S.C. FORMWERK S.R.L.

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BE SMART ≡ MAKE 3D

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SC FORMWERK SRL

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Administrator

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Date: 2021.05.12 13:46:33 +03'00'

Duplication Mode

Use both extruders in synchronized printing, doubling production capabilities.

Website: www.raise3d.com

Sales: sales@raise3d.com

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RAISE3D E2

Precise, Robust, Open

An industrial-grade desktop 3D printer
available for students to understand and overcome
the new challenges of Manufacturing.

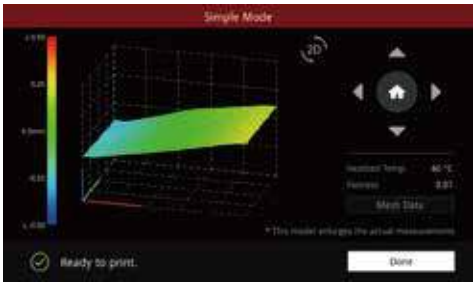
IDEX
Independent Dual Extruders

Mirror Mode

Produce 3D models and their inverse simultaneously, increasing productivity in industries like Footwear.

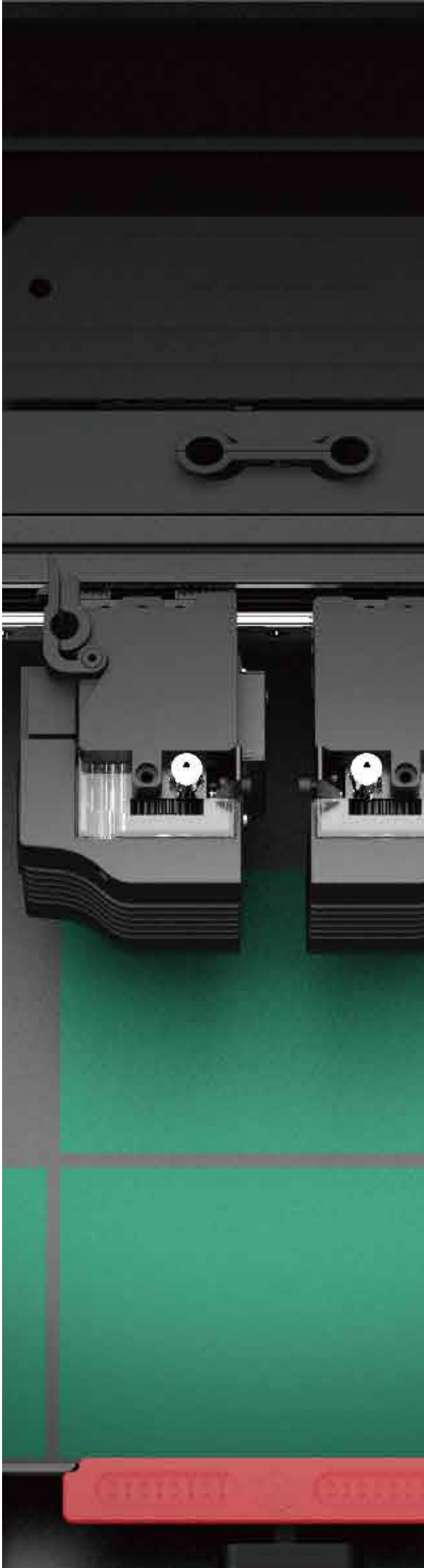
Auto Bed Leveling

Automatic leveling guarantees quality prints on a solid foundation, reducing the need for rafts and contributing to effortless post-processing.



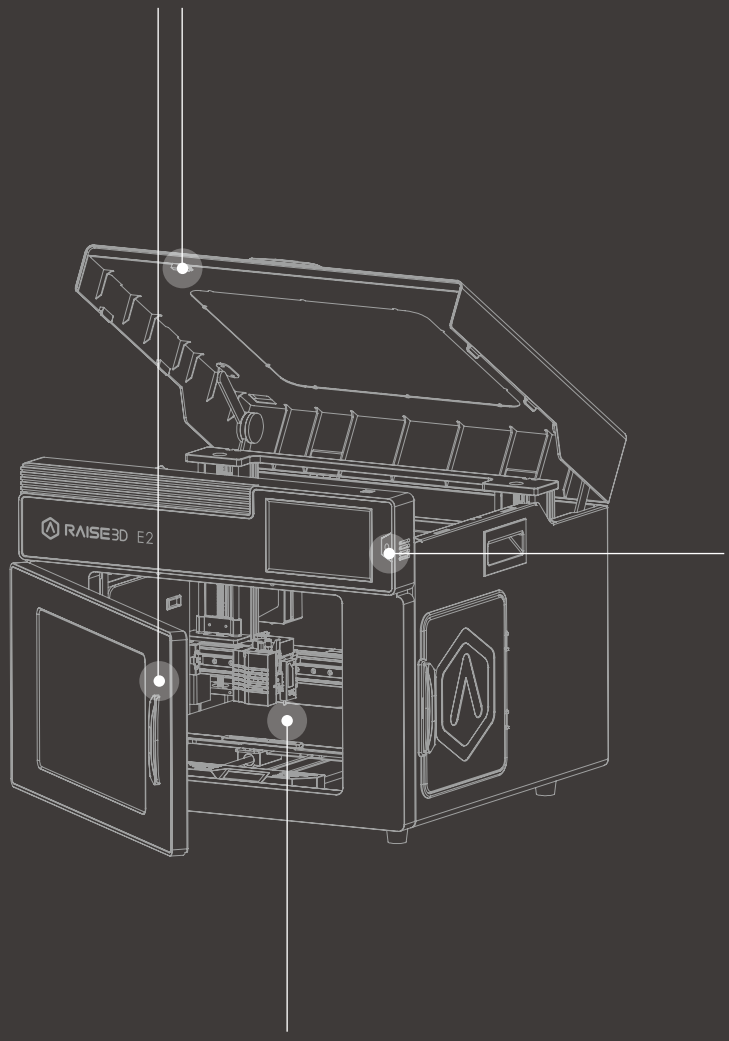
Assisted Offset Calibration

Easily remove prints from the flexible build plate, with proven durability over 5,000 prints.



Safety Mode

Opening a door is detected automatically, immediately pausing the print, keeping users safe and ensuring prints aren't accidentally damaged.



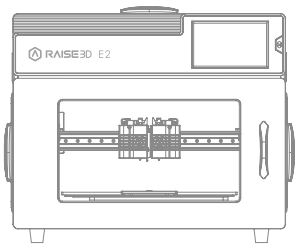
Power Saving Button

Turn off the RaiseTouch and LED lights to save energy and still print through the night continuously.

Flexible Build Plate

Easily remove prints from the flexible build plate, with proven durability over 5,000 prints.

Technical Specifications



ITEM	E2	
CONSTRUCTION	Build Volume (W×D×H)	
	Single Extruder Print	Dual Extruder Print
	13×9.4×9.4 inch / 330×240×240 mm	11.6×9.4×9.4 inch / 295×240×240 mm
	Machine Size (W×D×H)	
	23.9×23.5×18.3 inch / 607×596×465 mm	
ELECTRICAL	Power Supply Input	100-240 V AC, 50/60 Hz 230 V @ 2 A
	Power Supply Output	24 V DC, 350 W
PRINTER	Print Technology	FFF
	Motion System	Independent Dual Extruders
	Filament Diameter	1.75 mm
	XYZ Step Size	0.78125, 0.78125, 0.15625 micron
	Print Head Travel Speed	30 - 150 mm/s
	Build Plate	Flexible Steel Plate with Buildtak
	Max Build Plate Temperature	110 ºC
	Heated Bed Material	Silicone
	Build Plate Leveling	Mesh-leveling with Flatness Detection
	Supported Materials	PLA/ ABS/ HIPS/ PC/ TPU/ TPE/ NYLON/ PETG/ ASA/ PP/ PVA/ Glass Fiber Infused/ Carbon Fiber Infused/ Metal Fill/ Wood Fill
	Nozzle Diameter	0.4 mm (Default), 0.2/ 0.6/ 0.8/ 1.0 mm (Available)
	Hotend	V3P (V3 hotend with PTFE version)
	Max Nozzle Temperature	300 ºC
	Connectivity	Wi-Fi, LAN, USB port, Live camera
	Noise Emission (Acoustic)	< 50 dB(A) when building
	Operating Ambient Temperature	15 - 30 °C, 10 - 90% RH non-condensing
	Storage Temperature	-25 °C to +55 °C, 10 - 90% RH non-condensing
	Technical Certifications	CB, CE, FCC, RoHS
SOFTWARE	Slicing Software	ideaMaker
	Supported File Types	STL/ OBJ/ 3MF
	Supported OS	WINDOWS/ macOS/ LINUX
	Machine Code Type	GCODE
PRINTER CONTROLLER	User Interface	7-inch Touch Screen
	Network	Wi-Fi, Ethernet
	Resume Print after Power Outage	Firmware recording, no need for battery installation. Protection from any condition.
	Screen Resolution	1024*600
	Motion Controller	ATM Cortex M7.400MHZ FPU
	Logic Controller	NXP ARM C ortex-A9 Quard 1 GHz1GB
	Memory	1 GB
	Onboard Flash	8 GB
	OS	Embedded Linux
	Ports	USB 2.0*2, Ethernet*1

E2 in Education

Raise3D makes its new industrial-grade 3D printer available to Education.

With improved usability and safety features, the E2 can help all students unleash their innovative mindsets.

The access to the highest standards in FFF technology can further benefit technical students who can explore the E2 to understand and learn how to overcome the new challenges of Manufacturing.

Raise3D E2 Review

 Posted on December 3, 2020 by Al Dean

Raise3D has built its reputation on high-quality, larger capacity desktop filament machines. With two independent extruders supporting some interesting workflows, the new E2 looks set to extend the company's solid track record, as Al Dean reports

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A decade or so on from its initial explosion, the desktop filament-based 3D printer market is still going strong.

While unit sales may have slowed since that early peak, there's been no slacking in the number of new manufacturers or machines entering the market.

For buyers, the upshot is that, regardless of budget, they can find a machine that will let them build parts from spools of plastic filament, right there on the desktop. And that's true whether they spend £100 on an open-frame machine, or thousands on a fully enclosed, fully automated device.

Based in China, with marketing activities based in the US, Raise3D has built a reputation on offering larger capacity machines with an enclosed build environment and smart sensors to help with tasks such as bed levelling and filament control.

On loan to us from the folks at 3DGBire, its latest E2 machine continues the trend, but comes with some fancy new tricks up its sleeve.

Raise3D E2 – Getting ready to print

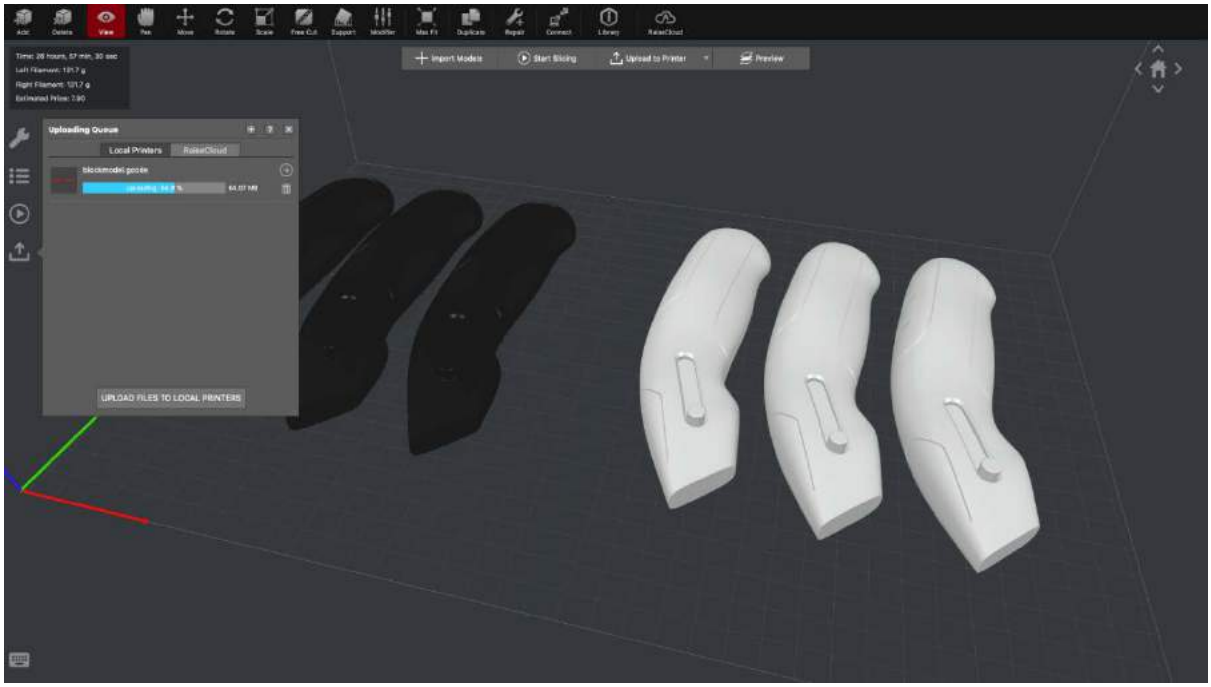
The E2 is an impressively robust unit. It weighs in at 35kg, so while one person may be able to lift it, two might be better.

Once out of the box, it's time to set it up and get ready to print. As you can see from the images, a vertical hinge-front door gives access to the build plate, but there's also a top-hinged lid, too. To the left and right, you'll see the filament bays and two extruders.

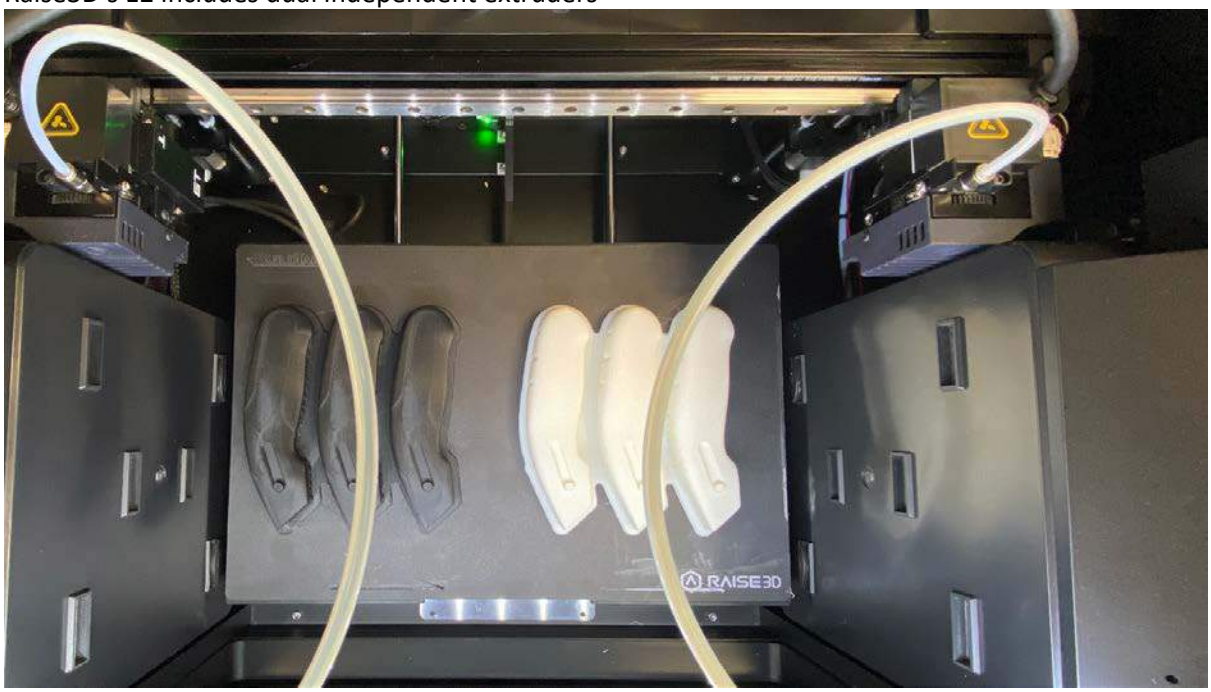
Set-up is pretty easy: unpack the unit, plug it in, then follow the instructions shown on the built-in LCD touchscreen on the front of the machine. Connectivity is via WiFi, Ethernet or USB and there's an on-board camera for monitoring your build.

You can also opt to connect the machine to Raise3D's RaiseCloud service. This provides access to machine monitoring without access to the physical network.

In terms of calibration, the E2's marketing materials make a fair bit of noise about what they describe as the "world's first videoassisted calibration". The reality is that the touchscreen displays explanatory videos to guide you through the process.



Raise3D's E2 includes dual independent extruders



Two sets of parts, built in two colours at the same time

It's a nice use of the display, certainly, but it may be a bit of a stretch to call it "video-assisted". That said, the vital step of calibration on this machine is performed easily enough.

Before we get on to the ins and outs of actually building parts, we need first to discuss the configuration of the mechanism inside the machine, and specifically, its extruders.

The E2 uses a technology that Raise3D calls IDEX, or independent extruders.

Dual-extruder machines are commonplace enough, but whereas most typically offer a single carriage featuring two extruders, the E2's two build nozzles are able to move independently on the X-axis – but only the X axis. So what does this mean in reality?

The answer is, it depends on what you're building. If you're running with a single build material and a support or, indeed, two build materials, then the difference is negligible. The machine builds with one extruder, then switches to the other, just as other dual extruder machines do.

It's when you activate duplicate or mirror mode that things start to get interesting.

Since the extruders are two separate units on the same X axis, if you want to build with both at the same time, then you need to have toolpaths that can drive all of the axes in the same motion, at same time, hence duplicate and mirror modes.

Duplicate mode forces the right extruder to replicate the movement of the left, but offset on the right-hand side of the build plate. If you're familiar with a pantograph, it's the same principle.

In terms of usefulness, if you're looking to build duplicates of the same part, then you can effectively split the job across the central line and have both extruders working in unison, effectively halving production time.

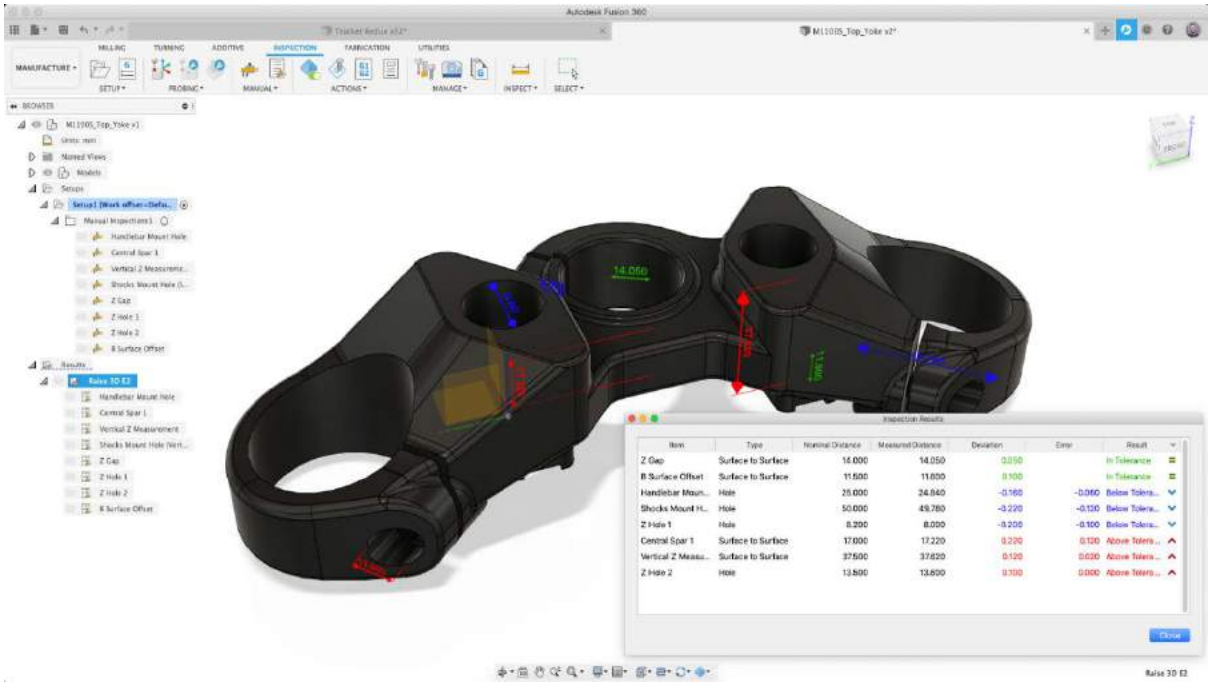
This is pretty easy to set up. Switching the set-up software into duplicate mode splits the virtual build platform and anything you do on the left side gets copied across the centre plane.

It allows you to work with different coloured materials, too. Note that while you can vary colour, you need to have matching build parameters between the two materials.

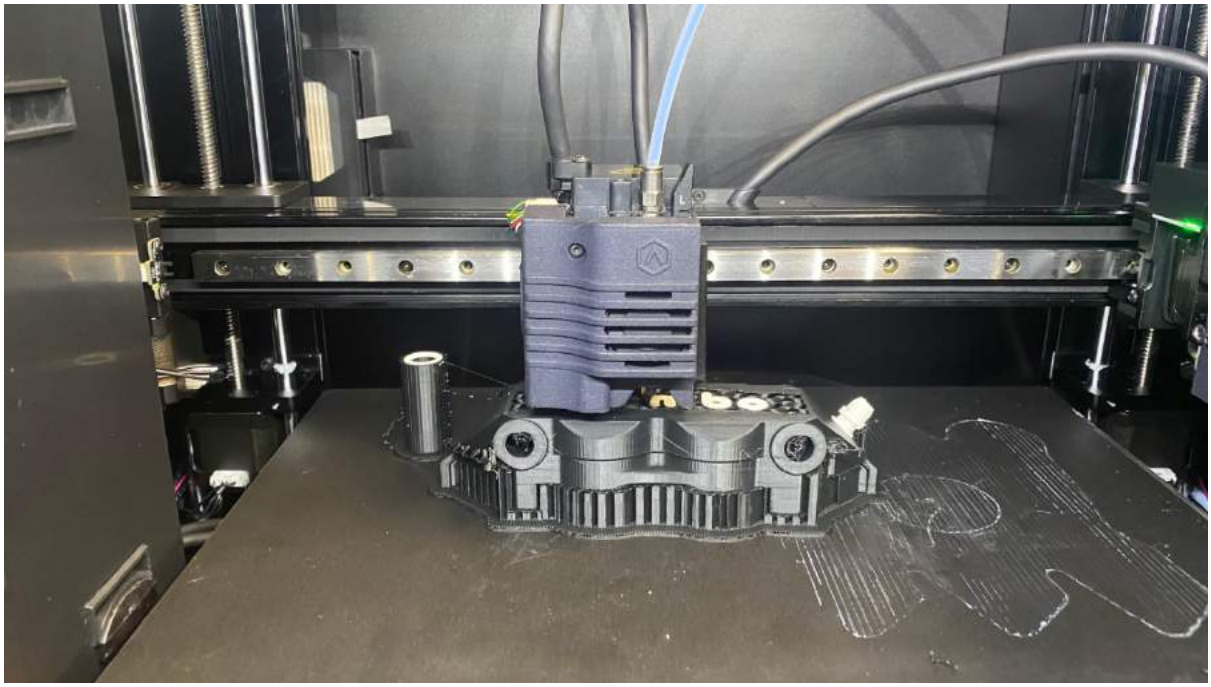
Mirror mode works in much the same way, but it mirrors the part across the central plane automatically. This mode may not be as useful as duplicate mode, but if you're building handed prototypes, or indeed, enduse parts, it could save you a bunch of time in set-up and build.

Imagine a set of jigs for a production run being built at the same time, with no pre-processing needed in your CAD system. You just model up one set, export, and then let the system build you the other set automatically.

Now that we've got our heads around the different build capabilities, let's dig down into what it's like to work with the E2.



Parts off the E2 did well under the callipers, with only a 0.2mm deviation at most in Z direction



As with all dual material processes, the build takes longer, as the system needs to switch extruders where needed, potentially on every layer

Raise3D E2 – Build process

The set-up software for the E2 is pretty nice, particularly when compared to some lower-end machines we've looked at recently. It's clear what you're doing.

The software gives you access to presets initially, but if you want to dig in, tweak settings, or bring in more complex materials (the E2 supports materials that build up to 300C so there are plenty of options), you can do those things, too.

If you want to activate the build modes (duplicate and mirror), the system guides you through the steps required to make the most of these capabilities.

Materials, meanwhile, are held in two closed-off bays on either side of the unit. That means you'll need a bit of space around the machine in order to open them.

Material loading is pretty simple: open the door and feed the filament (the unit uses widely available 1.75mm filament) into the Bowden tube till it reaches the extruder. Then, choose your material from presets or define a melt temp and start the loading process.

Again, you're guided through the whole process using on-screen videos. Once done, you're ready to begin calibration.

With care, decent dual-material results can be achieved

It’s worth noting that if you’re using both extruders extensively, then we found that you really need to pay close attention to calibration and bed measurement.

The E2’s build plate is removable, which in turn makes removal of parts simple, but it also means that every time you replace the build plate, you run the risk of knocking it out of calibration. As a result, you need to take care positioning the build plate and running the auto-level routine each time.

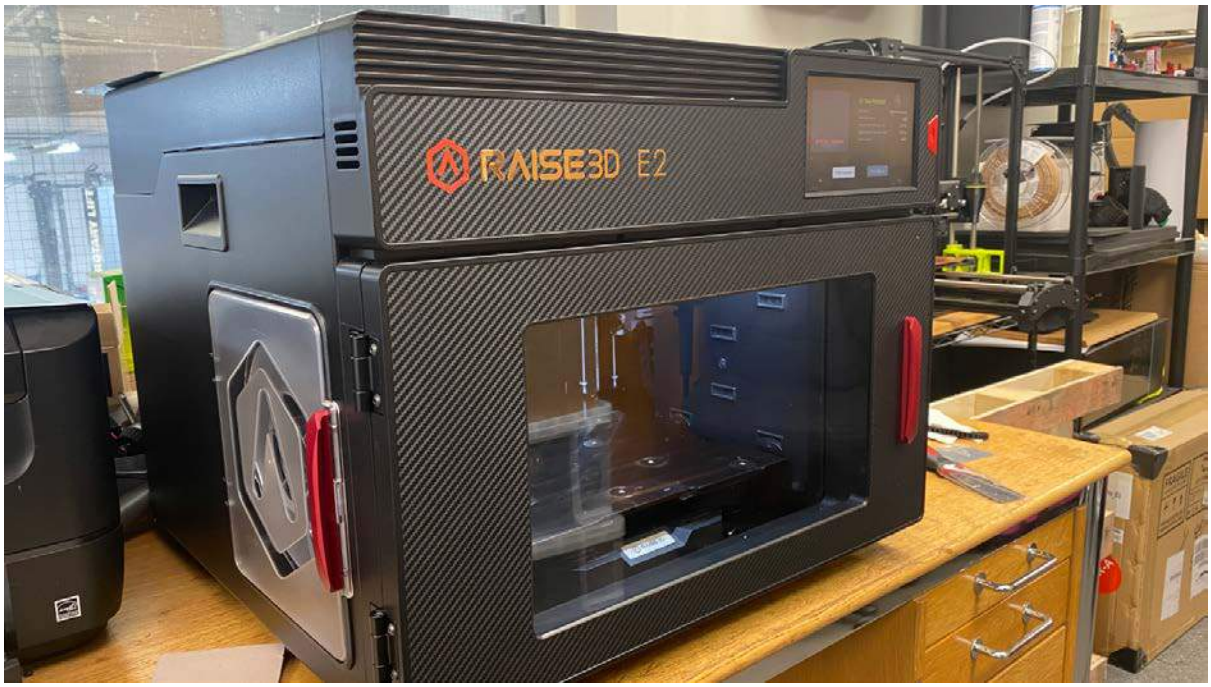
If you’re simply re-running a previous job, then you can probably get away with a quick and simple calibration, but if you’re using the right nozzle extensively, perhaps building a part with multiple materials or using the duplicate/mirror modes, we found it best to run the full levelling and left-nozzle calibration routines. That extra ten minutes you spend make the odds of a successful print much higher.

