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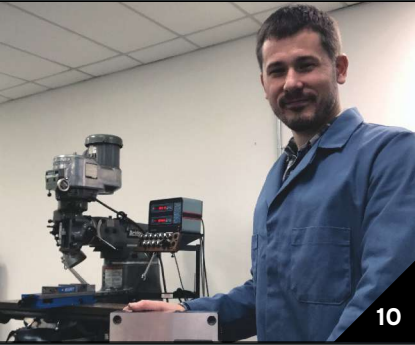
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10



24




38

Features

- 14 Software: Schedule Backward with ERP to Accurately Predict Mold Delivery**
One mold builder leveraged ERP software to maximize its productivity and achieve consistent, on-time delivery.
- 20 Additive Manufacturing/Machining A Hybrid Approach to Moldmaking**
When considering hybrid machines for mold manufacturing, it's important to get the facts to manage expectations of this emerging technology.
- 24 Surface Treatment Polishing Requires Local-Level Communication**
A focus on machining and measuring when polishing saves time and improves part quality.
- 28 Inspection/Metrology: Making a Metrology Match**
Price, accuracy, flexibility, speed, efficiency and ease of use help determine the best inspection/measurement solution.
- 34 International Perspective A Unique World of Experience for Moldmakers**
Germany's WBA Tooling Academy builds a bridge between industry and science by joint R&D projects addressing Industry 4.0.

Departments

- 6 From the Editor: Bridging the Gap Between Mold Builders and Buyers**
- 8 2018 Editorial Advisory Board: No Nonsense Ways to Promote Moldmaking as a Career**
- 10 Profile: Artisan Model Mold LLC**
- 38 Case Study: Software/Machining**
- 42 The Bottom Line: Tax Reform Impact on Research Incentives**
- 46 Gardner Business Index: Moldmaking**
- 50 Product Focus: Amerimold 2018, NPE2018** 
- 71 Ad Index**
- 72 TIP: Mold Material**

ON THE COVER

Image courtesy of Creative Technology Corp. This month's cover shows how Quest Industries is realizing greater productivity through its latest ERP enhancements. A machine map that is available on every shop floor computer provides an intuitive gateway. Clicking on any machine reveals details about current, past and upcoming tasks and much more information from the initial proposal to project completion. Ryan Reamer is in the foreground, Jim Burks is at the machine, and Jacob Lang is at the workstation. See the related story on [page 14](#).

Images courtesy of (left to right) Artisan Model Mold LLC, Gesswein & Company and Integrity Tool & Mold Inc.

 VIDEO ACCESS

5 TRICKS OF THE TRADE Great Tips from This Issue

- 1. Going Hybrid**
A self-contained laser cladding head used as an add-on enables metal 3D printing capabilities to be retrofitted to an existing CNC machine.
PG. 20.
- 2. Shine On**
Performing polishing in concert with machining and establishing the right culture to communicate machining and measurement data are key to quality polishing.
PG. 24.
- 3. Measuring Up**
System components rigidity helps ensure that the operator measures the workpiece and not the flex in the measuring system. Fixed component rigidity is relatively simple, but moving elements make it more challenging.
PG. 28.
- 4. Simulate This**
CAD/CAM simulation provides support for evaluating job costs by estimating the time for each program, which provides customers with important planning and scheduling information.
PG. 38.
- 5. Money Matters**
The Tax Cuts and Jobs Act eliminated the corporate alternative minimum tax, which makes it a challenge for mold shops with average annual gross receipts of more than \$50 million to use the R&D tax credits.
PG. 42.



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Bridging the Gap Between Mold Builders and Buyers



Bridging the gap is basically lessening the differences between two things. In our industry, those two things are the mold builder and the mold buyer, who have more in common than they believe. Mold buyers and builders experience many of the same challenges for which they are each seeking solutions, and that is where Amerimold comes into play. Amerimold highlights those similarities through the technology and processes on display (see the exhibitor product showcase on **page 50**) and the topics presented in the showfloor Tech Talks program.

Here is this year's program:

The Future of Making Things (*Omega Tool, CS Tool Engineering, Eifel Mold and Engineering and Autodesk*). Automotive mold manufacturers reveal how they are leveraging the latest advances in manufacturing for prototypes and production runs and how they are capturing, analyzing and managing sensor information from products in real time.

Avenues to Additive Manufacturing (*Proper Group International, Avante Technology LLC, Linear AMS and Forecast3D*). Additive manufacturing users share how to use a hybrid laser metal sintering/high-speed milling approach, ease into 3D-printed injection molds, build direct metal-laser melted parts and conformal-cooled inserts and use Multi Jet Fusion technology.

Leadtime Leader Awards: Honoring Excellence in Mold Manufacturing (*Cavalier Tool & Manufacturing, Westminster Tool and Industrial Molds*). To mark the 15th anniversary of the Leadtime Leader Awards, past recipients share the impact of winning and how their companies have grown.

Best Practices in Closing the Skills Gap: Local Activism Moves the Dial (*AMBA*). This panel provides implementable take-aways to fill the skills gap in local communities.

Supporting the Supply Chain: From the Custom Molder's Desk (*Sussex IM and AI Tool*). Custom injection molders will learn a strategy for investing in tooling personnel to support their original equipment manufacturer customers, and mold builders will learn how to best support, understand and manage the custom molder.

Proactive Strategies to Troubleshoot Mold Performance Issues (*Mold Trax and Beaumont's AIM Institute*). This presentation brings processing and tooling together to explore strategies to optimize mold performance, maintain efficiency, maximize part quality and minimize machine downtime on many different types of injection molds.

Melt Delivery Systems Required for Scientific Molding (*ROI Industries and Scientific Molding*). This presentation dissects the melt delivery system into the required steps for processing a pellet into a quality part and links each step directly to plastic injection molding issues, their sources and potential solutions.

I look forward to seeing you in Michigan! **MMT**

Christina Fuges

Christina M. Fuges
Editorial Director

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THIS MONTH ON moldmakingtechnology.com



VIDEO: Summit Tooling Reshapes Milling and EDM Processes with Automation

Among many die/mold shop owners, automation has been viewed as expensive, complicated and better suited for higher-volume production of milled parts. Dan Martin of Summit Tooling outlines how his mold shop identified and adopted low-volume, high-mix automation to improve the quality, costs and lead-times in the face of skilled-labor shortages. Through investments in automation, Summit Tooling has managed to double its sales while continuing to run one shift with the same number of employees, thanks to unattended, lights-out operation. Video courtesy of Makino. short.moldmakingtechnology.com/sumtooling

ZONE: Amerimold

Access all of the latest news, articles, columns and blog posts on the upcoming annual moldmaking event from *MoldMaking Technology*. Amerimold 2018 will take place June 13-14, 2018, in Novi, Michigan. moldmakingtechnology.com/zones/amerimold



WEBINAR: How to Improve Your Mold Design Workflow

In this webinar, you will learn by including modeling for manufacturing and simulation early can help you make manufacturing 'sense' out of virtually any CAD format file.

short.moldmakingtechnology.com/workflow



BLOG: A Look at Mold Texturing

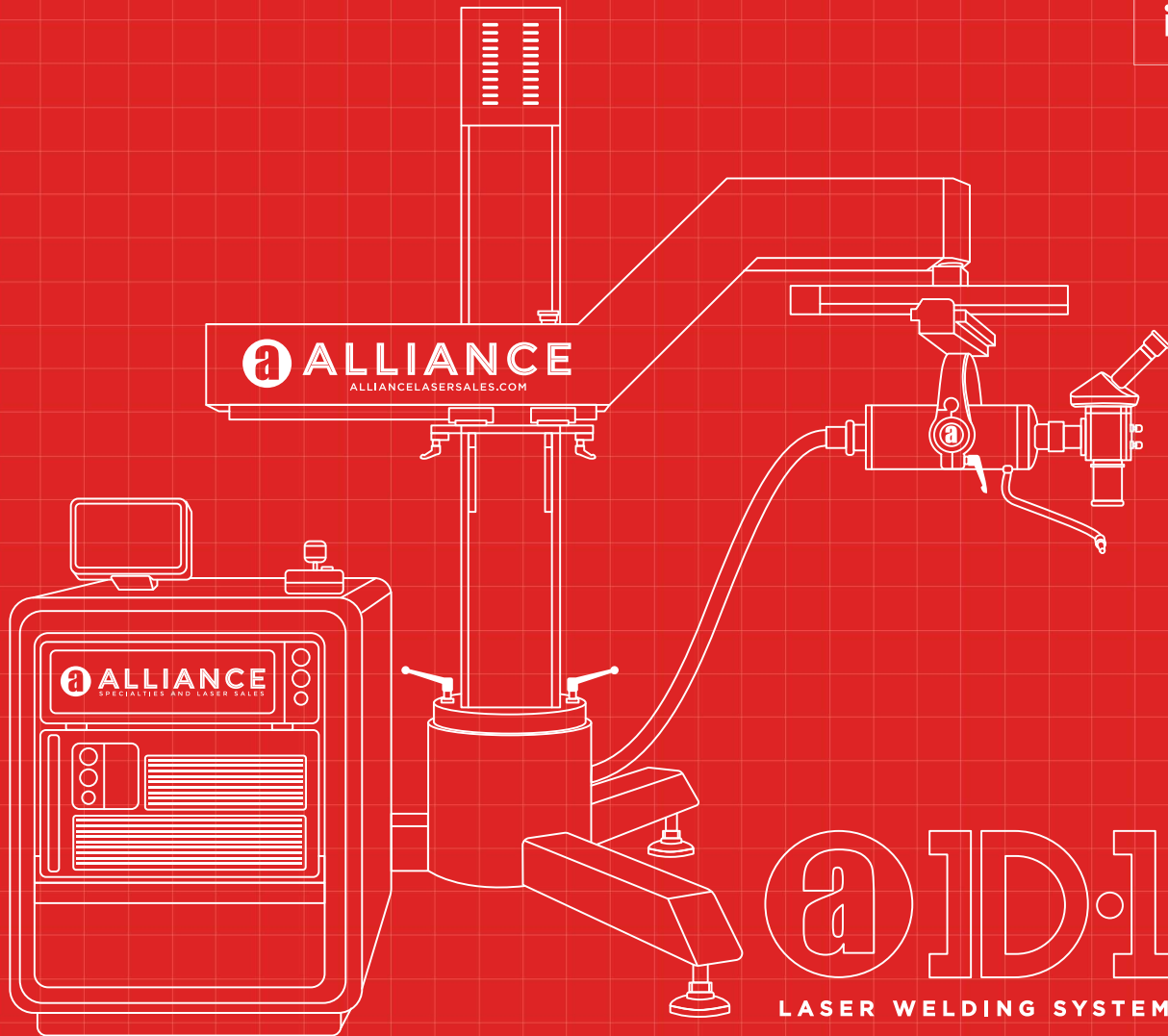
Laser texturing, if understood and appreciated, can open up the door to endless possibilities in texturing, according to this texture house. moldmakingtechnology.com/blog/post/a-look-at-mold-texturing



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No-Nonsense Ways to Promote Moldmaking as a Career



Francine Petrucci

President
B A Die Mold Inc.
Aurora, Illinois

Francine Petrucci, MMT EAB member and president of B A Die Mold Inc., believes that the moldmaking industry has hit the perfect storm: College tuition is sky high, and graduates are struggling to find good-paying jobs. STEAM (Science, Technology, Engineering, Art and Math) curricula and new machining and welding programs at high schools and colleges have seen a resurgence. Together, it presents moldmakers with a golden opportunity.

Promoting mold manufacturing careers to parents, teachers and kids as a smart, rewarding and affordable alternative may seem like a daunting task, but it does not have to be. Here are some no-nonsense steps for getting started.

The single most important thing you can do is establish a relationship with your local high school or community college. Call the administrative office first, as the people who work there are the gatekeepers and can tell you whether they have a machining program. If the school has one, ask for the right person to contact. If it does not, it probably has STEAM programs in place and someone who oversees them. Many STEAM classes incorporate CAD and 3D printing instruction, which provides a stepping stone toward advanced manufacturing.

Next, ask to visit the school to see what it teaches and how it equips its classroom or lab. Offer to do a presentation to the class about careers in mold manufacturing. Bring something to show like a core and cavity stack from a recognizable product, or show the MMT-sponsored video titled "Mold Making: Your Road to Success" and share your personal career path. MMT's website has many useful resources.

Offer to sit on advisory boards associated with the classes. Don't panic! Most advisory boards meet only quarterly and are well worth the time away from the office. This is an opportunity to help guide the creation of meaningful, real-world curricula. Some of my colleagues have employed shop instructors for the summer, giving them a taste of how a modern shop is run, enabling them to hone their machining skills and to build on an invaluable relationship. Once you have a great rapport with the instructors, they are sure to think of XYZ Mold and Die when the right student enrolls in their class.

Finally, consider hosting an open house, preferably on a Saturday so students and their parents can attend. Provide a tour that highlights all the possible career options that open up after completing an apprenticeship. If a weekday event is a better fit, work with your instructor liaison to develop a class project where students design a metal component in class and then come to your shop to see it manufactured from job planning to finished part! [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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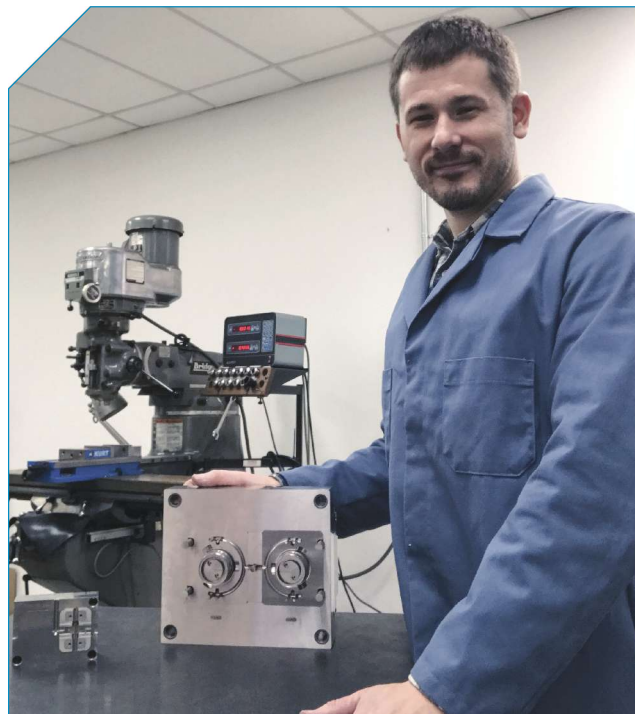
Artisan Model Mold LLC

Artisan Model Mold LLC (Artisan) is a family shop that you took over from your father and built into a small business. What has been your philosophy for doing that?

Jonathan Stanwick, owner: First, “you go to war with the army you have,” and then you do one thing better than yesterday. Every day, do something to get better somehow. That’s how you build a business. That’s how you become faster and smarter with more technology and training.

Like many mold builders, Artisan was started by your father in a garage. You mentioned that he was known for using innovative ways to make complex molds with only a Bridgeport and Hardinge lathe. Can you explain that more?

Stanwick: My father worked as a model maker for Thomas and Betts (T&B), a manufacturer of electrical and communication connectors and components, and would spend his nights at home in the basement fabricating models and injection molds for customers. Once T&B relocated its facility from New Jersey to Tennessee, he decided to officially launch his own company. He then worked in his basement and garage doing custom cavity prototype injection molds for medical device inventors and start-up companies. He found ways to make some fairly complex tooling and molds without a CNC



Images courtesy of Artisan Model Mold LLC.

Here, Artisan Owner Jonathan Stanwick shows an example of the company’s prototype molds.

or EDM machine. His molds were like puzzles that he would solder together. They are still works of art that continue to inspire me today. My father intentionally named the company as he did because an artisan, by definition, is a worker in a skilled trade, especially one that involves making things by hand. That was my dad. His roots as a model maker and tool-maker make “Artisan” the perfect name.

It sounds like over the past 10 years you have taken your father’s garage business and turned it into a competitive mold shop. When did technology begin to transform the company?

Stanwick: Equipment and technology came along when I stepped into the business in 2008. We were still working out of the basement and unable to quote projects because we couldn’t make the molds. The complex geometries and 3D models demanded a certain level of technology that we did not have. It required us to subcontract the work. It was then that I decided that we needed to invest in the necessary equipment to do the work ourselves. Of course, this was probably the worst time to make this move, as we were in the Great Recession. We bit the bullet and purchased our first CNC machine, a Haas mini mill. This machine was from a solid brand with great technical service, and it could fit in our garage. This investment elevated our shop’s work, which then



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- Was founded by model maker Ronald Stanwick in the early 1990s.
- Is a small family shop that became a small business.
- Fabricates tooling that requires insert molding, multi-cores and injection molding.
- Caters primarily to the medical industry for prototype and short-run injection tooling and molding.
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Artisan Owner Jon Stanwick says that this prototype mold and two-cavity insert injection mold (left) are two specialties of the company.

prompted us to move out of the basement and into a facility of our own with more space for growth and better equipment, organization and customer service. By 2012, we were up and running and adding employees and more new equipment, including molding machines like an Arburg and Boy vertical molding machine. Today, we have four employees.

When did you get into molding?

Stanwick: My father always did the moldmaking and molding for prototypes, but we expanded that work into production runs. Today, we have two molding rooms. One room is dedicated to production runs with our Arburg and Boy machines. The other room is our prototype development room with four custom-made hand-press machines for our prototype, small-volume parts. This can be a cost-effective option for some projects, as opposed to setting up in a bigger molding machine which can become expensive. We use the hand-presses for sampling from a couple hundred parts to 10,000 parts.

These two rooms make it possible for us to offer customers the option to set up on either, depending on the application. This is the value that we add. We cater toward making prototype molds for part validation and four- to eight-cavity production tools for short runs (1,000 to 500,000 units).

What is Artisan's specialty?

Stanwick: A key specialty is designing and building molds for insert and over molding and molding the parts with our vertical press. We did a one-cavity prototype mold project for a medical customer's new product recently. The customer requested some

areas to be steel-safe to ensure the right fit, so we engineered the mold to give the customer the ability to interchange the core pins for testing the parts as they were moving. We also designed the mold for versatility so that we could make changes economically without rebuilding and re-burning the mold. The ultimate goal of our prototype work is to design the molds with ease of interchangeability in mind.

What projects have challenged the team?

Stanwick: Recently, we did a very complex, delicate insert-molded prototype part, which we had to manually insert into the

mold. The project was for a medical device company. It was really challenging with respect to the mold and the molding. It required a three-plate mold to produce a few thousand ultra-clear nylon parts that needed to meet specs and be cosmetically acceptable.

Another challenging project involved a two-cavity insert mold for a nozzle. There were two, 2-cavity molds with one mold inserted first then the part was placed into the other mold for another inserting around it. It was basically over-molding on another over-molding. It took most of the summer to build all of the tooling.

