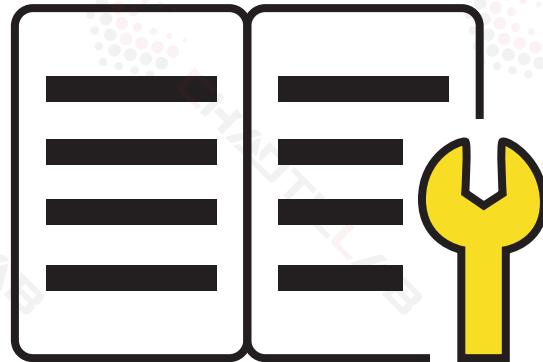




CHAOTICLAB

VORON2.4
CNC PARTS KIT BUILD GUIDE

VERSION 2024-02-18



- Highlighted in blue are included in this Voron2.4 CNC Parts Kit.
- Highlighted in red are other accessories of the Voron2.4 printer, which are not included in this Voron2.4 CNC Parts Kit and will need to be purchased by yourself.

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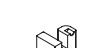
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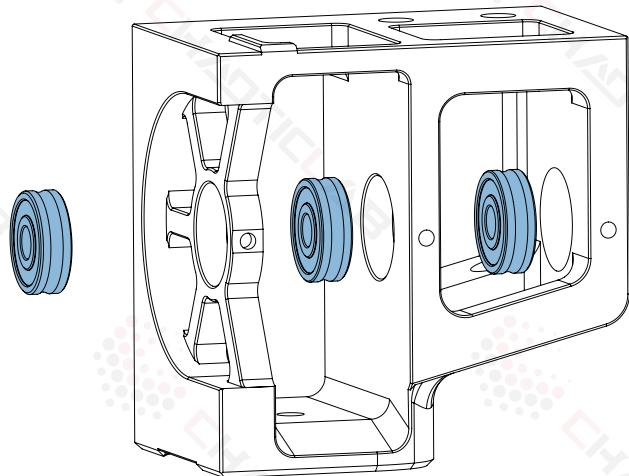
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PACKING LIST

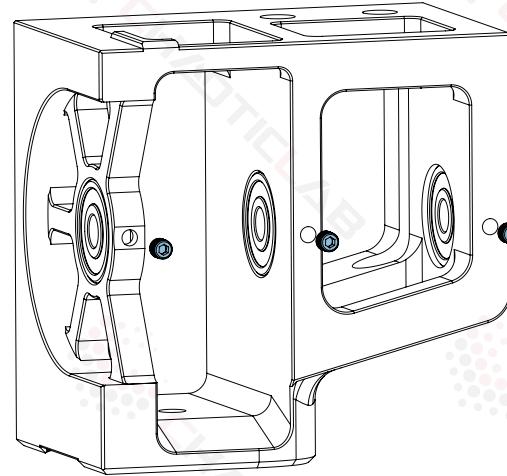
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	Drive Frame Upper Left 1pc		Tensioner Left 1pc		Z Belt Drive B 2pcs		Stand Off 2x5x23mm 10pcs		Hexagon Bolt M5x40 4pcs
	Drive Frame Lower Left 1pc		Tensioner Right 1pc		Z Tensioner Bracket A 2pcs		Stand Off M3x7x23mm 6pcs		Socket Head Cap Screw(SHCS) M5x38 2pcs
	Drive Frame Upper Right 1pc		X Carriage Frame 1pc		Z Tensioner Bracket B 2pcs		Stand Off 5x8x4.5mm 8pcs		M5x22 5pcs
	Drive Frame Lower Right 1pc		X Carriage Pivot Block A (For MGN9H) 1pc		Z Tensioner A 2pcs		M5 Knurled Nut 4pcs		M5x14 10pcs
	XY Joint Left Upper 1pc		X Carriage Pivot Block B (For MGN9H) 1pc		Z Tensioner B 2pcs		Microswitch Nut 4pcs		M5x36 3pcs
	XY Joint Right Upper 1pc		X Endstop Spacer 1pc		Z Belt Clip Upper 4pcs		PB5 Bearing 4pcs		M5x32 10pcs
	XY Joint Left Lower 1pc		M12 Cable Protector Bracket 1pc		Z Joint Upper 4pcs		625U Bearing 12pcs		M5x10 30pcs
	XY Joint Right Lower 1pc		Universal Drag Chain Bracket 1pc		Z Joint Lower 4pcs		Conical Spring 4pcs		M3x8 100pcs
	Front Idler Left Upper 1pc		XY Cable Chain Bridge 1pc		Z Motor Mount A 2pcs		M5 Shim 16pcs		M5x30 10pcs
	Front Idler Left Lower 1pc		Cable Cover 1pc		Z Motor Mount B 2pcs		Rubber Foot 4pcs		M5x16 40pcs
	Front Idler Right Upper 1pc		BLtouch Bracket 1pc		Belt Tensioner A 2pcs		Drop-in T-nut, M3 (2020) 60pcs		M3x14 10pcs
	Front Idler Right Lower 1pc		Z Belt Drive A 2pcs		Belt Tensioner B 2pcs		Drop-in T-nut, M5 (2020) 60pcs		M3x10 2pcs

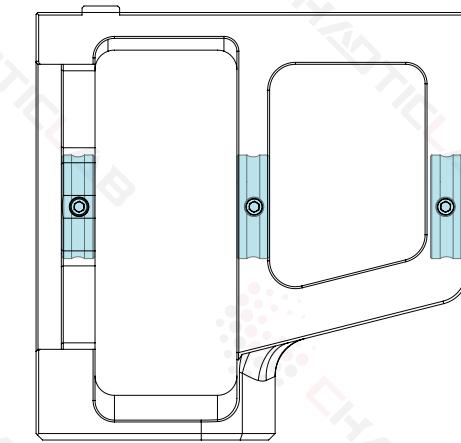
PACKING LIST



625U Bearing

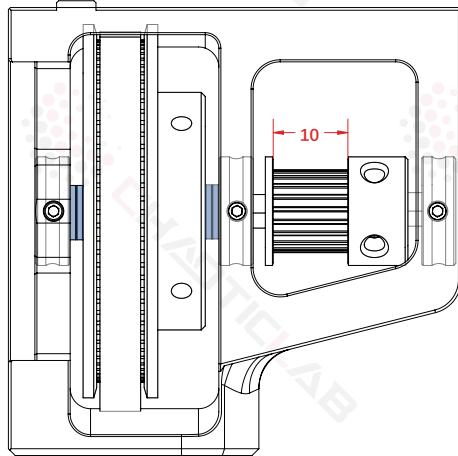


M3 Set Screw

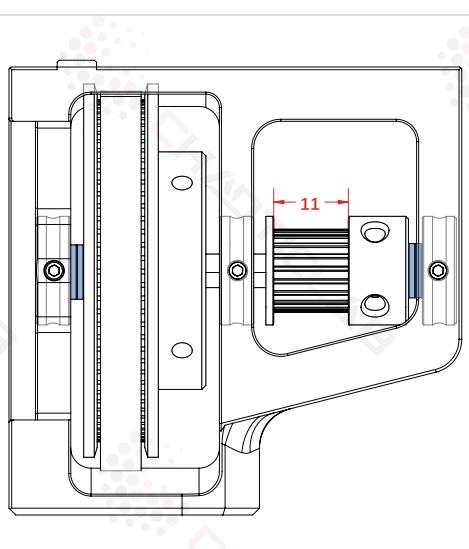
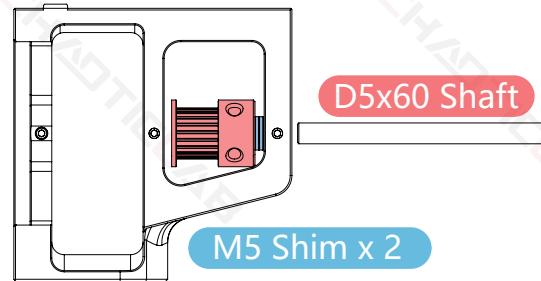
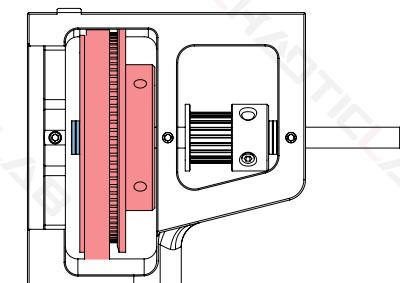
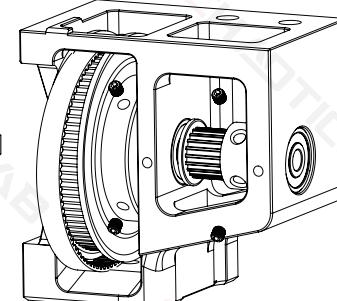


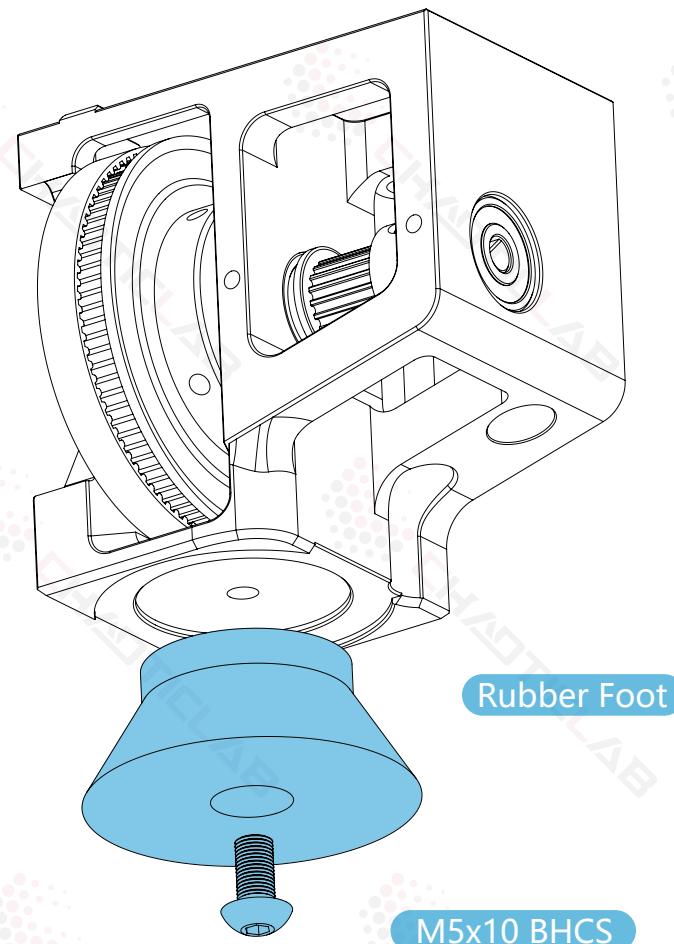
SHIM POSITION

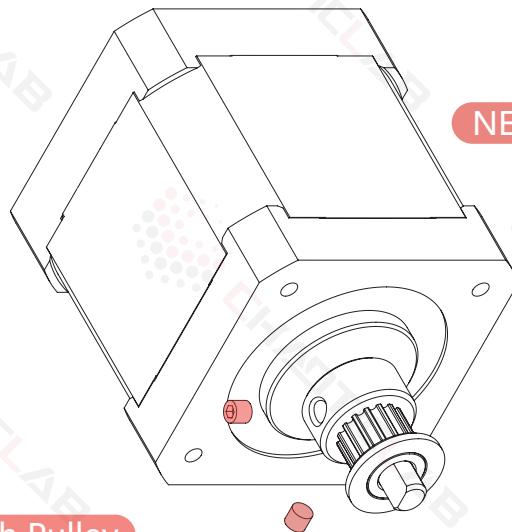
Please measure the actual width of the tooth groove on the pulley. If it is 10mm, refer to Figure A. For 11mm, refer to Figure B.

**A****PREFERRED POSITION**

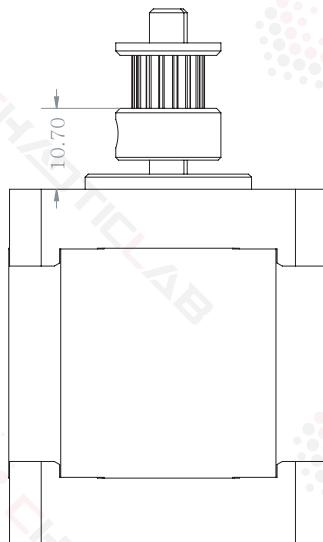
If you're not overly concerned with precision in details, you can directly follow Figure A. This won't affect the machine's operational accuracy.

**B****2GT 20T 9mm Pulley****M5 Shim x 2****M5 Shim x 2****2GT-80T Pulley and 2GT 188mm Belt Loop**



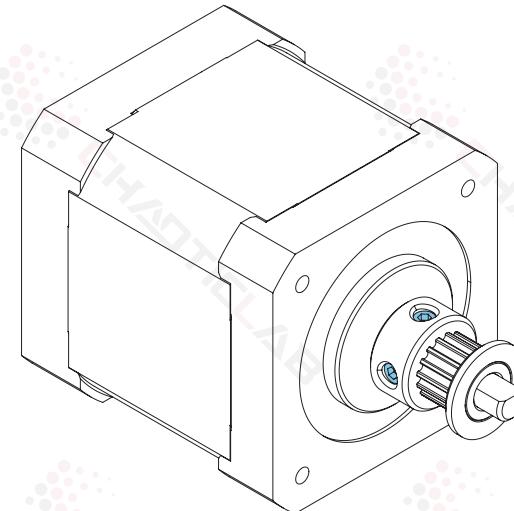


GT2 16 Tooth Pulley



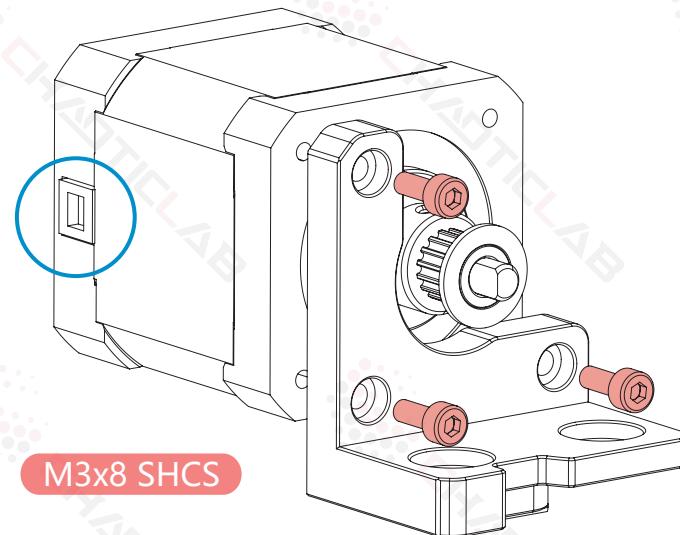
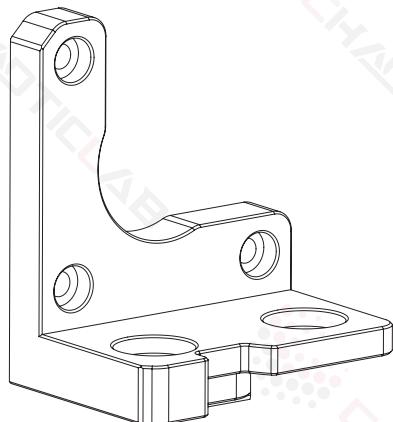
16 TOOTH PULLEY

The Z drive motors are the only place in the printer that use 16 tooth pulleys!
Remove the pulleys from your work surface after you finish this chapter



APPLY THREAD LOCKER

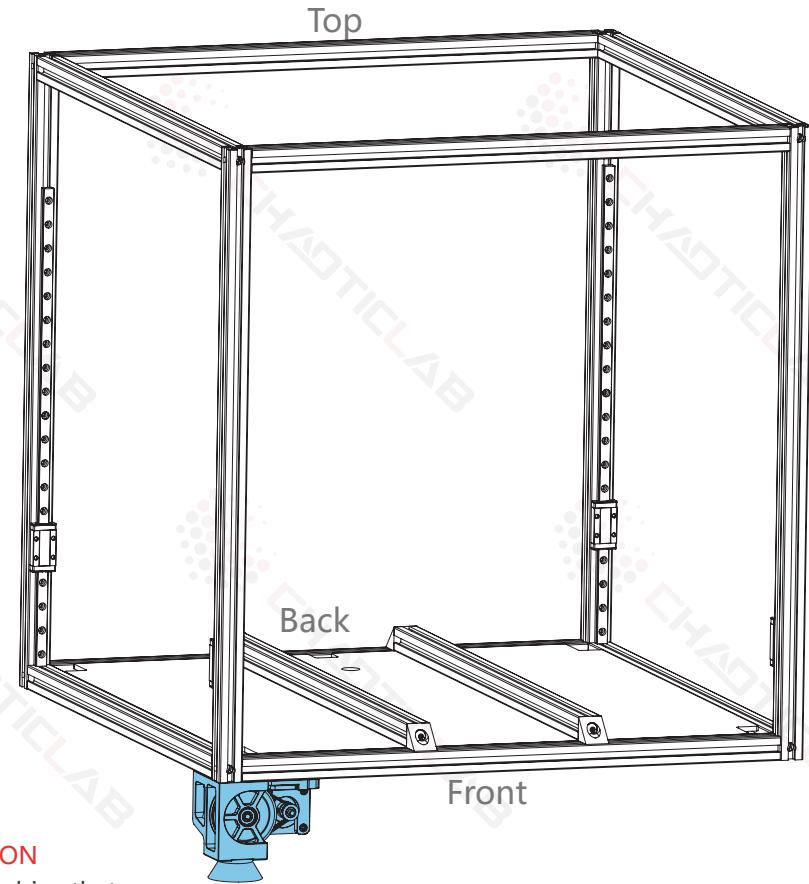
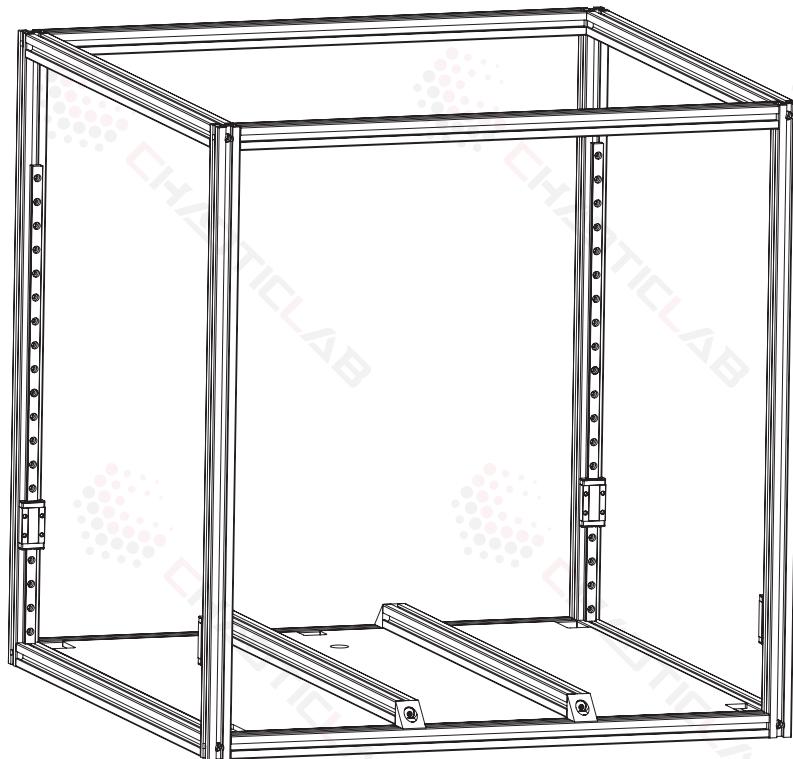
Make sure to use thread locker on the set screws.



MOTOR ORIENTATION

Pay attention to the orientation
of the cable exit.

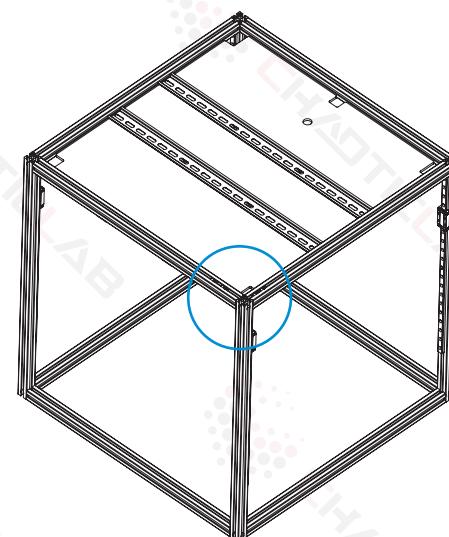
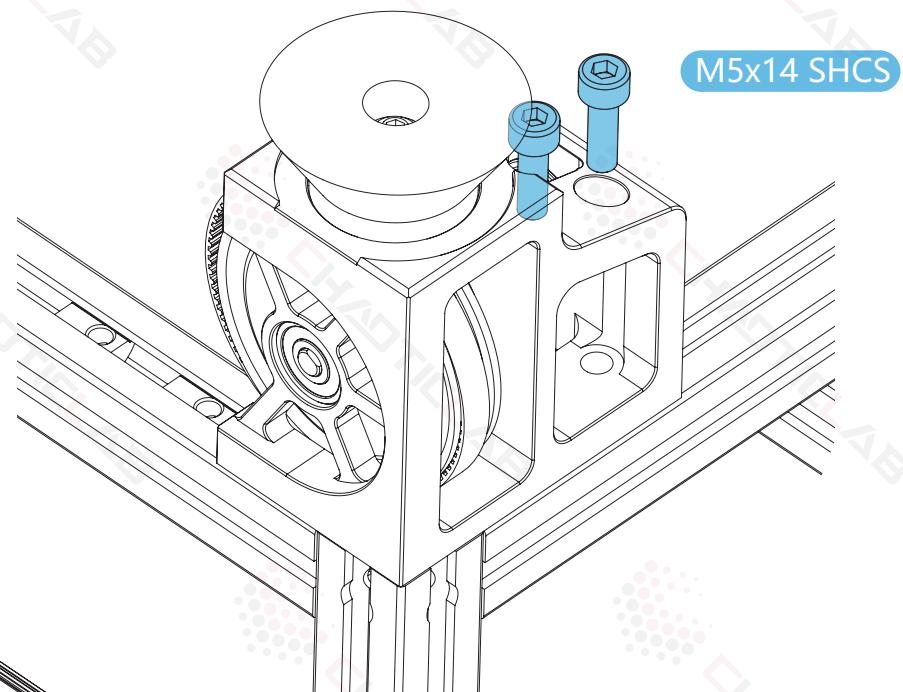
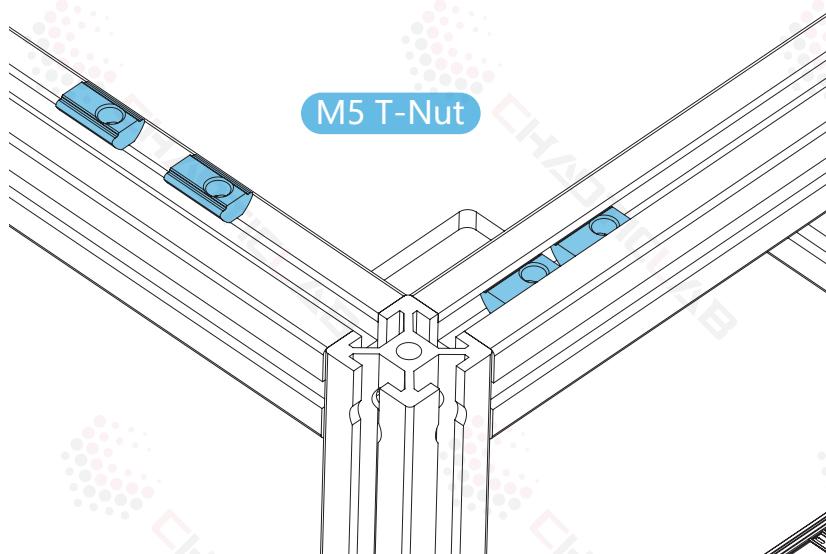
If you have not prepared M3x8 SHCS,
you can also use the M3x8 BHCS in the kit instead.

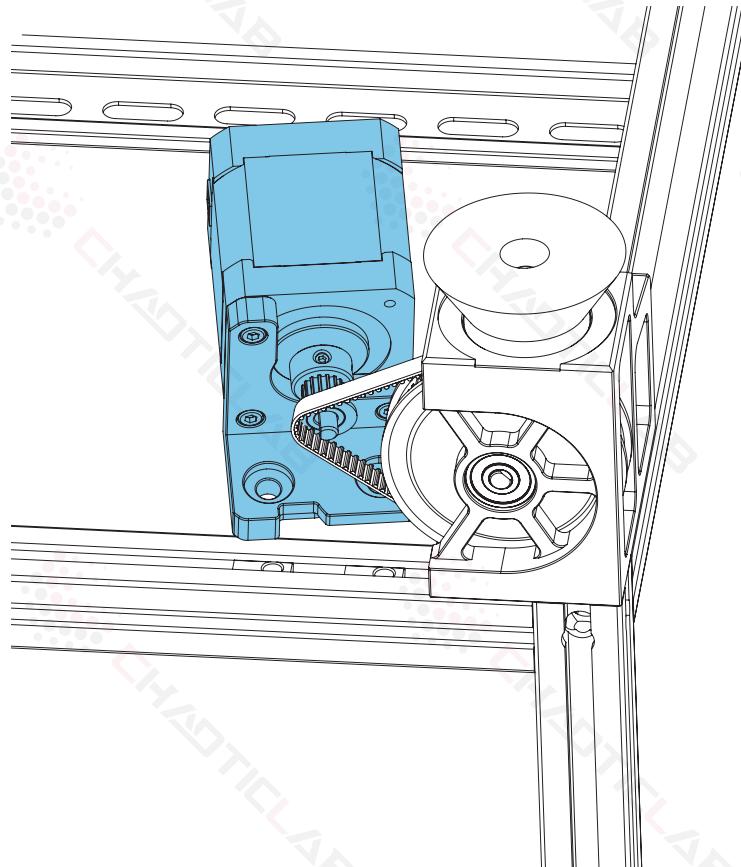
**PICTURE FOR ORIENTATION**

The Z0 drive is the first Z drive that will be added to the printer. The fully assembled Z Drive is highlighted in blue.

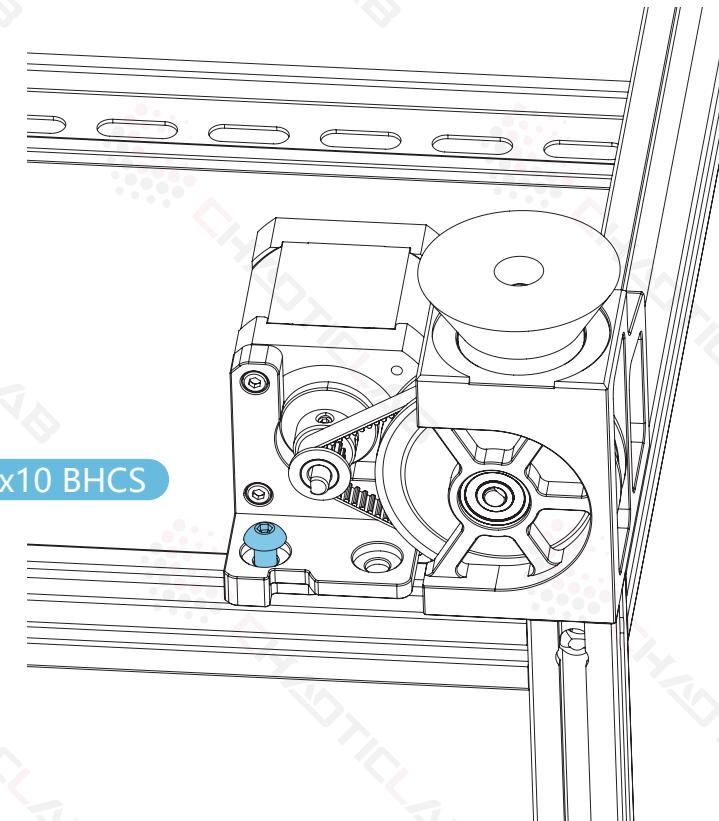
Z DRIVE

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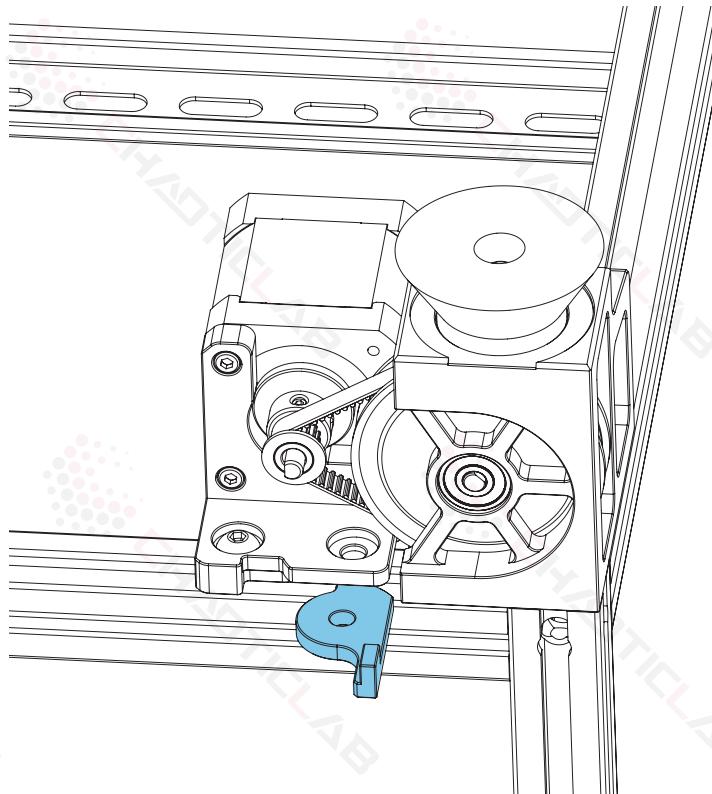


**SLIDE INTO PLACE**

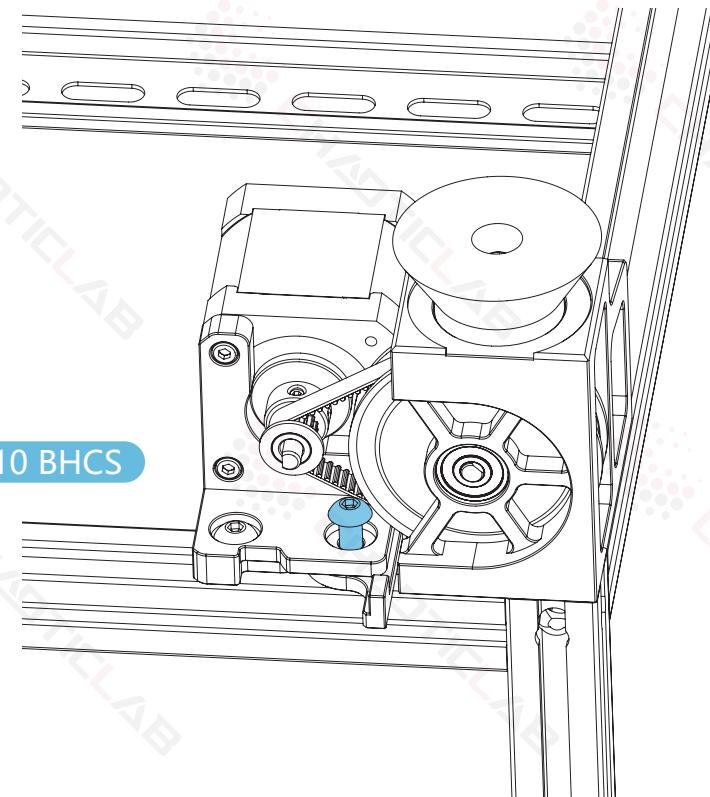
Insert at an angle and slide into place.

**DON'T TIGHTEN**

Leave the bolt loose for the next step.

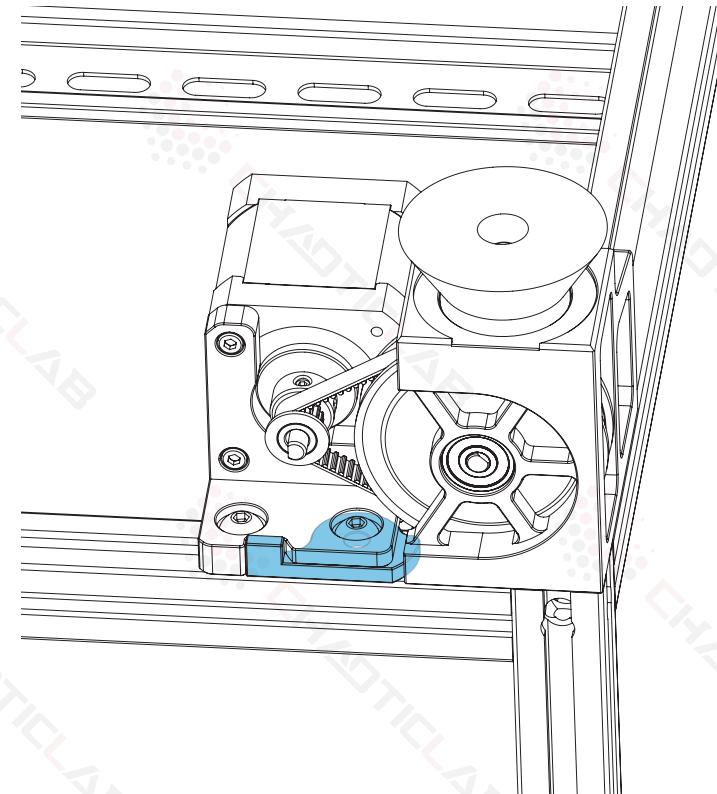
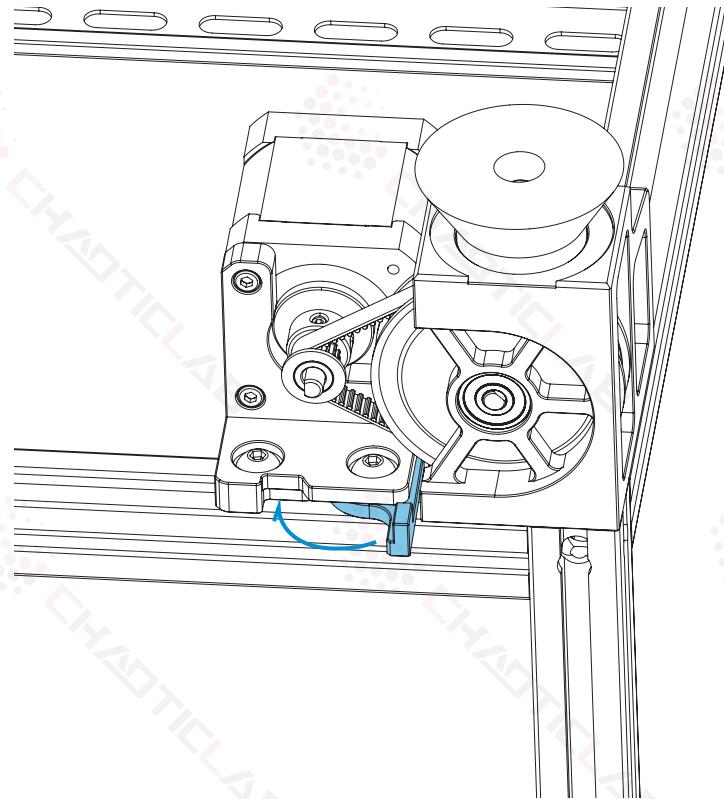


Belt Tensioner

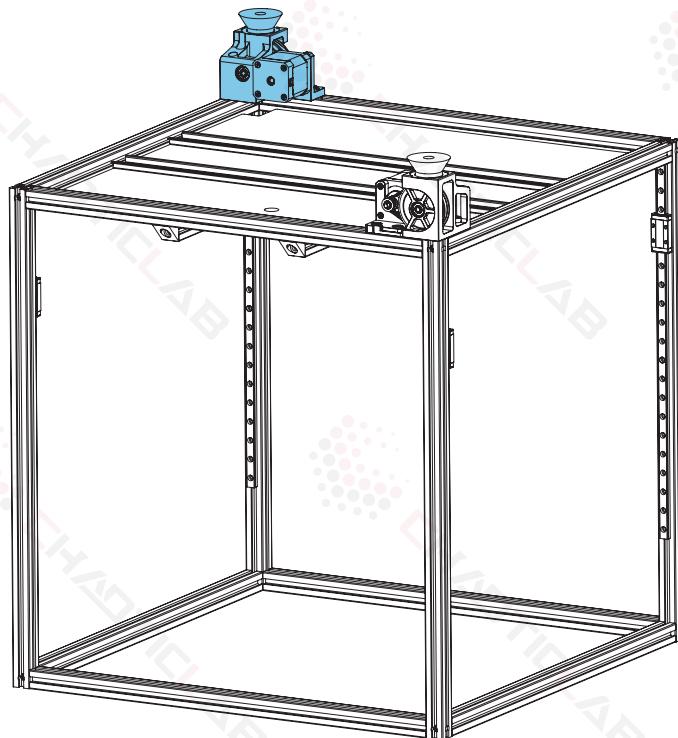


DON'T TIGHTEN

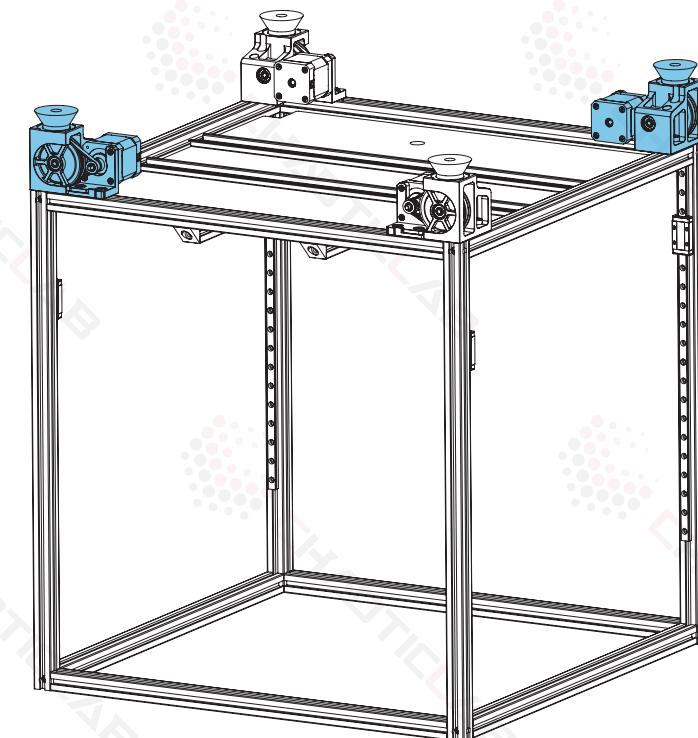
Leave the bolt loose for the next step.

**CLOSE THE BELT TENSIONER**

Flip the belt tensioner latch closed.

**REPEAT INSTRUCTIONS FOR OPPOSING CORNER**

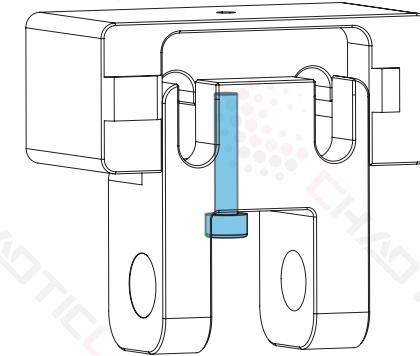
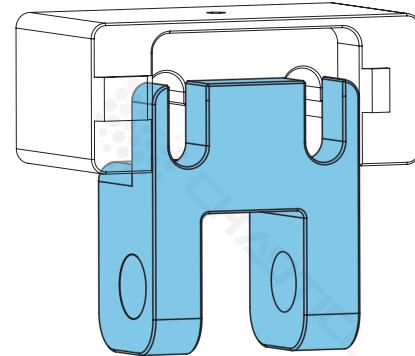
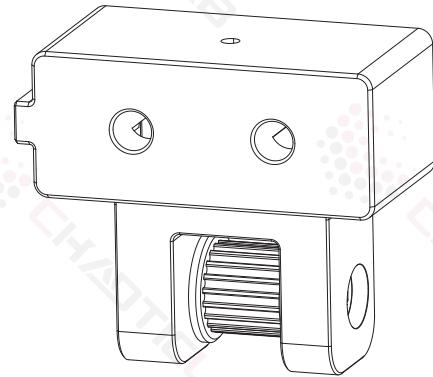
Build another Z drive, following the same instructions.

**REPEAT INSTRUCTIONS FOR THE MIRRORED DRIVES**

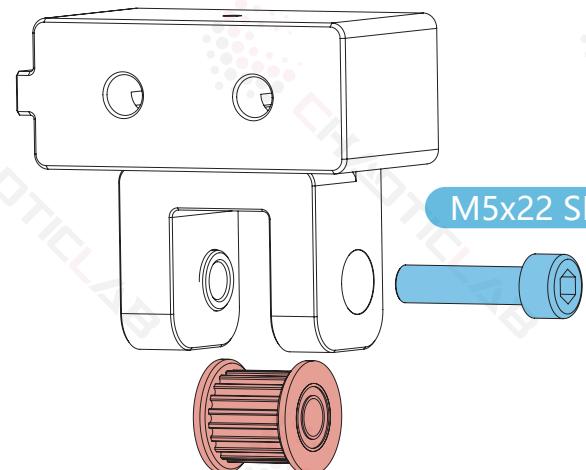
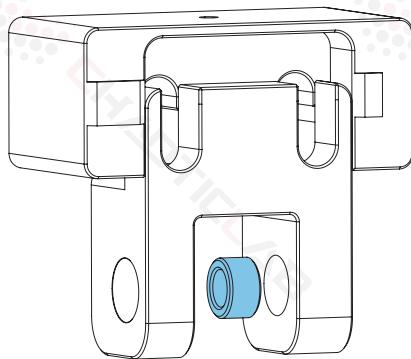
Build two more Z drives following the instructions that came before. The parts are mirrored.

