Press Release

Fraunhofer ADDITIV at »Formnext« 2026, Hall 11.0 Booth D31

More Functionality in the Part: Innovations for and Through Additive Manufacturing

The Fraunhofer Competence Field Additive Manufacturing ("Fraunhofer ADDITIV") will present a comprehensive overview at Formnext in Frankfurt, Germany from November 17 to 20, 2026, demonstrating how functions can be integrated directly into additively manufactured structures across metals, polymers, ceramics, and multi-material systems. Advanced processes and simulation-driven development will further accelerate the industrial adoption of 3D printing. Engineered by Fraunhofer, the solutions range from specialized software and process simulation to surface treatment and quality management.

Simplified Manufacturing, Value-Added Products: Integrating Functionality into the Part

The ProFi finger developed by Fraunhofer CPM demonstrates how functionality can emerge directly from a component's structure. Designed for a passive hand prosthesis, it replaces a conventional finger joint made up of several individual parts with a single additively manufactured component. A programmable metamaterial with a bistable structure enables multiple stable positions without additional joints, springs, or screws. The demonstrator was developed by the Fraunhofer Institutes **IWM**, **LBF**, **ITWM**, and **IAP** within the Fraunhofer Cluster of Excellence Programmable Materials CPM.

In powder bed-based 3D printing, Fraunhofer **ILT** integrates a strain gauge directly into the metal component of a smart wrench. This enables users to measure loads and monitor industrial components. Fraunhofer ILT also uses Laser Powder Bed Fusion to produce porous titanium structures for electrolyzer cells that combine water supply, gas removal, electrical conductivity, and mechanical stability in a single component.

Fraunhofer **IWU** will showcase compact, 3D printed pulsating heat pipes (PHP) for efficient heat transfer in extremely confined spaces. In preliminary tests, postcard-sized copper demonstrators produced in collaboration with Fraunhofer **IPM** dissipated around 1,200 watts of heat while measuring just 2.8 millimeters in height. Fraunhofer **IKTS** combines high thermal conductivity and wear resistance in additively manufactured diamond composites, enabling complex geometries for applications such as heat exchangers.

For energy technology applications, Fraunhofer **IGCV** is developing functionally graded tungsten-copper composites designed to withstand the extreme conditions in future fusion reactors. Fraunhofer **IFAM** is using sinter-based processes to make difficult-to-weld nickel-based superalloys accessible to additive manufacturing, overcoming the cracking and residual stresses that complicate laser-based processing.

Advanced Technologies for More Efficient Processes

The manufacturing processes themselves are also evolving. Fraunhofer **ILT**'s patented Fluidic Powder Switch controls the powder flow in LMD and EHLA processes without wear and up to 20 times faster than mechanical systems. With Laser Direct Plating, Fraunhofer **IWS** shortens processing times for the metallic coating of rotationally symmetric components while reducing energy consumption by up to 90 percent.

Additional exhibits highlight the breadth of polymer-based applications. Fraunhofer **IAP** will present additively manufactured hinges made from shape-memory polymers for deploying solar panels on satellites. Fraunhofer **IPA** will demonstrate tool-free production of EPDM seals as well as sealing geometries printed directly onto components.

End-to-End Digital: From Design to the Inspected Part

The digital workflow is evolving as well. With Cuttlefish®, Fraunhofer **IGD** will present software solutions for multimaterial 3D printing that enable precise reproduction of color and translucency, virtual visualization of print results, and data-driven design of dental and ocular prostheses. Fraunhofer **IWM**'s FlowBoard provides an optical method for capturing powder flow behavior in different geometries. Fraunhofer IMTE completes the digital process chain with nondestructive computed tomography for inspecting dimensional accuracy and internal defects. Together, these technologies seamlessly connect simulation-driven design, process development, and data-driven quality assurance.

Preview of DDMC 2027 and Call for Papers

The Fraunhofer Direct Digital Manufacturing Conference, an internationally leading conference series for additive manufacturing, will continue to evolve with its eighth edition in 2027. Fraunhofer ADDITIV will provide an initial preview at a dedicated press conference on November 18 at 3:00 p.m. in the Prisma Room, Portalhaus, Level C, and will launch the corresponding Call for Papers. Visitors to Formnext 2026 in Frankfurt am Main will learn how DDMC will set new priorities from 2027 onward and what role Formnext will play in this next context.



Fig. 1 Cover of Fraunhofer ADDITIV NEWS 1.26, the special issue for Formnext 2026, which also serves as a guide and orientation aid for visitors to the Fraunhofer joint booth: Download



Fig. 2 ProFi finger developed by Fraunhofer CPM: Designed for a passive hand prosthesis, it replaces a conventional finger joint made up of several individual parts with a single additively manufactured component. Download © Fraunhofer CPM



Fig. 3 3D printed pulsating heat pipes (PHP) for efficient heat transfer in extremely confined spaces. Download **© Fraunhofer IWU**

The **Fraunhofer Competence Field Additive Manufacturing (Fraunhofer ADDITIV)** brings together the expertise of 19 Fraunhofer institutes across Germany, covering the entire additive manufacturing process chain. Its activities include the development of new materials and efficient manufacturing processes, product quality assurance, software, and simulation. Fraunhofer ADDITIV supports companies with application-oriented research for the development and implementation of industrial solutions. Trade shows and conferences such as DDMC, Formnext, and rapid.tech 3D provide platforms for showcasing the latest research results and for exchanging ideas and building networks with partners from industry and research. Further information: www.additiv.fraunhofer.de

Contact

Dr. Bernhard Mueller
Fraunhofer Competence Field Additive Manufacturing
Spokesperson
Phone +49 351 4772 2136
spokesman@additiv.fraunhofer.de
www.additiv.fraunhofer.de/en.html