



A N N E X

High performance FDM 3D printing

# ANNEX ENGINEERING

Ascender R4 Assembly Manual – Alpha 0.1

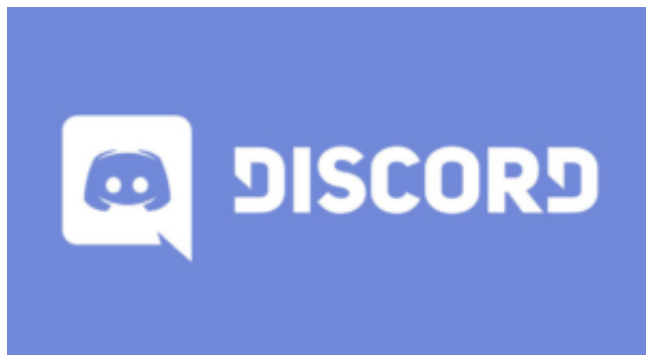
## About Us

# 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!



## **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

Fused Deposition Modeling (FDM)

### Layer Height

0.15 maximum

### Infill Type

Rectilinear

### Material

ASA

### Extrusion Width

0.4 or 0.5 mm

### Wall count

3 minimum

### Nozzle size

0.4 or 0.5 mm recommended

### Infill Percentage

70%+ preferred (at 0.6mm width)

### Solid Top/Bottem Layers

5 minimum

## 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 should be 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.

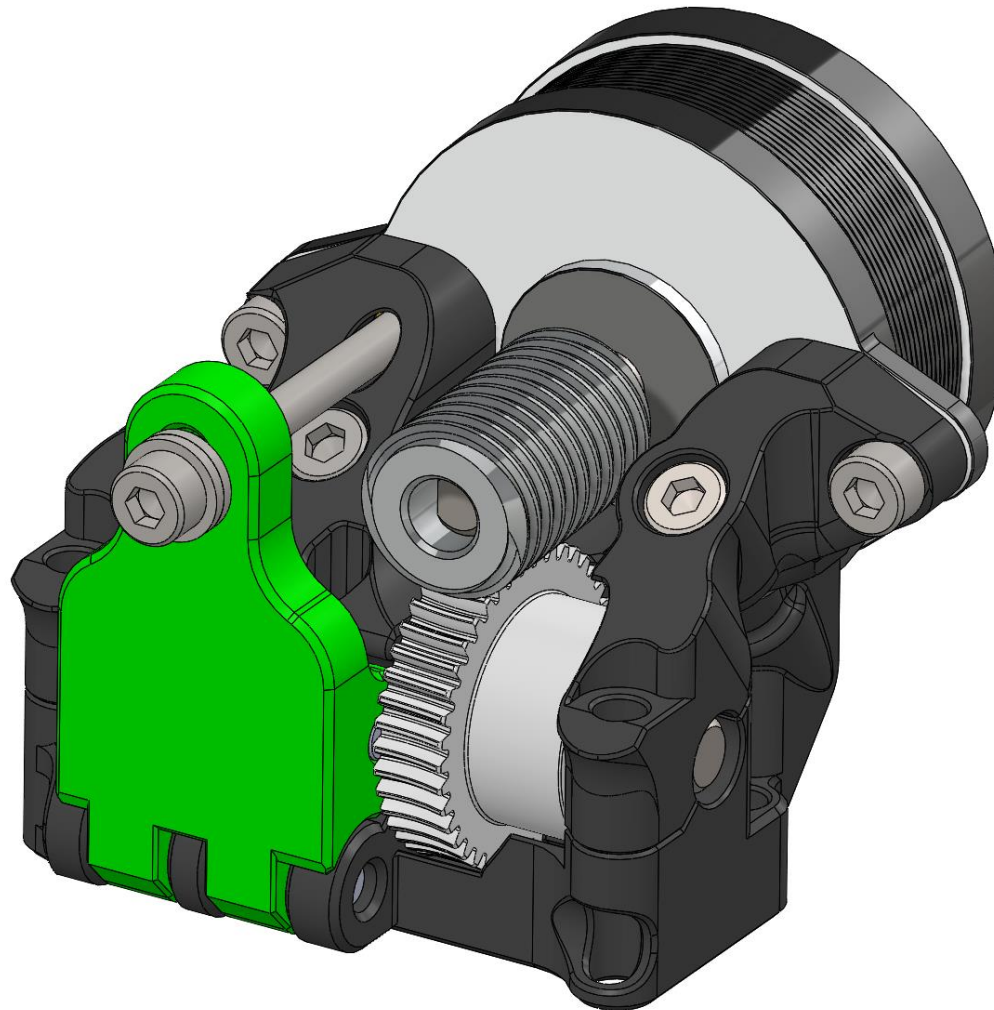
### Which specific NEMA 14 motor is recommended?

The current recommendation is to exclusively use the LDO-36STH17-1004AH stepper motor. Purchasing from alternative brands or vendors could lead to acquiring a lower quality clone, which may have inferior temperature class windings.

