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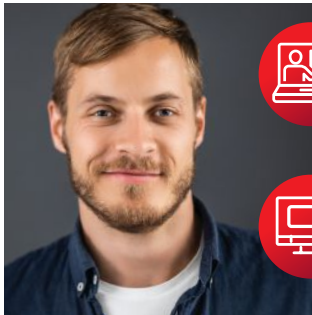


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Using Servos and Sensors to Advance Process Control - 22

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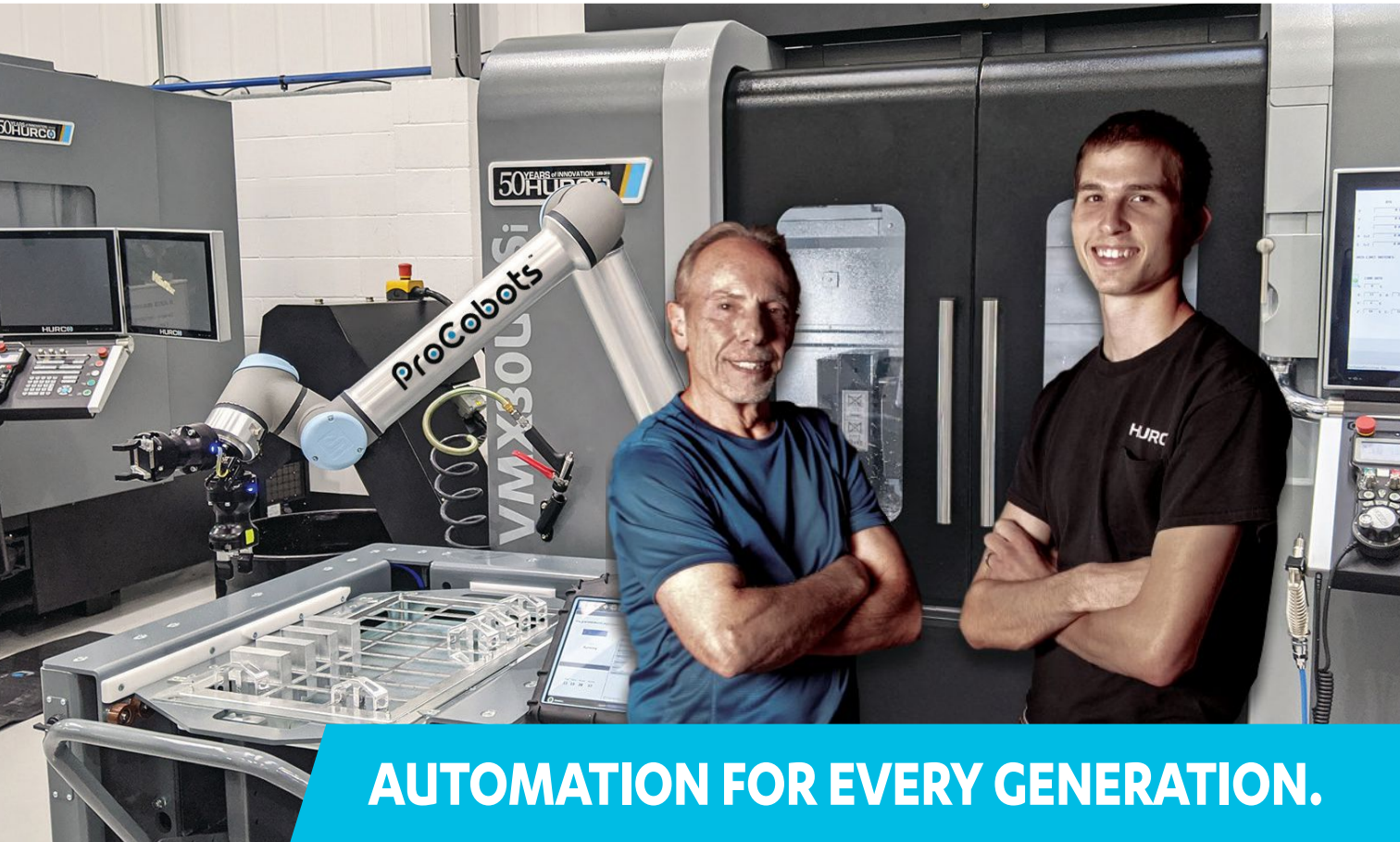
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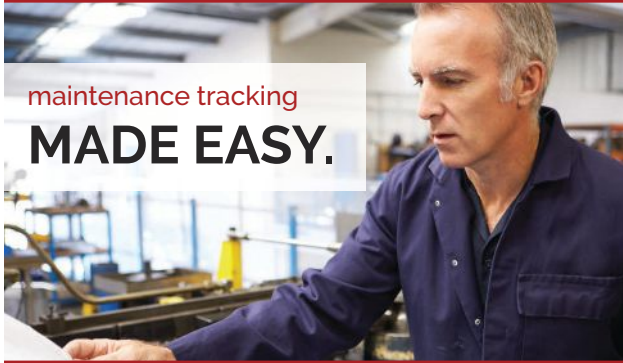
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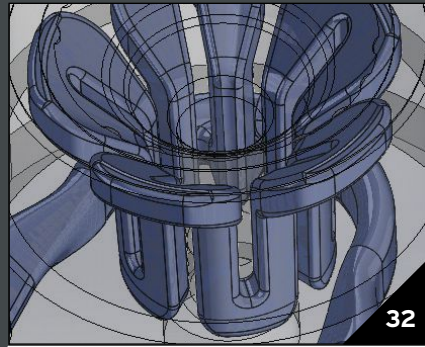
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The proof is in this winning shop's three-pillar value proposition and a three-phase growth plan that empowers people while promoting quality product and profit.

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The True Power of Servo Valve Gate Technology

A servo and sensor combination that makes the mold the machine presents opportunities to advance process control.

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Robust External Plate Controllers Solve Ejection Problems

Innovative, robust external synchronized plate controllers solve ejection problems on molds at 3D Tech, reducing time, complexity and effort.

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Where Cycle Time Hides

Difficult-to-cool areas of a mold cost cycle time, making the perfect application for additive tooling, including retrofitting an existing tool with lifters, slides and high wear areas.

38 Business Management

Tax Reform for Mold Builders: 30 Months After Enactment

A review of the impact that the Tax Cuts and Jobs Act of 2017 has had on mold builders over the past two years.

5 TRICKS OF THE TRADE Great Tips from This Issue

1. New Way Forward

Technology advancements as a result of a multiyear investment plan have changed the lead man's role at Precise Tooling Solutions to that of an orchestra conductor.
PG. 10.

2. Open the Gates

With servo valve gate technology, the user can cut tonnage in half by only pushing where you need to push or not applying full pressure to all of the cavities.
PG. 22.

3. External Control

Avoid homemade approaches with hydraulics and costly sensors. Instead, control external synchronized plates in the Z-axis with fully mechanical external plate controllers.
PG. 28.

4. Drive Design

Part design drives many mold elements, so design in fixed areas, such as parting lines, cores and sub inserts. Once those details are fixed, evaluate where cooling is required and add circuits that achieve the most efficiency.
PG. 32.

5. Tax Toll

Mold shops that are taxed as C corporations and were subject to the AMT in prior tax years should evaluate which tax years to have refunded, as other provisions in the CARES Act may impact their decisions.
PG. 38.

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ON THE COVER

Cover photo courtesy of Precise Tooling Solutions, Inc. The COVID-19 pandemic prevented an onsite team group photo at this year's Leadtime Leader winning shop, but that didn't stop us from featuring the most important component of this specialty manufacturer: the people. Located in central Indiana, Precise Tooling Solutions serves the automotive, consumer goods, aerospace, medical device and defense industries. Their talented craftsmen are recognized for expertise in building tight-tolerance optical lighting and thermoset molds, as well as their experience managing large, complex CNC projects. Precise Tooling's state-of-the-art facility includes the latest five-axis and EDM technology as well as leading-edge ERP, CAD/CAM and CRM software. See related feature on **page 10.**

Images courtesy of (left to right) HRSflow, 3D Tech and DENSO Manufacturing Michigan.



VIDEO ACCESS

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Our 2020 Winner Is...

Precise Tooling Solutions



Congratulations!!

Each year, the moldmaking industry recognizes excellence in mold manufacturing with *MoldMaking Technology's* Leadtime Leader Award. It's not just about being the shop with the shortest delivery times. It's about what you do with what you have. And this year's winner does a lot with what it has!

Precise Tooling Solutions has a complete outlook on being a Leadtime Leader, from its diversified business model, highly specialized work, talent and machines and use of technology to

increase efficiency to its IT strategy, marketing initiative, customer surveys and industry involvement. The Precise Tooling Solutions team is on the continued path to success. Here are some of this winner's standouts:

- Seasoned consumer goods and medical device industries executive at the helm since 2013
- A diversified business model with four complementary business units
- A shift from technology investment to operational execution (data-driven principles)
- Deep experience building thermoset tools and complex molds for automotive lighting customers
- Focus on mold repair and engineering changes and CNC machining
- On-time delivery consistency and low level of rework
- Efficiency gains by optimizing CAD/CAM technology with regard to current equipment
- Capabilities of Roeders and Fermat five-axis machines fully realized due to unified CAD/CAM software; also minimizes need for EDM
- On-site quality lab and cloud-based advanced ERP
- Data-driven methodology in measuring customer satisfaction
- Integrated digital marketing strategy, new website with RFQ feature and social media presence
- An average age of 42 and vocational program with local high schools
- Involvement with AMBA to reinstate the 25% tariff on Chinese molds

"It is a huge thrill for Precise Tooling to win what I consider to be the most coveted award in the industry. It's not far from winning a gold medal at the Olympics. To be recognized by a team of subject matter experts as one of the elite companies is truly an honor that we will always hold dear. It proves to an outside organization that we are an industry leader, and we can't be thankful enough," Don Dumoulin, CEO and Owner, Precise Tooling Solutions says.

You can "meet" this 2020 Leadtime Leader Winner online during Amerimold Connects—our answer to keeping the mold manufacturing community connected during the COVID-19 crisis. The live awards ceremony is taking place on June 10, 2020, at 3pm EST. Register for free today to attend and celebrate this year's Leadtime Leader winner with us! [MMT](#)

Christina Fuges

Christina M. Fuges
Editorial Director

Follow MMT on: Follow @MMT_ChristinaF

THIS MONTH ON moldmakingtechnology.com



VIDEO: Meet Our 2020 Leadtime Leader Winner: Precise Tooling Solutions

MoldMaking Technology Editorial Director Christina Fuges sits down (virtually) with some team members from Precise Tooling Solutions to break down key facets of the business that helped this shop gain our 2020 Leadtime Leader title. short.moldmakingtechnology.com/2020LLA

BLOG: Being Connected to Community and Customers During COVID-19

Mold manufacturers and suppliers have both day and night jobs when it comes to helping both their customers and local communities during the coronavirus pandemic. Here is one mold component supplier's story.

short.moldmakingtechnology.com/ProCompCOV



WEBINAR: Supply Chain Lessons from COVID-19

Gardner Business Media and the Reshoring Initiative have come together to deliver a four-part paid webinar series on strengthening supply chains by sourcing parts and services locally.

short.moldmakingtechnology.com/SupplyWeb



EVENT: Amerimold Connects

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2020 Editorial Advisory Board: James Jergens

By Christina M. Fuges

The next member of our new Editorial Advisory Board is James Jergens. James is currently the operations manager for Ernie Green Industries, a medical and automotive injection molder with nine manufacturing sites across the U.S. He is fiscally responsible for managing all aspects of product development and injection mold procurement.

James grew up helping out in his father's shop, aspiring to be a mold designer. He attended high school, spending two years at a joint vocational school for industrial drafting. Once he became a lead designer, he pushed his father's company into CNC and 3D mold design. In his mid-20's he started his own design company while working a night job at Delphi as a tool designer.



James Jergen, operations manager for Ernie Green Industries, is one of MMT's new Editorial Advisory Board members.

After three years, he closed his business and worked for several industrial and automotive injection molders. He gained a lot of experience with high temperature and engineered resins. During this time, he was responsible for building tools and providing support from quote to part qualification.

In 2005, James gained a new business partner and launched Global Source Manufacturing, which focused on sourcing injection molds and progressive dies from low-cost countries. After selling this business

to a venture capital group, James moved on to a tier one automotive company as a purchasing manager, responsible for finding and sourcing tools domestically and internationally.

After two years, he added the tooling operations manager to his role, which he holds today. By using a new leadership method, he has helped to increase efficiency with existing equipment and grow profit substantially.

James is trained in CAD/CAM, CMM, quality system management and lean manufacturing. He holds several patents, including one for the plastic cross-car beam for the mid-90s Grand Am. His area of expertise includes shop management, as well as product design and development through to mold development and part qualification.

Over his EAB term, he hopes to mentor the next generation on how to build molds using science and good leadership methods that drive profit and sustainability. He also wants to learn more about moldmaking from other experts and get acquainted with other industry leaders. [MMT](#)

FOR MORE INFORMATION

Ernie Green Industries / 614-219-1423 / egindustries.com

EDITORIAL ADVISORY BOARD (EAB)

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

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

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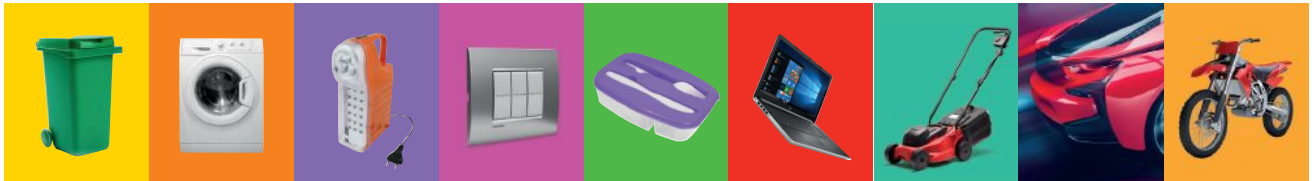
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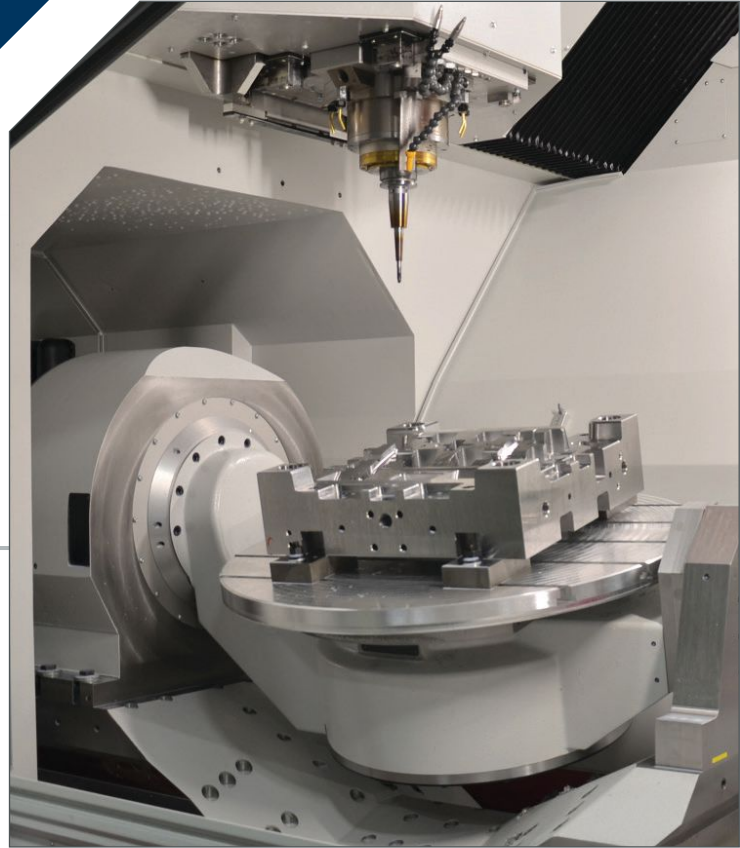
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AWARDS



Injection Molds | CNC Machining | Ergonomic WorkStations



Precise Tooling Solutions – The Power of People and a Plan

The proof is in this winning shop's three-pillar value proposition and a three-phase growth plan that empowers people while promoting quality product and profit.

“It's all about the people,” Don Dumoulin, CEO/Owner of Precise Tooling Solutions Inc. says. And by people, he means the employees and the customers.

Vision Statement: We will build upon a talented team, cutting-edge technology, and superior efficiencies to deliver only the highest quality products to delight our customers while continually increasing profitability.

This vision statement focuses on people, customers and making money. “We have to do everything we can with our people, customers and technology to make sure that we have a successful bottom line,” Dumoulin says. That is why he describes the Company's value proposition as having three pillars: on-time delivery, world-class craftsmanship and a fair price. “You're always going to get on-time delivery with us. In fact, last year our on-time delivery was north of 98 percent. And, you are always going to get world-class craftsmanship and a fair price,” Dumoulin says.

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



Images courtesy of Precise Tooling Solutions.

High-speed five-axis mills like this Roeders are used to achieve the dimensional accuracy which is key to thermoset molding. The Precise Team understands the complex geometries and unique construction requirements, enabling them to deliver flash-free thermoset tools that go straight into production.

