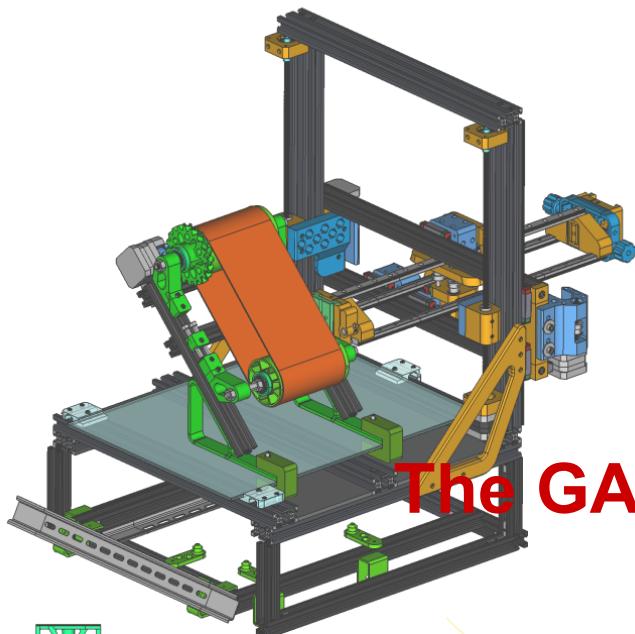




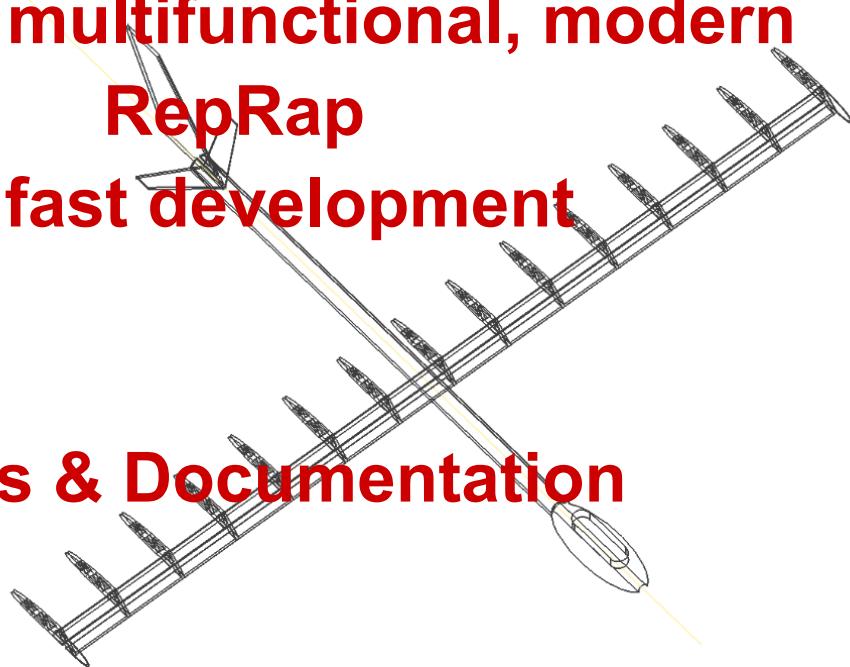
GA3D.TECH



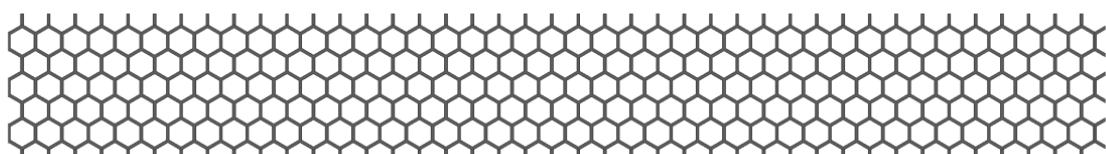
The GA3D Project

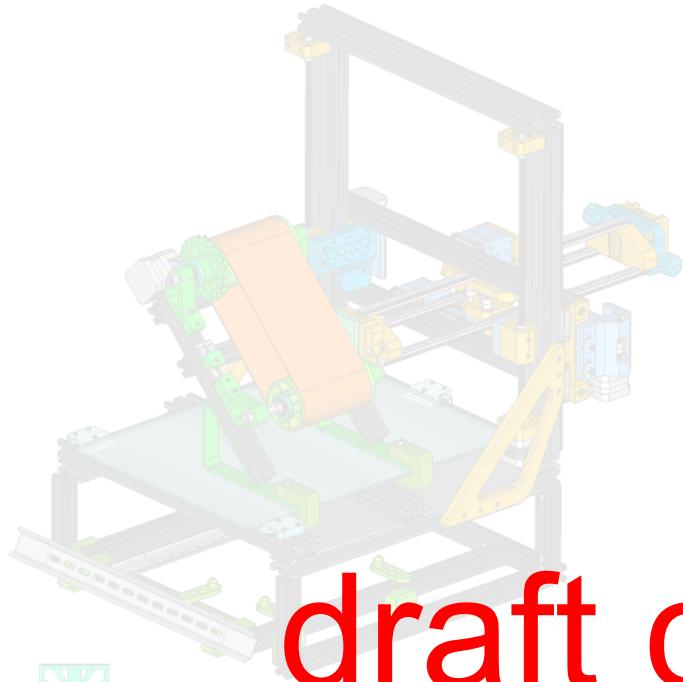
a flexible, multifunctional, modern
RepRap
for fast development

Notes & Documentation



2023, Switzerland, A. D. Geiser

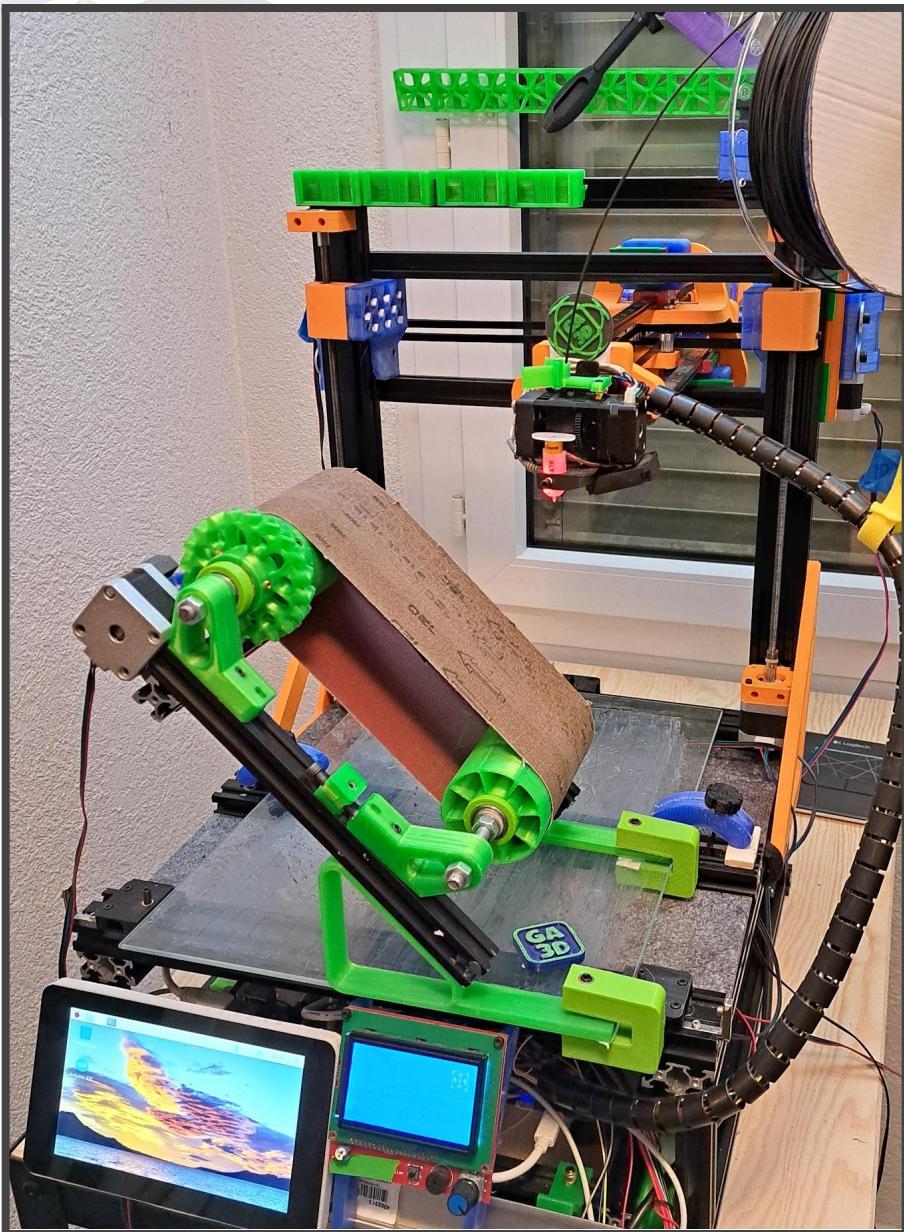




**draft copy of
work in progress**

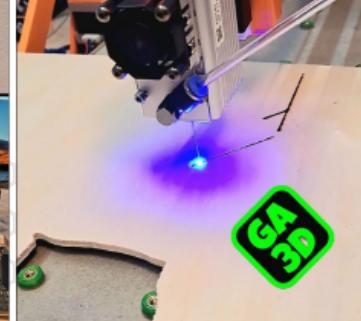
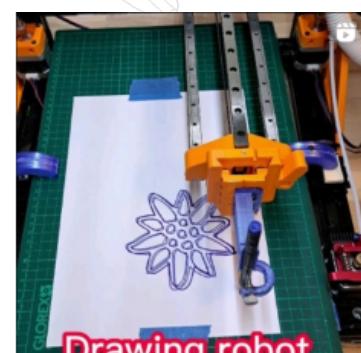
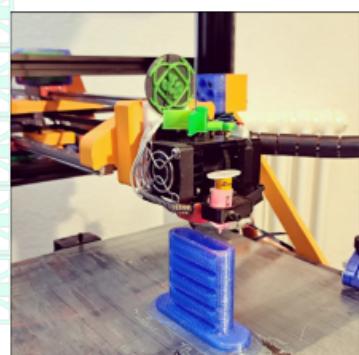
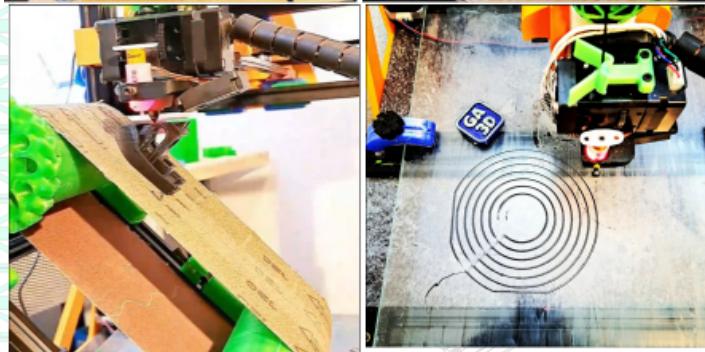
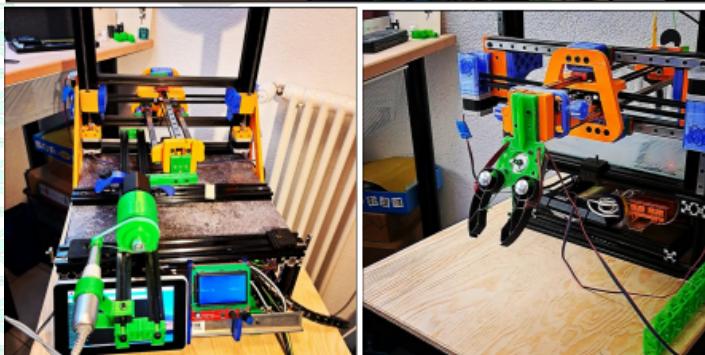
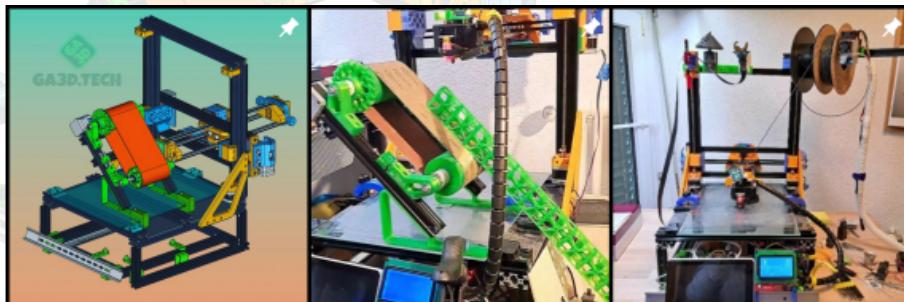


The GA3D Project machine in real
with its Infinite 45° module :



The GA3D Project

The GA3D Project is an open concept and opened machine for makers, tinkerer, researcher, scientist, selfmade creator



Disclaimer

This source, containing the design of a multifunctional 3Dprinter/machine, is provided by the authors {GA3D} on an “as-is” basis, without any express or implied warranties of any kind, including of merchantability, satisfactory quality, fitness for a particular purpose, compliance with standards or regulatory requirements, or the non-infringement of third party rights in its production, distribution and use.

The author(s) of this Hardware/Software accept absolutely no liability for any harm or loss resulting from its use.

It is extremely unwise to rely on Hardware/Software alone for safety.

Any machinery capable of harming persons must have provisions for completely removing power from all motors, etc, before persons enter any danger area.

All machinery must be designed to comply with local and national safety codes, and the authors of this software cannot and do not, take any responsibility for such compliance.

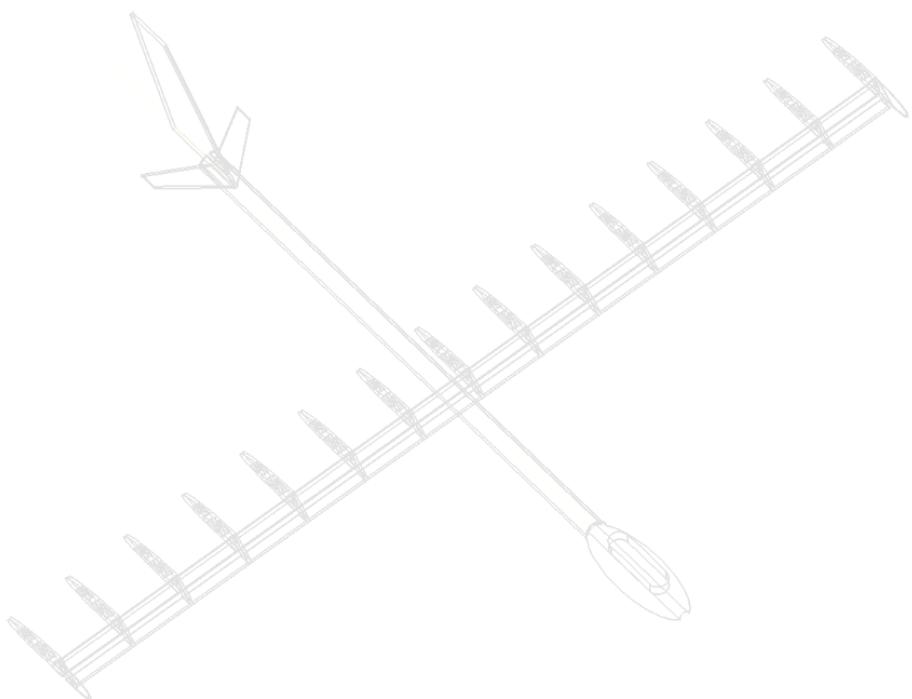
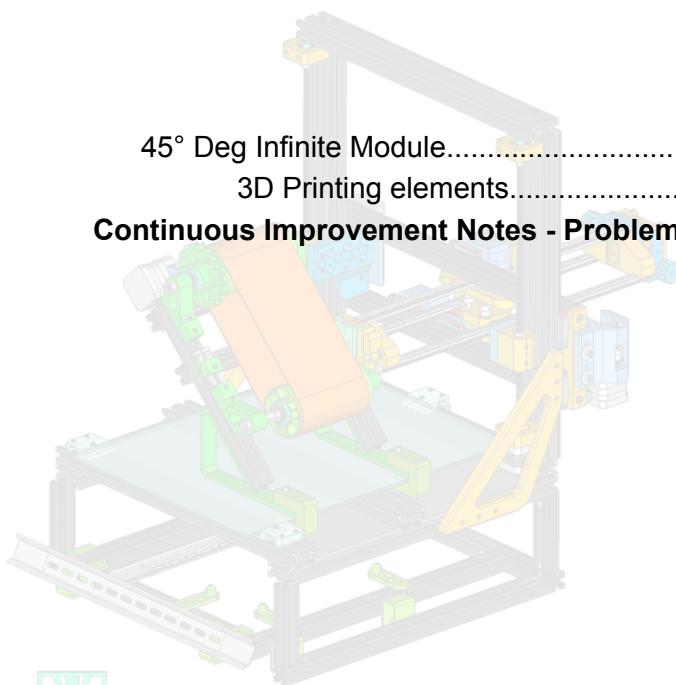
Copyright ©

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Introduction

Welcome to the GA3D Project !

The GA3D Project is a “Side-project” done for the passion around the theme of reprap 3Dprinter, with an attempt to extend the reprap / DIY (Do it Yourself) spirit to other processes and fields.

The basic machine consists of a frame with a fixed table, and a 3 axis Cartesian robotic arm with CoreXY kinematics crossed in the XY plane. A very simple tool changer is located at both ends of the robotic arm. This makes it a modular machine that can be easily converted into any kind of machine.

My goal is to have fun testing, developing and trying all kinds of processes. I'm sharing this project because it could be of interest to you as well or save you time in your tests whatever they are.

Until now I have already transformed my machine into :

- 3D printer with a Bowden extruder
- 3D printer with a direct extruder
- 45° 3D printer to make infinitely long parts
- automatic hacksaw - wire saw for scrolling
- laser cutter - plotter with pen
- cutting plotter cutter
- lathe (in progress)

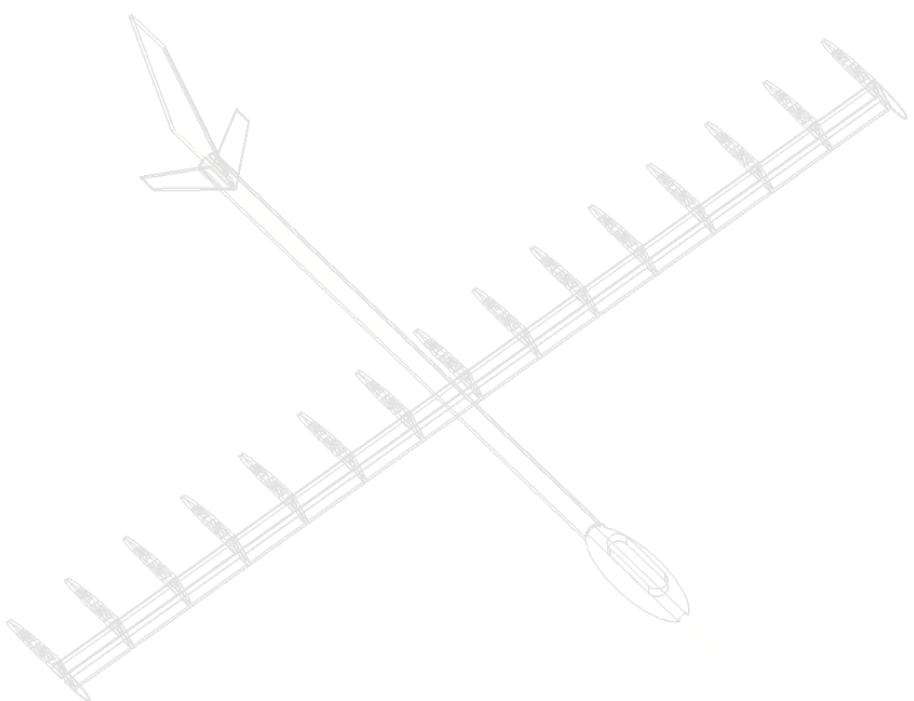
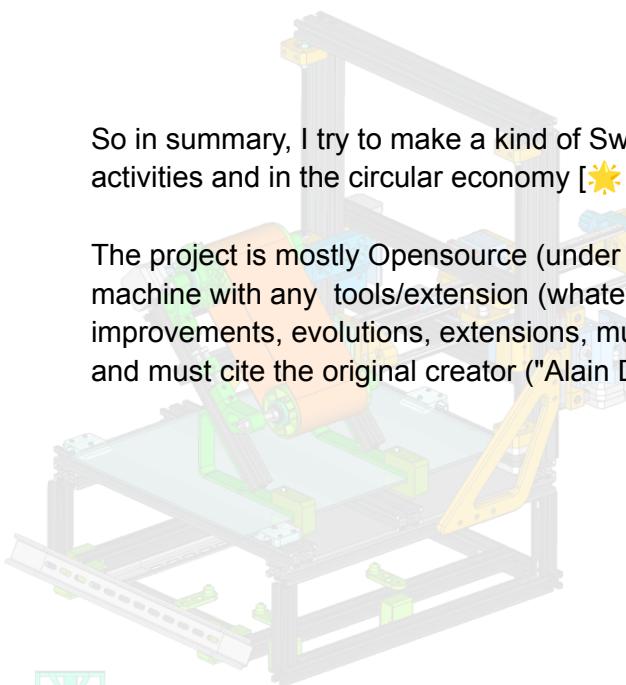
I still plan to make :

- a pick-n-place clamp
- a print head with two rotation axes for 5axis 3D printing
- a 3D printer for double parallel printing
- an extrusion head for culinary preparations
- an extrusion head for ceramics
- ...

The machine is essentially made of standard elements usually used in the construction of 3D printers in 2023: Nema 17 motor, linear rails, GT-2 belt, V-slot aluminum profile, some bearings, hexagonal head screws, and of course specially designed and 3D printed parts. For the electronic part, we use RaspberryPi, Arduino, and BTT boards. Overall I always try to source components that are totally Opensource / as available as possible / as standard as possible. As for software tools, I proudly use almost only opensource tools and software: FreeCAD, Marlin, Linux,...

So in summary, I try to make a kind of Swiss Army Knife 3Dprinter for your needs in maker's activities and in the circular economy [☀️⚡🔥🔧🌐]++.

