Can you 3D print without a cooling fan?

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Abstract. Yes for ABS, ASA, PC and nylon: profiles run the part fan off or at 10 to 20% on long layers. PLA needs it for bridges and overhangs. Never turn off the hotend fan.

Keywords: part-cooling, slicer-settings, abs

1 Can you 3D print without a cooling fan?

Yes for ABS, ASA, PC and nylon: shipped slicer profiles run the part cooling fan off or at 10 to 20% on long layers. PLA manages without it only on simple, slow parts; otherwise bridges sag, overhangs curl and small layers melt. The hotend (heatsink) fan is a separate fan and must always run.

1.1 The number

Table 1. The number

Material	PrusaSlicer 2.9.6 profile	Bambu Studio generic profile
PLA	100%, always on	100%, plus the auxiliary fan at 70%
PETG	30 to 50%, always on	40%, up to 90% on layers under 30 s
ABS	Off; 15% on layers under 30 s; bridges 25%	10%, up to 80% on layers under 30 s
ASA	20%, always on; bridges 30% (Prusament ASA)	10%, up to 80% on layers under 35 s
PC	Off; 20% on layers under 30 s; bridges 30% (Prusament PC Blend)	10%, up to 60% on layers under 30 s
Nylon	0%; bridges 30% (Fillamentum Nylon FX256)	Off; 40 to 85% on layers under 65 s

Values come from base profiles, inherited settings included: PrusaSlicer 2.9.6′s PrusaResearch.ini (Generic unless a product is named) and Bambu Studio v02.08.04.61′s Generic @base filament profiles; printer-specific variants can differ.

1.2 Why do ABS, ASA, PC and nylon need less fan than PLA?

ABS (acrylonitrile butadiene styrene) and ASA (acrylonitrile styrene acrylate) warp when cooled too hard, while PLA (polylactic acid) has to set the moment it leaves the nozzle. Polymaker calls active cooling critical for PLA, typically at 100% to stop curling and sagging.

Polymaker names excessive cooling as a cause of ABS and ASA warping, and Prusa traces ASA's warping to the temperature gap between the model and its surroundings. The PolyLite ABS and Polymaker ASA data sheets say cooling fan OFF, closed chamber needed. PC (polycarbonate) and nylon follow the same pattern in the table: off or 10% outside short layers and bridges.

1.3 When should you turn part cooling off completely?

- **The first layers.** Every profile in the table already runs 0% for the first 1 to 6 layers, for bed adhesion. Polymaker's rule is the first 0.5 to 0.7 mm.
- **Medium and large ABS or ASA parts in an enclosure.** Polymaker keeps 20 to 50% only for small features such as pins and thin walls.
- **Nylon.** PrusaSlicer's Fillamentum Nylon FX256 profile already runs 0% outside bridges.

Keep some fan on bridges. PrusaSlicer's profiles give them 25 to 30% even for ABS, ASA, PC and nylon.

1.4 What happens if you print PLA with no fan?

Anything printed over air, or in a layer that finishes fast, stays soft too long:

- **Bridges sag.** Prusa's bridging guide says the fans must cool the plastic mid-air for a bridge to hold.
- **Overhangs curl and droop.** The edge printed over air stays soft (why overhangs droop).
- **Small parts and tips melt.** The next layer arrives before the last has set (small prints melting).

If your part fan has failed and you must print, pick parts without bridges or steep overhangs. In Bambu Studio, tick **Slow printing down for better layer cooling** and raise **Layer time** on the **Max fan speed threshold** line above the 8 s that Generic PLA ships with. The printer then slows any layer that would finish faster. Printing several copies at once also gives each layer longer to cool.

1.5 Can you print without the hotend fan?

No. That fan cools the heatsink so filament stays solid above the melt zone. Without it you get heat creep and a jam. Firmware runs it, not the slicer: Marlin switches its extruder auto fan on above 50 °C, and Klipper's `heater_fan` stays on until the hotend drops below 50 °C. See what the part cooling fan does for how the two fans differ, and the Bambu "hotend cooling fan speed abnormal" error if that fan faults.

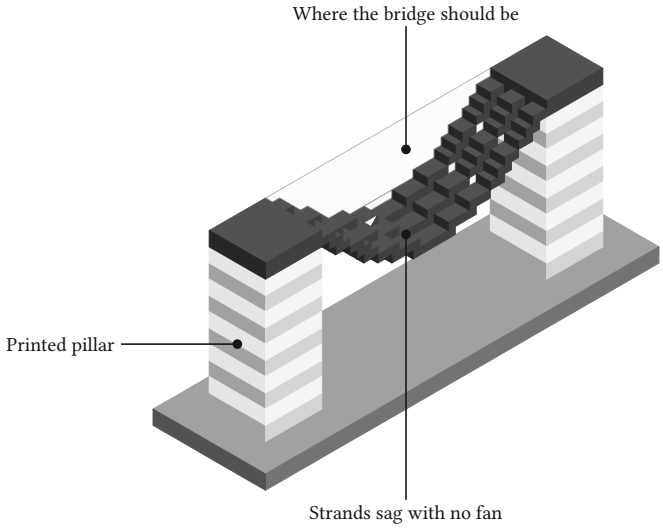


Figure 1. With no fan, bridge strands stay soft in mid-air and sag between the pillars instead of spanning straight.

1.6 How do you turn off the part cooling fan in Bambu Studio?

Open the filament's settings (the edit icon beside the filament) and go to the **Cooling** tab. In v02.08.04.61:

1. Under **Part cooling fan**, set **Fan speed** to 0% on both the **Min fan speed threshold** and **Max fan speed threshold** lines.
2. Untick **Force cooling for overhang and bridge**, or set **Fan speed for overhang** to 0%.
3. Under **Auxiliary part cooling fan**, set **ramp up to** on the **Linear ramp up** line to 0%. The ABS, ASA, PC and nylon profiles already leave it at 0%.
4. Save it as a new filament preset.

For the first layers only, use **Initial layer fan**: **For the first** N layers at **Fan speed** 0%. The **Exhaust fan** group below is the chamber exhaust, not part cooling.

1.7 How do you disable the part cooling fan in OrcaSlicer?

Same place (Filament settings > **Cooling**), with OrcaSlicer v2.4.2′s names:

1. Under **Part cooling fan**, set **Fan speed** to 0% on the **Min fan speed threshold** and **Max fan speed threshold** lines.
2. Untick **Force cooling for overhangs and bridges**. That also covers **Internal bridges fan speed** at its default of -1. Leave **Support interface fan speed** and **Ironing fan speed** at their default of -1.
3. Under **Auxiliary part cooling fan**, set **Fan speed** to 0%.

For the first layers only, set **No cooling for the first** N layers under **Cooling for specific layer**. It stops every part cooling fan for those layers.

1.8 Can you turn the fan off with G-code?

Yes. `M107` switches off the print cooling fan in Marlin and Klipper, and `M107 P<index>` picks another fan in Marlin. It lasts only until the next fan change in the file: Bambu Studio, OrcaSlicer and PrusaSlicer write a new `M106` whenever their computed fan speed changes. To keep the fan off for a whole print, set it in the slicer.

1.9 How to check it on your own print

- **Slice and switch the preview to Fan Speed** in Bambu Studio or OrcaSlicer. With the fan off, every layer reads 0, bridges included.
- **Print a short bridge test first.** If it sags, give bridges back 25 to 30%, the PrusaSlicer profile value.
- **On ABS or ASA, look at the walls.** Lifting corners or split layers mean the fan is still too high or the enclosure is open (ABS fan speed).

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