

THE RECORD

APRIL 2019

PUBLISHED BY THE NATIONAL TOOLING AND MACHINING ASSOCIATION

THE FUTURE OF MANUFACTURING STARTS TODAY



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2019 NATIONAL EVENTS

For more information visit: www.ntma.org/upcoming-events

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Tap into your company's full potential and learn how your shop can become a Top Shop. Expand your knowledge in multiple facets of your shop. Topics will focus on Shop Floor Management, Shop Technology, Human Resources and Financial Analytics.

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CHAPTER LEADERSHIP SUMMIT

January 30 - February 1 Nashville, TN

Connect, Learn, Lead. Chapter Leadership Summit is all about maximizing your NTMA membership at the local level. Learn ways to engage your chapter and build your regional coalition for stronger companies and a stronger industry.

THE MFG MEETING

March 6 - 9 Tucson, AZ

NTMA partners with the Association for Manufacturing Technology (AMT) for this interactive 4-day discussion of technological advances, innovative strategies and real-life case studies. It's the perfect platform for manufacturers to gain and share industry knowledge.

EUROPEAN TECH TOUR

March 31 - April 6 Munich to Milan

Take this opportunity to learn and observe global best practices that can be applied in your own company. We've scheduled strategic stops and tours to highlight some of Europe's most successful manufacturing companies.

LEGISLATIVE CONFERENCE

April 8 - 10 Washington, D.C.

There's power in our collective voice. Join NTMA member companies from across the country as we converge in Washington to meet with legislators and policy makers.

EMERGING LEADERS CONFERENCE

April 29 - May 1 Louisville, KY

To insure the future successes of our businesses and our industry, we have to build the future today. NTMA gathers the best and brightest up-and-coming industry leaders to network, share knowledge and brainstorm about tomorrow's manufacturing industry.

NATIONAL ROBOTICS LEAGUE COMPETITION

May 17 - 18 California, PA

Crunching metal, flying sparks-- it's a gladiator-style competition between robots designed and built by students. Come witness tomorrow's workforce in action today. It's a battle of epic proportions that truly is a win for both students and industry.

FALL CONFERENCE

October 15 - 18 Austin, TX

NTMA's signature event is not to be missed! Our annual conference pulls together all that is great about NTMA into three days packed with networking, advocacy and learning. You'll enjoy nationally acclaimed speakers, roundtable discussions, social events and sessions designed to educate and inspire—consider it an opportunity to recharge both personally and professionally.

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LOOK FOR THIS SYMBOL THROUGHOUT THE ISSUE FOR STORIES
RELATED TO THIS MONTH'S FEATURED TOPIC.

Do you have a great training program?

Are you using innovative methods to attract and
maintain top talent to your shop?

We'd like to feature your company in an
upcoming issue of The Record!

Please email Molly West (mwest@ntma.org)
with the details of what's working at your company
and how you're making a difference in the future
of manufacturing.



WELCOMES
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Safety Harbor, FL 34698

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39 Woodland St
Hartford, CT 06105-2337

FIVE STAR TOOL COMPANY, INC.
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Renee Lalonde
125 Elmgrove Park
Rochester, NY 14624

MATT MACHINE & MANUFACTURING, INC.
Pittsburgh Chapter
Mike Jezek
820 Unity Center Rd
Pittsburgh, PA 15239

VARIAN MEDICAL SYSTEMS, INC.
San Francisco Bay Area
Chapter
Hideyuki Tatsumi
911 Hansen Way
Palo Alto, CA 94304

WILKINSON MANUFACTURING, INC.
San Francisco Bay Area
Chapter
Doug Greene
332 Piercy Rd
San Jose, CA 95138-1401



NOW ACCEPTING NOMINATIONS: NTMA SERVICE AWARDS

NTMA's Nominating Team is now accepting nominations for the 2019 Service Awards.

The Service Awards are given out each year at NTMA's Fall Conference. We need your help finding the best candidates for these awards.

Do you know a member who has demonstrated outstanding and continuing service of the highest magnitude to NTMA? Nominate them for the **LA Sommer Memorial Award**.

Do you know of a member that has dedicated years of service to the U.S. Precision Custom Manufacturing industry, or the association? Nominate them for the **Honor Award**.

Do you know of a company, or individual that has consistently demonstrated strong support and active participation in training and/or workforce development programs that benefit the U.S. Precision Custom Manufacturing industry? Nominate them for the **William E. Hardman for Excellence in Training and Education Award**.

Do you know someone outside of our metalworking membership who has demonstrated outstanding service to the U.S. Precision Custom Manufacturing industry? Nominate them for the **Distinguished Service Award**.

Each month up until the submission deadline of July 1, 2019 we will spotlight one or two of the awards. In April we are spotlighting the LA Sommer Memorial Award:

LA SOMMER MEMORIAL AWARD:

The LA Sommer Memorial Award is named for the founder of NTMA, who began our Association in 1943. This award is given to an individual that has demonstrated outstanding and continuing service of the highest magnitude, with an emphasis

SEE "AWARDS" PAGE 5



PRESIDENT'S UPDATE

DEAN BARTLES / NTMA PRESIDENT

I hope you have enjoyed the first quarter of NTMA Events as much as I have. From the Chapter Leadership Summit in Nashville, to the Top Shops Seminar in Dallas, to the MFG Meeting in Tucson, I have enjoyed the time I have been able to spend with our members. We have some exciting events in April: the European Tech Tour, Legislative Conference, and the Emerging Leaders Conference. Are there people in your shops who will be your leaders of tomorrow? There is still time for you to register for the Emerging Leaders Conference-- please reach out to Brittany Belko if you are interested. If you're sending them to the Emerging Leaders Conference,

please also consider submitting those employees to the NTMA 30 Under 30.

Spring symbolizes the rebirth in nature; a promise that everything can begin again, acceptance of something new. Here at the NTMA that is no different. We focus this month on technologies that are new(er) and can provide your businesses with a rebirth of your processes as we accept and understand the new technology available to our industry. This month features Automation, Robotics, and 3D printing. While they may not be new technologies per se, they may be to your company. The NTMA has many resources for each of these areas including Protected Flow Manufacturing, Fanuc and

you combat the single biggest issue facing our members — workforce development. If you are able to run lights-out using robotics and other automation platforms, you get a whole shift of work without having to man it. By printing soft jaws overnight, you get back valuable time on your CNC machine.

We hope this month's issue provides insight and value as you look at options for integrating technology into your shop — and we hope to see you at an upcoming events — because there's no amount of automation that can replace the power of sharing ideas and time to face-to-face with industry colleagues.

