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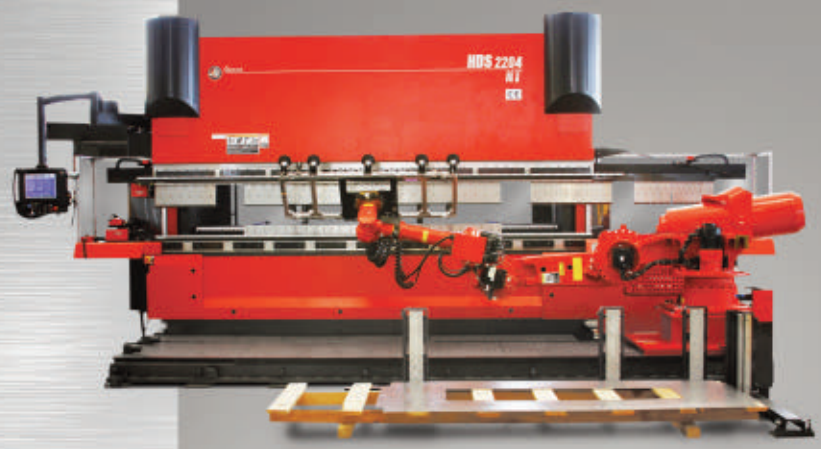

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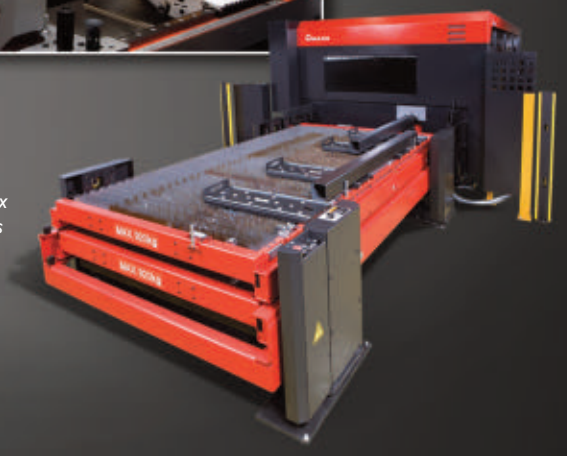

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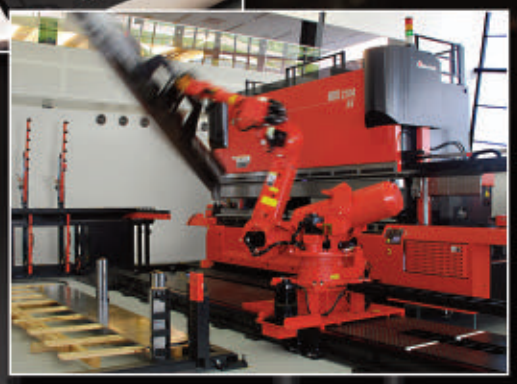

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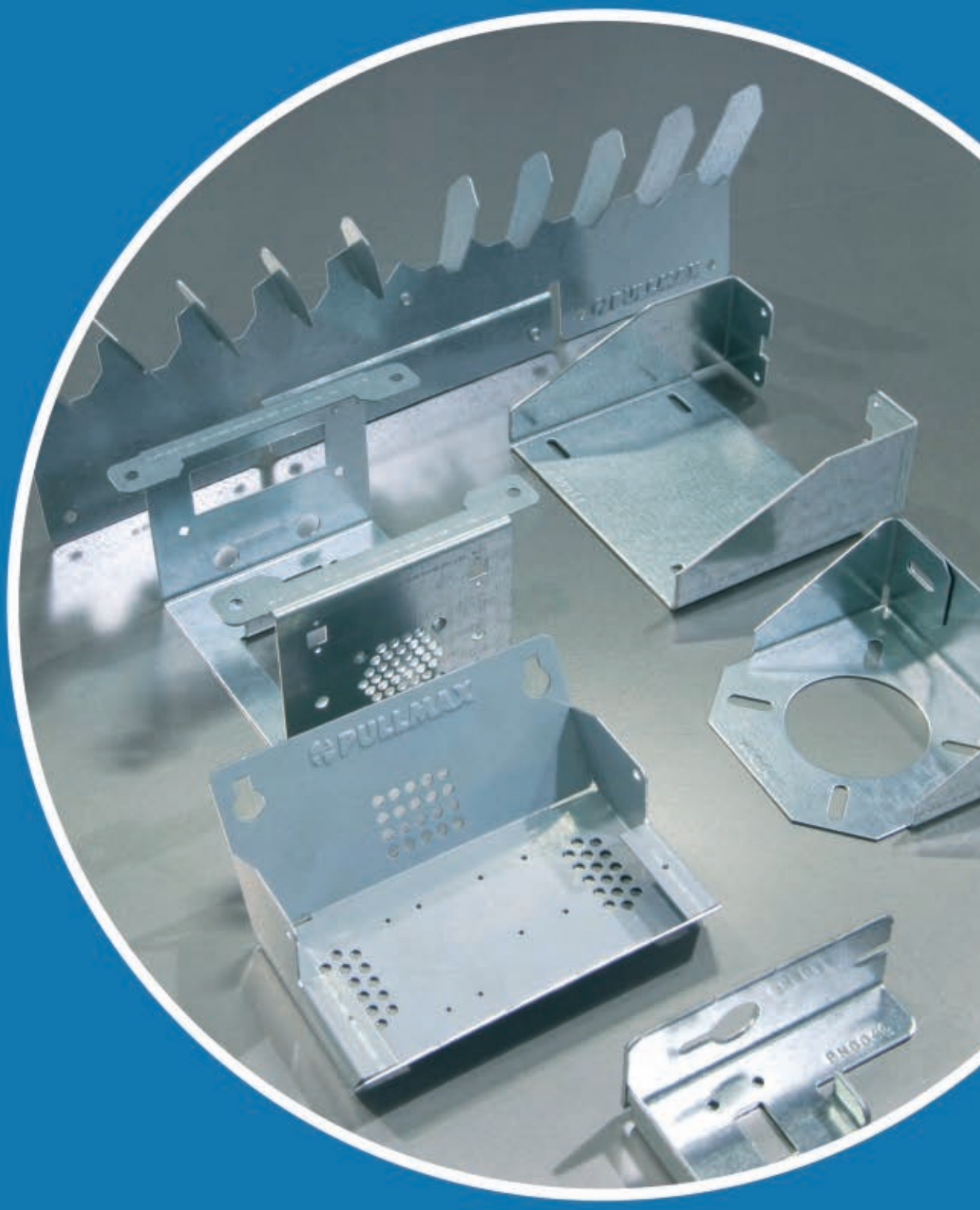

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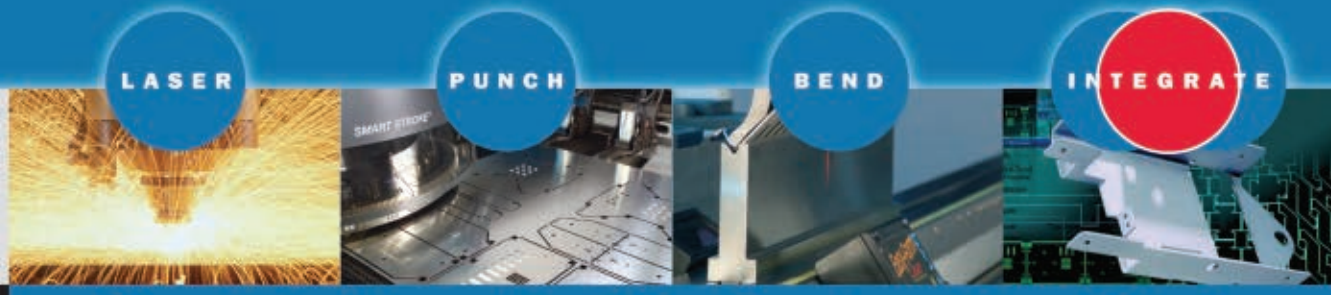

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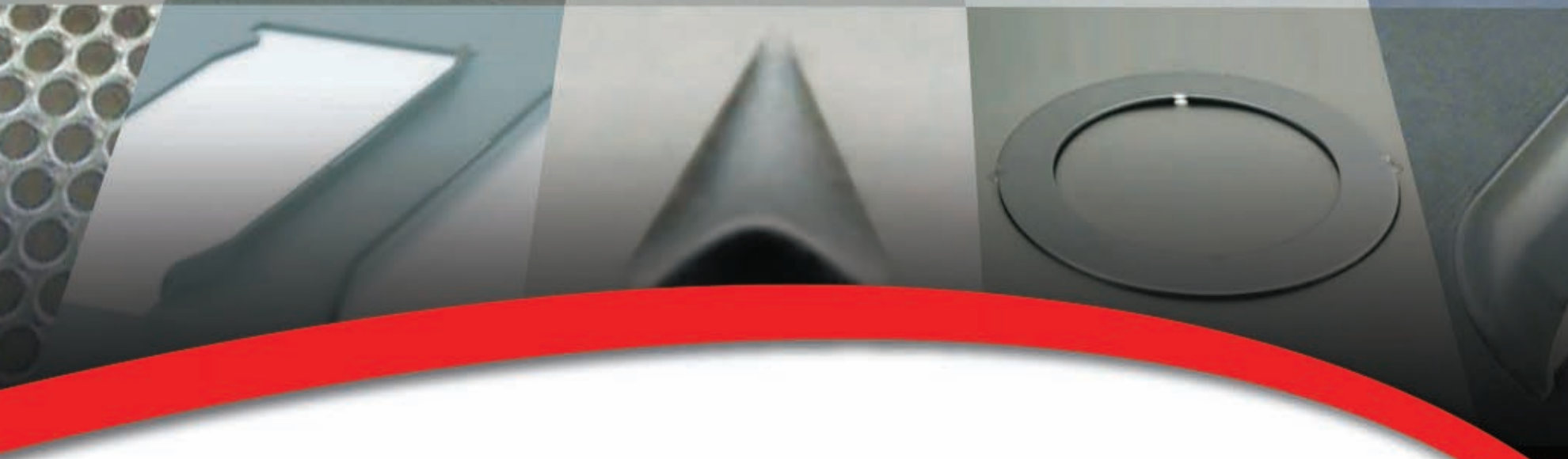

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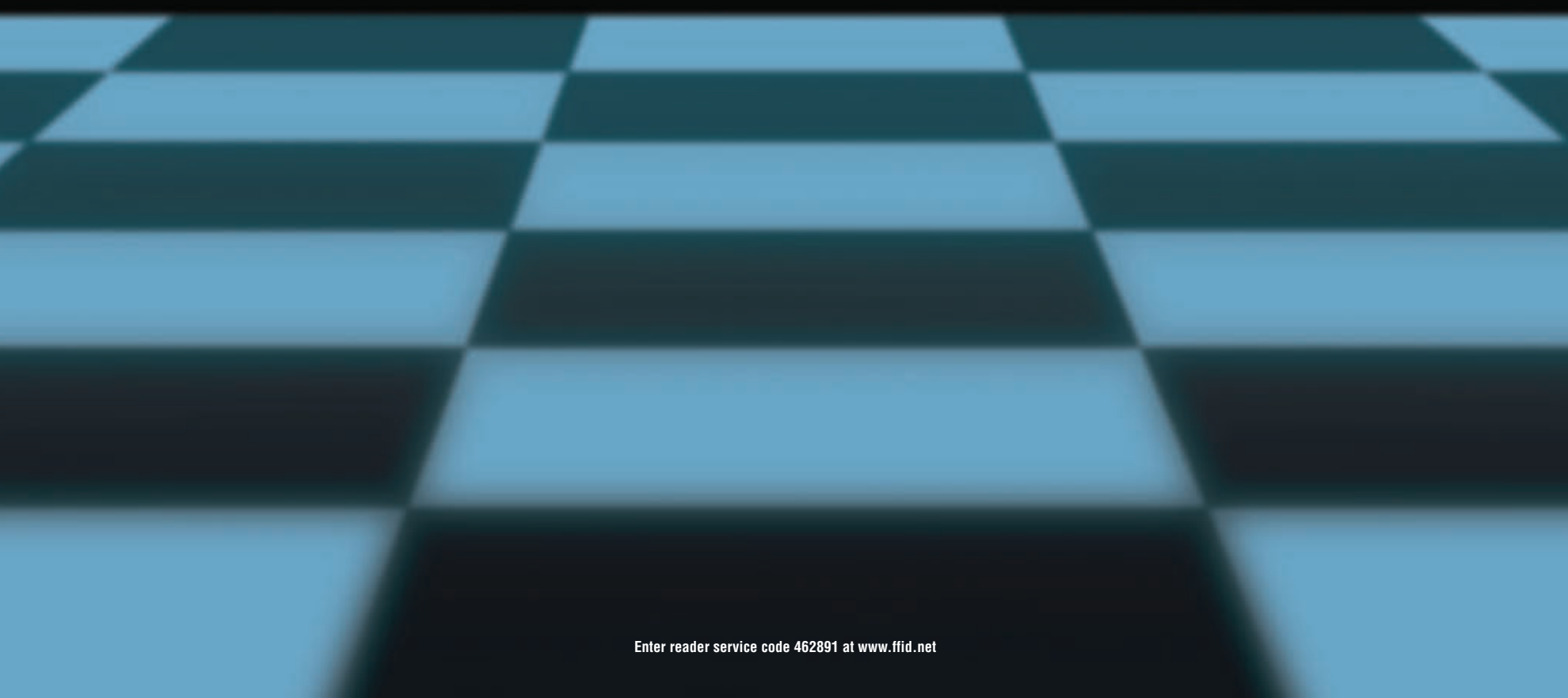

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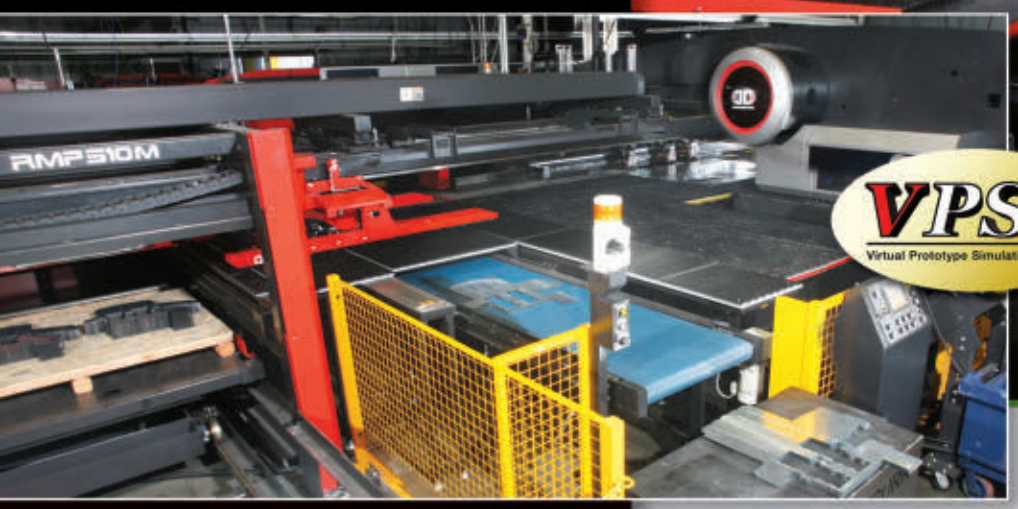
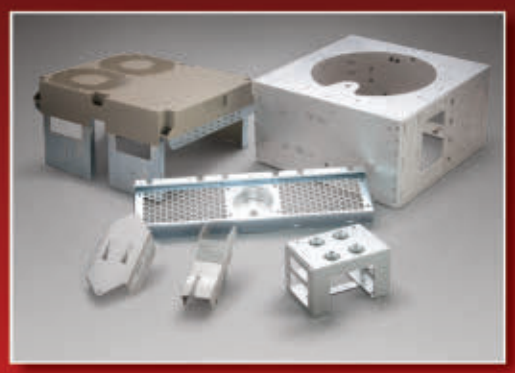
"Over the last 6 months, our business increased by 50% due in large part to a 30% productivity gain with Amada's EMLK punch/laser and automation."

— Al Stucky, Jr.
President, Mass Precision, Inc.



Automated systems load, unload and stack final parts without operator assistance — reducing labor costs and enabling round-the-clock production.



Since 1984 Mass Precision, Inc. of San Jose, CA has grown to become an industry leader by manufacturing products for a broad range of multinational OEMs. To successfully compete in a rapidly globalizing marketplace, the company turned to Amada to provide the optimal solution. Mass Precision's president Al Stucky, Jr. put it in these terms, *"Working with Amada as our technology partner has changed the way we do business. Today, we work in the paperless world of high-speed data transmission, designing parts on-line, in concert with our customers' engineers and converting those ideas virtually overnight into finished prototypes."*

To ensure seamless integration of the latest in punching and laser cutting technologies, Amada provided a networked solution consisting of two EMLK3610 NT punch/laser combination machines. To reduce part handling and eliminate machine interruptions, the combination machines are equipped with automated load/unload systems and a single-part sorter.

Amada's integrated network solution has enabled Mass Precision to:

- **Reduce setup time by 30%** *(while decreasing overall tool costs)*
- **Integrate punch and laser technologies** *(maximizing flexibility and productivity while improving utilization of floor space)*
- **Produce parts more cost effectively** *(by reducing part handling, eliminating machine interruptions and improving part flow)*
- **Improve green light on-time** *(while maximizing machine and material utilization through dynamic nesting of punch and laser parts)*

Commenting on Mass Precision's success, Stucky concludes *"We're involved in a constant race to out-perform our customers' expectations. We rely on Amada's innovative machines and automated systems to keep us ahead of the pack."*

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what's on thefabricator.com?

Listen to the newest podcast. Senior Editor Tim Heston talks with Christan Griego, Edwards Instrument Co., about a unique niche in metal fabrication—brass instrument manufacturing. Visit http://media.thefabricator.com/podcasts.cfm for more details.

Tune into a Webcast. Check out "Waterjet cutting: Tips for increasing productivity and reducing costs" at http://media.thefabricator.com/webcasts.cfm.

Participate in an online poll. In the latest fabricator.com poll, 75 percent of survey-takers believe trade agreements with South Korea, Colombia, and Panama will cause more U.S. jobs to disappear.

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management strategy

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October
Web exclusives

Arc welding. Welding expert Carl Smith describes how good welding skills can extend the life of manufacturing equipment and even improve its performance.

Manufacturing career. If you had to do it over, would you choose a career in metal manufacturing? Readers of the "Fabricating Update" e-newsletter chime in with their opinions on the topic.

departments

coming in November 2011

Find out how incorporating an electric press brake into the shop floor mix caused a metal fabricator to rethink the traditional safety-versus-productivity trade-off.

Learn about the differences between consumables used in manual and robotic GMAW.

Wondering how you might be able to squeeze more productivity out of the welding department? Read about 17 possible causes and do something about it.

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Amada's ongoing commitment to its customers has also led to the new Los Angeles Technical Center (LATC) — where state-of-the-art machines and systems can be experienced and verified in real time. At the LATC, customers will gain access to leading-edge technologies while benefiting from direct consultation with Amada's highly-trained staff of engineers.

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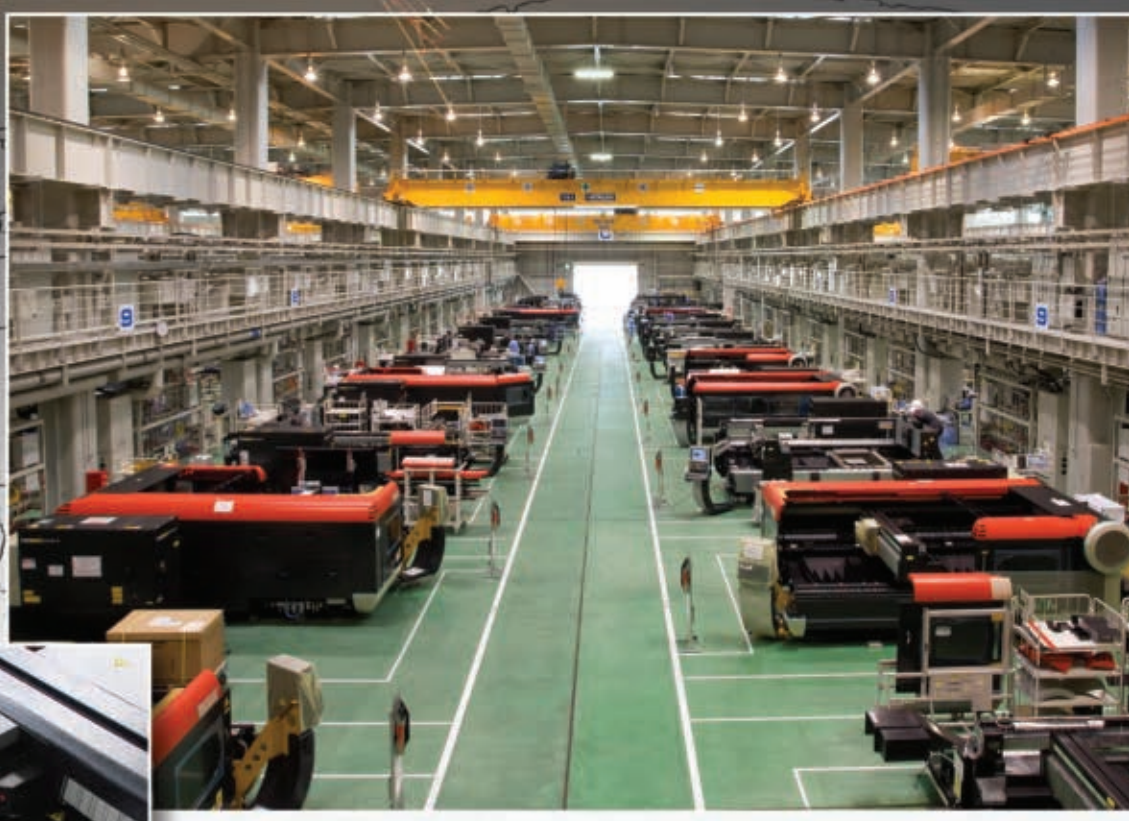

The Rotary Index on the FOM2-RI is located on one of three shuttle pallets which makes it extremely easy to switch from flat sheet cutting to tube or pipe cutting.

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The LATC and Amada's new laser manufacturing center in Brea, CA bring the power of Amada engineering, manufacturing, proposal and verification together for the North American fabrication industry. Scheduled for completion in 2012, the new Brea facility will become one of Amada's mainstay laser manufacturing sites. The 240,000 sq. ft. plant will enable Amada to manufacture its full line of advanced laser cutting systems at a rate of 250 machines per year.

Today, more than ever, one company defines industry leadership and is uniquely positioned to help you choose the best technology, system, software and automated solution for any sheet metal application — **that company is Amada.**

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Amada America, Inc.

from the editor-in-chief

Don't expect a retirement party

Manufacturers don't want experienced workers to leave just yet

Believe it or not, the Great Recession and anemic economic recovery have proven helpful to some metal fabricators. They've had the time and opportunity to fine-tune their manufacturing teams.

The employees who weren't the best fit were the first—and most obvious choice—to be laid off. The workers who remained demonstrated the greatest skill sets and were rewarded with more responsibilities and, hopefully, some sort of corresponding monetary reward. Forward-thinking companies also took the opportunity to train their workforces so they would be ready to tackle the influx of orders that started this year. And those valuable workers just don't pick up and move on like they might have in the past.

"For a company that never laid anyone off, all of a sudden the workforce becomes superstable. No one jumps down the street for an extra $25 cents because they are all really happy to work for a company that doesn't take employment for granted. So those things all work to our advantage," a metal fabricator told me recently.

You might call it a blessing in disguise. You also might call it a stay of execution.

If metal fabricators haven't looked at their workforce demographics recently, they could find themselves in dire straits during the next 10 years. These experienced employees who work multiple machines, provide topnotch maintenance, and can be relied upon to work overtime at a moment's notice are about to walk out of the door. They are nearing retirement, and I'm betting their employers are in no mood to throw them a party.

The statistics are pretty startling. According to the American Welding Society, the average welder is in his mid-50s and likely to retire in the latter part of this decade. Meanwhile, the Bureau of Labor Statistics projects that the annual growth rate of workers 55 and older will be four times that of the overall labor force through 2014. Manufacturing workers are gray-haired, and company management is going gray thinking about it—if they have had enough foresight to worry about it.

Rob Clark, vice president of operations, Clark Metal Products, Blairsville, Pa., has looked to the future and realizes that the demographic profile of his company's shop floor is going to change dramatically in the coming years. Management looked at the age of Clark Metal Products' staff five years ago and projected that about 65 percent of the workforce will turn over in 15 to 20 years. That may sound like a long time to young whippersnappers, but experienced workers know better.

"You don't train people in a year's time and certainly not in six months," Clark said.

What has Clark Metal Products done to prepare for this impending turnover? It maintains a database that documents employees' skills and actively promotes training to shore up any shortcomings. As a result, several employees can respond to shop floor situations, not just one employee trusted with the special knowledge. This effort also provides a glimpse into the technical skill set that has to be replaced when a particular employee is ready to hang up the protective eyewear on a permanent basis. The company also is involved with local community groups and high schools, trying to promote manufacturing as a career choice.

Keeping those older workers around actually might prove easier than getting that next generation on the manufacturing floor. A recent survey conducted for the Manufacturing Institute and Deloitte LP found that only 30 percent of respondents strongly agreed with this statement: "I would encourage my child to pursue a career in manufacturing." Meanwhile, the same survey revealed that 78 percent of those same respondents believe that the manufacturing industry is very important to U.S. economic prosperity. With that type of mixed guidance, young people are more likely to knock on a metal fabricator's door asking for Halloween treats rather than full-time employment.

So that leaves manufacturers trying to keep their seasoned veterans on the job for as long as possible. A Nielsen survey released in September said that 45 percent of manufacturing firms are "encouraging their older workers to stay on the job." That might work for a while, but asking gets you only so far.

Retirement is awfully enticing. For most, it's not about turning their backs on work altogether. That's why a lot of the old-timers show up at the shop even after they have left the full-time ranks. It's about living life on their terms, not someone else's. Those same old-timers who show up at the shop probably are working hours that suit them and management. That gives them more time to spend with the wife and grandchildren and some regularly scheduled time to spend away from the wife and grandchildren. It's the perfect balance.

But be aware. Just because older workers are still working, don't assume they love the arrangement. They could be working because they have to, and they could be out the door when they no longer have to.

Retirement should be a time of celebration, not anxiety. Proper planning can ensure that the moment remains merry, not bleak.

Dan Davis, Editor-in-Chief
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Tom Jellison, Flexco Products

(Elkhart, IN)

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Chris Portmann, West Mark, Inc.

(Atwater, CA)

"We purchased a FS4020 72" x 144" table with the HAT420 automation system and routinely cut materials ranging in thickness from 14 gage to 1" plate with no trouble. This has been a very dependable machine."

Jack Ellingson, Felling Trailers

(Saulk Center, MN)

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Preparing Students for Life, Not for Tests

Couldn't agree more ["Retraining America and finding skilled labor: Not a perfect match," From the Editor-in-Chief, *The FABRICATOR*, August 2011, p. 10]. Our public schools, for the most part, seem to be graded only on how many of their kids go to college and how they score on the ACT or SAT.

Our country isn't going to get out of this funk until we give industry a shot in the arm, starting with developing a workforce that has the skills, leadership abilities, and the knowledge of what will be expected of them when they do show up at work.

I have been working with the local schools and stating my frustration on the lack of preparation as it relates to industrial skills and job expectations. We are in the very early stages—all this while the states are bankrupt and cutting support they give to schools.

We have a long upward hill to climb. I don't live in a glass house either. Industry can partner with the schools to set the expectations, communicate the needs, and work together on a solution.

Rob Abfall
Director of Operations
Tyco Fire Protection Products
Marinette, Wis.

A Laserlike Focus on Equipment Search

We are in the process of purchasing a laser for our fabrication shop, and I was wondering if you could tell me who the top three manufacturers are in the industry for lasers. If not, could you direct me to someone that could answer that question?

Rod Delnero
Automation Manager
JB Radiator Specialties
Sacramento, Calif.

Editor's Note: For an in-depth look at many of the providers of 2-D laser cutting machines, check out the list of actual machine models in the 2-D Laser Cutting Machine Buyers' Guide© (http://www.thefabricator.com/buyersguides/2-d-laser-cutting-machine).

Answers to the Quiz

The FABRICATOR would like to congratulate the first 20 readers who responded to the Lean Manufacturing Pop Quiz in the July 2011 issue ["Lessons about lean manufacturing," p. 54] and received a copy of lean guru Gary Conner's new book, *Catapulting the Cow*.

The answers to the quiz follow:

1. The 5 phases of the 5S methodology are sort, straighten, ***shine***, standardize, and sustain.
2. **True:** *Kaizen* is a word related to continuous improvement.
3. Select the following definition that best describes the phrase *takt time*.
   b. Manufacturing pace determined by dividing available time by demand
4. **False:** SMED stands for System Management by Engineered Design
5. Which of the following material management systems likely will result in the fewest number of parts in inventory?
   c. Make to order
6. Which of the following strategies likely will provide the best possible material flow?
   b. Cellularization
7. Which of the following tools would be the best choice for solving a problem related to defects? **a. *Poka-yoke***
8. Value stream mapping is a process for:
   d. All of the above (a. Identifying non-valued-added activities; b. Identifying operator and machine cycle times; c. Identifying information and material flow)

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Lincoln Electric attempts to harness wind

For the past several years, Lincoln Electric has invited welders from across the U.S. to visit its Euclid, Ohio, manufacturing campus to see how they might be able to apply their skills to the world of wind turbine fabricating. So it made sense in August that the welding equipment company officially erected a permanent reminder of just how crucial welding is to the successful production of these wind turbines.

Standing 443 feet tall from its base to the tip of its blades, a 2.5-megawatt wind turbine now looms over the company's manufacturing facilities. When fully operational, the turbine is expected to provide 10 percent of the power consumed on the Euclid campus each year and save up to $500,000 annually in energy costs.

The latest submerged arc welding consumable and power source technologies were used in the construction of the tower sections. Katana Summit, Columbus, Neb., handled the fabrication of the four tower sections, the heaviest of which is the 38-ft.-tall, 141,500-lb. bottom section. The upper section, which is tapered, measures 81.5 ft. tall and weighs more than 73,700 lbs. A total of 624 bolts hold the tower components together.

The tower and the octagonal gravity base, which is 56 ft. wide and contains 65 tons of reinforced steel rebar and 595 cubic yards of concrete, has to provide support for the 12- by 13- by 35-ft., 198,000-lb. turbine body, or nacelle, and the three larger-than-normal blades, which are 164 ft. from the center of the hub to the blade tip and 328 ft. in diameter. The overall weight of the tower sections, nacelle, and blades is more than 800,000 lbs.

"We didn't do this to build a landmark for the city or our campus," said John Stropki, Lincoln Electric CEO, chairman, and president. "We did it because it is a good investment."

Lincoln Electric had looked at possibly manufacturing a wind tower on its property as it was simultaneously enticing its fabricating customers to pursue jobs in the expanding wind turbine manufacturing market, according to company officials. The tower wasn't financially feasible until the public sector was able to support the effort.

Cuyahoga County contributed a $350,000 forgivable loan, and a grant from the Ohio Department of Development and the U.S. Department of Energy—which was funded by the American Recovery and Reinvestment Act of 2009—provided $1.125 million. Public officials at the dedication ceremony on Aug. 23 called the investment of public funds into the project an important move because it showed the region's commitment to using renewable energy, not just providing a base for manufacturing renewable-energy equipment and structures. Lincoln Electric worked closely with the Great Lakes Energy Development Task Force, comprising several government bodies and private entities, during the planning and construction of the tower.

Lincoln Electric also partnered with wind turbine manufacturer Kenersys to build the tower, Kenersys' first in the U.S. Ironically, Paulo Fernando Soares, Kenersys Group CEO, worked as a welding engineer in his past, mak-

Lincoln Electric *(continued)*

ing the working relationship with Lincoln Electric a special one because it rekindled his fondness for fabricating.

"It's good to be here to build our first turbine, represent my company, and tie that into my passion," Soares said.

As more wind towers go up in the U.S., welding is sure to play an important role in finding the most cost-effective means of fabricating the tower sections. The people who live in and around Cleveland now have a constant reminder of that whirling above their heads.

—Dan Davis, Editor-in-Chief

North American robot orders jump 41 percent in first half of 2011

Fueled by its best quarter in six years, the North American robotics industry jumped 41 percent in the first half of 2011, according to new statistics released by Robotic Industries Association (RIA), Ann Arbor, Mich.

A total of 8,879 robots valued at $577.8 million were ordered by North American companies in the first six months of the year. When orders from outside North America are added, the totals are 10,476 robots valued at $667.9 million. "This was the best first half for our industry since 2007," said Jeff Burnstein, president of RIA.

The second quarter was particularly strong, posting gains of 50 percent in units and 55 percent in dollars over the same period in 2010.

Burnstein attributed the majority of growth to increased orders from automotive manufacturers and their suppliers, traditionally the largest customers for robotics. "With the revitalization of the auto industry in the U.S., robot orders to these customers rose 60 percent in the first half of the year," he said.

Nonautomotive orders increased 23 percent through June, led by gains in metalworking (up 70 percent).

Burnstein said the creation of a $500 million Advanced Manufacturing Partnership, which includes $70 million for a National Robotics Initiative, "could have a very positive long-term effect in keeping the U.S. a leader in robotics, both inside the factory and in a wide range of nonindustrial robotics sectors."

RIA estimates that some 205,000 robots are now used in the U.S. More than 1 million industrial robots are used worldwide.

OEM Fabricators to expand two Wisconsin plants

OEM Fabricators has announced plans to expand its facilities in western Wisconsin.

The Woodville facility will be expanded by 12,000 sq. ft. The company will add a large paint booth, 5-ton overhead cranes, large-scale machining equipment, and expanded welding bays. It expects to hire 50 new employees in the coming year to add to the current staff of 210.

The Neillsville facility is being reconfigured to achieve higher throughput and to fit customer needs better. The plant will undergo some construction and changes to the original layout. Additional lifting capacity and machining equipment—mostly CNC lathes and vertical machining centers—are being added. The plant currently employs 130 team members, and 70 more are expected to be hired over the next two years.

OEM Fabricators is a privately held contract manufacturing company that builds medium- to heavy-gauge components for OEMs.

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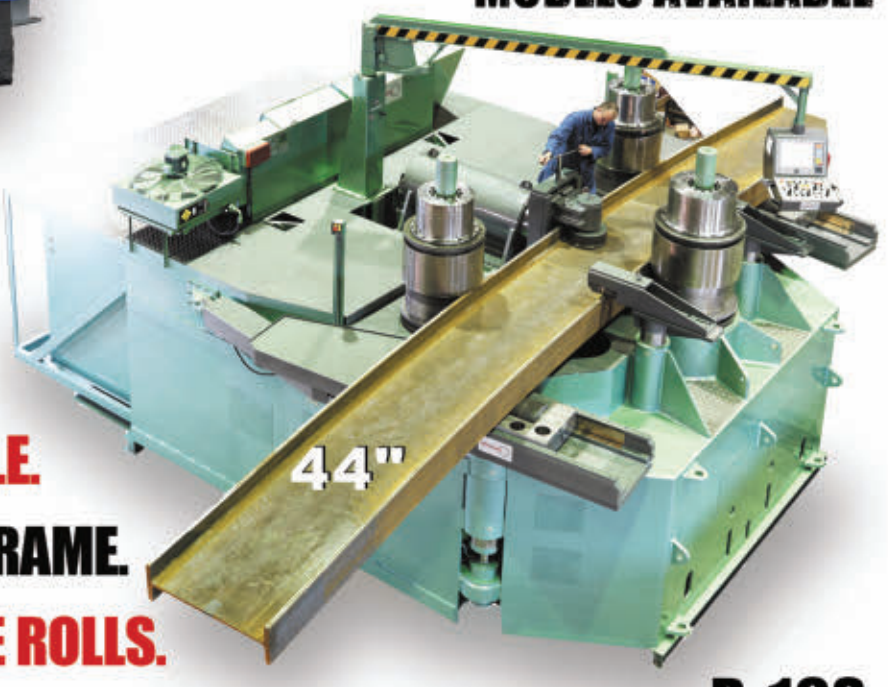

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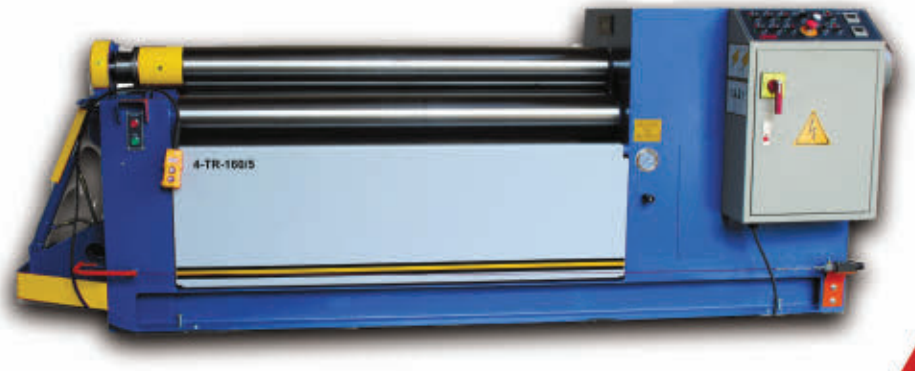

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Miller launches Nominate a Hero promotion

Miller Electric Mfg. Co., Appleton, Wis., has introduced its Nominate a Hero promotion, in which customers can submit information on a co-worker or friend for a chance to win prizes from Miller. The promotion recognizes individuals who make a special contribution to their workplace and the welding industry through job performance, education, training, and other worthy causes.

Visitors to www.millerwelds.com/hero can fill out a profile on their hero to be entered into the promotion. Ten finalists will be chosen, and members of the general public will have the opportunity to vote for their favorite three next summer. The three grand-prize winners will be flown to the Miller headquarters in Appleton for a closer look at the company and will be awarded a Miller product of their choosing, in addition to Arc Armor® welding apparel.

The company will feature at least one hero per month on the Web site, in addition to information on products, service, and support.

Wheatland Tube to expand DOM production capacity

Wheatland Tube, a division of JMC Steel Group, has announced plans to invest in its DOM mechanical tubing production capacity and capabilities. The planned investment expands the company's total DOM production capacity at its Church Street facility in Wheatland, Pa. The investment also enables the company to expand its size capability in products used for agricultural equipment, automotive parts, hydraulic equipment, fluid power applications, and machined parts.

In addition, the company is expanding its Howland Township facility in Ohio with an $11.4 million investment. The expansion is expected to create 20 new jobs.

CCAT forms alliance with AME

Connecticut Center for Advanced Technology Inc. (CCAT), East Hartford, Conn., has established an alliance with the Association for Manufacturing Excellence (AME) to promote manufacturing and supply chain development locally and globally.

As alliance partners, CCAT and AME collaborate to promote enterprisewide best practices for North American manufacturing and supply chain organizations, encourage knowledge-sharing among business enterprises for the mutual survival and growth of North American manufacturing businesses, and help organizations achieve enterprise excellence.

The alliance allows CCAT and AME to combine their complementary strengths to stimulate supply chain and manufacturing development through events and publications. CCAT provides services to organizations in the areas of efficiency improvement, workforce development, and applied technology, while AME focuses primarily on sharing best practices among practitioners and companies for process improvement, standardized management systems, and organizational development.

CCAT helps private and public entities to apply tools and practices to increase efficiencies, improve workforce development, and boost competitiveness. AME is a not-for-profit organization dedicated to continuous improvement and enterprise excellence for manufacturers.

Stinger Welding receives funding to complete steel fabrication plant

Montana Community Development Corp. has provided $17 million in funding to Stinger Welding Inc. to build a 105,000-sq.-ft. steel fabrication plant and create more than 100 new jobs in Libby, Mont.

The project was made possible through a partnership among MCDC, Stinger Welding, and Goldman Sachs and the continued efforts of Sen. Max Baucus, D-Mont.

Construction of the new facility began in 2009 but had been delayed by financing challenges. The deal came together as a result of the federal New Markets Tax Credit program written by Baucus and through his efforts to profile Montana's business opportunities to national investors, including Goldman Sachs, at his 2010 Economic Development Summit.

Penn Stainless installs plate laser system

Penn Stainless Products, a supplier and processor of stainless steel sheet, plate, bar, structural, pipe, and tubular products in Quakertown, Pa., has installed a Tanaka LMX VII 6-kW TF6000 plate laser system with a stainless steel nitrogen cutting system. According to the company, it is one of only two such systems in operation in North America.

Supplied by Metal Processing Systems Inc., the machine can cut stainless steel up to 1.125 in. thick, with a cutting envelope of 13 by 62 ft. The company says the system's gas-flow technology option helps achieve high-quality finish and edge condition after cutting.

The system cuts to a tolerance of ±0.10 in., depending on size and gauge, with a 0.020-in. beam and within less than 1-degree taper. The system also can cut a hole that is less than half the material thickness. Producing an HAZ of 0.012 in., the machine can tap a laser-cut hole without secondary operations required.

Steel Tube Institute launches HSS certified producer program

The Steel Tube Institute of North America (STINA), Chicago, has launched an industrywide hollow structural section (HSS) product certification program. Called the STINA Certified Producer Program, it is designed to provide assurance that HSS identified with the Certified Producer's Mark has been manufactured by producers that meet nationally recognized manufacturing standards and have passed the program's audits and product testing.

A structural steel tubing Certified Producer Program procedural guide, distributed to STINA's HSS Committee members, covers the rules and guidelines of the program, including program eligibility, the application and qualification process, and procedures for verification.

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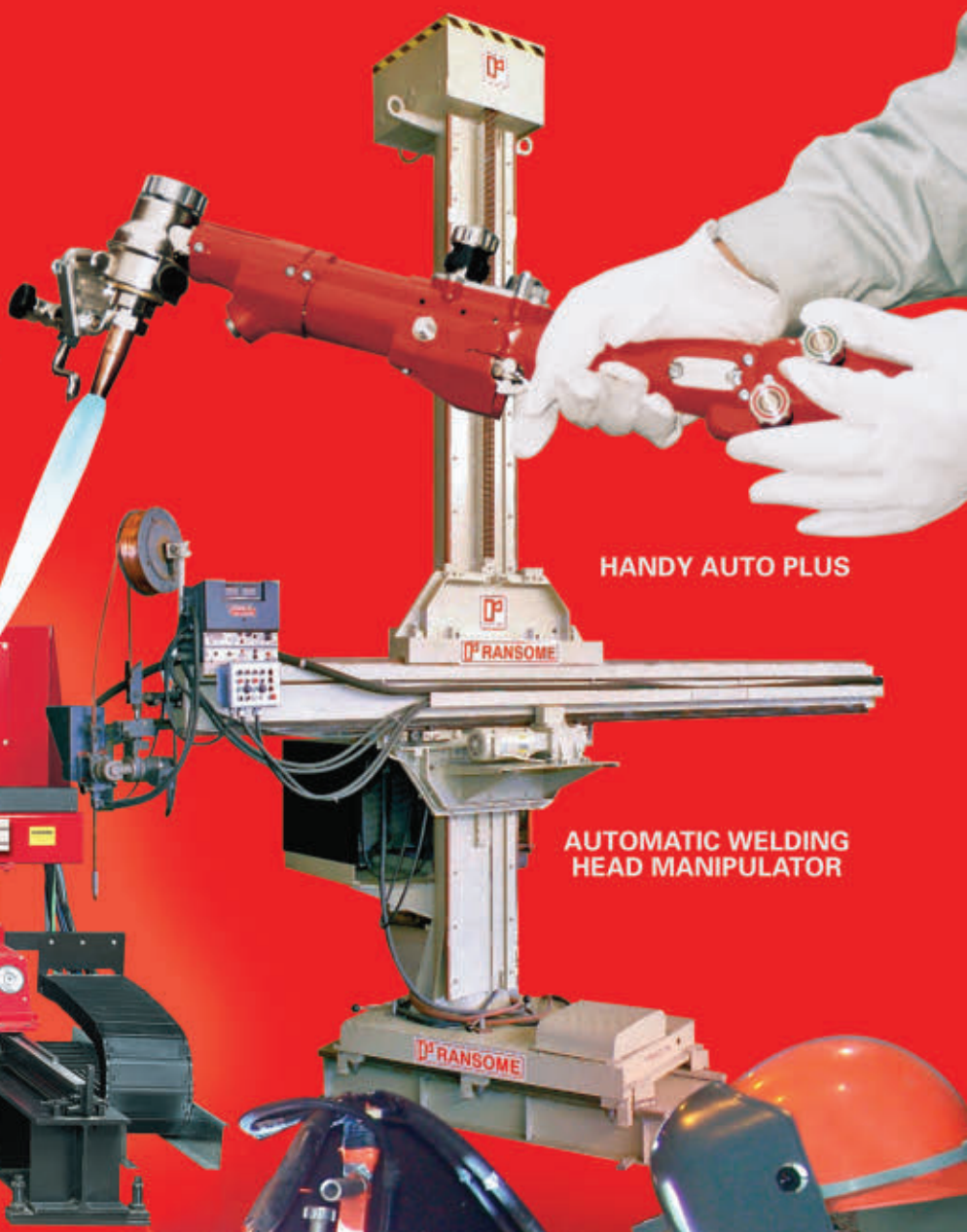

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Niles opens R&D facility

Niles Expanded Metals & Plastics, Niles, Oho, has opened Niles Expanded Technologies (NExT), a facility for R&D and expanded mesh manufacturing.

The company expanded its building by 7,000 sq. ft. to accommodate the new facility and remodeled 20,000 sq. ft. The expansion includes the addition of three new custom-designed production lines, slitting machines, and toll processing equipment for precision expanded mesh products.

Plymouth Tube awarded for exports

Plymouth Tube Co., Warrenville, Ill., has been awarded the U.S. Dept. of Commerce's Export Achievement Certificate for its achievements in the export of steel tubes and extrusions. The company exports to new markets in such countries as Thailand, the Philippines, Mexico, and Italy.

Plymouth Tube celebrates the 50th anniversary of its Winamac, Ind., site this year. The facility produces carbon feedwater heater tubes and seamless carbon-alloy tubes.

Quail Run Building Materials marks 25th anniversary

Quail Run Building Materials Inc., Phoenix, is celebrating 25 years in business. Founded in 1986, the company manufactures cold-formed steel building products using mill-certified prime steel. Products include steel studs, track, flashing, dripedge, angle, clips, and RC-1.

The company is a member of the Steel Stud Manufacturers Association (SSMA) and the Supreme Steel Framing System Association (SSFSA).

Innovated Machine & Tool acquires new equipment

Innovated Machine & Tool Co. Inc., Newport News, Va., has announced the recent purchase of a Prima Finn Power Syncrono laser and a Salvagnini P2 panel bender. According to the company, the equipment will help increase quality, capacity, and efficiency.

The plant now has two lasers, two panel benders, two turret punch presses, one robotic weld cell, and several CNC press brakes. The company currently is working to acquire an automated powder coating line to replace a batch powder coating system.

Sharpe Products holds open house

Sharpe Products held its first open house for customers, prospects, and vendors on Sept. 14 at its 52,000-sq.-ft. facility in New Berlin, Wis. The company provides custom pipe and tube bending services and manufactures and stocks architectural handrail fittings.

Attendees saw tube and pipe bending projects in various stages of production, learned the differences between hydraulic tube benders and all-electric bending machines, and saw lean cells set up within the shop.

Central Steel and Wire purchases automated cold saw

Central Steel and Wire Co., a metal distributor with headquarters in Chicago and districts in Cincinnati, Detroit, Milwaukee, and Greensboro, N.C., has purchased a Bewo Cutting Systems high-speed, automated cold saw from Kent Corp.

The equipment features inline deburring, measuring, and automated packaging. The system can quickly process large-quantity orders using all components of the cutting system, the company reports.

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Sheet metal construction camp designed for young women

Tri-Counties Sheet Metal Workers Apprenticeship Program in Ventura, Calif., held a MAGIC (Mentor A Girl In Construction) camp the week of July 15, where junior and senior girls from local high schools participated in five days of hands-on construction. The camp was sponsored by the National Association of Women in Construction's Ventura/Oxnard and Simi/Conejo Valley chapters.

David Maquinalez, an instructor and training coordinator with the Tri-Counties Sheet Metal Workers Apprenticeship Program, provided a comprehensive, hands-on session to students who fabricated their own toolbox from several precut pieces of sheet metal.

"A career in the sheet metal industry can be a lucrative profession for women as it offers a great work environment, above-average wages, and creativity with the opportunity to grow into a number of different fields," Maquinalez said.

The program maintains and operates a state-of-the-art facility and accepts individuals 18 years of age and older to train with craftsmen. Apprentices must complete 800 hours of classroom training and 8,000 hours of on-the-job training to become journeyman sheet metal workers, allowing them to earn while they learn.

Trades include heating, ventilating, air conditioning, architectural sheet metal, industrial sheet metal, kitchen equipment, specialty stainless steel work, custom fabricating, service, siding and decking, testing and balancing, and energy management and maintenance.

Owens Community College unveils $1.1 million Welding Design Center

Owens Community College, Perrysburg Township, Ohio, has unveiled a new $1.1 million Welding Design Center on the Toledo-area campus. The center previously held Penta Career Center's Welding and Automotive Collision Repair Labs.

The addition allows the Department of Manufacturing and Industrial Operations to more than double its degree and certificate program opportunities for area residents within the academic field of welding.

The 14,512-sq.-ft. facility features two dedicated instructional classrooms and two expansive experiential learning classroom areas for instruction and hands-on learning. The complex also includes three offices, a locker room, and restrooms.

The experiential learning classrooms house 60 welding booths, 12 cutting booths, and eight grinding stations to provide students with hands-on training specific to SMAW, GMAW, and GTAW processes. Thirty-six booths use argon and CO_2 for welding purposes, while oxygen and acetylene are used in the 12 cutting booths. The facility also has a 1,813-sq.-ft. storage complex for welding materials.

Marlin Steel adds robotic press brake

Marlin Steel Wire Products, Baltimore, has added a TRUMPF® TruBend 3120 press brake to its robotics fleet. The machine offers precision up to 10 microns and 0.25 degrees on a 122-in. beam length, along with 132 tons of force. Ram tolerance is 0.0004 in.

The four-axis backgauge enables the company to perform complex bends so that the designs can have fewer welds. The beam moves at 7.87 IPS as it reaches the bending edge.

Parts can be downloaded directly from AutoCAD® software—the same software the company uses to design punch layout programs.

Wildeck acquires Ladder Industries

Wildeck Inc., Waukesha, Wis., a manufacturer of custom industrial steel work platforms, material lifts, and safety guarding products, has announced the acquisition of Ladder Industries Inc., Goodyear, Ariz., and Sacramento, Calif. Ladder Industries now is a subsidiary of Wildeck, operating as a separate business entity.

With an emphasis on custom designs, Ladder Industries manufactures mobile ladder stands; conveyor crossovers; tank access and machine access stairs and work platforms; custom stairways, towers, and access gates for mezzanines; and specialized products including forklift safety platforms, dock ladders, hand trucks, tote dollies, and stock-picking carts.

Dynamic Fabrication marks 30 years in business

Dynamic Fabrication Inc., Santa Ana, Calif., is celebrating its 30th anniversary this year. The contract manufacturer serves clients in the aircraft, defense, environment, semiconductor, oil, gas, energy, entertainment, transportation, architecture, and medical industries.

Founded in 1981, the company specializes in close-tolerance fabrication, Mil Spec welding, and precision machining.

Work varies from small machined parts to 30-ft.-long, 15,000-lb. weldments, with a quick turnaround on short-run items.

Solar Atmospheres of California receives AS9100/ISO 9001:2008 certification

Solar Atmospheres of California, Fontana, has announced the completion of the AS9100/ISO 9001:2008 certification.

The certification is the culmination of a four-month effort that was fast-tracked at the request of several current and prospective customers. With this assessment completed, all of the commercial vacuum heat-treating and brazing facilities are now AS9100-registered.

Nissan Forklift Corp. names distributor

Nissan Forklift Corp., Marengo, Ill., has named Carolina Industrial Trucks as its authorized distributor in the Charlotte, N.C., region, serving Cabarrus, Catawba, Cleveland, Gaston, Iredell, Lincoln, Mecklenburg, Rowan, and Union counties.

In addition to its headquarters in Charlotte, the distributor also has branches in Monroe and Statesville, N.C. Nissan Forklift, a wholly owned subsidiary of Nissan Motor Co. Ltd., designs and manufactures material handling equipment.

Female student wins Skills USA's national sheet metal competition

At Skills USA's 47th annual National Leadership and Skills Conference in Kansas City, Mo., June 19-24, Olivia Keech, 16, won gold in the high school sheet metal category—the second gold award for Delcastle Technical High School in Newark, Del.

For the competition, the high school junior completed a written test and constructed a fitting.

"They said because I'm a junior I shouldn't expect anything," Keech said. "You're supposed to go get the experience [at the competition], go back as a senior, and win. But I won, so I can come back next year and try to do it all again."

As the only girl in her sheet metal class at school, Keech was aware she was a minority in the competition. Only two females competed in the nationwide sheet metal competition. Keech credits her teacher, John Fitzgerald, for helping her succeed.

"I figured out how special it was when people got excited [when I won]," she added. "I hope more girls come into the sheet metal trade."

Co-sponsored by the International Training Institute (ITI)—the education arm of the unionized sheet metal and air-conditioning industry—the competition involved 3,000 students participating in the building trade categories on the high school and college levels.

This year marked the first time ITI co-sponsored the welding competition to educate students about the secondary education and career training ITI can provide. The partnership between Skills USA and ITI allows for the exchange of information, so schools with Skills USA programs can reach out to the professional community for mentorship, expertise, and guidance, while ITI can recruit from a talent pool that already understands and practices leadership skills.

ITI has contacts at each student's school. The partnership also eventually will allow Skills USA to track its graduates through the sheet metal industry and check on their progress.

In the high school sheet metal category, Hunter Crook of Monroe, N.C., earned the silver and Alec Higgins of Jefferson, Iowa, took home the bronze. In the college/postsecondary group, John Halwix of Elgin, Ill., received the gold award; Allen Travelstead of Fitzgerald, Ga., earned the silver; and Derek Daufeldt of Bettendorf, Iowa, took the bronze.

In the high school team welding fabrication category, Jared Martinez, Brennan Clelland, and Joshua Ellrod of Farmington, N.M., earned the gold award; Skeeter Judd, Aaron Jamerman, and Joe Lake of Douglas, Wyo., took the silver; and Kyle Alexander, Mason Hart, and John Stratz of Cottonwood, Ariz., earned the bronze. In the college/postsecondary group, Austin Welch, Mike Montoya, and Joseph Fournier of Price, Utah, earned the gold award; Boaz Millar, Stephen Millar, and Ricky Lovell of Sallisaw, Okla., took the silver; and Ryan Dauel, Brandon Versnon, and Lucas Boshart of Lincoln, Neb., won the bronze.

Skills USA ***(continued)***

In the high school welding category, Tim Saxton of Cambridge, Minn., earned the gold award; Kaleb Parsch of Attica, Mich., won the silver; and Evan Vogler of Petersburg, Ind., took the bronze. In the college/postsecondary group, Spartak Matvyeyenko of Sacramento, Calif., earned the gold award; Blake Parks of Torrington, Wyo., took the silver; and Micah Hoover of Williamsport, Pa., received the bronze.

Survey finds high rate of worker noncompliance with PPE protocols

In a survey released by Kimberly-Clark Professional, Roswell, Ga., 89 percent of safety professionals said they have observed workers not wearing safety equipment when they should have been. Twenty-nine percent said this has happened on numerous occasions.

"This high rate of noncompliance with PPE protocols presents a serious threat to worker health and safety," said Gina Tsiropoulos, manufacturing segment marketing manager for Kimberly-Clark Professional. "While the reasons for noncompliance are varied, the threat to workers is clear-cut. Without the proper use of PPE, they are at risk of serious injury or even death."

OSHA requires the use of personal protective equipment to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective. However, data from the Bureau of Labor Statistics (BLS) shows that of the workers who sustained a variety of on-the-job injuries, the vast majority were not wearing PPE.

The survey examined the reasons for such high levels of noncompliance. Of those respondents who observed PPE noncompliance in the workplace, 69 percent said the primary cause was workers thinking that PPE wasn't needed. Other causes cited were that the equipment is uncomfortable, too hot, unattractive, fits poorly, and is unavailable near the work task.

Eye protection was found to be the "most challenging" PPE category, according to 24 percent of respondents. The next highest category for noncompliance was hearing protection at 18 percent. Those were followed by respiratory protection/masks (17 percent), protective apparel (16 percent), gloves (14 percent), and head protection (4 percent).

Callies Performance Products establishes Mechanical Fatigue Solutions division

Mechanical Fatigue Solutions, a division of Callies Performance Products, has been established in Fostoria, Ohio, to provide high-speed laboratory testing of any component subject to fully reversed bending or torsional fatigue.

