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K-D MACHINE & TOOL INSTALLS NEW CITIZEN A32 SWISS TURNING CENTER

K-D Machine & Tool, Inc., Union, Missouri, has recently installed a new Citizen A32 Swiss turning lathe.—p12

HOW TO CHANGE ASSOCIATION LEADERSHIP FOCUS AND GET SHORT AND LONG TERM GROWTH

Most associations have a ticking bomb and they don't really know it.—p17

AWARD-WINNING TARPON SPRINGS HIGH SCHOOL GETS AN EARLY CHRISTMAS PRESENT

SME Education Foundation facilitates \$68,000 Haas Automation entrustment to the Academy of Engineering at East Lake High School.—p19

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Thornton Academy tried old trick to train students for new technology.—p20



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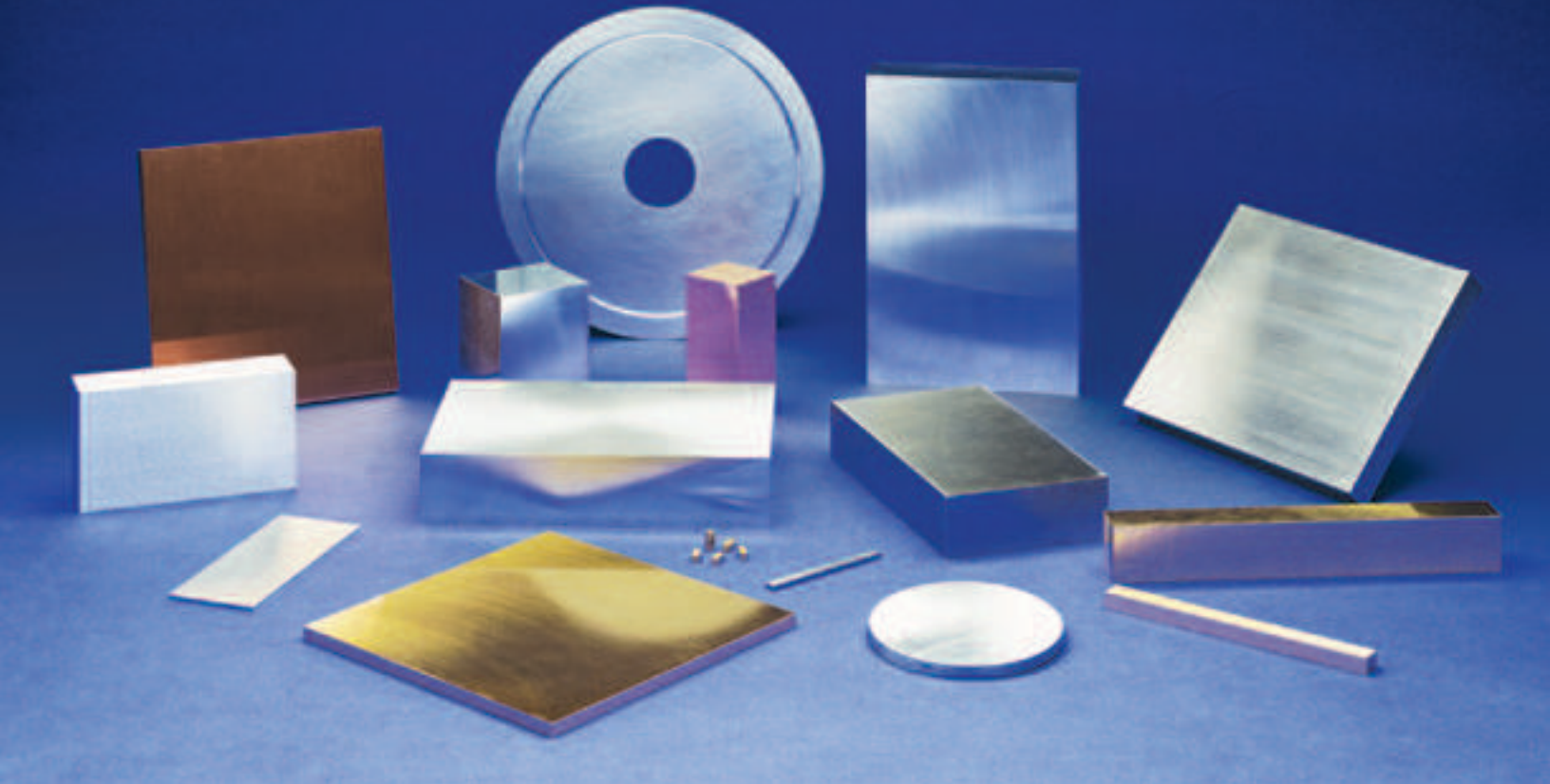
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CHAIRMAN'S CORNER

ROBERT MOSEY / NTMA CHAIRMAN OF THE BOARD

December was very quiet for me on the NTMA front. With most chapters dark for the month, I had no visits scheduled. Aside from our regular Executive Team calls, there were no meetings to travel to or attend. All of this free time allowed me to reflect on what has been accomplished in 2013.

I cannot put into words how impressed I am with all of the great stewards we have in our association; Chapter Officers, Team Leaders, Team Members, Trustees. And let's not forget the Executive Team. There has never been a more dedicated group of business owners freely giving of their Time, Talent AND Treasure, all in an effort to be good Stewards of The Manufacturing Industry.

I have met some of the most interesting people and seen some wonderful examples of American ingenuity. I have seen parts being manufactured from microscopic to the size of small houses. Parts that take milliseconds to make and parts that take days to machine. But most exciting and heartwarming to me were the people. Our members, at least all of the ones that I met, are shining examples of what a Steward of our Manufacturing Industry should be. These folks go above and beyond to ensure that our industry continues to prosper and grow. They are training the next generation of machinists. Some are going so far as to start schools at their own expense just to provide our industry with future workforce. Some have become involved in politics and given of their time to further advocate for our industry. Others have invested time and money into the NRL, not just to funnel young people into their shops, but for a much greater cause; to make aware the world of manufacturing to the people who will someday be our mechanical or electrical engineers, designers, mechanics,

our next customer, and yes, even machinists.

On many occasions, I have had the privilege of breaking bread with these people. I have heard heartwarming stories about how they acquired their businesses and how they plan to pass them on. Personal hardships have been overcome, some through the help and camaraderie of fellow NTMA members. To me, these are the most touching. This association is made up of the best of the best. I am truly convinced of that.

I ask myself if I have been a good steward of the NTMA this year. I think I have. I have certainly tried. Some may say that I have been a good chairman. Maybe, but I want you to know that is it not about the Chairman. It is about the entire Executive Team. These five people have nothing on their mind but the success of the NTMA and its members. You have to know that each member is an important part of the success of the association. Even the new ET Team Member each year brings invaluable insight to the team just by asking the tough questions. We all bleed NTMA blue.

I also don't want to forget our President, Dave Tilstone. For those who do not know, Dave has led our association through one of the most difficult times in NTMA history. He has such a passion for our industry and a most sincere desire to see our members grow and be successful. He has assembled a very competent staff and continues to grow and nurture their talents. All of his work over the last several years will pay dividends for years to come. We should all be proud and thankful that we have someone like Dave at the helm.

When I look at the NTMA accomplishments that been made over 2013, the list is long. There is the completion of the NTMA-U online Machinists Training pro-

gram, a complete update of the NTMA Blue Print Reading book, reinvigoration of the Technology Team, continued progress of our advocacy work with One Voice – our voice just keeps getting louder! And then there is the spectacular growth of the NRL with the addition of Maureen Caruthers, making the NTMF whole again on its \$1Mil investment into the Insurance program. Due to our spectacular President and his staff, we are enjoying the best economic times for the NTMA which has allowed us to rebuild many of the programs that were dying. We are paying back the debt to ourselves and have been able to establish a Reserve Fund that will protect the association from future financial hardships.

By the time March rolls around, I will have visited 20 of our 37 chapters, some multiple times. I have visited somewhere around 60 member companies, travelled to 19 states on approximately 75 flights and connecting flights. There have been the bi-weekly (sometimes weekly) two hour Executive Team calls and countless hours writing these Chairman Corners, which while seemingly a burden, has left me with a great journal of my year as NTMA Chairman.

Some of the highlights for me were getting to visit our members, working alongside some real leaders like Ron Overton, Roy Sweatman, Grady Cope, and Roger Atkins. Helping to mentor in the new leaders like Ted Toth, Herb Homeyer, Dave Sattler, and now Ken Seilkop. Establishing a Reserve Fund, and attending the NRL National contest. The Team Leader's meeting and the Chapter Leadership Summit are close to my heart as they have become a stepping stone to improve the communication between National and its Chapters. We have come a

CONTINUED ON – P5

THE RECORD

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long way in the last couple of years. There is still much work to do but I know this association will succeed.

I will leave you with one final note. Contrary to popular belief, the Stewardship logo below is NOT a fish! It is a SHIP! StewardSHIP! Get it? (Imagine a smiley face here). In the mean time, keep up the good work in your own chapters and communities! Farewell!

Peace,

ROBERT MOSEY / CHAIRMAN

A handwritten signature in black ink, appearing to read "R. Mosey".



PS. Next month I will be reporting on my visit to Tampa for the ET, Team Leader's, and Chapter Leadership meetings as well as my visit to the North Texas and Arizona Chapters and the soon to be new chapter in Albuquerque, NM. This article will not be in the Chairman's Corner as it will be Ted's turn to share with you each month so look for it buried somewhere deep inside the ever growing Record.

"Do we have VERICUT?"



"I started in my new position last Friday. The first thing I asked was: Do we have VERICUT?"

Jacques Ouellet, CEO, NSE-Automatech

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VERICUT

The logo for CGTech, featuring the word "CGTech" in a stylized font with a blue and green wave-like graphic.

2014 STEP Award Honorees



The Manufacturing Institute announced they will award 160 Honorees with the Women in Manufacturing STEP (Science, Technology, Engineering and Production) Award. The STEP Awards honor women who have demonstrated excellence and leadership in their careers and represent all levels of the manufacturing industry, from the factory-floor to the C-suite.

On February 6, The Manufacturing Institute will recognize these Honorees from over 110 companies at the STEP Awards in Washington, D.C. The STEP Awards program will highlight each Honoree's story, including their leadership and accomplishments in manufacturing. By telling the real stories of these women, we

will inspire the next generation of talent to pursue careers in the industry and support current female talent within the manufacturing industry.

We are excited to share with you the news that your fellow Board member Kimberly Arrigoni has been selected by the Manufacturing Institute to be a 2014 STEP Award Honoree. She will be recognized at the STEP Awards next week in Washington, DC, along with familiar face and NIMS supporter, Shannon Sweatman. Many congratulations to Kimberly and Shannon.



SHANNON SWEATMAN
DIRECTOR OF HUMAN RESOURCES
SOUTHERN MANUFACTURING TECHNOLOGIES

"Besides the fact that manufacturing produces the products that are used to protect our troops and fend off the bad guys, it also creates wealth and a stable, growing economy. Manufacturing creates good, high paying jobs, and has a higher multiplier effect than any other industry."

Shannon Sweatman

Shannon has been instrumental in improving HR overall, including training, procedures and employee satisfaction. Her recruiting talents have benefitted the organization and she's acquired grants that allow employees to enhance their skills. Shannon grew up in a manufacturing environment, working for the organization part-time in high school and college, and as her career progressed she has taken on more and varied responsibilities, including the development and management of the computer network, cost of quality reporting, and participating as a member of the management and strategic planning teams.

Shannon is active with NTMA (National Tooling and Machining Association), and has held all of the of the chapter officer positions, including President. She has been on various teams with NTMA, was team leader for three years for the National Robotics League and currently is active on the Government Affairs Team. She has lobbied with Congressmen and Senators, and met with the Assistant Secretary of Labor regarding workforce development.

Shannon is passionate about skilled labor development in the Tampa Bay area. She works with HCC as they develop a manufacturing training program, and she serves as chairperson for the industry advisory group to Middleton High School's STEM Magnet programs. She is well-regarded by industry peers, NTMA members and educators.



KIMBERLY ARRIGONI
CONTROLLER
HABERMAN MACHINE

"Considering a career in manufacturing versus 'just trying it on for size' is an investment that one makes to become an artist of a different level. Making parts and impacting the world is worth the energy it takes to learn the lifelong disciplines that go along with this industry."

Kimberly Arrigoni

Kimberly's focus is on growing her people, helping them switch from viewing work as a "job" to an emphasis on "career". To help employees become better qualified, she instituted an in-house apprenticeship program registered with the Minnesota Department of Labor and Industry that utilizes nationally recognized NIMS Credentials to certify employee capability. The program, using trainers from within the company, as well as outside tutors for math and special topics, is currently engaged with over 20 apprentices, upgrading their performance from operator to machinist with the hopes of reducing their skills gap. By growing the capability of her team, Kimberly recognizes that Haberman Machine will be better prepared to deliver the challenging products that their customers require.

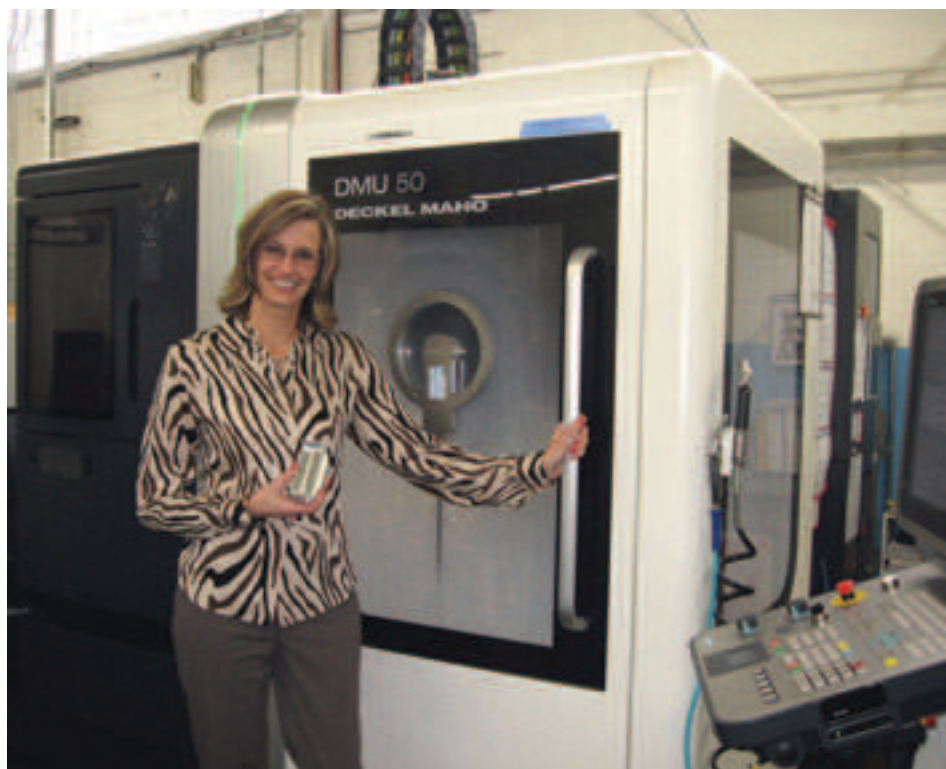
Kimberly credits her parents with instilling in her the desire to do whatever it takes to keep the business going. They provided mentorship in growing the business, and she has learned to be open to the wisdom and experience offered by others, and in turn share her own talents with those who need it.

Kimberly is also dedicated to her family, a feeling she brings to the organization as she supports employees and their families. Aside from actively participating in her sons' lives, she finds time to participate in a range of local, regional and national boards where others benefit from her thoughtful commitment to growing future resources.





Tanya DiSalvo, President of Criterion Tool, and Criterion's 5-Axis milling machine in their CNC Milling Department.



2nd Women in Manufacturing STEP Awards Recognize Women for Excellence in Manufacturing

The Manufacturing Institute Will Honor Tanya DiSalvo, President, at Criterion Tool



The Manufacturing Institute announced they will award Tanya DiSalvo with the Women in Manufacturing STEP (Science, Technology, Engineering and Production) Award. The STEP Awards honor women who have demonstrated excellence and leadership in their careers and represent all levels of the manufacturing industry, from the factory-floor to the C suite.

"Being passionate about manufacturing is about always pushing the envelope. Motivating the team to rise to every challenge and tackle the toughest jobs on sophisticated equipment to solve customer issues. I love the challenge of getting Team Criterion to think outside the box, every day, to provide a solution." Tanya DiSalvo

"These 160 women are the faces of exciting careers in manufacturing,"

said Jennifer McNelly, president, The Manufacturing Institute. "We chose to honor these women because they each made significant achievements in manufacturing through positive impact on their company and the industry as a whole. "The STEP Awards are part of the larger STEP Ahead initiative launched to examine and promote the role of women in the manufacturing industry through recognition, research, and best practices for attracting, advancing, and retaining strong female talent.

A recent survey from Deloitte and The Manufacturing Institute found that nearly 70 percent of American manufacturing companies have a moderate to severe shortage of available, qualified workers.

On February 6, The Manufacturing Institute will recognize 160 recipients

of the STEP Awards at a reception in Washington, D.C. The STEP Awards program will highlight each honoree's story, including their leadership and accomplishments in manufacturing.

ABOUT CRITERION TOOL

Criterion Tool is "highly engineered precision-machined components". We support the "no failure" industries of medical device, aerospace, defense, electronics, nuclear and photonics. Criterion Tool's niche is in the imaginative manufacturing of prototype and production components for Class II and Class III medical devices and precision high tech defense/photonics components for development, testing, proof of concept and clinical trials. For more information, please visit www.criteriontool.com.



NTMA OF SOUTHERN CALIFORNIA

SELFISHLY FUELING OUR INDUSTRY WITH REALLY GOOD PEOPLE
STORY & PHOTOS BY SEAN BUUR

"The misnomer is that there is no manufacturing taking place in America," explains Terry Kerwin, Executive Director of Marketing and Admissions at NTMA Training Centers of Southern California. "The jobs are there, but you do have to be a skilled person to go in and get those jobs now." NTMA Training Centers of Southern California has been training machinists for 45 years and boasts a 90% graduate job placement rate at their primary Santa Fe Springs, Ca. campus and 85% at their satellite campus in Ontario, Ca. In fact, "We have so many graduates and so many companies we work with, like SpaceX and Rickenbacker Guitars, placement isn't a problem."

