

MoldMaking

TECHNOLOGY

**Improve Mold Venting
with Metal Additive
Manufacturing - 16**

**Taking Care of People in
an Acquisition - 20**

**Boost Your Current
Efficiency Rate - 30**

**The Hidden Costs of Poor
Quality - 34**



WHO'S READY FOR A NEW YEAR?

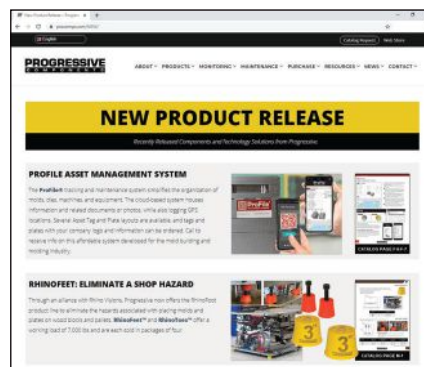
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BLOG

Daily Posts to Keep You Updated on Everything Moldmaking

The *MoldMaking Technology* Blog brings you daily news and views from around the moldmaking industry, including:

- Technology Features
- Shop Profiles
- Application Stories
- MMT Chats Video Interviews
- Industry News and Events
- and More!

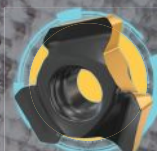


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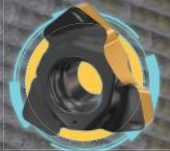
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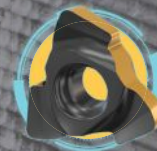
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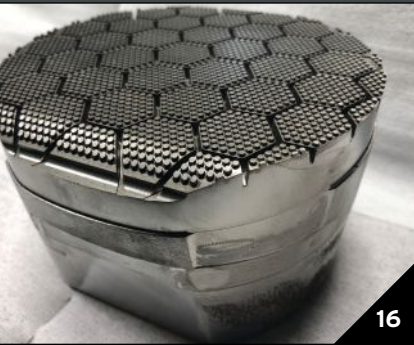
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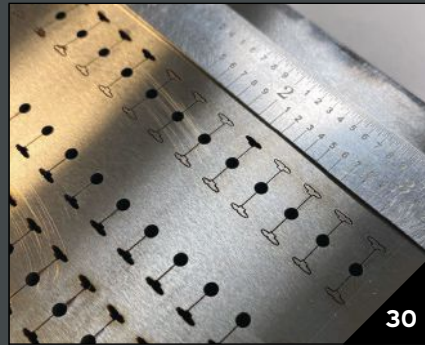
Play Store



16



20



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Features

16 Additive Manufacturing: Improve Mold Venting with Metal Additive Manufacturing

Patented 3D-printed mold insert design rapidly evacuates gases while preventing plastic flash-through, eliminates costly maintenance and need for press-side temperature-control units.

20 Business Management: Taking Care of the People Side of an Acquisition

Focusing on the human side of the business—employee health, safety, success and growth—is the only way to satisfy both buyer and seller.

30 EDM/CAD/CAM: How to Boost Your Current Efficiency Rate

An alternative approach to taking on more EDM-intensive work when technology and personnel investment are not an option.

32 Inspection/Masurement: Leadtime Leader Q&A: Embedded Quality Control

Precise Tooling Solutions shares current capabilities and a glimpse of the changes occurring inside their manufacturing operations when it comes to inspection and measurement.

34 Quality: Do You Know the Hidden Costs of Poor Quality?

Mold builders must fully understand and account for the hidden costs of poor quality or risk losing customer trust, brand reputation and business value.

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ON THE COVER

Cover photo courtesy of Hi-Tech Mold & Engineering. This month's cover shows a vented speaker grille insert being formed, one 40µm layer at a time, by melting a thin layer of steel powder with a 400-watt laser in one of Hi-Tech Mold & Engineering's EOS M 290 printers. Additive manufacturing has become an important resource at Hi-Tech, enabling a thought process that allows its engineers to reach beyond traditional manufacturing methods to provide innovative solutions to its customers. Improved cooling and reliable venting are two areas where 3D printing delivers a definitive advantage over typical subtractive processes. See related story on page 16.

Images courtesy of (left to right): Hi-Tech Mold & Engineering, B-Square Precision Group and Ernie Green Industries.

VIDEO ACCESS

5 TRICKS OF THE TRADE Great Tips from This Issue

1. Let It Work for You

If you bring additive manufacturing into your business, you'll find it's a versatile tool that you'll use in ways you never anticipated.

PG. 16.

2. Listen Up

Get employee ideas regarding what can and should change, then do as many as you can right away. Most of the time, if you allow people to shine, to grow and to progress, they will not disappoint you.

PG. 20.

3. Lesson Learned

Through research on an EDM and learning how others in the industry dropped slugs, this shop discovered how to weld the inserts back in place after passing the wire tab.

PG. 30.

4. Look Again

Quality is often disconnected from the rest of the company, and there is still a perception that quality is a cost center as opposed to a business optimization or operational efficiency tool.

PG. 34.

5. Lock It Up

Internal latch lock systems with floating plates that do not require further plate locking allow molds to actuate multiple split openings faster and more accurately.

PG. 48.

Shift Your Thinking

Faster cooling leads to reduced cycle times and increased production rates. Throw in improvements to part quality, and you've got a powerful tooling solution. MoldMAX alloys were created by engineers at Materion Performance Alloys to stand up to the relentless demands of the plastics processing industry. Their unique combination of strength, thermal conductivity and machinability can help your injection and blow molding operations reach new heights of performance excellence.

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A Look Back, A Look Ahead



You can tell a lot about what is on your readers' minds by what they look up, read, or watch. So in case you missed it, here are our top five most-viewed articles published across *MoldMaking Technology* in print, online and across our social media changes last year.

1. Moldmaker and Steel Supplier Stand and Deliver during Coronavirus Outbreak
2. Using Teamwork and Attention to Detail to Tackle Complexity
3. How to Improve the Flow of Mold Repair and Engineering Change

4. Michigan Mold Builder Gets Business Savvy and Adds Vibration and Hot Plate Welding Services
5. ALERT: An Unintended COVID Consequence

I believe this list indicates topics that you would like us to continue covering in 2021, in addition to giving you a taste of topics outside of the norm for the *MMT* brand, but for which there has been growing interest, especially when it comes to diversification. For example, tooling trends and challenges in liquid silicone rubber molding, die casting and metal injection molding, to name a few.

Some of this content was delivered via our new *MMT* Chats, which is a series of industry-focused video conversations. During each episode, I



conduct a brief, casual, but insightful discussion with leading moldmaking professionals about technology solutions, business strategies and industry trends. My tagline for these videos is "Stay Informed and Inspired," and I hope they live up to that.

MMT Chats will continue this year (just reach out to me if you are interest-

ed in being a guest), but in 2021 we're also presenting a special *MMT* Chat series called *MMT* Chats 5 in 5. This is a rapid-fire Q&A that delivers five best practices in five minutes on ways to improve efficiencies with technology, workforce development and business management. In this series, I ask the following five questions:

1. How do you create and maintain an employee-centered culture?
2. What are your top three best technology investments/recommendations, and why?
3. What is your latest process improvement?
4. How do you measure success/metrics?
5. How do you stay competitive/take advantage of new business opportunities?

All of these video interviews can be found on the homepage under *MMT* Chats or our YouTube channel.

Take some time this year to watch, listen and learn! [MMT](#)

Christina Fuges

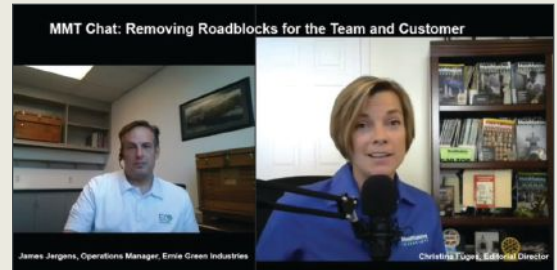
Christina M. Fuges
Editorial Director

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THIS MONTH ON moldmakingtechnology.com



VIDEO: Removing Roadblocks for the Team and Customer

"We try to overcommunicate when possible," James Jergens, operations manager for Ernie Green Industries admits, when discussing the importance of developing supplier relationships. In this latest *MMT* Chat, supply chain management changes, purchasing advice and other topics enlighten how to remove roadblocks and improve efficiencies.

short.moldmakingtechnology.com/EGlvideo

BLOG: Still Worth Your Time!

"It's about what you do with what you have." Since 2003, *MMT* has held its Leadtime Leader Competition to find and honor North American mold manufacturers who set an example. Now 2021 is here, and that opportunity is available to you! Learn more about shop benefits, nomination guidelines and more.

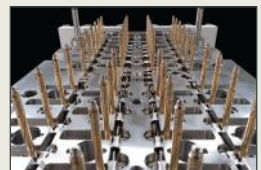
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NEW TECH: December Technology Roundup: Digital-Only

Every month, *MMT* presents a compilation of digital-only, new/proven product content.

Hot runners, machining, automation and software categories are covered in this roundup.

short.moldmakingtechnology.com/DecTechDig



WEBINAR: From Designers, To Designers: Medical Molds are Different

Designing molds for the medical sector requires

unique approaches. Progressive Component's Engineering team, headquartered in the northern Illinois medical corridor, offers tips and approaches from water to extending mold production between PMs in this free webinar.

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2020-2030 Editorial Advisory Board: Brian Dippel

By Christina M. Fuges

Brian Dippel brings 35 years of plastics and moldmaking experience to *MMT's* Editorial Advisory Board. His career has helped him develop an expertise in mold design, mold construction, production and maintenance.

Brian attended trade school to learn tool and die making and then earned his degree in business administration and management from Edinboro University of Pennsylvania. He started as a toolmaker building injection and blow molds and then moved into extremely high-volume injection molding production at The Plastek Group in Erie, Pennsylvania, (whose owner, Joe Prishcak, was the founder of *MoldMaking Technology*).

Brian was the tooling manager for the Spectrum Molding Division of Plastek, responsible for managing the tool room that supported 65 molding machines. His responsibility was to maintain the condition of the molds to improve production efficiencies and metrics. He also was the Spectrum Division program manager for high-volume "take over" consumer packaging production systems. Brian was responsible for integrating and validating high-speed production systems, assembly & decorating equipment, molds, robots and presses into the Spectrum Division. He also managed consumer product development programs before

being promoted to General Manager of Triangle Tool, at the time a 60-man tool shop, another division of the Plastek Group. Currently, as the operations manager for X-Cell Tool and Mold, he manages the engineering, quality, program management and molding departments. Most recently, Brian helped X-Cell expand into injection molding by supporting the effort to add more medical customers to capitalize on the company's ISO 13485-certified class 8 cleanroom capabilities.

Two of Brian's main focuses are the customer and continual improvement. He believes that customer satisfaction is critical because what defines a customer relationship is not what happens when times are great, but what is built and defined when times are not so great and things are not going well.

When it comes to continuous improvement, Brian says that complacency is not acceptable. He works with the X-Cell team to improve the quality of work by improving the quality of X-Cell's designs. It's their standard. Mold longevity through user-friendly designs that result in an overall lower cost of ownership is the end goal.

Outside of work, Brian likes woodworking and scuba diving. [MMT](#)



Brian Dippel, operations manager for X-Cell Tool and Mold in Fairview, Pennsylvania, is one of *MMT's* new editorial advisory board members.

FOR MORE INFORMATION

X-Cell Tool and Mold / 814-474-9100 x220 / xctam.com

EDITORIAL ADVISORY BOARD (EAB)

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

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

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**2021
AT A GLANCE...**

FEBRUARY

2

**SHOP RATE
SURVEY LAUNCH**

FEBRUARY

4

**ANNUAL ASSEMBLY AND
STATE OF THE INDUSTRY**

FEBRUARY

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**EMERGING LEADERS
"MEET THE MENTOR"
PROGRAM LAUNCH**

MARCH

10-11

**SALES AND MARKETING
VIRTUAL SUMMIT**

JUNE

22-24

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AUGUST

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**PLANT TOUR WORKSHOP:
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AUGUST

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NOVEMBER

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A Conversation with ... Innovation Mold & Design

What do you view as Innovation Mold & Design's chief competitive advantage?

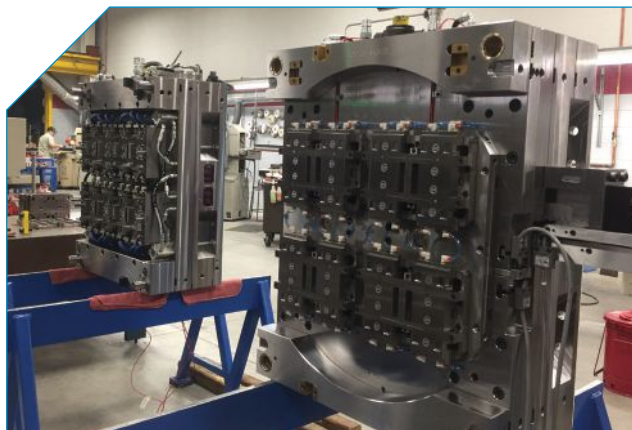
Alex Hermann, President, Innovation Mold & Design: We combine innovation, technology and precise craftsmanship to deliver the highest quality products the first time. Our highly skilled team, automated processes and partners/vendors relationships ensure attention to quality and workmanship. We are known for producing highly accurate, tight-tolerance tooling that requires a lot of engineering with competitive timing. This is an area where we can be competitive, even with the offshore markets.

We manufacture a wide range of tooling from single cavity prototypes to high cavitation Class 101 production molds using the latest machine tool technology and a lights-out approach. Quality assurance is met throughout the manufacturing process by our highly-skilled toolmakers. We also know that shorter production lead times are extremely valuable, so we offer in-house sampling capabilities.



