



DRAFTSHIFT DESIGN



MODULAR DOCK V1 BUILD GUIDE

Because you need a safe place to store all
the tools you've built.

VERSION 2024-04-12



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 DRAFTSHIFT DESIGN TEAM

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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 Modelling (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/jJs73c6vSc>

REPORTING ISSUES

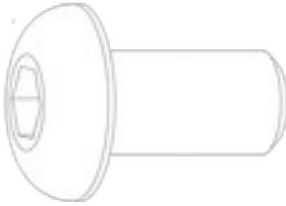
Should you find an issue in the documentation or have a suggestion for an improvement please consider opening an issue on GitHub (<https://github.com/DraftShift/ModularDock/issues>). When raising an issue please include the relevant page numbers and a short description; annotated screenshots are also 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.

The GitHub logo, consisting of the word "GitHub" in a bold, black, sans-serif font.

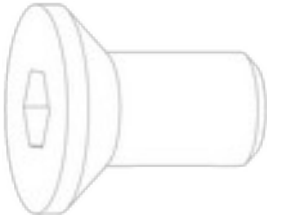
<https://github.com/DraftShift/ModularDock>



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



MAGNET

Metric round button neodymium magnet.

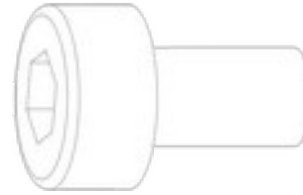
HIGH TEMP RTV SILICON

High Temp RTV Silicon in a tube for making moulds, make sure it can handle the temp of the nozzle.



HEX NUT

Metric hex nut used with metric fasteners.



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.



SPRING

Small stiff spring, be prepared to cut to fit.

T-NUT

A type of nut that slides into the extrusion rail as a method of affix other parts to it.

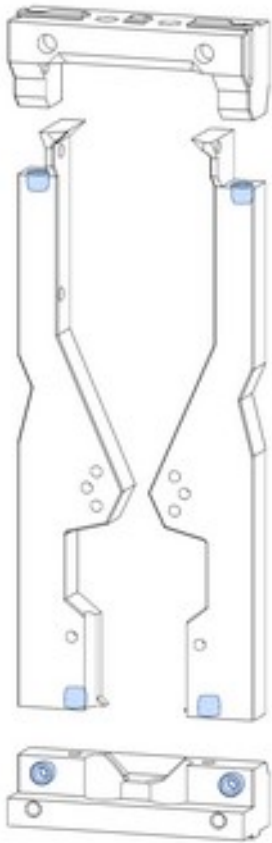
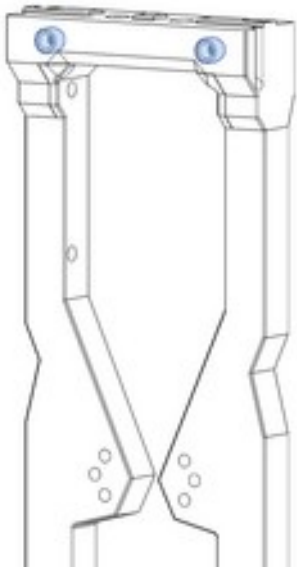


PARTS

The parts required to build a frame, Top, Bottom, Left and Right.