Over the last decade the number of students graduating from NTMA of So-Cal has climbed from an average of 10 in a graduating class to an average of 40 at each campus. Thanks to the leadership of the current administration and faculty, NTMA has more students and more graduates than anyone else in the industry. Other vocational programs offer training in a variety of industries, but NTMA is geared to one industry, machining. "One benefit of vocational education is that you get ready to work faster," tells Terry. "There are not a lot of pure manufacturing schools out there to pick from, but plenty of community college programs. While they have great stuff going on, there is just no way in 7 months that you will get this kind of training. Machining is just part of their programs, but it is what we do." There is no question that the way people are taught has changed over the last 20 years. It used to be that someone could



The Santa Fe Springs quarterly job fair had 30+ companies on hand with at least 300 students checking out the job openings.

apprentice for a time and learn everything you needed to know about that environment, but it isn't that way any more. "The world has changed and you can't go in and run the Zeiss equipment without having some sort of training.

Companies are not going to let you push a button on their expensive CNC machines without training. We have that training," continues Terry.

The hard part is educating others about manufacturing and explaining how great of an industry it is to be in. "The general public doesn't understand what we do and what opportunities exist in the industry," tells Terry. "I love it when they come in here at 18 years old



NTMA utilizes NRL robot battles to generate interest in their machinist programs.

and I explain what a possible starting salary breaks down into hourly. It puts it into perspective for them." NTMA has realized that one good way to generate interest in manufacturing is robotics, more specifically robot fighting. NTMA built a regulation arena to host tournaments for the NRL National Robotics League and donates build kits to local High Schools and Community Colleges. "We've been working on the Training Centers Robotics League for so long now," beams Terry. "We are so proud of it. The kids' just love building and fighting their bots. It teaches them so much from electronics to real world problem solving skills." The cage is located on the main shop floor at the Santa Fe Springs campus and will host another regional bout in the early part of the year before teams go to the Nationals in Cleveland, Ohio later in the spring. The first two events were standing room only and a huge success.

If machining is what you want to do then NTMA is the place you want to be. One look at the new 42,000 sq.ft. Santa Fe Springs training facility and you see right away the variety of CNC machines students are trained on. The space consists of 9-classrooms, multiple computer laboratories, a large machine shop, a student break area, and administrative offices. Major equipment in the shop and labs



Michael Flynn instructs advanced students on the Zeiss DuraMax CMM. The CMM was added last year to the curriculum and has been a great addition to the program.

include: Cad/Cam computer workstations, 16-vertical mills, 16-lathes, 5-surface grinders, 6-drill presses, 2-Wire EDM machines one of which is entrusted by North/South Machinery & Mitsubishi, 13-CNC machining and turning centers consisting of: Haas, Fadal, & Fanuc controls, surface plates, and an inspection room with the necessary inspection equipment with an entrusted Zeiss CNC CMM. The classrooms are designed to accommodate a variety of technological needs. "We have a Zeiss DuraMax in place at both NTMA locations here in Southern California," explains Drew Shemenski, manager from Zeiss's west coast tech center. "We picked the DuraMax for a couple reasons. First off it is durability. The DuraMax is designed to live in a manufacturing environment and it is an ideal machine to bring inspection to the shop floor. Second, curb appeal. This machine is not intimidating. Students can walk right up to it and feel at ease right away, it's not too large and does exactly what it needs to without going overboard on the bells and whistles." The DuraMax is an affordable, entry level machine, so there is a good chance



Students learn in a hands on environment on CNC mills, lathes, wire EDM, grinders and CAD/CAM workstations.

that graduates will see one in the work place. Having a familiarity is great for the student and the employer. "We want students to be able to walk into a shop and see a CMM and know instantly what it is. Doesn't matter if it is ours or a competitor's they know what it can do and they have experience using one."

NTMA's 7 month Machinist Training Program consists of five modules. Each module is made up of math, blueprint reading,

classroom instruction and hands on work on the shop floor. The further through the program the more time students spend out on the machines. The advanced course is offered to graduates of the machinist training program and to people already working in the industry who need to further their skills. NTMA also partners with the manufacturers on machine specific classes like a CMM course offered by Zeiss. You have to demonstrate a certain level of understanding to qualify for taking the course. They are designed to elevate a student's knowledge to the next level of understanding through practical application, hands on utilization and classroom learning. NTMA implemented the Zeiss CMM into their advanced program 18 months ago and are on their second run of the CMM class. NTMA faculty handles the instruction in the advanced class, but Zeiss is currently providing the training in the CMM specific course. "We are working towards NTMA being self sufficient once we fine tune the curriculum," tells Drew. "It is still a new undertaking

and something we feel strongly about. The industry has been very supportive and we had people come up to us at WESTEC just because they heard we had machines in place at NTMA. For us it is a long game. It isn't about selling ten more machines a year, it is about supporting the industry and making sure that quality is part of the industry." Traditionally there has been segregation between quality and production, but that wall is slowly eroding. Zeiss and NTMA are helping to grow the idea that production and quality are two sides of the same coin and the next generation of machinists coming out of NTMA will have a much better understanding of that.

With lifetime job placement assistance, NTMA's graduates can always return for assistance finding new or better employment. "We send out emails, texts, tweets, everything social media has to offer to alert past and current students of things going on here at NTMA," tells Social Media Administrator Bree Higgins. "Career Services really gets the word out to graduates and companies

for the job fairs, but mostly they call us and ask when the next one is." The most recent November job fair saw the upstairs meeting hall filled with over twenty companies looking to hire from NTMA's qualified graduates. For example, the Hartwell Corporation, who was in attendance for the November fair offers (according to their website) competitive salary and benefits packages including medical, dental, vision and insurance, paid holidays, vacation and sick time as well as a 401(k) investment program. It's hard to go wrong when companies like that are searching for you.

NTMA is a nationally accredited non profit organization whose sole purpose is to serve the machining industry," concludes Terry. "But I like to say we are selfishly fueling our industry with really good people." It looks like they are with an average of 80 graduates every 6 weeks heading into the workforce to machine their futures and ours.



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COTTON FIBER FINISHING STICKS PROFILE SHAPES MATCH OPENINGS AND HOLES

An expanded line of cotton fiber finishing sticks for deburring and finishing precision sticks cast or machined parts with tough to access areas is being introduced by Rex-Cut Abrasives of Fall River, Massachusetts.

Rex-Cut® Cotton Fiber Finishing Sticks are made from reinforced nonwoven cotton fiber with either aluminum oxide or silicon carbide abrasives which are pressed and bonded together into different profile shapes and sizes.

Now offered in a new half-round shape and as full-rounds and squares to match openings and hole details, they are ideal for removing exit burrs in difficult to reach internal spaces and will not change a part's geometry.

Suitable for use by hand or in reciprocal rotary tools, Rex-Cut® Cotton Fiber Finishing Sticks are available in 1/8" to 1" dia. round and square sizes in 4" to 6" lengths, with 24 to 320 grain sizes, and soft, medium, and hard bonds. Applications include deburring, edge-



breaking, and finishing precision cast and machined parts, molds, tools, and dies.



4 STEPS TO GAIN CONTROL OF YOUR INBOUND SHIPPING

Reducing inbound shipping costs is one of the easiest, yet most overlooked ways to reduce your overall transportation expenses. Like many small businesses, you may not currently have control over the shipments coming into your business. It is not uncommon for small businesses to let the vendor shipping the product to you arrange the carrier, select the mode of transportation, and manage the actual pickup and delivery times. In some cases, the convenience of this sort of arrangement may work well for your situation. However, that convenience comes with a cost: you may find that you are paying significantly more for inbound shipping than if you had arranged for it on your own.

INBOUND SHIPPING CHALLENGES

Why is getting control of your inbound shipping so difficult? The typical challenges that businesses face in trying to get the upper hand on their inbound shipping costs are as follows:

- Lack of visibility and knowing what's in transit – when your vendors control your inbound shipping, it's very difficult to know how and when your orders will be shipped to you.
- Lack of control to specify the ideal carrier and mode of transportation – when you don't have the control, your orders could be shipped using less-than-ideal, or more expensive, modes of transportation.
- Rising freight costs and limited resources to manage inbound shipping – with inbound shipping costs accounting for 40-60% of most businesses total sales, this is a significant cost that's often difficult to tackle in this age of shrinking staff sizes and multiple responsibilities.

In this e-paper, we'll discuss 4 steps you can follow to better understand your true inbound

shipping costs, and the cost savings opportunities you may be missing.

- 1) Find a 3PL or shipping partner that has inbound shipping management experience
- 2) Analyze your inbound shipping to determine actual shipping costs and opportunities for savings
- 3) Negotiate the best possible inbound shipping rates with your carriers
- 4) Create inbound routing instructions and send them to all of your key vendors

Since you are the buyer of the goods, you can and should determine how those goods are shipped to you. When you control and route your own inbound shipments, you have an excellent opportunity to lower your costs.

STEP 1: FIND A 3PL PARTNER

For many small businesses, there are distinct advantages of working with a 3PL partner. If you're looking to gain control of your inbound shipping, make sure you find a partner, like PartnerShip, that has demonstrated experience and established tools for helping businesses manage their inbound.

Additionally, most 3PL freight partners are able to aggregate the freight volume of many small-to-medium sized businesses and help them negotiate better discount rates and terms. They can also provide additional value-added services, sometimes at no additional cost, that are designed to lower your overall logistics expenses.

STEP 2: ANALYZE YOUR INBOUND

In order to understand your true, inbound shipping costs, you first need to complete a thorough shipping analyses by reviewing recent product invoices from your

key suppliers. Most businesses may be surprised to find that vendors often add 2-10% to the value of their purchased merchandise.

When reviewing your product invoices, here are some terms you should keep in mind:

- Free Freight – there really is no such thing. Look closely as your vendor has probably buried their shipping costs into the purchase price of your merchandise.
- Prepaid and Add – this means your vendor is paying the freight for your shipment. It also means they are controlling the routing and adding this expense – often with additional “handling fees” – to your product invoice.

PREPAID VERSUS COLLECT

One of the main objectives in controlling your inbound is working with your vendors to change the shipping terms from “prepaid and add” to “inbound collect.” When you successfully change the terms to collect, you have essentially taken control of your inbound shipment since you are now paying the freight charges on

Scenario A	Scenario B
From: Sparks, NV 89431	From: Sparks, NV 89431
To: Chicago, IL 60628	To: Chicago, IL 60628
Weight: 300 lbs.	Weight: 300 lbs.
Freight Class : 150	Freight Class : 150
Vendor Prepaid & Add: \$1065.84	Inbound Collect: \$639.51

the order.

In general, there are many benefits to having your inbound shipments routed collect, such as consistency and savings on your inbound shipping costs, as shown in the table below.

It also reduces the number of carriers from different suppliers arriving at your receiving dock every day. When you control the routings, you control how and when carriers deliver to your door, making it easier to maximize your staff's efforts.

STEP 3: NEGOTIATE BETTER RATES

As mentioned earlier, when you work with an established 3PL freight partner (either directly or through an industry or association shipping program), you will generally be able to secure your business the best possible inbound shipping rates. An experienced 3PL partner will be able to aggregate your needs with the needs of hundreds or thousands of small businesses just like yours, in order to secure you the most competitive deals.

Be careful of “fly-by-night” freight brokers or 3PLs that work with thousands of carriers. Often times the quality of the service you get from say, “Bob's Trucking,” will be comparable to the cheap prices you pay. So be sure you engage with a 3PL that only works with the most reputable carriers in the industry, such as UPS Freight, YRC Freight, Con-way Freight, FedEx, etc.

STEP 4: CREATE INBOUND ROUTING INSTRUCTIONS

With your 3PL partner relationship, your analysis of product invoices completed, and your competitive inbound shipping rates in hand – you're now ready for the final step of creating inbound routing instructions and sending them to all of your key vendors. This is where your 3PL partner with either impress or disappoint.

A 3PL with inbound shipping experience, will be able to help you create your inbound routing program with the following services:

- Identify and manage lists of key vendors
- Create clear inbound routing instructions for each vendor
- Draft and send routing instruction letters to each of your

key vendors on your behalf

- Monitor and report on vendor compliance
- Consolidate your billing and report to you the savings you are receiving through the program

CONCLUSION

Inbound shipping costs are a major expense item for many business, particularly when you leave the control up to each of your vendors. If approached correctly, an inbound shipping management program can be an easy way to reduce your overall transportation expenses.

Inbound shipping programs are best managed through a third-party logistics provider. A good 3PL can help you analyze your product invoices for savings opportunities, develop routing instructions for your vendors, monitor compliance, and audit and consolidate invoicing to ensure you're saving the most on your inbound shipping.

For help getting started, call PartnerShip at 800-599-2902 or email sales@PartnerShip.com. You can also let PartnerShip provide you with a free, no-obligation inbound shipping analysis. Let us help you put together a winning strategy for you to gain control of your inbound shipping!




ST. LOUIS CHAPTER MEETING PHOTOS




Photos of St. Louis Chapter's January 7 meeting. Above: Chapter President Nick Berilla, Hartwig Inc., welcomes new member Hubbs Machine & Mfg. with company president Rick Benward. Right: Fred Miller, No Sweat Public Speaking





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K-D Machine & Tool Installs New Citizen A32 Swiss Turning Center

K-D Machine & Tool, Inc., Union, Missouri, has recently installed a new Citizen A32 Swiss turning lathe.



(L-R): K-D Machine & Tool's Chris Hahne, sales manager/estimating; Jerry Carlin, special project manager; Eric Wildebrandt, general manager and Kevin J. Doerr, president.

The 23-year-old job shop offers precision machining, fabrication and painting. It is a one-stop shop, able to start a project with prototyping and take it through, production, assembly and finishing.

The new Citizen, purchased through McClain Tool & Technology, was needed to meet customer demand and keep up with growth. It features dual spindles, a sliding headstock, 8K spindles and 23 tools.

"McClain's service has been perfect," noted K-D's owner, Kevin Doerr, a 38-year industry veteran.

The Citizen joins ten other pieces of CNC equipment in K-D's 21,000-sq.-ft. facility. The ITAR registered firm has 24 employees that work with the company's full range of CNC and manual machining, fabrication, welding (MIG & TIG), inspection and painting equipment.

The firm serves a wide range of industries across the globe. It works with all steels (including tool steel), aluminums, titanium and plastics. It can handle machined parts up to 20" x 40" and turned parts up to 80" long and up to 3" in diameter.

"When asked about how the company has managed to grow and thrive through its 23 years, Doerr commented, "We are good at what we do." He noted that staying focused on the business, keeping a positive outlook and not wasting time worrying about world events have helped him manage the company and succeed over the years.

A recent unique project completed at the firm was the production of the world's

largest hot dog cart (recently recognized by Guinness World Records). It is 9'-3" tall by 23'-2" long and 12'-2.75" wide

K-D Machine & Tool can be contacted at: (636) 583-5513; Fax (636) 583-9444; 806 N Jefferson Ave., Union, Missouri 63084; kdmachine.webs.com.



A new Citizen A32 Swiss Turning Center at K-D Machine & Tool.



TAPPING ENERGY FROM THE SUN THROUGH HEAT AND LIGHT

SOURCE: ASM INTERNATIONAL

A new approach to harvesting solar energy, developed by Massachusetts Institute of Technology, Cambridge, researchers, could improve efficiency by using sunlight to heat a high-temperature material whose infrared radiation would then be collected by a conventional photovoltaic cell. This technique could also make it easier to store the energy for later use, say researchers.

Adding the extra step in this case improves performance because it makes taking advantage of wavelengths of light that ordinarily go to waste possible. A conventional silicon-based solar cell "doesn't take advantage of all the photons," explains associate professor of mechanical engineering Evelyn Wang. That's because converting the

energy of a photon into electricity requires that the photon's energy level match that of a characteristic of the photovoltaic (PV) material called a bandgap. Silicon's bandgap responds to many wavelengths of light, but misses many others.

To address that limitation, the team inserted a two-layer absorber-emitter device—made of novel materials including carbon nanotubes and photonic crystals—between the sunlight and the PV cell. This intermediate material collects energy from a broad spectrum of sunlight, heating up in the process. When it heats up, as with a piece of iron that glows red hot, it emits light of a particular wavelength, which in this case is tuned to match the bandgap of

the PV cell mounted nearby.

This basic concept has been explored for several years, since in theory such solar thermophotovoltaic (STPV) systems could provide a way to circumvent a theoretical limit on the energy-conversion efficiency of semiconductor-based photovoltaic devices. That limit, called the Shockley-Queisser limit, imposes a cap of 33.7% on such efficiency, but Wang says that with TPV systems, "the efficiency would be significantly higher—it could ideally be over 80%."

There have been many practical obstacles to realizing that potential; previous experiments have been unable to produce a STPV device with efficiency of greater than 1%. But Lenert, Wang, and their team have

already produced an initial test device with a measured efficiency of 3.2%, and they say with further work they expect to be able to reach 20% efficiency—enough, they say, for a commercially viable product.

The design of the two-layer absorber-emitter material is key to this improvement. Its outer layer, facing the sunlight, is an array of multiwalled carbon nanotubes, which very efficiently absorbs the light's energy and turns it to heat. This layer is bonded tightly to a layer of a photonic crystal, which is precisely engineered so that when it is heated by the attached layer of nanotubes, it "glows" with light whose peak intensity is mostly above the bandgap of the adjacent PV, ensuring that most of the energy collected by the absorber is then turned into electricity.

In their experiments, the researchers used simulated sunlight, and found that its peak efficiency came when its intensity was equivalent to a focusing system that concentrates sunlight by a factor of 750. This light heated the absorber-emitter to a temperature of 962°C.

This level of concentration is already much lower than in previous attempts at STPV systems, which concentrated sunlight by a factor of several thousand. But the MIT researchers say that after further optimization, it should be possible to get the same kind of enhancement at even lower sunlight concentrations, making the systems easier to operate.

Such a system, the team says, combines the advantages of solar photovoltaic systems, which turn sunlight directly into electricity, and solar thermal systems, which can have an advantage for delayed use because heat can be more easily stored than electricity. The new solar thermophotovoltaic systems, they say, could provide efficiency because of their broadband absorption of sunlight; scalability and compactness, because they are based on existing chip-manufacturing technology; and ease of energy storage, because of their reliance on heat.

Some of the ways to further improve the system are quite straightforward. Since the intermediate stage of the system, the absorber-emitter, relies on high temperatures, its size is crucial: The larger an object, the less surface area it has in relation to its volume, so heat losses decline rapidly with increasing size. The initial tests were done on a 1 cm chip, but follow-up tests will be done with a 10 cm chip, they say.

