

Nano - micro - macro Manufacturing redefined

From the lab to the production floor:
Globe shows how new technologies like digital fabrication and additive manufacturing are creating new possibilities.

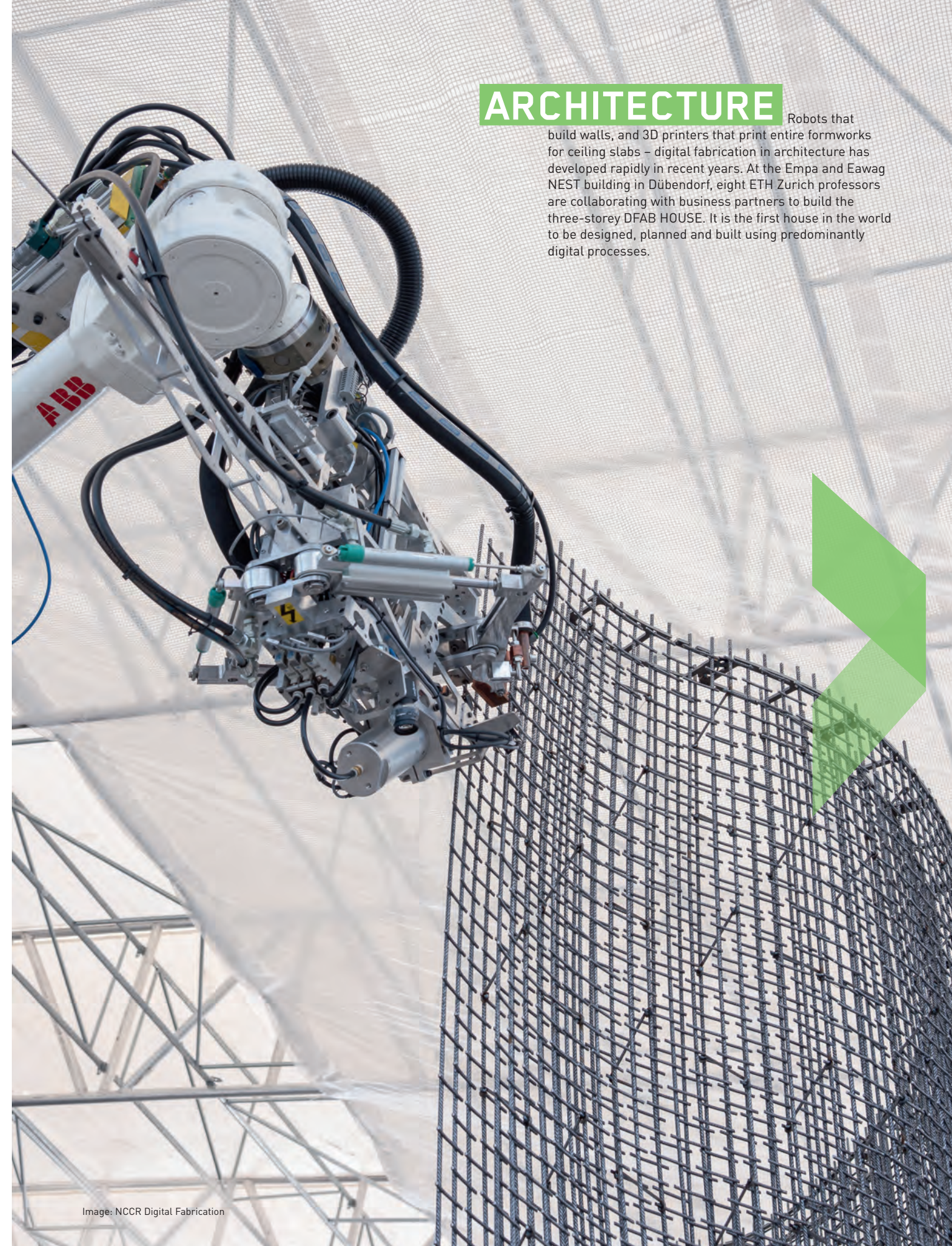
TINY METAL COMPONENTS

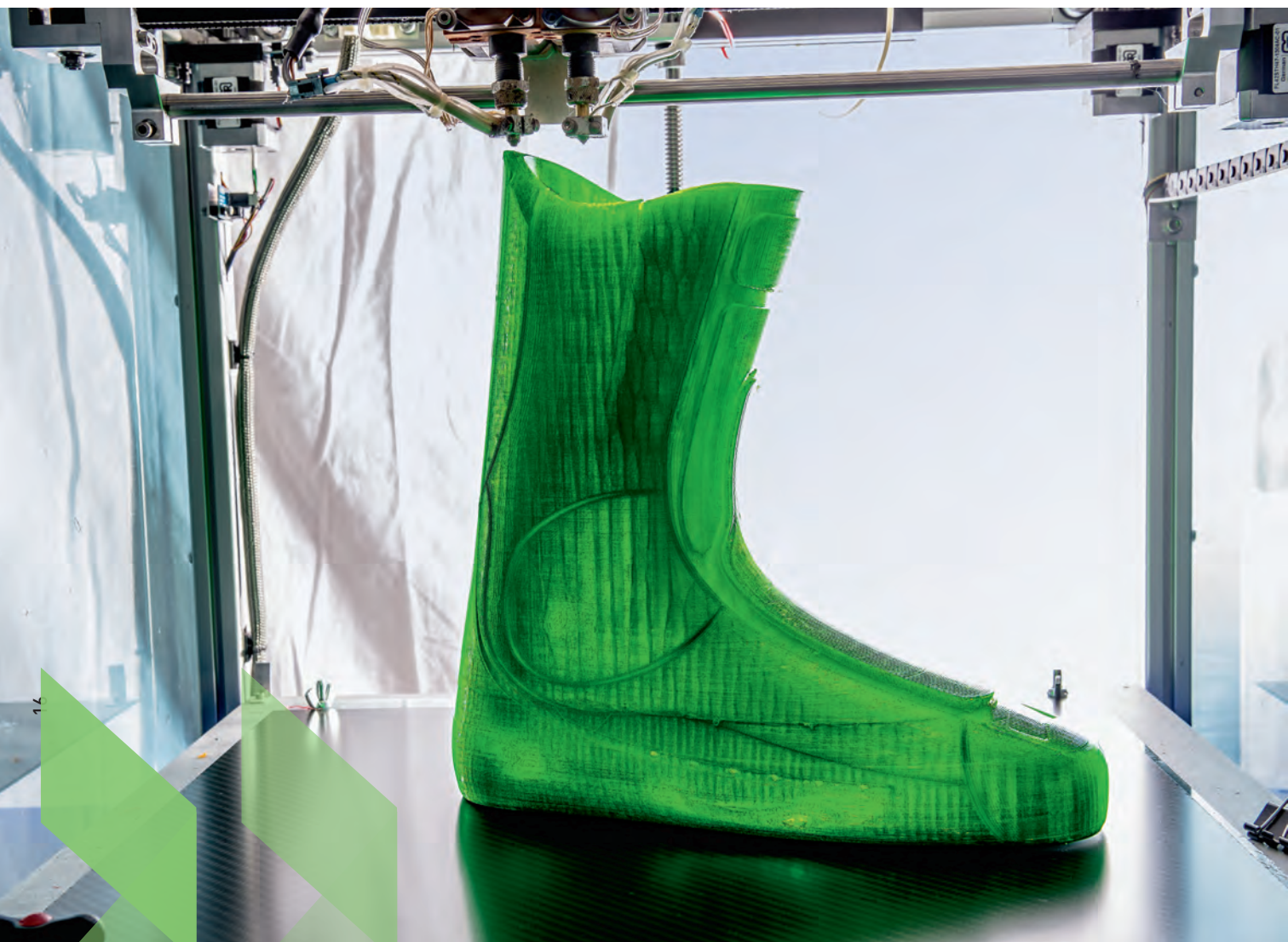
Thanks to a novel 3D microprinting process, it is now possible to manufacture complex metal components in the sub-micron and micron range, easily and in a single step. ETH Zurich researchers originally developed FluidFM technology for use in biological research. It has since been further developed for a different application, 3D microprinting. The ETH spin-off Cytosurge Ltd aims to make this technology accessible with its FluidFM μ 3Dprinter and, together with partners from industry, is testing possible applications in areas such as the semiconductor and medical device industries.

2 μ m

ARCHITECTURE

Robots that build walls, and 3D printers that print entire formworks for ceiling slabs – digital fabrication in architecture has developed rapidly in recent years. At the Empa and Eawag NEST building in Dübendorf, eight ETH Zurich professors are collaborating with business partners to build the three-storey DFAB HOUSE. It is the first house in the world to be designed, planned and built using predominantly digital processes.





CLOTHING

Tailored Fits AG manufactures tailor-made insoles for all ski boots. The way it works is by scanning the inside of the boot and the skier's lower leg. Based on the personal biometric data and information about skiing style, unique software defines individual pressure zones on the feet. This allows comfort and the distribution of force to be perfectly matched to every skier. After scanning, the insole is 3D printed in a single step using fused deposition modelling technology.

"Innovation is a balancing act"

New manufacturing technologies will transform the way we produce things. So can we expect everything to come off a 3D printer? Mirko Meboldt, an expert in product development, talks to management expert Torbjörn Netland about the potential – and reality – of the situation.