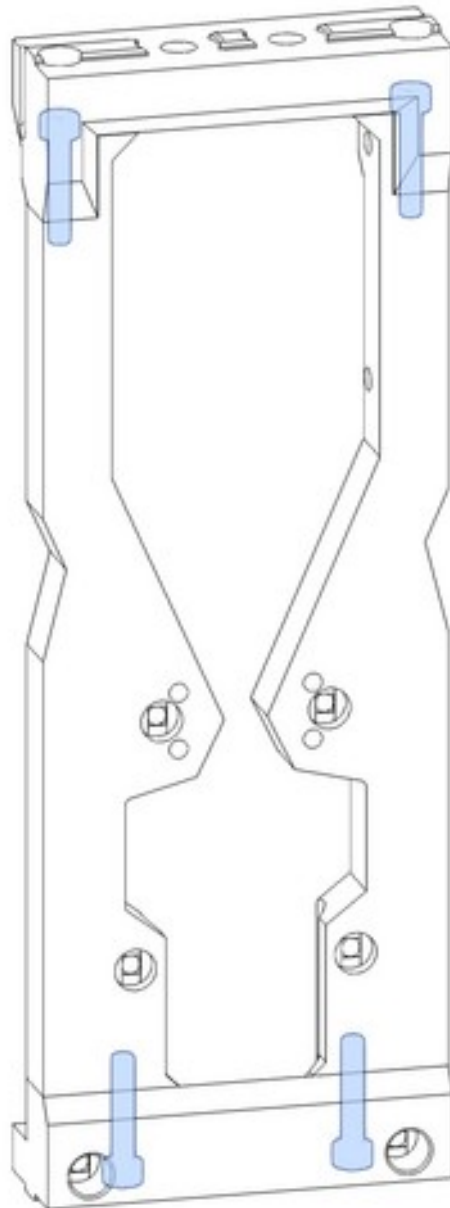
INSERT HEAT SETS

Start by setting the heat sets.



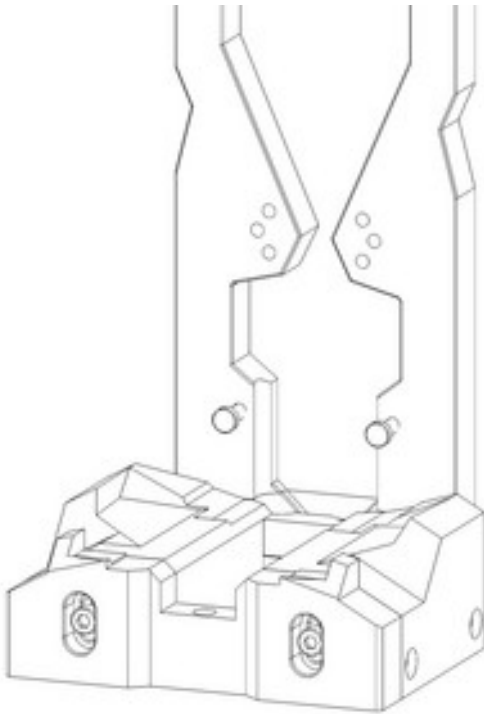
OPTIONAL INSERT HEAT SETS

Optionally add these inserts when using the "L Bracket", recommended if top mounting.

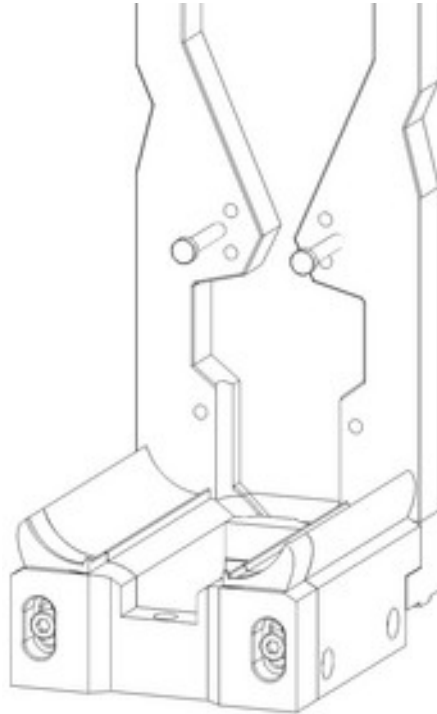
**ASSEMBLE**

Use M3x16mm socket head screws to attach the top and bottom to the frame sides. Make sure to get them straight and tight.

