

# THE RECORD

JANUARY 2017

PUBLISHED BY THE NATIONAL TOOLING AND MACHINING ASSOCIATION

## GEARING UP FOR 2017

Offering innovative ideas and efficient solutions for a successful year

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**MAKE THE MOST OF YOUR NTMA MEMBERSHIP IN 2017** - pp.10, 19, 29

**BUILD YOUR WORKFORCE WITH A STUDENT ROBOTICS PROGRAM - SEE HOW IT'S WORKING IN KANSAS CITY.** - p.6

**5 COMPETITIVE STRATEGIES THAT YOU CAN PUT TO WORK IN YOUR SHOP** - p.9

**REBRANDING MANUFACTURING: A FRESH LOOK FOR OUR INDUSTRY AND THE SMALL CHANGES YOU CAN MAKE FOR A BIG IMPACT** - p.28



# EMO Executive Technology Tour Hannover, Germany

SEPTEMBER 17-22, 2017

Pre-arranged booth visits to some of the world's technology leaders will take place Tuesday, September 19th through Thursday, September 21st. Booth tours in 2015 included:

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## Trip Details

- All NTMA members are invited to participate in the EMO Executive Technology Tour in Hannover, Germany this September 17-22. Attendees should plan to arrive on September 17th and depart on September 22nd. A limited number of hotel rooms will be available for check-in on September 16th. These are available on a first come first served basis.
- Hotel accommodations are not included in the administrative fee and the cost of hotel accommodations will be the responsibility of the participant. We have reserved a limited number of hotel rooms in Hannover for our members and these are available on a first come first served basis.
  - A non-refundable deposit of \$2165 for single rooms (5 nights); Or \$2390 for check-in on September 16th (6 nights)
  - A non-refundable deposit of \$2495 for double rooms (5 nights); Or \$3080 for check-in on September 16th (6 nights)
- You will be responsible for making and paying for your own air transportation. Please do not make any travel arrangements until you are confirmed for the tour.

**Registration deadline: February 24th (to guarantee hotel accommodations)**

To register or for questions, contact Brittany Belko at [bbelko@ntma.org](mailto:bbelko@ntma.org) or 216-264-2848

## PRICING INFO:

### EMO Executive Technology Tour Administrative Fee

#### \$1,395 - NTMA Member Rate

This fee includes:

- EMO show pass
- World Expo pass
- Ground transportation in Hannover
- Daily breakfast buffet
- Five group dinners
- NTMA staff tour guide for booth visits

#### \$495 - NTMA Member Spouse Rate

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- Five group dinners



### LEARN and LEAD...

- Team Building
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- Leveraging Technology to Support Leadership
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The NTMA Emerging Leaders Conference provides up-and-coming professionals in various roles of small-business manufacturing the opportunity to create communities that fuel innovation, facilitate knowledge sharing and provide training designed to develop authentic leadership.

**in** NTMA – Emerging Leaders Group **🐦** #NTMAEL2017



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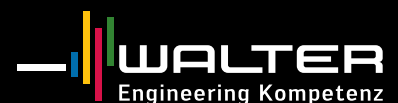
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## PRESIDENT'S UPDATE

DAVE TILSTONE / NTMA PRESIDENT

In the first 2017 issue of The Record, you'll see a different look with new areas of focus we think you'll enjoy. You'll find that our news is broken down into easy-to-read sections that include NTMA News, Chapter News and Member News, plus our team is working diligently to find insightful feature stories that will have an impact on you and the way your company does business. In the coming year, we'll focus each issue on a theme that's relevant to you, our membership. This month—it's a fresh look at the NTMA and manufacturing. It's a look ahead.

Rather than go through all of the accomplishments and highlights of 2016 in my column, I thought it would be more impactful and meaningful to present this to you through an easy-to-read information graphic. The two-page spread that follows (in the center of the magazine for quick reference) brings to your attention the prosperous and significant achievements we have made consistent with our mission: Educate, Network and Advocate.

The NTMA Team is proud to be able to serve you and provide the benefits and services outlined in the next coming pages.

Stay tuned for all that is in store for you in 2017 as we raise the bar to exceed your expectations.

DAVE TILSTONE / NTMA PRESIDENT



*(See the impact of your NTMA membership in 2016 on pp. 17 & 18)*

## BENEFIT OF MEMBERSHIP: THESE AFFINITY PARTNERS HAVE NEW OFFERS FOR NTMA MEMBERS IN 2017. START SAVING.

BY MATT GILMORE, NTMA, DIRECTOR OF MEMBERSHIP AND BUSINESS DEVELOPMENT



NTMA's affinity discount programs offer members a great way to save money on products and services that are critical to their businesses. These bottom line savings and ease of ordering, billing and delivery, provide NTMA members with cost-effective solutions to keep their businesses running efficiently.

Our partners are excited to offer some new programs and features only to NTMA members in 2017.



**Your Shipping Connection**

PartnerShip® helps NTMA members ship smarter and safer. Partnership now offers freight insurance through Roanoke

Trade – providing a better option than relying solely on a carrier's liability coverage. The coverage protects shippers against physical loss or damage and will pay to repair or replace the cargo regardless of if the carrier is found liable. There is a \$0 deductible, and claims are typically paid within 30 days.



Grainger is NTMA's get it, got it partner. With over 3 million products available discounted at least 10 percent with free shipping, NTMA members of all sizes can benefit from the buying power of a strong national association. Look for deeper discounts on product categories throughout

2017 as Grainger and NTMA work together to provide members with special MRO packages throughout the year as well as deeper discounts on industry-specific items.



Staples Advantage is the official office support and supplier for NTMA. Staples works with NTMA companies to provide deep discounts on the items they use most in their daily operations. They provide ink and toner, paper and pens and so much more. In 2017, Staples is also offering great discounts on office chairs and custom printing only to NTMA members.

SEE "AFFINITY" ON PAGE 5

# THE RECORD

## OPERATIONS & EDITORIAL

Dave Tilstone, President  
Molly West, Editor

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## ADVERTISING INQUIRIES

To advertise in *The Record*, or for information on publishing your corporate newsletter or sales literature, contact NTMA at (216) 264-2847 or [tbryson@ntma.org](mailto:tbryson@ntma.org) for advertising, [mwest@ntma.org](mailto:mwest@ntma.org) for editorial content. Design & layout by Z Graphics [dave@davezgraphics.com](mailto:dave@davezgraphics.com)



## NATIONAL TOOLING & MACHINING ASSOCIATION

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"AFFINITY" CONTINUED

## APPI ENERGY

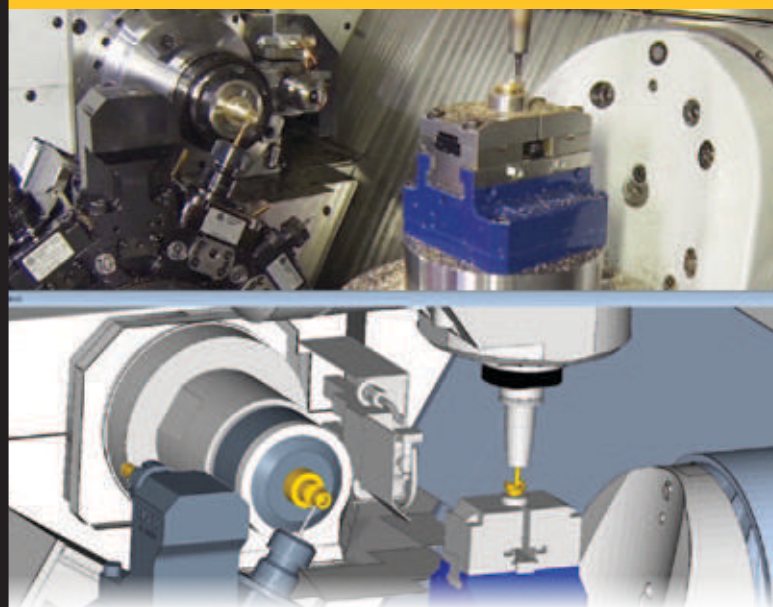
APPI Energy provides energy market expertise through a proven procurement platform that can provide significant bottom-line savings on utility costs to NTMA members in deregulated states. APPI's new online Price Finder tool (<http://www.appi-energy.com/price-finder>) provides real time pricing comparisons for gas and electric providers in eligible states so that members can make the best decisions for their energy needs.

## Heartland

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# REBRANDING MANUFACTURING, ELEVATING THE INDUSTRY'S IMAGE

BY MICHAEL DOCHTERMAN



In the last few years, we have seen manufacturers stepping up to enhance

the image of the industry. For example, last fall a General Electric TV commercial featured a millennial named Owen who had just told his parents he got a job at GE. The father proudly replies, "GE, a manufacturer," and produces a large hammer that belonged to Owen's 'Grandpappy.' "He would have wanted you to have it," Owen's dad says. Owen responds all flustered, "Yes, GE makes powerful machines. But I will be writing the code that will allow those machines to share information with each other."

In fact, thousands of companies across the U.S. are beginning to rebrand manufacturing as a high-tech industry filled with opportunity. Their target audience: smartphone-wielding millennials and their parents who still think of manufacturing jobs as high-risk or as a last resort after Silicon Valley tech jobs. Why the push? By 2025, it's estimated there will be two million unfilled manufacturing jobs, according to a study conducted by the Manufacturing Institute and Deloitte Consulting. Millennials are the obvious target to fill these jobs, but manufacturers are facing challenges in wooing this group. According to the Manufacturing Institute and Deloitte, although the most sought-after jobs for millennials are in the technology industry, they don't automatically connect manufacturing with the tech sector. This is despite the fact that modern manufacturing relies heavily on high-tech applications. Indeed, manufacturing ranked seventh in that study, even though research by the Manufacturing Institute shows that more than two-thirds of U.S. manufacturing companies are adopting 3-D printing and more than half use robots.

What can you do to rebrand and enhance your manufacturing business and attract fresh talent to your company? Following are several ideas, some of which are taken from a session on "Enhancing the Image of Your Manufacturing Company" at the 2016 Minnesota Manufacturers' Summit:

- Freshen up the front office as well as the back shop area. Get rid of all the tall, bland beige walls and replace them with

open workspaces and areas for collaboration. Allow visitors to see your manufacturing floor when they walk through the front door of your business. Install LED lighting in your shop floor area to brighten it up. Paint the walls white, or bright colors. Keep the shop floor clean (this is essential for safety, preventing accidents, too!).

- Consider establishing an apprenticeship or internship program. There are grants available through some states and other business organizations. These apprentices can develop into valuable employees who help you grow your business.

- Set up welcoming common areas where employees can relax, hang out, and even work. These areas can be inside or outside and aren't just for lunch breaks anymore. Younger employees would rather have the flexibility of moving around; they appreciate a change of scenery, so create spaces where people can work, collaborate and relax outside of their normal work areas.

- Make sure your website speaks to both your customers and potential hires. This means updating an existing site or creating a new one to have a modern look and feel. Your website should also be designed to render well on all types of devices, particularly mobile ones. Today's millennial uses his or her smartphone for everything, including looking up a business where he or she is applying for a position. Make sure your site is functional, too. Consider accepting job applications online. First impressions matter. Your website is the virtual portal to your organization.

- Get social. Leverage social media platforms to convey your shop's culture and environment, such as what cool things you're doing with 3-D printing. Have a presence on Facebook, Twitter, Pinterest, LinkedIn and other social sites. Create videos and post them on your YouTube channel. Consider adding videos to job postings to demystify certain manufacturing jobs. You can either contract with a third-party that can assist you with your social media or assign it to an individual in-house (to a millennial!). Be sure your social strategy is consistent and aligned with your goals.

