

Ender 3 Under-Extrusion

Under-extrusion is a common problem in FDM 3D printing, and the Ender 3 is certainly not exempt from this issue. Fix Ender 3 under-extrusion forever with this quick and easy guide.

Reality Check: Extrusion Issues



[Us3rn4m3-2018 via Reddit](#))

Arguably one of the best budget printers out there, the [Ender 3](#) is a popular choice for many beginner hobbyists. Despite its undeniable positive traits, it's still infamous for what seems to be an Achilles heel: [Under-extrusion](#).

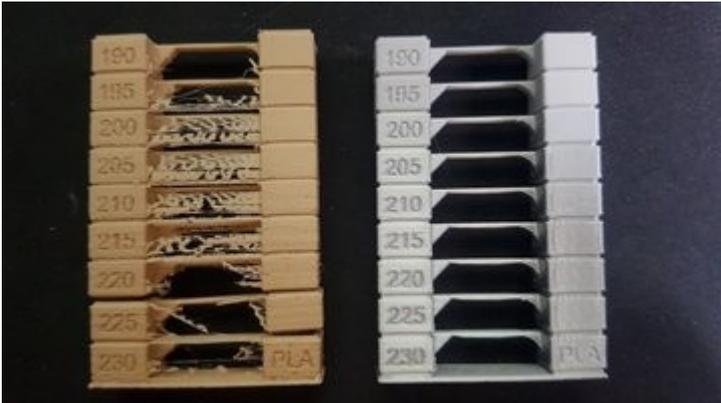
Many Ender 3 users have reported [under-extrusion issues](#). Today, we've compiled a list of some neat tips and tricks that are Ender 3-specific. So by the end of the article, hopefully, you'll have eliminated these issues.

The solutions below should solve your Ender under-extrusion issues, but before you get started, make sure your machine is properly assembled and calibrated and that the extrusion multiplier and filament diameter are set correctly in your slicer.

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Tip #1: Increase Temperature, Decrease Speed



[Seltix via Thingiverse](#))

It's easy to overlook flow rate and printing temperature. Generally, a [higher flow rate](#) means more material will come out of the nozzle, while a [higher temperature](#) can also increase filament flow.

However, note that excessively high temperatures can cause oozing and [stringing](#). To start, try increasing the flow rate by 5% and increasing the temperature by 3 °C until you get desirable results. That said, keep your printing temperature no hotter than 10 °C over your usual temperature.



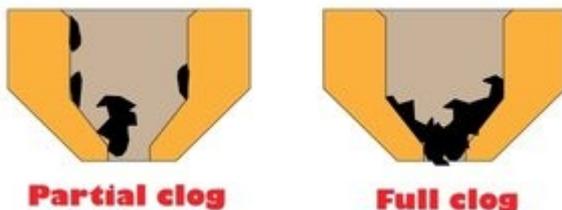
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[Nozzle Clogging vs Hot End Oozing – What's the Difference?](#)

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Tip #2: Clean/Adjust the Nozzle



[Anton Månsson](#))

Clogs

The issue is more commonly known as a partially-clogged nozzle. The easiest way to catch this is to extrude your filament and see if it comes out straight or curled. The curling indicates a partially blocked nozzle. This is mainly caused by foreign particles in the filament that cannot be melted. They get stuck in the nozzle.

When encountering a clog, the most common first solution is to do a few “[atomic pulls](#)”. With any luck, you’ll remove the offending material. If that doesn’t work, try pushing the material through with a [needle](#). (Just be careful not to damage your machine!)

Another thing you can try is [cleaning filament](#). However, this represents less of an immediate solution and more of a preventative measure, as you may not have cleaning filament on hand.

Z Distance

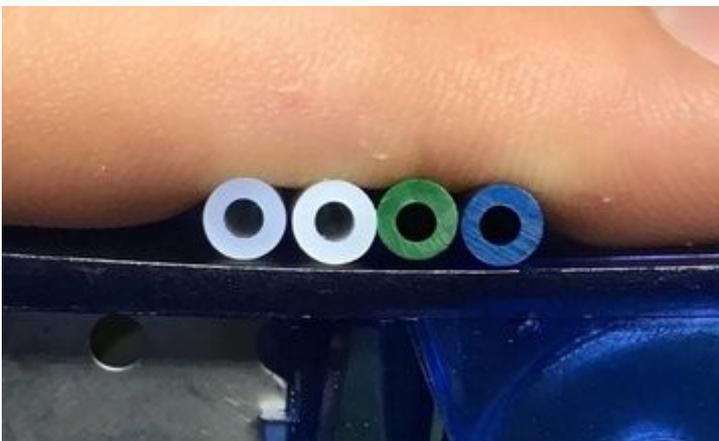
Another issue that’s related to the nozzle is its distance from the bed. If the nozzle is too close to the bed, the material won’t flow as it’s supposed to. Extruder skipping noises and a thin first layer are indicators of this.

