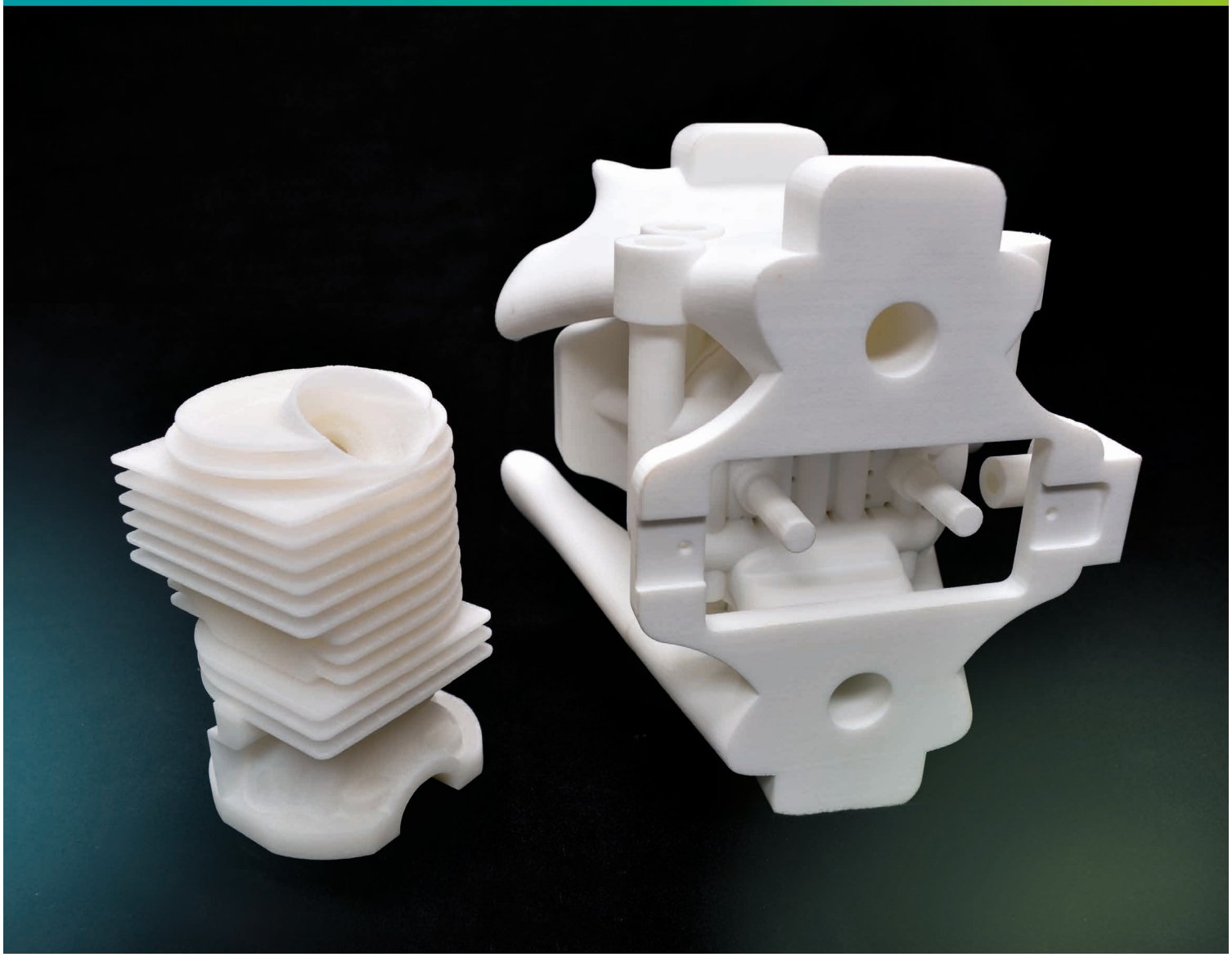
New materials for selective laser sintering: PA6X and PP

Innovative plastics for industrial 3D printing



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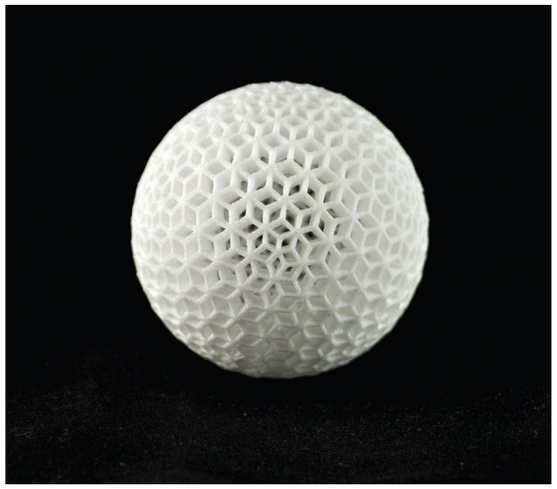
Innovative plastics for industrial 3D printing

The PROTIQ service portfolio includes much more than the additive production of prototypes. Our goal is to find and realize optimal solutions for every requirement of our customers in the future, too. That’s why we invest a lot of time in research and development work. With our new plastics PA6X and PP, we have qualified two extraordinary materials for the laser sintering process to further expand our range of materials.

