


MoldMaking

TECHNOLOGY®

A detailed 3D CAD model of a mold, shown in a perspective view. The mold is primarily blue. It features a complex hot runner system with a central reservoir and a network of channels leading to multiple injection points. Several red and yellow pins are visible, likely representing ejector pins or sensors. The mold is surrounded by a network of thin, glowing yellow and green lines, possibly representing a simulation or a data overlay.

CAM Automation
Increases Mold
Production, Quality - 18

Building a Better-
Performing Hot Runner
Mold - 24

Minimizing Wear,
Extending Gate Life
With the Right
Machining Strategy - 28

Five Ways to Make Your
Molds Smarter - 30

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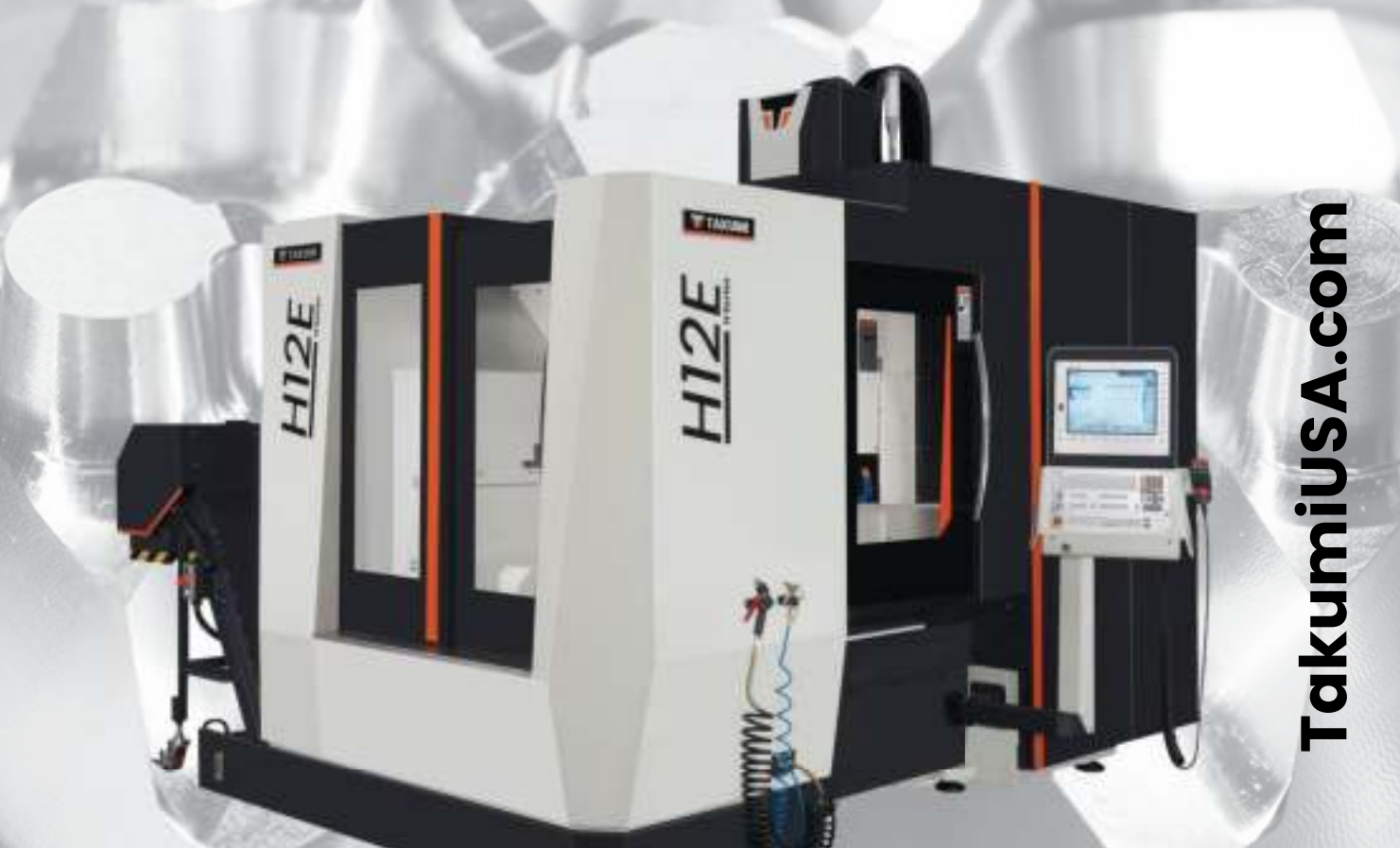
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MMT

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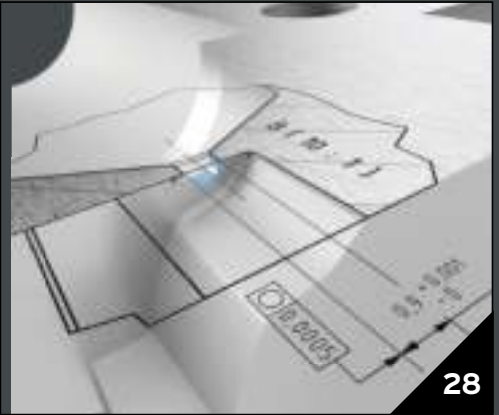
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on All Types of Machines



12



18



28

Features

18 Software/Case Study

CAM Automation Increases Mold Production, Quality

Mold builder switches CAM software package after 20 years to take advantage of innovative programming strategies that reduce mold machining programming and processing times.

24 Hot Runners

How to Build a Better-Performing Hot Runner Mold

Early stage communication across the supply chain about design considerations optimizes hot runner mold performance.

28 Hot Runners/Machining

How to Cut Setup Time, Extend Gate Life With the Right Machining Strategy

Microcut honing provides high-precision machining of needle valve nozzles and guides in hot runner systems.

30 Mold Maintenance

Five Ways to Make Your Tooling Assets Smarter

Global mold monitoring and asset management solutions can maximize productivity and efficiency.



ON THE COVER

Cover photo courtesy of OPEN MIND Technologies. Tool paths and processes are optimized on a mold plate at Machining Technology. With the help of OPEN MIND's engineers, Machining Technology's Vice President Miguel Aponte and mold department successfully implemented the *hyperMILL*® automation strategy to drastically reduce processing times, by saving NC programs for holes and pockets in a feature-based macro database, and applying and running the script in an easily understood routine. The *hyperMILL*® automation technology automates CAM programming for parts with similar geometries such as component families and variants, recurring shape elements, features such as holes or pockets, and repetitive processes. See feature on [page 18](#).

Image courtesy in order (left to right): Delta Mold Inc., OPEN MIND Technologies and Microcut AG.

 VIDEO ACCESS

Departments

- [6](#) From the Editor: Learn to Let Go!
- [8](#) Editorial Advisory Board (EAB): Meet New Board Member, Jenny Kotulak
- [10](#) This Month on Social Media
- [12](#) Profile: A Conversation With ... Delta Mold Inc.
- [34](#) Frequently Asked Questions: Mold Components
- [35](#) #ICYMI: In Case You Missed It 
- [36](#) Gardner Business Index: Moldmaking
- [38](#) Technology Showcase: Cutting Tools 
- [47](#) Ad Index
- [48](#) TIP: Cutting Tools

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- › Design for Additive Manufacturing (DFAM) Track
- › Additive Manufacturing for Production (AMP) Track
- › AM Industry Reception at Palmer Events Center
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WEDNESDAY, AUGUST 30TH

- › Exhibits
- › Product Technology Sessions
- › Design for Additive Manufacturing (DFAM) Track
- › Additive Manufacturing for Production (AMP) Track
- › Closing Events

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Learn to Let Go!



I always need time to download and digest after attending an American Mold Builders Association (AMBA) Conference.

I return to work energized by the conversations, new connections and session lessons. But more than that, I usually come back home with a life lesson. This year that lesson can be summed up in two words: Let go.

Let go of control. Let go of negative thoughts. Let go of old ways. Let go of my traditional mindset. All of that “holding on” keeps me from improving my personal and professional life. It can stifle the continuous improvement I strive for every day. But change is hard. I believe many conference attendees walked away with a similar feeling about their personal lives and businesses.

AMBA Conference keynote presenter Ricky Kalmon, a mindset expert, motivational speaker and author of the book “Leverage Your Mindset” — which offers ways to turn best intentions into great accomplishments consistently — works with Fortune 500 companies, sales teams, leaders, executives and sports teams, teaching them how to reinforce their thoughts and beliefs to enhance their results.

Kalmon not only put his hypnotist skills to work on stage with some audience members, but he also shared ways we can reduce stress, leverage a growth mindset, overcome challenges, adapt to change, tap into unrealized potential, and ignite purpose and prosperity by changing the way we think — all by leveraging our mindset. Easier said than done, I know, but it’s possible, one step at a time.

Step 1: Give yourself permission.

Step 2: Write down your intention(s).

Step 3: Sign it.

Subsequent breakout sessions covered various topics from CAD/CAM automation and 3D printing to global competition strategies and Washington, D.C.’s plans for American manufacturing, but collectively they all brought us back to “letting go” so we can move forward (for more on the conference, check out *MMT*’s slideshow wrap-up online at short.moldmakingtechnology.com/AMBA2023).

Which leads me to moldmaking. After 25 years of working on *MoldMaking Technology*, this community never ceases to amaze me with how it overcomes challenges and continuously solves problems to deliver high-quality molds. However, I also see how many struggle and remain stuck in how they’ve always done things.

I propose that maybe it’s time to “let go” to move your business forward by embracing the unfamiliar, trying new things, taking a different approach, listening to a different perspective and investing in that new technology, process or strategy.

And when you are ready, I hope you turn to *MMT* and its content to help you make those decisions. [MMT](#)

Christina Fuges

Christina M. Fuges
Editorial Director

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Follow @MMT_ChristinaF

MMT TIPS

5

TRICKS OF THE TRADE

Great Tips from This Issue

1. Totally Automatic

With feature technology automation, geometry features such as holes and pockets are recognized automatically, and information relevant to the machining task is applied automatically.

PG. 18

2. Go With the Flow

After identifying areas for potential gate location, use a flow analysis to determine the optimal flow and fill balance. Always remember “thick to thin” — gates should be placed in areas with thicker wall sections.

PG. 24

3. Microchanges

With microcut honing, the honing tool is guided, and the bore is machined in one step during machining. There is no need for time-consuming machine setup or tool dressing.

PG. 28

4. Going Remote

A portable version of a real-time monitoring system hooks up to a single mold for remote validation or mold qualification. Anywhere in the world, you simply plug this system into the molding press and add power to see data streaming in real time on a secured website.

PG. 30

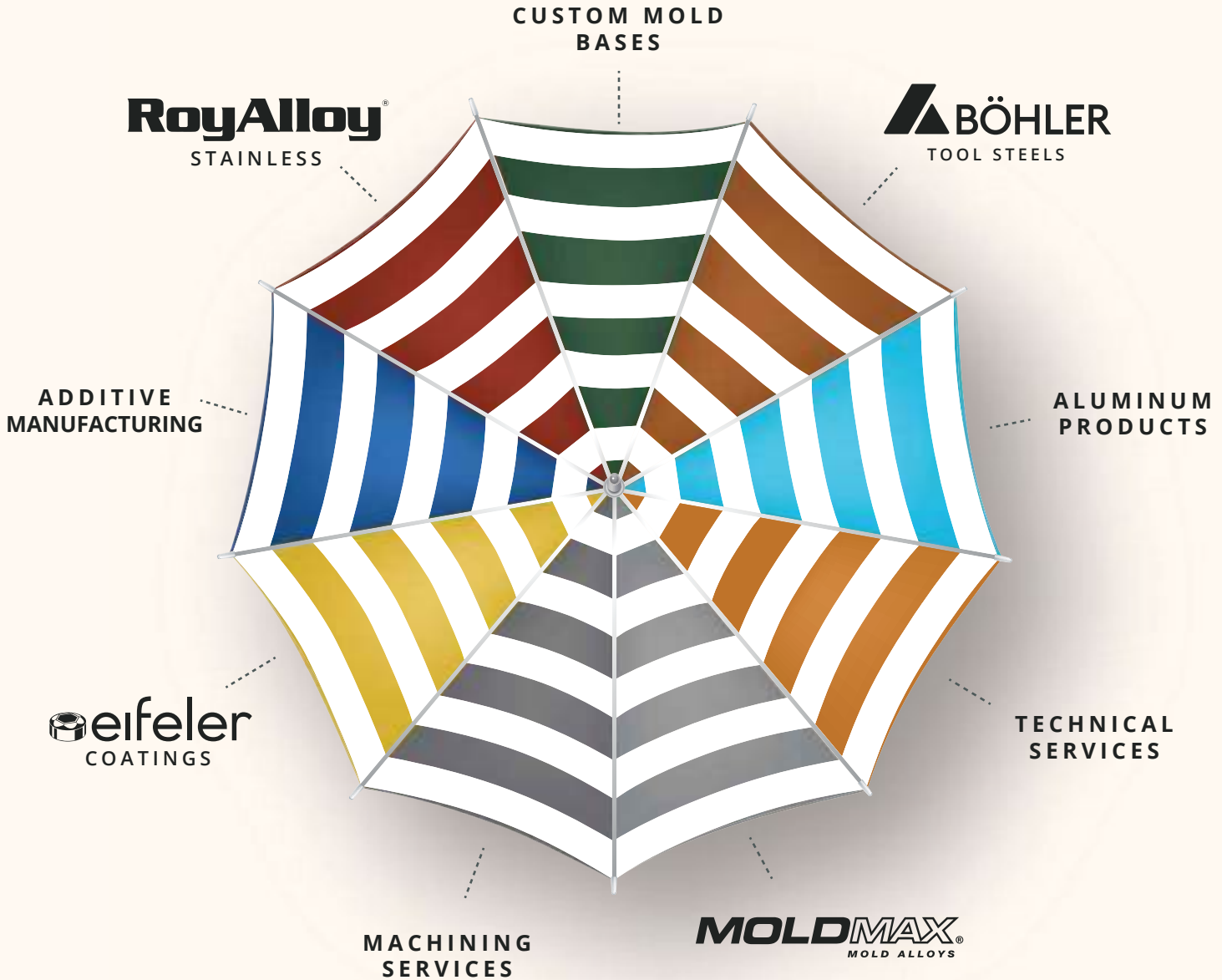
5. Sure Shot

With gundrilling, the depth-to-diameter ratio can be even greater than 300:1. The critical feature of gundrilling is that the bits are self-centering, which allows for such deep, accurate holes.

