

THE RECORD

Published by the National Tooling and Machining Association

DATA DRIVEN MANUFACTURING

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Engagement - pp 20-21**

and so much more...



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THE RECORD

OPERATIONS & EDITORIAL

Roger Atkins, President
Doug DeRose, Editor

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Upcoming NTMA National Events



Emerging Leaders Conference **POSTPONED**

April 27-29, 2020
Kansas City, MO



Summer Conference

June 15-17, 2020
Phoenix, AZ



Legislative Conference

September 21-23, 2020
Washington, D.C.



PRESIDENT'S UPDATE

Little did I know back in early February when I wrote my first Record article that come March my original goal and commitment to you would be challenged. I wrote, *"My goal is to lead the Association through the disruptors of the day, while providing all our members exceptional service and constantly advocating on your behalf, allowing you to stay focused on running your business."* Obviously, in referencing the disruptors of the day, I never considered a worldwide virus pandemic. As they say, you're never too old to learn something new. What I am learning through this current challenge is that it's not about knowing the challenges ahead but rather being prepared to address the known and unknown challenges that come your way.

The current challenge also reminds me of the true value of being part of an association - that when the unexpected comes - it is there to immediately address the issues on your behalf while you continue to operate your business. That is exactly what NTMA has been doing during this current challenge. Through our industry partners, Franklin Partnership and Bracewell Policy Resolution Group, we have had direct access to the most current information pertaining to the coronavirus: information which concerns the ramifications to us as small/medium size contract manufacturing businesses, many of whom provide critical parts to our nation's medical, aerospace, defense, and other industries.

Please be assured that any emails, notifications, etc. from NTMA concerning the coronavirus have been vetted by our industry advocates/partners and are trustworthy.

By the time this article is released, we will be close to the end of the eight weeks of social distancing recommended by the government and there should be some direction as to the next steps in overcoming the challenges caused by the virus.

From strictly a manufacturing business perspective, the other thing I have learned through this ordeal is the importance of automation, robotics, and 3D printing. It's interesting that these three subjects were determined months ago to be this month's Record focus. Little did we know how these three industry related focuses might soon play an important role in the future of our businesses, caused by challenges such as the coronavirus pandemic. The ability of our businesses to run with fewer people, potentially lights out, and the ability to provide non-conventional machined parts plays critical roles in addressing unplanned and unsolved industry disruptions. Understanding the major financial disruptions to our businesses, and our employees, caused by this recent outbreak, is a reminder of the importance of driving our companies to the new technologies of tomorrow.

Another value of NTMA is the tremendous network of industry partners who specialize in the automation,

robotics, and 3D printing technology of today and the new technology of tomorrow. Their support of NTMA, means their support of YOU as a member. These folks are available to work with you to provide the needed technology to support your current business challenges and prepare you for the unknown industry challenges of the future. We at NTMA are here to make the connections to these partners, if needed. They are truly there to help our members be successful and are eager to be a partner in your success.

As I continue to advocate about NTMA that "We are Stronger Together," one has to look no further than the current challenges we are facing and overcoming together. Having been in this industry my entire career, whether young or old, I cannot imagine not being a part of a group or network that could help my company through these unprecedented times. Thinking I was alone in running my business, while trying to find current and accurate information pertinent to my company, my size, and my particular industry served would be a daunting task.

Let us all remember, it is US, WE, TOGETHER, TEAM, THE FUTURE.

Roger Atkins, President - NTMA

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NTMA COVID-19-Related Event Changes

We have been closely monitoring news and information about the COVID-19 (coronavirus) pandemic. As we endure these unprecedented circumstances, the health and safety of our members is our top priority.

We want you to know that we are following all appropriate federal, state, and local guidance as we make decisions about our upcoming events. Here is a brief update on planned NTMA events.

Find the latest information on our website at www.ntma.org/

EVENT CANCELLATIONS

National Robotics League – National Championship

With the safety of our entire NRL community in mind, we made the difficult decision to cancel this year's NRL National Championship. We applaud the passion and hard work that the students invested in researching, designing, and building their Bots. And we appreciate the dedication of the teachers, coaches, mentors and volunteers, provided their students with a job-driven, project-based STEM learning experience.

EVENT POSTPONEMENTS

Japan Technology Tour

Postponed until 2021

Emerging Leaders Conference

Postponed, NTMA staff is considering alternate dates/locations and virtual options.

EVENTS TO WATCH

Summer Conference

There is a great deal of uncertainty about when it will be safe to travel again and to hold large gatherings. While we hope to deliver our Summer Conference in Phoenix, AZ on June 15-17 as planned, we are also coordinating contingencies including virtual presentations.

EVENTS STILL SCHEDULED

Legislative Conference

Fall Conference

We have two significant programs slated for this fall, the Legislative Conference in Washington, D.C., September 21 – 23 and the Fall Conference in Kansas City, MO, October 27 – 30. We are looking forward to seeing you in person and celebrating our industry.

In the meantime, please exercise all precautions and take care of yourselves, your families, your colleagues, and your communities. We are grateful for your patience, understanding, and continued support during this difficult time.

For questions, please contact Kristen Hrusch, our Events Manager, at khrusch@ntma.org or 216-264-2845 - www.ntma.org/upcoming-events

NTMA Provides Manufacturers With Access to COVID-19 Information

Over the past several weeks, as our nation has coped with the COVID-19 crisis, your NTMA staff has been working around the clock to support members by providing the critical information and guidance that you need to operate your businesses. These are stressful times for all of us, and the full NTMA team is here to help you. In partnership with NTMA's advocacy team in Washington, DC, we are providing real-time intelligence to equip you to make critical decisions. You can find tools and resources on everything from federal and state government actions to labor and human resources issues on our newly-created rapid-response website, www.onevoiceinfo.org.

In addition, we are offering weekly Friday webinars for NTMA members where we provide information and answer questions on a range of topics including new sick leave and FMLA regulations, and how to access newly created federal assistance funds.

Find information about those webinars at www.onevoiceinfo.org/webinars.

You can also watch recordings of the presentations at www.onevoiceinfo.org.

For more information about how NTMA is helping members find COVID-19 response information, contact Kelly LaMarca, Membership and Chapter Relations Manager at klamarca@ntma.org, or at (216) 264-2837

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An Open Letter to CEOs

American Manufacturers are Ready to Help Companies Cope with Supply Chain Disruptions

We, the undersigned trade associations, collectively represent 475,000 American employees working at 3,500 manufacturing plants across the United States. Our member companies stand ready to assist those industries who are facing global supply chain disruptions to help the economy continue its record growth. Companies need to look no further for suppliers than right here in the U.S. We have the capacity and the expertise to get the work done at our facilities across the country.

The threats posed by uncertainty and disruption to global supply chains are real and not limited to the current headlines. The spread of COVID-19 ("coronavirus") is already impacting the U.S. manufacturing sector. Recent reports from the Institute for Supply Management (ISM) show that many industry sectors from electronics to chemicals are feeling the impacts of the virus. Additionally, reports from around the world show slowing in factories in China, Japan and South Korea, among others and expected transportation and logistical delays.

This is not just about the current virus and temporary disruptions; it is about reliable supply chains in any circumstance.

American companies who source inputs and equipment from across the globe can minimize disruption to their businesses by looking to domestic suppliers. Near sourcing and reshoring business to the U.S. will not only help minimize current impacts, but will also mitigate future exposure to global challenges all while tapping into America's vast and innovative industrial base and supporting American workers.

The American companies who make up our trade associations indicate a capacity utilization rate of 60-70 percent – meaning our manufacturers can meet current and future demand, helping companies grow and thrive.

