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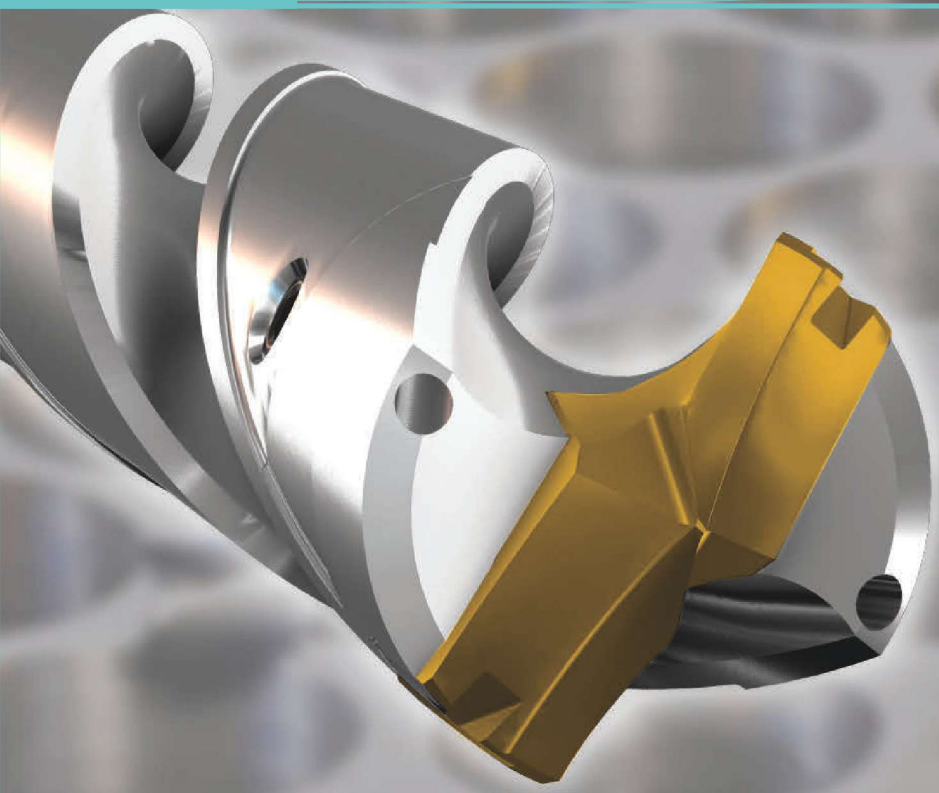

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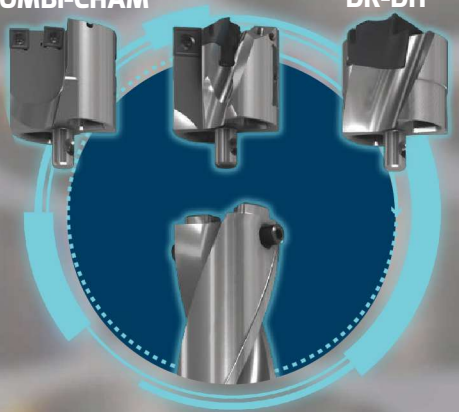

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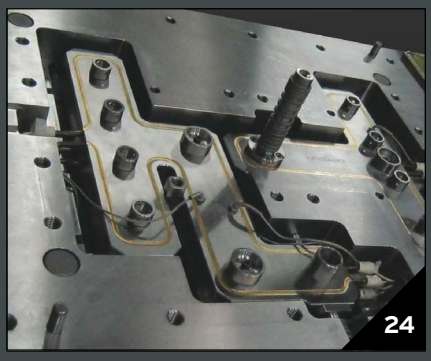
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Features

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ON THE COVER

Image courtesy of Husky Injection Molding Systems. In honor of *MoldMaking Technology*'s 20th anniversary, Husky Injection Molding Systems (Husky) recreated the original premier issue cover. Here, Husky's Assembly Technician Jason Chetcuti works on a 128-cavity HyPET 4.0 60x140 pitch cold half at the company's global headquarters in Bolton, Ontario, Canada. Husky is a supplier of injection molding equipment and services to the plastics industry, including designing, manufacturing and integrating a range of injection molding machines, molds, hot runners and auxiliaries.

MoldMaking Technology also thanks Francine Petrucci, president and owner of BA Die Mold, for contributing the mold components and supplies on the peel-away cover.

Images courtesy of (left to right) Sussex IM, Orycon Hot Runner Systems and Iscar Metals Inc.

5 TRICKS OF THE TRADE
Great Tips from This Issue

VIDEO ACCESS

1. All Systems Go
The entire scope of a project process should be scrutinized and considered as part of a systems-engineering approach to manufacturing.
PG. 20.

2. Heading off at the Pass
Hot runner leaks can be prevented during processing by paying attention to seemingly minor changes in the molded parts or press behavior.
PG. 24.

3. Getting to the Core
Advanced CAD/CAM includes modules specifically created for core and cavity model analysis and automated generation of full EDM requirements, such as the electrode model and documentation.
PG. 32.

4. Making the Cut
A common milling mistake is choosing a cutter that is too large for a given machine. Machinists are forced to sacrifice efficient use of carbide by limiting the depth or width of cut when choosing a cutter diameter that is too large.
PG. 36.

5. Game Changer
Additive manufacturing in conjunction with five-axis simultaneous machining has significantly reduced the use of die-sinking EDM. 3D printing makes possible the absolute approval of a product before building the mold for it.
PG. 88.

FIRST ISSUE ADVERTISER 20 YEARS

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Image courtesy of Galaxy Kalip

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Now Is Still the Time

"The time has come for a magazine dedicated exclusively to the moldmaker—*MoldMaking Technology* magazine. Over the past year, our research, training and interaction with the moldmaking world revealed an endless stream of moldmaking-related issues that were not being discussed. It was then that we decided to make it our mission to address this need. Until today, there never has been a monthly, one-stop, central resource for moldmakers who are searching for current moldmaking information."

This letter is from the late Gary Orfe, the founding publisher of *MoldMaking Technology* (*MMT*). Twenty years later, his words still ring true. That is especially evident from some of the conversations I've had this year as we mark *MMT*'s 20th anniversary. In regard to the magazine, members of the moldmaking industry have said things like: "Before *MoldMaking Technology*, there was not another publication focused on moldmaking. The only information we had was from networking with other local shop owners or from word of mouth. *MMT* was responsible for opening that up. It introduced mold shop owners to other mold shop owners across the country."

CELEBRATING 20 YEARS 1998-2018

"Articles in *MoldMaking Technology* are informative and honest. It made a big difference for the industry. By and large, today most moldmakers are cooperating and working together, helping each other to compete with global competitors. That's probably the most important part of the magazine because it features shops that are willing to share what's successful and what isn't in the way of equipment and processes and how they're working to improve."

"I just love *MoldMaking Technology*. It was so darn cool when *MMT* hit the newsstands. Finally, a publication dedicated to our trade! We have different challenges than your average 'production shop.'"

All of this feedback is motivation to continue the mission of serving and building this community through content any way that the moldmaker wants and needs it—print, digital, videos, podcasts, webinars, conferences, events, social media—you name it. The magazine is here to serve this industry. Although the format for information sharing has evolved, the need is still there.

As you work your way through this special issue, look for the 20th anniversary emblem, which designates content that takes a look back over the past two decades, including how the magazine was founded.

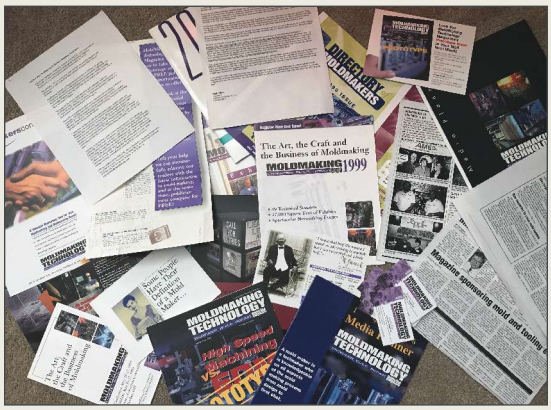
If you ask what the most important thing is that I have learned over the past 20 years, I would say it is that moldmaking still matters. Despite technology and processes changing, *moldmaking still matters*. MMT

Christina Fuges

Christina M. Fuges
Editorial Director

Follow MMT on: Follow @MMT_ChristinaF

THIS MONTH ON moldmakingtechnology.com



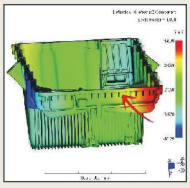
PODCAST: MMT Through the Years

MoldMaking Technology Editorial Director Christina Fuges joined The Manufacturing Alliance to discuss the history of the magazine, trends and where she sees the magazine headed.
short.moldmakingtechnology.com/mmt20

BLOG: AMBA Mold Builder of the Year

This year's AMBA Mold Builder of the Year is Mark Slack, director of operations for Roush Manufacturing in Farmington, Michigan. "To be honored in this way at the end of my career and know that I might have made a difference in how moldmaking is doing today, because of my involvement in CAD/CAM or through the young people I've hired who are now CAD designers, machinists and moldmakers, is humbling."
moldmakingtechnology.com/blog/post/2018-amba-mold-builder-of-the-year

WEBINAR: It's About your Part!



The key to reducing costs and keeping your project on schedule is to identify warpage issues prior to mold sourcing and cutting steel. In this webinar, the steps required to identify and solve part design and warpage-related issues will be reviewed.
short.moldmakingtechnology.com/caewebinar

ZONE: NPE

Access all of the latest news, articles, columns and blog posts on the upcoming triennial plastics event from the Plastics Industry Association. NPE2018 will take place May 7–11, 2018 in Orlando, Florida.
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THANK YOU!

The team at *MoldMaking Technology* would like to thank the following companies for their support and trust throughout the past 20 years. You appeared on the pages of the premier issue back in 1998 and continue to play an integral role today, as we evolve alongside the industry.

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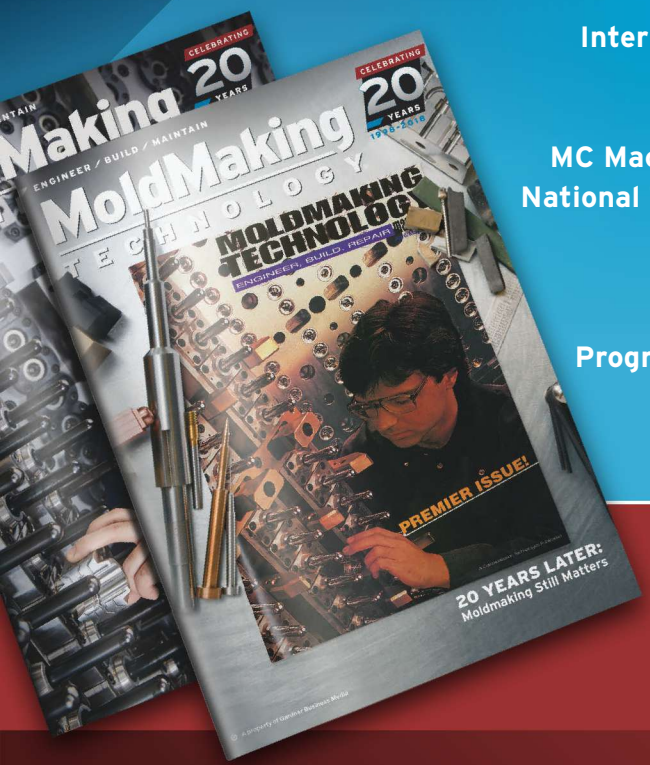

MoldMaking TECHNOLOGY®

Getting Retrospective

Current and past editorial advisory board (EAB) members and original supporting suppliers have been reaching out lately to share what *MoldMaking Technology* (*MMT*) has meant to their industry for the past two decades. Here are some of their gracious compliments and motivating feedback:

"*MoldMaking Technology* arrived on the scene at just the right time to address the moldmaking market and to provide moldmakers and their suppliers with the perfect place to share. The *MMT* team awkwardly stepped into the market, as no one believed it could compete with other established, but more general, magazines. However, suppliers in need of direct communication with moldmakers embraced it. Fueled by suppliers' need to reach moldmakers and the industry's desire to share knowledge unique to the molds themselves, *MMT* flourished."

"I think it was very brave to start this magazine 20 years ago when the moldmaking market was strong but experienced offshoring year after year, which made it harder and harder for moldmakers to survive. *MMT* gave mold shops a good overview of what new technology trends were emerging in the United States and around the world, helping to educate them on how to invest in newer EDM and five-axis technology to compete better in the global marketplace."

"*MMT* has been a resource to objectively assess technologies and companies supporting today's moldmakers and ultimately their customer, the molder. It communicates current trends in the industry to companies that historically would not be exposed in real time because of their size."

"We have a longstanding relationship with *MMT* that we hold in the highest possible regard. Quite honestly, I think of the magazine and my friends within as family because we have literally grown up together! From six employees in 1998 to 80 today, *MMT* has been with us every step of the way, and we are blessed to have their passion-driven leadership telling the story of our great industry."

MMT arrived on the scene at just the right time to provide moldmakers and their suppliers with the perfect place to share.

"*MMT* has helped the industry grow by keeping its audience educated on the evolution of moldmaking, and that coverage has included valuable information on process, machinery and technology. *MMT* has also done an outstanding job of publishing articles by industry specialists, which are my favorite part of the magazine."

"*MMT* launched and started the sharing of case studies, which has taught shops about real, proven solutions to common problems and unique challenges. The magazine also brought about a means to measure and benchmark the businesses within moldmaking through its annual Leadtime Leader Awards competition."

To those who have shared here and to many others who have reached out to share their thoughts about *MMT* this year, we are grateful that you welcomed us into your community. It is an honor to contribute in a small way to the industry's success. MMT

EDITORIAL ADVISORY BOARD (EAB)

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

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


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A Look Back:

Courtesy Mold and Tool

By Cynthia Kustush

Courtesy Mold and Tool (Courtesy) was the very first shop that *MoldMaking Technology* featured in a piece called "In the Spotlight" when the magazine launched in April 1998. A lot has changed in 20 years. In honor of the anniversary, *MoldMaking Technology* revisited Courtesy through past coverage and reflections from those who worked there.

First, a few basic Courtesy Mold and Tool facts from the 1998 piece:

- Walter Kreiseder and Gerald Sommers founded Courtesy Mold and Tool in 1972 as a garage-based moldmaking company with only a few customers.
- By the end of its first year in business, Courtesy outgrew the garage and made its first move to a larger facility. Over the next 25 years, many more moves and expansions followed.
- The company noted that its decision to sample the molds that it built in-house was critical to its long-term success. Courtesy purchased its first injection molding machine in 1977, and by 1978, it had launched its production molding operation. Customers liked the advantages that came with production molding services (they noted, for example, that higher quality tooling reduced cycle times), and this began the company's evolution to a full-service moldmaking operation.
- When *MoldMaking Technology* featured the company in 1998, Courtesy already occupied a facility of nearly one million square feet in Buffalo Grove, Illinois. Courtesy Corp. was then the parent company of four divisions: Courtesy Mold and Tool (the division that built the molds), Courtesy Med/Tek (the division that was known at the time for being the largest cleanroom moldmaking operation in the United States), Courtesy Tech Center (the division that sampled the molds) and Creative Packaging Corporation (the division that designed, developed and produced standard and custom packaging).
- Courtesy's customers in 1998 included Fortune 500 companies like Kraft, Coca Cola, Abbott Laboratories, 3M, Eli Lilly, Glaxo, Johnson & Johnson, Motorola and the Quaker Oats Company. Annual revenues reportedly exceeded $200 million.


In The Spotlight

A Formula for Success—Moldmaking Services from A to Z

From a Garage to a Multimillion Dollar Business

Moldmaking Services from A to Z

Courtesy Mold and Tool

By Shelly Unruh, Contributing Editor

Courtesy Mold and Tool was "in the spotlight" in *MoldMaking Technology*'s inaugural 1998 issue.

Moldmaking Ahead of Its Time

MoldMaking Technology interviewed Courtesy in 1998. The magazine's then contributing editor, Shelly Unruh, quotes Courtesy's owner Jerry Sommers as saying, "We fill a very distinct niche in the marketplace, and we feel this niche is growing. Customers nowadays don't just want a tool built. They want the tool designed, built, certified, sampled and validated. Having these departments at Courtesy gives us added credibility during all phases of toolmaking."

Courtesy Mold and Tool prided itself on being a trend-setter, with its 180 moldmakers using the latest state-of-the-art technologies to build "close-tolerance, high-speed, high-cavitation tooling and its trademark, ultra-high cavitation stack tools." The mold shop was equipped with MSI temperature controllers that it used to scan and control 165 zones within the plant to ensure excellent part quality and dimensional repeatability. Courtesy had its own, proprietary hot-runner system for molding polyolefin resins (95 percent of the molds that it built were hot-runner molds). Almost everything was computer-driven, including a CNC gun-drilling machine, five-axis vertical machining centers, lathes, wire and die sinker EDM machines and more. The company updated the equipment, on average, every seven years and trained the employees to use it. Sommers told *MoldMaking Technology* in 1998, "The moldmaker's job has evolved from that of a pure craftsman into more of an assistant foreman position. He or she plans the job, guides it through, answers all the questions and makes sure that everything is done right and on time." This teamwork concept set new standards for controlling how the company moved molds through the shop and for controlling how Courtesy kept customers up to date with one point of contact—the sales engineer.

Courtesy also blazed trails when it came to women in mold manufacturing. The company employed women "as mold designers, production engineers, mold polishers, inspectors and purchasing agents." Sommers said in the 1998 piece, "We consider women as capable as men in moldmaking...and we focus on qualified employees whether they are male or female."

An Employee's Perspective

Kurt Mohrbacher, who is currently the operations manager at Janler Corp. (Chicago, Illinois), worked at Courtesy for 15 years and recently shared his perspective on what it was like working there before and during the acquisition years. "When I first went to Courtesy in 1994, I thought I would retire there,"

Remembering Delta Tech Mold

Delta Tech Mold Inc. (Delta Tech) was a pioneering mold manufacturing company that prided itself on giving customers a blend of old-world craftsmanship and state-of-the-art technologies. The company started as Delta Tool Co. in 1966 as a partnership between Klaus Cisliek and Manfred Klemm. *MoldMaking Technology* featured Delta Tech in the November issue of its inaugural year, and 20 years later reflects on a company that introduced many industry "firsts."

Editor Mary Eck's 1998 feature states, "Delta Tech Mold Inc. has proven itself one of a handful of preeminent contenders in the field of high-precision tooling. From manufacturing leaps in automation to the acquisition of first-rate, rapid prototyping technology, the company is no stranger to technology and has, in actuality, made a strategic point of making 'friends' with it." *MoldMaking Technology* recently contacted Klaus Cisliek, now retired and living in Florida, to learn more.

"It all started with three used Bridgeports, two surface grinders and one drill press in a small garage we rented in Mount Prospect, Illinois," Cisliek says. A year later, the company purchased and moved into a 12,000-square-foot building. By 1970, the 30-man company became one of the earliest users of wire-cut EDM technology when it purchased a Charmilles wire EDM machine. "I believed in the advantages of EDM technology for moldmaking, including having the ability to run manufacturing lights-out," Cisliek says. In 1980, Delta Tech moved its operations into a new, 40,000-square-foot facility in Arlington Heights. As the company grew, it invested in new fixturing for the EDM machines. The company eventually accumulated several Charmilles machine tools, including five sinker EDM machines and two 4000 CNC EDM machines with automation and robots (an industry first) so that Delta Tech often served as a kind of showroom for Charmilles salesmen when courting new customers. "We were a forerunner in the industry with technology," Cisliek says. In 1988, the company changed its name to Delta Tech Mold to reflect its cutting-edge culture.

As Eck stated in her 1998 feature, "Delta recognizes the value of adding more and more services designed to facilitate one-stop shopping for the customer. Its trademark array of services includes moldflow/moldcool, reverse model engineering, piece-part inspection and in-house tool sampling." In 1996, the company distinguished itself further by becoming the first company in the industry in North America to earn ISO 9001 certification. It also adopted unique, patented technology called "Space Puzzles." Delta Tech purchased the patent in 1993 for this prototype tooling system from a German company. Cisliek's son, Ron, then executive vice president at Delta, described the prototype tooling system as a bridge between stereolithography and having long-awaited molded parts from hardened prototype molds. With this system, prototype cavities could be dropped into a special frame for quicker sampling of parts. It was an innovative precursor to some prototype strategies used today.

At its peak, Delta Tech had more than 100 employees using the latest CAD/CAM software to run state-of-the-art equipment 24/7, and Klaus Cisliek could monitor jobs throughout production from his office computer. Thirty percent of the molds that Delta Tech built focused on pharmaceutical products for original equipment manufacturer (OEM) customers like Abbott Laboratories, Baxter Healthcare and Becton Dickinson. The balance of molds supported programs for technical products like Bic/Schick shavers, Oral B toothbrushes and writing instruments. The flip-top closure industry benefitted from Delta Tech's early involvement with Zeller Plastik in Germany, which revolutionized the industry with a patented, protrusion-less hinge called the butterfly hinge. Delta Tech led the delivery of flip-top molds with this technology to U.S.-based OEMs like P&G, Unilever and Colgate Palmolive, along with contract molders like Seaquist Closures, Owens Illinois and Polytop.

Unfortunately, because of circumstances beyond the company's control, Delta Tech closed its doors on April 1, 2001. Still, in this industry, when one door closes, another often opens, and Cisliek became plant manager and vice president of operations at American Tool and Mold in Clearwater, Florida, where he worked for three more years before retiring. "It's still in my blood. I dream about it," Cisliek says. "I liked to work with people and share my knowledge and experience."

he says. "It's amazing how things can change in the world of acquisitions and mergers. I worked for 15 years in one place that changed its name three times."

Mohrbacher recalls that Courtesy was the largest shop in the Chicago area. When he joined the team as a mold designer, the company had about 500 employees between the moldmaking and molding operations. "Wally (Kreiseder) liked employing people. He called it "horsepower." He was the one who gave me the opportunity to move up when the current director of tooling retired," he says. "He put together a great crew. Everyone I worked with at Courtesy was the best in the business. I learned so much there. I still consider that place to be the gold standard."

In 1999, Hicks, Muse, Tate and Furst purchased Courtesy Corp. The firm, which had a controlling interest in Courtesy, seemed more interested in the molding operation than the tooling side, according to Mohrbacher. "Courtesy's molding business was booming, and there were many products on the verge of production, including a dry-powder inhaler device that was expected to be a $20 million-a-year business all by itself," he says. "The tooling operation was just an add-on."

I learned so much there. I still consider that place to be the gold standard.

In 2002, Precise Technologies bought Courtesy Corp. At the time, the investment company Code, Hennessey and Simmons owned Precise Technologies. Mohrbacher, who was director of engineering, was part of a group of employees that had to consolidate all the equipment that Precise Technologies had in its Des Plaines, Illinois, shop with equipment that Courtesy had in a small, Lake Geneva, Wisconsin, mold shop. They had to move everything into the main moldmaking facility (known as the 800 Building) in Buffalo Grove. "Precise Technologies had a toolroom, so they understood tooling and liked the idea of it supporting their molding business," he says.

Another Acquisition, Another Name Change

In 2006, U.K.-based Rexam PLC acquired Precise Technologies (including Courtesy Corp.) and renamed it Rexam Mold Manufacturing. *MoldMaking Technology* again featured the company in 2008, emphasizing the continued focus on manufacturing high-cavitation, tight-tolerance production molds for medical, caps and closures, home and personal care products under the new organizational structure. Mohrbacher moved from the tooling department in the 800 Building across Deerfield Parkway to the 600 Building, which was dedicated to pharmaceuticals with product design and development, molding and assembly. He worked there as a new product development engineer. "We had a kind of campus made up of three large facilities in Buffalo Grove. The 700 Building housed the Creative Packaging division. There was also a plant in Wheeling, Illinois, that was all medical molding," he said. Mohrbacher left the company in 2009, but he keeps in touch with several former coworkers.

Tom Worcester worked at Courtesy and then Precise Technologies. He became Rexam Mold Manufacturing's sales manager for mold manufacturing and was interviewed for the 2008 feature. According to Tom, the Rexam organization was a leading aluminum can manufacturer for the beverage industry but split the company to pursue the global plastics packaging market. Two distinct business units, FasTrack and Production Tooling, were created out of the mold manufacturing division that Precise Technologies had in place. Rexam also transformed it from a support center to a primary business unit. "The FasTrack group is dedicated to producing molds that are production-ready molds but typically with lower cavities (two to eight, sometimes 16). These molds are totally representative of how the production molds will operate and produce product," Worcester told *MoldMaking Technology* in 2008. "The production side of the business lends itself to the full production molds—ranging from large stack molds, high-cavity molds, up through 192 cavities to complex, multi-material applications to fill the needs of our clients."

Worcester said that in a similar fashion to Courtesy before the acquisitions, Rexam believed in keeping up with the latest technologies and equipment and made sure employees continually developed their skills. "The incorporation of fully integrated machining centers that can operate 24/7 unattended combined with the development and implementation of better and faster work processes has led to faster deliveries—which means less time in the shop and faster approval of production-ready molds," he told *MoldMaking Technology* in 2008.

