What is retraction distance when cut?

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Abstract. How far Bambu Studio and OrcaSlicer pull filament back before the cutter cuts it at a filament change: 18 mm by default, and the field only accepts 10 to 18 mm.

Keywords: retraction, slicer-settings

1 What is retraction distance when cut?

Retraction distance when cut is how far Bambu Studio and OrcaSlicer pull the old filament back just before the printer's cutter cuts it at a filament change, which shrinks the purge. The default is 18 mm and the field accepts 10 to 18 mm. It applies only when the experimental "Long retraction when cut" option is ticked.

1.1 The number

Table 1. The number

Printer or profile	Long retraction when cut	Retraction distance when cut
Field default, Bambu Studio and OrcaSlicer	Off	18 mm (accepts 10 to 18)
Bambu Lab X1, X1 Carbon, P1P, P1S, A1, A1 mini (printer profile)	Off	18 mm
Many Bambu Lab filament profiles on those printers, including PLA Basic, PLA Matte, PETG Basic and PETG HF (Generic profiles leave it off)	On	18 mm
Bambu Lab X1E	Off, and only the printer setting counts	18 mm
Bambu Lab H2D, H2D Pro	Off	10 mm
Bambu Lab H2C	On	14 mm
Creality K2, K2 Plus, 0.4 mm nozzle (Creality Print 7.3)	On	30 mm (Creality Print accepts 10 to 30)

The Bambu rows come from Bambu Studio v02.08.02.61′s source and printer and filament profiles (OrcaSlicer v2.4.2 ships the same range, default and Bambu printer values), and the Creality row from Creality Print v7.3.0′s source and K2 profiles.

1.2 Why does retracting before the cut save purge?

Bambu Lab's 1.9 release notes say a long retraction before the cut shortens the flushing length and saves about 2.4 × length mm³ of flush. That figure is the volume of 1.75 mm filament, about 2.4 mm³ per mm. Bambu Studio's auto flush calculation subtracts it from each change's minimum flush: about 43 mm³ at 18 mm and 24 mm³ at 10 mm.

The option adds one step to each filament change, on top of the ordinary retraction before travel moves. On the X1, P1 and A1 series, the change-filament G-code sends a line such as `M620.11 S1 I0 E-18` before the cut, so the printer pulls the old filament back 18 mm first. With the option off it sends `M620.11 S0`.

1.3 Is long retraction when cut safe?

It carries a clog risk, which is why Bambu Lab labels it experimental. The tooltip says it "may also raise the risk of nozzle clogs or other printing problems", and ticking it brings up a warning to use it with the latest printer firmware.

Bambu's X1 firmware notes name the clog case: the filaments in the sliced file do not match the ones loaded. Firmware 01.07.03.00 added a filament check before the retraction, and the feature needs slices from Bambu Studio 1.9.0.67 or later. If changes start clogging, untick it for that filament (clearing a Bambu hotend).

1.4 Where is it in Bambu Studio and OrcaSlicer?

- **Per filament:** open the filament's settings and go to Setting Overrides, Retraction. Tick "Long retraction when cut(experimental)" (OrcaSlicer: "Long retraction when cut (beta)") and "Retraction distance when cut" appears below it. Both lines show only when the printer profile allows per-filament control, which every Bambu Lab printer in the table does except the X1E.
- **Per printer:** turn on "Develop mode" in Preferences (OrcaSlicer: "Developer mode"). Then open Printer settings, Extruder, "Retraction when switching material". The checkbox stays grayed out when firmware retraction is on or the printer profile does not enable the feature.

The ordinary retraction length and speed sit elsewhere (retraction settings in Bambu Studio).

2 Why is retraction distance when cut not in range?

Because the value is outside the 10 to 18 mm that Bambu Studio and OrcaSlicer accept. Typing 30 gives "Value 30 is out