Our members are business leaders. They know that companies must constantly weigh the costs of manufacturing in America against importing from overseas. But, today, the short-term lower pricing that tempted some companies to source their parts from overseas is outmatched by growing supply chain complications. There simply is no substitute for the high quality and reliable delivery that our member companies can offer. You cannot manufacture a part or finished product if you cannot source your inputs and equipment on time.

To find appropriate U.S. sourcing options, links to each of our associations' websites are appended to this letter. With this comes our full commitment to support any company seeking to connect with a U.S.-based manufacturer.

Throughout history, American manufacturers have answered the call to find solutions, support progress and step up in times of crisis. Our U.S. manufacturers and workers are ready to minimize operational disruptions and help produce a quality, reliable products ready to ship to any location, foreign or domestic.

Sincerely,

American Mold Builders Association (AMBA)

300 Member Companies

35,000 Industry Employees

www.amba.org

National Tooling & Machining Association (NTMA)

1,200 Member Companies

148,000 Industry Employees

www.ntma.org

Precision Machined Products Association (PMPA)

400 Member Companies

103,000 Industry Employees

www.pmpa.org

Precision Metalforming Association (PMA)

800 Member Companies

159,000 Industry Employees

www.pma.org

Technology & Manufacturing Association (TMA)

850 Member Companies

30,000 Industry Employees

www.tmaillinois.org

Rethinking Your Risk Profile for the New Decade

Contributed by Patrick Buck, VP and Risk Management Advisor with CBIZ Insurance Services

The methods of managing risk haven't changed much for manufacturers and distributors in the last decade. What has changed, though, is the range and nature of risk common to activities in this sector that now operates globally and is transitioning to the interconnectedness of Industry 4.0.

The methods of managing risk haven't changed much for manufacturers and distributors in the last decade. Risk managers still include some combination of risk avoidance, risk control, risk transfer, and risk retention to construct a company's overall risk management policy. What has changed, though, is the range and nature of risk common to activities in this sector that now operates globally and is transitioning to the interconnectedness of Industry 4.0.

Industry 4.0, the Industrial Internet of Things (IIoT) and smart manufacturing, marries physical production and operations with smart digital technology, machine

learning, and big data to create a more holistic and better connected ecosystem for companies that focus on manufacturing and supply chain management. While the categories of risk remain essentially the same in this decade as in the last, (i.e., operational, financial, environmental, and reputational), many of the possibilities within and affecting each category could not have been imagined even 10 years ago. Examples include:

- *A change in just one country's trade policies that can have a global supply chain impact.*
- *The fluidity of global trade – tariffs and renegotiated trade deals, for example – and global disruptions (e.g., the coronavirus) that impact the ability of a company to fulfill orders within contracted cost and time frame.*
- *Safeguarding corporate reputation and brand value is a much different risk scenario now in the age of social media than at any time prior.*

- *Security risks, once primarily physical, now include cyber breaches. Product and service risks around safety, health, and the environment may include the impact of the legalization of marijuana.*
- *As companies are increasingly being held accountable for the actions of their suppliers, vendor risk has become a significant concern.*

As in years past, managing risk can be expensive and today, the cost of NOT managing risk can be catastrophic. The pace and reach of change in production, commerce, and communication make it absolutely vital for companies to reassess their programs for managing risk not only annually but on a continuing basis. With that in mind, discussed below are several risks facing manufacturers and distributors that may not have been on your radar screen when your risk policies were designed and implemented, including your efforts to mitigate your company's risk with insurance.



risk



Marijuana

The legalization of marijuana in some states, and the potential for a change in national law, contributes to a new and growing industry risk. Drug testing doesn't measure onsite impairment levels and is impractical to conduct daily. Obviously, an employee working with manufacturing machinery while impaired can be a threat to himself and his employer. The threat of loss of limb or life is very real. However, as marijuana impacts people differently, it is challenging to train supervisors to identify a worker whose ability to perform job duties is impaired under the influence of cannabis.

Beyond onsite workplace danger, a conflict between federal and state laws puts the employer in a tight spot. What's an employer to do when a drug screening turns up evidence that a candidate or an employee has used marijuana? Can the individual still be fired? It depends, as the rules evolve and jurisdictions pass stronger protections for marijuana users, it depends. But, whatever the decision, emerging laws and court rulings make it clear that organizations must assess how they approach their employee's permissible marijuana use and make changes to their policies and processes to stay in compliance.

Automation and AI – the Safety Factor

Automation has become increasingly common in the production and manufacturing of everything from food and small machine components to cars. There are many guidelines and requirements for owning and operating automatic equipment and for assessing the risks involved in such operations, which can help employers ensure a safe work environment for their workforce. OSHA's list of potential sources of hazard can be divided into two categories – mechanical/physical factors and human factors. Machines/robots are programmable and most of their actions (if unaffected by malfunctions and other mechanical failures) can be easily predicted. Humans are fallible and can miss or ignore necessary steps despite physical safety precautions. This is why it's important to create a culture of safety and provide human factors training in any workplace that has people working alongside robots.

Automation and AI – the Cyber Factor

One of the biggest risk factors for many manufacturers is a lack of investment in cybersecurity, which is especially troubling as the move toward connected Internet of Things (IoT) technology becomes more prevalent in the industry. Connected vendors, contractors, and customers introduce more entry points along with the increased cyber risk. A complex combination of platforms and systems of varying ages contributes to security challenges. Hackers are becoming increasingly sophisticated and are able to access confidential information, steal money, and lock users out of their accounts. Without proper security protocols all organizations are vulnerable to cyber attacks. An effective approach to cybersecurity will include several steps, including (1) identification of assets at risk, (2) creation and implementation of procedures and controls, (3) user training, (4) development of incident response and recovery plan guidelines, and (5) securing cyber liability insurance to limit financial, legal, and reputational damage. Proactive protection should feature real-time monitoring of the environment and maintenance of capabilities to respond rapidly to potential threats or vulnerabilities.

Talent Pool and Generational Shift in Workers

Millennials (those born between 1981 and 1996) are poised to make up 50% of those working by 2022. Generation Z (born after 1996) will comprise 20% of the labor pool by 2025, according to statistics published by the Pew Research Center and Inc.com. With more and more boomers retiring, they're taking with them long-held beliefs, workstyles and, in many cases, vast quantities of “tribal knowledge” – knowledge that is valuable to companies and not easily transferable. It is often exclusive technical, product or process information that is stored inside someone's head. It is rarely recorded in a structured way on web documents or paper.

The influx of millennials and Generation Z and the outflow of Boomers is taking place at the same time as the Fourth Industrial Revolution. This combination of generational and technology changes is destined to leave a knowledge gap, a skills gap, and perhaps a

cultural challenge ahead. The competitive advantage goes to companies that find ways to pass down this expertise and successfully navigate the generational shift. Practical strategies might include using video (e.g. YouTube) to capture critical institutional knowledge and creating mentor/mentee models allowing multigenerational workers to learn from each other.

Product Liability

Product liability doesn't fall into the “emerging risk” category but does meet “the more things change, the more they stay the same” test. While there are new challenges, it's important not to forget things that have always been important. According to the National Law Journal's top 100 verdicts of 2018, the most frequently awarded lawsuit was related to product liability claims, primarily involving manufacturing companies. The 18 verdicts represented \$5.9 billion in jury awards. Even if not at fault, a claim can cause significant loss, including damage to your reputation and market share. Your insurance broker should help you understand the specific product liability risk you face based on the products you manufacture and who the end users are. They should then recommend risk management and control measures to minimize your exposure. An insurance broker serving as a partner will also work with you to develop a response plan should you suffer a product liability claim.