DEAN BARTLES / NTMA PRESIDENT



AUTOMATIC RECURRING PAYMENT OPTIONS

To help our members save time and money, we've now made it easier for our members to pay their dues by allowing them to set-up automatic withdrawal via credit card or ACH either quarterly or annually. For more information, please contact Kelly LaMarca at: klamarca@ntma.org

Markforged. These companies aren't trying to impose on the traditions of precision manufacturing, rather they are trying to augment the current processes to streamline and improve efficiency. These technologies exist to help

NTMA MEMBERS CAN NOW ACCESS THE 2019 MEMBERSHIP DIRECTORY

Our annual Membership Directory is now online, and you can view it at: www.ntma.org.

The directory is a Members Only feature and user name (email address) and password are required to access the directory. Once logged into the website, simply click on "Member Directory" on the home page. The directory is searchable and contains links to websites and email addresses.

In order to log onto the NTMA website, you must be in the NTMA database and have a unique email address. If you have difficulty logging in, are not currently in our database, or have forgotten your password, Please email Sandy Bailey at sbailey@ntma.org. It's simple to set up your new account. Please provide the following:

Full Name
Title
Company
Address
City, State, Postal Code
email address

We think you will find the interactive Membership Directory very useful. If you haven't checked it out, log on today!



THE RECORD

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To advertise in The Record, or for information on publishing your corporate newsletter or sales literature, contact NTMA at (216) 264-2847 or jmayer@ntma.org for advertising, mwest@ntma.org for editorial content.

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NATIONAL TOOLING & MACHINING ASSOCIATION

1357 Rockside Road

Cleveland, OH 44134

1-800-248-6862

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NTMA NEWS

"AWARDS" CONTINUED

placed on service to the association by a regular member, both of the highest order and over a period of time. This award is given for excellence in a particular role in NTMA, rather than as a participant in a single event.

If you would like to nominate someone for any of these awards, please fill out the nomination form and send it to Christine Benco, executive assistant, at cbenco@ntma.org, no later than **July 1, 2019**. The nominees will be reviewed by the Nominating Team and the awards will be presented at NTMA's 2019 Fall Conference in Austin, Texas, October 15 – 18, 2019.



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WE SHOULD LISTEN TO OUR YOUTH

BY BILL PADNOS, DIRECTOR OF WORKFORCE DEVELOPMENT

I have made a huge mistake over the past six years in promoting manufacturing careers. The first words out of my mouth are that manufacturing jobs are high-paying and in-demand. I talk about the opportunity to earn while you learn and never having college debt.

I was reminded last week in an *Industry Week* article by a high school student in the Cleveland area that my way of thinking (and really, all of our ways) was wrong. The facts are not wrong – manufacturing provides our youth with a career pathway that is high paying and in demand. However, this is not the message that students want to hear and we all need to make changes fast. Parents need to hear this message, which is important, but we are not hiring them to come work for us.

Claire Kapitan, a high school junior, wrote her “Why Manufacturing’s Not Cool” article to explain why we are failing to reach teens and millennials. This article is not based on an in-depth study of 16- to 18-year-olds across the country on their impressions of careers in manufacturing. It is the opinion of one young lady from her individual perspective. While the comment section of the article mentions that issue over and over again, that is not the point of the article.

We are all desperately trying to find the secret sauce that will drive millennials to careers in manufacturing. This is why it is important for us to hear what Claire has

to say. By the year 2028, we need to fill 4.6 million manufacturing jobs with only 2.2 million of them likely to be filled. That means that we have to convince 2.4 million people to enter a pathway to a career in manufacturing. With those odds against us, we need all of the insights that we can get into the mind of a high school junior.

Teenagers have been affected by huge corporate layoffs from mergers, off-shoring and downsizing. They understand that they will have multiple jobs before they even turn 30. Safety and reliability is not high on their priority list. Having a job that provides them with purpose and a passion is important along with the comfort that their work will make this world a better place.

It is hard to imagine a generation that does not prioritize financial stability. As a rule, millennials love their gadgets and posting what they eat and drink online, but they also have no worries about being in debt in order to purchase them. This is why we need to focus our energies on promoting that manufacturing is a celebration of creativity and innovation.



It is about teamwork and not working on an assembly line. Working in manufacturing is dynamic, modern and high-tech, providing millennials with the opportunity to make a difference.

Over the next couple of months, thousands of high school students will be competing in NRL competitions across the country. They have been immersed in a program that celebrates the manufacturing process of creativity and innovation, teamwork, problem solving and technical learning. If 97 percent of NRL students say they would recommend the program to their peers, then why wouldn't they want to work in the industry and recommend that others join them?

When you take advantage of the opportunity to engage and recruit NRL students, talk about how much you enjoy working at your company. Promote that you recycle every scrap and ounce of coolant and even offer for them to become a member of that work committee. Remind them about why they love being a part of the NRL program and how they can experience that same feeling every day at your shop. As Claire states in her article, “If millennials have a chance to learn that manufacturing work is the future, where their ideas and imaginative minds have a place, there will be more of a response and eagerness to fill these jobs.”



STILL TIME TO SUBMIT: NTMA 30 UNDER 30 PROGRAM

Thank you for your strong response to our new 30 Under 30 program! Quality submissions continue to arrive at the NTMA national office showcasing the talent that will become manufacturing's future leadership.

Why are we starting a 30 Under 30 Program? The answer to this lies in the biggest challenge that many of our members face: Workforce Development. When it comes to recruiting and retaining skilled employees, especially those of a younger generation. There is no better way to recognize the achievement and hard work of the next generation of leaders than by recognizing them publicly. When you nominate employees for an exclusive award, such as the NTMA 30 Under 30, you're acknowledging their accomplishments and their potential. Some have been hesitant to submit their best employees because they are afraid of losing them. Workers under age 30 tend to work for financial gains, but more importantly, they work for recognition and the sense of doing something for the greater good. If you submit someone

to this program, you're building loyalty. You have recognized him or her as an up-and-comer in the industry, and this will have tremendous value to your young leader. Those selected for the 30 under 30 class will be featured in the July issue of The Record, and will be invited to the 2019 Fall Conference in Austin, TX,

where they will receive their award. Please take the time to recognize those employees under the age of 30 that you have working in your shop. If you are sending someone to the Emerging Leaders Conference in Louisville, they would be great nominees. The process is simple. Email James Mayer jmayer@ntma.org with the following information by May 17th.

• Name of Nominee

• Company Name

• Contact information (name or email) for Nominee

• Achievements and Contributions

• Any additional information that is pertinent

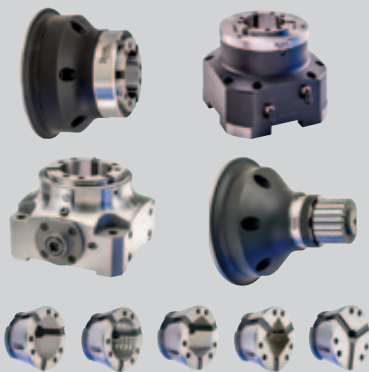
Candidates will be judged by a group of members and staff, and the inaugural group will be notified by the first week in June. Nominations are open to all dues paying members, including our National Associates.

