SPHEROFLEX ® TPU 50

Processing via High Speed Sintering

Material data sheet

Launhardt

Fraunhofer IPA

voxeljet

Contents

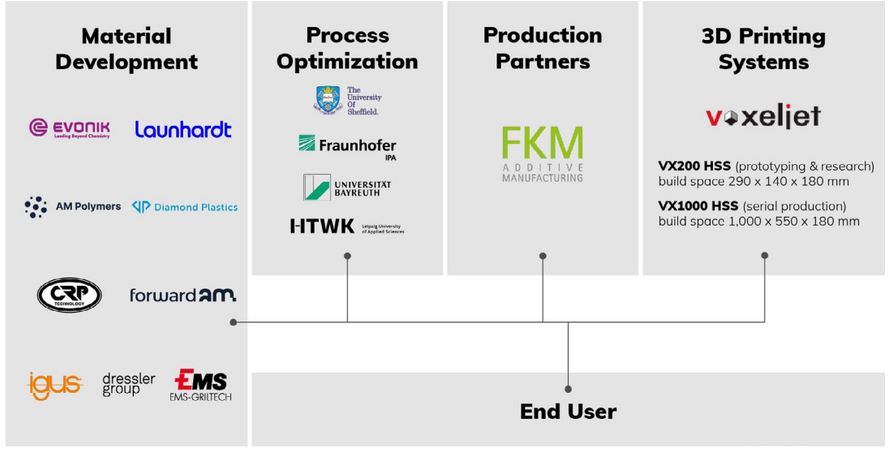
Intro

As part of the HSS Material Network, the material SpheroFlex® TPU 50 from the manufacturer Launhardt GmbH has been successfully qualified for use in High Speed Sintering (HSS). The qualification was carried out in collaboration with Fraunhofer IPA at its Bayreuth site on a voxeljet VX200 HSS.

SpheroFlex® TPU 50 is a thermoplastic polyurethane powder that is characterized by its versatile mechanical properties and good chemical resistance. Selective grayscale printing using the HSS process allows parts with locally varying Shore hardness between A 50 and 80 to be produced. This enables applications to be realized that require both a soft feel and high flexibility as well as higher stiffness.

Qualification in the HSS Material Network ensures that the material has been tested under practical conditions and can be used reproducibly for additive manufacturing. With SpheroFlex® TPU 50, users now have another industry-grade material available for additive series production – available on request.

The HSS material network at a glance



Material Properties

Mechanical Properties

Measured variable	Standard		Measured value	
			XY direction	Z-direction
Tensile strength	ISO 37	up to	10,6 MPa	2,8 MPa
Elongation at break	ISO 37	up to	292,6 %	104,9 %
Young's modulus	ISO 37	up to	21,0 MPa	11,3 MPa
Shore hardness	ISO 868	adjustable	50 - 80	
Density	ISO 1183-1	up to	1,17 g/cm³	

All test specimens were produced using a VX200-HSS from voxeljet AG (standard version) with a powder mixture of 70% recycled powder and 30% fresh powder, and were conditioned and tested in accordance with DIN EN ISO 291 at 23°C and 50% relative humidity.

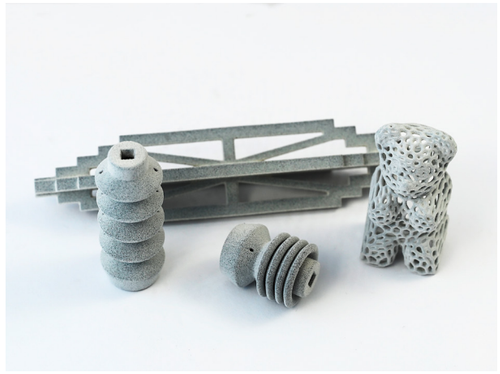
Functionally graded mechanical properties

By varying the amount of infrared-absorbing ink used in HSS, it is possible to specifically adjust material properties. This means that a part can have locally soft and hard areas, which can be used for applications such as insoles.

Grey scale printing can be used to create a wide range of hardness values within the same component.

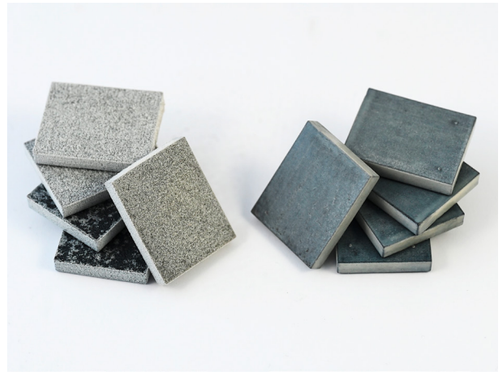
Typical hardness values for different gray scales

Geometric properties



Parts manufactured from SpheroFlex® TPU 50 in HSS are characterized by high precision and detail accuracy as well as mechanical properties that can be adjusted within a wide range.