The company can evaluate items from engine components to mounting brackets. Previously used by Callies to develop crankshafts, this capability now is available as an independent source for fatigue testing of outside component designs.

Nederman hires welding segment manager

Joe Salyer has joined Nederman LLC, Thomasville, N.C., as its new welding segment manager.

In this position, he works with territory managers to develop and implement a coordinated strategy that includes national partners, regional air pollution control dealers, and OEM accounts.

The company offers products and systems for the extraction and filtration of dust, gas, smoke, and automobile exhaust fumes, as well as equipment for industrial cleaning.

Strategic alliance to develop methodology for manufacturing low-mass steel fuel tanks

To demonstrate the manufacturing feasibility of lightweight sealed steel fuel tanks for plug-in hybrid and extended-range electric vehicles, the Strategic Alliance for Steel Fuel Tanks (SASFT), Detroit, in collaboration with the Auto/Steel Partnership and the U.S. Automotive Materials Partnership, has announced plans to develop a methodology for producing lightweight sealed steel fuel tanks with 30 to 40 percent mass reductions when compared with current-generation sealed steel tanks.

Funded by the U.S. Dept. of Energy, the project intends to show that manufacturing approaches can be used with thinner, high-strength steel and advanced high-strength steel (AHSS) to reduce mass and meet performance requirements associated with sealed systems, including structural integrity, fatigue, corrosion, durability, and crash integrity.

"To provide a fuel tank in a plug-in hybrid electric vehicle that avoids vapor purging but accommodates high internal pressure buildup, current-generation tanks are made of thick steel walls that can add unnecessary mass," said Peter Mould, program manager for SASFT. "That's why we will work to provide steel tanks with the same mechanical performance required for advanced hybrid vehicles that will have thinner walls, contributing directly to vehicle mass reduction and reduced fuel consumption."

The project will use advanced computer forming methodologies and will be performed in two overlapping phases, using the sealed fuel tanks from two current plug-in hybrid electric vehicles as initial benchmarks.

Airtronics gains trailer manufacturing license, launches food cart company

Airtronics Metal Products, San Jose, Calif., has been granted a license to manufacture light- and medium-duty utility trailers.

According to Jeff Burke, president and CEO of the sheet metal design, engineering, and fabrication firm, "In responding to orders for custom trailers for mobile food carts, we quickly realized we could achieve better quality by building our own trailers than by modifying existing trailers to meet customer specifications."

As a result of the licensing and market growth, Airtronics has launched Metal Gourmet™, a subsidiary devoted to the design, assembly, and distribution of high-end mobile food carts and trailers.

"What distinguishes Metal Gourmet from other food cart manufacturers is its modular design approach," said Burke. "The fully modular construction allows users to select the equipment and layout to best fit their food preparation needs."

Operating from a facility adjacent to Airtronics' 100,000-sq.-ft. San Jose plant, Metal Gourmet designs and assembles carts and trailers using NSF-approved components sourced from various manufacturers, primarily Airtronics.

Airtronics is a licensed trailer manufacturer, and supplies Metal Gourmet with trailer frames custom-made for its carts.

Airtronics also manufactures sinks, grills, griddles, and other mobile food components to Metal Gourmet's specifications.

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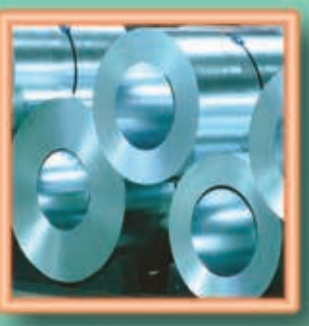

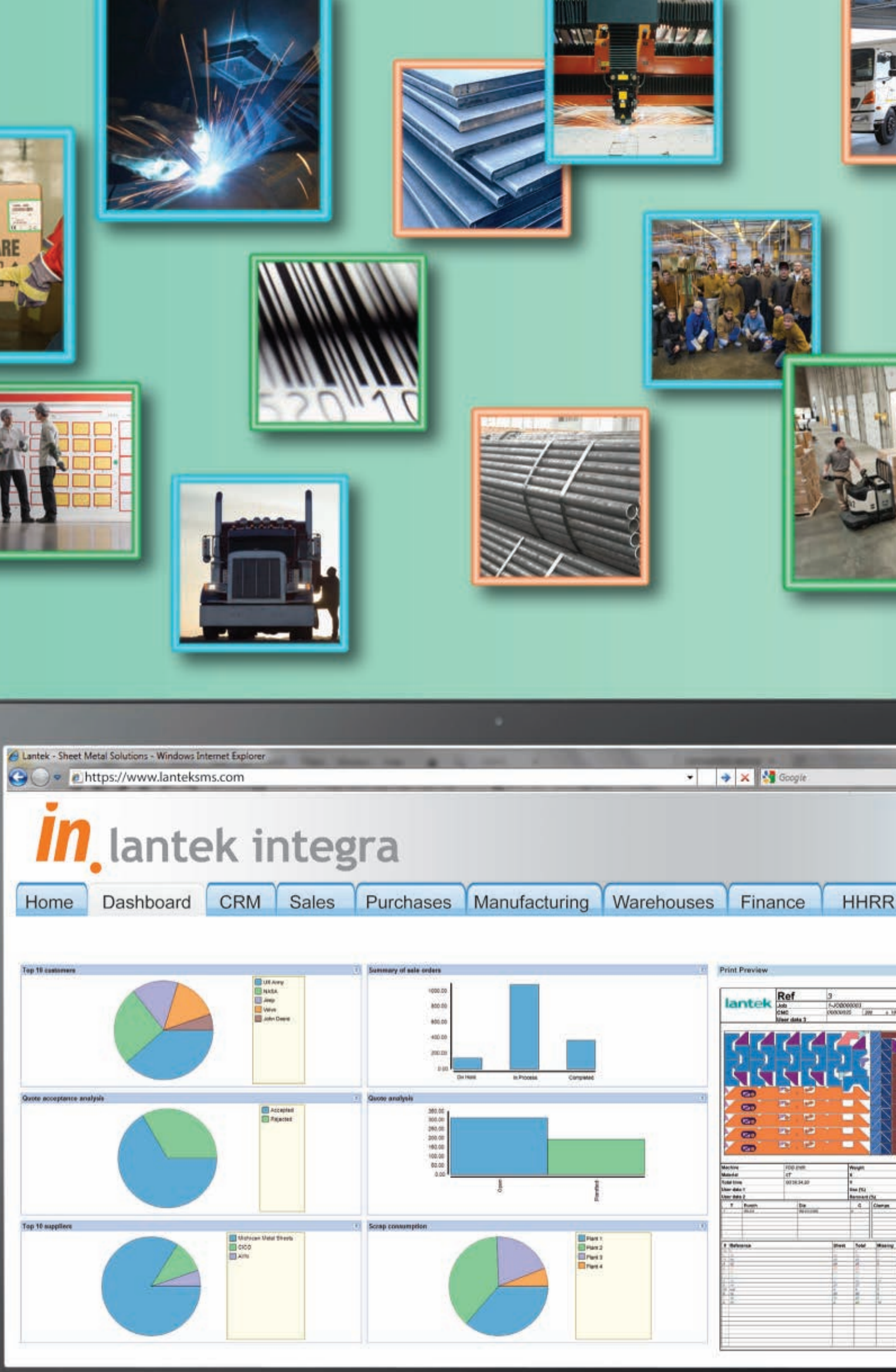
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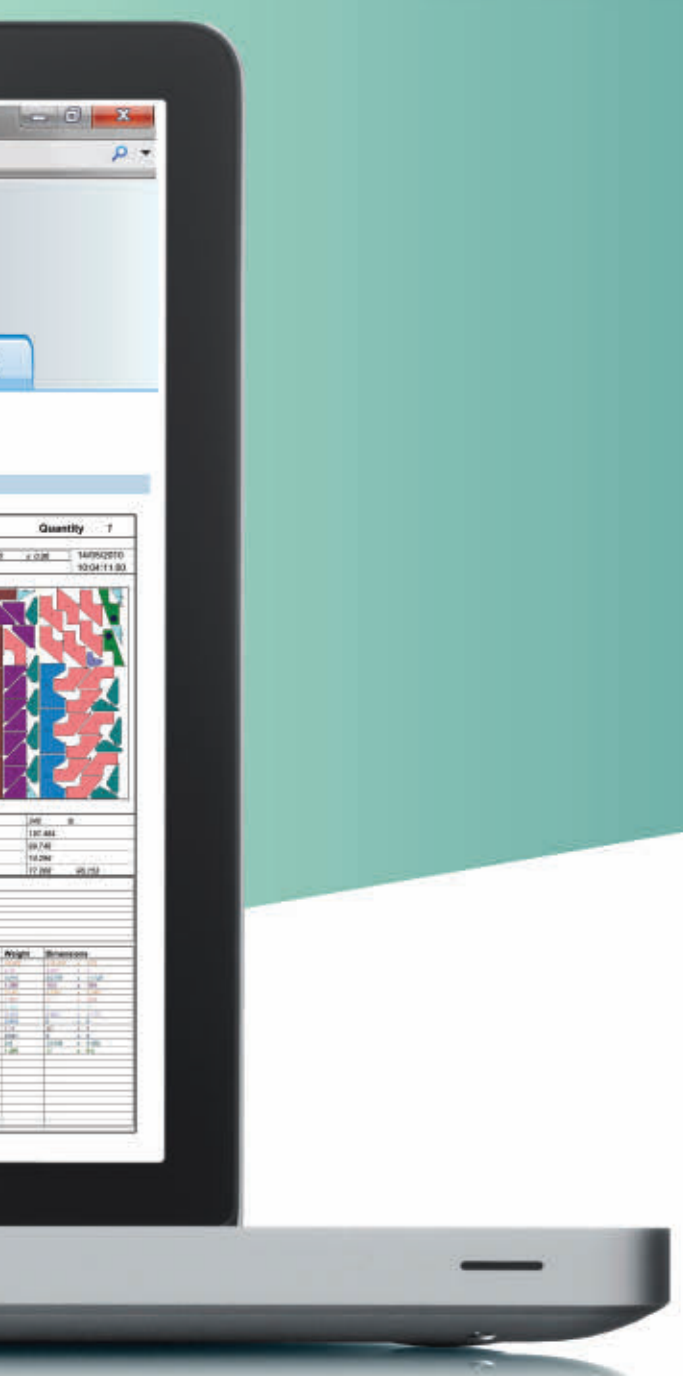

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Plant news

CNH, a manufacturer of agricultural and construction equipment in Grand Island, Neb., has received a $605,000 Community Development Block Grant to add to its $1.9 million investment in machinery and equipment. The award is expected to create 20 new jobs.

A $5,000 portion of the grant will be earmarked for the city of Grand Island to cover the cost of administering the funds.

CNH manufactures Case IH, New Holland Ag, Steyr, Case Construction Equipment, New Holland Construction, and Kobelco brands.

Dakota Trailer Mfg., a manufacturer of aluminum and steel grain trailers, has completed a 40,000-sq.-ft. expansion at its plant in Yankton, S.D. The company, which employs about 150 workers, manufactures more than 500 trailers and bodies each year for markets in the U.S., Canada, Mexico, and Ukraine.

The expansion provides additional capacity for the company's new Atokad Bodies line of service bodies, gravel trailers, and mechanical bottom-dump gravel trailers. It also has resulted in 60 new jobs, with more hiring expected in the future.

General Electric Co. has announced plans to build a $56 million manufacturing plant in Ellisville, Miss., to produce components for aircraft engines and systems. The facility is scheduled to open in 2013.

Honda Mfg. of Indiana LLC plans to add a plantwide second shift at its Greensburg, Ind., plant this October, creating 1,000 new jobs. The facility manufactures the Honda Civic® sedan and Civic compressed natural gas vehicle.

Luvata plans to invest $1 million in machinery and equipment at its aluminum production plant in Grenada, Miss. The company produces coils and coolers for commercial, industrial, and mobile refrigeration applications.

The 180,000-sq.-ft., city-owned building will be upgraded to include better and more energy-efficient lighting with funds from the Mississippi Job Protection through Energy Economic Development grant program.

Navistar Intl. Corp., Warrenville, Ill., will discontinue production of luxury coaches at its Monaco RVs plant in Coburg, Ore., in early 2012, eliminating 450 out of 600 jobs. The company is consolidating coach manufacturing at its plant in Wakarusa, Ind.

Navistar also has announced the permanent closure of its truck manufacturing plant in Chatham, Ont. The plant has been idle since 2009, with 1,100 employees out of work since then. Production has been absorbed by the company's other plants.

Operations are being scaled back at the Warrenville headquarters as well, and one of the company's subsidiaries is closing a plant in Indiana.

Rice Precision Mfg. has announced plans to expand its existing custom metal machining operation in Baldwin City, Kan., by 12,000 sq. ft., making room for additional equipment and employees and new manufacturing opportunities.

The manufacturing job shop offers welding, precision fabricating, machining, and heat-treating services.

Superb Fabricating, South Lyon, Mich., plans to add 1,500 sq. ft. of office space to its 6,000-sq.-ft. plant in 2012.

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VP Manufacturing
D & R Electronics Co. LTD
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Web news

Bernard features product information, demonstrations, and customer testimonials on its YouTube channel, The Bernard Difference, at **www.you tube.com/user/thebernarddifference#p/u**. Featuring welders, supervisors, and business owners from a variety of industries, the channel provides firsthand accounts and real-life applications involving the company's Q-Gun™ GMAW guns, Dura-Flux™ self-shielded FCAW guns, and Centerfire™ series consumables. The channel also features company experts providing up-to-date product information on the company's GMAW guns and accessories.

Capital Steel Works, Buffalo, N.Y., has launched a Web site at **www. capitalintlsteelworks.com**, showcasing its fabrication projects. Clients can view examples of the company's work in fabricating light metal pieces such as stairs, railings, ladders, and platforms.

Valley, Germany-based **data M** has redesigned its Web site at **www.datam.de**. It provides online training via Webinars, led by a company specialist. Participation is interactive, which means that questions can be asked along the way, with customer-specific issues handled directly.

Dengensha America, Bedford, Ohio, offers a Web site at **www.dengensha.com** with in-depth descriptions of its welding machines and guns, nut and bolt feeders, welding transformers, welding controls, monitoring and measuring equipment, and secondary cables and electrodes. Other highlights include videos of products in action, downloadable copies of sales brochures, a place for customers to submit questions and request quick quotes, and a complete Spanish version of the site. The company also has profiles on LinkedIn and YouTube.

Knuth Machine Tools USA offers a machine tool sales and special-offers Web site at **www.knuth-machine tools.com**. The site features monthly discounted prices and special offers on the company's products. Financing terms are offered.

Misumi USA Inc., Schaumburg, Ill., a subsidiary of Misumi Corp., part of Misumi Group Inc., has a Web site at **www.automationmaterials.com** designed to streamline and simplify selection, quoting, and ordering of precision machined metal plates used in the assembly of industrial machinery and factory automation systems. Visitors can obtain a precision metal blank, quoted within 10 seconds and ordered in minutes, according to the company.

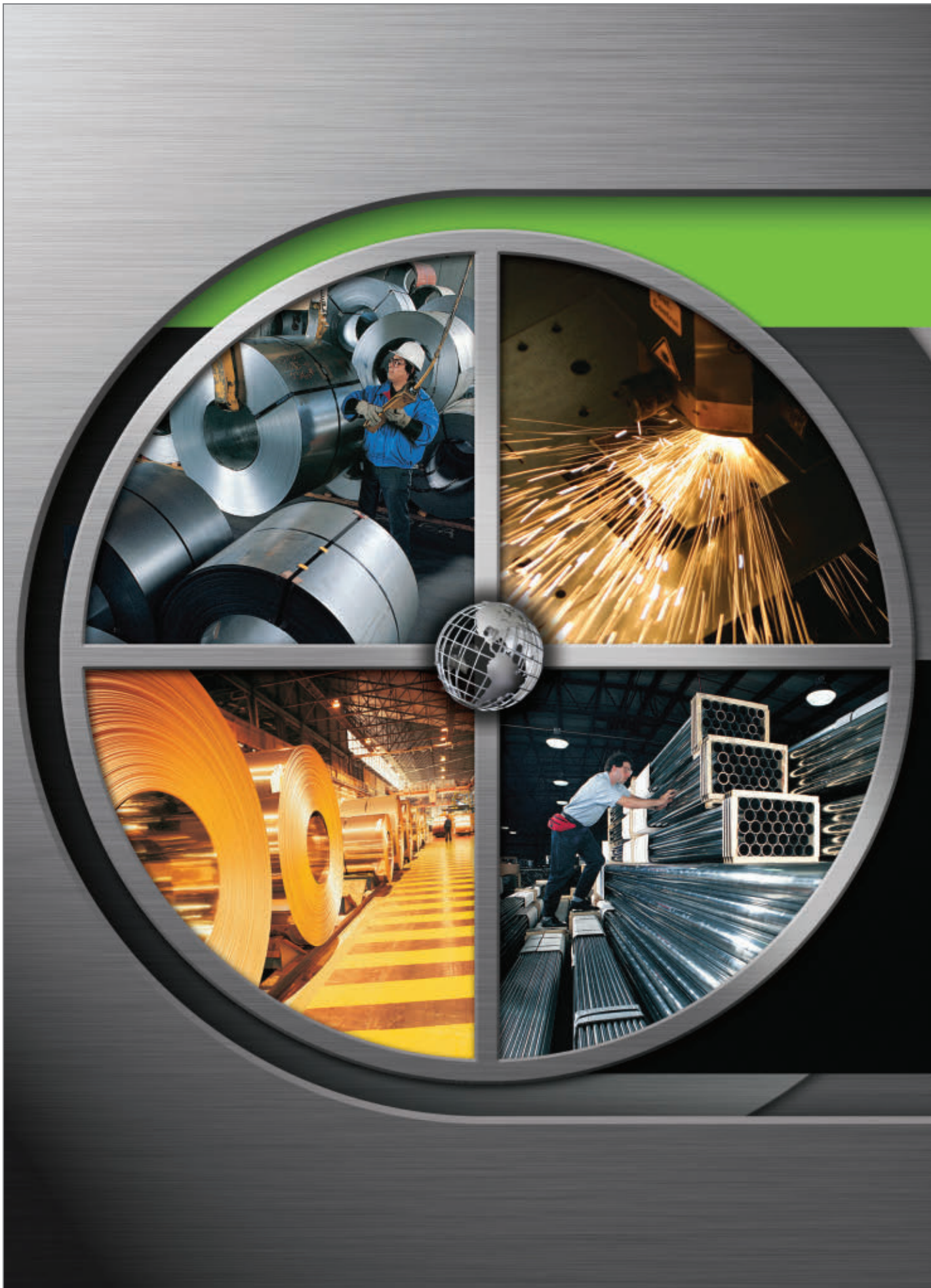
More than 30 different metals are available, including carbon steel, tool steel, stainless steel, aluminum, and copper. Blank dimensions can be configured in increments of 0.1 mm, in sizes from 20 to 2,500 mm, including very thin, very small, or extremely narrow sizes.

Orbitalum, Singen, Germany, has a Web site at **www.orbitalum.com**, presenting the company's products for orbital cutting, beveling, facing, and orbital welding.

The site is equipped with an online catalog for on-screen viewing, scroll-down menus, product sliders for quick gathering of relevant product information, and a download center where all available sales documents can be downloaded.

Saint-Gobain Abrasives has published a redesigned Norton/Merit welding and metal fabrication e-catalog, providing user-friendly navigation and a streamlined selection of the company's abrasive products. The new catalog is available online at **www.nortonindustrial.com**.

The e-catalog's consistent elements, charts, and selection tools help make it easy to navigate. The site is updated quarterly with new-product additions and changes to existing lines.



Waukesha® Metal Products, an international service supplier of metal stampings, sheet metal fabrication, and tool design and build in Sussex, Wis., has introduced a Spanish version of its Web site. The site, **www.waukeshametal.mx**, includes equipment lists, capability content, photograph descriptions, RFQ forms, and news and capability updates.

Supplier news

Dörken Corp. USA, a provider of multifunctional, nonchrome, microlayer corrosion protection coatings in Grass Lake, Mich., has appointed **J & M Plating**, Rockford, Ill., as a certified licensee for the application of the firm's coating products.

Eriez® will move its 5-Star Service® Center to a newly purchased 114,000-sq.-ft. building in Erie, Pa., about 15 miles from the company's world headquarters.

Previously located in a facility in Lake City, Pa., the center repairs and services customers' magnetic, vibratory, and inspection processing equipment. The service center is equipped with the machining, fabricating, and welding capabilities needed to rebuild all of the company's equipment and some competitive units. Once remanufactured, all Eriez equipment leaves the service center with an "as new" warranty.

The new building also will handle the manufacture of Hydroflow® fluid filtration and recycling equipment, column flotation cells, and metals recycling equipment. After renovating the space, the company expects to move operations in by the end of 2011.

Lincoln Electric Holdings Inc., Cleveland, has acquired substantially all of the assets of **Applied Robotics Inc.**, a manufacturer of Torchmate CNC cutting tables and accessories based in Reno, Nev. Torchmate offers CNC plasma and oxyfuel cutting tables and systems to small and medium-size fabricators. The company currently employs 44 people.

Lincoln also has acquired the welding operation assets of **Techalloy Co. Inc.**, Baltimore, and its parent company, **Central Wire Industries Ltd.** Techalloy, which employs 55 people, produces nickel-alloy and stainless steel welding consumables.

Lincoln Electric is a designer, developer, and manufacturer of arc welding products, robotic arc welding systems, plasma and oxyfuel cutting equipment, and brazing and soldering alloys.

Miller Electric Mfg. Co. has partnered with **Fox Valley Technical College** to launch the 26,000-sq.-ft. Advanced Manufacturing Technology Center in Oshkosh, Wis. The facility is outfitted with new welding, cutting, and fume extraction equipment, as well as fabrication and testing resources from Miller. The college built the facility with the goal of expanding its welding curriculum to train a new, skilled welding workforce for the region's manufacturing and fabrication industries, including shipbuilding, truck fabrication, and numerous foundries and manufacturers.

Motoman Robotics has moved from its West Carrollton and Troy, Ohio, locations into a new facility in Miamisburg, Ohio, just a few minutes south of the former West Carrollton plant.

TRUMPF Inc., Farmington, Conn., has received the Bosch Supplier Award in the machinery and equipment category for the second time in a row. TRUMPF also has presented 2011 sales achievement awards to three of its distributors. **Fabricating Machine Technology**, Cleveland, received the Outstanding Distributor Performance Award; **Mid-Atlantic Machinery**, Harrisburg, Pa., received the Sustained Excellence Award; and **Metalforte**, Monterrey, Mexico, received the Most Improved Performance Award.

Canada to get its own FABTECH show in 2012

The Society of Manufacturing Engineers (SME), Fabricators & Manufacturers Association Intl. (FMA), and American Welding Society (AWS) have announced plans to launch the first FABTECH® Canada, to be held March 20 to 22, 2012, at the Toronto Congress Centre. The event will showcase the latest technologies, tools, and trends—with a special focus on fabricating technology—geared toward the needs of Canada's estimated 1.5 million manufacturing employees in industries such as automotive, energy, transportation, and construction.

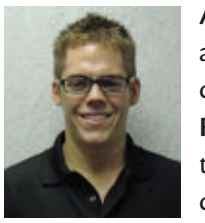
"FABTECH Canada 2012 will be a one-stop venue for solutions for welding, lasers, fabricating, bending, forming, and more, tailored to the unique needs of our country's growing manufacturing sector, as well as any business that either produces or relies on equipment and machinery in its day-to-day operations," said Janine Saperson, show manager with SME.

The event will feature an extensive exhibitor pavilion and a three-day conference and Town Hall panel session.

In the U.S., FABTECH will continue to be held annually in three rotating cities: Chicago, Las Vegas, and Atlanta. The FABTECH brand also was successfully introduced to the Mexican market in 2009 as FABTECH Mexico.

For more information on FABTECH Canada 2012 or to exhibit or register for the event, visit www. fabtech-canada.com. Show updates also are available on Twitter and LinkedIn.

People news



David Foley

Almetals Inc. has announced the addition of **David Foley** to the position of assistant production manager. He manages the shipping and receiving of all material to and from the company's headquarters in Wixom, Mich., as well as the secondary plant in Georgia. He also works directly with the vice president to ensure that production is running efficiently and that each order is accurate to customers' requirements.

Foley received his bachelor's degree in supply chain management from Michigan State University and interned with Almetals in the summer of 2010. The company is a special-metals slitter and distributor of coil products including aluminum, brass and copper, clad metals, cold-rolled material, fin stock, and coated and stainless steels.

Jeff Crawford

The **Harris Products Group**, a manufacturer of cutting, welding, brazing, and soldering equipment and consumables with headquarters in Mason, Ohio, has announced the appointment of Jeff Crawford as the new director of information technology.

A Miami University graduate, Crawford has more than 30 years of industry experience providing both IT services and business development skills to large organizations. In this position, he is responsible for integrating technology usage at the company's global facilities in Europe, Brazil, and the U.S. and for spearheading several new IT initiatives.

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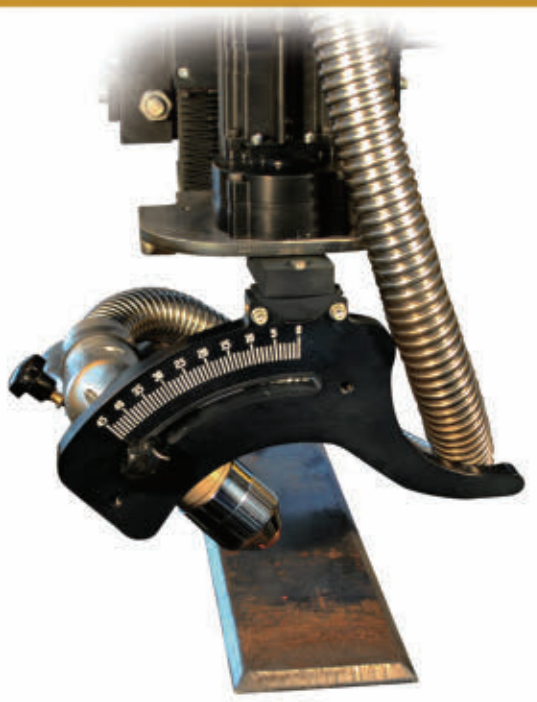

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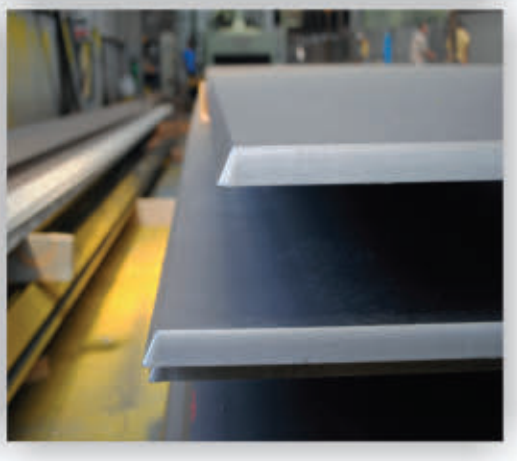

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Time is money—so, so much money

Quick-response manufacturing shows how less time leads to greater profits

It makes sense that Rajan Suri spent years studying control theory. Control theorists take a systems view, analyzing how components work in concert to produce an efficient, optimized whole. In control theory, the whole is not only greater than the sum of its parts, it's *everything*.

Years ago during a project with MIT, Suri spent time with an Italian manufacturer looking to optimize its automation control systems. Then he took a step back. Analyzing how all the parts in a plant worked together, Suri noticed that a conveyor was running as fast as it could. It was a massive (albeit not very obvious) bottleneck that wasn't getting attention. It's not as if removing that bottleneck would have solved everything—far from it. But it was a piece of the puzzle that shouldn't have been ignored; in fact, if you miss any piece, you don't get a complete picture of the problem, so how can you uncover the best solution?

So what is the problem many U.S. manufacturers face? Many would say it has to do with costs—they continually rise, while intense market pressures force companies to accept razor-thin margins. But what exactly drives these costs? Is it labor? Not really, according to Suri, who said for many products, direct labor actually makes up less than 7 percent of the selling price. What really costs metal fabricators and other manufacturers money is time—the days, weeks, and sometimes months it takes for an initial order to turn into a shipped product.

That point provides the foundation for Suri's latest book, *It's About Time: The Competitive Advantage of Quick Response Manufacturing*. The work describes quick-response manufacturing, or QRM, an improvement methodology for high-product-mix operations that Suri has championed for years. In 1993 he founded the Center for Quick Response Manufacturing at the University of Wisconsin-Madison. Boiled down, QRM says that time is money—a lot more money, in fact, than many manufacturers realize.

QRM focuses on a metric called *MCT*, or *manufacturing critical-path time*. As the book describes, this MCT is the "amount of calendar time from when a customer creates an order, through the critical path, until the first piece of that order is delivered to the customer."

The MCT forces people to see the forest through the trees. A shop may analyze manufacturing processes to ensure procedures are as efficient as possible, shaving hours off fabrication times. But that actual "touch time" doesn't account for much in the scheme of things. As Suri describes it, when you look at the whole system, an order often spends not minutes or hours but *days* or *weeks* just sitting as raw stock, as work-in-process, or as finished goods.

> QRM does demand that workers perform various functions, but it doesn't demand that they put in long hours to get the job done.

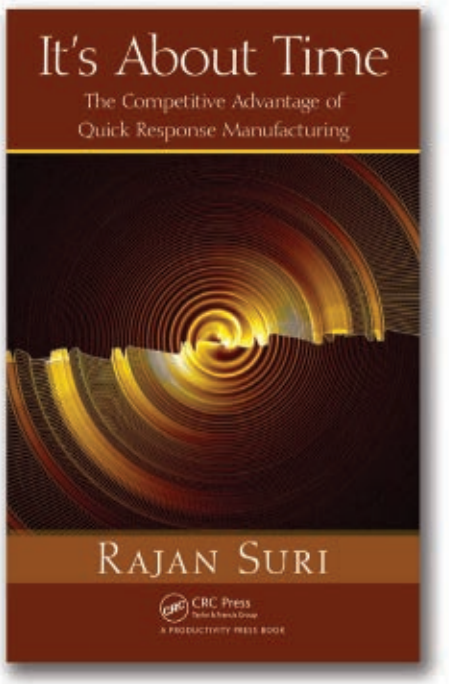
This is what QRM calls "white space" time, and for most organizations it's what consumes most of that MCT. And that ever-lengthening MCT, Suri says, is what really drives manufacturing costs skyward. White time occurs in the front office too. An order actually may spend only a few hours in engineering, but the job planner may give that department five days, because he knows the engineers have a big pile of jobs in their inbox.

At the same time, the manufacturer gets those angry calls about late orders, and the hot job commences. Employees drop what they're doing to expedite a work order through the system, putting in major overtime. Everyone bands together and bends over backward—performing the epitome of customer service, right? Not really, Suri says. For one thing, the order shouldn't have been late to begin with. More than that, the hot job pushed everything else behind. Plus, the company has to shell out more money for all those overtime hours.

So why are orders late? Why does it take six weeks for an order to flow through the shop, when workers really handle the job for only about eight hours? QRM zeros in on that white time.

So how does a shop reduce white time? For this, QRM focuses on the causes, one being large batch sizes. By reducing batch sizes, a shop can finish a batch more quickly and not leave other jobs sitting for hours or days waiting for machine time. QRM also proposes cellular organization. Like a lean manufacturing cell, these QRM cells may group dissimilar machines or processes, but unlike lean manufacturing cells, they aren't focused on specific products but instead on targeted market segments. As part of these cells, cross-trained workers carry a product through multiple stages of production. This means the product spends more time moving, less time sitting. There's less white time, which ultimately leads to shorter MCT.

Perhaps most significant, QRM preaches the virtues of *decreased capacity utilization*. A highway jammed full of cars has stop-and-go traffic, and the same holds true for a manufacturing facility jammed full of parts, with machines and people working furiously to process them all.



In fact, a highway running at, say, 75 percent capacity actually can handle more cars during a given time than when at 100 percent capacity, at which point even the slightest change in the traffic pattern can cause stop-and-go traffic, meaning it takes much longer for commuters to make the trip home. Now translate that concept to manufacturing. If a shop runs well below peak capacity, it can handle more jobs in less time—and make more money.

Suri's work is refreshingly logical. And for a book having fewer than 200 pages, it's incredibly comprehensive, covering shop floor part flow; the front office; engineering; new-product development; scheduling; supplier strategies; and even basic accounting issues, including an insightful discussion of how a shop allocates overhead and the effect it has on shop operations.

Most refreshing of all, not once does Suri mention anything about "doing more with less." Under QRM, if demand rises, companies should indeed invest in machines and people to build in that excess capacity and ensure utilization doesn't head into dangerously high territory. QRM does demand that workers perform myriad functions, set up more often, and manage product flow. But it *doesn't* demand that they put in long hours to get the job done. During a time when so many companies are reluctant to add to their payrolls, that's a powerful message. **FAB**

For more on QRM, see "Need a light—now?" in this issue. The article describes how Phoenix Products used QRM to shorten response times and gain market share.

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5'-0"	16.44	17.94	19.94	29.30	32.57	43.93
5'-6"	17.44	19.09	21.29	30.78	35.10	46.67
6'-0"	18.44	20.24	22.64	32.26	37.62	49.41
6'-6"	19.44	21.39	23.99	33.74	40.15	52.15
7'-0"	20.44	22.54	25.34	35.23	42.67	54.90
7'-6"	21.44	23.69	26.69	36.71	45.20	57.64
8'-0"	22.44	24.84	28.04	38.19	47.72	60.38
8'-6"	23.44	25.99	29.39	39.67	50.25	63.12
9'-0"	24.44	27.14	30.74	41.16	52.77	65.87
9'-6"	25.44	28.29	32.09	42.64	55.30	68.61
10'-0"	26.44	29.44	33.44	44.12	57.82	71.35
10'-6"	27.44	30.59	34.79	45.60	60.35	74.09
11'-0"	28.44	31.74	36.14	47.09	62.87	76.84
11'-6"	29.44	32.89	37.49	48.57	65.40	79.58
12'-0"	30.44	34.04	38.84	50.05	67.92	82.32
12'-6"	31.44	35.19	40.19	51.53	70.45	85.06
13'-0"	32.44	36.34	41.54	53.02	72.97	87.81
13'-6"	33.44	37.49	42.89	54.60	75.60	90.55
14'-0"	34.44	38.64	44.24	55.98	78.02	93.29
14'-6"	35.44	39.79	45.59	57.46	80.55	96.03
15'-0"	36.44	40.94	46.94	58.95	83.07	98.78
15'-6"	37.44	42.09	48.29	60.43	85.60	101.52
16'-0"	38.44	43.24	49.64	61.91	88.12	104.26
16'-6"	39.44	44.39	50.99	63.39	90.65	107.00
17'-0"	40.44	45.54	52.34	64.88	93.17	109.75
17'-6"	41.44	46.69	53.69	66.36	95.70	112.49
18'-0"	42.44	47.84	55.04	67.84	98.22	115.23
18'-6"	43.44	48.99	56.39	69.32	100.75	117.97

WIDTH	3/4"	1"	1-1/4"	1-1/2"	2"	2-5/8"
19'-0"	44.44	50.14	57.74	70.81	103.27	120.72
19'-6"	45.44	51.29	59.09	72.29	105.80	123.46
20'-0"	46.44	52.44	60.44	73.77	108.32	126.20
20'-6"	47.44	53.59	61.79	75.25	110.85	128.94
21'-0"	48.44	54.74	63.14	76.74	113.37	131.69
21'-6"	49.44	55.89	64.49	78.22	115.90	134.43
22'-0"	50.44	57.04	65.84	79.70	118.42	137.17
22'-6"	51.44	58.19	67.19	81.18	120.95	139.91
23'-0"	52.44	59.34	68.54	82.67	123.47	142.66
23'-6"	53.44	60.49	69.89	84.15	126.00	145.40
24'-0"	54.44	61.64	71.24	85.63	128.52	148.14
24'-6"	55.44	62.79	72.59	87.11	131.05	150.88
25'-0"	56.44	63.94	73.94	88.60	133.57	153.63
25'-6"	57.44	65.09	75.29	90.08	136.10	156.37
26'-0"	58.44	66.24	76.64	91.56	138.62	159.11
26'-6"	59.44	67.39	77.99	93.04	141.15	161.85
27'-0"	60.44	68.54	79.34	94.53	143.67	164.60
27'-6"	61.44	69.69	80.69	96.01	146.20	167.34
28'-0"	62.44	70.84	82.04	97.49	148.72	170.08
28'-6"	63.44	71.99	83.39	98.97	172.82	172.82
29'-0"	64.44	73.14	84.74	100.46	153.77	175.57
29'-6"	65.44	74.29	86.09	101.94	156.30	178.31
30'-0"	66.44	75.44	87.44	103.42	158.82	181.05
31'-6"	69.44	78.89	91.49	107.87	166.40	189.28
32'-0"	70.44	80.04	92.84	109.35	168.92	192.02
32'-6"	71.44	81.19	94.19	110.83	171.45	194.76
33'-0"	72.44	82.34	95.54	112.32	173.97	197.51
33'-6"	73.44	83.49	96.89	113.80	176.60	200.25
34'-0"	74.44	84.64	98.24	115.28	179.02	202.99

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CNC robotic cutting machines hit the classroom

Situation

At the Academy of Arts, Careers and Technology, a Washoe County School District public high school in Reno, Nev., students learn technical skills, in addition to their regular high school studies.

"Application is one of the high-end levels of learning. Not only does it stick with the student longer, it is motivation," said welding instructor Gaylord Rodeman. "To create something, see it work, and have that success is a learning experience that cannot be equaled in the fields of engineering and skilled manufacturing."

When it was time to purchase a CNC machine for his classroom, Rodeman said the biggest thing he wanted was a good support system.

Resolution

Rodeman chose Torchmate for its proximity and ability to deliver up-to-date technology and technical support. Today Rodeman uses a 4x8 Torchmate 3 CNC robotic cutting machine with arc voltage height control in his classroom to take learning from a textbook-oriented idea to a hands-on project.

With five Torchmate CNC machines in use across the school district, the company provides training for instructors on the capabilities of each machine and is available for free, in-depth technical support to help ensure students and instructors are able to use the full capabilities of each machine.

According to Bill Kunz, CEO of Torchmate, it is crucial for potential engineers, architects, and manufacturing professionals to have a good understanding of how CNC machines work before they dive into the industry.

Torchmate | 280 S. Rock Blvd., Suite 150, Reno, NV 89502 | 866-571-1066 | www.torchmate.com

Software tracks shop's inventory, streamlines shipping

Situation

QC Metal Fabricators Inc., Elkhart, Ind., supplies fabricated metal products to the automotive and RV industries, among others.

Brad Stacy, general manager, was looking for a software package to ease some of the time-consuming paperwork he faced each day while monitoring the progress and quality of jobs in the shop.

Resolution

Stacy acquired E2 software, a tailored shop management software system from Shoptech Software. With the system, he tracks inventory costs more accurately and has streamlined his shipping process. The software generates reports that consolidate information from several different sources at the touch of a button.

"Instead of hiring more staff to pull reports, we're letting the software do it," he noted.

The software is designed to deal with the constant changes that are common in machine shops, from product quantities to delivery dates and other variables.

Shoptech Software | 300 E. Business Way, Suite 450, Cincinnati, OH 45241 | 800-525-2143 | www. shoptech.com

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Sheet Metalworking, Our Passion, Your Solution

Plasma cutting machine cuts flue pipes at all angles

A new plasma cutting machine for flue pipes has been developed by Techserv Cutting Systems. The system uses interpolated motion to help increase production throughput, using a real-time machine control module from Baldor.

Capable of cutting aluminum and stainless steel flue pipes at any angle, as well as holes of any shape or size, the plasma tube cutter automates this aspect of manufacturing. Precutting of complex shapes is eliminated. Instead, the flat metal sheet is rolled into a tube and seam-welded, after which each tube is loaded into the machine.

The entire cutting operation is handled autonomously. Cutting the angled end pieces for an elbow pipe and then assembling them can be accomplished in about 4 min., the company reports.

The tube being cut is mounted in the machine with its top end held in a rotating, pneumatically driven clutch assembly. The plasma cutting torch is moved up and down as the tube rotates, at a rate that determines the severance angle or the size and shape of the hole being cut. The machine can handle tube diameters from 3.54 to 13.78 in.

Techserv Cutting Systems Ltd. | Pepperoyd Mills, Battye Street, Dewsbury, WF13 1PA, England | 44-1924-460-456 | www.techserv.co.uk

Power source cuts, welds with alcohol and water

The Multiplaz 3500 power source can be used for welding and cutting jobs and requires no gases for either application. It requires only a tailored 8-oz. mixture of alcohol and water to help generate a plasma flame for welding and requires only 8 oz. of water to generate a cutting flame.

The technology has been used in Europe for nine years and in Asia for six years. The plasma technology originated in Russia and now is being produced commercially in China.

To use the equipment for welding, the operator unscrews a cap on the torch and, using a plastic syringe, fills it with a prescribed mix of alcohol and water. (Adjusting the water-alcohol mixture makes it possible to tailor the plasma flame for varying metals.) When the solution runs out of the nozzle, the torch is ready for welding.

The fluid, influenced by a cathode, creates an electric arc, which then creates a plasma flame capable of reaching 14,400 degrees F. According to the company, extensive scientific research has shown that the power source has the capability to match gas tungsten arc welding (GTAW) results, or other welding processes in which a nonoxidizing or protective atmosphere is necessary.

The company also notes that the vapors at the periphery of the plasma jet remain chemically unchanged during welding. This provides complete shielding of the joining process and eliminates potentially toxic fumes to which the welder might be exposed.

The power source has two modes. Mode 1 is for gas welding, brazing, and soldering. Mode 2 is used to weld with an arc, similar to gas metal arc welding, GTAW, and shielded metal arc welding processes. As with those welding processes, welders need the appropriate welding wire and electrodes.

If the torch is to be used for cutting, the torch's reservoir is filled with tap water. Once again, the water's interaction with the electric arc creates a plasma flame.

The plasma flame can cut steel up to 0.375 in. thick and produce a clean cut. It also can "clean sever" steel up to 0.5625 in. thick, which means that multiple passes of the torch are required and the resulting edge won't be cosmetically appealing.

The Multiplaz 3500 comes with two torches, which weigh about 2 lbs. each. The power source weighs less than 25 lbs. and measures 15 in. by 7.5 in. by 5.5 in. It can run on 110 V or 220 V.

Multiplaz North America | 1625 17th St., Suite 5, Santa Monica, CA 90404 | 310-314-5551 | www.multiplaz.com

Plate beveler has high power-to-weight ratio

Steelmax Tools has introduced the BM 15 Metal Router plate beveling machine. The small, lightweight machine features a guide roller design that permits use on curved and rolled plates.

According to the manufacturer, the machine has the highest power-to-weight ratio of any portable beveling machine.

Variable electronic speed control allows adjustment of RPM to perform bevels on many types of material. Radius inserts uniformly break sharp edges for paint and coating preparation.

Steelmax Tools | 121 Southpointe Drive, Bridgeville, PA 15017 | 412-257-1908 | www.steelmax.com

Adjustment device compensates for press brake deflection

Specific® Press Brake Dies Inc. offers the O-DFLX series II multipoint adjusting compensation die holder for press brakes.

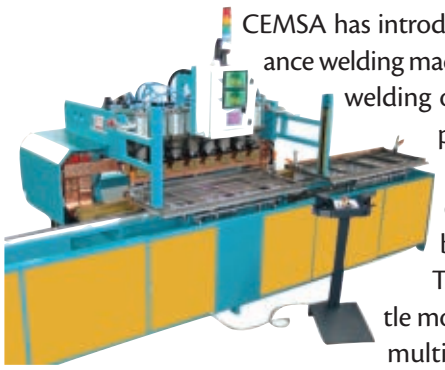
The device compensates for crowning at a single central point, while the patented dual-wedge design allows for independent adjustment at every 8 in. to compensate for inconsistencies in the press, worn tooling, or to aid in side-by-side staged applications.

The fixture, which eliminates shimming, features an integrated aperture read-out gauge. A top cap eliminates infiltration of abrasive particles when running materials that generate slag and galvanic debris.

The low-profile design consumes minimal die open space. Tonnage is from 175 to 375 for lengths up to 24 ft. Deflection is from 0- to 0.80-in. crown.

Specific Press Brake Dies Inc. | 9439 Enterprise Drive, Mokena, IL 60448 | 708-478-1776 | www.specificbrakedies.com

Multihead resistance welding machine designed for cutting steel wire panels



CEMSA has introduced the GRG-MPS multihead resistance welding machine. The machine is dedicated to the welding of stainless steel or carbon steel wire panels, both basic and special. Panels also can be made of wire with different diameters and wires on bearing bars.

The machine can operate with the shuttle moving tooling on an axis parallel to the multihead line or on a vertical axis at the front. It also is offered with a pallet recirculation shuttle with automatic loading and unloading.

Machines are available with 4, 6, 8, 10, 12, or 16 heads. Electricity is fed by individual AC transformers for each welding head, or by two AC transformers working in parallel when mechanical cascade for medium production is acceptable.

CEMSA S.p.A. | Viale Piemonte, 25, 20093 Cologno Monzese, Milano, Italy | 39-02-2544671 | info@cemsa.it, www.cemsa.it

Welding helmet's lens switches from clear to dark in 0.0005 second

Linde Gases, a division of the Linde Group, has announced the introduction of the OHE350 electronic welding helmet, constructed for use in arc welding to protect welders in the construction, manufacturing, and engineering sectors.

The high-speed electronic darkening filter lens, which offers complete UV and IR light protection, has a switching time from clear to dark of 0.0005 second. Run by solar power, the lens comes with an enclosed backup lithium battery.

The helmet's durable, lightweight shell is designed to minimize the amount of welding fume in the user's immediate breathing area while remaining comfortable.

Linde Gases | 6055 Rockside Woods Blvd., Independence, OH 44131 | 216-573-6600 | www.linde-gas.com

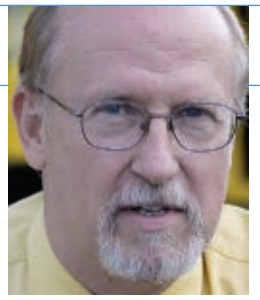
Monitoring service reports on robotic equipment

MyMotoman remote monitoring service from the Motoman Robotics division of Yaskawa America Inc. gives users equipment monitoring information on any device that has access to the Internet. With the service users have the ability to maintain a handle on robotic equipment by sending crucial alerts, current production information, and preventive trends.

No purchase of servers or software is required. Subscribers access robot information with a unique login and secure password. With the click of a mouse, the subscriber can configure views and add fields. Upgrades are automatic, and customization stays intact. Data is protected with physical security, data encryption, and user authentication.

The service sends alerts and predictive maintenance trend data on concerning situations. Subscribers to the expanded service program receive equipment status information on a mobile phone, laptop, desktop, or any device that has access to the Web.

Motoman Inc. | 805 Liberty Lane, West Carrollton, OH 45449 | 937-847-6200 | info@motoman.com | www.motoman.com



Gerald Davis is a job shop consultant and chairman of the board of DSM Manufacturing Co., **gerald@glddesigns.com**.

3-D CAD: Producing a 2-D layout from 3-D data

Converting an imported model into a production flat layout

Last month we explored using FeatureWorks® to transform a 3-D concept model into a 3-D production model. From that model we were able to produce flat layouts, but the main objective was to produce a good 3-D model that would be useful over the project's lifetime.

But what if you don't care about the 3-D model? What if all you want is a flat layout for CNC programming? Let's explore that premise.

Before we go any further, let's start with the usual disclaimer that we're examining functionality that is unique to SolidWorks®.

For this exercise, we will start with a file in IGES format. The acronym is derived from Initial Graphics Exchange Specification. If we opened our starting file—SL2IC.IGS for example—with Notepad, we would see that it contains text in a very specific format. It does not have much meaning to the typical human. 3-D CAD software, however, is able to interpret that formatted IGES text and produce a 3-D model from it.

We could have just as easily started with a STEP file, another file standard. For sheet metal work, either will do just fine.

Fashioning a Model From a File

In **Figure 1a** we see the start of the process for importing the IGS file into SolidWorks. I clicked on File>Open then changed the file type to IGS. I then went to the folder where I had saved the IGS file to import. I selected the file SL2IC-0001.IGS and clicked on the Open button.

After I open the IGS file, the system produces a preview image of the 3-D model, along with the message shown in **Figure 1b**: "Do you wish to run Import Diagnostics on this part?" The process of converting IGS data into SolidWorks features may

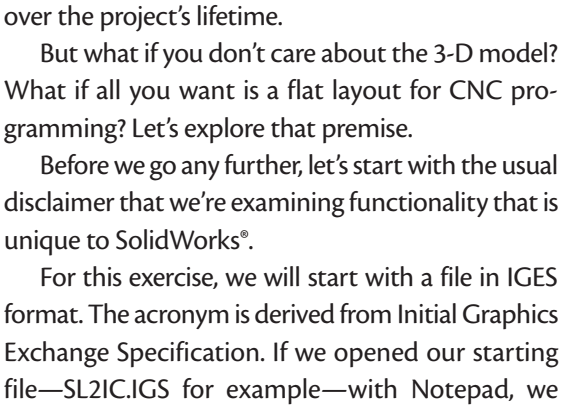


FIGURE 1a *Importing begins with finding the IGS file.*

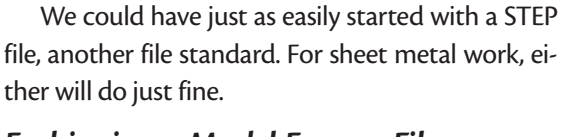


FIGURE 1b *Import Diagnostics will help you to remove faulty faces and gaps from the imported model.*

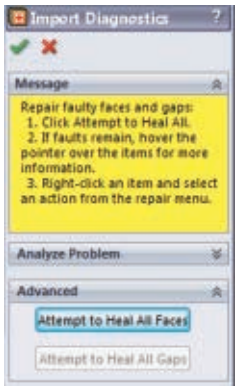


FIGURE 1c *The Attempt to Heal All button is almost always a good choice. If that doesn't work, you'll have to repair faulty features one by one.*

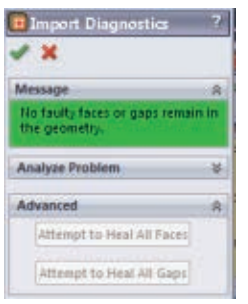


FIGURE 1d *Once the faulty faces and gaps are gone, you'll see a message with a green background. Celebrate this moment of joy.*

produce features that look right but function wrong; the Import Diagnostics process provides a means for you to help the software figure out what is right.

Figure 1c shows the Attempt to Heal All button. That is always my first choice. Let the software do its best. If that doesn't work, then I'll experiment with fixing, deleting, and re-creating faces until the model knits well into a solid.

Fortunately for this example, the software is able to make sense out of all of the IGS data, and we see in **Figure 1d** that no faulty faces or gaps remain in the geometry. I'm always happy to see that message with the green background.

From Dumb to Useful

Now that we have the data imported, we have a "dumb solid" with practically no feature history. That gives us a warm and fuzzy feeling, but our goal is to unfold the sheet metal part—maybe to change the bend radius, thickness, and bend compensation to match our tooling—and export a flat pattern. To do that, we need to convert this dumb solid into sheet metal. We'll start doing that by inserting bends as shown in **Figure 2a**.

On the Sheet Metal menu bar you'll find an Insert Bends tool. After you click on that tool, you'll be asked to select a fixed face. This can be any face of your choosing. When the software unfolds the part, the fixed face will remain stationary, and the other faces will swing and unfold around it.

In **Figure 2b** I've arbitrarily selected the largest face as the fixed face. I also could change the value for the inside bend radius: 0.787 mm is about 0.030 inch, which should work well for the 22-gauge (0.030-in.) stainless steel that this is made from. A K-factor of 0.392 works with my press brake tooling on this material, but your shop might need to use a different value. (The K-factor is used to reference the neutral axis in a bent form, the line in a bend where the metal is neither compressed like the inside surface of the bend nor stretched like the outside surface of the bend. More specifically, a ratio of the location of the neutral line to material thickness determines the K-factor for a bend.)

After completing the Insert Bends, we arrive at **Figure 3a**, and we're about to flatten the part to verify that our effort is going well. Before we do that, let's check out the Feature History.

We started with an imported model—Imported1—and then added a Sheet Metal feature, a Flatten Bends feature, and a Process Bends feature.

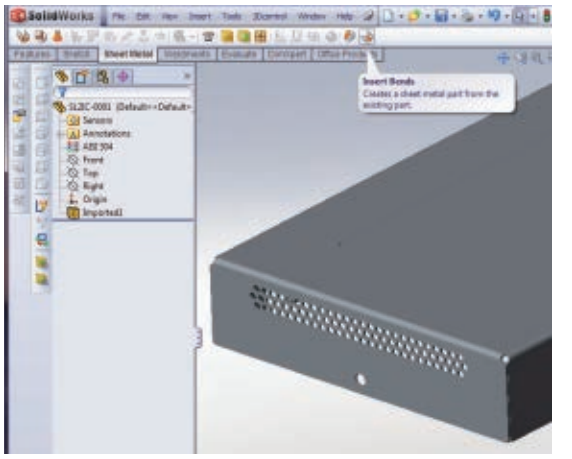


FIGURE 2a *Use the Insert Bends tool—found on the Sheet Metal menu bar—to unfold the sheet metal model.*

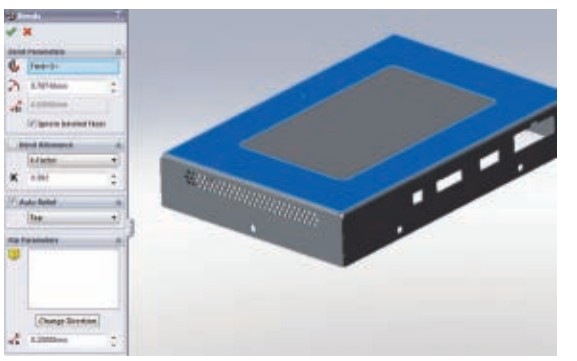


FIGURE 2b *Select a fixed face so the software knows how to start unfolding the part.*

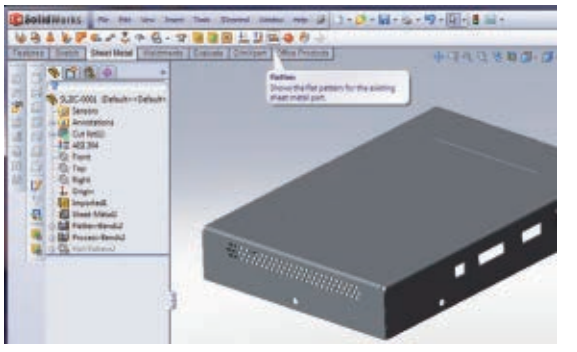


FIGURE 3a *The Unfold tool on the Sheet Metal menu is handy for toggling the part between the flat and folded versions.*

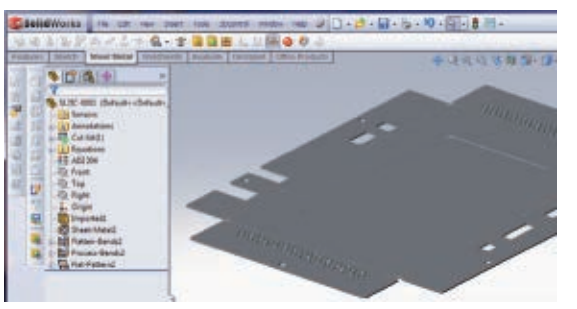


FIGURE 3b *Check the flat to make sure the K-factor, radius, and thickness all match your shop's expectations.*

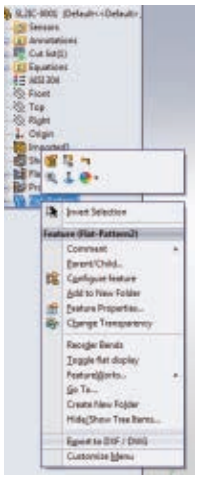


FIGURE 4 *Exporting to DXF is done with a right-click on the Flat-Pattern feature.*

Note that the Flat-Pattern feature is suppressed while the part is folded. To unfold the part, the Flat-Pattern feature needs to be unsuppressed.

To make the toggling of the suppressed state of the Flat-Pattern feature more convenient, use a tool on the sheet metal menu called Flatten. All it does is toggle the suppression state of the flat pattern.

Figure 3b shows the result of clicking on the Flatten tool to flatten the part. Note that the Flat-Pattern feature is no longer suppressed, and the part unfolds correctly.

One Final Check

After measuring the flat to verify that the K-factor is set correctly, we also scan the part to ensure that all appears to be as expected. If necessary, we would edit the Sheet Metal feature to change the K-factor or bend radius.