Z IDLER

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M3x16 SHCS



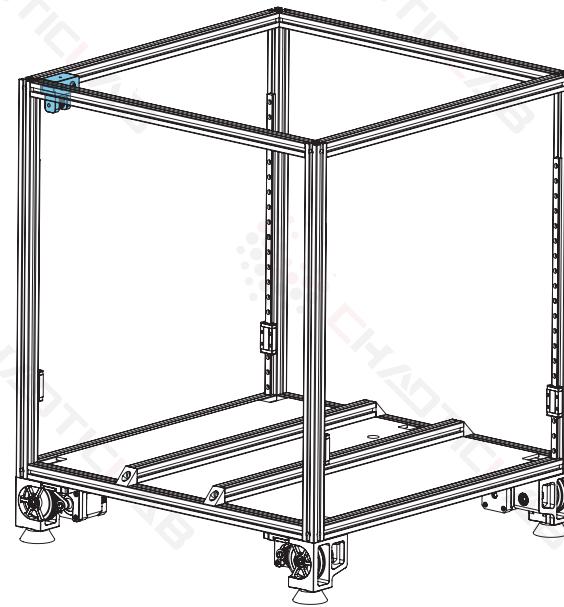
M5x22 SHCS

Stand Off 5x8x4.5mm

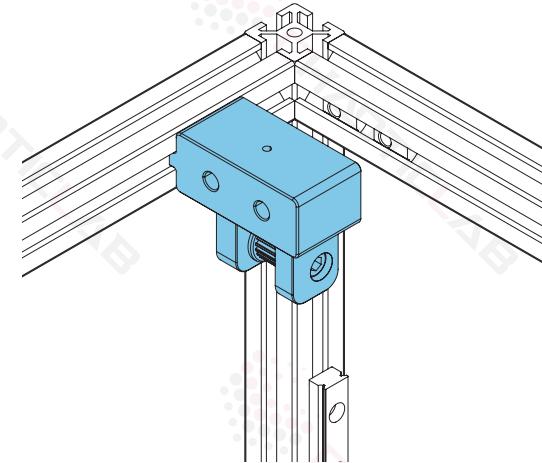
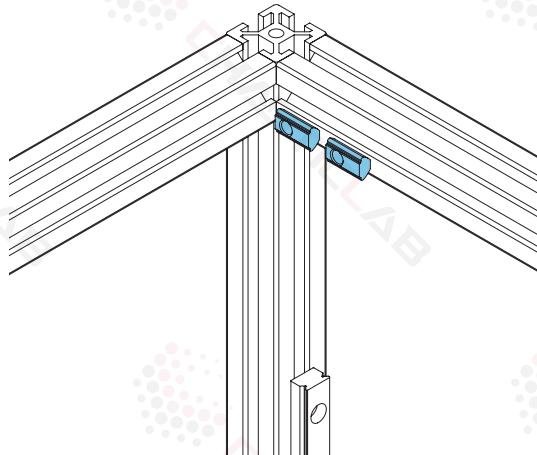
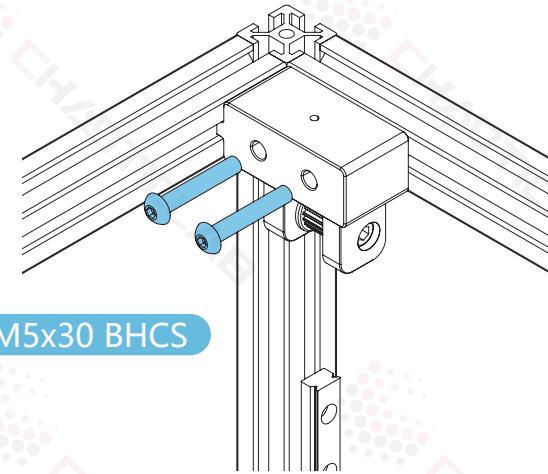
GT2 20 Tooth Idler 9mm Wide

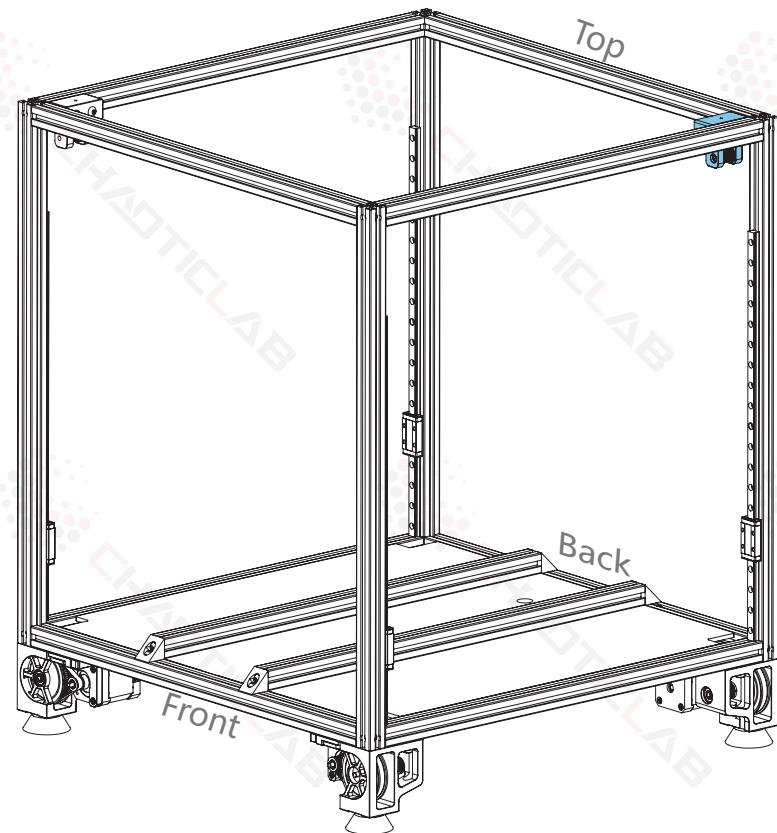
DO NOT LOCK THE SCREWS TOO TIGHTLY

Apply a bit threadlocker on the end of the screw and loosen it for half a turn after it is fully tightened. If you tighten the screw too tightly, the idler will not rotate smoothly due to the axial compression of the bearing.

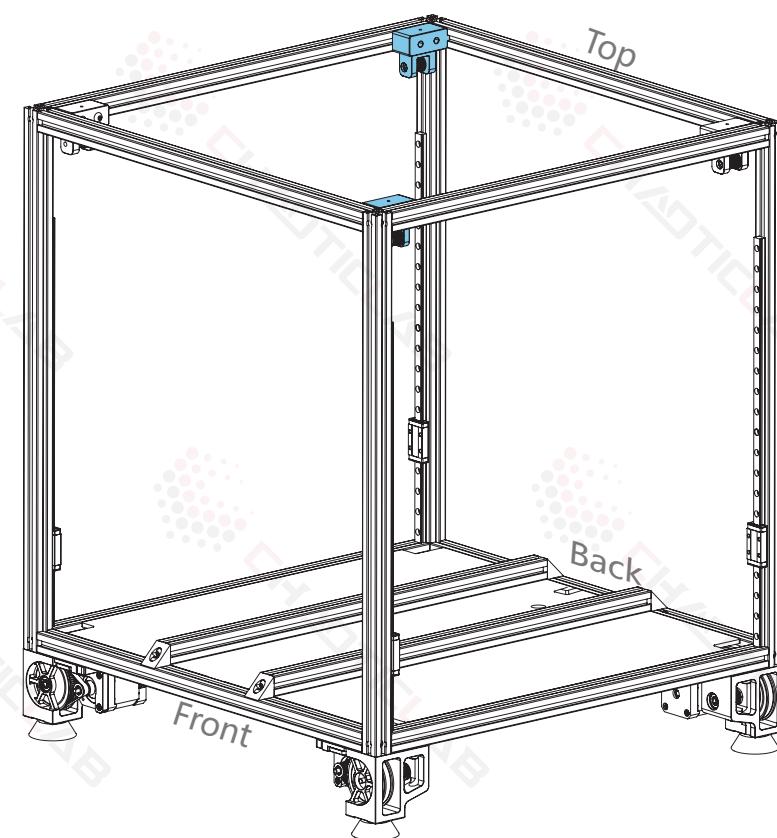
**IDLER ORIENTATION**

Mind the idler orientation. The idler must face in the same orientation as the pulley in the drive below it.

M5 T-Nut**M5x30 BHCS**

**REPEAT INSTRUCTIONS FOR OPPOSING CORNER**

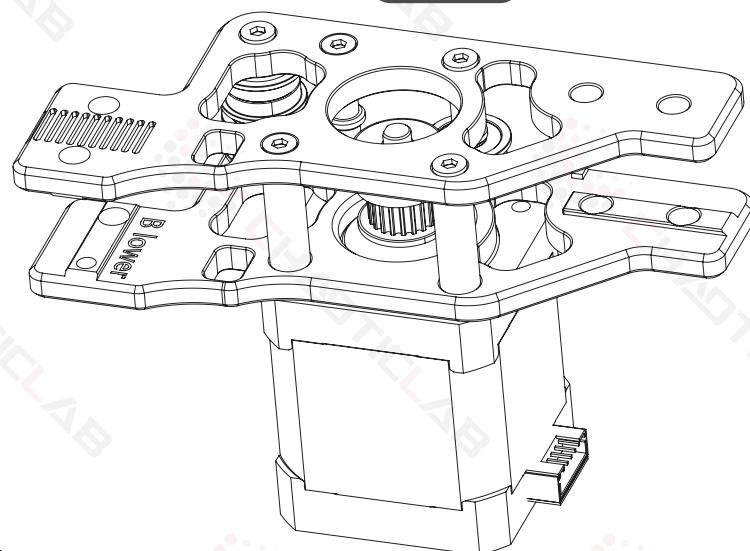
Build another Z idler following the same instructions.

**REPEAT INSTRUCTIONS FOR THE MIRRORED IDLERS**

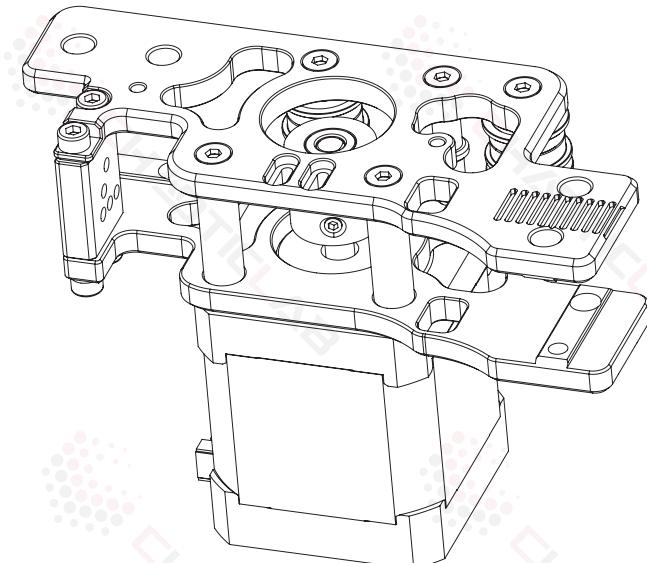
Build two more Z idlers following the instructions that came before. The printed parts are mirrored.



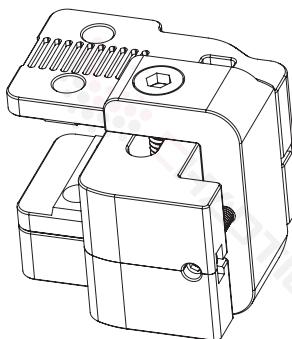
B Drive



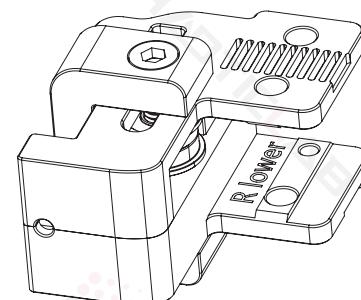
A Drive

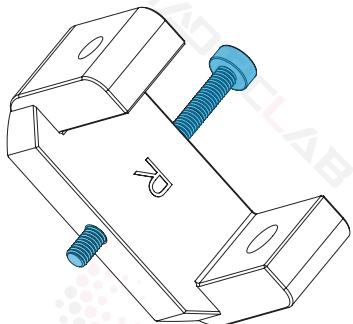


B Idler

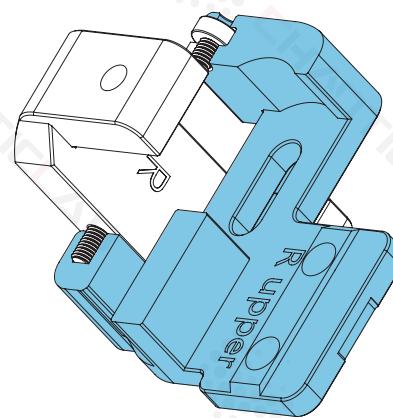


A Idler

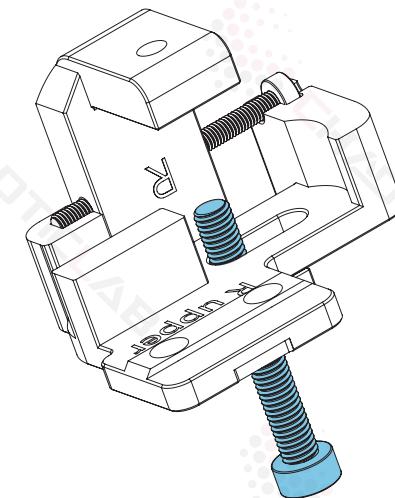




M3x36 SHCS



Front Idler Right Upper



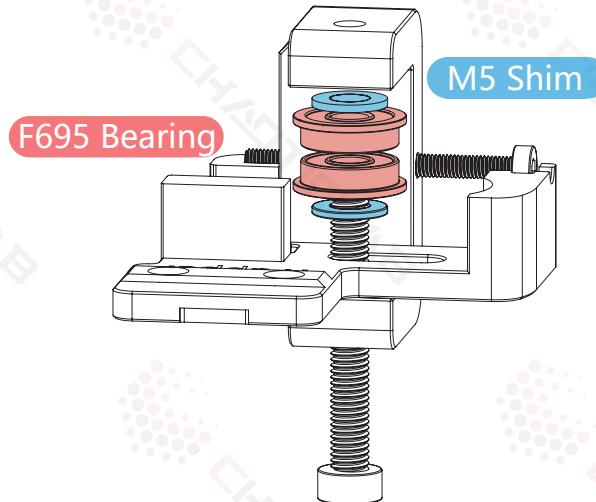
M5x38 SHCS

LASER ENGRAVING MARK

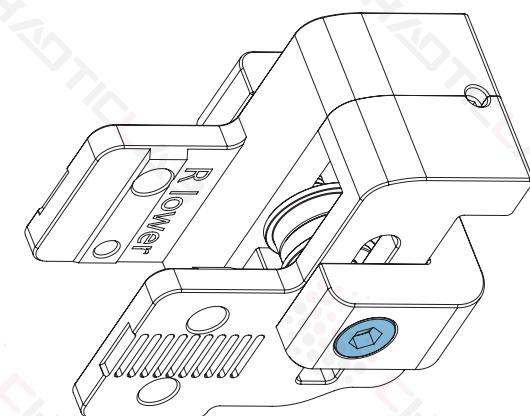
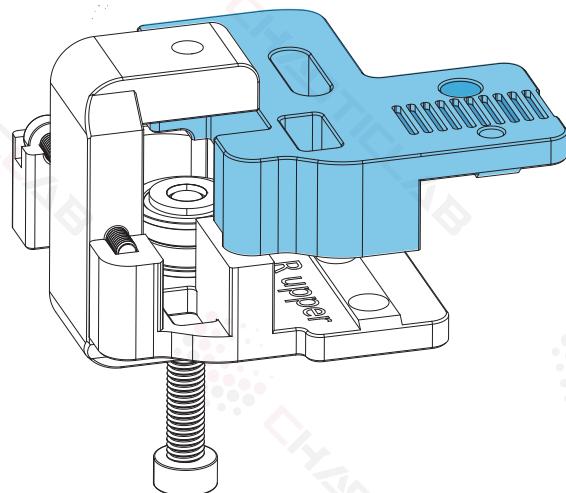
All parts that distinguish A/B are marked with 'L/R' and 'upper/lower'.
It means this part is on the left/right side and upper/lower .

A IDLER

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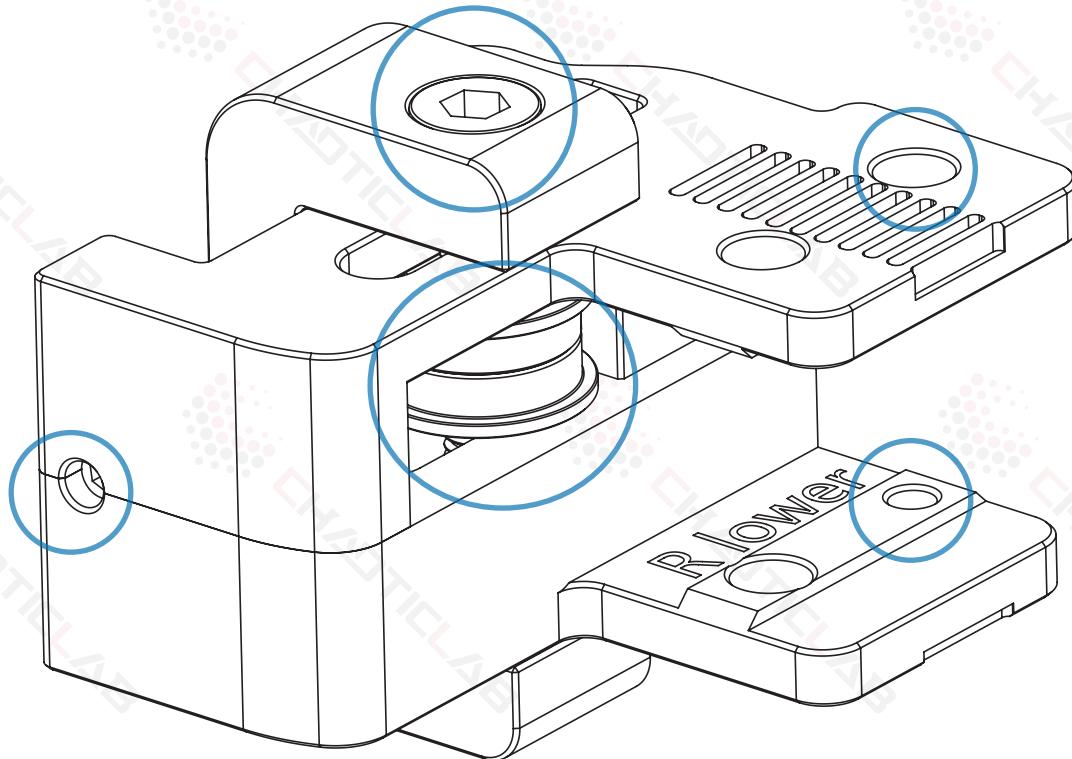
Front Idler Right Lower



TIGHTEN
Tighten M5 screws

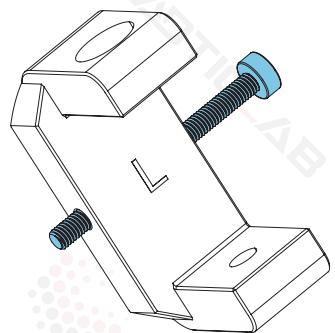
CHECK YOUR WORK

Compare your assembled parts to the graphics shown here. Pay attention to the features highlighted by the circles.

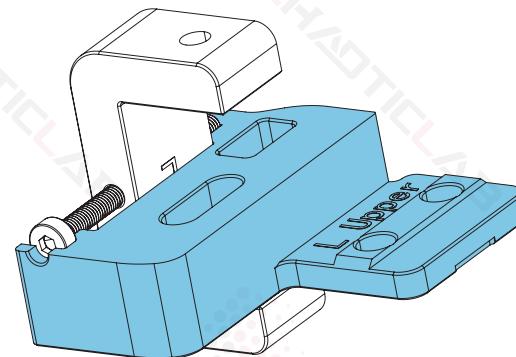


B IDLER

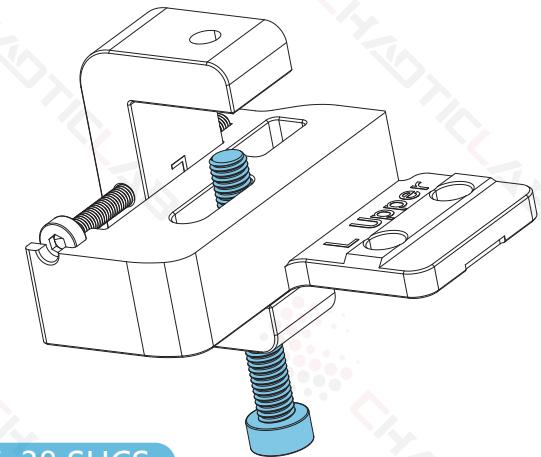
WWW.CHAOTICLAB.XYZ



M3x36 SHCS



Front Idler Left Upper



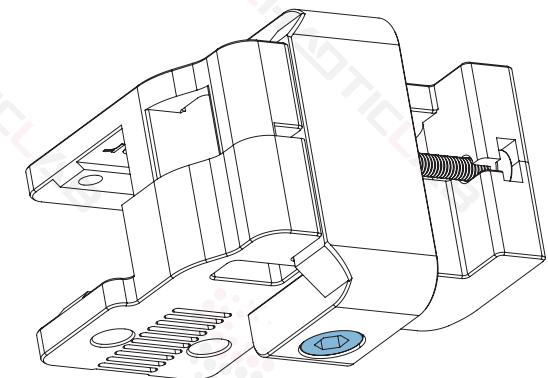
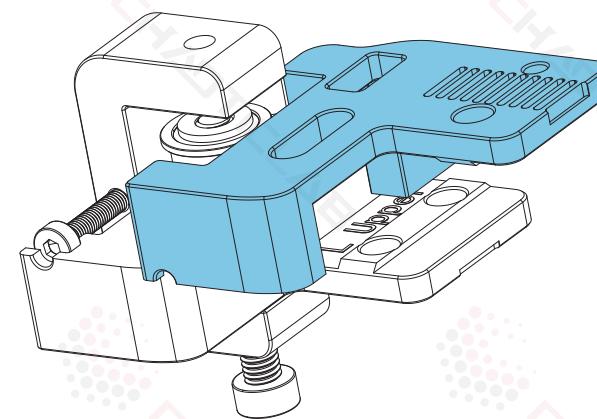
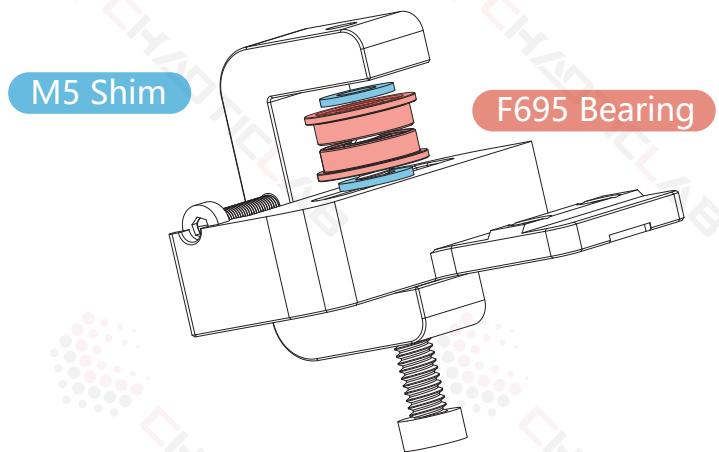
M5x38 SHCS

LASER ENGRAVING MARK

All parts that distinguish A/B are marked with 'L/R' and 'upper/lower'.
It means this part is on the left/right side and upper/lower .

B IDLER

WWW.CHAOTICLAB.XYZ



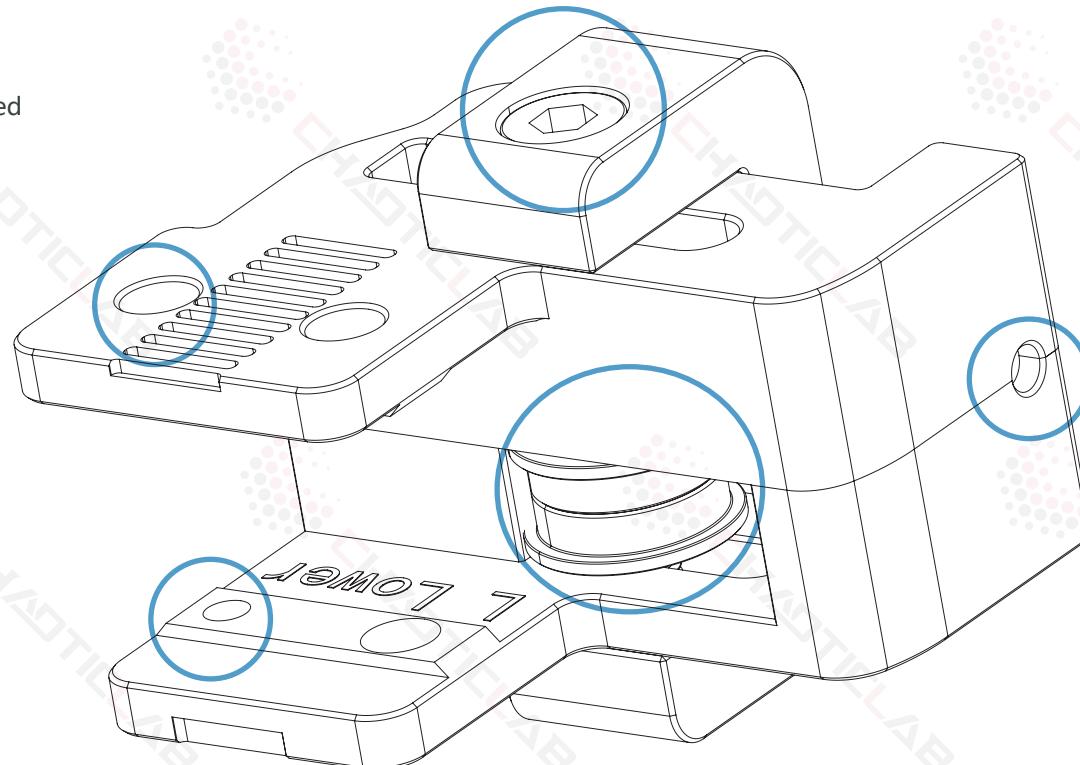
Front Idler Left Lower

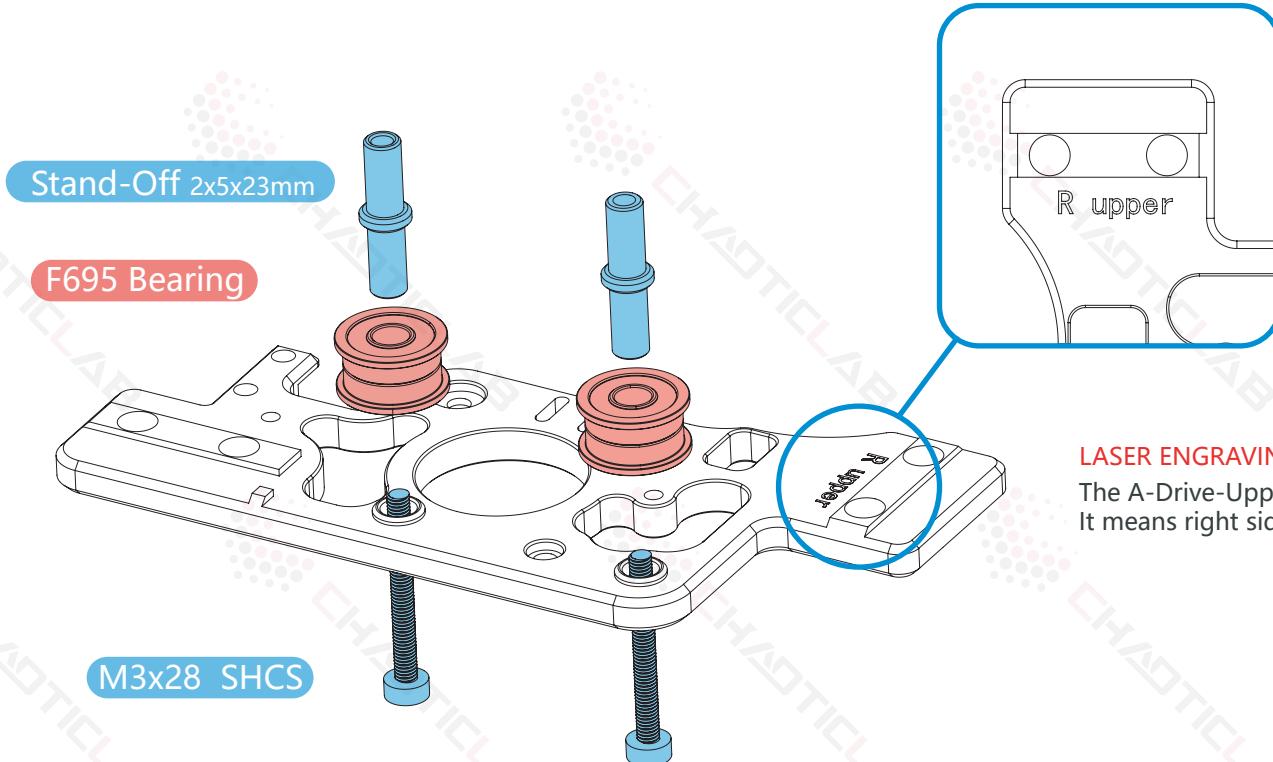
TIGHTEN

Tighten M5 screws

CHECK YOUR WORK

Compare your assembled parts to the graphics shown here. Pay attention to the features highlighted by the circles.

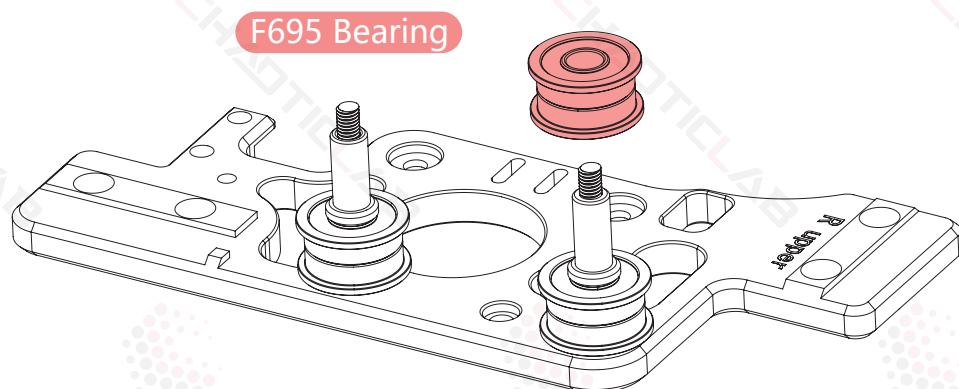


**LASER ENGRAVING MARK**

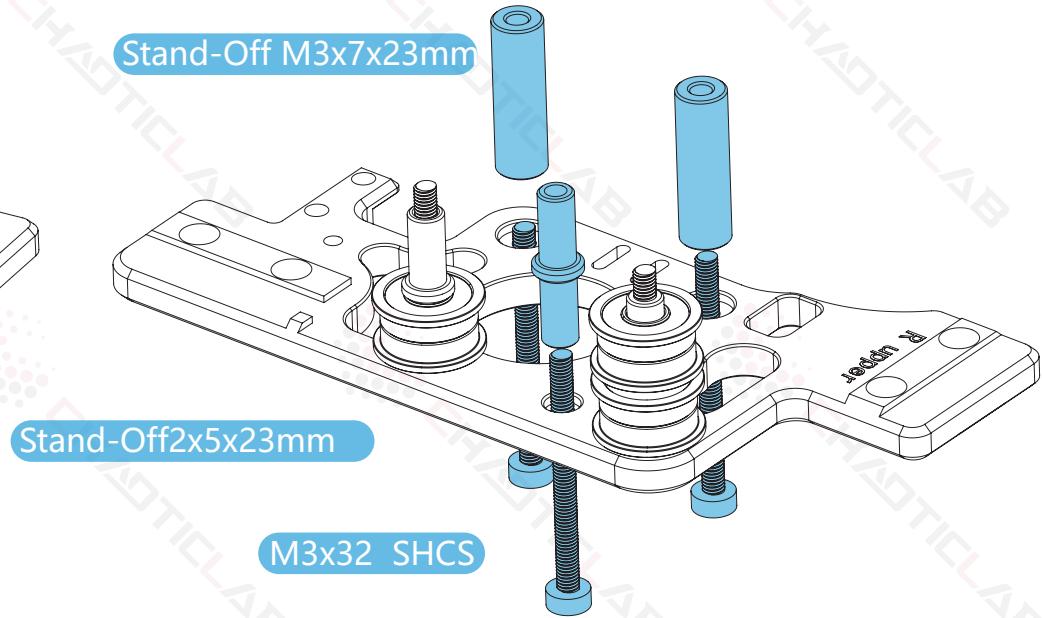
The A-Drive-Upper part is marked 'R upper'. It means right side upper drive part.

A DRIVE

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F695 Bearing



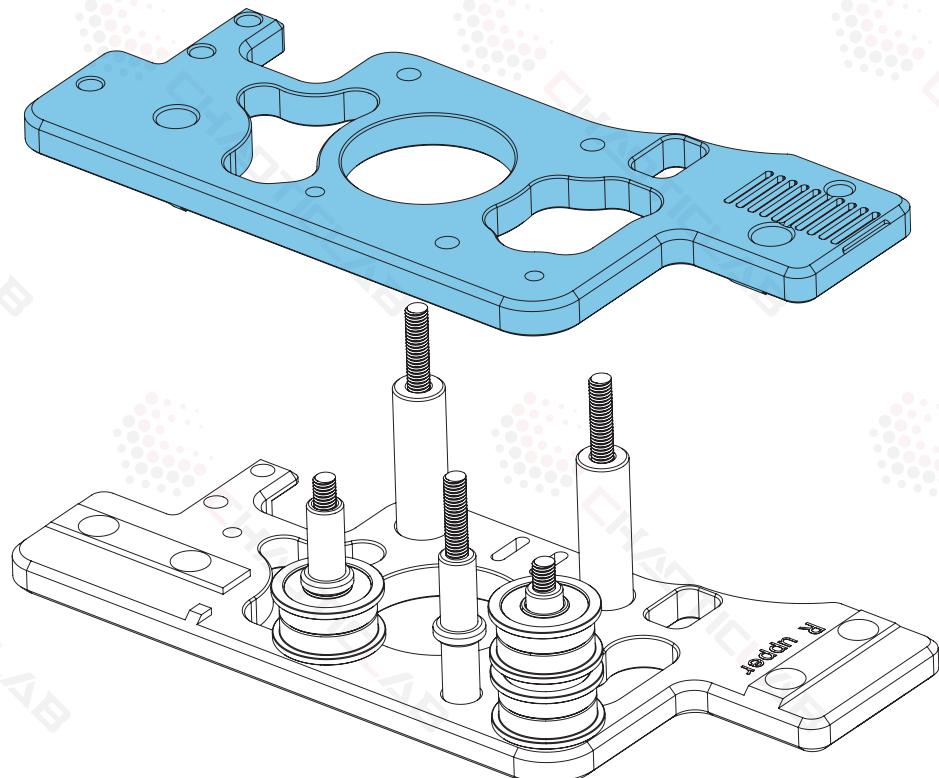
Stand-Off M3x7x23mm

Stand-Off2x5x23mm

M3x32 SHCS

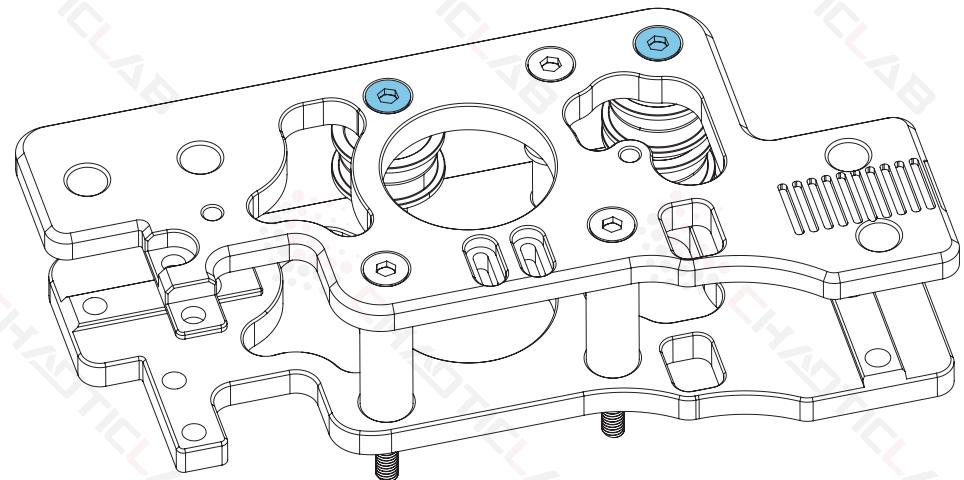
A DRIVE

WWW.CHAOTICLAB.XYZ

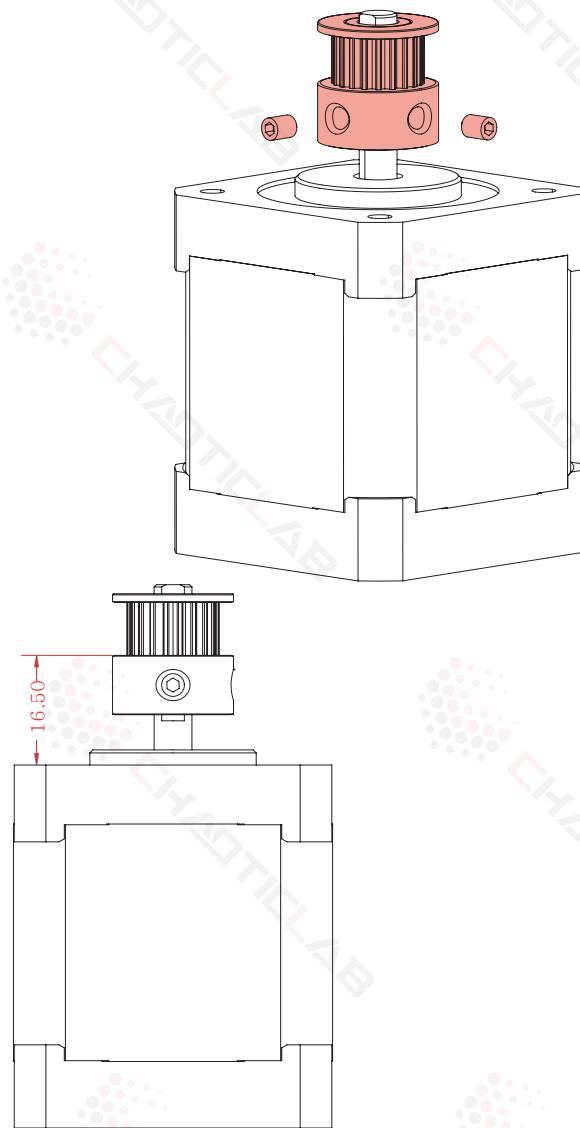


TIGHTEN

Tighten M3x28 screws



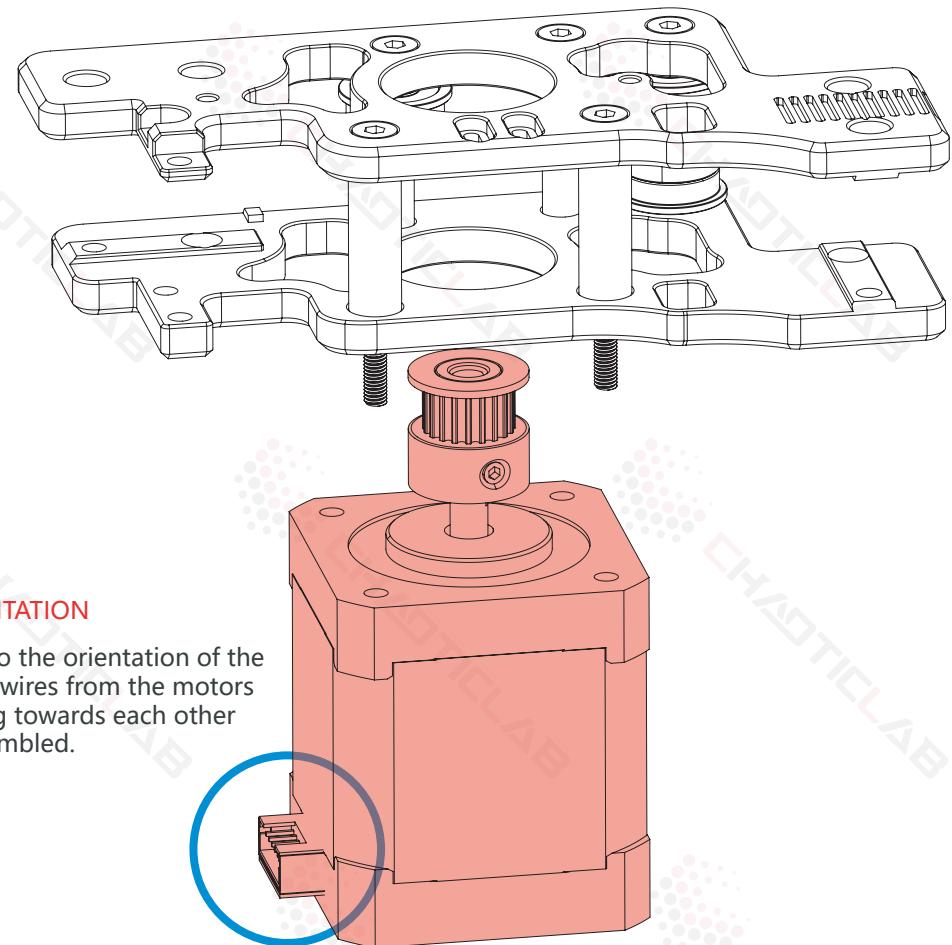
A DRIVE



APPLY THREAD LOCKER

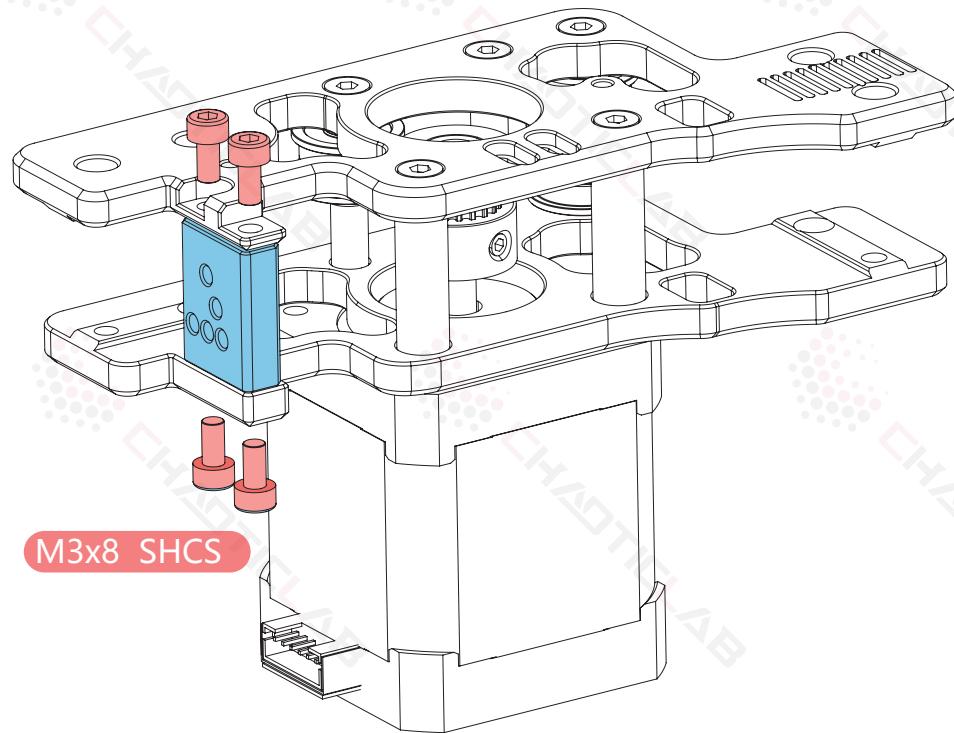
Make sure to use thread locker on the set screws.

