STEALTHCHANGER

STEALTHCHANGER V1 BUILD GUIDE

Because you can never have too many tools
for any project.

VERSION 2024-03-10

Before you begin on your journey, a word of caution.

In the comfort of your own home you are about to assemble a robot. This machine can maim, burn, and electrocute you if you are not careful. Please do not become the first STEALTHCHANGER fatality. There is no special Reddit flair for that.

Please, read the entire manual before you start assembly. As you begin wrenching, please check our Discord channels for any tips and questions that may halt your progress.

Most of all, good luck!

THE STEALTHCHANGER TEAM

Introduction 04

Hardware 07

Shuttle 08

Stealthburner 11

Dragonburner 14

Attaching to Carriage 17

End Stop Options 21

Next Steps 22

PART PRINTING GUIDELINES

The Voron Team has provided the following print guidelines for you to follow in order to have the best chance at success with your parts. The StealthChanger Team recommends to follow the same standards. There are often questions about substituting materials or changing printing standards, but we recommend you follow these:

3D PRINTING PROCESS
Fused Deposition Modeling (FDM)

MATERIAL
ABS

LAYER HEIGHT
Recommended: 0.2mm

EXTRUSION WIDTH
Recommended: Forced 0.4mm

INFILL TYPE
Grid, Gyroid, Honeycomb, Triangle or Cubic

INFILL PERCENTAGE
Recommended: 40%

WALL COUNT
Recommended: 4

SOLID TOP/BOTTOM LAYERS
Recommended: 5

FILE NAMING

By this time you should have already downloaded our STL files from the StealthChanger GitHub. You might have noticed that we have used the Voron naming convention for the files. This is how to use them.

PRIMARY COLOUR

Example part_x4.stl

These files will have nothing at the start of the filename.

ACCENT COLOUR

Example [a]_part.stl

We have added "[a]" to the front of any STL file that is intended to be printed with accent colour.

QUANTITY REQUIRED

Example [a]_part_x4.stl

If any file ends with "_x#", that is telling you the quantity of that part required to build the machine.

HOW TO GET HELP

If you need assistance with your build, we are here to help. Head on over to our Discord group and post your questions. This is our primary medium to help STEALTHCHANGER Users and we have a great community that can help you out if you get stuck.

https://discord.gg/Mx9JKbt7

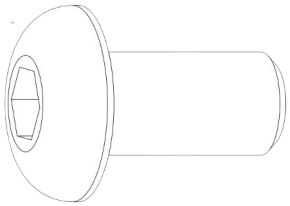
REPORTING ISSUES

Should you find an issue in the documentation or have a suggestion for an improvement please consider opening an issue on GitHub (https://github.com/Stealthchanger/Toolchanger/issues). When raising an issue please include the relevant page numbers and a short description; annotated screenshots are also very welcome. We periodically update the manual based on the feedback we get.

THIS IS JUST A REFERENCE

This manual is designed to be a simple reference manual. Building a StealthChanger can be a complex endeavour and for that reason we recommend downloading the CAD files off our Github repository if there are sections you need clarification on. It can be sometimes be easier to follow along when you have the whole assembly in front of you.

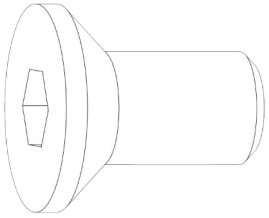
GitHub https://github.com/StealthChanger/Toolchanger



BUTTON HEAD CAP SCREW (BHCS)

Metric fastener with a domed shape head and hex drive. Most commonly found in locations where M5 fasteners are used.

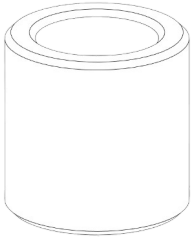
ISO 7380-1



FLAT HEAD COUNTERSUNK SCREW (FHCS)

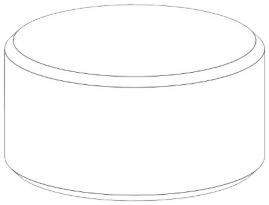
Metric fastener with a cone shaped head and a flat top.

ISO 10642



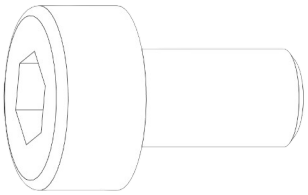
BUSHING/SLEEVE BEARING

Brass cindered are the most common. They should be self lubricating and metal construction.



MAGNET

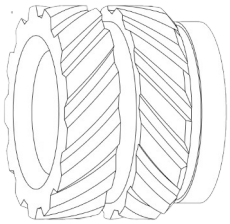
Metric round button neodymium magnet used on the Voron. N52 is highly recommended.



SOCKET HEAD CAP SCREW (SHCS)

Metric fastener with a cylindrical head and hex drive. The most common fastener used on the Voron.

ISO 4762



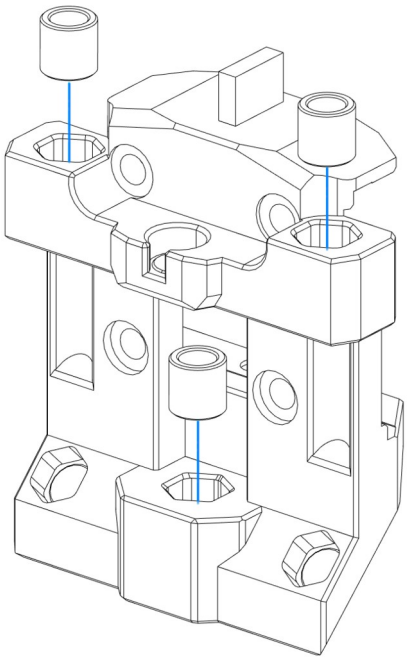
HEAT SET INSERT

Heat inserts with a soldering tip so that they melt the plastic when installed. As the plastic cools, it solidifies around the knurls and ridges on the insert for excellent resistance to both torque and pull-out.