PG. 48

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Meet New Board Member, Jenny Kotulak

By Christina Fuges

Meet Jenny Kotulak. Jenny is a lead project manager at Integrity Tool and Mold in Ontario, Canada. She is responsible for gathering the necessary information to initiate and complete programs, coordinating customer interactions and approvals, and managing the financial interface with customers to maintain those relationships.

She participates in both internal and customer design reviews, including part feasibility, steel buy off and completed final tool reviews for approvals. She interacts with engineering for scheduling, identifies variances in tool designs, communicates internal and customer approvals, oversees tool validations, and manages engineering changes and repairs. Jenny's role also requires an understanding of program costs versus budget, including in-process, at T1 and final ship.

Overall, her experience includes program management from various industries and customer and project management, and working in fast- and slower-paced manufacturing environments. She is passionate about the molding industry, bringing teams together and networking. On top of it all, she is committed to developing and maintaining consistent *Integrity* standard job timelines.

Jenny earned a business administration marketing advanced diploma and a master's certification in project management (mCPM). She also completed Dale Carnegie leadership manager training. Past work experience

includes RFQ administrator and production control administrator and program manager at Concours Tool and Mold, as well as program manager at Michael Tool. She was recognized as one of *MoldMaking Technology's* 30 Under 30 Honorees in 2018.

While serving on the EAB, Jenny is interested in providing input on business issues, culture, shop floor, process, workflow, training, workforce development and global competition. She is also very interested in getting a peek behind the scenes at what it takes to produce a technical article and discreetly sharing her knowledge to help produce quality content for *MMT*.

When not working, Jenny enjoys the outdoors, and spending time with her family, whether paddle boarding, kayaking or traveling north (yes, more north than Canada) to the family cottage. Currently, she's attempting to learn how to play golf. **MMT**

Image courtesy of Integrity Tool and Mold.



Jenny Kotulak, project manager for Integrity Tool and Mold in Ontario, Canada, is one of *MMT's* new editorial advisory board (EAB) members.

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jkotulak@teamintegrity.com / teamintegrity.com
Jenny Kotulak, Project Manager

EDITORIAL ADVISORY BOARD (EAB)

The EAB enhances the standing of the publication and strengthens its professional integrity through the active involvement of its members.

The Board represents all aspects of the mold manufacturing industry with a balance of moldmakers, molders, OEMs and academia, and various moldmaking segments and job functions. A member is selected based on his or her experience and knowledge of the mold-making industry to serve a three-year term.

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TECHNOLOGY®

A Conversation with ... Delta Mold Inc.

By Christina M. Fuges

Share a little about Delta Mold Inc.'s history.

Ernie Young, president, Delta Mold Inc.: Delta Mold was established in 1978 by Rudy Mozer, the founder of Delta Technologies. Delta Technologies, founded in 1952, was our parent company until 2016, when it was sold to US Farathane LLC. Rudy passed away in 2014 and the Mozer family retained Delta Mold. The current CEO is Eric Mozer; he and his brothers are the primary shareholders.

The company started to service the plastics business emerging in the southeastern U.S. The founders located the business in Charlotte, North Carolina, to take advantage of the manufacturing opportunities and support customers. Initially, Delta Mold focused on the expanding



All images courtesy of Delta Mold Inc.

Delta Mold Inc. has manufactured 17,500 unique molds over the last 44 years. With a dedicated repair program, Delta Mold services include on-site evaluations and support, as well as 24-hour repairs and fast parts delivery to keep customer operations moving forward.

plastic industry's needs for products such as personal computers, keyboards and printers that were exploding in the market in the late 1970s. Then, as the manufacturing of these products went offshore, Delta Mold began to focus on large plastic parts for products such as televisions, lawn and garden tractors and vehicles, recreational vehicles such as golf cars and the heavy truck industry.

Delta Mold manufactures multiple automotive components. Still, we hold a strong presence in the nonautomotive market. The nice thing about Delta Mold is that one day you might be working on a riding lawn mower, and the next, you might build a boat hull or a trash can. We've built 17,500 molds in the last 44 years; each one has been unique. In 2022 our annual revenues were greater than \$24.7 million.

We've worked hard over the last five years to build molds with fewer people, which does not just mean automation. It means design strategy.

What are the company's core values?

Young: Our core values start with safety, which ensures a healthy work environment. Next, we focus on dependable products and technology that sustains efficiency and leads to superb quality. Finally, employee engagement and career development to retain top talent and continuously sharpen our skills. These values guide the team, have nurtured our success for nearly 45 years and have helped us cultivate long-term partnerships with our customers, suppliers and on-site teams.



With up to 40-ton overhead cranes, Delta Mold can produce injection molds from 50 to 6,600 tons, including spotting and final assembly.

What do you look for in an employee?

Young: The first two things we look for when hiring new team members are availability and accountability. They don't need experience in injection mold building, but if they're willing to work every day to learn and improve, they can work at Delta Mold.

Talk about your setup and capabilities.

Young: We have 70,000 square feet of manufacturing floor space with 80 employees — an average tenure of 17 ½ years — and we run three shifts seven days a week. The joke is, "We can work every day except for Christmas, but we can work on Christmas for the right price."

We're also ISO 9001-2015 certified. We completed two audits in a row and finished the process with zero non-conformances.

We believe we're the best-kept secret in the South because of our Charlotte location. Plus, there are not a lot of other mold shops that can do what we do. We do the easy stuff, but we're really good at the hard stuff. We can build an injection mold of any size — as big as a boat hull to small, precision molds. For production tooling, we build anything from 50 tons up to 6,600 tons. We've built molds as large as 8,000 tons.

We usually build about 75 new molds simultaneously; the rest is service and repair work. We do mold maintenance and repair or complete engineering changes for any mold, not just the molds we build. We have a dedicated truck, program manager, machining center and all of the necessary capabilities for any service or repair. So, if we have a customer with a mold that goes down any time of day, we can get to it within 24 hours — including getting it to our shop to fix it and then turning it around to have it back up and running. This is 15% of the business — \$3 to \$4 million in service, repair and engineering changes. We are constantly working to grow it.

We also do injection molding on a minimal level, so our 950- and 2,500-ton presses are dedicated to validation. Our 160-ton press runs very low-volume production for our mold building customers, and we do some low-volume production and tryouts on our Haitian 360.

Share a snapshot of your arsenal of equipment.

Young: A tooling company is only as good as its



Delta Mold provides the equipment, technical support and climate-controlled space needed to manufacture molds of all sizes and materials.



DELTA MOLD

Delta Mold Inc.

9415 Stockport Place

Charlotte, NC 28373

704-588-6600 / deltamold.com

- Founded in 1978 to service the emerging plastic business in the southeastern U.S.
- Provides tooling and repair services.
- Retains 80 employees.
- Operates 24/7.
- Features 70,000 square feet of manufacturing space.
- Produces injection molds from 50 to 6,600 tons.
- Up to 40-ton overhead cranes.
- Five-axis CNC and EDM machining, gundrilling, boring, spotting and final assembly.
- Repair, reverse engineering and product sampling services for a turnkey process.
- On-site evaluations and support, 24-hour repairs and fast parts delivery.
- ISO 9001:2015 certified.



Delta Mold has in-house trial presses. The team can create samples and prototypes of all sizes and materials, as well as conduct limited production runs when needed.

technicians and equipment. As far as we know, we have the largest fleet of five-axis machines dedicated to mold building in our region. For example, we have a Fermat that handles up to 80,000 pounds and recently made an \$850,000 investment in a TOS boring mill that can handle up to 65,000 pounds. We reinvest about \$2,000,000 every other year.

Delta focuses a lot on design. Explain your design team and process.

Young: Our team has the engineering expertise to turn a proposal into a manufactured mold or part with custom design, finishing and assembly. They can develop prototypes,

Delta Mold houses a variety of high-speed finishing machines, boring mills, gundrills, EDMs and sampling presses.

- OMV Formula five-axis high-speed mill
- Parpas Diamond 30 high-speed mill
- Parpas Diamond high-speed mills
- Mecof Performa high-speed mill
- Makino A-77 horizontal pallet changer
- Fermat boring mill
- TOS boring mills
- Toshiba boring mills
- Tarus six-axis gundrill
- Tarus four-axis gundrill
- Large Makino EDNC 156W EDM tank
- Large Makino EDNC 156 EDM tank
- Charmilles wire EDM
- Cincinnati 2,500-ton sampling co-injection press
- Toshiba 950-ton sampling press
- Large Cosen band saw
- A 40-ton, dual-hoist overhead crane
- Ten- to 30-ton overhead cranes
- Engel 160-ton rotary press
- Haitian 360-ton press
- Nissei 110-ton press



The Delta Mold team believes that quality assurance and meticulous craftsmanship are essential to success and the success of its customers.



Operating 24/7, Delta Mold's two plants provide 70,000 square feet of manufacturing space that is ISO 9001:2015 certified.



The OMV Formula five-axis high-speed mill, with its automatic head changing, large-capacity toolchanger, laser tool setting and on-machine probing, is well suited for unattended machining on medium to large blocks.

conduct analytical and feasibility evaluations and create full-scale designs based on an idea or operational need. What we implement into our tooling is how we help customers eliminate material and cut cycle time by 20%.

We have five full-time designers and a manager. We've worked hard over the last five years to build molds with fewer people, which does not just mean automation. It means design strategy — everything from how we bring in the data to how we take that data to the mold and how we design out waste. We streamline mold design by “doing things along the way.”

This approach taps into our team's experience with the various mold types we design and build. There will be an aspect of every mold project we take on that is very similar to something we've built before. We rarely find something that is new to us.

How do you partner with customers?

Young: It's up to us and our customers to put together the strategy to build a mold. We sit down as a team and take a systems approach to design an entire process, from the material to the final product.



The Delta Mold engineering team, in addition to decades of experience, uses the latest 3D and CAD/CAM design software including Moldex3D, VISI, I-DEAS, WorkNC, Pro-E, Cimatron and NX.

Regal

Components

Higher Standards for Molds and Dies

A collage of images showcasing various metal components and tools. The top right shows a close-up of several long, thin metal rods. Below that, there are images of a laser cutting process, a collection of various metal rods and pins on a blue surface, a collection of various metal rods and pins on a red surface, and a collection of various metal rods and pins on a grey surface. The bottom left shows a close-up of three vertical metal rods on a red surface.

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For example, we designed and built a mold that produces components for a gaming station. The customer planned to

I believe a mold builder must transition into a full-service company, meaning a shop has to be open to taking on more types of business than it traditionally has.

sell 200,000 units a year and sold about four million! We partnered with the OEM and designed and built the press with the molding machine manufacturer — a rotational two-shot with no tie bars and a robot that runs on its own.

Initially, the cycle time

was one minute and we reduced it to 36 seconds.

Let's talk ERP.

Young: Finding an ERP built specifically for mold building is tough. We have a robust ERP system called Plex. After a year of working with Plex, they moved some things around in their system to tailor it to us.

How did Delta Mold change during COVID-19?

Young: There's more communication than there ever has been, both internally and with our customers. COVID also taught us a lot about the next generation. We discovered that the key to recruiting is listening and giving the teams the freedom to do their jobs. We learned how smart the next generation is and a lot of it is due to the information available to them at their fingertips.

How do you see the moldmaking industry in 5-10 years?

