

MoldMaking

TECHNOLOGY

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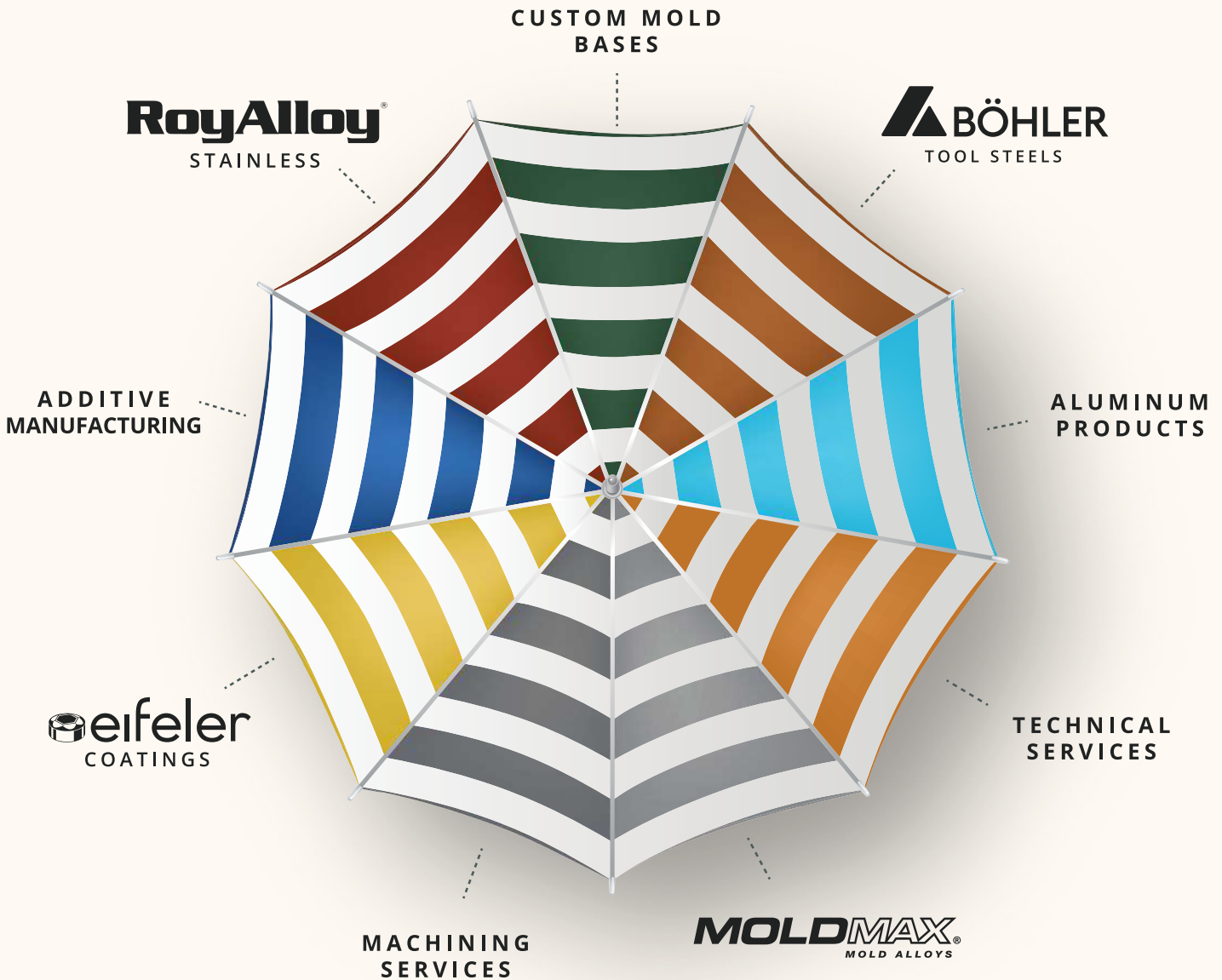
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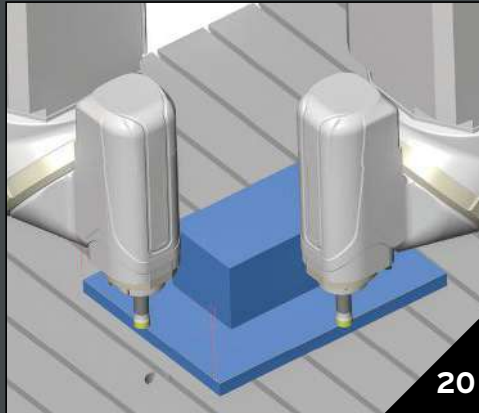
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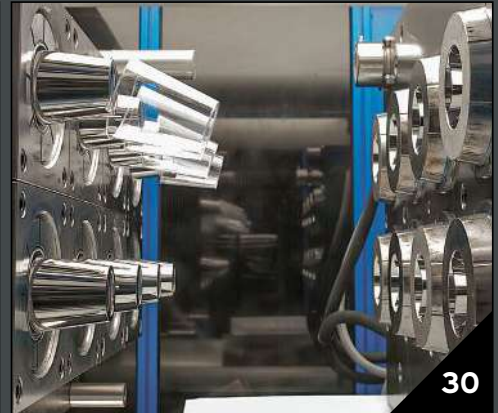
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Highly integrated but easy-to-use ERP system helps Delta Mold Inc. increase unattended hours, uptime, productive labor hours and improve mold delivery times.

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ON THE COVER

Cover image courtesy of Progressive Components, designed by Richard Evans of Reaction Plastics Solutions. The cover image shows a 32-cavity packaging tool producing a cup, designed and rendered in SolidWorks. The molded part includes an internal thread, and the mold features stripper plate ejection. With an anticipated product life cycle requiring 4-5 million parts, this mold features hardened stainless components with cooling jackets around the insert for optimal cooling, wear surfaces treated with black nitriding, multi-plate bar locks and an onboard mold monitor for recording performance and connecting to scheduled maintenance activities. See related article on page 56.

Source (in order) | Dynamic Group, Open Mind Technologies USA and Oasic Consulting.

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MMT @ NPE 2024!

The MMT Team will be on-site all week to talk shop with MMT readers, explore the show floor and promote all things MMT!

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NPE 2024 Set to Showcase Solutions for Six Key Moldmaking Trends



The moldmaking and plastics industries have undergone some changes in the past six years. As we put together our NPE 2024 Exhibitor Technology Showcase (see pages 38-55), we asked exhibitors to share the most significant trends they have observed since NPE 2018:

1. Technological Advancements for Efficiency and Speed: There is a continuous drive for efficiency and speed to market, with companies offering comprehensive solutions to streamline processes and reduce downtime. For

example, the use of ERP systems for integrated business management, 3D printing for cost-effective testing of new designs and improved cooling efficiency through conformal cooling, laser technology for 3D texturing, surface structuring, digital watermarking, electrification, digitization and automation.

2. Education and Training: The industry continues to face a shortage of skilled labor. Companies are looking for ways to mitigate this challenge through automation, simplifying processes and improving ergonomics. There is an emphasis on training in CNC cutting, grinding, specialized grinding and EDM educational institutions are adapting to industry needs, with courses focused on automation and hands-on experience in mold design and manufacturing. The industry is also adopting technological advancements.

3. Vertical Integration: Mold builders are offering more services, including production molding capabilities and automation concepts in parallel with mold design to improve project timelines and address manufacturing issues early in the process.

4. Digital Transformation/Data-Driven Decisions: There is an increasing reliance on data-driven decisions to validate manufacturing strategies and make informed adjustments, not just on the production floor but in the toolroom as well. This trend requires using data to track and keep historical information on mold building and molding processes through AI, in-cavity sensors, mold monitoring and data security and ERP that integrates data from all aspects of the business.

5. Part Complexity: Industries such as medical and electronics are requiring smaller parts and parts with more complexity, creating a need for small-diameter core pins, including micro pins, and requiring innovative moldmaking techniques such as conformal cooling and new metal powders with higher thermal conductivity and toughness.

6. Sustainability and Environmental Responsibility: There is a growing focus on sustainability, leading to the development of eco-friendly materials, improved recycling technologies and more energy-efficient manufacturing methods. [MMT](#)

Christina Fuges

Christina M. Fuges
Editorial Director

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MMT TIPS

5

TRICKS OF THE TRADE

Great Tips from This Issue

1. Top Skill

Problem-solving skills are paramount for mold builders. Being adaptable and thinking creatively to solve issues is crucial in meeting the demands of the industry.

PG. 8

2. Greater Productivity

The right ERP should provide highly usable data and analytics, helping management to tighten up financials and forecasting and be highly customizable during setup.

PG. 16

3. Not Always

Five-axis simultaneous tool paths are not required in every case on a five-axis machine tool. The user can benefit from software capable of providing high-performance indexing and simultaneous solutions.

PG. 20

4. Round Or Not?

A mold designer must always first consider whether a rounded edge is necessary at the end of the part and at the parting line. While it may be more aesthetically pleasing to have a rounded edge, in most cases it causes much more complexity and tighter manufacturing tolerances.

PG. 30

5. Got Your Library Card?

The first step is to set up the main library of components for primary selections. This library should be set up with the common and approved components easily accessible and kept to a manageable size.

PG. 56

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The Intersection of Robotics, Hands-On Training in Mold Design Curriculum

By Christina Fuges

What follows is a Q&A with Nicholas Vitelli, MMT EAB member and engineering lecturer at Penn State Erie, The Behrend College.

Q: What is your primary role at The Behrend College and what aspects of advising and teaching do you focus on?

A: Most of my time is dedicated to teaching courses in the plastics program, and I advise students both academically and in their career paths. I also oversee student groups and our capstone senior project course, which involves industry-sponsored projects.

Q: What makes the program at The Behrend College unique?

A: The program stands out due to its comprehensive curriculum and hands-on experience. We have one of the largest undergraduate processing labs in the country, covering a wide range of processes, from injection molding to blow molding and thermoforming. We also provide access to sophisticated equipment typically reserved for graduate-level studies, allowing our undergraduate students to gain experience in advanced testing methods and



The Manufacturing Center at Penn State Erie, The Behrend College is an open lab housing sophisticated equipment for students to gain hands-on experience in plastics engineering. Source | Penn State Erie, The Behrend College

equipment related to polymer science. electives that offer more specialized and in-depth training in areas like mold design.

Q: How does the Manufacturing Center contribute to addressing these educational gaps and industry needs?

A: The Manufacturing Center focuses on providing access to cutting-edge technology and equipment for local industries. It aims to bridge the gap between academic learning and industry needs, allowing companies to experiment with new technology and processes to enhance their operations and efficiency.

equipment related to polymer science.

Q: What do you believe is lacking in educational programs preparing students for the moldmaking and plastics industry?

A: The main challenge is the vast depth of knowledge and experience required in the field. Four-year programs cannot cover the extensive expertise needed in mold design and manufacturing. To address this, we're working on certificate programs and technology

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 moldmaking industry to serve a three-year term.

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Nick Vitelli
Penn State Erie, The Behrend College

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Get to know MMT's EAB members at short.moldmakingtechnology.com/EAB

Q: Can robotics replace jobs in moldmaking companies?

A: Robotics is increasingly used in some aspects of mold building due to the shortage of skilled labor. While not a complete replacement for human labor, robotics aids in streamlining certain tasks, improving efficiency and precision.

Q: How does Penn State involve students in the Manufacturing Center?

A: The educational approach involves an open lab setup. Students have access to all facilities to foster hands-on learning and exploration. It helps them discover specific industry segments they might find intriguing, encouraging their involvement in real-world scenarios.

Q: What plans does Penn State have to enhance the mold design curriculum?

A: Penn State aims to incorporate advanced topics into the mold design curriculum, such as designing cooling systems, understanding mold warping issues and project management. They are also looking into specialized certificates to offer students, in addition to their primary plastics engineering degree. [MMT](#)

FOR MORE INFORMATION

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The Behrend College
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Nick Vitelli, Engineering Lecturer

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#MMTRespectTheMold

William Docherty • 2nd
Export Sales Manager at ADOP FRANCE. The reference in L...

I am so lucky to be starting out on this adventure with Domazet, the HMC team and Adop team. A big thanks to them all as well as Guy Desjardins for believing in a vision - Growing together to ensure Injection Blow Mold (IBM) manufacturing "Made in France".

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Christina Fuges • 1st
MoldMaking Technology, Editorial Director

Enjoyed speaking with you gentlemen last week to learn about both companies, your IBM expertise, the motivation behind this partnership and your plans for the future. I felt your excitement (even through the computer screen 😊). Congratulations 🎉!

William Docherty (Author)
Export Sales Manager at ADOP FRANCE. The reference in Injection...

Thank you Christal! It was a real pleasure exchanging with you on this!

Mehdi Saint-Ange • 3rd+
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Congratulations

William Docherty (Author)
Export Sales Manager at ADOP FRANCE. The reference in Injection...

Thank you Mehdi

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Christina Fuges • 1st
MoldMaking Technology, Editorial Director

#MMTConversationWith... NextGen Mold Technologies Inc. Check all their coverage out at <https://lnkd.in/xvz2G6xk>



Reactions

Christina Fuges (Author)
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Sales Development Representative at Creation Technologies Canada a fa...

Great to see new companies strike a beautiful balance of progressive technology combined with genuine interest in employee engagement. Watching with great anticipation!

#MMTChats #MoldMakingConference



#innovation #kidcaddie



Kid Caddie Golf
24 followers
40 • Edited •

What a great article on how to bootstrap and scale a physical product into a company that is changing the way families play golf. Thankful for such a cool opportunity to work with MoldMaking Technology to tell our story.

Christina Fuges • 1st
MoldMaking Technology, Editorial Director

A Fun "Golf" Story to Tell
Kid Caddie Golf (patent pending) is a sophisticated piece of engineering designed to be lightweight and perfect for families looking to enjoy a round of golf. The inspiration for this product came from the birth of Ben Falbanks' daughter four years ago. From the outset, he wanted to create an injection mold to streamline the production process, but he also wanted to balance volume and cost-effectiveness.

Read all about his journey from inspiration

#InCaseYouMissedIt

#womenimpactingmoldmaking

MoldMaking Technology

You wanted more of Jane's story as a woman in moldmaking, so we went back to dig a little deeper with this 23-year-old mold designer and project manager at Accede Mold and Tool: <https://bit.ly/49wnfD0>



#MMTRespectTheMold



Caro Reedy and 25 others

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A Conversation with ... Dynamic Group

By Christina M. Fuges

Who is Dynamic Group?

Brian Kalina, director, tooling operations, Dynamic Group: We are a precision injection mold builder and plastic injection molder operating in two facilities located 11 miles apart. The tooling facility, spanning 16,500 square feet with 36 employees (including six apprentices), specializes in tight-tolerance, high-volume production of single- and multi-cavity tooling, focusing primarily on Class 101 and 102 molds.

We also build Class 103 or 104 molds as part of prototype-to-production programs. The injection molding facility, covering 23,500 square feet with more than 60 employees, is ISO13485-certified and specializes in molding and assembling medical devices and parts requiring cleanliness, consistency and traceability.

The only dedicated resources are the mold-makers located at each facility.

In 1977, Dave Kalina proposed a partnership with Peter McGillivray to build molds. McGillivray agreed, and the company, initially named Dynamic Engineering, has thrived for 47 years.

The company is evenly split between the two families, with Kalina and McGillivray remaining majority shareholders now along with three second-generation shareholders. In addition to my role as an owner/operator, Joe McGillivray is our president and CEO.

Dynamic Group's foundation is built on the philosophy of early adoption of business practices and technology. The company has been a pioneer in departmentalization, owning a wire



Dynamic Group is committed to continued investment in tooling, fixturing and equipment to maintain its mold manufacturing methods.



Minnesota-based Dynamic Group is a precision injection mold builder and plastic injection molder operating in two facilities located 11 miles apart, built upon the philosophy of early adoption of business practices and technologies.

Source (All Images) | Dynamic Group

EDM, obtaining ISO 9001 certification and adding molding capabilities. The moldmaking and molding companies operated separately until 2008, when they merged under one management team.

In 2016, the second generation assumed day-to-day operations, with Joe McGillivray becoming CEO. By 2018, they aimed for growth in molding to account for 70% of the company's revenue, while maintaining its existing moldmaking capacity and customer base.

When and how did you realize you had to adapt your moldmaking focus to better align with the growth in production molding by shifting the tooling team's focus to maintenance, repair and replacement tooling from new tooling programs?

Kalina: The investment in our engineering and quality departments for molding operations moved us from reactive to proactive. Our tooling operations had always been able to accommodate the urgent requests for repairs as needed, but the type and volume of requests to solve systemic issues with revisions and fixturing rose exponentially.

Although we have always been responsive, the continual introduction of such quick-turn projects started to more frequently impact our other commitments. We were having too many internal conversations to justify our priorities and too many conversations with our customers to explain why their projects would be late.

What was the first step and who was involved when making this shift?

Kalina: The first step is always accepting that you have a problem. Immediate support, when needed, had always just been considered an expectation of running a tooling operation,



More than 60 employees work in the injection molding facility, which specializes in molding and assembling medical devices and parts requiring cleanliness, consistency and traceability.



Dynamic Group's group has taught the team to make decisions with a greater awareness of capacity, which demands compromise and alignment across the entire team.

not just for our own molding operations but for most of our tooling customers. This had long been supported primarily through spontaneous overtime.

However, with industry changes regarding employee work-life balance, this continued to be more difficult. Like it or not, our ability to respond this way diminished. We had to first align awareness and acceptance of this new reality with sales and project management to balance and satisfy the two distinct demands for toolroom resources — new tooling and quick response.

We had to evaluate our overall capacity throughout two timeframes, the earlier including not just quick-response projects already in process, but also the reserved capacity for the unknown yet inevitable requests. The discipline not to overcommit new tooling projects into that capacity continues



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- A submersible rotary index in wire EDMs enables the low-volume manufacture of small precision core pins instead of outsourcing to a grinding shop.
- A vision system improves the consistency and accuracy of tooling component inspection.
- Growing molding business shifts the tooling team's focus and culture to include maintenance, repair and replacement tooling in addition to new tooling programs.
- Increased molding engineering team helps identify required tooling support and facilitates/manages customer change requests.
- Expanded use of ERP system includes maintenance/repair/overhaul (MRO) to manage and improve efficiency with the ever-increasing demand for tooling resources.
- Increased workforce development activities improve retention and increase new hire opportunities.



Technically knowledgeable project manager and skilled toolmakers work as a team to discuss options and recommendations for each project.

to be challenging. The need, determination and temptation to always sell “any and all” unbooked hours is still deeply ingrained in most of us. Our capacity is still adaptable with overtime and opportunities to sell more into one bucket or the other. However, it is now a decision based upon capacity awareness, compromise and alignment.

What did this shift require in terms of areas that needed to change?

Kalina: People and Training: We were able to transition from an environment that required each engineer to wear every hat to leveraging the skills and experience from a variety of engineering backgrounds in focused roles. We now have designated engineers focused on our quality management system, processing and manufacturing, new product introduction, validation, metrology and document control.

Individuals not only have accountability to apply their knowledge and experience to complete their specific tasks at hand, but also ownership to establish best practices and develop processes we can standardize for routine and confident application on all future work.

Representation in the Molding Facility: We have also extended direct representation of our tooling knowledge and capabilities within the molding facility. This

includes a dedicated mold maintenance technician, routine rotation of our apprentices and a tooling/project engineer dedicated to intercompany projects, who then also participates on the operations team at the tooling facility to help align their support.

Communication and Collaboration:

When the customer is our molding operation, our tooling/project engineer, manufacturing engineer and mold maintenance technician collaborate to identify the root cause of a possible tooling issue and/or a potential solution. They then include our mold design manager and lead moldmaker from our tooling facility to discuss options and recommendations further.

Estimations of costs and lead time are determined, and if approved, a work order is generated to provide instruction and document the history of changes

applied. These discussions provide tooling operations initial visibility to projects, and even just as potential projects, they are added to scheduling tools for projected consumption of our capacity.

Workflow and Planning Systems: Other than additional proactive project identification, separate capacity planning for



A tooling/project engineer, manufacturing engineer and mold maintenance technician collaborate with customers to determine the root cause of a possible tooling issue and a potential solution.

quick-response and reserved resource capacity, we already had all the necessary resources and skillsets needed. We have always provided the service. However, with just pure determination and a “we’ll fit it in” attitude, it was too often at the expense of other commitments and/or the frustration of our employees.