ROUNDED DOWEL PIN

Steel rounded dowel pin, These are commonly using in furniture construction. Female threaded versions are optional.

4 ID x 6 OD x 6mm Bushing



INSERT BUSHINGS

Inspect the bushing hex holes, make sure they are 6mm between walls of the hex. Make sure the hex is well formed. This is an important step as it could cause misalignment later on.

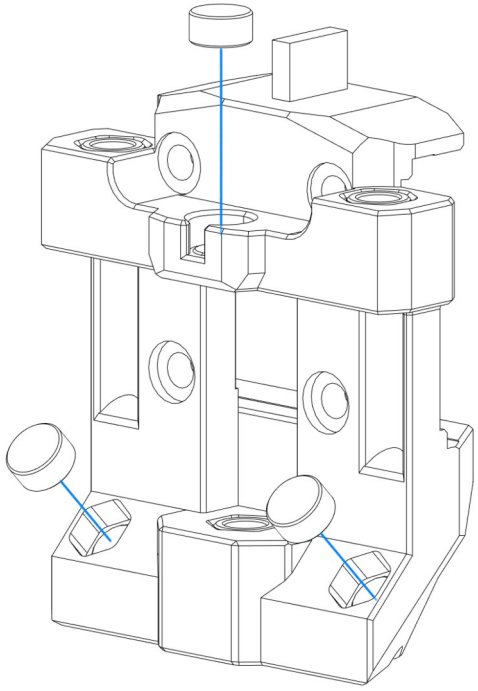
Apply a small amount of epoxy or glue to the inside of the hex (be sparing as you do not want any inside the the bushing).

Push the bushing into the hex and let sit until the epoxy or glue dries.

NOTE: Wipe any excess away and make sure none goes inside the bushing.

NOTE: you may be able to friction fit the bushings to test before your affix them permanently.

6x3mm Magnet

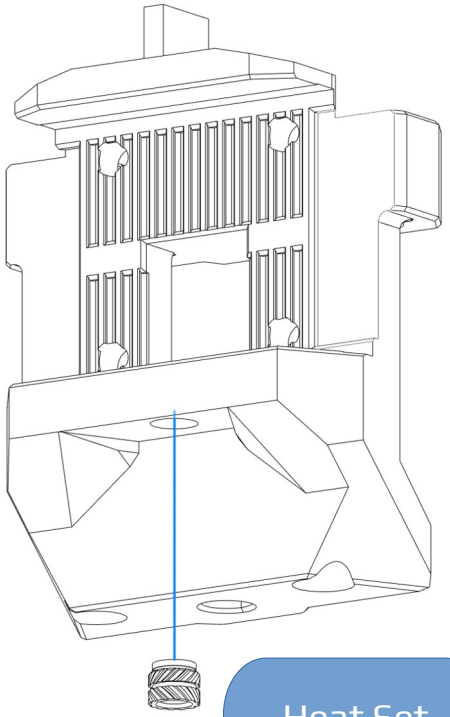


INSERT MAGNETS

Apply a small amount of epoxy or glue to the inside of the opening.

Push the magnet into the opening and let sit until the epoxy or glue dries.

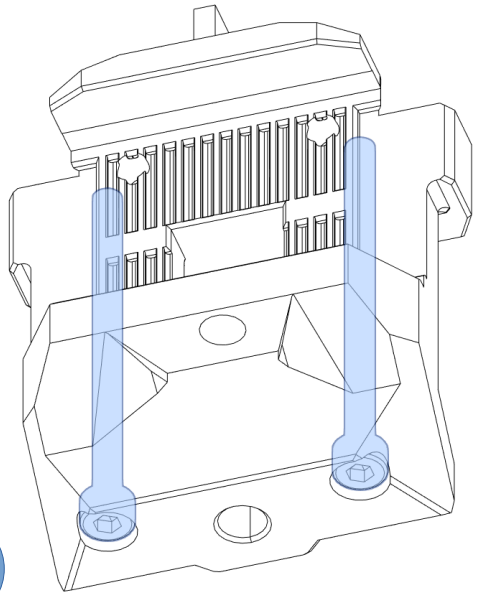
NOTE: you may be able to fiction fit the magnets to test before your affix them permanently.



Heat Set

OPTIONAL INSERT HEAT SET

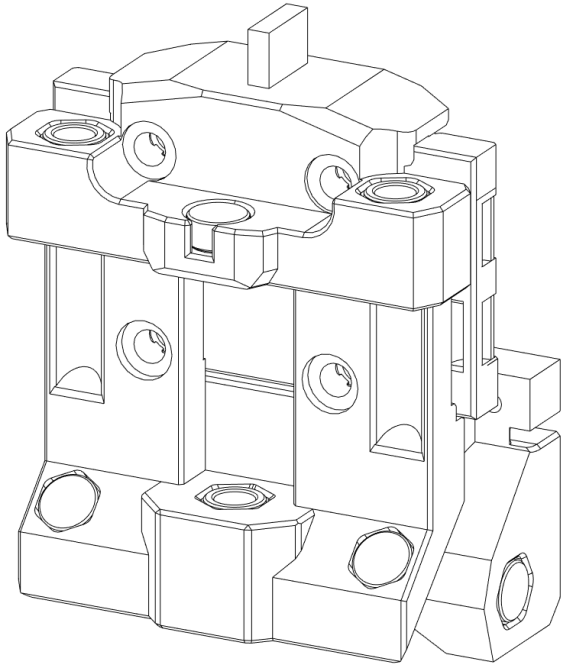
Optionally insert the end stop heat set. Only required if you are not using sensorless.