Now that we have a good flat pattern, we need to export it as a DXF file to the CNC programming software. To create the DXF file, I right-click on the Flat-Pattern feature in the Feature Manager's history list. **Figure 4** shows the pop-up menu that appears. Toward the bottom of the menu, an Export to DXF/DWG option can be found.

To review the process, we import an IGS file, verify that the resulting model has no faulty faces or gaps, insert bends, verify that the model will unfold as expected, and export a DXF for use with the CNC software. It actually took longer for me to type that sentence than it did to do the CAD work. ***FAB***

Gerald Davis uses CAD software to design and develop products for his clients at www.glddesigns.com. Please send your questions and comments to dand@thefabricator.com.

around washington >> updates on laws and regulations affecting fabricators

Stephen Barlas, a freelance writer based in Arlington, Va., can be reached at sbarlas@verizon.net.

Department of Energy could be targeting fabricators

Federal agency wants to reduce energy usage in manufacturing

The pain at the pump that motorists feel might be felt by metal fabricators in the near future. The Department of Energy (DOE) includes the fabricated metals sector as a leading electricity consumer with regard to various "pumps." These pumps are not currently subject to energy efficiency standards.

That may change, however, based on a DOE request for information published in June. According to DOE data, the fabricated metal product manufacturing category, as defined by the North American Industry Classification System, consumed 42.2 kWh of electricity in 2006, with pumps accounting for 7 percent of that. Other manufacturing sectors on the list of the top 15 pump electricity users in that category included machinery-makers and transportation equipment manufacturers.

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) opposes any rulemaking on efficiency standards. Karim Amrane, AHRI's vice president, regulatory and research, said his group believes that the preliminary analysis conducted by DOE is based on outdated information and cannot be used as a basis to initiate a rulemaking on commercial pumps that are in building and facility air-conditioning systems.

Utility MACT Means Higher Costs for Manufacturers

Even if the DOE's efforts don't come to fruition, electricity costs for manufacturers still could increase in the near future thanks to two Environmental Protection Agency (EPA) rules.

The first, issued in July, is called the Cross-State Air Pollution Rule (formerly the Transport Rule). The second, expected to be finalized this fall, is called the utility MACT rule. These complex rules require the installation of emission-control technologies—in particular, scrubbers—at many coal-fueled power plants.

"Both rules will significantly increase electricity costs for manufacturers," said Paul A. Yost, vice president, energy and resources policy, National Association of Manufacturers.

The National Economic Research Associates (NERA) recently modeled the combined economic impacts of both rules. The study estimates that average retail electricity prices nationwide will rise by 11.5 percent, and heavy manufacturing states such as Ohio can expect prices to rise by approximately 23 percent. Furthermore, the NERA estimates that natural gas prices will increase significantly by 2016 as a result of the proposed rule.

But that final and proposed rule may be targets for congressional Republicans whose return to Washington in September marked the start of a more aggressive campaign to limit the EPA's regulatory authority.

Free Trade Agreement Breakthrough?

Democrats and Republicans appear to agree that it's time to bring three long-delayed free trade agreements (FTAs) between the U.S. and South Korea, Panama, and Colombia to the floor of the Senate this fall.

A disagreement between the two parties has held up votes on the three agreements in the Senate and House of Representatives. The Senate Finance Committee, in part at the behest of the Obama administration, had attached an extension of the Trade Adjustment Assistance (TAA) Act to the South Korea pact, but that was not sitting well with Republicans.

The TAA is a federally funded program from the Kennedy era which pays workers who have lost jobs because of foreign competition. The program, expanded as part of the 2009 stimulus bill, now costs approximately $1 billion a year. Republicans oppose the TAA as both unaffordable in the current economic climate and believe it is a political payoff to unions.

Senate Majority Leader Harry Reid, D-Nev., and Republican Senate Minority Leader Mitch McConnell, R-Ky., have agreed to bring the South Korea deal to the Senate floor without a TAA-extension amendment.

A U.S.-South Korea FTA would be the most significant of the three. According to the U.S. International Trade Commission, the reduction of Korean tariffs and tariff-rate quotas on goods alone would add $10 billion to $12 billion to U.S. GDP. It would increase annual merchandise exports to Korea by $10 billion. FAB

Air-Conditioning, Heating, and Refrigeration Institute | www.ahrinet.org

Environmental Protection Agency | www.epa.gov

National Association of Manufacturers | www.nam.org

National Economic Research Associates Economic Consulting | www.nera.com

U.S. Department of Energy | www.energy.gov

U.S. International Trade Commission | www.usitc.gov

U.S. Senate Committee on Finance | http://finance.senate.gov

Who's calling? Your machine tools

Remote machine monitoring offers information with context

By Paul Blizel

Remember the last time you were left in the dark because of a power outage? The minutes seem to drag along like hours. Did you receive an automated message from the utility company's notification system informing you of the outage? If so, I am sure you would agree that the message was essentially meaningless. You *know* the power is out. What you want to know is *when* the power will be turned on so you can return to your normal life.

Unfortunately, notification systems have limited value. An automated message is meaningful to the lineman who repairs the problem. But to you, the message lacked *context*. Had the message included an estimated repair time, you could have made some informed decisions. For a notification system to have real value, it must include information that puts the message into a context for the recipient.

In other words, we need information, not data.

Gaining Smartphone Access

With the evolution of the smartphone, we have the opportunity to improve notification systems to include vital information along with the standard message. Imagine having real-time access to machine and production status from home or the cabin. The idea sounds very desirable. But, like an iceberg, there is more to it than meets the eye, and what you don't see is far more important than what you do.

So how does this information make its way from the shop floor to a smartphone? For a production manager to receive a message about stopped production caused by a machine error, three processes have to be in place. First, the CNC machine tool or automated process must be able to generate valid data such as error codes or event triggers. Second, the data must be gathered in a central location where context can be added, creating meaningful information. Third, that central location must securely communicate the information to the production manager.

Regarding data generation from CNC machine tools, data triggers can occur one of two ways. The intramachine method effectively places in the control a kind of "agent" that monitors the status of the machine tool and generates data on predetermined events. Not all machine controls accept a monitoring agent, but those that do can offer significant benefits. The intramachine agent has access to valuable information not available with other methods. Intramachine monitoring requires collaboration among software vendors, the CNC manufacturers that provide the software, and the machine tool builders who provide access to the data they generate.

The other method of gathering machine tool data is with external machine monitoring products. These tools include relays, sensors, and human-machine interfaces. External monitoring is the most common method of gathering machine tool data for two primary reasons. First, there wasn't a reliable intramachine agent system available until quite recently, and second, external monitoring is flexible, less expensive, and requires less expertise to implement.

The main problem with external machine monitoring is that only limited data is generated by the device. A hard-crash error will generate the same notification as a soft error that can be corrected with a simple reset button. Ancillary information is unavailable, which can reduce the quality of information in the notifications.

The Machine Interface

A common tool used with external machine monitoring is the human-machine interface (HMI). An HMI is a computer or device that allows an operator to easily communicate conditions or status to the monitoring system. These black boxes are easy to use and can provide more data than passive monitoring devices.

The problem is that HMIs typically require an operator to be engaged in the monitoring process. Any process that involves a person to *just* push a button to report an event makes recording that event unreliable. Even the best personnel forget to push the button or go around the process from time to time. In short, any HMI monitoring system that is not transparent in the production process introduces incomplete data, and therefore the monitoring process is suspect.

Challenges of Remote Access

Once generated, data is sent to a central location for processing and passing on to the end user. If the recipient is located within the company walls, the process is very straightforward. The message is simply relayed via messaging, e-mail, or Web service using the existing company network.

Relaying errors while key personnel are nearby does not require a major investment in a notification system. If the notification moves outside of the company walls, however, the complexity of the system rises—but so does its value: Key personnel can be anywhere yet still be in control of production.

As discussed, a simple error message does not contain enough information to allow the recipient to effectively make a decision. Notifications must have meaningful information added so that the recipient understands its impact. For instance, a production manager who receives a CNC error notification will call a maintenance person and ask how long it will take to fix. If that same notification included an error report and projected production schedule, the manager would understand the impact of the notification. Many notifications are minor, so the production manager does not have to take action. However, when a major failure occurs, the manager should be aware of the implications and respond accordingly.

Getting Usable Information

Where does the information come from that makes notifications intelligent? The most common source is the company enterprise resource planning (ERP) or manufacturing execution system (MES), as they are typically in control of production schedules. Other sources like a shop's distributed numerical control (DNC) systems also will work, but the goal is always the same: Synchronize with the trusted production schedule. This synchronization can be quite complex and may require qualified technicians to perform the work. It also represents a large portion of the success or failure of the project, yet it is often underestimated in terms of value and return on investment.

All monitored CNC equipment and processes are connected to a data collection center, which serves three purposes: *(continued on page 54)*

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For a notification system to have real value, it must include information that puts the message into a context for the recipient. In essence, we need information, not data.

1. It communicates with each CNC machine tool gathering data.

2. It synchronizes machine data with external system information to add meaning to the error.

3. It serves as a secure method of moving the notification from within the company to the outside world. Security often is the most overlooked issue, and one slip-up can have devastating consequences.

Today most CNC machine tools can be integrated into the company network. Some companies even have implemented notification systems that directly send errors to people outside the company walls. While well-intentioned, it simply isn't safe to put the CNC machine tools on a network that has direct access to the Internet. The CNC equipment lacks the necessary safeguards to be exposed to the Web. Instead, machine tools should be isolated with a proxy server that will relay data between the CNC equipment and the Internet. Being a dedicated server, it can be set up with the necessary security tools and protocols to ensure machine tool data can be accessed safely online.

Once up and running, the data collection server gathers all signals and notifications from the shop floor, generates intelligent notifications, and forwards them to the proper recipients. Messages can be sent in many ways. E-mail notification remains most popular simply because it is reliable and uses existing e-mail technology found in all companies. Some, though, are choosing to use messaging services that are quick and easy to access via cell phones.

Both of these methods allow the notification system to embed hyperlinks back to the server. The data collection system can generate substantial information surrounding an error, but can't effectively package it all to send to the end user. For this reason, the hyperlink allows a one-button click that tunnels back to the data collection system to provide great detail about the notification.

Hyperlinks and remote server access have security issues. If a simple push of a button allows someone to see detailed information, what would prevent a competitor or nonauthorized person from seeing the information? Secure identity management must be in place for any company that utilizes remote access of data. This security can take many forms, such as virtual personal networks (VPNs) and security certificates, but it must be taken into account for any system.

Active, Dynamic Data Management

This leads us back to smartphone technology. Let's assume the notification system is properly set up to pass meaningful information from the data collection system to the outside world. With the scenarios described previously, the end user receives secure information about processes within the company walls. But that information is *static* and he is *passive*. He can receive only what's given to him—that e-mail, which remains static, unchanging.

Some applications found in data collection systems can migrate to the smartphone. Now end users simply can ask the status of a machine or process, or ask for a history of all errors in the past 24 hours. In essence, end users create their own information; they become *active* and the information becomes *dynamic*.

What impact does this have? People can do their jobs based on knowledge they generate, not what is sent to them. It also broadens the scope of the data collection system from a notification/monitoring system to a production communications server. Because all aspects of the production process are available, the system can be used to learn more about production problems and make quick decisions.

Although the production manager isn't at work, he isn't in the dark about production. His smartphone has just notified him of a machine failure and, more important, the fact that critical work will not finish on time. A quick query indicates that all other machines are functioning normally and not running hot jobs. Rescheduling the hot jobs to other machines, the production manager successfully has put the shop floor back on track. A follow-up query later that evening confirms that the critical production has been completed. The system also indicates that all machines are up and operating, easing concerns over extended downtimes. Tomorrow's production meeting will provide everyone with the details of the event and its impact moving forward.

It isn't a question of *if* unplanned events will impede production. The question is *when*. Thanks to the Internet, cloud computing, and smartphone technology, those unplanned downtimes do not have to create chaos within the production environment. **FAB**

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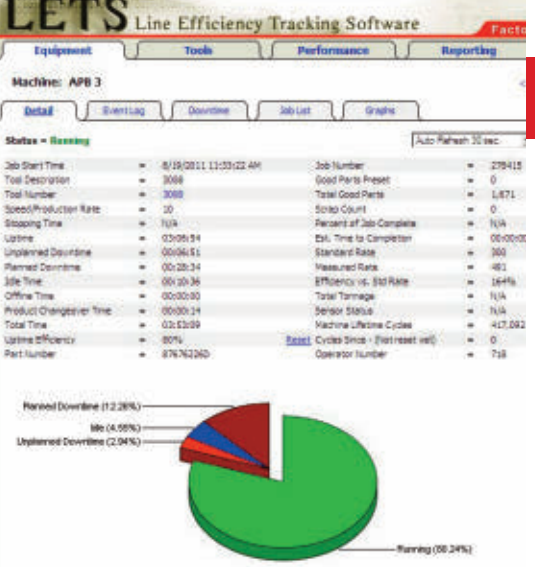


What's going on now? How about now?

Data collection system designed to boost improvement efforts

By Tim Heston, Senior Editor

Shop management systems—be they enterprise resource planning (ERP), manufacturing execution systems (MES), or anything else—require good data. Good data could be called the lifeblood of manufacturing management. After all, how can you change or improve something if you don't know what you have?

For years computer controllers have been sending electrical outputs for various machine functions. Those outputs represent data ripe for picking, but the challenge has been tapping into and interpreting that information so shop personnel can use and act on it. To that end, vendors have attempted to develop devices that can draw information from existing controllers and analyze it for improvement efforts, such as overall equipment effectiveness (OEE) measurements.

One company, Wintriss Controls Group of Acton, Mass., has developed such a data collection system— Line Efficiency Tracking Software, or LETS—and for several years has sold it in the stamping market. More recently the company started selling it in the metal fabrication arena, integrating the system on laser cutting systems, press brakes, welding cells, and related equipment.

Acquiring Data

According to Jim Finnerty, product manager, the system connects to the machine in various ways, depending on the equipment. For stamping presses the company has developed its SmartPAC 2 controller, "which is very integrated into the entire operation of the stamping press."

When it comes to other equipment, there are several options. The company publishes a document that instructs programmers how to allow a machine to talk with the data collection system. "If there is a PLC installed on the machine someplace, a PLC programmer can set up the data tags and tag behaviors, so it can communicate directly to LETS," he said. This approach makes sense if a company has PLC programming experience and especially if the shop floor has a number of similar or identical machines. This way, a bit of software engineering work can be amortized over a number of machines.

For shops that don't have the expertise, or facilities with many different types of machine tools on the floor, the LETS machine interface, or LMI, may be installed. This Ethernet-ready device attaches externally to a machine tool, collects the machine's data outputs, and sends them on to the data collection system. Such systems can be integrated to detect whether a machine is running or idle, count parts or machine cycles, or gather other types of information.

How such systems connect to machines depends on the application as well as the machine tool and control

brands involved. But when using the LMI, "we're not 'breaking into' the control system," Finnerty said. "We're picking up existing signals off of something that the machine controller is telling the machine to do. For example, we might notice that every time a machine is running, there's a coolant pump that runs." In this case, a sensor "ties into that signal that energizes that cooling pump, so we know the machine is running."

Making Data Useful

Getting data is only half the picture; the other half involves interpreting and using it. OEE tracks three factors: a machine's availability, performance, and quality. "But some people want to report OEE data slightly differently," Finnerty said.

Consider machine availability. This can be tracked in real time, with the system continuously reporting back whether the machine is running or idle. But what about planned downtime, such as an operator's lunches, breaks, or setup? Some operations don't count these factors against the availability measurement, others do, and plants can customize data collection to suit.

Also consider machine performance, which traditionally has been based on a machine's "ideal" rate.

In the LETS system, the ideal rate can be part-specific, because machine cycle times can change with the parts being manufactured.

Some applications—such as laser cutting a nested sheet of parts, or powder coating a series of components in one batch—make a wide variety of parts in one operation, so it's often not practical to track individual parts. On these types of operations, "rather than count parts, we've tracked the machine uptime," Finnerty said. "Often we can track the downtime, uptime, and efficiency by material types and thicknesses that run through the laser."

Defining undesirable or unplanned downtime is one thing; reporting the *reason* for that downtime is another, and it is here where operator intervention can come into play. In setups using the LMI, users can build a "downtime reasons" menu. So when that unplanned downtime does occur, the operator can go to the interface, select a dropdown menu, and report why.

Integrated Data Collection

All this information can be integrated with ERPs and MESs. In some setups, the data collection system produces comma-separated-value (CSV) files, which are dropped on a directory on the company network. "Then the ERP system can, at a scheduled time, retrieve that CSV document on the server and take out the information it needs," Finnerty said. He added that the information that LETS collects is in a Microsoft SQL format and so supports standard SQL queries and stored procedures, so a database programmer with the right skills can access and use the information.

This information can reside on a company network. If that network allows secure access from a laptop, home computer, or mobile device like a smartphone or tablet computer, personnel can access that shop floor data remotely. As Finnerty explained, "If somebody is in the field or at home, they can check how things are going back at the plant."

Wintriss Controls Group LLC, 100 Discovery Way, Unit 110, Acton, MA 01720, 800-586-8324, www.wintriss.com

A helping hand for hand tools

Ergonomic device makes tools feel weightless

By Tim Heston, Senior Editor

The Steadicam®—the spring-and-cam-based system that helps operators keep movie cameras steady, even for fast-moving or lengthy shots—inspired entrepreneur Eric Goldman. Working at movie camera-maker Panavision, Goldman already knew Steadicam and its inventor, Garrett Brown.

When an engineer from Honda Canada called Brown about adapting Steadicam technology to hand tools, Brown called Goldman. This first contact ultimately led Goldman to launch Equipois Inc., a 4-year-old firm based in Los Angeles that sells ergonomic supports for hand tool applications, including grinding.

"The DNA of the system really is from the Steadicam," said Jeff Disbrow, vice president of sales.

To understand how the technology works, it helps to know the basics behind the Steadicam. "Garrett figured out a way to take a spring and entice it to behave in a different way than it would normally behave," Disbrow said. "With a combination of cams, bushings, and bearings he was able to create lift from the deflection of tension on the spring." Equipois licenses this technology from Tiffen, the company that now owns the Steadicam system.

With this assist device, some grinding operators choose a heavier tool that can get the job done in less time.

Adapting Steadicam technology for manufacturing at first doesn't seem like a big stretch, until you consider what Steadicam initially was designed to do. The Steadicam has less to do with ergonomics and more to do with getting a steady shot on film. Operators mount it on their body, then walk and sometimes run behind actors. After the scene is shot, they remove the Steadicam and take a break. Movie cameras, with all their ancillary equipment, can weigh 70 pounds or even more. If camera operators were to work constantly for hours on end, their bodies would be in seriously bad shape.

To transform the technology into an ergonomic aid, engineers altered how the system distributes weight. Because the Steadicam mounts to an operator, its weight distributes into the body—not ideal for manufacturing workers wielding hand tools for an eight-hour shift. This is why Equipois' products connect to a stand that's either on the floor, for stationary applications, or on wheels. The stand distributes weight to the floor and, for the worker, makes the hand tool feel weightless. In some applications, the stand can be mounted on a gantry,

"The DNA of the system really is from the Steadicam." —Jeff Disbrow, Equipois Inc.

which allows the operator to move the device to several workstations or work on a large workpiece.

As Disbrow explained, most applications in metal fabrication center around grinding, especially overhead grinding. Another common application is right-angle grinding on a bench or tabletop, "where the operator is bent over and is holding a fairly large grinder at waist level," he said. "And this happens all day long in various metal fabrication areas."

The company offers several models, called zeroG®, that have specific payload capacities. These assist devices have a gimbal and ring system designed for specific hand tools, a double-link arm, and an interface that connects to a fixed or portable mount. The company also offers the X-Ar™, a device that acts like an exoskeleton for the arm. It helps workers in assembly, inspection, and numerous other jobs involving repetitive arm motion.

In grinding applications, Disbrow found that many operators using the system now choose a heavier grinding tool that can get the job done in less time. "Previously these workers would have gone with a smaller tool that wasn't as powerful, so they would apply pressure with their body to increase the rate of material removal. This actually creates more problems, because you're increasing the work load and forcing the worker to spend more time grinding each workpiece."

In these applications, integrating this work-assist allows employees to operate heavier grinders over long periods. They complete jobs faster and increase precision, because they're no longer fatigued at the end of a shift. He added that in most applications, it took grinding operators a few hours to adapt to using the assist device.

Disbrow added that most applications thus far have involved very specific motion. "Most of the time we're tackling a focused area where the manufacturer's ergonomists and safety people have already documented injuries."

The device has some obvious limitations, of course. For one thing, it requires some type of external mounting, because wearing it—like a Steadicam operator—would simply transfer the weight to other areas on the body. Disbrow described an aerospace manufacturer that has requested a device for its workers who rivet and use other hand tools inside an aircraft fuselage.

"You can't have a fixed mounting point in there, and you can't wheel a stand into the workspace either," he said. "But that application has huge potential."

For down the road, engineers now are dreaming up ways to make the product a bit more mobile. But for now, because of the physics involved, distributing weight outside the body remains the ideal setup for most manufacturing workers who use a hand tool all day, every day.

Equipois Inc., 5440 McConnell Ave., Los Angeles, CA 90066, 310-736-4130, www.equipoisinc.com

Adaptive gripper shows promise for jigless welding

Gripper designed to make the robotic welding cell more flexible

By Tim Heston, Senior Editor

A welder's hands and fingers move with delicate precision. They read the weld pool and adjust in-process to weld a complete, almost cosmetically perfect seam. Hand and finger movements matter, and until recently they've been absent from robotic welding. But when Samuel Bouchard saw jigless fixturing in action—in which a robot arm presents and holds a workpiece for another robot to weld—he saw potential.

Bouchard is president of Robotiq, a Canadian firm offering adaptive servo-electric grippers. They look a tad like they belong to the robot from "Lost in Space," only these grippers have three fingers instead of two. Each finger has phalanxes resembling human finger bones. The design allows the gripper to pick various objects, one after the other, and adapt to different shapes. For the metal fabrication arena, the company now offers a glove that protects the gripper electronics in the harsh welding environment. In addition, the gripper casing isolates the internal components from electrical noise.

The design allows the gripper to adapt to different shapes.

"The idea behind the adaptive gripper is to have one gripper for many different parts," Bouchard explained, adding that the technology has enough built-in intelligence so that the robot program need not command all finger joints independently. "You just need some high-level commands, such as 'open' and 'close,' and the gripper will automatically adapt."

The technology came from university research projects. One prototype was delivered to the Canadian Space Agency for use on the International Space Station. Another was used by the U.K. Atomic Energy Authority for handling cleanup at nuclear sites. In 2008 Bouchard and two other business partners licensed the technology and formed Robotiq.

"We still use that core technology," said Bouchard, "but we have adapted it so it can be installed on an industrial robot."

The gripper has enough built-in intelligence so that the robot program need not command all finger joints independently.

A robotic welding cell for high-mix production usually has required numerous fixtures to handle a variety of part families. In recent years those hard fixtures have been replaced with another robot that holds and positions the workpiece. But jigless fixturing still requires a robot end effector designed for each application. In these instances, Bouchard said, adaptive gripping could take the jigless concept a step further, allowing a robot cell to weld vastly different part geometries one after the other—a tube followed by a bracket, for instance—without needing to change the gripper.

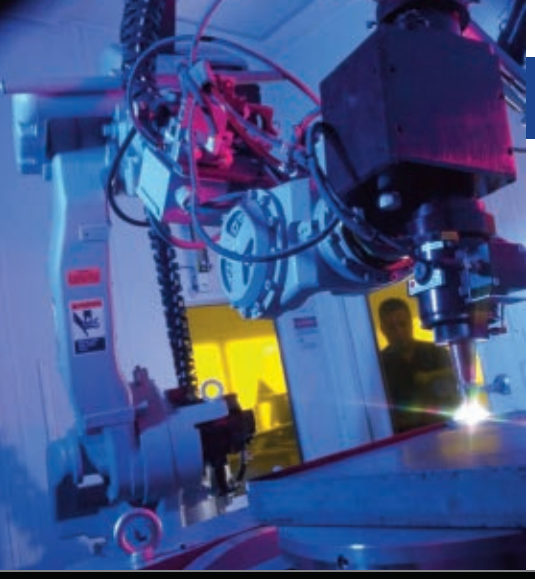
The finger grips can handle parts in various ways—that's what makes the gripper adaptive—but all of them can be categorized into two basic variants: a fingertip grip and an encompassing grip. In the fingertip grip, the last phalanx contacts the workpiece; in the encompassing grip, the entire finger curls around to hold the part.

"When it performs the fingertip grip, we receive good feedback on where the part is and whether it has the right part or not," Bouchard explained. The encompassing grip does not feed back such complete information, he said, though it still provides data on whether or not it has a part in hand (so to speak).

The feedback information, the part geometry, and the application's repeatability requirements determine what kind of vision system should be used. In some applications, a camera captures an image of the part before it is picked. The robot positioner then uses this visual information to grip the part and position it for welding. In applications involving complex part geometries, a camera within the work environment may capture an image of the part being held by the gripper. "From here we can measure the relative position of the part with respect to the gripper," Bouchard said. "Then we can offset the trajectory of the robot to put the parts in the right place."

The human hand has evolved to become a remarkably flexible device, so it's understandable why industrial engineers would want to emulate it. As Bouchard explained, such adaptive gripping devices are a big first step in that direction.

Robotiq, 156-1B Route du Pont. St-Nicolas, QC, G7A 2T4, Canada, 418-800-0045, www.robotiq.com



Evolution of flexible laser processing

Multiprocess system designed for high-mix environments

By Tim Heston, Senior Editor

In early 1974 *The FABRICATOR* magazine, then just a few years old, ran a bold headline, all caps: LASER METAL CUTTING. At that point laser cutting was moving from the laboratory into industry, and by the tone of the article published then, you can tell people saw serious promise in cutting with light.

This flexible laser processing cell features a six-axis robot with quick-change processing heads.

The article begins in bold: "Now, after all these years of promise, lasers have become a successful metalworking tool." Next to that text is a black-and-white photo of a CO_2 laser, all of 500 watts, cutting mild steel.

How far we have come. So many precision fabrication operations now cut with light. If a rush job comes in, it's no problem; software changes the nest, sends a new program to the machine, and everything is good to go. The process is perfectly suited for kit-based, small-batch fabrication. It reduces work-in-process, delivering only what downstream operations need, exactly when they need it.

Of all laser processes in the precision sheet metal arena, laser cutting has become the most pervasive, but others are gaining some ground in certain applications—and this includes flexible manufacturing cells that can perform multiple processes in one setup using the same laser source.

For instance, a few years ago Wayne Trail Technologies / VIL Laser Systems, Fort Loramie, Ohio, introduced its Flex Lase system, a compact automated cell that uses an IPG Photonics fiber laser power source to feed multiple cutting heads. Like a worker picking up various tools on the workbench, a robot can pick up a laser cutting head followed by a scanning head that allows it to laser beam-weld, followed by another head for localized heat treating, or perhaps some cladding. It then may choose another tool to perform hardware insertion or any number of nonthermal processes, including a camera for postprocess inspection.

"The robot becomes the prime mover for whatever tool you want to put in the workcell," said Bob Lewinski, vice president of marketing and sales at Wayne Trail.

The system comes in standard as well as customized configurations. It sits on a palletized base that can be moved all at once—the laser, chiller, robot, controller, processing heads, turntables, shuttles, fixturing, and everything else—within a facility where needed. The systems have been moved between manufacturing lines and even between company plants.

"It's plug-and-play, laser processing in a box," Lewinski said.

He added that several elements have contributed to the development of such flexible laser processing systems. First, today's robot controllers have sufficient amount of input and output capability to control not only the robot position and processing, but also the fixtures and the various peripheral devices that make up the cell. Second, solid-state technology has made the laser more flexible. Beam switching allows multiple heads—be they for welding, cutting, cladding, or heat treating—to use one laser source. Third, the laser heads have advanced so that they can fit in a small space and be integrated as a detachable robotic end effector.

Small size is especially apparent when the robot uses a scanner head, which uses extremely fast, servo-driven optics to direct a laser beam from one area to another, creating essentially an instantaneous rapid traverse. "Scanner heads today compared to not too long ago have become much smaller," Lewinski said, "and some can be programmed in conjunction with the robot, so that the scanner head can be scanning and welding [or performing a similar process] while the robot is in motion."

Fixturing and fit-up become extremely important when part geometries change from one job to the next. This is why, as Lewinski explained, such flexible manufacturing demands a focus on advancing fixturing techniques that sometimes can handle entire families of parts. For welding in particular, part fit-up must be consistent, precise, and repeatable. Sometimes the fixtures themselves can be put on positioning devices—such as a headstock/tailstock or other auxiliary rotational system—to ensure the laser has the best access to the work area.

This self-contained, flexible laser processing cell offers a small footprint.

"You need to know where the parts need to be held, how they need to be held, and sensors and other devices can feed back data so you know you've attained what's required," Lewinski said. He added that fixturing, be it supplied by the automation integrator or manufacturer, is as important as any other element within a flexible manufacturing system.

Some applications call for a system with multiple process areas, where work must be divided between production and prototyping or extremely low-volume work. "We've built custom cells that contain a side- or rear-accessed processing area with a fixture table," Lewinski said. "You can set up certain parts, and in between the production runs in the main portion of the cell, you can do some development work to see if another part or family of parts may be good candidates for production laser processing, or use the area for the true one-off or two-off requirements."

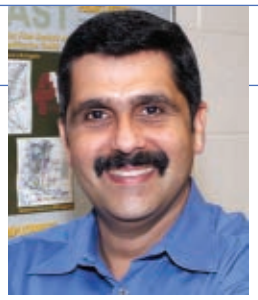
This kind of development work shows how such laser processing shifts the focus of expertise on the shop floor. The laser may eliminate numerous secondary processing, but it does require more forethought when it comes to fixturing, fit-up, and overall process design, and this means more collaboration between design and manufacturing engineering. Just throwing a part design "over the wall" to manufacturing wouldn't take advantage of the technological advantages the laser provides.

According to sources, no advantage is more apparent than the speed—something that is being taken even further with small-spot-diameter, single-mode laser systems. Wayne Trail /VIL Laser Systems integrates such lasers (also from IPG) within its Flex Lase Pro, a smaller system that in its standard configuration uses a stationary 3-D scanning head that sends the beam to various locations in the work envelope below. The look of such laser processing gets into "Star Trek" territory (without the unrealistically visible laser beams, of course). The laser spot jumps from one locale to another nearly instantaneously, so fast that it looks as if more than one laser beam is at work. The cells are capable of performing high-speed laser welding, marking, heat treating, and ablation (meaning the laser vaporizes the metal) on thin, coated foil at speeds up to 10 meters a second.

"This is extremely high-speed processing, now being used in industries producing delicate or intricate parts such as the medical sector and aerospace industries," Lewinski said.

Regarding the original Flex Lase, Lewinski said the self-contained footprint of this system has raised interest among small companies, including contract fabricators. Such flexible laser processing could serve a value stream dedicated to specialized components. Ultimately, the technology is designed to augment a manufacturer's capabilities in the high-mix, low-volume arena.

Images courtesy of Wayne Trail Technologies/VIL Laser Systems, 203 E. Park St., Fort Loramie, OH 45845, 937-295-2120, www.waynetrail.com.



job shop lean >> improvement for high-mix, low-volume operations

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Minding your P's, Q's, R's—and revenue too

A product mix, quantity, routing, and revenue analysis can jump-start a job shop's improvement efforts

Editor's Note: This is the third article in a bimonthly series. In June Irani introduced the concept of the PQR$T Analysis as the foundation for implementing lean in any job shop. In August he delved into the oldest and most common approach to segmenting a product mix, PQ Analysis, which he strongly advises against using as the sole basis for planning a job shop's implementation of lean.

Most job shops, knowingly or unknowingly, operate multiple businesses under one roof. All these "businesses" use the same workforce, the same planning strategies, the same suppliers, the same facility layout, and the same equipment. In reality, job shop managers could split their product mix into two or more segments, and each segment *ideally* should be allocated a separate area and run using different management policies; support systems; workforce skills; and operational strategies, including scheduling, purchasing, inventory control, and facility layout. Why? It is because these segments share resources—including people and machines—and so inherently interfere and compete with each other.

As discussed in August, the PQ Analysis—relating product mix (P) to associated quantities (Q)—is a useful but incomplete method for segmenting the product mix of a job shop. Yes, it is simple to implement on a spreadsheet, and it complements value stream mapping (VSM). Although VSM and the PQ Analysis complement each other, both are really effective only in low-mix, high-volume situations. This method *incorrectly* focuses attention on a small percentage of a job shop's product mix. Worse, it fails to consider the routing, revenue, stability, and repeatability of demand for a job shop's different products. VSM works best in low-mix, high-volume assembly facilities. In fact, the fundamental concept of VSM is based on the theory of assembly line balancing—and an assembly line simply is not a job shop, and never will be. VSM can map a single or, at best, two or three routings, which is obviously not enough for a job shop. Nor have I seen VSM able to depict an entire family of products with different setups and cycle times for various operations in their routings.

Essentially, VSM is a method that misleads job shops into believing that, just because they have a few high-volume products, their entire business can run to the assembly line-like "beat" of repetitious production. This is why the PQR$T Analysis can play a valuable role—it reflects the realities job shop managers face. They have a diverse product mix (P) with different routings (R) produced in various quantities (Q) with varying revenue and profits ($) and demand stability and order repeatability (T). Analyzing all these factors helps shop managers see the whole picture.

W/C #	DESCRIPTION OF EQUIPMENT	RELOCATABLE?	COST OF DUPLICATION
1	700 TON PRESS	YES	EXPENSIVE
2	5" UPSETTER	NO	EXPENSIVE
3	5000# Area FURNACE	YES	
4	LARGE ROTOBLASTER	YES	
5	350 TON PRESS	YES	EXPENSIVE
6	5" UPSETTER FURNACE	YES	
7	5000# Area HAMMER	NO	EXPENSIVE
8	GRINDING TABLE	YES	
9	60 TON PRESS	YES	
10	150 TON TRIM PRESS	YES	EXPENSIVE
11	3000# Area HAMMER	NO	EXPENSIVE
12	158 TON TRIM PRESS	YES	EXPENSIVE
13	HYDRAULIC BENDER	YES	
14	4" THREADER	YES	
15	4" BELT GRINDER	YES	
16	3000# Area FURNACE	YES	
17	BAND SAWS	YES	
18	200# Area OPEN DIE HAMMER	NO	EXPENSIVE
19	400# Area FURNACE	YES	
20	400# Area OPEN DIE HAMMER	NO	EXPENSIVE
21	600# Area FURNACE	YES	
22	600# Area OPEN DIE HAMMER	NO	EXPENSIVE

FIGURE 1 *The company lists its work centers (W/Cs) and specifies whether the machine can be relocated and if the process would be expensive to duplicate. This is just a portion of the complete list of 57 work centers. The red signifies monuments, which aren't practical to move. Highlighted green sections (not shown in this portion of the chart) signify outside processes.*

Analyzing Products and Routings

In this column I describe an approach that incorporates a PR Analysis (one relating product mix and routing similarities) into a PQ Analysis, creating the PQR Analysis. I also show the benefits of a PQ$ Analysis, which brings revenue into the decision-making. Although not as comprehensive as the complete method of PQR$T Analysis, the product-quantity-routing-revenue (PQR$) Analysis will surely not mislead job shop owners about their product mix, as does the PQ Analysis.

The PQR Analysis segments a product mix into at least two, three, or more segments. Thereafter, product families in each segment can be produced using a suitable manufacturing system, be it a high-volume cell devoted to a single product; a flexible line devoted to a product family; or a flexible cell that, say, can run unattended overnight to produce a large family of parts, but during the day produce the remaining low-volume products in the product mix.

Much of the methodology behind PQR Analysis comes from the Production Flow Analysis (PFA) work of Prof. John Burbidge of Britain, as well as the Group Technology strategies that helped transform numerous job shops in the U.K. into cell-based facilities during the 1970s. These proven approaches for high-mix, low-volume manufacturing were pioneered by the British, Germans, and Russians—and not Toyota. The Toyota Production System provides significant value for high-volume, low-mix production. But a job shop, of course, is not Toyota.

The Analysis

Consider one job shop that has 530 products with routings using 57 pieces of equipment (work centers), including equipment available at the shop's

	Part	Quantity	Revenue	Routings										
1	80-A37353	728	47320	17	6	2	11	10	29	54	55			
2	80-C27416-1	1456	124054	17	6	2	11	10	29	54	55			
3	80-C27416-2	5614	495992	17	6	2	11	10	29	54	55			
4	80-C46806-1	4354	362474	17	6	2	11	10	29	54	55			
5	80-C55581	1750	151284	17	6	2	11	10	29	54	55			
6	80-C558-1	1526	131922	17	6	2	11	10	29	54	55			
7	80-D8097	756	133882	17	6	2	11	10	29	54	55			
8	80-B113-1001	48132	186116	17	56	57	54							
	80-4003111	4900	41216	1	57	25	52	48	55					

FIGURE 2 *This spreadsheet shows the input data used for PQR$ Analysis; that is, quantity (Q), revenue ($), and the routing (R) for each product/part (P). Note, this is just a sample of parts that was extracted from the product mix of 530 part numbers, as described later. A complete PQR Analysis would include all 530 part numbers—and analyzing all product routings does have value, as revealed in the "Narrowing the Analysis" section.*

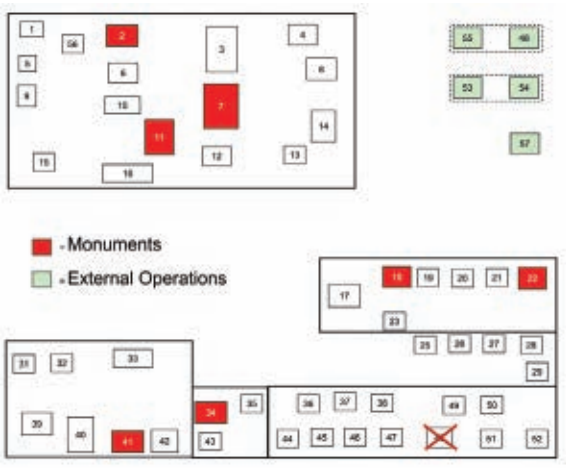


FIGURE 3 *The current shop layout shows monuments in red, external operations in green.*

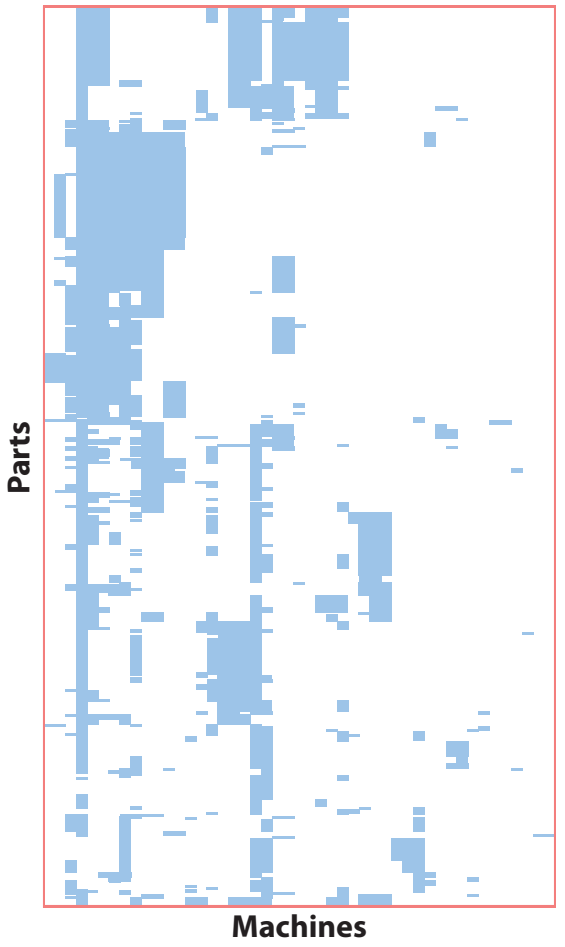


FIGURE 4 *This complete PR Analysis shows routings for all 530 parts in the shop's product mix. Part numbers are on the Y axis, work centers on the X axis. Here, blocks of blue show groups of products with similar or perhaps identical routings that could be grouped into part families. However, the long vertical blue bands running from top to bottom suggest that several part families require many W/Cs, so the improvement team is cautious about implementing too many independent cells.*

suppliers. Like any contract manufacturer, it's a complex, highly variable operation.

The shop uses analytical software to compute the current state of affairs. In this example, the company uses the Production Flow Analysis and Simplification Toolkit (PFAST) from The Ohio State University, but it may well be possible to implement these same analytics using Microsoft Excel® or Access®, or even Six Sigma statistical analysis software such as Minitab®.

To start, the improvement team assigns each work center (W/C) a number and determines whether the machine is a monument or if it can be relocated (see **Figure 1**). They determine if the process would be expensive to duplicate if the shop wanted to purchase new machines to minimize shared resources among product-mix segments.

The team also produces the information in **Figure 2**, which shows the quantity, routing (with corresponding W/C numbers), and revenue for each product number over a specified period. **Figure 3** shows the current facility layout with all the W/C locations, including unmovable monuments.

Next the shop analyzes all 530 products and their individual routings to assess if there are families of parts using groups of machines that could be moved into manufacturing cells. From here they develop a full-scale PR Analysis (see **Figure 4**), also called a *machine-part matrix clustering* or *product-process matrix clustering*. Think of this analysis as a visualization of all 530 value streams without using VSM at all.

At every point a part number along the Y axis (a row in the spreadsheet) is matched with a work center along the X axis (a column in the spreadsheet), a "1" is placed. Compact blocks of 1s suggest part families are present. Note that Figure 4 is a 530-line chart miniaturized, so clusters of 1s appear as solid blue blocks.

Narrowing the Analysis

Working with all 530 part numbers at once isn't practical for any improvement effort. So from here the team extracts a smaller sample of part numbers that have significant volume, significant revenue, or share common routings. Here is where analyzing the product mix (P), quantities (Q), routings (R), and revenue ($) comes into play. This is where the team also uses the PFAST software to replace the traditional PQ Analysis of the entire product mix with a PQ$ Analysis.

Figure 5 shows a typical PQ Analysis distribution of production volumes for a job shop. The head on the left side of the graph shows the few product numbers with high volumes, while the long tail to the right shows numerous jobs with low volumes.

Figure 6 brings *revenue* into the mix. As shown, most jobs have low quantities and low revenue—no surprises there. But note the remaining jobs. A few high-quantity jobs produce only moderate levels of revenue, while a significant number of low-quantity jobs produce moderate and even *high* revenue.

Considering both part quantity *and* revenue, the team focuses on products produced in quantities greater than 1,800 and earning revenue of more than $30,000, as shown by the dotted line in Figure 6. Initially only 44 product numbers were included in the sample, which accounts for only about 8 percent of the total product mix, 68 percent of the total volume, and 46 percent of the total revenue. In other words, almost half of the company's earnings come from those 44 products.

Here is where that original, complete PQR Analysis in Figure 4 steps back into the picture. Of the hundreds of remaining products not included in the sample, 35 have routings *similar or identical* to a significant number of routings for the 44 products initially selected in the sample. Seeing this, the team decides to include them in the sample selected for improvement, bringing the total number of products to 79—or 15 percent of the total number of active products, about 74 percent of the total volume, and about 54 percent of the total revenue.

Analyzing the Sample

These steps narrow the analysis and determine which products use similar machines, but they do not truly reveal the complex material flow that plagues the job shop. So from here the team uses the product mix, quantity, and routing information for the 79 products in the sample to develop a "from-to" chart (see **Figure 7**).

The chart lists the same set of work centers in the same sequence on both the X and Y axes. Software breaks up each routing into several from-to segments—that is, the quantity of products that move *from* one specific W/C *to* another. If a part goes from W/C 17 to 6, 2, 11, and so on, the software will split this into "from-to" segments: 17 to 6, 6 to 2, 2 to 11, and so forth. Note that this analysis then has to be repeated for each of the 79 routings in the sample. (Not surprisingly, job shops shy away from doing such crucial analysis because of the tedium and inherent error of data mining by hand.)

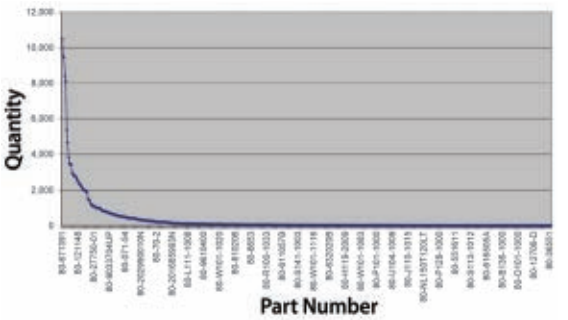


FIGURE 5 *This PQ Analysis compares the products based just on their production quantities. Like most job shops, this company has a few part numbers with high quantities and a long tail of low-quantity parts.*

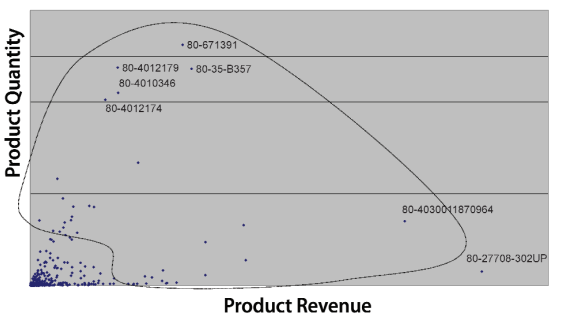
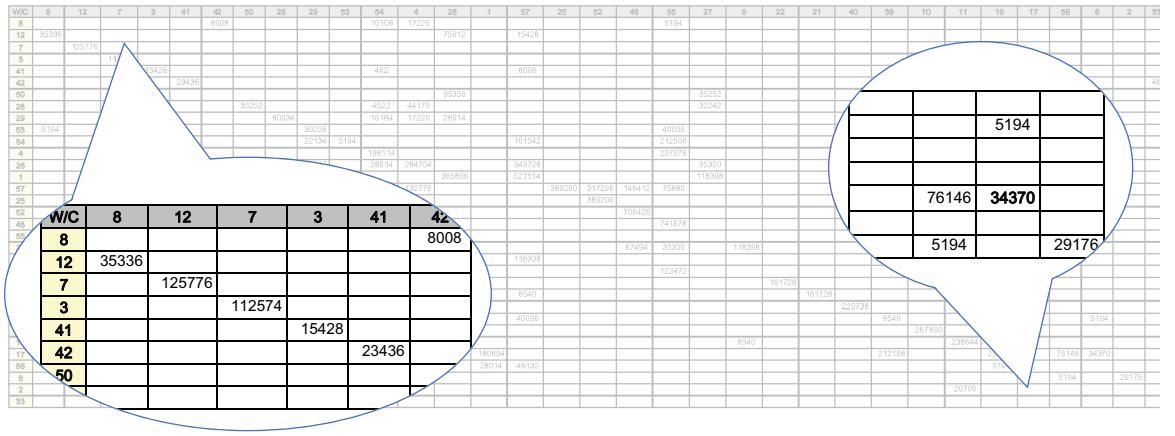


FIGURE 6 *This shows the results of a PQ$ Analysis of the entire product mix. The analysis relates product numbers (P) to both quantities (Q) and revenue ($). The dotted line shows the products the team chose for focusing improvement efforts. (The mathematical algorithm for this bicriterion analysis can easily be programmed in Excel.)*



W/C	8	12	7	3	41	42
8						8008
12	35336					
7		125776				
3			112574			
41				15428		
42					23436	
50						

		5194	
	76146	**34370**	
	5194		29176

FIGURE 7 *In this from-to chart, W/Cs are listed both on the X and Y axes. The set of "from" W/Cs that appear on the Y axis are identical to and in the same sequence as the "to" W/Cs that appear on the X axis. For example, 34,370—the number highlighted in the magnified section above—shows that 34,370 pieces move from W/C 17 (band saw) to W/C 6 (the furnace).*

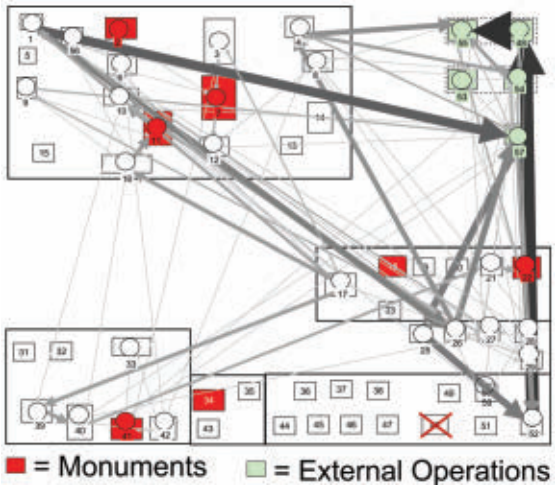


FIGURE 8 *This diagram shows material flow for the PQR$ Analysis sample of parts shown in Figure 2. Thicker arrows correspond to larger quantities in the From-To chart. For this job shop, a value stream map could never have captured this aggregate view of the entire material flow network.*

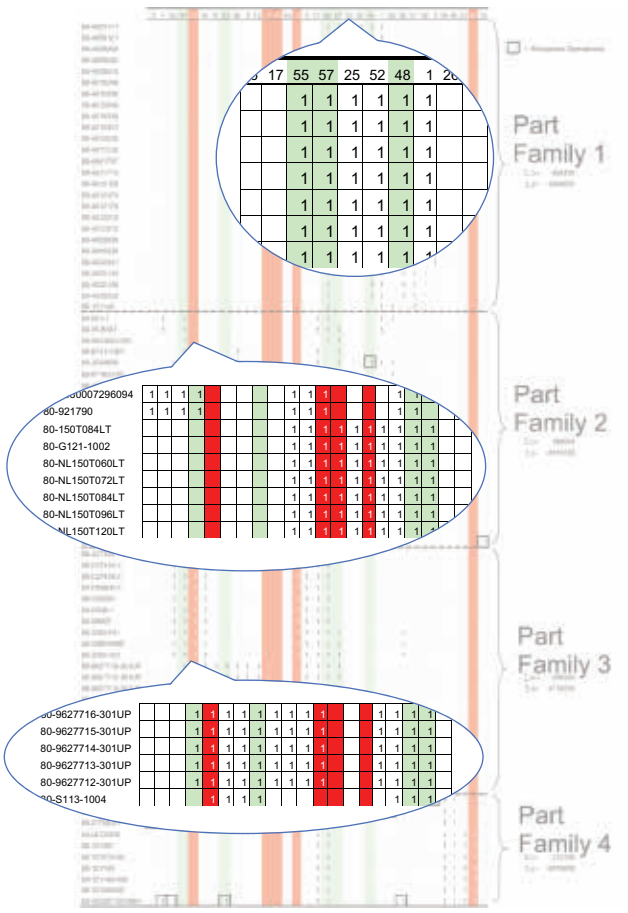


FIGURE 9 *This machine-part matrix clustering mirrors the one shown in Figure 2, only this one has just the 79 products derived from the PQ$ Analysis. Green columns signify outside processes; red columns signify monuments. Clusters of 1s show identical or similar part routings. Based on this, the team groups these products into four product families. (Editor's Note: This matrix derived from the PR Analysis is one of four different analyses that can be done to group parts into families based on how similar their routings are. For details about these other visualization methods, feel free to contact the author.)*

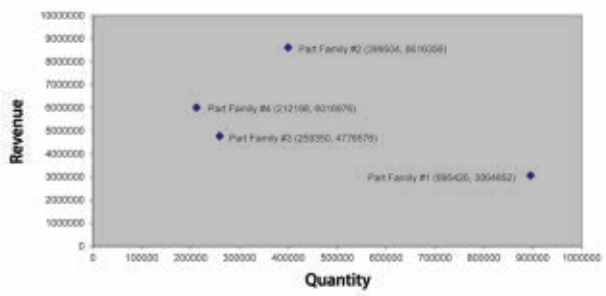


FIGURE 10 *This scatter plot identifies how product families compare in quantity (X axis) and revenue (Y axis).*

Applying the Analysis

• **Lay the foundational data for improvement.** Kaizen event teams usually don't have time to collect relevant data for all products. But with analyses already complete, the team could easily use just the PQ Analysis to segment their product mix into at least two areas, high volume and low volume. Then, using the PR Analysis for *at least* the high-volume segment, they could seek product families in that segment. Any product family found in that segment could then be the focus of a high-impact kaizen to implement a cell. A cell is ideal for fostering self-directed teamwork, for developing a cross-training plan, and developing leadership skills among the cell operators.

• **Split the facility.** With part families identified, the job shop could have one or more cells producing a family of products with similar routings. For one product family, these cells could entail an automated, flexible manufacturing cell capable of producing a family of parts in one or two setups. Another cell could focus on a product family of prototype and one-off jobs. Ideally, these high-margin jobs could be produced in a separate department.

• **Absorb low-volume products into high-volume part families.** The PQR$ Analysis can be applied to the low-volume segment. Low-volume, high-margin products can be grouped into those existing high-volume product families—if they share similar routings. As the manufacturing cell or improvement efforts directed at this product family make it even less costly to produce, the sales team can hunt for parts that also fit this product family. Some job shops even have purchased other product line manufacturers after they discover that its product or subcomponents already fit into their shop's existing product families.

• **Cull the product mix.** For low-volume products that do not belong in any product family, a team can analyze their profitability. Conducting the PQR Analysis can determine if any product cannot indeed fit into other product families. If it cannot, the team can ask some questions: Does this low-volume product go to customers who provide high-volume work? Or is it complex fabrication or prototype work offering high margins? If so, that low-volume product may be worth keeping. If not, then it may be a product ripe for culling. As one plant manager at a sheet metal job shop once told me, "We gladly recommend to those customers that send us difficult and low-margin products that they go to our competitors with their business."

• **Implement "milk runs" for material replenishment.** Scheduling deliveries of materials to manufacturing cells designed to fulfill orders for product families can be done using timed routes—that is, milk runs—performed by designated handlers. These people (called *water spiders* or *water striders* in lean parlance) could have an expanded role as "virtual cell managers"—that is, even though machines a strider monitors and supplies are dispersed, all those machines still produce a family of parts, and so their operators report to this roving "manager on wheels."

• **Competing through collaboration.** Two competing job shops can work together. Say a shop identifies low-volume, less profitable products it wants to cull. Still, for another job shop, this product may fit into product families and be more profitable. In fact, that other job shop could be in the same situation. So in this case, these two companies could swap jobs, leaving both firms with more profitable work that better fits their operations. Of course, both shops must ensure that any swapping does not affect their market-diversity goals, and they must ensure that their new product acquisitions fit the capabilities of their existing (or planned) cells. Here, strategic planning done using PQR$ Analysis can play a central role.

For instance, Part No. 80-A37353 has a quantity of 728. The routing starts at W/C 17 and moves to W/C 6—that is, from the band saw to the furnace—before moving to other operations downstream. In this case, the quantity of 728 is inserted where W/C 17 (on the Y axis) and 6 (on the X axis) intersect, as shown in Figure 7. When this 728 is added to the quantities from all part numbers flowing between those machines, the chart reveals that, during a predetermined time period, 34,370 workpieces travel from the band saw (W/C 17) to the furnace (W/C 6).

When the flow volumes and directions between all pairs of work centers are superimposed on the facility layout, with arrow thicknesses proportional to traffic volumes, the result is the flow diagram in **Figure 8**. The chaos in this diagram is common for job shops.

Identifying Product Families

After analyzing the part routings using one of the four PR Analysis algorithms available in PFAST software, the team organizes the 79 part numbers into four product families, as shown in **Figure 9**. The clusters of 1s indicate products with similar routings using the same W/Cs.

In Figure 3 the blocks colored red correspond to the W/Cs that are monuments, and the blocks colored green correspond to outside operations (vendors and the company's own machine shop located several miles away). Figure 9 uses the same color scheme—red for monuments and green for outside processes.

Using the results of Figure 9, the company develops a scatter plot depicted in **Figure 10** to compare the four part families with each other, based on the total quantity (Y axis) and the total revenue (X axis).

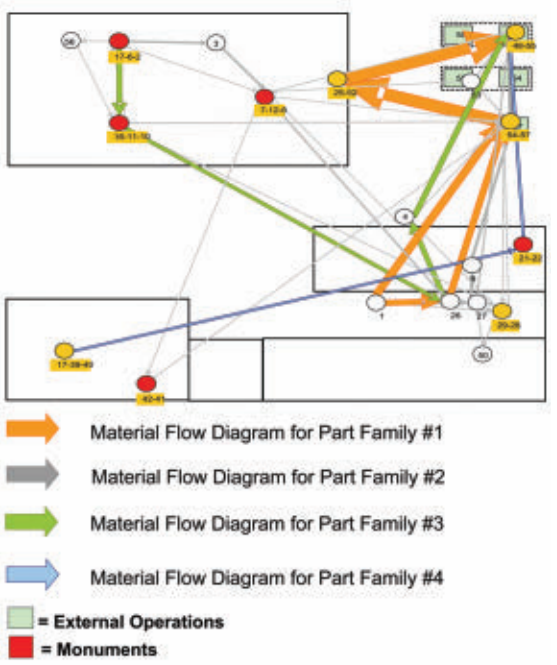


FIGURE 11 *This diagram shows material flow after part numbers are grouped into part families. Compare this to the chaos shown in Figure 8.*

Then they develop another material flow diagram, as shown in **Figure 11**, that superimposes the material flow diagrams for each of the four part families on each other.

