

Modern Machine Shop

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IMTS 2026 Editors' Picks

A selection of attractions and events you won't want to miss **pg. 74**

Large-Scale Turn-Mill Advances

Technology and process innovations lead to sizeable gains **pg. 66**

Metalworking Index Extends Expansion

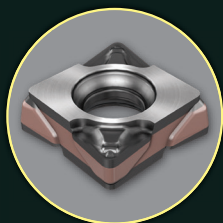
Production and new order wins keep optimism firmly intact **pg. 34**

Where Can Software Replace Tooling?

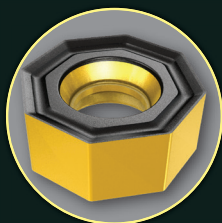
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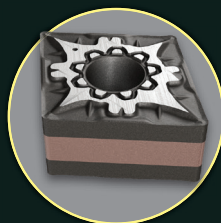
MAXOUT



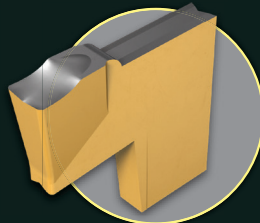
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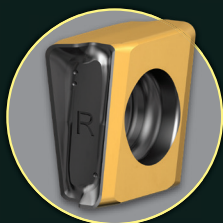
HELI-DO



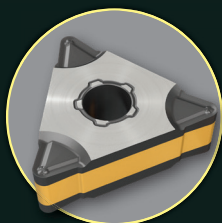
ISO-TURN



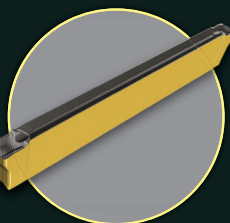
TANG-GRIP



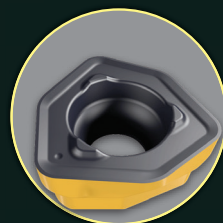
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LOGIQ-6-TURN



DO-GRIP XL



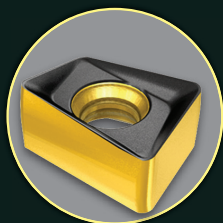
MICRO-3-FEED

MORE

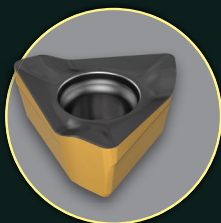
PERFORMANCE
PRODUCTIVITY
PROFITABILITY

MINIMUM COST

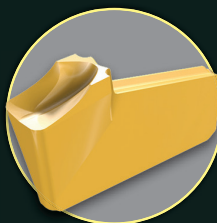
MAXIMUM OUTPUT



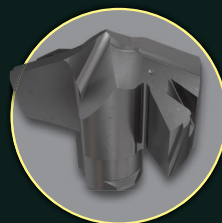
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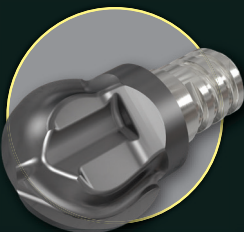
HELI-3-MILL



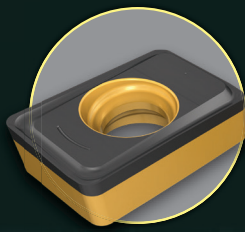
SLIM-GRIP



SUMO-CHAM



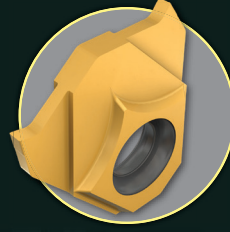
MULTI-MASTER



QUICK-D-MILL



PENTA-CUT



QUICK-2-CUT



SCAN ME

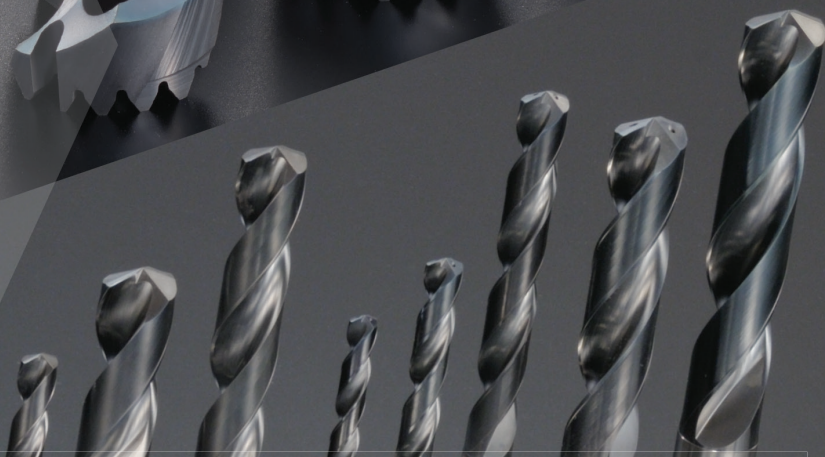




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46 AUTOMATION

Tooling-Free Forming Enables Flexible Factories



Machina Labs' RoboCraftsman forms parts autonomously and without dies. But sheet metal fabrication is just the first step for these AI-powered robotic production cells.

BY JULIA HIDER

CAD/CAM

56



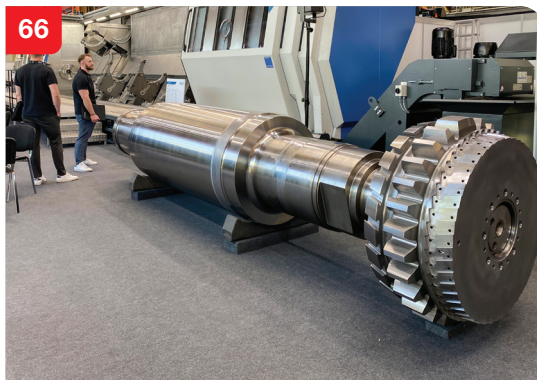
Associative CAD/CAM Increases Shop's Productivity Fivefold

Fully integrated CAD/CAM and revision control have enabled Willis Custom Yachts to confidently perform lights-out work for a fivefold productivity gain.

BY EVAN DORAN

TURN-MILL TECHNOLOGY

66



Seeing Advances in Large-Scale Multitask Machining

At a recent open house, WFL Millturn Technologies highlighted new forms of automation, tooling and process control for its sizeable turn-mill equipment.

BY DEREK KORN



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West Building, Level 3 — 431722 — Tooling & Workholding

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IMTS 2026

IMTS 2026 Editors' Picks

In addition to more than 1,800 exhibitors, IMTS 2026 features a packed schedule of attractions and events. Here's what the editors of *Modern Machine Shop* think you shouldn't miss.

BY MMS EDITORIAL TEAM

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| ABOUT OUR COVER | *Where Can Software Replace Tooling?*

Not only does traditional sheet metal forming require machines but it also requires tooling for those machines, which can increase costs and lead times, especially for high-mix, low-volume parts. Machina Labs uses AI-powered robots to fabricate large sheet-metal parts without the use of tooling.

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MARKET VP, METALWORKING GROUP

Bryce Ellis

bellis@gardner.media

EDITORIAL

EDITOR-IN-CHIEF

Brent Donaldson

bdonaldson@gardner.media

EXECUTIVE EDITOR

Julia Hider

jhider@gardner.media

SENIOR ASSOCIATE EDITOR

Evan Doran

edoran@gardner.media

CONTRIBUTING EDITOR

EDITOR-IN-CHIEF, *PRODUCTION MACHINING*

Derek Korn

dkorn@gardner.media

MANAGING EDITOR

Chris Pasion

cpasion@gardner.media

SENIOR ART DIRECTOR

Claudean Wheeler

cwheeler@gardner.media

CONTENT MARKETER

Cara Ready

cready@gardner.media

MARKETING COORDINATOR

Emma Deters

edeters@gardner.media

EDITOR EMERITUS

Mark Albert

malbert@gardner.media

CORPORATE

Richard G. Kline CHAIRMAN

Richard G. Kline, Jr. PRESIDENT

Kerry Gumas EXECUTIVE VICE CHAIRMAN

Melissa Kline Skavlem CHIEF GROWTH OFFICER

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ADVANCED MATERIALS AND PROCESSES

Debi Williams DIRECTOR, GROW CONTENT SERVICES

Bill Caldwell DIRECTOR, CUSTOMER SUCCESS

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**21**
MIN.**VIDEO | Shop Tour: Integrity Tool**

How does running a cattle farm relate to running a machine shop? Jeff Lewis of Integrity Tool knows — he runs a shop on a farm. Join Editor-in-Chief Brent Donaldson as Lewis and his team walk us through how they run both businesses.

WATCH: gbm.media/ShopTour0926

**4**
MIN.**ARTICLE | 4 Ways to Streamline Part Programming**

On page 56, Senior Associate Editor Evan Doran covers how Willis Custom Yachts leveraged Siemens NX features to cut programming times and improve productivity. For more about productivity-boosting programming features, check out the linked roundup of recent coverage.

READ: gbm.media/Programming0926

**8**
MIN.**ARTICLE | Physical AI Simplifies High-Mix Automation**

On page 46, Executive Editor Julia Hider discusses how Machina Labs uses AI-powered robots to perform forming without bespoke tooling and dies. AI technology can expand robots' potential uses, too, as Hider covered in this linked article about Path Robotics' AI-powered automated welding solutions.

READ: gbm.media/Robots0926

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The Paper Bag and the Digital Twin

In 1936, the first Bridgeport was sketched on a paper bag in a parked truck. Three companies recently featured by *Modern Machine Shop* show how much of that same judgment has moved into software and automated systems. A fourth shows where it hasn't.



bdonaldson@gardner.media

Brent Donaldson
EDITOR-IN-CHIEF

The internet's favorite Picasso quote, "Inspiration exists, but it has to find you working," may be entirely fabricated, but it still rings true in the case of Rudolph Bannow. One day in 1936, Bannow was out on a delivery for his pattern shop in Bridgeport, Connecticut, when he landed on an idea: build a machine around the high-speed milling head his company already produced. He sketched the idea right there in his truck on the nearest piece of paper at hand — a paper bag.

Two years later, on August 8, 1938, he sold the first machine built to that sketch to Precision Castings Corp., a foundry in Syracuse, New York. The shop building it didn't own a number punch yet, so someone had to hand-chisel the "1" into the casting. That machine, Bridgeport Serial No. 1, is being featured in Gardner Business Media's booth at IMTS this month, parked next to a 2026 Bridgeport built to the same basic layout. Huge thanks to our friends at the American Precision Museum for making this happen.

Bannow's paper bag is a reminder of how much manufacturing used to hinge on one person's skill and instinct — no drafting department, no engineering review, just his own judgment. Three companies featured in the September 2026 issue of *MMS* — Willis Custom Yachts, Machina Labs and WFL Millturn — are each moving a piece of that reliance out of someone's head and into a machine: Associative CAD/CAM closes the gap between a designer's intent and machining ops, AI-guided robotic forming replaces a machinist's feel for how sheet metal deforms, and an automated tool changer eliminates the manual stop that used to interrupt an internal cut. Each company has achieved a remarkable result because of it.

As *MMS* Senior Associate Editor Evan Doran reports, Willis Custom Yachts builds sportfishing

boats priced from \$2.5 million to \$25 million, holding tolerances around 0.008 inch on hulls with almost no flat surfaces. Every build is different, and tolerance stack-up between the design department and the shop floor used to throw off the schedule on nearly every job. Adopting Siemens NX's associative CAD/CAM allowed design changes to port directly into the machining program, with the software flagging any operation that no longer matches the updated geometry. Willis' own numbers improved drastically — productivity up more than 500%, scrap down more than 95% and delivery times down 50%. That gain also let the CNC department spin off as Willis CNC Solutions, taking on outside contract work the company now has capacity for.

Meanwhile, *MMS* Executive Editor Julia Hider explains how Machina Labs removes tooling from the equation. Its RoboCraftsman cells use two robots with stylus-like end effectors that form sheet metal directly, guided by AI that determines how the robot should manipulate the part to reach the target shape. There is no die and no mold, and the company is direct about that trade-off: A stamped part might take seconds once the die exists, while a RoboCraftsman part takes 30 minutes to a few hours. The economics change, however, once the cost and lead time of building the die get counted, particularly below stamping's volume threshold. This is why Toyota is using the process to mass-customize Tacoma tailgates and hoods — there is no longer a need to make \$100,000 molds for each customized truck. Machina Labs already runs 16 cells across two shifts and is building a third facility with 50 more, expected to add roughly 115 jobs.

Derek Korn, longtime *MMS* writer and editor-in-chief of sister brand *Production Machining*, »

Methods

BOOTH #339033

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YOUR ONE STOP SHOP

14

MACHINES ON DISPLAY

6

USA MACHINES DEBUTS

7+

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shows us how WFL Millturn applies the same logic one setup at a time. Its large multitasking turn-mills, built for turbine shafts, aircraft components and military and marine parts, used to require manual tool changes whenever an angle head handled internal machining. WFL automated that swap through the machine's central tool changer, so deep cavities, ribs and threads that once needed multiple specialized tools and hand intervention now run unattended.

Not every kind of judgment has moved into software. In the latest "How I Made It," David Wynn's

account of his family's screw machine shop shows where that shift falls short. Wynn spent seven years running Brown & Sharpe machines under his grandfather, who had 60-plus years on that equipment and zero patience for anything that didn't meet his standards: "When I would grind a cutoff tool, he would send me back to the grinder if it did not have a mirror finish," Wynn says. Seven years wasn't enough on its own. What closed the gap was Swiss-type machining, adopted after Wynn's family joined PMPA and gained access to the mentor relationships that came with it — a trans-

fer of judgment that happened through people at a conference rather than through code. Wynn now runs PMPA's technical services department. Willis, Machina Labs and WFL are systematizing decisions that used to require an expert's hands, while PMPA's mentor network is doing the same job for the decisions that don't systematize as easily.

It will be interesting to see the two Bridgeports side by side at IMTS this year and think about how much decision-making between a drawing and a finished part has moved from the operator's head onto a screen — CAD/CAM associativity, robotic form control, automated tool changing — and how much hasn't. The company Bannow started went on to build more than 250,000 of the machines he sketched on his paper bag. Willis, Machina Labs and WFL show where the line on that decision-making is moving now. Wynn's grandfather, and the PMPA network that took over his role, show where it still hasn't. ■



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How to Take Compound Measurements With a Digital Caliper

A digital caliper's zero function enables the user to take compound measurements, producing a result that would otherwise require arithmetic or a second tool.

PAUL MAILLOUX | CONTRIBUTOR

The four basic measurements a user can take with a digital caliper are outside, inside, depth and step. But let's take it a step further and add other measurement functions that the electronic digital caliper can perform.

The key is the zero button. Unlike a traditional caliper where zero means the jaws are closed, an electronic digital caliper can be zeroed at any point in its travel. This enables the user to set a known dimension as the reference point and let the caliper calculate the difference.

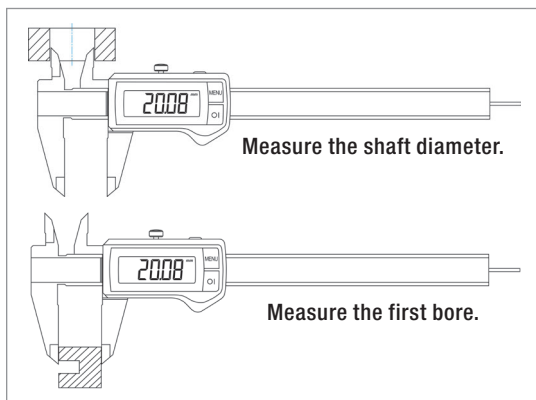
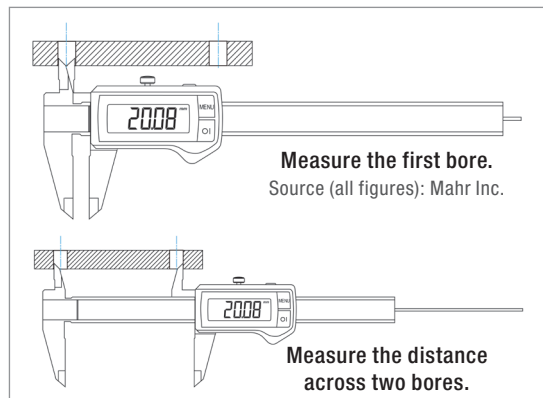
The result is compound measurements, where two separate measurements are combined to produce a result that would otherwise require arithmetic or a second tool.

Here are examples of compound measurements:

Finding the Distance Between Two Bore Centers

Because a user can zero an electronic digital caliper at any point, it can be used to do some of the arithmetic required for compound measurements. Use this procedure to measure the center distance between two bores of equal diameter:

- Use the inside jaws to measure the diameter



of one of the bores. Before removing the caliper from the bore, press the button to zero it while it is set to the hole diameter.

- Still using the inside jaws, measure the distance between the far surfaces of the two bores. The caliper reading will be the distance between the centers of the two bores.

Measuring Bore-to-Shaft Fit

Are you comparing a bore to a shaft, or needing to make a shaft or pin to fit an existing bore? Or are you boring a cylinder to fit a piston? An electronic caliper can be utilized to read the size difference directly by following these steps:

- Use the inside jaws to measure the diameter of a bore. Before the caliper is removed from the bore, press the button to zero the caliper while it is set to the diameter of the bore.
- Use the outside jaws to measure the shaft. A positive reading shows that the shaft is larger than the bore. A negative reading shows that the shaft is smaller than the hole and will fit. The caliper shows how much material needs to be removed from either the shaft or the bore to make them fit.



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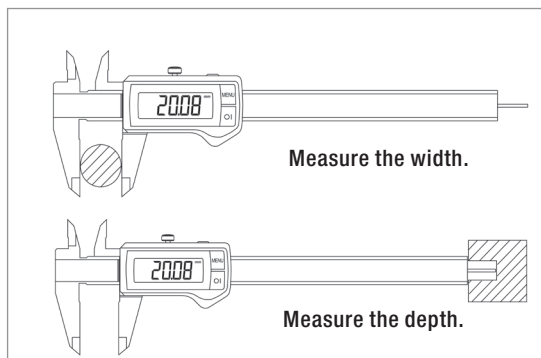


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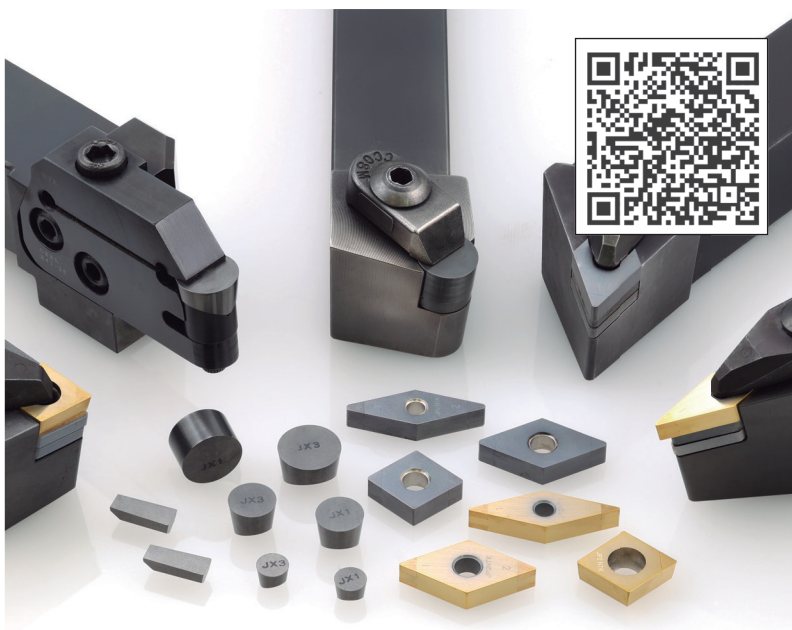
Measuring Remaining Thickness

When you need to put a bore in a workpiece that does not go all the way through, you might want to know how much material remains between the bottom of the bore and the other side of the workpiece. An electronic caliper can display this distance.