Eventually, Rexam broke up and sold off various divisions of the company. In June 2011, Rexam sold its caps and closures business to Berry Plastics, which included most of the packaging operations and the entire mold manufacturing operation. In 2014, Lynx Medpak, a subsidiary of Flextronics International (now called Flex), acquired the molding assets and the whole 700 Building from Berry Plastics. In the deal, Flex got the advanced "Mega-Cell" automation technology that Rexam Mold Manufacturing created. Mohrbacher says that Flex eventually purchased the moldmaking assets from Berry Plastics too. Flex also acquired Tech Mold in Arizona the year before. Numera from Novatek now owns the 600 Building, with its pharmaceutical division. Numera is a manufacturer of personal safety and proactive wellness products.

While Courtesy Corp. saw the retirement of its original owners and many subsequent changes in proprietorship, name and structure, its story does not end tragically. Rather, it makes for an historic portrait of a company's evolution, via acquisitions and equity investment companies, that the industry continues to see today. MMT

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By Christina Fuges

THE MOLDMAKING MISSION

Twenty years ago, a moldmaker launched this magazine, legitimizing an industry. He then passed it on to a passionate media company, which took it to the next level.

Many people in the plastics industry may know Joe Prischak as the chairman of the board for The Plastek Group (Erie, Pennsylvania), which includes Triangle Tool and Penn Erie. What many of them may not know is that he is an honorary alumnus of a school he never attended, helping to create the world's largest undergraduate plastics engineering program at Penn State Erie, The Behrend College, to which he and his wife Isabel donated $2 million for scholarships in 2011. He is the president and CEO of HaVACo Technologies, a designer and builder of heating, ventilation and air conditioning products made in the United States. He is the developer of the Lake Erie Speedway, a racetrack in Erie County that features NASCAR-sanctioned stock car and truck races. He is the founder of a nonprofit called Africa 6000 International, which is devoted to drilling wells and installing water systems across eastern Africa. He founded the nonprofit after he returned from a trip to Africa. To date, Africa 6000 has drilled more than 80 wells. Together with his wife Isabel he has five boys. They all have names that begin with the letter "D:" Dennis, Douglas, Donald, Daniel and David. Additionally, Joe has played another role that is near and dear to my heart: He is the founder of *MoldMaking Technology* (*MMT*) magazine. Twenty years ago, he and partner Gary Orfe invited me to join their crusade to launch a trade publication dedicated to covering the moldmaking industry.

Twenty years ago, a moldmaker saw the need for information-sharing within this critical niche manufacturing community and assembled a team to create a magazine. That need still stands today.

Moldmaking Motivation

Joe's beginning in moldmaking is a familiar one. He started in plastics manufacturing in 1949, working his way up from grinding scrap plastic at 25 cents an hour to working lots of overtime in a toolroom for 40 cents an hour. In the toolroom, he took care of molds, ran a Bridgeport milling machine, lathe, drill press and grinder. He moved on to repairing molds. "The next thing you know," he says, "I started building new molds for radio cabinets, television bezels, radio knobs and ice cube trays." No formal apprenticeships existed back in those days.

Joe got hooked on moldmaking because he loved making something out of steel and seeing the finished product. That is definitely a common feeling among those in moldmaking regardless of the decade that they entered the trade. I remember interviewing the late Amber Zapatka, a 25-year-old plastics engineer with Nypro in Clinton, Massachusetts, for our "MoldMaking Matters" video a few years ago. She also noted that it felt good to see products in stores that she had a hand in making.

Image courtesy of The Plastek Group.

Joe Prischak of the Plastek Group founded *MoldMaking Technology* in 1998 because he wanted to create a place for mold builders to share.

Eventually, Joe ventured out on his own. He decided to start Triangle Tool with two friends who became his partners. The trio set out with $5,000 each to grow the business. Joe's entrance into plastics molding came after he landed a Schick safety razor account. Triangle was building the molds and Schick was looking for someone to mold the parts, so Joe thought, *Why not us?* His partners were not interested, so they left that part of the business to Joe. Plastek Industries then started in 1971, and the rest is history. Today, the Plastek Group is comprised of 10 companies and 2,000 employees worldwide. Joe retired as president and CEO of Plastek Group in 2002 but remains chairman of the board.

Moldmaker Turned Publisher

Despite the evolution of technology used in moldmaking, the reasons that moldmakers have for choosing their careers has not changed much from generation to generation. Back in the 1950s, moldmaking itself was very different than what it is today. Back then, almost everything was done by hand, molds were only as big as you could lift by hand, and mold bases were round. Today, almost everything is done with computers, molds can be large enough for someone to stand inside, and mold bases and components can be square.

According to Joe, one of the biggest differences was the secretive nature of the early moldmaking industry. "No one was comfortable showing or sharing what they were doing. You hid everything. If you came up with an idea, you kept it for yourself," Joe says. This became his inspiration for launching *MoldMaking Technology* (*MMT*) magazine, and many years later that idea became a reality.

"The only way the industry would grow was if we all helped each other. I wanted to give moldmakers a place to share information. This became my primary reason for starting a magazine dedicated to moldmaking," Joe says. He started the research for the magazine in late 1990s, assembled a young but motivated team in 1997 and launched the first issue of *MMT* in 1998. I had the honor and privilege of being a part of that initial team **(see sidebar)**.

"The good part of *MMT* was that I didn't have to do any work. I hired good people who did all the work. All I did was go along for the ride," Joe says.

MMT Moves On and Grows

For seven more years, Joe invested in *MMT*. The magazine continued exposing a lot of the technologies, processes and strategies that were used in mold manufacturing through technical articles and success stories. Joe believed that these success stories highlighted real-life things that were happening in the industry. "Now, all of a sudden, everything was not a secret," Joe says.

> "The only way the industry would grow was if we all helped each other. I wanted to give moldmakers a place to share information. This became my primary reason for starting a magazine dedicated to moldmaking."

As the magazine continued to grow, Joe was on the lookout to pass the publication on to a company that could take it to the next level. In 2004, he sold the magazine to Gardner Business Media (GBM), a family-owned publishing company based in Cincinnati, Ohio. The company started in 1928 as Gardner Publications, Inc. with its flagship magazine, *Modern Machine Shop*. When GBM purchased *MMT*, Rick Kline Sr. was the company president. Today, he is chairman and CEO. His son, Rick Kline Jr., serves as president, and his daughter, Melissa Kline Skavlem, serves as COO. Three other family members manage operations. It was after a chance meeting with Gary Orfe, the late co-owner and publisher of *MMT*, at a Plastics Industry Association (PLASTICS) meeting (which at the time was an SPI meeting) that Rick discovered that *MMT* might be for sale.

Aspiring Media Journalist to Inspired Moldmaking Fan

This was not just a job opportunity–this was an opportunity to be a silent partner and editorial director for a new start-up publishing company. That is exactly what I thought to myself when Joe Prischak invited me to join the team to launch *MoldMaking Technology* back in 1997.

The late Gary Orfe and I spent the next several days sitting at his kitchen table and brainstorming. I remember at the end of that first day that I had a notebook full of ideas and questions. The next week, we drove out to Erie, Pennsylvania, to get Moldmaking 101, and from there it was nonstop. Starting the company Communication Technologies, Inc. (CTI) from scratch was exhausting and exciting. CTI ended up moving offices three times as it grew with more properties and people. And as many shops will find relatable, culture changed as the company grew. That small company feeling disappeared, but the growth was exciting.

MMT's founding owner and editorial director, Joe Prischak and Christina Fuges in 1998 and then again while reconnecting for this special anniversary feature.

When the sale happened in 2004, it was for the better. For *MMT* to grow, it needed to be with a company that could take it to the next level, and that undoubtedly was Gardner Business Media (GBM). GBM had a foothold in manufacturing, and by covering the metalworking side of manufacturing with *Modern Machine Shop* and the plastics side with *Plastics Technology*, *MMT* was a perfect fit.

Some of my favorite memories over the last 20 years include my *first sales call* with Glenn Starkey at Progressive Components. Gary Orfe and I met him at his daughter's hockey game and then proceeded to a bar. I'll never forget the immediate feeling of friendship while selling him on the idea of a magazine dedicated to moldmaking. He was beyond excited about the concept and supported us immediately. Like many original supporters, he still does today.

Producing the *first directory issue* really opened my eyes to how important this niche segment of manufacturing is. So many technology suppliers offer products, equipment and services.

I can't forget *MMT*'s "Top 10 Reasons to Be a Moldmaker" t-shirts, which I look forward to every year. The entries really show off the industry's general wit and sense of humor.

The parties of the early MoldMaking Expo, now Amerimold, also stand out. I have a very vivid picture in my head of one of the first casino night parties. People were standing on tables and cheering, while a bunch of men were getting down on the dance floor. What a blast!

But really, it is this community and what its members do for a living that just captivated me. The people in this industry took an aspiring media journalist and turned her into one of their own. I think that is why I am so committed to continuing to help build this community and connecting with them to find out what they need and how best to provide it. I am not a moldmaker, so I have never claimed to have all the answers, but if someone contacts me with a question or a request, I can absolutely find someone who can find the answer! Again, it's the community.

Someone recently asked me why I think *MMT* has remained a leading publication. I believe it is simply because *MMT* is still the only voice for this niche market, and not just every month with the print magazine as it once was, but every day with digital and social content. Twenty years ago, one moldmaker saw the need for information-sharing within this critical niche manufacturing community, and it is still there. Joe Prischak was right, and Rick Kline saw it too. In fact, that need is greater than ever before, and mold builders have become more and more open to sharing with one another. Although the format for information sharing has evolved, the need is still there.

So, with the continued support of the moldmaking community, both shops and technology suppliers, and GBM's expertise, *MMT* was, is and will continue to be the content source *for* the moldmaking industry *by* the moldmaking industry. This magazineis for moldmakers, and I am honored and humbled to be considered a part of it. Think about this: Today we have a generation of moldmakers who won't know a time when their industry did not have its own trade magazine and event.

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Although Joe was a self-made man, and Rick grew up in a family business, the two had common ground, especially when it came to people. Rick shares a similar outlook to Joe, saying, "My grandfather always said, surround yourself with people smarter than you are, and you'll be successful." He notes that although he and Joe came from different backgrounds, they sort of ended up in the same place. They hit it off right away and reached an agreement rather quickly. Neither party has looked back since.

GBM purchased *Plastics Technology* magazine in 2000. With *Modern Machine Shop* and *Plastics Technology* in its portfolio, GBM was covering both sides of moldmaking—metalworking and plastics. This provided the logic and motivation to add a moldmaking book, according to Rick.

"We believed *MMT* was serving a strong, important niche in manufacturing, which we could grow, especially with the help of a new relationship with PLASTICS on the National Plastics Exposition (NPE) show and a strong, existing relationship with the Association for Manufacturing Technology (AMT) on the International Manufacturing Technology Show (IMTS)," Rick says. *MMT* opened GBM's eyes to opportunities in areas on which they were not focused, such as conferences, shows and products around the brand.

In 2004 Gardner Business Media acquired *MoldMaking Technology* because then president Rick Kline Sr. believed the magazine was serving an important niche in manufacturing that his company could help grow.

For example, one brand *MMT* created, from which GBM learned a lot, is the Leadtime Leader Award, which Rick says is an industry favorite. "That award reminds me of how important *MMT* is to the craft and to the moldmaking industry. GBM now does a similar competition called Top Shops for its other publications."

Rick also believes that amerimold, formerly the MoldMaking Expo, has been another great addition to GBM. This annual industry event has grown each year since the acquisition, especially in the area of molder attendance and participation from moldmaker exhibitors.

"*MMT* is something we look upon with great affection and a lot of pride. I've come to really appreciate the people in it. It takes a lot of skill and a lot of knowledge to be really good, and I think we've helped them along the way," Rick says.

Both Joe and Rick agree that some of the biggest advances in moldmaking throughout the magazine's 20 years have been in software, automation and five-axis machining. More specifically since the purchase in 2004, Rick notes automated CAD/CAM software, five-axis machining's impact on complex molds, additive manufacturing in tool repair and prototyping and work coming back from overseas.

"Right now, moldmaking is one of the hottest industries in manufacturing as far as buying capital equipment. The survivors of offshoring and the recession are very successful today," Rick says. It is these moldmakers who improved their productivity and now better understand the business and the science of moldmaking. "They know what quality means, what on-time delivery means and what working with the customer means," Rick says.

"*MMT* is something we look upon with great affection and a lot of pride. I've come to really appreciate the people in it. It takes a lot of skill and a lot of knowledge to be really good, and I think we've helped them along the way," Rick says.

More importantly, these leading shops also are not afraid to share their knowledge, experience and expertise with others. They are the ones who come together and grow bigger because they're not afraid of sharing. That brings us back to *MMT*, a brand through which the industry continues to share, which helps today's moldmakers produce even higher-quality molds at a lower cost with higher productivity.

"We are going to continue to provide content, the way people want it and when they need it," Rick says. "Our work is important. We strive to help American manufacturers be more competitive and productive to produce better-quality products." And in the words of *MMT*'s founder Joe Prischak, "*MMT* will continue to be successful as long as people continue to want to share."

Here's to another 20 years of *MMT*. MMT

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Gardner Business Media / gardnerweb.com
HaVACo Technologies / havacotechnologies.com
Nypro / jabil.com/solutions/by-brand/nypro.html
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By John Berg

VIDEO Access the related video under the Videos tab at *MMT* online.

Best Practices in Tooling for Ultimate Molding Success

Active project participation and management using a systems-engineering approach streamlines efforts and optimizes opportunities for molding success.

Images courtesy of Sussex IM.

This manufacturing cell on the Sussex IM production floor exemplifies systems engineering. Creating a three-component cosmetics case with a lens, it features two injection molding machines (one is insert molding) with robots or end-of-arm tooling fixtures and two integrated press-side automation systems for part handling and decorating.

Anyone in the plastics industry whose job includes active project participation and management is aware of the three distinct players involved in a plastic injection molding production launch. They are the original equipment manufacturer (product), the molder, whether in-house or outsourced (process) and the tool shop (mold).

Certainly, other parts of a molding production launch are important, and those items include the resin, material handling systems, injection molding machine, specific production environment required, value-added operations, packaging and more. But these are considered sub-sets to the primary three. Whether any or all of these disciplines are in-house or outsourced, each has a unique mindset and perspective.

Ideally, the OEM, molder and tool shop operate as one to streamline efforts and optimize the opportunities for success. However, anyone in the plastics industry whose job includes active project participation and management is aware that these three players can find themselves in adversarial positions over the myriad technical details and time-sensitive decisions that must be made. Operating as one can be a challenge. Even though all three parties have the same goal in mind (which is to make something and get paid for it), they all have differing sets of priorities.

The Roles

The OEM must focus on its completed and validated product being ready to ship on or before the launch date. The OEM project manager, for example, must oversee everything from coordinating the efforts of all supply companies that are involved in creating the product to managing and synchronizing the packaging, advertising and logistics. The OEM project manager also must account for last minute design or packaging changes from its marketing department.

The molder concentrates on the overall process it is projecting, which includes equipment capacity, personnel resources and the floor space that is required for pellet-to-part

production (to packaging when required). The molder is absolutely reliant on the tool shop for the timely delivery of properly functioning and robust injection molds.

The tool shop concentrates on geometry and steel. The tool shop focuses on how to get resin in, cool it down and then get the part out as quickly and efficiently as possible. Of course, many additional considerations play into this process, including steel selection, the deployment of gating techniques, the potential of a hot-runner system, the strategic use of mold-construction methods to improve maintenance efficiencies and so on. However, to the non-toolmaker, the shop is responsible for the costliest of necessary evils: the injection mold.

> The key to any successful manufacturing project, and certainly to a project with multiple processes, is collaborative communication.

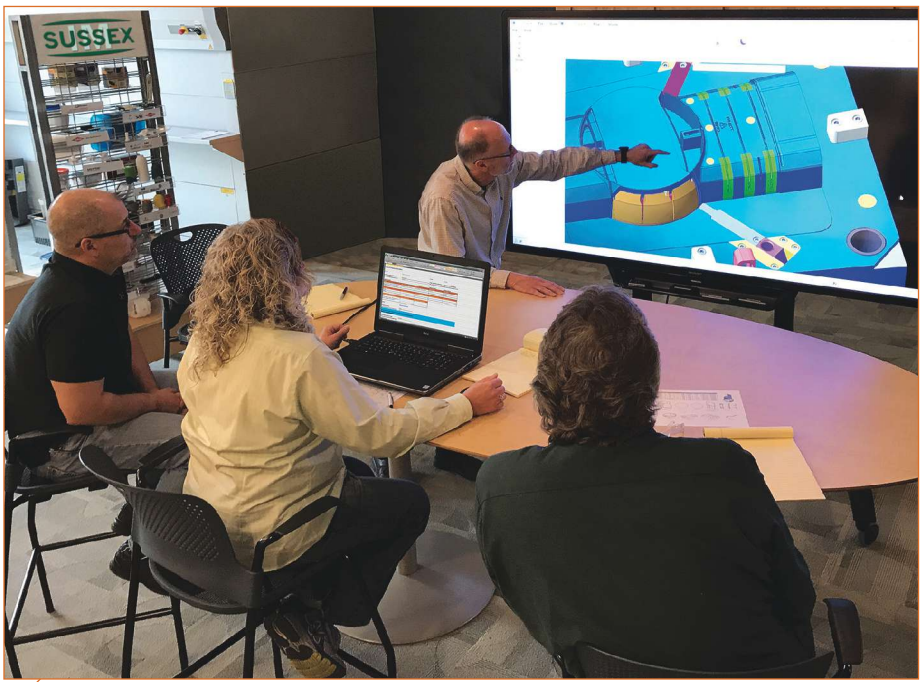
When formal RFQs and RFPs go out, months and sometimes years of OEM research and testing have preceded them. The OEM understands its market's needs and has developed, designed and tested a product to address those needs in a better or less expensive fashion than what is currently available. By accessing its roster of existing qualified suppliers and searching for appropriate new sources, the OEM seeks cost-effective manufacturing methods and any innovative techniques to apply to the new product design and part geometry.

Because the mold build is an isolated event, the tool shop has greater options for taking on projects that might be a little out of its sweet spot. For the molder, that is usually not an attractive or wise option. Custom molders must be relatively selective when it comes to pursuing molding opportunities. Much like a tool shop that has invested significant amounts of capital in machining and engineering technologies to accurately and repeatedly build specific styles of geometry, a processor invests in injection molding machines and ancillary equipment of a certain type or size range to mold accurate and repeatable parts. The molder judges the viability of a project based on identifying part geometry that is a good fit for existing production methods and, in many cases, existing equipment with open capacity.

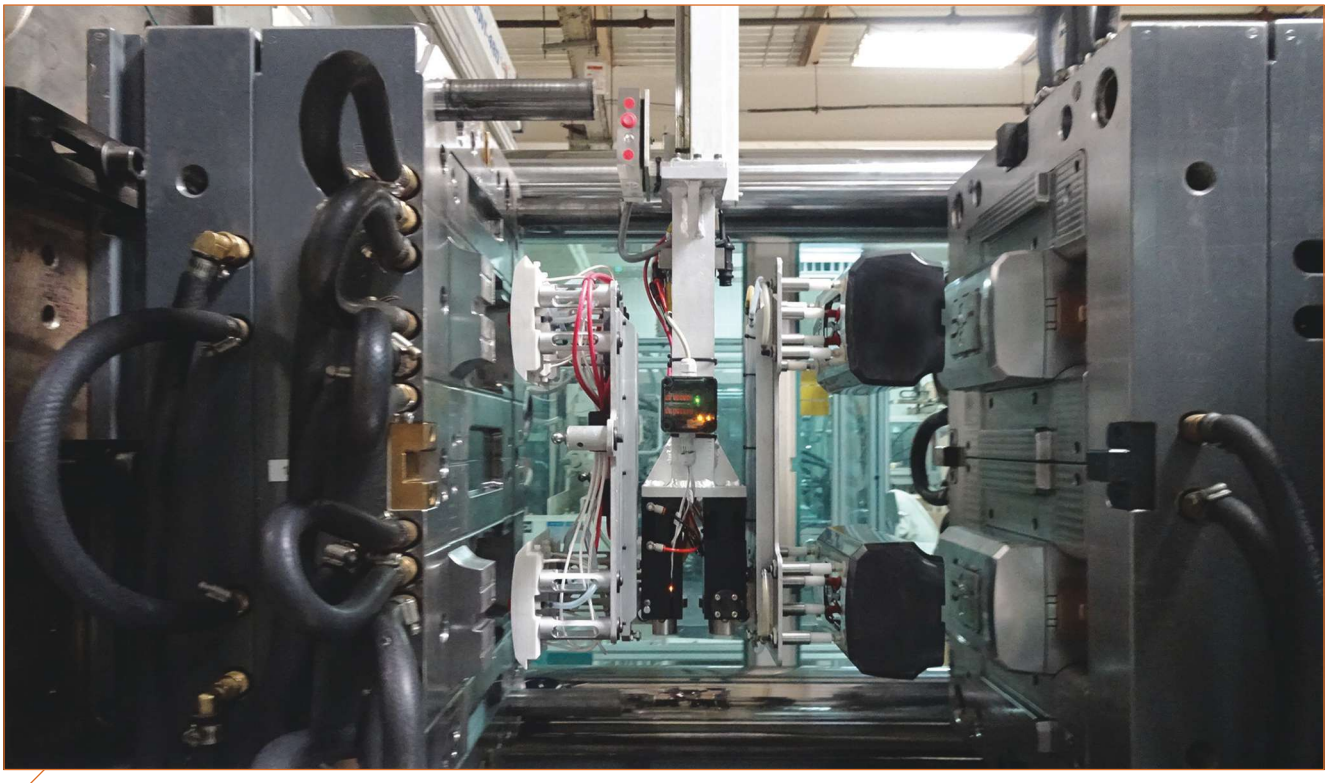
Unified Force Against Failures

Those who have a few years of experience under their belt have likely lived through a finger-pointing event. A project runs into unforeseen challenges, and the first inclination is to figure out who is at fault. For instance, the cycle time is 32 seconds but was projected at 24. Some might say it's the molder's fault because its machines or its process technicians are incompetent. Some might say it's the tool shop's fault because the cooling circuitry and steel selection are ineffective, and some might say it's the OEM's fault because its target pricing is not in line with the tooling budget and the aggressive cycle that the molder quoted. Regardless of individual opinion, all three participants are part of a potential failure, so everyone loses.

When significant money is on the table, all participants are wise to take every step as a unified force. The industrial-design phase of product development considers the features that attract and retain customers of the product. The design-for-manufacturing phase takes the industrial design and makes the required improvements for moldability. The mold-design phase creates the best tooling system based on project scope. One would think that if competent people with the best intentions orchestrated every phase, then every project would be a pain-free winner, but that is obviously not what happens.



Tooling engineers meet with project management and molding operations to review and evaluate mold design strategies. The ultimate goal is to create a cost-effective and robust mold, capable of maintaining production requirements and maintenance efficiencies.



Critical to the success of Sussex IM as a provider of in-mold decorating (IMD) technologies is the injection mold, the foundation of all successful molding operations, along with an integrated, robotic end-of-arm tooling fixture. A tooling system used as part of an IMD/in-mold labeling (IML) process is often one of tight tolerances, highly aesthetic surface finishes and some type of label control system. It is typically a vacuum, static charge or steel feature.

A Few Extra Rules of Thumb

- **Who is the "point" person from the OEM, the tool shop and the molder?** Identify the people who will act as the bottom line, the people who will answer questions and make decisions.
- **What are the qualification requirements, critical dimensions and tolerances, and why?** Identify areas of geometry that have a specific reason behind their design, whether it is one part fitting into another for assembly or parts nesting for shipment.
- **Which tolerances and design features are non-negotiable, and why?** This question facilitates the understanding of what can be done to the design to enable easier or less costly tooling, molding or downstream operations. If dimensions and tolerances have not solidified because of ongoing design tweaks, make certain that it is noted in the proposal that these costs have not been considered in the pricing (unless it is a joy to provide free PPAP Level 3 activities).
- **Are any cost drivers not addressed in the RFQ and proposal?** Make certain that special packaging and shipping needs, part identification requirements or stringent performance validations are acknowledged and discussed early on. If this is not possible, document the request and the lack of available information in an email to team leaders.

Systems Engineering Approach

Sussex IM (SIM) has a diverse portfolio of customers and a broad array of sizes and geometries. The majority of its products involve significant pre- and post-molding engagement with regard to value-added operations (like insert molding, in-mold decoration, downstream automated and manual assembly, packaging and fulfillment). This assortment of part styles, materials and purchased components mandates that it has the appropriate in-house resources to provide the best value to its customers through a comprehensive project-scope analysis.

SIM invests in personnel to enable the best tooling practices for the ultimate molding success. The technical team includes project managers, design engineers with part and tooling experience and automation engineers. It has five journeyman toolmakers on staff as part of the engineering and preventive maintenance teams. Based on the scope of the project, SIM's groups investigate geometry looking to add or enhance features to facilitate efficient part handling and orientation for downstream operations. SIM employs a best-practices approach to improve areas for product stability, consistent wall thickness, appropriate draft, improved temperature control and reduced cycle times.

The key to any successful manufacturing project, and certainly to a project with multiple processes, is collaborative communication. That means that all supply partners, as a team, start envisioning and expressing the entire manufacturing process from the perspective of production-part geometry. Every good tool shop and every good molder understands this and does this, but all relevant parties should scrutinize and consider the entire scope of the project process. This is a practical way to define systems engineering.

