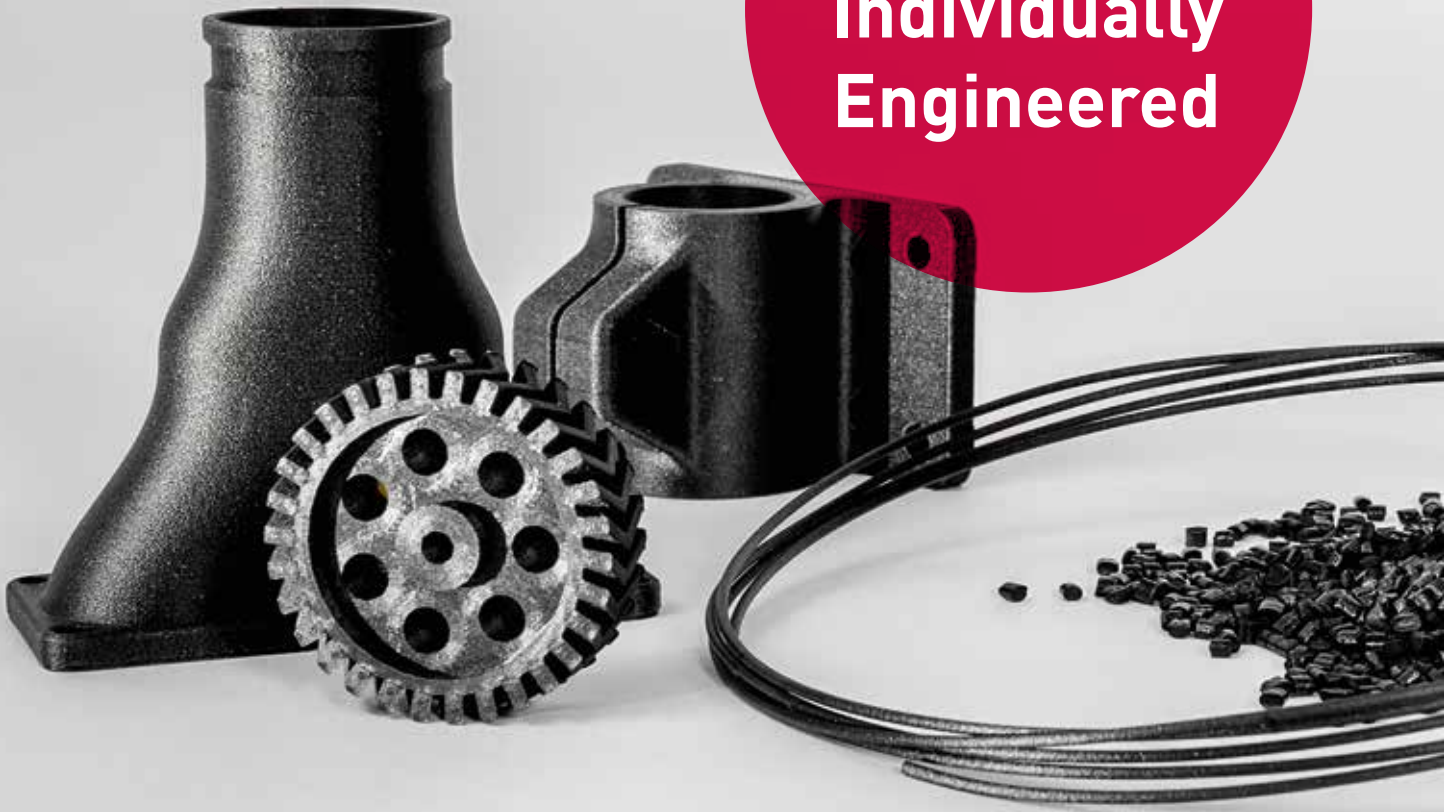


Additive manufacturing solutions

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Solutions – Individually Engineered



View of the LUVOCOM® 3F 3D printing laboratory in Hamburg, Germany. We support also from our laboratories in China and the USA.

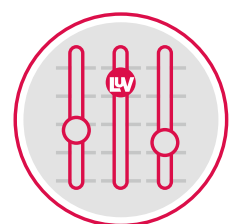
From granules to filaments – we offer our competence in materials and AM technology.



LUVOCOM® 3F – customized materials for extrusion-based 3D printing

Extrusion-based 3D printing, also known as FFF (Fused Filament Fabrication) and FGF (Fused Granulate Fabrication), is an additive manufacturing process for neat and reinforced polymers. In addition to removing tool costs, 3D printing offers much greater design freedom in comparison with traditional processes. It thus unlocks engineering capabilities at a much lower cost and considerably reduces product development times.

Our LUVOCOM® 3F materials take account of the process and final product during the design stage and are therefore able to achieve another level of properties and quality. All our products are thoroughly tested in our development laboratories and in close cooperation with printer manufacturers, which ensures that they will work in the systems available on the market. Offering Granulates from PP to PEEK and a selected number of Filaments in both 1.75 and 2.85mm diameters.