- Provide tours. Invite students and teachers at the local colleges to visit your operation. Many colleges team up with manufacturers to discuss and promote

career opportunities in the manufacturing industry. Also invite parents, federal, state and local politicians, and residents to talk about manufacturing and show them your business.

- Set up an ambassador program. Because millennials are more likely to listen to their peers than they will older experts, the Manufacturing Institute has led an initiative for companies to send younger employees as "ambassadors" to college campuses and schools where they speak about their jobs. These ambassadors also lead shop tours when students and young job seekers come to their plants and factories. One such ambassador appointed by her company was interviewed in an article in the Wall Street Journal on her ambassadorship role. "Students have no idea what jobs there are in manufacturing," she says. "They want to know what I do all day. So we talk about how manufacturing jobs are not the dark, dirty and dangerous jobs of the past. They are really high-tech and innovative. You can make a lot of money and have a good career path."

- Define your differentiators in everything you do as you promote your business and what it has to offer. What makes your business unique? Celebrate your accomplishments and awards.

- Promote volunteerism: This is particularly important for Millennials who rank social and corporate responsibility high when looking for work. Pay employees when they are volunteering their time in the company's name. If they volunteer with other groups, offer to make a donation in your company's name to those organizations.

*The manufacturing sector is a dynamic and evolving industry, the backbone of America. At Precision Manufacturing Insurance Services (PMIS), we are proud to be a part of this industry in our role as insurance and risk management professionals whose mission is to protect the future of the manufacturers that make up the sector. To learn more about our insurance products and services, contact us at 855.910.5788.*





## A SPECIAL MESSAGE FOR NATIONAL ASSOCIATE MEMBERS IN 2017: IT'S TIME TO CONNECT.

Happy New Year National Associate Members!

The year has come to a close and we are now looking toward the sunrise of 2017. I'm thrilled to announce some exciting new opportunities for our National Associate Members (NAMs).

### IN PERSON:

As many of our partners already know, in person relationship building is by far the most meaningful way to engage with our membership. Enjoying the deep social networking events, sharing your thoughts at an industry roundtable, or speaking at one of our many events allows you to strengthen and develop long term relationships with the NTMA membership. If you are not taking advantage of this simple and rewarding approach, I encourage you to do so moving into the New Year.

The NTMA has partnered with Modern Machine Shop to bring the membership seminars about 'How to be a Top Shop'. If you or your company has expertise to share with the membership, please contact me.

With over 2.7 million Baby Boomers expected to retire in the next 10 years, the NTMA Emerging Leaders Group is an important audience for you and your company. These are the next decision makers for our industry and they are approaching business differently than their predecessors. I invite you to attend the Emerging Leaders Conference in Denver. Come, observe, be seen and share.

Want to drill down and get to know one of our 34

Chapters across the US? Come and take the two day experience with a Deep Dive. Meet and greet six of your potential or current customers, get an introduction to the Chapter board and attend a monthly Chapter meeting. Contact me for more information.

### IN PRINT:

We have welcomed a new editor of our monthly print publication, The Record. We are thrilled to have Molly West join the NTMA crew! New for 2017 will be monthly themes which will include: Robotics, Best Practices, and Trends in Manufacturing. The NTMA rolled out the 'Meet Our National Associate' section in the newsletter last year. This is your chance to showcase the face of your organization, and share what you contribute to the industry. Our goal is to bring more depth and useful content to the membership. If you have an interesting story, or want to share a 'membership win' with the more than two thousand readers that receive the Record, then I encourage you to reach out to me to discuss!

### ELECTRONIC:

The NTMA Technology Team is gathering hot topics from the membership to have the Tech Team Webinar Series in 2017. This is your chance to get to know the team, share your expertise and perhaps present a topic that you find useful to the NTMA membership.

### HIGHLIGHTS AND ANNOUNCEMENTS:

Be on the look out for your Quarterly NAM Newsletter! This quarterly easy read

provides you with the MUST KNOW opportunities coming up.

I'm pleased and thrilled to announce that Craftsman Tools is now a partner with the National Robotics League Program. Interested in being part of the solution to help bridge the skills gap? Let's talk about how you can partner!

I would like to thank each and every one of our wonderful partners for your dedication, time, support and passion for our association and industry. I look forward to helping you be successful and making it rewarding along the way. Please don't hesitate to



reach out to me at any time to discuss interesting ways to get engaged. Cheers to 2017!

All my Best,  
Tiffany Bryson

National Account Manager  
tbryson@ntma.org



## WELCOMES NEW MEMBERS

### A.C.T. PRECISION SHEET METAL, INC.

North Texas Chapter  
Jana Criswell  
4829 Top Line Drive  
Dallas, TX 75247

### A.J. ROSE MANUFACTURING COMPANY

Cleveland Chapter  
Leanne Orange  
38000 Chester Rd  
Avon, OH 44011

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# 5 COMPETITIVE STRATEGIES EVERY MACHINING BUSINESS NEEDS TO WIN

A SERIES ON STRATEGY FOR MACHINING BUSINESSES

BY DAN BAGLEY, NTMA STRATEGIST

## PART 1

What is strategy?

Where does good strategy come from? Do we really need to plan? Does it apply to our types of companies? We will explore strategy in this series, and consider options, and decide on tools for a particular situation.

### COMPANY CASE

*A third generation machining company in the Pacific Northwest had reached \$14 million in sales, and nine percent EBITDA with nine customers comprising 80 percent of its sales. When the company's customer's major OEM moved to another part of the U.S., Robert, the 44 year-old third generation president, realized that half the revenue of the company had moved to other shops in the new area. Suddenly, the investments he made in machinery and people when had business to count on became monthly losses. As he sat in his office, contemplating selling assets and reduction in force, he focused on how this situation came to be. He needed to make decisions now, for the future. He was angry because he felt that his customer had betrayed him.*

Strategy is the plan of how to win in often violent games, where people, teams, companies, countries, cities and even individuals win or lose. Taken from the concept of military thought older than Greek times, "strategies" are typically meant to convey a plan. Much theory, research and practice of strategy has evolved in business, especially since the 1980s.

*"My grandfather had a few customers, and he sent my family through college and supported us well for over 25 years. He gave my father the reigns when he moved to Florida," Luke thought. "What do we do now?" As he walked the shop floor, he thought about how the business had grown until a few years before. He wondered what steps to take.*

"Is that idea strategic?" became a question for leaders and managers



alike. Winning companies articulate their strategies many different ways, but one thing seems clear. Companies win or lose, make high profits or low, and sustain through good times and bad based on choices leaders make versus their competitors. Despite changes in economic times and the actions of others, some companies come out on top or live through low tides of business. Is this luck?

### DECISIONS

*As Robert contemplated his options for action, he remembered friends he made through a working group. Specifically, he had befriended Luke, a family firm president in suburban Detroit. Luke seemed to have new machines, new customers, and was published in trade magazines. In a long conversation on a Saturday morning, he asked Luke about his situation and compared notes on what was different about his firm.*

In the economic downturn of 2008-2009, it was estimated that nearly 20 percent of machining businesses in the U.S. failed as their existing customers slowed, or stopped buying. Small firms with few customers, large firms with high operating costs, and single industry machine shops may have fared the very worst. Yet, some firms hit record highs. They grew in size and expanded.

Strategy is competitive – some firms win (stay in business and make more money) more often than others. Waiting on fortunes to arrive is a bad plan – but it is a plan.

**LET'S CONSIDER 5 KEY STRATEGY AREAS FOR MACHINING BUSINESSES.**

**1. Productivity** – drive to reduce touch & machine time, every part, every year

**2. Tooling** – coating, composition, machinery and geometry science to improve what you can do

**3. Sales** – Proposition, Pipeline, Pursuit, Persistence, & Patience

**4. Adjacencies** –

EXTEND what you do well to other customers

EXPAND what you do to other end-use markets (customers)

EXPORT

**5. Expertise** – This is what we sell and how special it is. Is what we do common and commoditized or is it focused work we are especially good at (better than competitors)? This is the heart of differentiation. It turns out the people are the key. Ask yourself, what talents and thinking do we have that other companies do not?

On the lighter side of strategy, sports teams win or lose based on many elements. Wins depend on things like the athletes' talent, team work, preparation and other factors. In the series ahead, we will examine each of these 5 Strategies for Machining Businesses, and look for ways to implement them to win.

Meanwhile, if you'd like to have questions addressed in the strategy column, email to [dbagley@ntma.org](mailto:dbagley@ntma.org), and we'll cover them along the way.



# EXCITING CHANGES AND ADDITIONS FOR NTMA EVENTS IN 2017

BY BRITTANY BELKO, NTMA EVENT PLANNER

The NTMA is continuously working to provide a full schedule of networking and educational opportunities that add value to our members' businesses and professional development. In the following pages, please find a listing of the major events on our calendar for the coming year. We not only encourage you, but we invite you to attend one or more of these conferences, workshops or roundtables. We are

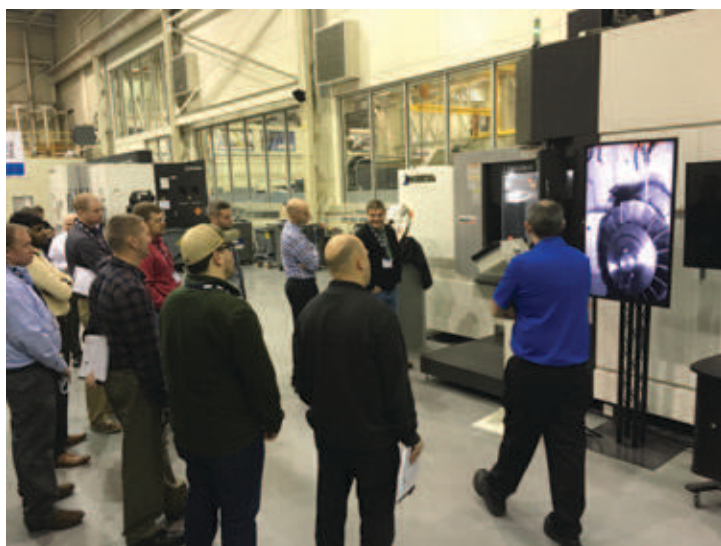
day of business development workshops and then a half day of roundtable discussions focusing on resources and tactics to "go native." Plan to join us in Pittsburgh in June.

Interested in learning how to make your company a "Top Shop?" In 2017, we

offering three locations and dates: April 6 in Cleveland, Ohio at Jergens; May 11 in Los Angeles, California; and August 24 in St. Louis, Missouri.

Of course, we're continuing the great events

in our people, our member companies and our industry. If you haven't attended an NTMA event in the past, make 2017 the year that you take advantage of one of these tremendous opportunities. We've secured the



confident that you'll leave energized and armed with new knowledge to take your company to the next level in 2017.

You'll notice a few additions and updates to our calendar this year. There was too much valuable information to pack into one day, so this year we have expanded our Sales & Marketing Workshop into a 2-day conference. We'll kick off with a welcome reception followed by a full

are introducing the How to Be a Top Shop Seminar, a partnership with Modern Machine Shop Top Shops. This one day seminar will focus on best practices to increase productivity, integrate business strategies, increase profitability and better manage human resources. We'll wrap the day up with a plant tour, networking and cocktails. In an effort to get this seminar to as many members as possible, we're

that you've come to expect from the NTMA, things like Legislative Conference, The MFG Meeting and Fall Conference. You can also expect new developments and expansion of programs like the Emerging Leaders Conference and the Chapter Leadership Summit.