Project Evaluation

Although difficult to do within the frantic pace of quoting, the entire scope of a project should be defined to legitimately determine cycle times, the impact of critical dimensions, validation requirements and tooling costs. However, the real world of manufacturing is not so organized, well-scheduled or patient.

Many RFQs start a bit informally. The OEM project manager contacts a few mold-building sources, shares the initial part data and forecasted volumes and simply needs "a ballpark number." The tool shop looks over part geometry quickly and compares it to other jobs that have a few similarities. Maybe the toolmaker gets a couple of answers to the stock questions: Will the system use a hot runner? What is the cavitation? Is it better to jump the threads or auto-unscrew them? What are the surface-finish requirements? But, details are not important yet. It is likely that the project is still in the OEM's evaluation stage. All that the OEM wants is a budgetary number. In these situations, the geometry often is not frozen and the estimate is needed right away.

What happens to the part after it is ejected? Will it need to be reoriented? Which performance functions need to be validated and what is the best way to do that? In which order should the value-added steps be sequenced? Are there any part features that can be added to the geometry to make any of the downstream events more efficient? Is the multi-cavity mold laid out in the spacing and configuration that the downstream fixtures and operations can accommodate? In many cases, answers bring more questions.

This is also the best time to define and understand quality objectives. From a part performance perspective, what are the critical dimensions and tolerances? Many OEM product designers like to answer that question with, "Every dimension is critical," believing that this statement affords complete CYA protection. Making every dimension critical absolutely ensures three things: arguments, extra time and extra cost.

If the OEM requires a formal PPAP, who is paying? Did the molder or the toolmaker include PPAP in the quote? Unless it is part of the RFQ (and often it is not), not one of the three players will assume financial responsibility for the required metrology events, documentation and man-hours. When part metrology uncovers a dimension or flatness specification that cannot be corrected via altering the process, that means that a steel adjustment is necessary. The tool shop will not assume responsibility, as the tool shop built to the print. The molder will not pay, as it did not design the part or pick the resin, and the OEM does not want to pay either. That is why the OEM went to the experts and believes that the toolmaker and the molder are responsible.

Unfortunately, a clear solution to this problem does not exist. Manufacturing runs this way in every industry. OEMs get quotes from multiple sources on multiple projects and most of them never get off the ground. An OEM chooses which new products to release based on the projected return on investment, and the only way to judge feasibility is to get quotes for manufacturing costs and lead times. Project engineers and designers come up with preliminary concepts based on input from marketing and sales. The quoting process begins, so someone in an office can tell someone else in a bigger office that "tooling will be around a hundred and twenty grand and piece part should be just under a buck fifty, based on the eight sources who supplied proposals." If the numbers make sense, the project may get the green light.

Several associates working on the OEM side have indicated that the average number of projects launched versus the number of projects researched and quoted is about one in 12 to one in 16. That makes for a great deal of time studying and quoting. OEMs cannot launch every idea into a new product, and they cannot fully develop every single new product idea into a complete 3D database with detailed part prints, appropriate tolerances, flatness, surface finishes and projected shrink. They cannot define the exact scope of their project regarding cavitation, cycle time, downstream events, packaging, projected annual volumes and the life of the program. Part of the OEM's homework is engaging with the tool shop and the molder to get answers to *some* of their questions to see if it's financially worth investing more time and money to get answers to *all* of their questions.

The smartest thing a tool shop and a molder can do is be intelligent, proactive and honest. It is wise to provide answers to the RFQ that reflect best effort. Ask questions even when there is no answer. Document both the known and the unknown. Craft proposals based on the information shared and note what is not included in the quote and how eventually it will be addressed. Then again, there is a theory that quotes should be low when there is a poorly defined RFQ and then nickel and dime the customer with all the tasks that it did not define, including PPAP, metrology, sampling, steel adjustments and expedited charges. It is up to the moldmaker to decide which strategy works best for its business at the time of the quote and for the long term. MMT

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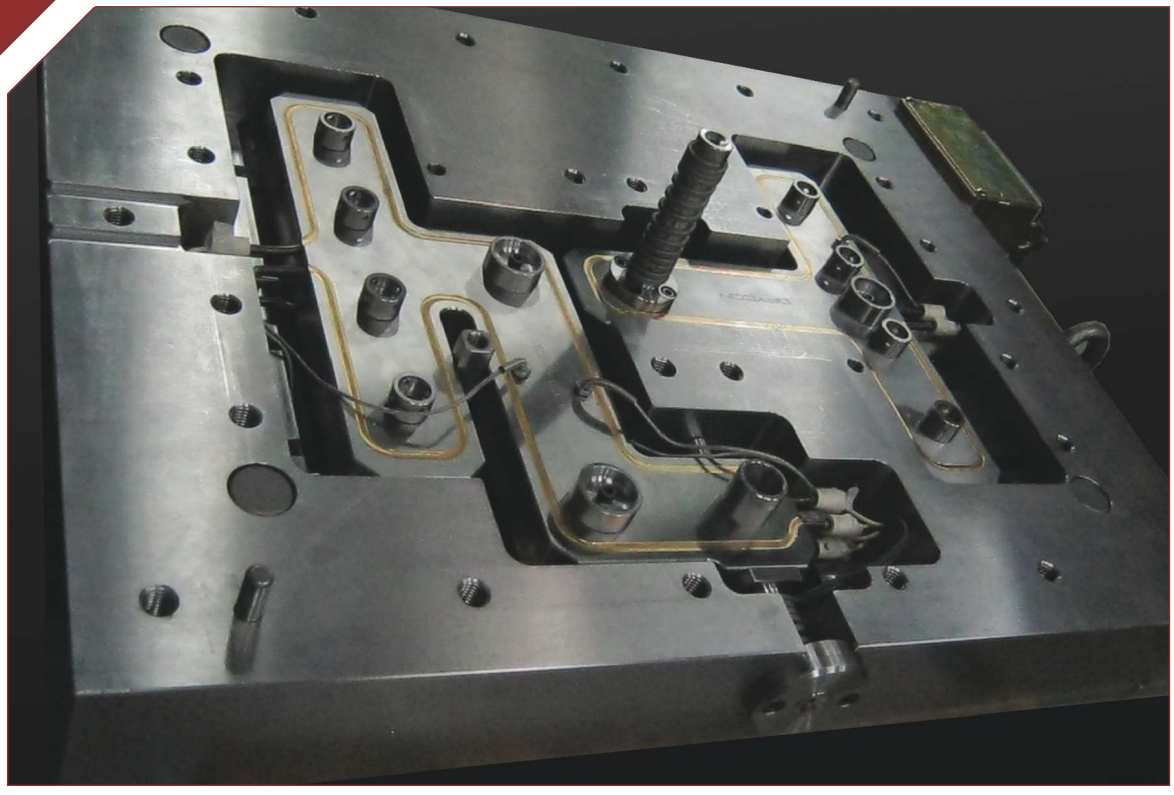
By Sal Benenati

Best Practices for Leak Prevention

A hot-runner maintenance program with purchasing, processing and preventive maintenance training will reduce the risk of leaks.

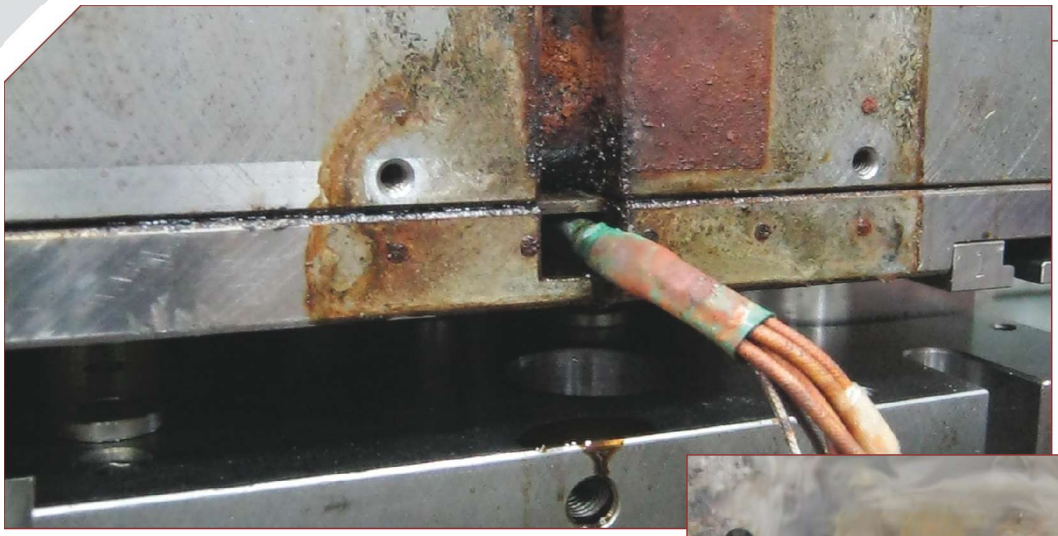


Images courtesy of Orycon Hot Runner Systems.

A hot runner is a very useful system in a mold. It helps accelerate the production of better-quality parts and enables gate placement in locations that are not possible with conventional runners. The caveat is that hot-runner manifolds need more attention and a little extra skill to run and maintain than their conventional counterparts. However, that is true with just about all technology that delivers worthwhile benefits. When we like the pros, we learn to deal with the cons.

Many things can go terribly and expensively wrong with hot-runner systems, but the worst and most common problem is leaks. Plastic, water and hydraulic-fluid leaks can wreak havoc on a hot-runner system. For example, a leaky connection in a water line can cause damage in the heaters or prevent heated components from operating at the proper temperature. A hydraulic-fluid leak from a valve-gate cylinder, actuator or fitting can short-out heaters, and on rare occasions, may even cause a mold to catch fire when the fluid

This two-material hot-runner system has the clamp plate removed to demonstrate the condition of a well-maintained hot half after several production runs.



A hydraulic cylinder operating an ejector plate in this mold leaked hydraulic oil into the manifold housing and caused a short in a nozzle heater. Notice the oil that dripped from the wire slot when the mold was placed horizontally on a bench.

This front view shows the mold after the nozzle was removed.

leaks into the manifold area. Basically, the heat turns oil into vapor, and as soon as the first heater shorts-out and sparks, it ignites, shooting flames that can reach the ceiling.

A hot-runner maintenance program is essential for avoiding these problems and ensuring optimal hot-runner mold performance. The most effective way to prevent manifold leaks and to keep systems running is a training program committed to sharing knowledge and experience.

Leak prevention must be part of the plan with hot-runner training that includes the basics of hot runners, purchasing the best-suited type, processing and preventive maintenance.

Leak prevention must be part of the plan with hot runner training that includes the basics of hot runners, purchasing, processing and preventive maintenance.

The Basics

Toolroom maintenance personnel are involved in so many complex technical systems, from presses and tooling to robots and plastics, that they don't have the time to master every area of the molding environment. Plus, they work with tight time constraints, so many take shortcuts and treat symptoms instead of determining the root cause of an issue.

Taking the time to become familiar with the basics of electrical theory goes a long way in solving problems. For example, it helps if the technician can easily determine how many watts a heater is producing, the correct wattage and the life expectancy of a heater. Learning how heaters are constructed, how thermocouples work and understanding thermodynamics and heat propagation also can be helpful.

This is all essential to preventing leaks because an electrical malfunction in the manifold system can cause overheating and overexpansion that can distort mold plates, which then can cause seals to lose compression. On the other hand, when part of the system is not hot enough, it can cause a plastic leak as the press tries to pump full shots while the runners are blocked. Faulty controllers also can cause these problems, so having controllers on a regular calibration schedule and keeping a close eye on the readings while running is also important.

Purchasing

A properly designed and built hot-runner system will improve performance and lengthen system life, so it is important to invest in the appropriate system for each mold. Mold buyers may specify the wrong system for a variety of reasons. For example, they may rely only on price considerations. On one hand, choosing a lower tooling cost can result in the most

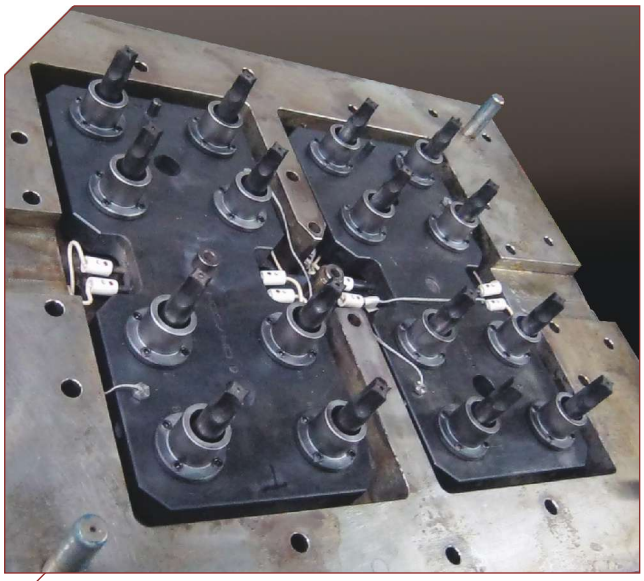
expensive purchase imaginable when downtime, repair costs and the inability to deliver the product come into play. On the other hand, choosing the most expensive system under the "you get what you pay for" theory can turn out to be disappointing too. These systems can have problems that often result in unexpected costs, lost production time and missed deliveries. Using the price tag as an indication of suitability is not the best yardstick.

One needs to consider system construction and then decide based on the design, reliability history and the application of basic technology. The technology involved is a little complex, but nothing in it is rocket science. Once it is explained, most tooling professionals will understand what makes things work and the difference between the various system options.

Processing

Hot-runner leaks can be "headed off at the pass" during processing by paying attention to seemingly minor changes in the molded parts or press behavior. If a press and the mold (including the manifold system) are functioning properly, they will repeat cycle after cycle without any changes to the original molding parameters. Short shots suddenly appearing in the middle of a run or new setups requiring more material volume than previous runs indicate that the plastic is moving to an unintended location. Often, operators will notice these changes and then make setting adjustments to continue

A well-maintained, complete, valve-gated hot half after years of production.



This is what a hybrid, hot tunnel-gate manifold system looks like after reconditioning.

producing acceptable parts. Instead, they should stop operation to lessen any damage and ease the process of returning the mold to proper operation. If the mold must be removed from the press for repairs, early leak detection will make the difference between one or two hours or days of interruption.

A few other simple actions to help extend the life of the hot-runner system include starting up the heaters with the warm-up or soft-start cycle, especially on high-humidity days; checking for water or oil leaks; running the system at the proper temperatures and lowering the setpoints of the hot runner when the press is idle.

Maintenance

Maintaining hot-runner systems can be simplified by adhering to the following rules:

- Check for any connector damage when a mold comes off a production run. This includes connector pins that may be bent or pushed into the sockets, cracked housings and deformed or broken latches.
- Check the resistance of each zone and compare to readings that are recorded prior to the last run. Resistance changes, especially when the reading is increasing, indicating impending heater failure.
- Check all thermocouples with an ohmmeter and compare readings to those taken prior to the run. A difference in readings within a few ohms is acceptable, but large variations indicate a possible loose connection or a damaged thermocouple. Please note that wire splicing in thermocouples should be done with silver soldering only, as thermocouples emit a signal of only a few millivolts, and a crimped splice will likely get oxidized at the point of contact, lose continuity or provide a false reading.

Performing these maintenance checks regularly at the end of each run will greatly reduce the risk of leaks and ease mold setup for the next run. MMT

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By Cynthia Kustush

This article is part of a series of roundtable discussions with industry suppliers addressing recent trends in moldmaking, the challenges moldmakers are experiencing and the latest solutions that are or will be available to resolve them.

Standardization and Turn-Key Solutions Drive Mold Component Innovations

Mold component suppliers continue to standardize products that speed mold building, and they are developing technology that addresses design, cooling, release and other challenges.

Moldmakers are pushing mold component suppliers to develop more turn-key solutions and value-added services to help moldmakers serve customers more effectively and to stay one step ahead of the competition. *MoldMaking Technology* asked a few components suppliers to shed light on the current trends and challenges that they are seeing in the field and provide details about what they are doing to help answer customers' needs.

Standardization Still Trending

The moldmaking industry's need for standardized components continues to grow, pressed primarily by original equipment manufacturer (OEM) requirements for globally available products. Yet, moldmakers also support the need for standards. "Designers, moldmakers and molders have been the real innovators of mold-component standardization and continue to be so," Bob Salhaney, senior product engineer at DME Company (Madison Heights, Michigan), says. "Instead of reinventing the wheel every time, they have approached DME for application reviews of components that they would like standardized and brought to market. This trend will continue for as long as human input is required."

"Our moldmaker customers continue to request more and more standards that make the design and build process as 'kit style' as possible," Glenn Starkey, president of Progressive Components (Wauconda, Illinois), says. "Recruitment of skilled workers is a challenge for mold builders, so anything that can be purchased off the shelf that optimizes the process is especially welcomed."

"Today all molds and tools are built with the use of standard mold components because it's more economical and enables a faster mold-building time," Rene Eisenring, general manager of Hasco America Inc. (Fletcher, North Carolina), says. "The biggest benefit will be the reduced downtime for maintenance and repairs down the road, and today's global manufacturing environment requires the global availability of consistent standards and quality components." Thomas Worcester, managing director of sales USA at Meusburger US Inc. (Charlotte, North Carolina), concurs, saying, "More and more moldmakers are manufacturing for clients that will potentially ship molds to another location like Mexico or Asia. The ability to support these molds as they travel throughout the world is key."

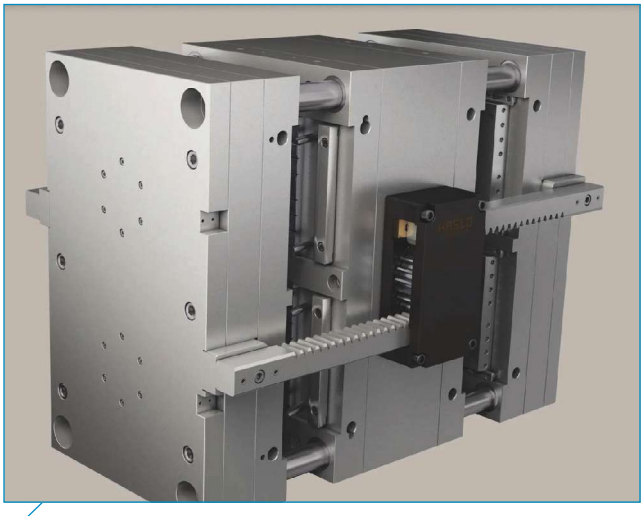

Image courtesy of Hasco America Inc.

This stack-mold system is equipped with standardized mold components, including the gear housing and rack unit. Component suppliers say that the demand for standard components continues to grow because they enable faster, more cost-effective mold building as well as easy replacement of globally available, off-the-shelf components that moldmakers need for repair or maintenance.

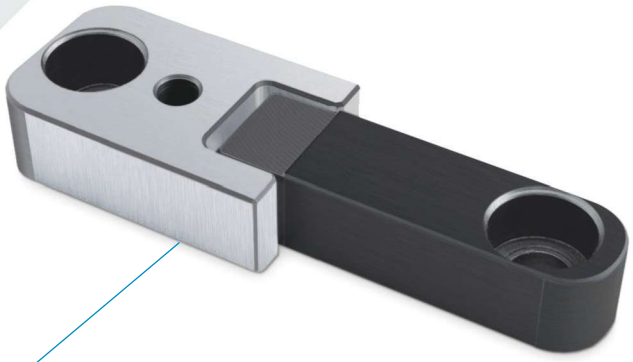

Image courtesy of Meusburger US Inc.

Components suppliers are offering more in the way of moving mold components with surface treatments that help minimize wear and extend maintenance intervals. An example is this centering unit from Meusburger, which features a diamond-like carbon (DLC) coating. Modifiable or near-standard components also are in demand by customers who want flexibility in the way that they can customize them.

A Need for Modifiable or Near-Standard Components Exists

Mike Hicks, vice president of DMS (Oldcastle, Ontario), says that technological advancements in plastic injection processes and mold machining processes is mainly what drives the development of new mold components. "Regarding injection molding, one example is variotherm technology, which is gaining ground in applications where the injected part must reach a high-gloss finish. There are several variotherm processes, the most common of which requires the circulation of fluids such as pressurized water or steam at high temperatures, thus requiring cooling mold components that are equipped with features suitable to this application, like fluorocarbon o-rings." He also mentions Mucell technology that is used frequently in the automotive industry to satisfy growing demand for light-weighting parts. "Optimizing the Mucell process requires injecting plastic at high speed, which calls for optimized mold venting capabilities, hence the need for high-performing mold venting components." He says that DMS has developed an innovative solution that can assist in resolving the most common effects of poor cavity venting. "This technology is based on a mechanical system that enables the gas to escape from a venting hole that automatically closes under the pressure of the plastic flow front," he says. "The component can be placed inside the cavity where the filling pattern produces gas traps. Thanks to the high-venting capacity, the counter pressure of the air inside the cavity is significantly reduced, enabling faster injection speed and lower injection pressure."

On the mold machining side, Hicks says that DMS recognizes that moldmakers are increasingly standardizing their processes to reduce costs and lead times. "For this reason, I foresee a growing demand for semi-finished components, which are easy to dowel and easily machined by the customer to suit his or her specific application. We are working on the standardization of lifters, focusing on the integration of the component in the production process. Our goal is to provide a semi-finished part together with special jigs that help optimize CNC operations by reducing time and costs."

Kirk Visser, regional sales manager at DME, also acknowledges the growing need for modifiable or "near-standard" components that are available ready-made. "Flexibility of standards and customization are becoming more prevalent," he says. "We are seeing more requests for mold bases that are machined complete, more hot-halves in many cases and near-standard components that have some element of customization because customers do not want to spend their time and money altering standards. They want to push this aspect down the supply chain."

Component Performance Integral to Mold Performance

Progressive Components's Glenn Starkey says that there is an increasing number of mold buyers who are asking moldmakers for a guaranteed number of cycles or years of performance. "That introduces an added liability to mold builders, and in turn, that often brings the conversation around to what the expected component life will be," he says. "Over the past few years, we have responded by ramping up testing of our components, which an independent lab performs. We not only test our products versus others, but we test several different versions of an item to get performance data for the use of various materials and treatments."

In regard to materials and treatments, both Hasco America and Meusburger US have introduced components that are coated with diamond-like carbon (DLC). DLC is said to offer low coefficients of friction and protect against corrosion. "The introduction of the DLC coating on all our moving standard components lowers the friction without the use of any lubricant," Hasco's Eisenring says. "This gives our customers many benefits, including low wear, high life expectancy, prevention of the components running dry and the elimination of any risk for contamination from lubricants, which is especially important for the medical, electronics and automotive industries." Additionally, DME plans to further expand its use of base materials and coatings that provide lubricity and reduced wear characteristics on its components, Salhaney says.

Progressive Components's Starkey adds that moldmakers and molders are also benefitting from an increased number of standard mold actions, which help make the design, build and maintenance processes more straightforward. "Otherwise, a repair technician needs to do some detective work to comprehend how each individual custom lifter or custom side action needs to be disassembled and assembled," he says. "Our engineering team has a hopper of ideas, and as we check off some, the team always adds more. At NPE2018 in May, we'll introduce not only interesting

gadgetry to further standardize mold building, but also advanced mold monitoring to ensure that tools are receiving scheduled maintenance for optimal performance."

Conformal Cooling and 3D-Printed Components Increase Offerings

DME's Bob Salhaney says that DME is looking to further assist customers by offering 3D-printed standard or custom components that can be delivered the same day or the next day. "We are rethinking what a mold is as a conveyor of plastic," he says. "Standard mold components and designer option components are an extension of the mold frame. Components will provide more than one function, like combining latch locks with guided ejection into one component. Also, 3D printing will continue to evolve in providing accurate and efficient componentry."

"From a sales standpoint, conformal cooling has been revolutionary in the way it reduces cycle times and DME has a strong commitment to the advancement of this technology," DME's Kirk Visser says. "We are always developing new products and researching the benefits they offer to moldmakers. Our goal is full thermal control." At NPE2018, DME will introduce new components tied to its conformal cooling line that will help solve challenges like hot spots in multiple areas of the resin flow path.

According to Dave Moore, business development manager for DME's conformal cooling line, DME uses advanced molding analyses to review the resin properties and the ways that heat affects the mold. DME then uses the analyses to review, in turn, the ways that the mold cooling process affects the molded part as it cools and solidifies. "This shows us how resin fills the mold, how it cools and warps and how it builds up stresses in the part from the cooling process. We determine areas that will benefit from conformal cooling (because of limitations in a conventional cooling approach) and design the necessary modifications to the tool to allow use of conformal cooling technology. We review the findings with the customer and if the decision is made to move forward, we create conformal-cooled inserts that offer much greater thermal control of troubled areas in a mold that limit the process. This is accomplished through 3D metal printing that enables us to deliver cooling in ways we never could before."

Moore says that new additive technologies have made it possible to offer a wider array of materials as well as greater sizes of printed components, and that

it also has reduced the time that is required in the printing process itself. "Better accuracy and surface finish will eventually minimize the need for post-print work," he says.