The system is then left to work. The E2 has some useful features that will give you more confidence when running jobs overnight or otherwise leaving the machine unattended. First, an on-board camera is available for monitoring while on the same network, but also further afield if you take advantage of the RaiseCloud platform for monitoring.

In addition, there are filament detection sensors that will pause your print if it runs into trouble, as well as a power outage resuming capability. So should you experience a power cut, the machine should get back to work on the job without too many problems once power is restored.

Once your build is complete, it’s time to remove the part from the build plate. As we’ve already said, the build plate is magnetically attached in place. It’s also made of flexible spring steel with a Buildtak surface applied. This means that, with a quick bend, most parts will pop right off. If they’re a little more resistant, a gentle tickle with the supplied spatula usually suffices.

Give the build plate a quick clean-up and pop it back into place and it’s ready to go again, while you post-process your parts.



The E2 is a pretty compact machine, considering the capabilities it offers. It’s also quiet, making it ideal for office use

In conclusion

This was my first hands-on experience of a Raise3D machine, and I really like the E2. Having subsequently detailed some of my findings on social media, I’ve discovered that the company has a very loyal set of followers, using its technology in lots of interesting ways.

As ever, the best results come from combining familiar materials with solidly proven build parameters. The unit lends itself to consistent part quality, because the fully enclosed build environment limits internal variances and protects from the negative impact of external factors.

There are a couple of other advantages to mention here. The first is that the E2 is a very well-built unit that builds at speed, but is also very quiet, particularly compared to the Method X device we benchmarked at the same time. The other is that while there are no interlocks on the access doors, there are sensors and it’s a pretty trivial matter to have the system pause build when they’re opened.

All of this makes the E2 ideal for use in an open environment, perhaps in sharedaccess spaces or in education.

The material range this machine supports is pretty wide, too. As long as your material builds under 300C, then you should be OK.

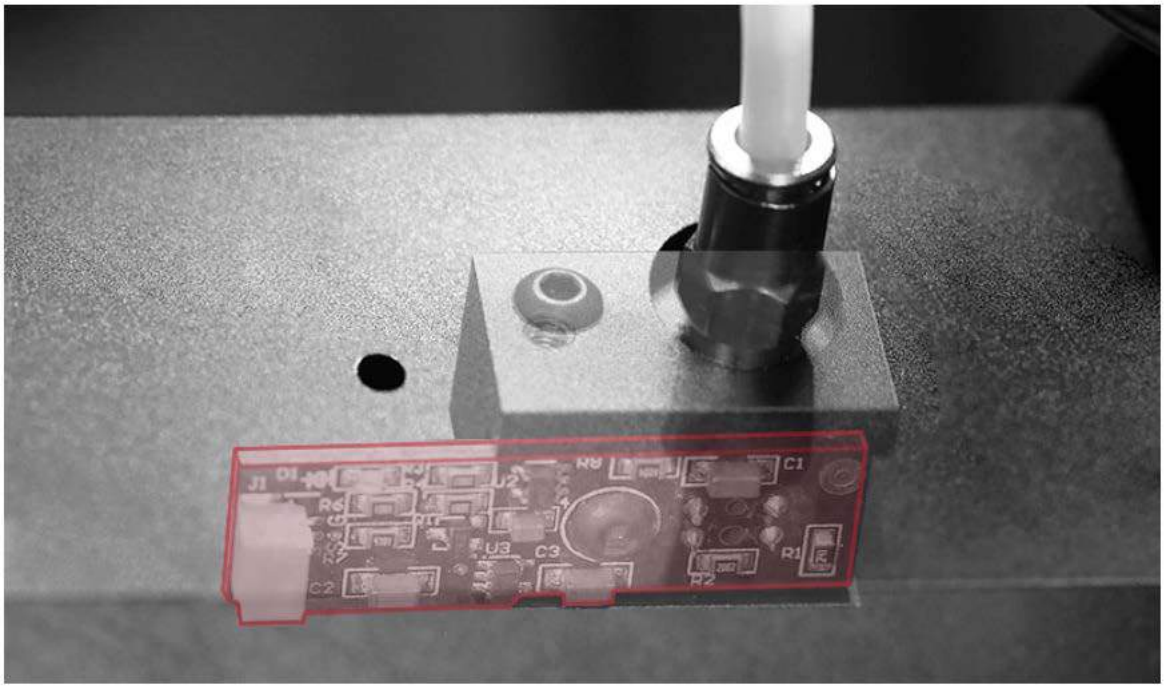
That said, known materials such as PLA, ABS, ASA, Nylon and some of the more exotic filled materials should all be fine, too.

There are many instances where speed of production will be a benefit, whether that’s for prototypes, assistive parts (jigs, fixtures and so on) or for end-use parts.

Never Lose a Print: Filament Run-out Sensors

Dependable and accurate optical run-out sensors automatically pause the print when the printer is out of filament.

- When filament runs out, a red light flashes and the print is paused. Then, users simply add filament and press resume.
- All types of filaments can be detected, regardless of color, material, or hardness.

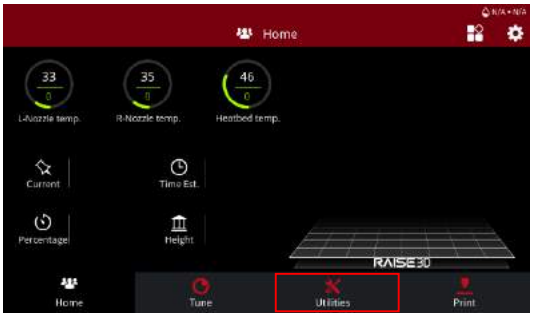


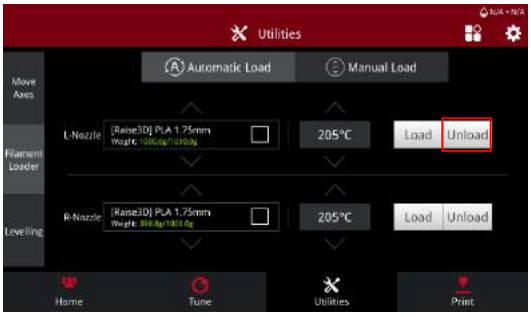
Manual E2 – How to Replace the Filament Run-out Sensor Board – V1.0

Tool:

① 2mm hex wrench

1. Go to the “Utilities” menu on the screen. Then, from the filament loader page, select the “Unload” button with the proper temperature set for the loaded filament, and wait until the nozzle heats up to the set temperature.

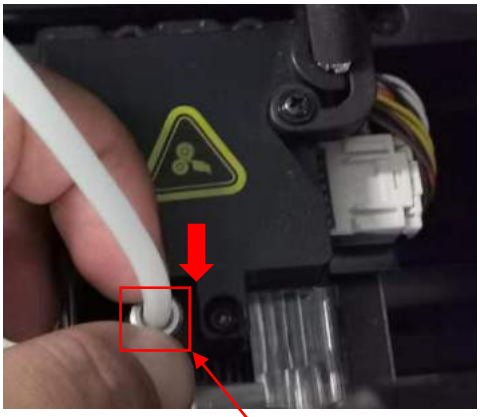


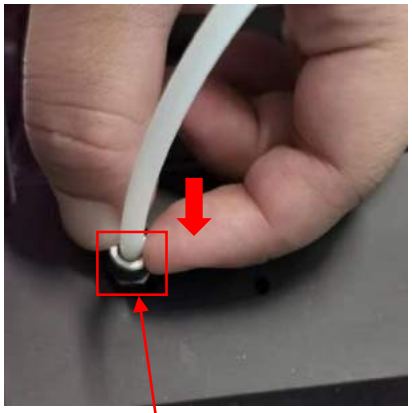


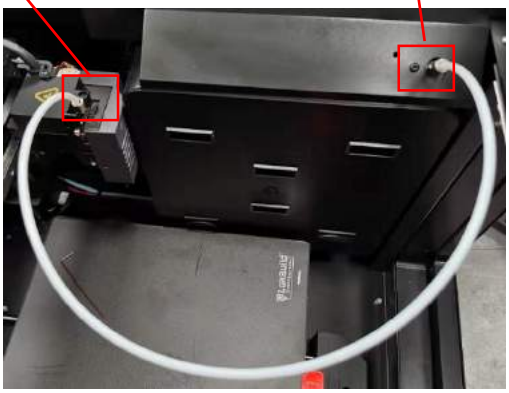
2. Wait until the filament is fully unloaded, then pull out the filament.

Note: If you have filament loaded in the other nozzle, please follow the same steps.

3. Press the top of the metal quick connector (with two fingers) to remove the guide tube from both the extruder and filament compartment.





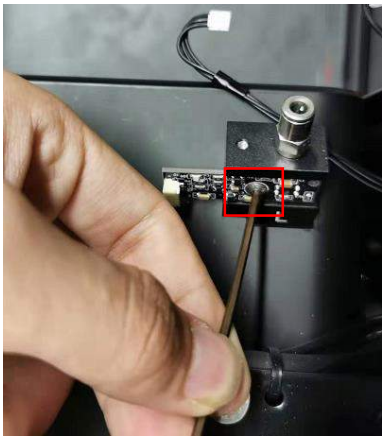


4. Use a 2mm hex wrench to remove the three screws (shown below in red) retaining the filament compartment cover. You should now be able to gently lift the cover away from the filament compartment.

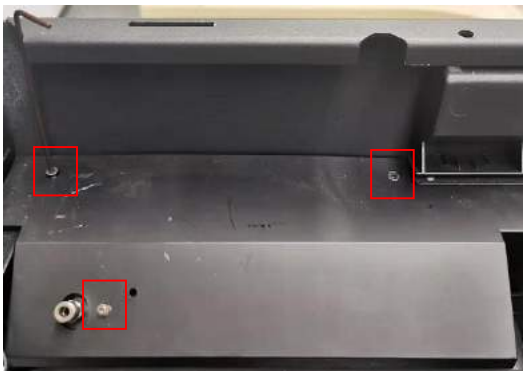
5. Locate the filament sensor and carefully remove its connector, then use a 2mm hex wrench to remove the screws retaining the sensor to the frame.

6. Prepare the new run-out sensor board by orienting it with the connector facing the front of the machine. Then use a 2mm hex wrench to install the retaining screw.

7. Reconnect the run-out sensor cable and route the cable underneath the optical sensor.



8. Reinstall the three filament compartment retaining screws, then reinstall the guide tube.



[Manual E2 – How to Replace the Filament Run-out Sensor Board - V1.0]

- END -

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For any other inquiries: inquiry@raise3d.com

How to Change a 3D Printer Nozzle on the E2

This manual will show you how to replace the nozzle of your E2 Raise3D device. Follow the easy steps below to have the most of your 3D printer and provide a long-life and durable device.

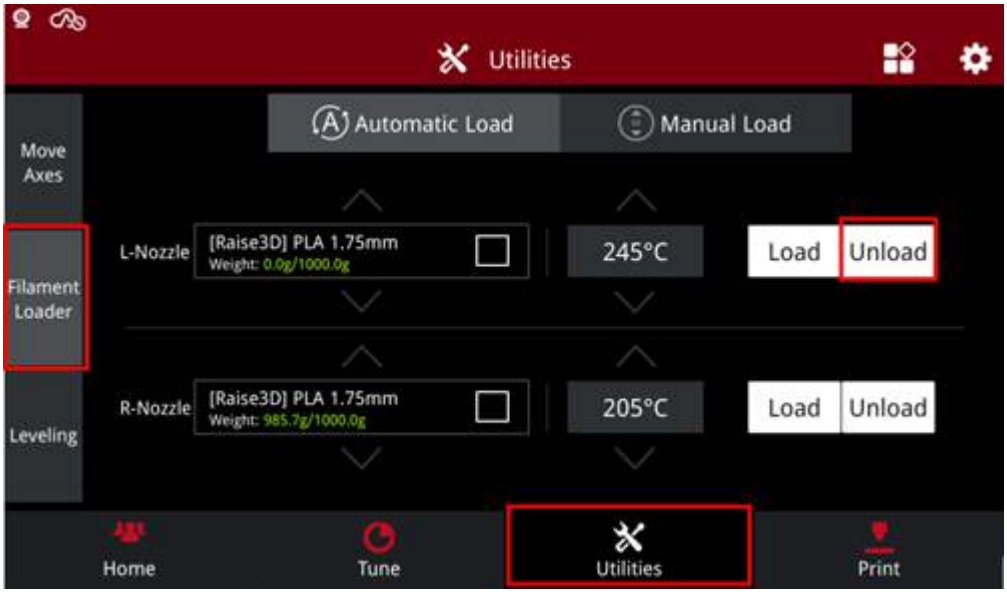
List of Tools Needed

- 2mm hex wrench
- 8mm socket wrench
- Longnose pliers
- Heat resistant gloves
- 3 mm stainless steel feeler gauge

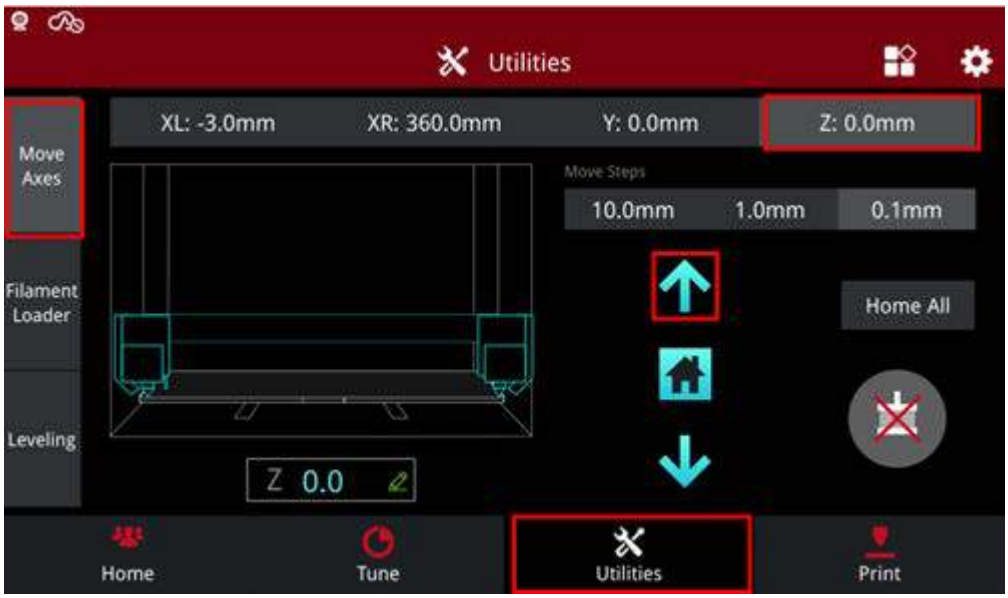
Power On The 3D Printer

1. The first step is to turn on your device.

2. Click “Filament Loader” to unload any filament in the extruder. (If there is no filament inside, you can just skip this process)

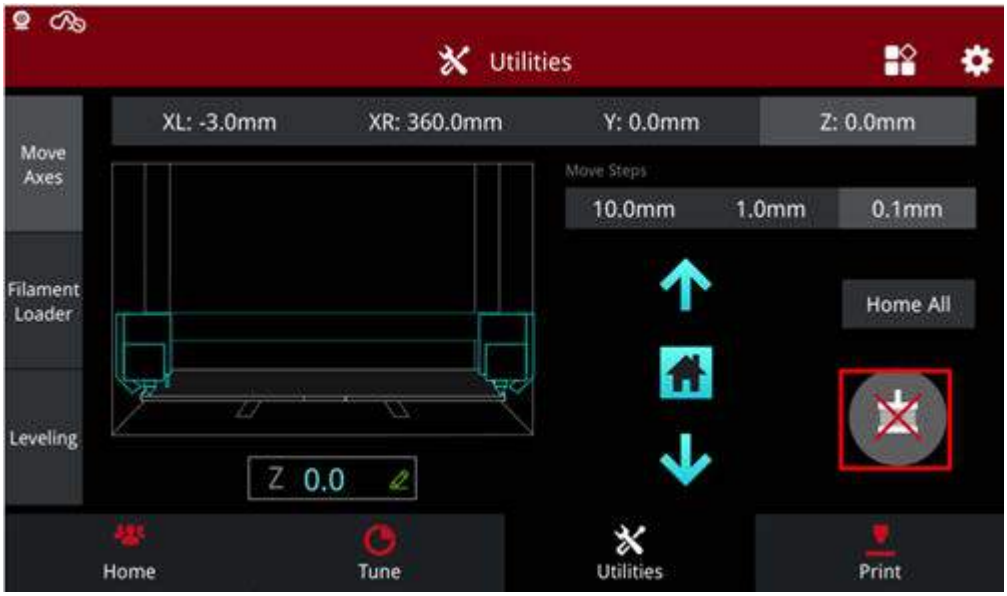


3. Then click the “Utilities” menu and next access the “Move Axes” option. Click on the upper arrow that appears on your screen and shift left the X-axis to a proper height for the following operation. Check the images below to have a reference on this process



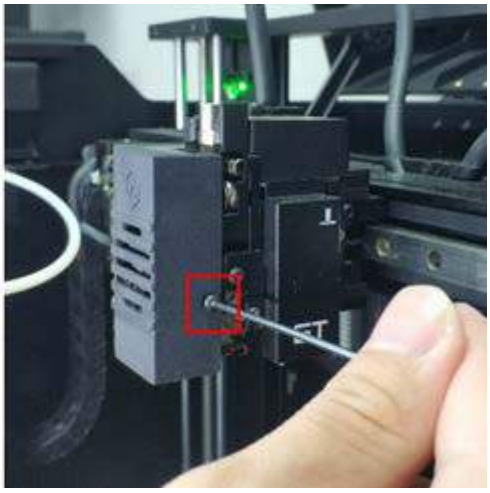
Disable the Motor

3. Click the “Motor Disable” button. Then move the extruder which needs to replace the nozzle to be placed in a central position.
-Note: This tutorial will take the left nozzle replacement as an example

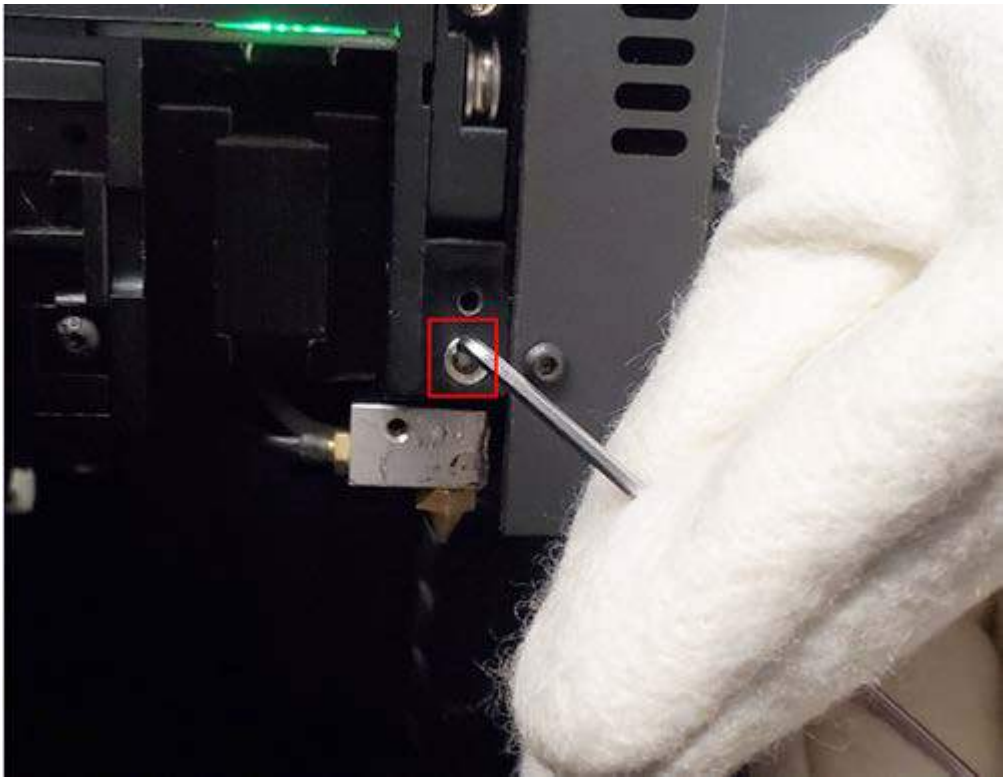


Loosen the Screws

4. Use your 2mm wrench to loosen the two screws located on the extruder cover. Then take the cover off carefully



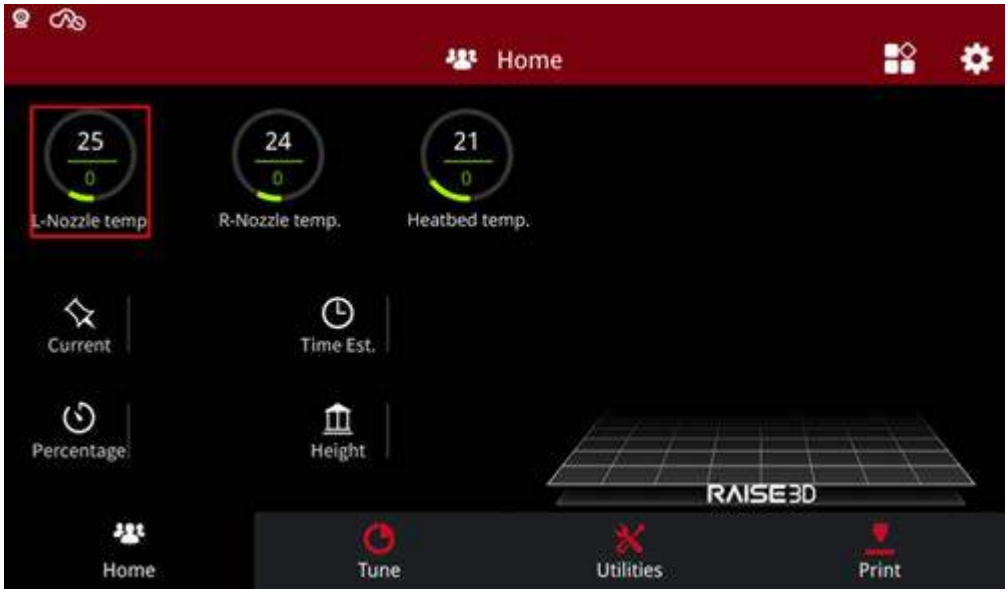
5. Loosen the clamping screw with the 2mm hex wrench.
-Note: The hotend is extremely hot at this point, please remember to put on the heat resistant gloves

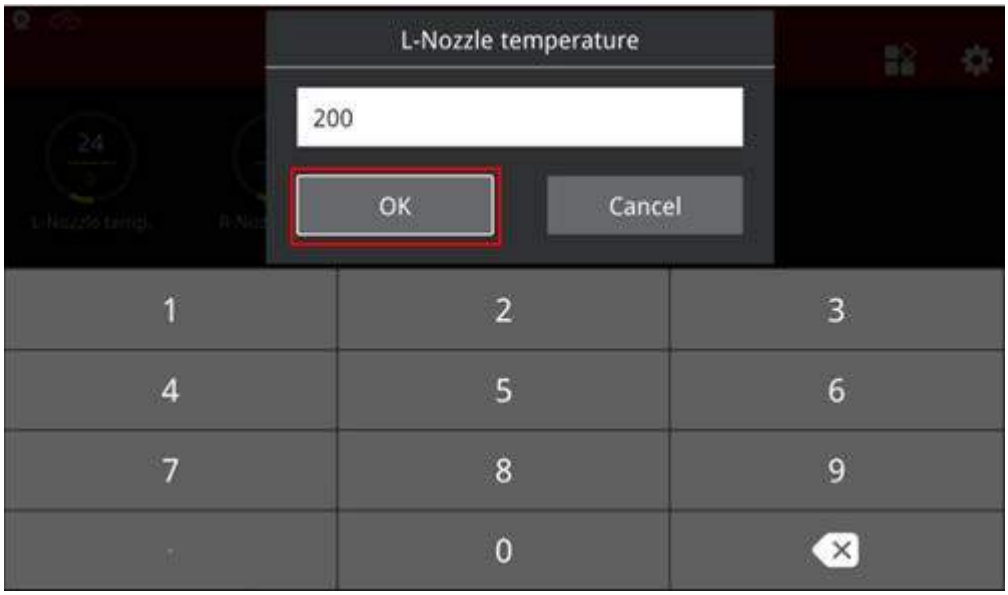


6. Pull out the entire hotend from the extruder.
-*Note:* Please be careful not to pull apart the cable

Set the Nozzle Temperature

7. Click the “Home” menu and then access the option “Nozzle Temp”. Then set the temperature to be 200°C, then put on the heat resistant gloves, and use the pliers to clean the extruder, and the 3D printer hotend carefully.



