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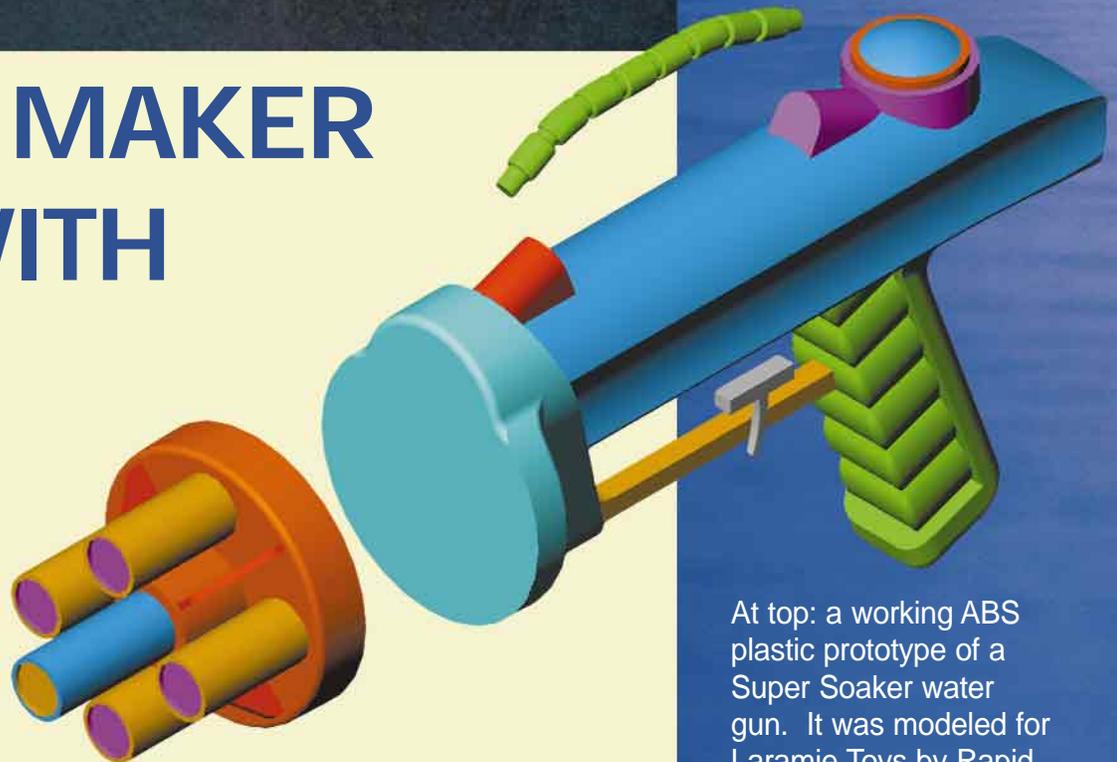
CASE STUDY



“Toy making is a unique craft; not every CAD draftsman is able to sit down and design a toy well.”

*Joe Pizzo
Rapid Models & Prototypes, Inc.*

MODEL MAKER TOYS WITH FDM



At top: a working ABS plastic prototype of a Super Soaker water gun. It was modeled for Laramie Toys by Rapid Models and Prototypes, Inc. in New Jersey.

At bottom: a preliminary CAD design of the toy.

Hewlett-Packard, Lucent Technologies, Johnson & Johnson, and Mattel are just a few of the clients that have regularly used the services of Rapid Models and Prototypes, Inc. (RM&P). The company is a full-service product-development house, model shop and rapid prototyping service located in Runnemede, New Jersey. For 41 years, the company has supplied model-making services to Fortune 500 and other high-profile companies.

RM&P creates models with end purposes ranging from the very serious – such as containing and transporting nuclear waste, to the more frivolous – such as toy water guns. The company has 17 full- and part-time employees, which include 8 model makers. The team includes talented designers, draftspersons, and model makers. It can handle a specific part of product development, or it can manage the entire project from initial thumbnails to drafting, to model making, prototype creation and testing, and even small production runs.

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***Joe Pizzo
RM & P***

“Clients can give us a file, a drawing, or even just relate their concept to us, and we can create a model for

them,” says President, Joe Pizzo. “And we can turn around and do low production runs as well. We can do that in urethane, acrylic, polystyrene, or rubber.” We do the full gamut of model and prototype making; we’ve got vacuum formers, lathes, rapid-prototyping and CNC milling machines. We create the CAD designs for probably 50 percent of our projects, and the other 50 percent we receive a CAD design from the client and just build the models and prototypes.

RM&P added fused deposition modeling (FDM) rapid prototyping to its services a few years ago, and Pizzo says it has greatly expanded the company’s capabilities. “There are things we’re doing on the RP machine now that are virtually impossible for a traditional model maker to do,” he says. “Or if they did, it would take four times as long to get one-half the quality.

“The reason we added an RP (rapid prototyping) system a few years ago, is that customers were bringing me rapid prototypes from another RP manufacturer. They would ask for a casting of the parts because they were fragile, and they knew they would break.

“We use a lot of ABS in our final products here, so it’s an advantage to prototype with the same material.”

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“When I saw the Stratasys FDM systems demonstrated, and I realized the ABS-plastic models had the strength I needed to do my own modeling work, not to mention service bureau work, I jumped at the chance. We use a lot of ABS in our final products here, so it’s an advantage to prototype with the same material.

