

The First Fully 3D-Printed Orthopaedic Shoe worn at OTWorld in Leipzig

Ultrafuse® TPU enables flexible properties – and processes!

OVERVIEW

High-quality Orthopaedic footwear is essential for treating certain foot problems without surgery. Daniel Petcu's pioneering work with 3D printing and [Ultrafuse® TPU 85A](#) and [TPU 64D](#) materials has set a new standard in orthopaedic footwear. By fully integrating digital design and production processes, he has demonstrated that it is possible to create fully 3D-printable medical footwear that is not only functional and durable but also stylish and comfortable. This innovation has the potential to make high-quality, personalized medical footwear more accessible than ever before.

QUICK FACTS

Materials:

- Ultrafuse® TPU 85A
- Ultrafuse® TPU 64D

Technology:

- FFF

Daniel Petcu, a footwear engineer with a PhD in foot orthoses, recognized the potential of 3D printing early on. After experimenting with a Prusa MK3S printer, he decided to shift his company, Pedorthic Art, to focus exclusively on 3D printing. This decision was driven by the advantages offered by Fused Filament Fabrication (FFF) 3D printing, particularly the automation of the manufacturing process and the unparalleled design flexibility it enables.

With 3D printing, new design options become possible, including the use of metamaterials – internal structures with properties that traditional methods simply cannot achieve.



Reduced labor costs and material waste



Precise customization tailored to the unique needs of each patient



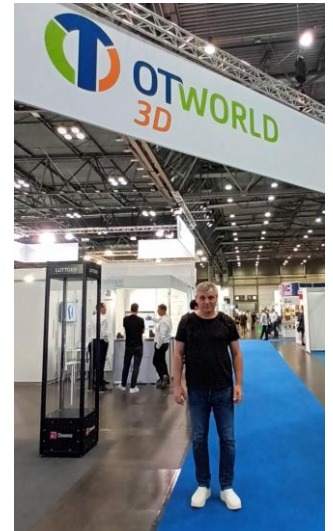
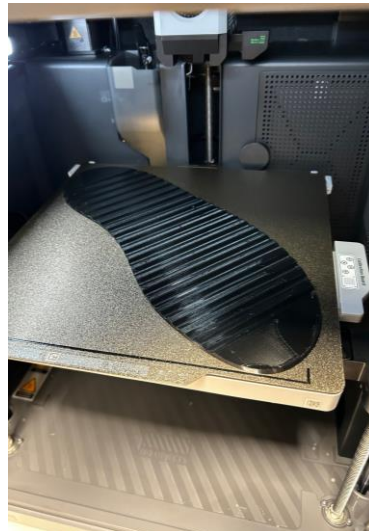
TPU materials offer superior durability, flexibility, and biocompatibility

Challenge: Create functional and stylish medical footwear that overcomes traditional design limitations.

Traditional techniques and materials used to make are functional, they usually lack style, making some patients reluctant to wear them. This is where 3D printing steps in as a true innovation. Unlike traditional orthopaedic shoe making methods, 3D printing automates the entire production process, and enables a fully integrated digital workflow. This reimagines the design and production of medical footwear from the ground up. Flexible 3D printing materials like Ultrafuse® TPU 85A and 64D were ideal choices for the application, enabling fast printing, excellent abrasion resistance, and compliance with medical device safety regulations thanks to their biocompatibility.

"I often receive private messages from others in the field with questions or comments about how my approach has motivated them. It brings me joy when people share images of their progress with me!"

- Daniel Petcu, Pedorthic Art



Utilizing 3D printing technologies to design and create orthopaedic footwear offers several significant advantages over traditional methods such as Complete Customization, Design Flexibility, Streamlined Production, Material Innovation, Patient Involvement, and Cost Efficiency.

Resulting in the creation of a custom designed, highly-functional and stylish shoe utilizing a streamlined production workflow.

You can read the full use case here: [The First Fully 3D-Printed Orthopaedic Shoe featured at OT World \(forward-am.com\)](https://www.forward-am.com/the-first-fully-3d-printed-orthopaedic-shoe)

Learn more about TPU 85A and 64D:

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