

THE LEADER

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SINKER EDM IS SETTING THE BAR AGAIN

Mitsubishi wire EDMs have long been the standard for quality, durability and innovation. Customers have counted on it since 1978 when the technology made its way to North America for the first time. But, it's the ongoing dedication to innovation and EDM intelligence that keeps us at the head of the pack. Such forward thinking has led to advances including the first AE (anti-electrolysis) power supply, highly adaptable auto-threaders and the revolutionary cylindrical drive motor.

Mitsubishi sinker EDM machining centers are no different. They are designed and built to the same high standards that have made our wire EDMs the best-selling of their kind in North America. Our latest sinker EDMs can do things such as independently accelerate burns when conditions are appropriate, conserve electrode wear without any extra attention from the operator, or adjust current shape to meet exact discharge requirements, just to name a few.

Now that's intelligent.



Our Intelligent Digital Power Master Control (IDPM) circuit can reduce electrode wear by up to 30%.

FIND YOUR SWEET SPOT WITH OUR SINKER EDMS

Gone are the days of operators hovering over a burn adjusting to every little variation. Sinker EDMs from MC Machinery have built-in intelligence that reduces the chances of human error; by adjusting on the fly, they are able to turn out the highest quality parts in optimum cycle times in all kinds of jobs.

With so many different electrode shapes, materials and cutting conditions, it's unrealistic to have a sinker dedicated to each. That's why we bring you machinery with the smarts to keep your burns in that speed-wear sweet spot.



THE INTELLIGENCE INSIDE

Fuzzy Logic – We introduced this sinker control system in 1991, but we've constantly tested it to ensure it's effective in the latest sinker applications. Today's Fuzzy Logic control rates every pulse, considering the most important conditions, and makes incremental amperage adjustments, decreasing or increasing amperage without burn interruption.

Thermal Displacement Compensation – Highly precise machining is possible regardless of the environment and without operator monitoring. Temperature sensors constantly record changes in the ambient environment.

Revolutionary Power Supplies – Our newest sinker EDMs are equipped with power supplies that examine conditions to reduce electrical consumption by 20% compared to previous generations.

Independently Responsive Controls – Our sinker EDMs make the most of given conditions. For example, our Gantry Eagle features the world's first Adaptive Current-Shape generator. It can calculate and create the ideal current shape for the exact discharge requirements of each pulse.

Machine Stabilizing Jump Controls – This feature reduces the load on less rigid electrodes by ensuring smooth jump-up movement for stabilized machining and increased speed.

Dynamic Burn Adjustment – Adaptive settings throughout our line recognize when a burn is putting valuable electrodes at risk or not cutting at maximum efficiency. The new GF2 setting for example, ensures ultra-low wear and fast machining, specifically in sensitive graphite electrode burns.



WIRE EDM

PARTNER FOR SUCCESS. PARTNER FOR LIFE.

With Mitsubishi EDM, you have a partner for life. Not only are we the No. 1 technology and market leaders in wire EDM, but our industry-leading service team will keep your equipment and investment protected long after the sale.

All current Mitsubishi EDMs feature the latest advances in auto-threading, internal machine communication and power supply.

THE BEST DOLLAR-PER-SQUARE-FOOT WIRE EDM INVESTMENT

The MV4800 Advance wire EDM features the largest capacity in the MV line. With an extensive travel of 31.5 inches by 23.6 inches, the machine is ideal for large workpieces—and offers 20-inch-deep submerged cutting capabilities. Game-changing engineering features—many of which were industry firsts with the new-generation MV Series—include:

- Cylindrical Drive Technology—The round magnetic shaft of the linear motor creates a 360-degree magnetic flux for a revolutionary, no-contact design. This provides smooth, friction-free motion without the cogging inherent in other linear motor designs. The larger air gap between the shaft and forcer minimizes heat output and the effect of metallic shop dust on the system.
- Superior auto-threading system—With an annealing length of more than 27 inches, this system is capable of threading the maximum workpiece height at the start point and through the gap for broken wire recovery—all with a curl ratio of less than 10 percent.
- Rigid Construction—X and Y axes are mounted on a fixed table traveling column. This eliminates the need to have the workpiece move inside the tank.



THE WORLD'S LARGEST SUBMERGED WIRE EDM



The FA50V Advance wire EDM is the world's fastest, extra-large workpiece, high-accuracy machine. Achieve submerged cutting up to 24 inches with a maximum Z height of 26.5 inches and 16.5 inches of Z-axis travel.

Visit mcmachinery.com/wire to learn more.

MILLING

FILLING THE MILLING SUPPLY CHAIN

The MC Machinery milling line has something for everyone. Hard- or soft-material milling, footprints big and small, drilling and tapping machines and even automation solutions. To fill out the milling machinery supply chain, the LU series combines with the Ingersoll-built Eagle V9 to offer full 5-axis capabilities. The LU-800 and LU-620 both offer a rare combination of brute strength and high precision while the Eagle's 42,000 RPM integrated spindle and rugged construction is just right for the most demanding work.



