

# Artist Adds Injection Molded Plastic to Palette

Industrial designers regularly face a variety of challenges in selecting and deploying materials in the course of product development. Not surprisingly, artists can face many of the same challenges. Artist Allison Luedtke works in a variety of media—wood, glass, mosaic, metals and found objects—and has gone through that process many times. Recently, she added a new and very untraditional material, injection molded plastic, to her palette.

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Luedtke describes herself as a self-taught artist, but learned a great deal about the materials and techniques she uses through the Minnetonka Center for the Arts. Recently, however, she found herself turning to four companies that work mostly with industrial clients to learn more about plastic resins and injection molding for a project for the Ronald McDonald House located at Children's Hospital in Minneapolis.

Opened on November 1, 2010, the new Ronald McDonald House is one of just four in the country that is actually located inside a hospital. Designed to provide a home-away-from-home for families with a child being treated at Children's Hospital, it includes private bedrooms, a hospitality center, a state of the art kitchen, exercise facilities, and an outdoor patio. It was for the outdoor patio that a donor family commissioned a sculpture in memory of their daughter. Working with an art consultant, the donors chose Luedtke to produce the donated work.

"They wanted something cheerful and bright and, according to the consultant, particularly liked some of the glass works I had done in the past," says Luedtke. "We met, and because their daughter had loved hummingbirds, chose a theme of hummingbirds and brightly colored trumpet vines. The initial plan was for a sculpture combining bronze birds with approximately 80 multi-colored glass flowers. We looked at the construction company's specs and were moving forward on the design when I realized that, because the sculpture would be in a public area, I wouldn't be able to use glass for safety reasons. We considered the possibility of using tempered glass, but that is only available in plate form and couldn't be shaped the way I wanted."



A portion of the patio sculpture designed by Allison Luedtke.

A friend of Luedtke's, who had worked at Proto Labs suggested that injection molded plastic might be a suitable replacement and that the company's Protomold service of rapid injection molding might be cost effective for a relatively short production run. A quick check with the architect and the construction company confirmed that any of a number of plastic resins would be acceptable in place of glass.

“It was a whole new process to learn,” says Luedtke. “Unlike glass, in which I was used to directly forming the finished pieces, injection molding was an indirect process. I would be sculpting a pattern, which, in turn, would be used to produce the finished flowers by injection molding. In that sense, it is like the process used with bronze, which is cast in a mold made from a model that you’ve sculpted by hand. But in most other ways it was unlike anything I’d done before.”

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Working with Luedtke was also a step away from the ordinary for Proto Labs. Molds used in the Protomold process are typically produced directly from 3D CAD models created by designers using CAD software. Luedtke created the flower designs in clay. Getting from her original clay model to a 3D CAD model was a multi-step process involving two additional companies. Her original clay model was laser scanned by Casting Creations in Howard Lake, MN, and turned into a data file representing all the points on the surface of her original clay model. That file was sent to Genesis Tek, where it was converted to a standard 3D CAD format compatible with Protomold’s rapid injection molding process.

Traditional injection molding using a steel mold would have been too costly for the production run of under 100 pieces. Protomold’s proprietary software that automates the mold design and toolpath creation for making aluminum molds slashes the cost of producing the mold, making it practical not just for short-run production but for prototyping as well.

An automated price quote was generated based on the 3D CAD design. “The only problem that the design analysis found was that the design was slightly too large for Protomold’s process,” says Luedtke. “That wasn’t really a problem, since I could use smaller flowers without compromising the sculpture. GenesisTek revised the CAD model, but I also had to redesign the fittings that attached the flowers to the rest of the piece, and I wanted a sample flower I could use to make sure everything fit.”

For that sample, Luedtke turned to Protomold’s sister service within Proto Labs. Firstcut makes

CNC machined plastic and metal prototypes using a variation of the software that produces the molds used by Protomold and can be cost effective for even single machined pieces. Working from the revised 3D CAD model, Firstcut produced a single plastic prototype, which Luedtke used to adjust the fittings and confirm that the smaller flowers would work in her design.

The next step was to choose a resin for the flowers. The requirements were pretty straightforward; because the piece was going to be located outside, the resin needed low UV sensitivity and to be able to withstand heat, cold, and moisture. It would also need to be custom colored and couldn’t fade. Finally, it had to be safe to use as a replacement for glass. Zytel® nylon 66 met all the requirements.

The choice of resin left one more step before molding. Luedtke’s design called for flowers in red, orange, pink, and yellow. Custom colorant was provided by Clariant. Protomold mixed the colorant into four batches of Zytel resin and molded 25 flowers in each of the four colors.



The flowers were molded in custom-colored Zytel® nylon 66.

“I used 88 of the 100 flowers in the final piece,” says Luedtke. “The finished piece was installed on the third floor balcony of the Ronald McDonald wing of the hospital and has been very well received. The entire project took about two months, and I would rate the entire Proto Labs experience A+. I really appreciate the speed of the entire process and the willingness to do something different. It opens my creative potential and gives me a new tool I can use in my future work. As in this case, glass isn’t always safe, and I’ve had to turn down projects in the past for that reason. Now I can go from a clay model to plastic and get the effect I want without the risk. I’m looking forward to learning more about Proto Labs’ services to see what else I can do with molded resin.”