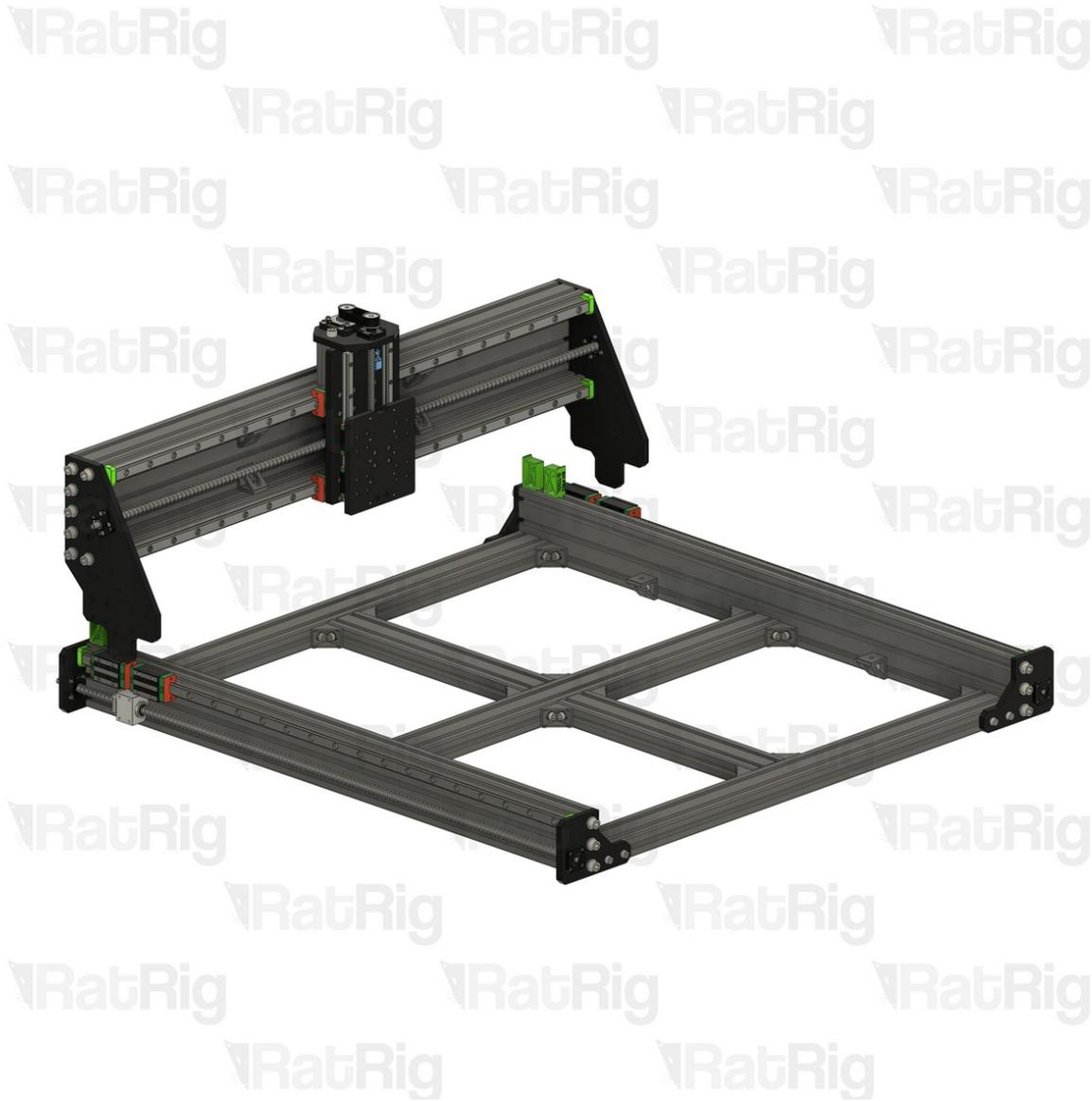


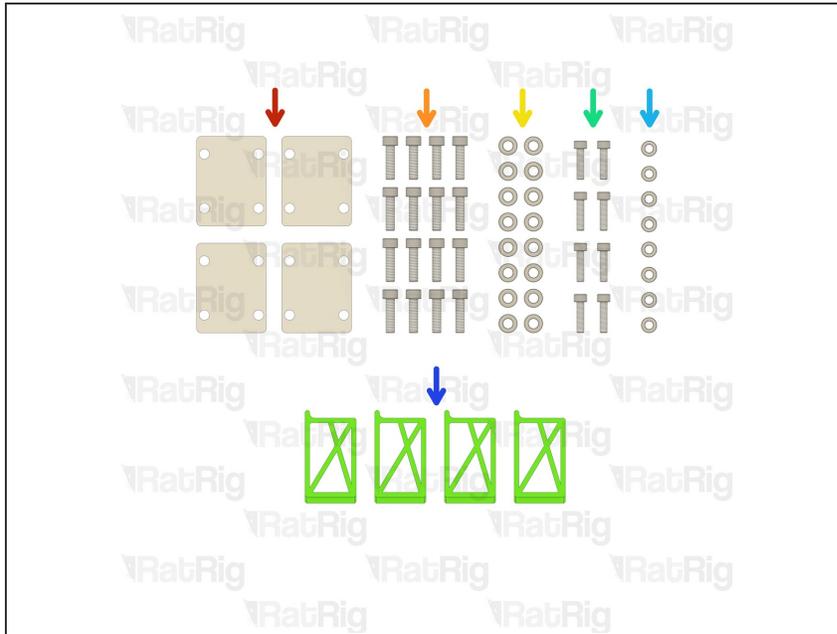
# Rat Rig

## 03. X-Axis Gantry & Stepper Installation

Written By: Simon Davie



## Step 1 — Prepare the X-axis gantry parts & tools



- 4x Rat Rig StrongHold PRO CNC - HG25 Spacer Plate 3mm
- 16x M6x22 Cap Head Screw
- 16x M6 Washer
- 8x M5x20 Cap Head Screw
- 8x M5 Washer
- 4x sh\_pro\_x-gantry\_tool Printed Part

## Step 2 — Position the X-axis gantry support tools



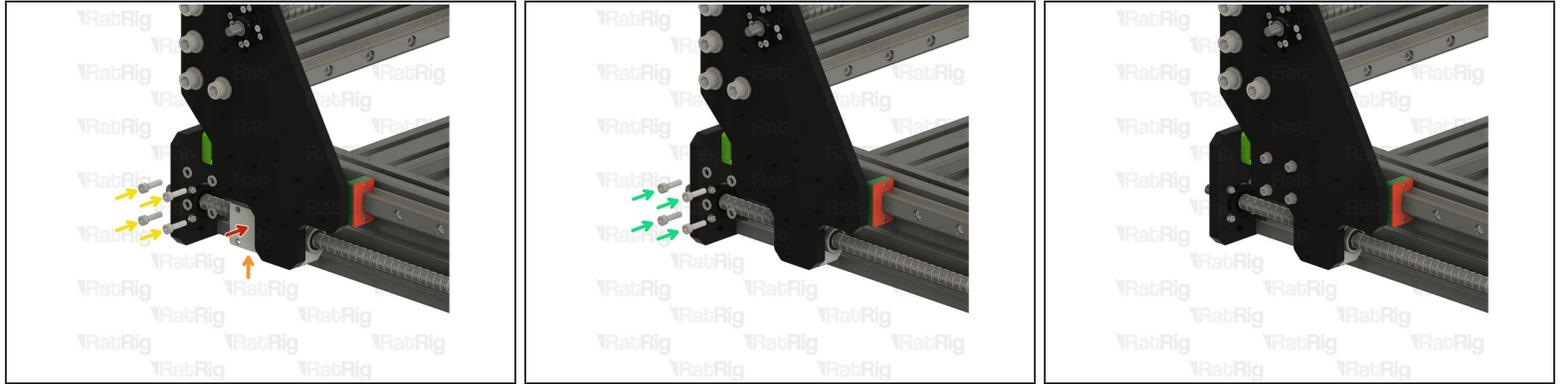
- StrongHold PRO Base Assembly - Rear Left Corner
- sh\_pro\_x-gantry\_tool Printed Part
- Position each pair of X-gantry tools as shown
- The rear tool should rest against the motor plate
- The front tool should be placed facing the rear one, and spaced so there is roughly a 20mm gap between the tools
- Repeat these instructions to position the second set of tools on the other side of the base assembly

### Step 3 — Position the X-axis gantry for installation



- ⚠** It is **highly recommended** to have two or more people for the next few steps in particular
- ⚠** The X-axis gantry is **large and heavy** and can cause injury if it were to fall
- ⚠** **The printed parts are designed to support the weight of the X-axis gantry, but they will not prevent it moving or tipping**
  - Lift the X-axis gantry assembly up and slowly lower it in to position on top of the printed tools as shown
- ⚠** When lowering the X-axis gantry, make sure the plates at either end do not collide with the linear rail carriages or the ball screw components
- ⚠** **Continue to support the X-axis gantry as it may tip forwards or backwards until secured**