- Use the outside jaws to measure the total thickness of the workpiece. Before removing the caliper from the workpiece, press the button to zero it while it is set to the workpiece's thickness.
- Now use the depth rod to measure the depth of the bore. The caliper reading (shown as a negative number) is the remaining thickness between the bottom of the bore and the other side of the work piece.

The zero function on an electronic digital caliper is more than a convenience. It can help transform a simple measuring tool into a versatile shop calculator. By zeroing the caliper at a known dimension, a user can let the tool do the math, whether to locate bore centers, check shaft-to-bore fit or confirm remaining wall thickness before a critical cut.

These compound measurement techniques only scratch the surface of what's possible. As you become comfortable using the zero function creatively, you will find ways to apply it to unique measurement challenges, saving time, reducing the chance of arithmetic errors and getting more out of an existing tool in the portfolio. 



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Here's how to use the CAM system itself as the place to organize your thinking and hand it off so anyone in the shop can understand its intent.

JOHN MILLER | COLUMNIST

READER QUESTION: *Is there a better way to build our CAM files so the entire shop can understand the programmer's intent?*

I have been doing more contract programming lately, and it has changed how I build files. When you are in the building, you can get away with a lot. Someone walks over and asks what you meant, and you tell them. When you are not in the building, you find out quickly that a setup sheet does not carry intent. It carries some basic process facts like the tool list, stock size, work offsets and fixture. All necessary, but none of it is enough. So, I started using the CAM system itself as the place to organize my thinking and hand it off. The way I know it is working is that I stop hearing from people in a “no news is good news” sense, because it means the work is getting done instead of waiting on me.

Here is the thing that reframed it for me: Your intent has two audiences, and only one of them can open the file. The first is anybody in the shop with CAM access. This could be another programmer, or even yourself when you pick up a rerun from two years ago. They see your operation tree, layers and notes. The second audience is the operator at the control, and that person generally just sees posted code. Every bit of organization you built inside the CAM system evaporates at the post unless you deliberately push it through.

This matters more as files get bigger. Ten operations, a few hundred tool paths, 50-plus tools and a part that moves between machines or even machine types on its way to done. At that size, nobody is really reading the file; they simply navigate it. Everything that follows is about making it navigable for both readers.

Naming Operations for What They Do

In CAM, start with your operation groups and name them by purpose rather than by tool or

sequence number. This could be titles like Roughing 1, Roughing 2, General Hole Making or Critical Features.

Not every part reduces to rough and finish. Plenty of work needs bulk material off while the part still has enough structure to hold, then some features finished, then back to more roughing once the geometry allows it. If your groups are named for what they are accomplishing, the sequence explains itself. Someone opening the file sees the strategy before they click into a single tool path.

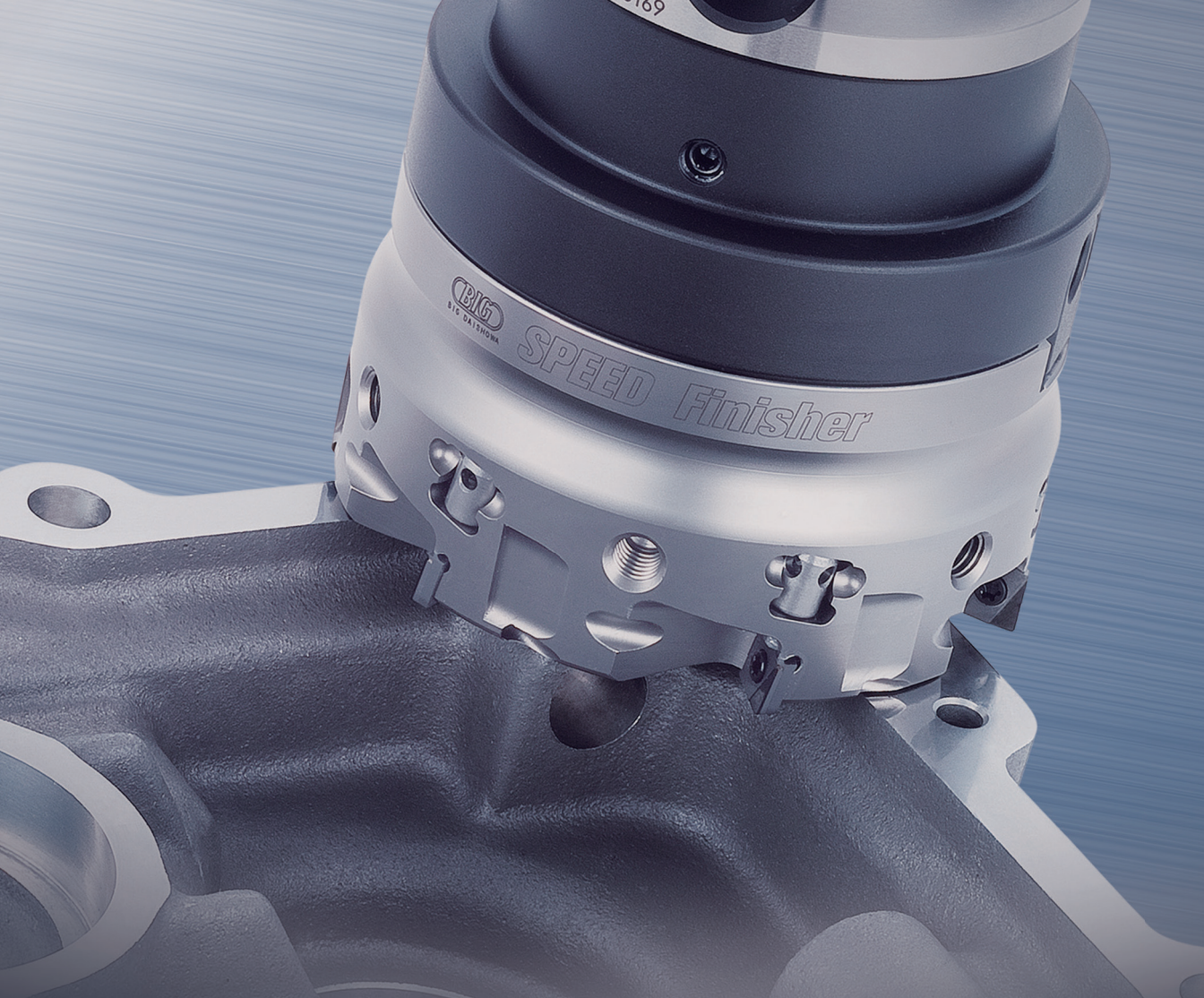
The bigger payoff is diagnostic. When a dimension goes bad, a named group tells you where to look and, just as usefully, where not to. If you gouge the part towards the end of the process on a critical surface, finding that path in “Critical Features” is a small search versus scrolling through a dozen tool paths all named “Contour.”

Layers as Instructions, Not Just Visibility

Most of us already use layers for stock models, toolholder geometry and cleaning up the screen. Name those coherently and you have communicated something before anyone reads a word of your notes. But layers do not have to hold geometry. You can build a layer that contains nothing but text and work instructions, and name it exactly that. “Op1 Vise Setup,” holding an arrow pointing to where the work coordinate origin lands and a note on how to pick it up. That instruction now lives in the same file as the geometry it describes, at the same scale, in the same orientation. It cannot get separated from the job, and it cannot be misread the way a written description of a location often is.

Manual Code Entry, the Part that Survives the Post

Most CAM systems let you insert manual code between tool paths, and this is the best way to push programmer intent to those who may only see the resulting program. First, you can just add »



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comments to match the stages of the program the same way the operation groups do to say the specific thing you would say if you were standing there. Someone scrolling through the code gets a general sense of the stages the part is meant to work through. Second, you may have code you intend to execute. Program stops, probing routines, tool setting and breakage checks are all typical. Lastly is commentary aimed at operator intervention. Comments placed after an M00 will generally display under the stop on the control. A macro popup does something similar with a more

direct message on-screen, acting like a stop and clearing on cycle start. Either way, the person running the part gets the instruction, rather than being buried in a setup sheet they closed an hour ago.

Build Them to Be Removed

Here is the discipline that keeps this from turning into clutter. I tie a comment or a stop to a specific concern I have about the process, and I expect the end user to delete or suppress it once that concern proves unfounded. On the first part, a reminder that chips may be packing in a deep

pocket is worth having. If it turns out that pocket clears fine every time, a forced stop there is just an interruption charged against every part from then on. The operator has better information than I did when I built the file, and they should be free to act on it. That expectation is what makes the notes welcome instead of ignored.

What Gets Handed Off

None of this is exotic. Group names, a layer of text or a few lines of manual code are all things you already do. Point them at the operator instead and the file stops being a place you store your work and starts being how you say what you meant. 📄

Do you have a machining question? Ask the expert. John Miller leans on more than a decade of industry experience to answer machining questions from *MMS* readers. Submit your question online at mmonline.com/MillersEdge.

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Owner, Way of the Mill LLC

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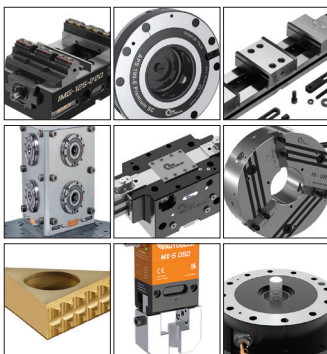


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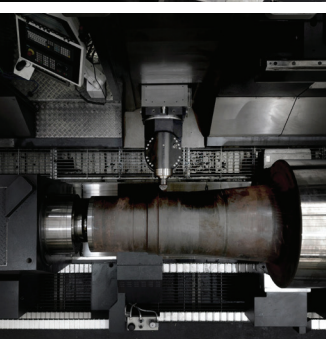
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How Tool Vibration Affects Turning Stability

The physics behind chatter and how stability maps can help you choose the right cutting conditions.

TONY SCHMITZ | COLUMNIST

In turning, the cutting tool is not rigid, so the cutting force causes tool vibration. When the tool is vibrating as it removes material, these vibrations are imprinted on the workpiece surface as a wavy profile. When the workpiece begins its second revolution, the vibrating tool encounters the wavy surface produced during the first revolution. Therefore, the chip thickness at any instant depends both on the tool deflection at that time

FIG. 1: The figure demonstrates the instantaneous chip-thickness calculation. It depends on the mean chip thickness, the current deflection, and the vibration during the previous revolution of the workpiece (to the left of the tool).

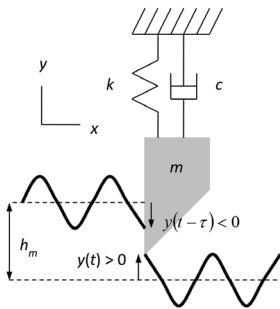
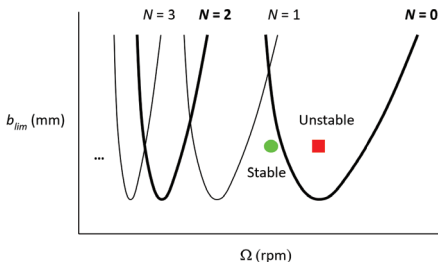


FIG. 2: Example stability map. The stability boundary separates spindle speed-chip width combinations (below the boundary, marked as a green circle) from unstable pairs (above, marked as a red square).



and the workpiece surface from the previous revolution. Vibration of the tool therefore leads to a variable chip thickness, which gives a variable cutting force. The cutting force governs the current tool deflection and, subsequently, the system exhibits feedback. In other words: The system has memory.

From a modeling standpoint, this regeneration of waviness appears as a time-delayed term in the chip thickness equation. This column considers only vibrations in the normal direction, y (positive direction out of the cut), which has the most direct influence on the chip thickness.

The time-dependent, instantaneous chip thickness, $h(t)$, is determined using Equation 1. It is seen that larger positive vibration during the previous revolution, $y(t-\tau)$, where τ is the time for one rotation, gives an increased chip thickness. Larger positive current vibration, $y(t)$, on the other hand, yields a thinner chip. See Figure 1, where h_m is the mean chip thickness commanded by the feed per revolution.

The relative phasing between the surface waviness from one pass to the next determines the level of force variation and whether the operation is stable or unstable (chatter occurs). The wavy surfaces between two revolutions may be in phase or out of phase. If the vibrations are in phase, even though vibration is present during material removal, the chip thickness variation (vertical distance between the two curves) is negligible and there is no appreciable force variation. This enables stable cutting at larger chip widths. Considering that the tool tends to vibrate at its

natural frequency, it is intuitive that matching the workpiece rotating frequency (spindle speed) to the tool's natural frequency will lead to this preferred in-phase situation. However, this is counter-intuitive based on our traditional understanding

Equation 1.

$$h(t) = h_m + y(t - \tau) - y(t)$$

Equations 2-4.

$$b_{lim} = \frac{-1}{2K_s \cos(\beta) \operatorname{Re}[FRF]}$$

$$\frac{f_c}{\Omega} = N + \frac{\varepsilon}{2\pi}$$

$$\varepsilon = 2\pi - 2 \tan^{-1} \left(\frac{\operatorname{Re}[FRF]}{\operatorname{Im}[FRF]} \right)$$

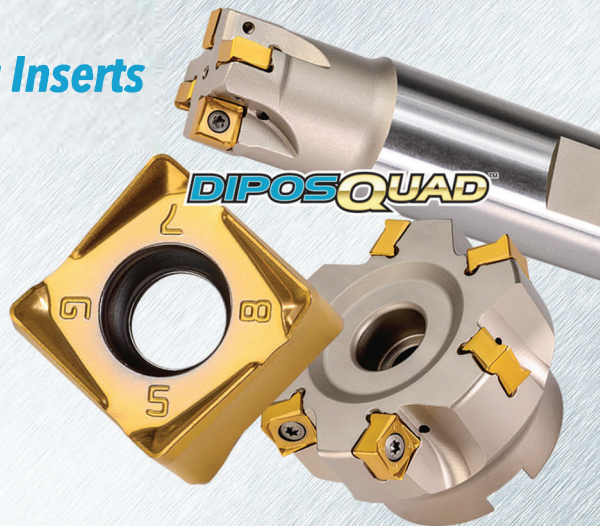
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of resonance, where we avoid exciting the system at its natural frequency.

An out-of-phase relationship results in significant variation in the chip thickness. This leads to unstable cutting at smaller chip widths than the previous case due to the force variations and subsequent tool deflections.

Depending on the feedback system gain, or chip width, b , and spindle speed, Ω , the turning operation will either be stable or will exhibit chatter, which causes large vibrations and forces and leads to poor surface finish and, potentially, tool/workpiece damage. In stable machining, the vibrations diminish from revolution to revolution. In unstable machining, on the other hand, the vibrations grow from revolution to revolution until limited in some way. The vibrations may even become large enough that the tool jumps out of the cut, losing contact with the workpiece. The governing relationships for this behavior are provided in Equations 2-4.

In these equations, b_{lim} is the limiting chip width to avoid chatter; K_s and β are terms in the cutting force model; FRF is the frequency response function at the tool tip; f_c is the chatter frequency (should it occur); N is the integer number of waves of vibration imprinted on the workpiece surface in one revolution; and $\epsilon/2\pi$ is any additional fraction of a wave, where ϵ is the phase (in radians) between current and previous tool vibrations. Note that for units consistency in Equation 3, if f_c is expressed in cycles/s (Hertz, Hz), then Ω must be specified in rev/s.

Figure 2 shows an example stability map where the Ω versus b_{lim} family of curves ($N = 0, 1, 2, \dots$) separate the domain into two regions. Any (Ω, b_{lim}) pair that appears above the collective boundary indicates unstable behavior, while any pair below is predicted to be stable.

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How Manufacturers Are Using AI to Predict, Adapt and Stay Ahead in a Disrupted Market

AI-driven tools can help organizations can make more dynamic decisions based on real-time conditions. The result is often improved working capital management and stronger operational flexibility.

MIKE SIBLEY | COLUMNIST

For years, manufacturers have focused on making supply chains faster, leaner and more efficient. Today, the conversation has shifted. The challenge is no longer simply moving products from point A to point B. It's about managing uncertainty, anticipating disruption and making better decisions before problems impact operations.

That's where supply chain intelligence is becoming increasingly important.



Artificial intelligence has become one of the most talked-about topics in manufacturing, but many companies still struggle to separate real-world applications from hype. While AI isn't a magic solution, it is creating opportunities for manufacturers to improve forecasting, identify risks earlier and make smarter operational decisions.

The companies seeing the most success with AI aren't replacing people. They're giving their teams better information to make decisions faster and with greater confidence.

One of the biggest opportunities for AI is forecasting. Historically, forecasting relied heavily on historical trends and human judgment. While experience remains valuable, today's market conditions are changing too quickly for historical data alone to tell the full story.

AI can analyze purchasing patterns, supplier

performance, inventory levels, lead times, market conditions and demand signals simultaneously. Instead of simply reporting what happened last quarter, these tools can help manufacturers identify potential disruptions before they occur.

For example, AI or other automation tools can flag a sudden demand spike, identify a supplier lead-time risk and help teams adjust purchasing or production plans before a disruption hits. That level of visibility allows organizations to become proactive rather than reactive.

Another area where supply chain intelligence is creating value is inventory management. Many manufacturers continue to struggle with balancing inventory levels. Too much inventory ties up cash and increases carrying costs. Too little inventory creates production delays and customer service issues.

AI-driven tools can help companies better understand inventory trends, demand fluctuations and purchasing cycles. Rather than relying solely on static reorder points, organizations can make more dynamic decisions based on real-time conditions. The result is often improved working capital management and stronger operational flexibility.

Supplier visibility is also becoming increasingly important.

Most manufacturers know their direct suppliers, but disruptions often originate much deeper within the supply chain. A delay from a secondary supplier, transportation issue or raw material shortage can quickly impact production schedules.

Supply chain intelligence tools allow organizations to monitor supplier performance more closely and identify vulnerabilities that might otherwise go unnoticed. The goal isn't eliminating risk. It's understanding risk early enough to respond effectively. One misconception I often



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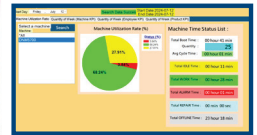
STEP
1



IDENTIFY EFFICIENCY GAPS USING REAL-TIME DATA

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STEP
2

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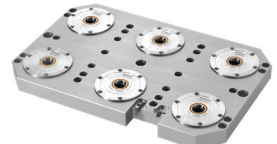
STEP
3



ENHANCE MACHINE THROUGHPUT BY MINIMIZING SET-UP AND CHANGEOVER TIME

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STEP
4



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STEP
5



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hear is that AI will somehow replace operational expertise. In reality, the opposite is true.

The most effective manufacturers combine technology with human experience. AI can process large volumes of data and identify patterns, but experienced professionals still provide the judgment, context and decision-making that drive successful outcomes.

Technology should support decision-making, not replace it. I also think manufacturers sometimes assume they need significant investments to begin improving supply chain intelligence. In

many cases, organizations already have valuable data available within their ERP systems, purchasing records, inventory reports and operational dashboards.

The first step is often improving visibility into the data they already have. That includes assessing ERP data quality, identifying the most critical supply chain KPIs and choosing one high-value use case — such as forecast accuracy, inventory optimization or supplier risk monitoring.

From there, organizations can build toward more advanced analytics and AI-driven tools

where they create the most impact. Looking ahead, I believe the manufacturers that will gain the greatest advantage will be those that use supply chain intelligence to improve adaptability.

The future isn't about creating perfect forecasts or eliminating every disruption. Instead, it's about building systems that help organizations respond faster, make better decisions and maintain operational flexibility when conditions change. Supply chains will continue to face uncertainty. Markets will continue to evolve. Disruptions will continue to happen.