The Payoff

Seeing all this, could this shop be organized into four product family cells? Probably not, especially considering the number of monuments in part families 2 and 3 (again, those columns marked in red), although at least the first part family could be produced in a dedicated cell. Regardless, the analysis gives a clear picture of the current, albeit complex, state of affairs on the shop floor.

At first glance, all this may seem like a lot of effort for not much reward. But this analysis is just a starting point. It gives the improvement teams a guide, showing what to tackle first and which strategies would pay off, as well as which ideas to avoid.

The actual job shop in this example moved certain machines to reduce job travel time and purchased other equipment to make material flow more efficiently. Ultimately, the resulting throughput increase saved $137,000 a year. That's not a bad return on investment. **FAB**

The next column will describe the PQ$ Analysis as it applies to a shop's entire product mix, especially when there are more than 1,000 routings involved. Future columns will cover the final element, T: demand stability and order repeatability.

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How metal makes music

Photo courtesy of Edwards Instrument Co.

Brass instrument-maker thrives with craft, not automation

By Tim Heston, Senior Editor

Holding the new Alessi model Edwards trombone, I was in band-geek heaven. I closed my eyes and blew. Never mind that the person standing before me had fitted horns for some of the world's greatest symphony players, including Joe Alessi, the model's namesake and principal trombonist of the New York Philharmonic. Never mind that I sounded like a person who doesn't play for a living, way too loud and out of tune.

Despite my shortcomings, the instrument responded. The horn body vibrated. It *sang*, so unlike my old ax I drag to community band rehearsal Thursday evenings. That resonance all starts with vibration from buzzing lips, plus the 70 workers at Getzen Company who manufacture brass instruments that amplify and shape the tone of that lip vibration. It's delicate work.

Christan Griego, the one standing before me while I blew out of tune on the Alessi trombone, pointed out that the shop still manually spins every brass bell. You won't see any CNC or even basic hydraulic spinning machines on the floor. The tube benders have no computer control either; they're all manual.

Griego is director of development at Edwards Instrument Co., a Getzen subsidiary that makes high-end trumpets and trombones—the luxury brands, so to speak. The Edwards facility is two doors down from the Getzen plant in Elkhorn, Wis. If a trombone or trumpet has an Edwards logo on it, its manufacturing began in the Getzen plant and then transferred over to the Edwards facility for final fitting, assembly, inspection, and testing.

As Griego explained, every horn coming off the line sounds a little different, and the company feels hand-craftsmanship plays a role. It's a bit like fine dining. Every meal the chef creates may taste wonderful, but one perfectly prepared filet is likely to taste slightly different from the next.

Getzen has held on to this strategy in a niche unique in metal manufacturing. There's no evidence of just-in-time practices here. A significant amount of work-in-process sits on the floor, and a new horn can take weeks to make. But such an arrangement, sources said, is necessary to maintain the company's hands-on approach to metal forming and fabrication.

This has worked, Griego said, because of what Getzen's core market demands. The company sells to professionals and those who aspire to sound like them, including college students. Sound matters. To them, a horn has *character*. It's an individual relationship and, for pros, a vital one. Their instrument is their voice. It helps them win auditions, get jobs, and support families. That's a tall order for a piece of bent, hand-hammered, soldered, brazed, spun, plated, lacquered, and polished brass.

FIGURE 1 *Getzen's raw brass coil stock inventory consists of varying gauges and types, from red brass with high copper content to yellow brass that has a significant amount of zinc.*

"We don't look at a trumpet or trombone as a machine. It's a musical instrument. The crafting of it—the valves and all of its components—there's character in that. If an instrument is produced on an automated production line, and each is absolutely identical to the next, where is the art in that?"

—David Surber, Getzen Company

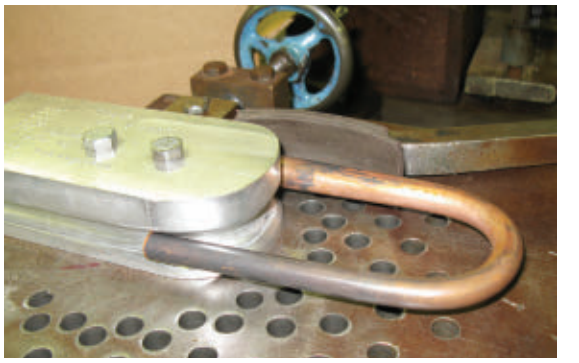

FIGURE 2 *Bending the tapered tube of a trumpet bell stem involves pouring a soapy water solution into the ID, freezing it to -65 degrees F, then bending it over the die. The ice doesn't crack during bending because the soap makes it pliable.*

FIGURE 3 *These balling-out dies ensure the bent tube's ID is precise.*

Globalization and the Band Room

Brasswind manufacturing isn't unique when it comes to globalization. Walk into any high school band room and you'll find that many, if not most, of the brass instruments come from China.

In this respect, Getzen reflects the broader metal fabrication business, but it solves the problem differently. To compete with overseas manufacturers, precision metal fabricators invest millions in automation to reduce direct labor content and lead-times. For the right job, a laser cutting system with a material handling tower can run unattended all weekend.

But as a brasswind manufacturer, Getzen takes an alternative approach, because it sells to a market with unique demands. Brass instrument players develop a unique sound; it's unavoidable, because everybody's lips are shaped and vibrate differently. Mechanized hydraulic spinning machines may form trombone and trumpet bells to precision, each one identical to the next, but as sources at Getzen put it, that's not what customers demand. They want a unique sound. The metalworkers on the floor put their signature on the instrument. Match that signature with the right player, and Getzen will probably sell another horn.

A Little History

Towns like Elkhart, Ind., Mount Vernon, N.Y., and Getzen's home of Elkhorn are known as historical centers of brass instrument manufacturing. A specialized business, wind instrument manufacturing has flourished where the talent resides. In the late 1930s, Tony J. Getzen worked as plant superintendent at Holton Co., a musical instrument-maker founded by Frank Holton, who at one time was principal trombonist for John Philip Sousa's band. In 1939 Getzen Co. Inc. launched in Elkhorn behind the Getzen family residence, in a converted dairy barn—appropriate beginnings for a Wisconsin company.

In the following years more well-known musicians began to take notice, including Doc Severinsen of "The Tonight Show" fame. For years the trumpeter played the company's horns and worked with designers to develop new ones.

In 1960 the founder sold Getzen to an investor outside the family. The decades that followed involved a factory fire and other family members launching their own music products companies. In the early 1990s financial hardship forced the company to declare bankruptcy. At this point the founder's grandsons purchased the assets and brought the Getzen organization back under family ownership.

Over the years many of Getzen's competitors have been bought, sold, and sold again. T. J. Getzen's old employer Holton, for instance, is now a brand sold by Conn-Selmer, a division of Steinway Musical Instruments. A few boutique manufacturers also have emerged, such as Massachusetts-based S.E. Shires Co., launched by a former Edwards product development manager.

Competition is fierce. With school band programs being cut and even professional symphony orchestras under financial duress, the brasswind market is a shrinking pie, and overseas companies have stepped in with massive price cuts. (Sound familiar?) To compete, Getzen has focused on the midrange and high-end trombone and trumpet markets. Top professional players give the company its reputation, but college and advanced high school players provide the company with most of its revenue.

Change is constant in the brasswind industry. A significant number of Getzen employees used to work at now-shuttered plants, including Sales Manager David Surber. He worked at the Holton plant in Elkhorn, at the time just a few miles from the Getzen and Edwards facilities.

"I've been here six years," he said. "Getzen is the last one left in Elkhorn—and we're hiring."

Material Matters

A brass instrument looks simple, just a brass tube with pistons or a slide and a tapered bell section that flares out at the end. But this isn't straightforward plumbing. Piston action must be extremely smooth, slide tubes extremely straight. In a pro-level horn, the tapered material leading to the flare must be of a consistent gauge throughout, so just stretching a tube sometimes doesn't produce the best results.

Three elements contribute to a player's sound, and the first—the player's buzz—must be matched up with the other two: the material attributes and the shape of the instrument's interior, which defines the pathway for the player's air. Change the brass grade or gauge, and you change how the instrument sounds and projects (see **Figure 1**).

A darker, rounder, heavier sound comes from darker brass, while a brighter, lighter sound comes from lighter brass. Brass becomes lighter or darker by increasing the copper content and decreasing the zinc. Getzen uses yellow brass consisting of 70 percent copper, 30 percent zinc; rose brass having 85 percent copper, 15 percent zinc; and red brass, with 90 percent copper and 10 percent zinc. The company also uses nickel-silver alloys for components like the inner tubes of trombone slides.

"It's an acoustic soup," Griego explained. "Every instrument needs these materials to have the right response and resonance. If you have too much soft material, the instrument's response will suffer. If you have too much hard material, you get a great response, but you have a thin, bright-sounding instrument.

Every person has an acoustical signature themselves. For instance, if they may need a greater amount of harder material to get a brighter sound, we can use more zinc. We fit each musician with the right materials, so the instrument responds accordingly."

The material gauge makes a difference as well. A thicker gauge creates a heavier sound with greater projection, ideal for, say, a bass trombonist in the very back of the symphony. A lighter gauge creates a lighter sound with less projection, ideal for a jazz trumpeter playing into a microphone.

Tempering plays a role too. Every time you work-harden and anneal with ovens or hand torches, the process can affect the sound. "On a pro-level bell, we might anneal it between seven and 11 times," Griego explained. "So we study the hardening and softening processes to achieve the outcomes we want."

FIGURE 4 *The two trombone bell stems on the far left were made from a formed tube. This process does alter the metal thickness, though, so for pro-level horns, bell stems are produced as the remaining work samples illustrate. They start as flat sheet and are bent and hand-hammered into the bell-stem shape.*

FIGURE 5 *A worker hammers a notched bell-stem seam for a trombone.*

Bending Brass

The amount of tempering in part governs the processes horns go through in manufacturing. For instance, years ago tapered brass tubes were filled with pitch material before being bent around a die. The pitch did work, but afterward workers had to heat the bent tubes to relatively high temperatures to remove that pitch material. Such dramatic temperature changes can alter the material properties and, hence, the sound of the instrument.

For most tube bending the company now uses alternative methods. One way is to fill the brass tube with Cerrobend® material, which has the consistency of lead at room temperature and becomes a liquid at less than 200 degrees F. For certain parts, such as the tapered stem of a trumpet bell, the company fills the component with a soap and water solution and freezes it to -65 degrees F. The ice doesn't crack during bending because the soap makes it pliable (see **Figure 2**).

Tube diameter is critical. Changing the tube inside diameter ever so slightly can cause fit-up problems with other tubing. To ensure a bent tube retains its diameter, the company uses balling-out dies. The die clamps the bent tube in place, a worker applies lubrication, and a large ball followed by slightly smaller balls are inserted into the tube, bringing the bent tube ID into tolerance (see **Figure 3**).

Snip This, Spin That

Walking through the Getzen factory is a bit like stepping into a metalworking museum. Lying on work benches are notching tools, snips, as well as rawhide and nylon hammers. Some lower-end trombone bell stems are made from formed tube, a much simpler process. But this requires turning a straight tube into a tapered one, which stretches the metal, meaning the gauge changes—thick where the tube ID is smallest, to thin where the ID is largest, near the bell flare (see **Figure 4**).

FIGURE 6 *An employee works a spinning tool against a trombone's bell flare.*

FIGURE 7 *A worker spins a trumpet bell, forming the metal against the spinning mandrel.*

This is why most professional-level bell sections are made from a precut sheet that is bent and notched together, then hand-hammered into a rough bell shape (see **Figure 5**). The vertical bell-section seam is brazed using a brass filler material.

After hand hammering, drawing, rolling, and other forming operations comes perhaps the most characteristic process of brass instrument manufacturing: metal spinning (see **Figures 6** and **7**). The manual spinning lathes make Getzen's shop floor unusual, especially considering the product mix. Most spinning shops use manual spinning only for low volumes, for which a mechanized or fully CNC spinning system would be unpractical. Other shops invest in mechanized systems simply because they cannot find the talent to operate a manual spinning lathe.

But at Getzen, the talent is there, and the process remains manual. According to sources, there's a good reason for it. The operator feel is paramount, and slight variations give a horn its character. Yes, a mechanized spinning center could produce precise, perfect bell sections time after time, but that would make the horns sound a bit homogenous—not what Getzen's market niche wants.

The trombone requires the spinning of two components: the bell flare, then the bell-flare and stem assembly. First, a circular brass plate blank is placed on the spinning lathe to make the bell flare. The worker manually moves the spinning tool so the brass forms against the mandrel into the bell shape. Then the worker brazes the flare to the bell stem, and again places it on the spinning lathe. He then flattens the brazed seam between the bell and flare. For the final pass, the worker moves the spinning tool very slowly across the entire workpiece to ensure a smooth and even surface. Periodically the spinner anneals the workpiece to avoid excess work-hardening.

After trimming material from the outer edge and scraping excess braze material from the joint, the worker uses a file to remove marks created by the spinning tool. He then uses emery paper to remove file marks, preparing the workpiece for buffing.

Near the back of the factory are chemical baths for plating. A trombone's nickel-silver inner slides, for instance, receive a chrome plating. Upon customer request, a horn can be plated in silver or (for a price) even gold. In an adjacent booth a worker sprays a lacquer (the most common finish) on the horn.

FIGURE 8 *An employee performs final lapping on a flugelhorn (the trumpet's larger cousin) to ensure smooth action between the pistons and valve casing.*

Next comes buffing and polishing. After this and assembly, some components require final processing, such as honing the piston casing for a trumpet (see **Figure 8**). "After buffing and assembly, the piston casing's bores can come out-of-true," Surber explained. "So we hone them to true them up and get them to the final diameter. Then the piston is fitted inside, and then hand-lapped at the very end." The honing, he explained, involves cutting ever-so-small amounts of the piston tube ID to a precise diameter, and the abrasive lapping compound "removes the high spots and low spots between the valve casing and piston."

Such a process is so critical because the better a piston responds, the easier it is for the trumpeter to play. The same holds true for the trombone slide. In an adjacent room (aptly called "the slide room") a worker places an assembled slide on a granite slab with a backlit surface to ensure the tube is perfectly straight and true. If light shows between the granite and slide tube, the slide isn't straight (see **Figure 9**).

"The only way to remove this is to massage them out by hand," Griego said. "This is achieved based solely on feel and experience. If too little pressure is applied, the bend will not be removed. Too much pressure will cause a bend in the opposite direction and just compound the problem. The process of checking, massaging, and checking again is repeated until the tubing is straight."

Now Hiring

Driving into the Getzen parking lot I spotted a small sign—a rare find these days: "Now Hiring."

FIGURE 9 *A technician performs final inspection and straightening of the trombone slide's inner tubes.*

> "It's an acoustic soup. Every instrument needs these materials to have the right response and resonance."
>
> *—Christan Griego, Edwards Instrument Co.*

Despite the lagging economy, the company can't make some instrument models fast enough—including that Alessi trombone model I tried during my visit (see **Figure 10**). New hires may start with relatively simple buffing, soldering, or general assembly. After several months that worker may move up to more difficult processes. After years of experience, he or she can be promoted to some of the most highly skilled positions like metal spinning and slide straightening. The entire environment requires highly skilled people—no button-pushers.

Each product, in fact, has some eye-popping direct labor content. So will Getzen ever consider automation to compete with Asian manufacturers? According to sources, it's not likely.

"We don't look at a trumpet or trombone as a machine," Surber said. "It's a musical instrument. The crafting of it—the valves and all of its components—there's character in that. If an instrument is produced on an automated production line, and each is absolutely identical to the next, where is the art in that?" **FAB**

FIGURE 10 *A stack of Alessi trombone bell-stem sections are ready for assembly.*

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Stampers' unique perspectives result in innovative designs

Savvy metal formers see an opportunity to become more valuable suppliers to cost-conscious customers

By Greg Farnum, Contributing Writer

How do smart companies make money in difficult times? By getting smarter. At least that's the gospel preached by some of today's metal formers that are aggressively marketing not only their prices and capacity, but their design and manufacturing expertise as well.

Some of them are finding new customers—and new life—at the same time.

A Better Way

One example is EBway, Corp., Fort Lauderdale, Fla., a stamper that refused to retreat in the face of hard times.

"As a company," said Terry Walker, EBway's president, "we've seen time and time again that maximizing our strengths through innovation and intelligent risk-taking can pay off."

Walker pointed with pride to the company's GRIPflow® stamping technology, one of its earlier success stories. The founder of this 50-year-old firm, Edward Bennett, was looking for an alternative to fineblanking, a stamping process that eliminates the fracture zone when shearing. During the blanking process, the sheet is firmly clamped down and is sandwiched between the die and the underlying plate. Inside the tool, an upper and lower punch extract the blank. This process permits very tight tolerances and can eliminate secondary operations, such as grinding and milling.

The downside to fineblanking is that it is more expensive than conventional stamping, can be used only with a limited range of workpiece thicknesses, and requires a specialized press. Bennett's goal was to get some of the same results with a less specialized, more robust, and more economical method. He called the process he came up with GRIPflow (see **Figure 1**).

Unlike fineblanking, which requires an impingement ring in the die and the use of a special fineblank press to produce the stampings, the GRIPflow process does not require an impingement ring. The press can use its full blanking tonnage, whereas a fineblanking press may use only 60 percent of its blanking tonnage. Also, the punch actually enters the die and slugs pass through the die, as it would in a conventional die. A modified conventional punch press is used to run production, and this press can accommodate either GRIPflow tooling or conventional tooling.

That type of out-of-the-box thinking is still alive at EBway and was evident in a recent job where it tackled the problem of die roll. Die roll on stampings is a natural phenomenon of the metal stamping process that engineers and press operators have wrestled with for ages. Stampers recognize die roll as the slightly curved contour on the edge of one side of a blanked part, opposite the burr side. The pull-down on the raw material before the actual cutting starts creates the die roll.

For a variety of reasons, designers, engineers, and end users of stamped parts often try to reduce or eliminate die roll. This is where EBway stepped in with its metal forming expertise.

FIGURE 1 *The GRIPflow process is sometimes used to form gears and parts that require close flatness tolerances or a square cut edge.* **Photo courtesy of EBway Corp.**

"We received an RFQ from a potential customer that requested we reduce the die roll around some holes in a new part," Walker recalled. "Upon further discussion with the customer it was learned that the 0.409-in.-thick low-carbon steel part was used in an automotive assembly and that hex-head bolts fastened the part to a mating surface. The customer was concerned with the possibility of an irregular surface—due to the die roll on the holes—and how it might cause the heads of the bolts, as they were tightened, to seat improperly, putting uneven pressure on the part. This could result in cocking the part so that it would not be parallel to the mating surface.

"In the past we would stamp the part from thicker material and add material to the thickness so we could remove the die roll by grinding it off," he continued. "We thought we had to try a new approach to be competitive and had many conversations with the customer to learn how the part was used. Even though initially we were not sure how much we could reduce the die roll, we had a goal to reduce it as much as possible."

Walker said that over a six-month period EBway engineers repeatedly analyzed how much material was pulled down before the actual cutting action of the punch. "It was laborious and at times frustrating work, but it resulted in a method to eliminate approximately 90 percent of the die roll around the holes," he said.

As a result of this research, EBway was able to design and build a special stamping die (see **Figure 2**) that reduced the die roll to the customer's satisfaction. The customer was then able to use the parts as stamped (see **Figure 3**), putting an end to secondary machining or grinding operations.

"Our customer was delighted with the results and the reduction in the cost of the part," said Walker, noting as well that this technology is available for use on materials from 0.060 in. to 0.500 in. thick.

Walker added that this example is not only a success story, but also a template for the future.

"Companies are spending more time examining alternative manufacturing methods to reduce their cost and be competitive in the global market," he said.

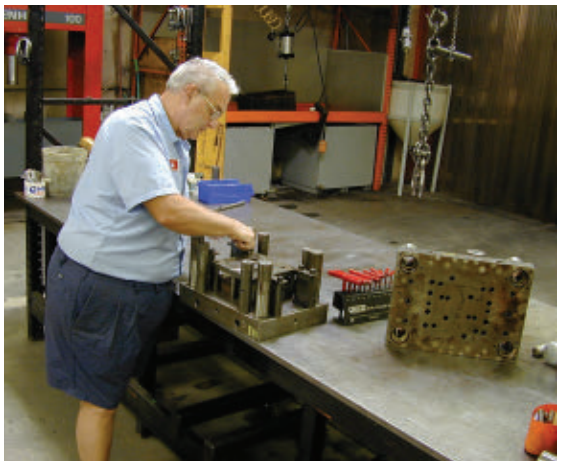

FIGURE 2 *Experienced toolmakers at EBway provided the knowledge that helped to produce tooling that eliminates die roll on a customer's stamped part.* **Photo courtesy of EBway Corp.**

Figure 3 *Die roll is typically evident in a part (left) after a punch pierces a hole. In this particular part, the web section is less than 50 percent of the material thickness, which caused additional die roll on the outside contour. EBway created a die that was able to eliminate that die roll in the metal part (right).* **Photo courtesy of EBway Corp.**

Figure 4 *Stamping isn't a method just for producing a large quantity of parts quickly and cost-effectively. Experienced toolmakers and engineers can turn the inside of a press bed into a place where innovative metal part designs can become a reality.* **Photo courtesy of Triangle Manufacturing Co.**

Sprocket to the Top

Innovation, of course, isn't limited to the Sun Belt.

Triangle Manufacturing Co., Oshkosh, Wis., is a family-owned firm that provides parts and assemblies to the automotive, farm implement, packaging, HVAC, and retail display industries. According to the company's president, Brent Walker (who is not related to EBway's Terry Walker), the business has put a premium on creative engineering, technical know-how, and adding value throughout its nearly 90-year history.

Be that as it may, the 45-person business clearly prizes those qualities now, maintaining a staff of eight engineers with a combined 157 years at Triangle and five toolmakers with a combined 140-plus years of toolmaking experience.

"This helps us provide full solutions, from design to implementation," Triangle's Walker said.

To underscore that statement, he pointed to a sprocket bearing that his company recently created for a corn planting machine produced by a major agricultural equipment-maker. The metal part is involved in activating a mechanism that deposits the corn seeds during planting. Formed from eight different stamped steel components, the design drastically reduced the need for additional processing when assembling the final part.

With this part Triangle also was challenged to accommodate the bearing to a hexagonal shaft.

"We engineered a round shaft with a hexagonal inside that fit inside a round sleeve bearing. We used a flange mounting to act as a backplate to ensure sturdy mounting," Walker said.

"This product can be used in many different chain-driven applications, with the possibility of many differently shaped shafts," he added. "It can also be further customized and altered for the specifics in any industry."

The benefits to the new system design are numerous.

"Our customer saved on assembly time. Because of the formed nature of the sheet metal, no additional welding was needed," Walker said. "Also, we used no machined parts, and the only component not created through our stamping process was the sprocket's oil-impregnated powdered metal bearing."

Walker credited Triangle Manufacturing's engineering and toolmaking capabilities with enabling this success story in a number of ways, some of which may not be immediately apparent. For instance, because the toolmaking is done on-site, the company can engineer and manufacture with no lag time, shipping products from its in-house shipping warehouse in a just-in-time (JIT) manner, Walker said.

Walker said JIT fits well with Triangle Manufacturing's overall approach to business.

"What separates us from other fabricators and manufacturers is our understanding of OEM logistics and the part that can play in furthering quick turnaround and lowering part costs," he said. "By shipping just-in-time, we reduce warehousing space. We have short lead-times and are able to maneuver shipping costs to be economical for our customers."

As for Triangle Manufacturing, its strategy for the future revolves around continued innovation (see **Figure 4**).

"Along with many in the manufacturing industry, 2008 and 2009 were difficult years for sales," Triangle's Walker said. "Our vendors and customers were hit by the recession and production was down. However, we saw it as an opportunity to improve our internal efficiency in production and shipping. We are feeling much more confident about 2011 and are bolstering our sales with global expansion and new, innovative product development."

"Companies are spending more time examining alternative manufacturing methods to reduce their cost and be competitive in the global market."

—Terry Walker, EBway Corp.

The days of banging out thousands of simple parts on a stamping press may be gone for many metal formers, but plenty of stamping business remains for the companies able to use their expertise to resolve customers' manufacturing dilemmas. This isn't an easy way to make a living in manufacturing nowadays; it's the only way. **FAB**

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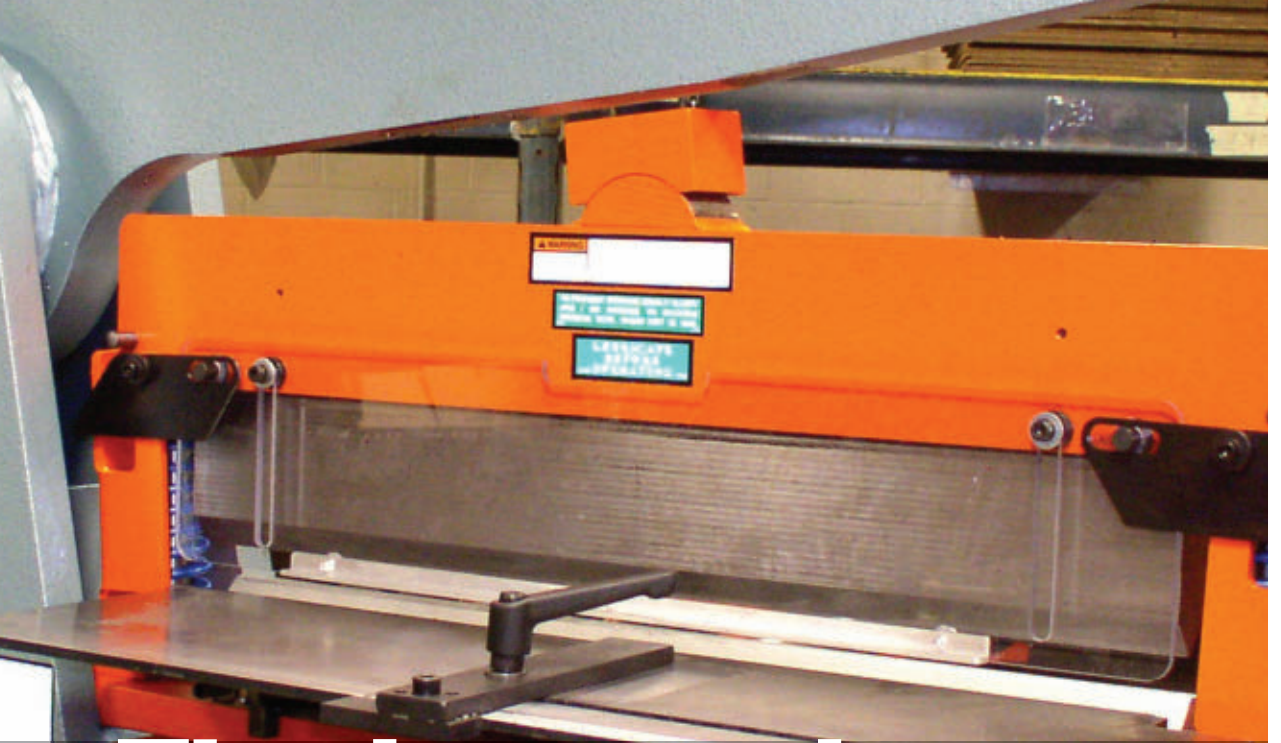

The ironworker stands ready for production

Ironworkers can do more than the occasional punching and shearing

By Mike Albrecht

Since the inception of hydraulic ironworkers, the traditional machine came with at least three main tools: a punch for punching holes in plate or angle iron; a flat-bar shear for shearing plate usually up to 24 in. wide; and an angle shear for shearing angle iron to length. Many machines also have had built-in notchers for notching or nibbling into plate or angle iron.

That was about it. Shops had at least one ironworker for short-run or one-off jobs, and it was always a reliable workhorse for maintenance work. But the ironworker typically was not thought of as a production machine.

Today the hydraulic ironworker can indeed augment production. Two factors make this possible. One, the machine can accept various custom tools designed around parts or part families. Second, ironworkers now have positioning and gauging systems that add accuracy, repeatability, and efficiency to ironworker operation.

The Right Tool

Consider a job shop bending department with two large press brakes, each with 8-foot-long beds. One press brake operator bends large side panels for a cabinet assembly, while at another brake an operator bottom-bends thin-gauge, 3-inch-wide brackets that go with that assembly. Meanwhile, work-in-process for another job—a stack of medium-sized panels—sits nearby. Welders and assemblers downstream have every component needed for the subassembly, except for one formed component—which is now WIP, sitting in front of the brake that's now bending tiny brackets.

To those uninitiated to fabrication, this makes for an odd sight: a massive brake bed with a narrow tool set near the middle. Such a setup might represent an unnecessary constraint, especially if an ironworker is sitting idle in the corner. An attachment would allow an ironworker to bend those small brackets and, ultimately, open this constraint in the bending department.

FIGURE 1 *This setup replaces the angle shear with a bending punch and die.* **Images courtesy of Scotchman Industries.**

Bending Factors

This scenario shows how an operation can match the demands of an application with the right machine. The CNC brake is a relatively advanced, expensive machine, and so has a higher operating cost (machine rate) than an ironworker. Bottom-bending those brackets ties up a machine that could be churning out complex air-bended components that require the press brake's ram repeatability and multiaxis, automated backgauging.

This isn't to say the hydraulic ironworker is inaccurate. Manual gauging on an ironworker can act just like a backgauge on a press brake. Narrow bending tool sets can be installed on either end of the ironworker, at the punching or notching station. Longer bending tool sets can be installed in the center, where the machine's angle shear would normally go (see **Figure 1**).

Ironworkers aren't limited to simple, straightforward bending either. Consider another operation involving rod bent into a narrow U shape with two 90-degree angles, creating a U-bolt. Space for the return flange would be so large that even an incredibly deep gooseneck punch couldn't accommodate it. So for this application, the operator uses a special punch with an open center, which provides space for the return flange to swing back during the second bend. In this setup, guides ensure the first and second bends are on the same plane (see **Figure 2**).

An ironworker with a custom bending tool set can excel at bottoming an offset or U-bend—but as with any forming machine, the ironworker must have adequate tonnage to make these forms in one hit. The ironworker usually offers between 2 and 7 in. of stroke height. Considering tonnage, many bending applications on an ironworker use a 2-in.-wide V-die opening for 0.25-in. material (using the traditional guideline of the die opening being eight times the material thickness). Occasionally an ironworker will have a 3- to 4-in.-wide die opening to bend 0.375- to 0.5-in. plate, but that normally is the thickest an ironworker will handle when bottoming.

An ironworker that air-bends can handle a variety of material thicknesses. Still, the limit switches in the hydraulics driving the ram are not as accurate as on a precision press brake. Precise air bending still is possible, however, with special tooling. For instance, a die with a solid stop at the bottom allows the ironworker to stroke down to the point where the material is formed, just as the machine bottoms on the stop. This enables the ironworker to air-bend precisely without relying on a precise stroke control.

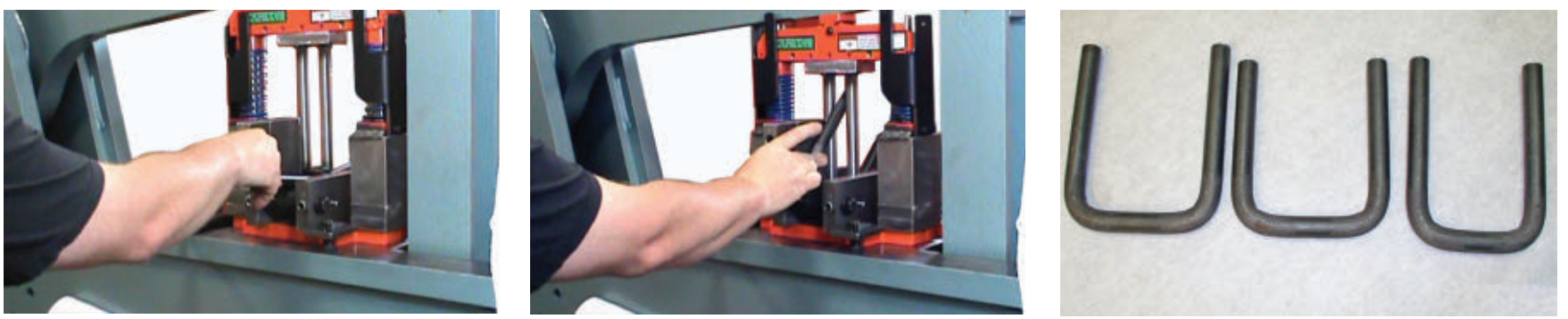

FIGURE 2 *A U-bolt is formed with a special bending tool on an ironworker. The bending punch has an open window for the return flange to swing back through during the second bend.*

Special Punching and Notching

Custom punching and notching tools allow an ironworker to cut complex geometries in angle iron and plate. For instance, one shop uses a specialty punch to broach a hex-head hole into predrilled bolt heads. These aren't 3-cent bolts found at the local hardware store, but instead specialized bolt heads that can be more than an inch in diameter. The operator drops the predrilled bolt head into a die designed specifically for the application. The die holds the bolt head in place while the hex-shaped tool descends to punch the hex-shaped hole into the head of the bolt. The slug material is forced down to the bottom of the predrilled hole. This is why, in this application, it is critical that the punch not overstroke (see **Figures 3** and **4**).

FIGURE 3 *This hex punch broaches a predrilled hole to create a hexagon hole in a bolt head. The custom die secures the bolt head as the punch descends.*

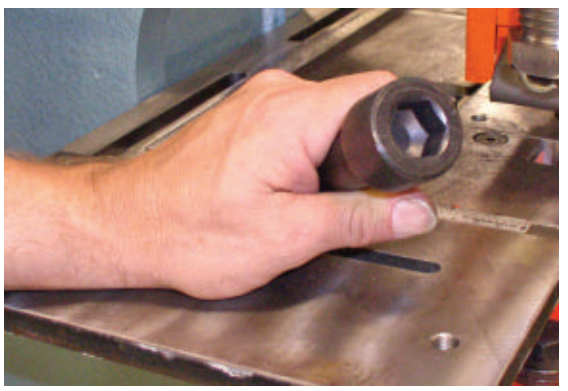

FIGURE 4 *The ironworker's custom punch broached a hex shape into this bolt head.*

FIGURE 5 *This setup punches oval holes into a tube. The mandrel acts as a die and supports the tubular workpiece.*

FIGURE 6 *This X-Y positioning table helps an operator accurately punch irregularly spaced holes.*

Ironworkers also can handle tube, as one shop demonstrates with a custom tube punching setup. This application involves welded tubes that make a T-joint. The tubes are preformed to match a coupler, and the design calls for an oval hole to be cut out of the cylindrical tube. On the ironworker, a tube is inserted over a custom mandrel, which supports the tube and also serves as the die. A punch then descends to cut that oval hole (see **Figure 5**).

Other special tools include cluster punches, which can cut complicated patterns in one hit. The tool design must consider slug removal; a four-hole cluster punch tool set must ensure all four slugs can be efficiently dropped out of the machine. These special punches make specific hole patterns; a four-hole punch makes a four-hole pattern in one hit. If an operator were to use the same tool to make only two holes, he could side-load and damage the tool.

Ironworker Precision

How precise an ironworker is depends on several factors. In punching, it depends on how well the punch ram is guided, and this includes the amount of clearance between the punch and die. Some new machines have a 1/16-in. clearance, while others have 1/32 in. The greater the clearance, the looser the punching tolerance will be.

In many cases, tolerance problems arise not from the accuracy of the hole geometry itself but from the hole position. Standard tooling allows workers to position common hole locations precisely, such as in the four corners of a baseplate. But beyond the standard four-corner punch and similar setups, hole positioning has been a challenge on the ironworker. Traditionally, workers center-punched or chalked-out hole locations based on a template, then attempted to locate these holes with the ironworker punch ram, matching up holes by line of sight. This was slow, tedious work.

Today's programmable stops and X-Y positioning tables change the situation (see **Figure 6**). Consider a long plate requiring a series of irregularly spaced holes in a line, so that the near side of each hole is 2, 12, 22, and 24 in. away from the plate edge. A programmable system can position that plate precisely, moving 2 in. from the plate edge to punch the first hole, another 10 in. to punch the second, 10 in. again for the third hole, and then a final 2 in. for the last hole.

For the right application, accurate positioning together with custom tooling can help turn the ironworker into a viable production machine. It obviously cannot match the speed of more expensive machine tools, but often the cycle time of individual machines isn't the constraint.

The ironworker's cycle time may be slower, but is this a problem? Another machine may be more productive, but all of that productivity is wasted if the machine just piles a mountain of excess WIP downstream. In the right situation, the humble, relatively inexpensive ironworker can ensure workers downstream receive all parts of a subassembly exactly where and when they need them. **FAB**

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FIGURE 1 *Shown just behind the drill, a hold-down clamp dampens web vibration and applies force to eliminate the potential for premature tool failure.*

A HOLISTIC VIEW OF HOLEMAKING

Maximizing drill line throughput requires a comprehensive approach

By Nick Hajewski

When drill lines aren't performing to expectations, they starve downstream operations. Work flow slows; profits are lost.

Drill lines are the backbone of any modern structural fabricator. When processed sections are not exiting the machine, other operations effectively are paralyzed. A tool can fail if material isn't adequately clamped; an unexpected deviation in material can wreak havoc on carbide tooling; or the machine simply may be lacking material to perform the job because of old-fashioned handling methods. Each of these scenarios equates to machines sitting idle and valuable overhead being wasted.

If a drill line doesn't deliver parts at the correct time, the operation stops and lost time mounts. To that end, structural fabricators must ensure that their drill lines are robust enough to properly support the aggressive speeds and feeds of modern tooling. At the same time, shop layout and material handling strategies must ensure no drill line sits idle for excessive periods, just waiting for that next piece of material.

Carbide Basics

Carbide tooling has long served the precision machining markets. Manufacturers that have relied upon traditional machining centers, with their stop-and-fixture methods of production, are familiar with the benefits that carbide can offer. Its high melting point and impressive hardness make carbide the ideal tooling choice when high drilling speeds and feeds are required. Carbide tools prove to consistently drill more than twice as fast as traditional high-speed steel (HSS) or twist-drill tooling.

What is old news in other sectors is new again for the structural business, which only recently started making significant use of carbide tooling. This is because of the nuances associated with properly applying carbide tooling to the structural fabricator's material of choice: hot-rolled mild steel sections. Rolled shapes such as beams, channels, square or rectangular tubes, and angle iron are commonly processed in a pass-through procedure. The increased feed and RPM of a carbide drill spindle can create unwanted material vibration and flex that might damage carbide tooling in an environment not known for stop-and-fixture methods.

Although harder than traditional twist-drill or HSS tooling, carbide is much more brittle and thus more susceptible to damage when unwanted material vibration or motion is present. Advances in machine design enhance workpiece rigidity and manage chip load, all while sustaining traditional pass-through production methods. Such technology has ensured carbide's newfound success in structural fabrication.

Clamping for Carbide

Today's drilling machines are designed to handle carbide tooling (see **Figures 1** and **2**). The comprehensive clamping systems not only ensure optimal tool life, but also allow drilling machines to push harder and drill faster. Compared to machines that are designed to apply HSS or twist drills, contemporary

FIGURE 2 *For wide profiles, an underside support maintains maximum workpiece stability.*

FIGURE 3 *Multitool drill lines, such as this nine-spindle system, eliminate downtime and secondary operations for workpieces with multiple hole sizes or operations.*

carbide drilling machines have far more vertical clamps, datum rollers, passline rollers, and clamping force than their predecessors. Where two vertical hold-down clamps used to be acceptable, four are now the standard. Web probes that previously located only the material surface now also serve as a web clamp to hold material rigid and dampen workpiece vibration.

Modern hold-down clamps keep flanges rigid despite the aggressive feed of carbide spindle assemblies. For machines designed to process extra-wide profiles, an underside support system helps eliminate the materials' inherent tendency to spring backward upon hole completion.

Drilling Feedback

Carbide tooling requires consistent chip load to achieve optimal tool life. When chip load is too heavy or too light, the tooling is susceptible to damage or premature failure. This is why modern spindle motors send information back to the controller in real time to ensure the spindle RPM matches programmed feed rates.

Spindle feedback is not as critical when using HSS or twist-drill tooling. In these applications spindle motors simply apply the amount of power needed to meet the desired speed in ideal situations. When hard spots are encountered, the spindle is allowed to slow down both its feed and speed to accommodate fluctuations in material quality. Although the less brittle HSS and twist-drill tools can accept those fluctuating speeds and feeds, such variability isn't ideal for carbide tools.

This is why carbide drilling benefits from "intelligent" spindle motors that maintain preprogrammed speeds and feeds, adjust to material hard or soft spots, and sense hole completion. The spindles' internal encoders monitor the exact speed and rotation of the drill. If the tool encounters hard spots, the motor adapts by applying additional torque to maintain its preprogrammed speed, regardless of the hardness or tensile qualities of the material being processed. This, combined with a precision feed, ensures optimal chip load in spite of material qualities. Because the system monitors torque, it senses the exact moment it completes the drilling cycle, stops the spindle feed, and immediately retracts and proceeds to the next hole in a program. This eliminates unnecessary and time-consuming "drilling of air" between operations.

Tool Lubrication

In a modern drill line, minimum quantity lubrication (MQL)—using an ecofriendly vegetable oil-based form of tool lubrication—is delivered through the tool directly to the cutting surface, as was the case in the past with water and chemical mixtures. But unlike those traditional methods, MQL usually applies only one drop every three to four seconds.

This "near dry" form of drill lubrication not only eliminates the need to continually clean profiles postprocessing, it also minimizes maintenance and mess. Less maintenance means less downtime, which also means more profiles are exiting the drilling machine and moving on to the next procedure.

More Tools, Automatic Tool Changers

These days structural fabricators process a wide range of projects, and this has made multitool operations commonplace (see **Figure 3**). Fabricating these projects on a traditional three-spindle drill may require more manual tool changes and repetitive processing of a single piece to achieve finished parts.

Modern multitool designs eliminate manual tool changeout. Nine-spindle and multistation toolchanger designs permit continuous production of complex parts with a diverse range of hole sizes or operations, including tapping and countersinking. Each axis of drilling can be loaded with tooling, ready to drill upon program command. Many structural parts commonly have up to three hole sizes per surface, so having three tool sizes available in each of the drilling axes can speed operations greatly.

For applications with up to five hole diameters per drilling surface, tool-changer systems use a tool rack stationed near the drilling assembly. The rack holds all of the tools needed for production requirements. Upon program command, the drill spindle unloads its current tool into the rack and makes the next selection automatically. Throughout the process, operators remain safely outside of the machine.

Modern Measurement Technology

Clamping the material once it reaches the drill's operating area is vital, but break-neck drilling speeds can be stifled if the material isn't measured efficiently as well. To that end, certain systems offer a precision roller wheel with an encoder that sends material-feed information to the controller. The wheel remains in a safe position where material enters the drilling machine. As material enters, the roller wheel presses against the material surface. The encoder counts the wheel revolutions in relation to the travel of material. A spring-loaded mechanism ensures that the wheel stays in constant contact with the material and remains unaffected by rust or scale (see **Figure 4**).

These automatically adjust to a profile's most true location to accommodate tight tolerances. The machine logic references an internal shape library that designates the proper place to measure on the material. For beams this means that measurement occurs in line with the location of the web. For channels and angles, measurement occurs at the heel; and for square or rectangular tubing, measurement occurs at the material's center. Because the measurement occurs at the drilling machine entry and not at a secondary piece of equipment that traverses the conveyor, workpieces can be fed into the drill line one after another without needing to wait for secondary devices.

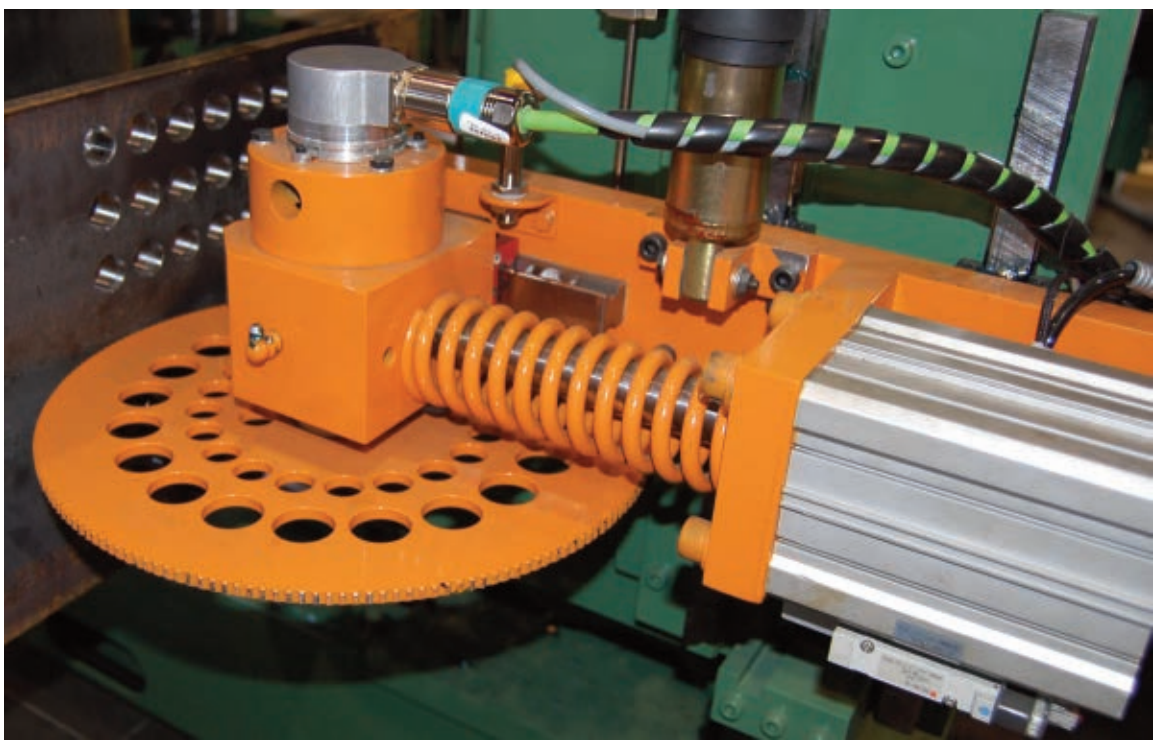

FIGURE 4 *This on-machine measurement tool ensures accurate material feeding and eliminates the need for secondary measurement devices that traverse the conveyor.*

FIGURE 5 *A powered conveyor feeds material into two drill and saw lines inside the outbuilding. Not only do such arrangements make for efficient material handling, they also dramatically reduce under-roof area, lowering overhead costs.*

Because no clamp or gripper is involved with material handling, there is no need to switch out components when changing over from large to small material, or vice versa. The feed system also eliminates restrictions on overall material length. The only feeding restriction is maximum weight, which is commonly based on the heaviest rolled section for the machine's specification.

The Fast Lane

No matter how fast drill lines become, they will not show their full potential if they sit idle, waiting for material. Efficient material handling designs eliminate unnecessary crane lifting, while also increasing overall throughput capacity.

In a structural fabrication facility, material handling equipment consumes most of the area required to accommodate machinery—and this under-roof space does not come cheap. Maintaining a large indoor facility creates significant overhead, including heating and electrical costs, initial investment, and property taxes.

FIGURE 6 *A scribe tool places layout markings while the material is on the drilling machine, eliminating the need to mark workpieces manually and expediting fit-up and welding.*

This is why some structural fabricators now place machines in smaller outbuildings or garages (see **Figure 5**). Material handling occurs outside, as fork trucks or dedicated outside crane-ways place beams on powered conveyors that carry material into the outbuildings. After cutting and drilling, beams and plates move to the main welding and fabrication garages for completion.

The arrangement allows a fabricator to allocate minimal overhead costs for the simple task of transferring material from one station to another.

It also minimizes crane-way traffic so that drill lines and other machines spend less time waiting for material.

Inside the outbuildings operators control all material handling via dedicated controls. As material passes through the machine, it simultaneously passes through the smaller outbuilding as well, and upon completion is transferred outside to another building for the next process, be it coping and sawing or fit-up and welding.

Ensuring Accurate Information

Multiple functions on these machines make them "all-in-one" production systems that meet the demands of complex commercial, manufacturing, or industrial projects. Modern drilling machines can scribe layout markings for connections (see **Figure 6**), which can expedite welding and fit-up operations.

Programming now can be directly linked to comprehensive, 3-D building information modeling (BIM) systems.

This ensures information is pulled from the original building design and is translated precisely into data-rich CNC programs.

The Big Picture for Part Production

Many carbide drilling operations can finish workpieces quickly and make as many as 1,800 to 2,000 holes per carbide insert. This all has serious benefits in today's competitive structural fabrication market.

Still, the efficiency and consistency of drilling—or any operation, for that matter—cannot be measured apart from the processes that surround it. Fast drilling does not mean much if a machine doesn't offer fast feeding and clamping; *or* if workers spend excessive time changing tools; *or* if a drill line sits idle for long periods, waiting for material.

Structural fabricators have found success taking a holistic view. It's not just about how fast one machine runs; it's also about how that fast machine integrates with the rest of the operation, shortening not only drilling but also overall manufacturing time. This reduces overhead, frees up cash, and ultimately leads to greater profits. **FAB**

Nick Hajewski is marketing manager at Peddinghaus Corp., 300 N. Washington Ave., Bradley, IL 60915, 815-937-3800, www.peddinghaus.com. Photos courtesy of Peddinghaus Corp.

PLASMA

PHD2000

PLASMA HIGH DEFINITION

Astralloy Saves Big Using New PHD System From ATTC

Astralloy Steel Products Inc. Birmingham Ala. is a steel service center offering wear and impact-resistant steel products.

"We are cutting steel 3/4 in. and above. To do this we needed a better, more cost effective system and the ability to cut thicker plate." said Mattocks.

"We considered purchasing new CNC plasma cutting systems but a large capital outlay in the six figures was not an option." says Mattocks

John Mattocks
Branch Manager
Astralloy Steel Products

Instead, the company purchased four plasma conversion systems from ATTC to be used for specialty cutting work.

Changing over the torches took 15 minutes and changing the consumables was quick and easy.

With the conversion, Astralloy improved cutting capacity and reduced the rework.

The PHD technology converts a conventional plasma system to a high definition-style cut quality without a big capital investment.

"The new torches have increased productivity by about 25 percent due to an increase in speed and longer consumable life. Now, there is very little grinding time needed to remove slag and dross. Grinding time was reduced by 75 percent, from eight hours to two," said Mattocks.

"All in all it was a good investment,"

The robotic eye watches over heavy fabrication welding

Take note of these considerations before setting up a cell

By Mark Oxlade

Taking your first steps into automating the welding of heavy fabrications can be a daunting task if you don't have a deep background in this subject area. You know you have the need, but you are not sure how to tackle the problem, or even whom to go to for support. Often the mission is further complicated if your operation produces many part types and variants, mostly in low batches.

The good news is that a fabricator can follow a core set of steps to ensure a successful venture into the world of robotic welding of heavy fabrications. Whether you undertake this activity with internal resources or look to an experienced external partner, the steps are basically the same.

Of course, any process starts with the people. Selecting an effective team will increase the chance of a successful outcome significantly. The selection of your team is scalable to the size of your organization. The necessary traits may lie within an individual or multiple people. A sense of project ownership, enthusiasm, and drive should be shared by all. Additionally, they should welcome new ideas, especially the person who will be responsible for the day-to-day operation of the new automation system. Another character trait to look for is foresight—the ability to understand on both the macro and micro levels the implications and ramifications of what new methodologies may bring to a process.

With the team in place, you can set about the task of qualifying and quantifying what should be considered for automation. At this point you should take a holistic approach. Review the complete fabrication process with regard to your products. You are looking to collect a list of all the possible products worthy of automation. As the list takes shape, you can start to group the components into families or groups—by joint type, material type, product family, or perhaps process constraints. You are looking for patterns, not necessarily parts of a common type, but perhaps the repetition of the same joint type within a group of components.

It is key to keep an open mind. The way you do it today may not be the way you do it in the future with automation. New processes, sequences of operations, or complete fabrication methodology should be considered. Often gas tungsten arc welding is thought of as the only way a product can be made. Robotic automation can bring other joining processes into play, like advanced gas metal arc welding (GMAW) with low heat input.

Generally, robots like repetition, something that is typically not applicable to welding large, heavy fabrications. Compensatory processes and devices are therefore required. In this phase of consideration, the detailed eye comes into play. Each of the selected components on the wish list of products to be welded through automation should be reviewed down to the joint level. Here considerations of joint type, material, size and length of weld, number of passes, overall stackup of manufacturing, and process tolerances must be taken into account.

How Can Robots Meet the Demands of Welding Heavy Fabrications?

What will start to emerge is a table of components and joints portraying the level of ease or complexity required for automation. At this point you should consider the tools available to meet the typical demands of welding heavy fabrications (see **Figure 1**). These are reviewed next in the order of cost and complexity, progressing from low to high.

Tactile Sensing. The most prolific impediment to setting up robotic welding of heavy fabrications is that the joint cannot be placed cost-effectively in the same position for each product. This is addressed traditionally by the use of a tactile sensing system (see **Figure 2**).

FIGURE 1 *Robotic welding innovations have resulted in systems that are flexible enough to tackle heavy fabrication work.*

In this type of system, voltage is applied to either the wire, gas shroud, or even a retracting probe, which becomes the tactile sensing means for the robot. The robot then carries out a search pattern in as many planes as is required to deduce the relationship between the original programmed point and the current position of the weld.

Tactile sensing systems are widely used and a trusted technology for cost-effectively locating joints on heavy weldments. The downside is that mill scale and other material defects sometimes can affect the quality of the search.

With the recent introduction of a laser sensor, the tactile approach to searching has been much improved. The sensing laser has an accuracy measured in microns and reacts at the speed of light. As a light beam, it can point into restricted areas where a torch/wire combination could be challenged. In the hands of a skilled programmer, a sequence of searches can provide fast, accurate positional data for the robot to act upon. Thanks to the technology advances, material condition and shiny surfaces do not present a problem to this technology.

FIGURE 2 *Robotic welding torches that rely on tactile sensing typically need only one to three seconds to locate a joint.*

Through-the-Arc Tracking. After it has been determined how the robot will find the joint, the question is, Can the robot get to the end reliably without further input? If the robot's path is impeded, further searches may be required. If the weld joint cross section or gap varies along its length, then further sensing levels are required.

An adaptive sensing system offers two levels of through-the-arc tracking. Using impedance the system can measure the voltage and current as the weaving of the joint takes place; an optimal path is achieved as a result. If the joint also changes in volume along the path, the adaptive sensing systems can vary the process to compensate for the fill requirement. If multipass welds are required, the same sensing technology will record and displace the subsequent strings by the required offsets to achieve correct fusion, penetration, and fill characteristics.

Tactile sensing or a laser sensor also can be used to create these types of adaptive fill techniques.

Laser/Vision Guidance. A laser- or vision-based guidance system typically is required for more demanding joint types, where through-the-arc tracking may not provide enough data to guide the robot.

Over the last few years, these guidance systems have continued to improve in value and functionality. Technology integrators, which incorporate their own laser/vision guidance products on OEMs' welding equipment, provide systems that deliver accurate and reliable data for welding the most demanding joints. These systems are able to plot the position and capture all the critical variables to ensure the robot is able to produce a suitable weld for that specific joint.

Which Welding Processes Are Used With Heavy Fabrications?

Many welding processes can work in conjunction with the sensors to resolve any welding challenge.

Conventional single-wire GMAW is most common, but the introduction of a second wire may meet your special needs. Combinations of plasma, laser, powder, wires, and gases also can come into play, with each providing a unique characteristic to achieve a successful outcome.

It is becoming more common to have robotic tool changers that enable the robot to carry out multiple processes. For example, a robot could be equipped with single-wire GMAW capabilities to weld certain strategic parts of the assembly with poor accessibility and, after a tool change, a twin-wire torch to provide high deposition for other welds (see **Figure 3**).

Welding power supplies from different manufacturers all have differing capabilities. They, too, continue to overcome the barriers to obtain the perfect weld in arduous circumstances. One such development is the ability to reverse the DC polarity, enabling very low heat input and allowing robots to carry out effective root runs.

Tacking the components is always a hot topic and another thing to keep in mind. How many tacks are needed? Where are they needed? What size should they be? Is a fixture needed for the heavy weldment? Is hard tooling needed? Getting to the right answer can take a little time. It is difficult for one answer to fit all situations, but if you break down your approach, a viable solution usually can be found.

For example, consider an assembly of components that need to be placed in a controlled relationship to each other, so once the weld process is complete, the item is ready for the next step of production. The ideal scenario, of course, would be for the fabrication to require no other secondary processes, such as straightening or cleaning, before its next manufacturing sequence or need rework or repair to meet the appropriate production specs.