Well-Organized/Managed Workflow: Project categories within our ERP account for and trend the various types of support to the molding operations. For example, line-down situations,

The better we get, the more capacity we have for getting even better.

adjustments during validation or process improvements. department and machine scheduling tools. We often schedule new tool production around empty buckets of time reserved for the unknown yet inevitable need for those same resources to support our molding operations.

High-Level Engineering and Documentation Processes: Detailed manufacturing planning developed in parallel with the mold design process can influence design and procurement to best leverage our capabilities and standardized manufacturing methods. They are designed to generate repeatable/interchangeable results.

Collaborative Mold Design: Our mold design team at the tooling facility is an extension of our engineering team. Often, with direct communication and collaboration with our customers, we are viewed as an extension of their engineering teams as well.

Equipment and Processes: Thus far we have been able to effectively schedule the needed capacity in our existing machines, avoiding the need to isolate or purchase dedicated pieces of equipment or to create an entire department dedicated solely to the support of our molding facility.

Reserved daily capacity of all scheduled resources, including three- and five-axis milling, sinker and wire EDMs and polishing resources (that can be deployed directly to the molding facility), is consumed as needed with minimal impact to the new molds scheduled. The only dedicated resources are the moldmakers located at each facility.

More recently, we invested in a submersible rotary index in our wire EDMs to manufacture a low volume of small precision core pins instead of outsourcing to a grinding shop. This provides internal control of our lead times for immediate

replacement and spare inventory of easily broken, extended-length, small-diameter, tight-tolerance core pins often used for many of the medical devices we produce.

Finally, our Starrett vision system improves the consistency and accuracy of tooling component inspection. Redundancy in some of the same inspection equipment at each facility provides consistency in measurement and alignment in evaluation, as well as backup capacity during calibration or maintenance.

What have been the benefits of this change of focus from new tooling to mold maintenance, repair and replacement tooling?

Kalina: The efficiency of molding operations certainly benefits directly from the combined efforts of production, engineering and tooling. With fewer parts reaching the material review board, there has been a shift from the percentage of requests for tooling that are reactive. There are still many requests for tooling support, but with more opportunities for the engineering team to focus on improvements, they are now proactive projects.

The better we get, the more capacity we have for getting even better. There has been an indirect benefit too. For new tooling projects, we plan, schedule and process using a routine and departmentalized approach.

However, to satisfy quick-response projects that often require troubleshooting, we leverage moldmakers and machining specialists to apply their cross-training and versatility to meet a more urgent demand. They are more often challenged

adjustments during validation or process improvements.

Detailed Planning and Scheduling System: The availability of reserved capacity for quick responses had to be physically represented in our



Designated engineers focus on quality management system, processing and manufacturing, new product introduction, validation, metrology and document control.



As the molding business grows, the tooling team shifts its focus from new tooling programs to maintenance, repair and replacement tooling. To meet the demands of quick-response projects, which often involve troubleshooting, the Dynamic Group team taps into the skills of its moldmakers and machining specialists who are cross-trained to help address urgent needs.

to apply their experience to in-process discretionary decision-making and they get to experience a different satisfaction for the value and impact they provide to the organization, not just our external customers. This is especially beneficial for the development of the next generation of moldmakers.

What have been the drawbacks?

Kalina: The only drawback so far has been explaining when our adjustments in the allocation of resources to accommodate trending demands or opportunities has swung too far in one direction. There is also a tendency to fall back into fire-fighting mode when we fail to recognize the combined impact

of surging demand across both value streams.

Our investment in resources to support molding has proven beneficial to the company's bottom line. However, our historical financial metrics specific to tooling are no longer directly comparable. Despite this, management is willing to accept any decrease in traditional tooling value stream performance until the metrics are updated to reflect the shift in resource allocation.

Give me some critical lessons learned?

Kalina: In hindsight, we could have sooner expressed the purpose, intent and impact of this service within the tooling facility. We are still striving for more opportunities for moldmakers and machine specialists to routinely experience the impact of their efforts first-hand — whether that be the quality of the product, efficiency of a process or immediate and direct recognition of their effort. The 11 miles between our facilities isn't much, but across any distance, it takes intention and follow-through to share feedback and appreciation.

To satisfy quick-response projects that often require troubleshooting, we leverage moldmakers and machining specialists to apply their cross-training and versatility to meet a more urgent demand.

What are some plans on the tooling side of the business?

Kalina: There is always the continued investment in tooling, fixturing and equipment to maintain our niche of mold manufacturing methods, including investigating and acquiring additive machining centers. Our continued investment in apprentice recruitment, education and career development remains one of the most challenging yet rewarding paths forward.

With the focus on mold maintenance, repair and replacement tooling, are you considering a certification for mold maintenance?

Kalina: We remain focused on aligning our capacity for reliable response and standardizing expectations with predictable results. Perhaps someday, we may choose to market and leverage our methods and resources as a truly independent value stream. Accredited certifications would certainly validate the knowledge of our individuals and the capabilities of the company, but until then, the confidence we have in our team's abilities is all that's needed to be successful. [MMT](#)

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ERP Empowers Mold Builder to Increase Speed, Efficiency, Accuracy



Highly integrated but easy-to-use ERP system helps Delta Mold Inc. increase unattended hours, uptime, productive labor hours and improve mold delivery times.

A 46-year-old moldmaker and custom injection molder, Delta Mold Inc. operates two facilities that run 24/7 in Charlotte, North Carolina. The company is ISO 9001:2015 certified, has three offshore partnerships to handle overflow work and is the largest moldmaker in the southeast U.S.
Source | Delta Mold Inc.

With 82 team members and two Charlotte, North Carolina, facilities totaling 70,000 square feet/6,503 square meters that run 24/7, Delta Mold Inc. is a 46-year-old moldmaker and custom injection molder with \$25 million in annual revenues. The company builds injection and compression molds for 320 customers in the appliance, agricultural equipment, consumer electronics, food storage, ground transportation, HVAC, lawn and garden, plumbing, recreational equipment and storage and refuse segments. In a typical year, the company ships three molds/week.

However, given the diversity of its markets and the broad range of types and sizes of molds it produces, Delta Mold can build as many as 300 tools in a year or as few as 80, depending on size and complexity. In addition to compression and straight injection, the company also produces co-injection, core-back, gas-assist, counterpressure, structural foam, micro-cellular foaming and stack molds sized for presses ranging from 50 to 6,600 U.S. tons/45 to 5,987 metric tons.

“As the primary mold builder in the southeast U.S., we work hard to stay diversified and agile, to understand the needs and requirements of our customers, and to be their go-to source of injection and compression molds,” Ernie Young, Delta Mold president, explains. “That means being competitive with mold builders in China producing \$25,000 molds but also being able

to produce 8,000-ton molds if needed. Our philosophy is to not turn away any good business from customers, whether it’s a mold with a good margin or one with a small margin. That way, we keep business in North America, we make sure our partnerships stay strong and we keep customers happy and with us for the long run.”

Young adds that the company has streamlined its internal processes to keep overhead as low as possible while providing customers with world-class molds at globally competitive

DELTA MOLD INC.

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.

pricing. “We’ve definitely invested in lots of automation and new equipment supported by the best software resources, plus we’ve trained our team members to machine as fast, accurately and efficiently as possible,” he continues. “The question we ask ourselves every week is ‘How do we become better at quality and delivery?’”

The Delta Mold team focuses attention on both individual components and the entire mold assembly during the engineering and manufacturing phases. They also give that kind of attention to purchasing each component that goes into their molds. “When you design to meet world-class quality and delivery targets, if you get the quality and delivery correct, then your price falls in line,” Young says.

Accurate, Actionable Information Faster

As part of its investment to streamline its financial processes, in 2017, Delta Mold decided to replace its legacy enterprise resource planning (ERP) system, which the company had outgrown. A team was assembled and spent the next year evaluating options. “Initially, we wanted to have a better process to track jobs and integrate that with accounting, so our forecasting was more accurate,” Young recalls. “However, as we dug

“However, as we dug deeper into the possibilities, we realized what we *really* wanted was a system that empowered our employees to do their jobs better.”

deeper into the possibilities, we realized what we *really* wanted was a system that empowered our employees to do their jobs better.”

Eventually, targets were narrowed down to three companies, then to two, after which a light trial was conducted on both finalist packages to see how each performed on a job-to-job basis. One company outper-

formed everyone else that had been evaluated, even with very limited customization.

Young, a Metro Detroit native who spent the early part of his career working in finance and purchasing at several automotive suppliers, recalled working briefly with a company called Plex while at a previous position, so he asked Nathan Wisch, Delta Mold IT director, to add them to the list of companies being considered. Once Wisch reviewed Plex’s offering, he got very excited.

“We were immediately struck by the fact that this system was designed specifically for manufacturers by a company with a manufacturing background,” Wisch explains. “We were also impressed that although it’s described as an ERP system, Plex incorporated more than just IT, accounting, procurement and human resource management [HRM] capabilities. It also integrated the functions of a management execution



Delta Mold produces between 80 and 300 molds/year for 320 customers across a variety of end markets. Source | Delta Mold Inc.

system [MES], quality management system [QMS], customer relationship management [CRM] system and a security credential management system [SCMS].”

“Plex sounded like exactly what we’d been looking for because it would enable our employees to do their jobs better — whether in finance, estimating, sales, program management, HR, engineering or on the shop floor,” Young continues. “With such an integrated system, we’d be able to see every job we’d won, know exactly how it was being designed and manufactured, and how we were doing in terms of meeting cost and timing targets.”

Managing Complexity

Plex by Rockwell Automation Inc. began life in 1989 as a special IT project at a Detroit automotive supplier. In 1995, it was spun off as a standalone company called Plexus Systems, which later became Plex Systems Inc. By 2001, the company was offering Plexus Online, claimed to be the first Cloud-based (rather than client server-based) ERP platform and the first sold on a software as service (SAAS)/subscription basis. The system gained converts — first in automotive and then in an increasingly diverse range of industries — for its ease of implementation, use and maintenance (features *not* associated with

Data Management / Case Study

most ERP systems) and its ability to provide a broad range of features considered critical to manufacturers.

“From inception, Plex was designed to incorporate a full suite of functions necessary to run a manufacturing business and that’s historically been a key differentiator and competitive advantage,” Chris Balow, Plex director of product management for discrete industries, explains. “If you consider its roots in the automotive industry of the 1990s and the challenges OEMs and suppliers at that time faced in serializing individual units of inventory and tracking them through the entire manufacturing process in case there was an automotive recall, there was just no system out there that controlled and maintained business processes, and nothing that tied past ERP to MES and quality and brought them together in one system. Our founders looked at that situation and decided they were smart enough to build a system that did offer that functionality and they were incredibly successful at doing so.”

Over time, the system evolved to include a full suite of functions that covered every aspect of a manufacturing business: ERP, HRM, MES, QMS, SCMS, CRM, inventory, shipping, supply chain management and later, rigorous traceability and food safety requirements. In 2021, Plex Systems was purchased by Rockwell Automation, a large industrial automation and digital transformation company and the only company globally positioned to offer the entire ANSI/ISA-95 model of enterprise



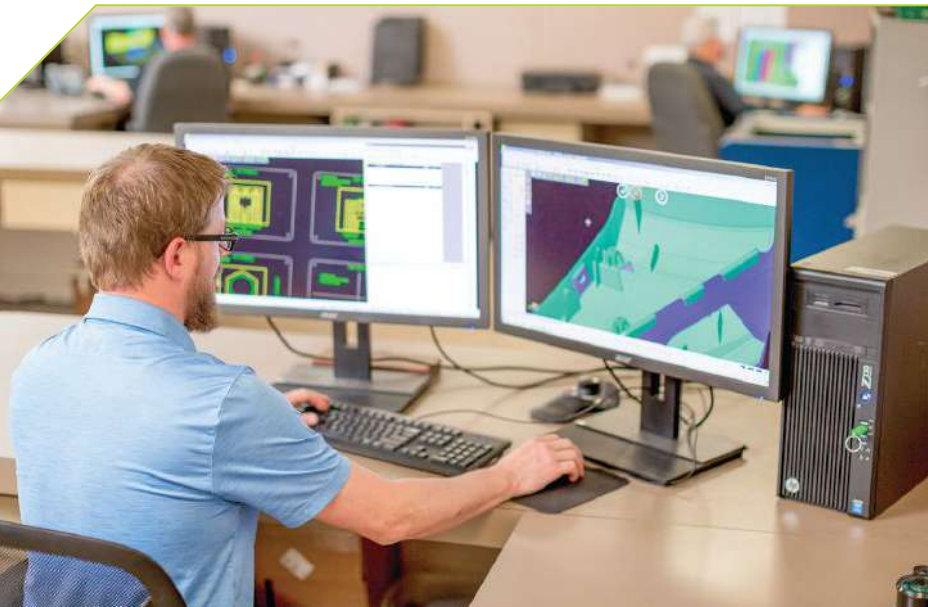
Since 2018, Delta Mold has relied on the Cloud-native, integrated Plex ERP platform from Rockwell Automation Inc. to manage nearly every aspect of the company’s business, from sales and estimating to supply chain management. Source | Plex Systems Inc.

and control systems in a manufacturing environment — from switches, sensors and controllers on machines all the way to the business management software that runs a company. At the time of the purchase, Plex ERP reportedly had more than 700 customers globally and managed 8 billion transactions/day.

While Plex historically included a full suite of functionality needed by manufacturers, and competitive ERP systems have slowly been following suit and adding more functionality to their packages in response to customer requests, the Plex team has changed direction. “As people have gotten more comfortable with Cloud services and SAAS, they would come to us and say things like, ‘We already have an ERP system, but it’s horrible at MES’ or ‘We love Plex’ production tracking and monitoring capabilities, so can we just purchase that specific module?” adds Balow, who says that the company has worked to decouple and modularize key blocks of Plex to offer standalone ERP, MES or QMS. Another new feature is applying machine learning algorithms to help manufacturers do *predictive* (rather than preventative) maintenance.

Greater Productivity

Plex was installed at Delta Mold during Q2 2018 and proved far more powerful and useful than the team initially expected for both its moldmaking and molding operations. The system quickly provided team members throughout the company with highly usable data and analytics,



Besides conducting manufacturing and tooling feasibility studies and designing, building and texturing molds, plus occasionally designing the parts to be produced in those molds, Delta’s team also offers reverse engineering, engineering changes, tool maintenance and repair, tool storage, program management, internal/external production services, plus product sampling and custom injection molding. Source | Delta Mold Inc.



Most tools are P20, 4140 or stainless, although occasionally Delta Mold produces something in aluminum alloys. Given the broad range of markets the company serves, injection molds can be very simple to highly complex – from single to 16 cavities – with or without side action. Source | Delta Mold Inc.

helping management to tighten up financials and forecasting. Plex is designed to be *highly* customizable during setup (with 20,000-30,000 options/modules), which helped it better meet Delta's needs. For example, since different employees in different departments preferred data in different forms, Plex worked with Delta to customize reports so each user received the data they needed in the form they preferred.

Every morning, the whole team sits down, pulls up Plex and walks through individual jobs for the day. For instance, if they have a multi-tool package going through the shop, Plex enables them to track the target and actual internal deliveries in terms of time and labor for every component and every mold in that package in real time and indicates whether each aspect of the job is ahead of or behind schedule.

"Recently, we designed and built four molds for a consumer product," Caitlin Gieza, Delta Mold finance manager, adds. "We were able to track labor in real time, monitor all purchasing of components, forecast remaining spend and track to the final delivery date."

"Plex is easy to understand, easy to train and the data we pull from it every day helps us do our jobs better," Wisch adds. "It even helps with ISO 9001 audits. We pull up Plex and show the auditor how we validate the quality of each component we machine. We've got all our documentation in one place. That digital thread gives us full traceability and transparency and it can travel with a tool throughout its life. Plex has proven phenomenal for a business like ours. We couldn't have asked for anything more from the system. Plex doesn't just supply us, they also support us."

"The scheduling function is simple and phenomenal," Young continues. "It lets us look at a specific job on a specific machine with a specific machinist and determine if the job can be done in the amount of time we're estimating. We're looking at data in real time on how each component of the job, plus the entire project, is doing in terms of

time and labor. We're also tracking OEE [overall equipment effectiveness]. There's no doubt it enables us to run more unattended hours and achieve more uptime. It also enables us to achieve greater than 98% productive labor hours and to boost mold delivery times to 100% and raw material delivery times to greater than 95%. At the end of the job, we review what we did *good* and what we did *bad*, and that helps us do *more good* and *less bad* the next time. It's such a powerful tool." **MMT**

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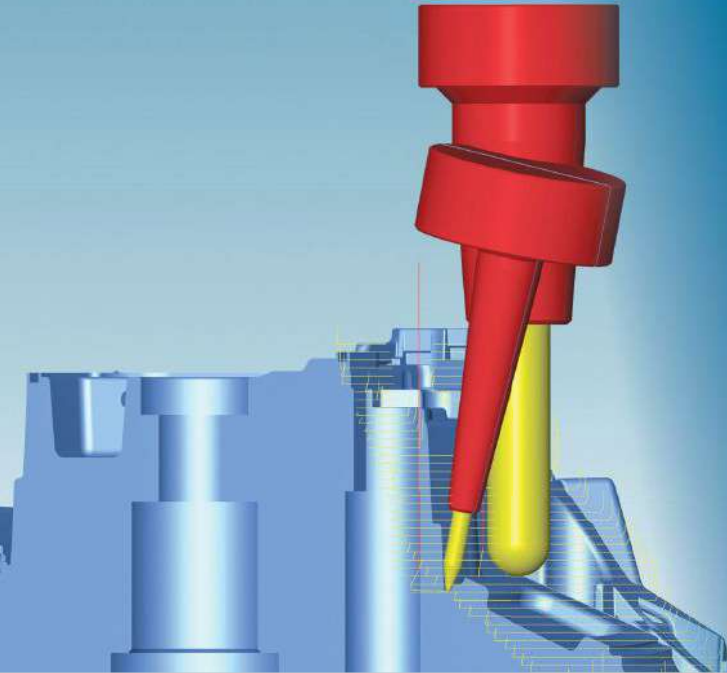
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Advantages of Multi-Axis Technology, Programming Techniques

Understanding the basics of five-axis capabilities justifies the investment, but exploring all the multi-axis machine benefits and approaches enhances the return on investment.

A smooth overlap function in CAD/CAM software helps in many situations including two adjoining tool paths with different cutters and different orientations. Source (All Images) | Open Mind Technologies

Investment in five-axis machining centers and adoption of multi-axis technology has been the winning formula for many shops. Shops that make this investment seldom regret it. Yet, the overall adoption rate of five-axis machinery with American mold builders and job shops remains low compared to other developed countries.

Let's review some of the key benefits of multi-axis technology and explore how some multi-axis programming techniques can expand potential manufacturing solutions for mold builders.

For example, implementing multi-axis technology enables creative fixturing and manufacturing approaches, increases opportunities to bid on more work, and achieves higher shop rates and profit margins. Five-axis processing also aligns with newer design concepts, including the manufacturing of monolithic parts rather than a set of individual subcomponents and making parts with more complex geometry. Last but not least, five-axis machining can be used for finish machining operations after processes such as additive manufacturing (AM).

Multi-Axis Technology Efficiency Gains

Let's take a closer look at three primary benefits of transitioning to multi-axis technology:

- **Shorter tooling and cutter stick-outs that pivot the cutter and holder away from a part surface.** The new tooling setup has benefits that include lower cost and added rigidity that allows higher feed rates than cutters with longer stick-out. It also has less deflection than a longer cutter, resulting in improved surface finishes and longer tool life.
- **One workpiece setup – as opposed to multiple operations –** that reaches features on multiple sides of a part or compound angles. In addition to the time and cost savings when using one setup, quality improvements are realized without having to reset a part in a new fixture and assure alignments.
- **Reduced setups that decrease the number of machine tools, reducing the amount of required floor space.** Many shops have limited floor space, so minimizing the number of machines while maximizing multiple processes in one five-axis machining center can increase productivity, avoid a building expansion and eliminate the need to redesign the shop floor.

