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# MoldMaking TECHNOLOGY



MARCH 2021 / VOL. 24 / NO. 3

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POSTMASTER: Send address changes to *MoldMaking Technology* Magazine, 6915 Valley Ave., Cincinnati, OH 45244-3029. If undeliverable, send Form 3579.

CANADA POST: Canada Returns to be sent to IMEX Global Solutions, P.O. Box 25542, London, ON N6C 6B2. Publications Mail Agreement #40612608.

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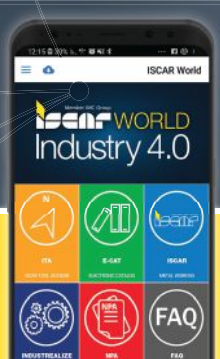


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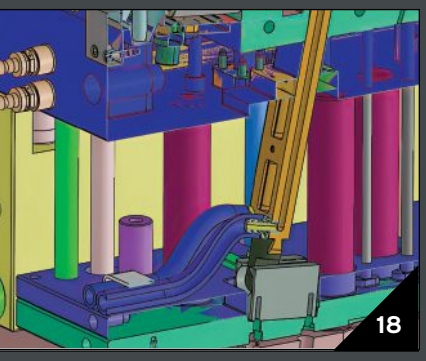


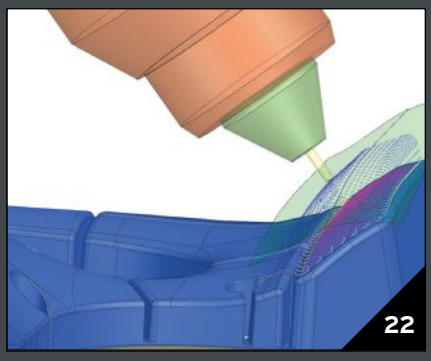



## Features



## Departments



**ON THE COVER**

Cover photo courtesy of Next Chapter Manufacturing. This month's cover shows conformal cooling in a 3D metal printed insert made of hardened tool steel. 3D printing enables consistent cooling to conform to the part contour while navigating around required sub inserts, core pins and venting. Consistent cooling reduces cycle time while ensuring part dimensional stability. Eliminating pipe plugs means that maintenance is simple and there are no dead spots that can build up residue in cooling circuits and lead to molding defects. See related story on page 18.

Images courtesy of (left to right): Next Chapter Manufacturing, Siemens Digital Industries Software and Twin City Die Castings Co.

VIDEO ACCESS

5 TRICKS OF THE TRADE
### Great Tips from This Issue

**1. KISS**
To keep circuits simple, allow free flow and eliminate dead spots, keep the circuits close to the insert height in the mold and use a direct route to hard plumb or drill a feed line into the insert.
**PG. 18.**

**2. Multiple Answers**
Mold builders can use both flatbed and multi-axis AM, but multi-axis is often used to coat molds, repair molds or build mold components to reduce material waste.
**PG. 22.**

**3. Get It Straight**
Nitriding is technically not a coating, but rather a diffusion process where carbon and nitrogen are forced into the surface of steel 76-127 microns.
**PG. 26.**

**4. Watch Out**
To assess fraud risk, evaluate if your internal controls are effective. Then consider the level of effort and authority to override or circumvent internal controls.
**PG. 34.**

**5. Share and Share Alike**
When looking to streamline the engineering to production flow, new assemblies with many shared components (yet never the same) are ideal.
**PG. 48.**

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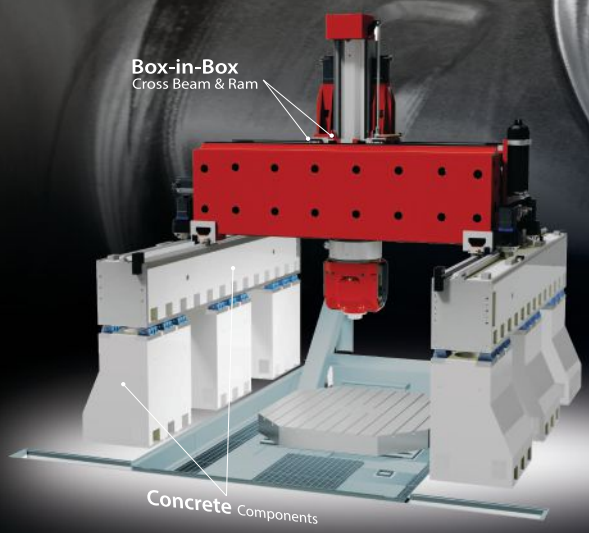



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# Making a Difference

Moldmaking may be known as a one-off industry, but that is not an accurate description of the current employment landscape across many mold shops. Those who are under the age of 30 are entering and staying in this niche trade, and I believe it's time to recognize 2021's new faces in moldmaking.

To do this, *MoldMaking Technology* is bringing back its 30 Under 30 Honors Program, which was developed to help recognize the influx of young talent making an impact on the moldmaking community.

Commitment, work ethic and passion are widespread traits in the mold manufacturing community. This year has been especially hard on many, but some have risen above despite the hardships. Leadership, understanding and community involvement have been key characteristics of the next generation as they continue to manage their work and personal lives during these challenging times.

Bringing back our program from 2018, *MoldMaking Technology* is looking for more 30 individuals under the age of 30 who are making a difference in mold manufacturing, both in their company and in the moldmaking community, and we need your help. Now more than ever is the time to recognize the next generation of leaders and innovators in our midst, and nominate potential winners.

MMT 30 UNDER 30

The program's emphasis is on leadership and potential leadership—whether for a current employer or overall involvement in the industry. Nominees may also be hardworking industry volunteers and community members who know how to give back to the moldmaking industry.

From your nominations, *MMT* will select 30 young people in the moldmaking industry who are striving to be the next generation of leaders and innovators. We will recognize them in *MMT* throughout the 2021 calendar year, as well as at special events.

Think of co-workers and colleagues—anyone who matches the criteria—and nominate someone you believe is deserving. **Nominees must be under the age of 30 as of June 1, 2021**. Honorees will be chosen based on the nomination's quality, not the number of nominations.

The deadline for nominations is **March 19, 2021**! Nominate at https://www.moldmakingtechnology.com/30 MMT

Christina Fuges

Christina M. Fuges
Editorial Director

Follow MMT on: Follow @MMT_ChristinaF

## MMT ONLINE

## February Highlights at MoldMakingTechnology.com

*MoldMaking Technology*'s revamped website offers a host of improved features which emphasize streamlined search solutions and weekly highlighted content for a better browsing experience.

What's new and what works in mold manufacturing? Explore the navigation bar at the top of the website to learn more:

### IMTS spark

IMTS spark is a digital platform on the latest manufacturing technology products, software and solutions. Drop-down menu options offer 13 clickable links that range from moldmaking-related knowledge centers and upcoming online discussions under the *MoldMaking Technology* Industry Insights series hosted by Publisher Ryan Delahanty and Editorial Director Christina Fuges, which are all housed on the IMTS spark website. Already-aired discussions can be accessed On-Demand. IMTS spark runs from September 2020-March 2021.


On-Demand:
- Cross-Generational Mentorship
- Working On and In An Apprentice Program
- Mold Design & Engineering and Virtual Learning
- Leading Today with Precise Tooling Solutions, *MoldMaking Technology*'s 2020 Leadtime Leader Award Winner

Upcoming Live Discussions:
- Leading Mold Manufacturers Share Best Practices On Ways to Improve Efficiencies (March 2, 2021)
- Coffee Chat on Social Media, Marketing and Moldmaking (March 8, 2021)

Knowledge Centers:
- Digital Manufacturing
- Trends in Parts Cleaning
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# The New Moldmaking Business Model

By Don Smith

A good strategy should help minimize firefighting and crisis management and then open up the energy to focus on a proactive methodology and your short-term and long-term goals. Creating the right strategy will allow you to craft a roadmap, a measurable plan to see where you are currently and where the business needs to go. By adopting a strategic outlook, the business will be able to keep its head above water and to look further down the road, especially with a "new normal" coming into focus. This process can improve decision-making and makes for more effective leadership.

A SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) is an excellent way to begin creating the strategic view, and ultimately, a new or improved business model. This is a textbook way to jump right in and start visualizing the business in the current state, and should be used as a living document to track your progress in bringing your business model to reality. One of the best ways to capture the information required for the SWOT analysis is to conduct surveys of both internal (employees) and external (customers) stakeholders.

Current EAB member Don Smith advises mold manufacturers to focus on developing a strategic view of their moldmaking business.

**Internal (Employees)**

- Do you see us as a low-cost or high-quality supplier?
- What markets do we serve best?
- Why do customers provide us with work over the competition?
- What operational areas are inefficient and need immediate attention?
- How do we assess the skills of our fellow employees?
- What tolerances are we best at holding?
- What areas of the business are critical to moving forward?

**External (Customers)**

- What type of supplier do you consider us?
- Do you come to us primarily because of price or quality?
- What is the most value-added process we supply your business?
- What current or future products do you see us best suited to manufacture for your company?
- What machine capabilities do you assume we have? Wish we had?

Gathering multiple viewpoints is extremely useful for discovering the current state of the business. One can gather tremendous amounts of critical data through a few simple surveys conducted with the right people and enough information to build a strategic view based upon reality and not assumptions. MMT

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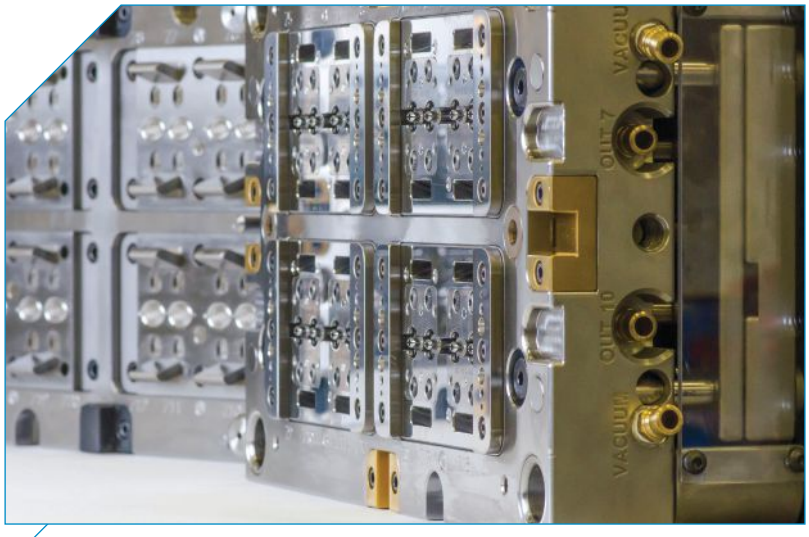
## A Conversation with ...
# Mold-Tech Inc.




Images courtesy of Mold-Tech Inc.

Every detail matters to the Mold-Tech team who takes total care of each mold by using the latest advancements in equipment, project management and training to continually improve quality, productivity and customer service.

**What do you view as Mold-Tech's chief competitive advantage(s)?**

**Dave Parks, Business Development/Sales:** Our people and our manufacturing processes. The key to our success is our highly-trained employees. They are continually looking for new technologies and process improvements to help design and manufacture high-quality molds.

For example, they have helped with the development and communication component of our new sinker EDM cell. This effort entailed the transfer of scanned data from RFID chips mounted on the electrode holders to the sinker EDM cell, the communication between the 3R robot that loads pallets of cavity and core components into the sinkers and loading the correct electrodes to correspond with the correct cavity and core components to complete the process.

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PRECISION INJECTION MOLDS

- Since 1978, Mold-Tech has served the injection molding industry, designing, building and sampling the highest quality injection molds.
- Molds include high cavitation, low cavitation, hot runner, auto unscrewing, insert, liquid silicone rubber (LSR), metal injection (MIM), micro, multi-shot, stack, shuttle and large tooling programs.
- Medical is 75% of the business.
- Industries served: Medical, dental, automotive, consumer, communications, defense, electronics, packaging and personal care.
- Business philosophy is focused on forming partnerships and building relationships to help deliver products to customers to help make them successful.
- An ISO 9001-compliant quality system tracks all systems and ensures a strict standard to deliver a quality mold every time.

**Explain Mold-Tech's training approach.**

**Parks:** Mold-Tech develops each employee through hands-on training with an organized, one-on-one approach. Matching an employee with a designated trainer allows for constant and thorough feedback during the training process.

This training method is used for existing employee skills as well as incoming interns. Also, we focus on cross-training employees across various departments to allow for flexibility in production and employee growth. Cross-training also facilitates sharing ideas across departments as well as suggestions for process improvements and efficiencies.

**What is your most valuable asset?**

**Parks:** Our entire team from conception to final assembly. Their experience and knowledge is the cornerstone of our business. We have extensive technical expertise and use an engineering-driven process. Our thorough production planning and tracking help us keep our projects on schedule with on-time delivery. We also use One Note for recording build plans and for tracking build progress.

Generally, the process is as follows: Most of our quotes start with a 3D design concept. Once we receive a purchase order, the project manager shares the concept with the engineering group.

We also put additional value into the design. For example, we apply a color-coding scheme to each component. This step helps communicate the overall build plan and brings value to the entire group involved with the project. Most of our staff, from project managers to sales and design, have a toolmaking background.

Our highly-skilled moldmakers coordinate each job with the various departments to ensure a successful mold build.

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**MARCH 17** — CONTINUING BUSINESS ROUNDTABLE DISCUSSION: EXECUTIVES AND DEPT. LEADERS

**APRIL 9** — EMERGING LEADERS "MEET THE MENTOR" SESSION: EFFECTIVE COMMUNICATION AND TEAMS

**APRIL 16** — CUSTOMER RELATIONSHIP MGMT SYSTEMS COLLECTION
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Once we complete the production planning meeting, the lead toolmaker then coordinates with each department, sharing the build plan and timeline. Every department keeps a separate schedule, which is connected to the overall schedule.

Our experienced staff is also dedicated to product quality and customer service, including project managers who maintain effective communication throughout the entire operation. A project manager is the single point of contact for our customers, from initial request for quotation (RFQ) to tool shipments. They are involved when we receive the purchase order, to the design, and kick-off meetings, up through the production planning meeting to ensure we meet our customer's needs.

They also provide weekly updates to our customers on their project's status from the weekly project reports completed by the lead toolmakers. Our customers view the project managers as an extension of their engineering departments.



### What is your latest technology focus?

**Parks:** We invest continuously in new technology. Each department is being evaluated for automation opportunities to increase throughput and decrease bottlenecks. We have focused on adding automation through the use of robots in many of our new machining centers. Along with robots, we have added pallets to allow our machines with robots to maximize machine run time.

### Take us through the automation in the shop.

**Parks:** We've expanded our automation capabilities in many areas and have invested millions in new equipment over the last several years.

For example:

- A sinker EDM cell with two Makino EDAF3 sinker EDMs, and a 3R robot that has a 200-position electrode carousel and a 20-position carousel for pallets that hold cavity and core components.
- Makino 5-axis graphite mill with a 60-position 3R robot.
- Two Makino 3-axis graphite mills with 60-position 3R robots.
- Two Makino hard mills with 20-position 3R robots.
- Two Makino A51 horizontal machines with rotating tombstones permit machining on multiple sides of one block, improving throughput time.
- We have implemented palletizing to streamline efficiencies within the different manufacturing areas.

### What is the impact of automation on your workforce?

**Parks:** More CNC machines are helping us remove manual labor. Over time, we have transformed our workforce from one

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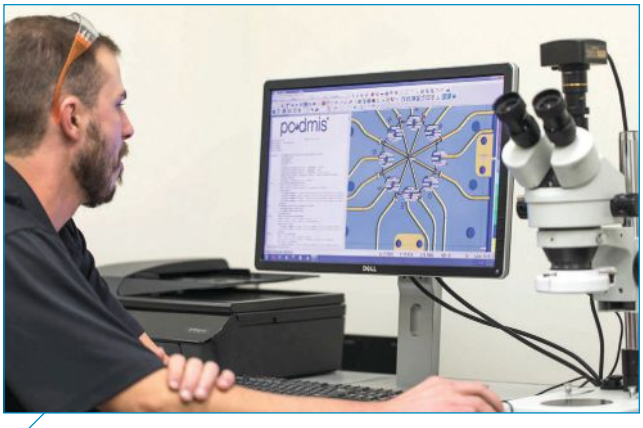
Mold-Tech continually invests in equipment and highly automated systems to produce consistent, highly accurate results in less time. For example, ultra-precise hard milling, electrode manufacturing and EDM machines, as well as precision fixturing and palletization.

with a heavy reliance on manual labor to one using automation to drive manufacturing.

