



PLA

Polyactic Acid

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# Background

Poly(lactic acid), more commonly known as PLA, is one of the most frequently used materials in 3D printing.

Its popularity comes from its ease of use, organic nature, and relatively strong mechanical properties.

PLA is also inexpensive making it a great entry-level material. PLA is made up of naturally occurring, organic lactic acid chains which generally makes it useful in organic settings such as medical applications.

Its chemical nature also makes it easy to recycle and reuse. PLA also boasts strong mechanical properties and user-friendly thermal properties that make it easy to print with.

For those looking for a place to start in additive manufacturing, PLA is an excellent choice.

# Applications

PLA is a great material for applications that require rapid prototyping and strong parts.

Its ease of use and low cost make it suitable when a part may be frequently reprinted as is the case in prototyping & architecture.

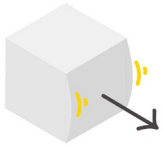
For those who are still learning to 3D print, or for those who are teaching others, PLA is a great introduction to 3D printing.

The thermal properties of PLA make it useful as an alternative to lost wax casting where the PLA is burned away instead of a wax.

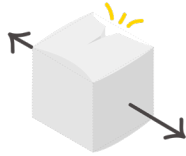
- > Rapid Prototyping
- > Lost Wax Casting
- > Education
- > 3D Models
- > Architecture

# Material Properties

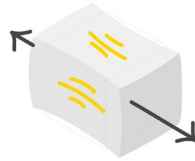
## Mechanical



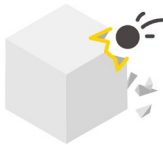
**Young's Modulus**  
2,315-3,138 MPa



**UTS**  
50-65 MPa



**Tensile Elongation**  
3.31-4.00 %



**Impact Strength**  
118 J/m

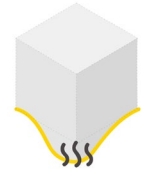


**Shrinkage**  
0.0002 mm/mm

## Thermal



**Glass Transition**  
57-60 °C

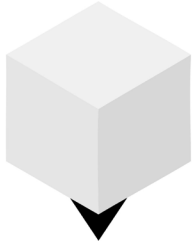


**Heat Distortion**  
80-90 °C

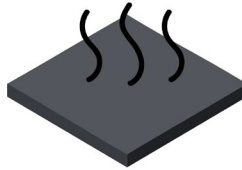


**Decomposition**  
250 °C

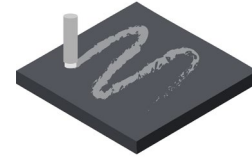
# Printer Settings



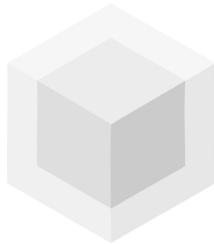
Extruder Temperature  
210 °C



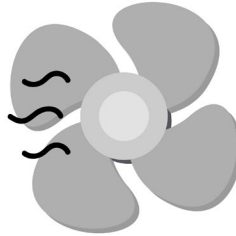
Heated Bed Temperature  
60 °C



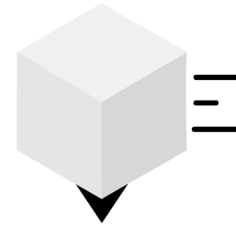
Bed Adhesion  
Nothing extra required



Enclosure  
Do not use



Fans  
On



Printing Speed  
3,600 mm/min

# Sustainability

Created from organic sources, making it sustainable to produce. It's possible to recycle through composting.

Furthermore, is easily reused if ground up and reused in pellet printers such as GBX.

Can only be reused a limited amount of times due to its compostable nature.

# Tips & Tricks

- > PLA, being one of the most common materials on the market, is often compatible with most supporting products & open source designs.

If you are unsure what material to use for an open source design, or what material to use with certain products like adhesives, PLA is a safe choice.

- > PLA is very dimensionally stable and can produce good prints without much work.

However, be sure to add brims & adhesive if your part geometry is large or complex.

Large and dense prints can still have warping issues!



# PLA Validated Suppliers



Coex



ColorFabb  
Woodfill



eSun  
Wood



Filacube



Gizmo Dorks



Fillamentum  
Timberfill



MakeShaper



MCPP



Polymaker  
PolyLite



UltiMachine

# PLA Validated Suppliers



KVP



Polymaker  
PolyMax



Polymaker  
PolyWood



ALGA Algae



eSun CCU



Polymaker  
PolyTerra



Filament PM

# Questions?

Please, do not hesitate to reach out to [support@re3d.org](mailto:support@re3d.org) via email or visit [re3d.org/support](https://re3d.org/support) if you have any more questions about PLA.

# Want to validate your material?

Would you like to see your material listed as a validated supplier? Our engineers welcome your 2.85mm spools! Email [info@re3d.org](mailto:info@re3d.org) for more information.

# Sources

- > S. Farah, et al., Physical and mechanical properties of PLA, and their functions in widespread applications - A comprehensive review, Adv. Drug Deliv. Rev. (2016), [dx.doi.org/10.1016/j.addr.2016.06.012](https://doi.org/10.1016/j.addr.2016.06.012)
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