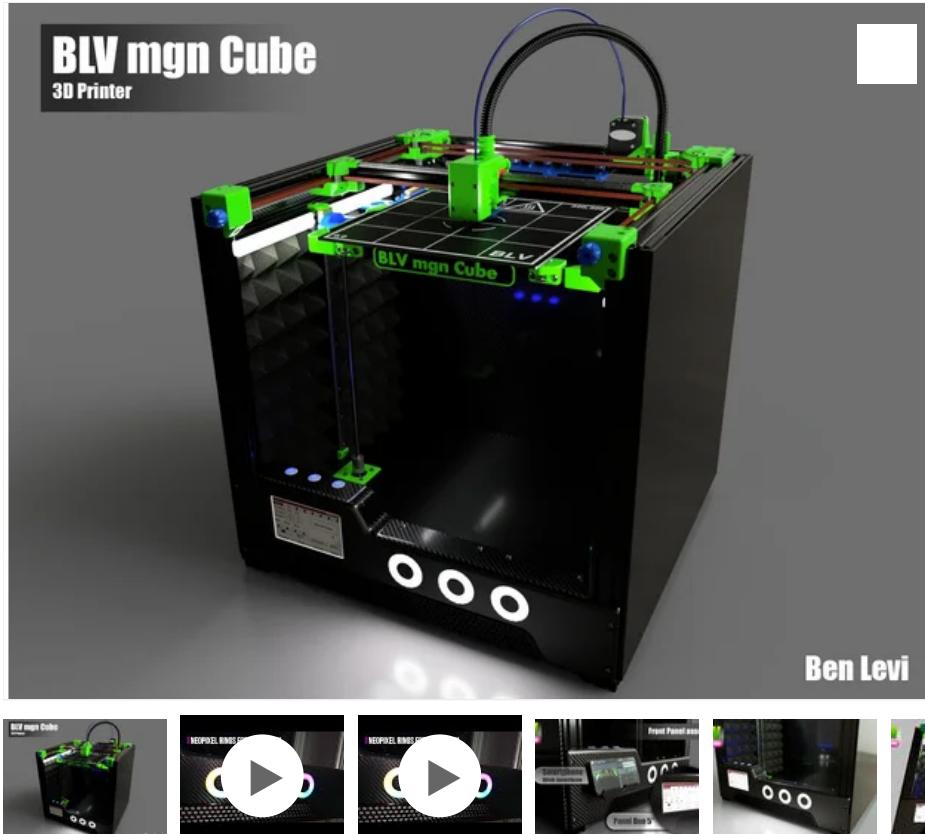




BLV mgn Cube - 3d printer

by [BLV](#) Jan 29, 2019


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Summary

Hi, my name is Ben Levi and This is: "[BLV mgn Cube](#)" open source 3D printer project. building your own good and a reliable 3D printer, is the main purpose of this project. Basically, it's an open front structure CoreXY 3D printer, based on mgn linear rails for maximum accuracy, efficiency and high print quality.

Notice: I promise to update this Project page on a weekly basis until it will be completed.

BLV mgn Cube Project

TIP DESIGNER

REPORT THING

Tags

3d_printer accuracy aluminium_profile

aluminum_extrusion anet Anet_A8 arduino

25.3.2020

BLV mgn Cube - 3d printer by BLV - Thingiverse

ben benchmark ben_levi blv BLV_mod

bmg_extruder bondtech_bmg

Bondtech_BMG_extruder corexy Core_XY

CR-10 cr10s Creality Duet Duet3D

DuetWifi Duet_WiFi e3d-titan e3dv6

E3D_Hotend E3D_v6 E3D_v6_clone

Ender_3 Fast gates GT2 hypercube

hypercube_evolution linear_rail MGN

MGN-12H MGN12 MGN12H neopixel

neopixel_ring prusa prusa_i3 rail tevo

titan

License

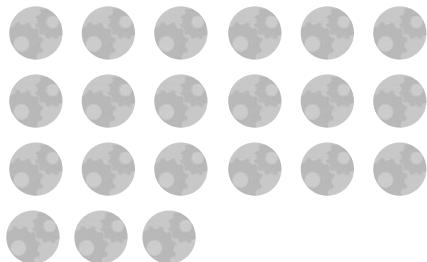


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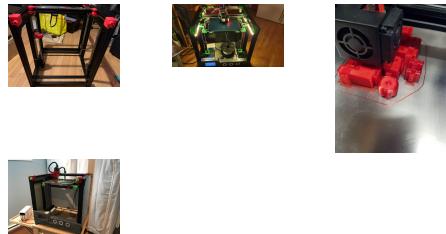
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Makes

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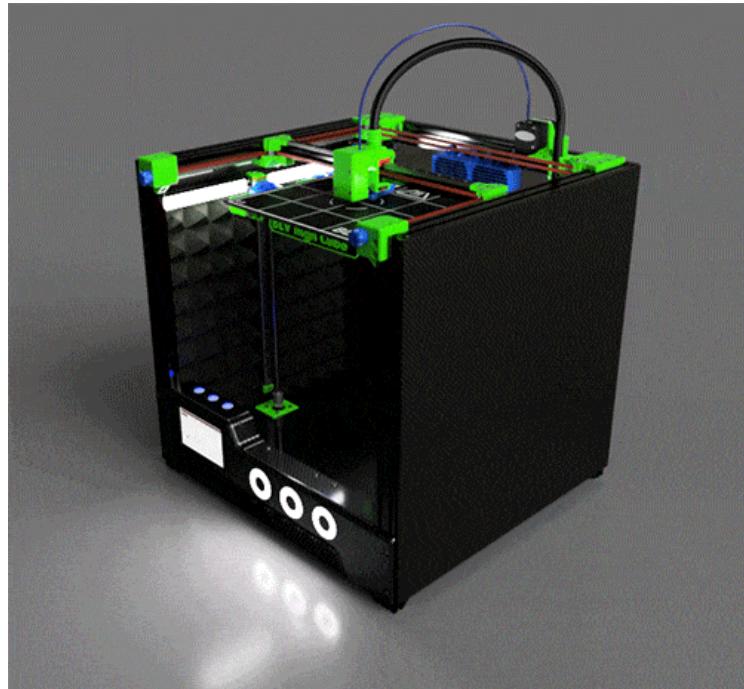


Thing Statistics

836204 Views

68768 Downloads

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3D animation of the finished printer

BLV mgn Cube - update



Have you built and liked the "BLV mgn Cube" project? I dedicated for the project hundreds of hours and I would really appreciate if you could share your creation by adding "Post a make". Please do it if and whenever you feel like.. Thank you guys for your support :)

BLV mgn Cube Project

- **Fast, reliable, accurate**

The linear bearing and Delrin Wheel Gantry commonly used at most of the low-mid 3d printers as a cheaper solution for linear motion. well, ye.. it's cheaper but at the expense of accuracy and reliability. linear guided rails (mgn rails) are a way more rigid, extremely precise and smoother than linear bearing or Delrin. shorting print time without compromising on print quality. There seems to be a good reason why they are mostly used

BLV mgn Cube - 3d printer by BLV - Thingiverse

with high-end 3D printers. So, i found cheap Chinese mgn rails at Aliexpress and thought to myself why not?

- **Rigid open structure**

I focused my efforts on designing an open front structure that will be rigid as a cubic structure but yet giving you easy access to your build plate and prints. the design includes a front belt tensioner to make it even more convenient. It came after spending tons of hours software simulating and physical stress test.

- **Accessible**

All the parts are easy to find, print or make. You will not find in the BOM an expensive CNC special machined parts or parts that are hard to get. most of the parts are printed or you can buy them online / locally. Notice that you can use your own electronics - as long as you have the knowledge to make your FW suitable to the build.

- **Open Source**

You don't need to ask for the original CAD files since i already included it inside the project folder. I admire this community and believe that sharing is the main key in order to make this project even more better. Feel free to download the CAD files (Step file) and modify, add, remix or improve it as you like. I would appreciate if you could please share it with this awesome community and mark the remixed parts as a "remixed" linked to this project page.

- **Build and print**

I spent many hours adjusting the Firmware for this 3D printer and fine-tuning the best slicing profile (Simplify3D) for it. After building this printer you will only need to upload the config files, load your slicing profile and you are good to go.

- **More modular**

The design is more flexible then you think. the printed parts and structure designed to be modular. Not only you can choose your Z height - But you can use a much bigger build plate. all you need to purchase a bigger aluminum profile and mgn rails. The provided CAD file will assist you calculating the right measurements for your customized "BLV mgn Cube" 3D printer.

- **Easy to build?**

To be honest, the rails installation will take 70% of the build time. you will have to be accurate and spend a few hours aligning the rails, but boy.. the joy you will feel when it prints will worth every minute you spent installing them. To make it easy on you, I made a 3D animation videos as instructions, Information PDF, sketches and measurements.

- **balanced budget**

The cost was important, therefore the BOM is balanced to give you the best money-value ratio, without compromising on quality. you will find The best 32bit board a 3D printer can have. Excellent stepper motors, sensors and so. you get to chose if you want to have a 5" paneldue touch screen or save 80\$ and use your [smartphone/Tablet screen](#) without losing features.

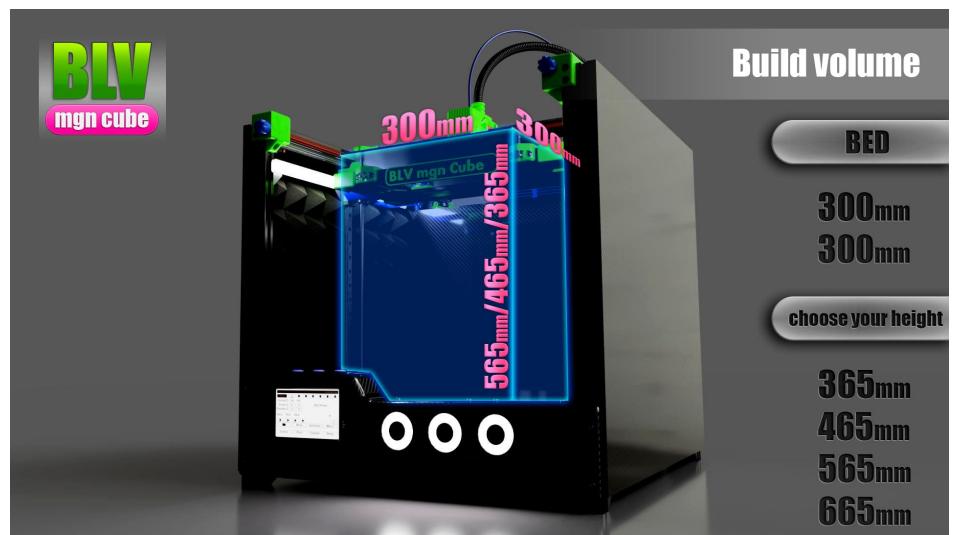


Explore the Printer

To your convenient, i added below an Online 3D viewer links.
you will be able to explore the printer and the isolated frame:

- [BLV mgn Cube - 3D view \(Click Here\)](#)

- [Isolated frame - 3D view \(Click Here\)](#)
- [Isolated Panels/walls - 3D view \(Click Here\)](#)



Modular build volume

Main features

- Super quiet and fast tmc2660 drivers !
- Efficient cooling system
- Hepa/Carbon air scrubber
- Rigid Aluminum Open front frame
- Option for Dual extrusion
- Front belts tensioner
- Mesh Auto Leveling
- Internal LED light

- Linear rails MGN12H for high accuracy
- Firmware config + S3D Profile included
- Bed: 300 X 300, Height: 365/465/565mm
- DuetWifi 32 Bit board
- Full web interface via Smartphone/Tablet/desktop
- Electronics at the back
- Clean and elegant design
- open source design cad file is available



Facebook group:

You are more than welcome to share your thoughts, build videos/photos and more at the BLV mgn Cube facebook group: www.facebook.com/groups/BenLevi

To Do List & Changelog

To Do List

- make CR-10 hotend adapter

Changelog

Latest updates:

03/02/19: added Jigs
 06/02/19: Printing orientation description added + image
 07/02/19: added Printer size calculator (Excel file) and info
 09/02/19: now BOM calculator file supports Threaded rods length
 09/02/19: added block shield for Bltouch, 8mm, and 12mm sensors.
 09/02/19: front panel for smartphone.stl - fixed
 15/02/19: electronics schematics updated (dual extruder + buttons)
 16/02/19: added BMG direct drive extruder (3 STL files + instructions)
 16/02/19: added Big Air Scrubber - HEPA+Carbon (working on instructions)
 17/02/19: renamed back the 8mm/12mm mounts
 17/02/19: added walls dimensions pdf
 18/02/19: added Calibration Z height guide
 25/02/19: added Zesty Nimble front plate and block shield
 26/02/19: Belt system V2 updated - Please use only flanged 623zz ball bearing+flip belt.
 28/02/19: fixed Z-height calibration guide
 08/03/19: added spitfire fan cover
 08/03/19: added Front plate for Chimera (not suitable for layer fan/sensor)
 18/03/19: Wiring diagram fixed.
 19/03/19: added Step file (CAD) for the DirectDrive setup.
 20/03/19: added DWG for the (bottom, Rear, sides) Panels
 25/03/19: small fix: Front Panel - Left plate for PanelDue 5 STL file
 31/03/19: Fw updated - added M80 PS_ON command on startup.
 04/04/19: added DXF (vector file) for the enclosure panels.
 16/04/19: Wiring diagram updated v3.2
 16/04/19: added steppers setup guide for others steppers brand/batches
 17/04/19: updated Simplify3D profile v1.2 (added: M81 S1 end script)
 17/04/19: added Neopixel wiring diagram (Beta) and Mimaskx Code.
 01/05/19: added STL panels for PanelDue 4.3 and MKS TFT32 V4 (not supported by duet)
 10/05/19: fixed V6 locker by decreasing the fan screws holes to 2.7mm.
 11/05/19: added E3D high temp 314x314 bed size
 12/05/19: added quick frame wire holders (based on samella design and thing:2576237)
 19/05/19: fixed typo - purge message box
 24/05/19: added support for Ender-3 bed size
 11/06/19: added Hotend and Heated bed PID tuning Quick guide
 25/06/19: added picture that demonstrates how to flip the belts on the rear
 01/07/19: added a link for all the screws kit
 05/07/19: added wiring diagram for using 12v fans on a 24v system
 21/07/19: added optional frame reinforcement for higher Z-axis builds
 03/08/19: added New updated Neopixel code by Claus Noack - works!
 03/08/19: added updated neopixel wiring version 2.2b
 09/08/19: added Powerful twin 4010 blower fan option (layers fan) for Bowden and direct!
 13/09/19: added step files for the new twin fans

Where to start?**where to start?****• 1. Read, understand and prepare yourself**

Start with reading the Thing description and "more info links" section, watch the 3d animations, explore the printer 3D model with the 3d viewer, read the pages I linked in the "more info" sections and make sure you understand the printer structure.