If the components can be designed to self-jig, then simple placement into the robot work envelope and some strategic tacking will be all that is required. The goal is to have the least number of tacks so that the product remains stable during the welding process, avoiding the opening or closing of gaps and achieving the required manufacturing tolerances. Tacks should be uniform and consistently placed to minimize the impact on process. Development of the welding procedure often moves or varies the number of tacks in an operation to achieve this goal.

FIGURE 3 *A GMAW process with twin wire is a great way to fill large welding gaps often associated with heavy fabrications.*

If the components can be designed to self-jig, then simple placement into the robot work envelope and some strategic tacking will be all that is required.

FIGURE 4 *This reinforcement plate for an off-road vehicle chassis once took several minutes for a welder to fabricate manually. Now a robotic welding cell can turn out these heavy weldments in a fraction of the time.*

How Do I Protect the Weldment From High Heat?

The thermal impact of welding is another consideration. As a part of product design, a certain alloy is selected to deliver very specific characteristics that enable it to function as required. The joining process should not dilute or degrade the product and, in the right circumstances, might even provide an enhancement.

Simple sequential robotic welding can control the heat input delivered to large fabrications. Automation lends itself very well to introducing the optimal amount of weld and heat in the right place at the right time, day in and day out.

Further enhancements can come from the use of thermocouples logically linked into the robot controller. These sensors can protect the fabrication, so that the robot welds only when operating conditions fall within predetermined parameters. For example, when it comes to welding a particular steel alloy, a welding robot might be limited to welding within a defined window of temperature. A few strategically placed thermocouples in series, monitored by the robot controller, will ensure welding takes place only in the optimum conditions.

It should be noted that the robot's ability to process large amounts of data is very useful. This is put to good use when the weld attributes are being monitored. In some instances, the fabricator might be interested in simply gathering historical data for traceability.

It's most important, however, that the robot's information-processing capability interacts with the welding process itself. Once an optimum process is established, the welding robot operator can input the usable upper and lower limits of the arc characteristics. The logic of the robot program then ensures the welding process doesn't deviate from that defined range. This feature eliminates the risk of producing scrap or unwanted rework, while simultaneously ensuring the application of uniform heat input.

How Do I Ensure Joints Are Completely Filled?

The good thing about robots is that they always know where they are in space. This is particularly helpful in ensuring the right amount of weld is deposited within a joint that is inconsistent.

Some robots are programmed using the tool-center point (TCP), which refers to the robot's position as well as the focal point of the tool. The ability to do this type of programming is particularly useful because, by knowing where the traveling TCP is in space, the operator can make important decisions during the welding process. If a joint, for example, requires 10 passes to provide the correct fill, each string or layer of strings can be defined and called up by virtue of position.

The A string would be used until a certain height was achieved, and then the B string would be selected. The welding robot could continue with the B string or move on to another type of string until the cap was completed. This approach provides a uniform fill with feedback, avoiding over- or underfilled weld joints.

Welding heavy fabrications with robots (see **Figure 4**) doesn't have to be a process filled with mystery—especially if you have a robotic eye looking out for you. **FAB**

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FIGURE 1 *What began as a simple redesign job for a component on the Expeditionary Fire Support System for the U.S. Marine Corps has become a full-scale fabrication effort to produce several parts for the vehicle.* **Photo courtesy of U.S. Marine Corps.**

"From the beginning we were about offering very comprehensive problem-solving to customers," Schmidt said. "Initially this involved completing engineering and some fabricating in-house but outsourcing quite a bit of nondesign work to local shops."

That approach changed in 2006 after a simple phone call. An engineering acquaintance from the defense industry called Schmidt and asked if his company could help with a job related to the Expeditionary Fire Support System (EFSS), a mobile artillery system for the U.S. Marine Corps comprised of two light-armored vehicles: one that tows a 120-mm rifled mortar and the other that tows an ammunition trailer (see sidebar **"Artillery Designed for Mobility"**). The vehicles needed a redesigned steering knuckle, a key connecting part in the steering assembly that allows the front wheel to pivot.

Engineering firm enters the 3-D world of laser cutting

Systems Engineering & Manufacturing now makes its innovative designs a reality

By Dan Davis, Editor-in-Chief

Many fabricating operations begin life producing parts to print. Systems Engineering & Manufacturing (SE&M), Forest, Va., is not that type of shop.

The company began life advising a customer in the defense industry how to make its metal parts more efficiently, and that design expertise has become SE&M's calling card. "[Design expertise] is the only way to stand out," said Bob Schmidt, SE&M president. "That's why our customers come to us—for solutions, not to make parts."

To help deliver those solutions, however, SE&M needed a flexible tool capable of working with a variety of raw materials, from flat sheet metal to already-formed tube stock. The company purchased a laser cutting machine capable of 2-D processing; 3-D cutting of preformed shapes; and 3-D rotary cutting of tube, pipe, and structural shapes.

Fabricating Comes Back In-house

SE&M came into being in 2000 when a local manufacturer was in the process of shutting its doors, and a group of employees took over an important product line. The failing company's customers were pleased to have an experienced team step in and maintain the supply of metal parts, so this new engineering house with light fabrication capabilities was formally in business.

SE&M took the job. The company's engineers redesigned the casting, coordinated its manufacturing, guided it through secondary machining processes, and delivered the new steering knuckles in four weeks. Knowing the right people allowed his company to turn around the job so quickly, Schmidt said.

That turned out to be the first of many jobs on the EFSS (see **Figure 1**).

"We did that, and then they asked, 'Can you do this? Can you do this? Can you do the *whole* thing?'" Schmidt said.

Today the company produces every fabricated component on the EFSS (see **Figure 2**). That includes parts made from steel tubing of varying wall thicknesses and many types of flat stock.

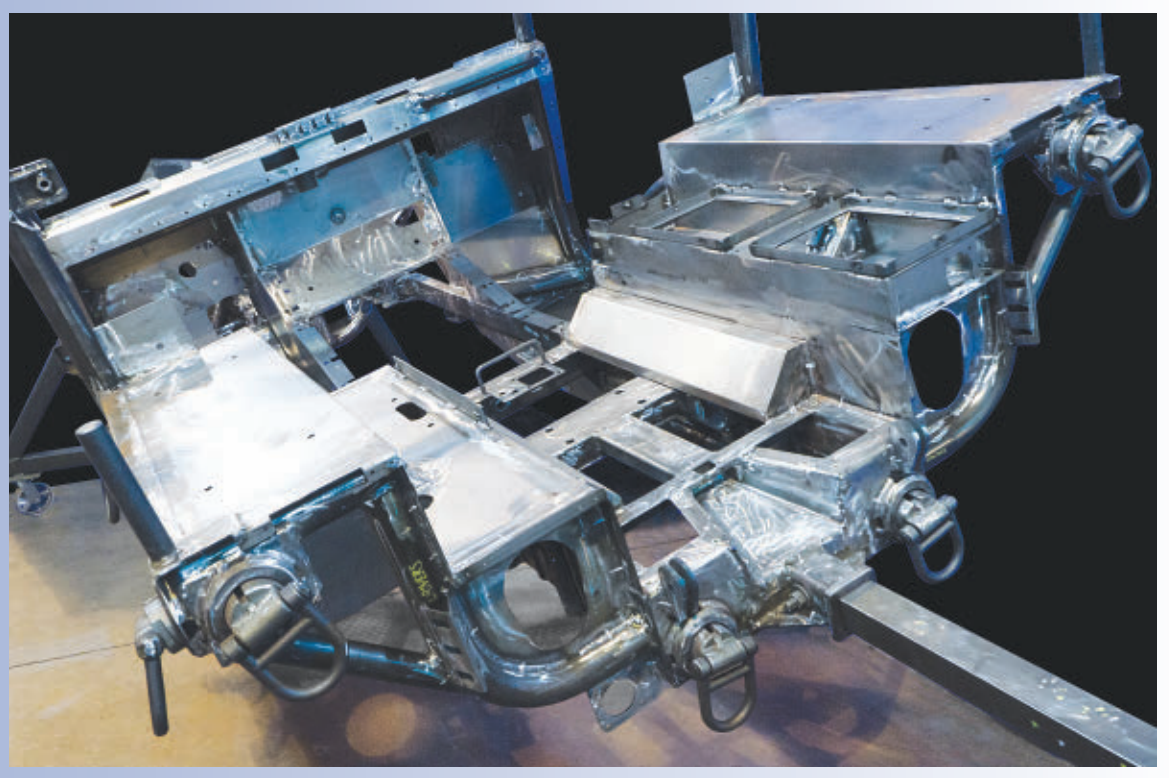

FIGURE 2 *The EFSS subframe contains plenty of tubing that had been outsourced for laser cutting until SE&M invested in its own laser cutting machine.* **Photo courtesy of Mazak Optonics Corp.**

Artillery Designed for Mobility

The Expeditionary Fire Support System (EFSS) provides the U.S. Marine Corps with a mobile artillery system that can be maneuvered quickly on the battlefield. Marines use the weapon to maintain consistent artillery pressure on the enemy while simultaneously making it difficult for the enemy to return fire accurately. Because of the weapon's light and easy-to-move design, Marines can move quickly from one spot to another between firing rounds. The EFSS' mortar can target enemy troops and vehicles from a distance of up to five miles away.

The EFSS also can be moved easily in and out of combat zones. Because of its compact design, the EFSS can be transported in the back of a Sikorsky CH-53E Super Stallion helicopter or a Boeing V-22 Osprey tiltrotor aircraft.

Schmidt had been looking at equipment that might be able to help SE&M handle these various fabricating chores. He knew about the capabilities of tube laser cutting machines because his subcontractor had one, but the equipment would not have been able to cut preformed tubes. A 3-D laser was necessary for that chore.

The Right Tool for the Right Job

As the amount of work on the EFSS grew, the need for a laser cutting center became evident. SE&M had been processing many of the parts through its machine shop, using sawing and milling centers predominantly to prepare components for welding processes. Running these jobs across multiple stations had created work flow and scheduling challenges.

In mid-2010 SE&M purchased a Mazak Optonics SpaceGear U44 (see **Figure 3**) to handle the 2-D and 3-D jobs. It can cut and mark tube in preparation for welding or other operations. It processes flat sheet consistently. With the six-axis cutting capability, it can cut tube that's already been bent.

"And because it allows us to pass parts underneath the head, we can cut any length of component that we need," Schmidt said.

The fabricator produces a large majority of the 544 components found on the EFSS' body weldment on its new laser cutting machine. Most of the parts are completed once they are unloaded from the laser, but a small percentage still require secondary finishing operations. However, it's nowhere near the number that had the aisles jammed up with work-in-process moving from one station to another.

In addition to streamlining work flow, the laser cutting machine also has helped to increase production efficiency of the EFSS. The laser can produce parts within strict tolerances, and the machine programmer can instruct the laser to mark for locating pins and bend points—all of which has led to better component fit-up and reduced rework.

Always Room for Improvement

Of course, being a fabricator with so much mechanical expertise, SE&M didn't waste too much time seeking out a way to increase the flexibility of its new machine. The company's engineers decided to build their own custom bar feeder.

Several options were available from other technology integrators, but the SE&M team couldn't find one that provided a second chuck that would operate in tandem with the chuck in the machine. The option of working with two chucks would allow SE&M to cut especially long components because tension and potential twisting would be eliminated from the raw material.

"We've cut up to 12-in. pipe on the machine using the bar feeder," Schmidt said. "You have that type of work at one end of the spectrum. At the other, we did a strainer for the EFSS that was 3.25 in. in diameter and contained 3,200 holes."

The tweaks didn't end there. SE&M also developed a series of tube holders that operators can put through the chucks to eliminate the potential for drops during laser cutting.

"It's definitely kept us busy, but it's also been very good for us," Schmidt said.

In the meantime, SE&M is seeking out other customers to take advantage of its engineering expertise and laser cutting capabilities. Sometimes a job might call for a simple $20 component for a small shop down the street. Other times a job, such as designing, building, and installing an automation system for a bottling plant, requires all aspects of the business to step up its game.

No matter what the scope of the job, however, SE&M now has the flexible fabricating tool to adapt to and overcome any challenge thrown its way. **FAB**

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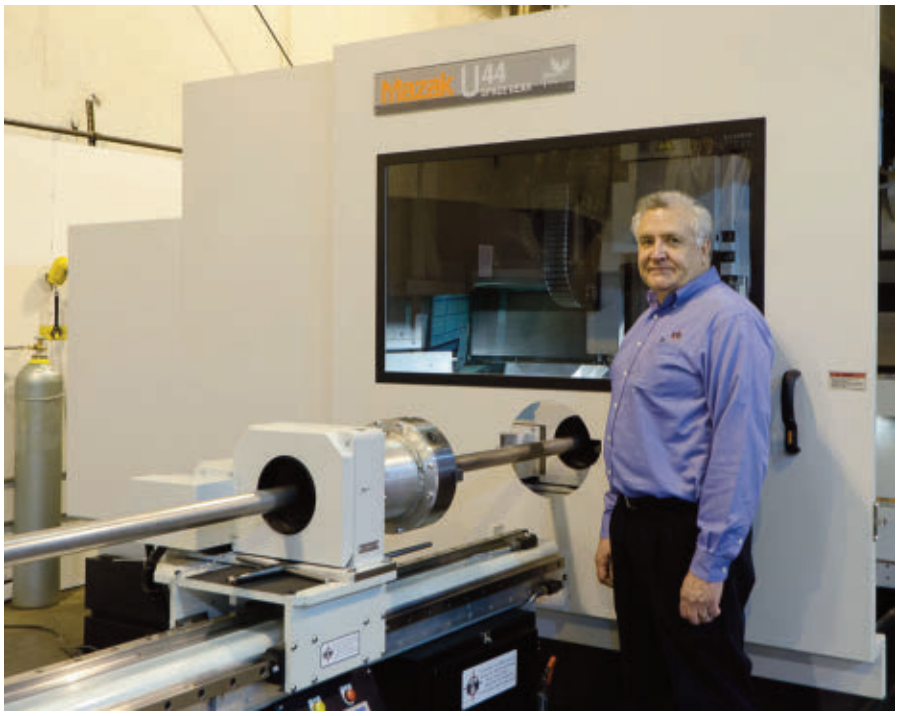


FIGURE 3 *Laser cutting allows SE&M to hold extremely tight tolerances on the parts it fabricates for the EFSS. "When we're done, we can't have an extra one-eighth inch anywhere on the vehicle," SE&M's Bob Schmidt said.*

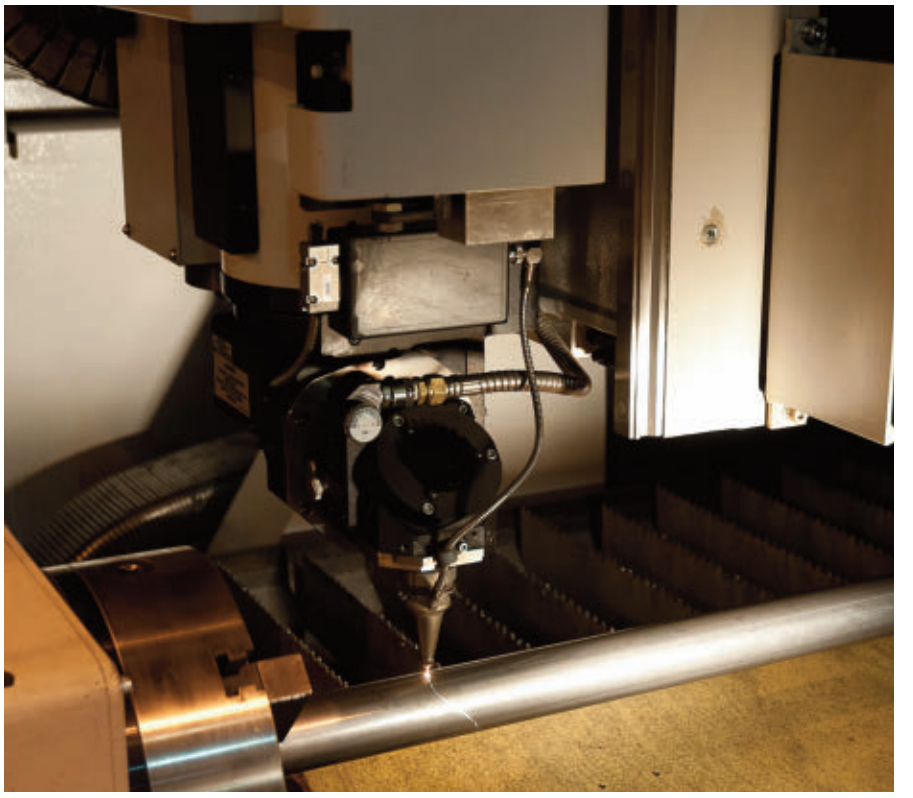


FIGURE 4 *The laser cutting machine holds tolerances that are similar to those associated with machining centers, according to SE&M officials.*

FIGURE 1 *Anderson Dahlen Inc. has diversified more than many, fabricating thin-gauge metal components to conveyors to large pressure vessels made to ASME specifications. To tackle it all, the company takes a unique, team-based approach to the business.*

Five teams, one company, one goal

Contract and specialty fabricator takes a unique approach to diversification

By Tim Heston, Senior Editor

Anderson Dahlen refuses to be pigeonholed. The company has typical fabrication processes—cutting (including two lasers and a waterjet), bending, welding, finishing—but its business model is anything but typical (see **Figure 1**). It's a precision sheet metal job shop. It's an industrial contractor that designs and fabricates entire systems for the processing sector, everything from mixing systems for the chemical industry to holding tanks for dairy plants. The company also fabricates architectural metal for commercial construction.

All these projects are manufactured within Anderson's Ramsey, Minn., plant, giving the company a variety of capabilities to sell, which helped during the recession. Anderson didn't avoid a revenue dip; few companies did, especially those tied to the construction and capital equipment markets. But because the firm offers a variety of services—design work; processing equipment fabrication; field work and installation; and high-mix, low-volume component fabrication—the revenue drop wasn't as dramatic as it could have been.

Capital equipment and commercial construction spending plunged in 2009. Commercial construction remains down, and capital equipment investment remains a challenge for Anderson in certain industries. Many of Anderson's food processing customers continue to build new plants internationally. When they do, they're using fabrication resources local to those new plants, be they in China, South Africa, or anywhere else. This is partly why Anderson's growth has been somewhat flat since 2009.

Still, sources emphasize that the company would be in far worse shape if it were not for some significant strides toward diversification. Some employees work on monthslong projects requiring frequent changes, unique material requirements, and numerous material handling challenges. Such work is so different from its low- to medium-volume, custom metal fabrication business, which turns orders around in a few days or weeks. It's not uncommon to see small parts nested dynamically on the laser cutting machines to allow for kitted part flow (all parts of a subassembly traveling together), followed by a nest of several large stainless steel pieces that will become part of a massive processing system.

"We believed diversification would be key to our success," said David Knoll, vice president. "When we focused only on the larger projects, they would come, we'd be busy, and then there would be decline, when we'd be working on acquiring the next project."

Other companies would undergo a similar cycle, which would force them to hire for the busy times and lay off during the respites. Such an environment makes for a very unstable work environment, and that's something Anderson managers wanted to avoid.

Team Players

The company's job shop work helps balance the highly cyclical, project-oriented fabrications. Still, managing such a diverse web of work wasn't easy. "When we tried to run different types of work all through one shop, with one management style, we ran into a lot of problems with deliveries," Knoll recalled. "The project part of the business is much different from [job shop] component fabrication."

The company has overcome this problem with a unique management structure involving teams. Anderson has five teams, each dedicated to a group of fabricated products with similar fabrication requirements:

1. The *design-build team* handles major projects from the ground up, including initial design and engineering. This team also includes those who specialize in tank and vessel fabrication performed to the ASME Section IX boiler code. The team designs equipment and systems for the food processing fields, dairy, pharmaceutical manufacturing, chemical industry, and other sectors.

2. The *project team* handles large equipment and processing system fabrications that often have a design already in the works. Team members work with customers to manufacture these large projects to spec and deliver them on time.

FIGURE 2 *Jib cranes adjacent to most welding cells mean welders don't spend time waiting for an overhead crane.*

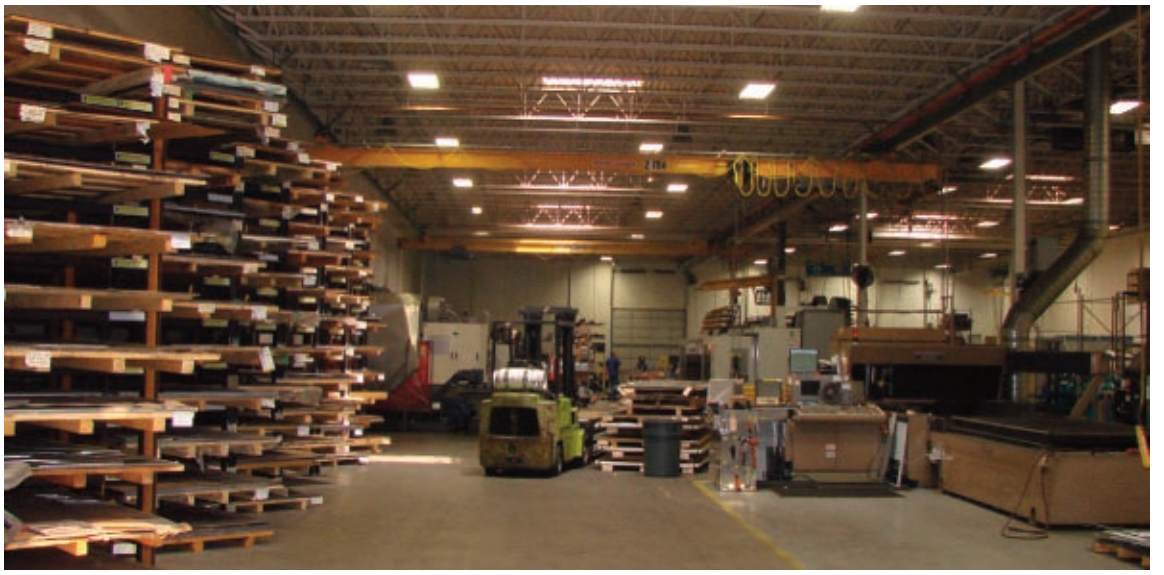


FIGURE 3 *Today Anderson carefully organizes its raw stock so that laser machine operators spend more time cutting metal and less time hunting for material.*

3. The *process and field installation team* focuses on fabricating piping and other mechanical work for plants and offers on-site installation services. This team often works closely with the project and design-build teams to install and integrate new machinery and systems into a customer's plant.

4. The *component team* resembles a job shop operation. This team fabricates various metal products, many of which are machine components.

5. The *architectural team* operates as a kind of subgroup of the component team, because both work with low-volume, made-to-order fabrications—primarily decorative components of stainless, brass, and aluminum—that don't require complex assembly. If a customer needs railings or metallic accents for an entranceway, this team can help.

Teams monitor their products from beginning to end and have dedicated, specialized personnel that carry a project to fruition. Most welders are tied directly to a team, for instance, because each team deals with projects with unique joining requirements. Most teams also have dedicated quality assurance personnel who inspect to customer requirements. Along the way the teams coordinate Anderson's shared resources, including laser cutting, waterjet cutting, bending, machining, and shipping.

The formation of these teams evolved over time. "The reason for this evolution," Knoll explained, "was that we were struggling to use those internal resources, which became very difficult to manage as we grew."

"I Need to Get This Through Today"

Workers heard this over and over 15 years ago. A sales coordinator would come to the floor, present a work order—usually involving late changes to a large project—and ask if the workers could shove it to the front of the queue. This wasn't easy or particularly efficient. Such orders would throw a pebble into the operational pool, causing ripples throughout the organization.

Significant projects—large processing systems for chemical, food, or similar plants—often have late changes. And unlike the component side, these large projects usually involve parts that have not been manufactured before. All this made scheduling such projects a bear.

> "If a component doesn't have a heat number in our production environment, I don't care if that part has a thousand hours of machining. We have to throw it in the garbage and start again."
>
> *—Richard Trnka, CAD systems manager, Anderson Dahlen Inc.*

This is why managers decided to move resources that didn't need to be shared into teams. Today each team gets a certain percentage of the schedule for a certain resource, "and teams can't interfere with another team's time on that resource, because they have to meet their schedule as well," Knoll said.

A critical factor here is that each team leader has an ownership stake. These team leaders want to see the entire organization succeed, not just one team—because if their mishaps cause other teams to falter, it can affect the entire company, and the value of their stake may decline. This means that one team throwing another team off schedule—essentially robbing Peter to pay Paul—isn't in anyone's best interest.

Moving Material

If upper management sees a need for improvement or change at the shop level, they start with specific teams. They are closest to the customers, after all, and as Anderson managers see it, if customers aren't happier than they were before, their improvement efforts are lacking.

"We work with one team," said Richard Trnka, CAD systems manager. "We get feedback from them,

we map processes, and we start developing processes for improvement. We get the bugs out, and then we introduce that new process to the other teams."

Improvements have focused on information transparency and efficient movement of materials on the floor. For instance, several years ago one of Anderson's teams analyzed some of the material handling practices in the heavy welding bays, where welders used one of two overhead cranes to carry components into their workcells. Each bay had 20 welders who waited an average of 15 minutes for a crane, and usually it was for workpieces weighing less than 3,000 lbs.

Managers analyzed the return on investment for one 4,000-lb.-capacity, 20-ft.-long jib crane and discovered it would pay for itself and then some within three years. Now welders have a dozen such jib cranes at their disposal, and all of Anderson's teams are benefiting (see **Figure 2**).

The company also conducted a time study in the laser area and found that, though workers remained busy almost constantly, the laser actually cut material only 30 percent of the time. That's not optimal beam-on time by any stretch. The issue was operators spent too much time moving metal. To improve matters, Anderson employees moved the flat-part deburring machine closer to the laser cutting machine, assigned workers as dedicated material handlers, and added jib cranes to improve material handling. Over time this more than doubled direct-labor efficiency in the cutting area.

Of course, all these material handling improvements don't mean much if workers can't find the correct material in the first place, and this wasn't easy considering the diverse product mix. The raw stock inventory consists of stainless and carbon steel structural, plate, and sheet material—and several years ago all of it lay haphazardly in the building. None had dedicated locations, which meant laser cutting operators spent much of their day on a material hunt.

A raw stock revamp was in order. First, they assigned all raw stock to specific locations, and all pieces were entered into the shop ERP system, Made2Manage®. Anderson didn't want to continue building its ever-greater "just in case" inventory, so any material that wasn't found was marked as "buy" in the system, meaning the material would be purchased when a job demanded it. Anything in raw stock inventory not purchased or used for one year was scrapped (see **Figure 3**).

Purchasing Strategy

Certain changes, Trnka said, must come from the top down, and when it came to inventory reduction, this included purchasing. Today Anderson relies on about a dozen preferred vendors, down from about 50 a decade ago.

Back then the thinking was that more vendors would reduce risk. With so many suppliers, *somebody* was bound to have material on hand. Managers found, however, that splitting business among so many metal suppliers meant that Anderson wasn't a major revenue source for any of them, so few if any had incentive to reduce material delivery lead-time. Moreover, merely managing such a long supplier list not only created a lot of extra work, it also fostered confusion. So today Anderson's purchasers have pared that metal vendor list to those dozen principal suppliers that deliver most metal within two days.

The shop chose vendors not just on price, but on the services they provided. For instance, under the previous system, whoever initiated a purchase order would also order material. If material required, say, 12 in. of steel tubing, vendors would supply that pipe only in 20-ft. lengths. That person would assign only that 12 in. of tube to the job cost, while the remaining 19 ft. of tubing went back into inventory.

"After a while we ended up with a massive amount of raw stock because of this," Trnka said. "So we reduced that by more than 50 percent by looking at our actual usage and making deals with our metal suppliers. Now we can purchase pieces of certain items at a reduced cost."

Today Anderson is able to order material in smaller lengths or batches, so that the ordered material comes closer to matching what is actually needed for a job.

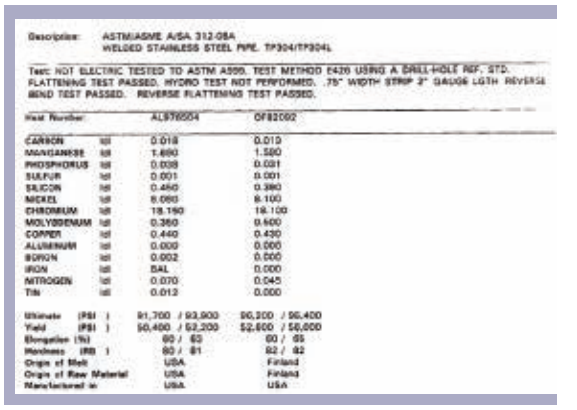
The Traceability of Metal

The shop also required vendors to provide material certification data. After all, if the shop couldn't maintain adequate traceability standards, it couldn't do business in several major sectors it serves.

"If a component doesn't have a heat number in our production environment, I don't care if that part has a thousand hours of machining," Trnka said. "We have to throw it in the garbage and start again.

"Whenever we have a pressure vessel job come in, we ensure we account for every piece of metal in that vessel," Trnka continued. "We need to know exactly what melt it came from, the exact metallurgy, and so on. This was always a struggle, because we move so many different materials in the shop. Some of them are [pressure vessel] jobs, and some of them aren't. So if it was a job to be done to the ASME code, we did what most shops do: purchase material specific for that job."

Any material remnant not used for that job would go back into inventory, but it wasn't organized. The shop didn't know which materials were previously certified and which weren't. So when new jobs came in requiring certified material, the company simply ordered enough certified material for the entire job again, sent the remnants back to inventory, and the cycle continued. Not only did ordering material after the purchase order delay manufacturing, but raw stock continued to mount, sit there unsold, and tie up cash. Something had to change.



Description: ASTM/ASME A/SA 312-08A
WELDED STAINLESS STEEL PIPE. TP304/TP304L

Test: NOT ELECTRIC TESTED TO ASTM A999. TEST METHOD E426 USING A DRILL-HOLE REF. STD. FLATTENING TEST PASSED. HYDRO TEST NOT PERFORMED. .75" WIDTH STRIP 2" GAUGE LGTH REVERSE BEND TEST PASSED. REVERSE FLATTENING TEST PASSED.

Heat Number:		AL976504	DF82092
CARBON	lot	0.018	0.019
MANGANESE	lot	1.660	1.580
PHOSPHORUS	lot	0.038	0.031
SULFUR	lot	0.001	0.001
SILICON	lot	0.460	0.390
NICKEL	lot	8.060	8.100
CHROMIUM	lot	18.190	18.100
MOLYBDENUM	lot	0.360	0.600
COPPER	lot	0.440	0.430
ALUMINUM	lot	0.000	0.000
BORON	lot	0.002	0.000
IRON	lot	BAL	0.000
NITROGEN	lot	0.070	0.045
Tin	lot	0.013	0.000
Ultimate (PSI)		91,700 / 93,900	90,200 / 95,400
Yield (PSI)		50,400 / 52,200	52,600 / 56,000
Elongation (%)		60 / 63	60 / 65
Hardness (RB)		80 / 81	82 / 82
Origin of Melt		USA	Finland
Origin of Raw Material		USA	Finland
Manufactured in		USA	USA

FIGURE 4 *This testing report shows the composition of stainless steel pipe supplied by one of Anderson's preferred metal vendors.*

FIGURE 5 *A printer adjacent to the laser prints bar code stickers, which are placed on the cut parts that emerge from the laser. The ERP system also replaces estimated material usage from the job quote with the actual amount of metal used for the job, adjusting job cost and inventory data accordingly.*

Enter enterprise product data management (PDM), which Anderson now uses to manage material data. About three years ago the company integrated SolidWorks® Enterprise PDM software. "Every piece of material that comes in the door is scanned, and it starts an approval process that goes through the company electronically," Trnka explained.

Now the shop's metal vendors provide data for every piece of metal that comes in the shop, standardizing raw stock management (see **Figure 4**). All material comes in the door with a bar code, which is scanned, sending information immediately to the materials manager, who examines it to ensure all the required data, including the heat number, is available. That person submits the material for approval, sending it on to Anderson's engineer, and assigns a code identifying the material as certified for particular jobs. From there the metal goes into inventory.

According to sources, Anderson has found a way both to react more quickly to customer demands and actually reduce the overall value of inventory, because that inventory is (unlike before) tightly monitored and replenished only as necessary. "The material certifications are searchable within our SQL database," Trnka said. "We can always tell where a particular heat number was used. If you put in a job number, you get a list of all the [material] certifications immediately."

The company also tracks material in its ERP system. When a part comes off the laser or band saw, the system shows not only what bin the material came from, but also the heat number. "That is documented in our Made2Manage system so we have that redundancy built in to be able to go back and track each one of our pieces of material to the initial source," Trnka said.

Say a piece of metal without the necessary certification documents slips into production. Operators scan parts before working on them. If a certain piece arrives at a sawing station, the operator scans the part, and the system flags him if that metal did not receive the appropriate certifications. Seeing this, the operator stops; retrieves new, certified material; scans it; receives the go-ahead; and commences sawing. This solves the traceability problem when it's least costly—early in the process.

The material database is permanent, so the material documentation remains for traceability. If years later a failure occurs when a unit is in operation, and litigation ensues, Anderson can search the database to find all the material certifications needed for the case.

Tracking Material, Knowing Costs

The ERP does more than help traceability. Previously, for instance, laser operators spent a lot of time making job routing labels for every part that emerged from the nest. Today nobody spends time making labels. Instead, the operator scans in a bar code on a shop floor PC terminal, and all the labels for the parts on the nest are printed (see **Figure 5**). Each flat component blank gets a bar code. After this the work-in-process moves to a staging area, where it is retrieved for downstream processing.

The system compares actual metal usage to what was estimated for the job and adjusts costs accordingly. If a nest has a remnant that goes back to raw stock, the software tracks that as well. If the remnant isn't usable, then that material is charged to the job.

Five Teams, One Goal

All of this improvement came from a company essentially organized into five minifirms. The structure helps Anderson coordinate various services that are unusual to see under one roof. Without this team approach, its numerous improvement efforts in all likelihood would not have taken place, especially if everyone continued to compete for shop floor time.

The organizational structure has helped the company survive in markets that have become seriously challenged during the past six years. The spending pie has shrunk in Anderson's major markets: capital equipment and commercial construction.

"If the customer calls, he deals with only one project manager and only one team," Trnka said. "On a large project, customers typically will visit our plant to inspect the work prior to shipping. They talk to the same people every time they're here."

Only those companies that can offer the best service at a good price can compete. Evidently, Anderson Dahlen is one of those companies. FAB

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Images courtesy of Anderson Dahlen Inc., 6850 Sunwood Drive N.W., Ramsey, MN 55303, 763-852-4700, www.andersondahlen.com.

Dassault Systemes SolidWorks Corp., 300 Baker Ave., Concord, MA 01742, 800-693-9000, www.solidworks.com

Made2Manage, Consona Corp., 450 E. 96th St., Suite 300, Indianapolis, IN 46240, 888-826-6766, www.made2manage.com

WET DUST COLLECTION SNUFFS HAZARDS OF INDUSTRIAL DUSTS

Filtration technology makes shop operations safer

By Mike Sweezy

Metal dust can be a fabricator's worst nightmare. If a grinding application causes dry aluminum and steel dust to mix, it can be a disaster waiting to happen.

The National Fire Protection Association (NFPA) has identified specific levels, in parts per million, of certain metal dusts that can be in the air before a serious risk of explosion arises. This is where proper dust collection helps. Dust collectors help prevent an explosion that can destroy a building and a business. Most important, they save lives.

Dust collectors come in wet and dry versions, and each suits certain operations. Dry filters can collect extremely small fines. Collection for these environments usually occurs either with a localized, arm-based system or filtration system far overhead. In all circumstances, the fume collection must ensure that any stray welding sparks dissipate well before they reach the dry filter medium.

Metal manufacturers use wet filter systems for two reasons: to collect combustible metal dust and to filter particulate in heavy-sparking applications. Common combustible metals are aluminum, lithium, magnesium, niobium, zirconium, and titanium. In fact, heavy use of titanium seems to be driving much of the aerospace sector toward wet filtration technology.

Across all sectors, applications like deburring and grinding can involve both combustible metal particulate and heavy sparking—and for these applications wet dust collection systems can help mitigate inherent health and safety risks.

Wet Filtration Basics

In a typical wet dust collector, particulate goes into a water bath. The bath itself is stirred, forcing the material to settle. As the airstream passes the fixed baffles, particulate is separated by a heavy, turbulent curtain of water created by high-velocity air. The centrifugal force caused by the rapid changes in airflow direction forces the dust particles to penetrate the water and become entrapped. Dust, as sludge, settles to the collector bottom, and the water is reused. Clean, filtered air is then forced out the top of the unit.

Filtering particulate in water removes the ignition source, which eliminates the problem—that is, until the particulate dries out. The process effectively turns the particulate into sludge, but if that sludge is removed and allowed to dry, the dust still can be combustible and, thus, a serious hazard. This is why workers must remove the sludge and then mix it with something else, usually sand or diatomaceous earth (crushed sedimentary rock). The mixture varies depending on the kind of particulate in the collector. After this, workers can safely dispose the sludge mixture.

Configurations

Wet filtration systems come in a variety of configurations. The simplest involves direct collection, essentially a "wet" downdraft table. In these workbench systems, the particulates are driven directly into the water below, and clean air is released. With the pool of water so close to the work area, these systems are simple and effective. However, the setup does dedicate one filter system to one work area. Each work area for grinding or other processes requires a separate filter system.

This wet filtration booth works well for applications involving workpieces too large to fit on a typical downdraft table.

Some workbench setups don't look like the typical downdraft table application, in which a worker grinds away at a small workpiece on a table. In some cases, downdraft workbenches are designed to accommodate very large parts. For instance, a table can be designed to be 8 ft. wide and 4 ft. deep, with the surface of the wet-filter tank just a little more than 2 ft. off the ground. Such a downdraft table configuration could handle fairly large parts. In these cases, lift assists can be integrated with the table so that workers don't break their backs lifting heavy workpieces all day.

Consider one application involving a company that makes metal carts, consoles, and enclosures. The company grinds and polishes both cold-rolled steel and aluminum, and to avoid the dangerous mixing of metal fines, the shop separates the grinding areas by the metal type. Steel parts go to one area of the plant, aluminum parts go to another.

Just because fines don't mix doesn't mean the fire hazard goes away. In this case, the particulate produced from grinding one type of steel resembles steel wool lint. If that lint hits sparks emitted from the grinding wheel, the particulates could smolder and ignite.

PM FOR A WET FILTRATION SYSTEM

Like its dry counterparts, a wet filtration system must be maintained. As always, you should follow the manufacturer's recommendations, but here are a few general preventive maintenance tips:

1. Periodically test the water's pH level. If it is out of the specified range recommended by the manufacturer (6.5 to 8 pH is typical), the water should be drained and refilled. Too acidic or alkaline water can damage the filtration unit. You can contact a local water treatment service company for assistance, if required.

2. At regular intervals, totally drain and refill water in the tank, as determined by the application.

3. In wet downdraft tables, dust settles as sludge in the main dust collector compartment. Sludge should be removed from the tank either when the water is drained or as required by the application. Often, once 1 inch of sludge has accumulated at the bottom of the tank, it is time for cleaning.

4. Periodically inspect other elements of the unit for any built-up solids, including the impingers immersed in water.

In a wet downdraft table like this, particulates are driven directly into the water below, and clean air is released.

This operation is high-mix, low-volume. Because the grinding department has a small number of workers, as opposed to dozens in a large plant, several wet downdraft tables may suit this operation best. The tables require a relatively simple configuration—again, because the metal dust goes directly into the wet filter below.

Ducting It Right

Of course, some applications involve dozens of work centers, and in these situations dedicating a filtration system to each may not be the most efficient approach. This is where custom, ducted systems can help. These can collect dust from multiple operations and send particulate through one central filtration unit. A plant may have a dozen grinders located in different areas of the plant, and particulates from each can be sent to one wet filtration unit.

However, manufacturers must ensure such systems are configured correctly, and this includes considering factors like static pressure. In basic terms, the narrower the ductwork, the higher the static pressure becomes, and higher static pressure means it will take more horsepower for a fan to effectively blow particulate at a specified CFM (cubic feet per minute)—usually about 3,500 CFM.

It's a balancing act. If the blower and fan units don't move particulate at a sufficient CFM, then the metal particulate will settle in the ductwork. If, say, titanium dust settles in the ductwork and then, several hours later, comes in contact with aluminum, a serious safety hazard is created. On the other hand, a system with too much horsepower will sound like an airplane taking off. Alleviating one hazard (fire) has introduced others, including worker hearing loss. Besides, the loud noise creates a very unpleasant working environment.

An optimized wet dust collection system will be designed so it produces the highest CFM with as little horsepower as possible. This happens by engineering the ductwork, blower, and blade design to move as much air with as little effort as possible.

A variant on ducted systems, a wet filtration booth can enclose a large work area; 30 ft. long isn't uncommon. These booths work well for applications involving workpieces too large to fit on a typical downdraft table. Such systems can be flexible as well. For instance, crane slots allow the booths to be moved where needed, should the plant layout change to handle a different product mix.

Drawing dust away from the work area sometimes is only part of the picture. Other aspects are fixturing and workpiece access. Dust collection setups can be configured so the workpiece rotates, maintaining a constant point of worker access. In certain instances, this also results in more efficient dust collection. If a grinder contacts a workpiece at the same place time after time, the metal particulate efficiently flows into a duct system designed for the application.

Wet Versus Dry

So which is best? It depends, as always, on the application. Dry systems handle finer particulates as well as smoke, while wet filters handle slightly larger particulates that may be combustible. Wet filters are still very efficient, just not as efficient as dry filters. Regardless, a safe shop requires a comprehensive, carefully planned filtration strategy. The result makes the shop floor a safer, more pleasant work environment. FAB

A safe shop requires a comprehensive, carefully planned filtration strategy.

Mike Sweezy is director of sales at Filter 1 Clean Air Consultants, 2525 National Drive, Garland, TX 75041, 972-278-2664, www.filter-1.com.

The fabrication cell at Phoenix Products has a punch press, a press brake, and welding stations.

Need a light—*now*?

Lighting manufacturer responds fast and wins more business

By Tim Heston, Senior Editor

In the corner of a conference room at Phoenix Products Co. sits an unassuming light fixture with a cast housing painted yellow, a bracket, and a formed sheet metal base. It's industrial, utilitarian. People in the petrochemical field use them during planned shutdowns for cleaning tanks.

For these costly shutdowns, petrochemical companies need the lights delivered on time, every time. Over the past few years, Milwaukee-based Phoenix Products has gained significant market share in the segments it serves, and it's mainly because of how quickly the manufacturer can respond. The lead-time for these light fixtures used to be eight weeks; now it's two (see **Figure 1**).

One more thing: The company did it not by increasing capacity utilization—but by *reducing* it.

Lynn Benishek, materials manager, knew the old mindset. She would walk the floor and see people at the turret punch presses, hydraulic presses, press brakes, welding, and assembly areas working away furiously. If the machine wasn't running, it wasn't making money, right? The problem was, too many orders shipped late. In fact, though Benishek witnessed all that furious work, some days few if any products would be sitting near the loading dock, ready for delivery.

Today she walks the floor and sees some machines idle, but most days she also sees various finished goods near the loading dock. When she arrives the next morning, those finished goods are gone. Her point: Running machines flat out does not translate into making money; shipping more quality products in less time *does*.

What Improvement Methods Worked

In recent years company managers have delved into various improvement methodologies, including lean manufacturing. For Phoenix, lean thinking worked to a point, but only to a point, and the company's background helps explain why.

Phoenix was founded more than a century ago as a printing shop. In the decades that followed the company launched a metal products division, which produced portable baking ovens for welding electrodes and lighting fixtures, among other products. Today Phoenix is best-known for its lighting products—fixtures for the architectural, mining, marine, and general industrial markets. The company also can customize products to suit customer needs—and all this has led to a seriously high-mix manufacturing environment. In all, Phoenix now has more than 20,000 SKUs and integrates more than 8,000 purchased items into its products. Some 92 percent of that product mix is build-to-order, driven by customer demand. Only 8 percent is build-to-stock.

In the 1990s Phoenix ran like a traditional manufacturing plant. It was stocked with purchased products, including castings from China. These products could have lead-times spanning months, so Phoenix's purchaser always ensured plenty of safety stock was on hand. High-volume orders meant cheaper per-piece pricing, so the purchaser bought in bulk—and why not? Not only did the low price make the purchaser look good, many of the company's key suppliers had weak on-time delivery rates. With such unpredictability, it's no wonder Phoenix stocked as much as it could.

Machine efficiency ruled the day, which meant that operators avoided setups like the plague. This flooded the floor with work-in-process (WIP), and it took weeks for products to make their way through the shop. It was like rush hour (itself an ironic term). There were plenty of cars, but nothing was moving anywhere fast.

As CEO Scott Fredrick recalled, "We were making things in big batches to amortize the cost of the machine setups. We had continually lengthening lead-times, continually increasing inventory, and continually increasing labor and especially overtime costs."

Compare this with today. The company's metal service center—only a few miles away—makes daily stops to deliver only what the company needs, when it's needed. The shop floor has minimal WIP, and though every machine may not always be running, products are moving.

Jeff Konkel, vice president of operations, pointed out the company's sheet metal fabrication cell; it has two turret punch presses next to a press brake next to a welding area. Everyone in the work area is cross-trained to some extent. For instance, the welder can operate the punch press and press brake as needed, then return to the joining area and pick up a gas tungsten arc welding torch (see **Figure 2**). Together they ensure fast product flow through the cell. This also happens to be a union shop. According to sources, when it comes to these kinds of improvement efforts, including cross training, the union is completely onboard.

FIGURE 1 *In recent years Phoenix Products cut lead-times for this product from eight weeks to two.*

FIGURE 2 *A cross-trained worker gas tungsten arc welds a light fixture component. Minutes before this employee set up and ran a press brake.*

Is This Lean?

All this sounds as if the company has treaded far down the lean manufacturing path, but it hasn't followed all elements of lean. Although the fabrication cell groups dissimilar machines, it isn't dedicated to specific parts or even broad part families. The punch press operator can work on a dozen parts for a light fixture, and then switch to components for electrode-drying ovens.

Phoenix's shop floor does have some attributes of lean manufacturing. The shop looks as if everyone takes 5S seriously; procedures are well-documented. Some work centers have screens that show assembly workers complete 3-D models and related documentation (see **Figure 3**). Working with so many SKUs, these employees must receive the right information at the right time.

Tools and materials are easy to find. In the assembly area and elsewhere, parts are placed near the point of use. All an assembler has to do is turn around, and he or she will find all the components needed to put together a product. Raw stock inventory also is minimal, replenished daily, and carefully managed (see **Figure 4**). The company also has streamlined material handling between work centers. Small batch sizes travel on carts or specially designed baskets between workstations. Few jobs wait for a fork truck.

So if this isn't lean manufacturing, what is it? It's something called *quick-response manufacturing*, or *QRM*, a concept born in the 1990s at the University of Wisconsin-Madison. The developer of QRM, Rajan Suri, released a new book on the topic, *It's About Time*, geared toward manufacturing executives. (For a review, see this month's Biz Talk column.) Phoenix launched its first QRM projects in 2006. According to managers, QRM helped this high-mix operation transform into a place that could deliver in days instead of weeks—and eat up market share because of it.

"Traditional lean principles do overlap with QRM," Fredrick said, "and we implemented a lot of lean manufacturing in our plant. But lean usually works for companies doing standard parts. QRM's reason for being is to serve high-mix, low-volume manufacturers. That's us. An order of 10 lights in certain markets can be a very nice order for us."

QRM Ground Rules

Now Phoenix's production abides by several QRM principles. First, the more time a product sits on the

FIGURE 3 *Screens in an assembly cell allow workers to pull up complete 3-D models and related information for the job at hand.*

FIGURE 4 *Phoenix's steel supplier delivers small batches of sheets daily—just what the company needs, no more and no less.*

floor—even if it's just sitting there, not being touched by human hands—the more it costs to make. During all this time, the company continues to pay wages, suppliers, utility bills, office expenses, sales expenses, and so forth. The longer it takes to ship products, the more payments continue to flow out; meanwhile fewer shipments over that same time period mean less cash is coming in. That's not a good combination.

"When we looked at a light fixture, its touch time consisted of only about six hours," Fredrick said. "But we'd wait six weeks to deliver it. Why did it take six weeks to ship if it only took six hours to build? In QRM, that difference is what we call 'white time.' Our machines were backlogged, making large batches of parts that really weren't needed immediately. Meanwhile we weren't making parts that people were screaming for—all just to save on setup."

Batch Size and Part Flow

To reduce the time it took for products to flow through the shop, Phoenix reduced batch sizes, and as Benishek described, one of the first projects involved a cell making welding electrode-drying ovens. The company ships about 30 a week, but to avoid setups, a portion of the plant would spend an entire week making 80 or more ovens. If an order for a lighting fixture came in, that was too bad. This week the floor was making ovens. So that lighting fixture order—along with many others—sat like a bump on a log until those 80 ovens were fabricated and assembled. After that about 30 ovens shipped out the door, while the remaining 50 sat in finished goods inventory, tying up cash.

"We were tying up machines when we needed to be making other products," Benishek said.

When the shop reduced batch sizes to 30, good things happened. Yes, people were setting up machines more often, but more products were shipping out the door. "By reducing the batch sizes of components and our assemblies, we reduced our machine time in our fabrication area," Benishek said, "and we also reduced our shipping time to customers." This happened because of the reduced waiting time. Those other orders weren't sidelined while massive batches of ovens were being finished (see **Figure 5**).

Various improvement techniques, including lean, preach the virtues of quick changeovers. Otherwise, with small batches workers spend too much time setting up, not enough time producing parts, the very thing those huge batch sizes were meant to prevent. Phoenix does work on quick-changeover improvements, but as sources explained, quick-changeover techniques have been icing on the cake—though it hasn't been the actual cake.

"Reducing setup time is always a good idea," Fredrick said. "But when we looked at the actual numbers, we realized we almost obsessed over setup times. Considering all the labor costs, setup time isn't as large as you make it out to be sometimes. Of all the labor in our factory, so much of it is indirect labor, maintenance, and warehousing. Meanwhile less than 10 percent of our total direct labor cost was spent on setups."

FIGURE 5 *Before the batch size reduction, electrode-drying oven manufacturing tied up work centers for a week, pushing more urgent orders behind schedule.*

FIGURE 6 *In assembly areas all necessary tools are within arm's reach. More machines were also moved into the area so that workers could complete multiple production steps.*

Calculating Capacity Utilization

What really has taken the cake has been running work centers at lower average capacity levels.

"We now plan to run at 75 percent utilization instead of 85 or 95 percent utilization," Fredrick explained.

He added that this happened in part because everyone was working only on orders due now; they weren't making extra and sending those goods to finished goods inventory. This did create more setup, and direct labor costs did increase. "But this was more than offset in decreases in indirect labor, expediting, emergency shipments, and overtime. This also gave us a lot of time in the schedule to respond to orders that we suddenly were getting, because we were delivering in two weeks instead of six weeks."

Note that the company treats the capacity utilization metric a bit differently. If a shop reduces batch sizes and increases the frequency of setups, it naturally reduces utilization, if you measure a machine's capacity utilization as time spent actually producing parts.

Following some of the principles of QRM, Phoenix takes a different approach. Managers define utilization as a machine's ability to take on an increased work load. When operators are setting up a machine, it's in use and not available for anything else. The machine is being "utilized" for setup. If a machine is undergoing intensive maintenance and so can't be used for anything else, it is being "utilized" for maintenance.

Phoenix managers determine capacity utilization by calculating the amount of available time a work center has to take an unexpected job, and then subtracting that from 100 percent. These days Phoenix's work centers on average are available 25 percent of the time to take on unplanned work; hence, its capacity utilization is 75 percent. This allows these work centers to handle the variability of a high-mix operation.

High-level Scheduling

"[The schedule] used to have a long list of about 100 priorities," Benishek said. Working from that long list, machine operators sometimes would choose, say, three parts with identical setups, even though two of them weren't due for several weeks. This meant the machine churned out parts, and only a third would move on downstream; the rest would just sit as WIP.

For scheduling, the company still uses information generated by its materials resource planning (MRP) system, but at a high level. The software doesn't schedule down to minutia. Instead, workers in each cell receive a sheet showing which jobs are due immediately—the "due now" time bucket. On the list may be about two to four priorities, but that's about it. The workers in each cell determine the order and work flow of those four orders.

The company operates about a half dozen QRM cells, including that fabrication cell. Each cell has multifunctional resources, carrying a workpiece through multiple setups of manufacturing. Most products do involve some type of fabrication, so the fabrication cell serves "internal customers," those working downstream operations. From there products flow to various QRM assembly cells devoted to broad product families for defined market segments—mining equipment, marine, architectural, industrial, and so on.

Key to designing these cells, Fredrick explained, was giving workers access to more machines so they could carry a component through multiple stages of production all in one area (see **Figure 6**). In the assembly area, for instance, workers would perform specific operations and then pass the workpiece down the line. This may work for low-mix assembly, but it slowed things considerably for Phoenix's high-mix operation. "We moved more machines into these assembly cells so workers could do multiple operations in one place," he said. "We wouldn't have another work order and more wait time—or as we say in QRM, more 'white time.'"

The Value of People

Sources agreed that the most challenging component of QRM was a cultural one. Employees had been taught that machine efficiencies and uptime ruled. Producing smaller batches was a hard pill to swallow. "It was all so counterintuitive, and counter to how we were all trained and how we cost things," Fredrick said. Overcoming that cultural hurdle, he added, has really paid off. "Right now we're above our previous highs experienced in 2007 and 2008."

Like most companies, Phoenix experienced tough times during the recession, but it had no mass layoffs. Why? Benishek didn't give the expected answer, that people are a company's greatest asset—a buzz phrase that, while true, has been made hollow by the rampant downsizing of the Great Recession.

Instead, she said this: "People have capacity too."

Their knowledge, experience, and cross training make them incredibly valuable, and if a company

Reducing setup times was icing on the cake; the cake itself came with reducing batch sizes and capacity utilization.

downsizes during a recession, it can take a long time to rehire and retrain. Because Phoenix retained most of its workforce, it has been able to maintain its quick response during the economic recovery and, because of it, gained more business.

Benishek also was careful not to say that more training increases a worker's *capacity*. This may be true to a point, especially for entry-level workers, but there are still only so many hours in a workday. Pushing people to maximum capacity is just as bad (if not worse) as pushing a machine to the limit—a recipe for backlogs, overtime, and part-flow traffic jams. This was why, in early 2008, just months before the financial crisis, the company hired an additional 10 workers in the assembly area.

Phoenix managers choose machinery investments carefully. For instance, the shop still runs a bank of manual spinning lathes; volumes just aren't high enough to justify CNC spinning centers. But the company still has made significant machinery purchases in recent years, including a new band saw and a reconditioned turret punch press.

Phoenix needed more machines and people to meet demand without driving up capacity utilization into dangerous territory—again, above 75 percent. Pushing capacity utilization to the limit is like creating a rush hour of parts on the floor. Jobs are released, go down the entry ramp, and get stuck in stop-and-go shop floor traffic.

Benishek held up a chart showing revenue produced by each worker per hour. After the company hired more people, revenue per worker-hour did not drop, as expected. Instead, it jumped—*significantly*. This happened, she explained, because those additional workers could ship more products in less time, including less overtime.

Speeding the Supply Chain

The stock area has shrunk significantly in recent years—and that, of course, has been on purpose. The company no longer judges suppliers on price alone, but also turnaround and quality. Small, frequent deliveries are better than a high-volume shipment.

Phoenix rates its suppliers quarterly and works with them to reduce response times. For items such as castings, the company does work with Asian suppliers that, while response has improved, still have relatively long lead-times. It simply takes time to cross an ocean. Nevertheless, these components are tied to products with relatively stable demand, so a long-lead-time supplier works.

But for other products, long supplier lead-times are detrimental, even if that supplier has a stellar on-time delivery rate. While waiting weeks for a component, an engineering change or demand fluctuation might occur, and this leaves Phoenix in one of three scenarios: The company may receive incorrect components that are sent to scrap; they may have too many products, so the company incurs excess inventory that may become obsolete; or they might not receive enough products, so Phoenix may end up losing orders—or even customers. Any scenario adds up to serious costs that may eliminate the price difference between domestic and overseas suppliers.

"This is why we are trying to source regionally when we can," Benishek explained.

The concepts of QRM are also spreading one step down the supply chain. Phoenix's customers no longer need to hold inventory but instead order from Phoenix just what they need. The result: Customers can order more frequently and in smaller quantities. "It's made us much more of a preferred supplier," Fredrick said, "because we're more reliable on deliveries, and we don't insist on high volumes."

