

WE 3D PRINTED A

SENSOR WITH CONDUCTIVE

MATERIALS

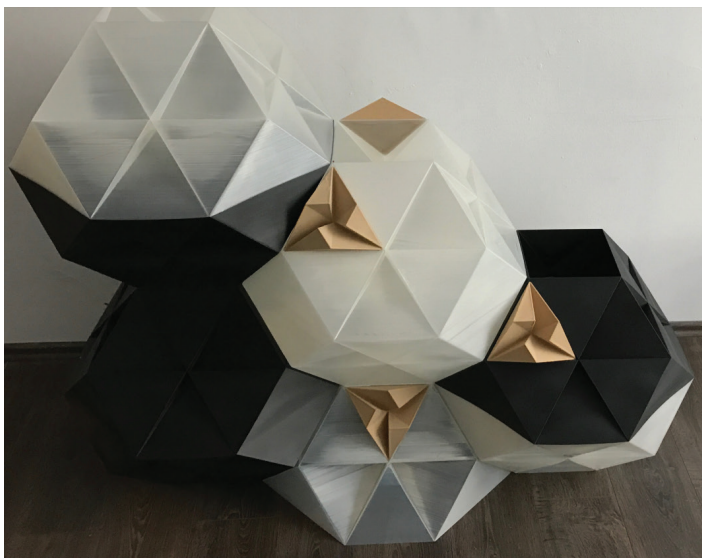
# YOU CAN IMAGINE IT. YOU CAN DESIGN IT. YOU CAN PRINT IT.

Industrial designers often dream up new products and then explore ways to manufacture them. Every now and again a highly innovative product emerges the other way around.

Daniel Büning and Jörg Petri, the founders of NOWlab@BigRep, were inspired by the potential of 3D printing. As Büning recalls, “We saw immediately that it would be a really nice idea to print modules that could be stacked together to create a space divider for an office space or a living room.”

To properly test the capabilities of the technology, they added three extra requirements to their brief: incorporation of sound-proofing properties; an integrated lighting system; and a 3D-printed sensor to control the lighting system.

In the past, bringing to life such a concept would have required the commission of custom parts from a variety of specialist producers. Additional challenges surrounding integration of the numerous different components would have consumed significant time and resources. Büning and Petri’s intuition was that by 3D printing a prototype of this complex product, these other issues could be avoided.



“ COMING FROM AN ARCHITECTURAL BACKGROUND, THE IDEA IS TO CREATE ANY GEOMETRY YOU CAN IMAGINE OF, THEN STACK THEM TOGETHER TO CREATE A BIGGER OBJECT. WE DECIDED TO USE THOSE BRICKS ALSO FOR SOUND PROTECTION. SO IN PARALLEL IN THE RESEARCH FOR THE GEOMETRY, WE ALSO RESEARCHED ABOUT THE OVERALL GEOMETRY BEST SUITED TO REDUCE NOISE. ”

**Daniel Büning**

Director of Innovation, NOWlab@BigRep

NOWlab is the research and innovation hub within BigRep that endlessly searches for new ways to scale and shape additive manufacturing for tailored industrial use cases. NOWlab's team of experts work to create custom industrial application solutions using cutting-edge, patent-owned production methods and processes. As a key player in the research sphere, NOWlab is leading BigRep’s journey to discover the future of industrial manufacturing and products.

With a [BigRep ONE](#) industrial 3D printer and its diverse range of [3D printer filament](#) materials for their use, NOWlab set out to meet their self-initiated brief. Their aims were to realize their inspiration, demonstrate the potential of 3D printing, experiment with 3D printer filament options, and to generate new knowledge that they could apply to future in-house and client-commissioned work.



## THE RESULT

“I DESIGNED THOSE PATCHES WHICH ARE PRINTED IN A WOOD FILAMENT. THE DESIGN IS BASED ON A QUADRATIC NOISE REDUCTION PANEL AND IT’S CUSTOMISABLE BECAUSE YOU CAN ADD AS MANY OF THESE AS YOU LIKE.”

