

## TALKING GROWTH AND VETERANS WITH B2 MACHINING

Now a year-long NTMA member, Bryan Bach shared some of his secrets to success and positive experience employing a Veteran. — p. 11

## TWO INNOVATIVE PROGRAMS PREPARE STUDENTS FOR THE WORKFORCE

The key to Maine's future economic growth is clear — educate, train and attract young people, both to replace the aging workers leaving our labor force by the tens of thousands each year and to fill the new positions that market and technological changes create each year. — p. 22

## HOW TO INCREASE ENERGY EFFICIENCY WITH MACHINE TOOLS

From the process itself to individual component power consumption, savings potential can be evaluated and measures defined for more efficient energy use. — pp. 26-27

## 2016 FALL CONFERENCE

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— special insert inside

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MEMBER

# TABLE OF CONTENTS

## PRESIDENT'S UPDATE . . . . . 4

### COVER STORY

- NTMA MEMBERS TAKE THEIR PRO-MANUFACTURING MESSAGE  
TO CAPITOL HILL . . . . . 14-15
- A CULTURAL COMMITMENT TO QUALITY: NTMA JAPAN TECH TOUR. . . . . 16-17

## 2016 CALENDAR OF EVENTS. . . . . 27

### ADVOCACY

- ADMINISTRATION RELEASES FINAL OVERTIME RULE. . . . . 22

### COMPANY NEWS

- TALKING GROWTH AND VETERANS WITH B2 MACHINING. . . . . 11
- QUALITY MOULD, INC. CELEBRATED THEIR GRAND OPENING AND  
RIBBON CUTTING CEREMONY. . . . . 20
- IS YOUR SHOP AN OPEN BOOK? . . . . . 25

### ECONOMY

- WHY MANUFACTURERS NEED AN ENERGY MANAGEMENT STRATEGY. . . . . 7

### EDUCATION

- COMPANIES FINDING UNIQUE WAYS TO ADDRESS THE SKILLS GAP  
FOR COLLEGE GRADUATES . . . . . 18
- TWO INNOVATIVE PROGRAMS PREPARE STUDENTS FOR THE WORKFORCE . . . . . 22

### IN MEMORIAM

- WILLIAM JAMES SAUL . . . . . 5

### NATIONAL EVENTS

- IMTS 2016 - AUGUST ISSUE OF THE RECORD CENTERSPREAD INFORMATION . . . 3
- APRIL FINANCIAL MANAGERS ROUNDTABLE RECAP . . . . . 20
- AMERIMOLD 2016 . . . . . 21

### NTMA CHAPTER NEWS

- NTMA WELCOMES NEW MEMBERS. . . . . 3

### TECHNOLOGY

- MANUFACTURING DAY WITH GF MACHINING SOLUTIONS . . . . . 6
- TRENDS IN MULTISENSOR MEASUREMENT. . . . . 8
- 3 TIPS FOR A SUCCESSFUL INTERNET OF THINGS CUSTOMER PITCH . . . . . 10
- 12 OKUMA MACHINE MODELS NOW ACCOMMODATE CRYOGENIC  
MACHINING TECHNOLOGY. . . . . 13
- BIG KAISER INTRODUCES HIGH PRECISION FACE GROOVING SYSTEM. . . . . 19
- HOW TO INCREASE ENERGY EFFICIENCY WITH MACHINE TOOLS . . . . . 26



WELCOMES  
NEW MEMBERS

#### HIGH TECH TOOL

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1208 SE Broadway Dr  
Lees Summit, MO 64081

#### MWI, INC.

General Member  
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1269 Brighton-Henrietta T/L Rd  
Rochester, NY 14623

#### QUALITY TOOL SERVICE, INC.

Kansas City Chapter  
Mr. Jeremy Nelson  
1501 S Handley St  
Wichita, KS 67213

#### SOUTH TEXAS COLLEGE

Mr. Daniel Morales  
PO Box 9701  
McAllen, TX 78502

#### ULTRA TECH AEROSPACE

Kansas City Chapter  
Mr. Keith Mills  
3003 Power Dr  
Kansas City, KS 66106

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## PRESIDENT'S UPDATE

DAVE TILSTONE / NTMA PRESIDENT

### INVESTING IN OUR FUTURE: EMERGING LEADERS

Most businesses in our industry struggle to fill the demand for skilled labor as baby boomers retire coupled with the general lack of trade skills training in public schools. In some ways it's the perfect storm. Therefore it doesn't surprise many of us to hear that enrollment in NTMAU continues to set records year over year in growth. Although this topic is often the key discussion at chapter meetings and during my visits to members, the NTMA has also established a strategic focus on one other workforce development challenge: The development of Emerging Leaders.

As I have noted before in the Record, our Emerging Leaders are not only the future of the NTMA but our industry. From the sophistication and ever-changing technology used in your business to the pressures exerted by customers on price and more efficient supply chains, to comparing and contrasting the values and potential outcomes of multi-generational interaction, the world for our Emerging Leaders is getting more and more complex. When you add to this scenario the laws and regulations burdening our industry, your precision manufacturing business requires a team of well-educated and confident individuals. Members of the Emerging Leaders Team do not necessarily have to be the next in line to take over a business nor do they need to be a member of the "family." The Emerging Leaders Team comprises those individuals that are, or will be, key management personnel responsible for managing some or all of the business. Preparing Emerging Leaders is paramount to all of us.

When you receive this edition of the Record, the Emerging Leaders will be holding their annual event in Chicago (check out the Twitter feed #NTMAEL2016). The Emerging Leaders team is co-chaired

by Zac Overton and Gretchen Homeyer and supported by our staff liaison, Kelly Kasner (also an Emerging Leader). Below is the agenda and you'll note that some of our National Associates also recognize and support this very important event. The registration list also includes all of the NTMA Executive Committee and executive staff.

#### WEDNESDAY, JUNE 8TH

- 2:00P Welcome
- Networking Energizer Activity
- Session 1 – Art of Negotiation by DMG Mori
- Presentation by Chris Kaiser, President BIG Kaiser
- Welcome Reception and Tour BIG Kaiser Sponsored by BIG Kaiser

#### THURSDAY, JUNE 9TH

- Networking Energizer Activity
- Session 2 – A Simpler Path to Profitability-The Team Approach to Significantly Improve Financial Performance by CliftonLarsonAllen
- Session 3 – Tools You Can Use to Improve the Price, Delivery & Quality of Your Company by Synergy Resources
- Lunch Sponsored by GF+
- Lunch Session – Fuel Your Social Media Strategy with Content and Engagement by Advance Ohio
- Session 4 – Multi-Generational Workplace – Conflict & Communication Panel Discussion
- Session 5 – Coaching for Improved Leadership Performance by CultureShoc
- CHICAGO! Sponsored by CliftonLarsonAllen – Cross-Industry Networking, Team Building Best Practices and Chicago Night Life!

#### FRIDAY, JUNE 10TH

- WOW Breakfast Sponsored by Okuma and Networking Energizer Activity
- Session 6 – One Voice Panel Discussion – Influencing the Manufacturing Agenda

- Session 7 – The Future State of Manufacturing Address by The Franklin Partnership

- Emerging Leaders Roundtable

Because of the positive feedback, we expect the attendance to continue to grow each year as more NTMA members understand what the NTMA Emerging Leaders Conference offers, including the camaraderie and support network that is formed at this event.

Although this is a dedicated and important event for Emerging Leaders, it's not the only conference that provides specific activities for them. The MFG Meeting, the Legislative Conference and the Japanese Technology Tour held earlier this year, and our upcoming Fall Conference being held in Charlotte, NC, October 12th to 15th provide additional opportunities for networking, professional development and training.

In closing, if you haven't sent one of your Emerging Leaders to the Emerging Leaders Conference or to other National events, you are missing out on a very targeted and valuable member specific benefit. If you would like to know more, please contact Kelly Kasner at [kkasner@ntma.org](mailto:kkasner@ntma.org) or (574) 220-9111, or get connected on LinkedIn NTMA-Emerging Leaders Group.

DAVE TILSTONE / NTMA PRESIDENT



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## IN MEMORIAM

### WILLIAM JAMES SAUL

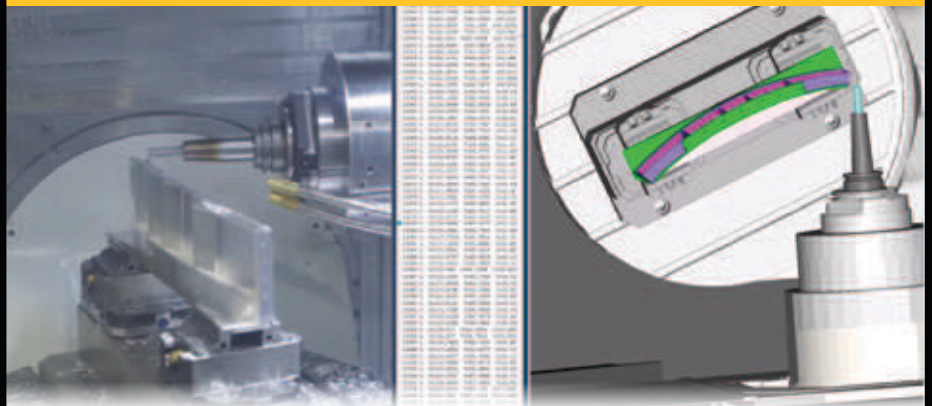
William J. "Bill" Saul, 78, of St. Paul, MN, passed away March 1.

Bill was NTMA Chairman of the Board in 1984. His company, Remmele Engineering, was an NTMA member from 1955 to 2010.