The difference is that manufacturers now have access to tools that can help them see around corners more effectively than ever before. The organizations that embrace supply chain intelligence today will be better positioned to navigate whatever challenges come next. ■

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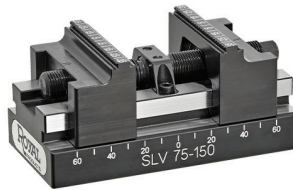
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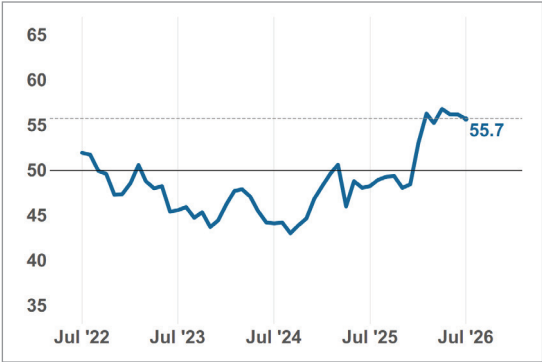
Metalworking Index Eases in July but Extends Expansion to Seven Months

Production and new orders held their ground, while a pullback in hiring trimmed the reading.



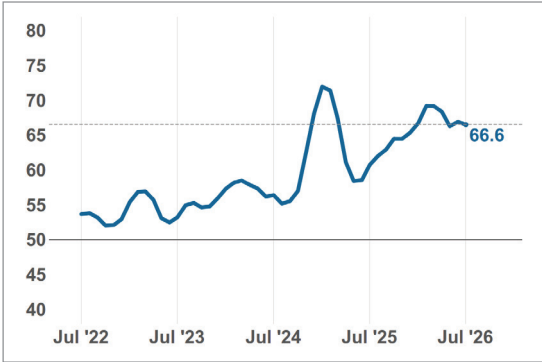
Mike Shirk
SENIOR MARKET
RESEARCH ANALYST

METALWORKING INDEX



The Gardner Business Index (GBI): Metalworking measures the current state of metalworking and machining activity through survey responses covering new orders, production, backlog, employment, exports and supplier deliveries. A reading above 50 indicates expansion, and a reading below 50 indicates contraction.

FUTURE BUSINESS INDEX



The GBI Future Business Index is an indicator of the future state of the metalworking market from industry respondents regarding their opinion of future business conditions for the next 12 months. A reading above 50 indicates expansion, and a reading under 50 indicates contraction.

GBI COMPONENTS SCORECARD

	Change vs	
	Month Ago	Year Ago
Supplier Deliveries	—	▲
Production	▼	▲
New Orders	▼	▲
Employment	▲	▲
Backlog	▼	▲
Exports	▼	▲

Source (all figures): Gardner Intelligence

The GBI Components Scorecard reports the monthly change rate of primary metalworking market factors contributing to the overall monthly index reading.

Reading the Scorecard:

- **Color** indicates *where* a component value falls relative to 50 for the current month. Green indicates expansion, and red indicates contraction.
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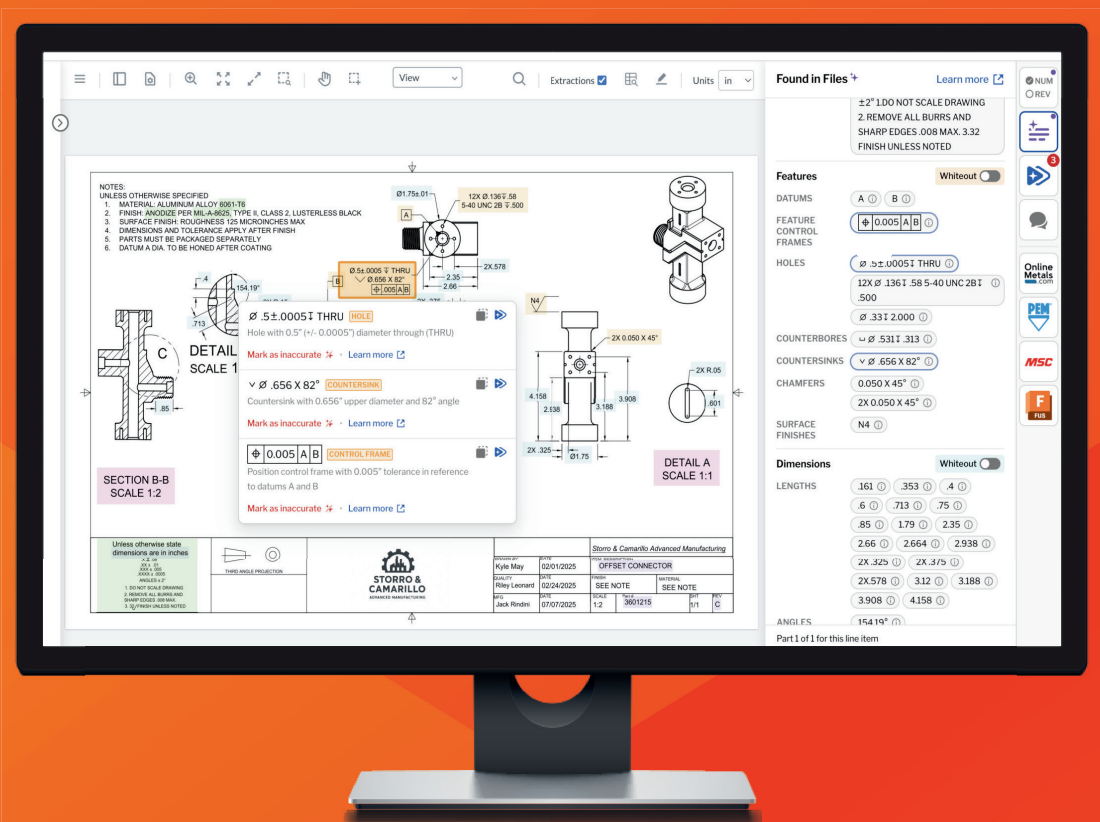
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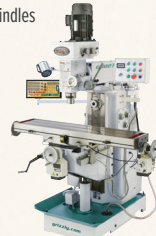
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- DRO with two-axis digital readout
- 70–2000 RPM, 8 spindle speeds
- Outboard spindle support spider
- 200-Series quick-change tool post
- 7" 3-Jaw & 8" 4-jaw chucks
- Footprint: 71" x 16"
- Shipping weight: ≈ 1550 lbs.



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G0824 // ONLY \$8079



10" x 30" 1½ HP Metal Lathe

Turn longer workpieces with ease

- Backlit LED display when ON, mirror finish when OFF
- 100–2200 RPM variable-speed spindle
- Spider mount system for stability
- 100-Series quick-change tool post
- 5" 3-Jaw & 4-jaw chucks
- Footprint: 46½" x 12"
- Shipping weight: ≈ 464 lbs.



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G0998 // ONLY \$4150



14" x 40" 2 HP Gunsmithing Metal Lathe

High-tolerance barrel creation

- Tailstock locking system
- 70–2000 RPM, 8 spindle speeds
- Spider mount system for stability
- 200-Series quick-change tool post
- 6" 3-Jaw & 8" 4-jaw chucks
- Footprint: 70¾" x 15¾"
- Shipping weight: ≈ 1550 lbs.



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G0709 // ONLY \$7495



7" x 12" 1 HP Metal-Cutting Bandsaw

Mobile metal stock prep

- 93" x ¾" Blade
- 90–255 FPM, 4 blade speeds
- Hydraulic downfeed control
- Quick-release vise
- 2½-Gallon coolant system
- Footprint: 38" x 13"
- Shipping weight: ≈ 335 lbs.



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10" x 18" 1½ HP Metal-Cutting Bandsaw

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First-Timer's Guide to IMTS

Michelle Edmonson, CEM

VICE PRESIDENT, EXHIBITIONS

AMT – The Association For Manufacturing

Technology, which owns and operates

IMTS – The International Manufacturing

Technology Show

Manufacturers solve big challenges by breaking them into smaller, achievable steps. That's also the best way to approach your visit to IMTS – The International Manufacturing Technology Show, which takes place Sept. 14-19, 2026, at McCormick Place in Chicago, Illinois.

Whether you want to reduce setup times, improve quality, automate repetitive tasks, meet compliance requirements or increase throughput, clear goals will help you make the most of 1,800 exhibitors across 1.2 million square feet.

These tips are designed for first-time attendees but can help anyone maximize their IMTS experience:

- **IDENTIFY YOUR PRIORITIES.** Meet with your team before the show and define one to three challenges you want to solve based on your biggest bottlenecks, growth opportunities or long-term goals.
- **DEFINE SUCCESS.** Establish baseline metrics such as OEE, on-time delivery, first-pass yield, scrap, revenue per employee or gross margin so you can evaluate solutions and measure results after the show.

- **REGISTER AND PLAN AHEAD.** Register early at [IMTS.com/Register](https://www.imts.com/register) for discounted pricing and use [IMTS.com/show/travel/](https://www.imts.com/show/travel/) to find deals on hotels and transportation.
- **BUILD YOUR GAME PLAN.** Use the IMTS exhibitor directory to compare solutions, then use the IMTS Show Planner to book-mark exhibitors, schedule appointments and organize your days.
- **LET THE IMTS SHOW PLANNER GUIDE YOU.** Use the recommendations, appointment calendar and Plan the Smartest Route features to organize your day and automatically adjust your route as plans change.
- **DIVIDE AND CONQUER.** If you're attending with colleagues, assign each person a technology or objective, then compare notes over lunch or dinner to identify the most promising opportunities.
- **LEAVE ROOM FOR DISCOVERY.** If you came to solve three problems, you'll probably leave with ideas for a fourth. Some of the best discoveries happen between appointments.
- **FOLLOW THROUGH.** The real value of IMTS begins after the show. Reconnect with exhibitors, evaluate solutions, implement improvements and measure results.



IMTS 2026 – The International Manufacturing Technology Show takes place Sept. 14-19 at McCormick Place in Chicago.

As Mack Loughlin, general manager at Jacobs Tool & Manufacturing in Hanover, Pennsylvania, puts it, “Sometimes I go to IMTS for hardware, sometimes I go for software. At IMTS 2026, I’m going for ‘peopleware.’” His advice: Look beyond the equipment and take time to learn how other manufacturers are solving challenges, building their businesses and preparing for the future.

And yes — wear comfortable shoes.

Register for IMTS 2026 at [IMTS.com/Register](https://www.imts.com/register).



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IMTS 2026 Job Shops Workshop Empowers Manufacturing's Backbone

Mary Cecile Neville

DIRECTOR OF STRATEGIC PARTNERSHIPS
AND INDUSTRY RELATIONS

AMT – The Association For Manufacturing Technology, which owns and operates IMTS – The International Manufacturing Technology Show

While IMTS – The International Manufacturing Technology Show has always been the place where job shops explore the latest machines, it's also where business leaders compare ideas, share challenges and discover best practices that can shape the future of their businesses. To help small manufacturers solve business and production challenges, IMTS 2026 offers the Job Shops Workshop on Tuesday, Sept. 15, 1:30-4:30 p.m., followed by a networking reception until 6 p.m.

The IMTS Job Shops Workshop provides practical guidance for today's most timely topics, including automation, AI, the economy and business management systems. The workshop features five sessions:

- State of the Industry: Economic Update, by Chris Chidzik, AMT principal economist
- The Automation Yellow Brick Road: Tips from Travelers at Different Stages of the Journey, with moderator Chris McNamara of Automation World and panelists David Liu of

- FinalRev, Katie Murphy of Arcamed and Mike Payne of Hill Manufacturing & Fabrication
- How is AI Changing the Future of Tomorrow's Job Shop? with moderator Russ Waddell of AMT and panelists James Marzilli of Warpcore AI and Al Whatmough of G28
- Manufacturing – The Change, with Jay Rogers of Haddy
- Job Shops Industry Exchange: An Interactive Conversation, with Dave Capkovitz of EBITDA Growth Systems, Nicholas Ward of Ward Manufacturing, Rebecca Wolfinger of Mil-Spec Manufacturing and Nate Bourgeois of Ouroboros Space and Defense.

"Job shops are the backbone of North American manufacturing. They're solving difficult problems every day while looking for smarter ways to stay competitive," says Rita Conroy, director of marketing and customer experience at Zoller, a workshop sponsor and IMTS exhibitor (**BOOTH #432018**). "This workshop gives manufacturers practical strategies they can apply immediately while connecting them with technologies and partners that can help improve efficiency and reduce costs."

"Most automation conversations focus on the technology," says Mike Payne, a panelist in the automation session. "I want this to connect automation to the business. Technology usually isn't what holds companies back. People, processes and execution are. Whether you're looking at robots, pallet systems, AI or automating office tasks like quoting and scheduling, the goal is understanding where automation creates real value rather than an exercise in buying another piece of equipment."



The IMTS Job Shops Workshop takes place on Tuesday, Sept. 15, 1:30-4:30 p.m., followed by a networking reception. Registration includes admission for all six days of the IMTS 2026 exhibit halls, giving attendees access to the full IMTS experience.

Register today at [IMTS.com/Register](https://www.imts.com/register). Workshop registration includes admission to the Job Shops Workshop, the networking reception and all six days of the IMTS 2026 exhibit halls.



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Drones and Test-Flight Vehicles Demonstrate Surge Production

Watch an automated manufacturing cell produce drones live, then see them fly. Stand beside Aires Tide, an 11-foot-tall AI-designed flight-test vehicle. Discover the digital backbone of smart manufacturing with MTConnect.

At IMTS 2026 – The International Manufacturing Technology Show, Sept. 14-19, discover how manufacturers reduce the time required to design, build and validate new products in the AMT Emerging Technology Center (ETC).

Located just inside the North Building, the ETC (**BOOTH #236700**) highlights how public-private partnerships can accelerate manufacturing innovation from concept to deployment. Together, AMT, the U.S. Department of Energy (DOE), Oak Ridge National Laboratory (ORNL), Sandia National Laboratories and commercial manufacturers demonstrate how collaboration speeds development, strengthens supply chains and supports the U.S. defense industrial base.



The fully assembled drone produced in the AMT ETC automated manufacturing cell and flight tested in the ETC during IMTS 2026.

Bonnie Gurney

VICE PRESIDENT, STRATEGIC PARTNERSHIPS
AND INDUSTRY RELATIONS

*AMT – The Association For Manufacturing
Technology, which owns and operates IMTS –
The International Manufacturing Technology Show*

“The ETC shows how digital engineering, AI, automation, additive manufacturing and connected systems function as a complete manufacturing workflow,” says Ryan Kelly, AMT VP – technology. “Manufacturers will find practical ways to reduce development time, improve productivity and respond to changing market demands.”

Drone Production and Flight Demonstrations

Every day during IMTS, an automated manufacturing cell, developed by the ORNL Manufacturing Demonstration Facility, will produce, assemble, test and fly drone quadcopters. The working exhibit shows how flexible production systems rapidly move from design to finished product. Using FANUC robots and Mazak’s VC EZ 20X and five-axis WAAM system, debuting at IMTS, the cell illustrates scalable production.

AI-Designed Flight Vehicle

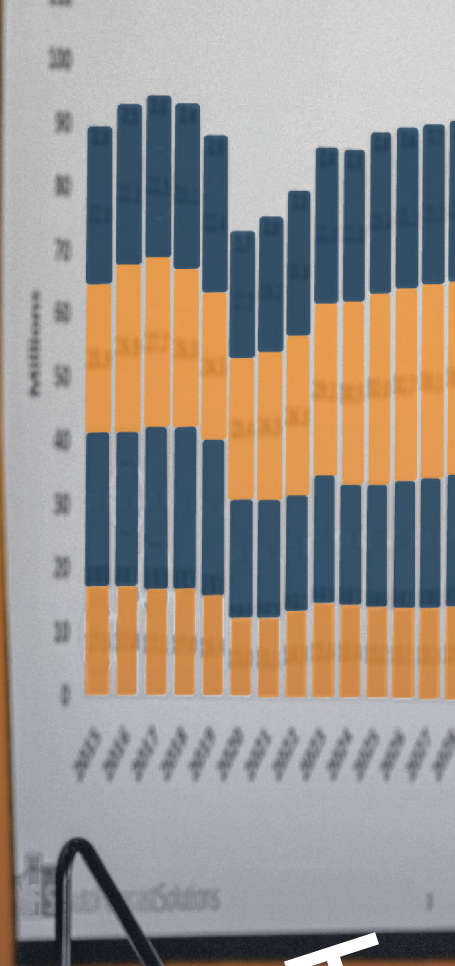
The ETC also features Aires Tide, a full-scale 11-foot-tall AI-designed flight-test vehicle and one of the first results of the DOE-led Genesis Mission, with support from Sandia National Laboratories. Combining AI, advanced computing and additive manufacturing, the team reduced development time to just six months. The vehicle was produced on a Velo3D Sapphire XC in modular sections.

Connected Manufacturing

MTConnect completes the picture by showing how standardized machine data enables manufacturers to monitor equipment, reduce downtime and support lights-out operations through connected production systems.

Experience these technologies in action, then explore more than 1,800 exhibitors at IMTS 2026, Sept. 14-19, at McCormick Place in Chicago. Register today at [IMTS.com/Register](https://www.imts.com/register).

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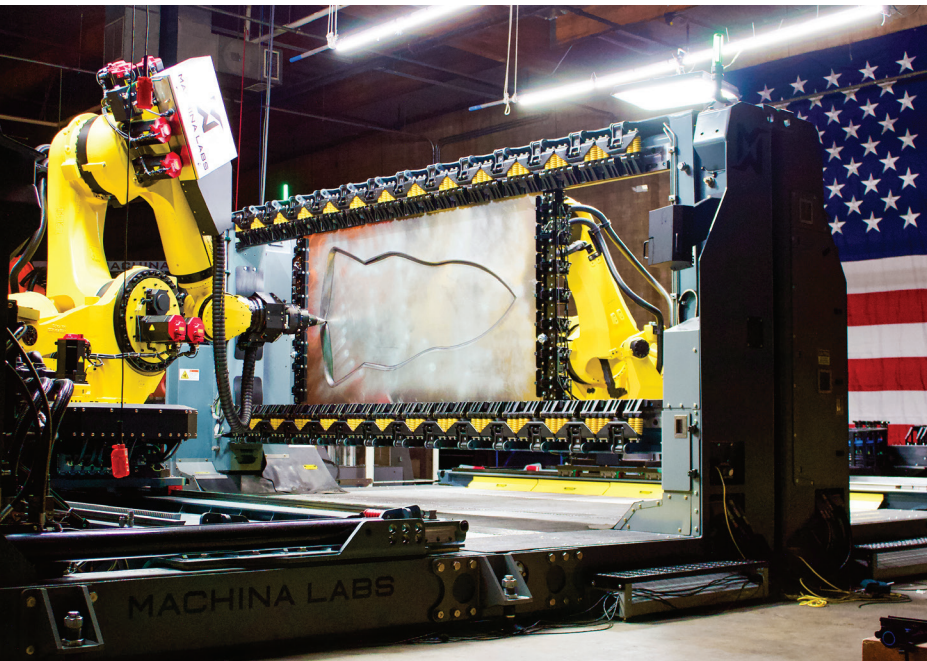
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Machina Labs is a manufacturer that uses robots to fabricate sheet metal parts without the use of specialized tooling. This enables it to handle high-mix, low-volume work just as easily as it handles low-mix, high-volume work. Source (all images): Machina Labs

Tooling-Free Forming Enables Flexible Factories

Machina Labs' RoboCraftsman forms parts autonomously and without dies. But sheet metal fabrication is just the first step for these AI-powered robotic production cells.

JULIA HIDER | EXECUTIVE EDITOR

Tooling requirements makes high-mix, low-volume manufacturing a challenge. "Every time you have to build a hardware product, you have to build a factory, and there's a lot of tooling, equipment, machinery that goes into the factory that's very closely tied to the product you're trying to build," points out Edward Mehr. Mehr is the founder and CEO of Machina Labs, a manufacturing company that uses AI-powered robots to fabricate sheet metal parts without the use of specialized tooling.

Software to Hardware

Mehr started his career focusing on AI at companies including Google and Microsoft. Eventually he joined SpaceX, where he started to apply AI to the challenges of manufacturing. "Since then, I have been in the intersection of using software and advanced techniques like machine learning and robotics to create more agile manufacturing technology," he says. He was a member of the founding team at Relativity Space, where he gained experience in

tool-less manufacturing via 3D printing. This experience also taught him that 3D printing, “even though it’s a great solution, it’s either physics-wise or economic-wise not available to all types of parts. And that became kind of the genesis of Machina.”