The major benefit of five-axis machining is the ability to mill highly complex shapes in a single setup. This game-changing technology means Precise Tooling's customers receive unprecedented precision and shorter lead times.

The key to living up to these expectations is knowing who you are. Dumoulin emphasizes that Precise Tooling is not a tool shop. Instead, it's a specialty manufacturer with four business units under one roof: new injection mold building focused on tight-tolerance optical lighting and thermoset tools; mold repair and productivity improvements on tools currently in production; managing large and complex CNC machining projects; and building custom ergonomic workbenches lift bases for assembly and material handling applications. This diversified business model is pretty unusual compared to most tool shops.

"Building new plastic injection molds is the largest of these business units, but the tool repair service, CNC and ergonomic table businesses give us four strong and profitable legs to stand on, which helps us weather any storm," Dumoulin says.

However, when push comes to shove, moldmaking is his priority. The company has dedicated teams for each of the business units, and cross-training allows leadership to pull resources for tooling projects as needed. "We're good at utilizing our resources the best we can, and we know how to build a really good tool. I like to tell prospective customers that we don't know how to make a cheap mold," Dumoulin says.

Dumoulin talks about how tool complexity in the injection molding industry ranges from plastic spoons and forks to complex thermoset lighting and medical devices. It is a broad spectrum, and they provide engineering changes and repair services on the entire range. That said, a significant portion of the new tools built are destined for automotive lighting companies, especially those launching LED products. "We have a specialty in automotive lighting, as we build and repair tooling for 75 percent of the companies in America that provide the vast majority of the lighting parts in the automotive industry," Dumoulin says.

The company's reputation as a top-flight builder of thermoset molds is well-deserved.

They understand the complex geometries and unique construction requirements and use the latest five-axis mills to achieve the dimensional accuracy that is key to thermoset molding. This approach allows them to deliver flash-free thermoset tools that go straight into production. In fact, one of their Tier 1 customers recently told them: "hands down, you guys build the best thermoset lighting tools we see."

For 2019, Precise Tooling reported 5% sales growth, a first pass quality rate of 94.6%, average on-time delivery rate of 98% and average lead times that range from one to 12 weeks depending on the type of project.

Knowing Your Roots and Adding Value

Known initially as Precise Mold, the company has been designing, manufacturing and repairing injection molds for more than 33 years. The company started modestly with a handful of employees who wanted to apply their mold industry knowledge to the process of making better molds. Slowly but consistently, the company grew in both size and reputation by building high-quality tools and repairing production molds quickly and at a competitive price.

Dumoulin, a seasoned executive from the consumer goods and the medical device industries, purchased the business in 2013 after a short-lived retirement. "I was looking for an opportunity where I did not need to manage the day-to-day tasks. My skill set is corporate finance, leadership and strategy. I wanted to invest in something that needed those skills. I wanted a business where I would be value-added," Dumoulin says.

Precise Mold was perfect. The company had plenty of experienced craftsmen doing what needed to be done to grow the business. Still, they didn't have a growth platform, a strategic

I believe in people, and when you fully trust people, it empowers them. You have to build a team and give them power. Give them the runway.

2020 Leadtime Leader Award: Winner

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Precise Tooling Solutions

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Email: info@precisetooling.com

Leadership

Don Dumoulin, *CEO/Owner*
Josh Jeffries, *Director of Manufacturing*
Brian Rose, *Tool Productivity Program Manager*
Ben Rooks, *New Tooling Program Manager*

Tiffany Laker, *Finance & Office Manager*
Ron Kraft, *CNC Program Manager*
Erica Whitby, *Director of Sales*
John Rowe, *ErgoSmart Program Manager/ Director of Marketing*

Metrics

- Annual Sales: under \$10 million
- No. of employees: 34 craftsmen + independent sales representatives
- Average age: 42 years
- Main facility: 29,000 square feet
- Average on-time delivery: 98% in 2019 on 1,285 Projects
- 100% Customer Referral Rate in 2018, 2019 & 2020
- Lead times: 12 weeks for New Tooling & Engineering Changes; <1 week for CNC Machining, Mold Repair & Productivity Improvements; 5 weeks for Ergonomic Lift Tables
- Annual Project Mix
 - 30-50 New Injection Tooling Projects
 - 350-400 Mold Repair and Productivity Improvement Projects
 - 500-600 CNC Machining and Plate Projects
 - 75-100 ErgoSmart WorkStation and Lift Table Projects

End Markets

- Automotive
- Consumer Goods
- Aerospace
- Medical Devices
- Defense Industry
- Assembly & Material Handling

Capabilities, Products and Services

Precise Tooling Solutions is a specialty manufacturer in Columbus, Indiana, that designs, builds, and repairs injection molds. The Company has expertise with optical lighting molds and thermoset tooling, manages large and complex CNC machining projects for multiple industries, and builds custom-built ErgoSmart adjustable-height workbenches and lift bases for assembly and material handling applications.

Equipment (highlights):

Five-Axis and CNC

- Roeders RXU 5-Axis 1001 High-Speed Mill; Roeders Control 30,000 1760 31.5 x 33.7 x 19.8 30 300 psi
- Fermat WHN 5-Axis 13.8P Large Boring Mill; Heidenhain Control 3,000 26,460 157.5 x 78.5 x 28.5 x 49.0 49.5 300 psi
- Johnford 3100SH Vertical Bridge Mill; FANUC Controls, 6,000 rpm spindle rate, 22,000 lb capacity, travel 120 x 69 x 31.5; 1,000 PSI through-spindle coolant
- Makino Vertical Mills (2): Leblond & SNC 64
- Haas Vertical Mills (3): VF 3, VF8, VF11

Software

- Shoptech's E2 cloud-based ERP
- Autodesk CAD/CAM: PowerMill, PowerShape, Fusion360
- Mastercam CAD/CAM: Mill, Wire, Design, SOLIDWORKS
- HubSpot for Marketing, CRM, Sales Pipeline, Website Hosting & Integrated Digital Media

EDM

- Mitsubishi MD Pro II Wire EDM; Mitsubishi Control 1100 27.5 x 21.7 x 8.4 tank, 12.6 x 9.8 x 8.6 travel 50 amp N/A
- Mitsubishi ea28V Sinkers EDM; Mitsubishi Control 5 4,500 43.3 x 31.9 x 17.7 tank, 25.6 x 17.7 x 17.7 travel 100 amp 10 psi

Sampling Molding Presses

- Nissei FN 7000 Sampling Press: 400-ton capacity; 25 oz. barrel; 28.9 between tie bars; 41 x 41 x 45 travel
- Millutensil Blue-In Spotting Press: 32,000 98.5 x 65.5 x 65.5

Specialty Equipment

- Blanchard Surface Grinders (2): 84" diameter and 42" diameter
- Faro Inspection Arm
- Owned Fleet of Trucks

These are just a few of the faces of the Precise Tooling team from the front office to the shop floor who are integral to this specialty manufacturer's continued success.

plan or leaders with the right responsibilities. Dumoulin's skill set was a perfect match. "It's really about the people. I'm additive to that," Dumoulin says.

In the seven years that followed, he used a strategic approach to make significant investments, including adding an ERP system, state-of-the-art machining technology and new software enabling Precise Tooling to meet customer expectations for high quality at a fair price. He also acquired the ergonomic equipment business, which prompted a decision to rebrand the company in 2017 as Precise Tooling Solutions.

Leading People and Creating Culture

What makes Precise Tooling unique is its 36 employees from the front office to the shop floor, and that is what motivates Dumoulin each day.

"I believe in people, and when you fully trust people, it empowers them. I truly don't run the shop. I didn't come from a tooling background. So, I give people the authority and the ability to make the right decisions. You have to build a team and give them power. Give them the runway," Dumoulin says.

Part of building trust is transparency. Dumoulin has always been a big believer in each employee knowing the impact he or she has on the work done in their group and across the company. This level of understanding requires metrics such as revenue, profitability, costs, projects that make money and projects that lose money.

"Unless people truly understand how they impact the company, they are rudderless," Dumoulin says.

So, he provides full transparency to the entire organization. Dumoulin holds town hall meetings throughout the year with all the craftsmen and provides information about the company's key financial metrics. He gives the four general managers individual P&L statements, so they each know precisely the amount of money they're making off every



Ben Rooks



Jacob Boyd



Chris Watson



Brett Barrett



Joel Collier



Erica Whitby



Charles Kinman



Ron Kraft



Tiffany Laker



Josh Jeffries

project and the performance of the business unit for which they are responsible. And, the eight-person leadership team meets every month to go through detailed financial reports.

Dumoulin strives to do the right thing by his people and take care of not only the individuals who walk through the door every day but the families, too. He believes that a happy employee is going to do a better job, make a better tool, make a better table, make a better CNC project, and that is what matters to the customer. “My job is to make sure that we’re

financially stable, that we’re making the right capital investments and that our customers are delighted in the work they get from us,” he says.

Achieving Operational Excellence

Speaking of capital investments, when Dumoulin came into the picture, the company had a long relationship with a couple of automotive lighting companies. However, Precise Tooling was falling behind the technology curve relative to the evolving



Precise has a separate business unit that provides Tool Productivity services such as engineering changes, preventive maintenance, productivity enhancements and emergency repairs on tools, including those built in China. Shown here is a repair project for a mold used to make biodegradable spoons.



Precise Tooling builds a broad spectrum of tooling, but the majority of its new tools will be for automotive lighting companies, especially those launching new LED products.

needs of those customers, so they were about to lose the business. “That’s when we upped our technology game to move back to the forefront of the moldmaking industry,” Dumoulin says. He implemented a three-phase plan.

During Phase 1 (2013-2015), the company transitioned to a more sustainable business model. They installed an ERP system, created a digital environment and layered on an ISO certification so that they had a quality language to talk about across the organization.

“These were gut-wrenching changes for our craftsmen who were used to writing down their hours on a piece of paper and handing it to the administrator. And working whatever hours they wanted to on a project without a goal in mind—in terms of

Enhancing customer productivity is why we exist, and exceeding customer expectations is at the core of our culture.

how much money we were going to make on that tool,” Dumoulin says.

Phase 2 (2015-2017) was all about upgrading equipment. “We doubled down and invested in the latest and greatest technology,”

Dumoulin says. Their purchases included their work-

horse, a five-axis FERMAT machine that efficiently manages large projects with complex geometries. They also took delivery of one of the few five-axis lens-quality Roeders mills in the Midwest.

The team focused on software analysis in Phase 3 (2017-Present). They looked at the software the shop was running, programming and executing, and how they managed IT and cybersecurity. “We are currently migrating to a unified software approach. We are shooting for an integrated software platform that ties everything together from design through final product fabrication,” Dumoulin says.

Collectively, Precise Tooling invested nearly \$4 million on new five-axis and EDM technology during Phases 2 and 3. This level of investment brought in new people who learned new skills, which has made the company a stronger, more cost-competitive manufacturer, according to Dumoulin. “Our largest customer told us recently they previously had 12 tooling vendors; they’re now down to five, and we’re one of them. That’s a good spot to be in.”

The result of this multi-year investment plan was profound. Precise Tooling changed the way it produces molds. “The old way of building molds where a lead man manages the whole process, including building the mold, doesn’t work anymore. Technology advancements—including five-axis machining that produces inserts at net shape, reducing the need for polishing and EDM, and decreasing blue-in time from 30 hours to two hours—have changed the lead man’s role to that of an orchestra conductor instead of the guy doing all the work,” Dumoulin says.

Precise Tooling has pivoted its operation to this new manufacturing method, which is keeping workers longer with less strenuous work, while taking significant time out of the production process and reducing manufacturing costs. Their next round of technology investment will likely include EDM automation.

Driving Savings with Advanced Technology

Precise Tooling’s lead times prove the team’s dedication to customer service and commitment to advanced technology and processes. Director of Manufacturing Josh Jeffries has a handle on the team and the arsenal of new technology, which has taken this specialty manufacturer to the next level.

For example, upgrading the core operating software that runs the majority of the CNC machines with Autodesk PowerMill and PowerShape has dramatically improved cutting cycles and shortened lead times for both new tooling and mold productivity projects over the past year.

“The new software enabled us to better understand new ways to optimize machining precision and surface quality on our most complex tooling projects,” Jeffries says.

In 2019, Precise Tooling expanded its software partnership with Autodesk with the implementation of Fusion 360, which unified design with manufacturing. “This meant our craftsmen could go from design to machining faster,” Jeffries says. Autodesk was so impressed, they sent a videographer to capture how Precise Tooling operationalized the software. That footage is now featured within Autodesk’s employee training program and their website marketing content.

Advanced machining technology always shortens lead times and improves quality, as proven by Precise Tooling’s newest machine, a Roeders RXU five-Axis 1001 mill. Along with new fixturing, they use this high-speed machine has given the company the best bang for its buck. They went from multiple setups for parts that have milling on each side to one setup, according to Jeffries. But it’s the mold surface finish that is of the utmost importance when it comes to their lighting molds. “A test part on the Roeders shaved 80 hours off our polishing time,” Jeffries says.

Advanced five-axis machining capabilities allows Precise Tooling to pick up optical insert work and work on projects in the LED lighting space they would not have been able to do before. “Light pipe technology advances so fast, forcing us to keep up with technology. As tool complexity grows, we have to evolve with it,” Jeffries says. “We’ve also eliminated about 25-30 percent of our EDM work for new tooling.”

Jeffries had to mention the team’s other workhorse, the Johnford 3100SH vertical bridge mill. This machine is used in all four of Precise Tooling’s business units because of its wide work area and ability to both rough and accurately finish a mold. “It has unmatched diversity,” Jeffries says.

The next step is software to automate the programming for the CNC and EDM areas, which will help Precise Tooling optimize machine runtimes.

“With our new machine technologies, we’ve chipped away at our blue-in times as much as we have our polishing times. Blue-in time would run 80 to 100 hours, and now we see 10 to 20-hour blue-in times, depending on mold complexity,” Jefferies says. The Millutensil blue-in spotting press has proved very valuable to the repair side of the business.

When it comes to inspection, Precise Tooling tailored its technology and offerings to customer needs. “We use a FaroArm with surface plates to inspect parts, which minimizes cost for our customers and ensures that their parts are checked according to their requirements. For anything more than that, we subcontract it out. The versatility of the FaroArm is key. We can pull it from its stand and then inspect on the machine,” Jefferies says.

Enhancing Production Molds

The decision to update the company’s name in 2017 was deliberate. New tooling services had been introduced in recent years, and long-tenured customers had always been quick to call Precise when problems arose. So, it seemed entirely appropriate to rebrand themselves as Precise Tooling Solutions.

Nowhere is that more appropriate than the company’s Tool Productivity business unit. It currently represents about 30% of top-line revenue and continues to grow at a healthy clip. Other tool shops often label this area ‘Repair & Maintenance.’ Precise



Precise Tooling’s Mold Productivity Unit services molds of all sizes and complexities, from small cable lock parts to large truck headlight housings. This unit represents about 30% of its overall revenue. A dedicated team of productivity specialists proactively reach out to customers about scheduled shutdowns, and they work around the customer’s schedule to evaluate mold surfaces, make engineering changes or conduct preventive maintenance.

Tooling takes a more holistic view, as the craftsmen assigned to this business unit provide a wide range of services such as engineering changes, preventive maintenance, productivity enhancements and emergency repairs. And not just on the tools they build.

Brian Rose is the program manager for tool productivity. He’s responsible for issuing Tool Productivity quotes and serves as the quarterback on most non-routine projects. “I like to get all hands involved at the very beginning of a project,”

Rose says. “That way, everyone knows up front what the customer expects, what the team needs to accomplish, and each craftsman’s specific role in that process.”

It is hard to find an engineering change or productivity improvement someone on this team hasn’t seen before. Experience matters, and it’s a challenge to maintain the collective experience as the more



CNC machining of plates has grown steadily over the past 10 years. A team of long-tenured craftsmen have seen virtually every kind of project imaginable and love to manage complex CNC projects other shops won’t tackle.

2020 Leadtime Leader Award: Winner

Crisis Management: Getting Ahead of the COVID-19 Impact

"I sleep like a baby most evenings, but when this virus hit and I heard that the governor was going to shut down businesses, I had a few sleepless nights," Precise Tooling Solutions CEO/Owner Don Dumoulin says.

At the end of the day, he had a meeting with his team about developing a plan in case of a shut down and spoke with customers about the potential impact of a shutdown. Then he took some time to decide whether he was going to shut down. The decision revolved around three things: employee safety, customer needs and the company's financial health. Dumoulin walked employees through his thought process, and quickly decided that by implementing common sense protective measures they could protect employee health, allowing them to move projects forward and keep the company healthy.

"The decision was about us doing the right thing," Dumoulin says. On March 16, Precise Tooling Solutions sent an email to all customers detailing the protective health measures it was taking and emphasizing that it was still open for business but down to a four-day work week. The following excerpt details five specific actions:

1. Employees who are sick are instructed to stay at home. While we have no current indication of exposure within our team, if the coronavirus does strike, we are prepared to minimize the impact.

2. We implemented a social distancing plan inside our facility with our team staying at their machines or workstations. Internal communication will be handled by text message and cellphone discussion. Face-to-face meetings are being significantly limited.

