



# Pushing the Boundaries of Architectural Design

## Elkus Manfredi Architects Designs Differently With the Help of 3D Printing.

A top architectural firm in Boston, Elkus Manfredi Architects tackles high-profile projects for clients across the world with a team of more than 285 creative thinkers and problem solvers. Driving to be at the forefront of technology in the industry, Elkus Manfredi is constantly looking for technologies that can advance the design process, provide high-end client service and push the work into new areas. “Our focus is on creating dynamic, connected, sustainable environments that foster a sense of community, from the smallest workplace to urban neighborhoods around the world,” said David Manfredi, CEO and Founding Principal.

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# Seeing Challenges as Opportunities

When exploring the architectural design possibilities for complex projects, Elkus Manfredi traditionally outsourced its models to model making shops. This process involved a significant amount of back-and-forth communication between the designer and the model maker. “We would have to draft for them what they were going to build — whether it was going to be made out of wood, foam, paper boards or other materials,” stated Thomas Carrier, Director of Fabrication for Elkus Manfredi. “It was a communication process involving drawings and meetings to properly get the design intent across — and there was a lot of back and forth.”

While utilizing this method of crafting architectural models by hand, changes or iterations to the designs often required a complete redo. That, paired with the reality of tight project timelines, meant the design team couldn’t explore as many design paths as they hoped. At least not without impacting the quality of the final output — which was certainly a challenge.

As with any challenge, Elkus Manfredi sees opportunity, and so it turned to technology — specifically 3D printing — which opened the door to new design possibilities.

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# Unlocking Design Freedom

In 2014, the principals of the firm, Howard Elkus, David Manfredi and John Martin, were interested in pursuing 3D printing and they committed to adopting this technology for use in their architectural practice. When they started looking for a system, reliability, quality, repeatability, speed, cost and user experience were all deciding factors — and Stratasys® 3D printers checked all the boxes.

With this new technology in place, design teams were able to hit the ground running — quickly transitioning from 3D printing simple forms like cubes and spheres to testing the limits with building forms, complex geometries, details, sculptures and spaces. “When we started exploring the vast applications for 3D printing in our design processes, it was about trying new things and seeing what stuck,” Carrier said. “There are now models everywhere, 3D printed parts lining the corridors and colleagues’ desks.”

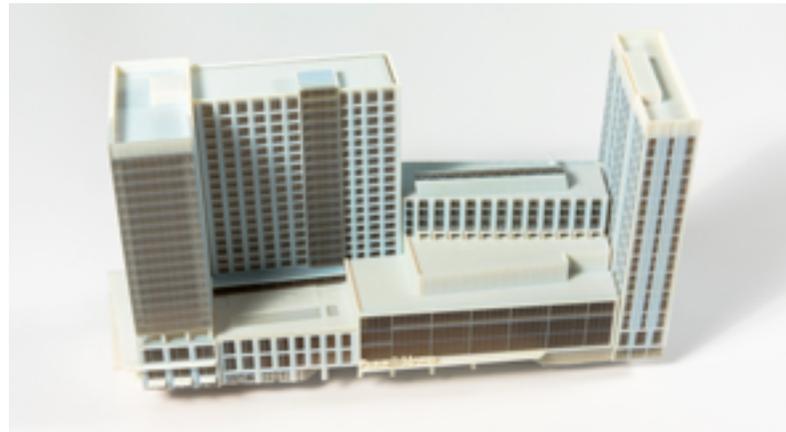
3D printing also became a powerful tool for conveying design intent while maintaining the quality and control of the output during the design iteration process. “We had all the tools at our fingertips to design and make models in-house, which reduced our efforts in planning and executing our projects,” added Carrier. “And we could suddenly get a lot more high-quality output than ever before.”