But his new venture isn’t abandoning 3D printing completely — it’s looking to expand tool-less manufacturing to a wider range of parts. “The goal of Machina is to build a platform that can do different types of manufacturing operations autonomously,” he explains. “If you have a platform that can do welding, forming, 3D printing, all different types of operations autonomously, then you can scale that in a factory and have a factory that can do different types of products just through change in software. It can make car panels in the morning and then missile airframes in the afternoon.”

Machina Labs’ platform is enabled by advancements such as robotics and AI, which Mehr says have brought manufacturing to an inflection point. “I think now we’re going to see a new wave of companies who are building factories with these new technologies,” he says. “Traditionally, companies have been selling these technologies to traditional manufacturers and OEMs. I think for the first time, we’re seeing that you are almost required to build a factory from the ground up with these technologies in mind.” As such, Machina Labs is not a technology supplier, but a manufacturer of metal structures.

Crafting a Robotic Solution

Machina Labs’ core technology is the RoboCraftsman, which uses AI-powered robots to form sheet metal parts and perform other manufacturing operations such as scanning, trimming and drilling. Mehr says that when the company was founded in 2019, not only had robotics become precise and dexterous enough to fabricate sheet metal without specialized tooling, but AI had advanced to where it could be used to determine how the robot should manipulate the part into the correct shape. Each cell has two robots on a platform that can fit into a shipping container for easy transportation. “It can get deployed to any warehouse floor, as long as there’s power, and within the same day, it can self-calibrate and start manufacturing parts,” he says.

For now, the RoboCraftsman primarily performs sheet metal fabrication using different forming end effectors designed by Machina Labs. Mehr describes them as styli in a range of sizes and shapes. “Two robots come from two sides, and pinch and deform the sheet into shape, like a potter would do to a clay bowl,” he says.

Compared to traditional metal-forming processes, cycle times for the RoboCraftsman are longer. “In stamping, once you have your tool and die set up, you’re looking at seconds to minutes before you go through a part,” Mehr says. “With us, it depends on the size and complexity. A part can take somewhere from half an hour to a few

hours.” But when the time and cost to produce the die are taken into account, the equation changes, particularly

Machina Labs’ production system, the RoboCraftsman, consists of two robots with styli-like end effectors that form sheet metal parts. The robots can also pick up other end effectors for scanning, trimming and drilling. End effectors for heat treatment, welding and 3D printing are in development.



for low-volume parts. "If you count the process of making the mold, then depending on the volume, we might have a better takt time," he continues. "And then when you start thinking about all the cost that goes into building a mold and a stamping press, how many of our systems can run in parallel with the same investment, then the number goes even further up." Machina Labs works with some order quantities in the tens of thousands of parts, and with opportunities to increase the speeds of the robots inside the cell, he expects even larger batches of parts.

In addition to eliminating worries about the time and cost involved in producing a stamping die, the RoboCraftsman doesn't need to change tools when switching from one part to another. "From design to design is just a few minutes," Mehr says. This is particularly useful for design iteration.

While sheet metal forming is the RoboCraftsman's specialty, the robots have the ability to pick up end effectors other than the forming styli. They can use scanners to inspect and

spindles to trim parts or add features such as holes or slots. Mehr says the company is working on additional capabilities for the cell, including heat treatment, welding and 3D printing.

Controlling the Cell

Machina Labs has developed a software stack to operate its RoboCraftsman cells, including offline preparation and real-time control in the cell. At the front end is a software studio called Architect, which enables engineers to translate digital designs into instructions for the RoboCraftsman system. Because the tool paths and forming strategies for complex sheet metal geometries are often not intuitive, the company incorporates algorithms and machine learning to help engineers develop part programs. As more parts are produced, the system improves, reducing the number of iterations required to achieve production-ready parts.

On the shop floor, RoboCraftsman is controlled by a system that monitors robotic motion, force application and execution. This system integrates



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sensor feedback, including force, displacement and in-process geometry measurement via 3D scanning, to continuously monitor and adjust how the part is being formed. These closed-loop adjustments enable the system to maintain accuracy and consistency across a range of geometries and materials. Over time, data collected from both in-process sensing and post-process inspection further refines performance, enabling continuous improvement.

In Practice

Machina Labs has two facilities, one of which is dedicated to production. It has 16 RoboCraftsman cells and runs two shifts per day. Each shift is staffed with three technicians, who are mostly dedicated to material handling and part loading/unloading. Mehr says the goal is to automate these tasks as well, enabling one technician to run 10 cells.

Much of Machina Labs' work so far has been for large parts with metal "skins." Mehr lists industries including "aircraft, missile bodies, fuel tanks, even some areas of automotive, heavy equipment and machinery." The tooling-free process has also found a niche in repair

applications for old aircraft where stamping dies for parts no longer exist. "They cannot even stamp them if they want to," he says.

A recently announced partnership with Toyota will expand the company's work in the automotive sector, enabling mass customization for Tacoma trucks. "The tailgate is custom designed. The hood has a pattern that you want. And they don't have to go make \$100,000 molds for every one of those trucks," Mehr explains.

The company is also in the process of deploying a third facility, which Mehr says will have 50 RoboCraftsman cells. In addition to providing production capacity, the facility will have additional capabilities, including welding and machining (outside the RoboCraftsman cells). "We can actually build full-on assemblies," Mehr says. "We can do internal structures as well as the airframes." The third factory is expected to create approximately 115 new jobs, bringing the company's total headcount to around 250 employees — a figure that could grow further with plans for a fourth factory. 

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Taiwan's Machine Tool Technology Advances Aerospace Manufacturing Precision

Taiwan's machine tool industry is strengthening its position in aerospace manufacturing by combining precision engineering, advanced machining technologies, and application-driven solutions. Across key processes—from EDM and 5-axis machining to high-performance motion systems—Taiwanese manufacturers are enabling the production of complex aerospace components with increasing accuracy, efficiency, and process reliability.



EDM Precision for Complex Aerospace Components

ACCUTEX focuses on wire electrical discharge machining (WEDM) solutions designed for high-precision aerospace applications, particularly where complex geometries and tight tolerances are required. Typical components produced using its technology include turbine disks and precision keyways, both of which demand high dimensional accuracy and consistent surface quality.

To enhance precision, Accutex has adopted linear motor drives in its machines, eliminating the backlash associated with traditional ball screw systems. Combined with high-resolution linear scales—capable of achieving positioning resolutions down to 0.1 micrometer—this configuration allows for highly stable and accurate cutting performance.

Surface integrity, especially when machining difficult materials such as titanium and Inconel, is addressed through process optimization. Accutex conducts cutting trials using customer-specific materials to develop optimized machining parameters. These parameters are then integrated into the machine control system, allowing operators to achieve consistent surface finishes through multi-pass strategies tailored to each application.

In addition, the company incorporates data connectivity through OPC UA protocols, enabling real-time monitoring of machine performance, productivity, and energy consumption. This approach supports more informed decision-making and contributes to improved operational efficiency in aerospace manufacturing environments.



5-Axis Machining for Structural and Engine Components

APEC (ASIA PACIFIC ELITE CORP.) develops 5-axis machining solutions tailored to different aerospace applications, including CFRP structures, titanium components, aluminum structural parts, and aero engine components. This application-driven approach allows the company to address a wide range of machining requirements across the aerospace sector.

Its machines are designed to process complex parts such as engine casings, structural components, and aerodynamic elements, which require precise multi-axis movements and stable machining conditions. In terms of accuracy, APEC solutions meet aerospace standards, achieving tight tolerances in critical features such as concentricity in boring operations.



To ensure process stability in complex machining environments, APEC integrates advanced control systems from Siemens and Heidenhain. These systems provide simulation capabilities and collision avoidance functions, which are essential for managing tool access and preventing interference in multi-axis operations.

Material-specific challenges are addressed through engineering solutions such as high-pressure coolant systems for titanium machining and integrated dust extraction systems for composite materials. In large-scale applications, APEC also incorporates automation strategies, including gantry loading systems designed to handle large aerospace structures such as stringers and spars.



Motion Systems Enabling Precision and Efficiency

HIWIN provides key motion components that are fundamental to achieving precision in aerospace machining, including linear guideways, ballscrews, and torque motor rotary tables. These components are widely used by machine tool builders around the world and play a critical role in ensuring positioning accuracy and long-term reliability.



A key advantage of HIWIN's technology is the use of direct drive torque motors, which not only reduce backlash, but also eliminate mechanical contact. This results in more consistent performance over time, particularly in high-speed and multi-axis machining applications.

In 5-axis machining environments, torque motor rotary tables enable combined multi-process operations such as milling and turning within a single setup. This capability reduces setup time, minimizes alignment errors, and improves overall process efficiency when machining complex aerospace components.

In addition to mechanical performance, Hiwin integrates intelligent features into its motion systems, supporting predictive maintenance through real-time monitoring of component conditions. By tracking the health of ball screws and other critical elements, these systems help prevent unexpected downtime and support more stable, data-driven manufacturing processes.



Rigidity and Structural Stability in Large-Scale Machining

KAO MING focuses on the development of double-column machining centers designed to combine heavy-duty cutting capabilities with high precision in large-format aerospace applications. The company's machines are engineered to deliver both high spindle speed and high torque, allowing efficient material



removal while maintaining dimensional stability in demanding operations.

A key challenge in machining large aerospace components—particularly those made from titanium or thick-section materials—is vibration control. Kao Ming addresses this through reinforced machine structures, including patented beam column designs that significantly enhance rigidity and reduce deflection during cutting.

In addition to structural design, the company integrates AI-based features such as temperature monitoring and tool wear detection systems. These capabilities allow real-time tracking of machine conditions, helping operators anticipate performance variations and maintain consistent machining quality across long production cycles.



Large-Format Machining and Composite Applications

VISION WIDE specializes in large-scale machining solutions, particularly double-column machining centers and 5-axis machines designed for structural aerospace components and composite materials.

The company's machines are used to process large parts, including CFRP and GFRP structures, which are increasingly common in modern aircraft design. In certain applications, Vision Wide supports dry machining processes for composite materials, eliminating the need for coolant and adapting to the specific requirements of these materials.

Customization plays a central role in the company's approach. Many aerospace applications require machines with extended table sizes, integrated rotary tables, or multifunctional capabilities. Vision Wide addresses these needs by developing tailored configurations, including machines capable of combining milling and turning operations within a single platform, reducing setup times and improving process efficiency.



The scale of these machines is reflected in production volumes: while smaller systems are produced in higher quantities, large-format machines—often exceeding several meters in working capacity—are built in limited numbers each year, underscoring their specialized role in aerospace manufacturing.

The scale of these machines is reflected in production volumes: while smaller systems (1–6 meters) are produced in higher quantities, at approximately 25 units per month, large-format machines—often exceeding 8 meters in working capacity—are built in much smaller numbers, with only about 15 units produced annually, underscoring their specialized role in aerospace manufacturing.



Turning Solutions for Aerospace Engine Components

HONOR SEIKI develops vertical turning solutions specifically designed to address the challenges of machining aerospace engine components. These parts—including turbine casings, rings, and combustion system elements—require high levels of concentricity, stability, and surface integrity.

Machining materials such as titanium and Inconel presents significant challenges, including heat generation, continuous chip formation, and rapid tool wear. Honor Seiki addresses these issues through machine designs that prioritize rigidity and stability, combined with process solutions such as high-pressure coolant systems for improved chip control and thermal management.

The company also integrates in-process measurement systems and servo compensation technologies to maintain accuracy throughout the machining cycle. In addition, tool monitoring systems are used to detect abnormal conditions and prevent potential damage to the workpiece.

A key differentiator is Honor Seiki's approach to system integration. By developing critical technologies in-house, the company maintains full control over machine performance and ensures faster response times in case of process deviations. In one application, the implementation of a new generation of vertical turning machines resulted in a 30% increase in overall equipment effectiveness (OEE), demonstrating the impact of integrated machine design on productivity.



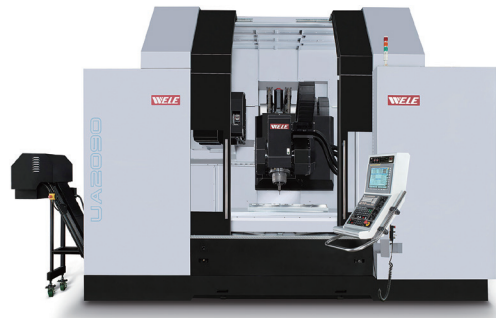
Global Deployment and Aerospace Applications

WELE supports aerospace manufacturing through machining solutions used in the production of structural components such as wings, landing gear elements, and frame structures. While Taiwan does not have a large-scale commercial aircraft manufacturing base, its machine tool industry plays a key role as a supplier within global aerospace supply chains.

Wele machines are deployed in multiple regions, including the United States, where they are used in facilities supporting major aerospace manufacturers. In some cases, these machines are applied in maintenance, repair, and overhaul (MRO) operations, highlighting their versatility across different stages of the aerospace production lifecycle.

In terms of automation, integration strategies often depend on the end user. In many aerospace environments—particularly those linked to defense or proprietary applications—customers prefer to manage automation and process integration internally. As a result, machine tool suppliers like Wele typically provide flexible configurations, allowing customers to adapt the machines to their specific production requirements.

Through its global distribution network and presence in key industrial regions, Wele continues to expand its role in supporting aerospace manufacturing across different markets.



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Associative CAD/CAM Increases Shop's Productivity Fivefold

Fully integrated CAD/CAM and revision control have enabled Willis Custom Yachts to confidently perform lights-out work for a fivefold productivity gain.

EVAN DORAN | SENIOR ASSOCIATE EDITOR

Custom marine manufacturing can include tens of thousands of components, many of which are not repeatable between projects. Last-minute design changes can sink a job's profitability if the design team and the shopfloor machinists aren't in sync. This concern spurred Willis Custom Yachts of Stuart, Florida, to adopt Siemens NX associative CAD/CAM software to support its growing in-house CNC department. In just over a year and a half, the department's productivity has increased fivefold with lights-out production and a purview that has expanded from marine parts into other industries.

Sea Changes

Willis Custom Yachts creates custom sportfishing yachts between 18- and 77-feet long. These are high-end sailfish boats with price tags from \$2.5 million to \$25 million, built using exotic woods, carbon fiber and aluminum. Each build involves tens of thousands of components, and the

Parametric modeling and built-in five-axis features assist the Willis team in programming the curved faces along its wood, carbon fiber and aluminum parts. In some cases, the team has managed to halve its programming time. Source (all photos): Siemens

company maintains an in-house CNC department to machine the large structural elements and a proportion of its smaller components.

The company works with tolerances around 0.008 inch, and few parts have square edges or planar faces. Instead, the company needs to machine cambers, chamfers, radii and compound curves onto most of its components. These parts can be anywhere from a few inches to about 30 feet in length, and the company uses two Multiax T1205 five-axis bridge mills

(along with several three-axis machines) to produce them.

As Willis has scaled up the amount of work it performs in-house, it has needed to increase the speed of its programming. At the same time, its

programmers noticed issues with fine details transferring between its CAD and CAM systems. This led to tolerance stack up and resulting rework, additional inspection cycles and compressed production schedules. By the end of 2024, the shop decided to implement associative CAD/CAM software to counter this issue, ultimately choosing Siemens NX.

Ensuring the Right Blends

The associative CAD/CAM's ability to directly translate CAD eliminated the minute errors on the surfaces and edges of Willis' complex components. In turn, this sharply reduced the shop's issues with tolerance stack-up and rework, helping Willis meet its schedules. The associativity features in NX have also made a large impact by improving the company's ability to handle design change requests. "Everything is custom for us," says Billy White, the company's chief financial officer. "We need to be able to adapt things very fast and on the go." Any lapse in communication between the design

Willis Custom Yachts manufactures most of the components for its luxury yachts at its facility in Stuart, Florida. As the in-house CNC department's workload increased with these jobs, the company looked for ways to improve CNC programming efficiency.



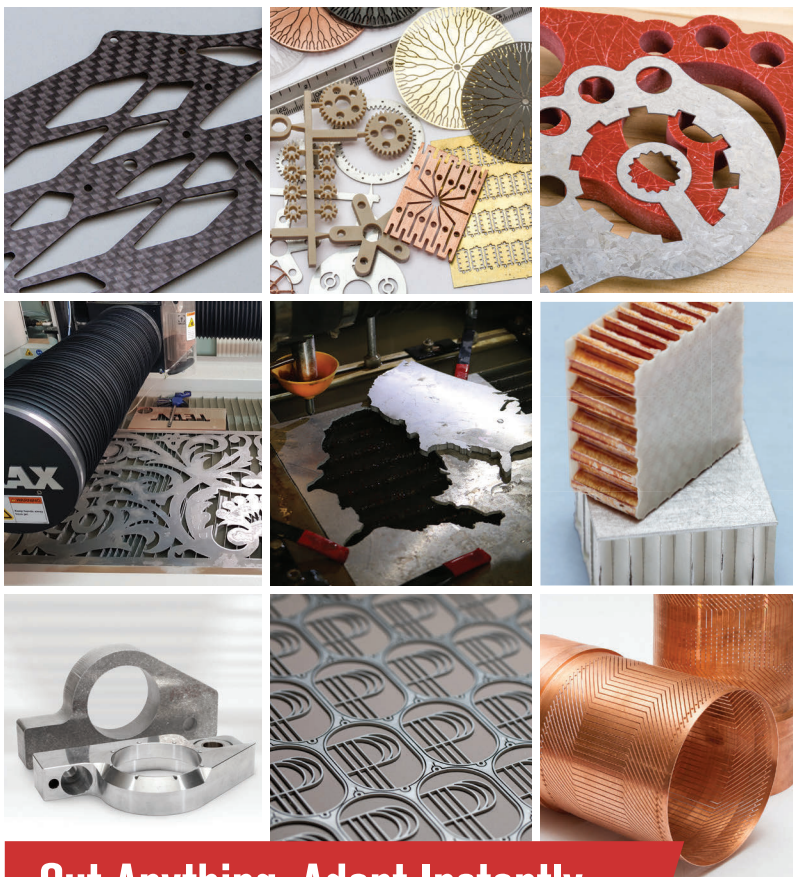
department and the shop floor could result in machining outdated parts and costly rework. Associativity through integrated CAD/CAM enables the team to automatically port design changes into the machining process and alert the manufacturing team if previous operations no longer match the new geometry, with an option to regenerate operations affected by the design change at the push of a button. The automatic

nature of this also simplifies revision control, ensuring that the shopfloor team produces the latest version of a part.

Parametric modeling capabilities have helped the company streamline how it designs and programs these curved faces and blended features. The software does not force designs onto planes or simple surface models, and so can adapt the flared surfaces, transitions and

compound curves of Willis' work when design changes arrive. Dedicated tools for surface extension, feature blending and filleting, and geometry refinement also improve the machine shop's ability to tackle the complex radii and scaling of hull designs. Willis' CAM programmers also use the five-axis machining strategies in NX to select how the machine approaches and machines faces and blended surfaces, streamlining programming and cutting up to about half of programming time. For smaller parts, NX includes a nesting feature that Willis has used to set up multiple jobs in the same sheet of material, which has improved the shop's efficiency in lights-out machining.