He spent the majority of his business career as president and chairman of the board of Remmele Engineering, Inc. Over the years, he served terms as president of the National Tooling and Machining Association, the Association of Manufacturing Technology, and the Minnesota Association of Commerce and Industry.



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# MANUFACTURING DAY WITH GF MACHINING SOLUTIONS +GF+

On April 6th through April 8th, GF Machining Solutions hosted a “Manufacturing Day” event for local students. During the three day event, more than 15 different schools and 250 students, parents and educators were given the opportunity to learn more about the manufacturing industry and potential careers in the field.

The purpose of Manufacturing Days was to expose the next generation of workers to the manufacturing industry. One of the biggest things affecting the manufacturing industry right now is the lack of STEM (Science, Technology, Engineering, and Mathematics) students to fill current openings. It is estimated that over the next 10 years there will be 3.5 million newly created manufacturing positions in the US and only 1.5 million of those jobs will be filled; leaving 2.5 million positions unfilled.

Manufacturing Days provided GF Machining Solutions with the opportunity to show students that the manufacturing industry has entered the 21st century. Many students and parents went into the event with an outdated view of what manufacturing is. GF Machining Solutions helped them to understand that manufacturing is no longer a “dirty industry” and that the machines have been updated so much in the last decade that they can be tracked and ran remotely.

During their visit, the students were treated to presentations hosted by Director of Business Development Gisbert Ledvon, Director of Sales Don McMillan and Reshoring Initiative Founder and President Harry Moser. Gisbert talked about GF Machining Solutions and the technologies they offer. Additionally, he gave the stu-

dents a crash course in EDM, Milling, Laser Texturing, Automation and Additive Manufacturing.

Don McMillan talked about how the students interact with GF Machining Solutions and or manufacturing on a daily basis. One of the examples that he used to really help break down manufacturing to the students is high value low production parts (aerospace parts) vs. low value high production parts (disposable razors). After breaking down manufacturing into two parts, he talked about potential career paths within manufacturing and how the many different paths people can take within the industry.

Harry Moser talked to the students about how to get into manufacturing and reshoring. One of the misconceptions Harry wanted to dispel was that students don’t need to go to a four year school immediately after high school. In fact, he said starting as an apprentice, in the long run, is typically better than going to a four year school and getting a liberal arts degree. He let the students know that they can leave high school, start as an apprentice making \$30-35k, and have the employer pay for them to go to school while they work full-time. After talking about the dollars and cents of potential career paths,

Harry touched on reshoring and how it will affect the students in the future. Harry pointed out that in the last 5-10 years offshoring has not only slowed down but has come to a breakeven point. This means that the US is bringing back just as many jobs as it currently sending overseas.

After the presentations and Q&A session, the students were given the opportunity to tour GF Machining Solutions’ demo cen-



ter, where they were able to talk with applications engineers and learn more about the machines and the parts that they were cutting/burning. Students were also provided the opportunity to talk to some of GF Machining Solutions’ best customers and local trade associations who were asked to attend because they offer apprenticeships and/or internship programs. Students had



the opportunity to talk with customers, ask them what they are doing on a daily basis, and inquire what they are looking for in a future employee, whether it was as an apprentice or a student with a four-year college degree. AMT also provided a 3D printed rally car that gave the students the opportunity to learn about 3D printing and more about IMTS.

Customers and trade associations that attended the event included Royal Die & Stamping, Janler, Woodward Governor, Kennmode, TMA, AMBA and NTMA. The event such a success GF Machining Solutions plan on hosting a similar event geared specifically to school college/career advisors. For more information, visit [www.gfms.com](http://www.gfms.com).







# WHY MANUFACTURERS NEED AN ENERGY MANAGEMENT STRATEGY

Manufacturers in deregulated energy markets have unprecedented flexibility to align energy management strategies with corporate goals, budgets, and fiscal calendars. A core component of risk management is mitigating exposure to volatile energy prices that can cause operating cost increases and budget uncertainty. Effectively managing energy supply contracts yields substantial cost reductions and improved business performance.

Evaluating energy markets and adhering to a buying strategy should be standard procedure. Unplanned events, such as a financial crisis, Polar Vortex weather patterns, or power plant generation regulations can result in substantial energy price swings and cause budget uncertainty. It's prudent for manufacturing facilities to have someone on staff designated as the energy manager, or use an external resource with energy procurement expertise. Knowledge of your facility's operations and energy consumption patterns is critical for success in managing energy spend.

Customers are becoming increasingly familiar with electricity procurement and competitive electricity suppliers. From 2013 to 2016, the Energy Research Council (ERC) conducted a survey series of 1,138 executives from small-to-medium size businesses (SMBs), who are involved with electricity procurement. ERC assessed the respondents' understanding of deregulated energy markets and energy management strategies. Survey results were that SMBs (defined as companies with fewer than 500 employees, and with average monthly electricity bills less than \$30,000) are becoming increasingly comfortable and interested in implementing energy procurement strategies. Yet only half of the SMB marketplace has established an energy strategy or management objectives.

## STRATEGY DRIVERS

ERC examined which factors prompt SMB executives to evaluate their energy management, and why and when business executives assess energy supply prices and suppliers.

**Contract expiration:** Seventy-six percent of SMBs with monthly electricity bills greater than \$15,000 said that the expi-

ration of their current electricity supply contract is the biggest driver for when to evaluate prices and suppliers. A common misconception that causes most SMBs to evaluate suppliers only when their current supply contract nears expiration is confusion regarding when energy supply agreements can be executed.

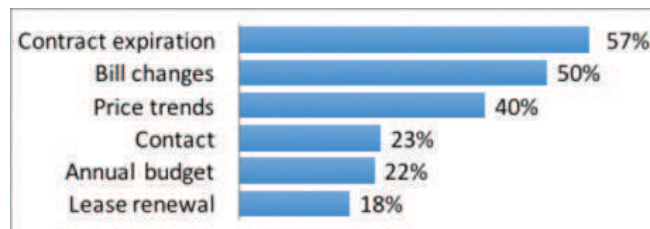
Most SMBs believe they must wait until just before their current contract expires to decide what to do next. They are not aware they can begin the process much earlier, in fact, at any time during their current contract term. Manufacturers can choose to enter into supply contracts with favorable terms and conditions, including a fixed price, whenever they think prices are favorable, regardless of when their current contract expires. Many suppliers provide prices for supply contracts with start dates up to one year or more into the future, enabling manufacturers to lock in a fixed price and execute an agreement for their future supply needs.

## PRICE TRENDS

Favorable electricity price trends also greatly determine when SMBs evaluate prices and suppliers. The question is, do manufacturers have adequate time and knowledge to track energy price trends and compare suppliers. For a facility that consumes one million kilowatt hours of electricity annually, the cost difference between supplier price quotes could be several thousand dollars annually.

**Bill changes:** Half of SMBs evaluate prices and suppliers when their electricity bill substantially changes. Not only are manufacturers likely to connect with suppliers at that time, but also manufacturers are more likely to finalize supply contracts with suppliers that track electricity bills and notify customers of significant changes.

**To what extent do the following events determine when your company evaluates electricity prices and suppliers?**



## EDUCATION AND INFORMATION

Electricity consumers are seeking expert advice regarding procurement. The majority (56%) of ERC survey participants responded that they want help evaluating, ranking, and selecting energy suppliers. These findings suggest that SMBs have become responsive to education and information sharing, rather than to aggressive sales interaction.

For many manufacturers, natural gas supply is an important component of a comprehensive energy management strategy. The majority of survey respondents consume natural gas. In 89% of cases, the same individual is responsible for procuring gas and electricity supply. This person can benefit his or her business by working with an independent energy consultant that provides reliable, thorough, and current information about both commodities, and who understands the dynamics and interplay of electricity and natural gas prices and supply.

Efficiency, benchmarking, data analytics, customer service, cost management, risk management, price trend monitoring, and notifying customers of regulatory changes have become value propositions. An integral component of an energy management strategy is to seek consultation regarding market timing, the procurement process, and suppliers and supply contracts. Manufacturers that are proactive, and access energy information regularly, have a competitive advantage when addressing their energy supply needs. They are positioned to make more fully informed decisions that decrease costs and provide improved budget planning and forecasting.

Since 2001, NTMA has endorsed consulting firm APPI Energy as an affinity partner to provide

data-driven procurement solutions to members. For more information, visit [www.appienergy.com](http://www.appienergy.com).





## TRENDS IN MULTISENSOR MEASUREMENT

In systems designed for automated precision measurement, users are typically balancing accuracy of measurement, speed of operation, and cost to purchase and operate. The need for tradeoffs and sometimes-difficult choices will always be with us, but the introduction of multisensory measurement over the last several decades, along with subsequent improvement in its capabilities, offers opportunities for improvement in all three areas. The key to maximizing performance lies in understanding the available capabilities and choosing those that will deliver meaningful benefits in your specific applications.

### WHY MULTISENSOR?

Tactile and optical measurement techniques each have their strengths, and there are certainly measurement tasks that require only one of the two. But in many cases, because the two methods complement one another, the combination can yield better data than either alone. In some specialized cases a third technology, either laser or “white light,” can be added. And while separate machines are certainly an option, a multifunction machine eliminates the need to move test pieces, speeding up the process and reducing labor cost. A multifunction machine can cost less than multiple single-purpose machines and reduces “real estate” costs. And, depending on the recurring demands of the operation, multisensor and single-function machines can be deployed side-by-side allowing you to choose the most efficient and cost-effective

functionality for each task.

