Rat Rig

04. Rat Rig Toolhead V1.0 BETA2

Written By: Rat Rig

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INTRODUCTION

This guide provides a thorough overview of the disassembly of the EVA3, the preparation of the V-Core 3.1 frame, and the installation procedure for the Rat Rig toolhead BETA V2 Upgrade Kit.

The Rat Rig Toolheads are streamlined to be used specifically with our favourite combination:

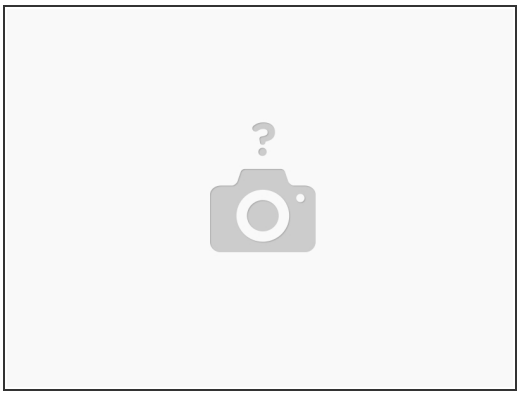
Orbiter V2

Phaetus Rapido V2 UHF hot end

4028 part cooling fan

Rat Rig “SuperPinda” Probe by P&F

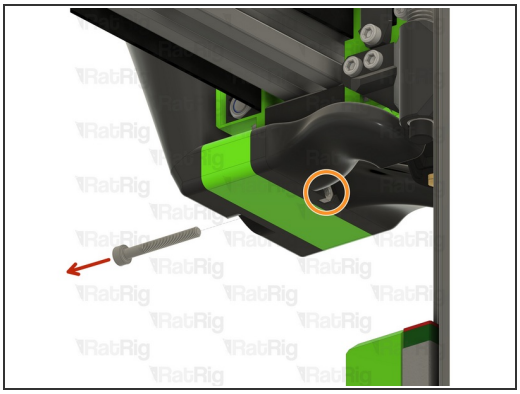
Step 1 — Get up to speed!

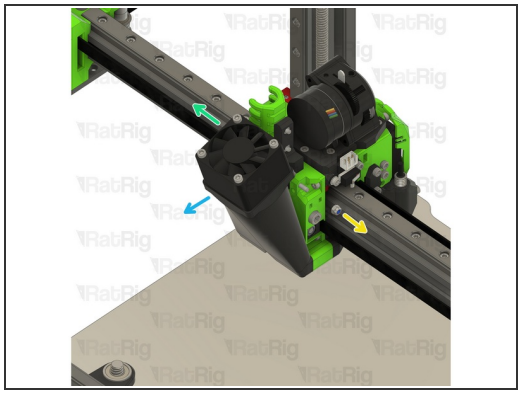


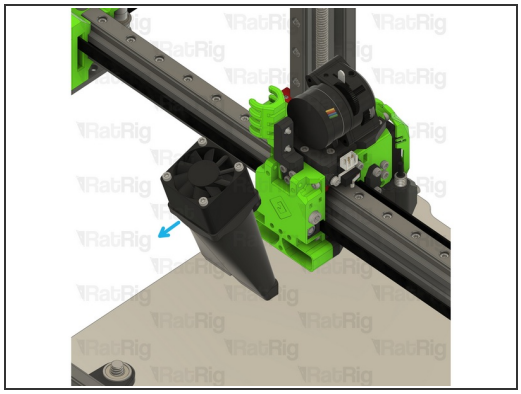
This guide is divided into 3 parts, to help you quickly find the instructions you need:

- Disassembling the EVA 3.0
- Preparing the V-Core 3.1 for the upgrade kit
- Installing the Rat Rig toolhead BETA 2 upgrade kit

Step 2 — Disassemble the 40mm fan duct

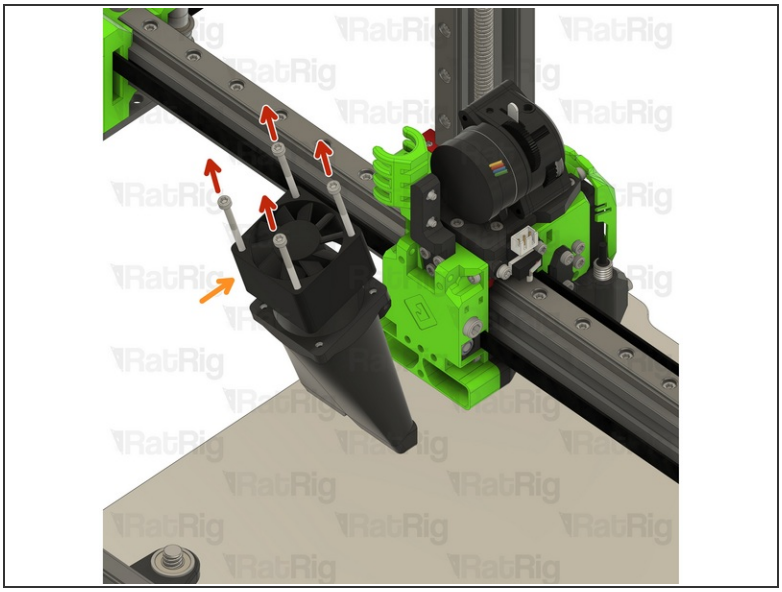


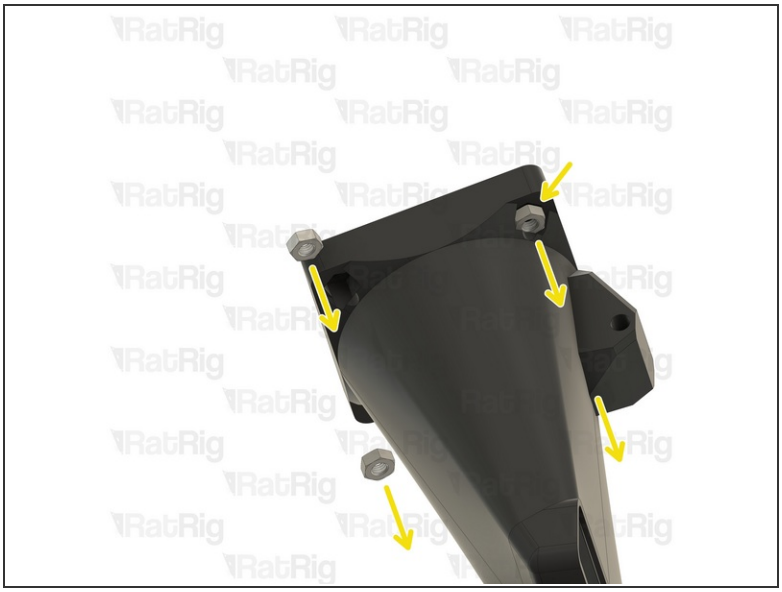




- Remove the M3x25 Cap Head Screw
- Remove the Hex Nut - M3
- Remove the M3 Nylon Locking Hex Nut
- Remove the M3x35 Cap Head Screw
- Remove the 40mm_fan_duct assembly as shown

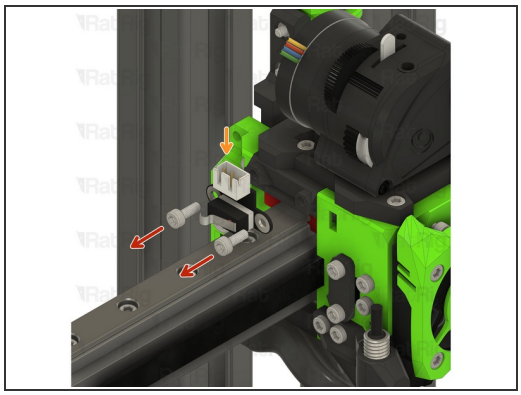
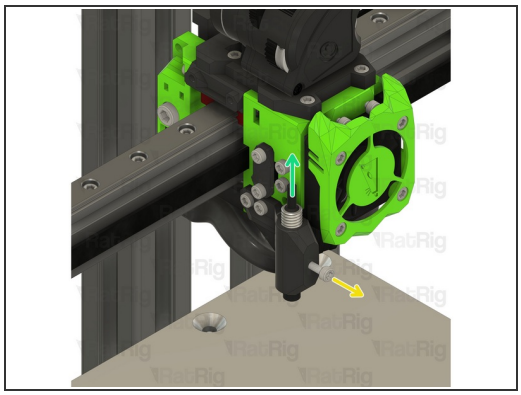
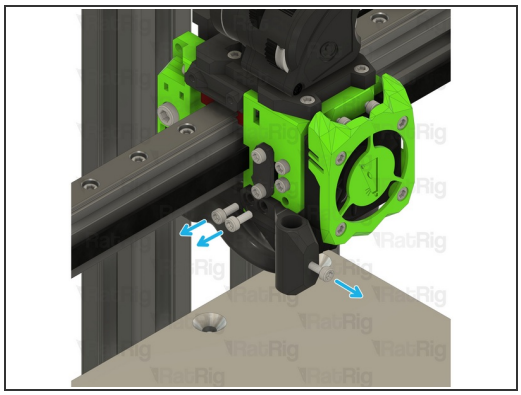
Step 3 — Remove the 4028 Part Cooling Fan





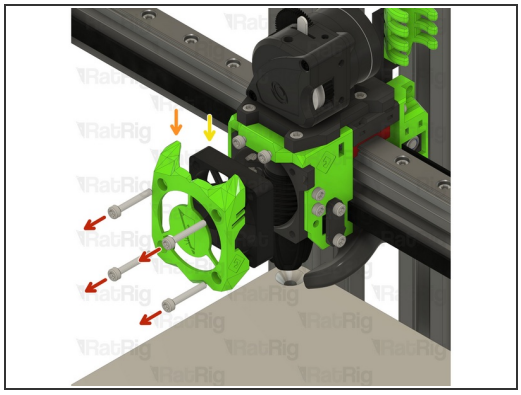
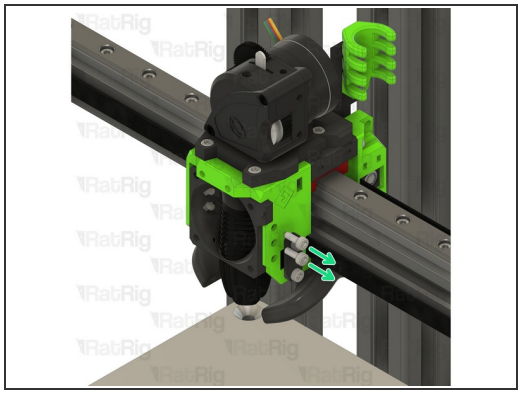
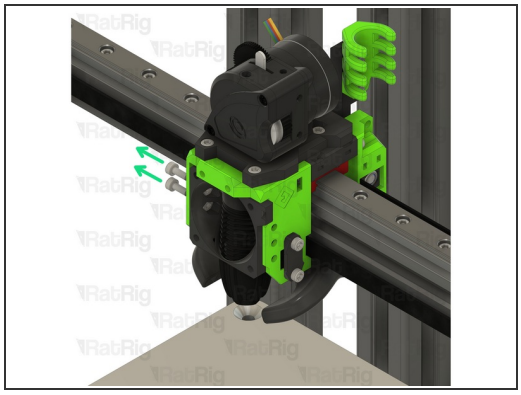
- Remove the four M3x35 Cap Head Screws
- Remove the 4028 Part Cooling Fan from the printed part, it will be re-used on the Rat Rig Toolhead V1.0
- Remove the four Hex Nuts - M3

Step 4 — Remove the X-axis endstop and Z-probe

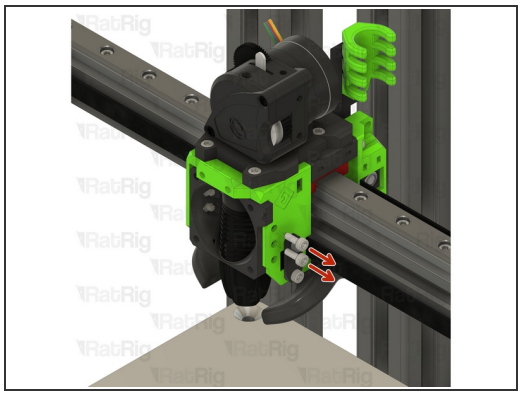
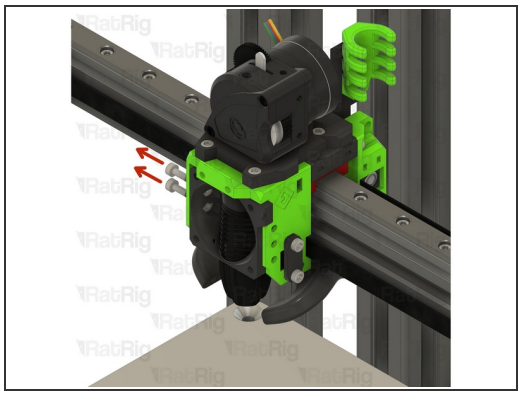
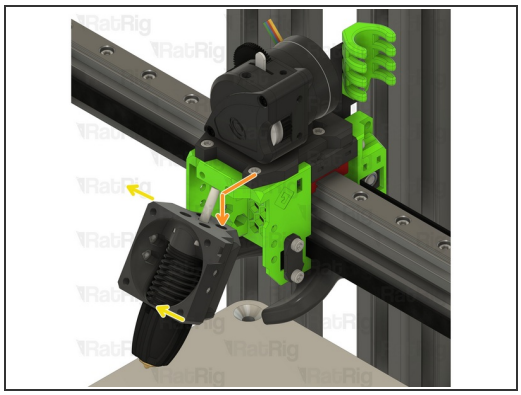
- Remove the two M3x8 Cap Head Screws
- Disconnect the Endstop Module and set it aside, it will be re-used on the Rat Rig Toolhead V1.0
- Loosen the M3x8 Cap Head Screw
- Remove the Z-probe from the printed part, it will be re-used on the Rat Rig Toolhead V1.0
- Remove the three M3x8 Cap Head Screws

Step 5 — Remove the 4010 Axial Fan

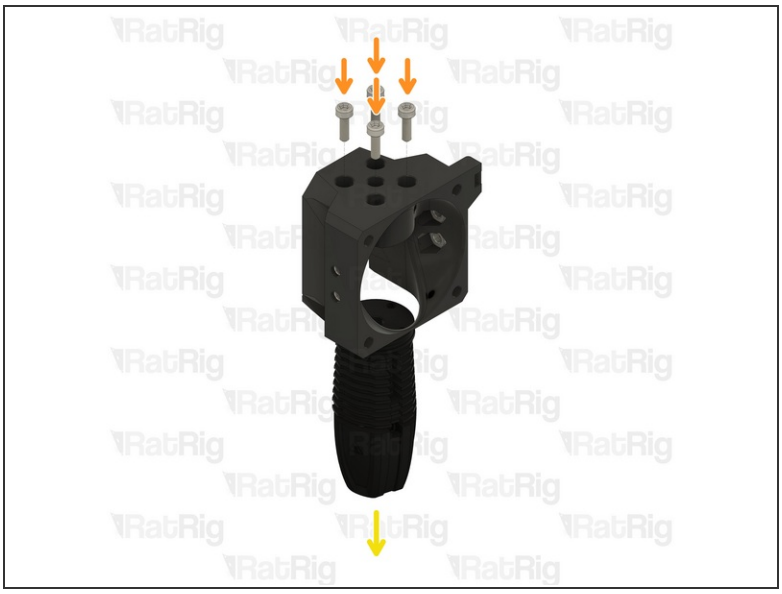
- Remove the four M3x20 Cap Head Screws
- Remove the ratrig_eva3_shroud Printed Part
- Remove the 4010 Axial Fan from the assembly, it will be re-used on the Rat Rig Toolhead V1.0
- Remove the four M3x8 Cap Head Screws

Step 6 — Remove the hotend assembly

- Remove the four M3x8 Cap Head Screws
- Gently push the hotend assembly down and away from the toolhead-
- Rotate the hot end assembly into position as shown

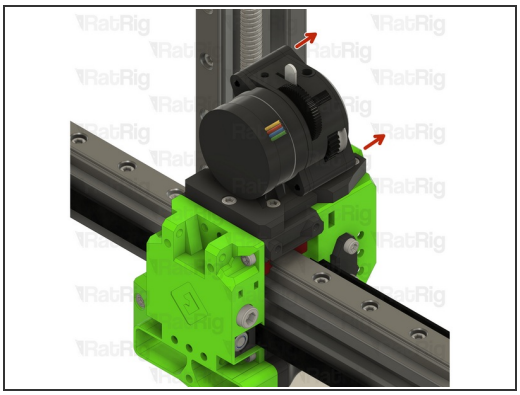
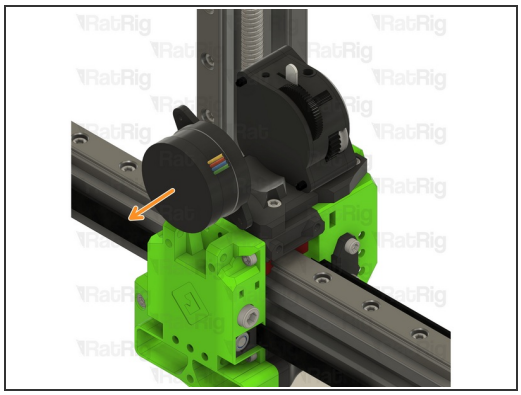
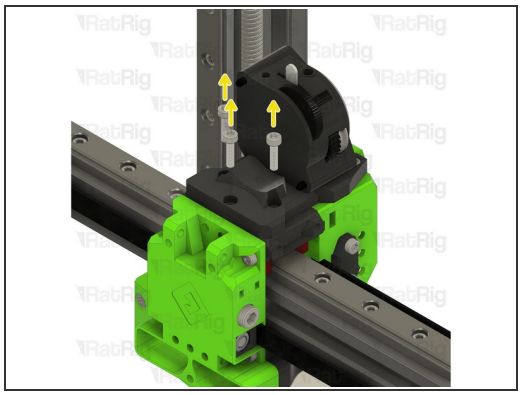
Step 7 — Remove the hotend from the assembly



- Remove the PTFE line
- Remove the four M2.5x8 Cap Head Screws
- Remove the Rapido hotend from the printed part, it will be re-used on the Rat Rig Toolhead V1.0

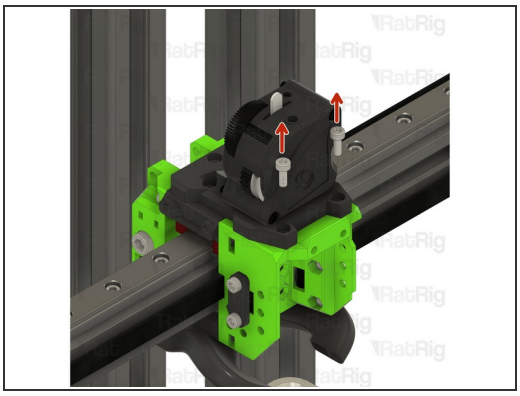
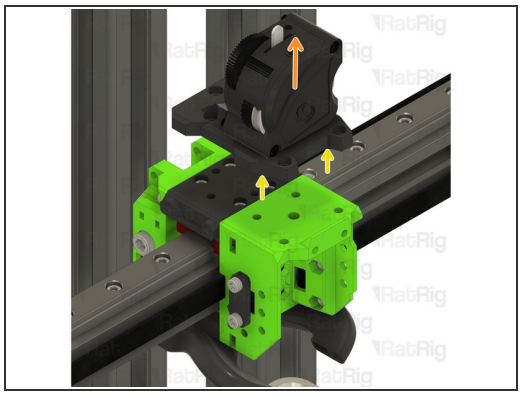
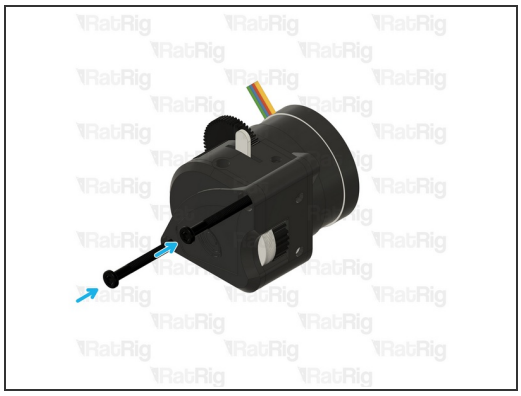
Tip: Insert the four M2.5x8 Cap Head Screws back in the Rapido hotend mounting points to avoid losing them.