Lights-out machining would be far more challenging without a simulation environment, and Willis' NX reseller provided the machine kits Willis needed to make full digital twins of its machines, including the machine setup, tool changers, kinematics



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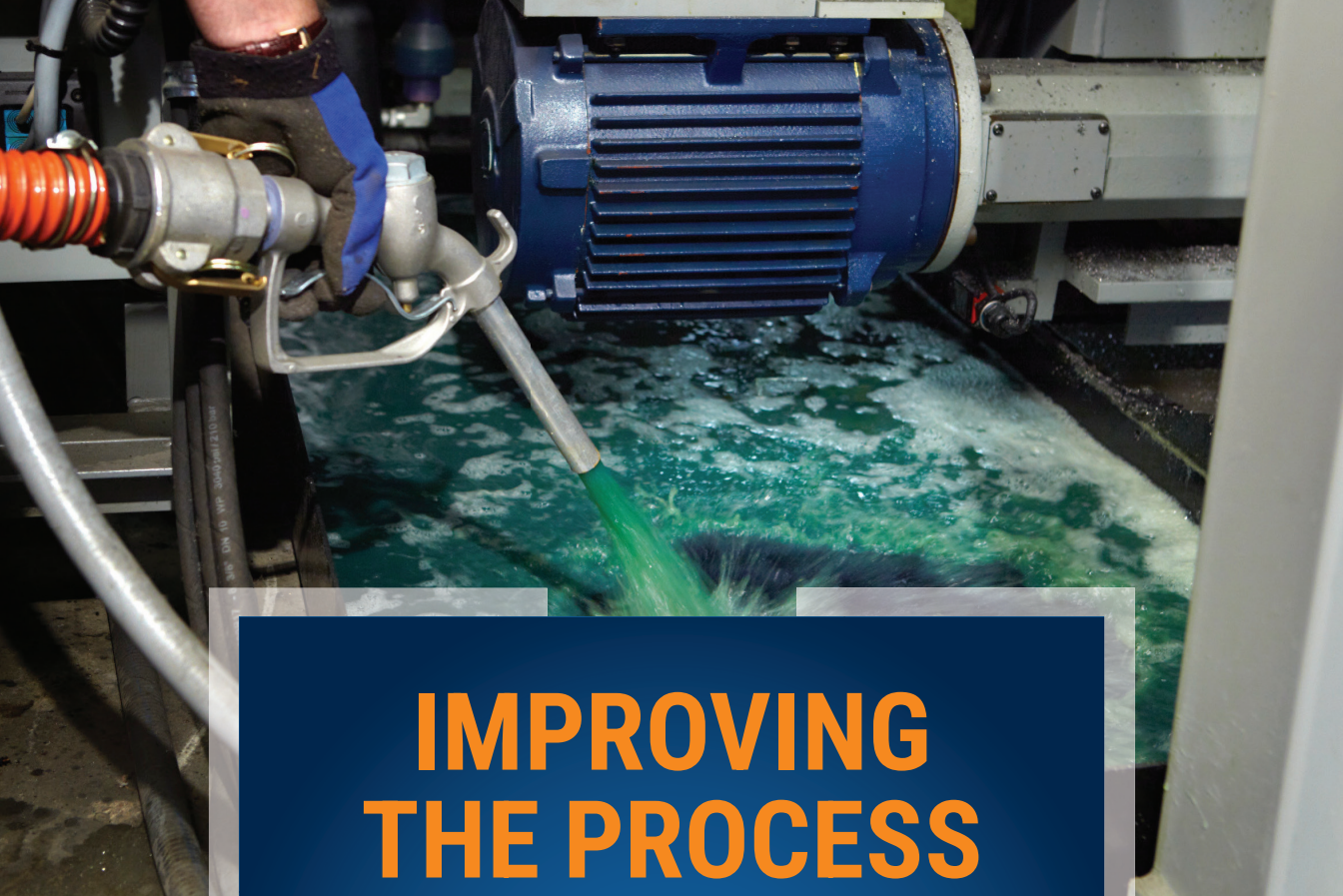
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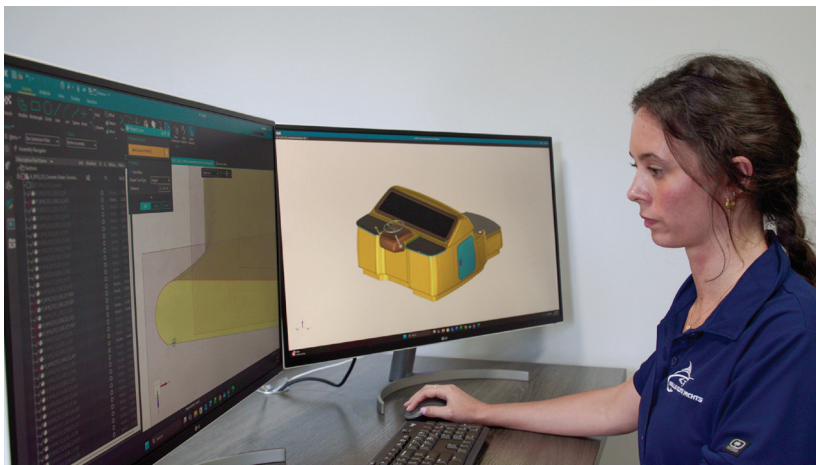
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Changes to Willis' custom parts can require significant rework, especially if communication lags between designers and shopfloor staff. Willis uses the associativity features in Siemens NX to handle revision control. The changes propagate directly from the CAD model to CAM software, with warnings for where changes in the model do not match up with the part's programming.

and actual-sized machining envelope.

"Having the digital twin and being able to run a simulation and know exactly what we're going to encounter allows us to run through the night,

lights out," says Bobby Cody, Willis' director of manufacturing. The accuracy of the estimated cycle times also improves the accuracy of the CNC department's scheduling, helping the shop determine its true capacity and delivery times.

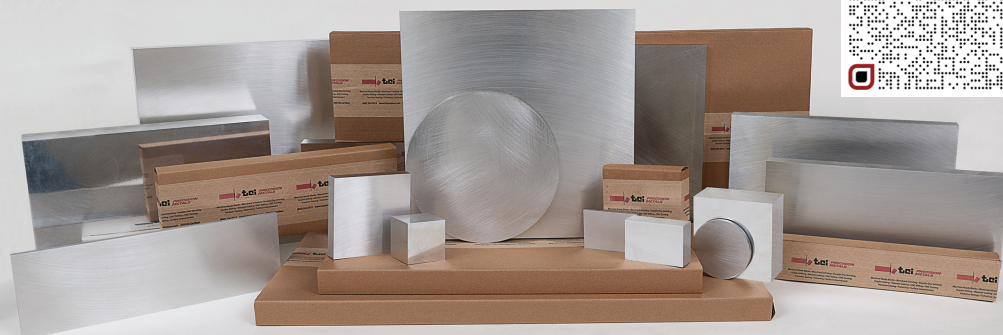
Boats and Beyond

Between the associativity improvements, parametric modeling and digital twins, Willis' team says they have improved productivity by over 500%. Associativity helped the CNC department reduce its scrap by over 95%, while parametric modeling reduced setup and programming times



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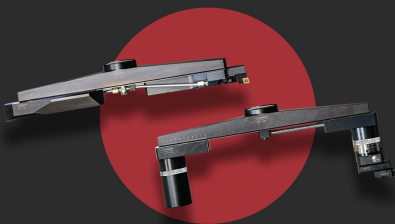
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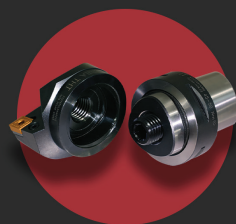
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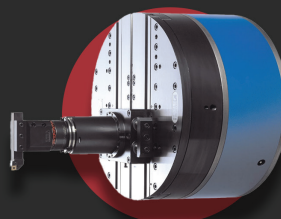
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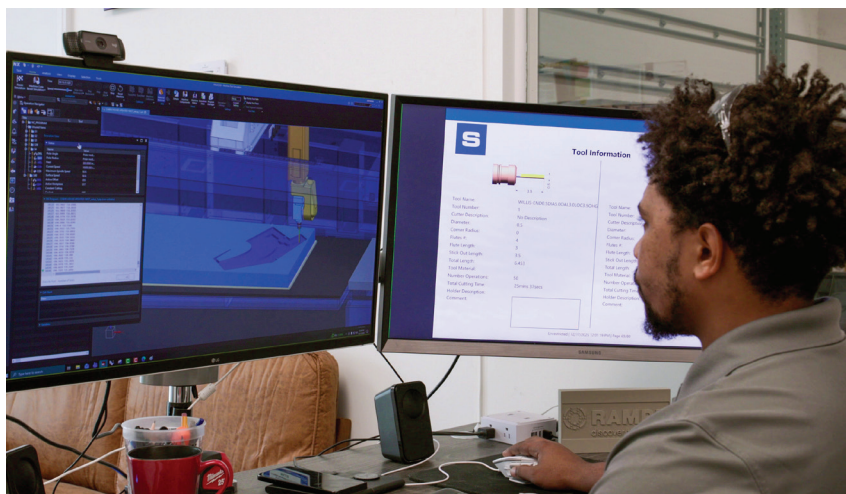


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Digital twins of Willis' machine tools and cutting tools enable staff to perform accurate simulations of their G code. This enables the company's CNC department to perform lights-out machining with confidence, increasing utilization across its machines.

by half for some parts. With simulation and digital twins, the shop doubled machine utilization and gained the confidence and accuracy to

perform lights-out work, gains which have also lowered Willis' part delivery times by 50%.

These efficiency gains have not only improved the CNC department's ability to produce its own parts but also have enabled it to take on work outside the marine industry

as Willis CNC Solutions. Now, the company is designing new buildings to expand its CNC department, with plans to adopt a large five-axis machine, as well as a three-axis machine to handle simpler parts. 

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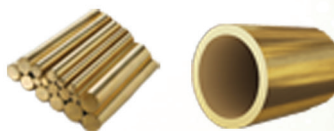
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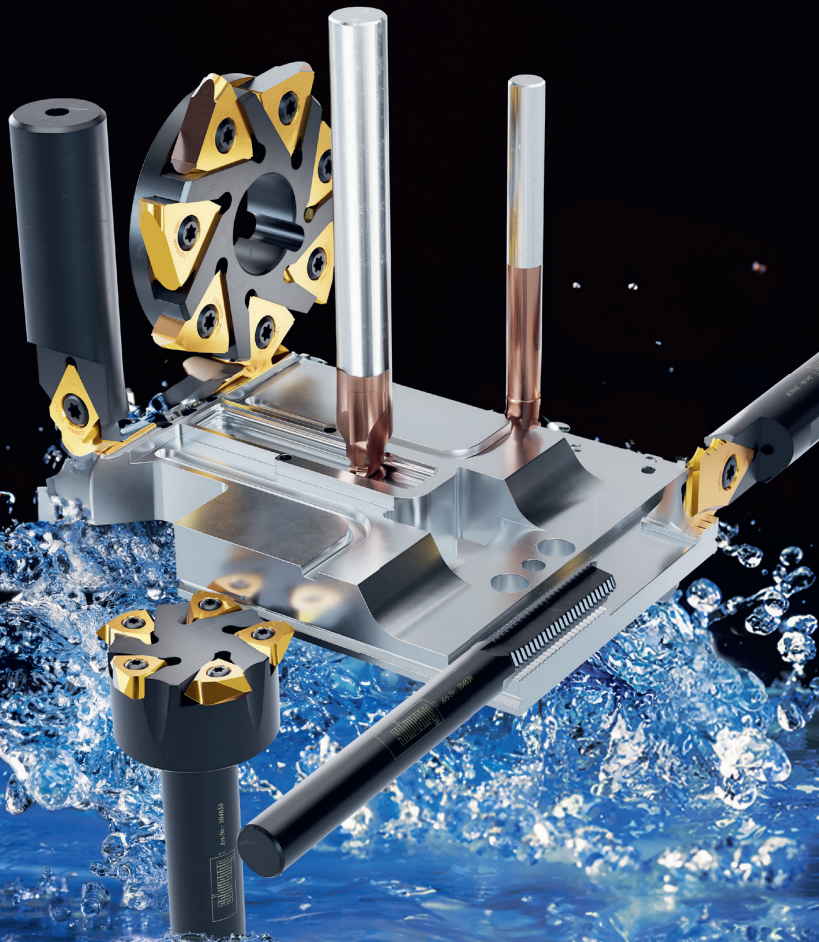
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Flexibility Gives a Competitive Advantage in Automation

As lot sizes get smaller and products change faster, shops need automation systems that offer flexibility from day one.



A few years ago, shops were asking how to start their automation journeys. But as collaborative robots and packaged machine tending solutions have lowered the barrier to entry, the conversation is changing.

As lot sizes shrink and product mixes shift faster, a robotic cell designed with custom tooling and fixtures for one specific job can quickly become a stranded asset. For most manufacturers, flexibility is a key feature in an automation system.

Technology such as SCHUNK's EGU and EGK electric gripper series can give automation system the flexibility shops need. Instead of using pneumatic actuation, these grippers use servo-driven fingers, so stroke, force and speed can be adjusted via software instead of hardware changeovers. Modular finger systems extend that further, letting one gripper body handle multiple part families with a quick-change interface.

For shops running multiple processes on one robot, SCHUNK's automatic tool changers swap end-of-arm tools through a single standardized connection, turning what was previously an

engineering project into a repeatable procedure. Image provided by SCHUNK.

engineering project into a repeatable procedure.

At the cell level, SCHUNK's pre-engineered machine tending bundles combine grippers, valve blocks and software plug-ins into deployment-ready packages, while quick-change pallet and workholding systems support unattended, mixed-part production.

Not every shop needs a turnkey automation system. But every automation system, even a simple machine-tending cell, benefits from being built with standardized interfaces and modular tooling from day one. Retrofitting flexibility later costs far more than designing for it up front. 



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You might recognize this huge crankshaft which was on display at WFL's recent Technology Meeting 2026 in Linz, Austria. That's because the company commonly displays it at IMTS, too. It likely will be at IMTS this September in its booth number 338666 in the South Building alongside the new M70 Millturn with automated angular head technology, which can boost the processing of complex parts requiring internal machining operations. Source (all photos): *Modern Machine Shop*

Seeing Advances in Large-Scale Multitask Machining

At a recent open house, WFL Millturn Technologies highlighted new forms of automation, tooling and process control for its sizeable turn-mill equipment.

DEREK KORN | EDITOR-IN-CHIEF, *PRODUCTION MACHINING*

In May, I was invited to be the sole U.S. media representative to attend WFL Millturn Technologies' Technology Meeting at its Linz, Austria, headquarters on behalf of *Modern Machine Shop* and sister brand, *Production Machining*. This wasn't my first visit there, but a good bit of time had passed.

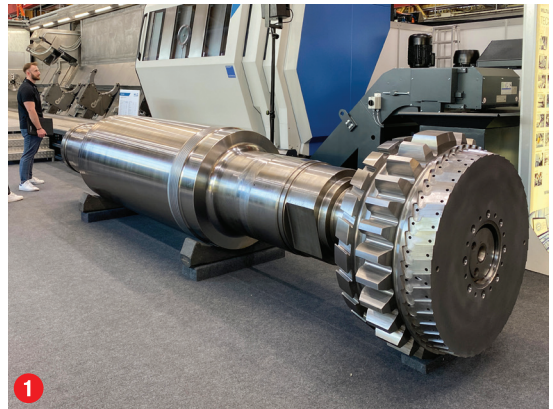
It was intriguing to see how the company has advanced its large-scale, multitasking machine technology not only in terms of the machines themselves but also in ways such as automation, digital tools, in-process probing and angle-head technology.

I was one of approximately 1,000 guests from Austria and abroad to see 12 of the company's machines in live operation. Its equipment is used for myriad applications including turbine and generator shafts; automotive and large-scale construction components; plasticizing screws for injection molding machines; aircraft components; components for military applications; oil and gas parts; crankshafts for ships and power generation applications; printing equipment cylinders and more.

Most machines are based on a modular design, meaning they can be customized per a customer's needs. Possible machining operations include multiaxis turning, milling, drilling, ID machining, boring, skiving, hobbing and grinding.

What follows is a sample of what I saw during my visit.

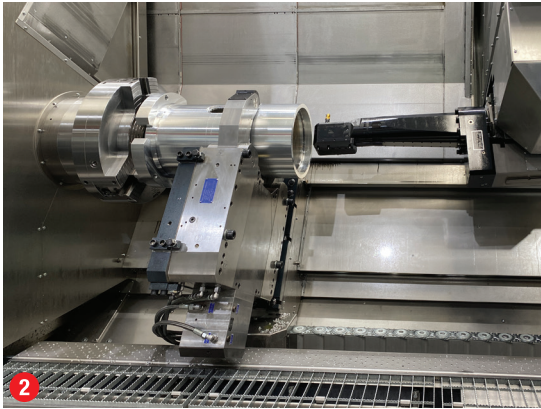
1 The 20-ton steel roller for sheet metal manufacturing in front of this five-axis M100 Millturn offers clear perspective of the size of parts a machine like this can accommodate as well as the multitasking capabilities it can perform to



machine it complete. Turning, milling, boring, gear cutting, gun drilling as well as ID machining can be performed. This model features a nominal center distance of 12 meters and four steady rests, and the single-piece, 60-degree slant bed made of grey cast iron combined with wide guideways are said to provide high stability and optimum anti-vibration properties.

2 Automatically changing cutting tool assemblies stored in an automatic toolchanger (ATC) magazine on CNC machining centers is nothing new. However, WFL has developed a new advancement for swapping tools in and out of the angle heads used on its large-scale multitasking machines, those tools being stored in and accessed from the machine's central ATC. Internal machining has long been one of the most challenging disciplines in metalcutting. Components featuring deep cavities, internal pockets, ribs, radii, threads and seating surfaces often require multiple specialized





tools and extensive manual intervention. These challenges become even more demanding when machining lightweight, thin-walled structures, particularly in aluminum.

To address these requirements, WFL has developed an angular head concept that fundamentally differs from conventional systems. While traditional angular heads typically require manual tool changes and are often limited in speed and rigidity, the WFL solution introduces a fully automated approach. Tools are exchanged automatically through the machine's standard tool magazine, eliminating manual handling and enabling uninterrupted machining processes. (And keep in mind that the angle heads themselves are also automatically changed out and stored in their own pick-up magazine.) This will be displayed at IMTS on WFL's M70 Millturn it is introducing to the U.S. market. The company says one key advantage of the M70 is its modularity, meaning the machine can be configured to meet specific customer requirements while maintaining the core principle of complete machining in a single setup.

3 WFL also presented a number of its digital solutions at the event. One example is iControl process monitoring, which protects machines even during unattended production throughout the night. Depending on the machine, as many as 16 configurable process signals are continuously monitored. The design is said to contain more complex and intelligent monitoring options, offering comprehensive safety during production. Multistage monitoring logics are used, which respond if the collision limit or adaptive process limit is exceeded or if there are significant, rapid changes in cutting force.

Other software offerings include CrashGuard Studio for virtual simulation and collision



prevention; Millturn Pro for efficient programming and process optimization; ScrewCAM for fast creation of complex threading programs, MyWFL which is a central digital platform for service, documentation and production support; and CrashGuard for real-time collision protection.

4 WFL is known for its in-process touch-probing capabilities and programming cycles. For turning, milling and boring operations, the sequence "semi finish cut – probe – finish cut" produces high accuracies in size and position even with complex workpieces.





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But at the event, the company demonstrated noncontact, in-process measurement of plasticizing screws for injection molding machines on an M70 Millturn configured for complete machining of those complex components. For this, a Hexagon M&H LS-R-4.8 wireless laser scanner was used. Because data is transmitted via radio to the machine control and measuring software, the sensor can be automatically changed in and out of the tool changer. Accurate machine tool measurement typically involves capturing data for a limited number of points on a part using a touch probe. With a metrology-grade laser scanner integrated into the machine tool, users can quickly capture and analyze a complete, data-rich image of a part to address flaws while the part is still clamped.

5 The M80CSX Millturn with disc milling unit is well-suited for machining large, forged crankshafts for power generation applications. The machine offers 70 kW of milling power and 12,000 Nm of torque for the disc milling unit at a maximum of 100 rpm. This enables it to achieve a 1,100 cm³/min material removal rate for rough-milling operations. The maximum disc cutter diameter is 1 meter, and the M80CSX can be fitted with two disc cutters operating independently to effectively cut cycle times in half. A gantry robot can be added to automatically replace discs as, ideally, another disc with fresh/indexed inserts would be set up offline and immediately installed in the machine.

The machine at the event was a tailstock model, but it can be installed with a counter spindle to perform complete rough machining of crankshafts. Probing capability is available to



measure runout, index position and general diameter and spacing measurements.