**Innovation Mold & Design
(IMD)**
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innovationmold.com

- Operating since 1974 as a full-service mold manufacturing company.
- New ownership took over in 2012 and grew the company from nine employees to 40 employees (and four apprentices) and from 12,000 square feet to 30,000 square feet.
- Increased sales over 500% throughout eight years.
- A highly skilled team, 100% in-house manufacturing, inspection and mold sampling.
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- Produces molds for all phases of product development and manufacturing, from prototype to multi-cavity, multi-shot hot runner molds.
- Begins each mold project with a detailed manufacturing plan that the lead toolmaker oversees until the mold ships.
- Streamline processes help to meet delivery times and budgets.



Images courtesy Innovation Mold & Design (IMD).

This lift-and-spin 16x16 cavity two-shot mold concept was created to allow two-shot molding techniques without a rotary platen, making it very versatile to run in multiple presses.

What is your team philosophy?

Hermann: I have a huge banner hanging in the shop that says: "The best people create the best processes. The best processes create the best technologies. The best technologies create the best products." This means putting the right people in charge, letting go of individual responsibilities and enabling people to take on more responsibility. The way to master your craft is to have a departmentalized shop where people are specialized. If you have a CNC programmer, they need to be the best CNC programmer, etc. This approach creates an assembly line-like process with custom molds. Every tool is a little different, but if you apply the same process, you can streamline things.

Share how Innovation has kept up with technology.

Hermann: We used to be 100% consumer products work—basically form and function with fairly wide open tolerances. However, to go to the next level and diversify into other markets, we needed to invest in talent and technology. We invested a total of \$6 million since 2012—including the expansion and new equipment.

But before the technologies, it's communication and process. When we get a P.O. from a customer, the first thing that happens is we generate a timeline for the customer to approve, we provide a progress log along with the way and process check sheets in every department and a pre-ship checklist.

As far as technology, we find ways to streamline and automate, where we can to remain competitive and cost-effective within our customers' timing demands. For example, incorporating more automation and focusing on more complete turn-key solutions while working together with our customers to help them streamline their processes and profitability as well. The latest investment was introducing five-axis machining to our capabilities.

We have three automated EDM cells paired with electrode-cutting machines—one of which is five-axis—and we are starting to incorporate this on our steel-cutting side as well. We also

have three cells capable of lights-out machining, and have a horizontal machine equipped with a pallet changer to help increase our unattended runtime. We are excited for our latest purchase, which is a larger Makino V80s five-axis machine with high-speed milling and finishing capabilities that will enhance our capabilities and efficiencies.

We used to write a simple program for a machine to run for hours, sometimes days. Today, with the newer machine technology, machines process information can run in half the time or faster, which allows for more capacity and requires more programming time. To keep up with this speed, we must maintain a backlog of programs to run the machines lights-out.

We also brought a lot of work that we used to outsource back in-house. For example, we outsourced 100% of our turning, wire EDM and polishing work. We purchased the necessary equipment and additional resources to bring this work in-house. This has given us control of quality as well as the schedule. It saves time, as we're not spending a day delivering a tool.

In terms of the equipment you buy, you learn the hard way that you get what you pay for. For example, one machine tool had a great price and worked right out of the box, but about a



This medical device two-cavity mold features multiple compound actions.

year later, it started failing. It could not hold the accuracy we needed to take on some of these new markets. If you're cutting twice, you throw your timeline out the window. We don't have the time. We have to cut once, and it has to be right. That's how competitive it has become. We are now challenged with doing a standard 16-cavity mold in eight weeks instead of the



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This stack mold design allows greater cavitation within a smaller press platen size.

traditional 16 weeks. The key is the right process and plan, which includes automation.

Then there is quality assurance. At Innovation, first, we buy equipment that we can trust, and that cuts consistently. Before a block leaves a machine, it is checked. That involves in-machine inspection with probes or third-party inspection. We have an in-house CMM and a vision system, and three partners on the outside for an unbiased opinion due to the tolerances we work with, especially on medical parts.

If we perform this in-house, we may consider it 'good enough' when we need to shoot for being right or wrong, and a third-party source gives us that honest answer, which helps us determine if we need to make an adjustment, replacement, or have a conversation with the customer.

We also are a paper-free environment where everyone works off the same model. It's our culture. Everyone checks their e-mail every morning for updates and then grabs a revised model, ensuring the entire team works on the most current model. Our experienced design engineers use the latest Siemens NX/Unigraphics, SolidWorks, Delcam and Mastercam CAD software to achieve accurate, efficient tooling designs and processes.

What are the most significant ways you have expanded your business in terms of your growth strategy?

Hermann: We continually look to add to our customer base and the markets we serve to be diversified in the areas where we perform best. This approach helps us maintain consistency as some markets slow, and others rise. We have made great strides in the medical and military industries and wish to grow within those markets and our current key markets.

I'd rather have 52 small customers hitting different markets

than two or three huge customers. The scheduling is a challenge, but if you do it right and put the right people in place, you're going to be able to sustain a steady workflow. We've averaged 45 to 47 hours consistently since 2012.

Currently, we have more than 60 customers with a range of work. Of note is newer military work. We became ITAR-certified in 2017. Many of the projects are experimental prototypes that can take two to five years before they go into production. It's a lengthy process, but the end goal is very rewarding because you can get a 5- to 10-year plus contract for production machining work, which is a segment of our diversification that we want to grow in the next couple of years.

Also, three years ago, 90% of our customer base was Wisconsin. Now we are branching out to other states. Work includes mold building as well as sampling and sometimes low-volume production runs. We have a molding department with 55-ton, 110-ton and 250-ton presses. We are not a molder, but it is a value-add service if needed.

Tell me how Innovation Mold has experienced the impact of reshoring.

Hermann: We have had many cases where various customers used offshore tooling primarily because of perceived cost savings. Our entire organization prides itself on designing and manufacturing molds in the U.S. We enjoy working with customers and developing plans to show them that in the long run, quality domestic-built tooling will save money. A quality, high-precision mold will run faster, produce more accurate parts and outlast lesser-quality molds, yielding substantial cost savings.

For example, we have a consumer products customer for the electronics industry that has done all of its tooling offshore for the last 15-20 years. This year, we became the first U.S. manufacturer to build their molds and run their products. They do two launches a year that we want to capture. They reached out to many larger companies but liked our approach, willingness to collaborate, outside-the-box thinking and strategies for improving speed-to-market. For example, instead of building a certain cavitation for a particular mold, we added cavitation. This approach means that we didn't have to build as many tools, so there is less of a window before that product hits the market. We are hopeful about growing this industry segment.

COVID-19 put the spotlight on American manufacturing, and not just its value but its resourcefulness. Can you explain it?

Hermann: What is most impressive about all American manufacturing is our ability to redirect resources. You might be a moldmaker today, but tomorrow you're making parts for respirators. You might not be making molds, but you are assembling or cutting paper dies, etc. We have the labor, the facilities and the technology that we can redirect. **MMT**

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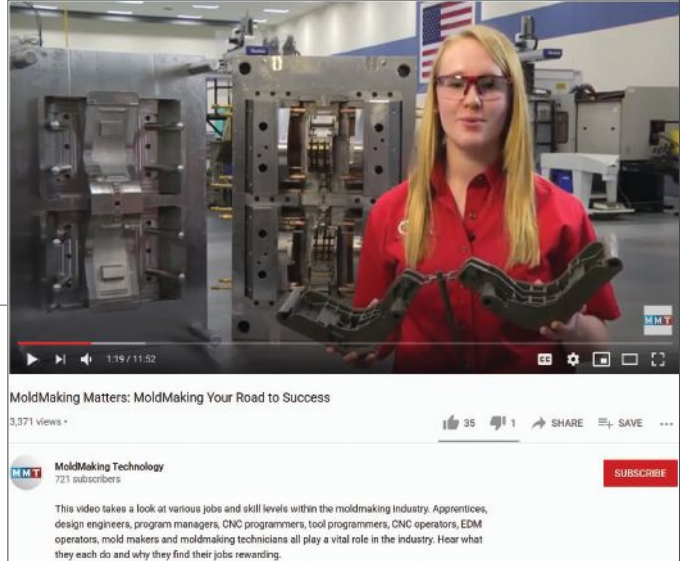
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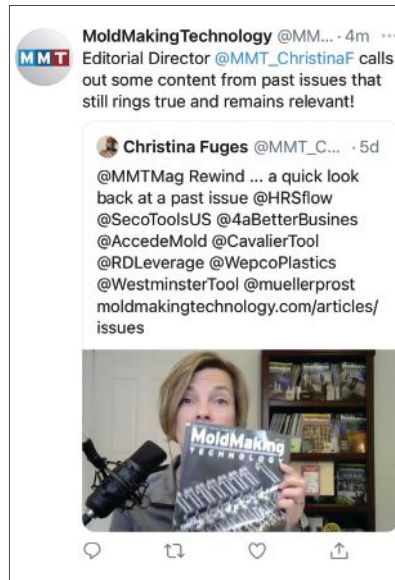
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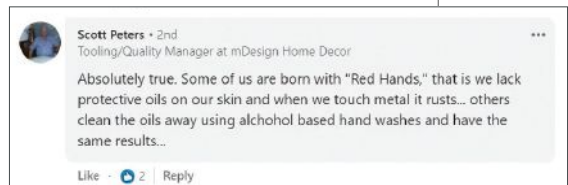
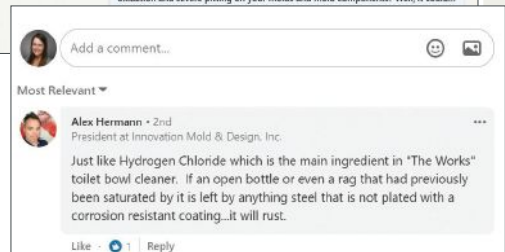
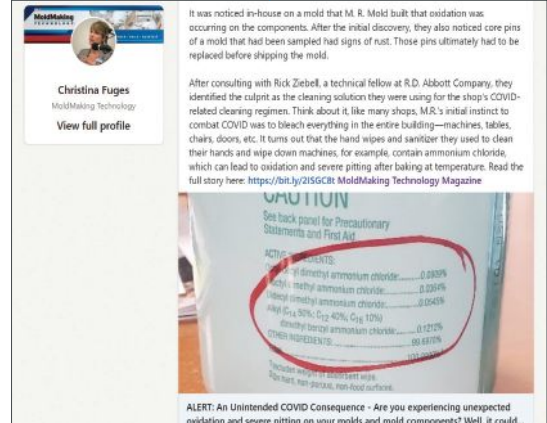
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Improve Mold Venting with Metal Additive Manufacturing

Patented 3D-printed mold insert design rapidly evacuates gases while preventing plastic flash-through, eliminates costly maintenance and need for press-side temperature-control units.



Images courtesy of Hi-Tech Mold & Engineering

3D printed mold inserts (like the image above and this detail from that insert) not only enable fine features to be molded, but also provides vital venting to evacuate gases to prevent dieseling, voids and die-lock.

Founded in 1982, Hi-Tech Mold & Engineering Inc. is a full-service mold-maker employing 240 associates and headquartered in Rochester Hills, Michigan. The company offers R&D, mold design/engineering/production, program management, custom machining/EDM, benching and polishing, additive manufacturing/3D printing, a CMM laboratory, tryouts and mold validation and service/repair with 24-hour turnaround. At its Michigan location, the company also offers low-volume injection molding and assembly. At two other locations—in Winchester, Tennessee, and Westminster, South Carolina—the company offers mold design/build/repair under the Hi-Tech name, while sister company Baxter Enterprises provides production injection molding and assembly for the plastics industry. To support global programs, Hi-Tech is also a landing house for offshore molds being prepared for use in North America.

The majority of mold components Hi-Tech Mold & Engineering prints are in MS1 alloy (maraging steel), which has properties similar to P20, making post-print machining, EDM, grinding and welding much simpler. By focusing on one material, the moldmaker avoids costly and time-consuming changeovers that are otherwise necessary to prevent cross-contamination between metals. Another Hi-Tech innovation is that it machines a P20 base, which functions as a scaffold on which the MS1 component is printed, including channels and conformal cooling lines. This hybrid design significantly reduces overall printing time and eliminates the need to cut the printed item from its build plate.

and produced by partners in Asia, Europe and South America. Hi-Tech and Baxter are major suppliers of tooling and parts to the automotive industry, but also service other ground transportation segments along with medical, appliance and defense. Hi-Tech also provides custom aerospace machining.

Extending Traditional Technologies

“Over the last couple of decades, our company has continued to evolve by adopting many of the developing technologies of Industry 4.0,” Paul Glowicki, Hi-Tech chief operating officer remarks. “With our use of data analytics, machine learning, adaptive scheduling, simulation and additive manufacturing, we look for competitive advantages to remain a leader in mold-making and machining.”

The company began using local suppliers to produce 3D-printed metal mold components in 2013. After thoroughly researching available technologies, in 2014 Hi-Tech acquired its first metal 3D printer from EOS North America (Novi, Michigan)—an EOS M-290 model—and in 2016 purchased a second of that same model. Both printers use direct metal laser sintering technology (DMLS, which EOS has rebranded as direct metal laser solidification “to more accurately reflect the nature of the process”).