### How can I get more help?

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

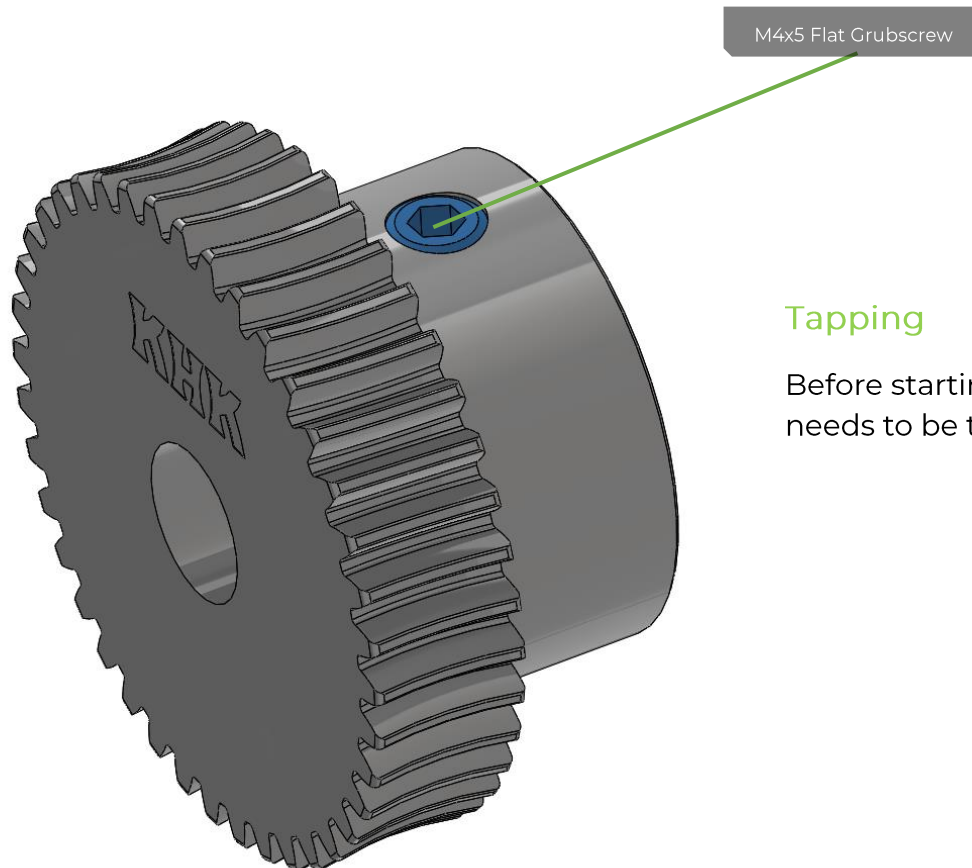
## Ascender R4 – Overview







# Assembly

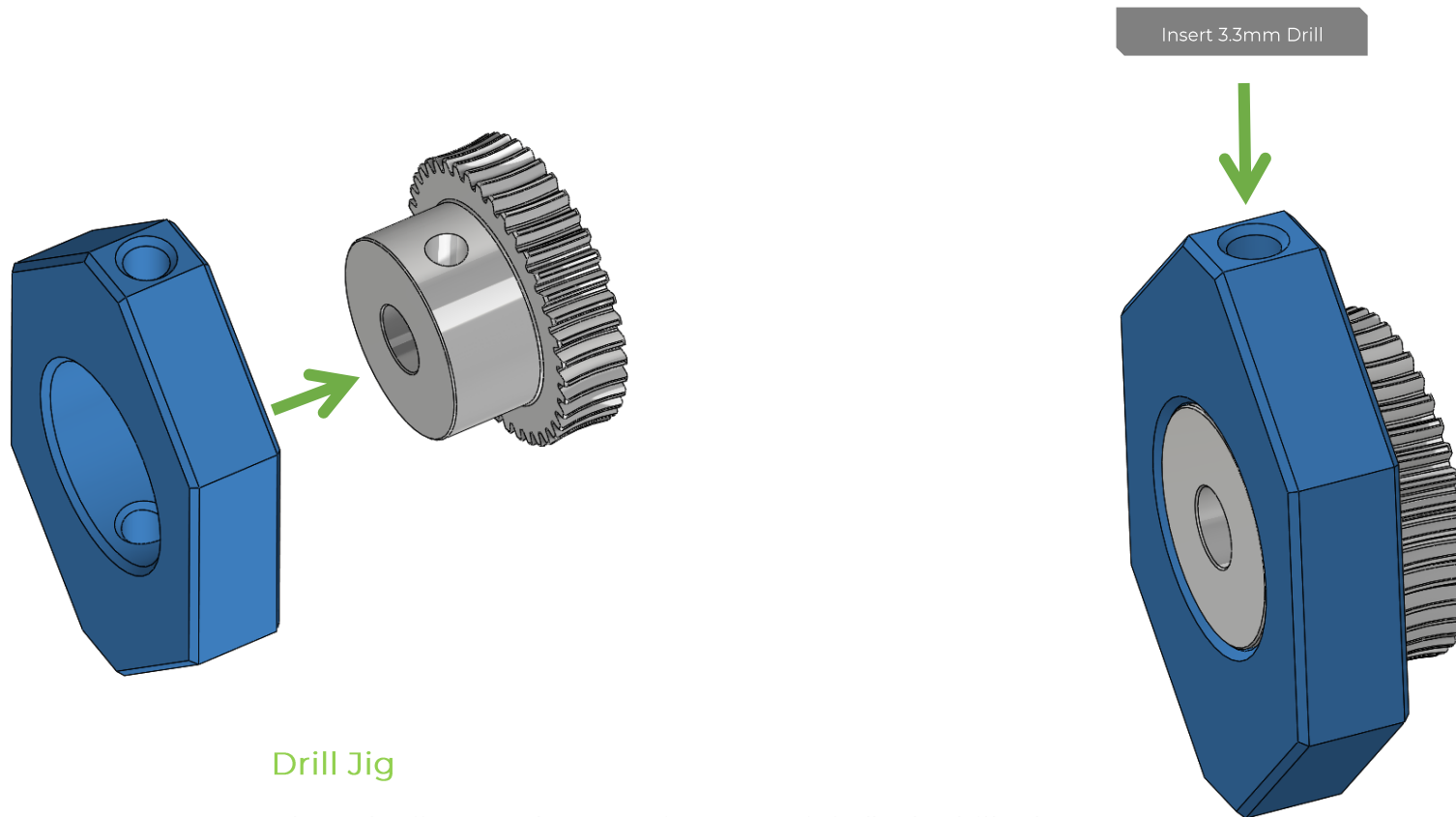


## Tapping

Before starting the assembly, the KHK 40T gear needs to be tapped to accept M4x5 grubscrews