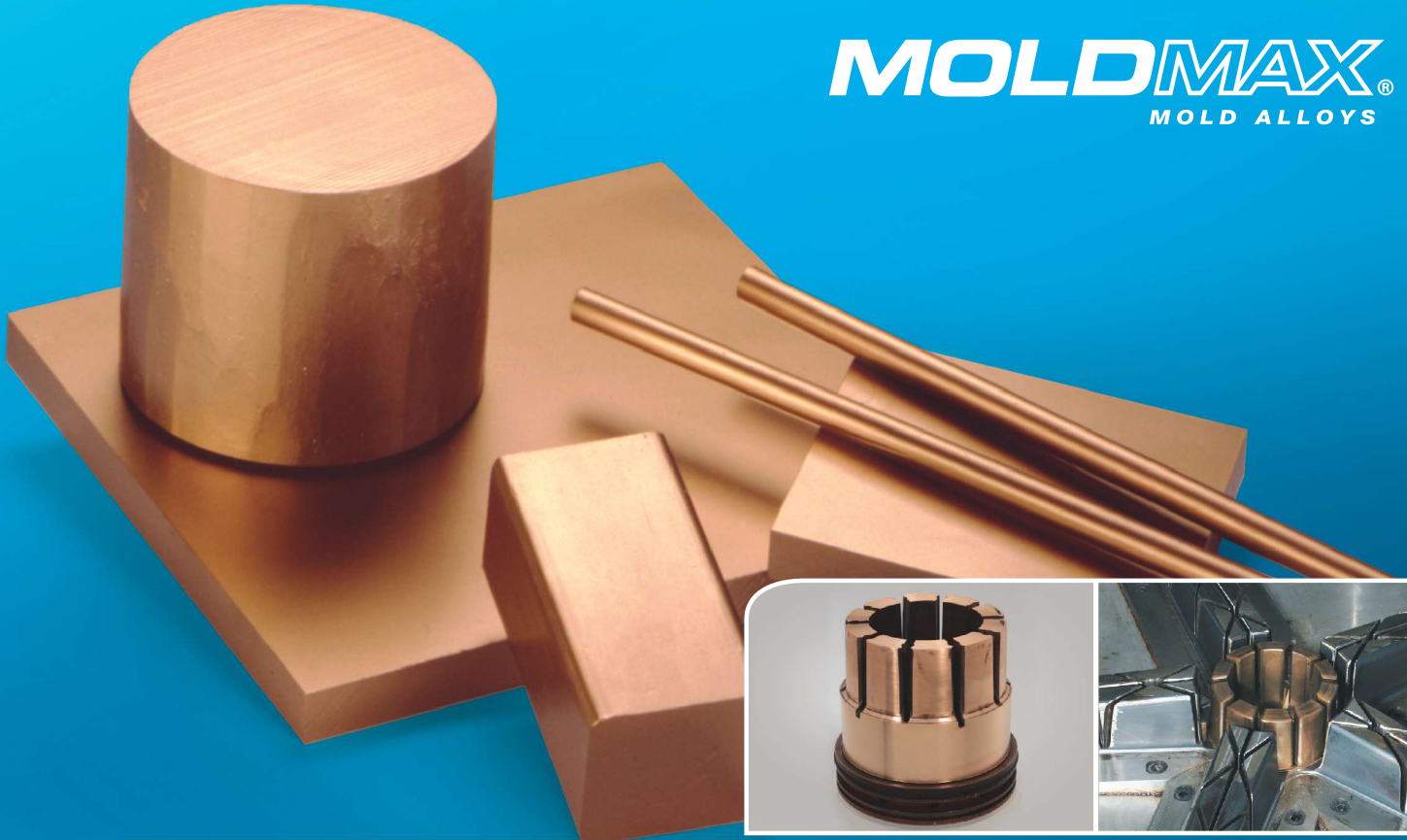
You said you never formally apprenticed as a moldmaker, so how did you learn this highly skilled trade?

Stanwick: I learned by watching my father every day. Plus, he taught at a local vocational school where I attended a few classes. For the most part, it was my father and our friend Tony Kuklo who became my mentors for designing and building high-precision tooling. However, I do see the value of apprenticeships, and just as I helped to take Artisan to the next level in technology, I am working toward developing a formal apprenticeship program for our next hire. We need to build a program to bring in and produce the talent that we need after we find candidates who possess the necessary passion required to make it in this trade. [MMT](#)

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One mold builder leveraged ERP software to maximize its productivity and achieve consistent, on-time delivery.



Detailed information about every job is never far away. Here, moldmaker Bob Kimberly fits slides while surrounded by a CAD workstation equipped with Synergy and a schedule monitor for the mold assembly area.

In moldmaking, traditional production planning starts off with mold design, machine scheduling, outside services scheduling, assembly and quality and then finishes with the hope of hitting the promised delivery date. With enough experience, most moldmakers get pretty good at predicting the future. But, is pretty good enough?

Many leading shops are considering enterprise resource planning (ERP) to improve their competitive position. When implementing ERP, shops conventionally cram the schedule full of the required operations to complete the job as quickly as possible. This may not be the most effective method. Consider turning tradition upside down and starting with the end in mind by using the delivery date and scheduling the process backward. For one mold builder, the overall benefits of this approach have been amazing.

Three years ago, Quest Industries (Quest) began the journey of ERP implementation in earnest. In 2006, it started using an ERP system but never really tried to understand all of its capabilities. As the company grew, Quest Industries President Dennis Hoover realized that he needed more information instantly to make the decisions necessary to take the company to the next level of performance. A year after searching for a solution, the Quest Industries team selected Exact Synergy Enterprise (Synergy) combined with its existing JobBOSS ERP to integrate, manage and control its workflow.

Despite all the hard work, the company was not impressed with the results two years into the implementation. The shop had more information, but there was little change. Quest developed a lot of numerical information regarding its productivity, machine use and material resources but could not get the data into a format that would enable the shop to predict delivery accurately. The team was not fully using the Synergy system. It was not until Hoover discovered Joshua Eddy with business management consultant The Attivo Group that things started to take off.

JobBOSS ERP is Quest's primary ERP system, Unipoint is another system that Quest uses in its quality department, and Synergy is the glue that ties all the information together.

Images courtesy of Creative Technology Corp.

Synergy visualizes the collected data and improves communication among all parties. The system coordinates workflow management, document management, project management, customer relationship and business process management across the entire company.

Approaching ERP

Implementing an ERP system company-wide requires a lot of planning, effort and monitoring to ensure success and to minimize problems. Quest spent a year working with an outside consultant to implement its ERP system fully. The consultant's experience saved time and prevented costly mistakes that someone with less experience would make, according to the company.

Quest's implementation was not easy. The shop had to clean up a lot of legacy data and collect information from the existing ERP system, spreadsheets and manual records. The shop also needed to update the internal network and servers to accommodate the new system and install monitors and computers into all the manufacturing cells.

Hoover knew that in conventional strategic planning, one starts with the goal, develops the objectives and then adds tactics to achieve the goal. For example, to achieve the goal of increasing sales by 20 percent, one needs to work backward and figure out how many additional projects are needed and how many prospects are required to fill the sales pipeline. Hoover and his company followed this same logic and started looking at job planning with the delivery date and working backward.

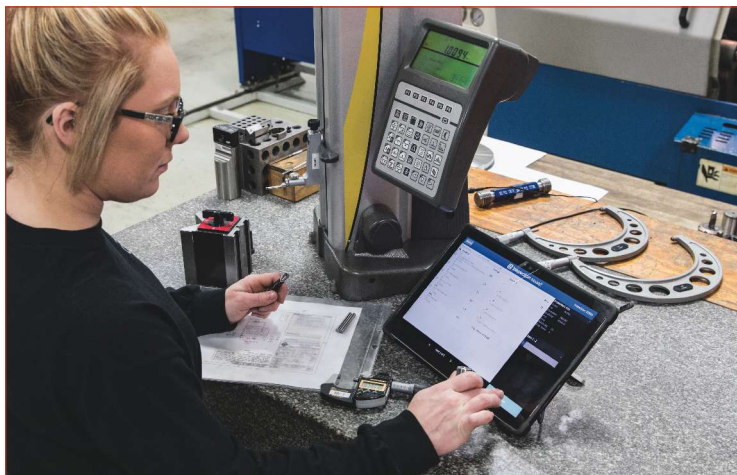
The ERP system is only a tool in Hoover's quest to continuously improve performance. He believes it is the people who make it happen. "It's easy to forget that the success of the system depends on the people who use it," Hoover says. Hoover lives by the words of Author Stephen Covey, who said, "An empowered organization is one in which individuals have the knowledge, skill, desire and opportunity to personally succeed in a way that leads to collective organizational success."

Implementing ERP

Today at Quest, computer screens are installed at every manufacturing cell, shop floor personnel see everything happening in real time, and project schedule changes are instantly

AMBA Plant Tour at Amerimold 2018

An added educational opportunity this year is the popular AMBA plant tour workshop. On Tuesday, June 12, Quest Industries will open its shop doors in Lapeer, Michigan, to share the success of its ERP implementation because this mold builder believes that "communication is the fix to all problems." Limited seating is available to mold building operations only, so register today at amba.org. It takes place 12:00 p.m.-7:30 p.m. (bus loads at 11:45 a.m. from Suburban Collection Showplace).



Inspection information is tracked throughout the shop in real time using uniPoint Inspection Mobile on tablets. Here, CNC lathe operator Brook Ellsworth records critical measurements from a turned part.

recognizable. Communication improved because everyone is working from the same real-time information. The entire team has visual accountability from monitors installed at each workstation.

Employees no longer need face-to-face meetings to update everyone, which has reduced interruptions by 70 percent. Now, updates are provided through the ERP system. And, operators no longer interrupt a program manager to report a delay. Instead, program managers and operators manage communication using Skype to report problems and delays without leaving their workstations.



Synergy has had a dramatic impact on communications, virtually eliminating endless little powwows on the shop floor. The detail and clarity of the information from ERP has made sales and production meetings more efficient and meaningful.



A CAD layout of the shop floor provided the inspiration for Quest's Synergy user interface. Machine operators can simply touch the desired machine to open detailed information about current and upcoming machine tasks.

Quest is an unusual moldmaker because it builds molds and does prototype and detail machining. The scheduling requirements for the wide variety of projects at Quest are very different from the scheduling requirements at other shops. Production molds, prototype and detail machining work well

with backward scheduling methodology while repetitive jobs and extremely hot jobs work better with forward scheduling. Hoover and his team spent a year evaluating whether to use forward or backward scheduling, as ERP systems require the use of one method. Since building production and prototype molds is the majority of the company's work, the shop chose backward scheduling.

Improving Performance

ERP software, scheduling and schedule adjustment are critical to maximizing machine use when it comes to correctly scheduling the constantly changing mix of detail machining and molds. Today everyone has visibility. For example, as soon as an operation is complete, the software automatically schedules it to the next workstation. Operators no longer need to leave their workstation, walk to the program manager and receive their next setup.

Inspections are now paperless with uniPoint Mobile. Tablets at the machines and on the shopfloor benches collect data. In multiple part runs, like detail machining and high-cavitation molds, Synergy sets the inspection frequency and retains the time stamp to avoid rushed reports at the end of each shift. If the staff does not perform inspections at the

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scheduled intervals, Synergy sends out alerts for corrective action. Synergy is the communication command center that expands the performance of the ERP system by integrating JobBoss and uniPoint.

As a bonus, machinery and inspection equipment, preventive maintenance and calibration are now scheduled into the workflow, which results in improved performance and reliability. The old method of waiting until there was open time for a problem was far more costly than this new, proactive approach.

Changing Culture

The biggest benefit to Quest's project scheduling is to the company's culture. Before ERP, decisions were dictated to the shop floor. Today, the shop floor personnel can help make decisions using their firsthand perspective and understanding of machine capabilities. For example, when a project hits the schedule for which the operator thinks too much or too little time has been allocated, he or she reports the discrepancy. This results in better machine efficiency and a significant reduction in outsourcing.

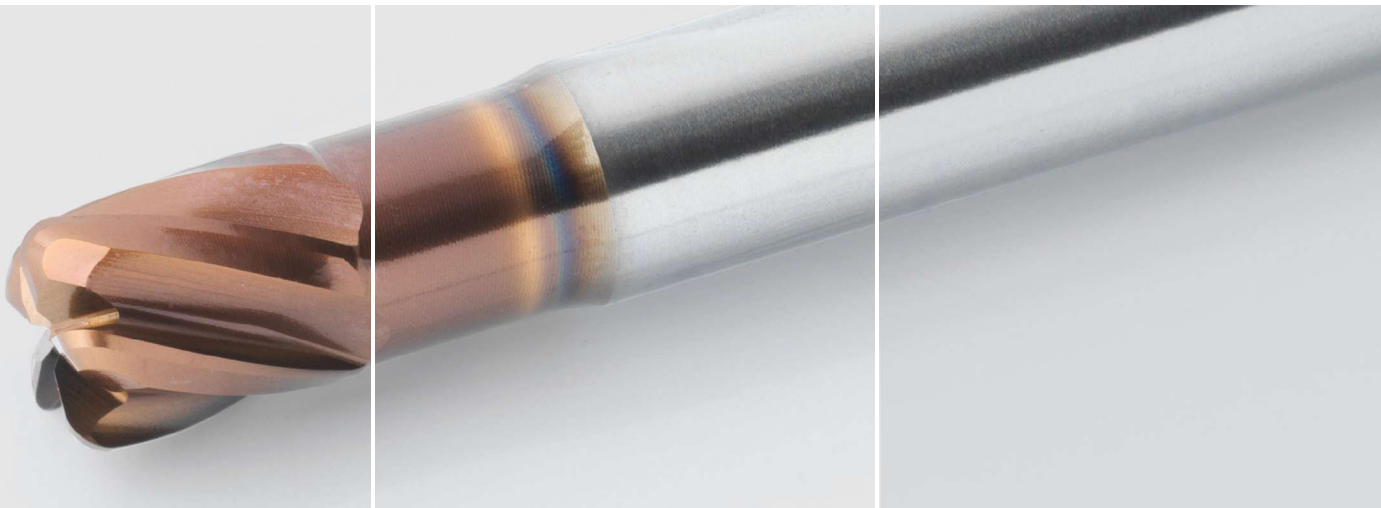
"We've eliminated paper travelers," Hoover says. "The software creates digital travelers that are automatically updated

as soon as someone makes a change to a project. This eliminates the problem of lost or multiple outdated travelers on the shop floor, reducing the chance for errors."

Managing the change has been the most challenging part of the implementation. It required a cultural shift. This came as a surprise to Hoover. To him, scheduling by starting with the promise date and working backward seemed superior to what they were doing. However, as with most instances of cultural change, it was difficult to get everyone moving in the same direction. "It wasn't until after we had a few small successes that we achieved widespread adoption," Hoover says.

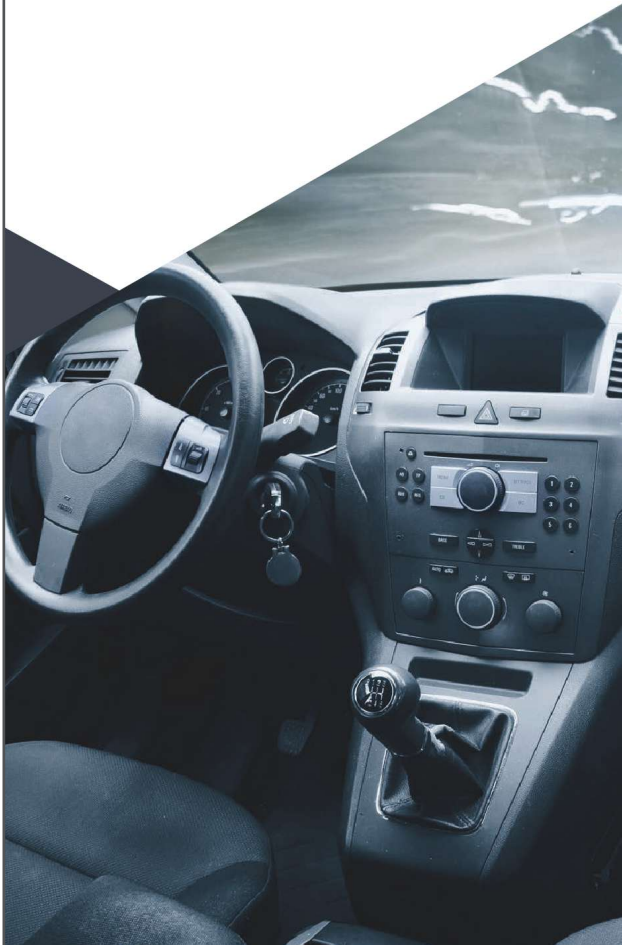
Often, people find it difficult to switch to new ways of doing things if the benefit is not obvious. With an ERP system, many employees' level of responsibility increases because the shop floor drives more of the decision making. As new information becomes available, processes evolve. It becomes easier for people to embrace the change as the system proves itself.

Hoover's philosophy is "there is always a way to do it better, and we have to find it. We hire smart people who care and channel their drive for success into our business. We work with the knowledge and satisfaction that each of us





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Quest's entire facility is organized by work cells, grouping machining and operator functions for maximum productivity.

makes a difference." The implementation and success of ERP have been a big step in this journey.

Taking the Next Step

The next step for Quest was centralized purchasing, so a single department directs all materials, supplies and outside services. Previously, department managers were responsible for obtaining their supplies. "Centralized purchasing gives us better control of inventory and reduces overhead expenses and outsourcing," Hoover says.

By consolidating purchasing under a single department, Quest can negotiate better prices, consolidate shipping costs and develop more favorable purchasing terms. Internally, systematic accounting of materials will prevent shortages and duplicate inventory, reducing Quest's overall stock.

Hoover says, "We have come a long way with our ERP implementation. We are getting more done in less time. Our quality has improved and, ironically, we don't feel like we are as busy as before because the firefighting has diminished. We have become a forward-thinking company." 

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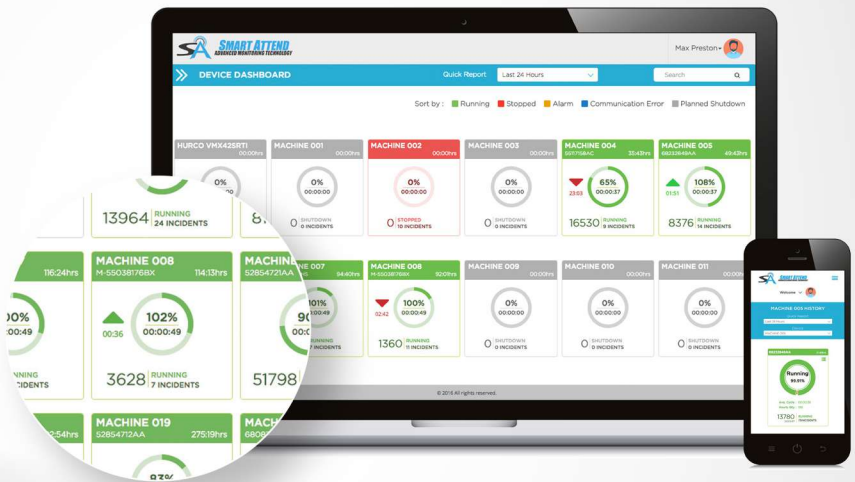


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A HYBRID APPROACH TO MOLDMAKING

When considering hybrid machines for mold manufacturing, it's important to get the facts to manage expectations of this emerging technology.

The manufacturing industry will always pursue streamlined solutions that lower costs, improve quality and increase profits. Hybrid manufacturing has the potential to do all three. Today, hybrid manufacturing most often refers to the combination of metal additive and subtractive manufacturing in one machine. To better understand the benefits of a combined technology, it is vital to first understand the limitations of 3D metal printing in its current state.

Metal parts created using 3D printing typically need to undergo some form of post-machining. Several factors result in the need for post-machining. First, 3D-printed metal parts have relatively poor surface quality because they are built layer by layer, and they often need supports to ensure that a part does not collapse during its build. Unlike plastic 3D printing, the supports for metal parts cannot be simply snapped off of the part. Instead, the supports must be

machined or ground off of the part and the remaining surface must be finished for the sake of the part's appearance.

Also, post-machining may be needed if there are fine features that will impact the part's functionality. For example, if the design calls for threaded holes, then it is necessary to tap and thread those holes in a separate operation. This is also true for any surface that must be very flat and smooth, like a cylinder or a gasket seal. Roughly two-thirds of all 3D-printed parts require some form of secondary machining before being finished.

Laser cladding can be fitted to a conventional CNC machine spindle to convert the machine to a hybrid manufacturing state using the head shown here.



Images courtesy of Star Rapid.

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Hybrid Benefits

While secondary machining does not always involve CNC machining, that is the most common process that machinists use on 3D-printed parts. Right now, the majority of these parts are 3D-printed on one section of the shop floor and must then be moved to another department for CNC machining. This is why hybrid manufacturing is worth consideration. It offers the ability to make a finished part in one setup.