LU-620: COMPACT FOOTPRINT, BIG-TIME RIGIDITY

The manageable 88.9-inch by 100.8-inch by 118.1-inch footprint makes this machine a great choice for shop floors of any shape or size. But, the LU-620 does not sacrifice strength. Its B and C axes are supported by a Meehanite-cast base and the X, Y, and Z axes are supported by boxed construction. Adding to the machine stability are its synchronous direct drive motors and an Optimized Contacting Ratio between the spindle head and machine column.

LU-800: MAKE MILLING LARGE PARTS A SNAP

One look at the LU-800 and you know this machining center is built for high-powered chip making. The rotary table can handle 2,200 lbs. while tilting ± 120 degrees on the A axis and a full 360 degrees on its C axis. Simultaneous A and C axis movement makes complex cutting of large parts simple and fast while integrated rotary encoders ensure consistent precision. Two front opening doors and a sliding roof make loading and unloading the large parts this machine specializes in easier.



EAGLE V-9: ONE-OF-A-KIND VERSATILITY

This gantry-type center is the first of its kind. It's the only machine in the world that features a removable fixed worktable that can mount over the fourth/fifth-axis unit to create a huge 3-axis machining area. And with a maximum spindle speed of 42,000 RPM* that can work with all five axes moving simultaneously, the Eagle V9 can make the most challenging cutting tasks simple, all while producing the finest of finishes.

**optional*

TECH TIPS

TACKLING SOME OF YOUR COMMON EDM QUESTIONS

Q.

I have several Mitsubishi EDMs, all with a floppy disk drive unit. Is it possible to update this device to a USB for loading programs or updating my system software?

A.

We have developed a USB emulator that works with all of our machines, including the old 16-bit model controllers (C-series, H1-series, etc.). The device is the same size as the FDD unit and mounts directly into the machine control.

Each series machine also has a specific flash drive available that contains the system software, e-pack files and parameter files specific to each machine series.

Q.

I often use the ESTIMATE screens on my wire EDMs to gauge how long a program will take to run. Is there another way to get an estimated cut time for a part without having to create a program and load it in to my machine?

A.

There is. To calculate the time, take the periphery of the part, one time around, divided by the A.L.F. (Average Linear Feed) rate value shown for the last pass of the cut you will be taking. The resulting value will give you the machining time. For example, if you are cutting 1.5" steel using .010" wire on a MV-R doing a rough and three skims, the A.L.F. value for the last pass of your cut is 3.81 and the part is a 1" x 1" square, you would calculate as follows: $4.0 \text{ (cut profile)} / 3.81 = 1.05 \text{ hours (63 minutes)}$.

Q.

I have a model MV1200R and at times need to position through a program without cutting until reaching a specific point, then manually thread the wire and restart the cut. Normally I use Dry Run for this, but sometimes I need to keep the wire threaded in the gap. Is there another way to do this without re-machining up to the point from which I want to continue?

A.

Yes, via the Auto Machining function. This is a switch you can activate on the Switch Screen located in MAINT. After activating Auto Machining, you'll need to add M6 P1 and M6 P2 commands as follows:

Place the M6 P1 on the first machining movement in your program and then a M6 P2 on the last line that you do not want it to machine. With the Auto Machining switch active, the machine will automatically turn off machining on the M6 P1 line and continue to move (with wire feed running) at the feed rate set for the RETRACE SPEED setting in your AT Settings screen. Once it reaches the line after the one you placed the M6 P2 on, the machine will automatically turn machining back on and continue cutting.

MUCH MORE THAN JUST A SUPPLIER

CONTOUR TOOL & MANUFACTURING

After a pause in the conversation, Augie Busalacchi broke the silence, "I'll be honest: if MC Machinery hadn't stepped up, I know we wouldn't be as far along as we are today," he says. The progress Busalacchi was referencing was that of his two-and-a-half year old Contour Tool & Manufacturing in Grafton, Wisc. just north of Milwaukee.

After 25 years in the tool and die world, in positions at shops global and local in scale, Busalacchi decided that the time was right to start a company of his own. In 2013, he purchased an existing business, including its equipped 5,000 square-foot facility, and Contour Tool & Manufacturing was born. Busalacchi envisioned Contour as a job shop with an emphasis on die cast tooling and plastic injection molds.

Soon after opening its doors in April of 2013, the customer roster started to balloon, stressing the capacity of the legacy Fadal machining centers. It was a difficult situation for the young business.

"Customers today have demanding lead times and want the project done as cost-effectively as possible," Busalacchi explained. "With the older technology, we weren't keeping up. If we were able to get the work done with the machines we had, I wouldn't have looked to buy. But, we needed to establish ourselves, our name, and we couldn't do that without better equipment."

The search began for a graphite machining center to cut its sinker EDM electrodes. The process quickly shed light on another of the challenges facing a new business: financing. With a short track record, some machine tool builders wouldn't help and banks didn't give them a chance.