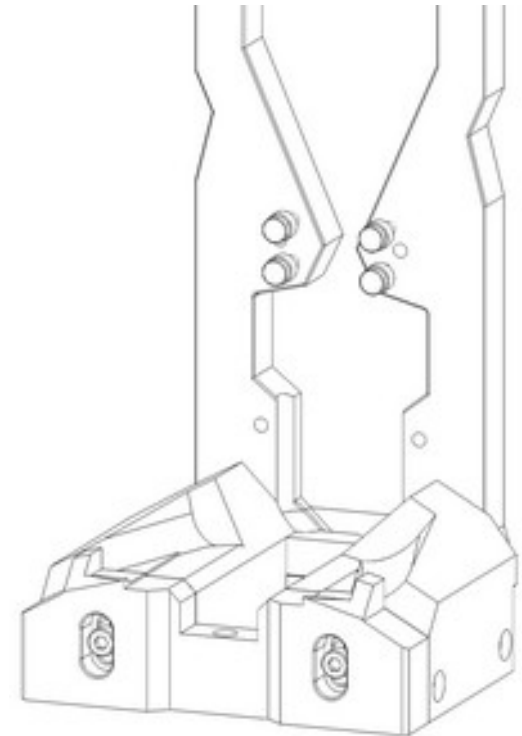
M3x16mm SHCS



Stealthburner



Dragonburner



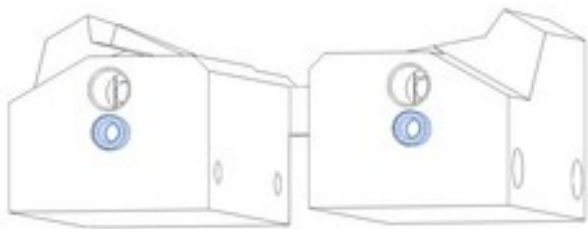
Blackbird

BASES

The modular dock has lots of options. This is to support different types of tools as well as a variety of nozzle blockers and wipers when at rest. Since the assembly is all the same we will only show the stealthburner. But rest assured they all use the same hardware and process.

NOTE: stubby version can not be used with extended front frame, 2020 front frame only.

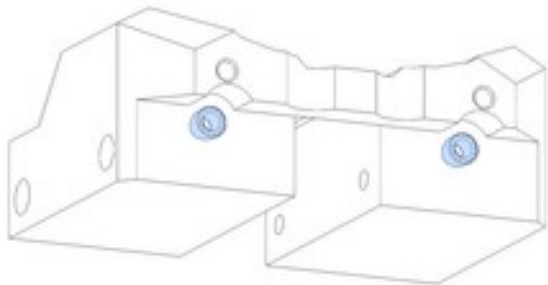
NOTE: stubby version can not be used with any other tools, so if you choose the stubby version you can only use dragonburners and stubby docks. Also the bolts are slightly shorter see the BOM.



Heat Set

INSERT HEAT SETS

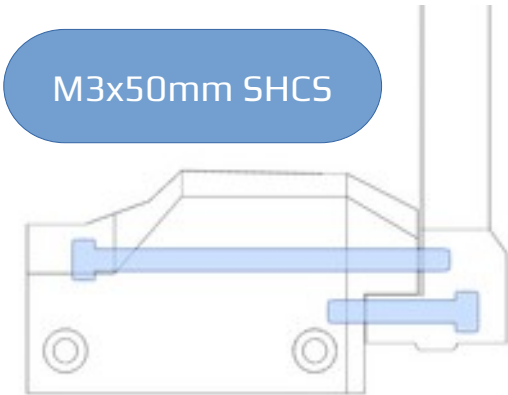
Start by setting the heat sets.



ATTACHING TO FRAME

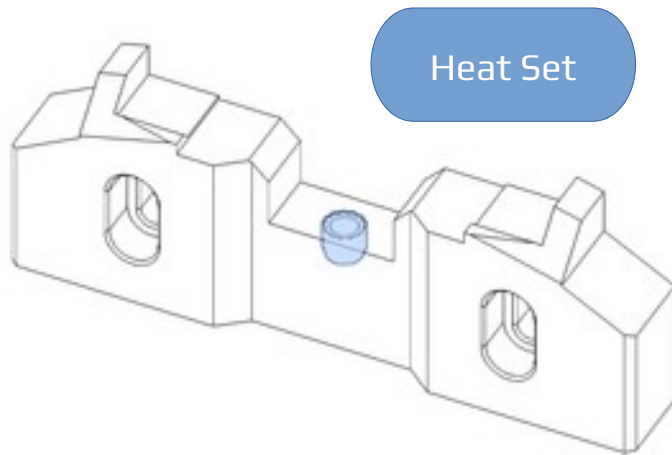
Insert the bolts from the front of the dock and snug them. Then install the longer bolts via the back of the base and tighten. Then return to the front and tighten.