Bottom Line

How manufacturers assess and respond to risk, including how often, can position them to be more successful. By knowing how the risk landscape is changing, manufacturers can better prepare for and manage their exposures. Competent and well-designed risk management practices should be ingrained in all levels of the company. Better risk management is ultimately a competitive advantage.

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2020

NTMA CALENDAR OF EVENTS



NATIONAL TOOLING AND MACHINING ASSOCIATION

Emerging Leaders Conference - **POSTPONED**

April 27-29 – Kansas City, MO

To ensure the future success 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.

Legislative Conference

September 21-23 – 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.

NRL Competition - **CANCELLED**

May 14-16 – 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.

Annual Fall Conference

October 27-30 – Kansas City, MO

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.

Summer Conference

June 15-17 – Phoenix, AZ

Strategize, revitalize, and let NTMA equip you and your business with the tools you'll need to succeed. Join NTMA during our Summer Conference offering business development sessions, educational speakers, and our highly rated roundtable discussions and networking events — these are conferences not to miss!

Please contact Kristen Hrusch, our Events Manager, for more information and to register:

Kristen Hrusch khrusch@ntma.org

216-264-2845 or visit:

www.ntma.org/upcoming-events

Emerging Leaders Rising 2020 Class Nominations - **Date Extended**

NTMA renamed the very popular 30 Under 30 program to Emerging Leaders Rising 2020, earlier this year. As a reminder, we are still taking nominations from managers and supervisors of talented manufacturing professionals who show leadership promise for the future of the manufacturing industry to be selected for the EL Rising 2020 class.

Due to the current COVID-19 crisis, the nominating deadline has been extended to June 1, 2020. Up to 15 individuals will be selected to join the EL Rising 2020 class, offering them an opportunity to connect with one another, gain valuable recognition, and develop their skills and knowledge throughout the year.

The selected individuals will be recognized in the July issue of The Record, with their photo, professional information, and their accomplishments. Individuals selected for the EL Rising 2020 class will be invited to attend the Fall Conference at a special rate and will be recognized on stage during the awards ceremony. They will also be invited to attend the 2021 Emerging Leaders Conference, where they can continue to grow and learn in this great profession.

Nominations for the EL Rising 2020 class are open to all regular members, including our National Associates.

The process to nominate is simple: Email Kristen Hrusch (khrusch@ntma.org) with the following information by Monday, June 1, 2020.

- *Name of nominee*
- *Company name*
- *Contact information for nominee*
- *Achievements and contributions*
- *Any additional information that is pertinent*

The group will be notified by the first week in June, in order to obtain more details for the issue of July issue of The Record. ***Please do not delay, enter your outstanding Emerging Leaders today!***

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PARTNERS



Smart Manufacturing Control

By Gisbert Ledvon, HEIDENHAIN Director Business Development Machine Tool.

The manufacturing process of today involves many challenges from mass production down to lot size one. The CNC controls in factories have to master this market trend specifically without an adequate amount of skilled labor in the U.S. manufacturing world. This article will discuss new technology features within the CNC, the HMI (Human Machine Interface), making the process easier to manage, and also how it relates to the machine motion control and specifically for multi-axis applications. The article will also include topics related to predictive maintenance and machine process monitoring.

In essence, manufacturing is facing a Renaissance in the CNC control technology shift. On one hand, many of the current CNCs used in factories are controlling machines with 3-axis motion or maybe 3+1, and relying on a CAM program to provide the right machine code (e.g., G-codes) to drive these machines. An operator just pushes the green button to start a program. When one operation is done, he stops the machine, repositions the part (or a cobot) and pushes the green button again to start the next machining program. This type of operation bears a few risks.

The next generation of professional manufacturing machine operators will not be willing to just push a button. Many machine operators want to feel empowered to make a quality part. At the same time, advanced 5-axis machine CNC controls have arrived and many of today's operators expect that the part they see on the touch screen comes off the machine at the exact size as the print or the 3D model calls for. They do not want to rework or re-cut like some of the more experienced machinists are used to. And quite frankly, that is how it should be if factory owners want to maximize the machine utilization and productivity output. In order to achieve this, the modern machine motion system has to be much more sophisticated than a simple 3-axis CNC with encoders on ball screws.

Improved Speed on the Factory Floor

Today's new 5-axis machine controls offer so much more on the factory floor. For example, the latest HEIDENHAIN TNC 640 (smarTNC) mill turn CNC control comes with a 24" multi touch screen and allows the operator to import CAM files in IGES or DXF formats right into the CNC. This enables users to interactively create and simulate the machining process right on a virtual machine with high resolution graphics. The system gives the operator the confidence that the part will be perfectly cut without a collision of the spindle or fixture of the machine setup more quickly and easily than ever before.

These new TNC controls offer accessibility from the operator panel on the machine right to the server system. Options now possible for the control users include the ability of the operator to view setup sheets, workflow information, and even run the CAM-system right from the machine, as well as update programs, create new tool paths, and transfer data right into the CNC. In the age of mass customization, priorities and workflow change constantly so the smart CNC needs to be able to adjust quickly and reliably.

Another important function now available for use on the factory floor and speeding up the process is the ability to reprioritize manufacturing jobs automatically. HEIDENHAIN's TNC 640 control, for example, offers Batch Process (see picture) to do this. The control is programmed to determine if all the necessary machining programs and tools are available to complete the next job, and if so, does so. It even determines if the remaining tool life is adequate to machine the next job where the tool will be used. The TNC can accurately determine how long it will take to machine a particular job because it has the actual machine motion or kinematics stored in the CNC. This enables the operator or programmer to accurately calculate the machining time based on machine behavior and axis motion speed, optimizing machine utilization time and maximizing profits.

To ensure that parts are set up correctly on a machine tool, a new feature similar to face recognition found on some newer smartphones is now also in use on some manufacturing factory floors. It's a visual setup system simply called VSC (Visual Setup Control) from HEIDENHAIN (see picture VSC). To explain, think of an operator at a 5-axis machining center connected to a robot or parts changer. The operator loads a pallet with the qualified part setup into the machine. In the machining center is a VSC system installed that will take a high-resolution image of the "perfect setup" and store it into the TNC. Now, when the operator starts the automaton process to load the next part into the machine, the VSC system will take another picture of that part, compare it to the stored image in the TNC and determine if the setup is correct. If so, the machining process can begin. But if there is a problem, such as if someone left a wrench on the fixture or a feature like a bore is missing, the TNC will then trigger an error message and either stop the machine or load the next part, repeating the process. When an "all clear" is received, the part will be machined.

Improved Accuracy on the Factory Floor

Now let's move from speed to accuracy, as in most cases, it is a trade-off between the two during machining. This is no longer the situation with advanced CNC functions.

The HEIDENHAIN TNC, for example, offers ADP/Cycle32 functionality which allows a programmer to achieve both speed and accuracy. To do so, the user can define a tolerance band for the machine movement allowing it to move as fast as possible around corners and critical features without radical speed changes. Radical speed changes are a problem as they generally leave marks on fine surface finishes and risk final part accuracy. Picture a racetrack with many curves. The race car driver wants to optimize the path he takes around the corners to be as close as possible to the curb and not lose speed but not go too far over the curb with the tires to get penalized by the officials. ADP/Cycle 32 compensates and controls for that on a machine tool.

When taken one step further, if the operator wishes to machine a part beyond the accuracy provided by the cutting tool shape (e.g., a bullnose radius tolerance), smart controls offer features to now handle that. HEIDENHAIN's TNC offers 3D-ToolComp together with a touch probe measuring cycle 444 as a powerful feature that ensures maximum part accuracy specifically on free-form surfaces.