### COMPLEMENTARY STRENGTHS

Optical measurement can collect a large amount of data very quickly and can address parts or features that are too small or too fragile for practical tactile measurement. But like a photograph, visual measurement flattens what it sees into two dimensions, so while it is very good at measuring two axes, typically X and Y, to identify outside edges or edges where two surfaces meet, it is not suited for measuring smooth contours along a third, usually the Z axis. And while it can see down into holes, it is limited to line-of-sight.

Tactile measurement can handle all three dimensions including smooth curves in the Z axis and is not limited to line-of-sight. It can reach down into holes and along walls and come at vertical surfaces sideways to gather data that visual methods cannot, but it may be limited by the physical reach of measuring tips. The amount of data collected depends on the contact method used. Touch-trigger systems make contact, withdraw, move, and repeat, collecting one data point at a time. Scanning systems slide across the surface collecting hundreds or thousands of data points as they move, and are both faster and more thorough.

Multisensor systems combine the strengths of both technologies. Examining a computer mouse, for example, a camera could quickly gather data regarding the edges while a scanning tactile sensor collects data on the curved upper surface.

### OPTIMIZING VISUAL MEASUREMENT

While many consider multisensor measurement a mature market, there are still details and capabilities that can significantly impact its effectiveness, its suitability for any particular application, and the user’s return on investment. For example, it is widely believed that “if you can’t touch it you can’t really trust the data.” While this has some basis in fact, there are visual technologies that are every bit as accurate as contact measurement (in addition to delivering visual’s particular advantages in certain applications). For example, magnification is a key factor contributing to the accuracy of visual measurements and can greatly improve an optical system’s accuracy. Unless you know exactly what you are going to measure, both now and in the future, you will want a wide range of readily adjustable magnifications. A wider field of view lets you quickly cover a larger area, while a higher magnification lets you address small parts or finer features with greater accuracy. Higher magnification can also narrow depth of field to eliminate irrelevant details.

Another key factor in the accuracy of visual measurement is the angle at which the system views the feature being measured. Ordinary lenses collect images from a conical area in front of the lens. This creates a true image of only what is in the center of the field of view; anything not in the center is viewed at an angle and, therefore, distorted. Telecentric lenses view everything in their field of view

“head on” and without distortion, greatly improving accuracy.

Features can tell you a lot about a system’s capabilities, but the best way to determine the real accuracy of a visual technology is GR&R (gage repeatability and reproducibility), the comparison, preferably in a live demonstration, of repeated measurements. That will tell you how accurate the system is at the demo site, but realizing that same accuracy in your own installation depends on one more step: the qualification of a system and certification of equipment during your installation. For maximum accuracy, a system should be qualified in true 3D using a step gauge. And at installation, the system must be calibrated to ensure that it is performing to its full potential. In this process, the accuracy of visual sensing can be adjusted to match that of the system’s contact sensing.

### OPTIMIZING CONTACT MEASUREMENT

First, unless your measurement needs are minimal, continuous scanning measurement delivers far more data far faster than a touch-trigger measurement, enhancing both accuracy and speed. Second, unless all the materials you plan to measure will be rigid, the scanning technology for applying the probe to the material will matter. Some technologies apply enough pressure to actually deform soft or thin-walled materials, producing unusable measurements. A better choice is electronic displacement technology, which exerts far less force—measurable in millinewtons—that will not distort flexible materials.



Also, you might want to check if there is a required warm-up time for some tactile sensors.

#### **LASER AND WHITE LIGHT**

Laser and white light technologies fill a small gap between optical and contact methods. This is typically in areas that are too small for contact measurement and where standard optical means cannot measure surface contour. Laser's small spot size can measure areas and features that are too small for tactile sensors to reach and, unlike ordinary light, laser's reflection can be captured to measure distance to a surface providing measurements in the same axis.

Like laser, white light technology sensing can be used to measure 3D surfaces both quickly and accurately. A white light system focuses a light source on an area of the target surface as small as 12 microns, collects the back

scatter, and analyzes spectral response to determine the distance to the surface. In addition to being fast and accurate, the technology can measure the contours of difficult surfaces including those that are highly reflective, highly light-absorbent, or transparent.

#### **PALLETS AND FIXTURING**

Moving test parts onto and off of measuring systems can be either quick and easy or painstaking and time-consuming, impacting the efficiency of the entire operation. Consider mounting and pallet technology and the time and effort required for alignment and calibration. As with other features, this can often be best determined through demonstration.

#### **SOFTWARE: PUTTING IT ALL TOGETHER**

Because software manages the entire measurement process and serves as the operator interface, it is critical to the efficiency of a multisensor

system. Ideally a single software package should manage both contact and optical measurement, along with laser or white light if either is utilized in a multisensor machine. In some cases, the same software that supports multisensor equipment can also serve other measurement systems in the same facility to simplify work for operators.

If the software is specifically designed to interface with 3D CAD, you will be able to import 3D CAD models and use them to set up the measurement process, eliminating costly, time-consuming manual programming. And after measurements have been made, an interface with 3D CAD can also allow visual presentation of the actual measured dimensions overlaid onto the original CAD model, visually highlighting variance and tolerances.

#### **IN SUMMARY**

Multisensor systems can improve the efficiency and reduce the cost of measurement operations, but careful attention to details of system operations can help maximize return on your investment. A clear understanding of your current needs will help with evaluation of capabilities, but it may also be wise to consider likely future needs, as after-purchase upgrades can be far more costly than including features in the initial purchase. The end result will be quicker, more affordable measurement and improved quality and conformity of your end product.

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# 3 TIPS FOR A SUCCESSFUL INTERNET OF THINGS CUSTOMER PITCH

BY ZACH SUPALLA, ORIGINALLY PRINTED IN FORBES

The Internet of Things (IoT) has dominated the tech scene this year. From its commanding presence at the Consumer Electronics Show to the barrage of analysts firms predicting that “billions of ‘things’ will be connected by 2020,” its perceived impact on the technological landscape is reminiscent of its cloud and big data predecessors.

But while IoT has begun to prove its worth in the consumer arena with wearables like Fitbits or smart lighting solutions like Phillips Hue, its impact on the enterprise is less visible today. Forrester says that IoT is a “business-led trend,” and reports that 23% of enterprises use IoT, with another 29% planning to do so within 12 months. However, a report issued from TKEsystems found that less than a quarter of businesses have gotten to the point where IoT has started to influence their organization in a meaningful or measurable way.

It takes time to show results, so how do IoT companies gain customers when they can’t show an immediate bottom line effect on business? In anticipation of your first (or next) pitch meeting, here are some tips and tricks on how to best relay the value of IoT to a prospective customer:

## ADDRESSING ROI CONCERNS

The biggest hangup that companies have about investing in IoT is that the market is young and not yet proven. Like most organizations, when you think of your return on investment (ROI), you want to make purchasing decisions that pay off relatively quickly. The problem? IoT investments take time to pay off, because they usually involve the development and manufacturing of new hardware, which can take 18-24 months. And most IoT initiatives start with small pilots (a few hundred or thousand connected devices), which are unlikely to show meaningful returns until the pilot scales.

Many companies who think about investing say to themselves: the Internet of Things is the future of my company 10 years from now, but if I start investing in it today, I’m only going to lose money for the next 3-5 years before this new busi-

ness takes off.

IoT is just like any other new and emerging technology. Look at cloud computing, for instance. In 2010, an initiative from The Open Group set key considerations for how to build and measure ROI for cloud initiatives from a business perspective. This gave businesses a set of standards and benchmarks to define success and measure results of investing in “the cloud”. Six years later, cloud-based solutions are the norm. We can expect IoT to develop in the same way.

Additionally, the cloud faced major skepticism and push-back in its early years – especially in the federal space. The same concerns regarding security, ease of adoption and use have emerged around IoT and are slowing adoption in the enterprise.

**Tip #1: Just because a technology hasn’t demonstrated its full potential doesn’t mean that the value isn’t there.** To show value more quickly, start small, and work on small projects that are “quick wins” that will generate value quickly without a lot of investment, even if they aren’t billion dollar opportunities. Do you see an opportunity for building a sensor to measure working conditions (temperature, noise levels, etc.) in a factory? Don’t start by immediately making 10,000 units. Start small with a hand-built prototype, make a dozen and give them to a few important customers. Prove value in small ways.

## IBM WON’T SOLVE THEIR PROBLEMS

If you are selling an IoT product today, chances are you’re a start-up, and as a startup you face some difficult battles. You may lack brand recognition which hurts your credibility and makes it difficult to close a sale. We’ve all heard the saying “no one was ever fired for hiring IBM,” but you’re not IBM. So how do you reassure potential customers that you have the staying power and stability they need to work with you?

IoT startups have a big advantage over incumbents: they’re specialists. Most incumbents – companies that have the scale and brand of an IBM – are not specialists in IoT. More likely they are

taking existing products and services that were previously focused on other related industry trends like “big data” and rebranding them as IoT products. So while they may have brand and scale, they may not have the expertise that you do.

This advantage may not last for long, though. Take Accenture, for example. They just recently opened a center in Dublin and announced that they’re looking for 200 experts across a range of roles – including IoT. But “IoT experts” don’t really exist yet – the industry is too young. So it will be quite some time before they build a deep expertise in IoT.

If it came down to hiring you, IBM or Accenture, you’re up against some stiff competition. Prove that you’re the best choice because specializing in IoT means that you have deeper expertise, which your customers will need to be successful. And don’t forget to sell the biggest advantage of start-ups – you can move much more quickly than the incumbents you’re up against.