Our workforce has also increased. We currently have 60 employees, and we still need more people to help with the setup and programming to run all of the automation.




Design for manufacturing, design control, in-house mold-flow analysis and regular comprehensive design reviews ensure an optimal mold design.

To solve this, we work with a couple of technical colleges and one local high school to promote moldmaking and to find new young talent. We give tours each year of our shop and usually get a few people from these events interested in Mold-Tech who return to inquire further. Over the last several years, we have offered technical internships at both the college and high school levels. All of our interns have returned after completing school to begin employment with us.

### How does Mold-Tech define quality?

**Parks:** Our quality systems are an integral part of our manufacturing process with document-controlled processes. Quality control is found throughout the entire moldmaking process.

Our quality lab is a climate-controlled environment with dedicated personnel. Our capabilities allow us to measure everything from simple parts to the most complex components and features. The lab is equipped with an OGP SmartScope Flash 500 with ZONE3 Pro metrology software, an Accucentric auto-calibrating zoom lens, scanning probe and touch probe and an MTR rotary indexer. We also have a Hexagon Global Perf 575 coordinate measuring machine, and a Hexagon Global S Blue 5.5.5 coordinate measuring machine with Leitz LSP-X1C quill mounted scanning probes.

Furthermore, we have simplified our inspection operations with software that extracts part data directly from CAD models assuring maximum accuracy. We even use PC-DMIS software for inspection that allows us to share that data with our customers efficiently.

### Any additional value-added services?

**Parks:** Mold-Tech focuses on production-ready molds, and making our in-house sampling a value-added service. This offering allows us to make any necessary mold adjustments quickly and efficiently. We have three dedicated engineers to facilitate sampling, including the use of scientific molding processes.

We also do mold repair. Our in-house laser welding technicians create precise welds with minimal downtime for our customers. This process is useful when completing modifications, revisions and repairs. With a dedicated staff and in-house laser welding, we address customer needs on a timely basis.

We also build mold bases in-house, provide in-house mold polishing services, and we engrave or laser mark our mold components for easy identification and service.

Additionally, we offer end-of-arm tooling for total mold integration. Our team designs end-of-arm tooling to suit our customer's needs for the handling of parts and runners. MMT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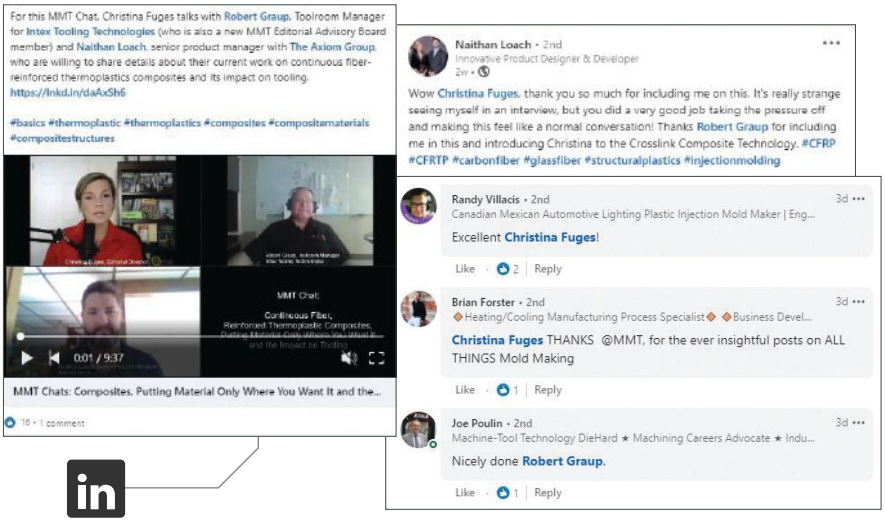


### #machining #EDM


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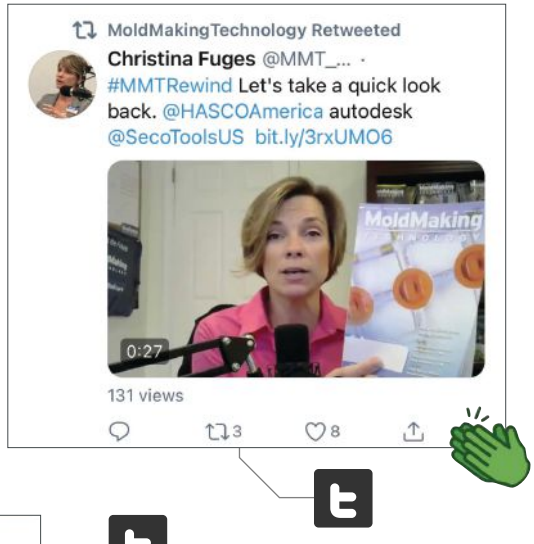


### #MMTBreakingtheMold


### #MMTRewind

ENGINEER / BUILD / MAINTAIN

# NOMINATE A FUTURE MOLDMAKING LEADER

MMT 30 UNDER 30

**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.**

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Honorees will be chosen based on the quality of the nomination submitted, not the quantity of nominations. ***Nominees must be under the age of 30 as of June 1st, 2021.***

*MoldMaking Technology* will select 30 young people in the moldmaking industry who are striving to be the next generation of leaders and innovators. We will recognize them throughout the year on the pages of *MoldMaking Technology*.




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MoldMaking TECHNOLOGY

By Jason Murphy

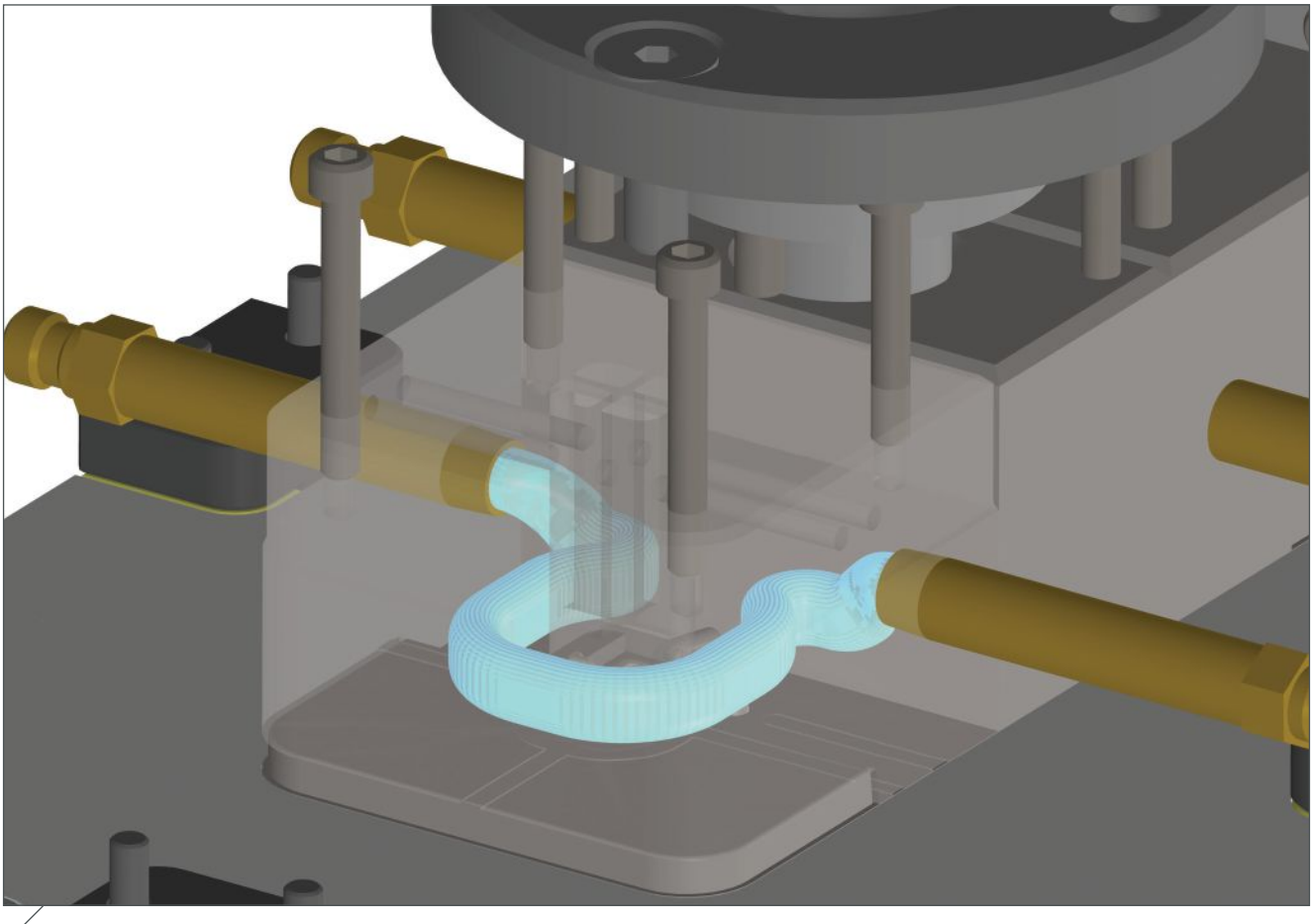
# Supplying Cooling to Additive Tooling

## Additive tooling provides limitless options for cooling a mold's difficult-to-cool areas.

The most challenging part of implementing additive tooling is getting cooling to and from the inserts in a mold. Here is a quick look at when to use conventional circuits or conformal cooling to achieve optimal production results with additive tooling.

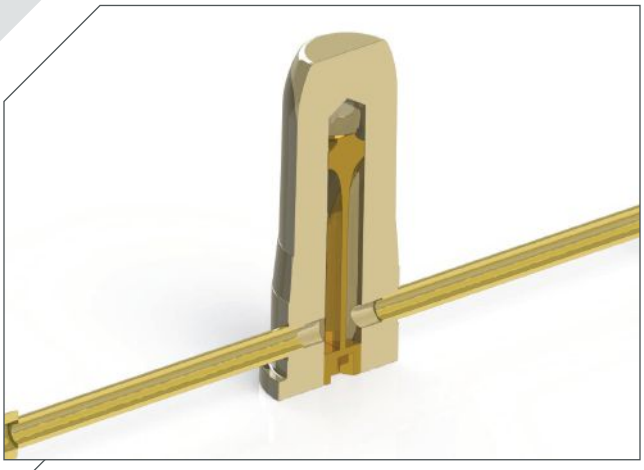
### Conformal Cooling or Conventional Cooling

Consistent cooling in a mold is the key to successful molding. Maintaining a consistent distance from the cooling circuit to cavity shape and between cooling circuits avoids hot spots in the mold that can lead to cosmetic defects, slow cycle times,

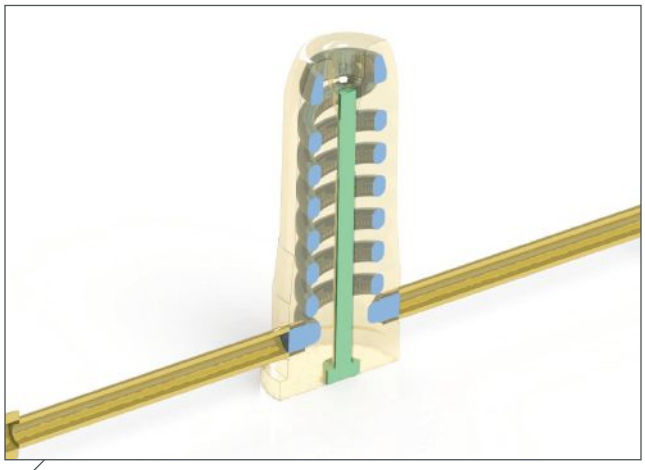


Photos courtesy of Next Chapter Manufacturing.

Conformal-cooled insert plumbed cooling line connectors in the A plate of a mold base.



Conventional baffle to cool a core without center ejection or a core pin.



A helical conformal cooling circuit cools the core while permitting a core or ejector pin in the center.

increased operational costs, lengthened molding time and cause late deliveries.

Here are five critical considerations for selecting the right cooling method:

- Determine the fixed design elements such as slides, core pins and sub inserts and then look at ejection and water placement. The key is maintaining a balance between placing cooling where it needs to be and providing ejection in critical areas.
- Look at the part's geometry. If the geometry is flat and long, consider conventional drilling. However, if there is a significant contour or large, round geometry, conformal cooling is more appropriate. It will avoid level changes in cooling circuits that create hot spots on the mold's surface.
- Consider baffles and bubblers for cooling standing steel areas like cores and between ribs. This option can be complicated when a core pin is inside of a larger core or the core is too large to cool effectively with a baffle. If either of these is the case, then use a helical conformal cooling circuit, as it opens up the center of the core for venting and places the cooling consistently to the part shape.
- Use a conventional bubbler or baffle if the standing steel is simple cylindrical geometry, and cooling can be placed in the center.
- Use conformal cooling to achieve consistent cooling and to reduce cycle time when cooling complex cores.

**Conformal Cooling Considerations**

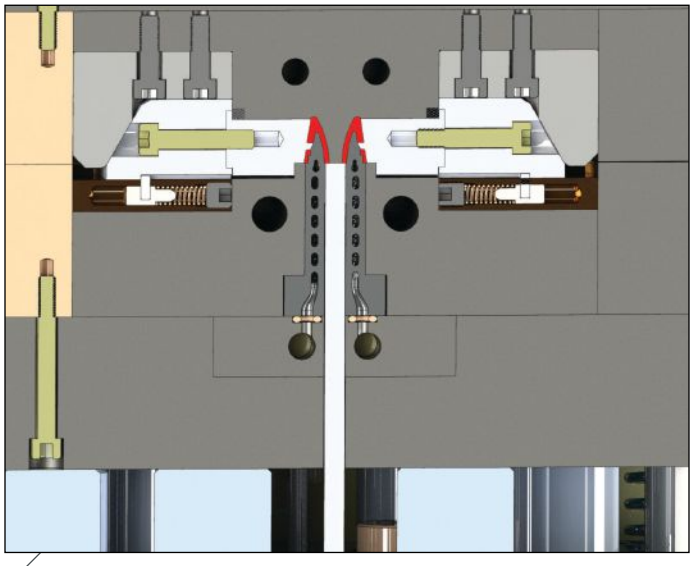
If conformal cooling is the method of choice, the challenge becomes getting the cooling from the outside of the mold to the insert that is buried inside the mold. The number of ejector and core pins, along with other sub inserts, makes the task daunting.

Here are a few recommendations for keeping circuits simple, allowing free flow and eliminating dead spots:

- Keep the circuits close to the insert height in the mold and use a direct route to hard plumb or drill a feed line into the

insert. However, this is not always possible due to other mold components obstructing the path.