OPTIONAL SPINE SCREWS

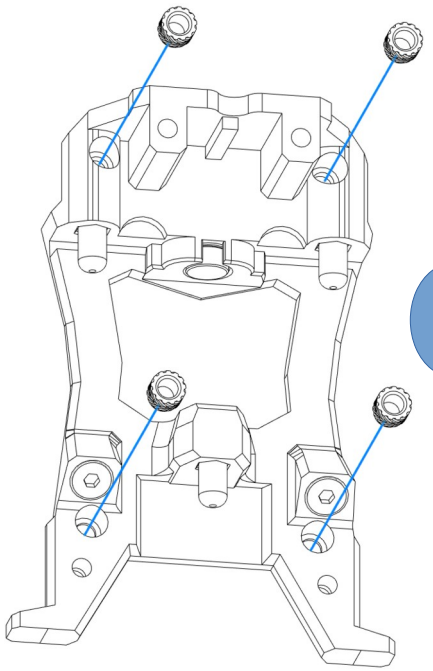
Optionally screws can be inserted to add rigidity to the shuttle if your not happy with it's stiffness

M3x40mm SHCS



FINISHED SHUTTLE

This is the finished shuttle with options shuttle keeper (later in this manual) and the optional Hall Effect end stop attachment (later in this manual).

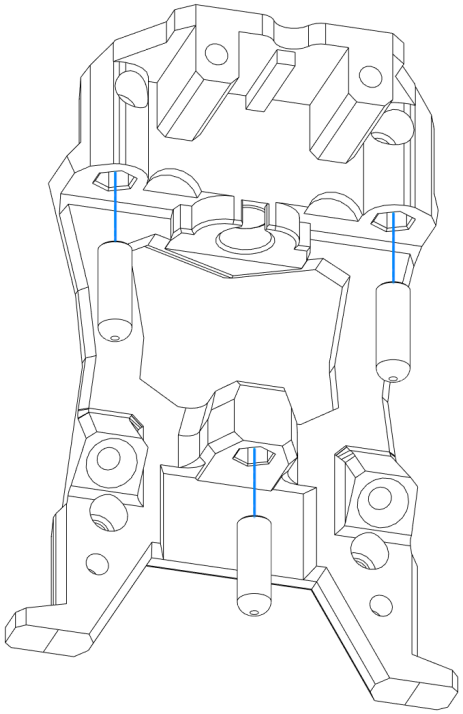


Heat Set

INSERT HEAT SETS

Start by setting the heat sets.

4 OD x 12mm Pins



INSERT DOWEL PINS

Inspect the pin hex holes, make sure they are 4mm between walls of the hex. Make sure the hex is well formed. This is an important step as it could cause misalignment later on.

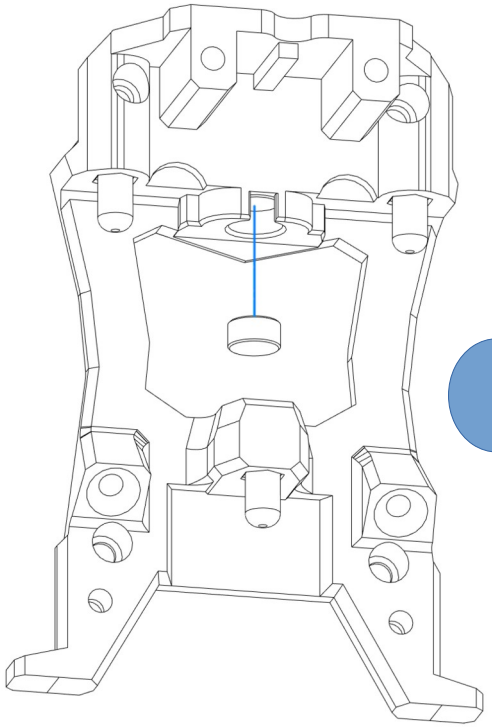
Apply a small amount of epoxy or glue to the inside of the hex.

Push the pins into the hex and let sit until the epoxy or glue dries.

NOTE: You may be able to friction fit the pins to test before your affix them permanently.

NOTE: You should test fit the pins onto the plate and the plate with the pins on the shuttle before making them permanent.

NOTE: Make sure to wipe away any excess so your can have a full sit into the bushings.



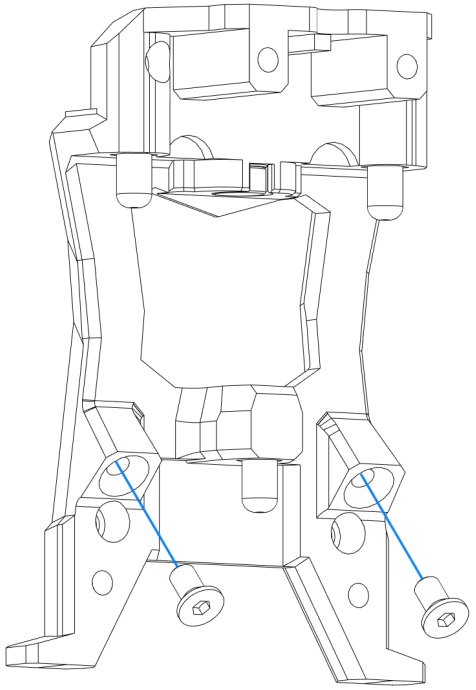
INSERT MAGNETS

Apply a small amount of epoxy or glue to the inside of the opening.

Push the magnet into the opening and let sit until the epoxy or glue dries.

NOTE: you should be able to fiction fit the magnets to test before you affix them permanently.

