

FAST CUSTOM CONCRETE

3D PRINTED FORMWORK ENABLES QUICK PRODUCTION
OF COMPLEX CONCRETE ELEMENTS FOR ARCHITECTURE,
CIVIL ENGINEERING AND CONSTRUCTION

CONCRETE CASTING: GEIGER GROUP WITH NOWLAB

The building restoration process often throws up difficult challenges.

Geiger Group found themselves in such a situation as they approached the renovation of a listed building in Kempten in southern Germany. Geiger, founded in 1923, specialises in property development, construction, civil engineering and more. This restoration, the conversion of an old brewery into an office and events space, was one of numerous architecture projects the group carries out each year. The challenge facing them was to replace five large stone window frames on the property, whilst retaining the impressive original aesthetic.

In replacing these stonework window frames, there were two standard options that Geiger could have considered. The traditional method would be stone masonry. This is a highly skilled activity that produces exquisite results, however it is time-intensive and costly. The second option would be to cast concrete from a resin-coated foam formwork. The depth of the pattern meant that milling a single piece of foam to the desired shape was not possible, and production using several pieces would have increased costs and extended the duration. A more general drawback to this method is the toxicity and waste involved.



“IF YOU WANT TO PRODUCE CONCRETE IN COMPLEX GEOMETRIES ON SITE RIGHT NOW ITS VERY EXPENSIVE. IT’S MAINLY HANDWORK, PEOPLE ARE MAKING INDIVIDUAL WOODEN FORMWORKS, THEY WILL BE USED FOR ONE THING AND THEN THEY WILL GO TO THE TRASH.”

Jörg Petri

Director of Innovation, NOWlab@BigRep

Since the project was on a tight schedule, Geiger reached out to NOWlab@BigRep, to explore a third option. 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.



THE PROCESS

“ IN THE END YOU USE LESS CONCRETE BECAUSE THE STRUCTURE IS ENABLED THROUGH A MORE COMPLEX GEOMETRY. WITH THE PRINT CAST WE SEE A CLEAR POSSIBILITY FOR ARCHITECTS TO EXERCISE DIRECT CONTROL OVER WHAT THEY DESIGN ON THEIR COMPUTER AND WHAT IS PRODUCED ON SITE”

Jörg Petri
Director of Innovation, NOWlab@BigRep

After discussing possibilities, NOWlab and Geiger agreed to collaborate on the windows and they produced them through the following process.

Geiger provided NOWlab with CAD files containing full specifications of the window frames. NOWlab worked from these files to generate a digital pattern for a cast formwork. Having created G-code files from SIMPLIFY3D 3D printer software, they then printed the formwork on a BigRep ONE, taking advantage of its 1m³ print volume to do this in one print.

The printed formwork, made from BigRep's a bio-degradable PLA 3D printer filament material, was then sent to a fabricator to cast concrete sections. Assembly of the window frames from

various sections was performed on the construction site, prior to a successful installation. While in this case the client provided CAD files, in another scenario NOWlab could have produced these, either creating a rendering from scratch or making a 3D scan of a template piece.

BigRep's experts are waiting to sink their teeth into your unique and challenging use case.

[CLICK HERE FOR MORE INFO](#)



“ YOU CAN RELY ON 3D PRINTING TECHNOLOGY IN ORDER TO CREATE A ONE TO ONE COPY OF YOUR DESIGN AT FULL-SCALE. THEN YOU’RE ABLE TO IMPLEMENT THIS IN THE REAL WORLD.”

Jörg Petri

Director of Innovation, NOWlab@BigRep

Geiger estimates the window frame elements produced using NOWlab’s 3D printing process cost 50% less than they would have from a stonemason, with a production time shorter than 45% compared with if they had opted for resin-foam cast production. Geiger was also able to considerably reduce staff resources needed for the project. Combined with a high-quality finish, this was the perfect 3D-printed solution for Geiger.

Discover 3D print solutions that reduce resource needs for your unique use case or project.