**Tip #2: Speed is a startup’s currency.** Make sure to demonstrate project length and cost and show how quickly and effectively you can take your customer from where they are today to where they want to be with their business. It’s something that can help differentiate you from these larger tech giants. Since your business was born from IoT you don’t have to pivot your business like some of your competitors, which means you already have the right team, tools, technology and resources in place to deliver value for your customer.

## SCALING WITH THEM AS THEY GROW

Every company building an IoT product believes they’re moving towards massive scale. After all, if they didn’t see a massive opportunity, why would they invest a bunch of time, energy, and money into a new industry?

At the same time, their eyes are usually bigger than their stomachs; we get emails all the time asking for quotes at a million units, but then the PO comes in for a thousand units.

The issue this raises is that the IT executive who’s planning this IoT project

has to balance their short-term needs (where speed and R&D costs matter) and their long-term needs (where scale and unit economics matter).

This can be challenging because building for scale is expensive, and if your customers are starting out at small volumes, it feels silly to invest a lot in supporting millions of units when you only have a few thousand units to start. This is especially true when your customers don't want to start out paying for massive scale – they want to see a bill that is appropriate for a small-scale pilot.

**Tip #3: You don't have to be prepared for massive scale right off the bat.** As we discussed above, IoT products take time to scale up and roll out, and the constraint usually has nothing to do with the software; more likely it has to do with the time and cost of manufacturing and distributing physical goods. The most important thing is that you have a clear plan for how you're going to scale. One that you can clearly communicate to your engineering team and to your customers so they have confidence that you're not going to run into problems when you ship

your millionth unit.

Selling in a nascent market is no easy task, but if you address barriers, educate and target the right industries with scalable, iterative solutions, you'll begin to see a shift in mindset from that of reluctance to optimism within your pool of potential customers. The bottom line is that, despite the skepticism, history has shown time and time again that powerful technologies will prevail—and you'll find it's an exciting time to be an IoT company.



## TALKING GROWTH AND VETERANS WITH B2 MACHINING

Bryan Bach founded B2 Machining in 2014. Since then, the company – which serves the semi-conductor and medical industries and works with 316VIMVAR, Hastalloy, Kovar and Inconel metals – has grown from a small shop with two Mills to a full facility with four CNC Mills and two Live Tooling Lathes. With new machinery came new job opportunities, growing the team of two to a team of six employees on two shifts – including a Veteran.

Now a year-long NTMA member, Bach shared some of his secrets to success and positive experience employing a Veteran:

**HOW DID YOU GET STARTED IN THE INDUSTRY?**

I started as a 20-year-old entry level kid who worked for a small shop and fell in love with cutting metal. Fortunately, the owner of the shop was a very knowledgeable, “old school” machinist who taught me well in terms of different, creative approaches and techniques in machinery.

**WHAT ADVICE DO YOU HAVE FOR OTHER COMPANIES, NEW OR OLD?**

Focus on quality and give your customers more than they expect. In other

words, go above and beyond! Make the buyer look good!

**WHERE DO YOU INVEST THE MOST?**

I say, invest in your employees and in new technology. Your investment return will always pay off in the long run.



**DID YOU SET OUT LOOKING TO HIRE A VETERAN?**

We did not specifically look to hire a Veteran employee. We just happened to post an entry level position online looking to hire someone that would show up to work every day that wanted to learn

the trade.

**WHAT HAS THAT WORK RELATIONSHIP BEEN?**

Great! He shows up early for work every day. He understands direction with very little supervision and is very eager to learn the trade. He knows how to pay attention to small details especially when it comes to perfecting the quality of the part.

**WHAT ADVICE DO YOU HAVE FOR COMPANIES LOOKING TO HIRE VETS?**

Veterans are dedicated, excellent workers that are self-disciplined and show up on time every day.

It is very difficult to

find responsible people who want to learn a new skill and excel in this trade. I found that with this Veteran employee.

**WHAT DOES THE FUTURE LOOK LIKE FOR B2 MACHINING?**

B2 Machining will be going after more 5 axis work along with larger quantity, production jobs. We will gladly do the difficult jobs that other shops turn away.

For more information, visit [www.b2machining.com](http://www.b2machining.com).





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THE ACCURACY AND SPEED  
TO ACCESS ENTIRELY  
NEW MARKETS. **WE  
CAN PRODUCE QUALITY  
FINISHED PARTS AT A  
COMPETITIVE PRICE.** ”

– Shop Owner



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Ask our customers: Makino quality means  
business. Hear their stories at [makino.com/quality](https://makino.com/quality).

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# 12 OKUMA MACHINE MODELS NOW ACCOMMODATE CRYOGENIC MACHINING TECHNOLOGY



Okuma and Partners in THINC member, 5ME, visionary leaders in state-of-the-art machine tool technology, are educating the machining world on the benefits of cryogenic machining – the process of using Internal Liquid Nitrogen (LN2) instead of coolant during the cutting process. Currently, there are 12 Okuma machine models, including vertical machining centers and horizontal machining centers that can be ordered with 5ME cryogenic machining technology and in some instances cryo machining is retrofittable.

According to 5ME, cryogenic machining is a game changing metal-cutting technology that increases throughput, quality, and tool life and is especially profitable when machining exotic metals. This technology is fairly new to machining and many questions arise when people first consider using cryogenics. Here are a few little known facts about

the technology:

- Nitrogen is 78% of the air we breathe and it's safe and easy to use. Liquid nitrogen is quite easy to handle but there is a cold factor involved so safety measures, such as wearing gloves and aprons, should be implemented when handling tools.

- Although fairly new to the machining world, liquid nitrogen has been used in other industries successfully. Flash freezing food has been going on for decades.

- It's environmentally friendly. There are no hazardous fumes or mist from coolant on clothes or in the air, so operators stay healthier.

- Chips are much easier to manage without coolant making them sticky and weighing them down. They are dry and lighter making them extremely portable. Additionally, the risk of slips and falls when clearing chips is reduced since


there is no oily residue from coolant.

- Cryogenic machining equipment does not have to be permanent on the machine. Hardware can simply be removed from the machine to run through-spindle coolant instead of liquid nitrogen.

- Liquid nitrogen is affordable, competitively priced and readily available from commercial distributors. The typical ROI on a cryogenic machining kit is 12 months.

Shops can run leaner, cleaner and greener with cryogenics. For more information, visit [www.5me.com](http://www.5me.com) or [www.okuma.com](http://www.okuma.com).





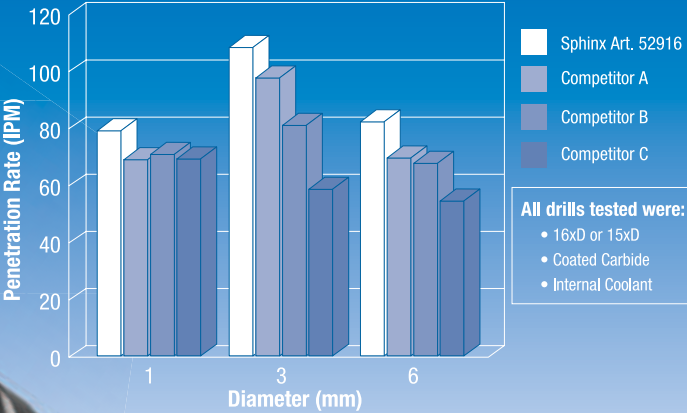
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Visit [BIGKAISER.com/TestUs](http://BIGKAISER.com/TestUs) to request your Sphinx Phoenix TC2 no-risk trial today.


### 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



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

## NTMA MEMBERS TAKE THEIR PRO-MANUFACTURING MESSAGE TO CAPITOL HILL



NTMA members joined with members of the Precision Metalforming Association (PMA) in April for the eighth-annual One Voice Legislative Conference in Washington, DC. More than 70 manufacturers representing NTMA and PMA member companies spent two days on Capitol Hill, visiting their elected representatives to advocate for pro-manufacturing policies.

NTMA's government relation firm, The Franklin Partnership, organized more than 100 meetings with Members of Congress and staff. A highlight of the visit were lunches organized by Franklin Partnership for small groups of participants with their Senators and Representatives. Also, NTMA's public relations firm, the Policy Resolution Group (PRG) at Bracewell, organized a special media briefing with three Wall Street Journal reporters for NTMA and PMA members.

The event kicked off with a briefing by Omar Nashashibi and John Guzik of the Franklin Partnership and PRG's Paul Nathanson. Attendees were given a refresher course on the latest policy developments and a brief prep session for their meetings with Members of Congress. Participants then split off into groups for their Congressional meetings,

"The legislative conference is our opportunity to tell Members of Congress how they can help manufacturing," says NTMA President Dave Tilstone. "In many cases, the message was simply 'stop doing us harm,' but on other issues, particularly workforce development, we've seen real progress on Capitol Hill as a result of these meetings and the work done by our lobbyists."

With so many pressing topics to discuss during the 20-25 minute meetings, attendees stayed focused on three policy priorities:

### 1. PROMOTING EFFORTS TO RECRUIT QUALIFIED EMPLOYEES.

A recent One Voice survey showed that 77% of members have job openings and 97% are having challenges recruiting qualified workers. According to the McKinsey Global Institute, the international economy could face a surplus of 90 million to 95 million low-skill workers and a shortage of about 38 to 40 million high-skill workers by 2020.

Several lawmakers are already working to help the industry find and train skilled workers with initiatives for STEM-related education and skilled worker apprenticeships. NTMA and PMA members asked their elected representatives to promote manufacturing careers in their public speeches, high school gyms, and at town hall events around the country. Members of Congress also agreed to promote and participate in Manufacturing Day, which this year will be held on October 7.