Programming cycles have been created so part parameters can be entered to simplify program creation. In addition, feed regulation capability helps compensate for variations in forged raw materials that can vary in terms of the amount of stock from one crankshaft to another.

6 The WFL Automation Solutions division creates turnkey projects with input from the customer as to its needs for a custom, automated, 24/7 machining solution. This typically extends much



beyond robotic part loading and unloading, and close communication and collaboration with the customer to develop a solution to meet its needs is key. Manfred Fahrion, the division's director of turnkey projects, quips that the customers often say they know what they want, but don't necessarily know what they actually need to achieve it. That's where the experience of the Automation Solutions division comes into play.

For example, installing a robot in front of a machine might work for part loading, but wouldn't be ideal if an operator needed to enter a cell to access the machine on a regular basis. In this case, an overhead, linear gantry system might make more sense. A linear gantry system likely also would be the better option for automating multiple machines in a cell. In addition, other processes might be added to further minimize or eliminate human intervention, such as washing, deburring and measuring stations. ■

■ WFL Millturn Technology | wfl.at/en

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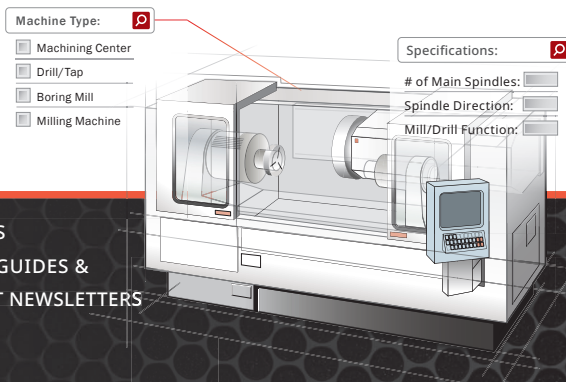
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IMTS 2026 Editors' Picks

In addition to more than 1,800 exhibitors, IMTS 2026 features a packed schedule of attractions and events.

Here's what the editors of *Modern Machine Shop* think you shouldn't miss.

MMS EDITORIAL TEAM

IMTS 2026 spans six days, 1.2 million square feet and more than 1,800 exhibitors. The editors of *Modern Machine Shop* have been on this floor many, many times as reporters, as attendees and in some cases as people who have lost their way trying to find the media center. Here is a short list of things we think are worth your time, drawn from our own reporting and from what we know about the people who attend.

The IMTS Shops Zone – Manufacturing in Motion, presented by Gardner Business Media (WEST BUILDING 432634)

The IMTS Shops Zone – Manufacturing in Motion, presented by Gardner Business Media (parent

company of *Modern Machine Shop*) will celebrate the past, present and future of manufacturing. A major highlight is Bridgeport Serial No. 1 — the first Bridgeport vertical milling machine, created by Rudolph Bannow in 1938, which is on loan from the American Precision Museum in Windsor, Vermont. Visitors can see manufacturing technology's evolution by comparing the original to a 2026 Bridgeport.

The booth also showcases the highest levels of precision in modern manufacturing. A cutaway of a 6.6-liter twin-turbo V8 "Fury" engine from Ilmor Engineering and Hennessey Special Vehicles, which is used in the Hennessey Venom F5 hypercar, gives visitors an idea of the precision

LEFT: The Smartforce Student Summit is designed for students and prospective young manufacturing professionals. Source: Gardner Business Media

and complexity required to make some of the world's fastest production cars. A custom machined and fabricated 14-foot-tall dart

and 6-foot-wide target featuring nods to partners in manufacturing made by Marathon Precision illustrates the possibilities of bespoke manufacturing. A FANUC robot cell gives a glimpse of the future, picking and dispensing swag to visitors.

Altogether, the zone highlights the importance of cooperation in manufacturing. "All of the partners we approached — the American Precision Museum, Ilmor Engineering, Marathon Precision and FANUC — were so excited to help out and take part in the story we're telling," says Jeff Norgord, executive vice president of audience and creative at Gardner Business Media.

Bridgeport Serial No. 1, on loan from the American Precision Museum, is on display at The IMTS Shops Zone — Manufacturing in Motion, presented by Gardner Business Media (parent company of *Modern Machine Shop*) in West Building booth 432634.

Source: Evan Doran, *MMS*



Industrial AI Arena (Front of the North Building)

For the first time, IMTS attendees will be able to find more than 25 exhibitors focused on providing applied AI solutions for manufacturers. The area features a mix of startups and established companies with solutions across quality and inspection, process optimization, downtime reduction, cybersecurity, safety and demand forecasting. This dedicated area will enable manufacturers to investigate a range of AI products, ask questions and directly compare options to find solutions that will make an impact in their operations.

Emerging Technology Center

(FRONT OF THE NORTH BUILDING)

As an IMTS attendee, you likely have a plan in place in terms of the specific companies or technologies you want to see. But be sure to set aside time to walk through the Emerging Technology Center (ETC) as it's valuable to see where manufacturing technology is headed.

For example, in partnership with Oak Ridge National Laboratory, Mazak and FANUC, the ETC will demonstrate a live, end-to-end manufacturing system operating continuously on the show floor. The system produces drone airframes using hybrid manufacturing techniques and robotic assembly, periodically integrating, testing and disassembling complete units, making visible how modern factories operate under real-world constraints.

The ETC is designed to show industrial surge capacity: the ability to translate design into production, sustain output, recover from disruption and make tradeoffs explicit. This brings concepts such as digital twins, automation and AI into a tangible, credible manufacturing context.

Smartforce Student Summit

(NORTH BUILDING LEVEL 1)

The Smartforce Student Summit returns for IMTS 2026. This part of IMTS has shorter hours than the other areas of the show: 9:00 to 3:00 Monday through Friday, and 9:00 to 1:00 on Saturday. While this section is primarily designed for students and prospective young manufacturing professionals, other attendees can learn about the current state of manufacturing education and outreach programs from the universities, tech schools and workforce development partners in attendance. Before leaving, be sure to stop by the NASA and





The Emerging Technology Center will demonstrate a live, end-to-end manufacturing system producing drone airframes continuously on the show floor.

Source: IMTS

BuildSubmarines.com booths, and check out the American Precision Museum's booth.

Smart Manufacturing Experience Showcase (NORTH BUILDING 236702)

Booth 236702 in

the North Building, just off the main hallway through McCormick Place, plays host to the Smart Manufacturing Experience Showcase, where a lineup of speakers deliver talks on adoption and implementation strategies for automation-friendly technologies (such as robotics and AI) that can help bridge the manufacturing skills gap. The times of these talks vary day to day, so be sure to check the Show Planner for daily programming.

If you only have time for one, we recommend "Unscripted Manufacturing: Real-Time Problem Solving Across the Industrial Ecosystem" at 1:30 on Wednesday, September 16. At this panel, five speakers from different areas of the manufacturing industry will take part in an unscripted discussion of modern manufacturing challenges and tools to help solve them.

Miles for Manufacturing 5K Run/Walk (7 A.M. ON WEDNESDAY, SEPTEMBER 16, LAKEFRONT TRAIL, CHICAGO)

The Miles for Manufacturing 5K has raised more than \$250,000 for STEM education since its debut at IMTS 2014, and every dollar of that came from runners and sponsors. IMTS covers all production costs, which means registration fees and sponsorships go directly to manufacturing education programs. At the 2024 race, 568 participants generated \$47,445 in donations supporting 17 organizations, including 12 FIRST Robotics teams and the Women in Manufacturing Education Foundation. The 2026 race takes place during show week in Chicago. If you're going to be on your feet for a few days, you might as well start one of them with a 5K.

Register at runsignup.com/Race/IL/Chicago/MilesforManufacturingIMTS or contact Cat Ross at cross@amtonline.org. 📄

- | American Precision Museum | americanprecision.org
- | Bridgeport | hardinge.com
- | FANUC America | fanucamerica.com
- | IMTS – International Manufacturing Technology Show | imts.com
- | Mazak North America | mazak.com

Modern Machine Shop

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[IN MOTION]**

7 Things You Need to See in the MMS Booth

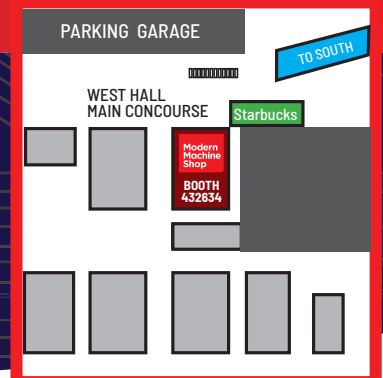


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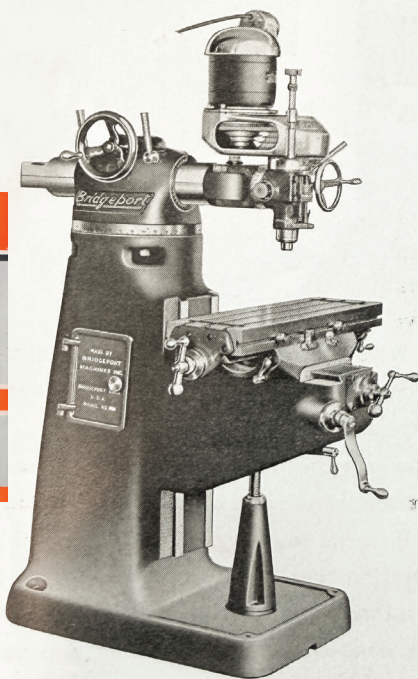
See the Machines

1

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MODERN MACHINE SHOP

29



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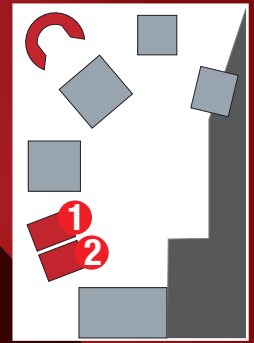
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Past and Present

2

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BOOTH #432634

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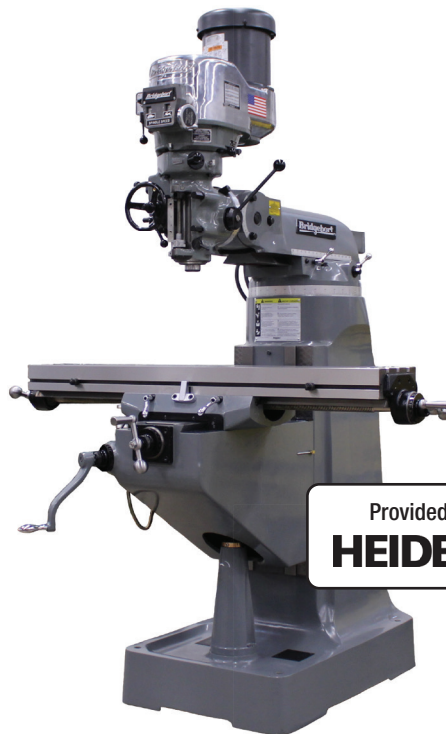
The **Bridgeport Series 1** is the **original** milling, drilling, and boring machine that revolutionized an industry. With more than 400,000 machines built and sold worldwide, Bridgeport Machine Tools continues to be the industry leader for milling machines.

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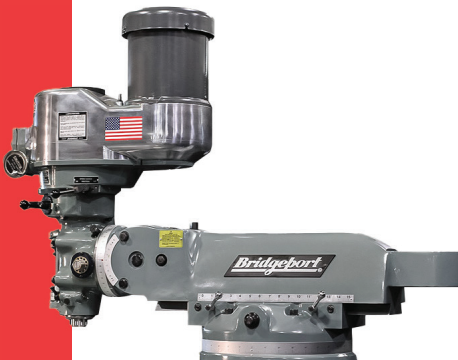
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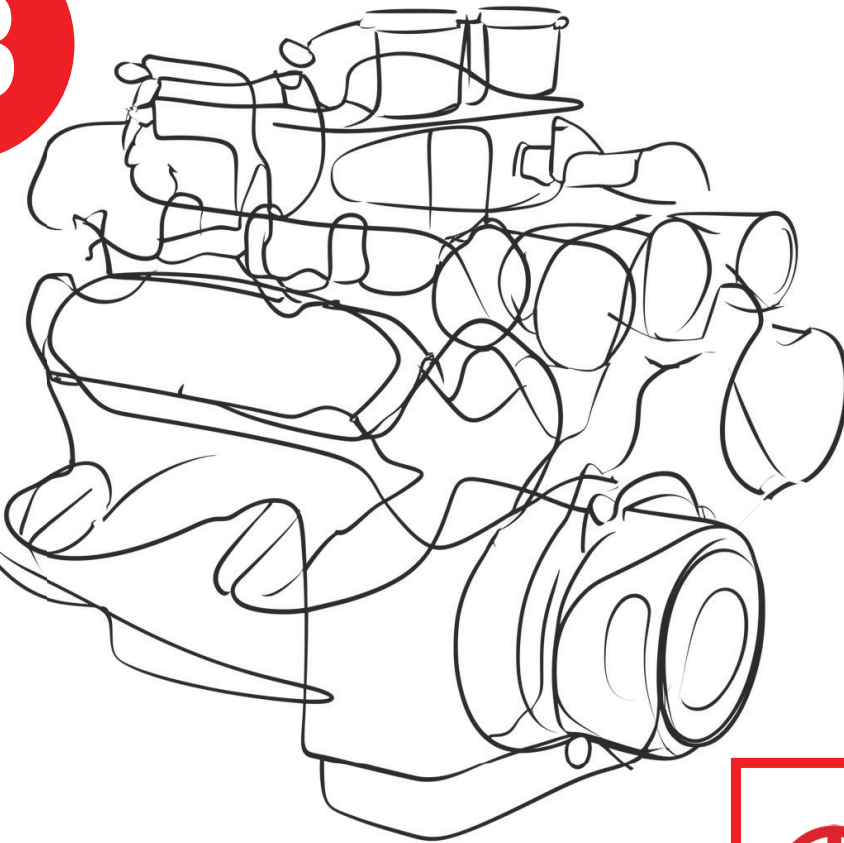
Visit us in West Hall - Booth #432634



Precision Built for Speed

A precision machined cut-away 6.6-liter twin-turbo V8 Fury engine block. Built by Ilmore Engineering for the Hennessey Venom 5, their variant engine boasts an incredible 2,000+ horsepower! Ilmore-designed billet aluminum pistons and high-lower fuel injectors, it is a real marvel of endurance and power.

3



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ILMOR

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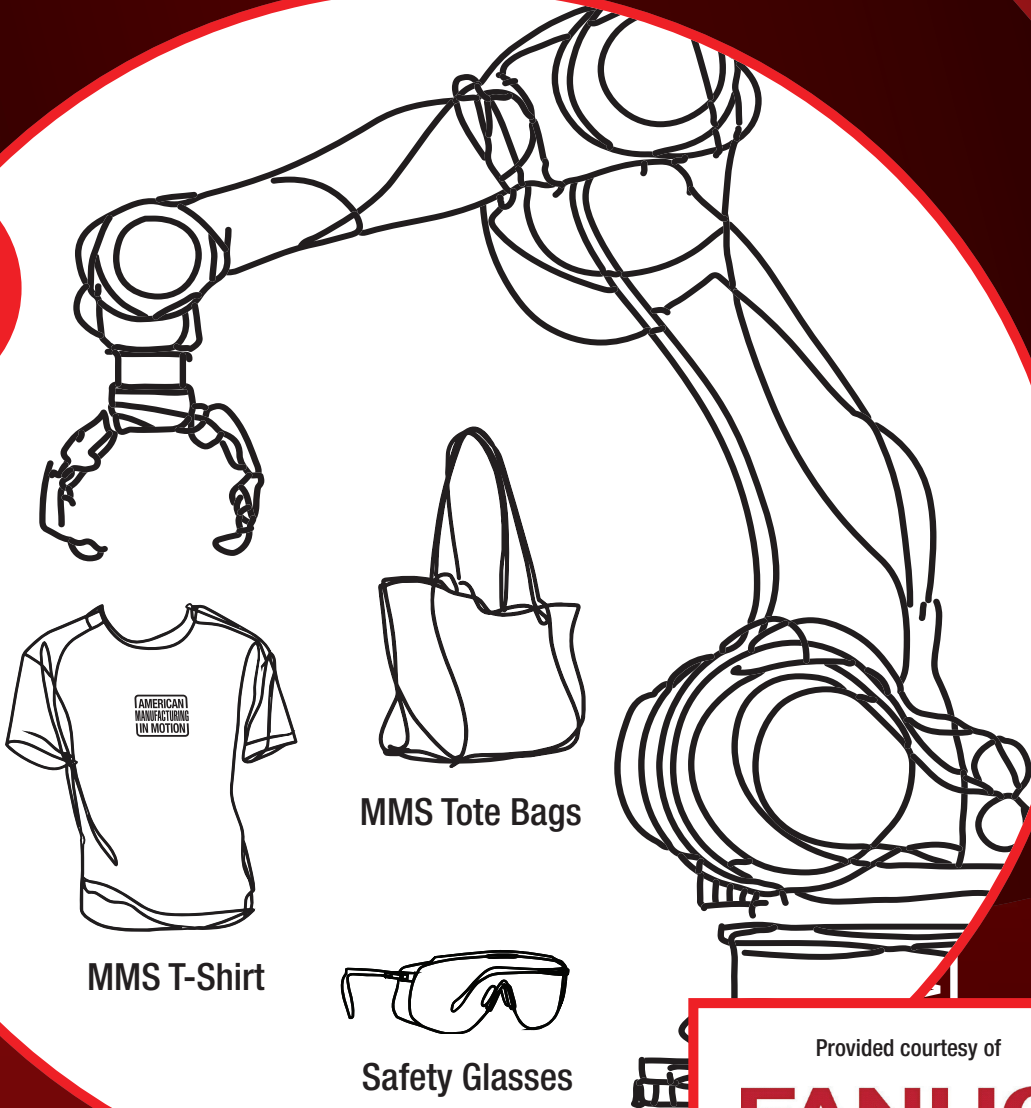
Scan for Swag

Serving up Modern Machine Shop swag, a FANUC robot will be showcasing the precision, accuracy and repeatability required of robots and cobots working in demanding manufacturing environments and processes.



BOOTH #432634

4



MMS T-Shirt

MMS Tote Bags

Safety Glasses

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Bespoke CNC Creativity

The display symbolizes the creativity and CNC technical prowess of Marathon Precision, a Midwest machining company and 2025 MMS Top Shops honoree. The brainchild of Marathon Precision founder and owner Mike Bauer, the dart and target are also a fantastic backdrop for an IMTS selfie.