Young: I believe a mold builder must transition into a full-service company, meaning a shop has to be open to taking on more types of business than it traditionally has. It must be focused on the end product and not just the mold. I think Delta Mold is already there. We build all types of molds in all sizes and provide full service related to product development, equipment development, process improvement and quality improvement. [MMT](#)



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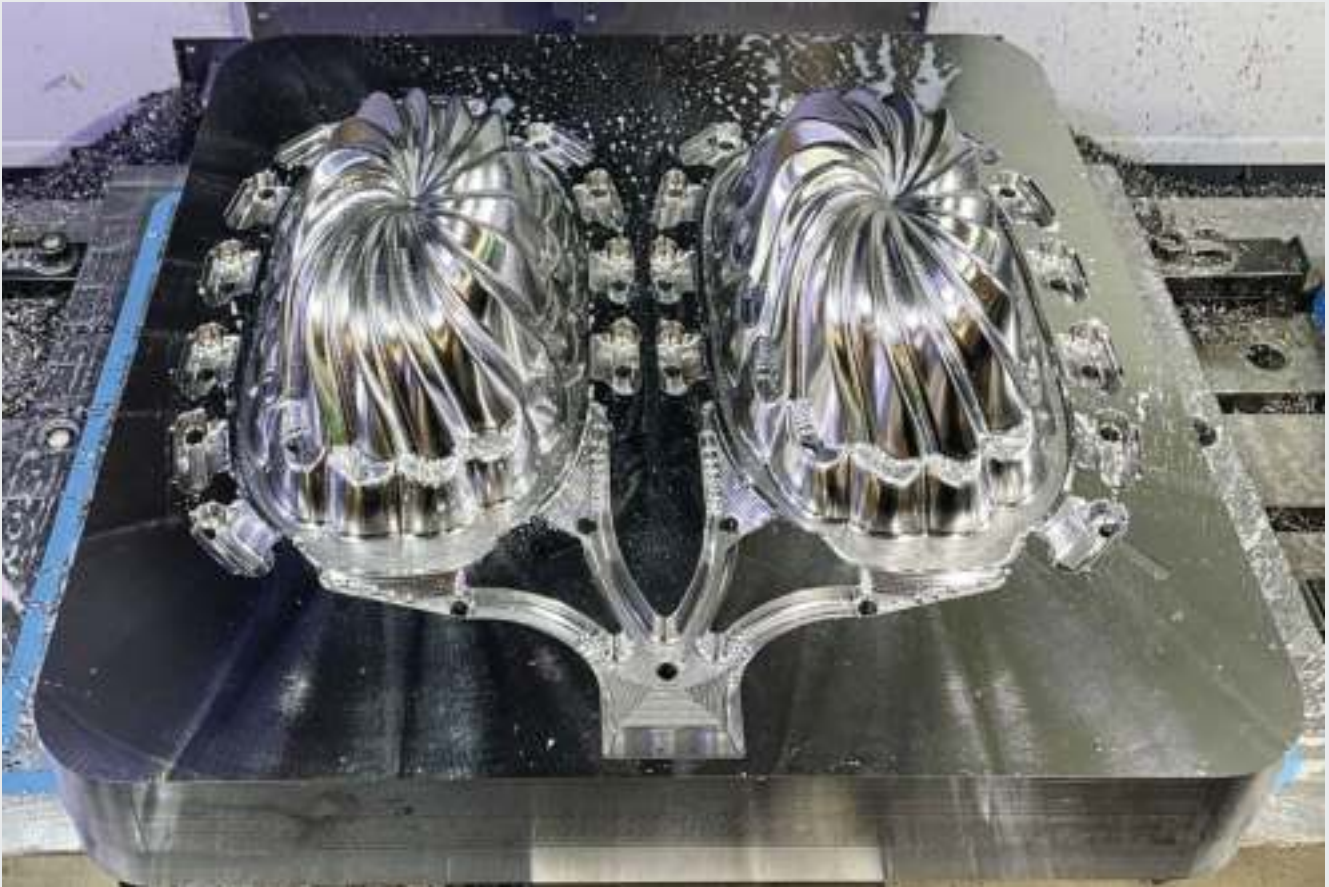
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All images courtesy of Open Mind Technologies.

CAM Automation Increases Mold Production, Quality

Mold builder switches CAM software package after 20 years to take advantage of innovative programming strategies that reduce mold machining programming and processing times.

What would compel you to replace software that has been a working solution for more than 20 years? Following a particular process for this length of time provides a sense of security with known expectations each day. However, it does not always mean it is the optimal process, especially as it relates to manufacturing technology continually advancing to offer more innovations and options.

For the programmers of the mold department at Machining Technology in Brooklyn Park, Minnesota, who had been adeptly using a CAM software package for a couple of decades, some

novel programming strategies would prove to be too beneficial to ignore.

Machining Technology is a 75,000-square-foot machine shop offering design, manufacturing and repair of plastic injection molds, die-cast dies, milling, Swiss turning and EDM. In 2013, owner Laurent Deconinck bought a machine shop called

Machining Technology uses *hyperMILL* CAM software to generate smooth tool paths such as for the mold shown above.

Main-Tool with more than 35 years of industrial machining experience. Over the next year, the company acquired new CNC machinery, added experienced operators and received ISO 9001 certification. Then in 2020, it acquired the assets of Tooling Science, including its employees, capabilities and nearly 50 years of experience.

This acquisition comprises the mold department at Machining Technology, which offers a wide range of mold-related services such as plastic injection molds, die-cast tooling, and mold design and engineering. The company has approximately 70 employees, with 12 — including three programmers — in its mold department and an experienced quality assurance team that supports its skilled operators with strict control protocols.

A Fresh Perspective

When Miguel Aponte joined Machining Technology in 2021 as vice president, he was asked to take an objective look at the mold department, which builds molds, mold plates and inserts using a combination of five- and three-axis machining centers.

“There were several areas that I wanted to focus on, including processing and delivery times, tool life and part quality,” Aponte says. “I thought evaluating a change in CAM software would be a logical place to start. *hyperMILL* from Open Mind Technologies was one CAM package that separated itself from the rest.”

However, it was not without skepticism that Aponte’s team was asked to embrace *hyperMILL*. “I understand that it can take more than a leap of faith to be willing to change programming habits that have been established for such a long time,” Aponte says. Fortunately, the advantages of switching to new CAM software did not require a leap of faith after all the benefits were revealed.

Proof in Productivity, Quality

“Open Mind understood that my team would need to see that the software was more capable and easy to learn,” Aponte points out. Open Mind provided a trial run along with its

applications expertise every step of the way so Machining Technology could test it out before committing.

hyperMILL is a modular and flexible CAM solution for 2D, 3D and five-axis milling, mill turning and high-performance machining strategies with everything integrated into a single interface. This complete integration enables fast and easy programming using the latest operating concepts, reduced machining times and tool wear, improved process reliability and accurate, high-quality surface finishes.

After Open Mind and Aponte reviewed the application requirements, they selected the *hyperMILL* automation capability as a key strategy to reduce processing times drastically.



Each month, Machining Technology’s mold department generally produces three to four molds along with eight mold plates per mold, totaling up to 32 plates.

MACHINING TECHNOLOGY

PROBLEM: Need for improved processing and delivery times, tool life and part quality for its molds, mold plates and inserts.

SOLUTION: Open Mind’s *hyperMILL* CAM automation capability.

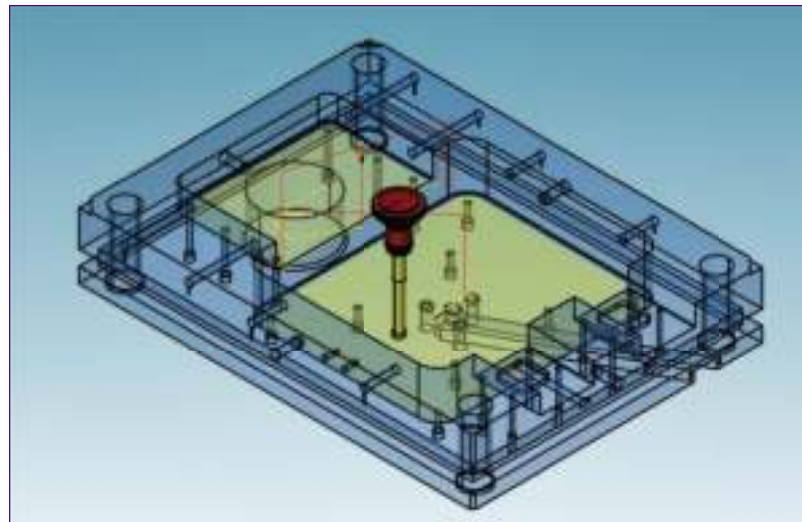
RESULTS: A 50% reduction in programming times and significantly reduced processing times.

However, this choice was not a simple one because it required the engineering team to change the manufacturing processes that were in place, which they had been following and were comfortable using. The new automation strategy had to show significant productivity advantages and be easy to learn.

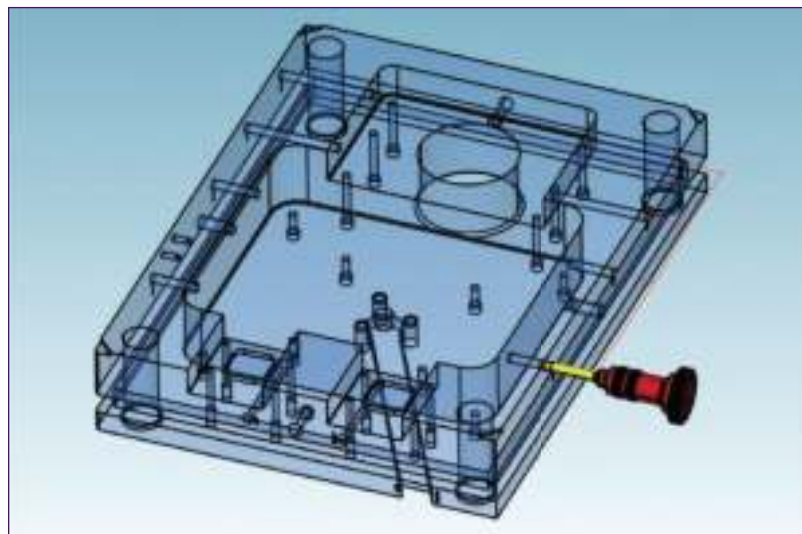
The *hyperMILL* automation strategy automates CAM programming for parts with similar geometries, such as component families and variants, recurring shape elements, features such as holes or pockets and repetitive processes to help reduce programming times, standardize processes, eliminate

human error and improve overall throughput.

The feature technology automation makes it possible to read a component's design properties relevant to the machining job. Geometry features such as holes and pockets are recognized automatically, and information relevant to the machining task is applied automatically. A macro stores a sequence of machining steps that contains all the tool and technology data of a characteristic geometry — the recognized features. Macros permit NC programming with just a few clicks of a mouse, greatly reducing programming efforts.



Using the *hyperMILL* automation strategy, Machining Technology follows a color-coding system to select hole types and operations that must be performed and then saves that tool path for another job.



The *hyperMILL* automation strategy saves NC programs for holes and pockets in a feature-based macro database and applies and runs the script.

For example, a macro can be created for drilling operations that include a sequence of machining jobs such as centering, drilling and countersinking. This can then be used to program various hole types with a single click.

Machining Technology's engineering team worked closely with Open Mind's engineers to make the implementation successful. They determined that by applying the automation capabilities to part families, tool paths could be replicated to speed up processes.

"Using the *hyperMILL* automation capability on molds, mold plates and inserts, we were able to save NC programs for holes and pockets in a feature-based macro database and apply and run the script in an easily understood routine," Aponte says.

This worked very well because even though the applications are custom, the parts always have the same types of holes and threads, albeit with different diameters. "First, we select the hole types and operations needing to be performed by following the color-coding system, and then we save the toolpath strategy so that we can automatically repeat it for the next job," Aponte explains. "Programming times were instantly reduced by 50% or even more, and we were amazed at how good the part quality was."

Machining Technology's programmers were impressed with the productivity improvements and felt comfortable with the learning curve, including a simple button press to run an automated routine. So, the decision was made to switch over to *hyperMILL*.

Time and Cost Saved

Every month, the mold department generally produces approximately three to four molds and eight mold plates per mold, totaling up to 32 plates. Most parts are tool steel, beginning at 24-34 Rockwell and hardened to 52-56

Rockwell in their final state. Processes that include reamers, boring heads and engravers are performed on the parts.

“We are taking advantage of the tool database in *hyperMILL* to speed up operations significantly,” Aponte says. The powerful tool database supports tooling from leading cutting tool manufacturers and special tools can also be mapped in the tool database. Selecting suitable tools and cutting parameters for programming tool paths with 2D, 3D or five-axis strategies increases productivity.

Before implementing *hyperMILL*, it took about four hours to program and set up a plate. Now the same process takes approximately 45 minutes.

In addition to the programming and setup time reduction, the machining time was decreased. “The tool paths we generate now are smooth and streamlined, which improves part quality, increases the life of our tools and cuts down on machining time,” Aponte adds. One



Machining Technology was able to reduce polishing and eliminate EDM burning when machining cavities using *hyperMILL* 3D strategies.

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Machining Technology's Vice President Miguel Aponte (left) and moldmaker Jason Vlasak (right).

plate is now machined in 1.5 hours compared to 8 hours.

Since Machining Technology typically needs to hold dimensional tolerances ranging from ± 0.0002 to ± 0.001 for die-cast molds, *hyperMILL* needed to be capable of generating tool paths consistently and accurately. Simulation checks also use the generated NC code to precisely simulate movement sequences to ensure the highest degree of safety during manufacturing.

"Now, when machining cavities with the 3D strategies, we can reduce polishing and eliminate EDM burning that was previously required," Aponte says.

Solid Support

Open Mind went out of its way to adapt a solution to Machining Technology's needs — the software's modular configuration and options mean they can configure the software how they want to use it. "Not only is my team pleased with *hyperMILL* because of its ease of use and reliability, but company executives are also fully on board because it has improved job profitability," Aponte says.

As Machining Technology looks to the future and adds new five-axis machining technology, they now have the CAM software to move them forward. [MMT](#)

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How to Build a Better-Performing Hot Runner Mold

Early stage communication across the supply chain about design considerations optimizes hot runner mold performance.

Too often, mold builders tasked with delivering a complete, production-ready hot runner mold work in haste to design the mold and system. They look online and order what they believe is needed but realize too late that the various components won't fit or work together as expected. If decisions are rushed or poorly informed, the result will likely be a poor-performing mold and system. To eliminate costly errors, making time for precise and proper communication between the molder, mold builder and hot runner supplier is essential.

It's a Team Effort

The molder/OEM typically chooses the hot runner supplier based on its expertise in a specific market segment. The mold builder leads the project and collects the necessary information. This information flows from the molder to the mold builder and then to the hot runner supplier.

When a new mold is being quoted, the experienced mold builder should know what questions to ask the molder/OEM to be able to provide all critical details to a hot runner supplier for a realistic and accurate estimate. This is not always the case, however, because the mold builder's spec sheets are generally more focused on the mold build. Information gaps regarding hot runner criteria can, and often do, lead to delays.