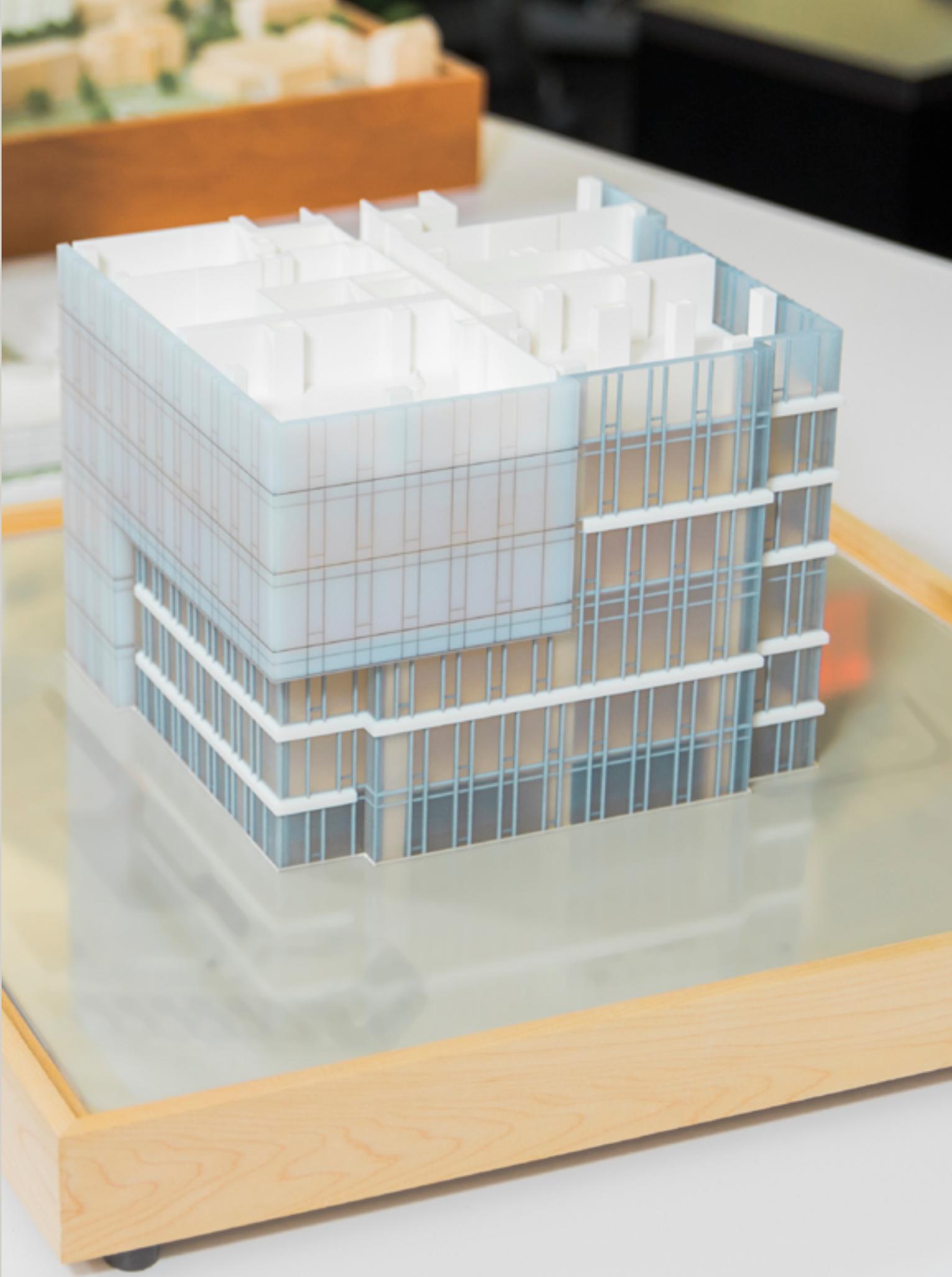
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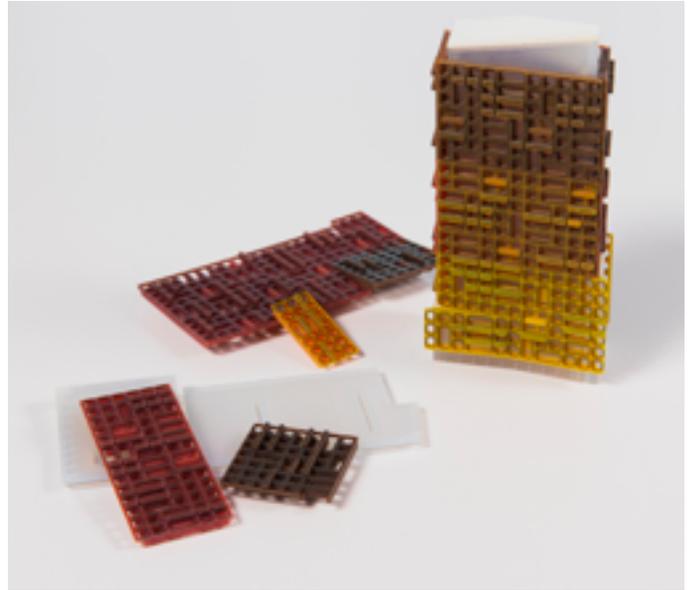