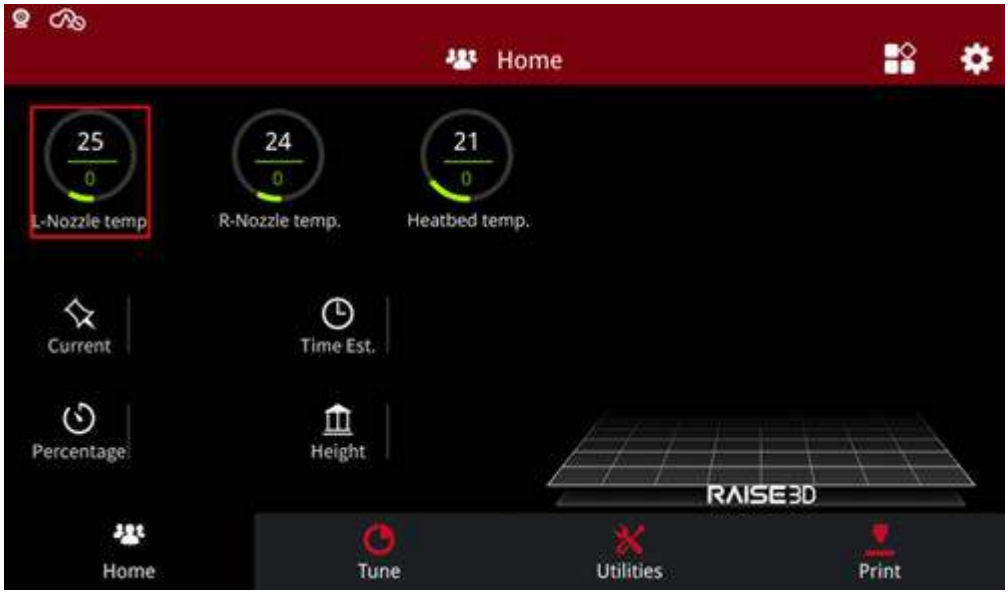


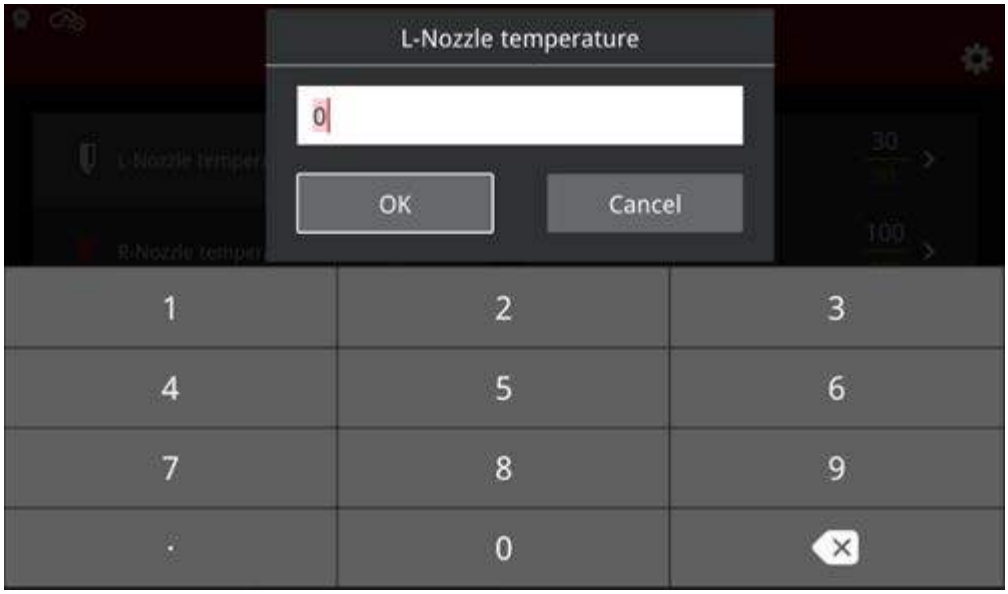
Managing the Hotend

8. Clamp the 3D printer hot end with the nipper pliers

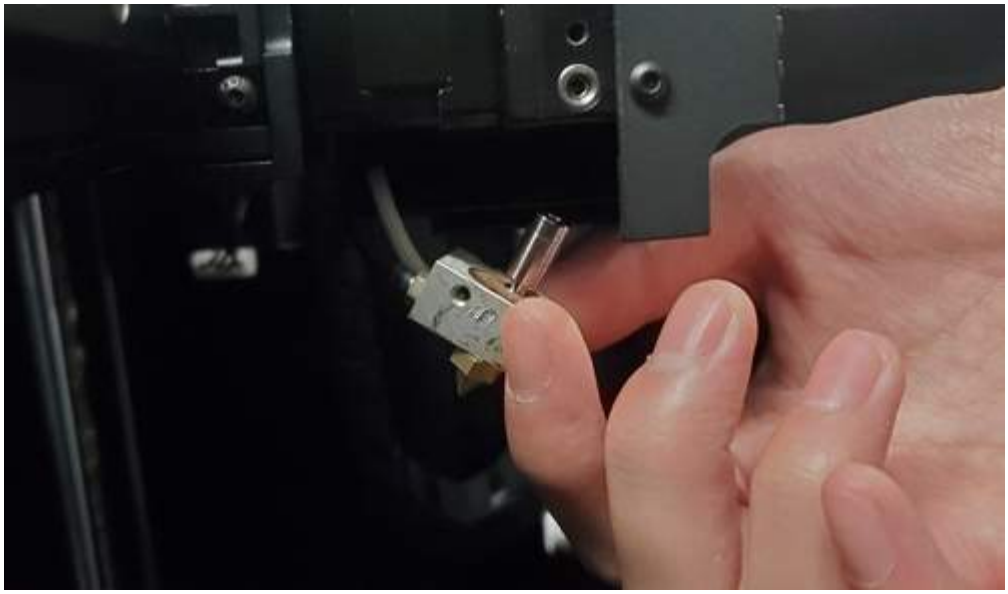
9. Then loosen the nozzle with the 8mm socket wrench. Note: (Please remember to keep the gloves on during this whole process for your safety. The hotend is made from aluminum, please clamp it with a proper force. Otherwise, it might be out of shape. And do not twist the plier as the throat tube might bend)

10. Once you have taken off the old nozzle, set the 3D printer hotend temperature to 0°C. Then wait for this to drop to room temperature. Check the images below to have a guide on this process





11. Once the hotend has cooled down to room temperature, install the new nozzle back to the hotend

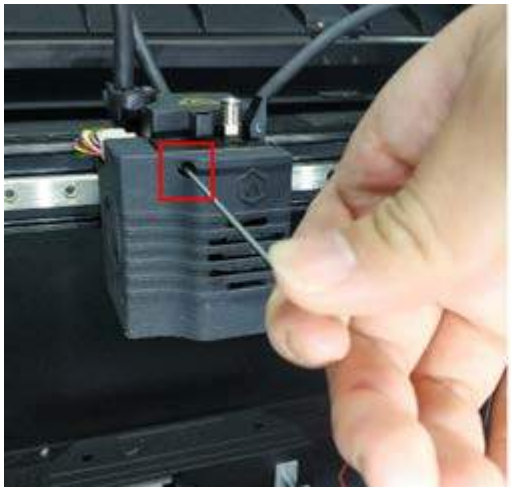


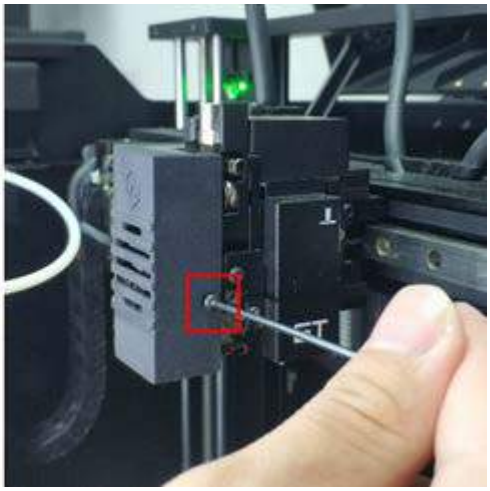
Setting Back the Temperature

12. Next, you need to set the hotend temperature back to 200℃. Clamp the hotend with a nipper plier, then tighten the nozzle with an 8mm socket wrench.
Note: The hotend is extremely hot at this point, please remember to put on the heat resistant gloves, and do not overexert in case of gear slip

13. Insert the hotend into the extruder, then tighten the clamping screw to hold the hotend in place

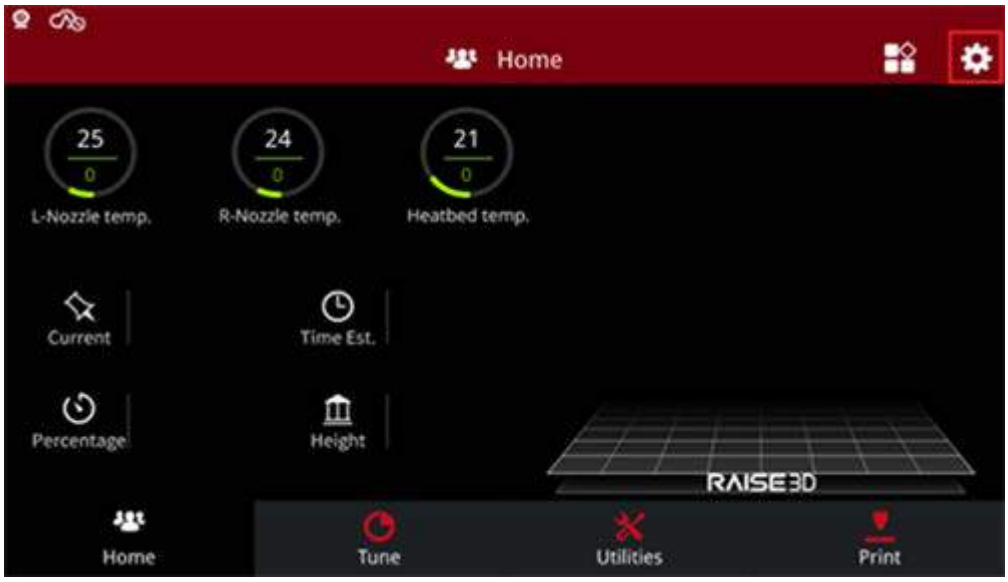
14. Install the extruder cover back, and use a 2mm wrench to tighten the two screws on it

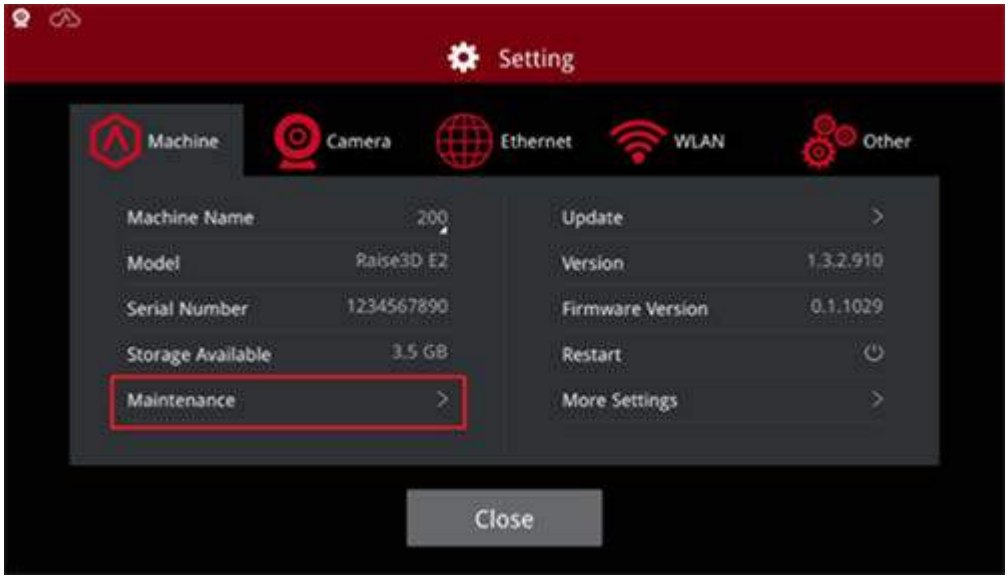


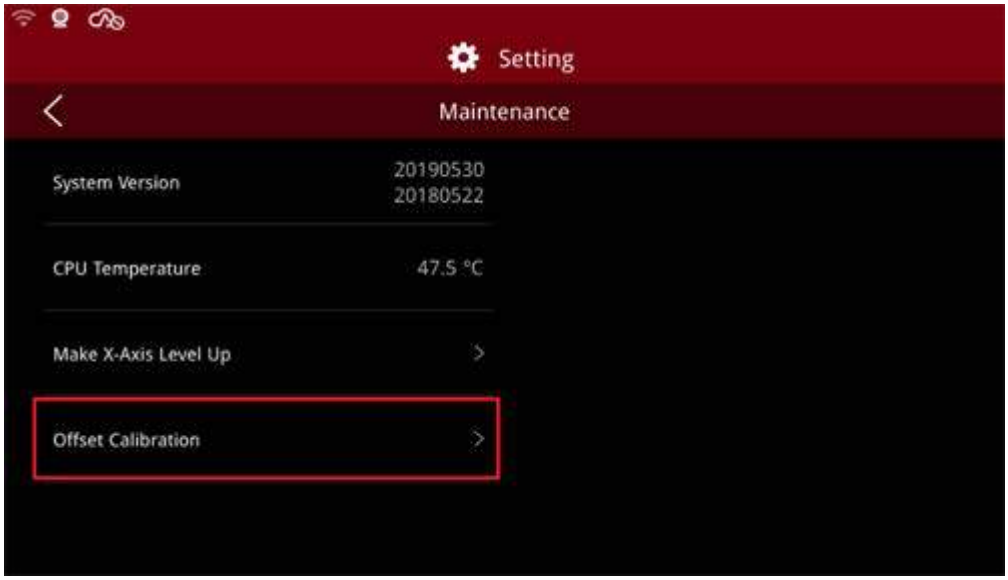


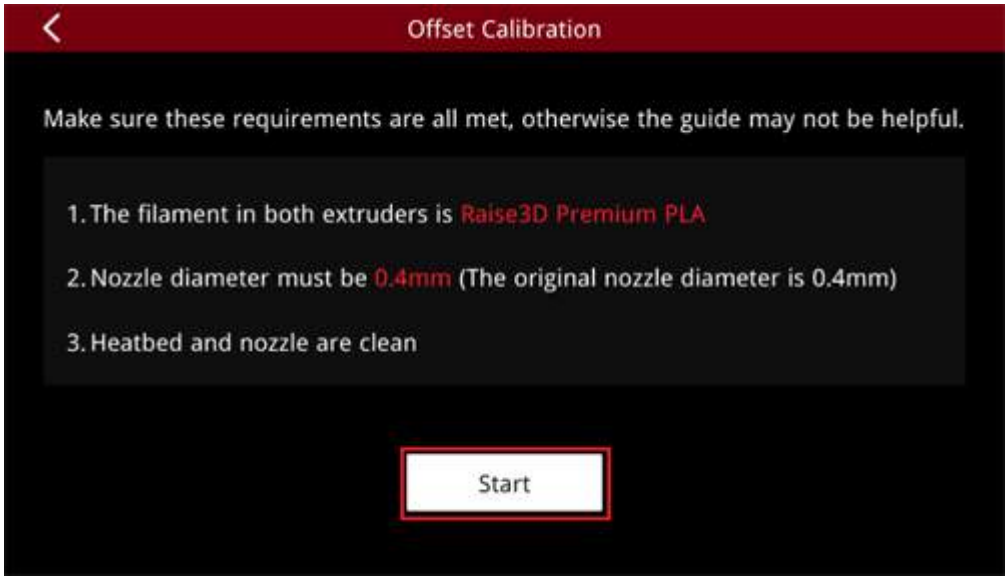
Calibrate the Nozzle

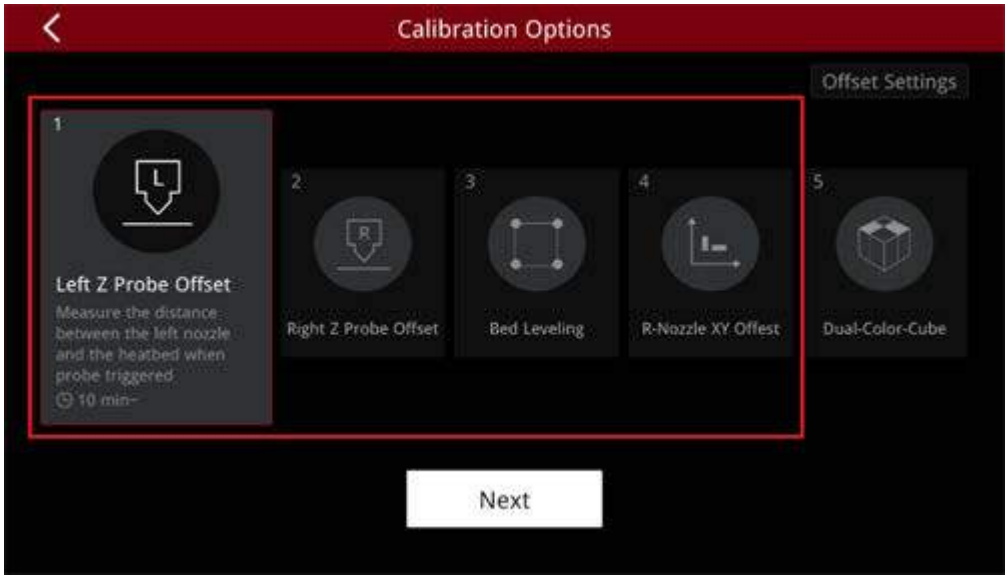
15. After the nozzle been replaced, run the five-step wizard to calibrate the nozzle's Z probe Offset, it is recommended to adjust the height of the left and right nozzles as well. (For more information please refer to the tutorial: Manual E2 – How to Adjust the Height of Left and Right Nozzle – V1.0). ***Note:*** You can find the "Offset Calibrations" at "Settings>Machine>Maintenance>Offset Calibration"




Setting
Machine
Camera
Ethernet
WLAN
Other
Machine Name
200
Model
Raise3D E2
Serial Number
1234567890
Storage Available
3.5 GB
Maintenance
Update
Version
1.3.2.910
Firmware Version
0.1.1029
Restart
More Settings
Close

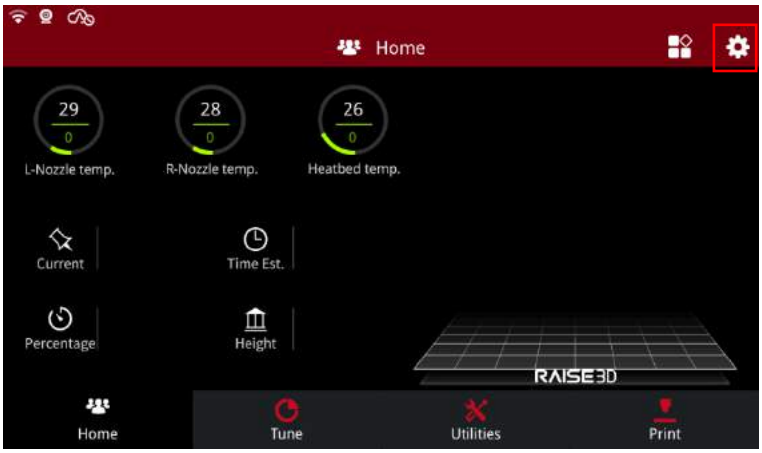

Setting
Maintenance
System Version
20190530
20180522
CPU Temperature
47.5 °C
Make X-Axis Level Up
Offset Calibration


Offset Calibration
Make sure these requirements are all met, otherwise the guide may not be helpful.
1. The filament in both extruders is Raise3D Premium PLA
2. Nozzle diameter must be 0.4mm (The original nozzle diameter is 0.4mm)
3. Heatbed and nozzle are clean
Start

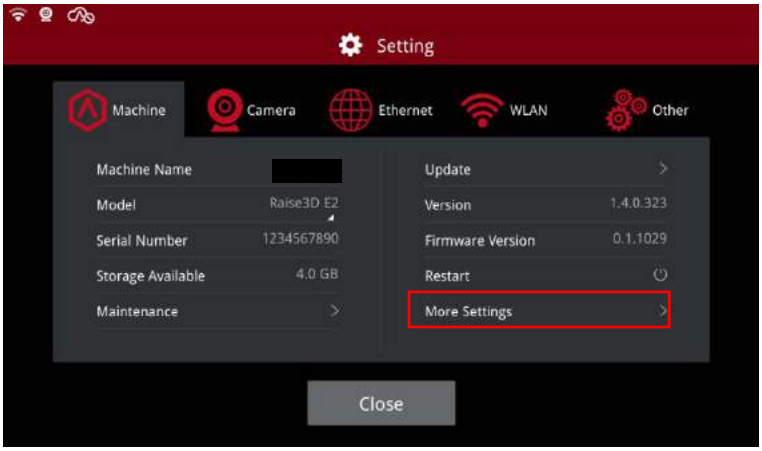

Calibration Options
Offset Settings
1
Left Z Probe Offset
Measure the distance between the left nozzle and the heatbed when probe triggered
10 min~
2
Right Z Probe Offset
3
Bed Leveling
4
R-Nozzle XY Offest
5
Dual-Color-Cube
Next

How to deal with HEPA fan not turning off

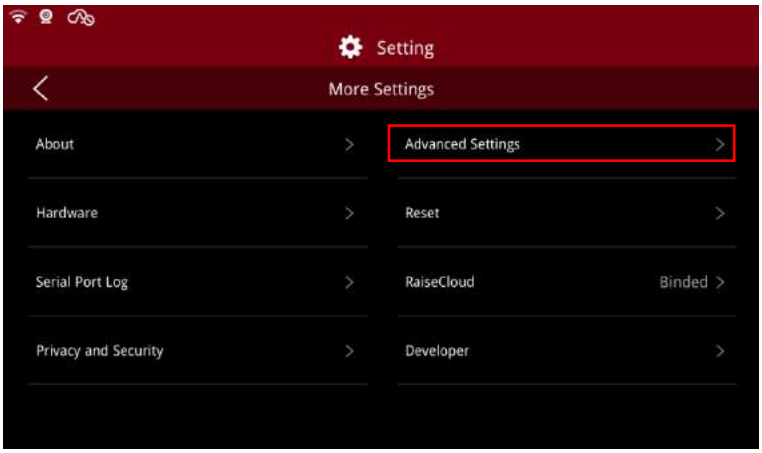
1. First of all, please make sure the machine is not in safe mode. If the machine is in safe mode, all setting about fan will be disable. Please restart the machine so that machine can be out of safe mode.
2. Please confirm whether the “Close the filter fan and side fans when printer is idle” function is turned on according to the following figures.
   1) Click the “Gear” icon in the upper right corner of the screen.



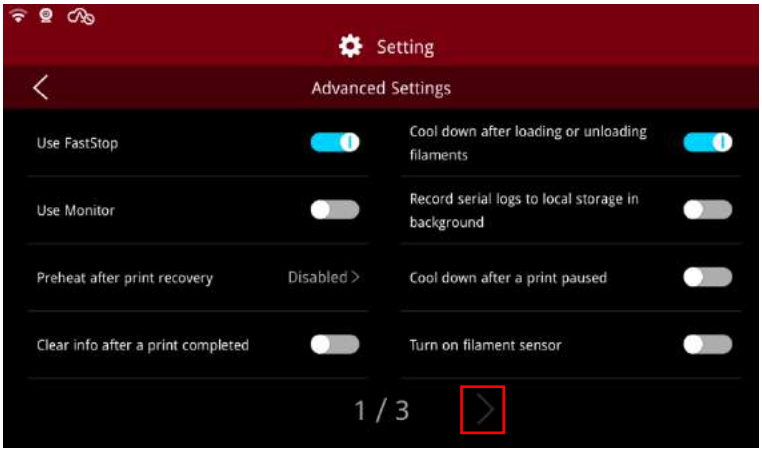
   2) Click on “More Settings” in the bottom right corner of the “Machine” settings.

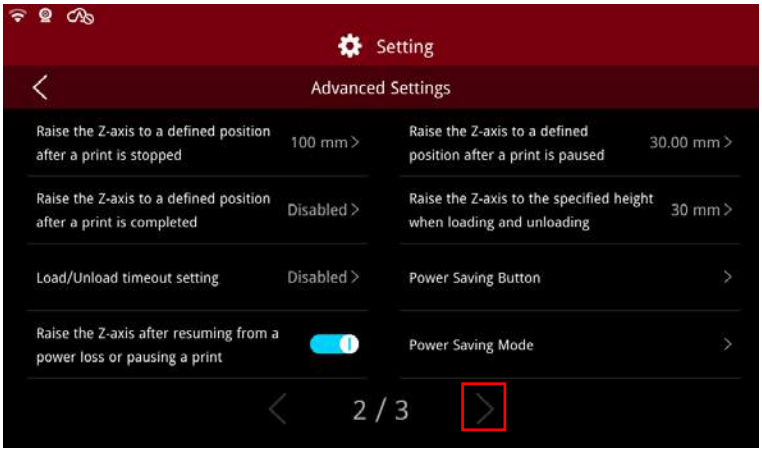


3) Then click “Advanced Settings” in the upper right corner.

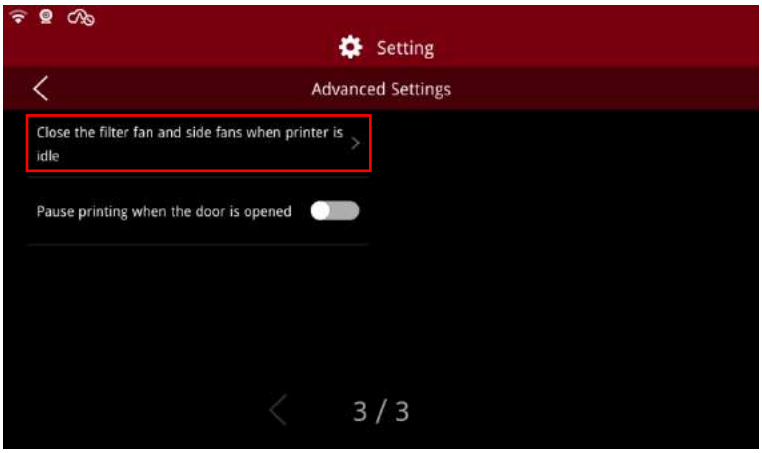


4) Go to page 3 by clicking the right arrow at the bottom.

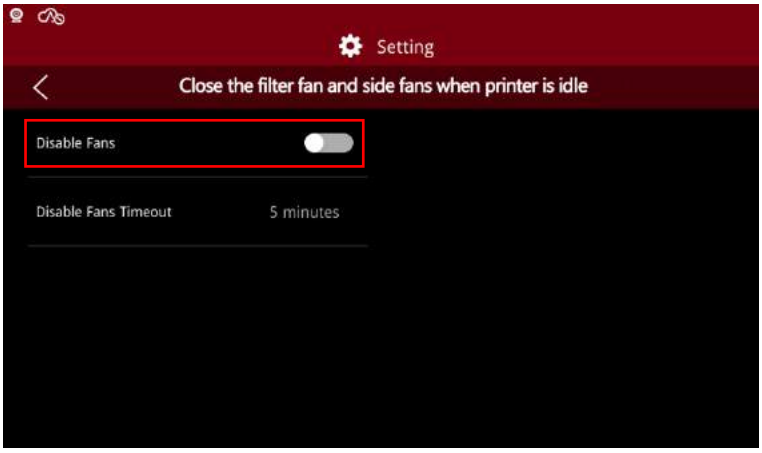


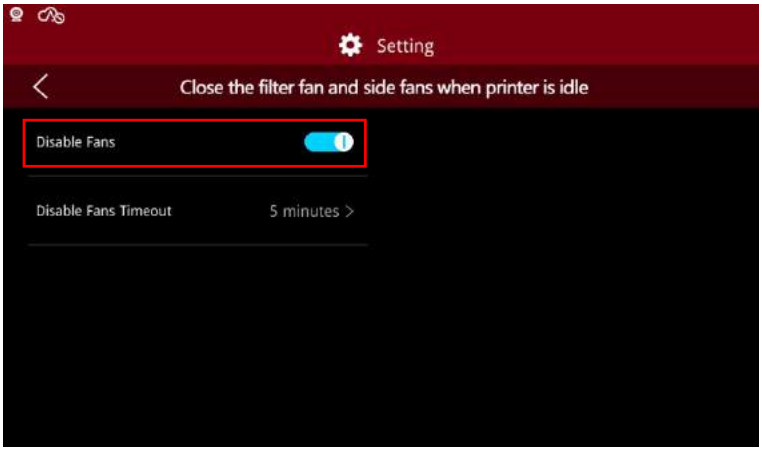


5) Click “Close the filter fan and side fans when printer is idle” to enter the settings.



6) Switch on or off this function by clicking the button beside “Disable Fans”.
Note: Gray means off while blue means on.