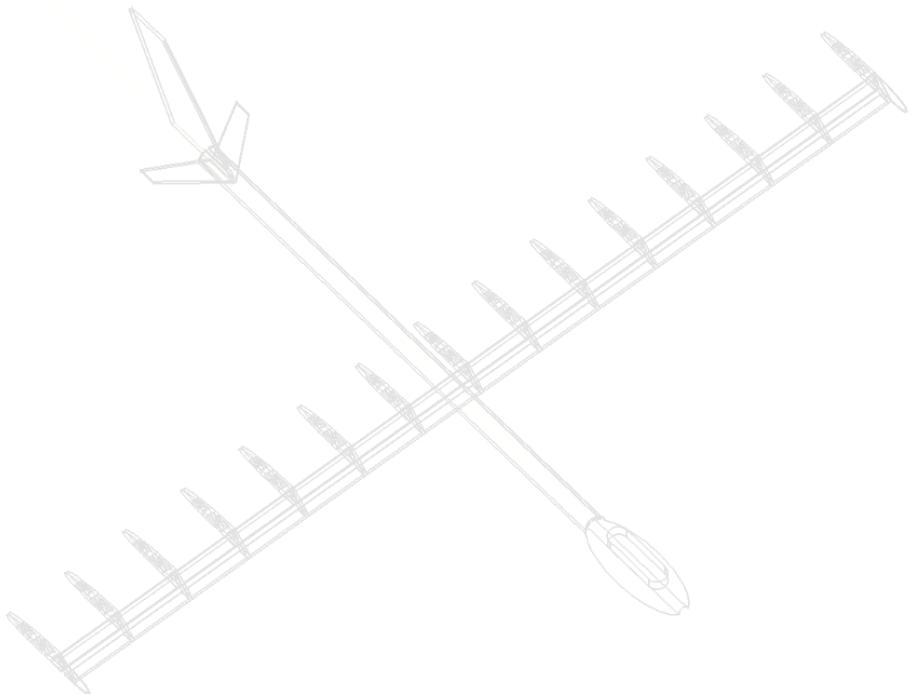
The project is mostly Opensource (under OHL-w license). This allow you to combine the machine with any tools/extension (whatever the licences or copyright), all modifications improvements, evolutions, extensions, mutations of the main machine, have to be notified to and must cite the original creator ("Alain David Geiser from , a.k.a GA3D").



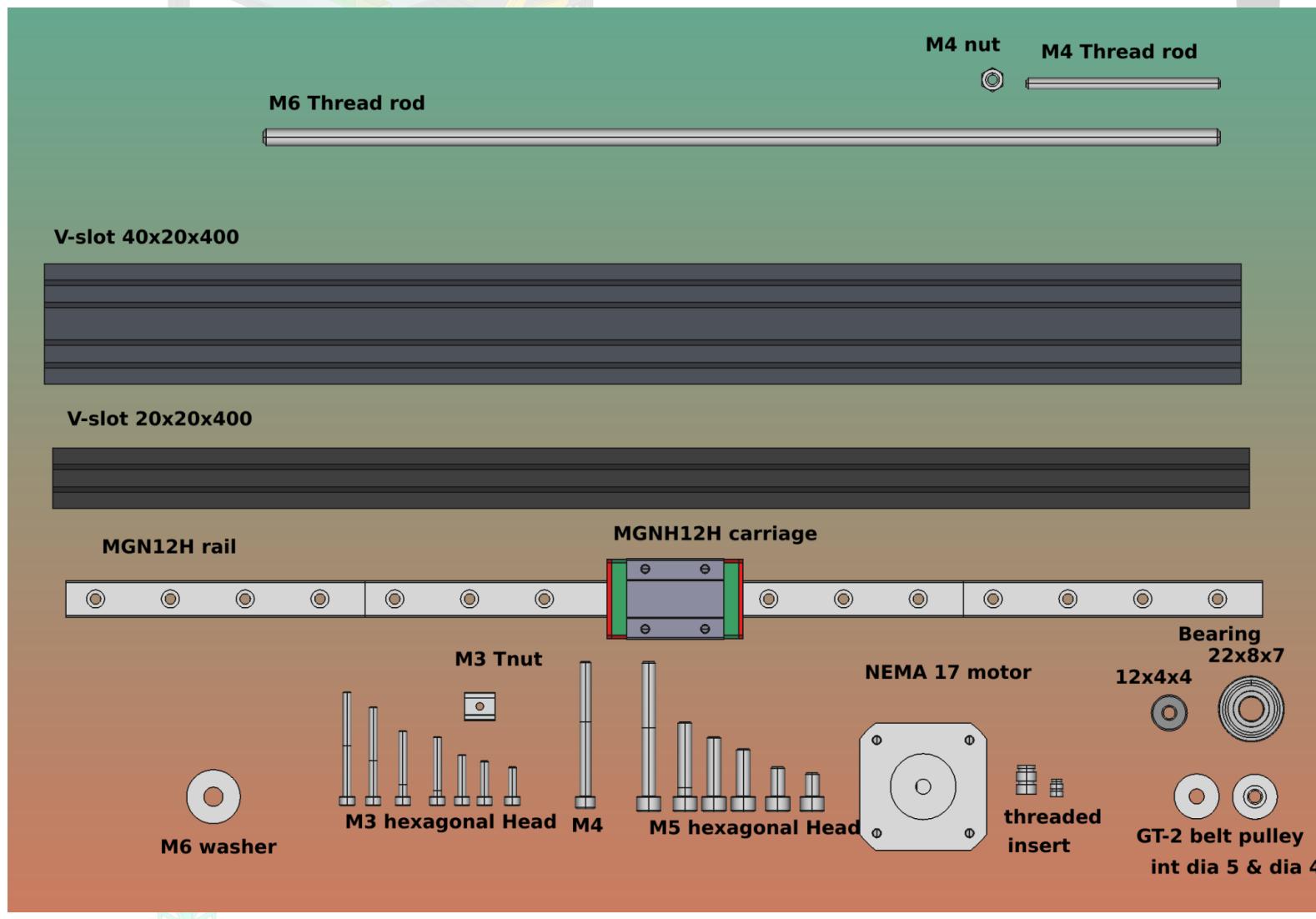
BOM (Bill Of Material)

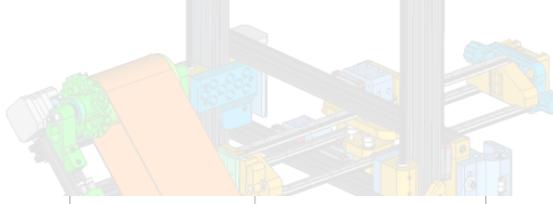
You'll find here under a list of standard element I've used to built this printer. I focus on long lasting material that I can reuse in other project, standard, not exotic, not expensive, easy to get.

I bought aluminum profiles, rails, motors, on Aliexpress mostly. The glassbed come from "Jumbo" a brico supermarket in my country. You can buy there glass to your dimension in 3 weeks for a few 10th of euros.



BOM (Bill Of Material)

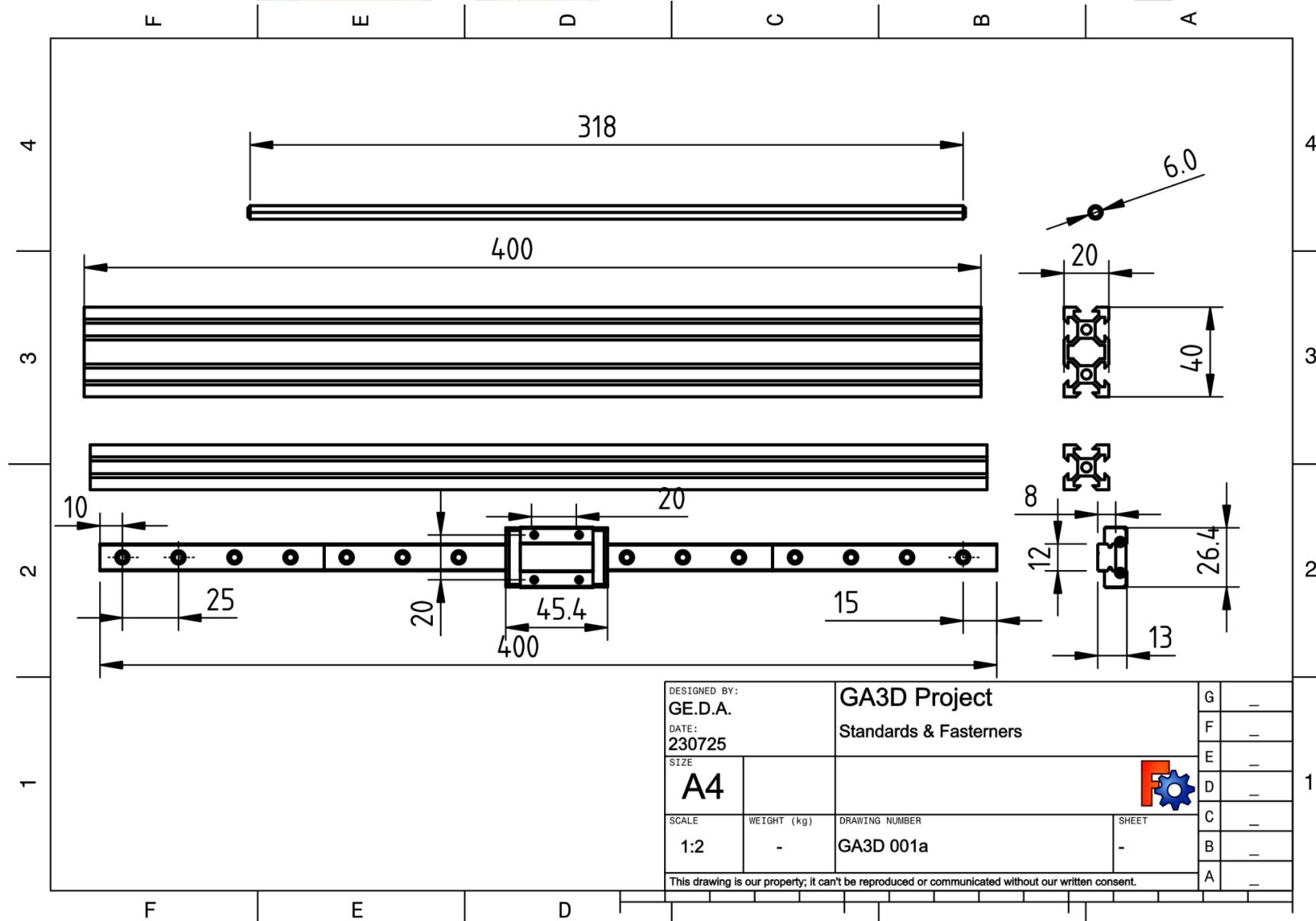
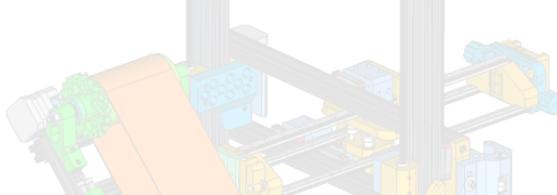




GAD3D

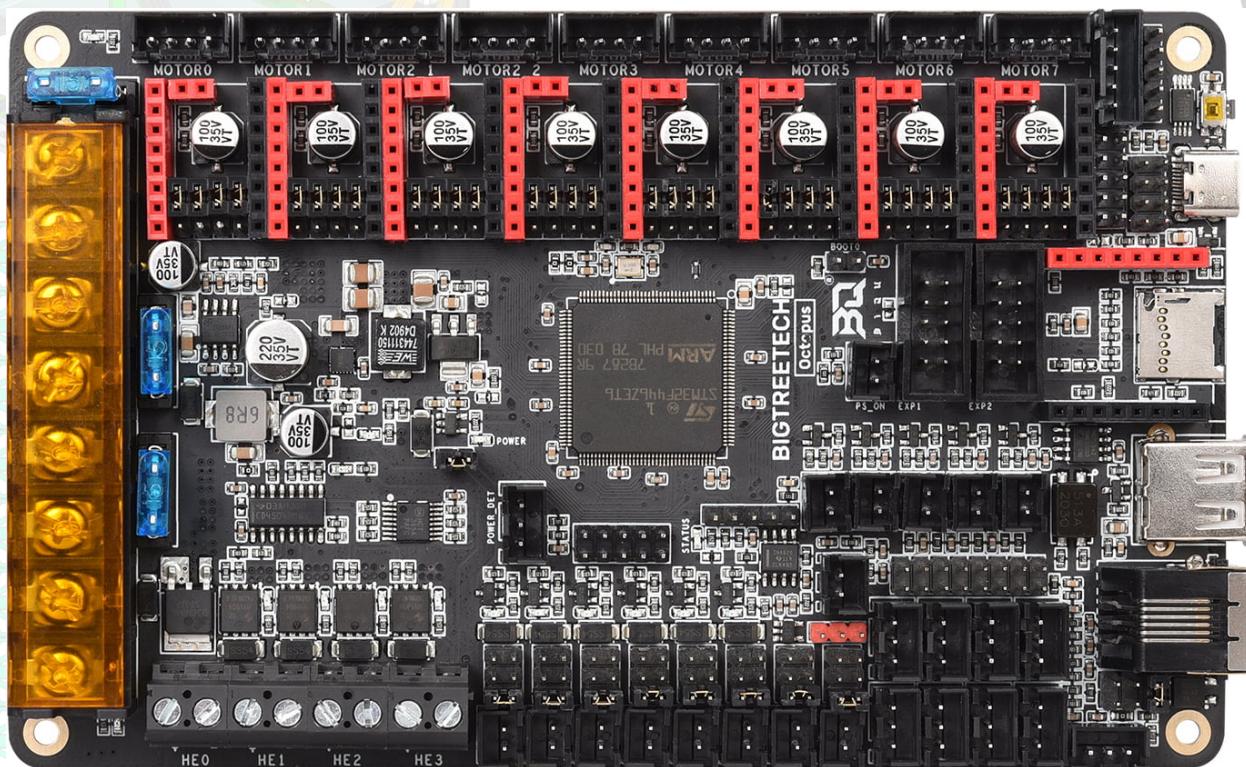
| | Frame | Z-right and links | X Carriage | Y-Spear | Y-CoreXY | Total Base machine | U \$approx | ~\$ tot |
|--|-------|-------------------|------------|---------|----------|--------------------|--------------------------|---------|
| name | | | | | | | | |
| V-slot Profile 20x40x400 mm | 8 | | | | | 8 | 9 | 72 |
| V-slot Profile 20x20x400 mm | | | 2 | | | 2 | 6 | 12 |
| | | | | | | 0 | | 0 |
| MGN12H rail linear guide x 400 mm | | 2 | 2 | 3 | | 7 | 10 | 70 |
| MGN12H carriage | | 4 | 3 | 3 | | 10 | 5 | 50 |
| | | | | | | 0 | | 0 |
| M6 Thread rods x 320 mm | | 2 | | | | 2 | 5 | 10 |
| M4 Thread rods x 65 mm | | | 2 | | | 2 | 2 | 4 |
| | | | | | | 0 | | 0 |
| GT-2 20 teeth belt pulley diam int 5mm | | | 2 | | | 2 | 2 | 4 |
| GT-2 20 teeth belt pulley diam int 4mm | | | 2 | | 4 | 6 | 2 | 12 |
| | | | | | | 0 | | 0 |
| Bearings 12x4x4 | | | 4 | | 8 | 12 | 1 | 12 |
| Bearings 22x8x7 | | 2 | | | | 2 | 3 | 6 |
| | | | | | | 0 | | 0 |
| NEMA 17 Stepper motor | | 2 | 2 | | | 4 | 10 | 40 |
| | | | | | | 0 | | 0 |
| M4 nut | | | 4 | | 4 | 8 | 0.2 | 1.6 |
| M3 T-Nut | 12 | 24 | 16 | | | 52 | 0.1 | 5.2 |
| M6 washer | | | 4 | | | 4 | 0.2 | 0.8 |
| Threaded insert M5 | | | 19 | 10 | | 29 | 0.2 | 5.8 |
| Threaded insert M3 | | 8 | 4 | 10 | | 22 | 0.2 | 4.4 |
| | | | | | | 0 | 0.2 | 0 |
| Hexagonal head cap screw | | | | | | | | |
| | | | | | | 0 | 0.2 | 0 |
| | | | | | | 0 | 0.2 | 0 |
| M3 x 10 | | 20 | 16 | 6 | | 42 | 0.2 | 8.4 |
| M3 x 12 | 12 | 2 | | | | 14 | 0.2 | 2.8 |
| M3 x 14 | | 8 | | | | 8 | 0.2 | 1.6 |
| M3 x 20 | | 6 | 8 | | | 14 | 0.2 | 2.8 |
| M3 x 22 | | | 8 | | | 8 | 0.2 | 1.6 |
| M3 x 30 | | | 12 | | | 12 | 0.2 | 2.4 |
| M3 x 35 | | | 12 | | | 12 | 0.2 | 2.4 |
| | | | | | | 0 | 0.2 | 0 |
| M4 x 45 | | | | | 4 | 4 | 0.2 | 0.8 |
| | | | | | | 0 | 0.2 | 0 |
| M5 x 8 | 4 | | | 6 | | 10 | 0.2 | 2 |
| M5 x 10 | | | | | 9 | 9 | 0.2 | 1.8 |
| M5 x 16 | | | 4 | | | 4 | 0.2 | 0.8 |
| M5 x 20 | | | 4 | | | 4 | 0.2 | 0.8 |
| M5 x 25 | 4 | | | 4 | | 8 | 0.2 | 1.6 |
| M5 x 45 | 4 | | | | | 4 | 0.2 | 0.8 |
| | | | | | | | total | 340.4 |
| M6 long Nut intern Thread Cylinder | | 2 | | | | | | |
| | | | | | | | Mean Well PSU 400W 24 V | 40 |
| | | | | | | | BTT octopus + driver tmc | 100 |
| | | | | | | | BTT H2 extruder | 70 |
| | | | | | | | Total | 550.4 |





Marlin Firmware Customization

I'll present here under the differences between my firmware and the standard version of the marlin firmware for my actual board a BTT octopus V1.1



Original and documentation of the manufacturer can be found here :

<https://github.com/bigtreeTech/BIGTREETECH-OCTOPUS-V1.0>

To edit and compile your firmware, I use Visual Studio Code associated with platformio and AUTO Build Marlin extension. These are good tools.



Auto Build Marlin - Marlin-bugfix-2.0.9.3.x - Visual Studio Code

File Edit Selection View Go Run Terminal Help

EXPLORER

- ✓ MARLIN-BUGFIX-2.0.9.3.X
 - > .github
 - > .pio
 - > .vscode
 - > buildroot
 - > config
 - > docker
 - > docs
 - > ini
 - > Marlin
 - ⚙ .editorconfig
 - ❖ .gitattributes
 - ❖ .gitignore
 - ❖ docker-compose.yml
 - ❖ get_test_targets.py
 - ❖ LICENSE
 - Ⓜ Makefile
 - ⌚ platformio.ini 9+
- {} process-palette.json
- ⓘ README.md

Auto Build Marlin x PIO Home platformio.ini 9+

Marlin Firmware Auto Build

Firmware: Marlin bugfix-2.0.x
Sunday, May 8, 2022

Config By: (GA3Dtech Octopus)

Machine Name: GA3D M2
CoreXY 200x300x200mm (no Heated Bed)

Extruders: 1
(Single Extruder)

Board: BTT OCTOPUS V1 1
BigTreeTech Octopus v1.1 (STM32F446ZE)

Pins: stm32f4/pins_BTT_OCTOPUS_V1_1.h
BTT OCTOPUS V1.1

Architectures: STM32F

Environments: STM32F446ZE_btt (512K)
Built "firmware.bin" at 5:47:12 PM on Wednesday, Apr 5, 2023

STM32F446ZE_btt_USB (512K) Build Upload Clean

STM32F429ZG_btt Build Upload

STM32F429ZG_btt_USB Build Upload

STM32F407ZE_btt (512K) Build Upload

STM32F407ZE_btt_USB (512K) Build Upload

STM32F407ZE_btt_USB (512K) Build Upload

STM32H723Zx_btt Build Upload

File configuration.h

72 :

```
#define STRING_CONFIG_H_AUTHOR "(GA3Dtech Octopus)" // Who made the changes.
```

104 :

```
#define MOTHERBOARD BOARD_BTT_OCTOPUS_V1_1
```

144

```
#define SERIAL_PORT_3 2 //GA3Dtech RPI
```



GA3D.TECH

151

```
#define CUSTOM_MACHINE_NAME "GA3D M2"
```

554

```
#define TEMP_SENSOR_BED 0 //GA3Dtech no heated bed on M2.0
```

601

```
#define HEATER_0_MINTEMP 0 //GA3Dtech
```

814

```
#define PREVENT_COLD_EXTRUSION //GA3D
```

815

```
#define EXTRUDE_MINTEMP 170 //GA3D
```

857

```
#define COREYX //GA3Dtech
```

885

```
#define USE_IMIN_PLUG //GA3D
```

970

```
#define Z_MIN_PROBE_ENDSTOP_INVERTING false //GA3Dtech // Set to true to  
invert the logic of the probe.
```

1018

```
#define DEFAULT_AXIS_STEPS_PER_UNIT { 80, 80, 3158, 100, 950 } //GA3Dtech
```

1025

```
#define DEFAULT_MAX_FEEDRATE { 600, 600, 5, 1, 50 }
```

1038

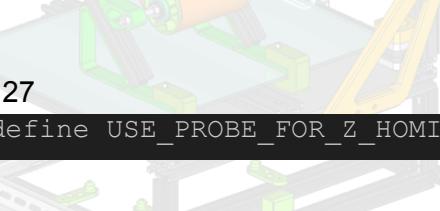
```
#define DEFAULT_MAX_ACCELERATION { 3000, 3000, 100, 5, 10000 }
```


1108

```
#define S_CURVE_ACCELERATION // GA3Dtech
```


1124

```
// #define Z_MIN_PROBEUSES_Z_MIN_ENDSTOP_PIN //GA3Dtech
```


1127

```
#define USE_PROBE_FOR_Z_HOMING //GA3Dtech
```


1181

```
#define BLTOUCH //GA3Dtech
```


1284

```
#define NOZZLE_TO_PROBE_OFFSET { 0, -20, 0, 0 } //GA3Dtech
```


1288

```
#define PROBING_MARGIN 10 //GA3Dtech
```


1411

```
#define I_ENABLE_ON 0 //GA3D
```


1423

```
#define DISABLE_I false //GA3D
```


1441

```
#define INVERT_X_DIR true //GA3Dtech
```


1444

```
#define INVERT_I_DIR false //GA3Dtech
```


1485

```
#define I_HOME_DIR -1 //GA3D
```

1496

```
#define Y_BED_SIZE 300 //GA3Dtech
```

1505

```
#define I_MIN_POS -100000 //GA3D
```

1506

```
#define I_MAX_POS 100000 //GA3D
```

1532

```
//#define MIN_SOFTWARE_ENDSTOP_Z //GA3Dtech
//#define MIN_SOFTWARE_ENDSTOP_I
//#define MIN_SOFTWARE_ENDSTOP_J
//#define MIN_SOFTWARE_ENDSTOP_K
//#define MIN_SOFTWARE_ENDSTOP_U
//#define MIN_SOFTWARE_ENDSTOP_V
//#define MIN_SOFTWARE_ENDSTOP_W
```

1683

```
//#define RESTORE_LEVELING_AFTER_G28 //GA3Dtech
```

1741

```
#define GRID_MAX_POINTS_X 2 //GA3D
```

1751

```
#define EXTRAPOLATE_BEYOND_GRID //GA3Dtech
```

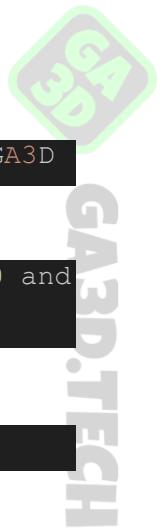
1805

```
#define LCD_BED_LEVELING //GA3Dtech
```

1878

```
#define Z_SAFE_HOMING //GA3Dtech
```

1886



```
#define HOMING_FEEDRATE_MM_M { (50*60), (50*60), (4*60), (4*60) } //GA3D
```

1963

```
#define EEPROM_SETTINGS //GA3Dtech // Persistent storage with M500 and  
M501
```

2020

```
#define NOZZLE_PARK_FEATURE //GA3Dtech
```

2221

```
#define DISPLAY_CHARSET_HD44780 WESTERN //GA3Dtech
```

2306

```
#define INDIVIDUAL_AXIS_HOMING_MENU //GA3Dtech  
#define INDIVIDUAL_AXIS_HOMING_SUBMENU //GA3Dtech
```