NTMA events are designed to make a difference

locations, invited the speakers and planned the agendas. There's only one thing we need: You. Join us for a workshop, seminar or conference this year.

*You won't regret it.*







**MANUFACTURING AMERICA'S FUTURE**

**February 8**

Plant Managers' Roundtable, Phoenix, AZ

**February 19-21**

Chapter Leadership Summit, Austin, TX

**March 8**

Employee Management & Benefits Workshop, Chicago, IL

**March 22-25**

The MFG Meeting, Amelia Island, FL

**April 6**

How To Be A Top Shop Seminar, Cleveland, OH

**April 24-26**

Emerging Leaders Conference, Denver, CO

**May 1-3**

Legislative Conference, Washington, DC

**May 8-13**

European Tech Tour

**May 10**

Financial Managers' Roundtable, Los Angeles, CA

**May 11**

How To Be A Top Shop Seminar, Los Angeles, CA

**May 19-21**

National Robotics League Competition, California, PA

**June 2017**

Sales & Marketing Conference, Pittsburgh, PA

**June 14**

Workforce Development Roundtable, Chicago, IL

**August 23**

Emerging Leaders Roundtable: Financial Management for  
Non-Financial Managers, St. Louis, MO

**August 24**

How To Be A Top Shop Seminar, St. Louis, MO

**September 5-7**

MMS Top Shops Conference, Indianapolis, IN

**September 13**

Financial Managers' Roundtable, Philadelphia, PA

**September 17-22**

EMO, Hannover, Germany

**September 26-27**

PMA Sales & Marketing Summit, Milwaukee, WI

**September 28**

PMA Sourcing Solutions, Milwaukee, WI

**October 25-27**

Fall Conference, San Antonio, TX

**November 9**

Plant Managers' Roundtable, Detroit, MI

# 2017 NATIONAL EVENTS AND TECHNICAL SEMINARS





# 2017 NTMA NATIONAL EVENTS

*"I left the Emerging Leaders Conference with valuable information both personally and for my company. We are all struggling to improve our workforce. I came back to my shop with many new ideas on how to get and keep our existing workforce engaged and have them buy-in to the company goals and values. There were also many ways for me to improve and to develop the skills necessary to lead effectively."*  
~ Jerry Flohr, President, Flohr Machine Co.

## Chapter Leadership Summit February 19-21, Austin, TX

Build relationships with new and seasoned chapter leaders from around the country while discovering different chapter models, learning how to engage your membership and discussing key subjects that affect your chapter.

## The MFG Meeting March 22-25, Amelia Island, FL

With business sessions and speaker presentations designed to address key business challenges, the MFG Meeting brings together the complete manufacturing chain for a unique conference experience that provides unparalleled opportunities to network with industry leaders.

## Sales & Marketing Conference June 2017, Pittsburgh, PA

High performing businesses plan their work and work their plan. Join us for a conference filled with workshops focusing on how to target business in specific industry segments and roundtable discussions focusing on resources and tactics to "go native" to get repeat customers and business in market segments. Topics will include "How to Enter a Market", "Price, Value and Wants in Each Sector", "Choosing Segments" and many more.

## Emerging Leaders Conference April 24-26, Denver, CO

Join with fellow up-and-coming industry professionals to learn, share insights and discuss issues that matter most in leadership positions. This high-impact, fast-paced event includes a variety of concurrent professional development sessions, workshops, networking and roundtable discussions.

## Legislative Conference May 1-3, Washington, DC

Bring common-sense solutions to Washington and have your voice heard by policymakers during our annual NTMA/PMA One Voice Legislative Conference.



## NRL Competition

May 19-21, California, PA

See the robots designed and built by teams of student as they battle to destruction. Students learn first-hand manufacturing skills and processes while sponsoring companies help inspire our industry's future workforce.

## European Tech Tour May 8-13

Drive efficiency, quality and process optimization in your own business by visiting factories outside the U.S. National Associate Members will host a 4-day tour for NTMA Members to manufacturing facilities in France and Germany. Attendees will see complementary product offerings and the full process of technology development and manufacturing at each location.

## EMO

September 17-22,  
Hannover, Germany

EMO Hannover is the only trade fair worldwide to cover the entire breadth and depth of manufacturing technology. No other event succeeds in bringing together so many high-profile experts in one place as the world's leading metalworking trade fair. Join NTMA on their pre-arranged Tech Tours with some of the most prominent exhibitors at the trade fair.

## Fall Conference

October 25-27,  
San Antonio, TX

With technology seminars, business development tracks, roundtables and networking events, this is one NTMA event you don't want to miss! Meet with other members, National Associates and the Executive Committee to see and discuss what's new in manufacturing.

# 2017 NTMA TECHNICAL SEMINARS

*"The Financial Managers Roundtable was a great opportunity to learn about the latest regulatory changes affecting my work, learn best practices and meet some great people in our industry. I'm looking forward to attending these in the future."*  
~ LJ Suzuki, Finance Manager, Mountainside Medical

**NTMA**

**EMPLOYEE MANAGEMENT  
& BENEFITS WORKSHOP**

**March 8, Chicago, IL**

Meet with NTMA owners and HR professionals to discuss some of the industry's hottest topics in human resources. This workshop will touch on topics such as Overtime, Interviewing and Evaluating, Legal Compliance Issues, Generation Gaps, HR Policies and much more.

**NTMA**

**FINANCIAL MANAGERS  
ROUNDTABLE**

**May 10, Los Angeles, CA  
September 13, Philadelphia, PA**

Join with other NTMA financial managers and professional experts to discuss Benchmarking, Revenue Recognition on Contracts, R&D Tax Credit, Tax and Compliance Updates and more.

**NTMA**

**PLANT MANAGERS  
ROUNDTABLE**

**February 8, Phoenix, AZ  
November 9, Detroit, MI**

Network with plant managers from NTMA member companies and discuss new techniques and the many ways to improve production at your facility. Each roundtable will start with a plant tour at a member company the day before the educational sessions. The educational sessions will allow you to learn about new technologies, manufacturing metrics, lean manufacturing and the importance of additive manufacturing.

**NTMA**

**EMERGING  
LEADERS**

**August 23, St. Louis, MO**  
**Financial Management for Non-Financial  
Managers Roundtable**

This roundtable is designed for those managers who don't have formal financial training but want to understand and implement key financial information. The goal of this roundtable is to make attendees more comfortable in using financial information in their decision making processes.

**NTMA**

**WORKFORCE DEVELOPMENT  
ROUNDTABLE**

**June 14, Chicago, IL**

Discover real-time solutions to recruiting and developing tomorrow's workforce and implementing programs at your company. Learn from successful, proactive companies that have gained the competitive edge by extending talent pipelines into their communities through workforce development and STEM partnerships and initiatives.

## How To Be A Top Shop Seminar

**April 6, Cleveland, OH  
May 11, Los Angeles, CA  
August 24, St. Louis, MO**



Learn what it takes to make your shop a Top Shop. Gardner Media and Modern Machine Shop will provide an interactive seminar on the industry standard benchmarking practice that can help elevate your business to the top of the industry. This seminar will focus on best practices to increase productivity, integrate business strategies, increase profitability and better manage human resources.

# NTMA TECHNICAL SEMINARS REGISTRATION FORM

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

Email Address: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Method of Payment: \_\_\_\_\_

CC#: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

## **REGISTRATION & FEES PER PERSON** (Please select the Seminar(s) you are registering for):

### **FINANCIAL MANAGERS' ROUNDTABLE**

- |   |   |
|---|---|
| <input type="checkbox"/> Early Bird - Member -- \$300 | <input type="checkbox"/> May 10, Los Angeles, CA          |
| <input type="checkbox"/> Regular - Member -- \$375    | <input type="checkbox"/> September 13th, Philadelphia, PA |
| <input type="checkbox"/> Non-Member -- \$500          |   |

### **EMERGING LEADERS FINANCIAL MANAGEMENT FOR NON-FINANCIAL MANAGERS ROUNDTABLE**

- |   |   |
|---|---|
| <input type="checkbox"/> Early Bird - Member -- \$300 | <input type="checkbox"/> August 23, St. Louis, MO |
| <input type="checkbox"/> Regular - Member -- \$375    |   |
| <input type="checkbox"/> Non-Member -- \$500          |   |

### **EMPLOYEE MANAGEMENT & BENEFITS WORKSHOP**

- |   |   |
|---|---|
| <input type="checkbox"/> Early Bird - Member -- \$300 | <input type="checkbox"/> March 8, Chicago, IL |
| <input type="checkbox"/> Regular - Member -- \$375    |   |
| <input type="checkbox"/> Non-Member -- \$500          |   |

### **PLANT MANAGERS' ROUNDTABLE**

- |   |  |
|---|--|
| <input type="checkbox"/> Early Bird - Member -- \$300 | <input type="checkbox"/> February 8, Phoenix, AZ                       |
| <input type="checkbox"/> Regular - Member -- \$375    | <input type="checkbox"/> November 9, Detroit, MI                       |
| <input type="checkbox"/> Non-Member -- \$500          | <input type="checkbox"/> Will attend optional plant tour the prior day |

### **WORKFORCE DEVELOPMENT ROUNDTABLE**

- |   |   |
|---|---|
| <input type="checkbox"/> Early Bird - Member -- \$300 | <input type="checkbox"/> June 14th, Chicago, IL |
| <input type="checkbox"/> Regular - Member -- \$375    |   |
| <input type="checkbox"/> Non-Member -- \$500          |   |

### **HOW TO BE A TOP SHOP SEMINAR**

- |  |   |
|--|---|
| <input type="checkbox"/> Member -- \$200     | <input type="checkbox"/> April 6, Cleveland, OH   |
| <input type="checkbox"/> Non-Member -- \$300 | <input type="checkbox"/> May 11, Los Angeles, CA  |
|  | <input type="checkbox"/> August 24, St. Louis, MO |

**\$ \_\_\_\_\_ TOTAL AMOUNT DUE**

## **PLEASE SUBMIT VIA EMAIL, FAX, MAIL OR IF ANY QUESTIONS, CONTACT:**

NTMA  
Attn: Kristen Hrusch  
Brittany Belko  
1357 Rockside Road  
Cleveland, OH 44134

Kristen Hrusch – khrusch@ntma.org  
Phone: 216-264-2845  
Fax: 216-264-2840

Brittany Belko – bbelko@ntma.org  
Phone: 216-264-2848  
Fax: 216-264-2840



# TAKE THE MYSTERY OUT OF CHAPTER SUCCESS. CLS REGISTRATION IS NOW OPEN—AND FREE TO THE FIRST 50 REGISTRANTS!

BY KELLY LAMARCA, NTMA, CHAPTER SUPPORT



Registration is now open for the Chapter Leadership Summit (CLS) scheduled for February 19-21 in Austin, Texas. Chapter leaders will gather to network, learn best practices

and share ideas. We're taking the mystery out of chapter success by providing tools to take back to your local membership.

## THIS YEAR'S SESSIONS INCLUDE:

### RUNNING A HIGH EFFICIENCY BOARD - PART 2

Learn the ins and outs of running a high efficiency board. We'll equip you with tools to make big things happen in a stream-lined manner.

### BUILD YOUR CASE:

Want deeper loyalty to our association

from our volunteers and our members? Create connections and build dynamics. We'll show you how.

### NOT JUST THE USUAL SUSPECTS:

This session will challenge you to think about new approaches to create an experience that deepens connections and improves membership retention.

### DISCOVERY:

We'll offer new approaches to target volunteer segments and commitments. Learn five trends in volunteering that can elevate the volunteer experience.