Remember that the hot runner supplier is responsible only for ensuring that its hot runner system delivers plastic efficiently to the mold. So, the supplier's spec sheets are specific to the molding requirements, such as types of gating and the system's interfaces with the molding machine and the mold.

The mold builder designs the core and cavity, cooling channels and mechanics within, which all play a significant role in the mold's cycle time and performance. Communicating openly with the molder/OEM and hot runner supplier ensures the data is complete and that the mold builder has what is needed to build a successful, profitable hot runner mold.



All images courtesy of PCS Company.

The Necessary Details

While the mold builder works closely with the hot runner supplier to design the system, the molder must be part of this collaborative process by providing the following details:

- The specific grade of plastic to be molded.
 - Will there be a mix of regrind material or will the product be molded from recycled or biodegradable plastics? Analysis tools such as flow simulation need grade-specific information to predict accurately. If resin specs are unavailable, consult the plastics supplier's technical resources.
- Color changes, gas-assist, foaming agents and other factors that may impact the design.
- 3D geometry along with a 2D part drawing indicating all critical-to-function details, such as tolerances, areas where gating is not permitted and surface finish requirements.
 - Instructions to simplify or expedite hot runner design, such as the preferred gate location or permission for a vestige.

Many molds require complex hot runner systems, like this one, which features a sequentially controlled valve gate system with nozzles on the top and sides. The communication of comprehensive data between the molder/OEM, moldmaker and hot runner supplier early on will ensure the right hot runner system is built for the job.

- Product designer contact information for minor modifications to the part design, such as adding a dimple, post or tab for convenient gating and improved flow.
- Molding machine specs and auxiliary equipment information to ensure compatibility between the mold, hot runner and molder's setup.
- Electrical voltage, controller and connector types, zone limitations and mounting locations.
- Hot half servicing requirements while the mold is in the machine, such as rapid replacement of tips, needles, heaters and thermocouples.
- Pneumatic, servo or hydraulic preferences for valve gate systems.
- Process configurations, including:
 - Water connector location and size preferences.
 - Mold clamping arrangements such as magnetic or quick mold change setups.
 - Cavity ID and nozzle zone ID which usually coincide to avoid troubleshooting or assembly mishaps.
 - Stamping or etching requirements, such as "0" corner, top of mold and operator side.
 - Mold lifting and handling preferences.

Gate Design Considerations

Designs can begin only after deciding on gate location(s), so the mold builder must check the part design by asking the following questions:

- Does the product design restrict gate marks or vestiges in specific areas due to aesthetic requirements? Also, consider knit lines, splays and blemishes.
- Can there be areas where gate vestige will cause injury or interfere with surrounding components in assembly? For example, components for medical products and barbs on parts for air or liquid flow systems.
- Are there critical, high-tolerance requirements such as flatness and roundness? Gate location influences these parameters.

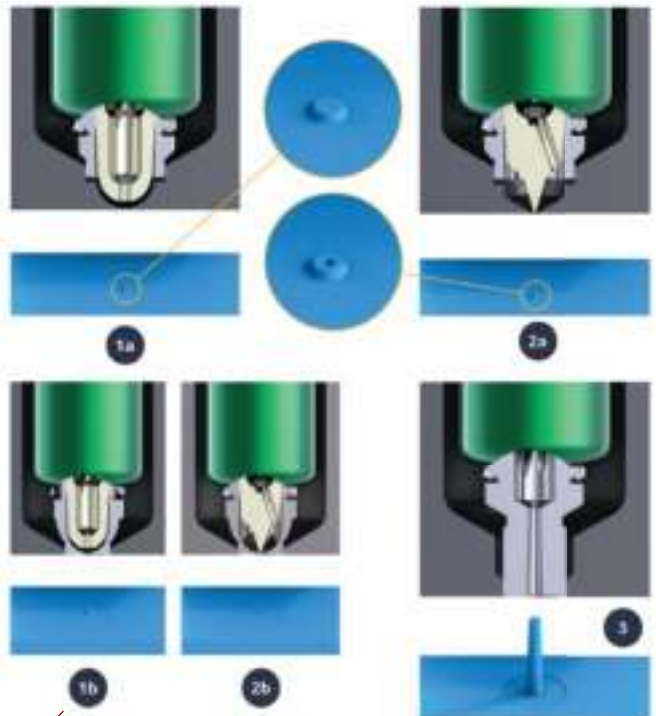
In some cases, indirect gating by a hot-to-cold runner system may be the solution. Where there are restrictions, a tab or post can be added if it is convenient for fill, provided the part design enables adding one. For some products, gating from the core or underside of the mold may be the only solution, which imposes many restrictions on the mold design, as ejection may be necessary on the fixed half.

It is also possible to gate on an angle, contoured surface or from the side. However, these designs increase hot runner costs and require tedious assembly procedures. Also, consider part and gate cooling requirements and verify conditions in all locations if more than one gate is necessary to fill the part.

Thermal gates offer various tip and needle styles. Valve gating is another option to mitigate the issues with thermal gates. They are 1.5 to two times more expensive than thermal gates but are often worth the investment.



This 144-drop hot half shows very closely positioned nozzles. Nozzle size and spacing are among the critical factors that help determine the size and cost of the hot runner system, mold and molding machine required for optimum production of a given part.



Some thermal gate tip options are illustrated here. The molder must specify what type of vestige, if any, is acceptable on the molded part so the moldmaker and the hot runner supplier can determine the best tip style for the application.

A sequential valve gate system may be necessary to meet product finish and quality specifications in parts requiring multiple gates. The ability to time each gate's open and close sequence helps manage end-of-fill and knit lines and eliminate gas traps.

After identifying areas for potential gate location, use a flow analysis to determine the optimal flow and fill balance. Always remember "thick to thin" — gates should be placed in areas with thicker wall sections.

Here are a few key factors to consider that influence gate and hot runner design:

- Melt flow index (MFI) in combination with wall thickness and flow length. Lower MFI resins such as polycarbonate (PC) require higher pressure and larger gates to fill.
- Fillers and additives play a significant role in flow characteristics. For example, glass fillers and flame-retardant additives increase injection pressure and temperature requirements. Filled materials usually require larger gates.
- Semi-crystalline resins like polyacetal (POM) and nylon need tighter temperature control due to a narrow window between their melt and freezing temperatures. Pay attention to the residual time of molten plastic within the manifold and nozzles to avoid material degradation or interrupted

production. The hot runner supplier engineers the system and provides guidelines to manage this efficiently. Well-positioned thermocouples and highly responsive heating components are required.

- Co-injection, gas-assisted, foam or MuCell molding and frequent color change requirements should be discussed early in the project.
- Materials like polyvinyl chloride (PVC) release corrosive gases and require corrosion-resistant material plus special coatings in the hot runner system.

With the correct information, estimating and quoting processes will flow smoothly for the mold builder and hot runner supplier. Always leverage each party's expertise because effective communication and collaboration will yield a quality mold and hot runner system. [MMT](#)

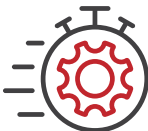
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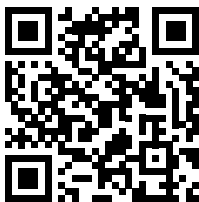
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How to Cut Setup Time, Extend Gate Life With the Right Machining Strategy

Microcut honing provides high-precision machining of needle valve nozzles and guides in hot runner systems.



Microcut honing technology is a user-friendly, economical solution for optimizing the function of small bores (diameters from 0.015 millimeter to 8 millimeters), especially for hard and difficult-to-machine materials. This technology enables the user to (a) produce the shape (roundness and cylindricity) and diameter within the narrowest tolerance ranges, (b) improve damaged surface structures (e.g., caused by spark erosion or hardening) via “cold” microchip machining and (c) compress the bore surface (inherent compressive stress).

The technology offers two significant advantages over conventional methods — milling, wire EDM and jig grinding — to machine needle guides and valve gates in hot runner systems:

1. A cost-effective, easily controllable process

The investment for a microcut honing machine is relatively small compared to conventional processing machines for bore machining. There is also savings potential in its ease of use because minimal training is required to operate the machine.

There is no need for time-consuming machine setup or tool dressing. Moreover, the machining process is robust and repeatable and the system requires minimal space (1 square meter) and energy consumption (2.5 volt-amperes at 400 volts).

This precision honing system machines bores from 0.015 millimeter to 8 millimeters. Applications include hot runner nozzles, needle guides and ejector pin bores in injection molds.

All images courtesy of Microcut AG.

2. Quality

The critical tolerances for hot runner applications are diameter, roundness and surface roughness. For example, surface finish and roundness <0.001 millimeter must be achieved to yield diameter tolerances of 0.001 millimeter. The one-piece honing tools are pre-calibrated to the target diameter to reproduce these results without any problems.

Below are the tolerances microcut honing can achieve.

MICROCUT HONING TOLERANCE	
Diameter Range	0.25 mm (0.01") - 8 mm (0.31") Bonded Grits
Diameter tolerance	±0.5 µm (0.00002")
Roundness	<0.2 µm (0.00001")
Cylindricity	<1 µm (0.00004")
Parallelism	<0.4 µm (0.00002")
Surface finish	Rz: 0.5 µm (0.00002") (Ra: 0.05 µm (0.000002") (N2)
Cycle time	Depends on the material, allowance, bore length
Part geometries	Rotationally and non-rotationally symmetrical
Materials	PCD, sapphire, ceramics, carbide, steel, powder metallurgical steel, various metal alloys, glass, various plastics

Benefits for Needle Valve Nozzles

An important application in moldmaking is *needle valve nozzles* (Figure 1). The goal is to achieve an ideal sealing function between the needle and the needle valve nozzle (gate) with the needle still able to move. A minimal defined mating clearance is required to achieve that goal. With the processing technology of microcut honing the best possible shape (roundness, cylindricity), surface and an exact dimension of the bore can be achieved.

Figure 2 compares the roundness measurement of a jig ground or milled bore and a bore after microcut honing. Due to the geometrically precise bore with microcut honing, the diameter of the needle can be defined more accurately.

This results in burr-free cast-on from the very first shot and an extended gate lifetime. Microcut honing can be used on new or existing molds to retrofit needle valve nozzles.

Benefits for Needle Guides

The advantages of a very cylindrical bore with an optimized

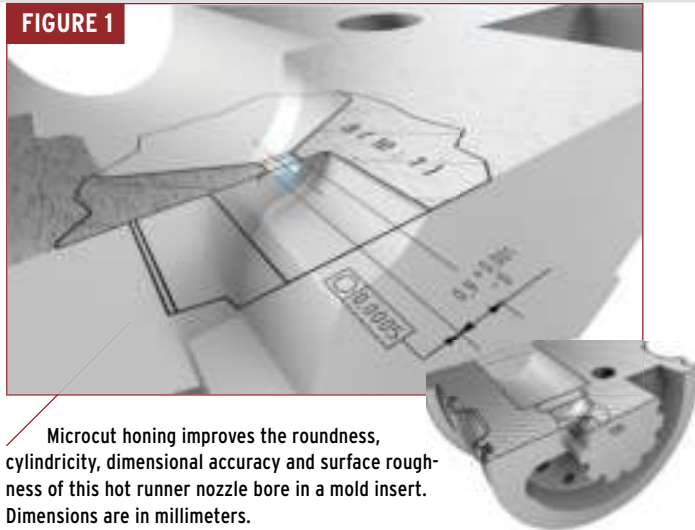


FIGURE 1
Microcut honing improves the roundness, cylindricity, dimensional accuracy and surface roughness of this hot runner nozzle bore in a mold insert. Dimensions are in millimeters.

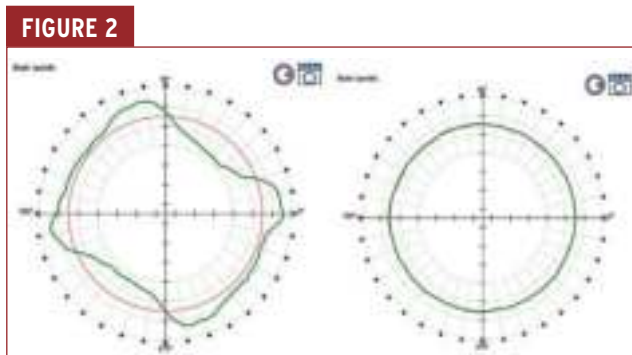


FIGURE 2
Jig ground or milled hole with roundness of 2.31 micrometers (left) and microcut honed hole with roundness of 0.16 micrometer (right).

surface are also evident in *needle guides* with reduced wear on the needle and bore that enables the hot runner systems to be used on the machine for longer, reducing downtime and mold maintenance.

Unique innovative machining tools and the intelligent, force-sensitive control of the machining process offer an easily controllable and robust process with minimum dispersion. The actual machining is carried out with tools coated with diamond or CBN grit.

Microcut honing can precisely, efficiently and economically produce bores below 8 millimeters in diameter. The system, which can be configured in various sizes, offers advantages for bores with cross holes or clearances. [MMT](#)

FOR MORE INFORMATION

Microcut AG
Patric.mikhail@microcut.ch / www.microcut.ch
Dr. Patric Mikhail, CEO

Five Ways to Make Your Tooling Assets Smarter

Global mold monitoring and asset management solutions can maximize productivity and efficiency.

Consider a shift in perspective regarding mold monitoring and performance. Instead of spending time gathering data, why not have the data at your fingertips and then spend your time analyzing that data to improve efficiency?

Today's shorter timelines, higher demands, supply chain challenges, fewer resources, less technical knowledge and increased remote activity make this focus on efficiency and performance critical.