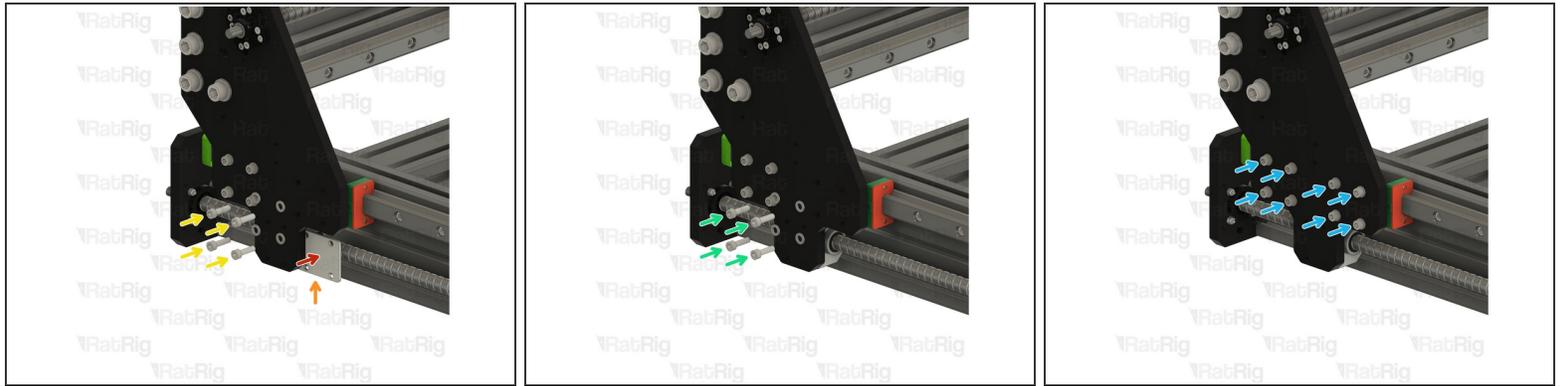
## Step 4 — Secure the X-axis gantry - Left side - Part 1



**⚠ At least one other person should continue to support the X-axis gantry during this step**

- i** Align one of the HG25 linear rail carriages with the holes on the X-axis gantry plate
  - Rat Rig StrongHold PRO CNC - HG25 Spacer Plate 3mm
  - Insert the spacer from below. It will fit in the gap between the linear rail carriage and the X-axis gantry plate
  - M6x22 Cap Head Screw & M6 Washer
  - Install an M6 washer on to each of the M6x22 screws, then insert them through the X-axis gantry plate, the HG25 spacer plate, and screw them into the HG25 linear rail carriage
- i** Do not fully tighten the M6x22 screws yet

## Step 5 — Secure the X-axis gantry - Left side - Part 2

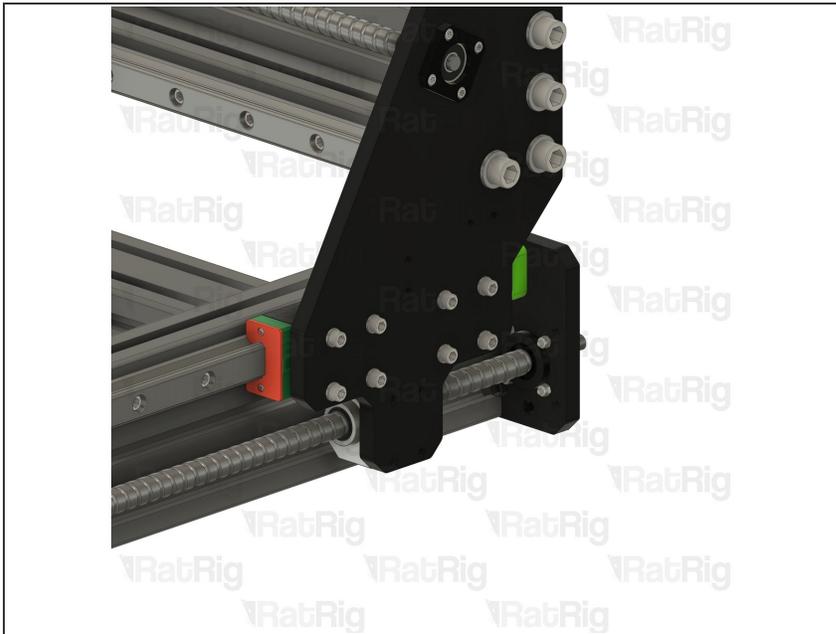


**⚠ At least one other person should continue to support the X-axis gantry during this step**

**i** Align the second HG25 linear rail carriage with the holes on the X-axis gantry plate

- Rat Rig StrongHold PRO CNC - HG25 Spacer Plate 3mm
- Insert the spacer from below. It will fit in the gap between the linear rail carriage and the X-axis gantry plate
- M6x22 Cap Head Screw & M6 Washer
- Install an M6 washer on to each of the M6x22 screws, then insert them through the X-axis gantry plate, the HG25 spacer plate, and screw them into the HG25 linear rail carriage
- Tighten all eight M6x22 screws

## Step 6 — Secure the X-axis gantry - Right side



**⚠ At least one other person should continue to support the X-axis gantry during this step**

- ① Repeat **Steps 4 & 5** to secure the right side of the X-axis gantry to the base
- ① Once all **sixteen M6x22** screws are fully tightened, the X-axis gantry no longer needs to be supported