Zhuomin Zhang, a professor of mechanical engineering at the Georgia Institute of Technology who was not involved in this research, says, "This work is a breakthrough in solar thermophotovoltaics, which in principle may achieve higher efficiency than conventional solar cells because STPV can take advantage of the whole solar spectrum. ... This achievement paves the way for rapidly boosting the STPV efficiency."

The research team also included MIT graduate students David Bierman and Walker Chan, former postdoc Youngsuk Nam, and research scientist Ivan Celanović. The work was funded by the U.S. Department of Energy through MIT's Solid-State Solar Thermal Energy Conversion (S3TEC) Center, as well as the Martin Family Society, the MIT Energy Initiative, and the National Science Foundation.

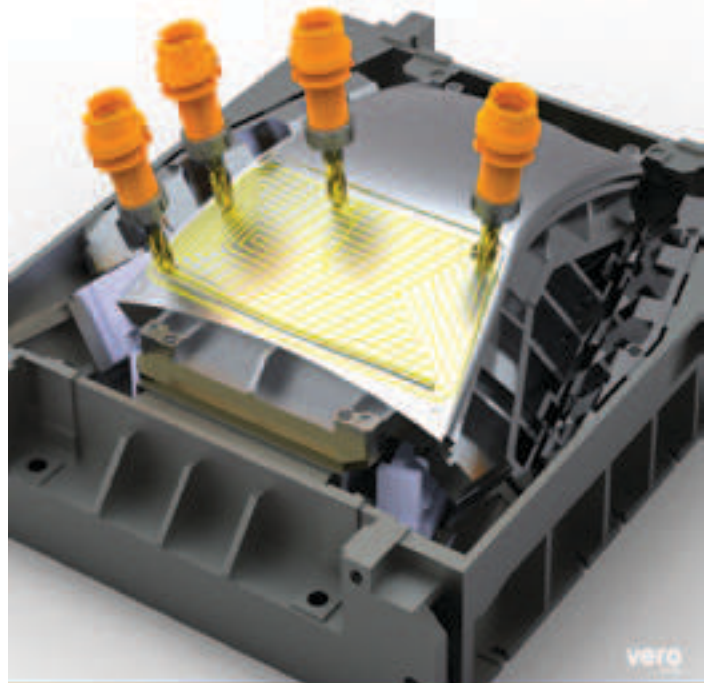


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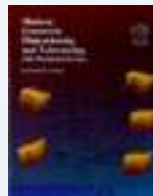
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AMERICA MAKES ANNOUNCES STAFFING CHANGES



America Makes, the National Additive Manufacturing Innovation Institute, proudly announces two staffing changes to its leadership team effective immediately.

America Makes is a public-private partnership with member organizations from industry, academia, government, and workforce development resources, and is driven by the National Center for Defense Manufacturing and Machining (NCDMM).

Current America Makes Deputy Director of Workforce and Educational Outreach Darrell Wallace, Ph.D. will become the new Deputy Director of Advanced Manufacturing Enterprise (AME).

Replacing Dr. Wallace as the Deputy Director of Workforce and Educational Outreach is Michael A. Hripko. Mr. Hripko is the former Director of the STEM College Research and Technology-based Economic Development at Youngstown State University.

"I want to first recognize Darrell for all

his workforce and education contributions and his dedication to our mission," said America Makes Director and NCDMM Vice President Ed Morris. "I look forward to him making a big impact in his new AME role. I am also very pleased to welcome Mike to the America Makes and NCDMM team. As a result of his previous role at YSU, Mike is very familiar with the work of America Makes and has been supportive of our goals. On behalf of all of us at America Makes and NCDMM, I am excited to extend a warm welcome to Mike."

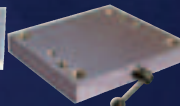
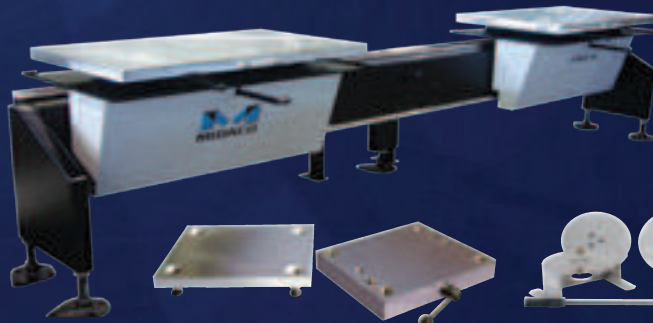
Ralph Resnick, NCDMM President and Executive Director and America Make Founding Director, added, "I too extend my congratulations and welcome to Darrell and Mike, respectively. I am very proud of how the NCDMM family continues to evolve, as well as grow not only in numbers, but in quality members. I want to thank Darrell for all of his accomplishments to date and for agreeing to move to a new and exciting role within

America Makes. I cannot think of anyone more knowledgeable for the demanding position of Deputy Director of AME. Since our original days of proposal preparation for the Institute, Darrell has quickly grasped the difficult to describe concept of AME and has nurtured the concept into a concrete strategic thrust. I anticipate Darrell growing into an ultimate AME expert.

"As for Mike, it truly feels like he has already been a member of our team since he has been so supportive of America Makes from our very first Youngstown encounter," continued Mr. Resnick. "I am confident that Mike will distinguish himself in his role as the new Deputy Director of Workforce and Educational Outreach and help America Makes achieve its goal of creating an adaptive, leading U.S. workforce in additive manufacturing."



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How to Change Association Leadership Focus and Get Short and Long Term Growth

THE RECRUITING REALITY OF TWO DIFFERENT TARGETS

BY KORDELL NORTON

Most associations have a ticking bomb and they don't really know it. Their core membership is going to start (don't say it) *retiring*. All those Baby Boomer members are going to drop out of membership and then what. There are 10,000 of this demographic group retiring from the work force every day. Not only do you need to recruit more of these ideal customers (boomers) but you also need to focus on the "young, new blood" in your marketing, programs and leadership.

Marketing to Baby Boomers is fairly easy. The Association recruiting efforts of the past will get what it got in the past. A few more of that Rock and Roll group. The real challenge is recruiting membership with the Gen X & Y (20 year olds to 40ish). That group grew up during the 30 years of constant layoffs that infected American business from the 1980s until now. They just don't trust like the Boomers do. Their life experience is that mom or dad came home with a pink slip and were miserable. They believe in work/life balance... none of this "to die for the organization is to live forever" stuff that Baby Boomers practice. They don't volunteer to join if they don't see something in it for them. Remember they

want...

1. EDUCATIONAL OPPORTUNITIES

They want this to grow their business abilities.

2. LEADERSHIP OPPORTUNITIES

They want this to grow their business abilities.

3. TO "MAKE A DENT IN THE UNIVERSE".

Don't communicate your association value of "our networking events" to the Gen XY group, because they just expect networking to be a tool/process that will get them what they really want (the 1, 2, & 3 above). What they want are the clear measurable programs and messages that let them know what that they will be able to Lead, Learn and to make a dent in the Universe.

The challenge for Association Leadership... use your wisdom to balance the focus on Baby Boomer members AND venture into new territory by recruiting these Millennials. There is a call for two different messages. One is focused on leaving a legacy and the younger generation is focused on winding UP (skills/contribution) to create a legacy going forward. Both are the same, but with slight nuances in time and skills needed.

No hiding your head in the sand on this one. It

requires learning new skills or asking those who naturally have those skills to help educate or lead. It means getting this younger generation to look at association programming to make sure it connects with Boomers and Gen XY. It means you have to get presenters and speakers who are not limited to PowerPoint, or their spill. Many speakers will be going the way of cotton only undershirts, penny loafers and frozen pizza. Start focusing on great presenters who can facilitate learning and getting participation and discussion with your members. You will want to inside and outside of the association industry. The innovative methods of giant corporations to sell, and brand to this younger generation is a must.

Which of your offerings can you say definitely helps your members GROW THEIR BUSINESS? In your planning to make sure your association activities have ROI for the Gen XY (and Baby Boomers while you are at it.)

WHY?

Because cars that don't interface with your smart phone are not that smart. Because screwdrivers and "craft

tools are just barely keeping some legacy department stores breathing. They just aren't as sexy as Twitter, or the latest app, Your marketing and message has to be exciting, an experience... or even more, it must be charismatic.

Kordell Norton is a Revenue Mechanic who



works with organizations who want to increase their sales, improve marketing or improve leadership by developing business charisma. He is the author of five books and a Certified Speaking Professional (CSP) member of the National Speaker Association, and speaks to thousands each year internationally. He can be reached at www.KordellNorton.com or (440) 744-4864.



WHEN LEGISLATION LAGS, KEEP AN EYE ON REGULATION

While the ritual crises, stand-offs and finger pointing in Congress have improved just a touch of late, Washington's overall ability to successfully pass legislation and make new laws remains weak – and isn't likely to improve in the coming election year. In 2014, look for federal regulators to be more aggressive as labor, environmental and other advocates look to the Administration to enact their priorities. Last year alone, every new law was accompanied by an average of 56 new rules and regulations.

Below are a few regulatory issues on which the One Voice Washington advocacy team is working in the coming year:

OSHA ELECTRONIC RECORDKEEPING:

The agency seeks to require businesses with 20 or more employees to file annual electronic incident / accident reports; those with over 250 employees would file quarterly. Reports would be made

public. Formal comments are due in February with OSHA action expected this summer.

NLRB AMBUSH ELECTIONS:

Despite repeated One Voice victories on Capitol Hill and in the courts, union supporters of the Employee Free Choice Act and the NLRB's Ambush Election rule are trying again. Look for the NLRB to reissue the Ambush Election rule in the coming months, aiming to work around a judge's determination that the regulation is illegal.

DOL PERSUADER RULE:

The Labor Department indicated it would release its final "Persuader Rule" in March 2014, following its initial proposal in June 2011, and declared the rule remains a priority. The new regulation requires employers to file certain reports with the Labor Department if they use outside labor consultants to interact with their employees during

a union organizing activity or collective bargaining dispute.

INJURY AND ILLNESS PREVENTION PROGRAM (I2P2):

Last summer, OSHA published an update of this proposed rule, which includes new standards for what constitutes an effective workplace safety program. Sources expect OSHA to publish its Notice of Proposed Rulemaking by September 2014.

COMBUSTIBLE DUST STANDARDS:

OSHA pushed back its proposed Combustible Dust Standards rule last year while working on its Silica Dust rule, but plans to convene a small business review panel for combustible dust in April, with a proposed final rule likely this summer.

GREENHOUSE GAS RULE:

Per court order, the EPA must propose a rule covering carbon emissions from existing power plants by June 1, 2014, with a final rule by June

2015. Last September, EPA issued a proposed rule for new coal-fired power plants requiring facilities to "capture" carbon emissions – a roughly 60% reduction with potential cost implications for electricity output.

Manufacturers can make a difference in Washington, but only if they participate in the process. NTMA members can give unlimited corporate or individual contributions to the NTMA Government Affairs Administrative Fund which supports the work done by The Franklin Partnership and Policy Resolution Group at Bracewell & Giuliani, LLP. Additionally, NTMA members can make limited personal donations to the Committee for a Strong Economy (CFASE) PAC, which supports pro-manufacturing Congressional candidates.



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Throughout its history, the Royal Filtermist has undergone continuous design improvements. The latest version, the Filtermist FX-Series, is the product of extensive computer-aided modeling and laboratory testing.

While the Royal Filtermist continues to be based on the well-established principle of centrifugal impaction, its design improvements have resulted in the most advanced and effective system available for the removal of oil mist and smoke created by metalworking

machinery.

The Royal Filtermist is available in four

sizes ranging from 300 - 1200 cfm, and its flexible design enables it to be mounted in a variety of ways, including: directly to the top of a machine tool, on a stand, or suspended from a factory ceiling. Maintenance and operating costs of the Royal Filtermist are minimal.

All Royal Filtermist units are sold with a 45-day risk-free performance guarantee to ensure complete customer satisfaction. Royal Filtermist – the world leader in metalworking pollution control.



Award-winning Tarpon Springs High School gets an early Christmas present



SME Education Foundation facilitates \$68,000 Haas Automation entrustment to the Academy of Engineering at East Lake High School

When it comes to Christmas presents, bigger isn't always better. But for East Lake High School in Tarpon Springs, Florida, this year's Christmas present—weighing several tons—comes with distinct rewards.

SME Education Foundation gets to play Santa this year, announcing East Lake High School as the recipient of machining technology worth more than \$68,000. Haas Automation will provide the school's award-winning engineering program with a top-of-the-line, Haas TM-1P CNC vertical mill including 6 control simulator modules.

A TRACK RECORD OF SUCCESS

The ten-year-old Academy of Engineering at East Lake High School has exceeded expectations from day one. Starting with just 22 students in 2003, the Academy has since enrolled over 600 students. Their wait list averages 100 students per year. Graduates have an average weighted GPA of 4.3. Over 90% go on to pursue post-secondary degrees, with 71% declaring engineering as their major.

Their curriculum, which emphasizes hands-on experience, was developed using the principles outlined in Project Lead The Way's "Pathway to Engineering." In 2008, the Academy was recognized by Project

Lead The Way as a top 10 national high school. In 2009, the Pinellas County Board of Education identified the Academy as a Center for Excellence. Earlier in 2013, the SME Education Foundation designated the Academy as a PRIME school, bringing national attention to the school's outstanding manufacturing program.

Rodney Grover, Senior Development Officer for the SME Education Foundation which facilitated the grant, was enthusiastic in his praise: "The East Lake PRIME program under the direction of Paul Wahnish is producing results for the manufacturing community by inspiring, preparing and supporting the next generation of innovators for industry. Thanks to the generosity of Haas Automation, Career Technical Education Foundation and others, students at East Lake will be instructed using the latest in technology."

PREPARING THE NEXT GENERATION OF ENGINEERS

The receipt of the vertical mill will enable East Lake students to become proficient with current industry machining and CNC standard practices. In order to operate the CNC mill students will learn to translate academic theory into practice using mathematics, especially trigonometry and ge-

ometry. CNC machinery also requires students to have basic computer coding skills. Eventually, they will also be able to compete for paid internships that are only available to students experienced with CNC machines.

By allowing the students to create their own parts (such as wheels, gears and sprockets), the Haas CNC vertical mill will also allow the Academy to save thousands of dollars each year.

"The manufacturing industry is getting increasingly sophisticated," noted Peter Zierhut, representative, Haas Automation. "We are committed to helping prepare the next generation of engineers and technologists. And we recognize that commitment needs to start early. Over the years, we have placed over three thousand machine tools at various educational institutions to help train future engineers and machinists."

An ongoing commitment that Rodney Grover readily acknowledges: "The SME Education Foundation is grateful for the support of both Haas Automation and the Gene Haas Foundation who most recently gave \$1 million in scholarship funding to support the machine trades throughout North America."



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Meller Microlux Alumina Powders come in two grades and seven particle sizes from 0.05 to 3.0 microns and are ready-to-mix with de-ionized water for producing surface finishes to 10-5 scratch-dig. Suitable for grinding, lapping, and polishing, they are ideal for hard and soft optics including barium- and calcium fluoride, germa-



nium, silicon, zinc selenide, zinc sulfide, stainless steel, and semi-soft crystalline materials.

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Be an Apprentice

Thornton Academy tried old trick to train students for new technology

REPRINTED FROM INNOVATION MAINE, JANUARY 2014

Many argue that you need a master's degree to get anywhere in a career today. However, the concept of college and graduate school wasn't always the best way to secure a lifelong job.

Apprenticeship dates back to the Middle Ages when someone got hands-on training by working beside a skilled worker. This idea is being introduced to students at Thornton Academy later this month on a smaller scale with a newly minted precision machining training program.

The program, based off an online training curriculum designed by the National Tooling and Machining Association (NTMA), is coming to students at the private high school in modified form.

"We're a private school, but we serve a public mission," said Thornton Academy Headmaster Rene Menard. "We have a range of abilities and a range of interests. We have an obligation to prepare students for highly academic careers, but we also have to look at the range of economy."

Menard was introduced to the array of manufacturers in southern Maine during a Biddeford-Saco Chamber of Commerce and Industry event over a year ago. The dialogue between the manufactures and the school seemed to fit like a puzzle piece. The companies are seeing a lack of skilled workers entering the trade. And the school identified that some students could be better prepared in high school to enter into these



OPERATES A PALLET POOL - Mike Gilbert, left, operates the machine. With him is Patrick Shrader, Vice President of sales and marketing for Arundel Machine Tool and a strong proponent of the apprentice program at Thornton Academy.

types of careers.

Paired with Arundel Machine Tool, the school has worked with the NTMA to tweak the online curriculum to fit high school level learning. Thornton Academy also has a list of three dozen students interested in starting the program. In late November, the school hired John Boissonnault as the program's instructor.

Boissonnault is a tool mold maker by trade. He's been in the machining and tooling industry for more than 30 years and teaches a CNC machining class for Biddeford's adult education program.

"Thornton Academy needs this," he said. "There are not enough people to fill jobs. And not every kid is going to go to college. There are hands-on technical trades that need people."

According to Manufacturers Association of Maine's website, there are more than 1,800 manufacturing businesses in the state that employ 50,000 residents. The industry realizes over \$5.5 billion dollars in gross domestic product. Many manufacture products for a wide array of industry sectors.

Patrick Shrader, vice president of sales at Arundel Machine Tool, said his business has already worked with Sanford High School seniors in vocational school on an apprenticeship program, but not one using NTMA's curriculum.

"We're well aware of a workforce development shortage," said Shrader, noting that 39 years old is the current median age of employees at Arundel Machine Tool.

The workforce shortage issue is twofold, explains Shrader. Part of the problem is that programs to train skilled machining and tooling workers are limited. The other part is due to businesses not educating the public on what kind of jobs are available in the industry.

"Twenty five years ago you were working



ARUNDEL MACHINE TOOL - Dan Aldrich is making a part at a CNC Turning Center. This is an example of a machine that a high school student could learn how to operate so he or she could possibly land a job after high school.

on a dirty floor and coming home smelling like oil," said Shrader. "Now these employees are using high tech equipment...these types of professions pay. We need to get out and show what modern day manufacturing is all about."