Step 8 — Remove the extruder - Part 1

- Remove the two M3x25 screws on the face of the LGX Lite which secure the motor in place
- Remove the Bondtech LGX Lite motor from the back of the LGX Lite extruder
- Remove the three M3x12 Cap Head Screws

Step 9 — Remove the extruder - Part 2

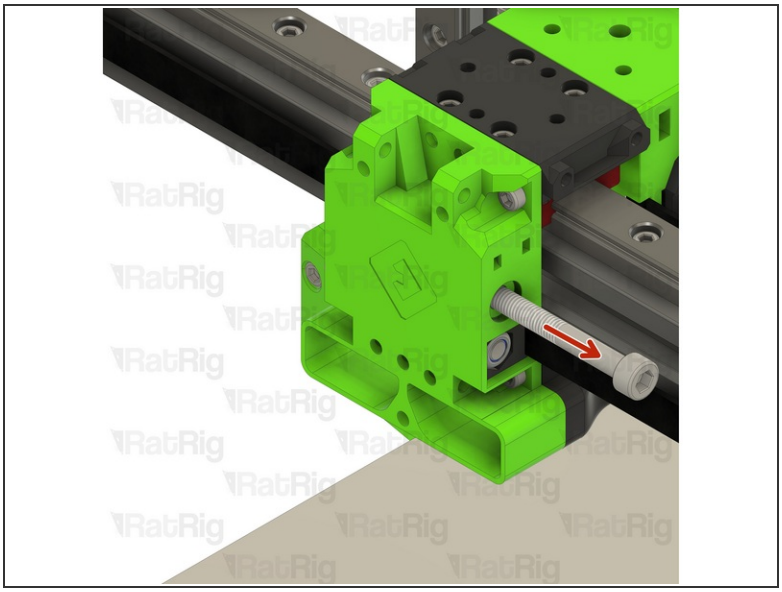




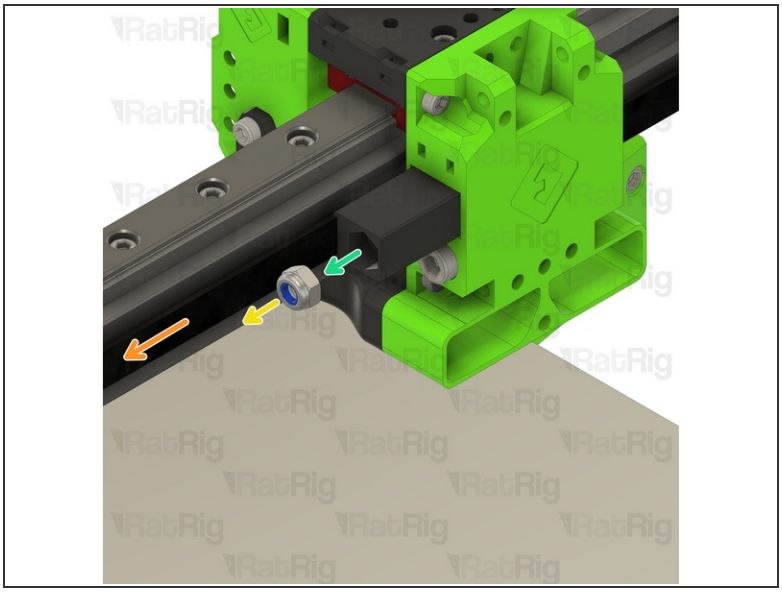
- Remove the two M3x8 Cap Head Screws
- Remove the extruder assembly

ⓘ The new Rat Rig toolhead uses the Orbiter V2,

- Remove the M3x8 Cap Head Screws holding the LGX Lite to the EVA3 drive_lgx_lite Printed Part
- Reassemble the LGX Lite so you can safely store it.

Step 10 — Remove the rear CoreXY belt grabbers

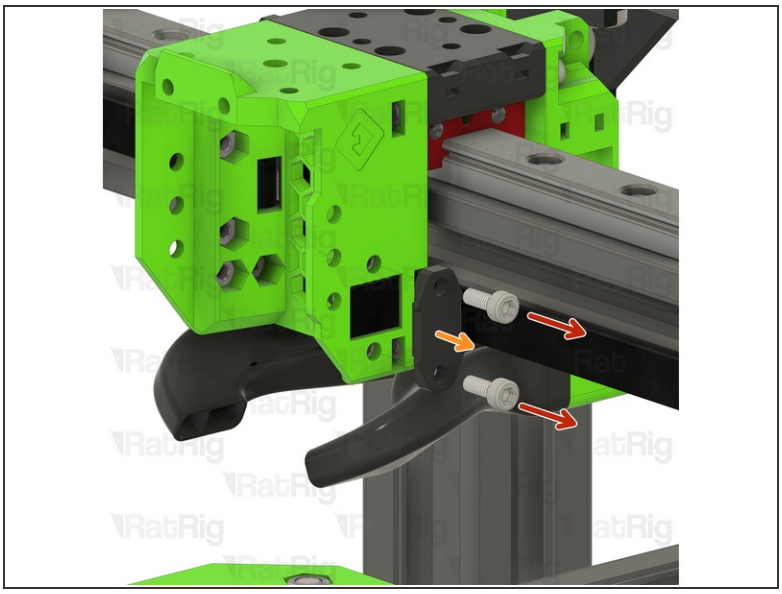


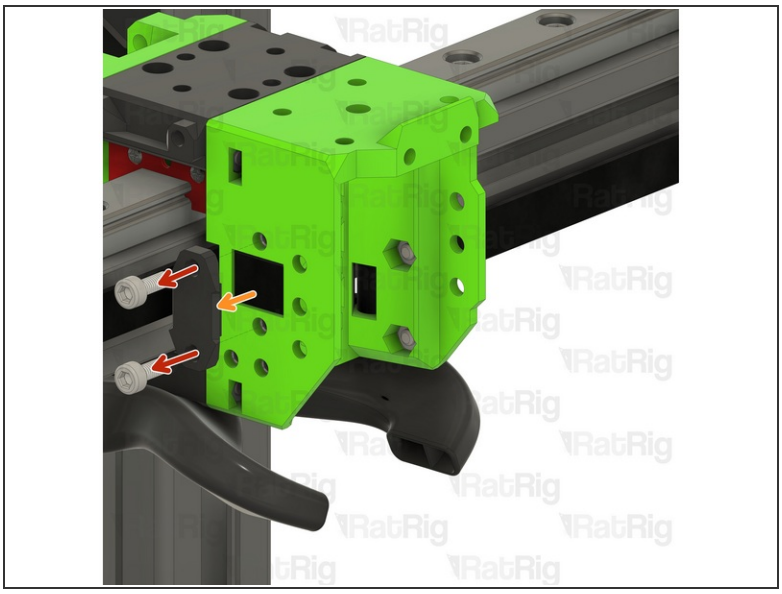


- Loosen the M5x40 Cap Head Screw
- Pull the belt to help remove the CoreXY belt grabber
- Remove the M5 nylon locking nut
- Remove the belt grabber from the toolhead

Repeat the previous steps and remove the other CoreXY belt grabber

Step 11 — Remove the front belt holder

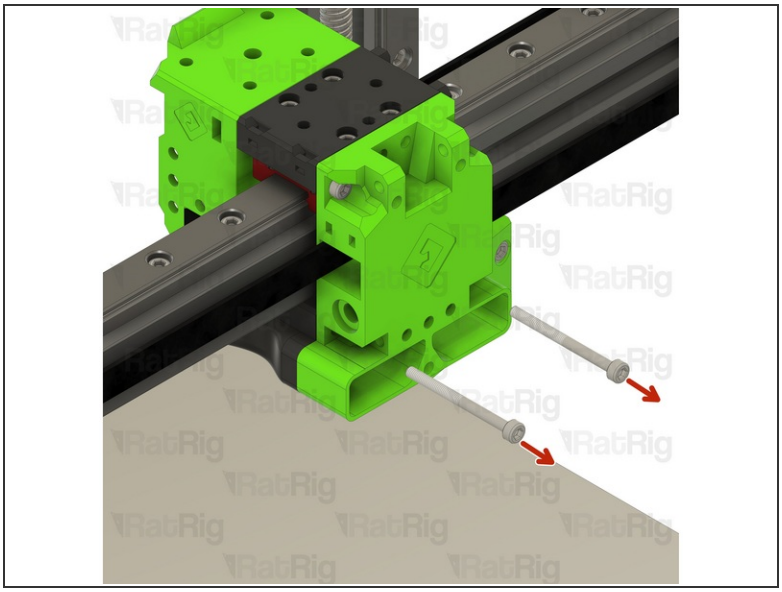


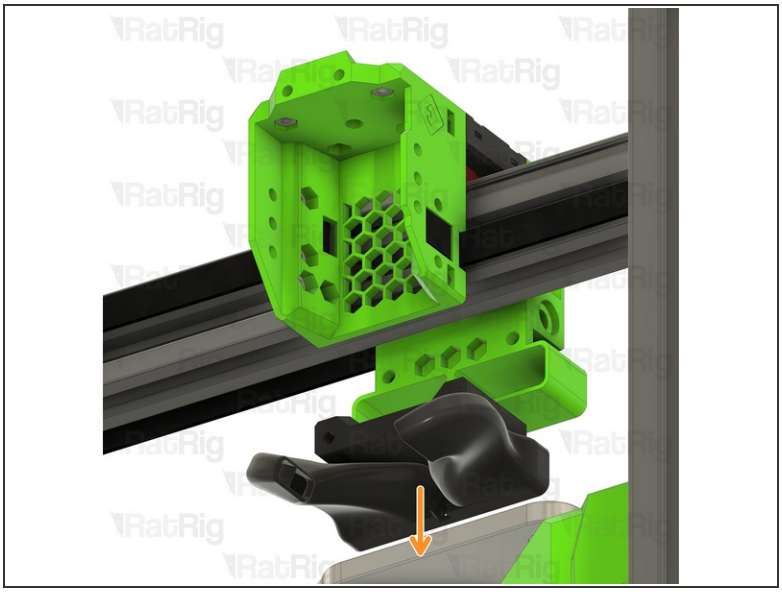


- Remove the two M3x8 Cap Head Screws
- Remove the belt front belt holder

Repeat the previous steps for the other front belt holder

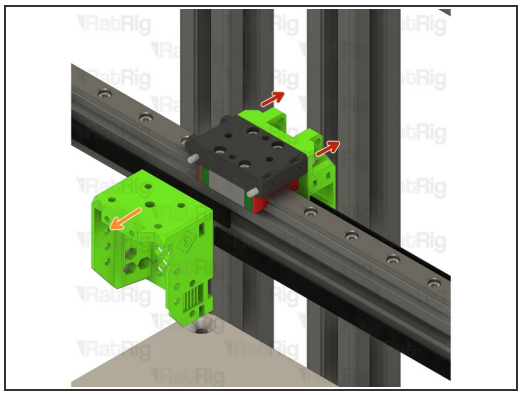
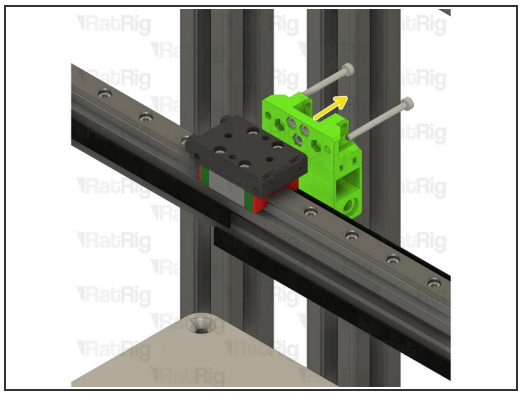
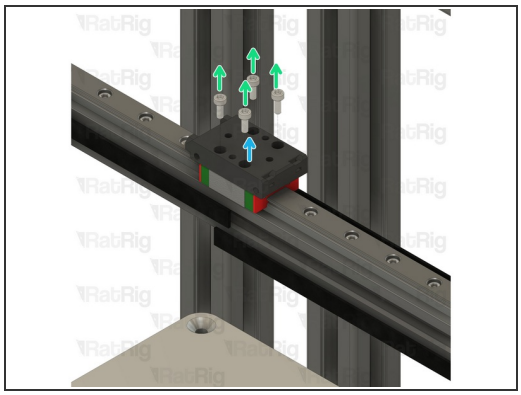
Step 12 — Remove the EVA horn ducts





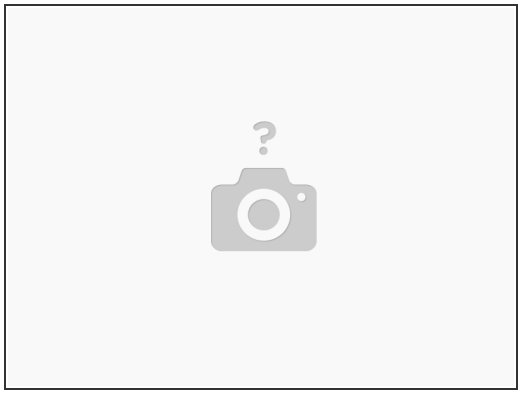
- Remove the two M3x35 Cap Head Screws
- Pull down on the EVA horn ducts

Step 13 — Remove the rest of the EVA3 assemblies from the gantry

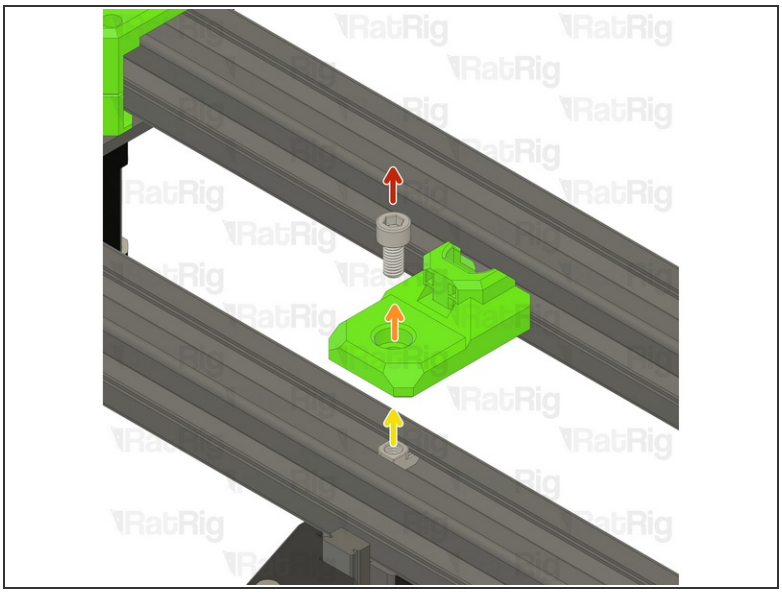
- Remove the two M3x35 Cap Head Screws
- Pull on the EVA3 front assembly to remove it
- Pull on the EVA3 back assembly to remove it
- Remove the four M3x8 Cap Head Screws
- Remove the EVA3 mgn12 mount

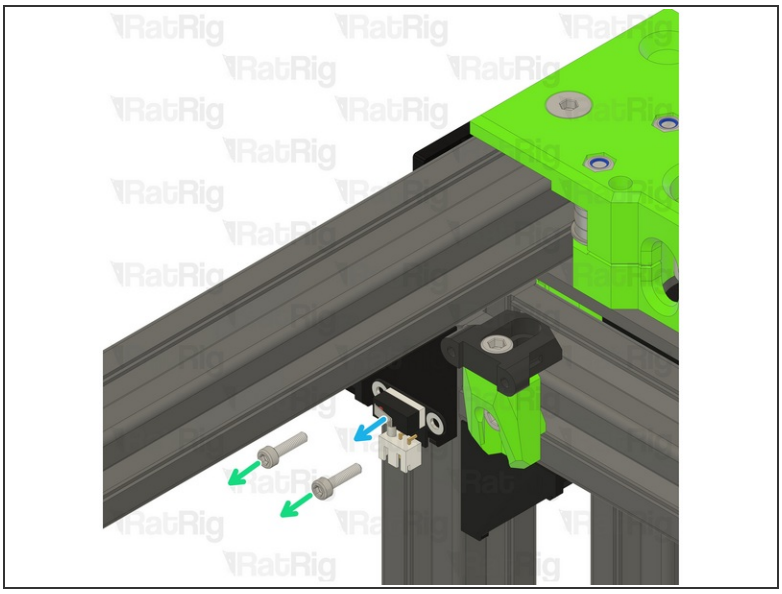
Step 14 — Preparing the V-Core 3.1 for the upgrade kit



Some components of the V-Core 3.1 need to be upgraded to support the new Rat Rig Toolhead. The following steps will show you how.

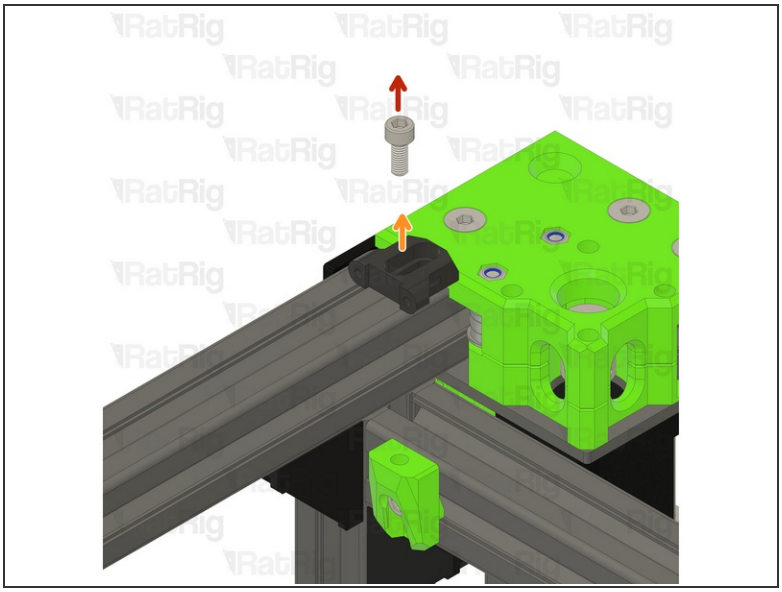
Step 15 — Remove the rear cable holder and the Y endstop

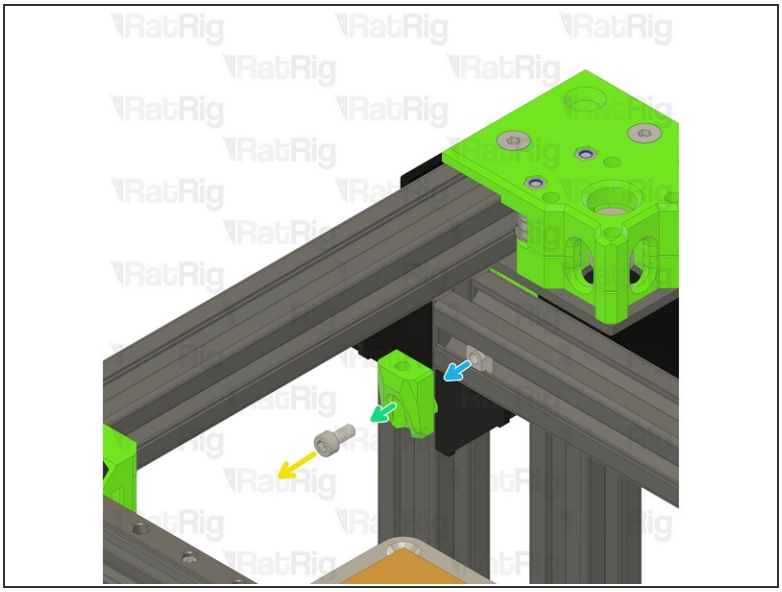




- [ ] Locate the rear cable holder
  - Remove the M6x12 Cap Head Screw
  - Remove the electronics_wire_guide_rear printed part from the frame
  - Remove the M6 3030 Drop in T-nut
- [ ] Locate the Y endstop mount
  - Remove the two M3x12 Cap Head Screws
  - Disconnect the Enstop Module and set it aside, it will be re-used on the Rat Rig Toolhead V1.0