Other important considerations now in place in today's advanced machine controls to ensure maximum part accuracy and superior surface finishes include the use of sealed linear glass scales and high dynamic motion systems which are critical specifically in simultaneous 5-axis applications. This allows users to take advantage of some new and unique features included with the TNC and its dynamic efficiency function. This feature is specifically advantageous if parts are machined without knowing how much stock material is really being removed. Let's take, for example, 3D-printed parts or castings. A 3D model in a CAM system "assumes" how much engagement

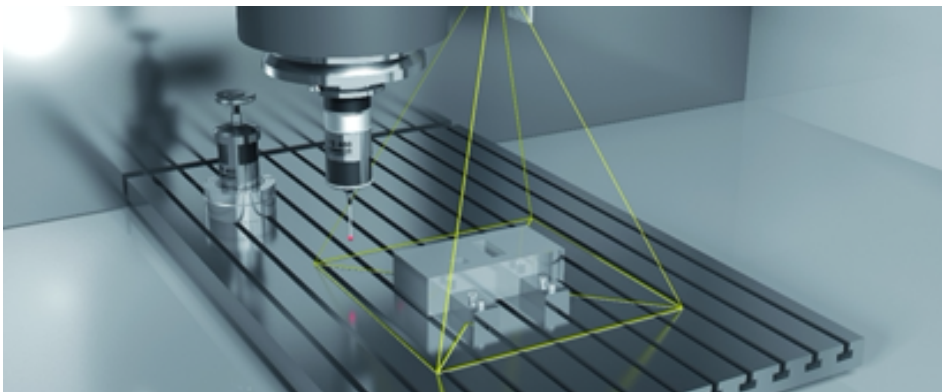
of the cutting tool in the material is happening, and determines the speeds and feeds that are written into the CNC program. The TNC control has the capability with AFC (Adaptive Feed Control) to automatically adjust the optimum feed rate based on spindle load, optimizing material removal rate as well as extending the cutting tool life. This maximizes process reliability and efficiency even when cutting unknown material thicknesses (see picture AFC) and the operator is not at the machine.

Connected Machining on the Factory Floor

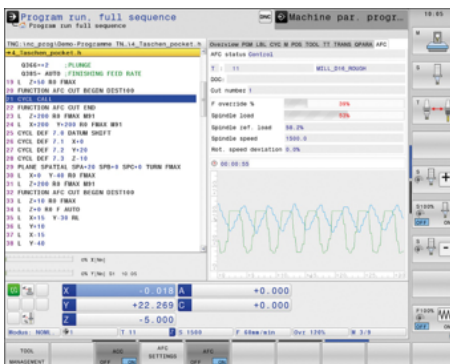
Today's smart controls can now often be connected to a company's network, allowing programmers and operators to communicate without paper and share files or other documents between the machining center and the office team. This encourages smoother and more efficient work than ever before possible. In addition, a powerful monitoring system like HEIDENHAIN's StateMonitor can be connected either via DNC, MTConnect Modbus, or OPCUA protocols.

This plug-and-play solution offers instant analytics about machine performance and operational efficiency. The communication feature Messenger will e-mail at predefined times/dates the specific machine messages to the person with the right skillset (e.g., preventive maintenance staff) who then can take action to ensure maximum machine utilization. All this can be viewed and operated not only on the local network but also on mobile devices like smart phones or tablets.

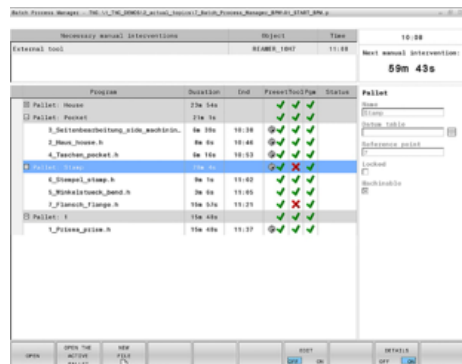
In summary, today's advanced smart CNC controls allow manufacturers to optimize the manufacturing process right on the factory floor like never before. At the same time, monitoring software provides valuable data and alerts to identify predictive maintenance or other error messages in real time allowing operator or managers to maximize the ROI of the modern machine tool everything from large productions down to small lot size applications.



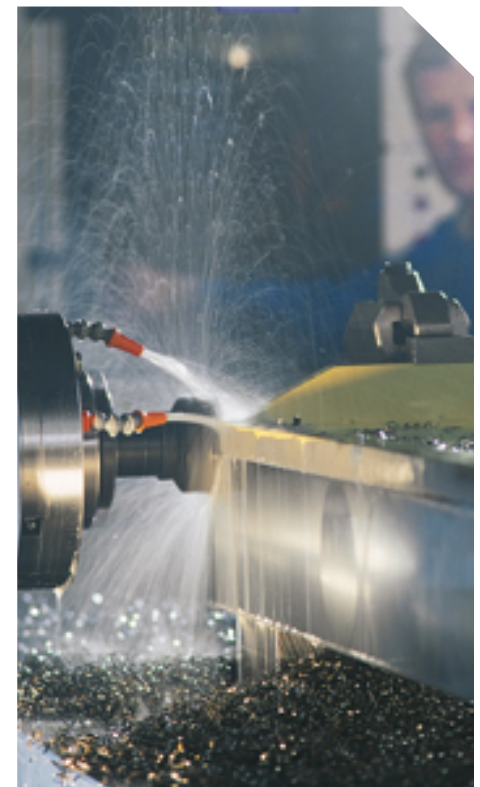
VSC 101



TNC screen showing AFC function.



TNC screen showing Batch Processor function.



Machining application utilizing the AFC function on a HEIDENHAIN TNC.



How to Bring a Junior Estimator into the Quoting Process

By Jason Ray, Co-Founder and CEO, Paperless Parts, intended for NTMA

Today's job shops need to be prepared for the future of manufacturing. This means having a sustainable infrastructure — people, tools, and processes — that can meet evolving market challenges, expectations, and opportunities. In assessing their current infrastructures, many job shops face the same dilemma: *there has been one cost estimator handling all the quoting — and juggling several other responsibilities — for several decades.*

This system may have worked well, even excelled, up until now — allowing the job shop to scale to its current size. However, the estimator's quoting process, while consistent, can be slow. There is also a steep learning curve, which makes it difficult to bring in a junior estimator with minimal manufacturing and estimating experience to help support the workload. To prepare for the future of manufacturing, job shops need to modernize their quoting processes — starting with a quoting solution that is 1) easy to use and learn, 2) ensures consistency and accuracy of quotes and 3) supports the transfer of tribal knowledge. To fuel modernization, job shops should make sure their most experienced people are reserved

for opportunities where their unique knowledge is required. The most experienced estimator often has significant manufacturing and business experience (and the scars to prove it) in the shop. As such, they are entrusted with the most sensitive and critical customer-facing interaction: quoting. However, these estimators do not need to facilitate every step in the quoting process — especially repetitive administrative steps such as turning the RFQ into a drafted quote for editing. Their wealth of skill and expertise can now be applied in more impactful ways to grow and serve the business.

With the support of a junior estimator, the more experienced estimator is freed up — oftentimes regaining 6-10 hours per week — to pursue responsibilities that make a bigger impact on the company, such as following up with customers or ensuring parts are getting shipped on time. Not only does reallocation of resources increase revenue, but it can also ensure the estimator's tribal knowledge is shared among employees. Having only one person with the knowledge of estimating/quoting is a single point of failure for a business. It creates a risk that could negatively

affect a shop if that person retires or becomes ill. Think about how much money you would lose if your only estimator was out for a week. It is essential that shops are able to train others in the quoting process, including the next generation of workers.