NOTE: 40mm screws are used in place of the 50mm for the stubby version.



M3x50mm SHCS

M3x20mm SHCS



Heat Set

OPTIONAL HEAT SET

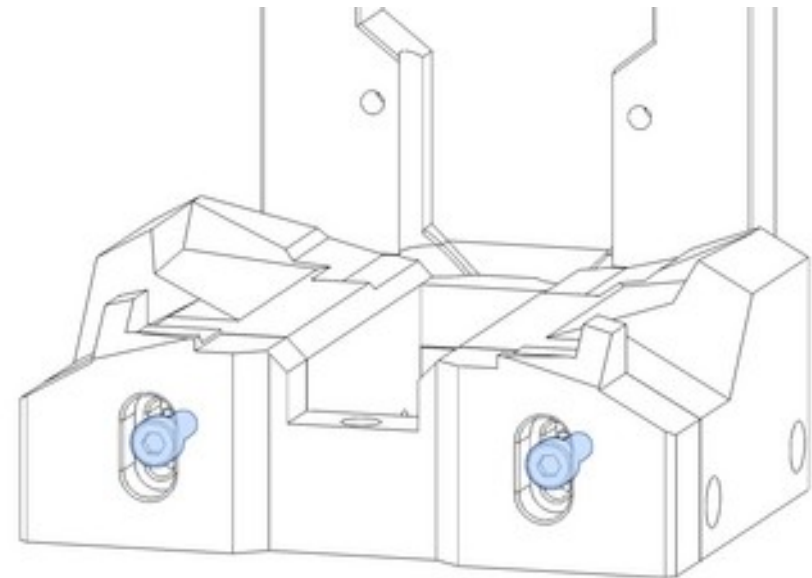
Optional heat set for PTFE wiper install.

NOTE: There are 2 optional 6x3 magnets on the bottom for future options to attach to.

INSTALL BACK PLATE

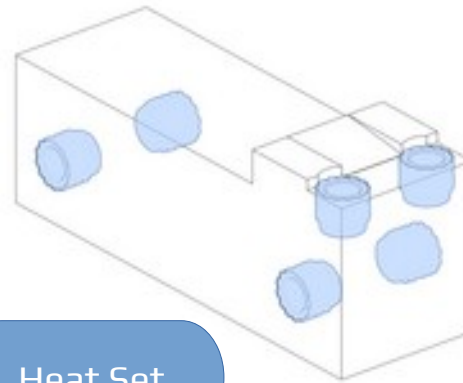
Screw the back plate on, just snugging it up as we will adjust this later in the manual.

M3x10mm SHCS



WIPERS

Just like bases, wipers have options. The main ones are Cup or Spring Steel version. Both were designed by TapChanger and adopted for these docks.

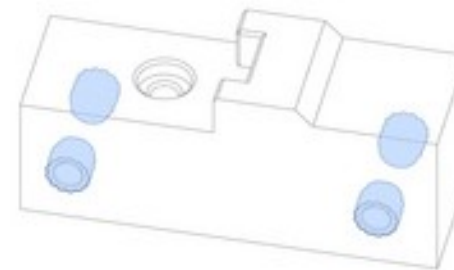


INSERT HEAT SETS

Start by setting the heat sets.

