Miguel Rodriguez, CNC Operator, sets up Phoenix Precision Plastic's new Daewoo Puma 240 MA turning center. The machine offers milling, drilling, and tapping capabilities, large bar capacity, high speed spindle, full contouring C-axis, rigid base-mounted tooling (BMT) system, a heavy-duty 12-station turret, 0.1 second turret indexing, one-piece torque-tube slant bed and solid boxway construction. The equipment cruises through the company's plastic machining with ease, according to Donnelly.

Plastic Artisans

A Plastics Job Shop Grows by Combining CNC Machining with Creative Solutions to Customer Problems.

Story and photos by C. H. Bush, editor

According to the dictionary, an artisan is a craftsman, a skilled manual worker who uses tools and machinery in a particular craft. In fact, artisans were the dominant producers of goods before the industrial revolution changed the world. Unfortunately, in an age of smart machines and computers, the term virtually has disappeared from the business vocabulary.

But not at Santa Clara, CA's Phoenix Precision Plastics, Inc., a 4-year-old company producing plastic components for semiconductor equipment manufacturers, start up entrepreneurs and others.

"It's one of the things that first got me interested in plastics," says John Donnelly, president, co-owner and founder. "I found I liked working with plastics because there is some artistry to it. It's not just a matter of programming and cutting and moving on. Many of our customers want special things done to the parts we make. I consider myself truly lucky that one of my partners, Gary Holst, is a true plastics artisan. Gary has the ability to handle the materials in ways others can't. He calls himself a fabricator, and there aren't very many real fabricators around. It's great to work with people like him."

Phoenix Precision Plastics offers two types of services to its customers.

As seen in CNC-West, October/November 2005 Issue

Gary Holst, partner, and John Donnelly, president of Phoenix Precision Plastics discuss parts to be run on the Anderson Stratos Pro router shown in background.

"One of our services is very much like a typical machining job shop," Donnelly says. "They give us drawings and tell us the materials they want, and we produce parts for them. But we also use our machining capabilities to produce parts for the other side of our business, which is fabrication and assembly. It is on this side of the business that the artistry arises. Typically, in the olden days, fabrication was a lot like wood working. You used a table saw, you used a router. But times change. To be successful and compete, people in the plastics industry have had to utilize CNC tools. Nowadays we're asked to deliver a high level of precision on plastic parts."

The Art and Science of Materials

Sometimes customers arrive knowing exactly which plastic materials they want to use, and sometimes they don't, Donnelly says.

"Our larger customers have some highly experienced engineers who know their materials," he says. "They know which plastic will give them the coefficient of thermal expansion they need, the dielectric strength, the hardness or flexibility, you name it. On the other hand some customers just come to us and say, 'Hey, our parts need to be precise, they have to be corrosion resistant, resist the pressures of underwater diving, and they have to be brightly colored and shiny, but we don't want to paint them.' That's where our materials know-how comes into play. We know and work with a wide range of materials, including composites, polyethylene, polypropylene, Kynar, Teflon, Peek, Delrin, acrylics and the polycarbonates. We know how to machine and fabricate with all those, but if we can't find the right material for our customer based on our experience, we can turn to our distributors, who constantly work with the plastic materials manufacturers. Their knowledge is cutting edge. In any case, one way or another, we'll find an answer for our customer."

Underwater Camera Case

As an illustration, Donnelly points to a problem his company solved not too long ago.

"We have a customer who manufactures underwater cameras," he explains. "They had a problem. They were having parts manufactured by a traditional machining job shop, and they were having significant failures. The product was a waterproof case for their cameras, and the cases were physically breaking. They were scratching their heads trying to figure out the problem. Was it tolerancing? Was it a manufacturing issue? They just couldn't solve it, but when they came to us, we did. They were using an inappropriate material for their application. They gave us the job, and we're in the process of working on it right now."