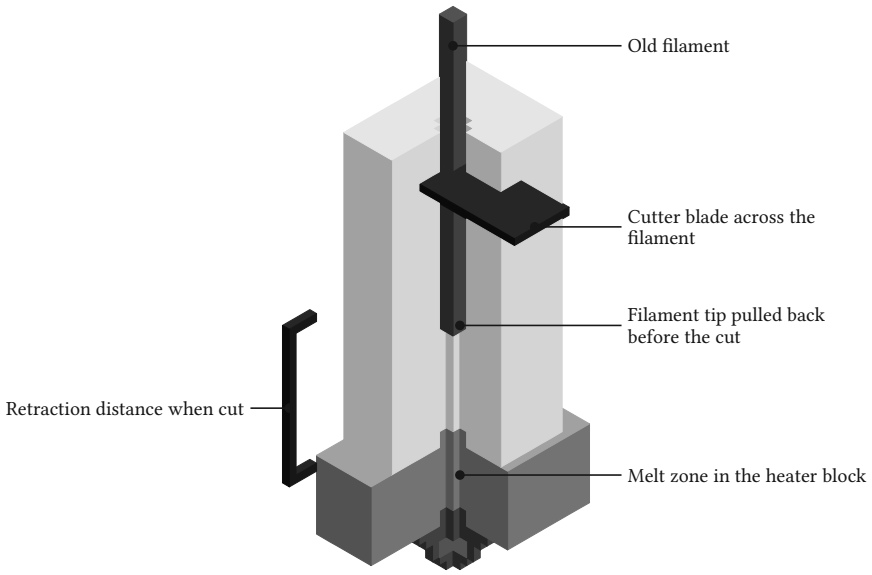


Figure 1. Before the cutter cuts the old filament, long retraction when cut pulls it back by the retraction distance when cut, which Bambu Lab says shortens the flushing length.

of range. The valid range is from 10 to 18." Opening a project that carries it, like a Creality K2 file, gives "30 not in range [10.000000,18.000000]". Use 10 to 18 mm.

2.1 What each message means

Table 2. What each message means

Where you see it	Exact text	What happens next
Typing in the field, printer or filament settings	`Value 30 is out of range. The valid range is from 10 to 18.`	After OK, the field goes back to its previous value (or to 10 or 18 if it had none)
Opening a 3MF project	`Invalid values found in the 3mf:` then `retraction_distances_when_cut: 30 not in range [10.000000,18.000000]` and `Please correct them in the param tabs` (OrcaSlicer writes "3MF")	A warning only: the project opens and the value is left for you to correct
Slicing from the command line	`Param values in 3mf/config error:` then the same line	Slicing stops; Bambu Studio gives the reason `Invalid parameter value(s) included in the 3mf file.`

The messages are from Bambu Studio v02.08.02.61 and OrcaSlicer v2.4.2 source; the 3MF check tests every numeric setting against its range.

2.2 Where does an out-of-range value come from?

- **A Creality Print project.** Creality Print 7.3 accepts 10 to 30 mm, and its K2 and K2 Plus 0.4 mm nozzle profiles ship 30 mm with long retraction on. Open that project in Bambu Studio or OrcaSlicer and 30 fails their 10 to 18 check.
- **OrcaSlicer's own profiles.** In OrcaSlicer 2.4.2, the Creality K2 0.4 nozzle profile ships 30 mm, the Creality SPARKX i7 profiles 28 mm and the Anycubic Kobra S1 Max profiles 0 mm. A project saved with one of them carries that value and trips the check when reopened.
- **The check ignores the on/off switch.** The Anycubic profiles have long retraction off, yet 0 still fails.

2.3 How do you fix it?

1. **Read the value in the message.** It shows what the project carries, such as 30 or 0.
2. **Switching to your own printer:** pick it in the Printer drop-down and, if asked, discard the project's modified printer settings. Your profile brings its own value: 18 mm on the X1, P1 and A1 series, 10 mm on the H2D, 14 mm on the H2C.
3. **Keeping the project's printer:** turn on Develop mode (OrcaSlicer: Developer mode). Then open Printer settings, Extruder, "Retraction when switching material" and enter 10 to 18. If the field is hidden, tick "Long retraction when cut" to show it. Enter the value, then untick the box if you want the feature off.
4. **Save the project and reopen it.** The warning should be gone. In OrcaSlicer 2.4.2, the Creality K2 and SPARKX i7 profiles themselves ship 30 and 28 mm, so a project left on those profiles' values warns on every reopen.

2.4 How to check it on your own print

1. **Slice a multi-color plate and search the G-code for `M620.11`.** On the X1, P1 and A1 series, `M620.11 S1 I0 E-18` means long retraction is on at 18 mm for the filament being unloaded, and `M620.11 S0` means it is off.

2. **Check each AMS (Automatic Material System) slot holds the filament the slice assigns to it.** A mismatch is the clog case Bambu's firmware notes name.
3. **Watch the first few changes.** If the nozzle clogs after a change, untick "Long retraction when cut" for that filament and slice again.

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