Spring Steel

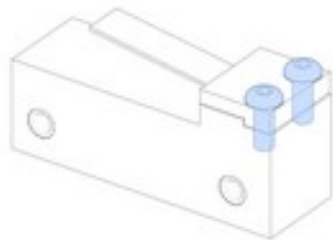
Heat Set



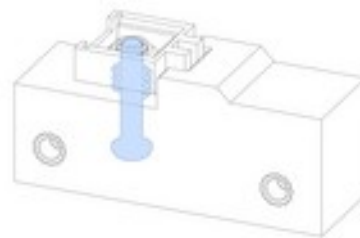
Cup Style

Spring Steel

Cup Style



M3x6mm BHCS



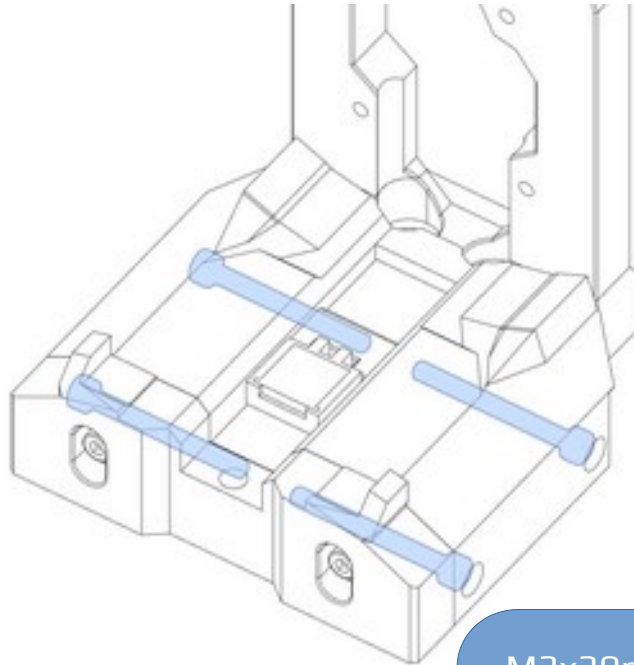
M3x16mm BHCS
+ M4 Spring

INSTALL BLOCKER

Both types will require High Temp RTV Silicon moulds.

CUP: Install the heat set from the bottom of the cup, install an M3 screw from the bottom to be flush, then fill the cup with silicon and with a wet finger press it smooth and let it dry then install, cut the spring to be about 2-3mm high.

SPRING STEEL: Use the provided mould, fill both sides with silicon, insert the spring steel and close the mould. Let dry and install.



M3x30mm SHCS

INSTALL WIPER

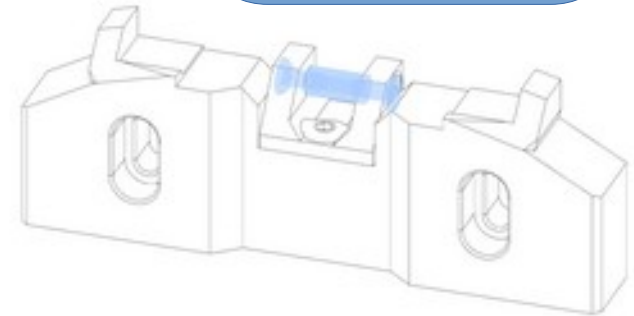
Install the wiper into the base of the dock. Seen here with the back plate already installed.

NOTE: 20mm screws used for DB width docks.

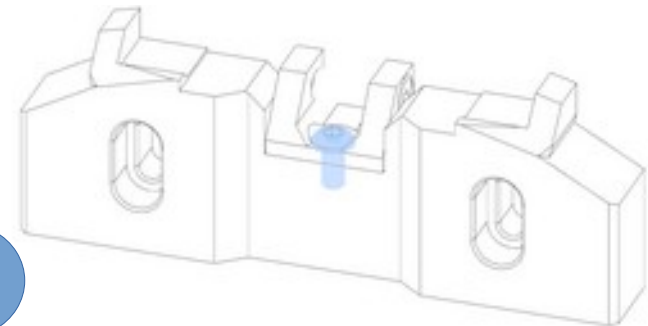
OPTIONAL PTFE WIPER

Cut a 8mm piece of 4mm OD PTFE tube. Fit between the 2 holes and screw in an M2.5x6mm (2mm ID) or M3x6mm FHCS (3mm ID) screw to each end to hold the PTFE tube in place.

Install the assembled wiper onto the back plate.

6mm FHCS
+ 8mm PTFE Tube

M3x6mm BHCS



MOUNTING OPTIONS

Like most parts of the modular dock, you have options at this point.

- Top mount, this meant only mounting to the top bar of the frame. In this configuration, you should use the “L Bracket” and the bottom “Links”.
- Bottom mount or Crossbar Mount, this means you are only mounting to a bar that runs in parallel to the top frame bar, but at least 170mm lower. In this configuration nothing is mounted to the top and no extras are required.
- Full mount, this means you are running both top and bottom bars to mount to. This is the most solid option and the most solid by far. You do not need any extra brackets.

