Ultimaker

Architectural model-making transformed by affordable 3D printing

"Ultimaker 3D printers haven't just increased model production speed and saved costs. By automating the production of additional context models, they allow our model-makers to focus more creative attention on the site's actual design."

— **Paul Miles,** Modelshop Manager at Make Architects

Make Architects is an award-winning, employee-owned firm headquartered in London. Its Ultimaker 3D printers support the studio's democratic design culture, enabling model-makers and other employees to print thousands of models each year. Easy-to-use 3D printing is embedded into each project's workflow – from conceptual design to presentation.

Company
Make Architects

Industry
Architecture

Challenge
Minimize the use of traditional model-making techniques during the design ideation phase. Automate model production for context buildings to avoid outsourcing large models, which are expensive and take time.

Solution
A group of 14 Ultimaker 3D printers allows architects and designers to test ideas by printing their own concept models. Model-makers print presentation models in white PLA and then apply additional post-processing.

Results
- Cost optimization
- Time optimization
- Increased creative attention for key models
- Aligns with the studio's democratic design ethos

Make Architects – Introduction
Today, almost all of Make's architectural designs begin life on an Ultimaker build plate. The model-makers rely on their Ultimaker 3D printers' high uptime and print success rate to produce thousands of models a year – far more than the small team could produce by hand. With an additive manufacturing process, only the required material is used, cutting down on waste, while producing proportionally accurate and highly detailed models.

Concept and context models printed in white PLA need no post-processing. For presentation models which require a specific finish, the model-makers use a variety of post-processing techniques. These include spray painting or adding laser-cut pieces.

More recently, the model-makers have used their Ultimakers to create 1:1 or 1:10 scale building parts – like cladding. Such large pieces help clients visualize geometric details or solid forms. Previously outsourced to a metal supplier, these designs can now be created and iterated upon in-house. The team then make silicone molds from the 3D prints and fill them with metal powder resins or concrete mixes.

Challenge
Paul and his team previously relied on traditional model-making methods. These included hand-cutting concept models from foam and card, and massing models from timber. But this was a labor-intensive, noisy, and messy process. Some models were also outsourced to a 3D printing service for overnight fabrication, but these powder prints were fragile and expensive.

Solution
After purchasing their first Ultimaker 3D printer, the modelshop quickly scaled their production. Today, 14 Ultimakers integrate seamlessly with Ultimaker Cura's preconfigured print profiles. This means that – after just a 30-minute induction – every employee can prepare models and print with confidence. In this way, Ultimaker facilitates Make's 'workshop' way of working.

Results
On-demand, in-house model production has transformed Make Architects workflow. And these models, printed in a few hours, are far superior to viewing CAD designs on a computer screen. Paul explains: *"3D printed concept models mean everyone – from architects to clients – can get their head down and really move around the model. They can pick up and feel the buildings."*

Ultimaker enabled Make Architecture to:
- Reduce costs by fabricating more models in-house
- Achieve a faster turnaround in model-making
- Develop ideas more quickly and easily
- Explore a site's design constraints more thoroughly, to find the best scale and orientation of spaces and forms
- Focus more creative attention on the design of their site, rather than on producing less critical context models

Costs
Make's modelshop team enjoy substantial savings across a range of model types – from concept models to large-base massing studies. With turnaround times cut by an average of 90% and costs reduced by a similar margin, the model-makers quickly achieved ROI. With this proof of concept, the modelshop did not hesitate to increase the size of their Ultimaker printer group.

Now with 14 machines, the team multiply their efforts through automated fabrication. Ultimaker printers are also installed in their Hong Kong and Sydney offices. This means the modelshop saves time and money by sending print data digitally, rather than shipping models around the world.

Every employee is inducted to use the Ultimaker 3D printers, enabling them to produce rapid iterations or '3D sketches', which test the design constraints of the site

Large context models are 3D printed in-house and to scale and can be produced within a week. Similar models fabricated from timber were outsourced and took up to six weeks

Using a varity of post-processing techniques, like spray painting and laser cutting, model-makers can further enhance 3D printed structures to produce high quality presentation models

Typical 1:1000 scale concept model

	External suppliers	Ultimaker 3D printers
Cost	£80 per part	£1 per part
Project	24 hours	3-5 hours

Small concept models were previously outsourced to a powder 3D printing agency, but they were too fragile and expensive

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About Ultimaker
Ultimaker has been in operation since 2011, and over the years has grown to become a market-leader; creating powerful, professional, and accessible desktop 3D printers with offices in the Netherlands, New York, Boston, and Singapore plus production facilities in Europe and the US. Ultimaker's team of over 300 employees continually strives to offer the highest-quality 3D printers, software, and materials on the market to accelerate the world's transition to local digital manufacturing.

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