

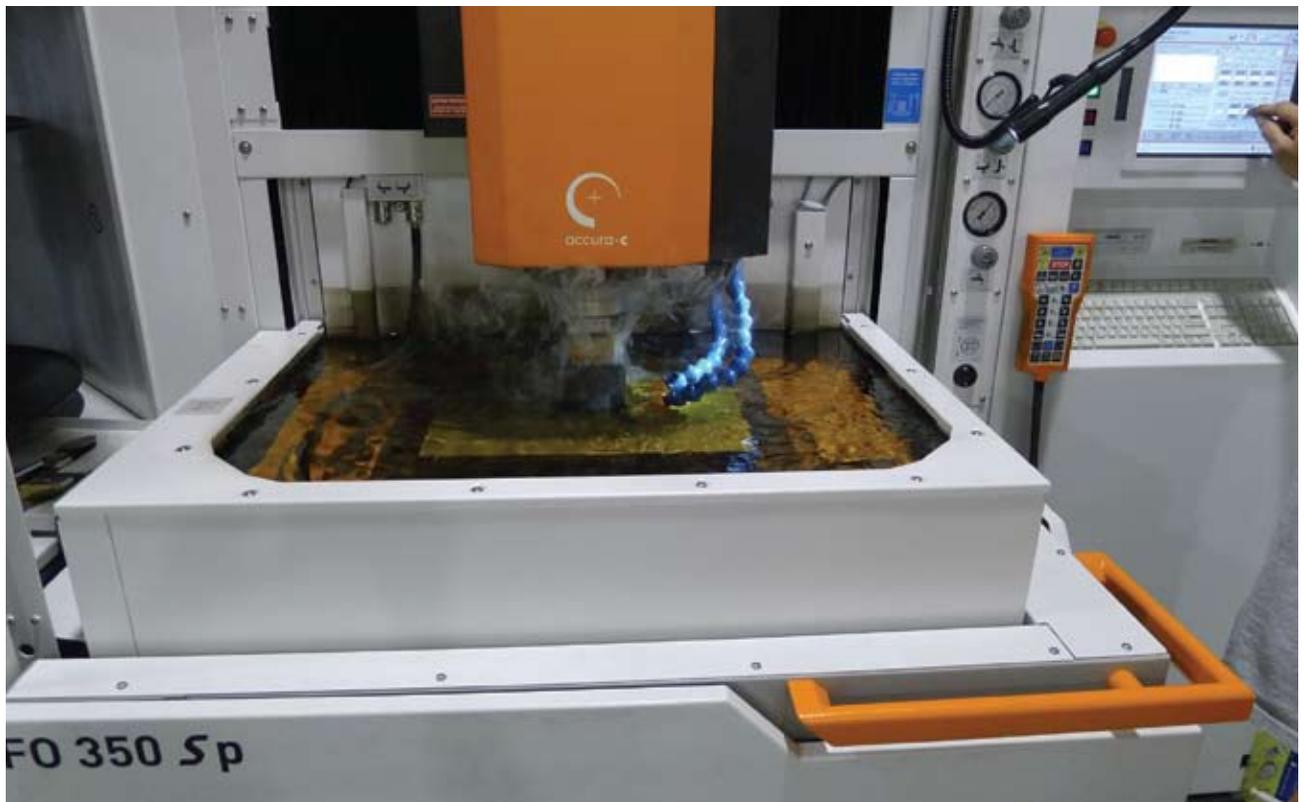
# The Competitive Edge at **Dynomax**

In 1986, Richard Zic saw a need for better machine tools to serve the machining requirements of his aerospace and defense customers. Many shop owners might have just gone out and purchased some new machines, but not Zic. Instead, he started designing and building his own equipment, including high-precision machine tool spindles, and in the process founded Dynomax Inc.

Now in its 25th year, Dynomax is still building machine tools, but it also does much more. With facilities in four Chicago-area locations—Wheeling, Lincolnshire, Mundelein, and Buffalo Grove—Dynomax serves an impressive list of customers in the aerospace and defense, medical, energy, and transportation industries. It offers extensive capabilities in high-precision and thin-wall machining, component assembly, injection micromolding, spindle, and specialty machine design and build, and automation.

The company continues to grow. According to Marketing Manager Patty Martucci, Dynomax added 50 employees in 2010, at a time when many companies were busy downsizing. In last May alone, Dynomax hired an additional 15 people, a record for them. In this tough economy, how is this possible?