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MOTOR ORIENTATION

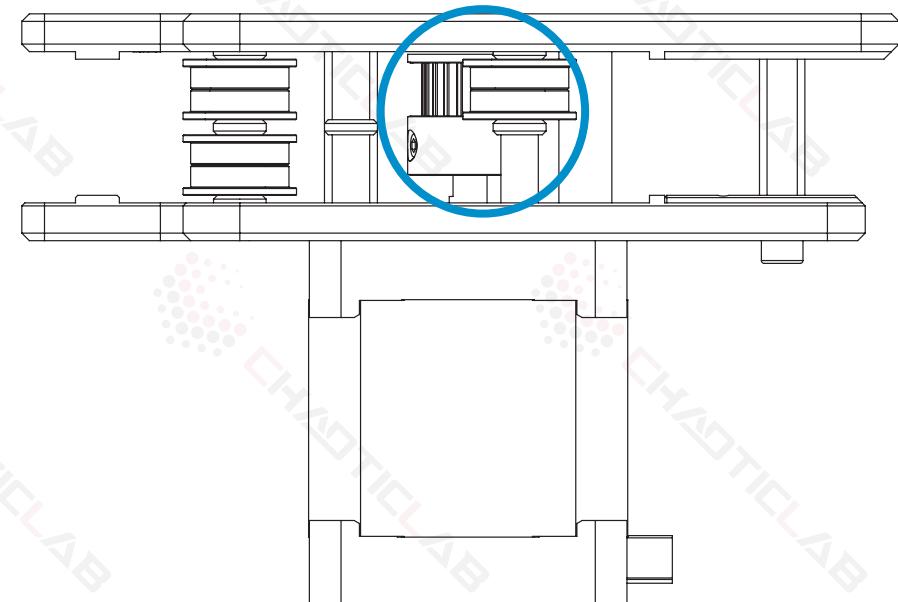
Pay attention to the orientation of the cable exit. The wires from the motors will be pointing towards each other once fully assembled.



M3x8 SHCS

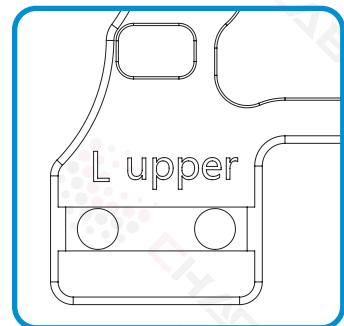
M3x8 SHCS

If you have not prepared M3x8 SHCS,
you can also use the M3x8 BHCS in the kit instead.

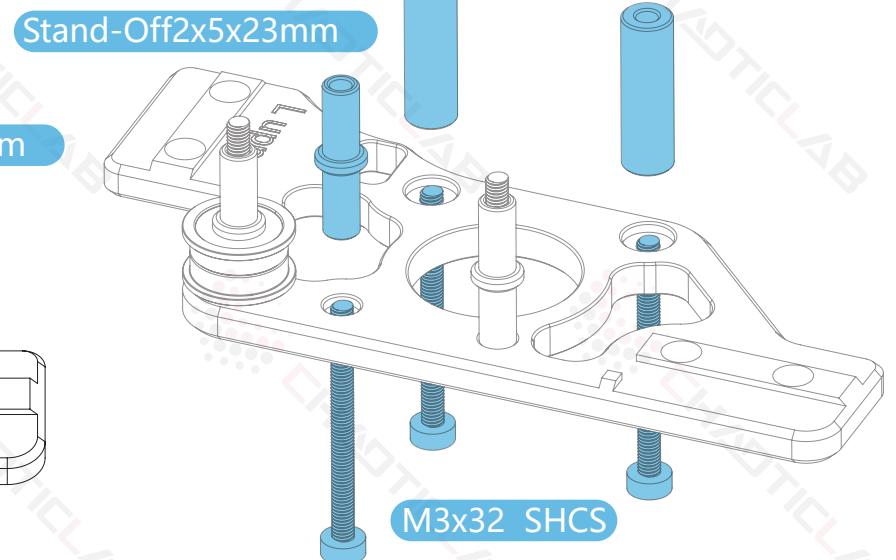
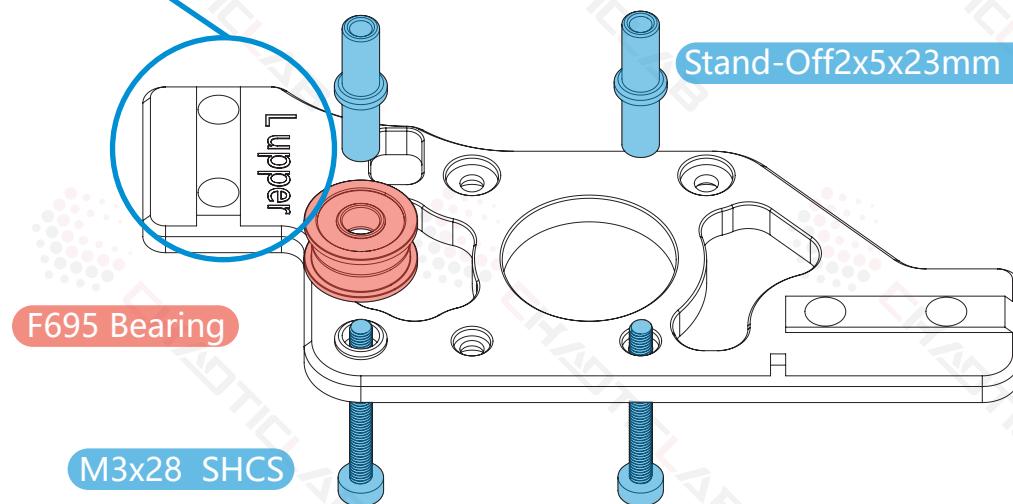


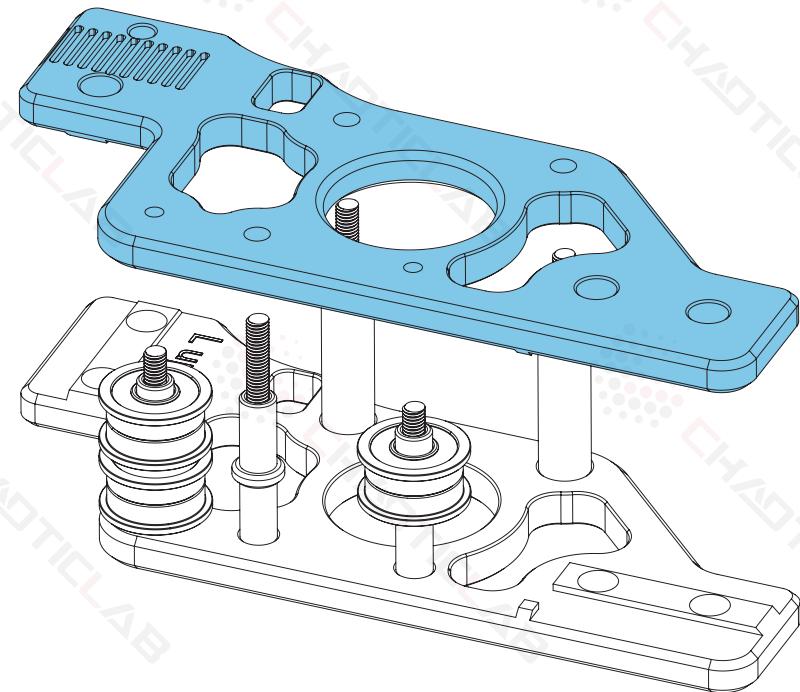
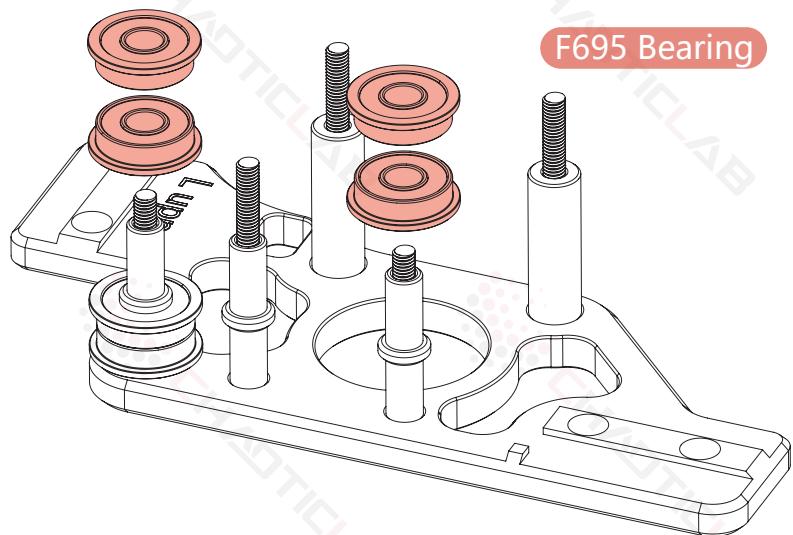
CHECK YOUR WORK

Compare your assembled part to the
graphic shown here.
Pay attention to the pulley orientation
and alignment with the bearing stack
ups.

**LASER ENGRAVING MARK**

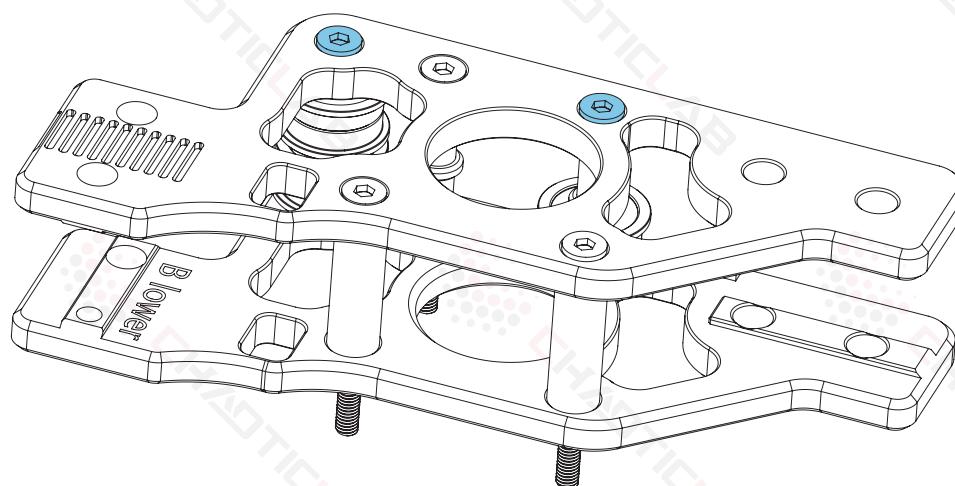
The B-Drive-Upper part is marked 'L upper'
It means left side upper drive part .





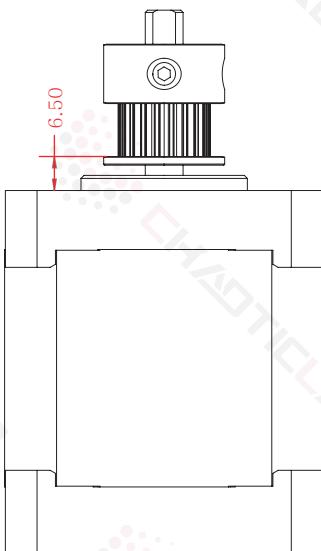
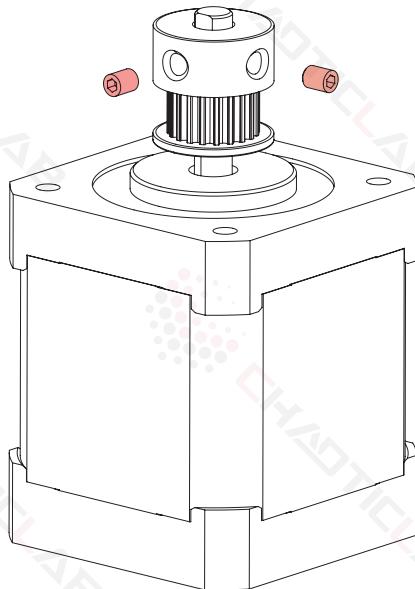
TIGHTEN

Tighten M3x28 screws



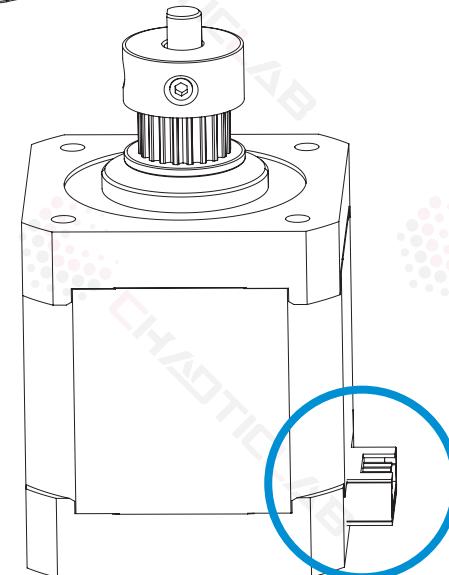
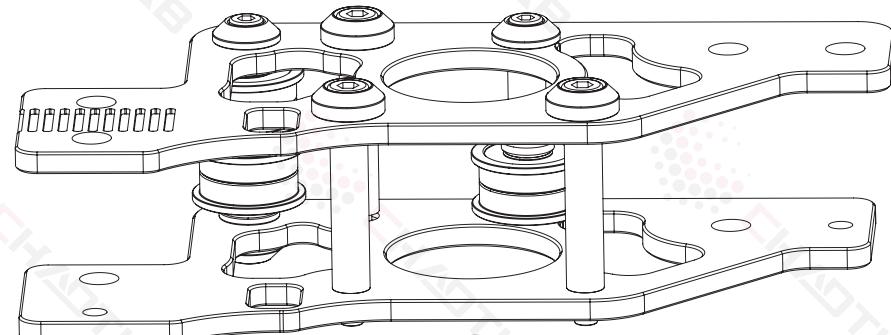
B DRIVE

WWW.CHAOTICLAB.XYZ



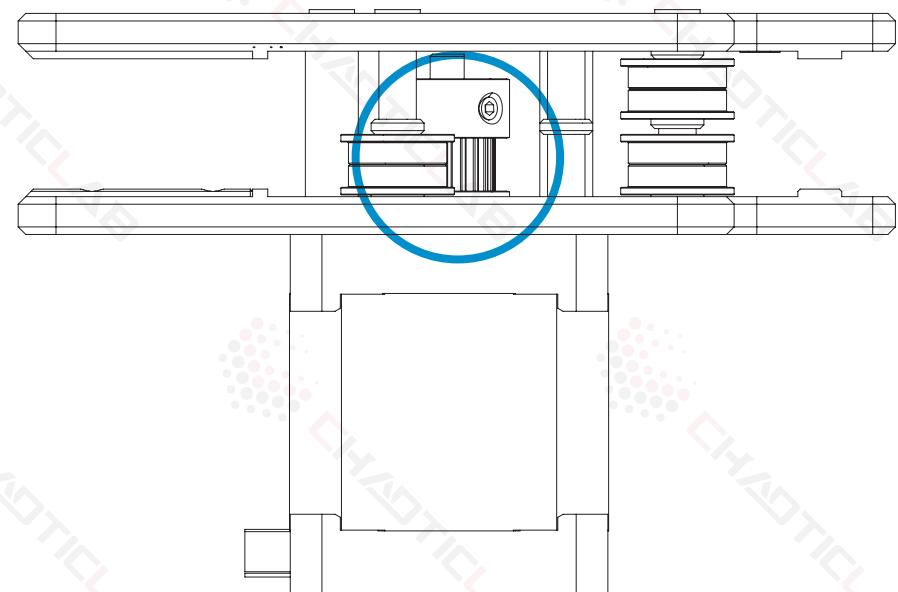
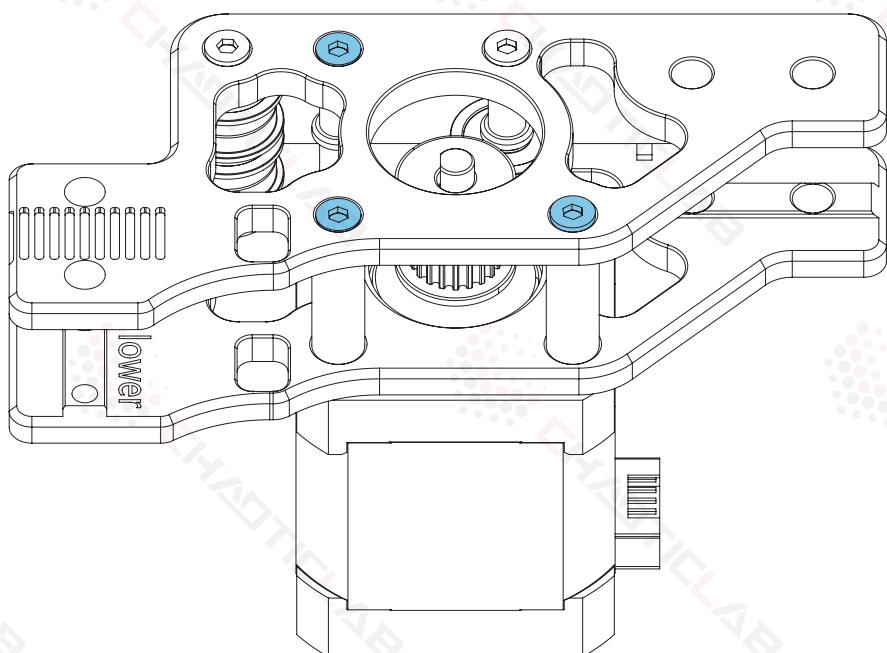
MOTOR ORIENTATION

Pay attention to the orientation of the cable exit.



TIGHTEN

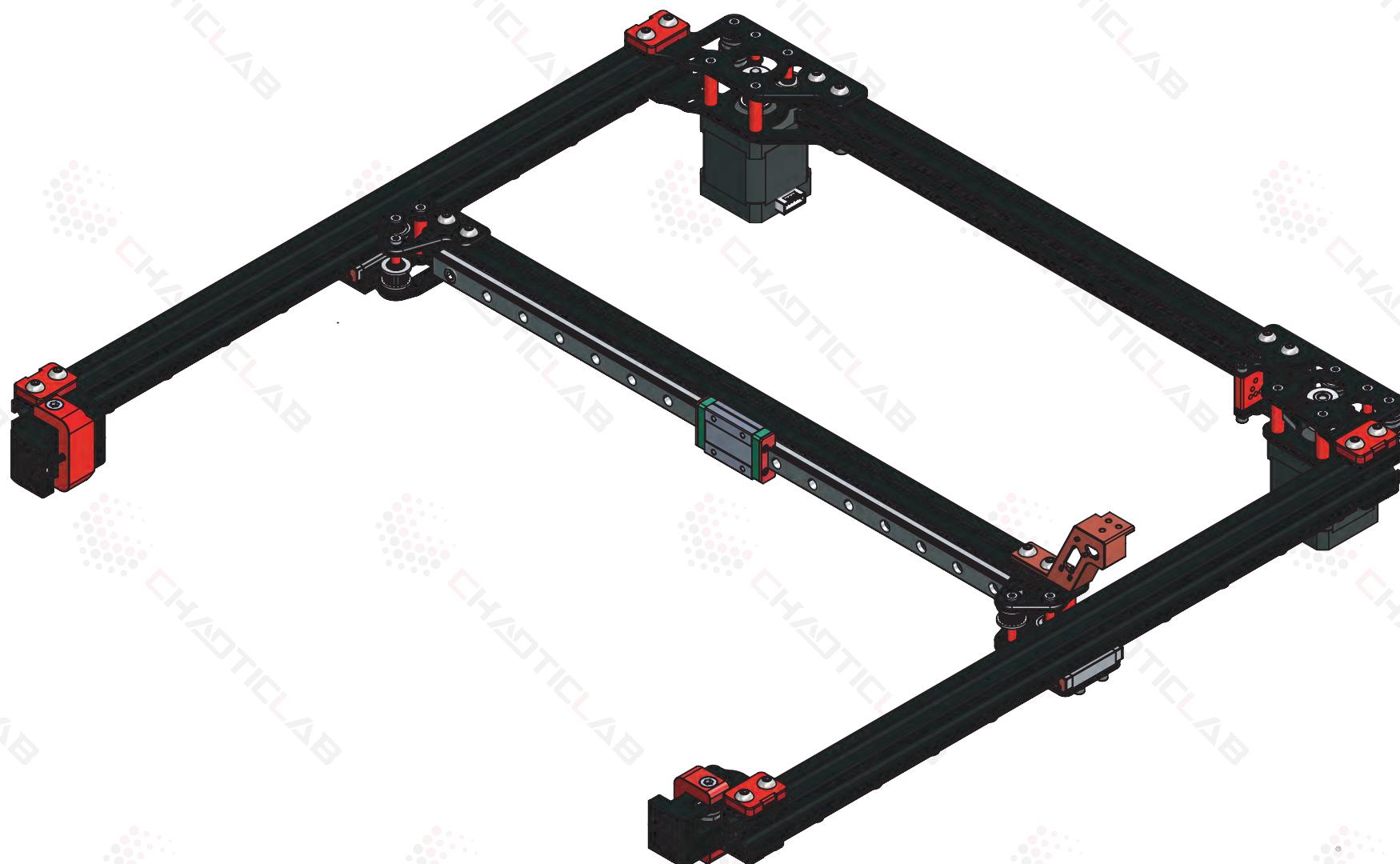
Tighten M3x32 screws

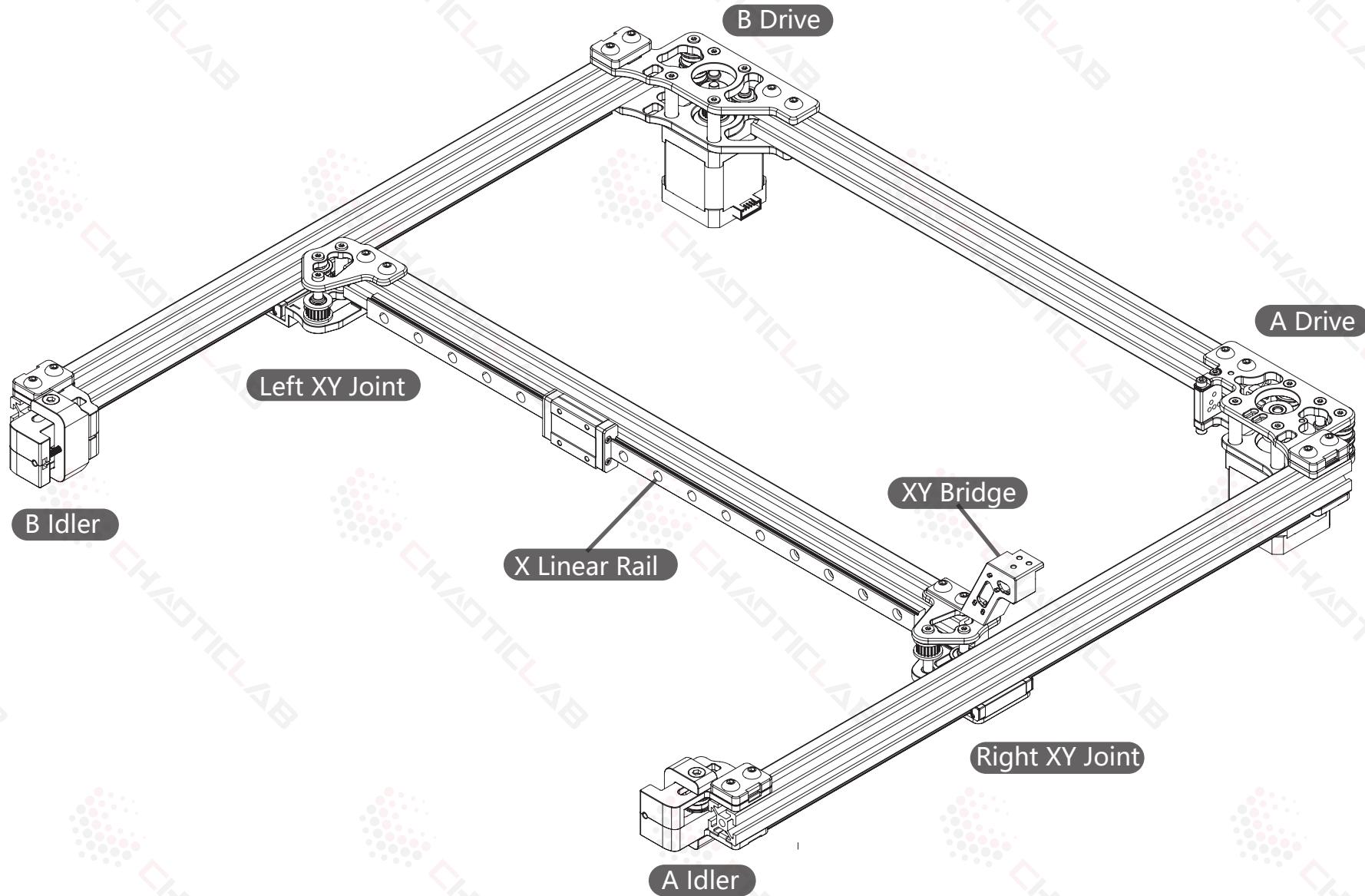
**CHECK YOUR WORK**

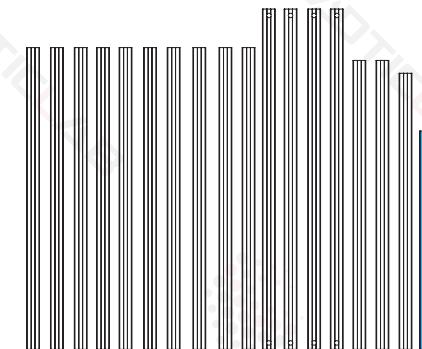
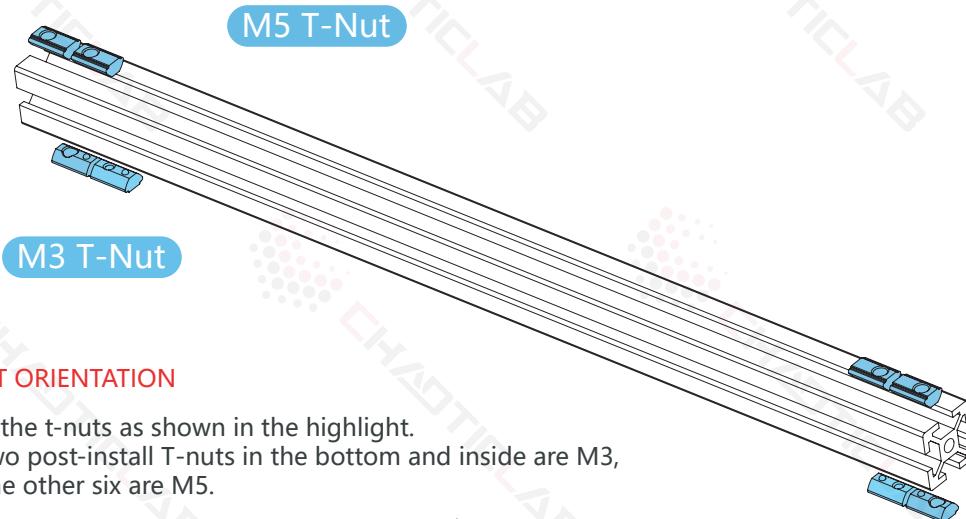
Compare your assembled part to the graphic shown here.
Pay attention to the pulley orientation and alignment with the bearing stack ups.

GANTRY

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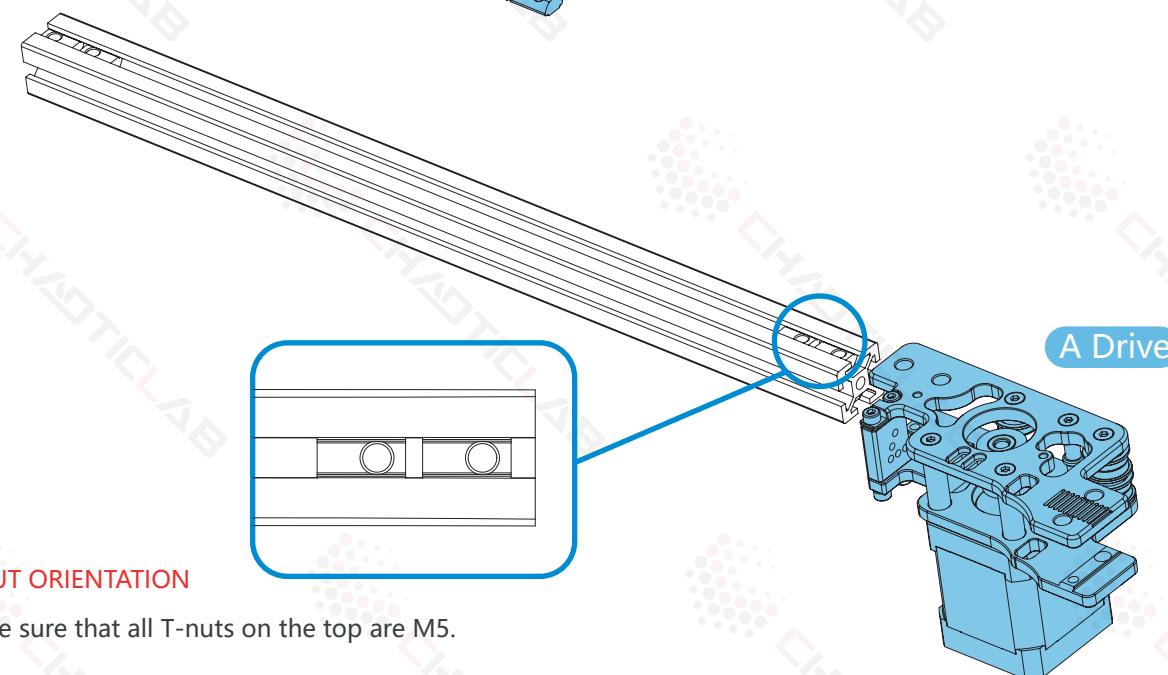






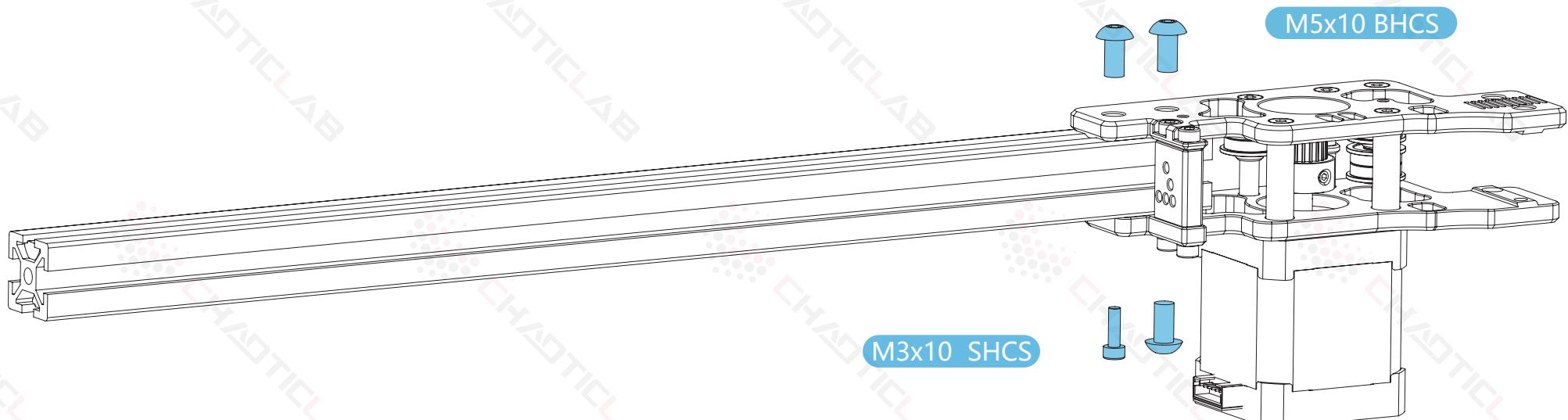
T-NUT ORIENTATION

Insert the t-nuts as shown in the highlight.
The two post-install T-nuts in the bottom and inside are M3,
and the other six are M5.



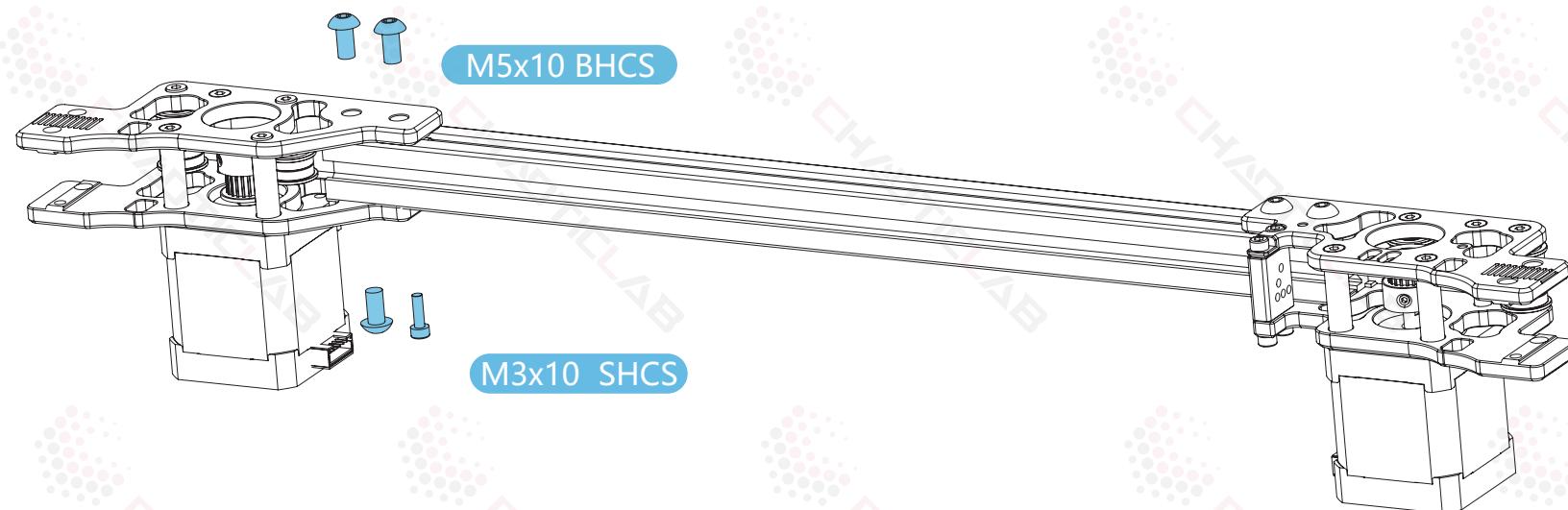
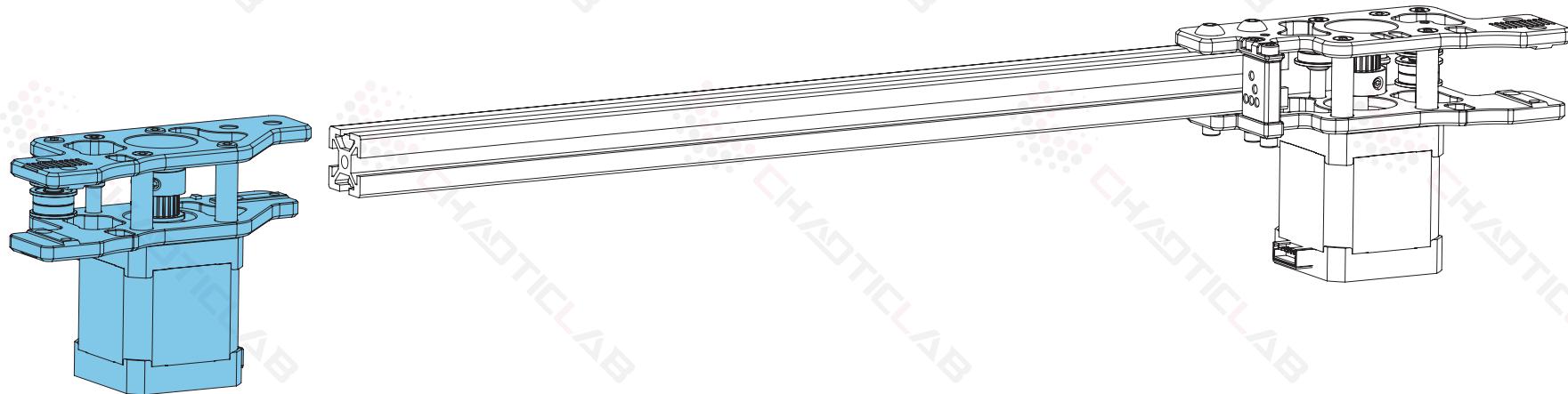
GANTRY

WWW.CHAOTICLAB.XYZ



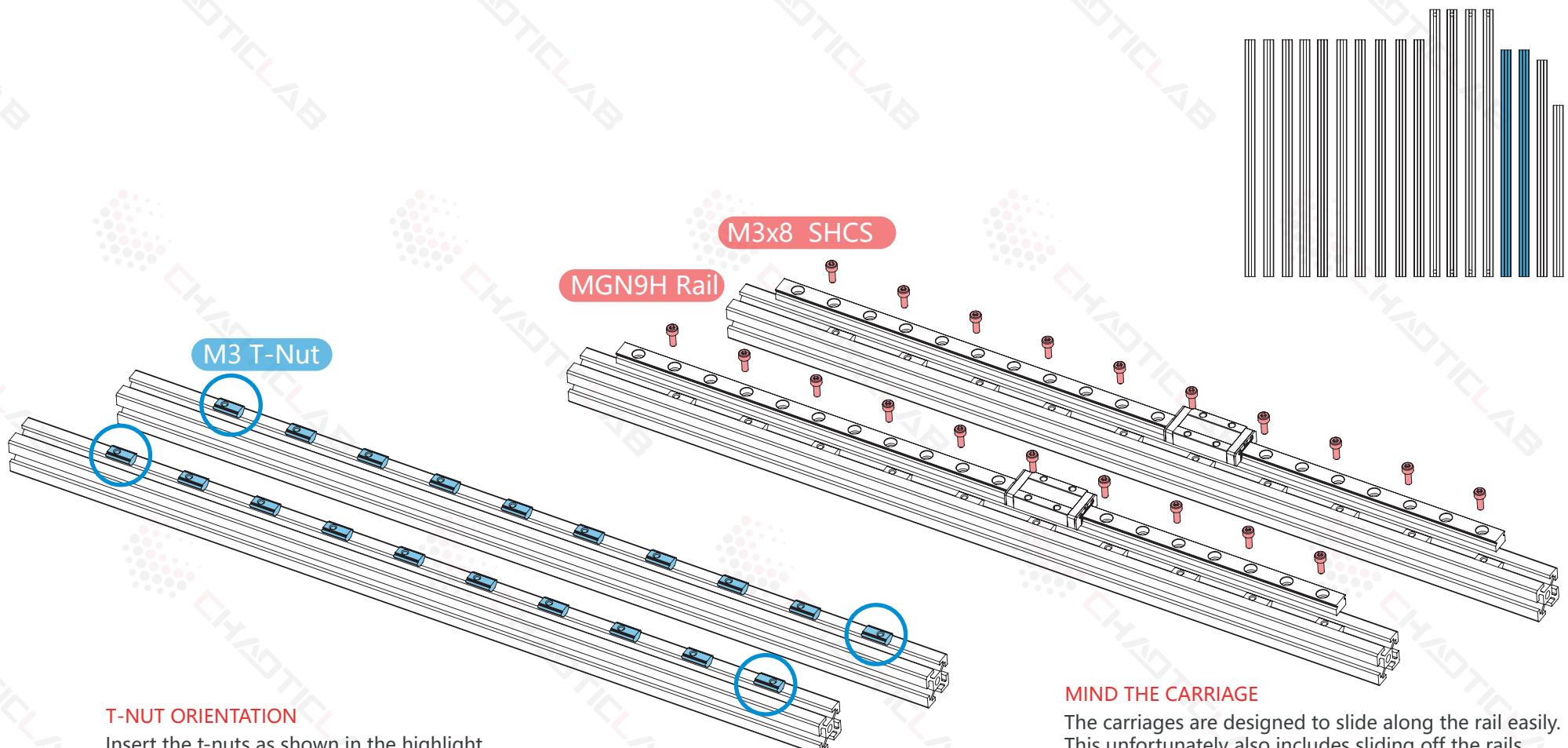
GANTRY

WWW.CHAOTICLAB.XYZ



Y AXIS

WWW.CHAOTICLAB.XYZ



T-NUT ORIENTATION

Insert the t-nuts as shown in the highlight.