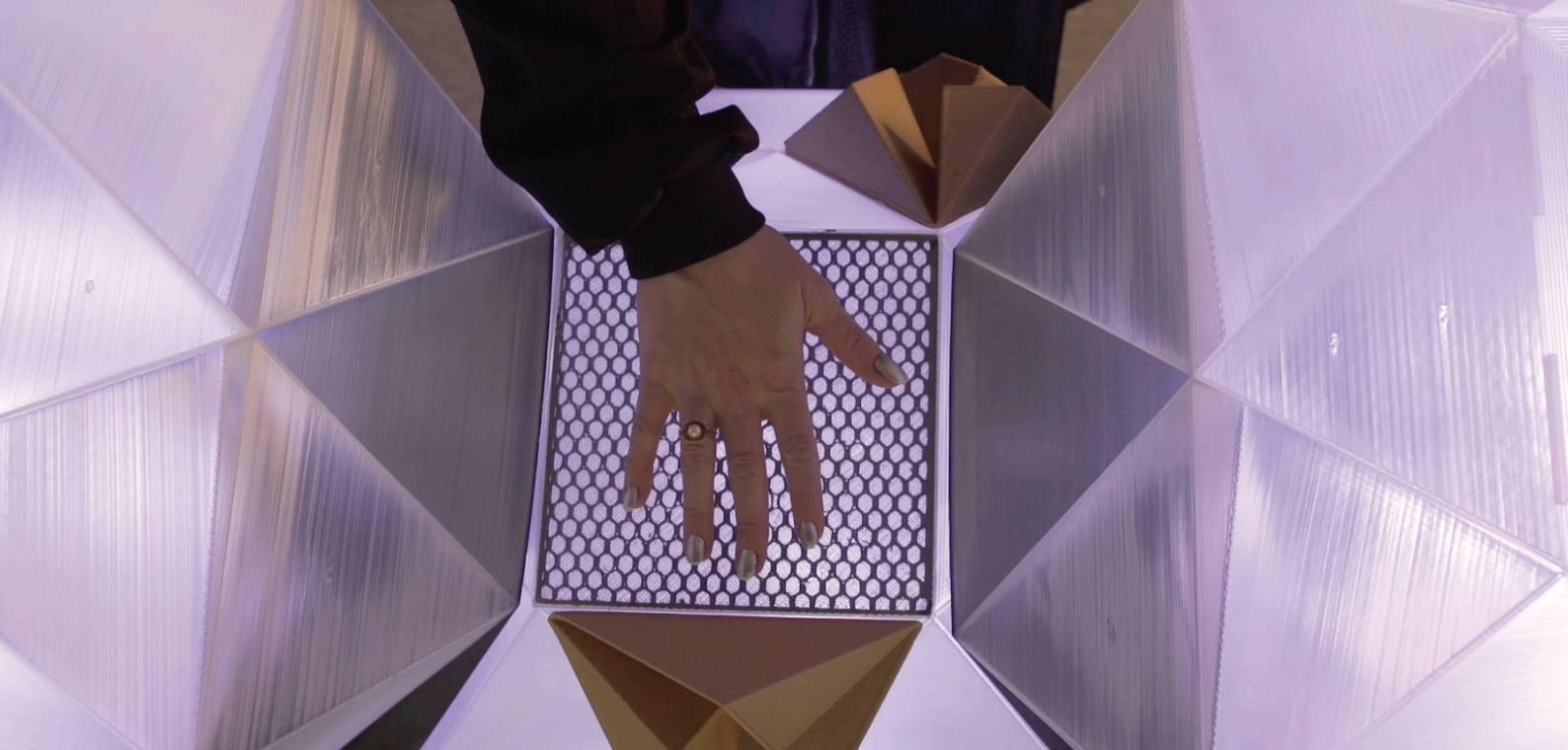
Lindsay Lawson  
3D Design Artist, NOWlab@BigRep

In just four months, NOWlab developed and produced a fully functional product fitting their brief. The Modular Wall is a clean and elegant solution, with an array of impressive built-in functions. The 3D-printed capacity sensor, a ground breaking feature, was created using a conductive material. It can be embedded in any module in the wall for the user to control the lighting system. Such printed components could eventually replace classical switches, allowing users to perform on/off functions with gestures, removing the need to touch the object. No less impressive, the design and manufacture of the product did not require the commission of any custom parts. Cutting-edge 3D printing was enough.