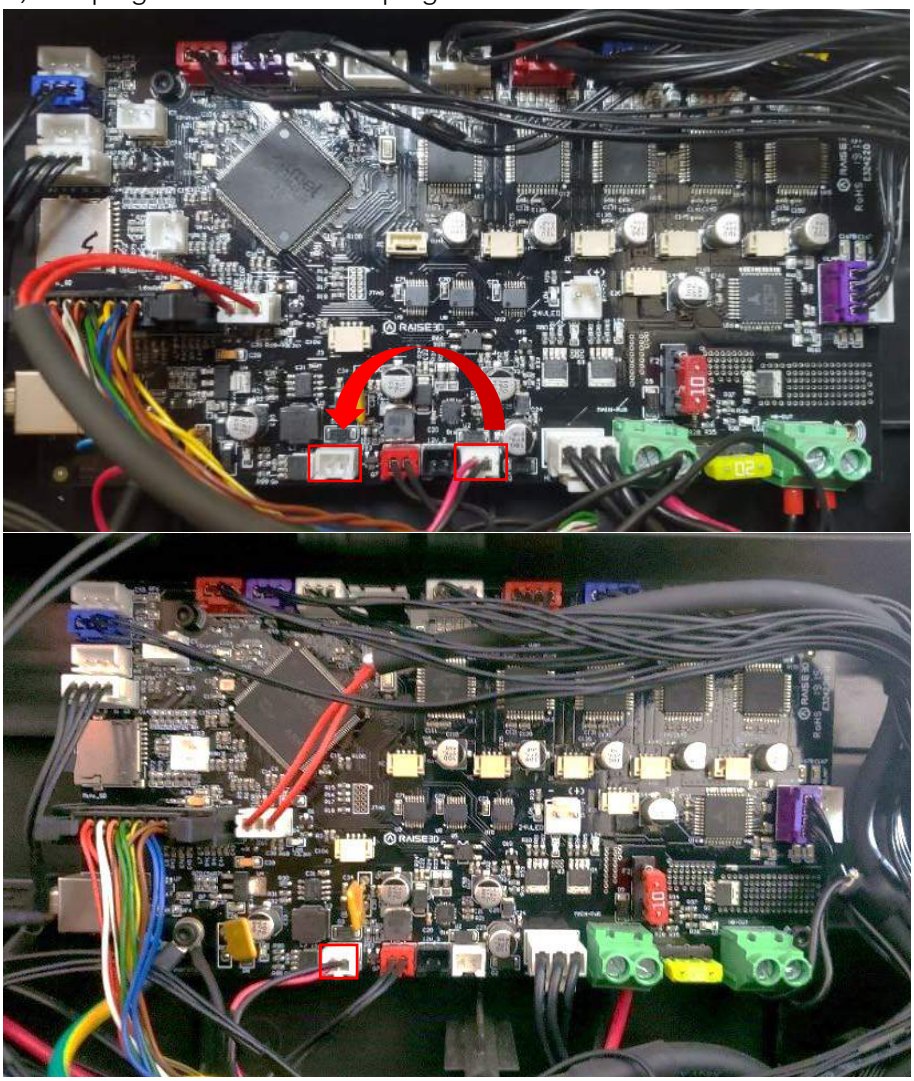
3. If this function is enabled, but the fan does not automatically turn off after a pre-set time interval, please follow the figures below to solve this problem.
   1) Power off the printer.

   2) Open the top cover of the printer.

   3) Unscrew the 7 fixing screws on the screen back cover with a 2mm hex wrench.

   4) Carefully remove the back cover of the screen and place it on the printer.
   Note: Be careful not to break the cable connecting to the back cover, and lay the cover down.

5) Unplug the fan cable and plug it into another socket as shown in the following figure.



6) Reinstall the back cover and tighten the 7 fixing screws with a 2mm hex wrench.

7) Close the top cover of the printer.

8) Restart the printer to check whether the problem still exists.

PrintDry™

Filament Dryer
for 3D Printing

The effective solution for moisture-related 3D printing problems, such as:

- Filament crackling, popping & clogging
- Weak printed model
- Poor surface quality
- Print failing

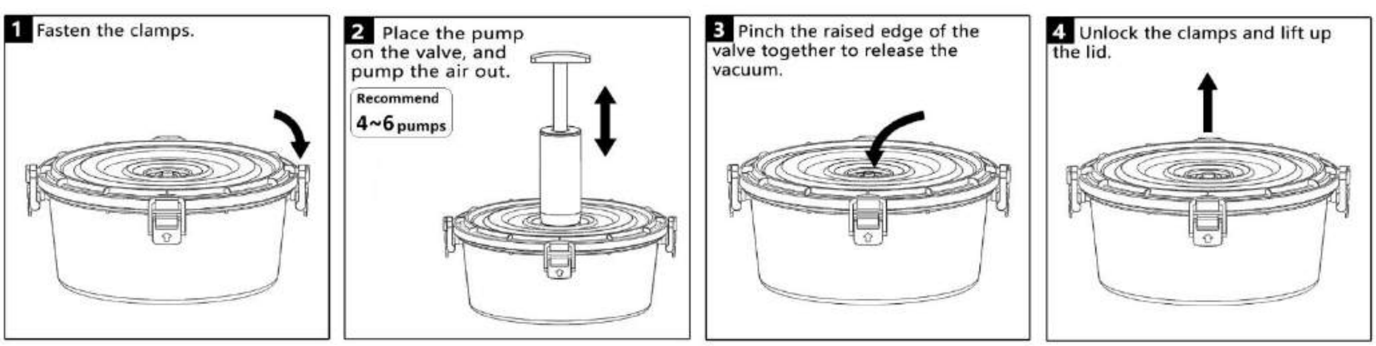
Good for:
- Drying filament before printing
- Feeding & drying filament during printing
- Regenerated desiccant pouches

Features:
- Spool size (OD): ϕ200 - 300mm (<5Kg)
- Dryer temperature: 35-75°C
- Continuous drying time: up to 40 hours
- Used for both 1.75mm or 3mm filaments
- Certified for product safety: ETL(120VAC), TUV/GS(220VAC)
- Dryer Dimension: 28x33x33cm

PrintDry™

Vacuum-sealed Filament Container
for 3D Printing

Max Spool Size: ϕ8"x 3.3"



PrintDry Reseller:

PrintDry filament dryers/containers have been used for drying & storing filaments for 10000+ users in 50+ countries. Please visit www.printdry.com for more information.

MAGIGOO® Pen 120ml - Industrial product

- ✓ 120ml Pen,
- ✓ Folded instructions leaflet
- ✓ Box 170mm*40mm*40mm
- ✓ Safety Data Sheet

What is Big Magigoo for?: A Big Magigoo bottle was designed with industrial user in mind. It is easier and quicker to apply on build surfaces as big as 1m*1m. Magigoo big bottle is for printing farms, prosumers, heavy duty 3D printing with PLA, ABS, PETG, HIPS. Its still releases and cleans easily - that little extra convenience can bring a lot of appreciation with professionals who do not have time to play around.

Suggested to be used with BigRep, Raise3D, MarkForged, Wasp, Builder3D,

How to use?

1: Shake before use

2: Apply with thin even layer

3: Sticks when HOT and releases when COOL

4: After use clean with water / damp cloth

polymaker

Innovators in 3D printing

Technical Data Sheet

PolyTerra™ PLA

www.polymaker.com

V5.0

PolyTerra™ PLA

PolyTerra™ PLA is a bioplastic based 3d printing filament designed from the ground up to create the next generation of PLA, providing ease of use, printing quality, speed and reliability.

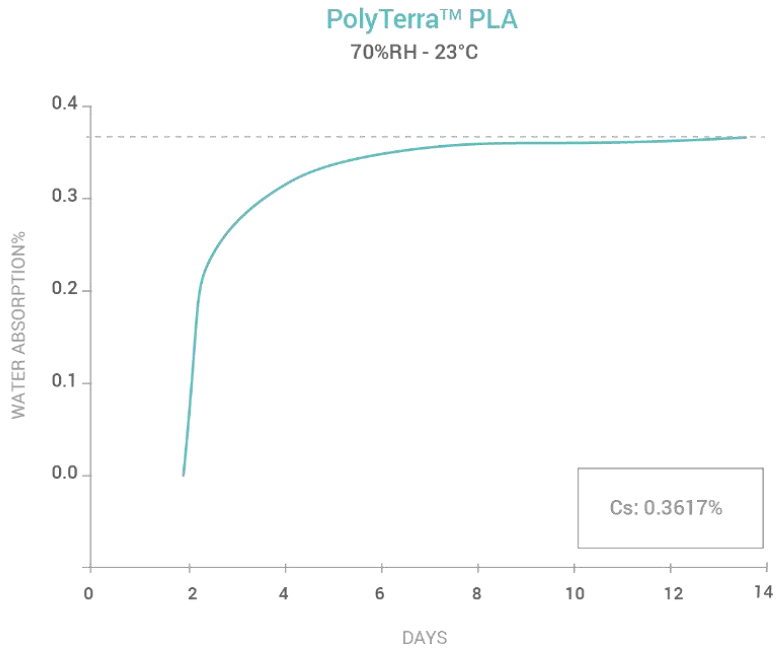
PHYSICAL PROPERTIES

Property	Testing Method	Typical Value
Density	ISO1183, GB/T1033	1.31±0.02 g/cm^3 at 21°C
Melt Index	210°C, 2.16kg	14-20 g/10min
Light Transmission	N/A	N/A

CHEMICAL RESISTANT DATA

Property	Testing Method
Effect of weak acids	Not Resistant
Effect of strong acids	Not Resistant
Effect of weak alkalis	Not Resistant
Effect of strong alkalis	Not Resistant
Effect of organic solvent	No data available
Effect of oils and grease	No data available
Effect of Sunlight	No data available

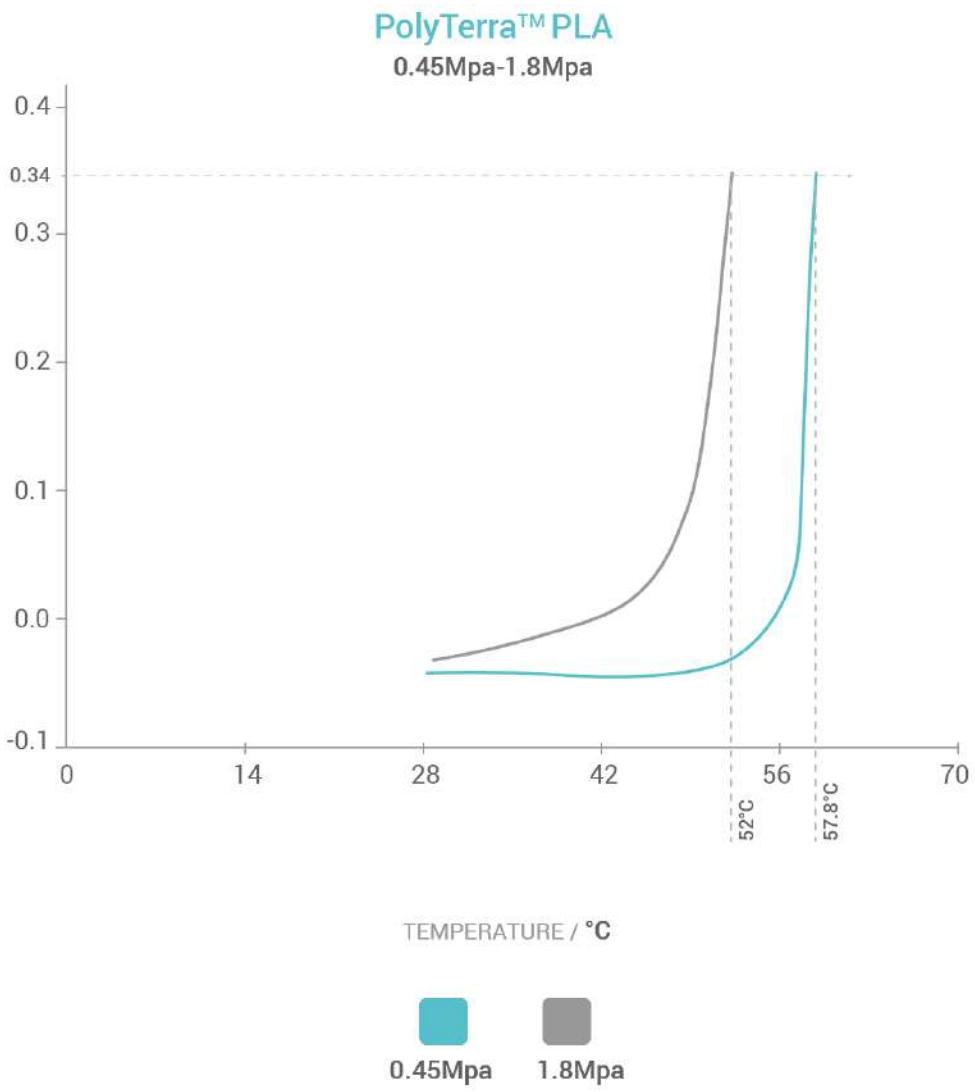
MOISTURE ABSORPTION CURVE



THERMAL PROPERTIES

Property	Testing Method	Typical Value
Glass transition	DSC, 10°C/min	60.6 °C
Melting temperature	DSC, 10°C/min	162.6 °C
Decomposition temperature	TGA, 20°C/min	N/A
Vicat softening temperature	ISO 306 GB/T 1633	62.7 °C
Heat deflection temperature	ISO 75 1.8MPa	°C
Heat deflection temperature	ISO 75 0.45MPa	°C
Thermal conductivity	N/A	N/A
Heat shrinkage rate	N/A	N/A

HDT CURVE



MECHANICAL PROPERTIES

Property	Testing Method	Typical Value
Young's modulus (X-Y)	ISO 527, GB/T 1040	1882 ± 141 MPa
Young's modulus (Z)		1869.7±38
Tensile strength (X-Y)	ISO 527, GB/T 1040	20.9 ± 2.0 MPa
Tensile strength (Z)		18.0 ± 0.3 MPa
Elongation at break (X-Y)	ISO 527, GB/T 1040	34.5 ± 8.1 %
Elongation at break (Z)		2.51 ± 0.83
Bending modulus (X-Y)	ISO 178, GB/T 9341	2695 ± 541 MPa
Bending modulus (Z)		N/A
Bending strength (X-Y)	ISO 178, GB/T 9341	39.6 ± 1.1 MPa
Bending strength (Z)		N/A
Charpy impact strength (X-Y)	ISO 179, GB/T 9343	5.7 ± 0.4 kj/m^2
Charpy impact strength (Z)		N/A

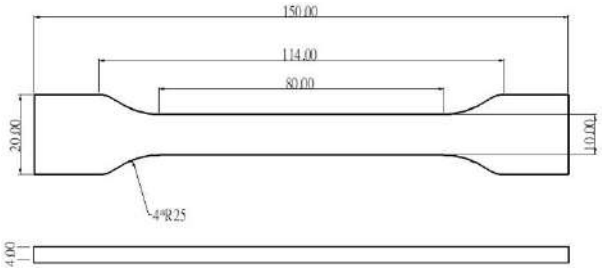
RECOMMENDED PRINTING CONDITIONS

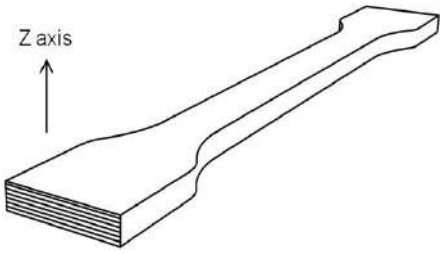
Parameter	
Nozzle temperature	190 – 230 (℃)
Build Surface material	BuildTak®, Glass, Blue Tape
Build surface treatment	Glue, Magigoo
Build plate temperature	25 - 60 (˚C)
Cooling fan	Turned on
Printing speed	30-70 (mm/s)
Raft separation distance	0.2 (mm)
Retraction distance	1 (mm)
Retraction speed	20 (mm/s)
Environmental temperature	Room temperature - 60 (˚C)
Threshold overhang angle	60 (˚)
Recommended support material	PolySupport™ and PolyDissolve™ S1

* Based on 0.4 mm nozzle and Simplify 3D v.4.0. Printing conditions may vary with different nozzle diameters

TENSILE TESTING SPECIMEN

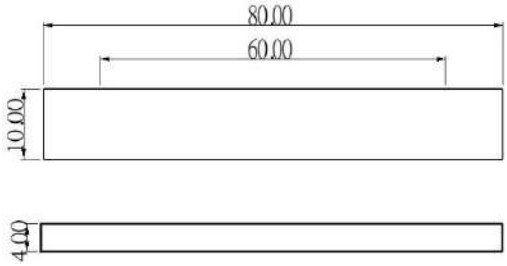
ASTM D638 (ISO 527, GB/T 1040)

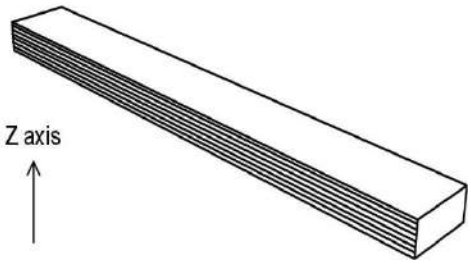




FLEXURAL TESTING SPECIMEN

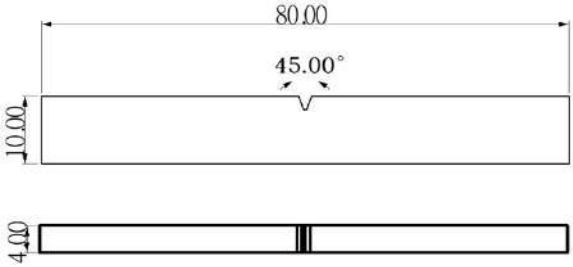
ASTM D638 (ISO 527, GB/T 1040)

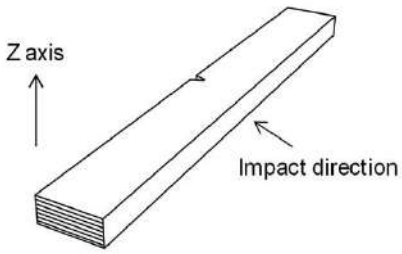




IMPACT TESTING SPECIMEN

ASTM D638 (ISO 179, GB/T 1043)





HOW TO MAKE SPECIMENS

Printing temperature	200 °C
Bed temperature	60 °C
Shell	2
Top & bottom layer	4
Infill	100%
Environmental temperature	25 °C
Cooling fan	ON

*All specimens were conditioned at room temperature for 24h prior to testing

PolyTerra™

PolyTerra™ is a bioplastic based 3d printing filament designed from the ground up to create the next generation of PLA, providing ease of use, printing quality, speed and reliability.

Physical Properties

Property	Testing method	Typical value
Density	ASTM D792 (ISO 1183, GB/T 1033)	1.31±0.02 (g/cm3 at 21.5˚C)
Glass transition temperature	DSC, 10 °C/min	60.6 (°C)
Vicat Softening temperature	ASTM D1525 (ISO 306 GB/T 1633)	62.7±0.1 (˚C)
Melt index	210 °C, 2.16 kg	14-20 (g/10 min)
Melting temperature	DSC, 10 °C/min	162.6 (˚C)

Tested with 3D printed specimen of 100% infill

Mechanical Properties

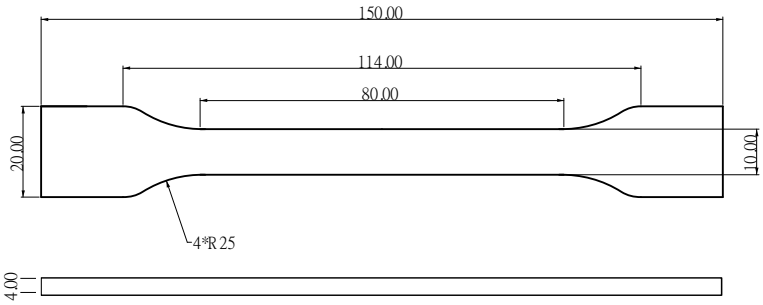
Property	Testing method	Typical value
Young's modulus (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	1882 ± 141 (MPa)
Tensile strength (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	20.9 ± 2.0 (MPa)
Elongation at break (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	34.5 ± 8.1 (%)
Bending modulus	ASTMD790 (ISO 178, GB/T 9341)	2695± 541 (MPa)
Bending strength	ASTMD790 (ISO 178, GB/T 9341)	39.6 ± 1.1 (MPa)
Charpy impact strength	ASTM D256 (ISO 179, GB/T 1043)	5.7± 0.4 (kJ/m^2)
Tensile strength (Z)	ASTM D638 (ISO 527, GB/T 1040)	18.0± 0.3(MPa)
Young's modulus (Z)	ASTM D638 (ISO 527, GB/T 1040)	1869.7 ±38 (MPa)
Elongation at break (Z)	ASTM D638 (ISO 527, GB/T 1040)	2.51 ± 0.83 (%)

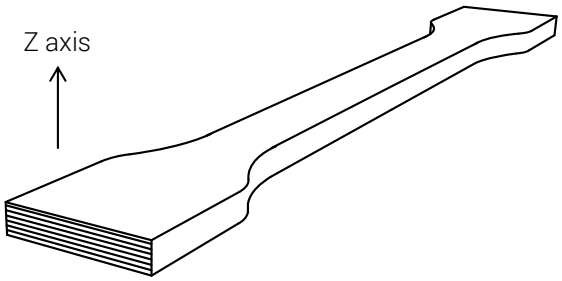
All testing specimens were printed under the following conditions:
nozzle temperature = 200 °C, printing speed = 50 mm/s, build plate temperature = 60 °C, infill = 100%
All specimens were conditioned at room temperature for 24h prior to testing

Recommended printing conditions

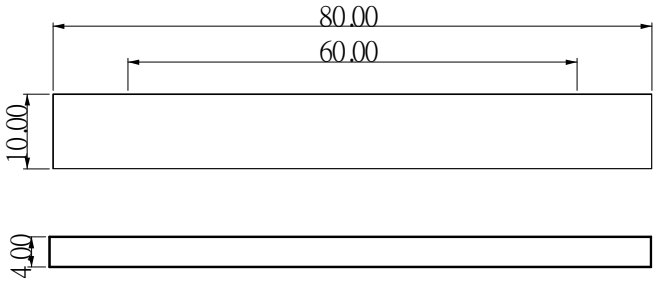
Parameter	
Nozzle temperature	190 - 230 (˚C)
Build Surface material	BuildTak®, Glass, Blue Tape
Build surface treatment	Glue, Magigoo
Build plate temperature	25 - 60 (˚C)
Cooling fan	Turned on
Printing speed	30-70 (mm/s)
Raft separation distance	0.2 (mm)
Retraction distance	1 (mm)
Retraction speed	20 (mm/s)
Recommended environmental temperature	Room temperature - 60 (˚C)
Threshold overhang angle	60 (˚)
Recommended support material	PolySupport™ and PolyDissolve™ S1

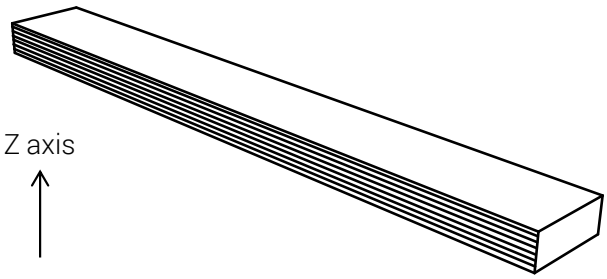
Based on 0.4 mm nozzle and Simplify 3D v.4.0. Printing conditions may vary with different nozzle diameters



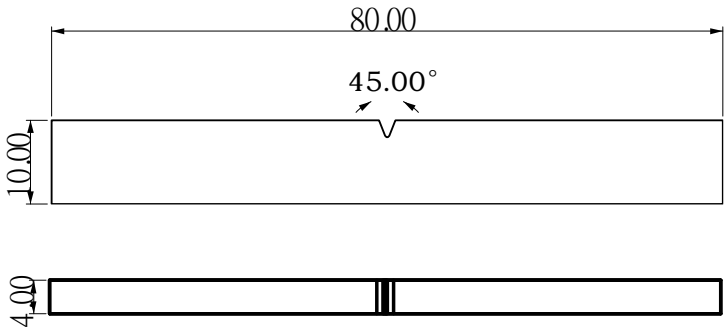


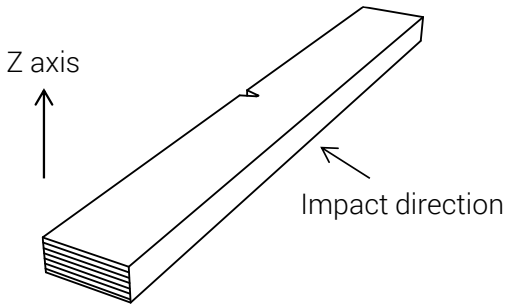
Tensile testing specimen; ASTM D638 (ISO 527, GB/T 1040)





Flexural testing specimen; ASTMD790 (ISO 178, GB/T 9341)





Impact testing specimen; ASTM D256 (ISO 179, GB/T 1043)

Disclaimer:

The typical values presented in this data sheet are intended for reference and comparison purposes only. They should not be used for design specifications or quality control purposes. Actual values may vary significantly with printing conditions. End- use performance of printed parts depends not only on materials, but also on part design, environmental conditions, printing conditions, etc. Product specifications are subject to change without notice.

Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/recycling practices of Polymaker materials for the intended application. Polymaker makes no warranty of any kind, unless announced separately, to the fitness for any use or application. Polymaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any application.

gembird®

Shaping the perfection

ABS Filament Grey, 1.75 mm, 1 kg

3DP-ABS1.75-01-GR

VERSATILE & EASY TO USE

- Acrylonitrile butadiene styrene (ABS) is a common thermoplastic strong, flexible durable plastic available in a range of colors.
- ABS is the plastic used in lots of things around us and is perfect for heated plastic extrusion 3D printing.

Features

- High strength, good toughness
- Low density: when printing larger volume the model is lighter
- Can be applied to a variety of 3D printers

Specifications

Material: ABS, 1.75 mm diameter
Weight: 1 kg/spool (2.2 lbs)
Length: approx. 400 m
Density at 21.5?C: 1.01 g/cm3
Melt Flow Index at 10min, 2.16kg: 5
Melt Point: 225 240 ?C
Heat-Deflection-Temperature at 0.455 MPa: 85 ?C
Yield Strength at 5mm/min: 45 MPa
Impact Strength: 16 KJ/m2
Ensile Break: 30 %
Diameter: 1.75 ± 0.05 mm

Packaging

Q'ty in crtn, pcs	8
Crtn volume, CUM	0.036
Crtn weight, kgs	11.86
Individual package size LxWxH:	210x210x80 mm
Carton size LxWxH:	440x440x185 mm
Country of origin	CN
Barcode	8716309088459
Customs code	3916909000

System requirements

A 3D printer with 1.75 mm extruder of temperature around 230 ?, suitable for use with ABS filament

Certificates

Wittevrouwen 56 | 1358CD Almere | The Netherlands | Phone: +31-36-5211588 | www.gembird.nl | postmaster@gembird.nl

ABS filament, blue, 1.75mm, 1kg

3DP-ABS1.75-01-B

VERSATILE & EASY TO USE

- Acrylonitrile butadiene styrene (ABS) is a common thermoplastic strong, flexible durable plastic available in a range of colors.
- ABS is the plastic used in lots of things around us and is perfect for heated plastic extrusion 3D printing.