Please do not hesitate, get your submission to James today!



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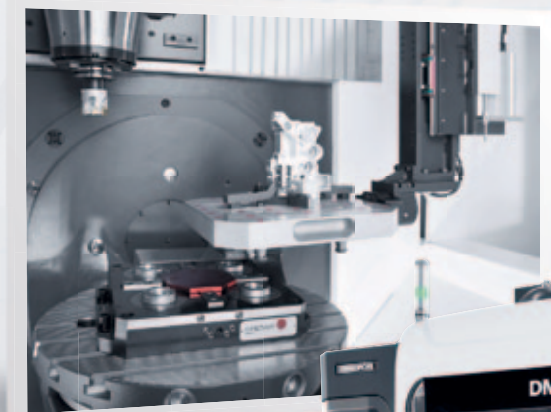
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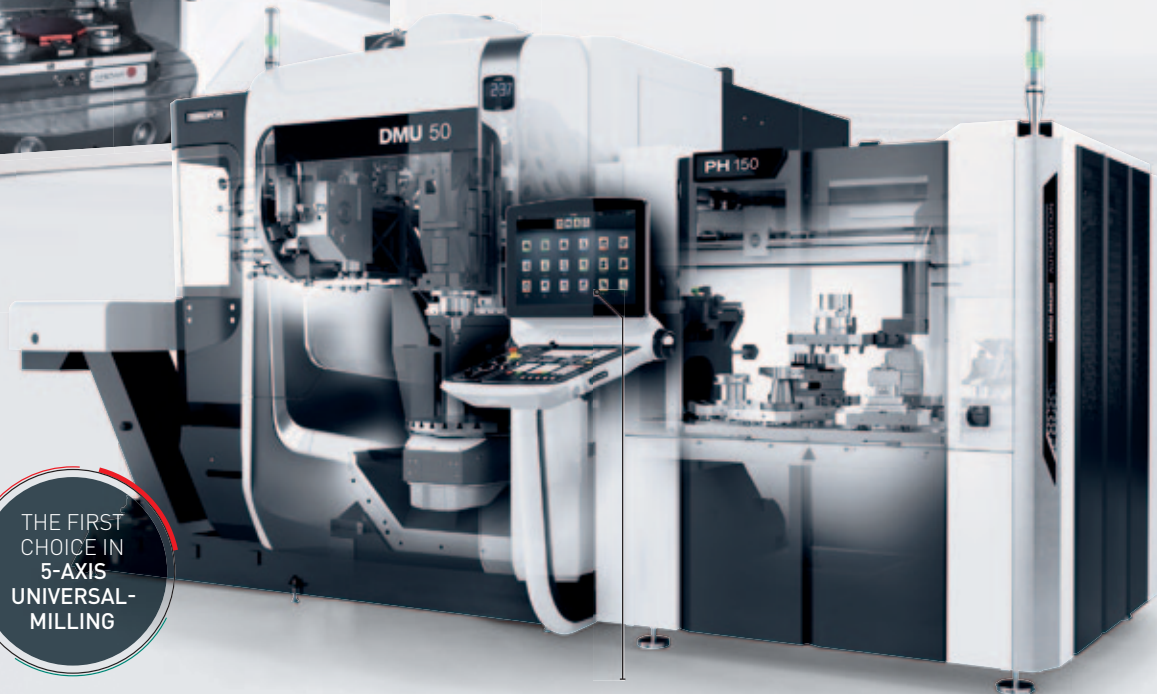
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NEW FUNCTION FOR PALLET MANAGEMENT WITH THE HEIDENHAIN TNC 640

The Batch Process Manager Intelligently Plans the Smooth Flow of Production



The TNC 640 provides many powerful functions for pallet management and the serial production of workpieces. A new addition to this repertoire is the Batch Process Manager. This function enables precise planning of the upcoming production sequence right on the control, as well as the smooth execution of pending jobs — capabilities of particular importance for unattended shifts.

The Batch Process Manager intelligently and predictively organizes the pending jobs. The user of a HEIDENHAIN TNC 640 simply creates a job list for the approaching night shift, entire day or upcoming weekend. The Batch Process Manager evaluates the job list and delivers important information before machining begins, such as when a manual intervention is required and how long the machine will be in use.

SIMPLE TO USE

The new Batch Process Manager is based on the pallet management feature of the TNC 640 — to be more precise, it interprets the pallet file in the background. All of the entries made in the Batch Process Manager are stored in this pallet file by the TNC control. The following types of structure elements are available for entry: pallet, fixture, and program. Based on these structure elements, the Batch Process Manager can model the actual situation at a machine with pallets.

A separate entry is available for each pallet, and the user has the option of defining the fixture plane, as well as the respective NC programs for the workpieces. To this end, the Batch Process Manager provides convenient editing features. Parts of or even entire structure entries can be copied, moved, and inserted. It is also possible to create new en-

Erforderliche manuelle Eingriffe			Objekt	Zeit	10:09
Werkzeug nicht im Magazin			REAMER_10H7	11:00	Nächster man. Eingriff: 59m 43s
Program	Dauer	Ende	Bezukt.Wkz. Pgm	Status	Palette
Palette: House	23m 54s		✓ ✓ ✓		
Palette: Pocket	21m 1s		✓ ✓ ✓		
3_Seitenbearbeitung_side_wachin..	6m 39s	10:39	✓ ✓ ✓		
2_Haus_house.h	8m 6s	10:48	✓ ✓ ✓		
4_Taschen_pocket.h	6m 16s	10:54	✓ ✓ ✓		
Palette: Slamp	28m 4s		✓ ✓ X		
6_Stempel_stamp.h	3m 1s	11:03	✓ ✓ ✓		
5_Winkelstueck_bend.h	3m 6s	11:06	✓ ✓ ✓		
7_Flansch_flange.h	15m 57s	11:22	✓ X ✓		
Palette: 1	15m 48s		✓ ✓ ✓		
1_Prisma_prism.h	15m 48s	11:38	✓ ✓ ✓		

The Batch Process Manager from HEIDENHAIN shows the job status at a single glance, with green check marks for smoothly executing jobs and red X marks for required manual interventions. A time indicator in the upper right of the screen informs the operator about the time of the next intervention.

tries during actual pallet machining. The created job list is carried out in a linear fashion, during which the user can lock individual programs or even entire pallets. These locked pallets are then simply skipped during the sequential execution of the jobs.

ALL OF THE JOBS IN VIEW

After the creation of a job list, the control automatically determines whether all of the prerequisites for smooth execution of the entered jobs are fulfilled. This process includes a check of the following criteria:

- Is a preset defined at the level of the pallet, program, or fixture?
- Are the required tools available in the tool magazine and do they have sufficient tool life?
- Does the NC program run in simulation mode without error messages?