When milling and turning are on the same machine as the printing, machinists can reduce setup time: one machine means one setup rather than two. Very complex and high-value parts, such as conformal-cooled injection mold inserts, may benefit considerably.

Setting up a single machine also eliminates the possibility of specifications being misinterpreted in between processes as the part is passed from one

This hybrid strategy has the potential to open up the technology to various new applications like bi-metal mold tools that combine superior thermal properties with high strength and durability.

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machinist to another, who must input a whole new set of parameters into his or her machine. Combining these two processes can reduce labor hours and turn-around time, creating benefits for both the manufacturer and the customer.

Being able to optimize floor space for multiple operations is another advantage of a hybrid machine. Powder-bed, metal 3D printing requires specific fire, health and safety precautions because of the fine metal powder that is used in the process. On their own, 3D printers need dedicated, sealed spaces with negative air pressure and air purification equipment. These measures prevent the powder material from leaving the enclosure.

A hybrid approach would also enable a new strategy for building certain parts. CNC machining by far remains a quicker and more cost-effective process for metal part creation. Depending on a part's design, having both capabilities within a single piece of machinery would make it possible for most of a part to be machined with CNC machining, and then complex features would only be 3D-printed when it makes sense to do so. Imagine a part that has a threaded hole deep inside of a recessed pocket. It could be CNC machined and then 3D-printed on top of that. The two approaches are currently considered separate process steps that are taken in series. In the future, it will be possible to engage in those steps in an alternating fashion, leveraging the advantages of each process solely on the features that require them. This would truly enable the production of parts that were previously impossible to make.

Machinists could also use this approach to machine a part out of one type of metal and then 3D print on top of it with a different type of metal. This hybrid strategy has the potential to open up the technology to various new applications, such as bi-metal mold tools that combine superior thermal properties with high strength and durability. For example, heat-treated tool steels are more durable for long-lasting injection mold tools, but aluminum has superior thermal properties. Combining aluminum and steel would make a stronger mold that can be heated and cooled faster.

Technology Outlook

The development of today's hybrid machines has taken many forms. Some equipment makers are designing all-in-one machines. These units are large, have a big footprint on the shop floor and can be quite expensive, so manufacturers need to be sure they can justify the expense for this kind of investment.

As an alternative, other developers are delivering solutions for preexisting equipment. For example, a self-contained laser cladding head that is used as an add-on makes it possible to retrofit metal 3D printing capabilities to an existing CNC machine. It is important to understand that this type of laser beam melting only works in applications that do not require cleanroom conditions. However, this option is less expensive, uses current equipment and floor space and can facilitate a manufacturer's transition to this new process without a huge cash investment.

While hybrid manufacturing technology presents numerous benefits, it is still largely unproven because of a lack of applications to justify the cost of the machinery. However, as the technology further develops and undergoes testing, the benefits will become clearer, and its accessibility to the marketplace will improve. **MMT**

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Polishing Requires Local-Level Communication

A focus on machining and measuring when polishing saves time and improves part quality.

Steve Smith considers himself a polishing coach. He is a big believer in taking work up to a very fine finish with abrasive stones using a crisscross method and then using a minimal amount of very fine diamond compound to do the final polishing. He learned this approach back in the 1970s, and it has served him very well throughout his career, including in his current role as a polishing instructor.

“Polishing is simple. It’s more about how you apply it,” Smith says. His standard process involves using general-purpose, middle-of-the-road hardness stones. Depending on surface roughness, he typically begins with a 400-grit stone, then a 600-grit, a 900-grit and sometimes a 1200-grit for the required finish.

“For example, if you’re going to an SPI A1 finish, the finer the scratches (peaks and valleys) are before you go to a diamond compound (loose abrasive) from a stone (fixed abrasive), the less the pattern of the scratches will show through (orange peel),” Smith says. That is why he likes to go up to at least a 900-grit stone, and if the surface needs a super finish, he will go one step further and use a soft 1200-grit stone.

The type of steel and the hardness dictate the process. Stones will rip and tear the surface of a 46 HRC 420 stainless steel or H13. Going finer and softer will yield finer peaks and valleys. Material with a hardness around 50–52 HRC will stone better. It will not rip and tear, so the polisher can get by with one less stoning operation, according to Smith.



Within these polishing classes, students use the latest technology in tools and equipment while learning standard and efficient techniques to optimize polishing and improve quality. Participants will receive a certificate upon completion. Classes are limited to eight registrants per class.

Instead of reviewing his step-by-step guide to polishing, he shares some insight into a few of the critical factors that contribute to a quality polish.

Machining

Smith’s number one rule is “perform polishing in concert with machining.” This essentially takes communication and information. “Establishing the right culture to communicate properly is key. The machining department must know what the polishing department is facing upfront instead of relying on a ‘the polisher can fix it’ strategy,” Smith says. He recommends “going backward.” Going backward means that everyone has to help his or her internal customer, which is the person who comes

next in the process. So, the machinist's internal customer is the polisher, and the polisher's internal customer is the actual customer, according to Smith.

The more a machinist helps the polisher, the better the product is going to be. Achieving a better product requires a conversation between the machinist and polisher. Knowing the required final dimension and required final polish at the start of the job is essential. So, the polisher knows the required finish, but what needs to be done to achieve that finish? Machinists often ask polishers how much stock they are going to take off to get a particular finish, but the answer is not that easy to provide, according to Smith. The customer will get better parts if there is enough stock to polish.

For example, consider EDM. Smith notes that often the machinist asks the polisher, "How much stock are you going to take off of the EDM finish? To which the polisher replies, "Well, how deep are the EDM pits?" The polisher can guesstimate how much stock he is going to take off, but it takes measuring the surface and years of practice for the machinist and the polisher to come up with

It All Starts with Engineering

Designers from a customer often disregard how the mold is going to run or how the parts are going to come out of the mold. They design parts with no draft, half-inch deep ribs, sharp corners and straight walls, which are contrary to good molding conditions. Then, when personnel comes out to test the mold, the personnel disagree with the customer's requirements. "Customers demand things they don't need, so communication becomes essential," Smith says. "For example, if the part has a sidewall and a flat straight surface with no draft in the rib, it's very easy to polish in an undercut a few tenths of a thousandth on the sidewall. It's really easy to create an undercut without even trying, so it is important that the designer makes room for some draft so that the polisher can polish it."



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Steve Smith, a master mold polisher with more than 50 years of experience, leads a two-day course providing intensive, step-by-step instruction in the polishing process and introduces trainees to the latest polishing equipment.

the right answers. On top of that, many polishers have never actually measured the amount of material that they take off to achieve a certain finish.

Measuring

“Let’s say you have to have a high polish with no scratches (an SPI A1 finish). You might start off with a 400-grit stone and follow that up with three or four more steps, so you need to know how much material you’re going to take off with each step. If you’ve never measured it, you don’t know. This takes time,” Smith says.

Although this does take time, it simply entails using measuring equipment, such as a dial indicator and finding out how much stock a polisher removes. The goal is not for the polisher to achieve a certain size, but for the polisher to measure with each step how much he removes from the surface and record that measurement to establish a history of how much he removes.



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It's a visual, manual method. The polisher is always removing the preceding scratches that he creates. Smith recommends using a crisscross method. "Make all your scratches with a 400-grit stone in one direction, then when you move onto the 600-grit stone use it in a different direction, so you are removing the 400-grit stone scratches. You measure with the 400-grit then measure with the 600-grit, and you'll calculate how much you removed," Smith says.

Basically the polisher, using a crisscross polishing method, sees the removed stock and can then easily measure it. Smith warns that sometimes the shape of the part prevents using the crisscross method. However, if the polisher has a history of the amount of removed stock, he can still measure and be fairly certain that he removed the preceding step.

Note that machinists and polishers must be honest about what they are measuring. Some people use an inspection sheet but wait until all the parts are finished and then place a checkmark all the way down the sheet without

measuring each one. They make the mistake of measuring the first one and then assuming that the rest are all the same.

It's important for the polisher to know exactly how much stock he or she takes off, so he can share relevant information to the process to save time. It is essential to have a means of communicating that data. It's about the value of measuring and communicating that information, which in the end improves the process and satisfies the external customer. **MMT**

About Steve Smith

In 1964 after high school, Steve Smith started working at Wilkin's Mold Polishing, which was the only mold polishing shop in the western part of the United States that trained polishers. In 1972, the company closed its doors. Smith moved to Samson Mold, a 20-person shop where he worked hand in hand with the EDM and grinding departments, learning the value of good communication. In 1979, he got an offer from Caco Pacific to run its polishing department. Five years ago, Smith retired but accepted a position as a consultant and instructor for Gesswein & Company's polishing course, which to date has taught 400 students across North America.

FOR MORE INFORMATION

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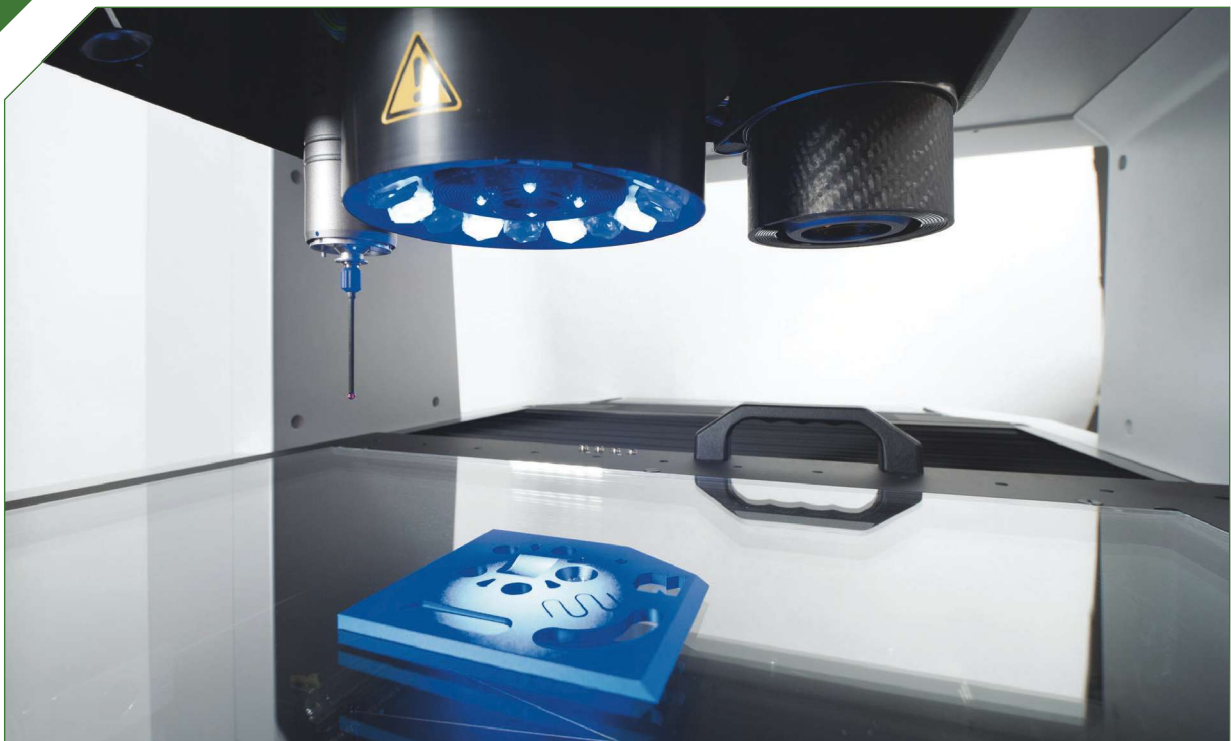
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Making a Metrology Match

Price, accuracy, flexibility, speed, efficiency and ease of use help determine the best inspection/measurement solution.



Images courtesy of Carl Zeiss Industrial Metrology LLC.

Today, a shop can get the required functionality from inspection/measurement systems without spending more than necessary. The challenge is striking the right balance between a shop's needs and the overall equipment costs. While the price of a system may be the only fully definable cost at the time of purchase, determining the best option involves accuracy, flexibility, speed, efficiency and ease-of-use considerations, which can have financial ramifications directly affecting the total cost of ownership and operation.

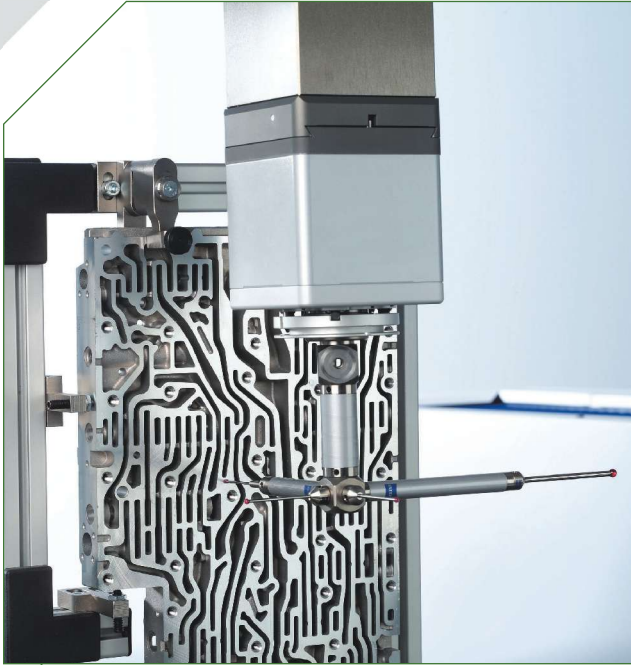
Accuracy

Accuracy is an essential consideration. For example, accurate identification of conforming and out-of-spec parts maintains quality, protects the integrity of the entire production process and reduces scrap rates. Protection from temperature

fluctuation and shop floor conditions enables inline installation, reducing the cost and delay of transporting parts for testing and enabling faster identification and correction of production problems.

The necessary degree of accuracy can vary depending on the application. A system's capabilities should match current and future needs. However, accuracy is not a uni-dimensional metric like horsepower. A system's accuracy depends on how one uses the system. This includes the sensors necessary to measure the workpiece, the workpiece shape, the angle at which the system must approach the workpiece, the required

This multi-function measurement system offers flexibility from its multiple sensor options that enable the user to maximize the return on investment.



This coordinate measuring machine uses active contact scanning, which makes it faster and more accurate than the “spot checks” of a touch-and-go system.

probe length when working in deep holes and more.

Many factors contribute to a system’s accuracy, including its design and construction. For example, resistance to temperature fluctuation, which can be affected by design, material choices and insulation, ensures that measurements are both accurate and consistent. It can also reduce or eliminate the need for mathematical compensation and make it possible for an operator to install the system on the shop floor rather than in a costly, often remote or environmentally-controlled lab.

The rigidity of the system components also helps ensure that the operator is measuring the workpiece and not the flex in the measuring system. Fixed component rigidity is relatively simple and straightforward, but moving elements make it more challenging.

Fixed component rigidity refers to the stiffness of the measuring equipment’s frame. For example, the frame holding the table and detector inside a computed tomography (CT) machine, which can measure a mold. The more rigid the frame, the lower the source of measurement errors. Moving elements, such as a rotary table that holds a mold or an articulating probe head in a coordinate measuring machine (CMM), make it more challenging. The heavier the moving part, the higher the inertia of motion that challenges the ability to precisely control its position during measurement.

Measurement technologies available today are many, but each has its place. For example, plastic injection molding

requires CT technology (like an MRI scan) to accurately see and measure a mold’s inner dimensions. Or, automotive powertrain applications require the most accurate tactile measurements for checking surface roughness and bore smoothness of engine blocks. And, medical device manufacturers require non-contact optical technology to measure three-dimensional shapes of artificial knee and hip joints. If the measurement at hand is specific, limited and unlikely to change, then a single-technology machine may be all that is required. On the other hand, if the shop’s needs vary (or may change in the future), the ability to support multiple technologies will be critical.

Flexibility

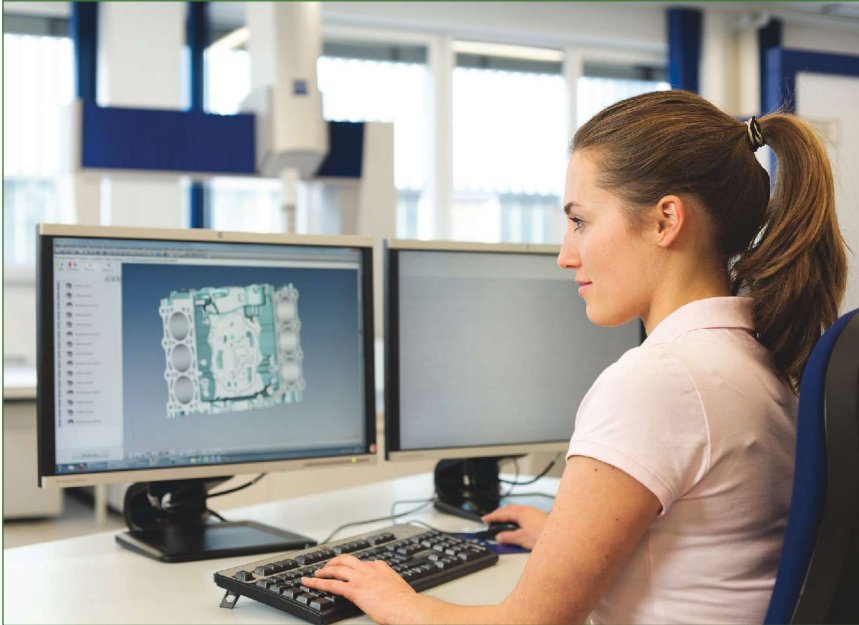
A multi-function measurement system enables a shop to maximize the return on its investment. For example, a flexible system enables right-sizing of machines, eliminating the cost of wasted capacity. A flexible system performs tactile, optical and laser measurements with the same base system, eliminating the cost of multiple machines, and a flexible system scans unknown contours, eliminating the cost of sending parts out for reverse engineering. And, it reduces the need for stylus changes or offers a quick-change capability, increasing throughput.

It is important to ensure that the measurement system has the range and level of functionality required. Consider the maximum measuring volume that the machine can accommodate. A too-small system will not handle bigger parts, but a too-large system takes up space and capital that could be put to better use. Look for equipment that can “right-size” without sacrificing necessary capabilities.

Measuring methods are another consideration. Tactile and optical techniques each have their place, and if one machine can do both well, it will yield effective measurements across the board without having to buy two machines. The system should also accommodate a range of tactile sensors. The wider the range a system can handle, the more flexibility it will provide.

Consider sensor size, the angles at which they can operate and scanning heads that offer electronic rather than spring buffering for maximum speed and accuracy. Active scanning technology makes it possible for unknown contours to be scanned, which can be particularly useful for reverse engineering tasks. For optical sensors, consider the granularity of measurement—smaller is better—and look for a choice of measuring ranges to maximize accuracy when measuring parts of different sizes. If laser scanning for extremely fast measurements of freeform workpieces is required, look for a system that offers that option.

Keep in mind when considering add-on components like more sensors, fixtures or application-specific measurement software (to increase system capabilities), that they must work together to be effective. While it is sometimes possible to integrate components from different manufacturers into a



Measurement software that can automatically create a measurement program from a 3D CAD model can drastically reduce the time it takes to create a measurement program.

single system, the more manufacturers that are involved, the more complicated that process can be. This applies both to initial integration and to ongoing operation and support. Working with a supplier that has a full range of multi-function systems and add-on components that can be purchased later is often the best approach.

Speed

In some cases, increased accuracy can be “purchased” by slowing down measuring operations and reducing throughput. That may be acceptable when time is not an issue, but when throughput is important, sacrificing speed to achieve accuracy is not an option. Slowdowns in measurement can slow down the entire molding or machining process. The right speed helps maximize throughput, which reduces labor costs and eliminates the need for additional machines to keep up with the workload.

