



EUROPEAN UNION

European Regional  
Development Fund

Senate Department  
for Economics, Energy  
and Public Enterprises



# PROSTHESES FROM A 3D PRINTER

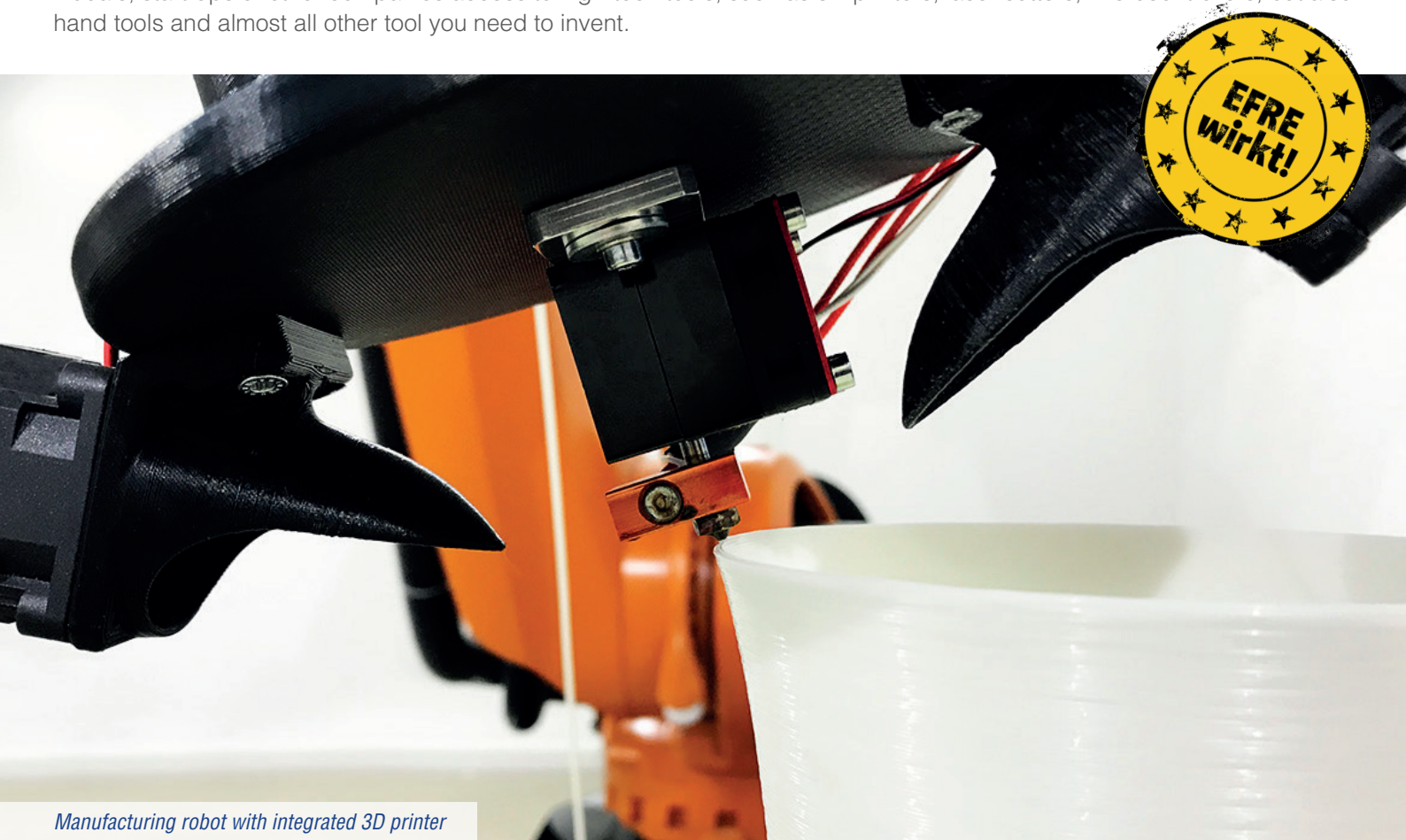
**THE BERLIN RESEARCH PROJECT *ADDCARBORI* REVOLUTIONISES** the manufacturing processes in orthopaedics. The vision: Using digital technology to produce custom-fit orthopaedic prostheses from a 3D printer within just eight hours.

**WITH THE CLEVER INTEGRATION OF DIGITAL TECHNOLOGY** into orthopaedics production processes are to become more intelligent. The interdisciplinary approach of experts in the fields of medical technology, ceramic materials, software development and orthopaedic technology relies on the combination of intelligent measurement technology, smart software, robot-assisted 3D printing technology and novel materials. This manufacturing process will make it possible to consider the individual needs of patients and to produce orthopaedic aids flexibly in the shortest time possible.

**THE PROJECT IS MADE POSSIBLE BY THE EUROPEAN REGIONAL DEVELOPMENT FUND (ERDF)**, which supports the joint project with a grant from the ERDF's co-financed **programme to promote research, innovation and technologies (Pro FIT)**. It is a co-operation between *Makea Industries GmbH*, the research institute *Rehabtech Research Lab GmbH* and the departments of medical technology and ceramic materials of the *Technical University of Berlin*. *Makea Industries GmbH* specialises in the development of prototypes. It was founded in 2013 with the aim of creating an openly accessible infrastructure for individual, independent product development. With *FabLab Berlin*, it provides an open development workshop that offers private individuals, start-ups or other companies access to high-tech tools, such as 3D printers, laser cutters, microcontrollers, but also hand tools and almost all other tool you need to invent.