Thornton Academy is currently in the process of reviewing interested students to select about 12 for the program's launch. Menard said there is currently a mix of sophomore, junior and senior students interested. The school hasn't limited the program to a certain grade, however the goal would be to have students start during the sophomore year and complete six semesters of training through senior year.

"When you talk with students, they don't know what they want to do in the future. [Going through the program] doesn't mean they'll go into the field," said Menard, but it helps them see what's out there.

Elements of the curriculum will cover topics such as geometry, trigonometry, how to read blueprints, and how to work with CAD programs. Ultimately, what they learn in the apprentice program will cover a lot of what they could learn in traditional high school courses. The difference being the lessons will be geared specifically to the machining and tooling trade.

In addition to the course work, students will likely head over to Arundel Machine Tool for some hands-on experience. The details are still being worked out, but Shrader envisions students visiting the shop on a regular basis.

"If [the school] can figure out logistics to get kids here, we have a classroom upstairs," he said. "We will also have a dedicated CNC work center where they could come and test mechanical stuff."

Shrader recently presented Thornton Academy's plan during a national conference in Boston. The audience was excited about the idea.

"We all believe it needs to get into the high school level, but we hadn't had a high school involved," said Shrader. "We're hopeful [this program] is going to sprout into something that's successful and unique."

Boissonnault sees this program as an opportunity for students to be marketable right out of high school. If a student completes all six semesters of the online curriculum, they will be easily three years ahead of someone starting the curriculum after high school.

"When it's all said and done, the kids will be a lot further ahead,"

he said. "The can finish up by doing 8,000 hours of on the job training and have their certificate. It shows a potential employer that you've put four years of training and are better than someone with an associate's degree."

Menard looks forward to the launch and evolution of the program.

"Part of this is educating students about opportunities," he said. "This is a challenging industry. These jobs are high tech, high skilled and high paying...we can get students out in the industry and get them excited about these jobs."



MT FOCUS® RELEASES REPORTING FUNCTION FOR MACHINE TOOL MONITORING SYSTEM

SYSCON International has released MT Focus® Reports—a powerful but easy-to-use reporting function—for its MT Focus machine tool monitoring system. While many manufacturers appreciate the value of "seeing" what is truly happening on their shop floor, it's easy to become overwhelmed by the large amount of information that can be pulled from a machine tool. "MT Focus users now have a quick and effective tool for assimilating the large volume of shop floor data from their MT Focus system into actionable information," said Don Hemler, MT Focus Product Manager.

HOW IT WORKS

MT Focus Reports takes real-time machine data and places it in a database on the MT Focus Data Collection Hub. Microsoft® Excel translates the data into four reports that can be viewed, printed or stored. No integration support or third-party tools are needed. MT Focus Reports includes:

a) Weekly Machine Performance: Utilization data for a machine over a one-week time frame

b) Part History: A job list with detailed data for a specific part over a user-specified time frame

c) Operator History: A job list with detailed data for a specific machine operator over a user-specified time frame

d) Individual Job: Detailed data for a given job

USE "RIGHT FROM THE BOX" OR CUSTOMIZE

"A manufacturer doesn't need an IT Department to take full advantage of MT Focus Reports," said Mr. Hemler. Right from the box, MT Focus Reports places four pre-engineered reports at the User's fingertips. Additionally, each report has two sheets (tabs). The first sheet is the report itself. The second sheet contains a complete set of the MT Focus data pulled from the machine. , Using available Microsoft Excel tools, any of these values can be moved to the cells on sheet one and incorporated into the User's customized report. Database or programming skills are not required. Users can also pull in data from other databases to optimize the value of their reports. For example, tool vending data can be added to show and correlate tooling usage on a job.



OKUMA AMERICA'S 2013 TECHNOLOGY SHOWCASE IS LARGEST TO DATE

EVENT DRAWS RECORD ATTENDANCE, FEATURES MORE CNC MACHINES UNDER POWER, AND INCLUDES A VARIETY OF HANDS-ON DEMONSTRATIONS

Okuma America Corporation's Technology Showcase event, held December 10-12, 2013 in Charlotte, NC, was the company's largest to date, both in attendance and the number of CNC machines shown. Held annually, the event is designed to give attendees the unique opportunity to see and gain hands-on experience with Okuma's latest technology and discuss their individual needs with a variety of industry experts.

HIGHLIGHTS OF OKUMA'S 2013 TECHNOLOGY SHOWCASE

- Drew more than 400 attendees, from three countries and 33 states.

- Displayed 27 machines under power, cutting parts for the aerospace, oil and energy, automotive, medical, gun and fluid power industries.

- Demonstrated 16 THINC apps – many of which were designed and written by distributor applications engineers. These applications allow the user to do everything from monitoring coolant concentration and pH, to limiting operator access and receiving remote alarm

and message notifications directly from the CNC machine.

- On-machine demonstrators (brief seminars conducted at the machine with actual cutting demonstrations) were held throughout the event and included titanium machining, gear cutting, automation and gaging.

- Attendees had the opportunity to try the THINC OSP-P300 CNC control on the THINC Try It stations, including the new, 19" P300 control monitor. Three



The THINC OSP-P300 Try It stations allowed attendees were able to actually try the OSP-P300 to experience the enhanced functionality first-hand.

lucky Try It users won iPads.

- A live hand scraping demonstration was conducted and attendees were given the opportunity to show their skill and perform hand scraping.

- Okuma's mechanical and electrical



Attendees had the chance to actually do hand scraping on a machine component.

exchange departments displayed various versions of components, including new, refurbished and damaged spindles, boards and cam boxes.

- 30 members of Partners in THINC were on-hand to demonstrate peripheral equipment and software and to discuss and solve productivity issues.

"We attribute the strong interest in this year's Technology Showcase to our customers' desire to lead their markets while also enhancing their own productivity," says Tim Thiessen, Vice President of Sales, Okuma America Corporation. "The opportunity to have hands-on, personalized access to such a wide variety of CNC machine technology and expertise can be a game-changer in terms of creating technological advantage."

Next year's Okuma Technology Showcase is scheduled for December 9-11, 2014.



TJAR INNOVATIONS, LLC



WHO WE ARE...

TJAR Innovations is your one stop destination for all your plastic needs, from product design and concept, to putting your products on the shelf. We're innovators by trade... We make the difficult, easy!

Here at TJAR, our goal is simple... We want to help you make money. TJAR strives to provide a full service destination that will help you deliver your products to market.... Creating smart and effective strategy for tooling and machining that, at the end of the day, saves you money.... We believe a cutting-

edge team of designers, CNC programmers, machinist, and material specialist will give you the resolve you're looking for.

By using cutting-edge technology, creative design, and the latest plastic developments, TJAR stays competitive with overseas prices. This keeps your products flying the Made In The USA logo with you still making money.

We work closely with our customers knowing what they need and expect. We're always looking at possible engineering changes during product development that at

the end of the day, translates to dollars being saved. We work with our customers to make sure that their product development is clear, and that they have a full understanding of the entire project. This saves valuable time and unnecessary spending.

Our Mission is to provide the highest quality plastic injection molds and plastic parts through innovative design and process. We help inventors bring their visions to fruition.



Hannover Messe 2014 - SPACE IS LIMITED – NTMA MEMBERS TO ATTEND Trade Show

APRIL 7-11, HANNOVER, GERMANY

WELCOME TO THE WORLD'S LEADING TRADE FAIR FOR INDUSTRIAL TECHNOLOGY.

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The core display categories at HANNOVER MESSE are inspired by global megatrends and drivers of growth such as energy and environmental engineering, mobility and urbanization. All these themes are addressed in the 7 leading trade shows in the 2013 line-up.

If you are interested in attending this show, please contact Emily Lipovan at elipovan@ntma.org



2014 TRADESHOW LINEUP

SYNERGISTIC TECHNOLOGIES. GET THE FULL PICTURE AT HANNOVER MESSE. WWW.HANNOVERMESSE.DE



ENERGY

The energy industry worldwide is facing the need for change.

At the trade fair Energy trade visitors from across the globe can discover how, with the right mix and control, state-of-the-art technology and solutions can meet this challenge. This is the only trade fair for the energy sector which covers the entire value chain – from energy generation, supply and storage through to transmission and distribution to smart grids. All at one venue.



MOBILI TEC

Leading Trade Fair for Hybrid and Electric Powertrain Technologies, Mobile Energy Storage and Alternative Mobility Solutions

This leading trade fair is now firmly established as the No.1 business platform for hybrid and electric mobility technologies. The entire industry comes to Hanover to meet its customers worldwide. This is where the key contracts are signed, projects launched and joint ventures further developed.



INDUSTRIAL GREENTEC

Leading Trade Fair for Environmental Technology Following its successful launch, the Leading Trade Fair for Environmental Technology is being further expanded. Themes such as sustainable production,

techniques for safeguarding air and water quality and the recycling industry attract a lot of interest from visitors and the media.

Green technologies, developed by industry for industry, form the core of the exhibition.

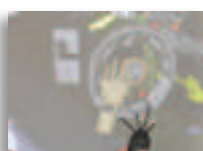


INDUSTRIAL AUTOMATION

The international profile of the event and the broad spectrum of topics and trends covered by Industrial Automation offers exhibitors new opportunities to tap into global markets and thus helps secure your

business success.

In 2014 Industrial Automation will again take up the themes that interest trade visitors from various sectors: the networking of automation and IT, process automation, energy and materials efficiency, robotics and systems integration, as well as smart systems offering solutions in assembly and handling.



DIGITAL FACTORY

Leading Trade Fair for Integrated Processes and IT Solutions.

From the very start the integration of all processes in the industrial value chain has been the core topic of Digital Factory, the Leading Trade Fair for Integrated Processes and IT Solutions.

This focus was reflected by the HANNOVER MESSE slogan in 2013 – Integrated Industry. Embedded software is the most important driver of innovative products, while IT solutions such as those showcased at Digital Factory are the key tools for developing and manufacturing these products.



INDUSTRIAL SUPPLY

Boasting highly specialized expertise and adaptability, industrial suppliers play an important role in their customers' ongoing drive for innovation.

The components and assemblies supplied by these specialist subcontractors are vital for the manufacture of all downstream end products. This symbiotic relationship makes today's industrial suppliers the forerunners of what we now call "Integrated Industry". Exhibitors at Industrial Supply will show how the growing demands of customers can be met through intelligent components and assemblies and collaborative partnerships. Attended by decision-makers from all your user sectors and over 50 nations, this show is the ideal place for you to market your solutions for materials, components, systems and processes.



RESEARCH & TECHNOLOGY

Leading Trade Fair for R&D and Technology Transfer. Industry worldwide faces enormous challenges.

In order to deal with complex issues such as the continuing integration of industrial processes, the transition to renewable energy, the efficient use of resources, sustainability, mobility, lightweight construction and the development of alternative resources and new materials, industry needs science. At the same time, R&D professionals need effective partners in industry and government in order to market their innovations successfully.



USING 5 AXES TO CUT COST

A growing number of manufacturers are using 5-axis CNC machining to reduce costs, increase accuracy, and improve profits. Switching to a 5-axis machining strategy often not only cuts production time, but also frees workers to do other jobs, making existing labor more efficient. This

allows shops to bid competitively on jobs that are more complex, with higher profit margins. It's not business rocket science, and the concept is helping fuel a resurgence in U.S. manufacturing.

WHY FIVE?

Most CNC machining centers provide three axes of movement – side-to-side, front to back, and up and down – generally labeled X, Y, and Z. For parts that only require machining on one or two sides, a 3-axis machine easily gets the job done quickly and efficiently in only one or two setups. Machining a multi-sided part in a 3-axis setup, however – for example, drilling and tapping the top and four sides of a cube – usually means re-fixturing the part multiple times to reach each side.

By adding two more axes of motion – tilt and rotation – the workpiece can simply be repositioned to present each side to the spindle, allowing the top and all four sides to be machined in just one setup. Eliminating setups reduces overall machining times, and also reduces stacking error – the cumulative error inherent in, and compounded by, each setup change. Using a 5-axis machining approach and fewer setups means faster production, while employing less direct labor, and delivering greater precision.

SIDES OR SURFACES?

There are two primary types of 5-axis machining: 5-sided machining and 5-axis simultaneous machining.

In 5-sided machining, also called 3+2 machining, the tilt and rotation axes are used only to position the workpiece to a specified angle and present a particular “side” to the spindle. The part is then cut using only the X, Y, and Z axes. Programming for this type of 5-axis machining is fairly straightforward, because once the workpiece is in position, it's essentially a 3-axis part.

In 5-axis simultaneous machining, all five axes move concurrently as the tool cuts. This method works particularly well for parts with compound surfaces, such as impellers and turbines; for molds and dies with deep cavities; and for

parts with undercuts and intricate recesses. Programming for this type of 5-axis machining typically requires a CAD/CAM system.

Both types of 5-axis machining find practical application



for a wide range of parts, but the efficiency of each method relies on using the right workholding. A successful workholding strategy must address the following key things: clearance, reach, and rigidity.

THE TALL PROBLEM

While there are several types of 5-axis machines, one of the most common – and the point of reference for this article – is a vertical machining center with a trunnion rotary table (or other 2-axis rotary system) mounted in the machine's

work cube.

In this configuration, the rotary itself can interfere with the spindle and cutting tool when the trunnion tilts the workpiece sharply. To afford unobstructed access to the workpiece, the workholding must raise the part high enough above the table to provide clearance. The physics of elevating the workpiece, however, magnify the importance of a solid, rigid connection between the fixture and the part, making fixture design extremely important.

THE VISE SQUAD

The vise is a traditional and often-used method of holding a workpiece securely for machining. Generally, vises have a sliding jaw opposite a fixed jaw, with both mounted to a common base (or individual bases) attached to the table. A screw mechanism draws the moving jaw toward the fixed jaw, supplying the clamping pressure. Vises depend on a significant amount of applied force to supply enough friction between the sides of the workpiece and the vise jaws to hold the part securely.

As the distance (height) between the workpiece and the screw increases, however, the clamping force decreases. Several manufacturers provide specialty 5-axis vises that counter this effect by raising the screw from the base of the vise to a point just below the workpiece, thereby maintaining the clamping pressure.

Vise jaws also tend to tilt outward slightly as they contact the workpiece and the screw tightens. This puts maximum force along the extreme bottom edge of the part as the top of the jaws tilt outward – inducing a tendency for the part to lift.

To minimize the effect, Kurt Workholding developed a vise system that forces the part into the fixture for a more secure grip.

“The Kurt Maxlock 350 AngLock® design,” explains Kurt Design Engineer David Schmidt, “helps control lifting by applying a downward force equal to, and in some cases, greater than, the linear loads applied from clamping. This gives the customer better repeatability.”

“Most customers want the same benefits in a 5-axis vise that they have come to expect in our standard vises,” Schmidt continues. “The difficulty is fitting all the same features in a much smaller package. Kurt's 5-axis vises have better clamping capability, and we are constantly developing new and innovative ways to meet the rigorous demands of our customers.”

The Kurt VB 5-Axis Schenke Clamping System takes a different approach to workholding. Instead of sliding, like most vises, the moving jaw mount pivots at its base to provide the pressure on the workpiece. The operator turns the VB's threaded spindle just beneath the jaws of the vise to clamp the part. The spindle threads into appropriate extension shafts that set the jaw distance just slightly more than the width of the workpiece. Tightening the spindle pivots the moving jaw in a somewhat downward angle into the side of the part, locking the workpiece into the fixture with minimal movement of the jaw.

Since vises must necessarily grip the sides of the part, cutting tool access is denied in the area of jaw contact. This area of contact must be accommodated when programming.

IN THE GROOVE

Another popular method of holding the part to the fixture uses a relatively small dovetail strip machined into the bottom of the workpiece, spaced away from the sides. The strip interlocks with a corresponding dovetail groove on the fixture, and is held securely by integral clamps. The 5-axis dovetail fixture



normally mounts atop a raised pedestal or cone, providing excellent access for cutting tools. Available in aluminum or steel from most manufacturers, the design makes a very robust and rigid setup, even when taking heavy cuts at high tilt angles.

The dovetail strip, and a small pilot slot, must be pre-cut into the workpiece – typically on the side that requires the least amount of machining, and in an area far enough from the sides to preclude interference with the cutting tool. The procedure requires very little material removal (about 1/8-inch), and since multiple billets can be machined in a single setup, the process doesn't take much production time. Once machining is complete on the other five sides, the dovetail is machined off the final (6th) side.

The geometry of the dovetail is the key to its workholding efficiency.

Angled edges direct the clamping pressure back toward the fixture along the narrow ridge of the dovetail. Likewise, the clamp angle directs the pressure downward and away from the part. The fixture does not depend on a great amount of friction to hold the workpiece, so the possibility of "throwing" a part is virtually eliminated.

Dovetails hold the part with minimal clamping force; in fact, the clamps require only moderate hand tightening with a T-handle hex wrench. A pilot pin fits into the pre-cut slot, ensuring accurate placement of the workpiece, and precise repeatability.

"The customer looking for 5-axis tooling should not only consider the actual access to the part, but also rigidity, and standardization," explains Raptor Workholding's co-owner Brian O'Rell. "A good system should be easy to set up and use for many different parts. One big advantage of dovetailing is that we can hang the part over the fixture without loss of rigidity. That cannot be done with a vise, because the jaw of the vise limits access to the side that it grips. Dovetailing allows greater access for the cutting tool at the lower areas of the part without crashing the tool or spindle, and also allows for using a greater range of tools. Holding the part by a relatively narrow dovetail on the bottom gives much greater access."

"And dovetails induce a lot less stress into the part," adds Raptor's other co-owner, David Fisher. "A vise has to use a lot of force to make the jaws grip enough to hold the part. That puts a lot of stress into the part. A dovetail induces a lot less stress because the holding force is all in the dovetail ridges – and directed into the fixture. The clamp uses the same angle, and is only hand-tightened. Less stress and less material deformation helps maintain excellent accuracy and repeatability."

SIZE MATTERS

Another problem with 5-axis machining is the reduction of the work-cube that often results from accommodating the trunnion or rotary. The size of the workholding fixtures sometimes becomes an issue in such limited space.

Chris Taylor, co-owner of 5th Axis Fixtures, sees dovetails as the solution to most fixturing issues, including space restrictions. "Dovetail fixtures give you superior clamping force, access to five sides of the part, and take up only half the space of a typical vise," he says "All of which are crucial factors in 5-axis machining."