Configuration_adv.h

835

```
#define SENSORLESS_BACKOFF_MM { 2, 2, 0, 0 } //GA3Dtech // (linear=mm,  
rotational=°) Backoff from endstops before sensorless homing
```

```
#define HOMING_BUMP_MM { 0, 0, 2, 0 } //GA3Dtech // (linear=mm,  
rotational=°) Backoff from endstops after first bump  
#define HOMING_BUMP_DIVISOR { 2, 2, 4, 2 } // Re-Bump Speed Divisor  
(Divides the Homing Feedrate)
```

875

```
#define BLTOUCH_FORCE_SW_MODE //GA3Dtech
```

1014

#define AXIS_RELATIVE_MODES { false, false, false, false, false }
//GA3Dtech

1264

```
#define MANUAL_FEEDRATE { 50*60, 50*60, 4*60, 2*60, 2*60 } // (mm/min)
Feedrates for manual moves along X, Y, Z, E from panel //GA3D
```

1540

```
#define LONG_FILENAME_HOST_SUPPORT //GA3Dtech // Get the long filename
of a file/folder with 'M33 <dosname>' and list long filenames with 'M20 L'
```

1543

```
#define SCROLL_LONG_Filenames //GA3Dtech // Scroll long filenames
in the SD card menu
```

2016

```
#define LIN_ADVANCE //GA3D
#if ENABLED(LIN_ADVANCE)
  //#define EXTRA_LIN_ADVANCE_K // Enable for second linear advance
constants
  #define LIN_ADVANCE_K 0.22 // Unit: mm compression per 1mm/s extruder
speed
  //#define LA_DEBUG // If enabled, this will generate debug
information output over USB.
  #define EXPERIMENTAL_SCURVE // Enable this option to permit S-Curve
Acceleration //GA3Dtech
  //#define ALLOW_LOW_EJERK // Allow a DEFAULT_EJERK value of <10.
Recommended for direct drive hotends.
#endif
```

2097

```
#define G29_RETRY_AND_RECOVER //GA3Dtech
```

2537

```
#define ADVANCED_PAUSE_FEATURE //GA3Dtech
```



GA3D.TECH

2797

```
#define Z_CURRENT 1500 //GA3dtech due to double motor on same driver
```

3078

```
#define CHOPPER_TIMING CHOPPER_DEFAULT_24V //GA3Dtech // All axes  
(override below)
```

3113

```
#define MONITOR_DRIVER_STATUS //GA3Dtech
```

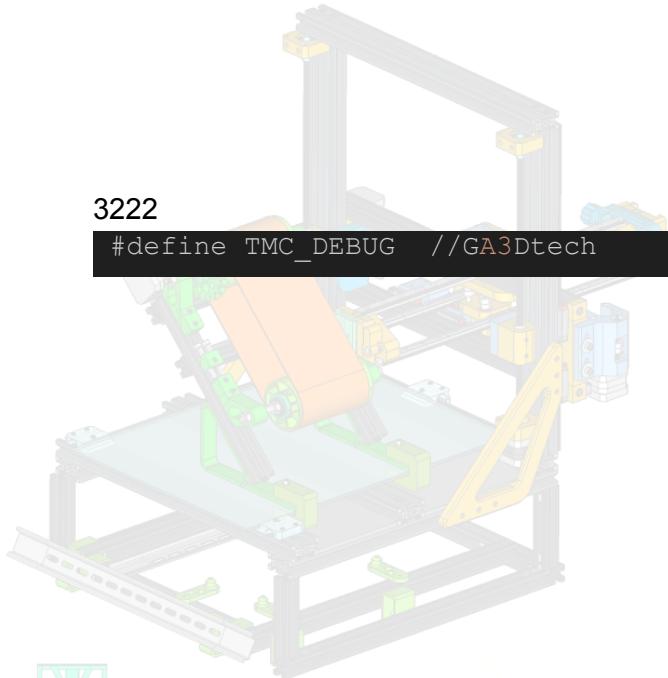
3178

```
#define SENSORLESS_HOMING //GA3Dtech // StallGuard capable drivers only
```

```
#if EITHER(SENSORLESS_HOMING, SENSORLESS_PROBING)  
    // TMC2209: 0...255. TMC2130: -64...63  
    #define X_STALL_SENSITIVITY 50 //GA3Dtech  
    #define X2_STALL_SENSITIVITY X_STALL_SENSITIVITY  
    #define Y_STALL_SENSITIVITY 50 //GA3Dtech  
    #define Y2_STALL_SENSITIVITY Y_STALL_SENSITIVITY  
    //#define Z_STALL_SENSITIVITY 8  
    //#define Z2_STALL_SENSITIVITY Z_STALL_SENSITIVITY  
    //#define Z3_STALL_SENSITIVITY Z_STALL_SENSITIVITY  
    //#define Z4_STALL_SENSITIVITY Z_STALL_SENSITIVITY  
    #define I_STALL_SENSITIVITY 50 //GA3Dtech  
    //#define J_STALL_SENSITIVITY 8  
    //#define K_STALL_SENSITIVITY 8  
    //#define U_STALL_SENSITIVITY 8  
    //#define V_STALL_SENSITIVITY 8  
    //#define W_STALL_SENSITIVITY 8  
    //#define SPI_ENDSTOPS // TMC2130 only  
    #define IMPROVE_HOMING_RELIABILITY //GA3Dtech  
#endif
```

3216

```
#define SQUARE_WAVE_STEPPING //GA3Dtech
```



3222

```
#define TMC_DEBUG //GA3Dtech
```

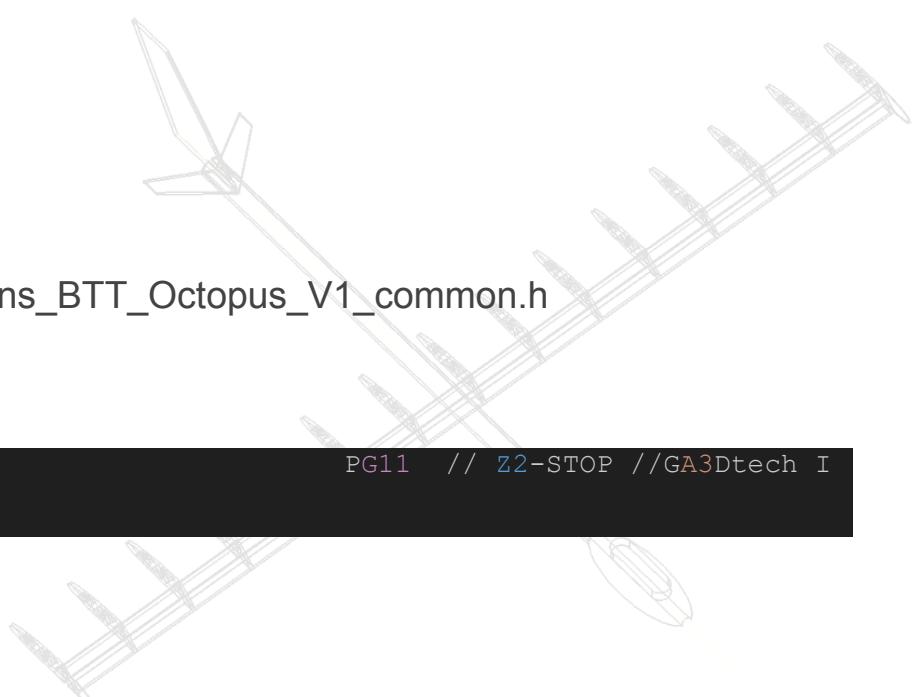


GA3D.TECH

File /src/pins/stm32f4/pins_BTT_Octopus_V1_common.h

54

```
#define I_DIAG_PIN PG11 // Z2-STOP //GA3Dtech I  
à la place de Z2
```



142

```
//GA3D I axis  
  
//GA3D I axis  
  
#ifdef I_STALL_SENSITIVITY  
    #define I_STOP_PIN I_DIAG_PIN  
    #if I_HOME_TO_MIN  
        #define I_MAX_PIN E3_DIAG_PIN // PWRDET  
    #else
```

```
#define I_MIN_PIN E3_DIAG_PIN // PWRDET
#endif
#ifndef NEEDS_I_MINMAX
#ifndef I_MIN_PIN
#define I_MIN_PIN I_DIAG_PIN // Z-STOP
#endif
#ifndef I_MAX_PIN
#define I_MAX_PIN E3_DIAG_PIN // PWRDET
#endif
#else
#define I_STOP_PIN I_DIAG_PIN // Z-STOP
#endif

//GA3D I axis

#undef NEEDS_X_MINMAX
#undef NEEDS_Y_MINMAX
#undef NEEDS_Z_MINMAX

#undef NEEDS_I_MINMAX //GA3D I axis
```



Electrical and electronic connection

For safety and legal reasons, I'm deliberately not going to give full details.

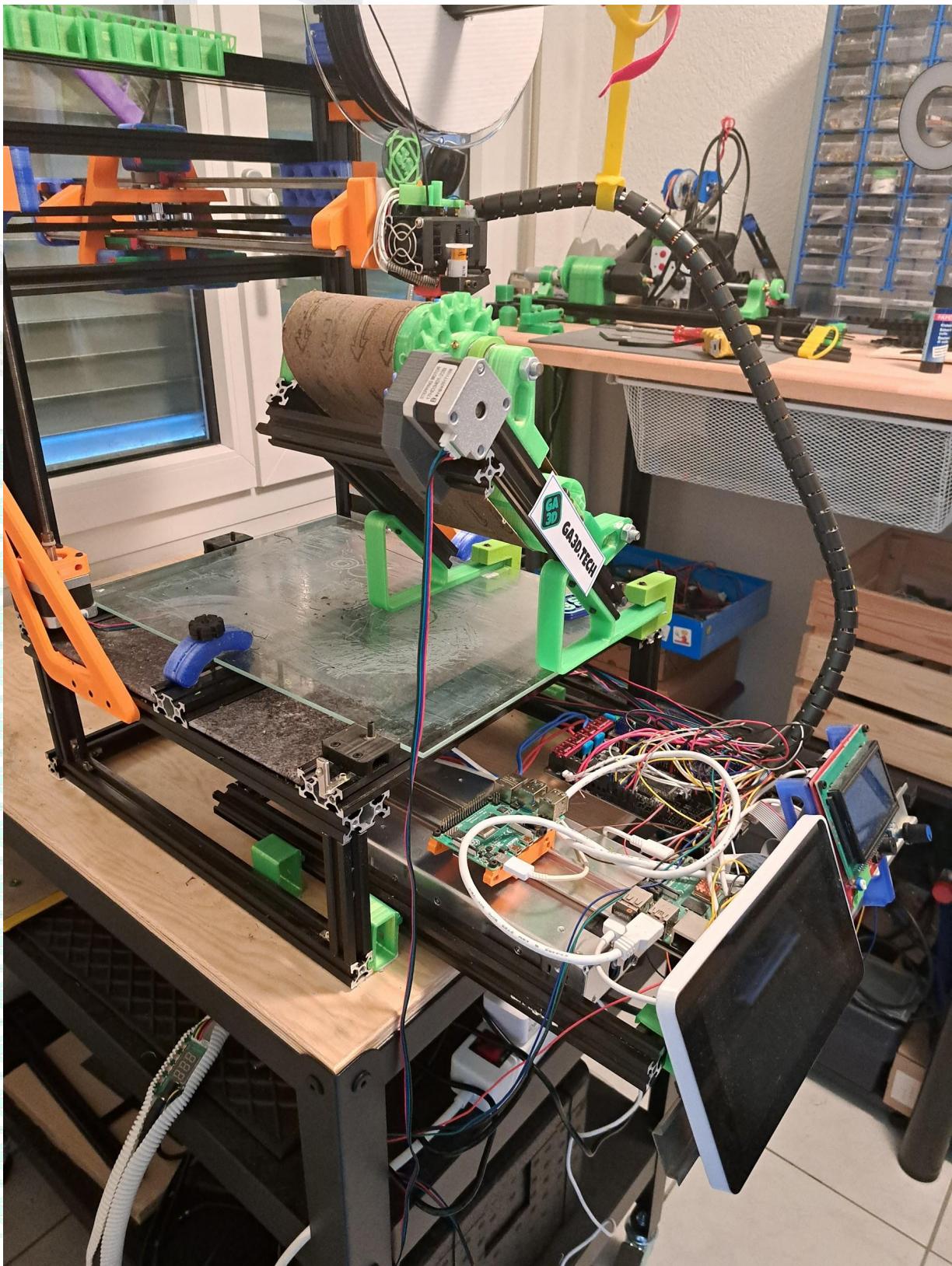
Everyone needs to know what they're doing, and respect the safety rules and regulations in force in their own country.

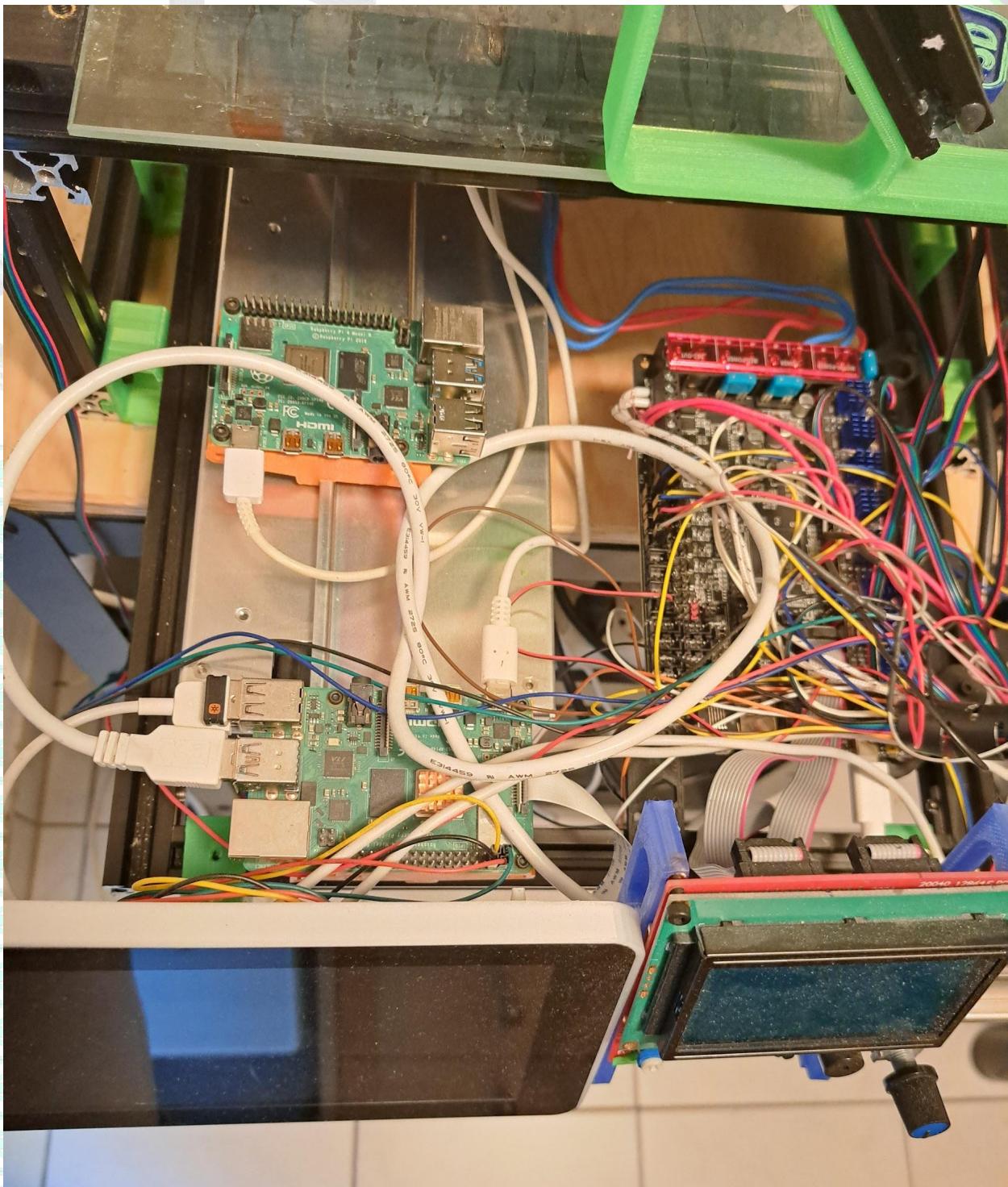
The following information is for illustrative purposes only. You need to adapt it to your equipment and know what you're doing.

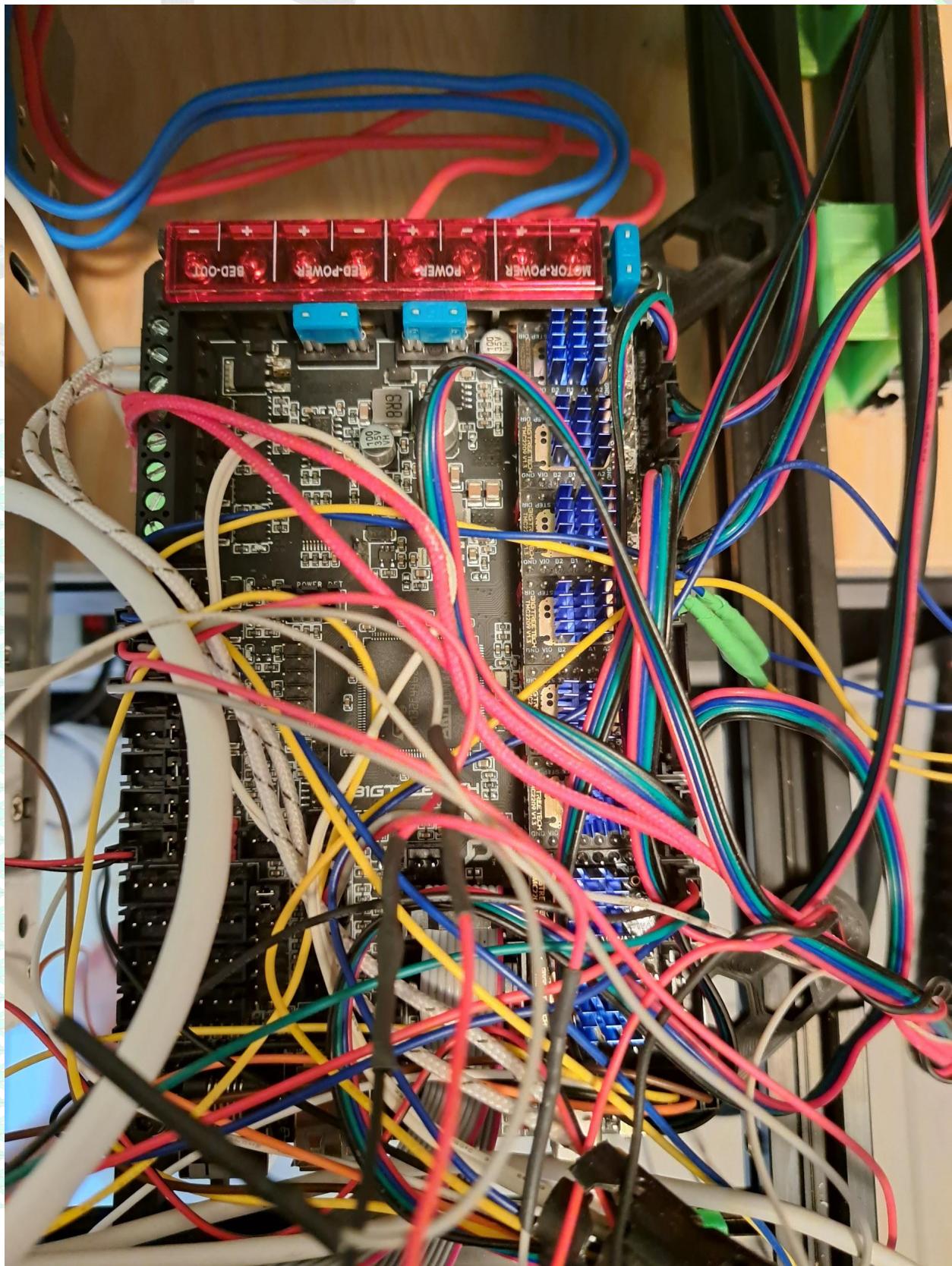
The fact that the power supply and electronic cards are housed in a drawer is very practical. I can easily access them to connect an additional motor, another extruder or use a pwm to modulate the intensity of a laser head or motor.

My drawer contains :

- a 400 W Mean Well power supply
- Big Tree Tech Octopus 1.1 motherboard
- with UART-controlled TMC2209 drivers
- 2 Raspberry pi 4, one with Octopi and one for manual operation with pronterface, or small python programs in serial.



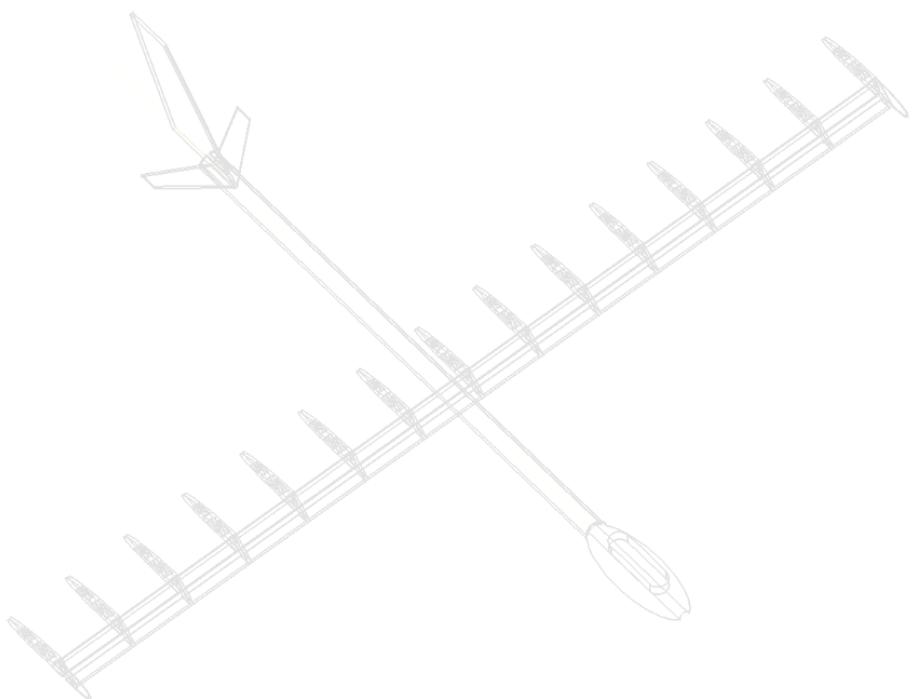
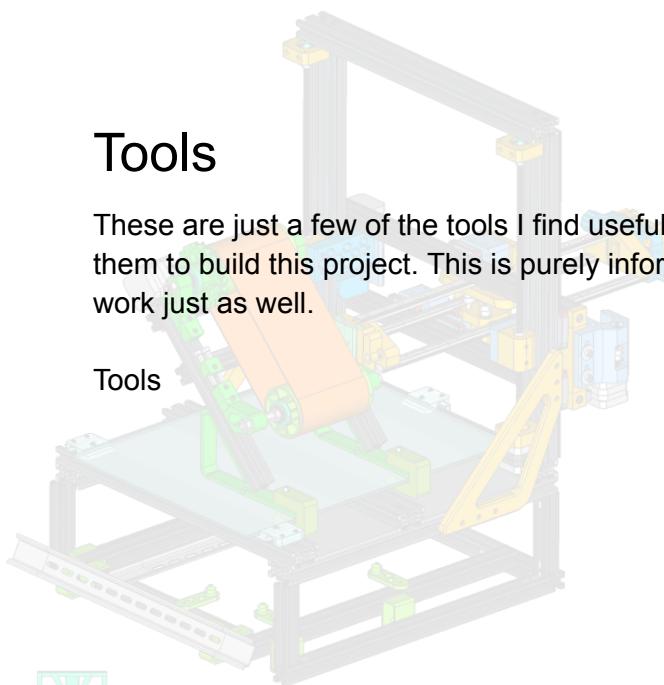




Tools

These are just a few of the tools I find useful in my daily life as a maker, and I made good use of them to build this project. This is purely informative, you certainly have other equipment that will work just as well.