## Step 7 — Remove the X-axis gantry support tools - Part 1



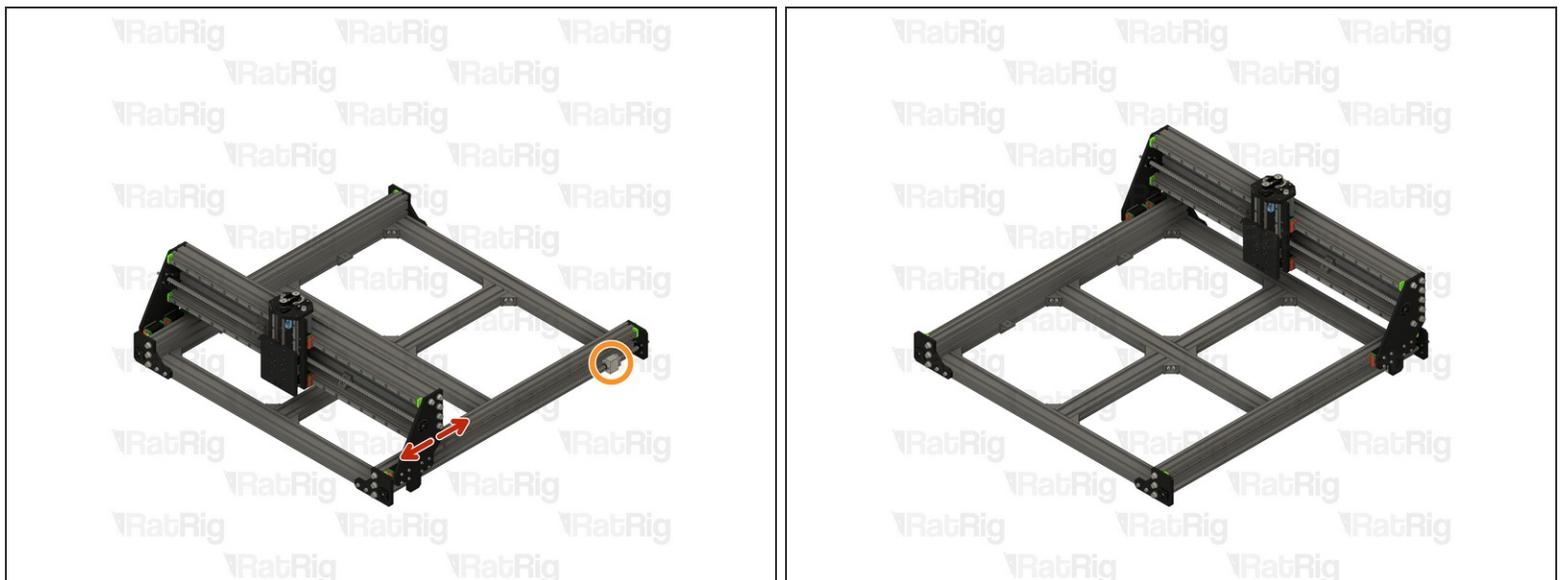
- sh\_pro\_x-gantry\_tool Printed Part
- Carefully remove the front two X-axis gantry tools from the assembly
- ① The tools may require a small amount of force to remove

## Step 8 — Remove the X-axis gantry support tools - Part 2



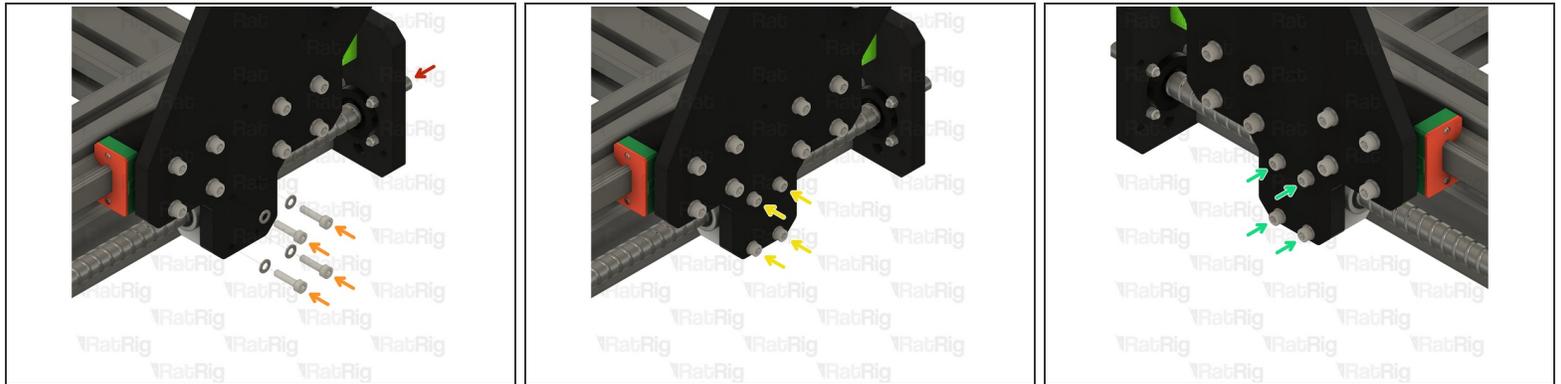
- StrongHold PRO X-Axis Gantry Assembly
- Carefully push the X-axis gantry towards the front of the machine. Once the X-axis gantry tools are no longer between the gantry and the base, it should move smoothly
- Remove the remaining two X-axis gantry tools