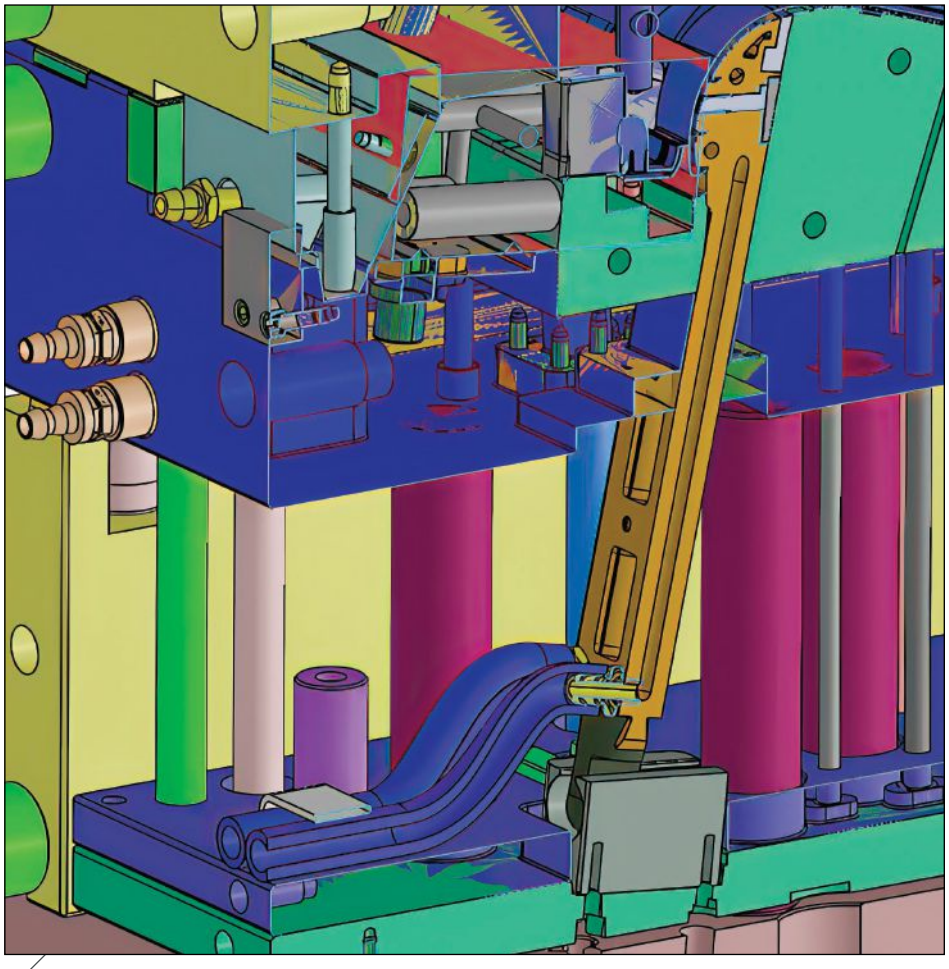
- Determine if you can drill a cross line in the plate and an O-ring in the face of the support plate under the insert. This approach is a simple way of running direct circuits under the inserts with minimal interference.
- Plumb from under the insert through the ejector plates and clamp plate to avoid obstacles that limit a direct circuit under the insert.
- Use a flexible hose to move between support pillars and ejector pins without drilling.
- Mount flexible hose in front of the ejector plate to get water to lifters and floating cores, and then mount the fittings at the bottom of the mold for easy access in setup.
- Use front stops to limit the travel of plates without crushing the plumbing. Use a lifter with conformal cooling between support pillars or plumb in front of the ejector plate for quick mold disassembly during maintenance. Consult with your mold maintenance technicians to determine the option that will work best with your design and improve mold assembly and ergonomics.



Conformal-cooled insert fed with cooling lines in support plate using O-rings.

Consistent cooling in a mold is the key to successful molding.

While every mold is unique with specific molding challenges, identify common steel geometries to establish cooling standards that predetermine the most efficient method for designing and building the mold with molding and mold maintenance in mind. MMT



Plumbing the 3D-printed lifter with the hoses in front of the ejector plate makes mold assembly simple to maintain.

**FOR MORE INFORMATION**

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By Jeff Jaje

# Five Key Aspects of a Basic Multi-Axis AM Programming Workflow

CAD, CAM and AM tools in the same software package and user interface ease programming for mold builders employing additive manufacturing operations.

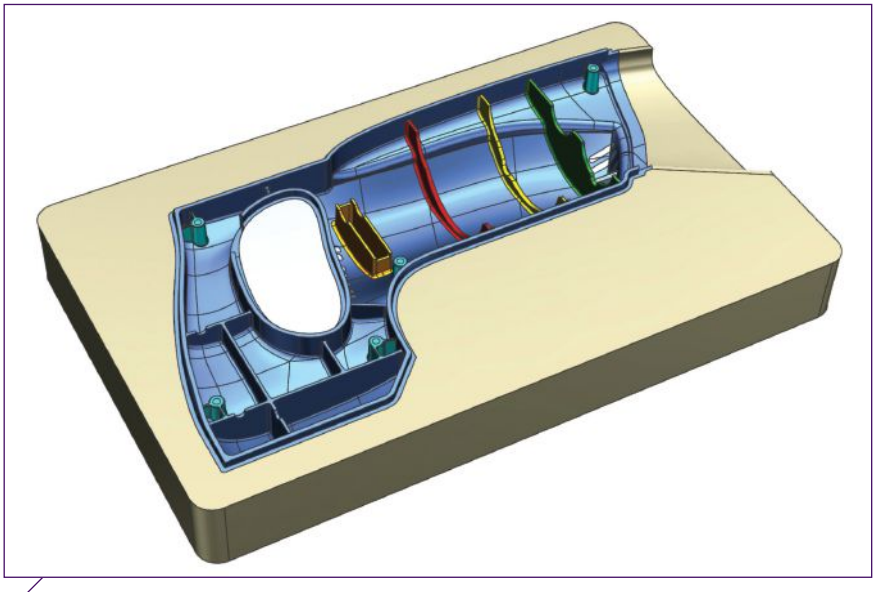
Additive manufacturing (AM) of metals is gaining market acceptance with specific use cases, including some workflow examples in moldmaking such as building up components with conformal cooling channels, printing expensive metals for less waste, or performing repair work to extend the life of production molds.

When it comes to the "big picture" view of AM, there are two approaches to moving the deposition head: flatbed (or planar) and multi-axis. *Flatbed* is the most common method used on printers ranging from inexpensive home 3D printers to large industrial metal laser sintering systems. When using the flatbed approach, parts are nested in a work envelope, and slicing is always planar—usually perpendicular to the Z-axis—and completed in that one direction.

The *multi-axis* approach deposits material in directions, compared to just one vector or direction. The print head of these systems is mounted inside a 5-axis CNC machine or mounted onto a robot. They are referred to as hybrid multi-axis additive machines when they can perform both additive and subtractive operations.

Programming software for multi-axis AM can often be found as an add-on or option to existing 5-axis CAM systems because programming multi-axis AM more closely parallels programming 5-axis milling operations than it does flatbed slicing. Although a fair amount of overlap in software options exists between multi-axis milling and additive, there are unique features for each manufacturing method.

Mold builders can use both flatbed and multi-axis AM, but multi-axis is often used to coat molds, repair molds, or build mold components to reduce material waste (when using exotic alloys). CAD functionality in multi-axis AM, used for getting a part ready to program is as important as the actual programming operations. Since many mold builders use subtractive operations on additively-manufactured parts, an integrated CAD/CAM/AM solution can be beneficial.



Images courtesy of Siemens Digital Industries Software.

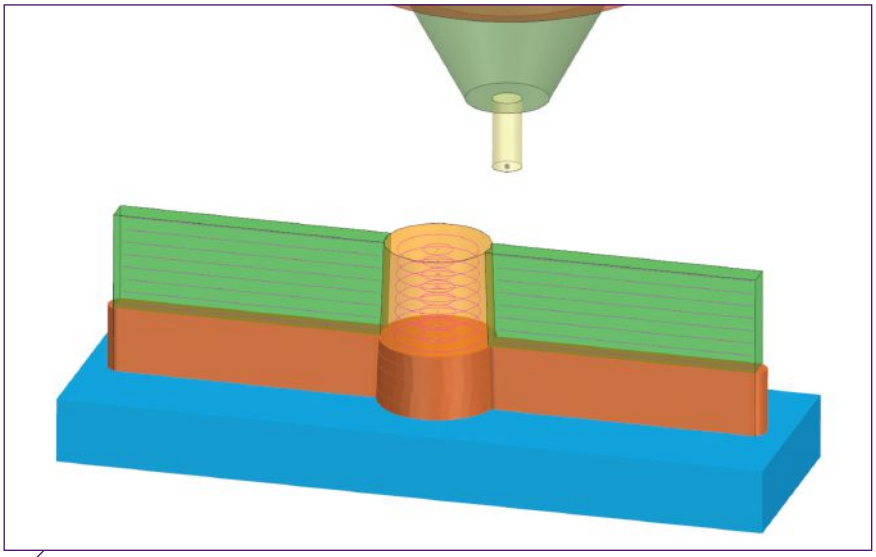
CAD tools are used to decompose the solid body into individual design features for additive manufacturing programming.

## Fundamental Multi-Axis AM Programming Workflow

Let's take a look at five key aspects of a basic workflow for programming a multi-axis AM part along with the necessary CAD/CAM/AM system tools.

### 1. Part Decomposition

Decomposing a part is the process of taking the solid body to be pro-



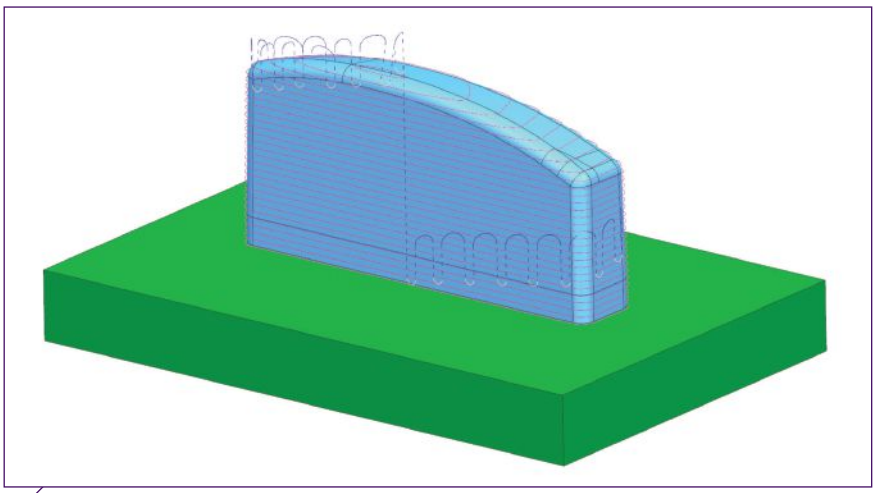
When different operations are used to program a part, merge automatically resorts the layers to print in the correct order.

grammed and splitting (decomposing) it into individual features or individual solid bodies based on how each feature will be programmed and printed. This process uses CAD design tools for manipulating the original solid body.

In one sense, multi-axis AM relies on CAD tools to prepare parts more than 5-axis machining. It is not uncommon to spend a fair amount of time performing CAD design functions before programming any additive operations. The design (CAD) tools and programming (CAM and AM) tools in the same software package and user interface avoid the need to swap software multiple times to program, simplifying the task.

For example, splitting larger solid bodies into individual bodies is key to part decomposition, and this entails splitting by a plane, a cylinder, or a face. Having CAD decomposition tools with multiple options for defining planes and cylinders makes this job more manageable.

Strong surface functions also ease part decomposition. Face extraction, creation and modification functionality are critical for decomposing parts that are not defined by planes and cylinders, such as components typically machined for a mold. For instance, mold builders often split solid features based on an extracted face, so working with surfaces that are offset, extended, or sewn together to create custom foundation faces or thin-wall sections allow them to program the parts exactly how they prefer.



By staggering start points per layer, you can reduce potential overburn or over-deposition at one spot.

**2. Part Arrangement and Machine Kinematics**

This process involves digitally placing a part and the necessary build plate into the machine to verify that you can meet the size and angle requirements. When 5-axis CNC milling, gravity allows the chips to fall, but when using AM, gravity works against you. Understanding how to use machine angles and kinematics is essential to ensure you have enough room and movement to build the part.

**3. Part Programming**

Many part requirements or features are necessary to produce higher quality parts. Here are eight specific part requirements or features to consider—some of which are common to both additive and subtractive manufacturing and others unique to AM.

*Actual 5-axis movement*: A mold builder using AM can produce higher quality builds on complex parts when the deposition head moves with full 5-axis motion. The orientation of the nozzle and laser to the part is more critical when *depositing material* than when *milling* with a ball nose cutter.

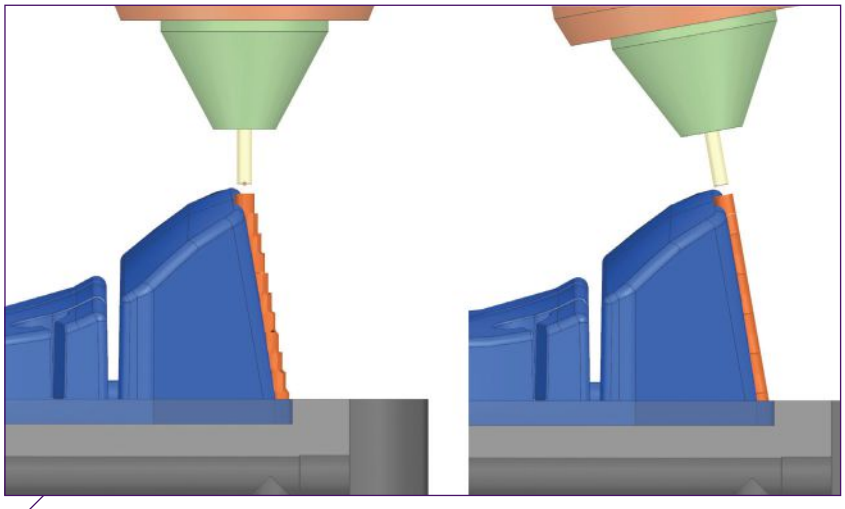
For example, sidewalls with either positive or back draft benefit from 5-axis movements on the outside wall. This is especially true with blown powder and laser processes because you align the laser and powder to the drafted wall instead of allowing gravity to influence the process.

When coating the top of a part—such as depositing a single layer of a harder material onto a mold surface—multi-

axis moves will allow more consistent layer thickness.

*Buildup, thin-wall and coating operations*: For additive manufacturing, one uses buildup operations to create layers and fill solid bodies, building up larger parts. Thin-wall operations create just one bead, using a face or sheet body as a guide. Coating operations coat material onto the top of a part. Both are useful for building parts but especially helpful for repair functionality.

*Merging operations*: This requirement is more unique to AM than to milling. For example, imagine creating an operation on a body with one set of parameters and a second operation on another body with different parameters; however, you want to build the two bodies simultaneously to avoid collisions during the build process or join two different materials.



Five-axis movements on sloped geometry can create more accurate walls, versus 3-axis operations.

Merge functions allow the user to merge multiple operations, each with different parameters, and then automatically re-sort the individual layers of each operation, completing the build. Analogous to shuffling two decks of cards together. Ideally, merge functions should not require a lot of manual sorting.

*Staggering start points*: The start points of the profiles often align with previous levels at each depth when milling contours use multiple levels. However, start point alignment can be a disadvantage with metal AM.

With AM, one must always take into consideration adding too much heat or metal into one area. If the start points of every layer are in alignment, it may overbuild material at that point, creating an undesirable finished part. The ability to stagger the start points from layer to layer helps spread the heat around and eliminates the possibility of overbuilding that one point.

*User-defined events*: These are events or commands added by the users to the calculated output and can be unique to AM. For example, with blown powder applications, a user may wish to input a command to blow excess powder away at some time interval. Other users may want to change a machine parameter just before the end of a deposition string to increase the output quality of the build.

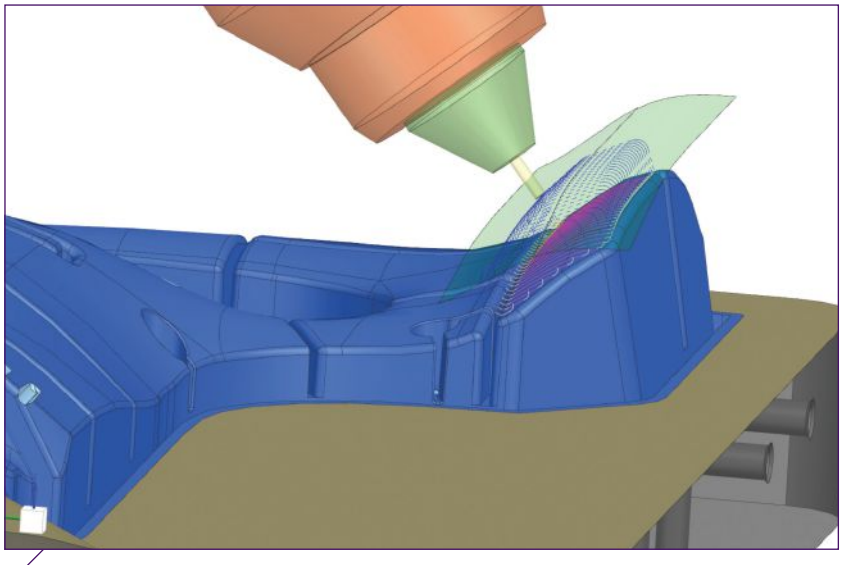
Automatically adding user-defined events offers finer control within the operation and can be unique to a specific workflow or deposition technology.