Enter MC Machinery Systems. Willing to partner with the up-and-coming company, MC Machinery's financing arm, MAC Funding, worked out a fair plan. Contour had a DM800G on the floor to machine its sinker EDM electrodes before the end of the year. About a year after that, a new SV1100B vertical machining center was installed.

"As far as accuracy and speed, I'd put my graphite machine up against a Makino any day," Busalacchi said. "I can't say enough about the SV1100B either. It removes material during roughing operations at a great rate, and does a great job with finishing operations as well."



The Mitsubishi EA12D sinker EDM installation at Contour

With production speeding up and a partner in MC Machinery, Busalacchi felt comfortable making another significant investment shortly thereafter, updating the company's bread-and-butter sinker EDM machine. He chose an EA12D.

Busalacchi made it clear; it wasn't just the financing and support of MC Machinery that made the purchase an easy decision. "I'd been running Mitsubishi EDMs for 16 years," he says. "As far as I'm concerned, there's no other EDM for me. I knew what I was getting—an excellent machine."

The updated equipment has eliminated the bottlenecks experienced in the business' early stages. The team has been freed up to hit demanding lead-time requirements on projects.

"There's a wide range of work in my shop," Busalacchi said. "All of our guys have backgrounds in miniature zinc die cast tools, which is high tolerance work, +/- .0002", as well as conventional zinc die cast, aluminum die cast, magnesium die cast and plastic injection molds."

Customers are noticing ... praising the shop's work, especially its precision. With the support of a willing partner in MC Machinery, Busalacchi feels Contour has graduated from establishing itself to looking for ways to expand its capabilities even further and growing its client base.

"We're further ahead than I expected to be at this point," said Busalacchi. "In fact, we have a couple of other machines we are looking to upgrade. We'll definitely look at MC Machinery first. We have no reason to go any other direction, they've served us well. We'll always be very grateful to them for that."

PARTNERS IN LEADERSHIP

WIEGEL TOOL WORKS

For more than 70 years since opening its doors, Wiegel Tool Works, located in the western suburbs of Chicago, has established itself as one of the leading stampers of electrical terminals and lead frames. Its continuous growth has been accompanied by a lot of change; but there are a lot of traditions around the shop too, most notably, the family that's guided the company since 1941.

Another tradition—for nearly 40 years now—is the EDM technology the company has relied on to cut its high-precision stamping tools. “We’ve had a long history with Mitsubishi EDMs,” says Ryan Wiegel, one of the members of a third-generation trio of Wiegel siblings who lead the company today. “Our lead EDM operator has been here since 1978, and he remembers having the first generation of DWC machines with the green AstroTurf, one of the very first EDMs from Mitsubishi.”

Mitsubishi is widely considered the leader in EDM machinery, and its drive to stay ahead of the pack is relentless; constantly offering hardware, software, and consumable upgrades to keep installed machinery at the forefront. A leader in its own right, Wiegel has kept up.

Once MVR series wire machines were introduced, Wiegel Tool Works moved quickly to get one on its floor. “We had the previous-generation FA series since 2003,” Wiegel says, looking back. “Upgrades came steadily, but they were pretty modest, until now. The MVR has been a huge plus for us.”

So much of a plus, in fact, Wiegel quickly added a second MVR, despite having to get creative to fit it in the facility. After utilizing MVR machines, the shop documented 5% faster burns than with the FA machines, but that wasn't even the big payoff according to Wiegel.

“The biggest savings were in wire consumption,” Ryan Wiegel said. “All of our machines are equipped with 20kg spools, and we saw 106-hour burns per spool versus 60 hours with the older model. The wire we use is about \$13 a pound, so the savings are drastic. Plus, the machine operators commented that the wire threader was superb and darn near perfect.”

The entire Wiegel team was in on the new MVR. Less than a year later, they approached their dealer with the idea of buying three more. This meant much more than just investing in the machinery, and even more than knocking down a few walls. Ryan Wiegel hired subcontractors to double the size of the EDM room in order to accommodate the upgrade.

Considering the efficiency, and especially the consumable savings, Wiegel pointed out that adding the second wave of machines and reworking the facility wasn't even a question, calling the decision a “no brainer.”

“ THE MVR HAS BEEN A HUGE PLUS FOR US.

**-RYAN WIEGEL
CO-OWNER**

As for installing the machinery into the new facility, Wiegel credits the MC Machinery service team for working during the Thanksgiving weekend to have the machines ready for the next week.

“It was pretty seamless,” Wiegel recalled. “Kudos to the MC Machinery team. When they set the machines, it was like a NASCAR pit crew. It was very well calculated.”

Integrating the five new machines into existing processes also proved relatively simple for such a major overhaul. Having experienced operators certainly helped, but two newer operators, at the shop for just a few months, quickly learned to maximize the machines and work them in to processes without any problems as well.