6x3mm Magnet

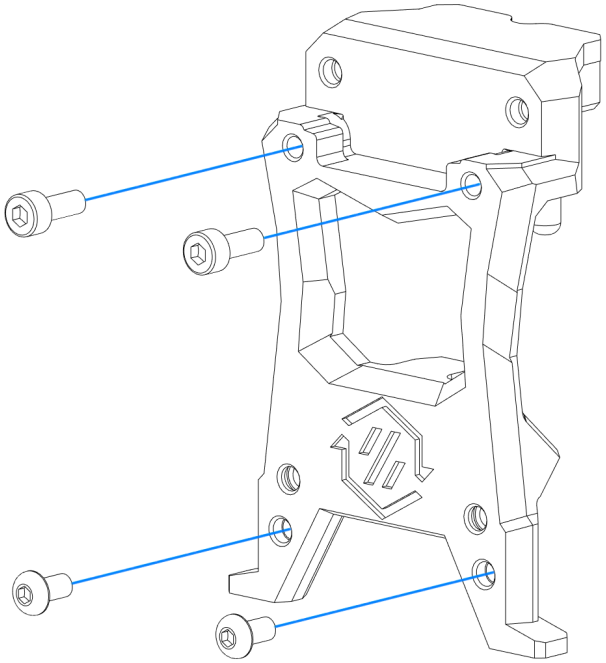


M3x8mm FHCS

PRELOAD SCREWS

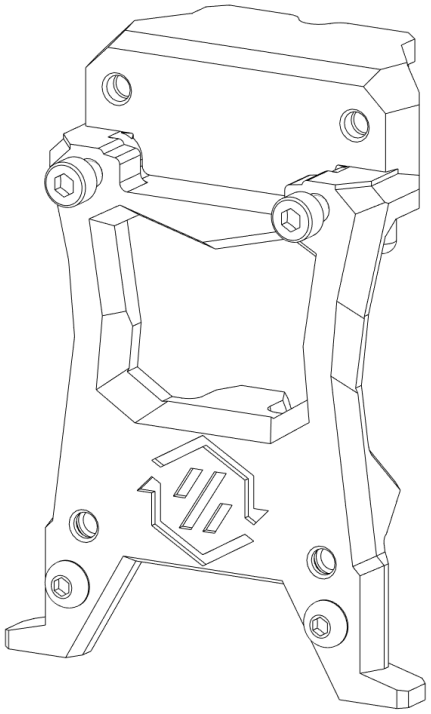
Insert the preload screws all the way, do not over tighten, we will set these later in this document (See Next Step). These just thread into the printed part without a heat set.

NOTE: These screws need to be magnetic like used in Voron Tap.



PREPARE FOR STEALTHBURNER

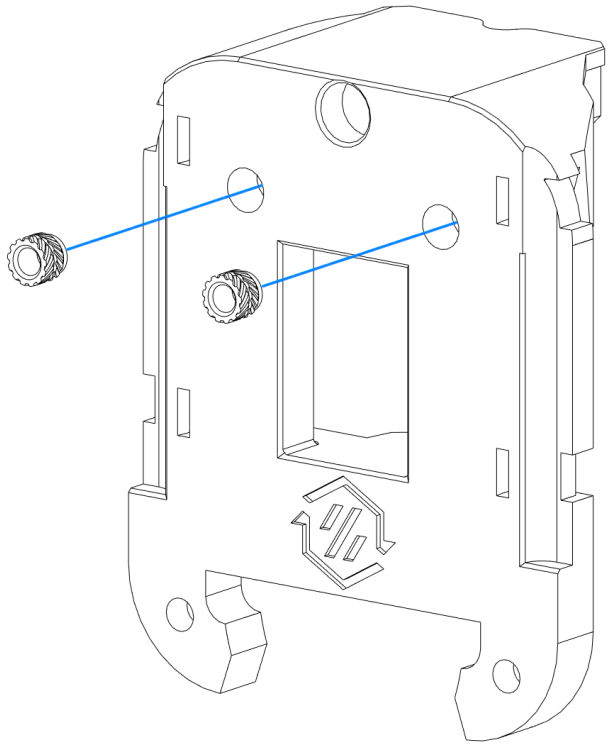
Install the screws to click on the stealthburner bottom piece. See stealthburner guild for screw sizes.



FINISHED TOOL PLATE

This is the finished stealthburner tool plate now continue with the official stealthburner guide from the Voron team.

NOTE: you may need to use longer screws when attaching the CW2.

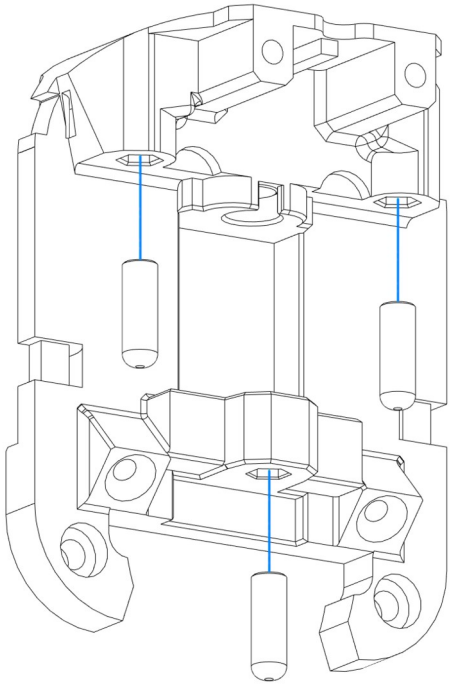


INSERT HEAT SETS

Start by setting the heat sets.