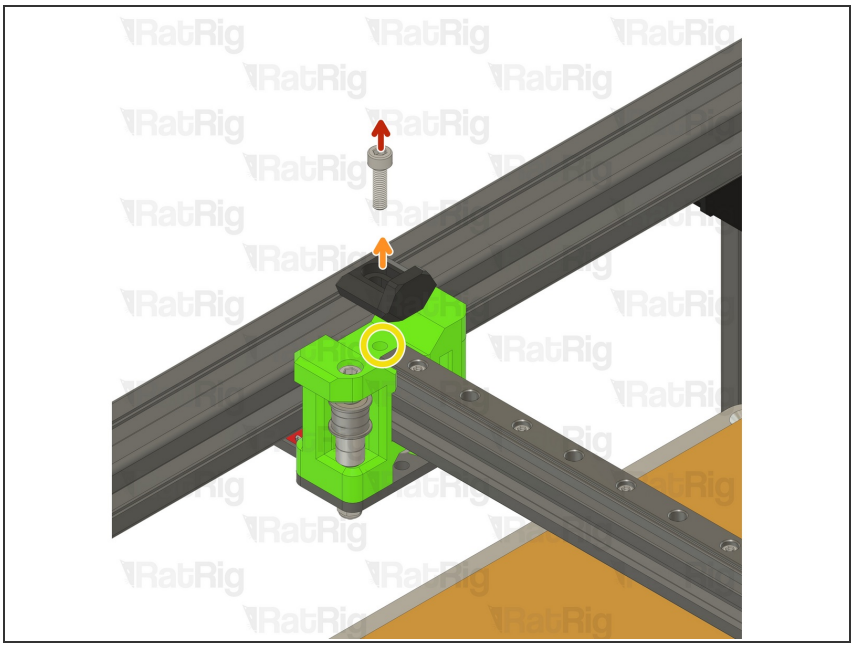
Step 16 — Remove the Y endstop mount





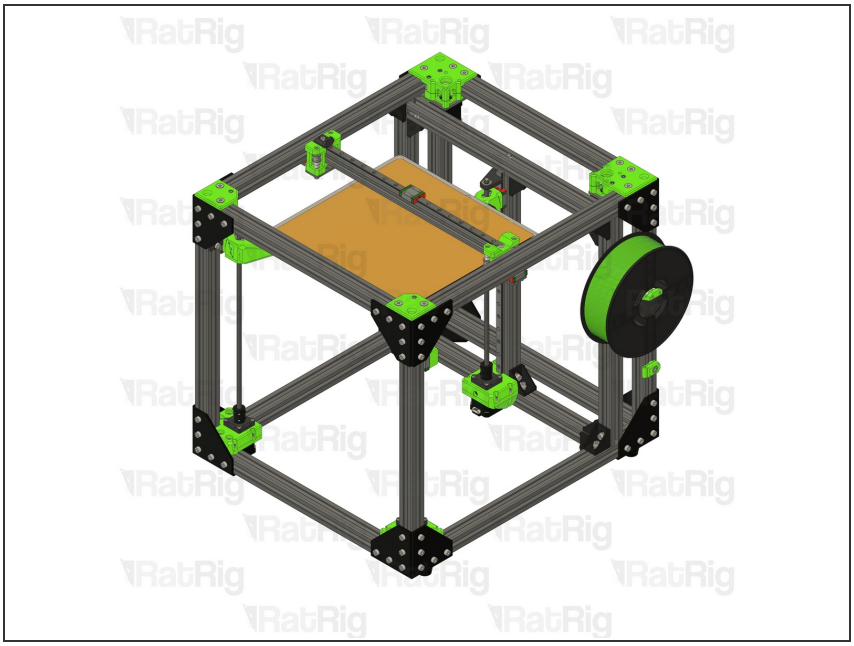
- Remove the M5x12 Cap Head Screw
- Remove the Y_max_endstop_slider printed part
- Remove the M5x10 Cap Head Screw
- Remove the Y endstop_max_block printed part
- Remove the M5 3030 Drop in T-nut

Step 17 — Remove the X endstop bumper



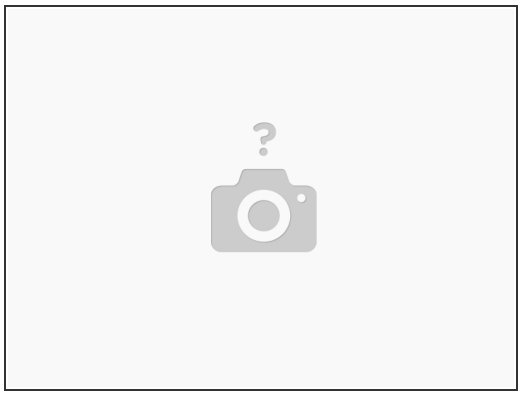
- Remove the M5x18 Cap Head Screw
- Remove the EVA3 endstop block
- Avoid moving the machine around at this point, os the M5 Drop in T-nut doesn't slide around on the gantry extrusion.

Step 18 — No more disassembling!



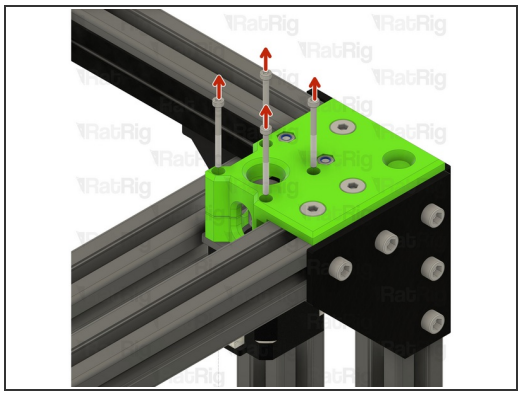
The V-Core 3.1 is now ready to receive the Rat Rig Toolhead V1.0 Upgrade kit

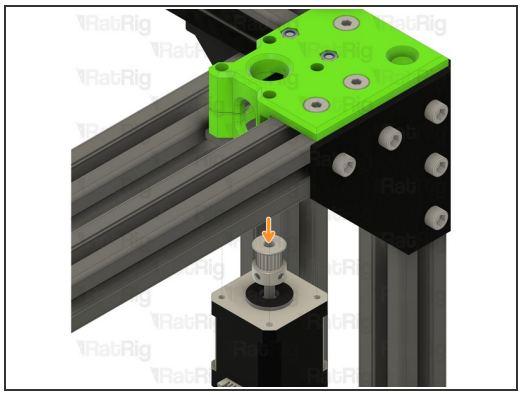
Step 19 — Ready to take the V-Core 3.1 to the next level

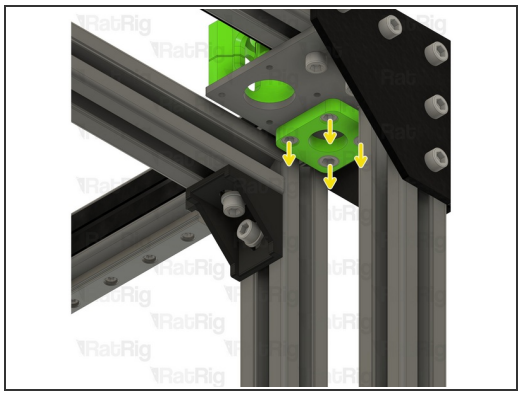


The next steps will cover the assembly of the Rat Rig toolhead V1.0 upgrade kit

Step 20 — Route the belts through the motor cages - Part 1

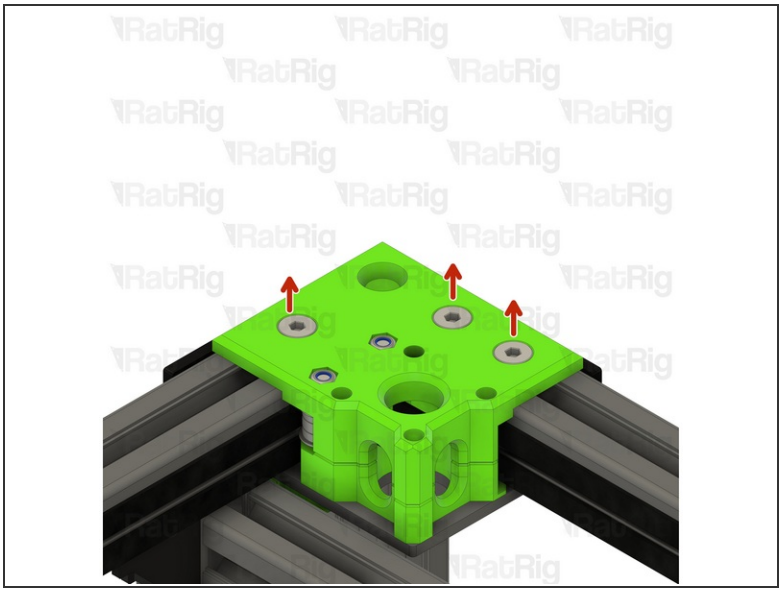


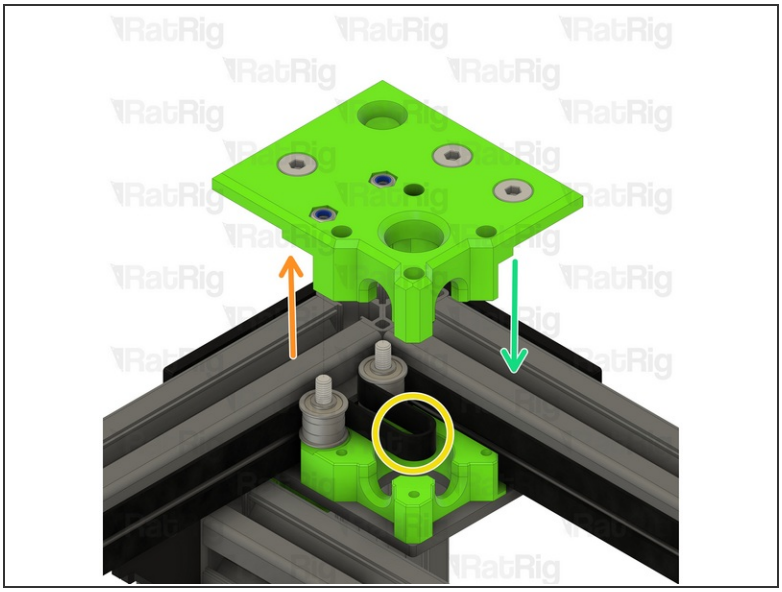




- Remove the M3x45 Cap Head Screws
- Remove the Stepper motor
- Remove the M5x40 Cap Head Screws

Step 21 — Route the belts through the CoreXY motor cages - Part 2



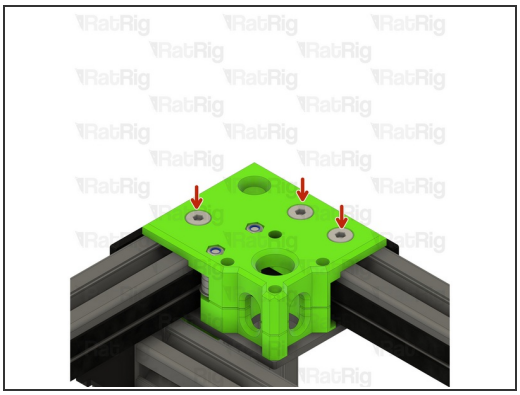
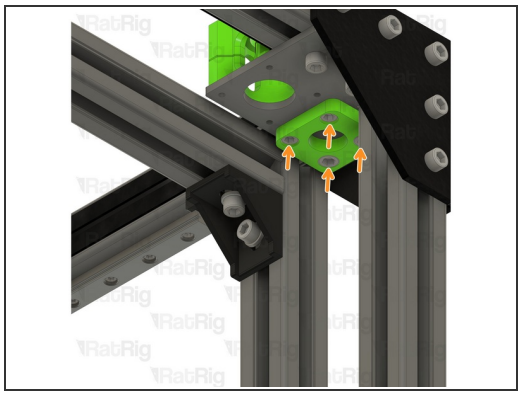
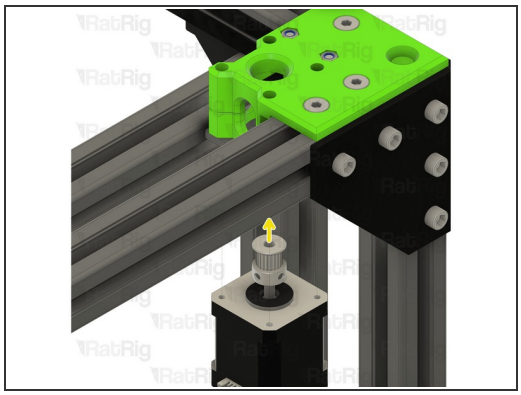


- Remove the three M6x14 Screws

  ⓘ If the M6 Drop in T-nuts fall off, loosely thread them in the screws so you can easly reinstall the CoreXY motor cage top easily.

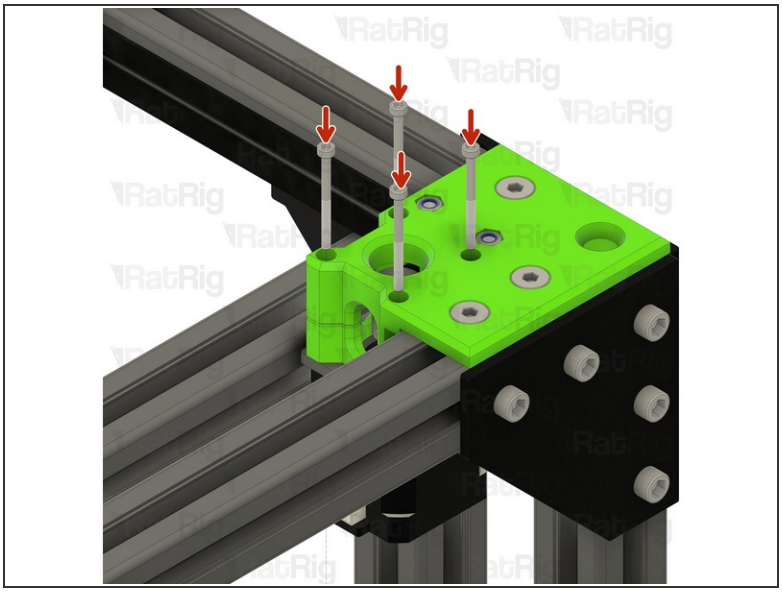
- Remove the CoreXY motor cage top
- Remove both of the old belts, then insert the two new ones following the same paths
- Reinstall the CoreXY motor cage top

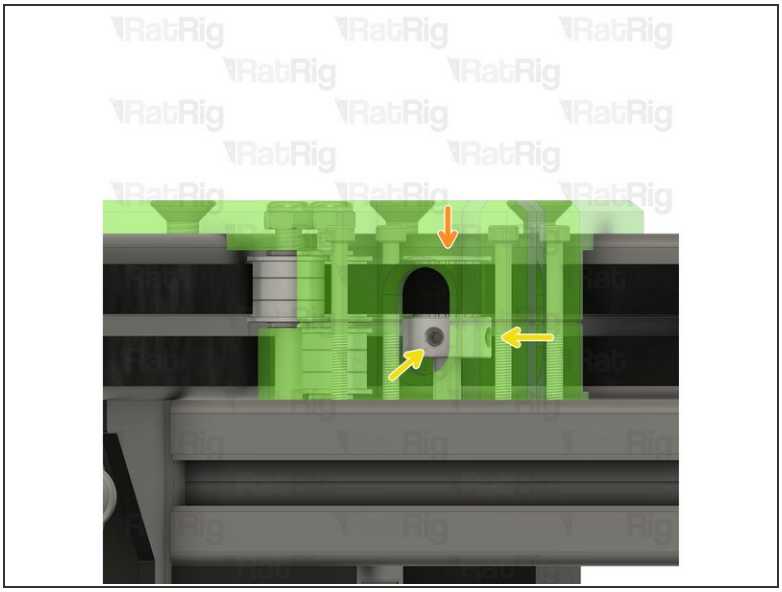
Step 22 — Route the belts through the CoreXY motor cages - Part 3

- Tighten the three marked M6x14 screws to secure the CoreXY motor cage top to the frame
- Tighten the M5x40 screws to secure the bearing stacks into the CoreXY motor cage top
- Position the NEMA17 motor up and into the motor cage from below, it will be secured in the next step

Step 23 — Route the belts through the CoreXY motor cages - Part 4



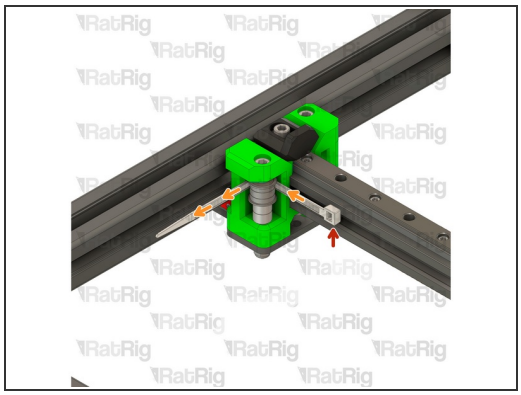
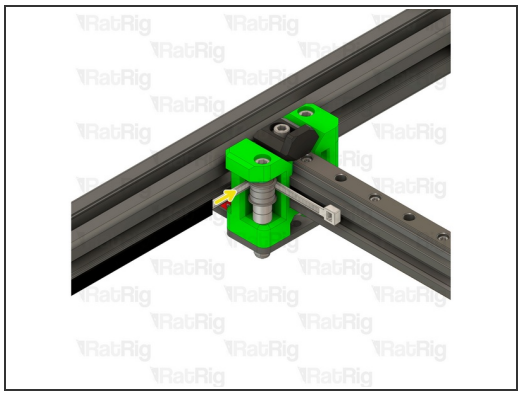
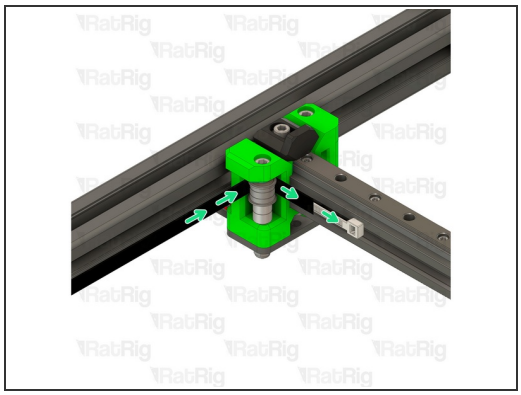


- Insert the M3x35 screws into the xy_motor_cage_left_top as shown, and fasten them to secure the NEMA17 motor to the mount
- Check the alignment of the timing pulley, the belt should be on the middle of the pulley as shown

  Adjust the pulley up or down if required to make sure the belt is in the middle of the pulley
- Fasten both M3 grub screws to securely mount the timing pulley to the NEMA17 motor shaft

Repeat Steps 21 - 24 for the other CoreXY motor mount cage.

