



## Rapid.Tech 3D

14– 16 May 2024, Messe Erfurt, Germany

### „3D printed Electronic skin“ is the Main Prize Winner of the 3D Pioneers Challenge 2024

(Germany, Erfurt, 16 May 2024) The exhibition and award ceremony of the international competition for additive manufacturing and advanced technologies took place for the ninth time as part of Rapid.Tech 3D and was once again a crowd magnet. For the 20th time, Messe Erfurt offered a platform for the industry and was able to provide significant impetus.

Exciting innovations from all over the world were on show in the special area of the 3D Pioneers Challenge. Submissions from 25 countries and 5 continents faced the international jury. 43 finalists presented their latest projects. Young start-ups, universities and established companies came together. In line with this year's call for entries, the projects showed how ground-breaking innovations can be created with a "collaborative mindset" in particular in order to create opportunities for business, industry and sustainability.

The industrial "vibe" could be felt at the trade fair stand. Large-format exhibits made of metal and wood were on display next to live printing industrial printers. For fashion lovers, there were also several projects on the booth this year. Dutch FashionTech designer Anouk Wiprecht reached the final with her Chromatic Dress, whose LEDs react to movement. The category winner was the British team around "Balena X Variable Seams", whose fashion concept with its delicate and filigree realisation represents the potential of AM and at the same time demonstrates the fashion industry alternative solutions for circular design.

Another highlight was the winner in "Material", which also impressed in the cross-category focus "Sustainability". The innovative start-up WILLOWPRINT from Germany produces printable material from wood waste and manufactures sustainable seating that can be recycled.

The applications ranged from nanostructure to large-format printing. In addition to glass lenses for solar elements, the largest 3D building in Europe printed on site in Heidelberg was also presented. WAVEHOUSE was the winner in the "Architecture" category. Artificial intelligence is also conquering 3D printing. Visitors were able to watch at the presentation of the team "Sketchurizer", how 3D objects are created from sketches.

For the first time, the "Electronics" category was able to represent the main winner. "3D Printed electronic Skin" gave goose bumps: Akilesh Gaharwar joined the hybrid award ceremony at the 3DPC stand from the USA live via video conference. The jury was convinced: advanced technologies such as AI, robotics and additive manufacturing should enable a future in which people take the centre stage. "E-Skin will enrich our lives as an interface between man and machine." E-Skin imitates the flexibility and sensitivity of human skin. The applied hydrogels can recognise stretching, pressure or temperature changes and are intended to serve as a motion sensor, voice recognition system, touchpad or thermometer. This is a significant advancement and offers promising applications in robotics, wearables and healthcare.

Lukas Dechau from the HFG Karlsruhe was honoured as "Best Student Project" with "Rock Solid", which demonstrates his specially developed 3D printing process for producing objects from "exposed aggregate concrete" without support structures and excess material.

The "Design" category was won by Virginia San Fratello's "WUIware" project from the USA, whose material is made from the ashes of forest fires in California. In "Digital", the project around the open-course platform "PicoGK- dual metal AM" from Dubai was the winner. They aim to make it easier for engineers to design their developments with unprecedented performance. The platform makes digital tools with libraries ranging



from artificial intelligence-supported structures to quasi-crystals freely available to everyone.

The Spanish company Reinforce3D was awarded in "Machinery" with their "Satellite Antenna Structure by CFIP". The new construction technology inserts continuous carbon fibers into 3D printed tubes to reinforce them. "Fidentis", a Munich-based start-up, won in the "MedTech" category. The jury was impressed by its scalable potential, which offers a cost-effective solution to make expensive dental treatments accessible to a wider audience.

"EconitWood" from "additive tectonics" convinced in the "Industrial" category, which was announced for the first time. The German team rethinks the recycling of wood scraps for large-format architectural products and impressed the judges with this sustainable and scalable solution for the architectural industry.

Prizes worth over 175.000 EUR in total were awarded. The entire prize money totalling 35.000 EUR was provided by the Thuringian Ministry of Economics, Science and Digital Society.

