Fraunhofer IGD

FRAUNHOFER INSTITUTE FOR COMPUTER GRAPHICS RESEARCH IGD

PRESS RELEASE

Fraunhofer IGD presents latest developments for realistic and efficient 3D printing at Formnext

Virtually preview, physically perfect: Fraunhofer IGD showcases Cuttlefish®::Proof and biomimetic 3D denture.

Fraunhofer IGD at Formnext
November 18–21, 2025
Fraunhofer Competence Field Additive Manufacturing
Hall 11, Booth D31

At Formnext 2025, Fraunhofer IGD will present two technological innovations for industrial 3D printing: the enhanced Cuttlefish® software with the new Cuttlefish®::Proof module, which for the first time enables a physically accurate preview of the print result, and a monolithic denture model produced using multi-material 3D printing that replicates the natural layered structure of human teeth.

(Darmstadt) At the international trade fair for additive manufacturing, Formnext (November 18–21, Frankfurt am Main), the Fraunhofer Institute for Computer Graphics Research IGD will present two innovations within the Fraunhofer Competence Field Additive Manufacturing that make 3D printing more realistic, efficient, and reliable: the latest, significantly more powerful version of the 3D printing software Cuttlefish® with the new module Cuttlefish®::Proof, and a novel technology for producing aesthetic dentures via 3D printing.

Cuttlefish®::Proof – 3D softproof for maximum print reliability

With the new Cuttlefish®::Proof plugin for Cuttlefish®, Fraunhofer IGD introduces a groundbreaking innovation in graphic 3D printing. The tool renders directly on the material distributions sliced by the Cuttlefish® printer driver, allowing an accurate simulation of color and translucency. It can also visualize effects such as displacement mapping, Boolean

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operations, and potential voxelization errors. Moreover, it simulates the appearance of 3D prints under different types of light and lighting conditions. "This enables users to avoid misprints caused by incorrect parameters or faulty data preparation. They can preview exactly how the printed part will look and make adjustments before investing time and material in production," explains Dr. Philipp Urban, Head of the '3D Printing Technology' department at Fraunhofer IGD. Cuttlefish®::Proof will be made available to existing customers upon request for the first time.

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Biomimetic denture via multi-material 3D printing

With a novel biomimetic 3D printing workflow, Fraunhofer IGD demonstrates how monolithic dentures with a naturally aesthetic appearance can be produced. The approach uses a multi-material inkjet process to replicate monolithic dentures with the internal optical structure of real teeth. Layers representing enamel, dentin, and root are digitally embedded in each tooth model. A machine learning model determines the appropriate material mixtures for each layer to reproduce predefined shades and translucencies.
Dental technicians can adjust the translucency of individual layers to refine aesthetics without altering color. This process enables the production of teeth that closely match the natural appearance and achieve color accuracies within industry-accepted dental limits (CIEDE2000 < 1.5). In addition, production costs can be reduced by up to 75 percent compared to conventional manufacturing methods. The entire process is compatible with standard dental CAD software and uses Cuttlefish® for slicing.

Compact outlook – 3D quality in focus

Ahead of the trade fair, Fraunhofer IGD invites participants to the '3D Quality' event in Darmstadt on November 17. There, results from the Industrial Collective Research (IGF) project on 3D color print quality assessment will be presented. Registration: https://www.igd.fraunhofer.de/en/events/3d-quality.html

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For more information:

More about Cuttlefish®: https://www.cuttlefish.de/

More about the 3D Quality event:
https://www.igd.fraunhofer.de/en/events/3d-quality.html

More about the Fraunhofer Competence Field Additive Manufacturing:
https://www.additiv.fraunhofer.de/

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Image: Left: Rendering with Cuttlefish®::Proof, right: physical 3D print.
The new plugin of the 3D printing software Cuttlefish® faithfully simulates color, translucency, and material effects – for maximum printing reliability and efficiency
(© Fraunhofer IGD)

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Image: Monolithic denture from a 3D printer – using a biomimetic multi-material workflow, Fraunhofer IGD demonstrates how digitally embedded layers of enamel, dentin, and root achieve a natural-looking aesthetic (© Fraunhofer IGD)

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About Fraunhofer IGD

The Fraunhofer Institute for Computer Graphics Research IGD has been setting standards in visual computing – image- and model-based informatics – for more than 30 years. Its roughly 260-strong staff support companies and institutions across manufacturing and mobility, healthcare, bioeconomy, infrastructure and public services, and maritime economy sectors. Fraunhofer IGD provides specific technological solutions and support for strategic development. Its researchers carry out problem analyses, design hardware and software, develop protypes, and implement interactive visual systems. The focuses are human-machine interactions, virtual and augmented reality, artificial intelligence, interactive simulation, modeling, and 3D printing and scanning. Fraunhofer IGD has been engaged in high-level research since 1987, supporting change in society and the economy with application-oriented solutions developed at its

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facilities in Darmstadt and Rostock. Its products acquire international relevance via ongoing collaboration with its Austrian sister institute, which operates facilities in Graz and Klagenfurt, and participation in a wide range of EU projects.

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