*Corner handling*: Sharp corners can also cause too much heat and build up in one area

For example, the speed at the tip of a tool can be very slow compared to the rest of the machine when using a large 5-axis kinematic movement in a sharp corner. This can cause an overbuild situation as well.

Using optional corner handling functionality gives the user options to modify or even turn off the deposition in the corner for a second, reducing the possibility of overbuilding.

*Spring passes*: In subtractive machining, spring passes are used when an extra milling pass on the same profile is necessary to account for any deflection in the tool or springiness in the material.



Optimize approach, retract and traverse motions using smooth 5-axis motions.

The gravity and draft angles associated with AM result in finish passes that may not always deposit enough material. Spring passes in AM are the same as in subtractive—an extra pass on the finish profile. This can be automatically applied all the time, or applied based on draft wall conditions to ensure a complete build of a part's sidewalls.

*Five-axis traverses*: One goal of 5-axis machining is to limit non-cutting moves (or air travel) to gain efficiency. However, in AM, you may want the opposite. The user may want to move the deposition head around more to spread the heat during deposition around and prevent a single area from absorbing too much.

Merging different operations per level will force the tool to move back and forth more often, which has the benefit of spreading the heat around.

Five-axis traverse options such as plane, box, cylinder and sphere (with a smooth approach and retract movements) allow the machine to perform these movements more smoothly and efficiently. Here is where an integrated 5-axis CAM system can lend existing functionality to multi-axis AM operations.

**4. Program Verification**

Verifying the program using machine simulation, one can see the deposition process and visually see if there are issues with excessive kinematic movement, possible collisions, or large voids. This will simulate the beads, in the same order, on the digital twin as they would be on the machine. Ideally, in hybrid additive/subtractive environments, the same additive simulation model and also verify any subtractive operations in the workflow.

**5. Post Processing**

After you decompose a part with CAD tools, mount it to a machine, program your additive (and subtractive) operations and verify every post-processing step. Keep in mind that creating multi-axis additive post-processors is just as technical as creating 5-axis milling post processors—possibly more technical. To achieve a complete build, it is crucial to have a fully functional post-processor that can correctly interpret movements, deposition commands and user-defined events. MMT

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By Peggy Malnati

# Black Nitride Treatment Extends Life of Die-Cast Die Components

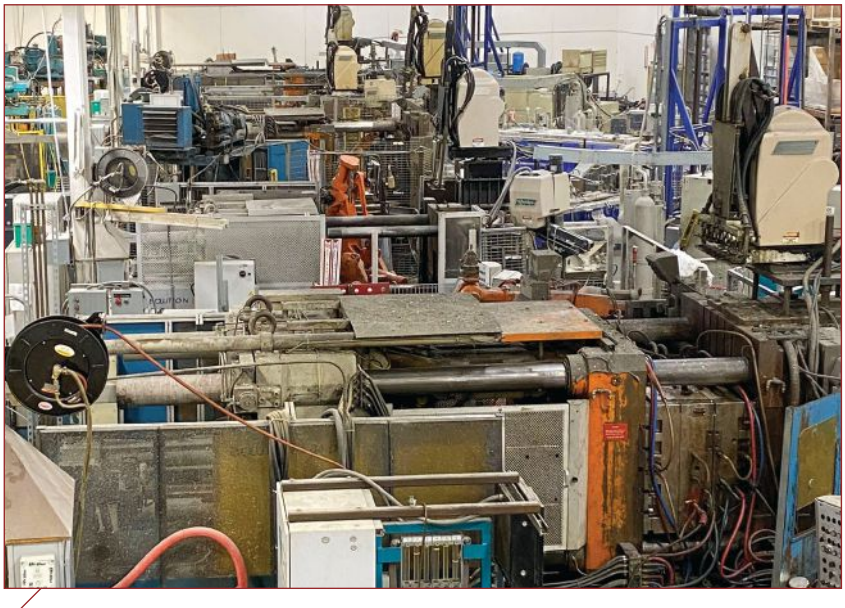
Proprietary black nitride treatment significantly increases strength, hardness, wear and soldering resistance of steel die-cast die and mold components.

Founded in 1919, Twin City Die Castings Co. says it's one of the oldest die casters in the U.S. The company is headquartered in Minneapolis (which casts aluminum only) and maintains two other facilities in nearby Monticello, Minnesota (which casts magnesium exclusively) and Watertown, South Dakota (which just casts aluminum). Between the three facilities, the company employs 190 associates, has a total of 184,000 square-feet/17,094 square-meters of workspace and operates 25 casting presses ranging in size from 350 to 1,000 tons/tonnes. The company casts parts ranging in size from that of coins to large door frames for off-road vehicles and serves customers in the automotive, recreational equipment, industrial, defense/aerospace, renewable energy, computer technology, heating/ventilation/air-conditioning, hand tool and medical markets. No single customer comprises more than 20% of company revenues and no single industry represents more than 40%. The die caster says its commitment to a diversified customer base has proven useful time and again when one industry contracts, but others stay strong.

Twin City Die Castings is both ITAR-registered and IATF 16949:2016 certified. Employee-owned since 2017, the company reports it has maintained profitability for over 30 years and continues to reinvest an average of $3.5-million USD in profits back into the company annually. It uses the high-pressure casting process to produce parts. This process produces stronger, denser parts with higher mechanical performance—potentially in thinner wall sections—but it's also harder to control, which is why not every die caster uses it. In addition to casting aluminum and magnesium, Twin City designs die-cast parts and tools, although die production is subbed out to other shops. It also deburs, blasts/power washes, machines, heat treats, polishes, plates/anodizes/e-coats, paints, rubber overmolds and pad prints/silk screens die-cast parts and offers subassembly, bonding, custom CNC machining and more.

### Die Soldering Problems

Die casting is a hot and corrosive process. Molten aluminum is typically held in the furnace at 1,100°F/593°C and magnesium at 1,250°F/677°C, while dies are typically operated at 350-425°F/177-218°C. Die soldering (die sticking) is one of the most significant and most persistent problems die casters face. It's a phenomenon in which molten metal contacts the surface



Images courtesy of Twin City Die Castings Co.

Founded in 1919 and reportedly one of the oldest die casters in the U.S., Twin City Die Castings Co. maintains three facilities: one in Minneapolis (company headquarters) where it casts aluminum only; one in nearby Monticello, Minnesota (shown above), where it casts magnesium exclusively; and another in Watertown, South Dakota, where it also casts aluminum. The company serves customers in the automotive, recreational equipment, industrial, defense/aerospace, renewable energy, computer technology, heating/ventilation/air-conditioning, hand tool and medical markets.

Twin City uses the high-pressure casting process to produce parts. This process produces stronger, denser parts with higher mechanical performance in potentially thinner wall sections. In addition to casting aluminum and magnesium, Twin City designs die-cast parts and tools, although die production is subbed out to other shops. It also deburs, blasts/power washes, machines, heat treats, polishes, plates/anodizes, paints, e-coats, rubber overmolds and pad prints/silkscreens die-cast parts and offers subassembly, bonding, custom CNC machining and more.

### TWIN CITY DIE CASTINGS CO.

**PROBLEM:** Die soldering during casting process was degrading core pin surfaces, which required cleaning three to four times per shift, and replacement every month.

**SOLUTION:** Switch to black nitride custom core pins from Progressive Components.

**RESULTS:** Cleaning was reduced, replacement intervals extended five times thanks to greater longevity gained from using black nitride products.

of a die/die component, heating the steel above its soldering critical temperature, causing iron to dissolve into the melt while, at the same time, molten metal diffuses into the die surface, creating a layer of intermetallics at the interface.

Over time, this layer builds up. Upon cooling the die and part, the molten metal solidifies and interlocks at the surface, welding the two components, resulting in sticking of parts, damage to the tool and a poor surface on the casting. This reaction also causes microcracking, pitting, thinning and weakening of the die and die components, necessitating constant cleaning. That's why casting dies typically only last for 100,000-150,000 aluminum parts and 200,000-300,000 magnesium parts before significant repairs or replacements are needed. (Contrast that with a well-maintained steel injection mold, which can produce a million shots before significant repairs or replacement are required.)

A classic example of the soldering issue is what can happen to core pins used to produce holes in cast parts to reduce secondary drilling. According to Dan Sheridan, toolroom/die repair supervisor at Twin City's Monticello plant, a large job his facility had been casting in magnesium—a two-piece, roughly 6 x 6-inch/15 x 15-centimeter frame for the center display panel on passenger vehicles—was proving very challenging to produce. The casting process had to be stopped frequently to clean and polish core pins to reduce soldering. Given that their four-cavity die used four custom core pins/cavity and that Twin City was producing 240,000 pieces per year, the downtime and productivity losses were becoming costly.

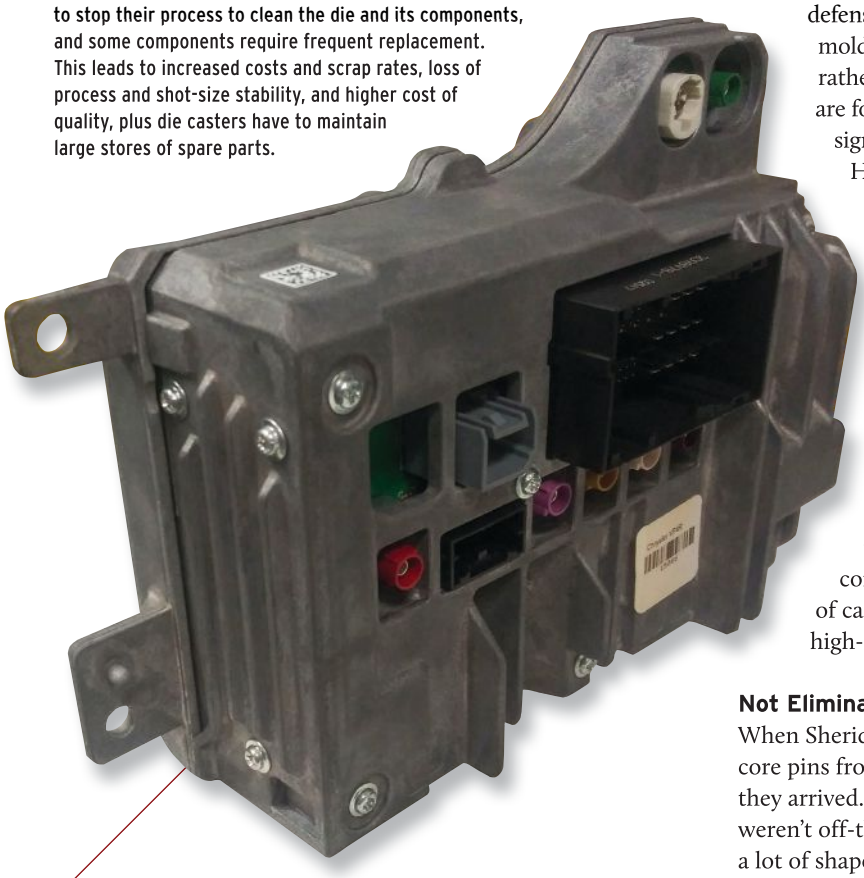
"We'd already tried several premium-priced coated products that just didn't work for long," Sheridan explains. "They'd start out helping, but too quickly, the coating would come off, and the benefits would be gone. That was frustrating because, on average, it takes us 45 minutes each time we have to go in to clean and polish the core pins, and we were shutting down to do this 3-4 times/shift, or our parts would get out of spec. Worse, we were replacing those pins every month. It was a never-ending cycle with lots of downtime, scrap parts and frustration."

It was then that Twin City decided to try a new product that its long-time supplier, Progressive Components (Wauconda, Illinois), had introduced: black nitride custom core pins. "Even though we'd been disappointed with premium-coated products before, given how this issue was hurting our productivity, I felt I had nothing to lose in trying them out," Sheridan adds.

#### Black Nitride Treatment

Formed in 1987, Progressive Components describes itself as offering advanced solutions for toolmakers, die casters and injection molders through product lines with standard and proprietary mold components, mold-monitoring devices, software and innovations for improved mold maintenance. Certified to ISO 9001:2015 standards, the company developed its proprietary hybrid black nitride process to help toolmakers and processors needing more durable products.

A persistent problem that die casters face is corrosion caused by die soldering (die sticking), where molten metal welds to the surface of the die, causing part sticking, damage to the tool and its components and a poor surface on the part. To fight the problem, casters often have to stop their process to clean the die and its components, and some components require frequent replacement. This leads to increased costs and scrap rates, loss of process and shot-size stability, and higher cost of quality, plus die casters have to maintain large stores of spare parts.



A two-piece die-cast magnesium frame assembly (above), which holds the center display panel in passenger vehicles, proved challenging to produce at Twin City's Monticello plant. Steel core pins, used to produce holes in the cast part to eliminate post-cast drilling, were being attacked by the molten magnesium in a process called die soldering. Press operators had to stop the process 3-4 times/shift to clean and polish the pins to reduce degradation and replace pins every month.

"I started working in die casting when I was 16 years old," recalls Ken Rumore, Progressive's R&D manager and the person who developed the company's hybrid black nitride process. "Years ago, people told me that if I could ever conquer the soldering problem, I'd change the industry. Almost five years ago, we set out to create a product that would solve major issues that die casters face every day. Our made-to-order black nitride core pins are products that do just that."

"Ken likes to tell people that this product's 'not your grandmother's nitride,'" laughs Patrick Fleming, Progressive Components regional sales manager. "I agree, and so do our customers. For a long time, we've felt that die casting was an underserved market. We love to get in there and see where everyone's pains and issues lie, and then develop new products to help solve their problems."

There are multiple nitriding processes, many of which are proprietary and used to improve the performance of steel parts in industries as diverse as automotive/racing, locomotives, defense/aerospace, firearms, oil & gas, and, of course, molds and dies. Technically, it's not a coating at all, but rather a diffusion process where carbon and nitrogen are forced into the surface of steel 76-127 microns. This significantly increases the metal's hardness (to 66-70 HRC) and surface lubricity, boosting both wear and corrosion resistance and significantly improving part life. In the case of die and mold components that, in turn, helps reduce downtime, maintenance and part rejects, so casters and molders are more productive and profitable.

For injection molders, black nitride components can facilitate greaseless molding—a big benefit in cleanroom/medical or packaging applications. And since it's not a surface treatment, dependent on good adhesion between coating and substrate that can wear off, black nitride components can significantly improve component life under the harsh heat and corrosion of casting or even when molding caustic, abrasive, or high-temperature plastics.

### Not Eliminated, but Greatly Improved

When Sheridan placed his first order for black nitride custom core pins from Progressive, he was surprised at how quickly they arrived. "The pins we were using in the display-frame die weren't off-the-shelf products. They were custom pins with a lot of shape and detail to them. They had custom diameter, radii and shoulder length. They weren't straight core pins. Given that the black nitride process takes extra time, we were very impressed that Patrick got them to us in just four days." Since that first use, he adds that Twin City's engineering department has worked with Progressive Components to change the black nitride core pin details to help further

After trying several different coated core pins to solve the soldering problem (lower pin), Twin City switched to black nitride custom core pins (upper pin) from Progressive Components, which last longer and give the die caster more uptime. Twin City has been running the display-frame die using Progressive's black nitride custom core pins for over a year now.

increase longevity. Sheridan says that the new pins held up much longer and took a lot of punishment, which meant less downtime and real cost savings.