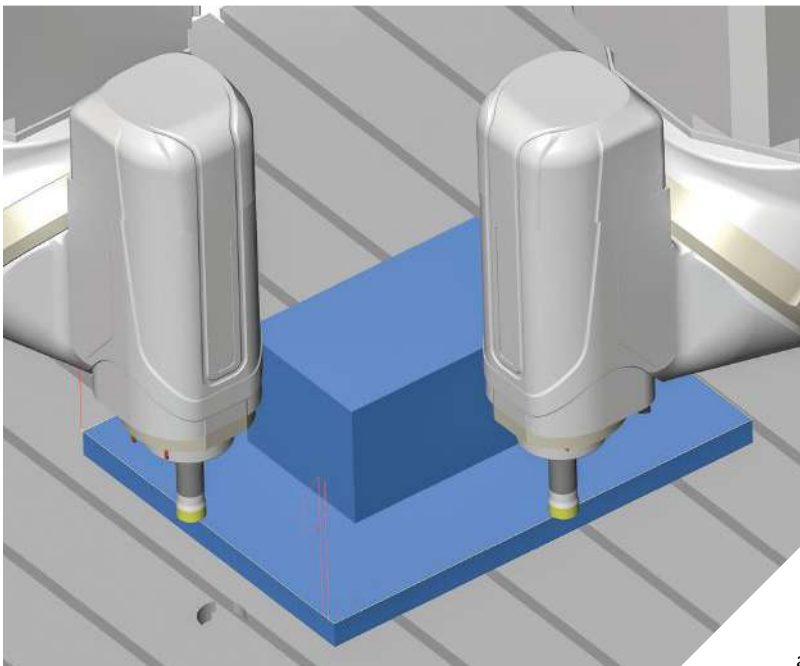
ROI Opportunities

The basic talking points are merely the tip of the iceberg. These introductory reasons alone justify the acquisition of five-axis

capabilities. However, once you have a multi-axis machine, the benefits increase exponentially.

These three approaches can increase your return on investment:

- Five-axis simultaneous tool paths are not required in every case on a five-axis machine tool. The user can benefit from software capable of providing high-performance indexing and simultaneous solutions. There are benefits from using 3+2 machining techniques (both rotary axes fixed) or 4+1 machining techniques (typically, the pivot axis is fixed and the rotary axis has free motion). These processes have technical benefits when applicable, primarily to stiffen the machine dynamics, enable higher feed rates and achieve consistent surface finish. Also, some larger machine tools are not very dynamic, so 3+2 motion is preferable.
- Automation within CAM software can identify multi-axis holes and pockets and create frames or cutting orientations that ease programming tasks and enable machine control functions.
- For production-oriented parts, a pyramid fixture is used like a traditional tombstone device on a horizontal machine. It can enable multiple parts to be manufactured in one setup, with multi-axis potential and without shuttling pallets in and out of the machine. A pyramid fixture can also move the cutter orientation away from the “pole,” which is a mathematical singularity, and further improve the machining efficiency.



An NC optimizer function in CAM software can enhance an NC operation to avoid machine collisions. Here, it is modifying a three-axis roughing routine to rotate the C-axis to avoid collision with the asymmetric head.

Versatile Machining Options

There are also creative solutions to consider for your five-axis machine. For example, when a *large milling machine has an asymmetric head*, a three-axis process is typically used to perform roughing operations. However, at increasing depths,

Implementing multi-axis technology enables creative fixturing and manufacturing approaches, increases opportunities to bid on more work, and achieves higher shop rates and profit margins.

the head may interfere with the core or cavity shape. Advanced CAM software can identify this and use the fourth axis on the machine to rotate the spindle away from collisions and continue the roughing operation with added safety. Other machines may have a *limited linear axis stroke or interface zones*, such as trunnion motors or a coolant block. Optimizations that identify these components

and use rotary motion can avoid collisions and streamline the five-axis machining process.

Then there is *five-axis helical drilling*. This is an enhanced technique over traditional three-axis helical drilling. The five-axis technique is more of a roughing process to open a bore or make a start-hole before a roughing operation. The three-axis technique is effective, but the cutter removes metal on the bottom and back sides of the cutter and recuts chips. The five-axis technique uses the available axes on the machine to lean forward and only cut on the front edge of the cutter. The chips fly out behind the cutter, enabling higher feed rates and longer cutter life.

Smooth overlap is another valuable technique. It is used to blend adjacent tool paths or even the steep and shallow areas of a tool path commonly used on mold components during slope-based processes. The result is an imperceptible blend zone that mitigates the need for manual or other subsequent finishing processes.

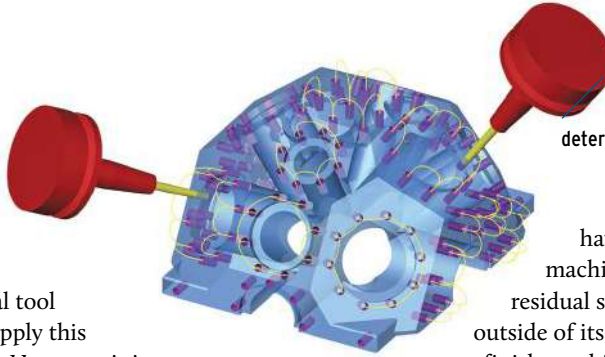
A common application is blending a Z-level finish on a part surface followed by rest machining, typically with a smaller end mill to form a fillet radius. From a theoretical CAD/CAM perspective, there should be a perfect blend between adjacent tool paths.

In a real-life situation, many factors may cause a minor mismatch, including tool length settings, machine kinematic precision, machine temperature, ambient temperature throughout the day and deflections between the two different cutters.

The smooth overlap technique slightly increases the toolpath width without double-cutting previous tool paths. Smooth overlap removes the mismatch without measuring and negates the need for fitment of the final tool path. A mold builder can also apply this process to three-axis machines. However, it is more common on five-axis machines where a smaller tool is used for rest machining and set at a different orientation for collision avoidance than the primary cutter used to machine the surface.

For many mold machining applications, whether for automotive or packaging, the appearance of the end product may be as important or even more important than geometric accuracy. Achieving a consistent machined finish that does not require manual polishing provides a substantial benefit and saves time on overall workflow processes.

Finally, another technique is *finish machining a component that was prepared with an AM process* using five-axis machining, even if the part would ordinarily be produced with a three-axis process. Additive processes can impart high temperature and stress.



Multi-axis drilling with automatic orientation determination and smooth connection between holes.

When finish machining a part that may have thermal deformation, a three-axis machining process might not be used. The residual stock may be imbalanced, or the part is outside of its intended design envelope. You can correct finish machining by probing and using a best-fit adjustment to ensure you meet part quality requirements.

Implementation Advice

In the current technological environment, the move to five-axis machining should be incremental, making it achievable for all-sized manufacturers while yielding substantive benefits. Adoption rates continue to expand, and the risk associated with this investment is much smaller than if it was made 10 or 20 years ago. [MMT](#)

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Modular Tooling Systems Enable Versatility in Hole-Drilling Operations

The versatility of replaceable cutting edges allows users to adapt to varied operations.

The moldmaking industry presents some unique situations when it comes to drilling holes. There are a variety of hole types from simple threaded and clearance holes for capscrews to precision holes for guide pin and dowel pin alignments to deep and intersecting coolant channels. This necessitates a wide variety of drilling tool options. Sometimes, moldmakers need to revert to specialized machines in addition to the standard CNC machines.

These unique operations often require tailor-made tools. Manufacturers will revert to the traditional solid carbide drills and brazed head solid carbide gundrills for these operations. Resharpener is a common practice that requires dedicated grinding machines. There are still some applications that may require the traditional methods. But great advances have been made in modern, indexable tooling systems. The versatility of replaceable cutting edges offers modular systems to adapt to the varied operations. This helps to lower inventory levels, therefore reducing overall tooling costs. Additional labor costs can also be eliminated by doing away with resharpening equipment.

Simple Holes for Screw Threads

One of the most common holes produced in any industry is a threaded hole. Moldmaking requires many threaded fasteners to assemble an injection mold or die set. Whether the threads are machined by tap, threadmill or single-point lathe



The SumoCham drilling family offers more than 12 drill head geometries for a variety of applications such as the FCP for a true 90-degree flat bottom hole. It will also work in breakout holes as shown.

operation, a hole must precede the thread. Counterbores are often required for capscrew head clearances or spring pockets. Using a modular drilling system like ISCAR's SumoCham replaceable head tools, allows you to drill a flat-bottom hole first by using a standard 90-degree head (FCP). The smaller through hole can then be drilled with a standard 140-degree head (ICP). This method is faster than drilling the small hole through the part then milling out the counterbore with circular interpolation. The varied geometries are all part of the same tool system. One common steel drill body will accept more than seven different interchangeable head geometries and a range of drill head diameters. Even the drill bodies come in various shank and drill depth combinations.

When tap-drilling, sometimes a smaller hole will put excessive wear on the tap. With the SumoCham system, drill head diameters are offered in 0.1 millimeter (0.004 inch) increments. Exchanging a head to the next larger size will often keep the hole within tolerance, while slightly reducing the amount of material the tap engages. This may extend its life and avoid the frustration — and sometimes time-consuming endeavor — of extracting a broken tap from a workpiece.

Precision Holes for Alignment

For proper component alignment, a dowel pin, with a press fit into one component and a slip fit in the mating component, is used. These holes need precise location and diameter control to produce accurate mating surfaces. The common practice is to drill to create the hole; bore to hold the location; and ream to control the diameter. The new Logiq3Cham drill from ISCAR applies three cutting flutes to the process. Three points create a more accurate hole for diameter, circularity and cylindricity. The self-centering drill point holds a very tight, true position tolerance. This can make a boring operation obsolete. Depending on the target size, sometimes the reaming operation can also be eliminated.



The Sumogun two-lip drill offers increased penetration rates compared to traditional brazed carbide gundrills. It also opens a variety of solutions with the versatility of the standard Sumocham head geometries.

during the breakout and start of the hole on the other side. The Tri-Deep system covers holes from 10 to 32 millimeters in metric and 0.437 inch to 1.250 inch in common fractional inch sizes and for depths up to 2,400 millimeters (95 inches). Driver shanks are available for many of the dedicated gundrill machines as well as common mills and lathes.

If tighter diameter tolerance is required for a deep hole, then SumoGun, a two-lip drill, can offer increased penetration rates while offering the versatility and precision of the SumoGun line. Self-centering geometries and double margin heads help to improve straightness for the deep holes. The standard SumoCham line offers drill bodies up to 12xD drilling depth. Beyond that the SumoGun bodies in diameters from 10 millimeters (0.394 inch) to 25.9 millimeters (1.020 inch), can reach from 200 millimeters (7.88 inches) to 400 millimeters (15.75 inches) with standard tools. Depths to 800 millimeters (31.50 inches) can be made upon request.

Modularity Equals Cost Saving Solutions

Moldmakers today have many options for economical, indexable solutions for their hole-making operations. These tools provide increased penetration rates for productivity gains. The versatility of the standard modular options can help reduce inventory costs and shorten the delivery times often associated with receiving special tools. [MMT](#)



The Logiq3Cham drilling family offers four drilling depths from 1.5xD up to 8xD, and two cutting geometries. The additional cutting flute enables an increase in feedrate for reduced cycle time.



Deep Holes for Cooling

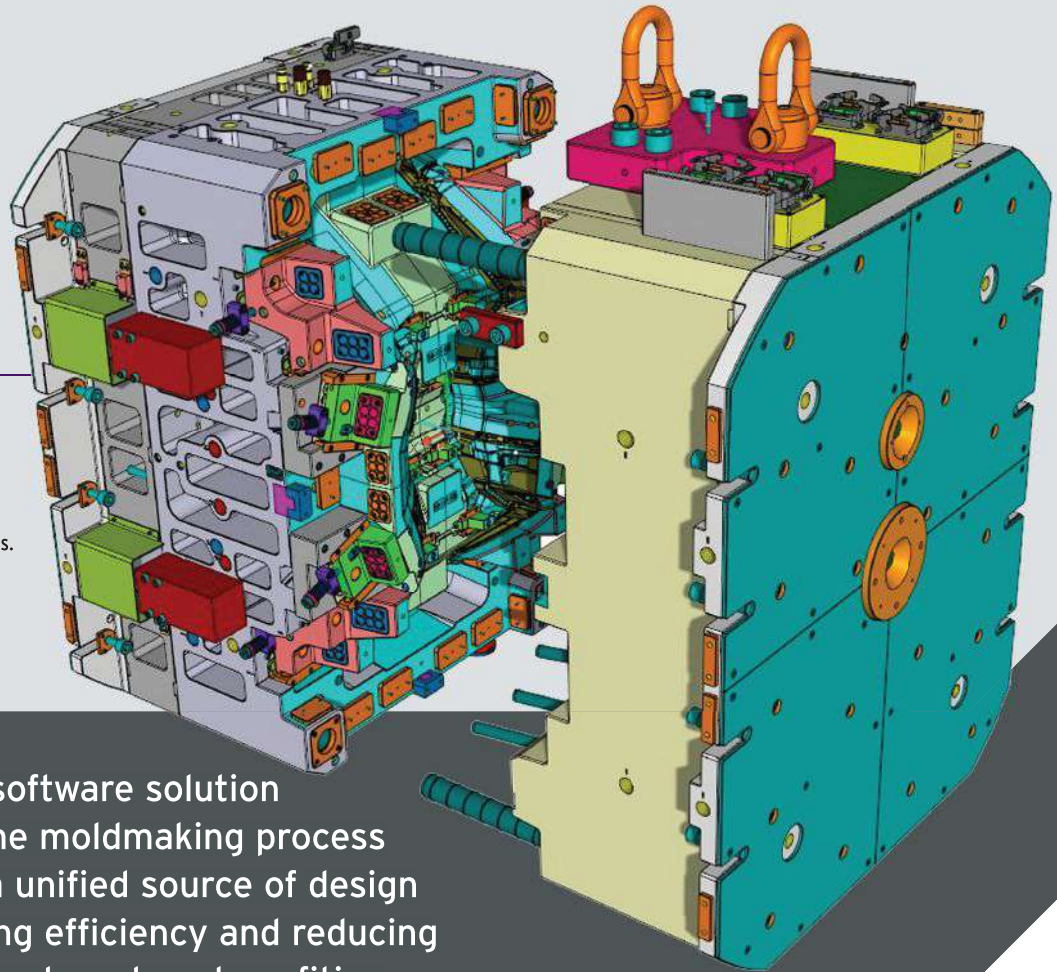
Moldmaking involves a lot of deep hole production using gundrills or BTA-type solutions, and most holes are completed using gundrills with a brazed solid carbide head. Recent advancements for optimizing deep hole drilling involve the introduction of indexable gundrilling solutions. ISCAR offers two indexable lines, Tri-Deep and SumoGun.

Tri-Deep can provide extreme improvements in terms of penetration rates and overall productivity, as well as drastically reducing the cost of performing the same operation with a brazed-on solid carbide solution. Since it is a single flute design utilizing solid carbide guide pads, it can offer straightness rivaling the traditional gundrill. For intersecting holes, a second row of guide pads provide additional stability

Please visit iscar.com for more information.

How to Customize an Interoperable Software Solution for Your Moldmaking Process

Connected solutions minimize errors, boost competitiveness, expedite time to market and enhance control over product quality throughout the entire process.
Source (All Images) | Hexagon's Manufacturing Intelligence Division



A connected software solution streamlines the moldmaking process by providing a unified source of design data, enhancing efficiency and reducing errors, with five key steps benefiting from this integration.

As production deadlines tighten and workflows continue to become more digitized, the connectivity of software used to produce plastic injection molds is rapidly becoming a requirement. Among other benefits, linking solutions from design through manufacturing ensures the use of a single source of design data from start to finish and eliminates data loss caused by repeated file transfers.

In cases where systems are incompatible, helpful data may even need to be omitted so that a file created in one software can be processed in another. While a skilled moldmaker can fix problems caused by missing data and system incompatibility, less experienced workers struggle to repair gaps in information that could be prevented by improved connectivity.

Essential for handling new and unfamiliar materials, flow analysis software should offer feedback that is clear and practical to utilize.

Connected systems are also a productivity boon to shops with different departments that work simultaneously on the same projects because connected solutions enable seamless data sharing. For example, when a change is made to a design file, that change is applied across the board so that everyone working on the file has access to identical information.

Here are five steps in the moldmaking process that benefit from being a part of a connected software solution:

1. Flow Analysis

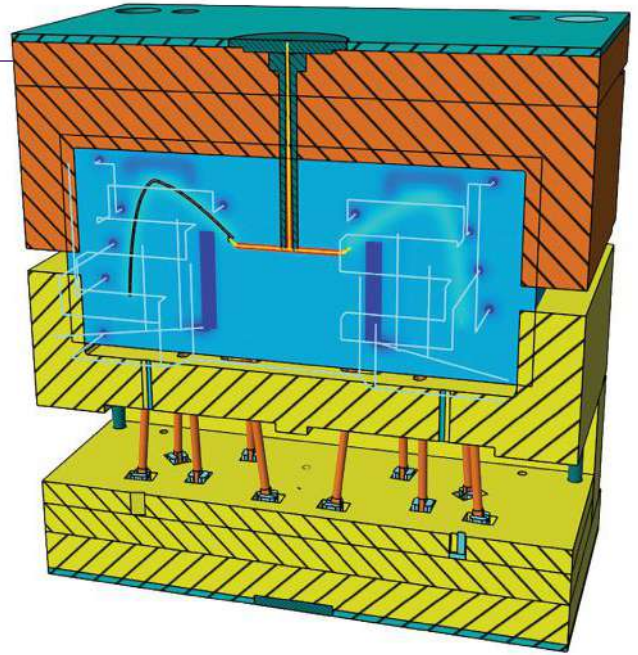
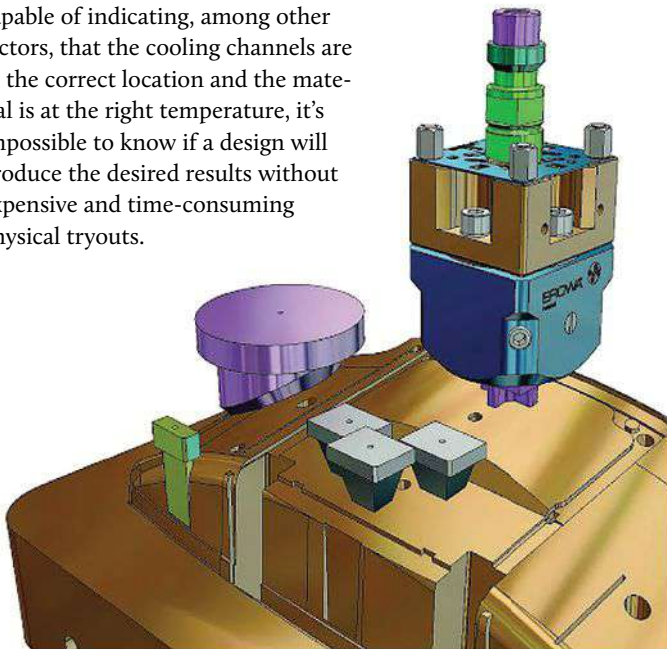
Less is more when selecting flow analysis software as part of an interoperable solution. While a market leader in flow analysis software can deliver

Connected systems enable seamless data sharing.

excellent predictive tools, the exhaustive number of tools provided and the expertise required to use them correctly can overwhelm a moldmaker who simply needs to know if their mold will perform as designed.

Software that provides easily digestible feedback reduces error and is crucial for working with new and unfamiliar materials. Without reliable software capable of indicating, among other factors, that the cooling channels are in the correct location and the material is at the right temperature, it's impossible to know if a design will produce the desired results without expensive and time-consuming physical tryouts.

Software that automates electrode design and provides simulation and collision checking guarantees the first-time functionality of electrodes.



Flow simulation software developed for moldmakers helps simplify complex cavity, runner system and cooling line design. It offers tools for optimizing runners, providing thermal and final part shape analyses and identifying the fastest possible cycle times. Connected solutions make it easier to apply design insights gained from flow analyses because it's much faster and easier to work back and forth between interoperable design and flow analysis systems.

2. Reverse Engineering

Because skilled moldmakers are also adept reverse engineers, no solution for plastic injection mold production is complete without interoperable reverse engineering software. As part of a connected solution, software dedicated to reverse engineering enables moldmakers to reverse engineer, design, simulate and produce components using software with common interfaces and workflows.