• 2. Get the parts

The waiting - is the most frustrating part. make sure you got all the needed parts. prepare spares of T-nuts, screws and so on. If you have decided to use your own electronics, make sure you know how to correctly configure the firmware of your board.

• 3. build

now the building process begins.. Know that it isn't going to be easy as building a pre-made kit. Prepare all the tools you need and please use a good corner alignment tool, it is crucial to have a precise structure for excellent printing results. it is advised to use also the provided JIGS, the assembly will be much easier. Don't forget to tap holes on the corners and check if its an M5/M6 screw (depends on your extrusions manufacturer). Take your time when fixing the rails to the extrusions. I found a good quick video tutorial made by 3D distributed: (youtube.com/watch?v=iXOU1ADH0MY) showing an easy way to align parallel rails. Don't forget to reward yourself after the rails installations - you deserve it :)

• 4. Electronics installation

Install your Electronics carefully. Check your connections and wiring diagram closely and make sure everything hooked up correctly. don't make any shortcuts and use the right tools and parts. the Power cable should be the last thing to connect.

• 5. Software, Tests and Calibrations

Update you DuetWifi board to the latest version and upload all the provided config to the sd-micro card, then insert it to your board and power up the system. make sure that the Mini IR sensor blinks 4 times right after powering the printer. please don't move the axis before checking endstop response. Try to home the printer - the printer should move to the left and then to the rear for the printer. if it isn't - check ou motors wiring and config.

calibrate your Z height and check your sensors reading (temp). Please make sure to do a PID calibration for both the bed and the hotend sensors - This is very important, otherwise your prints will fail. if everything looks good load filament and print a calibration cube and so on.

- 6. print

Enjoy your printer and give her love when needed :)
maintain your printer by greasing the rails with a Synthetic grease with PTFE or sewing machine oil. Keep the rails clean and the belts tight

Also, Clean your PEI build plate with alcohol after every print. If you are using the Air scrubber - please replace the HEPA filter when needed.

- 7. Post an "I made one" pictures

Show the world your new 3D printer and be proud of your creation:)

I would appreciate if you could please upload your new built 3D printers pics. Knowing that it helped you create your own 3D printer - for me, it's worth all the hard work and many hours that I spent in this project.

• 8 Remix & Share

I am 100% sure that there are many ways to make this printer even better. this is why I gave you the source file of the Printer. Make it better by sharing your remixed and instead with this awsome community:)

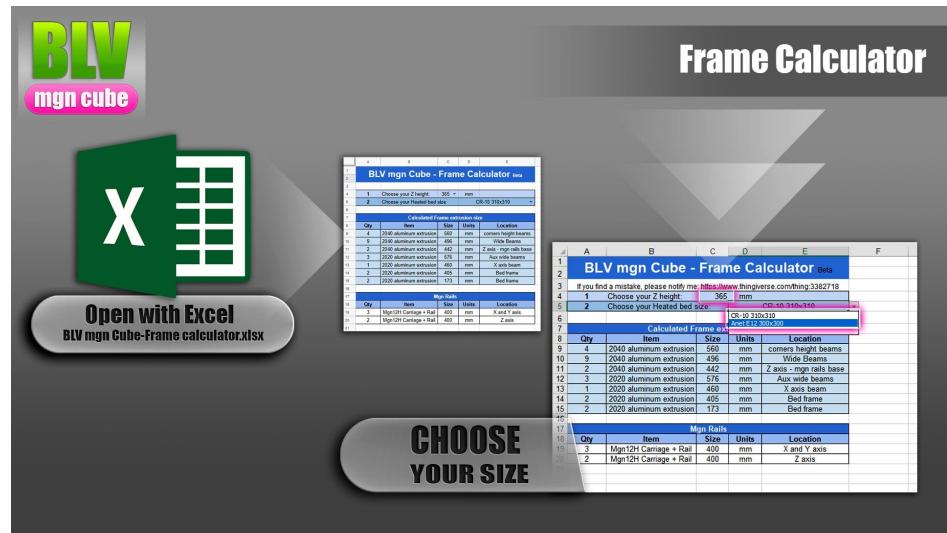


Requirements & BOM

Those are the main resources you will need have:

- **a passion for 3D printing** (most important)
 - Tools
 - Technical ability
 - spare time
 - budget (mid)





For different frame size please use the "BLV mgn Cube-Frame calculator.xlsx" that can be found inside the project Zip file (full size image: open in a new page)



Sealand started to sell a full kit for the project: <http://s.click.aliexpress.com/e/cmcYPkdE>

BOM - Bill Of Material

Notes:

- Please Be precise and use the correct extrusions without shortcuts. using 2020 profile instead of 2040, may reduce the frame rigidity.
- The BOM below is for 365mm Z height, If you wish to build different size, then use the Calculator (excel file named: "BLV_mgn_Cube-Frame_calculator.xlsx" can be found at the project Zip file)
- It is recommended to use **normal extrusions** with mgn rails and **NOT V-slot**.
- Please let me know if you found any typo/mistake and I promise to fix it ASAP.
- The Blurolls store from Aliexpress has started to offer a [Kit for the project](#).** It contains most of the needed electronics, frame, screws, pre-crimped wiring, panels, tube, brackets and more. I think its a pretty convenient solution, especially when part of the deal is genuine Hiwin rails!
- New [cheaper BLV mgn Cube \(lite\) kit based on SKR + tmc2209](#) spotted on Aliexpress.

Frame

- 9 x [2040 aluminum extrusion 496mm \(Wide Beams\)](#)
- 3 x [2020 aluminum extrusion 576mm \(Aux wide Beams\)](#)
- 1 x [2020 aluminum extrusion 460mm \(X axis\)](#)
- 4 x [2040 aluminum extrusion 560mm \(4 corners height beams\)](#)
- 2 x [2040 aluminum extrusion 442mm \(Z axis\)](#)
- 2 x [2020 aluminum extrusion 405mm \(bed frame\)](#)
- 2 x [2020 aluminum extrusion size: for CR-10 bed: 173mm OR for Anet bed: 142mm OR for E3D High temp size 314x314 bed: 240mm OR for Ender 3 bed: 106mm](#)

Optional: recommended Frame Reinforcement for higher Z axis builds (465mm+):

- 1 x [2020 aluminum extrusion 496mm](#)
- 4 x [aluminum 2020 Brackets 20x20 \ 20x17](#)

Other

- 2 x [T Shape Bracket 60x60](#)
- 14 x [Corner 90 degrees Angle Bracket for 2020/2040](#)
- 100 x [aluminum 2020 Brackets 20x20 \ 20x17](#)

Getting the frame Kit:

notice that you may be able to get a much cheaper price for the extrusions locally.

- [Alumnum frame kit in 4 colors: Black/Blue/Red/Purple - anodized after cut+Brackets](#)
- [Eysetc - frame aluminum profiles Set / Full frame Kit](#)
- [Funssor - frame Kit containing all the needed extrusions](#)
- [Reprap - Frame Kit with free DHL shipping - not tested yet](#)
- [Geckosys.ch - Frame kit](#) (Switzerland, Germany, and Austria)

Screws and bracket kits:

- [Eysetc Brackets, corners, T-nut and M5 screw kit](#)
- [Funssor Brackets, corners, T-nut and M5 screw kit](#)

Motion System**Rails**

- 5 x [Mgn12H Carriage + 400mm Rails](#) (Use Frame calculator for other Z sizes)

Update: Thanks to Jerry.h now we have two good options for rails:

- [Set of cheaper rails for 17\\$ each](#) (i bought it first).
- [Set of Hiwin rails which are the best rails exists on earth](#) or [Single Hiwin rail](#) one of the biggest stores on Aliexpress are authorized Hiwin dealer and decided to offer a full kit of Hiwin rails for 38\$ each rail. in my area it sold 80\$ for one rail. if you can afford it - That's a steal! even E3D chose to use Hiwin rails with their builds. (Notice: Hiwin rails should be tested with a load on the carriage)

Stepper Motors (Please ask them to give you a full D-cut shaft!)

- 2 x [X/Y Stepper motor: 17HM19-2004S Nema17 0.9deg 46Ncm 2A](#)
- 2 x [Z stepper motors: 17HS19-2004S1 59Ncm 1.8deg 2A](#)
- 1 x [Extruder stepper motor: 17HS16-2004S1 Nema17 45Ncm 1.8deg 2A](#)
- 2 x [GT2 Pulley 16 Teeth 5mm bore / excellent GT2 pully 16 Teeth](#) (for X/Y steppers)

Where to get the Steppers kit:

- [Motor Kit for BLV mgn Cube 3D printer](#) The manufacturer agreed to offer a kit with all the necessary steppers. Please ask for a full D-cut shaft!
- [Moon motors kit for BLV project - high quality steppers](#)
- [stepper kit for BLV mgn Cube - stepperonline store - not tested yet](#)
- [Stepper motors kit from Blurolls store](#)

Note: ask for a full D-cut! or shave X/Y stepper's shaft with a Dremel/file (2 min work).

Belts system (check assembly section):

- 24 X [F623 ZZ Flange Ball Bearings - number 2 or 3 option](#)
I recommend flipping the belts at the rear (check the belt system image), please do not use the geared GT2 16T.
Note: There is an Amazon seller who sells low-quality 623zz for triple the price!. his bearings are loose and it will ruin your printing experience.

Belts & Threaded rods

- 1 x [4m Gates 6mm GT2 Fiber Glass Reinforced Belt / 4m Gates 6mm GT2 Fiber Glass Reinforced Belt - tested](#) / 2 x [2m 6mm GT2 Reinforced Belt](#)
- 2 x [3D Printer Lead Screw Diameter 8mm Lead8mm 400mm](#)
- 2 x [Aluminum Coupler 8x5x25mm \(I prefer this option\) or spider couplers](#)

Main Electronics

- 1 x [DuetWifi 32bit main board from Filastruder.com](#)
- 1 x [PanelDue 5" screen \(not the "5i"\) OR save 80\\$ and use your phone/Tablet !](#)
- 1 x [Mini differential IR Auto leveling sensor / Mini differential IR height sensor](#)
- 1 x [Power Supply DC 24V 20A/30A - i use it / Meanwell PSU 24V 450W](#)
- 2 x [3-Pin endstop switch KW11-3Z / Omron high quality endstop switches](#)
- 1 x [Heat Insulation 300mm for the bed](#)
- 3 x [NeoPixel Ring 16 leds WS2812 Module](#)
- 1 x [5M Silicone Wire Flexible 14AWG Stranded Copper Cables black\red](#)
- 1 x [22 awg wire 415 wires 5m](#)
- 1 x [16mm Momentary switch with led 110V/220V \(wall voltage\)- power icon](#)
- 2 x [16mm Momentary/locking latching switch with led 12/24V - optional](#)
- 3 x [best 4010 24V-2Pin DB Bearing OR Cheap fan 24V add 4 for small air Scrubber.](#)
- 1 x [5015 Blower fan 24V ball bearings - 24V-2Pin DB Bearing](#)
- 2 x [4010 blower fans \(dual ball bearings\) 24v - only for the new twin blower shield](#)
- 1 x [24V to 12V 15A Step Down Converter \(only if you got Anet E12 bed\)](#)
- 2 x [120mm fan 24V ball bearings 3000RPM \(for the bigger Air Scrubber](#)

Note: Choose your PSU according to your specs

Hotend options - 4 options:

1. [Trianglelab excellent Quality V6 hotend \(1.75 24V PTFE\) - had it](#) - read the note.
2. [Mellow excellent hotend kit \(24V teflon\) - i use this](#)
3. [Blurolls good quality V6 hotend](#)
4. [Cheap v6 hotend clone](#)

Note: For Triangelab hotend change the M305 raw in config.g file to this: "M305 P1 T100000 B4725 C0.0000000706 R4700"

more info about it under the "Additional Notes" section on this page.