Online Tools and Simplicity Are Key

"In 2018, our customers will see many new benefits and advancements at Hasco America. We introduce, on average, 15 new standard components each year, with a focus on eliminating re-work and allowing easy and error-free installation by the moldmaker," Eisenring says. "But, we are not only improving our components, we are introducing a brand-new web portal with a powerful search tool designed to help the user build a mold base with a few clicks or find quickly what is needed in over 100,000 components." He says that the company will add more features this year for customers in North America, like the RFQ button for requesting a quote 24/7, or drop-and-quote, where customers can drop a parts list and receive a quote automatically. "The goal is to provide simplicity to our customers around the world."

Like Hasco America, DME is also investing in its Milacron-DME eStore to provide designers with tools and information that they need to address design challenges and make the most informed decision on the right components for their application. Customers can look forward to modular components that interchange with sister components and provide easy replacement. "We have also invested in equipment to make more special-order components in-house at DME," Salhaney says. He adds that DME works to ensure availability of CAD data for all products that is geometrically correct and along with that, global interchangeability of parts and knowledgeable global service.

Meusburger's Tom Worcester refers to moldmakers' approaches to building molds as the "Lego" effect because they manage a complete project from start to finish, including part approval. "This is much more than building a mold. It is also the ordering of the bases, components and hot-runner systems that make up these complete, working, manufacturing wonders: injection molds," he says. "The tendency is to purchase as much as possible in the way of components and accessories combined with fully machined mold bases. When meeting with moldmakers, I have recognized that those focused on 750-ton molds and smaller have established the most efficient way of manufacturing these types of molds. They are focusing on their engineering and manufacturing expertise of complex cores and cavities. This is all complemented by the capabilities of the new four- to five-axis machines and enables them to finish these components directly. They have the capability to do the finish work on them in conjunction with the high-speed machining of these components. These are very complex projects with very tight timelines. Everything must meet the promised deliveries that are stated by the mold base and mold components suppliers, hot-runner systems sellers and other vendor support." MMT

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By Alan Levine and Alan Zielinski

VIDEO Access the related video under the Videos tab at *MMT* online.

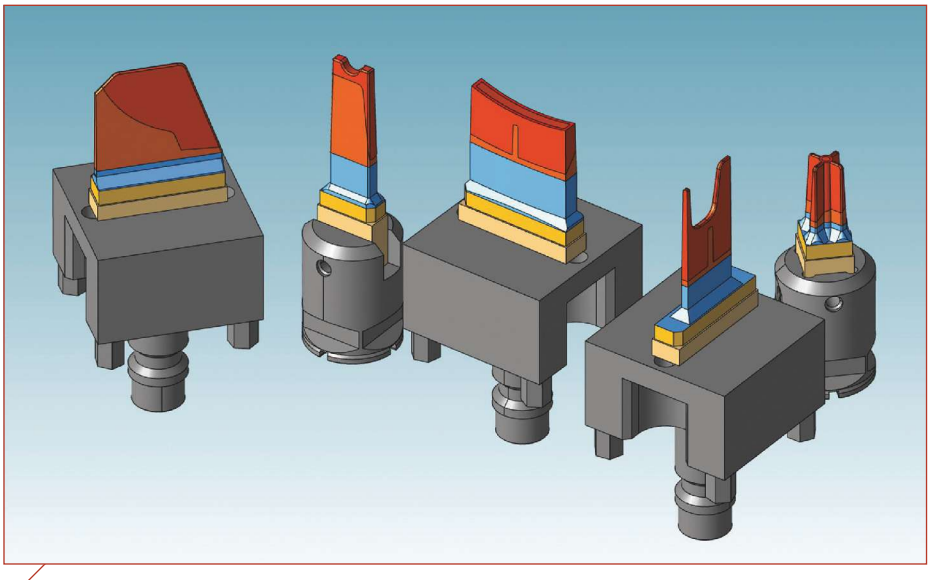
AUTOMATED ELECTRODE MANUFACTURING

Advanced CAD/CAM software with dedicated electrode design capabilities greatly reduces electrode design, modeling and manufacturing time.

More moldmakers are using contemporary five-axis CAM software today, which has greatly reduced the need for die sinking EDM requirements. But, the software has not completely eliminated the requirement for electrode design and manufacturing.

Certain geometrical features, like deep slots or small internal corner radii, are not easily milled using available software and tooling. These geometries require electrodes that are manufactured out of materials such as graphite or beryllium copper alloys, which are machined on traditional three- or five-axis machines. The electrode is electrically charged and the geometry of the electrode is burned into the core or the cavity by way of the spark, which is generated upon contact. All of this is done while the part is submerged in an oil bath that helps to conduct the electricity and flush away particles from the eroded pattern.

Historically, electrode design and manufacturing were time-consuming and counterproductive processes, requiring the designer to manually identify non-machinable areas. The surfaces comprising those areas would then need to be copied, tangentially extended to a common Z height, linearly extended for clearance and trimmed to the electrode profile. Generally, it was not until the entire electrode was designed before the programmer even got a chance to look at its manufacturing requirements.



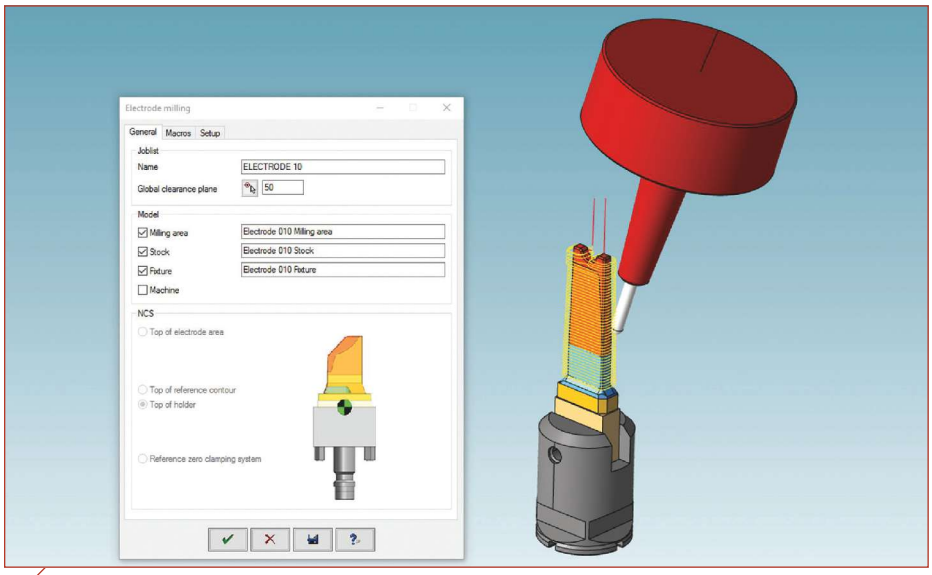
Images courtesy of Open Mind Technologies USA.

These various electrode and holder assemblies were developed using advanced CAD/CAM with dedicated electrode design capabilities.

Streamlining Electrode Design

Today, moldmakers can take advantage of advanced CAD/CAM software that includes dedicated electrode design capabilities. These capabilities greatly reduce the time required for designing, modeling and manufacturing electrodes. With these systems, one person can be responsible for both the electrode design and manufacturing, which eliminates the need to go back and forth between CAD and CAM software.

The design of advanced CAD/CAM software includes modules



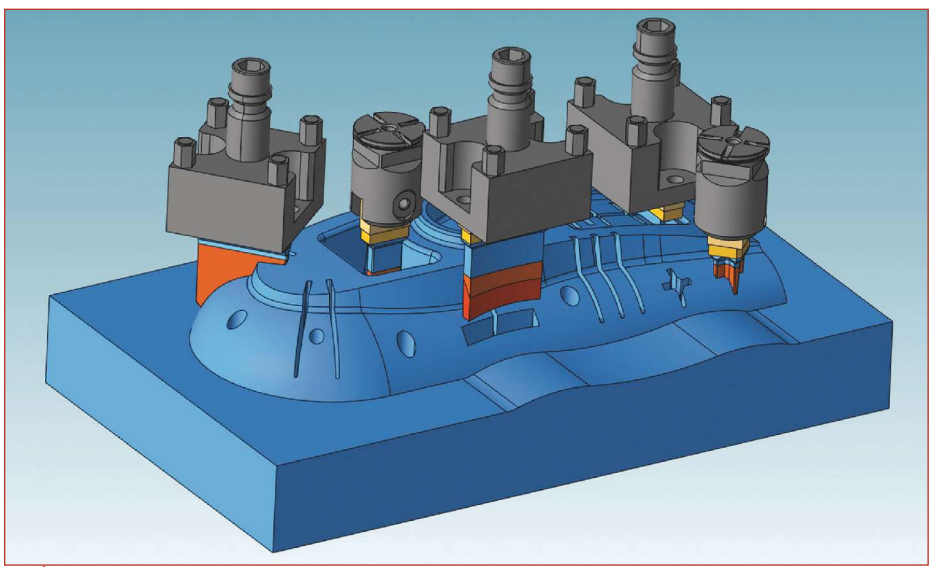
CAD-based electrode design software that is directly integrated with CAM connects this electrode to the milling process.

that were created specifically for core and cavity model analysis and the automated generation of full EDM requirements such as the electrode model and documentation. Electrode models that electrode designers and programmers generate are automatically color coded, which further eases manufacturing. Documentation is also generated, including individual electrode drawings with full manufacturing notes and assembly drawings that show every electrode with their respective X, Y and Z locations and any C rotation.

Advanced CAD also performs system analysis to isolate and identify potential electrode requirements. The CAD software analyzes the part based on an established coordinate system, and it displays the results using pre-set parameters, designating a minimum radius or minimum draft angle. A color-coded display of the core or cavity identifies areas fitting the required parameters. Some CAD systems will even create curves identifying those areas, further streamlining the manual identification of electrode requirements.

Prior to creating the electrode, the electrode designer or the programmer should ensure that the CAD system establishes a new EDM coordinate system, because the NC coordinate system for EDM work is often different than the NC coordinate system for core or cavity machining. For optimal results, the CAD system should automatically identify intelligent EDM coordinate systems, which are then established with the simple selection of a displayed point. The new coordinate system is used for machining the electrode, generating detailed drawings and posting out machine instructions to the sinker EDM machine.

Next, the electrode design user interface can be used to define electrode requirements. The interface should be intuitive and simple-to-use, following logical, easy to understand steps. Also important is using CAD software that offers an electrode section suitable for both solid and surfaced models.



These electrodes are placed safely against a part model using advanced CAD/CAM with dedicated electrode design capabilities that reduce the time required for designing, modeling and manufacturing electrodes.

The CAD system should offer several selection methods to easily include only the geometry that is necessary for electrode development, including by color, layer, two-point box selection, tangent surfaces or even by chaining the boundary of the area using the actual surface edges. The CAD system should then automatically fill any holes within the selected geometry.

Ideally, within the same interface, the electrode designer or programmer will have parameter settings to establish common electrode properties, such as the length of the

tangential and linear extensions as well as the electrode coordinate system and spark gap locations. Additionally, the software should provide an area to select the finished electrode's color scheme. The electrode designer or programmer can use the colors (erosion surfaces, tangential extensions, linear extensions and so on) at a later point for a more automated manufacturing process, because the parameters do not require adjustment for each electrode once the designer or programmer enters them.

A process that previously required hours to complete now requires only a few minutes.

Once the electrode designer or programmer selects the electrode geometry, the software creates and displays a fully developed electrode. The electrode should include the geometry that is necessary for machining the electrode, a fully modeled holder and an electrode blank, all ready to be used as a stock model for electrode manufacturing. CAD systems that are intelligent enough to select the blank and holder from a library based on a best-fit scenario are the most productive.

Documentation generation should be automatic but flexible, displaying pertinent data in the title block. Pertinent data includes items like electrode material, number of electrodes required from rough to finish, spark gap and orbit style.

Integrating CAD and CAM

CAD-based electrode design software that is directly integrated with CAM software that uses a single database, such as hyperCAD-S, eases automated electrode manufacturing. It enables full integration between the electrode model and the manufacturing process. This means that parameters such as electrode material, spark gap, blank size, positional reference (including automated C-angle orientation to minimize blank size) and automatic coloring of the various electrode components (erosion surfaces, tangential extensions, linear extensions and so on) are merged into the CAM software. At this point, the programmer can select macros that apply various toolpaths to the designed electrode. These macros, or collections of toolpaths, should identify the material being machined (based on color) and the general size of the blank and spark gap as input during electrode design. These parameters are then used to adjust the various toolpaths to achieve the desired results.

Once all electrodes are manufactured, the CAD/CAM system can export the actual machine code that is required for the operation of the sinker EDM machine. The output includes the electrode numbers and the X, Y and Z positions, including any C-rotation and machine parameter settings. This eliminates all-too-common errors that result from users entering the information manually.

A process that previously required hours to complete now requires only a few minutes. Using sophisticated electrode design and manufacturing software, the time-intensive process of electrode development and machining can be a point and click away. MMT

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By Tom Raun

VIDEO Access the related video under the Videos tab at *MMT* online.

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Solid Carbide or Indexable Cutting Tools?

Criteria like machine tool spindle power, workpiece geometry and material, CAD/CAM for CNC programming and fixturing drive rough milling cutter selection.

Most CNC milling machine operators will offer a variety of opinions on their preferred type of cutting tool for a specific application that is based strictly on past experience because it is natural to rely on strategies that have resulted in success. However, a better-educated decision can result in even better results.

For example, a common challenge across shops is the proper application and programming of solid carbide end mills for roughing applications in milling operations where an indexable cutting tool was previously used. In a nut shell, the way solid carbide is being used in a high-speed approach (high depth of cut and light width of cut) for roughing applications.

This article focuses on the factors that drive machinists to select solid carbide or indexable cutting tools. This requires a look at the criteria driving the cutting tool selection process for a given application. Examples of these factors include the machine tool's spindle power and speed capabilities, workpiece geometry and material, CAD/CAM for CNC programming and fixturing.

Machine Tool

Most milling machine tools purchased in the United States today are lighter-duty machines with CAT40 or HSK 63 spindles, which generate low horsepower and torque when they are operated at slow spindle speeds. Price is one of the main purchasing criteria for buying machines with these light-duty spindles. However, in moldmaking the trend toward finishing cores and cavities in a hardened state over producing electrodes and using EDM to complete a workpiece has driven mold shops to invest in light-duty machining centers with high-speed spindles.

Higher spindle speeds are necessary for the hard-milling process to be effective. Today, it is not uncommon to see spindles capable of running between 20–30K revolutions per

Seven- and nine-flute end mills can optimize roughing operations when machinists use them in a high-speed approach.

minute (RPM). Although many of these spindles have a fair amount of power (20–30 horsepower), many lack the horsepower and torque at slower spindle speeds and are better suited for a high-speed approach at higher (or maximum) RPM.

Advanced toolpaths benefit both indexable and solid carbide cutting tools, but it is the application of solid carbide end mills in a high-speed approach that benefits the most from these toolpath advancements.

Although it is not always possible to do so, the best-case scenario is to choose the cutting-tool diameter that peaks machine spindle power while operating within given surface-speed parameters (SFM) for a particular material. This leads to using solid carbide end mills in smaller diameters (¾ inch and smaller). Based on the trend toward lighter-duty machines with peak performance at higher RPM, many roughing operations that previously involved an indexable-type milling tool are now being performed with a solid carbide end mill.

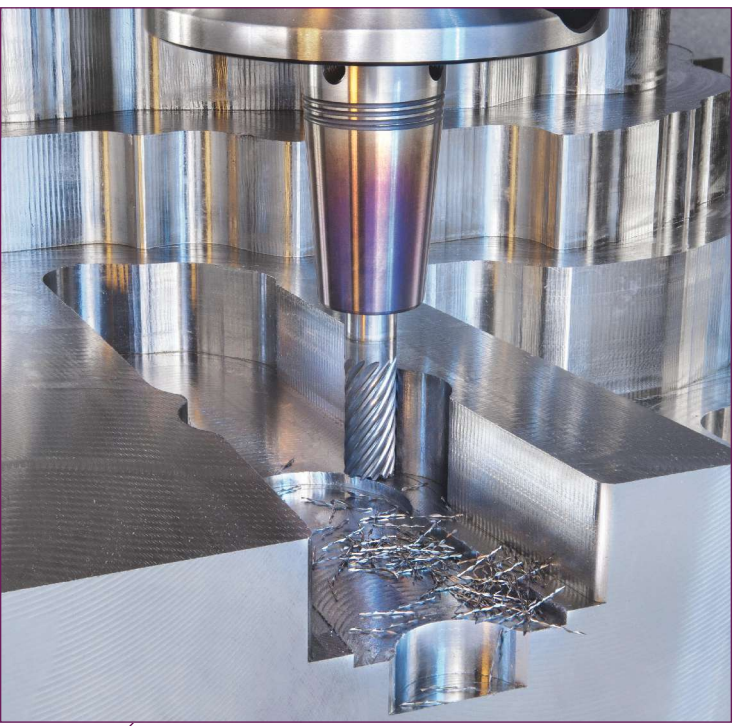
Programming

Advancements in CAM systems also are driving the selection of solid carbide cutting tools over indexable cutting tools. The ability to effectively maintain control of cutting tool engagement (or the width of cut) has provided the opportunity to optimize and maximize roughing applications, especially those involving light-duty, high-speed milling machines. These new algorithms can control the engagement of the cutting tool throughout an entire operation, no matter how complex the workpiece geometry.

Without these algorithms, catastrophic cutting tool failures would result that could damage the part or the machine spindle over time. This is especially true on a high-speed milling machine, since high-speed spindle design does not hold up well against excessive abuse.

Prior to these toolpaths, operators would often set speeds and feeds for an entire operation based on a worst-case scenario in which the cutting tool engagement changed drastically at some point in the program. This was because of the tool path algorithm's inability to control the tool based on some variation in the part geometry that the algorithm could not effectively handle. This worst-case programming sacrificed productivity for the sake of eliminating a cutting tool failure.

Advanced toolpaths benefit both indexable and solid carbide cutting tools, but it is the application of solid carbide end mills in a high-speed approach that benefits the most from these toolpath advancements. Without them, it would be virtually impossible to program the vast amount of code that occurs when using the high-speed approach, and it is now very common to see a solid carbide tool roughing a part in one axial pass (up to 6xD cutting-flute length) rather than using an indexable tool with multiple axial passes.



Multi-flute end mills can optimize rough milling applications when machinists use them in a high-speed approach.

Workpiece Geometry and Material

It goes without saying that workpiece geometry plays a major role in determining cutting tool type and size. However, workpiece geometry alone should not be the deciding factor for selecting a cutting tool diameter. For example, a given workpiece geometry may provide access for a 2.00-inch diameter cutting tool or larger. But, can a lighter-duty spindle be effective in running this cutter? Maybe not.

A very common mistake in milling is to choose a cutting tool that is too large for a given machine to effectively operate. Machinists are forced to sacrifice the effective and efficient use of carbide by limiting the depth or width of cut when choosing a cutter diameter that is too large. It is critical to match the cutting-tool diameter to the machine tool capability while staying within the limits of what the cutting tool can handle in terms of speed in a given material. Using solid carbide end mills in a high-speed approach offers more freedom when matching the cutting tool to the machine and material, especially on light-duty machines.

Another important feature is the stress or strain placed on the material during roughing. Here, machinists are reconsidering traditional roughing techniques that employ

New heads with 1.5 x D length of cut will be beneficial for optimization of the high-speed milling approach.

indexable tooling, since the high-speed approach with solid carbide tooling has proven to put less stress/warp on the workpiece.

Fixture and Part Clamping

Rigidity is the most important variable in machining. When rigidity is lacking, a high-speed approach that reduces force may be the only option for productive milling. For example, rigidity is lacking when the workpiece geometry makes it difficult to clamp the part, when holding onto a slim piece of material in a vice or when milling operations distort the workpiece with thin walls or ribs.

Of course, when faced with these circumstances, reducing the cutting tool diameter is a go-to alternative, which results in using solid carbide over indexable tooling. By design, solid carbide tooling (in variable pitch or helix

or in the sharpness of cutting edge) almost always imparts less force or stress than that of an indexable tool taking the same cut. Again, using solid carbide is a better strategy when facing less rigidity.

Milling Cutter Advancements

Most one-inch diameter and smaller cutting tools used in milling, whether indexable or solid carbide, are designed with two, three and four flutes. The design of indexable tools usually limits the addition of more flutes, since a significant area is required to create the insert pocket and chip gullet. And, solid carbide tools with two, three and four flutes are still the most common due to their versatility.

However, solid carbide and interchangeable solid carbide end mill designs are quickly evolving to optimize this high-speed milling approach. The small or light width of cut used allows the end mill's chip gullets to be smaller, which provides the opportunity to add more flutes with longer lengths of cut. For example, some tools have recently been updated with four- and seven-flute designs, which have cutting flutes twice as long as previously offered (1.5×D flute length). For solid carbide, end mills with seven- and nine-flute designs, or one flute for every 0.040 inch (or one millimeter) of diameter are also becoming more popular. For example, a ½-inch diameter multi-flute end mill will have 12 flutes and a 1.0-inch diameter end mill will have 25 flutes. These new interchangeable and solid carbide end mill designs take the high-speed approach to new extremes in terms of higher feed rates at deeper depths of cut, which gives shops a productive reason to replace an indexable tool.

Taking the machine, the material and the programming into consideration, the use of solid carbide cutting tools in a high-speed approach may offer more freedom to adapt to common machining variables and to match or surpass what has previously been done with indexable tooling. This is especially appropriate in a light-duty environment that lacks rigidity and where working at lower speeds would constrain spindle power. MMT

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By Barbara Schulz

A Look Back at 20 Years of Tool and Die Making in Europe

The European tool and moldmaking industry has moved from manual to industrial production via internationalization, digitalization, automation and communication.

Images courtesy of W. Fassnacht Werkzeug- und Formenbau.

"After the advent of CAD/CAM systems, CNC machines and digitalization 20 years ago, the tool and moldmaking industry is still in the stage of industrialization today," professor Wolfgang Boos from the German toolmaking academy (WBA), University of Aachen, Germany, says.

The 1990s were dominated by the events surrounding the Central and Eastern European countries and the disintegration of the Soviet Union. The advent of the European Union (EU) and Economic Monetary Union represented a step toward a policy of European integration, and 1995 marked the year of the EU's neutral expansion to 15 member states.

The lifting of trade restrictions in the EU meant that competition was suddenly an imminent reality for the tool, moldmaking and die-making industry. Everything was in motion, including the labor market. Now there was a large number of suppliers from the "cheap" countries that, because of the absence of security policies, were able to produce much more cost-effectively than Western European or German companies.

In 1998, almost every die-making company in Germany began to consider partnerships and alliances with companies in Eastern Europe. A significant number of tool and moldmaking operations formed, particularly in companies where toolmaking existed as an internal support division, and the work was shifted to partner companies in Poland, the Czech Republic, Slovakia and Hungary.

Twenty years ago, investors were also focused on new markets like information technology, multimedia or telecommunications. For the European tool and moldmaking industry, this period was characterized mainly by the mobile phone industry. A gold-rush mentality dominated companies that produced molds for mobile phones.

"However, for the industry, this also meant becoming more efficient," professor Thomas Seul, president of the German Tool and Moldmakers Association (VDWF), says. "We were discussing the topic of how to shorten time-to-manufacturing. Production times for tools were cut in half and copy tools (or repeat molds and tools with the shortest production times) were suddenly part of the standard tool and moldmaking repertoire."

From Manual Production to Industrial Production

However, this transition could only be achieved by automation and the advent of digitalization. During this period, the moldmaking industry was standing at the transition between manual work and industrial production. During this turbulent period, CAD/CAM and simulation were making their way into many small and medium-sized shops that dominated the industry in Germany and in Europe.

Even so, moldmakers were still operating in a very old-fashioned manner. They were very self-absorbed. The

number one explanation of a marketing strategy in the industry was, "People know me." Period. Moldmakers were still using regular mail to communicate, but the best form of communication for shop owners was the telephone. The word "data" had not yet come into existence and was a foreign concept in this industry. From a technological standpoint, some places were still in the Stone Age. Wooden models that were copy-milled following customer approval were sanded by hand and used to produce electrodes. Manual pre-milling was carried out before performing EDM.

However, by the end of the 1990s, moldmakers were increasingly using high-speed cutting (HSC) in electrode production. "Many companies were under the assumption that they could succeed completely without EDM," Matthias Schmidt, head of sales at OPS-Ingersoll in Burbach, Germany, says. (MC Machinery represents OPS-Ingersoll in the United States.) "When, in fact, HSC was being used for the production of electrodes, which started the big boom toward the transition to graphite as an electrode material. It also laid the groundwork for advanced automation. Moldmakers were using the first handling systems for single machine tools during this period."

Automation and CNC technology continued to gradually make their way into the design and planning phases of moldmaking. According to professor Boos of the WBA (Werkzeugbau Akaemie), the German toolmaking academy at the RWTH Aachen, moldmakers were successfully using the new CAD and CAM systems to significantly increase machine tool efficiency, bringing about industrial tool and moldmaking.

> The lifting of trade restrictions in the EU meant that competition was suddenly an imminent reality for the tool, mold and die-making industry.

Wolfgang Fassnacht agrees that much of what his 20-man operation produced in this period was done with conventional methods. For more than 25 years, the Swabia-based W. Fassnacht Werkzeug- und Formenbau has been providing high-quality molds to a diverse range of industries. "For many companies, integrated end-to-end CNC solutions were standard. In addition to CNC milling, all of our production was carried out using conventional machines. For us, this was a period when CNC machines were increasingly replacing conventional machines. This had an enormous impact on our investment activity."