### 2. EPA REGULATIONS AND THEIR EFFECT ON SMALL MANUFACTURERS.

Manufacturers also warned legislators and staff about the consequences of regulations by the Environmental Protection Agency (EPA). For example, the Clean Power Plan, a series of EPA regulations designed to lower carbon emissions from existing power plants, may raise the cost of electricity for manufacturers by up to 20% annually. A 20% increase in electricity costs every year could have a serious impact on the ability of manufacturers to compete with their international competitors. Additionally, the compliance timeline set by the EPA has been described by many analysts as "impossible."

### 3. COMPREHENSIVE TAX REFORM.

One Voice recently scored a major vic-

tory on taxes. NTMA and PMA members had the opportunity to thank elected officials that supported us late last year in making the R&D Tax Credit and Section 179 Equipment Expensing permanent, and extending Bonus Depreciation through 2019, giving manufacturers stability in the tax code to invest for the first time since the 1980s. NTMA and PMA manufacturers also stressed to Members of Congress that any comprehensive tax reform must include both corporate and individual taxes as many NTMA member companies operate as pass-throughs paying at the individual rate. Nationwide, these types of businesses account for 54% of all jobs in the United States and 81% of all manufacturers. This means eight in 10 manufacturing businesses pay taxes at the individual rate, the total of which reaches 44% for many. Tax reform only for C-Corporations would leave virtually all small businesses behind to pay the much higher rate.

"It was a great two days in Washington for our members, and a good reminder of why it's so important to educate and engage with our elected officials about our industry," says Dave Tilstone. "As our Washington, DC team always says: If you do not have a seat at the table, then you're on the menu."

It's also an election year and NTMA and One Voice have created a webpage for manufacturers to stay informed and take action this election year. At [www.metalworkingadvocate.org/resources](http://www.metalworkingadvocate.org/resources), NTMA members can find information about where to register to vote, how you can vote early, and other materials about Congressional members' voting records on the issues important to manufacturing.







## A CULTURAL COMMITMENT TO QUALITY: NTMA JAPAN TECH TOUR

18 NTMA members gathered in Japan April 18th to the 24th to experience a week packed with technology and machining innovation hosted by BIG KAISER, Blaser Swisslube, Mazak and MEMEX during the 6th annual NTMA Technology Tour. During the tour, each sponsor demonstrated their latest manufacturing technology and led tours through MAZAK, Chuo Iron Works, Sumitomo and BIG Daishowa. Throughout the week, executives of these companies joined for meals and offered advice for applying their technologies and products. NTMA would like to thank these sponsors for the opportunity to network, learn and tour their international facilities.

The trip began with visits to three of Mazak's factories in Minokamo and Oguchi where their latest technologies were on display and in action manufacturing their machines. These plants utilize robots of all sizes to load and unload parts. Arguably the most unique factory was Mazak Optonics. It is buried deep into a hillside to isolate the environment from any contaminants. With air quality 30 times better than typical manufacturing facilities, this is where Mazak manufactures ultra-precision laser machines.

During the tour of Mazak's Oguchi Plant, David McPhail, President and CEO of MEMEX, presented on "The Power of Data-Driven Manufacturing." McPhail outlined the Merlin software used at Mazak and implemented at Homeyer Precision to gather and present shop floor data using the MT Connect protocol. This software can provide real-time data to you and your managers so machine and manufacturing performance can be improved. The group also toured one of Mazak's customers, Chuo Iron Works. Much like the Japanese version of an NTMA member, this 18-person shop that machines and fabricates large parts began with a private owner who invested his time and capital to become a main supplier to the machine tool industry.

Another popular stop on the tour was a visit to BIG Daishowa/BIG KAISER cus-

tomers, Sumitomo Carbide. The largest supplier of metal cutting products in Japan, Sumitomo is in the process of expanding their facilities and investments in the US. During the plant tour, NTMA members learned how the company fabricates diamond and CBD tipped inserts, using sophisticated, vision-guided automation systems developed in-house.

The final tour stop was BIG Daishowa on the island of Awaji just outside of Osaka. Here, NTMA visited three factories as well as their technical center to see first-hand machine demonstrations, including a comparison of collect chucks for endmilling, a BIG PLUS comparison to HSK, their Sphinx deep-hole coolant drill and their new Smart Damper system for boring and milling to reduce chatter. Members will be able to see this Smart Damper demo during our NTMA Tech Tour at IMTS.

During the BIG Daishowa visit, Blaser Swisslube President and CEO Marc Blaser presented the importance and impact coolant can have on productivity and cost. Although coolant is only 0.5% of the cost to produce parts, Blaser demonstrated how this "liquid tool" can have a dramatic effect on tool life and productivity. Having seen first-hand the commitment Blaser has to the science behind coolant on last year's Swiss Tour, BIG Daishowa – as well as Homeyer Precision and Vaughn Manufacturing – now uses Blaser's coolant in their machining operations. BIG Daishowa proved to be a great way to close the tour, with Owner and CEO of TCI Precision Metals, John Belzer, saying, "the BIG Daishowa day was by far the best for me and worth the entire trip. It's a very different operation than BIG Kaiser in Zurich and I was blown away by what I saw."

If there was one theme that gleamed from the trip it would be the Japanese commitment to quality demonstrated by all the tour sponsors. "The overall quality of the shops we visited was very impressive – not only the



amount of technology and automation we witnessed in action, but the overall culture of the Japanese business environment," says Andrea Wosel, Executive Assistant at C&R Manufacturing. "Their commitment to quality as shown by 100% inspections, extremely clean and well organized shops and attention to detail was inspiring."

Outside of Technology Tour stops, the trip also gave members the chance to experience Japan through sightseeing, group dinners, and an introduction into Japanese culture. Members even stopped for a tour of the Toyota Museum while in route to Kyoto, where they viewed original stamping, forging and machining equipment from various periods throughout the 20th century.

"Dinner with the company executives was a great experience to be able to sit down and speak with them directly in a casual setting," says Wosel. "Networking with them as well as our own NTMA members is always valuable. I also really enjoyed the Toyota tour. And of course, the delicious Japanese traditional food we were able to try."

"NTMA's Japan Technology Tour was an incredible learning experience," Ben Belzer, President and COO of Belzer TCI Precision Metals. "From learning about how machine tool builders produce their machines, to seeing other precision machining facilities like mine, it's a once in a lifetime experience. Throw in modern technology and demonstrations, and I have a toolkit that not many people get to experience. On top of that, I've made connections and friendships that are invaluable. Hats off to the sponsors for providing a great experience!"

Again, NTMA thanks our National Associate Member sponsors for the opportunity, and we look forward to next year's Technology Tour!









# COMPANIES FINDING UNIQUE WAYS TO ADDRESS THE SKILLS GAP FOR COLLEGE GRADUATES

BY DONNA FUSCALDO, ORIGINALLY PRINTED IN GOOD CALL

Employers are facing a huge skills gap among college graduates, at a time when unemployment is hovering at an eight year low. And it's a problem that companies need to address the problem – because if they don't, jobs will be left unfilled and employers will be stuck with workers who are both unproductive and frustrated. And it's not only a problem in the financial and technology industries. Companies of all sizes and stripes are feeling the effects of the skills gap.

"Industry analysts estimate 3.5 million manufacturing jobs will open in the next ten years," says Glenn Johnson, Manufacturing Workforce Development Leader at BASF, the multinational chemical producer. "Projections indicate that the skills gap will leave two million of these jobs going unfilled."

Blame it on colleges and universities around the country or on the students themselves, but either way, countless college graduates are coming out of school lacking basic communication, problem solving and critical thinking skills. That makes them unprepared for the jobs they are hired for, at a time when companies want their workers to hit the ground running. Companies realize that higher education isn't necessarily going to give their future employees some of these soft skills they need, and as a result, they have embraced different ways to approach the problem.

## TRAINING NEEDS TO START BEFORE COLLEGE

Take BASF as one example. Record investments in the U.S. by the chemical industry and a shortage of applicants for jobs – particularly ones that require more education than a high school diploma but less than a four-year degree – are creating a need for candidates with the right skills. It doesn't help that many of the technical workers in the chemical industry will retire over the coming years, creating a bigger challenge to fill the void, says Johnson. As a result, the chemical maker has long partnered with community colleges to provide the schools with funding and guidance on

curriculum and to recruit graduates.

However, recognizing that bridging the skills gap has to start earlier than college, this past summer, BASF started a program called TECH Academy, a four-day program for high school students to learn about technical careers. "While many jobs require four-year and even more advanced degrees, a significant number of great career opportunities are available to those with community college training and education," says Johnson.

## COMPANIES WANT QUICK TRAINING FOR THEIR EMPLOYEES

Amy Fox, Chief Executive of Accelerated Business Results, the Cincinnati-based company that creates learning products for companies including Fortune 500 enterprises, sees a lot of clients dealing with workers who aren't performing and new hires who aren't able to hit the ground running. "Employees in general are pretty distracted, overwhelmed and impatient," says Fox. "We are asked to come up with creative ways to more quickly and more uniquely address the skills gap."

So what are Fox and her team doing to help bridge the skills gap? It's not classroom training and it's not even online learning. In this fast-paced, technology-driven economy, companies are embracing self-service systems where employees can access content and tools on their own, whether it's on their mobile phone, computer or tablet. These aren't two hour online seminars with twenty different PowerPoint slides, but three to five minute quick hits about a particular topic, whether it's negotiating a deal or communicating better with peers. "A lot of it is micro-learning as opposed to thirty minutes of online classroom training," says Fox. "We create YouTube-esq, white board style videos to break down a concept. People don't have the time. They want to get the stuff they need."