Tools





Ender3



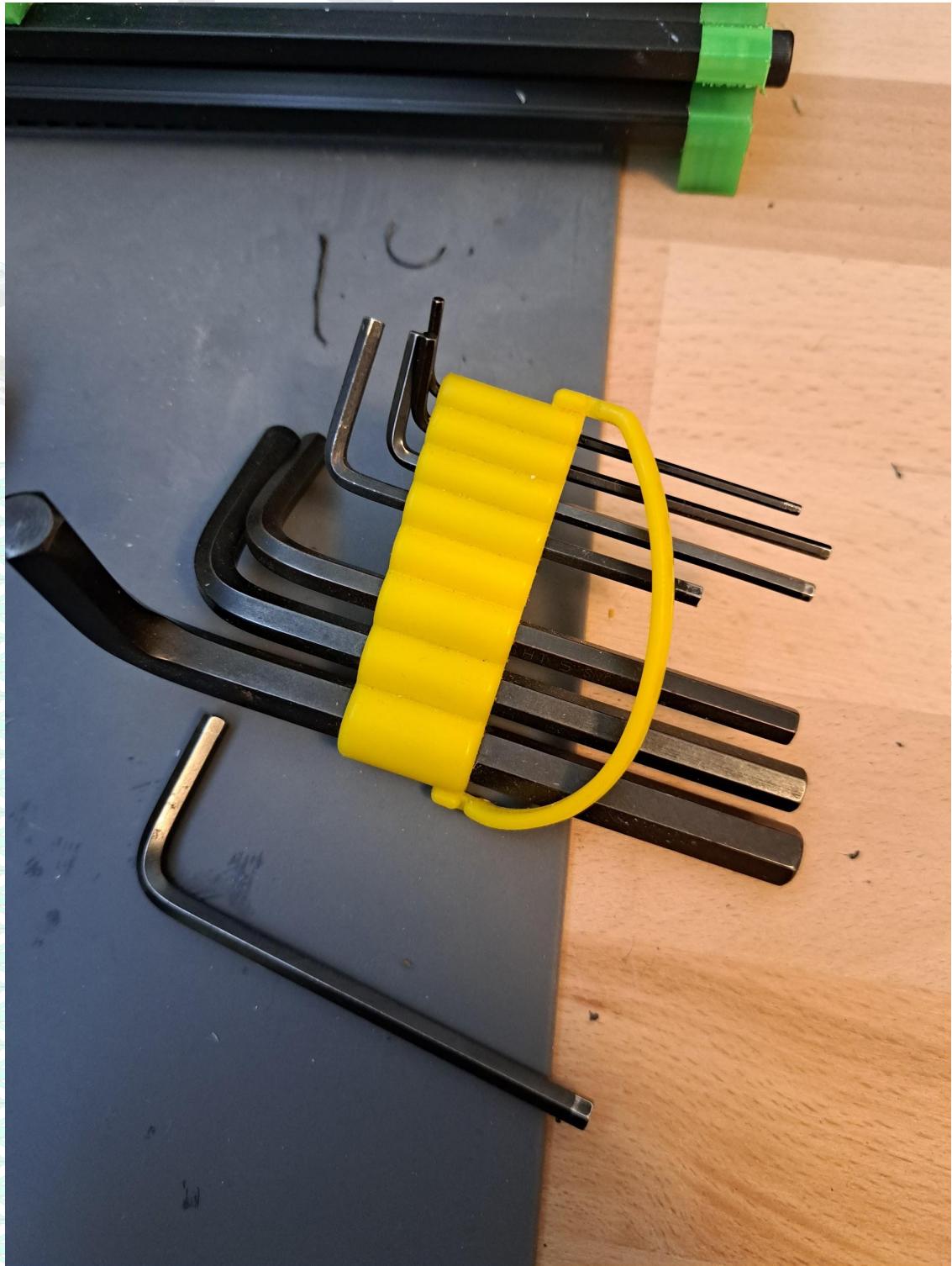
Stamos soldering sls4



Thread Tapping set



Cutter set



Hexagonal key set



Multi-tool





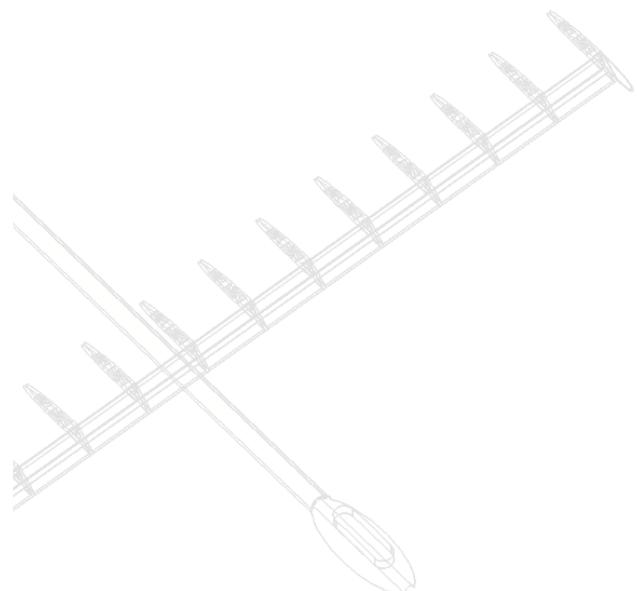
3D printing Parts synthesis for the project

Summary table

| Parts | 3D printing time [h] | Weight of filament [g] | Material |
|-----------------------------|----------------------|------------------------|----------|
| Frame | 14.4 | 234 | PLA |
| bed fixture | 2.8 | 45 | PETG |
| Z bloc 1 | 11.8 | 189 | PLA |
| Z fix 2 | 8 | 126 | PETG |
| Axe X 1 | 13.2 | 219 | PLA |
| Axe X 2 mot fix | 13.5 | 222 | PETG |
| Axe X 3 3x bloc | 12.2 | 195 | PETG |
| Axe Y 1 | 8.2 | 134 | PLA |
| Axe Y tension kit | 3.5 | 54 | PETG |
| Axe Y quick tool fixture | 6.5 | 53 | PLA |
| AxeY Core XY heart | 14.2 | 234 | PLA |
| Electro Drawer | 5.5 | 95 | PLA |
| 45° module rollers | 12.5 | 236 | PLA |
| 45° Module gears | 3.1 | 48 | PETG |
| 45° bearings and mot fix | 5.4 | 88 | PLA |
| 45° module lateral Elements | 9.1 | 151 | PLA |
| total | 143.9 | 2323 | |

Parameters used in Cura (case PLA)

| Quality | | |
|--------------------------|--------|----|
| Layer Height | 0.2 | mm |
| Outer Wall Line Width | 0.4 | mm |
| Inner Wall(s) Line Width | 0.4 | mm |
| Infill Line Width | 0.8 | mm |
| Walls | | |
| Wall Thickness | 1.2 | mm |
| Wall Line Count | 3 | |
| Horizontal Expansion | 0.0 | mm |
| Z Seam Alignment | Random | ▼ |
| Top/Bottom | | |
| Top/Bottom Thickness | 0.8 | mm |
| Top Thickness | 0.8 | mm |
| Top Layers | 0 | |
| Bottom Thickness | 0.8 | mm |
| Bottom Layers | 999999 | |
| Top/Bottom Pattern | Lines | ▼ |
| Infill | | |
| Infill Density | 100.0 | % |
| Infill Pattern | Lines | ▼ |
| Infill Layer Thickness | 0.2 | mm |
| Material | | |
| Printing Temperature | 210.0 | °C |





⌚ Speed

| | | |
|---------------------------|------|------|
| Print Speed | 60.0 | mm/s |
| Infill Speed | 60.0 | mm/s |
| Wall Speed | 60.0 | mm/s |
| Top/Bottom Speed | 50.0 | mm/s |
| Initial Layer Speed | 20.0 | mm/s |
| Initial Layer Print Speed | 10.0 | mm/s |

🛣 Travel

| | |
|----------------------|-------------------------------------|
| Enable Retraction | <input checked="" type="checkbox"/> |
| Retraction Distance | 1.0 mm |
| Retraction Speed | 45.0 mm/s |
| Z Hop When Retracted | <input type="checkbox"/> |

❀ Cooling

| | |
|----------------------|-------------------------------------|
| Enable Print Cooling | <input checked="" type="checkbox"/> |
| Fan Speed | 100.0 % |

🖨 Support

| | |
|------------------|--------------------------|
| Generate Support | <input type="checkbox"/> |
|------------------|--------------------------|

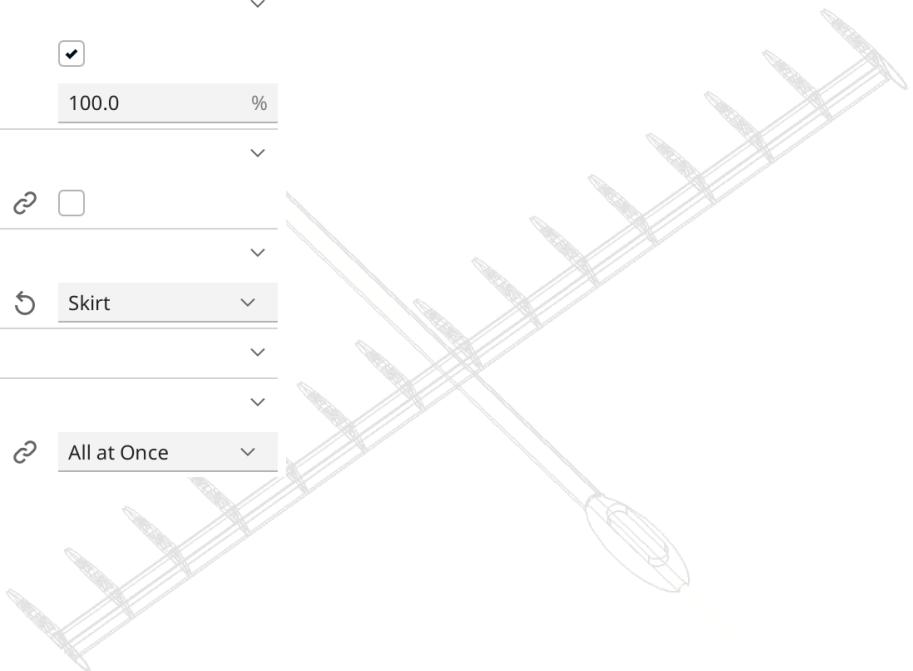
🖨 Build Plate Adhesion

| | |
|---------------------------|-----------------------------|
| Build Plate Adhesion Type | <input type="radio"/> Skirt |
|---------------------------|-----------------------------|

🖨 Dual Extrusion

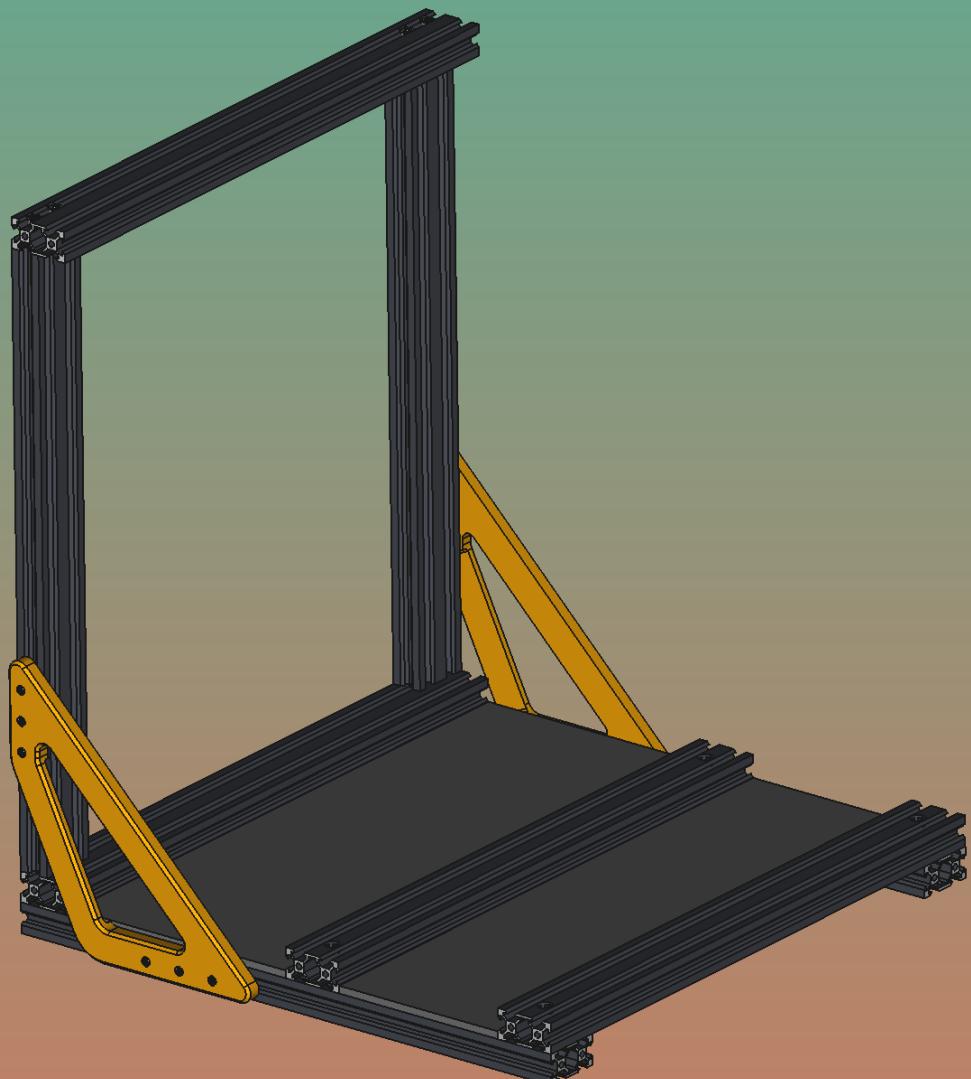
★ Special Modes

| | |
|----------------|-----------------------------------|
| Print Sequence | <input type="radio"/> All at Once |
|----------------|-----------------------------------|



Assembly - Decomposition of the machine

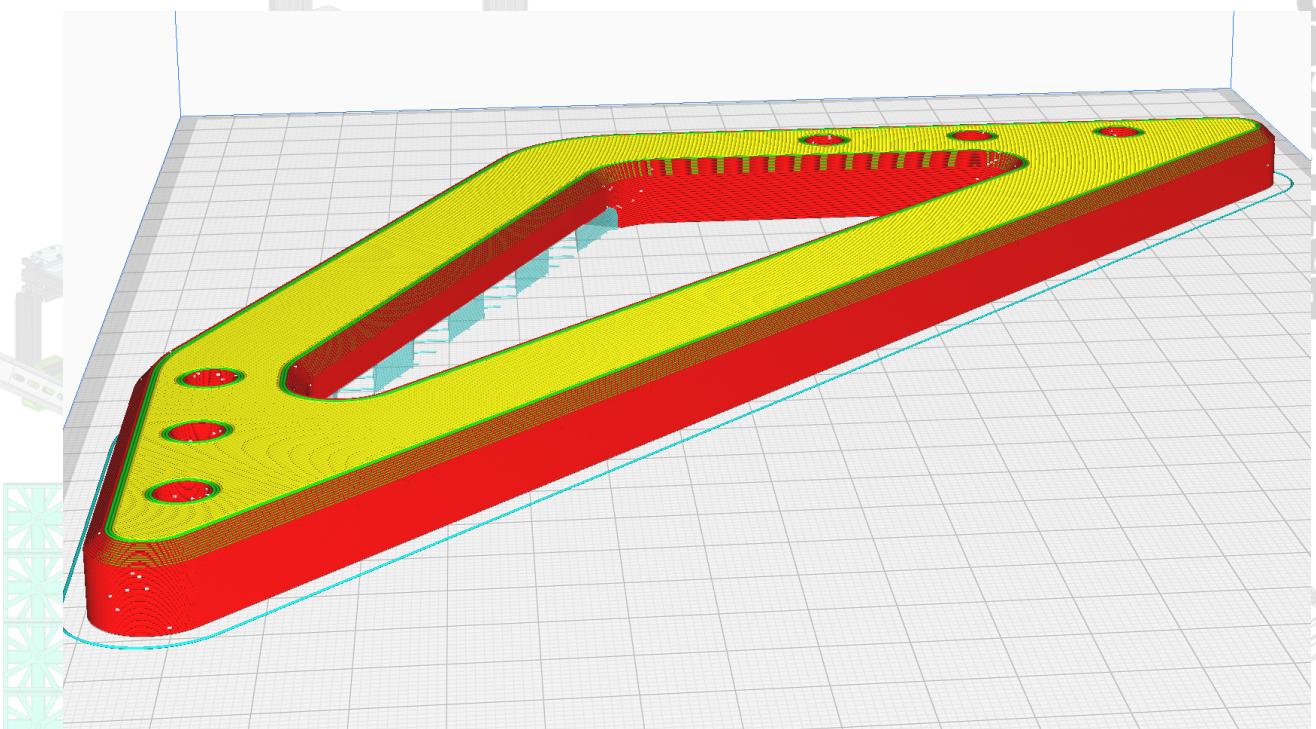
Frame





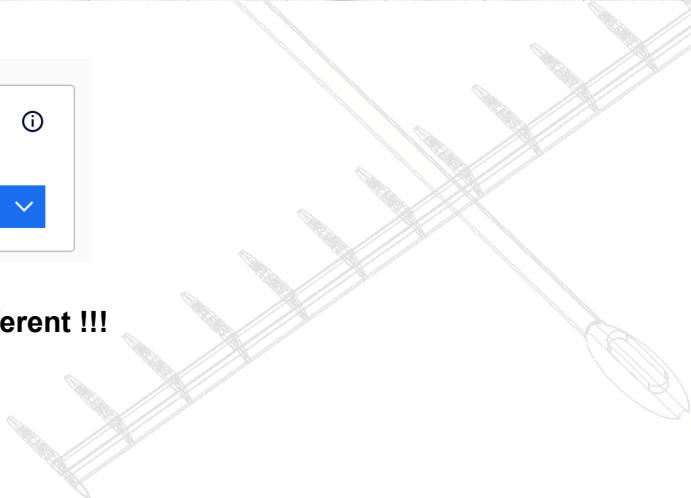
3D Printing elements

GARD TECHI

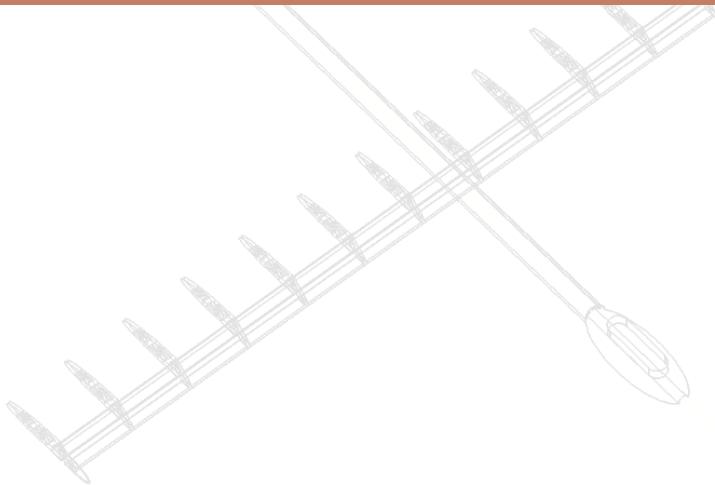
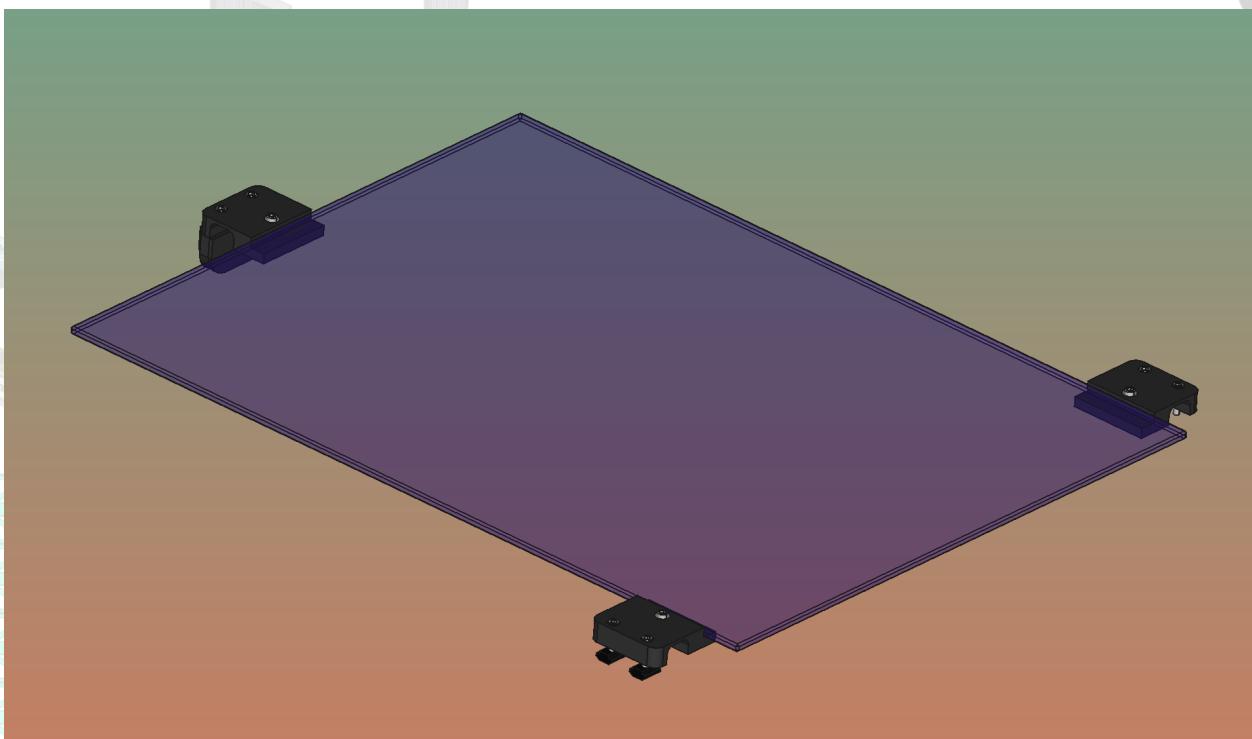


⌚ 7 hours 13 minutes ⓘ
⌚ 117g · 39.26m
Save to Disk ▾

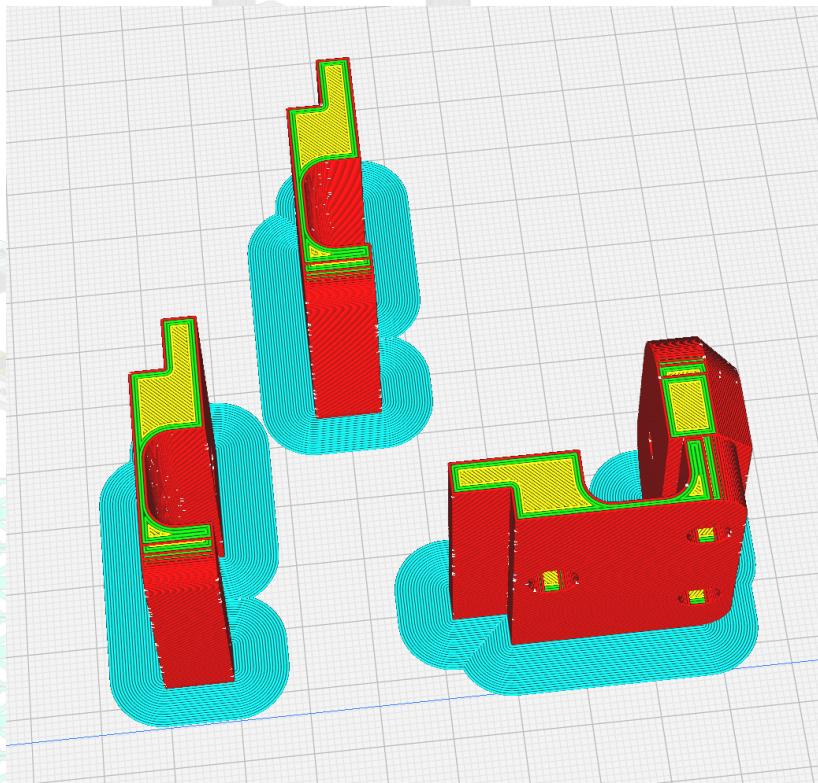
!! right and left parts are different !!!



