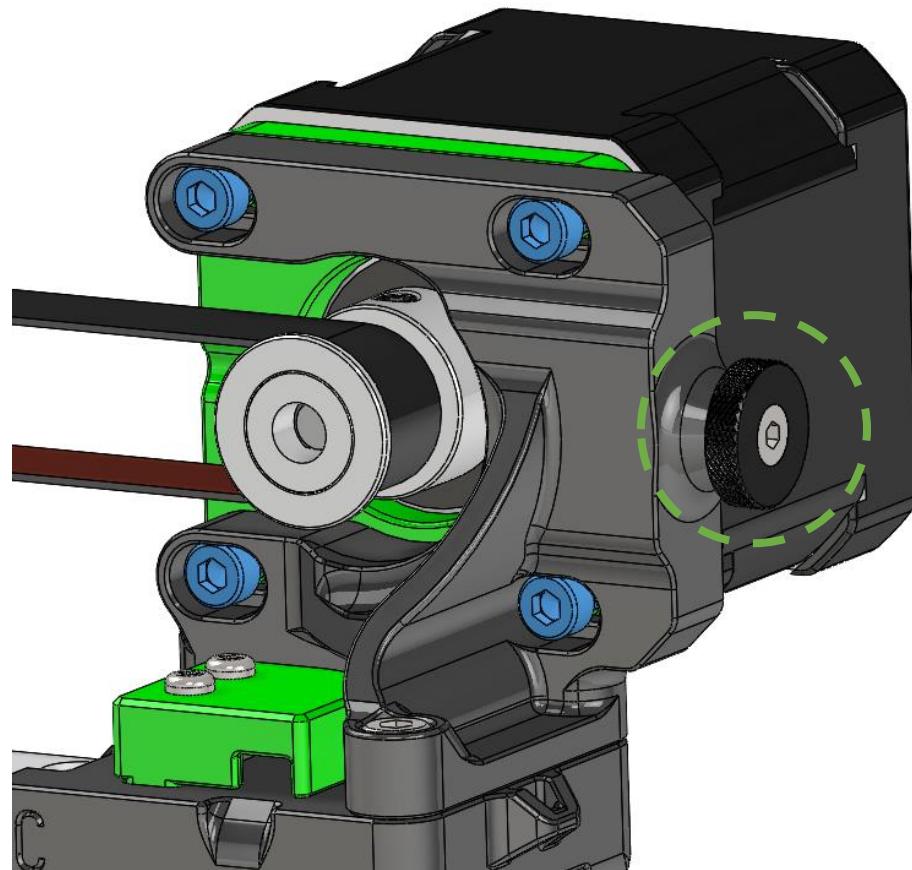
Belting – Assembly



Anchor

Anchor the belt by folding it around an M3 bolt.
If necessary, trim the end of the belt to ensure it
does not protrude past the outer face of the
right carriage.