**CUSTOMIZED
POLYMER MATERIALS**



Our service offer

Changing from traditional manufacturing to the digital industry may be challenging, so we offer assistance with this process. Together with our extensive network of partners, we can provide solutions from the material to the final product.

We are permanently developing materials for 3D printing, from PP to PAEK, which are then modified to your requirements, regardless of whether these requirements relate to properties, color or functionality.

Global presence

We are represented around the world. To help us react better to individual client and market requirements as well as to shorten supply routes and processing times, we produce on three continents. Apart from our main plant in Hamburg, Germany, we also have production sites in the USA and China. Our local market development staff provide on-site support.

3D printing filaments made of LUVOCOM® 3F PEEK for outstanding processing and part performance. Part produced on a Roboze 3D printer, in a non heated building chamber.

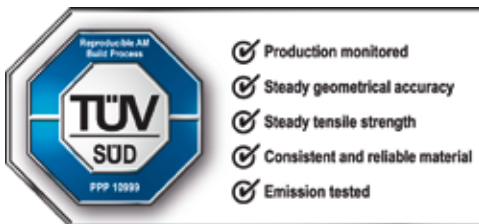




LUVOCOM® 3F Filament – High-Performance Filaments

Our LUVOCOM® 3F Filaments are specially designed to provide an easy-to-print experience and to achieve another level of properties. We are offering a dedicated range of filaments which is complemented by numerous filaments based on our materials provided by manufacturers around the globe.

Our filaments are quality controlled also by third parties as TÜV SÜD. For more information see page 10.

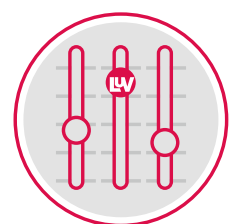




Product range

(available in 1.75 and 2.85mm diameter, 750g spools):

- **LUVOCOM® 3F Filament PET CF 9780 BK**
 - With 15% carbon fibers
 - The best cost/benefit Carbon-fiber reinforced material in the market
- **LUVOCOM 3F Filament PA^{HT}® 9825 NT**
 - Modified neat, natural color
 - The world's first TÜV SÜD Reproducible AM Build Process certified filament
- **LUVOCOM 3F Filament PA^{HT}® 9936 BK/L**
 - Optimized surface finish, black color
 - Magnetically detectable from 2x2x2mm³ printed parts and food contact certified
- **LUVOCOM 3F Filament PA^{HT}® CF 9891 BK**
 - With 15% carbon fibers
 - Extreme performance for functional prototypes and small series production



**CUSTOMIZED
POLYMER MATERIALS**



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Serial part for food processing machines, printed with multi-materials – LUVOCOM 3F PA^{HT}® CF and TPU

Mold 3D printed, using the FGF technology, with coated cavity. In the foreground, molded CFRP component.



Solutions with functional materials

3D printing has evolved tremendously in the last few years, allowing it to be used not only for prototyping but also for small-scale series production. Our LUVOCOM® 3F materials bring functionality to the printed parts not only by increasing their mechanical properties and reducing their weight but also by adding electrical/thermal conductivity and tribological properties. Regardless of whether you use a filament-based process or 3D print directly from granulates, we have the ideal solution for you.



3D PRINTING

Part made of LUVOCOM 3F PA^{HT}® CF 9891, a high strength and stiff carbon fiber reinforced PA. Printed with a 0.4mm nozzle for outstanding surface appearance.



Certified reproducible 3D printing – certification of filament and printing process by TÜV SÜD

Commissioned by the LEHVOSS Group and Ultimaker, TÜV SÜD has certified the 3D printing process using the combination of LUVOCOM® 3F Filament and Ultimaker printer. This comprised the material properties, production of the test specimen – including the dimensional tolerances, the manufacture of the filament and the printing process. In addition, the emissions were measured during the printing process. The printing process meets the requirements drawn up by TÜV SÜD in all aspects. The test specification “Reproducible 3DP construction process” makes reference to existing and emerging 3D printing standards. As a result, the LUVOCOM 3F Filament PA^{HT}® 9825 NT under test, an unreinforced high-performance polyamide, and the Ultimaker S5 Pro Bundle are the world’s first system certified by TÜV SÜD in the field of fused filament fabrication (FFF).

Product data

LUVOCOM 3F Filament PA^{HT}® 9825 NT (high-temperature polyamide unreinforced, natural color)