Modern quoting software is the fastest way to capture the knowledge of your most experienced estimators and build rules — or guardrails — based on their tribal knowledge, into a quoting system that will allow you to train even the most junior people. Easy-to-use software can flatten the high learning curve of existing quoting systems and processes, so junior estimators can be trained in mere days. From there, the more experienced estimator can focus on more strategic tasks, such as defining complex setup time, cycle time, and configuring the router.

Bringing in a junior estimator — and equipping them with the necessary tools — is a long-term investment in the future of a job shop. As pressure to modernize builds, and digital-driven competition increases, it is essential for shops to optimize operations now.



R&D TAX CREDITS FOR THE MANUFACTURING INDUSTRY

DID YOU KNOW?

- Certain product development and process improvement activities performed by manufacturing companies may qualify for sizable federal and state R&D tax credits.
- BRAYN's expertise includes industry standard time tracking and job costing software, which provides for efficient cost analysis and excellent substantiation.
- The R&D tax credit is based on "qualified research expenses" (QREs) - for every dollar spent on QREs, you can earn up to 7.9% in federal tax credits! Additionally, over 40 states offer similar R&D tax incentives that can double benefits in some cases.

EXAMPLE QUALIFIED ACTIVITIES:

- Product Design & Testing
- First-Article Runs
- CNC Programming
- Tooling Development
- Equipment Development
- Process Design & Development
- Quality Assurance

MANUFACTURING FIRM CASE STUDY:

Item	Average Annual Amount
Gross Revenues	\$ 15,000,000
Total Payroll	\$ 5,600,000
Qualified Research Expenses (QREs)	\$ 1,100,000
Net Federal Credits	\$ 72,000
Net State Credits	\$ 35,000
Total Net Federal and State Credits	\$ 107,000

"I was impressed with BRAYN's experience and methodology. They made the R&D tax credit easy to understand, and minimized time-impact on Heateflex and our staff... BRAYN was very thorough in conducting the R&D tax credit project by investigating all the relevant facts to calculate the credit. Their in-depth analysis included financial data, acquisitions and dispositions and its impact on the R&D tax credit... As such, BRAYN clearly demonstrated their experience and knowledge by bridging the gap between the law and the practical business realities of satisfying the legal requirements of the R&D tax credit."

~President/CEO, Heatflex

BRAYN is a niche consulting firm that guides businesses to greater value through tax credits and incentives, such as R&D Tax Credits, Cost Segregation, 179D, 45L, and Fuel Tax Recovery. The BRAYNiacs are a team of lawyers, engineers, and accountants with extensive industry experience hailing from Big-4 and other national consulting firms. At BRAYN, we focus on building quality relationships where we are a key partner in driving business prosperity.

A Justification For Student Engagement

Learners in the 21st century will be required to exhibit understanding and skills that were unfathomable to us just twenty years ago.

by Bill Padnos, Workforce Development Manager

The above statement, “A Justification for STEM Education,” by Amanda Roberts in the May/June 2012 edition of the Technology and Engineering Teacher journal. She concluded in her article that STEM education is an integrated approach to education for the purpose of instilling creative problem-solving techniques in students and the development of future innovators. A student’s learning experience is enhanced by STEM education through application of general principles and practices. When incorporated properly, it should inspire creativity, inquisitive thinking, and teamwork and offer a viable solution to a potential threat due to a lack of fully qualified workers who can contribute to the global economy.

Fast forward to today and here are facts from Industry Week’s “2020: Future of Manufacturing Technology” article.

- According to the Robotic Industries Association, manufacturers see the potential. Specifically, robot orders are up 5.2% through the third quarter of 2019, with 23,894 robotic units ordered, a value of \$1.3 billion.
- The 3D printing industry was worth \$3 billion in 2013 and grew to \$7 billion in 2017. By 2025, the market is forecast to account for more than \$20 billion in spending, according to GlobalData.
- According to the PwC’s 2019 Internet of Things Survey, manufacturers are optimistic about IoT with 93% believing its benefits exceed its risks. In fact, 68% plan to increase their investment over the next two years.

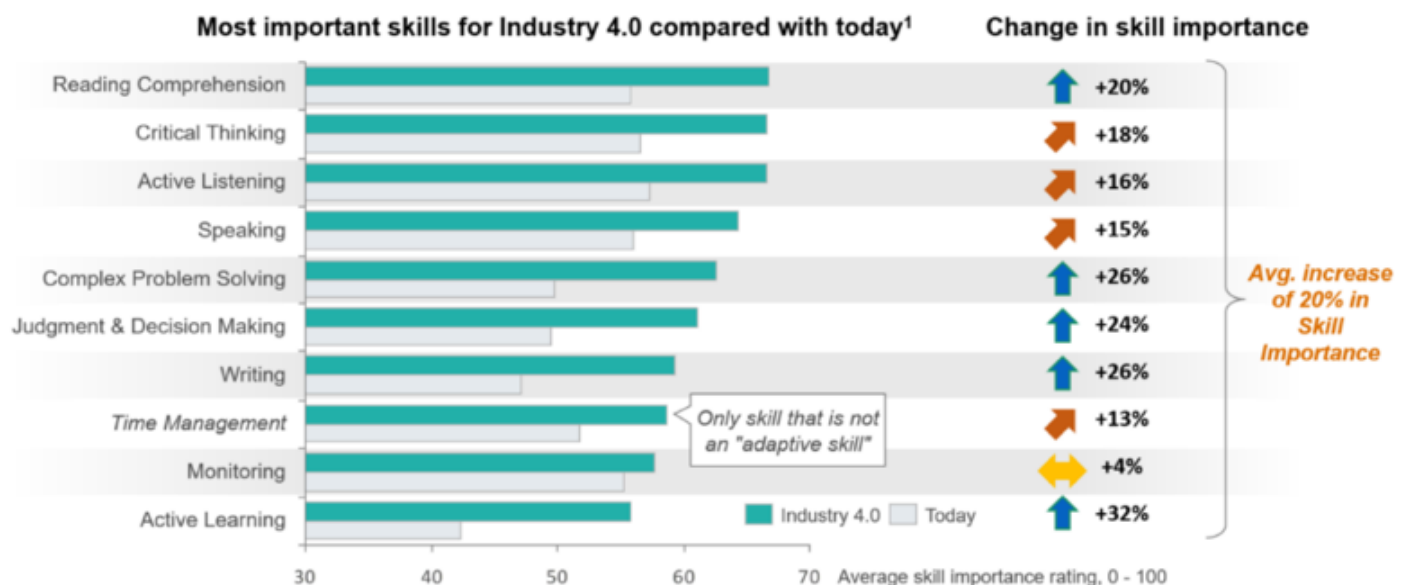
The Advanced Robotics for Manufacturing (ARM) Institute was created to assert U.S. leadership in advanced robotics manufacturing, empower the

American workforce, lower the technical, operational and economic barriers, and create and sustain valuable manufacturing jobs. According to the ARM, “We haven’t succeeded in reviving American manufacturing if we haven’t created opportunities for a more developed, diverse workforce to manage, design, and build the future with all the technological advantages that robotics provide.”

ARM has identified the adaptive skills that are expected to be 20% more critical across Industry 4.0 jobs than they are in manufacturing today. The chart below outlines the skills and the percentage of change in skill importance when it comes to Industry 4.0.

During the current school year, teachers, in partnership with their industry advisors, utilized the NRL program, a job-driven, project-based STEM

Adaptive Skills Expected to be ~20% More Critical across Top Industry 4.0 Jobs than They are in Manufacturing Today



learning experience to engage students and prepare them for future careers in manufacturing.