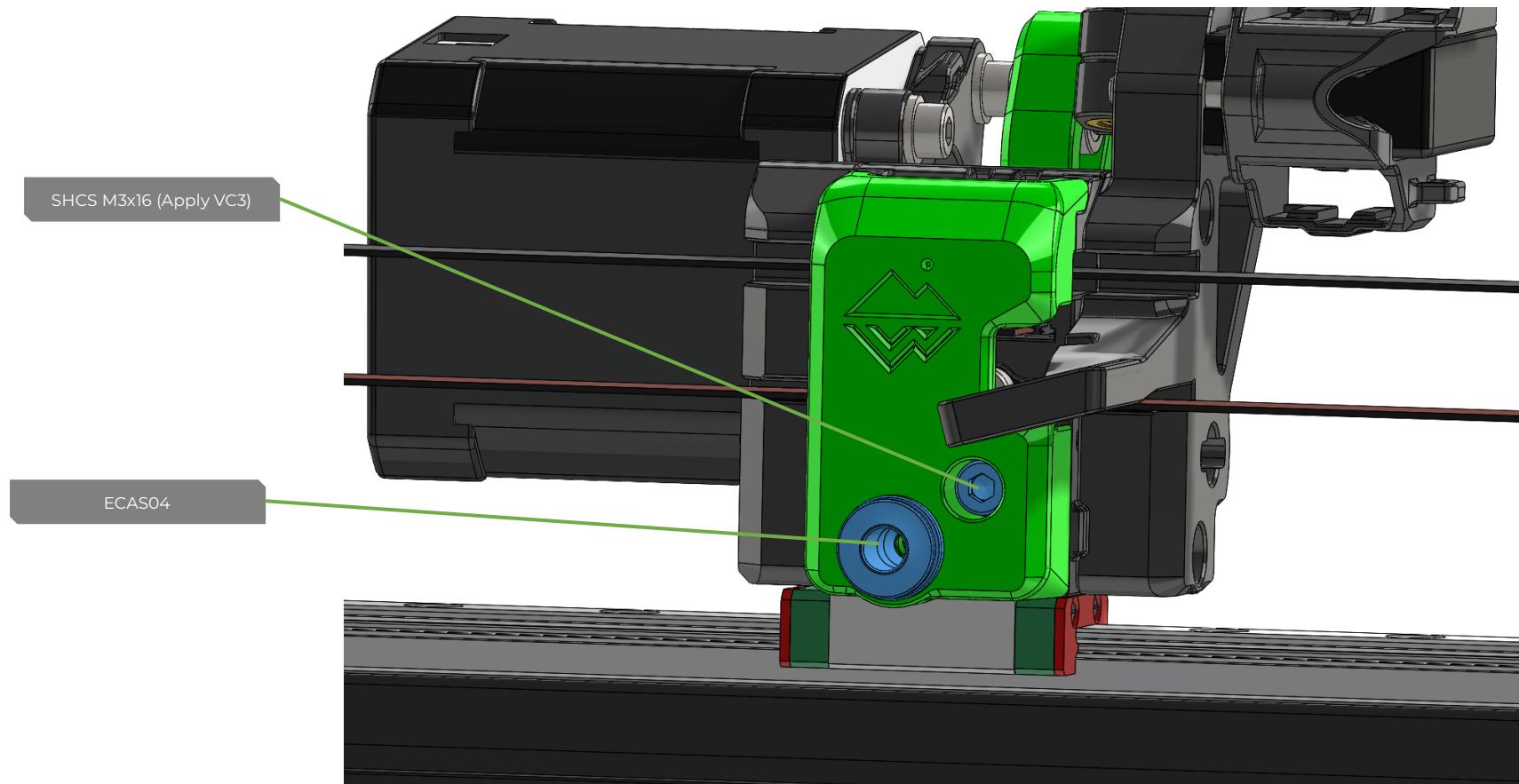
Belting – *Tensioning*



Tensioning

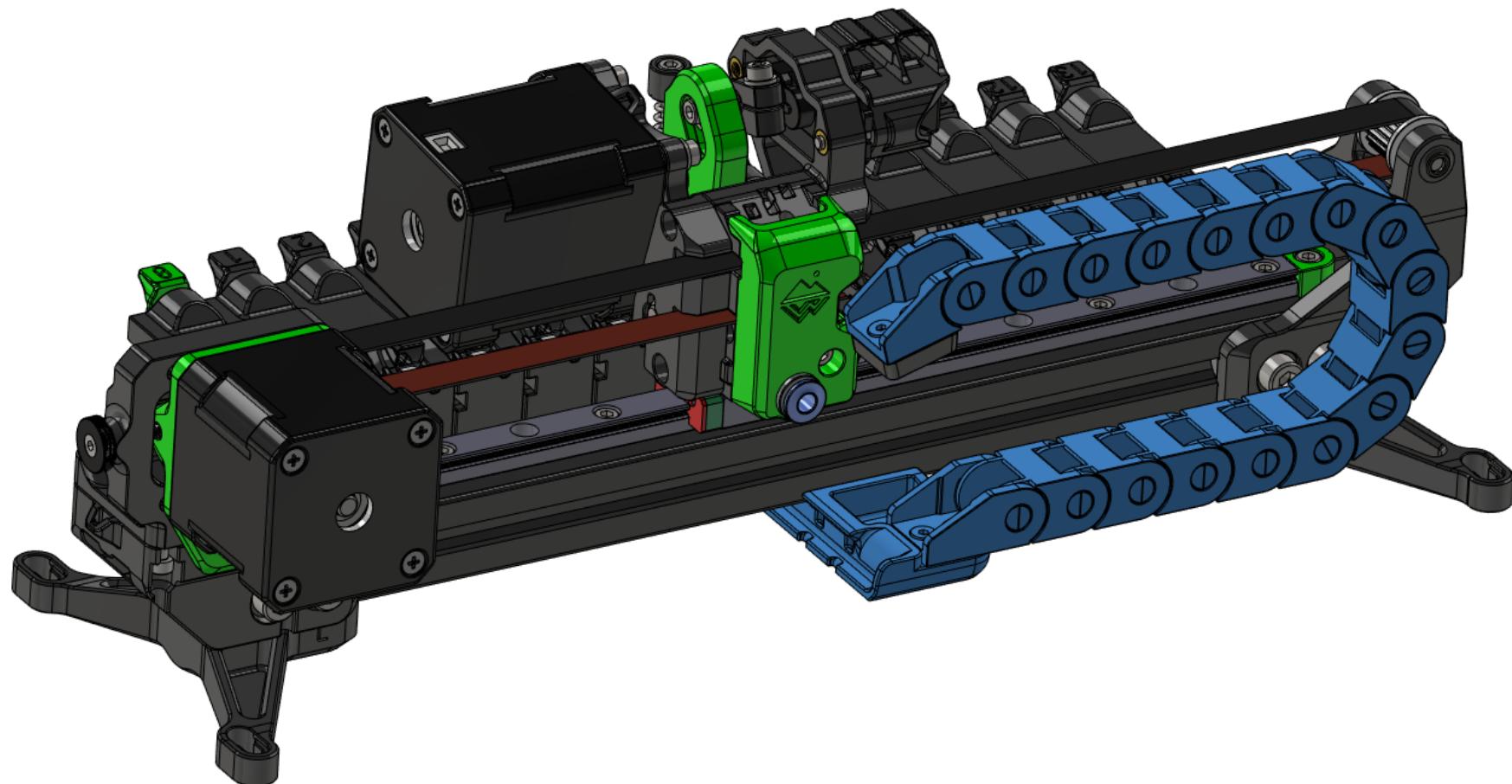
To achieve the desired belt tension, loosen the bolts securing the stepper motor and adjust using the thumbscrew. Once the desired tension is reached, tighten all bolts securing the stepper motor once again.