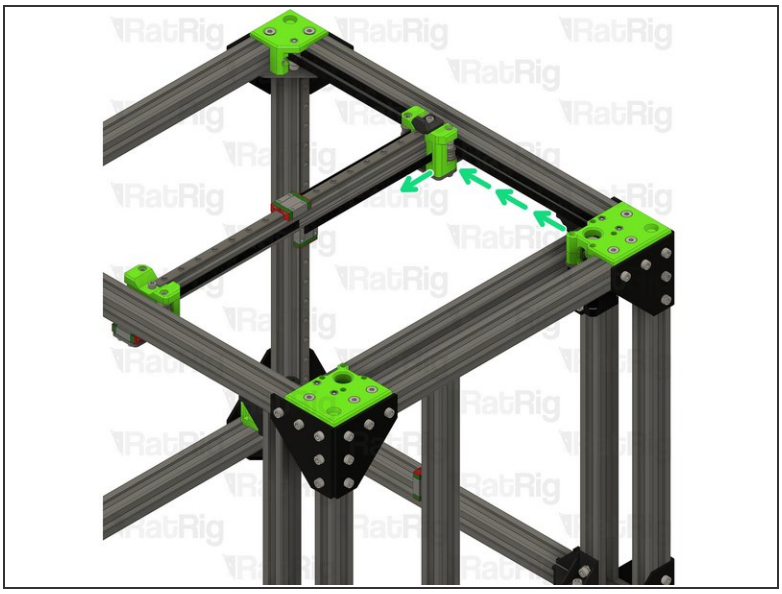
Step 24 — How to easily insert the belts

This step is not mandatory, it's just a Rat Rig tip on how to feed the belts on the idlers.

- Zip Tie
  - The wider the zip tie is, the easier the process will be
- Bend the tip of the zip tie a little bit and feed it between the printed part and the idler, as shown
- Insert the belt between the zip tie and the idler
- Slowly feed the belt and pull the zip tie at the same time

Step 25 — Route the CoreXY belts - Part 1



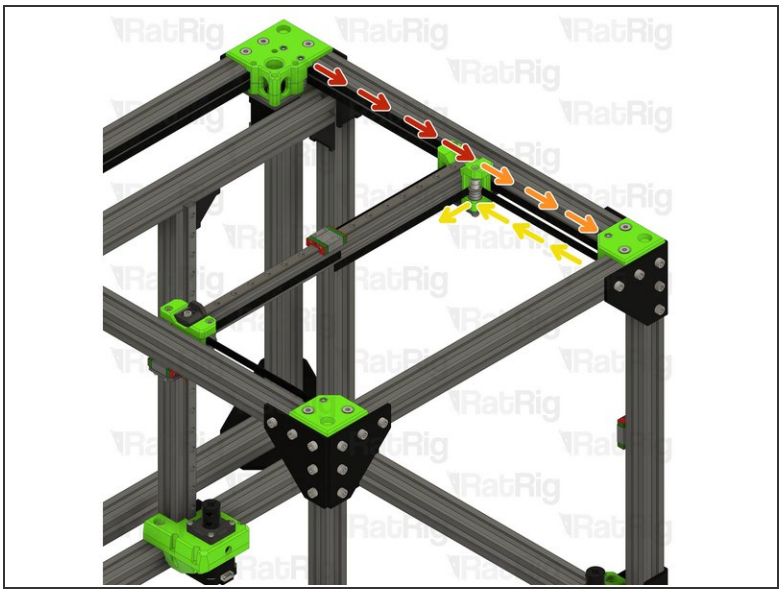
Take the loose end of the **top** CoreXY belt on the left hand side:

- Feed the belt behind the left xy_joiner
- Down and around the front xy_idler
- Around the front bearing stack on the left xy_joiner

Take the loose end of the **bottom** CoreXY belt on the left hand side:

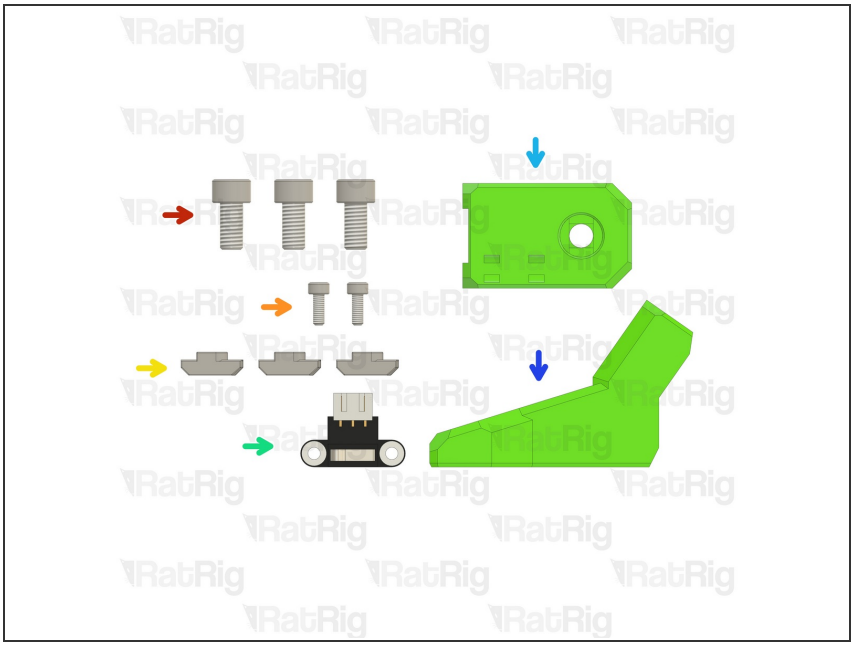
- Feed the belt around the rear bearing stack on the xy_joiner

Step 26 — Route the CoreXY belts - Part 2



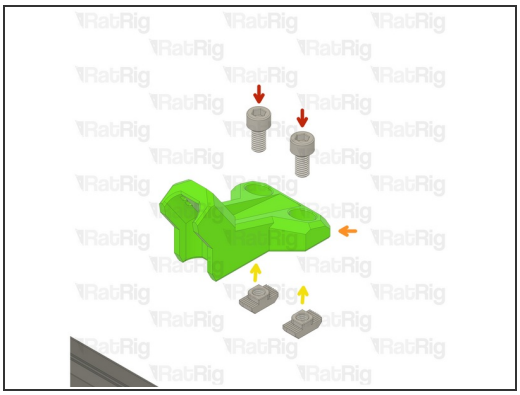
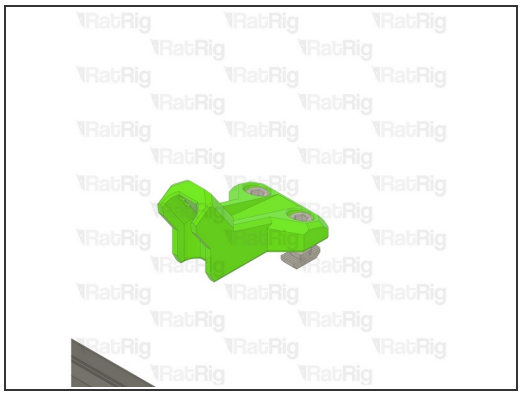
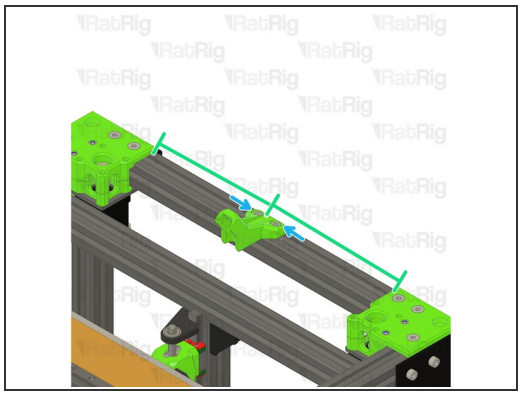
- Take the loose end of the **bottom** CoreXY belt on the **right** hand side:
  - Feed the belt behind the **right** xy_joiner
  - Down and around the **front** xy_idler
  - Around the **front** bearing stack on the **right** xy_joiner
- Take the loose end of the **top** CoreXY belt on the **right** hand side:
  - Feed the belt around the **rear** bearing stack on the xy_joiner

Step 27 — Prepare upgrade sub assembly parts



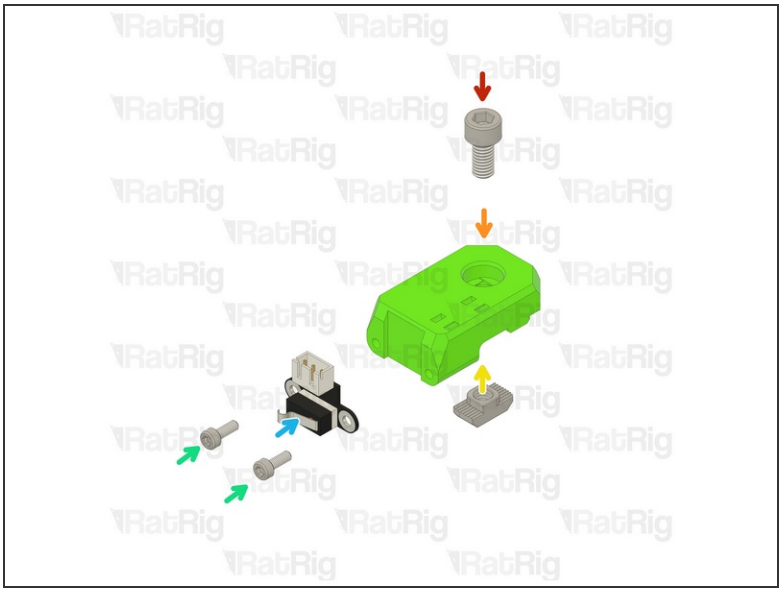
- 3x M6x12 Cap Head Screw
- 2x M3x8 Cap Head screw
- 3x 3030 M6 Drop In T-nut
- Y endstop
- Y_endstop printed part
- Umbilical_frame printed part

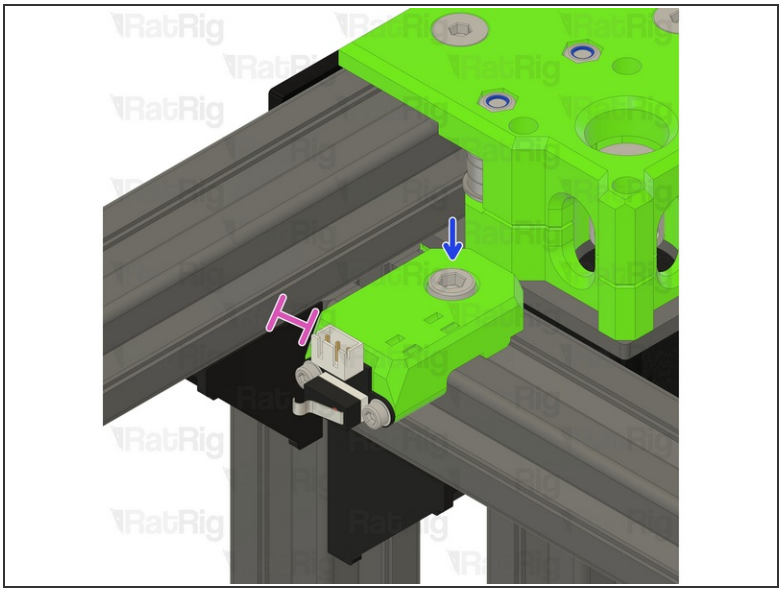
Step 28 — Installl the umbilical guide to the frame

- 2x M6x12 Cap Head Screw
  - Install the M6 cap head screws into the printed part as shown.
- Umbilical_frame printed part
- 3030 M6 Drop In T-nut
  - Loosely thread a 3030 M6 T-Nut onto the M6x12 screws. Do not tighten it at this point
- Make sure the printed part is on the middle of the rear extrusion.
- Tighten the M6x12 screw to secure the umbilical mount to the frame.

Step 29 — Installl the Y endstop

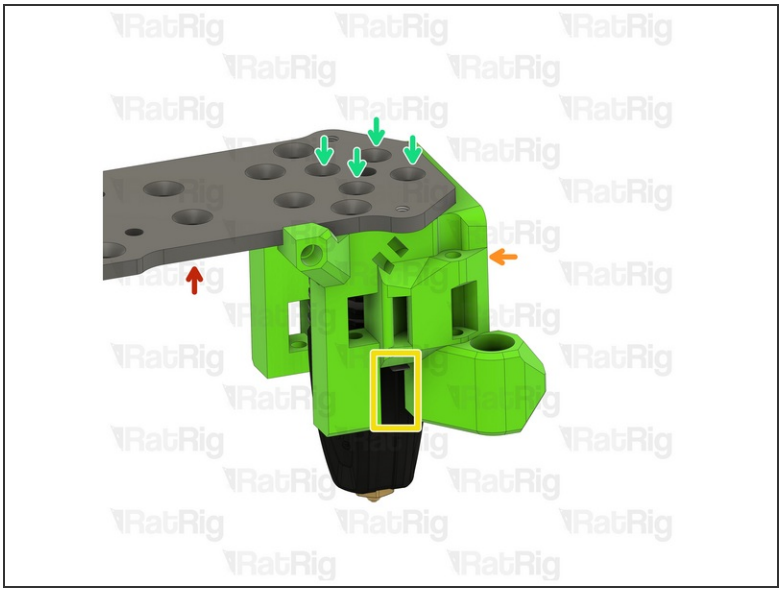


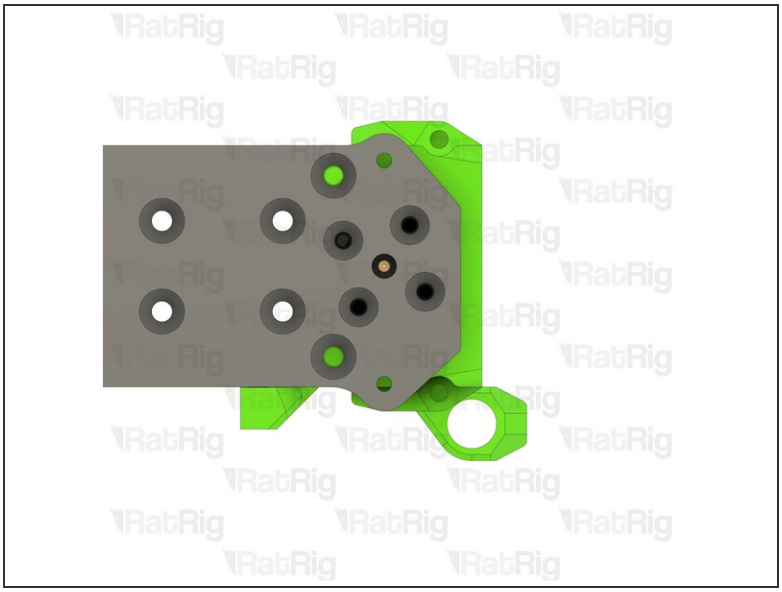


- M6x12 Cap Head Screw
- Y_endstop printed part
- 3030 M6 Drop In T-nut

  ⓘ Loosely thread a 3030 M6 T-Nut onto the M6x12 screw. Do not tighten it at this point
- 2x M3x8 Cap Head Screw
- Y Endstop
- Tighten the M6x12 screws to secure the endstop mount.
- Ensure a 5mm gap between the 3030 extrusion and the Y_endstop printed part, this distance is required for the belts to operate smoothly.

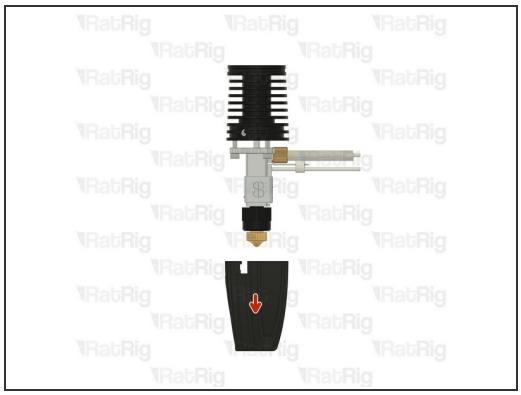
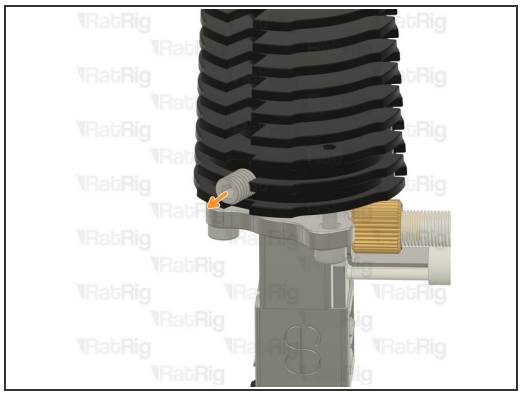
Step 30 — Check the hotend alignment





- Rat Rig toolhead plate
- Rat Rig toolhead front printed part
- Insert the Rapido V2 into the printed part as shown, and make sure the cables are positioned in the designated slot.
- Look from above and see if all four holes line up correctly.
- All the holes on the plate, hotend and printed part should line up:
  - If they align skip to step 35
  - If they don't align follow the next steps

Step 31 — Phaetus Rapido 2 Hotend - Part 1

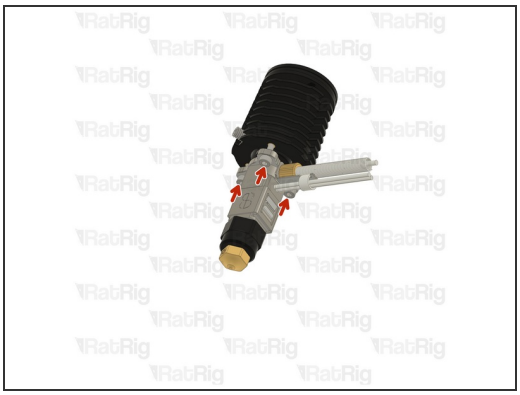
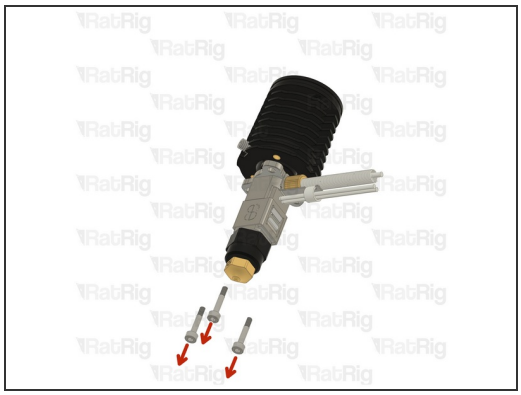
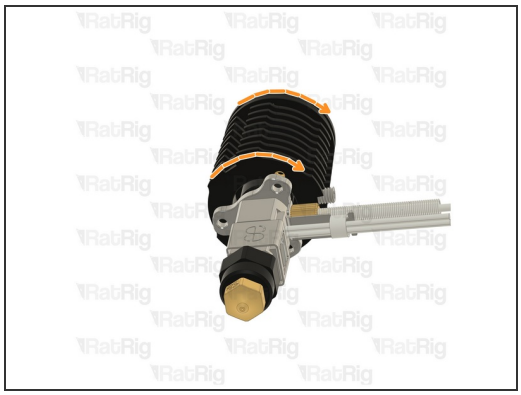




If the cables of your Rapido 2 hotend don't align perfectly with the toolhead slot, please follow the next steps:

- Push down on the silicone sock to remove it
- Loosen the set screw on the heatsink

  Do not remove it completely to avoid losing it

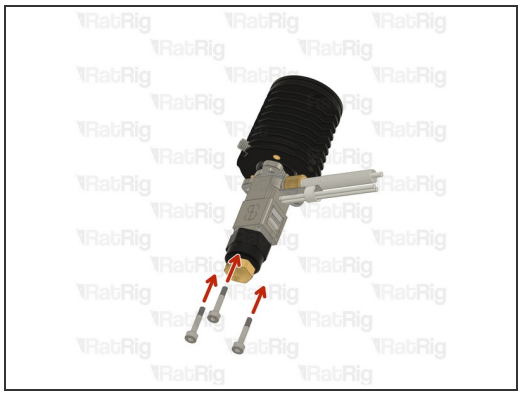
Step 32 — Phaetus Rapido 2 Hotend - Part 2

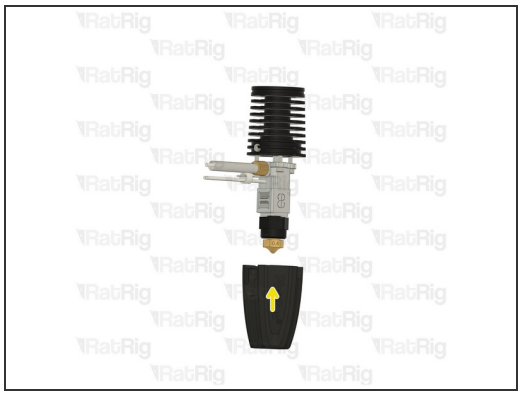




- Remove the 2.5 Cap Head Screws from the hotend
- Carefully rotate the heatsink until the three screw holes align again.