## Step 9 — Test the Y-axis motion



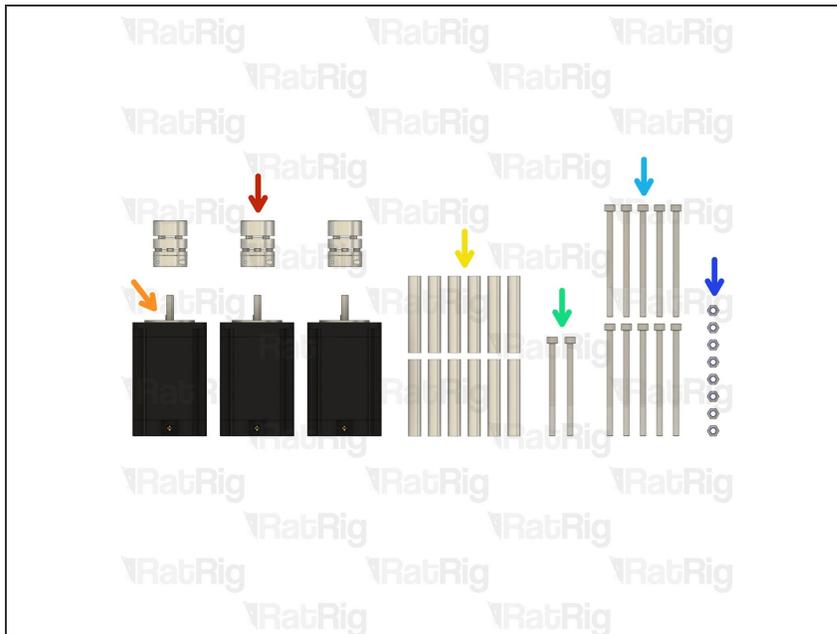
- Slowly and carefully move the X-axis gantry over the full length of the axis
- Be mindful of the ball screw blocks, do not allow the gantry to collide with them!

## Step 10 — Secure the Y-axis ball screws to the gantry



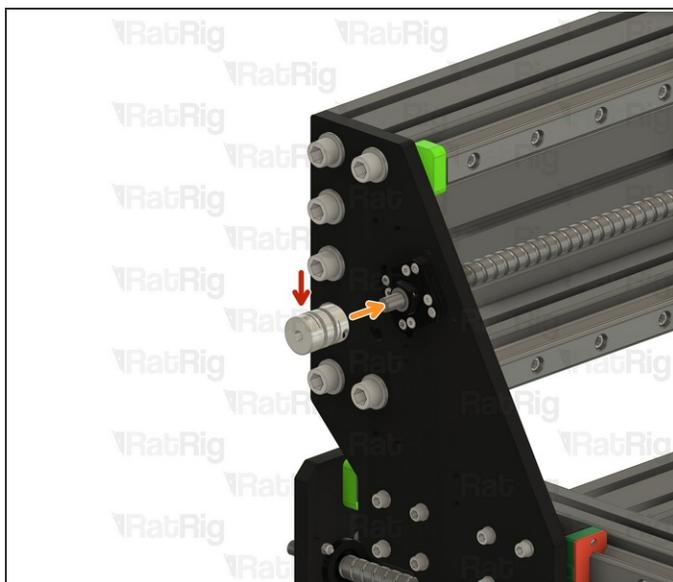
- 1610 Ball Screw
- ⓘ Rotate the ball screw by hand to align the ball screw block with the matching holes in the X-axis gantry
- Once all four holes are aligned, install an M5 washer on to each M5x20 screw and insert them through the gantry plate, screwing them into the ball screw block
- After all four M5x20 screws are installed, fully tighten them
- Repeat these instructions to secure the ball screw block to the other side of the X-axis gantry