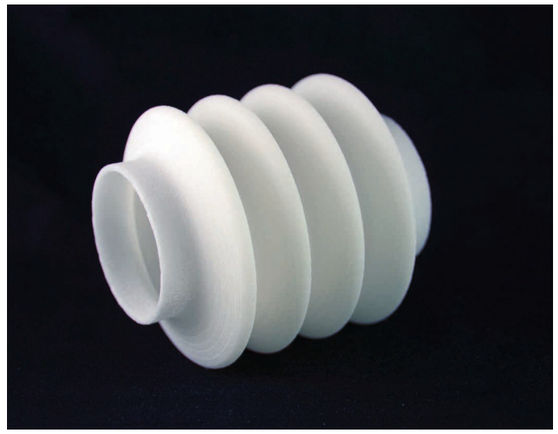


High detail resolution: PA6X produces the finest geometries.

PA6X- Plastic for the highest demands

Brilliant white and intricate – that is what 3D objects, made of the new plastic PA6X from PROTIQ, look like. But the material is not just visually appealing. Its special mechanical properties make the polyamide a versatile material for the most exacting requirements: “PA6X offers high-quality detail resolution, just as does PA12. However, PA6X allows us to significantly improve material performance”, reports Johannes Lohn – Technology Manager for Additive Manufacturing at PROTIQ. “It differs from our standard material PA12 above all through its above-average rigidity, high elongation at break, low anisotropy and high temperature resistance."

With a melting point of 212 degrees Celsius, PA6X is ideal for manufacturing components that are exposed to constant heat stress, such as engine components or engine covers for motor racing. In the glass-ball-filled variant PA6X-GF40, the plastic also achieves a tensile elastic modulus of more than 4,000 MPa with an elongation at break of about 3 percent.



Universally applicable: Products made of PP, like this flexible coupling, are needed for many applications.

Properties of PA6X:

- High detail resolution
- Exceptional temperature resistance
- Strong mechanical load capacity
- Low anisotropy

Properties of PP

- Low density (about 0.9 g/cm³)
- Resilient and durable
- Resistant to many chemicals
- Food-safe
- Minimal water absorption

PP – Polypropylene

Polypropylene (PP) is a standard plastic used in the manufacture of many everyday objects. Thanks to its extremely long durability and excellent chemical resistance, PP is preferred for producing vehicle body and interior moldings. Packaging of all kinds, medical devices and household items are also produced from the thermoplastic. The material has conventionally been processed, inter alia, by injection molding, extrusion, hot forming or welding.

“PP is rarely used in additive manufacturing because the semi-crystalline plastic warps very quickly when cooling down. This makes precise 3D printing much more difficult”, explains Johannes Lohn. Dispensing with polypropylene as a material was nevertheless not an option.

Plant construction by PROTIQ

High-quality processing of the most diverse materials requires the individual adjustment of all the 3D printing system parameters used. The team around Johannes Lohn thus developed a way that enables the processing of extraordinary materials by selective laser sintering: “Our systems technology allows us to address material-specific application areas and even improve them with 3D printing, thanks to higher design freedom. This helps us to close a big gap in the production of small series and mass-produced components.”

The extremely precise control and regulation technology, for example, allows the regulation of temperature management, exposure times and intensities or the diameter of the laser plotter, as required. With this flexible systems technology, PROTIQ has created new perspectives in additive material processing and has taken the next step towards fully automated production. ■

Material properties PA6X

Property	PA12	PA6X	PA6X-GF40
E modulus	1,650 MPa	2,500 MPa	> 4,000 MPa
Tensile strength	45 MPa	58 MPa	60 MPa
Elongation at break	14 %	28 %	ca. 3 %
Melting point	186 °C	212 °C	212 °C

Material properties PP

Property	PP
Density laser sintered	0,9 g/cm³
E modulus	1,300 MPa
Elongation at break	4 – 15 %*
Melting point powder	140 °C

*smaller value is Z-alignment

Learn more at **www.protiq.com**

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