How do you do a cold pull?

Asked 3D Content Team
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Abstract. Fill the nozzle at printing temperature, cool it to 70 to 100 °C for PLA or 140 to 160 °C for nylon, then pull up. A good tip is a cone with the nozzle's imprint.

Keywords: pla, nylon

Table 1. The number

Source	Filament	Heat and fill at	Pull at	How to pull
Prusa, manual method	PLA	270 °C, push until it pours out	100 °C	Slowly but steadily, straight up, with pliers
Prusa, automatic (firmware 6.0.0 and later)	PLA	Cools to 36 °C, then heats to 80 °C	80 °C	Printer unloads, you pull up by hand
Bambu Lab X1C and P1S	PLA	220 °C (X1C), 230 °C (P1S)	70 °C, within a 70 to 100 °C range	Retract with the extruder, help by hand without force
UltiMaker, Atomic method	PLA	200 to 220 °C	80 to 100 °C	Quick, firm pull with pliers
UltiMaker, Atomic method	ABS, cleaning filament, high-temperature materials	240 to 260 °C	140 to 160 °C	Quick, firm pull with pliers
Creality	PLA	Normal printing range, 220 to 260 °C	70 to 100 °C	One smooth motion, straight up
Creality	Nylon	Normal printing range, 220 to 260 °C	140 to 160 °C	One smooth motion, straight up

1 How do you do a cold pull?

A cold pull fills the nozzle with molten filament, cools it until it is semi-solid, then pulls it out, debris and all. Heat to printing temperature, push filament until it flows, let the nozzle cool to 70 to 100 °C for PLA (polylactic acid) or 140 to 160 °C for nylon, then pull straight up.

1.1 The number

Figures come from the Prusa Knowledge Base, the Bambu Lab Wiki X1C and P1S guides, UltiMaker's Atomic method article for the UltiMaker 2+ and Creality's cold pull guide. The sources split on speed: Prusa pulls slowly but steadily, UltiMaker quick and firm. They also split on filament. Prusa found PLA works best and says other filaments "will either tear or melt too much", while Creality calls nylon "the gold standard". Pull temperatures for PETG (glycol-modified PET), ABS (acrylonitrile butadiene styrene) and other filaments are on the cold pull temperature page.

1.2 Why

Bambu Lab describes the cooled filament as a plug that bonds with residue inside the nozzle. Pulled out, it drags burnt filament, dust and small clogs with it. The plug only works if it fills the nozzle, so every guide keeps pushing filament while the nozzle cools. Prusa pushes until about 170 °C, when PLA stops melting; Bambu pushes until the extruder skips, usually around 150 °C.

UltiMaker's Atomic method, credited to Atomic Bob and 3D Verkstan, adds hot pulls first. Push the strand in at full heat, then pull it straight out and cut the tip. A few rounds clear most of the carbonized material before the cold pull.

1.3 The cold pull, step by step

1. **Unload the filament.** Detach the Bowden or PTFE (polytetrafluoroethylene) tube at the print head, if fitted. UltiMaker cuts about 20 cm of filament; Prusa asks for at least 30 cm of PLA.
2. **Heat to a little above printing temperature**, using the table's figures.
3. **Push filament until it comes out of the nozzle.** On a Prusa, open the idler and push by hand. On a Bambu Lab printer, press extrude a few times.
4. **Set the pull temperature and keep pushing as it cools.** Bambu Lab pushes every 2 to 3 seconds until the filament stops. Pick extruded plastic off the nozzle tip so nothing blocks the pull.
5. **Pull at the target temperature.** Grip the filament with pliers and pull straight up while holding the extruder. Do not stop until the strand is out.
6. **Cut the tip and repeat** until it comes out clean, then refit the tube and load filament.