“We went with DMLS printers because that technology offered the right choice for our main use-case, which was mold inserts,” Mark Krauzowicz, Hi-Tech additive manufacturing specialist explains. “Insert vents have to be large enough to evacuate gas quickly, but small enough to prevent clogging by plastic melt and mineral fillers. With DMLS, we can produce parts—in the alloy of our choice—that are 99.9% dense. In contrast, printing technologies like metal binder jetting incorporate a binding agent in the metal powder that has to be flashed off in a post-print heating process, which adds time, cost, energy and the risk of shrinkage and warpage, making it hard to control vent size. DMLS gives us more predictable out-of-printer components; the tradeoff is a slower printing process and disposal costs associated with removing metal-condensate by-products.”

HI-TECH MOLD & ENGINEERING

PROBLEM: Moldmaker wanted to improve its venting strategy while avoiding issues with machined porous steel inserts.

SOLUTION: Switch to 3D-printed inserts in maraging steel with integral conformal cooling lines and more efficient vent channels placed exactly where needed.

RESULTS: Metal additive inserts evacuate gases quickly and don’t clog or require costly maintenance like machined porous steel inserts.



Hi-Tech Mold & Engineering, Inc. is a full-service moldmaker with operations in Michigan, Tennessee and South Carolina. Along with its sister company Baxter Enterprises, Hi-Tech is a major supplier of both tools and parts for the global automotive industry, including interior Class A, molded-in-color parts and exterior Class A hard trim and underbody components. Additionally, the company serves customers in other ground transportation segments (commercial truck, agricultural equipment, recreational/all-terrain vehicles) as well as medical, appliance and defense, plus provides custom machining for the aerospace segment.

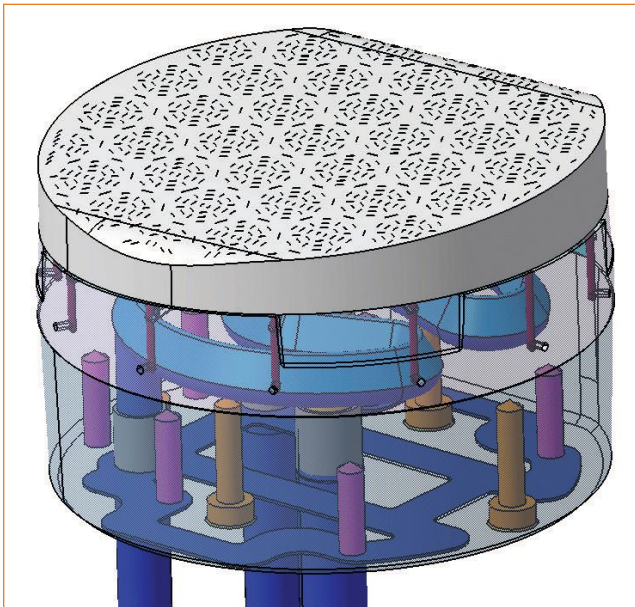
Machined vs. 3D-Printed Inserts

A few years ago, Hi-Tech was awarded a large tooling contract by an automaker and its tier integrator. The job entailed producing more than 60 production injection tools to mold interior door-trim panel uppers, lowers, map pockets and bolsters for many pickups and sport-utility vehicle models. Program life was anticipated to be seven years plus service, and total vehicle build with all models of the vehicles was estimated at 300,000 annually. As part of the job, 28 of the tools included speaker grilles, which would require 8-inch x 6-inch/20-centimeter x 15-centimeter inserts to produce the fine holes.

“Given the size of the holes we were dealing with, we knew from the start that we’d need good venting throughout the geometry to fill those parts without defects,” recalls Glenn Jacks, Hi-Tech engineering director. “Typically, we’d use a porous steel insert for this kind of application. Although our customer had limited experience with that type of material, they knew it required a high level of care to maintain good venting performance. A further complication was that we’d recently heard the supplier of a popular brand of porous steel was ceasing production, making the material more difficult to obtain.” These factors caused Hi-Tech’s customer to worry about high maintenance costs and production interruptions



Hi-Tech produces prototype and production molds for most plastic processes, particularly injection (including gas-assist, 2K/overmolding, core-back, stack and low-pressure molding), as well as compression, and injection/compression. While the toolmaker can produce molds in the full range of sizes (100-4,000 tons/tonnes), its specialty is large molds that typically fit presses at or above 750 tons/tonnes. Most are complex tools requiring side action.



Among the many advantages of additive manufacturing is that vents can be engineered only in surfaces that require venting—like rib bottoms—but not sidewalls or shutoff surfaces. Printed vents can be designed as continuous channels sized to vent gas quickly while restricting plastic flash-through, and spaced and shaped to follow part geometry. Additionally, conformal cooling lines can be incorporated, so moldmakers and molders needn't choose between addressing gas traps or hot spots.

on tools being shipped to plants in the U.S. and Mexico. They challenged the moldmaker to find another solution, which, fortunately, Hi-Tech already had.

Sintered and porous metal-matrix composite (MMC) has long been used in injection molds to improve venting, gloss levels, cycle time and pressure and scrap/reject rates. However, its tiny pores (~7µm) on every surface (including shutoffs), weren't connected, so gases had to take convoluted paths to escape during venting. Under fast-fill conditions, this could lead to voids, dieseling and die-lock as plastic became trapped in pores along sidewalls. Another problem reported by Hi-Tech's customers was that after ~50,000 molding cycles, inserts had to be removed and cleaned.

"Porous steel is a valid solution for solving quality issues on injection molded parts, but it's also given moldmakers and molders a lot of headaches," Jacks adds. "In addition to the high cost of raw blocks and the fact that there is a limited supply base, it requires delicate handling to produce a finished insert." During machining and polishing, the material being removed can easily be folded back into pores, blocking them, as can the oils and sprays mold shops and molders use daily, he notes. Another issue is that cooling lines can't be drilled into porous steel without going back and plating the holes, forcing moldmakers and molders to balance the tradeoff between gas traps and hot spots. "Although porous steel provided good breathability for venting gases, the inserts have both durability limitations and maintenance concerns for molders," Jacks continues. "When pores get clogged, maintenance is slow, arduous and costly. Inserts must be removed from tools, sent to outside vendors and cycled through ultrasonic baths for at least 12 hours. That's why we always produced backup inserts to keep tools in production." In the case of this program, that meant 2 inserts/cavity x 28 molds.

Since they'd been using MMC for inserts for some time, Hi-Tech was already aware of the benefits and challenges with these materials. "A few years before we got this job, we'd gone in search of a better answer for venting problems and that's how we got started with 3D printing," explains Anthony Debenedictis, Hi-Tech senior designer. "Not only were we able to print conformal cooling lines into our metal inserts but—thanks to metal's superior thermal transfer—we directly tied our water circuits to the water manifold for the rest of the mold. That enabled us to eliminate press-side temperature-control units, which are usually needed with MMC inserts to assist plastic flow through the grille geometry." Hi-Tech had produced at least 10 3D-printed speaker inserts with engineered venting before being awarded this program and one of the tools had been in operation for over a year, proving the concept worked.

Given concerns about potentially high-maintenance costs with porous steel inserts, and customer willingness to consider new technology, the program planned two inserts for each cav-

ity: one in MMC (the primary) and one in printed maraging steel (MS1 alloy; the backup).

“The program’s lead tool headed to initial tryout with printed inserts in place so all parties could assess their performance,” recalls Jacks. “The results were so overwhelmingly positive that specs for the remaining tools were changed, designating the printed insert as the primary and MMC as the backup. Since that program, we’ve had many other programs launch with exclusive use of 3D printed inserts for both primary and backup. In fact, to date, we’ve used metal additive inserts in over 70 molds, with more in planning and production, and in 2017 we were issued a U.S. patent for our work in this area.”

Gaining Ground with Moldmakers

EOS GmbH was founded in Krailling, Germany, in 1989 and supports customers globally. Although the company initially focused on supplying plastic printers and materials, it added metal printers and materials in 1995.

“Today’s 3D-printed metal parts are fully dense and incredibly robust, which is why they can be used in aircraft, medical devices, plastic molds, casting dies and many other mission-critical applications,” explains Jon Walker, EOS North America business development manager, who notes that traditional moldmaking won’t go away anytime soon, but greater trust is

We went with DMLS printers because that technology offered the right choice for our main use-case, which was mold inserts.

building within the industry as more decision-makers experience the capabilities of metal additive manufacturing—particularly how well such parts meet the rigorous demands of moldmaking and high-pressure die-casting. “Hi-Tech has a strong understanding of the value and benefits of metal

additive and they really did their homework before buying their first printer,” Walker adds. “It’s been a very good partnership.”

“EOS has been an important partner to us—especially on this tooling program,” recalls Krauzowicz. “They helped us overcome many challenges, including printing speed, laser intensity and geometric design. Cooling simulation was also critical to help us determine how to intertwine venting and cooling channels to make the greatest impact on molded parts. It truly took a team effort to achieve working components in an efficient manner.”

Walker notes that plastic parts produced from tools with 3D-printed components generally have higher dimensional accuracy. “There are lots of underutilized applications and huge opportunities to leverage 3D printing in moldmaking—especially for snap-fit parts,” he adds.

“One thing to remember,” notes Jacks. “Metal additive is not much faster than traditional methods of machining a



Unlike MMC inserts, pores in metal additive inserts don’t require special cleaning and rarely clog. The only maintenance needed is a daily flush with shop air through an externally-mounted port to keep the channels free of debris. In 2017, Hi-Tech’s engineered vent strategy was awarded a U.S. patent for design and use of a 3D printed insert to form speaker-grille details.

porous steel insert. It takes about 100 hours to print a 6-inch (15-centimeter) piece, and that’s after spending several days in CAE developing the vent architecture. Our two printers were working continuously for weeks to complete all the inserts we needed across all the tools in this program.”

Interestingly, not only has Hi-Tech used its printers to create mold components, but they’ve also printed replacement gears for their milling machines. “Additive manufacturing is a significant investment for any company, as aside from the machine purchase, there’s the need for a cleanroom and to support significant employee training,” Glowicki continues. “Because of that, it takes time to realize ROI. However, as rapidly as the technology is advancing, with larger printing envelopes and faster machines, its limitations for moldmaking are bounded mainly by user imagination.” **MMT**

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Taking Care of the People Side of an Acquisition

Focusing on the human side of the business—employee health, safety, success and growth—is the only way to satisfy both the buyer and seller.

With the average age of mold shop ownership nearing 60 and many owners wanting to settle into retirement, an acquisition sounds like a sensible option as long as their people are put in good hands. And therein lies the problem.

People in mold manufacturing matter most, because it's more like a brother and sisterhood than an industry. So, as the stories of private equity firm buyouts gone wrong persist, ownership is very hesitant to go down the M&A road.

So what makes for a successful acquisition? If you ask me, it's considering all aspects of the human side of the business, as well as taking into consideration and care the employee's

health, safety, success and growth. And this means a heavy focus on a culture of leadership and lean.

This is precisely what B-Square Precision Group's CEO Mark Beck and CFO Tony Butler did. And they are on the hunt for a quality mold manufacturer to add to their North Carolina-based high-precision manufacturing group.

Coming Together

You might be wondering how Mark and Tony came together. For starters, Mark has five kids, and Tony has 11, which indicates that, right from the start, they've had that big family



Images courtesy of B-Square Precision Group.

B-Square Precision Group's CEO Mark Beck and CFO Tony Butler empower the leadership of both KAM Tool & Die (Zebulon, North Carolina) and JMC Tool & Machine (Sanford, North Carolina) to collaborate and build teams that can take each company to the next level. Here, leaders at JMC & KAM meet to learn new "business system" tools.

mentality in common. Add to that a strong focus on faith, family, community, education and business management, and you have a powerful partnership.

However, the personalities of every successful partnership have differences too, and Mark and Tony are no exception. Mark is an idea man, ready to implement, and Tony is cautious, methodical and very detail-oriented.

“Mark is a visionary and can paint a big picture of the future and what’s possible. I’m one to focus on how to make that happen, so I tend to look at constraints and available resources,” Butler says.

They have a unique accelerator/brake partnership, according to Beck. The analogy he gives people is that he is the accelerator on this car, and Tony is the brakes. “If you think about it, if you only have an accelerator, you would only drive your car five miles per hour. You would never go 50 or 60 or 100, but if you have a solid set of brakes, then you can go as fast as you want because you can stop when you need to. I value Tony as the brake even more than I value myself as the accelerator. We’re a great team,” Beck says.

Reflecting upon the reason why he chose to team up with Butler in a manufacturing venture, Beck says that, despite a lot of time spent in the office and management meetings, the happiest times during his corporate stint were his visits to various company manufacturing facilities, vendor operations and customer sites where innovation happens. So, when the novelty of his semi-retirement faded, the idea of starting a manufacturing company was born.



Mark Beck and Tony Butler bring a unique accelerator/brake partnership to B-Square—Mark is the accelerator and Tony is the brakes. Put another way, Mark is the idea man, ready to implement, and Tony is cautious, methodical and very detail-oriented.



To build the right culture from the start, Beck and Butler tailored their approach to each company, each situation and each workforce. Here, Tony Butler and Frank Patkunas, JMC VP of Operations, walk the factory floor.

Butler made the move with Beck because he was seeing increased reshoring initiatives and trusted Mark’s background, experience and connections. “Mark was the humblest CEO/senior executive who I had ever met. I could tell that he was the ‘real deal.’ He was firmly and fully in control of all his abilities and passions and could direct them to bring about good with ease,” Butler says.

Another reason Beck picked manufacturing was that it was these types of companies that he would contract throughout

his career, and as a result, build a vast network of contacts that he can now leverage to grow B-Square. Beck notes that although he cannot walk up to a CNC machine and program it, he knows the difference between a mill and a lathe. More importantly, he understands lean and leadership, and that is where he believes he can make a difference.