The first step is to identify your needs. Are you trying to manage, monitor, maintain or maximize mold performance? No matter your answer, there are solutions for every mold builder, molder and OEM that align with your budget, timeline and resource constraints and offer different levels of visibility to match your business needs.

Use Data Proactively

A mold is the most valuable asset a molder or OEM has, so understanding what is happening inside a mold *proactively* instead of *reactively* is vital. Shops need to move away from being reactive because isn't it better to get diagnostics in real time before something unexpected happens? For example, if cycle time or downtime is slowly creeping up, isn't it better to know ahead of time

A smart mold can provide data to diagnose problems.

maximizing productivity.

This entails making a mold smarter. And let's face it, everything around the mold is getting smarter, so shouldn't the mold? The mold is the one piece of the puzzle left to collect vital data and correlate that data to what is happening in the process and with the equipment.

instead of reacting when something negative occurs and it's impossible or expensive to fix? Avoiding these unscheduled mold stoppages is critical to



All images courtesy of Progressive Components.

The team at CH3 Solutions in Dalton, Georgia, reviews real-time data to plan daily activities around maintenance and continuous improvement projects, and key performance indicators (KPIs) are monitored to ensure that OEE targets are being met.

A smart mold can be self-diagnostic with the right technology. Rather than a mold crashing and then finding out too late that something was not performing as it should have, or discovering a problem with the process that yields bad parts, why not put technology in the mold that can report back — either continuously reporting in real time so you can observe trends, or via a sensor that reports a critical failure or out-of-tolerance condition.

Mold data has value to every link in the chain; it just may be a different value for each link. For example, the OEM knows they need the data to ensure their assets are properly maintained and utilized, but they don't know how to enforce it because of the molders' reluctance, even as they are concerned about transparency. A molder needs to maintain the mold, to make good parts for the OEM, but also to drive continuous improvement activities and be more profitable. The mold



At a glance, users get a summary overview of their static assets and real-time assets' current status and KPI breakdown.



Customizable, role-based dashboards give users critical performance data to help drive decisions, continuous improvement activities and mold maintenance.

builder wants that information so they can provide feedback, suggest preventative maintenance (PM) strategies and not be held to warranty costs they have no control over.

Technology options to make a mold smarter and improve its performance can interface or be standalone. This decision depends on your business needs, budget, timeline and resources. Here are five ways to make your tooling assets smarter:

1. Asset Tags

Utilize QR code scanning for asset management, which enables location tracking, file sharing and storage of critical documents such as PM records, mold drawings, qualification documents and bill of materials (BOMs).

2. Mold Monitoring

Mold monitoring offers asset management capabilities and basic performance data (cycle times, efficiencies, OEE, local file sharing, flash drive or cloud-based), as well as visibility via

production reports and historical data.

For example, say a mold builder quoted a 20-second cycle and recommended maintenance at 50,000 cycles, but the molder runs the mold at 10 seconds nonstop for six months. There will be a problem. They are running faster than it was quoted and running without PMs. This gives the mold builder visibility when issues occur.

For the molder, mold monitoring can be a valuable tool also. It provides visibility to their internal operation and gives them the data to know how they are performing (OEE) and where there may be opportunities for optimization. The molder can also pull the production reports and go back to the OEM and say, "We've been running this mold and maintaining it within the quoted cycle time, but we're having problems meeting capacity, or the mold needs refurbishment." This data becomes evidence that the molder can use to show the OEM that he needs additional capacity or a refurbishment. It's protection for the molder.

Location and asset tracking using GPS allows users to see the number, types and location of assets on a global map.

For the OEM, it provides visibility to potential supply chain issues and a central place for all mold and process data to be stored/shared. That visibility ensures that the tool is properly maintained, process changes documented, and mold health and transfers are performed and documented efficiently.

Ultimately, mold monitoring is a communication device that allows the mold builder, molder and OEM data to talk in a common language.

3. Remote Validation

Users can easily hook up a portable version of a real-time monitoring system to a single mold for remote validation or mold qualification. Anywhere in the world, you simply plug this system into the molding press and add power to see data



GETTING STARTED

When it comes to mold data, forget a one-size-fits-all solution and consider “smart” technology that offers a customizable approach to what a mold builder needs internally while providing added value to molder and OEM customers, including a different level of visibility to match what each organization needs. To get started with any of these “smart” technology options, an OEM, molder or mold builder only needs to add an electronic monitor and then move to remote validation when ready.

OEM – Include electronic monitoring in mold specifications/RFQs up front and consider real-time monitoring at the molder after coming to an agreement about what is visible.

Molder – Include an electronic monitor to offer visibility and demonstrate how you offer value-added services to your OEM customer while also getting vital mold data for your operation.

Mold Builders – Add an electronic monitor to your tool specifications to reduce time spent on future documentation requests and to provide visibility into how the mold is being maintained.

streaming in real time on a secured website, including cycle time, mold stoppages, downtime events, etc.

It is a simple way to qualify a mold without being on site. A moldmaker can offer this remote validation kit to its customers for sampling, moving it from machine to machine, and molders and OEMs can move it from supplier to supplier. The system gathers much-needed data and dramatically reduces the need for multiple run-off iterations. It’s also a cost-effective option for collecting data, ensuring adherence to timelines, budget constraints and an efficient allocation of resources.

4. Real-Time Monitoring and Asset Management in One System

This solution offers comprehensive visibility into a user’s global molding operations, providing precise insights into their performance metrics such as reject rates, downtime rates, OEE and more. It provides real-time and historical data, enabling users to gain valuable insights into the overall status of their assets.

In addition, the system incorporates a complete PM and work order system, enhancing transparency and facilitating efficient asset management.

This is where visibility sensitivity comes into play with molders who don’t want to share their cycle time. To combat this objection, the software enables users to turn very specific metrics on and off.

5. System Cooling

This tool involves the measurement of the water flow, temperature and pressure throughout the mold. Cooling is 60% of overall cycle time and that 60% is the most ignored part of the process. Now imagine what cooling optimization can do for a business’ overall profitability.

Whether you are a mold builder, molder or OEM, isn’t it time to consider solutions that improve communication across the supply chain and help drive each business forward?



System Cooling allows molders to collect and view data on the cooling lines within a mold and the cooling parameters during production. Molders using the process monitoring system can view and collect data related to coolant flow, temperature and pressure with information recorded and time stamped for historical tracking.

duction, they knew the short-term investment would have prevented this failure and moved forward with cooling monitoring.

Whether you are a mold builder, molder or OEM, the ultimate goal is a dependable stream of quality parts on time to deliver the ROI each company needs. It isn't about "if" you start; it is about "where" you start on the road to making your assets smarter and using that data to increase efficiency and lower non-value-added costs in your organization. The best approach starts with an end goal and a comprehensive step-by-step plan to get there. **MMT**

For example, a medical customer needed system cooling on six 128-cavity molds and the total investment was around \$90,000 for six molding cells. The need was known based on the critical nature of the parts, but the short-term investment was challenging to justify. The customer knew that the systems would justify themselves if they had 12-24 hours of bad production. Three months later, after two days of suspect pro-

FOR MORE INFORMATION

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 Sujit Sheth, Monitoring Business Manager

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MOLD COMPONENTS

Commonly asked questions about the various technologies, processes and strategies used in moldmaking along with their answers and additional sources of information.

Image courtesy of Better Molding Solutions.



Q: Should I use standardized mold components?

A: There are many benefits to working standard components. For starters, the lead time on a project can be reduced. The time that would have been spent squaring up on blocks, machining, heat treating and grinding all of the slide components can be used to focus on the molding area. Programming time for the slide components is eliminated, and once the mold designer is tuned in to the idea of using standard slides, design time should also be reduced. What about cost? It is debatable. Depending on how long you determine it takes to manufacture all of the components of a slide assembly and what you use for a shop rate, the price of standard slides could be considered a bargain or overpriced.



Calculating the Benefits of Standard Slide

Image courtesy of Agathon.



Q: What are the key features of a guiding and centering system?

A: Key features include profile rollers; free space to add more mold inserts to increase productivity; flexible collar retaining ring can be positioned individually, and one item can be used for several plate thicknesses; long center stroke and flexible collar concept that means only one system required in stock for higher operational reliability.

WEBINAR: Roll Don't Slide: Flexibility and Reduced Wear Are Key Benefits to New Guiding and Centering Systems



Image courtesy of PFA Inc.

Q: How can I fix core pull flash and part problems?

A: Many problems can be solved by simply providing enough preload force on the core to prevent movement. Nonetheless, blocks and pins only provide a backstop to a core and often provide little to no active support to prevent movement. These methods rely on steel's mass or volume to minimize flex and movement to yield a "good enough" result. In this way, there is always some reaction to the forces of injection from the perfect positional geometry, rather than a proactive preloading of metal into position.



How to Solve Core Pull Flash and Part Issues

Q: How do self lubricating mold components work?

A: The main function of a self-lubricating mold component is to guide and control movement.

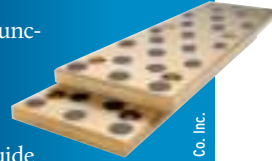


Image courtesy of SelfLube Co. Inc.

Such a mold is typically made of aluminum bronze, with embedded graphite plugs. The mating part of the mold (the one being guided) is usually made of hardened steel. As the two parts move relative to each other, the very slippery one-atom-thick sheets of graphite peel off and become distributed over the wear surface. With each cycle, a bit more of the graphite is distributed, so the process continuously replenishes.

Understanding Self-Lubricating Components



Q: How do I create the most efficient mold cooling process?

A: There are three keys to establishing the most efficient mold cooling process possible and producing quality products:



Image courtesy of Hiasco GmbH.

- Keep the cooling system a proper distance from the parting line and the molded part.
- Make sure the cooling line diameter is large enough to overcome the convection of the plastic material temperature into the surrounding steel.
- Use turbulent flow to pick up the maximum amount of heat possible from the steel.



Fundamentals of Designing the Optimal Cooling System

For more information, visit each FAQ's original article with the QR codes provided.

Content you may have missed. Read full stories with the QR codes provided. (This content is collected based on analytics and represents a variety of content and topics such as videos, products, features, etc.)



An “Impossible” Automation Project Still Proves Invaluable

Two years later and a once-thought-impossible automation solution is still proving its worth to the SelfLube high-mix, low-volume manufacturer via variable capacity.



Servo Control and Hot Runner Temperature Controller Best Practices

In this portion of our “Ask the Expert” series, Husky’s Vernon Moss answers some frequently asked questions on servo control and hot runner controllers. Vernon shares how following best practices for hot runner temperature controllers can increase the productivity of an injection molding cell.



Giving Back by Answering the Moldmaking Education Need



Maintaining a Customer-Centric Culture

Progressive Components President Glenn Starkey talks about the importance of the customer and culture when developing technology solutions for the moldmaking industry.



Applying Industry 4.0 to Cutting Tool Solutions



30 Under 30 Honoree, Plastics Engineering TA Teaches Value of Learning and Producing, Not Perfection

MMT brings on UMass Lowell plastics engineering teaching assistant Michael Shone as a guest for this MMT Chat to discuss moldmaking through the lens of academia.



SPE MTD 2023 Mold Maker of the Year

Editorial Director Christina Fuges takes the opportunity to sit down with the newly named SPE Mold Technologies Division 2023 Mold Maker of the Year, Patrick Roussey II, to learn about his lifelong career in moldmaking.



Emerging Leaders Instills Confidence in Future Workforce

What does a great leader look like to you? This question was explored at the AMBA Conference’s Emerging Leaders pre-conference session.



June GBI: Moldmaking – More of the Same

June – 46.8

Moldmaking activity contracted again in June, dropping another 0.6 points like it did in May. The Gardner Business Index (GBI) Moldmaking ended the month at 46.8.

With the exception of exports that contracted at a steady rate, components that contracted in May contracted *faster* in June. A couple components that were not contracting in May slowed in June, still managing to remain in expansionary territory.

Related components, new orders, production and backlog, were some of the ones that contracted faster in June. Backlog and new orders have been contracting for nearly a year now. Production has also been contracting since July 2022, though it experienced a reprieve from this activity from January to May 2023. It is surprising that neither new orders nor backlog paralleled that of production, considering this component expands to fulfill new orders and chip away at backlog. Supplier deliveries and employment lengthened and expanded, respectively, though slower than the previous month.

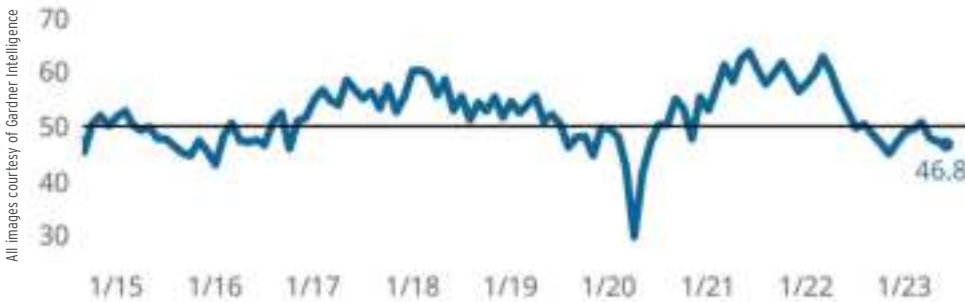
Sometimes, the future business metric — a sentiment question included in the GBI survey but not part of the calculation — paints a more optimistic picture when current state GBI components are not encouraging. That is not the case, however, for moldmaking in June. While the future business metric is growing, meaning more people think business in the next 12 months will be better than those that think it will be worse, the proportion of individuals who think this have declined the last three months. It is still comfortably distant from contracting activity, but the trend is concerning. [MMT](#)



ABOUT THE AUTHOR

Jan Schafer, MBA, is the director of market research for Gardner Intelligence, a division of Gardner Business Media (Cincinnati, Ohio, U.S.). She has been an essential part of Gardner Intelligence for over five years, and has led research and analysis in various industries for over 30 years. Jan is available at jschafer@gardnerweb.com

Gardner Business Index (GBI): Moldmaking



Production, New Orders and Backlog (Three-Month Moving Average)



GBI: Moldmaking activity dropped another 0.6 points in June.