### CAN YOU SOLVE THE CRIME OR WILL THIS END UP AS A COLD CASE?

Team building at its best: Attendees will work together in a CSI style game. It will be more fun than you knew you could have at a conference.

### KEYNOTE SPEAKERS


Lowell Aplebaum, CAE is the CEO of Next Connexion – a company work-

ing with associations on value-focused approaches to strategy development, membership and volunteer management. Lowell currently serves on the overseeing commission for the Certified Association Executive certification, and Chaired ASAE's Task Force on CEO Pathways.

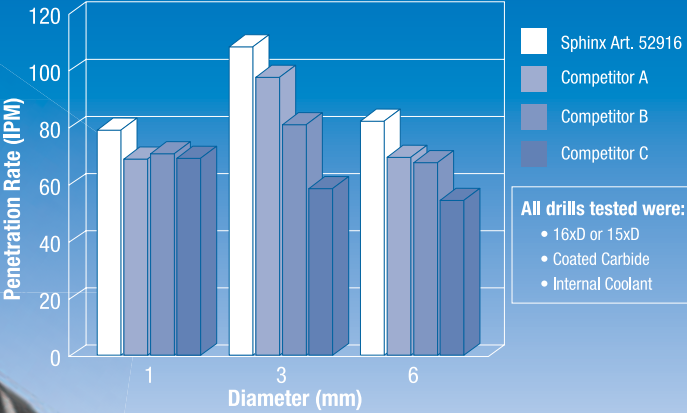
David L. Sullivan is president and managing partner of Shamrock Group, Inc., a management consulting firm located in La Quinta, California and Denver, Colorado. The Shamrock Group specializes in strategic management and board governance. Dave attended the 2016 CLS where he led a workshop on running a high efficiency board.

Registration is free for the first 50 registrants. To register, visit [www.ntma.org](http://www.ntma.org) or contact Brittany Belko at: [bbelko@ntma.org](mailto:bbelko@ntma.org) or 216.264.2848.





### Penetration Rate Comparison – Grey Cast Iron



Diameter (mm)	Sphinx Art. 52916	Competitor A	Competitor B	Competitor C
1	85	75	75	75
3	110	100	85	65
6	85	75	75	65

**All drills tested were:**

- 16xD or 15xD
- Coated Carbide
- Internal Coolant

**HIGHER PERFORMANCE GUARANTEED**

## HIGHER PENETRATION RATES AND WE'LL PROVE IT.

The **Sphinx Phoenix TC2** high-performance drill excels in nearly all materials—including exotics. The advanced coating and geometry affords less heat on the tool and better chip flow and evacuation. Don't believe us? Test a Sphinx TC2 in your shop to see the proof.

**10% OFF YOUR TEST TOOL**

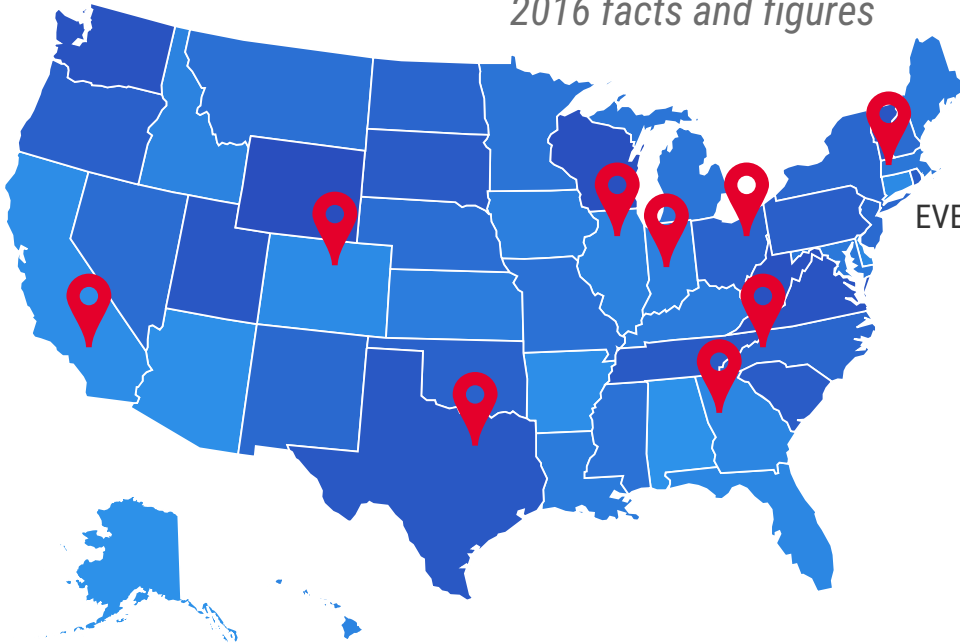
**BIG KAISER**  
A PROUD NATIONAL ASSOCIATE OF NTMA

Visit [BIGKAISER.com/TestUs](http://BIGKAISER.com/TestUs) to request your Sphinx Phoenix TC2 no-risk trial today.

# NATIONAL TOOLING & MACHINING ASSOCIATION

## IMPACT REPORT

2016 facts and figures



### EVENTS ACROSS THE COUNTRY: 733 PARTICIPANTS

- 3 Plant Managers Roundtables
- 1 Sales & Marketing Workshop
- Employee Management and Benefits Workshop
- 1 Workforce Development Roundtable
- 2 Financial Managers Roundtables
- 26 IMTS Tech Tours
- MFG Conference
- Fall Conference



Utilizing NTMA member discounts, NTMA members saved

**\$10,223,868**  
or  
**31.2%**  
off the Grainger catalogue price

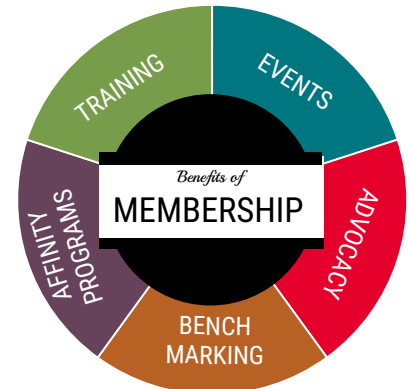
### AFFINITY PROGRAMS

With the addition of StarChapter in 2016, members can now take advantage of a suite of services for chapters to easily manage their websites, documents, services, event registration and more.



### ADVOCACY

The Franklin Partnership and the OneVoice initiative continued to be the strong voice of manufacturing in Washington, DC through advocacy for fair and transparent regulation. They provided key insight into Congressional and Senate races across the country and kept the industry plugged in to the policy agendas of both presidential candidates throughout a dramatic election season.



**In 2016, OneVoice successfully lobbied for a permanent R&D Tax Credit and Extended Section 179 & Accelerated Depreciation.**

### BENCHMARKING

Members participated in and utilized NTMA sponsored benchmarking reports to gain key insight on how to grow and manage their businesses.

OPERATING COSTS AND EXECUTIVE  
COMPENSATION SURVEY (OCEC)  
PARTICIPANTS

**140 COMPANIES**

WAGE AND FRINGE BENEFITS  
REPORT PARTICIPANTS

**220 COMPANIES**

Modifications in 2017 will make it easier to complete and submit surveys.

### TRAINING

Chapters across 8 states now host their own NTMA-U portals. In 2016, Member companies also have the opportunity to host portals.

**14 NTMA-U portals in 2016**  
**20 NTMA-U portals expected in 2017**

This year, NTMA-U enrolled

**572 STUDENTS**

Those students completed

**1,517 MODULES**



### EVENTS

At IMTS

**44 MEMBERS**

took advantage of

**26 TECH TOURS**

The NTMA was proud to send a delegation of

**17 to JAPAN**

At MFG Conference, it was the first year for

**MFG TALKS &  
EMERGING LEADERS**

Fall conference boasted firsts as well:

**5K RACE &  
NASCAR HALL OF FAME  
EVENT**



## OUR MISSION:

To help members of the U.S. precision custom manufacturing industry achieve profitable growth and business success in a global economy through advocacy, advice, education, networking, information, programs and services.



Mark Vaughn – 2017 Chairman  
Mark Lashinske – 2017 Vice Chairman

**WELCOME TO NEW EXECUTIVE COMMITTEE MEMBERS:**  
Sam Griffith – New Regular Executive Committee Member  
Tom Sothard – New External Executive Committee Member

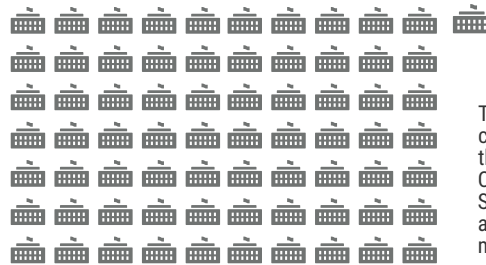
## OUR VISION:

To become the premier center of industry knowledge, leading U.S. precision custom manufacturing in continuing world leadership.

### 2016 BROUGHT ONE NEW FULL-TIME NTMA TEAM MEMBER: MATT GILMORE



Matt joined our NTMA Team as the Director of Membership & Business Development in January of 2016. Matt's work: new marketing and promotion initiatives, expanding and improving affinity program offerings and developing new processes and systems to enhance and grow membership.



# 71

The number of new companies that joined the NTMA in 2016. Congratulations to the St. Louis Chapter adding the most new members: 6.

Special thanks to Herb Homeyer for his **2 years** of service as Chairman

Thank you to Matt Wardle for his **2 years** of service on the NTMA Executive Committee

### NATIONAL ROBOTICS LEAGUE

Workforce Development never looked so cool. While they're building robots, we're building tomorrow's workforce.



In 2016, NRL participants included:

## 250 SCHOOLS

from

## 14 DIFFERENT STATES & PUERTO RICO

In 2016, that meant a total of

## 5,000 STUDENTS

None of which would have been possible without

## THOUSANDS OF VOLUNTEERS

### NEW & NOTEWORTHY

#### EMERGING LEADERS

Dedicated network of those identified as Emerging Leaders continues to expand and grow. As of December 2016:

## 200+ EMERGING LEADERS

Record attendance by Emerging Leaders at both MFG Conference and Fall Conference:

## 45 ATTENDEES PER EVENT



### 2017 CONFERENCE DENVER, CO

April 24-26, 2017

### GARDNER MEDIA PARTNERSHIP

In March 2016, the NTMA launched a partnership with Gardner Media the publishers of Modern Machine Shop magazine. The goal: To promote the industry and share resources to grow NTMA membership and MMS's subscriber base. This relationship was created to enhance educational opportunities and to develop events and media opportunities around the Top Shops concept.

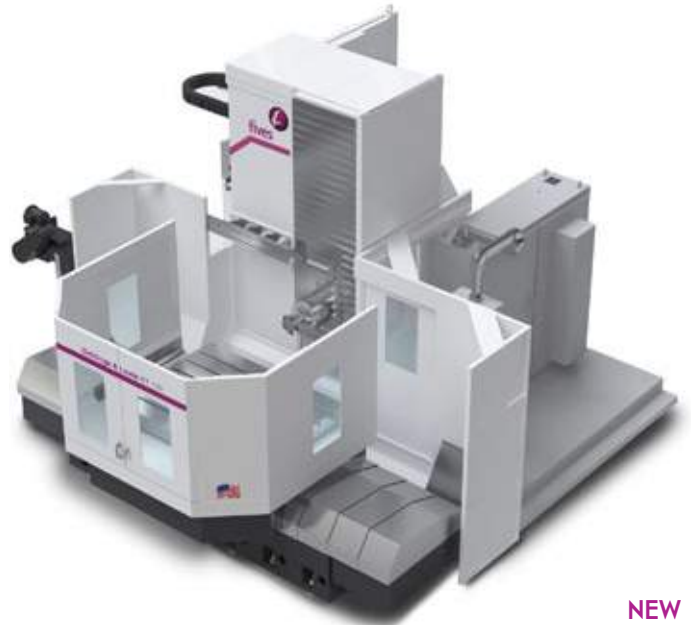




# Think you can't afford a Giddings & Lewis VTC or HBM? Think again!



**Giddings & Lewis V Series**  
800 - 2500 mm tables



**NEW**  
**Giddings & Lewis T-Bed HBM**  
130 or 155 mm spindle

**Proudly designed and built in Fond du Lac, Wisconsin**

## **Very Affordable Prices** **Without Compromising Quality**

Fives Giddings & Lewis has a tradition of building rigid, accurate and reliable machine tools. The V Series and T-bed HBM carry on that tradition but at price levels that will appeal to every shop.