This duo has a vast amount of experience that lends itself well to a high-precision manufacturing business. Mark is a Harvard graduate and an accomplished leader with demon-

“We are different because we love investing in people and using our experience to streamline operations and improve the customer experience. We aim to help these companies reach their full potential.”

strated capabilities in both strategy and execution. He has been successful in launching multiple start-up businesses and leading corporate turnarounds, often bringing lagging businesses into positions as market leaders, including Corning Inc., Danaher Corp. and JELD-WEN Inc.

Tony is a numbers guy who attended Brigham Young University, where he earned a BS and MS in statistics, attended one year of law school, then finished his schooling with an MBA. For most of his career, he has applied his skills primarily in the realm of commercial real estate securitization as well as finance and investments, including the Church of Jesus Christ of Latter-Day Saints, Koch Industries, First Union/Wachovia and RAIT Financial Trust.

In 2018 Butler teamed up with Beck to create the B-Square Precision Group. Both men have exceptional entrepreneurial roots and long-time experience working in the corporate world. Still, their true passion lies with manufacturing and applying proven management practices to the precision machine component (and related) space.

Building Blocks

To date, B-Square Precision Group (Charlotte, North Carolina) comprises KAM Tool & Die (Zebulon, North Carolina) and JMC Tool & Machine (Sanford, North Carolina). KAM Tool, which became the first member of B-Square in December 2018, builds and reverse engineers tools, dies, fixtures and molds. JMC, which was acquired in 2019, provides precision machined components and assemblies (10,000 to 30,000 parts per year) to the medical, industrial, aerospace and pharmaceutical markets.

"KAM is more of a prototype quick-turn shop with strong EDM and machining capabilities, and with JMC, we picked up a respected short-run production house with Swiss capabilities, turning, horizontal and vertical milling, laser cutting, a press brake, welding and assembly. JMC is a nice tie-in to KAM," Butler says.

Both companies are ISO 9001-2015-certified. JMC is on track to obtain the ISO 13485 certification by the end of the year, which is a proof of

Tony Butler discusses the scoreboard with JMC's VP of Operations Frank Patkunas that tracks safety, on-time delivery, quality, maintenance and cost.



Mark Beck leads a working session to streamline work flows between JMC & KAM. Meetings like this are important to building successful teams.

Quality Management System (QMS) compliance to the standard for organizations involved in the medical device industry.

Butler and Beck were sold from the start on KAM's robust EDM capabilities, pharmaceutical opportunities given its location and the skilled tradespeople running the day-to-day activities in the shop. They were also impressed with JMC's facilities, overall capabilities and the ownership team. To compare, KAM does around \$3.5-\$4.0 million a year with 20 employees, and JMC has a workforce of about 50 and does \$8 million a year.

Now, Beck and Butler are trying to build a group of companies that cover the precision manufacturing spectrum, with a goal to add three more to the B-Square family. Next on their list is a mold builder. They are looking for owners with high character and a business with a diverse customer base with long relationships.



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Beck and Butler love investing in people and using their experience to streamline operations and improve the customer experience. They keep the businesses they acquire autonomous, invest in new equipment, leverage world-class operating techniques and provide training.

"We look for companies that can cross-sell for each other, eliminating what we call a *customer concentration problem*. Many smaller shops have a customer dependency problem, but if you combine, let's say, five companies that each have a customer concentration problem into one company, you eliminate any customer concentration problems. Then you can grow," Beck says.

Listening, Leading and Getting Lean

The key to B-Square is culture. Beck always found himself working with management who was not always as commit-

ted to culture as he wanted to be. "I felt a little constrained," Beck says. He saw this as an opportunity to build a company culture the way he always thought it should be done, and make the people priority number one.

"We are different because we love investing in people and using our experience to streamline operations and improve the customer experience. We aim to help these companies reach their full potential. We keep the businesses we acquire and their brands autonomous, we invest in new equipment to grow the companies, we leverage world-class operating techniques and we provide training to every team member," Beck says.

Let's take a look at the first acquisition. Randy Jones is the general manager of KAM Tool & Die. Under previous ownership, he was the operations manager. With more than 25 years with KAM, he can attest to the positive changes put into place by Beck and Butler.

Although KAM's previous ownership continually invested in technology, it was the training that started to wane as their retirement neared, which was a sign to Jones that things would be changing. He was brought on board once the owners decided to move forward with the acquisition, but they instructed him not to share the news just yet—a hard demand to place on a man who sincerely cares for the workforce. "I'm a people person. I love my employees. Their families, their education and their training, mean a lot to me. Holding onto that information for ten months was very difficult," Jones says. The good news was Mark and Tony's people-first philosophy was a perfect fit.

As the acquisition moved forward, Jones' greatest fear was the new owners picking apart the company and moving it to another location, which is a common outcome of many acquisitions.

"KAM has excellent relationships with all of its customers. So good in fact, that we never hired a salesperson throughout our 24 years. That says a lot about our quality and commitment to our customers. I did not want to see that fall apart," Jones says.

One of the sellers also believed strongly in KAM's people, so he worked a stipulation into the buyout contract that kept the company as-is for a specific time frame. This fits nicely with Beck and Butler's focus on building B-Square with local businesses and not immediately bringing in any outside people.

Beck and Butler are committed to being there for the people, but they do not run the business. They are not micro-managers. "I couldn't ask for better leadership on their part," Randy Jones, general manager of KAM Tool & Die, says.

Benefits of a Group

One major advantage, and key strategy, to the B-Square Precision Group family of companies is that the sister companies help each other. For example:

- Combined healthcare programs improve better benefits to all employees at the same cost.
- Cross selling; sharing customers.
- Collaboration and assistance with large or complex projects.
- Shared expertise, best practices and vendors or suppliers.
- Shared sales people who visit customers and sell the capabilities of all members of the group.
- Centralized back-office work such as accounts payable at one location.
- Entrepreneurial Operating System (EOS) deployment across all operating companies.



Structured meetings have opened up communication across the companies. Tight inner circles are now opened up to other key team members, giving employees access to more information.

After the acquisition was complete, Beck and Butler came into KAM and showed a presentation of their four foundational values: Integrity, People, Customers and Performance.

Next, they met with each employee one-on-one to learn likes, dislikes and future career and educational goals. Beck

and Butler both believe that to gain employee buy-in, you must immediately start investing in the people and improving their environment.

“Listen. Get their ideas regarding what can and should change, then do as many as you can (the easy ones) right away,” Butler says. “Most of the time, if you allow people to shine, to grow and to progress, they will not disappoint you.”

For the first quarter, Beck and Butler allowed the KAM team to do their thing and sat back, watched and learned. They recognized that they were coming into this machining world blind, so watching and listening was vital. They *lead* by putting the employees first.

Jones says Beck and Butler are committed to being there for the people, but they do not run the business. They are not micro-managers. “I couldn’t ask for better leadership on their part,” Jones says.

Beck and Butler also understand the value of giving back to the employees. “I couldn’t ask for anything better. What they’ve done for me in the last year and a half has been more than the previous ownership did in 24 years,” Jones says. For example, showing appreciation with immediate raises and bonuses, and not just for Jones but the whole shop. And instead of coming in and cutting benefits, they improved them—increased the 401K match and decreased healthcare costs, etc. “The more you give back, the more employees give,” Jones says.

Then there are *lean* initiatives that have had a significant impact on KAM. Two fundamental changes supported their lean approach: a TPM (total productive maintenance) implementation and a score-board strategy.

After the first quarter, Beck initiated a visual score-board that tracks five metrics: safety, on-time delivery, quality, maintenance and cost. Each metric has a champion (on an annual rotation) who reports on their area during the team’s daily stand-up meeting.

“We place a green dot on the scoreboard for every goal that we meet and a red dot for each goal we do not meet. This is posted for everyone to see, which promotes accountability. Then every Monday, we send Mark a report,” Jones says.



Beck and Butler’s main pushes are for data-driven approaches, leadership training, improved collaboration among employees and more cross-pollination of customers.



Buyer/Seller Tips

Fran Brunelle, president of Accelerated Manufacturing Brokers, has a wealth of experience and passion for manufacturing, which shows when she works with her clients.

Here is a brief snapshot of our recent 20-minute Q&A during an *MMT* Chat with M&A tips for buyers and sellers.

MMT: Your background/history in the M&A world?

Fran Brunelle: I've been selling manufacturing companies for 26 years. We generally sell companies with revenues between \$2-\$20 million, and we work nationally.

MMT: Why are you manufacturing-focused?

Brunelle: This is what I know. I used to sell manufacturing equipment for a living, which eventually led to M&A work as long-time customers needed to sell their companies to retire or sought to expand through acquisition.

MMT: What are some tips from you for mold builders who may be considering selling?

Brunelle: Manufacturers in general, not just mold builders, tend to enter the sale process when they're ready to retire. The best tip I could give is to start the process early and be prepared for what it takes to go to market. The sale of a company can take about a year to conclude.

An acquirer will expect you to remain with them for up to a year. So, you can't wait until you're ready to retire to start the process. Besides timing, preparedness is vital. Most owners have no idea of the type of data a quality buyer will expect to see. Of course, there are the basics like three years of tax returns and financials. Still, there's also sale by industry, by customer, profitability for the products you make, customer retention history and more.

For more *MMT* Chats, visit moldmakingtechnology.com/videos/mmtchat.

"It's important that people know whether they won or lost every day. Did we succeed? Did we fail?" The scoreboard helps with that communication as does a new Job Well Done board.

Then on the side of the scoreboard, there is an Employee Training matrix, which helps each employee identify their strengths and weaknesses, and specific areas for improvement, which are posted for everyone to see and to provide a tool to request training in specific areas. KAM has also identified a Training Champion.

Beck and Butler committed to training by bringing trainers in and offering tuition aide. Plus, they also purchased an unlimited training package from Haas that allows employees to take training courses in its local Greensboro, North Carolina, facility whenever they want. "We have also ramped up our training programs with middle schools and local colleges through NC Works," Jones says.

Tied to training is mentorship, and Beck believes strongly in mentoring. Once a quarter, he comes in and assigns tasks to help improve skills to get employees to the next level. Currently,

he is mentoring a supervisor, mechanical engineer and programmer at KAM.

B-Square also offers opportunities for employees

to train at the other facilities, which may present different career options not available before this acquisition. Plus, this helps to keep them within the B-Square family.

Other changes include improved tool crib and general shop conditions, investment in additional equipment, lunch-and-learn activities and various bonus initiatives.

Common Perspective; Different Approach

Due to the timing of the acquisitions, Beck and Butler have completed more at KAM than JMC, but JMC already has benefits of its own to share about the acquisition.

Howard Nystrom is the general manager and president of JMC Machine & Tool. He is one of the three previous owners of JMC, with over 20 years dedicated to building this machining operation. A couple of years ago, the owners began having serious discussions about the future of JMC as they transitioned to retirement, keeping in mind their guiding principle: Always make decisions based on what is best for the success and future of JMC. After much thought and analysis, they decided that selling the company was the best route to continued growth.

As a result, they announced this decision to their 50 employees and began to transition to the new ownership in

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Young professionals are vital to the moldmaking industry, and it is important to acknowledge those making strides in shaping the industry's future. *MoldMaking Technology* is recognizing our industry's young talent through our **30-Under-30** honors program.

We are looking for 30 individuals under the age of 30 who are making a difference in moldmaking, both in their company and in the moldmaking community. The emphasis is on leadership and potential leadership—whether for a current employer or overall involvement in the industry. They may also be hardworking industry volunteers and community members who know how to give back to the moldmaking industry.

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September of 2019. The three were adamant about keeping things the same for their people for an extended period, as Beck and Butler got to know the business. Again, this was precisely what Beck and Butler had in mind as they believed in JMC, the current team and the ownership.

Beck and Butler tailored their approach to each company, each situation and each workforce. “They were not going to force a round peg in a square hole,” Nystrom says. For example, at KAM, one of the owners stayed on for a limited time, and at JMC, three owners were going to stay on and be heavily involved in the operation.

“My perspective about this acquisition may be a little different from Randy’s, as I am one of the original owners, but like Randy, I am impressed with the quality of leadership and the focus on the people side of this business,” Nystrom says.

“Beck and Butler understand the required capital investment and the need to add capability if you’re going to grow and maximize the efficiency and the utilization of what you have in your shop,” Howard Nystrom, general manager and president of JMC Machine & Tool says.

What did Nystrom like about B-Square? In a nutshell, Beck and Butler had a good story—their backgrounds, interest in staying in North Carolina, a solid growth strategy for building a precision manufacturing business and a

timeframe of a minimum of 10 years, which is not typical of an acquisition, according to Nystrom. “We felt like they understood manufacturing and truly wanted to continue the legacy of JMC and build the company. Their values were our values even though we never wrote ours down,” Nystrom says. Beck and Butler took the time to get to know everyone.

Nystrom’s initial path after the acquisition was to focus on sales because that was one area of the company that he was responsible for already. “JMC has a very contact-driven sales and marketing strategy. We did a lot of face-to-face development of customer relationships.”

Then, once COVID-19 hit, the pace of change picked up, and Nystrom shifted to the role of GM and president while Butler spent a lot of time onsite learning the business and Beck hit the road with him to visit customers.

JMC is now going into the most significant push of change as one owner leaves, and the other two owners step into new roles to develop the team. Beck and Butler’s main pushes are for data-driven approaches, leadership training, improved collaboration among employees and more cross-pollination of customers.

They are empowering JMC leadership and pushing them to get collaboration from within the company to build a team so that the company can grow to another level. “Before joining B-Square, we met only when we needed to meet, and now we have structured meetings that have opened up communication. What was once a tight three-owner inner circle is now open to other key team members like the sales manager or the quality manager. Employees have more information. They know more about what’s going on the organization,” Nystrom says.

