PRESS RELEASE

Fraunhofer Exhibit at Formnext, Frankfurt am Main, November 18–21, Hall 11, Booth D31

Fraunhofer IWU experts present new materials for additive manufacturing at their self-printed booth

This year's exhibits at Formnext focuse on materials particularly suited for aerospace applications but so far rarely used in LPBF (Laser Powder Bed Fusion) processes, as well as on printed components with integrated electrical functions. But the booth itself is also a highlight: It is fully 3D-printed, using elements made from biodegradable plastic and recyclable polypropylene (PP). After the event, the modular system will not be discarded. The high-quality exhibition furniture will be reassembled and repurposed for presentation purposes at Fraunhofer IWU.

In the Laser Powder Bed Fusion (LPBF) process, metal powder is selectively melted and solidified layer by layer using a laser beam, creating components with high geometric precision. Fraunhofer IWU's Dresden branch has recently acquired a high-temperature LPBF system that enables preheating of the powder bed surface to temperatures up to 1200 °C, depending on material requirements. This allows easier processing of refractory metals such as tungsten, as well as metallic materials with similar thermal properties, like titanium aluminide. While these materials have primarily been processed using Electron Beam Melting (EBM) in industry, high-temperature LPBF enables new possibilities for higher resolution, especially thin-walled structures, and precise control over the resulting microstructure.

In particular, this technology enables the production of extremely lightweight yet highly wear- and temperature-resistant components, which are especially crucial for high-performance engine parts, turbocharger systems, or heat exchangers in the aerospace industry.

Aluminum Matrix Composites (AMC): Combining Lightweight Design and Enhanced Wear Resistance

Particulate-reinforced AMCs offer low density and high wear resistance, making them attractive lightweight materials for automotive and aerospace applications. Dr. Florian Bittner's research team integrates silicon carbide (SiC) particles as a reinforcing phase in aluminum matrix powder to significantly improve the tribological properties, such as wear resistance.

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High-Temperature Aluminum Alloys for Service Temperatures up to 300°C

Constellium Aheadd® HT2 is a heat-resistant aluminum alloy designed for aerospace applications, capable of withstanding operating temperatures of approximately 250–300°C, depending on mechanical load and service duration. LPBF technology also opens new opportunities for manufacturing delicate structures with increased geometric freedom using this alloy. Fraunhofer IWU is developing appropriate process strategies and parameter windows to enable the reliable processing of this alloy in LPBF technology.

Cost-Effective and Eco-Friendly (Large-Scale) 3D Printing: Ideal for Exhibition Furniture, Durable Components, Special Tools

For the trade show booth, experts from Zittau and Chemnitz used biodegradable plastic (for light-colored components) and recyclable polypropylene (for black components). The latter significantly reduces manufacturing costs. The base material is an inexpensive granulate that already contains recycled carbon fibers and can be remelted indefinitely. Only 55 kg of black-colored granulate was needed to "print" the three shelving units and the counter, with a total manufacturing time of just under 13 hours. With a lean sales concept, a counter like the one presented in Frankfurt could be cost-effectively sold for about €1500. The modular system, which is easy to assemble and reconfigure, offers great flexibility for exhibiting items. When there is enough space, the shelves and counters can be freely placed in the room, offering "unobstructed" views from multiple angles. In tight spaces, the system can also be aligned with (temporary) walls. The individual components are space-efficient for transport; the counter (170 cm wide, 110 cm high, and 50 cm deep) is an excellent example of large-scale 3D printing. Thanks to its sandwich construction, it is lightweight yet has high load-bearing capacity. These properties are also beneficial for installations in special vehicles, for example. Fraunhofer IWU takes advantage of the geometric freedom and relatively short manufacturing times to produce custom special tools, such as handling systems for industrial robots or molds and fixtures.

Another highlight at Fraunhofer IWU's Formnext booth is the integration of electrical functions into components using the WEAM process. More detailed information can be found here: [Integrating Electrical Functions Directly into Components via 3D Printing Robust and Filigree with WEAM].
More Information on Fraunhofer's exhibits: Overview exhibits formnext 2025

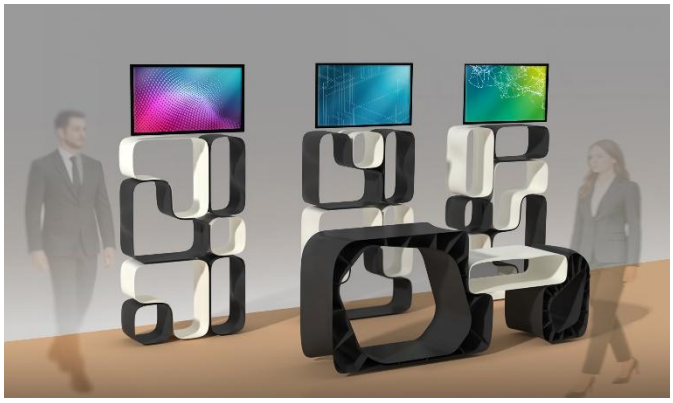

Fig. 1 Rendering of the Fraunhofer IWU booth at Formnext. Visitors can view the exhibits from multiple sides in the freestanding elements. © Fraunhofer IWU I Constanze Kuring

Fig. 2 Fraunhofer IWU and MOSOLF Special Vehicles GmbH have developed a 3D-printed rear shelf for the Mercedes Vito, saving 26.5 kg compared to the previous retrofit solution, including the hardware. The printed shelf fits perfectly into the vehicle body, requiring no additional reinforcements or fasteners, and optimally utilizes space in the rear. © MOSOLF Special Vehicles GmbH

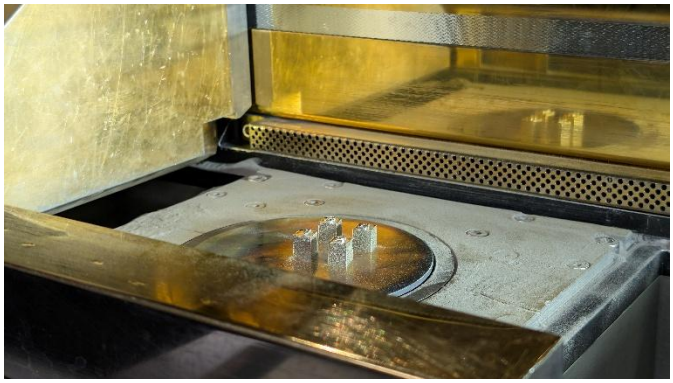

Fig. 3 Titanium aluminide: LPBF in a high-temperature system (also see video in the online version).
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Fig. 4 Aluminum Matrix Composites combine low density with excellent wear resistance.
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