- Cast iron cross-braced construction
- Hydrostatics for added rigidity
- Flat floor installation

## **Financing Available** **NO PAYMENTS** for 5 months

Financing examples\*:

Giddings & Lewis V 800

**\$8,710** / month (60 months) turning only

**\$11,185** / month (60 months) live spindle

Giddings & Lewis RT 130

**\$16,200** / month (60 months)

\* Talk to a Fives representative for full financing details.

Fives Giddings & Lewis  
142 Doty Street, Fond du Lac, WI, 54935  
Ph: 920 906 2860 — [fivesmsi-sales@fivesgroup.com](mailto:fivesmsi-sales@fivesgroup.com)

[www.fivesgroup.com](http://www.fivesgroup.com)

  
**fives** ultimate machines  
ultimate factory

## ST. LOUIS CHAPTER NTMA CELEBRATES LOCAL HEROES

BY SALLY SAFRANSKI



ST. LOUIS  
CHAPTER

The St. Louis Chapter NTMA returned to a popular venue for an early December holiday tradition – dinner at Kemoll's Italian Restaurant. Fifty members and their guests enjoyed the evening together with the backdrop an extraordinary view of the Arch and the downtown Riverfront.

The highlight of the evening was the appearance of guests Ron Battelle and his wife, MaryAnn. As director of The Backstoppers, Col. Battelle (retired chief of police, St. Louis County) knows all too well the perils, challenges and sacrifices made by first responders these days. Started in 1959, The BackStoppers provides needed financial assistance and support to the

spouses and dependent children of all police officers, firefighters and volunteer firefighters, and publicly-funded paramedics and EMTs in the St. Louis area who have lost their lives or suffered a catastrophic injury performing their duty.

The BackStoppers continues to support the surviving spouse until he or she remarries, and supports the surviving children until they reach age 21 or until the children complete their post-secondary education. The BackStoppers currently supports 81 families with 66 dependent children and has supported 160 families since 1959.



The St. Louis Chapter is proud to support The Backstoppers as their charity of the year, collecting more than \$2,000 in donations to support The Backstoppers' important work.



## CT CHAPTER NTMA CELEBRATES THE HOLIDAYS



CONNECTICUT  
CHAPTER

The CT NTMA held their annual meeting and holiday party on Tuesday, December 13 at the Inn at Middletown. The event began with cocktails, followed by a buffet dinner. Thirty guests attended, each bringing a toy to add to the chapter's Toys for Tots donation. Christmas came a little early for Linda Dworak, the winner of the chapter's holiday raffle for a white gold and gemstone necklace from Saks Fifth Avenue.

The annual meeting included the



nomination of the chapter officers and board and remarks from Dave Tilstone, NTMA president and Mark Vaughn, incoming chairman of the NTMA.



Pictured from left to right are: (front row) Mark DiLorenzo, Mark Vaughn, Dave Tilstone, Kelly McDaniel, Jim Bowtruczky, Tom Filomeno (back row) Bruce Dworak, David Segal, N.J. Goulet, Drew Swindler, Jacob Litke



# BOTSKC - CATCH ME IF YOU CAN!



For five years, the Greater Kansas City Chapter of the NTMA struggled to get access to potential employees. Members and staff attended job fairs, held lunch meetings for counselors and teachers and offered

to give presentations to any school or teacher willing to hear the message. It was clear that our aging industry was not about to become a crisis, the crisis was here!

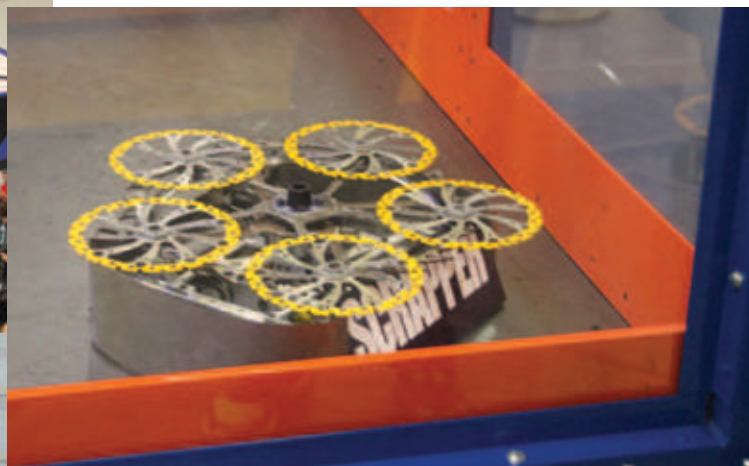
After being introduced to the National Robotics League (NRL) at the NTMA National Meeting in 2012, the KCNTMA

board started discussing how much fun it would be to hold a robotics competition in Kansas City and what great access they would get to potential employees. Torree Pederson, KCNTMA chapter executive, started talking with her peers already participating in the robotics program. NWPA NTMA, Pittsburgh Chapter NTMA, and a few others raved about how big their robotics programs had grown and how successful robotics was as a recruiting tool in their respective communities. We shared this idea of a smaller 15-pound battle bot with a local partner high school. Not only did the local high school like the idea, they loved it and offered to host an event and to pull together a couple teams for the next spring. KCNTMA offered to find industry mentor companies for each participating team in addition to purchasing a BOT kit for each new team.

Armed with this knowledge, a willing participant school and a very progressive and generous board, the KCNTMA voted to commission a state-of-the-art cage to host a regional competition. Past President, Craig Schroer, Unitech, Inc., utilized local interns and his staff to draft new cage drawings. The plans were dis-







cussed among board members and it was agreed to get started on the build phase. Again, local associate and regular members were generous in helping to source the materials at or below cost, further acknowledging the excitement for the project within the group.

The first year competition was primitive at best. There was no branding, no professional marketing materials and we hosted our first event in the common area of our partner high school. Our new cage went up in a matter of an hour or two; we pulled in a few portable bleachers and tapped students from the school to be our media/IT and hostess committee. We sent out a local press release to all media outlets in Kansas City hoping at least one would come by for an interview. What we got blew us all away-- top story on the local FOX Friday night news, front page of the Kansas City Star, radio spots all over town...AND more than 400 people walking into the high school common area that Saturday! They LOVED it!

We only had five teams competing that first year, but there was so much energy in the room, we had booked three new teams by the end of the day. Armed with a WIN, we focused on professional branding (BotsKC), marketing materials, SWAG and outreach to more local schools for the 2016 competition. We ended up with 12 teams in 2016 from across the metro area. We moved the event into the gym of our partner high school, thankfully, as we had about more than 500 people come through the event. Another WIN!

On March 25, 2017, we are excited to host 25 teams in our third regional competition. More and more local companies are lining up to sponsor teams, event items, meals, t-shirts, and other



needs. Local trade schools are participating in 2017, offering scholarship awards for teams and interested students. Local companies will be displaying products and job opportunities available to high school and college grads. Our 2017 event

will not only be fun, it will offer parents and students an alternative career opportunity they might not have considered. Win, Win!



## ARIZONA NTMA NEW CHAPTER EXECUTIVE



As of November, 1, 2016, the Arizona Chapter is pleased to welcome Julie Snider as their new chapter executive. Julie has a background in marketing, customer service and organization skills and looks forward to meeting the members and working with the board of directors to continue the success of the Arizona Chapter into 2017!



# MA-12500H



## SIZE, POWER, AND ACCURACY HANDLE LARGE, CHALLENGING WORKPIECES

The MA-12500H horizontal machining center offers high productivity without compromising accuracy to maximize your shop's profitability.

---

Contact your local Okuma distributor for details  
or visit [www.okuma.com/americas](http://www.okuma.com/americas) to learn more.

**Arizona CNC Equipment**  
[www.arizonacnc.com](http://www.arizonacnc.com)

**GOSIGER**  
[www.gosiger.com](http://www.gosiger.com)

**HEMAQ**  
[www.hemaq.com](http://www.hemaq.com)

**Thomas Skinner & Son**  
[www.thomasskinner.com](http://www.thomasskinner.com)

**EMEC Machine Tools, Inc.**  
[www.emecmt.com](http://www.emecmt.com)

**Hartwig, Inc.**  
[www.hartwiginc.com](http://www.hartwiginc.com)

**Morris Group, Inc.**  
[www.morrisgroupinc.com](http://www.morrisgroupinc.com)

## OPEN POSSIBILITIES



## INCOMING NTMA CHAIRMAN, MARK VAUGHN TESTFIES TO USITC ABOUT POTENTIAL “DEVASTATING IMPACT” OF DUTIES ON TOOL STEEL IMPORTS



When Mark Vaughn traveled to Washington, D.C. at the beginning of December, he warned the United States International Trade Commission (USITC) that high duties on tool steel imports would have dire consequences for U.S. tool and die manufacturers and could result in the loss of thousands of jobs. The USITC is considering imposing anti-dumping and countervailing duties on carbon and alloy steel cut-to-length plate from Austria, Belgium, Brazil, China, France, Germany, Italy, Japan, Korea, South Africa, Taiwan, and Turkey.

Mark Vaughn, Vice Chair of the National Tooling and Machining Association (NTMA) and President of Vaughn Manufacturing Company in Nashville, TN, testified before the ITC on behalf of the NTMA and the Precision Metalforming Association (PMA). Vaughn warned that, because most grades of tool steel are not available from domestic sources, U.S. tool

and die manufacturers must rely on imported tool steel. Imposing high duties on these imports would have a “devastating impact on the hundreds of thousands of well-paying U.S. jobs that rely on imported tool steel.”

Vaughn stressed that tool steel, used for cutting, pressing, and extruding of metals and forming tools such as dies, molds, and blades, has been recognized as a separate product from other steel products for more than three decades, a critical distinction that has allowed the American tool and die industry to remain globally competitive.

“Tool steel is used completely differently from the applications for carbon and other alloy steel plate, which is used in load-bearing and structural applications,” said Vaughn.

In a prepared pre-hearing brief, the NTMA and PMA argued on behalf of their industries that the three domestic steel companies that are petitioning for these investigations “produce miniscule volumes and only very limited grades of tool steel,”



and that the major US producers of tool steel “do not produce sufficient quantities or the full range of tool steel grades and types required by US purchasers.”

Vaughn stated in his testimony that, because U.S. steel producers do not produce tool steel and the specialty nature of the product, the vast majority of tool steel imports do not compete with US-produced tool steel. He asked that the USITC continue to observe that distinction, stating “imposing high import duties on tool steel would force many of our companies and customers to reconsider whether to continue manufacturing tooling in the U.S.”

*Reprinted from BusinessWire*



## MACHINE TOOL USERS LEARN HOW TO OPTIMIZE SHOP FLOOR PRODUCTION AT OKUMA'S 2016 TECHNOLOGY SHOWCASE

Okuma America Corporation, a world leader in CNC machine tool manufacturing, hosted more than 400 customers, partners and distributors at their annual 2016 Technology Showcase on December 6 -7 in Charlotte, North Carolina.