The Batch Process Manager displays the results of this analysis in a clear and straightforward graphical overview. The user immediately sees whether all of the programs will run without error and whether all of the required tools are available. He can also see how long his job list will take to complete. The Batch

Process Manager repeats this analysis cyclically so that the displayed data are continually updated.

If the control detects a problem, such as a tool with insufficient service life for the planned machining operation, then the Batch Process Manager displays the anticipated time at which the manual intervention will be required. The Batch Process Manager provides the following information in advance:

- The machining sequence
- The time of the next manual intervention
- The program duration and run time
- Status information regarding the preset, tool, and NC program

A prerequisite for all analyses involving tools is the enabling of option 93, Extended Tool Management, on the control. The NC program is executed as usual over the pallet management function. Naturally, the Batch Process Manager can be used for planning even when individual NC programs are executed in the Program Run, Full Sequence operating mode. In this case, the pallet entries must be manually locked after machining.

SEE "HEIDENHAIN" PAGE 11



HEIDENHAIN



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"HEIDENHAIN" CONTINUED

VERSATILE, WITH EXCITING POTENTIAL

Although the Batch Process Manager is primarily designed for machine tools featuring automation, this new function also makes sense for classic single-part production because the abovementioned structure elements can also be used on machines without pallets. In this case, the system settings are configured to define the intended behavior of the machine at the end of an NC program; namely, that the machine operator will manually set up the next workpiece and then start the subsequent machining operation.

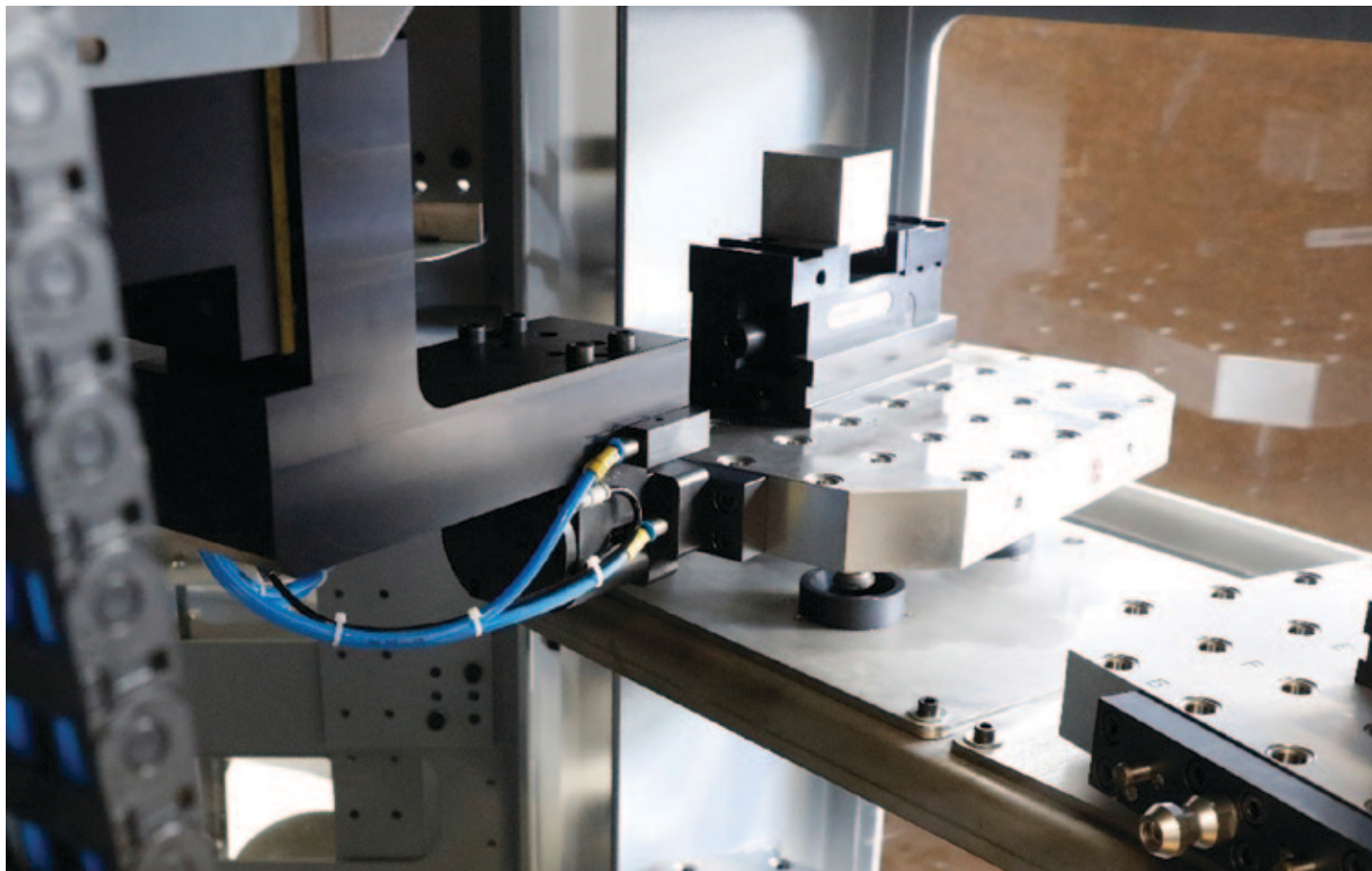
HEIDENHAIN is already working to expand the functionality of the Batch Process Manager. Among other things, plans are underway for the Batch Process Manager to be available for use from within the Program Run, Full Sequence operating mode.

