# LUVOCOM® 3F

Additive manufacturing solutions

## Experience the 3Difference


LEHVOSS Group


# LUVOCOM® 3F

## customized materials for extrusion-based 3D printing

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 for FFF (Fused Filament Fabrication) and FGF (Fused Granulate Fabrication) printing are designed for the manufacturing of functional parts in demanding applications. The materials have been developed keeping the printing process and the final product application in mind in order to achieve a higher 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 most systems available on the market. We are offering granulates from PP to PEEK and a selected number of filaments in both 1.75 and 2.85 mm diameters.

Our materials are available worldwide as filaments in a wide range from qualified filament manufacturers. **Contact us.**

# 3D PRINTING MATERIALS

Experience the 3Difference

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

CUSTOMIZED
POLYMER MATERIALS


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

## 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.

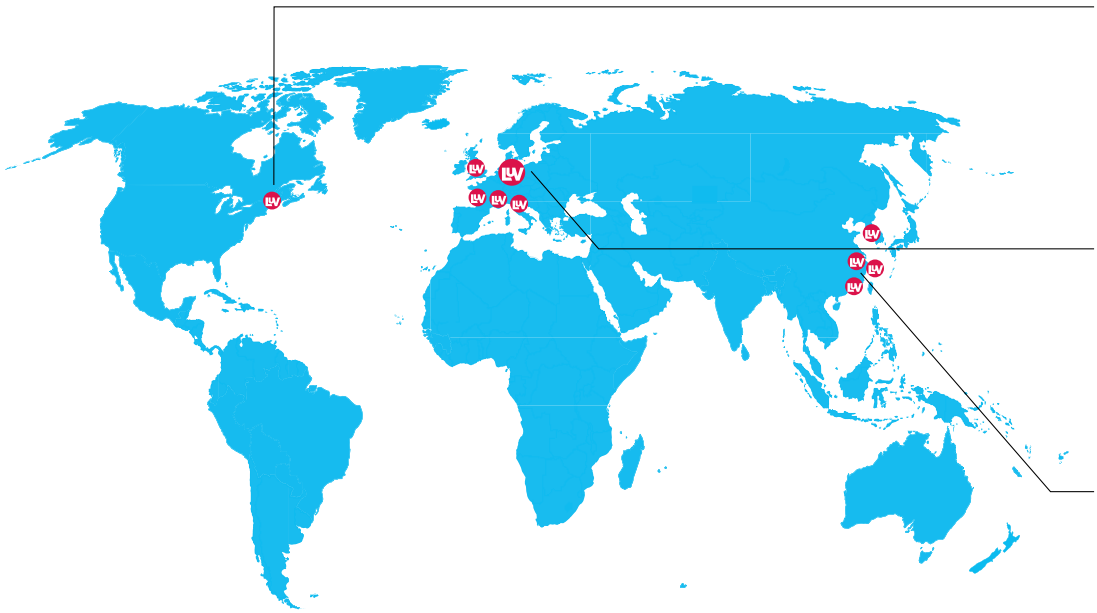
## Global presence

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 MATERIALS

Experience the 3Difference

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.