# Fostering a Collaborative Spirit

Collaborating with clients on projects of all shapes and sizes is a cornerstone of Elkus Manfredi's design process. 3D printing allows it to explore and convey complex visions as well as address design challenges and opportunities head on. "As designers, we want to bring our client's vision to life, and we want to achieve this through 3D printing," said Carrier. "I think it enriches the conversation and collaborative spirit of design. Now we get to show them things they've never seen before during the process."

3D printing has also energized the design team. "You could see collaborative conversations taking place around the printed objects that the designers created," added Carrier.



# Bringing the Complex to Life

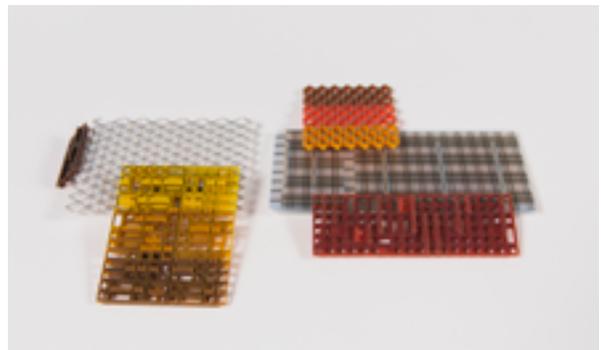
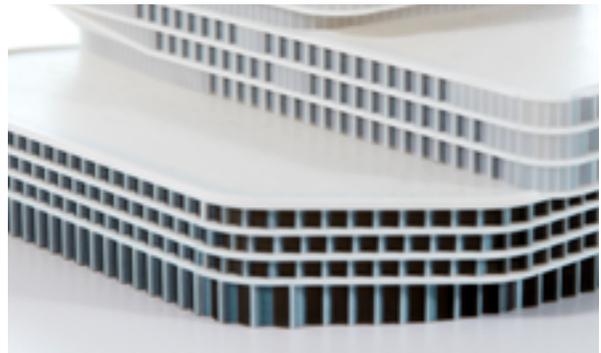
Today, Elkus Manfredi has fully embraced 3D printing. And with the addition of more printers, it continues to test the boundaries of the technology while exploring applications of interest such as color.

New, photorealistic models better communicate the look and feel of projects to clients. “One client expressed a vision for a multimaterial 3D printed master planning model for community approvals,” said Carrier. “The model was used to secure approval in one planning session, no small feat when discussing project potentials with the greater community.”

The designers are also able to take a more modular approach to 3D printing, allowing them to be more responsive to changes. For example, they can simply print new exterior options for the model buildings instead of reprinting the entire model.

Additionally, designers have been exploring 3D printing to visualize complex, subterranean spaces. “We were able to produce models for a scope of work that is otherwise difficult to visualize,” stated Carrier. “3D printing underground concrete structures in the urban context of a city was useful when collaborating with general contractors and subcontractors as they were embarking on coordinating the world beneath our feet.”

Beyond designing high-end models, Elkus Manfredi has also discovered a way to mimic other fabrication processes in the built environment using 3D printing, closing the gap between design intent, approvals and final fabrication. “We think we might be addicted to 3D printing,” Carrier added.



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