In addition to the 10.000 EUR prize money, the main prize winner received the limited 3DPC Trophy. The winners also received software licenses from nTop, 3YOURMIND and CASTOR, coaching from AM Ventures and 10xDNA, as well as 3D printers from Formlabs and UltiMaker/MakerBot. The partner Autodesk awarded three Special Mentions. Av edition, the publishing house for architecture and design, rounded off the prize packages with book prizes.

The 20th anniversary of Rapid.Tech3D was celebrated at the gala evening in the Kaisersaal. Minister for Economic Wolfgang Tiefensee and trade fair managing director Michael Kynast honoured the award winners in a festive setting on the evening of the second day of the trade fair, 15 May.

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**#3DPioneersChallenge**



## FACTS 3DPC 2024

### Award winners 3DPC 2024 and jury comments:

(detailed text descriptions of the award winners and all finalists see [www.3dpc.io](http://www.3dpc.io), further image material on request)

#### 3DPC2024 Winner Electronics // Main Winner:

##### 3D Printed Electronic Skin

Texas A&M University

Shounak Roy, Kaivalya A. Deo, Hung Pang Lee, John Soukar, Myeong Namkoong, Limei Tian, Amit Jaiswal, Akhilesh K. Gaharwar  
USA

Electronic skin (E-skin) mimics human skin's flexibility and sensitivity, offering promising applications in robotics, wearables, and healthcare. However, challenges include developing flexible, durable materials with biosensing capabilities and advanced manufacturing for wearable and implantable devices. A breakthrough is the creation of 3D-printed E-skin using nanoengineered hydrogels that exhibit tunable electronic and thermal sensing. These hydrogels leverage shear-thinning for crafting complex electronic structures, ensuring high flexibility, stretchability, adhesion, moldability, and conductivity. This E-skin accurately detects strain, pressure, temperature changes, and serves as a motion tracker, voice recognition system, touchpad, and thermometer, marking significant progress in flexible technologies and advancing robotics and human-machine interfaces.

- Prizemoney 10.000 EUR
- 3DPC Trophy by Ross Lovegrove, Hyperganic Materialise
- Expert talk with 10xDNA
- Book prizes by avedition

Jurystatement: "Advanced technologies such as AI, Robotics or additive manufacturing shall enable a future where human being is the central focus.

Those technologies will support and even scale our abilities. E-Skin as an interface between human and machines to enhance life, is the main winner of 3D Pioneers Challenge 2024 that pushes boundaries with goosebumps."

#### 3DPC2024 Winner Material & Sustainability

##### Willowprint

Willowprint, Start-Up RWTH Aachen

Joost Meyer, Federico Garrido, Emilia Grüne, Ana Ferretti Martarello, Mihaela Georgieva, Christina GERMANY

Willowprint is a university startup that developed a 3D printing process with 100% circular material.

- Prizemoney 6.000 EUR
- Book prize by avedition

Jurystatement: "Willowprint represents the best sustainable approach with huge potential to scale into different industries. Beyond furniture the material has the chance to focus industrial applications such as packaging which will increasingly shape our future. Take that prize as a chance to get in touch with those industries to improve your development further into a more sustainable market."



### **3DPC2024 Winner Best Student**

#### **Rock Solid - limitless washed concrete 3D printing**

HFG Karlsruhe  
Lukas Dechau  
GERMANY

Rock Solid shows a new 3D printing process utilizing "exposed aggregate concrete", which does not require support structures or excess materials.

- Prizemoney 1.500 EUR
- MakerBot SKETCH 3D printer
- Book avedition

Jurystatement: „A holistic preliminary diploma with great dedication and attention to detail, focusing on the individually developed process. All of this using the architectural mainstream material from the 1960s/1970s. Even in 2024, 3D printing makes ‚precast concrete‘ sexy again.“

### **3DPC2024 Winner Industrial**

#### **econitWood**

additive tectonics GmbH  
Bruno Knychalla and the team additive tectonics  
GERMANY

A novel material system that repurposes wood leftovers from harvesting and sawmills for architectural products through particle bed 3d printing.