The largest components, the stackable modules, were 3D printed. Some of them were designed to diffuse light, and were thus printed in a translucent filament. Separate sound-proofing ‘patches’ were also designed and printed, as were a range of smaller support parts.

Most components for the smart lighting system such as PCBs, wiring, light fittings, and magnetic contacts were off-the-shelf purchases. The exception was the signature element of the design: the printed sensor for lighting control. As planned, this part was especially developed and then 3D-printed from two different 3D printer filaments – one conductive, one non-conductive.

Intelligent design meant that most of the integration of different components could be performed by 3D-printed parts. Printed parts were designed to ‘click in’ to one another, while recesses were designed in them to accommodate the off-the-shelf purchases. Beyond this, all that was required was some simple assembly, such as soldering and nut and bolt fitting, as well as connecting a few electrical components together.



## THE FUTURE OF PRODUCTION

Inspired by 3D-printing technology, this product gives a glimpse of the possibility that many end-use products will be directly manufactured by 3D printers in future. It also shows the flexibility that large-format 3D printing lends to the creation of products that would have previously seemed unthinkable. Petri said: “This approach to industrial design brings new possibilities: things that really were not possible, like to embed a sensor, by yourself.”

There are three main elements of flexibility in BigRep’s 3D-printing technology. The ability to print large and small forms with highly complex geometries both inside and out;

the print precision and material flexibility which allows for ‘click-in’ connectivity of parts; and BigRep’s broad selection of 3D printer filaments, which included materials suitable for sound proofing, light diffusion, load bearing and electricity conducting.

When this flexibility meets the expertise and imagination of a team like NOWlab, ideas like the sensor become reality. New products become possible with 3D printing.

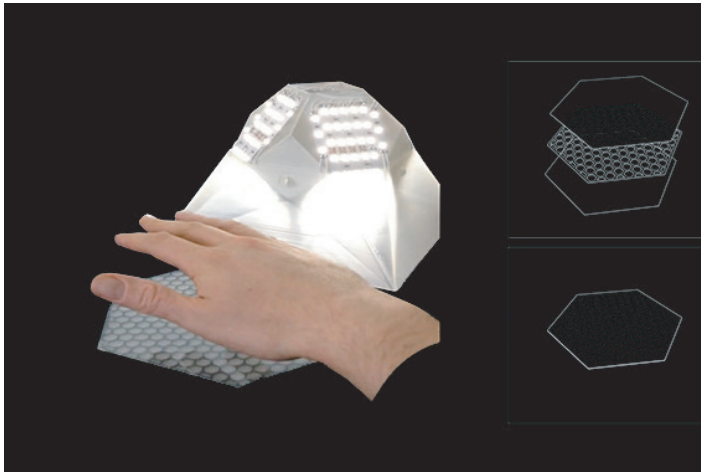
“WE BROUGHT TOGETHER LATEST DIGITAL TECHNOLOGIES IN TERMS OF SIMULATION AND PROGRAMMING TOGETHER WITH THE LATEST INNOVATIONS IN THE MATERIAL FIELD LIKE THE CONDUCTIVE MATERIAL AND THUS CREATED SOMETHING THAT HAVEN’T BEEN THERE BEFORE.”

Daniel Büning

Director of Innovation, NOWlab@BigRep

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“ THE ADDED VALUE 3D PRINTING GIVES US IS THAT WE ARE NOW ABLE TO EMBED FUNCTIONS INTO OBJECTS FABRICATED OUT OF MULTIPLE MATERIALS IN JUST ONE GO.”

Jörg Petri

Director of Innovation, NOWlab@BigRep

## AN ESSENTIAL INDUSTRIAL DESIGN TOOL

The development of the Modular Wall also illustrates the immense time and resource-saving power of 3D printing for the product design process.