Wiegel credited the advances in the controls saying, “As far as integration of the new systems, it's a lot easier than it used to be—a lot more user friendly. It's a mouse now instead of just a pad, floppy discs have been replaced with USBs, and there's also a touchscreen.”

Gone for certain, are the days of turf-adorned machines; however, the quality of the machines and the relationship with MC Machinery has only gotten stronger. “The competition has tried to lure us away over the years,” said Wiegel. “But, the fact is, the accuracy and the repetition can't be beat. Not to mention, at the end of the day, machines are only as good as how they are serviced, and the support is second to none.”



The recently expanded EDM room at Wiegel with seven Mitsubishi EDMs, including five from the new MVR series

QUALITY THAT ENDURES

DELTA RESEARCH

Delta Research has been around for a long time, since 1952 to be exact. The company has successfully developed countless prototype components for, among others, the automotive and aerospace industries, garnering coveted ISO9001 and AS9100 certifications.

In recent years, owner Bob Sakuta and the team has doubled down on the gear market. He purchased another company and has used those assets to help add Delta Gear to his family of companies and to hone in on the opportunities in this part of the market.

"His (Sakuta) goal is to make the world's finest gears," Jeff Nicholas, Director of EDM at Delta Research, said of its owner.

Now, one may make the assumption that a concentrated effort with such lofty goals would require significant investment in the newest machinery and Delta Research has certainly done that, regularly procuring new, state of the art equipment. But, the company has also maximized the effectiveness of existing assets. It has especially leaned on its lineup of Mitsubishi EDM machines—three wires and two sinkers—that have been work horses for the company long before Delta Gear was even an idea. Some date back to 1997 and they're still getting the job done in fine fashion.

"On a recent job, the inspector basically told me that I flat-lined his machine, from tooth to tooth, profile straightness, nothing was out more than .0002," Nicholas said. "That tolerance exceeds the specification out of the factory. To still be cutting with that precision on machines that are 17 years old is pretty remarkable."



A collection of parts cut on Mitsubishi EDMs at Delta Research

“ TO STILL BE CUTTING WITH THAT PRECISION ON MACHINES THAT ARE 17 YEARS OLD IS PRETTY REMARKABLE. ”

-JEFF NICHOLAS
DIRECTOR OF EDM

What's even more impressive is that Delta is no ordinary machine shop. Projects are ever-changing. With an emphasis on prototyping, it's even more noteworthy that Nicholas can hit, even exceed, exacting standards on burns the shop has never done before.

"Pretty much everything we do is non-process," Nicholas explained. "There's nothing standard that we do. My fixturing, flushing conditions, nothing is usually ideal. Our setups require a lot of thought. But, with Mitsubishi's submergeable capabilities and EPAC technology, the machines are very friendly if I need to make adjustments."

Delta taps into the versatility of its Mitsubishi EDMs for roughing and tough material work as well. Nicholas explained that aerospace manufacturing typically requires hard-finishing of tight-tolerance components after heat treatment is performed. Where EDM is permissible, Delta is able to EDM tough and abrasive materials to precise forms while leaving only the finish grind stock where necessary.

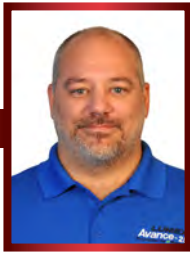
When asked what it is that keeps these machines performing at a high level on such a range of jobs while running "beyond full capacity," Nicholas touted the construction of the machines themselves. But, on top of that, he said the very high maintenance standards at Delta and the excellent service team at MC Machinery Systems are also major contributors to the longevity and sustained quality.

"The machines are taken very well care of around here," Nicholas said. "It's insisted upon. But also, whether it's maintenance or just a glitch it's always been a good experience with the MC Machinery service group. Within a half-hour, they are back on the phone with me trying to resolve the problem."

And that's why when the upcoming decision to buy another EDM machine is discussed, his input to his executive team will not only include examples of the proven durability, versatility and the quality, but also a resounding testament to the service and ongoing relationship with MC Machinery.

"It's nothing like a car dealership where if you aren't buying a new car they don't give two rips about you," Nicholas said of the MC Machinery relationship. "I call up and they treat me like I bought a new machine yesterday."

LEARN HOW OUR NEW ZT HYBRID WIRE HAS IMPROVED DELTA RESEARCH'S PRODUCTIVITY ON THEIR TOUGHEST CUTS – P. 14



WHAT WE'VE LEARNED ABOUT HYBRID ADDITIVE MACHINING

BY: BILL GILLCRIST, NATIONAL PRODUCT MANAGER

Hybrid additive machining is the wave of the future. It's so disruptive (in a good way), in fact, that even though the technology is more accessible than ever, manufacturers are still curious, even hesitant about joining the movement. But, if history is any guide, additive isn't going anywhere any time soon. That's especially true of hybrid processes like the groundbreaking laser sintering (3D SLS) high-speed milling technology performed exclusively by our LUMEX Avance-25.