3. Our facility has been closed to guests and customers. Incoming deliveries will occur outside the building and all incoming mail, packages and deliveries are being sanitized before entering our facility.

4. To protect your employees, all outgoing shipments are being sanitized.

5. We are equipped to conduct video conferences for project updates and provide video demonstrations of any processes you want to see.

A follow up email was sent to customers a few days later, reiterating that the shop is still operational and still taking the utmost care.

seasoned craftsmen transition to retirement or part-time roles. Rose explains it this way, "we're picky when we screen potential hires. We want them to have some level of hands-on experience, but we also want them to be open to how we train new craftsmen. That's why we pair new hires with a more experienced person who can teach critical thinking and problem-solving skills and do so while managing a live customer project."

Rose likens his team's approach to the current coronavirus environment. "Above all, our group needs to be adaptable. Things can change quickly, especially with lead times, so we have to stay on our toes."

Streamlining Scheduling and Working in the Cloud

Five years ago, Precise Tooling implemented an on-premise ERP system that proved to be transformative. Shoptech's E2 took Precise Tooling from a paper-intensive environment with

spreadsheets and sticky notes to an all-encompassing project management software that provides what-if modeling for planning productivity.

Then in 2019, Dumoulin decided to transition to a cloud-based version of E2, which eliminated the need for servers and hardware in the facility. It also meant that the vendor was now responsible for security, maintenance, upgrades and issue resolution.

Cloud-based deployment provides Precise Tooling flexibility. "It allows us to add features at any time without having to purchase new software. The user experience is intuitive, too. Users access the E2 via secure internet connection in our facility, from a customer's facility or anywhere else. Also, users have complete functionality from computers and mobile devices," Dumoulin says.

Then there is the enhanced process for exchanging large data files with tooling customers. Mold design files are typically too large to send via regular email. Plus, email transmittal poses an additional risk of data loss. In 2019, Precise Tooling transitioned to OneDrive for transferring large data files. OneDrive is fully integrated with other Microsoft cloud-based applications that Precise Tooling and many of its customers use.

"E2 helps drive the shop. It is the backbone of planning jobs from order entry," Jefferies says. Before E2, the team would jump around a lot when machine scheduling and trying to mesh departments, which destroyed machine efficiency and communication across the shop. With E2, all the employees can see a problem before it gets to them. Plus, E2 helps forecast delivery times and provides a plan to stay on time.

"Six years ago, I spent all day, every day just manipulating the schedule for the shop and making sure things were moving correctly. Today with E2, no one needs to manipulate schedules. The process of writing up and entering an order takes about 30 minutes, and then it's automatically scheduled. Now we just monitor a job," Jefferies says.

Precise Tooling's data tracking is also managed within E2. E2 records quality mistakes and offers a searchable database of mistakes, which helps with the shop's monthly quality review meetings. Jefferies notes they looked at investing in machine monitoring last year, but because he was able to use E2 to machine monitor and yield significant gains, he decided to forego investment in machine monitoring software.

Migrating to cloud-based ERP offers significant IT security advantages, too. Shoptech partners with Google Cloud, a pioneer in server security who operates three redundant data centers in the U.S., mitigating concerns about server downtime.

Listening to the Customer

"Enhancing customer productivity is why we exist, and exceeding customer expectations is at the core of our culture,"



Interestingly, Precise Tooling uses several of their two-lift post ErgoStations or four-lift post ErgoBases in the workcells where craftsmen assemble ergonomic equipment ordered by customers. The company markets the ErgoSmart brand to a wide range of industrial buyers.

Dumoulin says. So, how do they know they are doing a good job?

That's the job of John Rowe, who does double duty as the company's marketing director and ErgoSmart program manager. Since 2013, Precise Tooling issues a survey for all projects for every client. They send survey invitations to multiple contacts for every project invoiced during each survey period. They use Survey Monkey to administer the survey. It has 18 simple questions and takes about two minutes to complete from either a desktop computer or a mobile device. Four of the 20 questions have been included in every survey and form the core of the survey. Knowing that many survey respondents are long-time customers, Rowe believes that responses to these four questions provide valuable longitudinal data about current and emerging trends.

For example, respondents are asked to identify the top three selection criteria when looking for new suppliers. "It's fascinating; if you look at the results over the last six years, lead time was not in the top three for the first couple of years. Fast forward to today, and lead time has been the number one ranked criterion in the last three surveys," Rowe says. "Another key question asks if Precise Tooling is easy to do business with. Everybody's busy these days, and we think that if we can be easier to work with, we're going to win more than our fair share of new business."



The adjustable-height workstations and machine bases can be adapted to hundreds of manufacturing applications. Here is an adjustable-height welding table, complete with a platen that rotates 360 degrees in both directions.

Precise Tooling also provides a year-over-year comparison of 15 dimensions of customer satisfaction. After each survey, they share results with their customers and post a summary on their website that is available to everyone. “Our survey results confirm that customers are willing to pay for world-class craftsmanship, so long as it’s a fair and competitive price,” Dumoulin says.

Lastly, they publish on-time delivery performance metrics each month on their website, highlighting their commitment to transparency, which applies to marketing as well as to culture.

Managing the Brand

What good is all of this work if no one knows about it? Rowe set out to redefine customer service and marketing for a mold manufacturer because “although we invest in manufacturing technology, software and digital marketing, at the end of the day, our customers view Precise Tooling as a high-touch service provider.”

To set things in motion, Precise Tooling licensed HubSpot software in 2015. HubSpot is a cloud-based software suite for the entire front office of an organization—including sales and marketing, web hosting, search engine optimization, social media, blogs, outbound e-mail marketing, public relations, as well as press management and proactive customer communication. HubSpot also houses Precise’s customer contact data, company information and detailed quote data within a relational database is literally the hub to all Precise Tooling’s digital marketing programs. What makes this

My job is to make sure that we’re financially stable, that we’re making the right capital investments and that our customers are delighted in the work they get from us.

incredibly valuable is its sophisticated data analytics that provides real-time, end-to-end management of all sales, marketing and customer service processes.

“E2 is our manufacturing software. Think of HubSpot as the integrated software

where everything we perform during the sales and marketing processes is digitized and archived, then handed off to E2 when the PO arrives. For example, a program manager creates a quote and issues it to a customer contact directly from the contact database in HubSpot. And he’s able to see all quotes we previously issued to each location and each contact at that customer. So, at a macro level, this software application provides our leadership team with full visibility of each business unit’s quote pipeline. Not only that, we use

HubSpot’s real-time analytics to monitor quote volumes, win ratios, average quote size, etc. It’s enormously powerful,” Dumoulin says.

HubSpot servers are used for all broadcast communications, also. Precise Tooling has roughly 6,000 contacts in its contact database, each of whom is categorized based upon his or her product interest. This data set allows them to send targeted communications to subsets of their contact database, such as contacts interested in tool repair or ergonomic equipment. HubSpot’s embedded analytics provide open rates, the number of people who clicked or downloaded information and how much time was spent reading vs. glancing at the email.

“Our average open rate on broadcast emails is over 20 percent, which is high for any industry. We’ve been very successful in finding the right balance between type and frequency of information. And, we have tripled the size of our contact audience in five years,” Rowe says.

Precise Tooling recently retooled its website, too. It was relaunched late last year with an updated design and intuitive navigation system, as well as an expanded resource center with an RFQ feature, white papers, case studies, spec sheets, trade press articles, high-resolution photos of recent projects and several short video clips.

Additionally, Precise Tooling ‘soft-launched’ an online store in late December for its ergonomic workstations and lift tables on Amazon Business, which is a new and exciting distribution channel for the company.

Entering New Markets

Precise Tooling acquired the ErgoSmart business in October 2016 from a provider of plastics joining machines that started making ErgoStations as adjustable height tables and lift bases for their plastic joining machines. After 15 years, the previous owner ran out of space to manufacture the tables and, instead of expanding, decided to sell this portion of the business and focus solely on their top-of-the-line plastic joining machines. Don saw this as an opportunity to strengthen Precise Tooling’s brand as a specialty manufacturer and capitalize on the growing importance of ergonomics in manufacturing.

“ErgoSmart was an obvious business diversification and helps differentiate Precise Tooling as a specialty manufacturer,” Dumoulin says. “In addition to it being a complementary business, it validated our ability to integrate another business without interrupting the operating goals of our core business—mold building, mold maintenance/repair and mold productivity improvements.”

There are hundreds of different types of applications for these lift tables and bases, so they market the ErgoSmart



Precise Tooling CEO/Owner Don Dumoulin met with Congressman Greg Pence in late December to discuss U.S. and China trade issues as well as the ongoing challenge of finding skilled machinists to support the company's growth.

and serves on the Ball State University Foundation Board. He also chaired the Purdue University's Manufacturing Extension Partnership (MEP) and still sits on the board, which helped Precise Tooling win a workforce development grant from the State of Indiana in 2013.

"We also work with two local high schools and typically hire one or two of their best graduates every year. For example, Josh [Jefferies] was a graduate of that program. He started right out of high school and has been with Precise Tooling for 23 years, and runs manufacturing operations organization for us," Dumoulin says.

Another is Beau McKinney, who started with Precise Tooling as a high school junior and graduated last spring. Dumoulin is paying Beau's tuition at Ivy Tech Community College and expects him to become a mold leadman in about six months. "I wouldn't be surprised to see him run this place someday," Dumoulin says. [MMT](#)

brand to a wide swath of industrial buyers who have a need and interest in providing ergonomic equipment to their employees. One angle is savings as it relates to a manufacturer's healthcare costs.

"We promote the value of an ergonomic approach to manufacturing equipment across different industries. Our best customers or potential customers are those who are taking a very proactive approach to the well-being of their employees from an ergonomic and worksite efficiency standpoint," Rowe says. Interestingly, Precise Tooling itself uses 10 of their two-lift post ErgoStations or four-lift post ErgoBases in the work cells where they assemble ergonomic equipment ordered by their customers!

Supporting the Industry

Dumoulin is a big believer in surrounding himself with people who are smarter than him because it helps a business run better, and this includes people outside of Precise Tooling.

"When you are a private business owner, you tend to be isolated because you're focused on your business, people and customers. So, to stay fresh, I try to stay actively involved in industry associations," Dumoulin says. For example, he is on the board of the American Mold Builders Association (AMBA)

VIDEO:

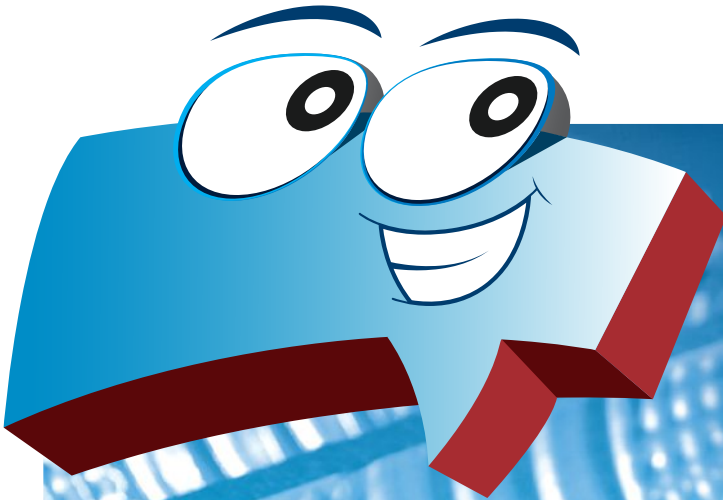
VIDEO: 2020 Leadtime Leader Precise Tooling Solutions

Precise Tooling Solutions team members virtually sit down with *Mold-Making Technology* Editorial Director Christina Fuges to talk shop core competency, workforce, technology, mold repair, marketing, customer service and much more.

short.moldmakingtechnology.com/2020LLA

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Absolute Machine Tool / 800-852-7825 / absolutemachine.com
American Mold Builders Association / 317-436-3102 / amba.org
Autodesk / 877-335-2261 / we-make.autodesk.com
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MMT

Join me at Amerimold Connects!

Want to talk with Phil? Use #IfAMoldCouldTalk

We're hitting the gas and going full speed into summer with our buddy Phil riding shotgun! It's officially our fourth month of asking you all what Phil would say #IfAMoldCouldTalk, and you continue to give us gold each time we toss a question your way. We're having a blast with this, and we hope you are, too.

While the current coronavirus crisis has caused the MMT team to have to cancel Amerimold (Phil had JUST picked out his outfit), we are very excited about this month's Amerimold Connects event. We wanted to make sure we were still giving the mold manufacturing community a way to connect with new business partners and old friends, so we got a little creative and

came up with this unique remote event. Phil would just love it if you registered to attend. It's entirely free for everyone, so don't let him down. Register today!

After asking us A LOT of questions about COVID-19 last month, Phil decided to pose a major question to the community: how do you think Phil would fight COVID-19? Phil was laughing so hard, he had tears in his bushings. Check out some of the best answers from the community.

Phil has more great stuff cooking up for June, so stay tuned to our social media channels for our latest questions and give us your most creative answers.

We hope you and your families are all safe and sound! Until next month, take care from us... and Phil!

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 IfAMoldCouldTalk



WE ASKED THE READERS: HOW DO YOU THINK PHIL WOULD FIGHT COVID-19?

Don't touch this!

James Jergens, *EG Industries*

I'm social distancing and staying put in my injection molding machine.

Lorena Fisher, *Progressive Components*

With a healthy dose of DAC-104 foaming cleaner, followed up with a DAC Degreaser "chaser." That's what gets ME out of bed in the morning.

Andrew Kasun, *DAC Industries*

Phil-osophically speaking, if I had to Phil-in the blank, he would exercise 'Closed-Captioning' and remain inside his bubble during this challenging period, and not question Mark, his buddy that just had surgery and now has a semicolon.

Patrick Fleming, *Progressive Components*

WHY BECOME A LEADTIME LEADER?

MoldMaking TECHNOLOGY®



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How becoming a Leadtime Leader impacted our past winners:

"Winning the Leadtime Leader award provided the Maximum Mold Group with additional marketing and exposure that we normally would not have. The network of other tool builders that we have connected with has allowed us to increase our work volume. In addition, our video that was produced has been used at all of our trade show events and was very professional compared to us using our phones and snapshots. We have stayed connected with a number of our new network contacts and have reached out to them for a variety of reasons, including increased workloads, tariff issues, COVID-19 procedures and many more."

Dave Lagrow, Maximum Mold

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The True Power of Servo Valve Gate Technology

A servo and sensor combination that makes the mold the machine presents opportunities to advance process control.

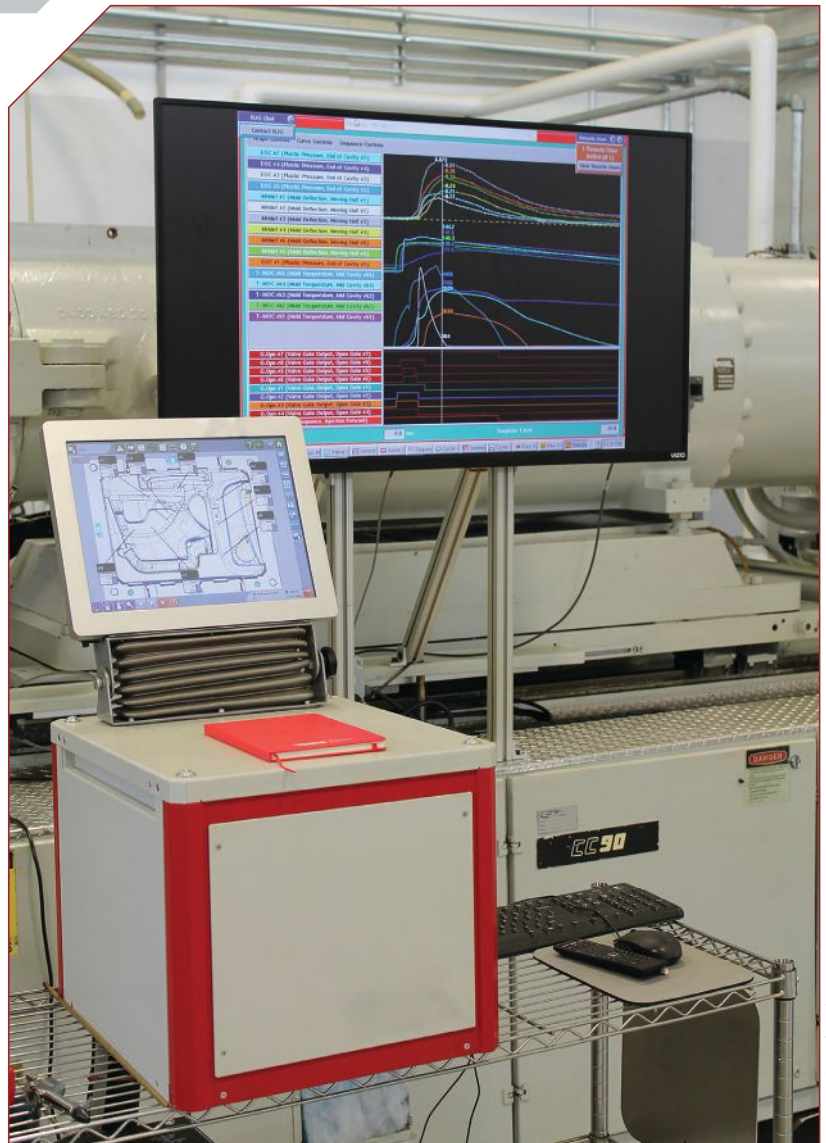
What is the impact of a hydraulic water leak or scrapped parts to your bottom line? How about the cost savings of consolidating parts into one mold to reduce the total number of molds required for a job? Answers to questions like these require a mold builder to think differently about technology and how the right technology applied correctly can be a true competitive advantage and a way to reduce costs.