Glass bed



3D Printing elements

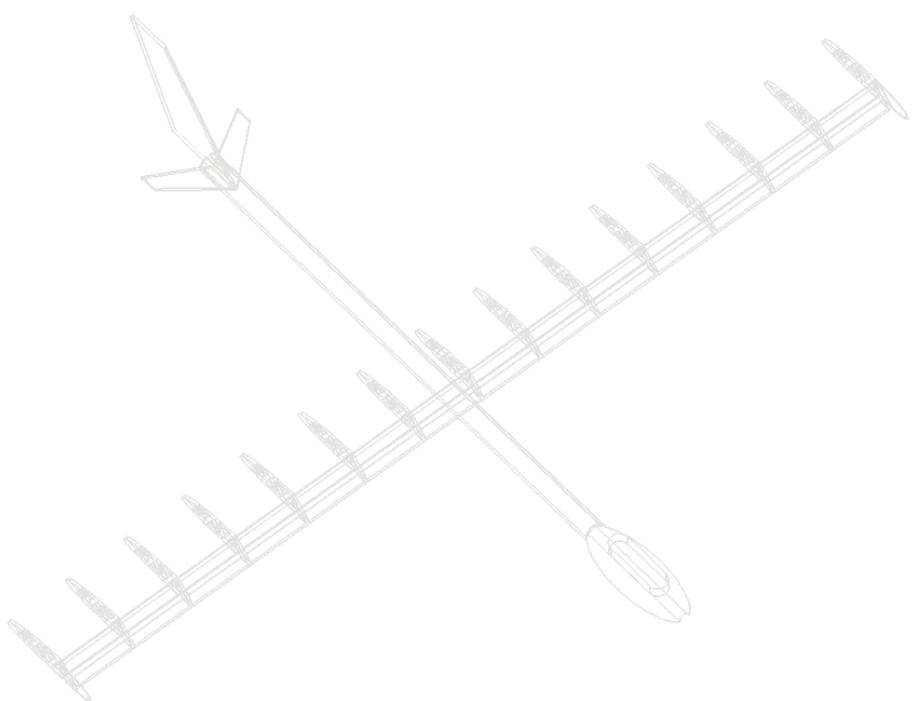
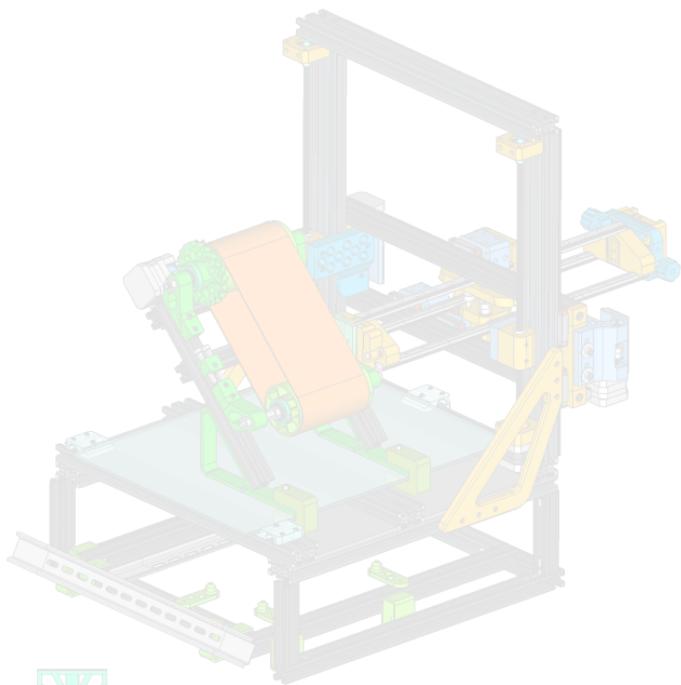


⌚ 2 hours 49 minutes

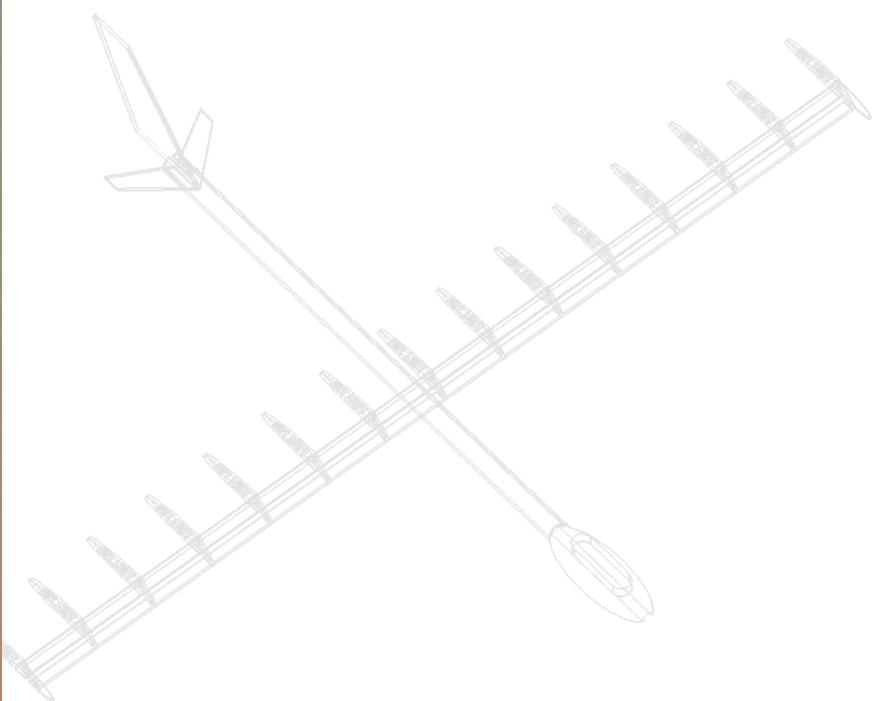
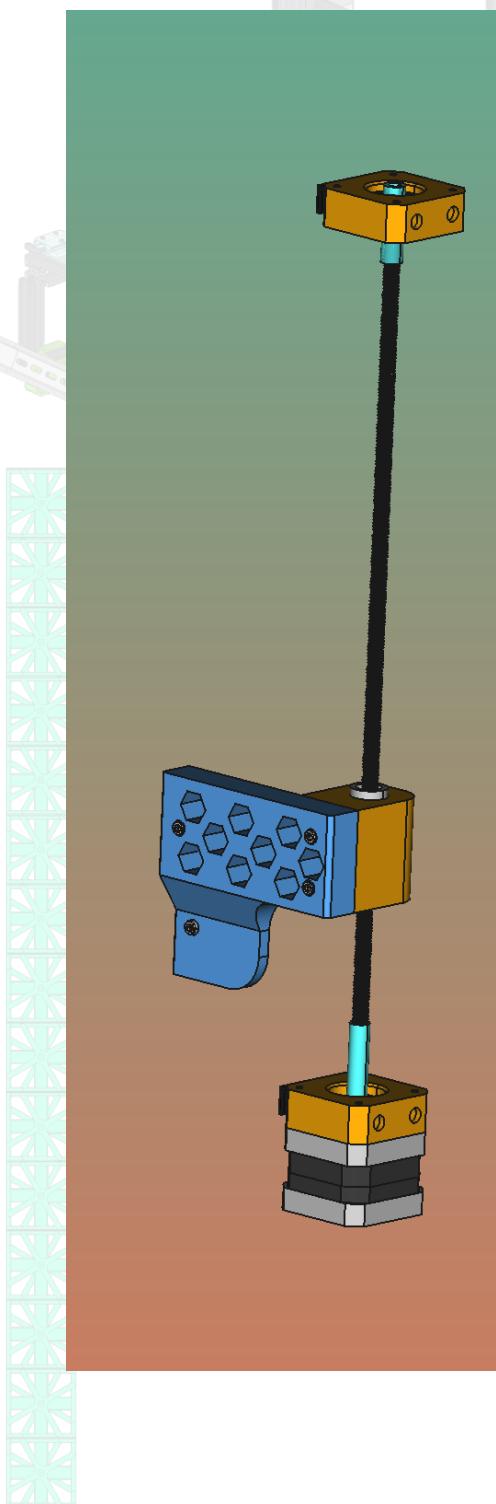
⚖ 45g · 15.03m

Save to Disk

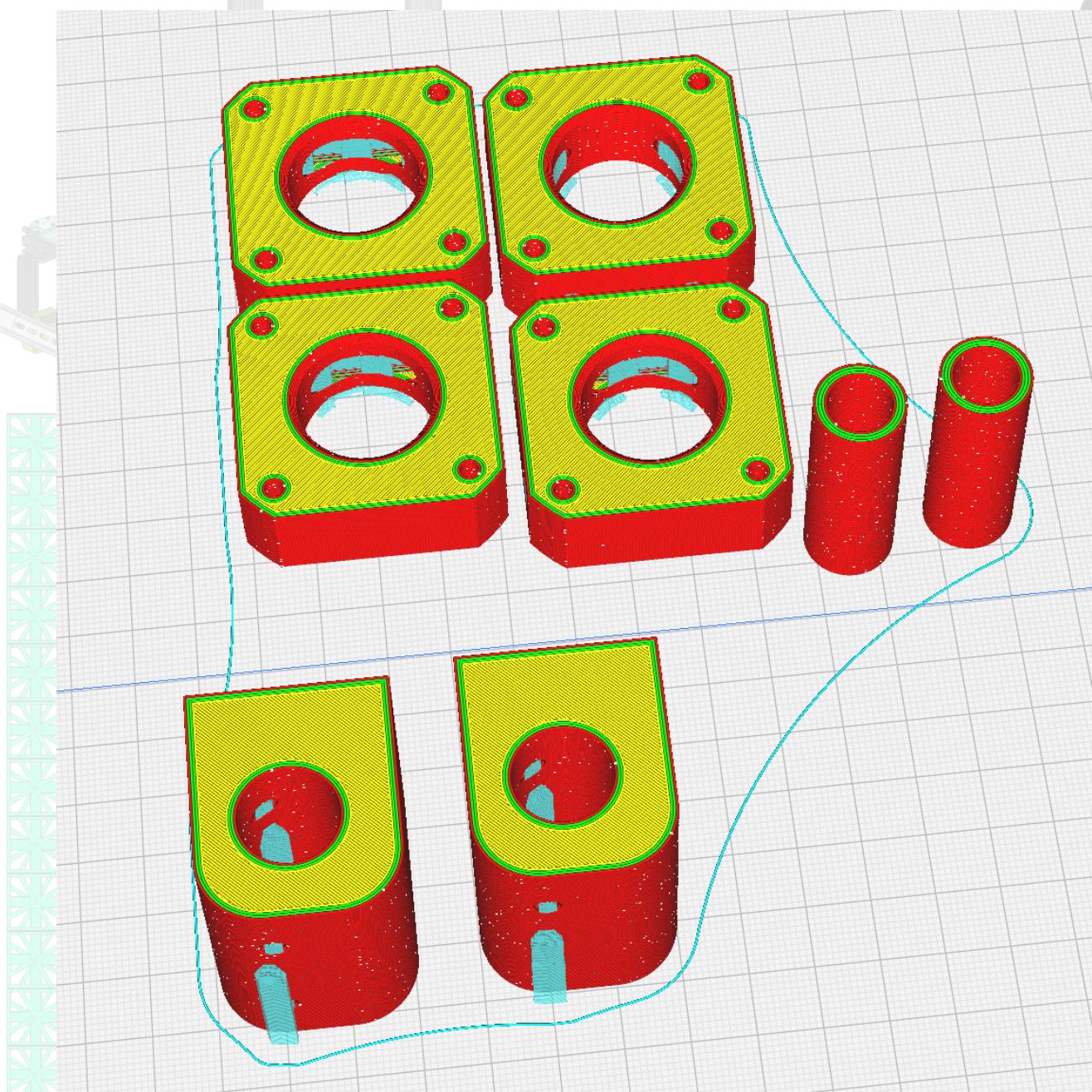
!! respect orientation to have the molecular chains orientation in the right direction, otherwise the part will not have good mechanical properties.