"The most notable improvements are reductions in scrap, downtime, maintenance and the cost of quality as well as stability of cycle and shot size," Rumore adds. "Additionally, casters no longer have to maintain huge drawers of spare pins, seriously reducing costs and management tasks long term. When you're changing pins every few days, the costs are going to be insane."

When Progressive first started evaluating these products, they asked customers to try them with their dirtiest, nastiest, problem child—the program that kept them awake at night. "We had one customer tell us that every time he had to pull a die to replace components, it could cost him $5,000 or more in lost productivity depending on die complexity," Fleming says. "We had another customer who had completely given up on core pins and had gone back to drilling holes as a secondary operation, costing a fortune. After trying our black nitride core pins, his situation was so improved that the company returned to casting holes again. And we had one caster who was having to change pins every 1-2 days. Last time we checked, he'd been running for 90 days straight and hadn't had to replace his black nitride core pins."

"Although it didn't completely eliminate the soldering problem, these pins definitely last longer and give us more uptime," Sheridan adds. "Twin City has been running the display-frame die with Progressive's black nitride custom core pins for over a year." MMT

**FOR MORE INFORMATION**

Twin City Die Castings Co. / tcdc.com
Dan Sheridan, Tool Room/Die Repair Supervisor
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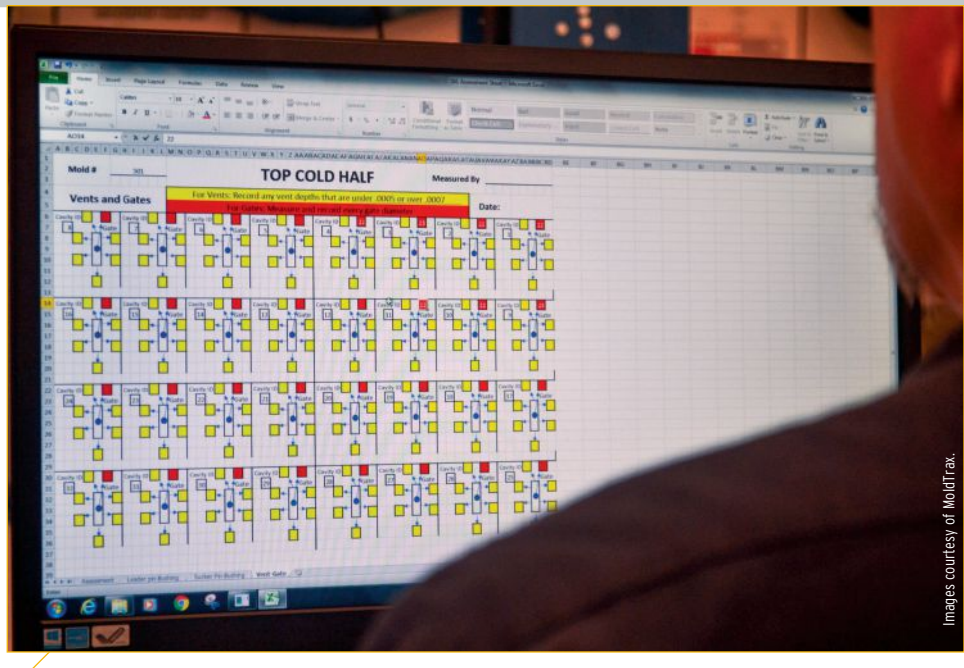
By Steve Johnson

# Scientific Maintenance, Say What? Part 2

Part two of this three-part series explains specific data that toolrooms must collect, analyze and use to truly advance to a scientific maintenance culture where you can measure real data and drive decisions.

A shop that runs higher cavitation molds with critical specifications at high volumes will never continuously improve mold performance or shop efficiencies with non-standard language in a comment field. This data collection method does not provide a means to quickly or accurately measure data because a technician must manually decipher and analyze an every work order. Moving to a more data-driven, 4.0 or scientific type of maintenance culture avoids this type of manual labor.

Part 1 of this article series reviewed the various maintenance cultures found within shops, identified necessary mold data and explained the inadequacies of journal-entry systems. Now, let's discuss the type of data that a shop must collect and the most appropriate means of data collection.




Images courtesy of MoldTrax.

Vent and gate dimensions are valuable data points for mold maintenance that many toolroom technicians do not document and should.

## A Universal Maintenance Goal

Maintenance and repair data aim to help provide molds and technicians with the best opportunity "to efficiently produce quality parts on time." Although maintenance data can be of great value to those upstream and downstream of maintenance and repair, the specific data type needed to better design, manufacture and run (process) a mold will vary.

Maintenance and repair data must focus on what prevents a mold from *efficiently* and *reliably* running a specific quantity of acceptable parts (specifications) at the necessary (designed) cycle time with an acceptable risk level. The costs to achieve this (tooling, labor, outside work, shipping the mold, etc.) controls the efficiency aspect of our goal.

## Categorization of Required Data

Shops need to collect a variety of maintenance data types. These categories are based on the run/repair cycle of a mold. When collecting and using data to troubleshoot molds, the "sequence of events" during the run/repair cycle can be critical for a proper root cause analysis. The data collected while the mold is in the press is called *production run data*, which includes press number, start and stop dates and times, cycle count, name of the start-and-stop processor and the mold stop reason. An electronic signal from a press, a cycle counter, or a process monitoring system can capture a few of these data points.

A smart, accurate maintenance plan cannot be created without production run data. Think about it—would you change the oil in your car without knowing how many miles it was driven since the last change? Of course not, because it depends on who was driving the car, in what type of environment the car was driven (a smooth highway or pitted gravel road), whether the car broke down along the way, and if so, the number of miles it ran before it broke down, the reason for the breakdown and the required corrective action taken to return it to a drivable condition, to name a few.

### Just the Facts Please

Molders are always surprised what they learn about their molds when this production run data is presented to them in a report based over time. Ask any manager what mold is costing them the most in unscheduled stops or tooling components, or which mold has the highest number of labor hours or quality issues, and most managers will point to the mold on the bench that day. Toolroom managers and repair technicians working in a firefighting environment rely on their experience with daily issues to know what molds are causing the most issues and what corrective actions were taken. However, real data surprises most toolroom personnel, mostly because there is no emotional attachment to the hot issue of the day—only facts. The facts allow toolrooms to set targets and goals because facts are based only on numbers.

### Defect Tracking Data

Defect information is next and is where non-standard language can make tracking and troubleshooting an exercise in futility. A single defect can be known by different names between repair technicians, process technicians, quality control and even engineering. All molding defects must have standardized names/terms so everyone can understand and track them.

Working with hundreds of companies over the years has revealed a severe lack of standardization in terms for part quality issues. Notes like *flash, burn,* or *non-fill* alone are not sufficient descriptions to distinguish precisely what flash the mold is suffering and/or which mold component(s) is/are creating the issue.

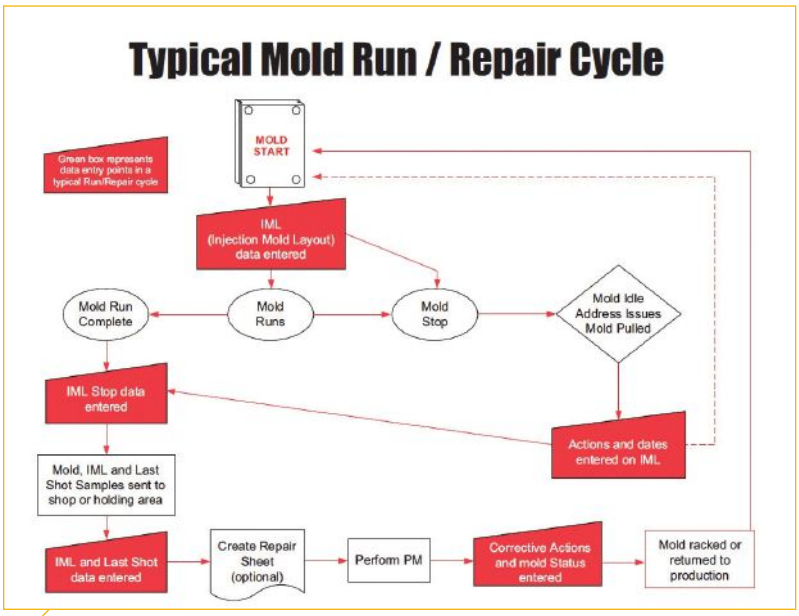
Standardize your terms to include the defect's location such as "flash on seal," "burn on tab," or "long gate." Do not say "flash on the top of the seal by the valve." Be mindful that this is a term—not a sentence.

Keep the term as short as possible (two or three words). Some molders have hundreds of different defects across hundreds of molds, and it is critical to be specific for targeting the high-frequency issues.

Other documentation systems use coded defects—like "FLSS"—which would be code for the previously mentioned defect. Coded defects can be confusing to decipher and time-consuming for the user to ensure it is correct. It is better to keep it simple to ensure accuracy.

Defect data also include the defect type. Although there could be several different categories of issues, there are five primary types: electrical, mold, part, process, or maintenance. This makes it easier to run reports to categorize issues and expand the list of goals. Additional defect categories should relate to the type of products and molds your shop maintains.

The exact date the defect was noticed, the person who noticed the defect, and if relevant, the mold position or cavity number of the defect, are other essential data points. Without this positional data, trends and patterns related to improper cooling, incorrect tooling stack dimensions, unbalanced mold fill, tooling configurations, unnoticed non-uniform manifold heat profiles, or corrective actions will be applied as short-term successes that only mask the root cause.

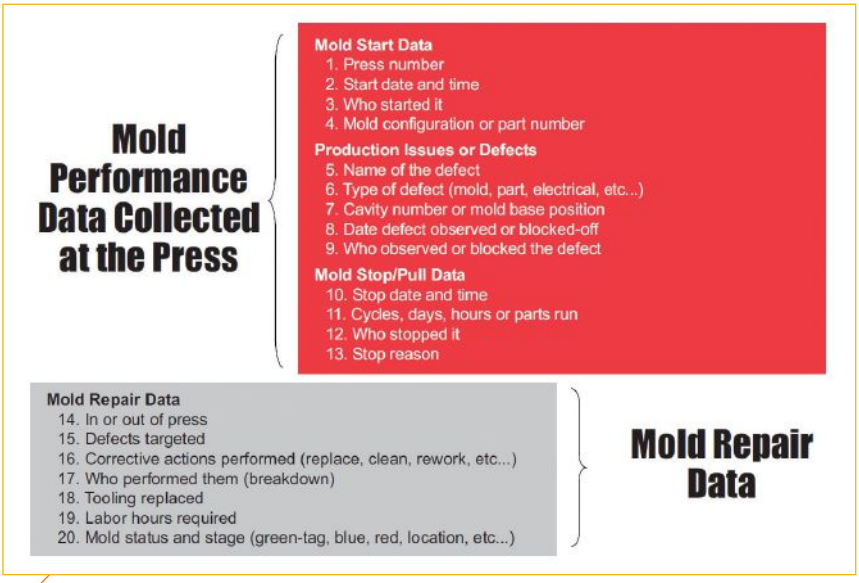



The variety of maintenance data categories are based on the run/repair cycle of a mold.

### Corrective Action Tracking

Confusing, inadequate repair "stories" are used in most systems when all corrective actions performed on molds can be captured in a corrective action "term."

For example, terms such as "replaced," "cleaned," "reworked" and "polished" provide a means to measure frequencies and relate direct costs to the type of work being performed on molds and in the shop. Sometimes, a note is




The sequence of events during the run/repair cycle is important for a root cause analysis when troubleshooting a mold.

necessary to better explain a procedure, but the use of a term is required to gather any useful data. You can also directly relate the term to the defect to determine how effective the resolution was.

Corrective action terms also allow technicians to justify investment in new or better equipment, such as ultra-sonic or dry ice cleaning, TIG or laser welders, polishing equipment, or even better, hand tools.

### Love for Accurate Maintenance Records

The great thing about accurate, measurable maintenance records is that everyone is associated directly with mold performance benefits, from repair technicians to mold designers to managers. When a system is designed to be granular enough to benefit maintenance, then everything else summarizes that data—or reports.

For example, designers and builders can see the off-the-shelf components that work best by performing head-to-head analysis of supplier pins, bushings, interlocks and other frame components. They can also better analyze if design features like cooling methods, plating, steel types, hot runner systems, or electrical components made an improvement or not.

A common barrier to improving data accuracy is the need for systemized maintenance practices, which must be developed based upon company culture or documentation "skill" levels for short-and long-term goals. A systematic process will be more than just asking a repair technician to "write down what you did."

### Explain the Goals and Teach the Process

Moving to a more cost-efficient and safer culture is much better than continuing to manage daily firefighting. Still, once you develop the maintenance process, it must become compulsory to work. This may be a hard sell to a seasoned technician who is used to "winging it" when a mold lands on his bench, so it's essential to understand that implementation of this maintenance system requires appropriate training about expectations and benefits; otherwise, the new system is doomed to fail.

Next month, we will cover how to use this new data, set targets and goals for improvement and allow better, faster and more accurate mold and part troubleshooting. MMT

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Steve Johnson, President

# Stay Informed and Inspired with MMT CHATS

## Watch, Listen and Learn!

*MMT* Chats are a series of industry-focused video conversations led by *MoldMaking Technology* Editorial Director Christina Fuges. Each episode is a brief, casual but insightful discussion with leading moldmaking professionals about technology solutions, business strategies, and industry trends.


*MMT* Chats can be found on our website or YouTube:
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MoldMaking TECHNOLOGY®

By Christina Solomon and Michael J. Devereux II


# Fraud Risk Management Strategies for Mold Shops

## Mold builders must understand fraud so they can reduce the risk and improve profitability and efficiency.

When it comes to fraud in the workplace, the question is not **if** it is taking place, but at what level it is happening. However, many businesses are reluctant to address fraud risks head-on and invest in strategies to deter and identify fraud.

Mold manufacturers can reduce the burden that fraud has on a business and enhance profitability and efficiency by understanding the scale and types of fraud.

### Do Not Ignore the Cost of Fraud

The cost of fraud and misconduct to a business is much more than the theft itself. A single instance of occupational fraud (fraud committed by the employees or owners) can cost shops almost $200,000 per instance. The consequential costs, such as the costs to investigate the fraud and/or replace staff, have been estimated to cost more than 50% of the initial fraud loss.

Also, the costs to your shop's reputation could be as much as 100 times the initial fraud loss. These estimates do not include the consequences of lost productivity, diminished employee morale or loss of confidence with customers.

### Identify Fraud

Shops can design controls to address their most significant threats by identifying the most common fraud scheme by industry. The Association of Certified Fraud Examiner's 2020 Global Fraud Study states that manufacturers are most vulnerable to the following types of fraud schemes:

- **Corruption:** Half of the manufacturers in the study fell victim to these scams. Corruption includes conflicts of interest,

bribery, illegal gratuities and economic extortion. Potential red flags of a corruption scheme may include complaints from bidders/suppliers, price outliers on awarded contracts, unusually close relationships with suppliers, or no "right to audit" clause in contracts.

- **Billing scams:** About one-fourth of fraud cases (23%) involved billing ploys. These scams may include submitting invoices for fictitious goods or services, inflated invoices, or invoices for personal purchases. A billing scheme's potential red flags may include missing documents or support for payment requests, invoices just under approval limits, poorly controlled vendor master file, or payments made outside of the accounting system.
- **Noncash theft:** Noncash ploys were reported in more than 20% of fraud cases. These incidents often involve the theft of such valuable assets as inventory and equipment. Potential red flags of noncash thefts may include unexplained credits or write-offs, unexplained inventory variances, or shrinkage.
- **Expense reimbursement:** Rounding out the top four categories, 20% of fraud cases involved fictitious or exaggerated claims for expense reimbursement. Potential red flags of an expense reimbursement scheme may include missing documents or support for reimbursement requests, late submissions of expense reports, or inconsistent/excessive spending compared to other employees, travel schedule, or expenses incurred on non-workdays.