MIND THE CARRIAGE

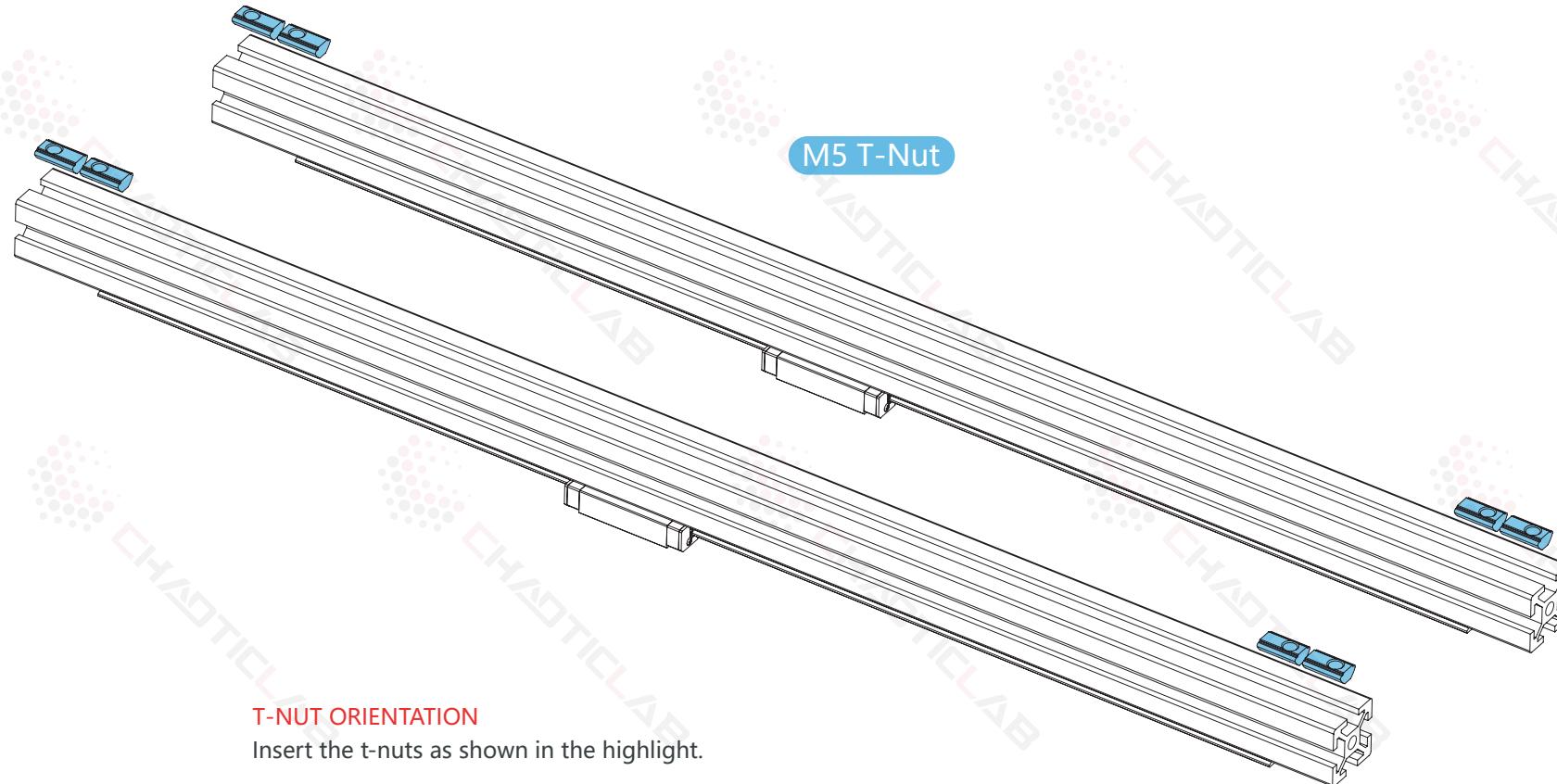
The carriages are designed to slide along the rail easily. This unfortunately also includes sliding off the rails.

Dropping the carriage likely irreparably damages it.



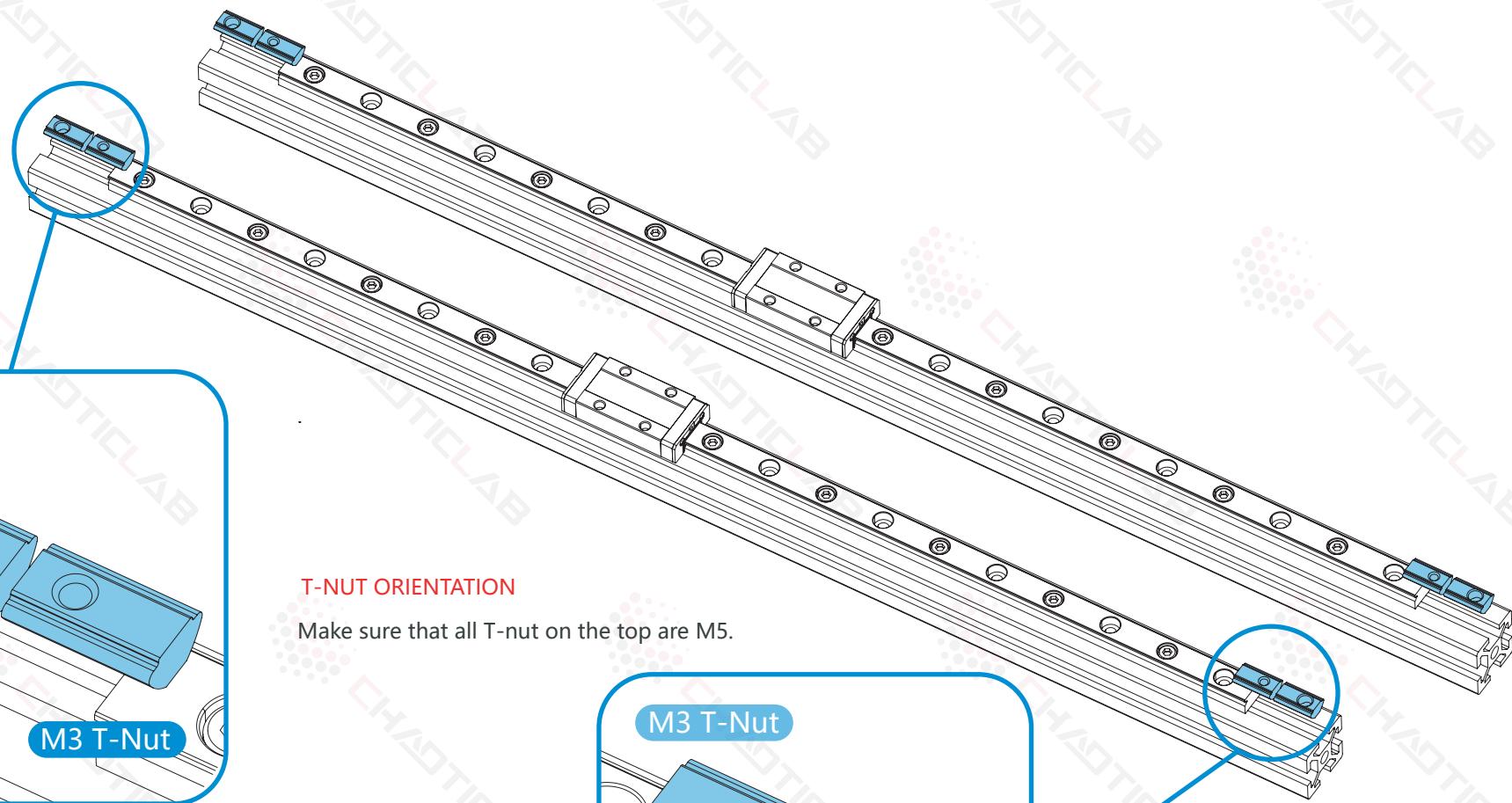
Y AXIS

WWW.CHAOTICLAB.XYZ



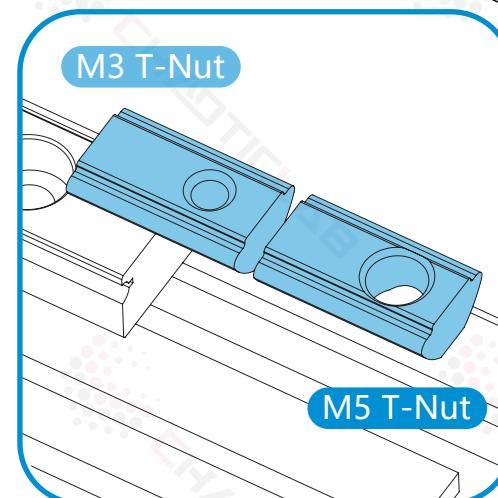
Y AXIS

WWW.CHAOTICLAB.XYZ



T-NUT ORIENTATION

Make sure that all T-nut on the top are M5.



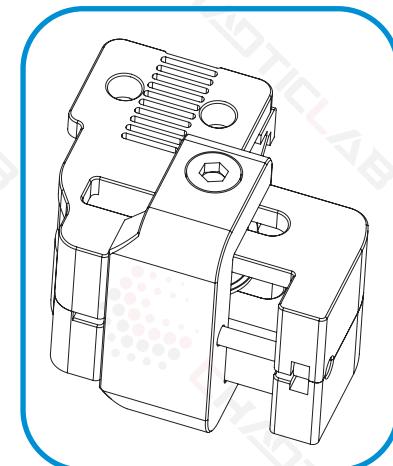
Y AXIS

WWW.CHAOTICLAB.XYZ



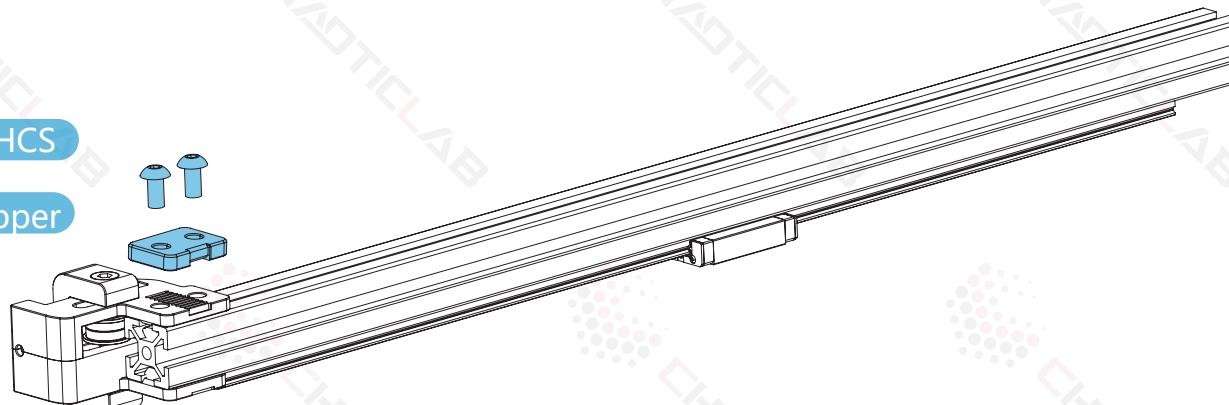
5MM HOLES ON TOP

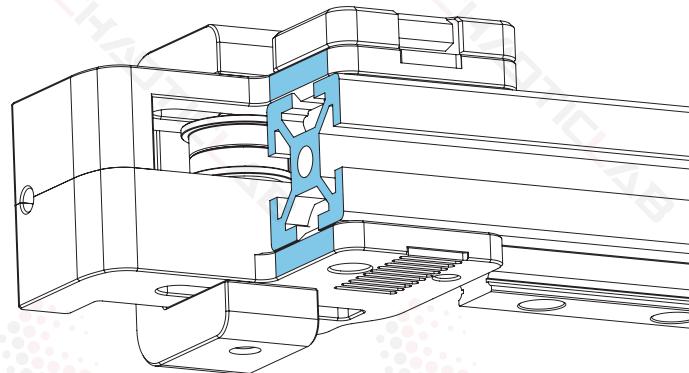
Make sure to use the idler that has 2 holes for M5 bolts in the top when oriented as shown.



M5x16 BHCS

Belt Clip Upper

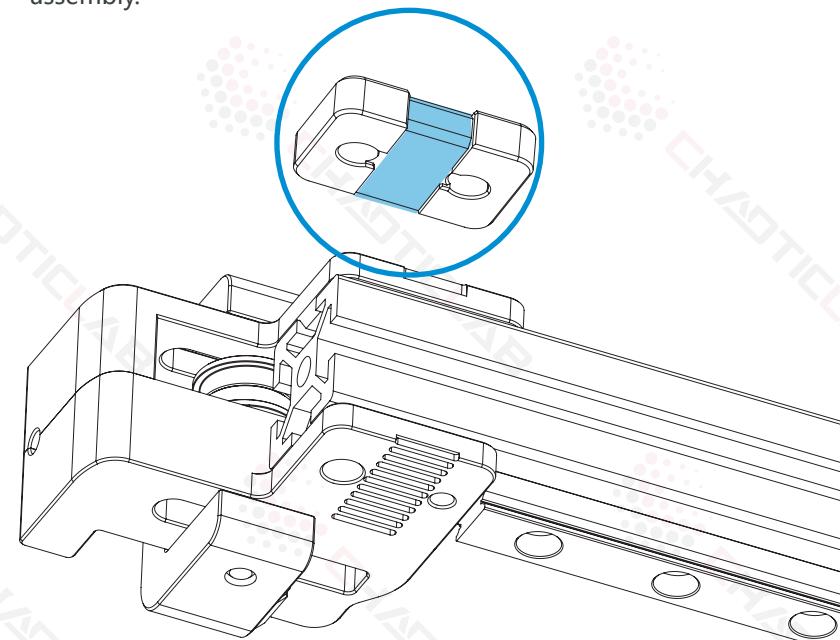


**FLUSH INSTALL**

Make sure the plastic part sits flush with the end of the extrusion. If not flush check if you installed the correct idler.

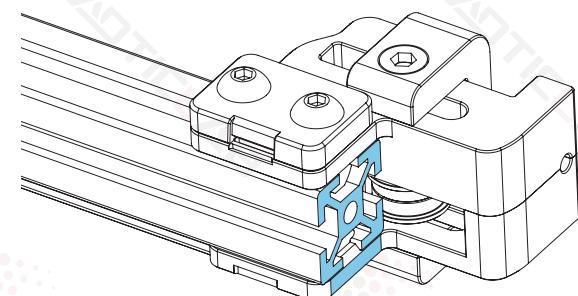
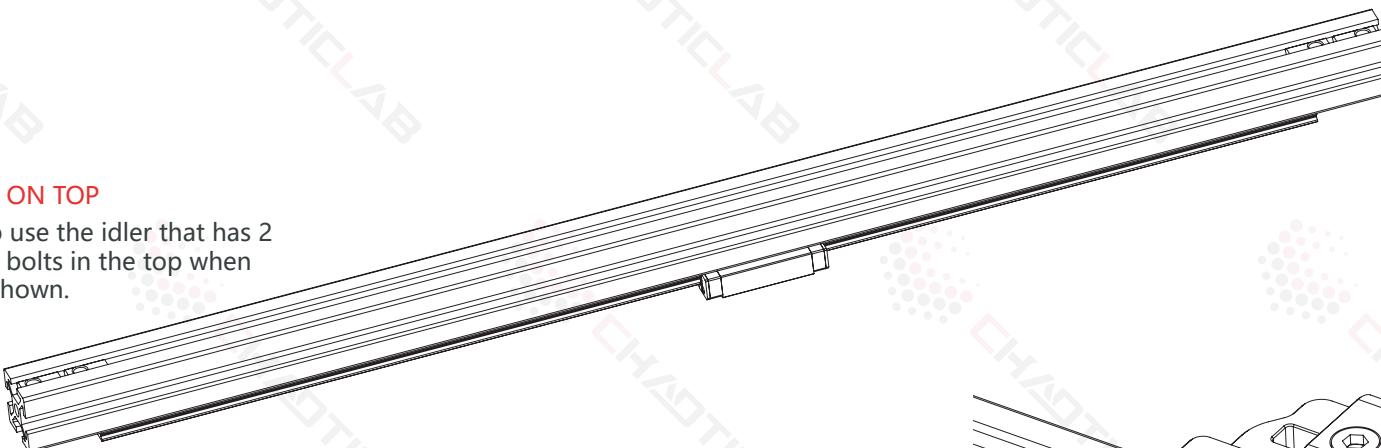
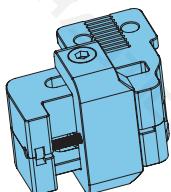
NOTCH ORIENTATION

The indentation along the part is designed to clamp on the belt. The notch points away from the idler assembly.

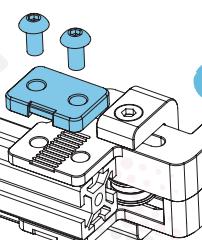
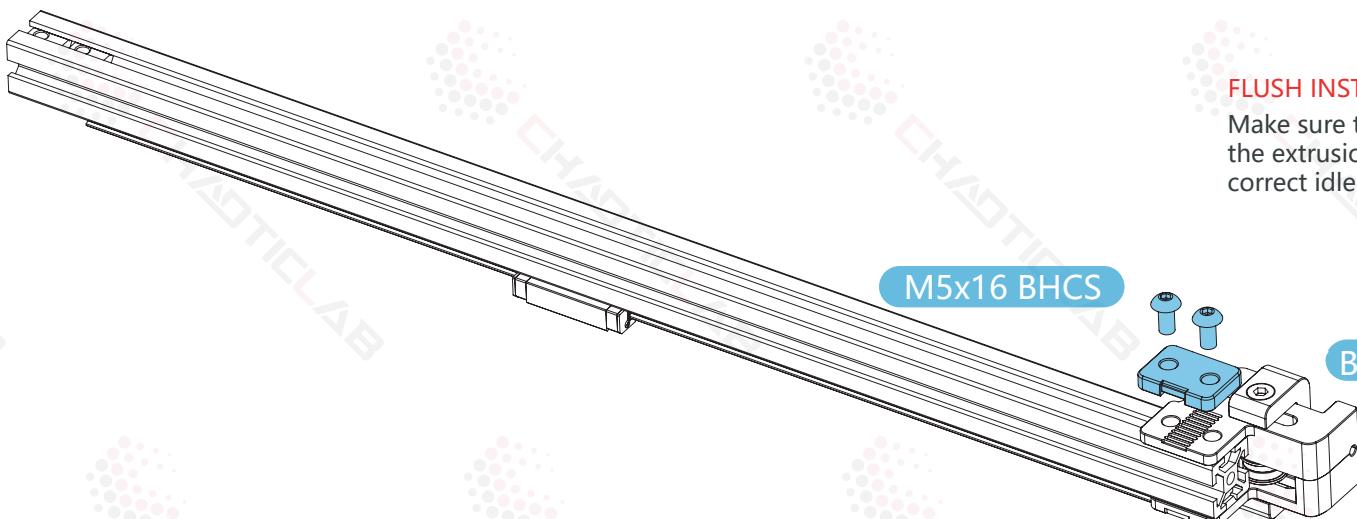


5MM HOLES ON TOP

Make sure to use the idler that has 2 holes for M5 bolts in the top when oriented as shown.

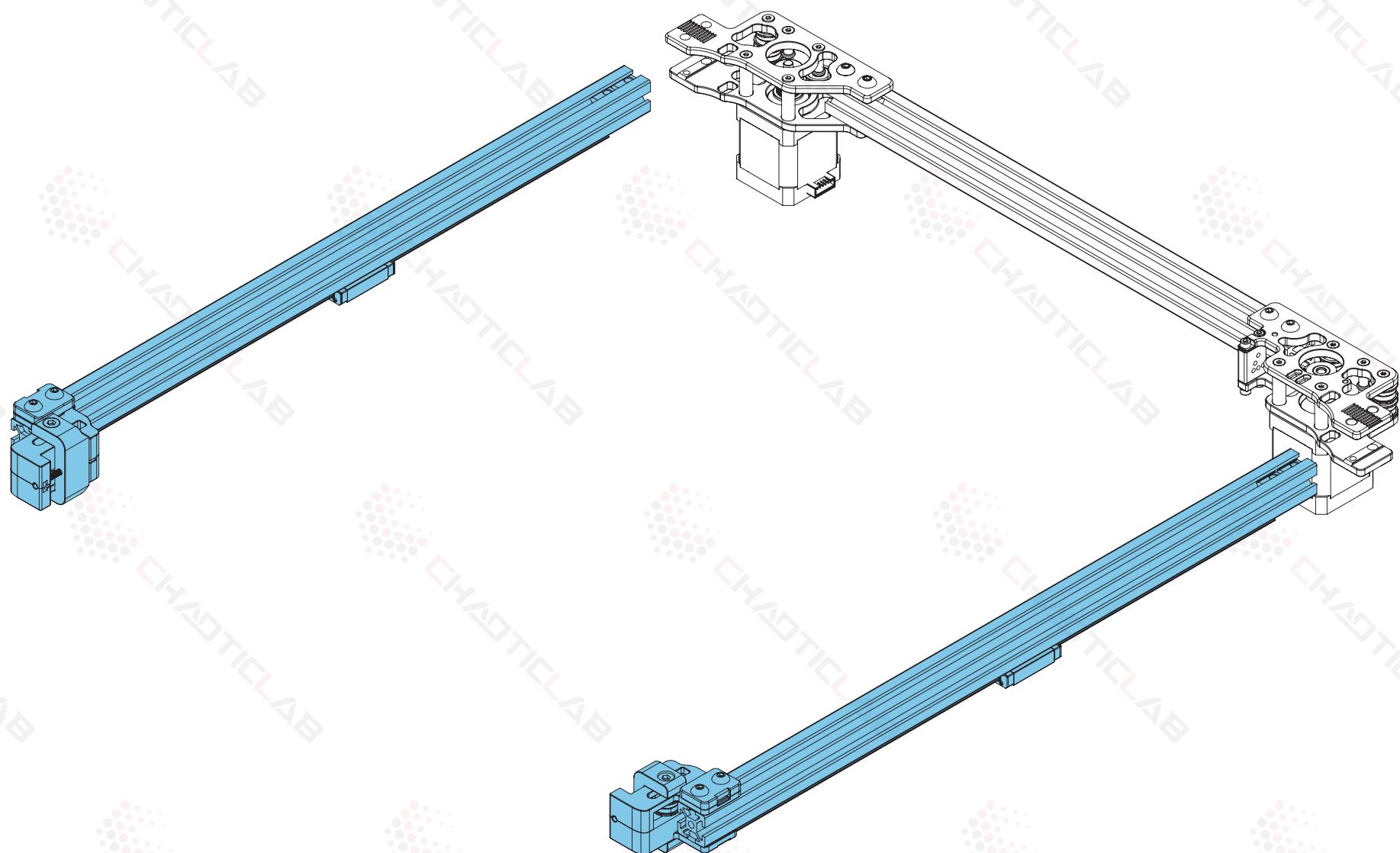
**FLUSH INSTALL**

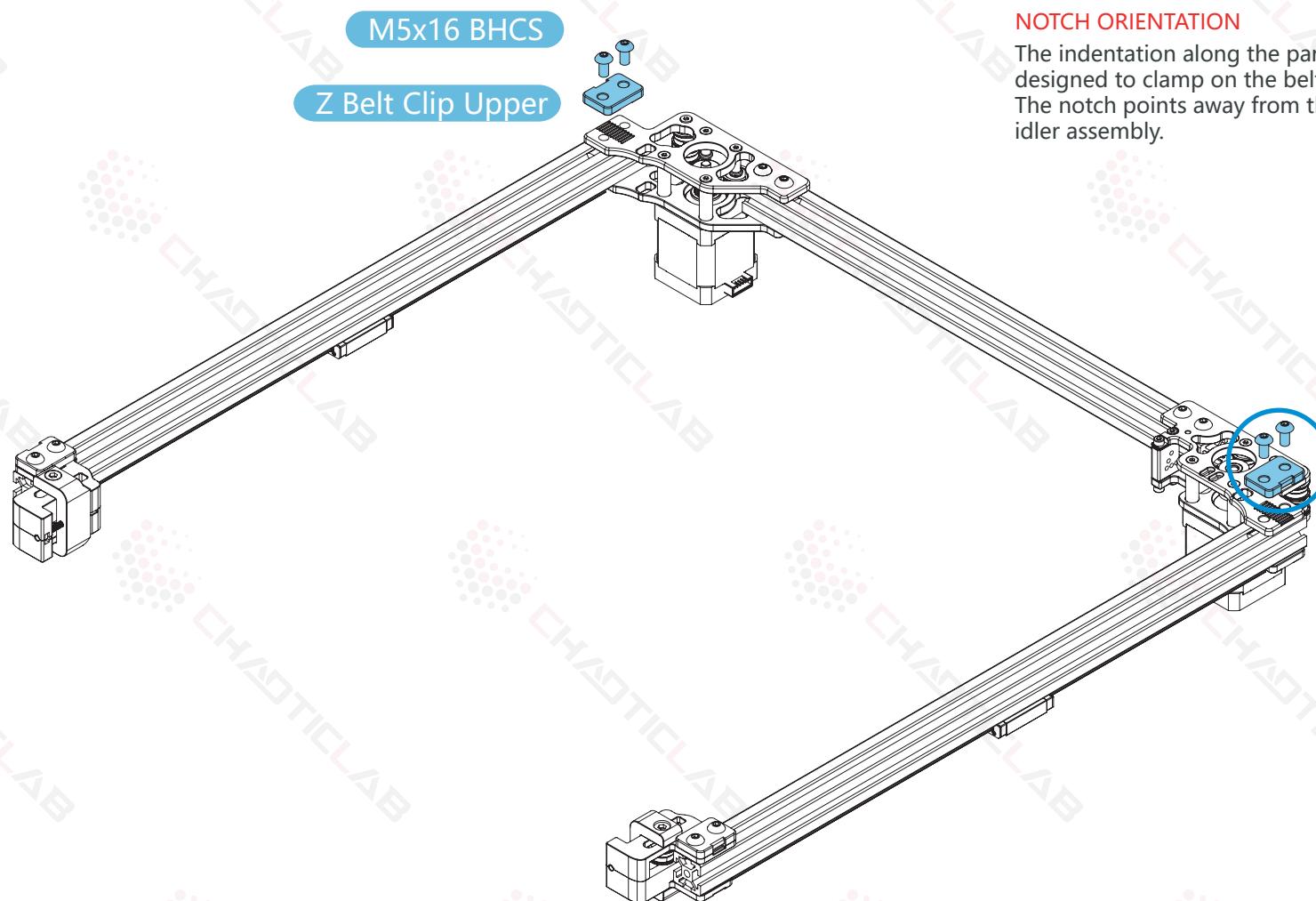
Make sure the plastic part sits flush with the end of the extrusion. If not flush check if you installed the correct idler.

M5x16 BHCS**Belt Clip Upper**

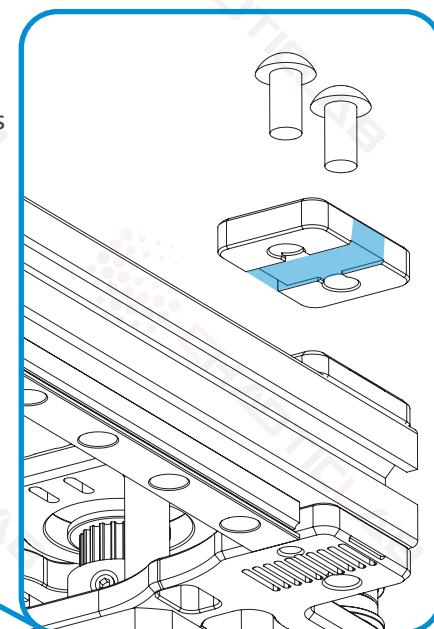
GANTRY

WWW.CHAOTICLAB.XYZ

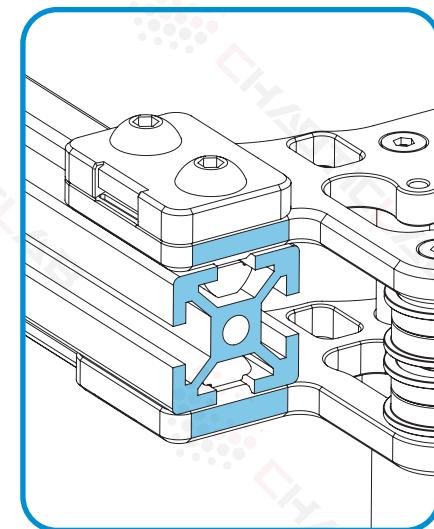


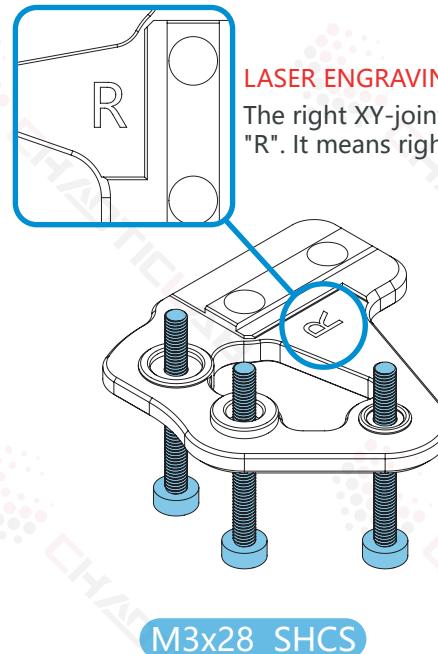
**NOTCH ORIENTATION**

The indentation along the part is designed to clamp on the belt. The notch points away from the idler assembly.

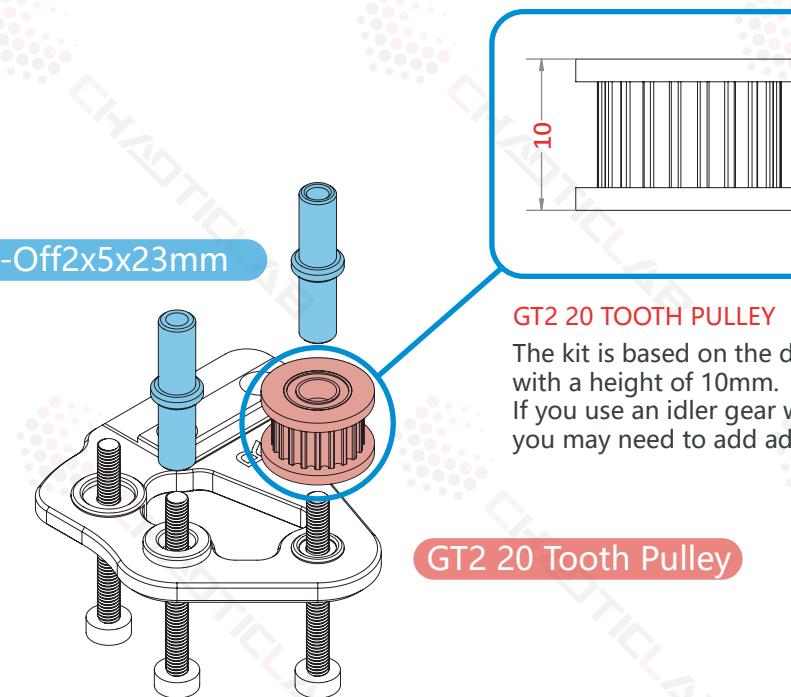
**FLUSH INSTALL**

Make sure the plastic part sits flush with the end of the extrusion. If not flush check if you installed the correct idler.

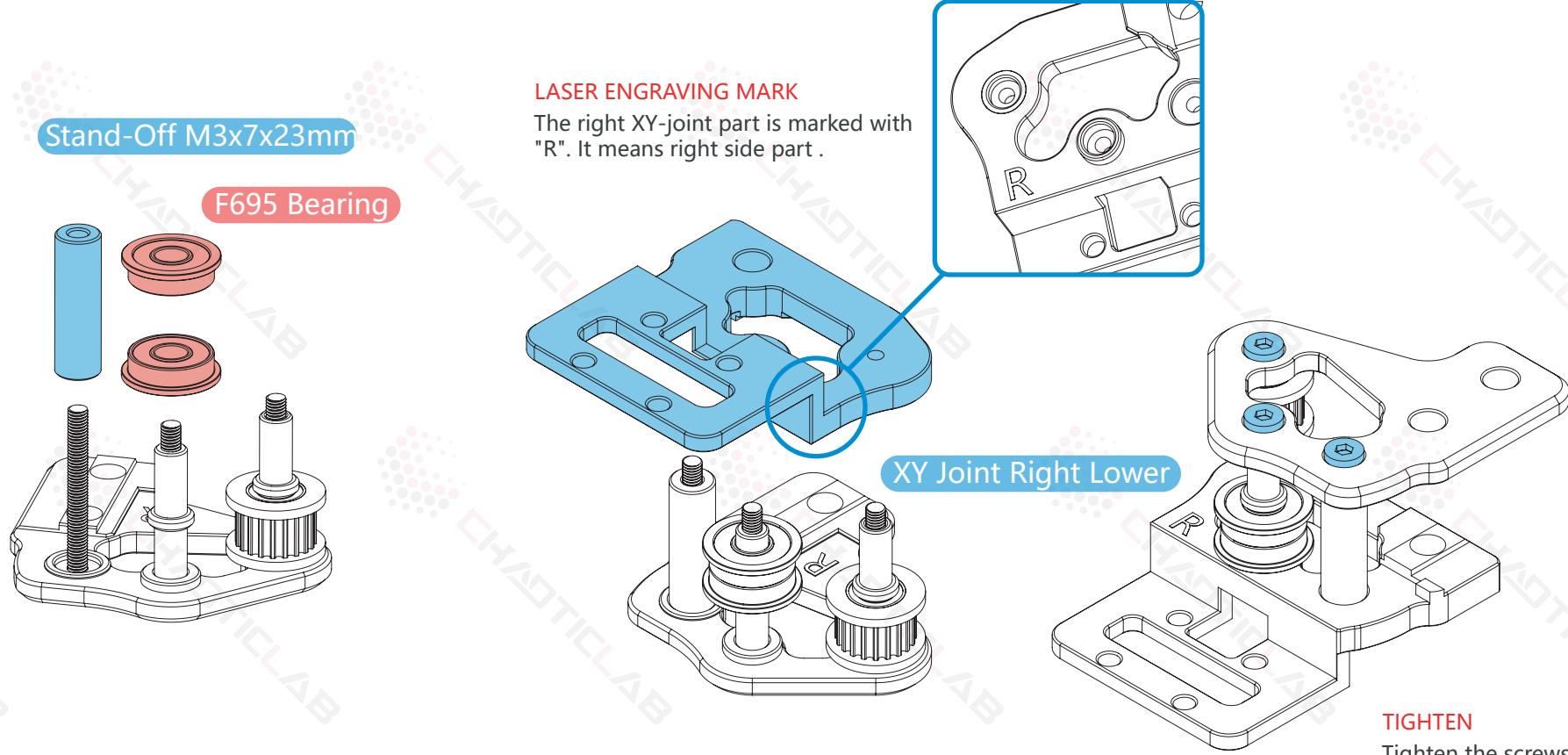


**LASER ENGRAVING MARK**

The right XY-joint part is marked with "R". It means right side part.

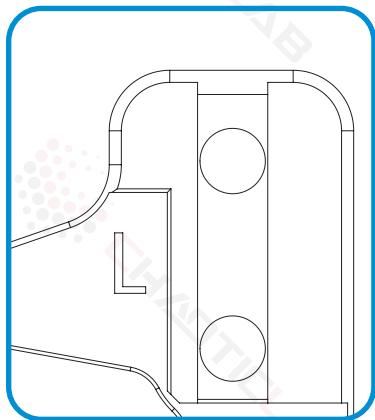
**GT2 20 TOOTH PULLEY**

The kit is based on the design of an idler gear with a height of 10mm.
If you use an idler gear with a height of 8.5mm, you may need to add additional shims.



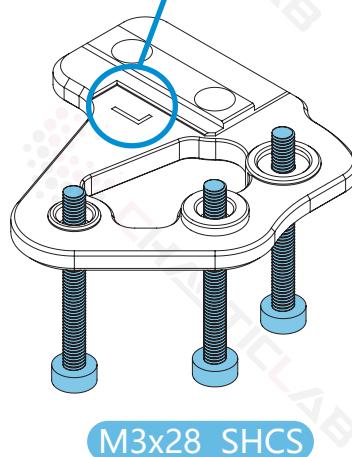
LEFT XY JOINT

WWW.CHAOTICLAB.XYZ



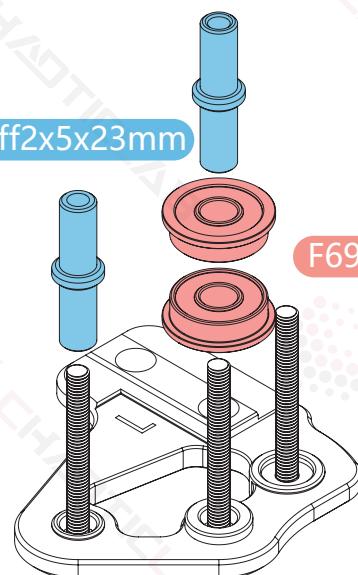
LASER ENGRAVING MARK

The left XY-joint part is marked with "L" . It means left side part .

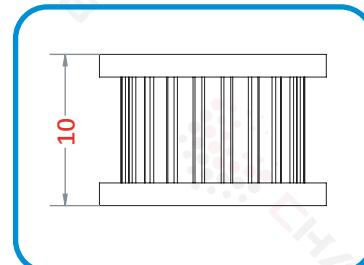


M3x28 SHCS

Stand-Off2x5x23mm



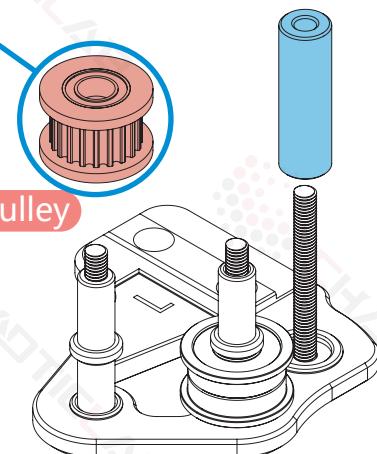
F695 Bearing



GT2 20 TOOTH PULLEY

The kit is based on the design of an idler gear with a height of 10mm.
If you use an idler gear with a height of 8.5mm, you may need to add additional shims.

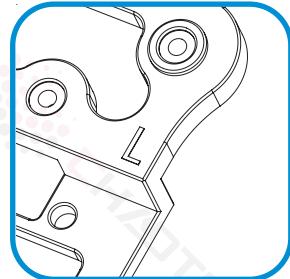
Stand-Off M3x7x23mm



GT2 20 Tooth Pulley

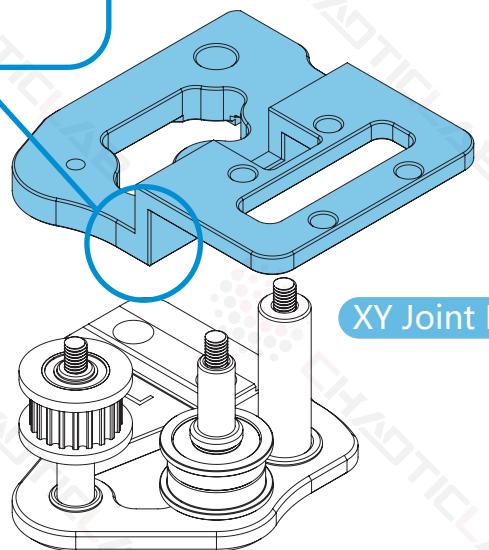
LEFT XY JOINT

WWW.CHAOTICLAB.XYZ

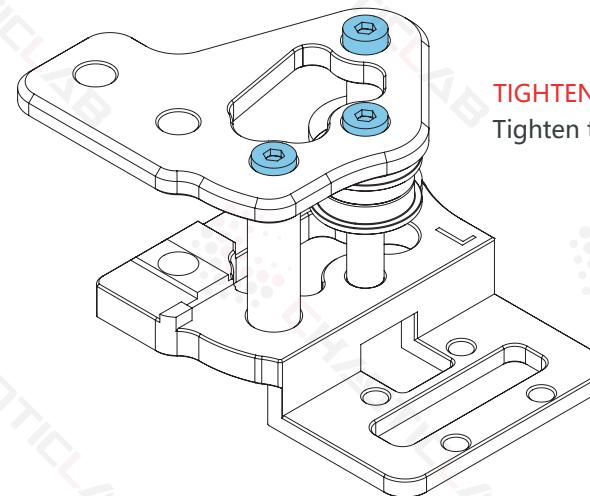


LASER ENGRAVING MARK

The left XY-joint part is marked with "L".
It means left side part .