Beck and Butler’s leadership approach is to be supportive and help the team accomplish its objectives, but not to tell the team *how* to do it. They want these businesses to be able to run on their own. “Plus, they understand the required capital investment and the need to add capability if you’re going to grow and maximize the efficiency and the utilization of what you have in your shop,” Nystrom says.

For those shops out there considering an acquisition, Nystrom advises preparation. “Ensure you have a solid management team in place, understand your growth story, learn to be proud of who you are, talk to other people that have been through this and work with an M&A firm.”

For those shops in the throes of the early stages of new ownership, Nystrom emphasizes the importance of being open to change. “No one should change just for the sake of change, but you should also not keep doing something just because you’ve always done it that way.”

Moving Forward and Doing the Right Thing

With the B-Square family, it’s all about allowing employees to take ownership in everything they do and instill pride. “Mark and Tony stress that it’s not about them. It’s not about me. It’s not about management. It’s about the team,” Jones says.

The key to B-Square’s success has been its core values—two people from different backgrounds joining together who have high integrity, possess different skillsets and experiences, but maintain a shared vision and goal which includes caring about the individual and wanting to make the world a better place.

“First and foremost, we want to do what’s right for the people, and then all the other things follow. We care about doing the right thing,” Butler says. **MMT**

FOR MORE INFORMATION

B-Square Precision Group / 919-775-7070 / bsquareprecision.com
KAM Tool & Die / 919-269-5099 / kamtool.com
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How to Boost Your Current Efficiency Rate

An alternative approach to taking on more EDM-intensive work when technology and personnel investment is not an option.

We live in unprecedented times, where as leaders, we need to find creative ways to maintain profitability and stability for our companies. Because of the current market conditions, capital spending has been reduced, and adding additional staff can be risky for both the company and the new staff member. As a result, companies are forced to find unique ways to increase efficiency.

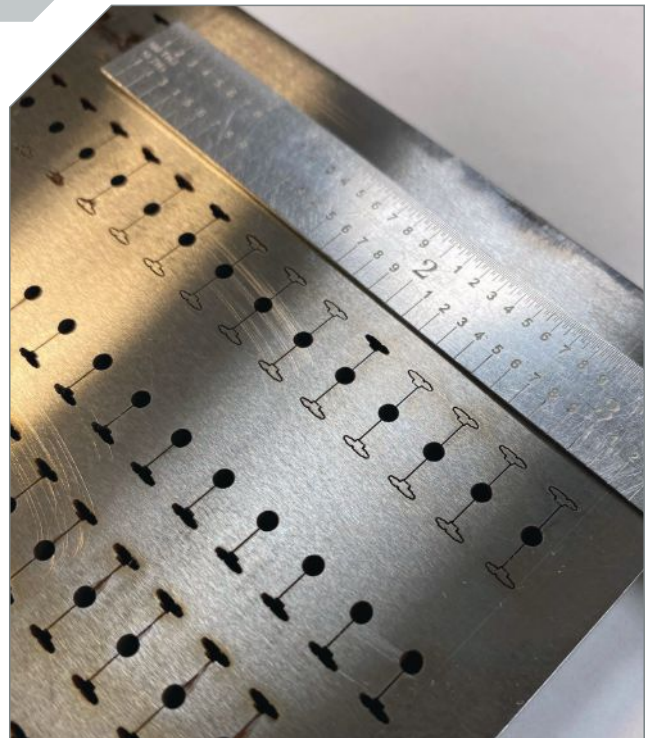
In the spring of 2019, our team—a 28-man internal mold shop of Ernie Green Industries (EGI)—faced the considerable challenge of building 63 molds in less than one year, which required extensive, high-precision wire EDM machining. The primary focus of the team is precision medical molds for non-invasive surgical devices, and many of our wired inserts and wired holes are very small (0.015 inch x 0.040 inch x 0.500 inch) or have thin steel conditions of less than 0.010 inch. However, in our current state, the shop did not have the wire EDM time needed with its two GF Progressive VP2 machines.

During the quoting phase of the project, we laid out a timeline to see if the project was feasible and quickly found out we did not have enough wire EDM hours. Our average cut time was 126 hours per week or 6,300 hours per year. To accomplish this task, the team needed to react quickly.

The initial solution was what most shops do—buy two additional machines at the cost of \$325 thousand per machine and hire the two to three additional staff required to run the new equipment. However, EGI's consulting partner, Harbour Results, challenged the organization to find another way to accomplish the task without investing in machines or staff.

Identifying Two EDM Problems to Solve

The team started by looking at how to improve our current efficiency rate. Utilizing two machines, EGI had 38 hours available cut time at 80% efficiency; however, it was only achieving an average of 21 hours cut time per day, or 52% efficiency.



Wire block for small mold inserts.

Images courtesy of Ernie Green Industries.

The first opportunity for improvement was to put multiple blocks in the machine. Our toolmaker had always *put one block in the machine at one time* in the same spot. He was trained to do it this way, 20 years ago. However, if we put multiple blocks in the machine, we could run for extended periods, including over the weekend.

This leads us to our second issue of *dropping inserts/slugs*. Some shops will let the insert/slugs fall into the tank, but our inserts/slugs are so small, we could lose them in the tank, or if they got into the machine head, the insert could cause costly machine damage. The toolmaker still needed to catch



Small mold inserts punched out.



Discovering an Autofix function on one of EGI's EDM machines and running multiple blocks helped the shop achieve 90% efficiency and increased available capacity.

each insert/slug that dropped. Initially, we decided to run our machines for extended periods, and then on the day shift, go back and drop each insert by hand. Doing so still took 5-10 minutes per insert, and there were thousands of inserts to wire EDM. Implementing these two steps improved cut-time efficiency to 75%, but the team knew there had to be another way to drop the inserts/slugs to increase efficiency further.

Through research on our machine and learning how others in the industry dropped their inserts/slugs, we found a solution where the wire would weld the inserts back in place after passing the wire tab. This would work, but require new equipment, which was not an option for this project.

Then, when one of the EDM machines went down, the team reached out for support and, at the same time, asked the manufacturer how they recommended dropping slugs and inserts. The machine has a function, called Autofix, which goes back to each wire tab and reduces it so that the insert can be tapped out with a small punch after the block was removed from the machine. With additional support, we implemented this functionality within one day.

Using both the Autofix and running multiple blocks allowed us to achieve an efficiency of 90% or more and significantly increased available capacity. Additionally, the team discovered that EGI's PEPS CAM system has a similar function to Autofix, which provides the company with multiple ways to achieve efficiency for wiring small, high-precision inserts and pockets.

Seeking Alternative Solutions

So, why did we not know about this function? First, the team was not challenged to look outside their typical solution set of adding equipment and people. Second, the appropriate level of training for the equipment was not required. Lastly, the tool-maker was not adequately trained in the use of the CAM system.

Challenging the team to look outside the norm, asking for support from our machine tool supplier and conducting more training on how to use our wire EDM and CAM system, EGI profitably completed the project requiring 63 high-precision molds and is considering additional wire EDM work because of open capacity.

What we have learned through this assignment is that a company should collaborate with its equipment suppliers to maximize its existing machines, to review all your processes to determine where efficiency improvements can be found, and invest in the training. Companies should not wait until there is a challenge or an issue but do this proactively to improve capacity and profitability. **MMT**

FOR MORE INFORMATION

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James Jergens, Operations Manager
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Leadtime Leader Q&A: Embedded Quality Control

Precise Tooling Solutions shares current capabilities and a glimpse of the changes occurring inside their manufacturing operations when it comes to inspection and measurement.



How extensively do you use inspection and measurement technology in your shop, and where or how do you use it most?

Don Dumoulin, President/Owner: As an ISO 9000 shop, we have embedded inspection and measurement into virtually all of our operating processes. We do this to ensure that

only quality products are manufactured and shipped to our customers. We tailored our technology and offerings to customer needs.

We have an on-site quality lab. This fully contained, environmentally-controlled facility is used by Precise craftsmen to verify and document every tool, CNC project and

ergonomic unit we manufacture. Every quality inspection form/report for each project is immediately available in both electronic and hardcopy formats. We maintain detailed inspection procedures, and archive a full complement of project photographs, CAD design files and spec sheets.

Two of our business units use traditional CMM equipment. Our Mold Productivity & Repair unit uses CMM when reverse engineering molds, before and after engineering changes and when tuning foreign-built molds. Our Plate Machining unit uses CMM equipment for spot checks during a project and as part of the final inspection before projects ship to customers. The accuracy and repeatability of our CMM equipment are ensured with frequent recalibration and staying current with the manufacturer's software releases.



Image courtesy of FARO Technologies.

Precise Tooling Solutions uses a FaroArm with surface plates to inspect parts.



3D measurement arm technology allows mold builders to quickly collect precise 3D measurements for verification of quality during inspections, tool certifications, CAD comparison, dimensional analysis, reverse engineering and more.

We also use a FaroArm with surface plates to inspect parts, which minimizes cost for our customers and ensures that their parts are checked according to their requirements. The versatility of the FaroArm is key. We can pull it from its stand and then inspect on the machine.

Have you invested in any new equipment recently? If yes, let us know about it.

Dumoulin: Our investment in five-axis machining centers jump-started our use of in-process measuring. For example, we now use the probing capability on our five-axis Roeders machine to measure and adjust during the rough cut and finish cut phases. Programming these inspections upfront allows us to complete projects more quickly (and at a lower cost) while still meeting our customer's tight tolerance expectations.

The accuracy and repeatability of our CMM equipment are ensured with frequent recalibration and staying current with the manufacturer's software releases.

We also installed VISI software in late October. VISI is acknowledged as one of the world's leading CAD/CAM software solutions for the mold and die industries. VISI is highly complementary to the 'in process' measurement capabilities of our five-axis machines, as it offers a unique combination of applications, fully integrated wireframe, surface and

solid modeling, comprehensive five-axis machining strategies with dedicated high-speed routines.

How do you see inspection and measurement technology evolving in the moldmaking industry over the next three to five years?

Dumoulin: We believe inspection and measurement technology will continue to improve as the moldmaking industry evolves. An example we'd cite is an increased use of the 3D visioning systems.

Precise Tooling Solutions is recognized for expertise in building, enhancing and repairing lighting/thermoset molds. Our customer's increased utilization of LED lighting means we're dealing with smaller mold cavities and complex geometries. It will need 3D visioning systems and advanced metrology approaches to ensure accuracy and repeatable operation. [MMT](#)

EDITOR'S NOTES

For more information on how to enter our Leadtime Leader Awards program, or if you have a question for any of the Leadtime Leaders, please e-mail Christina Fuges at cfuges@gardnerweb.com, or visit moldmakingtechnology.com/hashtag/leadtimeleader

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Do You Know the Hidden Costs of Poor Quality?

Mold builders must fully understand and account for the hidden costs of poor quality or risk losing customer trust, brand reputation and business value. Quality management is a business optimization tool to help address both the visible and invisible costs.

Most mold shops are well acquainted with the visible costs of poor quality. Still, these are just the tip of the iceberg compared to the deeper and more intractable invisible costs lurking below the waterline. Shops that think of quality as only a cost center enforce the incorrect perception that the quality function is essentially a thumbs up or the bearer of bad news. However, by embracing a comprehensive view of quality management, shops can limit the visible *and* hidden impacts of poor quality.

Calculating the True Cost of Quality

The true cost of quality is hard to quantify. The easy-to-see and easy-to-measure parts like inspection defects and internal

failure rates are the elements that provide the metrics and data. Still, it is the less obvious costs that can have the most significant impact on quality.

To continue the iceberg analogy, the hidden costs below the waterline are the ones that drive up the cost of poor quality. These nested costs are a laundry list of failures that are the significant contributors to the cost of poor quality, such as engineering change orders, nonconformance, customer complaints, lost sales, late delivery, product re-works, supplier incapability, excessive raw material orders, long cycle times, working capital allocations, degraded brand image and lost customer loyalty.

Commonly referred to as the “hidden factory” by economists and quality professionals, these costs are more incremental

and come into play when a drifting or “out of control” manufacturing process decreases both the quality and efficiency of production. In a perfect world with unlimited time, all defects would be identified, removed from production, fixed and placed back on the line. Unfortunately, we do not live in a perfect world.

One of the more defining characteristics of the hidden factory is that the longer problems exist, the higher the associated costs. There is a consensus that the cost of poor quality can be 10-15% of operations, and hidden costs can be as much as four times the visible costs. Noted quality guru Armand Feigenbaum believed that every American company had hidden factory operating costs that ranged from anywhere between 20-40% of total capacity.

If that is the case, then it is evident that the costs that lie beneath the surface are draining a significant amount of working capital. In a traditional manufacturing scenario—one in which a company has yet to automate its quality management process and relies on both the outdated image of quality as the “bad cop” and archaic working practices—nonconformances or other quality problems risk being lost in a series of disconnected systems.

It becomes clear that the cost of poor quality is less dependent on the visible costs and more related to the dangers that lurk beneath the surface.

As a result, corrective actions are delayed, if implemented at all, and the consequences beyond the obvious “above the waterline” issues are well hidden in the short-term. Over time, the “below the waterline” issues will have an even greater negative impact and require longer, more complex, and more costly fixes than had the issues been resolved in near real-time.

Recognizing Quality Bottlenecks
Tempting as it is to believe that the

siloed approach to traditional defect handling is an anomaly in manufacturing, the fact is that this type of quality pain point happens regularly.

