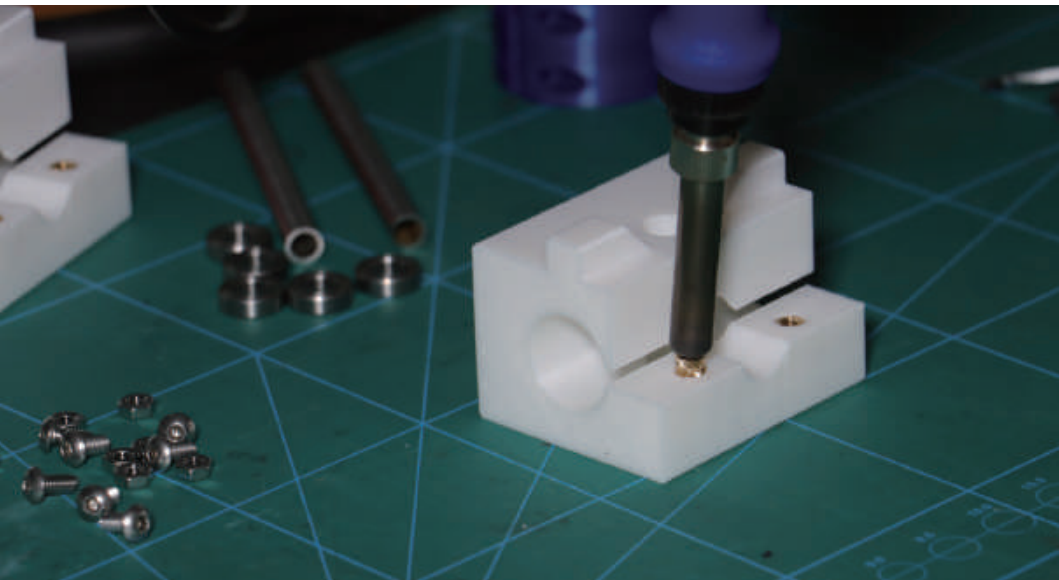




PolySonic™ PLA Pro



Professional

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www.polymaker.com

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Introduction

PolySonic™ PLA Pro is a tough PLA that can print at incredible speeds. With its advanced formulation, this filament ensures durable, rugged prints, with an impact strength similar to ABS and bending strength outperforming ASA & PETG. When time is of the essence for functional parts, PLA Pro is the ideal choice for you.

Key Features



High-Speed



Consistent
Extrusion



Excellent
Toughness

Physical Properties

Property	Testing Method	Typical Value
Diameter		97% is within +/- 0.02
		99% is within +/- 0.03
		99.9% is within +/- 0.04
Weight		1000g ± 30g
Density	ISO1183, GB/T1033	1.23 g/cm ³ at 21.5°C
Melt index	210°C, 2.16 kg	15.5 g/10min
Saturated Water Absorption		0.41%

Thermal Properties

Property	Testing Method	Typical Value
Glass transition temperature	DSC, 10°C/min	62 °C
Melting temperature	DSC, 10°C/min	164 °C
Crystallization temperature	DSC, 10°C/min	96 °C
Decomposition temperature	TGA, 20°C/min	370 °C
Vicat softening temperature	ISO 306, GB/T 1633	61 °C
Heat deflection temperature	ISO 75 1.8MPa	52 °C
Heat deflection temperature	ISO 75 0.45MPa	53 °C