Reverse engineering software is used to import point clouds from scanning devices, automatically create meshes, perform dynamic wireframe grid construction and automatically create surfaces. The benefit of using reverse engineering software instead of a standard CAD system is that it is developed specifically for working with point clouds.

While CAD systems *do* get the job done, reverse engineering tools are better at helping control the quality of developed geometry and provide functions for improving and repairing meshes and creating and trimming surfaces and solids.

3. Electrode Design

EDM electrode design is one of a moldmaker's most complicated and time-consuming tasks, so software dedicated to its automation is a significant time saver. As part of a connected solution, it offers the same benefits as design, simulation and reverse engineering software by ensuring data can be easily shared within the connected system.

Connected solutions for plastic injection mold production increase productivity by providing mold-specific tools that maximize efficiency at each stage of manufacturing and streamline collaboration.

Software that automates electrode design helps design electrodes and their holders for the manufacturing of detailed and difficult-to-machine mold features. Systems that offer comprehensive holder design, simulation and collision checking ensure that electrodes will function correctly the first time they are used.

While automating design is a clear benefit for less experienced staff, even experienced designers can benefit from systems that offer knowledge-based automation technology.

4. Component Selection

When customizing a connected solution to fit a company's needs, it's important to consider tools that relieve the burden of time-consuming and repetitive tasks. Among those tools is mold design software that simplifies the selection of digital mold components and their integration with existing projects.

Mold design entails constructing full assemblies that include in-house and supplier components like ejector pins, guide bushes and retainer plates. The ability to easily access and add digital models of these

Easy access and integration of digital mold component models into in-progress designs speeds up the design process and ensures flawless assembly of final products.

components to in-progress designs accelerates the process and ensures that final products are assembled perfectly.

Mold design software that provides direct access to cloud-based component databases and digital models eliminates flipping through paper catalogs or visiting websites to find and download models of single components and full assemblies.

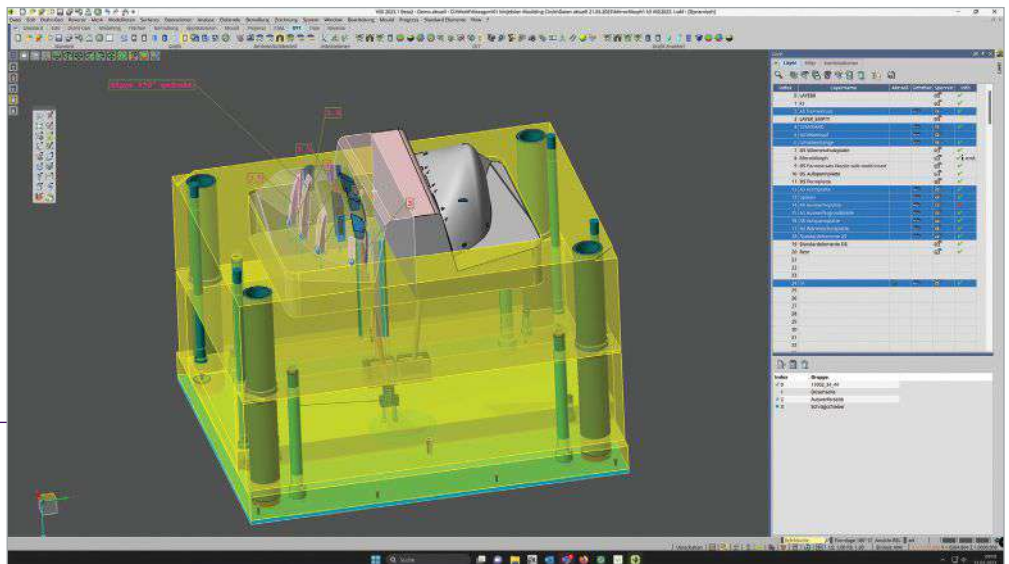
5. Design Data Transition

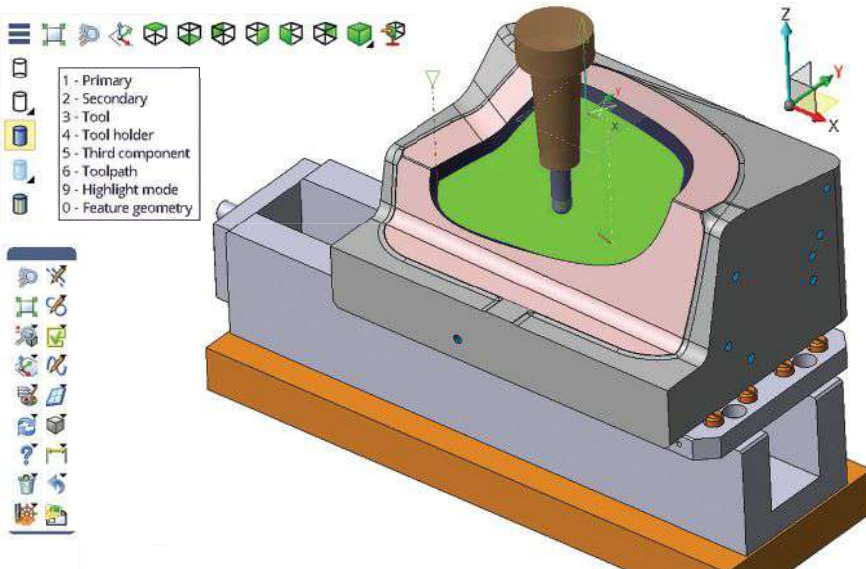
Connected solutions in which mold designs can be sent straight to CAM software improve efficiency and instill confidence that jobs will be accurately and safely produced. While the ease of importing CAD data has improved over the years, interoperable systems further ensure a painless transition from design to CNC manufacturing.

A CAM solution developed to produce plastic injection molds should provide tools for machining deep cavities and for simplifying complex multi-axis machining. Some systems are also capable of automatically converting a three-axis tool path to a five-axis tool path; this helps manufacturers reap the benefits of short, rigid tools that eliminate vibration for better part quality and surface finish.

Success at Every Stage

Connected solutions for plastic injection mold production increase productivity by providing mold-specific tools that maximize efficiency at each stage of manufacturing and help streamline collaboration. Using the tools of a single systems provider simplifies software integration and support, while uniform software interfaces and workflows make it easier to





train employees. These advantages add up to reduced error, increased competitiveness, shorter time to market and improved control over the quality of projects from beginning to end. **MMT**

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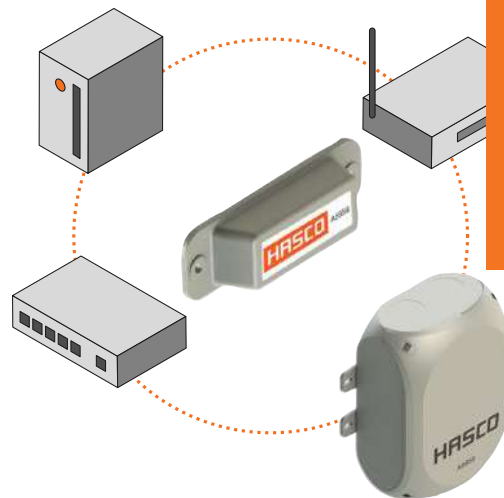
CAM solutions tailored for plastic injection mold production should offer tools for machining deep cavities and simplifying complex multi-axis machining.

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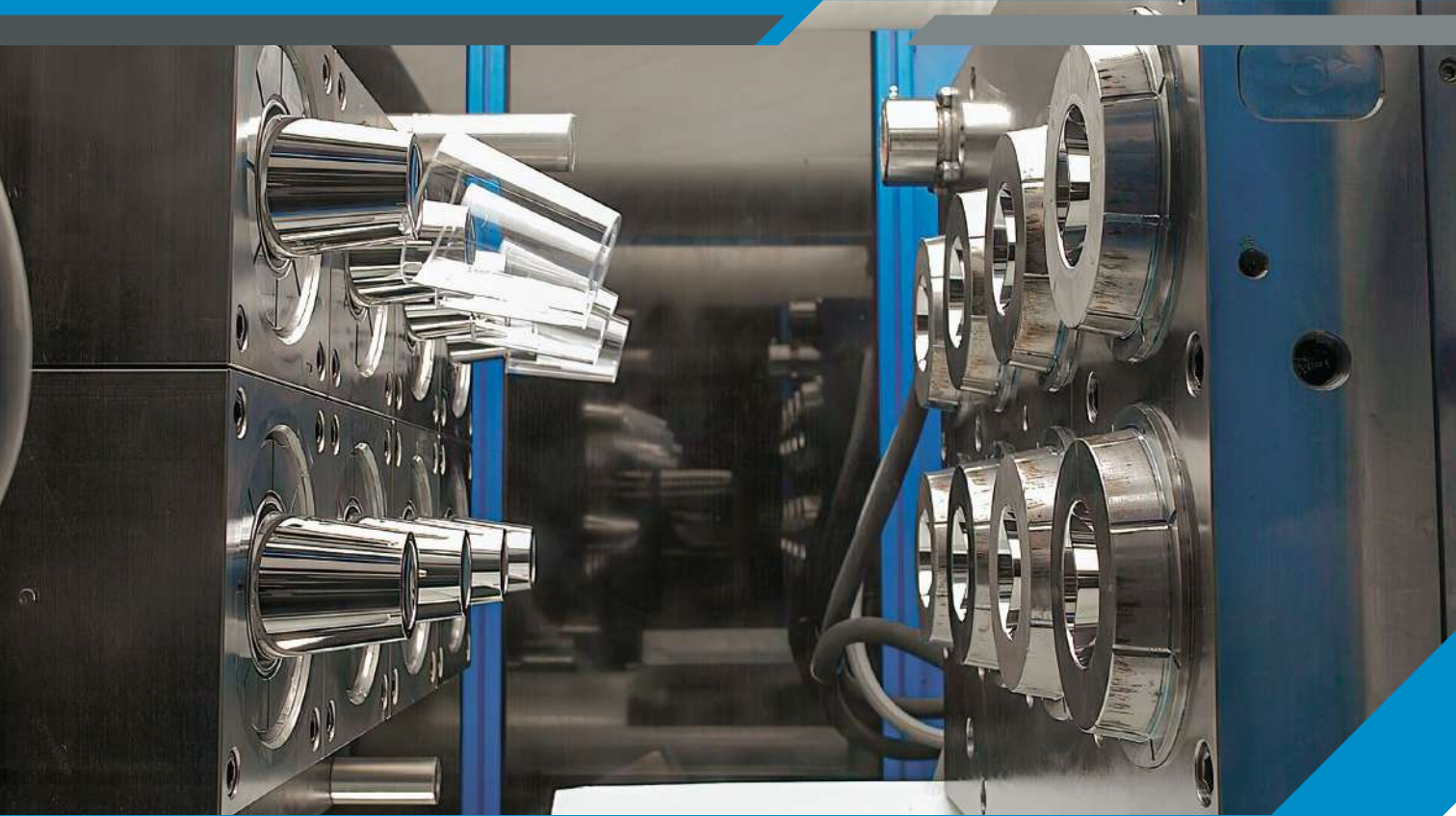


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Deliberate Mismatches for Easier Mold Manufacture and Improved Part Appearance

Basic principles for applying deliberate mismatch in the area between the core and cavity and between two matching plastic parts.

Trying to produce a perfect match between two surfaces is not only difficult to achieve but also very costly. Mold designers create deliberate mismatches for ease of manufacturing and improved part aesthetics.

There are two areas of deliberate mismatch to consider. One is between the core and cavity and the other is between the two matching plastic parts. There are many variations of matching parting lines or between lids and covers, but the basic principle applies to all of them.

A mold designer can reduce the impact of a potential mismatch and ease the cost of building a mold with simple modifications to the mold design.

Source (All Images) | Oasic Consulting

Round Edge or Sharp Edge?

A mold designer must first consider whether a rounded edge (see **Figures 1a and 1c**) is necessary at the end of a part and the parting line. While it may be more aesthetically pleasing to have a rounded edge, in most cases, it causes much more complexity and tighter manufacturing tolerances, especially in high-cavitation molds where cores and cavities must be interchangeable.

A rounded edge causes the potential of a mismatch to be much more pronounced as the diameter on the core side must equal the diameter on the cavity side just after a radius on the part. If a rounded edge is necessary, then a small straight diameter of at least 0.25 millimeter (0.010 inch) should be added to the side with the radius before the parting line, so that a more stable diameter can be achieved to match the opposing mold side.

Suppose a sharp edge (see **Figure 1b** or **1d**) is acceptable for the application. In that case, the potential of an undesirable mismatch is virtually eliminated and the cost of high-tolerance manufacturing is significantly reduced.

If a round edge is necessary, then there is a solution to reduce the visual and manufacturing impact of trying to create a perfect match. **Figure 2** shows one of several designs of a round edge with the ideal case having a perfect match at the parting line (1). However, due to the buildup of manufacturing tolerances of the mold parts and variations in stacks in multi-cavity tools, such an ideal case is not practical. In reality, the nominal diameter D of the cavity, or the core, will be either larger or smaller than the matching one and create either a hook (2), which is generally not tolerable, or a small step (3), which in most cases is perfectly acceptable.

Note that the actual differences caused by the tolerances of the diameters are small, usually less than 0.1 millimeter (0.004 inch), so that a step would not be more than about half this amount. However, a step is much less noticeable than a hook and it does not create the feel of a sharp edge or a flashed mold.

If required, a significant mismatch can be corrected by very time-consuming handwork, grinding or stoning (polishing). However, this should be avoided because of the high cost and difficulty in repeatability and core/cavity interchange possibilities on multi-cavity molds.

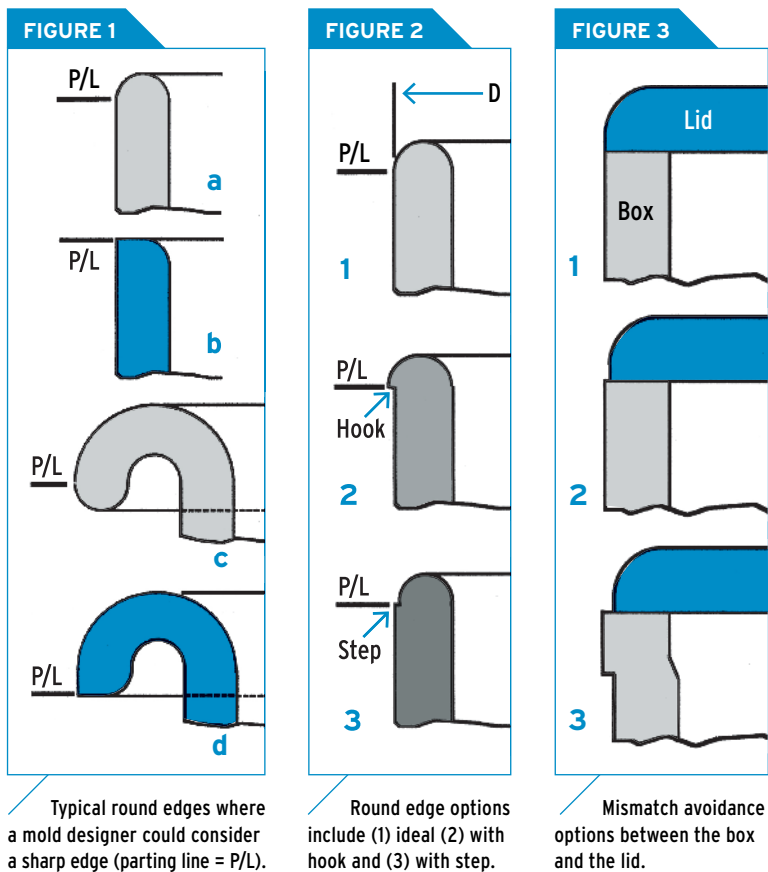
The proper and most economical approach is to dimension the matching diameters so there is always a step of a magnitude between zero and 0.1 millimeter (0-0.004 inch), as seen in **Figure 2 (3)**.

If the mismatch is located where the consumer uses their hand or lips, then the location of the mismatch must be verified with the molder or OEM to ensure this will not be a problem once molded. It may be preferable to offset the mismatch in one direction or another to hide it.

Mismatch Between Two Matching Pieces

The conditions of a mismatch are similar when designing and building molds for matching containers and lids. Here, a deliberate mismatch is even more important because the products may come from different cavities or even molds made under varying molding conditions. Also, due to the buildup of many tolerances (in cavities for both products), the mismatch could be much larger.

Figure 3 (1) shows the ideal condition that is difficult or impossible to achieve on multi-cavity molds. **Figure 3 (2)** shows a way to minimize the effect of a mismatch between



matching parts without causing an unsightly and poor-quality overhang of the lid from the container. Adding a decorative band to the larger part, as shown in **Figure 3 (3)**, is another way to create an aesthetically pleasing look that reduces the visual impact of the mismatch.

A mold designer can reduce the impact of a potential mismatch and ease the cost of the mold build by considering these simple modifications to the mold design in the concept and plastic part design stage. [MMT](#)

**This article is based on information from the "Injection Mold Design Handbook," Carl Hanser Verlag Munich, 2021. If you would like to learn more practical tips and guidelines for good mold design, visit hanserpublications.com or Amazon.*

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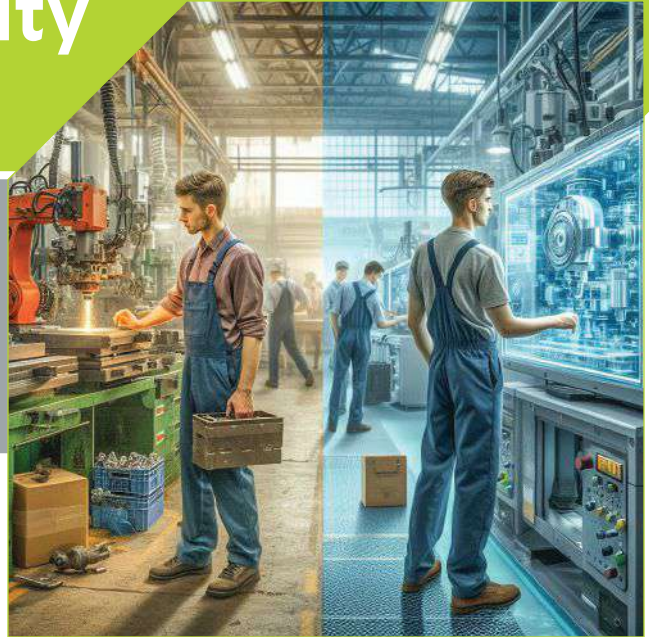
How to Make Data Work for Mold Productivity and Performance

The use of digital workflows improves the impact of mold design libraries, conformal cooling and machine learning.

Today, designers and engineers are accustomed to working with digital tools in their day-to-day jobs. Yet, over the last decade, these tools have evolved and unlocked new capabilities and productivity gains, enabling part and mold designs to be more complex and data-driven.

However, a central challenge in manufacturing lies in the scattered nature of data that exists across the product lifecycle. From design and moldmaking to manufacturing and quality control, valuable data is generated in silos, hindering seamless collaboration. Charlie Wood, Ph.D., vice president of innovation, research & development at SyBridge Technologies, believes that the concept of the digital thread has emerged as a solution, envisioning an interconnected flow of data from the inception of an idea to the final product.

“This digital continuum offers a centralized source of truth, facilitating easier tracking of changes, interconnecting production data with design and simulation, and unlocking the potential for creating digital twins and machine learning models,” Dr. Wood says.

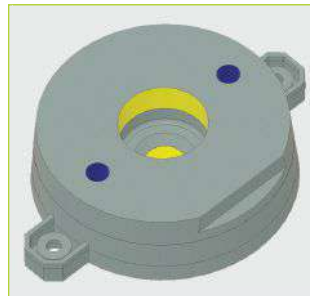
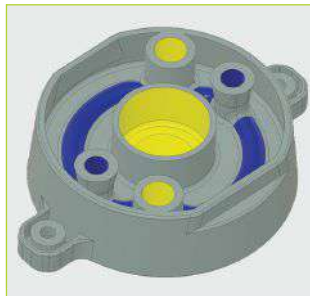
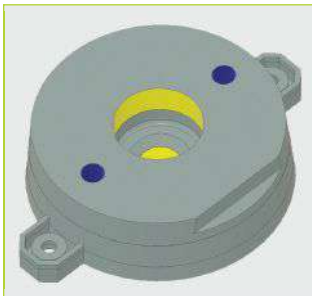


Manufacturers must embrace a software-centric approach that streamlines workflows to connect the physical and digital domains. Source | Stock, Copilot

The advantage of establishing a digital thread is evident in its ability to pave the way for digital twins and machine learning models. This shift from deterministic to probabilistic models opens avenues for preemptive defect detection and enhanced process simulation.

