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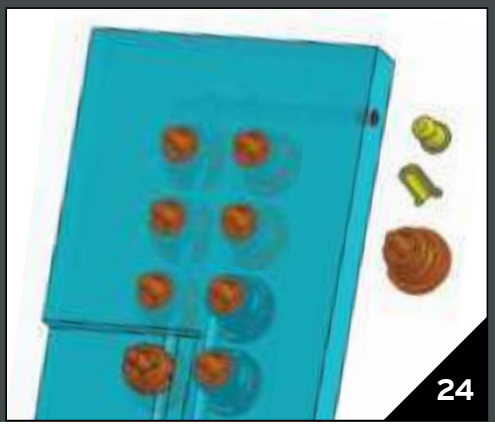

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Precision Meets Innovation at IMTS 2024
After attending IMTS, it's clear that the integration of advanced technologies is ready to enhance precision, efficiency and automation in mold manufacturing processes. It's a massive event, so here's a glimpse of what the *MMT* team experienced firsthand

ON THE COVER

Source: Pyramid Molding Group. This month's cover shows the mold for a compact hydroponic farmstand. Lettuce Grow, creator of the Hydroponic Farmstand, developed The Nook, a compact version for homes and apartments. Initially considering overseas tooling, the company opted to keep production in the United States. This decision enabled Lettuc Grow to stay within budget while utilizing Pyramid Molding Group's all-in-one solution. By choosing local sourcing, Lettuce Grow strengthened community ties and upheld its commitment to sustainability. The U.S.-based production also eliminated the need for international travel for tool validation, aligning with their eco-friendly mission and supporting local economies. See full story on page 16.

Source (left to right) |Pyramid Molding Group, | DJC Plastic Consulting LLC, Open Mind Technologies USA Inc.

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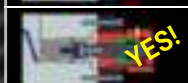 YES!	Mold CLOSED Core OUT	CAN'T DO IT!
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What Are Moldmakers Talking About Right Now?

Mold builders are talking about tried-and-true and new technology, focused on working faster, cutting costs and tackling labor challenges.

Mold design and engineering are seen as the future of mold manufacturing, so shops are laser-focused on technologies and strategies to boost efficiency and quality. It's all about streamlining workflows, cutting down on errors and upping productivity. CAD/CAM is a big player here with platforms created for mold design with the ability to sync up with CNC programming to automate tasks and cut down on manual work.

Data management is another hot topic. Shops are interested in how digital tools can help speed up delivery times and make smarter decisions with real-time data. AI is also making waves, especially in programming, process monitoring and design automation. Shops are already using AI to streamline daily tasks and they're excited about its potential to boost accuracy and productivity even more.

3D printing still remains a part of the conversation as well. Everyone's curious about how it's changing the game in moldmaking — whether it's improving hot runner designs, making molding more efficient or helping bridge the skills gap, there's a lot of excitement around what 3D printing can do.

Automation also continues to get a lot of buzz. In terms of tackling bottlenecks, with shops exploring everything from cobots to quick setup solutions. People want to know how they can use automation to cut costs, boost productivity and stay competitive.

Of course, **machining and EDM** are still big. Advanced five-axis techniques, remote monitoring and EDM improvements are popular because everyone's chasing better precision and efficiency. Advanced toolpath strategies, like trochoidal milling and adaptive clearing are also getting a lot of attention for their ability to improve precision and efficiency.

Cutting tools are a mainstay. Everyone's chasing the latest cutters and coatings that work faster, last longer and handle multiple tasks.

There's also a shift toward **on-machine verification**, moving away from traditional CMMs to laser scanning and software that enables more accurate inspections on the machine, minimizing downtime.

These advancements aren't just about doing things faster or more precisely — they're about changing how we approach mold design and manufacturing. Those who can effectively integrate these new technologies will be best positioned to meet the increasing demands for complex, high-precision molds, faster turnaround times and cost-effective solutions. The next generation of moldmaking is smart, efficient and more connected than ever before. Are you ready to be part of it? MMT

Christina M. Fuges
Editorial Director

Follow MMT on: Follow @MMT_ChristinaF

MMT TIPS

5 TRICKS OF THE TRADE

Great Tips from This Issue

1. Be A Champ
The goal of Camp CHAMP is to establish one in every state, offering daily manufacturing-focused activities for middle schoolers mentored by high school students. Camps can be rented, leased, or purchased and co-branded with CHAMPION Now!.
Pg. 10

2. Come Home
Pyramid Molding Group played a crucial role in product development by being flexible and understanding. It accommodated numerous design iterations, which met the highest standards while keeping the manufacturing in the United States.
Pg. 16

3. It's OK To Vent
Because of the abundant venting on the parting line, the mold was much easier to fill and the packing pressure was lowered, which also reduced the residual stress in the part, decreasing part warpage.
Pg. 20

4. Cool Rules
Looping cooling lines or having cooling channels that are too long can lead to the cooling liquid heating up too much from the inlet to the outlet. A general rule of thumb is to have a 5°F (3°C) difference between the inlet and outlet water temperature.
Pg. 24

5. 3D Printing Makes it Happen
In the right cases, AM offers the speed and ease of tooling creation needed to chase an idea through enough iterations to find a solution.
Pg. 28

THE COMPETITIVE ADVANTAGE FOR U.S. MOLD BUILDERS.

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Generational Quality: Balancing Tradition, Innovation and Continuous Improvement

By Christina Fuges

What follows is a Q&A with Corey Fox, an MMT *EAB member and Operations Manager at Accede Mold & Tool.*

Q: How do you think your family background and grandfather's founding of Accede Mold & Tool have shaped your leadership style and comitment to the company?

A: Our family's history in the business keeps me motivated to continue Accede's success. From my grandfather and Roger (Fox), I've learned a lot about managing and maintaining Accede's high standards, including ensuring employee satisfaction and a clean, safe environment. My commitment is to keep Accede advancing and producing high-quality molds, balancing traditional expertise with innovation to keep the company competitive and attract new talent to the industry.

Pictured above is Corey Fox, *MMT* EAB member and Operations Manager for Accede Mold and Tool. Source | Accede Mold & Tool

The best thing I have learned from Roger is to always invest back into the business and your employees. Make sure to find a great, reliable management team.

Q: How has your background as both machinist and moldmaker influenced your approach to managing manufacturing operations at Accede?

A: I have a personal connection and dedication to the company's mission and the moldmaking craft. Our commitment to quality is a core value, passed down through generations of leadership and our primary goal is to maintain this high level of quality, whether through training, looking toward future technological advancements, particularly in automation and robotics, acquiring new machines, creating a positive work environment and addressing industry challenges like workforce recruitment.

Q: What is the biggest challenges facing mold builders today?

A: Our biggest challenge here at Accede is finding qualified employees, a situation that has changed drastically in the last two years. Out of 10 interviews scheduled, only one or two candidates actually show up.

Q: What strategies has Accede tried to address this challenge of finding qualified employees?

A: We are revamping our apprenticeship program with new trainers and equipment. We have hired a full-time apprentice manager, a former high school technology teacher, who has the patience and ability to work with the younger generation. We are also in the process of purchasing a new Prototrak mill to spark the kids' interest in CNC machining.

The most effective method we have found for training young, new machinists/moldmakers is to have them start working with the machines as soon as possible. We aim to have them shadow an experienced machinist who can explain the significance of tolerances and the function of the molds we build.

We plan to involve them more in programming and CNC operations, focusing on efficient and effective use. This approach aims to increase the younger generation's interest in this field.

Q: What technological advancements do you predict will have the biggest impact on the moldmaking industry in the next five years?

A: Finding new ways to automate and use robotics while maintaining a high level of quality will significantly impact the future of moldmaking. MMT

FOR MORE INFORMATION

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A Conversation With ...

CHAMPION Now!

By Christina M. Fuges

How did your own experiences influence your views on the manufacturing industry?

Terry M. Iverson, CHAMPION Now! founder: The family business my grandfather founded has served four generations well. We have lived a comfortable life while learning and practicing a tremendous work ethic that has enabled many of us to succeed. We sold some of the most accurate and sophisticated American-made machine tools. In 2025, we will celebrate our family's 100th year in the manufacturing sector. I feel an obligation to give back so that other manufacturing legacy families can celebrate the same.

What motivated you to write "Inspiring Champions in Advanced Manufacturing"?

Iverson: After finishing my first book, "Finding America's Greatest Champion" in 2018, I realized the importance of helping parents and students explore different career paths beyond traditional college degrees. Many families can't easily afford higher education, and taking out loans may not be the best option. Manufacturing career paths offer opportunities that are often overlooked, with many employers willing to cover training or education costs. Spreading awareness about these options can help individuals consider if this path is right for them.

Can you share some of the most impactful stories or interviews from the book?

Iverson: In my books, I share significant success stories of women and people of color in manufacturing. I believe we need to be more inclusive and proactive in finding new leaders from under-represented groups in our industry. For example, I included Drew Crowe's story, who seized a chance opportunity and showed great initiative. Leah McConnell and Jossimar Mendez also found success through unexpected paths. Overall, we need to design paths to success with knowledge, research, inspiration and internships instead of leaving too much to chance.

Why do you think there is a cultural bias toward college education over alternative career paths like manufacturing?

Iverson: In the early 1980s, outsourcing and offshoring led to a decline in technical education and the belief that our economy would be service-based. Manufacturing was devalued in favor of college degrees, but now there's a shift back toward-skilled positions.

Terry Iverson is known for his work as a speaker, advocate and author who focuses on promoting and advancing manufacturing careers. He has been involved in initiatives to address the skills gap in manufacturing, including advocating for better training and education for the next generation of skilled workers. Source (All images) | Iverson & Company

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What advice do you have for parents skeptical about encouraging their children to pursue careers in manufacturing?

Iverson: Approach each child with an open mind, educate yourself before making decisions, and consider career options beyond a traditional four-year degree, such as training for a career in manufacturing.

How do you envision young people's role in shaping the future of manufacturing, and what qualities or skills do you hope they will bring to the industry?

Iverson: The younger generation has grown up surrounded by technology and may not fully appreciate the value of traditional mentoring. However, they can offer expertise in technology and provide reverse-mentoring to established individuals in the manufacturing sector.

What inspired you to start the CHAMPION Now!® initiative and how did you decide on the specific goals and methods for changing the image of manufacturing?

Iverson: I started CHAMPION Now! to change perceptions and show young people the potential in manufacturing careers. It stemmed from my extensive involvement at both regional and national levels. I was on my way to a CTE Education Foundation Board meeting and wanted to develop a catchy acronym to give the cause an identity.

That's when I created CHAMPION: Change How American Manufacturing's Perceived In Our Nation. This initiative gained traction and people didn't want me to step back from it. My goal has always been to elevate like-minded individuals who share my passion for supporting manufacturing and careers in the U.S. for our youth. I believe it's a mistake for people to stay in their own lane and not support others, as the benefits and deficits of doing so are significant.

> "We need to design paths to success with knowledge, research, inspiration and internships, instead of just relying on chance. We deserve better."

My second book aims to do just that while engaging the student at the same time. It is a two-front cover design with both manuscripts 180 degrees to the other.

How does the CHAMPION Now! team collaborate with local companies, schools and organizations like the TMA Education Foundation to achieve its objectives?

Iverson: I strive to offer event services to organizations nationwide. Recently, I presented at an event hosted by TMA where all 50 participants received a copy of "Inspiring Champions." I aim to secure more speaking engagements at meetings and conferences and actively participate in podcast interviews to promote the organization and books.

Can you share any success stories or testimonials from individuals inspired or influenced by the CHAMPION Now! program?

Iverson: I was at an event at DMG Mori several years ago. I was trying to keep a low profile as they were a competitor of my company. At the event, a young man mentioned me by name, recalling the story of my grandfather. He expressed that if my grandfather could start a successful career and legacy in manufacturing by sweeping floors, he felt compelled to pursue a career in the same field. He was delighted to use that story as an example of his inspiration.

CHAMPION Now! was launched to help reshape perceptions of manufacturing careers. CHAMPION stands for 'Change How American Manufacturing's Perceived In Our Nation,' aiming to inspire and unite.

The Camp CHAMP team is renting and selling turnkey kits, forming partnerships and aiming for impactful manufacturing camps across the U.S. for middle schoolers.

How do you plan to sustain and expand the reach of the CHAMPION Now! message in the future? Are there any upcoming projects or initiatives on the horizon?

Iverson: Wow, that's a great question. As I am now less directly involved in my company, I have many exciting plans. At IMTS 2024 in September, we had a 10- × 30-foot booth, three times the size of our previous booths. I plan to write more articles, books and possibly co-author a textbook.

CAMP CHAMP is a significant project; we're planning to lease, rent and sell turnkey kits across the country and

form partnerships with like-minded organizations to expand our reach. I'm most enthusiastic about the potential for national presence and impact as we move forward!

How did the support of IMEC enhance the execution and success of the six CHAMPION Now! camps, and what specific resources or assistance did IMEC provide?

Iverson: The six pilot camps received financial support from Illinois Manufacturing Excellence Center (IMEC) and will receive support again this fall. We need

Offering nationwide event services with AMT's support, Terry Iverson is seeking more speaking engagements and podcast interviews to promote the organization and his books.

to improve our fundraising efforts as most of the support for Camp CHAMP and CHAMPION Now! has come from a small group of people when this impacts everyone in our industry. We are working on engaging others for donations and grants to achieve national impact.

What were some of the most significant outcomes from the six CHAMPION Now! camps held in Illinois, and how have these camps impacted the participants and the local community?