"Many 5-axis machines have small work envelopes, so maximizing that work envelope is key," Taylor observes. "One way we accomplish this is by orienting four of our 1" x 1.5" dovetail fixtures on a 5" diameter pallet. The position of the fixtures optimizes tool clearance, allowing for the machining of four parts without taking up any additional space."

MOD GETS THE NOD

For a shop that manufactures a variety of parts, the ease of changing parts and fixtures is essential. For even greater flexibility, manufacturers should con-

sider modularity.

Modular fixtures are designed to be held by other fixtures, allowing a configuration for practically any size part. Raptor manufactures a system of modular workholding fixtures with dovetail strips on the bottom of the fixtures to mount on other fixtures. These modular fixtures can be stacked, enabling a shop to adapt to many different sizes of workpiece without removing fixtures from the trunnion table adapter.

For example, a mounted large fixture can hold a large workpiece, then – without being unmounted – hold a smaller fixture by its dovetail strip. By simply unclamping the small fixture, the large fixture can return to large-part production with almost no time wasted.

Jergens Workholding, a well-established manufacturer of workholding fixtures and vises, developed another approach to modular quick-change 5-axis fixturing, called the FixturePro® system.

"The Fixture Pro System consists of standardized components that mount to the machine's table to elevate and clamp the workpiece," explains Jergens Product Manager Mark Kubik. "The basic components include a subplate, riser, top plate, vise adapter, Drop & Lock™ pallet changer, and top tooling (vises, ER collet fixtures, dovetail vises, etc.)."

"The elements can be 'stacked' together in any combination to achieve the correct height," says Kubik. "But not all elements are needed for every application. If the stack-up is too high, or the customer does not require a subplate, the riser and other selected top tooling can be mounted directly to the machine table, or the riser can be removed and the top tooling can mount directly to the subplate. For applications that require very little elevation, the top tooling can mount directly to the machine table."

"Jergens utilizes components designed with multiple mounting options,"



Kubik adds. "They make up flexible and accurate setups quickly, with a minimal amount of custom components – achieving accuracy and repeatability of the elements to 0.0005".

Jergen's Drop & Lock pallet changer system offers

the ability to change tooling very quickly. The top tooling mounts on a pallet equipped with pull studs. The pull studs fit into the Drop & Lock pallet changer holes, and a couple of quick turns with a T-handle wrench lock the pull studs in place – like a tool holder in a spindle. The system is very solid and quick, and maintains an accuracy of 0.0005".

THE REST OF THE STORY

Remember that 5-axis machining involves the whole system – the CNC machine, cutting tools, workholding fixtures, and control must work together in harmony. The addition of two extra axes complicates programming, so manually programming an intricate tool path is virtually impossible. Fortunately, modern CAD/CAM systems are up to the task. A good CAD/CAM system is essential for 5-axis success, and many shops supplement that with simulation software. Additionally, many fixture companies offer CAD models of their products to help prove out the machining concept before making the actual cut.

Although the initial investment in 5-axis machining can be substantial, a busy shop can recoup the cost in a relatively short time, due to added productivity and enhanced shop capabilities. After a careful cost/benefit analysis of their individual situations (essential before making any important decision), many shops have discovered that 5-axis machining fits well into their plans – and have found great success.





2014 NRL COMPETITION

CLEVELAND, OHIO

MAY 16-17

Lou Higgins Center at Baldwin Wallace College

THE PREMIER NATIONAL ROBOTICS COMBAT LEAGUE

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The newly renovated Lou Higgins Center is the centerpiece of the BW athletic facilities. The 170,000 square-foot complex houses the Ursprung Gymnasium, Harrison Dillard Track, Natatorium, updated workout spaces, a state-of-the-art athletic training facility, classroom space, and offices for coaches and faculty

Mark your calendars, and plan to join us in Cleveland, May 16-17 for the 2014 NRL National Competition. The event will be held in the Lou Higgins Center at Baldwin Wallace College, a venue that offers easy airport access, free parking and plenty of space for up to 100 teams, 500+ spectators, two arenas, as well as exhibit space for sponsors to interact with students and spectators.

The move to Cleveland also means the teams from many of our most active regions will spend considerably less time on the bus, and everyone can expect to pay less than \$100 per room for overnight accommodations.

Stay tuned for more information about this event. We have some cool things planned for you and can hardly wait to see you there!

Check it Out

Servo Combat Zone is looking for articles by combat robot builders like you! Stories



about recent events, favorite parts or tools, as well as build tips are welcome. Remember, if you are a High School or College rising senior, there's nothing better than

a few published articles on your resume to rise out of the slush heap!

E-mail Kevin Barry, the Servo Combat Zone editor for more information @ legendaryrobotics@gmail.com

Rules Update

Over the summer, the NRL rules committee will be reviewing and updating our technical regulations and competition rules, and we want to make sure we address the concerns of everyone in the league. To that end, if you have a rules change request please email Maureen Carruthers at

mcarruthers@ntma.org and let her know which rule(s) you'd like us to consider changing, and your rationale for the change.



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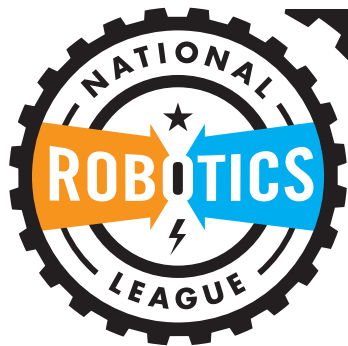


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DEPCO exists to challenge the idea of a general education model that marches students through a uniform curriculum. DEPCO's approach to educating today's youth stands to revolutionize the education environment by offering engaging curricula that takes the intimidation and confusion out of the learning for both students and instructors.

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- Logo and recognition as an Exclusive Sponsor in the NRL Program Guide
- (1) Full Color ad in the NRL Program Guide
- Recognition in the NTMA RECORD as an Exclusive Sponsor
- Logo and recognition on official NRL T-shirts as an Exclusive Sponsor
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- Logo and recognition as an Exclusive Sponsor in the NRL Program Guide
- (1) Full Color ad in the NRL Program Guide
- (1) Post event article to promo your philanthropic support in the NTMA RECORD
- Logo prominently displayed around Arena with branded banners
- Logo and recognition on official NRL T-shirts as an Exclusive Sponsor
- Branded Banners prominently displayed throughout competition area (*at expense of sponsor*)
- Arena naming rights for competition
- Social Media recognition on Facebook, Twitter and LinkedIn
- Free Exhibit table to be positioned in the Manufacturing Gallery



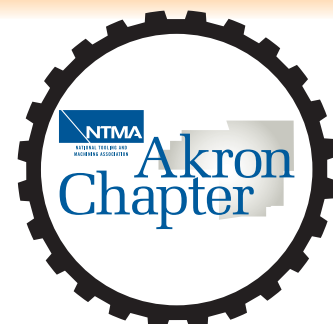
NOTE: Additional Branding opportunities of floor clings and other materials are available at the request and expense of the sponsor.

EXCLUSIVE COMPETITION AWARDS \$5,000

Sponsorship Includes:

- Award presenter for 1-3rd place winners and company recognition as award presenter
- Logo and recognition on new NRL Website
- Logo and recognition in NRL Program Guide
- Option to have logo on 1-3rd place trophies
- Social Media recognition on Facebook, Twitter and LinkedIn

NOTE: Additional branding opportunities and other material are available at the request and expense of the sponsor.



For sponsorship inquiries and discussions, contact: Tiffany Bryson 216.264.2847 • tbryson@ntma.org

ROBO-LOUNGE PREMIER SPONSOR \$5,000 (2 AVAILABLE)

Sponsorship Includes:

- Consistent company recognition as lounge sponsor throughout event
- Logo and recognition as a Premier Sponsor on the new NRL website
- Logo and recognition as a Premier Sponsor in the NRL Program Guide
- (1) Full Color ad in the NRL Program Guide
- Logo prominently displayed above Robo-Lounge area
- Branded floor and table clings
- Recognition in the NTMA RECORD as a Premier Sponsor
- Logo and recognition on official NRL T-shirts as a Premier Sponsor
- DJ recognition throughout event
- Social Media recognition on Facebook, Twitter and LinkedIn

NOTE: Additional Branding opportunities and other materials are available at the request and expense of the sponsor.



PREMIER PIT SPONSOR \$3,500 (2 AVAILABLE)

Sponsorship Includes:

- Logo and recognition on the new NRL website
- Logo and recognition in the NRL Program Guide
- Logo and recognition above Pit Area
- One (1) ½ page, 4-color ad in the NRL Program Guide
- Recognition in real-time during competition; live and via social media
- Logo and recognition on official NRL T-shirts as a Premier Sponsor
- Logo prominently displayed on Safety Inspection Station (test cages)
- Logo prominently displayed on each pit table, branded floor clings
- Social Media recognition on Facebook, Twitter and LinkedIn

NOTE: Additional Branding opportunities of floor clings and other materials are available at the request and expense of the sponsor.



REGISTRATION SPONSOR \$3,500

Sponsorship Includes:

- Logo and recognition on the new NRL website
- Logo and recognition in NRL Program Guide
- Logo prominently displayed on event badge
- Logo prominently displayed at and around registration area
- Logo prominently displayed on registration folder (option to include business card)
- Opportunity to meet and greet the teams at registration
- Opportunity for company branded give-away or material
- Social Media recognition on Facebook, Twitter and LinkedIn

NOTE: Additional branding opportunities and other material are available at the request and expense of the sponsor.



MERIT AWARDS SPONSOR \$3,000

Sponsorship Includes:

- Introduction of Award presenter and company recognition
- Opportunity for announcement of 5 awards post event
- Logo and recognition on new NRL Website
- Logo and recognition in NRL Program Guide

NOTE: Additional branding opportunities and other material are available at the request and expense of the sponsor.



SHIPPING SPONSOR \$2,500

Sponsorship Includes:

- Logo and recognition on the new NRL website
- (1) ½ page Ad in NRL Program Guide
- Social Media recognition on Facebook, Twitter and LinkedIn



INTERACTIVE MANUFACTURING GALLERY EXHIBIT TABLE \$1,500 (ASK FOR AVAILABILITY)

"BUY A PIECE OF THE ACTION AND SHARE YOUR STORY"

Sponsorship Includes:

- Logo and recognition as an Exhibitor on the new NRL website
- Logo and recognition as an Exclusive Sponsor in the NRL Program Guide
- Prominently displayed logo banner above exhibit table
- 6 ft table provided
- Exhibit table to be positioned in the Manufacturing Gallery in high traffic/action area
- Opportunity to tell your company's manufacturing story to the next generation
- Social Media recognition on Facebook, Twitter and LinkedIn

BLEACHER SPONSOR \$1,500 (6 AVAILABLE)

Sponsorship Includes:

- Logo and recognition on the new NRL website
- Logo and recognition in the NRL Program Guide
- Prominently displayed LARGE logo banner
- Logo seat clings
- Bleachers located in high traffic/action area



TRAVEL SPONSOR \$1,000 (ASK ABOUT AVAILABILITY)

Help get our next generation to the competition

Sponsorship Includes:

- Logo and recognition on the new NRL website
- Logo and recognition in the NRL Program Guide
- Personal 'Thank You' from the team your sponsorship supports
- Social Media recognition on Facebook, Twitter and LinkedIn
- Tax deductible

NRL COMPETITION T-SHIRT SUPPORTER \$500

Sponsorship Includes:

- Logo prominently displayed on Back of T-Shirts to show your support of this educational initiative
- Logo and recognition in the NRL Program Guide

SUPPORTING PARTNERS OPPORTUNITIES:

Platinum- \$1,000

- (1) Full Page Ad in the NRL Program Guide
- Logo and recognition on the NRL Website

Gold-\$500

- (1) ½ Page Ad in the NRL Program Guide

Silver-\$250

- (1) ¼ Page Ad in the NRL Program Guide

Don't see a sponsorship that meets your needs? Let's have a conversation and develop a customized package that fits your company's vision of support.



Building America's technology leaders, one robot at a time.

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AMERICA MAKES ANNOUNCES SECOND PROJECT CALL AWARDEES

THE INSTITUTE SELECTS 15 APPLIED RESEARCH PROJECTS;

ANNOUNCES TIMEFRAME FOR NEXT PROGRAM MANAGEMENT MEETING AND PROJECT KICKOFF MEETING



America Makes, the National Additive Manufacturing Innovation Institute, is proud to announce the awardees of its second call for additive manufacturing (AM) applied research and development projects from its members. Driven by the National Center for Defense Manufacturing and Machining (NCDMM), America Makes will provide \$9 million in funding toward these projects with \$10.3 million in matching cost share from the awarded project teams for total funding worth \$19.3 million.

According to America Makes Director and NCDMM Vice President Ed Morris, “We were very pleased by the quality of the projects proposed by our members for this second round of additive manufacturing R&D projects being launched, which of course made the final selection process even more challenging. Combined with the projects underway from our first project call, we will soon have nearly \$30 million of public and private funds invested in advancing the state-of-the-art in additive manufacturing in the United States.”

The Institute’s second project call, which was released on August 30, 2013, was focused on five technical topic areas—design for AM; AM materials; process and equipment; qualification and certification; and knowledge base development—each with subset focus areas. Proposals could address one or more technical topic areas, but had to address all evaluation criteria.

The 15 selected projects span a variety of AM processes and materials with near-term technical achievements that address a comprehensive set of priorities—needs, gaps, and opportunities—within the AM and 3D printing industry. Moreover, these projects represent exceptional teaming within the America Makes community and beyond. Of the 75 individual partners among the 15 selected projects, 31 are America Makes members, including four Platinum (Lead) members, 15 Gold (Full) members; and 12 Silver (Supporting) members.

Subject to the finalization of all contractual details and requirements, the 15 selected America Makes projects are as follows:

- “In-Process Quality Assurance (IPQA) for Laser Powder Bed Production of Aerospace Components”

- GENERAL ELECTRIC AVIATION

Led by General Electric Aviation, in partnership with Aerojet Rocketdyne; B6 Sigma,

Inc.; Burke E. Porter Machinery Company; Honeywell Aerospace; Montana Tech of The University of Montana; and TechSolve, Inc., this project will address the need for the development of a commercially available, platform-independent Quality Assurance technology for high-volume AM production of aerospace components, which is currently lacking within the industry. The proposed effort will be achieved through the maturation of an IPQA technology solution that leverages a development approach, incorporating multiple AM machines and multiple super alloys.

- “Developing Topology Optimization Tools that Enable Efficient Design of AM Cellular Structures”

- UNIVERSITY OF PITTSBURGH

Led by the University of Pittsburgh, in partnership with Acutec Precision Machining Inc.; Alcoa Inc.; ANSYS, Inc.; and ExOne, this project will develop robust software for design and optimization of AM structural designs based on cellular structures. The key innovation in this technology is the utilization of micromechanics models for capturing the effective behavior of cellular structures in finite element analysis (FEA). The results from this project will enable the AM community to optimize advanced cellular structures for the design and manufacture of lightweight and strong AM parts, impacting multiple commercial sectors.

- “AM of Biomedical Devices from Bioresorbable Metallic Alloys for Medical Applications”

- MCGOWAN INSTITUTE FOR REGENERATIVE MEDICINE AT THE UNIVERSITY OF PITTSBURGH

Led by the McGowan Institute for Regenerative Medicine at the University of Pittsburgh, in partnership with ExOne and Magnesium Elektron Powders, this project will develop AM methods to convert magnesium and iron-based alloys into biomedical devices, such as bone plates, tracheal stents, and scaffolds. Biocompatibility, bioresorption, and mechanical testing will be performed on the fabricated test specimens produced by a binder jet printing shape-making approach.

- “Refining Microstructure of AM Materials to Improve Non-Destructive Inspection (NDI)”

- EWI

Led by EWI, in partnership with Lockheed Martin and Sciaky, Inc., this project will address

the need to improve the ability to ultrasonically inspect titanium alloy components for high-performance aerospace applications, which feature a complex microstructure created during the electron beam directed energy deposition and subsequent heat treatment processes, through the modification of deposition process parameters and advancement of ultrasonic inspection techniques.

- “Development of Distortion Prediction and Compensation Methods for Metal Powder-Bed AM”

- GE GLOBAL RESEARCH

Led by GE Global Research, in partnership with 3DSim, Inc.; CDI Corporation; Honeywell Aerospace; Pan Computing LLC; Penn State University; United Technologies Research Center; and the University of Louisville, this project will benchmark and validate physics-based thermal distortion prediction and mitigation tools for metal powder-bed AM. The goal of this project is to achieve a significant reduction in development time enabled by physics-based distortion prediction and compensation tools. It is anticipated that this project will be foundational in establishing a standard set of AM design rules, distortion mitigation practices, and associated training for the entire AM supply base.

- “Development of a Low-Cost ‘Lens® Engine’”

- OPTOMECH

Led by Optomech, in partnership with Lockheed Martin Missiles & Fire Control; MachMotion; TechSolve, Inc.; and U.S. Army Benet Laboratories, this project will enable a broad proliferation of metal AM through the development of a modular, cost-effective “LENS® Engine” for metal laser deposition, which can be installed into virtually any modern machine tool. To reach this goal, the latest in controls, toolpath generation, and quality monitoring are to be embedded in a modular design that can be easily upgraded and maintained as part of a machine tool system.

- “Development of Knowledgebase of Deposition Parameters for Ti-6Al-4V and IN718”

- OPTOMECH

Led by Optomech, in partnership with Applied Optimization Inc., this project will offer

CONTINUED ON — P32

an efficient and reusable solution to define process parameters that result in defect-free deposition in metallic AM. The knowledgebase will consist of a matrix of permissible combinations of process parameter values that may be used in order to produce defect-free additive deposits using the LENS process. The knowledgebase will provide a process engineer the ability to select from a matrix of vetted process parameter combinations and minimize/eliminate the trial-and-error or cut-and-try approach to process development. The knowledgebase will be generated for two alloys of interest, Ti-6Al-4V and IN718.

- “Automatic Finishing of Metal AM Parts to Achieve Required Tolerances & Surface Finishes”

- NORTH CAROLINA STATE UNIVERSITY

Led by North Carolina State University, in partnership with Advanced Machining; CalRAM Inc.; FineLine Prototyping, Inc.; Iowa State University; John Deere; Kennametal Inc.; and Productivity Inc., this project will address a critical need currently impeding the broader adoption of AM methodologies. The goal of this project is to create a system that will be able to produce a mechanical product to final geometric specification. A hybrid manufacturing system, using both additive and then subtractive processing, will be developed so that mechanical parts can be “digitally manufactured” to meet the necessary final geometric accuracy required.