  There isn't a way to tell how much you need to rotate you hotend, it might be just 120º or it might be 240º. It's a matter of trial and error.

Step 33 — Phaetus Rapido 2 Hotend - Part 3





- Insert the 2.5mm Cap Head Screws back in and tighten them.

  ⚠ **DO NOT** overtighten the screws, they are only 2.5mm and will break if excessive force is applied.

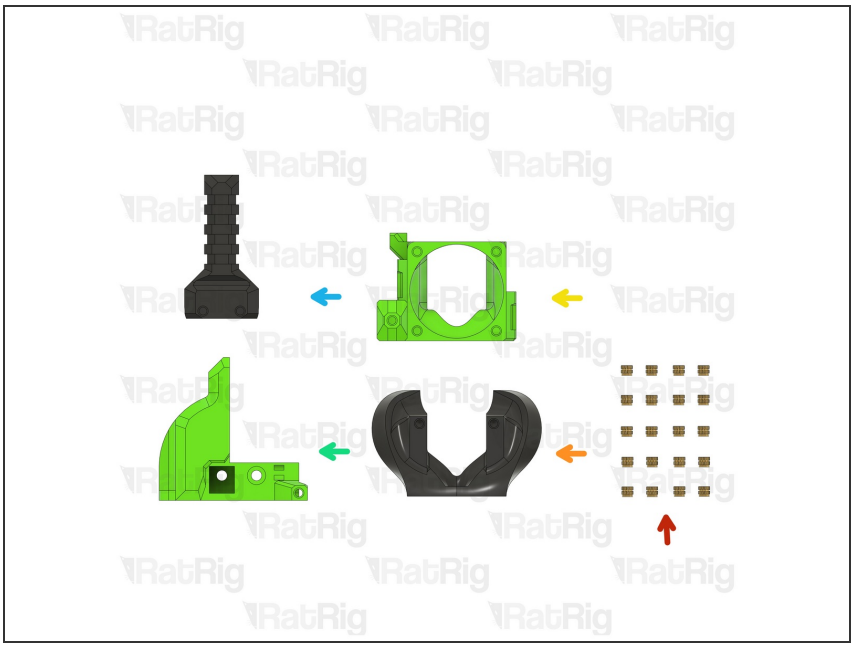
- Tighten the set screw back in

  ⚠ **DO NOT** overtighten the screw, if excessive force is applied the heatbreak will be permanently damaged.

- Put the socket back on

Try to insert the hotend on the toolhead and see if the cables align with the designated slot, if not, repeat steps 32-34 and try a different angle in step 34

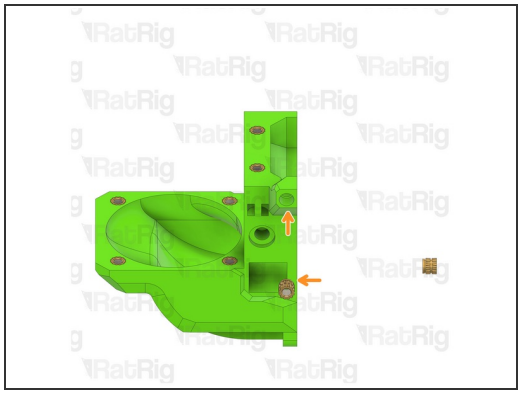
Step 34 — Prepare the printed parts and heat inserts

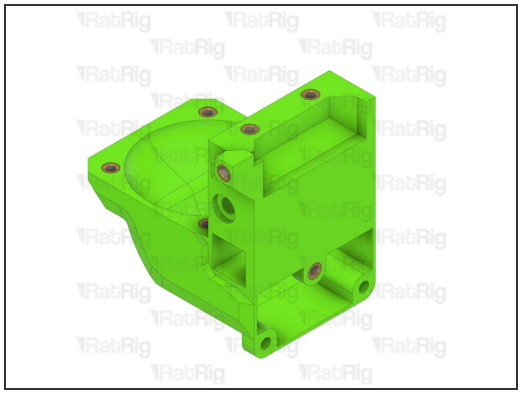


- 20x Heat insert M3
- 1x rr_toolhead_vc3_duct_beta2 printed part
- 1x rr_toolhead_vc3_front_beta2 printed part
- 1x rr_toolhead_vc3_back_beta2 printed part
- 1x rr_toolhead_vc3_umbilical_beta2 printed part

If you bought the printed parts from Rat Rig, the heat inserts are already in place. Skip to **Step 39**.

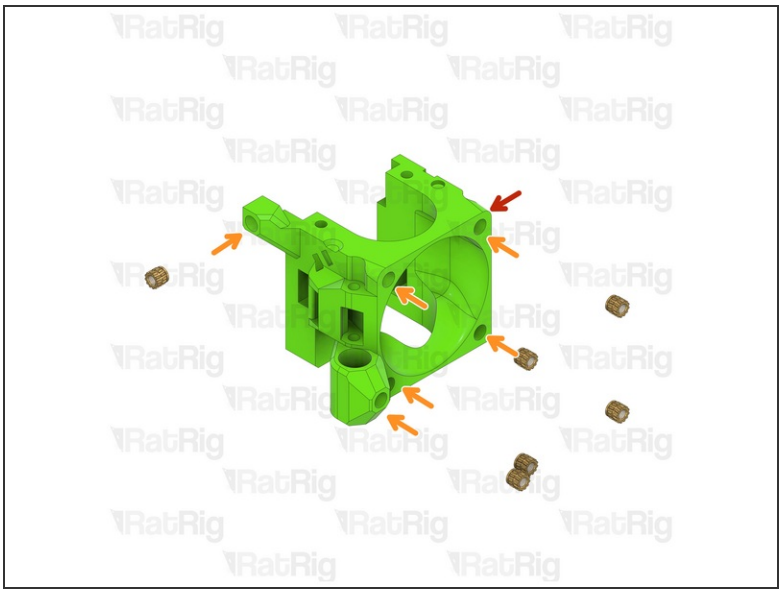
Step 35 — Prepare the Rat Rig toolhead back assembly

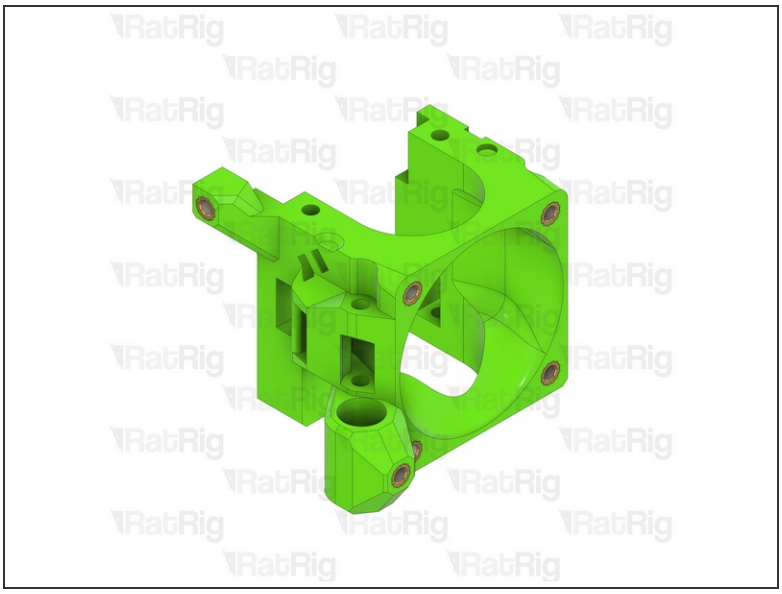




- 1x rr_toolhead_vc3_back_beta2 printed part
- 8x Heat insert M3

Step 36 — Prepare the Rat Rig toolhead front assembly



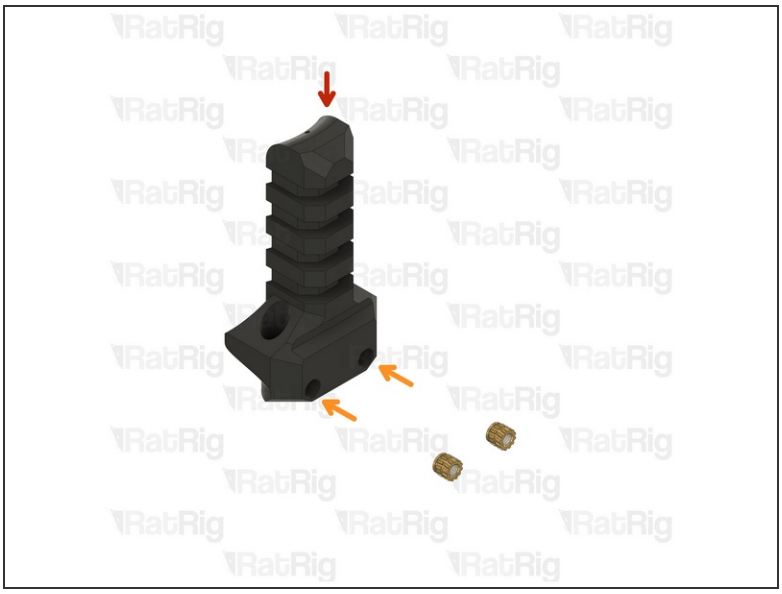


- 1x Rat Rig toolhead_front_beta2 printed part
- 6x Heat insert M3

Step 37 — Pepare the Rat Rig toolhead duct assembly

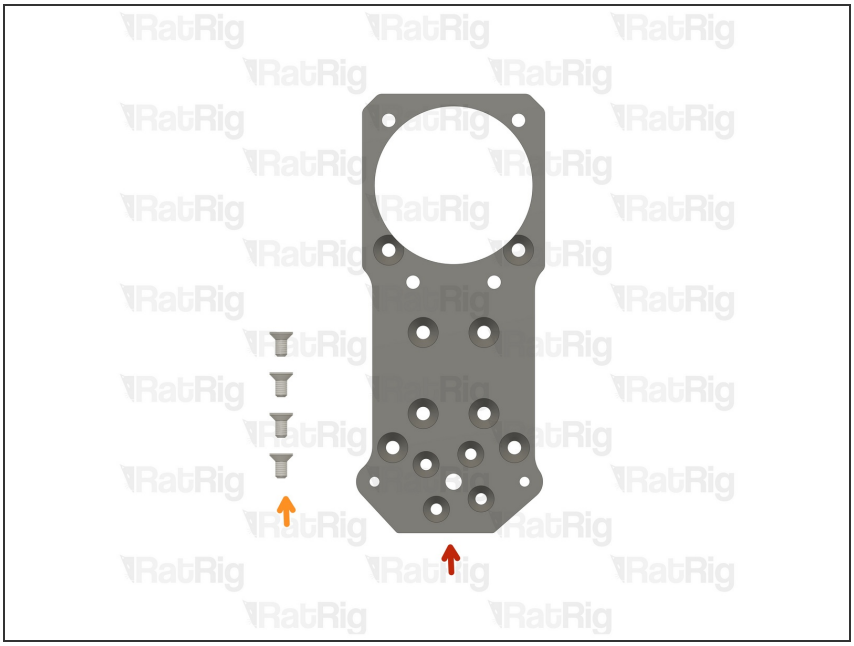
- 1x Rat Rig toolhead_duct_beta2 printed part
- 3x Heat insert M3

Step 38 — Prepare the Rat Rig toolhead umbilical assembly



- 1x Rat Rig toolhead_umbilical_beta2 printed part
- 2x Heat insert M3

Step 39 — Prepare the Rat Rig toolhead plate



- 1x Rat Rig toolhead plate
- 4x M3x6 Countersink Screw

Step 40 — Mount the toolhead plate

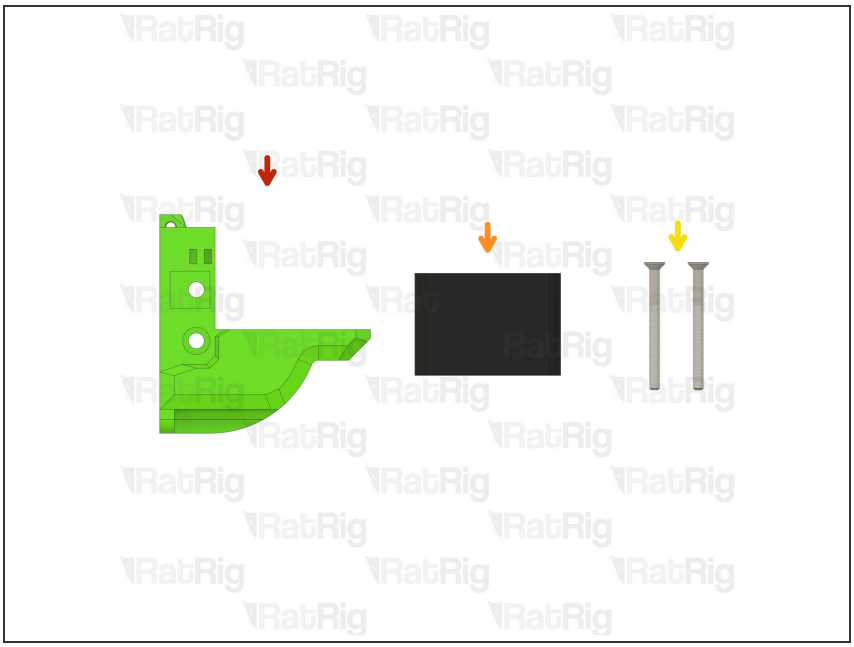
- Rat Rig toolhead plate
- 4x M3x6 Countersink Screw

ⓘ Tighten the M3x6 Countersink Screws to secure the plate to the carriage.

⚠ Avoid using a ball end hex key, as they are more prone to damaging the sensitive M3 countersink screw head.

⚠ After tightening of the screws, it is essential to verify that the X carriage retains its free movement. Excessive tightening of the screws may lead to the binding of the carriage.

Step 41 — Prepare the back assembly

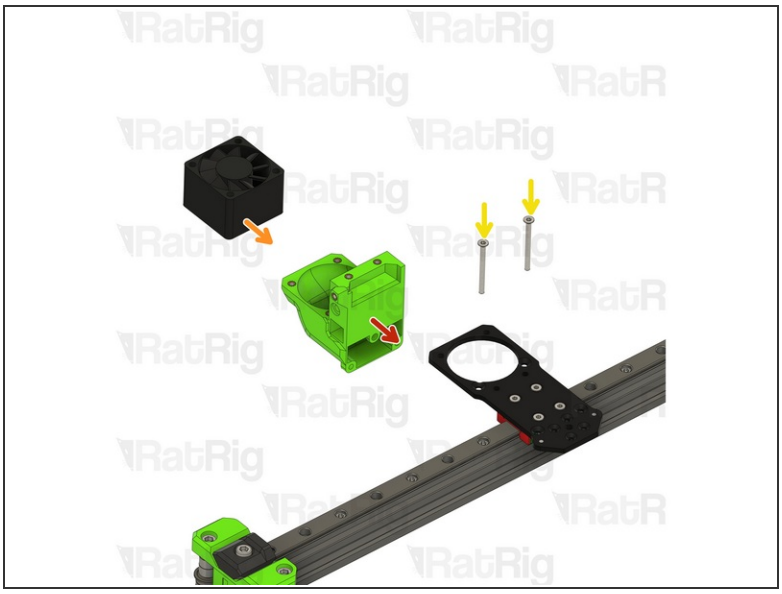


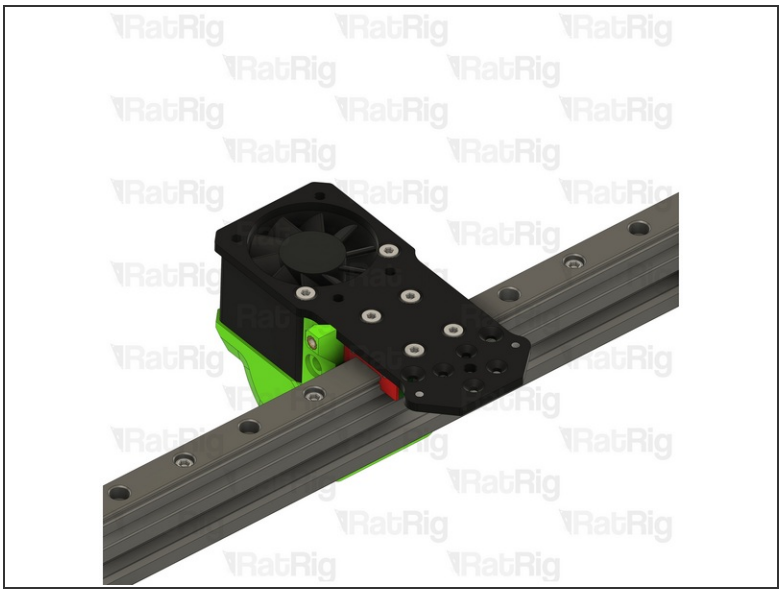
- Rat Rig toolhead back assembly
- 1x 4028 Part Cooling Fan
- 2x M3x35 Countersink Screw

Step 42 — Prepare the 4028 Part Cooling Fan

- Remove the four rubber spacers on the 4028 Part Cooling Fan

Step 43 — Assemble the Rat Rig toolhead - Part 1





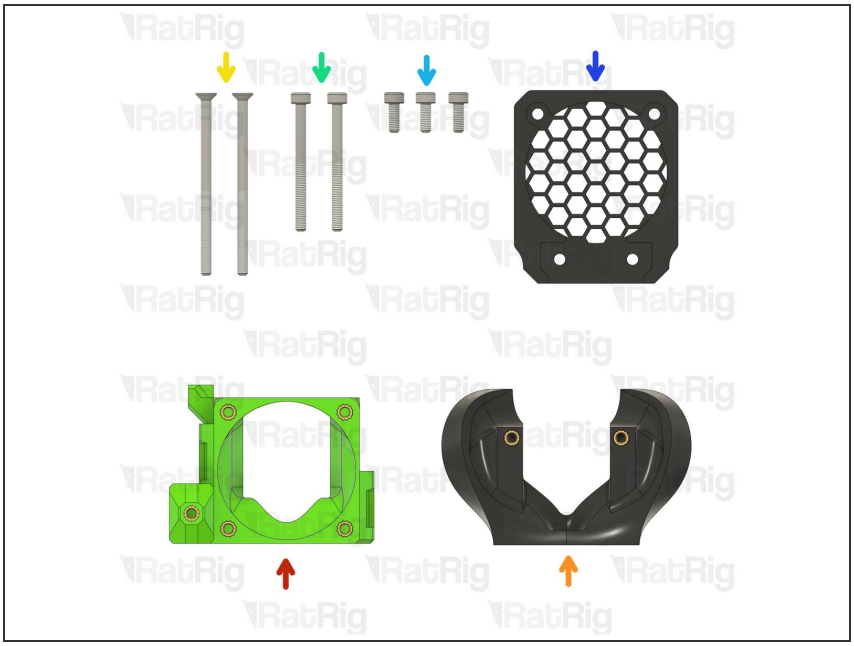
- Rat Rig toolhead back assembly
- 4028 Part Cooling Fan
- 2x M3x35 Countersink Screw

ⓘ Tighten the M3x35 screws.