For example, a CT system will be faster and more accurate when measuring a plastic injection mold’s critical dimensions than a tactile measuring system because the CT approach captures dozens of measurements at the same time. When measuring CNC-machined parts, a CMM using active scanning will be faster and more accurate than “spot checks” of a touch-and-go system. Once scanning has started, a system’s ability to “fly over” gaps in a contour can shorten programming time and speed up measurements. For example, this can speed up measurements when scanning overbore holes, scanning teeth of a gearwheel or scanning an interrupted plane.

Depending on the measurements being done, these capabilities can significantly shorten per-part run times and can reduce the number of machines needed to handle the workload in a busy shop. As with many “high-end” capabilities, this feature was initially available only on the most expensive systems but is now working its way down to more economical systems.

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Efficiency and Ease of Use

Metrology systems are getting smarter all the time, but people still run them. The machine's intelligence, in the form of software, has a significant impact on ease of use and the level of operator experience that is required. For example, faster programming and visual presentation of results can speed up the start and completion of operations. Look for measurement software that can automatically create a measurement program from a 3D CAD model. In mold applications, this approach can often reduce the necessary time to create a measurement program from weeks to hours.

An intuitive system with a touch screen and a user-friendly display requires less training and less operator expertise. It also can reduce setup time for experienced and less-experienced users alike. Characteristic-based software enables programmers and operators to easily maneuver through measurement plans. User-oriented features like the ability to visually superimpose actual measurements over design specifications help eliminate both out-of-spec parts and unnecessary scrapping of acceptable parts. And, if using a variety of machines, the ability to use the same measurement and quality data management software across multiple systems shortens setup time and cuts training costs.

Efficiency can be found in some unexpected places too. Many systems use compressed air to reduce friction, and while air may be free all around us, the stuff in tanks costs money. An option that reduces compressed-air use can quickly pay for itself. And, local availability of factory-trained service can help ensure that problems are addressed quickly and effectively to keep equipment operating at peak efficiency and to keep it correcting faults as quickly as possible, which reduces downtime.

Finding the most economical inspection/measurement system to meet a shop's needs does not need to be complicated. It begins with identifying current priorities and anticipating future requirements, factoring in the costs of labor (including setup and operation), possible downtime, air and other incidentals and then comparing the options with demanding, hands-on demonstrations. [MMT](#)

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A Unique World of Experience for Moldmakers

Germany's WBA Tooling Academy builds a bridge between industry and science by joint R&D projects addressing Industry 4.0.

Imagine a theme park dedicated to tool and moldmakers where they get a glimpse into the digital future. Imagine a place where they can put on virtual reality glasses and take a look at a customer's mold in South Africa, or they can take a look to maintain a machine, connect with industry peers and researchers, participate in interesting projects or have their molds optimized and machined in an automated, full-scale workshop.

The WBA Tooling Academy (WBA) is in Aachen, Germany, and it is that theme park. The school is closely connected with RWTH Aachen University, one of the leading technical universities in Germany. It provides a unique world of experience for tool and moldmakers who are ready to embrace digitalization.

Catchphrases like "Industry 4.0," "digitalization" and "data-driven manufacturing" are ubiquitous and seem to describe a futuristic scenario that does not apply to daily routines and workshops. But in reality, that scenario does apply. Industry 4.0 simply means to network people, machines, objects and systems with the aim of controlling dynamic and complex production systems in real time.

The ultimate goal is a self-optimizing system. Take, for example, a machine that runs 24/7 with optimum parameter settings without any operator intervention. However, according to professor Wolfgang Boos, CEO of WBA, Industry 4.0 is more. It starts with visualization (knowing what is happening in the shop) and transparency (understanding the reasons



Professor Wolfgang Boos, CEO of the WBA Tooling Academy in Aachen, Germany, explains the various projects that the school is working on together with its industry partners, including the optimization-of-change request processes and real-time part location on the shop floor.

why things happen). The next step is preparation, which means knowing what will happen so that it is possible to adapt and automatically react.

Industry 4.0 is happening, and although it is impacting tool and mold shops around the world, this industry segment is lagging behind in digitalization, according to professor Boos. "Mold and die shops must address new areas of activity and develop digital applications to remain competitive. Digitalization must be addressed through data analysis and through smart tools that collect process data during series production and autonomously adjust process parameters. We have to evolve from a production enabler to a production optimizer."

To support the industrialization of tool and mold shops, WBA is working on digitally networking the industry.

Images courtesy of Barbara Schulz.



WBA has developed a scanner, which automatically scans all order data when the worker places the order sheet in the appropriate tray. The ultimate goal is a paper-free organization.

According to professor Boos, the focus is on increasing the efficiency of order processing for batch-size-one production in a global value-creation network.

Offering Hands-On Solutions

So far, so good. But to some, digitally networking the industry still sounds very abstract, academic and not hands-on. However, upon visiting WBA, which has more than 80 member companies, it becomes clear that it builds a bridge between science and industry and offers hands-on solutions for shops. In its demonstration shop, WBA reproduces the entire tool and moldmaking process chain and owns machine tools (milling, turn-mill, three- and five-axis) from various

Mold shops must address new areas of activity and develop digital applications in order to remain competitive in the future.

machine tool brands, as well as a wire EDM machine and a die-sinker EDM machine with integrated automation.

“We are building real molds according to our member companies’ requirements,” professor Boos says. “Sometimes these companies have vari-

ous questions regarding mold flow behavior or whether the mold insert should be milled or peened. We are also creating smart tools, where integrated sensors measure temperature and pressure distribution. We use five-axis machining with integrated automation to gain valuable data that we share with companies interested in optimizing their machining strategies through automation.”

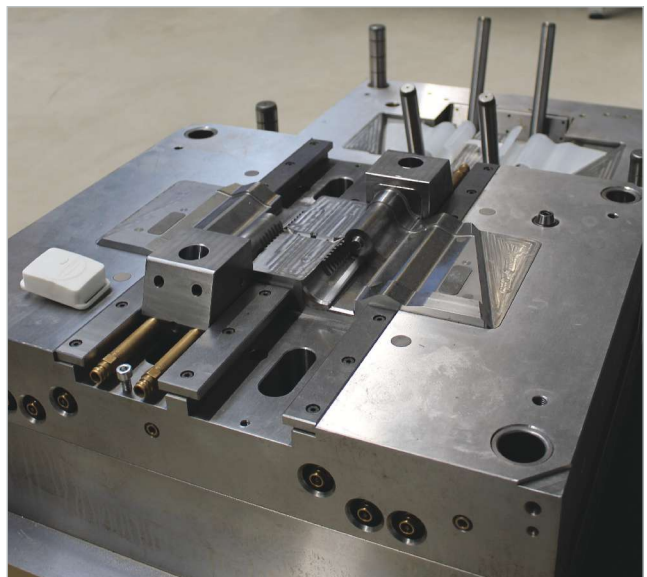
The demonstration workshop is making production parts for customers to create an environment that reflects real-world conditions. But, it also develops new applications, tools and accessories to optimize and digitalize processes. For example, the engineers have developed a digital assembly table, which is supposed to reduce errors and increase efficiency during mold assembly and maintenance through digital images and movies (which are produced by a worker who performs the assembly using virtual reality glasses). “Even if this is just a demonstration and not a finished product, member companies might see it and implement one or two features in their shops. Our support starts with ideas and food for thought.”

Examples of Industry 4.0 include a system that captures and evaluates errors along the entire process chain. It employs a user-friendly, smart device app and a shop floor, user-friendly networked system designed to comprehensively and continuously gather data and interpret processing times, idle times, setup times and so on.

Additionally, WBA is working on workflow solutions, such as methods for creating a paper-free production through bar or QR codes integrated into the workplace.

Simplifying Workshop Requests

Another interesting project designed to optimize the process chain is dealing with change requests. “Today, a change request is sent to the designer, who makes the change on the part and sends it to the production planning department. After CAM programming, the order finally reaches the shop floor where the job is eventually executed. We have analyzed 12 different shops involved in car-body production, and each shop provided



Smart tools collect process data during series production and autonomously adjust the process parameters.



The digital assembly table is supposed to reduce errors and increase efficiency during mold assembly and maintenance through digital images and movies.

data from five different projects. On average, it took 8.5 days for each change request, and there are 23 change requests per part on average in each company,” professor Boos says.

“These times are ridiculous. We talk about Industry 4.0, but it takes eight days to make a change to a part? Industry 4.0 means that the designer pushes a button, and the change is immediately transferred to the machine. To realize this, we are currently working on how to eliminate manual work with a new data format.”

While professor Boos emphasizes that WBA’s primary mission is to support German shops, globalization has a

considerable influence on the tool and moldmaking industry. Not only are customers internationally positioned, mold shops are also increasingly opening factories or cooperating with local companies in markets where their customers are located.

Global Support

“In order to overcome the challenge of internationalization, shops require extensive market intelligence to identify and evaluate customers, suppliers and competitors. We help companies by analyzing global markets and to find local suppliers, partners or mold shops. The problem is that there are countries like South Africa and Mexico, which are home to the global automotive industry. Companies like BMW, Ford or Daimler have to import their tools and molds and send them overseas again for maintenance and repair because the tool and moldmaking industry is virtually nonexistent in these countries.”

“I remember a German company that tried to set up shop in Mexico. They were working on establishing the company for two years, but it didn’t work. They wasted a lot of money because they were lacking local contacts. It doesn’t make sense to set up shop in a country with an unfamiliar language or culture and without a network. As a result, we help companies find potential partner companies, including small shops with staff lacking the appropriate knowledge and expertise in moldmaking but have contacts and an understanding of how business works in Mexico.”

In support of its member companies, especially in the automotive industry, WBA helps local shop owners and engineers in South Africa and Mexico to broaden their knowledge and reach an educational level that enables them to enter the

supply chain. Car manufacturers are increasingly producing in emerging markets such as Mexico, which is one of the world’s major economic locations. “But neither original equipment manufacturers, suppliers nor specialized tool and mold shops are able to cover the continuously growing demand for complex and high-tech tools. Currently, only around 20 percent of tools for the auto industry are locally made. The future goal is 40 percent,” Boos says.

The so-called “E-Mas Project” that WBA conducts, together with partner organizations and with support from the German



By producing real parts for customers, WBA is constantly optimizing its manufacturing processes, tools and automation solutions. The insights are passed on to member companies to improve their operations.



In its demonstration shop, WBA reproduces the entire tool and moldmaking process chain and owns machine tools from various machine tool brands, as well as a wire EDM machine and a die-sinker EDM machine with integrated automation.

Given the global competition in the manufacturing sector, the training and securing of skilled workers is becoming ever more significant.

government, aims to export vocational education and services for industrial process design and optimization into the Mexican automotive sector. Given the global competition in the manufacturing sector, the training and securing of skilled workers is becoming ever more significant. Mexican employees will be taught skills in the areas of workplace learning, productivity management, tool and moldmaking and lean management.

“Thus, they will be prepared for industrial challenges due to digitalization,” professor Boos says. “Our course offering includes the core elements of industrial tool, die and moldmaking and teaches participants concepts and methods that enable traditional mold shops to become modern, industrial producers of international standard. In addition to this, we will encounter the lack of knowledge concerning maintenance and repair of tool and die equipment. By improving the knowledge base in this field, we hope to increase the local availability of tools and molds.” **MMT**

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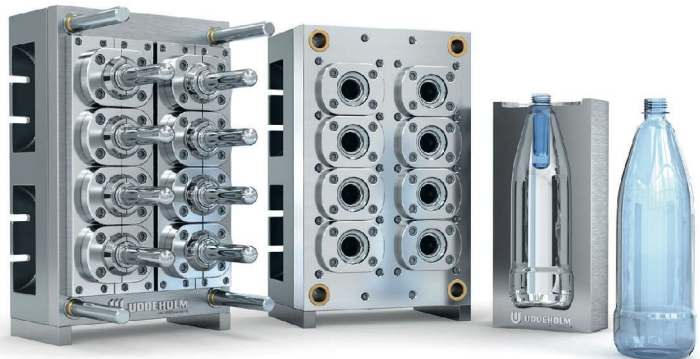
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Single CAD/CAM System Delivers a Complete Process

Nothing is ordinary about Integrity Tool & Mold Inc. (Integrity). From its founding in the Windsor suburb of Oldcastle in 2001, Integrity has been committed to lean design, advanced technology and continuous improvement, and it has paid off. By 2008, the young firm had built itself into a \$60-million per year company. Today, that figure stands at around \$150 million and the company has opened facilities in Pulaski, Tennessee, and Querétaro, Mexico. Yesterday's small Windsor-area shop now has 362 employees in Canada, over 600 employees globally and a total of 257,000 square feet. It has more than 100 spindles and produces about 400 plastic injection molds per year.

In recent years, Integrity's drive for continuous improvement and commitment to goals like quality and efficiency have been aided by Tebis software from Tebis America Inc. of Troy, Michigan. Tebis offers an integrated suite of CAD/CAM products. Apart from the power of the many individual modules, that each module uses the same database and user interface maximizes the speed and accuracy with which part data can be moved into production.

INTEGRITY TOOL & MOLD

PROBLEM: The potential for operator error, wasted time from a system relying on multiple files, a lack of confidence to run lights-out machining and complicated training.

SOLUTION: Tebis CAD/CAM software with robust simulation and automation capabilities and individual modules.

RESULTS: A single software system that delivers a complete process, taking the design from the CAD system right through to the finished product.



Plant Manager Davide Savio (left) and CNC Programmer Bobby Charron (right) review onsite Tebis programming.

"In 2011, Integrity started to move to Tebis in a big way," Vernon Benson, a Tebis account manager, says. Integrity had a strategic vision of having one main software product comprehensive enough to encompass its entire process, and from its research, the company determined that Tebis could be that software. The capabilities of the software's individual modules were another benefit. Take simulation, for example. "It's vital that we thoroughly and realistically check our programs before we release them to the shop floor," Integrity's Director of Manufacturing Ryan Hotchkiss says. "Tebis allows us to do that and be very confident in implementing lights-out machining."

Fully Integrated Simulation Optimizes Operations

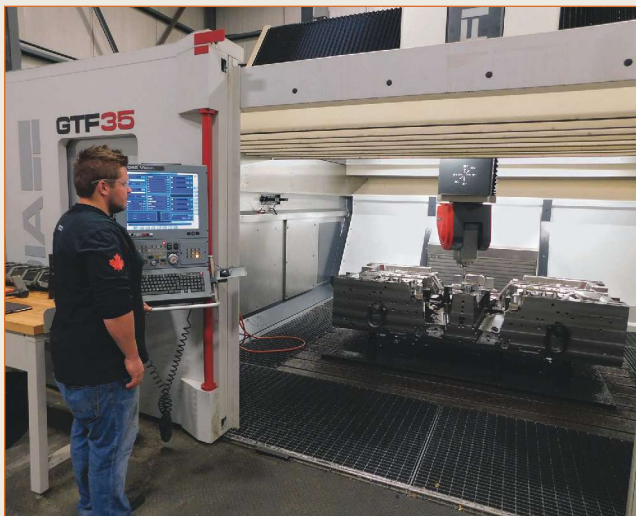
That confidence comes from the multiple capabilities of the Tebis software module. It enables users to reproduce entire machining sequences and do so on virtual versions of the machines on their floor. The software helps users optimize machine operation functions like collision avoidance, tool-length checking and the ability to interactively define optimum tilt direction. In addition, the Tebis module's material

removal simulation helps users assess the productivity and ultimate surface qualities of machining programs before any metal is cut.

This simulation is possible because Tebis personnel visit the customer to physically measure the exact machine parameters to encapsulate the entire machine environment, including the excess space required to make tool changes and the space between tool paths. This provides an exact 1:1 comparison between the real machine and the machine environment within the Tebis software, which is referred to as a virtual machine or a virtual machine build.

These tools are particularly useful for five-axis milling, which is increasingly important for Integrity as it looks to save time by capitalizing on using more axes. The use of more axes means more cuts taking place on one machine as opposed to using multiple machines for the same job. "Before they calculate an NC program, they can perform a detailed analysis of the tilt directions for the cutting tool, also taking head geometry and machine kinematics into account," Tebis's Senior Manager Global Strategic Accounts John Kowalczyk says. Collision avoidance calculations include the holder components defined in the Tebis tool library. The Tebis simulator also checks all machine components and limit switches.

When operating in the virtual machine within Tebis, a customer assesses the part as well as the most effective machining strategy on that machine. The customer can then simulate this action and test its feasibility, making changes or corrections to improve the program. The benefits of this robust simulation capability are many and include unattended, lights-out machining, tool-damage avoidance, expensive post-collision machine repair prevention, and setup and run-time reduction.



CNC Programmer and Operator Jason Henderson at the control of a Fidia GTF 35 five-axis machining center.

Additional downstream effects include improved accuracy, less rework and high-quality surface finishes.

The simulation also provides support for evaluating job costs. Tebis software estimates the time for each program, providing customers with important planning and scheduling information. Customers then have a plan of action before heading to the actual machine.

Kowalczyk notes that some of Integrity's competitors use simulation, but typically they use a third-party package, transferring data into and out of their CAD/CAM system. This slows programming and increases the opportunities for error. This doesn't happen for Integrity, since simulation is fully integrated within the Tebis suite of software tools.

There are numerous efficiency gains from the entire shop running on one software system.

This means that the Tebis virtual machine is accessible within the same software package as the rest of the Tebis CAD/CAM modules. Customers using the virtual machine environment would be in the same Tebis interface under the same computer window and would not need to share or exchange data between systems as a third-party software solution would require.

Automation Standardizes Programs and Supports Speed

The process at Integrity goes above and beyond simulation. "The NC automation module in Tebis, with features like its template-style programming, has been very valuable," Hotchkiss says.

The automation draws on the Tebis process libraries, which reflect the actual manufacturing environment. All tools, machines and clamping devices are stored in the library, along with geometric and technical properties. This benefits NC programmers as they select the appropriate machine in this virtual environment, define the optimal setup and select the appropriate tools, speeds and feeds.

"So, the program is partially written beforehand," Benson says. "The programmers can then employ our feature-based, template-style approach, aided by robust algorithms within Tebis that speed preparation and programming, even for large components and complex geometries." In addition, simultaneous calculation processes help accelerate NC programming, and the software's multiple setup and tool-match facilities can save significant time on the shop floor.

"The keywords are simplify and speed," Hotchkiss says. This is a benefit for any shop but especially for one like Integrity, which has expanded so quickly that often it is difficult to find quality programmers. This is where Tebis software can play another vital role. Its template-based programming standardizes similar programs so that a new programmer can get set up and can start moving quickly.



Integrity has over 257,000 square feet and more than 100 spindles in three locations: Oldcastle (Ontario, Canada), Pulaski (Tennessee, United States) and Querétaro (Mexico).

Fast and simple are fine of course, but ultimately, it is the quality of the final product that matters. “Tebis shines here as well,” Hotchkiss says. “That’s because it is a robust, surface-based machining software that does not depend on mesh models, which is especially valuable for Integrity since its products feature highly complex surfaces that require a high degree of accuracy.”

The big difference between a mesh-based and a surface-based approach is that the surface that mesh data creates is essentially like the pattern on the surface of a soccer ball (a series of pentagons). “As a result, you can’t generate highly accurate curves. In addition, mesh creates a surface that can be very ‘heavy.’ That is, the representation of the part’s surface is created using many smaller surfaces (or pentagons). This added ‘weight’ can be a problem when generating tool paths,”

Benson says. A Tebis surface, by comparison, is ‘light,’ which makes it easier to work with, resulting in higher quality and more accurate surfaces, according to Benson.

Single Solution Streamlines Process

Along with simulation, Integrity has more than 80 Tebis seats and employs a broad array of Tebis modules, including mold and die, collision check, viewer NC, surface morphing, boundary representation (BREP), reverse engineering, electrode prep, various five-axis milling modules (3+2 machining and five-axis simultaneous) and more. But apart from the capabilities and success of individual modules and functionalities, Ryan Hotchkiss

feels the biggest benefit of this collaboration is the ability to take the design from the CAD system right through to the finished product. It is Tebis’s single software system that helps deliver this complete process.