The guide will go over all the options, but you will not need all options.

Extrusion mounts require 2x M5 T-Nuts and 2x M5x10mm BHCS per rail. Since this is self explanatory we won't show images of these options.

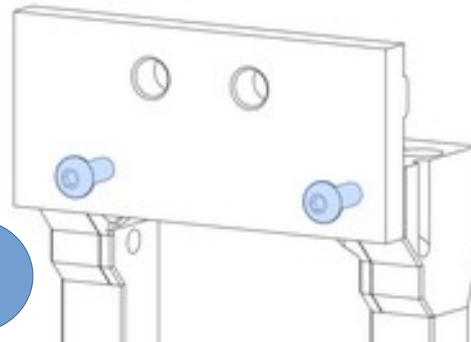
L BRACKET

Once you have the docks mounted to the top bar, add 2 more M5 T-Nuts to the inside of the top rail. Using M5 BHCS to the rail and M3 BHCS to the attach the bracket to the dock.

M5 T-Nut

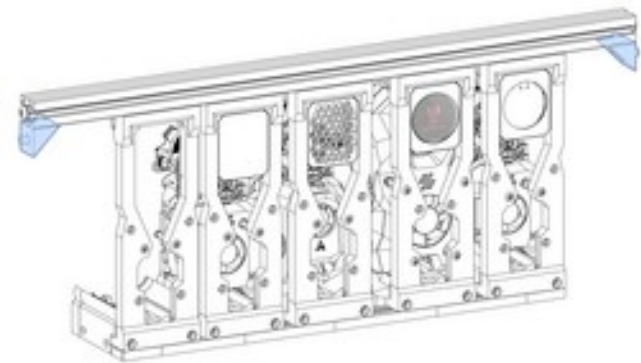
M5x10mm BHCS

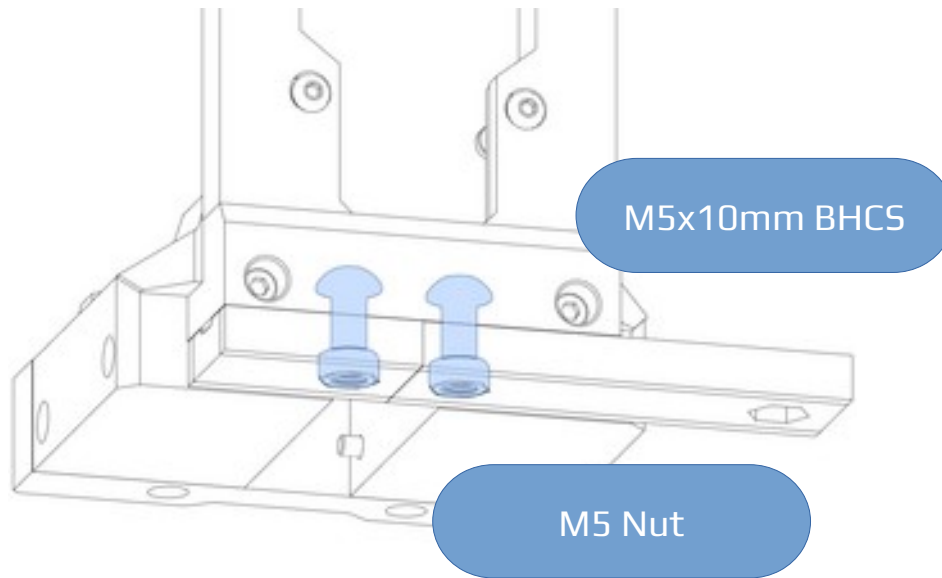
M3x8mm BHCS



CORNER BRACKETS

These are a good idea either way, but specifically if top mounting it is highly recommended to add corner brackets on the top rail. The leverage of the docks will allow the rail to spin on the blind join, this will counter it.