Hotend optional upgrades:

- [Fantastic Ruby nozzle - for abrasive materials printing such as Carbon, glow..](#)
- spare part: [Semitec 104GT-2 Thermistor / thermistor + connector / cheap Thermistor](#)
- [Plated Copper V6 Nozzle for high temp printing as peek..](#)
- [Hardened Steel V6 Nozzle for abrasive materials printing](#)

Heated bed system, choose one of the 2 choices:

1. [Funssor CR-10 Aluminum Heated Bed 24V - tested](#)
 2. [Anet E12 12V heated bed 300x300](#)
- [Thumb dial wheels M4-for CR bed or M3 for Anet bed](#)
 - [Bed springs set or Silicone solid Column-need to cut 2mm of the long ones](#)

Note: For those that preffer Duet clone:

- [DuetWifi clone v1.03 + 4.3 lcd + contoller](#)
- [Eyetec - DuetWifi v1.04 Clone + panel due + 4.3 / 5 lcd](#)

Mechanics

- 1 x [Good BMG extruder / metal BMG extruder / BMG extruder / Clear BMG extruder](#)
- 1 x [1m Capricorn clone PTFE tube 1.9mm or 2mm id](#)
- 2 X [optional: 635zz Ball Bearing for aligning the steppers shaft](#)
- 3 x [Silicone sock - helps keep the nozzle temperature steady](#)
- 1 x [Spring steel sheet 300x310+PEI sheet+magnetic sheet](#)

Screws

note: Usually a large quantity of screws is sold in bulk so i rounded the quantities.

- 300 x [M5 10mm Button Head Socket Cap Screw](#) (buy at least 300~350)
- 2 x [M5 16mm Button Head Socket Cap Screw](#)
- 4 x [M5 35mm Button Head Socket Cap Screw](#)
- [200 x M5 washers](#)
- 4 x [M4 40mm Flat Head Machine Screw - only using CR-10 24V bed](#)
- 2 x [M4 30mm Hexagon head](#)
- 78 x [M3 8mm Socket Head Cap Screw](#) (buy at least 100)

- 4 x M3 40mm Flat Head Machine Screw - only if using Anet E12 12V bed
- 2 x M3 50mm Socket Head Cap Screw
- 13 x M3 35mm Socket Head Cap Screw
- 2 x M3 30mm Socket Head Cap Screw
- 1 x M3 16mm Socket Head Cap Screw
- 5 x M3 16mm Socket Head Cap Screw - Only if NOT using Block cover
- 8 x M3 18mm Socket Head Cap Screw - Only if using the Block cover
- 3 x M3 25mm Phillips round head
- 1 x M3 22mm Phillips round head
- 4 x M3 40mm Socket Head Cap Screw
- 11 x M3 14mm Phillips round head
- 2 x M3 18mm Phillips round head
- 3 x M3 25mm Socket Head Cap Screw
- 2 x M3 10mm Socket Head Cap Screw
- 8 x M3 22mm Socket Head Cap Screw
- 8 x M3 12mm Socket Head Cap Screw
- 4 x M2.5 12mm Flat Head Machine Screw
- 283 x M5 T-nut (buy at least 300)
- 2 x M4 Nut
- 40 x M3 T-nut
- 62 x M3 0.5mm Washer (put 2pcs of 0.5mm or one of 1mm washer) (buy at least 100)
- 26 x M3 Nut (buy at least 50)
- 16 x M3 Nyloc

Links To kits that can be useful:

- [Full screws kit for the BLV mgn Cube from Blurolls](#)
- [Hardware Kit Screws, Nuts and brackets for BLV mgn Cube Project](#)
- [440pcs Set of M3 Socket Cap head DIN912 screws](#)

Optional and others

- [easy fast wires connectors](#)
- [1M Corrugated tube](#)
- [optional: Mayitr Black Wrap Braided Cable Sleeve Wear Resistant like prusa](#)
- [solid state relay SSR-25DA](#) to turn ON the printer with button
- [SSR Heatsink](#)
- [optional: DC step-down module LM2596 \(if you are going to use 12V fans/ Led strip\)](#)
- [5M LED strip 5050 60leds/m 44key waterproof](#)
- [Wago Compact Wiring Connector](#)
- [activated carbon filter](#) (for the bigger air scrubber)
- [500pcs replacement 3/32" G10 Hardened Precision Steel balls for mgn12H rails](#)
- [100K NTC 3950 Thermistors \(replacement if broken\)](#)
- [Hepa Filter for ilife vacuum robots](#) for the smaller air scrubber
- [Hepa Filter for eufy robovac 11c](#) for the bigger air scrubber
- [Soundproofing Foam Acoustic Sound Absorption Tile](#)
- [Brass brush for Hotend cleaner](#)

The filaments i used :

- [NOULEI Silk Filaments | link2](#)
- [1kg PETG transparent green](#)
- [1kg PETG transparent blue](#)
- [1kg PETG transparent black](#)
- [1kg PLA Silver](#)
- [1kg PLA Silk gold color - The best Silk filament that i have tested so far](#)

Walls / enclosure

How i created the walls / semi-enclosure?

Well, it's cheap and very easy..

You can choose one of those options:

- 4mm Cardboard sheets (cheap)
- KAPA foam boards (cheap)
- aluminum composite panel
- 4mm Plywood sheets

Then apply this [adorable Carbon Fiber Vinyl](#) on the board.

you can use M3/M5 screws to secure the board to the panels.

Tools

- [MUST have: 90 Degree Corner Clamps](#) if you want a good printing results.
- [Cable Cutter](#)
- [SN-28B dupont Crimping Tool](#)
- [Tapping Kit M3,M4,M5,M6 - mainly for the corners holes](#)
- [PTFE Tube Cutter](#)
- [Set Wire Copper Terminal](#)
- [10 pairs JST Plug Male to Female Wire Connector](#) for Dupont wires.
- [dehumidifier \(moisture absorb\) for your dry box](#) The best i have tested in my drybox.
- [Stainless Steel Digital Caliper](#)
- [Set Dupont Wire Jumper Pin Header Connector Housing Kit Male](#)
- [Cable Organizer](#)
- [TS100 Soldering iron \(my favorite\)](#)
- [Belt Tension Meter/gauge - 3d Printed tool](#)

What & How to print

What & How to print

All the parts were designed to be easily printed and most of them would not require support. in order to make it more convenient I added two tools that can help you decide how to print the parts:

- **1. Print Orientation guide** - The image below visualize exactly how you should place all the parts on the build plate. Some of the parts will require support such as the Tensioner idler holder, so pay attention before hitting the start print button. you may notice that on some of the parts has text such as: X90, Y-90.. its the rotation value in order to set the part on the build plate correctly.
- **PDF files/Images** - down below you will find a few sketches of the main components. Each part has his name on with the recommended infill percentage and material to print with.

Common print settings:

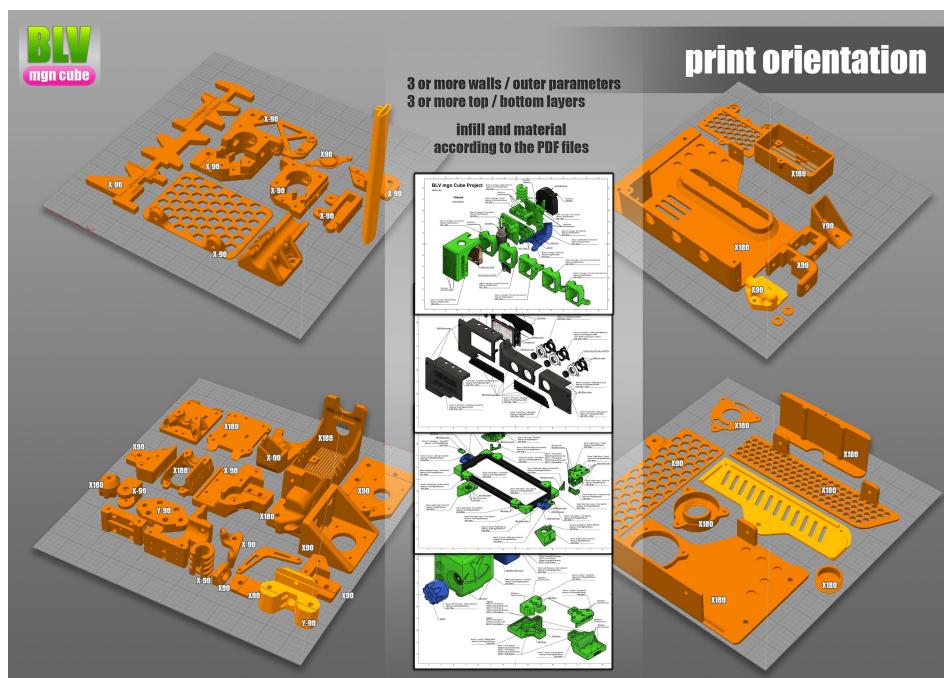
Personally, I would recommend printing all the parts with PETG, especially with parts that located in hot areas (heated bed, hotend..).

Using at least:

3 or more walls/outer parameters

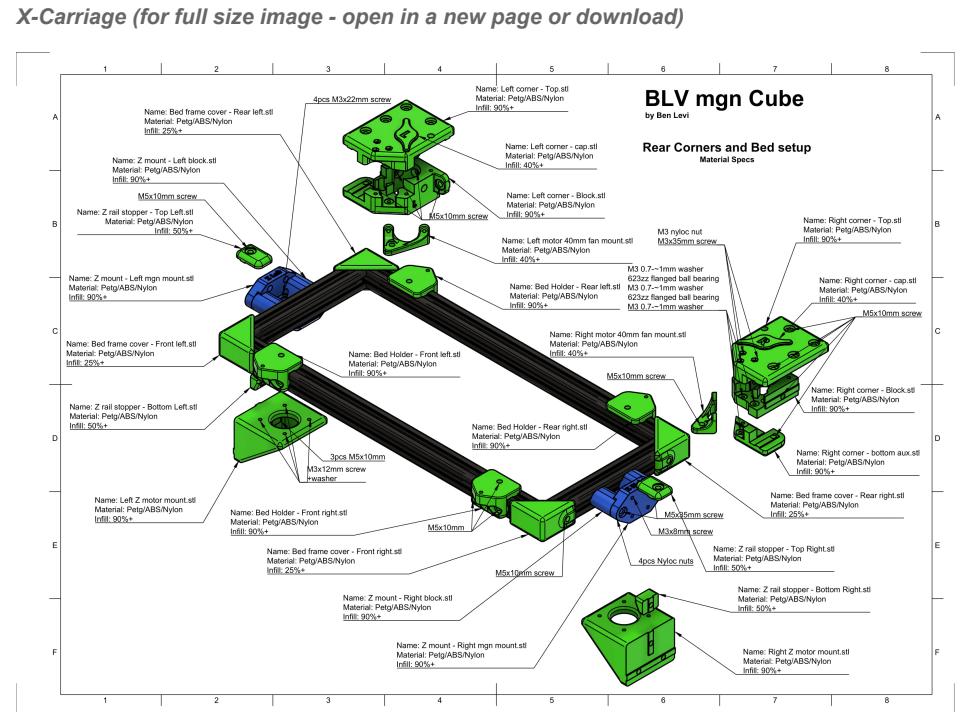
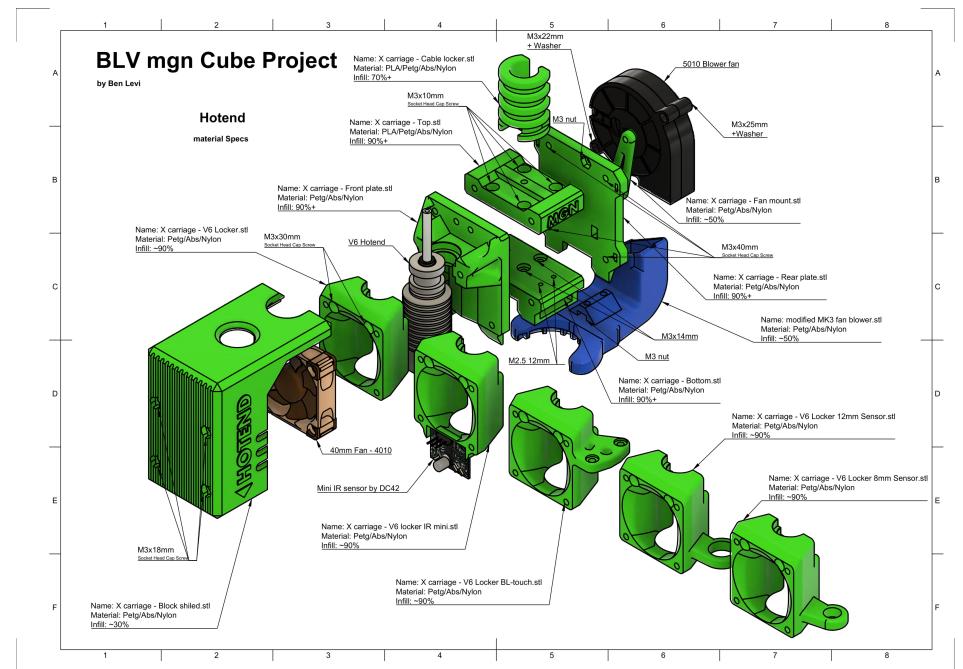
3 or more top/bottom layers

and the recommended infill/material suggested below.