HeatSet

4 OD x 12mm Pins



INSERT DOWEL PINS

Inspect the pin hex holes, make sure they are 4mm between walls of the hex. Make sure the hex is well formed. This is an important step as it could cause misalignment later on.

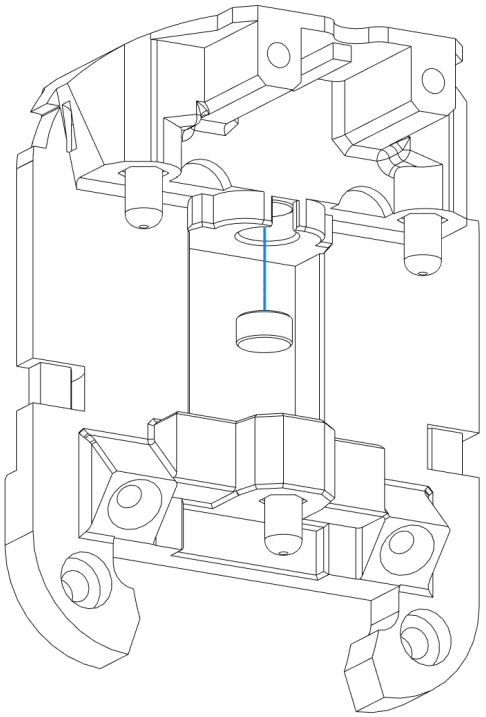
Apply a small amount of epoxy or glue to the inside of the hex.

Push the pins into the hex and let sit until the epoxy or glue dries.

NOTE: You may be able to friction fit the pins to test before your affix them permanently.

NOTE: You should test fit the pins onto the plate and the plate with the pins on the shuttle before making them permanent.

NOTE: Make sure to wipe away any excess so your can have a full sit into the bushings.



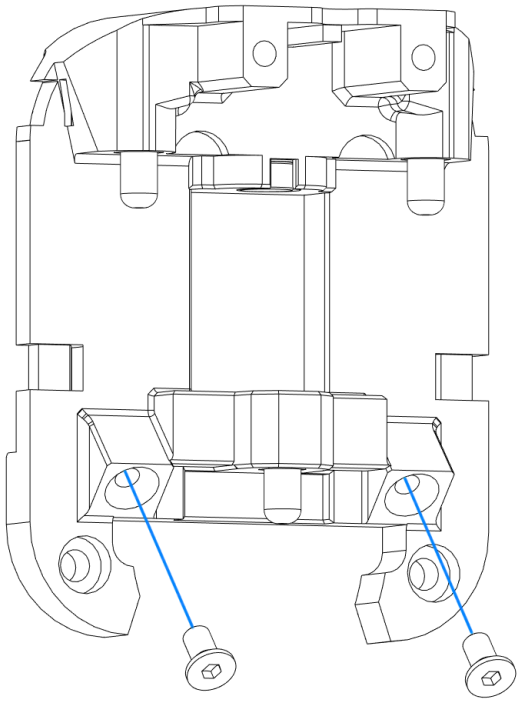
INSERT MAGNETS

Apply a small amount of epoxy or glue to the inside of the opening.

Push the magnet into the opening and let sit until the epoxy or glue dries.

NOTE: you should be able to fiction fit the magnets to test before you affix them permanently.

6x3mm Magnet

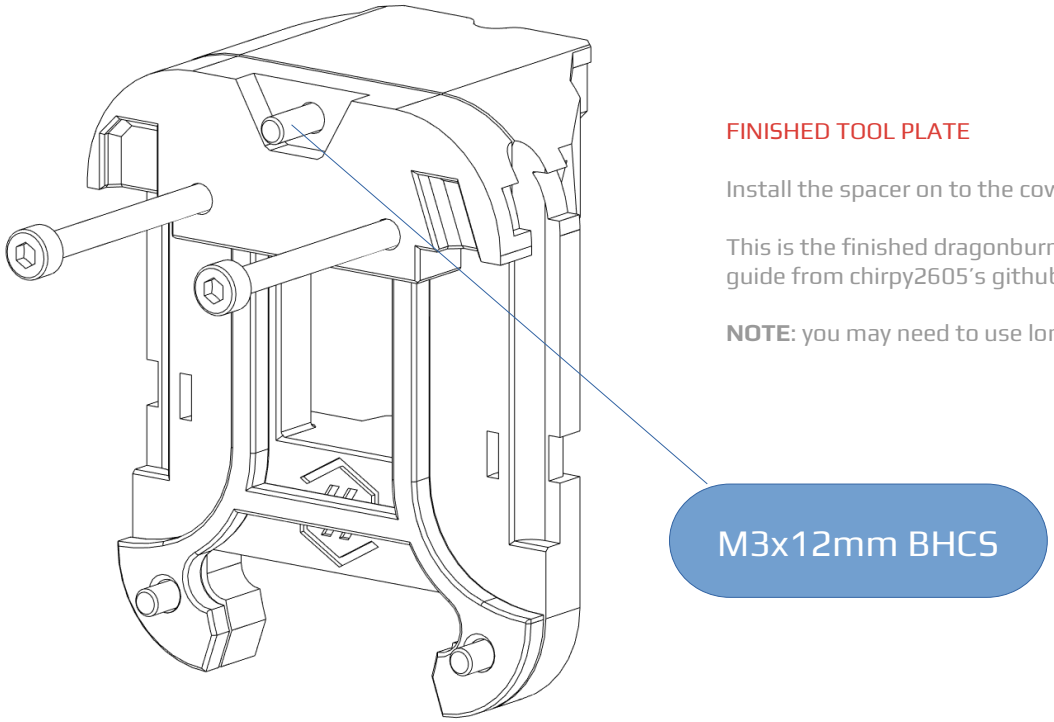


M3x8mm FHCS

PRELOAD SCREWS

Insert the preload screws all the way, do not over tighten, we will set these later in this document (See Next Step). These just thread into the printed part without a heat set.