Design Libraries and Conformal Cooling

To bridge the gap between the physical and digital realms, manufacturing must adopt a software-driven approach that optimizes workflows, according to Dr. Wood. He shares two practical examples that illustrate this transformative journey:



Advancements in computational tools help mold designers identify the most effective cooling designs such as conformal, turbulent, lattice or generative. Source | SyBridge Technologies

digital design libraries for enhanced productivity and additive manufacturing (AM) for improved performance.

1. Digital Design Libraries

Designing molds for manufacturing is a complex task that demands precision and efficiency. Digital design libraries offer a solution by introducing parametric design, enabling quick selection and placement of standardized components. This approach reduces the complexity of digital information storage by representing components through rules rather than individual instances.

The last five years have witnessed advancements in metal AM, opening new doors for moldmaking. For example, transitioning from a successful pilot to scalable production.

“This intentional shift toward a software-driven workflow has proven impactful,” Dr. Wood says. “By gradually expanding the coverage of design libraries, teams experience faster design times, smoother onboarding of new designers and a significant reduction in design-related issues. The result is a controlled design environment that enhances overall productivity.”

2. Conformal Cooling

The last five years have witnessed advancements in metal AM, opening new doors for moldmaking. For example, transitioning from a successful pilot to scalable production. The focus here is on conformal cooling, a method that significantly improves cycle times (see sidebar). Dr. Wood admits that most new customers look to conformal cooling solutions after they have experienced a problem in a tool build.

Cooling Action

Additive manufacturing (AM), or 3D printing, enables intricate and complex structures that conform more closely to the part's shape, offering a promising solution to the challenges posed by traditional methods to speed up the cooling process.

The four main steps to the conformal cooling process are (1) component design and integration, (2) mold flow simulation and virtual testing, (3) digital integration and feedback loops, and (4) finishing and assembly. Each step requires attention to detail and expertise to ensure that the components meet the stringent requirements of production environments where millions of cycles may be involved.

Let's take a mold from SyBridge Technologies with a small cavity and core, for example. It presents challenges, including long, slender parts, thin walls, tight tolerances and the need for high volume and throughput. The goal is to find a solution that instills confidence in the customer to run it in production without frequent maintenance interruptions.

Redesign for efficiency. To begin, they conducted a mold flow simulation that revealed hot spots on the tips of the parts, indicating a need for efficient heat extraction. To address this, SyBridge employed conformal cooling to incorporate more inlets and outlets constructed differently to enhance cooling efficiency – notably, cooling inserts on the front end to improve the interior cooling of the parts. The impact of this design change was substantial, particularly in reducing mold open time. The company cut the cycle time almost in half.

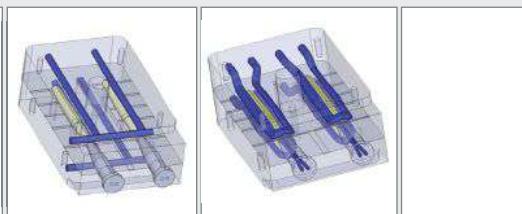
This not only accelerates injection into the part but also minimizes the time the operator needs to keep the mold open for proper solidification. Maximum temperature was also reduced from 193°F down to 85°F, illustrating the enhanced efficiency of the system with the added water.

“It's crucial to note that we're not merely introducing water cooling; we're refining the shape and width of the cooling lines to maximize their proximity to the part,” Dr. Wood explains.

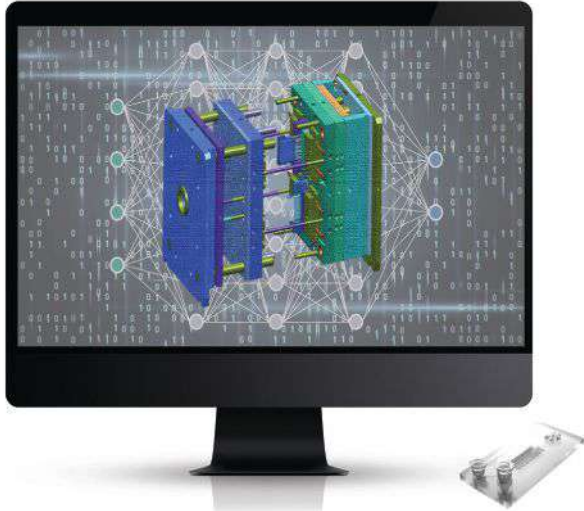
Identify the manufacturing process. After the digital design phase, build preparation involved surface offsets, part orientation and support addition in a CAM environment. SyBridge used a laser powder bed fusion system and carefully selected process parameters. Post-processing, including media blasting and EDM, were implemented to ensure the part met specifications.

Ensure precision in finishing. The finishing and assembly step is particularly vital, as the tolerances from metal 3D printing may not be suitable for direct use in a production mold. SyBridge's approach involved post-machining on a CNC to achieve the required tolerances, ensuring that the conformal cooled mold met the customer's production needs.

Tailor your approach. It is important to note that conformal cooling is not a one-size-fits-all solution. Productivity improvements can vary based on the geometry of the molded part.



	Conventional	Conformal	Impact
Cycle Time	31.8 sec	20.5 sec	-35%
Mold Open Time	40 sec	20 sec	-50%
Total Time	71.8 sec	40.5 sec	-43%
Max Temp - Core	193°F	85°F	-56%
Heat Contraction Area	4.27 in ²	0.18in ²	-95%



Machine learning helps design engineers in early stage decision-making identify statistical anomalies in manufacturing and inform design based on machine accuracy. Source | Stock, CoPilot

“This is a common entry point, as it helps to address issues in problematic tools. However, the more integrated and forward-looking approach is incorporating conformal cooling in new tool designs,” Dr. Wood notes. “This approach allows for a holistic and seamless integration of conformal inserts into the tool, covered by warranties and guarantees while tapping into the combined expertise of molding and AM.”

The process involves two distinct workflows: designing for conformal cooling and the subsequent manufacturing of the part. Mold builders can use advanced mold flow simulations and physical simulation tools to explore and optimize design candidates.

“They can also take advantage of the integration of artificial intelligence and machine learning to iterate through designs, simulate outcomes and explore diverse designs, including turbulent and lattice structures,” Dr. Wood says. Machine learning algorithms leverage massive datasets to uncover design space nuances, leading to performance enhancements that were previously unforeseen.

At the same time, the mold builder can evaluate the manufacturing parameters of metal 3D printing, such as surface roughness and channel sizes. Then, using a structured approach and database methodology, they can determine the optimal orientation for manufacturing.

“When these two workflows converge, the result is a tangible improvement in conformal cooling, reducing cycle times

and machine lead times. Aligning these separate data models early in the process accelerates decision-making and ensures a more seamless transition from development to production,” Dr. Wood says.

Looking Ahead

Dr. Wood sees machine learning continue to evolve as a powerful tool for leveraging the vast amounts of data generated in mold manufacturing. It can help design engineers in early-stage decision-making identify statistical anomalies in manufacturing and inform design based on machine accuracy, such as defect prediction, accurate design for manufacturing and feature-based accuracy assessment.

“The digital thread serves as the foundation for creating a data lake, enabling machine learning algorithms to identify correlations and streamline decision-making processes,” Dr. Wood reiterates.

While the integration of machine learning in manufacturing might seem futuristic, Dr. Wood notes that many companies are already putting these models to use in a variety of ways, ranging from machine health monitoring to on-demand quoting engines. He believes that over time, we will find more use cases and capabilities of machine learning models that will unlock new levels of access and productivity for everyone. For example, there are on-demand manufacturing platforms that use custom manufacturing execution system (MES) software to create a data lake that serves as the foundation for machine learning models.

The challenge lies in establishing robust data infrastructure across the industry, enabling accurate leveraging of machine learning capabilities. Dr. Wood emphasizes that the path forward for mold builders must involve a deliberate and phased approach, starting with critical components and gradually expanding their data models. Last but not least, the workforce involved in this transformation must possess not only software development skills, but also a deep understanding of manufacturing logic. [MMT](#)

The advantage of establishing a digital thread is evident in its ability to pave the way for digital twins and machine learning models.

FOR MORE INFORMATION

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Moldmaking Activity Returns to Accelerated Contraction

February – 45.9

Moldmaking activity accelerated contraction in February despite most components moving in positive directions (i.e., slowed contraction). The Gardner Business Index (GBI) Moldmaking ended February at a reading of 45.9, down 1.2 points from January.

New orders (by more than 3 points), production and, for the first time in a long time (call it a year) backlog, were led by slowed contraction in February. Employment saw little change and the exports component — after accelerating contraction last month — wobbled back to slowing contraction to about the same degree.

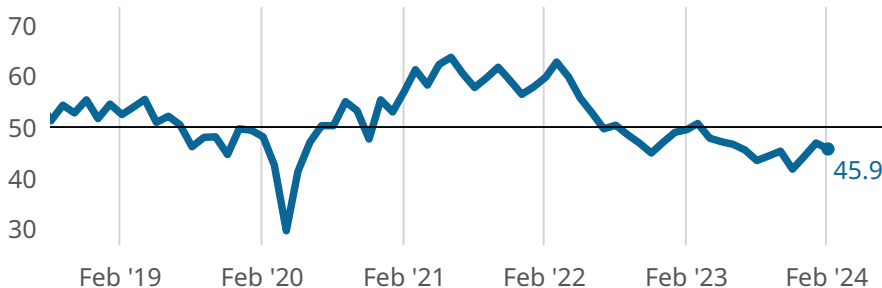
Supplier deliveries remained flat while expectations of future business (not part of the GBI calculation) continued to leap despite the total index continuing to contract or register “flat” at best. There are reasons to hope — it is only a matter of time before the *magnitude* of slowing component contraction catches up in terms of real business expansion, which is in line with the positive sentiment indicated by business expectations. **MMT**



ABOUT THE AUTHOR

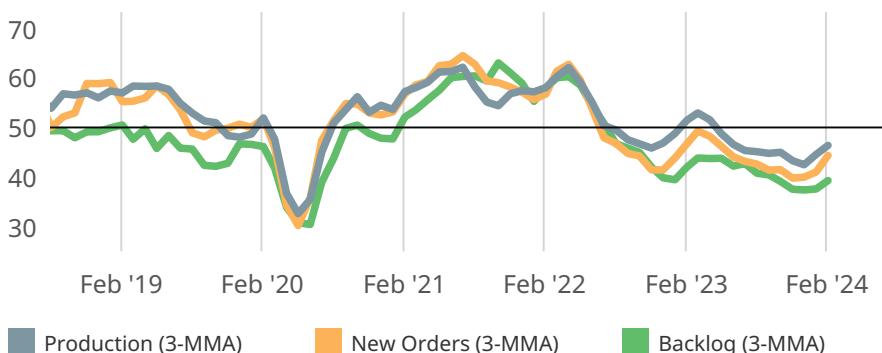
Jan Schafer, MBA, is the director of market research for Gardner Intelligence, a division of Gardner Business Media (Cincinnati, Ohio, U.S.). She has been an essential part of Gardner Intelligence for over five years, and has led research and analysis in various industries for over 30 years. Jan is available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

■ Gardner Business Index (GBI): Moldmaking



GBI: Moldmaking activity was down 1.2 points from January. Source (All Images) | Gardner Intelligence

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



February's slowed contraction in new orders, production and backlog suggests accelerated contraction in the total index may be short-lived.



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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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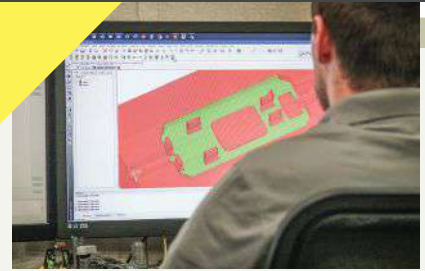
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Mold Builder Grows Mold Training, Additive Tooling Via Industry Partnerships

Westminster Tool is highlighting new developments with industry partnerships, including expanding its training opportunities with new Sumitomo SHI Demag machines and new case studies with metal 3D printing partner Mantle. Westminster's suppliers and partners are a critical component to serving its customers.

Adding the latest Sumitomo SE100EV-A and SE130EV-A injection molding machines to its fleet, Westminster Tool plans to expand its mold qualification capabilities to support customers with services such as adjusting processing parameters, developing production-quality prototype parts and troubleshooting molding challenges.

Westminster Tool is also speaking on stage at NPE 2024 about its latest case studies using metal 3D-printed tooling produced with Mantle's technology. It will present its findings at the Additive Workshop and the NPE Mold Building Track on May 8.

Westminster Tool Inc. / West Building Level 2 - Expo Hall, Booth W2691

Mold Repair, Design Solutions Serve Many Industries

Adler Industrial Solutions is showcasing its selection of pinnacle molds and rapid mold solutions, as well as plastic products from its family of companies, Pinnacle Molds, Rapid Mold and R&D/Leverage. Adler helps to support injection, injection stretch blow and injection blow molds by offering both custom mold design and mold repair services. The company purports itself as a network of tool and die companies capable of meeting the needs of a variety of manufacturers with its reliability and service, whether it's to develop new product tooling or to maintain existing molds.

Adler Industrial Solutions, Pinnacle Molds, Rapid Molds, R&D Leverage / South Hall Level 1 - Expo Hall, Booth S31151



MOLD BUILDERS

Moldmaker Highlights Domestic Mold Expertise for Plastics Industry

MSI Mold Builders is showcasing its ability to develop a full range of injection molds and structural foam molds domestically, meeting the needs of U.S.-based molders. The company's experience and operational stability enables an innovative approach to providing best-in-class solutions with short lead times and a low total cost of ownership. The company is featuring a number of products across industries where it has produced the molds.

MSI builds a variety of steel and aluminum molds, the latter for limited production runs, serving customers in the automotive, power sport, agriculture, lawn and garden, medical equipment, heavy truck, material handling, recreational vehicle, construction and office furniture industries.

Its capabilities cover early supplier involvement for part and production development, new mold construction, in-house sampling, design services and tooling revision, repair and maintenance. As industry trends evolve toward new automation technology, MSI Mold Builders has invested in new equipment, including five-axis machines, and improved processes to further automate its operations and maximize machine utilization and throughput.

MSI Mold Builders / South Hall Level 1 - Expo Hall, Booth S35065



Cross-Functional Group Targets Metal 3D Printing Design, Engineering Services

The **Plastek Group** is a cross-functional group of engineers covering multiple disciplines, from package development, mold design/manufacturing and molding/assembly, with an emphasis on collaboration and quality. In particular, the group is highlighting its reverse engineering, 3D printing and conformal cooling design capabilities.

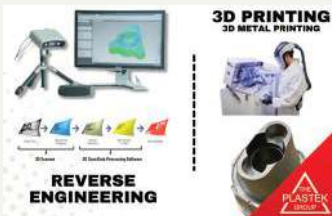
According to The Plastek Group, metal 3D printing is paramount to improved cycle time and the dimensional stability of molded parts. It sees the technology as an opportunity to quickly provide prototype pilot tools and provide real injection molded parts to customers.

Metal 3D printing has been out for almost 30 years now, but has only recently

reached the level required by the tooling industry to fit seamlessly into the everyday workflow. The Plastek Group highlights that recent advances enable molding components to be printed to near-net shapes, eliminating all soft machining. On top of this, when the part is printed, non-machinable features, such as conformal cooling, can be implemented at no extra manufacturing cost.

The Plastek Group's core strengths lay in multi-component, assembly, automated packaging cells, part removal and insert molding. It assists in everything from part design to mold design to downstream automation.

Plastek Group / South Hall Level 1 - Expo Hall, Booth S35161



Machining Equipment Investment Enables Quick Mold Delivery, Precision

Third-generation precision mold builder **Omega Tool Inc.** is growing its overall project delivery, precision and customer satisfaction with a heavy investment in the high-speed milling department. New innovations include high rpm spindles for Omega's multiple five-axis and three-axis hard cutting machines.



The company notes that it strives to hard cut whenever possible. This is because of the faster metal removal rate and improved surface finish which aids Omega in achieving high-precision accuracy and eliminating the need for polishing.

For example, on one of its spindles, Omega is able to generate 72,000 rpm, which enables the team to pick down to 0.003" corner radii. The surface finish that is produced typically does not need additional polishing. Moreover, the hard cutting direction reduces the number of operations over EDM.

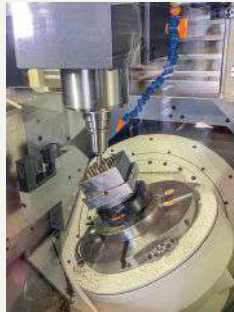
In addition to the investment and attention to its machining equipment, Omega is placing more emphasis on the cutters and the toolholders it has within its shop. The company says it is constantly pushing the envelope to improve accuracy, surface finish and the time it takes to finish a project.

Omega produces precision plastic injection molds for a wide range of markets. Customers often rely on the company for turnkey projects, starting from part development to molding validations. Mold maintenance/updates, mold sampling – full FAT mold qualifications, in addition to sampling for other molders and mold builders – and inspection and quality control are other capabilities offered.

Omega Tool Inc. / West Building Level 2 - Expo Hall, Booth W1588

Mold Builder Invests in Five-Axis Milling to Open the Envelope

Part of the mold building process used by **Mold-Tech Inc.**, serving the designing, building and sampling of high-quality injection molds, includes the addition of a Makino D200Z five-axis machine to its hard milling department. The company says that five-axis milling opens the envelope to options not always possible with more traditional three-axis machining, equipping its moldmaking professionals for efficiency to meet customer needs.



Five-axis milling provides many benefits to Mold-Tech's products. Cutter reach capability and cutter protrusion length are noteworthy. Moreover, when milling with the five-axis machine, rotating and tipping the working piece allows the operator to cut on the side of the cutter radius – rather than the centermost part of the tip, which is smaller in diameter. The company says that five-axis machining also reduces the need to set up work pieces multiple times when working on more than one surface.

Mold-Tech claims that milling with the larger portion of the radial ball end mill increases cutter life and improves quality, size and surface finish of an end product; that reduced cutter protrusion from the collet adds to the improved performance of surface finish and accuracy; that a five-axis can enable more complex geometries; and ultimately, delivers faster production speed (enhanced lead times).

Mold-Tech Inc. / South Hall Level 1 - Expo Hall, Booth S29137

Move Into Automation Adds to Mold Building Quality, Competitiveness

Cavalier Tool & Manufacturing has a decade-long history of continuous growth. To successfully navigate the obstacles inherent to this, the company has set its current focus on automation, to ensure it has good data to make decisions and measure results.

To build quality customer molds – ranging from injection, structural foam, gas-assist, multi-shot, thermoset, prototype or compression molds – Cavalier is currently operating an AI-driven



robotic cell that consists of three five-axis machining centers, serviced by a multi-axis robot that draws from a 235-pallet library.

This is the third phase of Cavalier's journey to repatriate all complex 3D components previously sourced LCC, which has been a decade-long, multiphase investment. Expanding to include sinker and wire EDM processes, once the automation cell is finalized, the company says it will be able to manufacture lifters, inserts and slides completely without human intervention. From stock blanks to finished product, Cavalier anticipates the cell to take data from scheduling and blanks from the library and produce just-in-time components for its assembly department to drop into molds.

Ultimately, the growth into automation ensures that Cavalier can meet customer demands and remain globally competitive, but notes that "adding automation doesn't necessarily mean we need fewer people. We still need skilled workers. In fact, as we look to the future, we need people with even more skills who are trained for jobs that don't even exist yet."

Cavalier Tool / South Hall Level 1 - Expo Hall, Booth S26021 – CMM Pavilion

Moldmaker Showcases Molding Equipment for LSR, Injection Molds

M.R. Mold & Engineering specializes in tight-tolerance, complex geometry, liquid silicone rubber (LSR) and plastic injection molds. It has a proprietary line of molding products which include valve gated cold runner systems, a pneumatic stuffer box, a universal base and a one-drop universal base, which has been designed for prototyping. M.R. Mold also offers customers end-of-arm tooling, robotics and vacuum seals.