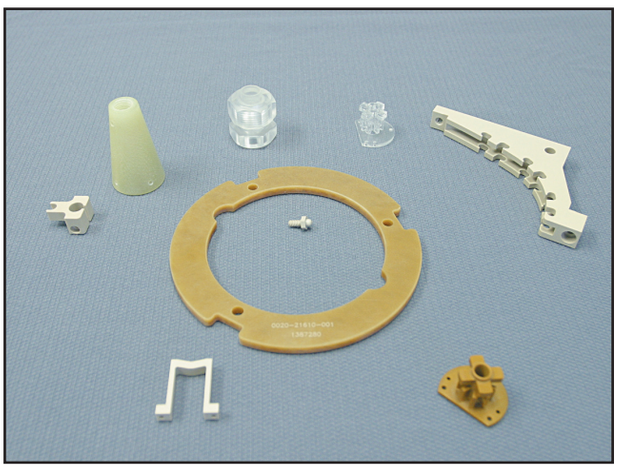
The material required for the camera box had to have very specific properties, Donnelly says.

"It needed a specific gravity that is less than one, so that it is neutrally bouyant," he says. "It also has to be able to withstand very specific physical conditions, like underwater pressures and so forth. We found the right material for them, and they seem very happy."

Rapid Growth

Donnelly started his company with three employees. Today he has eight people, including himself, hard at work.

"It was pretty tough at first," he says. "We lost money our first two years, but the past two years have been really good to us. We've been growing at the rate of 60% a year so far, and it looks like this year will be the same. What we did was the three of us worked long hard hours even after things got going, and we used the money we made to finance our growth and our equipment. We still work hard, of course, but maybe not as hard. We've added people who are compatible with our team, and who are willing to do what it takes to deliver the quality we require. We also added some great equipment which has immensely expanded our capabilities."



Variety of parts manufactured by Phoenix Precision Plastics, Inc. of such materials as polyethylene, polypropylene, Kynar, Teflon, Peek, Polyether and Delrin.

As seen in CNC-West, October/November 2005 Issue

Jose Perez, CNC operator, checks programming on one of Phoenix Precision Plastic's two Daewoos, a DMV 5025 3-axis milling machine. The company uses the machines to meet the demands of its 60% annual growth.

Equipping for Plastic Fabrication

Like many startup companies, Phoenix Precision Plastics was on a very tight budget in the beginning.

"We bought a low-budget CNC mill," Donnelly says, "but after a year we realized we had made a mistake. So we went shopping again for better equipment, more bang for the buck, you might say. That's when Paul Riley from CNC Solutions finally talked me into considering Daewoo. I wasn't sure about it at first, because we had been using a different kind of control. The Daewoos have Fanuc controls, but Paul convinced me, so we bought two Daewoos, a DMV 4020 and a DMV 5025. So far, they've been great. In two years, we haven't had even a single need for service. Compared to my first machine, I was amazed at how much more robust the Daewoos are. They're really rugged, so I know they'll last as long as we need."

Over the next couple of years, Donnelly sold off his original mill and bought two Daewoos and an Anderson Stratos Pro router.

Daewoo Puma 240 MA

Six months ago Donnelly added a Daewoo Puma 240 MA to his production arsenal.

"We bought the lathe with the milling option," he says, because we were getting more and more request for quotes for turned parts. At first we actually figured out ways to do the round parts on our Daewoo mills, but that became impractical as the amount of work increased. So we went back to CNC Solutions, and they recommended the Puma 240 MA. When we looked at the difference in cost for just a turning machine or one with the live tooling, we were surprised that it was low enough to justify the option. So we bought that one. We immediately realized significant savings by eliminating second ops and the time we wasted trying to figure out how to make round parts on the mills."

Machining Plastics

Machining plastics is a different ball game from machining metals, Donnelly says.

"On some of the softer plastic or less accurate applications, we run our machines at the limits of their feed rates," he says. You can't do that on metals. Another thing that is very different is that many plastics are damaged by the chemicals in coolants. So, we don't use coolants at all. We use air blasts to keep the tools and materials cool. That causes our tools to wear our pretty quickly, but that's just part of the cost of doing business."

Donnelly says his goal for his company is to have equipment and people to do whatever his customers want.

"But I never want to lose that touch of the artisan that we are able to offer now," he says. "We'll use advanced technology, but we'll make sure it is operated by true craftsmen, people who care about what they're making." ■

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