INTERVIEW Martina Märki and Nicole Kasielke

Do you have anything 3D printed at home?
MIRKO MEBOLDT – I made an attachment for my milling tool. It's cheaper than buying it and I can tailor it to my own needs.

TORBJÖRN NETLAND – I have some tracks for a toy train set. It's something of a metaphor for where 3D printing stands at the moment – which is in the hobby room. Something to play around with.

Play around? Enthusiasts are calling additive manufacturing the disruptive technology that's going to change everything...

MEBOLDT – It's a rather absurd situation. I don't think we've ever had a situation where a production technology enters children's playrooms and company board rooms at one and the same time. Never before has a technology been so over- and underestimated.

Why is that?

NETLAND – Often people get the wrong idea in their head. Yes, you can buy a 3D printer right now for just a few hundred Swiss francs. But it's only going to print toys. It's not suitable for industrial applications.

MEBOLDT – You have to remember that 3D printing isn't a singular term, but instead encompasses the entire range of additive – that is to say, layer-based – production techniques. These form a whole category of their own, bringing together more than two dozen different process technologies, and a whole plethora of different properties and materials.

"Companies need some sort of sandbox to experiment in."

TORBJÖRN NETLAND

So how do we do it all?

MEBOLDT – These days, there are 3D printers for ceramics, metal, plastic, wax, plaster, sand, and concrete – and for every scale. I can just as well print shapes that you can thread through the eye of needle as I can print an entire building. In other words, it's a technology with a great many fields of application, even in medicine, where it can >



TORBJÖRN NETLAND

is Assistant Professor of Production and Operations Management. His research focuses on increasing productivity in companies in industry.



MIRKO MEBOLDT

is Professor of Product Development and Engineering Design. His research concentrates on the use of new technology in the next generation of products and development processes.