## Pawcatuck, CT, USA

## Hamburg, Germany

## Kunshan, China

LEHVOSS Group


# 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.

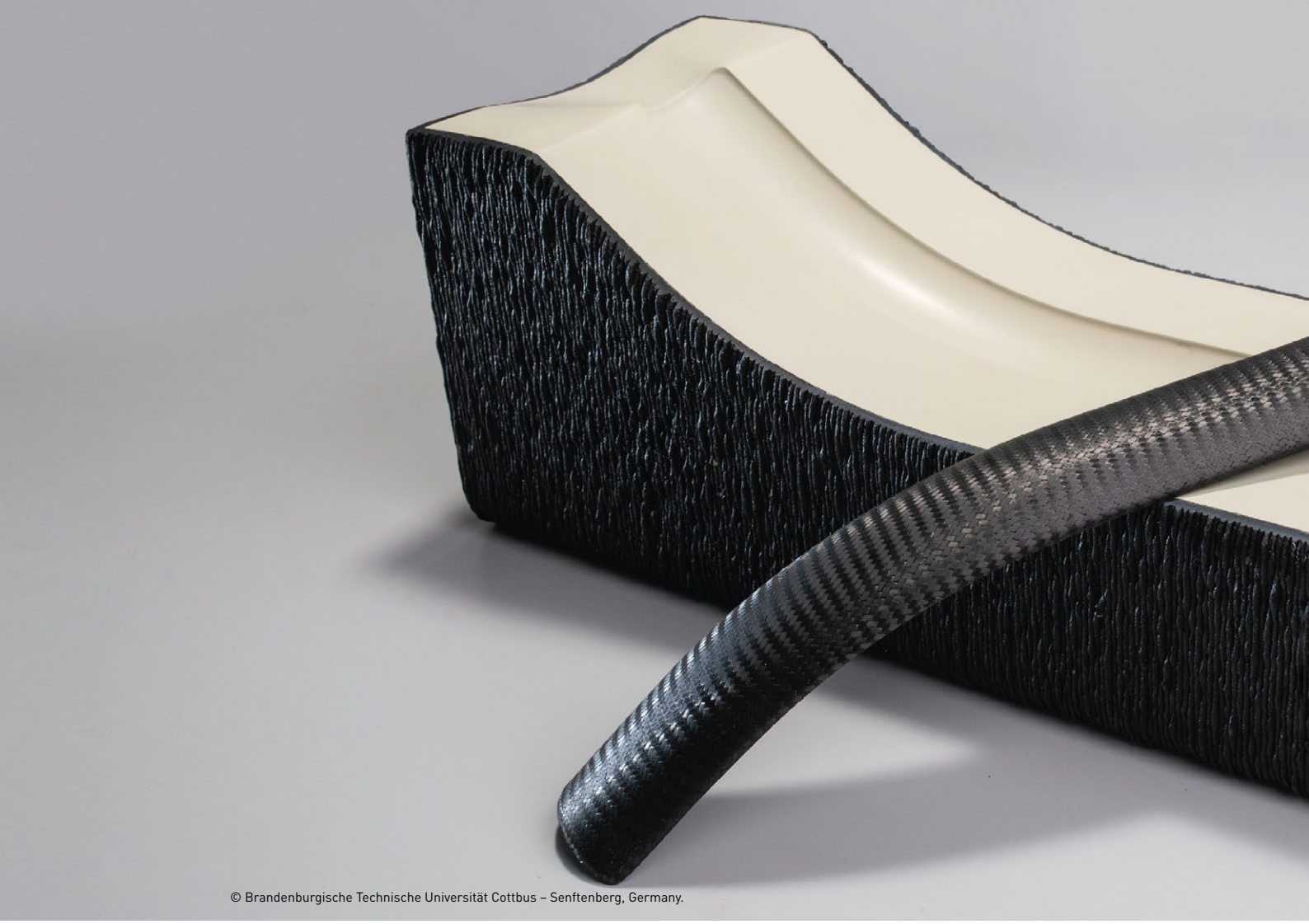

**3D PRINTING MATERIALS**
Experience the 3Difference

CUSTOMIZED
POLYMER MATERIALS

# Product range

(available in 1.75 and 2.85 mm diameter, 750 g 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
  - Extreme performance for functional prototypes and small series production
- **LUVOCOM 3F Filament PA$^{HT®}$ 9936 BK/L**
  - Optimized surface finish, black color
  - Magnetically detectable from 2x2x2 mm$^3$ 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



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# 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.

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

3D PRINTING

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

Demonstrator part made of LUVOCOM 3F PEI 50236 GY, the ideal material for all challenging applications in transportation industries.

# Flame retardant materials made easy!

RST

TESTING THE WORLD FOR TOMORROW

Environmental Lab
Materials Lab
Fire Lab
New Technologies

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**Gesamtbericht Nr.** **P60-22-8066** Brandprüfung
*Summary report no.* *Fire test*

Auftrags-Nr. / *Order number:* 204520
Eingangsdatum / *Reception date:* 21.06.2022
Prüfdatum / *Test date:* 07.07.2022 – 12.08.2022
Berichtsdatum / *Report date:* 15.08.2022
Bearbeiter / *Editor:* Malinski
Dokumentation / *Documentation:* SMa/SHa

Seite 1 von 4 / *Page 1 of 4*
und 0 Anlage(n) / *and 0 enclosure(s)*

Tel. / *Phone*: +49 3302 49982 60

**Prüfgegenstand:** LUVOCOM 3F PEI 50236 GY - Material 1, 2 mm und / *and* Material 2, 10 mm
*Test specimen:* (3D gedruckte Prüfkörper)