Veteran teams were implementing new and creative innovations into the manufacturing process of their combat Bot. The students printed parts, utilized new software for their design work and communication, implemented sensors, and produced their own battery cells. These are the students that are learning and showcasing the adaptive skills that will make them the perfect candidates as the future leaders of your companies.

Unfortunately, we are now living in a very uncertain time and each day brings another postponement or cancellation of an NRL competition. These are the hardest calls to make for the regional program

leadership because of all of the hard work from the students, teachers, and industry advisors that went into the manufacturing process of designing, building, testing and rebuilding of those Bots. I can only imagine the disappointment on the faces of the students when they receive the cancellation notice because I feel it also.

Not being able to compete means that they are not able to determine if their robotic creations can survive and thrive during the 3-minute battle against their opponents. However, that does not diminish the technical and critical thinking skills that the students have learned throughout the year during the Bot building process, nor what students have learned about careers in manufacturing through their industry

advisors. They have gained amazing insight into an industry that will never go away, along with the adaptive and technical skills they have learned.

These students are the untapped resource that you need at your companies who will embrace robotics, automation, and 3D printing. Even though we were not able to see the NRL students in action at the competitions, you can still connect with their teachers to find your future employees. If you are looking for talent that can lead to the future success of your company, let us know. Also, the new NRL season starts next fall. It is not too late to get yourself involved in Engaging Manufacturing's Next Generation through Full Contact Innovation.

The NRL 2018 National Championship survey of teachers provided us with proven data on the impact of student participation in the program.

100% of teachers stated their students learned Mechanical Engineering, Direct, Hands-on STEM Skills, Real-World Problems Solving and Teamwork.

95% noted that students learned Machining, Electrical Engineering, CAD, Project Manager, Leadership



SUMMER CONFERENCE

June 15-17 – Phoenix, AZ
The Kimpton Hotel Palomar

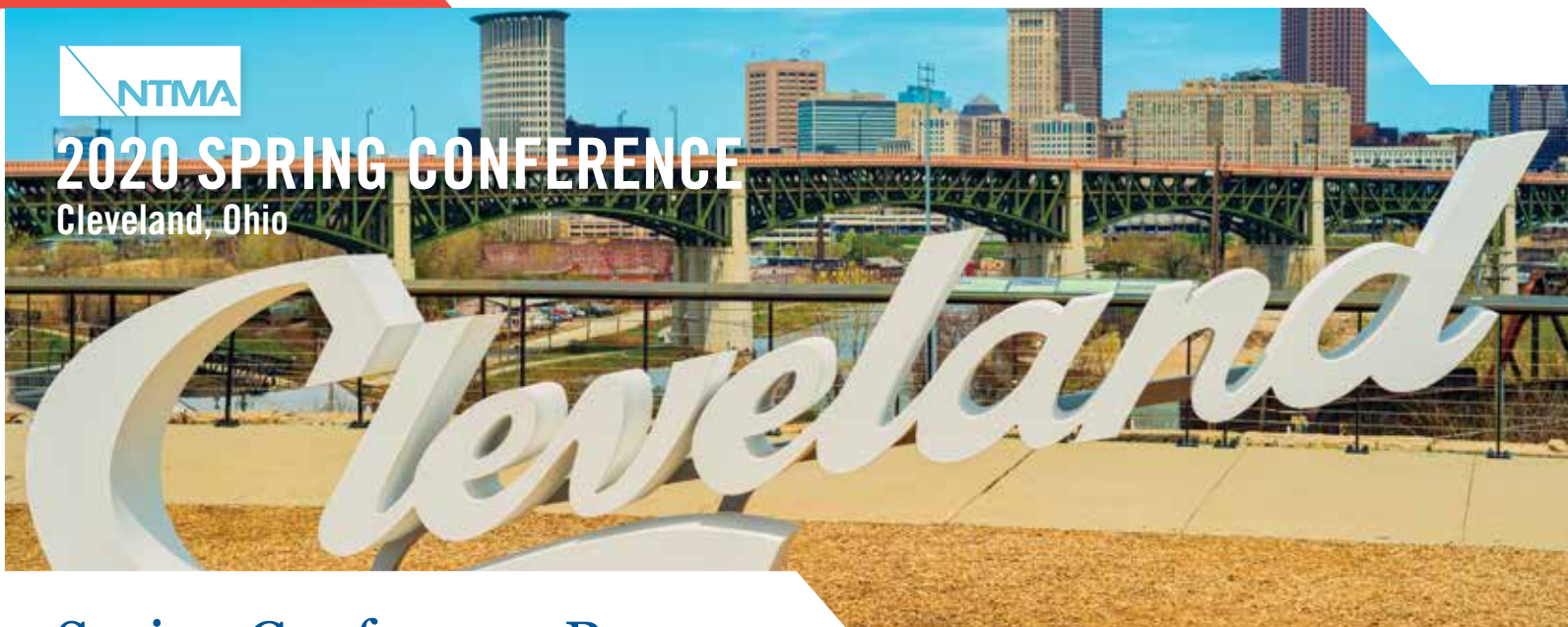
Strategize, revitalize, and let NTMA equip you and your business with the tools you'll need to succeed. Join NTMA during our Summer Conference offering business development sessions, educational speakers, and our highly rated roundtable discussions and networking events

Questions? Contact Kristen Hrusch - khrusch@ntma.org or 216-264-2845



2020 SPRING CONFERENCE

Cleveland, Ohio



Spring Conference Recap

The inaugural NTMA Spring Conference promised to equip you and your business with the tools you need to succeed through peer networking, business development sessions, high-level featured speakers, plant tours, and roundtable discussions in a compact schedule at an affordable cost. Based on the immediate feedback from NTMA members in attendance, we were able to fulfill our promise and then some!

The conference kicked-off with a welcome reception with attendees and Cleveland Chapter members at Butcher and the Brewer in sunny and warm downtown Cleveland. The conversation was lively and the beers on tap were plentiful as members came together to network and share stories. Following the event, members went off to enjoy all that Cleveland has to offer.

The next morning, NTMA President Roger Atkins welcomed the packed room of attendees to the conference and talked about his passion for the Association and precision manufacturing. Before the keynote presentation, Roger welcomed representatives from BIG Kaiser and Blaser Swisslube to present checks to the AMPED board to benefit the National Robotics League. Through their special promotion in November and December 2019 to NTMA and AMT members, BIG Kaiser donated \$7,283 to support our youth engagement program. The amount is 10 percent more than last year and a fourth year-over-year increase in NRL funding from BIG Kaiser. This was the first year of the Blaser Swisslube promotion to benefit the NRL

program. Through the participation of NTMA members, the company was proud to donate \$2000 to AMPED and looks forward to the promotion growing in 2020.

The opening keynote speaker, Lisa Ryan, kept the attendees energized by providing insights on how to “Keep YOUR Talent from Becoming THEIRS!” Based on how engaged and committed they are to your organization, workers can make the choice as to whether they want to stay with you or not. The bottom line is that you are faced with an enormous challenge: keeping your top talent from becoming someone else’s! We look forward to Lisa Ryan joining us at the NTMA Fall Conference, so you all will have another opportunity to learn from her.

During lunch, Omar Nashashibi from The Franklin Partnership and Caitlin Sickles from the Policy Resolution Group at Bracewell delivered an in-depth look into the 2020 race for the White House. They provided the implications of the election for manufacturers and analyzed what was currently happening and will take place with the Democratic primaries in the aftermath of Super Tuesday. Attendees left with a better picture of who will be facing President Trump in November, how candidates are communicating with manufacturers and what it all means for their businesses.

After lunch, the attendees broke up into the popular Industry Roundtables to participate in an open forum with peers about successes and issues within their shops. This was a great opportunity to share pains

and learn from each other on how to apply the best solutions. After the roundtables, it was time for plant tours at two NTMA member facilities – Jergens and Fredon Corporation. These long-standing members opened their doors and showcased their operations.