## INTERNSHIPS BECOME MORE THAN JUST COPYING AND GETTING COFFEE

Another way to bridge the skills gap? Make internships more meaningful.

Internships are a great way for students to gain real-world experience while still in school, and build the soft skills that many employers say they are lacking. The key is ensuring that internships are an opportunity to learn, rather than just busywork or menial tasks. And legislation has recently come around to reflect this – under federal law, internships must provide educational benefit to the intern, must not replace regular employees and must not provide immediate advantage to the employer. That's all to say that the law supports the idea that internships should primarily benefit the intern, not the company they work for.

Some companies are even getting creative with the types of internships they offer. Adecco Staffing USA, the international staffing company, hosts a CEO for One Month competition that gives students a front row seat to what's it's like to be a CEO or top level executive. The winner of the initiative gets to shadow the CEO and other leadership executives for one month, traveling around the country and internationally and seeing what it's like to run a Fortune 500 company.

While Adecco's program isn't something that it or any company can necessarily roll out on a wide scale, it does highlight the need to give students diverse and meaningful experiences in internships. It's no longer enough for students to spend an internship making photocopies, getting coffee or doing lunch runs. "We really try to give them a well-rounded internship that is focused on everything from business acumen to how to build and work in a performance based culture," says Rich Thompson, Chief Human Resources Officer at Adecco Group North America. "That's what people are looking for now, given the skills gap is huge."



# BIG KAISER INTRODUCES HIGH PRECISION FACE GROOVING SYSTEM

# BIG KAISER

BIG KAISER recently released new insert holders for face grooving. The new accessories are specifically designed to fit the BIG KAISER large diameter Series 318 and Series 319 SW twin-cutter boring heads for ultimate system flexibility.

The new face grooving system can be used as either a single or twin cutter grooving tool for diameter ranges from Ø2.087" to Ø118". The design allows for a grooving depth up to .472", with a minimum width of .079" and a maximum of .375".

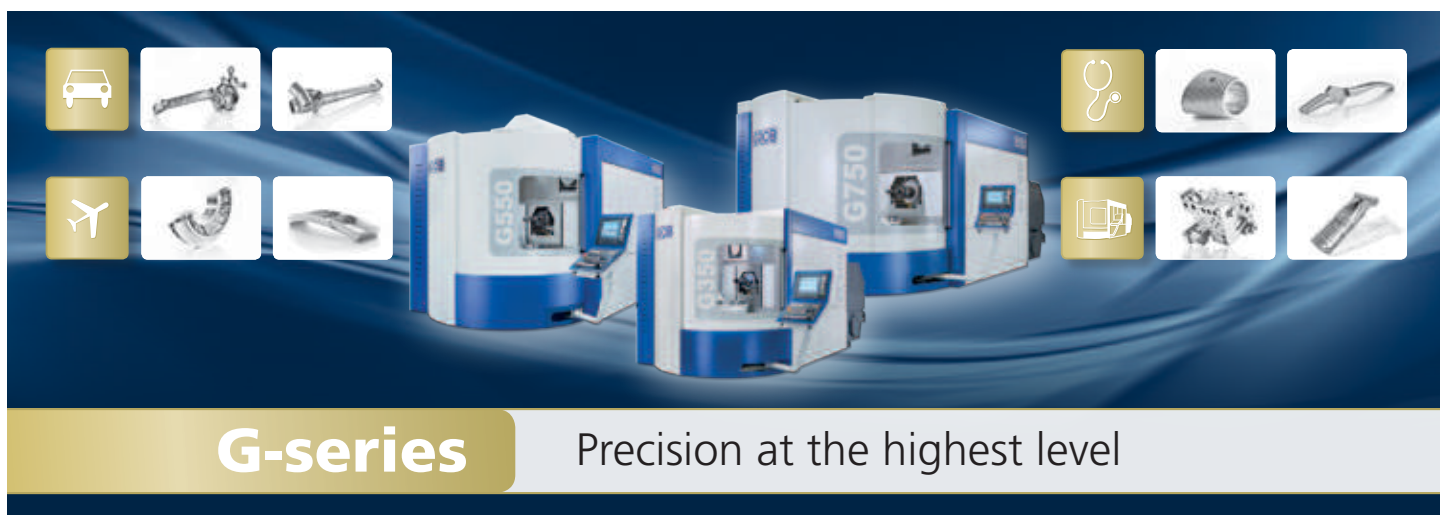
Face grooving with boring tools is generally more efficient than milling with circular interpolation, especially when manufacturing grooves of large diameters. Also, whenever a surface for a sealing application is required, there is no other acceptable or accurate option than to use a face grooving setup.

Using the boring tools as twin cutters, with a simultaneous adjustment in radius and length, allows the feed rate to be increased. Using the cutters in diameter offset operation enables a groove width of up to .472", and both inside and outside diameters can be adjusted separately within the smallest tolerances. Both cutting edges can be adjusted easily to the same length, due to an eccentric bolt mechanism with clear direction indication.

"BIG KAISER products give our customers an unparalleled combination of quality, precision and ruggedness," says Jack Burley, BIG KAISER vice president of sales and engineering. "These new face grooving holders uphold that tradition, while adding additional options to the applications possible with our SW twin cutter and large diameter Series 318 system."

BIG KAISER is a worldwide leader in high-precision tooling systems and solutions for the metalcutting industry that guarantee extreme accuracy and repeatability. Our products are of the utmost quality — manufactured with materials and craftsmanship that enable superior performance. As a member of the BIG DAISHOWA Group (Osaka, Japan), BIG KAISER has grown into a well-recognized global tooling provider, with manufacturing facilities in North America, Europe and Asia.

For more information, visit [www.us.bigkaiser.com](http://www.us.bigkaiser.com).

The banner features a central image of three GROB 5-axis universal machining centers, labeled G550, G350, and G750. Surrounding the machines are various icons representing different industries: a car, a key, a bolt, an airplane, a curved part, a ring, a medical stethoscope, a barrel, a wrench, a gear, a valve, and a drill bit. Below the images, the text "G-series" is displayed in a large, bold font, followed by "Precision at the highest level".

## G-series

Precision at the highest level



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### A promising future with the G-series

GROB 5-axis universal machining centers stand out thanks to their absolute precision and reliability in the automotive, aerospace, medical and mechanical engineering as well as tool and mold industries. The proven 5-axis simultaneous technology with horizontal spindle position enables you to machine parts of various sizes and materials in a flexible and failure-free way while offering maximum stability of the machine. Fast chip-to-chip times and the innovative further development of our spindle technology guarantee a high economic efficiency and productivity.

**The GROB G-series – for the most versatile machining possibilities.**



# GRAND OPENING AND RIBBON CUTTING CEREMONY

After seven years reinventing itself through hard work, seeking assistance with business diversification, and through substantial investment in machinery for new industry applications, Quality Mould, Inc. celebrated the grand opening and ribbon cutting ceremony of their new expanded facility May 6th.

QMI President, DJ Danko, is a firm believer in bringing manufacturing back to the area, and his diversification strategies have proven successful. He worked with Westmoreland County Community



College, New Century Career and the NTMA to hire and train employees for the diversified operations. As new business opportunities presented themselves it be-

came apparent that the company would need a larger manufacturing facility in the area.

QMI Human Resource Manager Jamie Danko and DJ approached the Saint Vincent College Small Business Development Center for assistance in developing a business plan for financing to purchase a larger

manufacturing facility in the area to accommodate the increased demand from diversification of industry services QMI now provides to their customer base. The SBDC worked in partnership with QMI, Somerset Trust Company and the Southwestern Pennsylvania Commission to provide the necessary information for Quality Mould, Inc. to receive the financing required enabling them to move from their 13,000 square foot facility to the new 33,000 square feet facility.

Quality Mould, Inc. has made a commitment to the local area, their employees, and the community to grow their business and manufacturing in Pennsylvania. For more information, visit [www.qualitymouldinc.com](http://www.qualitymouldinc.com).



## APRIL FINANCIAL MANAGERS ROUNDTABLE RECAP



FINANCIAL MANAGERS  
ROUNDTABLE

Members from OH, PA, WI and MO gathered in Akron, OH, April 27th for our first Financial Managers Roundtable of the year. Sponsored by CBIZ, the day's discussions covered everything from "Key Metrics for Performance Dashboard" and "Effective Budgeting" to "Costing and Overhead Allocation Methods," as well as a Tax Landscape and Economy & Market update.

Speakers from CBIZ, The Huntington Bank, MelCap Partners LLC., and Tower

Corporate Advisors hosted presentations while Jeff Walters, Senior Managing Director at CBIZ, led the roundtable discussion after lunch. Attendees shared positive feedback on the topics, presenters and networking opportunity. The next Financial Managers Roundtable will take place June 8th in Denver, CO.



Todd Peter, Founder & Managing Partner at Tower Corporate Advisors, presenting to the group.





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# TWO INNOVATIVE PROGRAMS PREPARE STUDENTS FOR THE WORKFORCE

BY CHARLES LAWTON, ORIGINALLY PRINTED IN THE PORTLAND PRESS HERALD

The key to Maine's future economic growth is clear – educate, train and attract young people, both to replace the aging workers leaving our labor force by the tens of thousands each year and to fill the new positions that market and technological changes create each year.

Unfortunately, the links between our educational institutions and our employers are not today the models of effective communication they need to be to achieve these goals.