- Prizemoney 2.500 EUR
- Book avedition

Jurystatement: „The project's integration of sustainable materials, quality design, and advanced 3D printing makes it a deserving winner. This innovative use of wood waste not only yields environmental benefits but also offers a sustainable solution for the architectural industry.“

### **3DPC2024 Winner MedTech**

#### **FIDENTIS**

Fraunhofer IGCV  
Founders: Max Horn, Lukas Langer, Timo Schröder  
Co-inventors & dental experts: Josef Schweiger, Kurt Erdelt, Oliver Schubert, Jan-Frederik Güth, Johannes Trimpl  
Mentor: Christian Seidel  
GERMANY

Multi-material additive manufacturing digitizes the production of the highest quality dentures — making them available and affordable for everyone.

- Prizemoney 2.500 EUR
- Best Start-Up by AM Ventures
- Book prizes by avedition

Jurystatement: „The project's brilliance lies in its scalable potential offering a cost-effective solution to make expensive treatments accessible to a wider audience. Democratizing production, the transfer of material knowledge, the significant social impact- and all buoyed by the team's positive mindset, made FIDENTIS a standout project for the jury.“



### **3DPC2024 Winner Design**

#### **WU!ware**

Emerging objects  
Virginia San Fratello  
USA

The WU!ware vessels are 3D printed out of a custom filament made of California wildfire ash and raise the question: How do we rebuild from the ashes?

- Prizemoney 2.500 EUR
- nTopology license
- Book prizes by avedition

Jurystatement: „This project convinced the jury by its inspirational narrative of overcoming challenges, coupled with its impressive material reuse. It’s showcasing AM capabilities by the diverse variations, in aesthetically pleasing design.“

### **3DPC2024 Winner FashionTech**

#### **Balena X Variable Seams**

Brigitte Kock from Variable Seams  
Team Balena: David Roubach, Yael Joyce Vantu, Pavel Vergun, Rotem Biks, Galy Levy, Dalia Diamond, Tzachi Shem Tov, Yael Roth  
GREAT-BRITAIN

Balena and Variable Seams co-created a modular 3D printed outfit with a new compostable and stretchable filament, redefining circular textile apparel

- Prizemoney 2.500 EUR
- Form3+ SLA Printer
- Book prizes by avedition

Jurystatement: „This project addresses an industry very much in need of more sustainable options-Fashion. The design captivates with its beautiful details, shapes, and versatile variations. It is transitioning seamlessly from haute couture to practical daily wear, while highlighting the delicate and exquisite potential of AM.“

### **3DPC2024 Winner Architecture**

#### **WAVEHOUSE**

SSV Architekten,  
KRAUSGRUPPE, Mense Korte architekten, PERI, Heidelberg Materials  
GERMANY

The largest on-site 3D printed building in Europe to date in concrete. It is 54m long, 9m high, and 11m wide.

- Prizemoney 2.500 EUR
- Book prizes by avedition

Jurystatement: „We mark a historic leap in 3D printing with the first-ever full-scale building in Germany, completed in just 170 hours, challenging norms and expanding the horizons of innovation despite regulatory obstacles, a testament to the team’s pioneering spirit.“



**3DPC2024 Winner Digital // Special Mention by Autodesk**  
**PicoGK Platform – Dual metal AM**

LEAP 71

Josefine Lissner, Lin Kayser  
EMIRATES

LEAP 71 developed a aerospike rocket engine, generated from a computational model, based on LEAP 71's PicoGK framework, which is released as open source on Github. It was printed using Fraunhofer IGCV multi metal printing systems.