Physical properties		Test method	Specimen	Units	Typical value
Specific gravity		ISO 1183-3		g/cm ³	1.20
Water absorption	23°C/24h	ISO 62	MPTS ISO 3167 A	%	<0.3
Melt flow rates (MFR)	250°C/2.16kg	ISO 1133	Pellet	g/10min	3.6
Melt volume rate (MVR)	250°C/2.16kg	ISO 1133	Pellet	cm ³ /10min	3.5
Thermal properties					
Heat distortion temperature	HDTA – 1.8MPa	ISO 75	Printed specimen	°C	80
Continuous service temperature	20,000h	IEC 60216	MPTS ISO 3167 A	°C	100
Service temperature	during lifetime max. 200h		MPTS ISO 3167 A	°C	120
Coefficient of thermal expansion		ISO 11359	10x8x4mm	10 ⁻⁵ /K	0.5
Thermal conductivity in plane	hot disk	ISO 22007	60x60x3mm	W/mK	0.3
Electrical properties					
Insulation resistance strip electrode	R25	DIN IEC 60167	MPTSISO3167A	Ω	>10 ¹²
Surface resistance	ROB	DIN IEC 60093	Ronde 60x4mm	Ω	>10 ¹²
Mechanical properties at 23°C / 50% rh		*Printed using Ultimaker S5 Pro and Engineering settings			
Tensile strength	100% infill - 0° - XY	ISO 527-2	ISO 3167:2014 Typ A	MPa	69.1 ± 2.9
Elongation at maximum force	100% infill - 0° - XY	ISO 527-2	ISO 3167:2014 Typ A	%	2.7 ± 0.3
Modulus of elasticity	100% infill - 0° - XY	ISO 527-2	ISO 3167:2014 Typ A	GPa	3.1 ± 0.1
Tensile strength	100% infill - 45/135° - XY	ISO 527-2	ISO 3167:2014 Typ A	MPa	82.1 ± 0.9
Elongation at maximum force	100% infill - 45/135° - XY	ISO 527-2	ISO 3167:2014 Typ A	%	3.7 ± 0.0
Modulus of elasticity	100% infill - 45/135° - XY	ISO 527-2	ISO 3167:2014 Typ A	GPa	3.1 ± 0.1
Tensile strength	100% infill - 90° - XY	ISO 527-2	ISO 3167:2014 Typ A	MPa	81.6 ± 0.9
Elongation at maximum force	100% infill - 90° - XY	ISO 527-2	ISO 3167:2014 Typ A	%	3.7 ± 0.0
Modulus of elasticity	100% infill - 90° - XY	ISO 527-2	ISO 3167:2014 Typ A	GPa	3.1 ± 0.0
Tensile strength	100% infill - ZX	ISO 527-2	ISO 3167:2014 Typ A	MPa	26.3 ± 2.7
Elongation at maximum force	100% infill - ZX	ISO 527-2	ISO 3167:2014 Typ A	%	1.1 ± 0.1
Modulus of elasticity	100% infill - ZX	ISO 527-2	ISO 3167:2014 Typ A	GPa	2.8 ± 0.1
Mechanical properties at 23°C / 50% rh		*Printed using Ultimaker S5 Pro and Fast settings			
Tensile strength	100% infill - 0° - XY	ISO 527-2	ISO 3167:2014 Typ A	MPa	54.8 ± 1.7
Elongation at maximum force	100% infill - 0° - XY	ISO 527-2	ISO 3167:2014 Typ A	%	2.6 ± 0.1
Modulus of elasticity	100% infill - 0° - XY	ISO 527-2	ISO 3167:2014 Typ A	GPa	2.8 ± 0.1
Tensile strength	100% infill - 45/135° - XY	ISO 527-2	ISO 3167:2014 Typ A	MPa	51.2 ± 1.9
Elongation at maximum force	100% infill - 45/135° - XY	ISO 527-2	ISO 3167:2014 Typ A	%	2.8 ± 0.1
Modulus of elasticity	100% infill - 45/135° - XY	ISO 527-2	ISO 3167:2014 Typ A	GPa	2.9 ± 0.2
Tensile strength	100% infill - 90° - XY	ISO 527-2	ISO 3167:2014 Typ A	MPa	66.2 ± 2.6
Elongation at maximum force	100% infill - 90° - XY	ISO 527-2	ISO 3167:2014 Typ A	%	3.2 ± 0.2
Modulus of elasticity	100% infill - 90° - XY	ISO 527-2	ISO 3167:2014 Typ A	GPa	2.8 ± 0.3
Tensile strength	100% infill - ZX	ISO 527-2	ISO 3167:2014 Typ A	MPa	22.2 ± 3.5
Elongation at maximum force	100% infill - ZX	ISO 527-2	ISO 3167:2014 Typ A	%	1.0 ± 0.2
Modulus of elasticity	100% infill - ZX	ISO 527-2	ISO 3167:2014 Typ A	GPa	2.8 ± 0.1



Any recommendations made for use of Seller's materials are made to the best of Seller's knowledge and are based upon prior tests and experience of the Seller believed to be reliable; however, Seller does not guarantee the results to be obtained and all such recommendations are non-binding – also with regard to the protection of third party's rights –, do not constitute any representation and do not affect in any way Buyer's obligation to examine and/or test the Seller's goods with regard to their suitability for Buyer's purposes. No information given by the Seller is to be construed in any way as a guarantee regarding characteristics or duration of use, unless such information has been explicitly given as a guarantee.

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Our material competences



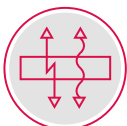
STRUCTURAL



RESISTANT



TRIBOLOGICAL



CONDUCTIVE



WEIGHT



PROTECTION



SURFACE



CUSTOMIZED
POLYMER MATERIALS