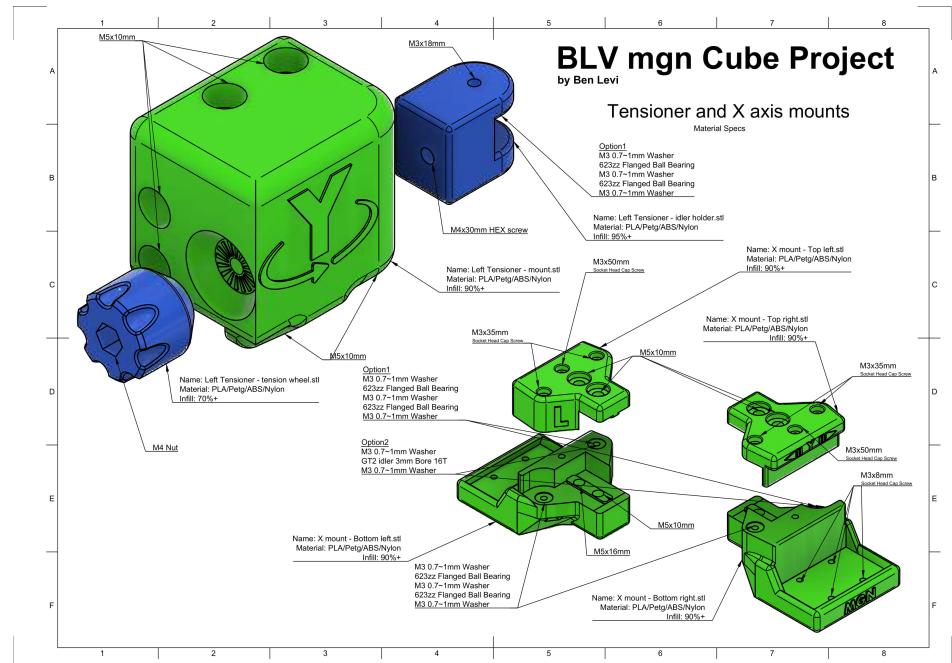


Print Orientation (for full size image - open in a new page or download)

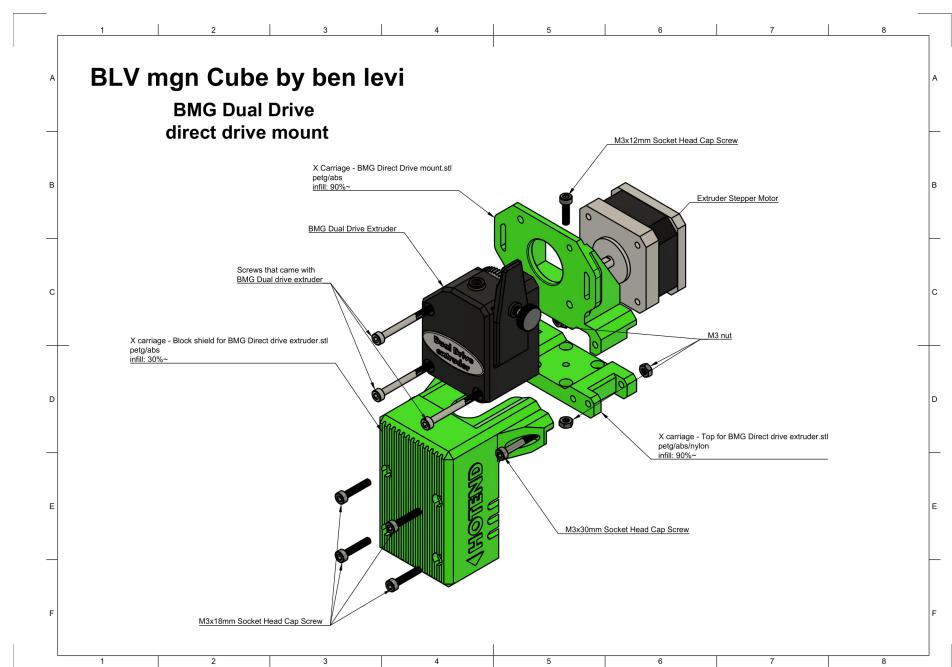
BLV mgn Cube - 3d printer by BLV - Thingiverse



BLV mgn Cube - 3d printer by BLV - Thingiverse

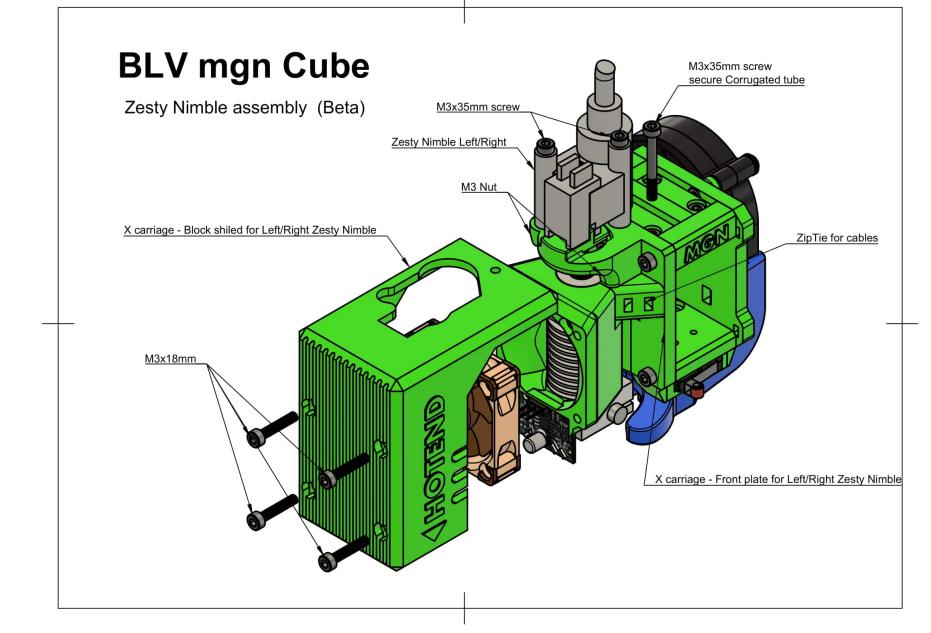


Y axis and Front corner (for full size image - open in a new page or download)

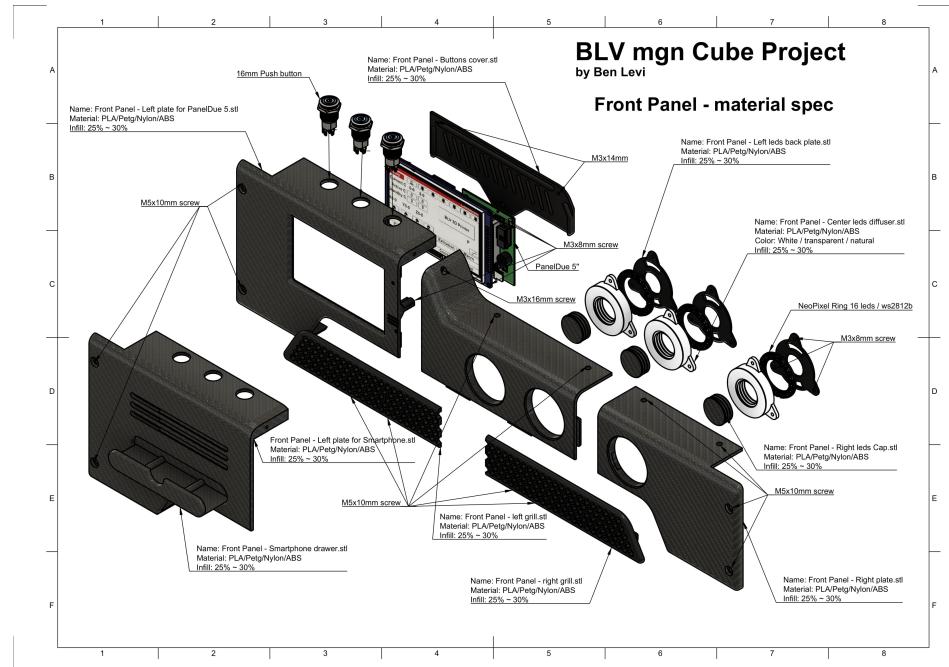


Dual Drive - direct drive mount beta (for full size image - open in a new page or download)

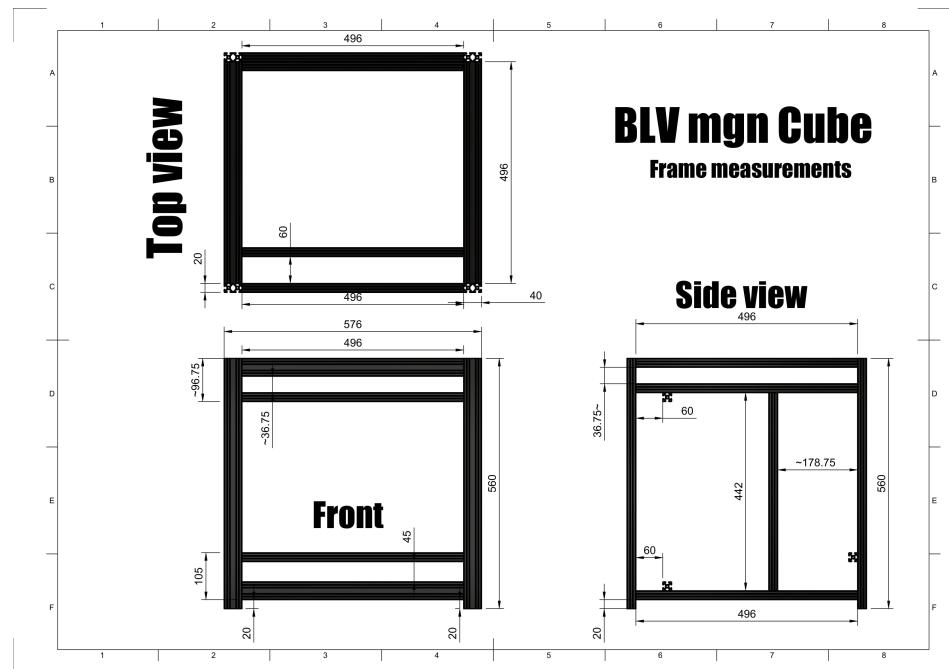




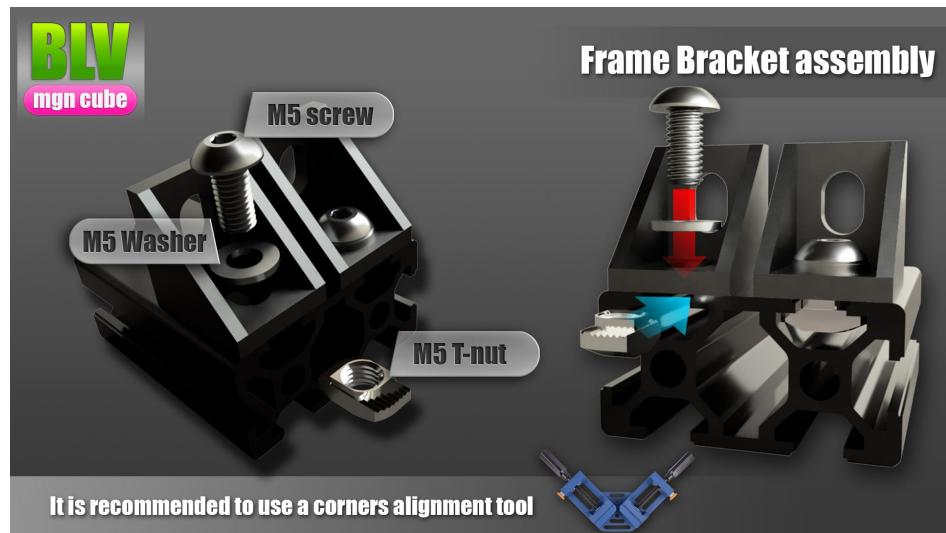
Zesty Nimble assembly - Beta (for full size image - open in a new page or download).
Please notice that you can get an official Zesty nimble remix:
www.thingiverse.com/thing:3606569