The theme of this year's event, “Get Connected. Put IIoT to Work for You,” included learning sessions about connecting

the CNC machine shop floor and using real-time data to empower decision makers. Through the power of IIoT attendees were immediately able to view machine status, specs and real-time cutting video of multiple machines located at the Partners in THINC facility and Okuma headquarters.

Real-time data enhances the manufacturing process and improves workflow and productivity. These benefits raise efficiencies, expand manufacturing capabilities and increase profits.

Participants also viewed cutting demon-

strations on more than 20 machine tools and were educated on breakthrough technologies that can give them a competitive edge. Attendees also learned how Okuma's open OSP control and OSP suite allow each user to customize the OSP experience to specifically address their unique manufacturing needs.

### TECHNOLOGY SHOWCASE HIGHLIGHTS

- **Smart Tool** - This innovative tool developed by Velocity Briney comes with a dashboard of pre-determined speeds and feeds from tap testing performed on Okuma mills and eliminates guesswork to achieve maxi-

SEE "OKUMA" PAGE 24



# OWNERS JARED AND JONATHAN VETETO ARE CHARTING A COURSE MAKING LOW-VOLUME, HIGH-VALUE PARTS FOR DEFENSE AND OTHER INDUSTRIES

BY BECKY HURLEY



Cogitic has written itself in the history books: The precision manufacturer is the supplier of specialized metal parts for the U.S. Navy's new USS Colorado submarine, the country's first submarine to carry the name, "Colorado."

Entrepreneurs Jared and Jonathan started the company in 2004. The two brothers, years earlier had owned a metals fabrication, engineering, and repair operation that was hit hard by government budget cuts and sequestration.

"With Cogitic, we knew sustainability had to be a goal so we concentrated on non-offshorable, high value military and high tech markets," Jared explains. That search has paid off, creating a vibrant future for the small company's machining, engineering, testing, and materials expertise.

Today, Cogitic is in growth mode, looking for larger quarters and ready to invest in additional CNC equipment, a bigger labor force and advanced training. The company supplies a variety of military and commercial clients, but its major focus is the manufacture Level I and nuclear parts for submarines.

"We're one of just two Level I-certified companies in Colorado — and one of about 70 nationwide," says Jared. The operation produces specialized ball valves, shaft seals and Virginia Class Locking Rings used by the U.S. Navy.

The company also provides parts to support aging weapons systems in submarines and aircraft carriers. Using specialized metrology equipment, fequipment, the company is capable of measuring and validating extremely precise components to ensure compliance with customer requirements.

The valves and seals of a nuclear reactor power plant on a ship or submarine — similar in complexity to a rocket in space — must be engineered to withstand intense temperature and pressure changes. "The cost of failure is incalculable," he says.

Ironically, its land-locked Rocky Mountain location wasn't a problem for its work on the USS Colorado. "There's a huge Navy presence here in Colorado, thanks to General Dynamics," says Jared. That's one reason

why, in 2014, Cogitic was selected by General Dynamics' Electric Boat division as a strategic partner and supplier.

The operation currently features state-of-the-art machining, lathe, milling, welding/cladding, and testing equipment, but the brothers are searching for room to grow. The company's sweet spot is a run of 15 to 50 pieces, but that could change. Business continues to expand. And only occasional metal plating or heat-

treating jobs are outsourced. So far 80 percent of business comes from repair and replacement. The other 20 percent involves building new products to exact customer specs — some within a few millionths of an inch.

Challenges: "Finding new customers," says

Jared. "We also want to grow capacity to offer our existing partners and clients the expanded services they require."

Opportunities: "We could double or triple our revenues in the near future, once we expand our footprint and add employees," says Jared.

Needs: "Talent. We often have to recruit nationally to find the quality engineers and technicians we require," says Jared. "Our goal is to marry the experience of seasoned employees with younger 'book-trained' software and technology professionals."

*Reprinted with permission from CompanyWeek.com*



"OKUMA" CONTINUED  
mum production.

• **Game-Changing Technology-** The MULTUS U4000 multi-function lathe featured several groundbreaking technologies that are now available on Okuma's high tech mill-turn machines. Turn-Cut, B-Axis Turning, laser and tool breakage system, and touch probe part inspection showcased the next leap in technology by combining multiple operations and hard to machine geometries in one easy setup. The MULTUS platform provides the ultimate in flexibility and utilization.

• **Titanium Machining-** Okuma and partner 5ME demonstrated the benefits of machining complex 5-axis, aerospace parts on titanium with cryogenics for the aerospace industry. Higher surface footage and longer tool life are achieved when machining exotic materials with cryogenics.

• **Automated Measuring-** Partners in THINC partners, Autonetics and ABB, joined forces to demonstrate automated laser

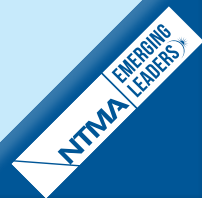


thread inspection, which fully automates measuring methods. Inspection data is fed directly to the control so decisions and adjustments can be made automatically without operator intervention.

• **Enhanced Machine Leveling** – New technology enhancements from Tru-Lign level CNC machine tools in a matter of minutes. This technology was displayed on Okuma's LB-3000EXMY lathe as it was lowered to the floor and leveled in a matter of minutes.







## A CULTURE OF CONTINUOUS IMPROVEMENT EXEMPLIFIED BY COMPANY AND EMERGING LEADER

### CORY CETKOVIC, BIG KAISER

BY KELLY KASNER, NTMA EMERGING LEADERS TEAM STAFF LIAISON



The National Tooling and Machining Association's Emerging Leaders initiative brings individuals from a number of its member companies into a close-knit network. These leaders work together toward a common goal: moving the precision manufacturing industry forward. BIG KAISER, as well as the NTMA, are proud to feature Cory Cetkovic as one of the NTMA's Emerging Leaders. Cetkovic starred in the NTMA's Emerging Leaders 'We Are Manufacturing' and 'The Faces of NTMA' videos in 2015. Cory's message encouraged today's youth to look at manufacturing as a viable career option.

Cetkovic is an Application Engineer/SPHINX Product Manager at BIG KAISER Precision Tooling, Inc. since 2012. He conducted his Magna-Lastic Devices Mechanical Engineering Intern at Methode Electronics and Computer Experience Design Intern at Motorola Mobility. Cetkovic is a 2012 Bachelor of Science graduate of the University of Illinois at Urbana-Champaign.

Cetkovic has plenty of experience, as an emerging leader in the industry and with BIG KAISER, training colleagues and crusading for the industry. BIG KAISER invites industry professionals to their headquarters for 'Breakfast and Learn' to hear about trending tooling topics from their product experts, such as Cetkovic. BIG KAISER is the U.S. subsidiary of the originator of the BIG-PLUS® concept, featured in Modern Machine Shop. BIG KAISER called on Cetkovic to deliver the presentation. He is also a popular presenter in BIG Kaiser Webinars on his represented product line.

Always a forward thinker, the September, 2015, issue of Metalworking Production & Purchasing (MP&P) featured an article penned by Sphinx Product Manager, Cory Cetkovic, about the changing landscape of micro machining. He notes how the growing volume of applications and demand today requires tooling capable of cutting smaller parts at production levels—not just prototypes or one-offs.

Cetkovic has represented BIG KAISER

in publications such as West Manufacturing News, MFG Digest, Modern Machine Shop, Canadian Metalworking, Shop Metalworking Technology, Fabricating & Metalworking Online, and more.

President and CEO of BIG KAISER, Chris Kaiser, received the 2016 Distinguished Service Award from the NTMA, which recognizes an associate member or partner for their exceptional support of the Association and leadership in the manufacturing industry.

It's no surprise Cory, and the BIG KAISER team, exemplify a culture of continuous improvement, whether in product innovation or leadership talent. We extend our many thanks to Kaiser, Cetkovic and BIG Kaiser for their support and leadership.

Source: [us.bigkaiser.com/](http://us.bigkaiser.com/)



# BIG KAISER

## BLASER SWISSLUBE JOINS PARTNERS IN THINC

Partners in THINC is a collaboration network of more than 40 industry leaders who come together to solve problems and explore new productivity ideas for real-world manufacturers. With the open architecture, PC-based OSP control as its nucleus, Partners in THINC brings specialized equipment, expertise and a commitment to provide the best possible integrated solutions to the end-user. Okuma America Corporation, announced last quarter that Blaser Swisslube, a leading supplier of CNC machine tool metalworking fluid solutions, joined this partnership.

Blaser Swisslube, founded in 1936, is a globally active company that is represented in approximately 60 countries. They develop and produce high-quality cutting and grinding fluids that enable customers

to successfully produce a wide range of products.

"The addition of Blaser Swisslube provides insight into the advantages of using the right coolant for a particular application. Coolant is a necessary element for longer tool life and reduced part distortion due to heat. While these are key benefits of machining fluids, proper selection also provides improved surface finish and chip evacuation, higher chip removal rates and improved health of the machinist and machine. Coolant isn't simply discolored water anymore," says Jeff Estes, director, Partners in THINC.

Blaser Swisslube's goal is to optimize its customers' manufacturing processes. The company's Liquid Tool® improves economic efficiency and productivity as well

as machining quality. They enable machine tool users to fully maximize the potential of their machines and tools. Blaser Swisslube solutions are backed by a long history of customized services, skilled experts and deep experience in the metalworking industry.

Members of Partners in THINC provide superior technologies that are integrated with Okuma's CNC machines and controls to deliver advanced manufacturing system solutions.

For more information on Blaser Swisslube, and other members of Partners in THINC, visit <http://www.okuma.com/partners-in-thinc>.



# EMO HANNOVER 2017 TO EXHIBIT PRODUCTION ENGINEERING TRENDS

EMO Hannover 2017 is scheduled to be held next year in Hannover, Germany, from September 18-23. "Under the slogan of 'Connecting Systems for Intelligent Production', production engineering manufacturers from around the globe will present solutions which customers can implement to derive the maximum benefit from the digitization and integration of production," said Dr. Wilfried Schäfer, Executive Director of the German Machine Tool Builders' Association (VDW), the organizers of EMO.

As a leading machine tool trade show, EMO Hannover is characterized by its strong international makeup and the large number of innovations presented there. At EMO Hannover 2013, 2,131 exhibitors from 43 nations showcased their machines, solutions and services.



EMO Hannover provides a networking hub for the international metalworking community. Some 143,000 attendees made the trip to EMO from more than 110 countries in 2013. The percentage of visitors traveling to Hannover from abroad was 42 percent, with 1,100 guests coming from the United States alone.

In Hannover exhibitors will encounter attendees who are characterized by their decision-making authority. "According to a recent visitor survey, 80% of visitors reported having an influence on procurement decisions at their companies, and exhibitors' expectations for brisk after-show business were correspondingly high," said an EMO spokesperson.

"EMO Hannover is seen as an innovations showcase for production engineering," said Schäfer. "Manufacturers frequently gear their new developments to the EMO timeframe so they can unveil them to an international audience. "This is why numerous trends have

been launched at EMO - for example, flexible manufacturing concepts, high-speed machining and the use of linear drives, to name a few. In 2013, 45% of exhibitors stated that they had brought new developments to EMO."

## INTELLIGENT PRODUCTION REQUIRES MANY CONNECTIONS

EMO's producers expect EMO Hannover 2017 to generate key ideas for realizing the widely discussed Industry 4.0. The EMO motto "Connecting Systems for Intelligent Production" points to this. "We have already been implementing digitalization in our machine tools for a long time," said Schäfer. "Digital mapping of things like simulation has likewise been possible for a long time. The concept of Industry 4.0 includes the integration of production or even the entire value chain."