XY Joint Left Lower

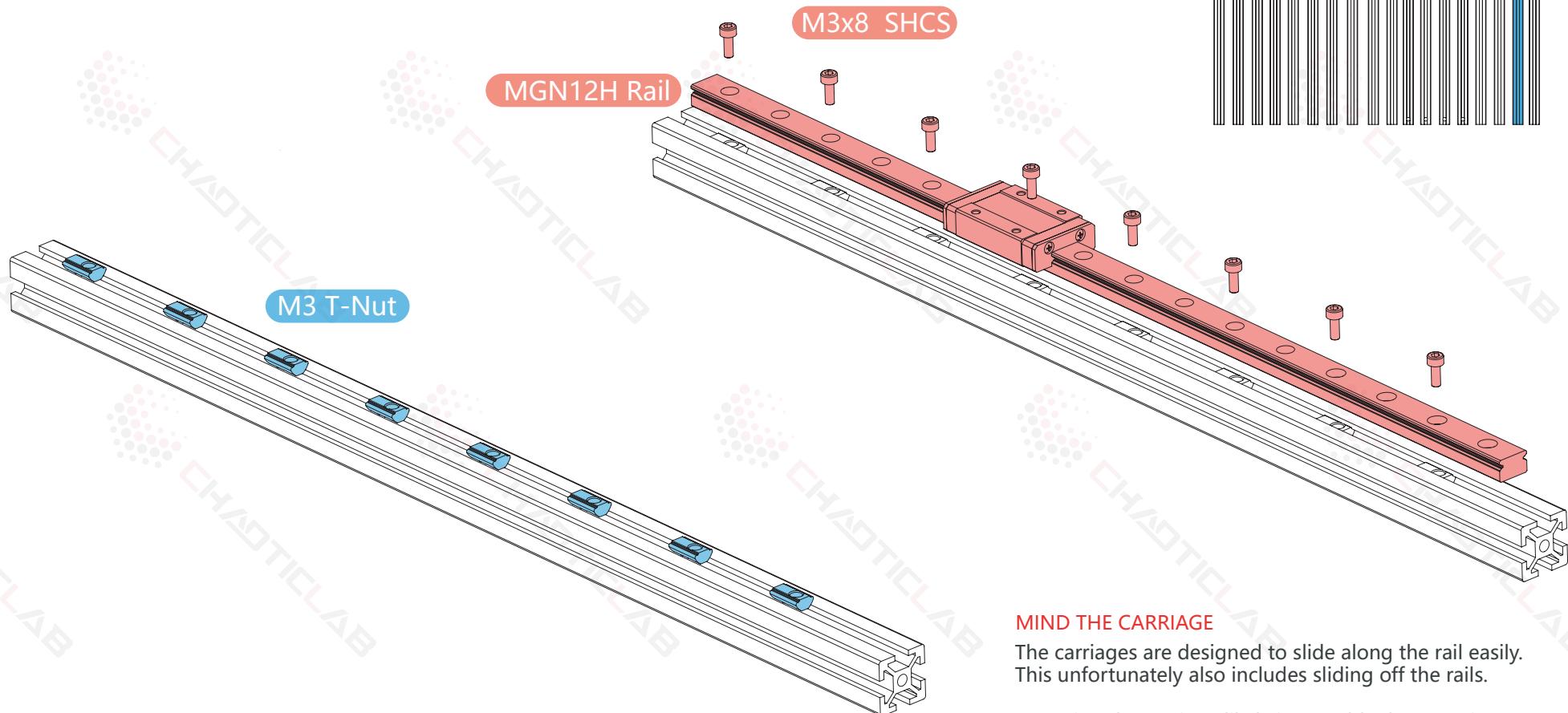


TIGHTEN

Tighten the screws.

X AXIS

WWW.CHAOTICLAB.XYZ

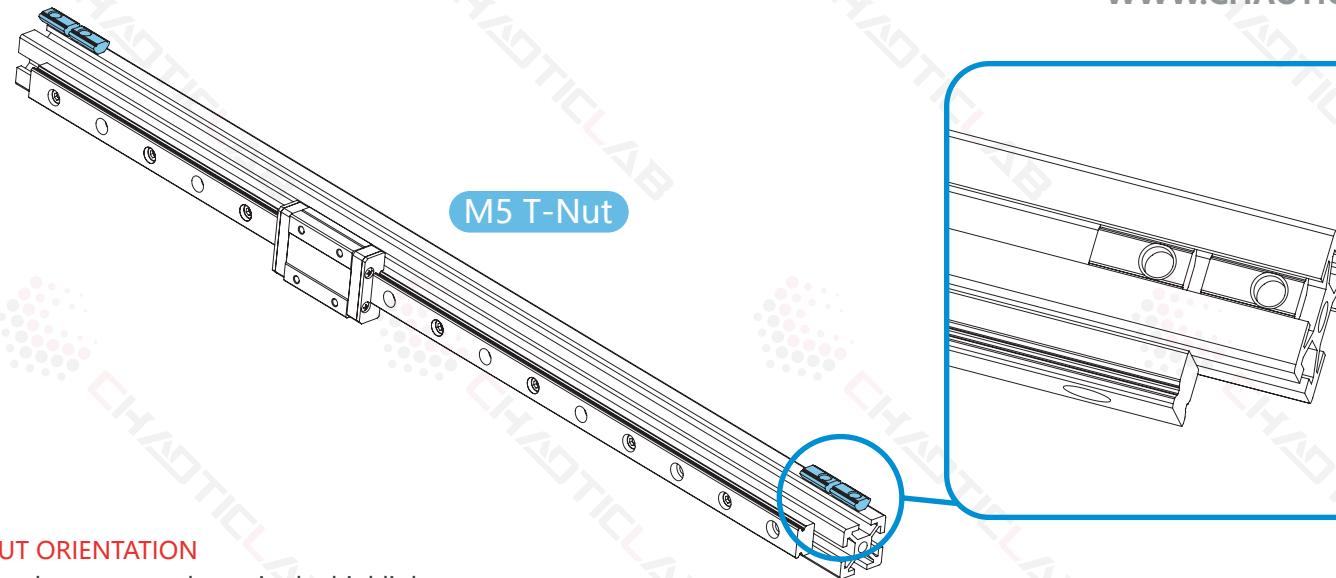


MIND THE CARRIAGE

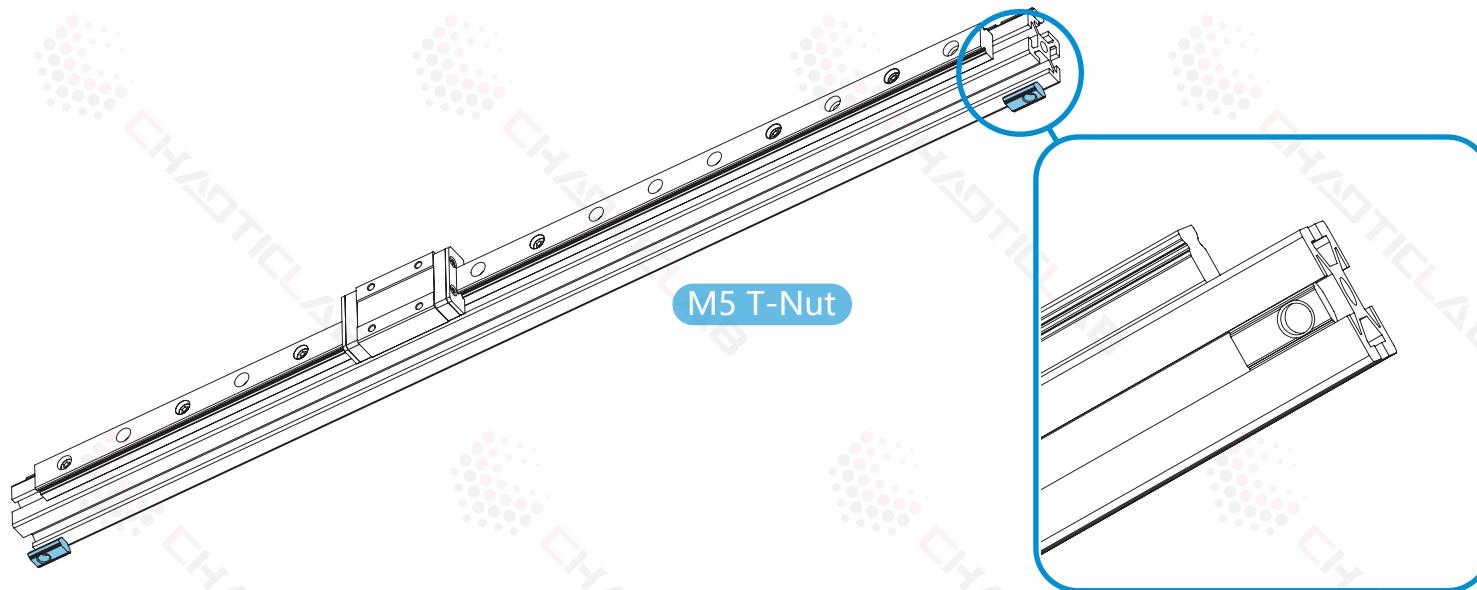
The carriages are designed to slide along the rail easily. This unfortunately also includes sliding off the rails.

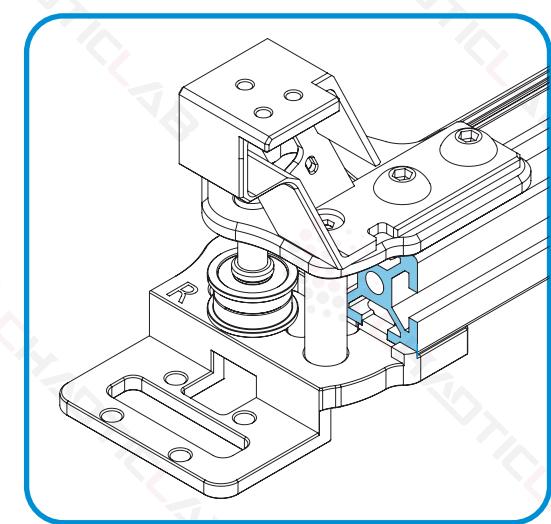
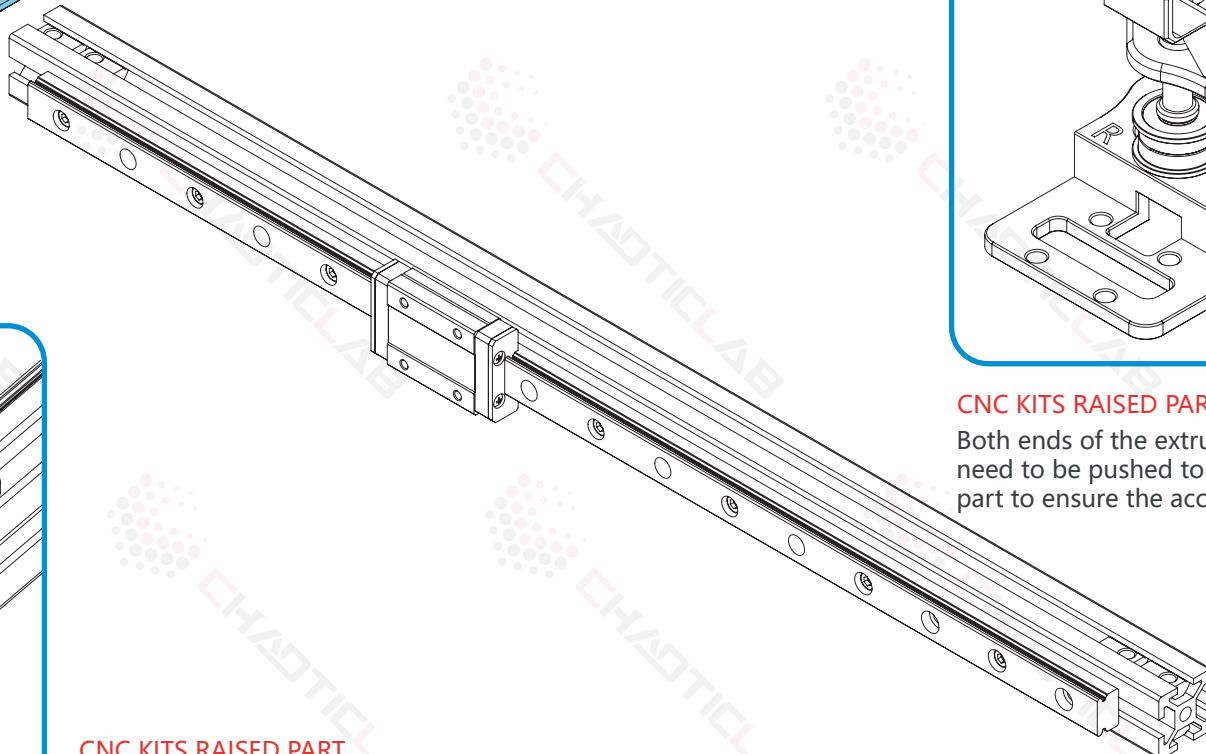
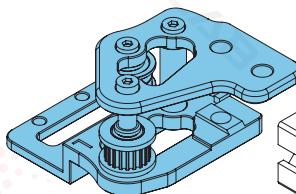
Dropping the carriage likely irreparably damages it.



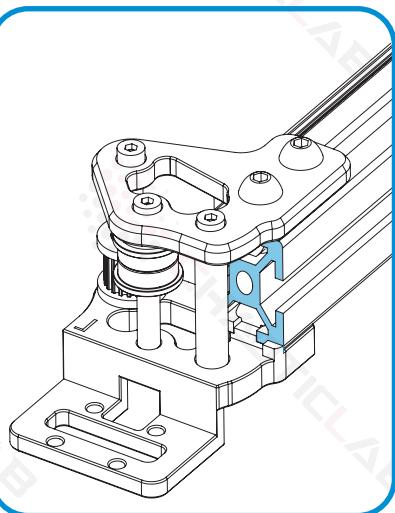
**T-NUT ORIENTATION**

Insert the t-nuts as shown in the highlight.

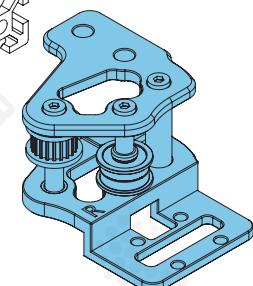


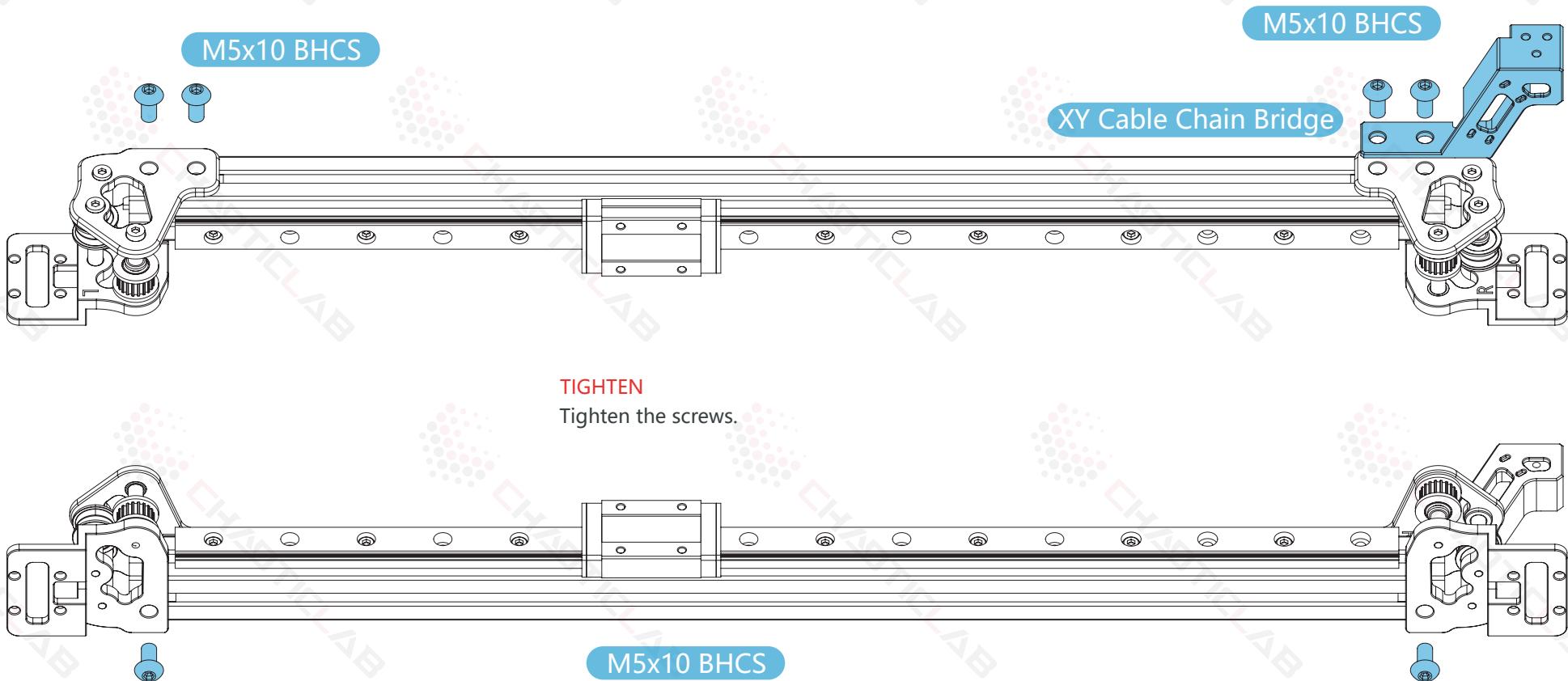
**CNC KITS RAISED PART**

Both ends of the extrusion, highlighted in blue, need to be pushed to the raised stops of the CNC part to ensure the accuracy of the installation.

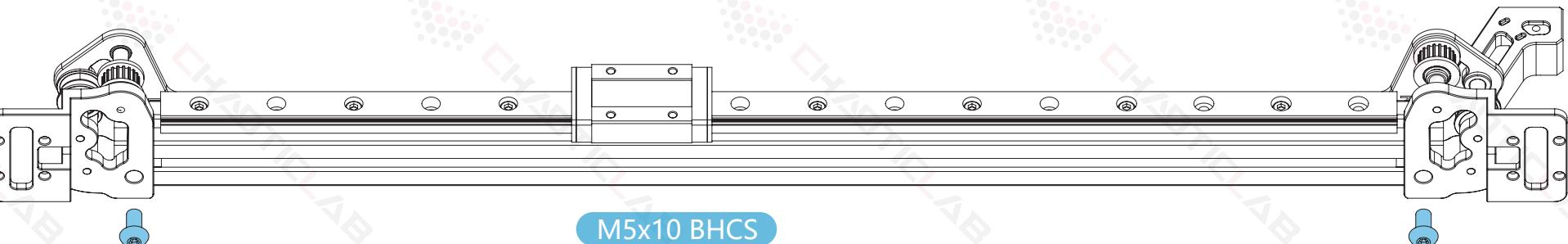
**CNC KITS RAISED PART**

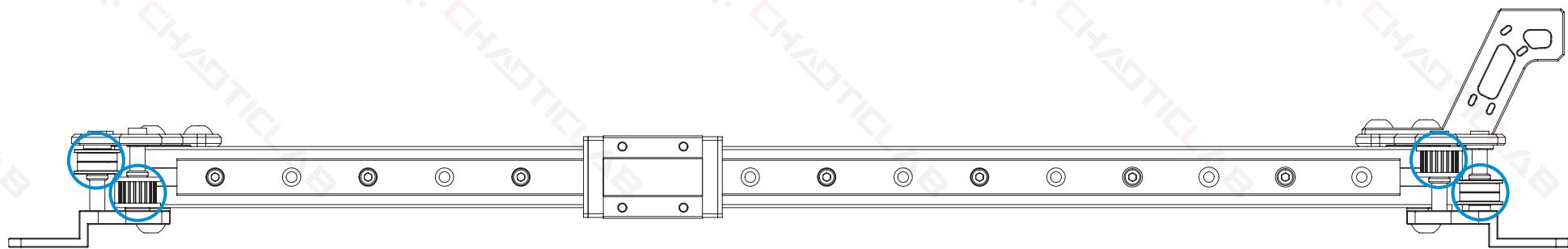
Both ends of the extrusion, highlighted in blue, need to be pushed to the raised stops of the CNC part to ensure the accuracy of the installation.





TIGHTEN
Tighten the screws.

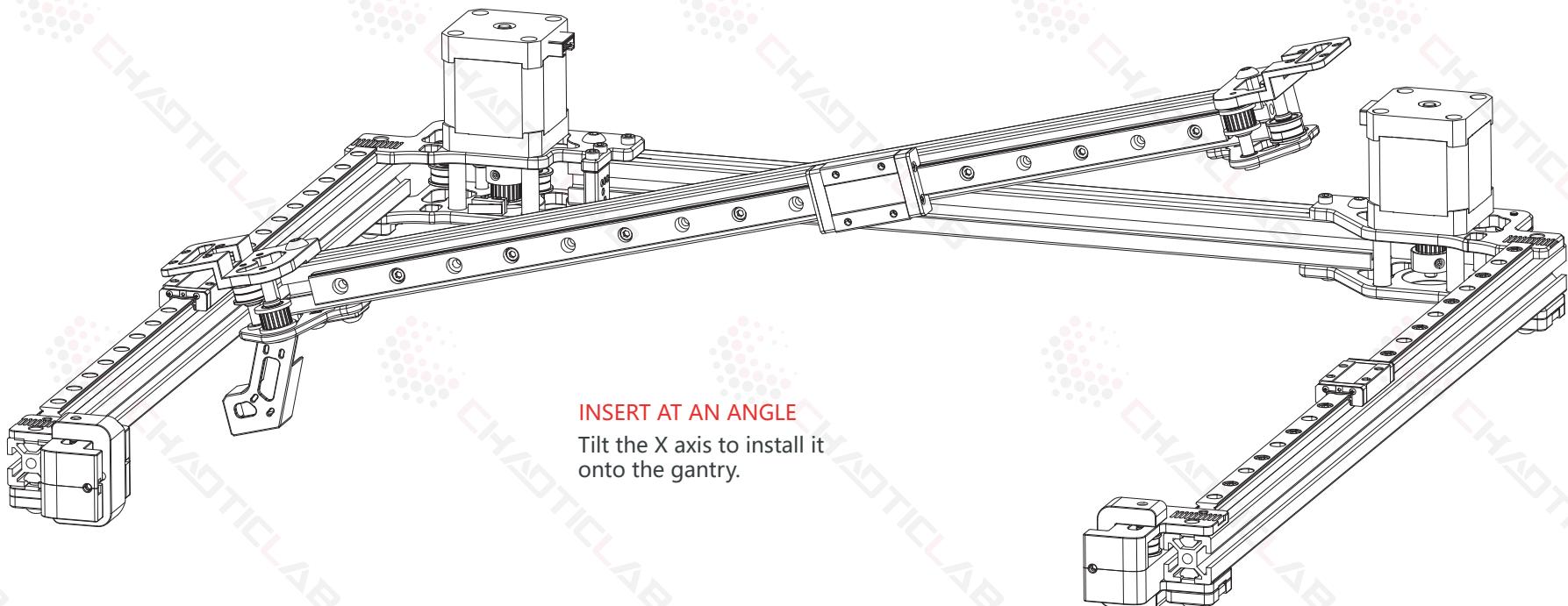


**CHECK YOUR WORK**

Compare your assembled part to the graphic shown here.
Pay attention to the pulley orientation and alignment with the bearing stack ups.

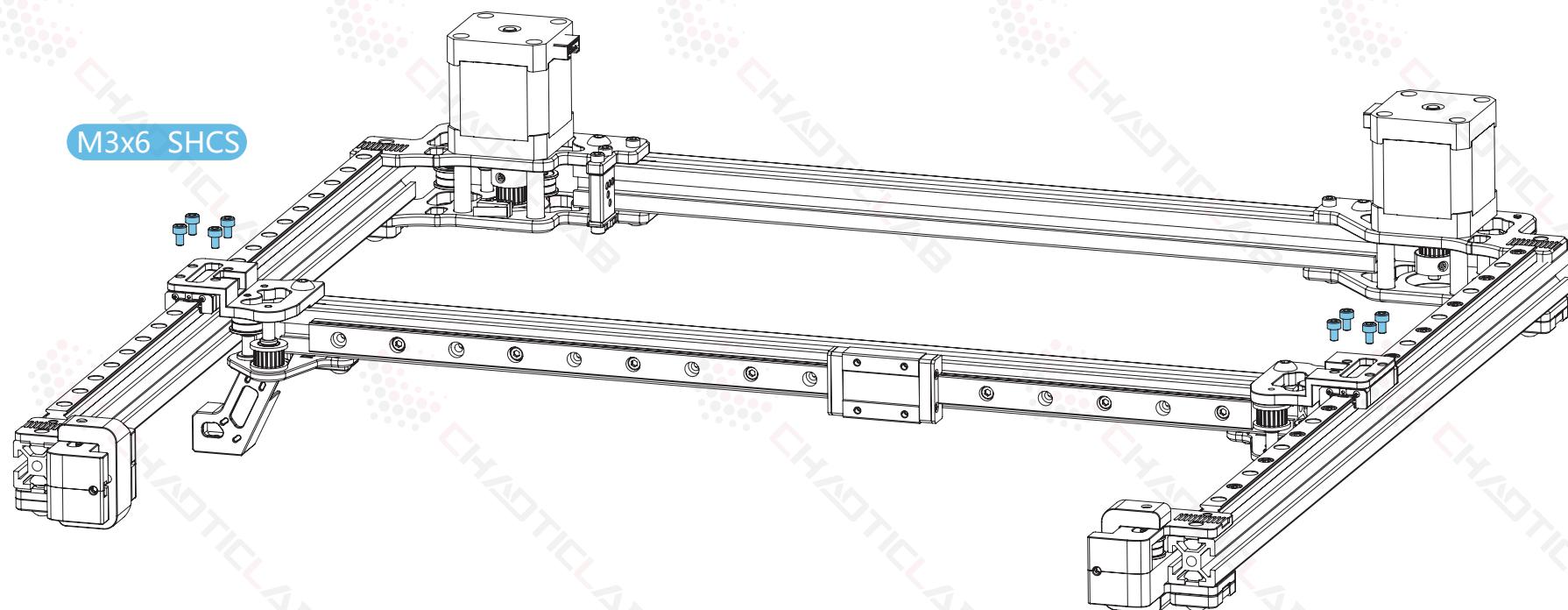
FLIP GANTRY

Turn the gantry around for the next step.



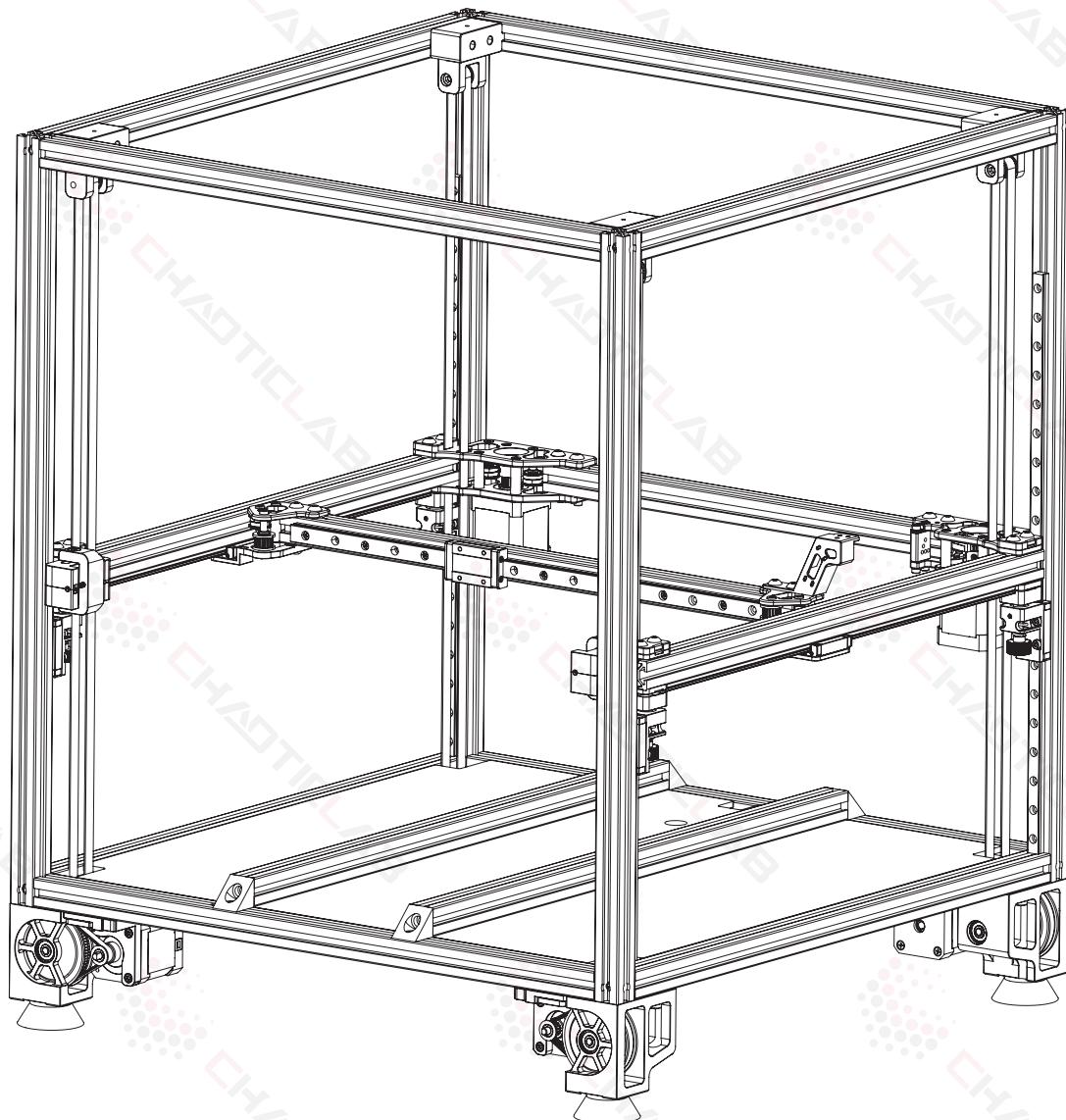
GANTRY

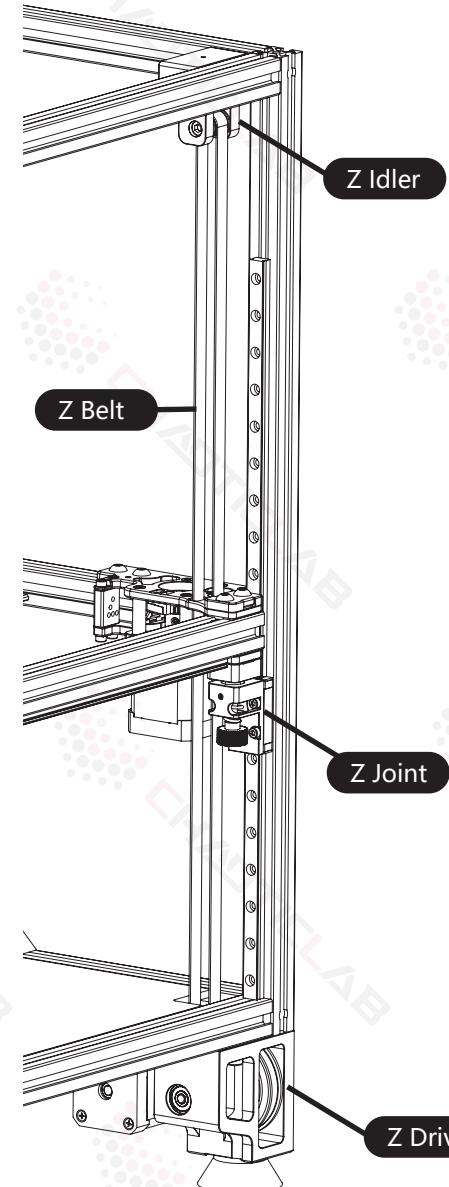
WWW.CHAOTICLAB.XYZ

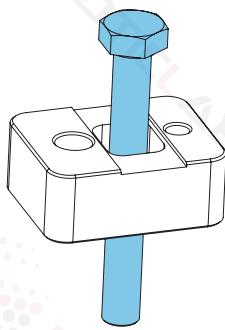


Z AXIS

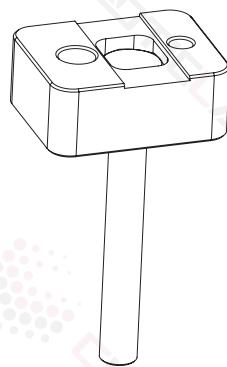
WWW.CHAOTICLAB.XYZ



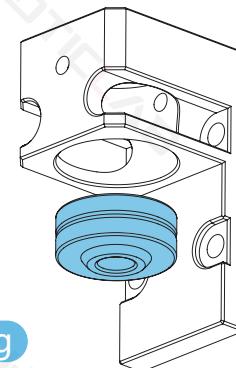




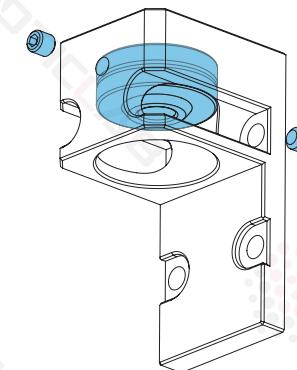
Hex Bolt M5x40



PB5 Bearing



M3x3 HSFG

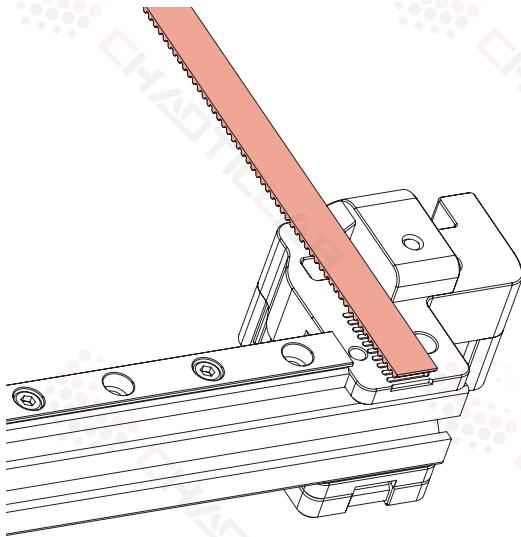


NOT TOO TIGHTLY

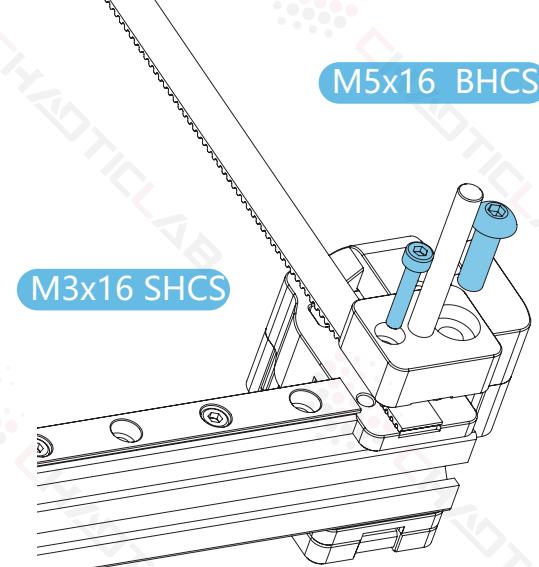
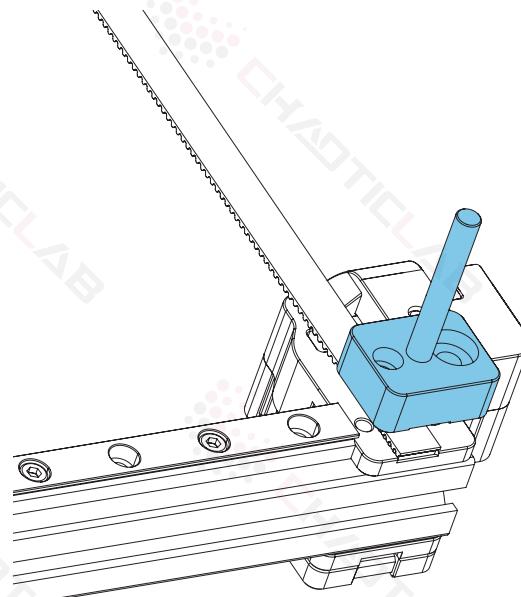
Fix the PB5 Bearing properly with the M3x3 HSFG, but not too tightly.

GANTRY IS STILL UPSIDE DOWN

It's a lot easier than fighting with gravity.