Chemical smoothing



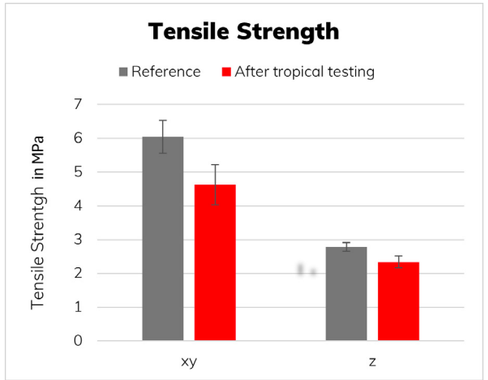
For many industries, post-processing of components using chemical smoothing (vapor smoothing) is playing an increasingly important role. Post-treatment of SpheroFlex® TPU 50 components using chemical smoothing (e.g., AMT SF50) can achieve smooth and sealed surfaces without porosity and increase mechanical properties.

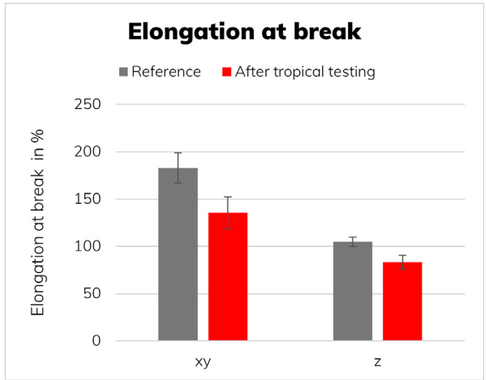
Tensile strength, elongation at break, and stiffness are significantly improved by the process, while component hardness increases only minimally due to surface compaction.

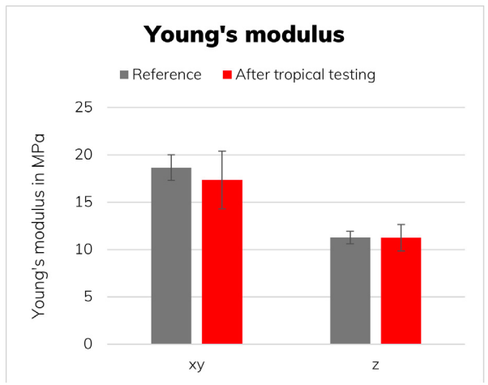
Material properties

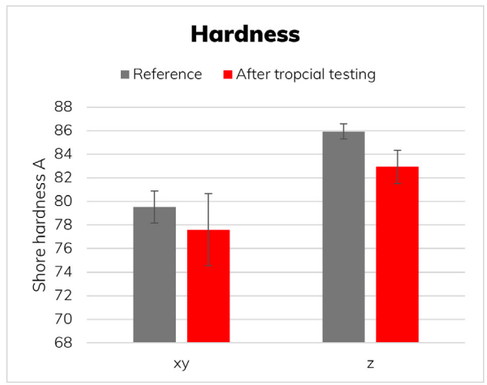
Hydrolysis resistance

All test specimens were produced using a VX200-HSS from voxeljet AG (standard version) with a powder mixture consisting of 70% recycled powder and 30% fresh powder. Hydrolysis resistance was determined in accordance with ISO 1419, Method C: Tropical Test.