Take servo valve gate technology coupled with mold sensors, for example. Let me back up a bit first.

People are familiar with hydraulic and pneumatic cylinders, maybe even servo valve gates, but do they *really* understand the difference among these technologies. For example, servo valve gate technology is not simply moving the valve stem open and close with a servo instead of a pneumatic or hydraulic cylinder. This technology gives the user the ability to stop the pin at a midpoint, opening the door to many other possibilities.

With servos, the pin must no longer be fully closed or opened, which is a common limitation of pneumatic or hydraulic cylinders. With pneumatic or hydraulic cylinders, you have some speed control over that valve stem, but you don't have the ability to articulate it across the cycle.

"That's exactly what servo valve gate technology can do. It can open the valve stems fully, halfway or even vary open and close across the cycle to affect the pressure and flow at each gate independently," Robert Harvey, director of sales for HRSflow North America, says.



The family mold for interior automotive door parts employs servo-driven valve gate technology combined with feedback sensors.

Images courtesy of HRSflow.



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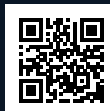
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Hot Runners

This is a big change in injection molding. In the past, the *injection piston* defined the process for each gate in the mold, determining the speed and pressure of the plastic flow. With servo valve gate technology, this is no longer true, as it uses the valve stems to meter the plastic at each gate independently.

The original goal of servo valve gate technology, according to Harvey, was to eliminate hesitation and pressure lines on large-format automotive Class A surfaces. “During traditional

sequential valve gating, you open the first gate, and the flow front begins to come out. Then as you open subsequent gates, the flow front hesitates as the pressure dips and cools a bit, creating a hesitation line. With servo valve gate technology, as you open the valve stems, you draw one back closed again, so that the pressure remains constant and the flow doesn’t have that hesitation,” Harvey says.

Since tackling this application, developers have discovered many other benefits of servo valve gate technology or independent cavity control.

A Family of Applications

Servo valve gate technology is a powerful tool for effecting flow lines, putting weld lines where you want them and creating a larger processing window to make Class-A surfaces. However, on top of that, independently controlling the flow at each gate opens up opportunities for family molds. Namely, controlling vastly different part weights even with soft-touch materials that tend to flash easily.

For example, if you’re not controlling the flow at each gate independently for lighter-weight parts, you’ll push too hard into the cavity and get flash before you fill the other cavities.

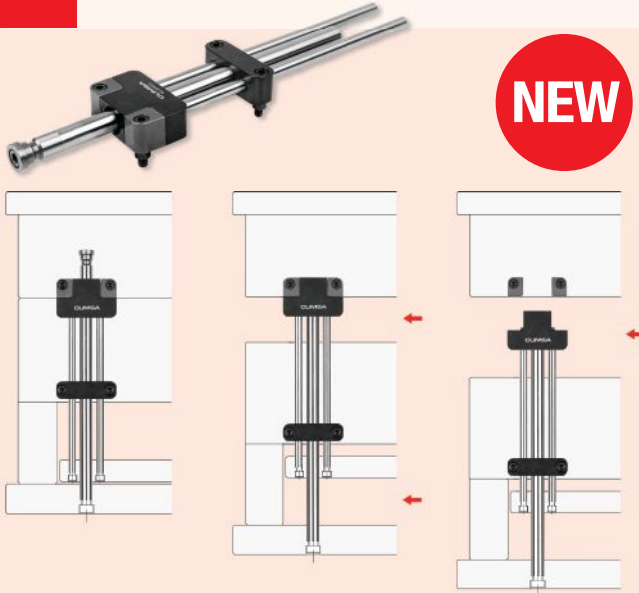
Here is another example—an *armrest mold* with roughly 250 grams of soft-touch material across the top of the armrest. The part also has two posts on the armrest frame that has soft-touch material for dampening the sound when the armrest closes. These posts are 1.5 and 1.4 grams, respectively. The resolution of servo valve gate technology can control the difference between 250 and 1.5, and still have the resolution to control 1.5 versus 1.4.

Now take a *door panel family mold* with three components with part weights of 10x, 6x and 1x and a very difficult geometry to fill. It is basically a grained door panel assembly. The door panel has a speaker grill, different wall sections and different part weights.

With a traditional system, you set the speed and pressure on the injection piston and all the gates are subject to that process. It is possible to time when to

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Data Proves Benefits of Servo-Driven Cavity-by-Cavity Processing

The results of a door panel family mold test demonstrate the tonnage reduction benefit of applying servo-driven cavity-by-cavity processing technology. The test measured processes with and without servo-driven technology applied.

The minimum tonnage required to mold good parts (those where parting lines had no flash) was approximately 800 tons using standard hydraulic. Those same good parts were molded at around 400 tons using servo-driven cavity-by-cavity processing. Essentially, this advance in servo-driven cavity-by-cavity processing gives molders the option to create parts in machines they thought were too low in overall tonnage clamping size.

Also, if reducing tonnage requirements is not a critical issue, molders can experience the added benefit of part weight reduction. For example, at 800 tons, the standard hydraulic process produces the three door parts with a combined weight of 988.4 grams. By using the servo-driven technology, also at 800 tons, those same three molded parts combine for a reduced weight of 970.4 grams. Part weight reductions can be extremely important in industries that focus on light-weighting applications, such as transportation, household appliance and lawn and gardening sectors.



The final flawless parts produced from the door panel family mold differ considerably from one another in terms of their dimensions and volumes.

open the valve (it's digital open or close) based on screw position or time; however all of the gates experience the same pressure as determined by the injection piston. The user cannot push less on the small part and more on the large part to yield greater flow rates on the large part and lower flow rates on the small parts so that they finish filling simultaneously. You can only do that through the timing of the valves, so all of the cavity surfaces are experiencing the same pressure.

The tonnage required to keep that mold closed is the highest pressure requirement part versus the surface area of all the parts together. With servo valve gate technology, the user can open the stems on the small part 25%, 50% for the medium part and 90% for the largest part. Servo valve gate technology can cut tonnage in half by only pushing where you need to push or not applying full pressure to all of the cavities.

Also, through this servo-driven technology, a user can make drastic changes to the way the door panel family mold behaves without even touching the

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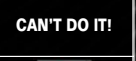



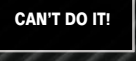
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molding machine. This is demonstrated by employing two completely different process cycles.

“On one cycle, you fill all three parts at the same time each with their own process, but it’s all occurring at the same time in all three cavities. The very next cycle without touching the molding machine, you fill each cavity one after the other. Cavity by cavity filling, not sequential.

Valve gate timing is often called sequential valve gating, but here we are filling each cavity one after the other instead of all at once,” Harvey says.

The Mold is the Machine

The next step was bringing mold temperature, internal cavity pressure and deflection sensors into the picture to remove any process dependence on the screw position.

“With this servo/sensor combination, the molding process is no longer controlled by the molding machine. We tell the machine, ‘Just give us the plastic, and we’ll take it from there,’” Harvey says.

Basically, mold sensors sense events taking place in the mold and fire the valve gates based on that data instead of timing the valve gates off of the screw position. This means that a mold can adapt to the circumstances by seeing what’s actually happening in the mold and respond back to the delivery device to effect proper change.

For example, valve gate *opening* is triggered by temperature sensors in the mold that see when the flow front reaches that point and then behaves according to the profile set in the controller. Valve pin closing is triggered by a sensor that sees an internal cavity pressure of a set amount.

Think about it: if the tool itself can be smart and lock down a process, then shops can rely less on the expertise of a person because you now have a repeatable device. It becomes more science and less art.

“This change to the mold controlling the process is a fundamental shift in injection molding. It is a game-changer. It’s the Jetsons versus the Flintstones,” Harvey says.

The latest advancement in this technology is a servo directly mounted on a manifold, but looking ahead, most innovation will come from software as the value of data and the importance of communicating that data only increases. **MMT**



Sensors in the mold allow real-time monitoring of deflection, temperature, and pressure during the molding process.

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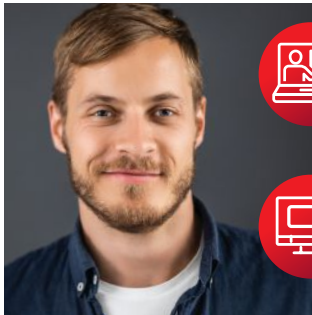


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Robust External Plate Controllers Solve Ejection Problems

Innovative, robust, external synchronized plate controllers solve ejection problems on molds at 3DTech, reducing time, complexity and effort.

Part of the Vangest Group, moldmaker 3DTech (Marinha Grande, Portugal) is strategically located in a technology corridor filled with automotive, consumer electronics and electrical-component companies. 3DTech specializes in precision injection molds in hardened and prehardened steel for medium-to-high-volume production runs for presses from 6.5 to 2,000 tonnes/tons. In addition to conventional injection molds, the company also produces tools for 2K, 3K and transfer molding and gas-assist injection—with most tools complex enough to require tooling action.

Torture Tools

3DTech builds lots of automotive tools. In 2018, it found itself having to produce a pair of very complex tools to injection mold door handles for a German carmaker. The program was already tight on deadline when the job arrived, so João Caetano, 3DTech design team leader, got right to work, and immediately ran into many design challenges.

- Each door handle—which was 200 by 330 by 105 millimeters/8.0 by 13 by 4.3 inches with a nominal wall of 2.5 millimeters/0.10 inches and containing rear-side geometry—had 12 undercuts: three on the A side and nine on the B side.
- The polished B side of each handle required a large lifter. Below this lifter, a hydraulically controlled slide was needed.
- Based on probable locations for the sequential valve gates and the need to hide parting lines inside the B side while maintaining a smooth surface that didn't chafe

fingers during use, each undercut would require its own lifter, and three of them would have to reside on the fixed side of the tool. One lifter would be placed near an injection gate and one would produce the parting line. However, a large A-side lifter would have to retract using less than a 42 degree working angle—a very aggressive target that required a special cooled-rack lifter solution.

- To prevent sinks in a thick section, the team added gas-assist and placed the gas port near the first valve gate on each cavity. Later, during tool tryout, they added a second gas port to each cavity to more rapidly cool parts and bring total cycle time down to 65 seconds.
- Given all the action in the tool, and how large each handle was, the mold already would be tall (almost 1,400 millimeters/55 inches) and would require a large stroke on the moving side of the press to produce parts (almost 150 millimeters/6.0 inches). Unfortunately, the press planned for this job wasn't equipped



In 2018, Portuguese moldmaker 3DTech needed to produce a pair of complex tools to injection mold door handles for a German carmaker. A three-stage plate separation strategy was needed for each cavity on each mold (one of which is shown on the pallet above) to preopen hydraulics on the slides, move all lifters out of the way and eject from the fixed side of each tool. Unfortunately, all known solutions had issues.

Image courtesy of 3DTech.

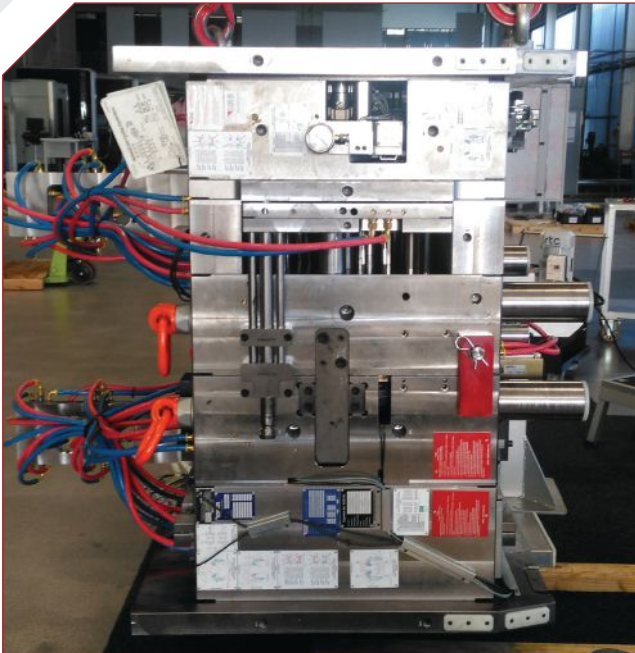


Image courtesy of 3D Tech.

Just when the 3DTech team had exhausted options and resigned itself to having to build something custom to handle the A-side ejections on each pair of tools, a team from Barcelona-based supplier Cumsa arrived to discuss new concepts for purely mechanical, external ejection controllers that were both big and strong enough for tools as large and heavy as the door-handle molds (one of which is shown above).

with a particularly big daylight opening, so a single four-cavity mold wouldn't fit. Hence, two tools would be needed (two cavities/mold for left and right sides of front and rear door handles).

"This tool was very difficult for me," recalls Caetano. "I am the project responsible leader for our design team and I had to leave my team to work alone so I could concentrate on this project. With six lifters on the fixed side of each of these molds—three per cavity—it was going to be a real challenge to open and eject this tool. And because work on tool design took

longer than expected, owing to the complexity involved, the milling process had to run very fast at the end, making things a bit of a nightmare."

Ejection Strategy

As if trying to design and build two very complex tools in less than four months wasn't enough of a challenge, Caetano had no good options for ejecting parts. He needed a three-stage plate separation strategy for each cavity to preopen hydraulics on the slides, move all lifters out of the way and eject on the fixed side of each tool. Using hydraulics to actuate A-side lifters wasn't as an option. "First, we had to follow the mold opening and we wanted to decrease pressure applied in the mold to keep tool action smooth," he explains. "Also, the big B-side slide for each cavity was controlled by two hydraulics, so we needed four hydraulics just for this feature, and I only had eight for the whole tool. In the end, there is only so much plumbing you can add." That meant that A-side ejections would need to be controlled purely mechanically.

There already were internal mechanical ejectors on the market, but they were only available for smaller molds—too small for the size and weight of these tools. A few companies offered external mechanical ejectors, but those were too small, none offered multi-stage ejection in the orientation he needed and 3DTech's previous experience wasn't overly positive. "We had used some external ejectors a year before, but our factory guys were always complaining because they made noise when they worked, and we felt that something could break," adds Caetano. "Also, since they were for smaller tools, we had to build bridges to connect them to make them long enough to use. All of them were too fragile, and they didn't give us the confidence to use in a tool of such dimensions and weight."

After poring over part catalogs, checking the internet and talking to colleagues at other Vangest businesses, Caetano resigned himself to building something custom. That's when a team from EuroCumsa, a supplier from which 3DTech regularly purchased standard components, showed up to discuss a development product that might just solve his problems.

New Solution

3DTech has worked with Barcelona-based Cumsa—a company that designs, manufactures and distributes standard solutions for the moldmaking and molding industries—for many years and several Cumsa components already were specified on the door-handle molds, including the cooled-rack lifter.

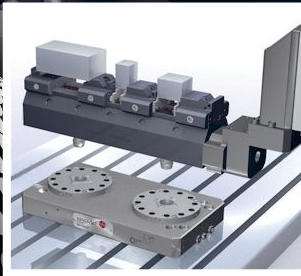
Cumsa is known for its high quality, simple and innovative component function, and ease of assembly and adjustment of its moldmaking components. The company was formed in 1979 by a group of Spanish moldmakers seeking markets outside Spain. By the early 1990s, Cumsa was taking advantage of its knowledge of tooling and the day-to-day challenges of molders and moldmakers to build its own moldmaking com-

3D TECH

PROBLEM: A pair of extremely complex injection molds were going to be a nightmare to eject parts from, and all known solutions had issues.

SOLUTION: Try developmental, fully mechanical external plate controllers from Cumsa that had never been tried before.

RESULTS: System worked perfectly right from the start, was simple to install and maintain, and was one of the few aspects of this tool build that was straightforward.



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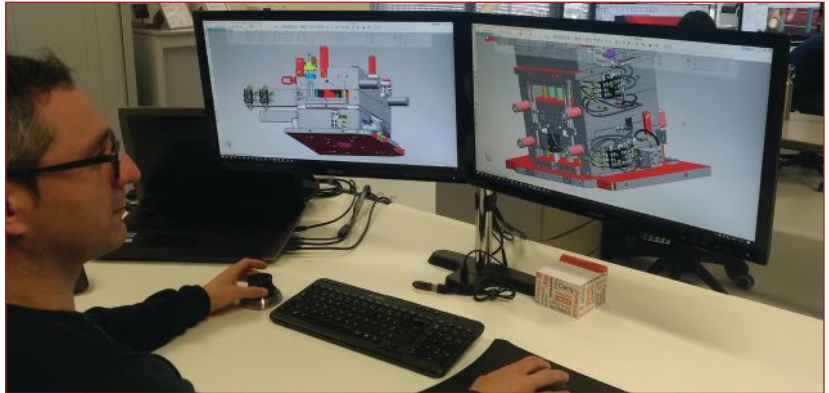


Image courtesy of 3DTech.