However, despite the increasing cost pressure and higher demands for speed, precision was in the hands of the moldmaker rather than in the machine, and edge rounding and 3D contours still required manual processes.

"Today, speed and precision are achieved by using the most modern equipment and is also required by customers,"

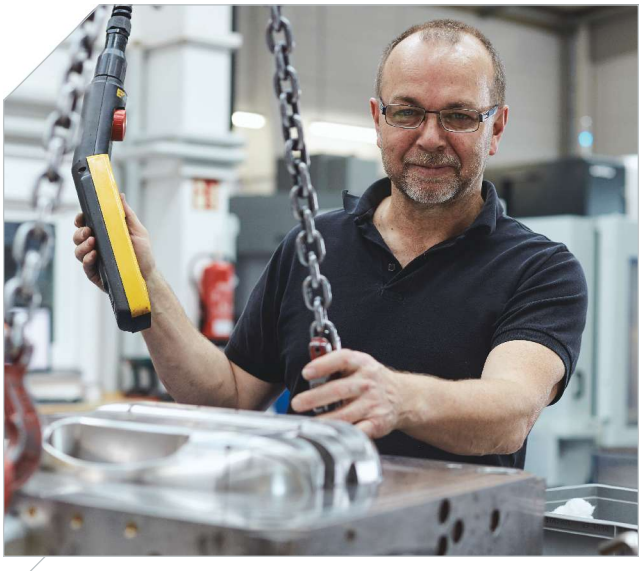
Compared to 20 years ago, molds have become much more complex and multi-component technology and special solutions are common practice," Wolfgang Fassnacht, Fassnacht Formenbau, Germany, says.

Axel Wittig of Webo Werkzeugbau, a medium-sized mold shop located in southern Germany, says. "Manual work is not looked upon favorably due to the requirements for interchangeability, so work is required to be carried out mechanically. True manual work is being reduced at an extreme rate. Competition from the Far East is currently increasing cost and competitive pressure, and we can only deal with this pressure by using innovation, process streamlining and new product ideas. The 'paint by numbers' philosophy of 20 years ago is not a legitimate survival strategy in this day and age."

Most Significant Changes

The survival strategy of today calls for internationalization, digitalization, automation and communication. Even after 20 years, the tool and moldmaking industry still finds itself in a stage of industrialization. These pressures stem from globalization, Industry 4.0 and additive manufacturing.

The mold itself, as it exists solely in the form of a service, is no longer enough to remain competitive. "Successful moldmaking businesses today not only offer their customers the most modern equipment and well-trained staff, but additional services as well," Wittig says. "These services can include all aspects of process support, including part development and design, FEM calculations, mold and molding simulation, bench tests and prototyping. The actual creation of the mold often does not occur until the very end of the process."



An important development that has taken place in the last 20 years is the transition from the moldmaker who "can do it all" to the expert tool and moldmaker. The strict division of labor, which Henry Ford already developed, means that jobs are designed for very specific tasks within mold shops today.

The markets are international, not only with respect to customer networks but also with respect to supplier networks. European suppliers and North American suppliers have had their subsidiary companies successfully established in the Far East for quite some time, accompanied by their tried-and-tested toolmakers. "Globally, and from the standpoint of tool and moldmaking technology, there are no limits. The competition is moving away from the 'me-too' product model toward specialization," Fassnacht says.

Fassnacht also says that, despite our increasingly global world, more and more customers recognize that molds and tools made by different manufacturers are not one and the same. "Compared to 20 years ago, molds have become much more demanding from a technical standpoint as well as from customer requirements. Meanwhile, multi-component technology and special solutions are common practice."

Another important development from the last 20 years is the transition from the moldmaker who "can do it all by himself" to the expert tool and moldmaker. The strict division of labor, which Henry Ford had already developed, means that jobs are designed for very specific tasks within mold shops. "The development of experts in their fields within shops is important," says Seul. "You just have to be careful that the individual manufacturing areas within your shop collaborate and work hand in hand."

Over the last 20 years, companies also have learned how to communicate with each other and exchange information. Markets have become global, and yesterday's neighboring competitors help out by sharing their experience. A national sense of community has developed and currently characterizes mold shops in Germany and Europe. However, as is the case across industries, the tool and moldmaking industry must solve the workforce dilemma as many experienced professionals retire and the search for young talent becomes more difficult. MMT

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FOR MORE INFORMATION

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OPS Ingersoll / en.ops-ingersoll.de
W. Fassnacht Werkzeug- und Formenbau / formenbau-fassnacht.de/en
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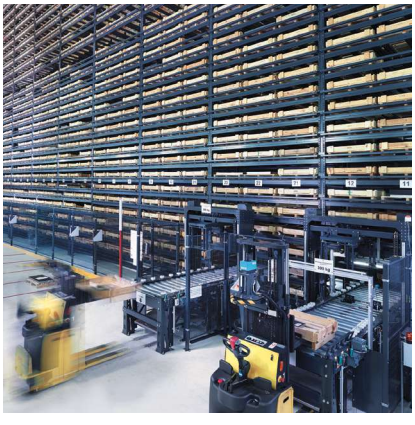

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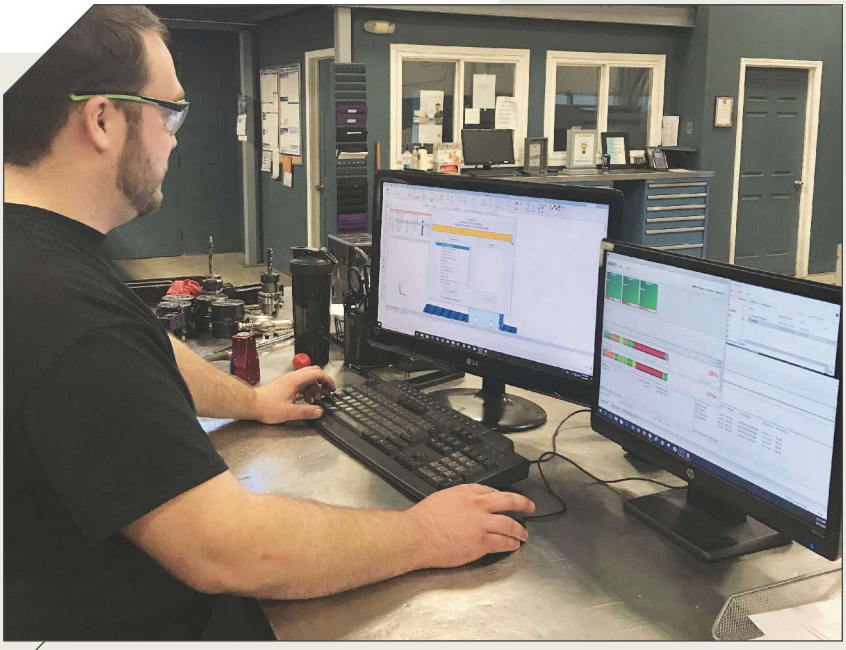


Images courtesy of TK Mold and Engineering Inc.

A machinist at TK Mold and Engineering Inc. responds to a prompt on his left-hand screen from the company's InFocus software, a machine monitoring program that R.E.R. Software Inc. created specifically for moldmaking. On the right-hand screen one can see the machining report that indicates the CNC's activity. If a machine is idle for 30 minutes or longer, InFocus requires that the machinist provide a reason, which enables a company to more effectively manage machine use and address any issues.

By Cynthia Kustush

TK Mold and Engineering Inc. (TK Mold) President Tom Barr knew something wasn't quite right with his shop's productivity levels. The company is based out of Romeo, Michigan, was established in 2003 and has 24 employees. It builds injection molds up to 1,000 tons primarily for automotive industry. Its specialties include interior and exterior trim tooling, tolerance insert molds, two-shot rotary and over-molding molds and molds for non-automotive products. "Some of our machines would be running while others were not. Some departments would be extremely busy while others were waiting for work," he says. "The problem was that I knew something was wrong, but I had no evidence to pinpoint the issue or any idea how to solve it."

That changed when he met Roger Bassous, president of R.E.R. Software, Inc. (Rochester, Michigan) at the 2017 American Mold Builders Association conference and learned about InFocus, a machine monitoring and job tracking system that is designed specifically for the moldmaking industry. By June of that year, TK Mold had purchased and installed the InFocus software. The company reports that the software helped the TK Mold team build more molds than it did in 2016 and increased sales by 24 percent, which made 2017 its best year ever.

TK MOLD AND ENGINEERING INC.

PROBLEM: The shop had machining productivity issues and lacked the data to support process, personnel and equipment improvements.

SOLUTION: R.E.R. Software program enabled the shop to track and optimize machine use and overall productivity.

RESULTS: Machines run unattended 24/7, resulting in decreased delivery times and costs and doubled sales and production.

Measurement Removes Mysteries

InFocus measures different aspects of shop-floor operations and has the ability to show individual machine and overall shop efficiencies. TK Mold initially used the software to focus on the effectiveness of its CNC and EDM departments, setting it up so that the software precisely categorizes each TK Mold machine by how long it has been running, how long programs are running (including the spindle speeds), and when a machine stops or shuts down. "Before, we tracked everything manually," Barr says. "The guys would write that a machine ran for so many hours, and if someone forgot to document something, we would do without it. We were working with inaccurate information. With InFocus, the information is super accurate because it prompts them to record reasons for machine inactivity."

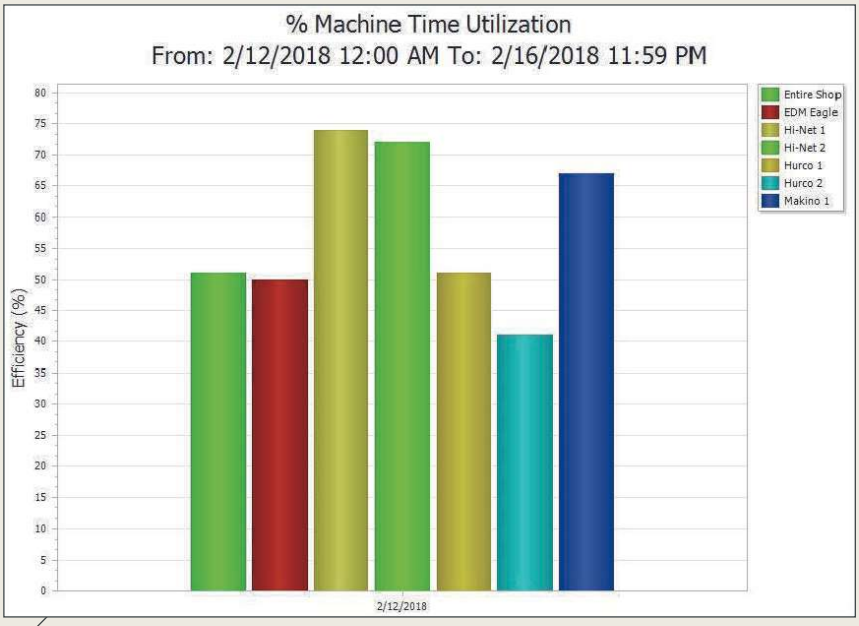
Barr says that he uses InFocus for tracking each machine in real-time to ensure that jobs are going according to plan. Meanwhile, his machinists use it to document information

about their respective machines, such as when a machine stops. “Every machine has a computer monitor connected to it, giving users access to the programming software for that machine and access to the InFocus software,” Kristie Barr-Salter, purchasing/estimating coordinator at TK Mold, says. She also is Tom’s daughter. “Roger downloaded the InFocus software on every computer that needed it, including in the office. I do not run a machine, but I can access all of the data that InFocus collects whenever I need it.” She says that InFocus already has set TK Mold’s standards for how long its machines should be running. “Machines running short programs should average 14 hours a day, and our larger machining centers, like the Makino, HiNet and Eagle that run long or multiple programs, should run practically 24/7. If that isn’t the case when we look at the InFocus reports, we know that there is a problem.”

> InFocus makes a mold shop environment think and operate like a production environment because of the kind of information the shop derives from it.

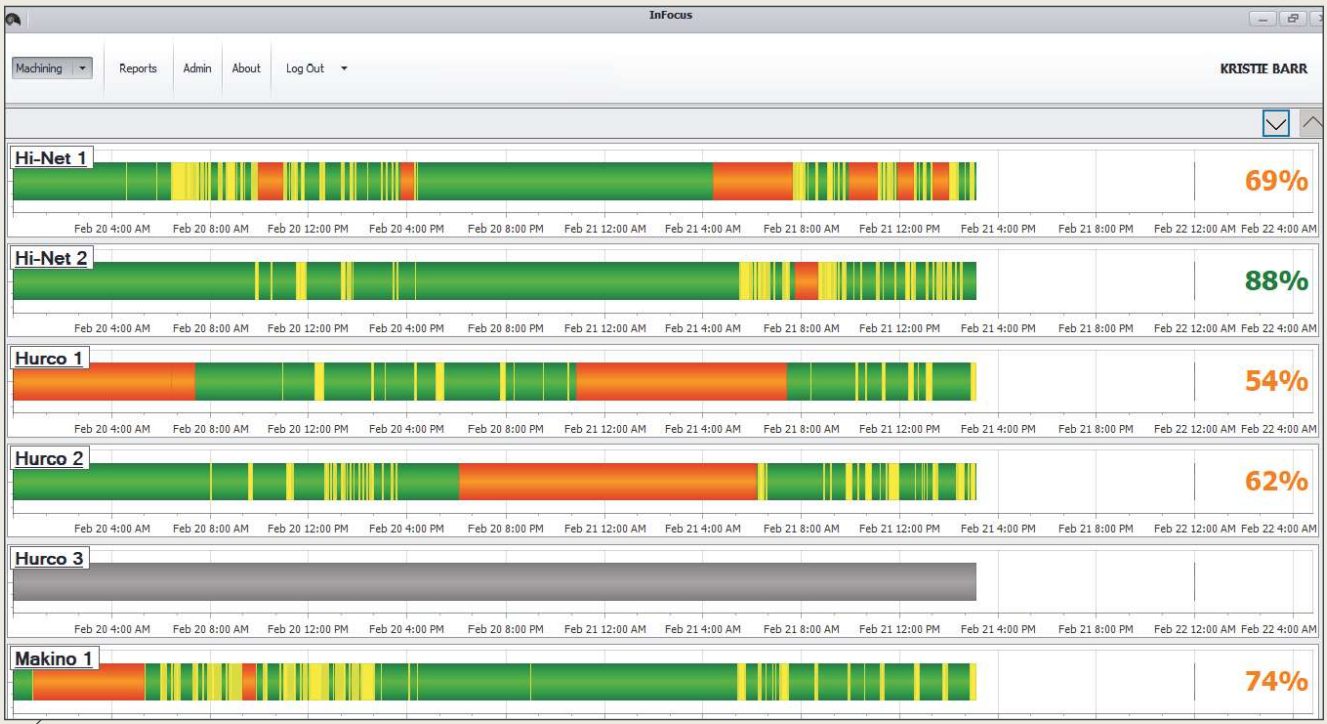
In the instance of a stopped machine, a prompt will appear on that machine’s monitor after a certain amount of time that the operator designates. The prompt requires justification for the stoppage. “We have worked with Roger to customize reasons why a machine has stopped,” Barr says. Reasons can include things like “waiting on EDM department,” “machine maintenance,” “job setup” and more. Additionally, machinists can enter a more specific reason if the drop-down choices are not descriptive enough. Either way, InFocus will not allow the machine to run again until someone logs a reason that the mold stopped. “We run a report for every work week and weekend,” he says. “By consolidating the reasons for idle times, we can measure each of them and determine the next actions. We have a reason that is called ‘shop meeting,’ for instance. It helps us know whether we’re pulling a guy away from his machine too much and how it’s affecting run times.”

Additionally, Barr says that InFocus data shows the user whether operations are continuously improving and can also reveal problems that previously were unidentified. “For example, InFocus showed that our machines were running constantly during the day, which you would expect to see since machinists are there during the day. But, it raised



InFocus can show historical data on the efficiency of each machine that the software monitors. Every week, TK Mold generates reports like the one shown here to share with each of its machinists. The report shows how well the company is using each machine in comparison to the others, plus overall shop performance. InFocus has spurred a friendly competition among machinists who want to see increasingly better reports.

questions about the need to purchase another CNC machine. It so happens that the InFocus reports also indicated that our machining programs were stopping too soon after our people went home at the end of the day," Barr says. He gathered the EDM and CNC team members and examined the data. "As a group, we came up with ways that we could fix this problem," he says. Solutions included running short programs during the day and long programs at night. "We also found that one of our machines had a malfunctioning control panel, which we replaced. R.E.R. Software created a text-messaging system that alerts the machinist that his or her machine has stopped, at which point the machinist can determine whether to start another program or wait until morning." Salter says that the company's overall shop efficiencies have increased significantly because of these actions. "From June to September, our shop's efficiency ranged between 35 percent



Machinists can look at InFocus in real time. Green means a machine is running, orange means a machine has stopped with reason logged, red signals a machine has stopped without a reason recorded and yellow means a machine stopped briefly. Shops can customize reasons for stoppages within a drop-down menu in the software.

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and 58 percent," she says. "Now, from October to January, it ranges between 45 percent and 65 percent."

"Data that InFocus collects can show where bottlenecks are occurring through the machining process," Bassous says. "Most people believe that understanding the runtime on equipment is the crucial part of machine monitoring, but we believe that understanding the idle reasons should be the driving factor behind using a machine monitoring system. It is great that the machines run 80 percent of the time, but the focus should really be on why the machines are not running 20 percent of the time."

History Hones Decision Making

In addition to tracking machine use in real time, InFocus creates a history about that use. Barr says that they now can track every machine's activities, and can generate reports dating back to June 2017, when they first installed the software. These reports have helped TK Mold make more strategic, effective decisions about its day-to-day operations and its future workforce needs.

Operationally, Barr knew in October that he would need more employees working on CNC, what with the company's growing customer base. He says it became a matter of choosing which of its seven apprentices to train and on which machine to start him or her. By looking at historical reports that the InFocus software generates, Barr was able to see which machines needed workers and tapped into the company's younger team members. "TK Mold is looking toward the future in moldmaking," he says. "Today, over half of the TK Mold population ranges between 18–26 years of age. We recently started an apprenticeship program so that TK Mold would be able to sustain itself for future generations to come." He went through InFocus reports month by month to confirm that the company would benefit from an additional machinist to run the two Hurco CNC machining centers (a VMX 24 and VMX 24 HSI) that the company uses to machine small components. The company selected and trained an apprentice for about a month until he felt comfortable running the CNC machine alone. "During the month of October 2017, InFocus recorded 623.13 unused hours on that CNC," Barr says. "By comparison, data from December shows that the machine's idle time was cut in half, down to 359.64 unused hours including hours shut down for Christmas. It proved that we made the right decision to bring an apprentice into the CNC department to help make more components."

In another instance, Barr says that TK Mold has been extremely busy, and his first instinct told him to create a night shift to keep the machines running continually. "With InFocus, we used our historical data to confirm or deny the need for the night shift. We found that we were not using one of our three EDM machines enough, so we sold it and began increasing the use of our newest EDM machine, an OPS-Ingersoll Gantry Eagle 1200, because it is much more efficient and burns faster. We were able to see when we had downtime and incorporated the extra work into that machine's schedule," he says. "InFocus makes a mold shop environment think and operate like a production environment because of the kind of information a shop derives from it."

Bassous says that InFocus is "alive" in the sense that it does not wait for a user to interact with it to know when an input of a reason for idle time is required. Instead, the software looks beyond use to help shops decipher the "why" behind a machine's idle time. This then helps shops develop a strategy to improve use rates, as TK Mold has done.

"Once users understand the reason for a machine's idle time, they can move on to automatic job tracking, another distinguishing feature of the InFocus system," he says. "On newer equipment, users can track where a job is, what is being done to it and with which tools, people and machining strategies. The software collects all of these metrics automatically. Some customers have taken the actual number of hours tracked and have directly integrated them with their existing ERP system to get accurate and reliable cost metrics for jobs."

Accessibility Eases Learning and Adapting

InFocus is very user friendly, according to Barr. "It's so easy to use. Once a user configures the way that he or she needs it, all the user has to do is hover the cursor over a machine's productivity bar to see precisely the reasons for any downtime that the software indicates for that machine."

"InFocus will generate charts automatically and makes the data clear, sparing the user from having to gather tons of data," Salter says. "All the user needs to do is log into the program daily or weekly—whenever he or she wants to check on the shop's progress. Customers love it, because they know there is a credible way of tracking their tool, and they are reassured that we know what is happening with every job."

Overall, Barr says that InFocus has made a real, positive impact on TK Mold. "InFocus has given us consistent proof of what needs to be done and the reassurance that our decisions are working," he says. "We proudly display the InFocus monitor screen on the shop floor for all to see. The employees like to watch their progress during the day and are satisfied when they see a full green bar. Surprisingly, the departments like to compete with one another to see who has the best productivity percentage at the end of the day." MMT

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Look How Far **Mold Repair Has Come**

By Steve Johnson

Those were the days. We smoked at our milling machines and safety glasses were optional. We had ample repair technicians, and there was plenty of overtime to go around. Music blasted from multiple radios and snack-covered benches. Journeyman toolmakers would migrate from shop to shop on a whim or for another 50 cents an hour, and apprentices started by manning mops and brooms. The job was simple: repair your mold, get it back in the press, and do not screw up anything. How we chose to get things done and to provide supporting documentation, if any, was a personal choice. The job description did not include long-term mold performance or shop-efficiency goals. We operated by a "just fix it" mentality.

Now and Then

Much has changed in the 20 years since *MoldMaking Technology's* inception. In honor of the 20-year anniversary, Editorial Director Christina Fuges asked me to compare repair shops of today with those from two decades ago. Like most things in the plastics industry, technological advancements have improved the way that businesses set up and run mold repair shops, but the changes are dramatic in some areas and not so much in others. A few shops still cling to comfortable past practices that outdated maintenance cultures sustain and that remain unchallenged through time. Stepping into these shops is a throwback—where only the air is cleaner.

To appropriately examine these changes, we must first categorize the different areas of mold shops and how they function. Readers who are familiar with my past articles and our training courses know that the five factors of total mold control dictate the growth and improvement of all mold repair shops, regardless of the type of plastic product that a shop's molds make. Those factors are leadership, maintenance strategy, documentation practices, shop design and shop skills.

Leadership

Today, those who oversee mold maintenance are facing new, more difficult challenges. Molds are getting more complex through technological advances in mold design and mold building. Product and part designers want to do more with molds than just mold parts. They want in-mold assembly, in-mold labeling, two- and three-shot over-molding and higher cavitation. Everybody wants their molds to run faster and longer, to mold higher quality parts and to require less maintenance. Hot runner manifold systems that require higher skill levels in both the processing and maintenance departments are replacing cold runners.

Along with new mold design requirements, new engineered resins, additives and colorants are constantly introduced to the market. These advancements make products last longer, look better and fit better. Occasionally, these advancements facilitate the development of products that are biodegradable and that are environmentally safer than previous models.

To address these new product and volume requirements, shops are building molds better. Improvements such as thermography, mold flow analysis, pressure sensors, conformal cooling, steels and coatings are all great developments that help molds perform better and last longer, but not without a cost. These improvements, in addition to a plethora of new CNC metal working equipment, lasers, engravers and tricked-out tooling components, jack up the cost of molds, making efficient and accurate maintenance even more critical.

Leadership today must continue improving the ability to track and recognize the performance characteristics and

Images courtesy of MoldTrax.

Toolrooms used to be disorganized and dirty, making for unproductive maintenance and repair. Because shops place a stronger focus on maintenance, toolrooms are better streamlined and organized today.

maintenance requirements of every mold run. Effective tracking creates more accurate and timely maintenance plans that, in addition to the appropriate training, will empower repair technicians and raise shop skill levels to meet these demands.

Maintenance Strategy

Twenty years ago, the predominate strategy was to assign a mold to an experienced maintenance technician (usually a toolmaker) in which the technician would review a few hand-scribbled notes concerning what repairs the mold needed. These experienced technicians would make the necessary repairs and clean the mold using hand-me-down practices and bench techniques. This is the essence of firefighting, and unfortunately, it is a culture in many shops that persists.

Today, forward-thinking, pro-active shops track every mold's performance and maintenance requirements to create maintenance or project management (PM) plans that address what needs to be fixed. These shops also track target-specific, high-cost or product-based issues over time (in cycles) to set goals and make continuous improvements to mold performance and shop-maintenance efficiency. This pro-active strategy (called RCM or Reliability Centered Maintenance) uses the data from the ongoing tracking to justify costs and to drive and sell improvements in all five factors to a company's upper management.

The barrier that keeps more shops from operating with a measurable, pro-active strategy is directly related to shops' inability to capture the true costs of mold performance and maintenance. True cost metrics are necessary to quantify and validate changes and improvements in each of the five factors that in turn control one's ability to efficiently produce quality parts on time. A reactive, firefighting culture prevails 20 years later.

Documentation Practices

The predominate reason for that barrier involves documentation procedures. Twenty years ago, there were fewer off-the-shelf work order systems. Record-keeping consisted of manual entries in log books and repair tickets. No shortage of electronic options exist today. Vintage work order systems have been replaced and supercharged through world-wide connectivity, cloud-based storage, corporate-sized enterprise resource planning (ERP) systems and even phone apps. These innovations were designed to improve the information gathering and usage that shops need to initiate real, measurable changes.