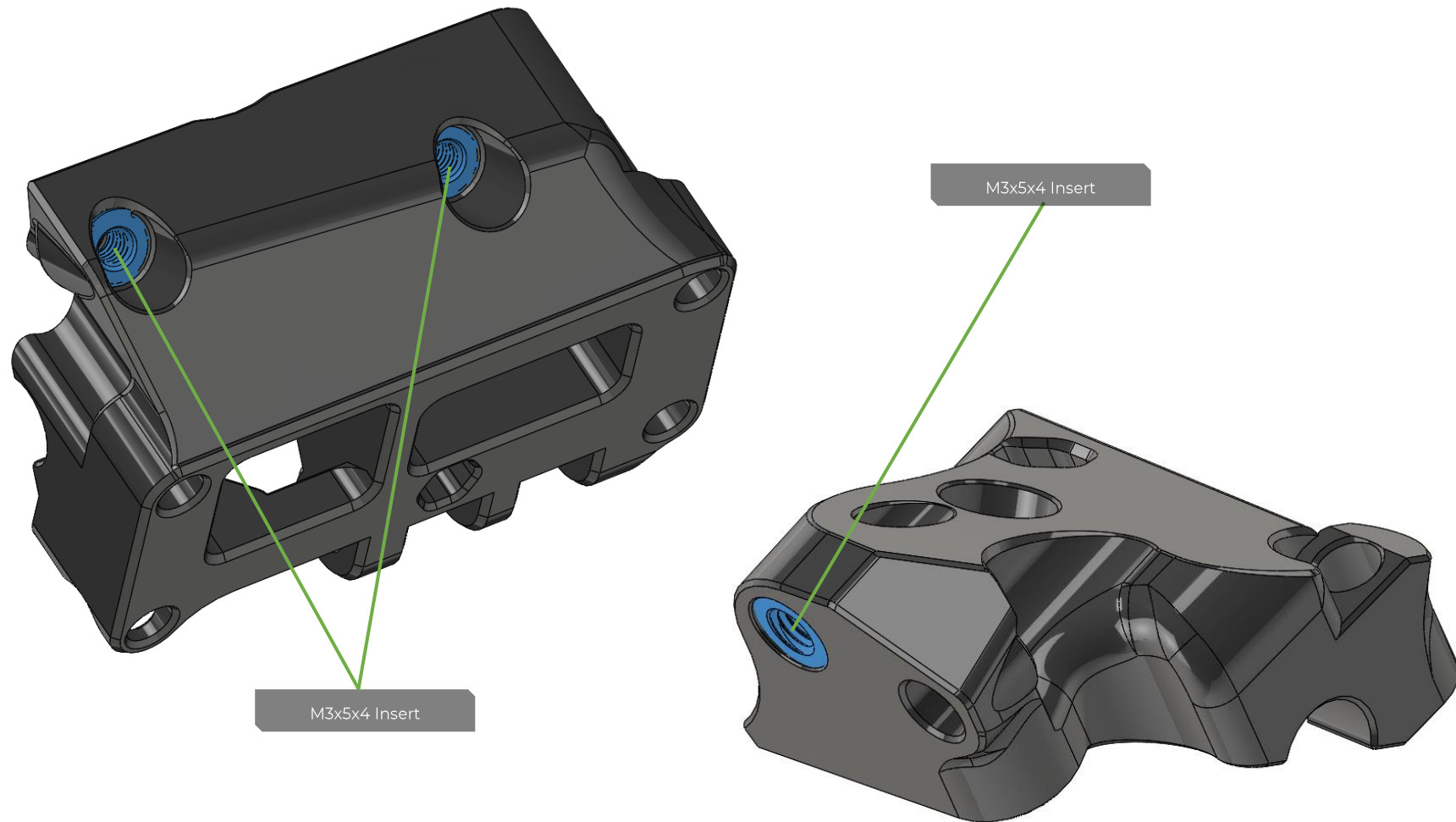
## Assembly



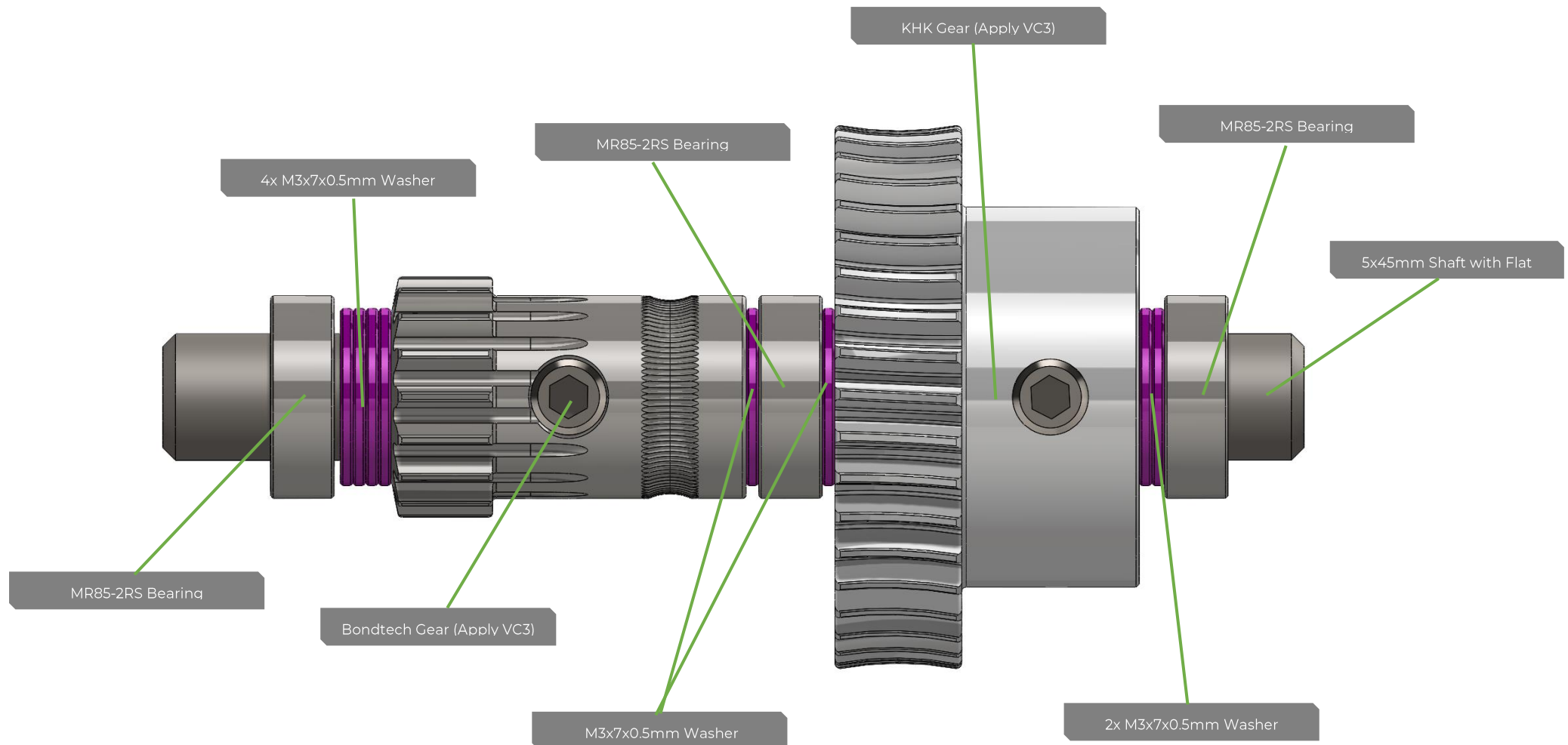
### Drill Jig

Place the jig over the gear ring. Once it is flush, drill at least 1 3.3mm hole in the body. Remove the jig and then use an M4 tap to complete the process.