Not only did new Cumsa controllers solve 3DTech's ejection problems on the tools, but the team reportedly was surprised by how quietly and smoothly the products worked. The door-handle molds were delivered to the automaker in February 2019 and went into production the following month without issues.

ponents when ready-made solutions were unavailable. Word got out and other moldmakers sought these components, which led Cumsa to form a standard-components business with its first office, EuroCumsa, in Marinha Grande. Other locations soon followed in Europe, Asia and North America. So successfully has the standard-components business grown over the years, that Cumsa sold its molding operations several years ago and now strictly focuses on finding standard-component solutions for injection molders and moldmakers.

The Cumsa team intrigued Caetano with a developmental external-ejector system it planned to launch at K 2019 in Düsseldorf, Germany. "I try almost everything they do because Cumsa makes some kinds of parts that other suppliers do not," he explains. "They always try to invent and put on the market things we really need but normally cannot find." The Cumsa team showed early concepts of a purely mechanical, external superior-plate separator for the X-axis (called EX) and an external double-ejection system for the Y-axis (called EY). The concepts could manage a two-plate separation strategy and were big and robust enough to work on the door-handle molds.

"They showed me their concepts and I said 'They were very nice, but I have a special tool and I have to find a quick solution,'" Caetano recalls. "I proposed a different solution, for them to adapt their system to our tool to give me three-plate separation in the Z-axis. The guy was very interested and understood this

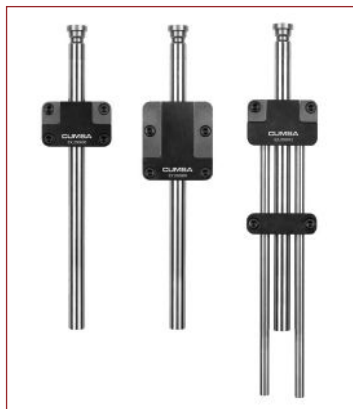


Image courtesy of Cumsa.

Cumsa has since commercialized three different models of the exterior ejection controllers—an external superior-plate separator for the X-axis (left, called EX), an external double-ejection system for the Y-axis (middle, called EY), and an external synchronized-plate controller for the Z-axis (right, called EZ)—and offers each model in four popular sizes that allow use in small through large molds. For moldmakers requiring synchronized control of plate movements in complex tools, particularly in cases where hydraulic actuation isn't available, these strong, purely-mechanical external systems are easy to install/retrofit and tune, require little maintenance, and help keep tools cost-competitive.

could be the kind of part that we don't have on the market, so he goes back to find a solution. He knows that João is trying to do something impossible again." Within days, the Cumsa team had a solution that became a commercial product called EZ to control external synchronized plates in the Z-axis. "This was a very strong and good solution," Caetano adds. "I didn't have to tear apart my tool to put it in. It was very easy to assemble and tune. I just had to cut simple rods and put them in the right position. And it is very easy to maintain."

Normally, Cumsa recommends using a pair of the external double-eject systems, one on each side of the cavities where ejections will take place. Since each of these tools contained two cavities, Cumsa built four EZ controllers for each tool (eight in total), and 3DTech drilled holes for their assembly. During tool tryout, the team decided to see if the system would work with just two units/tool—and it did. They worked so well that the extra units immediately were used in another tool 3DTech was building simultaneously. "Even better, what surprised me and my guys is how smooth and quiet these parts work, which gives us confidence that we have the right solution," he adds. The tool was delivered to the automaker in February 2019 and went into production the following month without issues.

"When you need synchronized control of plate movements,

these controllers are very helpful," says Silvia Navarra, CEO/general manager, Cumsa USA. "Trying to use homemade approaches with hydraulics and sensors is more complex, more work and more cost, plus sometimes they work and sometimes they don't.

"For most toolmakers, the good price and simple installation and maintenance of these systems will save time and effort, and make their molds more cost-competitive," adds Rui Rocha, general manager, EuroCumsa.

"Cumsa is truly a partner-supplier for difficult solutions," concludes Caetano. "I am so glad they have offered something strong to use outside the tool that works for big molds. They now offer four sizes each for the three systems, which makes them a very good solution." [MMT](#)

CONTRIBUTOR

Peggy Malnati is a Detroit-based contributing writer for *MoldMaking Technology* focused on application stories and shop profiles. She has provided writing and communications services for the global plastics and composites industries since 1984. p.malnati@sbcglobal.net

FOR MORE INFORMATION

3DTech / 3dtech.pt / João Caetano, Design Team Leader
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Where Cycle Time Hides

Difficult-to-cool areas of a mold cost cycle time, making the perfect application for additive tooling, including retrofitting an existing tool with lifters, slides and high wear areas.

Many mold builders and tooling engineers are in pursuit of the perfect tool for trying conformal cooling when in fact, the perfect mold is the one which they are currently struggling with, or the one simulation data determines will be a struggle. Then there are the processors who slow down mold cycles because of a hot spot in the mold or who decide to process around a quality defect by increasing cooling time, which depletes expected profits or eats up machine capacity. Mold builders and processors must work together to identify molds with which they are constantly struggling and apply additive tooling that will eliminate persistent cycle time and defect issues.

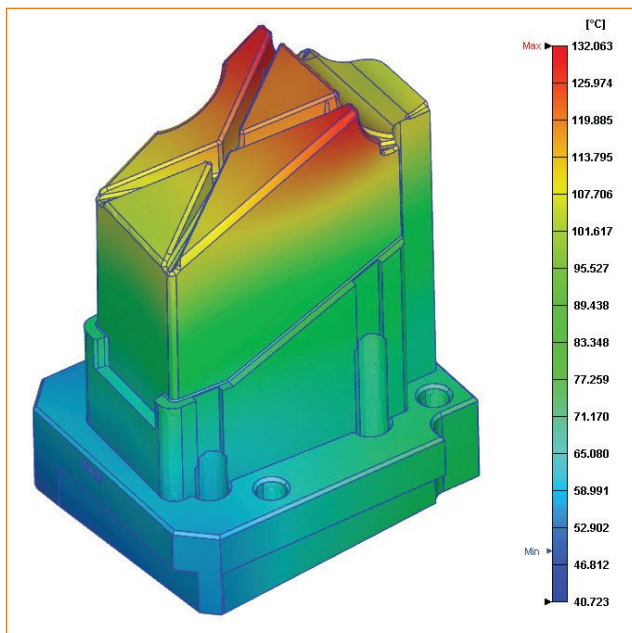
Concerning Cycle Time

Cycle time likes to hide in areas in a mold that we cannot cool

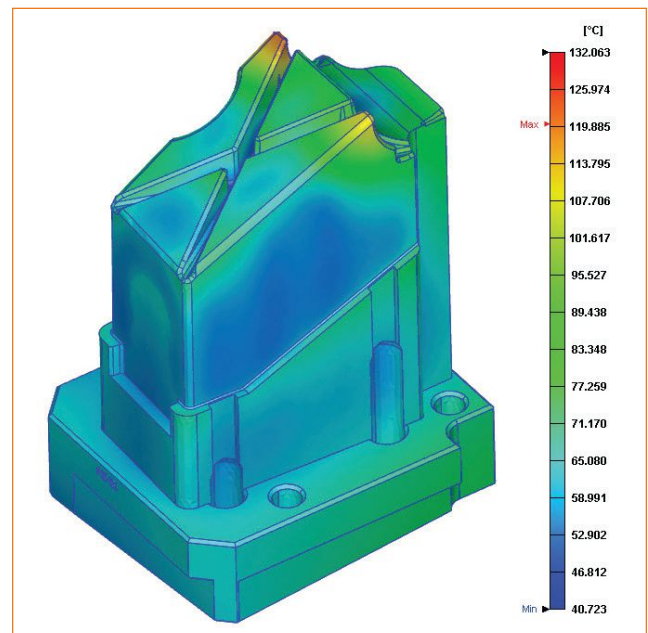
effectively, resulting in a hot spot that requires more time to cool the part to the ejection temperature. The difference in cooling rate leads to defects like warp that can create fit, form and function issues, as well as out-of-spec dimensions.

There are tools that shops can use to pinpoint the when and when of cycle time and defects that cause deformation, giving the shop time to create a countermeasure to cool the area effectively.

1. Mold simulation. Using simulation software, a designer can carefully review the cooling channels and see where any remaining hot spots will develop. Frequently, designers simulate the mold design and assume that they can achieve proper cooling in the desired areas. However, once the mold design begins, features such as split lines, ejection, venting and mold actions take precedence over cooling. Additive tooling enables



Cooling simulation of a high-performance, beryllium-free copper alloy material.



Simulation of 420 stainless with conformal cooling to show cooler mold temperature and longer tool life with a steel insert.

Images courtesy of DENSO Manufacturing Michigan.



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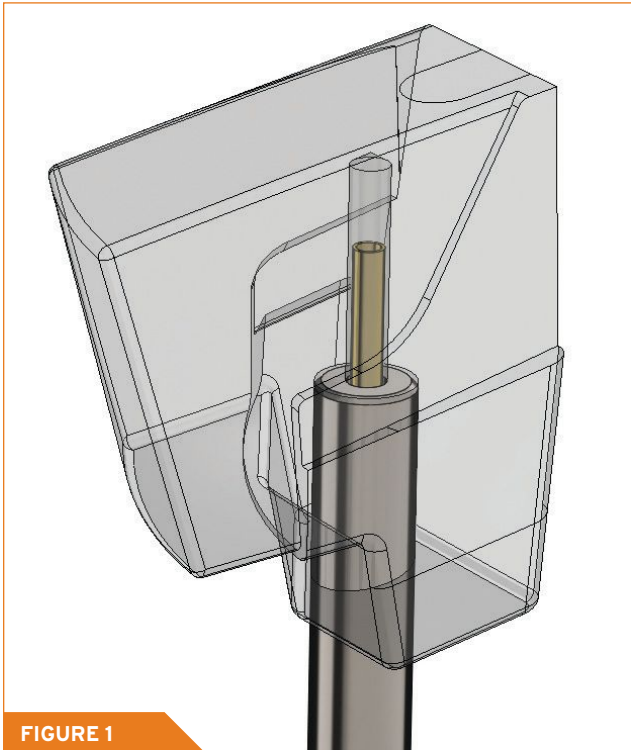


FIGURE 1

A lifter with a cascade cooling line before conformal cooling optimization.

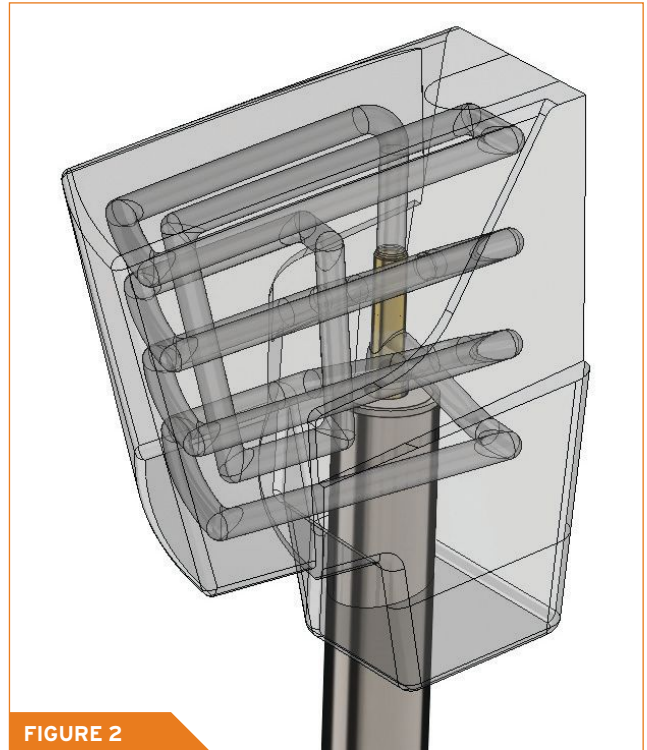


FIGURE 2

A lifter after conformal cooling optimization to balance cooling to latent heat buildup.

shops to integrate critical cooling and any necessary mold functions in areas where conventional cooling lines cannot be milled or drilled.

2. Thermal imaging. Shops can use this tool to observe the actual temperature of the molding surface and part temperature at ejection. This powerful tool reveals hot spot locations in existing tooling. It also balances the cooling temperature, determines where additional cooling is required to obtain consistent mold temperatures and cooling rates, and eliminates cycle time and molding defects.

If your shop does not have access to a good thermal imaging camera, rent one for a day at your local tool rental store. Your mold simulation and thermal images will identify the areas where cycle time likes to hide and help you implement cost-effective solutions to eliminate defects and run your molds at the cycles quoted.

Balancing Heat Load to Cooling

Lifters help to remove an undercut in a mold. They are one of the most difficult parts of a mold to cool because they are often mounted on a rod, have minimal space for cooling lines and the surface area forming the plastic is quite high compared to the mass of steel in the lifter.

A common solution for cooling lifters is to use a highly thermally conductive material, but this material type in a high-

wear environment does not hold up to the rigors of production molding or filled resins, increasing maintenance costs over the life of the mold.

The images above (**Figures 1 and 2**) show an example of a difficult-to-cool lifter with five molding surfaces. Note that reaching ejection temperature demanded a longer cycle time due to the part's critical tolerances and warp requirements. A solution was to use a cascade where the inner feed supplied cooling to the conformal cooling circuit inlet, which produced a consistent steel temperature on the molding surface. The circuit exited the lifter below the inlet using the outer diameter of the cascade bored into the lifter rod. The lifter was 420 stainless and hardened to 48-52 HRC to provide corrosion resistance, high wear durability and efficient cooling.

Cooling Loses Out

Slide actions in molds pose a different set of cooling challenges. While slides offer more access to provide cooling to the outside of a mold, there are more obstacles such as sub inserts, core pins, screws and O-rings that have limited options to route water conventionally. This scenario leaves slide actions under-cooled and ineffective, robbing the mold of precious seconds of cycle time waiting for the part to cool without warp.

Part design drives many mold elements, so design in fixed areas, such as parting lines, cores and sub inserts. Once those

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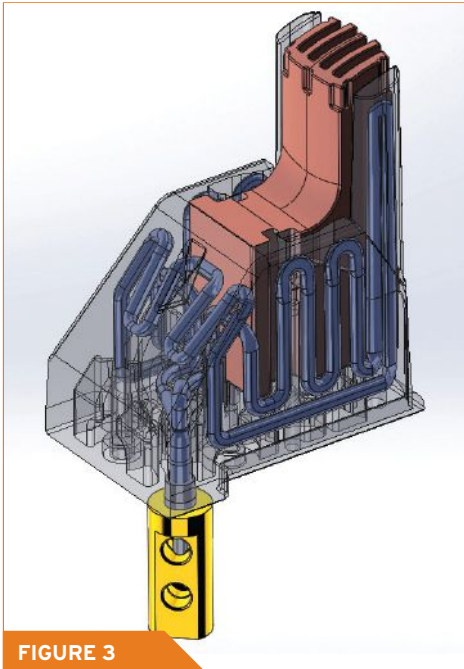
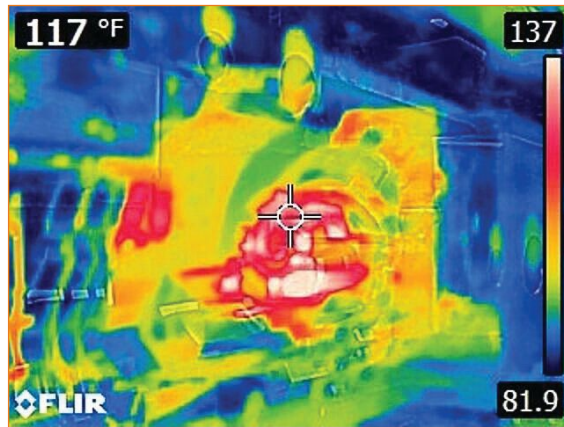


FIGURE 3

Slide optimized with conformal cooling.



Thermal image of a hot spot in an injection mold to show where conformal cooling is required to reduce time to ejection in the cooling portion of the cycle.

details are fixed, then evaluate where cooling is required and add circuits that achieve the most efficiency. It does not take a massively sized circuit to achieve the effective cooling of thin steel areas. In most cases, you can model cooling to fit between fixed components in areas as small as 0.25-inch wide by changing the cooling circuit's profile without limiting flow. This approach enables the required components to remain in place and adds effective cooling to reduce cycle time to the quoted expectations, and in some cases, much lower.

This slide in **Figure 3** uses steel for the main body, and a high thermal conductivity insert in the center with a simple U-shaped cooling circuit that comes in, across, and back out the other side. The slide also includes vent pins for venting deep ribs in the sub insert. The cooling for the slide was ineffective, given the massive amount of surface area. When the mold fully soaked out, the latent heat buildup caused sticking and lengthened the cycle time necessary for making a good part.

The solution was to use the main slide body as the carrier and use the water ins and outs to feed the thermally conductive insert. We created a separate conformal cooled insert for the slide face, as well as long outside standing cores to add cooling to the entire molding surface. This achieved an even cooling rate and reduced cycle time by 40%, resulting in a payback of just three months. We direct metal laser sintered (DMLS) 420 stainless steel 48-52 HRC for its corrosion resistance and high wear for filled resin.