In addition to fraud perpetrated by your employees, manufacturers are vulnerable to fraud losses related to intellectual property infringement, warranty, or product quality claims and face threats from cybercriminals seeking to exploit you and your customer's confidential personal and financial information.

## Assess the Risk

Assessing fraud risks is not a one-time exercise and cannot be adequately completed by anyone or department. There is not a one-size-fits-all solution to your shop's fraud risk management, but a framework may include:

- **Assemble the right team:** Solicit responses from all levels and all departments within the shop. You may find anonymous surveys or small workshops conducive to obtaining actionable feedback.
- **Brainstorm risks:** Put a timer on this exercise, but don't rule anything out or dismiss any risks identified during this process.
- **Prioritize risks:** Focus on those risks that are both likely to occur and could result in significant losses. Be sure to consider risks associated with information technology and regulatory/compliance, legal and reputational risks in addition to the dollar amount of the fraud itself. Determine a measured response to the prioritized risks. For example, can you accept, avoid, control or transfer the risk? And if so, how?
- **Get into a fraudster's head:** Knowledge is power. Knowing what a person's incentive might be to defraud you, current pressures and the ways he or she can exploit your business' internal controls will help determine and develop effective countermeasures.
- **Manage internal controls:** Evaluate if the internal controls in place are effective. Consider the level of effort and authority to override or circumvent internal controls.

## Use Proactive Anti-Fraud Strategies

Consider these proactive strategies to help mitigate fraud in your shop.

- **Develop an anti-fraud policy**: An essential first step to strengthen your anti-fraud stance is to formalize the shop's anti-fraud position and outline expectations and responsibilities of employees when it comes to identifying workplace misconduct, as well as spelling out possible consequences of misconduct.
- **Implement a hotline:** Fraud is most commonly discovered when the organization receives a tip from an employee, vendor or customer. Organizations with hotlines suffered half the amount in losses and detected fraud twice as fast as those without hotlines.
- **Incorporate data monitoring and analysis:** Data analysis techniques can help a shop assess if its internal controls are operating as intended. It can also identify potentially fraudulent transactions sooner, resulting in lower losses and faster detection compared to shops that didn't use these techniques. Examples of data analytics in a mold shop environment include, but are not limited to:
- Verify the existence of vendors with familiar names or addresses
- Identify vendors who are also employees
- Identify purchases just under approval thresholds
- Extract invoices posted with duplicate purchase orders
- Identify duplicate SKU number, item descriptions or costs
- Analyze the difference between standard and actual costs (more often than once per year when determining burden rates)
- Reconcile unmatched pay and remittances to freight invoices
- Extract products with zero quantities or zero prices
- Compare inventory levels and turnover rates
- Identify refunds paid to company employees
- Identify customers in sales who are not in accounts receivable
- Identify accounts with large (by dollar or volume) credit memos, refunds, write-offs.

Taking a proactive approach to fraud won't guarantee that fraud will not occur, but it will help minimize your shop's chances of becoming a victim. MMT

### FOR MORE INFORMATION

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Christina Solomon, CPA/CFF, CGMA, CFE, Director of Forensic Accounting and Michael J. Devereux II, CPA, CMP, Partner and Director of Manufacturing, Distribution & Plastics Industry Services

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

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## MMT CHATS Hot Rods, Performance, Predictable Manufacturing and Building a Legacy

By Christina M. Fuges


*MoldMaking Technology* Editorial Director Christina Fuges chats with three team members of Eden Tool Company and Eden Manufacturing to learn the "details" about how this mold builder also became a manufacturer of engineered medical components.

Eden Tool Company from New Freedom, Pennsylvania, is no stranger to the press. This shop has mostly had coverage on its EDM expertise and hard milling capabilities, but Christina wanted to spend this 20-minute chat with President Mike Eden, Dave Tomac, VP of Eden Manufacturing and Jake Eden who is in engineering in both, to discuss what she saw when she walked into the shop during her 2020 visit: a bunch of beautiful, awesome HOT RODS! She also got to ride in two of them—and the quality, detail and power she experienced tied perfectly into the company's focus on performance. (This chat is also a teaser for the larger feature story on Eden Tool published in *MMT*'s February 2021 issue.)

**Christina Fuges:** So Mike, walk me through your passion for hot rods, and then tie that in a little bit to your slogan of Eden performance.

**Mike Eden:** The car stuff was bred into me early on with my father—he was always into cars—and there was always something going on in the garage [up the street] and I always hung out there. So the attention to detail came to me early on with cars, always taking things to the next level. But it's also because of the attention to detail and the characteristics of being a toolmaker that those tendencies came about. With starting my own shop, it was all about cleanliness, it was all about attention to detail, the performance of the machines and it just all tied on with the Hot Rod industry. And that comes with the flames—our molds perform.

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## MMT CHATS Bottle Expertise Gives Way to Test Kit Work

By Christina M. Fuges


M.C. Molds designs and produces molds for vacuum forming and thermoset urethane foam, and offers custom machining. It also designs blow-molded bottles, a specialty that has taken upcoming COVID-19 projects to a new level.

Since July, from pre-purchased hand sanitizer, walkie-talkies on the production floor and split shifts to multi-use container/bottle molds, diagnostic reagent bottles and a pipeline of other virus-related tooling, M.C. Molds from Williamsburg, Michigan, has been in the fight against COVID-19 as nationwide testing continues to ramp up.

In this 20-minute *MMT* Chat, Christina Fuges chats with some of the M.C. Molds team—Vice President of Operations Dave Keesaer, Sales Manager Eric West and General Manager of Manufacturing Joe Palazzolo—about current business levels, employee safety and morale, and recent and upcoming COVID-19 tooling projects that capitalize on the shop's extrusion blow mold specialty.

**Dave Keesaer:** Earlier on we got all our leaders together and had a meeting and kind of came up with a plan of what we wanted to do, and we wanted to do as much as we could to help with this COVID-19 problem as possible. Knowing that, we initially put all of our COVID-19 projects at the top of the list. And we've been working with our customers with delivery dates, so that if we have a hot COVID project, some of our customers are willing to take their tools a little later to help alleviate some of that workload.

One such hot COVID project centered around several of M.C. Molds' already-related bottle projects that had been ramped up as a result of the pandemic. Two of these projects involved molds for diagnostic reagent bottles, one for sanitation purposes.

**Eric West:** We are primarily in multi-use-type bottles, so when you think about personal protection, wipes, or any type of hand sanitizer, those are all going to be very important as we move into that nationwide testing and ramp up. We're talking about 300 million people. We don't see that going away.

short.moldmakingtechnology.com/MCMoldchat

## Giving Mold Builders Additive Capabilities, Super Creativity

By Christina M. Fuges

I saw my first 3D-printed hot runner manifold at K 2019 in Germany, but the system did not have a name yet. Fast forward to 2020 and it not only has a name, but it's been successfully implemented in a number of applications across Europe. And today, it's ready for the North American marketplace.

It's name is Streamrunner, and it is opening up new options in hot runner technology. "The concept behind the name was to express how material flows from the machine to the cavities—illustrating balance and flow," says Neville Junkin, a technical engineer for HASCO Hot Runner.

Streamrunner is a niche product in terms of small pitches and small components, but the applications are many—including medical, and caps & closures. "This is not a silver bullet technology. We still have to look at it from the perspective of running material through the tool and it coming out into the cavities with the required quality for the application at hand," Junkin says.

This system was developed for small pitch applications, so you end up with a very small manifold, reducing print time. If you start getting into larger manifolds, conventional production methods are more appropriate. It is surprising how many applications need this minimal pitch. Junkin notes that customers want to have 18 or 20 millimeters between pitches or between cavities but they can't. Now they can!

The key to this technology is metal 3D printing or additive manufacturing (AM). AM offers flexibility, so designers can arrange nozzles however they'd like.

short.moldmakingtechnology.com/Steamrunnr

This additively manufactured hot runner manifold offers maximum freedom of design and opens up new options in hot runner technology.

## Next Generation Goes Go-Pro During COVID-19 to Advance Shop Technology

By Christina M. Fuges

"It was pretty amazing to see two young guys stepping up and doing a project most would not tackle. That's something that is needed in this industry," says Electroform Company CEO Wade Clark. Clark is referring to his son, Zach, who got creative and worked with Germany-based Exeron engineer Dominik Merz to remotely set up and make tooling modifications to the shop's 5-axis Exeron machining cell with integrated automation.

Electroform Co., located in Machesney Park, Illinois, has been offering product development, injection molds, automation and injection molding for the plastics industry since 1988. This line of work demands current technology, including the latest in machining and automation, and a shop can't afford to be static with technology even during a pandemic if it wants to remain competitive. Clark explains that the new linear 5-axis machining cell is not only extremely high precision but also very complex, which presented the challenge.

"We were not able to use a local technician. Plus, we didn't know exactly what went into setting up a 5-axis milling machine remotely because this machine is one of two Exeron 5-axis machines in the whole United States, and we own both of them," Zach Clark says.

Zach Clark decided to use a Go-Pro as a webcam to maintain ongoing communication with Exeron GmbH, which was 7 hours ahead. Zach and Dominik installed the 5-axis cell in two 6-hour days with a programming follow-up for air chuck that took another 90 minutes. All of this was completed over the internet.

The remote set-up was a big challenge, but Merz would do it again. "From my last visit to Electroform to set up their first machine, before the pandemic shutdown, I knew that the remote set-up would work because their employees are very good. We worked well together. Kudos to you and your team," Merz says.

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Zach Clark worked with Germany-based Exeron engineer Dominik Merz to remotely set up and make tooling modifications to the shop's 5-axis Exeron machining cell with integrated automation.

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

## A Best-Practices Quality Strategy for Profitability

By Lewis Yasenchak

Today's manufacturers have had to pivot quickly to adapt to demands brought on by COVID-19. These guidelines for quality and business process improvement planning will help achieve true business performance improvement and return on investment.

Quality management is the act of overseeing all activities and tasks that must be accomplished to maintain a desired level of excellence. This includes the determination of a quality policy, creating and implementing quality planning and assurance. Quality management ensures that an organization, product and service is consistent. It has four main components: quality planning, quality assurance, quality control and quality improvement. This blog shares guidelines for quality and business process improvement planning.

Typically, organizations define the processes they wish to improve when they develop their business case. However, during the implementation process, they should confirm that the processes defined in the business case are the ones that need to be improved and make sure they don't miss any processes that should be improved. This analysis lays the foundation for how the ERP will be configured and ultimately used.

The most critical consideration is to link improved processes to business performance improvement with a single focus on current state metrics. It's also critical to define the business value of the future state in key performance areas such as improved customer satisfaction, improved productivity, reduced cycle times, better on-time delivery and more.

To improve your shop, first determine where you are now and document your business' current state. That "current state" documentation helps teams determine how to use best practices built into the ERP system to streamline and improve these processes.

How does this phase work? Each business process is analyzed. A process flow is developed, and the inputs, processes and outputs are developed. The process flow becomes an excellent tool to identify waste in the process.

Real-time monitoring helps improve manufacturing performance from the shop floor to the top floor. By improving the quality of decisions, real-time data meet a diverse and demanding series of needs across every phase of manufacturing today.

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## PODCAST: Investing in Change for the Better

By Christina M. Fuges


A discussion with Kingson Mold and Machine's President Kaci Miller and Project Manager Joseph Solorio reveals lessons learned when shaking up the company. "Life is too short to be down and to be upset every day. I want to live my life," Miller says.

In this episode of The Manufacturing Alliance Podcast, we meet up with Kaci Miller, president of Kingson Mold and Machine Inc., and her project manager and right-hand man, Joseph Solorio. Together, this duo talks about the challenges they have faced in changing the company for the better through implementing new technologies and processes.

Here are some highlights from their conversation:

- Kaci's dad and grandpa started the company in 1977 in Brea, California, and she took over about eight years ago. She and Joseph started around the same time and soon began shaking things up at the company.
- Everyone has to learn from someone else. Joseph points out that instead of making someone else start from nothing, get them up to speed faster with tribal knowledge and experience.
- Not everyone was on board with the new machines and structure Kaci and Joseph were putting in place. They lost a lot of the crew that had been there for 30+ years but were able to create a new high-speed precision department from the growth those losses enabled.
- Kaci advocates for more women in leadership positions within the moldmaking industry. Despite the challenges she's had to face, she believes it is "empowering to know that other people are in the same footsteps."
- They emphasize the importance of looking back at previous work that has been accomplished, in order to take pride in one's work and use that to give more confidence in the next project.

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## Achieving Flexible Capacity with Automation

By Christina M. Fuges

It all started when Phil Allor, president of Selflube, a Michigan-based mold component supplier, returned from NPE 2018. On the flight back, he sketched out a plan—logically but not practically—to add automation into his operation. Allor then met with several robot integrators, and all of them turned him down, saying it was not doable. So, he set out to do it himself.

"We found that this was mainly a software problem. Conventionally, to do one part number in a robot cell requires one CNC program and one robot program. But we intended to have a robot cell capable of doing about 2,000 part numbers with many part number changes during the day. That potentially meant that we would need 2,000 CNC programs and 2,000 robot programs. Creating and maintaining all these programs would have been undoable, and in that sense, the robot integrators were right. But to us, not doable meant that we had to find another way," Allor explains.

SelfLube already had a parametric system that creates all of its CNC programs. This could be modified to create robot-enabled CNC programs. This got the company halfway there. For the robot program, Allor rejected the idea of 2,000 different programs. Instead, he envisioned having a single and likely very complicated program that would mimic its parametric system. SelfLube had a lot of experience with CNC software and computer software but none with robot software. Allor expected that there would be some similarities, so they would not be starting from ground zero. So, to find out what he didn't know, Allor signed up for a robot programming course. He was the oldest one in the class.

The SelfLube team also identified ten known problems that were potential showstoppers, but there was a catch: Financial commitments would have to be made before they became known. But with demonstrated success with the known problems, the team believed that the unknown problems would be manageable. And they were right.

"SelfLube's business is highly cyclical. At times, we're swamped and turning away customers and at other times we're not. Staffing up and staffing down is not a good option because quality and productivity tend to suffer. The robot cell gives us something that we never had before: *variable capacity*. When business is soft, it can sit idle with no complaints. When we're busy, it will cheerfully work lights out for a second shift. This thing easily replicates, so we will add cells as the need arises," Allor says. MMT

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A mini-shop floor control system eases essential scheduling tasks, reducing the complexity of a production run of multiple part numbers.

# Moldmaking Index Expands for 2021

## January–53.1

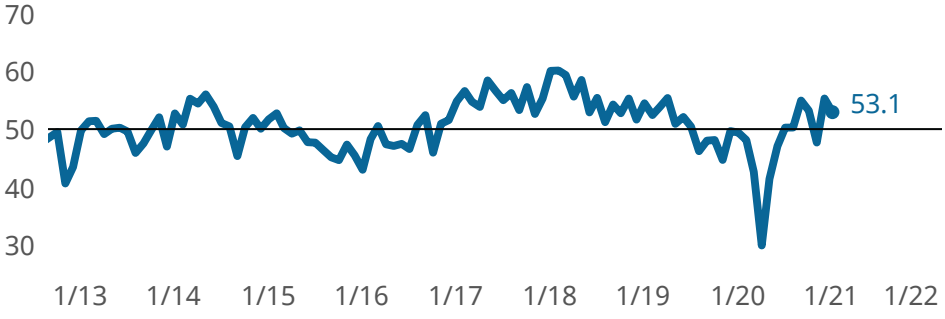
The Moldmaking Index started off 2021 on a positive note thanks to a January reading of 53.1. Moreover, in six of the last seven months the Index's readings have registered above 50, which indicate growth or expansion within the moldmaking and molding segment of the economy as compared with the prior month. January's results saw expanding activity in production, new orders and employment. An increase in the order-to-delivery time of upstream goods to survey respondents lengthened, which sent the supplier delivery reading to its highest level since Q3 2018. Lastly, survey results indicate contraction of both backlog and export orders activities.