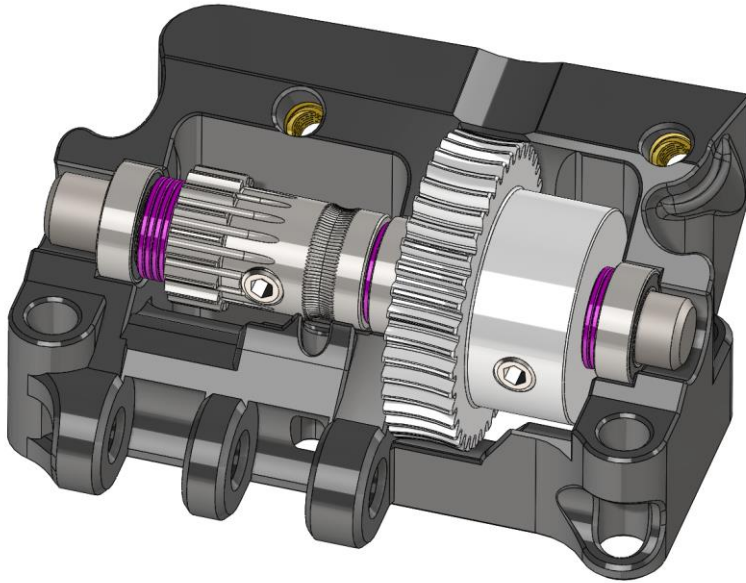
## Assembly



# Assembly



## Assembly

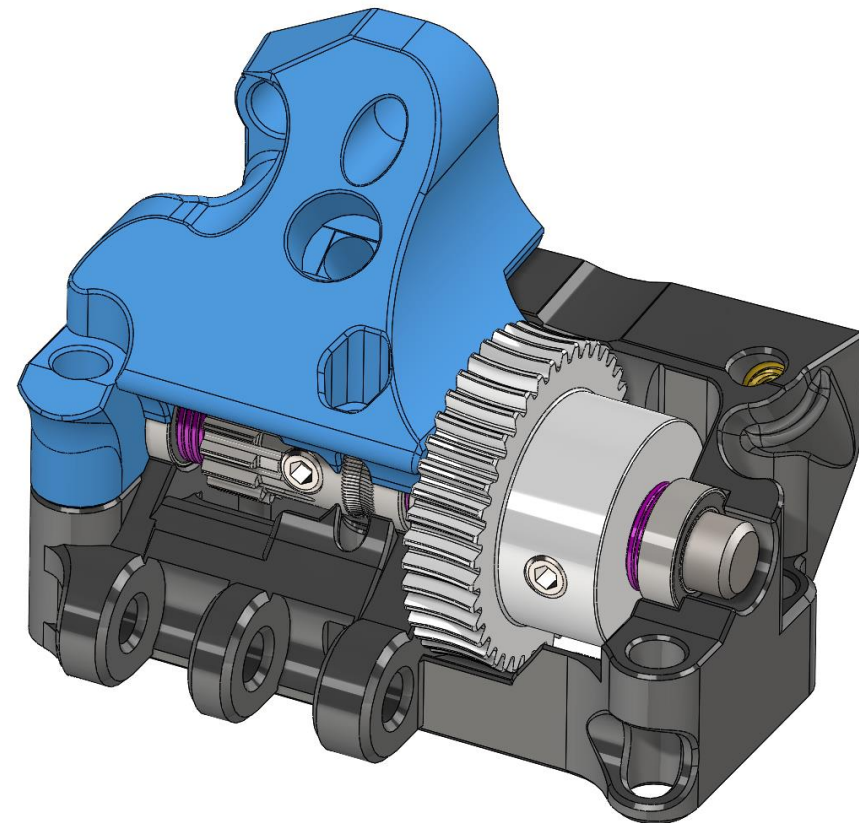


### Shaft

Place the assembled shaft into the main printed body.

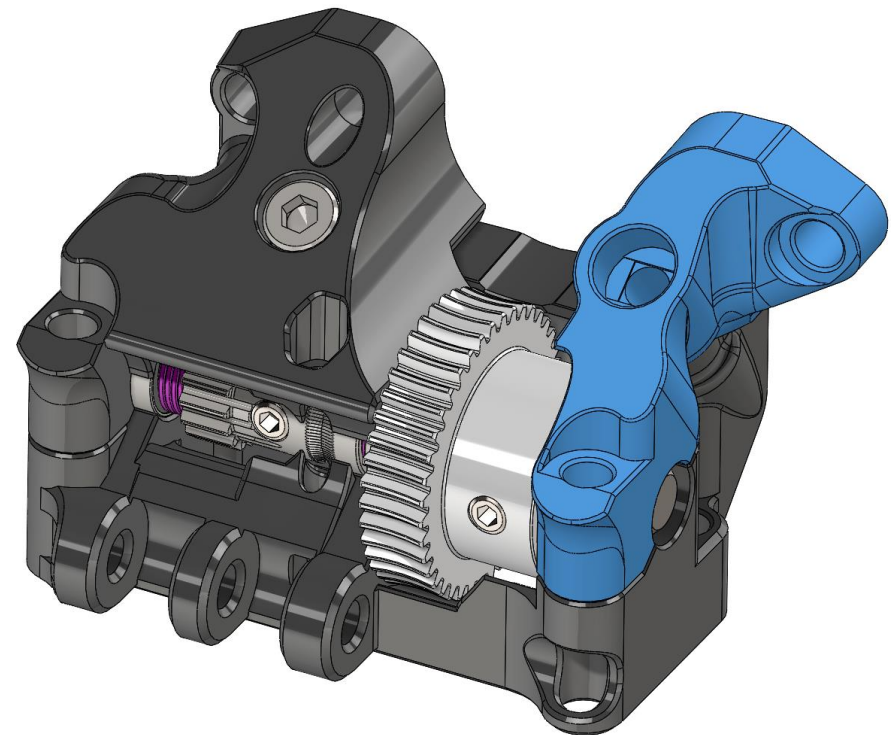
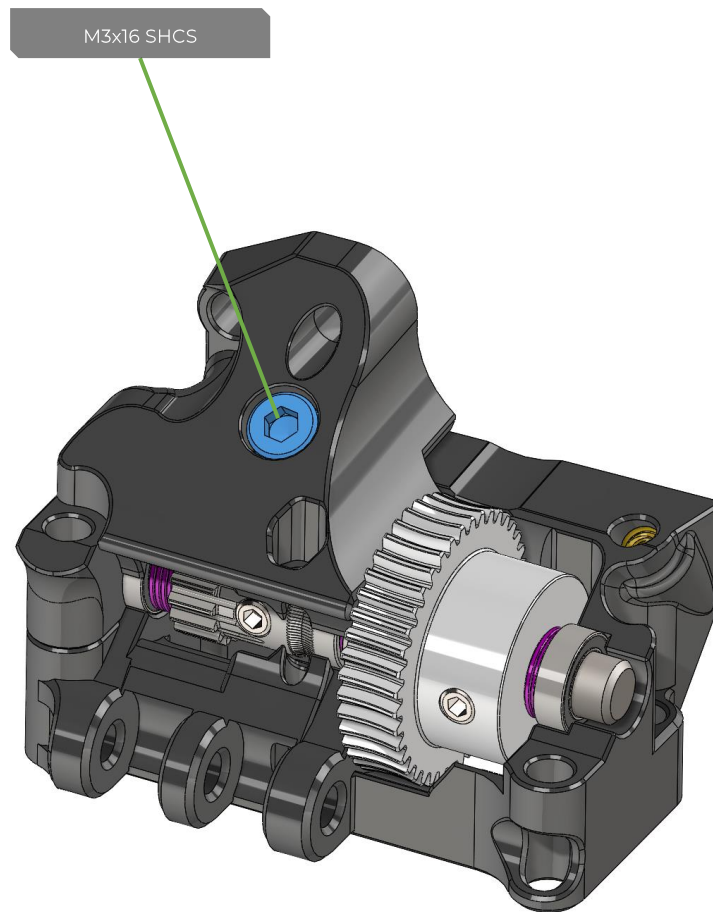
### Lock