“Besides having the part durability that I wanted, the FDM systems offer an environmentally clean process. Some of the other RP systems out there use chemicals that are toxic. I don’t want to be anywhere near that kind of environment. And I’m in New Jersey; they really hit you with the EPA regulations.”

Subcontracting for the North Pole

A significant portion of RM&P revenues come from the toy industry, and customers include companies such as Hasbro, K’nex, Mattel, and Laramie.

On any given day, a visitor to the shop will often see, in various stages of development, an assortment of models, such as the toy train, rubber football, or Star Wars action figures RM&P recently completed.



“Among other things, we’re currently designing the holiday toy display for the Macy’s Department Store window,” Pizzo says. “It’s September, and we’ve been working from 8:00 to 8:00. Christmas only comes on the 25th.”

One of Laramie Toys’ product lines, well known by kids, is the Super Soaker line of water guns. RM&P has designed, modeled, and prototyped some 12 models in this line, which ranges from a pistol that appears to be something from Star Trek, to a pressurized, pump-action rifle, to various sneak-attack models, which are designed to look like real cell phones or cameras but, to the dismay of the unsuspecting, are capable of delivering a good dowsing.

Pizzo recently completed the PowerPack BackPack model water pistol. The model comprises six components and includes a water-tight body. The components include left- and right-hand sections of the body; a solid trigger; a decorative, segmented top piece, which resembles a carrying handle; an end-piece with five pretend revolving barrels; and a pretend dial on the top.

“Some other rapid prototypes can get soft when exposed to moisture,” says Pizzo, “but with the FDM system, I constructed a vessel that actually holds water without absorbing any! That capability was a real plus.

“These people with the [laser-based RP] system have a new polymer: They’re saying it’s as good as the Stratasys ABS parts. They have improved, but I don’t think they’re as dimensionally stable as the ABS. I think they still absorb moisture and they still shrink.

“When we get toy design work, the client usually gives us a 2-D drawing. And the majority of the time, they don’t supply us with any dimensions, so we’re pretty much on our own. So our designers will turn that drawing into a 3-D CAD drawing that we then send to the rapid prototyping system. Toy making is a unique craft. Believe me – not every CAD draftsman is able to sit down and design a toy well. Over the years, we’ve learned a lot



Squirt gun or cell phone?

This Super Soaker, disguised as a cell phone for sneak-attacks, was modeled using FDM.

of tricks that make our toy projects go better and faster without any problems.”

RP System or Machining Center?

Some of the Super Soaker models have ‘carved’ figures, characters, and fancy fake pipes. In the past, Pizzo says, “a model maker would have taken a piece of wood and cut it out, shaped it, sculpted it, take it to a vacuum former and form it. Then he would shape out a pipe and vacuum form that. After vacuum forming, he would cut out some sections and add other pieces. He would maybe epoxy it to the vacuum-formed part. Five or six components later, he would have himself an assembly. It would continue being built up and built up until it was finished. The FDM system does that all in one setting. It saves me considerable time and labor costs by eliminating all those side steps.”

Pizzo likes to think of the RP system as a machining center, he says. “I’ve said this many times – I really believe this machine is not so much a prototyping system as it is a machining center. Because if I can make two, three, four different brackets and holding devices and clamps within the same mechanism, then I don’t have to put it on the milling machine, I don’t have to turn it on a lathe. And I don’t have to order various raw materials and hope they arrive on time and within the right tolerance. I don’t have to weld or screw components together. I just design it all into one piece. No matter how difficult a design is, the machine builds it, no problem – that’s the beauty of it. For two mating

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components, I even made threads that held up under pressure. With the FDM system, I've made very fine threads that fit together well the first time."

Water Soluble Material Automates the Process

This year RM&P retrofit its FDM system with the Stratasys WaterWorks soluble support system. The system saves users time by letting them dissolve temporary model-support material in a water-based solution.

Pizzo says that not only does WaterWorks free-up time that model makers once spent removing support material, but it has affected the way he designs toys and other products. "We used to design and orient parts, keeping in mind how we were going to remove the support material from intricate features or undercuts. Now we don't even think about that. We just build the part for the best appearance. I just run the part and drop it in the solution. Just the other day we built a toy that had complex internal geometry. After using the soluble process, I didn't have to clean up the part at all – I didn't even have to sand it."

Besides improving the process, the soluble-support retrofit has helped RM&P's bottom line, according to Pizzo. "For quoting a job, I used to plan time for support removal. Now, because support removal is automatic, I can bid a lower price. So it has made me more competitive than in the past." Pizzo says he hasn't yet done a payback analysis on the soluble support retrofit, but he estimates payback at about 90 days.

As far as general time savings with the FDM system, Pizzo says he roughly cut his work in half. "With some longer and some shorter projects, on average, my jobs used to take eight weeks before we brought the FDM machine in-house. Now they normally take four weeks, so I'm seeing a time savings of 50 percent. That means a lot to me."

Pizzo also says that because the machine operates constantly, it brings in solid revenues even when the shop is closed. "The machine is making money for me. It's working from 8:00 to 8:00 – to 8:00. I doubled production with it – I get 200 percent out of my shop instead of 100 – I think that's pretty good."

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