NOTE: These screws need to be magnetic like use in Voron Tap.



FINISHED TOOL PLATE

Install the spacer on to the cowl first, then using the front cowl bolt add the backplate.

This is the finished dragonburner tool plate now continue with the official dragonburner guide from chirpy2605's github.

NOTE: you may need to use longer screws when attaching the cowl.

OPTIONS

There are 2 options when it comes to attaching the belts and installing the shuttle to the X carriage.

1. You can use the **shuttle keeper**, this is the easiest way to install it the belts and allows for you to remove the shuttle without having to remove the belts. The down side is that you lose about 5mm of Y travel.

2. You can use the **belt Helper** tool to push the belts behind the shuttle and tighten the carriage screws which will pinch the belts between the carriage and the shuttle.

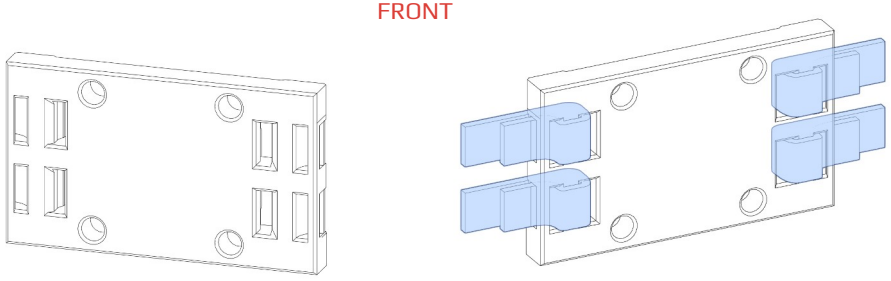
We will go though both options in this section but you only need to choose one.

SHUTTLE KEEPER

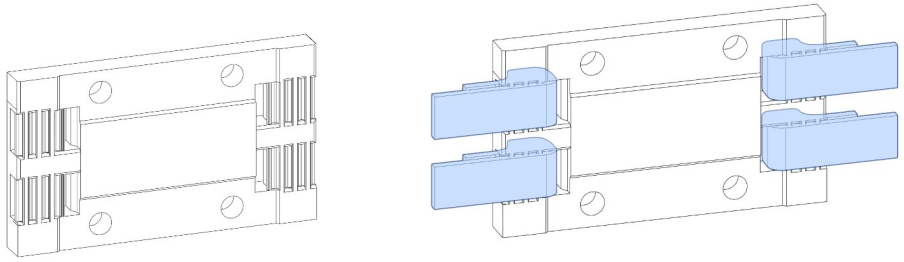
This is the easiest, you loops the belts through the keeper, and then install it between the carriage and the shuttle using BHCS screws. You need longer screws to be able to go through both. Make sure you tighten the shuttle well.

Now adjust your belts as per standard Voron adjustments using the idlers.