The company is showcasing its abilities with four partners at NPE2024. Milacron is running a four-cavity, fully automatic LSR umbrella valve mold with a four-drop cold runner. Shibaura is showcasing a four-cavity, fully automatic LSR duckbill valve mold with a four-drop cold runner. Sumitomo Demag is running a 16-cavity, fully automatic piston mold with an eight-drop valve gate cold runner. And Zeiger Industries is running a fully automated, four-cavity electrical connector using 30% glass fiber-reinforced Nylon 6/6.

Milacron / West Building Level 2 - Expo Hall, Booth W1601C and W1601



Servo Unscrewing Device Delivers High Performance to Multi-Cavity Molds

DME Company showcases the Servomold unscrewing device, an innovation that uses servomotors to drive mold actions. It offers the industry several benefits including precision and speed, energy efficiency, optimized cycle times, flexibility, reduced maintenance and a more environmentally friendly approach.

More precise control over the speed, position and acceleration of mold actions can improve the quality of the molded parts and reduce defects, DME reports. The servomotors also only use power when needed, leading to significantly reduce energy costs. Improved control and efficiency of servo-



motors can lead to faster cycle times, increasing productivity and reducing production costs.

The servomold systems can be programmed to perform complex mold actions, providing flexibility in the design and production of molded parts. However, the

systems employ fewer moving parts and do not require hydraulic fluid, reducing their own maintenance requirements and downtime. Along with the elimination of hydraulic fluid, DME servomolds are generally more environmentally friendly, aligning with the growing trend toward sustainability in the manufacturing industry.

DME Company / West Building Level 2 - Expo Hall, Booth W1601B

Built-In Hydraulic Cylinder Saves Space in Injection Molds

CUMSA USA is announcing the expansion of its hydraulic cylinder line with the launch of the Model F built-in cylinder. Model F is designed for internal movement and has been specifically engineered to meet the needs of moldmakers within the plastic injection industry. It offers a compact and robust design and is made of high-quality materials to ensure optimal performance in high production and other difficult environments.



The Model F is appropriate when needing to control pre-opening movements. All Model F cylinders come with Viton O-rings as standard, which make them effective in traditional and high-temperature molds. CUMSA says that the model is simple to assemble and disassemble to support easier maintenance.

The Model F hydraulic cylinder is available in five piston diameters – 25, 32, 40, 50 and 63 mm – with strokes up to 80 mm. The False Cut is also available to achieve a simple housing design.

CUMSA / West Building Level 2 - Expo Hall, Booth W2489

Cloud-Based System Designed for Mold Asset Management

Progressive Components presents ProFile v4, a cloud-based system for mold monitoring and asset management. Designed for OEMs, molders and mold builders, ProFile can be used as an asset management system to organize and track global tools and equipment, or for complete, real-time monitoring and production improvement capabilities.

Progressive proports several benefits to using the ProFile system. It provides live data feeds from molds, which the company claims enables users to monitor cycle times, downtime and potential issues before they impact production. The system also sends automated alerts to the user to remind them to schedule preventive maintenance on their machines.

ProFile enables users to share mold data and documents with their team. Its collaborative workspaces and role-based access are designed to ensure everyone has the information they need when needed.

Additionally, it integrates with existing enterprise resource planning (ERP) systems and manufacturing execution systems (MES), along with Progressive's Cve monitor, creating a unified data hub for mold information.

Progressive Components / West Building Level 2 - Expo Hall, Booth W1543 / South Hall Level 1 - Expo Hall, Booth S30139 - Moldmaking Zone



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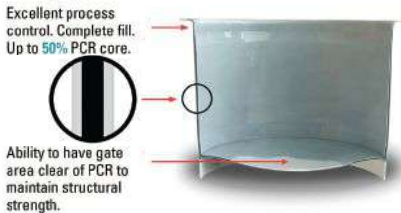
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Hot Runners, Auxiliary Injection Units Enhance Control, Processing Capabilities

Mold-Masters is exhibiting hot runner systems, temperature and motion controllers, an auxiliary injection unit, a gate seal and sustainable processing solutions.



New hot runner systems on display include the Fusion Series G3 hot runner and the EcoONE Series 1-8 drop hot runner system. Attendees can also see the new TempMaster M4 hot runner temperature controller and the M-Ax mold motion controller. The TempMaster M4 features Mold-Masters' HR-Connect technology, which eliminates conventional mold thermocouple and power cables and replaces them with a single, lightweight cable connecting the mold to the control head unit. The next-generation M-Ax mold motion controller features a simplified user interface with special features.

Tool Steel Alternative to S7-Based Molds

With staff shortages prevalent, mold builders are searching for new efficiencies that allow them to provide timely service to their customers. **International Mold Steel (IMS)** claims to answer this call by providing its DCMX cold-work tool steel as a time- and money-saving alternative to S7 in plastic molds. IMS claims that DCMX is a better alternative to S7 for five reasons:

- Its chemical composition and production process makes DCMX easier to machine than S7 because it does not have coarse, unevenly distributed carbides that tear up cutters.
- DCMX is an isotropic matrix steel that is more stable in heat treatment.
- DCMX resists cracking during the welding process because it is tempered at a higher temperature than S7.
- DCMX delivers better wear resistance against abrasive resins due to higher hardness than S7 – 60-62 versus 52-56 HRC.
- DCMX provides higher hardness than S7 while maintaining similar toughness, which helps the mold builder deliver molds that perform longer with less maintenance.

International Mold Steel Inc. / South Hall Level 1 - Expo Hall, Booth S32134 – Moldmaking Zone

Additional products featured include the company's E-Multi product line of auxiliary injection units, which now includes the E-Multi mini, and the Sprint Apex gate seal that minimizes flow lines, improving environmental stress crack resistance (ESCR) of CSD caps by up to 40%.

The company's various processing solutions for bio-resins and recycled materials, are also being

exhibited. For example, Mold-Masters' co-injection multilayer systems maximize the use of recycled content. The technology allows molders to incorporate recycled content up to 50% of total part weight as the core layer positioned between two layers of virgin resin.

Mold-Masters / West Building Level 2 - Expo Hall – W1601A

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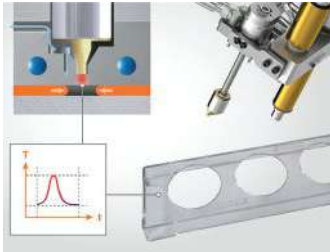
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Localized Mold Temperature Control Reduces Knit Lines, Optimizes Melt Flow

Incoe Corp. introduces Heat-Inject technology, a solution for reducing knit lines about holes and openings on a part, and improving melt flow through cold runner fan gates or thin-wall sections of the cavity. Heat-Inject technology is designed as an add-on module to Incoe unitized manifold systems, offering a simple design and implementation, reduced mold modifications/costs compared to other solutions and low power consumption – only 220VAC/30-amp power input is required.



Heat-Inject technology is based on the DH system from partner company Hotset. The technology's localized selection of dynamic mold temperature control ensures significantly improved part quality and low-stress filling of the cavity, Incoe reports. How knit lines can be eliminated will be shown at its booth

using a hot runner mold equipped with Heat-Inject technology. Incoe's Flight Attendant will be molded using an all-electric LSG-240 E LS Mtron machine and Sepro Robot cell. The three holes in one of the Flight Attendant's transparent components will demonstrate the Heat-inject technology solution.

Use of Heat-Injection helped troubleshoot production of a control panel for a household appliance by fan gate feeding the cavity to improve the melt flow.

Incoe Corp. / West Building Level 2 - Expo Hall, Booth W3761 / South Hall Level 1 - Expo Hall, Booth S30123

Moldmaking, Plastics Innovations Designed to Boost Injection Molding, Streamline Operations

PCS Company is introducing several new products related to the plastics injection molding, moldmaking and die-casting industries.

MCS hot runner temperature control systems precisely accelerate temperature control. Universally effective for the control of all standard hot runner systems, it features fast control response, improved intuitive operation and offers simplified controller functions.

Airtect's Plastic Leak Alarm systems provide 24-hour protection for hot runner systems or IMM injection nozzles. Users receive instant feedback from the direct protected area in the form of an alarm and/or the suspension of production, helping minimize damage and downtime.

Gesswein's mold & die micro-TIG welder U6 - 110V is a device that enables in-house mold repairs such as parting lines, mold seams, three-point corners and edges. Portable and easy to use, the unit comes pre-programmed for use on steel, aluminum and copper. Users can simply set the program for the particular mold repair operation and begin welding with the needed weld pulse and time lapse.

Other highlights include PCS' new 0.750" integrally heated sprue bushings, which help shorten cycle times without compromising part quality, and the company's complete line of Smartflow products.

PCS Company / West Building Level 2 - Expo Hall - W3801

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3D Printed Hot Runner Nozzles, Pressure Pads Provide Reliable Temperature Handling

Witosa GmbH will make its U.S. debut by showcasing its Monolith hot runner nozzles and Energy Blocker printed pieces at the **DMS Diemould Supply** booth.

The one-piece, additively manufactured Monolith nozzle was launched in Germany in 2021. Featuring a distinctive honeycomb structure, the nozzle provides optimal insulation and a more uniform temperature profile compared to traditional multipart nozzles. This design flexibility enables precise customization to meet customer specifications, especially for technically demanding plastics. The Monolith hot runner nozzle product portfolio includes individual nozzles to system nozzles with open gating or valve gates in nozzle diameters 11, 16, 20, 22, 24 and 28 as well as freely selectable nozzle lengths.



Witosa also introduces the Energy Blocker, additively manufactured pressure pads made of hardened steel that reduce heat dissipation from the manifold system into the mold, decreasing energy consumption by up to 52% compared to conventional systems with titanium pressure pads. The Energy Blocker's hardened steel is said to make it more pressure-resistant than conventional titanium backing plates.

DMS Diemould Supply / South Hall Level 1 - Expo Hall, Booth S28023 – CMM Pavilion



Electric Servo Cylinder Enables Detailed Valve Pin Control, Energy Efficiency

Yudo USA features the Yu Drive II Eco electric servo cylinder. Its electric valve pin control enables more delicate, individual control of the valve pins in a compact setting using only the signal from the injection molding machine, potentially solving a wide range of challenges that can occur during production.

Use of the Yu Drive II Eco reduces the cost of Capex due to the input signal that comes from the molding machine and eliminates the need for an external controller. The solution also has a finite amount of settings, making setup quick and easy. Seven total configurations are possible.

Yu Drive II Eco can be sequenced like conventional hydraulic/pneumatic cylinder systems. It uses the same 24 VDC signal used to operate solenoids. Importantly, Yu Drive II Eco consumes less energy than a typical hydraulic cylinder, adding to its more eco-friendly nature.

The company notes that sustainability has been a trend it continues to pursue, whether it's through the electric servo cylinder, or hot runner systems and components that perform well with eco-friendly recycled resins. Yudo looks forward to working with customers on their new projects.

Yudo Inc. / South Hall Level 1 - Expo Hall, Booth S31017

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Visit DMS at NPE booth S28023

Software Aids Localization of Injection Mold Inventory

Hasco America Inc. presents its Mould Track technology to provide indoor localization of injection molds. After production runs, mold tooling is placed in storage until it is needed again. It is imperative there be a fast and simple way to find these molds again when needed, to optimize both production planning and workflow.

Whether the mold is already in storage or is currently being used in the mold building process, Mould Track can locate it. Hasco's Mould Track software ensures molds are being used at the right place and at the right time. The technology utilizes precise, ultra-broadband radio modules and an intelligent software platform on a supplied PC.

The quick-turn technology ensures localization accuracy down to a few centimeters. Complete with robust algorithms, the system accurately tracks injection molding tools of any facility layout in real time via the digital inter-linking of processes.

One of the most significant trends the company has seen is utilizing computer data to track information and the history of the mold building process. As the digital world expands, ensuring the safekeeping,

organization and speed of this process is crucial.

Hasco / South Hall Level 1 - Expo Hall, Booth S35049



Hot Runner System Demonstrates More Precise Melt Control

Husky Technologies debuts its Ultrashot hot runner injection system. This technology is designed to increase overall part design freedom and speed to market with high scale and quality.

Live at NPE2024, the Ultrashot team shows attendees:

- How to increase scale faster with lower risk and go to market faster
- How to increase yield by reducing scrap rates
- How to eliminate subsequent manufacturing steps
- How to enable new part designs and new resins use; parts can be manufactured based on function.

The UltraShot features a servo-controlled injection system that permits more precise melt control right in the gate. This is achieved by positioning the shooting pots in closer proximity to the gates and pressurizing the resin near the cavities, which reduces shear and thermal variations in part quality and performance. This enables part freedom, removing design barriers caused by injection molding process constraints.

According to Husky Technologies, the market continues to evolve with more demanding and technical molding applications, which is fueling the development of new, advanced hot runners and injection systems that focus on part quality with higher cavitation output. With Ultrashot technology, Husky states, parts that were once "unmoldable" can now be produced in highly efficient injection molding production cells.

Husky Technologies / West Building Level 2 - Expo Hall, Booth W2801 / West Building Level 2 - Expo Hall, Room W206C and W208A



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Stack Mold System Combines Fast Injection With High Process Repeatability

Oerlikon HRSflow has developed a patent-pending compact stack mold system that targets thin-wall packaging applications. It is equipped with nozzles from the company's new Xd series, engineered to withstand high filling pressures. The stack mold system fits a maximum plate thickness of 220 mm. It is designed for fast injection and cycle times via a stable process with high part-to-part weight consistency.

The stack mold's design, with a plug-and-play system, enables a simplified assembly. It also offers fast and friendly maintenance, avoiding long and costly production line stoppage. The mold was also conceived to easily process PCR and sustainable compounds.

Oerlikon HRSflow aims for the best customer support, from rheological analysis and design phase to tryout and maintenance. For special

applications, its team can define the optimal system configuration and predict part quality through advanced hot runner system simulations. The company also prides itself in incorporating up-to-date technology and digitalization internally.

**Oerlikon HRSflow / South Hall Level 1
- Expo Hall, Booth S25183 - Advanced
Manufacturing Zone**



Aluminum Plate for High-Temperature Tooling Applications

Ellwood Specialty Metals showcases its EllCast 2 aluminum plate. This modified Alloy 2618 is designed for high-temperature applications up to 300°C (575°F).

EllCast 2 offers machinability properties with dimensional stability, which Ellwood claims makes it suitable for a wide range of industries. Its high strength at elevated temperatures, combined with high thermal fatigue resistance, hardness and polishability, reportedly makes EllCast 2 a good choice for critical applications.

EllCast 2 aluminum plate offers strength at elevated temperatures and dimensional stability during machining. It maintains an equiaxial fine grain structure and consistent properties throughout the entire plate, making it suitable for polished surface applications. EllCast accepts anodized nickel and other coatings, as well as mold finishes and textures. Moreover, it provides good welding characteristics.

EllCast 2 aluminum plate is suitable for a variety of applications, including injection molding, structural foam, composite tooling, reaction injection molding (RIM), resin transfer molding (RTM), rubber molds, blow molding, rotational molding, automotive, aerospace and thermoforming.

**Ellwood Specialty Metals / South Hall
Level 1 - Expo Hall, Booth S29132**

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Uddeholm USA's Tyrax ESR combines toughness, corrosion and wear resistance. This grade was developed to mold high-performance plastics, often filled with glass fiber reinforcements and additives like flame retardants. This matrix-based microstructure is designed to achieve a high-gloss surface with only a few polishing steps, reducing tool lead times and enabling the production of better plastic parts, the company claims. The Tyrax ESR can achieve a high hardness (up to 58 HRC) and is reportedly a suitable upgrade from AISI 420 ESR, AISI S7 and AISI 440C.



Uddeholm distinguishes itself through advanced metallurgy and a customer-centric approach, collaborating closely with clients to develop bespoke solutions to improve mold life, minimize maintenance costs or enhance overall productivity. With a keen focus on enhancing efficiency and reducing downtime, its solutions now include additive manufacturing, metal powders and PVD coatings, which empower manufacturers to achieve optimal performance and consistency in plastics production.

Uddeholm USA / South Hall Level 1 - Expo Hall, Booth S32135 – Moldmaking Zone

LSR Platform Meets Critical Medical Molding Needs

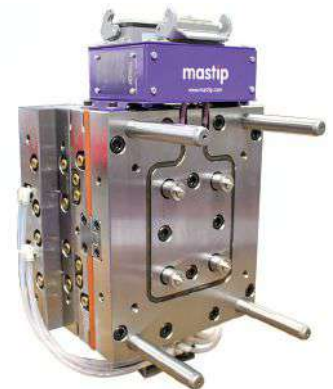
Mastip Inc. introduces latest updates to its Aquilo LSR systems and looks forward to sharing its experiences with recently completed projects for the medical industry.

Mastip's LSR solution features a "cold deck" design that includes cooling channels in the mold plates, manifolds and nozzles, ensuring the mixed material remains in its uncured condition before entering the heated cavity plates.

Additionally, the use of valve gating technology improves balance between cavities and from shot to shot, eliminating material curing in the gate between cycles. Sequential timing of the valve gates is the key component that ensures cavities are kept balanced.

Mastip's dedicated CR04 and CR06 LSR nozzles are designed with cooling channels extending toward the valve gate nut, ensuring a consistent thermal profile along the nozzle. This design enables optimal control of the valve gate nut temperature which Mastip says is critical in consistently producing high-quality LSR parts. Moreover, the consistent thermal profile along the nozzle ensures that LSR flows smoothly and uniformly into the part, resulting in a high-quality gate and improved part quality overall.

Mastip Inc. / West Building Level 2 - Expo Hall, Booth W3089



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Bonding, Sintering Tech Advances Metal Bonding for Mold, Die Components

Punch Industry USA Inc., subsidiary of Tokyo-based Punch Industry Co., is exhibiting its parent company's bonding and sintering technology called P-Bas. P-Bas, an alternative to 3D metal printing, is used to fabricate custom conformal cooling channels for mold and die components by bonding split parts, offering an extensive compatibility with iron-based materials.



P-Bas, denoting Punch Bonding and Sintering, employs heat and pressure for metal bonding, achieving joint strength surpassing 90% of the base material. Additionally, P-Bas produces parts and cooling lines with a finer, smoother surface finish than that of 3D metal printed parts; the process includes a

surface coating to reduce rust formation in the cooling lines.

Parts that can be made using P-Bas include gate inserts for components to make plastic bottles, core pins for injection and die-cast molds, and sprues.

Customers can initiate P-Bas ordering by designing components with cooling channels, approving suggested split parts and receiving a quotation.

Punch Industry USA is also exhibiting its precision-ground custom mold cores, core pins, ejector pins, ejector sleeves, ejector blades, micro pins, punches, button dies and more.

Punch Industry USA Inc. / South Hall Level 1 - Expo Hall, Booth S39137 – Moldmaking Zone

Hot Runner Controller Made to Integrate Into Molding Machines

Fast Heat by Spark Industries is introducing MOD24, a modern, modular hot runner controller offering unlimited plug and play of six-zone hot runner control modules within compact, 24-zone cabinets. The cabinets themselves offer up to 192 zones with a single Fast Heat Pulse HMI. The display can be cabinet-mounted in multiple configurations, remote-mounted or integrated with a molding machine controller. MOD24 is Industry 4.0-enabled with OPC-UA, Modbus TCP/IP, 4-Channel I/O and Micro-USB Recipe Transfer and operates on Fast Heat control technology.