Expecting a corrective action ticket to be dealt with in seconds is unrealistic. Still, the failure to address the problem costs the company time, materials, money, and, ultimately, a loss of customer trust. Also, the quality management team is blamed for not responding quickly enough or overreacting, which

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leads to the rest of the company labeling them as a bad actor.

However, the quality function is typically not the problem. Instead, there is a need for the other business functions in the shop to recognize that the bottlenecks in the system have prevented the issue from being fixed in a reasonable timeframe and contributed to the less apparent costs of quality.

Quality is often disconnected from the rest of the shop, and there is still a perception that quality is a cost center instead of a business optimization or operational efficiency tool. When a problem occurs, the quality department often must take part

obvious answer would be to increase investment in quality management systems that can identify and fix corrective action notifications with a minimum of fuss. However, that is only part of the solution.

Quality management needs to be done right from day one. The quality department is an integral part of the product lifecycle. These are also the people working on the quality frontline and are responsible for time-tested tools that drive reliability. As a result, the overarching goal for any shop that wants to cement its reputation as a quality leader is to maintain not

only a focus on continuous improvement but also a culture of quality throughout.

Integrating a *Plan-Do-Check-Act* procedure should be a minimum requirement for any company that is serious about changing its attitude toward change. This integration must incorporate a complete corrective action process (including a purposeful problem statement), in-depth root cause analysis, an appropriately scoped action plan and an effectiveness check.

Also, quality leaders must *manage change* in a coordinated way. These actions include keeping procedures and work instructions up to date, ensuring ongoing compliance with workforce training requirements and defining the required scope and frequency for quality audits. All these pathways to continuous improvement are the basic platform on which a shop can solve seemingly complex quality problems.

Doing these things right will drive the quality culture across the organization and impact all the hidden issues and the more visible ones. As a bonus, it ensures that quality becomes everyone's business—not just the “bad cops” that prevent products or projects from moving forward. Ultimately, a culture of quality must be instilled from the top down, and management must remove the notion

that quality management is solely the bearer of bad news.

We live in a connected society where the fulfillment of customer expectations remains the benchmark for success, and quality plays a significant role in meeting these expectations. Quality has always mattered. What is important now is that decision-makers not only give it the recognition it deserves but also close the doors that lead to the hidden factory. [MMT](#)



in an internal game of “who did what,” spending its time chasing quality-related issues that are, by and large, preventable.

The relevant support from IT or management is often lacking, and full integration with other business processes is not always achievable, especially in shops that rely on paper-based processes and spreadsheets. Factor into the mix that business needs and customer demands are in constant flux. It becomes clear that *the cost of poor quality is less dependent on the visible costs and more related to the dangers that lurk beneath the surface.*

Effectively Implementing Quality Tools

So, how do we solve these demonstrated pain points? The

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The American Precision Museum's story is a tale of innovating techniques, improving technologies, and pushing industry forward. It is an American story. When the Union government asked Robbins & Lawrence for 10,000 rifles in a month, they found a way.

In great factories and small shops, innovators and entrepreneurs figured out how to make complex objects in quantity by machine, rather than one at a time by hand, and the machine tool industry was born. The weapons of war and the peaceful products of everyday life became plentiful.

The work Robbins and Lawrence undertook at our site generations ago forged a new future for the manufacturing industry. Repeatability and interchangeable parts, the basis of the American System and precision manufacturing, changed the world. The American Precision Museum tells the story of this history and challenges visitors to apply their own problem-solving skills in the Learning Lab. As companies like yours seek new talent, we can work together to build interest in a world-changing industry.

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MMT Chats: Being Dynamic Amid Crisis

By Christina M. Fuges



Despite pandemic difficulties, Westminster Tool's employees are flexing—doing what needs to be done to get the job done.

Digital-only content you may have missed. Read full stories at links provided.

While the world was in the midst of the COVID-19 pandemic shut-down, *MoldMaking Technology's* Editorial Director Christina Fuges sat down (virtually) with Hillary Coombs, Strategic Leader at Westminster Tool in Plainfield, Connecticut, and discussed the importance of embracing change, leading and communicating during a crisis.

Christina Fuges: If people don't know, or are not familiar with Westminster Tool, the basis of [their] culture is emotional intelligence, and a lot of personality profiling of the disk. How does that play into being in crisis mode and keeping up morale and managing the uncertainty and the fear of your particular employees, your workspace?

Hillary Coombs: So, I think one of the best things about our culture is one of our core values is being dynamic, which means understanding that change is necessary. Every single person is having to embrace change, they're having to kind of embrace ambiguity. We don't have answers. The answer I gave you today could be different tomorrow. And so, I think because that is built into our culture and the core values that we look for when we're hiring, our employees are rock stars. They have just handled this so great.

Most importantly, Hillary acknowledges that there are positives coming out of this crisis for Westminster Tool.

Hillary Coombs: There are definitely a lot of positives, and I think, in general, with the use of technology, you don't always have to go and talk to somebody face-to-face. I think a lot of us prefer it, but we're starting to learn how to utilize the things that we had that you can hide behind just to have a face-to-face conversation, instead of following a process or procedure. And, so, yeah, there's a lot of good positives coming out of it, and I think the most important thing is just transparency and coming together. We're already a big family. Getting through this together, and watching every single person do their part...it's a great feeling.

short.moldmakingtechnology.com/WToolVid



MMT Chats: The Science of Moldmaking, Part 1

By Christina M. Fuges



MoldMaking Technology Editorial Director Christina Fuges chats with Don Smith, North American Senior Tooling Engineer for Scholle IPN in Northlake, Illinois, about the future and science of moldmaking.

Don Smith has a long history with moldmaking, which has resulted in a passion for engineering and data. In Part 1 of this two-part *MMT* Chat, Christina gets to the bottom of his work experience and why he believes that data is so important to the future of mold manufacturing, not just designing a mold.

Don's interest in the industry goes back to 1971 during a machine shop class his senior year of high school. From there, he was employed by a small, start-up shop as an apprentice and found himself still in the industry 49 years later, from developing his knowledge in programming and CAMs and more. He also brings up how the industry constantly changes, and his experience with companies merging and acquiring.

Christina Fuges: The whole mergers and acquisitions world within manufacturing, and even specifically moldmaking is not going away. What did you learn from that experience that you can talk about? What should they know if you could go back and do it over again?

Don Smith: For the people that are acquired, the sellers—the seller and the buyer—have to be on the same wavelength. To the point where, if a buyer is going to come in, the seller needs to understand and ask the question, do you really understand this business? Because it's not something where you have contracts. A shop is like an artist. You're commissioned to build a mold. There's no contractual agreement that says you are going to build these tools for us. That's something that has to be shared, that the people that are purchasing or acquiring our business have to understand.

short.moldmakingtechnology.com/SIPNVid

United Grinding offers a wide range of machines available for the demanding mold-making manufacturing niche with its MÄGERLE, BLÖHM, STUDER, SCHAUDT and MIKROSA grinding machines. The company recently held its IMTS press event virtually as part of IMTS spark, and they get moldmaking. This company understands that mold and die manufacturing is a job for specialists with unique challenges that the right grinding machine can tackle.

During the conference, United Grinding answered an important key question:

Q: The surface grinding department in a mold shop is critical to the quality of a mold. Surface finish is very important in moldmaking and grinding is a key process for this challenge, so what new or improved features and functions does United Grinding technology offer to address the surface finish needs of today's mold builders?

A: Mold builders are inherently craftspeople and often one person is working a manual machine to get the surface finishes he requires. All of our equipment has the flexibility to change grinding wheels automatically. For example, start off with a 46-grit grinding wheel and take it all the way down to an 80 to 220-grit grinding wheel to improve surface finishes.

We also offer the ability to introduce hydrostatic guideways into the grinders to add additional dampening characteristics and improve surface finishes. We also have dressing techniques such as putting a CNC disc dresser on the table to dress the grinding wheel at any speed desired—traversing across the wheel from one inch per minute to even slower than that to close up that grinding wheel and give a good surface finish. We also have refined our acoustic, monitoring and balancing systems to reduce vibration, helping improve surface finishes. [MMT](#)

short.moldmakingtechnology.com/UGQ

Not the Same Old Grind

By Christina M. Fuges



The S31 is a cylindrical grinding machine for the individual, small-batch and large-scale production of short to long-sized workpieces.

Founder and President Todd Schuett of Creative Technology joins this episode of The Manufacturing Alliance Podcast to talk marketing in moldmaking. Anyone who has attended a moldmaking event might know Todd as the guy behind the camera, so here we have him in front of the microphone to talk about not just marketing, but the creativity, innovation and magic that is the manufacturing industry.

Here are some highlights from their conversation:

- Learn how taking people's pictures at industry events not only helped Todd remember who was who, but helped connect to people in the industry.
- Discover how Todd got hooked on metalworking so much that he quit his job to switch industries.
- Manufacturing isn't like a field of dreams. If you build it, that doesn't guarantee they'll come. Companies need to tell their story, what differentiates them from others.
- They talk about a high school student-run manufacturing business to teach the next generation about available skills in the industry. "There's no teacher like hands-on experience."
- A challenge in the old days was that companies could give that same job to three different mold makers and it would come out three different ways.
- Marketing is so important in manufacturing. "It's not just a given that people are gonna come to you because you have a shop and do spectacular work. You've got to promote it in today's way. And today's way is largely the internet. It's using technology. It's potentially even using podcasts."

short.moldmakingtechnology.com/CTpodcast

PODCAST: The Magic of Manufacturing and Marketing

By Christina M. Fuges



"Manufacturing is magic to me," admits Creative Technology's founder and president, Todd Schuett, when discussing the moldmaking and his time in the industry.

Industry Ends Expansionary Run

November—47.9

November's Moldmaking Index at 47.9 reading ended a four-month rally during which the proportion of moldmakers and molders reporting improving business conditions briefly matched the cyclical highs from 2018 and early 2019. The contraction from October's 53.4 reading resulted from slowing new orders, production and backlog activity. Only the reading for supplier deliveries remained above a level of 50, which is defined for most index components as the boundary line between expanding and contracting business activity.

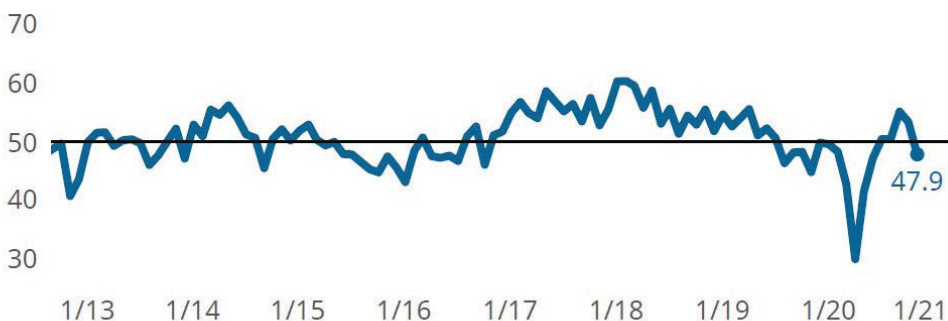
As we near the close of the calendar year, world supply chains will be challenged more than ever as an influx of seasonal package shipping and vaccine distribution further compound the existing logistics challenges already imposed by regulations designed to slow the spread of COVID-19. It is highly probable that this will lengthen the order-to-fulfillment time of orders placed by moldmakers and molders on their upstream suppliers, keeping the supplier delivery activity reading well above normal levels in the months to come. The enduring and potentially worsening supply chain challenges being reported in the GBI makes this a top issue for manufacturers. Firms need to make every effort to stay ahead of logistics problems if they want to start 2021 well. [MMT](#)



ABOUT THE AUTHOR

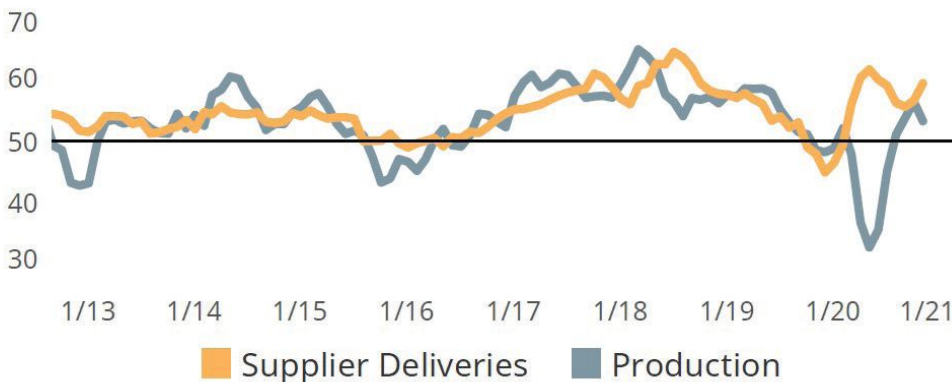
Michael Guckes is the chief economist for Gardner Intelligence, a division of Gardner Business Media (Cincinnati, Ohio, United States). He has performed economic analysis, modeling and forecasting work for nearly 20 years among a range of industries. He is available at mguckes@gardnerweb.com

■ Gardner Business Index (GBI): Moldmaking



Between October and November, business activity, as measured by four of the Index's six components, transitioned from expansion to contraction. Additionally, export activity reported an accelerating contraction during the same period.

■ Supplier Deliveries and Production (3-Month Moving Average)



The seasonal increase in shipping demand combined with vaccine distribution will put additional burdens on logistics providers in the near-term. This will further slow order-to-delivery times which are represented by elevated supplier delivery readings and likely impede future production activity.

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GARDNER BUSINESS INDEX

A business trends index measuring monthly changes in new orders, production, backlog, employment and other critical measures.