- Prizemoney 2.500 EUR
- "3YOURMIND Software & Consulting" package.
- Book prizes by avedition

Jurystatement: "PicoGK's approach enables collaborative innovation, particularly valuable for industrial applications with complex parts. Democratizing generative design and optimizing part design through voxel-based material placement is a groundbreaking endeavor that brings complex dual-metal production and high design standards to end users. It embodies the future of AM with complete engineering via an open-source platform."

**3DPC2024 Winner Machinery // Special Mention by Autodesk**  
**Satellite antenna structure by CFIP**

Reinforce3D, SL

Marc Crescenti, Joan Marc Escudero  
SPAIN

Satellite antenna structure made from two 3D printed parts reinforced and integrally joined with continuous carbon fibres by CFIP technology.

- Prizemoney 2.500 EUR
- nTopology license
- Book prizes by avedition

Jurystatement: „This hybrid production technique represents a significant advancement, especially for reinforced high-demanding space applications, promising broader industrial applications. Infusing innovation into AM enhances part strength at lower costs with the potential to reduce emissions through lighter weight components, making it an outstanding achievement.“

**Special Mention by Autodesk**

**Reinforce3D, SL**

Marc Crescenti, Joan Marc Escudero  
SPAIN

**PicoGK Platform – Dual metal AM**

LEAP 71

Josefine Lissner, Lin Kayser  
EMIRATES

**Sketchurizer - From sketch to 3D model in less than a minute.**

University of Duisburg-Essen  
Dr. Jonas Auda, Dr. Uwe Grünefeld  
GERMANY



## FOCUS 2024

### Collaborative Mindset

Cutting-edge processes, materials and procedures are creating ground-breaking applications in Additive Manufacturing and thus offering chances for the economy, industry and sustainability, for a responsible production. Implementation in the established manufacturing industry however demands a "collaborative mindset" - the mutual, open attitude of working cooperatively and courageously towards common goals. Where are realistic applications in the industry and what best practices are already in progress?

This open mindset becomes apparent in the convergence of advanced technologies. When robotics, smart materials, cloud technologies or blockchain interact with additive processes, this leads to disruptive concepts and sharpens the focus for strategy changes and pave the way for meaningful advancements.

A gaze upon the impressively vibrant developments in Artificial Intelligence, such as automated image generation, provides a glimpse of the possible when AI generates three-dimensional products that are then translated from the digital to the real world through additive processes.

The **3D Pioneers Challenge** seeks and supports the pioneers pursuing these ground-breaking approaches.

## CATEGORIES 2024

With regard to this year's focus, the "Industrial" category was also announced for the first time in 2024. This discipline and the 10 others - "Design", "Digital", "Architecture", "FashionTech", "Materials", "MedTech", "Mobility", "Electronics", "Machinery" and "Sustainability" - are derived from the questions "WHAT, HOW and WHY... we design and make".

## JURY and PARTNER

Participants had the opportunity to present their ideas and projects to the competition's network of partners and jury. The international partners and jury members are characterised by their diverse perspectives, which helps to comprehensively reflect the quality and range of the award - in line with the eleven disciplines announced. Until the award ceremony, the submitted entries were reviewed by the 30 jurors. The judges look beyond the horizon of 3D printing and contribute their expertise and experience from science, industry, politics, design, the press and sustainability. This mix of experts from inside and outside the sector of new technologies helps to ensure a multi-faceted assessment. The internationality of the jury members helps in the evaluation of the worldwide submissions.

In 2024, new partners also contributed jury members, including Ralf Anderhofstadt (Daimler Truck) and Brian Ingold (HP), as well as Martin Back (BASF- Forward AM) acting as an interface to the industry. Sherri Monroe from AMGTA supported the focus on sustainability. Other partners include FKM Sintertechnik with the juror Dr. Dirk Simon, the media platforms like Wevolver, Voxelmatters and the innovation hub for additive technologies from Barcelona, IAM3DHUB.