Most components that contracted in May contracted faster in June. This was the case for new orders, production and backlog.



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**The further away a reading is from 50 the greater the magnitude of change in business activity.*

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CUTTING TOOLS



Access the related video under the corresponding product post at MMT online.

Indexable Milling Platform Advances Mold and Die Capabilities

For over 65 years **Dapra Corp.** has provided workholding, indexable milling and power tool solutions to a wide array of manufacturing segments including aerospace, automotive, mold and die and more. Recently, the company has announced its new high-feed indexable milling platform, "Vapor powered by TRI-X2."



The Vapor platform features elements in body design and TRI-X2 insert geometry for higher metal removal rates and extended tool life. Vapor is said to be ideal for extreme machining with modern machine tool technology.

Dapra is a U.S.-based, multi-generation, family-owned parent company to multiple brands which provides high-quality engineered solutions for various manufacturing and industrial markets. From indexable cutting tools to permanent part marking equipment, Dapra Corp. says it continues to develop and invest in solutions to empower the success of manufacturers across North America and beyond.

Dapra Corp. / 800-243-3344 / dapra.com

Inch-Size Solid Carbide Shoulder/Slot Mills

With more than 3,000 new cutting tools in inch sizes, **Walter USA** continues to expand its solid carbide milling offerings, which now include the MA230, MA320 and MA321 *Advance* shoulder/slot mills for universal application.

The MA230 *Advance* solid carbide milling cutter is for universal machining of steel, stainless steel, cast iron and high-temperature superalloys (ISO P, M, K and S workpiece groups) at the highest level. The tool's exclusive edge prep enables stable and efficient cutting action. An eccentric relief provides a strong cutting edge, and a proprietary coating allows for a higher cutting speed and extended tool life.

The MA230 *Advance* cutter is for high-performance roughing and finishing and enables reliable milling with a very high metal removal rate. Most sizes are available with either a standard or reduced neck. The diameter range is from 0.031 to 1.0". These tools are available in three-, four-, five-, seven- and nine-flute versions. For example, the seven-flute mill offers extreme metal removal rates delivered at full flute length and a 15% radial engagement for high-feed machining processes. The nine-flute mill is said to be excellent for finishing tight tolerance walls.



The MA321/MA320 *Advance* solid carbide milling cutters were also developed for machining ISO P, M, K and S workpieces. The multiple-use tools are designed for roughing and semi-finishing in a single pass. The sinusoidal ground profile ensures optimal chip evacuation, optimal heat resistance and minimum tool wear. The tools are ideally suited for milling ferrous materials with a medium hardness and appropriate for use when heavy cutting while still providing fine surface finishes. The diameter range is from 3/16 to 1.0". The tools are available with a cylindrical shank in four- and five-flute versions.

Walter USA LLC / 800-945-5554 / walter-tools.com/us

High Penetration Drill Advances Hole-Making Activities

Allied Machine and Engineering, a manufacturer of holemaking and finishing cutting tools, highlights the T-A Pro high penetration drilling system for mold builders to utilize.

With tool life being one of the top challenges that mold-makers face when drilling, the T-A Pro achieves long tool life at high penetration rates – especially in situations where the balance of ideal chip formation at high penetration is critical. A high-speed steel substrate (X geometry) insert not only provides good chip formation, but also withstands the interruptions that are common within the cross holes of molds. Additionally, special guided T-A holders can assist with added hole straightness throughout the cut; the carbide guides on the holder are an extension of the margins on the insert, providing straightness and stability.



A final challenge often encountered in the mold and die industry is creating a 90-degree bend at the cross holes. While a common solution is grinding custom forms into high-speed steel twist drills, Allied Machine offers a replaceable ball nose T-A insert that is a secondary forming option for the bottom of holes to create that 90-degree bend at the intersection point.

Allied Machine & Engineering / 800-321-5537 / alliedmachine.com

Cutting Tools Portfolio Caters to High Machining Demands

The Haimer Mill line is an innovative range of cutting tools that prioritize essential product characteristics for precise and reliable machining. These characteristics, according to **Haimer USA**, make the line an optimal choice for professionals looking for entry-level cutting tools that offer efficient and cost-effective machining solutions.

Haimer Mill solid carbide end mills are characterized by their reliability, versatility and precision. They are adaptable and suitable for use in almost all materials, the company contends, making them ideal for efficient roughing and finishing operations in various industries. The end mills also provide accuracy and consistency for high-quality and consistent parts production.



The Haimer Mill line complements the solid carbide end mills with a vast array of chamfering end mills, expertly designed to produce an optimal surface finish and precise angles, adding a high level of intricacy to any machining operation. With its variety of sizes and configurations, end users are provided with an extensive range of possibilities to select the best tool for the correct specific applications and enhance the quality of their work.

Haimer USA / 866-837-3265 / haimer.com

Round Inserts for Mold/Die Machines Boost Free-Forming Milling Reliability, Productivity

Tungaloy has introduced an enhanced FixRMill round insert “button cutter” line that boasts high performance while providing tool reliability when copy milling (free-form milling) the curved surfaces of stainless steel and difficult materials in five-axis machining. This line includes four inserts and eight cutter bodies.

FixRMill uses round inserts for machining molds and dies, especially complex male-female main parts such as cavities and projections. The round inserts feature anti-rotation notches on the insert clearance side and matching locations on the pocket seats. These notches are said to not only prevent the insert from rotating under heavy load but also help the operator get a true, distinct index every time he/she goes for a new edge; this ensures the entire insert is utilized.



The round inserts are available in size 12 in two geometries: RQMT1204ENC8-MM enables up to eight indexes for 1.4 mm (0.055)

or smaller D.O.C. and up to four indexes when used at 6.0 mm (0.236) D.O.C., featuring optimized per index cost. Alternatively, RQMT1204ENC6-MM can provide up to six indexes for 2.6 mm (0.102) or smaller D.O.C. The two inserts are interchangeable for the same FixRMill cutter body.

The MM-style chipbreaker provides the cutting edge with sharpness and robustness, demonstrating exceptional reliability in varying cutting forces typically generated during copy milling operations, Tungaloy says. Two insert grades are available: the AH3135 grade provides improved cutting performance over a range of material groups and AH8015 showcases high performance in difficult materials.

Tungaloy-NTK Inc. / 888-554-8394 / tungaloy.com/us

End Mill Grade Features Advanced Wear, Oxidation Resistance

Kennametal Inc. has added an efficient new cutting tool to its portfolio of solid carbide end mills, featuring enhanced wear and oxidation resistance. It is designed with a distinctive PVD coating technology that is reported to deliver extended tool life for job shops machining stainless steel, titanium and other high-temperature alloys for general engineering industries, mold and die and more.



The KCSM15A solid end milling grade features a new copper color design for easier wear identification, enabling improved tool life observation and reconditioning management. Enhanced process stability and minimized edge buildup allows the KCSM15A

to level up a moldmaker’s machining operations, according to the company.

Available platforms include Harvi III, Harvi III Aerospace, Harvi II Long and RSM II.

Kennametal Inc. / 800-446-7738 / kennametal.com

High-Feed Performance for Mold and Die Machining Operations

Ingersoll’s new NanoFeed technology provides mold builders with exceptional high-feed milling performance for machining of miniature components and smaller part features.

NanoFeed is a 20-degree high-feed indexable insert design that Ingersoll claims will replace smaller diameter solid carbide end mills in a variety of applications. Inserts have been designed with pressed-in coolant channels, directing coolant or air directly to the cutting edge for maximized tool life. Inserts also have backdraft side clearance for straight-wall milling capabilities. Available in 6- and 8-mm diameters with steel or carbide shank options, NanoFeed will reportedly reduce cycle times, increase productivity and help to reduce solid carbide usage.

Furthermore, this highly engineered high-feed insert geometry is free cutting, providing excellent stability when in the cut. This is due to a strong and precise offset v-notch clamping system that firmly secures the high-feed insert in the pocket. Increased feed rates along with increased productivity are said to be achieved from the three times feed rate multiplier offered with this design. These faster feed rates, combined with smaller cutter diameters, will enhance many smaller detail roughing operations.

Particularly useful will be the benefits provided when performing detailed, high-feed rest roughing operations, which are a commonly used programming technique in the mold and die industry. Dies and molds of different sizes often have smaller detailed part feature areas that require various types of CAM programming pick-out roughing routines to bring the part in to net shape prior to finishing. These routines can utilize different types of milling tools as well. Small diameter indexable end mills are a good option when milling these types of details. This is one industry-specific example of where the NanoFeed can offer significant process improvement, whether it’s for high-feed face, contour, shoulder, slot, corkscrew or ramp machining.

Ingersoll Cutting Tools / 815-387-6600 / ingersoll-icmc.com



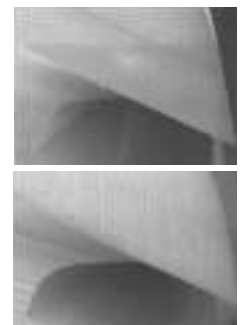
Diamond-Coated End Mills for Machining Electrodes

Crystallume, known for its chemical vapor deposition (CVD) diamond technology, features its three diamond-coated tool lines – Standard Premium, Lightning and Stealth – for machining the thinnest details in graphite electrodes.

The company’s newest and thinnest diamond coating, Stealth, is only 2-3 μm thick, ensuring that tools with the coating have the sharpest solid diamond cutting edge available, according to the company. Depicted in the images above via scanning electron microscope is a cutting tool with the Stealth coating (top) and one without (bottom).

Four-flute Stealth end mill series are available, with a cutting diameter of 1/32 to 1/4 and overall length of 1.5-4”.

Crystallume / 800-789-4322 / crystallume.com



CUTTING TOOLS

Roughing, Finishing Aluminum-Specific End Mill Line Expansion

Cutting tool specialist **Sandvik Coromant** is expanding its line of CoroMill Dura versatile solid end mills with aluminum-specific tools. The concept, originally introduced in November 2022, is well suited for roughing and finishing, giving it a variety of uses for industries like mold and die.

"Stable cutting, small burr, good surfaces and minimal vibration is a combination that's hard to beat for a versatile end mill like this," Antti Wikström, global product manager, solid end mills, at Sandvik Coromant, says. "One of the main advantages of the new CoroMill Dura aluminum-specific end mills is their versatile performance in all different types of roughing applications, while also offering finishing capabilities. Up to 2xD full slot, pocketing, 5-20-degree ramping, shoulder milling and more – all with the same end mill."



Another advantage is Sandvik Coromant's WhisperKut helix concept, in which each flute is carefully oriented, unequally spaced from the others and has its own individually adapted helix angle,

effectively breaking up harmful harmonics. This design is meant to eliminate vibration, resulting in quiet, safe and efficient machining.

The standard assortment offers diameters from 2-25 mm, depths of cut between 1.5-3xD, neck options, extended reach cutters, and sharp and corner radius styles. Tailor Made options include coated grades for more abrasive aluminums, specific diameters, corner designs and shank options.

To make tool selection easier, an online CoroPlus Tool Guide assists with tool and cutting data recommendations. "With the CoroPlus Tool Guide for CoroMill Dura, we can give the most accurate starting values for a specific application," Wikström says. "And, if you have CAM software with the CoroPlus Tool Guide plug-in, it makes it even easier – you get the most relevant cutting data recommendations directly into your CAM program."

Sandvik Coromant Co. / 201-794-5000 / sandvik.coromant.com

Small-Diameter End Mills Ideal for Mold and Die Industry

U.S. Union Tool (Union Tool Inc.) introduces the Inchmax series of inch diameter end mills for the mold and die industry. The Inchmax series consists of small diameter end mills on a 1/8" shank. Diameters range from 0.010 to 0.125" with flute lengths of 1.5 and 3xD, and a standard OAL of 1.500". Using the company's proprietary carbide material, the Inchmax series is said to hold the same tight tolerances and coating technology as U.S. Union's Unimax line, resulting in cost reduction, as well as longer tool life and consistent milling profiles.



The Inchmax series mills up to a hardness of 52 HRC in a variety of materials such as stainless steel, aluminum, titanium, platinum, brass and various alloys, making it ideal for multiple industries.

U.S. Union Tool Inc. / 651-552-0440 / usuniontool.com

Ceramic End Mills Excel in High-Speed Roughing, Milling of Heat-Resistant Superalloys

Emuge-Franken, a manufacturer of high-performance taps, thread mills, end mills, drills and other rotary tools, introduces its Cera-Cut end mills featuring a high-hardness cutting ceramic head brazed to a carbide shank for optimal vibration dampening and longer tool life compared to one-piece ceramic tools. Featuring a high-feed duplex cutting-edge geometry, Cera-Cut produces high metal removal rates in challenging nickel-based alloys, resulting in machining parts 200-400% faster than conventional carbide end mills. Also, the tool life of Cera-Cut is reported to be up to five times higher than regular carbide end mills.

"With the growing use of heat-resistant superalloys, we are pleased to offer our customers new, long-lasting, five-flute ceramic end mills for roughing and milling in these challenging applications," Dan Doiron, manager, milling products, Emuge-Franken USA, says. "For example, Cera-Cut excels in the machining of complex aerospace parts."

