

Miniature Tool & Die: Good Things Come in Small Packages

Micro molding and micro EDM'ing help a moldmaker fine-tune its niche and double sales in a year's time.

By Sherry L. Baranek

It was more than 30 years ago that Richard Tully started his miniature connector molds business in the basement of his home in Charlton, MA. After several moves to new facilities, the 11-person company now occupies a 16,500-square-foot facility and specializes in miniature mold building and micro EDM'ing - unique offerings that helped the company double its sales effort from the year 2000 to 2001.



Dennis Bibber had to think big to design and build miniature molds.

"I started small," Tully recalls, "with one Bridgeport milling machine. My wife used to hold the flashlight so I could see to make my machine parts." And although Miniature Tool & Die, Inc. has stayed "small" by catering to the miniature market, it has had to think big when it comes to methods for designing and building such miniature molds and machining such tiny components.

Tully also has managed to keep his family actively involved in the company. His son Dennis serves as the vice president of engineering and his daughter Donna is the vice president of sales - both have engineering degrees and gained experience at other companies before joining Miniature Tool & Die.

Tiny Technology

The company made a gradual evolution into micro moldmaking, Donna says. "We saw a need for very tiny molded and machined components in industries like fiber optics and minimally invasive surgery," she notes. "Minimally invasive surgery components - primarily made from metal in the past - are being replaced with tiny plastic molded components that are more cost-effective and less aggressive to human tissue.

"The micro mold market also is increasingly popular for many of our biomedical and pharmaceutical clients," Donna continues. "In fact, one of the smallest injection molded components is a mere .060 inch with a .0045 inch subgate! Tight tolerances and difficult geometries are our specialty and are usually required when parts are going into the body."

Donna feels that the key to designing and building micro molds is in the design of the mold itself. "If you have a really good design with very robust steel conditions, that's where the trick lies," she says. "We also go to 25 percent of part tolerances, instead of the more average 50 percent. Believe me, when you get into micro molds, that is helpful. For example, it's critical if you are dealing with a .006 core pin. You can't be off by .001 on this type of core pin."

Dennis explains that everyone at the company is learning the technology together - a key for keeping employees happy and constantly challenged. "Building such small molds requires some extra training," he says. "If we get a new project that requires us to try methods that we've never used before, we sit down and discuss all of the different possibilities of how we can get from point a to point b."

Donna adds, "When there is a new mold, we have a meeting with everyone and generate ideas on how we are going to design the mold. We involve everyone on the floor - and each moldmaker does his own setup and programming so no one is simply a button pusher."

Presently the company is in the process of perfecting some standard frames for the micro machines. "There really isn't anyone supporting our efforts," Dennis notes. "We don't know of any standard mold bases available for this type of work. So we have a couple of frames already developed that we believe are good standard frames for these machines."

Minute Machining

Miniature Tool's micro EDM'ing comprises 50 percent of the company's business, Donna notes. "We are pushing the envelope of current EDM technology using CNC micro EDM machines," she explains. "We have even mounted microscopes in our EDM tanks and are having fun with the challenges of making it smaller and smaller. Recent developments in the field of nanotechnology have prompted the need for very minute injection molded components. These microscopic components are used in human exploratory science; and products like these will become even smaller to fit with the future use of nanorobots."

Micro EDM'ing is quite a challenging process because there isn't any equipment out there designed for it, Dennis points out. "Micro EDM'ing is a process that evolves with every job we do," he notes. "It constantly presents us with new challenges and we have to develop methods that don't exist to use the EDM equipment in ways that it wasn't intended for to get the results we need. We've adapted the equipment we already have and are constantly studying new ways to do things with old equipment. As these parts get smaller and smaller and more difficult to handle and measure, the need to be creative in almost every step of manufacturing becomes important.

"For example, just moving a piece from one machine to another in the micro world is a whole different ballgame than to pick up a chunk of steel with your hand, position it against a set of rails, indicate it, find its location and go," he continues. "In the micro world, that's not really possible, the parts are sometimes so small you can't possibly physically measure them with an indicator like you normally would. What would take 15 minutes in the macro world may now take four hours."

It's a Small World

Miniature Tool & Die plans on capitalizing on its unique niche to ensure long-term success. "There are not a lot of mold shops doing this small of a mold, so there's a huge potential for growth," Donna states. "In about 15 years, the medical/invasive surgery market will introduce a device called the nanorobot, which will be injected into the bloodstream and travel to different areas of the body. If someone has cancer, it will take cancer cells out and replace them with good cells. This is just incredible, it's almost molecular and we want to be ready for it.

"Another market is DNA research, and the next generation of this technology is a lab on a chip," Donna continues. "It's this little computer chip that tests microfluidics and it will be smaller than the current 31/2-inch by 51/2-inch devices. These are examples of just how small everything is getting."

By focusing on the medical industry, Miniature Tool & Die hopes to eliminate the possibility of foreign competition. "By focusing on something new and exciting, we've guaranteed our growth throughout the next several years," Donna comments. "We also hope to keep OEMs from going overseas for molds because then their technology is open for many eyes to see. Most foreign countries don't have the confidentiality laws that the United States does. Competition is tough enough as it is, so many OEMs want to keep their products in the States for proprietary reasons."


Donna adds that this United States advantage has made them one of two choices for designing a mold for an implant for glaucoma patients. "This company hired a consulting firm to travel the world and find moldmakers that can help them with this project," she says. "We haven't been awarded the job yet, but it is nice to be recognized and acknowledged as one of the top two in the world."

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