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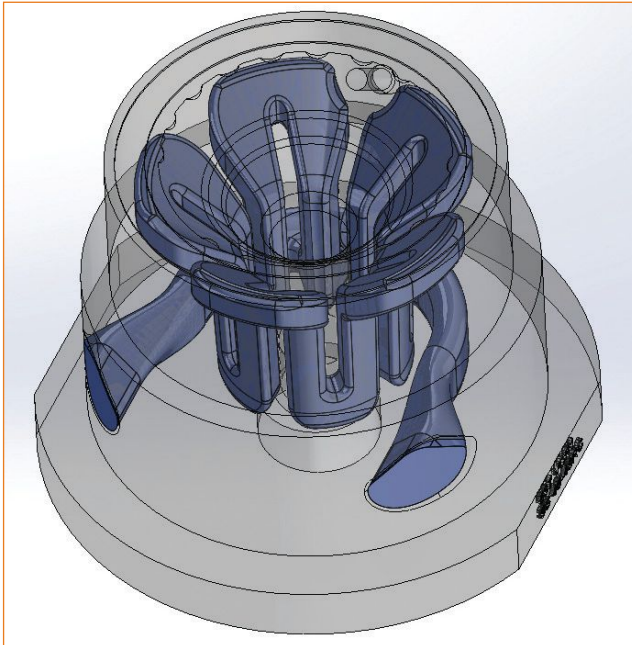
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Example of a core insert optimized with conformal cooling.

High Wear Solutions in Steel

A mold's core is typically the side with more plastic structural features, such as ribs and bosses for added strength and reduced plastic material mass. These core side features have more surface area, which requires more cooling and minimal draft. Additional challenges include features that require extra venting without gas traps or more ejection to effectively demold the plastic part.

For example, consider material savers (standing steel with machined ribs) that demand cooling the standing steel and ejector pins at the bottom of the ribs, which prevents the use of baffles or bubblebers. Another example is a round core around which many shops cut a channel and add O-rings to the top and bottom to route water. The part contour can extend beyond the parting line, so this can be an ineffective method for the core side as it leaves no room for cooling in the cores. The insert's perimeter was cooled but not the standing steel areas.

An alternative is to direct mate the cooling lines in the core block to the cooling lines in the insert, which maintains proper flow while using O-rings to seal the top and bottom. This approach is cost-effective because the cooling circuit covers the entire part surface, reducing cycle time and improving part quality by eliminating warp. These modifications reduced cycle time by 40%.

The goal of every mold builder is to make a mold that produces parts by the most efficient means despite the unique geometry and construction of each mold. The most effective method is to reduce the cooling time to ejection, which is the largest portion of a molding cycle. Use these examples to evaluate the challenges your shop faces and then start identifying critical areas where cycle time hides, so you can implement a solution to deliver molds that efficiently cool parts, lead to satisfied customers and sustainable business. [MMT](#)

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Tax Reform for Mold Builders: 30 Months After Enactment

A review of the impact that the Tax Cuts and Jobs Act of 2017 has had on mold builders over the past two years.

The Tax Cuts and Jobs Act of 2017 (TCJA) was signed into law in December of 2017 and ushered in several different ways mold shops could either reduce or defer their Federal income tax liabilities.

Two and a half years have passed since President Trump signed the TCJA. Treasury has issued dozens of new regulations and other guidance. And now, as a result of the COVID-19 pandemic, Congress passed, and the President signed, the Coronavirus Aid, Relief and Economic Security Act (CARES Act), which modified specific provisions of the TCJA and even provided taxpayer-favorable technical corrections to some of the TCJA's drafting errors.

We first wrote about the impact of the TCJA on mold builders and related suppliers in the March 2018 issue. In that month's article, we broke down the provisions of the TCJA most likely to be relevant to mold shops.

Now with over two years of hindsight, let's reflect on how some of these provisions impacted mold shops. Treasury provided a significant amount of much-needed guidance, but mold shops are still in the dark on some issues. The CARES Act further muddled matters by changing areas of the tax code that were just modified by the TCJA, but these changes will ultimately help mold shops.

Low Rates

Shops organized as C corporations saw a reduced tax rate of 21%, replacing the graduated rates of 15 to 35%. Pass-through entities (S corporations, partnerships and sole proprietorships) also saw reduced tax rates, as individual tax rates were reduced across the board. Most U.S. mold shops were able to claim a new 20% deduction on their qualified business income, reduc-

ing the top rate an owner would pay on their flow-through income to 29.6%, before Federal tax credits.

Impact: Mold builders saw lower tax bills in 2018 and 2019 thanks to the lower rates and some of the other provisions discussed hereafter.

Alternative Minimum Tax

The TCJA eliminated the Alternative Minimum Tax (AMT) for C corporations. Corporations that accumulated Minimum Tax Credits from prior AMT liabilities were to have these credits refunded over four tax years (2018-2021).

The CARES Act accelerated the refundability period. Shops may claim refunds for these credits in tax 2018 if amended timely, or shops can claim the remaining Minimum Tax Credits on their 2019 tax return. Special rules apply for those mold shops that have already filed their 2018 and 2019 tax returns.

Impact: Mold shops that are taxed as C corporations and were subject to the AMT in prior tax years should evaluate which tax years to have refunded, as other provisions in the CARES Act may impact their decisions.

Property and Equipment

The TCJA improved two popular deductions that allow for accelerated depreciation—179 and bonus depreciation. The 179 deduction limit was increased to \$1,000,000 for 2018, and after being indexed for inflation, is \$1,020,000 for the 2019 tax year. Additional assets were also added to the definition of 179 property, including HVAC and security systems; and the 179 phase-

The impact of changes from the Tax Cuts and Jobs Act of 2017 have made on mold shops that have implemented them have resulted in both permanent and temporary tax savings, both of which contribute to your shop's bottom line.

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out threshold now begins at \$2,550,000 of eligible assets placed in service for the tax year 2019.

Tax reform also increased the bonus depreciation percentage to 100%, retroactively, for property placed in service after September 27, 2017, through December 31, 2022. Beginning in 2023, the bonus depreciation percentage is phased down by 20% each year, with the accelerated “bonus” depreciation phased-out by 2027.

In December of 2019, Congress passed and the President

signed *tax extender legislation*, including a retroactive, three-year extension of IRC 179D: Energy Efficient Commercial Buildings Deduction. Mold shops that have used in-service, energy-efficient lighting systems, HVAC or building envelope may be entitled to accelerated deductions concerning these assets.

The CARES Act provided for a technical correction to the TCJA by accurately identifying Qualified Improvement Property (QIP) as 15-year property for depreciation purposes. For mold

builders, QIP includes any improvements made to the interior of your facility and placed in service after the date the building was first placed in service. QIP does not include additions, elevators or internal structural framework.

Impact: Many mold shops took advantage of both bonus depreciation and 179 on new purchases. Now mold shops should look at past purchases by scrubbing depreciation records for compliance with the tangible property regulations or segregating the cost of a mold builder's plant by performing a cost segregation. These additional deductions can be “caught up” all in the tax year the change is made. The expansion of QIP as eligible for bonus depreciation will likely have a significant impact on mold shops improving their plants or adding equipment.

Research Incentives



The R&D tax credit continues to be one of the most significant incentives for mold shops to reduce their Federal (and sometimes state) income tax liabilities. The R&D tax credit rewards mold shops that are designing and developing new molds or improving their manufacturing process by engaging in R&D tax credit eligible activities.

The TCJA made the R&D tax credit more valuable by reducing the top corporate tax rate. For some shops, the value of the credit increased by more than 20%.

The TCJA also requires mold builders to capitalize on research expenditures and amortize them over five years (15 years for research performed outside of the U.S.) for tax years beginning after December 31, 2021. Numerous trade groups are working to reverse this TCJA provision.

Impact: Mold shops continually perform research and experimentation in the develop-

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ment of their novel, unique, one-of-a-kind, never-been-build-before molds. Mold shops that have not investigated this credit in detail may be over-paying their Federal tax liability. While we're hopeful Congress will eliminate the requirement to capitalize and amortize mold builder's research expenditures, it's been approximately 30 months since the TCJA was enacted. Approximately 18 months until the provision takes effect. Any action on this issue will likely come after the 2020 election.

Method of Accounting

The TCJA allowed mold shops with average annual gross receipts (AAGR) of \$25 million or less for the prior three tax years (\$26 million for 2019, as the amount was indexed for inflation) to switch to the cash method of accounting. That is, the mold shop will recognize revenue when it receives the cash and claim deductions when the expenses are paid. Shops meeting the AAGR threshold are also exempt from accounting for inventories in a traditional manufacturing sense, meaning they can treat inventory as non-incidentals supplies and materials, deducting the inventory when it is used or consumed. Also, shops under the AAGR are exempt from the Uniform Capitalization (UNICAP) rules and are not required to capitalize their indirect expenditures and overhead into the cost of their inventory.

Impact: Many mold shops that met the AAGR threshold switched to the cash method, as their receivables were higher than their payables, by a significant margin in some cases. These shops were able to take significant deductions that were net of amounts invoiced and not yet received, and deductions accrued but not yet paid. Other mold shops changed their UNICAP accounting method, deciding to exempt themselves from the provision. There were not many inventory changes, however. Treasury has yet to issue guidance concerning this method change, and there are still differing opinions over when a material is used or consumed. So mold shops are waiting for Treasury to give the go-ahead to deduct the inventory once it becomes part of work-in-progress.

Business Losses

The TCJA limited how mold builders account for their business losses, regardless of company structure. It limited Net Operating Loss (NOL) deductions to 80% of the taxable income of the year in which the shop carries the loss for losses occurring in tax years beginning after December 31, 2017. Also, the TCJA eliminated the NOL carryback provisions but allowed for NOLs to be carried forward indefinitely.

The CARES Act removes 80% of taxable income loss limitation for losses generated in tax years 2018 through 2020. It allows mold shops to carry their NOLs back to each of the five taxable years preceding any losses generated in tax years 2018 through 2020. The TCJA also introduced a new limitation on excess business losses for the owners of flow-through companies. This provision, as enacted by the TCJA to be effective for tax years 2018 through 2025, limited business losses exceeding

\$250,000 (\$500,000 in the case of married taxpayers filing a joint return) and were not eligible for carryback.

The CARES Act allows excess business losses for tax years 2018 through 2020, and if net operating losses are generated, allow for a five-year carryback period.

Impact: Mold shops with taxable losses should evaluate the best approach to utilize those tax attributes. The CARES Act created additional opportunities for any tool shops with tax losses. Still, carryback claims, elections or election revocations must be made within the period prescribed within the CARES Act.

The Bottom Line

The TCJA created some different opportunities for mold builders to reduce their income tax liabilities. The impact these changes have made on mold shops that have implemented them have resulted in both permanent and temporary tax savings, both of which contribute to your shop's bottom line. **M.M.T**

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WEBINAR: When It Comes to Cutting Tools, It's Not About Price, It's About Performance

By Christina M. Fugas



The dirty little secret about cutting tool cost is that it's not about price, it's about overall costs. Do you understand the difference between cutting tool price and cutting tool cost? Do you know how cutting tool cost impacts job profitability? Do you know why a CNC programmer is vital to cutting tool purchases? To find out the answers to these questions and more, listen to this free online archived webinar.

Presenter Stas Mylek has worked at CNC Software, Inc., developers of Mastercam, for more than 12 years in the roles of director of product management, senior product marketing and most recently, as partnership program manager. His attention now focuses on building strategic alliances and partnerships that bring new and emerging technology to the CAD/CAM market. Using this wealth of knowledge and experience, Mylek spent time diving into a variety of cutting tool topics. Check out the free archived webinar online to learn all the details of cutting tool performance testing.

short.moldmakingtechnology.com/MCWeb

A free online archived webinar presented by Stas Mylek teaches all the details of cutting tool performance testing.

A Review of High-Productivity Workholding Solutions

By John Zaya



Each workholding option comes with its list of pros and cons, so be sure to contemplate this and see what works for your shop.

It's no secret that shops need to be flexible to keep up with today's marketplace, all while maintaining high part quality. Shops are no longer only making one part at a time or one type of part—their customers expect a more divergent product mix. A new type of request, or even machine type, can come at any time, and the fixturing process needs to play a part in the flexibility required to keep up.

Top shops, as denoted by Gardner Business Media's annual survey, take advantage of every bit of new technology and put it to good use. The biggest difference between a top shop and a standard shop is unattended machining, allowing minimal interruption and reduced operator involvement. In many of these environments, the loading of parts and fixtures is simplified, the operator only having to load raw material or having the ability to set several workpieces at once.

Four- and five-axis positioning also is growing in popularity among the most successful shops. It allows a workpiece to rotate multiple times, thus gaining access to all sides of the workpiece without an operator rotating it manually.

Having both horizontal turning centers and horizontal machining centers, equipped with CNC lathes, is an effective mix. The highest level of production is reached because these machining centers are able to perform multiple operations on a workpiece with minimal operator involvement.

It's clear, versatile workholding technology offers various benefits. They adjust to these emerging machining solutions to eliminate the risk of operators working inside the machine, spindle uptime is higher, and it takes advantage of a cell's capability to run unattended.

short.moldmakingtechnology.com/BKPTBlog



MoldTrax brings back its Tool Shop Live! demo, but this time *virtually* breaking down a hot runner mold during Amerimold Connects June 9-13 at amerimoldexpo.com. Register for free today! Here is a recap of last year's demonstration.

VIDEO: Elements of a New Age Repair Shop

By Christina M. Fuges

Just as important as creating a solid maintenance plan for molds, is the shop in which the repair takes place. During Amerimold 2019, ten mold maintenance and repair technology partners shared their experience and knowledge with developing a proper mold maintenance and repair culture and toolroom under the event's first Tool Shop Live! multi-exhibitor display and demonstration.

MoldTrax was one of those companies, and in his Toolroom Live Demo, MoldTrax President Steve Johnson presented an overview of a successful toolroom setup that includes a variety of essential bench and cleaning equipment on the market today.

Top maintenance issues MoldTrax has observed are toolrooms that are too small, poor lighting, incorrect benches or no standard bench design, no access to utilities, lack of data, poor housekeeping practices, no vacuum system and no posted metrics.

Some tips from the demonstration include adding such things as cleaning equipment, plastic media, overhead hoist systems, mold splitters, mold polishing equipment and fast heat checkers, as well as updating lighting, benches, and floors and walls.

See the in-depth demonstration video online to learn more tips and trick for improving mold maintenance toolrooms. short.moldmakingtechnology.com/TRLiveMT



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PODCAST: 3-in-1 Moldmaking Force Always Looking for Problems to Solve

By Christina M. Fuges

The mission of Minnesota-based Custom Mold & Design, Paradigme Engineering and Teamvantage is to help customers develop products, not just new molds. This episode of The Manufacturing Alliance Podcast with VP Lester Jones and VP of Sales Tom Caron discusses how this duo brings together these companies into a three-in-one precision and quality-focused company.

Here are some highlights from their conversation:

- In reality, they look for problems that build relationships and grow the business.
- Provide creative solutions to complex manufacturing challenges.
- A lot of effort goes into designing out the complexity to make simpler, cheaper molds, but CMD likes to keep the complexity in.
- Number one challenge is growing people. You can buy machines, but building people is the real need.
- They key to everything is the culture, the team, collaboration, open and honest conversation to move in the right direction together.

Listen to the whole podcast online to hear more!

short.moldmakingtechnology.com/3in1Pod

VIDEO: MMT Chats: Remoting, Reaching Out and Ramping Up Recyclable PPE

By Christina M. Fuges

Max Preston, general manager for Smart Attend, and Robert Graup, general manager for Intex Tooling are with a group of companies that recently turned production over to manufacture face shields. In this conversation with Editorial Director Christina Fuges, they examine the COVID-19 impact on business and precautions taken across both facilities, as well as leadership's strong focus on employee morale.

These two dive into the details of the face shield project that was centered around recyclable material, and the URL they set up so companies can purchase these face shields: <http://www.axiompppe.com/>

Listen to the whole chat online!

short.moldmakingtechnology.com/AxiomCOV

Two members of the Axiom, Intex Tooling and Smart Attend team chat about COVID-19's impact on the business, employee morale across the business units and the switch to producing and selling recyclable face shields.



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M.I. Integration does mold building and molding work for some critical automotive and defense industry projects. Still, as the coronavirus hit, the injection molding facility was shut down, temporarily laying off all the employees. With its top priorities being the health and safety of its people and the financial health of the company, M.I. management focused on managing its cash flow properly and connecting to all available government aid to minimize the impact on its workforce.

“Once things settle down, we will need to adjust to a 25-30% drop in business throughout the next year, so we are preparing now. We are thinking about how to put our structure back in place to make sure that we will still be profitable,” Vincent Houle, president at M.I. Integration, says.

A former employee who left M.I. Integration to start his own business, eLab, reached out to Houle about some open-source data to make face shields. The engineering services provider asked if M.I. would be interested in 3D printing and injection molding some parts and tools.