Īpašības

- High strength, good toughness
- Low density: when printing larger volume the model is lighter
- Can be applied to a variety of 3D printers

Specifikācija

Material: ABS, 1.75 mm diameter
Weight: 1 kg/spool (2.2 lbs)
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Yield Strength at 5mm/min: 45 MPa
Impact Strength: 16 KJ/m2
Ensile Break: 30 %
Diameter: 1.75 ± 0.05 mm

Packaging

Skaits iepakojumā, gab.	8
Iepakojuma izmērs, kub.m	0.036
Iepakojuma svars, kg	11.74
Individual package size LxWxH:	210x210x80 mm
Carton size LxWxH:	440x440x185 mm
Izcelsmes valsts	CN
Svītrkods	8716309088398
Customs code	3916909000

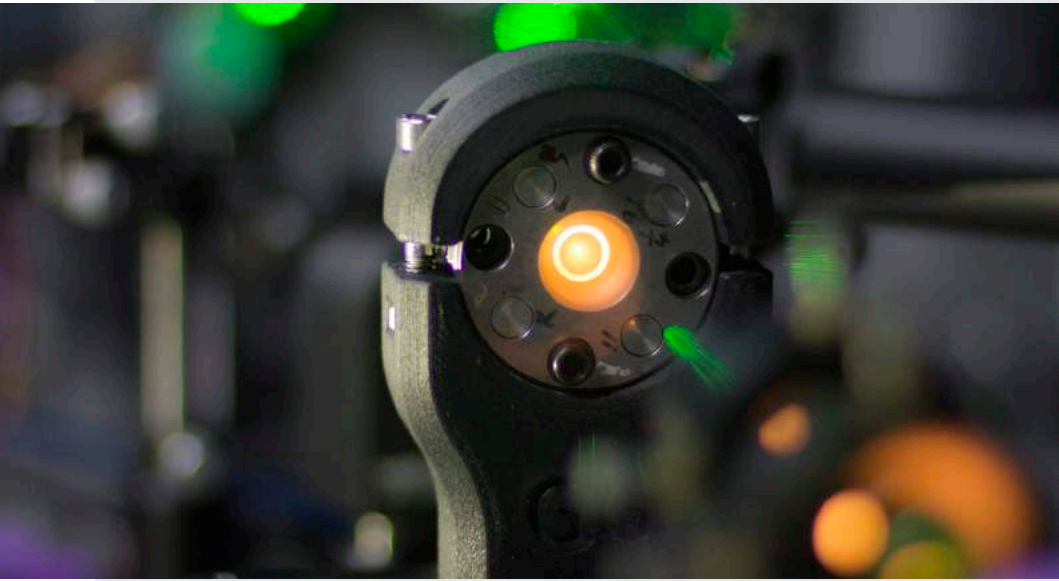
Sistēmas prasības

A 3D printer with 1.75 mm extruder of temperature around 230 °, suitable for use with ABS filament

Sertifikāti

Wittevrouwen 56 | 1358CD Almere | The Netherlands | Phone: +31-36-5211588 | www.gembird.nl | postmaster@gembird.nl

PolyMide™ PA6-CF



Industrial

INDEX

Printing with PolyMide™ PA6-CF

PolyMide™ PA6-CF

PolyMide™ PA6-CF is a carbon fiber reinforced PA6 (Nylon 6) filament. The carbon fiber reinforcement provides significantly improved stiffness, strength and heat resistance with outstanding layer adhesion.

Printing settings

Nozzle Temperature:	280-300 ˚C
Bed Temperature:	25-50 ˚C (Do NOT exceed 50 ˚C)
Chamber Temperature:	25-50 ˚C (Do NOT exceed 50 ˚C)
Printing Speed:	60 mm/s
Cooling Fan:	OFF

Note: Settings are based on 0.4 mm nozzle, and may vary with different printers and nozzle diameters.

Bed surface

PolyMide™ PA6-CF can be printed on almost any surface with a thin coat of PVA glue or Magigoo PA. We recommend a flex plate to facilitate the removal of the model from the plate.

Wear resistant nozzle

PolyMide™ PA6-CF contains 20% chopped carbon fibers by weight which makes it very abrasive. It is important to have an abrasion resistant nozzle.

Nozzles can come in many different materials, from soft to hard:

Brass
Nickel plated copper
Steel
Stainless steel
Tool steel
Tungsten-carbide
Ceramic/Metal hybrid

PolyMide™ PA6-CF can easily damage a brass nozzle after a few hundred grams of printing. Hardened nozzles are more expensive than regular brass nozzle so it is important to consider the amount of materials planned to be used. It is sometimes more cost effective to destroy one nozzle for some prints.

Note: Brass nozzle will give a better thermal conductivity than hardened nozzle such as stainless steel.

High temperature hot end

We recommend a full metal hot end that can maintain a stable temperature of at least > 280 ˚C.

Annealing PolyMide™ PA6-CF parts

We reccomend annealing all models printed in PolyMide™ PA6-CF. This allows users to take advantage of the full mechanical and thermal properties of this material.

The annealing process consists of putting the model in an oven at 90 ˚C for 2 hours.

Support material

PolyDissolve™ S1 is the recommended support material for PolyMide™ PA6-CF. For more information, please visit www.polymaker.com

When using PolyMide™ PA6-CF as a self-support, it is important to remove the support structure right after printing.

Leaving the part exposed to atmospheric moisture may result in strong bonding between the support and printed part, making support removal difficult.

Feeding system

PolyMide™ PA6-CF is a very stiff filament so it is required to have a good set up to ensure a good feeding. For example we recommend avoiding excessive bending in the filament guide system.

Dry box system

PolyMide™ PA6-CF is a polyamide 6 based material which makes it very hygroscopic, meaning that it will tend to absord moisture quite easily. The absorbed moisture in the filament can compromise the process by creating gas in the hot end lowering the quality and mechanical properties of the final print.

We recommend storing PolyMide™ PA6-CF in the PolyBox™ to prevent moisture absorption. If the filament has absorbed moisture it can be dried at 80˚C for 12 hours in a convection oven.

Note: Polymaker provides the filament with the right moisture amount, having a filament with an extremely low moisture content can affect its processability.

PCP: Profile Creation Process

The profile creation process (PCP) allows users to rapidly develop a printing profile for a given material/printer. It is important to consider all of these factors to build a profile.

Geometry
Material
Printer
Environment
Purpose

Polymaker came up with a process which allows you to build your own profile considering the material, printer and environment. This base profile will then be used to create the custom profile taken in account the model geometry and purpose. Indeed the process is also designed to let you learn more about the 3D printing process and therefore give you the skills and knowledge to troubleshoot your prints.

The PCP is available on www.polymaker.com

The PCP is divided in 5 steps:

It uses less than 300g of materials and less than 7h of working time.

Step 1: Extrusion Flow
Step 2: Flow Management
Step 3: Cooling Fan
Step 4: Warpage
Step 5: Fine Details

Each of these steps has a specific objective and introduce an important concept about the FFF 3D printing process. Each step will also give you the possibility to push your test further for more accurate results.

PolyMide™ Family

	Heat deflection temp. ASTM D648 (ISO 75)	
	1.80 Mpa HDT-A	**0.45 Mpa HDT-B**
PolyMide™ PA6-CF	196 ˚C	215 ˚C
PolyMide™ PA6-GF	124 ˚C	191 ˚C
Unreinforced PA6	80 ˚C	96 ˚C
PolyMide™ CoPA	71 ˚C	91 ˚C

	Young's modulus ASTM D638 (ISO 527, GB/T 1040)	Charpy impact resistance ASTM D256 (ISO 179, GB/T 1043)
PolyMide™ PA6-CF	7453 Mpa	13.3 kJ/m^2
PolyMide™ PA6-GF	4431 Mpa	16.5 kJ/m^2
Unreinforced PA6	2621 Mpa	9.9 kJ/m^2
PolyMide™ CoPA	2223 Mpa	9.6 kJ/m^2

Note: Tested with 3D printed specimens.

Fiber Adhesion™ Technology

Fiber Adhesion technology dramatically improves the Z-axis strength, via engineering the surface chemistry of the fibers to achieve a strong fiber/matrix bonding.

In contrast to conventional fiber-reinforced filaments, which exhibit considerable reduction in Z-axis strength, PolyMide™ PA6-CF actually has higher interlayer adhesion compared to unreinforced PA6.

Layer adhesion

Tensile strength
(Z axis)
ASTM D638
(ISO 527, GB/T 1040)

Unreinforced PA6
53.2Mpa
PolyMide™ PA6-CF
67.7Mpa
+27%

Unreinforced PA6
53.2Mpa
PolyMide™ PA6-GF
61.4Mpa
+15%

Competitor 1	Competitor 2	Competitor 3	Competitor 4
35% CF by weight	20% CF by weight	20% GF by weight	20% GF by weight
PA12 48 Mpa PA12-CF 28.9 Mpa	PA6/66 23 Mpa PA6/66-CF 18 Mpa	PA6/66 23 Mpa PA6/66-GF 15 Mpa	PA6 28 Mpa PA6-GF 21 Mpa
-40%	**-40%**	**-35%**	**-25%**

Material Development

If your application requires a specific material that is not yet available in the market, consider our custom development service. With our talented material scientists and application engineers, we are ready to develop the needed material to enable your unique application.



Material development

-Twin-screw compounding
-Single-screw extrusion
-Torque rheometry
-Wet chemistry
-Other polymer processing equipment

Testing and characterization

-Thermal characterization (DSC, softening point)
-Mechanical testing (tensile, 3-point bending)
-Optical microscopy
-Capillary rheometry
-FTIR-ATR

3D Printing

-3D printing
-Post-processing
-Application development

Our state-of-the art R&D facilities, allow us to engineer materials at different levels and fully optimize them for 3D printing. Our goal is to deliver materials with right combination of properties/functions, processability and form to suit your needs!

Application

Processability technologies

Printing thechnologies
Post-processing
Other

Properties & functions

Mechanical
Thermal
Electrical
Other

Form

Pellet
Filament
Powder
Other

Polymaker products

PolyLite™

PLA
PETG
ABS
PC
ASA

PolyMax™

PLA
PETG
PC

PolyFlex™

TPU95

PolyMide™

CoPA
⚙ PA6-CF
⚙ PA6-GF

PolyDissolve™

S1

Specialty

PolyWood™
PolySmooth™
PolySupport™
PolyCast™

Hardware

PolyBox™
Polysher™

More products coming soon...

Technologies

JAM-FREE™

Regular PLA

With Jam-Free™

ASH-FREE™

Without Ash-Free™
Ash content: 0.5%

With Ash-Free™
Ash content: 0.003%

WARP-FREE™

Regular Nylon

With Warp-Free™

STABILIZED FOAMING™

Wood

Stabilized Foaming™

LAYER-FREE™

Rough surface

With Layer-Free™

FIBER ADHESION™

NANO-REINFORCEMENT

About Polymaker

Our Values

Customer Oriented

Responsible

Entrepreneurial

Embracing Innovation

Mission

Polymaker is committed to lowering the barriers to innovation and manufacturing, by continously developing advanced 3D printing material technologies for industries and consumers.

PolyMide™ PA6-CF

PolyMide™ PA6-CF is a carbon fiber reinforced PA6 (Nylon 6) filament. The carbon fiber reinforcement provides significantly improved stiffness, strength and heat resistance with outstanding layer adhesion.

Physical Properties

Property	Testing method	Typical value
Density	ASTM D792 (ISO 1183, GB/T 1033)	1.17 (g/cm3 at 21.5˚C)
Glass transition temperature	DSC, 10 °C/min	56.6 (°C)
Melt index	300 °C, 2.16 kg	20.5 (g/10 min)
Melting temperature	DSC, 10 °C/min	220 (˚C)
Crystallization temperature	DSC, 10 °C/min	186.6 (˚C)
Heat Deflection Temperature	ISO 75 1.8 MPa	196 (˚C)
Heat Deflection Temperature	ISO 75 0.45 MPa	215 (˚C)
Sheet Resistance in Moisture State	ASTM D991 (GB/T 2439， ISO 1853)	1 – 10 (10^8 Ω/sq)

Tested with 3D printed specimen of 100% infill

Mechanical Properties (Dry State)

Property	Testing method	Typical value
Young's modulus (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	7453 ± 656 (MPa)
Young's modulus (Z)	ASTM D638 (ISO 527, GB/T 1040)	4354 ± 206 (MPa)
Tensile strength (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	105.0 ± 5.0 (MPa)
Tensile strength (Z)	ASTM D638 (ISO 527, GB/T 1040)	67.7 ± 4.7 (MPa)
Elongation at break (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	3.0 ± 0.4 (%)
Elongation at break (Z)	ASTM D638 (ISO 527, GB/T 1040)	2.9 ± 0.7 (%)
Bending modulus (X-Y)	ASTMD790 (ISO 178, GB/T 9341)	8339 ± 369 (MPa)
Bending strength (X-Y)	ASTMD790 (ISO 178, GB/T 9341)	169.0 ± 4.7 (MPa)
Charpy impact strength (X-Y)	ASTM D256 (ISO 179, GB/T 1043)	13.34 ± 0.52 (kJ/m^2)

All testing specimens were printed under the following conditions:
Nozzle temperature = 300 °C, printing speed = 45 mm/s, shell: 0.8mm, infill: 100%
All specimens were annealed at 80 °C for 30 min and dried for 48h prior to testing

Mechanical Properties (Moisture Conditioned)

Property	Testing method	Typical value
Young's modulus (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	5666.07 ± 469.67 (MPa)
Young's modulus (Z)	ASTM D638 (ISO 527, GB/T 1040)	4713.82 ± 282.70 (MPa)
Tensile strength (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	81.72 ± 6.0 (MPa)
Tensile strength (Z)	ASTM D638 (ISO 527, GB/T 1040)	64.38 ± 5.64 (MPa)
Elongation at break (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	4.60 ± 0.56 (%)
Elongation at break (Z)	ASTM D638 (ISO 527, GB/T 1040)	1.78 ± 0.40 (%)
Bending modulus (X-Y)	ASTMD790 (ISO 178, GB/T 9341)	6387.46 ± 1120.96 (MPa)
Bending strength (X-Y)	ASTMD790 (ISO 178, GB/T 9341)	152.2 ± 15.57 (MPa)
Charpy impact strength (X-Y)	ASTM D256 (ISO 179, GB/T 1043)	32.83 ±1.03 (kJ/m^2)

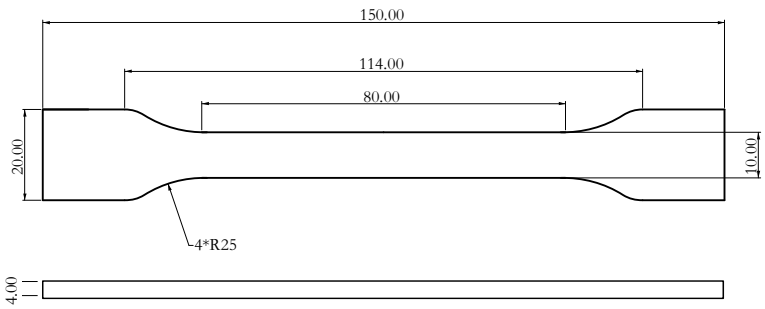
All specimens were annealed at 80 °C for 24h, and conditioned at 70% RH/23 °C and ambient temperature for 15 days prior to testing

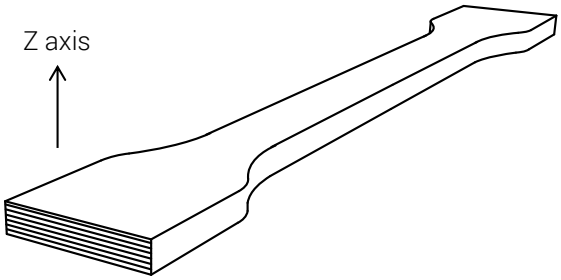
Recommended printing conditions

Parameter	
Nozzle temperature	280 - 300 (˚C)
Build Surface material	Glass, Garolite, Magigoo PA
Build surface treatment	Applying PVA glue to the build surface
Build plate temperature	25 - 50 (˚C)
Cooling fan	Turned off
Printing speed	60 (mm/s)
Raft separation distance	0.1 - 0.2 (mm)
Retraction distance	3 - 6 (mm)
Retraction speed	40 - 60 (mm/s)
Recommended environmental temperature	25 - 50 (˚C)
Threshold overhang angle	45 (˚)
Recommended support material	PolyDissolve™ S1

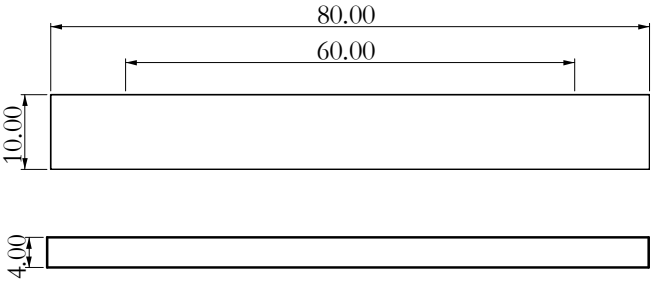
Based on 0.4 mm nozzle and Simplify 3D v.3.1. Printing conditions may vary with different nozzle diameters

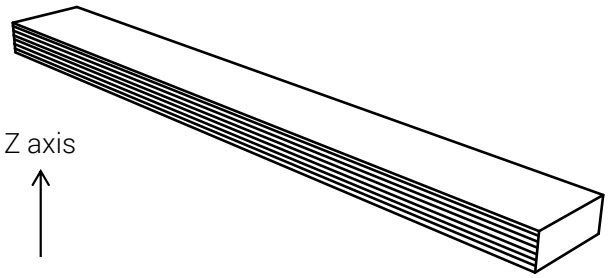
• Abrasion of the copper nozzle happens quite often when printing PolyMide™ PA6-CF. Normally, the life of a copper nozzle would be approximately 9h. A wear-resistance nozzle, such as hardened steel and ruby nozzle, is highly recommended to be used with PolyMide™ PA6-CF.
• PolyMide™ PA6-CF is sensitive to moisture and should always be stored and used under dry conditions (relative humidity below 20%).
• If PolyMide™ PA6-CF is used as the support material for itself, please remove the support structure before excessive moisture absorption. Otherwise the support structure can be permanently bonded to the model.
• After the printing process, it is recommended to anneal the model in the oven at 80 - 100°C for 1 - 3 hours.



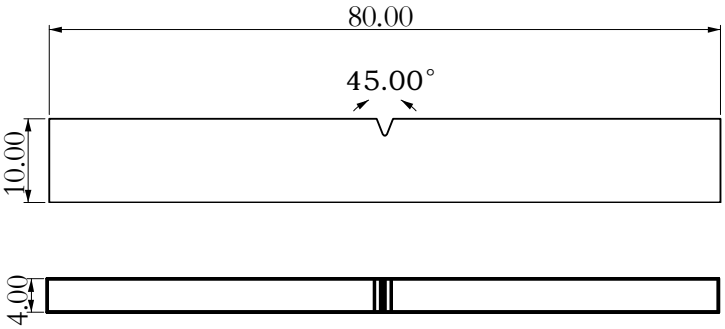


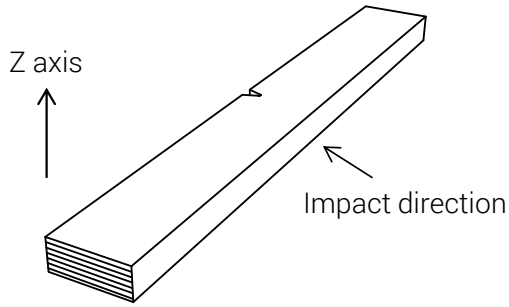
Tensile testing specimen; ASTM D638 (ISO 527, GB/T 1040)





Flexural testing specimen; ASTMD790 (ISO 178, GB/T 9341)





Impact testing specimen; ASTM D256 (ISO 179, GB/T 1043)

Disclaimer:

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Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/recycling practices of Polymaker materials for the intended application. Polymaker makes no warranty of any kind, unless announced separately, to the fitness for any use or application. Polymaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any application.

PolyMide™ PA6-GF

PolyMide™ PA6-GF is a glass fiber reinforced PA6 (Nylon 6) filament. The material exhibits excellent thermal and mechanical properties without sacrificing the layer adhesion.

Physical Properties

Property	Testing method	Typical value
Density	ASTM D792 (ISO 1183, GB/T 1033)	1.2 (g/cm3 at 21.5˚C)
Glass transition temperature	DSC, 10 °C/min	75 (°C)
Melt index	300 °C, 2.16 kg	15.9 (g/10 min)
Melting temperature	DSC, 10 °C/min	215 (˚C)
Crystallization temperature	DSC, 10 °C/min	174 (˚C)
Heat Deflection Temperature	ISO 75 1.8 MPa	124 (˚C)
Heat Deflection Temperature	ISO 75 0.45 MPa	191 (˚C)

Tested with 3D printed specimen of 100% infill

Mechanical Properties (Dry State)

Property	Testing method	Typical value
Young's modulus (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	4431 ± 184 (MPa)
Young's modulus (Z)	ASTM D638 (ISO 527, GB/T 1040)	3330 ± 145 (MPa)
Tensile strength (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	84.5 ± 2.1 (MPa)
Tensile strength (Z)	ASTM D638 (ISO 527, GB/T 1040)	61.4 ± 3.9 (MPa)
Elongation at break (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	3.4 ± 0.3 (%)
Elongation at break (Z)	ASTM D638 (ISO 527, GB/T 1040)	2.9 ± 0.7 (%)
Bending modulus (X-Y)	ASTMD790 (ISO 178, GB/T 9341)	4637 ± 293 (MPa)
Bending strength (X-Y)	ASTMD790 (ISO 178, GB/T 9341)	136.4 ± 1.6 (MPa)
Charpy impact strength (X-Y)	ASTM D256 (ISO 179, GB/T 1043)	16.5 ± 0.5 (kJ/m^2)

All testing specimens were printed under the following conditions:
Nozzle temperature = 300 °C, printing speed = 45 mm/s, shell: 0.8mm, infill: 100%
All specimens were annealed at 80 °C for 30 min and dried for 48h prior to testing

Mechanical Properties (Moisture Conditioned)

Property	Testing method	Typical value
Young's modulus (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	2050.3 ± 243.6 (MPa)
Young's modulus (Z)	ASTM D638 (ISO 527, GB/T 1040)	2593 ± 192 (MPa)
Tensile strength (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	50.8 ± 4.9 (MPa)
Tensile strength (Z)	ASTM D638 (ISO 527, GB/T 1040)	44.4 ± 4.7 (MPa)
Elongation at break (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	19.4 ± 2.2 (%)
Elongation at break (Z)	ASTM D638 (ISO 527, GB/T 1040)	2.9 ± 0.8 (%)
Bending modulus (X-Y)	ASTMD790 (ISO 178, GB/T 9341)	2232 ± 97 (MPa)
Bending strength (X-Y)	ASTMD790 (ISO 178, GB/T 9341)	65.1 ± 2.2 (MPa)
Charpy impact strength (X-Y)	ASTM D256 (ISO 179, GB/T 1043)	21.2 ± 1.1 (kJ/m^2)

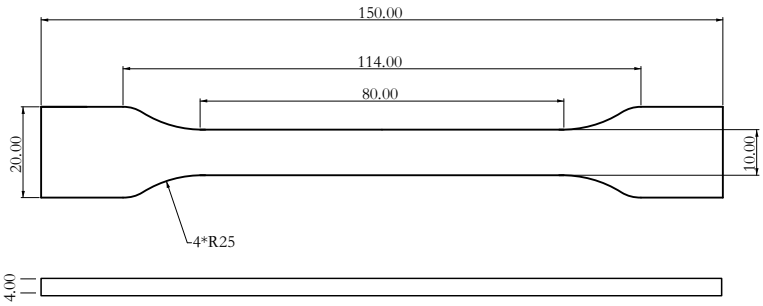
All specimens were annealed at 80 °C for 24h, and conditioned at 70% RH/23 °C and ambient temperature for 15 days prior to testing

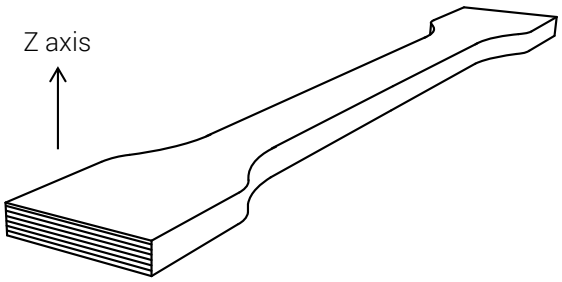
Recommended printing conditions

Parameter	
Nozzle temperature	280 - 300 (˚C)
Build Surface material	Glass, Garolite, Magigoo PA
Build surface treatment	Applying PVA glue to the build surface
Build plate temperature	25 - 50 (˚C)
Cooling fan	Turned off
Printing speed	60 (mm/s)
Raft separation distance	0.1 - 0.2 (mm)
Retraction distance	3 - 6 (mm)
Retraction speed	40 - 60 (mm/s)
Recommended environmental temperature	25 - 50 (˚C)
Threshold overhang angle	45 (˚)
Recommended support material	PolyDissolve™ S1

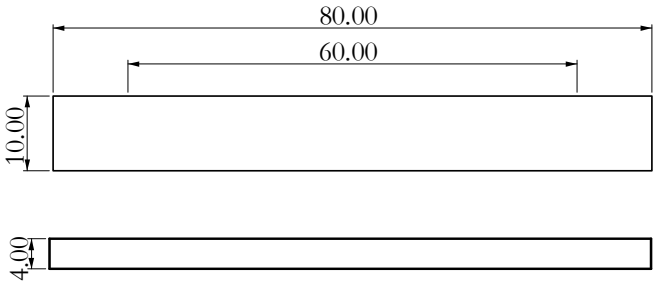
Based on 0.4 mm nozzle and Simplify 3D v.3.1. Printing conditions may vary with different nozzle diameters

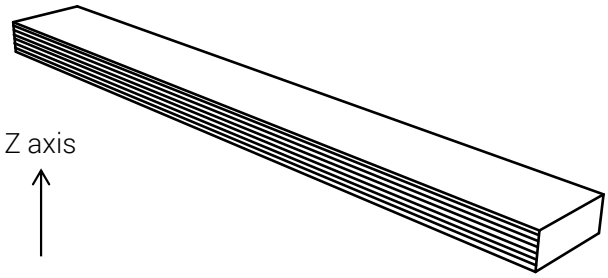
• Abrasion of the copper nozzle happens quite often when printing PolyMide™ PA6-GF. Normally, the life of a copper nozzle would be approximately 9h. A wear-resistance nozzle, such as hardened steel and ruby nozzle, is highly recommended to be used with PolyMide™ PA6-GF.
• PolyMide™ PA6-GF is sensitive to moisture and should always be stored and used under dry conditions (relative humidity below 20%).
• If PolyMide™ PA6-GF is used as the support material for itself, please remove the support structure before excessive moisture absorption. Otherwise the support structure can be permanently bonded to the model.
• After the printing process, it is recommended to anneal the model in the oven at 80 - 100°C for 1 - 3 hours.



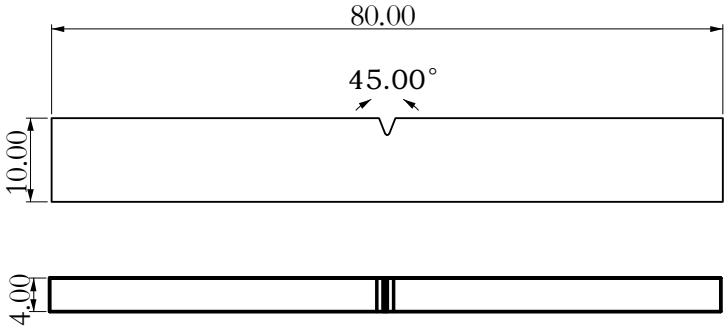


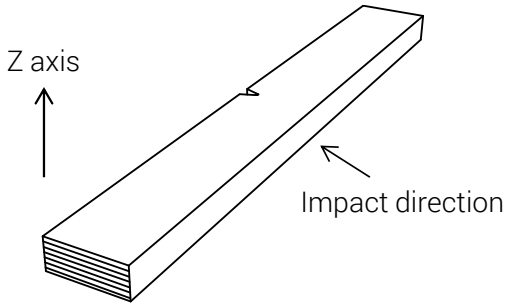
Tensile testing specimen; ASTM D638 (ISO 527, GB/T 1040)





Flexural testing specimen; ASTMD790 (ISO 178, GB/T 9341)





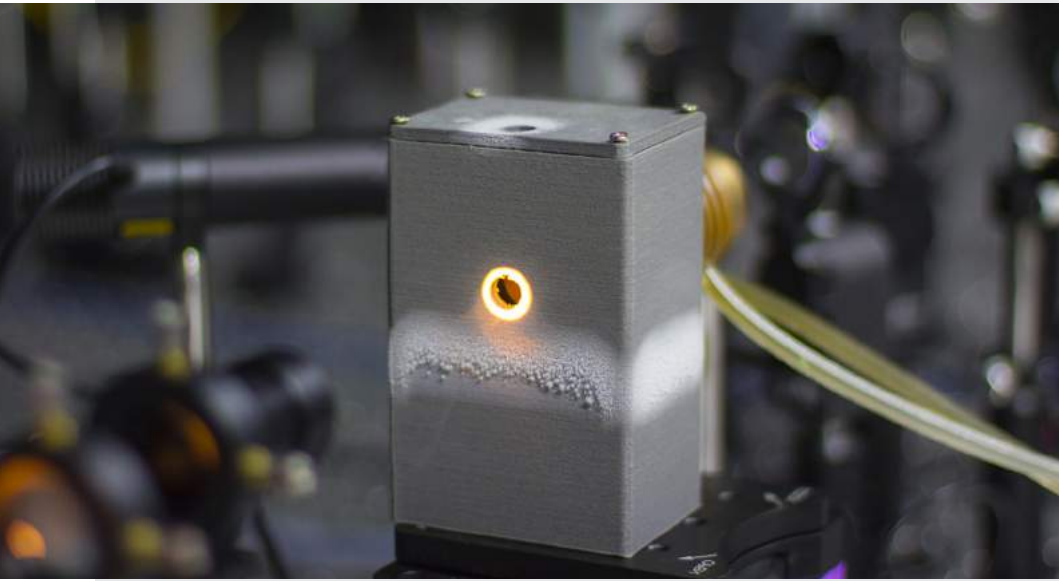
Impact testing specimen; ASTM D256 (ISO 179, GB/T 1043)

Disclaimer:

The typical values presented in this data sheet are intended for reference and comparison purposes only. They should not be used for design specifications or quality control purposes. Actual values may vary significantly with printing conditions. End- use performance of printed parts depends not only on materials, but also on part design, environmental conditions, printing conditions, etc. Product specifications are subject to change without notice.

Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/recycling practices of Polymaker materials for the intended application. Polymaker makes no warranty of any kind, unless announced separately, to the fitness for any use or application. Polymaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any application.

PolyMide™ PA6-GF



Industrial

INDEX

Printing with PolyMide™ PA6-GF

PolyMide™ PA6-GF

PolyMide™ PA6-GF is a glass fiber reinforced PA6 (Nylon 6) filament. The material exhibits excellent thermal and mechanical properties without sacrificing the layer adhesion.

Printing settings

Nozzle Temperature:	280-300 ˚C
Bed Temperature:	25-50 ˚C (Do NOT exceed 50 ˚C)
Chamber Temperature:	25-50 ˚C (Do NOT exceed 50 ˚C)
Printing Speed:	60 mm/s
Cooling Fan:	OFF

Note: Settings are based on 0.4 mm nozzle, and may vary with different printers and nozzle diameters.

Bed surface

PolyMide™ PA6-GF can be printed on almost any surface with a thin coat of PVA glue or Magigoo PA. We recommend a flex plate to facilitate the removal of the model from the plate.

Wear resistant nozzle

PolyMide™ PA6-GF contains 25% chopped glass fibers by weight which makes it very abrasive. It is important to have an abrasion resistant nozzle.

Nozzles can come in many different materials, from soft to hard:

Brass
Nickel plated copper
Steel
Stainless steel
Tool steel
Tungsten-carbide
Ceramic/Metal hybrid

PolyMide™ PA6-GF can easily damage a brass nozzle after a few hundred grams of printing. Hardened nozzles, whilst abrasion resistant, are more expensive. Therefore, it is important to consider the cost of investing in a hardened nozzle, the potential frequency of use and scale of the print project.

Note: Brass nozzle will give a better thermal conductivity than hardened nozzle such as stainless steel.

High temperature hot end

We recommend a full-metal hot end that can maintain a stable temperature of at least > 280 ˚C.

Annealing PolyMide™ PA6-GF parts

We reccomend annealing all models printed in PolyMide™ PA6-GF. This allows users to take advantage of the full mechanical and thermal properties of this material.

The annealing process consists of putting the model in an oven at 90˚C for 2 hours.

Support material

PolyDissolve™ S1 is the recommended support material for PolyMide™ PA6-GF. For more information, please visit www.polymaker.com

When using PolyMide™ PA6-GF as a self-support, it is important to remove the support structure right after printing.

Leaving the part exposed to atmospheric moisture may result in strong bonding between the support and printed part, making support removal difficult.

Feeding system

PolyMide™ PA6-GF is a very stiff filament so it is required to have a good set up to ensure a good feeding. For example we recommend avoiding excessive bending in the filament guide system.

Dry box system

PolyMide™ PA6-GF is a polyamide 6 based material which makes it very hygroscopic. This means that it is susceptible to absorbing moisture from the atmosphere which can subsequently affect the quality and mechanical properties of the final prints.

We recommend storing PolyMide™ PA6-GF in a PolyBox™ to prevent moisture absorption. If the filament has absorbed moisture it can be dried at 80˚C for 12 hours in a convection oven.

Note: Polymaker provides the filament with the right moisture amount, having a filament with an extremely low moisture content can affect its processability.

PCP: Profile Creation Process

The profile creation process (PCP) allows users to rapidly develop a printing profile for any given material/printer. During this process is important to consider all of these factors to build a successful profile.

Geometry
Material
Printer
Environment
Purpose

Polymaker developed the PCP to assist customers in creating their own tailored print profiles; taking into account the material, printer, environment as well as the models geometry and purpose. Additionally, the PCP allows individuals to develop their own knowledge and troubleshooting skills.

The PCP is available on www.polymaker.com

The PCP is divided in 5 steps:

It uses less than 300g of materials and less than 7h of working time.

Step 1: Extrusion Flow
Step 2: Flow Management
Step 3: Cooling Fan
Step 4: Warpage
Step 5: Fine Details

Each of these steps has a specific objective and introduces an important concept about the FFF 3D printing process. Each step will also give you the possibility to push your test further for more accurate results.

PolyMide™ Family

	Heat deflection temp. ASTM D648 (ISO 75)	
	1.80 Mpa HDT-A	**0.45 Mpa HDT-B**
PolyMide™ PA6-CF	196 ˚C	215 ˚C
PolyMide™ PA6-GF	124 ˚C	191 ˚C
Unreinforced PA6	80 ˚C	96 ˚C
PolyMide™ CoPA	71 ˚C	91 ˚C

	Young's modulus ASTM D638 (ISO 527, GB/T 1040)	Charpy impact resistance ASTM D256 (ISO 179, GB/T 1043)
PolyMide™ PA6-CF	7453 Mpa	13.3 kJ/m^2
PolyMide™ PA6-GF	4431 Mpa	16.5 kJ/m^2
Unreinforced PA6	2621 Mpa	9.9 kJ/m^2
PolyMide™ CoPA	2223 Mpa	9.6 kJ/m^2

Note: Tested with 3D printed specimens.

Fiber Adhesion™ Technology

Fiber Adhesion technology dramatically improves the Z-axis strength, via engineering the surface chemistry of the fibers to achieve a strong fiber/matrix bonding.

In contrast to conventional fiber-reinforced filaments, which exhibit considerable reduction in Z-axis strength, PolyMide™ PA6-GF provides a higher interlayer adhesion compared to unreinforced PA6.

Layer adhesion

Tensile strength
(Z axis)
ASTM D638
(ISO 527, GB/T 1040)

Unreinforced PA6
53.2Mpa
PolyMide™ PA6-CF
67.7Mpa
+27%

Unreinforced PA6
53.2Mpa
PolyMide™ PA6-GF
61.4Mpa
+15%

Competitor 1

35% CF by weight

PA12
48 Mpa
PA12-CF
28.9 Mpa
-40%

Competitor 2

20% CF by weight

PA6/66
23 Mpa
PA6/66-CF
18 Mpa
-40%

Competitor 3

20% GF by weight

PA6/66
23 Mpa
PA6/66-GF
15 Mpa
-35%

Competitor 4

20% GF by weight

PA6
28 Mpa
PA6-GF
21 Mpa
-25%

Material Development

If your application requires a specific material that is not yet available in the market, consider our custom development service. With our talented material scientists and application engineers, we are ready to develop the necessary materials to enable your unique application.



Material development

-Twin-screw compounding
-Single-screw extrusion
-Torque rheometry
-Wet chemistry
-Other polymer processing equipment

Testing and characterization

-Thermal characterization (DSC, softening point)
-Mechanical testing (tensile, 3-point bending)
-Optical microscopy
-Capillary rheometry
-FTIR-ATR

3D Printing

-3D printing
-Post-processing
-Application development

Our state-of-the art R&D facilities allow us to engineer materials at different levels and fully optimize them for 3D printing. Our goal is to deliver materials with the right combination of properties/functions, processability and form to suit your needs!

Application

Processability technologies

Printing thechnologies
Post-processing
Other

Properties & functions

Mechanical
Thermal
Electrical
Other

Form

Pellet
Filament
Powder
Other

Polymaker products

PolyLite™

PLA
PETG
ABS
PC
ASA

PolyMax™

PLA
PETG
PC

PolyFlex™

TPU95

PolyMide™

CoPA
⚙ PA6-CF
⚙ PA6-GF

PolyDissolve™

S1

Specialty

PolyWood™
PolySmooth™
PolySupport™
PolyCast™

Hardware

PolyBox™
Polysher™

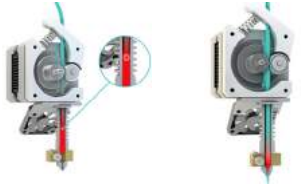
More products coming soon...

Technologies

JAM-FREE™

Regular PLA

With Jam-Free™



ASH-FREE™

Without Ash-Free™
Ash content: 0.5%

With Ash-Free™
Ash content: 0.003%

WARP-FREE™

Regular Nylon

With Warp-Free™

STABILIZED FOAMING™

Wood

Stabilized Foaming™

LAYER-FREE™

Rough surface

With Layer-Free™

FIBER ADHESION™

NANO-REINFORCEMENT

About Polymaker

Our Values

Customer Oriented

Responsible

Entrepreneurial

Embracing Innovation

Mission

Polymaker is committed to lowering the barriers to innovation and manufacturing, by continuously developing advanced 3D printing material technologies for industries and consumers.

Technical datasheet

colorFabb CopperFill

Date of issue: August 9, 2017
Version: v1.0

ColorFabb CopperFill is a high quality PLA 3D printing filament, loaded with a high amount of copper particles, especially developed for aesthetic prints. After printing, the objects need to be polished which will result in shiny copper-like objects.

TYPICAL MATERIAL PROPERTIES

Physical properties	Unit	Value	Method
Density	g/cm3	4,0	ISO 1183
Humidity absorption (23ºC,50%RH)	%	0,3	
Tensile Strength	MPa	25	ISO 527
Flexural Strength	MPa	40	ISO 178
Flexural Modulus	MPa	7000	ISO 178
Tensile Elongation@break	%	3-10	ISO 527
Impact Strength (Izod-Un 23ºC)	kJ/m^2	10	ISO 180

FILAMENT SPECIFICATION

Nominal diameter:	Diameter tolerance	Ovality
1,75 mm	± 0,05	≥ 95%
2,85 mm	± 0,10	≥ 95%

Netto filament weight 750 grams / 1500 grams

GUIDELINE FOR PRINT SETTINGS

Advised 3D printing temperature	195 - 220°C
Advised Bed temperature	50-60°C if possible, but not strictly needed
Bed surface / modification	Glass plate, glue stick, polyimide tape, kapton tape
Active cooling fan	On
Advised 3D print speed	40-100 mm/s

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Technical datasheet

colorFabb SteelFill

Date of issue: August 9, 2017
Version: v1.0

ColorFabb SteelFill is a high quality PLA 3D printing filament, loaded with a high amount of stainless steel particles, especially developed for aesthetic prints. After printing, the objects need to be polished which will result in shiny and robust steel like appearance.

TYPICAL MATERIAL PROPERTIES

Physical properties	Unit	Value	Method
Density	g/cm3	3,13	ISO 1183
Humidity absorption (23ºC,50%RH)	%	0,3	
Tensile Strength	MPa	23	ISO 527
Flexural Strength	MPa	30	ISO 178
Flexural Modulus	MPa	3000	ISO 178
Tensile Elongation@break	%	1-3	ISO 527
Impact Strength (Izod-Un 23ºC)	kJ/m^2	10	ISO 180

FILAMENT SPECIFICATION

Nominal diameter:	Diameter tolerance	Ovality
1,75 mm	± 0,05	≥ 95%
2,85 mm	± 0,10	≥ 95%

Netto filament weight 750 grams / 1500 grams

GUIDELINE FOR PRINT SETTINGS

Advised 3D printing temperature	190 - 210°C
Advised bed temperature	50-60°C if possible, but not strictly needed
Bed surface / modification	Glass plate, glue stick, polyimide tape, kapton tape
Active cooling fan	On
Advised 3D printing speed	40-80 mm/s

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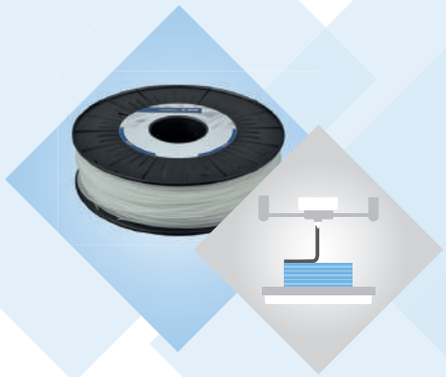
FORWARD AM
Innovating Additive Manufacturing

BASF
We create chemistry



Ultrafuse® PA

First BASF Filament Development Based on Ultramid®

Ultrafuse® PA is the translation of BASF´s Ultramid® to the 3D printing space. It is based on a copolyamide 6/66 grade of intermediate viscosity. With Ultrafuse® PA, it is possible to print semi-flexible thin parts; however, it is very rigid at higher thicknesses. It has a lower melting temperature than PA6 and PA66, meaning it can be printed at a lower temperature and also has better impact resistance versus PA6 and PA66, opening up a whole new application field for end-users.

Benefits at a Glance

- Good fatigue resistance
- High mechanical strength
- Low melting point makes it printable for many FFF printers
- Good wear resistance/ lubricity
- Good impact resistance at low temperatures

Example Applications

- Most engineering sectors
- Suitable for a wide range of different components and machine elements, such as high-grade electrical insulation material

Material Properties (dried specimens)

Tensile Strength (MPa)	**16.4 (ZX), 61.4 (XY)**
Flexural Modulus (MPa)	**2149 (ZX), 2246 (XZ), 2051 (XY)**
Elongation at Break	**0.8 % (ZX), 9.6 % (XY)**
Impact Strength Izod notched (kJ/m²)	**1.7 (ZX), 3.9 (XZ), 5.8 (XY)**
Impact Strength Izod unnotched (kJ/m²)	**3.2 (ZX), 45.6 (XZ), 28.0 (XY)**
HDT @ 0.45 MPa	**135 °C**

Printing Guidelines

Nozzle Temperature	**220 – 250 °C**
Bed Temperature	**90 – 120 °C**
Nozzle Diameter	**≥ 0.4 mm**
Bed Modification	**Glass + PVA Glue Stick / Kapton tape / PA adhesive**
Print Speed	**30 – 60 mm / s**

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Ultrafuse® PA

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Ultrafuse

BASF
We create chemistry

Technical Data Sheet

Ultrafuse PA

Date / Revised: 14.06.2019

Version No.: 2.0

General information

Components

BASF Polyamide (PA) based filament for Fused Filament Fabrication.

Product Description

The key features of Ultrafuse PA are the high strength and high modulus. Furthermore, Ultrafuse PA shows a good thermal distortion stability.

Delivery form and warehousing

Ultrafuse PA filament should be stored at 15 - 25°C in its originally sealed package in a clean and dry environment. If the recommended storage conditions are observed, the products will have a minimum shelf life of 12 months.

For your information

Ultrafuse PA comes in its natural white/translucent color. Chemical properties (e.g. resistance against particular substances) and tolerance for solvents can be made available if these factors are relevant for a specific application. Generally, these properties correspond to publicly available data on polyamides. This material is not FDA conform.

Product safety

Recommended: Process materials in a well ventilated room, or use professional extraction systems. For further and more detailed information please consult the corresponding material safety data sheets.

Notice

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

Recommended 3D-Print processing parameters	
Nozzle Temperature	220 – 250 °C / 428 – 482 °F
Build Chamber Temperature	-
Bed Temperature	90 – 120 °C / 194 – 248 °F
Bed Material	Glass + PVA / Kapton tape / PA adhesive
Nozzle Diameter	≥ 0.4 mm
Print Speed	30 – 60 mm/s

Drying Recommendations	
Drying recommendations to ensure printability	70 °C in a hot air dryer for 4 to 16 hours
Optimum drying recommendations for best mechanical part properties	80 °C in a vacuum oven for at least 40 hours
Please note: To ensure constant material properties the material should always be kept dry.	

General Properties		Standard
Printed Part Density (dry)	1115 kg/m^3 / 69.6 lb/ft^3	ISO 1183-1
Printed Part Density (conditioned)	1050 kg/m^3 / 65.5 lb/ft^3	ISO 1183-1

Thermal Properties		Standard
HDT at 1.8 MPa (dry)	65 °C / 149 °F	ISO 75-2
HDT at 0.45 MPa (dry)	135 °C / 275 °F	ISO 75-2
Vicat softening point at 50 N	172 °C / 342 °F	ISO 306
Glass Transition Temperature	49 °C / 120 °F	ISO 11357-2
Crystallization Temperature	147 °C / 297 °F	ISO 11357-3
Melting Temperature	195 – 197 °C / 383 – 386 °F	ISO 11357-3
Melt Volume Rate	49.5 cm^3/10 min / 3.02 in^3/10 min (275 °C, 5 kg)	ISO 1133

Mechanical Properties | Dried specimens

Print direction	Standard	XY	XZ	ZX
		Flat	On its edge	Upright
Tensile strength	ISO 527	61.4 MPa / 8.9 ksi	-	16.4 MPa / 2.4 ksi
Elongation at Break	ISO 527	9.6 %	-	0.8 %
Young's Modulus	ISO 527	2419 MPa / 351 ksi	-	2122 MPa / 308 ksi
Flexural Strength	ISO 178	77.0 MPa / 11.2 ksi #	95.5 MPa / 13.9 ksi #	40.2 MPa / 5.8 ksi
Flexural Modulus	ISO 178	2051 MPa / 297 ksi	2246 MPa / 326 ksi	2149 MPa / 312 ksi
Flexural Strain at Break	ISO 178	No break	No break	1.8 %
Impact Strength Charpy (notched)	ISO 179-2	5.6 kJ/m^2	3.3 kJ/m^2	1.2 kJ/m^2
Impact Strength Charpy (unnotched)	ISO 179-2	23.0 kJ/m^2	29.7 kJ/m^2	3.5 kJ/m^2
Impact Strength Izod (notched)	ISO 180	5.8 kJ/m^2	3.9 kJ/m^2	1.7 kJ/m^2
Impact Strength Izod (unnotched)	ISO 180	28.0 kJ/m^2	45.6 kJ/m^2	3.2 kJ/m^2

No break, strength at 5% bending strain

Mechanical Properties | Conditioned specimens



Print direction	Standard	XY	XZ	ZX
		Flat	On its edge	Upright
Tensile strength	ISO 527	33.2 MPa / 4.8 ksi	-	17.6 MPa / 2.6 ksi
Elongation at Break	ISO 527	143.3%	-	12.8%
Young's Modulus	ISO 527	395 MPa / 57 ksi	-	334 MPa / 48 ksi
Flexural Strength	ISO 178	17.7 MPa / 2.6 ksi [#]	18.1 MPa / 2.6 ksi [#]	17.3 MPa / 2.5 ksi [#]
Flexural Modulus	ISO 178	445 MPa / 64.5 ksi	468 MPa / 67.9 ksi	428 MPa / 62.1 ksi
Flexural Strain at Break	ISO 178	No break	No break	No break
Impact Strength Charpy (notched)	ISO 179-2	-	136 kJ/m^2 [##]	9.4 kJ/m^2
Impact Strength Charpy (unnotched)	ISO 179-2	No break	No break	13.4 kJ/m^2
Impact Strength Izod (notched)	ISO 180	85.4 kJ/m^2	106.0 kJ/m^2	10.1 kJ/m^2
Impact Strength Izod (unnotched)	ISO 180	No break	No break	17.4 kJ/m^2

[#] No break, strength at 5% bending strain
[##] Partial rupture

Technical Data Sheet

Ultrafuse PA

Date / Revised: 12.11.2019

Version No.: 2.2

General information

Components

BASF Polyamide (PA) based filament for Fused Filament Fabrication.

Product Description

The key features of Ultrafuse PA are the high strength and high modulus. Furthermore, Ultrafuse PA shows a good thermal distortion stability.

Delivery form and warehousing

Ultrafuse PA filament should be stored at 15 - 25°C in its originally sealed package in a clean and dry environment. If the recommended storage conditions are observed the products will have a minimum shelf life of 12 months.

Product safety

Recommended: Process materials in a well ventilated room, or use professional extraction systems. For further and more detailed information please consult the corresponding material safety data sheets.

Notice

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

Recommended 3D-Print processing parameters	
Nozzle Temperature	220 – 250 °C / 428 – 482 °F
Build Chamber Temperature	-
Bed Temperature	90 – 120 °C / 194 – 248 °F
Bed Material	Glass + PVA / Kapton tape / PA adhesive
Nozzle Diameter	≥ 0.4 mm
Print Speed	30 – 60 mm/s

Drying Recommendations	
Drying recommendations to ensure printability	70 °C in a hot air dryer for 4 to 16 hours
Optimum drying recommendations for best mechanical part properties	80 °C in a vacuum oven for at least 40 hours
Please note: To ensure constant material properties the material should always be kept dry.	

General Properties		Standard
Printed Part Density (dry)	1115 kg/m^3 / 69.6 lb/ft3	ISO 1183-1
Printed Part Density (conditioned)	1050 kg/m^3 / 65.5 lb/ft3	ISO 1183-1

Thermal Properties		Standard
HDT at 1.8 MPa (dry)	65 °C / 149 °F	ISO 75-2
HDT at 0.45 MPa (dry)	135 °C / 275 °F	ISO 75-2
Vicat softening point at 50 N	172 °C / 342 °F	ISO 306
Glass Transition Temperature	49 °C / 120 °F	ISO 11357-2
Crystallization Temperature	147 °C / 297 °F	ISO 11357-3
Melting Temperature	195 – 197 °C / 383 – 386 °F	ISO 11357-3
Melt Volume Rate	49.5 cm^3/10 min / 3.02 in^3/10 min (275 °C, 5 kg)	ISO 1133

Mechanical Properties | Dried specimens

Print direction	Standard	XY	XZ	ZX
		Flat	On its edge	Upright
Tensile strength	ISO 527	61.4 MPa / 8.9 ksi	-	16.4 MPa / 2.4 ksi
Elongation at Break	ISO 527	9.6 %	-	0.8 %
Young's Modulus	ISO 527	2419 MPa / 351 ksi	-	2122 MPa / 308 ksi
Flexural Strength	ISO 178	77.0 MPa / 11.2 ksi #	95.5 MPa / 13.9 ksi #	40.2 MPa / 5.8 ksi
Flexural Modulus	ISO 178	2051 MPa / 297 ksi	2246 MPa / 326 ksi	2149 MPa / 312 ksi
Flexural Strain at Break	ISO 178	No break	No break	1.8 %
Impact Strength Charpy (notched)	ISO 179-2	5.6 kJ/m2	3.3 kJ/m2	1.2 kJ/m2
Impact Strength Charpy (unnotched)	ISO 179-2	23.0 kJ/m2	29.7 kJ/m2	3.5 kJ/m2
Impact Strength Izod (notched)	ISO 180	5.8 kJ/m2	3.9 kJ/m2	1.7 kJ/m2
Impact Strength Izod (unnotched)	ISO 180	28.0 kJ/m2	45.6 kJ/m2	3.2 kJ/m2

No break, strength at 5% bending strain

Mechanical Properties | Conditioned specimens

Print direction	Standard	XY	XZ	ZX
		Flat	On its edge	Upright
Tensile strength	ISO 527	33.2 MPa / 4.8 ksi	-	17.6 MPa / 2.6 ksi
Elongation at Break	ISO 527	143.3%	-	12.8%
Young's Modulus	ISO 527	395 MPa / 57 ksi	-	334 MPa / 48 ksi
Flexural Strength	ISO 178	17.7 MPa / 2.6 ksi #	18.1 MPa / 2.6 ksi #	17.3 MPa / 2.5 ksi #
Flexural Modulus	ISO 178	445 MPa / 64.5 ksi	468 MPa / 67.9 ksi	428 MPa / 62.1 ksi
Flexural Strain at Break	ISO 178	No break	No break	No break
Impact Strength Charpy (notched)	ISO 179-2	-	136 kJ/m^2 ##	9.4 kJ/m^2
Impact Strength Charpy (unnotched)	ISO 179-2	No break	No break	13.4 kJ/m^2
Impact Strength Izod (notched)	ISO 180	85.4 kJ/m^2	106.0 kJ/m^2	10.1 kJ/m^2
Impact Strength Izod (unnotched)	ISO 180	No break	No break	17.4 kJ/m^2

No break, strength at 5% bending strain
Partial rupture

Extrudr TPU Flex Line - 3d Printing Filament

Description

The Extrudr TPU Flex line with different degrees of hardness has been developed mainly for industrial applications.
The chemical resistance, which prevails in the machine environment, was taken into consideration.
As a result depending on the application area or industry, individual solutions can be offered.

Storage and Shelf Life

Store at around room temperature (18 to 27 ˚C [65–80 ˚F]) and protect from direct heat or sun light. Keep sealed in an air tight container, away from humidity.

TPU hard

Property	Testing Method	Typical Value
Hardness	ISO 868	Shore D58
Specific Gravity	ISO 2781	1.19 -1,24 g/cm^3
Ultimate Elongation	ISO 527-2/5A/500	480%
Tensile Strength	ISO 527-2/5A/500	40 MPa
Tear Strenght	ISO 34-1B	170kN/m
Vicat Softening Point	ISO 306 (A50)	137˚C

TPU medium

Property	Testing Method	Typical Value
Hardness	ISO 868	Shore A98
Specific Gravity	ISO 2781	1.18 -1,23 g/cm^3
Ultimate Elongation	ISO 527-2/5A/500	470%
Tensile Strength	ISO 527-2/5A/500	40 MPa
Tear Strenght	ISO 34-1B	175kN/m
Vicat Softening Point	ISO 306 (A50)	115˚C

TPU soft

Property	Testing Method	Typical Value
Hardness	ISO 868	Shore A82
Specific Gravity	ISO 2781	1.16 -1,21 g/cm^3
Ultimate Elongation	ISO 527-2/5A/500	630%
Tensile Strength	ISO 527-2/5A/500	40 MPa
Tear Strenght	ISO 34-1B	80kN/m
Vicat Softening Point	ISO 306 (A50)	77˚C

Speed vs. Temperature

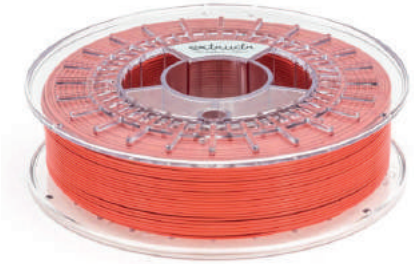
The printing speed and its related temperature is not only defined by the design of the 3D model, but also by the printer, hotend and nozzle being used.

For questions or further information please contact us.

support@extrudr.eu

Settings

Extrudr:	190 - 230˚C
Heating bed:	0-90 ˚C
Speed:	up to 80mm/s



True Colors

T

Technical Support

Contact us regarding any questions, improvement suggestions, or problems with this product.

Mechanical Properties	++
Abrasion Resistance	++
Low Temperature Flexibility	+
Hydrolytic Stability	0
Heat Ageeing	++
Resistance to Oil and Fuels	++

Excellent	++
O.K.	0
Weak	-

Höchsterstrasse 81, 6972 Fussach, Austria.
FN 412622y | UID ATU68570147 | ATEOS100061094

Our mailing address is:
info@extrudr.eu

www.extrudr.eu

TECHNICAL DATA SHEET
TPU Flex Hard

DESCRIPTION

TPU FLEX is a durable elastomere based on Polycaprolacton-Polyester. It was specially developed for industrial applications and is ideally suited for the production of elastic and damping components. The material is optimized for the FFF/FDM process in regards to thermal stability and better flow properties. The raw material is compliant according to the REACH- and RoHS-Standards.