Axe Z



3D Printing elements



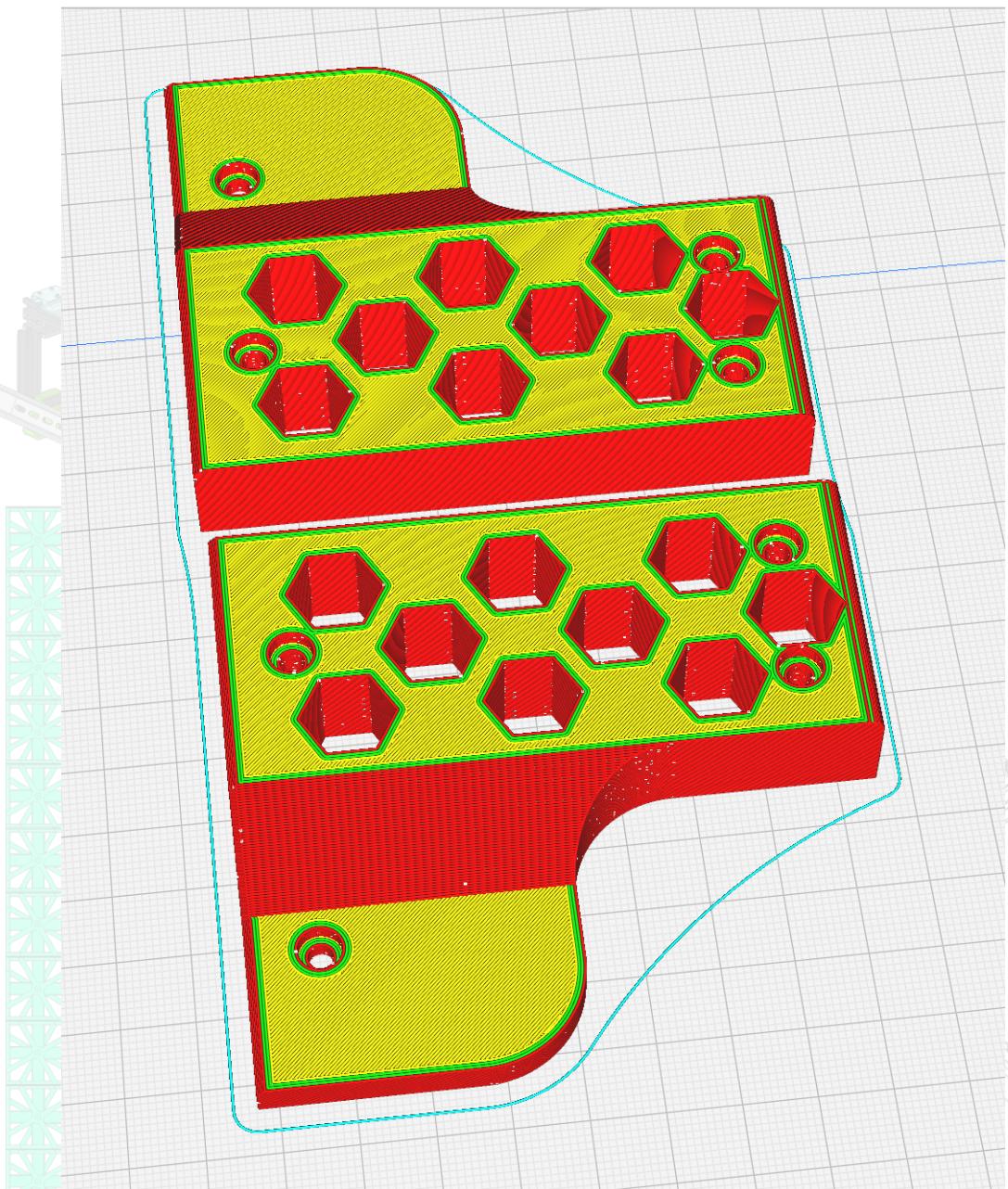
⌚ 11 hours 49 minutes

ⓘ

➊ 189g · 63.53m

Save to Disk

▼



⌚ 8 hours 0 minutes

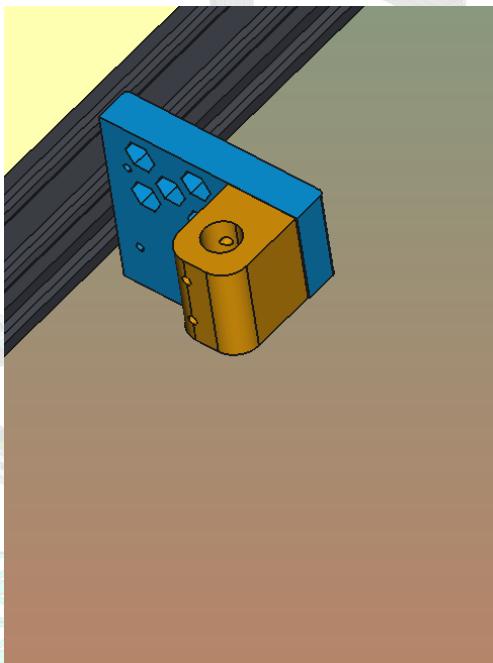
ⓘ

➊ 126g · 42.19m

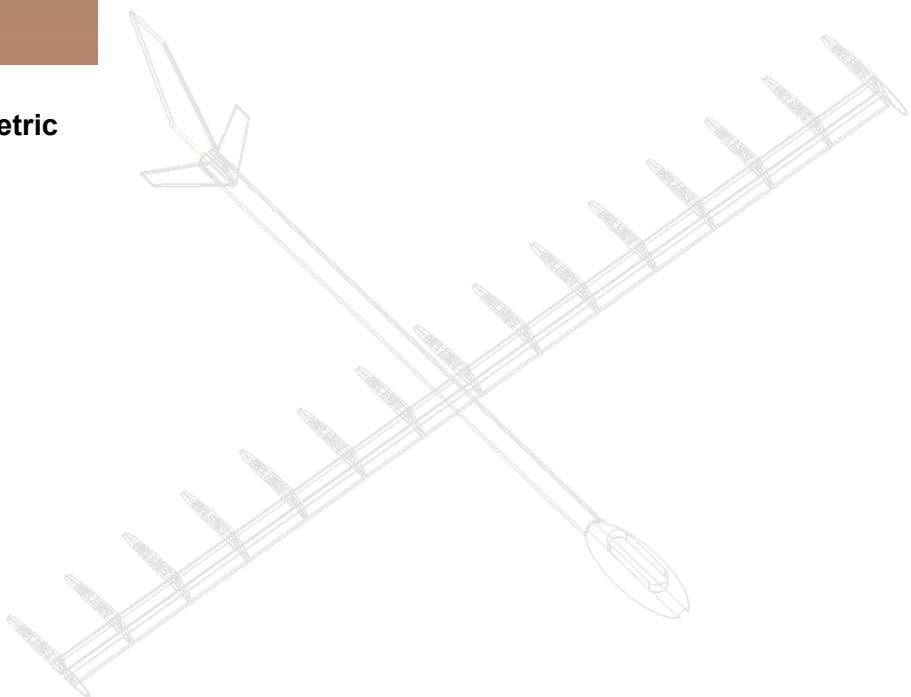
Save to Disk

▼

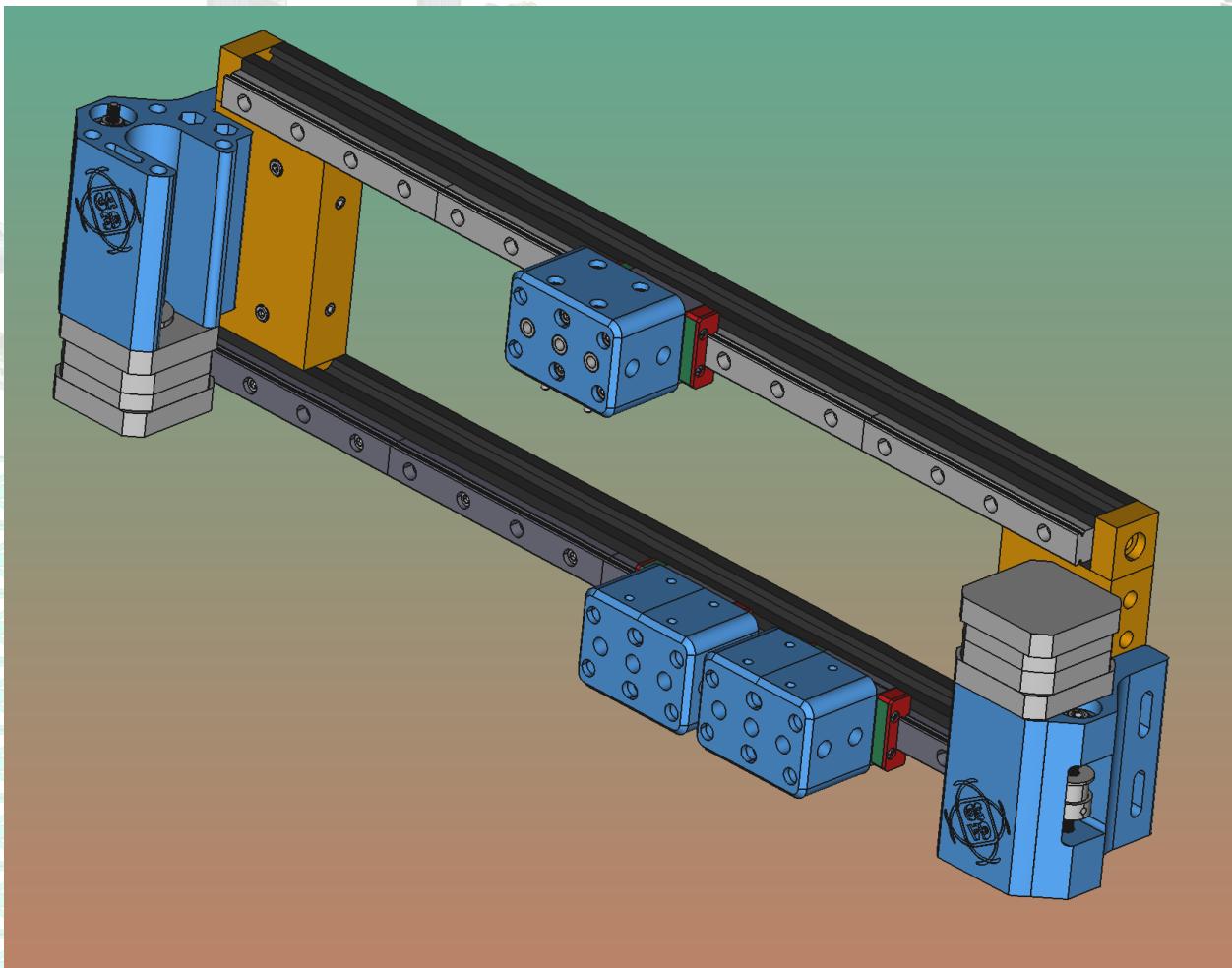




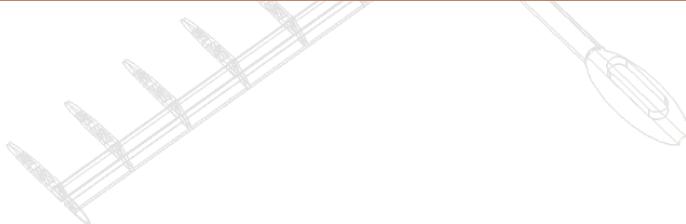
!! right and left size are symetric

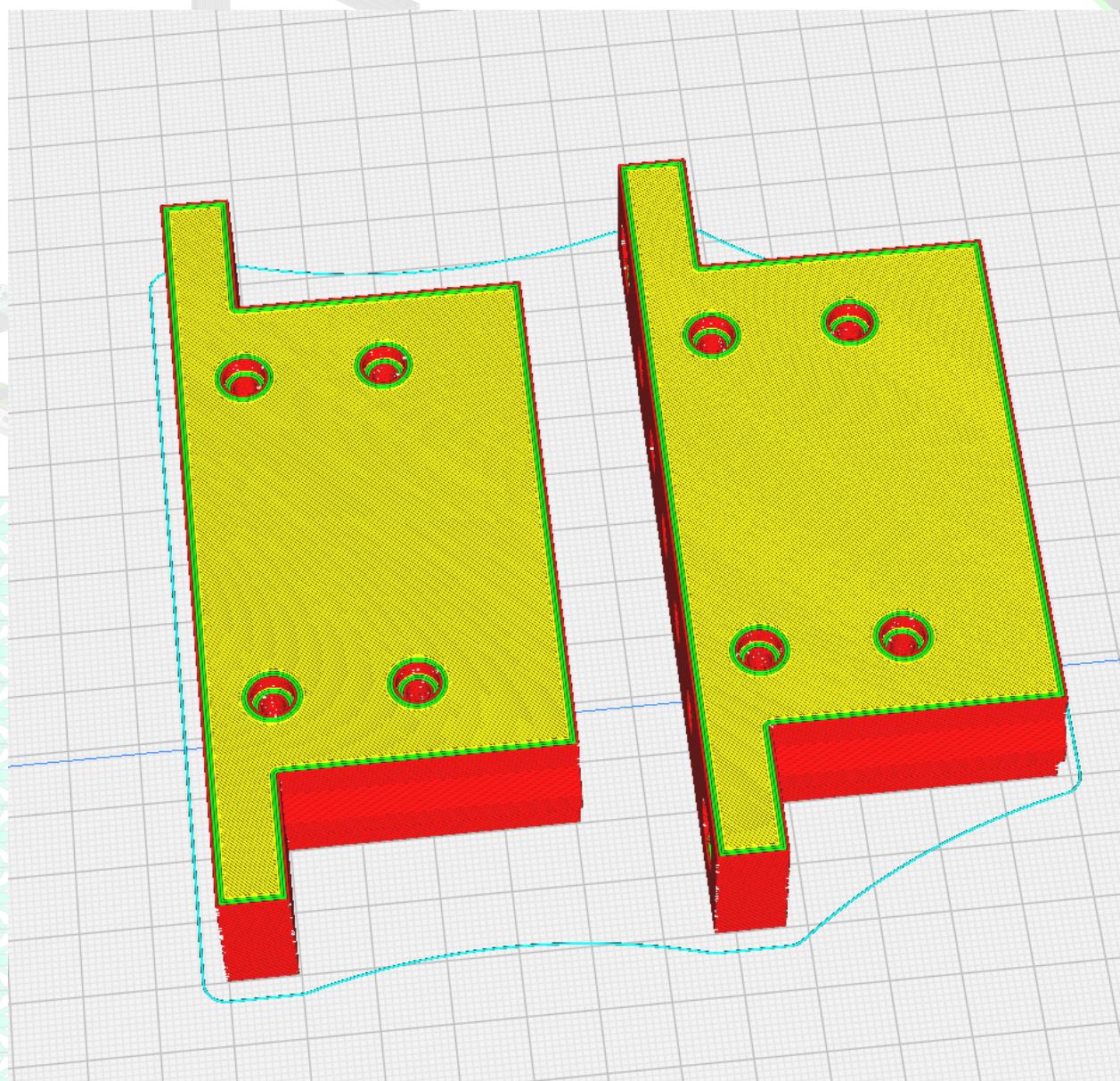


Axe X



3D Printing elements

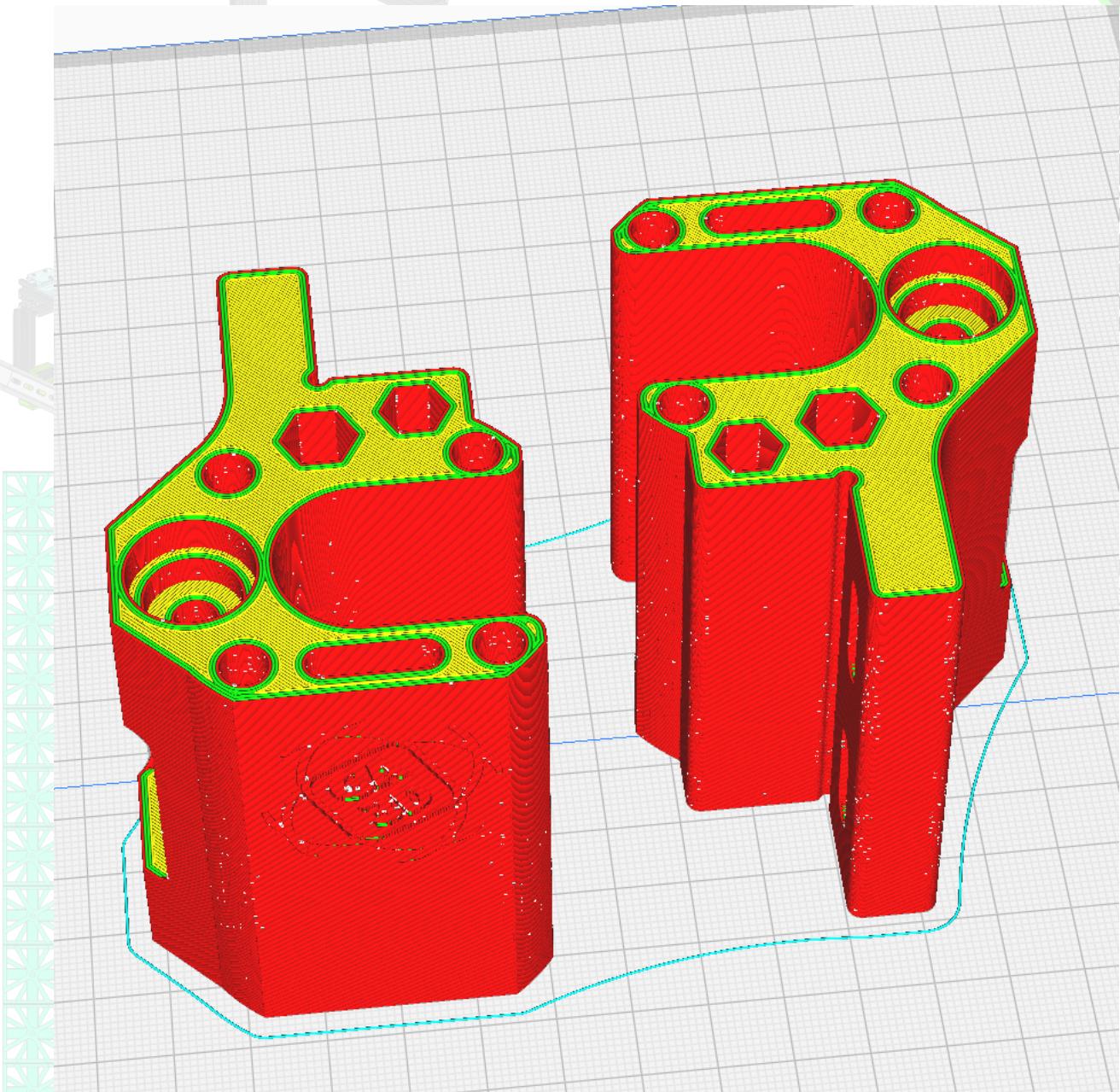




⌚ 13 hours 9 minutes ⓘ

⌚ 219g · 73.35m

Save to Disk ▾



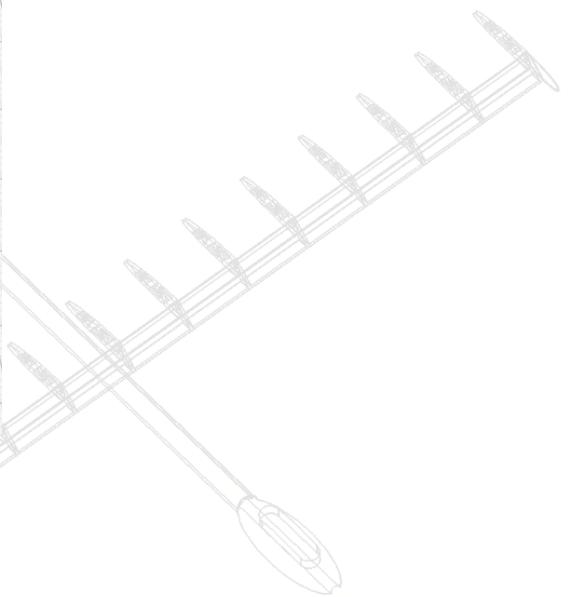
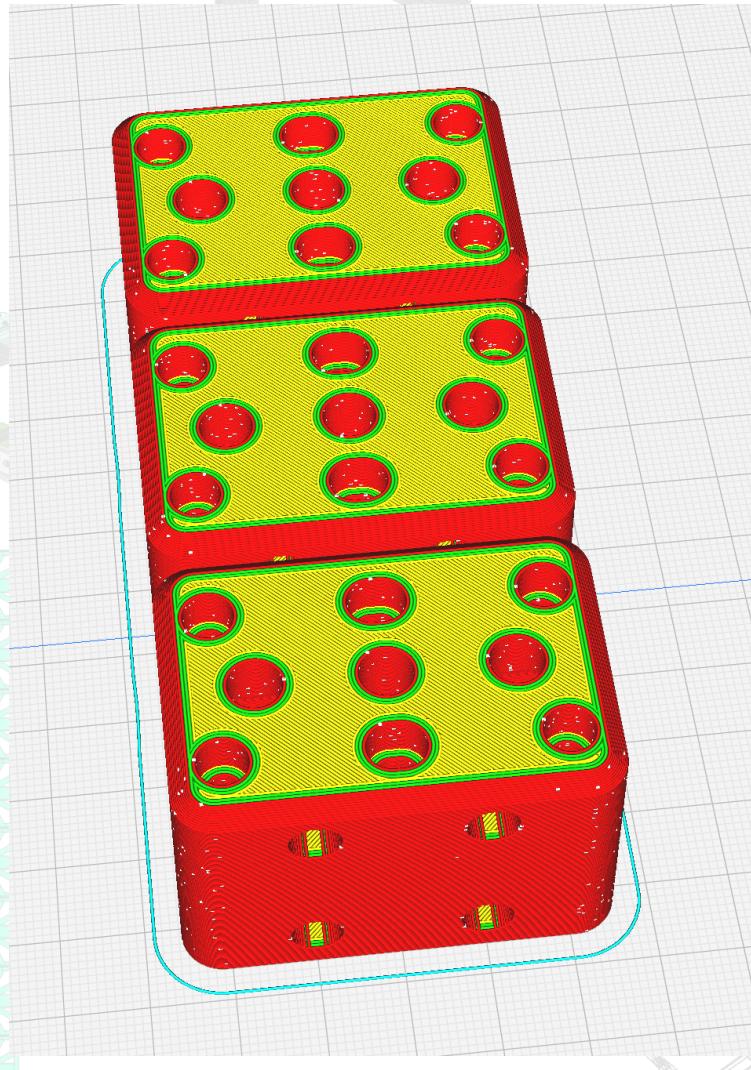
⌚ 13 hours 36 minutes

ⓘ

➊ 222g · 74.36m

Save to Disk

▼



⌚ 12 hours 7 minutes

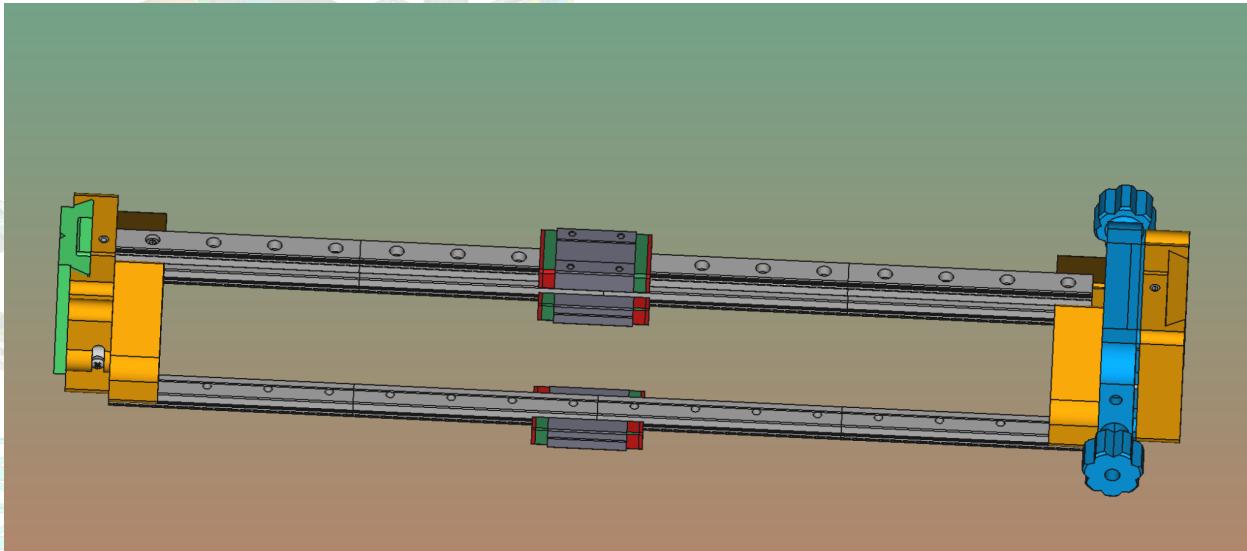
ⓘ

⚖ 195g · 65.28m

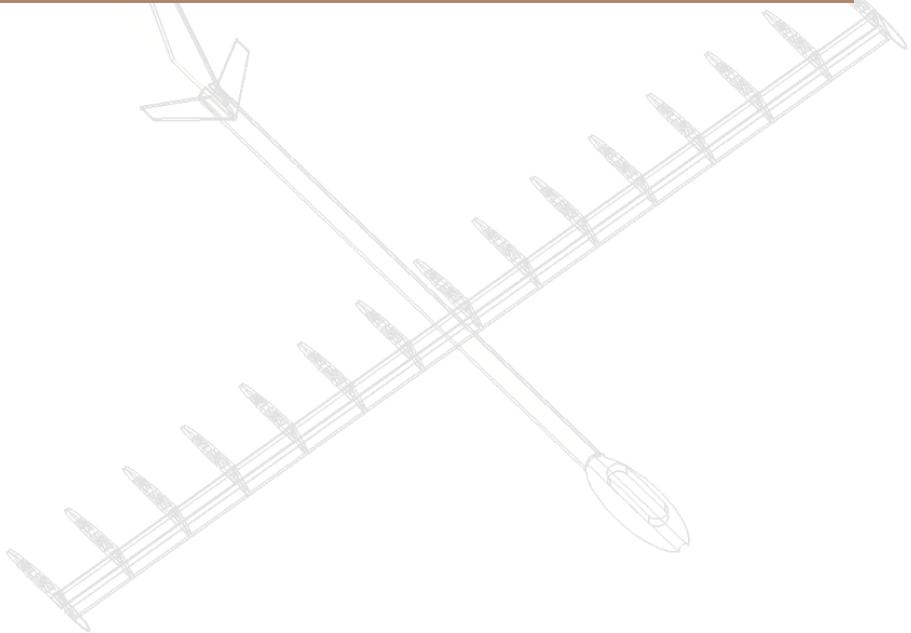
Save to Disk

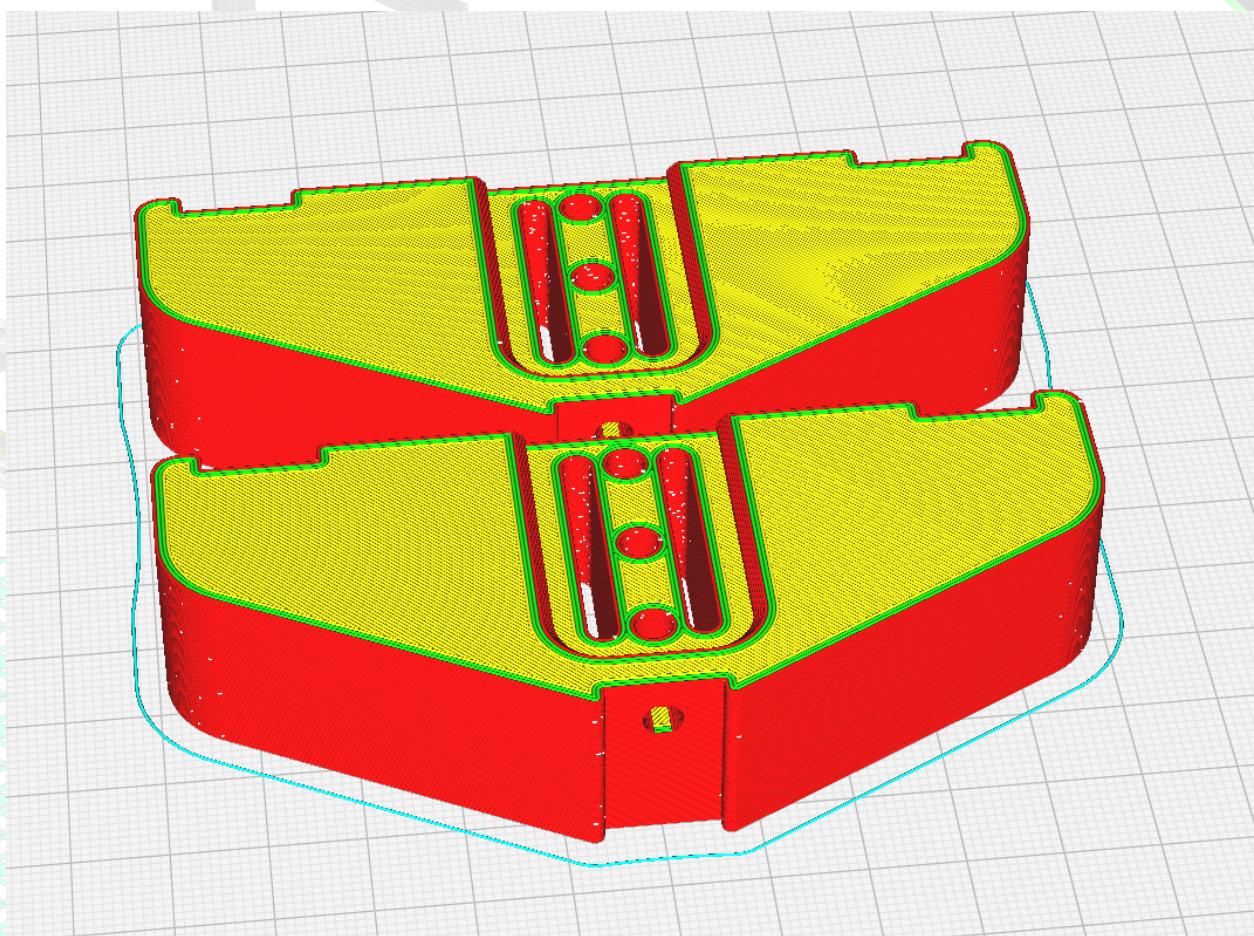


Axe Y



3D Printing elements





⌚ 8 hours 10 minutes

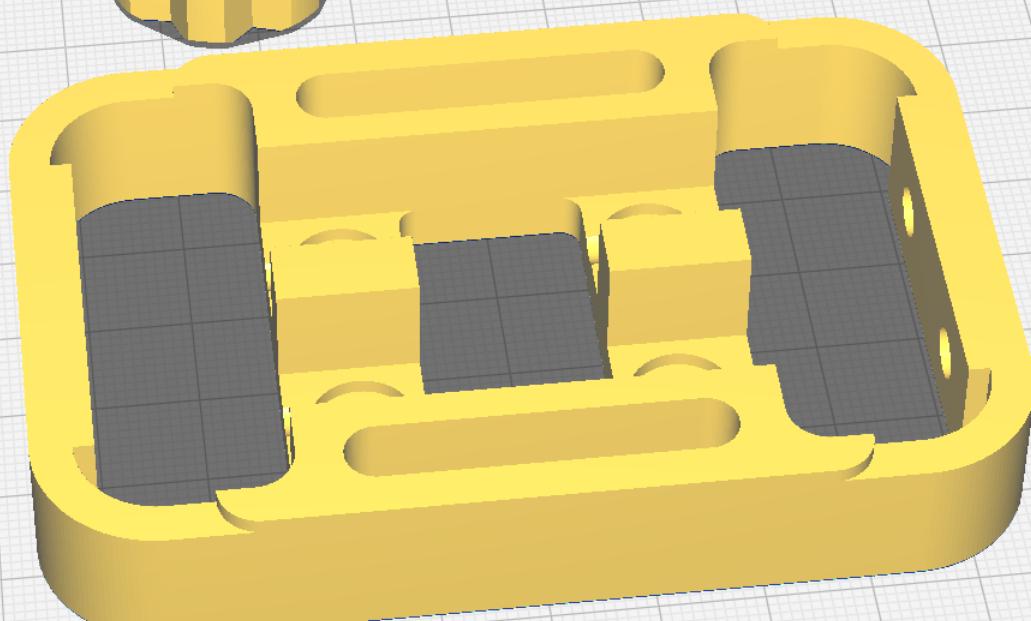
ⓘ

⌚ 134g · 44.91m

Save to Disk

▼





⌚ 3 hours 26 minutes

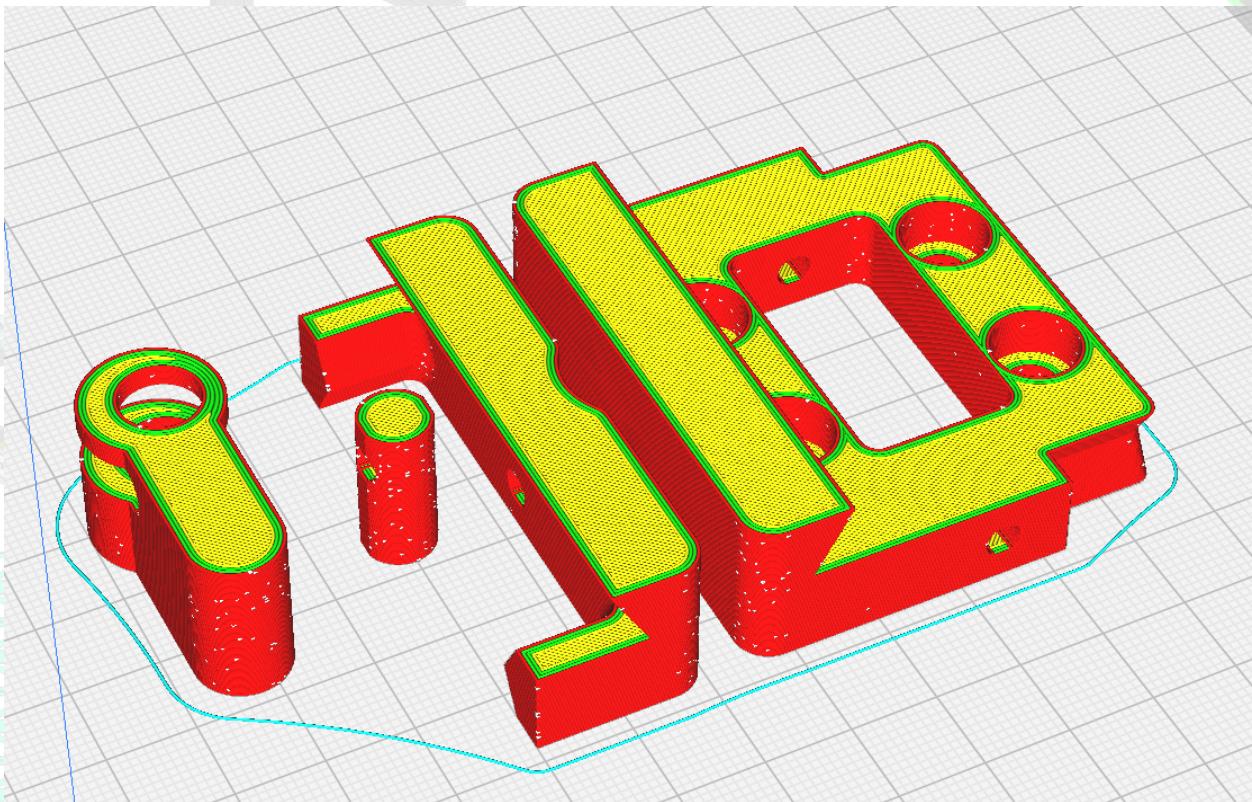
ⓘ

⌚ 54g · 18.18m

Prev...