Securely fasten the left and center bearing in place using the secondary printed parts.





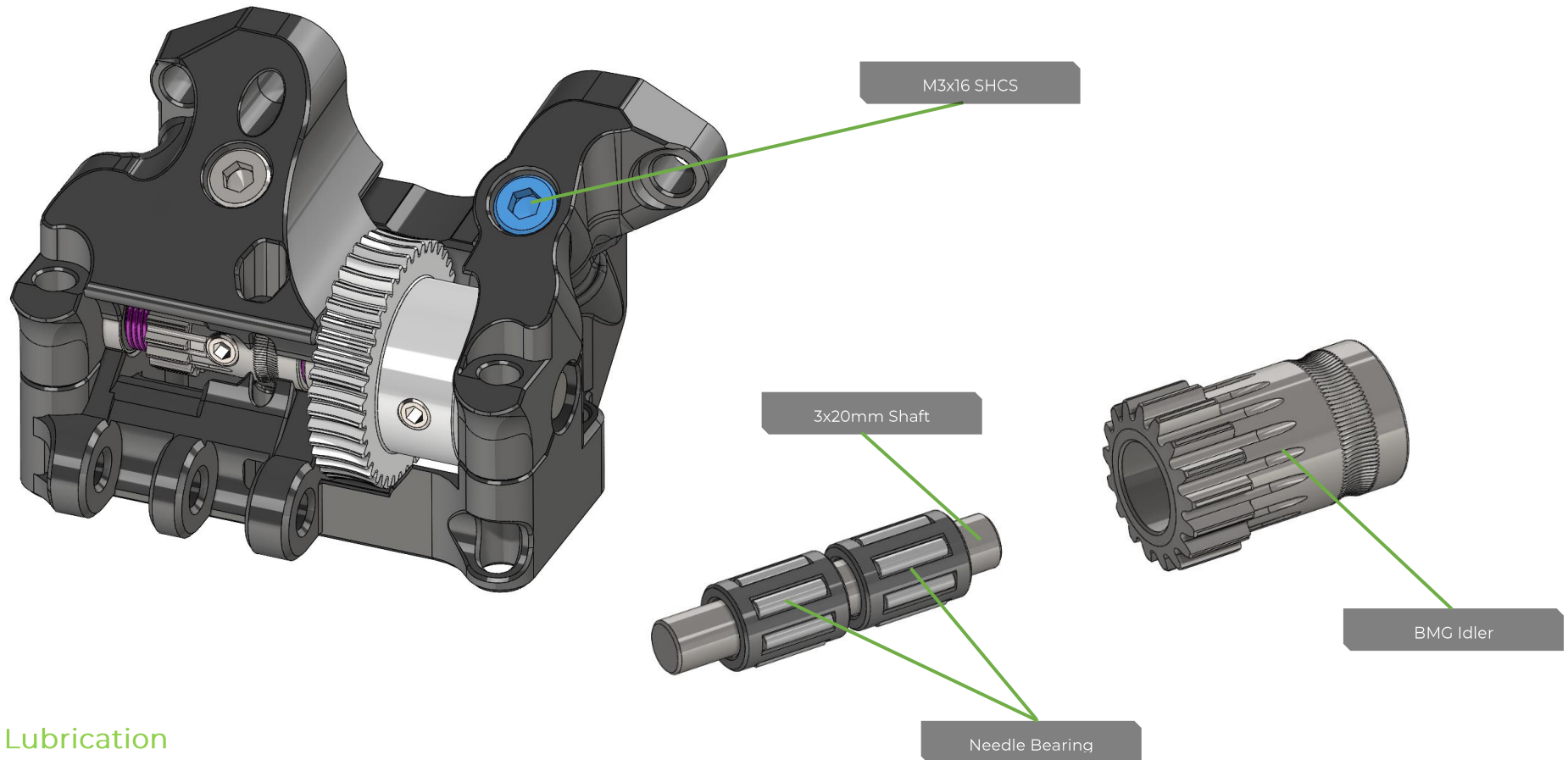
## Assembly



### Lock

Securely fasten the right bearing in place using the secondary printed parts.