## Step 11 — Prepare the X & Y Stepper motor parts

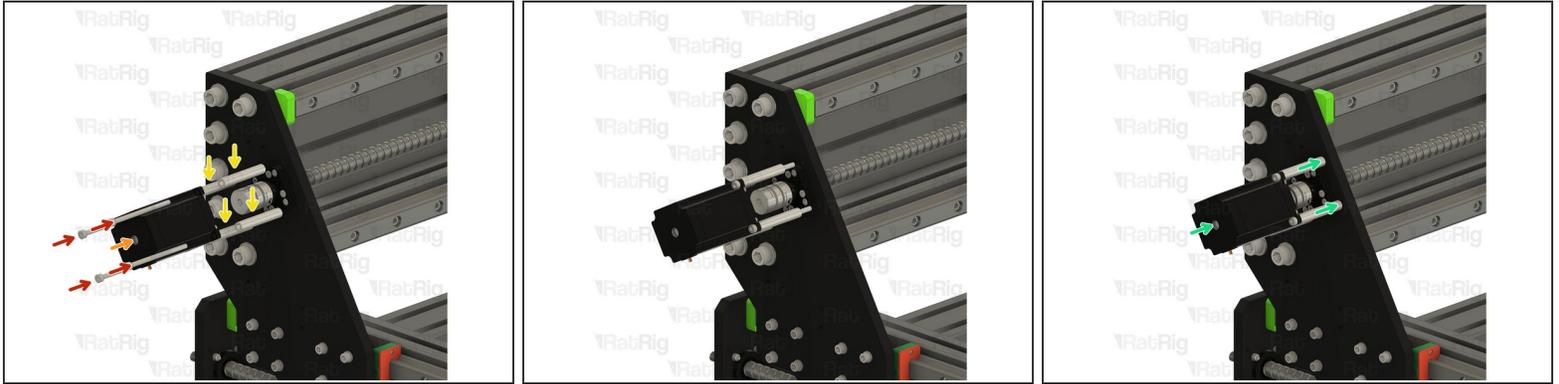


- 3x Disc Coupler
- 3x NEMA23 Stepper Motor
- 12x 58mm Aluminium Spacer
- 2x M5x70 Cap Head Screw
- 10x M5x80 Cap Head Screw
- 8x M5 Nylon Locking Hex Nut

## Step 12 — Install the X-axis disc coupler



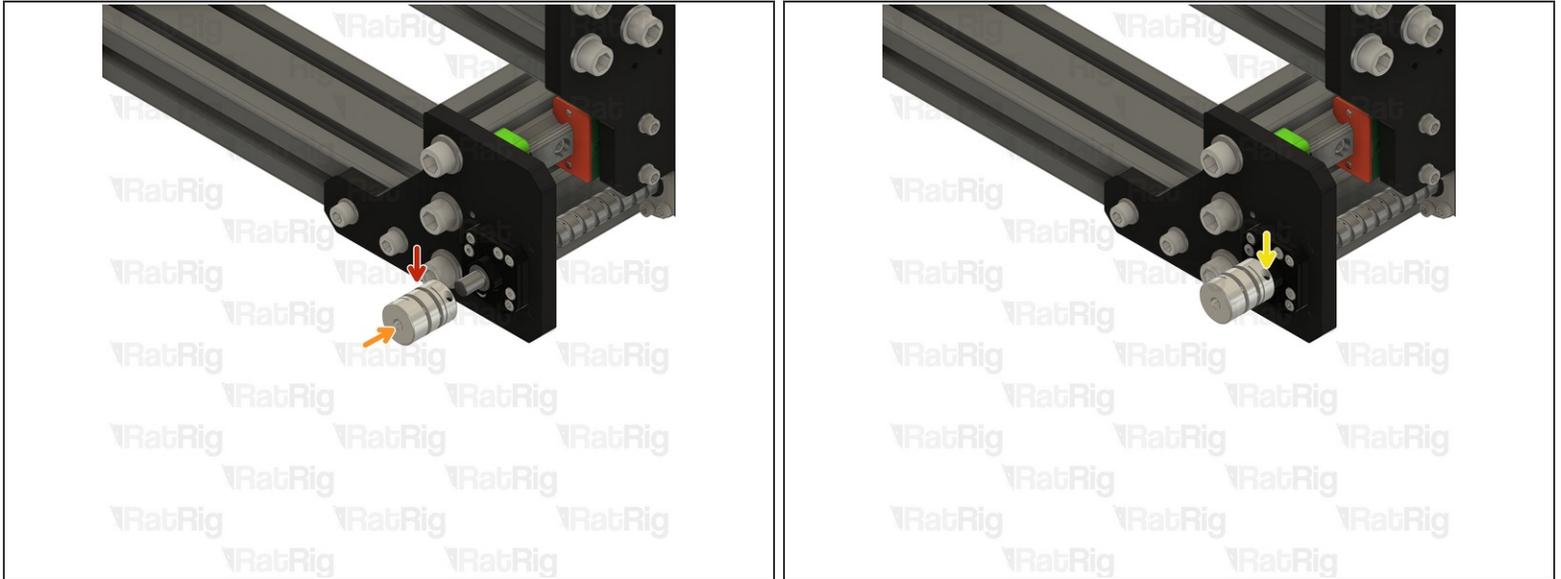
- Disc Coupler
- Install the disc coupler on to the end of the 1610 ball screw shaft
- Using a 2.5mm hex key, tighten the marked screw to secure the disc coupler to the shaft

**Step 13 — Install the X-axis stepper motor - Part 1**

- M5x80 Cap Head Screw
  - NEMA23 Stepper Motor
  - 58mm Aluminium Spacer
  - ⓘ Insert one M5x80 screw through each hole on the NEMA23 stepper motor
  - ⓘ Install one aluminium spacer on to each M5x80 screw
  - Install the NEMA23 assembly on to the X-axis gantry. All four M5x80 screws should pass through the plate and the NEMA23 shaft should fit into the disc coupler
- ⚠ Continue to support the NEMA23 assembly until it is secured in the next step**