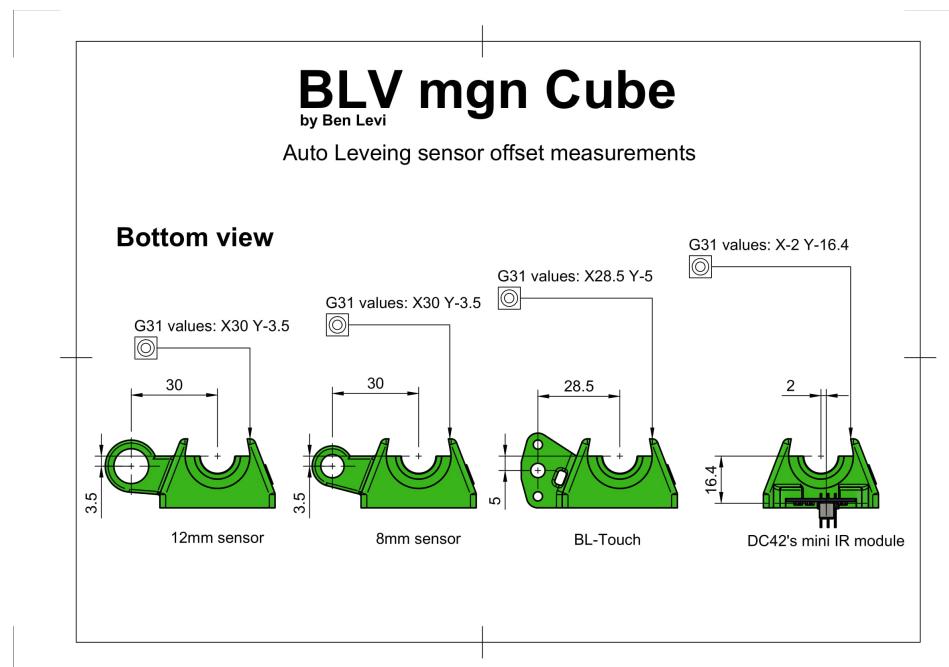
Front Panel (for full size image - open in a new page or download)



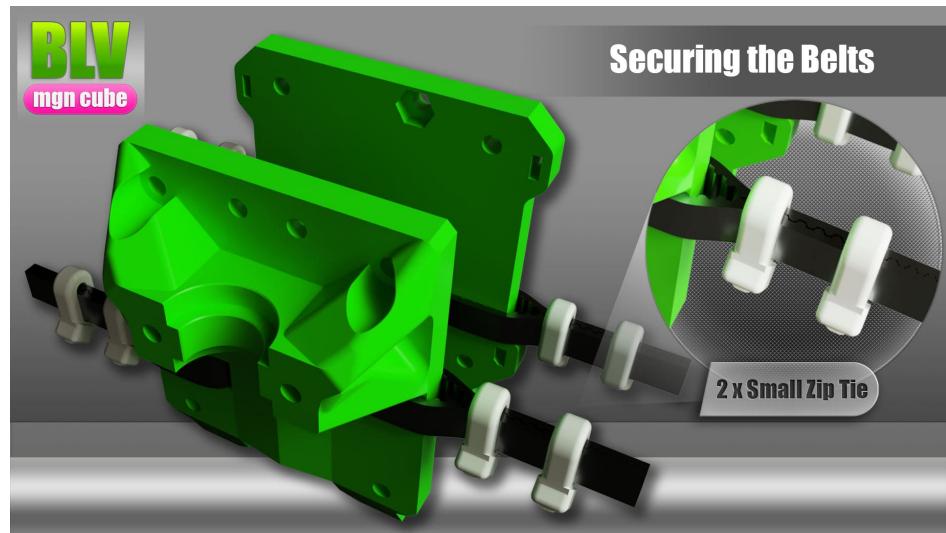
Frame (for full size image - open in a new page or download)



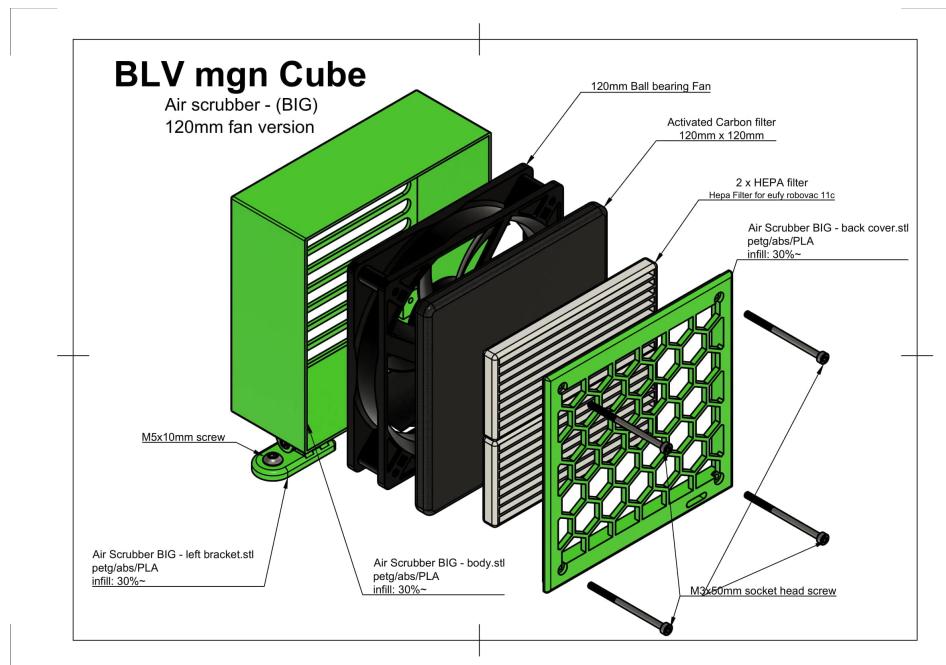
Frame bracket assembly (for full size image - open in a new page or download)



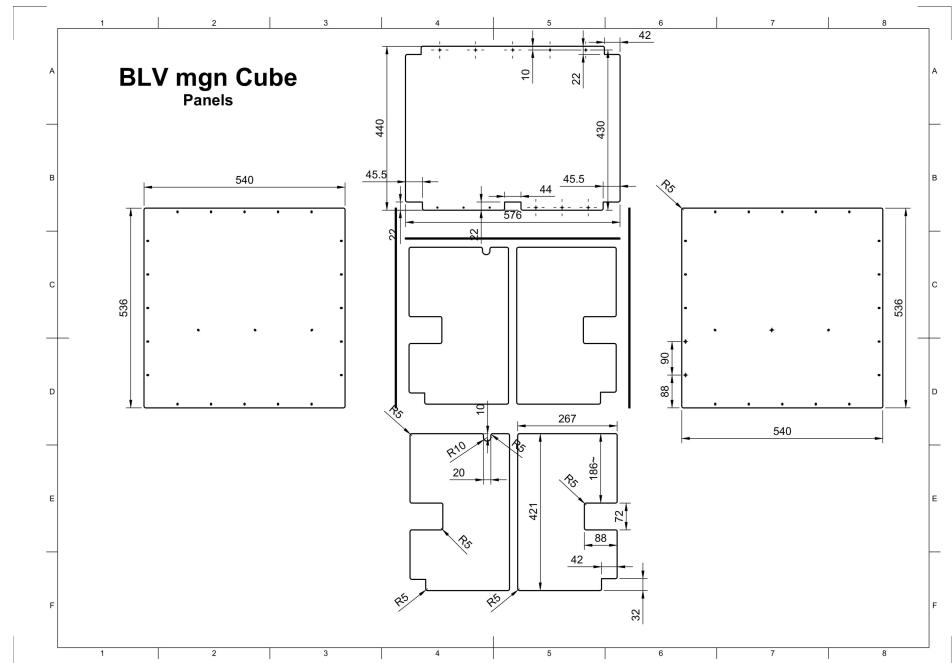
Hotend offsets (for full size image - open in a new page or download)



New twin 4010 blower fan option!



Air scrubber BIG version (for full size image - open in a new page or download)



Panels / Walls dimensions (for full size image - open in a new page or download)

Assembly instructions

Assembly instructions

Assembly instructions

BLV mgn Cube - Front Panel assembly



BLV mgn Cube - Front belt tensioner assembly**BLV mgn Cube - Frame assembly**

Note: The most recent frame version can be found here: <https://a360.co/2DDDBn4>

BLV mgn Cube - 3D printer frame overview

Note: The most recent frame version can be found here: <https://a360.co/2DDDBn4>

BLV mgn Cube - X carriage assembly

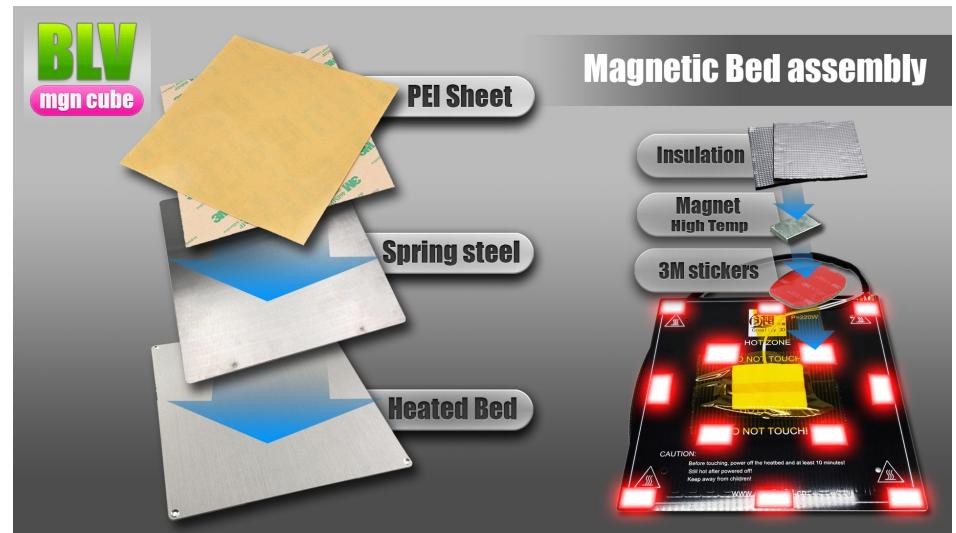


BLV mgn Cube - Y axis assembly

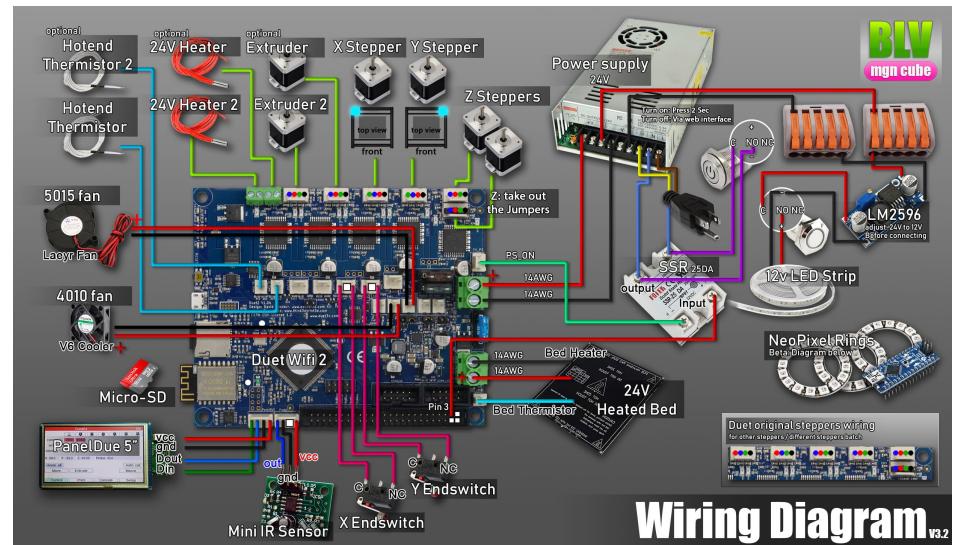


BLV mgn Cube - Z axis assembly

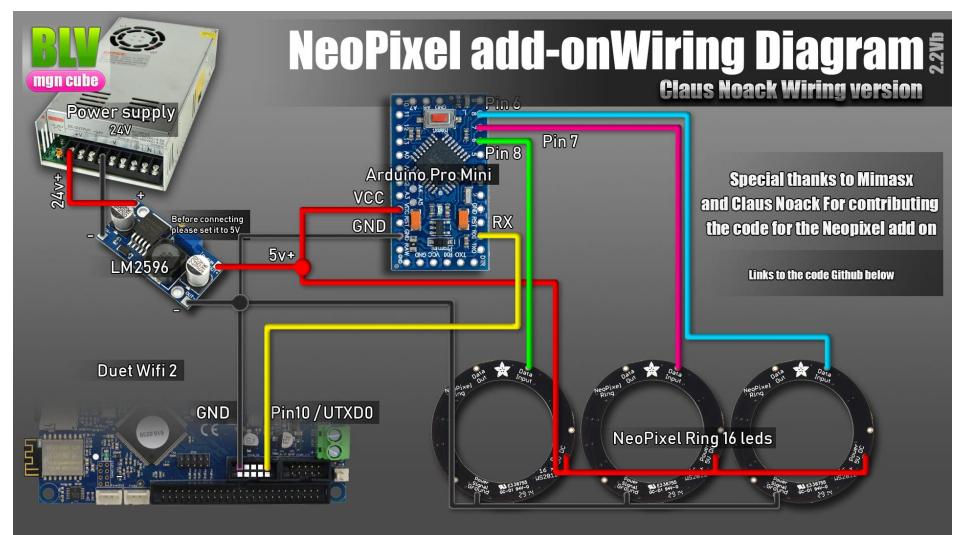




If you choose to get the magnetic sheet - you don't need the magnets.