Cable Cover – Assembly

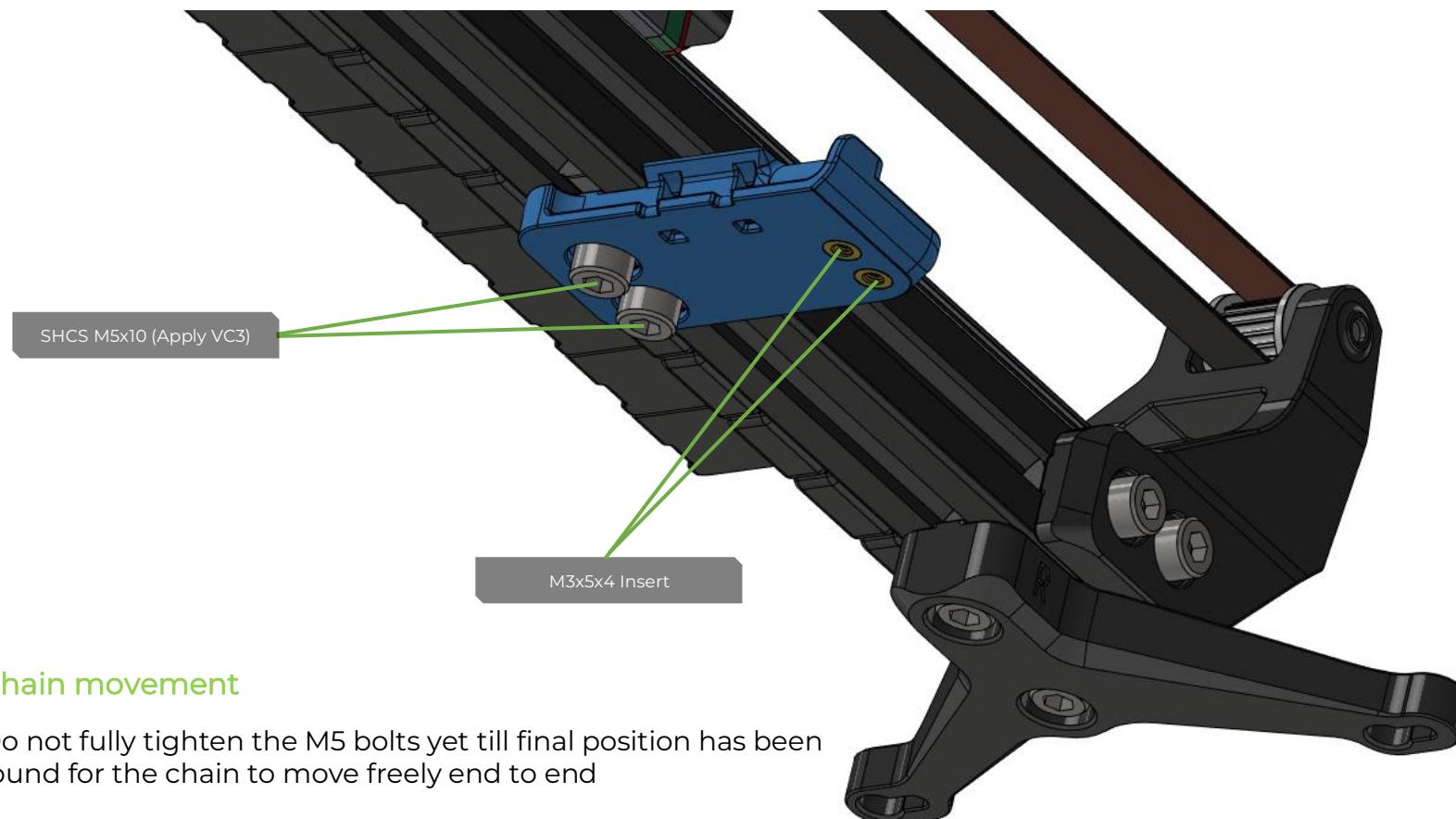


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Cable Chain – Overview



Cable Chain – Assembly



Chain movement

