

Polymaker PC-Plus™ User Guide



Innovation Simplified



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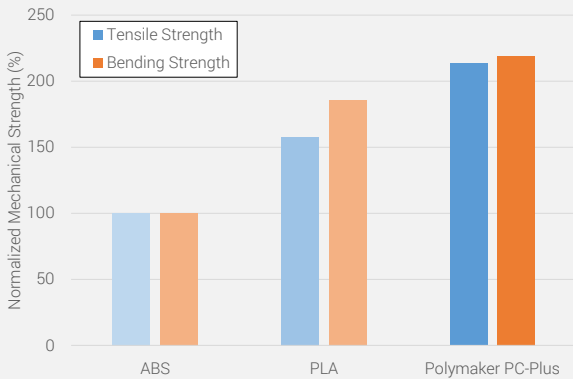
Introducing Polymaker PC-Plus™

Key Features

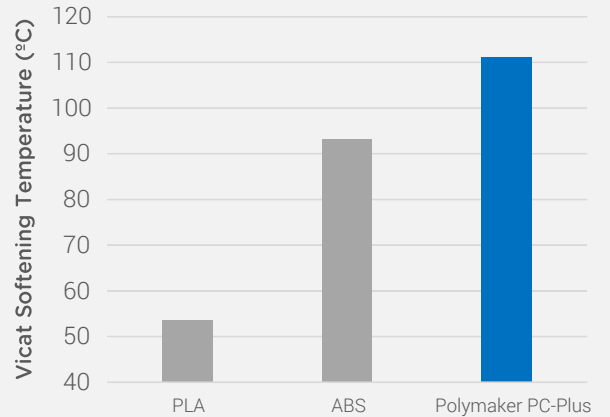
Polymaker PC-Plus™ is a polycarbonate based filament designed specifically for desktop FDM/FFF 3D printing. It offers superior printing quality, excellent mechanical strength and heat resistance, with moderate printing temperatures and great warping resistance.

■ Heat Resistance

Polymaker PC-Plus™ offers better heat resistance than almost all other 3D printing materials currently in the market. It can withstand temperatures well above 110 °C.



Tested with 3D printed specimens (100% infill)



Tested with 3D printed specimens (100% infill)

■ Excellent mechanical strength

Parts made with Polymaker PC-Plus™ shows much improved mechanical strength compared to ABS and PLA under almost any deformation test.

■ Optical Clarity

Polymaker PC-Plus™ shows good optical clarity, rendering parts with an attractive crystal shine!

■ Additional benefits

- Intrinsic flame retardance (V2 based on UL94:2006)
- Good chemical/solvent resistance
- High printing quality



Printing with Polymaker PC-Plus™

Preparations

Before you start printing with Polymaker PC-Plus™ for the first time, check to make sure the following conditions are met:

- ❑ The extruder of your 3D printer can operate in the temperature range of 250 – 270 °C (While printing at less than 250 °C is also possible, it is recommended that Polymaker PC-Plus™ be printed at 250 °C or above for better layer adhesion and consistency)

- ❑ Your printer is equipped with a heated build plate (HBP) (Printing with a non-heated build plate is possible, but a HBP is generally recommended)

- ❑ The build plate is covered with a BuildTak™ sheet (Required. Other build surfaces such as the blue tape, Kapton tape, glass, etc., are not recommended for Polymaker PC-Plus™)

- ❑ Your printer is well calibrated

(Special care should be taken to ensure that the “zero” distance between the nozzle and the build plate is not overly small; 0.3 – 0.4 mm or 1-2 “business card thickness” should be good)



- BuildTak™ is an ideal 3D printing surface for FFF 3D printers. It works with all Polymaker filaments!



Design by Daniel Noree
<https://www.myminifactory.com/object/openrc-65t-spur-gear-vase-12628>

Recommended but not required:

- ❑ Your printer is equipped with an enclosed printing chamber (It is not a must, but having an enclosed printing chamber can lead to more consistent prints. If an enclosed printing chamber is not available, try to avoid large variations in environmental temperatures during printing)

Printing with Polymaker PC-Plus™

Slicer Settings

□ Temperature settings

- Nozzle temperature (for 0.2 mm layer height): 250 - 270 °C
(255 °C was found to be optimum on most printers we have tested and is therefore a good starting point)
- HBP temperature: ~ 80 °C