The passing of the holiday season did not in itself result in an improvement in supply chain delivery performance as was hoped. Rather, January's supplier delivery reading underscores that available shipping capacity is only one of many challenges facing supply chains. In addition to the molding community dealing with low inventory or out-of-stock situations, the inventory which is available is commanding a price premium. The latest material prices data indicates that an overwhelming proportion of survey respondents in January reported rising input costs while a relatively smaller proportion reported passing price increases through to their own customers. MMT

**ABOUT THE AUTHOR**

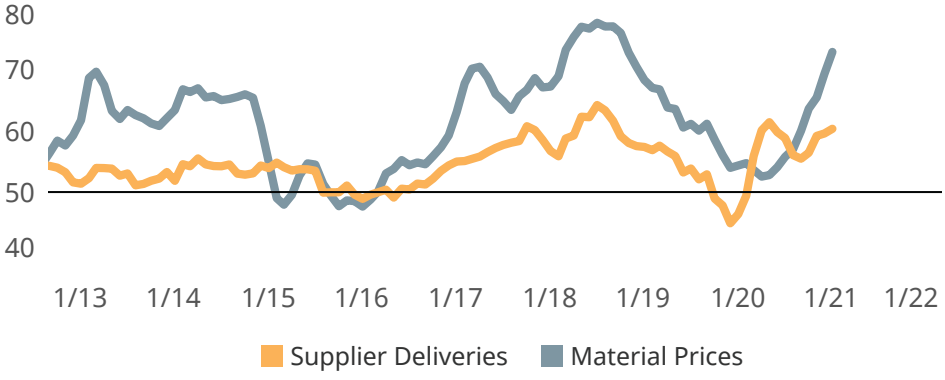
Michael Guckes is the chief economist for Gardner Intelligence, a division of Gardner Business Media (Cincinnati, Ohio, United States). He has performed economic analysis, modeling and forecasting work for nearly 20 years among a range of industries. He is available at mguckes@gardnerweb.com

**Gardner Business Index (GBI): Moldmaking**




The Moldmaking Index has reported expanding conditions in six of the last seven months, aided by improving domestic new orders activity.

**Supplier Deliveries and Material Prices (3-Month Moving Average)**




The highly correlated historical relationship between supplier deliveries activity (measured by order-to-fulfillment duration) and material prices help us understand why COVID-19's impact is resulting in rising prices.

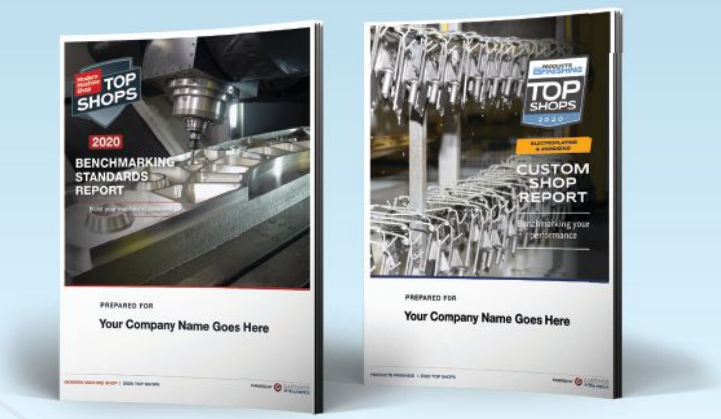
# The Insight That Matters Most to Your Business

Whether you are a manufacturer, equipment supplier or finance professional, we provide deep, rich, actionable insights about durable goods manufacturing.


GARDNER BUSINESS INDEX

## GARDNER BUSINESS INDEX

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




## TOP SHOPS CUSTOM REPORTS

Enables shops to benchmark operational and financial performance, leverage strengths, and identify opportunities.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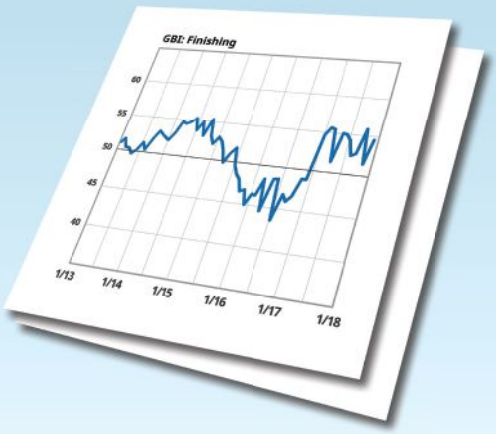
Capital Spending data collected annually, regarding budgeted spending on machines, testing equipment, software and more, projected across industries.

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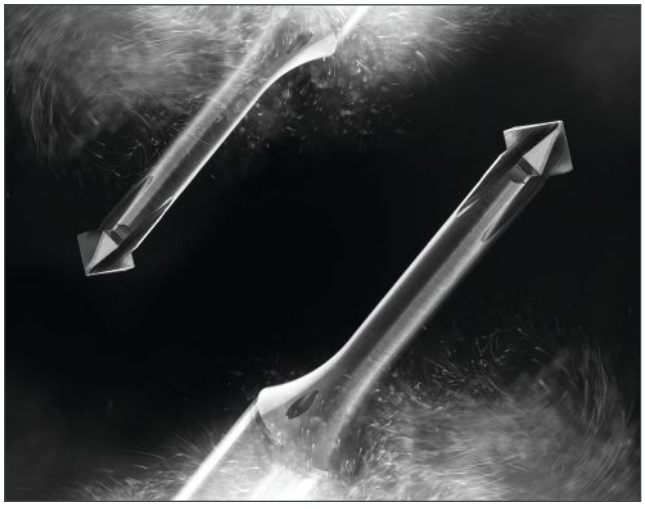
Access the related video in the product online at moldmakingtechnology.com

## CUTTING TOOLS



### Milling Cutting Tool Improves Front-and-Back Chamfer

**Big Kaiser Precision Tooling** showcases the Noventa from Sphinx, the newest addition to its milling cutter lineup. The Noventa is ideal for 90-degree front-and-back chamfering, and deburring holes up to 4xD.

According to Big Kaiser, the Noventa from Sphinx can transform the tedious, time-consuming process of chamfering the entry and exit of 0.80-6.00-mm holes using an innovative geometry that improves cycle time, tool life and surface quality.

Noventa is equipped with four flutes and four coolant channels to optimize performance and cycle time. Outstanding tool life in most common and exotic materials is achieved using modern double-layer coating techniques. Surface finish is also improved by the milling tool's reinforced shank diameter and edge-breaking capabilities.

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

### Square Shoulder Cutter Focuses on Secure Processes, Longer Tool Life

**Seco Tools** presents the Turbo 16 square shoulder cutter to its Turbo portfolio to acknowledge secure processes and long tool life, two characteristics the company says that have not experienced high importance in the cutting tools category.

With optimized features, the cutter generates exceptional tool performance across a broad range of applications and materials. A smooth cutting action and low cutting forces reduce power consumption and tool wear, boosting tool life by up to 130%.

Turbo 16 also offers an exceptionally close pitch on selected cutters, improving overall productivity and increasing material removal rates by up to 50%. Flexibility is achieved via a comprehensive range of ground and direct pressed inserts. The corrosion-resistant tool steel cutter bodies have internal coolant channels at every size, ranging from 25-250 mm (the imperial program covers diameters from 1-6 in.), which are compatible with a wide range of interfaces and standard rotating holders.

Further, Turbo 16 inserts are said to be the first Seco Tools products to feature Data Matrix tags. These scannable codes store product and batch information, and can be read by the new Seco Assistant smartphone app.

**Seco Tools LLC / 800-832-8326 / secotools.com**

### Cutting Tool Product Expansion Improves Drilling and Machining Range

**Horn USA** has recently added several cutting tool products to its offerings, including the System Mini tool system for threadcutting by turning; its DDHM/DSFF tools for carbide and core drilling; and a range expansion for its M310, 383 and M101 slot milling tools.

With sintered chip breaking geometries, the System Minis enable stability through chip breaking in difficult-to-cut materials, and provide optimum chip control with pitches offered from 0.5-2.5 mm and diameters starting at 8 mm. This product is available in the standard program System Mini 108, 111, 114 and 116.

The DDHM/DSFF tools economically machine sintered carbides. They can drill into solid materials up to 10 times in diameter as well as core drill threads. The tools also avoid the need for long eroding processes.

The slot milling tool range expansion offer higher performance through

targeted internal cooling, a larger cutting diameter for increased flexibility and new cutting widths, grades and geometries.

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


## Extended Through-Hole Tap Range Offers High Versatility

**Walter USA** enables wider versatility with an expanded range of tolerances for its popular TC117/TC217 Advance tap product line.

The new, oversized blind and through-hole taps–H7 (+0.003 in.) UNC#6-UNC 5-16 in., UNF#6-UNF 5-16 in., and H11 (+0.005 inch.) UNC1/4-UNC3/4 in., UNF1/4 -UNF3/4 in.–deliver high threading productivity in a wide range of different materials. The TC117 (blind-hole) and TC217 (through-hole) taps tackle material ranging from steel and stainless to cast iron and non-ferrous materials (ISO material groups P, M, K and N), and materials with hardness up to 40 Rc (370 HB). Walter says this versatility can help save on inventory costs by reducing the number of taps needed.

The TC117 blind-hole tap has a 40-degree helix angle and up to 2.5 x $D_N$ with chamfer form C (semi bottoming) or E (full bottoming). The TC217 through-hole tap features a spiral point for forward chip evacuation and a thread depth capability of 3.0 x $D_N$. Both taps use HSS-E substrate which, typically alloyed with cobalt, provides excellent durability. The taps feature grade WY80RG–for good chip control, good wear resistance and higher cutting speeds–and WY80FC, which offers less wear resistance and cutting speed as well as chip control for stringy and difficult-to-control chips including stainless steel. All are offered with DIN length/ANSI Shank (DIN/ANSI standard).

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



## Through-Coolant and ER-Style Saw Arbors Advance Productivity

**RobbJack** unveils two new cutting tool-based products, the through-coolant slitting saw arbor and ER-style collet integrated saw arbor.

According to the company, the through-coolant slitting saw arbor will achieve faster and more consistent speeds and feeds, and extend tool life. Precision ground, the product is said to have 15 times the gripping force compared to conventional saw arbors. Further, they increase productivity by 200%.


It is required to use the through-coolant arbor with RobbJack's through-coolant flanges. When used with through-coolant flanges, coolant ports will be equally distributed on each side of the saw, eliminating one of the most common failures when using solid carbide slitting saws. Equal high-pressure coolant is delivered to both sides of the saw and avoids saw damage and poor performance.

RobbJack's solid, ER-style saw arbors have precision ground tapers and saw journals for unparalleled ease of use and advanced productivity. Snap groove fits into most standard ER clamping nuts for repeatable saw edge positioning with TIR held to 0.0002 in. or better. This product is offered in several tool ranges under the ER11, ER16 and ER20 collet integrated saw arbor series.

**RobbJack Corp. / 844-342-0238 / robbjack.com**

## New Drill Series Offers Higher Performance, Speeds in Steel and Cast Iron

The **YG-1 Tool Co.** Dream Drills Pro line is optimized for machining in steel and cast iron.

The main advantage of this line, according to the company, is high cutting speeds with longer tool life. Several advances were combined to make these tools faster, more efficient and longer lasting than other comparable tools tested.

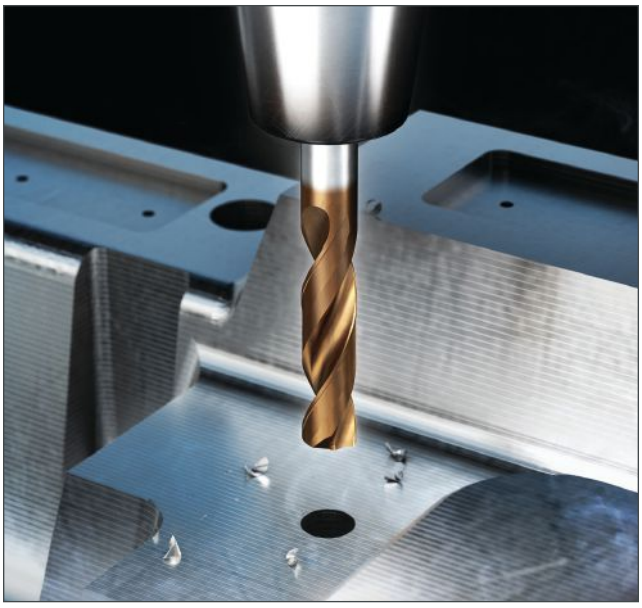
This drill line is made with micrograin carbide for exceptional core strength and longer tool life. They also feature YG-1's wave-shaped cutting edge to reduce cutting forces, and an advanced, wide-flute design optimized for faster, reliable chip evacuation. A self-centering 140° point angle reduces torque and extends tool life.

YG-1's Z-Coating (silicon-based, nano-layered) technology gives cutting edges high hardness and greater heat resistance, as well as superior surface finishes and more parts per tool.

The tools come in drilling depths of 3xD to 5xD, in sizes from 1-20 in. in diameter.

Dream Drills Pro is the latest line in the Dream Drills product matrix from YG-1, including General Purpose, MQL, High Feed, Flat Bottom, High Hardened and Inox. Each is said to align with customers' various machining demands and applications.

**YG-1 Tool Co. / 800-765-8665 / yg1usa.com**



## CUTTING TOOLS

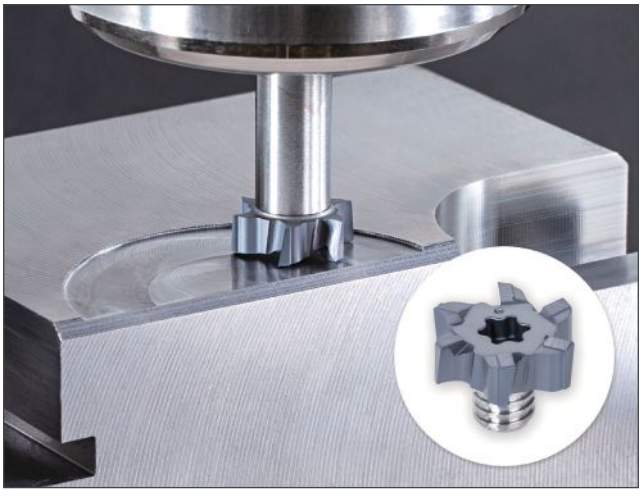
### VFM Milling Head Enables Face Milling with Exchangeable-Head End Mills

**Tungaloy America Inc.** introduces a new VFM-style milling head to the TungMeister series of exchangeable-head end mill systems to enable face milling operations.

According to the company, TungMeister is designed to reduce a significant amount of tool changeover time through its ability to replace used heads instead of an entire tool. Short setup time is reduced to 1/10th of the time it would typically take to replace solid carbide end mills for maximum productivity and cost effectiveness. With more than 13,000 possible head-shank combinations available, TungMeister readily provides tooling flexibility for almost every application.

According to Tungaloy, using a solid carbide end mill to do face milling on small workpieces is often inefficient; its pointed bottom edges with no wiper create an uneven, often unacceptable, surface finish. An indexable face mill is, in many cases, too large to fit in the tight area of the small workpiece. In addition, the number of teeth on the face mill is usually less compared with the end mill of the same size, restricting the use of higher feeds and speeds for improved machining efficiency.

The new VFM end milling heads are said to address these challenges. The cutter diameter of all VFM heads are designed to be larger than standard end milling heads of the same connector size; a standard TungMeister square end milling head with S05 connection has a cutting diameter of 8.0 mm (0.315 in.),



while the new VFM cutting diameter comes in 12 mm (0.472 in.). This feature enables the use of relatively large-diameter face milling tools on small Swiss machines. In addition, a wiper built in every cutting edge of the VFM head provides superior finish.

**Tungaloy America Inc. / 888-554-8394 / tungaloy.com/us**

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### ToolRoom Software Supports Manufacturing of Complex End Mills

**ANCA Inc.** showcases the support of the barrel shape ballnose (BSB) tool type in its up-to-the-minute ToolRoom RN34 software for machining. The software's latest enhancement also comes with revamped double corner radius (DCR) end mills, and support four tool types, including taper form, barrel, oval and lens shapes, which are predominately used in die mold, aerospace and general machining applications.