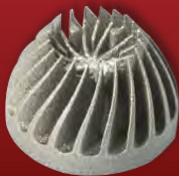
Some industry insiders have likened the current state of additive machining to where EDM technology was about 20 years ago. At that point, shops didn't think they needed the newfangled electric discharge machining because there were long-established techniques that performed similar processes. But, as we know today, sinker and wire EDM turned out to be a much better way to perform deep, high-tolerance cuts. Eventually those who hesitated caught up to the early adopters and today EDM machines are everywhere.

A REVOLUTION IN INJECTION MOLDMAKING

Similarly, the LUMEX Avance-25 is proving to be a better way. Early applications have shown this is especially true in the area of injection molding. Because the LUMEX can finish cut as it builds up the layers, it is capable of producing elaborate cavities and molds with conformal cooling, venting, light weight honeycomb structures and extreme angles, all of which have historically been very demanding of machinery and operators.

The LUMEX is an excellent complement to the conventional methods of producing these certain types of injection mold components not only because it has rare capabilities, but also because it can be more efficient. Instead of roughing a unique electrode for each mold, then finishing it on another machine, then actually burning the mold on a sinker EDM, it can all be done on the LUMEX. This means one operator instead of three, one machine instead of three and one process instead of three, dramatically reducing cycle times.

Direct Metal Laser Sintering



LUMEX Avance-25



The LUMEX Avance-25 can achieve finishes that rival traditional CNC processes



The LUMEX Avance-25

SMART MACHINING FOR TIGHT TOLERANCES

Additionally, the machine has alleviated concerns that laser sintering disrupts the integrity of the metal too much to turn out fine finishes and tight tolerances. The machine's high-powered, 45,000-RPM linear drive milling spindle finishes with tools as small as .024" after every 20 .020"-thick layers are sintered with the 400-watt fiber laser.

Because the freshest 10 layers of metal need time to cool, the layers are sintered in succession. The cutters begin milling the first 10 layers, while the second 10 layers are cooling from the sintering process. The milling process is always one set of layers behind the laser sintering process. As the part increases in height, the table lowers, making up for the difference. The two processes work in tandem, always at the same height.

This kind of technology and smart machining is why additive technology is here to stay. And hybrid processes like the one unique to our LUMEX Avance-25 are proving to be the cream of the crop in manufacturing applications. Come 2035, and maybe even sooner, we'll all look back and wonder how we ever lived without it.

MoldMaking
TECHNOLOGY

MITSUBISHI EDM CUSTOMER WINS 2015 LEADTIME LEADER AWARD

A HOLISTIC APPROACH TO SETTING THE PACE

THIS MOLD MANUFACTURER HAS RADICALLY TRANSFORMED ITS BUSINESS BY INSTITUTING A STANDARDIZED, FLEXIBLE PROCESS, ADVANCED TECHNOLOGY AND A PEOPLE-CENTRIC PHILOSOPHY.

By Matt Danford, Senior Editor, MoldMaking Technology

Cavalier Tool & Manufacturing has big plans for its new EDM cell. As this article began to take shape, the shop was preparing to install three large sinkers, all with high-capacity electrode changers, and a robot-fed, true five-axis machining center. Each standard workholding fixture will feature a radio frequency identification (RFID) tag to enable flexible storage and retrieval of all electrodes as needed, regardless of their locations within the cell. With part designs and tool paths completed well in advance, operators will simply load the EDM carousels and tables, choose a suitable program/job sequence and walk away, free to focus on bigger-picture, more value-added activities.

With the capability to run completely unattended for days on end, the new cell is expected to significantly expand capacity and efficiency without adding to labor costs, says Brian Bendig, company president. These gains will make it the apex of an ongoing transformation at this Windsor, Ontario, mold manufacturer, which has completely reinvented itself during the past five years. The cell's technology, the process it embodies and its expected effect on how people approach their work also make it a microcosm of this broader transformation.

In fact, a three-part focus on people, process and technology is formally codified into the shop's business philosophy. Bendig and the rest of the leadership reason that pursuing continuous improvement in all three areas is the best way to not just keep up in a highly cyclical, constantly evolving industry, but to set the pace.

All indications are that Cavalier is doing just that. In a little more than five years, annual sales have increased from \$8 million to \$24 million and continue to climb. An increasing amount of revenue comes from new customers in the automotive industry, historically a nonstarter for the shop but now its fastest-growing segment of business. All in all, the company is closer than ever to the vision that Bendig first laid out in the waning years of the previous decade—close enough to earn the 2015 Leadtime Leader Award.



President Brian Bendig holding an electrode in front of the Eagle 1200 Gantry from MC Machinery

AIMING HIGH

Bendig's vision began to take shape circa 2007. By that point, Cavalier enjoyed a long-standing reputation for quality on mid- to large-sized molds for recreational vehicles, heavy trucks and commercial products. Efficiency-wise, however, the shop had begun to fall behind the competition. Bendig, who was vice president at the time, began regularly travelling the globe in search of new technologies, techniques and production philosophies. His goal was ambitious: to place Cavalier in the top tier of North American mold manufacturers.