*Micromolding technology helps the Chicago-area manufacturer thrive as the A&D supply chain consolidates.*



**Die sinker with a three-sided drop tank and a high-speed pulse Z axis.**

“This was due to our penetration into the aerospace and defense industries,” Martucci explains. “According to Dr. Zic, the aerospace industry today is where the automotive industry was 25 years ago as far as vendor consolidation.” In short, the vendor supply base for aerospace and defense is shrinking, leading to more work for those who make the cut.

Dynomax is gearing up to meet this opportunity head on. As Martucci said, the company is hiring good people. It’s also improving its technology. On the metal-removal side of the business, there is tremendous growth, as well as key investments. At its headquarters facility in Wheeling and its Lincolnshire facility, Dynomax added more than 40 new three, four, and full five-axis milling and turning machines that can make components smaller than 1" (25.4 mm) to others up to 23' (7 m). By the end of this year, Dynomax’s operations will be expanded to include the finishing of aerospace components. At its injection-molding facility in Mundelein, the company has upgraded a number of hydraulic molding machines to all-electric models. And to meet the increased tooling demands of its micromolding division, Dynomax recently purchased three new EDM machines from GF AgieCharmilles.

Dynomax purchased a GF AgieCharmilles FO350 SP diesinker, a Model Drill 20 hole-drilling EDM, and an FI240 CCS wire EDM. They basically purchased an entire EDM shop in one shot.

Filippo explained that the machines were purchased to augment the company’s existing capabilities, as well as allow for other opportunities in the future. “We try to be as dynamic as we can.” Martucci supports this statement, “Dynomax continues to explore newer technologies within our industry. These machines are more precise and can hold tighter tolerances, which also improves lead-times.”

The diesinker is a PC-based machine, allowing for innovative machining routines to be incorporated into an easy-to-use graphical interface. It features a high-speed pulse Z-axis, a three-sided drop tank for improved access to the work area, and collision protection (ICP) on all axes, all in a compact footprint. The machine at Dynomax is an SP or “Speed Performance,” designed to cut machining times of some workpieces by up to 30%, while still able to generate mirror finishes.

For small parts such as those manufactured at Dynomax, this is especially important. Says Filippo, “The better the finish, the easier it is to mold and eject the part.” Due to its

“As far as vendor consolidation, the aerospace industry today is where **the automotive industry was 25 years ago.**”

**Micromolding differs from traditional** injection molding, which has been around a long time. Injection molding is the process of forcing molten thermoplastic—nylon and polyethylene are just two examples—into mold cavities that have been machined into a negative or reverse image of the desired shape. Once the mold has been filled, the plastic is held under pressure momentarily until it has set and cooled. The finished part is then ejected by means of ejector pins.

As its name implies, micromolding is the process of injection molding very small parts, say anything smaller than a pen cap, and frequently far smaller. In the case of Dynomax, the tolerances are quite tight, and the materials difficult. According to Tom Filippo, general manager of the molding & tooling division, Dynomax frequently molds microparts made of glass-filled and abrasive materials, as well as thin-walled workpieces. This presents a number of difficulties, including excessive tool wear, voids, and air pockets.

“The material dictates the design of the tool. You have to find a way to let the air escape the mold, avoid weld lines, and compensate for the different shrink values of the materials,” says Filippo. And since many of their workpieces call for tolerances of  $\pm 0.0005$ " (0.0127 mm), this means the tool must be held to far closer tolerances—somewhere in the neighborhood of 0.0002" (0.005 mm) or less—to anticipate material shrinkage. This is where the new machines come in.

special Surface technology, the machines are capable of surface finishes as low as  $0.1 \mu\text{m} R_a$ .

The wire-cut EDM boasts an industrial cutting speed of 38 in<sup>2</sup>/hr (24516 mm<sup>2</sup>/hr), 45° taper cutting, and traverse speeds of 3 m/min. The machine’s Thermocut wire threading system means spark-to-spark times of less than 30 sec. And while Dynomax typically runs wire diameters of 0.006" (0.152 mm), the machine accommodates wire as large as 0.013" (0.33 mm) all the way down to 0.003" (0.076 mm) with an optional small wire kit.