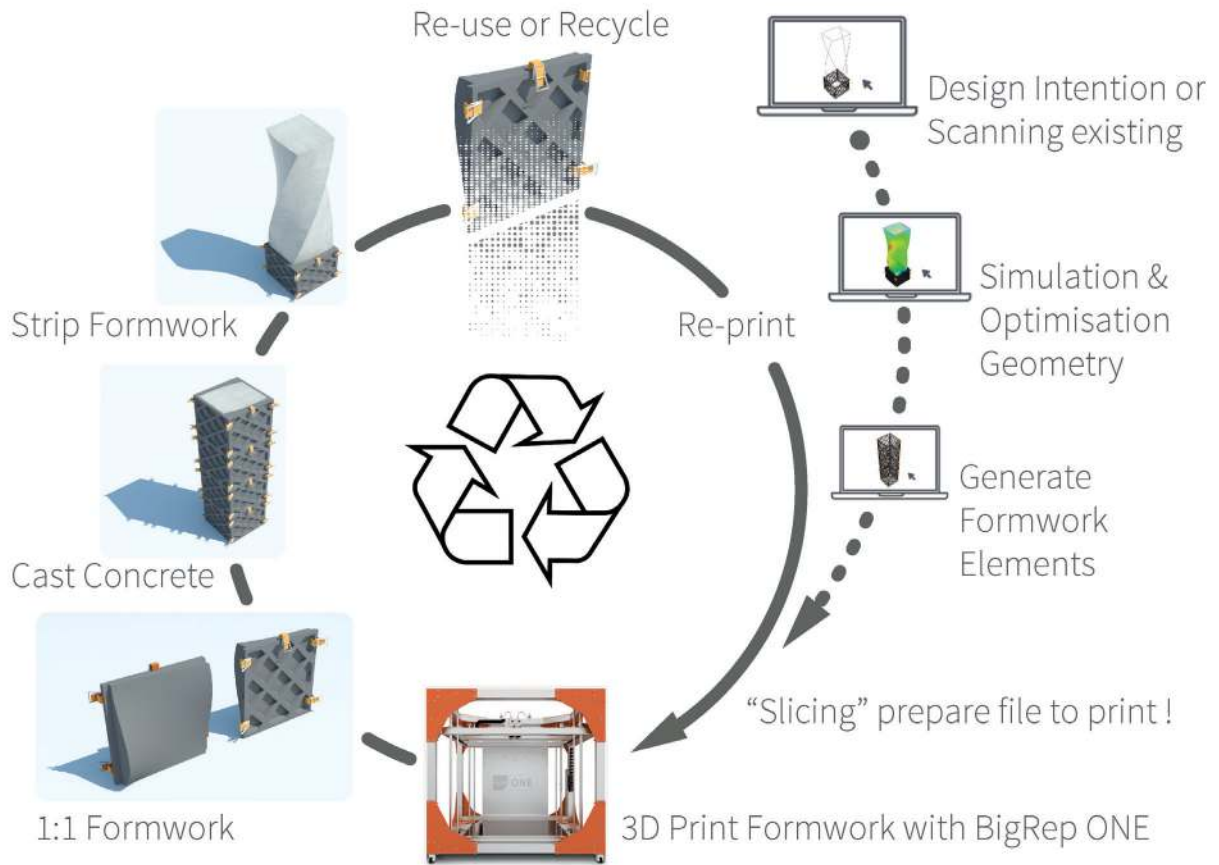
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PRODUCTS FOR THE FUTURE

Over time it seems probable that Geiger and others will increasingly adopt these methods in their renovations. However, restoration is only one way to apply the basic technique.

NOWlab is developing 3D-print based concrete casting processes for the architectural construction elements of the future. For the creation of both architectural facades and load-bearing, structural elements. With test-case projects underway, NOWlab has a patent pending for the production of 3D-printed formwork for this technology.

The advantages brought by 3D printing in terms of faster production, reduced cost, and greater environmental soundness apply similarly to these applications. However, with new products, the flexibility of 3D printing also unlocks huge design potential. We can expect elaborate new surface textures, exterior forms and structural characteristics in designs freed from existing constraints. In this way 3D-print based concrete casting offers a vision of a different future for architecture and construction – which applies to both restoration projects such as Geiger’s and to architectural design at the cutting edge. The BigRep ONE is helping that vision to fast become a reality.



“ WE AIM TO ACHIEVE ARCHITECTURAL FAÇADE ELEMENTS AND PERHAPS EVEN LOAD BEARING WALLS WITHIN A YEAR”

Jörg Petri

Director of Innovation, NOWlab@BigRep

CLICK HERE TO CHECK OUT THE USE CASE VIDEO