Iverson: In the first round of camps, we received excellent feedback from the teachers. However, our feedback from parents and students was limited. This year, we plan to capture much more feedback to provide a much better report on our impact.

"Camp CHAMP is a significant project; we're planning to lease, rent and sell turnkey kits across the country and form partnerships with like-minded organizations to expand our reach. I'm most enthusiastic about the potential for national presence and impact as we move forward!"

What strategies do you plan to implement to expand the CHAMPION Now! program beyond Illinois and across the country in 2024, and how do you intend to measure the success of this expansion?

Iverson: Our goal is to establish Camp CHAMP in every state, offering daily manufacturing-focused activities for middle schoolers mentored by high school students. Families can access the book "Inspiring Champions in Advanced Manufacturing" for inspiration and information to encourage discussions about manufacturing careers. Camps can be rented, leased or purchased and co-branded with CHAMPION Now!.

How has the partnership with IMEC contributed to the success of the CHAMPION Now! camps, and what role do you see similar partnerships playing in the future expansion of the program?

Iverson: IMEC has been amazing in supporting the Camp CHAMP program. For the second year, they have provided funds for us to organize five to six camps in Illinois. We had a CHAMPION Now! Booth at the Student Summit at IMTS2024 in September. This fall we will complete six camps as agreed with IMEC and look forward to exponential growth for the camps and organization in 2025! MMT

By Christina Fuges

Domestic Tooling Collaboration Boosts Innovation, Efficiency, Savings

Pyramid Molding Group and Lettuce Grow's collaboration on the Nook showcases technical expertise, innovation and effective project management. Source (All images) | KD Shah / Pyramid Molding Group

Pyramid Molding Group and Lettuce Grow partner to develop optimal tooling for a compact Hydroponic Farmstand.

Pyramid Molding Group (PMG), a domestic mold builder and plastic injection molder based in Rockford, Illinois, partnered with Lettuce Grow to develop tooling for the second generation of its innovative hydroponic plant stand. This project involved collaboration on the technical considerations, cost-management strategies

Lettuce Grow created The Nook, a hydroponic plant stand. For budget-friendly and efficient production, they chose U.S.-based Pyramid Molding Group to handle both moldmaking and molding processes.

and project-management approaches necessary to successfully complete the project — from designing and manufacturing the tooling to molding and adjusting the tooling for the final parts.

Lettuce Grow, best known for its Hydroponic Farmstand, set out to develop a smaller version called "The Nook" suitable for homes and apartments. Originally, the company planned to get the tooling overseas but ultimately decided to keep the project within the United States. This choice was driven by the company realizing it could stay within its budget and take advantage of a seamless, all-in-one solution provided by PMG.

"We decided to keep the project in the United States to support local sourcing and strengthen community ties, aligning with our commitment to sustainability and local economies. By staying in the United States, we also avoided sending staff to China for tool validation and adjustments," says Jacob Pechenik, CEO of Lettuce Grow.

Tooling Considerations

PMG collaborated with Lettuce Grow to identify the most cost-effective tooling options while ensuring the product's design and functionality remained intact. Since the design was already largely determined, PMG focused on making tweaks to reduce tooling costs while maintaining functionality.

PMG's in-house engineering team carefully evaluated mold gate types and design options to ensure optimal part quality and functionality. "We evaluated various gate locations for the different parts to balance flow, minimize defects and enhance the overall aesthetics of the final product. The choice of gate types was critical in achieving efficient filling and maintaining the structural integrity of the components," Raymond Gibler II, PMG Operations Manager, says.

Lettuce Grow was also concerned with fit and function and wanted to ensure optimal water flow for plant growth in the Nook. To further refine the mold design, PMG used Moldex3D to conduct fill analysis on parts that incorporated a cold sprue. These analyses provided insights into the flow patterns and potential issues, enabling PMG to make informed adjustments to the design and ensure uniform filling and minimal warpage.

Design for Manufacturability

Throughout the design phase, PMG's engineering team provided valuable input based on moldability considerations. "We implemented Design for Manufacturability (DFM) principles to streamline the production process. By creating detailed design concepts for all tools, we established a solid road map for our designers," says Gibler.

LETTUCE GROW

CHALLENGE: Lack of quality control, long lead times, increased transportation costs and complicated supply chain.

SOLUTION: Partnering with a domestic integrated mold builder and molder.

RESULTS: Improved communication, increased quality control, shorter lead times, reduced transportation costs and a simplified supply chain.

PMG collaborated with Lettuce Grow to optimize tooling costs while preserving the product's design and functionality. The engineering team used Moldex 3D to analyze parts and make informed design changes.

Certain parts required a more in-depth DFM approach due to their complexity, ensuring that the designs were optimized for efficient and cost-effective manufacturing. PMG worked in partnership with Lettuce Grow to create revisions to the design to gain functionality for the overall product.

> "Lettuce Grow chose to keep the project within the United States, recognizing the advantages of working with a local partner including quality control, shorter lead times, reduced transportation costs and a simplified supply chain."

Lettuce Grow also prioritized minimizing waste, so PMG used post-consumer materials. They also assisted with product packaging development, as PMG would ultimately assemble and ship the finished Nook directly to consumers.

"Since we were ultimately packaging and shipping the product direct-to-consumer, we collaborated with Lettuce Grow to make sure we used as little packaging as possible for sustainability while still providing safety for the product," says Gibler.

Project Management

To manage the project, PMG held frequent design reviews. Lettuce Grow was assigned a dedicated point of contact at PMG to oversee the tool build, with bi-weekly meetings scheduled to discuss updates on DFMs and part design.

During the early stages of the project, frequent design reviews were conducted to discuss part changes and moldability concerns. These collaborative sessions ensured both teams were aligned on design objectives and enabled PMG to address potential issues proactively.

A big advantage of working with a domestic manufacturing partner who offers both mold building and molding capabilities is improved quality control.

Lettuce Grow prioritized waste reduction by using post-consumer materials, with PMG aiding in product packaging development and handling assembly and shipping of the Nook.

Manufacturing in the United States. with Pyramid Molding Group, Lettuce Grow ensures quality, meets demand and refines products through flexible collaboration.

Improved communication led to better timing, convenient meetings and swift issue resolution. "We operated as a one-stop shop and handled all tooling-related aspects as part of our project management," says Gibler.

Regular touch-base meetings led to the successful production of the tooling. Lettuce Grow invested time upfront to ensure the product met its requirements, resulting in minimal engineering changes after the T0 sample.

The collaboration between Pyramid Molding Group and Lettuce Grow on the Nook hydroponic plant stand succeeded in bringing a complex assembly to life, reflecting the strength of the partnership and the quality of work that can be achieved with the right technical expertise, innovative problem-solving capabilities and effective project management.

"PMG played a crucial role in our product development by being flexible and understanding. They accommodated numerous design iterations, which enabled us to refine our product to meet the highest standards while keeping the manufacturing in the United States.," says Pechenik. MMT

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Lettuce Grow / lettucegrow.com
Pyramid Molding Group / pyramidmoldinggroup.com

By Michael Louris

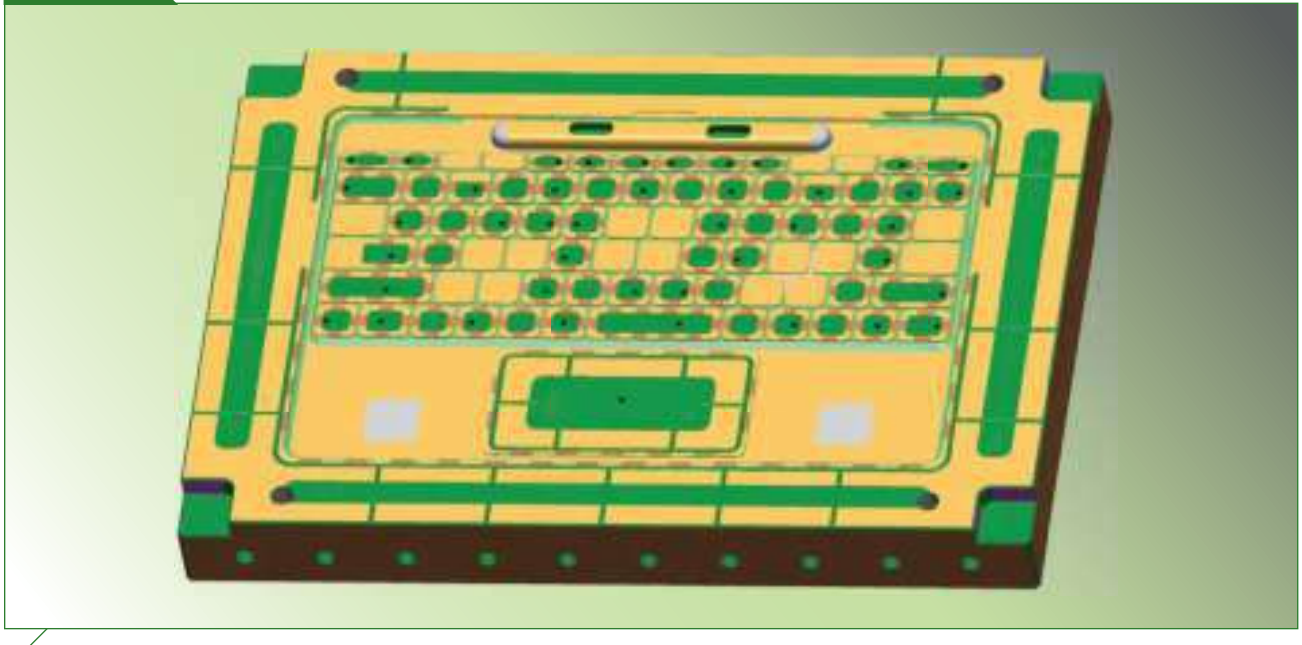
Understanding the Elusive Nature of Mold Ventilation

A personal journey of lessons learned about the challenges of poorly designed, understood and executed mold venting.

It was a hot summer day in August 1987 at RKO Tool Corp. in Shoreview, Minnesota. I was finishing my first one-cavity mold after graduating from Hutchinson Vo-Tech College, where I received a degree in tool and die making, majoring in moldmaking. After 10 weeks of work, it was finally done, well, almost done. The only thing left was grinding the vents on the parting line.

Cutting vents is one of the most anxiety-inducing aspects of moldmaking because it's the last step and if the vents are cut too deep and the part flashes, then the mold will come back like a boomerang. The customer is unhappy and so is the boss. If the vent is not deep enough, the full benefit of proper venting will never be realized, and the opportunity costs are forever unknown.

FIGURE 1



This laptop computer enclosure, featuring a keyboard web between the keys, was first seen in 2005. Due to the numerous knit lines in this design, it is crucial to provide ample vents to maximize weld line strength. In addition to vents, both primary and secondary vent relief channels must be sufficiently sized to allow gas to escape, ensuring a larger processing window and better part quality. Source (All images) | Michael Louris