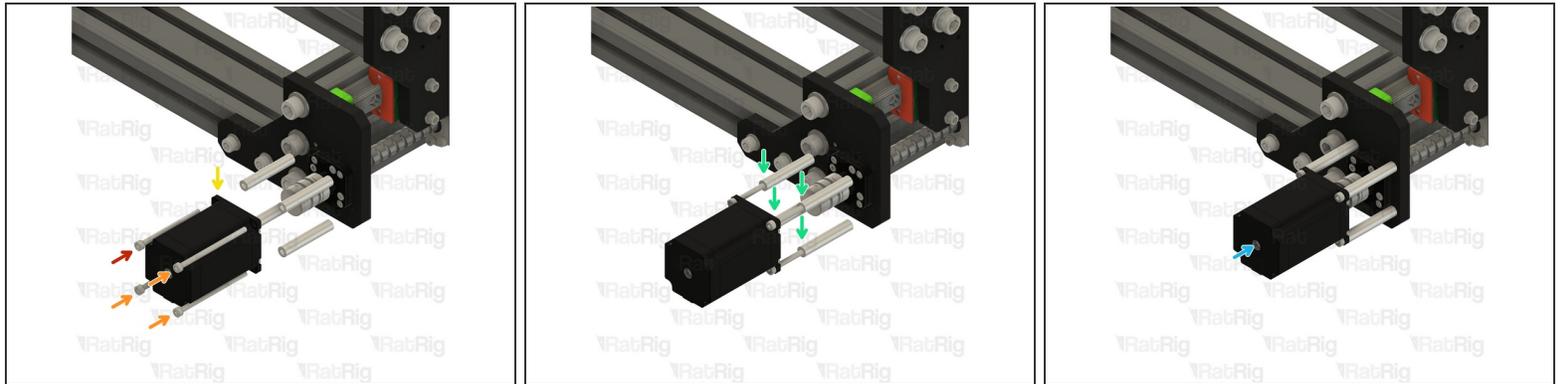
**Step 14 — Install the X-axis stepper motor - Part 2**

- M5 Nylon Locking Hex Nut
  - ⓘ Install an M5 nylon locking hex nut on to each exposed M5x80 screw
  - ⓘ Fully tighten all four M5x80 screws to secure the NEMA23 stepper motor to the X-axis gantry
- Rotate the ball screw by hand until the marked screw is accessible
  - ⓘ Using a 2.5mm hex key, tighten the marked screw to secure the disc coupler to the NEMA23 shaft

**Step 15 — Install the left Y-axis disc coupler**

- Disc Coupler
- Install the disc coupler on to the end of the 1610 ball screw shaft
- Using a 2.5mm hex key, tighten the marked screw to secure the disc coupler to the shaft

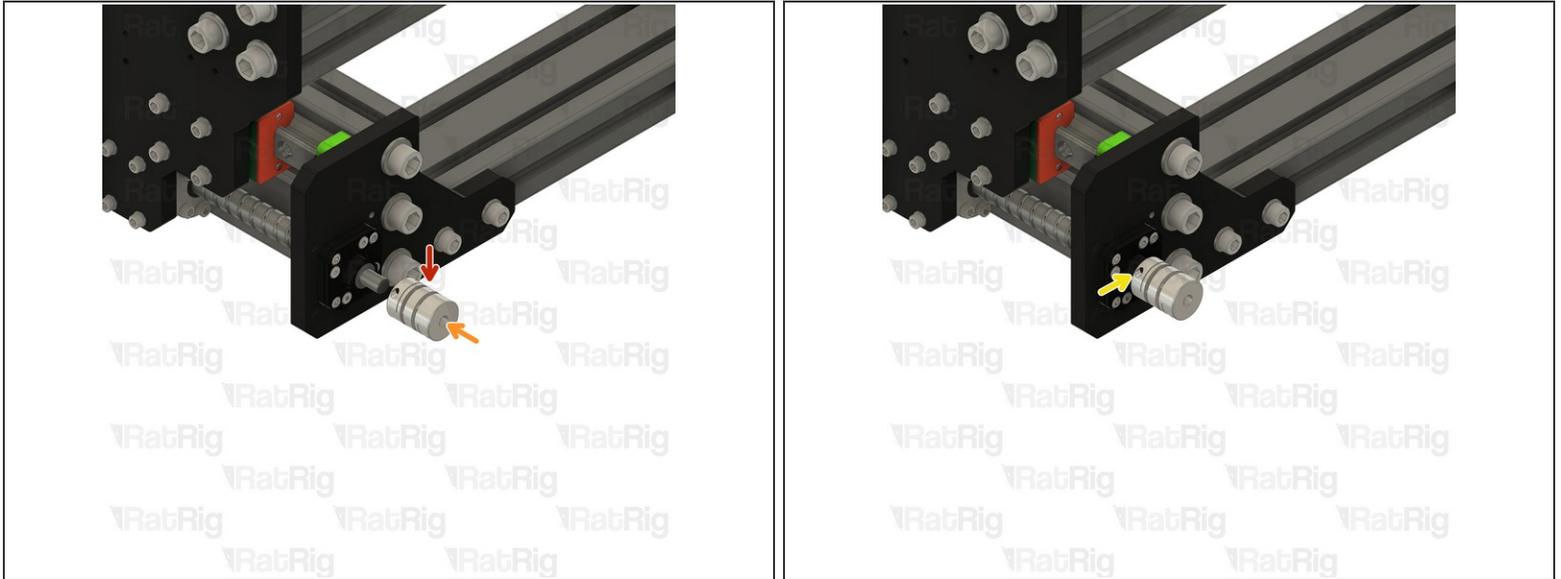
## Step 16 — Install the left Y-axis stepper motor - Part 1