The lessons he brought back are easy to spot these days. This is a shop that sticks to what it does best: building molds. There are no fixture-building services or sampling presses here, and the company devotes time and resources only to the most difficult work. In that arena, building a better mold than the competition means never

cutting corners (engravings are always done on CNC rather than stamped, for example) and never compromising on technology. Quality and overall value rule at Cavalier, and price is simply not a priority, whether for selling a mold or purchasing a machine. In fact, the shop accepts work from certain well-known customers without ever quoting it. "We go after customers who need what we can provide, not those who want what we can provide," Bendig explains.

Earnest efforts to implement these principles began in 2009, when Bendig took ownership of the company his father founded with two partners nearly 35 years prior. That timing might seem less than ideal, but Bendig and crew weren't going to let the economy stop them. "We chose to not participate in the recession," he says. "We just asked ourselves what we'd need to succeed, and we went after it."

TECHNOLOGY AS A DIFFERENTIATOR

Updating technology was a top priority. Given the economic climate at the time, auctions presented an ideal opportunity to find quality, affordable manufacturing resources, and Cavalier purchased as much as it could. Still, Bendig refers to that machinery as "bridge equipment," and for good reason: It was never intended to serve any purpose beyond laying the groundwork for what was to come. The shop that can remove the most metal the fastest and with the most precision wins the race, he explains, and for Cavalier, that race isn't the local derby. It's the proverbial Indianapolis 500.

Indeed, Bendig credits high-end machinery above all for the company's ability to hold tolerances of 0.0002 inch across more than 80 inches of a surface. Such capability didn't just open the door to the shop's new focus in automotive work, which has grown from 16 percent of business two years ago to 46 percent today. It's essential to maintaining an edge, particularly given Cavalier's specialty in fans, shrouds and other "tolerance-critical, black plastic parts," Bendig says. "If a machine can help us make a better mold—say, get water lines into areas where a competitor can't—that's a real differentiator," he adds. "Some people might say they can't afford it; we say we can't afford not to have it."

“ WITHIN A YEAR, THAT FIRST MACHINE SAVED US \$126,000 IN GRAPHITE, ALL THE RELATED CUT TIME, PLUS THE CARBIDE USED TO MAKE THE ELECTRODE.

**-BRIAN BENDIG
PRESIDENT**

Once the shop was ready to move beyond temporary "bridge" equipment, Bendig's aforementioned travels paid off. One notable example was his introduction to German machine tool builder OPS Ingersoll, which supplied Cavalier with one of the first Eagle-brand sinker EDMs in North America in 2012. Given the shop's experience with that first machine, it's no surprise that Cavalier is incorporating two more of those sinkers into its new EDM cell. "They burn fast, and there's very little electrode wear," he says, crediting adaptive current technology and a rapidly oscillating Z axis that ensures efficient flushing. "Within a year, that first machine saved us \$126,000 in graphite, all the related cut time, plus the carbide used to make the electrode."

In addition to raw capability, the company prioritizes technology that reduces labor by consolidating operations. Within the new cell, for example, the EDMs' 30- and 48-position electrode changers and the Ingersoll Automation robot servicing the Ingersoll/OPS V9 high-speed machining center will limit the need for operator intervention. The V9 also employs true, simultaneous five-axis motion (not just 3+2). This is expected to enable cutting the vast majority of electrodes in a single setup.

The philosophies at work here have already proven their worth outside the cell, Bendig notes. High-capacity toolchangers and multi-axis machinery are common sights throughout the shop floor, as are pallet changers that enable operators to set up one job while another is in the workzone. "The best way to get labor out of the process is to never introduce it in the first place," he says.



One of many high-capacity toolchangers on the Cavalier floor

A FLEXIBLE, STANDARDIZED PROCESS

The right equipment isn't the only factor at work in consolidating operations. Cavalier's design-driven process helps make the most of that equipment by ensuring efficient allocation of resources. Designs for any given mold are always at least 90-percent complete before the shop ever cuts a chip, Bendig says. This maximizes flexibility because the order of operations can change based on capacity to keep work flowing. For example, gundrilling operations might occur prior to roughing if the required machining center is tied up.

A design-centric approach also improves process predictability and consistency by reducing the potential for variation during manufacturing. Consider the new EDM cell, which will employ standardized fixtures from Erowa to ensure proper orientation and location repeatability as graphite moves from robot to machining center and from electrode changer to EDM chuck. Such a system is capable of executing a pre-programmed sequence of operations virtually indefinitely and with the exact same result every time, barring mechanical wear or some external influence. Human beings could never be so precise or repeatable, Bendig says.

Sourcing all machines in the cell from the same builder is also an example of the shop's broader drive toward standardization. Dealing with the same essential machine configuration, CNC interface, burning parameters and so forth is far easier than getting used to multiple systems, Bendig says. Employees can also fill in for one another more easily when required.