And again, since surface finish is critical in micromolding, the Clean Cut (CC) power generator on the FI240 machine can produce surface finishes down to  $0.1 \mu\text{m} R_a$ . This means that the wire EDM machine allows Dynomax to automate what were previously tedious manual operations, including the machining and grinding of insert pockets, slide and shut-off surfaces, and jig-grinding of core pin holes.

For drilling EDM wire start holes in mold bases and tooling components, Dynomax uses its hole-drilling EDM. The machine is equipped with a touch screen interface offering a number of edge and corner finding routines for easy multipoint hole drilling. The machine uses ordinary water, eliminating the need for messy dielectric fluid, and is capable of drilling holes up to 0.12" (3 mm) in diameter and nearly 8" (203-mm) deep in steel, carbide, aluminum, copper, and brass.

According to Filippo, “The new machines give us more control over the toolmaking process.” And by having all three EDM

machines—sinker, wire, and hole-drilling—in one location, the company is able to quickly tackle most any EDM job that comes its way and gains the flexibility to react to customer needs, offering better lead-time and improved customer satisfaction. This translates into opportunities for company expansion.

Filippo explains, “As a company you have to continue to strive, continue to grow. If you’re settled on one specific product or market, there are other companies out there that are hungry and will pass you up. By adding additional machines and additional people, it’s the way to stay relevant.”

Apparently it’s working. Says Filippo, “We have 50 people here in this facility alone, all focused on injection molding, toolmaking, and EDM.” They run specialty jobs for specific areas of aerospace and defense, focusing on custom design work for parts made from thermoset plastics, rubber, and fluorosilicone. Filippo adds, “But we’re always interested in expanding to other materials.”

The EDM machines are well-utilized, running two full shifts and a partial third, with lot sizes from a few thousand up to several hundred thousand parts. “We’re not really looking for production runs of millions of pieces.” Filippo laughs, “But that doesn’t mean we won’t take those jobs when they come along.”

**The sweet spot for Dynamax** is anything from single-cavity specialty jobs up to eight or even twelve-cavity molds. They focus on special care and special treatment for their customers. “This is where the new EDM machines have really helped out. A lot of our work requires the precision and superior finishes produced by these machines.”

Martucci elaborates: “Dynamax manufactures high-precision, tight tolerance, customer-compliant components that conform to ISO 9001 and AS 9100 standards. As a contract manufacturer for the very demanding and exacting industries of aerospace and defense, we require machine technology that supports these applications.”

Further, Dynamax prides itself on vertical integration. Many shops specialize in either tool building or injection molding, but Dynamax does both. Says Martucci, “Dynamax’s mission is to provide vertically integrated turnkey solutions for our customers. For example, we design, engineer, and manufacture the tooling that is used for our injection-molding operations, as well as molding the customer product. We purchased the EDM equipment to enhance our toolmaking operations, thereby increasing productivity and enabling us to grow further in the A&D and medical industries.” In short, Dynamax is a one-stop shop for most things injection micromolded.

**Transitioning from manual machining methods to CNC** can be tough, however. When asked about the learning curve involved in acquiring not one but three distinct EDM technologies, Filippo explained that, with a little help from GF AgieCharmilles, Dynamax had the machines in production very quickly. “We have very good people here, and the training and support from GF AgieCharmilles was very good as well.”

So where do they find good people? Martucci explains, “Dynamax has grown considerably in the last few years. As with any growing company, it is important to manage that growth through extensive training and by integrating our new employees with Dynamax’s culture. With a nationwide shortage of people in STEM careers (Science, Technology, Engineering, and Mathematics), it is a challenge to find qualified people in the job marketplace. Therefore, Dynamax provides community outreach that supports STEM programs for local middle and high school students, and internship/co-op programs for engineering and machine technology students from universities and community colleges.”



**Hole drilling EDM at Dynamax is capable of drilling holes to 3 mm diam and 203 mm deep in a range of metals.**

However, despite Dynamax having good people and good technology, still there are challenges. Competition is stiff in most industries these days, and injection molding is no different. Says Filippo, “Everyone’s trying to reduce lead times, reduce price. To counter this, we continually try to reinvent ourselves, helping ourselves achieve as well as our customers, so we can all grow together.”

Martucci explains, “We’re in a time where the A&D industries are embracing lean and just-in-time manufacturing.” For more than 25 years, Dynamax has shown that by investing in new technology as well as in its people, it is able to improve operations as well as customer responsiveness. ➔