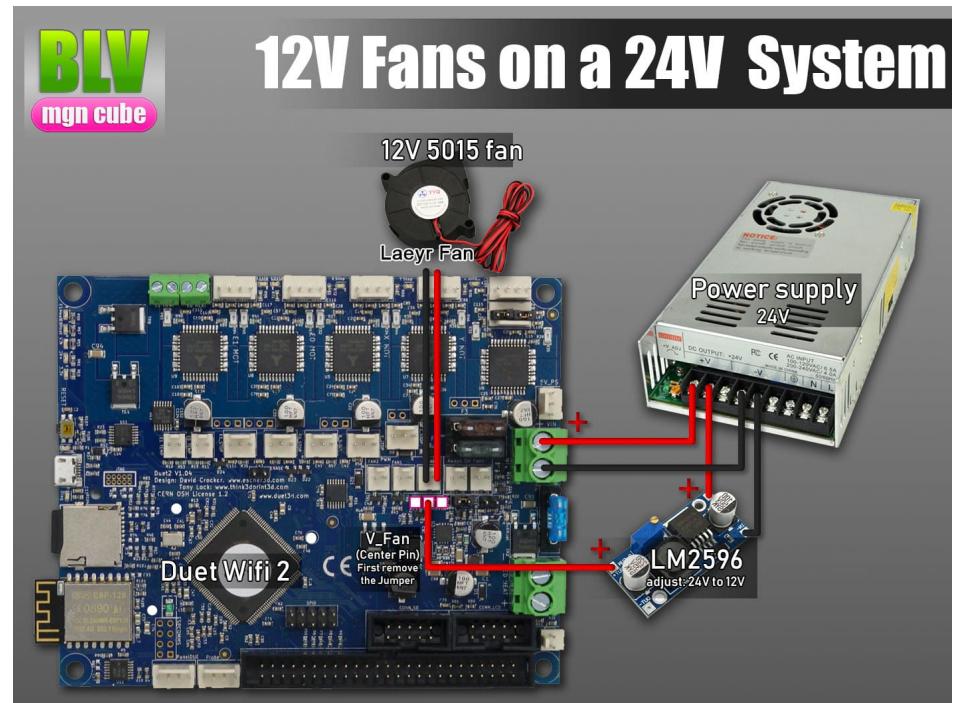
Wiring Diagram V3.2 (for full size image: open in a new page)



Arduino NeoPixel Wiring Diagram V2.2b (for full size image: open in a new page)

NeoPixel rings add-on arduino code source:

- [Most recent Arduino code by Claus Noack - Confirmed working!](#)
- [First alpha version By Mimasx](#)



If ALL of your fans are 12V instead of 24v - this is the correct way to connect them.



If you have decided to use other brands or got different stepper motors batch:

1. Identify the coils/phases wires

your stepper has 4 wires - 2 for each one of the coils/phase and you need to identify the pairs. [click here for a quick guide for identifying the wires](#)
you can watch this video also: youtube.com/watch?v=S0pGKgos498

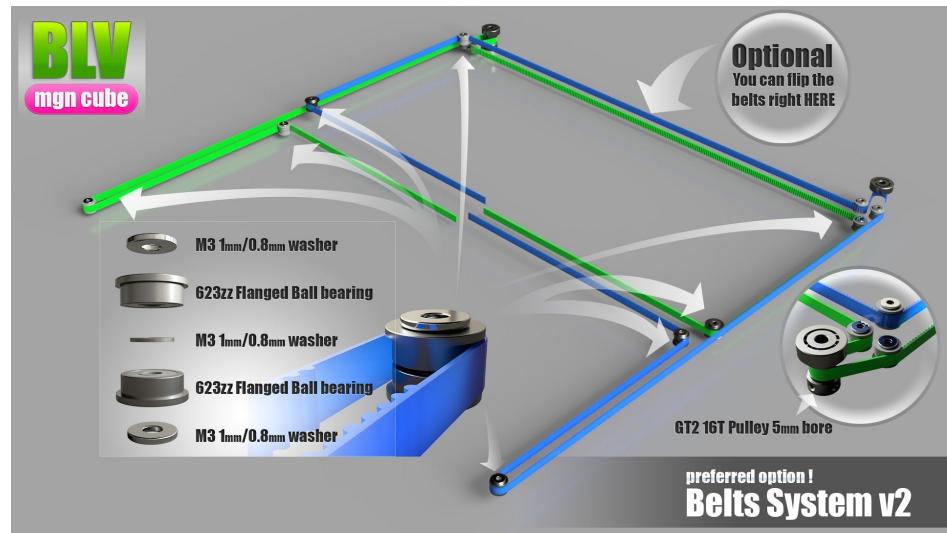
2. Connect your steppers Please use the original Duet steppers wiring while connecting the steppers. you can find it in the right button corner of the Wiring Diagram v3.2 (under the text headline: "Duet original steppers wiring")

3. Test and configure the steppers according to [Duet documentation](#)

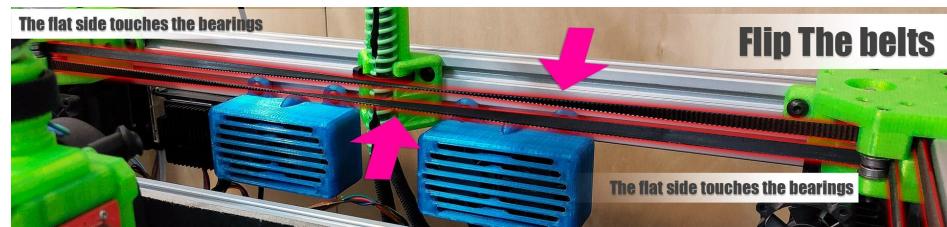
I uploaded a video that demonstrates the expected movements for the commands from the Duet guide:

BLV mgn Cube 3D printer - Steppers Test

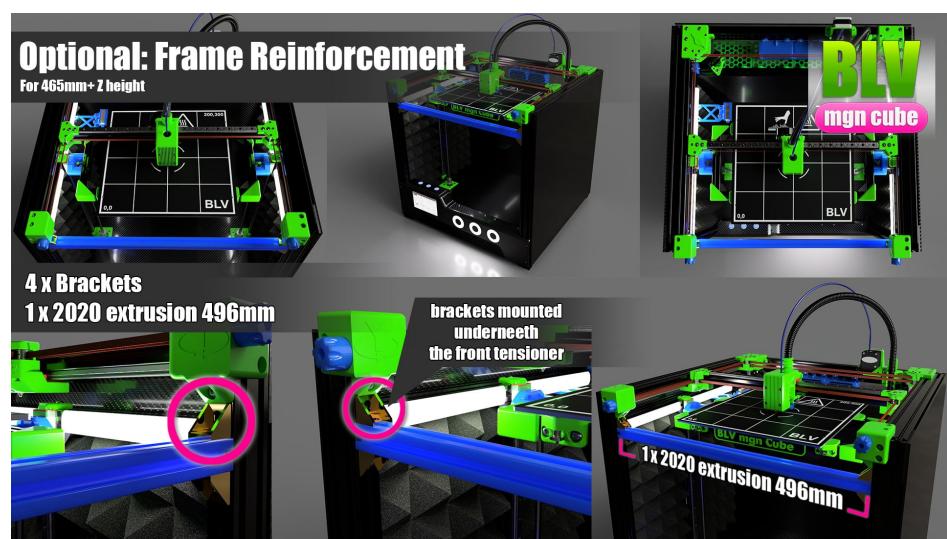




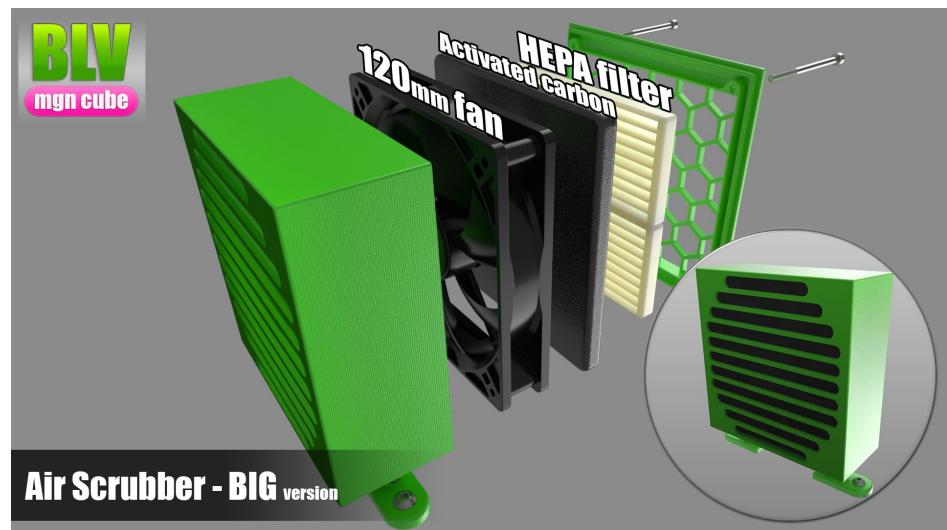
Belts system: I prefer this option + flipping the belts (for full size image - open in a new page or download)



Please flip the belts on the rear, so that only the Belt's flat side will touch the bearings.

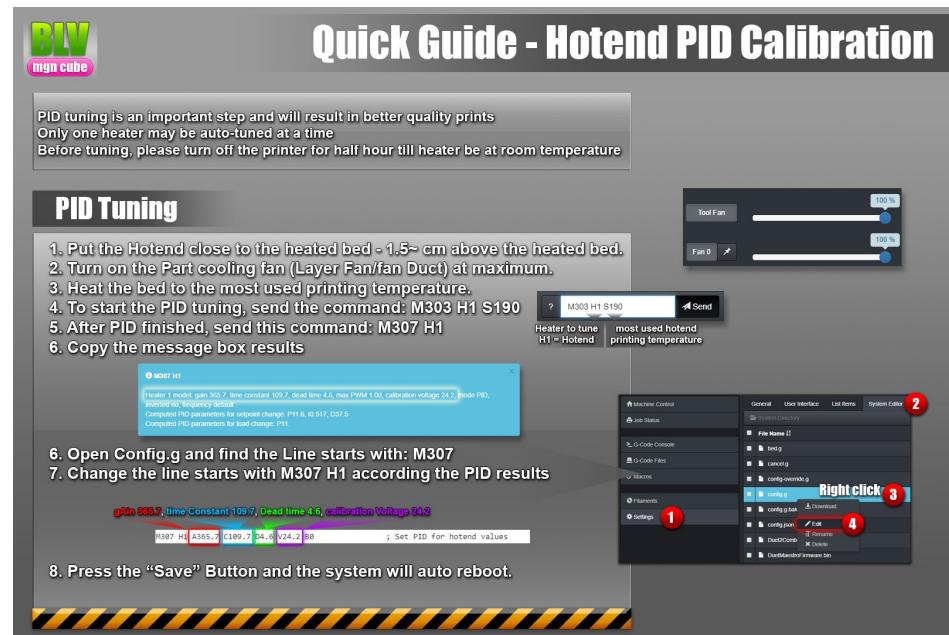


Optional: recommended Frame Reinforcement for higher z-axis (465mm+) (for full size image - open in a new page or download)

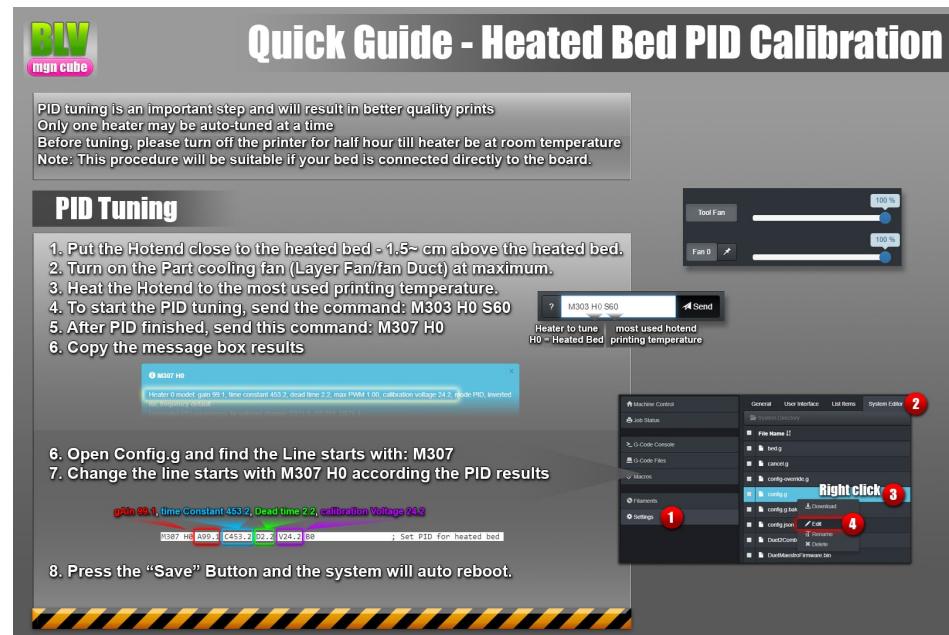




Calibrating Z height for IR-mini Sensor (for full size image - open in a new page or download)



Hotend PID Tuning (for full size image - open in a new page or download)



Heated Bed PID Tuning (for full size image - open in a new page or download)

rails

IMPORTANT

fixing the mgn rails can be very frustrating. it need to be perfectly aligned and straight. else, it will give you a headache, so don't start this project without tons of patience.

