

3Dnatives

your source for 3D printing

Press review Pollen AM

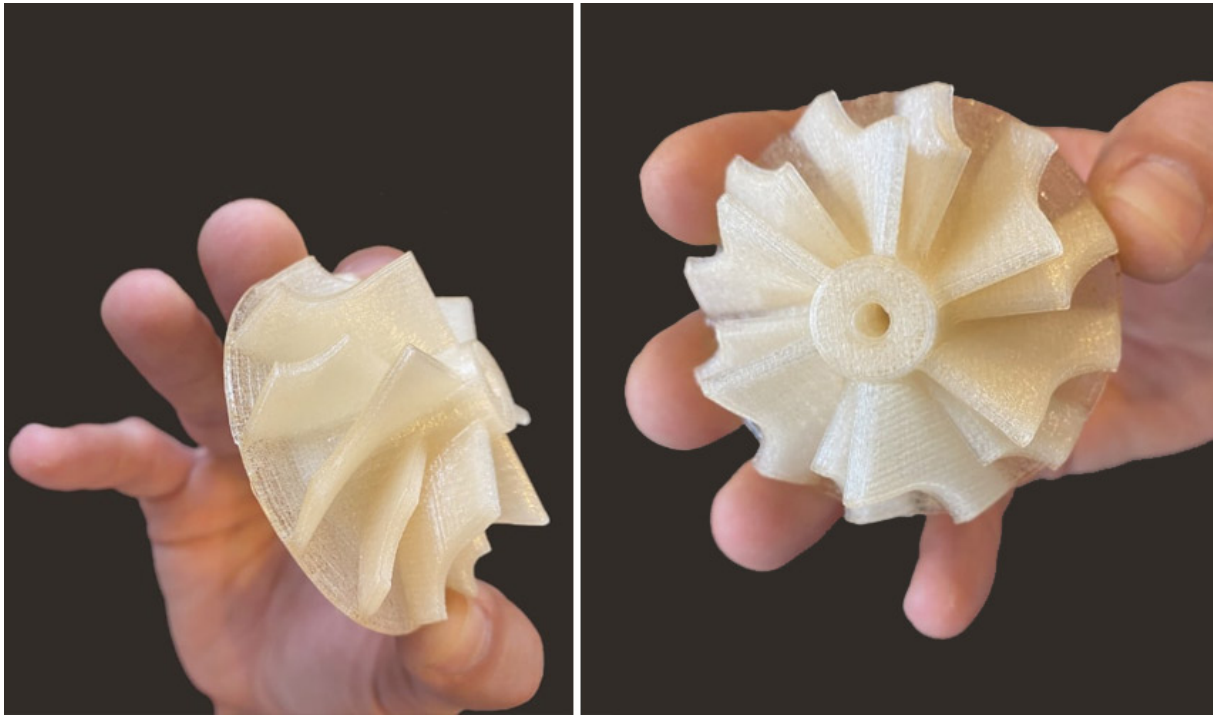
Support : 3Dnatives.com
Publication date: March 24th 2021.

"[With Pam 3D printers], all the standards and certifications of PESU are retained, allowing manufacturers to 3D print complex parts, resistant to heat, fire and smoke" Cédric Michel, co-founder.

The characteristics of the PESU in additive manufacturing

PUBLISHED MARCH 24TH 2021

TRANSLATED FROM THE ORIGINAL VERSION: [HTTPS://WWW.3DNATIVES.COM/PESU-IMPRESION-3D-24032021/](https://www.3dnatives.com/pesu-impresion-3d-24032021/)



Belonging to the sulfone family, polyethersulfone PESU is a high performance material with a unique thermal profile in the world of thermoplastics. Highly heat resistant, it is an amorphous polymer that displays interesting properties for many industries but is still little known in the world of additive manufacturing. However, the French manufacturer Pollen AM has validated with its PAM (Pellet Additive Manufacturing) technology the printing of functional parts in PESU in its raw form - remember that it works with injection grade granules and not filaments or powder. This makes it possible to obtain the same standards and certifications as the material used in injection molding, for example, and thus to offer a high-performance material that is ideal for manufacturers. But what are the characteristics of PESU?

Polyethersulfone is especially well known for its thermal properties: it can withstand very high temperatures (up to 220°C), even in a liquid and vapor environment up to 170°C. It has fire/smoke resistant characteristics which makes it a material of choice for the aerospace, railway and automotive sectors. To give you an idea, the material starts to degrade above 400°C with ignition starting between 475 and 575°C. In addition to this unique thermal profile, PESU is food contact compatible, can withstand very high loads and exhibits good electrical insulation and dielectric properties.



3D printed support with PESU (photo credits: Pollen AM)

PESU is an amorphous material, which has a disordered molecular structure: unlike a semi-crystalline material, it is easier to shape because it undergoes less contraction and expansion at temperature. Its melting point is between 340 and 390°C. These two characteristics make it, at first glance, an ideal material for additive manufacturing. However, in order to manufacture a filament that can be extruded on an FDM 3D printer, it is necessary to add additives or even modify the PESU chemistry, which leads to an alteration of its properties. The manufacturer will then have to requalify the production process if he wants to obtain the same standards and certifications as the raw material. This can be a disincentive to use additive manufacturing.

This is why Pollen AM's offer represents a key solution: by processing the material in its raw form, i.e. in injection grade granules, it is not altered and retains the same properties and characteristics for additive manufacturing. All the standards and certifications of PESU are retained, allowing manufacturers to 3D print complex, heat, fire and smoke resistant parts. Compared to PEI (whose most famous brand is ULTEM), for example, which is now available in filament form, PESU not only has better characteristics but is also less expensive (20 to 25 euros per kilo of granules compared to 70 euros for PEI in granule form and more than 250 euros in filament format). In addition, polyethersulfone has a much lower moisture absorption, and is therefore an alternative to be seriously considered.



3D printed gear wheel (photo credits: Pollen AM)

Polyethersulfone applications

As you can see, thanks to its thermal characteristics, 3D-printed PESU is highly prized by the transportation sector, whether it be aerospace, railways or, above all, the automotive industry. As it is resistant to fluids, grease and gasoline, it is suitable for the manufacture of probes to check oil levels, for example. PESU is also used in the design of personal protective equipment.

Finally, PESU is often used to replace the polyamide family and more particularly polycarbonate. It offers good transparency, food contact and is sterilizable. Note however that PESU is not flexible.

If you want to know more about PESU, do not hesitate to contact Pollen AM and visit their website [HERE](#).

**Cover photo credits: Pollen AM*