FEATURES

- Extreme layer bonding
- Excellent chemical resistance
- Free of silicone, softeners and oil
- Free of halogen
- UV-Resistant

PROPERTIES [1]

TEST	METHOD	UNIT	VALUE
Tensile modulus (E-Modulus)	ISO 527-2/5A/500	MPa	40
Ultimate elongation	ISO 527-2/5A/500	%	490
Stress at break	ISO 527-2/5A/500	MPa	16 (50%)
	ISO 527-2/5A/500	MPa	16 (100%)
	ISO 527-2/5A/500	MPa	29 (300%)
VICAT A (VST)	ISO 306	°C	140*
Melting temperature	ISO 3146-C	°C	190-210
Density	ISO 2781	g/cm³	1.2
Abrasion resistance	ISO 4649-A	mm³	26
Shore hardness	ISO 868	Shore	58D
Tear strength	ISO 34-1B	kN/m	175
Glass transition temperature		°C	-24
Permeability AIR	DIN 53380	25°/60°C	420/-
Permeability N2	DIN 53380	25°/60°C	300/1600
Permeability O2	DIN 53380	25°/60°C	790/3900
Permeability CO2	DIN 53380	25°/60°C	5800/1700
Permeability N2O	DIN 53380	25°/60°C	11600/-

*Temperature resistance tested at a minimum wall thickness of 4 mm.

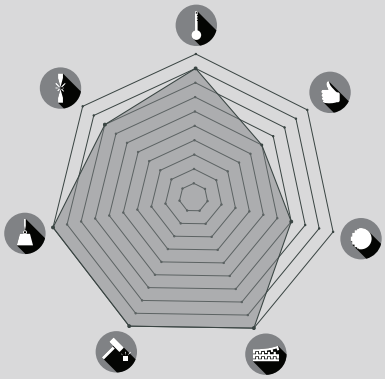
CERTIFICATIONS & ADDITIONAL INFORMATION [2]

RoHS COMPLIANT
REACH COMPLIANT
FDA COMPLIANT
CHEMICAL RESISTANT
FREE OF SILICONE
58D SHORE 58D

STORAGE AND SHELF LIFE

Store in a dry room at room temperature (18-27°C / 65-80°F). Keep out of direct heat and sunlight. When stored correctly, this material has a shelf life of 2 years.

1. Additional info in our **regulatory, additional information** and **chemical resistance data sheets.**
2. **Certifications depend on colors in final product. More info in the additional information sheet.**



TEMPERATURE RESISTANCE	9
EASE OF PRINTING	6
VISUAL QUALITY	7
LAYER ADHESION	10
IMPACT RESISTANCE	10
MAXIMUM STRESS	10
ELONGATION AT BREAK	8

PRINT SETTINGS

Nozzle	230-260°C
Heatbed	50-60°C
Adhesive	not required
Speed	20-40mm/s
Cooling	0-30%

Recommended settings for printers with a 0.4mm Nozzle. Max. 50% layerheight. Optimal print settings may vary between different printers and also depend on environmental factors.

NEED HELP?

If you have any question about the product and/or you are experiencing an issue, please contact us via **support@extrudr.com**

PolyLite™ ASA

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My first print

1) Prepare the gcode

Download the MyFirstPrint.stl on **www.polymaker.com**
Load the stl file in your favorite slicer.

Enter the correct settings for PolyLite™ ASA;

Property	Value
Nozzle temperature	240˚C-260˚C
Bed temperature	75˚C-95˚C
Nozzle speed	30mm/s – 50mm/s
Cooling fan	OFF
Layer height	0.1
Infill	20%
Number of outlines (shell)	3
Top/Bottom layers	4
Surface adhesion	Brim or Raft

2) Prepare the printer

- Clean the build plate and prepare it with the right surface:
We recommend to print **PolyLite™ ASA** on BuildTak® or using Magigoo.
- Level the build plate.
- It is recommended to clean the nozzle when you change the material to prevent partial clog.

Note: It is recommended to use an enclosure to print **PolyLite™ ASA** to prevent warping issue.
It is recommended to place the printer in a well ventilated area.

3) Prepare the filament

- Carefully open the resealable bag, remove the spool and close the bag back to preserve the desiccant bag.
- It is recommended to store **PolyLite™ ASA** in the **PolyBox™** to prevent moisture absorption which will lower the quality and the mechanical properties of the print.
- Load the filament in your printer and wait until you have a consistent extrusion.
- At the end of the print, make sure to correctly store the filament back in the resealable bag if you are not using the **PolyBox™**.

4) Start the print

When the print begins make sure the first layer is correctly laid down and sticking well to the bed before leaving the printer to finish the print.

5) Post process

PolyLite™ ASA can be wet sanded to obtain a smoother surface.
PolyLite™ ASA can be chemically smoothed with acetone. We highly recommend to use our **PolySmooth™** filament for this purpose as it can be smooth with IPA which is safer to manipulate than acetone.

PolyLite™ ASA

PolyLite™ ASA is an alternative to ABS with an improved weather resistance. Its UV resistance and excellent mechanical properties make it the perfect choice for real life applications.

Available colors:

Physical properties

Property	Testing method	Typical value
Density	ASTM D792 (ISO 1183, GB/T 1033)	1.1 (g/cm³ at 21.5 °C)
Glass transition temperature	DSC, 10 °C/min	97.8 (°C)
Vicat softening temperature	ASTM D1525 (ISO 306, GB/T 1633)	105.3 (°C)
Melt Index	220 °C, 10 kg	25 (g/10 min)

Mechanical properties

Property	Testing method	Typical value
Young's modulus (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	2379 ± 157 (MPa)
Tensile strength (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	43.8 ± 0.8 (MPa)
Elongation at break (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	6.7 ± 0.6 (%)
Bending modulus	ASTM D790 (ISO 178, GB/T 9341)	3206 ± 108 (MPa)
Bending strength	ASTM D790 (ISO 178, GB/T 9341)	73.4 ± 2.1 (MPa)
Charpy impact strength	ASTM D256 (ISO 179, GB/T 1043)	10.3 ± 0.4 (kJ/m2)

Drying settings

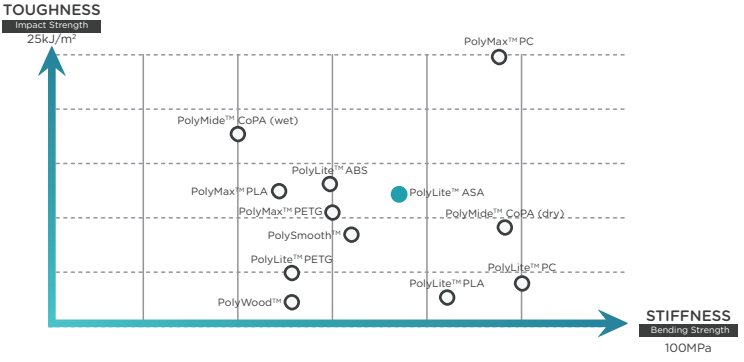
80˚C for 8h

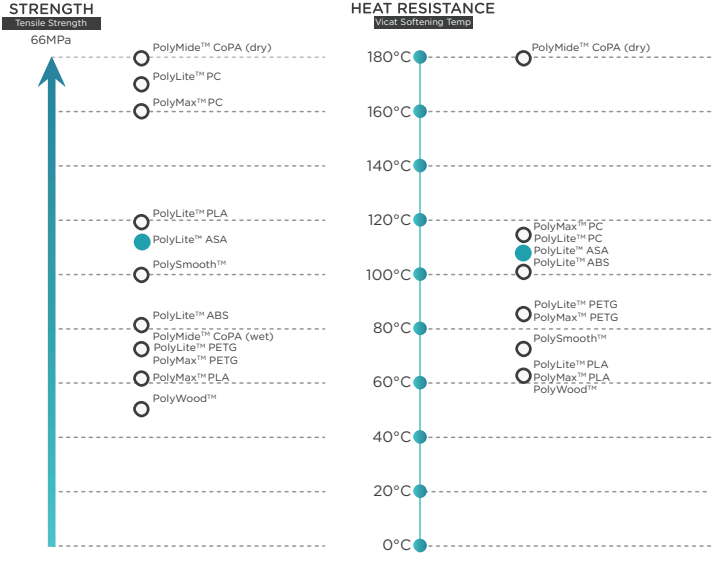
Diameter accuracy (2.85/1.75 mm):

70%	is within	+/- 0.01
97%	is within	+/- 0.02
99%	is within	+/- 0.03
99.9%	is within	+/- 0.04

Weight accuracy:

600g	+/-	20g
750g	+/-	20g
1000g	+/-	30g
3000g	+/-	60g


TOUGHNESS
Impact Strength
25kJ/m²
PolyMax™ PC
PolyMide™ CoPA (wet)
PolyLite™ ABS
PolyMax™ PLA
PolyLite™ ASA
PolyMax™ PETG
PolyMide™ CoPA (dry)
PolySmooth™
PolyLite™ PETG
PolyLite™ PC
PolyLite™ PLA
PolyWood™
STIFFNESS
Bending Strength
100MPa


STRENGTH
Tensile Strength
66MPa
PolyMide™ CoPA (dry)
PolyLite™ PC
PolyMax™ PC
PolyLite™ PLA
PolyLite™ ASA
PolySmooth™
PolyLite™ ABS
PolyMide™ CoPA (wet)
PolyLite™ PETG
PolyMax™ PETG
PolyMax™ PLA
PolyWood™
HEAT RESISTANCE
Vicat Softening Temp
180°C
160°C
140°C
120°C
100°C
80°C
60°C
40°C
20°C
0°C
PolyMide™ CoPA (dry)
PolyMax™ PC
PolyLite™ PC
PolyLite™ ASA
PolyLite™ ABS
PolyLite™ PETG
PolyMax™ PETG
PolySmooth™
PolyLite™ PLA
PolyMax™ PLA
PolyWood™

Product Families

PolyLite™

ABS, PETG, PLA, PC, ASA

PolyLite™ is a family of 3D printing filaments made with the best raw materials to deliver exceptional quality and reliability. PolyLite™ covers the most popular 3D printing materials to meet your everyday needs in design and prototyping.

PolyMax™

PLA, PC, PETG

The PolyMax™ is a family of advanced 3D printing filaments produced with Polymaker's Nano-reinforcement technology, to deliver exceptional mechanical properties and printing quality.

PolyFlex™

TPU95

PolyFlex™ is a family of high-quality flexible materials. It provides the perfect solution for applications where high flexibility and durability are required.

PolyMide™

CoPA

PolyMide™ is a family of Nylon/polyamide based filaments. Produced with Polymaker's Warp-Free™ technology, PolyMide™ filaments deliver engineering properties intrinsic to Nylon and ease of printing.

PolyDissolve™

S1

PolyDissolve™ is a family of dissolvable support filaments. This family offers support solution for our portfolio of filaments. It enables a greater design freedom.

Specialty

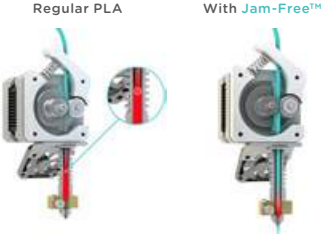
PolyWood™, PolySupport™, PolySmooth™, PolyCast™

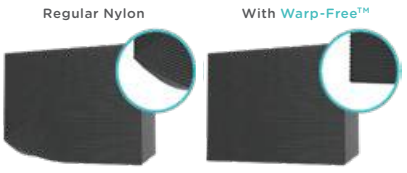
The Specialty family provides unique filaments from Polymaker to unlock new 3D printing applications.

Technologies

JAM-FREE™

Jam-Free™ technology improves the heat stability of Polymaker's PLA filaments with softening temperatures over 140 °C. As a result, Polymaker's PLA filaments show minimal softening in the "cold end" and can melt rapidly once entering the heating zone, leading to excellent printing quality with zero risk of nozzle jams.





WARP-FREE™

Warp-Free™ technology enables the production of Nylon-based filaments that can be 3D printed with excellent dimensional stability and near-zero warpage. This is achieved by the fine control of micro-structure and crystallization behavior of Nylon, which enables the material to fully release the internal stress before solidification.

ASH-FREE™

Ash-Free™ technology allows Polymaker's filament which has been designed for investment casting to burn off cleanly without any residue, enabling defect-free metal parts. 3D printing has been used to produce investment casting patterns as it cuts down both the cost and lead time for small-volume production runs.

LAYER-FREE™

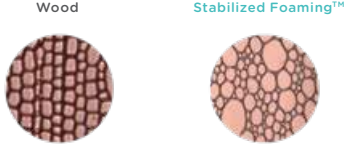
Layer-Free™ technology involves exposing a 3D printed part to an aerosol of micro-sized alcohol droplets, generated by a rapidly vibrating, perforated membrane called the nebulizer. The aerosol will then be adsorbed by the surface of the 3D printed part and render it smooth and layer-free.

NANO-REINFORCEMENT

Nano-reinforcement technology is applied to produce filaments with excellent mechanical properties and printing quality. It dramatically improves the toughness of the material by increasing its impact resistance.

STABILIZED FOAMING™

Stabilized Foaming™ technology is used to produce foamed filaments, whose foam structure can survive the printing process and be inherited by the printed parts. This enables light weight 3D printed parts with unprecedented surface finish.



Hardware

Polymaker offers 3D printing accessories to optimize the user experience with their filaments.

PolyBox™

PolyBox™ is a dry storage box designed to provide the optimum environment for 3D printing filaments. The PolyBox™ is compatible with all 3D printers and can house two 1kg spools or one 3kg spool.

Polysher™

The Polysher™ is a desktop post processing unit designed to remove layer lines from PolySmooth™ and PolyCast™ prints. The Polysher™ uses Polymaker's Layer-Free™ technology to create a fine mist of alcohol which evenly smooths the model.

About Polymaker

Who We Are?

Polymaker is an international team passionate about 3D printing. We produce the very best 3D printing materials by controlling every stage of production. With a diverse portfolio of materials ranging from high performance plastics to unique aesthetic solutions, Polymaker will continue to add cutting edge materials to its ever-growing portfolio.

Mission & Vision

Our mission is to create the best in class when it comes to 3D printing materials. We believe that materials are the enabling factor which will realise 3D printing as a final production tool. Our high performance materials offer solutions that will develop 3D printing into a mainstream manufacturing method.

Locations

Polymaker is a global company head-quartered in Shanghai. With distribution centers located in North America, Europe & Asia, our materials have penetrated every corner of the globe. Our worldwide presence is closely managed through our relationships with our local distributors and resellers. Polymaker is a regular exhibitor at 3D printing exhibitions on 4 continents.

Research & Development

At the core of Polymaker is our research & development laboratory, this is where all our materials are formulated and fine-tuned from the ground up to create the best in class 3D printing materials. Our precision testing equipment combines the latest advancements in technology to ensure we are ahead of the game.

Quality Control

Polymaker implements a rigorous quality control check on all materials. Utilizing our state of the art technology, we measure both the roundness and diameter of our filaments many thousand times a second, monitoring our processes with strict tolerances. We also have a number of processes and technologies that set apart Polymaker materials.

polymaker

Innovators in 3D printing

Technical Data Sheet

PolyLite™ ASA

www.polymaker.com

V5.0

PolyLite™ ASA

PolyLite™ ASA is an alternative to ABS with an improved weather resistance. Its UV resistance and excellent mechanical properties make it the perfect choice for real life applications.

PHYSICAL PROPERTIES

Property	Testing Method	Typical Value
Density	ISO1183, GB/T1033	1.13 g/cm^3 at 21°C
Melt Index	220°C, 10 kg	25 g/10min
Light Transmission	N/A	N/A
Flame retardancy	UL94	V2

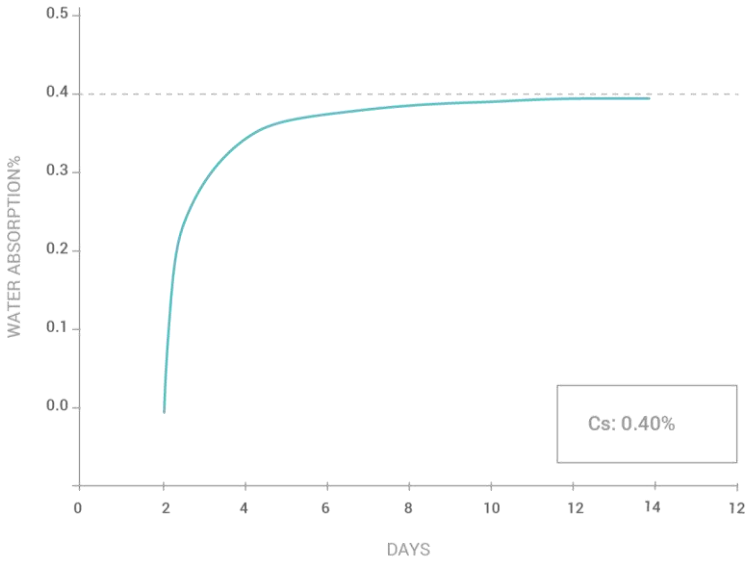
CHEMICAL RESISTANT DATA

Property	Testing Method
Effect of weak acids	Resistance
Effect of strong acids	Slightly Resistant
Effect of weak alkalis	Resistance
Effect of strong alkalis	Slightly Resistant
Effect of organic solvent	Not Resistant
Effect of oils and grease	Resistance
Effect of Sunlight	Resistance

MOISTURE ABSORPTION CURVE

PolyLite™ ASA

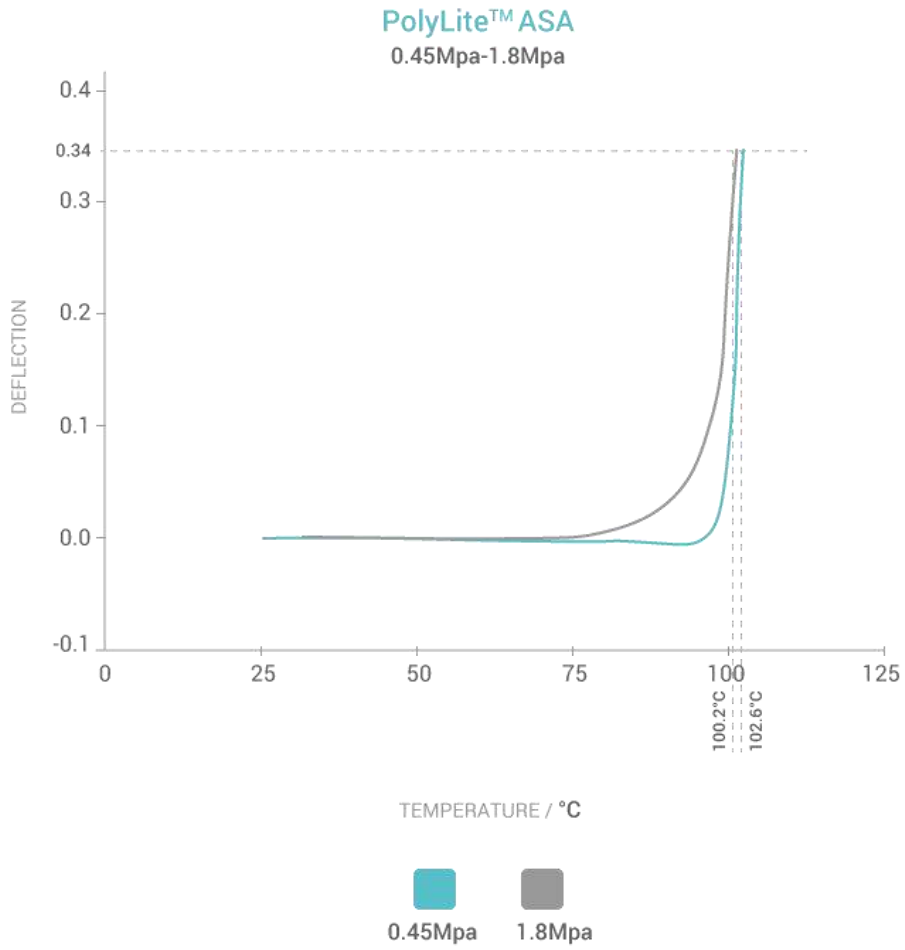
70%RH - 23°C



THERMAL PROPERTIES

Property	Testing Method	Typical Value
Glass transition	DSC, 10°C/min	97.8 °C
Melting temperature	DSC, 10°C/min	N/A
Crystallization temperature	DSC, 10°C/min	N/A
Decomposition temperature	TGA, 20°C/min	N/A
Vicat softening temperature	ISO 306 GB/T 1633	105.3 °C
Heat deflection temperature	ISO 75 1.8MPa	100.2 °C
Heat deflection temperature	ISO 75 0.45MPa	102.6 °C
Thermal conductivity	N/A	N/A
Heat shrinkage rate	N/A	N/A

HDT CURVE



MECHANICAL PROPERTIES

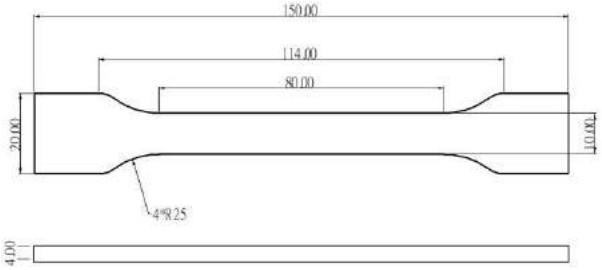
Property	Testing Method	Typical Value
Young's modulus (X-Y)	ISO 527, GB/T 1040	2379 ± 157 MPa
Young's modulus (Z)		1965 ± 136 MPa
Tensile strength (X-Y)	ISO 527, GB/T 1040	43.8 ± 0.8 MPa
Tensile strength (Z)		32 ± 1.8 MPa
Elongation at break (X-Y)	ISO 527, GB/T 1040	6.7 ± 0.6 %
Elongation at break (Z)		1.65 ± 0.2 %
Bending modulus (X-Y)	ISO 178, GB/T 9341	3206 ± 108 MPa
Bending modulus (Z)		N/A
Bending strength (X-Y)	ISO 178, GB/T 9341	73.4 ± 2.1 MPa
Bending strength (Z)		N/A
Charpy impact strength (X-Y)	ISO 179, GB/T 9343	10.3 ± 0.4 kj/m^2
Charpy impact strength (Z)		6.7 ± 1.4 kj/m^2

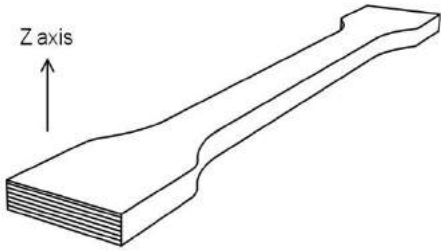
HOW TO MAKE SPECIMENS

Printing temperature	260 °C
Bed temperature	90 °C
Shell	2
Top & bottom layer	4
Infill	100%
Environmental temperature	50 – 70 (recommended) (˚C)
Cooling fan	OFF

TENSILE TESTING SPECIMEN

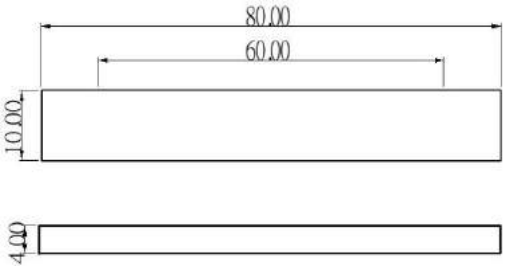
ASTM D638 (ISO 527, GB/T 1040)

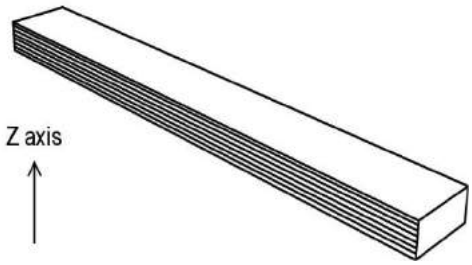




FLEXURAL TESTING SPECIMEN

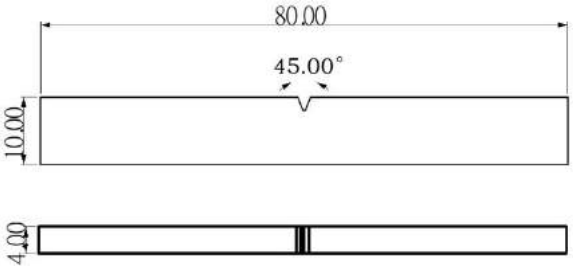
ASTM D638 (ISO 527, GB/T 1040)

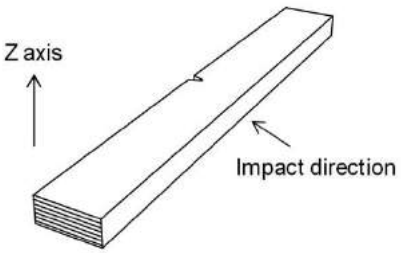




IMPACT TESTING SPECIMEN

ASTM D638 (ISO 179, GB/T 1043)





DISCLAIMER:

The typical values presented in this data sheet are intended for reference and comparison purposes only. They should not be used for design specifications or quality control purposes. Actual values may vary significantly with printing conditions. End- use performance of printed parts depends not only on materials, but also on part design, environmental conditions, printing conditions, etc. Product specifications are subject to change without notice.

Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/ recycling practices of Polymaker materials for the intended application. Polymaker makes no warranty of any kind, unless announced separately, to the fitness for any use or application. Polymaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any application.

PolyLite™ PETG

INDEX

My first print

1) Prepare the gcode

Download the MyFirstPrint.stl on **www.polymaker.com**
Load the stl file in your favorite slicer.

Enter the correct settings for PolyLite™ PETG;

Property	Value
Nozzle temperature	230˚C - 240˚C
Bed temperature	70˚C - 80˚C
Nozzle speed	30mm/s – 50mm/s
Cooling fan	ON
Layer height	0.1
Infill	20%
Number of outlines (shell)	3
Top/Bottom layers	4
Surface adhesion	Brim

2) Prepare the printer

- Clean the build plate and prepare it with the right surface:
We recommend to print **PolyLite™ PETG** on BuildTak® or glass with glue.
- Level the build plate.
- It is recommended to clean the nozzle when you change the material to prevent partial clog.

Note: It is recommended to use an enclosure to print **PolyLite™ PETG** to prevent warping issue.
It is recommended to place the printer in a well ventilated area.

3) Prepare the filament

- Carefully open the resealable bag, remove the spool and close the bag back to preserve the desiccant bag.
- It is recommended to store **PolyLite™ PETG** in the **PolyBox™** to prevent moisture absorption which will lower the quality and the mechanical properties of the print.
- Load the filament in your printer and wait until you have a consistent extrusion.
- At the end of the print, make sure to correctly store the filament back in the resealable bag if you are not using the **PolyBox™**.

4) Start the print

When the print begins, make sure the first layer is correctly laid down and sticking well to the bed before leaving the printer to finish the print.

5) Post process

PolyLite™ PETG can be sanded to obtain a smoother surface.

PolyLite™ PETG

PolyLite™ PETG is an affordable PETG filament with balanced mechanical properties and ease of printing.