Because most systems are used to track maintenance on anything mechanical (for example, on things like fork trucks, presses and electric motors), the majority still rely on free-form text fields containing maintenance stories for managers and technicians to use. This means that the accuracy and completeness of the data collected is entirely dependent on the journalistic and grammatical skills of the user. In my experience, unstructured maintenance stories remain the number one reason that mold repair shops remain mired in firefighting cultures.

Improvement will only be driven as far forward as data allows. In today's lean companies, the owners, plant managers, tooling engineers, managers and maintenance technicians increasingly need data that is accurate, fast and clean to be of value. It just makes economic sense to drive improvements that are based on real costs. Once shops are placing greater attention on lowering maintenance costs, unsupported opinions will do little to justify more capital for resources, tools and training. Saving money is a language that everyone understands.

Shop Design

Twenty years ago, we could chew tobacco, smoke and snack while we worked. Safety glasses and other personal protective equipment (PPE) were optional. Tool chests for moldmakers even came equipped with a mirror and a set of tweezers to pick steel chips from blistered eyes. HR (for Human Resources) meant Home Run. Only the most stringent medical companies required hairnets, coats and footsies in the repair shop.

Twenty years ago, repair technicians cleaned by hand using solvents and an array of bottle brushes, Scotchbrite, sandpaper, stones and files. Airlines, water hoses and electric cords provided ample tripping hazards while working. Technicians flipped molds precariously by hand or with the aid of a single overhead hoist. Plastic smoldered from overheated hot-runner systems that hung in the air. Cleaning solvents came with warnings not to inhale the vapors or to touch with skin during prolonged use. It's a wonder any of us lived through those times!

In those days, maintenance areas were typically cramped, dark, dreary and greasy places that were stuffed back in to the corner of a warehouse where few ventured unless it was necessary. Shops gave little consideration to planning for future growth, and shops gave little thought to their mold workflow, the strategic placement of machines and metalworking equipment or to the ergonomics of working on molds with hand tools at a bench.

Today, many shops are much improved when it comes to safety and health concerns. Repair technicians run and repair molds for medical and consumer goods in clean-room environments as the FDA and other regulatory boards mandate. However, other areas of shop design still vary greatly. The culture of the company and the ability to justify the cost of new tools, equipment or a general shop overhaul dictate these other areas. Those that can enjoy ergonomically built, better-equipped and strategically located work benches, improved lighting and the use of cleaning technologies like ultrasonics, dry ice, laser cleaning and plastic media blasting. For those companies, floors are tiled instead of epoxied over cement, and walls are made with fiberglass-reinforced plastic (FRP) or PVC instead of drywall. In some cases, there are no walls. At these

shops, PPE equipment is abundant and dispersed from vending machines, like tooling components or crib items.

More managers today understand that shops must be set up for success to inspire. Or, shops must be set up to require that technicians achieve the skill level that is necessary to competently address the more difficult mold repair challenges of the present.

Shop Skills

Twenty years ago, most repair technicians were journeyman toolmakers. Skills like welding, brazing, machining, polishing, fitting and fabricating close-tolerance tooling were abundant. If an item wasn't needed quickly, there was little that the toolmaker couldn't do. Shops drafted most of the repair technicians, as the majority of workers preferred to build molds instead of clean and repair them. Therefore, shop cultures were much better suited for implementing unique, short-term fixes than for troubleshooting mold or part issues to find root causes and implement long-term repairs. Shops rarely questioned individual methods, as that might lead to a sudden departure, and so the label "prima-donna" was born.

As the baby boomers retired, the industry suffered a shortage of skilled technicians to replace them. To address this problem, many companies were forced to hire less-skilled employees to basically clean molds and perform minor PMs, leaving the more complex or difficult work for local machine shops or for the mold builder to make repairs. This has created a new breed of specialized repair technicians who have fewer bench and machine skills and who mostly just clean. This has led to an increased cost for repairs, more part-quality issues, mold downtime and the inability to react quickly to mold performance issues in-house. But, there is hope.

Today, shops do a better job challenging younger technicians who enjoy the troubleshooting aspect of mold maintenance more than in other generations. They do not just blindly accept the past repair practices of baby boomers. They are savvier with PCs, and they are quite comfortable navigating the web to learn about molds and new technology that is used to design, build and maintain them. The younger crowd also more readily accepts and embraces that data is a valuable tool. We see a growing commitment to developing a mold's knowledge base that makes it exciting to train and work with younger technicians who are open to new ideas and who are quick to check the history of molds to make more informed maintenance decisions.

The challenge is that many over the past 20 years have not developed hand skills and tool knowledge through hobbies like repairing cars, motorcycles, lawnmowers or other mechanical equipment. The "feel" or ability to read resistance, associated with using hand tools correctly and safely, might not be present initially, but it is something that new technicians can learn once training professionals explain and physically demonstrate the basics of a tool. Companies need to continue training and grooming these new, hungry apprentices into capable and skilled craftspeople.

All in all, the main differences between mold repair shops today and 20 years ago are evident in a company's ability to break down, measure and apply specific data in the five factors of total mold control. Huge improvements have been made on the safety and technology fronts, but the firefighting maintenance culture of 20 years ago has deep roots. New technology in mold design, building and processing will continue to challenge repair shops and maintenance professionals, and how they address these challenges will be what differentiates today's shops from those 20 years from now. MMT

CONTRIBUTOR

Steve Johnson is president of MoldTrax Maintenance Solutions, which provides specialized course work, hands-on bench training, maintenance software, maintenance products, toolroom design and maintenance efficiency auditing.

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Taxation of Mold Builders: 1998 vs. 2018

Michael J. Devereux II, CPA, CMP

As *MoldMaking Technology* celebrates 20 years in print, it looks back on the changes in tax laws that affect mold shops. A comparison between the tax laws that were on the books in 1998 and the tax laws in effect today reveal that most of the changes have been beneficial.

Tax Rates and Alternative Minimum Tax

Overall, tax rates have gone down. In 1998, corporate tax rates were graduated, topping out at 35 percent. The Tax Cuts and Jobs Act of 2017 (TCJA) recently changed the corporate tax rate, lowering it to 21 percent.

Individual tax rates have decreased as well. Many mold shops are organized and taxed as partnerships, S corporations or sole proprietorships. These companies pass through the income to the owners, who pay the income tax based on their share of the income, deductions and credits. In 1998, the top individual rate was 39.6 percent and applied to taxable income exceeding $278,450 for both married couples filing a joint return and single individuals.

The top individual rate dipped in the early 2000s, but the top rate crept back up to 39.6 percent until Congress passed the TCJA in December 2017. The TCJA lowered the top individual tax rate to 37 percent and applied to taxable income exceeding $600,000 of married couples filing a joint return and $500,000 for single taxpayers.

Mold builders' most used tax incentive (R&D Tax Credit) has changed significantly in the last 20 years, and those changes have been almost entirely favorable for mold shops.

The R&D Tax Credit

Mold builders' most used tax incentive has changed significantly in the last 20 years, and those changes have been almost entirely favorable for mold shops. In fact, very few mold shops were claiming the R&D credit in 1998 compared to today. In 2015, the AMBA conducted a non-scientific survey reporting that 46 percent of members participating were claiming the R&D tax credit. This percentage has surely increased with the elimination of the Alternative Minimum Tax (AMT) hurdle for shops under $50 million in sales.

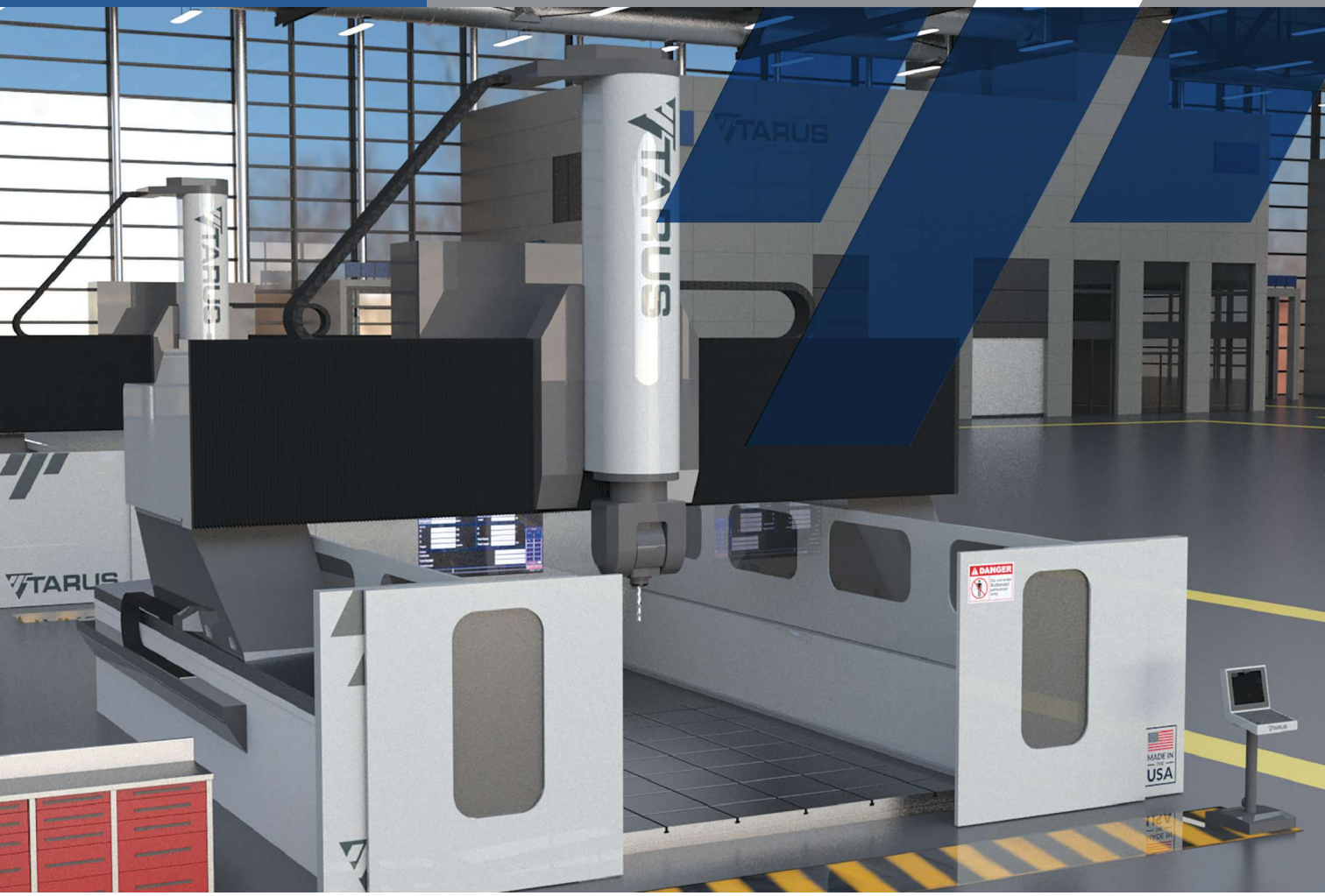
In 1998, new treasury regulations introduced the "discovery test" as a means of defining qualified research. This onerous test meant that mold shops had to be expanding, exceeding or refining the knowledge of a skilled professional in their field. Wow, what a standard! Many companies that claimed the credit in the late 1990s had to either obtain a patent or show how they were a pioneer, doing things that their peers were not.

This is not so today. Proposed regulations that were proposed in December 2001 eliminated the discovery test. The regulations added the elimination of design uncertainty as a qualifying activity, paving the way for most mold builders to claim the credit.

In December 2006, Congress introduced the Alternative Simplified Credit (ASC), which provided taxpayers with a simplified method of computing their Credit for Increasing Research Activities. Prior to the introduction of the ASC, taxpayers that were performing research from 1984–1988 had to document qualified expenditures from that period to claim the credit. By introducing the ASC eased the documentation for many mold shops, because the ASC only requires shops to document their research expenditures for the prior three tax years.

In 2014, the U.S. Treasury finalized regulations that allowed companies to include the cost of their prototypes and pilot models as eligible expenditures, regardless of whether the resulting prototype or pilot model was sold to a customer or used in the mold shop's business. With this change, tool shops can now claim the cost of labor and materials paid or incurred up to the elimination of design uncertainty.

In 2015, the Protecting Americans from Tax Hikes Act (PATH Act) made the R&D tax credit permanent, thereby removing the annual or biennial act of renewing the credit, often retroactively. As noted above, the PATH Act also allows for eligible small businesses (those with less than $50 million in gross receipts) to offset the AMT.



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In 2017, the TCJA indirectly increased the amount of the credit. Now, taxpayers claiming the R&D tax credit must either reduce their expenditures by the amount of the credit or elect a reduced credit that is equal to the gross credit multiplied by the inverse of the top corporate tax rate. Therefore, taxpayers claiming a $100,000 gross credit who elect the reduced credit will now receive a $79,000 credit [$100,000 x (100% - 21%)] rather than a $65,000 credit [$100,000 x (100% - 35%)].

It's not all good news with respect to mold shops' research activities, however. The TCJA introduced a new provision that will require taxpayers to capitalize their research expenditures and amortize them over a five-year period. This provision becomes effective in 2022 unless Congress changes the law before then.

Capital Expenditures

The last 20 years have seen a drastic improvement in the way that mold shops account for the tax treatment of their buildings and equipment. In 1998, bonus depreciation did not exist. The Job Creation and Worker Assistance Act of 2002 originally enacted bonus depreciation, enabling a 30-percent bonus depreciation for property that is placed in service on 9/11/2001 and for three years thereafter. Since then, bonus depreciation has been a main-stay of the Internal Revenue Code, with bonus depreciation percentages ranging from 30-100 percent. Under today's law, taxpayers are allowed 100-percent bonus depreciation on eligible assets that are placed in service after September 27, 2017 and before January 1, 2023, with the bonus depreciation scheduled to phase-down beginning in tax year 2023.

Section 179, the election to expense certain depreciable business assets, has also changed drastically since 1998. Section 179 allows mold shops to write off certain assets, such as equipment, in the year that the asset is placed in service, up to a specified limit. In 1998, this expensing limit was $18,500, with the benefit being phased-out once the mold shop places over $200,000 of eligible property in service.

Thanks to the TCJA passed in December, however, the Section 179 limit has increased to $1,000,000 and begins to phase-out once a mold shop places over $2,500,000 of eligible assets in service.

Moreover, taxpayers won a significant victory in the summer of 1997 with respect to how they account for their capital purchases in Hospital Corp. of America, et al v. Commissioner. This landmark case allows for taxpayers to segregate the costs of real and personal property. Therefore, 1998 saw a number of taxpayers analyzing their buildings and assets to determine which assets could be segregated into shorter depreciable lives. Cost-segregation studies are still alive and well today, and many mold shops use these studies as support to accelerate their depreciation deductions.

Personal Goodwill

In 1998, personal goodwill was a relatively new concept. It marked the year of Martin Ice Cream v. the Commissioner, the landmark case that acknowledged the existence and accounting treatment of personal goodwill. The concept of personal goodwill drastically changed how C Corporations and some S Corporations treated the sale of their assets. The concept still applies today, with additional court cases supporting the concept.

Export Incentives

Today, many mold shops rely upon an Interest Charge – Domestic International Sales Corporation (IC-DISC) to reduce the income tax liabilities that are associated with their export income on property manufactured in the United States. While the IC-DISC was available in 1998, the ordinary income tax rates and the qualified dividend rates were the same. Therefore, the incentive was not as beneficial because the tax savings were temporary, unlike the permanent tax savings the IC-DISC may generate in today's environment. While the lower tax rates of the TCJA reduced its benefit, permanent tax savings are still available to those that qualify.

This new deduction may help mold shops reduce the overall income tax liabilities that are associated with their exports.

Further, the TCJA introduced a code section that essentially creates a new, lower tax rate on income derived from foreign markets. This new deduction may help mold shops reduce the overall income tax liabilities that are associated with their exports. While this benefit has flown under the radar, guidance is forthcoming from the U.S. Treasury to help explain it.

The Bottom Line

So, what is the bottom line? The tax laws are much more favorable for mold shops today than they were 20 years ago. While tax reform was a significant windfall for most mold shops, the tax law has become incrementally more favorable over the last two decades. MMT

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News & Reviews from **Industry Organizations**

American Mold Builders Association (AMBA)

The AMBA Annual Conference held in Grand Rapids, Michigan, was the first significant event of 2018 geared solely toward moldmaking. It was two full days of making connections and focusing on leadership. Energizing presentations from peers and keynote speakers provided relevant insights that may trigger a significant change in a shop's company culture or management style.

Breakout sessions, lunch-and-learn presentations and keynote speakers all provided an array of opportunities to learn new ways of managing one's business through setting goals, implementing new or better processes and bringing employees together as a team with a single purpose. For example, keynote speaker David Horsager, MA, CSP, CPAE, is the CEO of Trust Edge Leadership Institute. He says that the number one reason for someone to want to work for an organization is trusted leadership. Trust is "a confident belief in an individual or organization," he says. "A lack of trust is your biggest expense." He also told attendees that gratitude is the most "magnetic trait" that a person can possess.

Breakout sessions and panel and peer-group discussions were valued parts of the program. For example, peer-to-peer exchanges were broken out into leaders and top management, operations and processing, human resources, sales and marketing and finance, ERP and IT professionals. Breakout sessions covered the overall health of the moldmaking industry, ownership transition, collaboration, making buying decisions and metal 3D printing. They were moderated by industry executives and experts with panel discussions, data sharing, cross talk and question-and-answer time. Mold Builders Connect offered yet another way to share and learn through open discussions on hard milling, training, employee engagement and scheduling.

A highlight of the program was *MoldMaking Technology*'s Editorial Director Christina Fuges providing an overview of its annual Leadtime Leader Awards (LLA) Competition, encouraging attendees to enter their companies for 2019 (its 2018 Leadtime Leader will be announced at amerimold in June!). Then, representatives from previous LLA shops shared their experiences and the benefits of winning.

The AMBA will exhibit at NPE2018 in booth S33058. Stop by to learn more about membership or visit amba.org for more information.

The Mold Technologies Division of The Society of Plastics Engineers (SPEMTD)

This group strives "to be the leading industry resource for technical information to advance plastics mold engineering technologies, while fostering industry growth, education and leadership." With that mission in mind, SPE MTD offers educational grants to support the next generation of mold builders.

The Mold Technologies Division of the Society of Plastics Engineers is looking for qualified vocational technical programs within high school or college settings that are interested in applying for one of three annual $2,500 grants for the 2017/2018 school year. Eligible programs will have curriculums that benefit and produce skilled employee candidates for careers in the plastics industry, particularly in mold manufacturing and related areas.

Simply email gosborn@synventive.com for a grant request form and, if accepted, your program will benefit from extra funds to benefit your students' learning experience. Together, we can help many of your students work toward a brighter future in the plastics industry.

The Mold Technologies Division also will exhibit at NPE2018 in booth WL10. Stop by to learn more about the Mold Technologies Division or to sign up for membership.

For more information, visit mtd.4spe.org or contact Division Secretary Christina Fuges at cfuges@gardnerweb.com or Division Councilor Cyndi Kustush at ckustush@gardnerweb.com.

Canadian Association of Mold Makers (CAMM)

CAMM is a Canadian national association that represents moldmakers, service providers and suppliers to the global moldmaking industry. An 18-member board of directors and industry-leading advisors provide the focus and direction for the organization. New board members are elected annually by the membership. Its main objective is to promote the moldmaking industry locally, nationally and internationally as well as provide representation on behalf of the industry to federal and provincial governments. CAMM negotiated an agreement with the Automotive Parts Manufacturers Association (APMA) in 2015 whereby members of CAMM are also full members of APMA and vice-versa. This partnership enables its members to participate in committees, trade missions, supplier days, conferences, dinner meetings and lunch and learn sessions.

CAMM will exhibit at NPE2018 in booth S30000. Stop by to learn more about membership or visit camm.ca to view its informational video. MMT

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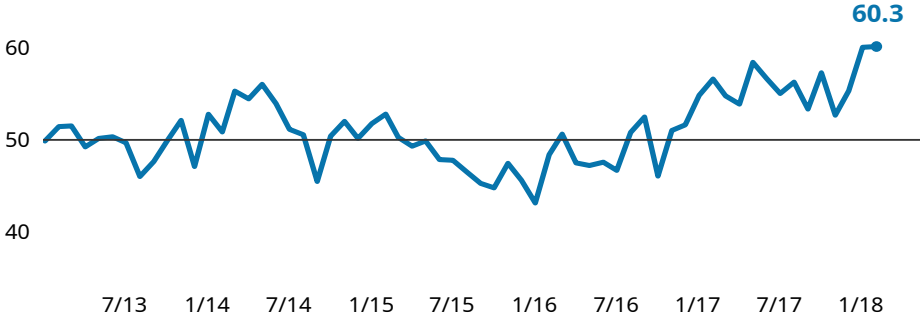
Index Extends Record Growth Rate

Growth in backlogs are the primary driver of the Moldmaking Index, at 60.3 for February.

The Gardner Business Index (GBI): Moldmaking registered 60.3 for February, extending its record-setting growth for a second month. In comparison to the same month one-year ago and to the average reading for 2017, the Moldmaking Index increased by 6.2 percent and 8.3 percent, respectively. Gardner Intelligence's review of the underlying data for the month revealed that growth in backlogs was the greatest driver of the Moldmaking Index in February, followed by production and new orders. All three of these measures recorded multi-year, record-setting growth rates in February. Employment, supplier deliveries and exports pulled the Moldmaking Index lower. Exports and supplier deliveries showed slowing rates of growth. No components of the Moldmaking Index contracted in February. MMT

ABOUT THE AUTHOR

Michael Guckes is the chief economist for Gardner Intelligence, a division of Gardner Business Media (Cincinnati, Ohio, United States). He has performed economic analysis, modeling and forecasting work for nearly 20 years among a range of industries. He is available at mguckes@gardnerweb.com



February's Moldmaking Index reading of 60.3 beat the record-setting growth rate that occurred in the prior month. For a third consecutive month, no components of the Moldmaking Index contracted. However, export growth that spiked in December has slowed in both of the past two months.

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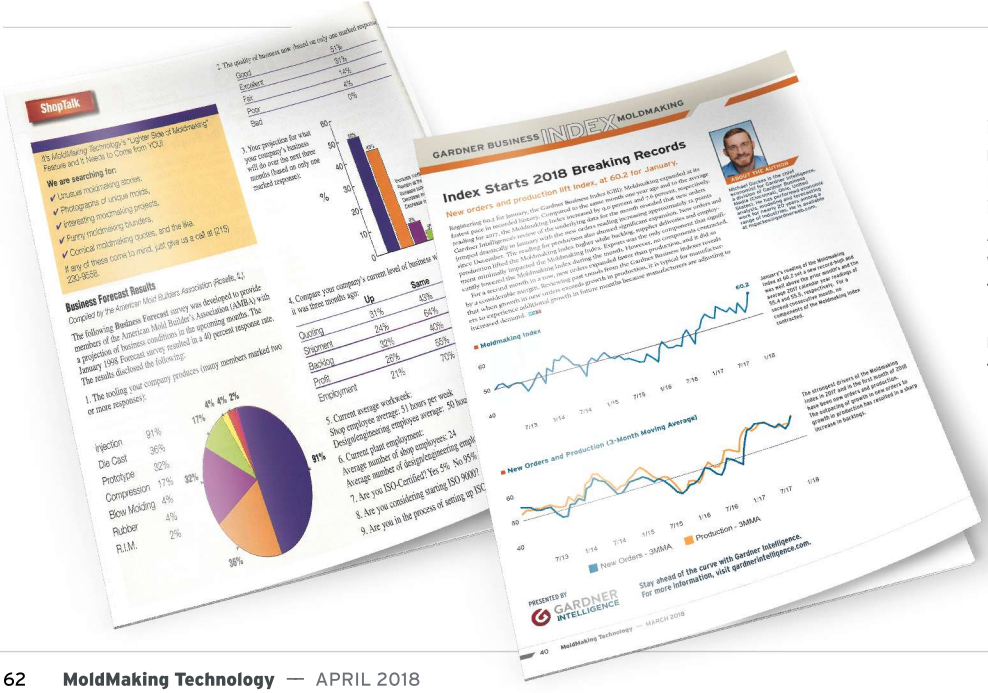

CELEBRATING 20 YEARS

In 1998 *MoldMaking Technology* provided industry information based on member responses from national trade associations. For example, the magazine included information from the American Mold Builders Association's (AMBA) Business Forecast, which projects business conditions in the upcoming months. Today, Gardner Intelligence surveys the magazine's readership and reports on industry data and trends each month in print and online.

THE COMPETITIVE ADVANTAGE FOR U.S. MOLD BUILDERS.

APRIL 2018 | MONTHLY UPDATE

AMBA SLATED TO GRANT $60,000 TO MEMBER COMPANIES IN 2018

Photo courtesy of Century Die Company, LLC

In 2017 alone, the American Mold Builders Association (AMBA) distributed $90,000 to 12 AMBA member companies through the American Mold Manufacturing Advancement (AMMA) Grant. This year, AMBA has committed $60,000 to invest in member companies through the grant, which is dedicated to creating opportunities to advance the industry.