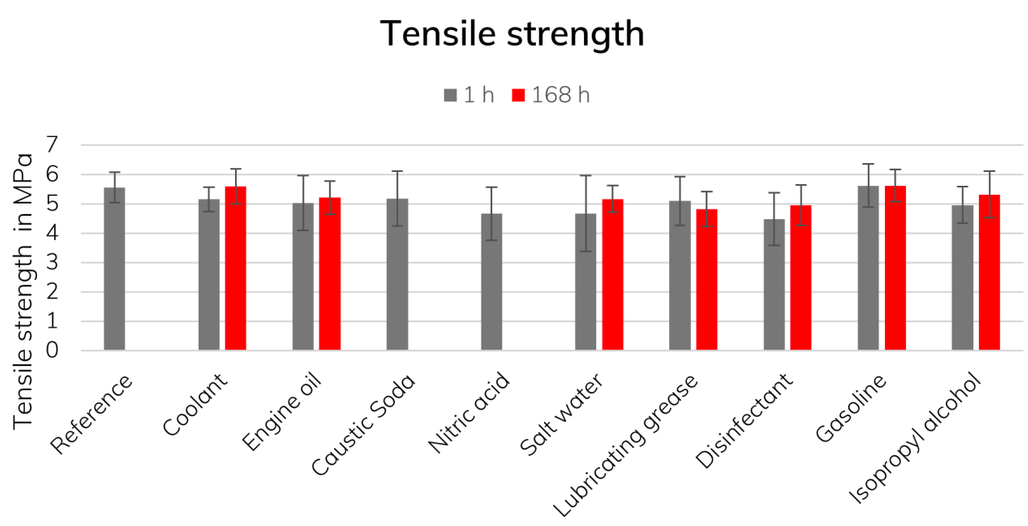


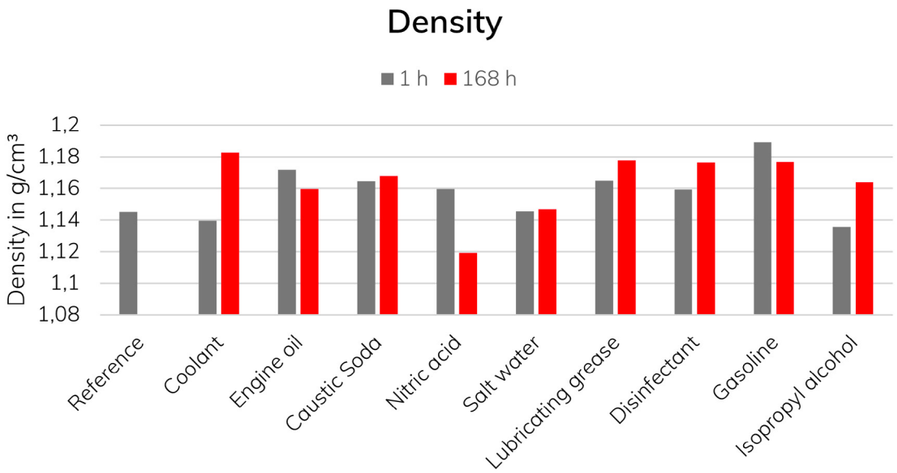
Chemical resistance

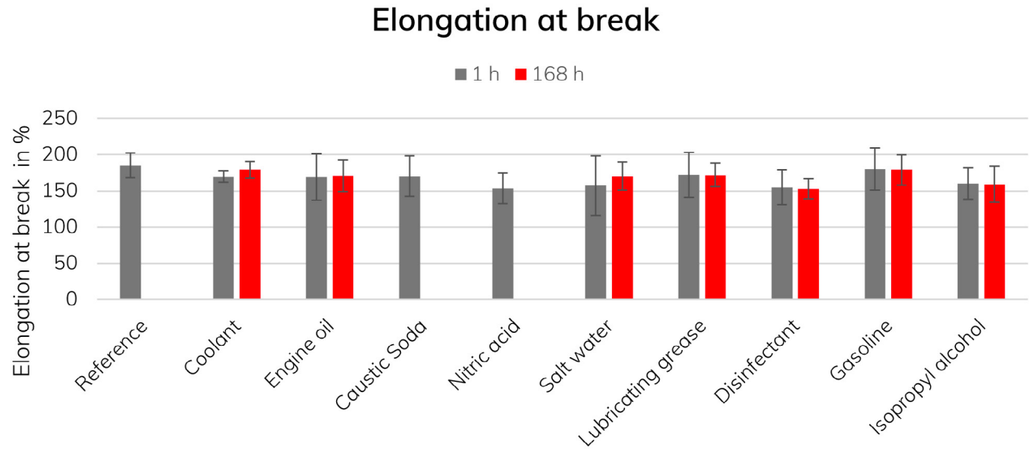
The resistance of test specimens made of HSS from SpheroFlex® TPU 50 was analyzed in accordance with DIN ISO 1817 for the following chemicals:

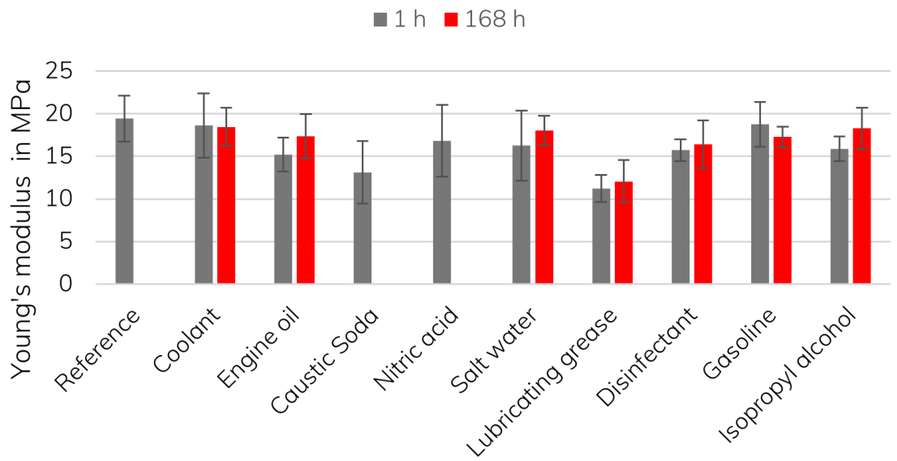
Medium	Concentration	Temperature
Coolant (Type D/G12)	100 %	23 °C
Engine oil (eni i-Sint MS 5W-40)	100 %	23 °C
Caustic soda	2,5 %	80 °C
Nitric acid	0,5 %	80 °C
Salt water (NaCl)	3,5 %	23 °C
Lubricating grease (Würth Long-Term Grease III)	n.a.	23 °C
Disinfectant (Sterilium Gel pure)	100 %	23 °C
Gasoline (E5, 95 RON)	100 %	23 °C
Isopropyl alcohol	99,7 %	23 °C

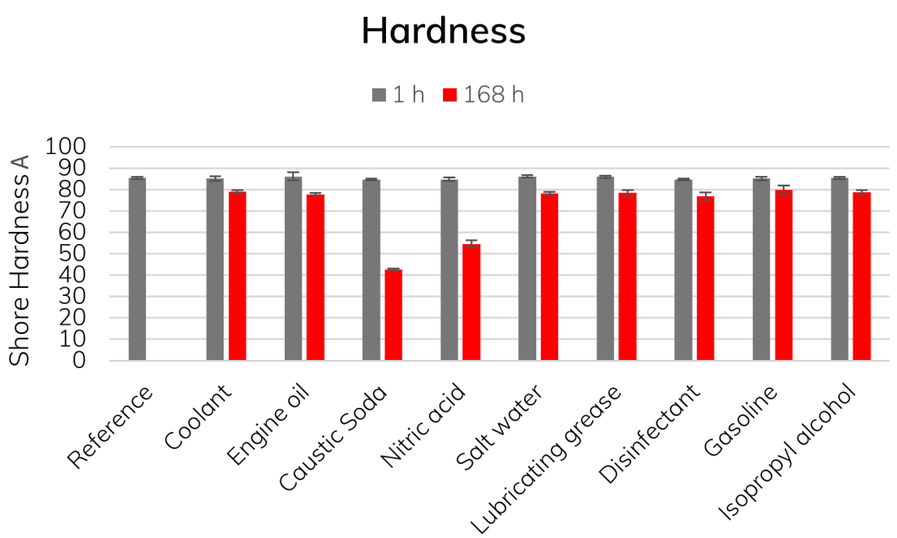
For this purpose, the samples were immersed in the media for 1 hour and 168 hours and then tested for the resulting mechanical properties.











Biological compatibility

The Ostthüringische Materialprüfgesellschaft für Textil und Kunststoffe mbH (OPMG mbH) has confirmed the following for SpheroFlex® TPU 50 samples manufactured at HSS:

SpheroFlex® TPU 50 showed **NO CYTOTOXICITY** and **NO IRRITATING POTENTIAL** according to test reports 2545B-0024_1 and 2545B-0024_3 dated 24.04.2025; tested according to DIN EN ISO 10993-5 "Biological evaluation of medical devices, Part 5: Tests for in vitro cytotoxicity" and DIN EN ISO 10993-23 “Biological evaluation of medical de-vices, Part 23: Tests for in vitro irritation”

Contact and further information

Whether you need components, materials, materials + machines, or qualification of your own materials—we and our partners are available to assist you as needed:

- **Fraunhofer IPA:** Benchmark parts as well as material testing and qualification
- **Laundhardt GmbH:** Material procurement
- **voxeljet AG:** 3D printing systems and tailoring projects

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