Printing Materials

This document is designed to serve as a general introduction to 3d printing filaments. Other useful guides and videos related to more specific topics can be found at OT3d.org

There are many distinct kinds of materials that can be used with FDM or filament printers. This guide will touch on a few of the more popular options. After reading, you will have more insight into what filaments may work best with your printer and what filaments will work best for your project.

The first material that we will talk about is PLA. PLA is a plastic filament with a low printing temperature (180°-230°C). It can be used in the vast majority of FDM 3d Printers and is relatively forgiving. PLA is a biodegradable plastic, and while it prints easily and can show excellent detail, it is not the most durable filament and is subject to damage if used roughly. It comes in many colors, is affordable, and can be used in 3d pens as well.

PETG is a form of plastic that is similar to the plastic that is used in soda bottles, altered for use in 3d Printers. It has a relatively high printing temperature (220 – 250°C), although many printers can accommodate it in the low range. PETG is a very durable material with okay flexibility. A heated bed is necessary, and you may consider using painters' tape, hairspray or a glue stick on the print bed to help with adhesion.

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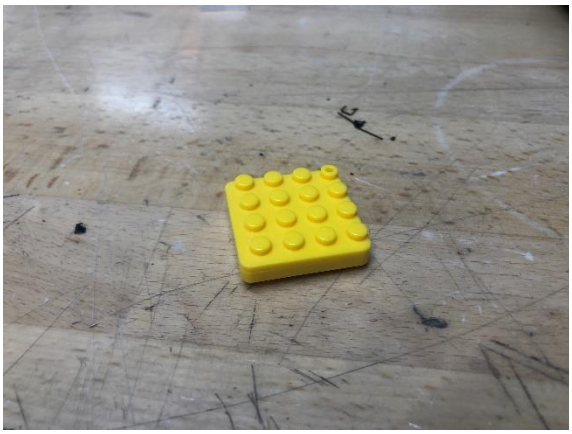
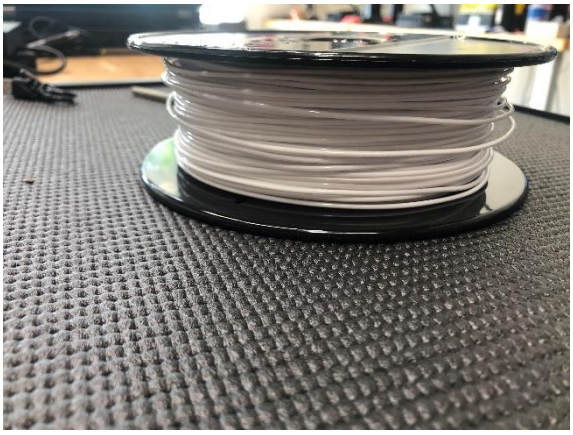
TPU is a somewhat unique material that can be used. The main draw of TPU is its flexibility, having a similar consistency to rubber. TPU's temperature range will generally be between 220 and 230°C. One consideration with this material is that you will need to print it more slowly than others, generally around 20mm/s which can add a considerable amount of time. TPU supports tend to adhere more than others, so keep this in mind as well.



ABS is a common plastic, used in common materials like Legos. ABS is known for being strong and durable. When printing ABS, be aware that it produces fumes and should be used with a printer enclosure. ABS has a wide temperature range from around 210 to 250°C and requires a heated bed to print on.

ASA is another filament that is similar to ABS. The filament is extremely durable and is one of the most UV/weather resistant filaments out there. It has very high printing temperatures that many printers will not be able to manage (240-260°C) along with the need for an enclosure and heated bed. If the air in the enclosure is not heated properly, ASA is susceptible to cracking on it's layer lines.



Information in this guide was sourced from individuals with years of experience 3d printing, as well as the website all3dp.com, which is cited below. You can also find information about specific materials from the manufacturer of the filament. Temperature ratings for printers can be found from the manufacturer of your 3d printer.

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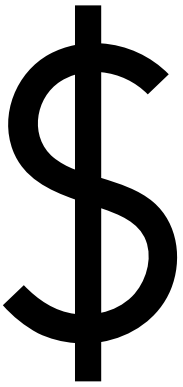
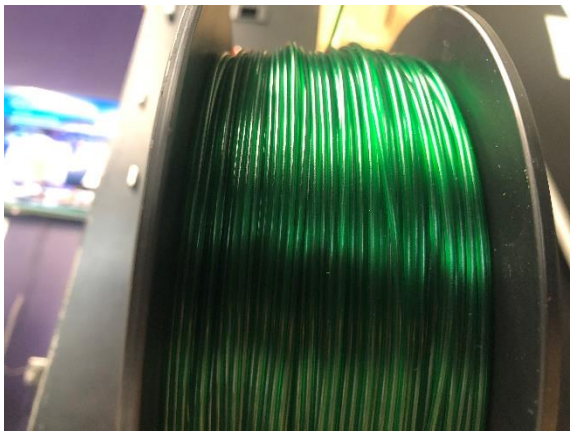
There are a variety of specialty filaments that are available as well. Materials can be imbedded into filaments including wood, metals, and glow in the dark components. Be aware that these filaments are typically more abrasive and can wear out your brass printer nozzle. Replacing your brass nozzle with a steel nozzle can help remedy this problem.

Most of the filaments that are included in this list are relatively common and inexpensive, ranging from around $20 for 2 kgs of PLA, to around $40 a 2 kg roll of ASA. Often, manufacturers will offer 200 g rolls of filament at an even lower price if you find one that you would like to try but aren't entirely sure about. I would encourage you to experiment with various kinds to find what works best for your needs.





There are many more specialty filaments that are out there as well, including nylon and carbon fiber to name a few. Please check out the citation at the end of this page if you would like to learn more about these interesting options. You might find the perfect material, or inspiration for your next project. Happy Printing!

Reference:

The best 3D printer filament: The types in 2022. (2021, December 27). All3DP.

https://all3dp.com/1/3d-printer-filament-types-3d-printing-3d-filament/