

## PLA (polylactic acid)

PLA is a biodegradable polymer that is ideal for prototyping 3D models with pleasing aesthetics. It has good surface quality, is somewhat glossy, and prints details with a high resolution. PLA is a reliable and easy-to-print material that can be printed at low temperatures. It has a low shrinkage factor and does not require the use of a heated build plate. It is the perfect choice for creating concept models, visualization aids, or for use in education.

Overall, PLA is not as strong as more technical materials but does have a high tensile strength. It is not recommended for functional and mechanical parts. Items printed with PLA can lose their mechanical properties and may become brittle over time.

## ABS (acrylonitrile butadiene styrene)

ABS is a well-known material used by professionals for mechanical and technical applications. It has excellent mechanical properties and can be used for objects that require toughness and durability. With a thermal resistance of up to 85 °C, ABS can be used in warm environments. These properties make ABS a good choice for prototyping and fit testing.

ABS is specially formulated to minimize warping and ensure consistent interlayer adhesion. This makes it easier to use than standard ABS filaments. ABS has pleasing aesthetics and results in a matte finish when printed.

**Note:** ABS is adversely affected by exposure to UV light, so it is strongly recommended not to use ABS for applications that are exposed to UV light for extended periods.

## CPE (co-polyester)

CPE is a popular material for mechanical applications. It has the same strength as ABS but also has high tensile strength, dimensional stability, and chemical resistance. This means that CPE can be used in combination with most industrial oils and chemicals without adverse effects. CPE is odorless and emits few UFPs (ultrafine particles) and VOCs (volatile organic compounds) during printing. This makes it a safer choice than many other materials.

**Note:** CPE should not be used for parts exposed to high temperatures as it may deform at temperatures above 70 °C.

## CPE+ (co-polyester)

CPE+ is stronger than CPE, which makes it suitable for applications where the strength of the object is key. CPE+ is primarily used for functional prototyping and modeling. It has greater thermal resistance than CPE, and therefore parts printed in CPE+ can be used at temperatures up to 100 °C without deforming.

## PC (polycarbonate)

PC can be used for various engineering applications. It's one of the toughest print materials, making it a perfect choice for printing strong objects. PC has a high mechanical strength, good UV stability, and high thermal resistance. It retains its form at temperatures up to 110 °C. In addition, PC has a good dimensional stability, is chemical resistant, and has flame-retardant characteristics. These properties make it suitable for lighting, molds, engineering parts, tools, functional prototyping, and short-run manufacturing.

## Nylon (polyamide)

Nylon is a well-known material used for printing tools, functional prototypes, and end-use parts. It combines strength, impact resistance, and flexibility. Nylon 3D prints are both strong and slightly flexible. Nylon is very durable due to its abrasion resistance and corrosion resistance to alkalis and organic chemicals.

## TPU 95A (thermoplastic polyurethane)

TPU 95A is a semi-flexible material for use in applications that demand the qualities of rubber and plastic.

TPU 95A has a score of 95 on the Shore A Hardness Scale, with an elongation break of up to 580%. TPU 95A is flexible, strong, and can withstand high impacts without deforming or breaking. It is also resistant

TPU 95A is not recommended for applications that will be exposed to UV light, moisture, or high temperatures for extended periods.

## PP (polypropylene)

As the second most used polymer worldwide, PP offers many possibilities for both prototypes and end-use parts.

PP is durable with a high toughness and fatigue resistance. This means that PP retains its shape after torsion, bending, or flexing. It has very low friction, allowing parts that are in contact with each other to move smoothly over each other.

PP is also semi-flexible. While it's not as flexible as TPU 95A, it can still be a good option if you're looking for a material with slight flexibility. Besides this, it has good chemical resistance and high electrical resistance, so it is ideal as an electrical insulator.

Another key advantage of PP is that it has a low density, making it perfect for the creation of lightweight parts. Furthermore, it has good translucent properties.

## PVA (polyvinyl alcohol)

Although PVA is not typically used for printed objects, it is an ideal material to choose if you're looking for removable support structures. PVA is biodegradable, has a good thermal stability, and is less moisture sensitive than other PVA filaments. After printing in combination with another material, PVA support structures can easily be removed by dissolving in water. This makes PVA a good support material and allows you to print models with large overhangs and complex geometries.