For the evening, attendees headed over to Forest City Shuffleboard for drinks, dinner, and a little competition. While shuffleboard is not a contact sport, it does get your blood pressure going and lends itself to a battle that includes strategy and finesse. In the end, it was a great time for all and a chance to connect in a casual atmosphere.

On Wednesday, we had a high impact morning of general session speakers. Mark Eich from CliftonLarsonAllen provided insights on cybersecurity and the CMMC requirements from the DOD. Montez King, from NIMS, made the case that training for performance will be more effective for skill building and industry credentials. The concluding speaker was Dr. John Sankovic from the Ohio Aerospace Institute. Dr. Sankovic spoke about the impact of aerospace innovation on advanced manufacturing and what NTMA member companies need to do at their shops to be able to continue to be in the supply chain.

The NTMA Summer Conference is taking place June 15-17 at the Kimpton Palomar in downtown Phoenix. While the sessions will be different, the value of the conference will stay the same. This is a great investment of your time and registration will be open soon.



Roger Atkins welcomes attendees to the Spring Conference



Carsten Witthauer presents Blaser's donation to AMPED (Mark Lashinske, Roger Atkins, and Kevin Ahaus)



James Mayer, representing BIG Kaiser, presents their donation to AMPED (Mark Lashinske, Roger Atkins, Kevin Ahaus and Bill Padnos)



BIG Kaiser and Blaser announce their donations to support our youth engagement program

"It was great to be there with you all. The new NTMA Spring Conference was a very worthwhile event for me. I came back to the shop with enough good ideas and information to pay for the trip and my membership:

- *Lisa Ryan's session is already paying off as my focus on gratitude has been especially helpful through this coronavirus fiasco.*
- *Omar's session has given us tools to get better insurance rates, assistance with international sales, and assistance with training, and government grants.*
- *Stu Shepherd's (Universal Robots) session was a game changer because I now have clarity on how I can implement cobots in my shop.*
- *I love shop tours and the tour of Fredon was one of the best – got a great look at some best practices for job shops that will help LeanWerks progress.*
- *Finally – I cannot go without mentioning how great it is to see old friends from around the country – the support and camaraderie shared among shop owners is awesome.*

There was more, but these alone are worth more than the price of admission. Looking forward to seeing you this summer."

Reid Leland PE, President - LeanWerks



Montez King from NIMS presents on Educational Training Programs - How to Match your Technology with What's Coming Down the Pike



Members after the Jergens Plant Tour



Lisa Ryan spoke on Manufacturing Engagement - Keeping YOUR talent from becoming THEIRS



Mark Eich spoke on the new Cybersecurity Maturity Model Certification.



Attendees have a bite to eat as they listen to The Franklin Partnership and the Policy Resolution Group give a Washington 2020 Update.



Shuffleboard event



Shuffleboard event



Shuffleboard event

In Memoriam - Jay “Don” Wardle

July 29, 1929 ~ March 22, 2020 (age 90)



Jay “Don” Wardle, 90, passed away on March 22, 2020. He was born July 29, 1929 in Ogden, Utah to William Elton Wardle and Margaret Jane Blakeley. He attended Ogden High School, Weber State College, and Utah State University.

Don was a faithful member of The Church of Jesus Christ of Latter-day Saints and served a full-time mission to Holland from 1949 to 1951. After Don returned from his mission, he married Mary Ann Wyatt in 1952 in the Salt Lake Temple. Don was a WWII Veteran; serving as a first lieutenant in the Army Occupational Forces in Frankfurt, Germany.

Don worked as a machinist and enjoyed his work very much. In 1972 he moved his family to Canoga Park, California for his job at Marquardt Corp. After living there for seven years, the Wardle family moved back to North Ogden, Utah. Don founded JD Machine, which is now a large manufacturing plant owned and operated by his son Matt.

Don always enjoyed working with his hands and was very mechanical. His job was his hobby. He never really retired and continued to go to his office at the shop every day up until just a few months before he passed away. He was very fortunate to have a place where he felt needed and productive. Don was very much a “people person” and enjoyed his association with the guys at work. He had many wonderful friends who brightened his days.

Don believed in serving the Lord and did so very faithfully throughout his life. He served in many callings including second counselor in the bishopric of the North Ogden 7th ward, Bishop of the Canoga Park 2nd ward, and Bishop of the Ben Lomond 11th ward. He and Mary Ann served a full-time mission to Fresno, California from 1997 to 1998.

Don was, most importantly, a devoted husband and father. He and Mary Ann left behind a large legacy that has been blessed by their sacrifice, teachings and examples. Don is preceded in death by his parents, his wife of 63 years, and a sister (Ruth Bryan). He is survived by one sister, Nelda Wardle, and five children: Rebecca (Jerry) Sandberg, Lisa Leigh, Natalie (Brent) White, Peggy (Sid) Creager, and Matthew Don (Teal) Wardle, 17 grandchildren, and 29 great-grandchildren with two on the way.

SCHOLARSHIPS FOR MANUFACTURING CAREERS

Inspire Students to Pursue Pathways to Careers in Manufacturing.

Do you know a driven, resourceful, and innovative student in the United States looking to explore a post-secondary educational pathway to a successful career in manufacturing?

If yes, the National Tooling & Machining Foundation Scholarship awards scholarships up to \$2500 to graduating high school seniors, undergraduates and graduate students pursuing two-year, four-year or advanced degrees in manufacturing or engineering.

Manufacture their future and encourage them apply for an NTMF scholarship by May 1, 2020. Information about the scholarship program, along with the link to the online application form, is available at www.ntma.org/initiative/foundation. A recommendation by an NTMA Member in good standing is required for each student applicant.

For more information or questions, contact Bill Padnos at bpadnos@ntma.org.





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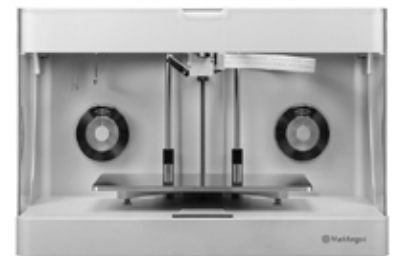
ENGAGE MANUFACTURING'S NEXT GENERATION THROUGH FULL CONTACT INNOVATION



On behalf of the thousands of NRL students and the AMPED Board, we would like to extend our appreciation to NTMA members for their generous support of the NRL Raffle.

We are excited to announce that Ted Toth of Rosenberger North America was the winner of the Haas Desktop Mill and Ron Gronback of PDQ, Inc. was the winner of the Markforged Mark Two Carbon Fiber 3D Printer. In the coming months, we look forward to sharing the stories of the schools that are the recipients of these new machines from Ted and Ron, and how they are engaging manufacturing's next generation.

Thank you to Markforged and Haas Automation, Inc. for being incredible partners in making this raffle fundraiser possible. Your unrelenting commitment to closing the skills gap is truly appreciated by all of us.



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FORCE OPTIMIZATION - MACHINE SAVINGS CALCULATOR

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(total burden)

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Number of Machine Tools

5

Weekly Machining Hours

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Estimated Reduction in Machining Time
Reduce machining time by as much as 15-25% or more

25% (typical reported savings)

ANNUAL MACHINE SAVINGS

\$520,000



FORCE OPTIMIZATION - CUTTER SAVINGS CALCULATOR

Hourly Cutter Cost \$
(average cutter cost/cutter life hours
e.g. \$100/1 hour)

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Number of Machine Tools

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Weekly Machining Hours

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ANNUAL CUTTER SAVINGS

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SAVE THE DATE**12th Annual
NTMA/PMA One Voice
Legislative Conference****September 22-23, 2020**

Washington Court Hotel | Washington, D.C.