“There are numerous efficiency gains from the entire shop running from one software system,” Hotchkiss says. “It means having one file. Multiple file setups in different software takes time and invites errors. One file means less human interaction and less wasted time referring to multiple files and easier training.” [MMT](#)

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Tax Reform Impact on Research Incentives

By Michael J. Devereux II, CPA, CMP

The Tax Cuts and Jobs Act of 2017, signed into law in December 2017, drastically changes how mold builders pay federal income taxes in 2017 and beyond. These changes impact tax rates and the treatment of capital expenditures and various incentives that mold builders are using. The next few installments of this column will cover how these changes impact the business of mold builders and the amount of federal income taxes that they pay.

Changes to tax law and treasury regulations over the last decade make the R&D tax credit the most advantageous tool in a mold builder's tax toolbox. However, the R&D tax credit is not the only research-based incentive that mold shops claim. Currently, shops also can elect to deduct research expenditures in the tax year that those expenditures are paid or incurred (even if the expenditures result in future value to the company). The following provides an overview of the changes to the research incentives that mold builders claim as well as other changes impacting the use of those incentives.

R&D Tax Credit

The R&D tax credit rewards mold shops for the development of novel, unique, one-of-a-kind molds. The credit is activity-based. It rewards shops for developing or improving its products or processes where modeling, simulation or systematic trial-and-error eliminate technological design uncertainty. A 2016 American Mold Builders Association survey revealed that almost one-half of mold shops participating in the survey claim the credit. Of those claiming the credit, almost three-fourths indicate that they include the labor and materials cost of new molds that are ultimately sold to customers as qualified research expenditures.

IRC §41, which tax reform did not change, governs the R&D tax credit. However, the R&D tax credit's value increased by 21.5 percent after Congress reduced the top corporate tax rate as a result of a provision of the IRC §280C. IRC §280C requires shops to reduce research expenditures by the amount of the research tax credit that is claimed. So, if a shop incurred \$1,000,000 of research expenditures in the calendar year 2017, resulting in a \$100,000 tax credit, the shop must reduce its \$1,000,000 research expense by the \$100,000 tax credit. Under pre-tax reform law, the resulting tax increase is \$35,000 (assuming a 35-percent marginal tax rate). Claiming the credit is still beneficial since the mold builder has a \$100,000 tax credit to offset the \$35,000 of additional tax and an additional \$65,000 of federal tax liability.

However, in 2018 and beyond, the top corporate tax rate is 21 percent. So, if a mold builder has the same facts in 2017 (\$1,000,000 of research expenditures, resulting in a \$100,000 tax credit), IRC §280C would increase its tax liability by \$21,000 with a \$79,000 federal tax benefit.



The results may not be the same as those with a flow-through entity (S corporations, partnerships or sole proprietorships). Under the new law, mold builders are likely to receive the benefit of the new flow-through deduction of 20 percent of qualifying income, resulting in a top marginal tax rate of 29.6 percent. Subsequent Bottom Line columns will provide more details on this tax rate.

With the same facts in mind, consider that a mold builder is an S corporation that one individual owns entirely. In this example, if the mold builder claims a \$100,000 tax credit, IRC §280C would increase the shop's tax liability by \$29,600, resulting in a \$70,400 federal tax benefit.

However, mold builders making a special election can level the playing field. Shops that timely file their returns may make an election to claim a reduced tax credit with no change to their research expense amount. An originally filed tax return requires this election, including extensions. By making this election, the shop subtracts the product of its gross credit and the top corporate tax rate from its gross credit to calculate a "reduced" credit.

Again, assuming the same facts, consider that the shop makes the election under §280C and in doing so subtracts the product of its gross credit of \$100,000 and the top corporate tax rate of 21 percent (\$21,000) from its gross credit (\$100,000), resulting in a reduced credit of \$79,000. This election is available to both C corporations and flow-through entities. So both C corporation and flow-through entity mold builders will see an increased benefit in claiming the R&D tax credit.

All else being equal on a mold builder's tax return, C corporations will receive the same benefit regardless of whether they make the election under §280C. However, flow-through entities



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may see an added benefit by making the election to claim the reduced tax credit.

Alternative Minimum Tax

The Tax Cuts and Jobs Act eliminated the corporate alternative minimum tax (AMT), which makes it a challenge for mold builders with average annual gross receipts more than \$50 million to use the R&D tax credits. In the tax year beginning after December 31, 2017, C corporations can reduce their tax liabilities down to the general limitation on general business tax credits (or 25 percent of the shop's regular tax liability that is more than \$25,000). As a result, mold builders taxed as C corporations can use the research tax credits more quickly.

The AMT may still limit flow-through entity mold builders who claim the R&D tax credit since tax reform did not eliminate the individual AMT. While owners of flow-through entities that are eligible small businesses (taxpayers with average annual gross receipts of less than \$50 million) may use the R&D tax credit to offset AMT, those exceeding this amount still face the general AMT limitation.

However, the AMT limitation will no longer be as onerous. Tax reform increased the individual AMT exemptions and the income amounts for which the exemption begins to be phased

out. Indexed for inflation and beginning in 2018, the AMT exemption amounts are:

- \$109,400 for married taxpayers filing jointly or for surviving spouses.
- \$70,300 for single taxpayers.
- \$54,700 for married taxpayers filing separately.

Also, the income amount for which the exemption begins to phase out increases:

- \$1,000,000 for married taxpayers filing jointly or for surviving spouses.
- \$500,000 for single and married taxpayers filing separately.

With these increases in the exemption and phase-out amounts, the owners of flow-through entities can monetize the R&D tax credits faster.

Future Treatment of Research Expenditures

Tax reform was not all good news. Since 1954, taxpayers could elect to deduct, as current expenses, research expenditures in connection with their trade or business. However, the Tax Cuts and Jobs Act modifies the treatment of mold builder research expenditures. For amounts paid or incurred in tax years beginning after December 31, 2021, mold builders will be required to capitalize their research expenditures and amortize them over

five years (and 15 years for any research performed outside the United States). While potentially temporary, this could have a significant impact on both federal and state tax liabilities.

Tax reform has drastically improved the R&D tax credit impact on mold builders, but research deductions are limited in future tax years unless Congressional action occurs before the provision takes effect in 2022. Either way, mold builders need to pay special attention to research incentives and how they ultimately impact their federal and state tax implications. [MMT](#)

CONTRIBUTOR

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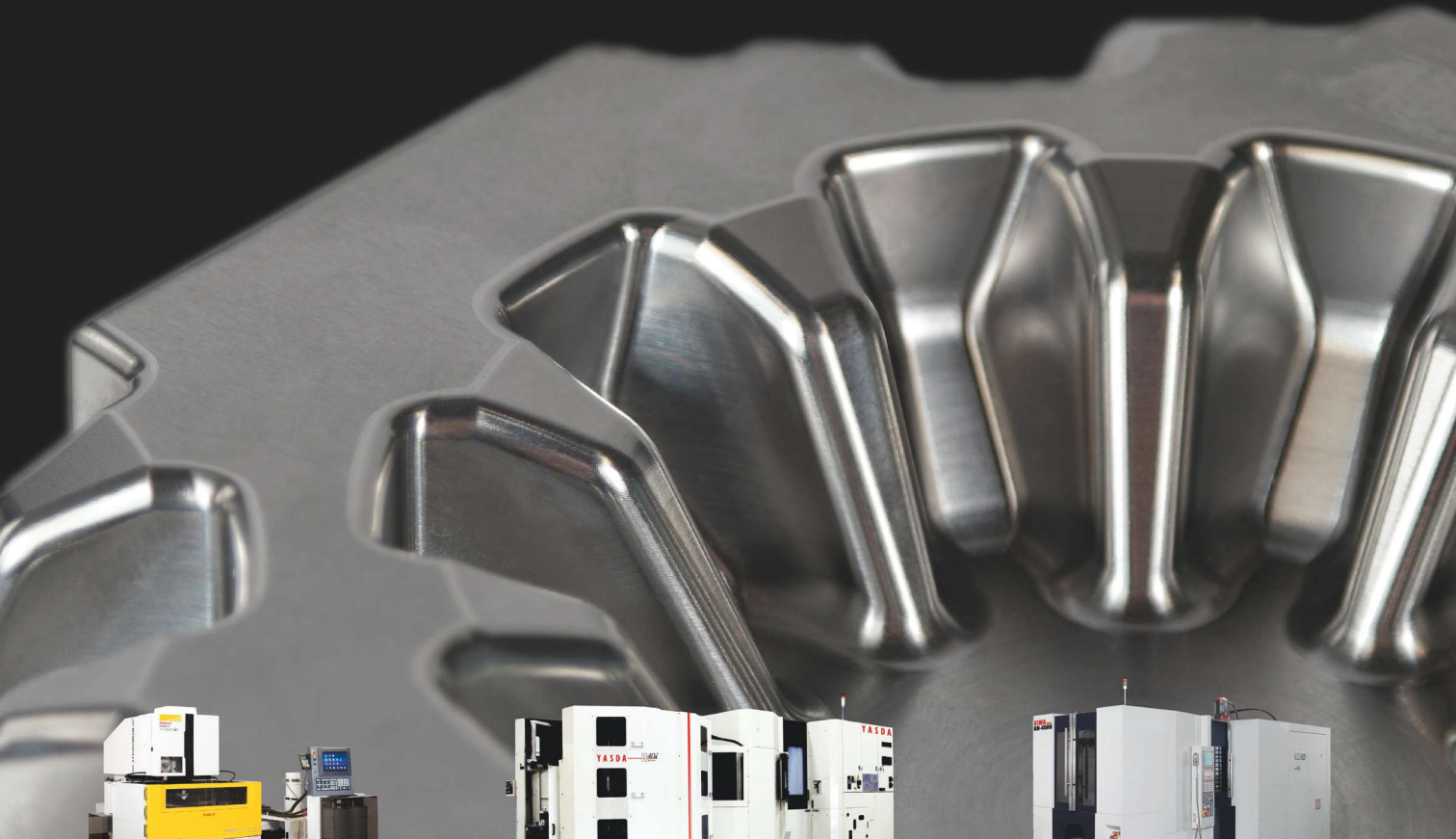
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Index Finishes Best Quarter Ever

New orders growth boosts Moldmaking Index, at 59.5 for March.

Registering 59.5 for March, the Gardner Business Index (GBI): Moldmaking completed its best quarter ever with an average quarterly reading of 60.0. In comparison to the performance from the same month and quarter a year ago, the Moldmaking Index increased by 8.0 percent and 7.7 percent, respectively. Gardner Intelligence’s review of the underlying data for the month revealed that growth in new orders, production and a strong upside reading in supplier deliveries boosted the Moldmaking Index’s average-based calculation. Backlog, employment and exports lowered the Moldmaking Index’s average-based calculation. No component of the overall Moldmaking Index contracted for a fourth consecutive month.

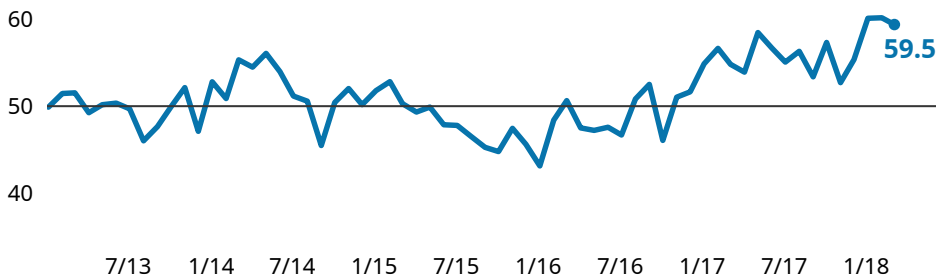
March’s notable events included a significant increase in the growth of supplier deliveries and the significant slowing of growth in backlogs. During many of these months, the reported growth of new orders outpaced moldmakers’ ability to raise production, resulting in elevated backlogs. The most recent quarter’s data indicates that suppliers have become much more responsive to needs of moldmakers, and the drop in backlogs to a more typical level is evidence of that responsiveness from suppliers. [MMT](#)



ABOUT THE AUTHOR

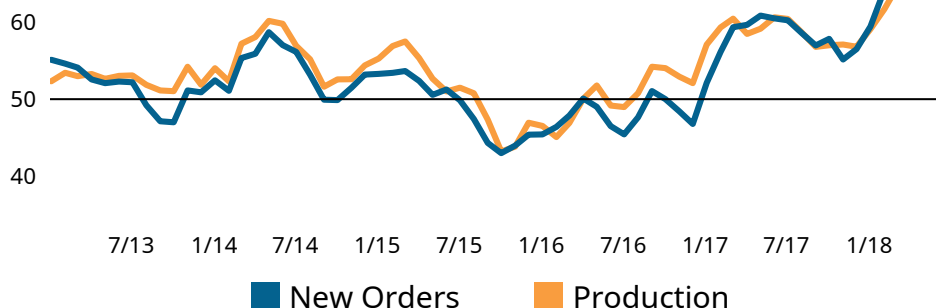
Michael Guckes is the chief economist for Gardner Intelligence, a division of Gardner Business Media (Cincinnati, Ohio, United States). He has performed economic analysis, modeling and forecasting work for nearly 20 years among a range of industries. He is available at mguckes@gardnerweb.com.

■ **Moldmaking Index**



March’s Moldmaking Index reading at 59.5 concluded the best quarter for the Moldmaking Index since at least 2012. Readings for production and new orders, along with an unusually strong supplier delivery reading, kept the Moldmaking Index at record-high levels.

■ **New Orders and Production (3-Month Moving Average)**



The first quarter of 2018 saw many significant trends. In particular, average production and new orders readings for the quarter both set all-time records. Despite impressive production growth and elevated supplier deliveries, survey data indicates that backlog is still increasing.

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amerimold

The Event for Mold Manufacturing 2018

Novi, MI | June 13-14, 2018

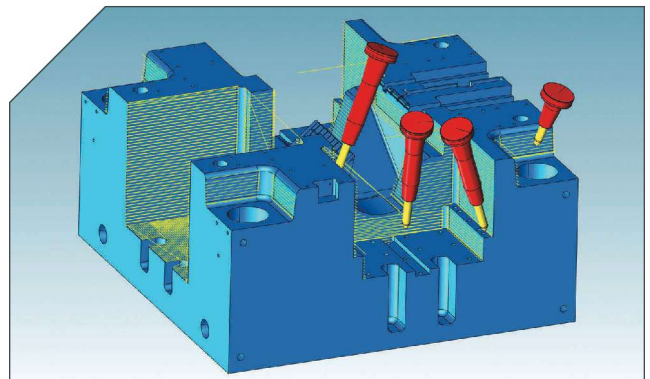
Here is a sampling of what will be on display at this year's show. Look for more products in our June issue.

Diamond Coating Minimizes Wear on Slideways

Hasco says its Z1545 gear housing and Z1547 rack unit enable the simple, reproducible and inexpensive installation of stack molds. The low height of these stack mold components permit small distances between the tie bars on the machine and high opening forces through the use of high-quality material, the company says. DLC-coated slideways minimize wear and extend maintenance intervals. The components ensure that mold production costs remain calculable, improving item costs and competitiveness, the company says.

The company says its stack mold components make production more efficient and double the output of molded parts for the same clamping force, ensuring more effective machine use. Alternatively, the number of cavities can be kept the same and the clamping force halved, reducing the investment and the space required.

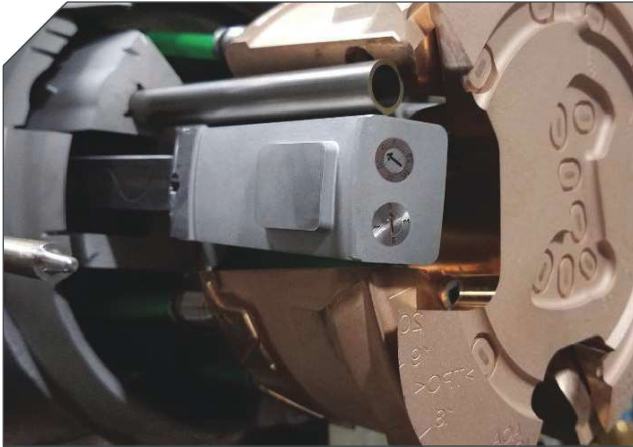
HASCO / hasco.com / Booth 217



CAM Software Enables Use of Conical Barrel Cutting Technology to Reduce Cycle Times

Open Mind Technologies highlights the capabilities of hyperMILL CAM software. The software's MAXX Machining finishing module, a performance package of the hyperMILL CAM software suite, is a CAM programming source that enables the use of conical barrel cutter technology to reduce cycle times by more than 90 percent. The company says that MAXX Machining is ideal for planar, ruled and curved surfaces in complex five-axis components. hyperMILL MAXX Machining offers three modules for finishing, roughing and drilling. hyperMILL 2018.1 includes a new "global fitting" feature that simplifies the definition of complex surfaces or patches of surfaces. Many of the software's strategies recognize and follow the ISO u-v orientation of the surface patch. hyperMILL MAXX Machining finishing is one technique that benefits from having a simplified surface definition. hyperCAD-S Electrode automates the construction and manufacturing of electrodes for die-sinking. Users can choose their electrodes from the face to be die-sunk within the component geometry with no special expertise required.

OPEN MIND Technologies USA / openmind-tech.com / Booth 123



Mold Shop Has ISO Certification to Support Its Customers

Celebrating 32 years, **Ameritech Die & Mold Inc.** has a philosophy of "Performance through Engineering" and a core business of producing automotive airbag molds. Ameritech also designs and manufactures molds for the consumer goods and commercial sectors while supporting many customers with custom mold repair.

Ameritech Die & Mold is ISO9001:2008 & AS9100C certified supporting its growing business of aerospace, space and defense precision-machined components. Additionally, Ameritech Automation Systems division continues its success by providing complete turnkey automated systems solutions. The company tailors its automated solutions to meet its customers needs, whether it is a second operation requirement to complement molding operations or a new from scratch design and build program. Ameritech Die & Mold South says it is pleased to house these two new divisions while strengthening its core business of new manufacturing and repair of injection molds.

Ameritech Die & Mold / amdiemold.com / Booth 638

Purchasing Technology Optimizes Ordering of Graphite Blanks

Ohio Carbon Blank introduces the GraphimatorEZ at Amerimold 2018. GraphimatorEZ is a new web-based technology for automating graphite purchasing. The new technology provides a streamlined approach for graphite procurement that eliminates errors and ensures faster deliveries.

To improve graphite purchasing bottlenecks that result from incorrect data entry in the ordering of graphite blanks, Ohio Carbon Blank has created the GraphimatorEZ, which automates graphite purchasing and eliminates keyboard entry error risk (ISO9001:2015). The three-step automation process includes extracting the CAD data (x,y,z) from mold dies as an Excel file, importing Excel file of CAD data into the GraphimatorEZ for instant pricing and exporting pricing data for online ordering or purchase order completion.

Ohio Carbon Blank is currently developing CAD output templates for companies like SolidWorks, VISI, MasterCAM, Cimatron, UG and Pro-E. It is also building an API that exports pricing data from the GraphimatorEZ directly into major business software programs like QuickBooks and Peachtree.

Ohio Carbon Blank Inc. / ohiocarbonblank.com / Booth 637

Die and Mold Carbide End Mills Have Coating for Better Wear

RobbJack features many product lines at Amerimold 2018. Among the numerous tools the company displays, the highlight of the show is its diemold series end mills. The company says that the DM/MDM die/mold carbide end mills are made with a revolutionary coating technology, reduce wear by 909 percent and last over 450 percent longer than comparable tools in hard metal applications. RobbJack says that the DM/MDM die/mold carbide end mill offers tighter tolerances, lasts longer in difficult areas like parting lines and produces better finishes that reduce or eliminate the need for polishing. According to RobbJack, when tests were conducted in D2 58 HRC that pitted comparable carbides and coatings against RobbJack's DM/MDM die/mold carbide end mills, RobbJack's tools outperformed every test tool with a smooth wear land of only .0025", which is 909 percent less wear.