⚠ Take care not to over tighten the M3x35 screws as you can damage the printed parts

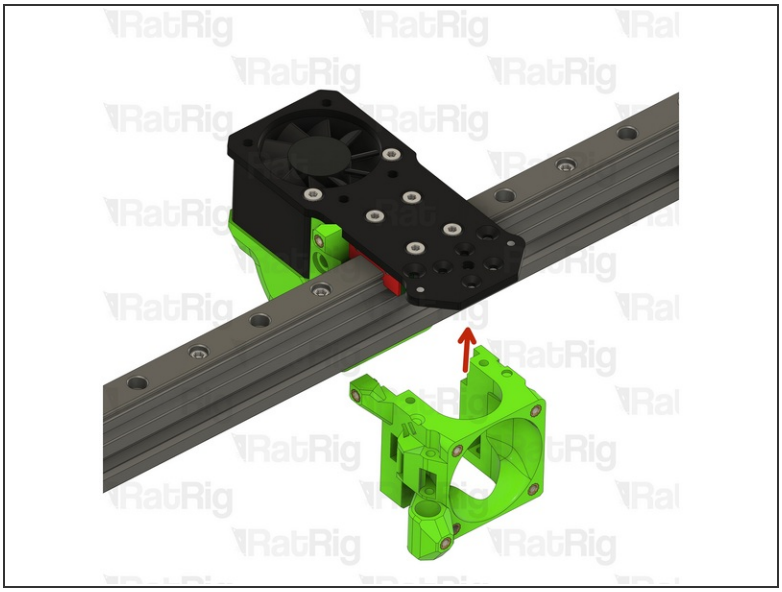
⚠ Avoid using a ball end hex key, as they are more prone to damaging the sensitive M3 countersink screw head.

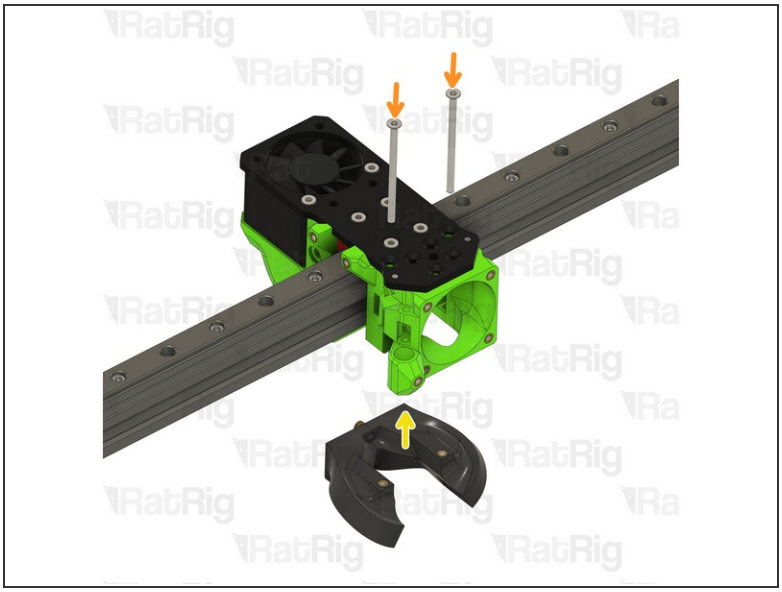
Step 44 — Prepare the following parts



- Rat Rig toolhead front assembly
- Rat Rig toolhead duct assembly
- 2x M3x50 Countersink Screw
- 2x M3x35 Cap Head Screw
- 3x M3x8 Cap Head Screw
- 1x Rat Rig toolhead fan grille printed part

Step 45 — Assemble the Rat Rig toolhead - Part 2



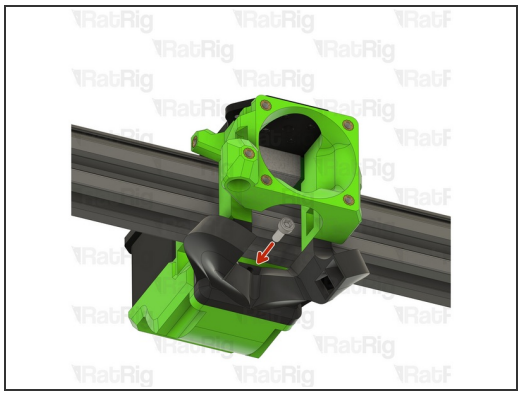
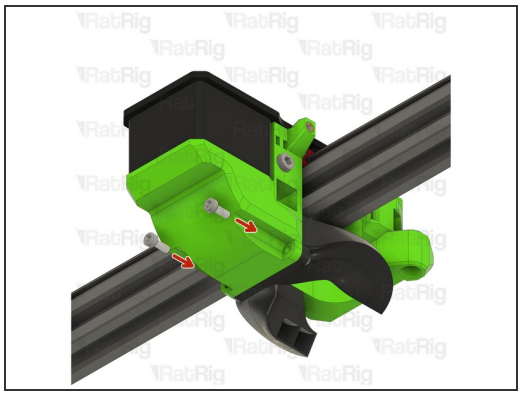
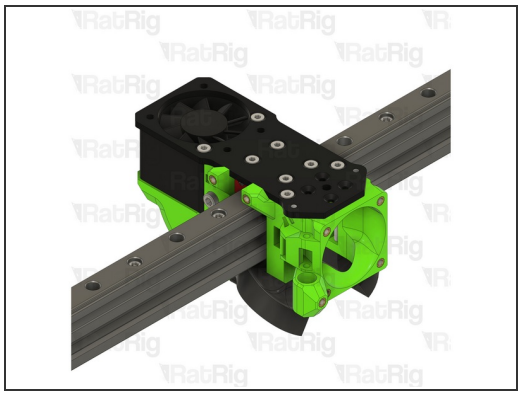


- Rat Rig toolhead front assembly
- 2x M3x50 countersink screws
- Rat Rig toolhead duct assembly
- The M3x50 countersink screws must go through the holes on the front assembly and thread into the duct assembly.

⚠ Take care not to over tighten the M3x50 screw as you can damage the printed parts

⚠ Avoid using a ball end hex key, as they are more prone to damaging the sensitive M3 countersink screw head.

Step 46 — Assemble the Rat Rig toolhead - Part 3

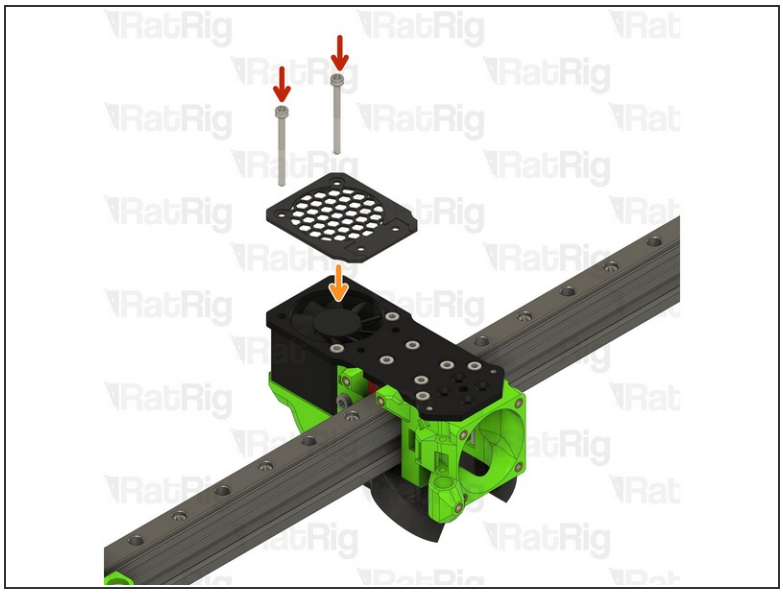
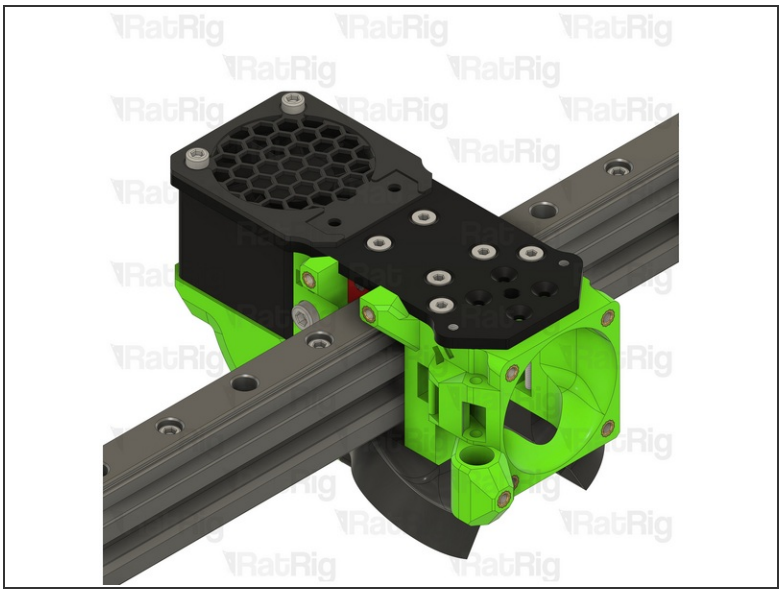




- 3x M3x8 Cap Head Screw

ⓘ Secure the duct assembly to the toohead.

⚠ Take care not to over tighten the screws as you can damage the printed parts

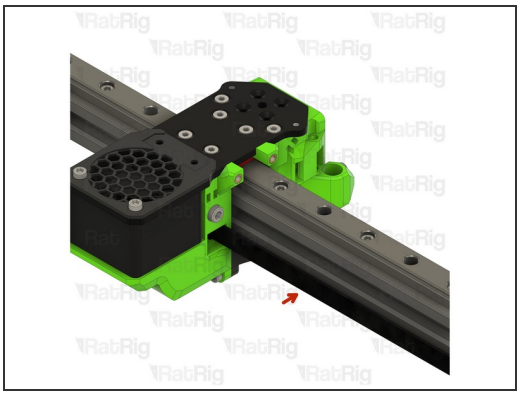
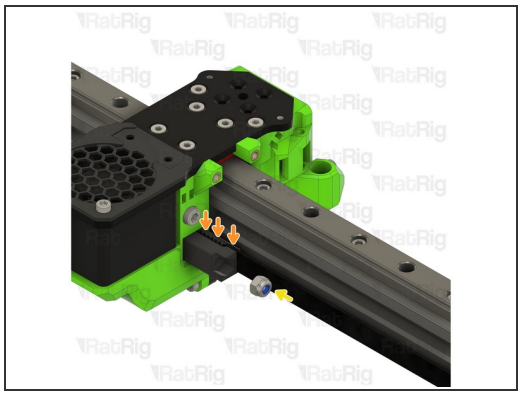
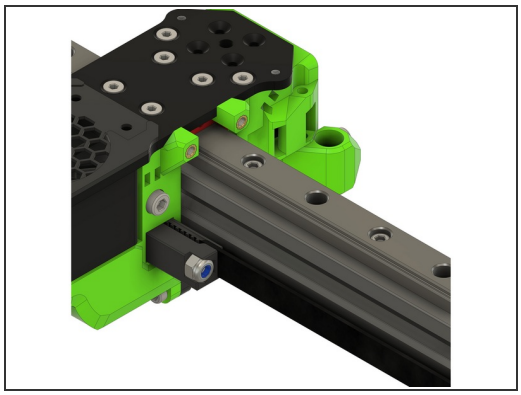
Step 47 — Assemble the Rat Rig toolhead - Part 4

- 2x M3x35 Cap Head Screw
- Rat Rig toolhead fan grille printed part

⚠ Take care not to over tighten the M3x35 screws as you can damage the printed parts

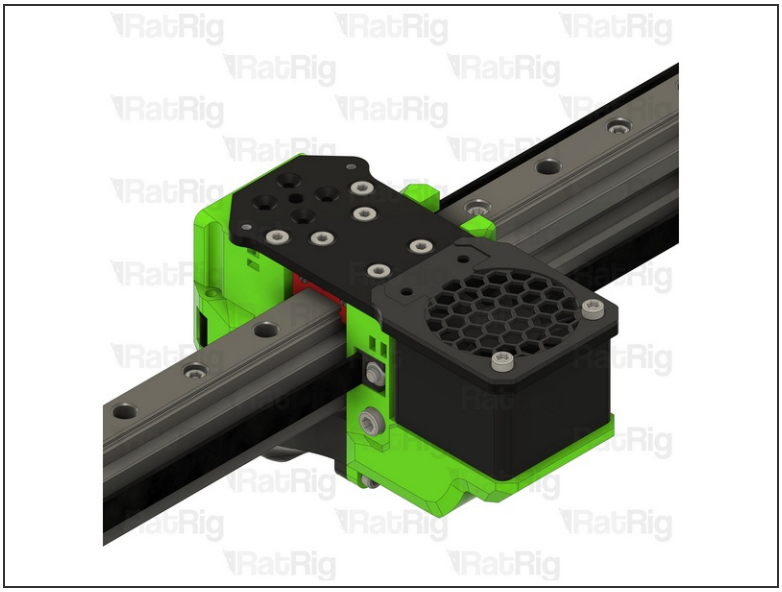
Step 48 — Assemble the belt tensioners - Part 1

- Make sure the belt is properly seated on all idlers and pulleys
- Insert the end of the belt inside the belt tensioner, and make sure the teeth are secured.
- M4 Nylon Locking Hex Nut

  ⓘ Insert the M4 nylon locking nut into the Rat Rig toolhead belt tensioner as shown

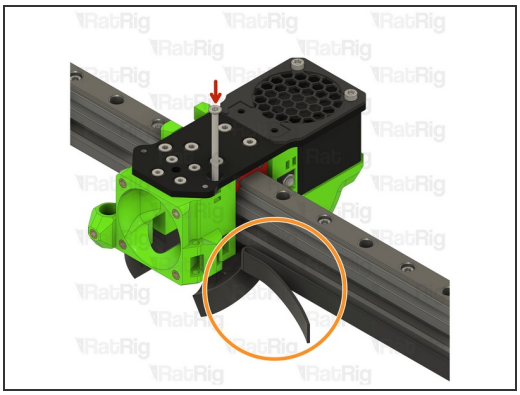
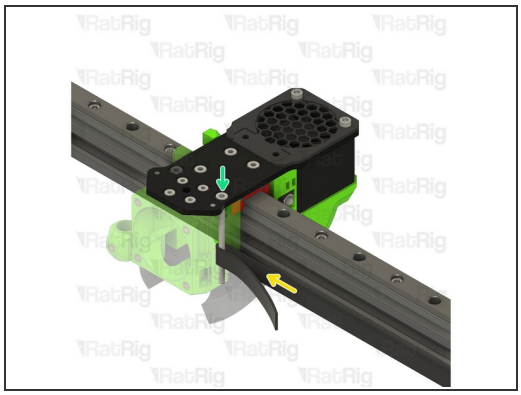
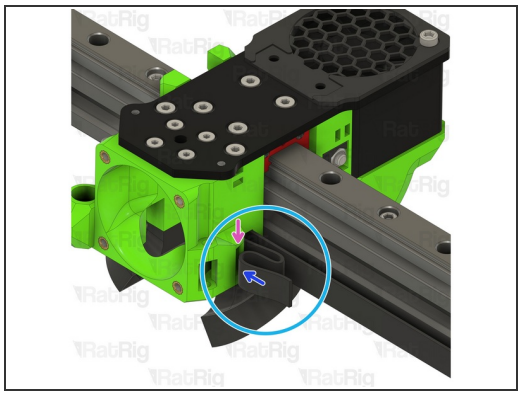
Step 49 — Assemble the belt tensioners - Part 2

- M4x40 Cap Head Screw

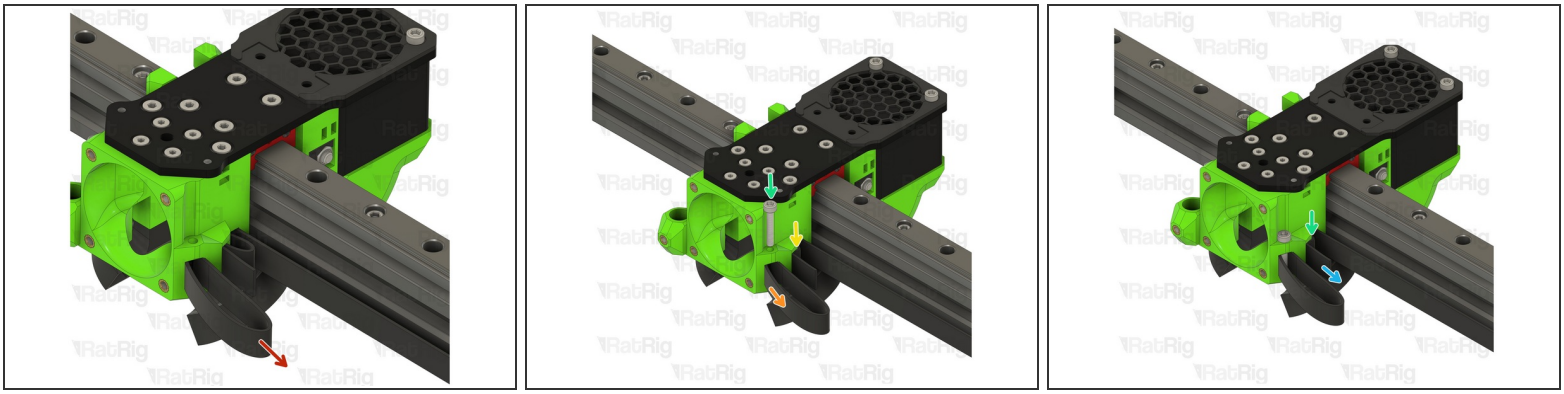
  ⓘ Tighten the M4x40 Cap Head just enough to hold the M4 Nylon Locking Hex Nut
- Repeat **Step 48** and assemble the second belt tensioner block.