During the 2016 elections, presidential candidate Donald Trump put a spotlight on manufacturing. In the 2020 White House race, manufacturing is certain to take center stage once again, making it critical that we have our voices heard. On September 22-23, 2020, NTMA and PMA will host members in Washington, D.C., scheduling meetings with senators, representatives and key policymakers.



During this 12th annual Washington fly-in, PMA and NTMA will seek to build on prior victories, bringing attention to and securing resources for apprenticeships and job training. Closing the skills gap and raising awareness of manufacturing careers is our top priority, and visiting D.C. in the middle of the most consequential election in decades gives you an opportunity to make sure politicians are focusing on manufacturing in America. Attendees also will have the opportunity to discuss the impact of tariffs, taxes and regulations on their businesses.

One Voice will schedule all of your meetings in advance, freeing you up to speak to policymakers about what you know best – your business. Join your fellow NTMA and PMA members in Washington, D.C. to speak with One Voice!

**LEGISLATIVE
CONFERENCE AGENDA****Monday, September 21, 2020**

4:00 p.m. – 5:30 p.m.

Early Conference Registration

5:30 p.m. – 6:30 p.m.

Optional Early Arrivals Reception

Tuesday, September 22, 2020

8:00 a.m. – 11:30 a.m.

Conference Registration

11:30 a.m. – 1:00 p.m.

Conference Opening Remarks, Briefing and Lunch

2:00 p.m. – 4:30 p.m.

Capitol Hill Visits

5:30 p.m. – 6:30 p.m.

Networking Reception

Wednesday, September 23, 2020

8:00 a.m. – 9:30 a.m.

Breakfast

10:00 a.m. – 4:00 p.m.

Capitol Hill Visits

(includes lunch with members of Congress)

TO REGISTER,**VISIT WWW.PMA.ORG OR WWW.NTMA.ORG****PMA | NTMA members \$199 per person****Nonmembers \$499 per person****Registration deadline August 24, 2020****Questions?** Contact info@metalworkingadvocate.org or **202-393-8250**.**CONFERENCE LOCATION/
HOTEL ACCOMMODATIONS**

The Washington Court Hotel

525 New Jersey Ave., NW

Washington, DC 20001

Phone: 800-321-3010

Rate: \$325 per night (plus tax)

To make your hotel reservation, please call 800-321-3010 and reference NTMA/PMA One Voice Conference. Deadline to make reservations in our group block is **August 24**. Rooms reserved after this date are subject to space and rate availability.

Today's Energy Market and COVID-19

By APPI Energy



APPI Energy is committed to monitoring the COVID-19 pandemic, how it is affecting the current energy markets, and what that means for the foreseeable future. We are dedicated to serving NTMA members and making the best recommendations based on the market and member needs, even in the most uncertain times.

Last week, the prompt-month natural gas contract closed at \$1.87/MMBtu. Pressuring prices downward, natural gas demand is likely to decline on a combination of springlike weather engulfing most of the country coupled with a likely reduction in demand due to COVID-19. Total U.S. consumption of natural gas fell by 10% compared with the previous week. Natural gas storage levels are currently 12.5% higher than the five-year average at 2.043 trillion cubic feet (Tcf).

There are several factors, however, that may spike prices upward. The Saudi Arabia/Russian oil war has driven prices from \$41 to \$30 per barrel, roughly a 25% drop. Lower oil prices create more pressure on

U.S. oil and gas companies already operating below break-even costs (\$45/barrel) and struggling with high debt. Well over 30% of the country's natural gas production comes as a by-product of drilling for crude oil. The drilled-but-uncompleted (DUC) well inventory in the Marcellus/Utica basins are almost depleted and new drilling permits have evaporated due to the prolonged low price environment. Capital investment for new well and pipeline development has vanished from the market and is unlikely to reappear until prices rise substantially and for a sustained period of time.

Two opposing forces are pressuring prices. Lessening demand due to milder spring weather and the economic impact of COVID-19. On the other hand, low prices are squeezing both oil and gas producers to limit new well development which will likely result in a substantial production shortfall later this year. The question is when will production tumble and drive the price up. COVID-19 has made a need for cash imperative now in both the energy sector and many parts of the economy. Longer term, lower oil production

in 2020 and 2021 would be bullish for natural gas prices. The COVID-19 situation has shifted the U.S. that a "rational" market environment to an "irrational" one where fear and momentum are driving prices. History also shows irrational market environments are short-lived. While there are business uncertainties caused by the virus, history shows that rational markets revert to the mean. This means business will return to normal and economic growth will resume. Since the oil war was not caused by the virus, but by an effort to regain market share, the economic recovery, at least temporarily, will take place in an environment of lower energy prices.

What should you do now? Be sure to review your energy plan. With an eye towards the long run, review where prices are today for calendars 2021 – 2025 with where they were a few weeks ago. APPI Energy is here to assist, answer any questions, and help alleviate your organization's energy needs and costs.

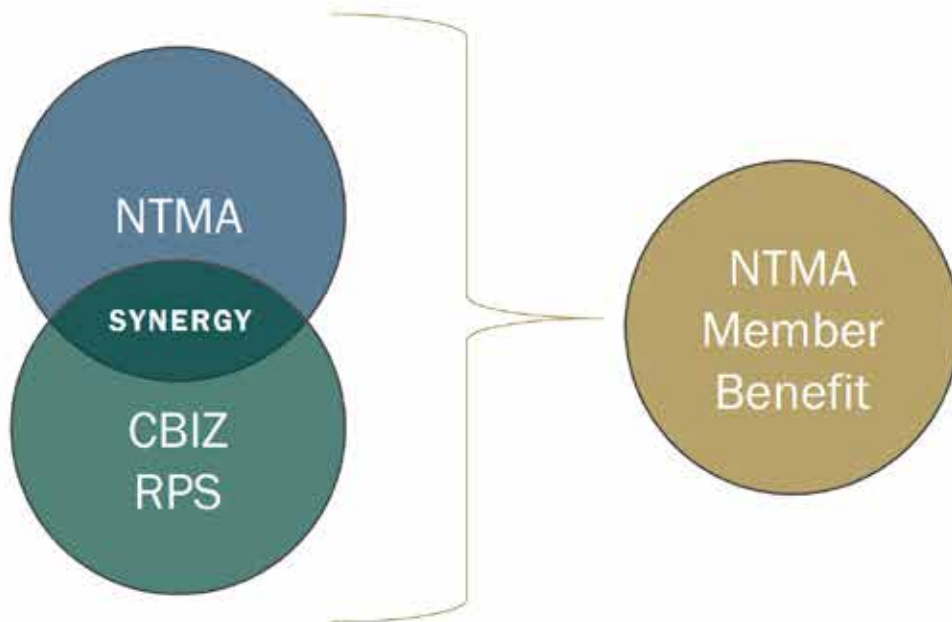
Contact us today to review your energy plan at 800-520-6685.



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NATIONAL TOOLING AND MACHINING ASSOCIATION

1375 Rockside Rd.
Cleveland, OH 44134

Manufacturing America's Future

**Have an interesting story you would like to
share with other NTMA members?**

Each issue of The Record will feature one or more stories
from members that fit the month's theme.

The submission deadline will be the first
of the month prior to the publication date.

Email to Kelly LaMarca at klamarca@ntma.org.

Upcoming Record Themes:

May

Skilling up the Workforce

June

Fall Conference Preview

July

Emerging Leaders Rising 2020
& Summer Conference Recap

What's Your Story?