Save to Disk



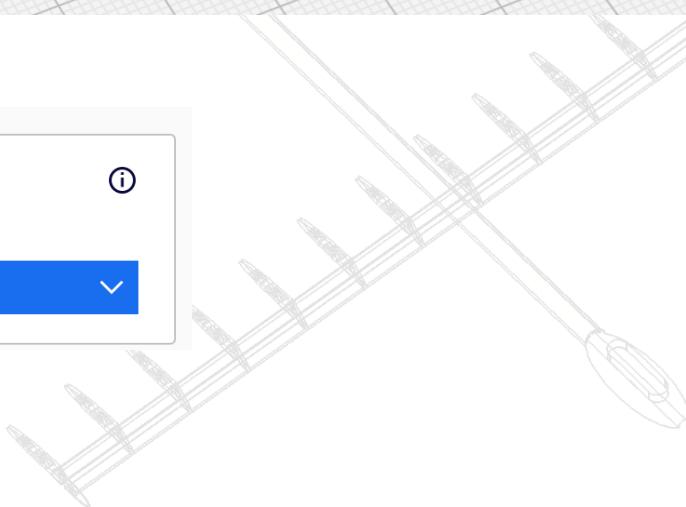


⌚ 3 hours 16 minutes

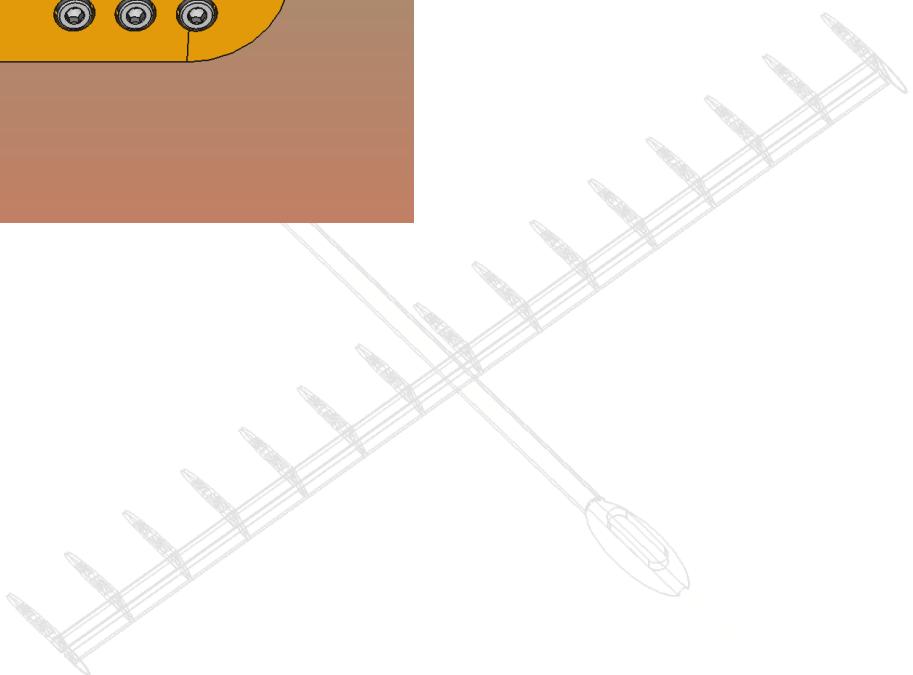
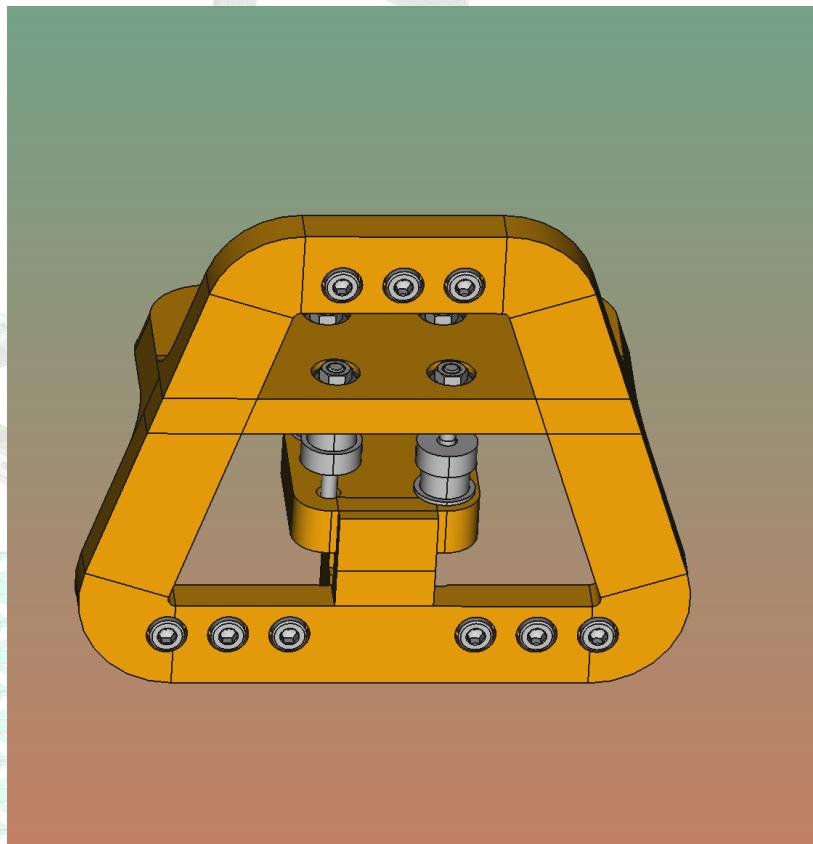
ⓘ