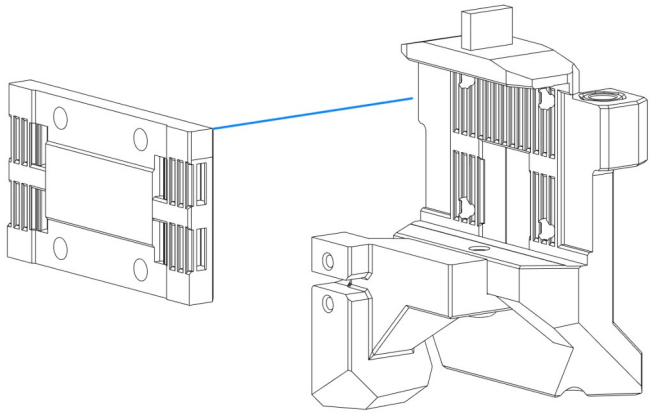
FRONT



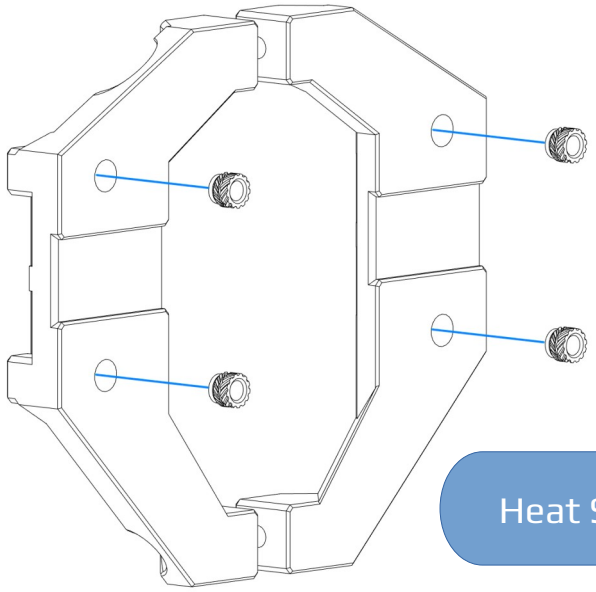
BACK



INSTALL ORIENTATION



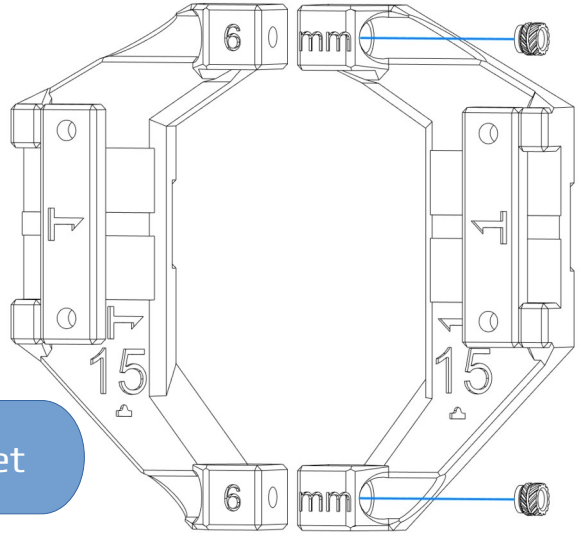
BELT HELPER



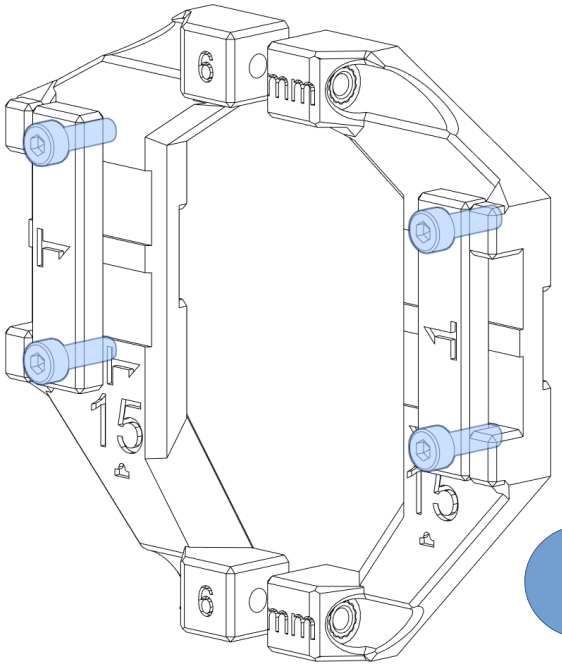
Heat Set

INSERT HEAT SETS

Start by setting the heat sets.



Heat Set



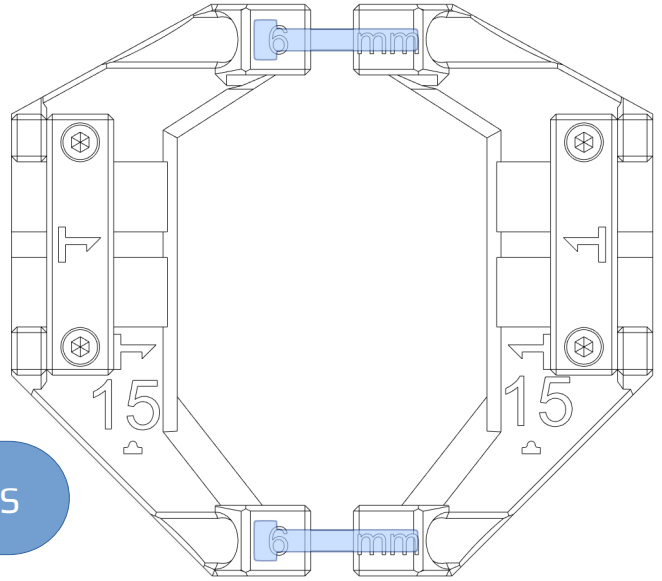
INSERT SCREWS

Add the belt clamps, make sure to match the icons with the right sides.

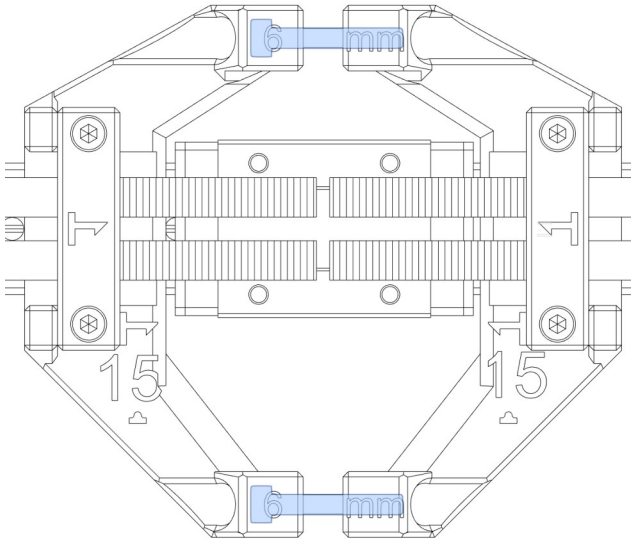
Install the belt clamp screws loosely.

Install the clamping screws loosely.

M3x10mm SHCS



M3x20mm SHCS

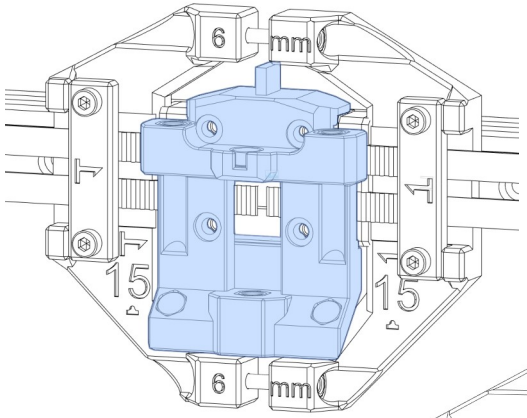


INSERT THE BELTS

Insert the belts, Making sure that there are 15 belt ridges on the inside of the helper. Makes sure you tighten the belt clamps well so the belt doesn't slip.

NOTE: there is no need to pull hard the belts, just make sure there is no slack, if you pull too hard at this point you will over tighten the belts a could damage other components.