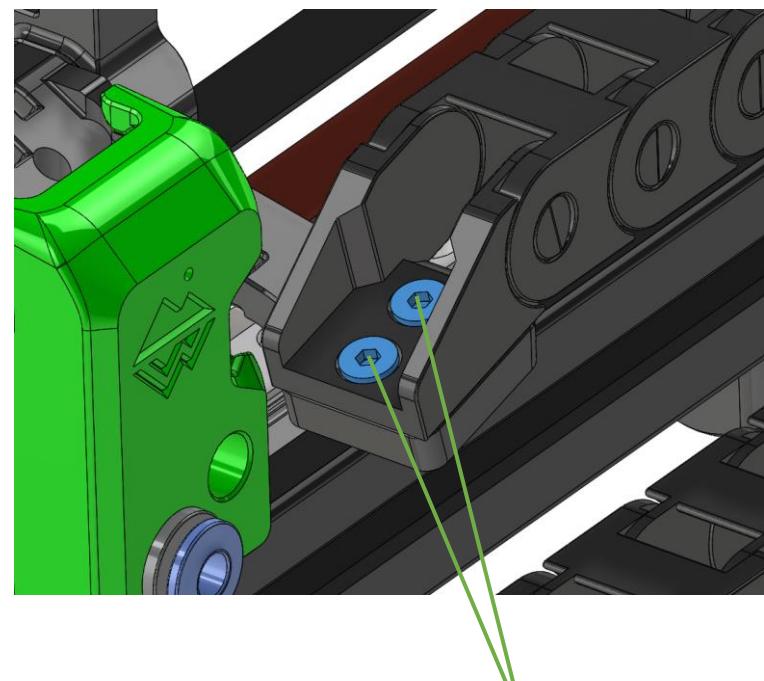
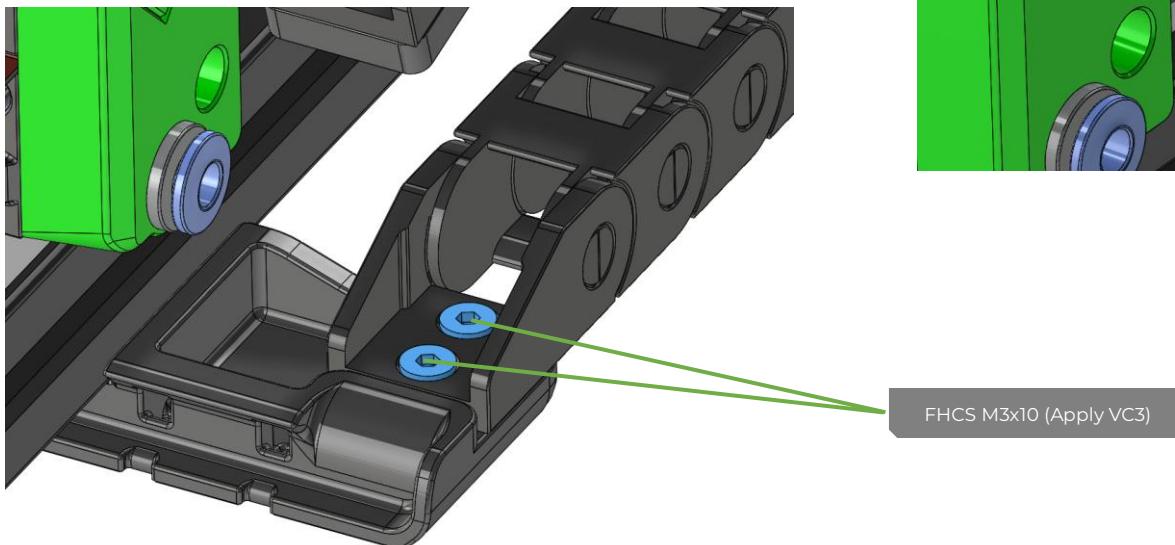
Do not fully tighten the M5 bolts yet till final position has been found for the chain to move freely end to end