GT2 Belt 9mm wide

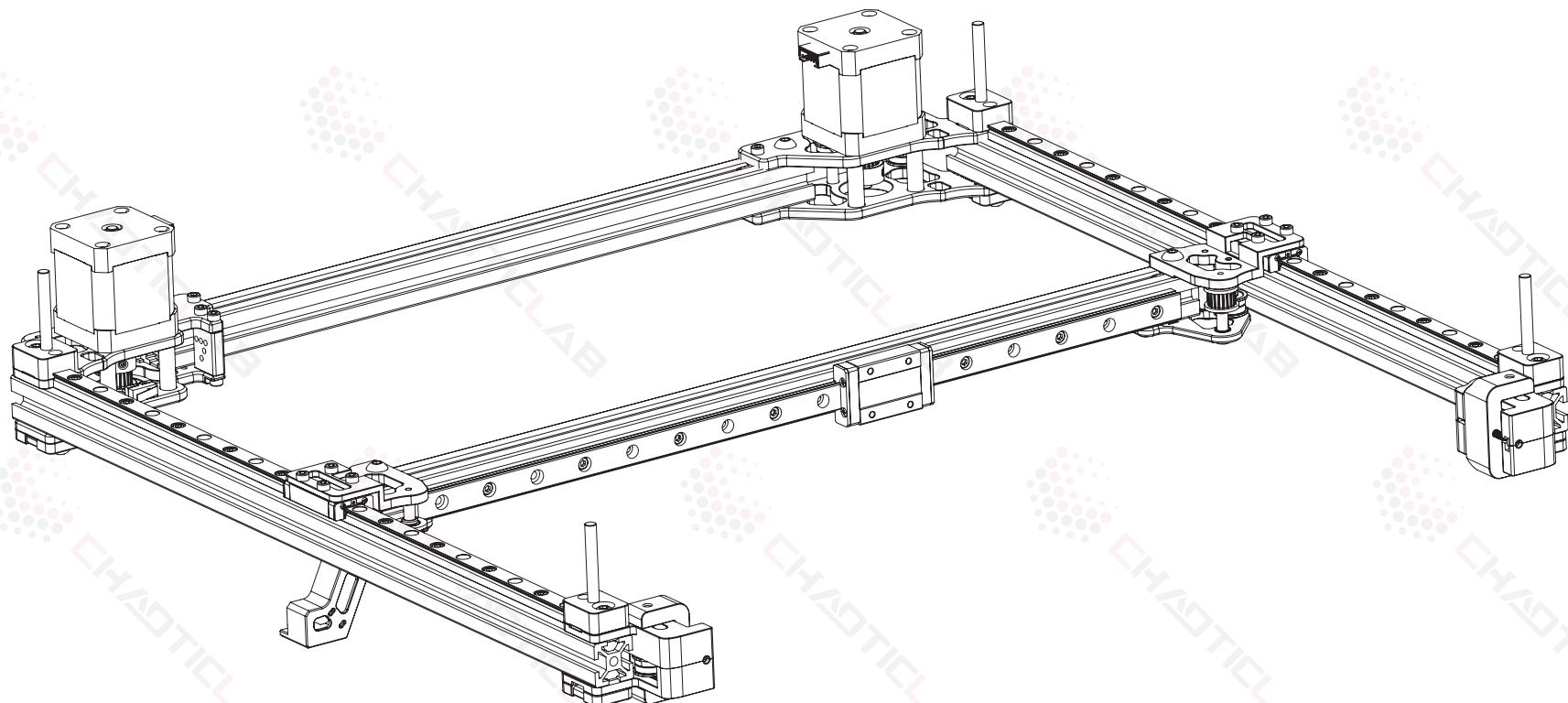


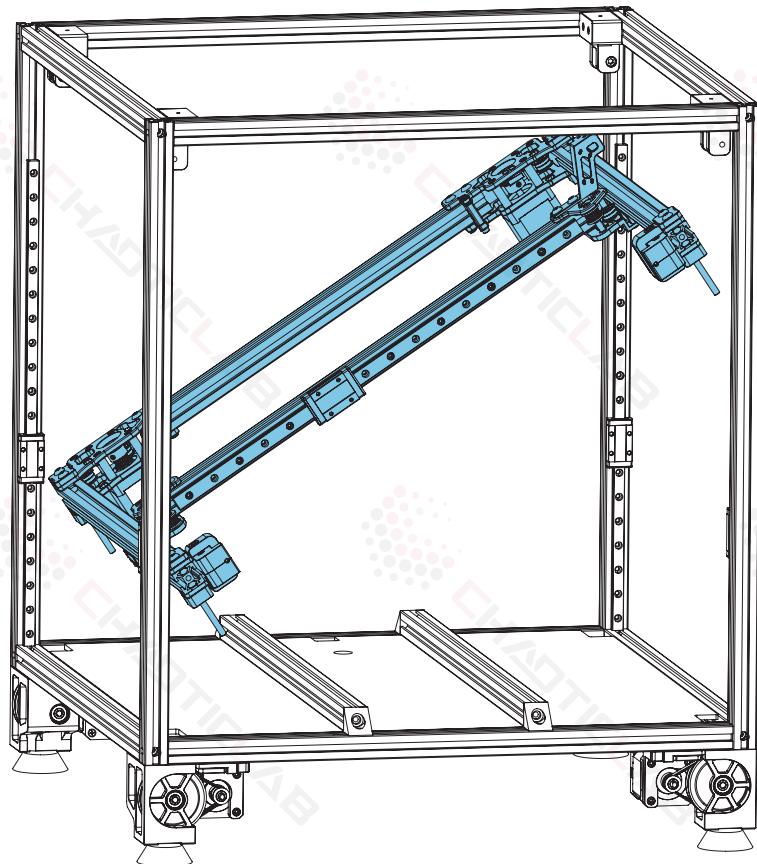
M5x16 BHCS

M3x16 SHCS

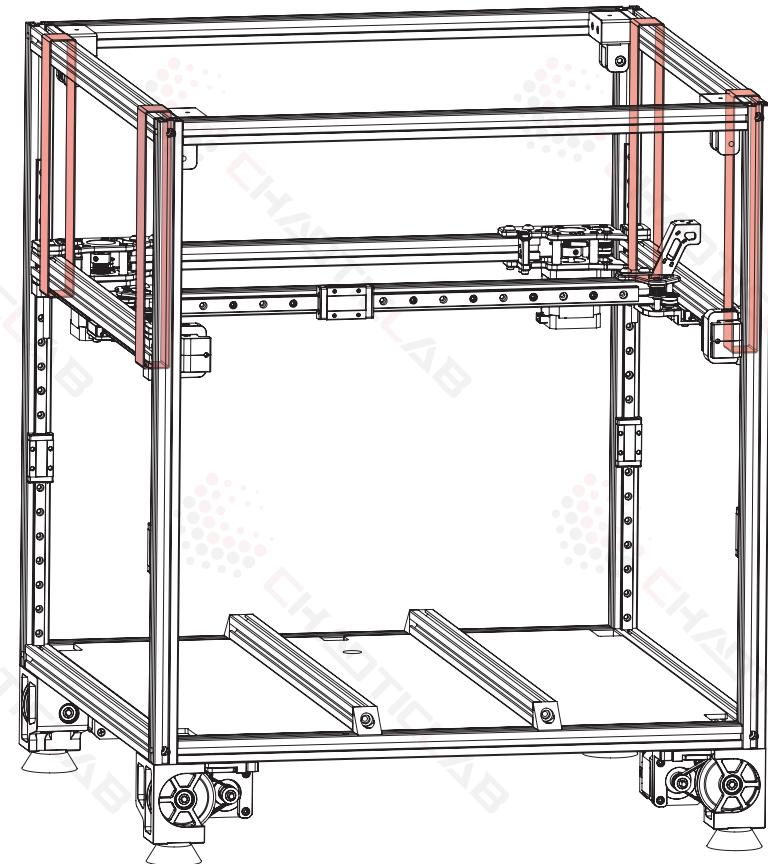
Z BEARING BLOCKS

WWW.CHAOTICLAB.XYZ



**INSERT AT AN ANGLE**

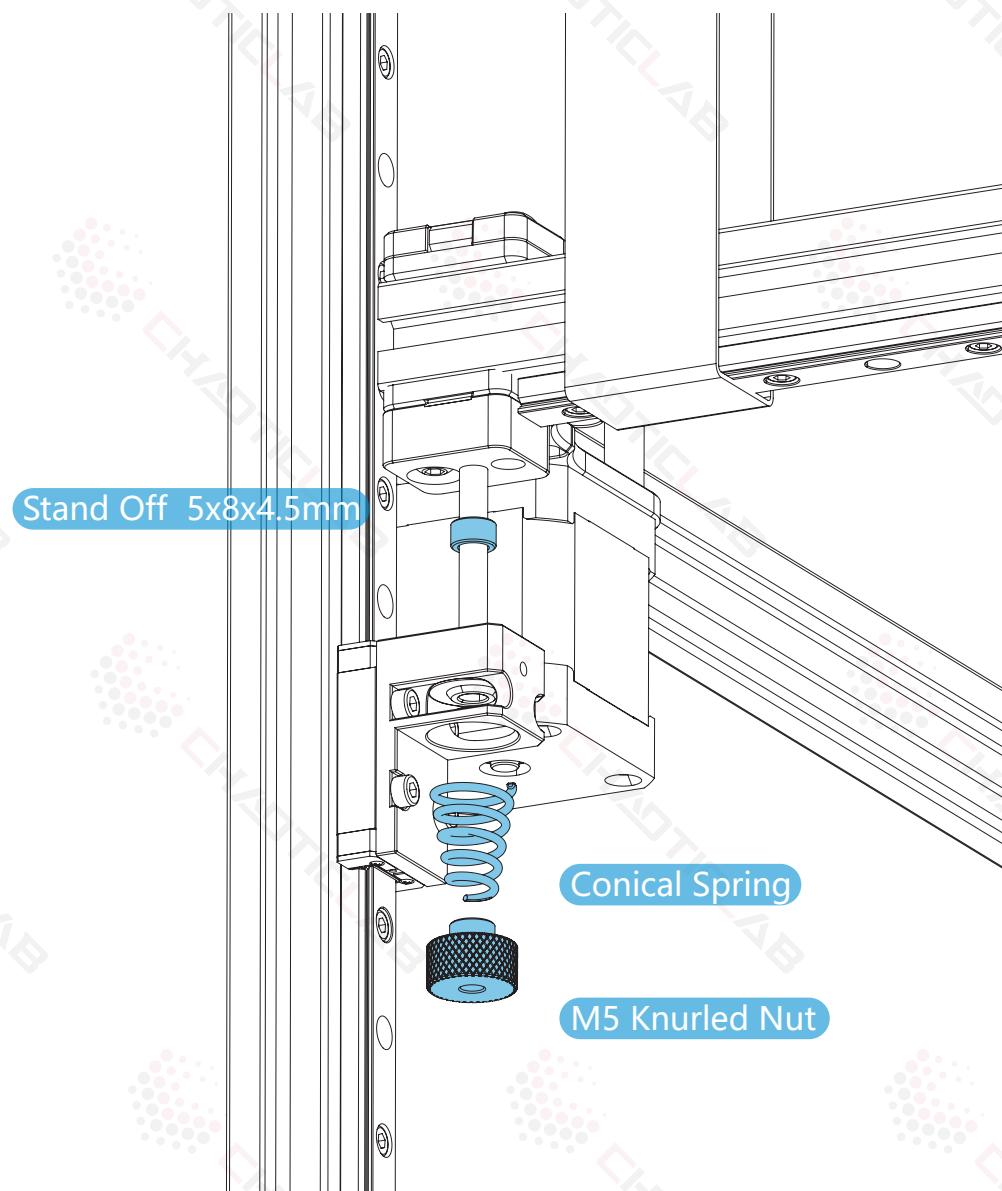
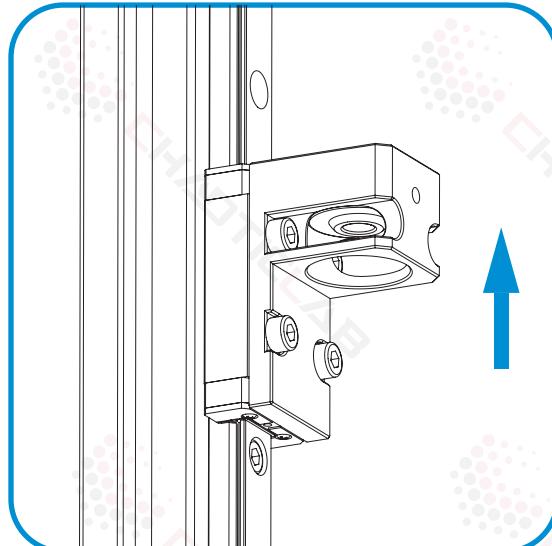
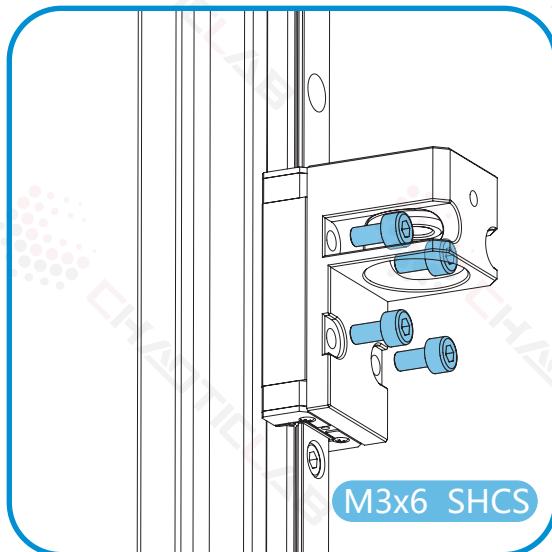
Tilt the gantry to move it past the uprights.

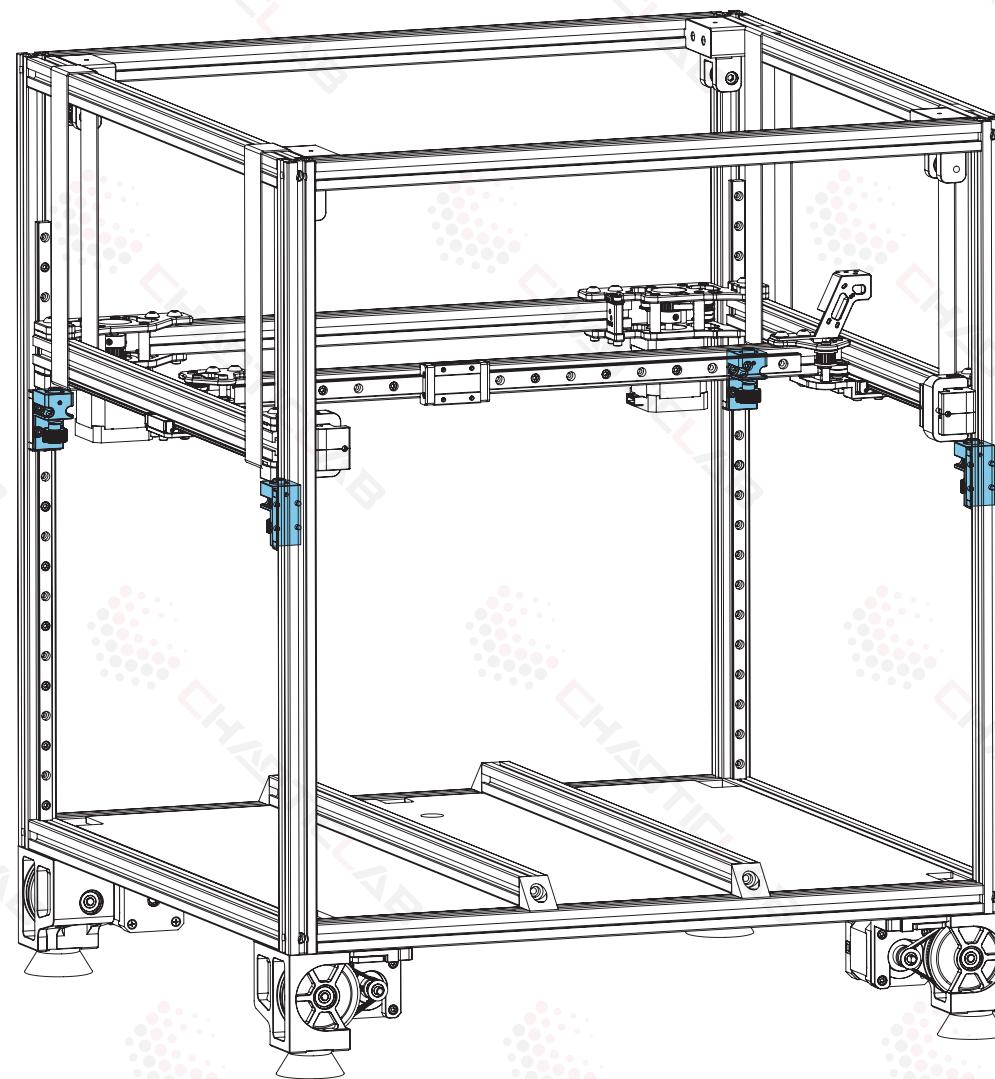
**A HELPING HAND**

Secure the gantry with long zipties or similar while the gantry is being installed. An extra pair of hands helps with this step.

GANTRY INSTALL

WWW.CHAOTICLAB.XYZ

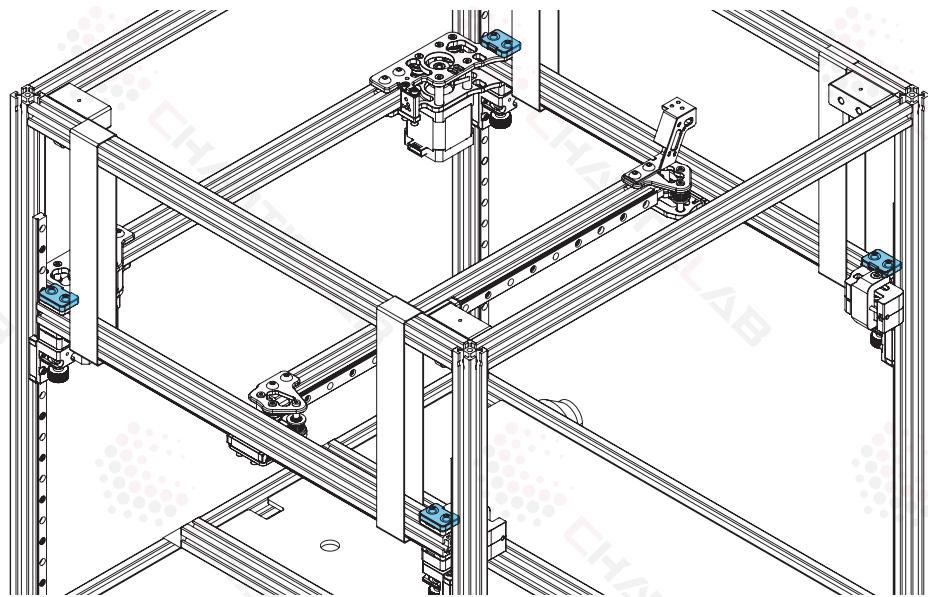


**INSTALL REMAINING JOINTS**

Add the other 3 joints repeating the same steps.

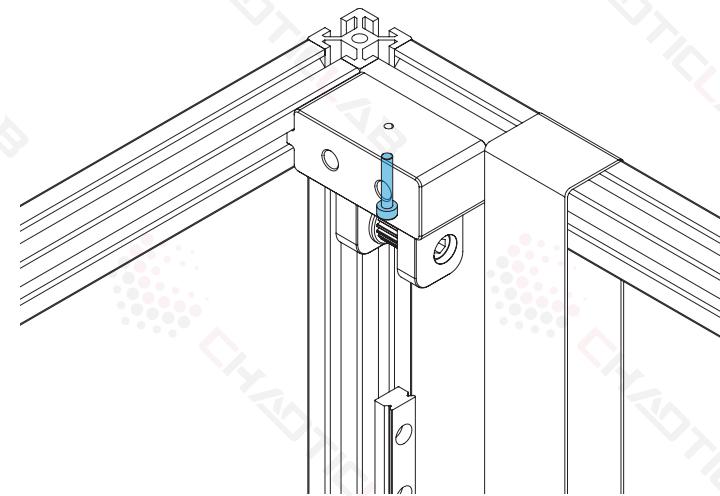
PREPARATION

WWW.CHAOTICLAB.XYZ



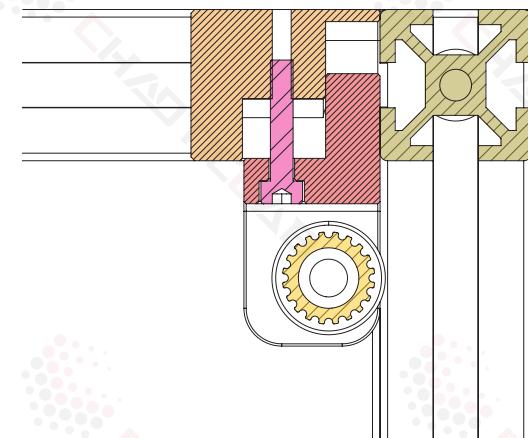
LOOSEN TOP BELT CLAMPS

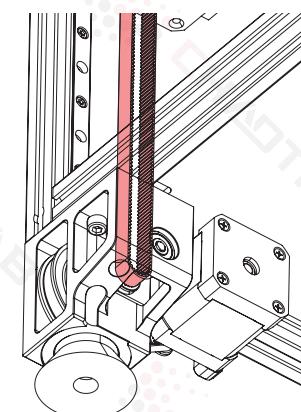
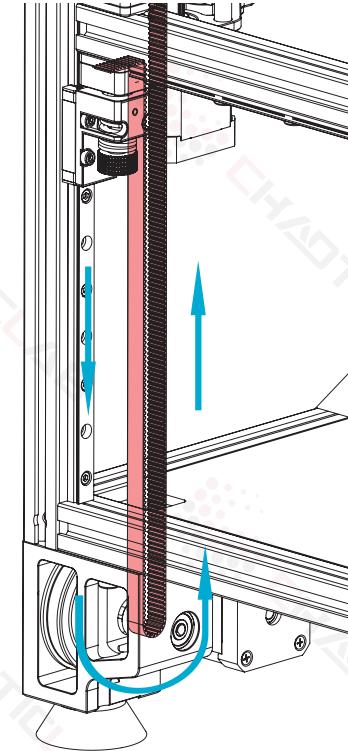
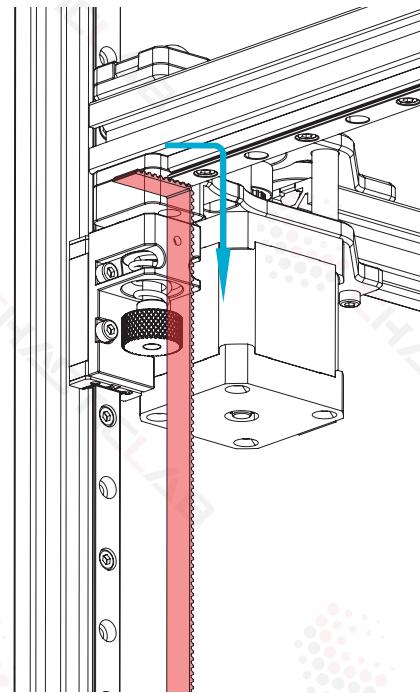
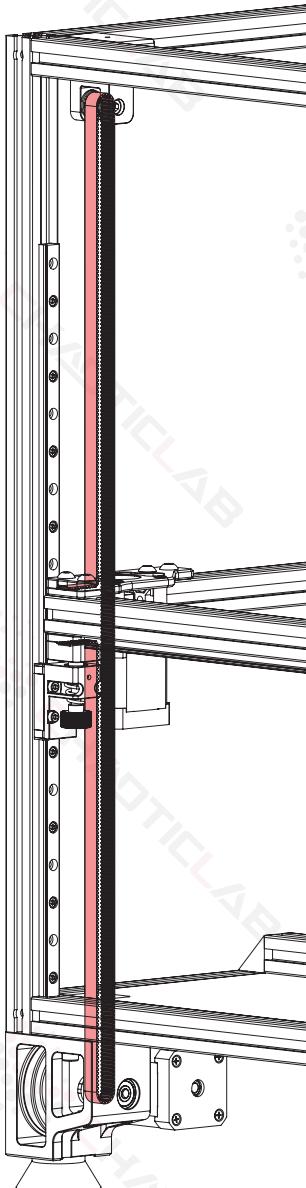
Undo the top belt clamps, we'll be installing the belts in the next steps.



EXTEND IDLER

Loosen the idler bolt to extend the idler. Once extended to the maximum before becoming undone tighten 4 turns. Repeat for all 4 idlers.





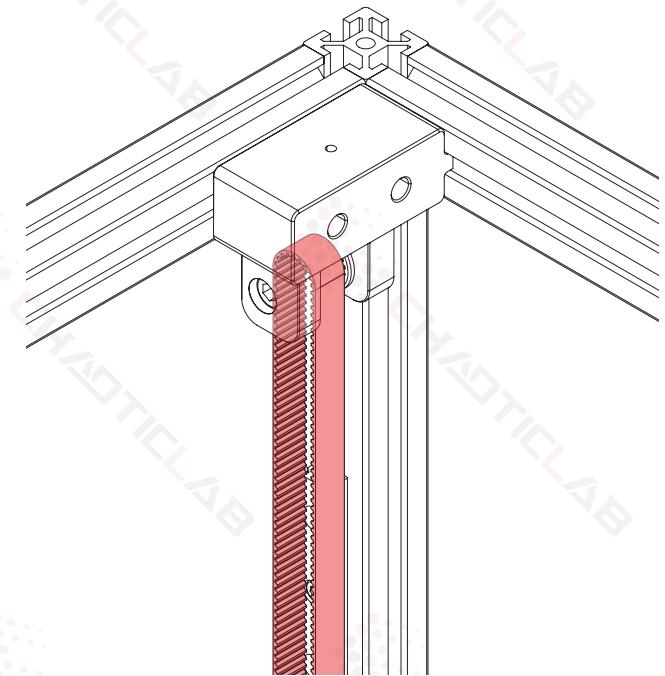
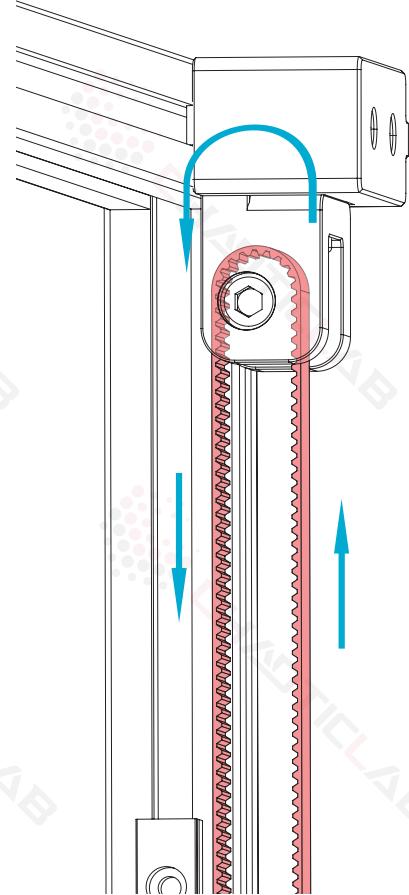
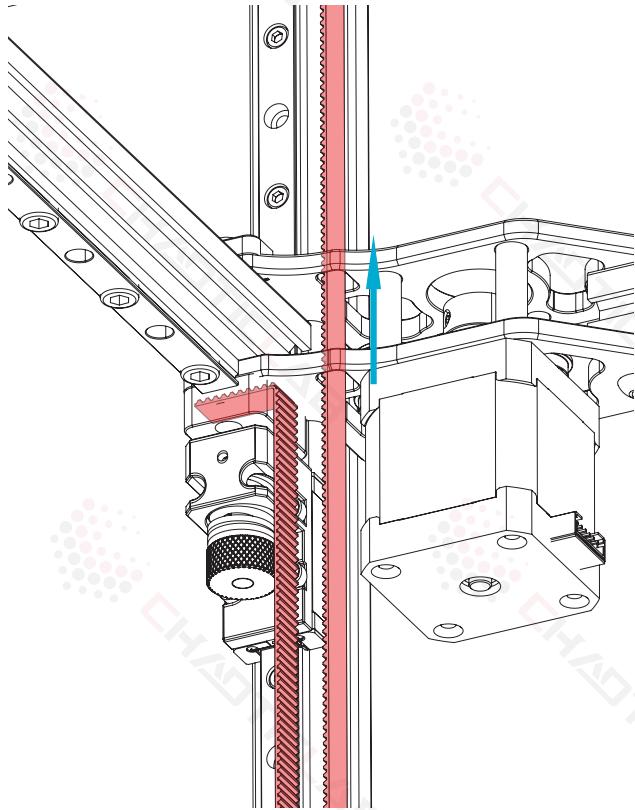
Z BELT ROUTING

Follow the path pointed out by the arrows.
Needle nose pliers, tweezers or similar tools
can help in this step.

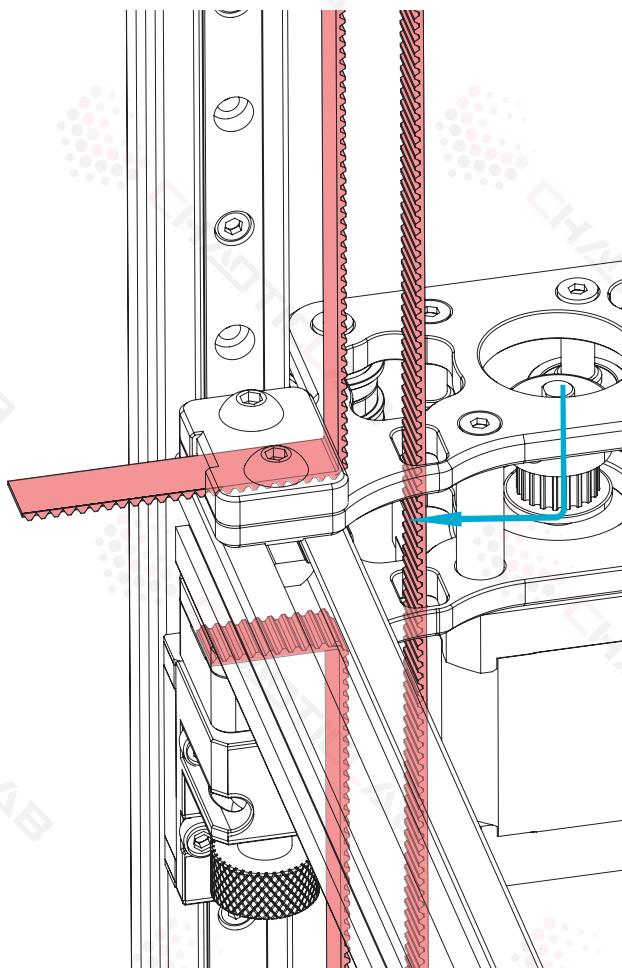
The belt teeth are on the inside of the loop.

Z BELT

WWW.CHAOTICLAB.XYZ



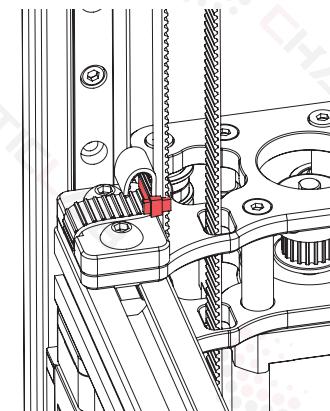
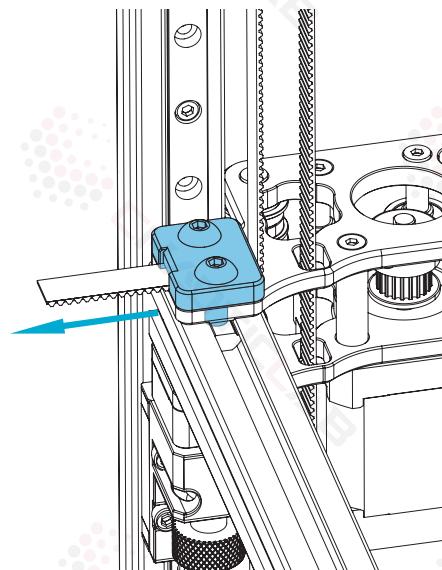
Z BELT



WWW.CHAOTICLAB.XYZ

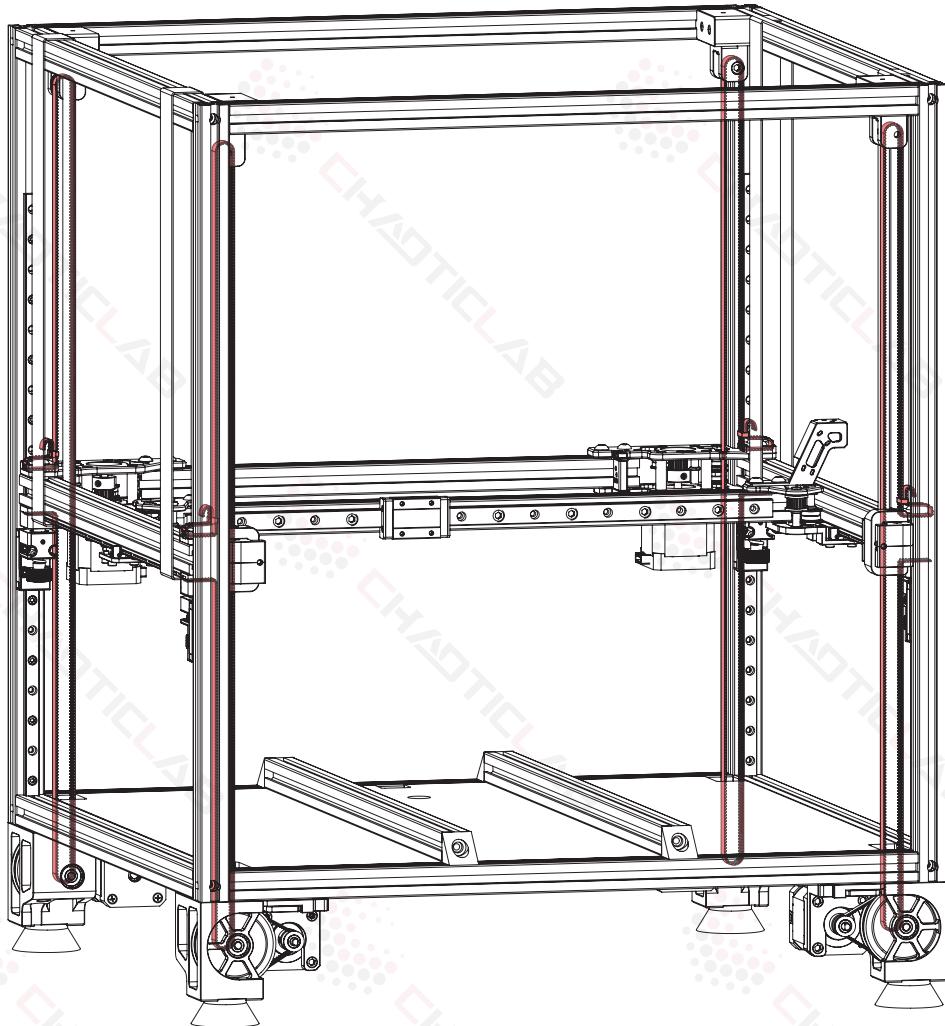
PULL TIGHT AND SECURE BELT CLAMP

Pull on the end of the belt and securely fasten the top belt clamp.



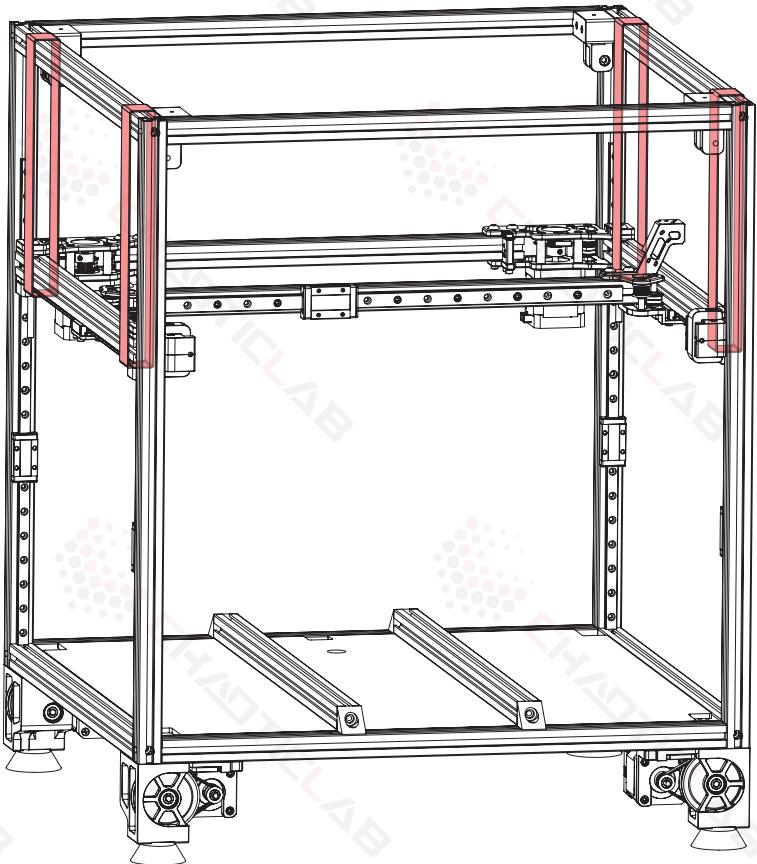
EXCESS BELT

Fold the excess belt over and use a small zip tie to secure the end.

**INSTALL REMAINING Z BELTS**

Repeat the install instructions for the other 3 Z belts.

Z BEARING BLOCKS

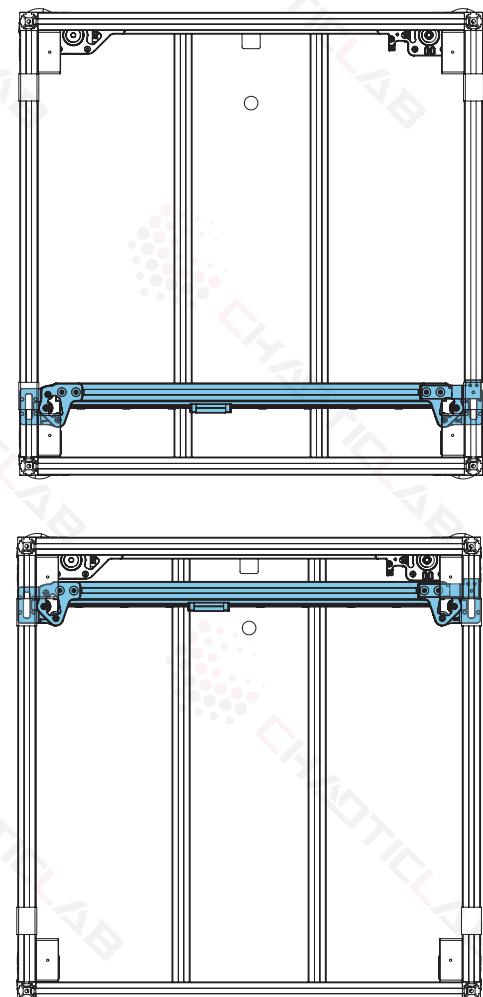


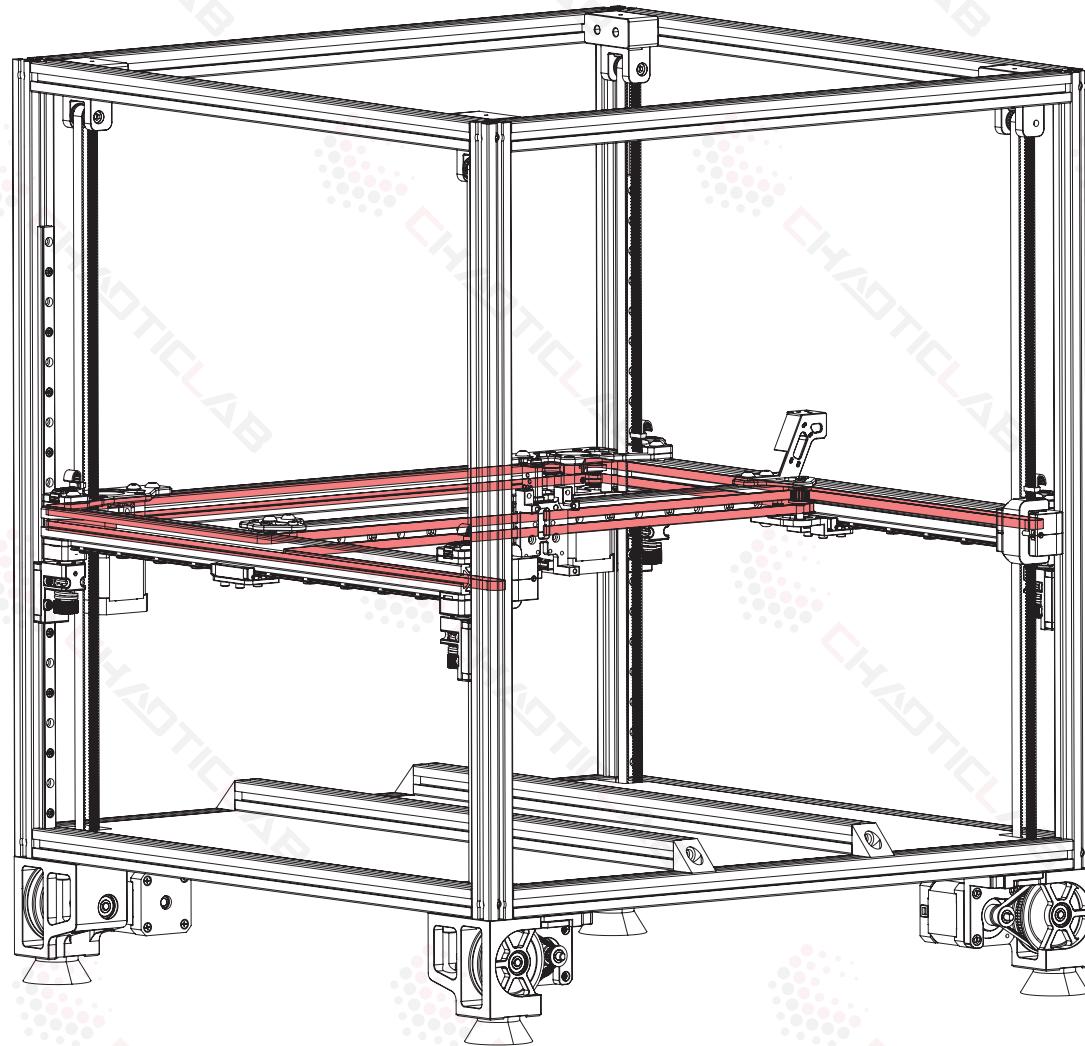
REMOVE ZIPTIES

With the belts installed the gantry will stay in position.

SQUARING THE GANTRY

Move the gantry all the way back until it hits the A and B drive on both sides. Fully tighten all screws on the X axis.

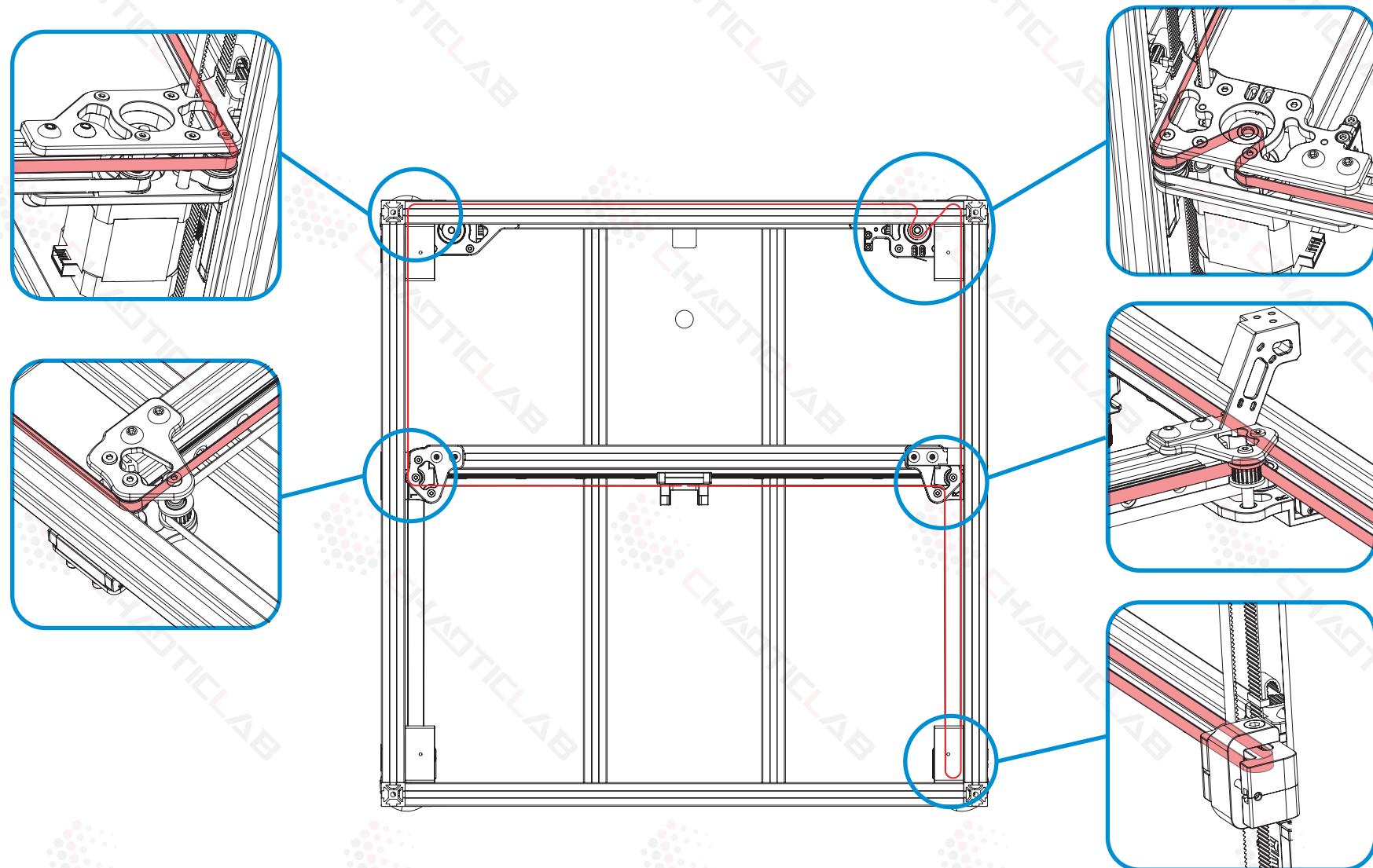


**THE VORON BELT PATH**

Voron printers use a belt path based on the popular CoreXY pattern.