Additional Notes

For those who have Trianglelab Hotend

This section is relevant for those who got the [Trianglelab Hotend from here](#).

Since it's using a different kind of thermistor, you would need to make a small change in the firmware, otherwise, your hotend temperature will not be accurate.

The change can be done in two ways:

1. by entering to the Duet web interface > Settings > System Editor > right click on "config.g" and choose "Edit".
2. Opening the config.g file manually located in "sys" folder inside the Duet SD card.

Find the raw:

M305 P1 T100000 B3950 C0 R4700

and replace it with:

M305 P1 T100000 B4725 C0.0000000706 R4700

Save, reboot and you are good to go.

MGN12 rails & Carriages extra info

MGN12H rails & Carriages extra info

Well, i used a [cheap Chinese mgn12H rails from aliexpress](#) cost 18\$ each.

After buying from 4 different Aliexpress sellers i found [the best rails sold here, at "CNA Mechanical Parts Store" store](#).

I even not needed to clean the rails! The block is sliding smoothly without the need to clean it. Wonderful rails, highly recommended!

Please be careful and DO NOT buy rails from: "RDC Official Store" nor "linkcnc Store" at Aliexpress. "linkcnc Store" sold me an awful rails which was used, damaged and shorter than what i ordered. even after cleaning and lubricating it was still stuck and jammed "RDC Official Store" started to ship mgn blocks with non mgn standard size, so i can no longer recommend on him.

Cleaning and lubricating

notice that the mgn rails you'll get will not be smooth as it should be.

at the factory, they lubricate it with a protecting oil that needs to be cleaned away. There are some videos on YouTube showing how to clean the carriage with WD-40.

Don't forget after cleaning both rails and carriage to lubricate it with sewing machine oil or Teflon silicone grease.

As for smoothness: Please ignore the method for testing smoothness by tilting the rail - its wrong! You want it to be smooth but not too much.

Also, since its miniature rails, please don't use too thick grease for lubrication.

Additional links

Cleaning mgn12H carriage video:

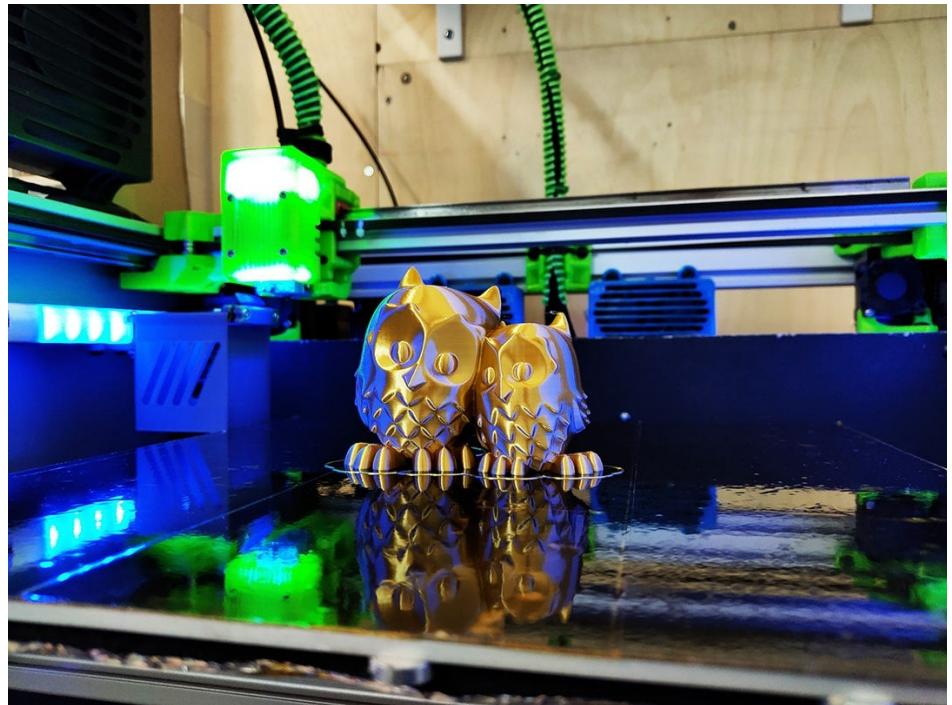
youtube.com/watch?v=c53sa46C1qQ

it's a pretty good video. just **use a container in order not to lose steel balls**

note: after assembling all steel balls, you will be left with empty space of one steel ball.

samples

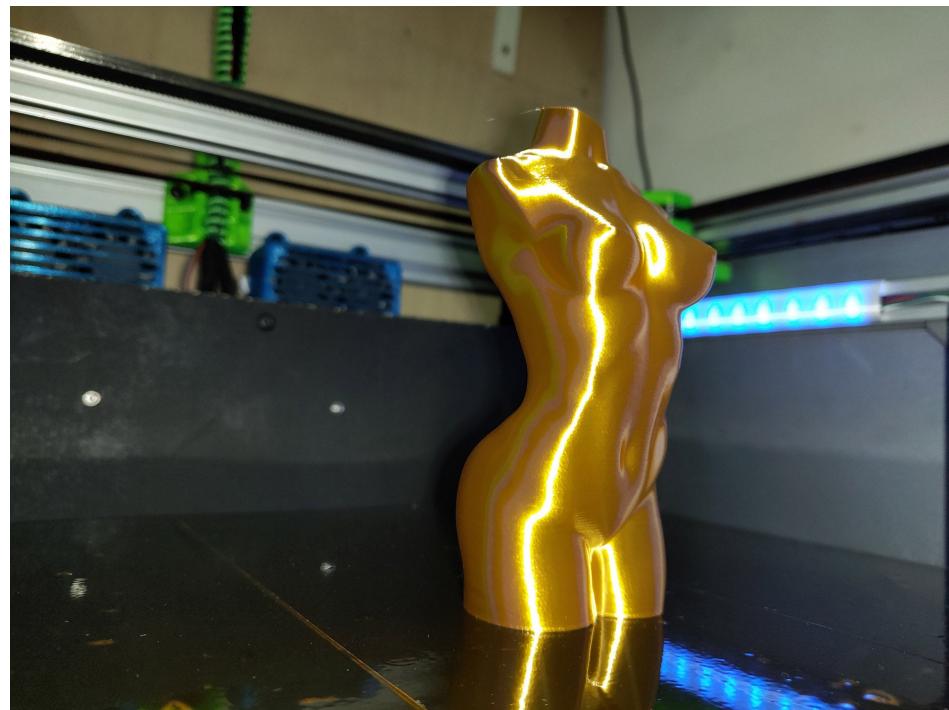
BLV mgn Cube 3D Printer - Sample



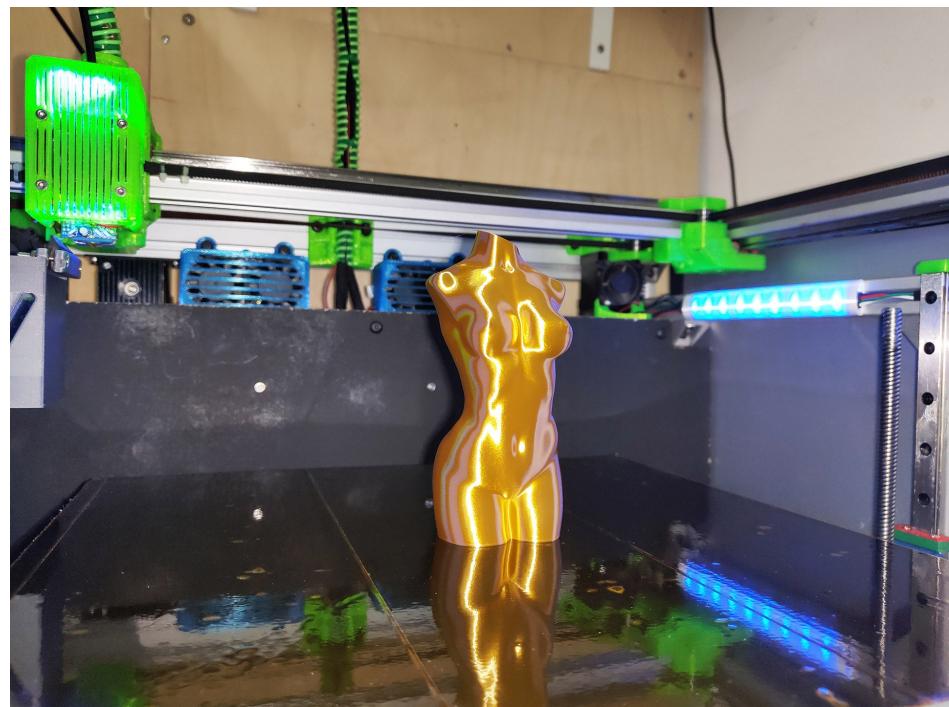
printed at 60mm/s (Simplify3D) Gold Filament

BLV mgn Cube 3D printer - Printing Sample





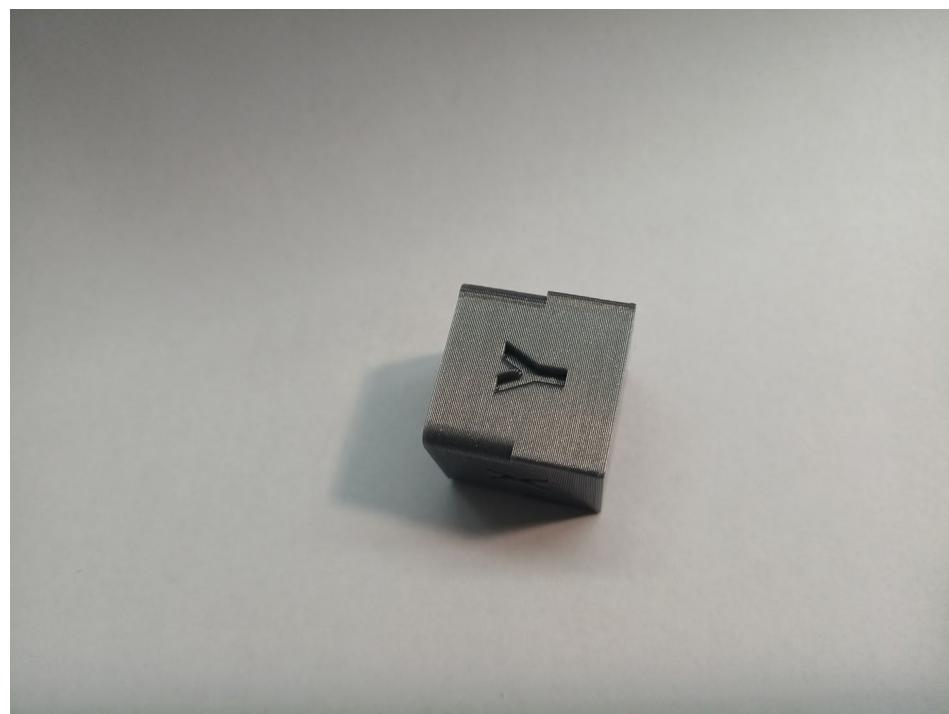
printed at 60mm/s (Simplify3D) Printed with Gold Silk PLA (link in the BOM)



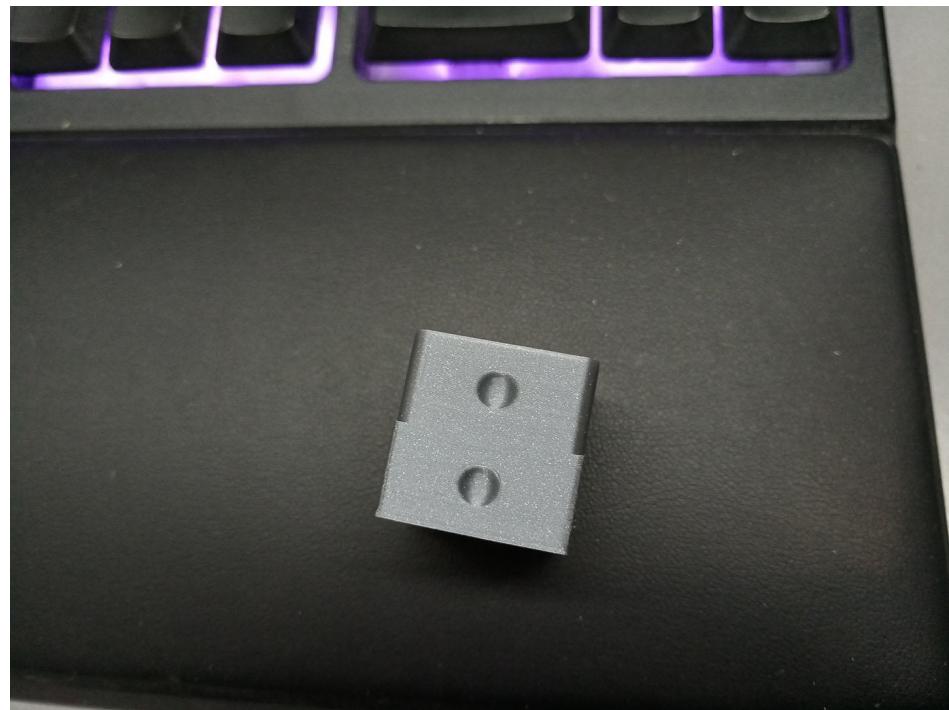
printed at 60mm/s (Simplify3D) Printed with Gold Silk PLA (link in the BOM)



printed at 60mm/s (Simplify3D)