Cera-Cut end mills are designed for the consistent cutting of high-temperature resistant materials such as Inconel, Hastelloy and Nimonic as well as the machining of hardened tool steels. Cera-Cut is also suitable for making interrupted cuts, and offers a tight cutting diameter tolerance ranging from -0.0008 to -0.0016" (-20 to -40 µm), depending on the tool diameter.

Cera-Cut end mills can be used for roughing or pre-finishing, can produce 2D or 3D contours and are suitable for face milling, slot milling, helical milling, contour milling and pocket milling. Emuge-Franken Cera-Cut end mills are offered in different diameters from 0.24 to 0.79" (6 to 20 mm). Corner radius, modular and special designs are also available.

Emuge-Franken USA / 800-323-3013 / emuge.com



Face Mill Holder With Damping Vibration Control Supports Far-Reaching Operations

Big Kaiser, a member of the Big Daishowa Group, has expanded its lineup of Smart Damper-equipped, arbor-style face mill holders. This new holder is the largest and longest milling tool of the company's offerings, supporting face mills with diameters of 3", 4", 80 mm or 100 mm with an arbor pilot diameter of either 1" or 27 mm.

The Model SDF57 assembly has an outside diameter of 2.83" and enables those using 3" face mills to access up to 19.68" of reach. The new toolholder will benefit face milling operations where long reaches are common.

Smart Damper enables quiet, vibration-free milling, even in long-projection assemblies. The integral design of Smart Damper shortens the distance from the damping mechanism to the cutting edge. This produces higher damping effects to the tool assembly, minimizing chatter or vibration for improved surface finishes and metal removal rates.

The Smart Damper face mill holder is available for BBT50, BCV50 and HSK-A100 shank styles.

Big Kaiser (part of Big Daishowa) / 888-866-5776 / bigdaishowa.com



Coating Technology Enables Tough Mold and Die Steel Machining

Millstar, a part of Cole Tooling Systems Inc., offers an HNC coating for cutting tools that provides new levels of toughness and heat resistance for expanded machining capabilities. An evolution of the company's proven HSN coating, HNC is a multi-



layer hybrid nanocoating applied with state-of-the-art technology for what the company contends is the highest possible adhesion rate to the substrate. The result is a durable coating that outperforms on tough-to-machine, un-heat treated or heat treated materials up to 72 HRC.

HNC from Millstar offers an optimal combination of friction coefficient, hardness, toughness and oxidation temperature. Its

high performance with high-temperature alloys makes HNC an ideal choice for mold and die steels. The coating has been shown to achieve improved surface finish and greater accuracy with more consistent extended runs.

Millstar's HNC provides key benefits for increased efficiency in any machining operation, leading to lower overall production costs. These benefits include extended tool life, reduced tool inventory by eliminating the need for different coatings and reduced downtime from tool changes for chipped or worn cutters. HNC also has optimal lubricity properties for improved chip evacuation.

This versatile coating from Millstar can be used with a full range of both inserts and solid carbide cutting tools.

Millstar manufactures insert and solid carbide tooling for conventional profile machining, high-speed milling and hard milling.

Millstar / 586-573-9450 / Millstar.com

Universal Presetting, Measuring Machine Aids Cutting Tool Assembly

According to **Zoller Inc.**, the company's »redomatic 600« machine and a pair of powerful software programs give mold builders the peace of mind that their cutting tools are perfectly measured and assembled before production, optimizing the process to save time and produce a high-quality part.

The »redomatic 600« combines a presetting and measuring machine with a heat-shrink system for a two-in-one solution that maximizes accuracy and efficiency in five-axis CNC machining. The machine presets tool lengths within 10 µm to meet the high tolerances required in moldmaking. A recent redesign shortened the heat-shrink process, which has the added benefit of conserving tool life.



A presetting machine such as the »redomatic 600« is required to run Zoller's 3D Scan and »tool realityCheck« measuring programs. These modules provide mold builders quick, precise data to avoid CNC machine crashes and reduce the need to rework or scrap parts.

The 3D Scan rotates a tool and scans its contours to generate a highly accurate digital twin. The data can be output into several formats, including DXF, XML, STP and STL.

Zoller Tool Management Solutions users can include this digital replica in their tool library so the operator can easily locate and put together the components of each unique tool assembly.

The company's »tool realityCheck« performs a collision check prior to production. After entering the start and end points, the program scans the physical tool and compares it to the digital twin to ensure the tool assembly aligns correctly. A green dot means production can start, while a red dot warns a collision will happen. This safeguard is especially important in an industry where significant time often passes between the creation of an NC program and the actual machining.

Zoller Inc. / 734-332-4851 / zoller-usa.com

Precision Microfinishing Tools Supply Machine, Mold and Die Operations

Titan Tool Supply Inc. expands its precision microfinishing tool online product catalog offerings, making more than 100 products available for immediate customer order and shipment. The company's precision microfinishing tools have supported the advanced manufacturing requirements of hundreds of companies, as well as their associated machine shops, and tool, die and moldmaking operations.

Among the additions are new models of the company's Carbide Micro Grinding Mandrels for optimized precision micromachining accuracy and performance. Carbide Micro Grinding Mandrels are compatible for use with tungsten carbide, stone, marble, ferrite, composites, non-ferrous metals, industrial ceramics and other hard, abrasive materials.



Offered in Diamond and Borazon Jig types, the grinding mandrels are further available with a choice of either 500/600 or 325/400 grit, as well as either a 0.016, 0.020 or 0.02" head size. Diamond Jig Grinding Mandrels are also available with a choice of either 80/100 coarse or 200/240 fine grit. Borazon Jig Grinding Mandrels are offered with choices of 60/80 coarse, 100/120 medium or 230/270 fine grit. They are typically specified for the precision microfinishing of materials such as dies and die buttons, specialty punches, drill bushings and cutting tools, as well as stainless steel, exotic super alloys, cast iron, Beryllium copper and Stellite parts.

Titan Tool Supply has also recently expanded its Borazon Pin offerings, in support of the precision microfinishing of high-carbon, high-chrome, high-speed steels, such as M2, M3, M4, M7, T1 and T15; and D2, D3, D7 and A & O series die steels.

In addition, the company has expanded its available range of Composite Diamond Flex Files. Featuring a non-steel blank construction, the lightweight design of Composite Diamond Flex Files incorporates a specialty composite material for added durability and flexibility. A specialty "Dot Matrix" plating on the Flex File further enables the easy removal of filed materials, as needed to achieve a high surface finish.

Titan Tool Supply Inc. / 716-873-9907 / titantoolsupply.com

CUTTING TOOLS

Sharpening Solution to Give End Mills New Life

Darex has been in the business of drill bit sharpeners for more than 50 years. Knowing that the average quality end mill easily costs several hundred dollars, the company is finally applying its sharpening expertise to an upcoming end mill solution in the form of a new attachment for its XT3000 drill sharpener.

The LEX600 end mill attachment will enable users to sharpen the primary and secondary grind on the tips of two-, three or four-flute end mills up to 5/8", giving new life to these tools while cutting cost. While not a cutting tool itself, the sharpening solution is directly beneficial to managing cutting tools – specifically those that are commonly used by moldmakers to create shapes and holes for a mold during milling, profiling, contouring and more. Ultimately, Darex notes, its new end mill sharpener emphasizes its attempt to keep sharpening simple. A 30-day trial is offered to those that purchase directly through Darex. Join the company's mailing list at its website for release date updates.

Darex LLC / 800-547-0222 / darex.com



Submicron-Grade Carbide End Mills Achieve Material Removal Versatility

Greenleaf Corp. has announced Greenleaf-360, a new line of high-performance solid carbide end mills to complement the XSYTIN-360 line of solid ceramic end mills. Greenleaf-360 end mills combine a proprietary flute design with a high-performance carbide substrate for fast and efficient material removal with less stress induced into the part. A combination of strength, toughness and heat resistance enables machining capabilities from roughing to finishing with extended tool life and predictability, well suited for materials in the aerospace, automotive, mold and die, medical and power generation industries. Speed and feed performance are said to be 25-50% higher than competitive cutting tools.

Greenleaf-360 end mills use a substrate that is capable in a wide variety of materials, from low-carbon steel alloys to heat-resistant alloys. The submicron grade provides great toughness and wear resistance, the company notes, which offers customers one grade that can be applied in many different applications.

The PVD coating that is standard on all Greenleaf-360 end mills provides added productivity and performance. It offers a low coefficient of friction with a high service temperature range. This combination results in high wear resistance and enables higher speed capabilities, especially in heat-resistant alloys, according to Greenleaf Corp.

Distinctive features and benefits of Greenleaf-360 end mills include a full line of four-, five- and seven-flute configurations for solutions from full slotting to high-speed machining; extended shank length options for long-reach applications; and regrind capabilities to like-new condition. Greenleaf-360 inch and metric end mills are available.

Greenleaf Corp. / 800-458-1850 / greenleafcorporation.com



Toolholder Solutions for Moldmaking

Designed for accuracy to meet the demands of machining molds, **Lyndex-Nikken** offers three advanced toolholder solutions: MMC Collet Chucks, SK Collet Chucks and Shrink Fit Toolholders.

MMC Collet Chucks are highly flexible for machining molds and dies, providing both clearance and accuracy in small diameter cutting. Featuring a slim and compact body for precision machining with small diameter tools (up to 0.5"/12 mm), the MMC Collet Chuck is ideal for high-speed machining applications where clearance is needed. The MMC is precision ground and pre-balanced which helps ensure accuracy and reliability during high-speed operations up to 40,000 rpm. Runout accuracy is reported to be 0.00012" or better at four times diameter stickout of the cutting tool.

SK Collet Chucks feature a narrow body design to access tight spots in a mold. Key to the design is the patented titanium nitrided bearing nut that increases cutting performance and tool life durability by providing more efficiency than a conventional ball bearing built-in nut; good sliding effect due to surface hardness of HV-2,200; no damage – no friction or corrosion occurs internally; less microvibration with collet flange contact; and an increase in cutting performance and tool life durability with more cutting rigidity.

The company's Shrink Fit Toolholders provide optimal surface finish and extreme gripping, making them ideal for high-speed moldmaking applications. Shrink Fit Toolholders have 0.0002" or better runout and are pre-balanced for up to 20,000 rpm – this results in increased cutting tool life, material removal rate and mold accuracy. Lyndex-Nikken also offers a heat induction Shrink Fit Unit to quickly heat up the toolholder to expand the inside diameter.

Lyndex-Nikken Inc. / 847-367-4800 / lyndexnikken.com



Chip Splitter End Mills Excel in Deep-Cavity Machining

Hanita, by **Widia**, has introduced the VariMill Chip Splitters cutting tool to its portfolio of high-performance end mills, designed specifically as a solution for dynamic milling applications for high-temperature alloys, steels and stainless steels.

VariMill Chip Splitters are made with chip gashes (chip splitters) along the flute to rip chips in half, clearing a path for clean cuts; this solution also prevents bird nesting and lessens the potential for tool breakage. The end mills excel in the machining of deep cavities and side milling, shoulder milling and helical milling applications, due to a design that actively controls chip size, making the cutting tool optimal for mold builders.

The end mills come in five- and seven-flute configurations, from 8-20 mm metric standard diameters, both of which feature unequal fluting spacing for vibration dampening. The five-flute cutting tool excels in steel applications and seven-flute optimizes cutting operations for stainless steel and high-temperature alloy applications.

Widia Products Group / 800-979-4342 / widia.com



Cutting Tool Series Ups Mold and Die Machining Results

Intricate components require exceptional precision. To meet the mold and die industry's demands, **Kyocera SGS Precision Tools** highlights the Turbo-Carb,



Z-Carb-MD and Power-Carb cutting tool series, each of which contributes to quality finishes.

Engineered with a short flute length and rigid design, the Turbo-Carb series minimizes deflection, ensuring precision and accuracy. Its S-Gash Ball geometry effectively reduces

load and heat generated during cutting, extending tool life. It is well suited for machining complex contoured shapes in hardened steels.

The Z-Carb-MD is designed with a negative rake, heavy core and higher helix, offering high strength and shearing capabilities. The unequal flute spacing disrupts cutting patterns, minimizing damaging harmonics. With enhanced corner geometry and tight tolerance corner radii, precision is said to be boosted.

The Power-Carb end mill specializes in trochoidal milling applications in hardened mold and die steels. This cutting tool excels in dry machining scenarios. With its short flute length and large core design, Power-Carb minimizes deflection for precise and accurate milling. Optimized edge strength is the result of extreme negative rake and eccentric relief.

These three tool series benefit from high performance and durability with the addition of the Ti-Namite-X coating, according to the company, which reduces edge wear by 66%, extends tool life by up to 70% and increases smoother surface finishes by 321%.

Kyocera SGS Precision Tools / 800-823-7284 / kyocera-sgstool.com

New Tool Breakage Alarm System Mitigates Machining Damage

Air Turbine Tools introduces its Tool Breakage Alarm System, which can protect a mold builder's work-in-process and cutting tools, avoiding scrapped parts, lost hours and machine damage.



As pneumatic Air Turbine Spindles and Air Turbine Motors with cutting tools speeds from 25,000 to 90,000 rpm follow the programmed tool path the tool breakage detector system monitors cubic per meter and liter per second air flow. This is to determine any deviation from a sensitive baseline record of compressed air consumption.

Compressor malfunctions and fluctuations are also detected. If a cutting tool breaks, the system activates to alert the operator with a light and/or a klaxon alarm. Operators can also program the monitoring system to stop the CNC machine, lathe, automation or robot if controls are connected to the tool breakage alarm system's external port, permitting 24/7 unattended operation.