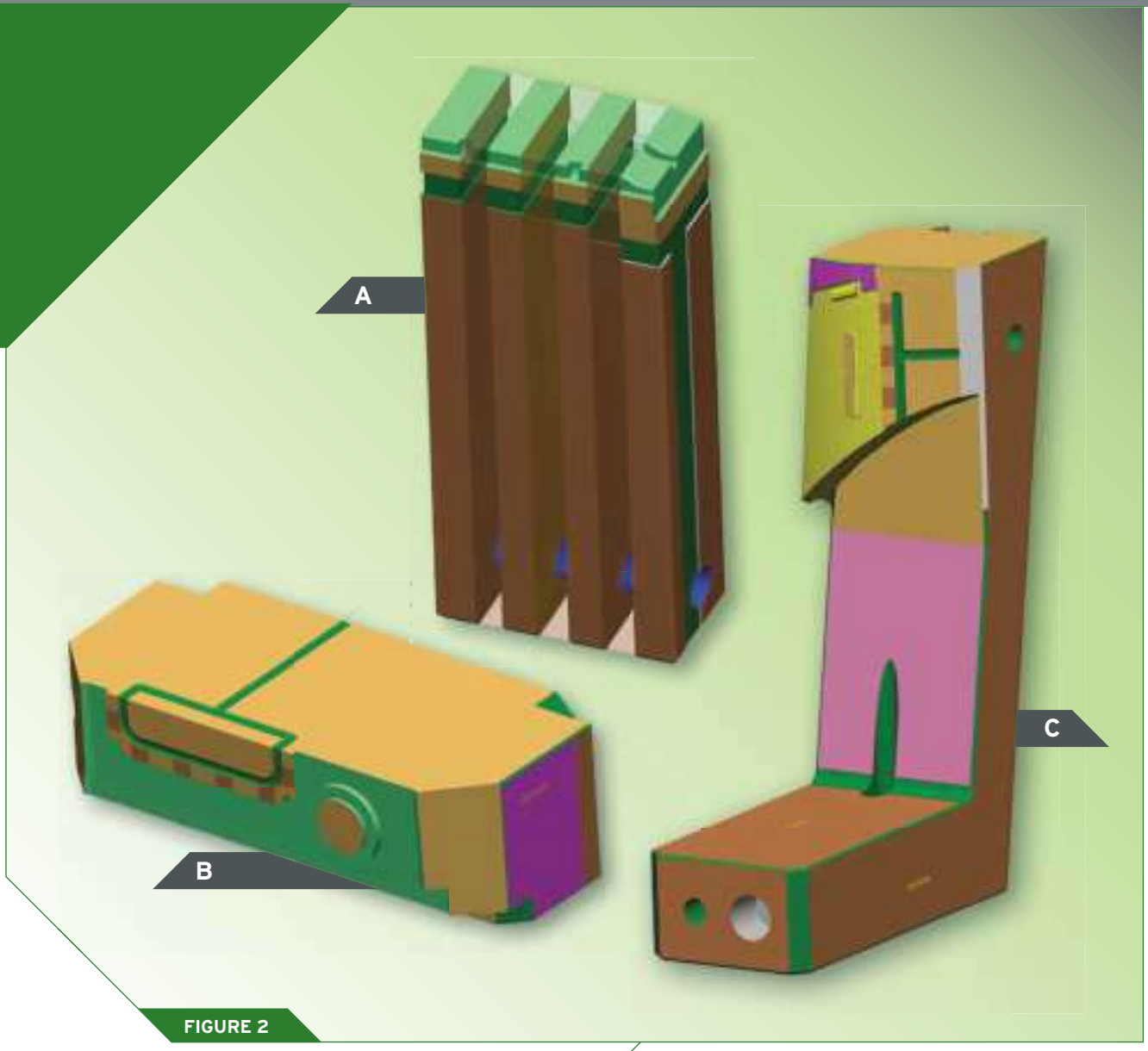


FIGURE 2

Vent types demonstrate a variety of effective venting strategies. For example, (a) a laminate stack comprises multiple inserts assembled and inserted into a pocket formed by wire EDM. Each insert is fully vented, with primary relief channels enabling gas to escape along the sides of the core inserts. Secondary relief channels are machined on the support plate's surface, enabling gas to escape to the atmosphere between the A or B plate and the support plate. These channels are particularly useful for relieving gas traps at the center of a part. (b) The geometry on the face of the slide can be vented using this vent style. While many molds rely on natural venting around slides, it is preferable to design venting that allows gas to escape as easily and quickly as possible. This approach improves gas release, enlarges the processing window, and reduces maintenance costs associated with gas residue buildup in slide pockets. (c) Inserts, core pins, ejector pins, slides, and lifters should all be vented to facilitate quick and easy gas escape. This is especially important for high-volume, thin-wall, high-pressure/high-speed molded parts. Increased venting leads to a larger processing window, lower mold maintenance costs, reduced downtime, and better product quality. For materials with a V0 flame rating, maximum venting is essential due to the higher volume of gas produced as flame-retardant additives burn off during molding.

This is the elusive nature of mold ventilation.

Establishing Requirements

When I reconnected with Christina Fuges at *MoldMaking Technology*, 25 years after writing my last article, she asked me about the most important lesson I learned from managing tooling worldwide. My answer was venting. Venting is the most poorly designed, poorly understood and poorly executed aspect of tooling across all countries and industries.

In the late 1980s and early 1990s, I worked at Dynamic Engineering, one of the top mold shops in Minneapolis, where I learned how to build class 101 multi-cavity tooling. I then worked as an estimator and later as a tool procurement engineer at Thermotech, a well-respected U.S. molder providing close-tolerance parts to the automotive, defense, oil

and gas and medical industries. The company molded glass-filled PPO, PET, PBT, PEI, PA66, PPS, POM and PEEK, for which the tooling and processing requirements are extraordinarily challenging.

For this reason, Thermotech had a mold specification manual to which the local high-precision tool shop contractors had to adhere when building molds for us. This increased tooling costs, but management knew that the ROI on the additional mold cost was longer mold life, better processing windows, higher part yields and, most importantly, improved customer satisfaction.

"Because of the abundant venting on the parting line, the mold was much easier to fill and we were able to lower the packing pressure, which also reduced the residual stress in the part, decreasing part warpage. The team was shocked and delighted to see the results that were even better than I predicted."

One section in the manual specifies the mold ventilation requirements. Not only did we require mold venting on parting lines, but we also required it on ejector pins, core pins, slides and lifters. The parting line vents were always perimeter vents, not whisker vents. Years of conversations with our seasoned processing engineers and tool designers laid the foundation for my appreciation of the importance of good mold ventilation.

At the time, we were fortunate to have a group of local precision mold builders who were experienced with the mold standards manual and would strictly follow it, ensuring that they met every aspect of our mold build requirements and built the tools to specification.

Sticking to the Plan

In the spring of 2000, I started working for a consumer electronics and software company. One of my early projects was a laptop computer (**see Figure 1**). During the tool design review meeting, I clearly detailed how I wanted the perimeter vents to be cut and provided the reasons behind this approach. Since the vents were properly designed when we did the final tool design review, I expected they would be cut as we decided.

However, when I attended the tool trial and inspected the parts, the filling pressure was higher than expected, and there were cosmetic issues. There was also a cosmetically unacceptable weld line on the logo and gas marks in other areas. The part was high gloss, translucent PC, so the defects were highly visible.

When inspecting the parts, I noticed that the parting line was quite sharp and jagged when I rubbed my finger along the bottom edge of the top case part. I inspected the tool further and discovered they cut whisker vents instead of perimeter vents. I felt a flash of anger and disappointment. Then I paused and thought about that hot summer day in 1987 at RKO Tool, feeling nervous about cutting those vents.

I collected myself and asked them to accompany me to the conference room where we could discuss the importance of venting and why we need to machine the perimeter vents as originally specified as well as the need to add core insert vents.

After much negotiation, they reluctantly agreed, with one condition: a signed guarantee that if they followed my instructions and the mold flashed, the company would assume responsibility for the cost of the tool repair. I signed the document, and they proceeded to recut the vents per my request. We put the tool back in the press.

Once the tool was up to temperature, we started the molding process. The injection pressure was reduced by over 35%, the gate blush issue was resolved, and the bottom edge of the part was free of jagged flash and steps and had a smooth 0.05 mm radius.

Because of the abundant venting on the parting line, the mold was much easier to fill and we could lower the packing pressure, which also reduced the residual stress in the part, decreasing part warpage. The team was shocked and delighted to see the results that were even better than I predicted.

Continuing to Learn and Lead

Over the coming decades, I repeatedly encountered similar issues in shops worldwide. Despite emphasizing the importance of venting during mold design reviews and thoroughly checking final designs, I often found that tools did not meet the vent design specifications and were almost always cut too shallow. I spent many hours negotiating with tool shop managers, persuading them and their teams to cut vents as per the agreed-upon specifications (**see Figure 2**).

Hopefully, the lessons shared here motivate you to clearly communicate to ensure that all of your molds are vented correctly, benefiting everyone involved. MMT

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By Dennis Czubin

NEW SERIES:
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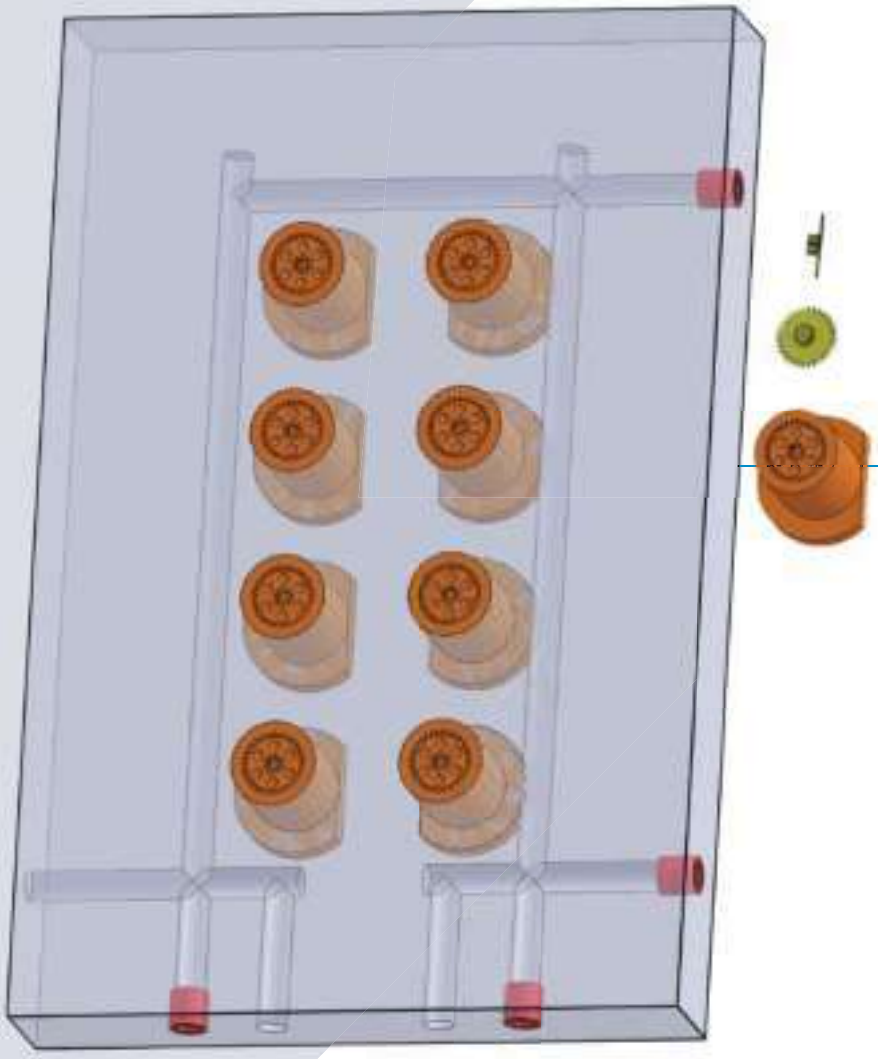
In this article series, Dennis Czubin, a seasoned plastics professional, shares valuable insights from his 40+ years in the industry, focusing on fundamental principles in part and mold design to help mold builders and molders enhance their practices and avoid common pitfalls.

Mold Cooling *Enough Is Enough!*

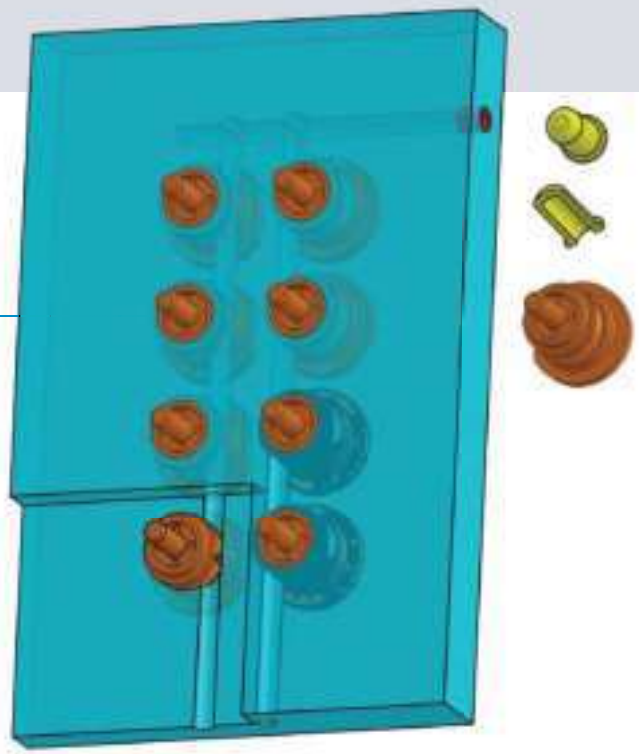


This image shows a typical eight-cavity gear mold from the 1980s. The B-side cooling was looped in the base surrounding the cavity insert. Due to the thin walls and small volume of molten plastic being cooled, this cooling method was sufficient. The cavity surface temperatures were able to recover quickly after each injection cycle. Source (All images) | DJC Plastic Consulting LLC

Proper cooling is crucial in molding, yet often overlooked. Discover proper cooling methods to prevent defects and improve efficiency.

Mold builders and molders know that cooling is critical to the molding process, as uneven or insufficient cooling can impact dimensions and surface finish and lead to internal voids, sink marks, warping and molded-in stresses, but it often remains an afterthought.

Common mold cooling challenges include difficulty cooling the core because ejector pins are in the way or long, thin mold features limiting cooling channel access. Cooling lines usually can't be drilled from the side above the parting line, so they are not as near to the top surface as desired. As a result, core blocks do not receive enough cooling. Baffles or bubblers may be needed to bring proper cooling near the top surface, and although conformal cooling can overcome some of these limitations, it is not yet a widely used technology.



Providing cooling water channels around each individual cavity typically offers better cooling performance than only cooling the base, especially when molding parts with higher mass. However, connecting all eight cavities in series on a single cooling line could lead to a significant temperature increase in the cooling water from the first cavity to the last, potentially reducing cooling efficiency.

In addition to these challenges, many molds are designed by first placing the ejector pins, screws, etc., into the mold design, with the areas for cooling lines being considered last. It is better to first design the optimal cooling scheme and then add ejector pins, screws, inserts, etc. Sometimes, you may need to compromise and relocate the cooling lines to accommodate these components, but it's crucial to maintain as close to optimal cooling as possible.

The question at hand is: How much cooling is required? The answer is that enough cooling is needed to produce an acceptable part in the shortest amount of time at an acceptable tool cost. This is a vague statement and can only be defined by those most familiar with the project. For a prototype or low-volume mold, tooling cost may be the driving factor and cycle time may be less important. However, tooling cost may be secondary for high-volume commodity parts, where part cost is paramount, so optimum cooling and minimal cycle time are critical.

Mold Cooling in Action

Molten plastic only reacts to the steel it contacts on the mold surface. The rate of plastic cooling is only affected by the immediate surface skin of the mold. The rest of the heating or cooling of the mold only indirectly affects the plastic, as it is used to achieve the optimal mold surface temperature. Heat flows through steel and other metals at a rate based on the surface areas of the cooling lines and cavity surface, the distance between them, the temperature difference between the hot plastic and cooling medium and the thermal conductivity of the mold metal.

