

BUILDING A SKY-HIGH CASE FOR 3D PRINTING

Architectural Modeling Firm Builds Scale Model of Stunning Abu Dhabi Edifice with 3D Printing

"The [Dimension 3D] printer has given us the ability to create unorthodox shapes to an exacting degree of accuracy. There have been projects that we simply could not have completed without it."

— Josh Coulas,
Peter McCann Architectural Models Inc.

Masdar Headquarters, Masdar City, UAE.



After building designs have been conceptualized and before ground is broken, real estate developers often transform their two-dimensional blueprints into three-dimensional scale models.

For Toronto-based architectural modeling firm, Peter McCann Architectural Models Inc. (PMAMI), replicating some of the world's tallest and most notable buildings on a one-hundredth scale prior to construction is all in a day's work.

From balsa wood and knives to rapid prototyping, the tools used to create such intricate models have come a long way in the firm's thirty-year history. Can you imagine carving an Abu Dhabi edifice model eight feet in diameter out of balsa wood?

The Challenge

By nature, architectural modeling requires high-level craftsmanship and attention to detail. "Even for our skilled craftsmen and women, amorphous shapes always present the biggest challenge; they are the most difficult to model by hand to the level of precision our type of work demands," says Josh Coulas, manager for PMAMI.

Prior to purchasing the Dimension 3D Printer, PMAMI steered clear of 3D printing technology because it was not yet capable of producing a product to their standards. Instead, the firm used CNC machines or created parts by hand.

However, when chosen to construct the architectural model for Masdar Headquarters, the search began for a tool that would meet the project's standards requirements and time constraints.

The Solution

Turned off by "pushy vendors" with "inadequate products," Coulas was impressed when he discovered Dimension. "We did our homework," he says. "The Dimension reseller Cimatrix was great to work with, and their printer presented a huge advantage by using ABS plastic over the more conventional powder."

The high resolution and strong outputs of ABS plastic are "crucial," says Coulas. "For our work, we need to have the ability to fuse pieces together, which ABS allows us to do."

The Project

A significant win for PMAMI, Chicago-based Smith+Gill Architects hired the firm to create a large model of Masdar Headquarters, the world's first large-scale positive-energy building that generates more energy than it consumes. Masdar City – where Masdar Headquarters is located – is a carbon-neutral, zero-waste development under construction in the southeast corner of Abu Dhabi.

The architecture for the model included multiple helix-shapes that needed to be both precise and strong because they were structural. "We purchased our printer to accomplish this," reflects Coulas. "We were only given a couple of months to complete the project."

With the 3D printer, Coulas and his team created structural voids and a free-flowing roof for the Masdar Headquarters model. The dozen conical structural voids supported the large roof, which, covered with solar panels, was a free-flowing form. "It would have been really difficult to build without the printer," says Coulas.

The Dimension Difference

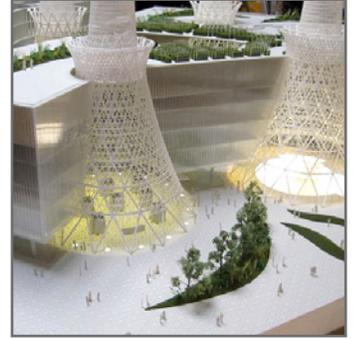
PMAMI produces models for a myriad of projects each year. "Since purchasing the Dimension 3D Printer, we've used it for anything from creating miniature furniture to moulds for intricate pieces of the Salt Lake Temple in Utah," says Coulas.

When asked to consider the best time-saving benefits of the printer, Coulas points to the firm's ability to create a library of reusable designs. "When we have repetitive pieces, we can print one as a mold, cast it and then use the cast to injection-mold the rest. It really speeds up the process. Once we've printed the file, we can do it at any scale; creating a library of the drawings to reuse is invaluable."

Coulas also notes that breaking out the modules and using methylene chloride glue to meld them together is difficult – if not impossible – to achieve with any other technology. "The structural members are intricate parts, comprised of hundreds of thin pieces that we need to be rigid and strong," he says.

It's been just over two years since PMAMI purchased the Dimension 3D Printer. Countless projects later, Coulas and his team can't imagine working without it.

"The [Dimension 3D] printer has given us the ability to create unorthodox shapes to an exacting degree of accuracy," concedes Coulas. "There have been projects that we simply could not have completed without it."



Masdar Headquarters, Masdar City, UAE.



Salt Lake Temple, Salt Lake City, Utah.



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