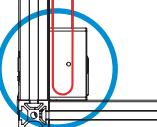
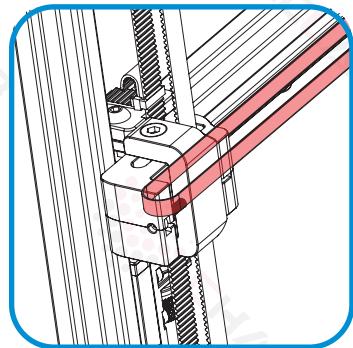
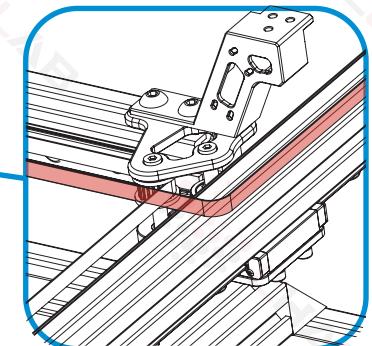
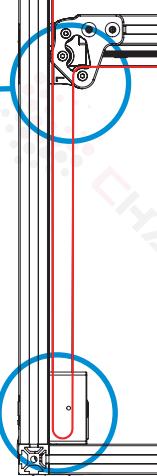
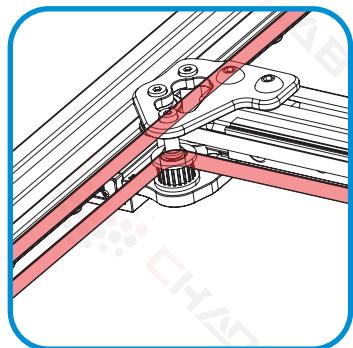
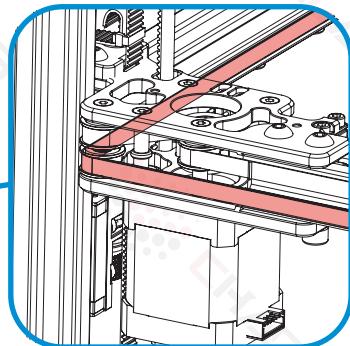
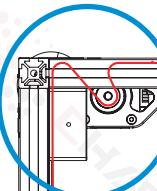
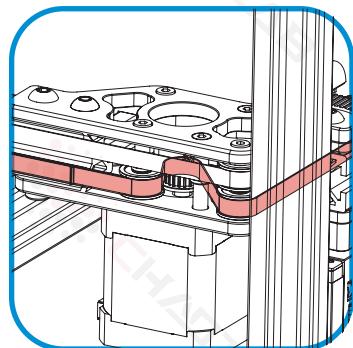
OVERVIEW - A BELT

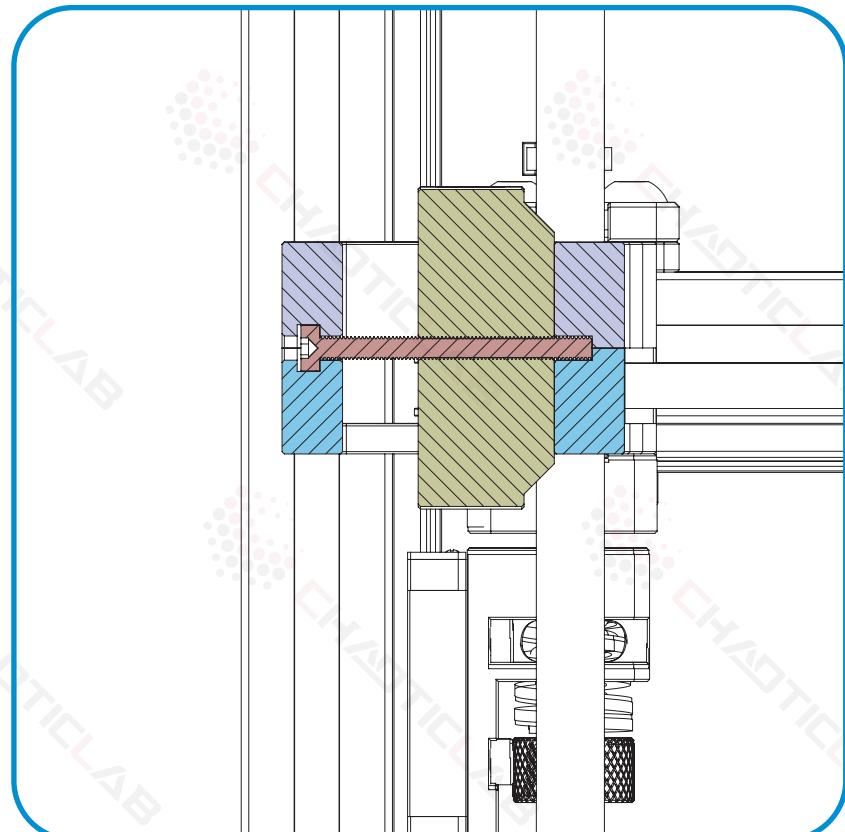
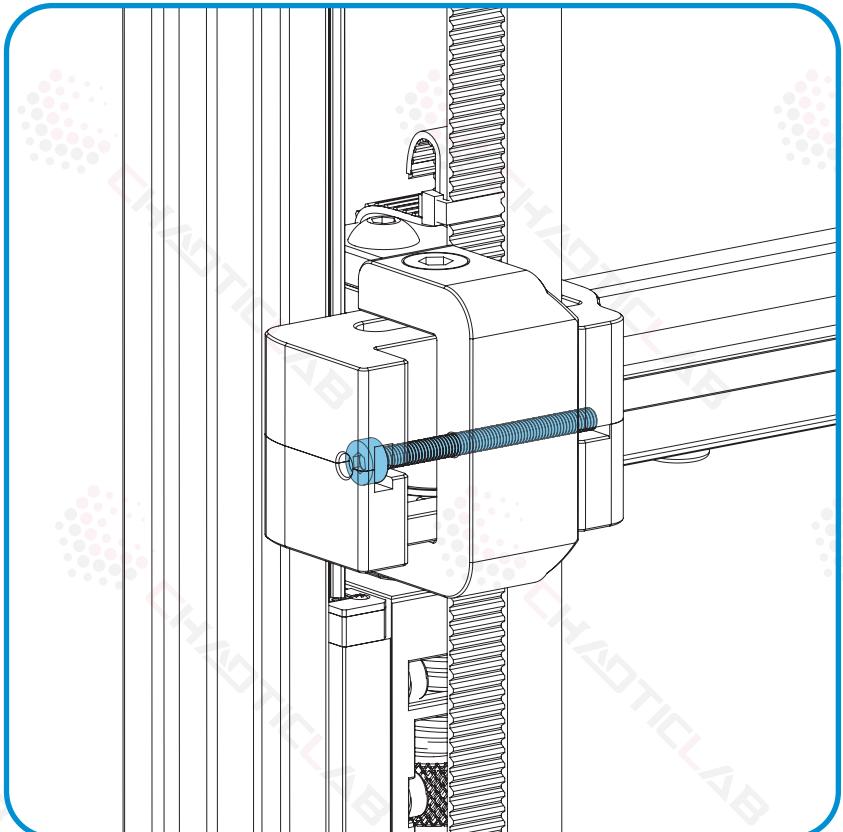
WWW.CHAOTICLAB.XYZ



OVERVIEW -B BELT

WWW.CHAOTICLAB.XYZ

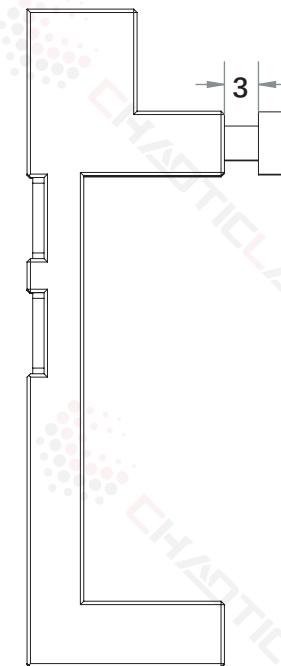
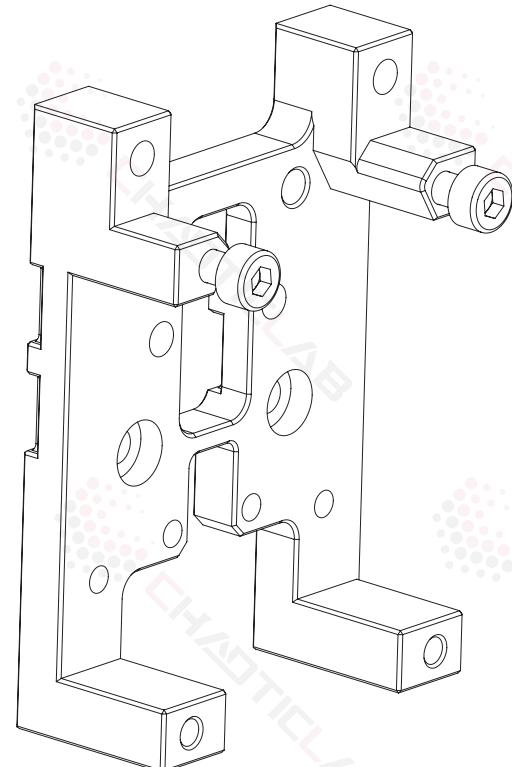
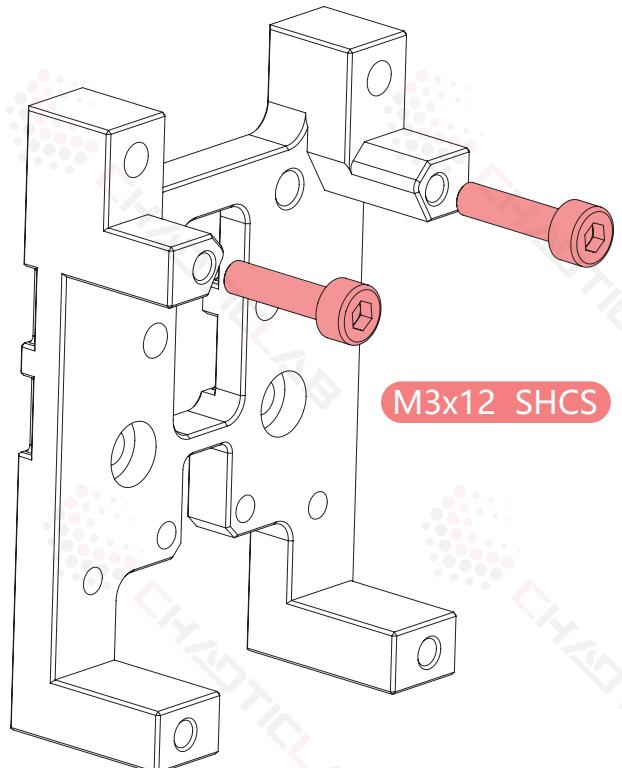


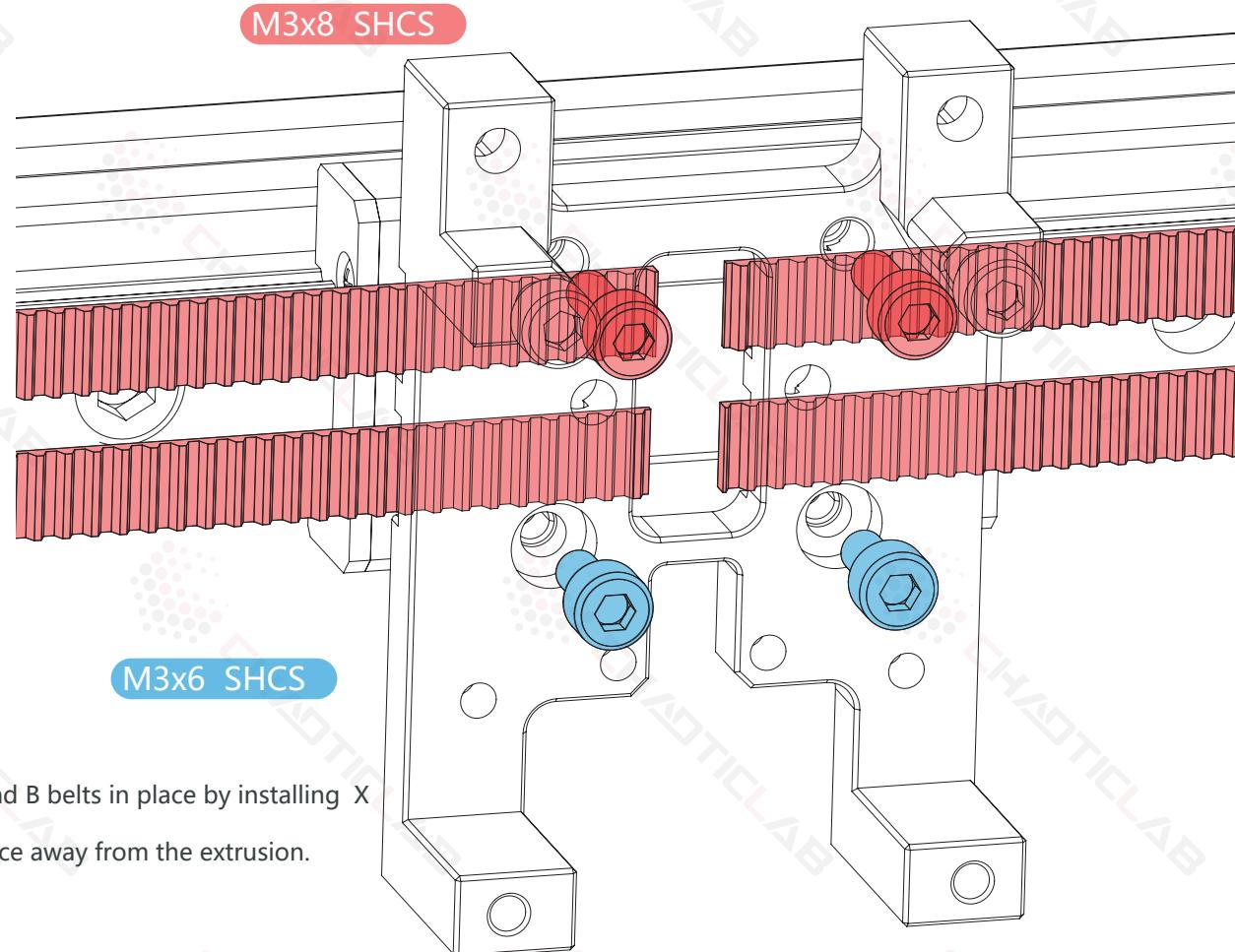
**EXTEND IDLER**

Loosen the idler bolt to extend the idler.
Once extended to the maximum tighten 4 turns.
Repeat for the second idler.

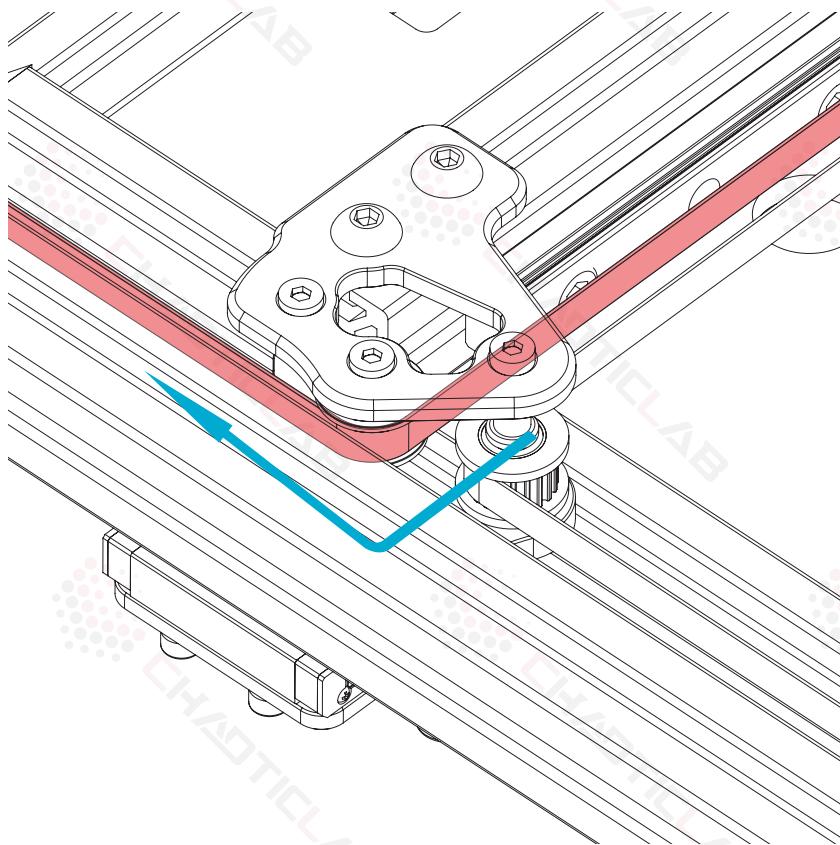
X CARRIAGE

WWW.CHAOTICLAB.XYZ

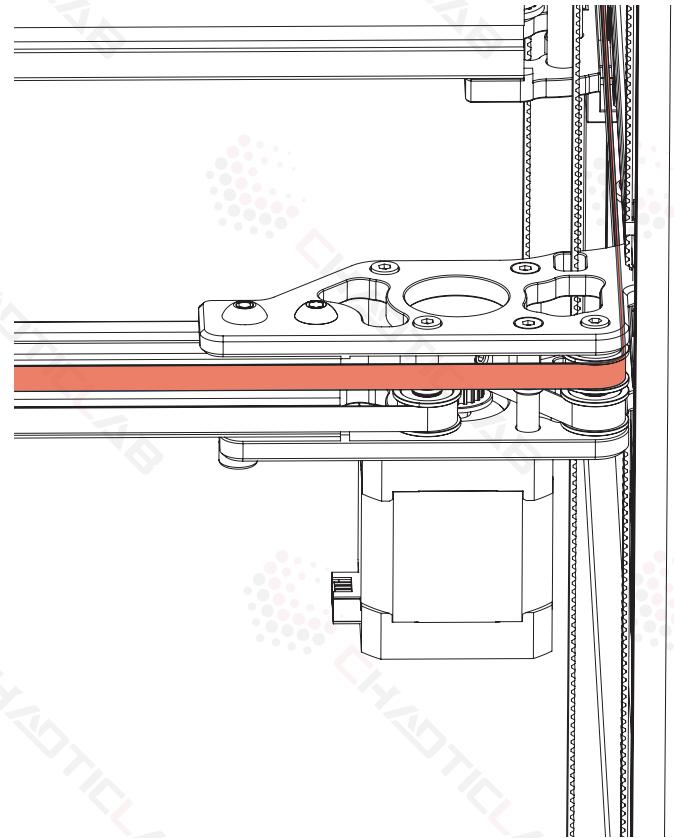


**CLAMP BELTS**

Clamp both A and B belts in place by installing X carriage part.
The belt teeth face away from the extrusion.

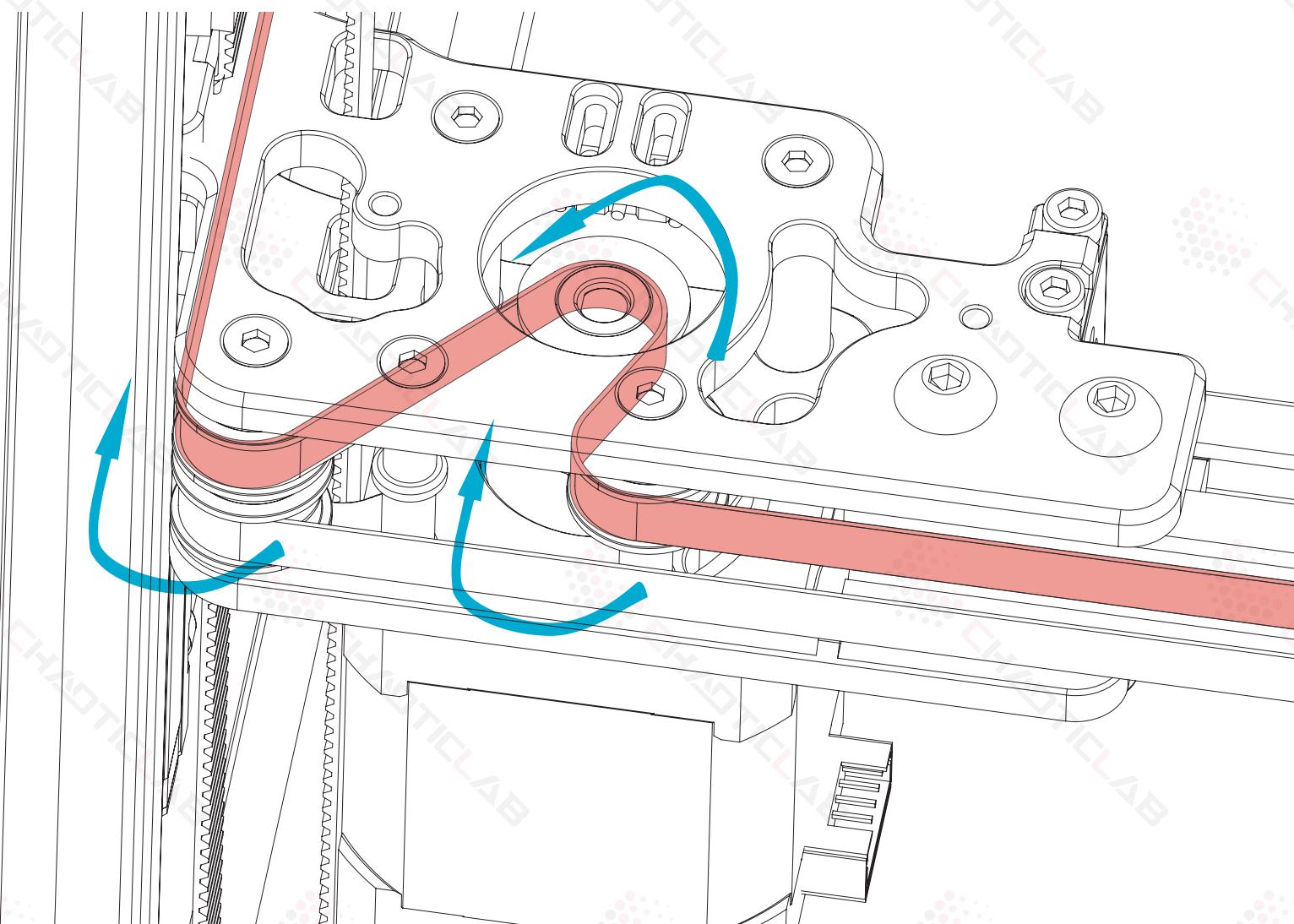
**A BELT ROUTING**

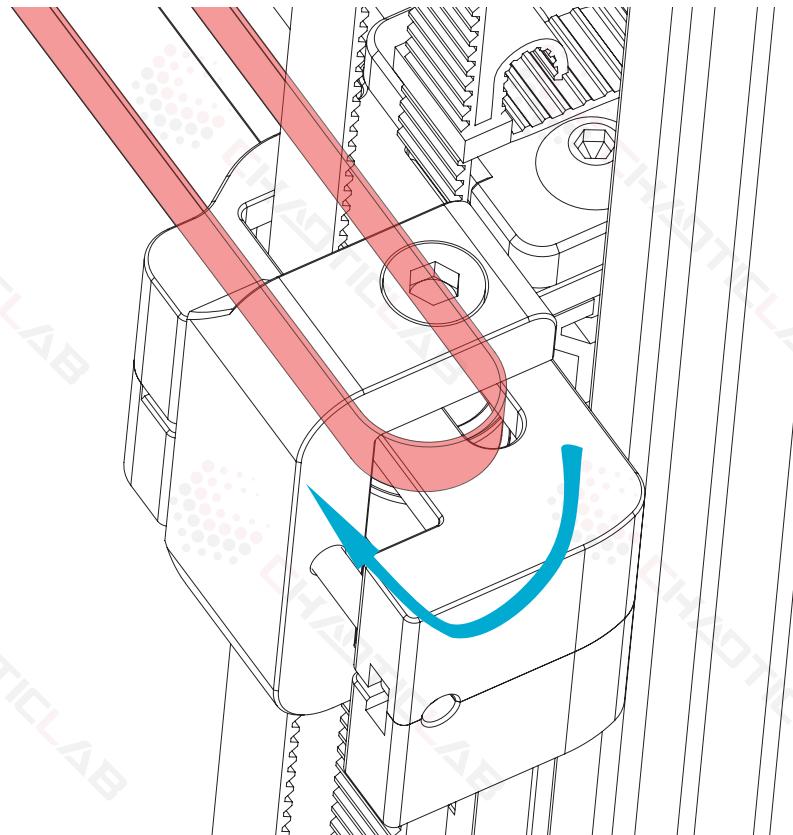
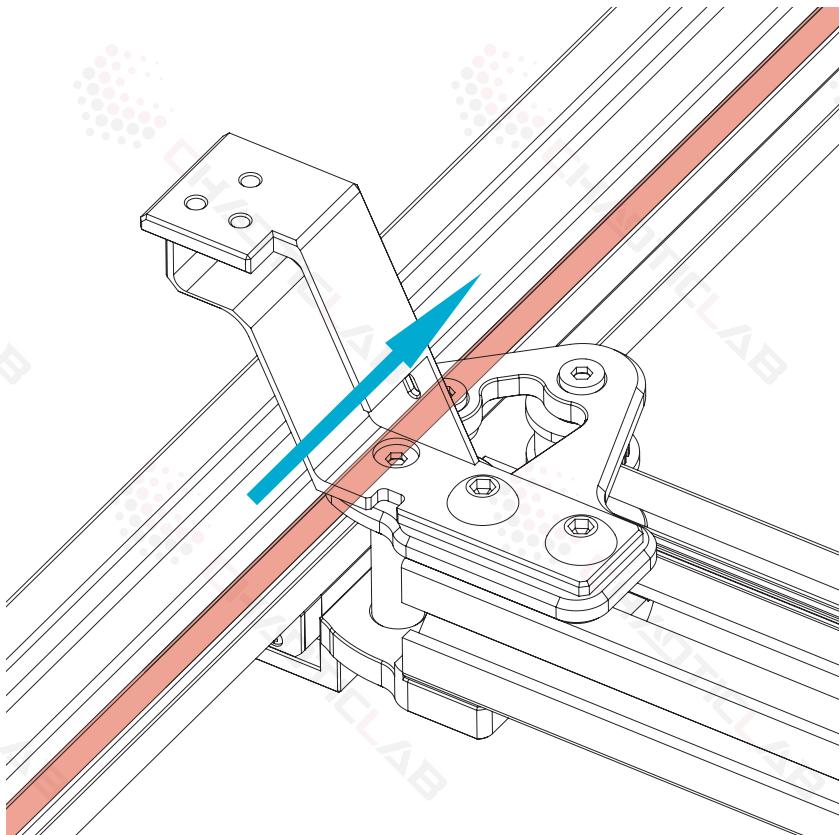
Follow the path pointed out by the arrows.
Needle nose pliers, tweezers or similar tools
can help in this step.



A BELT

WWW.CHAOTICLAB.XYZ



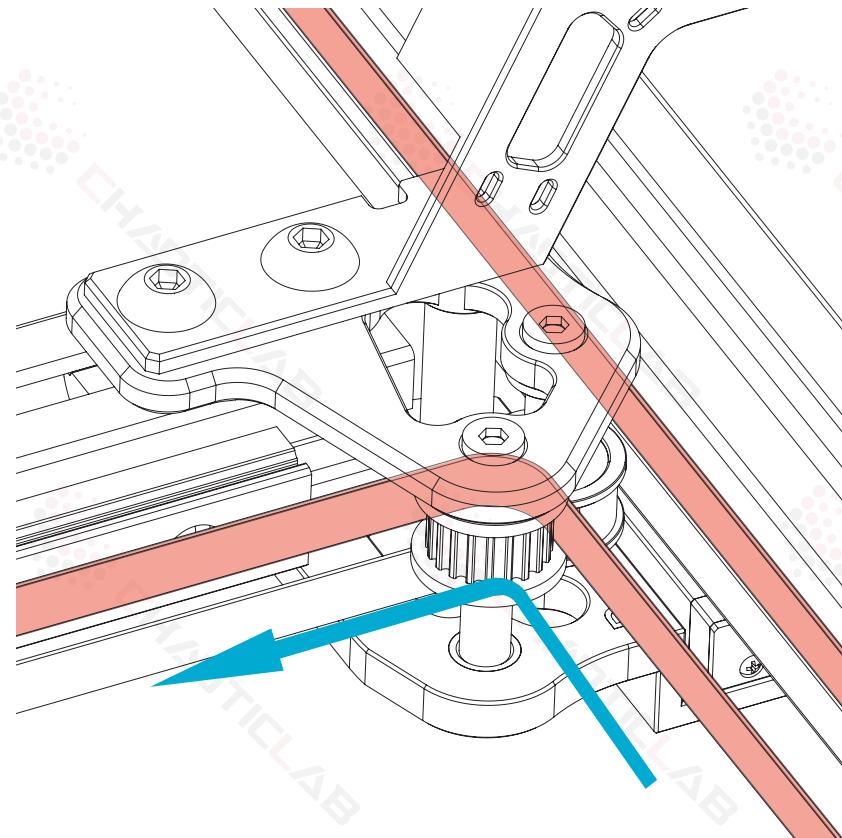


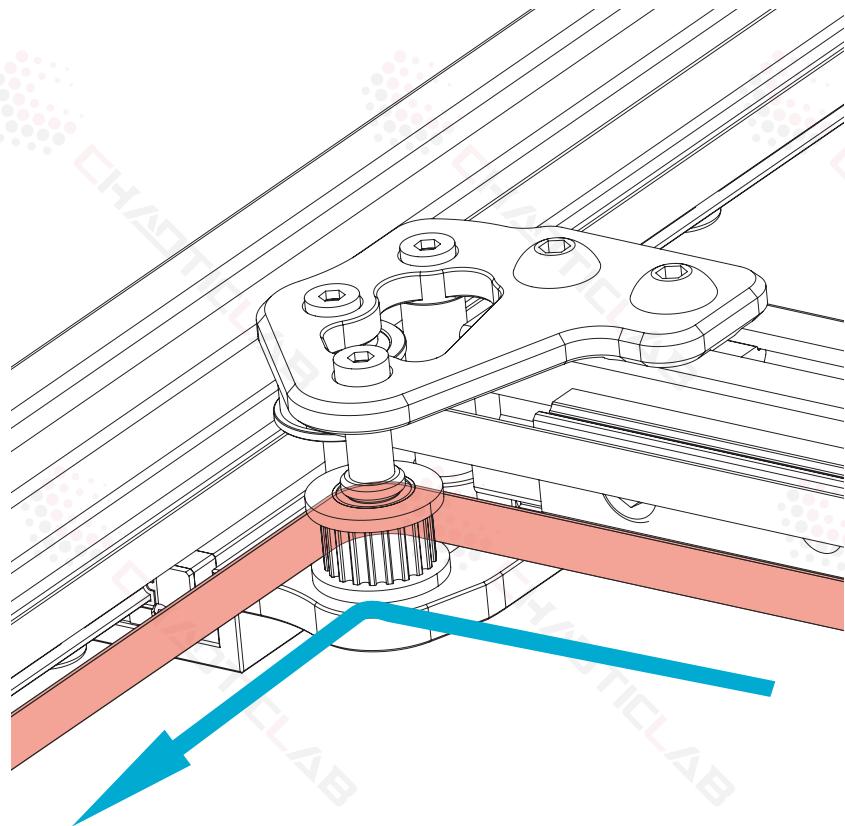
BELTING IDLERS

If you're having trouble guiding the belts around the bearing stack temporarily remove the M3x40 SHCS to get better access.

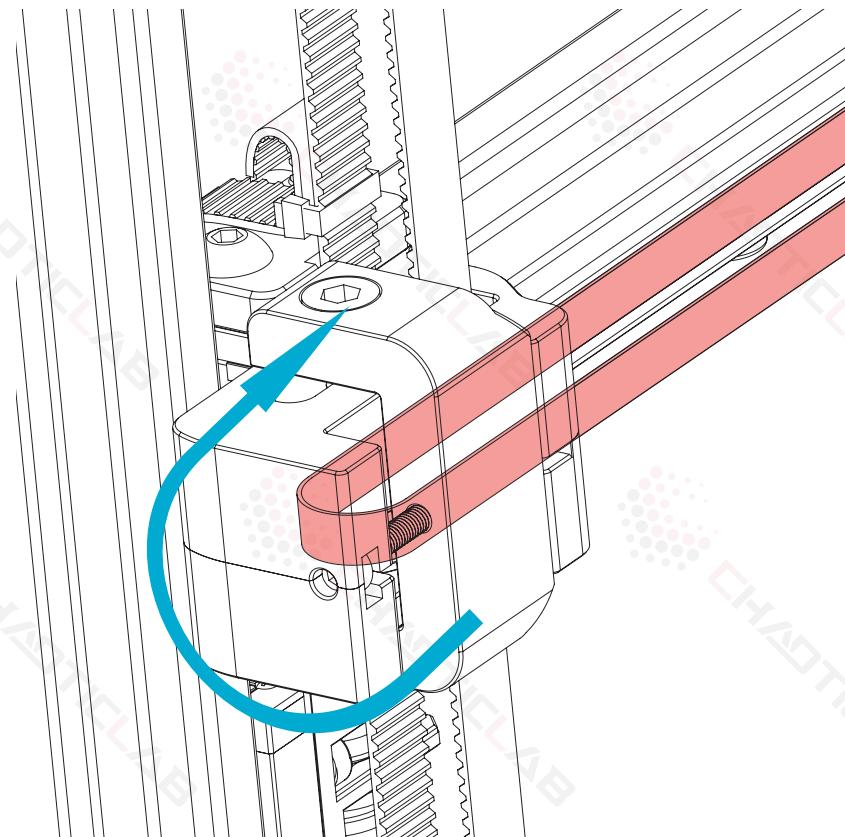
A BELT

WWW.CHAOTICLAB.XYZ



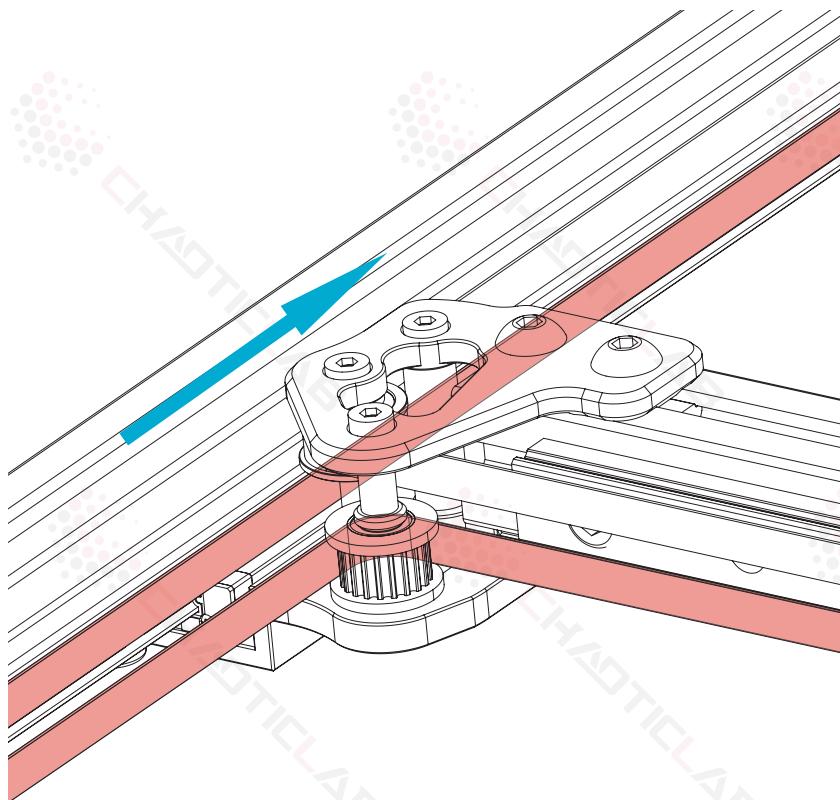
**B BELT ROUTING**

Follow the path pointed out by the arrows.
Needle nose pliers, tweezers or similar tools
can help in this step.

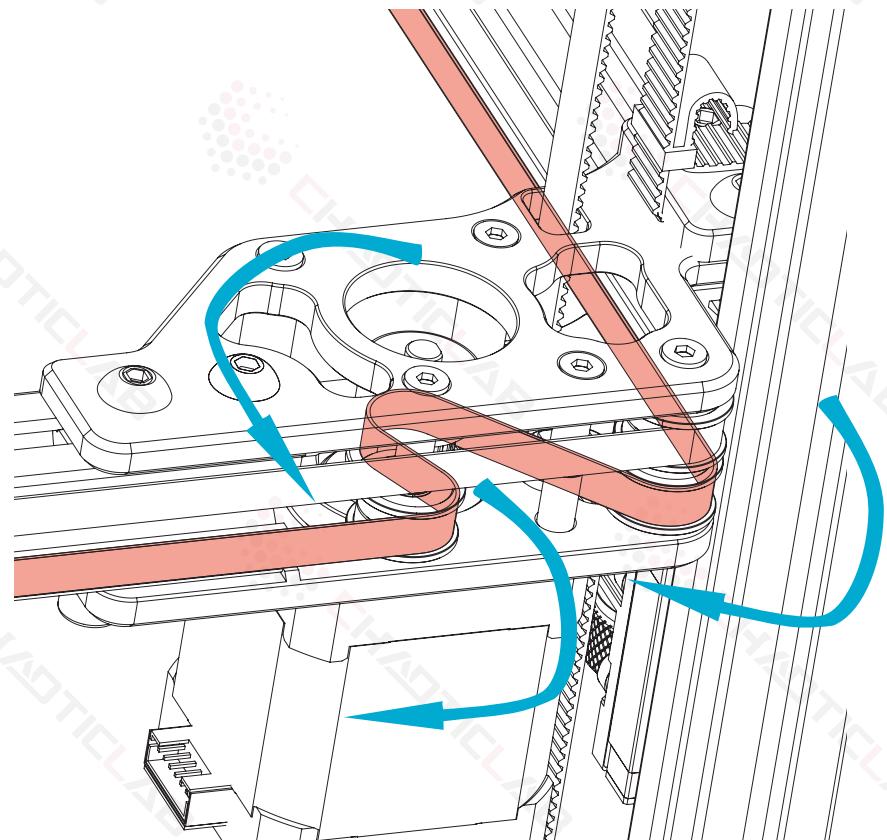
**BELTING IDLERS**

If you're having trouble guiding the belts around
the bearing stack temporarily remove the M3x40
SHCS to get better access.

B BELT

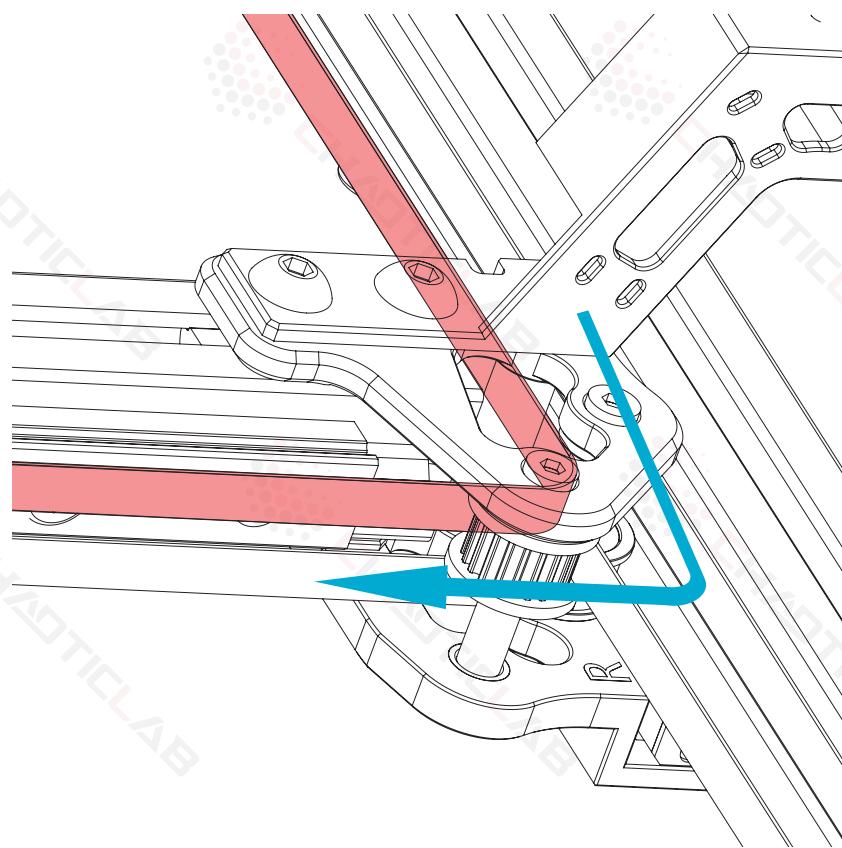
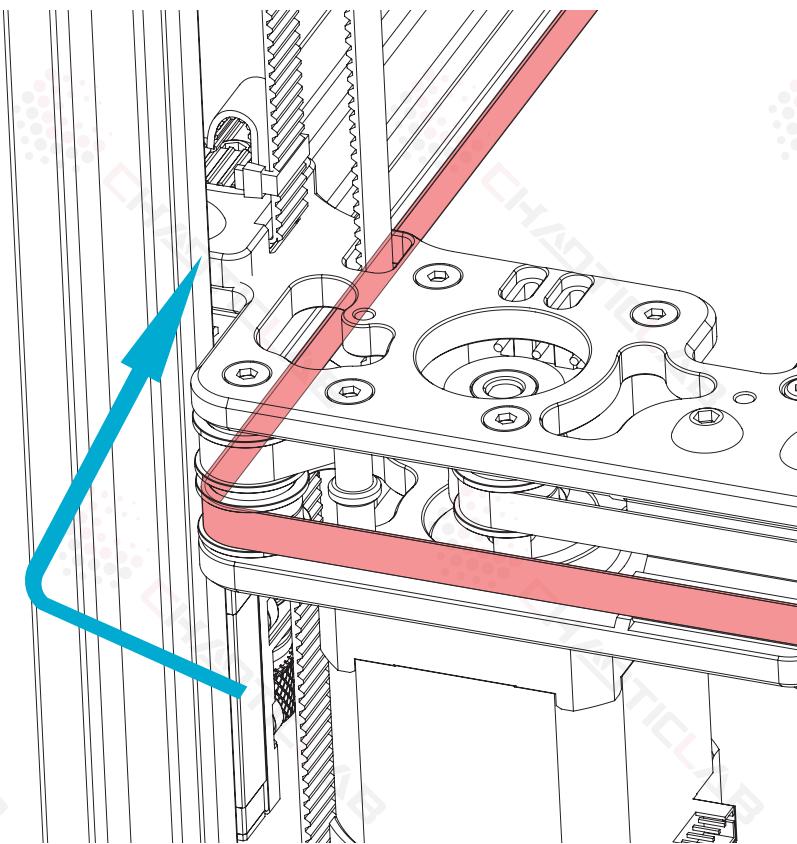


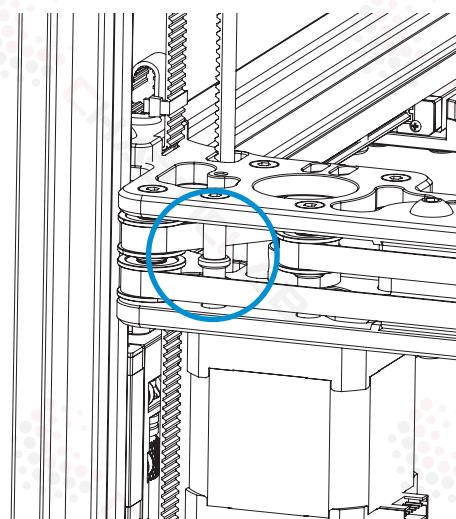
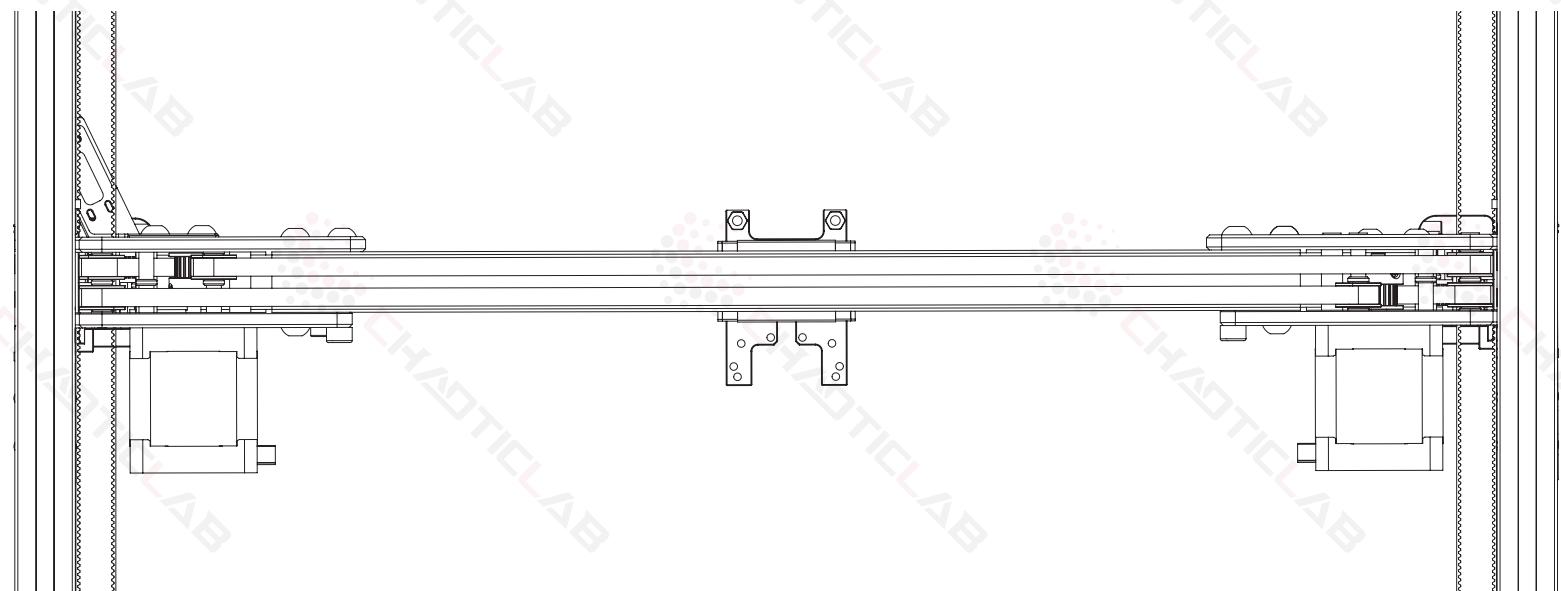
WWW.CHAOTICLAB.XYZ



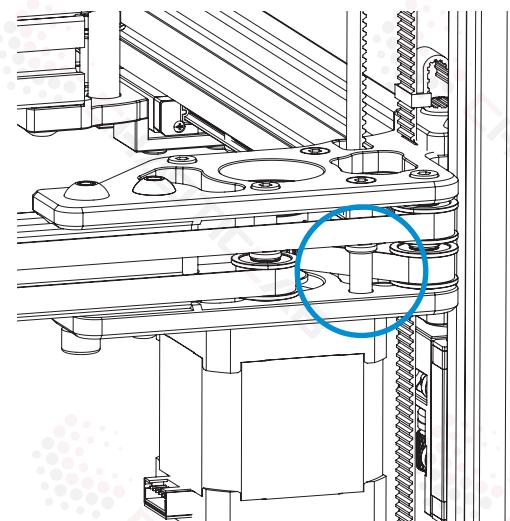
B BELT

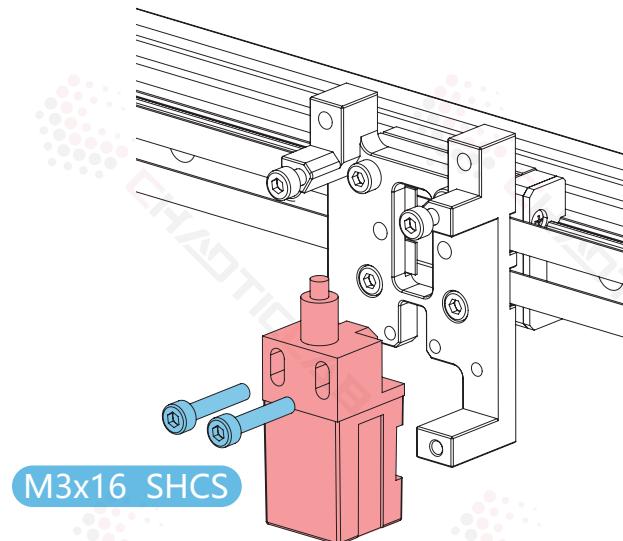
WWW.CHAOTICLAB.XYZ





CHECK YOUR WORK
Make sure that the belt is not riding on the plastic parts.