Much has been written about achieving a high Reynolds number to induce turbulent flow in the cooling lines. While this is important, other considerations may significantly impact the cooling rate. A high Reynolds number may not provide sufficient cooling if the distance between the cooling line and the cavity surface is too large, if there is an air gap between the steel with the cooling line and the cavity steel (for example, if only the mold plates are being cooled and not the cavities) or if corrosion in the cooling line creates a thermal barrier.

Cooling Cases in Point

Looping cooling lines or having cooling channels that are too long can lead to the cooling liquid heating up too much from the inlet to the outlet. A general rule of thumb is to have a 5°F (3°C) difference between the inlet and outlet water temperature. I once saw a multi-cavity mold at a custom molder that had a single inlet and outlet on each half. In this case, the inlet water was 60°F (16°C), but the outlet water was almost boiling. The molder thought this was great because "the water is pulling out a lot of heat." However, although it was pulling out a lot of heat, the cycle time was limited by the hottest cavities. This led to differences in mold filling, shrinkage and internal stresses from the coolest to the warmest cavities.

Another customer insisted that each mold feature should have its own cooling inlet and outlet, even for a mold that fits in a 200-ton press. This resulted in a large number of inlets and outlets, requiring 6-foot water manifolds on each half

Designing cooling channels to surround each cavity individually and looping only two cavities ensures more uniform temperatures across all cavities. This approach becomes even more critical when molding parts with greater plastic mass or when dealing with more constricted cooling lines.

of the mold. (I am not exaggerating — two 3-foot manifolds in series on each half.) It seemed like overkill for the size of the mold. However, when the mold was put into operation, the temperature across its surface varied by only one degree Fahrenheit. This made me question whether it was necessary, but perhaps the customer's experience with similar parts led them to prioritize optimum cycle time and part quality over the added tooling and setup cost.

Optimum cooling varies from part to part and from mold to mold, but one thing remains constant: Cooling must be carefully considered during the design of every mold. MMT

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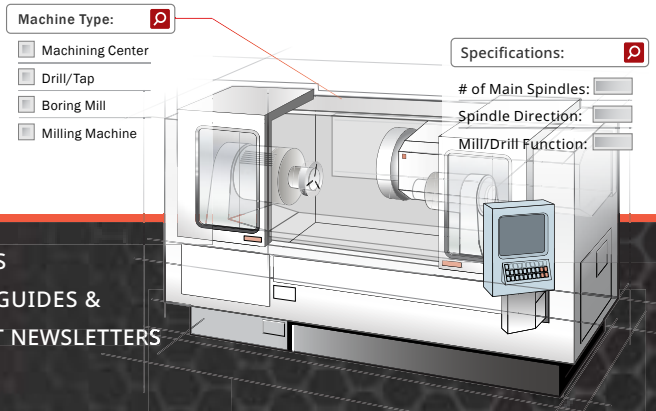

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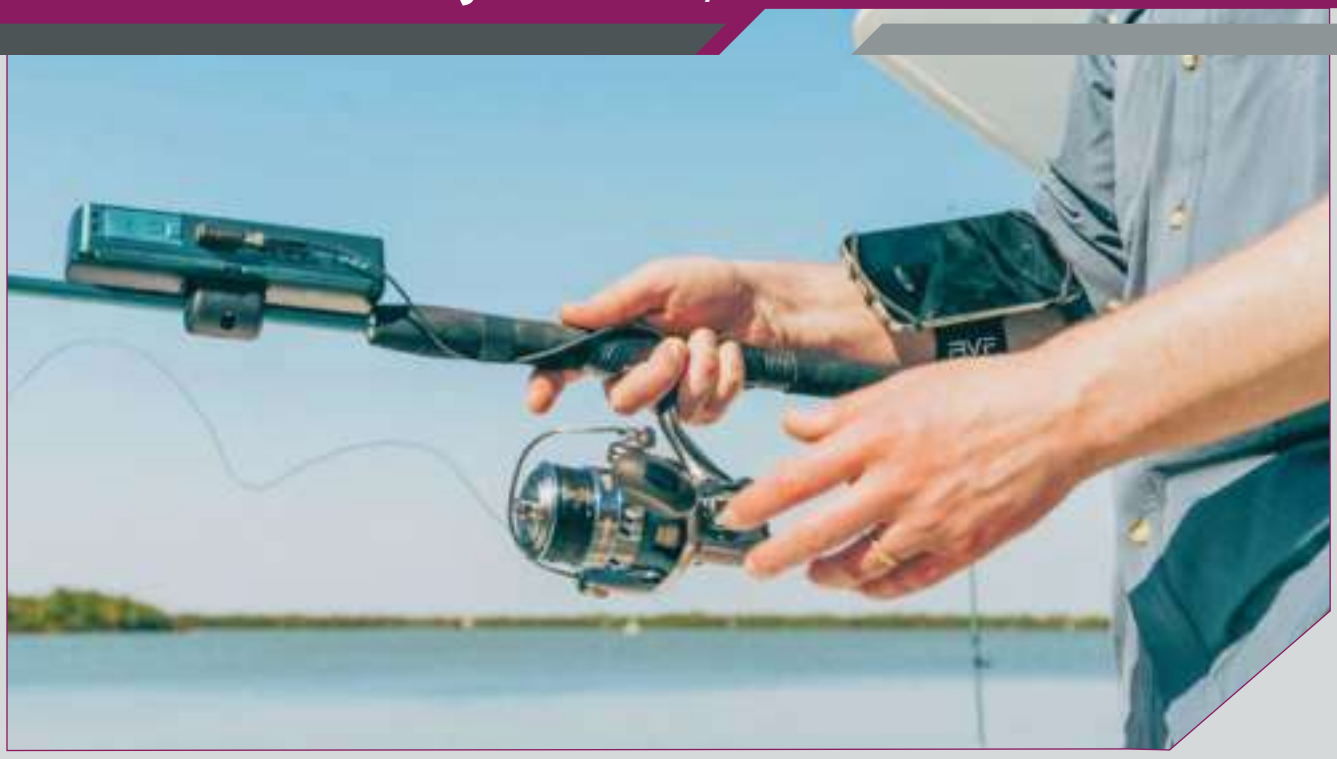
By Peter Zelinski



The Connector Conundrum:

3D Printed Mold Tooling's Role in Innovation

ReelView Fishing faced an electronics obstacle in the development of its new technology for underwater video. Additive manufacturing for moldmaking enabled the speed necessary to iterate a solution.

Here is the classic frustration for the engineer inventor: A big, breakthrough idea that ought to be attainable advances through 90% of the development needed to make it real, only to stall at that point because of one vexing, unanticipated detail that presents a problem too difficult to solve in a cost-effective way. For ReelView Fishing and its system for underwater real-time fishing video, that problem was a cable connector.

Solving the problem of this connector (and it has, thankfully, now been solved) ultimately required the startup company to invent not just its new technology for fishing but also an entirely new underwater connector design. Realizing this design — getting to the answer quickly and then being able to manufacture it — presented molding and moldmaking challenges that 3D printing answered in two different ways. In the solution ReelView found, developed with the aid of injection molding specialist Alba Enterprises LLC 3D printed steel mold tooling is used for overmolding around a 3D printed polymer component of the connector.

The resulting success provides an example of what may well be the most transformative role additive manufacturing is set to play in moldmaking, particularly as it relates to AM

The ReelView Fishing system provides real-time underwater video of fishing on the angler's smartphone. Source | ReelView

The fishing line serves as the signal transmission cable. For the inventors, the challenging component of this system was the connector merging this line to the camera.

making steel mold tooling. Attention to AM in moldmaking sometimes focuses on AM-enabled internal features such as conformal cooling channels. However, the advance of metal additive for moldmaking has also improved the speed with which AM can deliver a tool. This speed improvement has significant implications for product development, and the leaders of both companies experienced this with the connector application.

"Iteration is the area where additive helped us so much," says ReelView founder Dustin Alinger. The molds used to make successive versions of the connector design could have been made conventionally through machining instead of 3D printing (there are no conformal cooling lines, for example), but he says the molds could not have been delivered as cheaply or as quickly in this way. For each new connector redesign, a new mold was obtained in less than one week, at a cost of about one-third of what conventional moldmaking would have required. Whether the additive mold will deliver the life of a conventional tool is a valid question, he notes, but the steel mold does deliver a production-quality part, which enabled the ReelView team to evaluate real connectors in real testing that would match the use and experience of the customer.

Alba Enterprises' president and CEO Richard Oles says this kind of application represents the reason why his company is exploring and developing 3D printing molds, investigating and characterizing various additive mold tooling processes in both metal and polymer. The freedom to iterate often determines whether a promising new idea or technology will be realized. "With 3D printed tooling, there will be products successfully introduced that otherwise would never have made it to market," he says. In the right cases, only AM offers the speed and ease of tooling creation needed to chase an idea through enough iterations to fully realize the solution to the problem at hand.

That means the ReelView Fishing system, as interesting as it is, is something even more than a new resource for anglers. It is also an electrical engineering success, made possible because of the way 3D printed mold tooling opens up the range of what inventors can achieve.

In other words, fishermen, underwater signal transmission, and the future of invention all connect. To see this, it helps to look at the connector.

Can a Fishing Line Be a Cable?

"You cannot do Wi-Fi underwater," Alinger says. That simple fact seemed to present the central obstacle standing in the way of the capability he had set out to find. The angler and electrical engineer wanted to be able to watch his bait and

Alba Enterprises employed 3D printed steel mold tooling to help ReelView rapidly iterate to a solution. Both laser powder bed fusion and TrueShape molds were used.

the response of the fish in real time through video. But while underwater video cameras are available, their signals cannot wirelessly reach a smartphone above the surface. However, there is a wire of sorts — the fishing line. Alinger's insight: *Can the fishing line be used to carry a signal from the camera?* He left his work with a large engineering enterprise to found the company that set out to develop this idea.

An example of the underwater view made possible with the ReelView system. This still was captured from underwater video by a camera integrated with the fishing line.

And the hardware piece that proved the most difficult was the connector uniting the signal-carrying fishing line with the underwater camera.

The reason is because this connector faces so many demands at once. It has to perform reliably underwater, despite being pulled and jerked by fish. And it has to be small enough, no more than 5 mm in diameter, to be threaded through the line guides of a fishing rod. All of this produced a set of requirements no available connector could meet.

"We could find a two-pin waterproof connector, but not one you can pull on with 50 pounds of force. Then when we found a connector you can put 50 pounds of force on, and maybe waterproof it, we learned it is not going to be small enough," he says. "The combination we needed wasn't there."

But inventing a new, tangible, producible electronics component is not just a design engineering challenge. It is also a challenge in manufacturing, not ReelView's expertise. "It took us time to figure out we were going to need to go after this idea through injection molding," Alinger says. But it was this understanding that ultimately got the company to the right provider and to a successful solution. Alba Enterprises, which markets the compact Babyplast injection molding machine, also uses this platform along with its own internal engineering expertise to help customers with product design and process development for molded products.

The success ReelView and Alba Enterprises realized is multifaceted. 3D printed tooling is the enabler but not the only technology that proved valuable. Another is polymer 3D printing. Another, says Oles, is Scotch tape.

Overcoming Through Overmolding

Injection molds are essential to the production of many plastic parts, but frequently they are an impediment to the development of new products. Mold cost and lead time can preclude physical iteration, often the only course for product improvement. Alba Enterprises has pursued 3D printed tooling as part of the answer to this and

The finished connector on the left is seen here with transparent overmolding. The overmolding process, which includes a polymer 3D printed piece, is described below.

Mold Base for 3D Printed Molds

Another element of Alba Enterprises' system for rapid product iteration in molding is a standard mold base for small 3D printed mold tools. Molds are sized to this standard base. Peter Zelinski talks about the design and features of this small mold base, and the molding machine that uses it, in a video filmed at Alba's Colorado facility.

Rich Oles of Alba Enterprises (right) shows Peter Zelinski the Babyplast injection molding machine. 3D printed tooling plus a compact precision molding machine offer a system for the rapid development of new ideas, he says.

is developing a process around additive tooling that includes other elements aiming to speed production development. (See video about a mold base design that is part of this work.) The company's name for this process (it has applied for a trademark) is Scientific Additive Injection Molding, or SAIM.

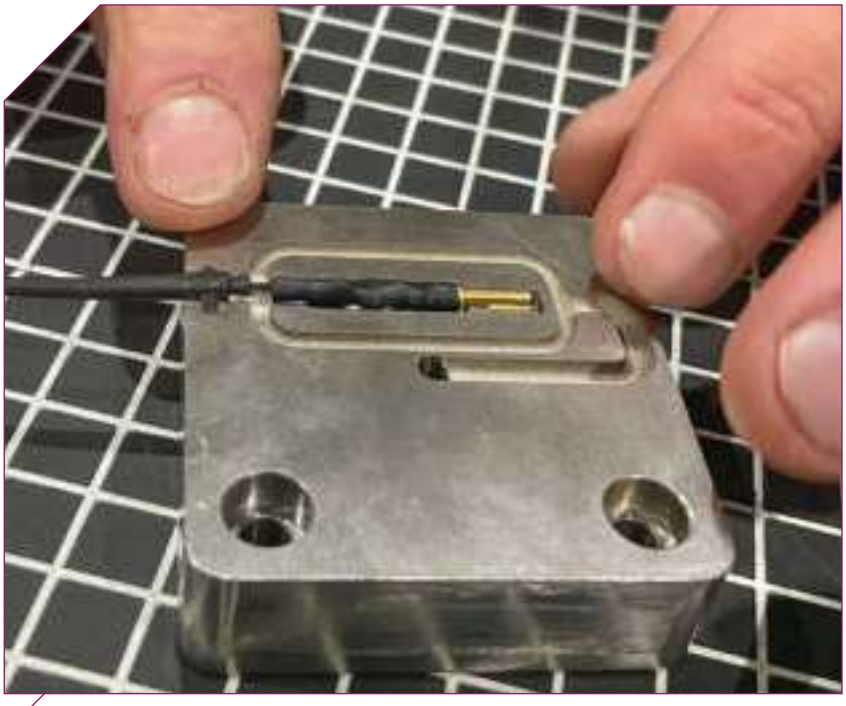
"A metal 3D printed tool means we can do product development with production-quality parts and potentially [let a company] go to market in just a few weeks," Oles says. Additive molds Alba Enterprises has used have been 3D printed in steel via laser powder bed fusion and via the flowable metal paste TrueShape process from Mantle, both of which were used successfully for design iterations of the ReelView connector. (The final mold was made by Mantle.)