Too many employers complain of the inability to find the workers they need. They cite a gap between the technical and social skills and attitudes job candidates bring to the labor market and those they need for success. Yet most of these businesses do not apply the same principles of supply-chain management – define needs more clearly and work more closely with current and potential vendors – that they use with material suppliers.

At the same time, too many educators cite declining enrollments, growing social dysfunction in homes and increasing budgetary pressures as reasons for not reaching out to employers.

In this environment of disconnection and finger pointing, therefore, it is encouraging to find two examples of educational institutions and employers working closely to overcome the traditional barriers that separate them.

The first is Tree Street Youth Center in Lewiston. Named for the neighborhood that encompasses Ash, Pine, Walnut, Spruce and Birch streets, the center is “strategically located on the walk route to the elementary, middle and high schools in one of the state’s most socioeconomically challenged communities.”

Over 65 percent of the youth in the center’s neighborhood come from immigrant or refugee families, and 99 percent live at or below the poverty level. Each school day, the center serves between 120 and 150 young people with tutoring and homework help, supplemental language instruction and coaching and personal assistance with problems arising from sociocultural adjustments and personal impulse control.

Operated by a small staff and an inspired cadre of upper-grade mentors and

supported by community volunteers and a wide range of area businesses, the center has served over 800 students since its founding in 2011. Of its regular attendees, 100 percent of those eligible have graduated from high school. And of those who have applied to institutions of higher education, 95 percent have been accepted.

Tree Street students, from its youngest attendees to its oldest “branches” mentors, learn the skills of communication, collaboration, personal motivation and adjustment to unfamiliar and challenging social situations: precisely the skills so many employers complain that many of their job applicants lack.

If Maine is to grow from within, we must treat the fastest-growing segment of our population – our immigrant and refugee communities – as a treasured resource to be understood, nurtured and connected to every opportunity our labor market might provide.

A second example of an educational program reaching out to the business community in a creative way is to be found at Thornton Academy in Saco.

Recognizing that the traditional academic track is not suited to all students and that the traditional vocational track was not meeting the needs of many local manufacturers, the school reached out to a number of local businesses with known “skills gap” problems: most notably Arundel Machine and Pratt & Whitney. Together they set up a program that combines:

- An online learning module developed and certified by the National Tooling and Machining Association.
- A professor at Southern Maine Community College willing to bring Thornton students into a college machine shop “lab” during off-hours for basic equipment training.
- Employers willing to confront the obstacles of traditional shop floor culture and liability concerns to bring high school students into the workplace to see how machining works in the “real world.”

With companies paying licensing fees for online learning tools and offering part-time and summer jobs to enrollees, the community college providing access to machines and lab space during available hours and

Thornton Academy paying for an additional instructor and a van to shuttle students between their learning and working locales, the program has proven a great success.

Virtually all the students who’ve passed the online certification process and completed the academic and work experience requirements have been offered full-time, good-paying jobs. Thornton Headmaster Rene Menard told me that some of the parents of enrolled students have asked if they could sign up.

These are but two programs of innovative business-education linkages that I’ve come across. I am sure there are others. All should be celebrated, encouraged, emulated and expanded.

Whatever the costs of such programs – and they are considerable – they pale by comparison with the costs of avoiding the only path to a prosperous Maine future: expanding the ways we link the worlds of education and work into a seamless and continuous process of learning.



## ADMINISTRATION RELEASES FINAL OVERTIME RULE

Late on Tuesday, May 17, the Obama Administration released its controversial final rule expanding overtime eligibility to over four million additional workers. The rule, opposed by One Voice and thousands of other business and non-profit groups, doubles the white-collar salaried overtime exemption from \$23,660 annually to \$47,476, or \$913 per week. The new standards affecting Executive, Administrative, Professional & Clerical Employees (EAP) take effect December 1, 2016.

Not only is the federal government more than doubling the exemption threshold, the new rule will increase the

\$47,476 by roughly 10 percent every three years. The initial proposal called for the increase annually; however, following strong objections raised by small businesses and non-profits, the Administration relented on the yearly jump, but will mandate that employers adjust their payroll systems starting in 2020 with the new levels and every three years thereafter.

The Administration promoted the rule as an effort to grow the middle class; however, the final rule goes further than the draft proposal by increasing the overtime exemption for Highly Compensated Employees to \$134,004 annually from \$100,000. This is \$12,000 higher than the Department of Labor proposed in its initial rule last summer and will make thousands more manufacturing employees, such as those at the VP or Comptroller level, eligible for overtime.

One Voice filed official comments and joined coalition forces in opposing such a drastic increase in the exemption level virtually overnight. Manufacturers and their HR managers across the country have only six months to adjust their current policies and possibly make significant changes to their budgets to account for increased costs. Most observers believe employers will reclassify affected employees from salaried to hourly status. This will lead to lower worker morale and reduced flexibility for those reclassified.

Manufacturers are not alone in raising concern over this major rule change. Non-profits and charities, including the American Red Cross, have said they will reduce social and disaster related services due to increased overtime costs for staff. Trade associations will also have to re-examine their annual activities and may limit staff from attending key conferences and supporting members' activities.

#### OSHA Finalizes Rule Making Incident Reports Public

The Department of Labor has significantly increased its activity this spring, targeting employers on issues ranging from wages, to recordkeeping, and union organizing. On May 11, 2016, the U.S. Occupational Safety and Health Administration (OSHA) revealed its long delayed Electronic Recordkeeping rule, also known as "Improve Tracking of Workplace Injuries and Illnesses."

The new requirement forces small businesses with 20-249 employees to

electronically submit their Form 300A, which OSHA will then put on the internet for public viewing. Larger manufacturing companies with over 250 employees will submit Forms 300, 300A, and 301 quarterly, which OSHA will also post online. One Voice repeatedly raised concern with the Administration that the information, without proper explanation to the general public, will mislead them to believe that manufacturing facilities are unsafe.

One Voice is a leader in Washington opposing this new policy that does not improve workplace safety and hurts the image of manufacturing in America at a

time when employers are struggling to recruit qualified workers into the industry. The new rule takes effect January 1, 2017.

In addition to publicly posting the information online, in the rule, OSHA also reiterated its opposition to employee safety incentive programs. The Labor Department believes that rewarding employees for days without an incident or maintaining a safe workplace are disincentives for reporting injuries.



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## OPEN POSSIBILITIES



# IS YOUR SHOP AN OPEN BOOK?

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An open-book management style might help motivate employees to work more efficiently because they can readily see how their performance affects the company's bottom line.

Reid Leland previously worked for a company that practiced open-book management (OBM), in which the business' financials were shared with all employees. Today, Mr. Leland leverages OBM at LeanWerks, a contract shop he started in 2003. In fact, OBM represents the cornerstone of the Ogden, Utah, company's culture, he says.

OBM as it is applied at LeanWerks has three primary elements. The first is financial training. New employees go through four one-hour courses covering topics including the time value of money; project management; income statement, balance sheet and cash flow; and ratios such as debt to equity and gross profit to operating expenses (GP/OE). Mr. Leland says it is important that employees have a basic understanding of these concepts, especially as they are applied to his business, for the OBM model to work properly.

The second element is feedback, especially with regard to GP/OE, which is an easily understood profitability metric. When Mr. Leland became a manager for his previous employer, he created a large board list-

ing key company financial information that was updated weekly. He did the same when he started LeanWerks, establishing a GP/OE board located in a prominent area of the shop that was updated daily. That board was recently replaced with a large monitor showing a simple spreadsheet containing GP/OE information.

All shop machine tools are listed across the top of this spreadsheet. The rows below that include the gross profit that individual machines produced each day of the month. An overall GP/OE ratio is calculated for each day by taking the sum of the gross profits of all machines that ran that day and dividing it by the daily operating expenses (including expendable tooling). The shop makes money on days in which the GP/OE ratio is higher than 1, loses money when the ratio is less than 1 and breaks even when it is 1.

This feeds the third element of OBM at LeanWerks: profit sharing. The spreadsheet includes a column with a running, month-to-date GP/OE ratio. If at the end of the month the GP/OE is 1.2 or higher, then part of the monthly profits is shared with the employees. Specifically, each 0.01 increment higher than the 1.2 value is multiplied by \$400 to determine the total amount of monthly profit that will be shared with hourly employees.

Mr. Leland says sharing this type of information enables LeanWerks to be a transparent, more "flattened" organization. Even though there is a company hierarchy, accountability flows up as well as down, with OBM creating a sense of "psychological ownership" that leads to a more equitable distribution of stress. As president, Mr. Leland still feels the most stress, but now others also worry when the GP/OE ratio looks bad, and that's a good thing. In addition, OBM provides a clearer sense of how an employee's performance, as well as his/her suggestions for improving shop processes, impacts the bottom line. Conversely, there is no place for non-performers to hide.

OBM is not a panacea, however. Mr. Leland has had employees move on when business financials weren't terribly strong. Similarly, while morale is high when the company experiences a profitable run, it sometimes slumps when the numbers look bad. Mr. Leland says he is often humbled by his employees' effort and loyalty when morale is low, however, as was the case during difficult business conditions in 2009. In fact, he's not sure the company would have made it through that tough stretch without OBM.



## CALLING ALL POTENTIAL EXECUTIVE COMMITTEE CANDIDATES

In its ongoing mission to find qualified members for the Executive Committee, the Nominating Team asks for your help in identifying potential candidates.

We have comprised the below list of attributes or qualifications of an Executive Committee member, both internal and external. If you know someone fit for the position, please forward their resume, including any past or current board work they have done, to the Nominating Team. For more information, contact Nominating Team Leader Bob Mosey at [bob@moseys.com](mailto:bob@moseys.com).