- “Electron Beam Melted Ti-6Al-4V AM Demonstration and Allowables Development”

- NORTHROP GRUMMAN CORPORATION

Led by Northrop Grumman in partnership with CalRAM Inc.; Concurrent Technologies Corporation; General Electric; and Robert C. Byrd Institute, this project will demonstrate the full-scale component fabrication of electron beam (E-Beam) AM Ti-6Al-4V titanium alloy components, the development of a complete set of materials design allowables, and validation of non-destructive evaluation (NDE) methods on full-scale E-Beam AM demonstration components. Implementation opportunities for air and space structural components, as well as propulsion system components, will also be evaluated for transition to production.

- “3D Printing Multi-Functionality: AM for Aerospace Applications”

- UNIVERSITY OF TEXAS - EL PASO

Led by the University of Texas - El Paso, in partnership with Lockheed Martin; Northrop Grumman Corporation; rp+m, Inc.; Stratasys, Ltd.; The University of New Mexico; and Youngstown State University, a comprehensive manufacturing suite will be integrated into a base AM fabrication process to include 1) extrusion of a wide variety of robust thermoplas-

tics/metals; 2) micromachining; 3) laser ablation; 4) embedding wires and fine-pitch meshes submerged within the thermoplastics; and 5) robotic component placement. Collectively, the integrated technologies will fabricate multi-material structures through the integration of multiple integrated manufacturing systems to provide multi-functional products like consumer wearable electronics, biomedical devices, and defense, space, and energy systems.

- “Metal Alloys and Novel Ultra-Low-Cost 3D Weld Printing Platform for Rapid Prototyping and Production”

- MICHIGAN TECHNOLOGICAL UNIVERSITY

Led by Michigan Technological University, in partnership with Aleph Objects, Inc.; ASM International; Miller/TTW; ThermoAnalytics, Inc.; and The Timken Company, this project will focus on four interlinked tasks necessary to commercialize an ultra-low-cost 3D metal printer and develop new 3D printable alloys for it. Material development will focus on aluminum alloys, with the ultimate goal of developing a printable alloy from recycled beverage containers or cans.

- “Accelerated Adoption of AM Technology in the American Foundry Industry”

- YOUNGSTOWN BUSINESS INCUBATOR (YBI)

Led by the Youngstown Business Incubator, in partnership with the American Foundry Society; ExOne; Humtown Products; Janney Capital Markets; and the University of Northern Iowa, this project team will support the transition of binder jet AM to the small business casting industry by allowing increased access to use of binder jet equipment and the development of design guidelines and process specifications.

- “A Database Relating Powder Properties to Process Outcomes for Direct Metal AM”

- CARNEGIE MELLON UNIVERSITY

Led by Carnegie Mellon University, in partnership with AMETEK Specialty Metal Products; ATI Powder Metals; CalRAM Inc.; Carpenter Powder Products Inc.; FineLine Prototyping, Inc.; Medical Modeling Corporation; North Carolina State University; Oxford Performance Materials; Pratt & Whitney; Robert C. Byrd Institute; TE Connectivity Ltd.; United Technologies Research Center; and Walter Reed National Military Medical Center, this project will create a first-of-its-kind database relating powder properties (e.g., mean particle diameter, particle diameter distribution, particle morphology, metrics for flowability) from various suppliers to process outcomes (e.g., powder spreadability, powder ability to be sintered, melt pool geometry, microstructure, geometric precision, and material hardness). Additionally, for at least one powder system that is not immediately useable in a direct metal machine, the project

will identify process variable changes needed to make that powder system yield outcomes comparable to standard powders.

- “High-Throughput Functional Material Deposition Using a Laser Hot Wire Process”

- CASE WESTERN RESERVE UNIVERSITY

Led by Case Western Reserve University, in partnership with Aquilex Corporate Technology Center (AZZ, Inc.); Lincoln Electric Company; rp+m, Inc.; and RTI International Metals, this project will focus on the assessment of a laser-assisted, wire-based additive process developed by the Lincoln Electric Company for different high-throughput functional material deposition applications, and will benchmark it against a laser-/powder-based AM process.

- “Optimization of Parallel Consolidation Method for Industrial Additive Manufacturing”

- STONY CREEK LABS

Led by Stony Creek Labs, in partnership with Grid Logic; Michigan Economic Development Corporation; MSC; Oakland University; and Raytheon Missile Systems, this project will continue development of a novel method for AM by consolidating powder at many points on a part simultaneously. Materials and process data relating to the parallel consolidation method will be captured in a knowledgebase in a format consistent with the America Makes national repository framework. The knowledgebase will be complemented by online training, workforce development, and publication initiatives to disseminate information about the project’s results and support transition to commercial adoption.

“I want to congratulate the America Makes community and our second project call award-ees,” said America Makes Founding Director and NCDMM President and Executive Director Ralph Resnick. “I continue to be extraordinarily proud of the strides that America Makes is making to advance additive manufacturing and 3DP technologies. Today’s announcement of the second project call awardees exemplifies how our incredibly innovative and active community-comprising both members and non-members-is working together, sometimes even with competitors, to advance our industry by exploring the limitless possibilities of 3DP. I am very excited for these projects to get underway.”

The anticipated start date of the second set of projects is early Spring 2014.

In addition to today’s project award announcement, America Makes is also announcing that it will conduct a Program Management Review for members only on March 18-20 in Youngstown, Ohio. The review will include overviews of the new projects being awarded.



GF MACHINING SOLUTIONS SETS NEW STANDARD WITH WIRE EDM INTERFACE

AC CUT HMI DELIVERS SPEED, EFFICIENCY AND EASE OF USE FROM ONE MACHINE TO THE NEXT

The AC CUT HMI (human machine interface) from GF Machining Solutions (formerly GF AgieCharmilles) provides a common language for the company's entire CUT line of wire EDM machines. AC CUT gives operators a fast, efficient and easy-to-use programming interface that shares the same basic platform and functional layout as the company's AC FORM HMI for sinker EDMs. These shared commonalities allow experienced wire EDM operators to seamlessly transition, with minimal training, over to also running sinker EDM machines and vice-versa with those experienced sinker EDM operators moving to wire machines.

"A good interaction between the operator and the machine increases efficiency and process reliability," said Gisbert Ledvon, director of business development for GF Machining Solutions in North America. And according to him, the AC CUT and AC FORM are the result of GF Machining Solutions taking a new approach to the user interface design – making operation simpler and more easily accessible to operators of all skill levels. In fact, the interface is extremely intuitive and uncomplicated for beginners, allowing them to quickly learn it and confidently run their machines.

Based on a standard Windows® platform, the AC CUT HMI offers interactive graphical assistance so that all functions, such as measurement and machining cycles, are illustrated by graphics/icons for fast operator understanding and ease of use. The AC CUT HMI also features a "sequence" screen that automatically organizes machining flow. Programming steps are in logical and chronological order, and there is an on-board CAM system for quickly programming at the machine from common part file formats such as IGES and dxf.

The AC CUT also offers several automatic wire-EDM machining strategy functions that are unique to the industry and that optimize both machine setup and performance. These functions include wire recommendations through the GF Machining Solutions EDM Expert, reverse cut and skimming in the gap functionalities and backward program compatibility.

As part of the AC CUT HMI, the on-board EDM Expert recommends specific types of wire that will give the best performance and surface finish based on workpiece materials and desired machining parameters. The function eliminates the guess work in selecting the optimum wire – choosing between hard or soft brass wire, brass coated or copper coated wire and others – as opposed to using the same type of wire for all materials and achieving mediocre results.

With AC CUT's reverse-cut function, wire EDMs, once at the end of a burn path, automatically reverse direction and cut back along the same path just traveled. This capability is particularly beneficial when EDMing punches. Machines are able to rough cut clockwise around the punch shape, then counterclockwise for the finish pass – resulting in significantly shorter part cycle times. There is no longer a need for machines to break the wire at the end of a rough pass, travel back to the program start position, off-set for a finish pass, rethread the wire and re-start the program to run through a second time.

For thicker/taller workpieces, the two skimming technologies – skimming in the open and skimming in the gap – within the AC CUT HMI ensure both absolute parallelism and straightness from a part's top to its bottom. Different conditions exist when wire EDMing

in an open part cavity where the slug has been removed and when cutting in the gap between the slug and workpiece where

flushing is hindered. While most other EDMs fail to differentiate between these two skimming conditions in terms of flush and level of gap contamination, the AC CUT HMI compensates for both of them by automatically adjusting gap voltage for optimized skimming in the open or skimming in the gap.

As an industry first, the backward com-



patibility function of the AC CUT HMI allows shops to work backwards and run older part programs generated for existing GF Machining Solutions EDMs on newer and even future machine models. Instead of older programs having to be rewritten for use on today's machines, the new HMI includes a converter that automatically updates these programs to increase workflow-scheduling versatility. Shops can freely run any job on any one of their GF Machining Solutions EDM machines – no matter when the part programs were first produced.

In terms of connectivity and documentation, users can take advantage of the AC CUT HMI's E-Connect for MTConnect compatibility and the electronic documentation that is available in an embedded HTML format. The embedded documentation eliminates big hardcopy manuals, so there is no need for users to print out information on topics such as code programming, machining parameters and maintenance because with a simple touch of a button, they can instantly access all of this data on the screen. Furthermore, once their jobs are complete, operators can easily run complete machining reports that detail data such as strategy, discharge time and events. Having such information in one report allows operators to control the workpiece, archive data, enrich their know-how and calculate production costs.



"A good interaction between the operator and the machine increases efficiency and process reliability"

Gisbert Ledvon, Director of Business Development for GF Machining Solutions in North America

**"OUR TOOL LIFE'S BEEN EXTENDED
UP TO 23 PERCENT, WHICH HAS LOWERED
TOOL COSTS BY ROUGHLY 15 PERCENT.
AND OUR PRODUCTIVITY HAS
INCREASED AROUND 25 PERCENT."**

**"WE'VE SEEN NOTICEABLE
DIFFERENCES IN TOOL LIFE AND
LOWER TOOLING COSTS."**

**"EXTENDED TOOL LIFE AND
REDUCED TOOL BREAKAGE HAVE
DECREASED OUR OVERALL TOOL
COSTS BY 30 PERCENT."**

For people who make what matters, tool life is critical. Which is why these companies chose Makino. They appreciate how Makino's comprehensive approach to machine design extends their tool life. But mostly, they're thrilled with how Makino has helped their cost per part and improved their efficiency and profitability.

Read their stories and watch their videos and cutting demonstrations at makino.com/tool-life.





AMERICAN JOBS FOR AMERICA'S HEROES CAMPAIGN MAKES IT EASY AND FREE TO HIRE NATIONAL GUARD AND OTHER VETS

The National Guard and other military branches are laying off soldiers at all ranks because of downsizing. The Army National Guard is likely to reduce between 15,000 and 35,000. The U.S. Army may lose 80,000 or more. There will be thousands more veterans looking for jobs in addition to those veterans currently looking.

In 2013, almost 50,000 U.S. veterans of combat in Afghanistan and Iraq were homeless or in a federal program to provide housing during 2013, three times the number in 2011, according to the Department of Veterans Affairs. They and their families need jobs!

Hiring National Guard members and other veterans creates real benefits for your company, your community and veterans and their families. The nonprofit American Jobs for America's Heroes (AJAH) campaign gives you free, direct access to of highly trained National Guard members and other vets who are transitioning to civilian jobs.

"Guard members bring tremendous skills and teamwork values to the workplace – they've had years of training at government expense in areas that are very relevant to civilian employment," said Steve Nowlan, campaign director. "Guard members are committed to continuous evaluation and self-improvement so they naturally fit into high-performance organizations and get the job done right," he continued.

The Guard trains in 107 occupational specialties. Most members have put this training to work in high stress situations ranging from disaster relief to combat situations. They are disciplined, reliable and drug free. Guard members are focused on continuous learning and improvement so they excel in advanced job training.

Watch this short video featuring veterans on the success Phillips 66 has had in military hiring: http://www.CenterForAmerica.org/pledge/ng/ajah_Phillips66_military.html

In the AJAH campaign, your free job postings flow directly to National Guard and other military employment counselors in the states who work one-on-one with candidates to match them to your job requirements. These counselors help you understand how military training and experience translates to your civilian requirements.

You can watch a five-minute video about

the campaign – www.CenterForAmerica.org/video.html – and then visit the website at www.CenterForAmerica.org to register online in five minutes. A campaign counselor will contact you to set up your posting and answer questions. All services are free. More than 1,000

employers are already participating.

Questions? Contact: Steve Nowlan, Center for America, 201-513-0379 or SNowlan@CenterForAmerica.org.



O'FALLON BUSINESS MAN SAYS, "IT'S TIME TO GIVE BACK"

Troy Pohlman, founder and CEO of Component Bar Products, Inc. and a self-proclaimed expert in the act of handshaking, says, "It's time to give back," but a little bit more later about his expertise in shaking hands.

Pohlman, a third-generation manufacturer of precision machined products (commonly referred to as machined parts or manufactured components), is now starting a 16-week training school designed to develop skilled manpower in a fast-track, hands-on manufacturing environment for the precision machined products industry and associated businesses. Pohlman says the training will be very hands-on, incorporating project-based training and education. The students will be challenged to make a variety of projects throughout the 16-week program, with each project progressively requiring a higher level of discipline, care and quality.

The school, Midwest Machine Tool Training Center (MMTTC), is located directly next door to his 75,000-square foot manufacturing plant, all located in the O'Fallon Corporate Centre. A passionate businessman, Pohlman feels that his school is ideal for the male and female, aged 18 to 28, who wants to build a "trade" first and then maybe consider returning to a two-year or four-year college experience.

In his own words, Pohlman says his motivation is twofold: First and foremost, "It's time to give back." Secondly, "We have a serious demographic issue in manufacturing where a large percentage (30% for his own company) of the workforce will be retiring over the next 7 to 10 years. This particular part of the workforce is not only highly skilled, but also inventories the experience and intellectual capital that makes US manufactures competitive and successful...

Without these people, the machines come to a halt and become very silent. This part of the workforce must be replaced by a 'new generation of machinist' or the machines will remain silent. This would be very bad for our country," Pohlman says.

Asked about what makes his training school different, Pohlman responds: "First and foremost, our curriculum is designed for industry requirements and expectations. Another very unique feature that separates our school from others will be a mentoring and shadowing program. Students will be paired up with associates of Component Bar Products (Pohlman's manufacturing company) and will have the opportunity to work with and shadow that mentor. This will give the students a very real opportunity to test drive his or her potential future trade."

Now what about that expertise in shaking hands? Pohlman's response: "We have an entire generation out there that is good with their fingertips (texting), and good at looking down (at their PDA). But do they know how to look you in the eye and shake your hand? Absolutely not... These soft skills are essentially nonexistent in this generation."

And this is why Soft Skill development in his training center will remain front and center during the 16-week curriculum. The MMTTC training center is about producing quality individuals and not quantity.

To learn more about the Midwest Machine Tool Training Center visit the website at www.go-mmmttc.com

To set-up a tour, contact Troy Pohlman at 636-939-5582 or troypp@go-mmmttc.com



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CENTRAL MASSACHUSETTS MACHINE BECOMES MERIDIAN INDUSTRIAL GROUP



In January 2014, Central Massachusetts Machine will become Meridian Industrial Group. Recent investments in equipment and technology have resulted in increased capabilities and a customer base that continues to grow well beyond Massachusetts. Our new name marks this transition.



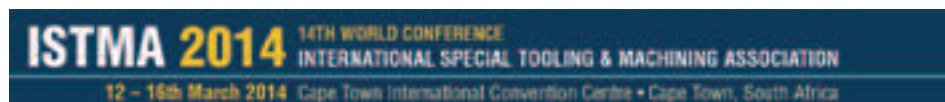
Our staff and dedicated team of machinists will remain the same. We will maintain our operations in Holyoke, Massachusetts where we've been providing machining services to the commercial, aerospace and defense industries for more than a century. As always, large part machining will be our specialty.

As Meridian Industrial Group, we will strive to improve our manufacturing processes and streamline our business practices so that we may meet the demands of a more competitive manufacturing industry in 2014 and beyond.

In the coming weeks, you will be receiving updates as we complete this transition. Thank you for your continued support.



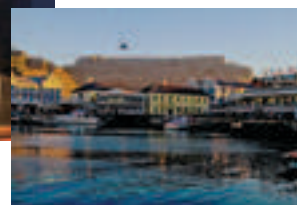
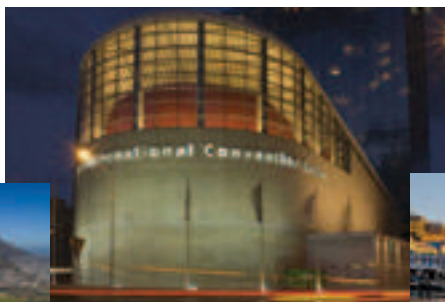
ISTMA 2014



The Toolmaking Association of South Africa (TASA) is a full member of the International Special Tooling & Machining Association a multi-national organization representing the world tooling industry. ISTMA promotes international meetings to support a worldwide exchange of experience. Every three years a major World conference takes place. In March 2014 we are privileged to be its host in Cape Town.

The ISTMA World Conference will bring together the special tooling and machining industry business owners and senior management from around the world.

This highly influential group will meet to discuss international and regional trade, government regulations and international trading conditions, trends, new technology and new techniques driving the industry and any other critical issues of



concern.

ISTMA therefore, offers suppliers an excellent opportunity to gain international and local exposure to these influential people for their products and services in an unbelievable cost effective way by participating as a sponsor and or exhibitor.

Most governments around the world are focusing on strengthening their manufacturing capabilities and capacity to counter the drift towards low cost manufacturing in the Far East and China. Many new initiatives by government and government agencies are developing to stimulate the industry and particularly in the areas of skills development and assistance packages for asset investment.

So as a supplier come along and join us to find out about these opportunities and meet

some of the people involved.

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3D RAPID PROTOTYPING CHANGING MANUFACTURING

BY ANDY COUTU

“Faster. Better. Cheaper.”

No, this is not the introduction to a “Six Million Dollar Man” episode from the 1970s. It’s the new mantra of today’s manufacturing companies, which are using innovative methods to get their products to market faster, better and cheaper than ever before.

Who would’ve thought these words would be used to describe manufacturing?