The injection molding process for the connector is overmolding. That is, plastic is molded around existing elements placed into the mold. "We have to make the part without damaging the electronics," Oles says. This is part of the challenge. Another part of the challenge simply related to the way connector designs would have to be validated — in use. No digital simulation was sufficient to arrive at a design because the part would need to be tested in the water, by anglers, according to the various potentially rough or careless ways an angler might put it to use. Alba Enterprises General Manager Michael Darymple led the project within Alba and performed the engineering work for each iteration.

Alinger says: "The internals we're molding around are very delicate. That affects the way we gate the tool. Then there are injection machine settings such as temperature and pressure. To tune the process, those things are knobs we needed to turn. And then the actual outside geometry of the part is also something that evolved over time."

One important change to the outside geometry was this: The team discovered the connector needs a stress relief, a sleeve to protect the cable where it meets the connector body. Because this sleeve would be pliable while the connector

Michael Darymple (right), general manager for Alba Enterprises, led the mold engineering work for the ReelView connector development. Here he explains the overmolding solution to the author.



The overmolding setup is delicate, and this is one of the important considerations. Placed into the mold prior to molding are the internals of the connector plus the stress relief for the line. The stress relief is a separate 3D printed component.

housing is rigid, a different material was needed. ReelView and Alba Enterprises' solution was to make this stress relief as a separate piece, added to the components being overmolded. At high volumes, the piece might make sense to mold, but the initial run was made through 3D printing instead. Because of the need for a tight, waterproof seal, dimensional precision was important. The stress relief was 3D printed by B9 Creations in the company's Resilient-Silicone elastomer on its fine-resolution photopolymer DLP (digital light processing) AM system.

Overmolding thus involves placing the connector's internal elements and the 3D printed stress relief into the 3D printed mold. Holding these elements in the mold is nontrivial, because of the vertical orientation of the two halves of the mold in the Babyplast machine. In a high-volume production application for this part, the molder would find a more automated solution, but to make the connectors at the volume ReelView will need to satisfy its initial market entry, Alba was able to employ an off-the-shelf adhesive.

Oles says, "Scotch tape has a thickness that is dimensionally repeatable." Machining just enough relief into the mold leaves clearance for a piece of tape to both hold the line in position and sufficiently seal the mold. (Not every valuable solution needs new technology.)

It has taken five iterations of the mold design to arrive at a reliable, compact connector design, reliably produced within the compact injection molding machine. But this number of iterations is not the important point.

The more meaningful point is this: ReelView had *no idea* how many mold design iterations would be needed.

3D printed tooling was the enabler not because it offered a sufficiently fast and economical way to get a series of five molds, but because it offered the way to keep on making mold after mold, for as long as it took, without knowing which of these molds might prove to be the production tool. If ReelView's inventors had lacked this freedom, it is unclear how they would have proceeded toward their connector design, or how much more time they would have spent on getting there. MMT

Updated and republished from Additive Manufacturing Media.

Mantle TrueShape Moldmaking Process

TrueShape is a additive manufacturing process specifically for moldmaking that uses a flowable metal paste. Zelinski filmed an introduction to the process at Mantle's facility in California.

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By Alan Levine

Maximizing Machine Tool Potential With CAM Software

Identifying specific areas where CAM software can utilize machine capabilities to benefit the user and maximize milling machine potential.

In a virtual machining center environment, individual part programs can be linked with smooth and safe connections that enable the cutter to remain close to the workpiece. Source (All images) | Open Mind Technologies USA Inc.

Have you ever read articles or attended presentations where an opening statement indicates that interactions of machine tools, software and tooling dictate the success of a manufacturing process? In these cases, what specific information has followed to substantiate the well-worn thesis? This article intends to go beyond general statements and identify specific items where CAM software can take advantage of machine tool capabilities to benefit the user.

"CAM software systems can positively impact the performance of downstream processes in the machine tool and controller by knowing these systems and having mechanisms to model and coexist with the capabilities of these process steps."

How Well Does Your CAM System Know Your Postprocessor?

Many CAM software products produce toolpath process data and neutral-formatted output files, such as APT CL data. An external postprocessor program then translates the neutral data to a specific machine tool focusing on machine tool kinematics and controller syntax information. This traditional process has certainly been successfully applied.

However, the disconnect between toolpath planning and postprocessing means that the postprocessor cannot access certain information to leverage the machine's capabilities. Likewise, the CAM program often is separated from the details of the destination machine tool. The benefit of an integrated postprocessor technology is more dramatic in multi-axis applications.

Description of Local Programming Coordinate System

One example of additional information that can be passed from CAM to postprocessor to help machine performance is a description of the local programming coordinate system. Many CAM software calculations operate on simple geometry on arbitrary orientations (such as holes, pockets and engraved lettering) by defining a local coordinate system or frame and programming occurs in this orientation.

The postprocessor makes necessary adjustments so the postprocessed machining instructions are transformed relative to a defined part origin and reference on the machine tool. Does your postprocessor know both the part setup coordinate system (NCS) and the local programming coordinate system (frame)? For many machine controllers, this information can be used to enable 2-D style programming with canned cycles and cutter compensation to be used for many operations occurring on tilted work planes.

Functionality Regarding Connections or Linking of Multi-Axis Drill Patterns

In another example, the CAM software has functionality regarding connections or linking of multi-axis drill holes. If the CAM software knows that the machine tool control has tool center point management capability, a smooth linking path

can be applied close to the workpiece, compared to typical retracts to predefined safety planes. The benefit is a non-collision tool path while avoiding unnecessary cycle time caused by continually moving to safety zones. By having this information available, there is higher process assurance and machine tool performance.

Modern CAM software simulators that are connected to CAM software and aware of the machine tool, controller and part model can also provide the linking moves automatically, without effort by the CAM programmer. This can apply to all tool path types with the same cutter, not only for linking between holes.

How Well Does Your CAM System Know Your Machine Tool?

Machine tools have different capabilities due to size, speed, power, application intent and other constraints and limitations. It is helpful for a CAM software system to have strategies that can enable the machine to use these features. One end user may have equipment to produce large molds and smaller, high-speed machines to produce inserts or electrodes. So, milling machines with significantly different capabilities may even reside within one shop.

Many shops today cover a wide range of processes or applications. A large mold shop may have heavy-duty roughing machines, more dynamic finishers and specialty gun drills. Also, to balance workload through business cycles, many shops have extended their business beyond mold and die to include aerospace or medical applications. The CAM software should handle multiple processes and materials.

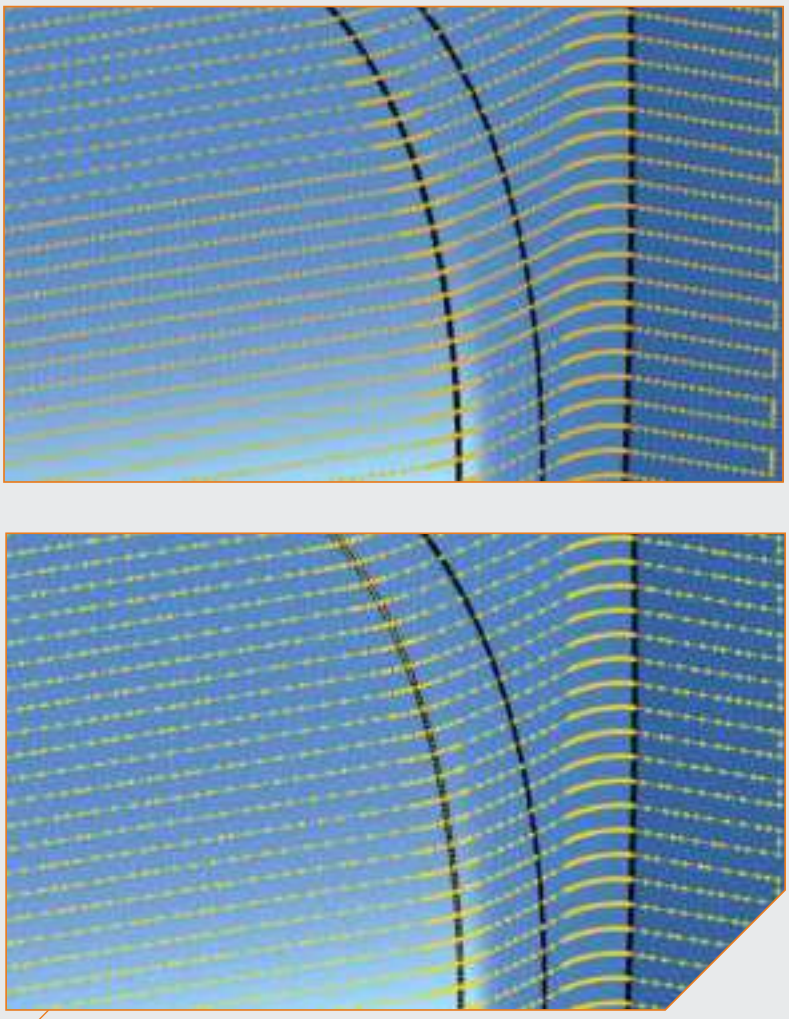
Five-Axis Machining

Some of the clearly differentiating characteristics of machine tools are found in the class of five-axis machines. There are obvious distinctions, such as the kinematic layout — whether the rotary axes are with the cutter or the part or mixed; how the rotary axes are designed into the machine, and whether the axes are orthogonal to each other or at other angles.

Much is said and written about five-axis machining. This is a powerful machining concept with well-documented benefits to improve tooling, setups, surface finish and to enable access to complex geometries. However, the complex dynamics of moving heavy masses (machine and part) suggest that full five-axis simultaneous solutions are not ideally suited for *every* application.

4+1 Machining

In many mold and die applications, users can get the tooling and setup benefits of multi-axis machining by seeking solutions with a locked pivot axis and active use of the *rotary* axis. This process is called 4+1 machining. In addition to facilitating improved dynamics, this process also takes advantage of the typically higher-performing rotary (C) axis on a machine tool. However, in some cases, the workpiece has large mass and active use of the rotary axis is not preferred.



A comparison of a new generation of programming assistance and analysis (top) and traditional programming assistance/analysis methods (bottom) reveals key differences such as distinct points near geometry features and even spacing in open areas.

Mold components often have product features with small radii that produce corners and edges on finished components. Historically, these features have been made with an additional EDM process operation. With five-axis machine tool technology,

more such features are machined today. However, small cutter diameters required to produce these features may be ineffective with long cutter stick-out lengths. The process performance improves for small cutter diameters with short cutter lengths and tapered thick shafts. A five-axis machine is generally used to accommodate thick-shaft tooling requirements, by orienting the cutter in a direction with open space.

3+2 Approach

The cutter and machining performance is still improved by limiting the number of active axes. A process called *multi-axis indexing* is well-suited for heavy roughing cuts. It seeks to simplify five-axis programs into segments of 3+2 machining, thereby further simplifying machine dynamics and increasing cutter stability. Multi-axis indexing provides a process variation to enable the machine to manage multiple segments from one programming job and reorient between them. To improve the efficiency of the indexing tool paths, the tool paths are trimmed against the remaining stock to minimize moves in the air.

In some applications, such as *bumping* the cutter up and down along the walls of a complex core or cavity, each individual toolpath stroke may have a unique 3+2 solution and a five-axis reorientation occurs while the cutter is transitioning between strokes. The process can, therefore, cut an entire hard milling core or cavity with fixed-angle *machining* in one program.