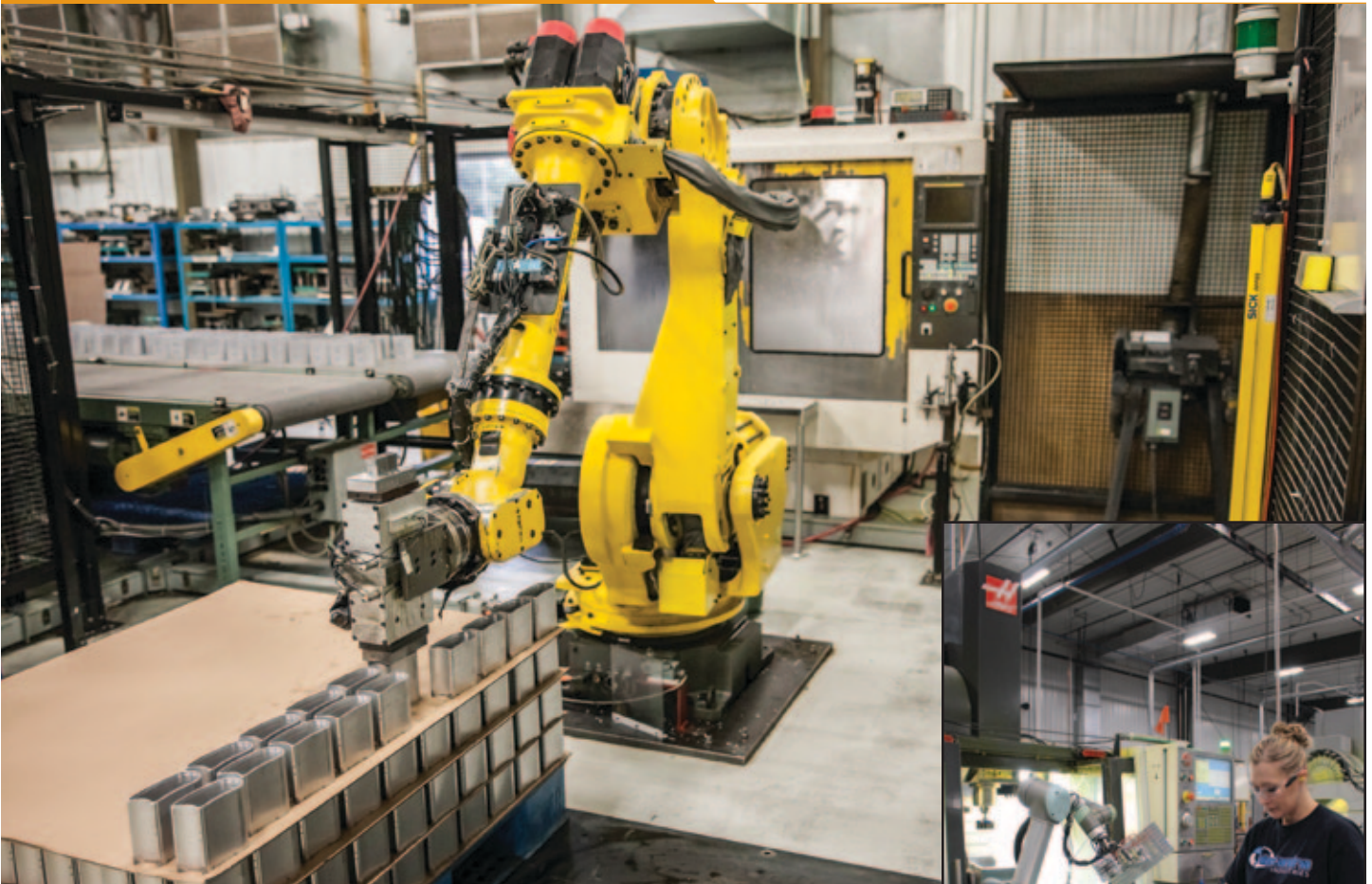


Above: Always in the right place at the right time: the Batch Process Manager from HEIDENHAIN ensures that the right workpiece and all of the tools and information required for machining are available in the machine and on the control.

HEIDENHAIN

Below: Job sequence planning made easy: the Batch Process Manager for the HEIDENHAIN TNC 640 organizes the sequence in which jobs are machined and provides a preview of the expected results.





IF AT FIRST YOUR CNC MACHINE SHOP DOESN'T SUCCEED WITH ROBOTS, AUTOMATE AGAIN

BY DEREK KORN, EXECUTIVE EDITOR—MODERN MACHINE SHOP

ORIGINALLY TITLED 'IF AT FIRST YOU DON'T SUCCEED, AUTOMATE AGAIN'



Alexandria Industries struggled with its first robotic machining cell. However, the aluminum extrusion components manufacturer — now with more than 20 robots — discovered that by simplifying and standardizing its automation strategy, it could reap the benefits of unattended machining even for relatively low batch sizes.

On one hand, Alexandria Industries' first attempt at machine-tending robotics was Rosie. On the other, it was not so rosy.

"Rosie" is the name the aluminum extruder, machining and fabricating company picked for its first machine-tending robot. Installed in one of its Alexandria, Minnesota facilities in 2001, the cell this robot was to anchor was designed for a family of parts for the telecommunications industry. The cell included two CNC machine tools; two conveyors that would feed Rosie fresh workpieces to load into the machines; a

camera to enable her to locate workpieces on the conveyors to pick, eliminating the need and cost for hard fixturing; and an area where she would deliver completed parts to awaiting pallets.

However, a downturn in the telecommunications industry caused the company to lose the work for which the machining cell was created before production ensued. As a result, there was a significant need to redeploy the cell, one that was no small investment.

Eventually, the company came up with a strategy it hoped would help the cell investment return: It identified an existing repeating job — extruded aluminum housings for oxygen delivery systems — that also featured a family of like parts. The idea was to dedicate that job to one of the cell's conveyors and machines, and then work in other jobs to keep the remaining conveyor and machine (and Rosie) busy.

Capacity and CNC Robotics Manager Todd Carlson admits that this strategy did not work so well. When one machine was down for a new-job setup, maintenance or other reasons, the robot and second machine also had to be shut down because shopfloor employees needed to enter the cell to safely perform their tasks. With this configuration, the cell never delivered the production efficiencies the company hoped for.

"We thought we'd never try our hand at robotic automation for CNC machining again," Carlson said.

After struggling with it for a couple of years, Alexandria Industries decided to simplify the cell. It removed one of the machines and dedicated the cell to the family of oxygen-delivery-system housings. In making this change, spindle uptime and production output for the

CONTINUED NEXT PAGE

cell's sole machine increased more than 30 percent. Carlson says it was at that point that the company realized simplifying and standardizing its approach to automation could help it realize more of unattended machining's potential benefits.

Alexandria Industries has since applied that thinking to the design of various robot-tended machining cells. In fact, the company now has more than 20 robots in this facility, some of which are collaborative models (aka "cobots") that feature force-sensing technology so that employees can safely work alongside them to measure, deburr or package components. (For example, if a cobot unexpectedly contacted a person or object, it would recognize that and stop moving before injury or damage occurred.)

All its robot-tended machining cells are designed to accommodate numerous jobs, as many as 50 in some cases. When designing these cells, concessions had to be made in terms of production speed and flexibility. Still, traditional job shops thinking about adding machine-tending robots are well-served to consider Alexandria Industries' strategy of setting up cells to succeed in a high-mix/low-volume part-machining environment.

KEEP IT SIMPLE, STANDARDIZE

Alexandria Industries was founded as Alexandria Extrusion Company in 1966. Its 188,000-square-foot facility located in the city that shares its name features a range of manufacturing capabilities. There, it extrudes and machines 30 million pounds of 6000-series aluminum alloys per year, much of which undergoes additional machining, fabrication and other value-adding operations. (The company has another location in Alexandria, as well as facilities in Wheaton, Minnesota; Indianapolis, Indiana; and Carrollton, Texas.)

The raw material used at this facility is delivered in 20-foot-long bars — either 3.5 or 7 inches in diameter — that the company refers to as "logs." This facility has two 7-inch extrusion presses and one 3.5-inch press. (The Indianapolis facility has a 10-inch press.) Prior to extrusion, the logs are sawn into 18 - 28-inch billets. Each section is then brushed to remove any oxide coating from its surface and delivered to an induction heater that heats it to as much as 850 degrees F in a mere 75 seconds. The extrusion press pushes the soft, heated aluminum through a die to create the desired profile. This Alexandria facility extrudes approximately 3,500 components and has approximately 5,500 dies (some of which are copies). After cooling, the extrusions are sawn to length, and many require some machining work.