### Jury 3DPC 2024

Ralf Anderhofstadt\_AM & AMS Daimler Truck AG  
Martin Back\_BASF AM Forward  
Frank Beckmann\_Fraunhofer IAPT  
Prof. Christiane Beyer\_OVGU University Magdeburg  
Dr. Shajay Bhooshan\_Zaha Hadid Architects  
Stefanie Brickwede\_DB, Mobility goes Additive  
Lutz Dietzold\_German Design Council  
Stephan Galozy\_3YOURMIND  
Sarah Goehrke\_Additive Integrity  
Arno Held\_AM Ventures  
Dr. Karsten Heuser\_Siemens Digital Industries  
Thomas Hundt\_Jangled Nerves  
Brian Ingold\_HP  
Carina Lebsack\_Adolf Würth GmbH & Co. KG  
Marie-Lucie Linde\_Sustainable Natives, nextblooming

Ulf Lindhe\_ADAXIS  
Ross Lovegrove\_Lovegrove Studio  
Dr. Cora Lüders-Theuerkauf\_Medical goes Additive e.V  
Alana Mongkhounsavath\_Autodesk Research  
Sherri Monroe\_AMGTA  
Kristin Mulherin\_Women in 3D Printing  
Joris Peels\_SmarTech Analysis, 3DPrint.com  
Sonja Rasch\_Materialise  
Paul Schmidt\_10xDNA  
Dr.-Ing. Sascha Schwarz\_TUM Venture Lab AM  
Dr. Dirk Simon\_FKM Sintertechnik GmbH  
Peter Storey\_Autodesk Research Industry Future Team  
Joachim Stumpp\_raumPROBE  
Andreas Velten\_IFA3D Medical Solutions  
Christoph Völcker\_Innovation Lab AM, Würth Elektronik



### Partner 3DPC 2024

Thuringian Ministry of Economic Affairs Science and Digital Society; Rapid.Tech 3D; Messe Erfurt GmbH, 10xDNA, 3D natives, 3D Point, 3DPrint.com, 3D Printing Industry, 3Druck.com, 3YourMind, aed e.V., ALL3DP, AMGTA, AM Ventures, Autodesk, av edition, BASF Forward AM, CASTOR, Daimler Truck, DB Deutsche Bahn, Designspotter, FKM Sintertechnik GmbH, Formlabs, Fraunhofer IAPT, German Design Council, Haute Innovation, HP, IAM3DHUB, Jangled Nerves, MakerBot, Materialise, Medical goes Additive e.V., Mobility goes Additive e.V., ndion\_News on Design, nTopology, raumPROBE, Siemens, TUM Venture Lab Additive Manufacturing, UltiMaker, Verband 3DDruck e.V., VoxelMatters, Wevolver, Women in 3D Printing, Würth GmbH & Co KG

### About Rapid.Tech 3D

In two decades, Rapid.Tech 3D has developed into one of the leading AM trade events in Central Europe. In addition to the congress as the centrepiece, the focus is on the exchange of additive innovations between industry and science. Once again this year, there will be high-class and clearly user-orientated congress contributions and keynotes from Brent Stucker, ASML, BMW and Innosyn, for example, as well as comprehensive exhibitor offerings along the additive process chain.

The special 3D Pioneers Challenge area is another highlight of Rapid.Tech3D 2024.

### About 3D Pioneers Challenge

The international competition for Additive Manufacturing processes and Advanced Technologies is the most prestigious award of its kind and is one of the most highly endowed worldwide. The annual announcement and presentation of the finalists is considered to be the innovation monitor of the industry. Unique in its structure, the competition has been addressing specialists who think outside the box since 2015 - **pushing boundaries!**

### 3DPC Platform

The Challenge has become a platform with a global network and is an interface for creative future-makers, pioneers of advanced technologies and innovators from research and industry.

### 3DPC & Friends

Under the umbrella of 3DPC & Friends, 3DPC brings together the creative minds and high-tech pioneers of the 3DPC platform in an interdisciplinary way, resulting in new, ground-breaking projects in which everyone can contribute and live out their expertise - design rethought! The 3DPC shows today what tomorrow will bring - **pushing boundaries.**