Step 50 — Attach the front belts to Rat Rig toolhead - Part 1

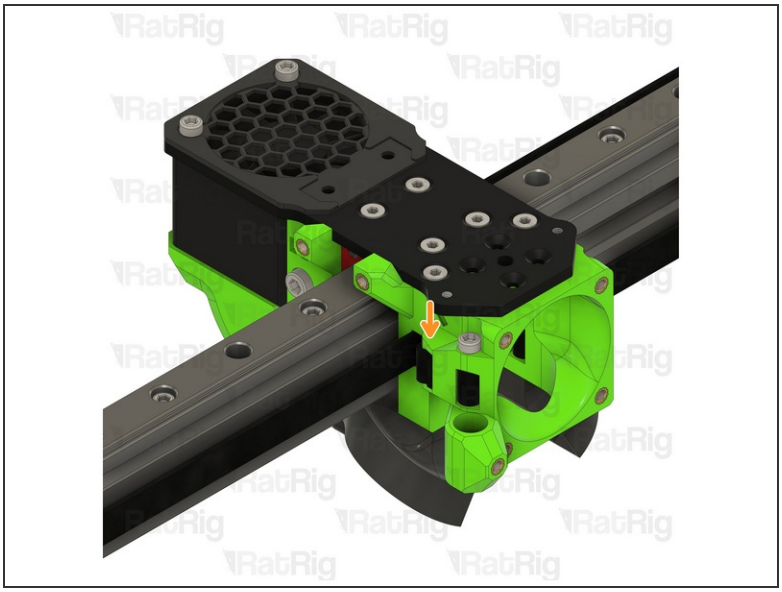
- Remove the M3x50 countersink screw almost all the way
- Make a small loop on the belt as shown.
- Feed the belt loop into the slot
- Tighten the M3x50 countersink screw and make sure the belt goes around it, as shown in the picture.
- Make a new loop on the belt, it helps if the loop is big, so it can be managed more easily.
- Feed the belt loop into the slot

Step 51 — Attach the front belts to Rat Rig toolhead - Part 2



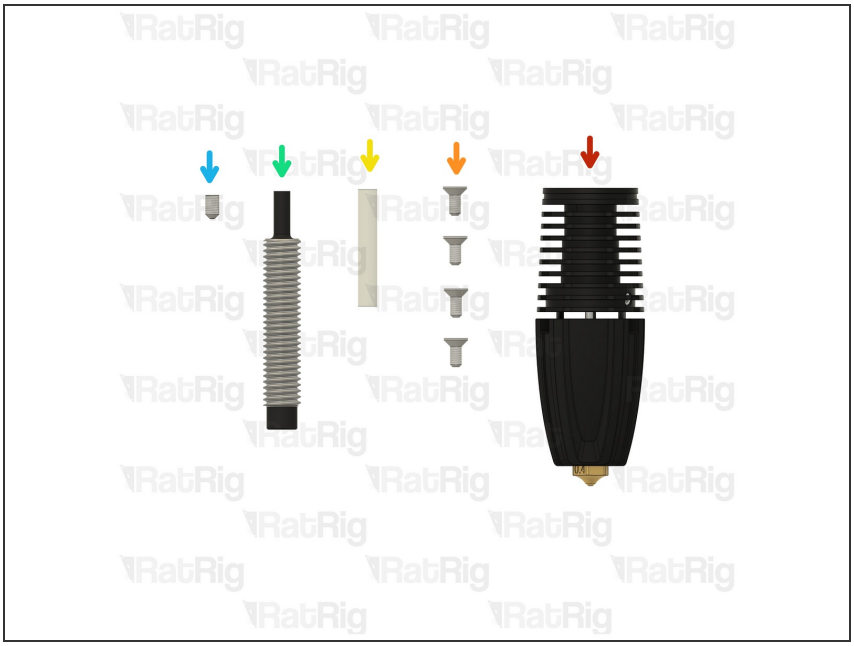
- Make sure the loop is all the way fed thought the slot
- Pull this side of the belt
  - Make sure the small portion of the belt, indicated with the yellow arrow, is tight against the printed part
- Insert an M3x18 Cap Head Screw
- Pull the belt end to tighten the loop around the screw

Step 52 — Attach the front belts to Rat Rig toolhead - Part 3



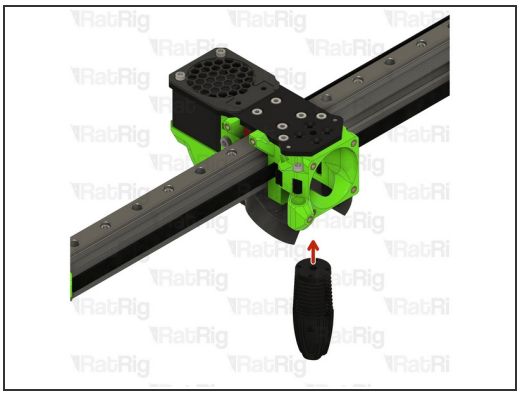
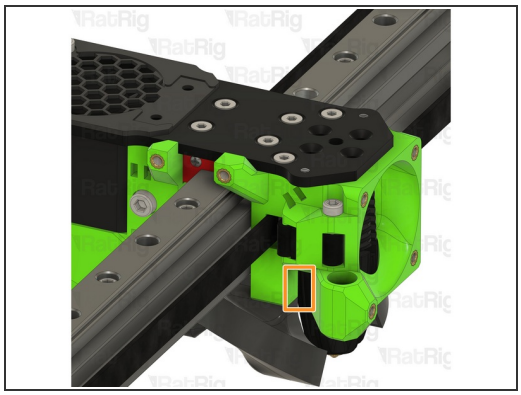
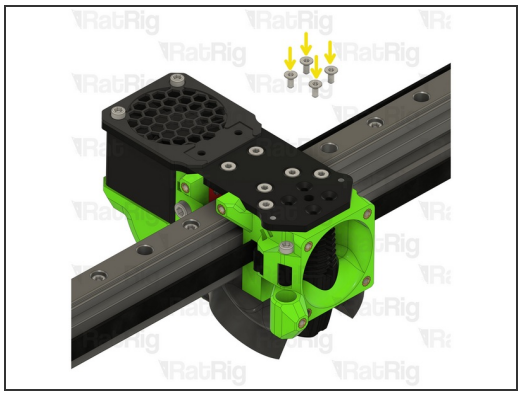
- Cut the excess belt
- Repeat **Steps 50, 51 and 52** and attach the other belt.

Step 53 — Prepare the Rapido V2 and PTFE tube



- Phaetus Rapido V2 UHF Hotend
- 4x M2.5x6 Countersink Screw
- PTFE tube - 24.5mm
- Rat Rig SuperPinda Probe by P&F
- M3x5 Set Screw

Step 54 — Mount the hot end - Part 1

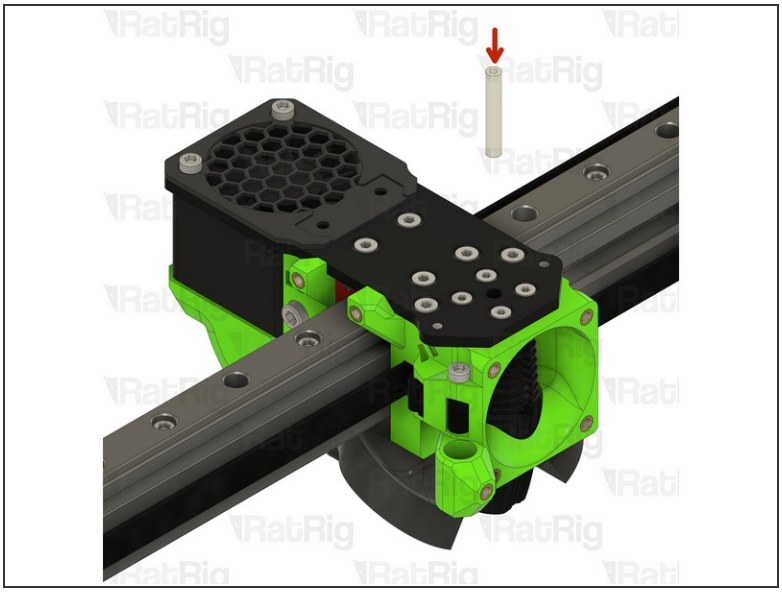




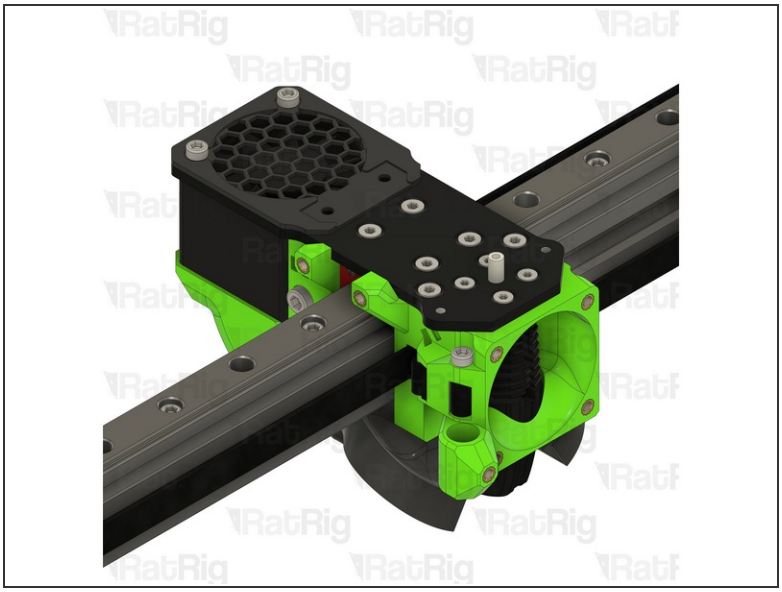
- Phaetus Rapido V2 UHF Hotend
- Place the Phaetus Rapido V2 UHF Hotend on the plate, making sure to route the cables through the designated slot
- 4x M2.5x6 Countersink Screw

ⓘ Tighten the M2.5x6 Countersink Screws to secure the hotend to the plate

⚠ Avoid using a ball end hex key, as they are more prone to damaging the sensitive M2.5 countersink screw head.

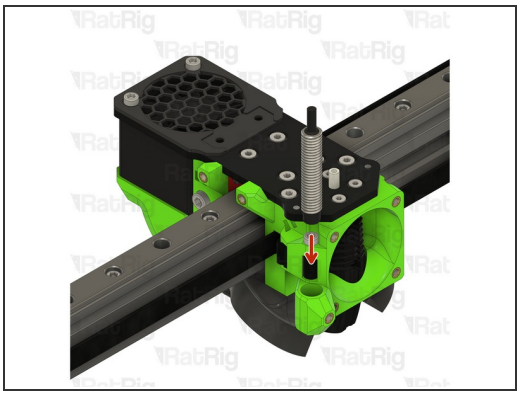
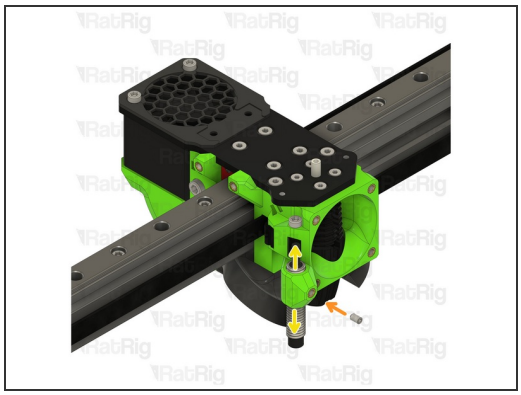
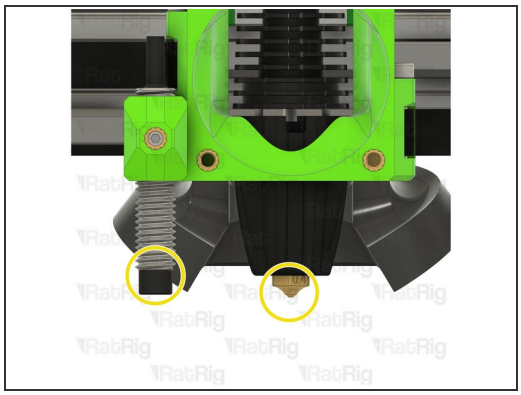
Step 55 — Mount the hot end - Part 2





- PTFE tube - 24.5mm
- Insert the PTFE tube in to the marked hole and push it until it stops

Step 56 — Mount the probe

- Rat Rig SuperPinda Probe by P&F

The Rat Rig SuperPinda Probe needs to be at the correct height to trigger properly

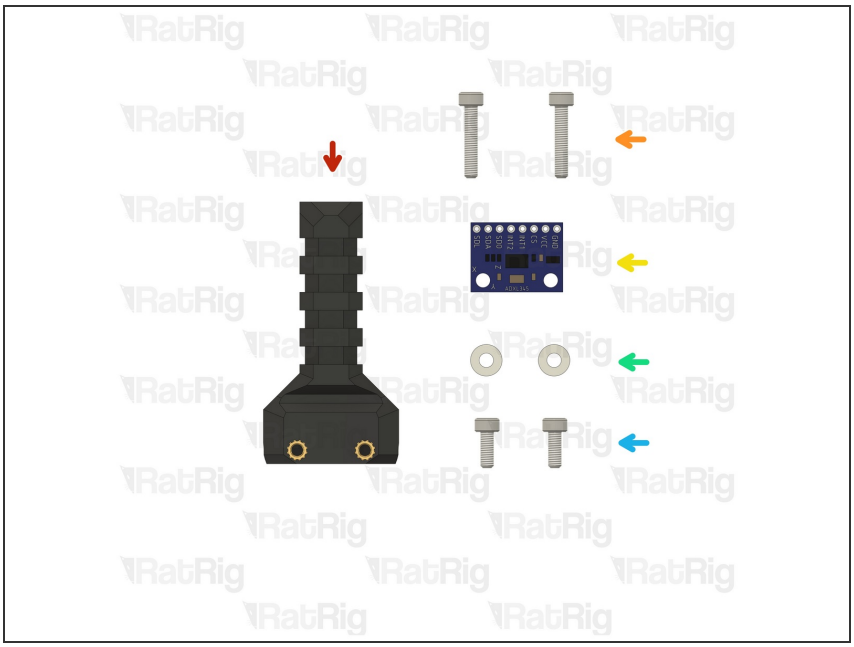
A recommended method to set the correct height is to rest the hot end nozzle on the bed, and then place a cable tie between the bed and the tip of the probe

- Adjust the probe up to down as necessary to position the tip 1mm higher than the hot end nozzle
- M3x5 Set Screw

Tighten the M3x5 set screw to secure the probe in place

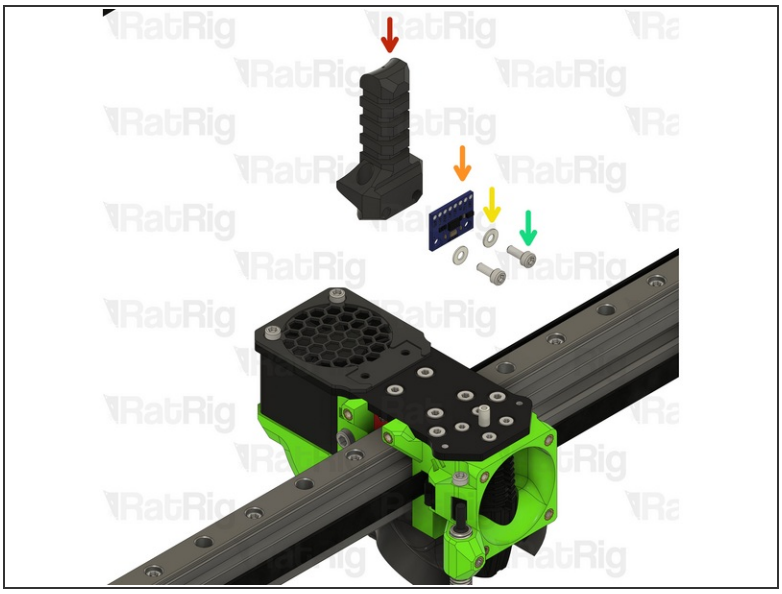
Do not over-tighten the M3x5 set screw, doing so can damage the probe or printed probe mount

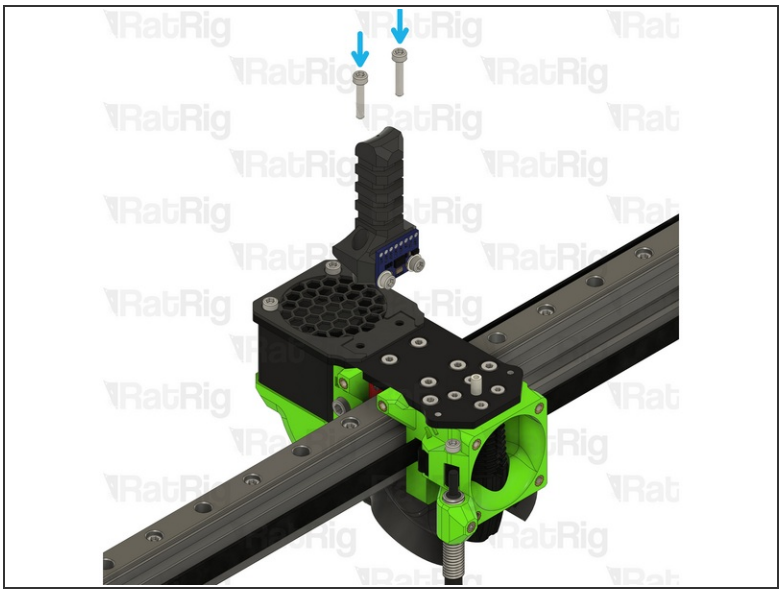
Step 57 — Prepare the following parts



- Skip to Step 59 if you are using a toolboard setup
- Rat Rig toolhead umbilical assembly
- 2x M3x16 Cap Head Screws
- ADXL 345 Accelerometer
- 2x M3 Nylon washer
- 2x M3x8 Cap Head Screw

Step 58 — Mount the umbilical + ADXL





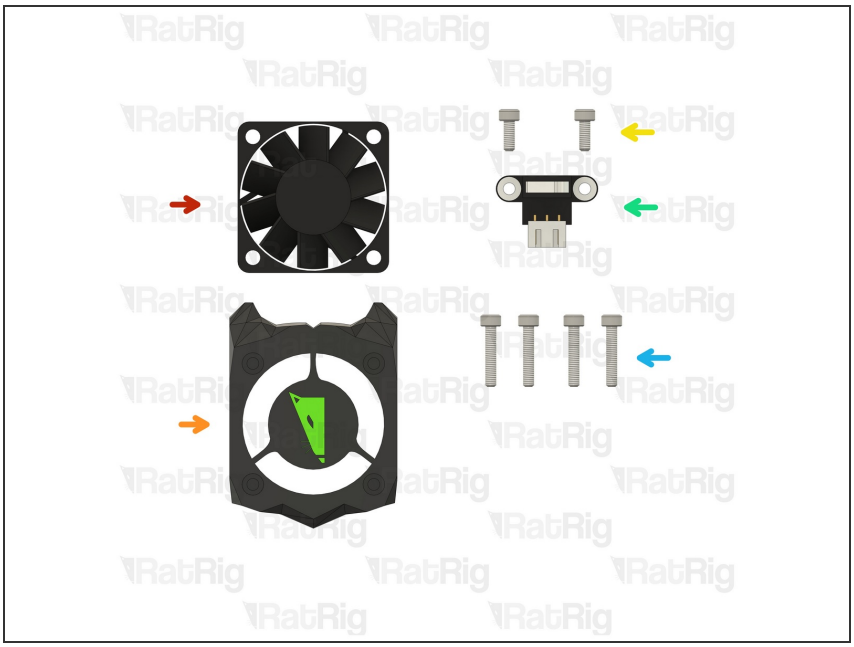
- Rat Rig toolhead umbilical assembly
- ADXL 345 Accelerometer
- 2x M3 nylon washer
- 2x M3x8 Cap Head Screw

  ⓘ Mount the ADXL 345 to the umbilical assembly

  ⚠ Take care not to over tighten the M3x8 screws as you can damage the printed parts
- 2x M3x16 Cap Head Screw

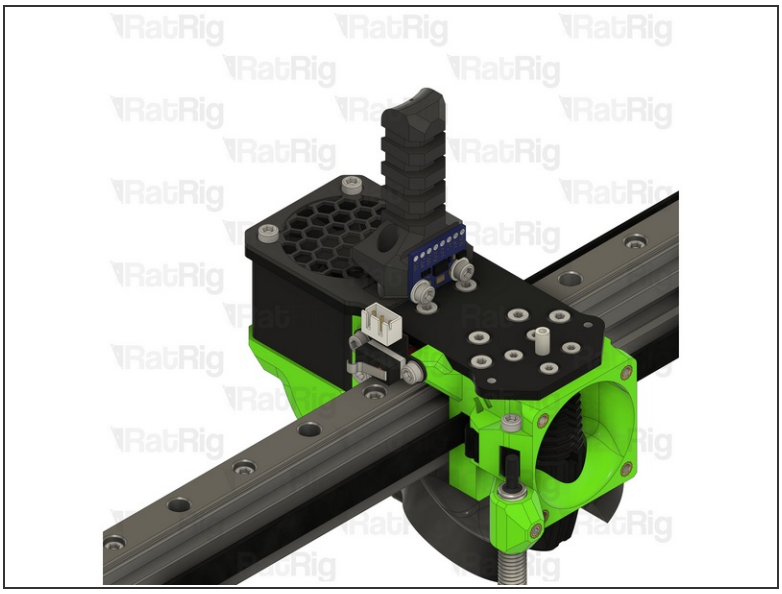
  ⚠ Take care not to over tighten the M3x16 screws as you can damage the printed parts

Step 59 — Prepare the following parts



- 1x 40x10mm 24V Axial Fan
- 1x Rat Rig toolhead_shourd printed part
- 2x M3x8 Cap Head Screw
- 1x X Endstop
- 4x M3x16 Cap Head Screw

Step 60 — Mount the X endstop

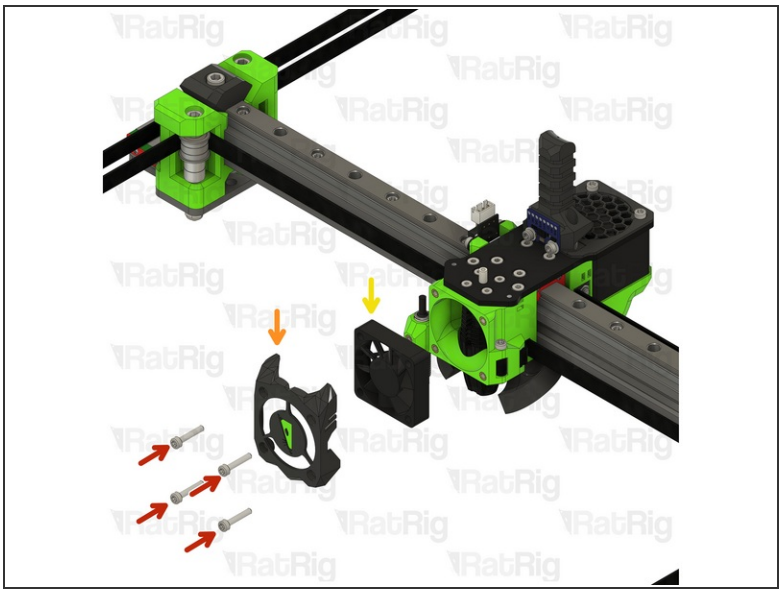


- 2x M3x8 Cap Head Screw
- X Endstop

Tighten the M3x8 screws to secure the X endstop to the toolhead.