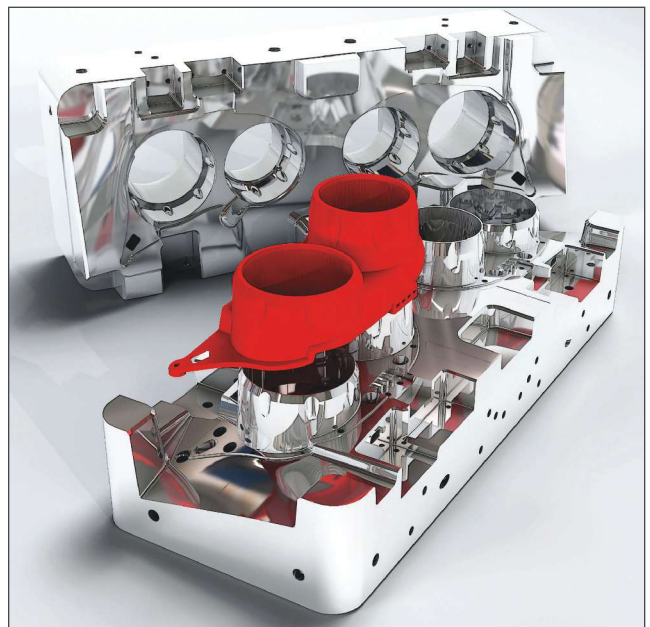
RobbJack/Crystallume / robbjack.com / Booth 321



Package of Programs Offers New Features for Accelerated Mold Design

Missler Software has the "Program That Part Challenge," a new program to demonstrate the raw power of the TopSolid solution. In addition to the "Program That Part Challenge," Missler Software debuts TopSolid'Tooling, which the company says groups together TopSolid'Mold, TopSolid'Progress and TopSolid'Electrode and further speeds mold design and manufacturing. Some of the new TopSolid'Tooling functionality includes automated separation of cavity blocks, accelerated definition of moving parts, intuitive positioning of ejection components, regulation design with a safety margin and automated production of workshop documents (electrodes). Show visitors can enroll in the "Program That Part Challenge" experience TopSolid'Tooling's new features.

Top Solid / Missler Software Inc. / topsolid.com / Booth 410



AMERIMOLD

Mold Cleaner Uses Dry Ice for a Deeper, Non-Abrasive Clean

Cold Jet showcases its i³ MicroClean cleaning method during dry ice cleaning demonstrations at Amerimold 2018. The non-abrasive cleaning method helps facilities clean molds in-place at operating temperatures. According to the company, this cleaning system enables the cleaning of intricate cavities that other methods cannot reach. It extends the life of equipment by eliminating the need for chemicals, wire brushes and abrasive pads and enables increased cycles between preventative maintenance while reducing scrap.

Cold Jet / coldjet.com / Booth 722

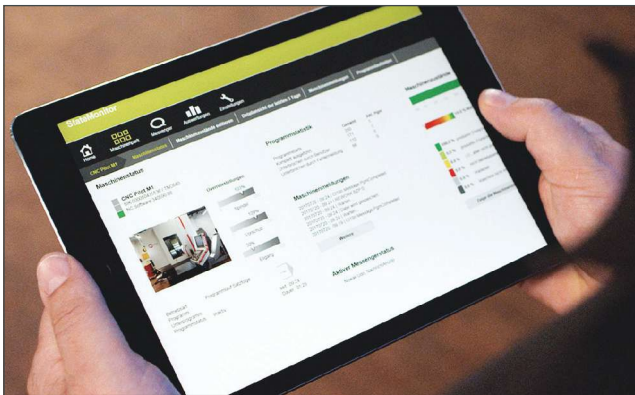


End Mill Has Helix Design to Reduce Vibration While Machining

Haimer USA introduces its newest line of end mills, the Basic Mill, at Amerimold 2018. Basic Mill solid carbide end mills are created with H6 shank tolerances using geometries with an unequal flute and helix design that reduces vibration while machining. The Basic Mill can be used in almost all material, including stainless steel, alloy steel, cast iron, aluminum and general steels. Haimer says that the end mill is capable of aggressive roughing machining strategies that include slotting, trochoidal milling, steep ramping and even drilling. The end mills is available in inch and metric, a full complement of radii and flute lengths and with or without Safe-Lock shanks. Haimer says that the Basic Mill is the do-it-all end mill for the shop.

Other technologies and products that Haimer features at Amerimold 2018 are the Haimer Microset tool presetting machines, Power Clamp shrink fit machines, Haimer shrink fit tool holders and collet chucks, Tool Dynamic balancing machines, Haimer Safe-Lock and Duo-Lock technologies, Haimer 3D Sensors and Haimer Power Mill end mills.

Haimer USA / haimer-usa.com / Booth 403



Machine Monitoring Software Enables Remote Status Updates

Heidenhain Corp. introduces StateMonitor software to enable users to view data and evaluate control processes remotely and in real-time. The software is an option with Heidenhain TNC controls and is designed for CNC manufacturing personnel who are implementing connected systems as part of the Industry 4.0 initiative.

The software captures, visualizes and evaluates the status of connected machines and displays it on any networked terminals, including remote devices such as tablets, smartphones and PCs. This enables users the flexibility to display current machine status on multiple devices and from outside the workshop in an office, meeting or in other locations. The program presents status of connected machines visually as charts and graphs.

StateMonitor is part of the company's Connected Machining functional package, which combines solutions for the individual networking of production. The package includes the Heidenhain DNC interface, the Remote Desktop Manager and the enhanced display function Extended Workspace as well as other applications with which the TNC user can receive and use digital job data in the workshop. According to the company, this package places users at the center of digital order management through the control of their milling or turning machine.

HEIDENHAIN CORPORATION / heidenhain.us / Booth 248

High-Speed Mill Features Three-Axis Linear Motor Drive

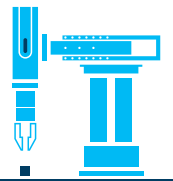
EDM Network and Chmer EDM introduce their newest model linear motor drive, the HM4030L dust-free, graphite, high-speed mill at Amerimold 2018. The mill features a three-axis linear motor drive that uses a Siemens 828D CNC control and drives and Chmer EDM linear motors. The optional dust-free oil shroud is unique to the Chmer high-speed mills and is offered on all three standard models HM43GT (graphite only), HM65GT and HM86GT (graphite and hard metal). These are all available in both ball screw as well as linear motor drive configurations. EDM Network and Chmer EDM offer a model configured for companies that already have a vacuum system, or EDM Network and Chmer EDM can set it up for both.

EDM Network Inc. / edmnetwork.com / Booth 624



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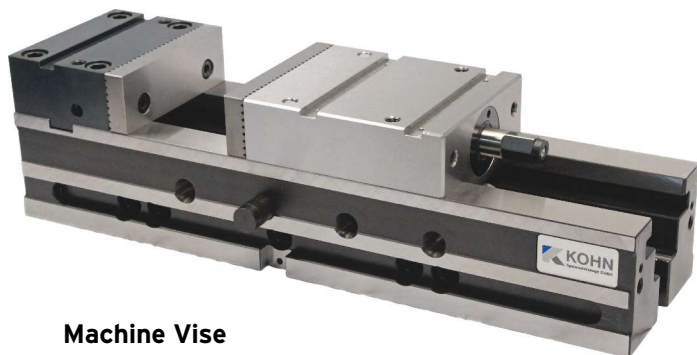


Gear Unit for Stack Molds Increases Output and Precision

Meusburger's E 8630 gear unit for stack molds is built for stability and precision. The unit comes in two compact sizes, module 3 or module 4, which enable increased precision and quality, the company says. Closed housing provides stability and safety. According to the company, this unit is designed for use with stack molds because stack molds enable more efficient production. The unit's assembly is equipped with ground and induction hardened gear racks and gear wheels. These are available with a length of 800 to 1,200 mm in either module size. The unit's smaller teeth achieves more accurate synchronization, the company says.

An additional feature is the DLC coating of the force-absorbing gliding plate, which reduces wear and extends durability. The compact design of the unit enables it to be used in injection molding machines with a small tie-bar spacing. The installation and exact positioning can be done either via milled pockets or dowel holes.

Meusburger US, Inc. / meusburger.com / Booth 614



Machine Vise Features Clamping Slider

Hirschmann Engineering's NCS machine vise features a clamping slider that clamps against a fixed jaw or changeable sliders. The vise is available as mechanical-hydraulic or hydraulic and features a jaw width of 125 mm and a bed length with ground beds 64 mm to 1,200 mm. Optional tie rods are available for high-precision clamping.

Hirschmann Engineering USA, Inc / hirschmannusa.com / Booth 526

Drill Has Coating to Facilitate Chip Evacuation

OSG USA's A Brand represents a new evolution in cutting tool technology. OSG USA says that the A Brand is a tooling brand that is composed of OSG's latest high-performance threading, drilling and milling innovations. The A-Drill series features the Exocarb ADF drill. The Exocarb ADF enables one-step drilling to simplify machining time and tool management and is suitable for a wide variety of drilling applications including inclined surfaces, curved surfaces, counter-boring, eccentric holes, thin plates and so on. The Exotap A-Tap Series is a tap line made from powdered metal HSS with OSG USA's proprietary coating that was developed to facilitate chip evacuation in a wide variety of work materials over a wide range of machining conditions.

OSG USA / osgtool.com / Booth 136

Joint Presentation Covers Mold Performance Troubleshooting

Beaumont Technologies's Director of Business Development Alex Beaumont and MoldTrax President Steve Johnson are teaming up to present Proactive Strategies to Troubleshoot Mold Performance Issues. Beaumont and Johnson are bringing processing and tooling together to explore strategies to optimize mold performance, maintain efficiency, maximize part quality and minimize machine downtime on many different types of injection molds manufacturing products from all industries. This presentation focuses on understanding product defect positions and how much plastic changes as it flows within a mold and its impact on efficiently producing quality parts on time.

Beaumont Technologies Inc. / beaumontinc.com / Booth 507
MoldTrax / moldtrax.com / Booth 447

Decatur Mold Expands Molding Department

Decatur Mold, Tool & Engineering Inc.'s expanding molding department offers low to medium production molding and around-the-clock process technicians to maintain production on all shifts. This year, the company expands its facility and adds presses and operators to accommodate increased business. The company builds and services plastic injection tooling, specializing in prototype and production tools for many diverse industries such as the automotive, appliance, agriculture and consumer markets.

Decatur Mold, Tool & Engineering, Inc. / decaturmold.com / Booth 137





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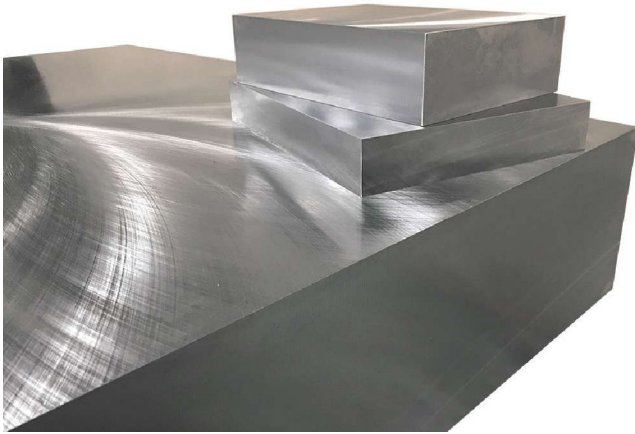
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Dual Spindle Edge Milling Machine Offers Speed and Accuracy

Superior Die Set expands its mold plate machining services with a precision dual spindle edge milling machine. This machine mills the edges of plates to within .002" TIR with a maximum capacity of 16" high x 48" square. The dual spindle action rapidly removes material on two opposing edges, then indexes 90 degrees and completes the process so that all four sides are milled square and parallel. Superior Die Set says that this high-speed action provides lower costs and reduced lead times and the micro finish produced by this machine typically surpasses 32 Ra.

Additional machining options include waterlines, quick-disconnect c'bores, side lock pockets, clamp slots, roughed cavity pockets, and FCS System 'clamping seats' holes. Superior Die Set says that the FCS System is a powerful and accurate method of work holding that eliminates typical clamping and indicating techniques and will enhance your production process. The system enables the plate to go easily onto the machining center for 3D mold work.

Superior Die Set Corp. / supdie.com / Booth 620

Five-Axis Machines Cut Cycle Time and Tooling Costs

Makino introduces Sinker EDM technologies to save cycle time and tool costs in die and mold component manufacturing using a five-axis continuous (5XC) machining approach. DAF and EDNC-Series machines feature improved Z-Axis Jump Speed that uses a core-cooled ball screw to achieve speeds of 20 meters per minute with a 1.5G acceleration for processing plastic-injection mold support rib details. The machines are also designed to reduce electrode wear and enable rough and finish EDM using a single electrode. In addition, the company's improved Hyper-i control enables easier and more productive EDM operation, Makino says. Off-line CAM software, called EDCAM, utilizes 3D CAD information for Sinker EDM programming.

The company says that its 5XC approach to die and mold component manufacturing results in greater cycle time savings, improvement in surface quality and reduced cutting tool costs by changing the milling cutter selection and eliminating the number of milling tools needed to complete a part. Makino introduces its Sinker EDM machines and displays its expanded D-series of 5XC VMCs at Amerimold 2018.

Makino / makino.com / Booth 111

Diamond Files Enhance Mold Polishing Tool Lineup

Boride Engineered Abrasives adds a variety of diamond files to its product lineup. The product line includes Diamond Needle Files, Extra Slim Needle Files, Contact Files, DH and DHM Files.

According to the company, Needle Files and Extra Slim Needle Files are critical grinding tools for mold and die shops and extruders while DH and DHM Files are specially designed tapered files for the aluminum extrusion and plastics industries with the primary application of filing inside slots and grooves. Contact Files offer solutions for the mold and die, electronic and automotive industries. The company says that these files are designed for quality and results and that they are meant to complement its other mold polishing tools and equipment.

Boride Engineered Abrasives / borideabrasives.com / Booth 231



Compact Milling Machine Enhances Performance and Accuracy

The CNC portal milling machine FZ40 compact from **Zimmermann** is designed for the machining of hard materials and aluminum. The inherently rigid machine structure enables simultaneous five-axis high-speed machining. This compact machine has a solid cast base so it does not require a foundation and can be set up on any solid shop floors. The machine table is integrated into the cast baseplate, which enables a table load ranging to 16 metric tons.

Eight mounting elements of the FZ40 compact reduce vibration for high accuracy and optimum surface quality of the workpieces. In addition, the sidewalls are filled with a special dampening concrete mix to further enhance performance. The machine has a fully enclosed working space with a fixed machine table. The structural sound overhead gantry with a reinforced Z-rail make up the moving masses.

Zimmermann Inc. / f-zimmermann.com/us / Booth 433





THE COMPETITIVE ADVANTAGE FOR U.S. MOLD BUILDERS.

MAY 2018 | MONTHLY UPDATE



COMPETITIVE ADVANTAGE: NETWORKING

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AMBA PLANT TOUR WORKSHOPS FOSTER STRATEGIC NETWORKING

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Each plant tour delivers a new experience, as attendees have the opportunity to tour the manufacturing operations of industry peers; examine innovative processes used on the production floor to maximize quality; explore various business systems and approaches to serving the customer and engage in cross-discussion on approaches to continuous improvement.



Photo courtesy of Creative Technology Corp.

Visit AMBA.org for information on future AMBA plant tour workshops; open to member and non-member mold builders.



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PLANT TOUR WORKSHOP: QUEST INDUSTRIES
Lapeer, Michigan

JUNE 27

PEER NETWORKING WEBINAR

JULY 18

ENVIRONMENTAL, HEALTH AND SAFETY (EHS) SUMMIT
Columbus, Ohio

AUGUST 30

PLANT TOUR WORKSHOP: EXTREME TOOL & ENGINEERING
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(In conjunction with Amerimold)
June 12, Lapeer, MI

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AMERIMOLD

Line of Mold Care Products on Display

Clean Plast Mold Cleaner and Degreaser contains no chlorinated solvents. The company says it provides a convenient method for removal of silicones, grease, oil and wax build-up on mold surfaces without the need for wiping with no residue left. Clean Plast Go Green Mold Cleaner is all natural and made from citrus and vegetable products. Clean Plast recommends using it for oil spill clean-up and remediation, dewaxing, removing mold release and degreasing molds. Clean Plast Mold Rust Preventive has an extra-dry spray package. It delivers non-penetrating mist into ejector pin holes, slides, cams and other moving parts, which prevents marking of plastic parts during start-ups.

Clean Plast Heavy-Duty Mold Release is an almost-dry, paintable molded part release and lubricant for ejector pins. It minimizes leaching onto molded parts and can be used on plastics, rubber, waxes and glass-filled nylon. Clean Plast Food Safe Mold Release contains an effective non-silicone release in a non-chlorinated solvent carrier system. It is highly paintable, permits ultrasonic welding of parts, and affords thermoplastic release. Clean Plast Silicone Mold Release contains a non-paintable silicone oil in a non-chlorinated solvent carrier system. It gives releases with thermoplastics and is approved for indirect food contact.

Clean Plast / cleanplast.com / Booth 542

Steel Solutions Offered Closer to North American Customers

Scana Steel USA Inc., Scana's Chicago-based U.S. hub, stocks various tool and die steel grades in different sizes for delivery to North American customers. The company also produces grades such as P20, O2, O6, S5, S7, W2, 420, H10, H11 and H13 in forms of bars and blocks with a maximum thickness of 50 in. for hot or cold work applications. The company's U.S. branch performs and outsources sawing, cutting, gun drilling and milling tool and die steel bars or blocks to deliver products as close to near net shape as possible to the North American customers. In-house steelmaking, forging, heat treatment and machining are company traditions that go back over 360 years in Sweden. As a global company, Scana supplies forged steel products for clients in tool steel, machine and energy markets.

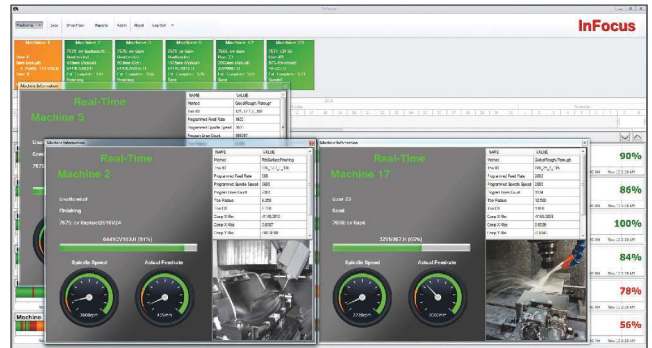
Scana Steel USA Inc. / scanasteel.com / Booth 130

Quoting Program Automatically Generates Project Costs

ToolQuote from **JDL Technical Services** is an injection and die-cast mold quoting program that automatically generates a mold layout based on part size and the appropriate mold template chosen. The mold layout then generates all material sizes and costs, purchased items and labor items based on the user-defined tool profile that is selected. Users can then adjust any numbers as they see fit based on experience.

Users can easily manage revisions and print or directly email quotes from ToolQuote with detailed costs and a tool sketch with customer press layouts. Recent improvements make it possible for users to build a custom component library for the items pertaining to their needs and enable users to set different 'master' profiles for varying tool types being quoted. ToolQuote uses an easily searchable database of all calculations and quotes, including a search-by-picture feature for comparison results with a history of changes and actual costs.