**Geprüfte Dicke:** 1,9 & 10,2 mm
*Thickness tested:*

**Prüfspezifikation:** DIN EN 45545-2 (02/2016; 10/2020)
Bahnanwendungen – Brandschutz in Schienenfahrzeugen – Teil 2: Anforderungen an das Brandverhalten von Materialien und Komponenten
*Test specification:* *DIN EN 45545-2 (02/2016; 10/2020)*
*Railway applications – Fire protection on railway vehicles – Part 2: Requirements for fire behavior of materials and components*

**Prüfziel:** Beurteilung nach DIN EN 45545-2 (02/2016; 10/2020)
*Objective:* *Evaluation according to DIN EN 45545-2 (02/2016; 10/2020)*

**Prüfergebnisse:** Die Prüfergebnisse sind den folgenden Prüfberichten zu entnehmen:
*Test results:* *The test results are to be taken from the following test reports:*
P60-22-0303; P60-22-5168; P60-22-4235; P60-22-3235; P60-22-0341 (2 mm)
P60-22-0304; P60-22-5169; P60-22-4236; P60-22-3236; P60-22-0342 (10 mm)

**Klassifizierung:** Der Prüfgegenstand entspricht folgender Anforderung:
*Classification:* *The tested specimen corresponds to the following requirements:*

| Dicke *Thickness* | Anforderung *Requirement* | Gefährdungsstufe Hazard level |
|---|---|---|
| 2 mm | R1 | HL1, HL2, HL3 |
| 10 mm | R1 | HL1, HL2, HL3 |

**Bemerkung:** Die Klassifizierung gilt für alle dazwischenliegenden Dicken und nur in Verbindung mit den oben genannten Prüfberichten und deren Prüfnormen. Details sind in den jeweiligen Prüfberichten nachzulesen.
*Note:* *The classification is valid for all thicknesses in between the tested ones. It is valid only in conjunction with the above-named test reports and their test standards. Please refer to the test reports for details.*

2022.08.16 06:51:37 +02'00'
**Stefan Harder**
**Leiter Brandlabor** / *Head of fire lab*

2022.08.15 15:12:02 +02'00'
**Sabine Malinski**
**Prüferin** / *Tester*

Die Akkreditierung gilt nur für die referenzierten Prüfberichte / Referenzprüfverfahren darin und die daraus unter Punkt 2 zitierten Ergebnisse.
*The accreditation is only valid for the referenced test reports / the reference test methods therein and the results quoted out of them under section 2.*

Geschäftsführer
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ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-13312-01-00

Flame retardancy is a not-so-known characteristic of polymers. The ways to evaluate it are even more complicated. Each industry has different standards: the UL94 for the E&E market, FAR 25.853 for the aerospace market, UN-ECE R.118.03 for buses, and EN45545-2 for the railway. The combination of different standards, material characteristics, and thicknesses is overwhelming and may seem confusing.

Because of this, we decided to provide you with test results using the most known standards in the industry to save you time and effort and guarantee an easy adoption process.

The newest addition to our flame retardant portfolio, our LUVOCOM 3F PEI 50236 GY, achieved the EN45545-2 R1 HL3 certification. The railway industry often uses the EN45545-2 standard, the most demanding FR standard currently available worldwide. Even more impressive is that our material earned the certificate with a 3D printed specimen with only 2mm of thickness, positioning itself among the best-in-class materials available worldwide.

# Product data

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

| Physical Properties | | Test Method | Specimen | Unit | Typical Value |
|---|---|---|---|---|---|
| Specific gravity | | ISO 1183-3 | | g/cm³ | 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 | cm³/10min | 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 |

* Further data and data sheets, also for other products, available on request.

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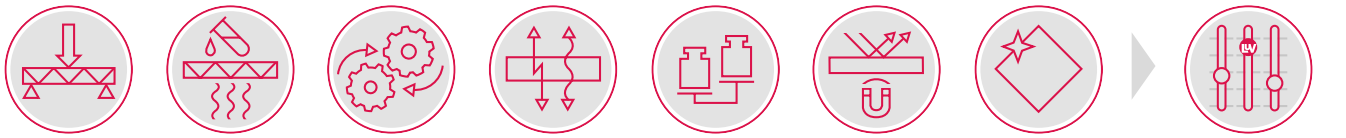
## Our expertise in materials

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