In the old days, manufacturing took time. “Time to market” was clearly a lengthy cycle in any industry because getting a product from concept stage to being available for purchase took time. Product development often had a difficult time making it out of the engineering department, based on such variables as initial approval, testing phases, budgeting, staffing allocations, manufacturing, shipping ... the list goes on and on.

But today, that’s all different. Thanks to an innovative process known as “(3D) rapid prototyping,” time to market can be greatly reduced. And the strange thing is: the technology is nothing new. It has been around for nearly three decades.

Known as “additive manufacturing,” 3D printing is used to fabricate models, prototypes and parts out of resin material. Using a CAD drawing, a part can be printed in a matter of hours.

Today’s high-end 3D rapid-prototype printers have improved exponentially over the last decade. There are machines with better print quality and resolution, significantly higher run speeds, more material choices, properties and shades of color, and less of a footprint. It’s possible to buy a 3D printer to sit on your desk – similar in size to a laser printer – for printing convenience at your fingertips.

So not only are 3D printers more capable, but the range and mechanical properties of 3D print materials are expanding. The result of all this is that advanced 3D printers are becoming a must-have fixture within every large product-development company, from the automotive sector to electronic goods and household appliances.

Manufacturers are able to cut out much of their secondary tooling processes, such as injection molding, resin

tooling, mold making and soft tooling. And all of this will go into helping them shorten their time to market and reduce costs.

There’s not a mechanical engineer on the face of the planet who wouldn’t want to hold their product idea in their hands. To physically see it; to feel its material properties; and to test how it works. A design engineer could have a new product idea on Tuesday, design a CAD drawing of it on Wednesday morning, and print a 3D part to have in-hand for the sales department’s customer meeting on Wednesday afternoon. Rapid prototyping virtually eliminates the need for preproduction tooling and speculative – costly – manufacturing.

Engineers today are using 3D rapid prototyping much the same way the busi-



ness world embraced “spell check” with word-processing documents. It’s a step in the process that saves costly mistakes by enabling form, fit and function testing prior to manufacturing.

There’s no end to the innovation that is taking place using 3D rapid prototyping, on a small and grand scale. According to The Wall Street Journal, Boeing plans to someday make an airplane wing without cutting or bending any metal – using a giant 3D printer. General Electric is getting in on the act, too, for new technology in health care. From musical instruments to dental orthodontics and automotive parts – 3D printing is turning ideas into reality.

It’s a fact that the U.S. is competing with other countries when it comes to manufacturing at reduced costs. 3D printing is but one tool to explore innovation and cost reduction, to determine

if a product can be built stronger with less material, for example, or as a tool to check if a new design will function properly.

Businesses today compete with ideas in a global marketplace. In order to compete in this modern, “instant” world, ideas have to be very fast. What’s your next-generation product? You’d better come up with it quickly and it needs to be better than your competition’s.

One of our customers is a major luggage manufacturer. We built a prototype of handles and a new wheel design on a piece of luggage so it could be tested via focus group for instant feedback critical to the manufacturing process. Another customer, a world-renowned gaming-technology company, came up with a cover design that we prototyped for a casino machine that would use less plastic, saving millions of dollars in the process. For a major golf ball manufacturer we prototyped four dozen balls, each with different dimple arrays, in a matter of two days. These balls were blown through a wind tunnel to see how they would react for speed and accuracy – something that would never have been possible before with traditional manufacturing processes.

Three-dimensional rapid prototyping is revolutionizing the manufacturing floor. The future is here, and its “one-off,” meaning it’s possible to produce just one part or model cost effectively, versus having to produce thousands. When faced with the pace of rapid change, 3D printing is allowing more businesses to compete and take advantage of developing opportunities in their own backyards and around the world. It puts imagination and innovation back into the hands of more companies.

Andy Coutu is president of R&D Technologies Inc. in North Kingstown, RI. He can be reached at acoutu@rnd-tech.com. To learn more about 3D printing, visit www.rnd-tech.com.



One of the most effective and widely available ways for manufacturers to reduce electricity costs and consumption is participation in demand response programs; however, a large gap exists between interest levels and actual participation in such programs.

Demand response provides financial incentives for voluntarily reducing electricity usage during peak demand times when electricity prices are highest. A new report by the Energy Research Council (ERC), *Best Practices: Demand Response*, validates that 28% of midsize companies are very interested in demand response participation, but only 9% currently take advantage of demand response programs.

Peak demand occurs only a few times per year, mostly during afternoon hours in the summer. Manufacturers can reduce consumption during peak times by shutting down equipment, alternating production schedules, operating onsite generators, and adjusting lighting and HVAC settings.

“Demand Response programs help to prevent blackouts, reduce demand on the grid, and benefit the environment,” said James Moore, Ph.D., President of the ERC. Reducing electricity usage during peak demand times is important because more “peaker plants” must go online to generate enough power to meet peak load. Peaker plants are old, dirty, and expensive to operate.

DEMAND RESPONSE PARTICIPATION

Several reasons explain the gap between interest levels and actual participation in demand response. A 2012 ERC survey of midsize businesses verifies that a significant barrier to demand response participation is lack of awareness and education. Only 20% of survey respondents said they were very or mostly familiar with demand response. The majority reported they were only somewhat familiar (34%) or not at all familiar (46%) with demand response services.

“Demand Response programs are generally either incentive-based or time-based programs,” explained Michael Payne, JD, LLM, Executive Vice President & Corporate Counsel of APPI Energy. “Under incentive programs, customers reduce electricity consumption during periods of peak demand in exchange for financial incentives or lower electricity bills.” Incentive-based demand response programs are most common and deliver the majority of energy savings.

Time-based demand response programs are suited for midsize businesses that have the ability to modify their energy usage during different times of the day or week as electricity prices fluctuate. This concept is much like buying a low-cost airline ticket

based on low travel demand days.

SMART GRID

Comprised of millions of individual meters and thousands of local networks, the U.S. electricity infrastructure is expensive, challenging to maintain, and rapidly aging.

Trillions of dollars must be invested nationally in the next few decades to upgrade from the current infrastructure to a modernized, fully interactive Smart Grid. As utilities are required to rebuild transmission systems to ensure reliable delivery of electricity to homes and businesses, consumers will see electricity delivery costs rise to cover necessary expenditures.

Looking forward, Smart Grid technology will greatly improve demand response and its ability to better manage electricity costs. Smart Grids can automatically control electricity flow, and can identify, isolate, and resolve load problems. For a Smart Grid to be truly effective, it must interface with smart buildings and smart equipment. Connected to a Smart Grid, smart buildings can respond to peak demand events and real-time electricity pricing.

BOTTOM LINE

One of the most widely available and effective ways to reduce electricity costs and

consumption is participation in a demand response program. Demand response programs are becoming an increasingly important resource for grid operators during periods of system stress. For more information about the Energy Research Council, or to participate in future surveys, contact 410-749-5519 or visit www.energyresearchcouncil.com. For more information on enrolling in a demand response program, contact APPI Energy at 800-520-6685.



ROCK RIVER VALLEY TOOLING AND MACHINING ASSOCIATION TO OFFER FIVE SCHOLARSHIPS

The Rock River Valley Tooling and Machining Association is offering five \$1,000 scholarships to high school seniors graduating in spring 2014 who are pursuing a manufacturing-related degree program.

Candidates graduate spring 2014; live in Winnebago, Boone, Ogle, Stephenson or Whiteside counties, and Rock or Walmorth counties in Wis.; must be a U.S. citizen or documented permanent resident; pursuing a degree in a manufacturing-related field; and attending community or technical college or a four-year college/university. Candidates essay's must state their interest in a manufacturing industry career, what led them to pursue this type of career and their specific career goals.

To apply, download the Scholarship Application Packet from RRVTMA.com/scholarships. The completed application must be received by Feb. 1. Incomplete and late applications will not be accepted.

For information: 815-978-3698, don_rrvtma@comcast.net.



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ONSET ANNOUNCES NEW DATA LOGGER FOR BUILDING PERFORMANCE MONITORING

Onset, a world leader in data loggers, today announced a new high-performance, LCD display data logger for building performance monitoring applications.

The HOBO UX120-006M Analog Logger provides twice the accuracy of previous models, a deployment-friendly LCD, and support for up to four external sensors for measuring temperature, current, CO₂, voltage, and more. This enables energy engineers, facility managers, and others to easily and affordably solve a range of building performance applications, including energy audits, building commissioning studies, and equipment scheduling optimization.

"Our next-generation HOBO UX Series platform has been a major step forward for Onset in terms of providing customers with an ideal combination of deployment ease-of-use, measurement accuracy, and convenience," said Jessica Frackelton, senior manager of product marketing for Onset. "With our latest model, the UX120-006M, customers can now have a simple and reliable amp logging

solution with twice the accuracy and memory for less than \$150. These features will enable customers to manage projects with the logging frequency they need, without having to get into complicated deployments setups involving multiple loggers for a single task."

FAST, EASY DEPLOYMENT

The HOBO UX120 Analog Logger streamlines building performance monitoring applications in a number of ways. For example, it features an easy-to-view LCD that visually confirms logger operation and battery status, eliminating the need to connect the logger to a computer to view the information. As the logger records, the LCD provides a near real-time readout of the current measurements as well as minimum, maximum, average, and standard deviation statistics. On-screen alarms can be set for each channel to notify users when a sensor reading exceeds high or low thresholds.

The logger also features a large memory capacity capable of storing 1.9 million measurements. This enables the loggers to be



deployed for longer periods between offloads. Firmware is user upgradeable, and the logger offers start, stop, and restart pushbuttons to make installation fast and easy.

POWERFUL SOFTWARE

Once data has been recorded with the HOBO UX120 Analog Logger, it can be easily viewed in graph form and analyzed using Onset's HOBOWare® Pro software. Time-saving tools allow users to batch-configure and readout dozens of loggers in a fraction of the time it would take with previous generations – a particular advantage in large-scale monitoring projects. The software also features a Bulk Export tool that allows users to export data files to text format for use in spreadsheets.



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AERODEF MANUFACTURING 2014 ADDITIVE MANUFACTURING/3D PRINTING RESOURCE CENTER



AeroDef® Manufacturing Summit and Exposition 2014 will feature an Additive Manufacturing/3D Printing Resource Center, where attendees can explore the growing number of applications made possible by the technology, according to event producer SME. AeroDef Manufacturing, the one event solely dedicated to aerospace and defense manufacturing, takes place February 25–27, 2014, at the Long Beach (Calif.) Convention Center.

Named one of the “Top Ten Breakthrough Technologies” by MIT Technology Review, additive manufacturing – frequently referred to as 3D printing – is the process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies. Aerospace and defense manufacturers are introducing the technology to lower production costs, reduce waste, speed product development and produce new designs.

The Additive Manufacturing/3D Printing Resource Center (Booth 339) will display parts produced by major technologies, including stereolithography, laser sintering and fused deposition modeling. Todd Grimm, an influential author, speaker and consultant on additive manufacturing/3D printing, will host the

center and present two sessions on each day of the three-day exposition:

MORNING SESSION: TACTICAL INFORMATION

A look at the technology landscape, what’s available, and what manufacturers need to know to get started.

AFTERNOON SESSIONS: STRATEGIC INFORMATION

How to map out a plan to incorporate the technology, when to get in, and choosing technologies and services.

The resource center is part of the AeroDef Manufacturing Exposition, which is free-of-charge for those who register before February 21, and also includes access to exhibitors offering additive manufacturing/3D printing related products. Attendees can also register for technical sessions on digital and additive manufacturing/3D printing as part of the AeroDef Manufacturing Summit that includes exclusive keynote and featured speakers, Executive Insights Series panel discussions and networking opportunities – the Take Off! and AeroDef Afterburner.

Register for the AeroDef Manufacturing at aerodefevent.com. Join our Twitter group @AeroDefMfg and our LinkedIn group to learn details about AeroDef as they unfold, including keynote speakers, panels and sponsorship opportunities for exhibitors.

TODD GRIMM: ADDITIVE MANUFACTURING/3D PRINTING KNOWLEDGE BAR HOST

Todd Grimm is 22-year veteran of the additive manufacturing/3D printing industry. From his work as a consultant, writer, author, speaker, editor and advisor, he was recently named as one of The TCT Magazine’s 20 most influential in the additive manufacturing (AM) industry. Todd is president of T. A. Grimm & Associates, an additive manufacturing consulting and communications company, editor for ENGINEERING.com and columnist for The TCT Magazine. He is the author of User’s Guide to Rapid Prototyping. Todd currently serves on the board of the Additive Manufacturing Users Group (AMUG) as its AM industry advisor and has served as chairman of the Society of Manufacturing Engineers’ (SME) community for additive manufacturing.



FLANGE MOUNTING COLLARS MANUFACTURED TO CUSTOMER SPECIFICATION

Custom made flange mounting collars that are perfectly square for mounting a shaft, tube, or pipe to a flat surface or for attaching components to them are available from Stafford Manufacturing Corp. of Wilmington, MA.

Stafford Custom Flange Mounting Collars can be manufactured from steel, stainless steel, alloys, aluminum, and thermoplastics in a wide range of flange designs, hole patterns, and sizes. Incorporating the Accu-Clamp™ non-marring and perfectly square clamping feature, these one-piece collars can be machined into flat and

stable mounting flanges, hubs, or pulleys.

Featuring flatness and perpendicularity held to < 0.001 TIR, Stafford Custom Flange Mounting Collars can be manufactured in bore sizes from 1/2” to 6” I.D. with flanges up to 14” O.D. and also as two-piece designs. Typical applications include conveying, converting, and packaging equipment as well as various power transmission, drive, and structural applications.





GUEST COLUMN FROM STATE REPRESENTATIVE MARK ROMANCHUK

AN UPDATE ON THE OHIO GENERAL ASSEMBLY'S PROGRESS

As we turn the page to 2014, I wanted to report on the progress the Ohio General Assembly has made in cutting taxes, reforming government and improving workforce development. My top priority continues to be making Richland County a place where businesses can grow and create jobs that will provide a better quality of life for every family.

In June, my colleagues and I passed the biennial state budget which brings about many positive changes for Richland County and Ohio including:

CUTTING TAXES

The state's balanced budget plan slashes the state income tax and puts more money back in your pocket. I voted to permanently cut the income tax by 8.5% beginning in fiscal year 2014, 9% in 2015, and 10% in

2016. This represents nearly \$2.7 billion in tax cuts that will benefit all Richland County families. It is the largest "year-to-year" tax cut of any state in the nation.

INCREASED FUNDING FOR RICHLAND COUNTY SCHOOLS

Education is crucial to improving the competitiveness and vitality of our state. That's why I supported a new per-pupil formula which increases funding to Richland County schools by \$11.4 million dollars without raising taxes. The new formula puts a priority on the quality of education our children and grandchildren receive and better prepares them for success after high school.

WORKFORCE DEVELOPMENT

There is a critical need for workers with technical skills and knowledge. In order to

prepare our young people and unemployed adults for these positions, I voted to increase funding for job readiness programs in career-technical schools in Richland County which will provide this much needed training.

Many revisions to state law are the result of ideas from Ohioans like you. I have met with many constituents this past year and look forward to hearing from you this year. If you have ideas on how to continue Ohio's progress, please contact me at 614-466-5802 or rep02@ohiohouse.gov.

Have a great year!



ANCHOR DANLY ANNOUNCES NEW DISTRIBUTOR



Anchor Danly is pleased to announce The Lee Horneyer Company as a distributor for Anchor Danly products, including die sets, steel & aluminum plate, and fabrications. The alignment has taken place to better serve our customer base in Missouri, Kansas, and Southern Illinois. We look forward servicing all our customers with quality and on time products. For additional information, contact Ryan Reinhardt @ (314) 616-6835 or general@horneyer.com



MICHIGAN MANUFACTURING INTERNATIONAL PRESENTS EMPLOYEE SERVICE AWARDS

Michigan Manufacturing International (MMI), a leading broad line supplier of high-quality mechanical assemblies and components, presented employee service awards recently at its annual sales meeting.

MMI CEO Jacob Prak presented the MMI All Star Award to Andy Lamb (Northeast Territory, USA) and Peng Hong Mei (China) for outstanding performance. Both employees have demonstrated their commitment to MMI and were recognized for their exceptional efforts to ensure that customers receive the quality and service they deserve.

All of the MMI sales reps received plaques to commemorate their years of service.

The meeting also consisted of sales training modules conducted by Benchworks CEO Thad Bench.

Jacob Prak commented on the sales meeting, saying, "At MMI, we are very fortunate to have a team of seasoned sales professionals who are knowledgeable and

resourceful, so that they are able to offer the very best solutions to our customers. Our reps are located throughout the United States and China, so it's exciting to bring everyone together to discuss goals and learn how we can perform even better in 2014."

Founded in 1991, Michigan Manufacturing International (MMI) specializes in supplying manufactured to print assemblies and components to original equipment manufacturers (OEM). Products include assemblies, castings, stampings, machined parts, gears, bearings and more. Services include product engineering, manufacturing, inventory management and stocking programs — all designed to streamline client operations and increase profitability. MMI designs the most effective, highest quality solutions from anywhere in the world.

For more information about MMI, visit www.michmfg.com or call 800-677-0504.



GILKES: WATER POWERED — CUSTOMER SUCCESS STORY

Kendal is in the Lake District, Cumbria, in the north west of England. By rights, it should be called the Wet District, but as anyone who has ever been to the exposed reaches of our fair but damp island will understand, honesty isn't necessarily good for tourism. So, the area has always been known and described by dogged and enterprising locals for the weather's pretty and marketable side effects, rather than for its towering hills or craggy mountain tops, like its less wet, less famous neighbor, the Peak District.

Long before its natural history drew the huddled holidaying masses, the town's people got along nicely producing pipe tobacco, snuff, and Mint Cake, an invention from the 1860s that's still made and sold today. Kendal Mint Cake isn't cake at all, but dense, glucose-based confectionary that could just about keep you alive if you're an injured shepherd or a wretched hill-walker traipsing ever decreasing circles in thickening cloud – at least, long enough to enjoy one last smoke of your local tobacco.



North West England in the mid-19th century may not have been the tourist destination it is today, but it became a place of great industrial activity. The coal-

powered revolution had begun 100 years previously, 150 miles or so to the south; but in the valleys of what used to be the old Westmorland and Kendal baronies, those who owned the means of production covetously eyed the cascading water as an alternative and cheaper source of potential power to run their machinery and turn their mill wheels.