Cable Chain – Assembly

Chain assembly

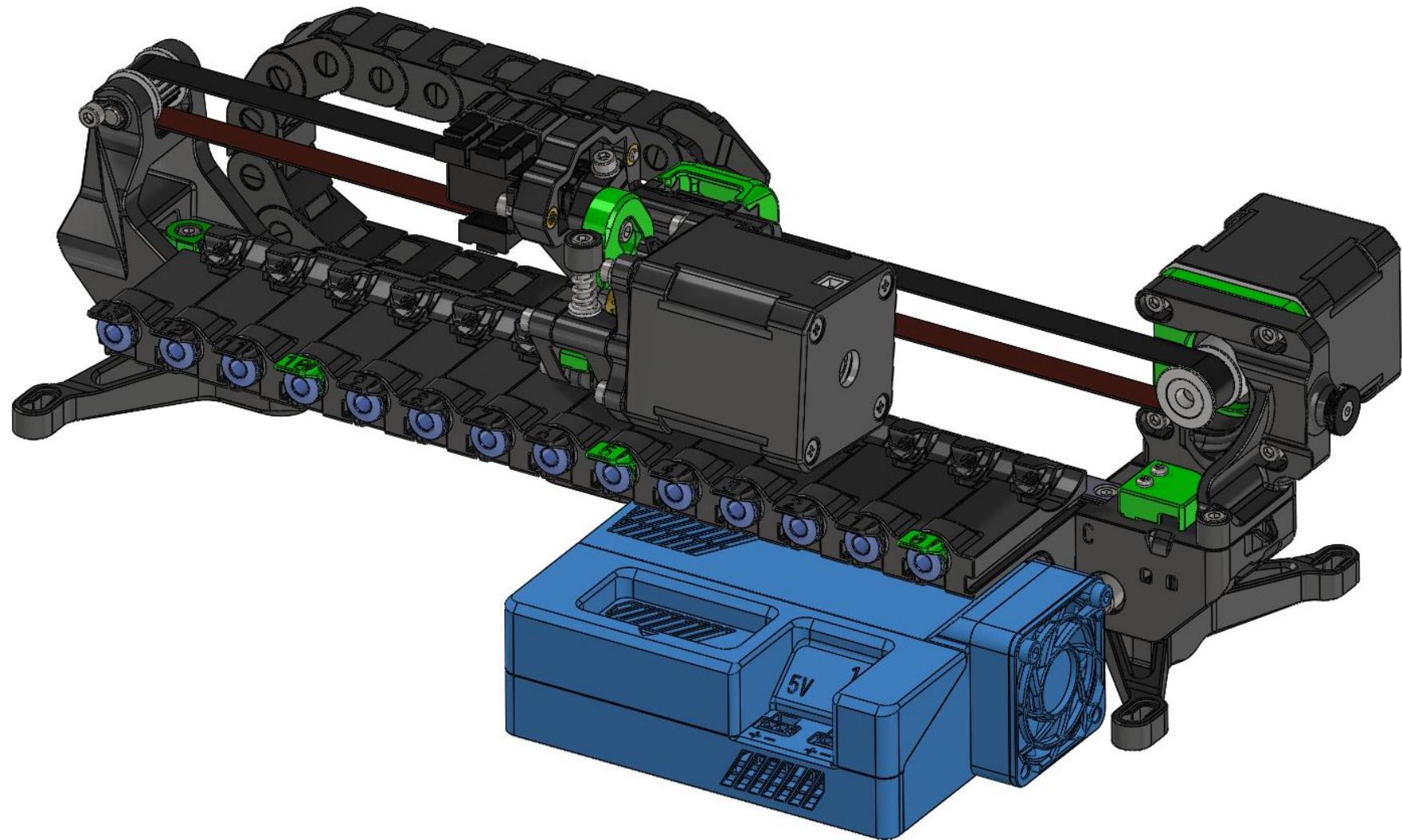
Reference the calculator for the required number of chain links.

Flip the chain ends if necessary before mounting.
Use the rigid end at the bottom.



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Controller – Overview



SoonTM

Constellation: Nebula

Credits

Thank you for building the Trad Rack 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 Trad Rack to life.

<i>Alonso240</i>	<i>Cbon</i>	<i>Lastone</i>	<i>Kirby</i>	<i>Papejelly</i>	<i>Rincewind</i>
<i>Altvnk</i>	<i>Churls</i>	<i>Flukz</i>	<i>Lukes Lab</i>	<i>TorinoFermic</i>	<i>Ryan G</i>
<i>Anlin</i>	<i>Coffee</i>	<i>Trails</i>	<i>Mattthebaker</i>	<i>Przy</i>	<i>StrikeEagleCC</i>
<i>Boa</i>	<i>Dalegaard</i>	<i>Kmobs</i>	<i>Mental</i>	<i>Razgriz</i>	<i>Xile</i>
<i>CIRob</i>	<i>Fermion</i>	<i>iKirin</i>	<i>Newtwo</i>	<i>Rentable Socks</i>	<i>Yhaiovsky</i>

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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 Trad Rack.

Sincerely,

The Annex Engineering Team