- M5x70 Cap Head Screw
- M5x80 Cap Head Screw
- NEMA23 Stepper Motor
- ⓘ Insert the M5x70 screw through the marked hole on the NEMA23 stepper motor
- ⓘ Insert one M5x80 screw through each remaining hole on the NEMA23 stepper motor
- 58mm Aluminium Spacer
- Install the NEMA23 assembly on to the Y-axis plate
- ⓘ The **M5x70 screw** will thread into the motor plate and the **M5x80 screw below the M5x70 screw** will thread into the existing M5 hex nut. The remaining two M5x80 screws will pass through the motor plate. The NEMA23 shaft should fit into the disc coupler

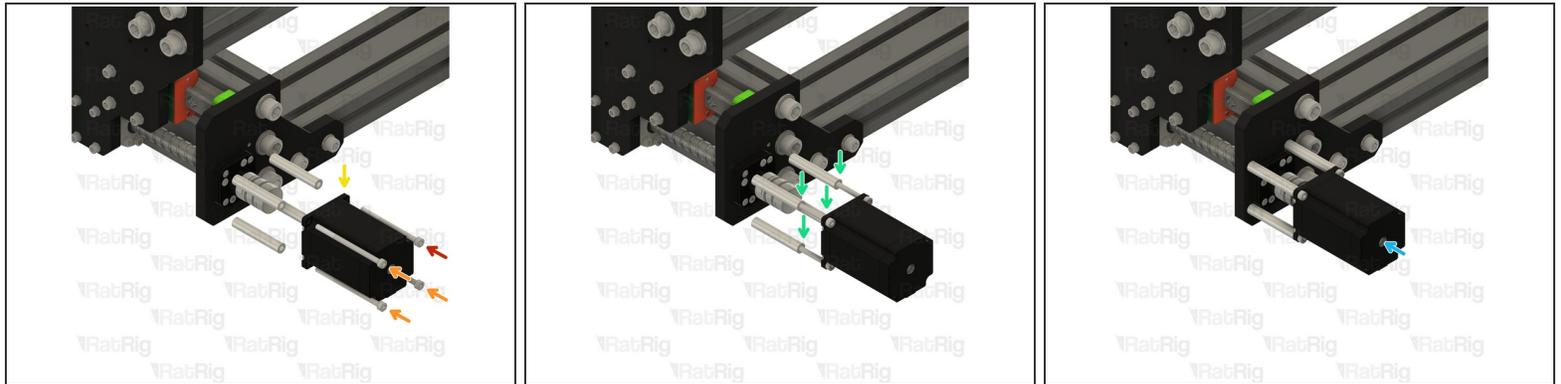
**Step 17 — Install the left Y-axis stepper motor - Part 2**

- M5 Nylon Locking Hex Nut
  - ① Install an M5 nylon locking hex nut on to each exposed M5x80 screw
  - ① Fully tighten the M5x70 and all three M5x80 screws to secure the NEMA23 stepper motor to the motor plate
- Rotate the ball screw by hand until the marked screw is accessible
  - ⚠ You will need to rotate both Y-axis ball screws together, otherwise the X-axis gantry can twist
  - ① Using a 2.5mm hex key, tighten the marked screw to secure the disc coupler to the NEMA23 shaft

**Step 18 — Install the right Y-axis disc coupler**

- Disc Coupler
- Install the disc coupler on to the end of the 1610 ball screw shaft
- Using a 2.5mm hex key, tighten the marked screw to secure the disc coupler to the shaft

## Step 19 — Install the right Y-axis stepper motor - Part 1



- M5x70 Cap Head Screw
- M5x80 Cap Head Screw
- NEMA23 Stepper Motor
- ⓘ Insert the M5x70 screw through the marked hole on the NEMA23 stepper motor
- ⓘ Insert one M5x80 screw through each remaining hole on the NEMA23 stepper motor
- 58mm Aluminium Spacer
- Install the NEMA23 assembly on to the Y-axis plate
- ⓘ The **M5x70 screw** will thread into the motor plate and the **M5x80 screw below the M5x70 screw** will thread into the existing M5 hex nut. The remaining two M5x80 screws will pass through the motor plate. The NEMA23 shaft should fit into the disc coupler

**Step 20 — Install the right Y-axis stepper motor - Part 2**

- M5 Nylon Locking Hex Nut
  - ⓘ Install an M5 nylon locking hex nut on to each exposed M5x80 screw
  - ⓘ Fully tighten the M5x70 and all three M5x80 screws to secure the NEMA23 stepper motor to the motor plate
- Rotate the ball screw by hand until the marked screw is accessible
  - ⚠ You will need to rotate both Y-axis ball screws together, otherwise the X-axis gantry can twist
  - ⓘ Using a 2.5mm hex key, tighten the marked screw to secure the disc coupler to the NEMA23 shaft

**Step 21 — Next guide**

- Continue with the next guide: [04. Endstops & Accessories](#)