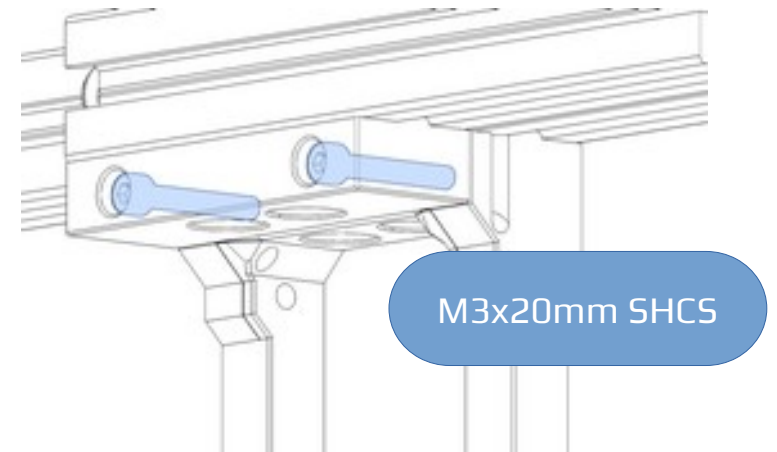


LINKS

Each dock will require 2 links. There are lots of combinations, the end piece has a single hole in it and is meant to start or end a chain of docks. Between docks there are different lengths, this is do to the size of and proper spacing between the tools/docks. The links are names to match the toolhead combinations to maintain the proper gap.

NOTE: Blackbird (BB) is the same length as SB.

NOTE: Links are strongly recommended as they add lots of stiffness across docks when no crossbar is available.



BUFFER BRACKET

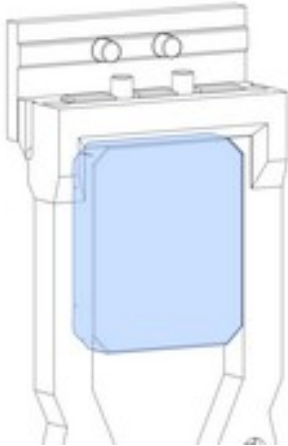
This is a special bracket to help secure the top part of the dock when used with the door buffer. It uses the L Bracket heat sets and screws into the printer top rail.

OPTIONAL CONTAINER

Each dock can hold one optional container. There are several types and each type simply clips in. The container have the male side and the dock frame has the dimples at the top where they click into.

The blank version is provided for you to build off of it or if you want to add a tool ID to it. The grill version adds nice Voron style hexes to the top. The fancier version allow for electronics, there is a 3mm diameter wire path near the top of the frames to be able to safely run power to the top rail and across the docks.