### EXECUTIVE COMMITTEE MEMBER ATTRIBUTES

- Be an experienced, effective board member
- Independent thinker
- Learn / understand the purpose of the industry and association
- Support the purpose of the organization
- Understand the role and responsibilities
- Ability to think outward and forward - not inward and backward
- Focus on the whole, not just parts.
- Be disciplined, attend meetings and follow the bylaws and rules
- Be part of, and responsible for, the effectiveness of the board
- Focus on the make-or-breaks while limiting trivia
- Willing to be judged based on mutually agreed to performance criteria

### BOARD SERVICE

- Help establish the annual board focus
- Be prepared to actively participate
- Partner with CEO
- Open to diverse opinions
- Able to work with fellow board members
- Able to support final choices of the board
- Ensure you are working on the right NTMA agenda
- Determine what is needed to be a more effective board
- Be a major resource to industry and staff if called upon

## HOW TO INCREASE ENERGY EFFICIENCY WITH MACHINE TOOLS

Machine tools include numerous motors and auxiliary components. Energy consumption varies significantly during operations. The main spindle drive and the coolant system, for example, work near rated power while roughing at a high stock-removal rate, but power consumption during finishing is significantly lower. Close interdependence exists between individual components and subassemblies on the one hand and productivity and quality measures on the other. From the process itself to individual component power consumption, savings potential can be evaluated and measures defined for more efficient energy use.

One area of potential savings comes from the machine tool base load, which consumes energy even in nonproductive phases. The base load is determined substantially by the machine's auxiliary components. Besides use of energy-efficient motors in these components, many opportunities for reducing the base load can be found. Some energy consumers, for example, can be switched off by the machine control during nonproductive phases.

Scrap inevitably increases energy consumption per good part. Manufacturing with accuracy from the very first part can therefore be decisive for energy efficiency. Machine designs with balanced thermal behavior and precise position measuring technology have a distinct advantage here.

### ENERGY DEMAND DURING MILLING

Power requirements of a milling process fall into the following consumer groups:

- Cooling lubricant processing
- Compressed air generation
- Electrically powered milling-machine auxiliary components
- CNC control package with main spindle and feed-axis motors

Proportionally calculated energy for lighting, ventilation, and air conditioning must be added to these groups. Milling process energy demand depends primarily on the size of the milling machine and the machining task.

Dry machining has great potential for improved energy and resource efficiency. In many milling applications, however, doing without cooling lubricant increases scrap rate and, therefore, raises mean energy

consumption as well.

Compressed air is required for minimum spindle lubrication, tool changing, and work piece cleaning. Small quantities are required as sealing air. Mean compressed air power changes only slightly across production readiness, roughing, and finishing.

Machine electricity consumers include the CNC control with main spindle and feed-axis motors, as well as numerous auxiliary components, including the pallet changer and cooling, hydraulics and automation systems.

### DRIVE COMPONENT EFFICIENCY

Spindle and feed-axis motors are among the central components of a machine tool. Drive-component energy efficiency depends on the ratio of delivered power to consumed power. The network of drives converts consumed electrical energy to delivered mechanical power. Drive network components include a power supply module, drive modules, motors and mechanical components. Data on efficiency typically refer to the rated power. For other rated values, individual component efficiency can vary significantly. Supply modules and drive modules can attain efficiency values of more than 95%.

Comparing power consumption during rough-face and circular-pocket milling reveals that feed drives consume only a small share of the CNC's total power usage. On the other hand, spindle selection can significantly affect energy consumption. If a spindle drive operates far below its rated power, the drive's intrinsic losses increase in proportion, with negative effects on the energy balance. If the spindle limits the maximum possible metal removal rate, the milling process inevitably takes longer. The result: energy efficiency decreases due to the base load generated by the auxiliary components. Potential also exists for more efficient design of milling processes through consideration of spindle-motor efficiency, for example by using synchronous instead of asynchronous motors.

### REGENERATIVE SUPPLY MODULES

Every drive's acceleration requires a braking process in return. Energy from the drives' moving masses is largely reconverted to electrical energy. In a non-regenerative

supply module, kinetic energy released by braking is converted to heat by the braking resistors. A regenerative supply module returns this energy to the power grid. However, the path required for returning the energy and the necessary components for smoothing the grid power generate losses even when the drives have no power requirement. Power loss increases slightly even when power is not being regenerated. Thus, a regenerative supply module operates more efficiently than a non-regenerative module when the regenerated energy more than compensates the higher power loss. Machine operation therefore determines what type supply module to employ.

Tool change frequency also impacts this decision. In one example, a milling operation at 15 kW is interrupted cyclically by a tool change. Starting the spindle requires peak power of approximately 60 kW. A regenerative supply module returns 48 kW to grid power. High metal-cutting power requirements mean that the mean-input power sinks the more frequently the milling process is interrupted by tool changes.

A regenerative supply module works more efficiently as soon as the time interval between two tool changes is less than 100 seconds (equals 0.6 tool changes per minute). In processes with many tool changes per minute, a regenerative supply module often proves to be the better choice. During contour milling with infrequent tool changes, the advantages are on the side of the non-regenerative system.

### DEACTIVATION OF AUXILIARY COMPONENTS

In the ready condition, energy use of several consumer groups is only slightly reduced. Therefore, these nonproductive phases must be kept as brief as possible. With machining centers for smaller production batches, energy consumption can be significantly reduced by the selective deactivation of auxiliary components. Beyond this, potential savings result from the use of energy efficient pumps in the coolant and lubricant circuit.

However, consistent switch-off of auxiliary components -- such as hydraulics and spindle cooling -- or of the compressed-air supply can also have a deleterious effect. If sudden removal of waste heat from auxiliary components, or of temperature-stabilizing



media, leads to thermal displacement in the machine frame, scrap can result. Selective auxiliary component switch-off therefore functions best on machines with little inclination to thermal displacement.

CNCs can be the central control unit for machine tool energy management, taking advantage of special PLC functions for linking events in the production process (such as NC stop) with outputs for controlling auxiliary components. Delay times can be assigned to events so that, for example, motors can be locked and disconnected from current after standstill. Functions for deactivating various auxiliary devices, axes, light in the working space, etc., can be generated on this basis. These basic functions are the responsibility of the machine tool builder. For users, it is helpful to adapt energy management to specific usage habits.

#### MEASURING SERVO-CONTROLLED MOTORS

In the control loops of spindle motors and direct-drive feed axes, even the smallest feedback signal disturbance can result in large motor current fluctuations.

Signal interpolation of a position encoder includes short-range deviations within one signal period (interpolation error), typically of approximately 0.5% of the signal period. If interpolation error frequency increases, the feed drive can no longer follow the error curve. However, additional current components are generated by the interpolation error. Therefore, if torque remains constant, energy consumption and motor efficiency get worse. Additional energy required is converted to heat that must typically be dissipated by a motor cooling system, which itself consumes energy.

Comparing the effects of an optical and a modular magnetic encoder on a direct-drive rotary table drive illustrates the point. An angle encoder with 16384 lines generates only barely noticeable motor-current disturbances and generates little heat. Because of the magnetic scanning principle, the encoder has notably fewer signal periods. Significant disturbances occur in the motor current with the same controller settings. For example, at a shaft speed of approximately 30 min<sup>-1</sup> the effective value of the current is 15 A greater than for an optical encoder. The result is greater motor heat generation.

An encoder with low signal quality can lead to greater motor energy loss. The additional energy requirement for active cooling also has to be included in the energy balance. To increase the energy efficiency of the motor, the encoders need high-quality

signals.

#### MINIMIZING SCRAP WITH A CLOSED LOOP

Bad parts reduce process productivity and therefore contribute to energy costs per manufactured part. A primary cause of bad part generation is thermal drift of feed axes running on recirculating ball screws.

The temperature distribution along ball screws can be changed very rapidly by feed rates and moving forces. On machine tools in a semi-closed loop the resulting changes in length -- typically: 100 µm/m within 20 minutes -- can cause significant workpiece flaws.

If a linear encoder is used for slide position measurement, an increase in the ball screw's temperature has no influence on accuracy. This is referred to as "operation in a closed loop" because drive mechanical errors are measured in the position control loop and are therefore compensated. For more information, visit [www.grainger.com](http://www.grainger.com).

#### COMPONENTS OF MACHINE TOOL ENERGY EFFICIENCY

Power consumed by a CNC control with feed-axis and spindle motors frequently comprises as much as 30% of the total required for a metal-cutting process. Auxiliary components play a dominant role in the energy balance.

Whether a CNC control operation benefits from energy recovery to line power depends on the frequency of tool changing during milling operations or of workpiece changes during turning.

Further energy savings are possible depending on whether spindles can be closely adapted in their speed and torque to the machine's range of operations. If a universal spindle design is required, its motor may have to run at low efficiency rates—with

the expected consequences for energy consumption.

Position encoder selection can have a decisive impact on spindle-motor and direct-drive efficiency. Insufficient resolution and accuracy generate high current values in the position control loop. Position encoders with high line counts are essential for servo-controlled drive efficiency.

Linear encoders increase accuracy and therefore contribute to precise and reproducible machining. This makes it possible to reduce production waste and energy requirement per good part.

Processing cooling lubricants, supplying compressed air and hydraulics, and accomplishing cooling command a dominant share of total power used. Efficient pump motors save significant amounts of energy. With the relatively high base load of machine tools, minimizing nonproductive phases is a high priority.



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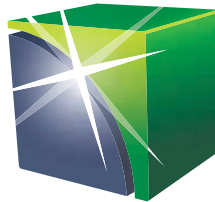


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