JDL Technical Services / jdltech.ca / Booth 537



Machine Monitoring Software Automatically Collects Data for Easy Use

R.E.R. Software features its InFocus Machining and InFocus Scheduling software at Amerimold 2018. InFocus Machining is a complete machine monitoring and job tracking and analysis solution that automatically collects the machining hours of a job and each component. Specifically designed for the mold and die tooling industry, InFocus Machining displays metrics and information relevant to an organization's needs. The company says that the intuitive and easy-to-use technology ensures that adoption into an organization is seamless.

InFocus Scheduling is designed and developed specifically for the mold and die tooling industry to meet the challenges of day-to-day operations. The company says that InFocus Scheduling is easy to use yet centralizes the schedule for the organization, coordinates the work flow with line ups on the floor and highlights all potential scheduling issues with clear visibility into any open capacity on all resources.

R.E.R. Software, Inc. / rersoftware.com / Booth 247

Performance Dashboard Consolidates Key Data for Efficiency

MoldTrax announces the release of its newest version of MTSQ for tracking the performance and maintenance of molds and dies. MTSQ can be cloud- or local-based and comes with new features such as main screen dashboards that automatically display via pie charts the most critical top ten targets in any date range the user chooses. Mold Performance Dashboard shows unscheduled mold stops, defect count by mold, corrective actions by mold, tooling used by a mold and labor hours by mold. Maintenance Efficiency Dashboard offers the average degree of difficulty (DOD) of molds worked on per technician, the number of specific corrective actions performed by technician, tooling used and costs per technician and labor hours required and costs per technician.

Also new is an expanded hot runner section with links to relevant images and work instructions, standard heaters and thermocouples, a new "Cycle Count" field that automatically calculates specific production runs from a non-resettable, total lifetime cycle counter and is included in many reports and a mold performance report that shows maintenance costs per production hour, average cycles per defect, average cost per defect, average run hours per defect and more.

The system is available for "test driving" in MoldTrax's DocStation at Amerimold 2018. MoldTrax says that the MT DocStation is a turnkey system to make inputting data fast and easy for all repair technicians.

MoldTrax / moldtrax.com / Booth 447



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AMERIMOLD

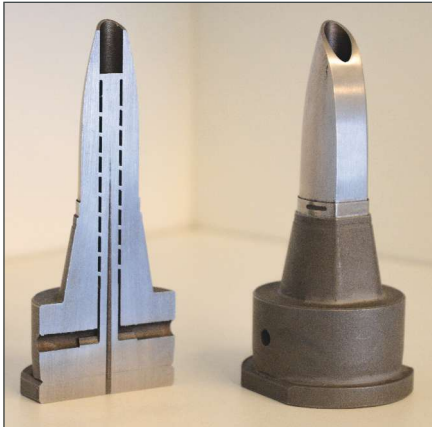
Additive Manufacturing Services Guide Clients for More Efficient Projects

Baker Industries has 25 years of industry expertise and a full adoption of the latest technologies in additive manufacturing. Baker offers Tier 1 and original equipment manufacturer customers both additive and conventional manufacturing.

Additive manufacturing (AM) in metals has already proven itself to be a valuable tool for moldmakers in a variety of ways. Through AM, moldmakers have the unique ability to print parts before tooling is executed to pre-test quality and assembly procedures, enabling their customers to make any necessary adjustments before entering tooling production. Conformal cooling via additively manufactured channels that can be placed exactly where they are needed helps to shorten injection molding times, improve part quality and lengthen the lifespans of mold cores and inserts.

By considering AM integration for each project, Baker says it is able to exceed its customers' needs for lightweighting, designing for function, achieving complex geometries, customization, process optimization and product innovation while educating them on the technical and economical fit of each application.

Baker Industries /
bakerindustriesinc.com / Booth 333



Mobile Robot Designed for Targeted Hardening of Metal Surfaces

The AI-Rock from **Alpha Laser** is a mobile robot for targeted hardening of metal surfaces whether it be at a set work station or deployed on-site to a customer. With the self-driving caterpillar track, users can move the laser right to the workpiece. There is no need to remove the components to be hardened, and Alpha Laser says that the reworking cost is significantly reduced. The laser beam precisely follows the workpiece contour in free 3D movements. This enables weld edges, grain structures and localized areas to be hardened easily. Temperature-dependent control of the laser power brings the heat precisely to the desired location to achieve the exact degree of hardening needed.

Alpha Laser / alphalaser-us.com /
Booth 617

Toolroom Bed Mill Features Powerful CNC Technology

Southwestern Industries/TRAK Machine Tools features its DPMSX2P three-axis bed mill at Amerimold 2018. The mill is designed for small lot work and features ProtoTRAK CNC technology, which the company says is powerful but simple to learn and use. The mill joins the company's product line, which includes bed mills, knee mills, lathes, manual knee mill CNC retrofits, the TRAK 20P portable VMC and the LPM VMC for high-mix or low-volume work.

Southwestern Industries, Inc. /
southwesternindustries.com / Booth 202

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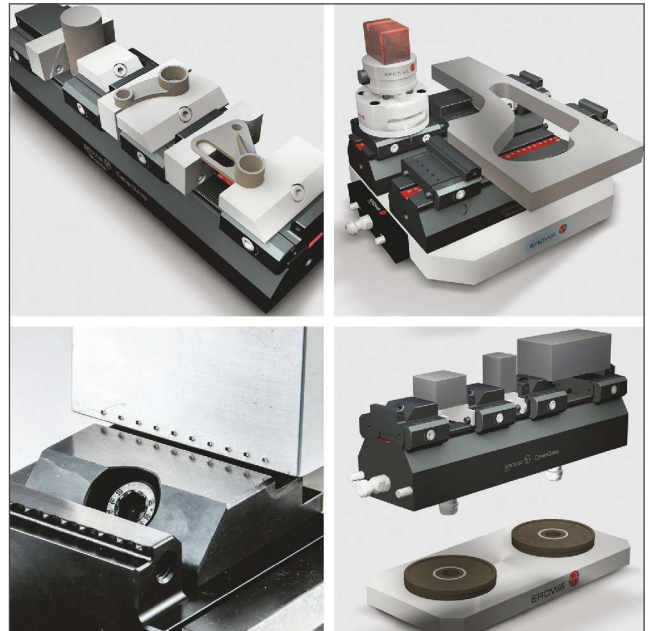


Deep-Hole Drilling and Milling Machines Streamline Moldmaking

Unisig features its USC and USC-M Series machines that combine deep-hole drilling and milling capabilities, which the company says enable mold shops to reduce setup time, increase accuracy and eliminate mold design restrictions. The USC Series column-type machines generate highly accurate holes ranging to 1.5" in diameter in large workpieces. They are available in table-weight capacities ranging to 50 tons and are suitable for mold plates and frack pumps.

These machines enable the processing of large and small parts with four-sided machining capability in a single setup. The USC-M series machines use two independent spindles for gundrilling and BTA drilling and another CAT 50 machining spindle. When this additional capability is combined with a rotary workpiece table and programmable headstock inclination, accurate deep-hole drilling and all standard high-performance machining capabilities are available within the working envelope. The seven axes of control on the M-Series machines use the B, A, X, Y and Z axes for five-axis machining operations, the W axis for the combined gundrilling and BTA deep-hole drilling spindle and the U axis for machining. This provides 3+2 machining to make deep-hole drilling and machining of compound angles faster and improves productivity and throughput by reducing setups and eliminating transfers to multiple machines.

UNISIG Deep Hole Drilling Systems / unisig.com / Booth 530



Clamp Elements Are Versatile for Small-Batch Parts Production

The clamping elements of Erowa's CleverClamp system are specifically tailored to the manufacturing of one-off and small-batch parts. The company says that they are simple to handle and serve a wide variety of applications while decreasing set-up times, increasing machining times and improving productivity.

The basic rails of the CleverClamp system are calibrated to fit the Erowa UPC and Erowa MTS production tooling systems. The wide range of clamping elements can be quickly positioned on the serrated base rails and can be used either horizontally or vertically. The base rails provide the flexibility to attach workpieces of varying shapes and sizes in a limited amount of space. An added feature of the CleverClamp system is that it can be universally automated. This increases customer's machine use by making use of marginal and night hours when the CleverClamp system is combined with an Erowa automation solution.

Erowa Technology Inc. / erowa.com / Booth 420



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Gantry Machine Designed to Meet Various Needs

Promac North America Corp.'s Sharav GVT gantry machine with fixed table is designed to machine medium-sized to large working envelopes with a compact footprint. The machine can be used for automotive applications, aerospace applications, prototypes and other special projects. This machine is one of the company's five-axis machining centers and has been designed as an innovative solution to meet customer requests, according to the company.

Promac North America Corp. / promac.eu / Booth 525



High-Speed and High-Power Options Available on Milling Machines

Waldrich Coburg has Taurus 25 & 30 Bridge Type Milling Machines in two versions, high speed to 20,000 rpm and high power with 6,000 rpm. New for 2018, both high-speed and high-power versions are available on the same machine. This combination has full five-axis capabilities.

Taurus 25 has a 5-m (196.8") X axis, a table size of 2 m x 4 m (78.7" x 157.5"), a clearance height of 2 m (78.7") and a ram stroke of 1.5 m (59"). Taurus 30 has a 6-m (236") X axis, a table size of 2.5 m x 5 m (98" x 196.8"), a clearance height of 3 m (118.1") and a ram stroke of 1.5 m (59"). The Taurus series are available with either Heidenhain TNC 640 or Siemens 840D sl controls.

Waldrich Coburg NA, Inc. / waldrich-coburg.com / Booth 512



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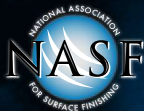
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If you are at the triennial plastics show this month, be sure to check these items, which exhibitors will have on display.

External Position of Side-Mounted Cylinder Eases Maintenance

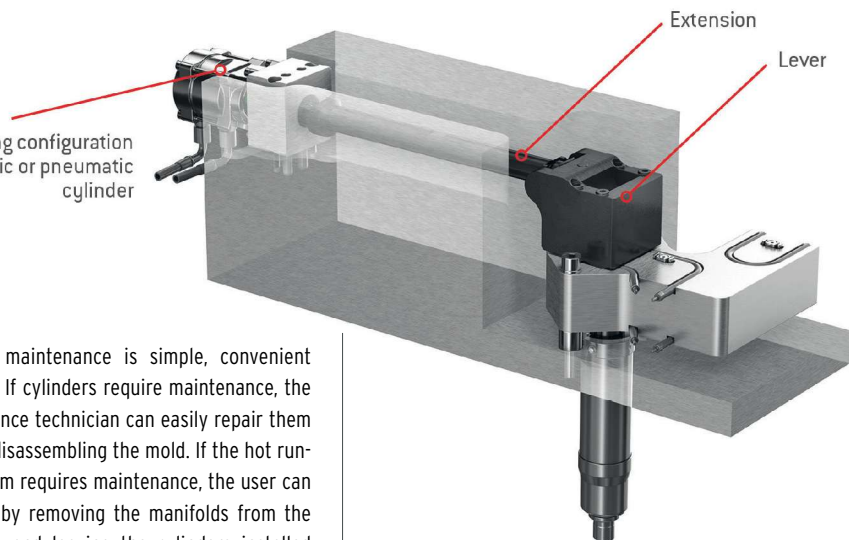
HRSflow developed a new solution for hydraulic and pneumatic cylinders that does not require cooling. HRSflow says that its side-mounted cylinder optimizes shutdown during the injection process, improving time and costs. Placed laterally at the border of the mold, the side-mounted cylinder uses the same lever and extension to move the pin as HRSflow's Flexflow hot-runner technology (a servo-driven valve-gate system) for accurate and flexible control of the process.

Since the side-mounted cylinder is placed far from the manifold area, cooling configuration for hydraulic or pneumatic cylinders is not required, ensuring high performance of the hot runner systems and reliability from the components. And, because the cooling connections are totally removed, the pipe layout is simplified considerably. HRSflow says that because of the special external position of the side-mounted

No cooling configuration for hydraulic or pneumatic cylinder

cylinder, maintenance is simple, convenient and safe. If cylinders require maintenance, the maintenance technician can easily repair them without disassembling the mold. If the hot runner system requires maintenance, the user can repair it by removing the manifolds from the leverages and leaving the cylinders installed on the plate.

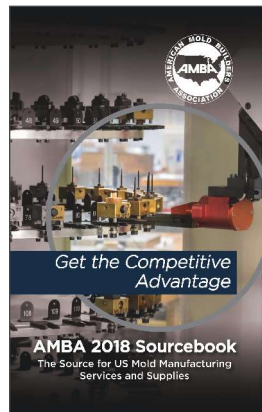
HRSflow / hrsflow.com/eng/ / Booth W991



AMBA 2018 Sourcebook Connects Clients to Mold Builders

American Mold Builders Association (AMBA) has its recently published the 2018 AMBA Sourcebook at NPE2018 in booth S33058. The AMBA says that the 2018 AMBA Sourcebook is a key resource in the industry, providing valuable information for sourcing skills-certified mold builders in the United States. The reference guide enables users to sort by capabilities, geographic location, type and size of molds made, industries served and more. From plastic injection molds, compression molds, blow molds, rotational molds, stack and thermoform molds to rubber silicone molds, injection molds and more, users can find a wealth of information to help them source the right AMBA mold builder for the job. AMBA partners are listed alphabetically with contact information and full descriptions of products and services for easy reference.

American Mold Builders Association / amba.org / Booth S33058



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Booth W4205
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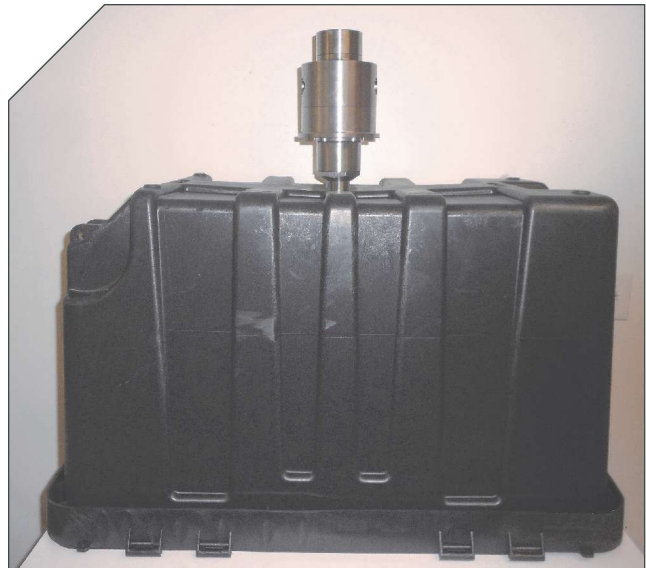


Mold System Runs Two Separate Molds Simultaneously

Canon Virginia Inc. introduces a new Multi-Mold System, which runs two separate molds in one press simultaneously. Show attendees can see the system in action as it runs in a customized Sumitomo (SHI) Demag press in Canon's booth. Plastic material is injected into the first mold. The system then moves the first mold outside the machine chamber for cooling and moves the second mold in place for processing. Then the first mold returns in the machine and ejects its parts, while the second mold moves outside of the machine for part cooling. In addition, the retrieval robot can handle two types of parts with different shapes in cooperation with the system.

This system helps transform idle cooling time into productive time by shuttling a second mold into production. The user can program changing conditions like pressure, temperature, injection speed and clamp force as specified for each mold and the system controls the parameters automatically as the mold shuttles back and forth. The company says that the proprietary process accomplishes dual, multi-product molding by the same machine without error or loss of time, achieving reductions in cost, time and waste.

Canon Virginia Inc. / cvi.canon.com / Booth W223



Single-Cavity Valve-Gate Nozzle Designed for Large Shot Sizes

Osco's Jumbo valve-gate nozzle is designed for large shot sizes and for shear-sensitive resins. With the largest feed channels ever used, Osco engineered this new, custom single-drop nozzle to deliver 28 lb of plastic for producing a container bin.

The Jumbo is built on the foundational platform of Osco's single-cavity valve (SCV) gate. Osco says that Jumbo retains the unique and practical advantages of the original patented SCV design. For example, Osco says that the Jumbo has simplified installation, simplified operation and a robust design.

Osco's Jumbo eliminates the need for a multi-drop manifold system along with the temperature and valve-gate controllers. Significantly less time was needed in machining to accept the Jumbo nozzle in comparison to a four-drop manifold system. The Jumbo nozzle also requires less time to install, wire and plumb than a four-drop manifold system. Osco says that using the Jumbo valve-gate nozzle simplifies the startup, the setting of the valve pin and operation.

Osco Incorporated / oscosystems.com / Booth W891

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Micro-Injection Molding Machine Direct Gates Small Parts on a Large Scale

At NPE2018, **MHS** launches a new generation of its M3 micro-injection molding machine. The new model is called the M3-D08. MHS says that it is the only dedicated micro-injection molding machine capable of producing small, direct-gated plastic parts on a large scale. MHS says it is important to note that the M3 is not restricted to micro parts. The M3 has enough clamp force and shot volume to produce larger small parts and also has the ability to expand the number of parts produced on one machine.

The M3 can produce high-quality, direct-gated parts without creating wasted cold runner material or incurring the need for secondary processes. The machine has quick cycle times (generally ranging from 4-6 seconds, depending on the part) for small parts that range from 0.001-0.400 g. This results in substantial savings especially when molding highly valuable plastics such as PEEK or bioabsorbables. The M3 can direct gate parts as small as 0.001 g with a fine \varnothing 0.5-mm gate. The M3 has production outputs of as many as 60 million direct-gated plastic parts per year. MHS says that the machine is capable of fast, cost-effective prototype molding and low-volume molding. The M3 has the ability to produce two different part designs with each shot, each with different part weights. The patented ISOKOR injection technology improves the part quality and consistency of each part, reduces melt-residence time and protects resin morphology. The M3 is easy to move with leveling castors and has integrated automation featuring standard touch-less parts-handling and take-out. MHS says that the M3 has user-friendly machine controls, a large touch-screen interface and secure cloud access. Cleanroom options are available for this product.

MHS - Mold Hotrunner Solutions / mhs-hotrunners.com / Booth W8081

Variety of New Hot Runner Products, Plus Mold with More Cavities, Same Small Dimensions

Gunther Hot Runner Technology Inc. (Gunther) presents a variety of hot runner products at NPE2018. For example, Gunther displays the new DPE control unit for step motors. The two-phase step motors individually control up to 16 needles of a hot runner system. This new control unit is available in a variety of versions (DPE4, DPE8, DPE12 and DPE16) with different numbers of channels. All versions feature a central 7" touch LCD, which shows the current traversal position of all stepper channels in color. The motors are equipped with corresponding encoders for self-referencing and fault indication to initiate a production stop during unmanned shifts. The design of the DPE control units reduces motor wiring to a minimum to eliminate wiring faults as much as possible during connection.



As a special highlight, Gunther also presents a mold with more cavities but with the same small dimensions. Because of the convenient front mounting of NTF nozzles, it is not necessary to fully disassemble a hot runner to exchange nozzles. Gunther says that the nozzles can even be changed on the machine. The innovative design of the needle guide and gate-needle geometries enable contact-less and low-wear operation. The mechanical coupling on the sliding mechanism enables precise, synchronous opening and closing of the needles. An actuator is used to drive the gate unit electrically for this mold. The moldmaker can exchange any of the wear parts at any time, which Gunther says makes the use of the 16x valve-gate system all the more attractive and suitable for the production of medical technology parts.

Gunther also presents a split-nozzle shaft at NPE2018. As a compliment to the insulating titanium alloy of the nozzle cap, Gunther uses an innovative coating, which helps prevent corrosion, optimizes the friction coefficient against steel, protects materials and increases the gliding effect. Gunther says that this ensures a considerably longer service life and maximum process reliability.