Air Turbine Tools Inc. / 800-840-4019 / airturbinetools.com

Advanced Turning Grade Gains Application Versatility

A new-generation turning grade has been launched by **Dormer Pramet**, offering moldmakers a high level of productivity and versatility. The Pramet T9415

is said to be the most advanced MT-CVD grade launched by Dormer Pramet in almost 10 years. This fourth-generation grade covers a broad application range, replacing the previous T9310 and T9315. In addition, it also partly overlaps with grade T9325, giving T9415 a wide range of applications in steel turning.



A 30% thicker coating than the previous generation improves tool durability by increasing resistance to wear and offers higher productivity by enabling higher cutting speeds. Several testing users of the new grade have reported that their productivity has doubled while machining carbon and structural steels.

Additionally, a new post-treatment process improves toughness and stability of the cutting edge, resulting in improved reliability in interrupted cuts and unstable conditions, while still being suitable for high cutting speeds.

Dormer Pramet says the insert seating area has been ground to improve stability and enhance heat transfer away from the cutting edge. This further helps to improve tool life, reducing the plastic wear on the cutting zones. Also, a gold TiN coating enables operators to better detect wear along the flank of the inserts.

Using the latest technologies, the Pramet T9415 inserts have optimized cutting-edge geometry which reduces cutting forces, enhances performance and saves energy.

Dormer Pramet / 800-877-3745 / dormerpramet.com

Micro-Diameter End Mill Series Reduces Cutting Time, Enhances Finishing for Ultra-Precision Moldmaking

Towa, with headquarters in Kyoto, Japan, is a global manufacturer of ultra-precision



molds and molding equipment for the semiconductor industry. The company has developed its own line of micro-diameter end mills and drills that feature high accuracy, with excellent wear resistance, sharpness and long life. Towa is now introducing its end mill product line to the North American market.

The end mills, tipped with CBN, which is the second hardest material after diamond, are offered in sizes ranging from 0.1-6 mm in diameter, with various configurations – from sharp corner, radius corner, ball, standard neck length and extended neck length. Towa also offers CBN end mills in multi-flute configurations. By maintaining the same feed per flute, and increasing the number of flutes, the company notes reduced cutting time, and thus, increased profitability. As the result of their hardness, the CBN series of end mills are ideal for machining hardened materials in the range of 55 to over 60 HRC.

Towa's proprietary-coated solid carbide end mills are offered in sizes ranging from 0.1-20 mm in diameter, and with the same configurations as the CBN series. Specialized coatings, such as "Hard Star" is designed for finishing operation for hardened steels from 55 to over 60 HRC. "Ion Depo" coating enables the machining of hardened steels to the 50 HRC range, and is well-suited for machining non-ferrous materials such as copper and aluminum alloys and graphite.

Tooling | Towa Corp. / 81 75 692 0250 / towajapan.co.jp

CUTTING TOOLS

Hydro Chuck Toolholder Promises Precision When Heavy Milling

Precision cutting tool solutions manufacturer **NT Tool**, and a key company in the aerospace, medical and mold and die industries, highlight the Hydro Chuck Omega, an innovative addition to its PHC family which offer the machining industry advanced features and high performance.



The Hydro Chuck Omega is designed to eliminate the common issues of chatter, deflection and pullout that often occur during heavy milling. With this tool, users are capable of high-efficiency machining. Cycle times are reduced, and surface quality is improved, leading to increased tool life.

The key benefit of the Hydro Chuck Omega is the anti-vibration effect of the hydraulic chamber. It is said to provide improved surface quality while displaying accuracy and precision in every cut. The dual clamping oil chamber around the chucking sleeve absorbs cutting vibrations, utilizing a stronger gripping force than a conventional hydro chuck.

The hydraulic clamping enables an accuracy of 3 μm at four times the diameter of the cutting tool. A repeat setup chucking accuracy of 1 μm or less further supports its high-precision capabilities, which collet holders with multiple parts cannot achieve, UT Tool reports. Clamping with the Hydro Chuck Omega is easy, quick and simple, and because only a hex wrench is required to operate its dual clamping points system, a stable and high-precision procedure is guaranteed. The tool's pre-balanced design and individual balancing for each product also enables higher rotational speed machining applications.

Eliminating excess material after milling is simple with the Hydro Chuck Omega, so cleaner and more efficient cuts are ensured. This reduces the need for zero cuts and machining in later steps, resulting in faster and more efficient production processes.

The Hydro Chuck Omega is now available for purchase from authorized dealers of NT USA Corp.

NT USA Corp. / 615-771-1899 / nttoolusa.com

Versatile End Mills Key for Moldmaking Operations

IMCO Carbide Tool Inc. has developed a new series of Pow-R-Feed M936 end mills with the versatility to machine a slot for wire channels, cut a helical entry into an insert pocket, rough the pocket with a traditional or HEM tool path and face off the rough block to square it up, all without a single tool change.

Designed for faster part cycles and high speeds, regardless of a machining station's horsepower, the M936 designs feature wiper flats and flute geometry ideal for producing good surface finishes on workpiece sidewalls and floors.

One of the best features of the M936 six-flute is its extended tool life in die steels, Application support manager Steve Avers says. Tool life is reported to be exceptional, thanks to the variable helix and variable index effects on vibration damping, a specially engineered carbide core and an AlTiSiN slippery-smooth coating, which also prevents chip buildup and enables high feed and metal removal rates

"M936 end mills are free cutting, so they reduce heat transfer to the work piece," Avers explains. "Less heat transfer means less risk of warpage. Also, note the open-ended face geometry. That's what makes it cut really well in a downward direction. So it's an extremely effective cutter when you're machining 3D impression shapes."

End Mill Series Design Enables Dynamic Milling Strategies

Proper cutting tool selection for moldmaking, such as the **M.A. Ford** TuffCut XV series XV5CB, XV7 and XV7CB end mills, get the job done when it comes to improving speeds and feeds, wear and surface finish, in addition to standing up to difficult-to-machine materials like alloyed steels.

The company's XV5CB five-flute end mill is designed to deliver exceptional metal removal on steels and stainless steels with up to 4xD axial engagement. Using AlTiTiN coating, staggered chipbreakers and open end geometry for aggressive engagement, it is ideally suited to dynamic milling strategies.



Available in diameters from 3/8 to 3/4", the XV5CB's combined variable pitch geometry flutes and thick core are said to minimize harmonic vibration and increase strength. Productivity is increased via the tool's aggressive stepover capabilities while maintaining a stable and reliable process.

The TuffCut XV7 series end mill shares some of the same features as the XV5CB such as the staggered chipbreakers, AlTiTiN coating and thick core design. In addition, the XV7/XV7CB was developed for dynamic milling strategies in tough-to-machine materials. This cutting tool uses M.A. Ford's variable pitch, center-cutting geometry to deliver optimal metal removal rates. It's 180-series geometry, along with some distinctive enhancements, enables more efficient ramping and enhanced floor finishes.

Available in 1xD up to 4xD flute length options, the thick core design helps maintain rigidity during high axial engagement machining.

Ultimately, the TuffCut XV series, with a thick core design and increased axial cutting, makes them reliable tools that can be used across many industries.

M.A. Ford | 800-553-8024 | maford.com

Another notable benefit is that users can make various toolpath moves without slowing down, Avers says, "so they get faster cycle times and more production."

The M936 maximizes the output of machines most customers use, Avers adds. With conventional low-horsepower machines, its free-cutting action means the M936 cutter can run to the machine's upper capacity limits.

"This is the cutter for any programmer machining steels, stainless steels and titanium on three-axis to five-axis CNC machining centers who wants to run fast and helical enter, ramp, slot and peripheral mill at optimal feed rates," Matt Osburn, vice president, technical director for IMCO, adds. "Toolbot, IMCO's simple-to-use and intuitive feed and speed calculator, which is available through our website, gives programmers instant feeds and speeds for M936 in most materials and cutting conditions. It couldn't be easier."

IMCO Carbide Tool Inc. / 800-765-4626 / imcousa.com



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CUTTING TOOLS

Tool Caddy Safely Stores Cutting Tools

Kaiser Manufacturing's Tool Caddy is a compact storage solution for assembled CNC tooling. The narrow stainless steel rack features up to 82 locking, horizontal pockets for CAT 40 or HSK 63 toolholders.

The horizontal arrangement of the tool pockets is designed for machinist safety. Traditional tool racks and carts keep tools in a vertical position with the cutter tip pointing up. This creates a risk of injury for operators when they need to reach over sharp edges to access other tools in the middle or back of the cart. The Tool Caddy design makes it convenient for the operator to grab each toolholder without any risk of cuts, and it uses only about 4 square feet of floor space.

Each tool pocket is slightly angled to safely support the tool while allowing coolant to run off the tool tip and collect in the integrated drip pan. This further improves safety by keeping fluid spills off the shop floor.

Tool Caddy is practical and convenient for tool storage next to the machine, by the pre-setter or for organizing special tool sets. It is available for all major spindle interfaces including CAT 50, HSK 100, BT and Capto.

Kaiser Manufacturing / 855-919-3626 / kaisermanufacturing.com



Reamer Reconditioning Service Restores Cutting Tools to OEM Specs

Monaghan Tooling Group offers a Diatool reamer reconditioning service that can retip, renew and restore most major brands of high-performance reamers to OEM specs. The service includes replacing all blades, grinding a fresh bevel geometry, refurbishing the body of the reamer and coating the blades if required.

Diatool reamer reconditioning is designed for solid and expandable monoblock reamers, expandable cutting rings and replaceable head reamers. Diatool can provide multiple options in advanced coatings and blade materials using cermet, coated carbide or polycrystalline diamond (PCD). Diatool does not limit the times a reamer can be reconditioned, providing a longer service life of the reamer with no compromise in tool life or cutting quality. Diatool's reamer reconditioning service is said to offer standard deliveries of 4 to 6 weeks and cost savings of 40% over new tooling.

In addition to refurbishing, Diatool offers application consultation to improve existing tooling by offering the latest alternative geometries or coatings. According to the company, typical results are higher bore quality of the part, reduced cycle time and significant savings without reinvestment in new tooling.

Monaghan Tooling Group / 800-732-4565 / monaghantooling.com



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ADVERTISERS' INDEX

Allied Machine & Engineering.....	26
DME Company.....	16
Edro Engineering Inc.....	7
EMO Hannover.....	33
Formnext Forum - Austin.....	5
Gardner Intelligence.....	37
Hurco North America.....	1
Iscar Metals Inc.....	3
Mold-Masters Ltd.....	Back Cover
MoldMaking Conference 2023.....	17
PCS Company.....	21
PFA Inc.....	9
Platinum Tooling.....	16
Progressive Components.....	Inside Front Cover, 47
Regal Components Inc.....	15
Takumi USA.....	1
Techspex.....	Inside Back Cover
The Automated Shop Conference (TASC).....	22, 23
VDW - German Machine Tool Builders' Association.....	33

How to Overcome Common Deep-Hole Drilling Challenges

By Thomson Mathew

Understanding the deep-hole drilling process and being aware of common problems turns a complex operation into a productive and profitable one. Deep-hole drilling produces holes in metal at high depth-to-diameter ratios on CNC machines. The length-to-diameter ratio is less than five times the diameter for normal drilling processes. The process is called deep-hole drilling if the length-to-diameter ratio goes beyond five.

Deep-hole drilling is effective in diameters ranging from 1–200 millimeters (0.04–8.00 inches). It requires special drills with through-coolant holes that deliver high-pressure coolant to evacuate chips cleanly and achieve required hole tolerances and surface finish.

Process Review

Some standard deep-hole drilling processes include gundrilling, BTA drilling (boring and trepanning association) and conventional carbide twist drills, each offering benefits based on hole diameter and tolerances.

- **BTA drilling** is an effective method of drilling deep holes, as it is cleaner, reliable and capable of achieving larger diameters at higher feed rates. BTA drilling is effective in holes from 20–200 millimeters (0.80–8.00 inches), a more extensive size range than gundrilling and carbide twist drills.
- **Gundrilling** was originally developed to drill out gun barrels and is commonly used for drilling smaller diameter deep holes. The depth-to-diameter ratio can be even greater than 300:1. The critical feature of gundrilling is that the bits are self-centering, which enables such deep, accurate holes.
- **Carbide twist drills** with through-coolant holes are also commonly used in several deep-hole drilling applications. The challenge is to manufacture and regrind these drills with minimal runout, which requires an additional axis on machines to support the flute grinding process.

Three Ways to Conquer Deep-Hole Drilling Challenges

1. Through coolant or internal coolant. Coolant can improve chip evacuation while cooling the cutting edge. Coolant is flushed down to the bottom of the hole, pushing the chips back up toward the top. Software is available that helps design

and verify the coolant holes at the design stage, avoiding coolant holes breakage into flutes and eliminating scrap.

2. Hole straightness. The “margin or radial land” is the portion of the drill that contacts the hole. A single-margin drill (one margin per flute) is preferred in long-chipping materials. This is because single-margin drills provide additional clearance in the



Image courtesy of ANCA CNC Machines.

Typical deep-hole drilling processes include gundrilling, BTA drilling and carbide twist drills.

longer chipping materials. In contrast, a double-margin drill (two margins per flute) provides excellent hole straightness compared with a single-margin drill.

Although not as common, double-margin drills with a floating second margin are also available where a compromise can be made on hole straightness and chip evacuation, so more margins add accuracy while maintaining a higher surface finish but restrict the amount of clearance for chip evacuation.

3. Tool runout control. One of the most significant challenges of deep-hole drilling is maintaining control of runout, which increases with cutting tool length. Consider a more accurate method of toolholding that can deliver minimal runout and longer cutting tool life that includes a high-precision collet adapter and tool support system. **MMT**

FOR MORE INFORMATION


ANCA CNC Machines / anca.com
Thomson Mathew, Product Manager

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