Advantages of Time Splicing

For certain outside processes, including powder coating, Phoenix practices *time sharing* or *time splicing*. The company buys a weekly time slot at a custom coating facility—*whether Phoenix needs anything powder-coated or not*. This gives the powder coating shop a predictable revenue stream. In return, the shop gives Phoenix access to its powder coat line at the same time every week, and the coater is happy to run various colors Phoenix might need—immediately.

"We know that Thursday afternoon that powder coating line is ours," Fredrick explained. That immediate response pays for itself and then some, he added, because metal parts no longer sit for days waiting for a powder coater to run a certain color.

No Wasted Space

The moment I walked into Phoenix's front lobby, I noticed something: no lobby—just a few chairs and a small display of the company's lighting and oven products in the corner. I opened the door and found myself standing in front of cubicles full of people selling, planning, and engineering products. The company also has no front receptionist. An employee in the nearest cubicle stopped what he was doing, greeted me, picked up his phone, and called Jeff Konkel.

"When we moved to this new facility several years ago, we went from several hundred thousand square feet down to 60,000 square feet," Konkel said. "We had a major culture change, and we tried to be more efficient with our space."

Reducing space seems counterintuitive for a growing business, but large workspaces cost money to maintain. "We try to use every cubic inch we can," Konkel added. "We've kept our operating costs down by not building bigger buildings, and not having to heat and maintain those buildings." The place isn't cramped at all. In fact, aisles on the floor are clear of WIP.

The manufacturing space shows how dramatically the culture has changed at Phoenix. A big building doesn't make a product any better or help deliver it faster. In manufacturing, people and machines do the real work and so provide the real value. For manufacturing overall, a sector with an unfortunate reputation for mass layoffs and weak job security, that's a good message. **FAB**

Senior Editor Tim Heston can be reached at timh@thefabricator.com.

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Discover technology, opportunity at FABTECH® 2011

Broadening your business horizons in the city of Broad Shoulders

By Amanda Carlson, Contributing Editor

Chicago is known for many things—its unforgettable skyline, a frantic pace, brisk weather, legendary blues music, and a tough blue-collar attitude. Add the largest metal forming and fabricating show to that list and you've got a city with as diverse a repertoire as any you'll find on either coast.

Underneath the notable eateries, polarizing sports franchises, and pockets of ethnic diversity lies a city that was built on—and continues to thrive on—the shoulders of its industrial workers and its manufacturing roots. In fact, a 2010 report released by *Manufacturers' News* ranked Chicago No. 3 on its list of the top 50 U.S. cities for manufacturing based on the number of industrial jobs.

More than 1,200 exhibitors and 30,000 attendees are expected to converge on Chicago for FABTECH® 2011, Nov. 14-17.

That brings us to FABTECH 2011, North America's largest metal forming, fabricating, finishing, and welding tradeshow, co-sponsored by the Fabricators & Manufacturers Association Intl. (FMA), Society of Manufacturing Engineers (SME), American Welding Society (AWS), Precision Metalforming Association (PMA), and Chemical Coaters Association International (CCAI). Show organizers are expecting 30,000 attendees to descend upon the North and South Halls of Chicago's McCormick Place Monday, Nov. 14, through Thursday, Nov. 17.

More than 1,200 machine tool manufacturers from around the world are slated to exhibit the latest in metal fabricating technology and products over 500,000 net sq. ft. of floor space.

More than 1,200 machine tool manufacturers from around the world are slated to exhibit the latest in metal fabricating technology and products over 500,000 net sq. ft. of floor space, making this the largest show on record. For your convenience, the show is organized by technology pavilions to help you access the technologies that you're looking for. The South Hall houses pavilions dedicated to forming and fabricating, laser technologies, metal forming, tool and die, tube and pipe, and finishing. The North Hall houses pavilions dedicated to welding and thermal spray.

Accompanying the product and technology showcase on the show floor are educational conferences, seminars, and professional programs that delve into various topics related to cutting, finishing, forming and fabricating, shop management, stamping, tube and pipe, and welding.

Want More Information?

To keep up with the most up-to-date FABTECH news, or to find out how you can connect with the show via Facebook, Twitter, or LinkedIn, visit www.fabtechexpo.com. The Web site also can serve as a guide as you secure your plans to attend the show. Also available on the Web site is important information regarding:

- **Show registration.** The show is free to anyone who preregisters by phone, mail, or online before Nov. 11, 2011. The registration fee after this date or on-site is $50.
- **Show planning.** Check out the *My Show Planner* link on the home page to assist you in mapping out your time on the show floor. The tool helps you search for products and exhibiting companies and provides you with a map of both the North and -South Halls.
- **Show accommodations.** Click on *Hotels and Travel* underneath the *Attendees* drop-down box for a complete list of participating FABTECH hotels, as well as tips to secure the best rate. You'll also find the shuttle schedule to and from the convention center, area maps, and parking information.
- **Show extras.** Visit the *Education and Events* link on the home page for a complete listing of educational seminars and events. As the old saying goes, "Knowledge is power."

Show Quick Facts

What? **FABTECH 2011**

When? **Nov. 14-17**

Where? **North and South Halls, McCormick Place 2301 S. Lake Shore Drive Chicago, IL 60616**

www.mccormickplace.com

See some of the nation's best welders square off in the Professional Welders Competition.

Special Events—*Free and Open to All Attendees*

Location: FABTECH Theater, Grand Concourse

Monday, Nov. 14
9:00 a.m.–10:00 a.m.

America's Challenge: Strengthen U.S. Manufacturing and Create Jobs

Don Manzullo, R-Ill., will speak about legislative and regulatory initiatives being taken to create a level playing field for American manufacturers competing in global markets. He will cover currency manipulation, government enforcement of trade agreements, intellectual property protection, patent abuse, and other topics related to boosting U.S. manufacturing and creating jobs.

Location: FABTECH Theater, Grand Concourse

Monday, Nov. 14
12:30 p.m.–1:30 p.m.

State of the Industry: Executive Outlook

Machine tool manufacturing executives share their views about the industry and discuss trends they foresee having an impact on the future. Panelists will also talk about their customers' needs, adapting workforce issues, what's changing in their businesses, future technologies, and answer audience questions.

Moderator: **Dr. Chris Kuehl, managing director, Armada Corporate Intelligence; economic analyst, Fabricators & Manufacturers Association, Intl.**

Panelists: **Rolf Biekert, president and CEO, TRUMPF Inc.; David Lazzeri, president, DuPont Powder Coatings America; Tim McCaughey, president and CEO, Schuler; John Stropki, chairman, president, and CEO, Lincoln Electric Co.**

Location: North and South Halls

Monday, Nov. 14
4:00 p.m.–6:00 p.m.

Happy Hour

Visit with equipment exhibitors and fellow attendees right on the show floor. Network with peers in a relaxed, entertaining environment while perusing the technology highlighted in exhibitors' booths. A complimentary drink ticket is included with your show badge.

Location: Grand Ballroom (S100)

Tuesday, Nov. 15
9:00 a.m.–10:00 a.m.

Keynote Presentation: Growing Your Business Through Innovation

Innovation is essential to both the survival and growth of your company in today's competitive manufacturing environment. This practical presentation will give you a step-by-step guide to managing innovation with the daily challenges of running a business in mind.

Speaker: **Robert Tucker, president, The Innovation Resource**

Location: FABTECH Theater, Grand Concourse

Wednesday, Nov. 16
9:00 a.m.–10:00 a.m.

Reshoring: Helping Manufacturers Understand the Total Cost of Offshoring

Recent reports by the Boston Consulting Group and Accenture Consulting say that it is time for manufacturing to return to the U.S. This presentation is designed to reveal the true cost of offshoring to you and your customers. Attendees will receive a free copy of the Initiative's proprietary Total Cost of Ownership Estimator software, which will help you to indentify and calculate costs, including 25 hidden costs of sourcing offshore.

Speaker: **Harry Moser, founder, The Reshoring Initiative**

Thursday, Nov. 17

Buyer Appreciation Day

Make the most of the last day of the show by takinge advantage of exhibitor show specials. Participating exhibitors as well as show management will be giving away prizes and products.

Also on tap...

Location: FABTECH Theater, Grand Concourse

New-product Presentations

Visit www.fabtechexpo.com for details

Get an up-close look at the newest products and technologies on the market during these free, 30-minute presentations led by machine tool manufacturers.

Professional Welders Competition

Monday, Nov. 14—10:00 a.m.–5:00 p.m.
Tuesday, Nov. 15—9:00 a.m.–5:00 p.m.
Wednesday, Nov. 16—9:00 a.m.–5:00 p.m.

Come and watch professional welders compete on the show floor for a $2,500 grand prize. Competitors must complete a ¼-in. fillet weld using a ⅛-in. E7018 electrode on low-carbon steel in five minutes or less. The competition will be judged by a team of AWS certified welding inspectors. The winner will be announced at the awards ceremony on Thursday, Nov. 17, starting at 11:00 a.m.

Conference Preview—*To register, visit www.fabtechexpo.com/registration.cfm*

Forming & Fabricating Track

Monday, Nov. 14
10:30 a.m.–12:30 p.m.

NEW! Laser Marking (F10)

Introduction to Laser Marking

This session will provide practical information about laser marking in numerous applications. The focus will be on the components, advantages, processes, and resources available for laser marking of products. Process technicians, plant-manufacturing personnel, or anyone who is interested in enhancing the efficiency or traceability of product identification should attend.

Dale Sabo, ScanLab-America

High-speed Laser Marking & Engraving Metals

High-power, high-brightness fiber laser markers are now offered up to 100 W. This provides a tool to produce extreme marking speeds on copper, aluminum, as well as ferrous materials. Deep engraving can also be achieved with control on removal rates versus engrave quality. An introduction to the technology and process capabilities with applications examples will be given.

Geoff Shannon, Miyachi Unitek

Error Proofing—Using Barcodes in Harsh Environments

We will review the difference between Asset tracking and ID tracking, followed by why your company needs to barcode and the benefits to your customers, regulation requirements, and to streamlining your process and inventory. The objections many companies use for not barcoding and "what's new in barcoding" techniques and products that solve almost every situation will be covered.

Edward O'Neal, InfoSight Corp.

Safeguarding Your Equipment (F11)

Learn the seven steps of successful safeguarding, beginning with proper risk assessment, choosing an expert safeguarding outside partner, and ending with how to sustain a culture of safety within your organization. Topics will include application and device evaluation, system design and installation, and most importantly, operator training.

Douglas Raff, Paragon Industrial Controls Inc.

Monday, Nov. 14
1:30 p.m.–3:30 p.m.

Punch Press Technology (F21)

Selecting the Right Punch Press for Your Application-

Learn how to evaluate and select the right punch press for your application by considering key criteria, including part geometry, jobs per day, material types and sizes, floor space, machine styles, automation, and other factors.

Daniel McIntyre, LVD Strippit

Punch CAD/CAM Software Optimizes Machine Versatility

Focus will be on improvements in CAD/CAM systems for punch machines that allow for tool path optimization and taking advantage of additional processes. Realized efficiencies will also be showcased in the form of case studies.

Jim Lindsey, SigmaTEK Systems LLC

Process Integration: The Key to Profitable Punching in a Lean Environment

Discover profitable processes and procedures using today's punching technology. This presentation will address cost reduction through process integration, automatic tool/turret changing, hybrid technology, and parts sorting.

Cary Teeple, Murata Machinery USA Inc.

Estimating—Made-to-Order Manufacturing (F22)

Topics for this presentation include requests for quote management, material needs, operation time, and large assembly estimating.

David Ferguson, MIE Solutions

Tuesday, Nov. 15
10:30 a.m.–12:00 p.m.

Press Brakes With Tech Tour (F32)

High-mix, Low-volume Part Processing

This presentation will cover the challenge fabricators face to remain competitive with short-run processing of a wide variety of parts. Attendees will be presented with ideas on how to reduce setup time and scrap on the press brake to make low-volume processing profitable.
Scott Ottens, Amada America Inc.

Hybrid Technology: The Next Step in Press Brake Evolution

Learn how to optimize your press brake operations with advancements in technology and design. With case study demonstrations, this presentation will show the benefits (less power, less oil, whisper-quiet) of servo-hydraulic brakes.
Emre Varisli, Ermak USA Inc.

Streamline Part Processes Using Offline Software

This presentation will cover the advantages of offline software that can streamline the bending process by overcoming flat blank part size issues, complex bend sequences and setups, documented setup plans, and reduced scrap through 3-D graphics. It will also demonstrate the ability to use less-skilled operators at the press brake.
Shane Simpson, TRUMPF Inc.

Getting Started With Robotics (F33)

Learn what systems will work best for your operation, the differences in robotic applications, and the pros and cons of introducing robots to your operation. You will understand how to evaluate robotic equipment and suppliers, effectively budget for robot applications, and avoid failure.
Bob Rochelle, Staubli Corp.

Tuesday, Nov. 15
1:30 p.m.–3:30 p.m.

NEW! General to Advanced Roll Forming Concepts (F42)

Benefits of Roll Forming

The advantages of utilizing the roll forming process as compared to other metal forming processes, such as stamping, extruding, and press brake, will be discussed. Learn how roll forming can often produce the same for half the cost. These operations can be added to the roll form line seamlessly.
Brian Rodgers and Brian Wesley, Roll Forming Corp.

Flexible Roll Forming Systems for Productivity & Profitability

More than ever it is necessary to have roll forming systems that can rapidly be changed from one job to another. Learn about the latest advances in roll forming and the integration of punching, notching, welding, folding, and robotics into highly efficient, flexible systems. How these systems can lead to greater productivity and profitability will be discussed.
Antonio Gallo, Gasparini S.p.A.
Peter Swenson, S Tech LLC

Wednesday, Nov. 16
8:00 a.m.–10:00 a.m.

NEW! Add-on Applications for Roll Forming (F51)

The Four Basic Machine Applications

Most roll forming lines are comprised of one of four basic machine application types. The rest are either very special applications, or they are a mix-and-match setup of the four basic types. Learn more about these four applications and which application will work best for your unique operation.
Jaycen Rigger, AMS Controls

Added Value Options for Your New or Existing Roll Forming Lines With Different Inline Punching and Cutoff Solutions

Understand how completely integrated roll forming lines incorporate the cutoff and punching operations in the line to produce finished parts without secondary operations. This starts with simple cutoff methods to applications with holes, slots, notches, and cutting the part to length using different methods of dies, presses, and measuring systems.
Paul Williams, Hill Eng.

Wednesday, Nov. 16
10:30 a.m.–12:30 p.m.

NEW! Laser Joining Overview (F61)

Introduction to Laser Welding

This presentation provides an introduction to the process covering materials, joint geometries, basic weld penetration data, and key aspects required for successful laser welding. An overview of the laser sources available will be given, along with application examples.
Geoff Shannon, Miyachi Unitek

Harmony of excellent speed and performance

"Hummingbird, with its high speed and maneuver capability while flapping its wings 80 times/sec. has a miraculous performance and admired in the animal world."
Now you can create miracles with your business thanks to excellent speed and performance of Fibermak, increase your profit-per-part and be admired in your world.

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Intelligent Solutions for Robotic Laser Processing

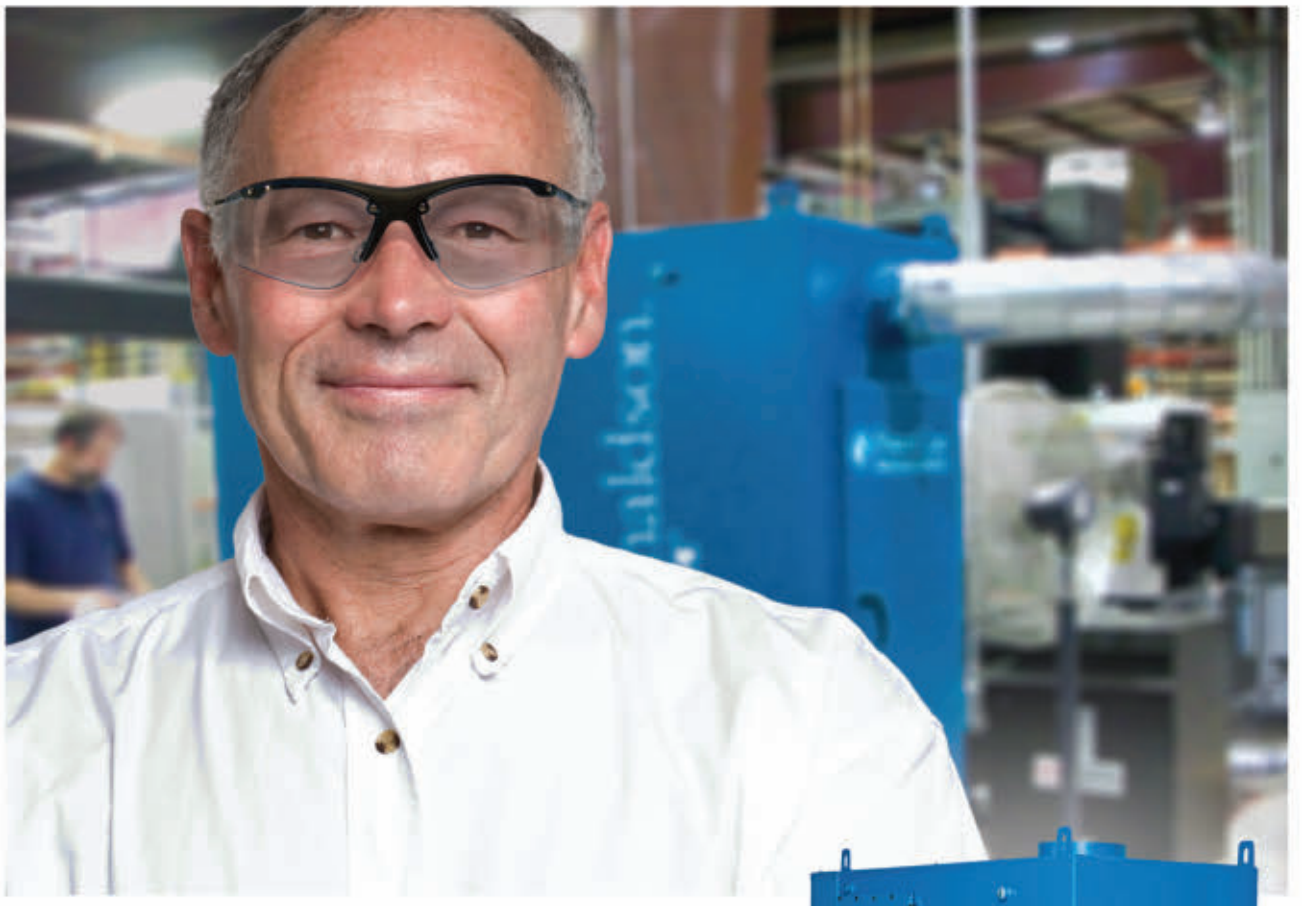
This session will provide an overview of the latest in robotic laser applications and the use of sensors, programming tools, and techniques to achieve high-quality and flexible production. Attendees will witness an overview of robotic solutions for laser processing, illustrating the cutting performance and the benefits of robots. The latest in welding applications including hybrid, remote, and seam welding with servo wirefeed will also be discussed.

Michael Sharpe, FANUC Robotics

Integrated Laser System Design Options for Multiple Spot Remote Welding, High-Production Applications

This presentation will compare and contrast various designs of integrated, multiaxis laser systems that produce multiple spot welds for high-production applications. Features and benefits of different fixturing options, material handling systems, remote focus heads (scanner vs. static), robotics, multiple heads or stations and laser choices (CO_2, disk, Nd:YAG, fiber) will be discussed. Summary comparisons in system price, production output, flexibility, maintenance, and quality control (process monitoring) for the various designs will also be covered.

David Gustaferri, VIL Laser Systems/ Wayne Trail Technologies



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Effectively Slitting & Blanking Coils (F62)

Best Slitting Practices

Understand the best practices for slitting coils of metal. Learn how to identify problems in slits and correct them on future setups, enabling you to introduce continuous improvement in your slitting operation. With the implementation of this knowledge, you will be able to improve quality while reducing costs.

Al Zelt, ASKO Inc.

Advances In Blanking

While close-tolerance blanks are being used more frequently, a great deal of confusion remains about the definition of a blank. What is the proper way to measure them? What types of CTL/blanking lines are best-suited to produce the most accurate parts and why? Learn how the best tolerances can be produced and how the latest technology can improve efficiency and quality.

Dean Linders, Red Bud Industries

Precision Slitting Technology & Practices

In a given day, processing lines spend very little time slitting coils. Learn how new technology on the market and time-tested solutions can help you improve the efficiency, productivity, and quality of your flat-rolled operation.

Ray Kuch, Braner USA Inc.

NEW! Robotic Automation (F63)

This presentation will provide a practical guide to the technology and solutions currently available to manufacturers interested in more intelligent robots. Attendees will leave with practical knowledge of vision-enabled robot technology, a clear understanding of the current trends in robotic vision, and an insight into the future intelligent robotics.

Terry Tupper, FANUC Robotics
Mike Monnin, Wayne Trail Technologies

Wednesday, Nov. 16
1:30 p.m.–3:30 p.m.

NEW! Advancements in Coil & Sheet Leveling Technology (F70)

Changing the Shape of Flat-rolled Product

Understand the available types of shape control equipment for upgrading the flatness and stability of flat-rolled metal sheets, plates, and coils. This includes flatteners, straighteners, roller levelers, plus stretch and tension leveling systems. Discover how to evaluate the relative capabilities of this equipment.

Thomas Hazen, Consultant

Precision Steel Leveling— State-of-the Art Innovation

This session will discuss how part leveling is very different from coil leveling. Learn how part leveling provides added flexibility to the manufacturing process and impacts the mainstream production process. Examples of being able to improve many different types of material and how part leveling can increase production and throughput and improve material tolerance will be covered.

Tom Campbell, ARKU Systems

No Regrets! >> You can still get the most out of your capital investment

Have you invested substantially in a variety of different CNC machines? Many fabricators who have taken a similar approach later regret the fact that they did not standardize on one brand. Unfortunately, if you want to get the best mix of features, you have to stock your machine shop with the best mix of machines.
So how can you relieve the headache of running a mix & match operation?

Standardize the software that runs the machines.
SigmaNEST is a complete lean manufacturing and nesting software solution for all major profile cutting and punching machines. No matter what hardware you have, SigmaNEST works with it! SigmaNEST is the most flexible CAD/CAM solution, offering specialized modules to optimize CNC cutting machine efficiency, accuracy and part quality.

The Benefit

- You can dramatically improve your productivity without changing your shop floor setup
- You can reduce scrap and manage sheet remnants painlessly
- You can eliminate rework or unecessary processes

SigmaNEST works with your CNC hardware

- Support for all major profile cutting and punching machine brands
- Support for all major machine controllers
- Support for advanced machine features

SigmaNEST works with your CAD software

- Support for native 3D CAD files from SolidWorks, Autodesk, NX, and more
- Support for DXF, DWG, STEP, IGES & other standard formats
- Support for advanced process information for beveling

SigmaNEST integrates with your business system

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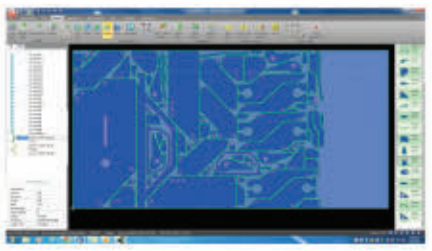

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Bob Sipp, Leveltek International LLC

Advanced Laser Technology and Applications (F73)

High-power Disk Lasers

This presentation will discuss how ongoing increases in power per disk and improvements in beam quality and efficiency continue to validate the genius of the disk laser concept. As of today, the disk principle has not reached any fundamental limits regarding output power per disk or beam quality and offers numerous advantages over other high-power resonator concepts, especially over monolithic architectures.

David Havrilla, TRUMPF Inc.

Industrial Production With Laser Cladding

Laser cladding will be reviewed for powder and hot-wire technology. The presentation will include laser types, nozzle types, and systems approach. Applications will include power generation and oil and gas industries. Metallurgical results will be presented for several of the processes.

Wayne Penn, Alabama Laser

New Advances in Laser-based Strip Splicing

This presentation presents a new laser-based splicing system that incorporates state-of-the-art fiber laser and precision motion technologies to enable splicing material as thin as 0.002 in. and with width-to-thickness ratios of up to 7000:1. Semiautomated operation and an easy-to-use user interface allow an operator to become proficient with the system after just minutes of training, compared to months of experience with most TIG-based systems.

Scott Boynton, Joining Technologies

Thursday, Nov. 17
8:00 a.m.–10:00 a.m.

NEW! Parts and Surface Cleaning Technologies (F80)

The presentation will cover an environmentally safe alternative cleaning method to traditional hazardous solvents and hand scraping for removal of weld slag and spatter. Dry ice cleaning can clean online, without the need for disassembly—clearing slag off welding equipment, as well as cleaning grease, glue, and dirt off production equipment. Learn how to clean better, faster, hot, and in place without tooling damage.

Dan Orlowski, Durr Ecoclean
Tyson Marlowe, Cold Jet

NEW! Automated Deburring: A Surprising Cost & Time Saving With Tech Tour (F81)

This presentation will describe the advantages of different types of deburring machines. We will also describe different types of abrasives technologies in detail, including coated and nonwoven abrasives. Many factors that improve performance, such as processing wet vs. dry and the impact of speed, coolant, and pressure, will also be discussed.

Gregory Larson, Timesavers Inc.
Erik Vanstrum, 3M

Thursday, Nov. 17
10:30 a.m.–12:30 p.m.

Press Brake Troubleshooting (F90)

What You Need to Know Before You Automate a Press Brake

This presentation will cover current trends in press brake automation, machine utilization, and hybrid alternatives. Software and programming examples will also be included, as well as floor space, support personnel, and safety issues.

Paul LeTang, LVD Strippit Inc.

Which Press Brake Tooling System Is Best for You?

Determine which of the three most common press brake tooling systems (American, European, and New Standard) would be best-suited for your current and future needs. Primary emphasis will be on achieving maximum productivity.

David Bishop, Wila USA

Stamping Track

Monday, Nov. 14
8:00 a.m.–10:00 a.m.

Error-Proof Metal Forming (S01)

Electronic digital and analog sensors, along with scores of tools and dies, will be showcased to illustrate best practices in metal forming and assembly. The value-added function of in-die welding will also be presented. Attendees will learn how to eliminate die crashes and minimize die maintenance in order to remain competitive in this challenging economy.
George Keremedjiev,
Tecknow Education Services Inc.

Stamping Advanced High-strength Steels (S02)

Stamping Advanced High-strength Steels—Closing the Manufacturing Gap

The emergence of advanced high-strength steels (AHSS) is changing the way metal stampings are being processed in the press shop. Due to their higher strengths and greater springback after forming, producing high-strength steel stampings and their tools requires special attention.
Peter Ulintz,
Anchor Manufacturing Group Inc.

Tool Steel Tutorial for Stamping and Forming Tools

This presentation will cover methods for comparing and selecting tool steels for die design, improving tool life or tool performance, and addressing tool failures. Attendees will learn how to make informed decisions regarding tool steel selection. Bring questions about your specific tool steel problems or issues.
Ed Tarney, Erasteel Inc.

Monday, Nov. 14
10:30 a.m. – 12:30 p.m.

New! Increasing Productivity and Quality Monitoring (S10)

Increasing Productivity in Welding, Forming, and Fabricating Through Integration of Best Practices in Electronic Sensing, Positioning, and Measurement Devices

Sensors, transducers, RFID systems, and other monitoring/tracking systems have improved manufacturing practices, but often these devices are not placed properly and can cause problems. This session will carefully examine individual technologies and proven methods used to optimize the performance of these peripheral sensing, poke-yoke, positioning, and tracking and measurement systems that can potentially save organizations a fortune in revenue through productivity enhancement.
David Bird, Balluff Inc.

Automatic In-Die Part Quality Monitoring & Tool Adjustments

Implementation of part measurement, die adjustment, and part tracking can result not only in 100 percent verification of critical part features, but also in significantly increased machine utilization, accurate production and scrap rates, and more reliable die protection. Learn the practical methods to select, apply, and integrate sensors and control systems into the stamping process to fulfill accuracy and quality requirements.
James Barrett, Link Systems Inc.

AHSS Stamping Forensics and Green Fluid Technology (S11)

Green Fluid Technology for Metal Stamping

Learn how to turn your stamping operations lean and green. Cost-saving techniques and evaluations will be demonstrated. Attendees will learn how to select lubricants and evaluate their performance, as well as how technology advancements in green lubricants can make a substantial difference to the bottom line. Finally, the pros and cons of green lubricants will be compared to standard chemistries for metal forming lubricants.
Steve Lowery, Tower Oil & Technology Co.

AHSS Stamping Forensics

This session covers emerging trends in high-strength steel, including challenges faced in stamping shops and toolrooms, and potential tooling-related solutions. Using research conducted on die clearance, piercing loads, tool geometry, tool steel materials, and coatings, you will learn techniques to improve productivity while processing high-strength steels.
Bruce Konopinski, Dayton Progress Corp.

Fabtech conference >> www.fabtechexpo.com/education.cfm

Monday, Nov. 14
1:30 p.m. – 3:30 p.m.

Die Design and Efficiency (S20)

Die Planning and Cost Estimating in the Cloud

Attendees who plan, purchase, or produce dies should attend this session. The focus will be on new cloud computing technologies that make tier collaboration possible. The presenter will use example parts to demonstrate how to achieve speed, consistency, and accuracy in stamping planning and die-cost estimating.
Jeff Bennett, Tool Planners Inc.

The Benefits of Manufacturable Solid Die Designs

Attendees will learn about the importance of development and simulation accuracy to achieve better results. Focus of the discussion will be on the transformation into virtual tool and die engineering and the recurring benefits to the industry.
David Darling, Autodie LLC

Gaining a Competitive Advantage Through In-Die Fastener Installation

Attendees will learn how to properly evaluate a project and determine if an in-die assembly system is appropriate. The individual elements of an in-die system and how they function together to form a complete system is reviewed. The presentation also includes working animations of the internals of the in-die tooling and photographs of typical and unique projects.
Roger Patton, PennEngineering Fastening Technologies

Tuesday, Nov. 15
10:30 a.m.–12:30 p.m.

Beyond Forming: Fabrication in the Stamping Press (S30)

Why Invest in Servo Press Technology?

Learn how to achieve significant productivity gains (20 to 60 percent, on average) from motion curve modifications—with press forces ranging from 100-2000 U.S. tons. The technology provides better part quality and extended die life for processing high-strength steels. The advantages of this will be reviewed.
Barry Lewalski, Schuler Inc.

Servo Press Technology

The press and the dies in the press need to operate as a complete system to ensure part quality. Learn how servo press technology gives the ability to eliminate the trial-and-error setup and use exact digital data to minimize setup time and guarantee performance stroke after stroke.
Jim Landowski, Komatsu America Industries LLC

Improving Stamping Efficiency (S31)

Production and Tryout Mapping: A Systematic Approach

Systematic measures can be put in place to eliminate potential variation during stamping process planning and design. Participants in this session will get an overview and introduction into the common stamping environment variables, and learn methods available to quantify and map responses to variation.
Eric Kam, AutoForm Engineering USA

Automated Data Collection and OEE Reporting

This session will describe ways to automatically collect unbiased production and OEE data directly from the machines in real time. In addition, new calculation methods will be introduced that produce accurate and relevant results for piece-part manufacturing processes.
Jim Finnerty, Wintriss Controls

Material Utilization: Planning, Engineering, and Achieving Best Results

Attendees will learn methods commonly employed to define the initial material utilization requirements for sheet metal stamped parts. The strengths and weaknesses of these methods and the potential pitfalls involved will be discussed. Methods for overcoming these risks, as well as new technologies available to lower costs with minimal material use, will be introduced.
Eric Kam, AutoForm Engineering USA

Wednesday, Nov. 16
8:00 a.m.–10:00 a.m.

NEW! Best Practices for Manufacturing: World-class Safety & How to Compete Globally (S50)

World-class Safety Culture in a Metal Forming Plant

Learn how one company has worked over seven years without a single OSHA 300-log recordable incident. Over 2 million safe work hours worked, training education and metal forming professionalism, random drug testing, enforcement of safety policies, and PPE near-miss learning moments will be covered.
Erick Ajax, EJ Ajax & Sons Inc.

Beyond Stamping—
Methods to Compete on a Global Stage
Prepare to grow in a global market with competitive manufacturing techniques that include in-die assembly, welding, and measurement. Real-world case studies, including medical devices, will be presented showing complex products that have been stamped, molded, and assembled with complete automation.
Michael Nordmeyer,
Novo Design Group LLC

Wednesday, Nov. 16
10:30 a.m.–12:00 p.m.

NEW! Vibration Control and Installation Methods to Improve the Performance of Metalworking Machinery (S60)
This presentation will explore the relationship between installation methods and their effects on machine performance, productivity, and the surrounding environment. Basic machine structural dynamics and vibration theory will be explained using technical illustrations and case studies. The characteristics of a wide variety of isolators and mounting systems will be covered, including elastomeric, coil spring systems, material and viscous damping, leveling and nonleveling designs. Mechanical, servo-driven, and hydraulic metal forming equipment, including large stamping presses, high-speed and gap-frame type presses, will be addressed.
Keith Leatherwood,
Vibro/Dynamics Corp.

Tube & Pipe Track

Monday, Nov. 14
8:00 a.m.–10:00 a.m.

Fundamentals of Tube Mill Operations (F03)
This session will help you address and strengthen the "weak links" in your tube and pipe mill operation. Learn how to identify problems and implement corrective measures that will build morale, improve product quality, reduce scrap, and produce greater profit by practicing the best standards and procedures.
Robert Sladky and Bret Molnar,
Roll-Kraft

Monday, Nov. 14
1:30 p.m.–3:30 p.m.

NEW! Advanced Tube Mill Operations (F26)
Increasing Productivity
With Tube Mill Coolants
Selection of the right coolant for your mill must be based on compatibility with your lubricants and proper monitoring techniques. Learn how to provide the best filtration for your system, proper storage techniques, and long-term rust protection in a number of environments.
David Kinnard,
Tower Oil & Technology Co.

Optimized Inline Cutting Techniques for Pipe & Tube
The flying shear cutting process results in significant cost savings and improved schedule deliveries when compared to non-value-added secondary operations. Using this process, you can produce shorter cut lengths with 50 percent better accuracy at faster mill speeds than other techniques, as well as less frequent and faster tooling changes with lower costs.
Charles Sepkaski, Thermatool Corp.

Dust Collection for Remetallizing Weld Seams
The two main thermal spray hazards are fumes and metal dust that need to be properly collected through ventilation systems and overspray units. This requires proper airflow, the correct cartridge design, the right collector safety equipment, and regular maintenance and inspection. These measures ensure your operation meets the new OSHA directives and protects the health and safety of your workforce.
Scott McLaughlin, McLaughlin & Associates Thermal Spray Inc.

Tuesday, Nov. 15
10:30 a.m.–12:30 p.m.

Tube & Pipe Welding & Inspection (F38)
Recent Trends in HF Contact Welding
Learn how recent design developments in HF contact welding have improved the process, resulting in less contact marking of the tube, higher efficiencies, longer contact tip life, less downtime, and better weld quality.
Thomas Ignatowski, Thermatool Corp.

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Regulated Metal Deposition (RMD™) Modified Short-circuit MIG and Pro-Pulse™ Pulsed MIG Welding Processes Advance Pipe Welding Performance and Productivity

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Jim Cuhel, Miller Electric Mfg. Co.
Ron Halpenny, Graham Corp.

Wednesday, Nov. 16
8:00 a.m.–10:00 a.m.

NEW! Hydroforming—It's Lower-Cost Than You Think (F54)

This session will provide the knowledge you need to plan a hydroform cell step by step, including how to automate the entire process and what assorted modules are typically used before and after the hydroform process.

Mike Bollheimer,
Wayne Trail Technologies Inc.

Thursday, Nov. 17
8:00 a.m.–10:00 a.m.

Basics of Tube & Pipe Fabrication (F85)

Lubrication Fundamentals for Bending and End Forming Tube & Pipe

Learn about the different families of lubricants used for bending and end forming tube and pipe and the advantages and disadvantages of each. Learn how to select the most compatible lube for your process that takes into account any secondary processes like welding and the chemistry of your cleaners.

Joe Hough,
Tower Oil & Technology Co.

Bend Shop Improvements

In today's challenging manufacturing environment, we often get asked to improve efficiency and productivity in every area of the bending process. So where do you start? What are the areas where the most payback can be found? How do you get the operators to buy in? How do you change the culture?

Kent Horn, Horn Machine Tools Inc.

Thursday, Nov. 17
10:30 a.m.–12:30 p.m.

NEW! Advanced Tube & Pipe Fabrication With Tech Tour (F92)

Tube Bending Goes All-Electric

Learn how all-electric benders can reduce setup time while improving bend quality and repeatability. Find out how all-electric benders utilize less energy and eliminate the potential environmental hazard of hydraulic leaks. Learn how to reduce work-in-process by utilizing stack tooling.

Jeff Arendas, BLM Group USA Corp.

Eliminating the Black Art of Tube Bending

The focus of this session will be on how the all-electric tube bending machine is finally accepted as the only approach for high-value, high-accuracy, repeatable production. Learn about the latest developments and how they can benefit your business.

Alan Pickering, Unison Ltd.

For additional conference listings, please visit www.fabtechexpo.com/education.cfm

Show Hours

Monday, November 14
10:00 a.m. – 6:00 p.m.

Tuesday, November 15
9:00 a.m. – 5:00 p.m.

Wednesday, November 16
9:00 a.m. – 5:00 p.m.

Thursday, November 17
9:00 a.m. – 3:00 p.m.

The new normal—quick response

FMA economist Chris Kuehl describes how the logistics industry welcomes shorter supply chains

By Tim Heston, Senior Editor

Chris Kuehl

How's this for irony? Wal-Mart Stores Inc. could be an indirect model for nearshoring in U.S. manufacturing. Yes, Wal-Mart. The retail giant everyone loves to hate has been blamed for boarded-up Main Streets and shuttered U.S. manufacturing plants. But this isn't the entire story. Over the decades Wal-Mart revolutionized the logistics business. To ensure efficient movement of inventory, and to react quickly to changing customer demands, the retailer developed a hub-and-spoke distribution network.

Railcars traveling from the ports deliver container loads of products to massive Wal-Mart distribution centers strategically placed across the continent. From these centers, short-haul truckers deliver certain quantities to replenish shelves. The distribution network made Wal-Mart's supply chain more responsive, because instead of tracing orders for products all the way back to a main distribution hub a thousand miles away, the company could order from one just several hours away, short enough so that a trucker could make the delivery and drive home to his family that night.

It's not as if Wal-Mart shelves soon will be full of made-in-the-USA products. According to a recent article from *The Consumerist*, the retailer's CEO did say that more than half of sales come from U.S.-made products. But according to the report, the executive may be using groceries and consumable household goods—most of which come from domestic sources—to support his statement. Wal-Mart's home-related merchandise, electronics, and clothing still generally are made overseas.

Regardless, the retailer's hub-and-spoke supply chain has become a model of efficiency in the logistics realm. Major corporations like Honeywell and Emerson Electric have since set up their distribution networks to mirror the retail giant's logistics wizardry. These supply chains demand flexibility and quick response—and this happens to be what America's best manufacturers can offer.

Chris Kuehl, economist for the Fabricators & Manufacturers Association, has studied the logistics field for years. He is also managing director of Armada Corporate Intelligence in Lawrence, Kan., and has various clients in the transportation and credit management arenas. At this year's FABTECH show in Chicago, Kuehl will lead a keynote panel of machine tool company executives.

These executives head companies offering equipment that obviously produces efficiently, but also may allow for fast setup and job change-overs. For example, parts for myriad jobs can be nested dynamically on one sheet for laser cutting or punching; and new press brakes, folders, and panel benders require minuteslong (not hourslong) setups between jobs. Modern metal forming and fabrication can stop on a dime and change direction without missing a beat.

Such a strategy can shine when manufacturers are, geographically speaking, close to customers.

The FABRICATOR: *How has the logistics industry adapted to overseas manufacturing and the advent of global supply chains?*

Chris Kuehl: Many people in logistics have never been comfortable with long supply chains. These countered almost everything that was happening domestically, because at the very same time that you're dealing with these long supply chains, you have the "Wal-Martization" of the supply chain, which emphasizes regional distribution. Look at long-distance trucking companies—they're struggling. The ones that have been growing have been regional providers. Nearshoring actually gets back into the comfort zone of the transportation sector. They're all for it.

Many people in logistics have been uncomfortable with long supply chains.

Wal-Mart's model finds the cheapest way possible to get the goods to their regional distribution centers, which is generally by rail. Then you have shorter routes from that distribution center out to the various Wal-mart stores. It's a modified hub-and-spoke model.

This does not relate directly to manufacturing, except that every major company has looked at that model and saw it as a really good way of handling distribution. They're copying it. Honeywell uses it. So does Emerson Electric, and the automotive companies are using it too.

The FABRICATOR: *There are obvious risks to long lead-times in a global supply chain. It takes time to cross the Pacific Ocean. But is longer lead-times the only problem?*

Kuehl: Look at what's happening with ocean cargo. Many of these companies overinvested. Now they're in financial trouble, and many think that we are going to go from a glut of cargo ships to a shortage. Companies can't get the ship they need. The ship is with a company that's in financial distress. They don't want to use a lot of fuel, so they engage in slow-sailing, and now it takes two weeks longer for the parts to arrive. Now you have the manufacturing sector saying, "You do know that if you had worked in plants in neighboring states, those plants would have delivered those parts in a matter of days."

The Boston Consulting Group study released earlier this year reported that China was going to be losing its competitive edge over the U.S. by the middle of this decade, predominantly because China's wages have gone up, and because labor costs are much less significant now when costing out a product. China still has a labor advantage, of course, but it doesn't matter, because the expenses really include those capital expenditures, transportation costs, and so on.

Of course, people talk about China's low wages, and if corporations see that China isn't the low-wage competitor it used to be, then they'll just move to the country that still is. But China's advantage was always twofold: It was partly because of its low wages, and partly because of its infrastructure to support foreign trade. If you consider Indonesia, Vietnam, or even India, look at the infrastructure. Some of their highways and ports can be horrendous. So the expense of trying to ship out of those countries, even though they have cheap labor, is absurd.

When we talk to companies, we keep telling them that when they're costing out products, they have to look at total costs, which also include the cost of inspection, the cost of delay, and the cost of compliance with certain industry requirements. Environmental regulations have made it more expensive to run trucks right off the dock—and those costs are being passed on to the shippers.

The FABRICATOR: *But what about the major investments corporations have already made in manufacturing overseas?*

Kuehl: Many companies will be facing some uncomfortable moments of truth, because they have put an awful lot of money into and emphasis on their international supply chain. That was the thing to do for the past 15 years, if not longer. It's been eroding as a good idea for a few years now, because of the energy and transportation costs. But I think the wake-up call for a lot of companies was the Japanese supply chain debacle after the devastating earthquake earlier this year. Companies were shut down for months.

People didn't really notice that one of the reasons just-in-time worked was that years ago you had multiple suppliers. Over time, just-in-time actually helped eliminate the competition to the point where the most efficient company won the battle, so it ended up being the only company customers relied on for just-in-time delivery. As that was happening, nobody noticed that it worked like a charm—but only if that company was still producing products. **FAB**

Senior Editor Tim Heston can be reached at timh@thefabricator.com. For more information on FABTECH, which takes places Nov. 14-17 in Chicago, visit www.fabtechexpo.com.

How much does offshoring cost—really?

Harry Moser works the numbers to demonstrate the true cost of outsourcing overseas

By Tim Heston, Senior Editor

Harry Moser

Harry Moser knows the machine tool business. Last year he officially retired as chairman emeritus of Lincolnshire, Ill.-based AgieCharmilles LLC, a maker of electrical discharge machining (EDM) and high-speed machining centers. Today he stands knee-deep in the advocacy business—specifically reshoring, supporting companies that bring previously offshored manufacturing back stateside.

He is all business. Yes, he is passionate about U.S. manufacturing. Yes, he feels that bringing manufacturing back to our shores can help put a lot of people back to work. And yes, he feels manufacturing will help reinvigorate the middle class. But at heart he remains a business executive who is well aware of economic realities.

Major OEMs close U.S. factories for various reasons, but according to recent reports, labor savings isn't as big of a factor as it once was. China's wages still are low, of course, but they're rising. And because of all the uncertainties that come with a long supply chain, any factor forcing the China price upward can be significant.

What are the *true* costs of manufacturing thousands of miles away? Being true to his roots in business management, Moser set out to quantify this cost by developing a tool that estimates what he calls the total cost of ownership (TCO) of outsourcing. His TCO Estimator—central to his reshoring initiative and available for download at www.reshorenow.org—estimates the true costs of sending work offshore, including transportation costs, excess inventory costs, intellectual property theft, and foreign wage inflation.

Not surprisingly, the estimator has been a hit with contract manufacturers looking to win work from OEMs. A contract fabricator quotes a price and then can use the estimator to show the prospect an approximate total cost of outsourcing the work overseas. A lower price quoted by an overseas firm is just part of the total cost.

The challenge, Moser said, has been with large stateside OEMs. Many are well aware of the reshoring trend already taking place. When the Boston Consulting Group released its report earlier this year about U.S. manufacturing's resurgence, OEM executives paid attention. But in some cases, companies literally can't find U.S. manufacturers to make certain products. In other cases, large corporations have already invested billions in overseas manufacturing facilities. Reversing decadeslong offshoring strategies may be a bit like throwing an oil tanker in reverse.

This year Moser is traveling around the country to make more than 100 presentations, one of them being a keynote at FABTECH in Chicago Nov. 14-17. His speeches don't resemble the sound bites from politicians making obligatory visits to manufacturing plants, preaching the good-old American virtues of the manufacturing worker.

Moser goes a step further. Yes, America needs jobs. Yes, manufacturing may help our struggling middle class. But when Moser makes his case, he shows the math. It turns out that moving manufacturing closer to customers creates a shorter supply chain, one that reacts faster to change and can reduce inventory costs by sending smaller orders more frequently, delivering just what customers need, just in time.

It seems the oil tanker can go in reverse. It may be only a matter of time.

The FABRICATOR: *How did you decide what to put in the TCO Estimator?*

Harry Moser: I read every article I could find on offshoring and reshoring and found a consistent pattern of costs that various economists, writers, company owners, and other businesspeople reported. I then made a list, and I read the general and theoretical articles on the subject. The rest I developed from my academic and professional experience, including international trade and supply chains. They just made sense to include.

So many companies just look at price, and some look at price plus duty and freight. In my experience—and surveys say this as well—most companies don't look beyond this. So it was a question of coming up with what was not in the current practice, but ideally should be.

For instance, consider product liability and nonrecovery risk, an item on the estimator. According to an article in *The Financial Times*, a component was made in China, sourced by a U.S. product company. The product failed, the customer sued, and it collected only from the U.S. product company. The customer could not get through the Chinese legal system to collect from the company that actually made the failed component. There's a risk of not being able to recover on a liability that would almost surely be collectable in the U.S.

Another item on the estimator is intellectual property risk. There's a theoretical chance in the U.S., but there's clearly a much higher risk in China. Another item is opportunity cost. What dollar value of orders are you going to lose if, sourcing overseas, you can't deliver or can't respond quickly enough, because the [supply chain] pipeline is too long; or because the container load came in, the quality was bad, so you couldn't deliver on time, and you lost that order or even that customer?

For all this, the estimator calculates it as the price of the component that's purchased multiplied by a probability. You could do more detailed calculations, but then the spreadsheet would be so long that nobody would do it. That's why I call it the Total Cost of Ownership Estimator, not calculator.

Consider intellectual property risk. Take a simple bracket, and then Coke®'s formula. There's a lot more intellectual property risk on Coke's formula than there is on the bracket, so you would assign a higher risk to that formula. Are two numbers absolutely correct? Almost surely not, but it identifies the higher risk. If you get the relative items right, comparing costs in the U.S. versus overseas, then the answer should turn out to be highly useful.

The FABRICATOR: *This seems to bring risk assessment into the purchasing function, correct?*

Moser: Yes, and companies should be thinking about that risk. The surveys that have been done by me and others say about 60 percent of companies do not look at much more than rudimentary costs.

The problems arise because of the incentive structure in place. Everything suggests that supply chain managers receive bonuses on their savings at the price level. It's easier to get big savings at the price level than the total cost of ownership level, and it's easier to calculate. Also, companies like to announce their bold supply chain moves to cut costs. But they're not necessarily cutting costs—only the purchase price.

In addition, many accounting and business software systems don't calculate total cost of ownership. They calculate price, and they calculate cost of goods sold. I asked one company if they calculate duty and freight in these costs. The containers that came in had five different items, each of a different quantity. They told me they take that freight cost and use an aggregate against cost of goods sold, but they didn't allocate specific costs to each of the parts, because that would have taken too much time. So the accounting and business software systems don't make it easy to calculate total cost of ownership.

The FABRICATOR: *What's been the major resistance for you since you launched this initiative?*

Moser: Large companies have invested a lot of money in offshore facilities to supply the U.S. market, and the last thing they want is to be told some of that was a mistake now. A decade ago it may have been a good decision, but now with higher wages, oil prices, and so on, it may not be a good decision anymore.

Some of them do believe that they're already doing total cost of ownership, even though they're giving bonuses to the supply chain person based on price. The policy may be to consider total cost, but in practice they aren't.

It's easy, of course, to get the attention of the contract manufacturers, the metal suppliers, the machine toolmakers, the software suppliers, and others because they all will clearly benefit if more work is brought back here. They already believe in it. They know it. They are onboard.

If I'm a salesperson and I'm talking with an OEM, I say, "I'd like to make those parts for you." You say, "Harry, you could, but you'd have to match the China price." Then I would say, "Do you mean your price from China, or your total cost of ownership from China?" The OEM representative asks what I mean. "Well, I've got this software [the TCO Estimator], and it seems credible. A lot of people are using it. Let's work it through together to find out where I really need to be to actually save money for your company."

The FABRICATOR: *We've always heard, over and over, that offshoring occurred because of labor costs. But were there other drivers?*

Moser: Companies sent work offshore for various reasons, but three stand out: One, it was a lower price. Two, everybody else was doing it, and people felt they needed to have some sort of offshoring strategy that they could talk about, put in their annual report, and tell Wall Street about. And third, there is logic to putting a factory overseas to both sell in China and ship back to the U.S.

Some of it was about how China was this large, growing market, and companies felt they needed to be there. There's some logic to that. But I ask them to analyze those decisions. If you're doing it to sell in China, that's fine. But if you're doing it to make components that will ship back to the U.S., make sure you've at least calculated the total cost of ownership to ensure that decision increases your profitability.

The FABRICATOR: *What if a manufacturer attempting to get work back from offshore uses the estimator and discovers total cost still is less in Asia?*

Moser: I hope to put together a group to tackle what I call "closing the gap." Right now there's a price gap between the U.S. and China. The U.S. shop may be at $100, while the Asian company may be at $70. Using total cost of ownership, in many cases you can close the gap, but in some cases you may not. You may cut that gap in half, so only $15 separates the two prices. So now the question becomes, "What can the U.S. company do using lean manufacturing, theoryof constraints, quick-response manufacturing, or anything else to bring the U.S. price down while still maintaining good profitability?"

My hope is for this group to produce benchmark information from typical contract manufacturers. Which type of improvement effort worked for what kind of company? This would give companies an idea where to go for help to improve operations and finally close the gap.

It's a combination. The TCO Estimator gives accurate information, which can cut that price part of the way. Then more efficient manufacturing eliminates the price difference entirely—and now we're competitive, even with the currency where it is.

Senior Editor Tim Heston can be reached at timh@thefabricator.com. For more on Harry Moser's Reshoring Initiative, and to download the Total Cost of Ownership Estimator software, visit www.reshorenow.org. For more information on FABTECH, visit www.fabtechexpo.com.