After dialing in its first robot-tended machining cell, the company decided to give

automation another go by standardizing the process. In 2005, it installed two cells with infeed and outfeed parts conveyors, FANUC LR Mate robots and Haas VF2 vertical machining centers (VMCs) with fourth-axis rotary indexers. These were integrated by the company's machine tool distributor, Productivity Inc. Like Rosie, the robots in these cells also used cameras to locate parts to be picked from the infeed conveyor.

Alexandria Industries' goal with these cells was to run a mix of parts with maximum lengths of 8 inches. "We looked for repeating jobs in which parts were similar in size and shape, and required somewhat straightforward machining work," Carlson said. "We wanted to establish a family of like parts for each cell instead of trying to accommodate any and all jobs. We didn't want to run complex parts unattended in the cells. Those jobs we'd rather run on standalone machines with an operator standing by to perform part inspection, monitor tool wear and, in general, keep an eye on the process."

Within six months of installation, the two cells were running 24/7 at full capacity, machining as many as 30 different jobs. The company added two more identical cells, and those were soon running at full capacity, too. Today, it has six VF2 cells, and one operator can tend three cells at a time. Standardizing on equipment and process makes it easy for operators to comfortably tend any of those cells, Carlson noted.

Alexandria Industries also standardized its workholding strategy for the robot-tended machining cells. Initially thinking it would use the fourth-axis indexers only for parts that required machining on multiple sides, the company removed the indexers from the machines when they were not needed and replaced them with hydraulically actuated vises. However, the company discovered that it made more sense keeping indexers mounted in the machines and making fixtures for the indexers for parts that required machining on only one side. By maintaining that same indexer location, the company would not have to tweak robot programs because the indexer was not re-installed at precisely the same position as before. It justified the added cost for indexer fixturing because this strategy sped and simplified changeovers. Carlson said it could take two hours to reinstall an indexer and modify the robot program.

That said, the reason the company limited the cells to parts no longer than 8 inches is because of how the parts were loaded into the machines. In order to enable operators to access a machine's CNC and door, a side window was installed through which the robot would load and unload parts. As a result, the robot could not extend a part longer than 8 inches through the window and maneuver it to the fixture.

Despite these limitations, the company wanted to automate the machining of longer parts. It initially created a cell with infeed and outfeed conveyors around a bigger Haas VF6 VMC with five-axis trunnion table that could accommodate parts as long as 24 inches. Eventually, it replaced that with a Haas UMC 750 five-axis machine. It now has three UMC 750s in identical cells with safety fencing that enables operators to access the machines' CNCs.

Looking to automate the machining of parts as long as 50 inches, Alexandria Industries created six similar cells around Haas VF6 VMCs with fourth-axis rotary indexers. At first, an operator could tend only one cell at a time largely because of the size of the parts and the manual deburring and washing operations they required.

With the VF2 cells, operators could grab a number of parts and place them in a vibratory tumbler to deburr them, and then wash them prior to packaging. That is why one operator could tend multiple machines. Given the longer parts that run through the VF6 cells, operators could manually deburr and wash only one part at a time, meaning they could only keep up with one cell at a time. As a result, robotic deburring and part-washing capabilities were added to each VF6 cell, enabling one operator to tend two cells.

Alexandria Industries has since turned to collaborative robot technology to enable VF2 VMCs to machine parts ranging in length from 8 to 24 inches. Because of the collabora-

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"AUTOMATE" CONTINUED

tive nature of these robots and appropriate risk assessment and mitigation, the cobots can be positioned in front of the machines to load parts through the machines' doors (instead of a smaller side window) while operators perform other duties in the same vicinity.

ROBOTS AND PEOPLE GETTING ALONG

The company purchased its first cobot, a UR5 model from Universal Robots, four years ago. These robots use sensors to detect when they unexpectedly contact something (or someone) as they move through their programmed path. Alexandria Industries now has four VF2 cobot cells that one person can tend while performing duties such as in-process inspection and packaging.

Carlson said this robot technology is a good example of the trade-offs a machine shop might have to consider when deciding which configuration of robotic cell makes the most sense for their business. For instance, the UR5 models have a maximum payload capacity (including end effector) of 11 pounds. Conventional industrial robots have higher payload capacities, but this is not an issue because the cobots at Alexandria Industries are handling relatively light, aluminum workpieces. The cobots also move at a slower speed than industrial robots for safety purposes because they are not operating alone in a secure work area that people



cannot access during operation.

However, a low price point makes cobots attractive. Company manufacturing engineers integrated the cobots themselves, eliminating the cost of an outside integrator. Operators have found that programming the cobots from the touchscreen control pendant is intuitive and relatively easy.

Cobots can also be redeployed to tend other machines or perform other duties. In fact, the base designed for the cobots includes forklift pockets that would enable them to be easily moved throughout the shop. That said, each time the company added a cobot cell, that cell would quickly reach maximum capacity, so it did not make sense to redeploy the cobots. However, its most recently purchased cobot is currently not assigned to any machining cell. The base for that cobot also includes forklift pockets as well as wheels to enable it to be

moved through the shop. The company is currently working to identify nonmachine-tending applications for it, such as deburring, riveting, assembly and simple tapping.

AUTOMATION'S AFFECT

Carlson said production employees were initially leery of the robots, thinking they might eventually take away jobs. However, automating the repetitive, monotonous task of loading and unloading machines has enabled the employees to grow their technical skills and focus more on problem solving. He believes that it also has helped the company retain some of its best talent. In fact, robotic automation makes the company more enticing to potential new hires who see they won't be performing basic manual labor all day long.

"The robots have really helped grow the company's sales," Carlson said. "We've actually had to add employees since we started adding robots due to that growth."

And while Rosie has officially retired, her robotic successors look forward to long lives working next to the company's 625 employees.