A fully connected production line is the prerequisite for flexible production based on the use of optimized processes, allowing manufacturers to take on even short-term, small-batch orders. If, for example, a customer calls on Friday with an order for 50 pump casings needed by Monday, the manufacturer can query the readiness of individual machines. Digitalized shift plans indicate that worker X has signed off for the weekend via app, while worker Y is available for that time period. Staff planning works via smartphones instead of a time clock. During the production process, the machines continuously report their precursor material stock levels. These materials can be identified and located at any time - for example via RFID - to be fed into the production process.

The full integration of the entire production line with real-time communications and control systems brings the greatest added value for companies, when they implement horizontal communications from the order intake to shipping of the finished product. Within the value chain it is also important to connect not just with suppliers, but also with logistics partners and customers in order to achieve the highest possible degree of productivity, flexibility and efficiency. Suppliers find out in real-

time when they need to deliver new supplies. The forwarders are at the shipping gates at just the right time to pick up the finished products. And the customer knows exactly when he can plan in the pump casings for his own assembly process.

## TRADITIONAL REQUIREMENTS PROVIDE THE FOUNDATION FOR NEW TECHNOLOGY

Despite all the focus on digital topics, the traditional requirements for machine tools and production systems are equally vital. Mechanical robustness, secure machine control systems and intelligent process design and control remain the bedrock of quality, productivity and cost-efficient manufacturing. The new options presented by digitalization can also be tied in to these aspects to optimize processes and increase availability and output.

"That is where Big Data - currently one of the industry's hottest topics - comes into the picture," said an EMO spokesperson. Before it can actually be applied in the production environment, the vast amount of machine condition measuring and sensor data needs to be liberated from its 'data grave.' Signal analyses of large quantities of data help operators to recognize impending breakdowns - for example, of main spindles or feed screws - even earlier than was previously the case, making it possible to more precisely predict the moment when the necessary maintenance needs to be performed. These new approaches to predictive maintenance based on the use of adaptive algorithms represent a big step beyond the traditional condition monitoring of individual machines. The condition of all machines in a production system is logged, centrally monitored on a continuous basis and the necessary measures initiated on the basis of real-time condition data.

This gives rise to completely new options for maintenance or servicing operations. Augmented reality is taking the place of the





traditional maintenance manual. A service technician uses his smartphone or tablet as an orientation aid, while a software system recognizes the machine area in which the technician is working. Online communication with the machine's control system makes it easier to find the relevant fault. Superimposed step-by-step repair instructions replace time-consuming product workshops at customer premises. And the initial steps to resolve a problem can be handled by people who have not been specially trained for the task.

#### BEST-PRACTICE EXAMPLES FOR SMALL AND MEDIUM-SIZED SHOPS

Despite all recent advances, small and medium-sized enterprises find it particularly difficult to implement a fully automated, connected smart factory. It is more realistic for them to take a series of smaller steps on the road to Industry 4.0. Numerous small-scale innovations are available which can create added value for machine users and boost the competitiveness of the machine manufacturer as well. Many of these solutions will be showcased at EMO Hannover, including the following:

- New methods for intelligent tool management, featuring the direct transfer of tool data to the machine, thus streamlining work scheduling

- Feedback of online measuring data to ensure adaptive, optimum process control in tool grinding

- Sensor and software systems that facilitate easier, control-independent machine monitoring - from individual components to an entire factory

- Approaches to managing data transfer and data security

- Assistance systems for increasing productivity through the cooperative connection of machines and ERP systems

- Business platforms for the complete organization of production using real-time data

- Communication environments for the transparent, independent, open and simultaneously secure sharing of data along the entire value chain

- Apps for individually configurable control systems designed for enhanced operability and expanded connectivity, and much more.

#### SPECIAL INDUSTRY 4.0 DISPLAY

At EMO Hannover 2017 a special Industry 4.0 display will be staged by the German-based Konradin Publishing Group. The Industry 4.0 Area has been planned as a platform for specialist networking within the international community, building a bridge between research and practice. University institutes engaged in production research and

development will present their latest projects and findings, supported by examples of practical implementation in industry.

#### ADDITIVE MANUFACTURING PROCESSES

A current survey by VDW reveals that, although Additive Manufacturing (AM) still plays a minor role in today's production environment, it is growing exponentially - and experts expect this trend to continue over the coming years. The technology is already employed in various industries such as medical technology, automotive manufacturing, aviation and aerospace and mechanical engineering, where the first mass-produced products made using additive processes are already available.

"As a production process, AM meshes well with other key components of the value chain - above all with CAD and simulation, finishing, production measuring technology and quality assurance. Apart from pure AM systems, hybrid machines are also becoming available. Many traditional machine manufacturers are already active in the field and are integrating the process in their machines," reports Schäfer.

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## MEMBER NEWS

NATIONAL TOOLING AND MACHINING ASSOCIATION

# JERGENS, INC. PARTNERS WITH SCHOOLS TO EDUCATE, EMPOWER AND EMPLOY

BY MATT GILMORE, NTMA DIRECTOR OF MEMBERSHIP AND BUSINESS DEVELOPMENT

In response to Ohio Governor John Kasich's Employment First Initiative, in 2015, a partnership was forged between the Cuyahoga East Vocational Education Consortium (CEVEC) and Jergens, Inc. of Cleveland, Ohio. It was the first of its kind in the state of Ohio. The company

agreed to open its doors to teach students a variety of skills that translate into positive outcomes for both the students and Jergens.

While Jergens employees serve as mentors and conduct the actual training, CEVEC provides a job training coordinator and a job trainer on site to support both the students and the staff of Jergens. Each day, six students attend all-day training while there are two additional slots available for half-day training at the Cleveland location.

Throughout their training,



Jergens students experience nine different aspects of working in a modern manufacturing facility. Upon completion of the program, students earn credentials.

The program is now in its second year and has proven to live up to its motto of: Educate/Empower/Employ.





## GF MACHINING SOLUTIONS TO HIGHLIGHT ADVANCED AEROSPACE SOLUTIONS AT AERODEF

GF Machining Solutions LLC. is the world's leading provider of machines, automation solutions and services to the tool and mold making industry and to manufacturers of precision components. In 2017, GF Machining Solutions looks forward to participating in the in Fort Worth, Texas. The company plans to use this opportunity

### CUT 200 Dedicated wire EDM



to discuss advanced AeroDef Manufacturing Conference and Exhibition technologies, products and turnkey systems designed specifically for complex aerospace and defense work.

One aerospace part production solution is the advanced CUT 200 Dedicated wire EDM. Through its built-in A/B tilt/rotary table, fast axis speeds and quick wire threading, this precision-focused machine can quickly and easily cut turbine discs – fir tree patterns – from alloy workpiece materials. It also incorporates on-machine, in-process inspection to ensure consistent, high accuracy parts production.

Another solution is GF Machining Solutions' first mill-turn machine, the new Mikron MILL P 800 U ST. This compact machine combines milling and 4-axis simultaneous turning within a single machine platform to help manufacturers achieve optimal productivity, accuracy and cost effectiveness. In addition to cutting aluminum parts more than 50 percent faster than conventional processing, the machine also eliminates transfer-related part runout issues and er-

### MILL P 800 U ST Siemens side closed atc



rors for overall better finished part quality. Additionally, the MILL P 800 U ST is automation ready and equipped with pallet changers for 2, 7, 9 or 12 pallets. It also easily integrates into existing automation systems such as those from System 3R.

If you plan to attend the AeroDef Manufacturing Conference and Exhibition, make sure to look for GF Machining Solutions—and make sure to tell them you are an NTMA member!



## MOSEYS PRODUCTION MACHINISTS ANNOUNCES REBRAND AND NEW WEBSITE LAUNCH

Moseys Production Machinists, an industry leader in providing high-tech precision manufacturing services for U.S. and global businesses, has announced the launch of its new brand and website. The NTMA member based in Anaheim, California has long been known as “MPM” for Moseys Production Machinists. The new brand and logo places greater emphasis on the name “Moseys,” the family's name who founded the company in 1975.

“We are very proud and excited to announce the launch of the new Moseys brand and website,” said Bob Mosey, the company's president. “The new brand and updated look will allow us to better represent the high quality, precision work that we do around the world, and also expand our presence across multiple industries. As a third-generation business, we have

experienced growth and success with a few common denominators: fully understanding the needs of customers and building strong, long-term relationships. Even though our look has changed, our commitment to partnering with customers remains the same.”

Mosey provides high-tech precision manufacturing services to OEMs across the U.S. and around the globe. This includes the production of CNC machined components and assemblies (metals, plastics, casting and forgings) to meet customer specifications, and other value-added services starting from product inception through final packaging. Moseys manufactures a high mix of critical components for various industries including Aerospace, Automotive, Hydraulics, Medical, Petrochemical (Oil and Gas), Semiconductor, Food Processing, Laser, and more. Moseys' success during

its 41-year history can be attributed to its commitment to innovation. By focusing on its innovative operational approach, the company has developed a set of master production processes for customers that are lean, efficient, and consistently repeatable. Moseys refers to this as “Production Process Innovation,” a concept highlighted on the website. The manufacturing process is facilitated by a team of precision craftsman.

The new Moseys website is [www.moseys.com](http://www.moseys.com). Built on the latest responsive technology, the website is designed to provide a more user-friendly and functional experience. The site is highly compatible on all devices, including mobile, creating easier and quicker access for customers.



# MEET OUR NATIONAL ASSOCIATE: CGTECH

*an interview with Bryan Jacobs, Marcom Manager*



## WHAT IS YOUR COMPANY HISTORY? WHEN/HOW DID YOU START?

VERICUT has been the industry standard for verifying, optimizing, and simulating NC programs since 1988. Prior to founding CGTech, Jon Prun had a great job, a new mortgage, a toddler at home, and his wife was pregnant with their first daughter. He decided to quit his job to create CGTech. His wife thought he had lost his mind. She was quickly reassured though because CGTech's first customer was an industry leader that knew how to innovate quickly to stay relevant. That customer was Kodak...

## WHAT IS YOUR COMPANY SPECIALTY?

CGTech's product, VERICUT, is a software program that provides an NC programmer with tools to verify the quality and accuracy of an NC program. VERICUT interactively simulates the material removal process of an NC program while showing full 3D simulations of entire CNC machine tools to check for collisions. This information can then be used to correct inefficient motion or programming errors. The software allows the manufacturer to be more competitive by increasing programmer and machine tool productivity, reducing or eliminating costly prove-outs, and minimizing the time from conceptual design to production. VERICUT accepts input from virtually all CAM systems and G-codes.

CGTech also offers machine-independent off-line programming and simulation software for automated fiber-placement and tape-laying CNC machines. VERICUT Composite Applications are currently being utilized to create and validate NC programs building next-generation composite aircraft.



## WHO ARE YOUR CLIENTS? WHAT TYPE OF WORK SHOULD A COMPANY CONTACT YOU ABOUT?

While more than 40 percent of CGTech's customers are working in aerospace, any company cutting metal with complex CNC machine tools can benefit from its products. VERICUT enables users to eliminate the process of manually proving-out NC programs. It reduces scrap loss and rework. The program also optimizes NC programs in order to both save time and produce higher quality surface finish. VERICUT simulates all types of CNC machine tools, including those from leading manufacturers such as DMG MORI, Mazak, Makino, Matsuura, Hermle, and Chiron. VERICUT runs standalone, but can also be integrated with leading CAM systems such as Catia, NX, Creo Parametric, Mastercam, Powermill, EdgeCAM, hyperMILL, GibbsCAM and more. With offices throughout Europe and Asia, CGTech software is used by companies of all sizes, universities/trade schools, and government agencies.