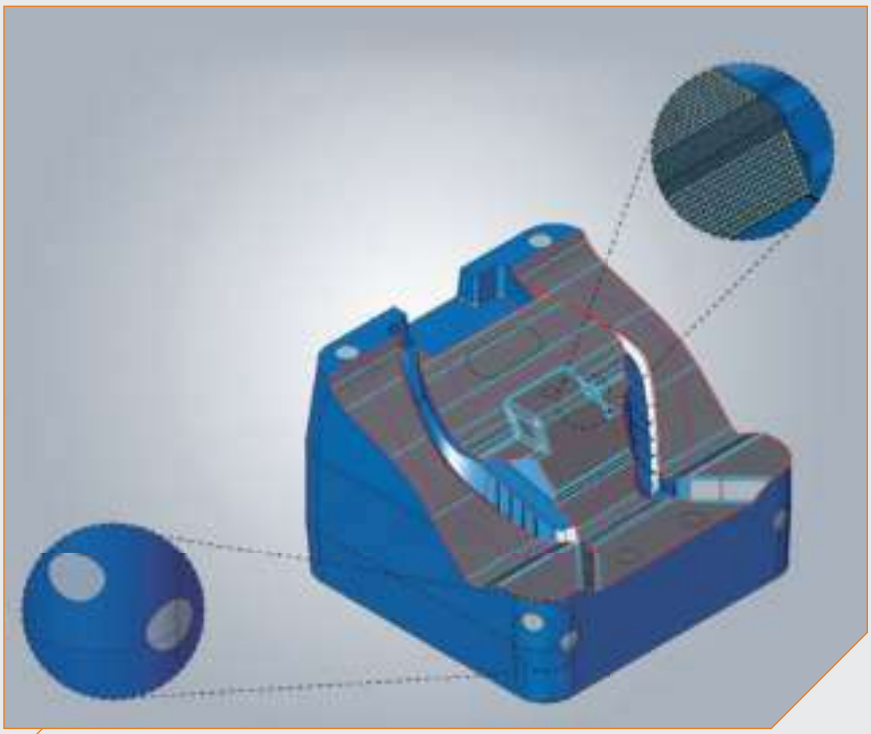
The machine tool performance is improved by using its multi-axis capability judiciously, yet applying the proven 3+2 process to ensure a high-quality surface finish and longer cutter life.

> "Five-axis machining is a widely used process, and it is easier with a software system designed to attain five-axis performance."

How Well Does Your CAM Know Your CNC Control?

Modern control systems include the ability to look ahead at coming NC blocks and offer smoothing functions. While these functions provide a strong safety net and can improve surface finish, a better result is achieved when the CAM software takes greater care about point spacing and precision of the NC points to the model surface and ensures the NC points and tool orientations are intrinsically smooth. Higher-quality CAM data will be processed more easily through the CNC control smoothing.

Also, if the CAM system can accurately model the machine by a digital twin concept and control functions about tooling and offsets, then the CAM software simulation can confirm tool paths staying within axis limits and reduce risks at the machine tool.



A new generation of programming assistance and analysis simplifies various programming tasks and identifies possible sources of error such as calculating the optimum point distribution based on part topology data and automatically creating cover surfaces for holes.

Summary

CAM software systems can positively impact the performance of downstream processes in the machine tool and controller by *knowing* these systems and having mechanisms to model and coexist with the capabilities of these process steps. Five-axis machining is a widely used process, and it is easier with a software system designed to attain five-axis performance. MMT

Partially updated for current trends.

FOR MORE INFORMATION

Open Mind Technologies USA
openmind-tech.com/en-us
Alan Levine, Managing Director

By Christina Fuges

Precision Meets Innovation at IMTS2024

INTERNATIONAL MANUFACTURING TECHNOLOGY SHOW

After attending IMTS, it's clear that the integration of advanced technologies is ready to enhance precision, efficiency and automation in mold manufacturing processes. It's a massive event, so here's a glimpse of what the ***MMT*** team experienced firsthand.

The message to moldmakers is clear: Embrace technological advancements! The *MMT* team was on-site at IMTS to uncover what's new and what works when it comes to metal-cutting technology for mold manufacturing. Source (All images) | Gardner Business Media

The International Manufacturing Technology Show (IMTS) 2024 in Chicago in September has once again proven to be an important event for the moldmaking industry, showcasing products, equipment and services set to redefine our approach to precision manufacturing. As the *MMT* team walked the bustling show floor, it became clear that the future of moldmaking is smart, connected and more efficient.

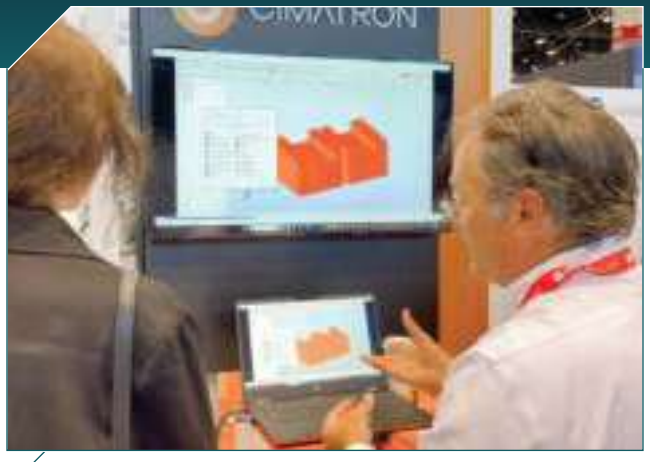
A complex mold core demonstrating the precision and accuracy of YCM Alliance machines and Open Mind Technologies' hyperMILL CAM software.

The event highlighted how integrating cutting-edge technology, maximizing flexibility, embracing automation and using advanced control systems can position mold builders to capitalize on new business opportunities, achieve lights-out capabilities and lower operational costs.

Advanced Machining

At the forefront of the show were advanced machining centers, with a significant focus on five-axis capabilities. Exhibitors like DN Solutions, Mitsui Seiki and Grob Systems demonstrated machines that excel in machining complex shapes and curved surfaces in a single setup. The DVF 5000 Second Generation from DN Solutions, for example, offers faster speeds and a larger work envelope, ideal for the intricate geometries common in mold production.

These advanced centers are not just about speed and precision; they're also addressing the industry's need



Cimatron's latest mold design software update emphasizes digital connectivity.

The SV12P and SG12 sinker EDMs from MC Machinery / Mitsubishi EDM minimize electrical consumption and eliminate the uncertainty in estimating machining time.

for space-efficient solutions. Compact, high-performance machines were all over the place, offering moldmakers the ability to enhance their capabilities without expanding their shop floor.

Automation and Smart Manufacturing

Automation was a central theme, with exhibitors like System 3R, Hurco and Hermle showcasing solutions that enable unattended operations and easy scalability. The WorkPartner 1+ from System 3R, for example, offers flexible automation for milling, EDM and laser micromachining, allowing shops to start small and expand as needed.

Collaborative robots (cobots) and automated work handling systems were featured across the show floor, designed to address workforce shortages and increase throughput. These solutions are particularly valuable for moldmakers looking to optimize their operations and reduce labor costs.

Innovations and Tech Set to Transform Mold Manufacturing

The *MMT* team explored the tried-and-true and new products, equipment and services at IMTS that boost moldmaking precision and efficiency.

Software Advancements

CAD/CAM software saw significant advancements, with AI-driven features taking center stage. Siemens Digital Industries Software introduced NX X Manufacturing, while Autodesk showcased its Fusion software with 1,500 improvements for three- and five-axis CAM programming of molds. Cimatron announced the release of Cimatron 2025 enabling improved modeling and electrode design for the moldmaking industry via CAM enhancements, moldmaking capabilities, efficiency updates and an emphasis on digital connectivity.

Open Mind Technologies' hyperMILL 2024 introduced new features like deep-hole drilling CAM strategy and improved rest machining, addressing specific challenges in mold manufacturing. The integration of Manufacturing Execution Systems (MES), such as Tebis ProLeiS, further emphasized the industry's move toward comprehensive digital solutions that can automate job scheduling, inventory management and quality control checks.

These software solutions offer AI-driven programming tools and advanced machining strategies that can significantly reduce programming time and optimize toolpaths.

Additive Manufacturing

The integration of additive manufacturing into traditional moldmaking processes was also evident. MC Machinery's Mitsubishi AZ600 wire laser metal 3D printer showcased how welding wire can be used as feedstock for creating high-quality 3D structures, opening new possibilities for rapid prototyping and short-run production in mold and die work.

Hybrid manufacturing solutions that combine additive and subtractive processes were also highlighted, offering moldmakers new ways to create complex geometries and conformal

Verisurf machine tool probing and inspection fast and easy. Users can program and operate their CNC machines like a CMM.

cooling channels that can significantly improve mold performance and cycle times.

Cutting Tool Innovations

High-performance cutting tools designed specifically for moldmaking applications were plentiful. Iscar's Mill-4-Feed high-feed milling tools and TOWA's CBN end mills stood out for their ability to machine hardened steels and complex geometries efficiently. These tools promise extended tool life, enhanced cutting speeds and improved surface finishes — all critical factors in mold production.

EDM Technology

EDM technology continues to evolve, with exhibitors like Belmont and MC Machinery showcasing machines with enhanced capabilities for complex geometries and fine detail work. The integration of AI and adaptive control in EDM machines, as seen in MC Machinery's SV12P and SG12 sinker EDMs, promises to further improve precision and reduce operator intervention.

The key to solving problems lies in rethinking the process not just adding technology. For example, an effective automation strategy focuses on removing time and cost from the process. It's important to define true cost-cutting measures and avoid automating inefficient processes. Consistency in EDM operations is crucial for achieving optimal results.

Measurement and Quality Control

The importance of precise measurement in moldmaking was reflected in the advanced inspection tools on display. Hexagon introduced handheld 3D scanning devices while Verisurf showcased its Inspection Planner Suite, offering

First-Time IMTS Experience

By Fiona Lawler, Associate Editor

Attending my first IMTS with the *MMT* team gave me the chance to explore a variety of products, equipment and services that will benefit moldmakers while engaging with industry experts.
While at the show, I observed the following key trends as well as technologies that are impacting the moldmaking industry.

- Automation
- Precision and Advanced Machining
- Software Solutions
- Process Optimization
- 3D Printing
- Inspection/Measurement Solutions

When asking exhibitors about what's hot on the show floor, the most common answer was **automation**. I saw an abundance of booths exhibiting different automation solutions to improve moldmaking processes in terms of time and cost reductions. Automation helps reduce the time it takes to get from design to prototype. Examples that I saw on the show floor are cobots, robotic arms and automated tool changers.

As far as **precision and advanced machining**, there's a lot of tried-and-true and new technology out there. Precision and advanced machining are critical in moldmaking as these enable the best accuracy possible to ensure costly mistakes are not made. On the show floor, I saw examples of this in machines with five-axis abilities at exhibitor booths like Kitamura, Grob Systems and Takumi. Five-axis capabilities enable moldmakers to work at quicker speeds while retaining accuracy.

Software solutions were not lacking on the show floor. Whether it be CAD/CAM solutions, new AI features or VR training, one thing is evident: These options offer moldmakers solutions to the workforce shortage the industry is facing.

A trend that struck me as particularly fascinating was that of **process optimization** — The idea that before a mold can be made, there often needs to be many changes to optimize the process. Whether you are a supplier or molder, a concrete process is always necessary. Quality checks for process and planning ahead saves time, money and efforts in the long run. While visiting Belmont Equipment & Technologies, the company described its process in going into customer shops and smoothing out any kinks before even beginning to implement its services. Key steps in this consultative process include: Visiting the customer in-person to assess process and facility capabilities, ascertaining where improvements need to be made before any concrete steps are taken, active communication with the customer and keeping a detailed log/list of progress.

3D printing remains impactful on the manufacturing world, and moldmakers continue to find ways to utilize additive manufacturing (AM) technology to streamline production processes. Whether it be for quick prototyping, injection molding or creating molds with intricate geometric structures, AM provides solutions that are worth exploring.

Last but not least, I noticed a ton of **inspection/measurement** equipment and software solutions on the show floor. From hand-held scanners to ensure mold cavities are on par to software that enables tons of CAD capabilities, its clear there is a large focus on these quality control systems.

moldmakers powerful yet affordable inspection solutions with full CAD capabilities.

Blum-Novotest's FormControl X measurement software, designed for unmanned operations and robotic integration, highlighted the industry's move toward more automated and precise quality control processes.

Iscar's BLP series three-flute fully effective 240° ball nose endmills carrying double-sided inserts. Designed for roughing, semi finishing and finishing at high feed rates.

LaserStar's 4101 Series Laser Cleaning System is a backpack laser cleaning system made for hi-speed direct part cleaning in an easy-to-handle package for molds.

Industry 4.0 Integration

The combining of various technologies under the Industry 4.0 umbrella was evident throughout the show. Increased connectivity between machines, software and management systems was a common theme, with real-time monitoring and data analytics at the core. This integration allows for unprecedented levels of process optimization and predictive maintenance, crucial for maintaining the high precision demands of moldmaking.

Maintenance and Repair

Solutions for mold maintenance were highlighted as well, including LaserStar's 4101 Series Laser Cleaning System featuring a portable backpack design for versatile indoor and outdoor cleaning. Its precision tackles rust, paint and grease on various materials.

Rocklin Manufacturing's MoldMender Micro Welder also stood out for in-house mold repair. This low-heat, non-arcing device addresses scratches, pinholes and flashing with interlinking spot welds, minimizing heat distortion.

Both technologies highlight portability, on-site use and efficiency, promising streamlined maintenance, reduced downtime and extended asset life.

Training Technology and Courses

Hexagon's Machine Trainer is transforming workforce training with virtual machines using digital twins. This technology enables machinists and metrology specialists to practice safely without risking expensive equipment. The system replicates real machines, including a 43-inch screen, CNC handwheel, and CMM joystick, providing an authentic experience that bridges the skills gap. It supports up to three CNC controllers (Fanuc, Heidenhain, Siemens) and simulates three-axis, five-axis and mill-turn machines for versatile training.

Entegris/Poco Materials continues offering free EDM training, now both in-person and online. Their basic program covers EDM processes, materials classification and graphite selection while the advanced curriculum addresses complex topics. The six-module online course includes videos, Q&A and quizzes, resulting in a certificate of completion.

Gesswein's intensive mold polishing training, led by an instructor with 40+ years of experience, teaches attendees to polish rough EDM surfaces to a mirror A-2 finish.

These offerings underscore the industry's commitment to skill development, providing accessible, cutting-edge training for professionals at every level.