This strategy is at work beyond the new cell, too, and it extends to options and auxiliary equipment. All CNC equipment features coolant-through spindles, laser tool gaging, touch probes, standardized workholding and, where possible, a standardized selection of cutting tools. Common machines with common capabilities improve throughput by making performance more predictable and scheduling more flexible, Bendig says.

Yet, these strategies did nothing to alleviate what was once one of Cavalier's chief hurdles. Historically, the ebb and flow of business often left the shop scrambling to keep up one week and contemplating the need to cut shifts the next. To address this problem, Cavalier employs



Paul Magro, CNC Machinist holding two different kinds of tooling

strategic, highly selective partnerships to flex capacity as needed. This helps maintain a steady workload (and steady employment), regardless of business conditions.

More specifically, the manufacturing floor runs 24/7, and the shop strives to maintain a workload that is more than it can handle. Typically, the goal is 110 percent capacity. During busy periods, that extra 10 percent can be outsourced to partners. When business slows, the shop can bring the work back in-house to keep its spindles running and its people busy. In keeping with Cavalier's philosophy of sticking with what it does best, outsourced work tends to involve less cost-effective portions of the build. However, as the shops grows and changes, so do its bottlenecks. For instance, Cavalier has been performing far more gundrilling since the addition of two large, five-axis MF 1500BB models from I.M.S.A.

A PEOPLE-CENTRIC APPROACH

Transitioning to new technology and new processes has had a profound effect on how shopfloor personnel do their jobs. With the fully automated EDM cell, for example, staffers

will act "more like overseers," Bendig says. Recognizing the potential difficulty of such a transition, the shop has made efforts to keep employees happy, engaged and productive from the very outset. These efforts to make Cavalier a good place to work have succeeded, judging from an annual turnover ratio of less than 6 percent.

Much of this success stems from a dual focus on engagement and transparency. As for the latter, regular "state of the company" addresses from Bendig keep everyone informed about the bigger picture of the company's performance and future outlook. "Nobody wants to follow someone that does not know where they are going," he notes. Just last year, an outside consultant coached senior management on strategies to facilitate open, effective communication.



Cavalier Apprentice Michael McCutcheon Moore



Multi-axis machinery that's helped reduce setup times

That successful, two-month effort culminated in a day-long team-building exercise outside the shop.

Meanwhile, giving employees a real voice in the operation helps avoid the tendency to, as Bendig puts it, “put their brains in a toolbox before coming to work.” Despite the shop’s design-driven process, staffers are encouraged—and, as those closest to the work, even relied upon—to suggest process improvements. To that end, the shop has also instituted regular “job review” meetings in which the whole staff discusses what went right, what went wrong, and new ideas. Such feedback isn’t limited to just meetings, either. Bendig and his management team make a point to be out on the floor and available to engage with staffers as often as possible.

Keeping communication open has been critical to building the right team. Indeed, one of the first orders of business when Bendig took ownership was, as he puts it, “getting the right people on the bus, then getting those people into the right seats on the bus.” The right people, he explains, are critical thinkers who are willing to try new things and are comfortable with technology and processes that demand walking away from machines while they run. Even with the right attitude, however, a potential hire might be happier in one area of the shop than another. That’s why Cavalier takes personal preference into account when it comes to getting people into the right “seats” (for instance, a computer whiz is likely to be more comfortable with learning CAD/CAM software than learning how to operate a machine). As for long-standing employees, twice-yearly reviews help identify what they like and don’t like about their jobs and, by extension, whether a change might be in order.

Most new hires come in from the Ontario Youth Apprenticeship Program (OYAP), which has been a particularly good source of fresh talent in recent years, Bendig says. He attributes that to broader awareness among educators and government of the skills shortage, and the fact that young people appreciate the opportunity to work with the latest technology and processes. That said, Cavalier’s own efforts can’t be discounted. Bendig and his team commonly visit local schools, advise on technical curricula and sometimes even offer direct support, such as toolboxes to reward winners of technical skills competitions. They also host regular tours of the facility for students, parents, teachers, guidance counselors and administrators. In 2013, the company received an award from the Essex County Schoolboard for its support of the local education system.

GETTING THE WORD OUT

As evidenced by the shop’s efforts to re-invent the EDM department, Cavalier’s three-part transformation is far from over. In the meantime, the company has been working to get the word out about its capabilities and philosophy by redoubling efforts in sales and marketing.

Cavalier has long maintained a relationship with public relations firm Generator Design. In late 2014, however, the two companies embarked on a major push to expand advertising, social media engagement, targeted marketing, and presence at trade shows and other industry events. The shop’s message is targeted not just at prospective customers, but also the potential employees and supplier partners that Bendig views as critical to the company’s success. “We’re known as the Tylenol—we make it pain-free—and everyone wants to be on the winning team,” he says. “The more they find out, the more customers and suppliers want to work with us and the more people want to be employed here.”