5

Special Thanks to Mike Foy and Mike Bauer at:



Located in the IMTS Shops Zone

2026 Top Shops Honorees

6

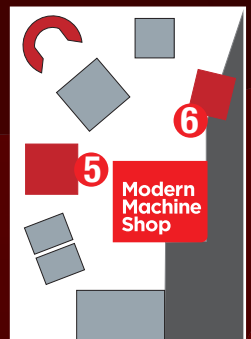


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- Machine Technology: **HEI Precision**
- Shopfloor Practices & Performance: **Precision Profiles LLC**
- Human Resources: **Astro Machine Works**
- Business Strategies: **Hill Manufacturing & Fabrication**



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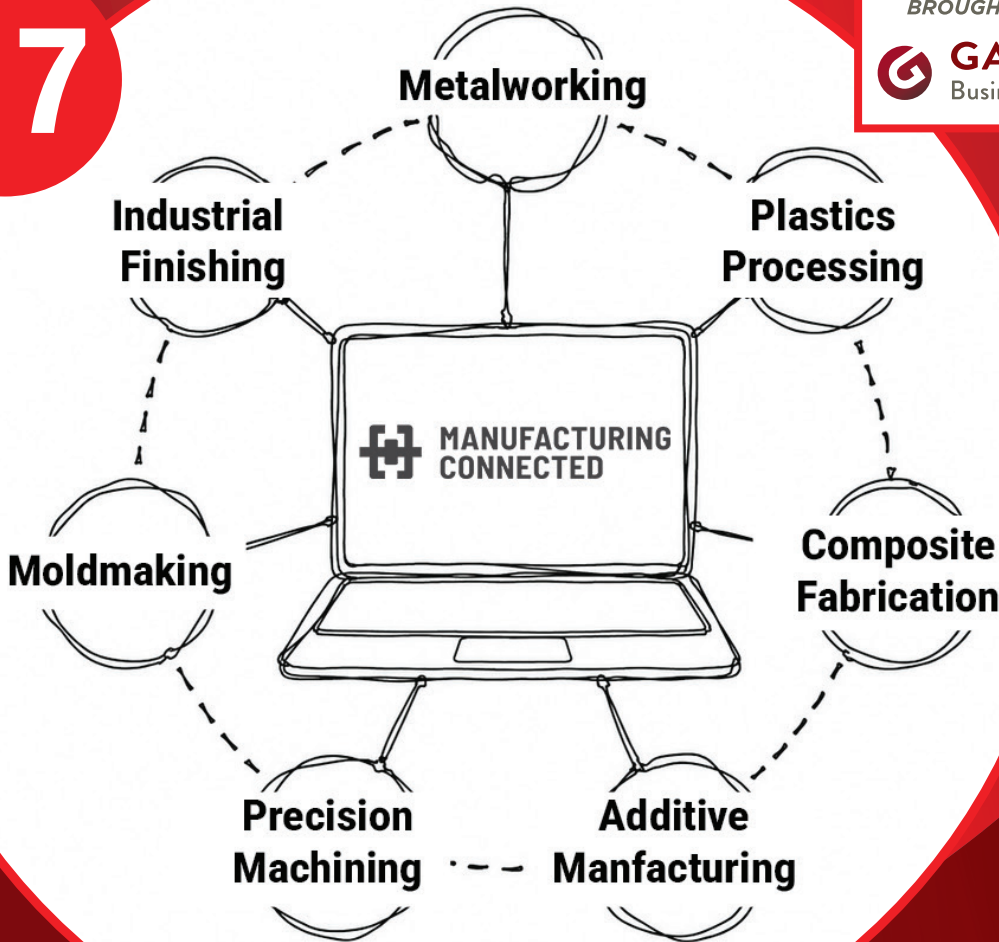
Connect with Manufacturing's New Technology Network

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International Manufacturing Technology Show

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IMTS, organized by AMT – The Association For Manufacturing Technology, is the largest manufacturing trade show in North America.

Hybrid Platform Combines Additive Manufacturing With CNC Machining in Single Workflow

DN Solutions exhibits the AM2CNC platform, which integrates AM and CNC machining in a single workflow. DN Solutions runs a metal additive preform through to a finished, ready-to-use part on a single connected platform, demonstrated live with the DLX 450 metal additive system and the DVF 5000 five-axis machining center with an Automatic Workpiece Changer (AWC).

The AM2CNC platform is designed to carry the workpiece from additive preform to qualified part inside one workflow, under one vendor with no integration gap.

DN Solutions demonstrates AM2CNC using the DLX 450 and the DVF 5000. The DLX 450 builds the preform; palletized automation delivers the stored parts directly to the DVF 5000, where the five-axis mill performs the high-precision finishing and tapping that turn a raw preform into a finished part.

The AM2CNC platform applies precision CNC finishing to complete what additive cannot, closing the loop from

preform to certified, ready-to-use part. Because no two preforms leave the build chamber identical, AM2CNC measures each one directly in the machine and fits the finishing program to where that specific part actually sits, so the tool path references the real preform on the table rather than an idealized nominal.

| DN Solutions | dn-solutions.com | Booth 338919



High-Feed Milling System Reduces Cycle Times

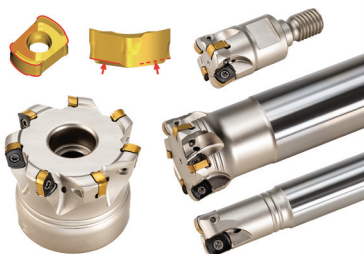
Ingersoll Cutting Tools introduces the DiFeedWinV high-feed milling system. The DiFeedWinV provides the strength and stability needed for roughing and semi-finishing complex cavity and core geometries while maintaining consistent, predictable performance.

The system features radius-style, high-feed inserts that provide strong edge strength, making them well-suited for hardened steels and long tool overhangs commonly found in die and mold applications. An angled V-bottom insert face

increases the contact area between the insert and cutter body, promoting secure seating and improved stability during aggressive toolpaths. This design allows feed rates up to 0.090" per tooth, enabling faster material removal while reducing cutting forces that can lead to vibration or deflection. With the ability to ramp at angles two to four times higher than traditional high-feed cutters, the DiFeedWinV gives programmers greater flexibility when machining deep pockets, contoured surfaces and 3D geometries.

Available in diameters ranging from 0.625-3.00", the DiFeedWinV is designed to reduce cycle times, improve process stability and achieve consistent results.

| Ingersoll Cutting Tools | ingersoll-imc.com | Booth 431522



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Mechatronic Grippers Offer Flexibility, Precision for Automated Work Cells

SMW Autoblok features the Motiact series of mechatronic grippers. The Motiact mechatronic gripper series is designed to perform precise, consistent and accurately monitored gripping operations for moving parts, pallets and chucks in and out of CNC machines and automated work cells.

There are four series of Motiact grippers featuring a range of sizes and gripping forces:

- **MX-S (Small Parts):** 3- / 6- / 8-mm strokes per jaw and gripping force of 40 / 150 / 250 N. It is well-suited for cobot applications, pick-and-place tasks and handling delicate or small workpieces.
- **MX-M (Universal):** 8- / 13-mm strokes per jaw and gripping force of 1200 / 1800 N. It is well-suited for machine-tending applications, with a substantial weight capacity and gripping force to accommodate various workpieces.
- **MX-U (Universal):** 55-mm strokes per jaw and gripping force of 300 N. It is designed for a larger range of products, part families, delicate parts and medical applications where parts must be handled carefully.
- **MX-L (Long-Stroke):** 55- / 99-mm jaw strokes per jaw and gripping force of 27,000 / 40,000 N.



With a maximum weight capacity of up to 200 kg, these robust, larger jaw stroke grippers are designed for larger-part applications.

■ SMW Autoblok | smwautoblok.com | Booth 431617

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Port Mills Expand Options for Hydraulic Port Machining

Scientific Cutting Tools Inc. (SCT) introduces a line of solid-carbide port mills for machining SAE J1926 ORB and AS5202 hydraulic port profiles. The line is designed to provide a flexible option for hydraulic port machining.

Designed for circular interpolation from a pre-drilled hole, SCT port mills are engineered to machine key port features, including the seal surface, counterbore and chamfers. The line gives manufacturers a flexible alternative to traditional plunge-style or reamer-style porting tools, especially in applications where access, spindle

speed or production volume may be limiting factors.

Each port mill is designed to cover a range of port sizes, helping reduce the number of tools required while giving programmers and machinists more flexibility on the shop floor. The line includes tools for both SAE J1926 ORB and AS5202 port profiles, with uncoated options and Versa-coated (AlCrN) options available.

SCT provides application-specific tooling for demanding industries such as hydraulics, aerospace, defense, medical, energy and advanced manufacturing. By combining standard tooling availability with custom and modified tools, SCT says it is helping customers simplify complex machining applications while improving access, repeatability and total cost per part.

"Port mills are a practical solution for shops that need more flexibility in hydraulic port machining," says Sarah Kate Christopher, engineering manager at SCT. "They are especially useful for prototypes, small-batch production and shops using lower-RPM equipment or smaller CNC machines."

Scientific Cutting Tools Inc. | sct-usa.com
Booth 432414



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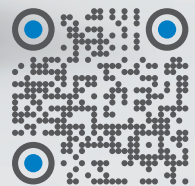
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complete
SOLUTION

Toolpathing Software Streamlines Complex Part Programming

Mastercam's EverPath Technology is an advanced toolpathing solution designed to transform how manufacturers approach complex part programming. Built to streamline toolpath creation and improve machining efficiency, EverPath Technology is designed to streamline automation and intelligence to the shop floor.

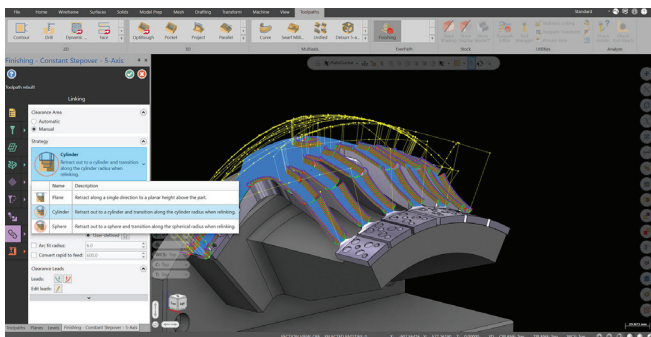
Adaptive algorithms within EverPath Technology analyze part geometry and automatically generate optimized tool paths for high-speed, multi-axis machining. This approach is said to reduce the need for manual programming adjustments while maintaining precision and sur-

face finish quality. The result, according to the company, is faster programming, shorter cycle times and improved consistency across parts.

Key features include automated toolpath optimization, real-time collision awareness and seamless integration within the Mastercam environment. Programmers can quickly iterate and validate strategies with confidence, minimizing errors and reducing machine downtime.

EverPath Technology also supports a wide range of materials and machining styles, making it well-suited for manufacturers across industries such as aerospace, automotive and medical.

The company says the technology is designed to increase productivity, reduce programming complexity and improve overall shop efficiency. By minimizing manual intervention and maximizing toolpath performance, EverPath Technology is intended to allow teams to focus on higher-value work while maintaining tight production timelines.



Mastercam | mastercam.com
Booth 133222



Reduced Chatter, Impressive Results

The Aluminum Ultra Series is made specifically for slotting and finishing in non-ferrous materials.

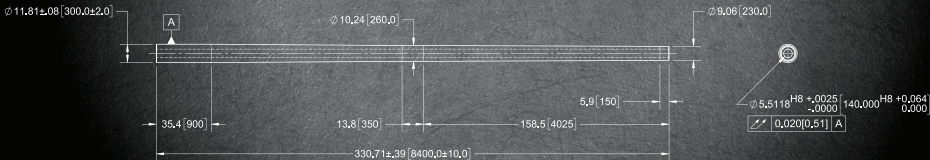
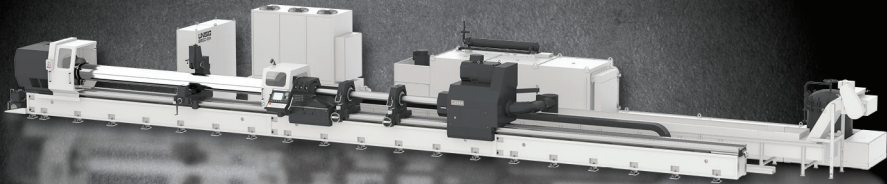
Available in 2 & 3 flute options and a specialty DLC coating for Aluminum. This series offers chatter free machining at high RPM and heavy cuts. Resulting in increased tool life, producing a higher quality part, and optimized cutting efficiencies.



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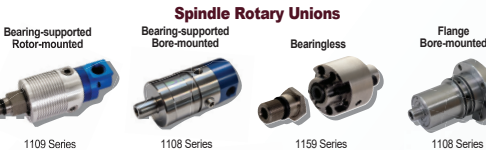


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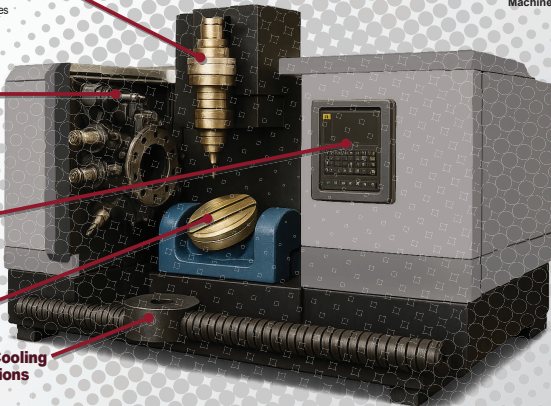
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Deublin
Machine Tool Page

IMTS2026 **DEUBLIN**
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Sinker EDMs Maintain Accuracy During Long Machining Cycles

MC Machinery Systems Inc. showcases the Mitsubishi SG70 Sinker EDM, which is designed to deliver stable, repeatable results from start to finish. At the heart of the machine is a collection of intelligent technologies



that continuously maintain accuracy throughout the burn process. Thermal displacement compensation actively monitors environmental changes and automatically adjusts to help maintain precision, even during long machining cycles. Meanwhile, IDPM3 optimizes spark energy in real time, helping reduce electrode wear while maintaining consistent machining conditions.

Supporting this stable performance is SS Jump 5 technology, which enables high-speed No-Flush machining for improved efficiency and shorter cycle times without compromising accuracy. The SG70's heavy-duty construction and large-capacity work area provide the foundation needed for oversized molds and demanding applications, while the M800 control and Esper II Navigator simplify setup and programming to reduce operator input.

For manufacturers producing large, complex tooling where accuracy must remain consistent from the first spark to the last, the SG70 provides stability and repeatability to keep production moving forward.

MC Machinery Systems Inc. | mcmachinery.com | Booth 338129



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Machining Centers Provide High Performance for Range of Part Sizes

Chiron Group showcases its latest advancements in high-precision manufacturing, featuring the Micro5 XL micromachining center and the FZ 19 S five-axis machining center. From ultra-precise micro components to larger, complex parts, both technologies are designed to increase productivity and improve accuracy across a wide range of industries.

The Micro5 XL expands workpiece capacity up to 120 mm while maintaining a compact footprint of only 1.7 m². Designed for demanding precision applications, the Micro5 XL features highly dynamic five-axis kinematics, spindle speeds up to 50,000 rpm and jerk values reaching 900 m/s³. The result is said to be optimized surface quality, micron-level precision and reduced cycle times, even on highly intricate components. Typical applications include bone plates and medical implants, knee inserts, precision mechanical components and watch parts.



The machine is capable of machining difficult materials such as titanium, stainless steel and precious metals.

Chiron also features the FZ 19 S five-axis, designed to provide power, rigidity and flexibility for larger and more demanding workpieces. With

traverse paths of 850 mm (X), 960 mm (Y) and 700 mm (Z), the machine is well-suited for aerospace, mechanical engineering and other high-precision applications.

The FZ 19 S combines robust machine construction with Chiron's spindle technology to provide high torque and dynamic machining performance when machining difficult materials such as titanium.

Chiron America Inc. | chiron-group.com
Booth 339265

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Hybrid Chuck Reduces Vibration in Precision Machining Operations

Haimer presents the Hybrid Chuck, a toolholder that combines the advantages of shrink-fit and hydraulic chuck technologies within a single toolholder design. Featuring integrated passive damping technology, the Hybrid Chuck is designed to reduce vibration during machining operations while maintaining the rigidity and clamping forces associated with shrink-fit systems.

The damping element is integrated directly into the chuck structure, supporting more stable cutting conditions without the need for external components or increased toolholder size. Reduced vibration can improve surface quality, support longer tool life and increase process reliability, particularly in high-speed machining applications, difficult-to-machine materials and operations involving long gage lengths.

The Hybrid Chuck is designed to maintain the high runout accuracy



required for precision machining applications and features a 4.5-degree outer geometry similar to the Power Shrink Chuck design, allowing compatibility within existing shrink-fit setups.

Additional configuration options include Cool Jet for internal coolant delivery and Safe-Lock pull-out protection for demanding machining environments. Each toolholder is marked with a distinctive ID to support identification and traceability within tool management systems.

By combining precision clamping with integrated damping technology, the Hybrid Chuck is designed to support improved machining stability, reduced vibration and more consistent machining performance across a wide range of applications.

Haimer USA | haimer.com | Booth 431510

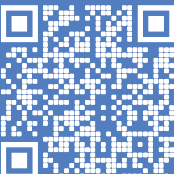


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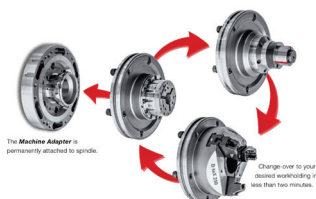
**BOOTH
338844**

Workholding System Enables Quick Changeovers

Hainbuch America Corp. showcases its Centrotex quick-change workholding system, which the company says can enable complete clamping device changeovers in less than one minute.

Engineered for high-speed workholding changeovers, Centrotex can deliver repeatability of 0.003 mm or less between the machine adapter and clamping device, with no need to indicate or realign after every changeover.

The interface simplifies setup procedures, increases flexibility through machine-overlapping use of clamping devices, and



supports both power-actuated and fluid-actuated work-holding systems. For heavier clamping devices, the optional Monteq mounting aid improves handling, safety and operator ergonomics.

Hainbuch America Corp. | hainbuchamerica.com
Booth 431636

Sinker EDM Provides Powerful Performance in Compact Footprint

Belmont Equipment & Technologies highlights the MX-226C ZNC sinker EDM, which combines the EDM generator with user-friendly EDM settings designed to streamline setup, along with a compact machine body design housing the oil reservoir within the machine base.

The MX-226C features X-, Y-, and Z-travels of 11.8" x 9.8" x 5.9", an open height of 9.4" and a maximum workpiece weight capacity of 1,760 lbs. Key features include a programmable Z-axis that automatically controls depth and generator settings from roughing through



finishing cycles, as well as conversational G- and M-code programming that reduces operator learning time.

Belmont
Equipment &
Technologies
belmont4edm.com
Booth 338854

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HG series at Starrett.com/hg



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Get Demos of the HG Gages at:

 **IMTS2026** BOOTH #134244



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Precision Grinding, Machining Technology Increase Productivity

United Machining Solutions' equipment and technology showcase features 17 CNC machines from Mäggerle, Blohm, Studer, Walter, Agie Charmilles, Charmilles, Mikron Mill and Step Tec, as well as several automation offerings — including the Automated Tool Production cell from Walter, the WorkPartner 1 cell from System 3R and the VersaLoad cell from United Grinding North America.

United Machining Solutions houses two divisions: United Grinding (North America headquarters in Miamisburg, Ohio) and United Machining (North America headquarters in Lincolnshire, Illinois).

Mäggerle, Blohm, Studer and Walter all have their latest grinding innovations on display. Studer debuts the S23 universal cylindrical grinding machine for the first time in the U.S., along with the S131r, S41 and S33. Walter showcases the Helitronic Vision Laser and the Automated Tool Production (ATP) automation cell, as well as the Helicheck Nano, Helitronic Micro and the Power Diamond 400. Blohm and Mäggerle showcase the MC5 and the MFP 30 surface and profile grinding machines.

Machining brands at the United Machining Solutions booth include Agie Charmilles, Charmilles and Mikron Mill. Agie Charmilles introduces the Cut E 600 Prime for the first time, along with the Form F 450 and the Cut P 600 — the latter making its worldwide debut. Mikron Mill unveils the five-axis Mill E 700 U Prime for the first time, and also showcases the Mill S 600 U. Lastly, Charmilles demonstrates laser machining capabilities with the Laser S 500.

United Machining | ums.swiss/en/ | Booth 236802





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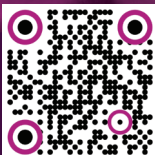
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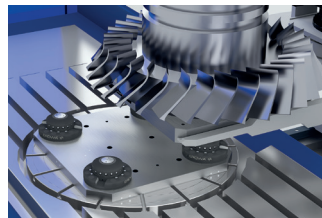
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PLATINUM TOOLING
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Booth 432201

Workholding System Automates Handling of Large, Heavy Workpieces

Erowa Technology Inc. features several workholding and automation solutions, including a modular workholding system for large and heavy workpieces and two side-by-side robot demonstrations.

Among the technology being showcased is the GTS (Giant Tooling System), Erowa's modular workholding solution designed for machining large



and heavy workpieces. The system is well-suited for EDM, wire EDM and machining applications.