Next start to tighten the top and bottom screws, make sure your try to do this evenly until you measure 6mm between left and right side at the top and bottom evenly.



INSTALL THE SHUTTLE

NOTE: you must wait until after the shuttle is installed before adding any end stops if you are using one.

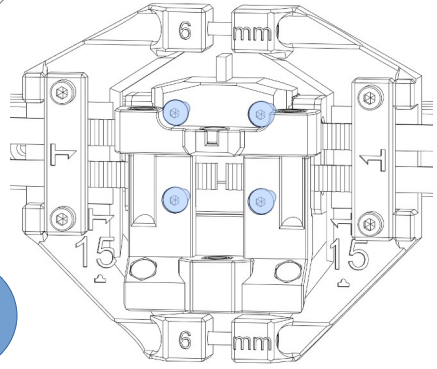
The belt ends should be nearly touching, at this point install the shuttle and tighten it to the carriage using BHCS screws as per Voron Manual. Make sure things are nice and tight before you start to replace the helper.

Once you are ready, slowly undo the top and bottom screws evenly. Once there is enough slack you may remove the clamps on the belts and remove the helper.

Now adjust your belts as per standard Voron adjustments using the idlers.

M3x8mm BHCS w/o Keeper

M3x12mm BHCS w/Keeper

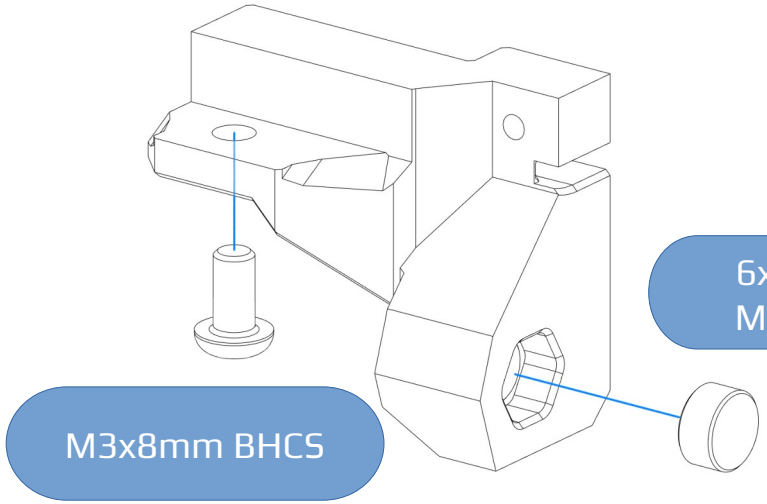


OPTIONS

There are a few options when it comes to end stops. Hall Effect is a Voron stands as well as end stop switches. The team doesn't provide the switch side, but we do have attachment points for and suppose to most common activation arms.

NOTE: more options may be available and are welcome.

HALL EFFECT



INSERT MAGNETS

Apply a small amount of epoxy or glue to the inside of the opening.

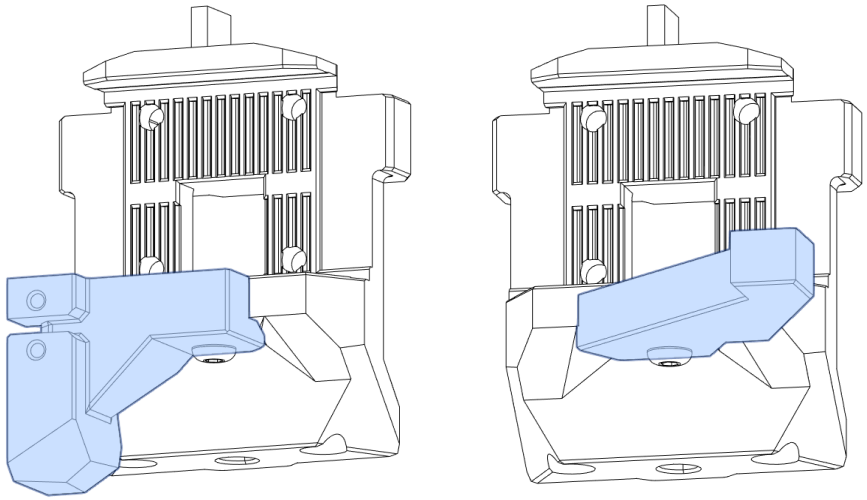
Push the magnet into the opening and let sit until the epoxy or glue dries.

NOTE: you should be able to fiction fit the magnets to test before you affix them permanently.

INSTALL THE END STOP ACTIVATION ARM

Simply screw it into the back side of the shuttle.

NOTE: Hall Effect and X Switch pictured.



ASSEMBLY COMPLETED!

The last step is to set preload. This should be done on each tool separately as it's meant to help counter inconsistencies/variances in the parts.

Preload is created with the 2 countersunk screws in the tool plate. These 2 screws need to be magnetic and will make contact with the magnets in the shuttle. This adds 2 more wider points of contact at the base while also pre loading the sleeves/bearings. To adjust them screw them all the way in, then slowly unscrew them 1/4 turn at a time (keeping each side even) until the tool no longer engages its self right away. Once you reach a point where this happens, screw them back in 1/4 turn. Each tool needs to be adjusted separately as printing irregularities can happen and this will allow you to compensate for it. You may want to test and readjust these from time to time.

NEXT STEP: SETUP & CALIBRATION

This manual is designed to be a reference manual for the build process of a StealthChanger.

The software setup and other initial setup steps with your new toolchanger can also be found on our github page. We recommend starting there.

GitHub https://github.com/Stealthchanger/Toolchanger/wiki/Installation

Enjoy your toolchanger.

STEALTHCHANGER

GITHUB

github.com/StealthChanger

DISCORD

discord.gg/Mx9JKbt7