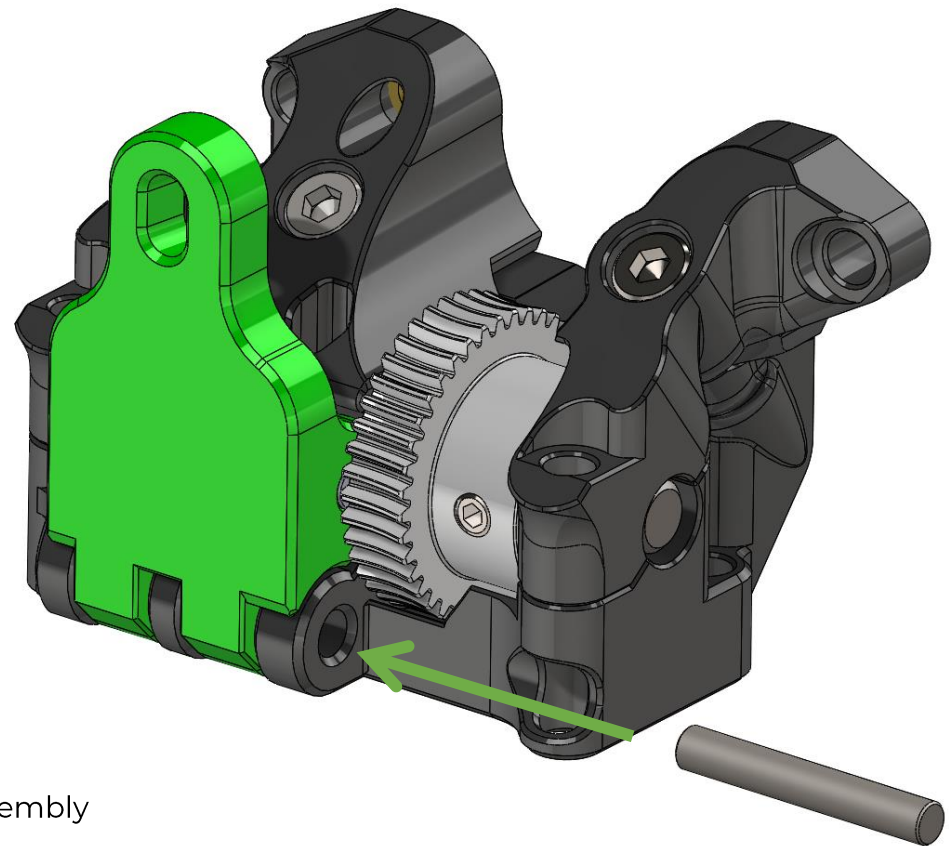
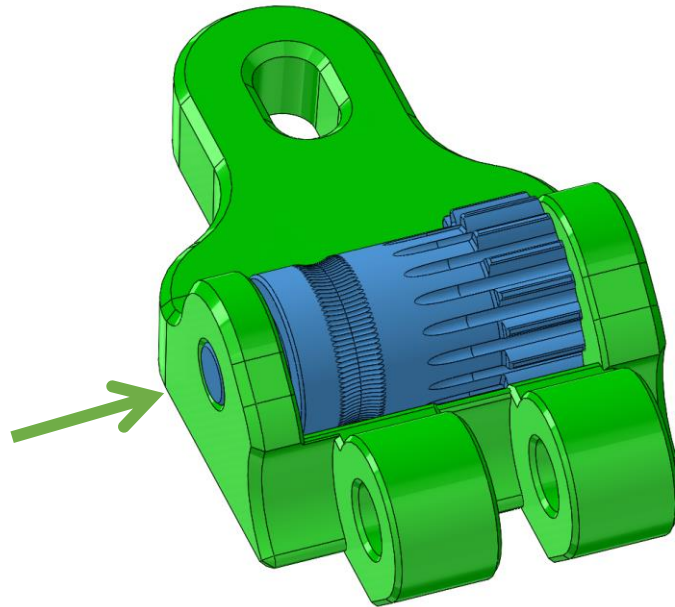
## Assembly



## Lubrication

Apply a small amount of bearing grease to the needle bearings, taking care to avoid any contact with plastic components.