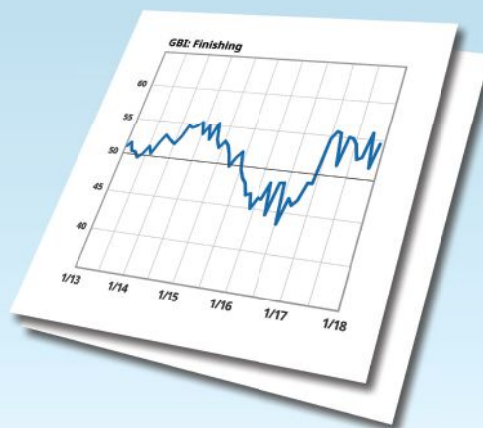
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Technology Showcase

CUTTING TOOLS

DrillForce-Meister Tackles Large Diameter Flat Bottom Hole Drilling

Tungaloy has expanded its DrillForce-Meister exchangeable head drill series by adding SMF-style flat head drill tips, which tackle large diameter counter-boring challenges, and is suitable for parts and materials found in a wide range of industries. Three versions of the SMF flat head drill tips are offered, including the SMF200, SMF300 and SMF400.

The SMF-style flat head drill tips are designed to efficiently open large diameter holes ranging from 20.0 mm to 40.0 mm (0.787-1.575) at a lower cost. Further, the exchangeable drill tip feature eliminates the need for regrinding and recoating—as is the case with solid carbide drills—and reduces the amount of tool float inventory kept to avoid machine downtime, minimizing the overall cost per hole in high-volume production lines. Drill dimensional stability and tool life predictability are guaranteed.

Further, DrillForce-Meister's featured clamping design securely retains the drill tip in place with the clamping

screw and supports the tip with large contact surfaces between the drill tip and body, enabling reliable holemaking operations.

According to Tungaloy, the SMF drill tip can create flat bottom holes, enabling one-step counterboring without requiring a start hole or end milling processes. The SMF's cutting-edge form allows easy penetration into the material with inclined or irregular surfaces, while improving the precision and minimizing the shifting of the hole position. The drill diameters are available in a range from 20.0 mm to 40.0 mm (from 0.787 to 1.575 inches). The drill tips are also available in the AH9130 grade for holemaking applications.

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



MCD Ball Nose End Mill Saves on Polishing Processes

Horn USA highlights its expanded tool range for high polish milling. The monocrystalline, diamond-tipped (MCD) ball nose end mills, intended for machining non-ferrous materials in the tool and moldmaking industries, save on polishing processes when producing free-form surfaces. Horn's new offerings in large diameter variants are said to reduce machining time, guarantee compliance with the tightest tolerances and produce surface finishes in the nanometer range. Further, the product increases quality, including precision, contour accuracy, flatness and surface finish.

Horn offers the expanded portfolio of MCD ball nose end mills from stock. Diameters of 6 mm, 8 mm, 10 mm, 12 mm and 16 mm allow a broader range of applications to be covered. All variants are single-edges and feature an internal coolant supply. The solid carbide tool shanks enable vibration- and oscillation-free machining.

High polish milling has a wide range of applications, particularly in areas where the surface quality of the mold needs to be matched by the finish of the parts being produced. This includes PET blow molds and chocolate molds, as well as applications in the medical technology sector.

In addition to high polish milling, Horn also offers solutions for high polish turning with MCD tools.

Horn USA / 888-818-4676 / hornusa.com



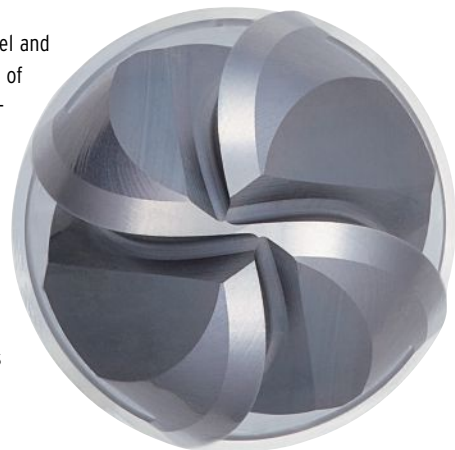
End Mill Cutting Tools Optimized for Dynamic Steel Milling

OSG has released a range of new end mill products, including the HY-PRO CARB VGM end mills and the A Brand AE-H advanced performance carbide end mill.

The HY-PRO CARB VGM variable end mill is a series of variable geometry end for dynamic milling, ideal in steel and stainless steel. Designed with unequal flute spacing, it reduces vibration during machining by altering the timing of each flute engaging in the workpiece. The sharp rake angle, high helix and adjusted core diameter are said to maintain excellent cutting edge sharpness and tool rigidity which promotes smooth, stable cutting with low cutting force. The variable end mills also feature OSG's proprietary multi-layer coating, which OSG says enables longer tool life through higher wear and heat resistance than conventional TiAlN (titanium aluminum nitride) coatings.

The A Brand AE-H advanced performance carbide end mill for high hardness steel are available in three styles to cover a wide range of applications. This series features sharp spiral curves for stable performance, unequal flute spacing to suppress vibration and variable negative spiral gash to control chipping to deliver efficiency, surface accuracy and precision. OSG's new Durorey coating is said to provide superior heat resistance and toughness, while suppressing chipping and achieving longer tool life that has been optimized for high-hardness steel milling.

OSG USA, Inc. / 800-837-2223 / osgtool.com



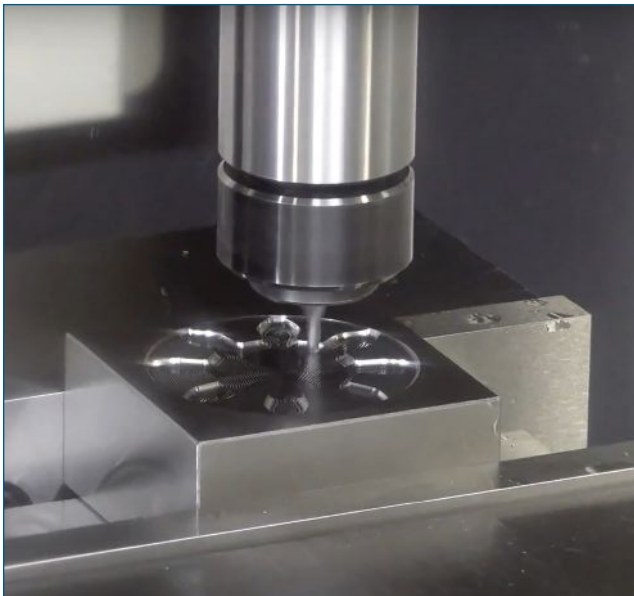
Ball Nose Series Meets Rigors of Processing Hardened/Abrasive Steel

The challenge when cutting steels greater than 60 HRC and moderate steels with abrasive properties lies with the cutting tool used in the process, says **U.S. Union Tool Inc.** To address this challenge, the company introduces the HGB/HGLB Ball nose series, designed specifically for these types of applications, meeting the rigors of cutting hardened/abrasive steels in the 59-70 HRC range.

The series is said to be a new blend of carbide, emphasizing low tool wear and exceptional deflection resistance. Both HGB and HGLB series boast H4 shanks, negative rake angle point geometry, a ball radius accuracy ± 0.002 - 0.005 mm, and a new HMG coating rated to 4200 Vickers hardness, which Union Tool says surpasses the current Hardmax coating. These tools are available in a diameter range of 0.10-6 mm and in varying lengths.

According to a case study of the HGB/HGLB series on HAP72 tool steel (69HRC), there was a 40% reduction in tool wear width, compared to a conventional cutting tool product. Further, Union Tool says the same volume of milling was processed with twice the efficiency using its series, exhibiting increased cost-effectiveness via improved tool life, without chipping.

U.S. Union Tool Inc. / 714-521-6242 / usuniontool.com



Sensory Toolholder Monitors Machining Processes at the Tool

With **Schunk's** iTENDO sensory toolholder, it will be possible to monitor machining processes in high resolution at the tool, and to control cutting parameters in real time. The required acceleration sensor and electronics are integrated into the toolholder without affecting its interfering contour and other characteristics.

According to Schunk, the iTENDO seamlessly records the metal cutting process, monitors previously defined exact limit values and, in the event of irregularities, enables real-time adaptive control of the speed of rotation and feed rate, among other measures. Equipped with a sensor, battery and transmitting unit, the toolholder records the data at the tool and transmits it wirelessly via Bluetooth to a receiver unit in the machine room, where it is forwarded by cable to a control and evaluation unit. Reported pilot applications indicate that the intelligent mounting has proven performance for milling, drilling, countersinking and deburring.

The iTENDO is standardized for the common interface HSK-A 63 with clamping diameters from 6-32 mm and a length of 130 mm. The sensory toolholder is suitable for coolant use and designed for speeds of up to 10,000 RPM.

The commissioning and data analysis is carried out via a browser-based dashboard on standard PCs, tablet computers or smartphones. For simple configurations, live data from the sensor can be displayed on the Schunk dashboard via a local connection; a case system with integrated display is provided for this purpose, enabling toolholder commissioning within two hours. All variants can also be operated and centrally controlled via a cloud solution.

Schunk / 919-572-2705 / us.schunk.com

Jet-Through Hydraulic Chuck Line Expanded for 5-Axis Machining

Big Kaiser expands its jet-through hydraulic chuck line to include the BCV interface and additional inch sizes. The HDC jet-through type holders are ideal for high-precision five-axis machining and fit nearly any application in the automotive, aerospace, medical, and die and mold industries.

An exclusive thread feature allows for convertible coolant delivery between jet-through coolant and center-through coolant. Jet-through hydraulic chucks are ideal tool holders for finishing applications that would benefit from improved coolant delivery. The coolant flows through the end of the tool holder and is angled to direct coolant to the cutting tool tip, greatly improving surface finish and tool life.

BIG KAISER Precision Tooling Inc. / 888-866-5776 / bigkaiser.com



CUTTING TOOLS

Cutting Tools and Accessories Deliver MRO Needs

Precision Twist Drill (PTD), Union Butterfield and Dormer are just a few brands representing cutting tools and accessories that **Dormer Pramet** has created for MRO professionals. Easy to select and comprehensive for MRO needs, Dormer Pramet has identified drills, taps, dies, reamers, end mills and rotary burrs that will deliver reliable and cost-effective results in portable and machine applications and in a wide range of operating conditions for various materials.

The selection of drills in the program highlights MRO drills that cover most ferrous applications and are suitable for use in portable drilling, drill presses and other operations within this segment, including the HSS R10 series for right hand drilling, HSS L10 series for left hand drilling, and the carbide DC series for center drills. Drill availability can be found in jobber length (301JD style), heavy duty jobber length (331HD, 332HD, 333HD styles), mechanics length with "tri-flat" shanks (321MD style), stub length (331SM, 332SM styles) and S&D reduced shank (341SD, 342SD styles) drills. There is a specific selection for sheet metal and spot weld drilling.

Further, the program contains conventional 118-degree point geometries as well as 135-degree self-centering split points for more challenging applications. Sets within each style are available in a rust-resistant, water- and shatter-proof case for easy carrying and all-inclusive use.

The MRO segment offer extends into drills, taps, combination drill and tap tools, dies, reamers, countersinks, counterbores, end mills, carbide rotary burrs, drilling and tapping fluids and accessories. Within this offer there are different surface treatments to cover the wide range of MRO operating conditions. Surface treatments are also offered to cover the range of MRO operating conditions.

Dormer Pramet / 847-783-5700 / dormerpramet.com

Drill Head Series Provide Consistent Performance

Sunnen Products Company offers a series of drill heads, inserts and pads that are directly interchangeable with Sandvik deep-hole drilling tools. The new line, Sunnen DirectDex, features BTA/STS (single tube system) and DTS/Ejector (double tube system) style deep-hole drilling tools designed to

produce a low cost-per-bore with consistent performance. The series directly corresponds to the previously available line of Sandvik drill heads, inserts and guide pads, with additional product series set to be released soon. CVD- and

PVD-coated inserts are available in two grades, providing excellent wear resistance and toughness. The CVD-coated inserts are optimal for machining heat-resistant super alloys and also work well with ISO P, K, H and N materials. The PVD-coated inserts are specifically designed for ISO P, K, H and N materials, and also provide resistance against built-up edges.

Sunnen Products Company / 314-781-2100 / sunnan.com



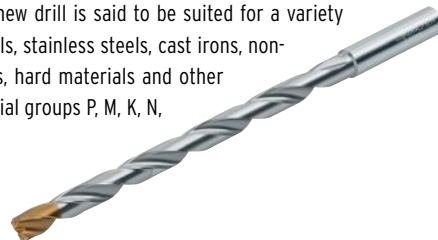
Solid Carbide Drill Suitable for Versatile Material Drilling

Walter's new versatile Xtreme Evo DC160 Advance solid carbide drill is said to deliver exceptional productivity in a wide variety of materials, and a broad range of applications, which include the mold and die, energy, automotive and general metalworking sectors.

Apart from the new 30 x Dc L/D ratio offering, the drill's design innovations include double margins and advanced placement of second margins that ensure better centering capabilities and the tendency of the drill to stabilize early into the cut. Walter says this gives an advantage in performing difficult applications such as cross holes and inclined entry and exits. A deep chip gash ensures reliable chip evacuation resulting in improved hole quality and reliability, and a new, thinner web produces superior positioning accuracy, reduced cutting forces and vibration.