## WHAT COMPANY ACCOMPLISHMENT ARE YOU MOST PROUD OF?

CGTech has experienced steady growth since 1988 and now has staff of more than 150 with 8,700 end-user customers in more than 11,000 installations around

the world.

## WHAT SETS YOUR COMPANY APART?

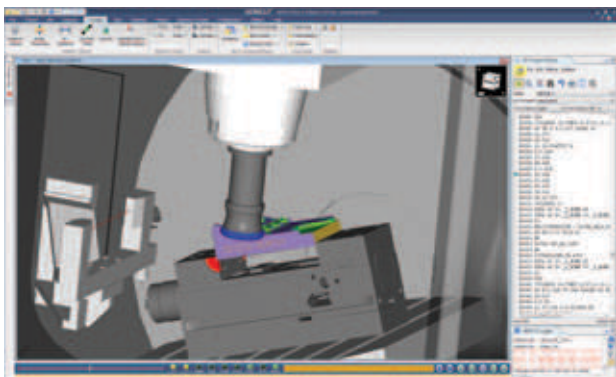
VERICUT software catches more CNC manufacturing problems than any other method or product. When a company invests in VERICUT, they're not just buying a software program, they're teaming up with a manufacturing partner with the largest collection of CNC machining experts in the world. CGTech's products, including VERICUT's simulation technology, are developed in-house by CGTech engineers. This allows for quick changes and specific customization by the original developers. CGTech also enjoys very high retention of its sales and customer support engineers, providing consistent and experienced contacts for a long term business relationship with your company.

## WHAT IS YOUR COMPANY MOTTO?

Right the first time. Every time.

## WHAT ELSE WOULD YOU LIKE OUR READERS TO KNOW?

CGTech always welcomes input. Regardless of where the feedback is received – the VERICUT User forum, CGTech technical support, or at one of the many VERICUT User Group meetings held around the world – we are listening. User input is what drives the vast majority of enhancements included in each VERICUT release.





## WHEN A TURN-MILL DOESN'T TURN

LeanWerks uses innovative probing, tooling and workholding strategies to enable its turn-mill machine castings complete, in effect turning it into a five-axis machining center.

BY REID LELAND, LEANWERKS (2015 TOP SHOPS HONORS PROGRAM WINNER)

Business for machine shops commonly ebbs and flows. In 2015, contract shop LeanWerks' business was certainly ebbing, largely because much of its work was done in support of oilfield customers. Orders had dropped off quite a bit by that time and efforts to survive led the shop to sell a turning center it recently acquired and lay off half of its 60-plus-person workforce.

This spurred the Ogden, Utah, shop to pursue work in other industries, such as aerospace and high-speed automation, to establish a more balanced customer base and a steadier work flow. LeanWerks, now registered to the AS9100C aerospace standard, also began adapting some of its existing machining capacity to better suit the machining jobs it would encounter with those new industries.

One example is shown below, an aluminum investment casting for a jet engine fuel filter housing. By the time LeanWerks was introduced to this job, its aerospace foundry customer was nearly one year behind the delivery schedule, because its in-house ma-

chining process, thus production rate, was slow. As a result, its customer, the OEM of the jet engine onto which this housing is installed, was losing patience and the backlog caused by the delays with this job was disappointing other customers. Thus, in an effort to alleviate some load on its internal machining resources, the foundry contacted LeanWerks to consider taking on the machining of those castings.

Although many engineers specify investment castings for their designs because they offer form intricacy with good dimensional precision relative to other casting processes, investment castings still require machining to achieve accurate fitment and function in high-performance assemblies. However,

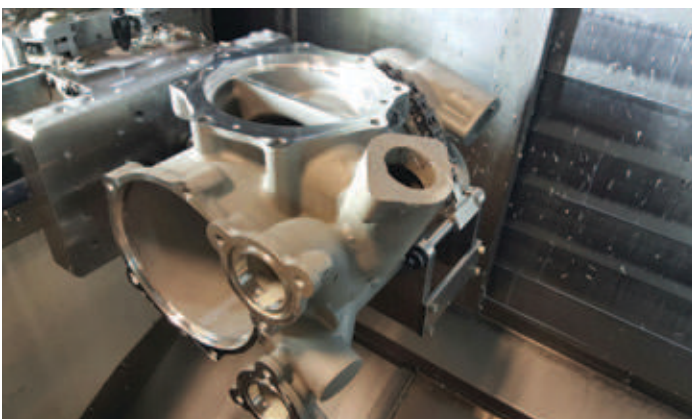
the variability of these types of as-cast parts and their associated tricky workholding requirements cause some shops to avoid taking on this type of machining work.

For example, the fuel filter housing part requires multiple machining operations, including deep-hole milling, bor-

ing, facing, drilling, tapping, ID grooving and 3D contouring. Originally, the shop thought it might complete the job using several setups on a three-axis mill and one setup on a turning center. It ultimately decided that this wasn't the best strategy, because the part's tight position tolerances with complicated datum scheme would not be attainable due to the multiple set-ups.

Instead, LeanWerks considered how it might take advantage of the milling capability of its Mazak Integrex i200s turn-mill to minimize the number of times the part is touched during machining. The shop primarily used this machine to produce tapered plug valve inserts for high-pressure pumping operations in the oil and gas industry, such as those required for hydraulic fracturing and coiled-tubing applications. The Integrex was well-suited for the valve insert part because it could both turn the part's tapered OD and mill its internal cross-axis flow bores. The machine could also mill the bore's associated O-ring, which required a five-axis contouring operation because of the bore's conical surface.

That said, machining the fuel filter housing part on the turn-mill, a job that required no turning, presented a variety of challenges. For instance, the A356.0 aircraft-grade cast aluminum has a high silica content and can be hard on cutting tools. In addition, the part's geometry has multiple features at multiple angles on



LeanWerks developed a process combining cutting tool, workholding and part-probing technologies to enable its turn-mill to machine five sides of an investment casting part in one setup



all faces, including a critical fitting inside the bottom of the 13-inch-deep casting, and thin-walled areas create vibration issues during machining. Plus, the part with complex datum structure requires tight tolerances, including true-position tolerance of 0.25 mm on some widely separated features and size tolerances of  $\pm 0.01$  mm and true position tolerances of 0.05 mm for other less-separated features.

As a result, LeanWerks essentially took three steps to enable its turn-mill to effectively machine five faces of the investment casting in one setup. The first step was designing a fixture to hold the casting to enable machining to be performed on five sides of the part. A key component of this fixture design is a cradle that engages the main body of the casting while offering access to features between and alongside the cradle legs (see the photo on page xx). To secure the casting to the cradle, a chain and pulley mechanism was installed between the cradle legs to provide an evenly distributed clamping force.

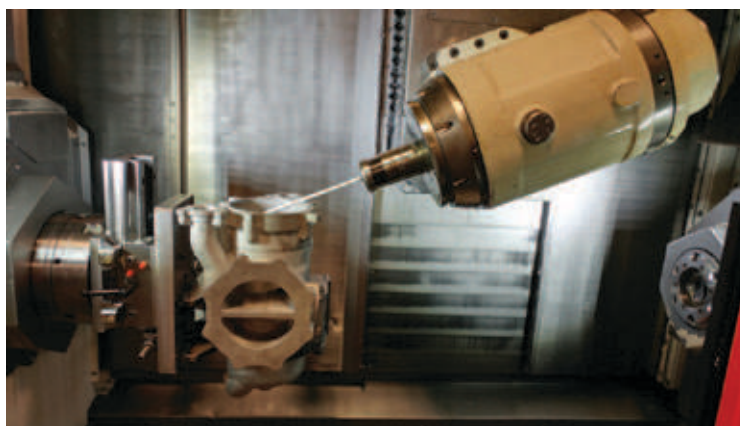
Because the turn-mill did not offer sufficient Y-axis travel to reach all features, a Setco dovetail slide was incorporated in the fixture to enable the cradle and part to be slid and re-clamped in an accessible position without completely re-fixturing the part. To ensure rigidity, the cradle was mounted and braced to a steel base plate with dowel pins and welds. That base plate mounts to the dovetail slide saddle, and the slide base mounts to the master jaws on the machine's existing three-jaw chuck.

Next, the shop integrated a touch-trigger probing system. Touch probing was necessary because the form of each as-cast part varies slightly, and the sliding fixture used to mitigate the Y-axis travel issue changes the location of the part. Probing allowed the new position of the part after the shift to be precisely defined, and the subsequent tool paths to be best fit to the actual part location.

In fact, the shop realized it needed a standard-length probe as well as an extended-reach probe to access features located deep inside the part. Because the turn-mill featured only one probing channel, LeanWerks retrofitted the machine

with a Renishaw RMI-Q radio receiver and installed a programmable logic controller (PLC) card in the main machine control panel to handle a second probe signal. The short probe uses a 25-mm-long stylus while the long probe used a 50-mm-long stylus mounted on a 200-mm extension. Both use a Renishaw RMP-60 probe body.

The probing routines were programmed using Renishaw's Inspection Plus software, and the resulting code was added to the machine program at the appropriate locations. The initial probing routine measures points on the bottom port inside the housing and the opening at the front of the housing to define the central axis of



**Due to the size of this workpiece, the turn-mill's Y-axis travel doesn't enable its spindle to reach all areas of the part to be machined. To mitigate this, the fixture LeanWerks developed uses a dovetail slide to enable the fixtured part to be slid and re-clamped in an accessible position. Subsequent probing routines determine the true position of the repositioned part.**

the part. Other features that are probed include one of the small ports near the face to define the part's rotational orientation and a wall inside the main side flange to define the part's Z-axis location. Mazak's work position error compensation (WPEC) software module allows for deviations detected through true-position calculations derived from the initial probing routine to move with the part through spindle indexing movements. After the initial probing routines, additional probing is performed to confirm the location of related features and post-machined surfaces.

Finally, the deep-reaching machining operations required for this part and abrasive aluminum material led the shop to employ advanced cutting tool technology. For this job, the shop uses the Rego-Fix powRgrip tool holding system. An alternative to shrink-fit, the powRgrip is a mechanical, press-fit system that consists of a toolholder, precision collet and compact benchtop

hydraulic clamping unit used to insert the collet and tool into the holder. According to Rego-Fix, the system is able to generate high clamping forces while maintaining a TIR of less than 0.0001 inch. The rigidity of this system improves tool life and cutting accuracy.

Cutting tools used for this job must have positive high rake angles and be run at very high speeds with light depth of cuts. Garr Alumistar end-mills were used and one insertable tool, a small face mill, utilized uncoated, highly polished, high positive inserts.

LeanWerks also presets tools for this job using a Speroni STP Magis 400 presetter available from Big Kaiser. The presetter not only allows for the external setting of tools, but, more importantly, aids in qualification and troubleshooting because it facilitates inspection of the cutting edge, validation of the shape of form tools, and measurement of run-out.

#### TURNING POINT

The process LeanWerks developed to machine this investment casting job on its turn-mill improved the production rate from 10 hours per part to less than two hours per part. As a result, the shop continues to consider other ways it can maximize the capabilities of its existing capacity in similar

ways as it pursues work in various new industries. In fact, LeanWerks is now looking to bring new employees onboard, given that growth has returned as the shop continues to expand into new markets. Its goal is to identify quality candidates that have the potential to grow with the company and train them to continually consider ways that the shop can achieve higher operational effectiveness and success moving forward.

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