On Bambu Lab printers the extruder does the pulling; the Bambu Lab cold pull page has those steps. On recent firmware, Prusa's MK4, MK3.9 and XL run the whole se-

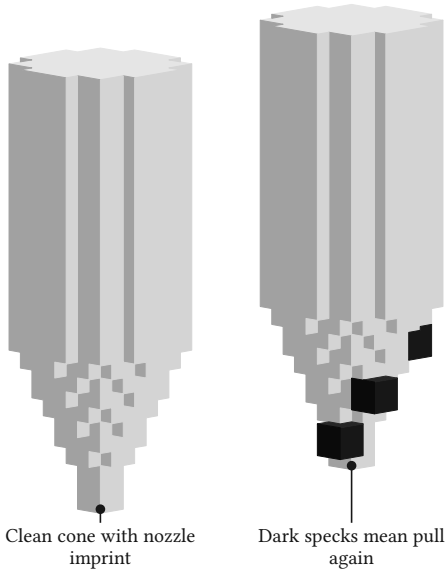


Figure 1. The cone and the thin nub at the end are the inside of the nozzle cast in plastic. Specks of a darker color mean burnt residue or old filament came out, so pull again.

quence from the Control menu (Cold Pull). Prusa says never to cold pull its Nozzle X; use cleaning filament instead.

1.4 What should a cold pull look like?

A clean pull ends in a cone shaped like the inside of the nozzle, one solid color, with the nozzle's imprint at the tip. Prusa says the imprint proves the nozzle was full and nothing was left inside.

Read the tip against these signs from the makers' guides:

- **Black specks or the previous color on the cone.** Burnt dirt or old filament came out. Prusa and Bambu Lab both say to repeat until the tip is clean.
- **No nozzle imprint.** The filament never filled the nozzle. Creality says to reheat to printing temperature, push more filament through and pull again.
- **A soft, stretched, stringy end.** Creality reads this as too hot. Let the nozzle cool further before you pull.

1.5 Why does my cold pull keep breaking?

The nozzle is usually too cold. Creality's fix for a strand that snaps is to raise the temperature 5 to 10 °C and try again. The other cause is direction: Prusa warns that pulling sideways breaks the filament inside. Prusa also found filaments other than PLA tear, while Creality prefers nylon for its strength and flexibility; the cold pull filament page weighs the two.

Too hot fails the other way. Bambu Lab suggests a first pull at 70 °C, the cold end of its range, so the PLA does not go soft and clog the extruder. If the strand snaps inside, start again from the heat-up step. The stub melts and the new strand pushes it out.

1.6 What if the cold pull won't work and the clog won't move?

A cold pull only clears partial clogs. Prusa recommends it only while filament still loads and unloads, and Bambu Lab warns a full clog may block the pull entirely. If filament will not go in, force the clog out first. Prusa's steps for its MK3S and MK3.5 hotends:

- **Heat higher.** Set 260 °C after PLA, or 280 °C after PETG or ABS. Wait 2 minutes for plastic to drip out.
- **Use a needle from below.** Push a 0.3 to 0.35 mm acupuncture needle 1 to 2 cm up into the hot nozzle. Never feed it in from the top, and never load filament with it inserted.
- **Push from above.** If that fails, push a straight, rigid 1.5 mm wire about 100 mm long down the hotend. How far it goes shows where the jam sits.
- **Reload PLA** to push out the rest, then cold pull to clean up.

A wire that stops above the nozzle means the jam is higher up; see filament stuck in the heatbreak. Creality's limit is three clean pulls. If flow is still poor, move to a hot needle, a hotend teardown or a new nozzle. The unclog a 3D printer nozzle page covers each.

1.7 How to check it on your own print

- **Compare the tips in order.** Cut each tip off after a pull. The last should be a single-color cone with the imprint.
- **Watch the purge after reloading.** UltiMaker's check is smooth flow from the nozzle. A thin line that curls back onto the nozzle means part of the clog remains.
- **Listen on the next print.** Prusa lists extruder clicking, thin lines and a curling purge as early signs of a partial

clog. If they return, pull again or check the clogged nozzle symptoms.

- **Pull before a material change.** UltiMaker recommends it between materials with very different printing temperatures. Bambu Lab recommends one before TPU (thermoplastic polyurethane), which may not push out plastic left in the hotend.

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