□ Raft settings

- **Always** print with a raft
A raft ensures both good adhesion and easy removal from the build plate
- Separation distance between the raft and the part: 0.2 - 0.3 mm
This relatively large value is to ensure easy removal of the raft after printing

□ Model cooling fan

- If your printer is equipped with a model cooling fan, turn it off completely or disable it in your slicer. (Unlike PLA, Polymaker PC-Plus™ solidifies rapidly and therefore does not need extra fan-cooling; over-cooling can lead to poor interlayer adhesion)

□ Printing speeds

- Various depending on printers; in general 30 - 90 mm/s
(In most circumstances the default speed settings of your printer should be good for Polymaker PC-Plus™)

Slicer Settings Example: Simplify 3D

Ver. 3.0

□ Temperature Settings

Temperature Controller List (click item to edit settings)

- Primary Extruder
- Heated Build Plate

Primary Extruder Temperature

Overview

Temperature Identifier: T0

Temperature Controller Type: Extruder Heated build platform

Relay Temperature Between Each: Layer Loop

Wait for temperature controller to stabilize before beginning build

Per-Layer Temperature Setpoints

Layer	Temperature
1	255

• Set the extruder temperature to 255 °C

• (Note: you have to delete the old settings first)

Add Setpoint

Remove Setpoint

Layer Number: 1

Temperature: 255 °C

Add Temperature Controller

Remove Temperature Controller

Printing with Polymaker PC-Plus™

Temperature Controller List (click item to edit settings)

Primary Extruder
Heated Build Plate

Add Temperature Controller
Remove Temperature Controller

Heated Build Plate Temperature

Overview

Temperature Identifier: T0

Temperature Controller Type: Extruder Heated build platform

Relay Temperature Between Each: Layer Loop

Wait for temperature controller to stabilize before beginning build

Per-Layer Temperature Setpoints

Layer	Temperature
1	80

Add Setpoint
Remove Setpoint

Layer Number: 1
Temperature: 255 °C

- Set the HBP temperature to 80 °C

❑ Cooling Settings

Extruder Layer Additions Infill Support Temperature Cooling

Per-Layer Fan Controls

Layer	Fan Speed
1	0

Add Setpoint
Remove Setpoint

Layer Number: 1
Fan Speed: 60 %

- Disable the model cooling fan by setting the speed to "0"

❑ Raft Settings

Extruder Layer Additions Infill Support Tempera

Use Skirt/Brim

Skirt Extruder: Primary Extruder

Skirt Layers: 1

Skirt Offset from Part: 4.00 mm

Skirt Outlines: 2

Use Raft

Raft Extruder: Primary Extruder

Raft Layers: 3

Raft Offset from Part: 3.00 mm

Separation Distance: 0.30 mm

Raft Infill: 100 %

Disable raft base layers

- Check to enable the use of raft

* Only key settings are shown here; you can adjust other settings (e.g. speeds, Infill, shells, etc.) based on your needs

• Important: set the separation distance to between 0.2 - 0.3 mm for easy removal of the raft after printing

FAQs

❑ My printed parts appear stringy, any suggestions?

- That means either the retraction settings are insufficient, or your printing temperature is too high. First check your retraction settings, and if needed, reduce your printing temperature.

The “fine positive features” model by Andreas Bastian is a good testing model for retraction settings:

<http://www.thingiverse.com/thing:533472>

❑ I found it difficult to remove the part from the build plate, what shall I do?

- As we mentioned earlier, you should always print a raft with Polymaker PC-Plus™. If the part is difficult to remove even with a raft, try increasing the initial nozzle-plate distance.

❑ Why is the removal of the raft from the printed part so difficult?

- You need to correctly set the distance between the raft and the model (~ 0.3 mm recommended). Under the correct settings the raft should peel off easily. If you still experience difficulty with removing the raft, try increasing the distance (e.g. by 0.05 mm increment) until the result is satisfactory. However the distance cannot be overly large as adequate adhesion between the part and the raft is still needed to prevent part warping.

❑ I printed a tall part and found the interlayer adhesion in certain areas to be rather poor, what shall I do?

- For tall parts (> 10 cm), as there is less heat compensation from the HBP for taller sections, it is recommended that the printing temperature be slightly raised (e.g. 260-270 °C) to ensure better interlayer adhesion. Or if the slicer allows, you can increase your printing temperature with increasing heights.

Having an enclosed printing chamber can greatly minimize this issue, and therefore is essential for getting consistent results particularly for large, tall parts.

More questions or comments?

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