Mechanical Properties

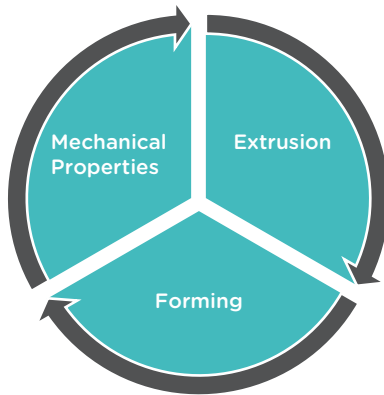
Property	Testing Method	Typical Value (classic speed)	Typical Value (high speed)
Young's modulus (X-Y)	ISO 527, GB/T 1040	2360.0 ± 30.1 MPa	2305.7 ± 42.9 MPa
Young's modulus (Z)		2283.3 ± 32.1 MPa	2102.9 ± 74.3 MPa
Tensile strength (X-Y)	ISO 527, GB/T 1040	41.2 ± 0.6 MPa	39.3 ± 0.5 MPa
Tensile strength (Z)		33.6 ± 0.5 MPa	31.92 ± 0.5 MPa
Elongation at break (X-Y)	ISO 527, GB/T 1040	23.4 ± 6.3 %	17.98 ± 5.2 %
Elongation at break (Z)		4.9 ± 1.1 %	3.8 ± 0.2 %
Bending modulus (X-Y)	ISO 178, GB/T 9341	2688.7 ± 26.1 MPa	2544.5 ± 27.0 MPa
Bending strength (X-Y)	ISO 178, GB/T 9341	67.5 ± 0.7 MPa	64.1 ± 0.6 MPa
Charpy impact strength (X-Y)	ISO 179, GB/T 1043	22.7 ± 2.5 kJ/m2	19.4 ± 3.4 kJ/m2

Note:

Based on 0.4 mm nozzle and 0.2mm layer thickness. Classic printing speed = 46.7mm/s, printing temperature = 210 °C. High printing speed = 300mm/s, printing temperature = 230 °C

High-Speed Performance

To validate the concept of high-speed printing, we have established three criteria that delineate how a material can perform effectively under high-speed conditions (specifically, at speeds of at least 300mm/s with a 0.4mm nozzle and 0.2mm layer height).



Extrusion

In terms of high-speed extrusion, PolySonic™ PLA Pro demonstrates significant improvements compared to the general PolyLite™ PLA Pro, by exhibiting a wider extrusion window and higher flow rates when printing.

As illustrated in Figure 1, the data unveils a remarkable attribute of PolySonic™ PLA Pro – it maintains an extrusion efficiency exceeding 90% even at a flow rate surpassing 24mm³/s (equivalent to a swift 300mm/s printing speed with a 0.4mm nozzle and 0.2mm layer thickness). In contrast, conventional speed printable PLA like PolyLite™ PLA Pro grapples with under-extrusion challenges at such speeds.

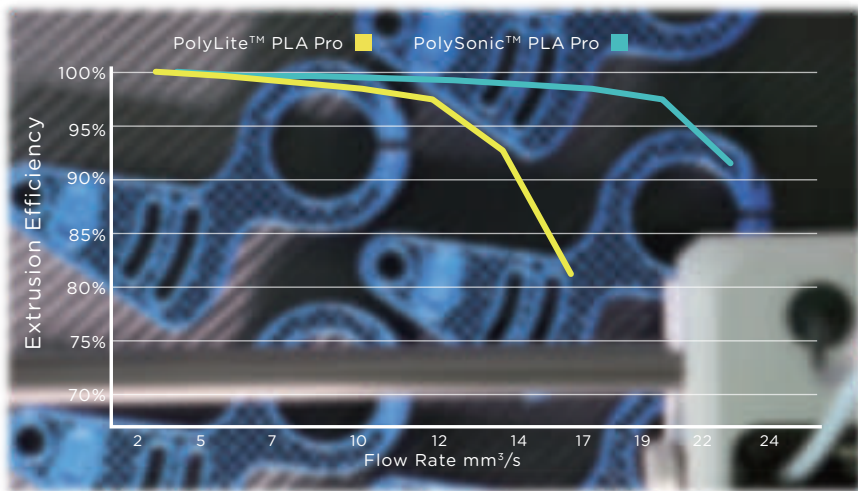


Fig.1 Comparison of extrusion efficiency between PolyLite™ PLA Pro and PolySonic™ PLA Pro at 190°C (The reference extrusion testing is performed on a customized extrusion platform equipped with E3D volcano hotend and 0.4mm nozzle with Hemera XS extruder).

Figure 2 reinforces this point by showcasing the clear advantage of PolySonic™ PLA Pro across varying extrusion temperatures. Irrespective of the temperature, the maximum flow rate achieved by PolySonic™ PLA Pro consistently surpasses that of PolyLite™ PLA Pro, asserting its dominance.