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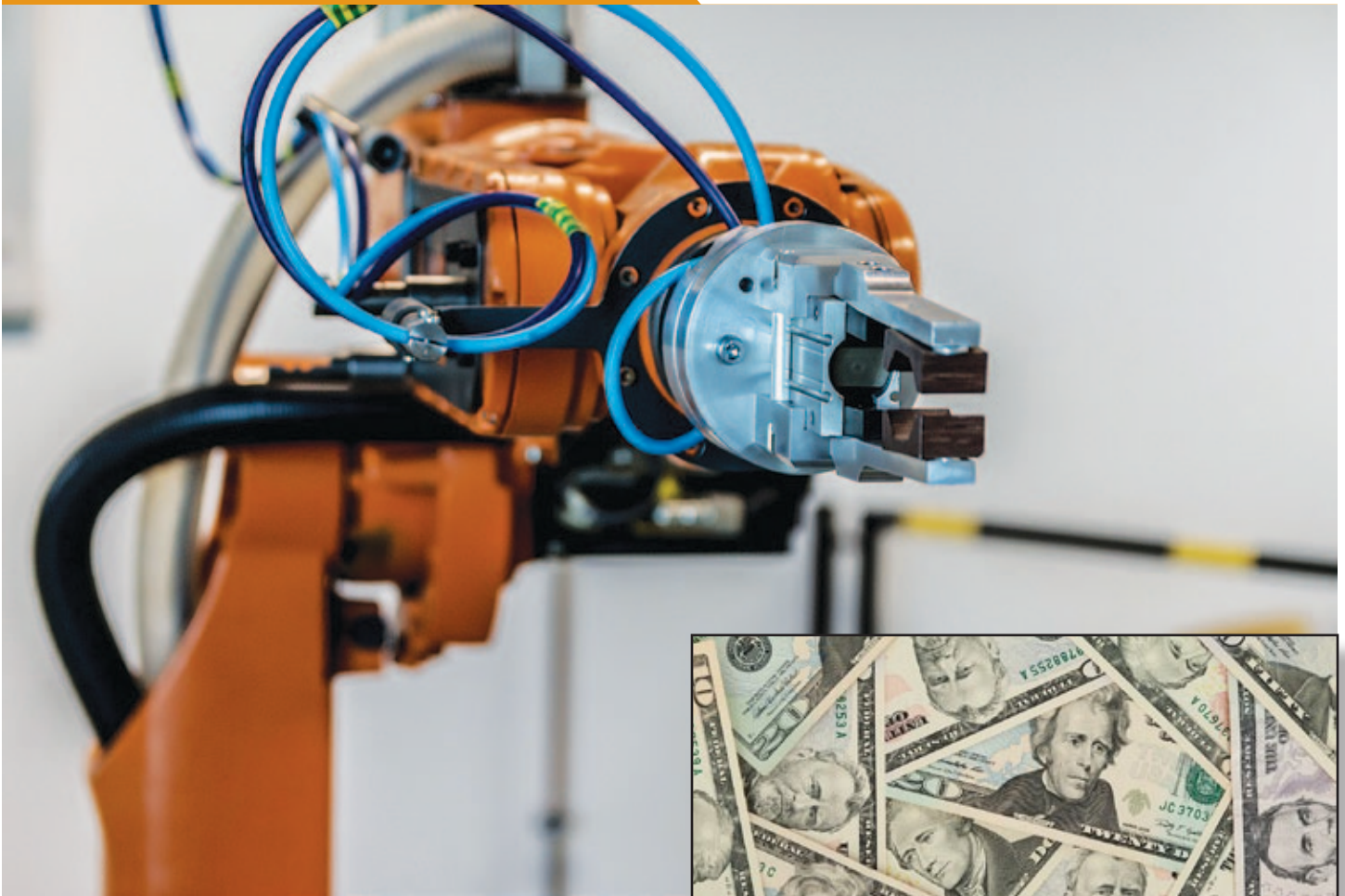
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THE INCENTIVE THAT WON'T BEND: HOW THE METALWORK MANUFACTURING INDUSTRY CAN LEVERAGE THE STRENGTH OF THE R&D TAX CREDIT

BY: TRACY LUSTYAN



Looking at the numbers, the fabricated metal industry in the United States is anticipating substantial growth in terms of revenue, employment and exports over the next four years. The structural steel fabrication market alone is expecting to reach more than \$184 billion by 2026, with manufacturing being one of the primary sectors of the market.

While these numbers certainly offer hope for those in the business of metal manufacturing, it also means that competition will likely increase, forcing these companies to innovate like never before.

Luckily, this innovation comes with a substantial financial benefit – the R&D tax credit. This government incentive, which has helped NTMA members realize \$38.8

million in tax savings, was enacted in the early 1980s to stimulate economic growth and drive domestic business. The credit offers American businesses (and specifically American manufacturers) the chance to receive significant tax relief for what often amounts to their daily projects.

Over the years, the credit has evolved for the benefit of U.S. businesses, with the most recent changes coming as a result of the passage of the Tax Cuts and Jobs Act. Businesses working in the manufacturing industry shouldn't turn a blind eye to this tax saving opportunity – particularly with this legislation expanding individual AMT relief and eliminating the corporate AMT – changes that will greatly impact the number of businesses able to benefit from this incentive.

With a host of qualifying activities, manufacturers are well positioned to reap the benefits of a stronger R&D tax credit.

A POWERFUL TOOL

The incentive, which has only been strengthened over the years by Congress, has helped companies in the U.S. claim roughly \$10 billion a year in federal tax savings – additional revenue that can be put right back into their business. While tax code provisions are intimidating enough to send any business person running for the hills, it's key for those working in any field of manufacturing to realize that the R&D tax credit isn't just about basic research, but also about applied research.

Simply put, the incentive rewards manu-

CONTINUED NEXT PAGE

facturers who bring a new or improved product to market, as well as those who are improving the manufacturing process itself. Companies that have made technical enhancement to any product or process that they use on a daily basis would more than likely be a good candidate for the R&D credit.

The everyday technical problem-solving that manufacturers perform to improve an existing product, the steps taken on the factory floor to solve a production issue to make that product or even the trial-and-error performed to ensure the product meets a client's specifications are all generally what qualify these businesses for the credit.

Finding the Application

So, how valuable can the R&D tax credit be for a job shop or contract manufacturer? Countless production and design specializations make precision machine shops, fabricators, stampers and other metalworking companies potentially eligible for substantial tax savings.

Manufacturers in general have successfully claimed more than \$1.5 billion in credits working with alliantgroup. Here are some examples of qualifying activities that have led

companies to large returns:

- Integrating new materials to improve product performance and manufacturing processes
- Achieving compliance with changing emissions laws and regulations
- Prototyping and three-dimensional solid modeling
- Streamlining manufacturing processes through automation
- Programming PLCs, CNCs, RTUs, DCS, PACs, CLCs, CNCs, SCADA and more
- Exploring new or improved material applications and testing alternative uses of steel, iron, aluminum or plastics

Manufacturers need to simply create or improve upon an existing product or process in order to set themselves up for a return. When it comes to actually calculating the credit, the end result will ultimately be impacted by the supplies consumed or used during those qualifying projects and the wages of the workers performing those specific projects.

A HISTORY OF SUCCESS

The key for manufacturing companies attempting to claim credits is making sure

to take into account all of the activities completed during the lifecycle of the project. This includes activities involved the ideation, design, testing and production phases.

A perfect example: a small secondary automotive manufacturer reported expenses dealing with developing and prototyping its manufacturing process for certain automotive parts. For four years' worth of qualifying projects, this company received more than \$1 million in federal and state tax credits.