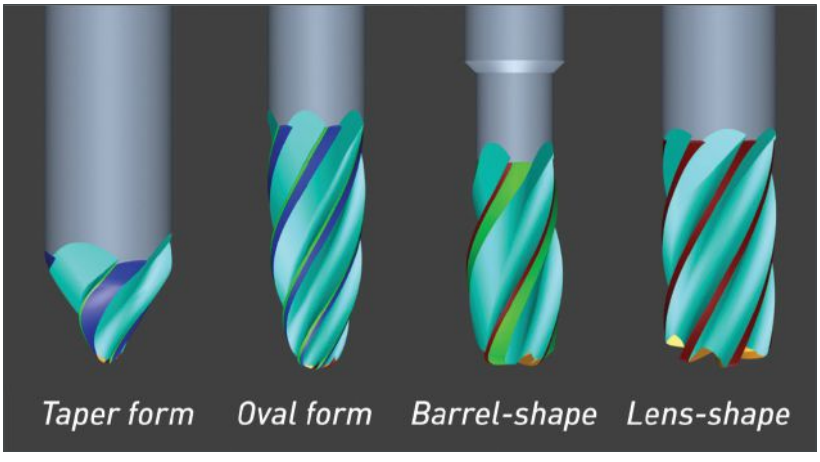
With the support of these forms, ANCA says, the ability to create end mills with a larger radius edge has been made possible, thus permitting greater step over increments, which in turn improve productivity, longer tool life, faster cycle times and improved surface finish.

According to ANCA, the combination of the end mill and its upgraded wizard-based BSB design in ToolRoom enables manufacturing of complex, sophisticated end mills and is suitable for catalog production. It provides the option to scale tools and add various other operations like roughing or chip breakers. For example, a special fluting operation ensures a constant hook angle all the way along the trajectory of the cutting edge resulting in vibration-free tools, with less wear and tear during machining. ToolRoom also supports custom forms for specials. A static view is available, to give parameter inputs for geometry description and a dynamic view enables visualization of the geometry as parameters are entered.

Other software features include compensation methods for high accuracy, which ANCA supports with manual, iView and LaserPlus compensation for all geometry. These finishing cutters are said to have very tight tolerances; LaserPlus can maintain a tolerance within +/-0.002 mm on both the ball and form radius. According to the company, this accuracy can also be maintained in batch grinding with automatic in-process compensation for large volume production on machines.

Additional tool functions are offered with ToolRoom. Tool balancing minimizes the influence of eccentric weight distribution on uneven tools, and designer edge ballnose is offered for aggressive cutting.

**ANCA Inc. / 248-926-4466 / anca.com**



## High-Speed Steel Jobber Drill Delivers More Holes

**Dormer Pramet**'s long-time Precision Twist Drill brand continues to illustrate its quality and consistency with the HX series of High-Speed Steel jobber drills, which offers a purple/bronze oxide finish for increased wear resistance.

According to the company, the series combining the toughness of HSS substrate with a 135-degree split point design, which reduces thrust requirements and eliminates drill "walking" while providing greater strength and rigidity than general purpose drills. Users can also achieve increased efficiency and better tool life resulting in reduced cost per hole.

Compared to other high-speed steel, heavy-duty jobber drills, Dormer Pramet says the PTD HX can deliver up to 70% more holes in moderate conditions. The versatility of the industry's "Go-To" jobber drill extends beyond medium strength materials, delivering 18% more holes in heavy conditions and up to 30% more holes in light conditions.

With optimal flute geometry for effective chip evacuation, the PTD is said to run faster and more efficiently. The HX is available in HX10 (fractional sizes), HX15 (letter sizes) and HX18 (wire gauge sizes).

The Precision Twist Drill HX is also available in a 29-piece fractional set (sizes 1/16-1/2 in. x 64ths).

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

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## Rough Boring Insert Holder Excels in Compatibility and Speed


**Allied Machine and Engineering** has expanded its boring line with the Wohlhaupter VolCut insert holder. The rough boring system removes large volumes of material at high speeds and light feed rates in one cut.

VolCut combines the modularity of the Wohlhaupter MVS connection with Allied Machine and Engineering's large-diameter holemaking solution. The company says this combination offers increased material removal and excellent chip control at greater depths for large-diameter applications, even on underpowered machines. Allied Machine and Engineering's distributor partners stock the VolCut insert holder for quick delivery with bore diameters ranging from 2.559-128.149 in. (65 mm–3,255 mm). Its design incorporates serrations designated to connect seamlessly with Wohlhaupter's Twin Cutter and AluLine boring systems.

Allied Machine and Engineering says manufacturers pre-machining large-diameter holes in components for the oil and gas and heavy equipment industries can reduce cycle times with VolCut's high cutting speed and material removal up to 2.755 in. (70.00 mm). The company also reports case studies show cycle time reductions up to 80% when compared to similar circular milling applications. The indexable inserts the VolCut holds shorten process times even further by allowing the tool to remain engaged in the spindle while worn cutting edges are changed out. Allied Machine and Engineering stocks the indexable inserts as standard items to ensure quick replenishment.

According to Natalie Wise, U.S. product manager of the Wohlhaupter boring line, VolCut insert holders provide a rough boring solution unmatched by other rough boring competitors. The ability to utilize the VolCut insert holders with existing standard Wohlhaupter modular tooling provides the additional range needed to vastly improve rough machining operations."

**Allied Machine & Engineering / 800-321-5537 / alliedmachine.com**

## CUTTING TOOLS

### Four-Fluted Drill Increases Precision with Four Cutting Edges

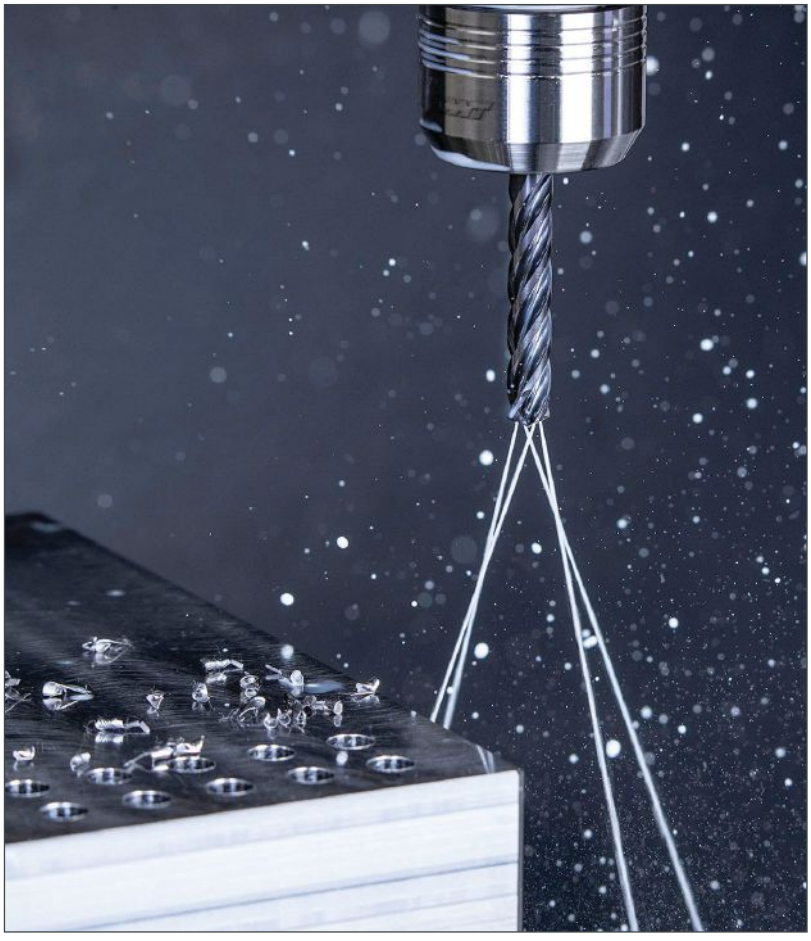
**Ceratizit USA Inc.** features the WTX High-Feed Drill, what the company says is the first of its kind on the market. The drill offers customers four effective cutting edges for increased precision, productivity and service life.

The innovative pyramid geometry of the WTX ensures aggressive and precise drilling performance, achieving positioning accuracy of 0.03 mm and excellent centering properties. Higher levels of drilling quality, hole tolerance, surface finish and positioning accuracy increase component quality, reducing potential reworking, and low burr formation when entering and exiting the hole eliminates the need for time-consuming subsequent deburring.

According to Ceratizit, the drill's four-flute design enables high feeds in steel processing, as well as secure and quick chip removal. The distribution of cutting force to four cutting edges results in longer service life. In addition, four continuous spiral-through coolant holes provide optimum cooling of each cutting edge and contribute to a higher tool service life and a noticeable reduction in tool costs.

Further, the application of a new Ceratizit Dragonskin DPX14S coating on the WTX provides maximum protection for the drill and further increases tool life, cutting speeds and process reliability. Dragonskin utilizes TiAlN nanolayer coating with a 0.35 coefficient of friction and allows for maximum application temperatures of 1,832°F.

**Ceratizit USA / 847-923-8400 / komet.com**



### Angled Round Toolholders Increase Position Versatility

**Thinbit**, manufactured by Kaiser Tool Company Inc., introduces its angled round toolholders, which are designed for CNC, conventional and end working positions on Swiss screw machines.

The angled round toolholders position the insert at 30-, 45- or 60-degree angles for reliefs, undercuts and angled OD and face grooves. Round shank sizes are available in diameters of 1/2, 5/8, 3/4, and 1 in. and 20 mm and 25 mm.

Made for use with Thinbit inserts in grades for ferrous and non-ferrous materials. Inserts are available in sizes 0.004-0.150 in. in 0.001-in. increments coated with TiN, TiAlN, TiCN, diamond film or uncoated.

**Thinbit / 260-484-3620 / thinbit.com**

### Predictive Tooling Calculator Reduces Production Costs, Improves Quality

**Machine Metrics** showcases the Predictive Tooling Calculator which diagnoses, predicts and avoids tool damage and quality issues–such as subtle anomalies in machine load, torque, acceleration and spindle speed–before it happens. This, in turn, can also reduce production costs, from machine downtime, damaged tools or scrapped parts.

Predictive calculator variables include answering the following questions:

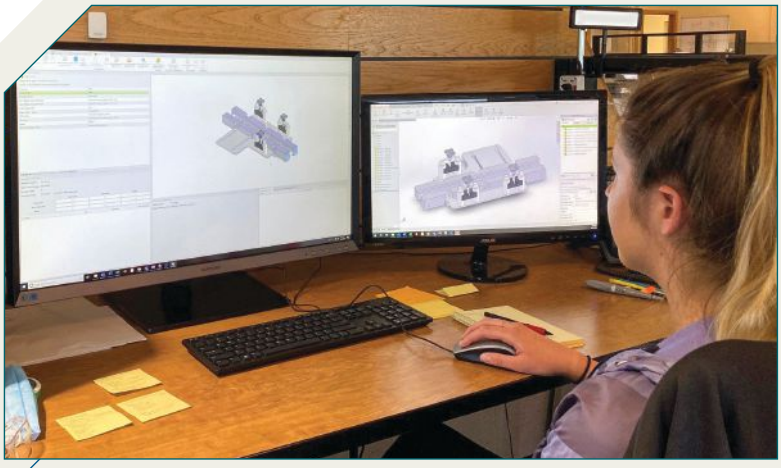
- How much do you spend on tooling per machine per month?
- What's the average remaining tool life when changing a tool?
- How many parts are scrapped when a tool fails (break or wears)?
- What is the average cost of a part?
- What's the average downtime (hours) from tooling issues per machine per month?
- What's the hourly billing rate of a machine?

**Machine Metrics / 844-822-0664 / machinemetrics.com**

## ADVERTISERS' INDEX

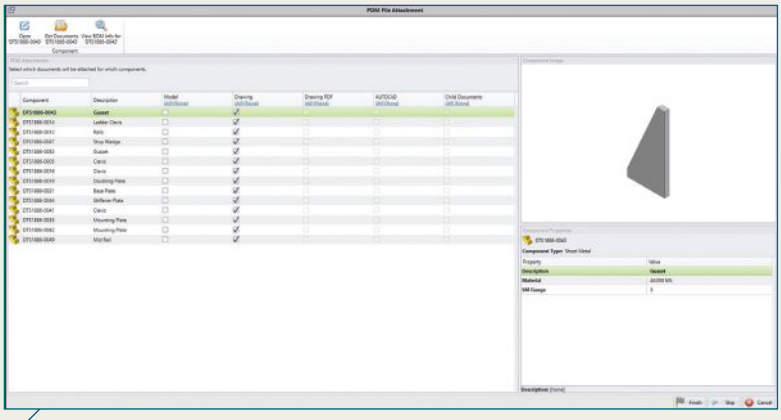
SOFTWARE

# How to Use Engineering-Centric ERP to **Keep Up with Constant Changes**



Images courtesy of Counterpart.

Automation for ETO moldmakers ensures highly paid engineers with unique skillsets are more productive.



An example of an automatic file attachment provided by CAD/CAE software with PDM, which identifies files that need adjustment.

By Andrew Schutte

The engineer-to-order (ETO) manufacturing process means engineers are continually making new and different components (as opposed to high-quantity manufacturing). For example, mold builders who produce one-of-a-kind molds require solutions designed explicitly for streamlining workflow.

When looking to streamline the engineering to production flow, new assemblies with many shared components (yet never the same) are ideal. For mold builders using CAD/CAE, integration is vital, and even more robust, if paired with product data management (PDM). Synchronizing CAD/CAE and ERP data in real-time ensures that production, purchasing and engineering are continually aligned. Failure to synchronize a fully-integrated ERP solution can introduce human error. This critical synchronicity is especially crucial because engineers continue working on updated designs.

Here is an example of the complexity of the engineering-focused process for a custom moldmaker:

- Project design is finalized, approved by the customer and manufactured.
- The customer requests an updated design, which requires an additional slide.
- The engineering team must know and communicate with purchasing and manufacturing what parts were changed (and stop manufacturing the older version).
- Change the design, gain approval and communicate with purchasing and manufacturing the specific added, removed and updated components, typically a manual process prone to error.
- Once a mold enters manufacturing, provide the correct version of the CAD.

This approach demonstrates the hours of duplicate data entry for engineers, resulting in a considerable waste of time and possible production disruptions due to revision discrepancies. Mold engineers using CAD/CAE alone are challenged to create and maintain ERP data. Effective integration of ERP into CAD/CAE software is vital. Data integration allows engineers to drill into the bill of materials (BOMs) and item level discrepancies for each model.

Automation for ETO moldmakers ensures highly paid engineers with unique skillsets are more productive. Contemporary ETO ERP solutions reduce the routine work so that experienced engineers design better molds and quote more business. Automating nonvalue-added functions guarantees increased productivity and profits. MMT

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Andrew Schutte, General Manager

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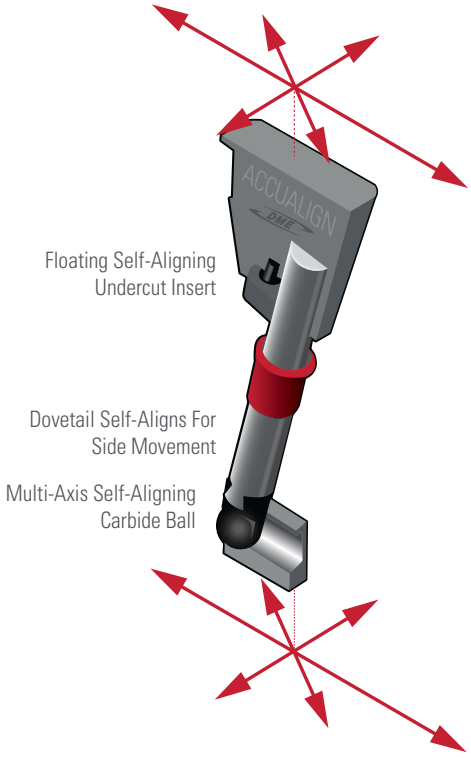


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