Take care not to over tighten the M3x8 screws as you can damage the printed parts

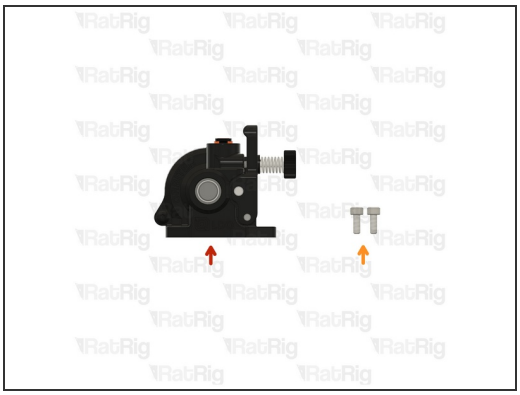
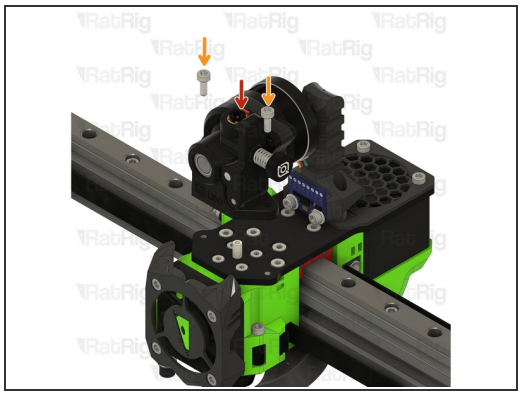
Step 61 — Mount the hot end cooling fan



- 4x M3x16 Cap Head Screw
- rr_toolhead_vc3_shroud printed part
- 40x10mm 24V Axial Fan

Insert the M3x16 screws into the Rat Rig toolhead shroud printed part, through the 40mm fan, and fasten them into the Rat Rig toolhead front

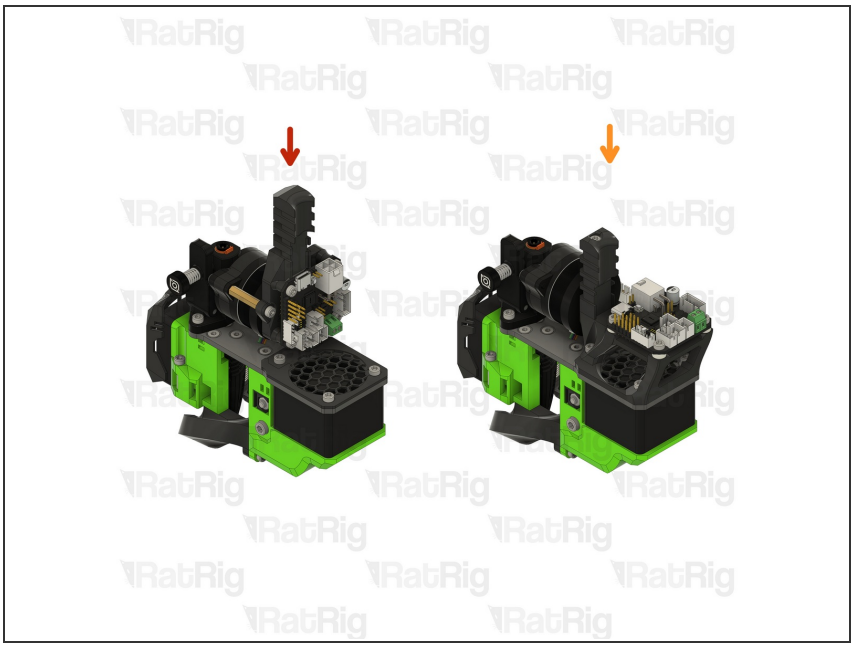
Step 62 — Prepare the extruder


- 1x LDO Orbiter V2
- 2x M3x8 Cap Head Screw

Insert the M3x8 screws into the LDO Orbiter V2 and fasten them to the Rat Rig toolhead plate.

Step 63 — OPTIONAL - Toolboard variations



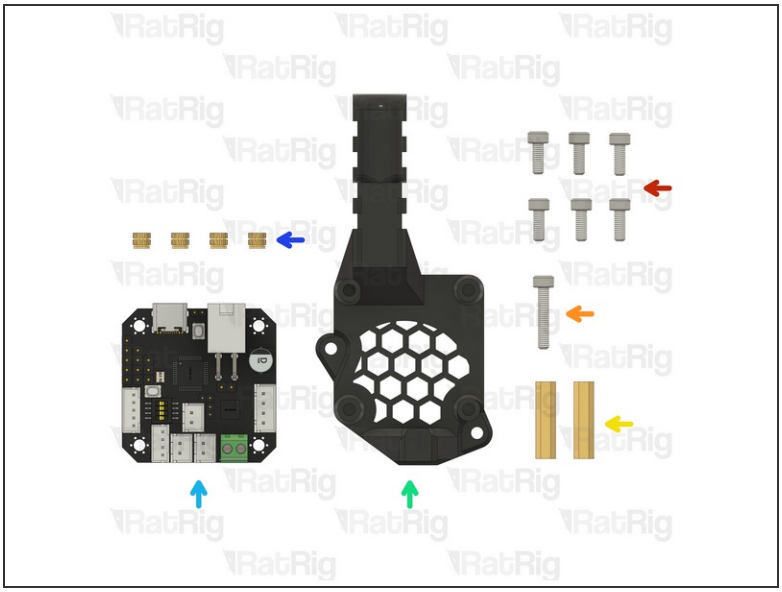
The Rat Rig Toolhead Beta 2 supports 2 variations for toolboard mounting:

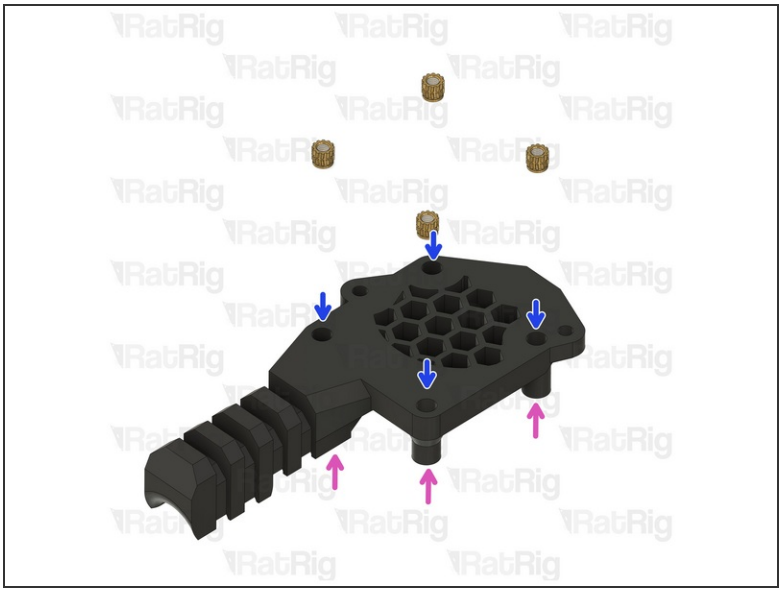
Rat Rig kits do not include the necessary hardware for this setup; these components must be sourced separately

- Vertical toolboard mount
- Horizontal toolboard mount

  This option requires a 90º usb-c cable

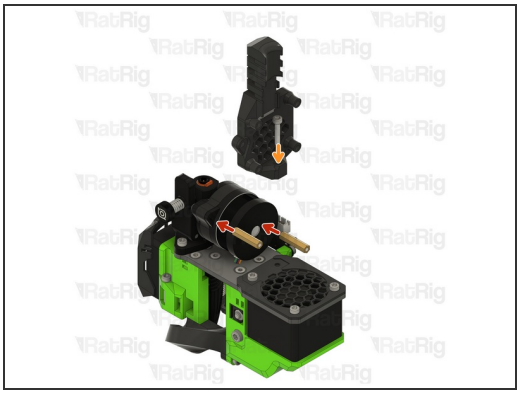
Step 64 — Vertical toolboard mount - Part 1

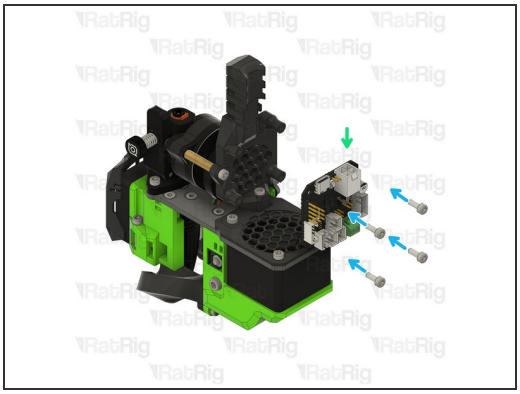




- 6x M3x8 Cap Head Screw
- 1x M3x16 Cap Head Screw
- 2x Hex standoff brass M3x20x4.5
- rr_toolhead_vc3_ebb42_vertical printed part
- BIGTREETECH EBB42 USB/CAN TOOLBOARD V1.2
- 4x Heat insert M3
- This printed part has sacrificial layers which need to be removed prior to assembly.It is recommended to remove them by using a screwdriver, a hex key, or a drill, to push through the layers. This clears the holes for the screws to thread in to the head inserts

Step 65 — Vertical toolboard mount - Part 2





- Thread the hex standoffs on to the LDO Orbiter V2 screws.

  ⚠ Do not overtighten the hex standoffs. They are brass and it is possible to strip the threads.

- Insert the M3x16 Cap Head Screw in to the rr_toolhead_vc3_ebb42_vertical printed part and thread it on the toolhead.

  ⚠ Take care not to over tighten the M3x16 screws as you can damage the printed parts

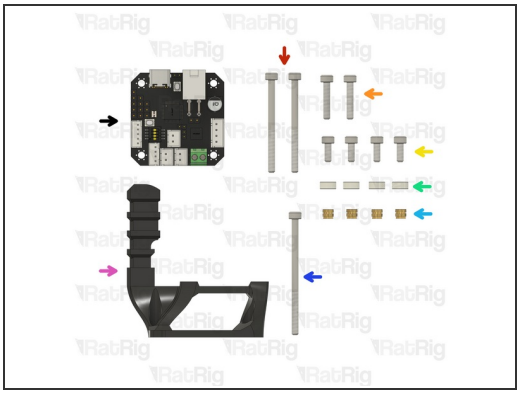
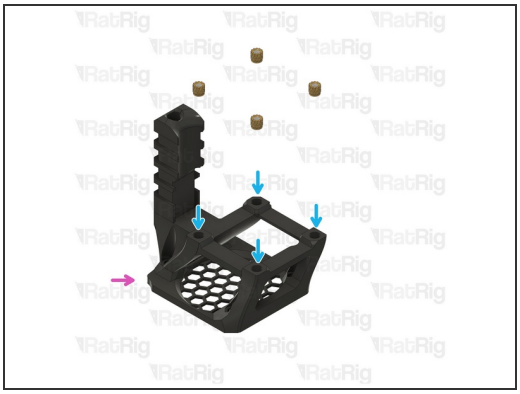
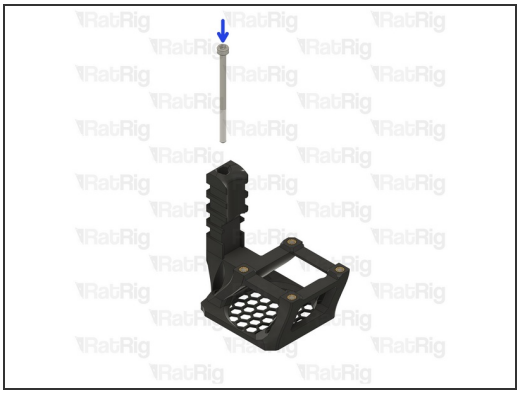
- 2x M3x8 Cap Head Screw

  ⓘ Insert the M3x8 Cap Head Screws in to the printed part and thread them to the hex standoffs

- BIGTREETECH EBB42 USB/CAN TOOLBOARD V1.2

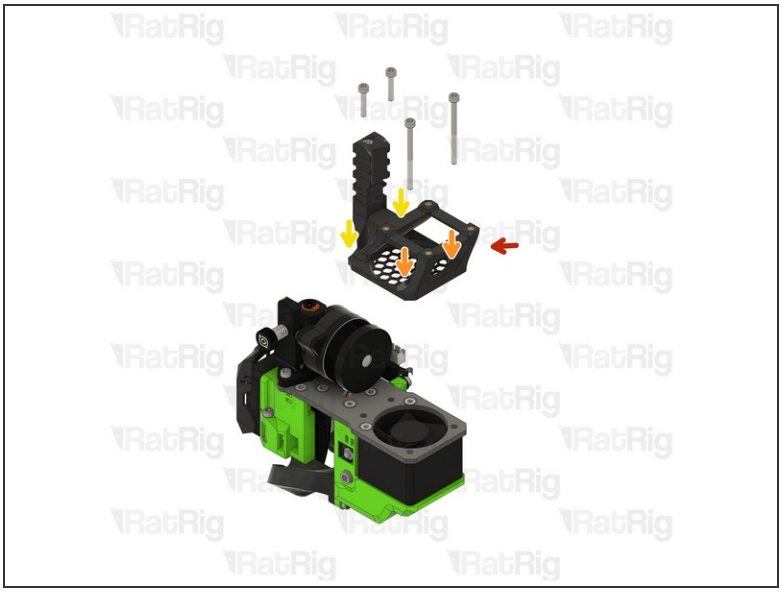
- Insert the M3x16 Cap Head Screws into the toolboard and thread them into the vertical toolboard mount

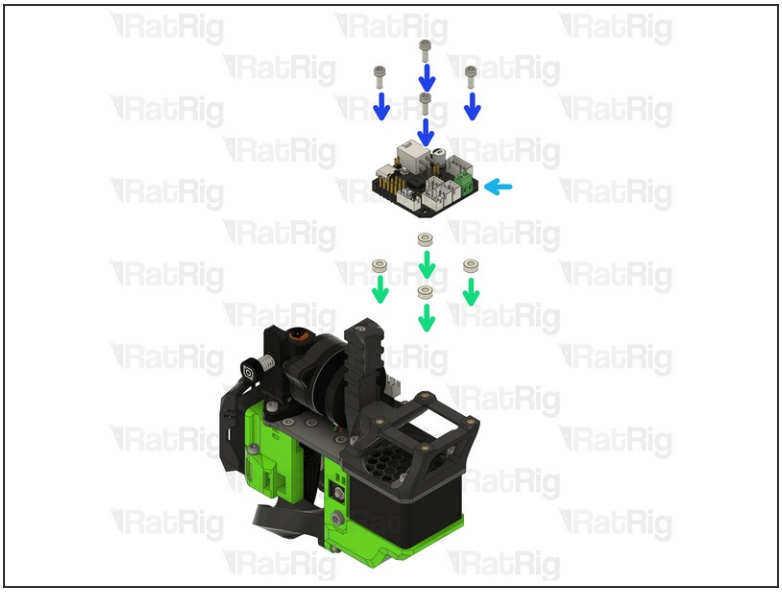
Step 66 — Horizontal toolboard mount - Part 1

- 2x M3x40 Cap Head Screw
- 2x M3x16 Cap Head Screw
- 4x M3x8 Cap Head Screw
- 4x M3 Nylon spacer 3mm
- 4x Heat insert M3
- 1x M3x50 cap Head Screw
- 1x rr_toolhead_vc3_ebb42_horizontal printed part
- BIGTREETECH EBB42 USB/CAN TOOLBOARD V1.2

Step 67 — Horizontal toolboard mount - Part 2



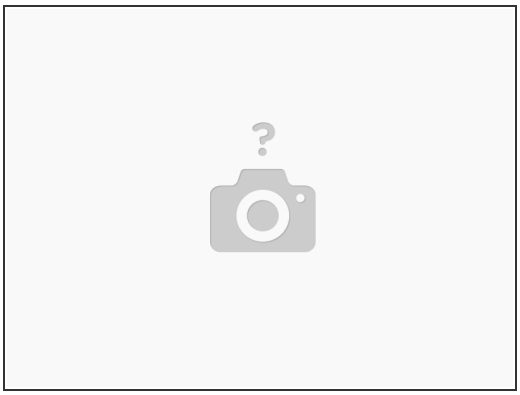


- Horizontal toolboard mount assembly from the previous step
- 2x M3x40 Cap Head Screw

  Insert the M3x40 screws through the toolboard mount, plate, 4028 cooling fan, and secure them to the toolhead
- 2x M3x16 Cap Head Screw
- 4x M3 Nylon spacer 3mm
- BIGTREETECH EBB42 USB/CAN TOOLBOARD V1.2
- 4x M3x8 Cap Head Screw

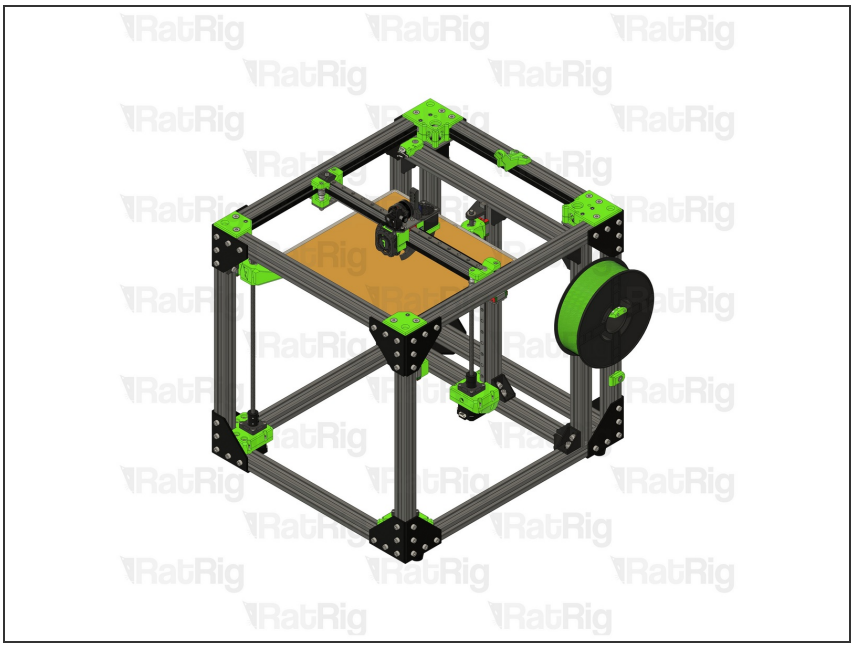
  Take care not to over tighten the M3x8 screws as you can damage the printed parts and the toolboard itself.

Step 68 — Align the X-Axis Gantry



Follow this guide to correctly align the X-Axis Gantry: 11. X-Axis Gantry Alignment

Step 69 — You are done!



Your V-Core 3.1 is now upgraded with the Rat Rig Toolhead BETA2 and it's ready to melt some filament!

A new toolhead is a big change for any 3D printer, make sure to follow the commissioning guide to properly tune it.