In other examples, a steel ring manufacturer received \$406,000 in federal credits for design improvements in its products, a manufacturer of high-tech armor defense was granted \$787,000 in federal credits and a multi-tools manufacturer was able to claim more than \$286,000 in federal credits.

Manufacturers of all shapes and sizes are turning to government incentives to put money back into their company to create and maintain a competitive edge. With numbers like these, any manufacturer should take a second look at what the R&D credit has to offer. Doing so might be the most profitable move they make – so why wait?



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ZERO DOWN TIME (ZDT) FANUC'S AWARD-WINNING INDUSTRIAL IOT SOLUTION



ZDT's predictive analytics have saved millions of dollars by preventing unexpected downtime in the automotive industry. Now, small-to-medium-sized manufacturers are realizing there is even more to ZDT than downtime avoidance. In addition to reducing unexpected downtime, ZDT allows users to maximize production throughput, optimize maintenance costs, increase the life of their robots and access data from anywhere via the ZDT web portal.

At the recent 2019 Automate Show, FANUC featured a new augmented reality experience that depicts a variety of manufacturing situations where ZDT can help.

HERE'S A LOOK AT ONE ZDT EXPERIENCE CALLED "PROCESS CHANGE":

Process Change is an example of how ZDT provides great diagnostic tools that

help customers quickly resolve issues.

Many people will agree that change is good, but not when changes reduce quality or throughput. ZDT's Process Change feature can identify changes to either process-related variables or robot programs. Knowing that a change was made, when it happened, and exactly what the change was, allows customers to quickly track down the root cause of production problems. Gone are the days of spending countless hours examining programs line by line to find the issue — or in the case of variable changes, the trial and error method of finding a changed variable value. ZDT tracks it all!

FANUC sends customers daily notices regarding process or program changes. When notifications are sent, the user simply clicks on the details link to view the changes. Icons on the ZDT web portal

dashboard provide status updates of the system. Users will find it easy to navigate through a company-specific ZDT web portal to view changes to their robots. Like all ZDT data, Process Change is easy to read and understand. If a change proves detrimental to a process, a user can clearly see the change, know when it was made, and use that information to return to the previous value.

When manufacturing changes occur, whether good or bad, ZDT's Process Change detects the change and helps users quickly resolve any related issues.

Want to know more? Visit www.fanucamerica.com/zdt



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OPERATING COSTS DASHBOARD – BENCHMARKING YOUR WAY

If your company wants to increase profitability and continue to grow in today's competitive environment, you have to realize that sometimes your best instincts may not be enough (and without an industry benchmark, they're only instincts). The NTMA Operating Costs Survey is a process of comparing the costs of what one precision tooling & machining shop experiences against what another shop encounters. The result is a business case for making changes to improve profitability.

HERE ARE JUST SOME OF THE QUESTIONS THE OPERATING COSTS RESULTS CAN HELP ANSWER:

- What is the "profitability divide" between High Profit manufacturers from the rest of the pack?
- What is a competitive gross margin in the precision tooling & machining industry?
- What type of productivity should I expect out of my employees?
- More importantly, are my payroll expenses in line with industry standards?

Each Operating Costs Survey participant receives an individual company **Financial Benchmarking Dashboard** that compares your financial performance to industry benchmarks, to others with a similar sales volume, or in your line of business. You can slice and dice specific performance results in ways that are most useful to you.

INNOVATIVE RESULTS FORMAT:

An interactive Excel® dashboard allows

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Michael Tamasi
President
AccuRounds

you to create customized reports in an efficient and user-friendly format – select the specific data you want to benchmark against your company.

Detailed Results – Your primary metrics can be supplemented by more granular views and analyzed using a variety of well-defined ratios. See what separates "Typical" and "High Profit" distributors in the industry. Navigation buttons allow you to jump to a specific section of study. There are columns based on product emphasis, sales size, and similar topics. A drop-down menu allows you to select the specific columns of data you want to benchmark against your company.

Dollar Benchmarks – Financial Benchmarking studies are all about ratios and percentages. Now you can view your performance versus your peers in dollars and cents. This gives you a clear understanding of how much your company spends on key performance areas like payroll, or cost of goods

compared to industry leaders. You select the specific columns of data (or dollars) you want to benchmark against your company.

Confidentiality – Only the staff of the Mackay Research Group will have access to your financial information. Specific data masking procedures are in place to ensure that no one company's data can be identified from the aggregate industry data being reported. Because the members send the survey directly to Mackay Research Group, neither the association staff nor its members have access to any individual company's data. In order to protect your confidential data, Mackay Research Group sends your individual company dashboard directly to you.

The Operating Costs study provides you with the tools to identify industry financial performance benchmarks, to identify the best practice performance based on the top 25 percent of the companies in the industry, and to identify your company's strengths and weaknesses versus those industry benchmarks.

To ensure a comprehensive report, NTMA needs your participation. Be sure to send in your response by May 1. It's free to you through NTMA!

To complete YOUR survey, visit www.NTMA.org and download the form today.



SAMPLE NTMA Operating Costs Dashboard							Print Full Report
Introduction	Summary	Detailed Results	Data Graphs	Trends	\$ Benchmarks	'What If' Toolkit	Definitions
Click on a section to skip to that section. You can also scroll down the page.		Change any or all 5 column headers: (Your Company remains as a fixed column) Click on a box and a drop down menu will appear with ALL industry performance columns available.		Typical NTMA Mfr.	High Profit NTMA	Sales \$10-\$15 Million	General General Product Aerospace Mach Production Oper Diversified Machining Under Machining \$3-\$5 Machining \$5-\$7 Machining \$7-\$11
Return On Investment & Product Mix		Income Statement		Typical NTMA Mfr.	High Profit NTMA	Sales \$10-\$15 Million	Aerospace Machining & Fabrication Your Company
Income Statement		INCOME STATEMENT		Typical NTMA Mfr.	High Profit NTMA	Sales \$10-\$15 Million	Precision Machining Machining & Fabrication Your Company
Operating Statement Expressed as % of Value Added		Net Sales		100.0%	100.0%	100.0%	100.0%
Balance Sheet		Cost Of Goods Sold		100.0%	100.0%	100.0%	100.0%
Financial Ratios, Asset Productivity Ratios & EVA		Direct Materials		24.9	22.8	31.1	21.0
Employee Productivity		Direct Labor		21.9	19.5	22.3	22.3
		All Other Factory Labor		6.9	5.9	4.9	6.9
		Plant Payroll Taxes, Group Ins., Benefits		6.9	6.0	7.9	6.8
		Tools & Supplies		4.4	4.3	3.9	5.6
		Utilities		1.5	1.7	1.4	1.6
		Rent/Lease		1.7	2.3	1.9	1.9
		Depreciation & Amortization		4.2	3.6	3.4	5.1
		All Other Factory Costs		4.4	4.5	4.4	4.8
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