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Note: This list is current as of August 25, 2011. This list of exhibitors was supplied by the show's co-sponsors. The FABRICATOR *is not responsible for any inaccuracies on the list as it was provided to the editors. For the most up-to-date list, refer to the Show Directory distributed at FABTECH, or visit www.fabtechexpo.com.*

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3-D Solutions Design Service LLC
www.3ddiedesign.com

3M
www.3m.com/occsafety

3R Software Solutions
www.3-r.de

5S Supply
www.5Ssupply.com

A & A Manufacturing Co.
www.gortite.com

A J Dralle Inc.
www.ajdralle.net

A&V Waterjet Tech Inc.
www.avwaterjet.com

ABB Inc.
www.abb.com/robotics

Abbey Intl. Ltd.
www.abbeyintl.com

ABICOR Binzel Corp.
www.binzel-abicor.com

Abrasive Blast Systems LLC (ABSBlast)
www.absblast.com

Abtex Corp.
www.abtex.com

Accurate Die Design Inc/LogopressCorp.
www.accuratediedesign.com

Accurex Measurement Inc.
www.tubemeasure.com

Accurpress America Inc.
www.accurpress.tv

Accustream Inc.
www.accustream.com

Ace Industrial Products
www.aceindustrialproducts.com

AceCad Software
www.acecadsoftware.com

Acme Finishing Co.
www.acmefinishing.com

Acme Refining
www.acmescrap.com

Acrotech Inc./Di-Acro
www.acrotechinc.com

ACT Test Panels LLC
www.acttestpanels.com

Addison Machine Eng. Inc.
www.ameinc.com

AddisonMckee Inc.
www.addisonmckee.com

ADF Systems Ltd.
www.adfsys.com

ADIRA SA
www.adira.pt

Advanced Mfg. Solutions LLC
www.pressbrakesafety.com

Aesthetic Finishers Inc.
www.afipowder.com

AFC Finishing Systems
www.afc-ca.com

A-G Tool & Die
www.agtooldie.com

AIDA-America Corp.
www.aida-global.com

AIM Inc.
www.aimmachines.com

Air Liquide
www.ALspecialtygases.com

Airflow Systems Inc.
www.airflowsystems.com

Airgas
www.airgas.com

Airloc
www.airloc.com

Ajan Elektronik Servis San Ve
www.ajancnc.com

Ajax Tocco Magnethermic
www.ajaxmag.com

AKS Cutting Systems Inc.
www.akscutting.com

Akyapak
www.akyapak.com.tr

Akzo Nobel Powder Coatings
www.interpon.com/usa

Alabama Laser
www.alabamalaser.com

Alabama Power Co.
www.amazingalabama.com

Alabama Robotics Technology Pk
www.alabamartp.org

Aladdin Welding Products Inc.
www.aladdin3in1.com

Albany Door Systems Inc.
www.albanydoorsystems.com

Albion Industries
www.albioninc.com

Alcos Machinery Inc.
www.alcos.ca

Allcryo
www.allcryo.com

Alliance Mfg. Inc.
www.alliancemfginc.com

ALM Corp.
www.almcorp.com

Alma Cam USA LLC
www.almacamusa.com

Alma Machinery Co.
www.almamachinery.com

Almco Inc.
www.almco.com

Almond Products Inc.
www.almondproducts.com

Alpha Professional Tools
www.alpha-tools.com
Alpha Workholding Solutions
www.alphaworkholding.com
Alpine Bender Machinery
www.alpinebender.com
Alro Steel Corp.
www.alrosteel.com
AltaMAR Inc.
www.altamarinc.com
Alternative Parts Inc.
www.altparts.com
AM Machinery Sales
www.ammachinerysales.com
AM Vaerktoj
www.amv.dk
Amada America Inc.
www.amada.com
Ambi Clutches & Joints Corp.
www.ompisrl.com
Americ Corp.
www.americ.com
America Fortune Co.
www.americafortune.com
American Express Open
www.open.com
American Finishing Resources
www.afrnow.com
American Friction Welding
www.teamafw.com
American Punch Co.
www.americanpunchco.com
American Roll Form
www.arfpcorp.com
American Society for Nondestructive Testing
www.asnt.org
American Technical Publishers
www.go2atp.com
American Torch Tip Co. Inc.
www.Americantorchtip.com
American Welding Society
www.aws.org
Ameritherm -AnAmbrell Co.
www.ameritherm.com
AMET Inc.
www.ametinc.com
AMETEK Specialty Metal Products for Fab
www.ametekmetals.com
AMETEK Specialty Metal Products for Welding & Thermal Spray
www.ametekmetals.com
Ampco Metal Inc.
www.ampcometal.com
AMS Controls Inc
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Anchor Danly
www.anchordanly.com
Anest Iwata USA Inc.
www.anestiwata.com
Antec Electronics (Wuxi) Co. Ltd.
AP&T NorthAmerica Inc.
www.aptgroup.com
Aquasol Corp.
www.aquasolcorporation.com
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www.arborimage.com
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www.arbormetals.com
ARC Abrasives Inc.
www.arcabrasives.com
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www.arcmachines.com
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www.arc-products.com
Arc Specialties Inc.
www.arcspecialties.com
ARCON Welding Equipment LLC
www.arconweld.com
ArcOne
www.arc1weldsafe.com
Aristo Machines
www.aristomachines.com

ARKU Coil Systems Inc.
www.arku-coil-systems.com
Arro-Mark Co. LLC
www.arromark.com
Arrowhead Manufacturers & Fabricators Association
www.amfa-mn-wi.org
ASKO Inc.
www.askoinc.com
Associated Rack Corp.
www.associatedrack.com
Associated Spring Raymond
www.asraymond.com
Assured Testing Services
www.assuredtestingservices.com
Astro Arc Polysoude
www.astroarc.com
ATEK Corp.
www.atekcorporation.com
Atema Inc.
www.atema.com
ATI Industrial Automation
www.ati-ia.com
Ati Stellram
www.stellram.com
Atlanta Drive Systems Inc.
www.atlantadrives.com
ATTEXOR Clinch Systems SA
www.clinchsystems.com
Auburn Mfg. Inc.
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Autoform Eng. GmbH
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Automated Tapping Systems
www.automatedtappingsystems.com

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www.awpind.com
AWS Foundation
www.aws.org
Axelent Inc.
www.axelentusa.com
Axxair SA
www.axxair.com
AZZ Galvanizing Services
www.azzgalvanizing.com
B&B Steel Products Inc.
www.bandbsteel.com
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A Member of the Formtek Group
www.bkformtek.com
Bachhuber Mfg.Corp.
www.bmcautomation.com
Bachman Machine Co.
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Bad Dog Tools
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Balluff Inc.
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www.bandsawparts.com
Baril Coatings USA
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www.baystatesurfacetech.com
Baykal Makina Sanayi ve TicaretAS
www.baykal.com.tr
BCN Technical Services
www.bcntechserv.com
Beckhoff Automation
www.beckhoffautomation.com
Beckwood Press Co.
www.beckwoodpress.com
Behringer Saws Inc.
www.behringersaws.com
Beijing China XingGang Technologies Co. Ltd.
www.vegaweld.com
Bellman-Melcor Inc.
www.bellmanmelcor.com
Bend Tooling Inc.
www.bendtooling.com
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Berger Gruppe GmbH
www.bergergroup.de
BESSEY Tools North America
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BESTAR LLC
www.bestar-steel.com
BesTech ToolCorp.
www.bestechtool.com
Betenbender Mfg. Inc.
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Big Ass Fans
www.bigassfans.com
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www.bihler.com
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Bilz Vibration Technology Inc.
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www.BGK.com
Bishop-Wisecarver Corp.
www.bwc.com
Blastec Inc.
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BLM GROUP USA Corp.
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www.bucorp.com
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www.bohlerweldinggroupusa.com
Bonal Technologies Inc.
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www.bortech.com
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www.boschtools.com
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www.boschrexroth-us.com
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www.boschertusa.com
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Bruce Diamond Corp.
www.brucediamond.com
Bruderer Machinery Inc.
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Bruker Elemental
www.bruker.com/hhxrf
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Bug-O-Systems/Cypress Welding
www.bugo.com
Bulk Chemicals Inc.
www.bulkchemicals.us
Bunting Magnetics Co.
www.buntingmagnetics.com
Burghardt + Schmidt GmbH
www.b-s-germany.de
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Burr King Mfg. Co.
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Cadi Co. Inc.
www.cadicompany.com
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Calvary Industries Inc.
www.calvaryindustries.com
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www.cambcoinc.com
CAN-AM Engineered Products Inc.
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www.capitalweldcleaners.com
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www.carbitech.com
Cardinal Paint and Powder
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CarellCorp/EagleBending Machines
www.carellcorp.com
Carestream Health Inc.
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Carhartt Workwear at Rugged Outfitters
www.ruggedoutfitters.net
Carpenter Chemicals LC
www.cc-lc.com
Catalytic Industrial Systems
www.catalyticirovens.com
Cedar Valley Region of Iowa
www.cedarvalleyregion.com
CEIA USA
www.ceia-usa.com
Cemsa S.p.A
www.cemsa.it
Cerbaco Ltd.
www.cerbaco.com
CFCM Canadian Finishing & Coatings Mfg.
www.cfcm.ca
CGW-Camel Grinding Wheels USA
www.cgwcamel.com
CH Steel Solutions Inc
www.chsteelsolutions.com
Changzhou Golden Globe Welding & Cutting Equipment Co. Ltd.
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Changzhou Huarui Welding & Cutting Equipment Co. Ltd.
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www.czhyal.com
Changzhou Longren Mechanical & Electrical Co. Ltd.
www.longrenwelding.com
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www.shine-xunan.com
Changzhou Wujin Golden Globe Welding & Cutting Machinery Co. Ltd.
www.cn-goldenglobe.com
Chart Inc.
www.chart-ind.com
Chemco Mfg. Co. Inc.
www.chemcomfg.com
Chemetall US Inc.
www.chemetallamericas.com
Chemical Coaters Association Intl.
www.ccaiweb.com
Chicago Slitter
www.chicagoslitter.com
Chicago Women In Trades
www.chicagowomenintrades.org
China Council Promotion of Intl. Trade Machinery Sub-Council (CCPIT MSC)
www.chinamachine.org.cn
China Daheng Group Inc.
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Chiyoda Kogyo-Maruka USA
www.marukausa.com/chiyoda.html
Christy Metals
www.christymetals.com

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www.chu-cra.co.jp/pm
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www.cidanmachinery.com
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www.ciecocontrols.com
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www.cimatrontech.com
CIMID Corp.
www.cimid.com
CK Worldwide
www.ckworldwide.com
Clara Vision
www.weldingexpert.net
Clark Fixture Technologies
www.clarkfixtures.com
Clean Air Consultants/Filter 1
www.filter-1.com
Clear Clad Coatings LLC
www.clearclad.com
Cleveland Motion Controls/Burny
www.cmccontrols.com
Cleveland Punch & Die Co.
www.clevelandpunch.com
Cleveland Steel Tool Co.
www.clevelandsteeltool.com
Clips & Clamps Industries
www.clipsclamps.com
Cloos Robotic Welding
Inc.ww.cloosrobot.com
CM Industries Inc.
www.cmindustries.com
CMF
www.cmf.fr
CML USA Inc. Ercolina
www.ercolina-usa.com

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www.cna.com
COB Industries Inc.
www.cob-industries.com
Coe Press Equipment
www.cpec.com
Coherent Inc.
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***Coil World* Magazine**
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COLE-TUVE Inc.
www.coletuve.com
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Combilift USA
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COMEQ Inc.
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Commonwealth Oil Corp.
www.commonwealthoil.com
Compco Industries
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Computer Eng. Inc.
www.computereng.com
Computers Unlimited
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CONCOA Inc.
www.concoa.com
Continental Pipe & Tube Cut-Off Machines
www.continentalcutoff.com
Control Vision Inc.
www.controlvisioninc.com
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www.controlledautomation.com
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Coral SPA/Industrial Air Solutions Inc.
www.industrialairsolutions.com
Cordstrap USA Inc.
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COR-MET Inc.
www.cor-met.com
Corporate Finance Associates—Chicago
www.cfachicago.com
Cosen Saws USA
www.cosen.com
Costa & Grissom Machinery Co.
www.costagrissom.com
CPM Tool & Die Mfg. Co. Ltd.
www.cn-cpm.cn
CR Bearings—CuscinettiA Rulli S.r.l.
www.crsrl.com
Crippa S.p.A
www.crippa.it
Crum Mfg. Inc.
www.crummfg.com
CS Unitec Inc.
www.csunitec.com
CTS Fabrication
www.princeizant.com
Current Tech
www.currenttech.com
Cut Technologies Metal LLC
www.cuttech.com
CVI Melles Griot
www.cvimellesgriot.com
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Cyl-Tec Inc.
www.cyl-tec.com
D&H Machinery Inc.
www.dnhmach.com
D/F Machine Specialties Inc.
www.dfmachinespecialties.com
Dahlstrom —A Member of the Formtek Group
www.dahlstromusa.com

Dake Corp.
www.dake-div-jsjcorp.com
Dallas Industries Inc.
www.dallasindustries.com
Dalmec Inc.
www.dalmec.com
Danobat–Goiti
www.danobat.com
Darex LLC
www.darex.com
data M Sheet Metal Solutions GmbH
www.datam.de
Dataweld Inc.
www.dataw.eld.com
Daubert Cromwell
www.daubertcromwell.com
DAVI Inc.
www.davi.com
Daymark Technologies
www.dissolvo.com
Dayton Progress Corp.
www.daytonprogress.com
DCM Tech Inc.
www.dcm-tech.com
Decoral System USA Corp.
www.decoralamerica.com
DeFelsko Corp.
www.defelsko.com
Deloro Stellite Inc.
www.stellite.com
DELTA Computer Systems Inc.
www.deltamotion.com
Delta Industrial
www.deltaconcrete.com
Dengensha America Corp.
www.dengensha.com
DENN—Industrias Puigjaner SA
www.denn.es
Denray Machine Inc.
www.denray.com
Desch Canada Ltd.
www.desch.de
Design Data
www.sds2.com
DE-STA-CO
www.destaco.com
Devasco International Inc.
www.devasco.com
Diagraph MSP—an ITW Co.
www.diagraphmsp.com
Diamond Ground Products Inc.
www.diamondground.com
Diamond Saw Works Inc.
www.diamondsaw.com
Diamond Vantage
www.diamondvantage.com
Diamond Vogel Paints
www.diamondvogel.com,
www.peridiumpowder.com
Die Makers Mfg.Corp.
www.diemakersmfg.com
Die Tech Services Inc.
www.dietechservices.com
Diehl Steel Co.
www.diehlsteel.com
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Dinse Inc.
www.dinse-us.com
Direct Wire & Cable
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Diversi-Tech Inc.
www.diversitech.ca
DoALL Sawing Products
www.doallsawing.com
Docmagnet Inc.
www.docmagnet.com
Donaldson Torit—Donaldson Company Inc.
www.donaldsontorit.com
Dongsan Bearing Co.
www.dongsanbearing.com

Doringer Cold Saws
www.doringer.com
DOU YEE Technologies Ptd. Ltd.
www.douyeetech.com
Dr. Gold & Co.
www.carrydate.com
Dr. Shrink Inc.
www.dr-shrink.com
DSI/Dynamatic (Drive Source Intl.)
www.drivesourceusa.com
Dual Draw LLC
www.dualdraw.com

DuBois Chemicals
www.duboischemicals.com
DuBose Packaging LLC
DuPont Industrial Coating Solutions
www.powder.dupont.com
Durable Superior Casters
www.durablecasters.com
Durable Supply
www.durablesupply.com
Dura-Carb Inc.
www.dura-carb.com

Durma/SCA
www.durmausa.com
Durr Ecoclean Inc.
www.durr-ecoclean.com
Durum USA
www.durumusa.com
DVB Design & Eng.
www.dvbdesign.com
Dynabrade Inc.
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Dynatorch Inc.
www.dynatorch.com

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www.earth-chainusa.com
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Easy Abrasives LLC
www.easyburs.com
Eaton Fabricating Co. Inc.
www.eatonfabricating.com
Eaton Leonard
www.eatonleonard.com
Eberle America Inc.
www.eberle-america.com
ECi M1
www.ecisolutions.com
Econco
www.econco.com
Edwards Mfg. Co.
www.edwardsironworkers.com
EFD Induction Inc.
www.us.efdgroup.net
EH Wachs Co.
www.ehwachs.com
Ehrhardt Tool & Machine
www.ehrhardttool.com
EHRT NorthAmerica/Porth Products Co.
www.porthproducts.com
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www.eicgroupusa.com
Eifeler-Lafer Inc.
www.eifeler-lafer.com
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EL Hollingsworth & Co. Inc.
www.elhc.net
ELCo Enterprises
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Elcometer Inc.
www.elcometer.com
Elderfield & Hall
www.kooltools.com
Electron Beam Technologies Inc.
www.electronbeam.com
Elektro Physik USA Inc.
www.elektrophysikusa.com
Elmaksan Machinery
www.elmaksan.net
ELT Tooling Inc.
www.eatonleonardtooling.com
Elumatec NorthAmerica Inc.
www.elumatecusa.com
Emmegi USA Inc.
www.emmegi.com
Enco Mfg. Co.
www.use-enco.com
Engineering Technology Associates Inc.
www.eta.com
Enprotech Mechanical Services Inc.
www.enpromech.com
ENTRON Controls LLC
www.entroncontrols.com
Enutron Intl.
www.enutron.com
Environmental Air Solutions
www.keeptheheat.com
Epicor SoftwareCorp.
www.epicor.com
Epilog LaserCorp.
www.epiloglaser.com
Equipois Inc.
www.equipoisinc.com
Erasteel Inc.
www.erasteelamerica.com
Ergotech Inc.
www.ergotechinc.com
Erickson Metals Corp.
www.ericksonmetals.com
Eriez Magnetics
www.eriez.com

Ermak USA Inc.
www.ermakusa.com
ESAB Welding & Cutting Products
www.esab.com
ESCO Tool Co.
www.escotool.com
Essen Trade Shows
www.essentradeshows.com
EST Group Inc.
www.estgroup.cwfc.com
Etco Industrial Co. Ltd.
www.etcochina.com
Euromac/Metal Finish LLC
www.metal-finish.com
Eurotec Eng. Inc.
www.eurotecus.com

Exact JobBOSS
www.exact.com
EXEL North America
www.exel-na.com
***Expansion Solutions* Magazine**
www.expansionsolutionsmagazine.com
F & G Tool and Die Co.
www.fgtool.com
Fab Supply Inc.
www.fabsupplyinc.com
***Fabricating & Metalworking* Magazine**
www.fandmmag.com
Fabricators & Manufacturers Association Intl.
www.fmanet.org
Faccin USA Inc.
www.faccin.com

Factory Cat
www.factorycat.com
FANUC FA America
www.fanucfa.com
FANUC Robotics
www.fanucrobotics.com
Farley Laserlab
www.farleylaserlab.com
FARO Technologies Inc.
www.faro.com
Fastenal Co.
www.fastenal.com
Feed Lease Corp.
www.feedlease.com
Fein Power Tools Inc.
www.feinus.com

Felton Inc.
www.feltoninc.com

***FF Journal* magazine**
www.ffjournal.net

Fibre-Metal/By Honeywell
www.fibre-metal.com

Fibro Inc.
www.fibroinc.com

Ficep Corp.
www.ficepcorp.com

Filter-DocCorp/FD Services Inc.
www.filter-doc.com

Fischer Technology Inc.
www.fischer-technology.com

Fladder-Hansen & Hundebol Inc.
www.fladder.com

Flame Technologies Inc.
www.flametechnologies.com

Flex Arm Inc.
www.flexarminc.com

Flow Intl.Corp.
www.FlowWaterjet.com

Flowdrill Inc.
www.flowdrill.com

Fluid Tech Machines Inc.
www.fluidtechmachines.com

Foerster Instruments Inc.
www.foerstergroup.com

Folding Guard Corp.
www.foldingguard.com

FomUSA
www.fomgroupusa.com

Fong Kai Industrial
www.fongkai.com

Fontijne Grotnes Inc.
www.fontijnegrotnes.com

Formdrill USA Inc.
www.formdrill-usa.com

Forming Technologies Inc.
www.forming.com

FORMTEK–Maine
www.cwpcoil.com

Formtek Metal Forming & Hill Eng.
www.formtekgroup.com

Foshan Yihong Welding Co. Ltd.
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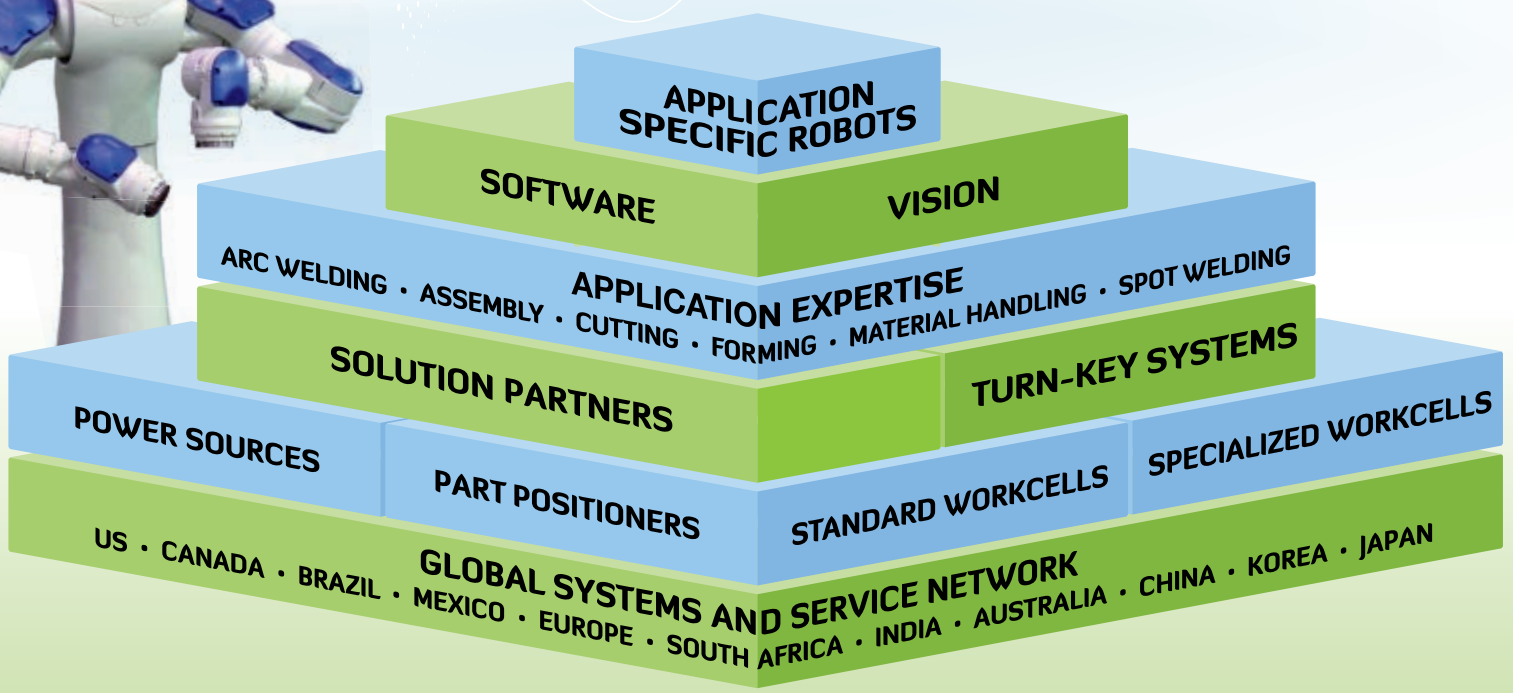

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CML USA Inc. Ercolina	1368	www.ercolina-usa.com
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Dengensha America Corp.	5314	www.dengensha.com
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Diamond X/General Tool	6761	www.gtdiamond.com
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SCA/Durma	1171	www.durmausa.com
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Sertom Group North America LLC	2361	www.tsgnorthamerica.com
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TRUMPF Inc.	1100	www.us.trumpf.com
Unist Inc.	3334	www.unist.com
United Aluminum Corp.	3133	www.unitedaluminum.com
Ursviken Inc.	769	www.ursviken.com
Versatility Professional Tool Storage LLC	3537	www.versatilitytool.com
Voortman Corp.	2558	www.voortmancorp.com
Wayne Trail Technologies Inc.	5769	www.waynetrail.com
Weiler Corp.	5615	www.weilercorp.com
Wila USA	1873	www.wilausa.com
Wilson Tool Intl.®	3321	www.wilsontool.com
Witt Gas Controls	6431	www.wittgas.com
Wysong Parts and Service	3140	www.wysongpartsandservice.com

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Servo presses

AIDA-America Corp. will demonstrate the NS2-1600(D), a 160- ton-capacity, straight-side servo press, as part of a completely functional line producing stamped parts. The line will be presented in cooperation with Formtek/CWP, Dayton Progress, AG Tool & Die, and Anchor Danly with a press provided courtesy of Royal Die & Stamping.

The company also will exhibit an NC1-1100(D) 110-ton, gap-frame servo press, demonstrating its ability to reduce reverse tonnage and its simplified operation.

Both presses have an infinite number of freely programmable, application-optimized speed, velocity, and dwell profiles.

AIDA-America Corp. | 937-237-2382 | www.aida-global.com

Waterjet abrasive delivery control

AccuStream Inc. has designed the Abrasive Regulator EPC (Electronic Proportional Control). Operated remotely from a CNC and mounted directly to any motion system, the regulator delivers the precise amount of abrasive to the cutting head for waterjet applications.

The regulator uses a mini abrasive hopper fed by compressed air and an electronically controlled transfer wheel to deliver a metered flow of abrasive directly to the cutting head. This metered flow eliminates clogs in the mixing chamber and feed line caused by too much abrasive.

AccuStream Inc. | 651-294-8600 | www.accustream.com

Auto-adjust toggle clamp

BESSEY® Tools North America has launched two new toggle clamp styles. Two versions of the horizontal toggle clamp and one version of the inline toggle clamp are offered.

Both styles can adjust automatically to workpiece dimensions while maintaining constant clamping force, and both have adjustable clamping force. Clamp force is from 25 to 550 lbs. Holding capacity is 700 lbs.

BESSEY Tools North America | 519-621-7240 | www.besseytools.com

Finishing equipment

Hans Weber Sales & Service will display information on its line of polishing, deburring, and slag grinding machines. Included is the TT series of finishing and grinding machines with the patented DR planetary disc, which handles laser oxide film removal and precision edge rounding.

Modular machine construction gives users versatility to operate abrasive belts, planetary disc stations, and polishing platens to attain their required surface finishes.

Hans Weber Sales & Service | 877-519-9795 | www.weberamerica.com

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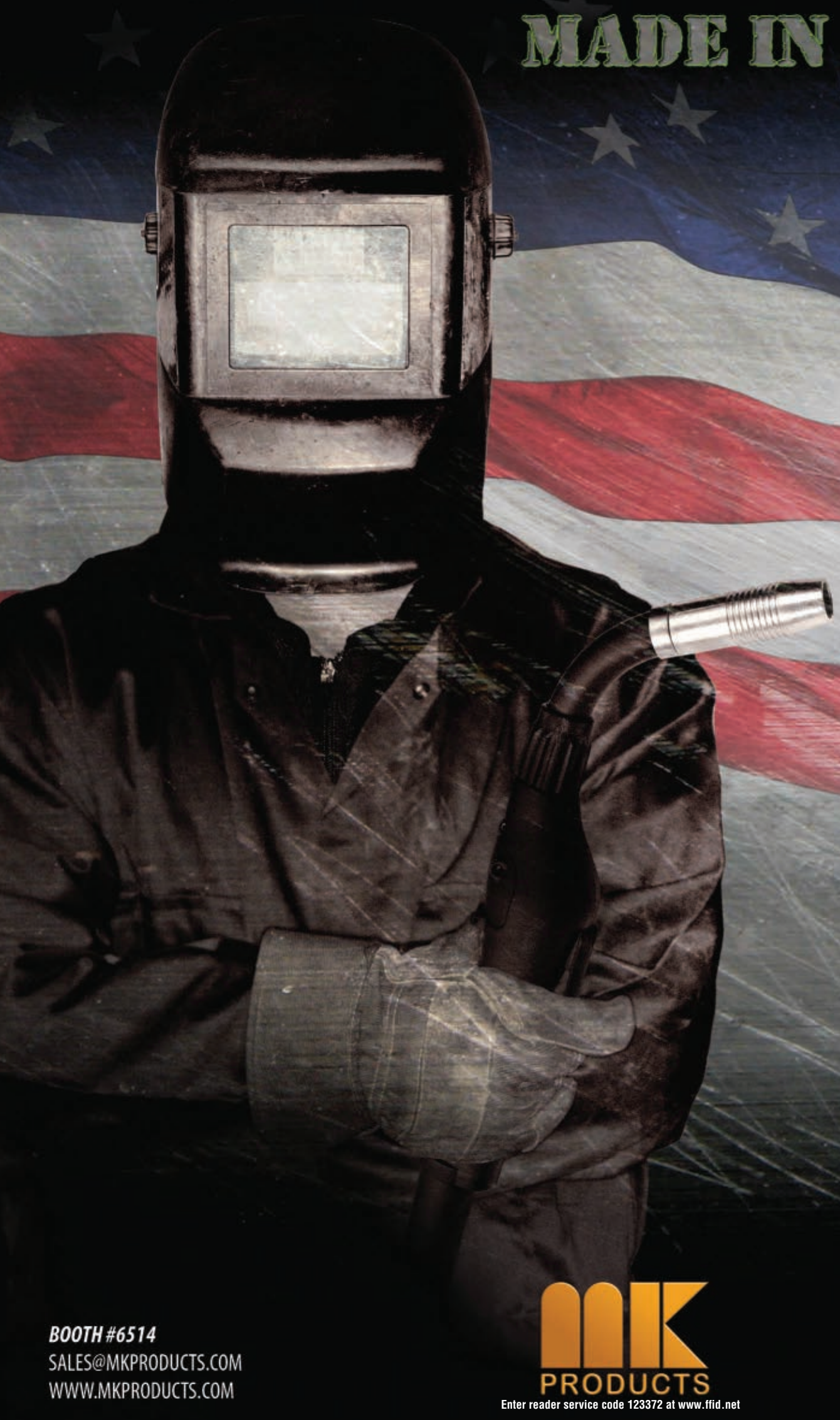

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IRVINE, CA 92606
(800) 787-9707

Industrial fan

Big Ass Fan Company® offers the 8- to 24-ft.-dia. Powerfoil®X industrial fan.

The fan, which delivers maximum airflow in large spaces, employs a sealed-for-life NitroSeal Drive™ gearbox. According to the company, destratifying space with the fan during the winter can reduce heating bills by an average of 30 percent.

Big Ass Fan Company | 877-244-3267 | www.bigassfans.com

CO_2 laser consumables

Richardson Electronics is a global distributor of RF tubes (power grid tubes) and consumables used in CO_2 industrial lasers. The company's inventory includes laser lenses, nozzles, filters, bellows, and other laser parts that can be shipped to any location around the world from stock.

Spare parts and replacement consumables are available.

Richardson Electronics | 800-348-5580 | www.rellaser.com

Band saw

Kalamazoo Machine Tool's model H6 SA double-column, semiautomatic mitering saw features a heavy monoweldment saw frame canted 6 degrees for sawing structural materials and mitering from 0 to 60 degrees.

The saw features two vises on the infeed side to help ensure the material is clamped securely during feeding and sawing operations. The material feeder is controlled by a variable-speed inverter drive motor that turns a roller ball screw and ball nut with a large number of recirculating ball bearings, producing a low friction coefficient and stabilization in the up/down and left/right directions. The material feeder vise and saw vise are designed to yield the smallest possible remnant end.

The saw has a 1.25- by 17-ft. 5-in. blade operating at 60 to 360 FPM. Material work height is 32.25 in., with a vise opening of 23.5 in. Capacities are 20 in. at 90 degrees, 17.5 in. at 45 degrees, and 9.5 in. at 60 degrees.

All functions are fully hydraulic, and the saw feed controls use precision control valves. A freestanding control console can be placed as needed by the operator.

Kalamazoo Machine Tool | 269-321-8860 | www.kmtsaw.com

Electrode application equipment

Rocklin Mfg. Co. will exhibit the Rocklinizer model 800, which has a rotary applicator to increase application speed. The 35-lb., portable unit can apply deposits from 0.0002 to 0.007 in. in a single application, controllable within 0.0001 in. by machine setting.

Tungsten carbide electrodes are applied to high-speed steel and other metal surfaces to help prolong useful life and reduce wear. Titanium carbide electrodes surface-seal carbide to help prevent chipping. "Rockhard" electrode material is applied to build up, to reclaim undersized tools by restoring tolerances, for maintenance, and to provide gripping surfaces.

Features include touch-panel controls and digital readout for deposit thickness and applicator speed.

Rocklin Mfg. Co. | 800-831-0890 | www.rocklinmanufacturingco.com

Portable clinching machine

The SPOT CLINCH® 0201 IP from Attexor Clinch Systems is a 100 percent pneumatic hand tool that produces more than two clinch joints per second in continuous production.

The tool is suitable for light-gauge sheet metal products such as HVAC, appliances, automobiles, electric products, and furniture.

Attexor Clinch Systems | 41-21-694-8000 | www.clinchsystems.com

Cutting tool machines

Fastenal offers the FAST 4000 CT℠ and FAST 2000 CT℠ cutting tool machines for controlling cutting tool consumption.

The machines dispense round tools and individual inserts, with detailed usage reporting. The compact design allows the installation of multiple machines throughout the shop. Workers have secure, 24/7 access to tooling without leaving the workcell.

The machines connect to the Internet, allowing for real-time reporting—on-demand or scheduled—and automated ordering to ensure that fill levels do not dip too low. A large visual display screen can display still images, presentations, and video content.

Fastenal | 507-454-5401 | www.fastenal.com

Tooling system technology

Mate Precision Tooling will exhibit its special-application tooling. The EasyMark tool marks parts for identification in downstream operations. The EasySnap tool creates shake-and-break joints for separating parts. The SnapLock tool makes interlocking tabs to lock parts together.

The company also will show its XMT24A two-piece punches for Euromac XMTE6 multitools, as well as the ValuGrind™ for regrinds of punches and dies. The regrinding machine comes completely fixtured and is available for thick-turret, TRUMPF®, Murata Wiedemann®, and Strippit® thin-turret tooling.

Mate Precision Tooling | 800-328-4492 | www.mate.com

Turret punch press

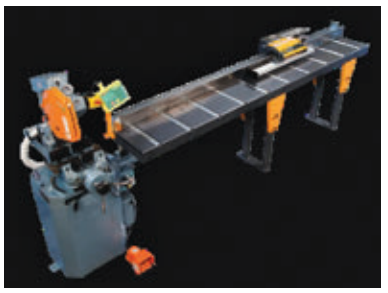
The new Motorum 2048ST ram-axis, servo-driven turret punch press is available from Murata Machinery USA for production of parts requiring punching, forming, tapping, and deburring.

According to the company, the press is an evolution from its Motorum EZ press, with a reinforced J frame design; a larger table and turret; stronger specifications; and a less complex and more rigid, energy-efficient ram drive.

The Wiedemann-style positive strip tooling is controlled throughout the punching stroke. With 28 tool stations as standard, the press can expand with the use of 12-station Varitools.

Murata Machinery USA Inc. | 704-875-9280 | www.muratec-usa.com

Linear positioning system



TigerRack is a rack-and-pinion-driven linear positioning system from TigerStop that attaches to a cold saw, punch press, ironworker, or bender. It can be used as a pusher or material stop and maintains its speed and accuracy to help ensure consistent-quality output, the company states.

The system is part of the manufacturer's Built Metal Tough™ product line, built to withstand heavy-duty use in metalworking environments. Systems are available for almost any application.

TigerStop LLC | 360-254-0661| www.tigerstop.com

Laser scanner for CMM

The CMS108 laser scanner from Hexagon Metrology uses flying-dot technology to scan one point at a time while adjusting laser intensity 10 times during each point measurement. This technology rapidly detects changes in colors and surface finishes via their reflectivity, allowing the scanner to transition from matte to shiny or multicolored surfaces without manual exposure adjustments or calibrations.

The unit is suitable for tight tolerances, with a 16 percent increase in accuracy. It incorporates a zoom feature that allows the operator to adjust the scan width to 0.94, 2.36, or 4.88 in. while keeping a density of up to 2,000 points per line.

Mounted to the seven-axis Romer portable CMM, the scanner and arm are specified as a total system suitable for inspection and reverse engineering applications on small, intricate parts, as well as large surfaces.

Hexagon Metrology | 800-274-9433 | www.hexmet.us

Drilling lubricant

Hougen Mfg. Inc. has introduced RotaFoam™ cutting fluid, an extreme-heavy-duty, foamy aerosol lubricant that protects the cutting tool even in hard, high-torque machining applications.

The highly sticky fluid adheres to the tool and reduces friction throughout the cut. It is formulated with XHD blue-colored foam, allowing the operator to see where the lubricant is sprayed to help ensure thorough coverage.

The fluid is designed for use on all metals, including carbon steel, stainless steel, INCONEL® alloy, Hastelloy®, titanium, aluminum, other alloys, and exotics. Applications include annular cutters, taps, drills, saws, reamers, and end mills.

The product, which contains no chlorinated solvents or CFCs, is available in single 17-oz. aerosol cans or in a case of 12 cans.

Hougen Mfg. Inc. | 810-635-7111 | www.hougen.com

Tooling changeover cart

The Versatility® turret and press brake changeover cart features an ergonomic design that stages and organizes tooling to help shorten setups.

Dies and guide assemblies are protected from scratches and other damage by a protective polyurethane liner. A drawer organizes instruments, shims, wrenches, and other changeover tools.

The cart is made from 14- and 16-ga. material, robotically welded. Its 6-in.-dia. casters have a capacity of 900 lbs. Two of the casters swivel and two are fixed.

Versatility Professional Tool Storage | 866-382-0482 | www.professionaltoolstorage.com

Tube connection components

J.W. Winco Inc. offers tube connection components in inch and metric sizes. When combined with round or square tubing, they can be used to build jigs, fixtures, and operating systems. The line includes tube clamp fittings made from aluminum or stainless steel, in two-way, split and multipart assembly, flanged, base plate, and T-angle designs.

Tubing is available in round and square configurations, aluminum, steel, and stainless steel. Also offered is a line of miniclamps in small sizes, typically used to build support structures for mounting sensors and Plexiglas® guards.

J.W. Winco Inc. | 800-877-8351 | www.jwwinco.com

Tooling systems

Wilson Tool International® Inc. will display punching, bending, and stamping products, such as a deburring tool designed to reduce secondary operations; a line of quick-change, large- radius press brake tooling; and Exacta ironworker tooling for heavy-gauge materials.

According to the manufacturer, its tooling systems for punch presses, press brakes, and stamping presses can help reduce waste, improve productivity, and solve specific fabrication challenges.

Wilson Tool International Inc. | 800-328-9646 | www.wilsontool.com

Multiprocess welding machine

Miller Electric Mfg. Co. has introduced the XMT® 450 MPa multiprocess welding machine, rated at 450 amps at 100 percent duty cycle.

The inverter-based power source offers pulsed GMAW capabilities with up to 0.052- and 0.0625-in. wires when matched with 74 MPa Plus and AlumaFeed™ feeders and an XR-AlumaPro or XR-Pistol GMAW gun. The system automatically adjusts pulse parameters as the welder works to match the wire feed speed. Remote control capabilities are available with the company's new XMT WCC or wireless remote control products.

Miller Electric Mfg. Co. | 800-426-4553 | www.millerwelds.com

Aluminum coil

United Aluminum Corp. offers rolling, annealing, and slitting to tailor aluminum coil to customers' applications.

Custom Rolled ® aluminum coil is available in a variety of alloys, including brazing sheet, all tempers, and special finishes. Ultraclose tolerances are available in any gauge from 0.005 to 0.160 in. and widths up to 37 in.

Any quantity is available, from prototype samples to large requirements, for worldwide delivery.

United Aluminum Corp. | 800-243-2515 | www.unitedaluminum.com

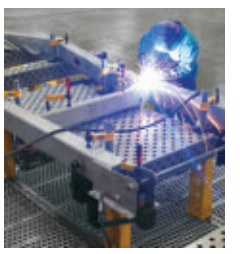
Pressroom feed equipment

Feed Lease Corp. offers pressroom automation to meet the material and productivity requirements of today's stampers.

The feed equipment, from single pieces to complete coil feeding lines, is designed to reduce downtime to help maintain productivity and profitability, according to the manufacturer.

Feed Lease Corp. | 248-852-6660 | www.feedlease.com

Modular fixturing for welding



Bluco's modular fixturing system for welding features precision- machined welding tables and a reusable set of tooling components, such as patented bolts, angles, clamps, and blocks, to fixture almost any weldment size and shape.

The five-sided design of the welding table allows for extension of the welding table surface for fixturing larger weldments. Tables also can be joined together, either face-to-face or with spacer blocks, for larger weldments.

Bluco Corp. | 800-535-0135 | www.bluco.com

Abrasive waterjet systems

OMAX® Corp. will showcase computer-controlled, multiaxis abrasive waterjet tables from its JetMachining Center and MAXIEM JetCutting™ lines. The tables come in sizes from 2 by 2 ft. to 13 by 46 ft.

Also demonstrated will be the new EnduroMAX™ direct-drive pump and the A-Jet multiaxis cutting head with terrain follower for machining parts with up to 60-degree bevels and automatic adjustments in material surface height changes without additional programming.

OMAX | 800-838-0343 | www.omax.com

Welding curtains

Goff's custom-made welding curtains allow users to create separate welding areas and contain welding fumes and contaminants. The curtains glide in and out of use on a galvanized steel track and roller system to form a UV-protected area when necessary.

Manufactured with 14-oz. solid vinyl and a 14-mil weld view PVC that blocks 100 percent of UV light, the curtains meet California State Fire Marshal standards for fire resistance and are water-repellent and resistant to mildew, rot, and most chemicals.

Accessory options include filter panels, floor sweeps, valance panels, and wind ties.

Goff's Enterprises | 800-234-0337 | www.goffscurtainwalls.com/fabricator

Trackless welding carriage

Gullco Intl. offers the Moggy®—the new 400 series trackless welding carriage with integrated wire feeder. Suitable for shipbuilding and beam welding applications, the electrically powered, self-propelled welding and cutting automation carriage travels in forward and reverse directions at precisely controlled speeds, the company reports.

Horizontal and vertical adjustments, as well as a fully adjustable gun/torch holder assembly, allow the carriage to accommodate various welding applications and help ensure weld quality and accuracy.

The Electronic Arc Height Sensor (EAHS) integrates with existing welding equipment to control torch height and weld current.

Gullco Intl. | 440-439-8333 | www.gullco.com

Low-volume spray nozzle

Unist Inc. has introduced the LV spray nozzle, designed to apply consistent amounts of fluid in a fan or cone spray pattern to coil or sheet stock and critical die areas. The nozzles are operated with a compressed-air input signal and an integral valve at the nozzle tip, which allow the pressurized fluid to flow when the air signal is present.

The volumes of fluid and atomizing air are controlled with independent, precision needle valves. The nozzles can be combined with the company's SPR-2000 programmable controller, which controls spray frequency and duration for up to 22 independent LV nozzles. A pressure tank and modular mounting options can be added to form a complete system.

Unist Inc. | 616-588-2237 | www.unist.com

exhibitor product preview >> www.fabtechexpo.com

Laser cutting system

Mazak Optonics will demonstrate its new Optiplex 2-D laser cutting system with flexible two-pallet changer. According to the company, integrated intelligent automation combined with high cutting speeds allow the system to process material thicknesses from thin steel to 1-in. mild steel.

The system's automated setup functions help maintain optimal cutting conditions, while the PreView II control helps simplify machine operation.

The company also will display a fiber laser, modular automation, a 6,000-W laser, and a 2-D plate/tube/pipe laser with integrated tapping.

Mazak Optonics Corp. | 847-252-4500 | www.mazakoptonics.com

Freestanding filtration system

Lincoln Electric Automation offers the Circulator™, a freestanding general filtration system for weld fume control. Suitable for manufacturing and fabrication facilities that have obstructions for ductwork, such as overhead cranes and large amounts of infrastructure, the unit is intended to supplement an existing source-extraction system.

The system reduces the amount of dust and dirt in the work area and supplements natural and forced ventilation to help reduce the concentration of welding fumes in the workshop.

Its Green-Drive™ control system uses a pressure sensor to monitor operations continually.

Lincoln Electric | 888-355-3213 | www.lincolnelectric.com

Grinding, finishing guide

Weiler Corp. has published a grinding and finishing guide that shows its product line, including a variety of flap discs for deburring, cleaning, weld blending, and finishing.

With the discs, grinding and finishing are accomplished in one step.

The original Tiger disc is suitable for jobs requiring a high cut rate and long life; the Vortec Pro™ flap disc is designed for a high cut rate with a value price; and the Trimmable Tiger® disc is equipped with a composite backing that can be trimmed. The ceramic Saber Tooth flap disc features ceramic cloth that provides cool, fast cutting action on aluminum, stainless steel, INCONEL® alloy, titanium, and other hard-to-grind metals.

The line also includes application-specific abrasive flap discs such as BigCat™ high-density discs for increased conformability on curved and irregular surfaces, the Tiger disc for stainless steel, and the BobCat™ disc for use with air and electric right-angle die grinders.

Weiler Corp. | 800-835-9999 | www.weilercorp.com

Plate processor

Peddinghaus offers the High-Speed FDB (HSFDB) plate processor for drilling, tapping, countersinking, milling, and cutting plate in a single pass.

A side-unloading conveyor delivers parts directly to the operator for situations where shop space is limited. One operator can load, process, and unload parts. P

Peddinghaus | 815-937-3800 | www.peddinghaus.com

Bar code tags

InfoSight has introduced a bar code traceability system for many harsh processes and environments to help trace products from the fabrication shop to the customer.

KettleTag®PLUS is a metal bar code tag formulated to withstand hot-dip galvanizing, surviving the molten zinc dip and resisting caustic wash and acid pickling.

PaintTag™ is a lower-cost bar code tracking tag for identifying fabricated steel through typical painting operations. It resists common paints and acid wash.

ShotTag™ has been developed to withstand the shotblasting process. It uses a metal substrate with a chemical- and heat-resistant coating.

All of the tags can be printed on the company's metal tag printers.

InfoSight | 740-642-3600 | www.infosight.com

Servo drive system

Dynatorch has introduced the new XLR8 CNC servo motion control system with integrated arc voltage torch height control designed for plasma and oxyfuel cutting.

According to the manufacturer, the new system offers increased torque, fast communications for greater detail, and smooth motion.

Dynatorch | 270-442-0560 | www.dynatorch.com

Coil feeding system

Formtek Maine will display a complete 12-in. by 0.125-in. by 8,000-lb. coil feeding system.

The equipment will uncoil, straighten, and feed 0.060- by 6.56-in. HSLA 340 material at feed lengths of 5.125 in. into a 160-ton AIDA servo press. The press will stamp coasters to be given away to show visitors.

Formtek Maine | 800-247-2645 | www.cwpcoil.com

Air-over-oil presses

Multicyl® cylinders are patented air-over-oil presses used for hole punching, notching, shearing, tube piercing, assembly, and metal joining.

The company provides individual cylinders for these applications, as well as turnkey punching systems, such as the Multicyl Linear Rail (MLR) system.

The MLR is adjustable along the Y axis, with a quick-change setup to accommodate punching in various part lengths and hole combinations.

It is designed to be compatible with standard unitized tooling and to work with shop air.

Multicyl Inc. | 800-388-6359 | www.multicyl.com

Three-in-one welding system

Thermal Arc®, a Thermadyne® brand, offers the first in a series of three-in-one multiprocess, fully integrated, portable welding systems for GMAW, SMAW, and GTAW applications.

The Fabricator® 181i system delivers up to 180 amps of welding output power from a 33-lb., compact system.

Standard features include a detailed weld setup guide for a variety of materials and shielding gases, digital meters with preview, infinitely variable voltage control, metal feed plate with quick-change drive rolls, and a receptacle for connecting remote control devices and a spool gun.

Thermadyne Industries | 636-728-3000 | www.thermadyne.com

Pipe sander/grinder

CS Unitec's Pipe-Max weld seam grinder/pipe sander helps render weld seams invisible and can produce satin to mirror finishes on stainless steel, aluminum, and high-quality metal pipe and handrails.

With a 14.5-amp, variable-speed (950 to 3,500 RPM) electric motor that provides high torque, the 11.25-lb. tool deburrs, grinds, and polishes closed and open pipe constructions from 0.375 to 14 in. in diameter. Constant sanding belt speed adjustment, from 33 to 100 FPS, and a continuous belt-tightening adjustment accommodate pipe material.

A gas pressure cylinder system allows uniform grinding and helps simplify pipe adjustments. The soft, elastic return roller allows the unit to adapt to pipe contours. Flat surfaces can be ground to remove spot welds and deep scratches, leaving no edges. The drive roller has replaceable rubber rings to help keep the grinding belts from slipping.

CS Unitec Inc. | 800-700-5919 | www.csunitec.com

Lubrication system for stamping

LSP Industries has released the new MiniCoater lubrication system to complement the company's line of stock lubricating equipment for the stamping industry.

Controlled lubrication dispenses only the quantity needed, where it is needed. Lubricant is dispensed on the exterior of the rolls to help prevent clogging. Rolls can be removed and replaced in less than two minutes, according to the manufacturer.

Four models are available for stock from 0.125 to 9 in. wide. The system's stainless steel frame is designed to withstand years of rugged use.

LSP Industries Inc. | 815-226-8090 | www.lspind.com

Plasma, oxyfuel system

Voortman has introduced the latest version of the V808M plasma and oxyfuel cutting, AISC-accepted holemaking, and layout system for processing beams, channels, angle, flat bar, and plate. The robotic cutting system is designed to accomplish tasks that previously required manual intervention; according to the company, savings of 15-to-1 over manual methods can be realized.

The system optimizes the cutting sequence of the stock length to help reduce cycle time per piece; reduce raw material requirements, consumable costs, and energy consumption; and minimize the process's carbon footprint.

The eight-axis robotic arm can cut and lay out on all surfaces of a structural steel profile. Using the plasma source, the layout function can place detail information directly on the profile, eliminating the need for multiple layout workers at the welding/fitting bench. Each location and part number of the plate or angle is produced on the profile.

The detail/layout information is taken from the 3-D CAD detailing system using the DSTV format. It then is filtered using the DSTV checker in case of file corruption before material is processed, helping to eliminate errors. Layout also can be generated directly using the company's proprietary user interface, VACAM.

A roller feed measuring system positions the material, eliminating the need for a fixed measuring pusher or gripper system. The roller feed measuring system works in unison with telescopic roller conveyors on the infeed and outfeed sides of the machine that extend and retract automatically to allow the Panasonic robotic arm to move freely around the material and support the material as needed.

Voortman USA Corp. | 815-468-6300 | www.voortman.net

Pipe notchers

Scotchman® Metal Fabricating Solutions has introduced pipe notchers by ALMI. Suitable for preparing double-corner joints for welding, the machines help ensure that the correct cope is made on gas pipes, steam pipes, and stainless steel pipes.

Three types of notchers are available: manual, electric, and abrasive notcher/grinder.

The wall-mountable manual machine allows the user to transfer considerable force with minimal effort. On the electric-drive notching machine, the motor forms one unit with the special eccentric shaft that drives the notching tool. The motor is fitted with an on/off switch with zero-voltage protection and a guard.

The abrasive pipe notcher/grinder, which features a clamp mounted on a compound carriage, grinds a diameter or any shape of pipe to the desired angle. The unit operates at high speed for machining of stainless steel sections without grinding burrs or discoloration.

Scotchman Industries Inc. | 800-843-8844 | www.scotchman.com

Industrial filtration systems

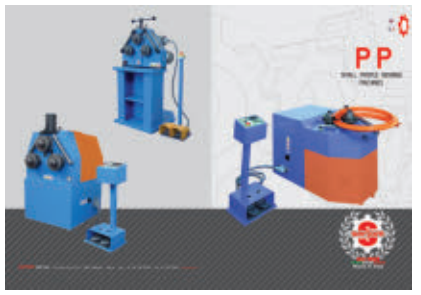
TDC Filter develops, manufactures, and supplies industrial filtration systems for protection of equipment, personnel, and the environment.

The company offers filters for any industry, baghouse, or collector. Custom systems also are available to help customers achieve compliance, governance, and capital cost goals.

TDC Filter | 800-424-1910 | www.tdcfilter.com

exhibitor product preview >> www.fabtechexpo.com

Angle rolls



The Sertom Group (TSG) North America LLC offers the new Italian-built PP line of profile bending machines (angle rolls), available in capacities from 0.5 by 0.5 in. to 8 by 8 in.

TSG North America is the exclusive importer for Sertom (Brescia, Italy) plate rolls, dish head, and flanging equipment, as well as heavy-duty presses and beveling machines.

TSG North America | 815-904-1666 | www.tsgnorthamerica.com

Plasma welding, cutting machine

The Multiplaz 3500 is a patented machine for welding, cutting, soldering, and brazing of materials including steel, aluminum, copper, cast iron, and bronze. Weighing 17.5 lbs., the portable plasma welding and cutting machine has a 100 percent, 24/7 duty cycle.

Instead of shielding gas, the unit uses a water/alcohol mixture for welding. It employs water to cut metals including high-alloy and stainless steel.

No consumables such as special electrodes, gas, propane, acetylene, or oxygen tanks are required. The unit runs on 230/115-V residential power.

Multiplaz North America | 855-314-5551 | www.multiplaz.com

Arc weld video system

InterTest Inc. offers the iShot Weld-i high-temperature V2011-UDR-C color weld video system, specially designed for live viewing and recording in the blinding light of arc welding.

With its Ultra-Dynamic-Range (UDR) of more than 10,000,000-to-1, the camera can capture the bright arc and metal features. A welding arc can be 10 million times brighter than the metal.

The video system reaches UDR levels by combining an HDR camera with PC-based digital signal processing. Each multiplies the range of the other, resulting in a dynamic range far greater than either can reach alone.

InterTest Inc. | 908-496-8008 | www.intertest.com

Raster-to-vector conversion software

Arbor Image Corp. has introduced Cutting Shop v 4.5, the latest version of its raster-to-vector conversion and editing program for fabricators and artists. The software gives users the tools to make 2-D art projects quickly, as well as machine parts, dies, gates, gaskets, and signage.

Adding to the previous version's updates—which included updated editing tools, Windows® 7 support, spline and ellipse import, and expanded preset values—the new version features TIF and PDF file support and more transformations so that text and artwork can be manipulated rapidly into unique flowing shapes. Users of v4 receive a free upgrade. Online demonstrations are available.

Arbor Image Corp. | 734-741-8700 | www.arborimage.com

CNC milling, drilling machines

Quickmill Inc. offers large-area CNC milling and drilling machines for the metal cutting and fabrication industries. Large tables, high-horsepower spindles, and complete turnkey milling and drilling systems are available.

Many table sizes are available on the Intimidator and Eliminator lines, accommodating a variety of parts in many different sectors.

Quickmill Inc. | 800-295-0509 | www.quickmill.com

Laser, inspection services

United Performance Metals has expanded its service offering with a Mazak 4,000-W laser and a Virtek Vision LaserQC inspection system.

The laser cuts stainless steel from 0.015 to 0.375 in. thick and can handle sheet sizes up to 60 by 120 in. The inspection system features reverse engineering capabilities that allow a finished part to be converted into an electronic file.

According to the company, providing in-house laser cutting capabilities will allow it to deliver stainless and high-temperature alloys to customers in near-net shapes, already cut to starting dimensions. Customers then can begin value-added services as soon as they receive the material.

United Performance Metals | 888-282-3292 | www.upmet.com

Magnetic conveyors

The Eriez Tuf-Trac™ magnetic conveyor removes and elevates ferrous materials such as chips, turnings, punchouts, and small parts using rare-earth magnets and drive in a sealed housing.

The units require no lubrication and can be submersed in a sump or oil bath.

Magnetic conveyors can be configured to collect high-grade steel scrap or parts into one central location from multiple machines and punch presses.

Eriez Magnetics | 800-345-4946 | www.eriez.com

Press brake

Ursviken has introduced the redesigned OptiFlex press brake in 88 to 350 tons and configurations up to 20 ft. The company will display the 230-ton, 10-ft. press brake with a material plate support and swing function that is synchronized throughout the bending cycle.

The entire electrical system has been changed, and the B&R control system combines with the PCSS system from LazerSafe for uninterrupted service. The Cybelec control system features ModEva RA 3-D software.

The company offers a complete lineup of hardened mechanical and hydraulic upper tool clamping to all press brake users to allow vertical tool changes for large-radius tools. For high-tonnage machines, an upper tool clamp is available to accept a 1.1-in. upper safety tang.

Ursviken | 866-872-4868 | www.ursviken.com

Portable weld preparation machines

Tri Tool® Inc. will show portable machine tools for weld preparation and in-place machining.

New machines include the model 208B and 214B BevelMaster® ID-mounted bevelers.

The company also will feature products from the new AdaptARC® welding product line, including the OrbitMaster™ digital welding arc controller and the DualARC™ multi-process GTAW-GMAW weld head.

Along with the featured equipment, the company will have representatives from its services division available to assist with on-site machining and welding services.

Tri Tool Inc. | 888-874-8665 | www.tritool.com

Arc welding equipment

OTC Daihen Inc., a division of the Daihen Corp. and the most recent Approved Testing Center (ATC), has been active in the U.S. arc welding market for more than 30 years. Originally known as OTC America (Osaka Transformer Co.), the company set up its first office in Charlotte, N.C., in 1979.

The company began as a supplier of welding equipment to other Japanese transplant companies but soon entered the U.S.-based Japanese automotive market as a provider of GMAW equipment and systems. In the late 1970s, OTC Japan developed its first generation of dedicated arc welding robots, and the company entered the U.S. robot business in 1983.

OTC Daihen Inc. | 800-682-7626 | www.daihen-usa-com

Mounted ceramic flap wheel

Grinding additives in the coating of the new Co-Cool mounted ceramic flap wheel from Pferd help prevent clogging and allow aggressive, cool grinding on stainless steel and nickel-based alloys.

These added elements are embedded within the resinoid bond on the wheel's strong, flexible backing cloth flaps, arranged radially about the tool axis. This fan-type configuration gives high flexibility for grinding hard-to-reach surfaces in tank and processing equipment construction or for fine work on radii in tool, die, and mold-making applications.

Pferd Inc. | 800-342-9015 | www.pferdusa.com

Fiber laser cutting system, hybrid press brake

SCA/Durma will show its new HD-F/L linear-driven fiber laser cutting system. The cutting system features an IPG fiber laser and Siemens linear motion control. The fiber resonator helps reduce energy consumption.

The company also will feature its hybrid press brake, equipped with a six-axis backgauge, CNC sheet followers, and a touchscreen control.

The company reports that the machine provides fast, smooth ram positioning; a 40 percent reduction in energy consumption; and reduced oil and horsepower requirements.

SCA/Durma | 800-367-6911 | www.durmausa.com

Welding outfits

Thermadyne® Industries' Victor® brand offers newly configured Journeyman® Select outfits that come standard with ESS4 Edge series regulators and environmentally friendly packaging.

In addition to the regulators, the outfits also include the 2460 cutting attachment and the 315 FC torch handle with built-in flashback arresters and reverse-flow check valves. The cutting attachments are available with 75- or 90-degree head angle.

The heavy-duty outfits cut material up to 8 in. and weld material up to 3 in. with the appropriate accessories.

An internal vent system protects the regulator internals from weather elements. Proprietary Shock Limitation and Absorption Mechanism (SLAM) technology, built into the knob, protects regulator vitals and the cylinder valve itself by absorbing more than 5,000 lb.-force of impact energy.

Thermadyne Industries | 636-728-3000 | www.thermadyne.com

Punch presses

LVD Strippit offers the Pullmax series of punch presses, including the LVD Pullmax 520, 530, 720, and 730 models. The machines perform punching, forming, marking, bending, and tapping.

The hydraulic press drive combines with rapid table accelerations and high hit rates to produce prototypes, short-run, and long-run operations. The machines handle workpieces up to 60 by 120 in. without reposition in material thicknesses to 0.315 in.

Advanced control software adds to the machines' forming capacity. Flanges up to 3 in. can be formed to any programmed angle. Flanges oriented on the sheet at angles other than 0 or 90 degrees can be formed using the OptiBend feature with 360-degree head rotation.

All-tool rotation allows every tool to rotate 360 degrees for total flexibility. All 20 tool stations are designed to hold any size tool, up to a maximum diameter of 3.54 in. Any tool can be used anywhere on the sheet. Tool capacity can be increased with the addition of indexable multitools in five- or 10-station configurations. An optional extended tool magazine, offered on the Pullmax 720 and 730 models, provides 40 additional tool stations.

LVD Strippit | 800-828-1527 | www.lvdgroup.com

Mechanized pipe welding system

Bug-O Systems has released the Piper-Plus pipe welding system, which is based on the capabilities of the original Piper-Bug system, plus several new ones.

Digitally integrated with the Lincoln Electric Powerwave S-350 power source and Autodrive 4R220 wire feeder, the system is capable of STT root, GMAW-pulse vertical-up and vertical-down, and FCAW vertical-up fill and cap. Automatic, through-the-arc torch height control is standard.

Bug-O Systems | 800-245-3186 | www.bugo.com

Plasma with drilling spindle

MultiCam® Inc. will display the heavy-duty 6000 series CNC bridge and rail plasma with drilling spindle. The system is designed for cutting heavy plate or needing a large processing area while maintaining accuracy and cut quality.

The motion platform is independent from the cutting surface to prevent damage from material loading or high-heat oxyfuel cutting.

An optional Max40 drill and tap spindle, which allows drilling of holes up to 1.125 in. dia. in steel plate, mounts next to the Hypertherm® torch.

The Z-axis probe, offered as an option, determines the Z-axis plane accurately on warped or inconsistent sheets.