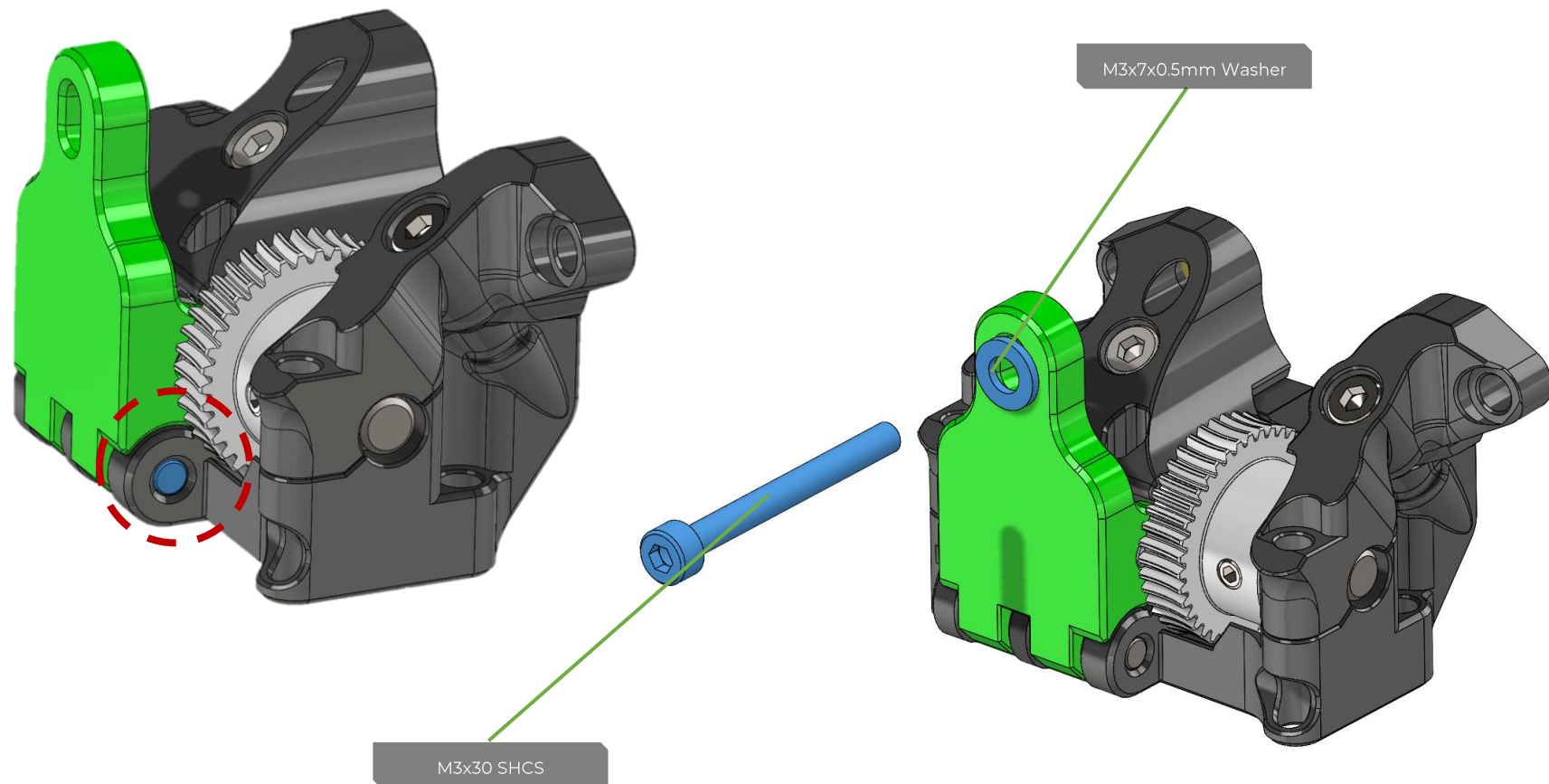
## Assembly



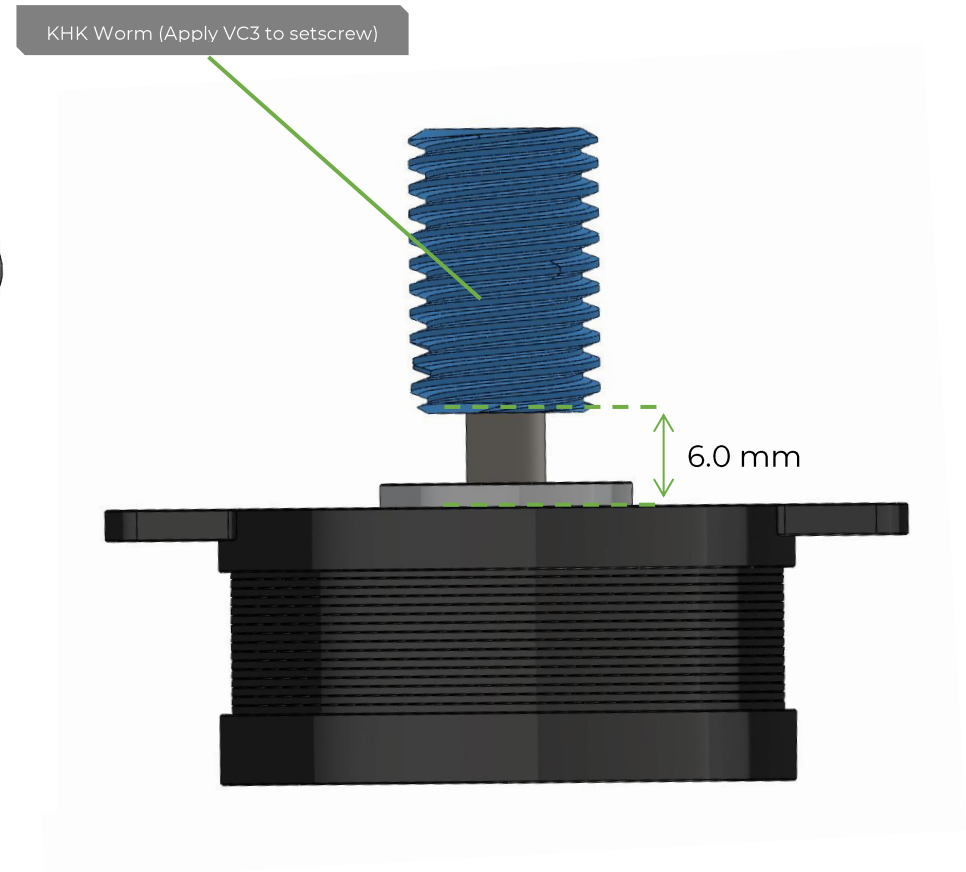
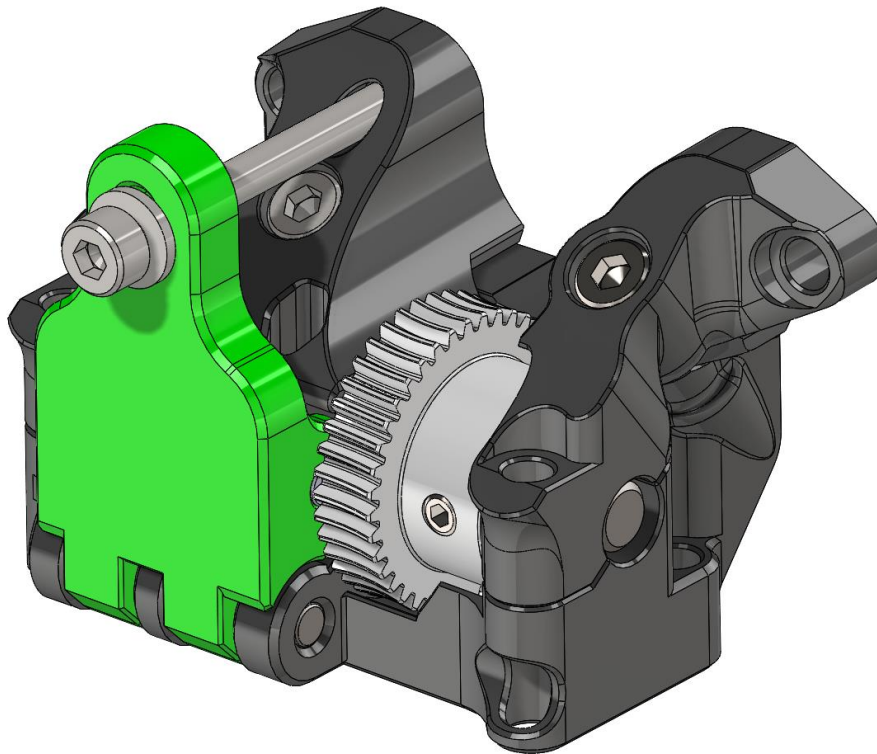
### Orientation