Sustainability and Efficiency

Energy efficiency and sustainability were not overlooked, with many machine tool builders showcasing energy management features in their CNC machines. Tools and processes designed to reduce cycle times and material waste were also prominent, aligning with the industry's growing focus on sustainable manufacturing practices.

Embracing the Future of Moldmaking

IMTS 2024 painted a clear picture of the future of moldmaking — one where advanced technology, automation and digital integration are not just buzzwords but essential components of a competitive moldmaking operation. The show demonstrated that while the initial investment in these technologies might seem daunting, the potential returns in terms of increased productivity, precision and capability are substantial.

For moldmakers, the message is clear: Embrace technological advancements! Whether it's investing in advanced five-axis machining centers, integrating automation solutions, adopting AI-driven CAM software or exploring the possibilities of additive manufacturing, there are numerous paths to enhance your moldmaking capabilities.

As the industry continues to evolve, those who can effectively integrate these technologies into their operations will be best positioned to meet the increasing demands for complex, high-precision molds, faster turnaround times and cost-effective solutions. The future of moldmaking is here, and it's smarter, more efficient and more connected than ever before. MMT

Moldmaker Takeaways from IMTS

- **Five-Axis CNC Machine:** In-machine inspection with photo checks and crash protection has advanced rapidly.
- **3D Printing:** New applications and materials in both metal and resin printing are now more affordable, inspiring new implementation ideas.
- **Robotics:** Robots and cobots play a major role in shop integration.
- **Industry Collaboration:** The value of exchanging ideas; left the show with insights that wouldn't have surfaced otherwise.

Steve Michon, *Zero Tolerance LLC*

- **3D Printing:** Xact Metal's 3D printing of cavity and core blocks for injection molds.
- **CMM Accuracy:** Hexagon CMM impressed with its accuracy and ease of use for checking dimensions on electrodes, molded parts and inserts.
- **Precision Machining:** YCM machined a small block with incredible detail. The rims on the Bronco model gave a relatable perspective.

Murphy Forsyth, *Zero Tolerance LLC*

- **Inventory Management:** Henel's system optimizes floor space and boosts productivity through better inventory control.
- **Machine Metrics:** Industry 4.0 advancements, such as real-time data storage, OEE management and AI adjustments for efficiency.
- **Multitasking Machines:** Soraluce SAD combines milling, turning and finishing processes, reducing lead times within a compact footprint.

Dennis Goggin, *NextGen Mold Technologies*

- **Electropolishing:** Gpainnova's system (DLyte) claims to produce a diamond finish quickly.
- **On-Machine Inspection:** Discussed closed-loop feedback for CNCs to compensate for cutter wear.
- **Submersible Rotary Indexer:** Hermann Schmidt's new indexer for wire EDMs automates a traditionally manual process, aiding in workforce changes.

Chris Hanes, *Micro Mold Co., Inc.*

- **Automation:** Increasing automation for CNC operations indicates alignment with current trends.
- **Performance Tracking:** Monitoring runtime, uptime and throughput for optimized performance.
- **AI Integration:** Exploring how AI could benefit business applications.
- **Consistent Tech:** No major changes in cutters and machines; the focus remains on 3D printing.

Brian Bendig, *Cavalier Tool & Mfg.*

- **Additive Manufacturing:** Improved speed, affordability and variety in machines.
- **3D Printing Sector:** Busy with diverse materials and software solutions.
- **Technology Visits:** Explored offerings from United Grinding, Makino and laser engraving vendors for comparisons.

Emilo Piedra, *Intralox*

- **Palletizing:** Planning to implement Midaco's technology in a milling cell.
- **Inspection:** High interest in OGP brand upgrades and troubleshooting with Renishaw on CMM probes.
- **Vision Inspection:** Hexagon's advancements in CMM profile measurements.
- **Laser Engraving:** Reviewing Keyence's latest technology for potential use.

Chris Howard, *Production Mold Shop, Intralox Metal Fabrication*

- **AI:** From quoting to programming, our industry is on the brink of a huge revolution.
- **3D Printing:** It appears to be stabilizing, meaning the technology is basically the same from company to company. Now it comes down to what type and machine configuration fits your customer's needs.
- **Cloud NC / Cam Assist:** Not AI. However, it is adding digital automation to CAM programming. As this evolves and adds five-axis capability, this has the potential to help bridge the talent gap we are experiencing.

Louie Fields, *Decatur Mold*

- **Latest in 3D Technology:** Exploring new technologies with the potential for market penetration.
- **Software Improvements:** Enhancing efficiencies through pre-staging, setup and in-process optimizations aimed at streamlining the entire manufacturing workflow.
- **Advances in Wire and EDM Technologies:** Expanding capabilities, especially as we extend our reach into Mexico.

John Heinrikson, *The Plastek Group*

MOLD COMPONENTS AND HOT RUNNERS

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

Q: What does my hot runner system need to process bioresins?

A: Global engineering and process experience are vital in designing hot runner systems for bioplastics applications. In addition, the sensitive nature of bioresins requires an in-depth application review to mitigate any potential risk:

- Thermal finite element analysis (FEA) monitors heat distribution along the flow path and minimizes overshoot. Thermal FEA tools predict manifold temperature variation per the design by adjusting heater wrap, heater zones, thermocouple placement, melt channel layout, heat sinks and the manifold profile.

Source: Husky Technologies

- Melt channel selection via proprietary software provides an evaluation of melt channels to maintain an adequate shear rate. As a result, equal melt distribution can be achieved with a geometrically balanced layout.
- Low-temperature gate design ensures components meet the required fit and seal during thermal expansion.

How to Solve Hot Runner Challenges When Molding with Bioresins

Q: What should a moldmaker consider when using a bonding and sintering technology to make mold and die components?

A: A mold builder should consider the metal bonding/sintering process, material compatibility, surface quality, surface coating, ordering process, development phase, bonding conditions and quality assurance.

How to Enhance Efficiency, Reliability of Mold Components With Metal Bonding/Sintering Technology

Source: Punch Industry USA Inc.

Source: Hasco

Q: How is metal 3D printing helping to create better designs for hot runner manifolds?

A: Not only is it making complex melt flow channel designs possible, but this same process also shortens lead times via fewer R&D iterations and evolves projects much faster, enabling upfront cost savings. We are talking about attaching 3D printed inserts to a conventionally machined hot runner manifold base block. Conventional machining is used in areas easily manufactured. Then those areas are combined with 3D printed inserts to create a hot runner system that moldmakers can adjust "on the fly" and within days, not weeks or months.

3D Printing Innovates Hot Runner Manifold Design

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

Q: How do you expand upon products already offered to customers, such as pins, cores and sleeves?

A: Adding things like metric pins, adding greaseless pins and hardened pins improves customers' ease of use and enables a better understanding of their needs.

Source: PCS Company

Mold Component Advancements & Hot Runner Insights

Q: When does a mold need a guided ejection system?

A: So, the answer to when a mold needs a guided ejection system is based on four primary factors:

Source: Injection Mold Consulting LLC

- The desired lifespan of the mold (in cycles)
- The weight of the ejector plates
- The quantity and complexity of the ejection components
- The hardness of the core inserts

The Lowdown on Guided Ejection Systems

MOLD COMPONENTS AND HOT RUNNERS

Mechanical Solution Enables Simpler Extraction of Undercuts

Ermanno Balzi S.r.l's AnglePro is a mechanical solution that enables the extraction of undercuts with a reduced extraction stroke compared to traditional systems. This result is made possible by a chain sliding system that, starting from a vertical push of the extraction plate, enables the movement of the extraction rod at angles up to 35°.

Considering that maximum extraction angles of 12° are normally used with single-rod systems and up to 18° with double-rod systems, with its 35°, AnglePro can significantly reduce the ejection stroke, thereby decreasing the mold height and the opening required between the fixed and movable parts for the ejection of the molded part.

Since mold height is often a key factor in choosing the IMM on which to mount it, AnglePro enables the use of smaller IMM, thus reducing the production cost of the molded part.

With AnglePro, it is also possible to extract undercuts with delay and advance angles up to 35°, while keeping the fixing system in the ejection plate unchanged, which provides a seat similar to that of an ejector pin. Advance and delay are achieved simply by tilting the chain links, with one-degree intervals, without any modification to the external system.

According to the company, the 3D configurator makes it is easy to identify the most suitable AnglePro model for a specific application and download its 3D model in the desired format.

Ermanno Balzi S.r.l.
39-030-2120868
ermannobalzi.com

Plate Movement Product Sizing For Mold Tooling

The geometry of planned injection molded component defines the complexity and the amount of work involved in designing and producing the molding tool. At the design phase, one should look closely at the practicality of the molding tool and the complexity of the demolding process.

Hasco America Inc., with its comprehensive range of latch locking units and two-stage ejectors, offers a variety of solutions specifically for the field of multi-stage demolding. Compared to latch locking units, which precisely control the movements of the mold plates by opening the mold, two-stage ejectors control the sequence of the ejection by splitting up the output movement into separate stages.

To simplify selection for users and provide help with the design, to make choosing demolding easier, a brochure entitled "Multi-stage Demoulding" is now available both online and in print.

The main focus when choosing the right demolding unit is on desired movements and respective mounting positioning. Some movement examples are: forward and backward movements, single stroke and the use of stripper plates. The product selection can then be narrowed down according to the requirement of how the plates should move in relation to each other.

Next, the mounting position necessitates renewed filtering of the selection. A distinction is made between central and off center mounting and between internal and external mounting of the standard units. Then the right standard unit can be ordered, depending on the mold size and the desired length of the stroke movements.

All products can be easily and reliably mounted and adjusted.

Hasco America Inc. / 877-427-2662
hasco.com/en

Mechanical System for Slides Enables a Decrease in Mold Size

CUMSA USA highlights its LS, the new long stroke for slides. It's a mechanical system designed to expand slide travel up to 100 mm, therefore, significantly decreasing the mold size.

Molds with long strokes present several challenges due to the complexity and precision required in their design and manufacturing. It's well known that the longer the stroke is, the larger the mold will be. Moving big molds will ultimately be more complicated, as they require more time, effort and larger transportation machines. The LS system was created with mold reduction in mind, even in the event of longer strokes for larger molded parts.

The LS has a compact design, making it easier to fit into any application. The product can be attached to any slide to produce a better performing mold. The only machining required to install the system to any slide is a simple grove on the side of the slide to guide the LS. It can also be applied to any conventional movement, even on existing molds.

This product features the patented CUMSA Double Rack system and is a 100% mechanical solution, which comes with a slide retainer, designed to replace any angle pin by a perpendicular rack instead. Thanks to the 45° of the teeth, CUMSA obtains a 1:1 relationship, so the length of the guide is equal to the stroke. For 100 mm of travel, a 100 mm rod is needed with all of the movement being perpendicular.

The LS is designed to expand slide travel up to 100 mm without the use of angle pins or hydraulics and can be attached to slides with angle inclinations from -25º to +25º.

CUMSA USA / 248-850-8385 / cumsausa.shop

Conventional and Self-Lubricated Mold Components Offer Various Benefits to Moldmakers

SelfLube is a U.S. manufacturer of bronze and steel components used in mold and stamping dies. SelfLube makes over 10,000 standard part numbers to accommodate the different needs its customers might have. The company offers conventional components as well as self-lubricated components. These graphited parts require less maintenance, as they do not need any additional lubricates.

Wear plates are used to guide and control linear motion when there are heavy forces to contend with. While the wear plates were originally developed for metal stamping dies, there are many other uses in molds, particularly for special machines and heavy equipment. SelfLube's technology continues to reduce maintenance costs, downtime and workload.

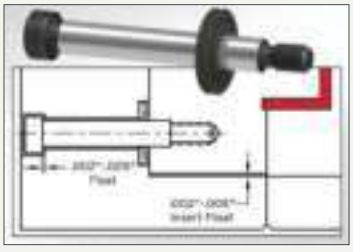
SelfLube / 800-690-3600 / selflube.com

MOLD COMPONENTS AND HOT RUNNERS

Radial Springs to Center Floating Inserts for Alignment

Progressive Components introduces Radial Springs, which lift and center floating inserts to pre-align cores before a mold's cavity interlocks engage.

Precise alignment is often required between the cavities and cores, such as with critical shutoffs or requirements for a consistent parting line match. Rather than rigidly bolting inserts to the mold base, stripper bolts enables the Radial Spring's pressure to reduce side forces and pressure on alignment locks. Previous design practices utilized disc springs to provide preload in the Z-axis, but Progressive's new Radial Springs go a step further by positioning the core insert in the X- and Y-axis for minimal force to be experienced with the initial lock engagement.



Radial Springs are available in four sizes to fit Progressive's Stripper Bolt diameters of 1/4", 5/16", 3/8" and 1/2". For alignment purposes, Progressive offers Cavity Interlocks in both a round and a flat series.

Progressive Components / 800-269-6653 / procomps.com

Multi-Cavity Line Redefines Injection Molding Via Hot Runner Technology

Oerlikon HRSflow's Multiflow HRS multi-cavity line is designed for the precise production of low shot weight parts, ranging from 0.5 to 120 grams. It is suitable for sectors such as thin-wall packaging, beverage and home, beauty and personal care, medical applications and technical components. The multi-cavity systems offer key advantages, including fast cycle times, high production volumes, consistent part-to-part weight and the ability to process various materials, including PCR compounds and biopolymers. Additional benefits include rapid color changes and good part finishes.