**"WE ARE WORKING TO MAKE ORTHOPAEDIC MANUFACTURING PROCESSES MORE INTELLIGENT THROUGH DIGITAL TECHNOLOGY."**

**Dipl.-Ing. Bettina Westebbe**, *field of expertise Medical Technology | Technical University Berlin*



*Manufacturing robot with integrated 3D printer*



## ORTHOPAEDICS FROM A 3D PRINTER

Orthopaedic aids such as prostheses are **sophisticated high-tech designs**. Nevertheless, the production process is still highly manual: Up until now, orthopaedic technicians have been scanning bone structures by hand to measure the orthopaedic dimensions. Patients assess by feeling whether the measuring instrument is actually in the right place or not. On the basis of these data, a plaster cast is then made, which serves as a template for the production of the finished prosthesis. Also, the production itself is done so far with elaborate manual lamination of carbon fabric or prepreg, a fibre base for prostheses.

The research project *ADDcarbori* makes this **process smarter**. It combines **digital scanning technology** with modern 3D printing. Among other things, the researchers are developing a data glove with which the **body** of the patients can be **measured** in an innovative scanning procedure. This data can be digitally processed and adapted at any time. Afterwards, the **body scan** software provides the **3D printer** with the necessary data for the automatic production of the prostheses. They are made of specially researched carbon fibres, which offer **high durability**. Thus, **tailor-made orthopaedic aids** are produced from the 3D printer within a short period of time.

## THE ERDF STRENGTHENS THE POTENTIAL FOR INNOVATION

The European Regional Development Fund (ERDF) supports the research project *ADDcarbori* with **grants** from the programme to promote research, innovation and technologies (*Pro FIT*). This will finance personnel and the necessary research infrastructure. The funding has enabled the project to acquire a **manufacturing robot**. The *Makea Industries GmbH* programmed and developed it further so that it can produce individual and stable moulds **using a 360° printing process**.

## ERDF HAS AN IMPACT ON BERLIN

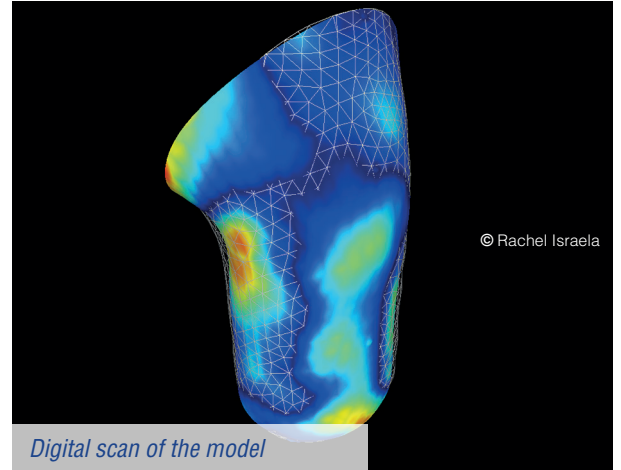
Innovative ability is of fundamental importance for **economic development** in a globalised economy. Innovations arise when knowledge, technologies and market impulses of various kinds are identified and used to create and establish new offerings on the market. Berlin can only stay competitive if it can expand on **implementation-focused research** and development activities of industry and research institutions. Growth can also be achieved by stimulating the economic application of new products, services and processes. With the ERDF funds from the *Pro FIT* programme the state of Berlin therefore specifically supports **industrial research** in private companies in addition to their **cooperation** with research institutions, higher education institutions and universities in all phases of the innovation process.

### In concrete terms, the ERDF is ensuring that

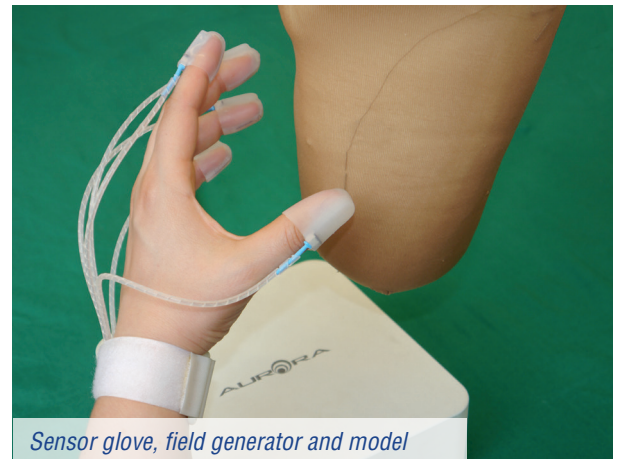
- companies create new and intelligent production technologies through research.
- companies, start-ups, universities and research institutions work closely together.
- companies emerge and grow so that high-quality jobs are created.
- innovations and new technologies are researched and developed.



Field Generator & Sensor Glove



Digital scan of the model



Sensor glove, field generator and model

### FUNDING: CONTACT:

#### FUNDING PRIORITY 1

Innovation, Action 1.1: Programme to promote research, innovations and technologies (Pro FIT)

#### INVESTITIONSBANK BERLIN

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#### FUNDING AMOUNT

€412,436; 50% from ERDF

#### PROJECT TERM

01/11/2016– 31/07/2019

#### MAKEA INDUSTRIES GMBH

Rehabtech Research Lab GmbH  
Medical Technology | Technical University Berlin  
Department of Medical Technology and Ceramic materials  
Homepage: <https://makea.org/public>



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