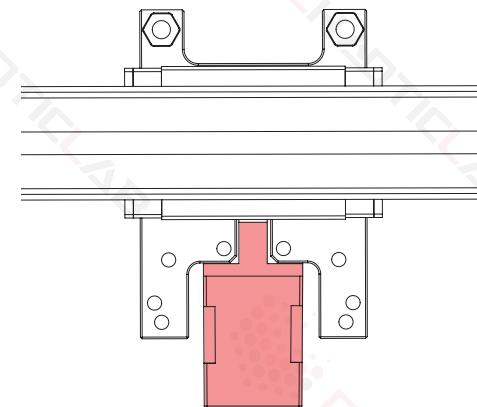




M3x16 SHCS

PROBE

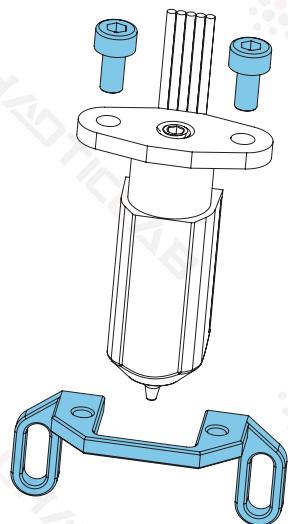
The picture shows the recommended Omron TL-Q5MC probe.



Z PROBE

WWW.CHAOTICLAB.XYZ

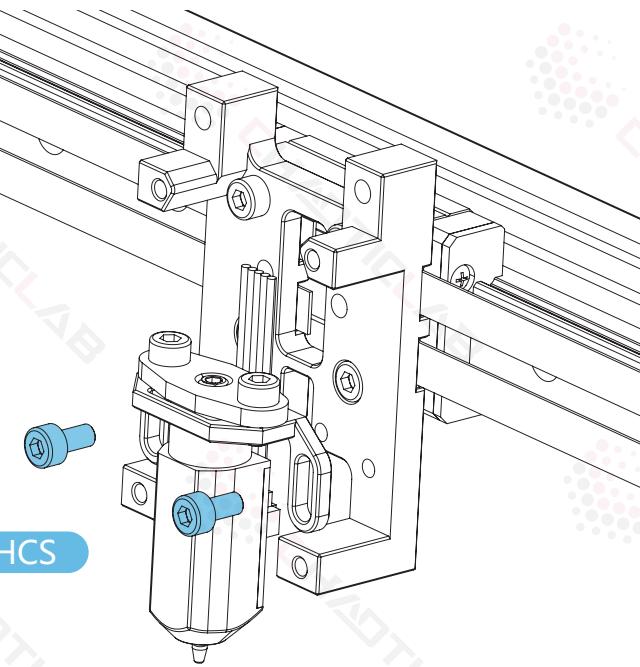
M3x6 SHCS



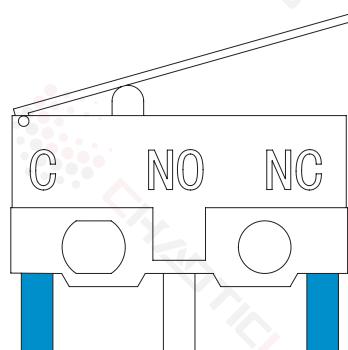
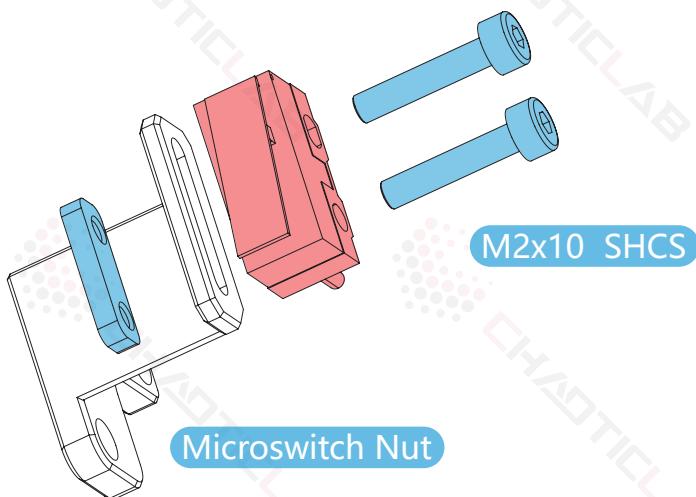
PROBE

The picture shows the BL-Touch probe.

M3x6 SHCS

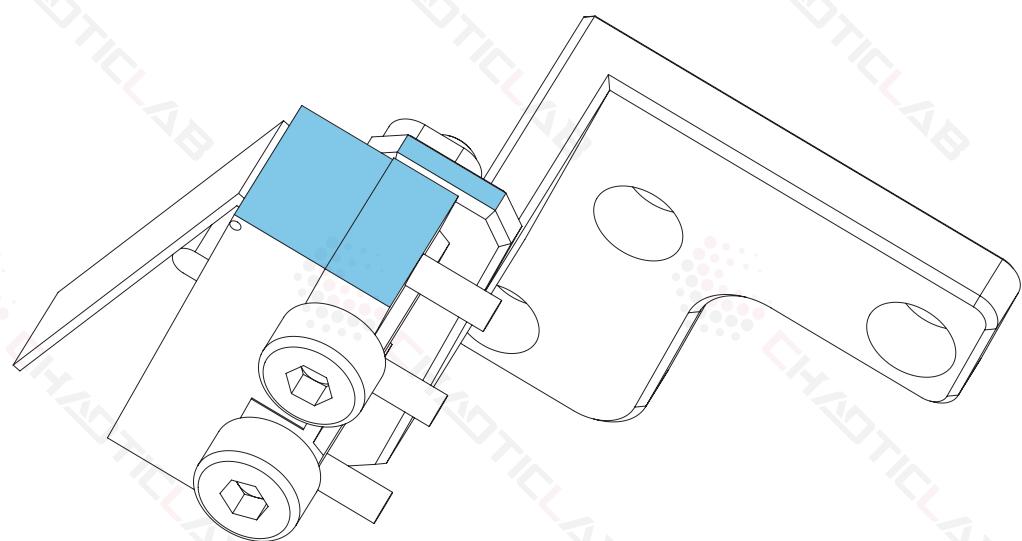


X LIMIT SWITH
 (Only applicable to x-axis use MGN12)



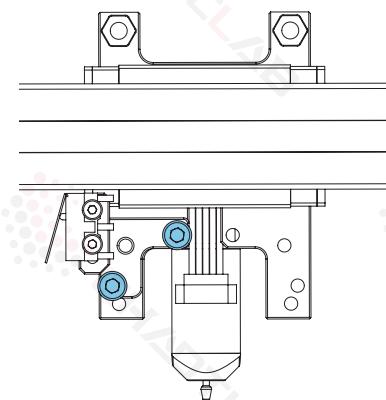
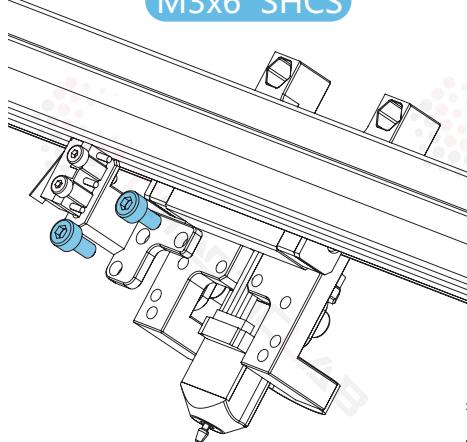
END-STOP SWITCHES FOR X AND Y

End-stops are wired in a "Normally Closed" configuration.
 On microswitches those are the 2 outer terminals indicated by C and NC.
 Prepare the switches for X and Y by soldering 150mm of wire to each of the outer terminals.



Make sure that kw10 is aligned with the end of the bracket.

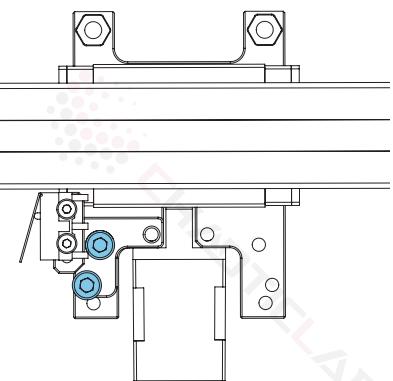
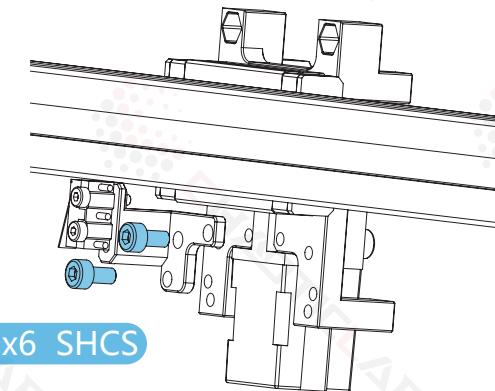
M3x6 SHCS



WHEN USE BL-TOUCH

Screw in the screws at the position shown in the figure.

M3x6 SHCS

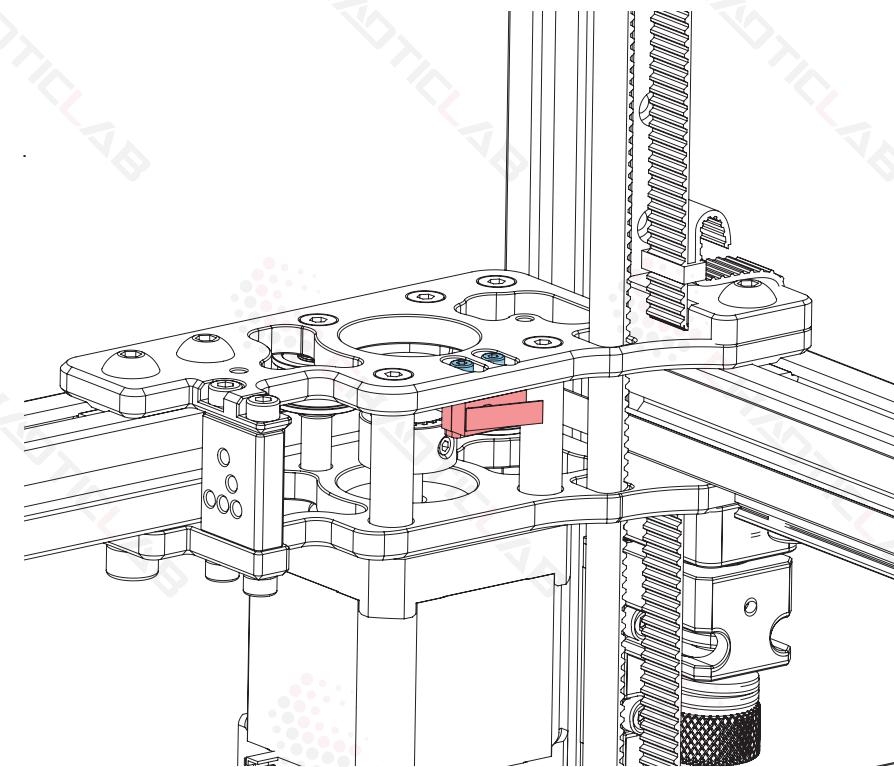
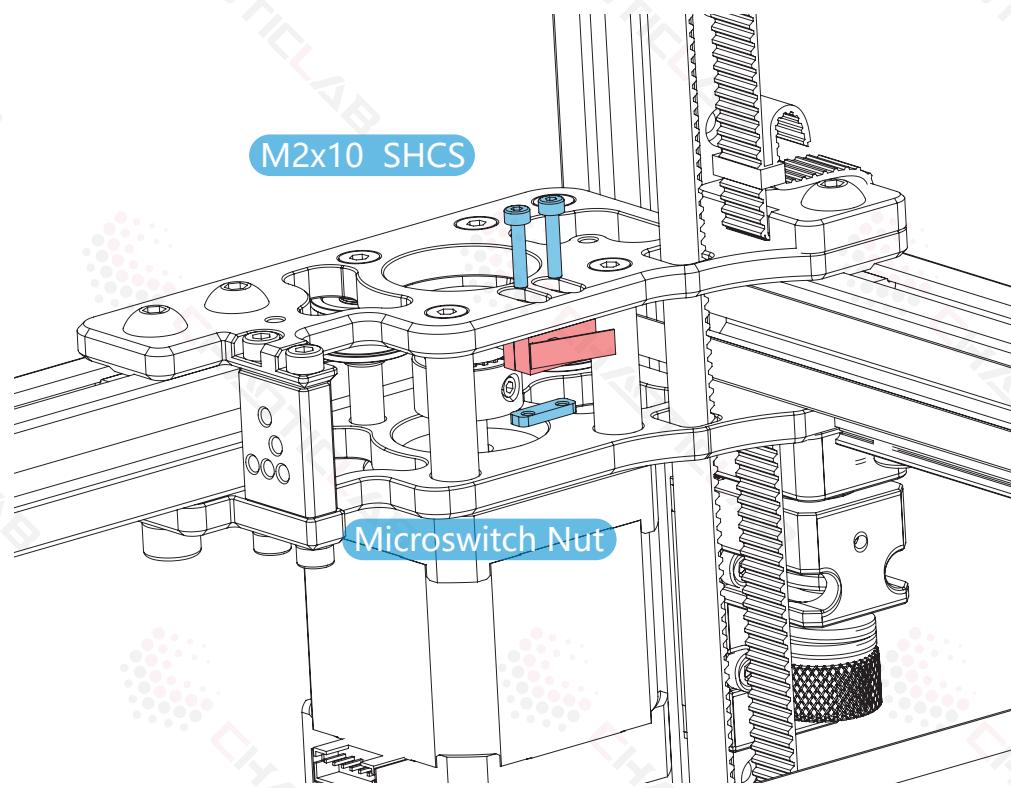


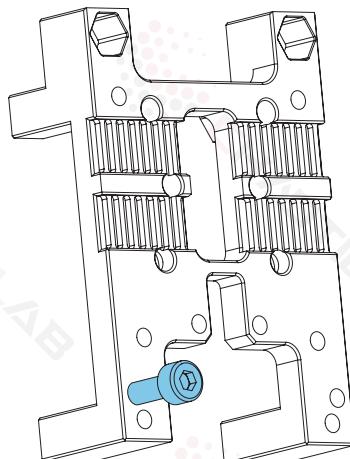
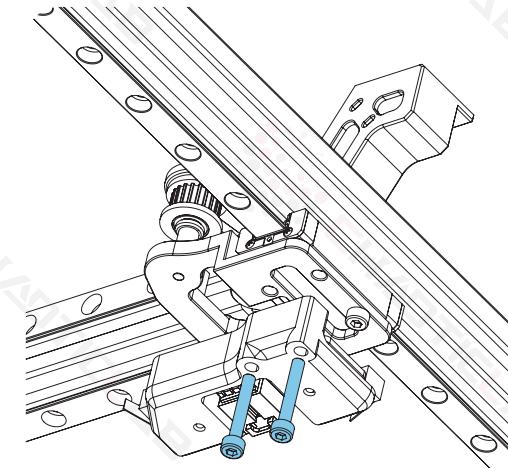
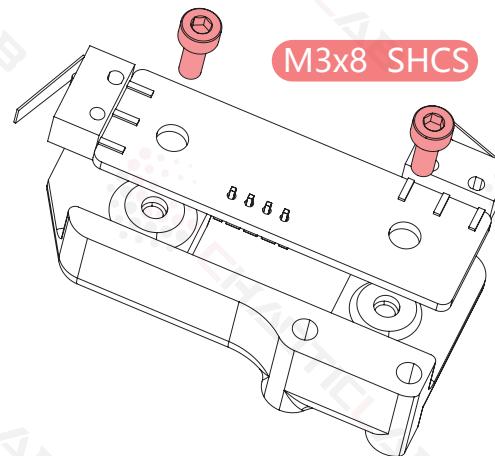
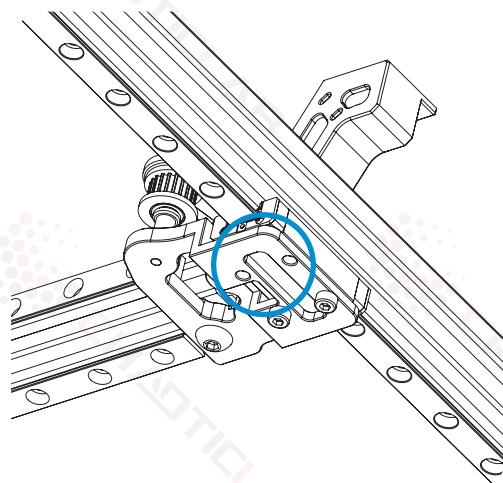
WHEN USE TL-Q5MC

Screw in the screws at the position shown in the figure

Y LIMIT SWITH

WWW.CHAOTICLAB.XYZ





M3x14 SHCS

MICROSWITCH ENDSTOP BOARD

MGN9 is used for X-axis, only Microswitch-endstop board can be used for limit switch.

MGN12 is used for X axis, kw10 or Microswitch-endstop board can be used as you like.

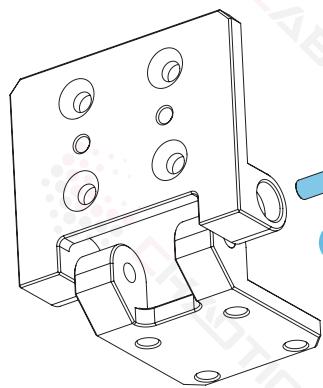
The screw is on the side near the Microswitch-endstop board.

MGN9H should use M3x14 SHCS or M3x12 SHCS.

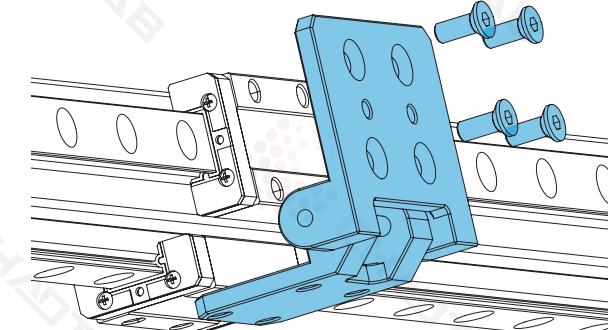
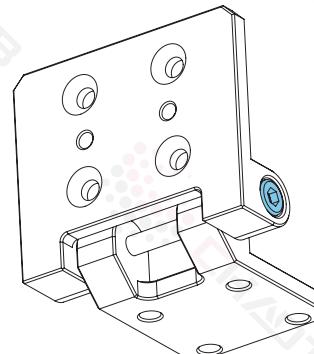
MGN12H should use M3x16 SHCS or M3x14 SHCS.

MGN9 FOR X-AXIS

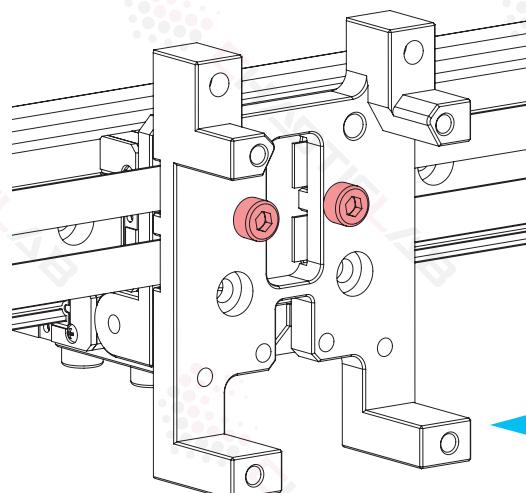
WWW.CHAOTICLAB.XYZ



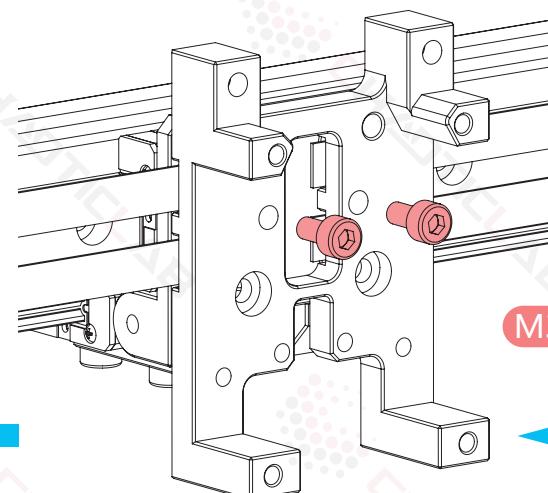
M3x36 SHCS



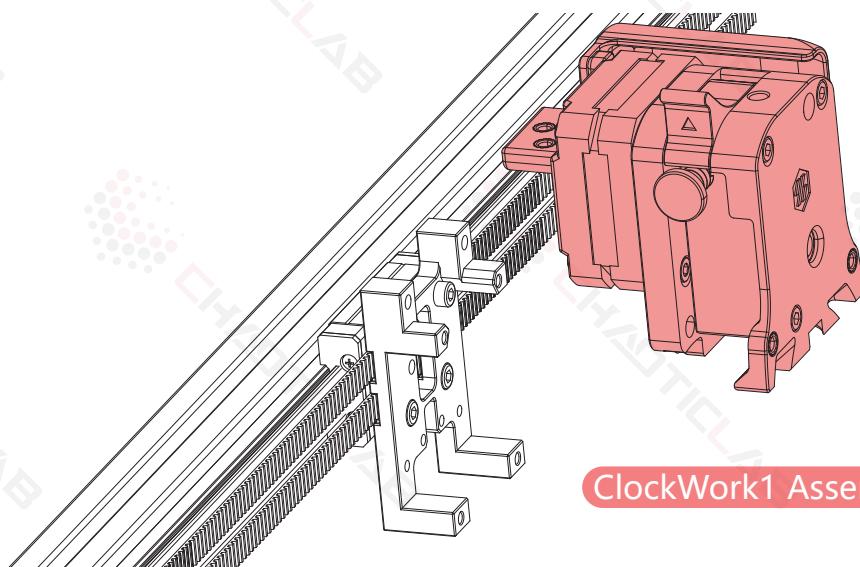
M3x6 SCHS



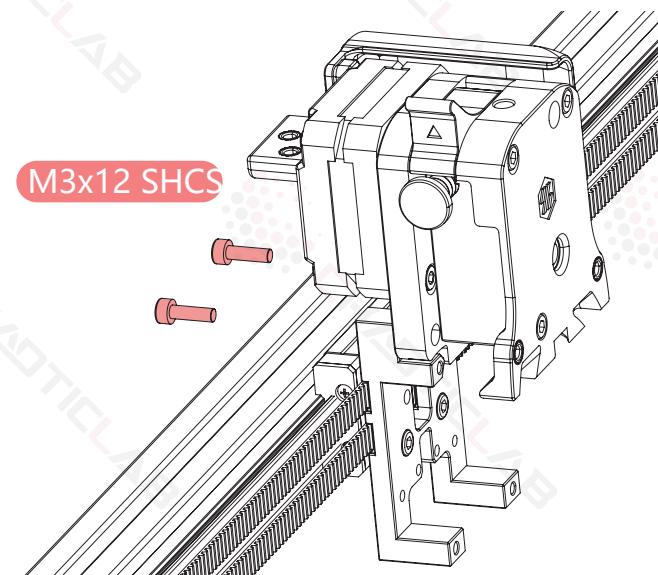
M3x8 SHCS



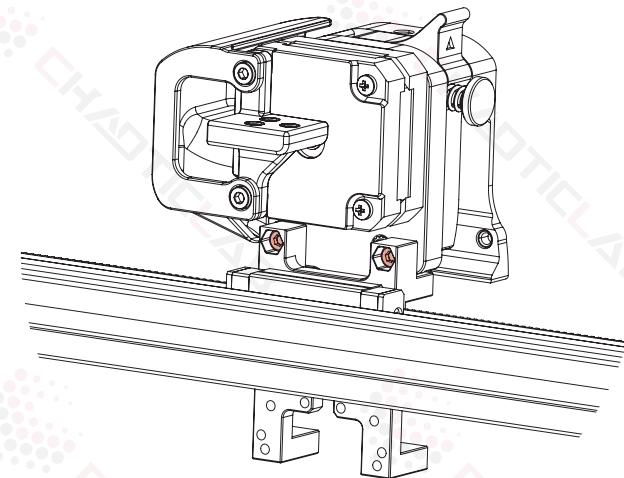
M3x6 SHCS

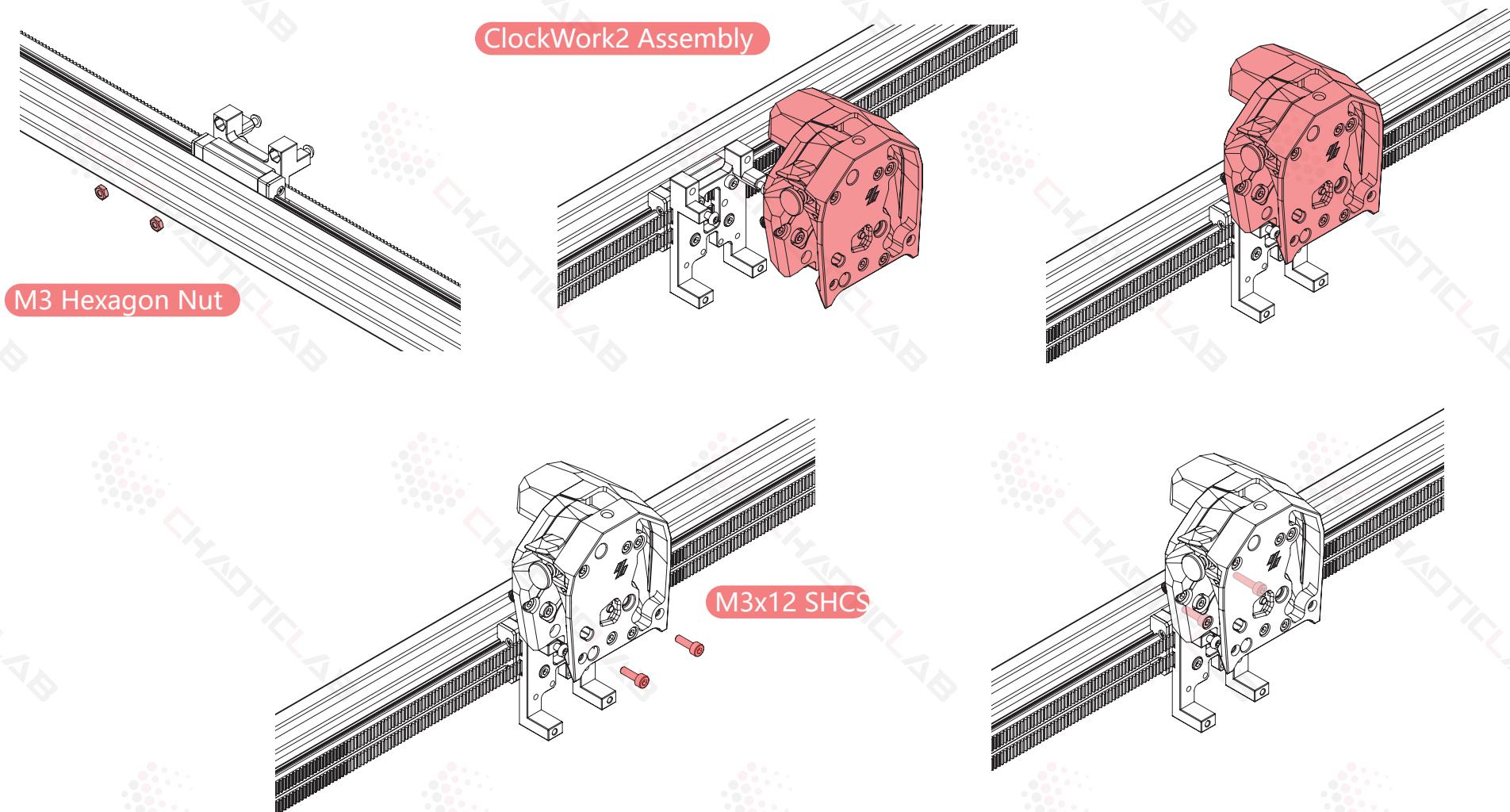


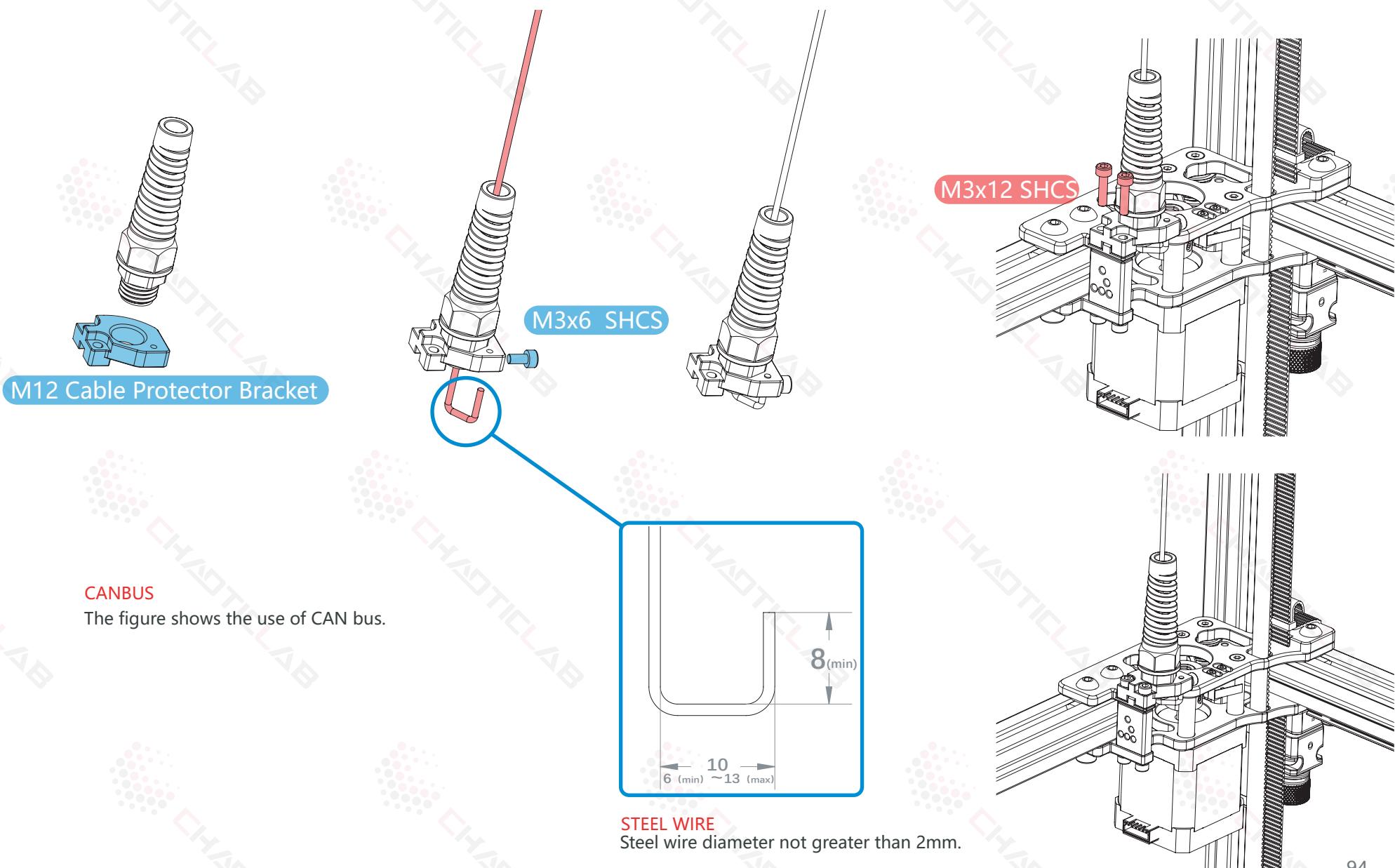
ClockWork1 Assembly



M3x12 SHCS

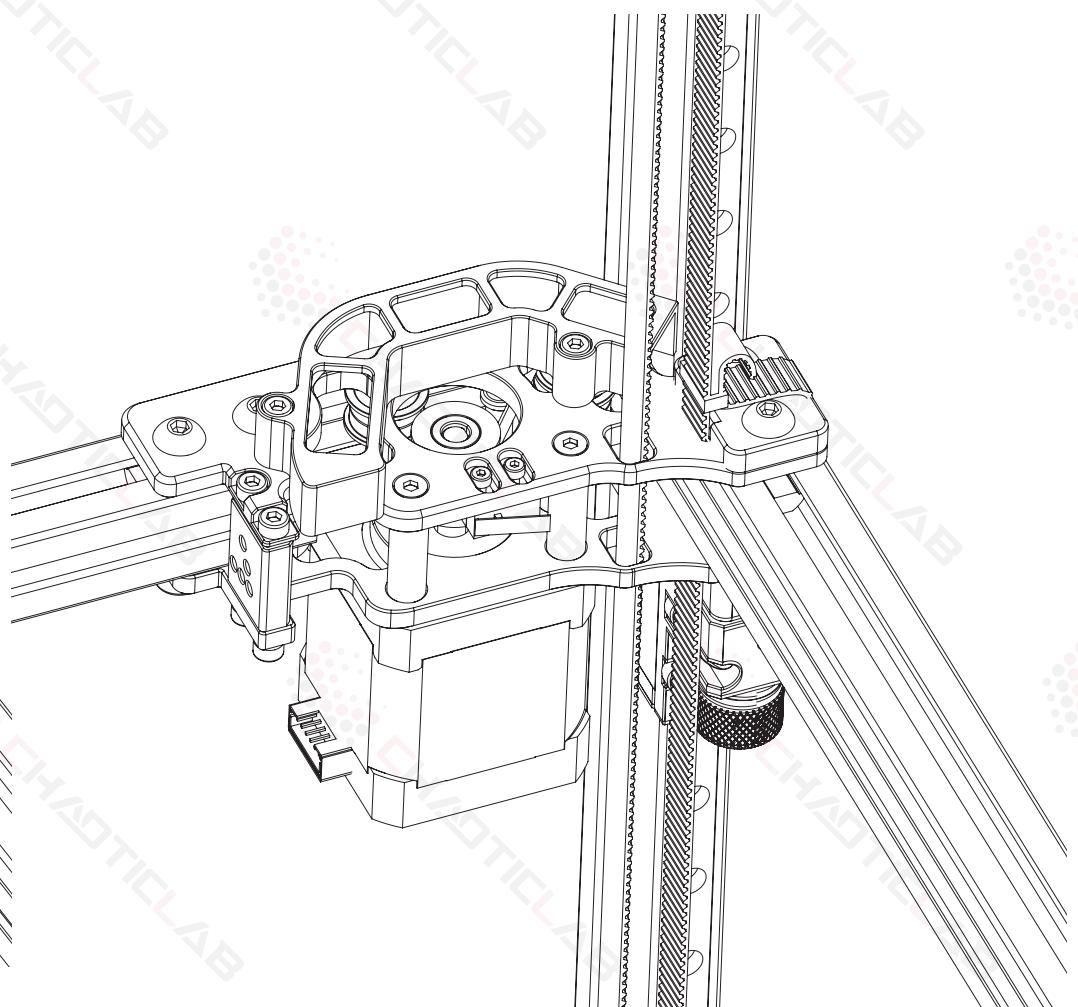
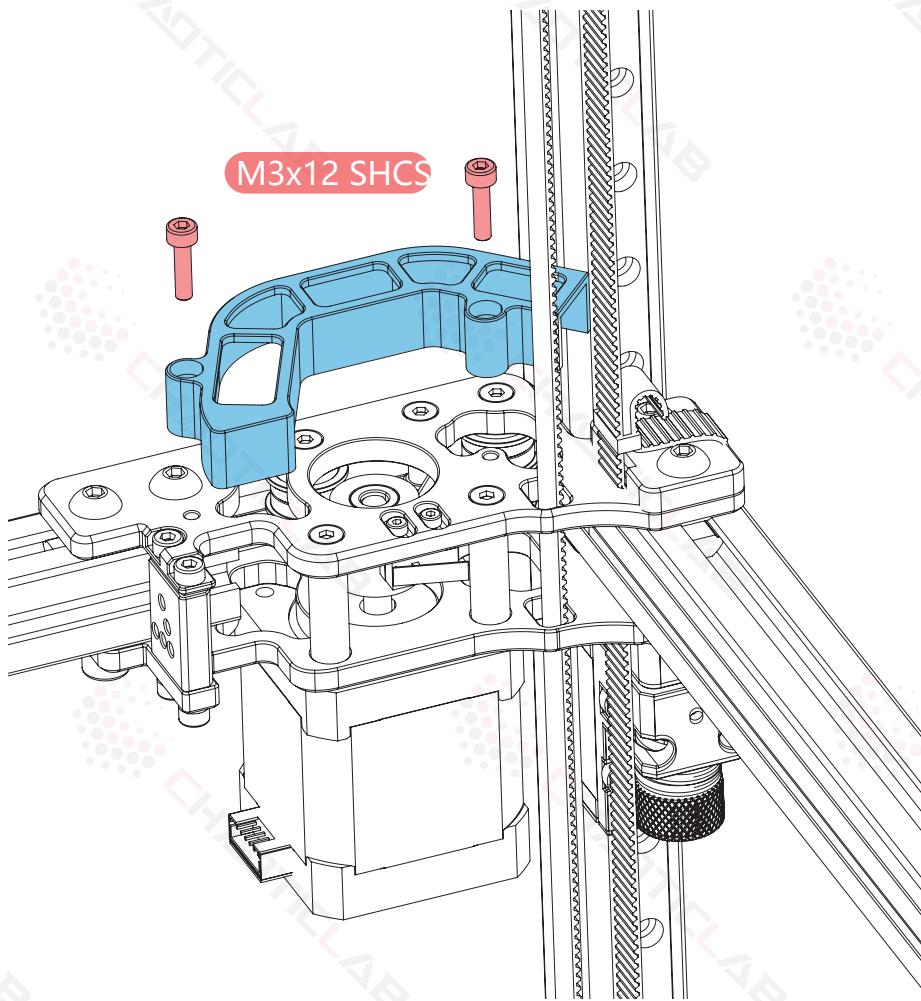






WIRING

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CABLE COVER

Confirm that the wiring is completed before installing this part.

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CHAOTICLAB



Website

www.chaiticlab.xyz

Github

github.com/chaiticlab

Discord

discord.gg/uUCX666tk2