Among the latest solutions, the stack mold system is specifically developed for the efficient injection molding of thin-walled packaging. Its patent-pending design ensures easy assembly and maintenance, enabling a plug-and-play integration that reduces downtime and costs. The solution is optimized for high-filling pressures and features the new Xd series nozzles on a 220 mm hot half plate, providing a cost-effective solution without compromising quality. The demo tool is available at the Oerlikon HRSflow Test Lab, where customers can test various polymers, including bio-based and compostable materials aligning with circular economy principles.

Moreover, Oerlikon HRSflow has recently enhanced its portfolio to deliver efficient turnkey solutions by offering a comprehensive package of hot runner systems and control units. Among the latest user-friendly controllers, the T-Flow HRS represents a new generation of thermal multi-zone control units, delivering reliable and precise temperature control for hot runners in injection molding machines.

Oerlikon HRSflow / 855-477-3569 / hrsflow.com/ww/en

Expanded Hot Runner System Increases Manifold Sizes

DME Company's EcoOne hot runner system, a configurable manifold and component system for time and cost-sensitive commodity applications, has been expanded to include a single drop nozzle (hot sprue bushing), a 16-drop system and larger manifolds (600 × 600 mm) to complement the initially released one-, two-, four- and eight-drop system family.

The company says EcoOne is an economical solution suitable for processing commodity resins for simple, cost-sensitive applications such as consumer goods, small home appliances, basic automotive components, electronic peripherals/accessories and more.

The DME EcoOne hot runner system offers a wide range of standard nozzle options with a shot range capacity of <5g up to 3,500 g in lengths ranging from 50 to 300 mm. There are six standard non-valved and five standard valve gated options. Manifolds are available in one- to 16-drop configurations with custom pitch options. Currently, EcoOne systems are expected to be shipped and delivered in as little as three to four weeks.

The standardized components are what enables DME to offer rapid delivery and reduce prices to minimize mold makers' costs for simpler projects.

The DME EcoOne hot runner system is field serviceable to minimize downtime and operating costs. Nozzles use replaceable brass heater sleeves while manifolds incorporate push-in heater elements. Because these are globally standard components, inventory is on-hand and available through DME's global sales network. System components are covered for up to two years under the product's global warranty.

DME Company / 800-626-6653 / dme.net

Hot Runner Controller Solutions Benefit Injection Molding

Fast Heat by Spark Industries' hot runner controllers, MoldXChecker, CableXChecker and related solutions make injection molding easier for the molder. From simple to complex resins and part geometries, these technologies open processing windows, maximize production uptime, reduce peak kW demand, integrate with injection molding machines and molding cells, protect hot runner tooling and enable IoT-driven manufacturing.

The Pulse hot runner controller is undergoing updates that are designed to be user-friendly and backward compatible. With a modern microprocessor, streamlined board components, OPC-UA, and recipe upload/download capabilities, these updates will soon be available to all existing Pulse users and on new Pulse orders, ensuring a seamless transition.

MOD24 offers a high degree of flexibility, utilizing the Pulse control algorithm within a modular six-zone control board and a 24-zone cabinet. One can add or subtract as many modules and cabinets as needed for an application, enabling a customized solution. This compact and modular approach is ideal for injection molding machine integrations and space-saving mounting in out-of-the-way locations.

Fast Heat by Spark Industries / 574-606-4243
fastheatbyspark.com

Expanded Nozzle Series Improves Performance in Multi-Cavity and Hot Half Systems

Mastip Inc. highlights the MX Nozzle Series, known for its high performance in multi-cavity and hot half systems, expanded to include the recently released MX09 nozzle range.

Having undergone testing using various materials and high injection pressures, the MX09 nozzle improved reliability, temperature profile and thermal stability by incorporating an advanced micro coil heater along with a thermocouple design. With a minimum pitch of 20 mm, a pocket of 14 mm, a nut diameter of 7 mm and a range of extended tips available, the MX09 can fit into very tight spaces.

The MX09 was developed to meet customers' demands for a small pitch, high value molding solution for the packaging, caps and closure and medical markets. MX09 will be available in H13 Steel (F1), in both front and rear loading configurations, with standard lengths varying from 55-175 mm.

The MX nozzle range now includes the 09, 13, 16 and 19 series to offer a comprehensive solution for any industry requirements.

Every Mastip solution incorporates advanced thermal technology producing quality components supported by Mastip's global service network.

Mastip Inc. / 262-644-9400 / mastip.com

Four-Drop Hot Runner Valve Gate System Offers Compact Design

Heitec Heisskanaltechnik**,** based in Burgwald, Germany and distributed in North America by **Technoject Machinery Corp.** of Bolton, Ontario, offers a newly designed, compact valve gate hot runner system. In the past, mold designers have struggled to place gate locations close to the center of the mold due to limited space available for the valve pin actuation above the manifold block. The only available solution was to move the gate locations much farther away from the center, resulting in unnecessarily large mold bases.

Heitec Hot Runner Systems, specializing in small component technology, addresses these space constraints with innovative solutions. For example, a 4-drop valve gate system can be arranged on a 30 mm bolt circle in the center of the mold. This design makes it possible to easily install a mold into small tonnage machines such as a 7 or 10-ton.

Feature highlights include a compact valve gate system, 30 mm bolt circle for four gates, independant control zone for each drop, low hot half thickness for limited stackup heights and CAM.

Technoject Machinery Corp. / 905-951-7144 / technoject.com

Honing System Enhances Precision of Hot Runners in Injection Molding

Microcut AG highlights Swiss honing systems for the fine machining of bores in mold manufacturing. The company also provides subcontracting work of high precision for bores in the diameter range of 0.015 – 16.0 mm.

In terms of optimizing quality criteria, the company says it achieves the first shot, no burr needed at the injection molded part. There is no pairing process necessary between needle and bore, provising a longer service life of the mold.

Example as used for a hot runner system of injection molds: The optimum cylindrical shape as well as dimensional accuracy and surface are the most important requirements.

Microcut AG / +41 (0)32 654 15 15 / microcut.ch

Side Gate Hot Runner System Nozzles Improve Usability for Moldmakers

Side gate nozzles from **Barnes Molding Solutions** offer customers ease of use and reliability, even with challenging plastics.Toolmakers often hesitate, preferring inefficient cold runners or even placing cylindrical components sideways in the cavity. However, the side gate nozzle THS has proven that cosmetic injection points, easy assembly and consistent reliability can be smoothly combined even on difficult parts and with difficult materials.

The homogeneous temperature profile is crucial because, especially with technical materials, the risk of freezing increases when the melt is first redirected to the side. During development, Barnes Molding Solutions focused on heating design, using patented heating elements from Thermoplay.

Additionally, sufficient space was provided for nozzles near cooling channels, which can also be used for heat supply if needed. A circular seal between the nozzle tip and the tool ensures thermal separation which leads to reduced energy consumption and enables shorter cycle times and barely visible injection points with diameters measuring fractions of a millimeter.

Medical disposables such as pipets, syringes, caps or medical cannulas are among the products where side gating (with standard polymers like PP) is already widespread. With wall thicknesses of less than 1 mm, low part weight, and the highest demands on concentricity, precision work is required to produce in-spec parts. But side gating can also be beneficial for technical applications such as socket inserts and decorative frames made of PC or ABS, as it helps avoid markings in visible areas.

Barnes Molding Solutions offers three nozzle variants for different component geometries. The maximum part weights for sizes 12, 17 and 23 are 6, 20, and 40 grams (polyolefins/low-viscosity materials), respectively, or 1.5, 7 and 16 grams (technical plastics). Even fiber-reinforced and mineral-filled materials can be processed with high stability.

The nozzles are available in both linear (THS-linear) and radial configurations (THS-Radial). The latter is currently used in a series application for the elongated cover of a car battery. Three radial nozzles in a row, each with two opposing nozzle tips, serve two cavities with a shot weight of 640 grams. The THS-Radial can be equipped with up to eight nozzle tips, while the linear version features 2+2 or 4+4 parallel nozzle tips. The minimum distance between injection points here is 16 mm (about 0.63 in.), ideal for multi-cavity tools, with temperature control available for each individual tip.

Barnes Molding Solutions / 860-583-7070 / barnesmoldingsolutions.com

Moldmaking Activity Contraction Continues in September

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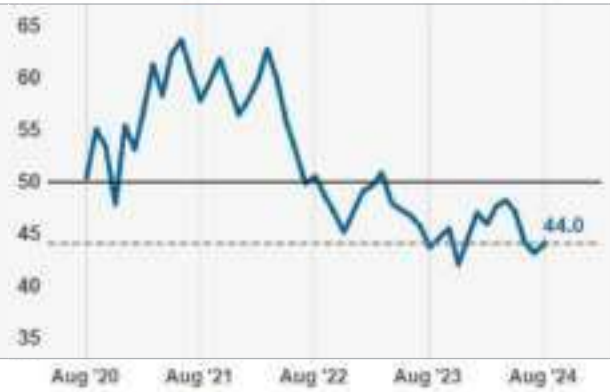
Gardner Business Index (GBI): Moldmaking



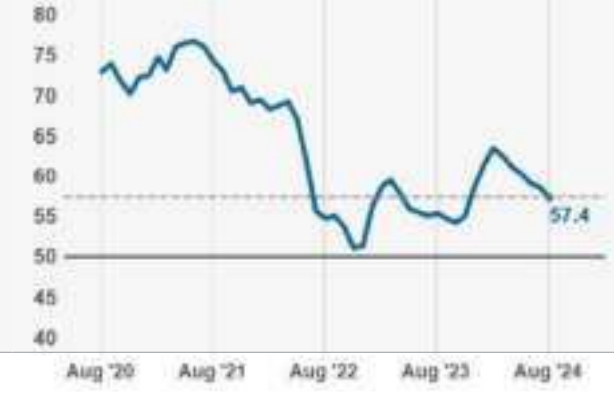
The Gardner Business Index (GBI) is an indicator of the current state of moldmaking considering survey responses regarding new orders, production, backlog, employment, exports and supplier deliveries. Over 50 is expansion. Under 50 is contraction. The September GBI shows the moldmaking market continues to contract overall and is at its lowest in the last year. Materials prices, exports and future spending increased slightly, but all other measured factors are down this month.

GBI Components Scorecard

Shade = distance from 50 (darker shades are farther from 50)
Direction = change (Pointing up is better)

The Gardner Business Index (GBI) Components Scorecard reports the monthly change rate of primary mold-making market factors contributing to the overall monthly index reading.

GBI Future Business Index



The GBI Future Business Index is an indicator of the future state of the moldmaking market considering industry respondents regarding their opinion of future business conditions for the next 12 months. Over 50 is expansion and under 50 is contraction. The index remained positive but dropped very slightly, with continued contraction indicating slower future growth expectations.

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BUSINESS DEVELOPMENT

Seven Things You Need to Know About Nearshore Opportunities

Thorough research, strong teams and planning are key to navigating cultural, logistical and regulatory complexities when expanding into other countries. Source | Thinkstock

By Carlos Redfern

Conducting business across borders may seem daunting, so understanding all the complexities is important. By doing so, you can analyze appropriately, define a course of action and monitor progress to ensure goals are met. Here are seven considerations for doing business in Mexico:

1. Advisory

- Consider strategic site research covering geography, supply chain, security, human capital, infrastructure, government incentives, utilities, etc.
- Use resources such as the American Chamber of Commerce Mexico, state trade missions, the American Embassy and industry peers.
- Seek assistance from Mexico-specific professionals (advisors, foreign trade, legal, tax and labor).
- Understand that investment requires significant corporate involvement and financial and capital commitment.
- Consider appointing a project manager for your expansion.

2. Human Capital

- Cultural understanding is crucial and can make or break a deal if not managed properly, including the market, salary and benefits.
- Your organization needs to adjust to Mexican standards, not vice versa.
- Securing good talent requires strategic screening and significant training, as well as patience and support to ensure that staff meet industry requirements.
- A local administrative team must handle SAT (Mexico's IRS equivalent), foreign trade and IT requirements.

3. Legal – Corporate

- In Mexico, the year-end date is December 31st.
- It's important to understand the roles and responsibilities of legal representatives and notaries.
- The requirements for corporate books and stock certificates are more bureaucratic compared to the U.S. and Canada.
- Formal agreements and notarization are required for intercompany loans and advances.

4. Foreign Trade

- To import, you must obtain an importer's registry permit. A lease agreement and designated broker are required for the permit.
- To export, it is essential to participate in export promotion programs such as IMMEX – VAT and Excise Certification, PROSEC and the 8th rule. This requires a robust inventory system and careful attention as regulations change quickly.
- You will also need strategies for importing machinery and equipment.
- It is crucial to comply with foreign trade requirements, given the high level of audit collections conducted by the SAT.

5. Labor

- Employment relationships are not "at-will".
- Termination causes are those provided by the Federal Labor Law and the internal work regulations. For example, productivity is not a justified cause for termination.
- Unions with at least 30.0% of eligible employees can request the signing of a collective labor agreement. Multiple unions are allowed.
- Labor and social security rights are not waivable.

6. Tax Issues

- The legal representative must have an active SAT electronic signature (FIEL) and a tax ID number.
- Profit sharing (PTU) is calculated at 10.0% of the taxable income.
- Transfer pricing studies are necessary for intercompany transactions, and the tax authorities closely audit this area.
- The company must fulfill various requirements, including electronic accounting, CFDI receipts (e.g., invoices, payroll, etc.), and monthly, quarterly and annual obligations, regardless of its level of activity.
- Compliance with tax requirements is essential in foreign trade; collections in 2024 have increased by 5.8%.

7. Information Technology

- Care must be taken to ensure that the ERP or software being used complies with SAT and foreign trade requirements. Failure to do so could result in severe penalties, interest and operational disruption. MMT

FOR MORE INFORMATION

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