In essence, PolySonic™ PLA Pro emerges as the ultimate solution for high-speed printing, harnessing a superior extrusion capability that surpasses the capabilities of traditional PLA filaments.

Experience the future of rapid 3D printing with PolySonic™ PLA Pro, where speed meets precision like never before.

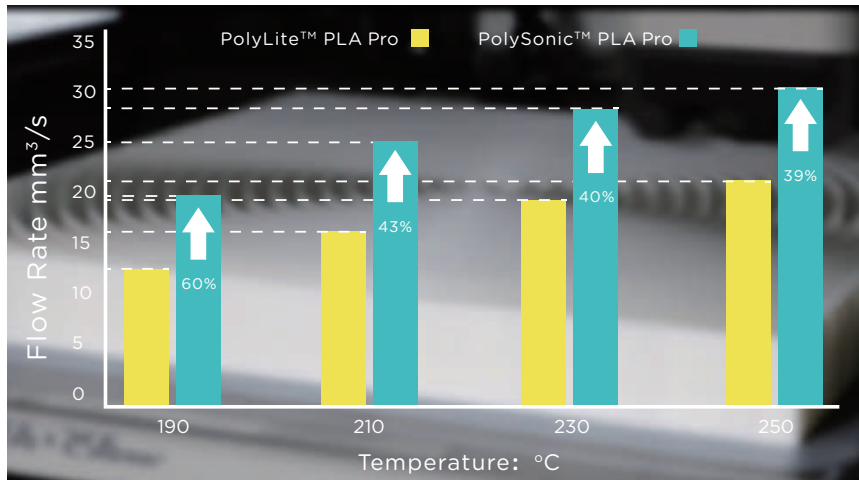


Fig.2 Comparison of the max flow rate of PolyLite™ PLA Pro and PolySonic™ PLA Pro with incremental temperatures (The reference extrusion testing is performed on a customized extrusion platform equipped E3D volcano hotend and 0.4mm nozzle with Hemera XS extruder).

Forming

With PolySonic™ PLA Pro you can experience an excellent and fast print process without sacrificing the printing quality, in the meantime, it can help you to save over 30% time, to dramatically increase your productivity efficiency, and achieve your ideation in time.

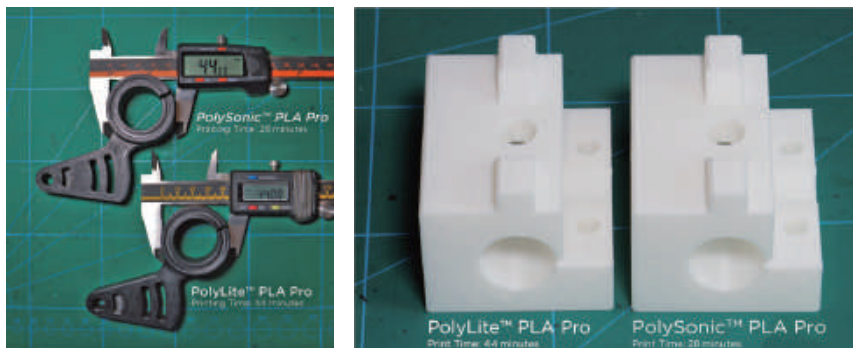


Fig 3 Comparison of the printed part by PolySonic™ PLA Pro and PolyLite™ PLA Pro

Mechanical Properties

PolySonic™ PLA Pro exhibits the inherent strength and modulus of PLA, and remarkably, it maintains its mechanical integrity even at high printing speeds, retaining approximately 90% of its strength when printed at standard speeds (refer to Fig 4). As a result, PolySonic™ PLA Pro empowers you to create parts that are not only fast to print but also exhibit impressive strength, exceeding expectations.