Gunther Hot Runner Systems Inc. / gunther-usa.com / Booth W4351

Tool Mover Improves Safety with Secure Movement of Heavy Molds

RUD-Chain Inc. displays its Tool Mover at NPE2018. The handling and turning of heavy tools, dies and metal molding tools can be dangerous without the right equipment, causing risk to operators and damage to expensive tools if they are not turned effectively. RUD-Chain Inc. says that its RUD Tool-Mover moves heavy and sensitive dies, molds and tools safely and securely and therefore limits costs that damaged tools incur and improves safety for the operator. The Tool Mover does not need to be bolted to the floor. It is available in a variety of models with load capacities of 10t, 16t, 32t and 64t, depending on the system. RUD-Chain Inc. says that the mover is low-maintenance, low-noise and user-friendly.

RUD-Chain Inc. / rudchain.com / Booth S18171





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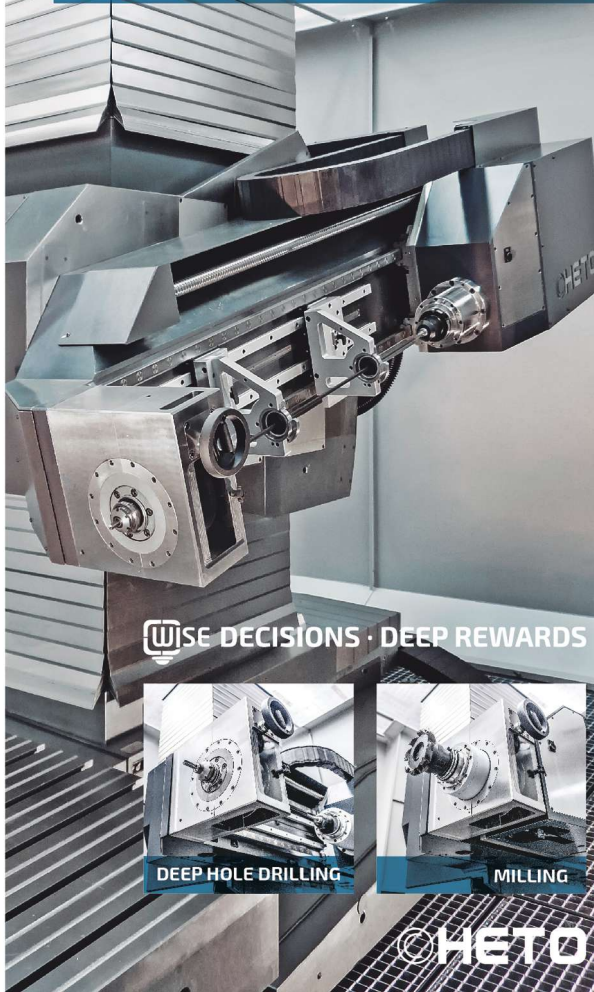
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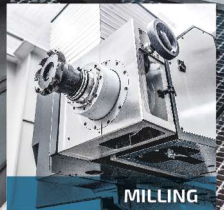
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Robot System Boosts Logistics Efficiency

Yudo Inc. presents its latest hot runner systems for the automotive and packaging industries, factory automation systems and multi-tasking robot systems. It displays its PET Preform turnkey business plan under the name Otto Systems. The company also introduces the Smart Warehouse Solution, which includes IntraLogistics Transportation Robot Systems like the Tagon AGV and Shuttle. Visitors can see the demonstration of material handling in-process and in between processes through Yudo's Factory Automation System.

Yudo says that the Tagon AGV system and the Shuttle system automatically transfer all forms of logistics units such as container, carton box, cart, rack, pallet and so on safely and precisely. Tagon AGV has various attachment combinations such as Shelf Lifter, Roller, Flex Picker, Heavy Lifter and Robot+.

It makes production without down time and maximizes logistics efficiency. Tagon Shuttle transports supplies, following the rail between the racks. Single or double-deep picking and loading is available. It handles supplies of various sizes with the function and width control of a telescopic arm extractor.

Yudo says that benefits include increased productivity and reduced labor costs, maximum use of space and efficient storage of the warehouse and high turnover rates from rapid processing logistics ability.

Yudo Inc. / yudousa.com / Booth W8147

Mold Builders to Collaborate to Produce Two-Component Parts

French toolmaker JP Grosfilley SAS has partnered with medical mold builder **X-Cell Tool and Mold Inc.** as its representative in North America. Grosfilley's approach to multi-shot molding is different. It uses rotating index plates on a single parting line to permit multiple consecutive functions—such as injection overmolding, cooling, in-mold assembly, injection in “hidden time” and even injection-blow molding—all within a single shot and without extending cycle time. X-Cell Tool and Mold Inc. exhibits its capabilities for designing and building medical molds at NPE2018 in booth S10166. A Grosfilley mold runs on a new model of injection machine in booth W2703 of Milacron Inc., in a system together with a Mold-Masters hot runner system and E-Multi auxiliary injector. The mold uses a G2 index-plate system. The product is a two-component drinking glass.

X-Cell Tool and Mold Inc. / xctam.com / Booth S10166



Catch the Headlines!

The must-see moments from both on and off the show floor at NPE2018 - The Plastics Show will be broadcast on the NPE Network!

The NPE Network will feature daily video highlighting the events at the show. It will also include one-on-one interviews and soundbites from attendees, exhibitors and speakers.

Stay informed and watch the latest on the NPE Network at the show, online, on the NPE2018 app and on TV in your hotel room!

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Plastic Additive Machine Offers Material Choice and Optimization

With a freeformer and numerous functional parts, **Arburg Inc.** demonstrates at NPE2018 that Arburg Plastic Freeforming (APF) is suitable for prototyping and industrial additive manufacturing of functional parts. Freeformer customers can qualify their own materials using the APF process and optimize process parameters to the application at hand. Arburg says that an enormous advantage in this context is that certified original materials can be used. In addition to amorphous standard granules such as ABS, PA and PC, the company's range of qualified materials includes elastic TPE, medical-grade PLLA, PC that is approved for the aerospace industry and semi-crystalline PP.

Arburg Inc. / arburg.us / Booth W1325

Quick-to-Market Strategies for Mold Base Construction

National Tool & Manufacturing Co. (NTM) has expanded operations to respond to customers "quick-to-market" strategies. NTM relocated its steel headquarters to East Dundee, Illinois, in 2018. The company says that the East Dundee location is designed for ideal material handling, storage and production flow as well as for expanded lifting capabilities. NTM says that the move further improves NTM's lead times on processed mold base plates and improves sawing, milling and grinding on both raw and processed mold plates.

The East Dundee steel facility upgrades follow the 2016 expansion of NTM's temperature-controlled mold base manufacturing plant located in Elgin, Illinois. According to NTM, the dedicated machining facility with internal precision grinding capabilities enables premium, "insert-ready" mold-base construction. The combined steel service center and mold-base manufacturing operation with over 60,000 square feet offers a "one-stop" supplier for every size mold builder.

National Tool & Manufacturing Co. / ntm.com / Booth W4855

Adaptable Multi-Zone Controllers Offer Advanced Functions

At NPE2018, **SISE Plastics Control Systems Inc.** presents its new generation of multi-zone controllers (MV3). Soon, these controllers will be able to control as many as 336 zones. They are available in five sizes (XS, S, M, L and XL) with three available power cards (2.5 A, 15 A and 30 A). They are adaptable to the packaging, automotive, cosmetics, medical and technical-parts markets.

SISE uses a 10"- or 15"-touchscreen display that runs on Linux-based SISE software for the controllers. SISE says that the MV3 controllers have easily accessible power and thermocouple cards on removable pivoting shelves that enable useful, advanced functions like four soft starts, zone grouping, PTI function for thermocouple anomalies, Moldscan for real-time hot-runner diagnostics and material-leak detection. The system is multilingual and offers unlimited mold-file memory. The MV3 communicates with injection molding machines and can save and monitor production temperatures. SISE says that the controllers are suitable for Industry 4.0 installations.

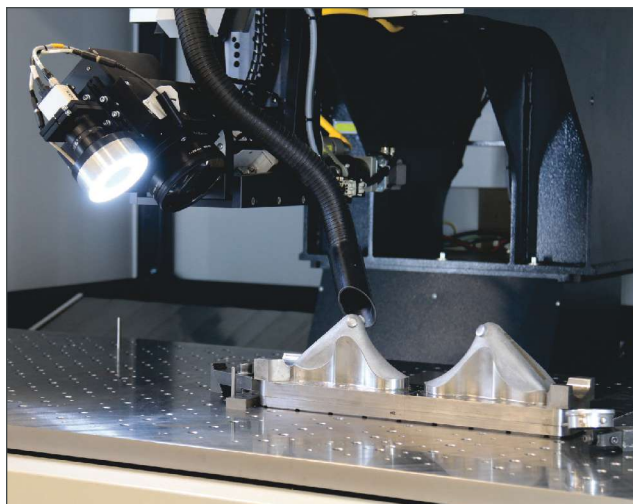
SISE Plastics Control Systems Inc. / sise-plastics.com / Booth S30022



Laser Machine Increases Engraving and Texturing Capacity

High Tech Laser and Polishing has purchased a large four-axis laser to expand its laser engraving and laser texturing capabilities. The new laser machine has the capability of traveling 62" x 31" x 42" with 2,200-lb weight capacity. High Tech Laser and Polishing offers laser engraving, laser texturing, mold polishing and laser welding services.

High Tech Laser and Polishing / htlaser.com / Booth S31007



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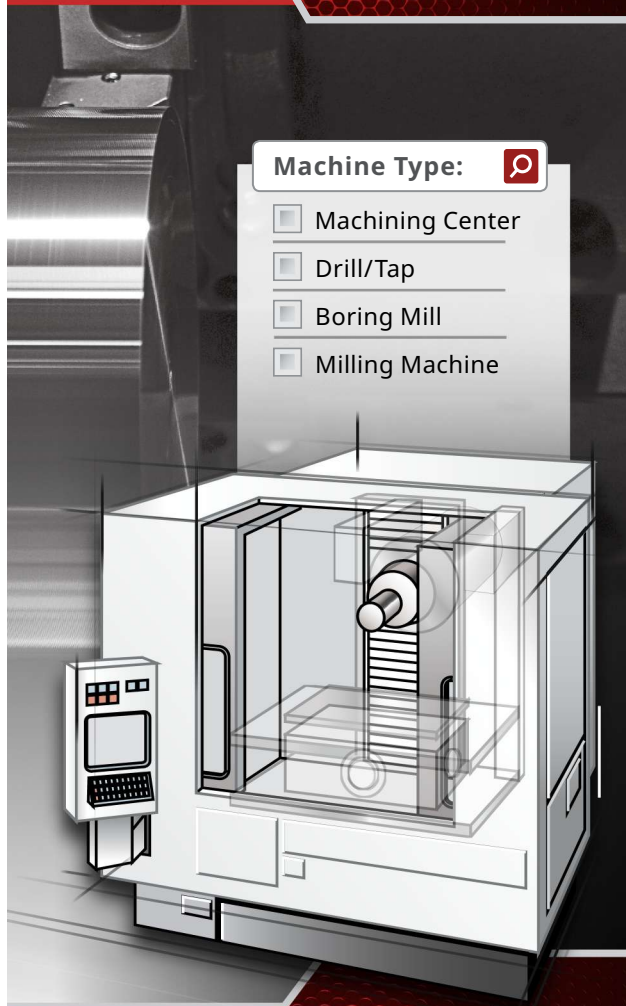
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Alliance Laser Sales.	7
American Mold Builders Association	57
AMT - The Association For Manufacturing Technology	59
Autodesk, Inc.	5, 32
Bohler-Uddeholm.	37
Boride Engineered Abrasives.	22
CGS North America Inc.	65
Chetocorporation S.A.	68
Crystallume.	2
Doosan Machine Tools America.	31
Edro Engineering.	13, 55
EOS North America.	33
Finkl Steel.	60
Gesswein & Co., Inc., Paul.	44
Haimer USA.	30
HRSflow.	47
Hurco North America.	1
INCOE Corporation.	11
Intex Tooling Technologies.	25
Iscar Metals, Inc.	3
LightShapes Canada.	19
Marposs Corp.	27
Methods Machine Tools, Inc.	45
Milacron/Mold-Masters Limited.	Back Cover
Mold Base Industries, Inc.	64
National Association for Surface Finishing.	63
NT USA Corporation.	61
PCS Company.	62
PFA Inc.	41
Progress for Industry Inc.	62
Progressive Components.	Inside Cover
Renishaw Inc.	26
Schmolz + Bickenbach USA, Inc.	18
SCHUNK Inc.	53
Seco Tools Inc.	16-17
TARUS Products Inc.	43

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MOLD MATERIAL

Strategic Mold-Material Selection

By Mark McDonald

Molding a successful part goes beyond the design of the part. Molding a successful part requires a quality mold. Working with a team that has extensive knowledge of mold materials can help ensure that an end product comes in on budget and on time.

Molds require a material that can stand up to thermal shock, abrasive resins, part details, moving mold components and heat cycles. Improperly selecting a mold material can lead to galling, warp, sink, slow cycle times and steel fatigue, which results in premature wear, breakage and steel erosion around the gate (or gate washout).

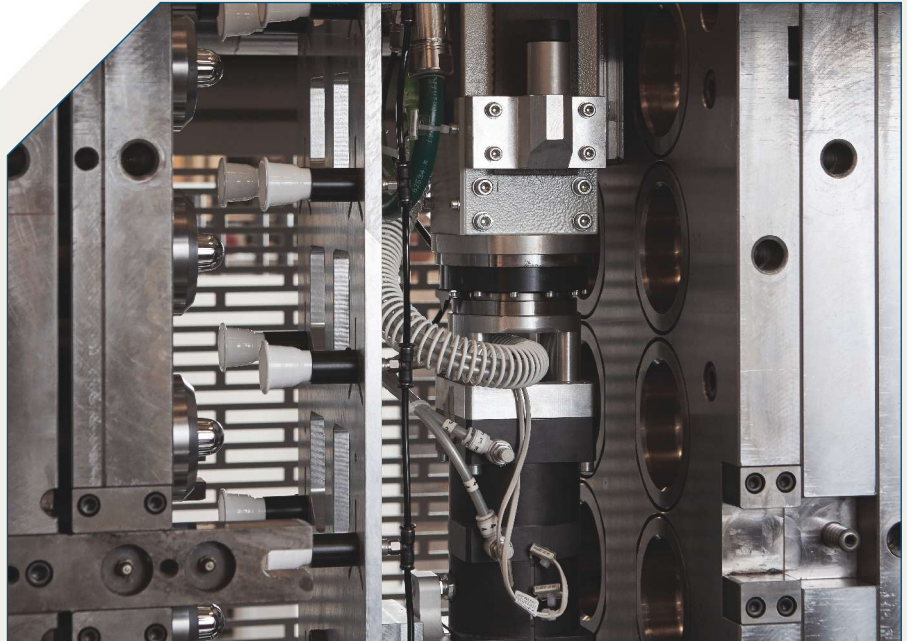
When determining the right mold material, consider part finish, production volume, part material, cycle time and mold detail.

Understanding the composition of a part and general industry uses of certain materials can aid in the selection process, ensuring that the team arrives at the best decision for its shop to produce a superior part.

Stainless steel is used in plastic injection molding because of its corrosion resistance, hardness and polishability. It comes in grades like 420 and 440, which lends itself to projects that must withstand corrosive or abrasive materials, high- or low-volume molding and tight-tolerance parts. Molds for transparent parts are commonly built out of stainless steel because of its polishability.

Hardness, compressive strength and machinability are key attributes of *H13* and *S7*. The characteristics of these steels have been formulated over time to have the right metallurgical compositions to withstand abrasive glass or mineral-filled

It's important to consider part finish, production volume, part material, cycle time and mold details such as the molding resin, gate style, print tolerances, finish requirements and part configuration when determining the right mold material.



This multi-cavity precision mold for a drug-delivery component was produced using S-7 steel.

Image courtesy of Evco Plastics.

materials, endure long runs of a million (or more) parts and maintain the proper cavity finish. These two steel types are commonly used in cavities, cores, inserts for smaller areas, high-cavitation molds where extended mold life is required, projects involving abrasive materials and parts demanding a high polish.

Another commonly used steel for cavities and cores is *P20*. It is generally used for large molds because of its availability in larger sizes and for projects that permit shorter mold life. *P20* has a Rockwell hardness of 28–36 RC, which makes it easy to machine and does not require post-heat treatment. However, someone looking to prevent premature mold damage from resin erosion should use plastics without abrasive additives.

Metals such as *beryllium copper*, *Ampcoloy* and *aluminum* are also used, especially when there are concerns about mold cooling, as these materials have better thermal conductivity in comparison to common mold steels. The result of improperly cooled molds is warp, sink and long cycle times, all of which can ultimately increase the cost of the project and delay its completion. Better thermal conductivity means a more efficient cooling process, faster cycle times and enhanced part quality. [MMT](#)

CONTRIBUTOR

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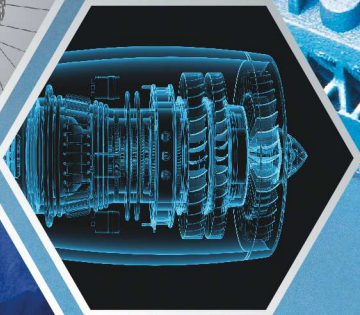
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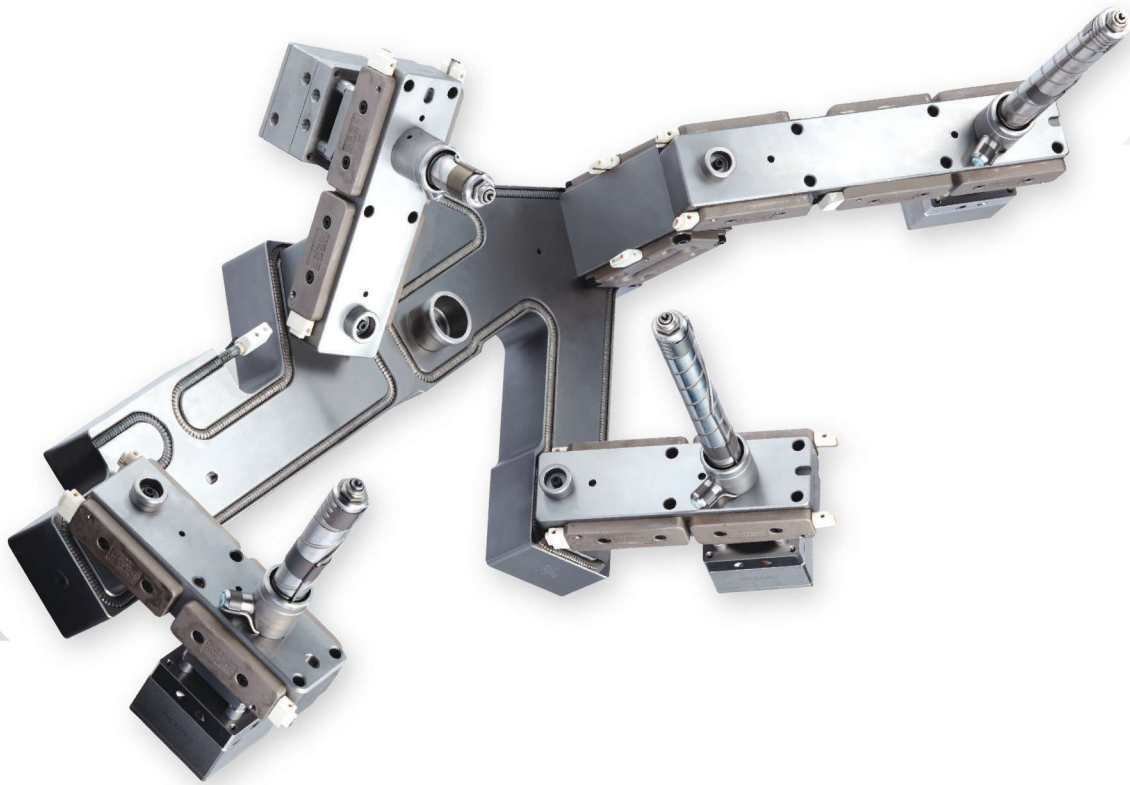
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