The firm of Gilbert Gilkes and Gordon Ltd was founded in 1853 to design and manufacture the turbines and infrastructure to capture the energy sliding off the hillsides. The company is still there today, in Kendal town, doing what it always did, and it still occupies the building it moved into 120 years ago, where part of the Lancashire Canal once passed through, bringing packet boats of freight and passengers from the neighboring county. The tunnels that carried the boats along the canal and under the Gilkes factory were blocked a long time ago, but the brickwork arches remain where the old building abuts the new, and a sepia-toned photograph hanging beside the current production line shows workers shifting supplies into and out of boat hulls.

There are few other reminders that this privately owned company has been here since the 15th year of Queen Victoria's reign. One half of the factory floor is packed with the latest Haas CNC machine tools, arranged in cells and making pumps for diesel engines; the other is open space where components of hydro-power turbines are assembled before being shipped somewhere in the



world, to add to the impressive tally of more than 6500 "installations" in 80 countries.



The Haas CNC machine tools are used to manufacture a range of sophisticated pumps for cooling diesel engines and plants. Gilkes supplies many of the world's major diesel engine manufacturers, and also produces pumping solutions for lubricating oil, gas, and steam turbines. In fact, says Operations Director Andy Poole, Gilkes produces pumps for virtually any application, and has been trading on a reputation established during the Second World War.

"We developed a pump that went on trawlers," he says. "When the war finished, the fishermen remembered the name. Then, when they built their own boats, they told the engine suppliers what pumps they wanted, and the demand has just grown from there."

Many similar pumps are manufactured using rubber impellers (the part that goes inside the pump and does all the work), and rubber wears out. "We've always offered metal impellers," says Andy Poole, "which means our pumps last longer and perform better for longer. This year, we'll make about 19,000 units, all here, in this facility, on Haas machine tools." By contrast, turbine parts are not manufactured in Kendal. "We do all the design work," says Mr. Poole, "but the components are made by sub-contractors and only assembled here. We also have a pump plant in Houston, which was established around 35 years ago to refurbish units for our U.S. customers.

"Both Caterpillar and Cummins run refurbishing programs, where they take engines back from customers and overhaul them. They usually send the pump back to us for rebuilding. So, we're working on pumps now for generator-sets and industrial and marine applications that we may get back for reconditioning in around 7 or 8 years' time. Many of the bronze pumps you see around the factory are for marine applications."



In Goods Inward (the receiving department, to non-Brits), pallets are stacked high with cast pump bodies in different finishes and colors. The castings are all sourced in the UK,

which means any quality issues can be resolved quickly and easily. Assuming the casting is good, it becomes a finished pump in around a week, and is then most likely shipped to one of Gilkes' customers' plants in the UK or overseas.

"We don't run a Kanban system," says Andy Poole. "We make for stock or to order. We have a warehouse in the United States, because our largest customer, Caterpillar, rarely gives us more than one or two days notice."

The decision to invest in Haas CNC machine tools had a lot to do with the company's U.S. operations.

"We researched the market," says Mr. Poole, "but one of our main considerations when we shortlisted the choices was that we wanted to have the same machines at our U.S. plant in Houston as we use here, in the UK. We wanted a machine tool that was going to be supported

both sides of the Atlantic, and that used the same control. Haas has a huge user base in America, plus they have a wide range of different machines for different applications. It also means our engineers in the UK can easily share their experience and best practices with their U.S. counterparts.”

Gilkes’ Haas machine tools are organized in product cells – or on a “group technology” basis, as the company refers to the layout. The eventual aim is to have 6 cells, with Haas machines replacing all of the company’s older machine tools.

One of the lines runs two Haas SL-30 turning centers and an EC-400 horizontal, making small bearing houses and bodies. Another, non-Haas, line runs shafts; Haas machines will eventually replace all of these, older machine tools. “Some of these machines are actually older than me,” says Mr. Poole.



A third line runs SL-40 turning centers and VF-3 vertical mills making larger housings and bodies. The fourth line is actually a dedicated, high-volume cell that, during my visit, was being installed and tested: It’s a Haas DS-30SSY high-speed, dual-spindle turning center with Y-axis and live tooling. There’s a Haas bar feed, an ABB robot for unloading parts, and a Renishaw Equator bench-top gauge for in-process testing. When the cell is fully commissioned, it will work two shifts a day making one collar and one spacer for every pump, plus spares, which will add up to around 50,000 parts a year. The whole investment totals more than £400,000!

“We also have two more Haas lathes coming on later this week,” says Mr. Poole, “which will make up the fifth cell, to machine impellers.”

Standing alongside one another are two Haas TL-2 Toolroom Lathes, making bronze parts for marine pumps, and alone in the middle of the workshop is a TM-1P Toolroom Mill, dedicated to making impellers.

Gilkes is a very busy British manufacturer developing and making perdurable industrial products for global customers and applications. The company is still managed by members of the founding family, but unlike some firms that find it difficult to let go of the past, this one is planning and investing for future glories, and has recently received a government grant for a purpose-built factory on the outskirts of town, where it will have room for its biggest-ever expansion.

In this day and age of super-profit-making, self-congratulating corporations, the example this self-assured firm sets begs the question: How many will be around 160 years from now, doing more-or-less what they were doing when they were founded, but doing it better with every passing year? As long as the Lake District is wet, I predict that there will always be a Gilbert Gilkes and Gordon Ltd.



TQC HULL ROUGHNESS ANALYZER CORROSION INNOVATION OF 2014?

TQC’S HULL ROUGHNESS ANALYZER IS NOMINATED BY MATERIAL PERFORMANCE MAGAZINE FOR THE CORROSION INNOVATION OF THE YEAR AWARD 2014. MP MAGAZINE IS A PUBLICATION OF NACE INTERNATIONAL.

Honoring the most important innovations impacting corrosion control today, the awards showcase progressive technological developments in all aspects of corrosion prevention and mitigation and recognize the innovators who have created revolutionary solutions to combat corrosion and protect vital assets from its damaging effects. Innovations go beyond marginal improvements to current products, services, methods, and techniques.

The highest-rated innovations will receive the awards on March 10, 2014 at the world’s largest corrosion conference and expo, NACE International’s CORROSION 2014 in San Antonio, Texas.



The TQC Hull Roughness Analyzer measures the AHR value (Average Hull Roughness) of sea going vessels. AHR is the ‘mean’ of all the vessel’s hull roughness readings and is the measure against which ship’s performance is correlated.

A high structural roughness leads to a full penalty and increased CO2 emissions. Modern anti-fouling paints reduce the structural hull roughness. TQC’s Hull Roughness Analyzer provides data that shows the “before and after” situation. With these data the expected fuel saving can be calculated. The TQC Hull Roughness Gauge provides graphical representations, storage of data and survey reports in Microsoft Excel ®.

More information about the TQC Hull roughness gauge can be found on the dedicated website: www.hull-roughness.com or by contacting TQC in The Netherlands, +31 10 7900 100, info@tqc.eu



ADD, REMOVE MATERIAL IN SINGLE SETUP WITH MILLING, METAL DEPOSITION UNIT

DMG MORI

A VERSION OF THE HYBRID MACHINE IS TO BE DISPLAYED AT EUROMOLD 2013.

DMG Mori said it will introduce a machine concept that offers both 5-axis milling and metal deposition processes.

The company's Sauer Lasertec unit worked with DMG Mori's US operations to integrate laser metal deposition technology into the hybrid machine concept, which is based on a DMU 65 Monoblock machine tool.

Commercially available technology will reportedly be demonstrated at a pair of machine tool shows in September 2014: IMTS in the US and AMB in Germany. At the same time, the series start-up is planned, the company said.

DMG Mori said the concept study at Euromold will feature a Lasertec 65 Additive Manufacturing machine fitted with a 2kW diode laser for laser metal deposition. According to Gregory A. Hyatt, senior VP & CTO of DMG Mori Advanced Solutions Development, "By combining additive manufacturing with milling or turning in one machine, additive technologies are no longer limited to small workpieces. Our focus is to create a solution for more typical and larger workpieces found in industries such as aerospace, mould & die and energy, and for faster, more productive and economical justifiable deposition rates."

The powder nozzle process allows for the manufacture of large parts, and the build rate of up to 3.5kg/h makes this process as much as 20 times faster than laser sintering in a powder bed, according to the supplier.



The unit's powder jet sprays the metal into the laser, a process said to drastically cut build time.

areas occurring before further material additions block these areas from the cutting tool.

The hybrid machine combines the advantages of milling – high accuracy and surface finish – with the flexibility and high build rate of laser powder deposition, and it can cut costs, too, according to Friedemann Lell, head of sales at Sauer Lasertec.



The unit is based on a DMU 65 Monoblock machine tool.

It explained that the combination of additive steps with milling makes completely new applications possible. For example, the part can be built in sections, with milling operations of important

"For integral parts that are traditionally milled with a material waste rate of ninety-five per cent and more, a significant cost saving can be achieved and the rate of waste can be reduced to about five per cent."

ABOUT THE DEPOSITION PROCESS

The machine features a diode laser mounted in place of a cutting tool, and the material is added by spraying metallic powder into the laser beam, melting the powder in layers into the base material, the company explained, noting that the powder is fused to the base material without porosity or cracks.

The metal powder forms a high-strength weld joint with the surface. After cooling, a metal layer develops that can be machined mechanically.

DMG Mori said that while the laser deposition technology is nothing new, it is a reliable and proven process, which makes it suited for integration into the company's CNC machines, such as those from the DMU, NT and NTX series. "The combination of conventional and additive manufacturing methods will take on increasing significance, as it offers a number of advantages as compared to stand-alone solutions," the company said.

A strength of this process is that it can be used to create a number of similar or differing metal layers, which can then be machined to the required accuracy before the next layers are added and the area would not be accessible for cutting. Hence, the hybrid solution makes sense for repair work and the production of moulds

and dies, the company noted, but it also offers an interesting option for other applications, especially in the field of large part machining, where other additive manufacturing techniques cannot be applied.

The machine is said to allow for the processing of all common metal powders, including steel, nickel and cobalt alloys, brass or titanium.

When in operation, the laser head is located by a HSK interface in the milling spindle. It can be automatically swivelled to a protected parking area when the machine is used for milling. The control for the laser process is located in a separate cabinet which makes it easy to integrate the system into other machines of the DMG Mori group.



Commercially available machines are expected to be ready by September 2014, according to the supplier.



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SEMESTER 1 (100 HOURS) INTRODUCTION TO MACHINING / BASIC SHOP MATH / BASIC BLUEPRINT READING

A foundation for study of manufacturing methods, processes, related equipment, and tools of industry, shop safety practices, job planning, feeds and speeds, layout tools and procedures, hand tools and bench work, metal cutting saws, drilling machines, lathes, milling machines, jig bore and jig grinder, surface grinder, E.D.M, and abrasives. Blueprint Reading-related to the manufacture of a working part, lines, views, dimensioning, calculating cutting planes, fraction to decimal conversion, practical and applied basic shop math, constructing a sketch of an engineering drawing, auxiliary sections, symbols, and broken lines.

SEMESTER 2 (100 HOURS) INTERMEDIATE MACHINING / INTERMEDIATE APPLIED SHOP MATH / INTERMEDIATE BLUEPRINT

Provides skills in layout techniques and operations, including calculating bolt hole circles, location of surfaces related by non-right angle triangles, and points of tangency and other related applied shop mathematics. Included is all learning outcomes that are necessary to successfully layout drawing by understanding the proper views from an actual part. Continues with a foundation for study of manufacturing methods, processes, related machining equipment, and tools of industry, requiring the student to understand shop safety practices, job planning, feeds and speeds, precision measuring and layout tools and procedures, hand tools and bench work, metal cutting saws, drilling machines, lathes, milling machines, jig bore and jig grinder, surface grinder, E.D.M, and abrasives.

SEMESTER 3 (100 HOURS) INTRODUCTION TO CNC / ADVANCED APPLIED SHOP MATH / ADVANCED BLUEPRINT

Computer applications to machining processes. Engineering drawing analysis, using trigonometry to determine programming points; ascertaining implied part dimensions; determinations of machining parameters; calculation of speeds; feeds and tool offset; establishment of work zero and tool home positions. Manual programming of CNC machines using G-codes; tooling and set-up of CNC operations; verification of toolpaths by simulation. Program upload/download, proper collets and guide bushing setting and adjustment, turning tools setting, milling tools setting, ID tools setting, proof running, first part cutting techniques.

SEMESTER 4 (100 HOURS) CNC OPERATIONS / SHOP MATH / BLUEPRINT READING/GDT

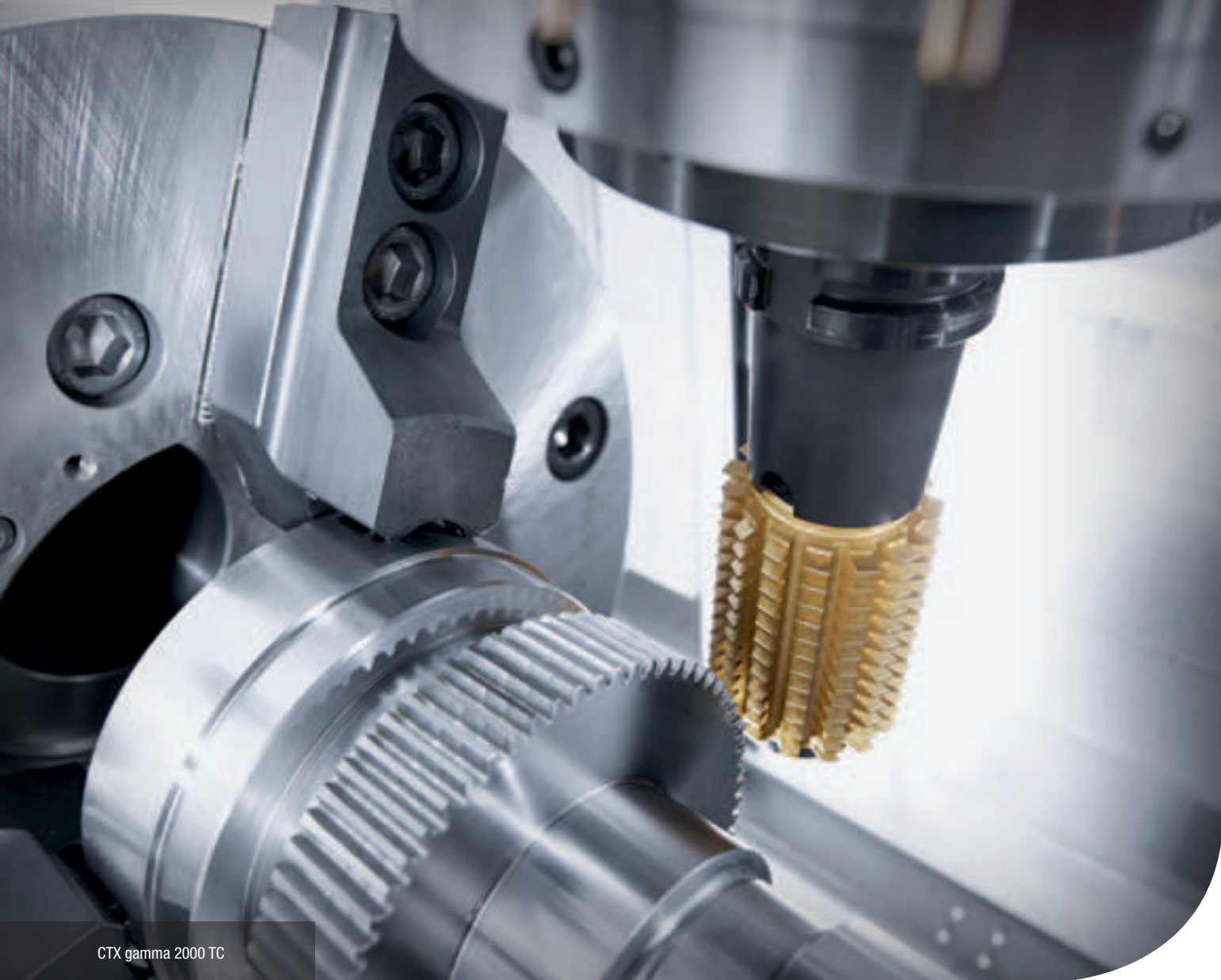
CNC machine controls, setting tools, programming and operations of CNC, and machine limits and capabilities. Fundamentals of work planes and the process of setting work planes, fixture offset, determining work offset shifts, input work offset shifts, writing a CNC mill program. Advantage of using canned cycles in CNC mill manual part programming. Codes and information required to program CNC mill canned cycles. Writing a simple CNC mill program using canned cycles, subprograms, the commands and rules for creating and processing subprograms. The advantages of using subprograms. Writing CNC mill programs using subprograms.

SEMESTER 5 (100 HOURS) SPC / MFG PROCESSES

SPC- Quality tools used to solve problems determined by SPC data collection process, basic statistical parameters, interpret variables and attribute control charts, Interpret process capability, measurements of central tendency and variability, descriptive Analysis of Data, Control Charts for Variables Data and attributes. Job Planning and Control Mfg systems, job flow and decision making, specialty tooling and materials. Metallurgy and Composites. The basics of steel manufacturing, the elements used to create steel and steel alloys, the main types of ferrous materials and their properties, and the common tests used to measure metal properties

SEMESTER 6 (100 HOURS) ADVANCED MANUFACTURING PRACTICES AND PROCEDURES

Additive Mfg, Specialty Steels, Advanced manufacturing technologies, processes, performance objectives in modern manufacturing, increased output and quality by integrating the right tools. Jig and Fixture building, CNC, PLC, automation, and software. Calculations of critical performance objectives. The 5S tool used for organizing and maintaining the workplace: Sort, Straighten, Shine, Standardize, and Sustain. properties, elements, and types of ferrous materials commonly employed in metal manufacturing.



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CALENDAR OF EVENTS

MFG MEETING

March 5-8, 2014
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NTMA PURCHASING FAIR

April 1-2, 2014
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HANNOVER MESSE TRADE SHOW

April 7-11, 2014
Hannover, Germany

NTMA/PMA ONE VOICE LEGISLATIVE CONFERENCE

May 6-7, 2014
Washington, DC

NATIONAL ROBOTICS LEAGUE COMPETITION

May 16-17, 2014
Cleveland, OH

NTMA PURCHASING FAIR

June 3-4, 2014
Chicago, IL

NTMA FALL CONFERENCE

October 22-25, 2014
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