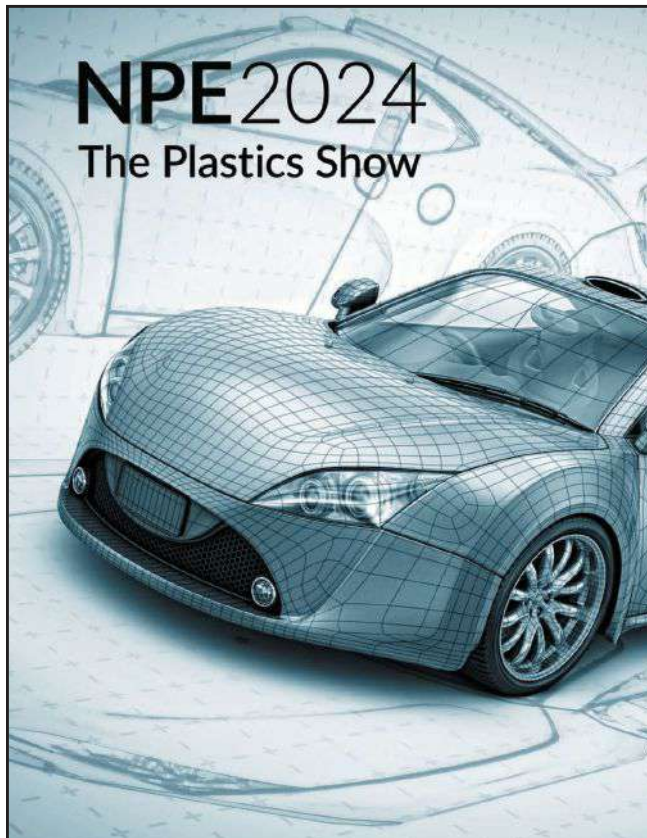
Prior to MOD24, industry has had two options for hot runner controls: traditional modular mainframe controllers with independently controlled power modules, and "integrated" controllers with a single HMI and more advanced control, but without a modular cabinet system that can



easily be expanded or reduced. MOD24 combines the benefits of both into one system while improving cabinet mounting, power options, injection molding machine integration and Industry 4.0 capabilities.

Mold builders and toolrooms can also enjoy MOD24's advanced diagnostics, recipe storage upload/download and reporting functionalities.

Fast Heat by Spark Industries / West Building Level 2 - Expo Hall, Booth W4243



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Hot, Cold Runner Technologies Sustain Quality Injection Molding

Ewikon Mold Technologies highlights its innovative, reliable and practical hot runner solutions. With a full range of highly technical products and a global sales and service network, Ewikon says its hot runner systems guarantee efficient, stable production and aid in saving time and material.

Ewikon offers the global injection molding industry a broad range of hot runner systems as well as cold runner solutions for the processing of LSR. Its solutions are designed to optimally meet the demand of customers, providing various options to improve the injection molding process, the quality of the manufactured parts and reduce costs. According to the company, this has resulted in thousands of successfully realized applications.

Moreover, Ewikon's Smart Control integrates the hot runner system completely into the networked injection molding production and enables transparent processes as well as simple process optimization and quality control.

Ewikon Molding Technologies Inc / West Building Level 2 - Expo Hall, Booth W1581

Tool Guide System Offers High Precision

With more than 100 years in operation, **Agathon Machine Tools** has developed several tool guide systems known in the mold market today. The company claims that its high-precision guide systems help to increase users' cycle times and reduce maintenance costs; they have been successful in critical applications, even when tight tolerances are needed.

Agathon's latest product in this line is the Guide System Plus. This system not only provides the main tool guiding, but also the fine centering between mold halves. Agathon products use a fine centering technique that utilizes rolling elements, which the company says enables users to eliminate traditional friction-style side and taper locks that wear out quickly and require frequent replacement – resulting in a smoother running tool and longer tool life.

Agathon Machine Tools Inc. / South Hall Level 1 - Expo Hall, Booth S21170



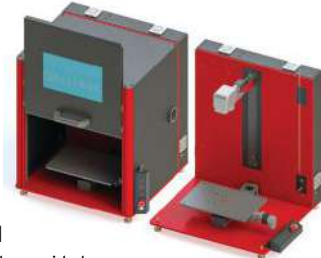
Laser Engraving System Features MOPA Fiber Laser

The Alliance Advantage from **Alliance Specialties and Laser Sales** is a laser engraving system with a compact footprint, featuring a master oscillator power amplifier (MOPA) fiber laser. It can be acquired as an open system or with a cabinet surround, and laser wattages from 20-200 are available.

Designed and built by Alliance's laser experts in Prairie Grove, Illinois, the Advantage has laser engraving software, built-in motion control (up to four axes), a rotary D-axis for marking round parts and flexibility to mark metals, plastics, polymers and more.

The machine, with a bench-top design (mobile cart is optional) offers a variety of additional features. It has an interlocked door for laser safety and an 11" x 17" viewing window. The laser source, a certified Class 1 laser, is air-cooled and maintenance-free. Alliance Advantage also has a programmable Z-axis (powered), runs on 110 or 220 VAC and maintains a red light distance pointer for easy focusing of the laser. Additional features include a guide laser for easy part alignment, removable side panel for larger parts and 163-, 254- and 330-mm lens options.

Alliance Specialties and Laser Sales / South Hall Level 1 - Expo Hall, Booth S31038



Dry Ice Blasting Achieves Mold Maintenance Needs

Cold Jet is exhibiting the next generation of dry ice smart blasters, as well as the chance to win a \$40K smart blaster. Machines on display highlight the ability for operators to adjust the cleaning aggression of a product – such as during mold cleaning/maintenance – by changing not only the blast pressure settings, but also the dry ice particle size. Cold Jet systems employ a patented Particle Control System that allows molds to be cleaned with 28 different dry ice particle sizes from 0.3-3.0 mm.

While dry ice is a soft material, known for being a non-abrasive process, cleaning parameters need to be set for various mold types. Molds can be made from aluminum, H13, P20, etc., all of which possess a wide range of complexities and employ different surface finishes from A1-D3. Importantly, dry ice cleaning systems achieve mold cleaning maintenance in-situ, while the mold is still in the press and at operating temperatures, eliminating the possibility of mold damage during mold removal and reinstallation.

Cold Jet says that its systems have the distinctive capability to save different mold cleaning recipes to eliminate any user error that might occur. Moreover, they offer password protection and screen lockout features.

Cold Jet / West Building Level 2 - Expo Hall – Booth W5371



Texturing, Engraving Service Supports Mold Builders, Plastics Industry

Custom Etch Inc. is a texturing and engraving specialist, with its core business servicing mold builders and the plastics industry. Considering itself as one of the largest five-axis laser job shops in the U.S., Custom Etch strives to give customers the best turnaround time and pricing, keeping up with the constant evolution of laser technology and new hardware, which has been implemented to handle any shape and any size mold with high-speed 3D scanners with multiple laser sources.

Custom Etch produces texturing, engraving, micro-structuring, marking and labeling of 2D geometries right through to complex 3D geometries. It also maintains capabilities for mold repairs, chemical texturing and offers a process to apply patterns to an extrusion roll.



The company recently increased capacity to meet high demand. In addition to its current lineup of technology, Custom Etch invested in a Laser P 2500 U laser texturing machine from GF Machining Solutions, which offers increased accuracy and repeatability, reduced hot spots and other advantages.

Custom Etch Inc. / South Hall Level 1 - Expo Hall, Booth S25027



Injection Molding Supplies Target Mold, Molding Challenges

In its quest to eliminate costly injection molding problems, **Plastix LLC** is announcing several new products, which can be explored at its booth.

Offering comprehensive hot runner mold protection, the **Airtect Ultimate** incorporates both "Point" and "Loop" plastic leak detection zones in its design, ensuring mold safeguarding.

When durability and reliability are crucial, **Plastix's HiTemp** and **Xtreme HiTemp** manifold assemblies can handle temperatures and pressures at elevated levels, 400°F (250 psi) to 450°F (680 psi). These manifolds are made from corrosion-resistant stainless steel, feature a compact and configurable design.

The **X-Flow** is another novel technology with multi-flow circuit validation, enabling quick and easy validation and troubleshooting of mold flow rate and temperature per circuit.

For faster and safer mold changes, **Plastix** introduces the **LinkedX Valve** system, which offers a single lever to operate both mold cooling supply and return lines simultaneously, enhancing efficiency and reducing standard manifold footprints.

The **X-Pure** water supply system provides a compact and cost-effective solution for supplying clean, distilled water to high-temperature water units. Well suited for applications operating between 300-450°F, **X-Pure** effectively prevents contaminants from damaging molds and machinery.

Another innovation, **Barb-Tech** push-lock assembly tools, eliminate the hassle and potential injury associated with using traditional methods of installing push-lock fittings.

**Plastix LLC / South Hall Level 1 -
Expo Hall, Booth S31027**



Hydraulic Gating Cutting Reliably Separates Molded Parts

Ermanno Balzi Srl has been engaged in the production of components and accessories for molds since 1995. Among the solutions the company offers for the molding of plastic materials is its hydraulic gate cutting technology, which enables the separation of the molded part from the gate during the molding cycle via the axial movement of a cutting tool operated by a mini cylinder.

The cutting, more precisely described as a material displacement, is carried out in a closed mold at the end of the holding phase when the polymeric material is still hot. The high pressure required by the process can be provided through a hydraulic power unit or a pressure multiplier applied to the mold and controlled by the injection molding machine.

There are multiple advantages in this production process, including the elimination of external cutting equipment; repeatability of a cut with high aesthetic quality; the possibility of using larger injection points without requiring external gate removal systems; and the elimination of risks for the operator during manual gate removal. Applications with different materials and types of gates are possible, including film and diaphragm injections.

**Ermanno Balzi (shared booth with
DMS Diemould Supply) / South Hall
Level 1 - Expo Hall, Booth S28023**

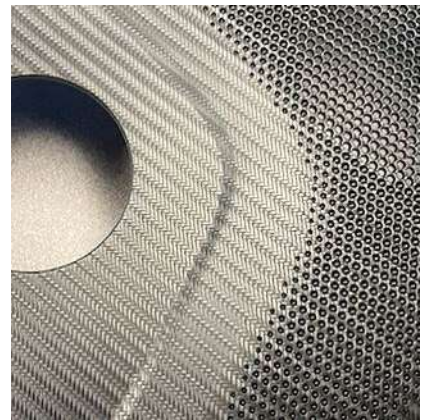
One-Stop Shop Simplifies Custom Surface Textures, Mold Performance

Through its One Partner Solution, **Standex Engraving Mold-Tech** offers services and technologies that support projects from the beginning to end – from specialized finishing through to manufacturing support.

The company's services start by designing a custom texture tailored to a customer product, verifying those grains on the product, engraving the tool and then optimizing that tool for streamlined manufacturing. **Standex Engraving Mold-Tech** highlights the seventh-generation **Ford Mustang** as a key example of its capabilities, demonstrating its laser engraving technology throughout, but in particular on the front door speaker grill (shown below), which presented a challenge.

Ford's front door upper speaker mold was laser engraved with a carbon fiber texture onto a steel surface consisting of both benched and EDM in a seamless fashion. **Standex Engraving** notes the preciseness of laser engraving, which can control the grain locations around featured surfaces and shut-offs. The end result camouflages the speaker holes within the texture itself, eliminating the need for framing or a separate grill piece.

**Standex Engraving Mold-Tech / South
Hall Level 1 - Expo Hall, Booth S20151**



Low Flow Indicators Designed for Critical Mold Cooling Channels

Burger & Brown Engineering is displaying **Smartflow** low flow indicators, designed to show the presence of flow inside flow channels between 0.08 and 1 GPM (0.3 to 4 LPM). High visibility rotors spin behind a viewing window at flow rates that do not register on conventional mechanical flow meters.

High-temperature and pressure models are ideal for pressurized water circuits commonly used in cooling engineering resins. Standard temperature units for use up to 210°F include options to add temperature and pressure gauges along with **Delta-Q** flow regulators.

The flow regulators are of value to mold builders and maintenance personnel for bench verification of flow inside tool paths with critical flow restrictions such as bubblers or baffles.

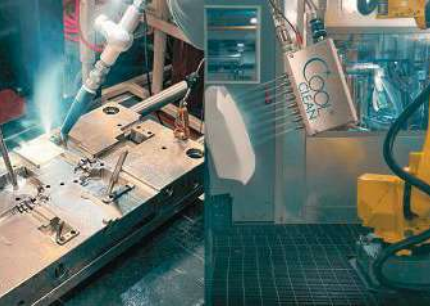
Connection sizes are 3/8" NPT and BSPP for high-temperature and pressure models. Sizes 1/4-1/2" NPT and BSPP connections are available in standard temperature models to provide the widest range of applications possible.

**Burger & Brown Engineering Inc. / West
Building Level 2 - Expo Hall, Booth W3071**



CO₂ Cleaning Effectively Generates Contamination-Free Mold Surfaces

Cool Clean Technologies is highlighting its specialization in CO₂ cleaning. The company's products incorporate CO₂ in all phases for cleaning, surface preparation and plastics deburring, removing contamination from surfaces. Its CO₂ spray methods can be configured in two ways: dry ice blasting and CO₂ snow cleaning.



Dry ice blasting is a fast and effective cleaning solution that surpasses traditional methods for plastic and rubber molds. Dry ice blasting is an aggressive form of cleaning using dry ice pellets, referred to as "blasting rice." When pellets of dry ice are propelled at high speeds and

impact the mold, they sublimate immediately, transferring kinetic energy to the surface and removing any existing debris.

Alternately, CO₂ snow cleaning generates the cleaning spray by condensing liquid CO₂ to solid CO₂, or "snow," inside the spray nozzle assembly. CO₂ spray cleaning systems provide cost-effective, no-touch cleaning that can be dropped into existing production lines with a fraction of the footprint of water-based cleaning. Importantly, Cool Clean Technologies says there is no waste disposal required when using these solutions.

Cool Clean Technologies / South Hall Level 1 - Expo Hall, Booth S39043



Industry Veteran Provides Laser and Polishing Services

High Tech Laser & Polishing Inc. has been serving the mold and plastics industry since 1985. It provides multiple services, including mold polishing, laser engraving, laser texturing, laser welding and more. The company's polishing department offers finishes from mirror diamond, paper, stone and blasted according to the Plastics Industry Assn. (PLASTICS, formerly the Society of the Plastics Industry) standards. Many of High Tech's projects require the polishers to work under a microscope for small and complex jobs – with the company's many years of experience, it claims that its polishers are able to manage orders that require such attention to specific details.

The laser department offers engraving, part marking, texturing, cutting and welding. High Tech's lasers create detail with depths ranging from 0.0005" to 0.075" or deeper. It engraves on tool steels, aluminum, copper and graphite for electrodes. Logos, cavity ID, tool identification or text can be accomplished on a contoured surface, a sidewall or down in a deep pocket. In addition, the welding department offers laser welding and TIG welding services on various tool steels, aluminum and copper materials. After welding, High Tech states that it is able to blend down the weld to match existing surface finishes.

High Tech Laser & Polishing / South Hall Level 1 - Expo Hall, Booth S25088

Custom Core Pins Advance Long, Thin-Walled Part Molding

Custom CraftAlloy core pins by **Crafts Technology** are designed for molding long, thin-walled parts, enabling lightweighting and reduced wall thicknesses. This lightweighting reduces the use of plastics and can reduce the amount of plastics that potentially end up in landfills. Moreover, Crafts' core pins are said to allow for the thinnest wall sections possible and should be deployed when looking to reduce plastics, reduce core deflection, maximize process control (CPK) and improve cycle times.



Crafts Technology's proprietary tungsten carbide material, CraftAlloy, offers high thermal conductivity and high hardness. Its use in core pins is said to enable it to outperform other core pins in core deflection (reduced by 65% compared to other commonly used materials) and tool life for most molding applications experiencing premature wear. Crafts Technology provides completed core pins including polishing, as well as custom CraftAlloy hot runner tips, gate bushings and tip bushings for automotive, glass-filled and abrasive plastics.

Crafts Technology / South Hall Level 1 - Expo Hall, Booth S34135 – Moldmaking Zone

Mini Hot Runner Nozzle Supports Intricate Geometries, Complex Parts

Heitec Hot Runner Systems' Star Line Crown Mini hot runner nozzle is being introduced to North American customers through **Technoject Machinery**. As parts become smaller and more intricate, followed by the emergence of miniature molding, the Star Line Crown Mini's compactness and versatility enables moldmakers to create intricate geometries and complex part configurations for both medical and automotive industries.

The hot runner nozzle provides edge gate technology in a very small package. Notable features include its:

- Design freedom: Its compact size and versatility allow for intricate geometries and complex part configurations.
- Minimal gate remnants: Due to vertical edge gate shear, gate vestiges are minimized, resulting in clean gate appearances.
- No separation of mold inserts: The nozzle's design eliminates the need for separating mold inserts, streamlining assembly.
- Quick tip exchange and gate well cleaning: Maintenance tasks can be performed directly on the machine, saving time and effort.
- High temperature profile: Maintaining an optimal temperature profile, it suits various engineering resins including PA, PBT and PEEK.
- Robust construction: The nozzle can be inserted into a single cavity block, providing high strength and optimized cooling.
- Micro injection molding ready: It is ideal for micro-sized components and producing high-precision parts even at subgram weight.



The Star Line Crown Mini's nozzle length is 24.5 mm. Part weight per tip ranges from 0.05-5g, and there are 1-8 tips per nozzle. Radial layout of parts is 56 mm in diameter.

Technoject Machinery Corp. / West Building Level 2 - Expo Hall, Booth W1281

Mold Solutions Target Safety, Storage and Productivity

Globeius sells and services a wide variety of machinery and equipment for the North and South American plastics industry. The company is exhibiting a range of molding solutions targeting the transport, storage and performance of injection molds.

Globeius is presenting its range of GT Cranes that are designed specifically for the injection molding industry. With a focus on making mold transport through the plant and mold changes simple and safe, the GT Cranes make a single-man operation possible.



They have up to 55,000-lb capacity and horizontal, vertical, angled and rotating boom arm dexterity. Adjustable speed simplifies the placement of the mold in the injection molding machine, while the use of a remote control allows one operator to perform tasks that are usually done by several people. In addition, the overloading system is designed to block the operator from performing potentially unsafe activities.

Customers will also find Rack Storage injection molding racking and storage solutions at the Globeius booth. A heavy-duty modular mold racking system can hold shelf loads from 4,400-22,000 lb with an electric actuator. In addition, the Rack Storage options reduce

floor space cost by up to 50%; reduce forklift time and costs; improve safety; and more. The modular design options include rear panels, side panels, covers, doors, etc.

Customers can also learn about the latest Flosense mold control from MouldPro, which is designed to optimize mold cooling to help injection molders improve part quality and maximize productivity. The Flosense IQ-One interfaces with a dedicated TCU/mold heater and controls the pump speed and temperature, which Globeius says will reduce energy consumption significantly and optimize the thermal process.

Globeius / South Hall Level 1 - Expo Hall, Booth S14026

Plastic Injection Molder Debuts EOAT, Mold Monitoring Solutions

Denmark-based Mouldpro ApS is exhibiting for the first time with Globeius Inc., its partner and exclusive North American distributor. In addition to showing visitors a wide range of general products and supplies for injection molding, recently introduced

Mouldpro products and two new offerings are available to attendees.

One innovation, Roborex, is making its debut at the show. The end-

of-arm tooling (EOAT) helps streamline automation and increase productivity in the molding process. Also making its debut is the Flosense thermal management/mold monitoring system. Flosense provides optimum control over mold cooling processes, reducing cycle times. The system uses sensors to measure the differences in input and output temperatures and pressures as well as total flow rate through the system, among other innovations to be demonstrated at the show.

**Mouldpro (shared booth with Globeius)
South Hall Level 1 - Expo Hall,
Booth S14026**



Optical System Delivers Rapid Machine Vision Solutions

Keyence Corp. of America is introducing the new VS Vision System, which focuses on ease of use to reduce the barrier of entry for moldmakers and plastics manufacturers to integrate automated visual inspection into their machines. Key features include ZoomTrax internal lensing with software-driven image setup, VS Creator programming software and edge-AI Detection and Classification tools.

ZoomTrax automatic image optimization with continuously variable optical zoom enables full image setup, including setting the field of view, focusing the image and lighting adjustment.

The VS Creator feature is a free software interface that was designed to be familiar to anyone who uses a PC. This is all paired with free monthly training so that the VS can be quickly picked up and used.

**Keyence Corp. /
South Hall Level
1 - Expo Hall,
Booth S34129 -
Moldmaking Zone
/ South Hall
Level 1 - Expo
Hall, Booth
S11151**



Maintenance Products, In-Booth Demonstrations Highlight Mold Cleaning

ID Additives, a company fulfilling additive needs in the plastics industry, is exhibiting all of its main product lines including chemical foaming agents, purging compounds, plastic mold cleaners, and water cleaning and maintenance systems.