The AMMA Grant will support programs that fall within three primary areas: training, advocacy/industry promotion and research and development. Eligible initiatives include apprenticeship and training programs, career fairs, open houses and new technologies, with the common theme of advancing the industry as a whole. Grants range from $1,000 to $10,000 with a maximum of one grant awarded per member company per year and a five-year accumulation maximum of $25,000.

Visit AMBA.org to apply. Deadline for submissions is April 30, 2018. For specific questions about the AMMA Grant process, please call 317.436.3102.

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Medical Industry Trends Point to Strong 2018

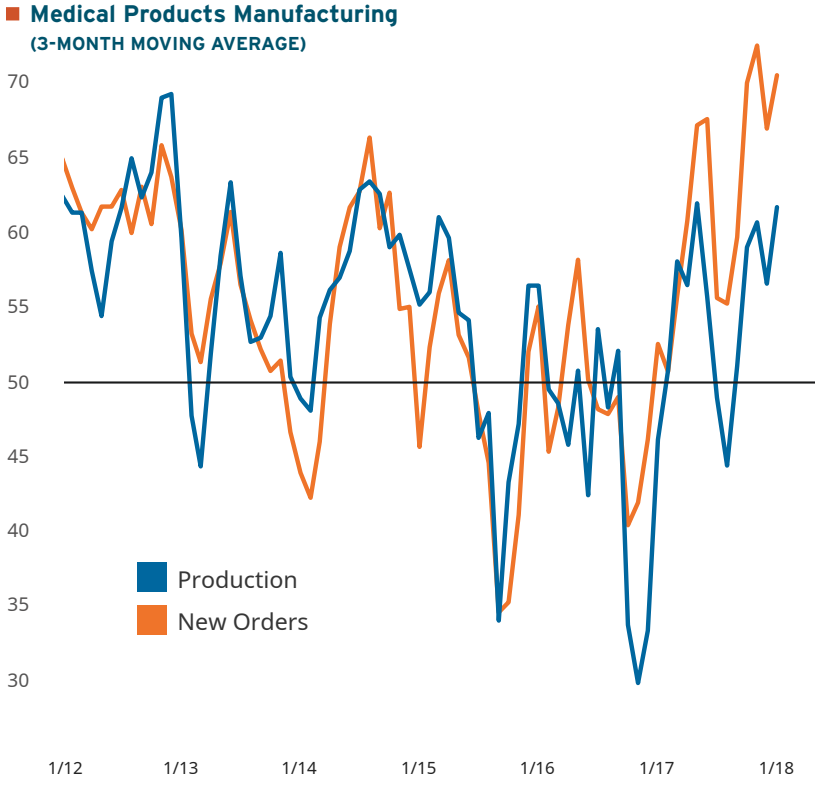
Gardner Business Index data trends point to medical manufacturing expansion.

Gardner Intelligence predicts 2018 will be a strong year for medical manufacturing growth based on data that medical goods manufacturers supply for the Gardner Business Index (GBI). Since the second quarter of 2017, Gardner Intelligence data indicates that new orders growth has and continues to outpace production. These two GBI components were the primary drivers of the GBI among medical devices and equipment manufacturers in 2017. As 2018 began, it appeared that those two GBI components would continue to be fundamental GBI drivers.

The 2017 period in which new orders grew in excess of production should have resulted in increased GBI readings for supplier deliveries, as manufacturers increased their consumption of inputs in order to meet the demands of the medical industry. However, Gardner Intelligence data indicates that this was not the case, as 2017 readings for supplier deliveries did not significantly change in response to growing new orders. If Gardner Intelligence's interpretation of the data is accurate, then unresponsive supplier deliveries figures from 2017 through to the present have partially hindered production from fully responding to increased new orders growth, which sustains the gap in production and new orders. As one might expect (and as the data confirms), backlog readings from 2017 changed drastically, from registering contractionary readings in the first quarter to setting multi-year highs by the fourth quarter.

As the medical industry continues to experience growing demand, Gardner Intelligence's outlook for the medical manufacturing industry is strong. In time, Gardner Intelligence expects that improvements in the supply chain and additional capital expenditures will narrow and ultimately erase the gap in new orders and production. According to Gardner's data measuring expected capital spending over the next 12-months, data from medical manufacturers during the three-month period ending January 2018 indicated an approximately 40 percent increase in capital equipment as compared to the same months one-year ago. However, new investments are not likely to properly or fully compensate for the seeming bottleneck that unresponsive supplier deliveries have created.

Wall Street analysts covering medical devices, instruments and supplies support this positive outlook for the medical industry. Based on 56 publicly traded, U.S.-listed firms, analysts expect a revenue growth of 11.9 percent in 2018. Analysts also expect earnings margins to increase from an actual median level of 13.5 percent in the third quarter of 2017 to 16.1 percent in the third quarter of 2018 and to over 17 percent in 2019. MMT



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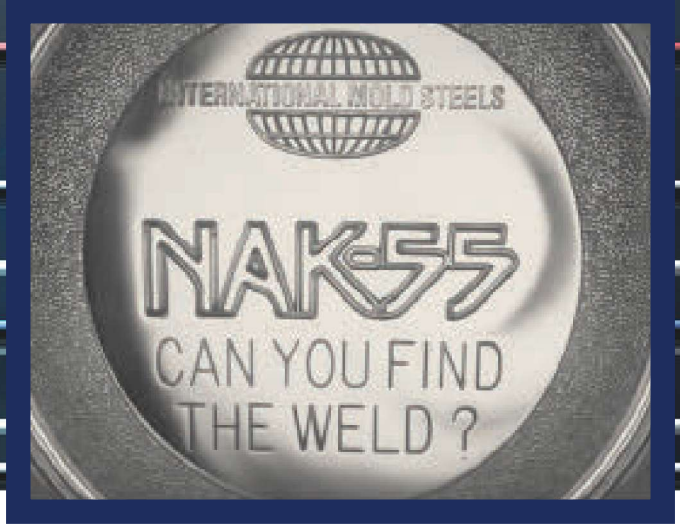

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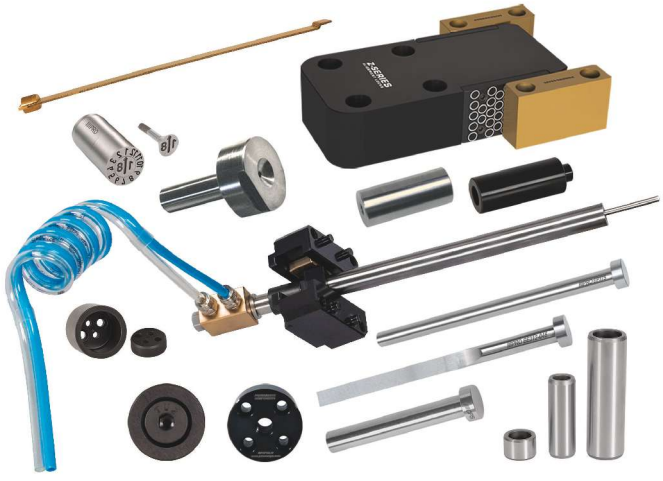

Standard Components Catalog Reveals Expanded Components Line

At NPE2018, **Progressive Components** introduces its new v12 Catalog. New product advantages include a variety of standard mold base components to complement its existing line, new cooling products that are readily machined and reach throughout cores previously not feasible, expanded through-hardened pins for large automotive and appliance tools, advancements in mold maintenance and monitoring technology and new alignment lock configurations.

According to Progressive Components, the catalog provides new standardized options for plate sequencing and more economically feasible routing cooling. The catalog also provides options for eliminating custom per-mold machining with new ejection and alignment standards. The company is also advancing its mold maintenance and monitoring technology. With the debut of the V12 Catalog in May 2018, Progressive Components has the largest and most comprehensive product line offering in the company's history.

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Booths S33004, W4871

Nozzles and Controllers Offer Mold Support

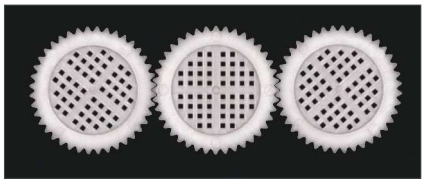
INCOE Corp. is in booths W4463 and S19023 at NPE2018. It has its new slim DF 5 nozzle with SBH heating (Slim Base Heater) on display at the show. The outer diameter of the nozzle is reduced by almost 25 percent, therefore enabling the large 5-mm flow diameter nozzles to be supplied as close as 18 mm apart or even closer at 16 mm apart with modification to the nozzle shank. The result of this slimming solution is tighter pitch spacing, closer proximity of water cooling circuits and reduced radiant heat to the mold. All of these benefits reduce cycle times and enhance mold support.

INCOE has upgraded the GSCmini, a compact, lightweight, timer-based, pneumatically valve-gate actuated sequencing controller. INCOE introduces the GSC2mini at the show, which can now provide valve-gate actuation for either pneumatic or hydraulic cylinders. This gate sequence controller is ideal for valve-gated applications that do not require sensors or linear transducer control. New to its temperature controller line is the I-Series Pro. The new I-Series Pro is an integrated microprocessor-based temperature controller with 12 to 144 zones (or two zones per card). The advanced PID control logic provides repeatable operation and temperature control accuracy. Enhanced features include hot runner system wiring testing capabilities and various viewing displays that enable ease of operation.

INCOE Corp. / 248-616-0220 / incoe.com
Booths S19023, W4463

Micro-Mold Demonstrations Highlight Collaboration

Mold Craft demonstrates micro-molding of a 100-µm filter screen with POK resin using the Wittmann Battenfeld MicroPower 15-t press in booth W4207. Mold Craft also has personnel in Sodick's booth (W782), where it molds PEEK 100-µm filter screen micro-parts in the LP20VRE vertical molding machine, which has a two-stage plunger system.



Mold Craft has a typeable .pdf checklist for DFM criteria available at NPE2018 to help visitors describe their perfect micro-mold. If visitors return the completed document, Mold Craft responds with information and advice on moldability and manufacturing. Its complete design package includes models, assembly views, bill of materials and prints with fully documented dimensions and tolerances for the micro-mold.

Mold Craft realizes that certain areas of a mold are going to wear faster than other areas so Mold Craft designs its molds to make those areas replaceable. Those areas include gates, thin steel, shutoffs and core pins. Mold Craft says that it designs molds this way to save customers time and money over the life of the mold. Mold Craft is the 2010 Small Shop Leadtime Leader Award winner.

Mold Craft / 651-426-3216 / mold-craft.com / Booth W782

Mold Builder Highlights Latest Tech Improvements

Cavalier Tool & Manufacturing Ltd. showcases its latest technology and capabilities at NPE2018 in booth S29013. Cavalier focuses on value-added services in addition to its infrastructure, which includes multiple palletized five-axis machines; RFID-chipped EDM cells; double-craned, fully serviced, advanced assembly bays and process monitoring. Its value-added services include presale feasibility studies, DFMs, product design assistance and simulations. Post-build support includes tool start-up, tool tuning and maintenance. The company says that anyone can cut steel, but that anyone wanting a cradle-to-grave tooling partner should contact Cavalier. The company manufactures medium to large plastic injection, compression and structural foam molds. Cavalier's reach extends into automotive, heavy truck, sport recreational and commercial industries. Cavalier Tool & Manufacturing Ltd. is the 2015 Leadtime Leader Award winner.

Cavalier Tool & Manufacturing Ltd. / 519-944-2144 / cavaliertool.com / Booth S29013

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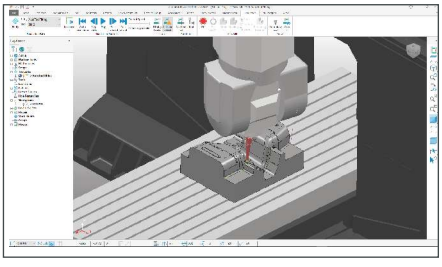
Software Demonstrations Feature Simulation Tools and Milling Strategies

Autodesk Inc. features three demonstration stations at NPE2018. One focuses on Moldflow Insight and Moldflow Helius, another on Moldflow for Design and the third on manufacturing.

Moldflow Insight is a complete set of plastics engineering simulation tools for analysts. Helius Composite software offers detailed information on composite material behavior without finite element analysis. Moldflow Adviser is a plastic simulation tool that optimizes part and mold designs to ensure molded part quality and manufacturability. PowerMill CAM software provides milling strategies for high-speed and five-axis machining.



PowerMill offers a range of tools to enable the manufacturing of molds, tools and other complex shapes and is capable of driving both wire-fed and powder-blown hardware with three- and five-axis machine motion. PowerMill also provides an improved workflow for the definition of open-sided 2D features. PowerMill also includes an interface to Autodesk Fusion Production, which is a cloud-based collaboration tool specializing in scheduling and tracking production.

Autodesk Inc. / 877-335-2261
autodesk.com/solutions/manufacturing / Booth W8147

Hot-Runner System Has Screw-In Nozzle for Leak Protection

The new, fully assembled and wired hot-runner system H4016/ supplements **Hasco America Inc.**'s extensive range of ready-to-install systems and hot halves. Hasco says that the robust, form-fit connection between the hot runner manifold and the screw-in nozzle guarantees leak-free operation and significantly facilitates the mounting and removal of the system as a whole in the injection mold.

The connector cables for the individual nozzles and the hot runner pass through individually configured cable ducts to the connection box where they are wired up according to the customer's specifications. Hasco says that this saves the moldmaker or injection molder from having to connect up the system and ensures a smooth start to production. The correct allocation of the zones to the manifold heating units and nozzles is documented on a dimension sheet and in a special test report.

The system layout facilitates mounting and removal and prevents any damage to the hot runner system when the mold is being serviced. Attachment points on the manifold mean that it can be readily lifted out of the cavity, avoiding any distortion of the system when it is tilted during installation or removal.

HASCO America Inc. / 877-427-2662 / hasco.com/hasco/en
Booth S26003

Solution for Manufacturing Reflector and Lens Molds

Schmolz + Bickenbach USA highlights the motto of bringing out the shine in plastic mold manufacturing in its NPE2018 display of the extremely corrosion-resistant, hardened high-grade steel Formadur PH X Superclean from DEW. With its excellent polishability, Schmolz + Bickenbach says that Formadur PH X Superclean is an ideal solution for manufacturing reflector and lens molds. Formadur 2083 Superclean from DEW also is resistant to corrosion. Resistance to wear makes this material ideal for PVC extrusion tools and smaller cross section injection molds. Schmolz + Bickenbach also features Corroplast FM from DEW at NPE2018. Corroplast FM is a material engineered for sophisticated plastic mold bases. The company says that this free-machining, pre-hardened stainless steel has outstanding machining characteristics and dimensional stability.

Schmolz+Bickenbach USA Inc. / 800-323-1233
schmolz-bickenbach.us / Booth S15037

Cleaner Combines Dry Ice Pellet Production and Dry Ice Blasting

Cold Jet, LLC is in booth W483 at NPE2018. The company displays the Combi 120H, an automated system that combines dry ice pellet production with dry ice blasting. The system integrates seamlessly into existing production lines for surface preparation of parts prior to painting or bonding or for automated deflashing and deburring solutions.

The system connects into existing plant- monitoring systems and can be monitored remotely for any field service requirements. Cold Jet says that the Combi 120H eliminates the need for cleaning parts with aqueous methods that require part drying and water treatment or containment systems. At the show, the system runs using a collaborative Universal Robotics Model 10 robot.

This automated solution makes it possible for dry ice blasting equipment to be integrated within a production line via a robotic system. The automated system is equipped with a pelletizer unit that guarantees continuous cleaning with freshly made dry ice. The system is placed in a sound-reduction chamber that controls the noise and provides for the extraction and filtering of air.

Cold Jet, LLC / 513-831-3211 / coldjet.com / Booth W483

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Milling and EDM Cell Demo Highlights Latest Automation Solutions

Makino highlights its D200Z-graphite 5XC vertical machining center with a 30,000-rpm spindle in booth S34188 at NPE2018. The graphite mill is integrated within an automated cell using a Makino EDNC6 sinker EDM machine and an EROWA ERC80 robot. The robot shuttles electrodes and work pieces between the two machines, using EROWA's JMS Pro automation cell control software. This cell showcases the latest advancements in automation and productivity.

Makino / 800-552-3288 / makino.com
Booth W4289

Side-Gating Hot-Runner Solution Cuts Assembly Times

New at NPE2018 is a second generation of the Melt-CUBE side-gating hot-runner solution from **Mold-Masters/Milacron**. The solution enables simultaneous, direct side gating of up to eight cavities per CUBE for high-cavitation molds. A simplified design makes this generation easier to maintain and service. Tips are clamped by a single bolt in sets of two (not the entire assembly), which reduces assembly and disassembly times by up to 85 percent. Manifolds can be accessed from the parting line and tips are located to gate.

This Melt-CUBE incorporates brazed heater technology for a precise thermal profile, the enhanced ability to process it and the reliability. Mold-Masters offers a 10-year warranty. Mold-Masters says that Melt-CUBE is known for its excellent vestige control, low-pressure drop and precise cavity-to-cavity rheological balance.

Melt-CUBE side gating eliminates wasteful sub-runners and offers higher pitch density than circular systems for greater production output. The company says it is ideal for deep-draw medical parts like pipette tips, syringe barrels, needle shields or parts where only side gating is permitted. The company has a hands-on display that shows the assembly-time reduction at its booth at NPE2018.

Mold-Masters / Milacron / 800-387-2483 / milacron.com/products/hot-runners / Booth W2703

Demonstrations Highlight Course Opportunities and More

RJG Inc. holds multiple live demonstrations of its products on an injection molding machine in its booth. They include daily CoPilot demonstrations at 10:00 a.m. and 2:00 p.m. and eDART demonstrations at 11:00 a.m. and 3:00 p.m. RJG also has ongoing demonstrations for its online Math for Molders course.

RJG also has live demonstrations of ToolStats in its booth. The company joined forces with ToolStats to give molders instant access to relevant and actionable information regarding their tools, machines or equipment.

eDART Systems is also running in the booths of Milacron (W2703), Nissei (W923), Sodick (W782), Sumitomo (W3045), Toshiba (W1263) and KraussMaffei (W403). RJG's booth features equipment from Sumitomo, Ameritech, Smartflow, ToolStats, Ashley Polymers, LaRos and Progressive Components.

RJG, Inc. / 231-947-3111 / rjginc.com / Booth W3383

Couplers Automatically Connect to Remove Need for Specialized Rods

Alba Enterprises (Alba) has its couplers at NPE2018. Alba couplers tie in the ejection rods of the machine to the ejection plate on the mold. Several ways to tie in the ejection rods exist, but most are very time consuming and cumbersome. Alba couplers automatically connect and disconnect through the standard motions of the machine. This occurs on every cycle and eliminates the need for specialized rods for each mold and guarantees full return of the ejector plate. When it comes time to change the mold, simply move the machine knock out to full back position, and they are free from the mold and clear for removal of the tool. Since manual connection or disconnection are not required, Alba says its couplers are especially suited for use in machines that have little access to the ejector plate. Also, they make it possible for center ejection to be tied in. With five sizes available, Alba couplers can withstand as much as 88,000 lbs of pull force. The smallest of the couplers can withstand as much as 3,300 lbs of pull force but are only approximately 2" in length and 1.7" in diameter.

ALBA Enterprises Inc. / 800-432-6653 / albaent.com
Booth W4263

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Hands-On Fiber Laser Welding Machine Requires Minimal Maintenance

The ID1-Fiber Laser Welding System machine from **Alliance Laser Sales** uses Fiber Solid State (FSS) laser technology, which generates laser power through a series of diode pumps instead of crystals and mirrors. This removes many of the intricate parts found in typical YAG lasers, yielding virtually no maintenance. The machine's design also offers high beam quality, air cooling with high-ambient air temperature operating capabilities, efficient low-power consumption, long diode life (up to 100,000 hours), fewer necessary optics and easy integration and service.

ID1-Fiber Laser Welding System machine has more pure power per application driven by the diodes (not dependent on any crystal or mirrors life as with YAG lasers) and requires almost no maintenance. The swivel design provides unlimited head position configurations for greater job flexibility, 4.5-ft travel and a full 360-degree rotation. Every part of this system is easily adjustable, giving the operator versatility and flexibility to meet most laser repair demands. It is also designed to be manually adjusted, which eliminates the possibility for mechanical failure and offers the ability to focus in on specific areas, reducing wear. Material applications include most tool steels, such as tool steel, stainless steel, carbon steel, titanium, aluminum, nickel, copper and beryllium. The ID1-Fiber is a pure, hands-on laser welding machine.

Alliance Laser Sales Inc. / 847-487-1945
alliancelasersales.com / Booth S16188

Tool Achieves Balanced Filling Control on Multi-Cavity Tools

Plustech Inc. is showing a 60-ton GL60A "Global Platform" horizontal press that uses the V-Line system. The GL60A demonstrates the next-generation Meltflipper test tool from **Beaumont Technologies, Inc.** (which is in booths S29023 and W2193). The cavity balance achieved with the Meltflipper is monitored by Sodick's new cavity-pressure monitoring system. The GL30A-LP micro molder will be on display in Technoject's booth (W3883), running a Heitec narrow-pitch, valve-gated mold.

Beaumont Technologies Inc. / 814-899-6390
beaumontinc.com / Booths S29023 and W2193

Precision Tooling for Thin Recess Injection Molding

StackTeck Systems Ltd. showcases four of its precision, high-tech molds at NPE2018 in booth W1583. It displays a high-cavitation stack mold for containers that features ultra-light weight thin recess injection molding (TRIM) panels. The company also displays an injection compression mold for an in-mold labeled (IML) lid, a TRIM-IML cup mold that features a micro-cellular molding and a servo in-mold, closing flip-top cap mold. StackTeck says it anticipates aggressive cycle times and optimal performance for each of these molds and says that these integrated plastic tooling solutions feature innovative technologies. StackTeck is the 2008 Leadtime Leader Award honorable mention.

StackTeck Systems Ltd. / 888-700-8555 / stackteck.com
Booth W1583

Plastic Mold and Tooling Alloys for High Production Demands

Materion Performance Alloys features the MoldMax product line of plastic mold and tooling alloys at NPE2018. Materion has the MoldMax product line on display in booth W5966. Materion says that MoldMax plastic tooling alloys provide a unique combination of strength, thermal conductivity and machinability. The benefits of using MoldMax for plastic molding process include shorter cycle times and improved part quality. Materion offers a variety of MoldMax alloys to meet the high production demands of the plastic processing industry.

Materion Performance Alloys / 800-375-4205 / materion.com
Booth W5966

Metal 3D Printer Combines Laser Sintering and High-Speed Milling

Plustech Inc. introduces **Sodick Inc.**'s OPM250 metal 3D printer in booth W782 at NPE2018. The printer combines laser sintering of metal powder and high-speed milling in the same machine. This can speed production of tooling components such as cores and cavities with conformal cooling channels. Additive manufacturing reportedly can produce in one piece components that would normally be assembled from multiple parts.

Sodick Inc. / 888-639-2325 / sodick.com / Booth W782

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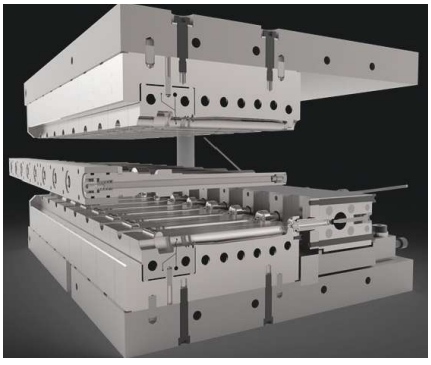
Injection-Blow Tooling System Reduces Labor and Improves Quality

R&D/Leverage has the Liberty IBM system on display at NPE2018 in booth S32079. It uses patented technology to overcome the challenges of conventional IBM tooling. R&D/Leverage filed its 15th IBM-related patent this year, as its solutions keep evolving to make better injection-blow tooling.

A major improvement of the Liberty IBM System is said to be its ability to achieve thermal isolation between the neck insert and the shoulder of the bottle. Unlike traditional IBM tools that use key stock and all-thread to locate and clamp the mold inserts onto the die set, the Liberty IBM System uses dowels to locate the mold inserts. This allows gaps to be designed between the mold inserts, which negate the effects of accumulated horizontal thermal expansion across the injection mold inserts.



The Liberty System also incorporates a new, patent-pending Self-Alignment System that is said to ensure optimal cavity alignment in the parison and blow stations. R&D leverage says that these new technologies allow fast and trouble-free startups, improved bottle quality and reduced tool wear. The new system can be designed to change out damaged cavities without removing the tool from the machine.

R&D/Leverage / 816-525-0353 / rdleverage.com
Booth S32079

Hot-Runner System Features Save Time and Boost Quality

Synventive showcases the SVG+ hot runner systems. The company says that it has a simple design in that no cooling lines or plates are required. The system saves time by providing monitoring and diagnostic tools from outside of the molding machine. Synventive says that this results in less downtime, less scrap and increased reliability. The system upgrades easily activeGate control technology for lower operating costs and improved quality. The system makes it possible to mold complex geometries and high-quality, Class A part surfaces in less time. The SVG+ hot runner systems are equipped with a new modular actuator design and patent pending SynCool3 technology. SynCool3 provides cooling of the actuators without the need for separate cooling lines. These systems are delivered with a Valve Monitoring Interface (VMI) for monitoring, diagnostics, and trouble shooting from outside the molding machine. VMI provides measured individual pin movement data and allows operators to check whether the valve pins are moving as intended.