“I saw the wave coming, so I decided to take on this project, entering the medical space. We put our teams together to create a new face shield,” Houle says.
short.moldmakingtechnology.com/MIICOVID

Editorial Director Christina Fuges speaks with Jason Murphy of Next Chapter Manufacturing, Chris Kaminsky at Muskegon Community College, John Harding of PCS Company and Jason Sparks of Concept Molds about how they collaborated in record time to design, 3D print, tool up, mold and deliver face shields to help fight coronavirus.

“The move from 3D printing into a mold gave us the capacity to go from several hundred a day to several thousand a day,” Murphy says. It was then all about how quickly they could work to get this job through the shop.

See the video online for the full story.
short.moldmakingtechnology.com/NCMfgCOV



A Virtual Handshake Takes on COVID-19


By Christina M. Fuges

VIDEO: MMT Chats: Fighting COVID-19 with Collaboration

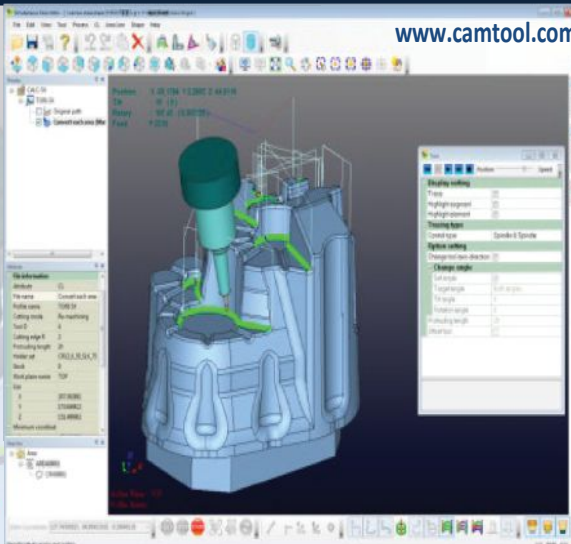
By Christina M. Fuges

Next Chapter Manufacturing, Muskegon Community College, PCS Company and Concept Molds chat about a coalition they formed to produce face shields to help fight COVID-19.

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Business Activity Registers Collapse

April 2020 - 30.1

The GBI: Moldmaking fell 13 points in April after reporting a near record low in March. The Index experienced a virtual collapse in new orders, production and exports. That these components are leading indicators of employment and backlog activity suggests further challenges ahead. April's sub-20 reading for new orders activity was matched by a similar reading for production activity. These low readings indicate that a large proportion of respondents reported a decreased level of business activity without quantifying the magnitude of the downward change.

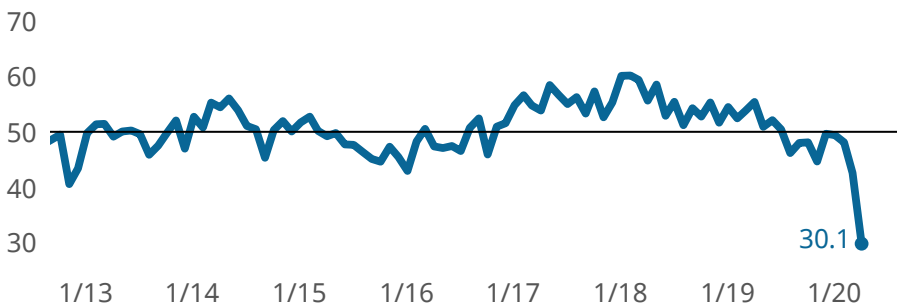
Supplier deliveries elevated for a second month due to efforts to slow the spread of COVID-19, which significantly disrupted supply chains. In normal times when demand for upstream goods is high, supply chains cannot keep pace with these orders. The result is a growing backlog of supplier orders which lengthen delivery times from the perspective of moldmakers. Our survey, therefore, interprets slowing deliveries as a sign of economic strength. **MMT**



ABOUT THE AUTHOR

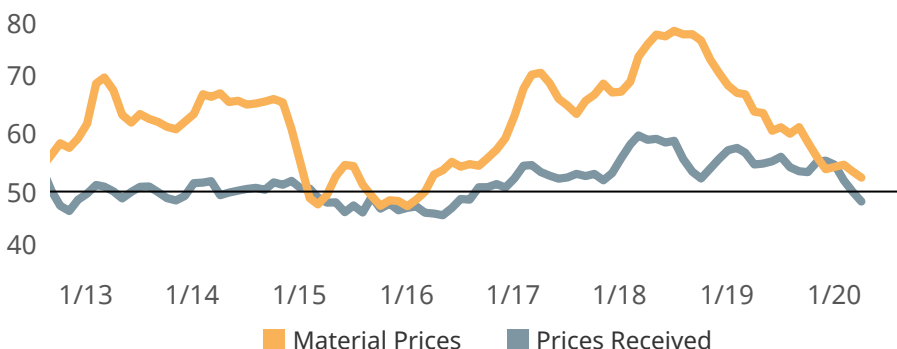
Michael Guckes is the chief economist for Gardner Intelligence, a division of Gardner Business Media (Cincinnati, Ohio, United States). He has performed economic analysis, modeling and forecasting work for nearly 20 years among a range of industries. He is available at mguckes@gardnerweb.com

■ Gardner Business Index (GBI): Moldmaking



Moldmakers reported a drastic fall in new orders activity, which sent production and backlogs lower. All components except for supplier deliveries registered significantly lower readings for April.

■ Material Prices and Prices Received (3-Month Moving Average)



Survey data tracking prices received registered its third consecutive reading below 50 in April, indicating weakening pricing power for moldmakers. Conversely, the reading for material prices remained above 50, the results collectively imply growing pressure on profit margins.



Stay ahead of the curve with Gardner Intelligence. Visit GBI's blog at gardnerintelligence.com.

**The further away a reading is from 50 the greater the magnitude of change in business activity.*

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GARDNER BUSINESS INDEX

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



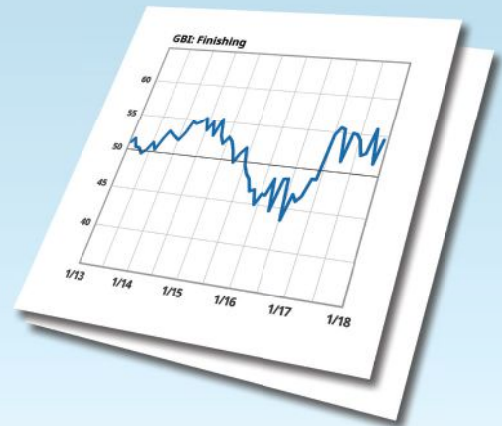
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Although COVID-19 has forced the cancellation of Amerimold 2020, this does not stop *MoldMaking Technology* from arming you with technologies and strategies to help better manage and operate your business through the impact of this crisis.

Introducing Amerimold Connects, a remote event experience that brings the moldmaking industry together in a virtual space. Easily access interactive networking, online forums, free education sessions and virtual booths. Here is just a snapshot of highlighted products, equipment and services from exhibitors attending this virtual event.

Join us June 9-13 for Amerimold Connects! Be sure to register today at amerimoldexpo.com.



Bar Locks Series Expand for Alignment of Large Molds

Progressive Components introduces an expansion of its Z-Series bar locks for alignment of large molds and multi-plate sequencing tools. Additionally, a metric series also has been added. Uniquely suited towards complex molds for packaging and medical applications, bar locks offer the company's patented Z-Series technology.

The company provides Mold-Ready, custom lengths, as well as corner radii for when a lock pocket is not machined through the full plate width.

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



Control Offers Higher Spindle and Axis Dynamics During Manufacturing Process

Heidenhain Corporation launches the Gen 3 version of its high-end TNC 640 control for machine manufacturers and end users looking for forward-thinking manufacturing capabilities. The control is useful for machines ranging from three-axis milling to five-axis simultaneous machining with milling, turning and grinding operations with up to 24 axes.

The control provides higher spindle and axis dynamics during the manufacturing process, with drives that require less space in its electrical cabinet, resulting in reduced storage, mounting costs and servicing time.

Some feature highlights of the latest generation control include new jig grinding functions, extended workspace compact, optimized contour milling within its "Dynamic Efficiency" package, as well as the ongoing option of a "Dynamic Precision" package. Also, the StateMonitor 1.3 remotely monitors efficiency improvements and ROI of new CNC functions.

Heidenhain Corporation / 847-490-1191 / heidenhain.us

Five-Axis Laser Technology Enhances Services

Wisconsin Engraving Company has added five-axis laser technology to enhance its services. The company can accommodate max workpiece dimensions of 11.811 x 11.811 x 11.811 in (300 x 300 x 300 mm) and weights of up to 330 lbs (150 kg).

Wisconsin Engraving / UNITEX / 262-786-4521 / wi-engraving.com



Modified Grade of Mold Steel Offers Consistent Surface Finishing

Ellwood Specialty Steel Co. introduces a P20 modified grade of mold steel. Improved Lens/Texture Quality (LTQ) alloy offers very consistent surface finishing properties. Recognizing the increased demands for flawless diamond polish finishes on lens molds and complex geometric and delicate texture patterns, the company's metallurgists have engineered a steel that will perform to your most stringent requirements. Employing a newly developed chemistry, state-of-the-art re-melting facilities, a proven forging process and a tightly controlled heat treatment this thru-hardened steel meets all challenges. In addition to consistent surface finishing, the material can be relied on for thermal conductivity, machinability and welding properties.

Ellwood Specialty Steel / 800-932-2188 / ess.elwd.com

Shrink Fit System is Industry 4.0-Ready for Shop Floor Communication

Haimer's power clamp comfort i4.0 shrink fit system sets new standards regarding digital connectivity and communication of tools and machines for manufacturing. Each system comes with a seven-inch touch display and an intuitive software package that provides simplified usability. Features like illustrated functions, clear symbols, larger fonts and a robust color display make for a user-friendly interface. The system is network compatible and Industry 4.0-ready for communication on the shop floor. In the machine shop of the future, data will be the key to making the entire enterprise more efficient and productive. Balancing, presetting, shrink fit equipment and machine tools will interface and communicate with each other.

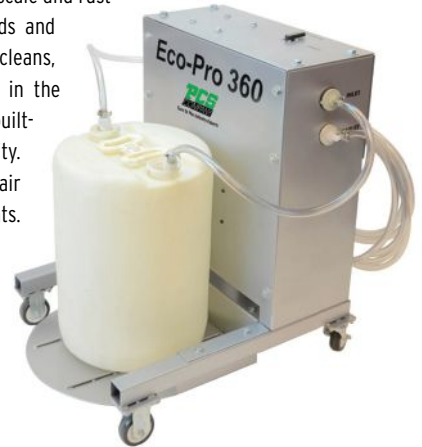
Haimer USA / 866-837-3265 / haimer-usa.com



Descaling Cart and Solution Cleans, Coats and Prevents Corrosion in Cooling Lines

PCS Company, together with iD Additives, announces the environmentally friendly Eco-Pro 360 Descaler Cart and Solution. The descaling cart is a pump and filter combination to remove scale and rust build up in cooling lines of molds and heat exchangers. The solution cleans, protects and helps prevent rust in the cooling lines, and it includes a built-in replaceable filter for reusability. The cart runs off compressed air and has no electrical requirements. It also works on all ferrous and non-ferrous metal surfaces. The solution is water-based, non-hazardous, non-aerosol, non-flammable and is EPA tested and verified.

PCS Company / 800-521-0546 / pcs-company.com



Dry Ice Blaster Provides Versatility in Cleaning Applications

Cold Jet, LLC launches the PCS 60 dry ice blaster, which features the company's patented particle control system. The dry ice blaster precisely cuts dry ice into diamond shaped particles in the exact dimensions chosen by the operator, enabling the user to have a greater degree of versatility in their cleaning applications. With the dry ice blaster, a plastics processor can use one machine to clean many types of surfaces such as injection molds and deburring and deflashing parts.

With a seven-inch LCD color screen and digital controls, the dry ice blaster provides an intuitive display so the user can view, adjust and store blasting parameters and machine settings that are password-protected. It is IoT-enabled via Cold Jet's Industry 4.0 solution, Cold Jet Connect, enabling monitoring and diagnostics. The machine is also automation and integration capable via an optional accessory package, which enables the dry ice blaster to be combined with a robot for continuous and fully automated blasting.

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



AMERIMOLD CONNECTS

Automatic Tool Changer Designed to Increase Production Process Efficiency

Cheto Corporation's automatic tool changer enables automatic switching between drilling and milling for the company's machines. Users can change deep hole drilling tools and also automatically modify the deep hole drilling process mode into the milling one without any manual operator intervention.



Before starting machining, the user can equip drilling tools up to 250 tools and up to five gundrills, and then the machine mills and drills automatically.

The company's developed software covers a range of control options: torque, feed, coolant, pressure and emulsion/oil flow, as well as vibrations. While aiming for efficiency and cost-saving, the software ana-

lyzes and evaluates processes. It then identifies intersections and variations and automatically adjusts the drilling parameters. In doing so, the software enables a continuous production process while protecting tool life.

CHETO Corporation, SA / 351256247970 / cheto.eu

Five-Axis Machining Centers Offer More Complete Production of Precision Hardened Cavities

Mitsui Seiki introduces its Vertex type III five-axis machining center series to complement the company's traditional jig borer, jig grinder, and larger jig mill lines. The high speed, ultra-precision five-axis machining centers enable more complete production of precision hardened cavities and cores, including contour milling, boring, drilling and tapping. The machines can be readily adapted for both electrode and jig grinding types of applications. The line includes three foundational machines to satisfy a broad range

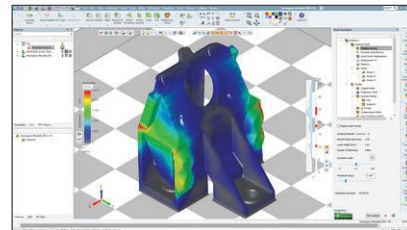


of small to midsize workpieces. All three offer a choice of coolant systems and "lights out" automation solutions for both process and material handling.

Mitsui Seiki (USA) Inc. / 201-337-1300 / mitsuseiki.com

Software Add-On Streamlines Design for Additive Manufacturing Cycle

3D Systems' latest software solution, 3DXpert for SolidWorks 15, prepares and optimizes users' designs for additive manufacturing. This enables users to design complex structures and accelerate the product design life-cycle with better automation and seamless bi-directional data exchange. These enhancements help provide an accelerated path



to design freedom, increased efficiency, reduced total cost of operation and gain competitive advantage for a range of applications and industries.

3DXpert is an add-on for SolidWorks, extending the program's design capabilities with a complete design for additive manufacturing toolset, equipping designers with everything they need to prepare and optimize their designs for 3D printing.

3D Systems / 888-337-9786 / 3dsystems.com

Hybrid Milling Machine Effectively Vents Gas

Matsuura Machinery USA Inc.'s Lumex technology makes effective mold/gas venting possible and improves the quality of molds. Using porous structures in any place, the Lumex Avance series enables the user to anticipate potential molding problems, such as gas burning and poor weld line formation, then address them by promoting quality improvements and reduced mold development cycles.

The machines enable air permeability to be controlled freely by creating a porous structure, simply by adjusting the density of the built part. Users can expect reductions in fill time, fill pressure, prevention of uneven filling and elimination of gas burning.

With Lumex technology, users can build inserts layer by layer, incorporating many micro-pores through which gas can escape, without adversely affecting the quality of the tooling surface. The inserts are 3D laser sintered in steel or other metals, to match the exact requirements of each injection mold tool. The dimensions and characteristics of the gas escape channels are optimized to reduce cycle times and boost productivity, while maintaining high levels of part quality, even for extremely complex designs.

These porous inserts can be manufactured into any 3D shape, facilitating reduction of lead-times, removing challenges produced by gas traps, and maintaining part quality and productivity.

Matsuura Machinery USA, Inc. / 651-289-9700 / matsuurausa.com





Sourcebook Publication Provides Access to Valuable Resources

The **American Mold Builders Association** announces that its annual 2020 Sourcebook publication is available in both a digital and hard copy format. The 2020 Sourcebook provides professionals in the mold manufacturing industry access to valuable resources necessary for doing business.

This year's all-new digital version makes connecting easy and includes embedded website and email address

hyperlinks for all member and supplier listings, as well as within all display ads.

Readers can access U.S. mold manufacturers, suppliers to the trade, geographic member listing by state, member capabilities and industries served and instant connection opportunities.

American Mold Builders Association / 317-436-3102 / amba.org

Mold Controllers with Virtual Network Computing Enables Remote Access

Husky Injection Molding System's Altanium mold controllers are now available with virtual network computing (VNC) options. VNC is a screen sharing technology that enables remote access and control of another computer through transmitting all touchscreen movements from the controller to a client computer, such as an injection molding machine's operator interface. This enables one computer within an injection molding cell to become the central point of control for the entire operation. Centralizing user interactions with molding equipment increases productivity by reducing movement between different devices critical to the molding processes. This setup also maximizes floor space.

Available with the Altanium Delta5 and Matrix5, VNC brings rich feature sets supported by these operator interfaces right to the machine's screen. This opens the possibility to supplement or replace the integrated hot runner controller of the injection molding machine with an Altanium mold controller, increasing processing capabilities by applying Altanium's active reasoning technology to control the hot runner system.