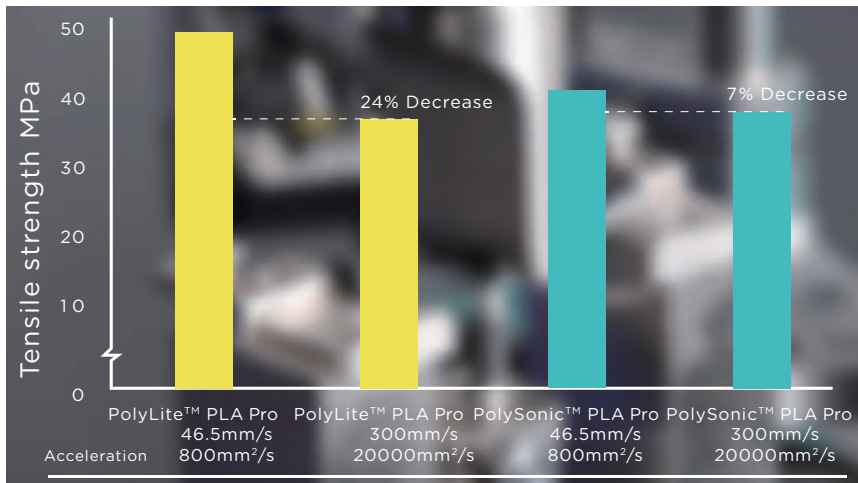


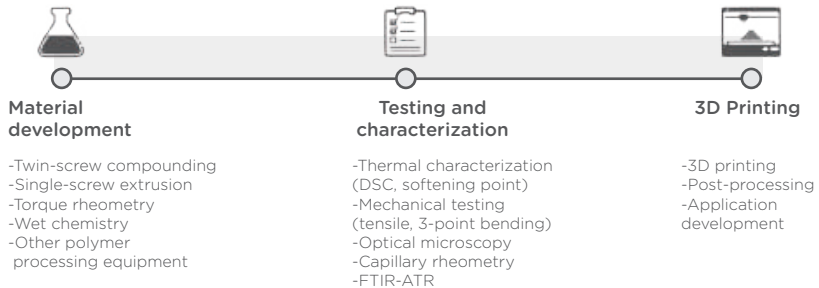
Fig.4 Comparison of tensile strength of PolySonic™ PLA and PolyLite™ PLA at high speed and classic speed

Recommended Print Profile

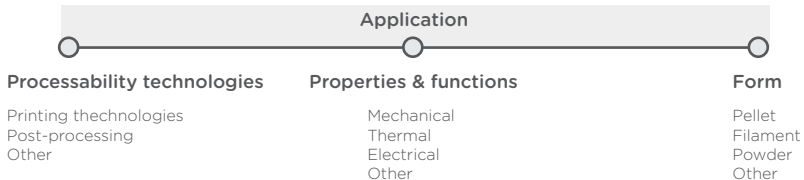
At Polymaker, prioritizing the user experience of our materials remains paramount. To enhance the convenience of using our PolySonic™ PLA Pro, we have meticulously developed printer profiles tailored to compatible printers. These printing profiles aim to provide you with an optimized printing experience. If you're interested in utilizing these tailored profiles, kindly visit www.polymaker.com for downloading.

Material Development

If your application requires a specific material that is not yet available in the market, consider our custom development service. With our talented material scientists and application engineers, we are ready to develop the necessary materials to enable your unique application.



Our state-of-the art R&D facilities allow us to engineer materials at different levels and fully optimize them for 3D printing. Our goal is to deliver materials with the right combination of properties/functions, processability and form to suit your needs!



Technologies

JAM-FREE™

Regular PLA



With Jam-Free™



ASH-FREE™

Without Ash-Free™
Ash content: 0.5%



With Ash-Free™
Ash content: 0.003%



WARP-FREE™

Regular Nylon



With Warp-Free™



STABILIZED FOAMING™

Wood



Stabilized Foaming™



LAYER-FREE™

Rough surface



With Layer-Free™



FIBER ADHESION™



NANO-REINFORCEMENT



Contact us

For any inquiries please contact:

inquiry@polymaker.com

For technical support please contact:

support@polymaker.com

The information provided in this document is intended to serve as basic guidelines on how particular product can be used. Users can adjust the printing conditions based on their needs and actual situations. It is normal for the product to be used outside of the recommended ranges of conditions. Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/recycling practices of Polymaker materials for the intended application. Polymaker makes no warranty of any kind, unless announced separately, to the fitness for any particular use or application. Polymaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any particular application