Synventive Molding Solutions / 800-367-5662
synventive.com / Booth W643

Mix of Mold Plate Materials On Display

Clinton Aluminum and Stainless Steel is in booth S30008 at NPE2018. Clinton Aluminum and Stainless Steel stocks the full spectrum of alloys. Clinton Aluminum and Stainless Steel's mold plate products include M1, Duramold-2, Duramold-5, M5, Formodal, Alumold, Hokotol and Weldural along with its new product CA-7 plus, which the company says helps close the gap between the cast products and the heavy forged 7000 plate.

Clinton Aluminum and Stainless Steel has millions of pounds of aluminum plate, bar, rod, sheet and structural shapes at its multiple processing facilities. Multiple plate saws in each facility help the company process customer orders quickly and accurately, and the company's logistics team delivers daily to help customers meet critical lead times.

Clinton Aluminum and Stainless Steel
800-826-3370 / clintonaluminum.com / Booth S30008

Small Footprint Laser Machine Designed for Texturing of Precision Work Pieces

GF Machining Solutions provides of machines, automation solutions and services to the tool and moldmaking industry and to manufacturers of precision components. The company has its AgieCharmilles Laser P 400 U machine on display at NPE2018. GF Machining Solutions says that this laser engraving, texturing and marking solution is one-of-a kind and combines outstanding quality, efficiency and femtosecond laser technology in the smallest possible footprint. It is designed for aesthetic and functional texturing of precision parts for watches and jewelry, small inserts, cutting tools and micro-machined work pieces. See this machine in action at the show.

GF Machining Solutions / 847-913-5300
gfms.com/us Booth S37079

Multi-Layer Technology and Valve-Gate Innovations Optimize Productivity

Husky Injection Molding Systems is in booth W1303 at NPE2018. It occupies a 12,000 square-foot space at the show and features a range of solutions for the beverage, food, closure, medical, automotive and home, personal and beauty markets. Husky features the HyPET 225 system and has bottle designs with new colors, shapes and functionality. Husky also has a multi-layer technology that can enhance package design, and it has tooling technologies that can deliver optimized equipment productivity and extended mold life. The company displays valve-gate innovations and original equipment manufacturer spare parts intended to reduce total part costs. Husky subject matter experts present throughout the week at the Bottle Zone Technical Forum.

Husky Injection Molding Systems / husky.ca / Booth W1303

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AMBA Releases 2018 Business Forecast Report

The **American Mold Builders Association (AMBA)** recently released its annual "AMBA Business Forecast Report." Copies are available to qualified mold builders at NPE2018 in booth S33058. The AMBA collected data for this report from over 100 U.S.-based mold manufacturers during the AMBA's Business Forecast Study (conducted from mid-December 2017 to late-January 2018). This benchmarking report analyzes and highlights information on the anticipated outlook for the U.S. mold building industry for 2018.

The report showcases data on sales trends, profit levels, capital expenditures, shop and design employment levels and challenges faced in the industry. It reveals cautious optimism for 2018 and explores challenges facing the industry overall. New questions to further understand the future of the industry have been added about new activities being implemented to improve competitiveness, new technologies impacting the plastics industry, the impact of 3D printing and additive manufacturing and trends in customer demands. All of the information is compared to the historical data and expert insights into what 2018 will look like for mold builders.

American Mold Builders Association (AMBA)
317-436-3102 / amba.org / Booth S33058

Component Supplier Highlights Mold Venting to Mold Polishing Solutions

DMS displays several mold-related products at NPE2018. It displays the Almo worm-gear device, which enables inserts to be tightened and released inside the mold cavity. DMS also displays the Balzi mold-venting valve, which helps resolve the most common effects of poor cavity venting. The company has Boride-bonded abrasive products in its booth, including polishing stones, diamond-compound mounted points and industrial sharpening stones. It has i-Mold tunnel gate inserts designed for bottom gating and Exaflow gate inserts for tunnel and rear-surface applications; Kool Flow compact water manifold systems for injection molding, resistant welding, pneumatic control, vacuum forming, die casting, extrusion technology and water distribution; Diprofil handheld machines and diamond tools for tool, die and moldmaking; Desoi thread unscrewing devices; full-color, high resolution mold plaques.

DMS also showcases Bolex P ball-guided ejector bushings made of special roll steel bush casing, hardened and ground to hold fixed inside a high-resistant bronze cage for guiding the balls running along the cage. The unique feature is that the balls do not run aligned, but at a slight angle, enlarging the contact area and enabling greater load capacity. This system enables the precision balls to circulate endlessly. Typically, these are used in the ejector system when a friction-free application is required. DMS displays BZ hydraulic locking cylinders with robust cam-finger design to withstand heavy loads in a compact package for use in molds with side actions, slides or core pulls, and the company has MetalRustGuard self-adhesive wrap that protects metal molds from rust and corrosion in virtually any type of climate, including high humidity and marine environments.

DMS / 800-265-4885
dmscomponents.com / Booth W4289

Electrodes Highlight Power of Machining with EDM Graphites

Poco Graphite has a product line that includes more than 100 graphite grades used in EDM, semiconductor and other industrial applications. The company says that the use of Poco EDM graphites increases the potential for optimum performance. Poco Graphite produces materials with consistent properties and performance for maximum EDM efficiency and overall cost reduction. The company showcases several machined electrodes of various material classifications to demonstrate the type of machining detail that can be achieved with Poco EDM materials. End users in the industry provide the electrodes on display, which represent actual applications. Poco Graphite is in booth S33044 at NPE2018.

Poco Graphite, an Entegris Co. / 877-762-6336
poco.com / Booth S33044

Micro-Welding Solutions Offer Affordability and Variety

Gesswein & Co. presents new micro-welding solutions for mold and die repair at NPE2018. Gesswein performs live demonstrations of Sisma Laser Welders and the new PUK U5 Micro TIG Welder. Gesswein displays Sisma's SWA and SWT lasers. They are designed specifically for mold and die repair on small to large molds. They are easy to operate and are made in Italy. The new PUK U5 Micro TIG Welder is a more affordable solution for mold and die repair and is easy to transport through the shop. The new PUK U5 Micro TIG Welder is made in Germany. Gesswein's staff will be ready to demonstrate and answer your questions at booth W4043.

Gesswein & Co. / 800-243-4466 / gesswein.com
Booth W4043

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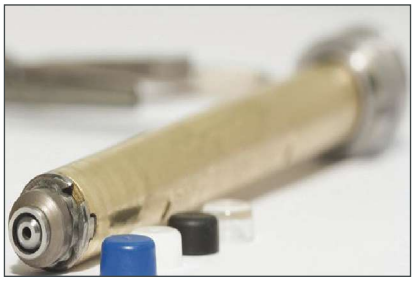
Compact Nozzle Enables Injection on the Inside Surface of Part

At NPE2018, **Thermoplay** displays its newly expanded small nozzle series featuring the F Ø11. Designed to meet the increasing requirements of special applications in cosmetic, medical and food packaging markets, the nozzle features a small pitch and is now available for valve gate applications. The F Ø11 valve gate nozzle has a minimum pitch of 17 mm. Because of its compact profile, the nozzle is useful in restricted areas and enables injection on an "inside" surface of the part. The nozzle and tip design enable low thermal dispersion, giving maximum flexibility to the moldmaker in designing the cooling system.

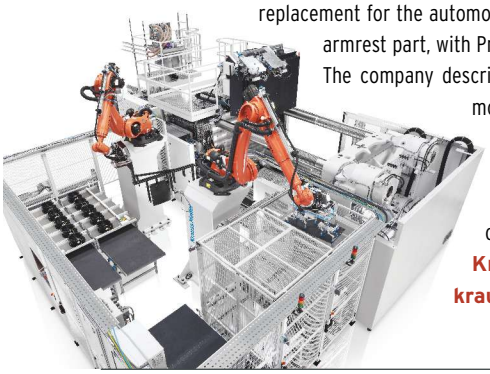
The patented Thermoplay heaters uniformly distribute heat along the whole nozzle surface, providing low energy consumption (at 150W maximum per nozzle). Thermoplay says that the moldmaker can easily replace the tip for maintenance with the mold installed in the injection machine. Valve-gate actuation can be pneumatic or hydraulic, individual- or plate-actuated, which Thermoplay says makes the nozzles useful for high-cavitation applications requiring increased precision. The pin, available in a cylindrical or conical option, is designed to minimize the witness mark on the part (gate diameter from 0.8 to 1.2 mm) providing the highest quality finish. Thermoplay says that the FØ11 valve gate nozzle series combine flexibility and quality and are available in lengths from 56 to 146 mm.

Thermoplay S.P.A. / 39-125-800311
thermoplay.com / Booth W643



Technology Combines Processes for Strong, Lightweight Components

KraussMaffei presents its FiberForm technology and the GXW 450-2000/1400 multi-component injection molding machine cell featuring swivel plate technology at NPE2018. The FiberForm process combines the thermoforming of organo sheets and injection molding into a single process. This process results in fiber-reinforced plastic components that are particularly lightweight yet feature a high level of strength. KraussMaffei says that FiberForm is a high-strength, lightweight metal replacement for the automotive industry. The machine will be running a center armrest part, with Proper Tooling providing the mold for the exhibit.



The company describes the process as an ideal combination of thermoforming and injection molding and says that it is a one-step procedure for using an integrated reshaping process in the mold. The company says that the technology has short cycle times and the capability of handling large industrial quantities.

Krauss-Maffei Corp. / 859-283-0200
kraussmaffeigroup.us / Booth W403

Double-Racked Lifters Save Time and Simplify Tool Construction

CUMSA USA Double Racks Lifters (DRs) are designed to save time, reduce the size of the overall mold and simplify tool construction. They also help cut down the ejection stroke. This patented system is oriented along a straight, vertical plane, improving rigidity and limiting the need for angled channels through multiple mold plates. Unlike conventional lifters, DRs eliminate complicated CAM-action operations. Their straight-movements enable them to move more smoothly, causing less friction and reducing the impact on tool performance. The ejection stroke of the DRs range from 100 mm–125 mm, but can accommodate a larger ejection stroke upon request. CUMSA currently offers this line in a variety of sizes ranging from 16 mm wide to 72 mm and in release undercuts ranging from 14 mm to 52 mm.

CUMSA USA / 248-850-8385 / cumsa.com / Booth W4289

Trunnion Lifter Slide Cuts Mold Build Time, Cost

Mold and die component manufacturer **SelfLube** showcases its trunnion lifter slides, which come in inch and metric and are available with or without self-lubricating graphite. The company says that these slides are ideal for mold builders because they reduce build time and cost since they are finished and ready for installation in the tool. The company also offers bushings, wear strips, parting line locks and gib assemblies, among other products from its 10,000 standard part numbers.

SelfLube, which sells directly, offers a range of components, including bushings, wear strips, parting line locks, gib assemblies and more. The company can customize its standard offerings to accommodate any size or special feature that a customer might require.

SelfLube / 800-690-3600 / selflube.com / Booth W3888

Conformal Cooling Design and Cleaning Services and Standard Cooling Components

TruCool Conformal Cooling from **DME** is designed to maximize cooling efficiency through additive metal manufacturing. This line of conformal cooling products has complex cooling channels conforming to the part-surface geometry. DME says that this line provides greater overall cooling coverage with even distribution while maintaining a targeted, consistent temperature and reducing cycle times by as much as 60 percent. DME announces three new products and services to the TruCool product and services line. First, DME Design Services builds on decades of moldmaking, mold design, thermal analysis and conformal channel design to provide customers with the most reliable, robust and efficient mold design. Second, DME says its new cooling aftermarket services and equipment provide the ultimate cooling channel cleaning, diagnostics and maintenance. Aftermarket services and maintenance has the ability to troubleshoot, clean and descale both conventional and conformal cooling water channels to maximize the lifespan and efficiency of intricate conformal and conventional cooling through a closed-loop, computer-controlled, automated process. Third, DME announces its new line of TruCool "standard" conformal-cooled components, which includes core pins, gates and sprue bushings.

DME - Milacron / 800-626-6653
dme.net / Booth W2703

Display of Mold Materials Features Wear-Resistant Products

One of **Finkl Steel Canada**'s main focuses at NPE2018 is innovation. The patent-pending, prehardened mold steel Corebloc was engineered for injection molding tools and for the core plate of injection molds up to 40" (1015 mm) in size. Finkl says that the excellent ability to harden through characterizes this steel in comparison to standard materials like 4140 and 1.2312, and that Corebloc's machinability and resistance to wear are outstanding.

Corebloc is suitable for laser-hardening, chrome-plating and nitriding. Finkl says that users save from expenses on core-side molds and tools. Finkl also presents the plastic mold steel MD-Xtra SH (Super Hard) at the show. Microalloying additions ensure higher hardness levels than material that is typically available.

With a hardness ranging to 43 HRC, the wear resistance is significantly increased. Polishability is guaranteed up to 1200 grit. MD-Xtra SH is ideal for manufacturing sophisticated automotive components with extremely smooth surfaces. Its remelted counterpart, MLQ-Xtra, combines these benefits with a guaranteed SPI A1 finish.

Finkl Steel Canada / 800-268-3077
finkl.com / Booth S15037

Coating Has Diamond Particles for Added Toughness

Bales Metal Surface Solutions provides coatings and finishes to protect from wear, abrasion and corrosion. Its coatings can increase hardness for better durability and lower the coefficient of friction for better lubricity. Its diamond polishing can achieve finishes from D3 to A1. The company's newest coating, Diamond EN, has the uniform corrosion resistance of electroless nickel with the added toughness of diamond particles for 57RC. Samples of coatings are available in its booth.

Bales Metal Surface Solutions / 800-215-6653 / balesusa.com / Booth W118

Guide for Inclined Pin Enables High-Force Absorption

The E 3064 guide for inclined pin from **Meusburger US Inc.** achieves optimal surface contact with the inclined pin and best material pairings, which results in a high-force absorption. The machining of the pocket in the slide is possible without inclining. Additionally, the slide stroke can be adjusted subsequently by customizing or adjusting the position of the guide for an inclined pin.

Meusburger developed the E 3064 guide for inclined pin to address the challenge of the inclined surface machining of the guiding hole in the slide. The product is inserted in the slide and forms the contact surface for the inclined pin. The special geometry in the hole creates full-surface contact between the inclined pin and the guiding. Meusburger says that to introduce the guide to the inclined pin, the machinist cuts a rectangular pocket with a threaded hole in the slide and then provides the required clearance for the inclined pin. The machining therefore can be carried out on a conventional three-axle machine and before the hardening. It is possible to execute the installation conveniently from the split line face. The E 3064 guide for inclined pin is available from stock for inclined pins with diameters of 12-30 mm.

Meusburger US, Inc. Standard Molds
704-526-0330
meusburger.com / Booth W4289

Production Monitoring System Built for Simplicity, Affordability

Smart Attend launched commercially last June. Smart Attend collects data (such as 24V I/O signals) produced by injection machines, extruders or other machinery and connects to the plant's WiFi network to send data to PCs via a web-browser login or to mobile devices via the Smart Attend app for iOS or Android. Data is collected by a small, WiFi-enabled box called a Smart Device, which sends encrypted data to a secure "cloud" server. A backup 2 GB memory card ensures that data is never lost and can be collected in the event of a network disconnect. Also included is a special "tower light" with 150 LEDs capable of flashing a wide variety of colors to signal the state of the machine and production.

Initial registration and setup of the system can be done on a PC through a micro USB cable. Further Smart Attend settings can be configured directly over the network via the app. Utilizing "plug-and-play" functionality, initial configuration can be complete in as little as 20 min without requiring IT or specially trained personnel. Overall installation time averages 2-4 hours. The Smart Attend system can work with any brand and any age of machine. With Smart Attend, data goes instantly from machines to managers. Smart Attend provides information visually through the tower light, audibly through a powerful speaker housed at the top of the tower light, and digitally through the native mobile-device app and web portal.

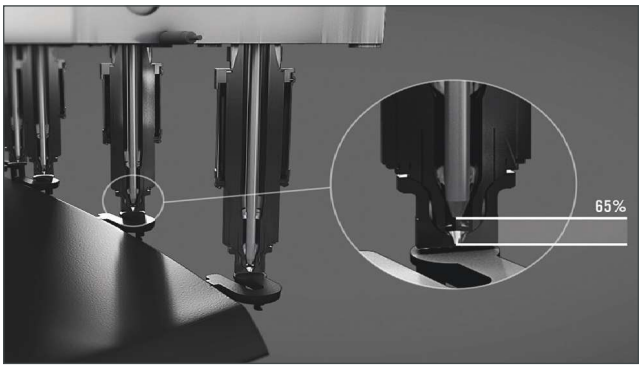
Smart Attend Inc. / 866-210-9630 / smartattend.com
Booth S10029

Servo Display Features Two-Shot Injection Mold Applications

U.S. moldmaker **Accede Mold & Tool** includes its custom-built, advanced technology servo display in booth S10091 at NPE2018. The display includes six servo-driven in-mold actions, showcasing both lift-and-rotate and cube technology for two-shot plastic injection mold applications.

The mold actions are controlled by the new Mold-Masters M-AX servo axis controller, which Milacron says is its most technologically advanced controller to date.

Accede Mold & Tool / 585.254.6490 / accedemold.com
Booth S10091



Servo-Driven Valve-Gate System Increases Flexibility of Flow Control

In booth W991 at NPE2018, **HRSflow** showcases its Flexflow line, the new range of products including the servo-driven valve-gate systems, Flexflow and Flexflow One.

To face new challenges in the automotive market and obtain the next-generation, high-quality parts, Tier 1 and original equipment manufacturer customers need increasingly flexible flow control. The electric servo technology by HRSflow is designed for the independent adjustment of each valve pin with precise control of stroke, velocity and force during opening and closing phases. HRSflow says that this solution assures accurate, flexible control of pressures and flow rates at each individual gate during the injection process.

HRSflow / 855-477-3569 / hrsflow.com / Booth W991

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Finkl Steel Canada / 800-268-3077 / finkl.com
Booth S15037

Pre-hardened Steels Eliminate the Need for Heat Treat

International Mold Steel highlights mold base steels and cavity and core steels at NPE2018. At the show, it has Toolox 33 and Superplast Stainless mold base steels. It also has cavity and core steels like Nak 55, Nak 80, PX5 Modified P20, S-Star 420 Modified, DH2F Modified H-13 and Toolox 44.

The company says its prehardened steels save time by eliminating the need for heat treat, which eliminates the need for secondary machining. With mold shop deliveries getting shorter and shorter, International Mold Steel's customers need to squeeze as much time out of their mold builds as possible. The company says these products are very free machining. In some cases, its customers are seeing double the cutter life of their tooling. International Mold Steel says that these qualities increase savings for the moldmaker and the molder.

International Mold Steel Inc. / 800-625-6653 / imsteel.com / Booth S33060

Mold Care Products Have No Chlorinated Solvents

Slide Products says that it has eliminated all chlorinated solvents from its line of mold care and processing products, which come in a variety of formulations, including NSF, food-approved, paintable, non-paintable and medical. Slide also purged compounds for resins and processing applications. The company's NSF products include mold releases, mold cleaners, rust preventives and lubricants. Product titles are EconoMist, a light-duty mold release; IPA Isopropyl Alcohol cleaner, a kosher-approved solvent; Mold Cleaner Plus Degreaser, which removes build-up on mold surfaces; On/Cycle mold cleaner, a multi-purpose equipment cleaner; NEXGEN, a biodegradeable cleaner; White Rhino rust preventive, a fingerprint acid neutralizer; Super Grease aerosol, a dielectric lubricant; and its counterpart, Super Grease non-aerosol. Slide Products is in booth S32045 at NPE2018.

Slide Products, Inc. / 800-323-6433 / slideproducts.com
Booth W4043

Platform Facilitates Product Launches

Octex announces the release of Launchpad, which enables customers to compose and control the entire launch process. With Launchpad, customers experience streamlined, time-sensitive launch processes, prototype tooling and proof of concept, testing and verification, continuous improvement and process optimization and as much as a 65-percent reduction in critical pathway schedules. Customers get the full support and tactical readiness of the Advanced Team—a singular unit comprised of experts in all stages of advanced manufacturing, science, engineering and business. The Advanced Team works in lock step with department heads in engineering, tooling, metrology, QA, production and technology to monitor in real time every aspect of the launch process. Software-defined project tracking algorithms place metrics on all critical stage levels in every phase, enabling the team to proactively monitor and respond to all project scenarios. Having all facilities and capabilities for a complete product launch on institute eliminates transit time, communication problems and loss of fidelity. Customers experience 75 percent reduction in tooling qualification, 75-percent reduction in pre-production process development and 75-percent reduction in validation.

OCTEX / 941-371-6767 / octex360.com
Booths S31090 and S31137

AM Powder Designed to Create Conformal Cooling Channels

Uddeholm announces the launch of Corrax additive manufacturing powder, a product designed for the additive manufacturing of tooling components. Uddeholm says that using Corrax additive manufacturing powder enables the creation of conformal cooling channels to reduce cycle times. Uddeholm maintains that Corrax powder is excellent for additive manufacturing tooling applications because of high demand, short run series and the ever-increasing need for shorter lead times. Uddeholm exhibits at NPE2018 in booth S31061. It features its complete line of plastic tooling solutions in addition to Corrax additive manufacturing powder.

Uddeholm announces its 350th anniversary as a manufacturer of industrial tool steels in 2018. Based in Hagfors, Sweden, Uddeholm has delivered high-alloyed steels since opening in 1668. Uddeholm provides tooling solutions through technical know-how, advice and support to customers from over 90 countries around the world. Uddeholm serves customers in a wide range of industries, providing local stocking and technical support for tool steels, mold materials and specialty alloys. Uddeholm says that continuous development of new products and solutions has shaped the success of Uddeholm today. Uddeholm opened its first facility in the United States in 1925.

Bohler-Uddeholm Corp. / 800-638-2520 / bucorp.com
Booth S31061

Top 10 Game-Changing Technologies

By Christina Fuges

As part of its 20-year anniversary, *MoldMaking Technology* reached out to readers and asked them to list what they believe are the top most impactful technologies since 1998.

1. **Data** from additive manufacturing, design, build and maintenance to machining, automation and inspection/measurement has transformed the products and processes of moldmaking. The ability to capture a company's manufacturing know-how digitally, and then having the ability to reuse it with little to no error has had one of the biggest impacts on the industry relative to other changes. That newfound power includes the ability to work with and standardize around a process, which enables a company to shorten lead times and stay competitive with overseas companies.

2. 3D printing or **additive manufacturing** (AM) in conjunction with five-axis simultaneous machining has eliminated or significantly reduced the use of die-sinking EDM. 3D printing makes possible the absolute approval of a product before building the mold for it, and it facilitates the seamless transfer of the electronic geometry directly into the CAM software to ensure the production of an acceptable part piece. AM also makes it possible to create channels with conformal cooling to improve molding cycle times and accuracy.

3. **Automation** and robotics has helped the industry move more toward lights-out machining. This includes automation combined with internal process mapping, more automated presetting of parts and electrodes outside of the machine tools and automation that massively reduces grinding work.

4. **Advances in five-axis, high-speed machining** have further improved productivity and accuracy. For example, five-axis high-speed cutting of hardened mold inserts right to size with a near-mirror surface finish and tolerances of 3–5 microns or better; five-axis machining of intricate details, which spares shops from employing slower, more expensive processes like EDM; and, combining five-axis technology with work cells and process development.

5. Mold maintenance is no longer an afterthought. It is now employed proactively to help reduce mold downtime. The growth of **true preventive maintenance** encompasses accurately monitoring issues and corrective actions over time with data discipline and employee accountability.

6. Getting real data for flows, pressures, temperature and so on has transformed processes in plastics part manufacturing. Moldmakers can now use **mold flow analysis** to calculate what may or may not happen to a specific mold design or build which guides moldmakers to faster success.

7. The use of **lasers** for measuring, welding, texturing, engraving and in additive manufacturing has made these processes more accurate and efficient.

8. In the past, the moldmaker controlled the **"flow of information"** for himself or for the machinist via a print or through verbal instructions, slowing down production and leaving room for errors. Today, machining programs provide the information, speeding production and improving accuracy. This processing information is captured at production planning meetings and the programs are created according to that plan.

9. **Advanced computer technology**, smarter computer logic, improved computer speed, and the reduced cost and size of computers has made CNC control affordable on most machines. These advancements have also made it financially possible to purchase and upgrade real engineering computers. Because of CNC machines, coordinate measuring machines (CMMs) and advanced engineering software, shops require fewer employees but achieve higher throughput and cut-to-model capability.

10. **CAD/CAM software** has continued to reduce the time it takes to make a mold. Simultaneously, the software enables moldmakers to take on more complex parts and improve plastic-part quality. Advancements in 3D modeling have also enabled reverse engineering, so moldmakers can generate cavity and core geometry from the approved electronic 3D model. Moldmakers can then download that geometry to a CAM system to generate NC code to machine the mold. Today's moldmakers are not as intimate with the mold geometry as moldmakers of the past, but that is no longer necessary with today's technology. MMT

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- Developments in 3D-printable materials
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- 3D printing conformal-cooled inserts

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Steel Plates

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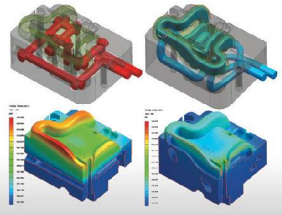

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