Husky Injection Molding Systems / 802-859-8000 / husky.ca



Remote Validation Kit Expedites Qualifying Process

Progressive Components reveals its remote validation kit, which enables tooling engineers to validate their tools remotely. The kit is a plug and play tool that provides real-time data by connecting the portable system to a C/E monitor on the mold. Then, info is accessible from across the plant or around the world.

The kit improves the PPAP or IQ/OQ/PQ approval process to help speed molds into production. Additional benefits include reducing or eliminating the need for tooling engineers to drive or fly back and forth to suppliers' sites to validate tools; tooling that can move into production even if the customer can't travel on-site; a virtual file cabinet for mold documentation, activity reports and process sheets; and an expedited qualifying process following the tool build.

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

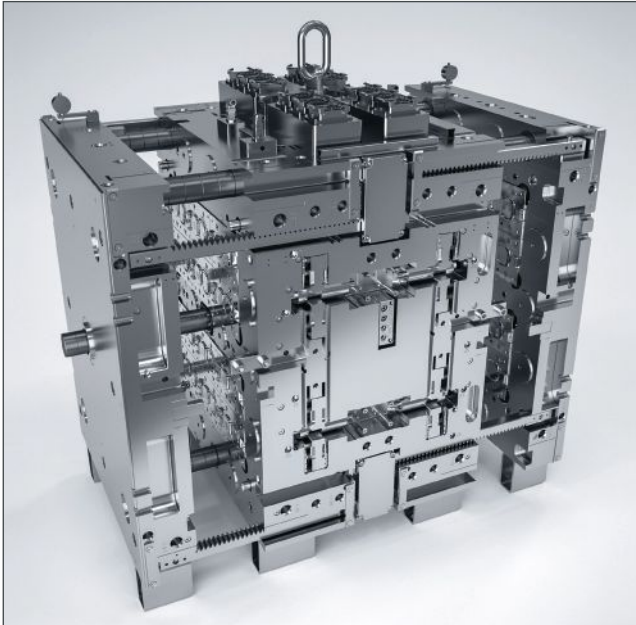


Hands-On Laser Welding Machine Offers Versatility and Flexibility

Alliance Specialties and Laser Sales offers the ID1-Fiber, a hands-on laser welding machine. Every part of the machine is easily adjustable to enable versatility and flexibility to meet demands. Because it is created to be manually adjusted, the machine has eliminated virtually any and all possibility for mechanical failure. The machine features a smaller footprint to fit most any shop space, purer power per application and requires almost no maintenance, which means less downtime resulting in greater efficiency.

Alliance Specialties and Laser Sales / 847-487-1945 / alliancelasersales.com

AMERIMOLD CONNECTS



Turnkey Mold and Tool Solutions Are Delivered Ready for Production

Roth Mold + Automation Inc. offers the manufacture of high-precise and turnkey mold and tool solutions. A quick payback, environmental benefits and an increase in productivity are some of the key drivers for each project. The family-owned business combines traditional, highly experienced craftsmanship with a cutting-edge technology in designing and producing high-quality and "made in Germany" molds and tools for injection molding, avoiding readjustment and running-in times. Solutions are delivered ready for series production, which ensures a trouble-free and smooth manufacturing start. The company has a broad field of experiences within several industries, including automotive, packaging and medical appliances.

Roth Mold + Automation Inc. / 248-419-4332 / roth-mold.com

Engineering Department Focuses on Design for Assembly and Tool Cost Savings

Best Tool & Engineering Company, Inc. provides engineering services, tool manufacturing, injection molding and plastic bonding services in the form of vibration welding and hot-plate welding. The company has a fully staffed engineering department to focus on design for assembly and tool cost savings. Tooling is manufactured in house utilizing the current five-axis CNC technology and wire EDM capability. The company also provides linear vibration welding and hot-plate welding tooling. Part designs are reviewed for best practices in this discipline prior to tool build. The company can also supply finish molded parts to 500 US Ton, with secondary vibration and hot-plate welding operations.

Part designs are reviewed for best practices in this discipline prior to tool build. The company can also supply finish molded parts to 500 US Ton, with secondary vibration and hot-plate welding operations.

Best Tool & Engineering / 586-792-6500 / bteplastics.com



Round Latch Lock Units Enable Optimum Movement

HASCO has developed the round latch lock units Z1780/ and Z1782/ especially for applications when a second parting line or additional ejector plate is necessary. For example, on three-plate or molds with dual ejector assemblies to enable defined movement and latching of the moving plates. The compact round latch locks have multipoint locking around the circumference, enabling optimum movement. The round latch locks with pulling and pushing action can be mounted in many different ways.

HASCO America, Inc. / 877-427-2662 / hasco.com

Pump/Filter System Provides Fast, Eco-Friendly Rust Removal

iD Additives, Inc. introduces the newest addition to its Eco-Pro 360 line of rust removal and preventative products. The Eco-Pro 360 XL Cart is a mobile, heavy-duty integrated pump/filter system for cleaning internal cooling passages in molds and other products. It works with the company's iD Eco-Pro 360 solution, which provides fast, eco-friendly rust removal on injection molds, heat exchangers, blown film dies and other products. The XL Cart more than doubles the output of the company's standard Eco-Pro cart and is ideal for larger molds and chill rolls for extrusion.

iD Additives, Inc. / 708-588-0081 / idadditives.com



Guided Drill Addresses Large Component Challenges

Allied Machine & Engineering announces the guided T-A drill for moldmaking applications. The drill addresses two major large component challenges of tool failure in deep cross-holes and unsuccessful chip evacuation. The drill minimizes the clearance between the holder and blade and maintains increased stability in deeper holes. It incorporates guided wear pads for straightness and stability and two adjustable Torx Pkus screw pins for TIR reduction through a simple diameter adjustment. These details enable the guided T-A to drill up to an 84" depth of cut, while producing balanced cutting forces and small chips for optimal evacuation.

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

Automation Technology Enables Flexible Capacity Adaptation

Grob Systems Inc.'s automation technology enables flexible adaptation to capacities and guarantees coordinated pallet handling. The company offers self-made automation components for its entire product range, from semi-automatic to fully automatic production. The automation solutions ensure an efficient production process and guarantee optimal workpiece handling. All fully automatic technologies can be adapted to specific customer needs.

The linear pallet storage system (PSS-L) is ideally suited as a modular system for individual machines or for interlinking multiple Grob machining systems. With it, up to five machine tools can be connected to a pallet storage racking with a maximum of 87 tool pockets. A significant increase in machine utilization and economic production can be achieved and a longer unmanned production period can be made possible.

PSS-L is a modular, expandable system consisting of at least one basic module. It is also system-flexible and can be expanded by up to four extension modules and additional setup stations. The basic and extension modules are available with up to three storage levels and ensure a fast pallet change thanks to a dynamic shuttle transfer system. The accessible setup station can be flexibly extended and positioned, with the possibility of crane loading; it also features a modern, flexible production control software with 24-inch touch screen panel that visualizes and organizes production orders. Other advantages of the PSS-L include a high storage capacity with a small footprint, a cost-conscious acquisition investment and visibility into the work space and the pallet storage locations.

GROB Systems Inc. / 419-358-9015 / grobgroup.com/en



Cutting Tools Ideal for Surface Accuracy

OSG USA Inc. releases two products to the A Brand master tooling class. The A Brand ADO-Micro Drills provides better chip evacuation in the medical and electrical industries, and non-step drilling is made possible even for deep-hole applications, enabling high processing efficiency. For the die mold industry, the A Brand AE-H series offers heat resistance and toughness for high-hard steel milling. Its geometry enables milling by point, which prevents chattering and chipping, resulting in improvement of surface accuracy.

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



Cloud-Based Asset Management System Provides Online Filing Cabinet

To reduce tooling managers from using multiple systems to keep track of tools, **Progressive Components** has developed ProFile, a cloud-based asset tracking program. The system consists of Asset Tags with a unique QR code that connects a mold's information to those who need it.

The ProFile asset management system provides an online filing cabinet with a capacity of 10GB to store and share essential documents promoting collaboration with all stakeholders. Individual asset pages display a GPS map of the last asset scan location. The system can use existing maintenance worksheets or use PM worksheets provided. In addition to tracking molds, assets can include dies, fixtures and molding machines.

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

Shop Tackles Complex Projects with Technology Arsenal

Precise Tooling Solutions offers high quality tooling with state-of-the-art five-axis machining centers and the latest design software to meet evolving customer expectations and reduce setup and machining times, while improving CNC project quality and consistency. The company builds a broad spectrum of tooling, and the majority of its new tools are for automotive lighting companies, especially those launching LED products.

Precise Tooling Solutions / 812-378-0247 / precisetooling.com



MOLD DESIGN

3 Simple Strategies of Scientific Injection Molding

By Mike Busser

Applying scientific injection molding principles to parts upfront in the manufacturing process will help to ensure an optimized part and a robust mold design. The inputs will inform the mold design and build, and allow for optimal processing conditions and part conformance. Here are three simple strategies of scientific injection molding.

Simulation

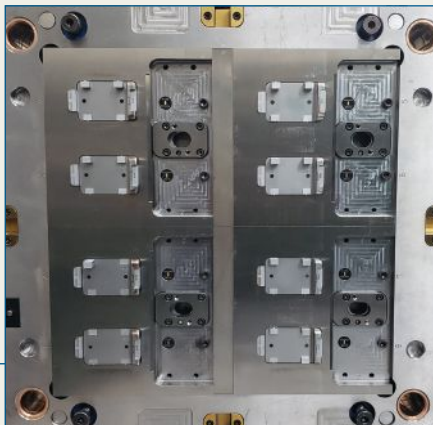
Before you design a mold, assess the part. One of the most impactful ways to do this is by incorporating scientific injection molding into the process and running mold flow simulations on the part to help inform the tool specifications. This process is called design of experiment (DOE) simulation, and it looks at fill, warp, shrinkage and cooling.

You can repeat the virtual DOE simulations as many times as necessary, applying different variables each time to see how the part will be affected during the molding process. The simulation will note any design flaws and identify ideal gating location, which helps to enhance both part design and tool design. Collectively, the data you obtain during this upfront process will provide the inputs and specifications for the mold.

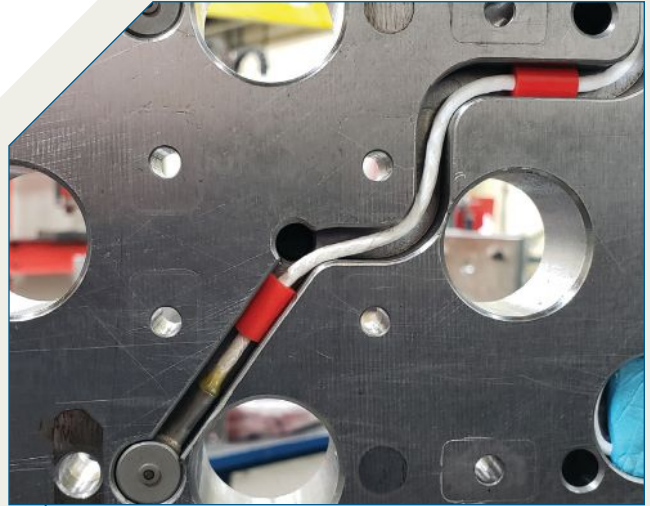
Scientific injection molding is especially critical to ensure part compliance for complex parts with high tolerances, thin walls or multiple cores. Incorporating more science upfront will help ensure that you build an optimal mold from the start.

Sensors

A moldmaker can also build a mold to include pressure and/or temperature transducer sensors, taking scientific analysis even further. Sensors are small pins that send data to a central computer when



Pressure pin on the A side of a mold.



Images courtesy of Evco Plastics.

Mold builders can take scientific analysis even further by including pressure and/or temperature transducer sensors in their molds.

triggered by a specific pressure or temperature. The data allow engineers to “look” inside the mold while it’s running, providing real-time feedback. This instantaneous feedback allows the process engineer to adjust every single shot in real-time, enhancing overall part quality.

Molds are more likely to have flaws that can delay time-to-market and reduce overall part quality if scientific injection molding is not used. Scientific injection molding helps mitigate the likelihood of pulling a mold to manage steel changes, welding needs or reburning. These are costly delays that slow down production and delay order fulfillment.

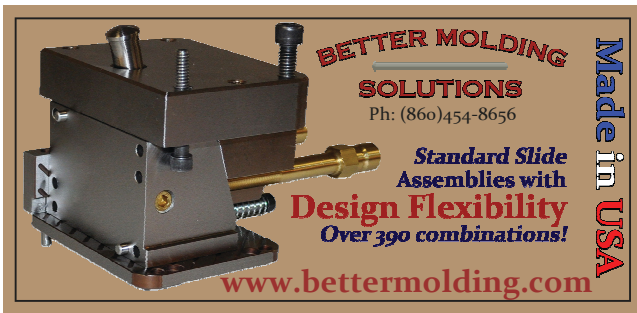
Savings

With a little extra technology, analysis and cost upfront, a manufacturer can save money in the long run. An optimized part and a well-designed and built mold can make everything easier during the production schedule, and the long-term return on investment is substantial. Incorporating scientific injection molding can eliminate the occurrence of defects, reduce the cycle time and get parts into market faster.

As the workhorse of a project, a mold is a prudent place to invest time and money. Obtaining and working with valid criteria from the onset will provide the foundation from which to build a sound tool and yield positive results throughout the part run. [MMT](#)

FOR MORE INFORMATION

Evco Plastics / 800-507-6000 / evcoplastics.com
Mike Busser, Innovation Center Process Engineer



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THIS MONTH ON SOCIAL MEDIA



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Have you seen MMTChats, where Christina Fuges video chats with moldmaking industry #mfgheroes about how they're handling the #COVID-19 crisis? Catch up on them now!
[Instagram.com/moldmakingtechnology](https://www.instagram.com/moldmakingtechnology)

YouTube Videos
See what true high speed and true high precision can produce, and learn what makes high speed machining different from traditional milling.
[youtube.com/c/moldmakingtechnology](https://www.youtube.com/c/moldmakingtechnology)



Conversations
The #COVID-19 pandemic has presented challenges to every link in the mold manufacturing supply chain and those companies in a position to help have put their teams and processes to the test.
[Linkedin.com/company.moldmakingtechnology](https://www.linkedin.com/company.moldmakingtechnology)

Popular Posts
As the COVID-19 crisis has deepened, this shop has been addressing the need to fulfill a growing PPE backlog by not only turning to 3D printing, but by also connecting with its local community.
[facebook.com/moldmakingtechnology](https://www.facebook.com/moldmakingtechnology)



Hot Tweets
Help our boy Phil by submitting your funniest answers to his questions for our #IfAMoldCouldTalk campaign!
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Cutter Considerations for Hybrid Additive Manufacturing

By Dan Doiron

One of the significant advantages of using hybrid additive manufacturing (AM) is the cost-savings associated with reducing machining waste/scrap. Consider a machinist placing a block of steel weighing 100 pounds into a CNC machine and the finished manufactured part weighing only 25 pounds. That is 75 pounds of scrap being tossed in the chip bed! The cost of material, logistics, time and scrap disposal all add up. For these reasons alone, it may be time for your shop to take a closer look at hybrid additive manufacturing.

One important aspect of any hybrid AM system is the cutting tool technology. Cutting tools have evolved to support the subtractive part of the additive process and offer geometric shapes and coatings relative to the layering process with the abrasive properties and toughness of the sintering procedure.

For optimal results, select end mills specially designed with the right geometries, tool material and coatings that are suitable for machining molds and components that have been additively manufactured.



Image courtesy of Matsuura Machinery USA.

Hybrid additive machining facilitates new design possibilities, such as a one-piece design of a component, complex internal structures or material properties.

Applications include a range of materials such as tool, stainless and cobalt chrome steels, nickel-chrome-iron, titanium and aluminum alloys.

Here are four tips for applying the right cutting tools in hybrid additive manufacturing:

1. Ball-nose and radius end mills with a special neck design, cutting edge contour and coating are good choices. A pre-milling end mill with ball-nose geometry targets roughing and pre-finishing operations in order to produce a specific machining allowance on the additively manufactured component. The machining direction here is from top (Z+) to bottom (Z-).
2. A finishing cutter, also with ball-nose geometry, is recommended for finishing operations in construction layers no longer subject to thermal stress. The cutting area of the tool should be designed so that pull machining from bottom (Z-) to top (Z+) is possible in order to finish the material layers that are no longer thermally stressed.
3. A “back taper” radius end mill is suitable for 2D machining of undercuts on the component. Its specifications are aimed at pre-finishing and finishing applications on additively produced components.
4. Some hybrid additive manufacturing applications may require solid carbide micro end mills that are designed to meet the unique and demanding requirements of micromachining applications. In this case, micro end mills with a specific neck geometry enable the optimal application of these tools even in deep contours. A high radial bending strength allows the tools to withstand alternating radial stress on the cutting edge and on the relieved neck during the machining process. A newly developed ALCR coating provides exceptional wear resistance for long tool life. **MMT**



Image courtesy of EMUGE Corp.

Select end mills that are specially designed with the right geometries, tool material and coatings that are suitable for machining molds and components that have been additively manufactured.

FOR MORE INFORMATION

Emuge Corp. / 800-323-3013 / emuge.com
Dan Doiron, Milling Product Manager



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