Highlighted are the live demonstrations taking place at the iD Additive booth featuring the company's Eco-Pro 360 plastic mold cleaning system. Eco-Pro 360 is a preventative maintenance cleaning system for injection molds and other products that includes a pump and filter combination unit. It removes, protects and helps prevent rust and limescale within the cooling passages and water



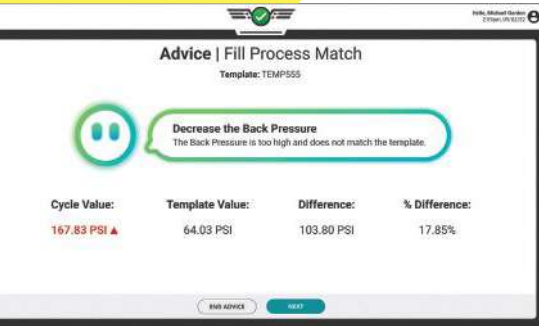
lines in a mold. A built-in filter function enables the Eco-Pro 360 to remain at peak performance for optimal reusability. During these demonstrations, iD discusses how to measure GPMs, and the safety characteristics of different chemicals and cleaning systems.

In addition to the Eco-Pro 360 display, iD Additives is talking about its chemical foaming agents, which are applicable for a wide variety of plastics processing, including injection molding, extrusion, blow molding and more. iD Additives has a large selection of foaming agents designed for specific applications to reduce weight and maintain dimensional stability of plastic parts.

Attendees can learn more about purging compounds for color changes, resin changes and startup/shutdown maintenance for injection molding, extrusion and blow molding. iD Additives features numerous options for purging including its Quickshots single-dose purging compounds.

Finally, iD Additives is showcasing Eco-Pro 360 Cool EX water cleaning and maintenance systems for optimizing closed-loop water systems. This all-organic cleaning and maintenance system includes an industrial cleaner for safe and effective scaled and metal oxide corrosion product cleaning, and a conditioning formula for preventing cooling water system corrosion and mineral scale fouling.

**iD Additives Inc. / South Hall Level 1 -
Expo Hall, Booth S32033**



Smart Assistant Bridges Injection Molding Skills Gap

RJG Inc. announces an innovative feature for its CoPilot process

control system called molding automation xprience (MAX), the Process Advisor. MAX utilizes AI technology powered by Master Molder techniques to provide molders with real-time, expert guidance to optimize their injection molding processes. The technology will be available to demo at RJG's booth.

RJG developed MAX to assist in bridging the skills gap and reducing waste during production. This smart assistant monitors process parameters in real time and offers troubleshooting advice to help molders rapidly resolve issues and improve productivity. Featuring an intuitive and easy-to-use interface, MAX offers guidance to molders by delivering step-by-step instructions for restoring a process to optimal performance.

Attendees are able to demonstrate the power of MAX for themselves. Two of RJG's experts are presenting the CoPilot twice daily at 10:00 a.m. and 2:00 p.m. for the duration of the show in RJG's booth. In addition, attendees can see the CoPilot and MAX live on a machine in Sodick's booth (Booth W3581), where an expert will answer questions.

RJG is also offering free presentations at its hospitality suite, W304EF. Attendees who visit RJG's booth will also be given a coupon code for 20% off any public or online training course if they register during the week of NPE.
RJG Inc. / West Building Level 2 - Expo Hall - Booth W3973

Strategic Workforce Management Supports the Moldmaking Industry

Injection molding simulation service and technology provider **Kruse Analysis Inc.** says that the key to organization within a company is its tactical management of human resources.



Kruse Analysis' ATR (attract, train and retain) framework offers a complete approach to optimized workforce management. According to the company, the first step is attracting the best talent, followed by honing their skills via practical training to ensure long-term company commitment.

Kruse Training implements eLearning complete with virtual reality training methods for recruiting and developing a skilled engineering workforce. The company says eLearning techniques in the moldmaking industry are the first steps toward a more sustainable economy. The progression includes technological advancements, cost-effectiveness and resource optimization, accessibility and inclusivity, and the impact on employee productivity and retention. These factors encapsulate the reason why this advanced and strategic workforce management in the moldmaking industry is successful.

Kruse Training Inc. / Kruse Analysis, Inc. / West Building Level 2 - Expo Hall, Booth W4488

Magnetic Mold Clamping Amplifies Quick Mold Changes

Stäubli Corp. presents the QMC123, released in 2023, as an advanced magnetic mold clamping technology option, distinctive by its magnetic holding force measurement and analysis. It is adapted to the full range of machines and molds. There will be demonstrations of the QMC123 at Stäubli's booth.

In the new system, the amount of holding force that can be generated can be customized to the mold and its condition. Specifically for mold builders, Stäubli's IMAG-Editor software is available to calculate the expected magnetic holding force that can be generated with each mold, based on CAD data, during the mold design phase.

Offering a high level of safety, Stäubli says that its magnetic mold clamping system anticipates malfunctions, not only protecting employees and equipment but also improving mold quality, increasing productivity and providing cost savings. For example, its interactive control panel enables validation of safety points during mold changing operations. Via IMAG, the operator is alerted if the mold clamping system is damaged or insufficient with regard to the force exerted on the mold.

In addition to these displays, there are Stäubli's range of quick mold change solutions including: mono couplings, a mold loading vehicle, an automatic multi-connection system, a robot with an automatic toolchanger and more.

Stäubli Corp. / West Building Level 2 - Expo Hall, Booth W2521



University Programs Expose Next-Gen Students to Moldmaking, Plastics

The University of Massachusetts Lowell (UMass Lowell) extends an invitation to its Alumni and Friends Reception to UMass Lowell alumni and industry professionals attending NPE2024.

The UMass Lowell Plastics Engineering department offers the largest Accreditation Board for Engineering and Technology (ABET) accredited plastics engineering program in the U.S. More than 3,000 UMass Lowell graduates are working in the plastics industry worldwide.

UMass Lowell attributes its students' success to its programs, which combine hands-on laboratory experiences relevant to the industry with the fundamental theory of mathematics, science and engineering. The school



also makes an effort to expose its students to all of the major plastics manufacturing, design and testing technologies.

Constant feedback from industry professionals and alumni enables UMass Lowell to stay on the cutting edge of plastics manufacturing and design technologies.

To view details about the reception and to register, go to short.moldmakingtechnology.com/umlreception.

UMass Lowell / West Building Level 2 - Expo Hall - WL2



Production Tracking Software Enables Smart Factory Functionalities

Wintriss Controls Group is demonstrating advanced features in its ShopFloorConnect OEE and production tracking software. Through its latest functionalities, ShopFloorConnect is made scalable and robust, giving manufacturers easy-to-use software for increased efficiency and reduced downtime, including when remote monitoring is required. ShopFloorConnect provides OEE calculations that accurately report OEE, providing machine downtime and manufacturing efficiency reports.

Wintriss is sharing its new ShopFloorTracker hardware solution which complements ShopFloorConnect. The cost-effective device is designed to simplify and maximize data collection, while minimizing operator involvement. For capturing and tracking process parameters, customers can choose from several pre-programmed digital inputs such as run/idle and counting, and analog inputs including temperature, pressure, flow, voltage and electrical current. Temperature and pressure data is especially helpful for monitoring injection molding operations. Inputs are viewable in different formats, depending on operator preference. For manufacturers that are using the Wintriss SMI 2 machine monitoring hardware interface, ShopFloorTracker is designed as a companion device, enabling even more machines to be tracked at a lower cost.

Wintriss Engineering Corp. / South Hall Level 1 - Expo Hall, Booth S16041

Plant Software Enhances Real-Time Condition Monitoring

MiVue, a division of the ACS Group, is showing expanded capabilities for its plant monitoring software for plastics processors, enabling real-time condition monitoring of critical manufacturing assets.

New features and modules have been recently added to MiVue to further drive resource optimization. These include a job report module for lot tracking and quality accountability; a material usage module to track manufacturing material assets and cost; a preventative maintenance module to ensure proper maintenance schedules are followed; and overall layout and control improvement based on customer input.

MiVue digital manufacturing connection kits are designed to provide plastics plant managers more insight into their equipment by providing produc-



tion data. The company maintains that data-driven understanding of its processes improves plastic processors' uptime, reduces costs, and improves service and maintenance operations.

MiVue's cellular router connects injection molding and extrusion machines with auxiliary equipment through encrypted data transmission. Featuring analytics and cloud-based data storage, MiVue claims that its software can be used on any web-enabled device. Users receive text and email alerts

to keep processes running smoothly.

MiVue connection kits can be installed with new equipment, retrofitted with older equipment and incorporated into custom system integration projects.

MiVue (shared booth with AEC) / West Level 2 - Expo Hall, Booth W3921

All-Electric Injection Molding Machines Exhibit Application Versatility

Engel invites customers to visit its exhibits at NPE2024 where the company addresses challenges faced by plastic processors. Each exhibit features one of Engel's injection molding machines – all-electric, servo-hydraulic and two-platen systems – available to the North American market:



- Engel's all-electric E-mac, now available in slim execution, which provides a compact footprint for utilizing production space.
- The E-Speed 610/90 injection molding machine.
- Quick mold change (QMC) demonstrations on the hydraulic Victory 330/85.
- The E-Motion 440H/160TWP Combi M, a compact injection molding machine.
- The all-electric, tie-bar-less E-motion 50/30 TL injection molding machine.

- The Duo 5160/770 WP Tech US servo-hydraulic, two-platen machine.
- A T-win 750/7800 (830 U.S. tons), showcased by Wintec, a member of Engel Group.

Engel / West Building Level 2 - Expo Hall – Booth W3301 and SH-18

Molding Equipment Features More Connectivity With Robots, Auxiliaries, Industry 4.0

Wittmann USA is showcasing five injection molding machine work cells, integrated with robots and auxiliaries, featuring 4.0 technologies in every cell. These machines include plug and produce, Wittmann Digital, control room, remote access, OPC UA communication and data collection, and more.

Wittman breaks down the work cells and technology being featured, including the MacroPower large tonnage servo-hydraulic machine with electric metering motor; the SmartPower servo-hydraulic 400 three-shot machine; the SmartPower 120 showcasing LSR technology; the

MicroPower 15 two-shot featuring micro molding with LSR; and the SmartPower demo cell featuring Wittmann 4.0 on a SmartPower servo-hydraulic machine.

Moreover, a portion of Wittman's booth is dedicated to material handling, showcasing the Tempro plus D 390, FeedMax clean, Drymax plus, as well as material traceability, material lot control and error-proofing software options for the M8 central conveying control.

There are also two robot cells, both showcasing the Wittmann Control room. The Control room can be used to view and control several Wittmann auxiliary products within its work cell.

Wittmann USA Inc. / West Building Level 2 - Expo Hall – Booth W3043





ZE 28 BluePower
Upcycling medical PP regrind
into a dyed recycle rPP

Molder Emphasizes Circularity in Molding, Extrusion, Automation and AM

KraussMaffei comes to NPE2024 with the motto "Make plastic green – with high quality and efficiency." This is exemplified through injection molding, extrusion, reaction process machinery, automation and AM.

A form of sustainable solutions is shown by the direct compounding injection molding (DCIM) process, with which the company says up to 50% of material costs can be saved.

The new HPS-Physical Foaming screw for MuCell applications has a longer three-zone area, which can be universally used for all plastics and has a plasticizing capacity that has increased by up to 30%.

Moreover, a PX 121-180 SilcoSet produces matrix lenses for the headlight industry, using challenging materials like LSR. The two-cavity LSR matrix mold comes from mold specialist ACH Solution.

KraussMaffei is also touching on current case studies and solutions that illustrate the capabilities of powerPrint, and highlighting recent partnerships. Several other partners are present at KraussMaffei's booth.

Krauss-Maffei Corp. / West Building Level 2 - Expo Hall – Booth W600

Cooling, Mold Temperature Control Solutions Augment Energy, Water Savings

Frigel North America presents its latest process cooling solutions designed especially for the industrial processing of plastics. The company's technology focus on maximizing productivity, energy and water savings.

New and optimized cooling and temperature control systems on display include the 4DK Series adiabatic coolers (patented, centralized, closed-circuit adiabatic cooling systems); the new 3PR 4.0 Control System, which provides complete, real-time control of the entire Frigel central cooling system (parameters, functions, alarms, etc.); and a wide range of upgraded Microgel models. The Microgel RSM/RSD Series provides an optimized mechanical design, increased reliability and a wide range of options.

In addition, Frigel expands its adiabatic product family line, introducing the Ecodry 4DK series, designed for flexible configuration of modular adiabatic solutions for small to large plastic factories.

Frigel releases the MiND 2.0 platform to North American customers. It is now able to provide customers a supervision and maintenance tool for all Frigel equipment and accessories, both central and machine-side, enabling monitoring and management of all working parameters and events and registering performance and energy consumption of every single cooling system component through a multifunctional user interface, both locally and remotely, through a user-friendly webpage.

The company also debuts the Thermo-6 product line, closed-circuit TCUs built with optimized mechanical and control features.

Frigel North America Inc. / West Building Level 2 - Expo Hall – Booth W3989 and W4089

YUDO

NPE2024
The Plastics Show
Booth S31017

Leading Innovation in the Global Hot Runner Market



- Uptime is one of the most significant factors in determining the profitability of your molding operation.
- When you need a spare part - you need it fast!
- Our 13,000 sqft North American Head Quarters located in Livonia Michigan is home to our sales, service, and spare parts center.
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State-of-the-Art Machines, Reduce Injection Molding Waste

Together, **Sodick-Plustech**, **RJG Inc.** and **Matrix Tool** are showcasing state-of-the-art technology that aims to reduce waste.

Sodick-Plustech is exhibiting an all-electric MS100 machine with a multi-cavity high cycle mold by Flocon Inc. The star of the show in Sodick's booth is the new vertical, two-station, low-profile machine, the VR40G. Another cell feature Sodick's GL60A-LSR horizontal machine showcasing multi-cavity, flashless LSR molding, utilizing a mold and pumping units by Nexus. Also featured in the booth is another fully automated, metal 3D additive/subtractive machine from Sodick Inc. Finally, there is Sodick's LP20EH3 IMM, highlighting Matrix Tool Inc.'s ultra-precision fast-cycle mold using Sumitomo Chemical's Sumika Super LCP material.

Sodick By Plustech Inc. / West Building Level 2 - Expo Hall, Booth W3581

Fiber Laser Welder Brings Flexibility to Mold Repair Operations

The SWA Fiber series by **Gesswein** is a laser welder offering a maximum working range. This means that the SWA is capable of repairing molds of any size – large or small – which is enabled by an adjustable laser arm and head for flexibility.

Gesswein highlights the Sisma SWA 450 F laser welder in particular. Like those in the series, it has been specifically designed to perform modifications and repairs on molds damaged by wear or use. It is powered by a new-generation Fiber laser source that Gesswein says offers greater energy efficiency and enables high productivity consistently. Moreover the laser welder is maintenance-free, as it does not have any consumable parts.

The laser's processing parameters are managed through advanced software functions (tracked routes) that make it so any operator can carry out advanced welding operations practically and intuitively. These software functions include welding along circular paths, on inclined planes, filling and the overlap function for executing regular weld seams.

Gesswein / West Building Level 2 - Expo Hall, Booth W4261



Hydraulic Locking Cylinders Offer Faster Mold Builds With Zero Flash Performance

PFA Inc.'s new 70 series "mini" hydraulic locking core pull cylinder, part of the Kor-Lok side action system product line, is driving more standard strokes for off-the-shelf assembly and next-day delivery. Stock strokes for models KL-70/75/100/112 are 0.38", 0.50", 0.63", 0.75", 1.0", 1.25", 1.50", 1.75", 2.0", 2.25", 2.5", 3.0", 3.5", 4.0" and 5.0".

PFA cylinders feature large preloading capacity for zero flash performance in a small footprint. The product line's primary advantages are high output force, locked-in preloading and a narrow cylinder profile. The mini's 8,000 lbs of preload activates force in a new narrow format, enabling multiple small cores to nest together and time independently.

PFA Inc. / pfa-inc.com / 262-250-4410



MOLDMAKING MARKETPLACE/AD INDEX

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Five Priorities for Managing a CAD Library

By Kevin Kelly

Similar to the headache of sorting through years of emails trying to find one from a vague memory, a CAD library can become a disorganized clutter of knowledge, making it difficult to find relevant information when needed.

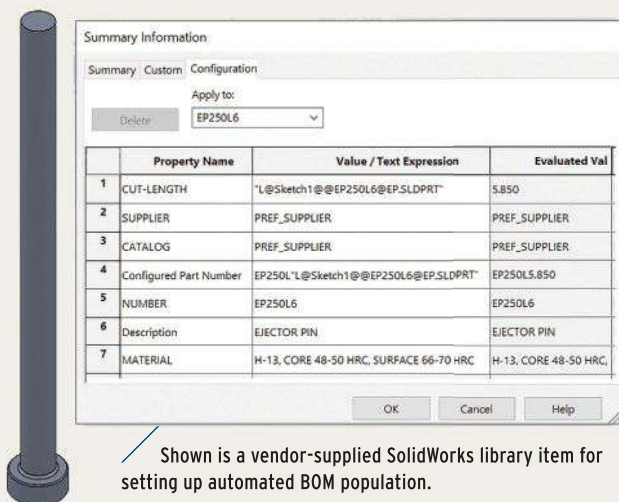
Whether starting fresh or reorganizing a legacy collection, here are five priorities for building an efficient CAD library to benefit longtime and joining members of a mold design team.

1. Establish a main library.

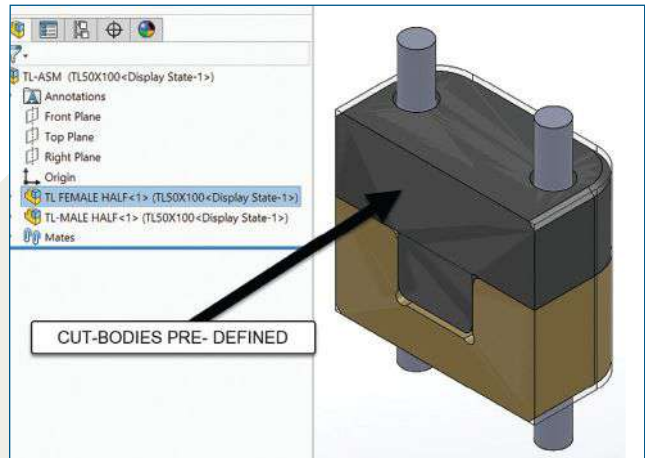
The first step is to set up the main library of components for primary selections. This library should be set up with the common and approved components easily accessible and kept to a manageable size. The fewer folders and files that must be viewed and clicked through, the faster it is to navigate. Also, a smaller library reduces the decisions needed in the early stages, which yields faster and more consistent designs.

2. Add secondary libraries.

Any sometimes-chosen features can be kept outside the main component library so that they don't have to be sifted through on every job. In addition to folders established for seldom-used components, there would be in-house custom component preferences, as well as folders set up for OEM/Tier 1-specified



mold lifting blocks, gate inserts, etc. This type of library structure reduces decisions directly relating to a faster and more consistent design. Any components on a do-not-use list should be documented and all CAD data should be deleted.



Including pocket-cut geometry in the component library ensures consistency across a design team. Source (All Images) | Progressive Components

3. Reuse data.

Continuously improve these libraries by ensuring the team is aware of any task that is done twice when inserting a standard component. Professional CAD software provides a way to save this task for repeated use. For example, drawing component pocket geometry should only be done once and be able to be reused. This can be programmed into your software's mold package or feature library or offered directly from the component supplier. Any manual dimension input creates an opportunity for error and having a well-built library with reusable data will reduce common mistakes and save secondary steps.

4. Define standards.

Control the library with a standards document defining company standards such as tolerances, orientation and colors. Define anything that will help efficiency, but be cautious so as not to over-restrict and bog down the design process.

5. Advance BOM population.

One of the biggest opportunities to reduce manual input is to populate the bill of materials (BOM) directly from the 3D design. Time can be invested into defining what the final BOM must look like for efficiency down the line, and then each component in the library can be set up for this BOM and the necessary info can be pulled from it for ordering. Mold design activity has its ebbs and flows, and this process of BOM preparation is a great use of time in between hot projects.

A well-built and diligently maintained library is a valued repository of company standards and consistent design expectations. Fully leveraging the technology when managing a CAD library enables a design team to focus on cavity and core details and spend less time on repetitive design tasks. [MMT](#)

FOR MORE INFORMATION

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