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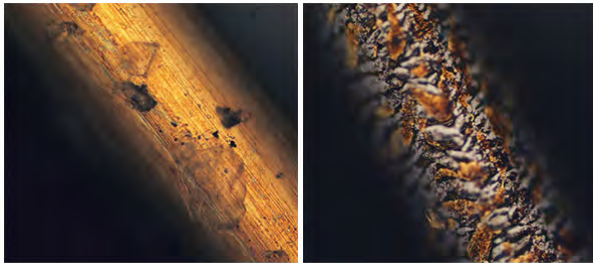


Tight-tolerance automotive molds like this are Cavalier’s fastest growing segment

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Conventional brass wire
photographed at 400x

ZT Hybrid Wire
photographed at 400x

“ ZT HYBRID WIRE WORKS REALLY WELL WHEN YOU GET INTO THE THICK MATERIALS. YOU WON'T GET AS MUCH BREAKAGE. AND IT AUTO THREADS REALLY WELL TOO. PLUS, IT'S FASTER; WE'VE DOCUMENTED PRODUCTIVITY INCREASES OF ABOUT 20%.

*-JEFF NICHOLAS
DIRECTOR OF EDM
AT DELTA RESEARCH*



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The texture of the wire's outer layer makes room for more fluid than usual in the cut. Since it's the fluid actually carrying the charge from the wire to the part, the extra and more consistent spark energy allows for a faster and more precise cut with finer finishes.

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TRAINING OPPORTUNITIES

MC Machinery hosts a number of comprehensive training and application consulting classes to ensure the maximum performance of all of our machines. Whether at an open house or at our technical training centers, our experienced staff provides instruction that is easy to understand and implement in your shop. To view current classes, visit MCMachinery.com/training and click on "View current list of classes."

COMING SOON—MC REMOTE 360 FOR EDM

In early 2016, MC Remote 360 will be available for a variety of EDM machines. MC Remote 360 is a new desktop and mobile monitoring system that provides real-time access to machine data. You can view the machine's state, status and production performance all from your PC, cell phone or tablet. MC Remote 360 also provides instant notifications to you and MC Machinery's service team should any problems

HOURS OF OPERATION:

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Pine Brook, NJ
9 a.m.-5 p.m. EST

West Coast Facility

Cypress, CA
9 a.m.-5 p.m. PST

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Auburn Hills, MI
9 a.m.-5 p.m. EST

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THE BIGGER PICTURE

A LETTER FROM ALAN HALLMANN
NORTH AMERICAN SALES MANAGER—EDM/MACHINING SOLUTIONS

TO ALL OF OUR FRIENDS AND CUSTOMERS,

We have had an exciting spring season demonstrating products from MC Machinery all over North America at trade shows and open houses. Hopefully many of you have had the chance to attend one of these and we had the opportunity to say hello. We also want to thank all of our sales partners and customers for their support and business. MC Machinery exists only as a result of their partnership. Our primary focus is to grow our technology and continue to meet our clients' needs.

On the forefront, Mitsubishi EDM continues to play the role of market leader. The MV series wire EDM consistently rises above the competition as the premier wire EDM technology on the market today. It's truly awesome. Our sinker EDM sales have outpaced 2014 and are on track to have a great year. Again thanks to our customers and sales partners for their efforts. We cannot do this without you.

The LUMEX additive manufacturing technology continues to draw more and more customers to MC Machinery and has enhanced our reputation as a provider of world class innovation. It is amazing to witness how one machine can accomplish such detail in one operation. VMC sales have also outpaced last year's numbers and continue to grow. This is outstanding as we have worked very hard to continue to grow our reputation for offering these quality products in a competitive market. Fortunately, the machines speak for themselves and have provided reliable performance for our customers. Our line of turning centers and 5-axis technology is growing quickly with excellent feedback from our users. Our applications staff and our partners are adding to our applications success stories and MC Machinery will continue to utilize these to demonstrate our strengths in the marketplace.

One of the newest products in our line-up is the OPS Ingersoll V9 5-axis machining center. Our first installation occurred this last quarter and is part of an overall three-machine cell, complete with two OPS Ingersoll EAGLE1400 sinker EDMs. The automation was also supplied by OPS Ingersoll. A special thank you goes out to our partner on this project, Cavalier Tool. We appreciate the support. The high-speed machining capability and accuracy of the V-9 is one of the best in the world and nothing short of phenomenal. MC Machinery in Wood Dale, Ill., has a V-9 on demonstration in its technology center as well.

Finally, MC Machinery is working hard to bring more applications support to our customers by increasing our manpower and our showroom presence around North America. We have already increased our presence at our own technical centers in Illinois, California, New Jersey and Canada. Additionally, we have worked with many of our sales partners and set up additional showrooms and demonstration areas across the United States including Connecticut, North Carolina, Oklahoma, New York and Michigan. This coming year we will have a technical center in Mexico as well. MC Machinery is on the move.

So again, we thank everyone for all of your business and support. Have a great summer!

With Our Best Regards,

Alan Hallmann
North American Sales Manager—EDM/Machining Solutions