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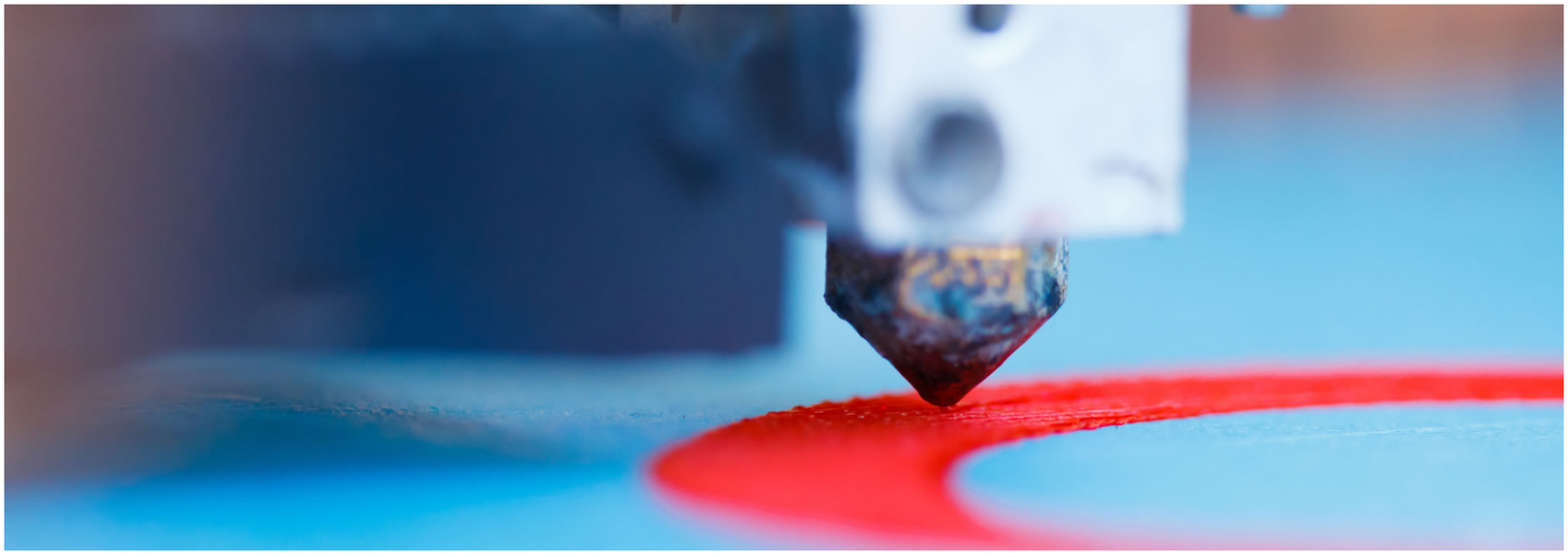

SIBUR DEVELOPS NEW POLYMER GRADE: SIBEX 3DF

SIBUR specialists have created a new polymer for use in fused deposition modelling (FDM).

In order to broaden the scope of FDM 3D printing to include functional parts, SIBUR specialists have developed a new polymer grade that overcomes the downsides of traditional FDM filament.

FDM is an additive manufacturing process that is widely used in 3D modelling, prototyping and in industrial production. The method builds up objects layer-by-layer by extruding molten material – thermoplastic polymer filament – according to a pre-programmed algorithm.

THE INNOVATIVE COMPOSITION OF POLYPROPYLENE-BASED SIBEX 3DF NOT ONLY OVERCOMES THE TRADITIONAL DRAWBACKS OF PLASTICS USED IN FDM, IT ALSO PREVENTS POLYPROPYLENE SHRINKAGE

The resulting product’s consumer properties are driven by the properties of the material used: ABS, PLA and PETG are currently the most popular plastics for FDM.

Some advantages of ABS are its low price, ease of use and adhesion to the print bed. Its main downside is the unpleasant “styrene” odour when printing. PLA is prized for its thermal stability, but it is not long-lasting and is expensive. PETG has solid physical and mechanical properties, yet it has a high density, is unstable in acidic and alkaline environments and is less economical. Compared to polypropylene, all these materials have a relatively low resistance to repeated bending loads, i.e. they snap under frequent strain.

The innovative composition of polypropylene-based Sibex 3DF not only overcomes the traditional drawbacks of plastics used in FDM, it also prevents polypropylene shrinkage. For a long time, polypropylene’s high shrinkage prevented it being used in FDM 3D printing, as parts could not be produced to the required level of accuracy. The shrinkage of Sibex 3DF is less than 0.5%, which removes the barriers to its use.

SIBEX 3DF PROPERTIES

Properties	Method	Typical values
Melt flow index @ 230 ºC & 2.16 kg, g/10 min	ASTM D1238	8.08
Yield strength, σpy, MPa	ASTM D638	15.8
Tensile strength, σpt, MPa	ASTM D638	15.4
Elongation at break, εb, %	ASTM D638	470
Flexural modulus, MPa	ASTM D790	500
Vicat softening temperature @ 10 N, °C	ASTM D1525	94
Notched Izod impact strength @ 2–3 °C, J/m	ASTM D256	620 (h)
Mould shrinkage after 2 h, %	ASTM D955	0.4
Mould shrinkage after 24 h, %	ASTM D955	0.4

SIBUR also plans to develop a polypropylene grade suitable for selective laser sintering (SLS) printing. To achieve this, the polymer must first be turned into a powder of a set fineness, which calls for a set of special conditions during production. Creating this kind of polymer is no mean feat, but the result will enjoy high demand in the production of unique, high-strength products with a complex shape.

Looking ahead, plans also include expanding the range of polypropylene available for 3D printing by developing high-strength grades, as well as lightweight, lower-density grades.