Also on display are two of the company's compact automation robots shown side by side for the first time. The ERC80 (Erowa Compact 80 Robot) is designed to service two machines and offers a transfer weight capability of 80 kg. The ERC150 (Erowa Compact 150 Robot) handles up to 150 kg in transfer weight. Both units feature small footprints, according to the company.

| Erowa Technology Inc. | erowa.com | Booth 339072

Vertical Double Disc Grinder Targets High-Precision Applications

Nissei USA features its V-5P vertical double disc surface grinder, demonstrating grinding technology designed for high-precision, high-volume production applications.

The V-5P utilizes a vertical spindle double disc grinding configuration designed to provide exceptional parallelism, thickness control and surface finish consistency across a wide range of flat workpieces. The machine's rigid box-frame construction and high-stiffness spindle

design help minimize vibration and maintain grinding accuracy during demanding production cycles.



| Nissei USA Inc
nisseiddg-usa.com
Booth 237334

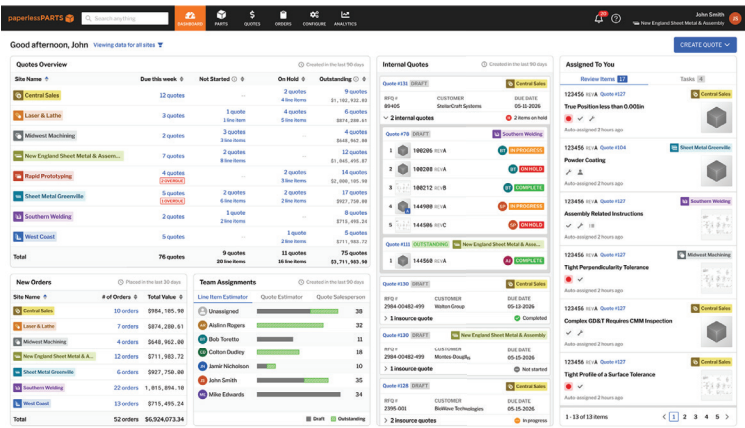
Software Features Enhance Centralized Visibility

Paperless Parts' software solution is designed to provide centralized visibility and coordination across a portfolio of businesses. According to the company, the solution connects organizations without forcing sister companies to abandon the systems that made them successful in the first place. It does so with three features:

- **A multisite dashboard**, a centralized command

center giving leadership aggregated visibility across all sites

- **Internal quoting**, which allows shops to transfer parts and quotes between sites
- **Multisite search**, which allows users to search across all businesses within an enterprise, eliminating costly inefficiencies or undercutting sister sites.



“With the new multisite features from Paperless Parts, what maybe in the past could take as many as 10 minutes per instance, now takes 15 or 30 seconds to do,” says Jamie Goettler, chief revenue officer at BTX Precision, a beta user of the feature set. “If I can quote more opportunities in a day, that’s more at-bats, which means more hits, which means more revenue.”

Paperless Parts
paperlessparts.com | Booth 133267

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CNC Series Reduces Cycle Time, Extends Tool Life

Mitsubishi Electric Automation Inc. is expanding its M80 CNC Series with the introduction of the M8V CNC Series, designed to help manufacturers achieve faster machining, higher precision and greater flexibility.

The M8V CNC Series builds on the performance of the M80 Series platform while adding advanced control functions designed to improve cycle times, extend tool life, reduce scrap and support highly customized machining requirements. These enhancements are intended to help manufacturers minimize trial machining and defective parts while maintaining consistent, high-quality output.

The M80V CNC Series features built-in wireless LAN, enabling operators to connect machines to software tools on a remote PC for wireless data exchange. The M8V CNC Series can also deliver approximately 11% faster machining than the previous M80 CNC Series through optimal machine response-contour control (OMR-CC), according to the company. Additional functions include cutting load control for shorter cycle times and longer tool life, as well as tool cutting point control to optimize machining when tool geometry changes without requiring program modifications.

To further support customization and usability, the M8V CNC Series allows image input from PCs or cameras to differentiate machine tools and supports ST language alongside ladder language, enabling PLC programs to be created and edited using conventional programming code. Integrated 3D machining simulation helps reduce waste from trial and defective machining, supporting more efficient and sustainable manufacturing practices.

Mitsubishi Electric Automation Inc.
us.mitsubishielectric.com/fa/en | Booth 338136



VMC Provides Speed, Precision in Compact Footprint

Fryer Machine Systems highlights its MC-L compact linear way high-speed machining center in Siemens' booth. Standard features of MC-L machines include high-speed 30-tool arm-type automatic tool changers, 40-taper Big Plus 10,000-rpm inline spindles, high-torque inline 30-hp motors and fast 1,450-ipm rapid

feed rates. Combined with roller-type linear ways and heavy-duty FEA- designed castings, the compact MC-L series provides high speed and performance.

The MC-L features a Siemens Sinumerik One CNC for ease of use in both production and low-volume, high-mix facilities. The control features "do one" cycles, which enable single-cycle operation with no programming necessary. Users can automatically pocket, contour, rough, finish, drill and tap one step at a time. Simple menu programming including graphic verify and fast setup keys streamline the process of making one-off parts. Shopfloor programming in conversational mode is available for single-piece runs and G-code programming is available for high production.

Equipped with a cast-iron one-piece base, high-precision ball screws and bearings, the Fryer MC-L machining centers are engineered for 0.0002" positioning accuracy.

Built in the U.S., Fryer MC-L machines are designed for high-performance cutting, accuracy, reliability and ease of use, all within a compact footprint.

■ Fryer Machine Systems Inc. | fryermachine.com
Booth 338262



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North Building, Level 3
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Briquetting Systems Automate Scrap Processing

RUF Briquetting Systems features its automated scrap-processing solutions, highlighting how manufacturers can reclaim floor space, streamline chip and sludge handling as well as gain greater control over waste management.

As production environments become more automated, scrap handling often remains a manual, space-consuming step that disrupts workflow. RUF Briquetting Systems address this challenge by converting loose metal chips and grinding sludge into dense, uniform briquettes through continuous operation. The result is reduced scrap volume, improved material flow and a cleaner,

more organized shop environment with less space occupied by loose scrap. In many applications, briquetting can reduce scrap volume by up to 20:1, according to the company.

Compacting scrap into stackable briquettes also minimizes storage requirements, simplifies handling and enables recovery of cutting fluids for reuse. It further supports downstream recycling by transforming difficult-to-manage waste into a more consistent and transportable material stream.

“True shop automation goes beyond the machine tool — it includes how chips and scrap are collected, moved and managed,” says Wyatt Mann, vice president and general manager at RUF Briquetting Systems. “At IMTS, manufacturers can see how automated briquetting helps save space, improve workflow and bring greater control to waste handling.”

IMTS visitors can stop by the RUF booth to discuss their application and learn how briquetting can streamline operations and make better use of available space.

RUF Briquetting Systems | ruf-briquetter.com | Booth 339089



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Fluid Recycling, Material Handling Solutions Streamline Operations

Eriez showcases solutions designed to improve fluid management, workplace safety and material handling efficiency.

Leading the exhibit is the Eriez Sump Cleaner, a system engineered to remove sludge, tramp oil and contaminants from machine tool sumps without interrupting production. The unit is designed to increase coolant effectiveness and longevity while helping manufacturers improve productivity and reduce disposal costs.

Also featured are Eriez Safehold lifting magnets, designed to provide secure, efficient handling of steel components. The magnets support improved safety, productivity and ease of operation in industrial environments.

Rounding out the lineup are Eriez chip and part conveyors, which streamline scrap and component transport in manufacturing settings, and Eriez coalescers, which separate and remove tramp oils to help keep coolant systems cleaner and longer lasting. These solutions remove chips, tramp oil and fine particulate from cutting fluids.

Together, these technologies reflect Eriez's

focus on fluid recycling, safer material handling and efficient conveying solutions. The company's broader fluid management equipment is designed to extend coolant life and reduce overall operating costs.

| Eriez | eriez.com | Booth 237433



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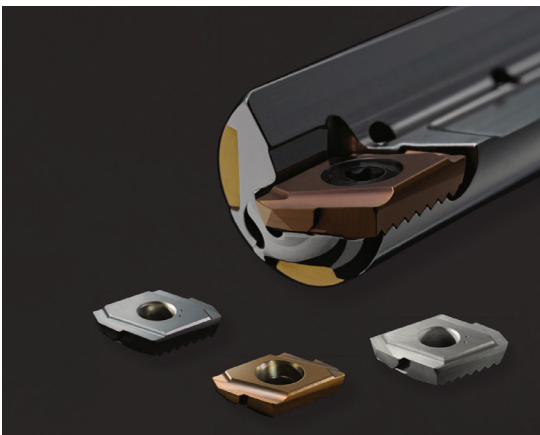
Botek America features its Type 01 single-flute gundrill with indexable inserts, designed to provide high productivity and flexibility in deep-hole drilling applications. Engineered for larger diameters, the Type 01 combines precision performance with reduced tooling costs.

Unlike solid carbide tools that require regrinding, the Type 01 utilizes replaceable cutting inserts and guide pads, allowing operators to quickly change worn components and return to production with minimal downtime. This design not only simplifies maintenance but also promotes consistent tool length and performance across multiple tool changes.

The tool is designed to maintain tight tolerances and optimal hole straightness. Its internal coolant design supports reliable chip evacuation and thermal stability.

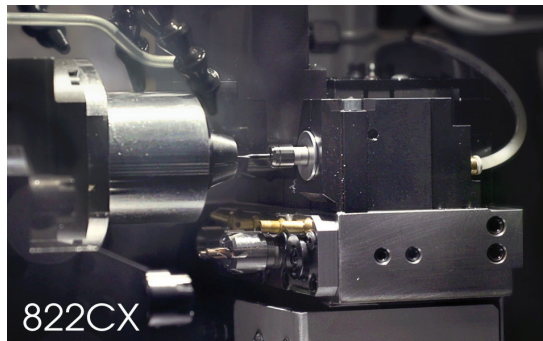
By reducing material waste, minimizing downtime and improving process reliability, the Type 01 is intended to help manufacturers achieve greater efficiency without sacrificing precision.

| Botek America Inc. | botekamerica.com
Booth 431233



Live Tool Boosts Swiss-Type Lathe Output at High Speeds

Air Turbine Tools Inc. highlights the 822CX Air Turbine live tool, which is engineered to add governed 60,000 or 80,000 rpm on Swiss-type lathes. According to the company, the 822CX outperforms conventional live tools by providing reliable, ultra-high-speed cutting at a significantly lower cost with only a connection to 90 psi required.



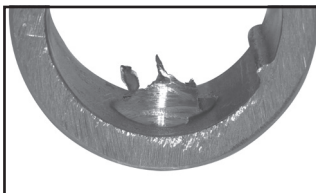
A key feature of the 822CX is its custom double turbine-driven mechanism, which automatically increases airflow cfm volume to match cutting load. This design is intended to keep the tool running at its rated speed in the cut, maintaining the sfm specified for small tools. The company says production cycle times can be reduced by 6 to 10 times across a wide range of lathe applications. This contrasts with traditional nominal high-speed tools, which lack power and bog down on the tool path. The 822CX's governed speed is designed to prevent tool breakage and promote consistent finishes, optimizing small-diameter tool performance to improve surface quality and tool life while shortening cycle time.

| Air Turbine Tools Inc. | airturbinetools.com
Booth 431645



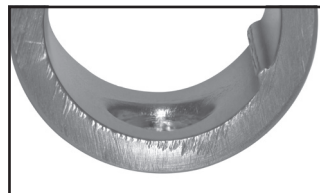
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Machine-Ready Blanks Boost Throughput

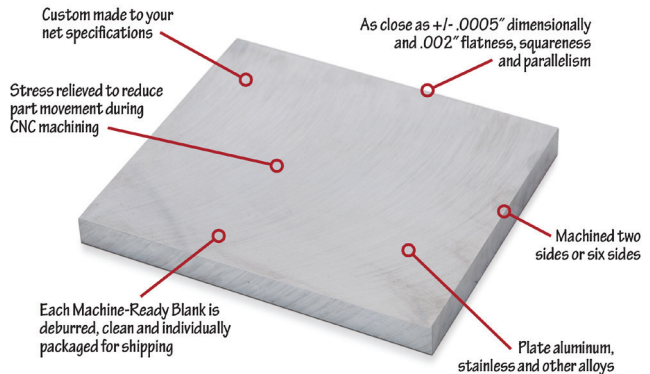
TCI Precision Metals highlights its precision Machine-Ready Blanks designed to eliminate material prep, shorten setup time, reduce scrap and increase overall throughput. Machine-Ready Blanks arrive inspected, certified and ready to go directly from receiving to finish machining.

Custom made-to-order precision blanks eliminate the need for in-house sawing, grinding, flattening, squaring operations and outside processing. Each blank arrives deburred, clean and individually packaged to avoid damage during shipping. Custom blanks are made to customer specifications and are guaranteed as close as ± 0.0005 " dimensionally and as close as 0.002" flatness, squareness and parallelism. Thin, flat material is de-stressed to reduce part movement during final machining.

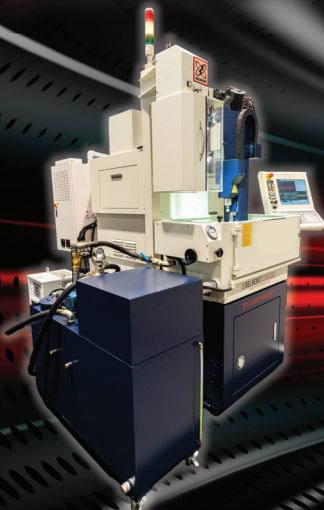
Operators can use the time previously spent in setup and prep for more productive use of CNC machining centers, according to TCI President and CEO Ben Belzer. "Using Machine-Ready Blanks for production jobs is like adding a machining center, without the overhead," Belzer says.

Standard ready-to-ship blanks are also available from TCI and can be ordered online for same-day or next-day shipping. Standard blanks are available in thousands of alloys and dimensional combinations. Each blank is produced square, flat and parallel within ± 0.002 " of specified dimensions on two or six sides.

TCI Precision Metals | tciprecision.com
Booth 432123



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Vise Improves Milling Accuracy

Pascal Engineering Inc. showcases the CVH centering vise for milling applications after lathe turning. The double-acting vise holds the workpiece with high accuracy and repeatability while saving time through automatic operation.

The CVH features a pressure range of 1-7 MPa and a proof pressure of 10.5 MPa. It is available in standard or long stroke configurations as well as with a jaw.



The centering vise minimizes tool interference and promotes a stable cutting process with optimum tool length. It helps maintain a constant workpiece center by using both

jaws to stroke. Center datum processing remains possible even when the external shape of the workpiece varies.

The same soft jaw used for the lathe turning process mounts on the centering vise, eliminating the need to fabricate a new soft jaw for use with a machining center. One-chuck machining is possible for a variety of workpiece shapes using a self-cut soft jaw.

■ Pascal Engineering Inc. | pascalenginc.com
Booth 431569

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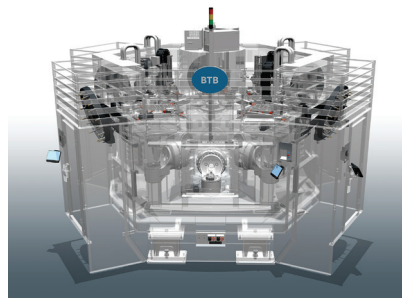


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Transfer Machines Combine Productivity with Versatility

BTB

Transfer showcases a range of three- and five-spindle transfer machines available in two models:



the M04, with three spindles and four stations (three machining stations and one loading/unloading station), and the M06, with five spindles and six stations (five machining stations and one loading/unloading station).

The concept behind both machines is to combine the productivity of a transfer machine with the versatility of a machining center.

■ BTB USA Corp. | btb.it/en | Booth 339178

Indexable Insert Handler Automates Milling Tool Preparation

Zoller Inc.'s Micbox is designed to automate indexable insert handling on milling tools. From RFID-supported tool identification to mounting, indexing, rotating, flipping and exchanging inserts, the system also automatically replaces fastening screws after a predefined service life.

An optional AI-supported measuring function, Zoller Wearcheck, takes automation a step further by automatically inspecting and evaluating the condition of every cutting edge before any action is taken.



The system can detect wear, classify the condition of individual cutting edges and intelligently determine whether an insert should remain in use, be indexed to the next cutting edge, rotated or completely replaced. This is designed to ensure that only inserts that have reached

their wear limit are serviced, maximizing insert utilization, reducing tooling costs and providing a fully autonomous and optimized tool preparation process without additional cycle time or operator intervention.

| Zoller Inc. | zoller.info/us | Booth 432018

Metal 3D Printer Enables High-Volume Production

EOS showcases the EOS M4 Onyx, an industrial metal 3D printer for high-volume production. The EOS M4 Onyx combines productivity, automation and process stability to provide consistent, high-quality parts for demanding industries such as aerospace, defense, energy, semiconductor manufacturing and more.

The EOS M4 Onyx features six 400-W fiber lasers and a large 450- × 450- × 400-mm build volume, enabling higher productivity while reducing cost per part. Advanced process controls, optimized gas flow and active temperature management are designed to promote repeatable builds and part quality.

To support efficient serial production, the system includes automated job changeovers in less than 30 minutes, increasing machine uptime and reducing production interruptions. EOS' RFS Pro filtration technology is said to improve operational efficiency by eliminating filter consumables, reducing hazardous waste and enabling more than 90% powder recovery.

Visitors can also explore production-scale metal AM applications with EOS technology, including a Boom Supersonic engine, the Beehive Fury drone engine and an AMCM M 8K-produced rocket nozzle.



| EOS | eos.info | Booth 338450

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HOW I MADE IT

David Wynn

Director of Technical Services for PMPA

INTERVIEWED BY | DEREK KORN

I started my college career as a dual chemistry and biology major while working in my family's machine shop. While attending college, I noticed that I had a passion for two things: machining and business.

It eventually occurred to me that I should be studying my passions. So after two years, I switched to a business degree and earned a degree in finance economics with a minor in accounting, all while working at my family's shop.

After graduating college, I started moving more into the management side of the business. One professor urged me to get my MBA, so I re-enrolled in college. All my classes were at night, which enabled me to work full time in the shop. While I was an undergrad, machining was a fun hobby, but now it was becoming a career — being in a small family shop, you had to get your hands into a little bit of everything.

While studying for my MBA, I started working on my "masters in machining" at the school of hard knocks and real-world teaching by my grandfather. He had worked on Brown and Sharpe screw machines for several companies in the Chicago area. My grandfather got to see about everything one could do with a Brown and Sharpe. When it came to teaching, he demanded perfection. When I would grind a cutoff tool, he would send me back to the grinder if it did not have a mirror finish. I spent time learning flat-die thread rollers, the burnishing machine and various other mechanical equipment.

Machining was not the career David Wynn chose; it chose him. Here's a bit about his journey to an accidental career that became his passion.

After earning my MBA, my grandparents were eyeing retirement and my dad and I decided to take over the business. I had spent seven years on Brown and Sharpes at this point, but my skill could not compare to my grandfather's 60-plus years of experience. I challenged myself to find a way to produce the parts as efficiently or more so while maintaining quality. This is where the Precision Machined Products Association (PMPA) and Swiss-type machines enter the story.

For years, I had collected old manuals from the National Screw Machine Products Association, which became the PMPA in the mid 1990s. The manuals were the holy grail of information in our industry.

I called and talked with Miles Free, the now retired director of industry affairs for PMPA, and my dad and I decided to join the organization. My first PMPA Management Update was special because I met so many of the people who ended up mentoring me.

I fell in love with the parallel processing of Swiss just like screw machines — Swiss just takes a different mindset. I also learned mill-turns, CNC lathes and spent a little bit of time on CNC mills, in addition to mastering the implementation of IT throughout the business.

I recently stepped into the director of technical services role at PMPA.

Working for PMPA is a fun and exciting journey. I get to meet lots of great people. I get to see the best manufacturing facilities in the world. My favorite part is helping our members solve their problems.

Machining wasn't the career I chose — it chose me. 🇨🇦





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