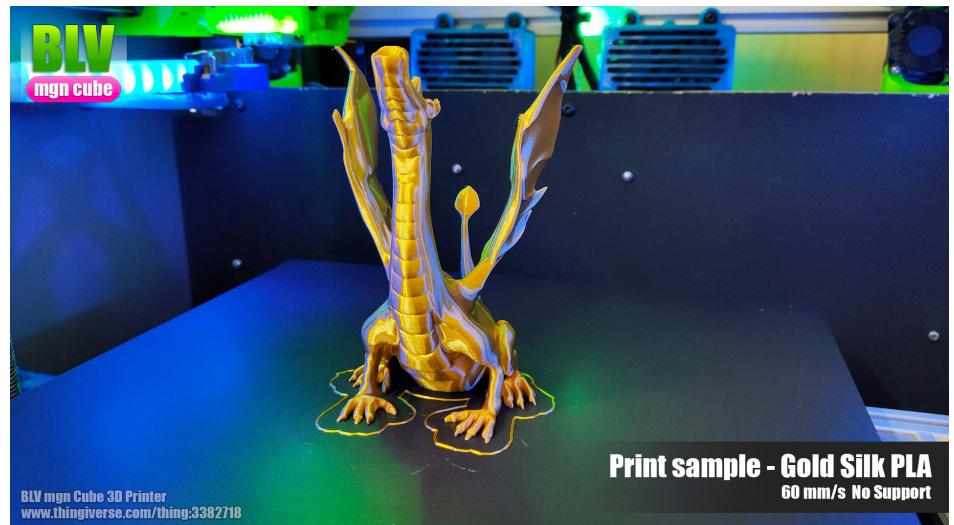


printed at 100mm/s (Simplify3D)

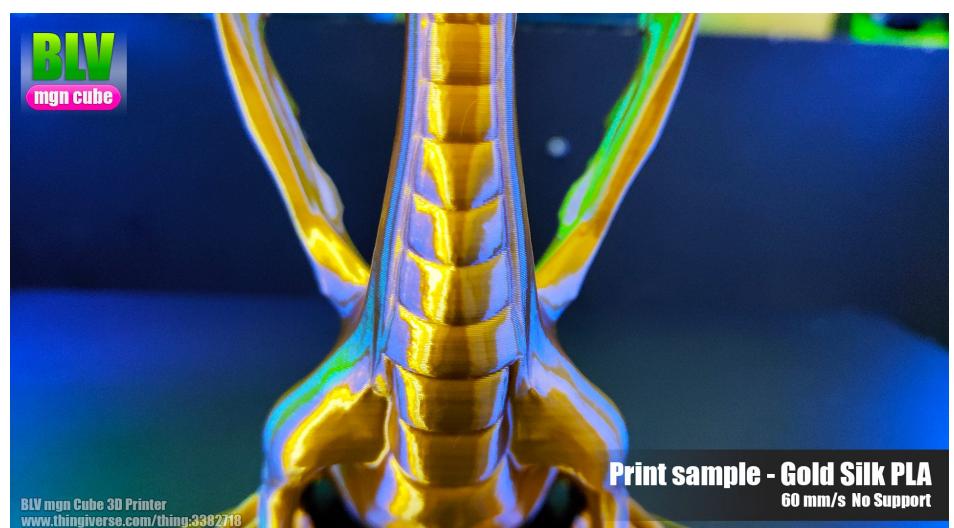


printed at 80mm/s (Simplify3D)

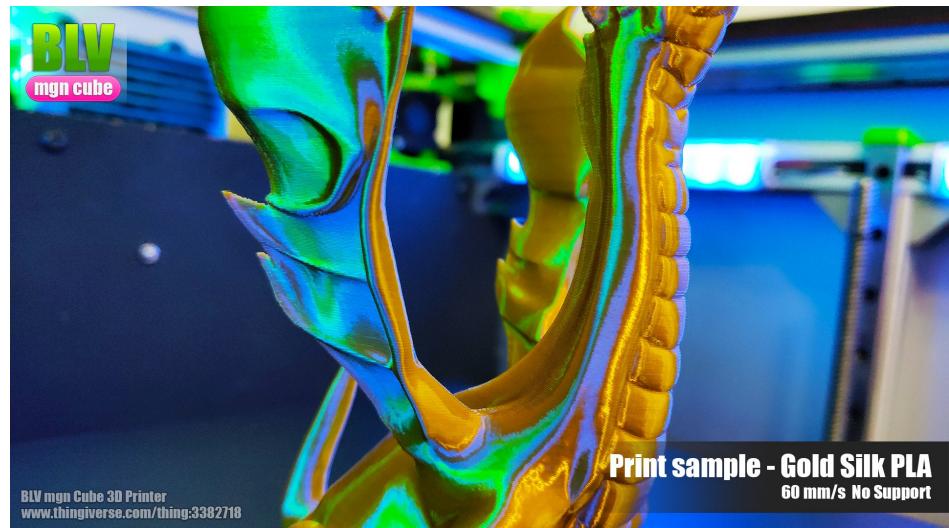
BLV mgn Cube 3d printer - printing with Gold Silk PLA



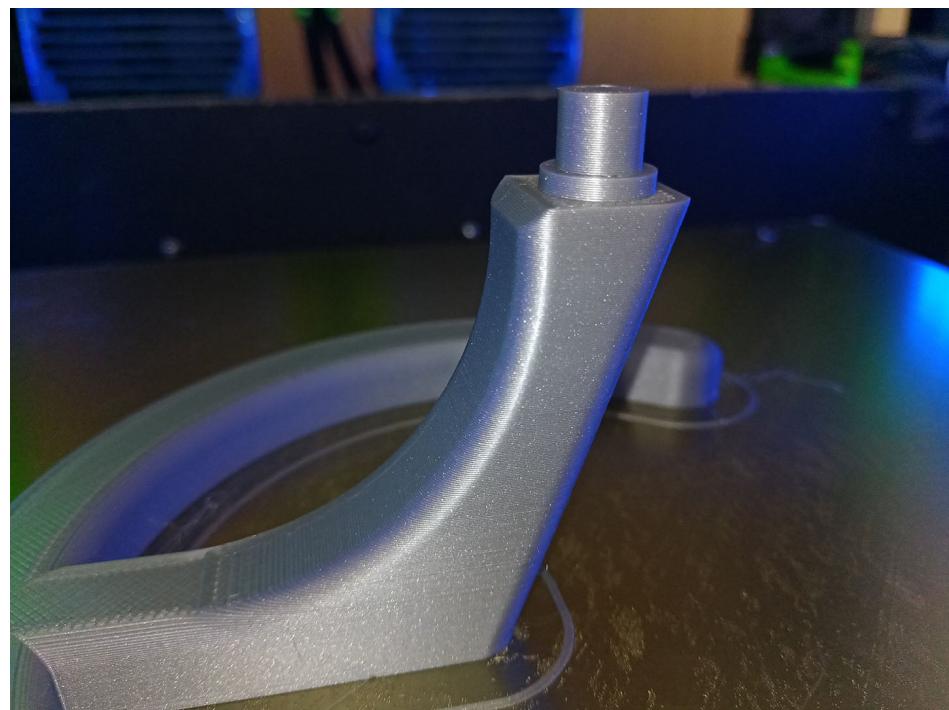
printed at 60mm/s (Simplify3D)



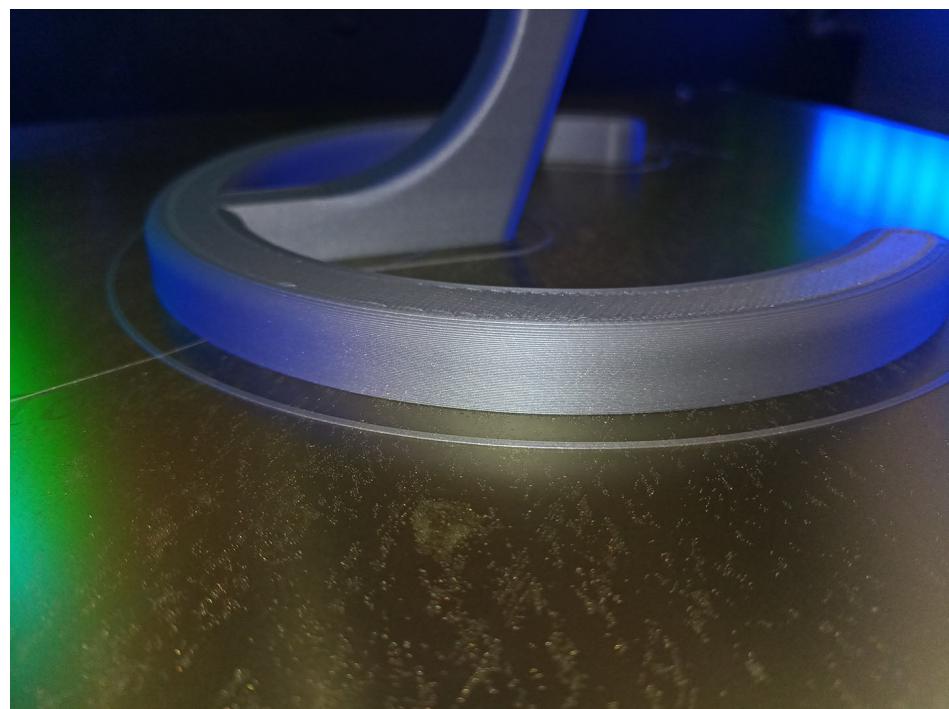
printed at 60mm/s (Simplify3D)

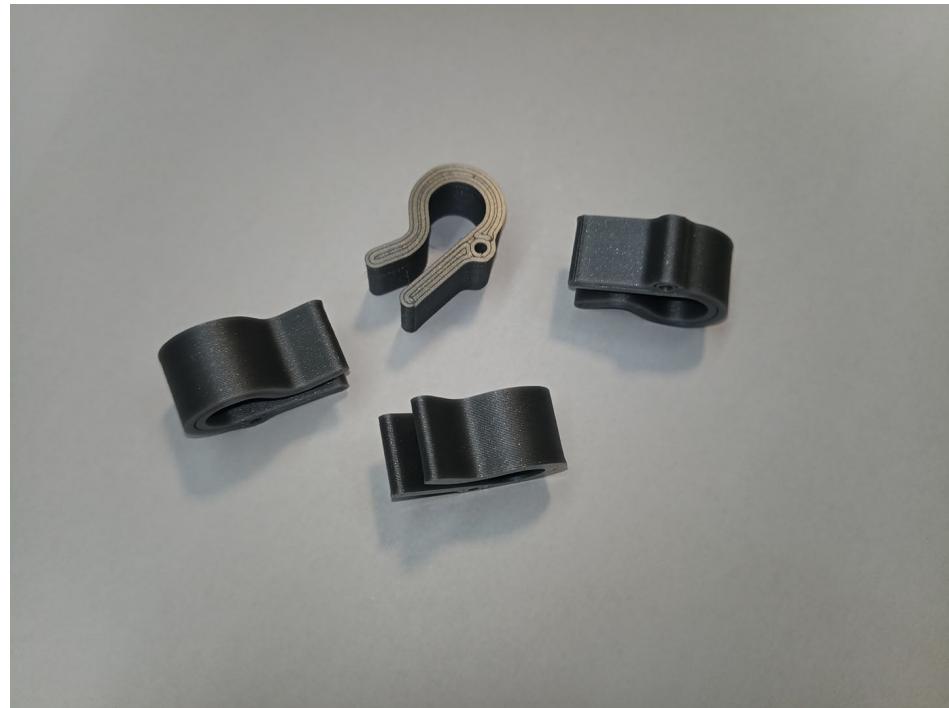


printed at 60mm/s (Simplify3D)



printed at 80mm/s (Simplify3D)





printed at 100mm/s (Simplify3D)



printed at 100mm/s (Simplify3D)

Info & Links

- [DuetWifi documentation](#)
- [Duet Web interface](#)
- [Mini IR sensor by DC42](#)
- [CoreXY - Calibrating motion directions for X/Y steppers](#)
- [DuetWifi electronics scheme](#)
- [Duet board forum](#)
- [Dux5 expansion board](#)
- [Changing the sensor to PT100 info](#)
- [Connecting other Z sensors](#)

Small request: In order to make all the information concentrated in one place, I would like to ask you to use the Thingiverse forum for this project and comments. unlike facebook - in here you can find answers more easily for common and repeated questions.

Thanks and Tip

Special Thanks

Special Thanks to:

- I want to give heartfelt thanks to my lovely wife for encouraging and supporting me throughout the project.
- Huge thanks and appreciation for Tim from [Filastruder.com](#) for supporting this project and many more! ([you can read more about it here](#))
- This great community for making this place my second home :) Thank you!

Tip

There are no conditions other than the license terms.

You don't have to, but if you insist a [small donation will be greatly appreciated](#).

Thank you :)

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