Available colors:

Physical properties

Property	Testing method	Typical value
Density	ASTM D792 (ISO 1183, GB/T 1033)	1.25 (g/cm³ at 21.5 °C)
Glass transition temperature	DSC, 10 °C/min	81 (°C)
Vicat softening temperature	ASTM D1525 (ISO 306, GB/T 1633)	84 (°C)
Melt Index	210 °C, 2.16 kg	3.9 (g/10 min)
Melt Index	240 °C, 2.16 kg	10.8 (g/10 min)

Mechanical properties

Property	Testing method	Typical value
Young's modulus (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	1472 ± 270 (MPa)
Tensile strength (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	31.9 ± 1.1 (MPa)
Elongation at break (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	6.8 ± 0.9 (%)
Bending modulus	ASTM D790 (ISO 178, GB/T 9341)	1174 ± 64 (MPa)
Bending strength	ASTMD790 (ISO 178, GB/T 9341)	53.7 ± 2.4 (MPa)
Charpy impact strength	ASTM D256 (ISO 179, GB/T 1043)	5.1 ± 0.3 (kJ/m²)

Drying settings

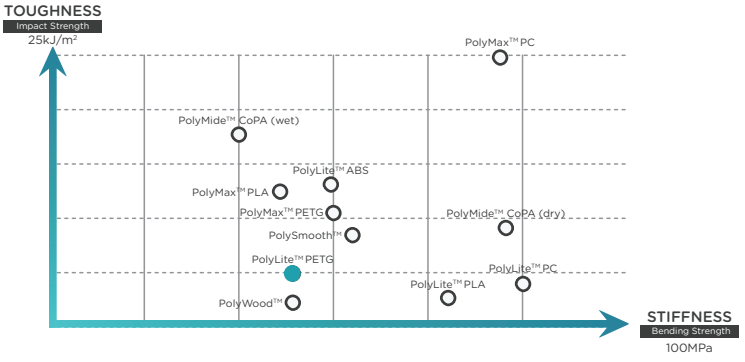
70˚C for 8h

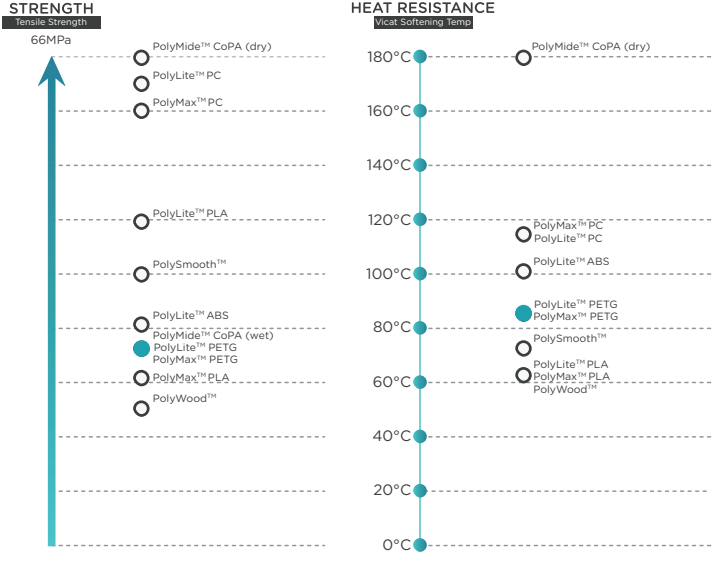
Diameter accuracy (2.85/1.75 mm):

70%	is within	+/- 0.01
97%	is within	+/- 0.02
99%	is within	+/- 0.03
99.9%	is within	+/- 0.04

Weight accuracy:

600g	+/-	20g
750g	+/-	20g
1000g	+/-	30g
3000g	+/-	60g


TOUGHNESS
Impact Strength
25kJ/m²
PolyMax™ PC
PolyMide™ CoPA (wet)
PolyLite™ ABS
PolyMax™ PLA
PolyMax™ PETG
PolyMide™ CoPA (dry)
PolySmooth™
PolyLite™ PETG
PolyLite™ PC
PolyLite™ PLA
PolyWood™
STIFFNESS
Bending Strength
100MPa


STRENGTH
Tensile Strength
66MPa
PolyMide™ CoPA (dry)
PolyLite™ PC
PolyMax™ PC
PolyLite™ PLA
PolySmooth™
PolyLite™ ABS
PolyMide™ CoPA (wet)
PolyLite™ PETG
PolyMax™ PETG
PolyMax™ PLA
PolyWood™
HEAT RESISTANCE
Vicat Softening Temp
180°C
160°C
140°C
120°C
100°C
80°C
60°C
40°C
20°C
0°C
PolyMide™ CoPA (dry)
PolyMax™ PC
PolyLite™ PC
PolyLite™ ABS
PolyLite™ PETG
PolyMax™ PETG
PolySmooth™
PolyLite™ PLA
PolyMax™ PLA
PolyWood™

Product Families

PolyLite™

ABS, PETG, PLA, PC

PolyLite™ is a family of 3D printing filaments made with the best raw materials to deliver exceptional quality and reliability. PolyLite™ covers the most popular 3D printing materials to meet your everyday needs in design and prototyping.

PolyMax™

PLA, PC, PETG

The PolyMax™ is a family of advanced 3D printing filaments produced with Polymaker's Nano-reinforcement technology, to deliver exceptional mechanical properties and printing quality.

PolyFlex™

TPU95

PolyFlex™ is a family of high-quality flexible materials. It provides the perfect solution for applications where high flexibility and durability are required.

PolyMide™

CoPA

PolyMide™ is a family of Nylon/polyamide based filaments. Produced with Polymaker's Warp-Free™ technology, PolyMide™ filaments deliver engineering properties intrinsic to Nylon and ease of printing.

PolyDissolve™

S1

PolyDissolve™ is a family of dissolvable support filaments. This family offers support solution for our portfolio of filaments. It enables a greater design freedom.

Specialty

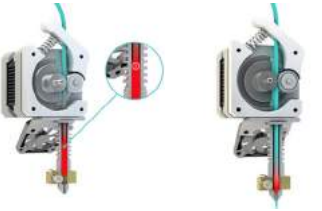
PolyWood™, PolySupport™, PolySmooth™, PolyCast™

The Specialty family provides unique filaments from Polymaker to unlock new 3D printing applications.

Technologies

Regular PLA

With Jam-Free™

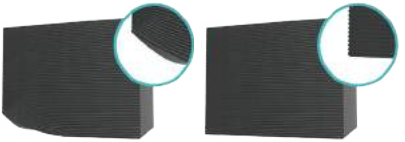


JAM-FREE™

Jam-Free™ technology improves the heat stability of Polymaker's PLA filaments with softening temperatures over 140 °C. As a result, Polymaker's PLA filaments show minimal softening in the "cold end" and can melt rapidly once entering the heating zone, leading to excellent printing quality with zero risk of nozzle jams.

Regular Nylon

With Warp-Free™



WARP-FREE™

Warp-Free™ technology enables the production of Nylon-based filaments that can be 3D printed with excellent dimensional stability and near-zero warpage. This is achieved by the fine control of micro-structure and crystallization behavior of Nylon, which enables the material to fully release the internal stress before solidification.

Without Ash-Free™
Ash content: 0.5%

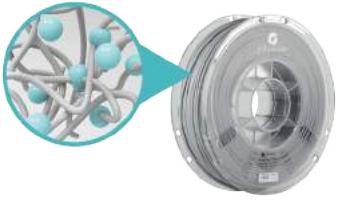
With Ash-Free™
Ash content: 0.003%

ASH-FREE™

Ash-Free™ technology allows Polymaker's filament which has been designed for investment casting to burn off cleanly without any residue, enabling defect-free metal parts. 3D printing has been used to produce investment casting patterns as it cuts down both the cost and lead time for small-volume production runs.

LAYER-FREE™

Layer-Free™ technology involves exposing a 3D printed part to an aerosol of micro-sized alcohol droplets, generated by a rapidly vibrating, perforated membrane called the nebulizer. The aerosol will then be adsorbed by the surface of the 3D printed part and render it smooth and layer-free.



NANO-REINFORCEMENT

Nano-reinforcement technology is applied to produce filaments with excellent mechanical properties and printing quality. It dramatically improves the toughness of the material by increasing its impact resistance.

STABILIZED FOAMING™

Stabilized Foaming™ technology is used to produce foamed filaments, whose foam structure can survive the printing process and be inherited by the printed parts. This enables light weight 3D printed parts with unprecedented surface finish.

Hardware

Polymaker offers 3D printing accessories to optimize the user experience with their filaments.

PolyBox™

PolyBox™ is a dry storage box designed to provide the optimum environment for 3D printing filaments. The PolyBox™ is compatible with all 3D printers and can house two 1kg spools or one 3kg spool.

Polysher™

The Polysher™ is a desktop post processing unit designed to remove layer lines from PolySmooth™ and PolyCast™ prints. The Polysher™ uses Polymaker's Layer-Free™ technology to create a fine mist of alcohol which evenly smooths the model.

About Polymaker

Who We Are?

Polymaker is an international team passionate about 3D printing. We produce the very best 3D printing materials by controlling every stage of production. With a diverse portfolio of materials ranging from high performance plastics to unique aesthetic solutions, Polymaker will continue to add cutting edge materials to its ever-growing portfolio.

Mission & Vision

Our mission is to create the best in class when it comes to 3D printing materials. We believe that materials are the enabling factor which will realise 3D printing as a final production tool. Our high performance materials offer solutions that will develop 3D printing into a mainstream manufacturing method.

Locations

Polymaker is a global company head-quartered in Shanghai. With distribution centers located in North America, Europe & Asia, our materials have penetrated every corner of the globe. Our worldwide presence is closely managed through our relationships with our local distributors and resellers. Polymaker is a regular exhibitor at 3D printing exhibitions on 4 continents.

Research & Development

At the core of Polymaker is our research & development laboratory, this is where all our materials are formulated and fine-tuned from the ground up to create the best in class 3D printing materials. Our precision testing equipment combines the latest advancements in technology to ensure we are ahead of the game.

Quality Control

Polymaker implements a rigorous quality control check on all materials. Utilizing our state of the art technology, we measure both the roundness and diameter of our filaments many thousand times a second, monitoring our processes with strict tolerances. We also have a number of processes and technologies that set apart Polymaker materials.

PolyLite™ PETG

PolyLite™ PETG is cost-effective 3D printing filament based on PETG. It features good printability, large overhang angles and environmental friendliness.

Physical Properties

Property	Testing method	Typical value
Density	ASTM D792 (ISO 1183, GB/T 1033)	1.25 (g/cm3 at 21.5˚C)
Glass transition temperature	DSC, 10 °C/min	81 (°C)
Vicat Softening temperature	ASTM D1525 (ISO 306 GB/T 1633)	84 (˚C)
Melt index	220 °C, 2.16 kg	3.9 (g/10 min)
Melt index	240 °C, 2.16 kg	10.8 (g/10 min)

Tested with 3D printed specimen of 100% infill

Mechanical Properties

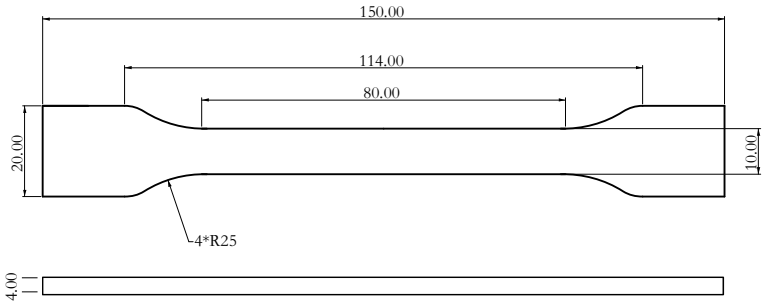
Property	Testing method	Typical value
Young's modulus (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	1472 ± 270 (MPa)
Tensile strength (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	31.9 ± 1.1 (MPa)
Elongation at break (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	6.8 ± 0.9 (%)
Bending modulus	ASTMD790 (ISO 178, GB/T 9341)	1174 ± 64 (MPa)
Bending strength	ASTMD790 (ISO 178, GB/T 9341)	53.7 ± 2.4 (MPa)
Charpy impact strength	ASTM D256 (ISO 179, GB/T 1043)	5.1 ± 0.3 (kJ/m^2)

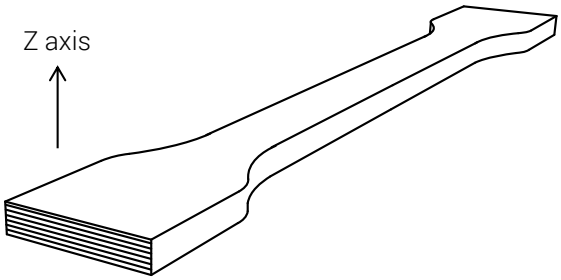
All testing specimens were printed under the following conditions:
nozzle temperature = 240 °C, printing speed = 45 mm/s, build plate temperature = 80 °C, infill = 100%
All specimens were conditioned at room temperature for 24h prior to testing

Recommended printing conditions

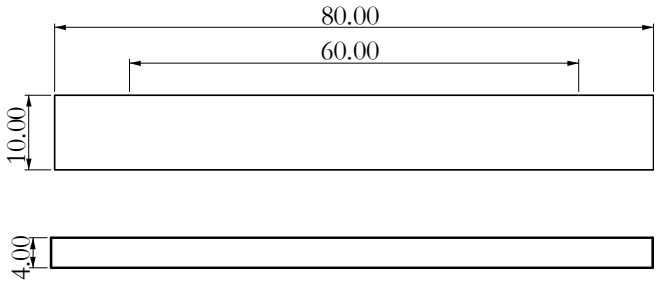
Parameter	
Nozzle temperature	230 - 240 (˚C)
Build Surface material	Glass, BuildTak® (recommended)
Build surface treatment	None
Build plate temperature	80 (˚C)
Cooling fan	Turned on
Printing speed	45 (mm/s)
Raft separation distance	0.14 (mm)
Retraction distance	1-3 (mm)
Retraction speed	20 - 80 (mm/s)
Recommended environmental temperature	Room temperature
Threshold overhang angle	70 (˚)
Recommended support material	PVA

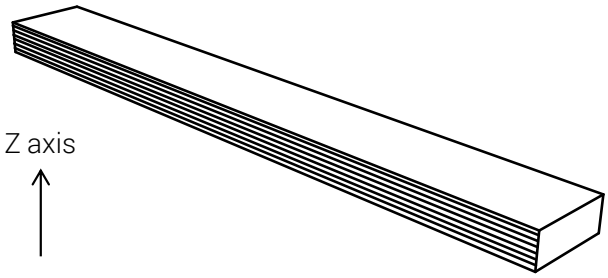
Based on 0.4 mm nozzle and Simplify 3D v.3.1. Printing conditions may vary with different nozzle diameters



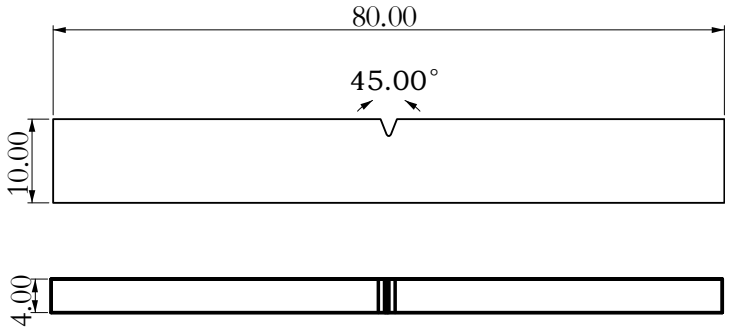


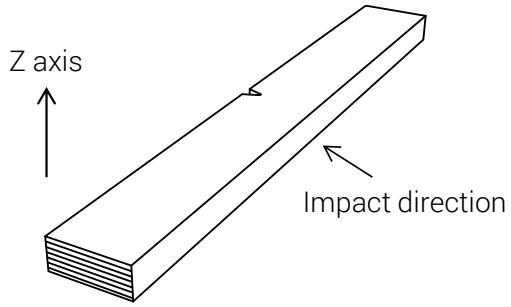
Tensile testing specimen; ASTM D638 (ISO 527, GB/T 1040)





Flexural testing specimen; ASTMD790 (ISO 178, GB/T 9341)





Impact testing specimen; ASTM D256 (ISO 179, GB/T 1043)

Disclaimer:

The typical values presented in this data sheet are intended for reference and comparison purposes only. They should not be used for design specifications or quality control purposes. Actual values may vary significantly with printing conditions. End- use performance of printed parts depends not only on materials, but also on part design, environmental conditions, printing conditions, etc. Product specifications are subject to change without notice.

Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/recycling practices of Polymaker materials for the intended application. Polymaker makes no warranty of any kind, unless announced separately, to the fitness for any use or application. Polymaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any application.

PolyDissolve™ S1

INDEX

Printing with PolyDissolve™ S1

1) Prepare the gcode

Download the MyFirstPrint.stl on **www.polymaker.com**
Load the stl file in your favorite slicer.

Enter the correct settings for PolyDissolve S1™;

Property	Value
Nozzle temperature	215˚C - 225˚C
Bed temperature	25˚C - 60˚C
Nozzle speed	30mm/s – 40mm/s
Cooling fan	ON
Z gap	0mm
X-Y gap	0.5mm

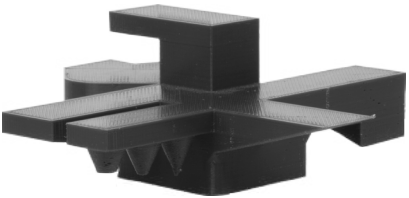
PolyDissolve™ S1 is a Poly (vinyl alcohol) based filament. PVA has excellent solubility in water, making **PolyDissolve™ S1** a very good dissolvable support material for FFF 3d printing.

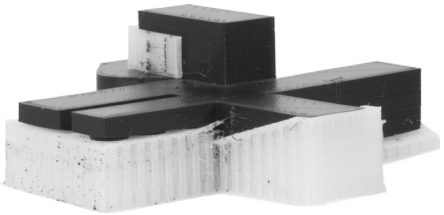
PolyDissolve™ S1 can be used as full support material or only as the interface between the support structure and the model, this later can allow the support to be easily removable by hand but will also speed up the dissolving process.

2) Removing the support

a) **PolyDissolve™ S1** is designed to be partially removable by hand so we recommend to remove the support that can be easily pealed off before submerging the model into water.

b) After partially removing the support the model can be submerged in water to dissolve away the rest of the support. This process can be speed up by agitating the water, using warm water (>50˚C) or regularly changing the water.





Note: The preferred method of disposal for polyvinyl alcohol (PVA) support material is in the trash. The immersion of 3D printed objects into water containing support material will generate wastewater containing PVA. It is suggested that you contact your local Sanitary Sewer (Wastewater) Authority to obtain the proper disposal method prior to discharging to the sewer.

PolyDissolve™ S1

PolyDissolve™ S1 is a water dissolvable support for PLA, TPU, PVB and Nylon based filaments from our portfolio. It is specifically engineered to have a perfect interface with these materials while also displaying good solubility.

Available colors:

Physical properties

Property	Testing method	Typical value
Density	ASTM D792 (ISO 1183, GB/T 1033)	1.37 (g/cm^3 at 21.5 °C)
Melt Index	210 °C, 2.16 kg	7.8 (g/10 min)

Mechanical properties

Material	Combination
PLA based material from Polymaker's portfolio	++
PETG based material from Polymaker's portfolio	+
ABS based material from Polymaker's portfolio	--
PC based material from Polymaker's portfolio	--
PVB based material from Polymaker's portfolio	++
TPU based material from Polymaker's portfolio	++
Nylon based material from Polymaker's portfolio	++

++ : support the model very well
+: generally support the model depending on its geometry
-: generally don't support the model depending on its geometry
- -: do not support the model

Drying settings

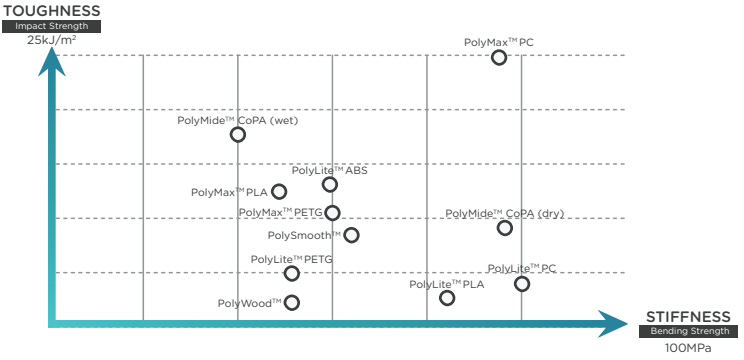
80˚C for 12h

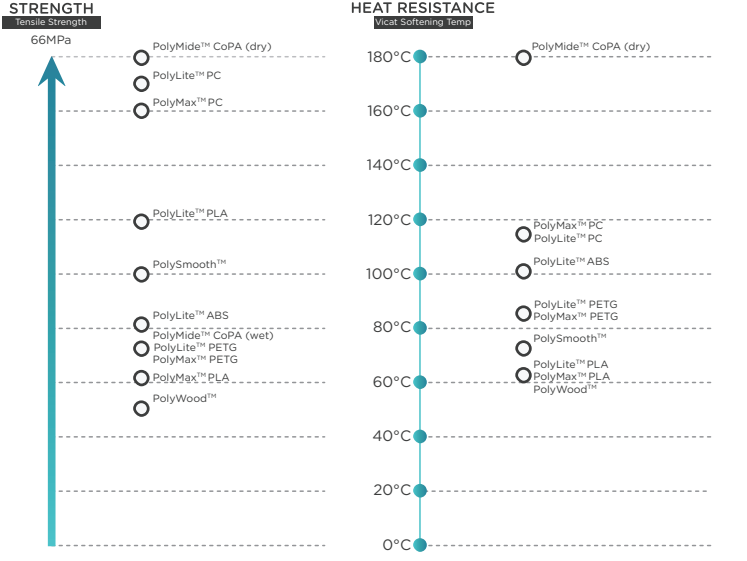
Diameter accuracy (2.85/1.75 mm):

70%	is within	+/- 0.01
97%	is within	+/- 0.02
99%	is within	+/- 0.03
99.9%	is within	+/- 0.04

Weight accuracy:

600g	+/-	20g
750g	+/-	20g
1000g	+/-	30g
3000g	+/-	60g


TOUGHNESS
Impact Strength
25kJ/m²
PolyMax™ PC
PolyMide™ CoPA (wet)
PolyLite™ ABS
PolyMax™ PLA
PolyMax™ PETG
PolyMide™ CoPA (dry)
PolySmooth™
PolyLite™ PETG
PolyLite™ PC
PolyLite™ PLA
PolyWood™
STIFFNESS
Bending Strength
100MPa


STRENGTH
Tensile Strength
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Vicat Softening Temp
180°C
160°C
140°C
120°C
100°C
80°C
60°C
40°C
20°C
0°C
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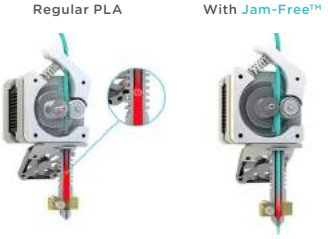

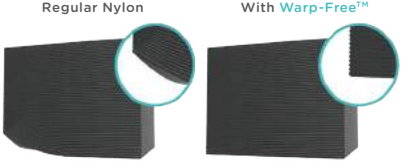

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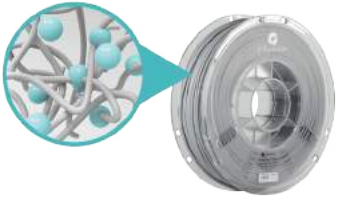

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polymaker

Innovators in 3D printing

Techanical Data Sheet

PolyDissolve™ S1

www.polymaker.com

V5.0

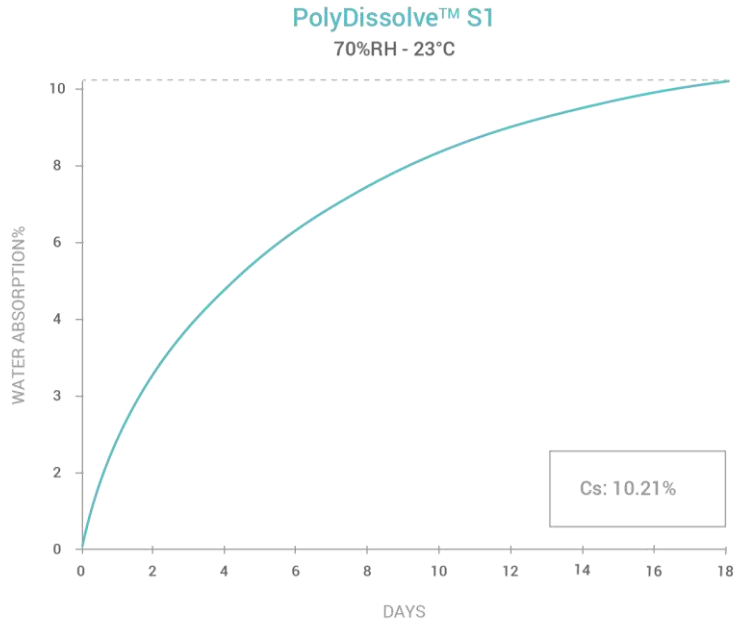
PolyDissolve™ S1

PolyDissolve™ S1 is a water dissolvable support for PLA, TPU, PVB and Nylon based filaments from our portfolio. It is specifically engineered to have a perfect interface with these materials while also displaying good solubility.

PHYSICAL PROPERTIES

Property	Testing Method	Typical Value
Density	ISO1183, GB/T1033	1.37 g/cm^3 at 21°C
Melt Index	220°C, 2.16kg	7.8 g/10min

MOISTURE ABSORTION CURVE



Material Compatibility

Material	Adhesion with PolyDissolve™ S1
PLA based material from Polymaker's portfolio	++
PETG based material from Polymaker's portfolio	+
ABS based material from Polymaker's portfolio	- -
PC based material from Polymaker's portfolio	- -
PVB based material from Polymaker's portfolio	++
TPU based material from Polymaker's portfolio	++
Nylon based material from Polymaker's portfolio	++

++ support the model very well
+ generally support the model depending on its geometry
- generally doesn't support the model depending on its geometry
- - do not support the model

Note:

- It is highly recommended to use the PolyBox™ when printing with PolyDissolve™ S1 and to store it in the resealable bag.

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PP Filament

- High quality Polypropylene (PP) filament for material extrusion (ME)
- One of the most commonly used plastics in industry
- Good mechanical properties of stiffness and tensile strength
- Good surface finish
- Resistant to acids, alkalis and organic solvents
- Very light
- Food package grade pellets used
- Good transparency
- Hinge properties
- Main applications: Technical products, automotive, mechanical engineering, prototypes, toys.

Filament Specifications

Size	Ø tolerance	Length
1.75mm	± 0.05mm	233 m
2.85mm	± 0.05mm	88 m

Material properties

Description	Test method	Typical value
Density	ISO 1183	0.89 g/cm
Melt flow rate	ISO 1133	20.0 g/10min
Viscat softening temperature	ISO 306	115°C
Flexural strength	ISO 178	14 MPa
Flexural modulus	ISO 178	350 Mpa
Impact strength - Charpy method 23°C	ISO 179	10 kJ/m2
Tensile strength	ISO 527	14 Mpa
Tensile elongation	ISO 527	>200 %
Durometer hardness	ISO 868	Shore D55

PP Filament

Recommended printer set up

Extrusion temperature	200-240°C
Bed temperature	80°C
Printing speed	30 mm/s

Note: PP film tape recommended for print bed

Filaments Available

Colour	Part Number		PANTONE® ref.*	Diameter	Weight
Natural Transparent	55950	▢	N/A	1.75 mm	500 g
Natural Transparent	55951	▢	N/A	2.85 mm	500 g

* Closest PANTONE® colour reference

Verbatim filament is manufactured from high quality materials to extremely rigid standards. The filaments are manufactured from the highest quality materials and produced to extremely tight tolerances to ensure consistent feed and stable printing. The filaments are distributed in vacuum-sealed bags with desiccant, and wound onto a custom spool that has been designed for strength, uniform dynamic performance and trouble-free dispensing.

Verbatim™
Technology you can trust