Available in a variety of dimensions, now up to 30 x Dc and in diameters from 3-25 mm, the DC160 Advance solid carbide drill features grades WJ30ET (full coating) for universal usage up to 8 x Dc and WJ30EU (tip coating) for 12 x Dc up to 30 x Dc. The new drills have both a cylindrical (HA) and whistle notch (HE) shanks ground to an h6 tolerance for highest reliability. The point angle is 140 degrees. This versatile new drill is said to be suited for a variety of ISO materials including steels, stainless steels, cast irons, non-ferrous materials, super alloys, hard materials and other nonmetal materials (ISO material groups P, M, K, N, S, H and O).

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



Micro Milling/Drilling Chucks Designed For High Precision Performance

Emuge Corp.'s micro milling/drilling chucks, like the company's micro end mills, are ideal for a wide range of die and mold, and medical applications.

The chucks feature a slim design for hard-to-access areas, as well as high gripping torque and accuracy. This product is said to provide unprecedented rigidity, vibration dampening, concentricity, machining speed and tool life versus conventional chuck technologies.

Featuring what Emuge contends is the world's only chuck with a 1:16 worm gear, the Emuge FPC Chuck's design delivers 3 tons of traction

force. Both design and body provide 100% holding power for maximum rigidity, and the collet-cone assembly absorbs virtually all vibration.

Emuge Micro Chucks are offered in a range of models in five shank styles (CAT, HSK, SK, BT and PSC) and hold 1-6 mm or 1/8 inch-1/4 inch shank tools. Special coated collets provide high strength and lubricity.

Emuge Corp. / 800-323-3013 / emuge.com

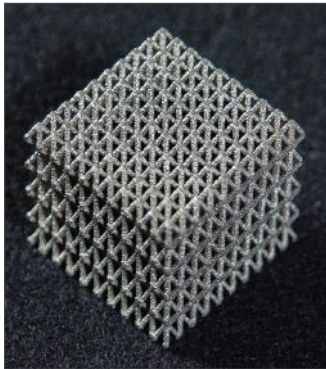


MISCELLANEOUS

Open Software Technology Refines 3D Printing and Scanning Workflows

The release of **Siemens Digital Industries Software's** Parasolid open software technology for geometric modeling is said to enable the solving of the most difficult technical challenges and improves upon 3D printing and scanning-based workflow with new tools for Convergent Modeling and lattice structures.

According to Siemens, the advances in Convergent Modeling provide engineers greater efficiency in workflows that need to mix facet and B-rep geometry. Further, the support of lattice structures—repeating networks of nodes and beams that offers increased strength-to-weight ratio while maintaining the required structural integrity—enables engineers to design parts with reduced material requirements and mass. Further, the functionality gives 3D printing a new level of accessibility and improved performance benefits.



Siemens Digital Industries Software / 800-498-5351 / sw.siemens.com

Traveling-Column Grinding Center Excels in Modern Production Environments

United Grinding North America's Blohm PROFIMAT MC high-performance, heavy-duty, traveling-column grinding center is said to offer the capabilities modern production environments require for various industries and applications. Measuring 94.488 in (2,400 mm) wide, the 5-axis, space-saving machine includes an automatic tool changer with up to 24 tools and offers multiple spindle configurations, including an optional horizontal spindle or a stationary or NC-swiveling vertical spindle.

With standard grinding wheel diameter capacities starting at 15.748 in (400 mm), a double NC rotary table and an automatic loading system, the PROFIMAT MC is ideal for continuous path-controlled creep feed grinding. An optional tool changer, overhead dressing system and RazorTec grinding-wheel cleaning system boost performance further, as does a wide range of accessories and special systems for workpiece clamping and handling. Wide guide spacings and anti-friction guideways on all machine axes ensure a rigid machine structure that minimizes vibration and reduces system maintenance.

United Grinding North American / 937-859-1975 / grinding.com



THEY GAVE THEIR ALL. LET'S GIVE SOME BACK.

The iWarriors mission is to honor severely injured soldiers from all branches of the Armed Forces by providing personalized technology packages to aid in their rehabilitation and recovery. With help from members of the American Mold Builders Association, MoldMaking Technology, colleagues, suppliers, and friends to the industry, we can honor and assist these brave men and women.



www.iWarriors.org



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Piezoelectric Pressure Sensor Variants Improve Process Quality

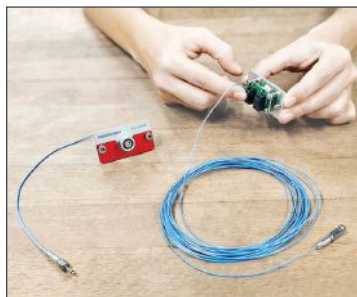
In addition to its existing range of cavity pressure sensors for plastic injection molding process monitoring, **Meusburger** now offers two charge transfer versions, the single wire E 6760 and the E 6757 mini coaxial cables, as well as matching multi-channel connectors for optimal process quality and increased part sustainability.

With a cable wire diameter of 1.2 mm, the single wire cable is ideal for molds with limited space. The wire can be routed flexibly with minimal bending radii, but may kink if not careful. Available in lengths of 2,000 and 5,000 mm, the single wire variant allows for shortening if required. Installation is effortless as a result of the insulation displacement connector on the multi-channel connector.

The E 6757 coaxial cable is characterized by optimal shielding against external signals due to its steel sheath, making it ideal for molds with a high number of electrical components such as hot runner components or monitoring equipment, or if the cable is routed outside of the mold. With a cable diameter of 1.9 mm, the coaxial wire is less flexible, but less prone to kinking,

and is available in consecutive lengths from 200 to 1,000 mm. With Meusburger's mini coaxial version, several sensor signals can be combined on one multi-channel connector.

The company's offering of matching E 6763 multi-channel connectors, enables high process reliability during mold changes via a mold recognition



chip integrated on the circuit board, and easy sensor data identification. Meusburger says the signals from 4 to 8 cavity pressure sensors can be combined with minimum cabling effort. Depending on the version, the multi-channel connectors also have insulation displacement contacts for the single wire cable (version S) and mini coax female connectors for the mini coaxial cable (version C).

Meusburger US Inc. / 704-526-0330 / meusburger.us

Valve Gate Nozzle Offers Exceptional Wear Resistance

Adding to **Husky Injection Molding Systems'** Ultra Helix Valve Gate nozzle lineup, the Ultra Helix 250 T2's advanced design minimizes wear, provides high gate quality and longevity and was specifically developed to extend the benefits of the Ultra Helix technology to jobs for small part weights and difficult-to-access gate locations.

The Ultra Helix 250 T2 has a 12-mm nozzle bore for direct gating in locations that are said to be not typically achievable with larger nozzles, and pitch spacing down to 15 mm for high cavitation density and a small mold footprint.

Extended maintenance PX actuation is another added feature, designed for applications with leakage-prone resins such as TPE and PE. The addition of a stem seal paired with

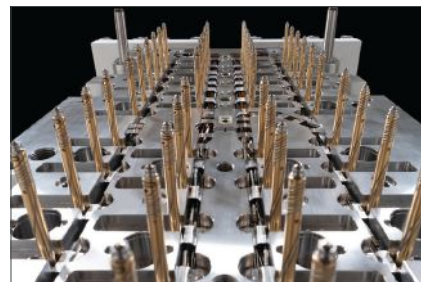
enhanced thermal management heater technology improves performance and is said to significantly optimize maintenance requirements, lowering risk and ownership costs.

Husky offers three actuation options for the Ultra Helix 250 T2. The Individual Pneumatic option, for example, offers pitch spacing down to 25.4 mm, providing easy access for maintenance with the ability to individually access valve stems without removing the backing plate. According to the company, both the plate actuated UltraSync-P or servo driven UltraSync-E options can achieve 15-mm pitch spacing.

Since the Ultra Helix 250 T2's launch, Husky adds, the product has been applied to make high-quality precision parts from medical barrier closures and flow regulation valves to personal care products, food and beverage packaging, flip top closures and multi-material parts with limited gate access.

Part weights produced are said to range from less than 0.1 g to more than 4 g and are being made from resins that are prone to leakage including PP, HDPE, LDPE, TPE and TPV, in both single injection and multi-material applications.

Husky Injection Molding Systems / 905-951-5000 / husky.co



Expanded CounterView Product Line Offers Exclusive Mold Monitoring Accessories

Contending that it carries the world's widest range of mold counting and monitoring products, **Progressive Components** has recently expanded the line to include CounterViews, along with new accessories.

As an industry exclusive, the CounterView cycle counter is now available in both left- and right-hand orientations to allow mounting on either mold half, enabling easy viewing while the mold is in the press.

Progressive has also added a High Temp CounterView, which offers the same functionality as the standard cycle counter, while performing in higher temperature tools operating at a maximum of 375°F (190°C).

For added heat protection, Progressive has introduced the Retrofit Bracket, which insulates its CVe Monitor or CounterView in high-heat applications. With a maximum operating temperature of 410°F (210°C), the bracket installs within an existing pocket without modification to the mold's cavity or core half.

CAD geometry for Progressive's line of cycle counting products is available via the CADalog, a free parts library with downloads offered in multiple formats including SolidWorks, NX, VISI, STEP, Parasolid, ACIS and IGES.

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



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moldmakingtechnology.com

Speed Mold Build Time with Latch Locks

By Brenda Clark

Here is a look and functions of internal and side-mounting latch-lock devices that help to reduce mold build times and increase safety:

1. The latch pull rod and housing of an internally-mounted latch lock system allows the actuation of the split lines in sequence without using springs. For example, a second parting line remains closed while the first parting line is activated. Once the first opening is achieved, the pulled plate locks and the second parting line activates to strip or eject the part.

2. Internal latch lock systems with a small footprint allow use in designs without adding to the mold base's overall length by width, while also activating multiple mold parting line openings.

multiple split openings fast and accurately.

4. The following sequence is recommended for a pulling system: Both plates (or sets of plates) move forward, the latch lock unlocks, the rear plate stops and the front plate moves the rest of the stroke. This sequence allows the front plate to strip or eject parts on final movement while the plate or plates are not locked in place.



Round latch locking unit for precise opening of a second mold parting line in injection molds.



Image Courtesy of Hasco America Inc.

Compact round latch lock units define movement and latching with collision protection.

5. The following sequence is recommended for a pushing system: Both plates (or sets of plates) move forward, the rear plate or plates unlock, the front plate stays in place as the rear plate moves forward, and the plates do not lock in position.

6. Designs using central multipoint locking roller balls around the circumference of an internal latch lock system in fast-running molds align the mold with any offsets due to misalignment by thermal expansion.

7. Rolling steel balls (not rollers or springs directly at the latch locking actuation location) achieve low-wear stroke guidance on stroke movement at the plate opening using a free gap principle.

8. Integrated collision protection keeps reaction forces from impacting the latch lock. The rear of the latch lock has an internal spring design that cushions the center actuation sleeve moving around the control pin. The steel roller balls run along the outer diameter of the center actuation sleeve, allowing the center sleeve to move freely and with speed.

9. A compact design eases the installation of complex plate movement within the mold base, resulting in safer mold transport and storage and more space for other necessary components.

10. Latch sizing considerations include mold size, required stripping forces, opening and closing requirements in the press and actual required strokes. [MMT](#)

FOR MORE INFORMATION

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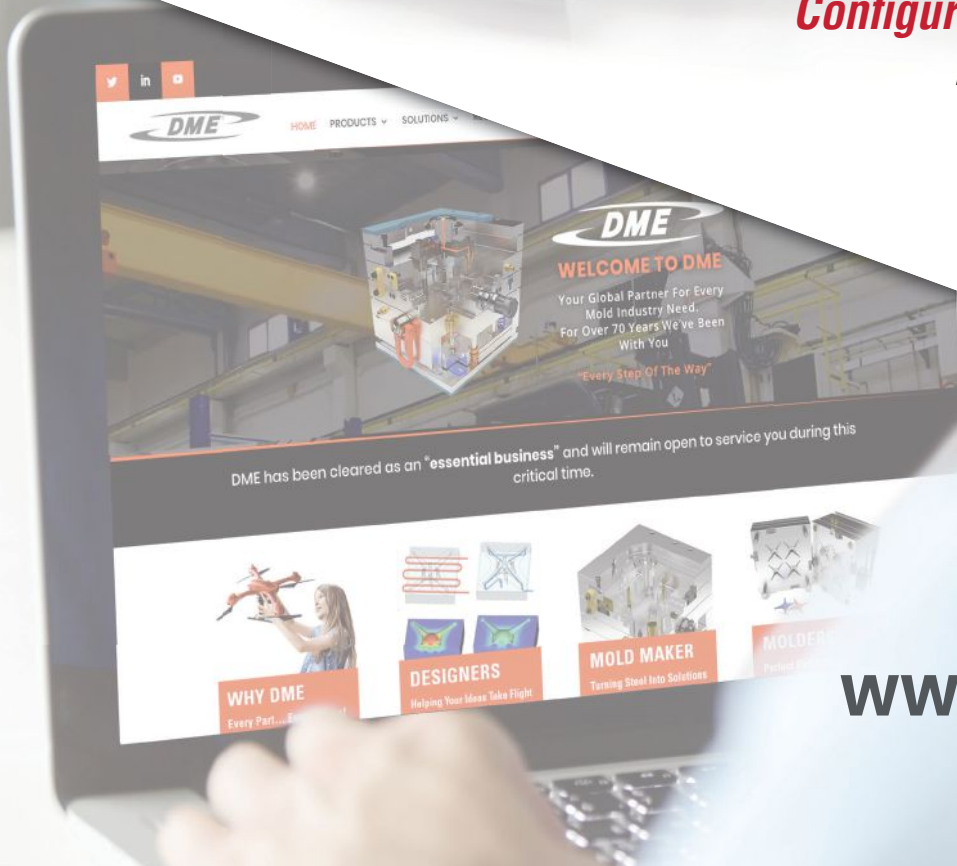
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