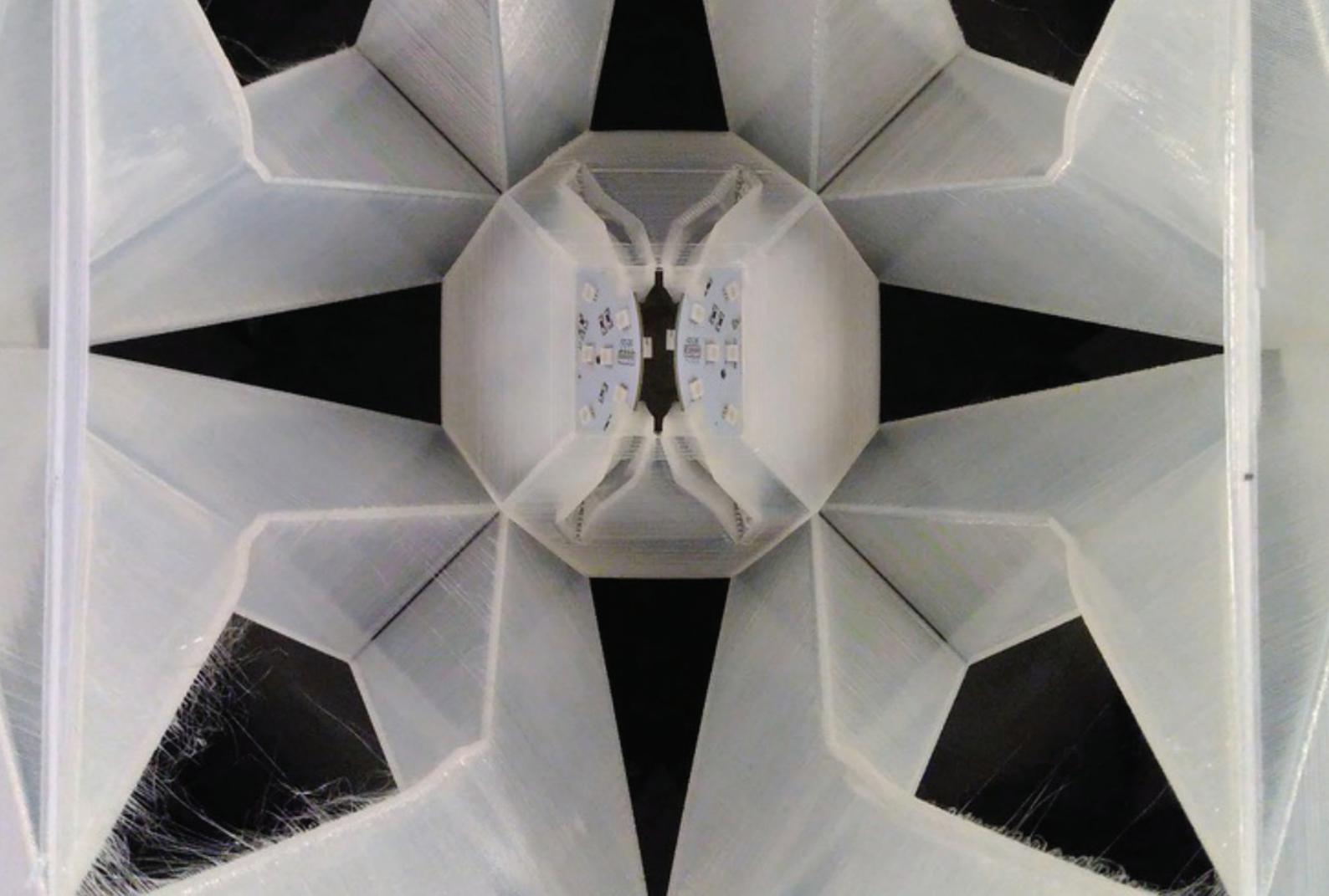
This product was developed in four months, whereas Petri believes, “for a large furniture company, developing this kind of product takes roughly 2 years. This is due to the length of the traditional prototyping iteration cycle, which 3D printing – especially in-house – can shorten immensely.”

In terms of costs, a conventional approach to development would have required significant spending on externally produced prototypes, as well as more time spent on in-house modelling.

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Petri points out a final benefit to the 3D-printing process, being that it results in better industrial designs. This comes in part from the flexibility we already described, but it also comes from the speed and lower cost. Being able to produce sophisticated models at speed means industrial designers can make small changes to an idea and quickly print a new iteration. This gives more information to the designer, so they can really test the limits of possibility.



“ FOR US, THIS PROJECT PUSHES THE BOUNDARIES OF WHAT IS NORMALLY DESCRIBED AS INDUSTRIAL DESIGN, TAKING IT A STEP FURTHER ”

Jörg Petri

Director of Innovation, NOWlab@BigRep

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THE USE CASE VIDEO