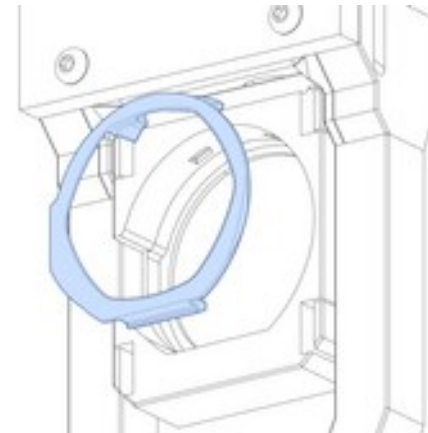
BLANK



GRILL



KNOMI



KNOMI V2



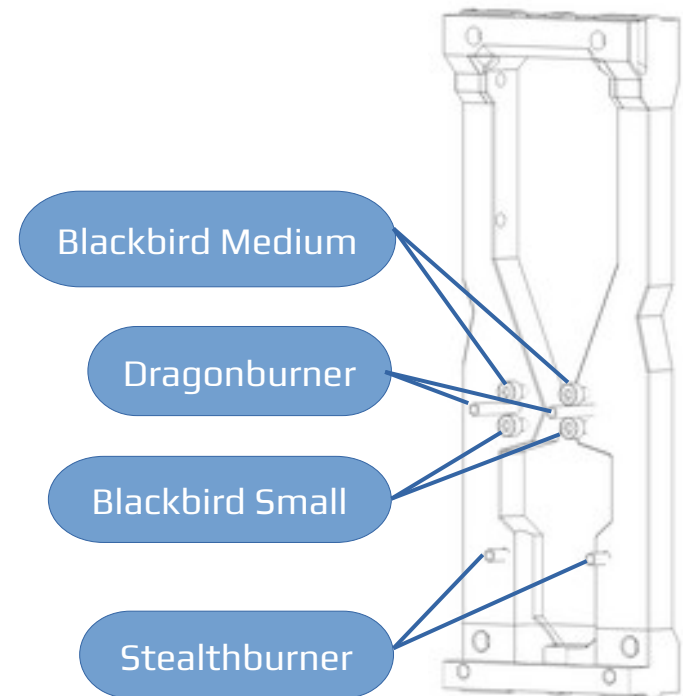
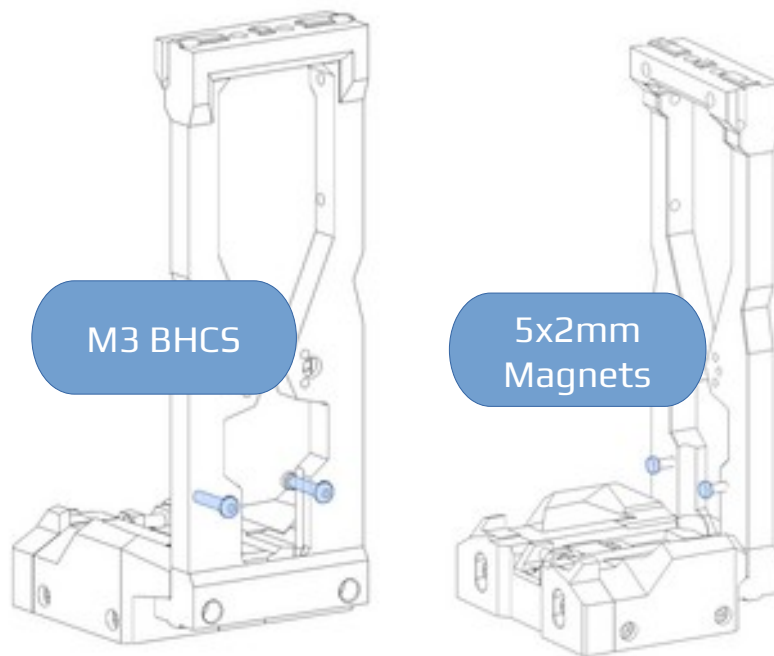
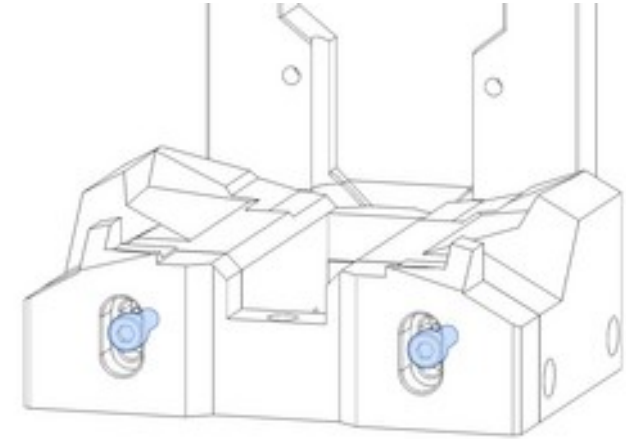
SETTING UP THE TOOL

There are 2 steps to this.

1. This step we want to make sure the tool sits at a perfect 90 degrees. Sit the tool into the dock and adjust the back plate (slotted bolts) until the dock can hold the tool at a perfect 90 degrees on it's own. Make sure the tool is just inside the lip on the very back of the tool.

2. Once step 1 is fully done, we need to add M3 BHCS via the front to the front and screw them in. Optionally add 5x2 magnets to the head of the bolts on the front of the cowl (Steel bolts are required for this option). Tighten the bolts until it touches the bolts/magnets on the front cowl of the tool.

NOTE: Stealthburner shown, other tool heads user different screw sizes and placement.



ASSEMBLY COMPLETED!

Congratulations, now restart at Step 1 for as many tools as you are installing on your toolchanger.

NEXT STEP: CONFIGURATION

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

The configuration you'll require for the docking sequence can be found on our github page. We recommend starting there.



<https://github.com/DraftShift/ModularDock/tree/main/config>



DRAFTSHIFT DESIGN

GITHUB

github.com/DraftShift

DISCORD

discord.gg/jJs73c6vSc