Check out our [Ender 3 bed leveling guide](#) to learn everything you need to know.

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Tip #3: Replace the PTFE Tube



[the_Skimmy via Reddit](#))

This is easily overlooked and hard to recognize. Users usually wouldn’t even guess that the cause of their extrusion issues could be the PTFE tube.

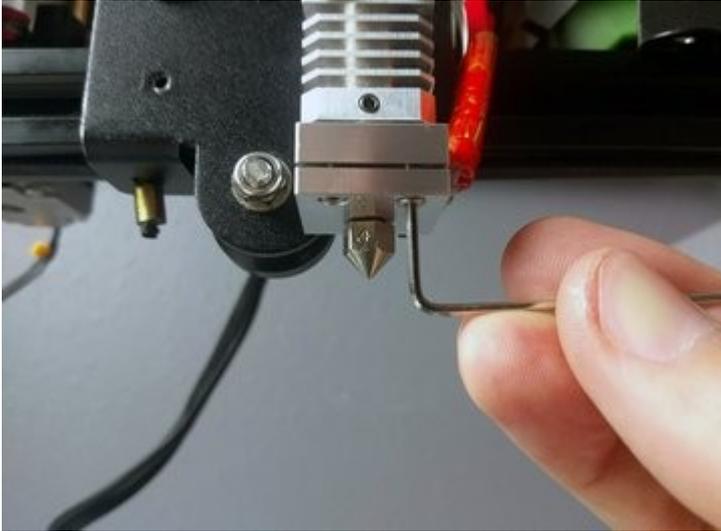
Not all filaments are manufactured the same. Also, if they claim to have a ± 0.05 -mm tolerance, chances are it may not be consistent. If the PTFE tube has very tight tolerances, it provides higher resistance to the filament path. Ultimately, this results in a disturbed flow to the hot end, and thus you can have under-extrusion.

The easiest way to check for PTFE tube resistance is to try to extrude the filament manually. There should be no resistance, and you should be able to push the filament through the tube with ease. If you have to put in some effort to push the filament through the tube, its time to replace it.

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Tip #4: Fix the Hot End



[Let's Print 3D](#))

If you've tried everything else and are still facing under extrusion, chances are you need to fix your [hot end](#). The PTFE tube goes all the way to the nozzle in the heater block on the stock hot end of the Ender 3. The tube should, at all times, sit flush with the nozzle surface. But sometimes, due to faulty couplings or poor QC, there might be a gap between the tube and the nozzle.

In this gap, the filament oozes out and accumulates instead of directly going in the nozzle. This can result in a reduced flow of filament, and over time, the PTFE tube might become blocked.

The most trusted and reliable solution is [Luke's hot end fix](#). It uses a washer to ensure that the tube sits flush to the nozzle. Alternatively, you can get better couplings and reassemble the hot end accurately.

Tip #5: Replace the Stock Extruder



[Liam via 3dprinting.stackexchange](#))

This is among the most recommended upgrades for the Ender 3. The stock extruder setup that comes with the Ender 3 consists of a plastic extruder, which is inherently inferior to the metal counterparts and will wear out very quickly.

A common reported issue is the filament chewing through the arm of the extruder. Users have also experienced the extruder cracking up over time, resulting in a loss of spring tension. The gear can't grip the filament properly, which leads to extrusion issues.

Hence, installing a [new metal extruder](#) will hopefully resolve your extruder-related issues, at least. The metal extruder is more rigid and less susceptible to wear and tear.

[Extruder calibration](#) is also very essential. You might even be facing under-extrusion issues due to poor calibration. Having a properly-calibrated extruder will ensure dimensional accuracy and greater print quality.

Source : <https://bit.ly/2LuYnJd>