⚖ 53g · 17.61m

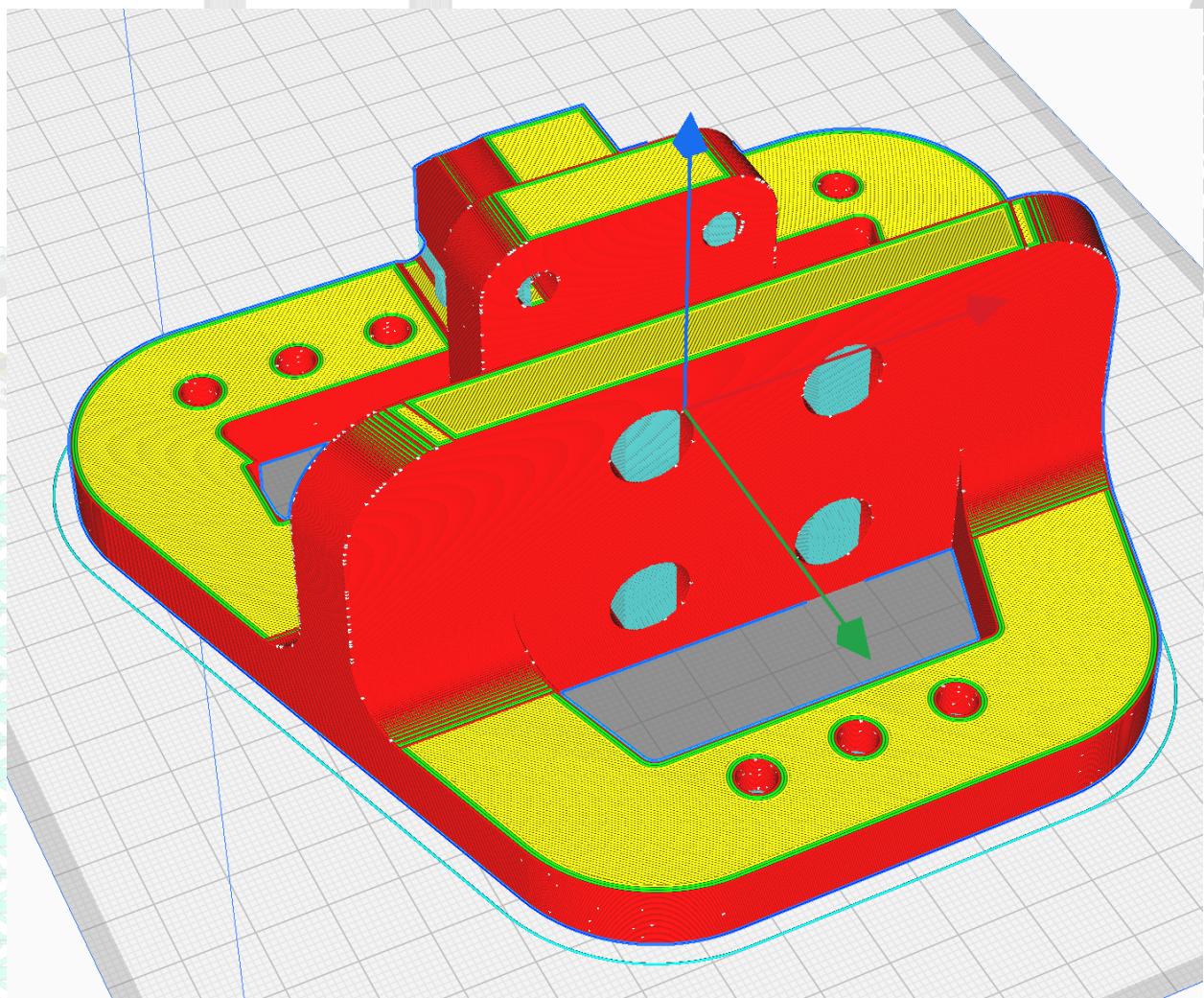
Save to Disk



Crossed CoreXY Central Heart



3D Printing elements



⌚ 14 hours 17 minutes

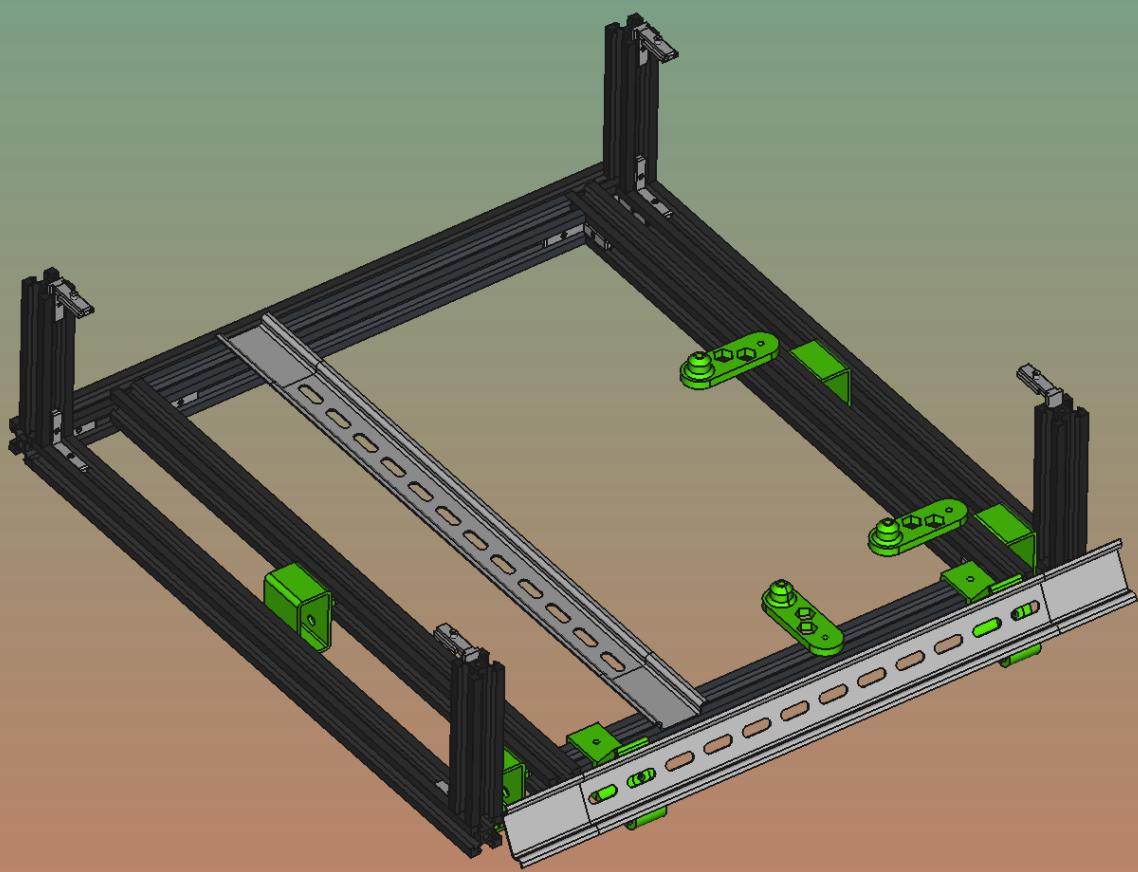
ⓘ

⚖ 234g · 78.38m

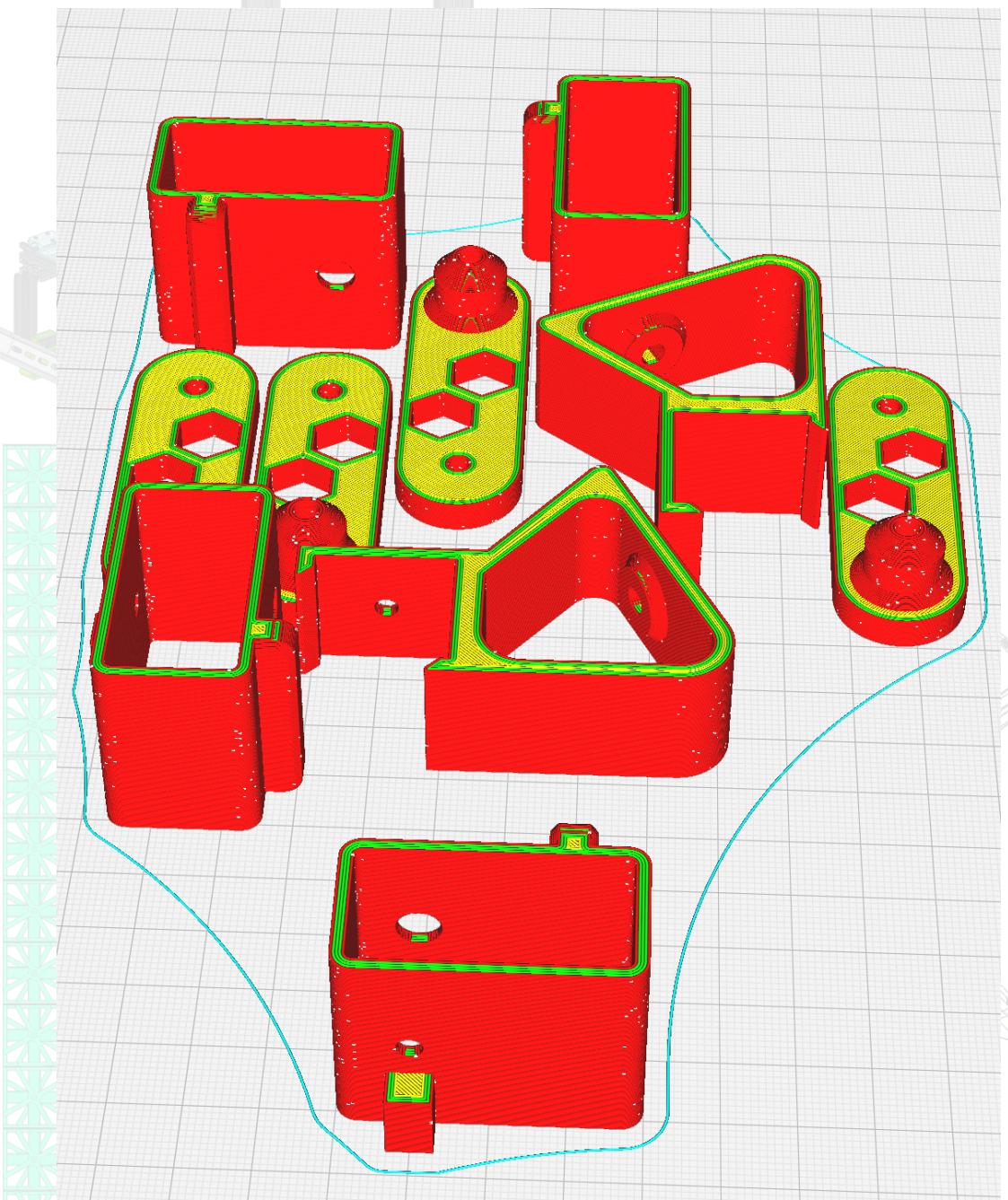
Save to Disk



Electro Drawer



3D Printing elements



⌚ 5 hours 28 minutes



⌚ 95g · 31.96m

Save to Disk

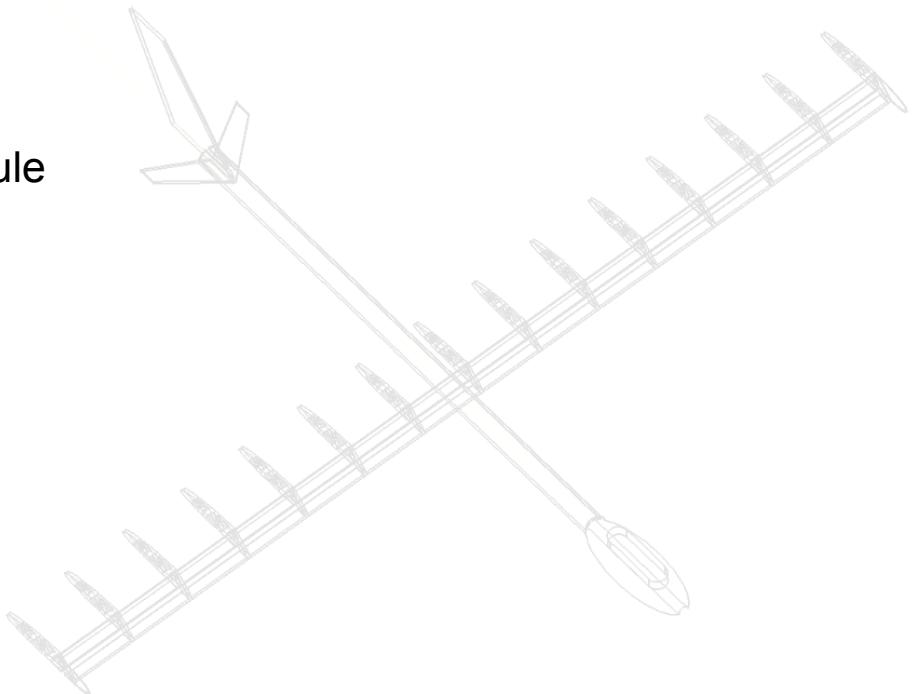


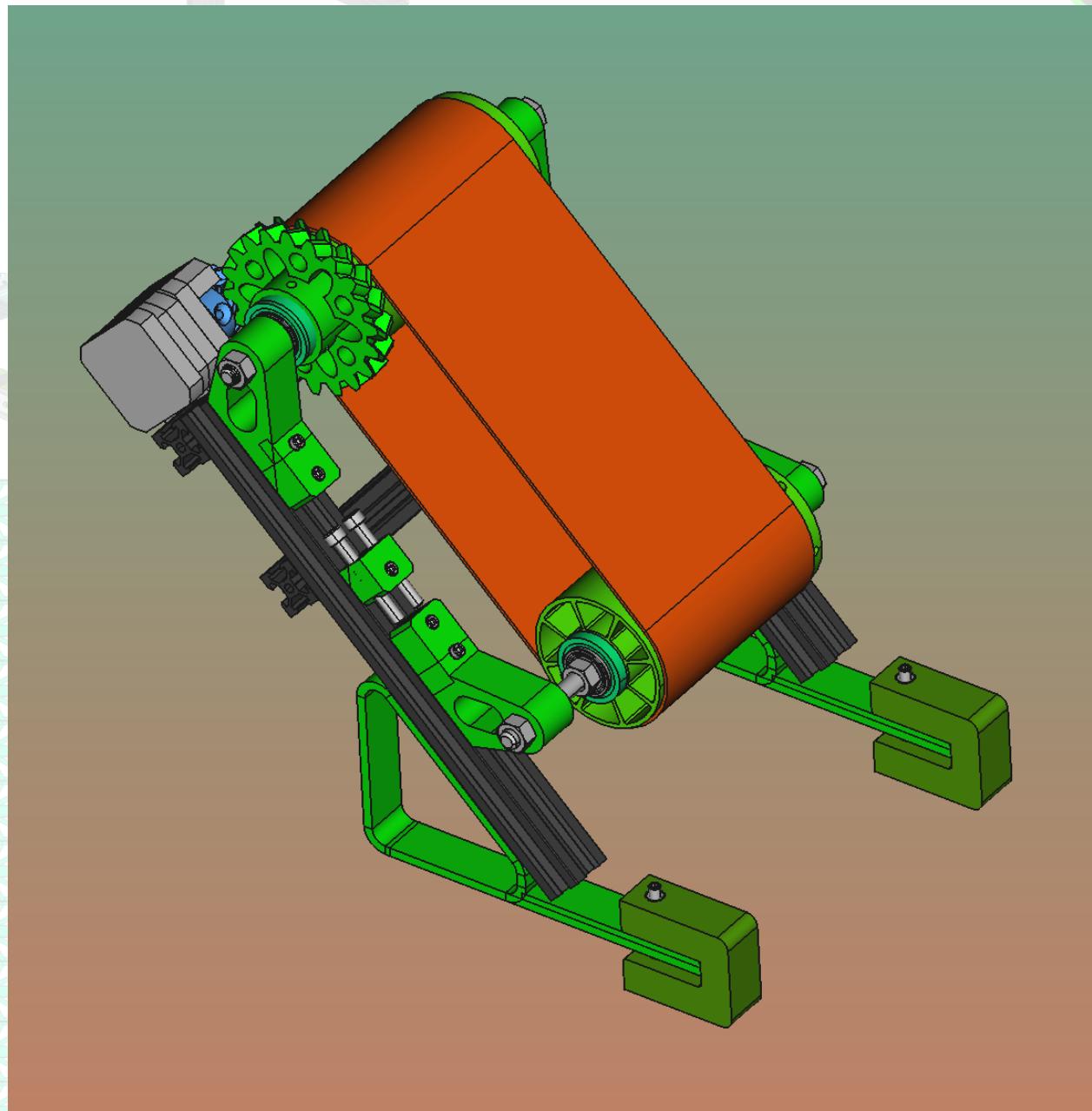


GA3D Modules

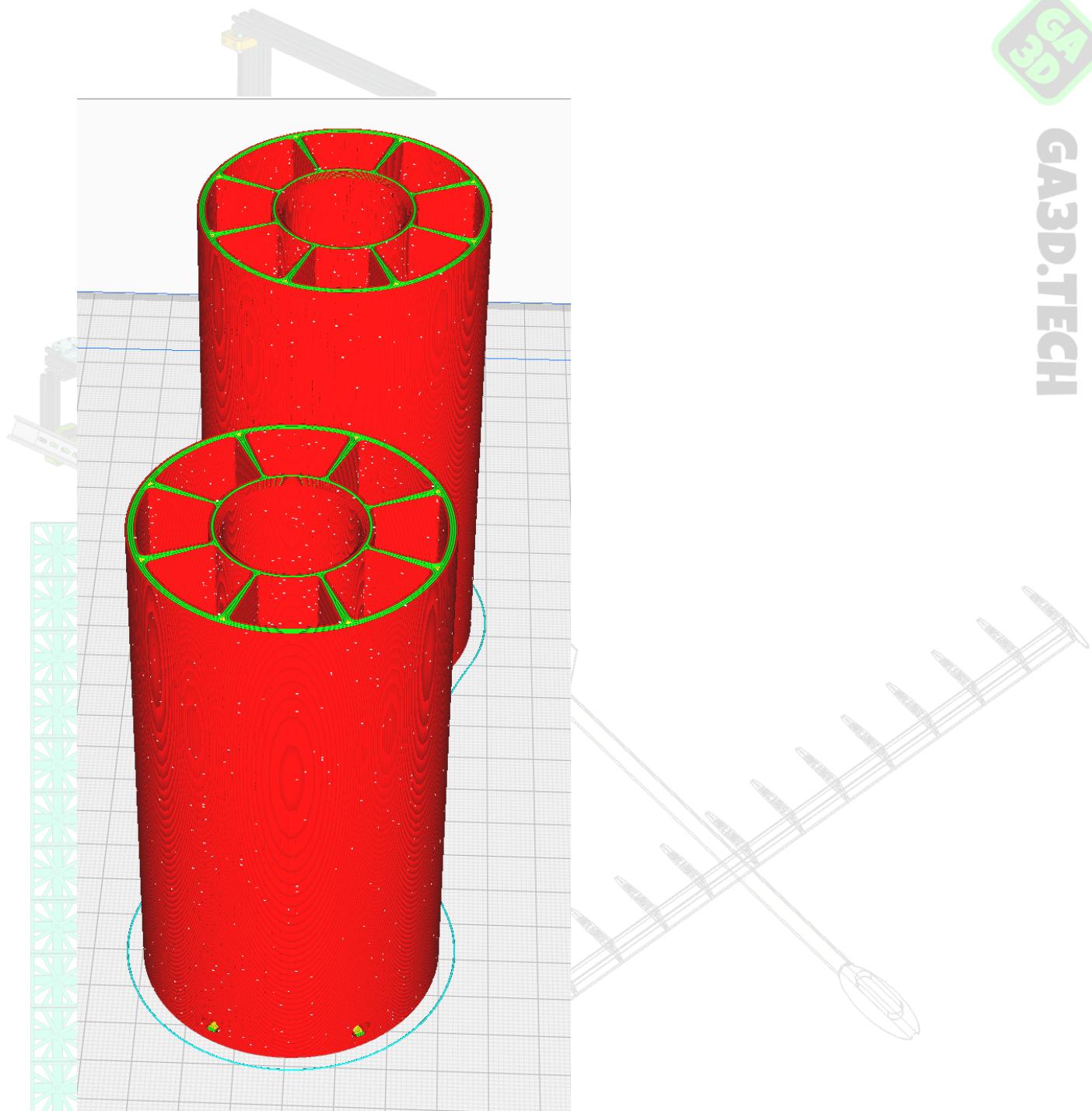


45° Deg Infinite Module





3D Printing elements



⌚ 12 hours 27 minutes

ⓘ

➊ 236g · 79.28m

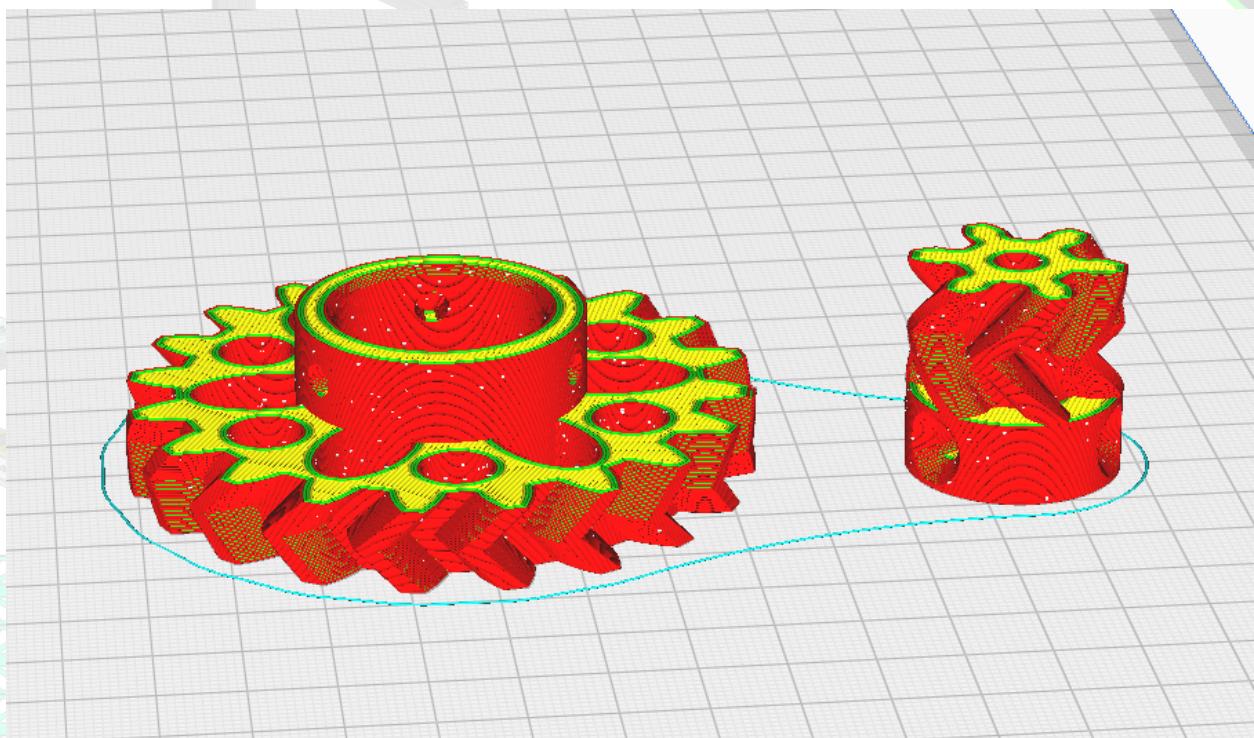
Save to Disk

▼



63



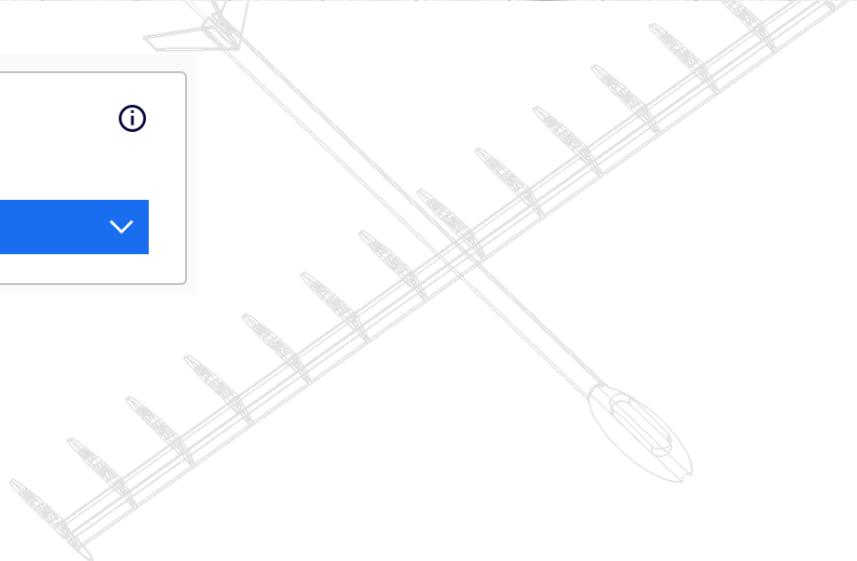


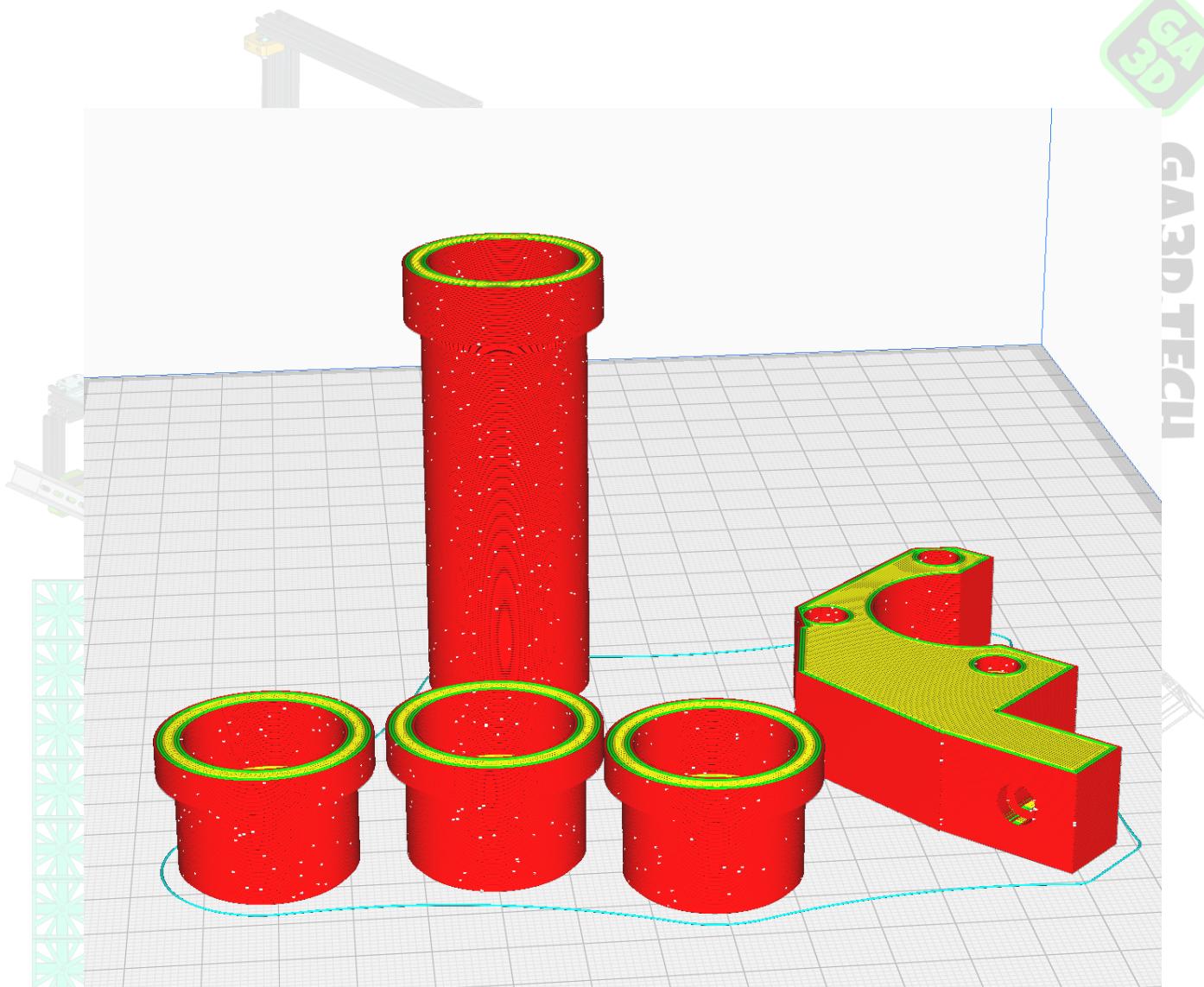
⌚ 3 hours 8 minutes

ⓘ

⚖ 48g · 16.22m

Save to Disk





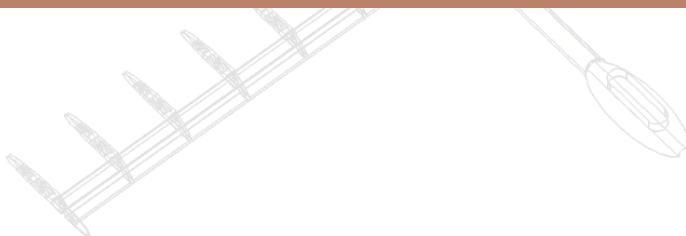
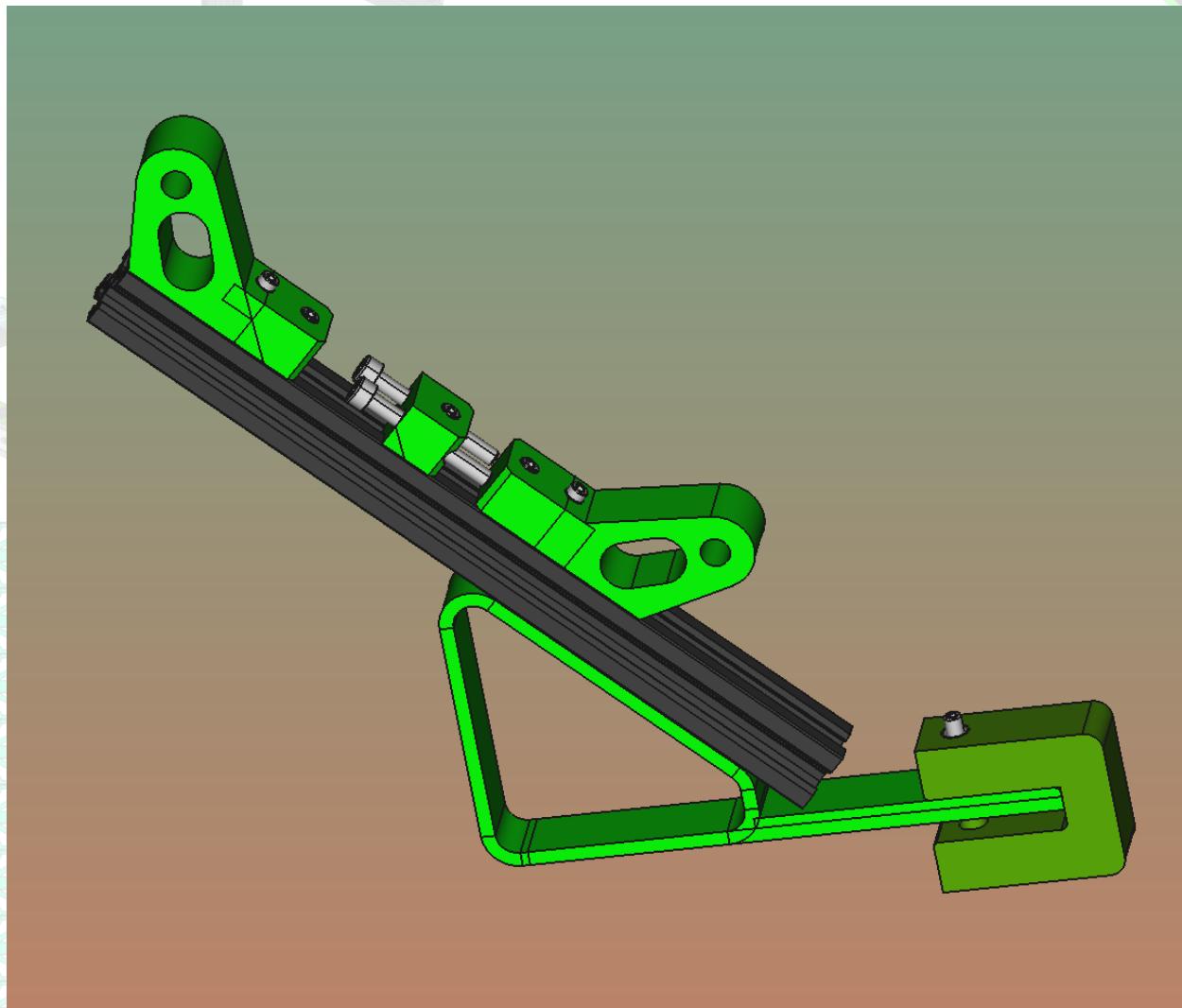
⌚ 5 hours 17 minutes

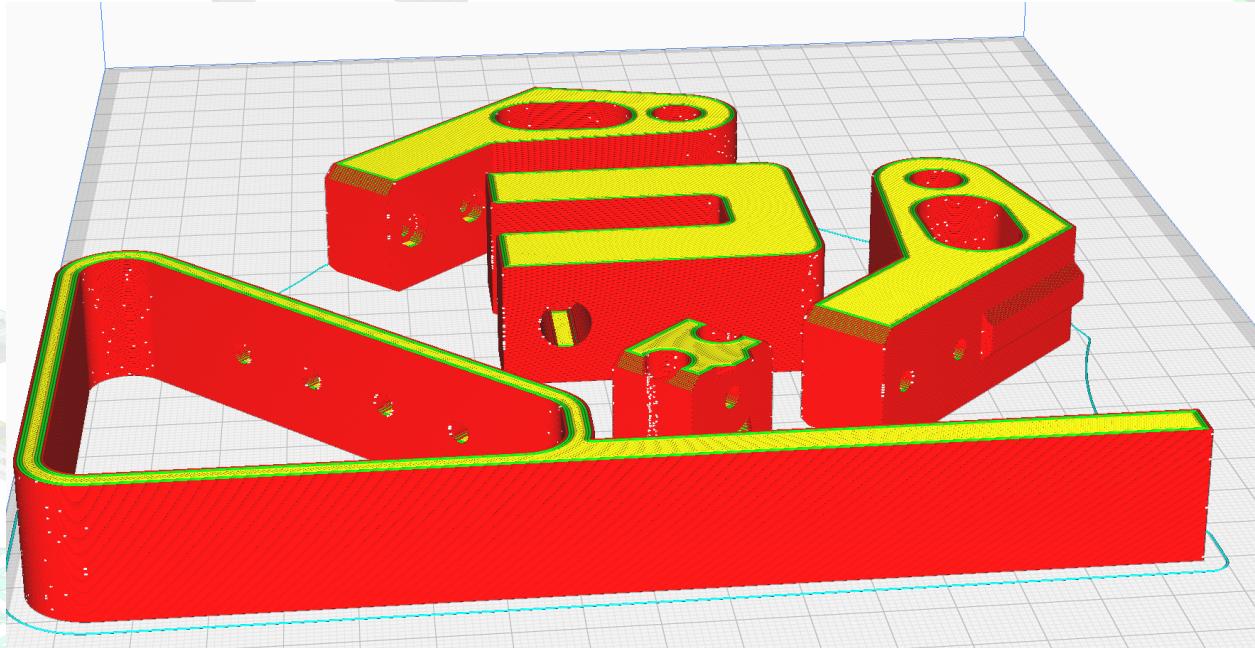
ⓘ

⌚ 88g · 29.61m

Save to Disk



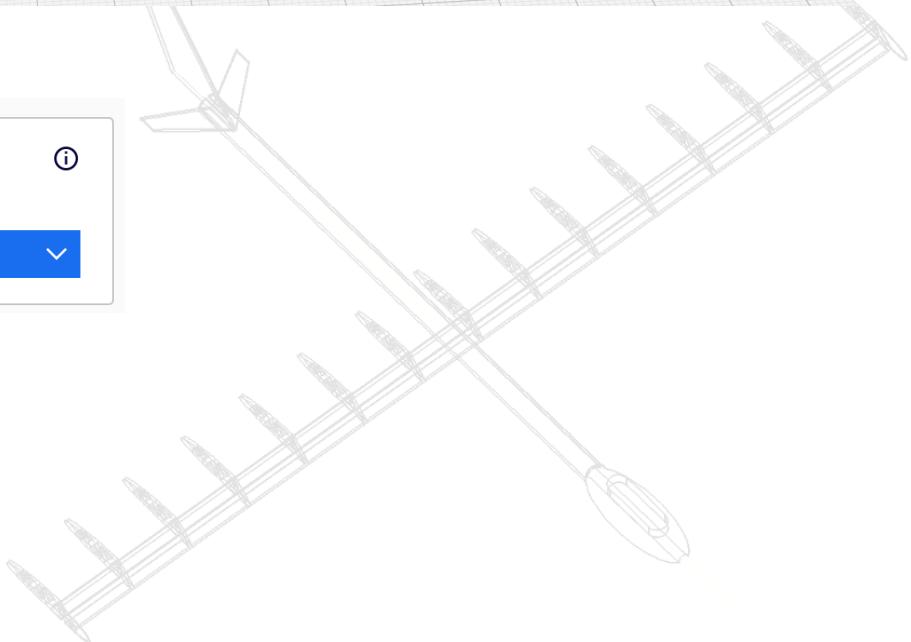




⌚ 9 hours 4 minutes

⌚ 151g · 50.66m

Save to Disk ▾



Continuous Improvement Notes - Problem - Open points

- Concerning fasteners (bolts, screws, gears, bearings, etc...) : for future project I would try to limit to the extreme the choice to ONE unique screw size for simplification even if it's not the best choice in some case, it could make a great simplification for purchasing.