Pay attention to the orientation of the idler gear assembly

# Assembly



## Assembly

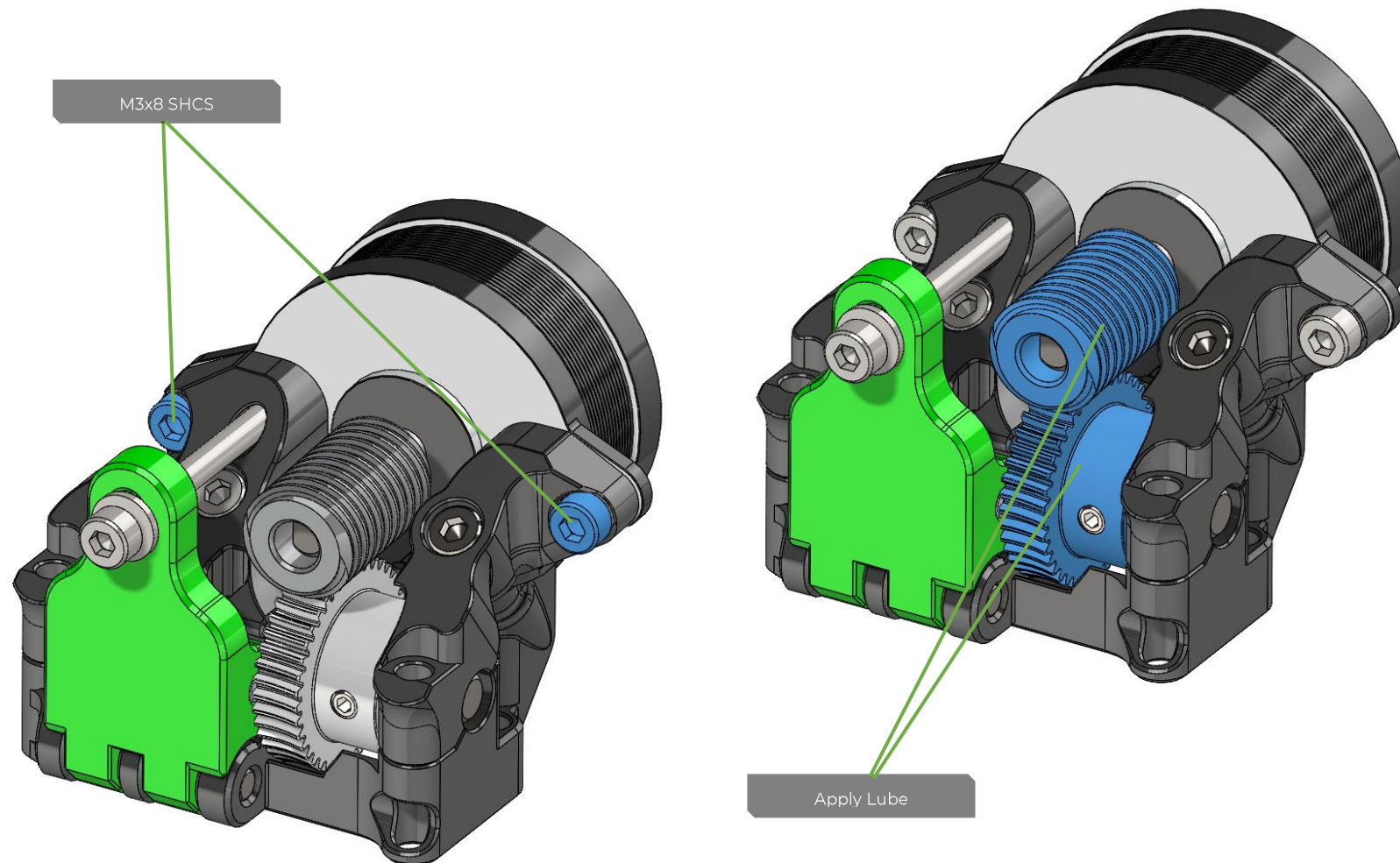


### Idler Arm

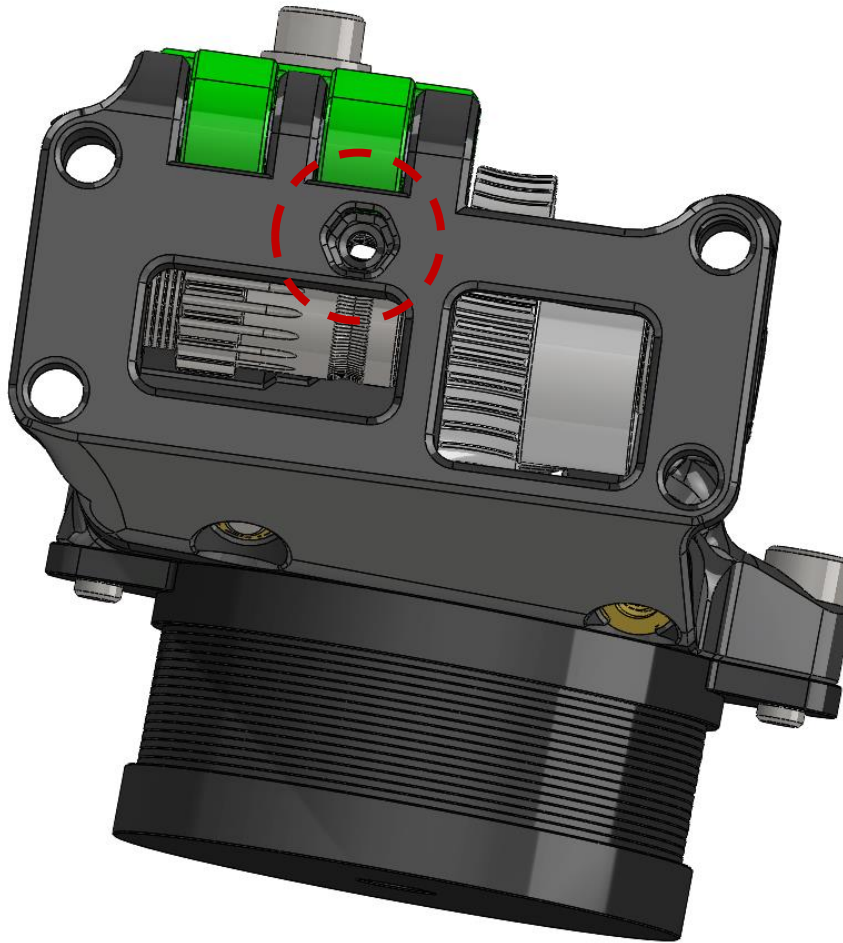
Before screwing down the idler arm, make sure that filament is loaded.  
Apply VC3 on the M3x30 bolt to prevent it from loosening over time.



# Assembly



## Assembly



### Filament Tube

Remember to use a PTFE tube between your hotend and extruder. The PTFE tube should be inserted 7mm deep into the ascender extruder.

# Maintenance

To maintain your extruder's optimal performance and prolong its lifespan, regular maintenance is essential. While both Sherpa Mini and Micro extruders are designed to be low maintenance, a few key tasks should be performed periodically.

Check for and remove any accumulated filament dust or debris around the drive gears with a brush or compressed air periodically. This prevents potential blockages or disruptions in filament flow. Inspection takes only a few seconds, and can be done when you change filament spools.

For every 20 kilograms of filament fed through the extruder, it is recommended to check for inspect the bearings and housing for signs of damage or wear. This could potentially affect the extruder's performance. Ideally, a full teardown of the extruder is done to allow thorough examination and cleaning of all components. Because of the simple construction of the extruder, this should only take a few minutes. When disassembling, make sure to reapply grease on the worm gears. It is important to never run the gears when they are dry.

Over time, the drive gears will be subject to wear. The wear rate is significantly influenced by many factors, including filament type, idler pressure, and drive gear manufacturing quality. For this reason, no fixed replacement interval can be given. Instead, we recommend inspecting the drive gears during your regular maintenance and replacing them if excessive wear or damage is observed.

By following these maintenance recommendations, you can ensure that your extruder remains in excellent condition, delivering reliable and consistent performance, throughout its lifespan. Regular maintenance is key to preventing potential issues and maximizing the longevity of your extruder.

## Credits

Thank you for choosing the Ascender Extruder 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 Ascender 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>Matthebaker</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</i> <i>Socks</i>	<i>Yhaiovyi</i>

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 Ascender Extruder. 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 Ascender 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 Ascender extruder.

Sincerely,

The Annex Engineering Team