MultiCam Inc. | 972-929-4070 | www.multicam.com

Waterjet cutting machine

Jet Edge Inc. has introduced the midrail gantry model MR513 waterjet cutting machine for cutting complex parts from almost any material without creating a HAZ.

The system comes standard with one abrasivejet cutting head. A second cutting head can be added to increase productivity.

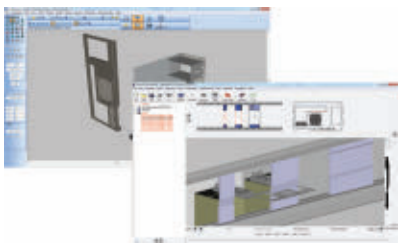
Optional mirroring makes it possible to cut large parts twice as fast, the manufacturer reports.

Featuring a direct-couple, AC, brushless digital servomotor and a single or double carriage, the machine is available with work envelopes from 5 by 5 ft. to 24 by 13 ft. It uses an industrial PC controller and can be configured so that all three axes are fully programmable (Z optional).

The system is powered by an electric or diesel waterjet intensifier pump from 25 to 280 HP, including 36-, 60-, and 90-KSI models.

Jet Edge Inc. | 800-538-3343 | www.jetedge.com

Press brake bending simulation



Planit's Radan brand Radbend module provides simple, offline press brake programming for 3-D model simulation of the bending process, helping to overcome production bottlenecks by eliminating online programming at the machine.

Features include automatic bend sequence calculations, automatic tool selection, and automatic finger-stop placement. The simulation shows whether any aspect of the part will collide with any aspect of the machine.

The module's tooling library can incorporate a tooling manufacturer's complete inventory, enabling non-standard tools to be tested and proven on new products before purchase.

Planit Software | 800-875-7232 | www.radan.com

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MillerWelds.com/hero

Straight-side servo press

Stamtec will feature the iLS1-160 single-point, straight-side servo press. With the company's servomotor drive technology, the standard electric motor, flywheel, and clutch/brake are replaced by a servomotor.

Proprietary press controls designed for the servo press achieve a variety of stroke lengths and slide movement profiles, while supplying full working energy capacity, even at low speeds. Preprogrammed profiles include perforation/blanking, compound pressing/forging, general forming, deep drawing, and warm forming.

User-defined motion curves allow up to 20 various segments in a cycle curve, defined by segment position, speed, and pause duration parameters.

Stamtec Inc. | 931-393-5050 | www.stamtec.com

Online welding resource

Bug-O Systems has established weld.com, a resource for the welding and cutting industry. The site allows users to engage with industry leaders, see full line cards and product reviews, and use multiple search features.

Information is available on manufacturers, distributors, manufacturers' representatives, consultants, schools, and job postings.

Bug-O Systems | 800-245-3186 | www.bugo.com

Laser systems, press brakes

TRUMPF will introduce the TruMatic 7000 laser system to the North American market. It combines scratch-free punching and laser processing with the TruFlow CO_2 laser. Available in medium and large formats, the machine can process sheet metal up to 0.3125 in. It delivers 4 kW of laser power and punching with a maximum stroke rate of 1,200 SPM in the medium format and 1,000 SPM in the large format.

The company also will showcase the TruLaser 5030 fiber, with the fiber-guided TruDisk solid-state laser, for cutting parts in thin sheet material. With its high dynamics, the machine makes full use of the solid-state laser to achieve high cutting speeds in thin sheet when producing parts such as medical products, items for ventilation systems, and façade elements, the company reports.

The TruLaser 1030, also on display, is available with either the TruDisk 2001 solid-state laser for 2 kW of power or the TruCoax 2500 laser for 2.5 kW of power.

The company also will feature the TruLaser 3030 with its TruFlow CO_2 laser. Available with up to 6 kW of laser power and the manufacturer's Roto-Las tube cutting option, the system has a single cutting head for processing sheets up to 1 in. thick.

Also on display will be the TruBend series 5000 hydraulic press brake and the TruBend series 7000 electric press brake, the TruMark Station 5000, TruTops software, portable power tools, and demonstrations of the mytrumpf.com customer portal.

TRUMPF Inc. | 860-255-6112 | www.us.trumpf.com

Touchscreen controller for ironworkers

Trilogy Machinery Inc., the U.S. distributor for Sunrise ironworkers and punching machines, has introduced the Omron touchscreen controller for CNC ironworkers. The controller features a 10.4-in., high-definition, color touchscreen interface with offline programming abilities; removable memory card for file transfer; and a PLC-based operating system featuring quick and custom programming.

The pivoting pendant-mounted design is positioned at eye level, providing the operator with a clear line of sight for part programming and operation. In addition, the controller can nest up to five different patterns into one program.

The Sunrise semiautomatic CNC plate and angle positioning system is available as a factory-installed option on any ironworker or punching machine with a 20-in. or larger throat depth in table sizes of 40 by 16 in., 40 by 24 in., 80 by 24 in., and 80 by 16 in. The pendant-mounted graphical control features simple user programming. The operator positions the plate, angle, or channel against the CNC X and Y stops and initiates the punch program, nearly eliminating the need for manual plate layout.

The positioning system features dual 400-W servomotors, ball transfers, 590-IPM variable positioning speed, and an accuracy of ±0.002 in. In addition, the machines feature ball-bearing linear guideways on either side of the table to help ensure parallelism and enhanced performance.

Trilogy Machinery | 410-272-3600 | www.trilogymachinery.com

Right-angle grinding abrasives

Norton, a brand of Saint-Gobain Abrasives, will exhibit new abrasive products for welding and metal fabrication applications.

Three of the four main displays will be product towers featuring right-angle grinding abrasives from the company's Best, Better, and Good categories, and the fourth will feature live demonstrations of a variety of the products being displayed at the show.

One product tower will feature flap discs, including SG Blaze® R980P, NorZon® BlueFire™, and Merit® Metal discs. New this year is the Quick Trim backing on SG Blaze and TwinStar™ flap discs, providing a new flexible, trimmable plastic back plate.

The second tower will feature new nonwoven right-angle discs, including SG Blaze Rapid Strip™ and Vortex® Rapid Blend™.

Depressed-center wheels from 4 to 9 in. and 0.125 to 0.25 in. thick will be featured in the third tower, including the new BlueFire advanced zirconia wheels.

Norton | 508-795-4435 | www.nortonindustrial.com

product news >> technology innovations in the fabricating industry

Carbon fiber tooling

Bilsing Automation offers its carbon fiber tooling for robotic handling applications. According to the company, the material weighs less than half the amount of traditional materials yet is stiffer, stronger, and settles more rapidly, enabling robot motion paths to occur quickly with low vibration and idle time.

Potential applications for the tooling include crossbar beams, loading and unloading beams, destacking beams, panel loading T-booms, and tooling supports for body shops, pressrooms, and injection molding.

Bilsing Automation | 586-463-0686 | www.bilsing-automation.com

Wet blasting parts cleaning system

Proceco's new, patented wet blasting parts cleaning technology uses a rotary wheel to discharge a mixture of hot cleaning solution and abrasive media at high velocity to clean and mechanically remove oxides, scale, carbon deposits, oils, and grease from metal part surfaces.

The machine can process oily and greasy parts and provides a clean, smooth finished surface ready for coating, painting, or remanufacturing operations. It cleans parts in a short cycle time without creating dust.

Spinner hanger, tumble blaster, and turntable system configurations are available.

Proceco | 800-978-6677 | www.proceco.com

Roll form software

Ubeco GmbH has added two new functions to its roll forming software. Partial Project Add On and Partial Project Save As enable creation of a new project by combining parts of old projects, such as adding a new-design left half to a right half of an existing older project, including the rolls.

In addition, the new arc-type Angle/Radius Bending Method extension allows the user to compensate for springback during the flower pattern design. New snap points are provided for setting the reference point in an imported CAD drawing, eliminating the need to split CAD entities.

The new draft modus enables editing of the final profile cross section without bending or unfolding.

Ubeco GmbH | 49-2371-9771-0 | www.ubeco.com

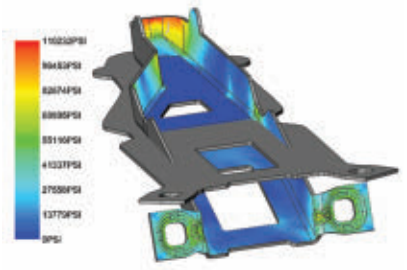
Coil processing machines

Pivatic has introduced the PCCe electric coil processing machines. Rather than a hydraulic system, the machines feature an electric-controlled CNC ram with up to 33 tons' capacity. The ram is suitable for embossing and forming tools, and it can be stopped throughout the stroke while maintaining accuracy.

The CNC right-angle shear can cut nested parts and release them as needed for automatic stacking or downstream forming. The manufacturer reports that the electrical ram, together with the company's patented double tool punch system, can outperform conventional turret punching by up to four times.

Pivatic Oy | 847-214-8700 | www.pivatic.com

Die design software



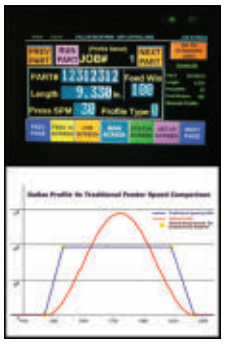
Accurate Die Design Inc. offers Logopress3 3-D die design software (SolidWorks® Gold Certified), as well as stand-alone Forming Technologies Inc. (FTI) forming simulation, flat-blank prediction, and quoting software.

The company has added functions and enhancements to the die design software. The software features automatic, 2-D drawing creation, tool animation, and dynamic interference detection. It can design both large dies and dies for tiny parts that have several hundred stations, the company reports. A component library in both inch and metric also is included.

Also available is an FEA software package called Logopress3 Blank that requires no formal training, according to the designer. In addition to the blank, it analyzes stress, strain, and thinning.

Accurate Die Design Inc. | 262-938-9316 | www.accuratediedesign.com

Feed control



Dallas Industries' ProfileSelect™ feed control can help minimize electrical and mechanical stress on stamping equipment and material. Using a sinusoidal profile (cam motion), the control helps provide smooth motion and material feed while using 100 percent of the press feed window, putting less stress on the mechanics.

The control is suitable for progressive-die work, when the part's cosmetics are a factor, or when delicate material is being used.

It has an HMI touchscreen and comes standard on new press feeding equipment from the manufacturer. It also can be retrofitted to most existing lines.

The company also features two of its servo press feeds connected to a networking, monitoring, and analysis system for communicating to the plant floor while monitoring and analyzing equipment efficiencies and providing reports.

Dallas Industries | 248-583-9400 | www.dallasindustries.com

Filler metals

Hobart Brothers' filler metals include tubular wires (flux-cored and metal-cored) designed to improve productivity, as well as aluminum GMAW and GTAW filler metals from MAXAL.

Hobart Brothers Co. | 800-424-1543 | www.hobartbrothers.com

Semiautomatic, robotic GMAW guns, peripherals

Tregaskiss offers its semiautomatic and robotic GMAW guns, along with consumables and welding peripherals.

The new AutoLength liner system is a spring-loaded module housed inside the power pin that helps ensure the liner remains properly seated while offering up to 1 in. of forgiveness if the liner has been cut too short or too long. The system is designed for use with the front-loading QUICK LOAD™ liner system, which is standard on TOUGH GUN™ semiautomatic, robotic, and automatic GMAW guns and TGX™ semiautomatic GMAW guns. The new TOUGH GUN ThruArm™ G2 series robotic GMAW gun is compatible with all robotic systems, including those by Fanuc, ABB, Motoman, and Kuka.

Tregaskiss Products | 877-737-3111 | www.tregaskiss.com

Cutting, heating, welding products

Smith Equipment offers its cutting, heating, and welding products, along with various alternate fuel outfits and gas regulators.

Designed for use with propane, propylene, and natural gases, the alternate fuel outfits are available in medium- and heavy-duty models, as well as an economy version. Each outfit includes a torch and torch handle, regulators, hoses, a toolbox, and accessories designed to assist with cutting, heating, and brazing performance.

Mizon flowmeter regulator and flowgauge regulators are designed to accompany a shielding gas mixture developed by Linde that eliminates ozone emissions in GMAW applications.

Silverline gas regulators, which are available in up to 10,000 possible configurations, provide gas purity levels up to 99.999 percent. They are available in general-purpose, high-purity, analytical, and high-purity stainless steel corrosion-resistant models.

Smith Equipment | 605-882-3200 | www.smithequipment.com

Press controller

Coe Press Equipment's ServoMaster Touch™ controller features a user-friendly, 5.7-in. VGA color touchscreen interface with customizable operator screens.

New features include streamlined entry of machine setup information and enhancements to the operator prompts, machine diagnostics, and serial communications to the press controls.

Auxiliary functions achievable through its servo feed automation feature include motorized and encoded passline height, motorized and encoded automatic edge guides, feed roll pressure control, and material support table position.

It has a batch counter to 999,999 cycles with output, remote jog with hand-held pendant for threading, continuous jog or jog-to position for threading, and downloading of setup data or job number selection.

Coe Press Equipment | 586-979-4400 | www.cpec.com

CNC metal spinning machines

Global Metal Spinning Solutions Inc.—DENN USA Metal Forming has introduced eSPIN CNC metal spinning machines.

The model eSPIN-100 features a high-precision, electrically controlled pressure control; electric tailstock positioning; automatic safety door; six-tool changer; blank centering unit; blank backup support; part ejector; automatic blank lubrication system; CAD/CAM software; remote diagnostic software; and preventive maintenance software.

The company also provides videos and information about its circle shears and its flow-forming, trimming and beading, rotary forging, and wheel forming machines.

Global Metal Spinning Solutions Inc.—DENN USA Metal Forming | 719-282-9061 | www.globalmetalspinning.com

Tube facing, cutting tools

Swagelok® has added four new tube facing tools and one new cutting tool to its product line. The tools are intended for use with 316 stainless steel, carbon steel, titanium, and most nickel-based alloys.

The tube facing tools produce flat, smooth, square, burr-free, and chamfer-free tube ends in thin-walled tubing. Available in four sizes in both electric and cordless versions, they feature coated tool bits with two cutting edges, built-in electronic speed regulation, and a quick-change collet system that requires no tools to change sizes.

The new facing tools include the TF16 for 0.125- to 1-in.-OD tubing; the TF24 for 0.125- to 1.5-in.-OD tubing, with a 90-degree-angle option; the TF40 for 0.25- to 2.5-in.-OD tubing, including an angled version; and the TF72 (electric version only) for 0.5- to 4.5-in.-OD tubing.

The TC72 cutting tool is designed for thin-walled tubing and elbows up to 4.5 in.

Swagelok Co. | 440-349-5934 | www.swagelok.com

Hydraulic presses

With capabilities to 40,000 tons and bed sizes exceeding 240 in., Greenerd hydraulic presses are available in a variety of styles, from gap-frame and straight-side to die-spotting and forging presses.

The company recently designed and built a turnkey system including tooling and an indexer for bearing insertion and forming for an industrial hardware application; a 100-ton, four-post metal forming press for an appliance manufacturer with full tooling integration; and a 1,000-ton, gib-guided press for coining heavy-truck brake components. The presses are available as standard machines, or they can be designed for custom applications.

Greenerd Press & Machine Co. Inc. | 800-877-9110 | www.greenerd.com

GTAW torches, accessories

Weldcraft says its GTAW torches and accessories are designed especially to improve quality and performance on fabricating and manufacturing applications.

Weldcraft | 800-752-7620 | www.weldcraft.com

GMAW guns, accessories

Bernard's GMAW guns and consumables are designed to address quality and productivity challenges in the fabricating and manufacturing industries, the company states.

Bernard Welding Equipment | 800-946-2281 | www.bernardwelds.com

Material handling equipment

Magnetic Products Inc. offers a number of products, including the Eco-Mag® magnetic filter, M-series electric shakers, Magnetic Extreme Coolant Cleaner (XCC), the Beltless Magnetic Conveyor (BLM), and the Power Matrix electropermanent magnetic chuck.

The high-intensity magnetic filter uses high-power neodymium rare-earth magnets to remove ferrous and paramagnetic contamination from fluids. The compact, patented electric shakers can handle applications from low-volume operations to central scrap removal systems carrying several thousand pounds per hour.

According to the company, the coolant cleaner improves ferrous swarf capture rate while reducing the need to buy consumables or change paper filters. The conveyor is available in several models for positive control of ferrous metal materials, such as stampings, turnings, chips, fasteners, and scrap.

Magnetic Products Inc. | 800-544-5930 | www.mpimagnet.com

Manufacturing software

MIE Solutions offers several new software products for the manufacturing industry. MIE Trak Pro integrates and streamlines operations across the sales, manufacturing, engineering, and accounting functions. Features include cost control, MRP, scheduling, reporting, quoting, job costing, inventory control, and real-time tracking.

MIE Dashboard allows employees to share information, collaborate, and manage tasks and documents. It can be used in organizations with thousands of users who want to manage their daily business activities. Available modules include CRM, document management, in/out board, task and project management, calendar, journal, and chat.

MIE QuoteIt Pro is an upgraded release of the QuoteIt estimating software package, designed to help companies manage RFQs. Detailed quotations include all the required specifications to make the product, including operations and bill of materials. Quotes are generated for parts from simple flat panels to complicated machines with thousands of components.

MIE Solutions Inc. | 714-786-6230 | www.mie-solutions.com

Rotary index

Amada has added a rotary index to its FOM2 laser cutting system for cutting medium to thick materials. The rotary index is located on one of three interchangeable shuttle pallets, simplifying the switch from flat-sheet cutting to tube or pipe cutting.

The FOM2RI-3015 can process round, square, rectangle, C-channel, and angle iron. The rotary system can handle materials up to 441 lbs. The company's Dr. Abe_Tube software can be added for fabrication of tubular structures that fit together for welding.

The rotary index is an integrated unit, allowing the cutting head to be positioned near the controllable pneumatic chuck and thereby minimizing the dead zone.

At the heart of the laser cutting system is the Amada/Fanuc RF-excited resonator. This fast axial laser is designed to produce high edge quality by improving the overall shape and stability of the laser beam itself, says the manufacturer.

Amada America Inc. | 877-262-3287 | www.amada.com

Ferrite content measurement device

The FERITSCOPE® FMP30 hand-held ferrite content measurement device from Fischer Technology Inc. determines if the ferrite content in a weld can withstand mechanical stresses at high temperatures.

It identifies if the weld is susceptible to cracking under tension or vibration by taking a quick measurement of the ferrite content. If the ferrite content is too low, the weld could crack under heat; if the content is too high, the weld could lose its strength and corrosion resistance.

DataCenter software, included with the device, helps expand its functionality. The measurement data is transferred to a PC so inspection reports can be created and printed for immediate evaluation of the measurement results and a quick overview of the process. It displays a histogram, sum frequency chart, and SPC chart with one click.

Fischer Technology Inc. | 800-243-8417 | www.fischer-technology.com

CNC notcher

Carell Corp. offers the S.I.M.A.S.V. AV226/PA-CNC notching machine, a hydraulic unit that provides variable-angle hydraulic notching from 30 to 140 degrees.

An integrated, electronic NC moves and controls each blade singularly, allowing the machine to achieve cutting precision equal to 0.1 degree.

Carell Corp. | 251-937-0957 | www.carellcorp.com

Wire feed system

The new PowerLiner from Fronius is a wire feed system for all standard wire types, including steel, silicon bronze, aluminum, and stainless. The machine handles wire diameters from 0.030 to 0.0625 in. The minimum feeding radius is 6 in. No inner liners are required.

The wire electrode is guided by rollers set at an angle of 90 degrees. Seventy-six rollers are used for each meter of wire feed hose. As a result, rolling friction rather than slip friction occurs while the wire is being transported, imparting almost no resistance for wear-free wire feeding.

The system can be connected to large spool systems, wire drums, welding torches, or wire feed units using the QuickConnect quick-locking system.

Fronius USA LLC | 810-220-4414 | www.fronius-usa.com

Dust collection products video

Camfil Farr Air Pollution Control (APC) has produced a video about its dust collection products and capabilities.

The 9.5-min. video includes an overview of the company's engineering services, application and technical support, and in-house dust testing. It also showcases the Gold Series® dust collectors and HemiPleat® filters. Applications and markets served worldwide are detailed in the video as well.

Camfil Farr APC | 800-479-6801 | www.farrapc.com

Cross-training whiteboard

Magnatag®'s new magnetic cross-training whiteboard system organizes and displays employee training, qualification, and proficiency levels in up to 18 skill disciplines. Placed where everyone can see it, the board helps encourage workers to learn and qualify in as many skills as they can.

The board serves as a scoreboard for employee training programs. It organizes and displays a matrix of people, skills, and qualifications.

The board comes with signal magnets in 10 colors, magnetic nameplate cardholders, and everything needed to operate the system. The board is heat-fused printed and comes in four sizes to hold up to 68 employees on a single board.

Magnatag Visible Systems | 800-624-4154 | www.magnatag.com

Cutting, welding, drilling workstation

JK Lasers has introduced the JK System 5000, a flexible workstation that can be integrated with the company's fiber and Nd:YAG lasers to perform industrial cutting, welding, and drilling.

Options include linear and rotary axes, process tools and scan heads, and proprietary software that closely couples motion and laser control.

The system has an ergonomic design and integrated Class I safety enclosure with viewing panel.

JK Lasers | 44-1788-517-800 | www.jklasers.com

Fiber laser cutter

Salvagnini America offers the new L3 fiber laser cutter, which the company says is the first laser cutter specifically designed and built around fiber-optic technology.

Features include high speed, low energy consumption, low maintenance, low cost per part, increased accuracy and realiability, and small footprint, the manufacturer reports. The proprietary focusing head features a single optic for cutting across a variety of thicknesses.

Salvagnini America Inc. | 513-874-8284 | www.salvagnini.com

Laser focusing lenses

Laser Research Optics offers CO_2 laser focusing lenses that are compatible for use in Amada high-power lasers. The ZnSe CO_2 lenses, designed for 10.6 µm and A/R coated to exhibit less than 0.2 total absorption, are available with mounts, without mounts, or mounted into customer-supplied focusing lens mounts.

Available in 1.5- and 2-in.-dia. sizes with 3.5- to 12-in. focal lengths, the lenses can include plano-convex and meniscus configurations.

Laser Research Optics | 888-239-5545 | www.laserresearch.net

Continuous-duty vacuum cleaners

Nilfisk Industrial Vacuums has announced the launch of its CFM T series three-phase, continuous-duty vacuum cleaners.

Constructed of heavy-duty steel and polypropylene, the T26, T48, and T63 vacuums are suitable for the collection of powders, liquids, dust, and debris. A manual filter shaker removes caked-on dust from the filter's surface. A release lever lowers the wheeled collection container and acts as a handle for disposal of collected debris.

An optional HEPA filter helps ensure than 99.995 percent of particles are retained, down to 0.18 micron in size.

Nilfisk Industrial Vacuums | 610-913-5300 | www.nilfiskindustrialvacuums.com

Web-based ERP software

Lantek has released its Integra 2011 Web-based ERP software. The system allows companies to automate, manage, and control all of their business processes in a Web-based environment, facilitating management access across the Internet from any location or time zone.

The Web interface is compatible with Internet Explorer®, Mozilla Firefox®, Chrome®, Safari®, and Opera®, as well as mobile devices such as the iPad®. Page-rendering speed has been increased to enable large quantities of data to be viewed quickly on a single page.

Access to information such as source data, columns, groups, orders, and operations enables the manipulation of data and presentation for each report.

Lantek Systems Inc. | 903-258-9422 | www.lanteksms.com

Stainless steel arbor shims

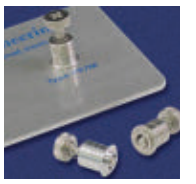
Precision Brand Products Inc. has introduced stainless steel arbor shims in 18 thicknesses and 12 different ID/OD combinations.

The shims are corrosion-resistant and can be used for spacing of milling cutters, gang cutters, saws, slitting blades, and grinding tools. Special sizes, materials, spacers with keyway, and bulk quantities are available on request.

The shims are packaged in airtight poly bags, 10 pieces per bag, unless otherwise indicated.

Precision Brand Products Inc. | 800-535-3727 | www.precisionbrand.com

Captive panel screws



New PEM® PF7M™ and PF7MF™ captive panel screws from PennEngineering® have two distinct mounting styles for permanent installation into thin sheets. Both types feature small, compact, low-profile designs suited for limited-access areas.

The patented MAThread® anti-cross-threading technology corrects off-angle installations, aligns components, and slides through clogged internal threads. The Phillips recess allows for tool or hand operation.

PF7M captive panel screws integrate a self-clinching mounting design that provides high pushout resistance. The fasteners install flush on the back side of panels as thin as 0.036 in. They can install reliably into panels with hardness of HRB 80 or less or HB 150 or less.

PF7MF captive panel screws feature a flaring design that allows them to be installed permanently into any panel hardness with minimal force. The flare-mounting style allows a close fastener centerline to sheet edge. They install flush on the back side of panels as thin as 0.031 in.

Both types are available in two lengths with thread sizes of #4-40 through #8-32 and M3 to M4.

PennEngineering | 800-237-4736 | www.pemnet.com

Lubrication system

LSP Industries has announced the release of the new FloaterCoater lubrication system for the stamping industry. Made of stainless steel, models are available for stock from 12 to 72 in. wide.

The floating inside frame allows the rollers to stay in contact with the coil stock at all times. Rollers can be removed and replaced in less than 2 min.

Lubricant is dispensed in a controlled manner on the exterior of the rolls to prevent clogging.

LSP Industries | 815-226-8090 | www.lspind.com

Air knives

Exair offers air knives in super, standard, and full-flow models for blowoff, drying, and cooling. Bearing the EU's CE mark, the systems have small profiles for mounting in tight spaces and to accommodate applications involving conveyors and webs.

According to the company, the air knives use less compressed air and less energy than other blowoff products. They are available in aluminum, stainless steel, and PVDF for corrosive environments, in lengths from 3 to 96 in.

Exair Corp. | 800-903-9247 | www.exair.com

Industrial spray products catalog

A catalog featuring technical information about spray technology and thousands of spray products is available from Spraying Systems Co. The literature includes detailed information on hydraulic, air atomizing and automatic spray nozzles, spray guns, tank cleaning equipment, and air nozzles.

The catalog also includes spray optimization tips, selection guidelines, and a reference section discussing spray angle/coverage, drop size, impact, operating pressure, viscosity, temperature, and weight/measurement equivalents.

Spraying Systems Co. | 630-665-5000 | www.spray.com

Tube bending tooling calculator for iPhone

A calculator for evaluating tube bending machine tooling is available from Unison Ltd. for the Apple iPhone®. After the user enters the bend radius, tube diameter, and wall thickness—in metric or imperial units —the unit provides a visual representation of the type of mandrel and wiper die needed for the bend.

Compatible with any iPhone, iPod® Touch®, or iPad® running IOS 4.0 or later, the calculator is updated regularly with new features and functions. Version 1.0 can be downloaded free of charge from Apple's iTunes® App store.

Unison Ltd. | 44-1723-582868 | www.unisonltd.com

EPA MFHAP compliance advice

Camfil Farr Air Pollution Control (APC) has published a brochure to help metalworking companies comply with the new EPA regulation for metal fabrication hazardous air pollutants (MFHAP).

Under the new requirements, which cover nine metal fabricating and finishing source categories, companies that used to exhaust welding fumes and other process contaminants outside the plant no longer will be permitted to do so and now will be required to prove "zero opacity."

The informational brochure pinpoints important aspects of the regulation, including upcoming deadlines, the processes affected by the regulation, and monitoring and test methods required for compliance. It also discusses the role of high-efficiency dust and fume collectors in maintaining compliance while also reducing energy costs.

Camfill Farr APC | 800-479-6801 | www.farrapc.com

Tray-style sheet hydroforming presses

Pryer Technology Group has added two new models to its Triform line of sheet hydroforming presses. The new machines, specifically developed for aircraft parts production, are the first tray-style hydroforming presses manufactured in the U.S. in more than 30 years, according to the company.

The presses use high-pressure hydraulic fluid in a flexible rubber bladder to form sheet metal using a single tool, producing parts in complex geometric shapes. Model 1648BD has a 16- by 48-in. work envelope, while the 2448BD has a 24- by 48-in. work envelope. Both presses deliver standard pressure up to 5,000 PSI, with the 1648BD also available in a 10,000-PSI model.

Pryer Technology Group | 855-864-4670 | www.triformpress.com

Large angle grinder

Metabo Corp. has added the W24-230 large angle grinder to its Metal Masters series. The grinder comes with a 9-in. wheel guard and delivers 150 in.-lbs. of torque. Rated speed is 6,600 RPM; loaded speed is 4,600 RPM. The tool features 2,400 W of power and is rated at 15 amps.

The VibraTech three-position side handle helps reduce vibration levels up to 60 percent. The grinder's ergonomic rear handle includes a vibration-dampening system and pivots 90 degrees left or right during cutting or vertical grinding.

The tool includes an on/off switch with a safety lockout switch that protects against unintentional start, a burstproof guard with seven positions, and a spindle lock. A newly designed diagonal fan pulls air across the grinder's motor for cooler operation.

Metabo Corp. | 800-638-2264 | www.metabousa.com

Metal-cored wire

Hobart Brothers has expanded its Tri-Mark® Matrix™ metal-cored wire line to include 0.063-in.-dia. wire for welding on applications composed of thicker materials. The wire also is available in 0.045- and 0.052-in. diameters.

The wire is designed for use in high-volume robotic welding applications, particularly those in the heavy equipment manufacturing industry. According to the manufacturer, the wire is formulated for good arc starting, consistent wire feeding, improved seam tracking and touch sensing, extended consumable and liner life, reduced spatter, and reduced buildup at the drive rolls.

The wire creates a consistent weld bead shape that resists cracking, the company reports. It is available on 33-lb. plastic spools that ship in heat-sealed, VCI-impregnated bags, or it can be purchased in a 750-lb. X-Pak drum with a rubber gasket and VCI-impregnated interior.

Hobart Brothers Co. | 800-424-1543 | www.hobartbrothers.com

Get a bead on these epic prizes!

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AWS WELDING FMA SME PMA METALFORM

See us at Booth #7107

We're making it easy for you to leave FABTECH® with some fantastic free stuff! All you need to do is stop by the *Practical Welding Today*®/*The FABRICATOR*® booth (#7107) at the show and either sign up for a new subscription or renew your existing one and you'll walk away with a pair of official *PWT* Welding Stix or a *PWT* skull cap. You will also be automatically eligible to win some of the incredible items listed below that will be given away in random drawings throughout the show.

As if that wasn't enough, *PWT* Editor Amanda Carlson (the award-winning host of PWTv) will also be in the booth during the show!

Your new/renewed subscription automatically enters you in the drawings for these prizes:

Lightweight torch and accessories *Abicor*

Welding helmet *ArcOne Welding and Safety Products*

Fill-O-Matic machine *Bug-O Systems*

Assorted GP-X and other markers *Diagraph MSP*

Tungsten grinder *Diamond Ground Products*

(2) 10B Welding ovens *Gullco*

(3) Boxes of EB-flex, standard 1-gauge welding cable (25 ft. per box) *Electron Beam*

Drill bit sets & welding helmets *Fastenal*

(4) 6 x 8 welding screens *Frommelt*

Welding curtain *Goff's*

HMD904 magnetic drill *Hougen*

Stainless MIG and TIG and stick, mild steel flux-core MIG *Kiswel USA*

Pneumatic Die Grinder *Knuth*

Welding helmet, welding jacket, 1 pair welding gloves *Miller Electric*

(2) Digital cameras *Olympus NDT*

(20) Boxes of (10) abrasive discs *Pferd*

Grinder w/ discs *Suhner*

$300 gift certificate *Thermacut*

Power tool *TRUMPF*

Welding kit *Weiler Corp.*

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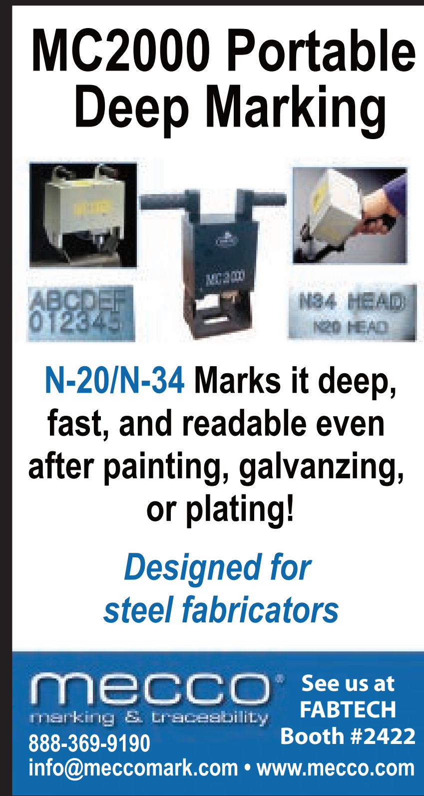

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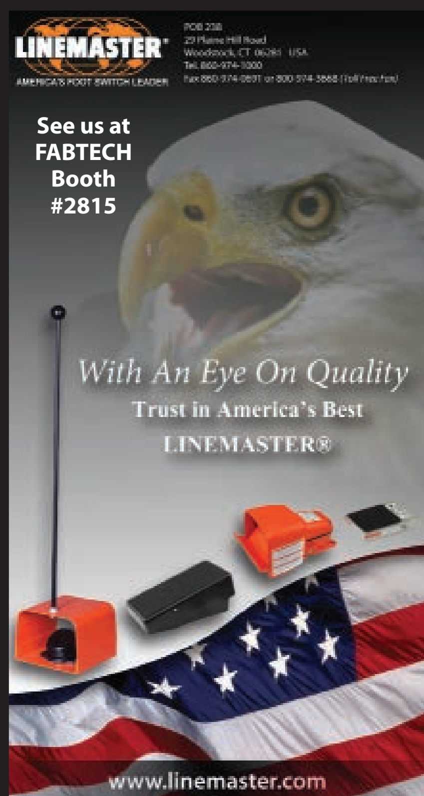

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Go to our Web site at www.fma-communications.com/ratemaker and fill out the form to submit your ad, or contact Jim Gorzek at 815-227-8269 for more information.

4-⅛"

2-3⁄16"

Ironworker training package

Impact and the Ironworker's Shop Department and National Training Fund have worked together to publish a new training package entitled "Training and Fabrication for Shop Ironworkers." It is designed to meet the basic training needs of most shops and can be used in a formal training program, registered apprenticeship program, or a one-on-one coaching or mentoring program.

The reference manual covers such topics as safety, measuring, hand tools, welding, rigging, lifting and cranes, structural steel properties, layout, fitting and fastening, and stairs and handrails. The package also contains an instructor guide, student workbook, blueprints, and a DVD for the instructor.

Impact | 800-545-4921 | www.impact-net.org

Thor welding helmet

Lincoln Electric offers a limited-edition Thor™ welding helmet featuring authorized, original graphics from Marvel® Thor comics, including the logo and action shots of the comic book hero.

The VIKING™ 2450 series helmet features a 2.4-in. viewing area height in a U.S. standard 5.25- by 4.5-in. lens cartridge with four arc sensors. The shade level is adjusted with an internal, continuously variable 9-13 shade control. Variable delay allows the user to adjust the time required to bring the helmet from a darkened view back to the light state, while variable sensitivity controls the cartridge's performance in varying environments.

An internal grind mode allows the helmet to be used as a grinding shield for weld prep or postweld cleanup activities. The solar-powered helmet features user-replaceable lithium batteries. For the GTAW process, the helmet is rated to perform at 3 amps DC and 5 amps AC polarity.

Lincoln Electric | 888-355-3213 | www.lincolnelectric.com

Vacuum lifter for tube, pipe

Anver Corp. offers the VPFL4 vacuum lifter, designed to handle heavy pipe or tube from the top, in and out of containers, without using slings or hooks.

The lifter features nylon centering guides and oval rubber suction cups to prevent anything other than nylon or rubber from touching the load. Designed to compensate for unevenly packed loads with staggered rows, it has a 500-lb. capacity and can pick up two, three, or four pipes or tubes simultaneously.

Anver Corp. | 800-654-3500 | www.anver.com

OSHA regulations guide

Mancomm has published the latest edition of its *OSHA General Industry Regulations* book, updated through Jan. 1, 2011.

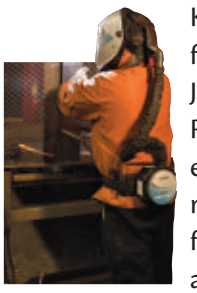
This 29 CFR 1910 volume is made with RegLogic®, a graphical approach that helps simplify the reading and using of government regulations. With the book's Quick-Find Index™, users can access needed information quickly.

Included in the new edition are the 1903 regulations about inspections, citations, and proposed penalties; the 1904 regulations about recording and reporting occupational injuries and illnesses; the 1928 regulations for agriculture; and the 1910 regulations that apply to all general industry operations.

Also included are the publisher's Sharps Injury Log, an improved version of the OSHA 300 log, incident report forms, and selected OSHA letters of interpretation.

Mancomm | 800-626-2666 | www.mancomm.com

Powered air-purifying respirator



Kimberly-Clark Professional offers the Jackson Safety brand R60 Airmax powered air-purifying respirator (PAPR). It features a NIOSH-approved HE filter that locks into place for particulate contaminants.

According to the manufacturer, the PAPR can help provide protection in accordance with new OSHA guidelines on hexavalent chromium fumes that may be produced when welding on stainless steel.

The respirator comes with adjustable headgear and a welding helmet featuring the company's W40 series variable autodarkening filter. The filter automatically detects weld arcs and switches to weld shade, which can be adjusted to shade 9-13 with a light shade of 4. The variable filter is suitable for GMAW, GTAW, and SMAW.

A flame-retardant face seal around the welding helmet protects welders from sparks, and the helmet's shape helps to prevent embers from sitting on the shell. The unit's breathing hose is flame-retardant and extends about 35 in. for maximum flexibility.

Powered by a lightweight, eight-hour lithium-ion battery, the compact blower unit has a wide, adjustable waist belt. An audible alarm gives the user a signal when a new filter or battery charge is needed. An airflow indicator also is included for checking the unit's airflow before use.

Kimberly-Clark Professional | 888-346-4652 | www.kc-safety.com

Induction heating system

Ambrell has introduced the Ekoheat 250/10 induction heating system, delivering 250-kW power and a center frequency of 10 kHz.

The system has been used to shrink-fit a pipe with a 10-in. OD for the oil industry, anneal wire with a diameter of nearly 1 in. as part of an in-line manufacturing process, and preheat steel bars with a diameter of 2.5 in. before welding. Other applications include hardening, preheating for forging, and crucible heating.

Ambrell | 585-889-9000 | www.ameritherm.com

Straddle crane

Air Technical Industries has announced the development of the Telescopic Mast Straddle Crane.

Designed for indoor and outdoor use, the mobile, compact crane can carry a variety of loads up to 50,000 lbs. It can straddle a flatbed or a semitrailer and lift the load up to 120 in. high for loading, unloading, or transporting large, heavy loads from one plant bay to another.

The crane is hydraulically operated with four telescopic masts synchronized for level and uniform lifting and positioning. The hydraulic cylinders are enclosed, and the plumbing to the cylinders and control valves are enclosed and protected.

The telescopic mast slides on bearing material for smooth action. The uniform level lifting is synchronized by hydraulic flow dividers, and it zeros in automatically each time the unit is fully lowered. The two heavy, wide-flanged I-beams are equipped with four laterally adjustable lifting hooks. Hook heights start at 105-in. lowered position, with a minimum of 72-in. vertical lift and 177-in. raised height.

Air Technical Industries | 440-951-5191 | www.airtechnical.com

Stackable containers

Heavy-duty Trainer Macs, offered by Sumner Mfg., are compact containers for mobile storage of power cords, fittings, fasteners, safety gear, hardware, loose parts, pumps, hoses, and rope slings.

The containers can be stacked with each other or with other products from the company, including the Mac Rack, Pipe Mac, and Bundle Mac. When stacked, items in the lower container remain accessible.

The containers feature four heavy-duty casters that are lockable on one end, a large storage capacity, a steel wire screen, and a load capacity of 1,500 or 3,000 lbs. when stacked on top of each other. They measure 24 in. high by 32 in. wide by 56 in. long.

Sumner Mfg. Co. Inc. | 281-999-6900 | www.sumner.com

Inspection software

Delcam offers the 2011 R2 version of its PowerInspect inspection software—the first version developed for use on 64-bit computers. It features improved visualization of the results, simplified creation of automated inspection routines, full integration of DRO functionality, and support for the latest Renishaw probes.

The software combines the ability to work with all types of inspection devices with a variety of inspection routines for making simple measurements, for inspecting geometric features, and for checking complex surfaces.

The introduction of support for 64-bit computers enables increased memory use on that hardware. According to the manufacturer, this is beneficial for memory-intensive applications in which larger CAD files need to be manipulated, especially for very complex parts and multicomponent assemblies.

Delcam | 44-121-683-1081 | www.delcam.com

Dock gates

EdgeGard dock gates are available from Wildeck Inc. The gates help protect personnel and equipment from falling off wide truck pits and loading docks.

The gates are offered in straight-rail and folding-rail designs. The latter has a pivot point in the center of the gate that folds up and protects a wider opening.

The gates meet the 200-lb. OSHA 1910.23 load force protection requirement. When raised, the gate completely clears the opening, offering unimpeded traffic flow and accessibility.

When closed, the gate is held in place and does not move. Top rails are 42 in. above floor level when closed.

Wildeck Inc. | 262-549-4000 | www.wildeck.com

Magnetic drills, cutting tools

Hougen Mfg. Inc. has released the second volume of its fabricating tools catalog. Coinciding with the development of the company's swivel-base technology, the 40-page catalog covers 26 portable magnetic drill models, many offering the swivel-base feature.

Several models feature patented quill feed arbors, which provide a constant low profile for drilling in tight spaces. The drill section includes full specification charting for each model, plus application information.

Also detailed are the company's Rotabroach® annular cutting tools for use with the magnetic drills and in stationary machine tools. Cutter accessories shown are machine tool arbors, soft stick lubricants and coolants formulated for annular cutter use, kits containing popular sizes of cutters, and a sharpening system. Rotacut™ and Holcutter™ series annular cutters for holemaking in sheet metal and plate fabrications round out the line.

The catalog also features six Hougen-Ogura™ Punch-Pro™ electro-hydraulic hole punches, including the latest model 76000, an 18-V, cordless, battery-powered unit.

Hougen Mfg. Inc. | 810-635-7111 | www.hougen.com

Tear-tab tube caps

Mocap's tear-tab caps are designed to fit over threaded tubing, rods, and fittings. The caps are suitable for use as shipping caps, end caps, pipe caps, and product and thread protectors.

The inner rings lock the cap onto threads until the cap is removed by pulling the tab and breaking the seal.

The caps are available for standard, metric, NPT, and BSP threads.

Mocap | 800-633-6775 | www.mocap.com

Safety glass frames

The F21 is a lightweight, rubberized eyewear frame with side shields, available from Laservision. Outfitted with soft nose cushioning, the compact safety glasses fit snugly with integrated extensions around the eyebrows and cheeks.

The flat, lightweight glasses feature sporty-style side pieces and a straight outer curve.

Laservision | 800-393-5565 | www.lasersafety.com

Stainless steel electrodes

Select-Arc Inc. has introduced two gas-shielded, austenitic stainless steel electrodes that it says are designed with a high level of ferrite to make the weld metal very resistant to cracking, even when highly diluted.

Both SelectAlloy 312 and 312-C have nominal weld metal compositions of 30 percent chromium, 9 percent nickel, and 0.1 percent carbon. These wires produce a two-phase weld metal with substantial ferrite in an austenitic matrix.

The 312 is a flux-cored electrode developed to weld dissimilar metals, such as joining of carbon steels to high-nickel stainless steels. The 312-C is a metal-cored wire designed to weld dissimilar metals at elevated speeds.

Both of these electrodes are available in 0.045- and 0.06-in. diameters.

Select-Arc | 800-341-5215 | www.select-arc.com

All-electric tube bending machine

Horn Machine Tools offers the new Unison Breeze-Revolution, an all-electric tube bender with two multiple-tool heads mounted on opposite sides of a rotating frame.

After bending using one or more tools on the right-hand head, the head retracts and a combination of transverse and rotational movement then positions the left-hand head for subsequent bending operations. This changeover can be repeated as many times as required.

According to the company, the machine's operation speed is increased by the use of simultaneous movement of multiple machine motion control axes during bending and head changes, as well as movement profiles. These take place automatically and transparently without the need for programming by the user.

The machine can be used on all types of tubular material, from exotic alloy to mild steel. The continuous automatic operation allows complex shapes to be made in a single cycle.

Horn Machine Tools | 559-431-4131 | www.hornmachinetools.com

Orbital fusion head

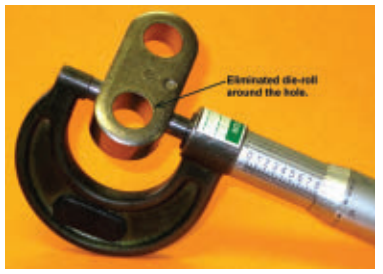
Magnatech has introduced the model 860 enclosed, autogenous orbital weld head. It fusion-welds tube from 2 to 6 in. Digital encoder drive motors eliminate the need for calibration.

The 6-in. head is the most compact and lightweight available, the company reports. A straight length of 0.75 in. from tungsten to collet face is required. Measuring 1.7 in. wide, the head can be used in tight-clearance applications, welding fitting to fitting or fitting to valve.

Five models handle tube sizes from 0.125 to 6.00 in. OD.

Magnatech LLC | 860-653-2573 | www.magnatechllc.com

Die-roll reduction technology



EBway Corp. has designed a compound stamping die to reduce the amount of die roll on pierced holes.

Die roll is the slightly curved contour on the edge of one side of a blanked part, created by the amount of pull-down on the part material before the actual cutting of the material starts.

Developed to solve a particular customer's concern, the technology now is available for use on materials from 0.060 to 0.500 in. thick.

EBway Corp. | 954-971-4911 | www.ebway.com

Recirculating heat-treating oven

Lucifer Furnaces has shipped a model 42-M24 recirculating heat-treating oven to a machine parts manufacturer for stress relieving.

The oven has a stainless steel liner forming the 12- by 18- by 24-in. interior chamber. The liner baffles the work load from the fan and heating element to create a horizontal airflow of uniform heat throughout the chamber. Heating elements of coiled, low-watt-density wire are held in element holders located on the sidewalls.

The oven is lined with multilayered, lightweight firebrick and mineral wool block insulation to help retain heat. Precision heating is obtained with a Honeywell digital time-proportioning controller along with a digital overtemperature safety system and soak timer.

A hearth with stainless steel rollers assists in loading and unloading the product. The unit is sealed with a horizontal swing door with adjustable latch.

Lucifer Furnaces Inc. | 800-378-0095 | www.luciferfurnaces.com

Welding gas blast equipment

Viking Blast & Wash Systems has announced the release of its new welding gas blast equipment catalog. The brochure includes features and specifications for several models of cylinder refurbishing systems.

The GC 111 has a cylinder capacity of 20 in. dia. by 72 in. long and cleans about 15 cylinders per hour or 120 per eight-hour shift. Custom machines can be engineered to fit users' specific cleaning applications.

The GC 440 is a pass-through machine that removes rust, enamel paint, and surface contaminants from gas cylinders up to 12 in. dia. It cleans about 400 cylinders per eight-hour day.

The GC SR-12 also is a pass-through machine but can clean about 1,920 T-K 300 series cylinders per eight-hour day. The machine can also be configured optionally to blast 20-lb. propane cylinders.

The E-50 small cylinder reconditioning system removes paint and conditions the sidewalls of aluminum cylinders in diameters from 3.21 to 6 in. and lengths from 9 to 36 in.

Viking Blast & Wash Systems | 800-835-1096 | www.vikingcorporation.com

Brush-on finishes

Birchwood Casey offers brush-on decorative finishes for copper, brass, steel, and aluminum.

Antique Black® M24 is a concentrate suitable for blackening or browning of brass, bronze, or copper alloys. It produces US10B finishes on large architectural surfaces, sculptures, and engravings, whether new or reconditioned. Reaction speed and finish color are controlled by diluting the concentrate with water.

Aluma Black® A14 is designed to provide a durable, smooth, black finish on aluminum alloys. It can be applied undiluted to blacken entire parts or as a touch-up for black anodized parts that have been damaged or remachined. The coating is suitable for all types of aluminum parts, including engravings.

Presto Black® BST4 is designed for application on any part size in limited quantities. It produces a durable, black finish that can be sealed with a rust preventive for extra finish protection.

Birchwood Casey | 952-937-7931 | www.birchwoodcasey.com

Automatic tube saw

The TC720 automatic tube saw from BLM Group USA is designed to operate as a stand-alone unit or as part of a fully automated tube processing line controlled by a single CNC.

The programming system has an applications-tested database that covers blade speeds and feeds for different materials, saw blade selection, and material feed speed. Operators can use the system to select automatically the optimum parameters for the job at hand. Changeover can be accomplished in less than three min. with all settings centralized and to scale. No tools or sample tube is needed.

Two length stops can be fitted, and three programmable unloading positions can be integrated with downstream deburring, washing, and collecting operations. The material feed system and vise geometry help ensure positive clamping of the material during the cutting cycle, whether the material is thin- or thick-walled.

BLM Group USA | 248-560-0080 | www.blmgroup.com

Inspection software, point cloud viewer

Capture 3D offers GOM's software release, GOM Inspect. The free software, available for download at www.gom.com/3d-software/gom-inspect.html, allows users to import scan data from various types of measuring systems with several point cloud and inspection functionalities.

Mesh processing allows polygonizing of points to meshes, smoothing, thinning, hole filling, data refinement, and extracting curvature lines from meshes. Inspection functionalities include CAD import, alignments, comparisons, CAD-based primitive generation, 2-D section analysis, GD&T analysis, and reporting.

Results can be shared among departments, vendors, and customers.

Capture 3D | 714-546-7278 | www.capture3d.com

Teardown bench

Shure Mfg. Corp.'s heavy-duty teardown benches are designed to ease the task of working with fluid-saturated components. These benches help eliminate unsafe spills while speeding work on transmissions, small engines, and hydraulic systems.

The reinforced, heavy-duty top has a 0.5-in. lip on all sides. The all-welded, adjustable-height legs include four heavy-duty swivel casters with a brake.

Features include a storage drawer with optional lock and a 3-gal. fluid drain pan. A stainless steel insert is optional. The powder-coat paint finish is available in 22 color choices.

Shure Mfg. Corp. | 800-227-4873 | www.shureusa.com

Welding helmets

Miller Electric Mfg. Co. offers Arc Armor™ Titanium Series™ welding helmets, designed for industrial protection. The helmets reflect radiant heat and feature a lightweight shell design, an aluminum heat shield secured within a shock-absorbing gasket, and a quick-release front cover lens to help reduce welder downtime.

The Titanium 1600 welding helmet features a 16-sq.-in. shade #10 passive lens. The Titanium 7300 features a 7.22-sq.-in. viewing area, three independent arc sensors that respond in 1/20,000 second, auto-on/auto-off, grind mode, shades 8 to 13, sensitivity and delay control, and 5-amp GTAW performance.

The Titanium 9400 features a 9.22-sq.-in. viewing area, four independent arc sensors that respond in 1/20,000 second, and 5-amp GTAW performance. Battery powered with solar assist for life up to 3,000 hours, the 20-oz. helmet features auto-on/auto-off, grind mode, adjustable sensitivity, and delay, and shades 8 to 13.

Titanium 9400i is similar to the 9400 but with the addition of an integrated grinding shield. Its autodarkening lens flips up to expose an ANSI-approved grinding shield with an almost 180-degree field of view. This provides a better view of the weld cell and allows the welder to switch between welding and grinding without removing the helmet.

Miller Electric Mfg. Co. | 800-426-4553 | www.millerwelds.com

Indexable multitool

Mate Precision Tooling offers the Ultra® IMT™ fully indexable multitool, which can achieve any angle setting on the workpiece. The patent-pending tool is designed to use Mate Ultra punches, strippers, and Slug Free® dies, eliminating the need for specialized tooling inventory.

No tools are required for punch, striker, and stripper retention and removal. The tool features a drop-in quick tool change design.

Mate Precision Tooling | 763-421-0230 | www.mate.com

Water-soluble purge dams

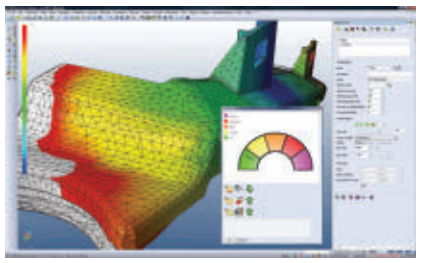
Aquasol Corp. has developed ZAP™ (zero air permeability) technology to help maximize gas retention in its EZ Purge® water-soluble purge dams.

The preformed, self-adhesive purge dams are flat to allow equal distribution of gases across the body of the dam. When used to weld pipe joints, the dams can minimize or eliminate oxidation and prevent argon from exiting the dammed area.

Made of sodium carboxy methyl cellulose and wooden pulp, the 100 percent biodegradable dam dissolves instantaneously and completely in most liquids.

Aquasol Corp. | 716-564-8888 | www.aquasolcorporation.com

CAD/CAM/CAE software



Vero Software has released VISI 19 CAD/CAM/CAE software with many new features.

For sheet metal stamping, VISI Progress enhancements include three new dedicated routines to manage complex springback based on results from CMM s, third-party FEA systems, and bend section geometry. Each routine includes skimming capabilities to reduce point clutter and allows the operator to define an additional percentage to overcompensate for the springback deformation.

VISI Modeling is the base platform for all products. Enhancements include an updated GUI with improved user interaction, new blending capabilities, improved annotation, advanced profile offset, graphical texture mapping, and support for the JT Open file format.

VISI Mould enhancements include a new assembly tool manager to handle multilevel tool structures and provide the ability to generate specific tree hierarchy structures for the creation of partial BOM lists.

VISI Flow includes a new part quality tool with potential remedy suggestions for each problem area, as well as improved filling analyses and flow balancing caused by the fine tuning of melt compressibility at the end of the filling phase.

Vero Software | 44-1242-542040 | www.vero-software.com

Transfer press tooling

Bilsing Automation North America now manufactures M-parts, the General Motors global standard for tooling used in transfer press operations. The series comprises modular steel and aluminum components used to build tooling that handles body panels and other sheet metal on the pressroom floor.

The new series meets all specifications stated by GM as a requirement of its global manufacturing standards, the company reports. The modular design allows users to configure the components to their applications.

Bilsing Automation North America | 586-463-0686 | www.bilsing-automation.com

Layout tool

A tool for laying out holes on flanges and base plates is available from J&B Specialty Tools. The single tool allows the user to locate holes based on the web centerline, regardless of variations in flange width, without having to use a collection of squares to first mark horizontal and vertical lines.

The scale can be purchased separately and is designed to fit most combination square bodies. It also is available with its own hardened steel combination square body. It handles gauges up to 8 in. wide.

J&B Specialty Tools | 317-883-1849 | www.beamgaugetool.com

Pipe milling end prep tool

The Esco Commander MILL-HOG® pipe milling end prep tool can perform any angle of weld prep, including compound and multiangle preps, on stainless steel, superduplex, P-91, and other hard-alloyed pipes.

Featuring one mandrel and seven sets of clamps for diameters from 3.75 in. ID to 14 in. OD, the portable tool pulls a thick chip without cutting oils. It is available with pneumatic or hydraulic motors.

The unit is suitable for fabricating and maintaining high-temperature and high-pressure piping systems. Standard features include dual-opposed, tapered roller bearings and oversized clamps with six contact points that spread the radial load for chatter-free welding end preps.

Esco Tool | 800-343-6926 | www.escotool.com

Aluminum rings

Bishop-Wisecarver Corp. offers the HepcoMotion® ALR aluminum ring, a rotary movement system for medium-precision and light-load applications. It is suitable for use in applications requiring corrosion resistance and a nonmagnetic environment.

Available with external V's and in four sizes from 5.83 to 11.81 in. in diameter as standard, the rings are machined from high-strength aluminum alloy and are anodized for durability and finish. A number of special rings are possible, such as additional diameters and thicknesses, rings with internal V's, gearcut rings, and rings machined in the form of self-aligning timing belt pulleys.

The company's Size 2 DualVee® polymer overmolded guide wheels with integral studs run on the surface of the aluminum rings. The outer portion of the polymer wheels are comprised of plastic molded onto a stainless steel bearing and stud that allows for smooth, antifriction motion and little wear on the aluminum ring V's.

Bishop-Wisecarver Corp. | 888-580-8272 | www.bwc.com

Office products stampings

Connecticut Spring & Stamping offers springs and stampings for the office products industry.

The company specializes in developing and manufacturing springs and stampings for such high-volume parts as printer/toner cartridges, including detent springs, compression springs, spring clips, latch clips, and blade springs.

Connecticut Spring & Stamping | 860-677-1341 | www.ctspring.com

Aluminum oxide conversion coating

Birchwood Casey has introduced the MICROLOK® AO, a nontoxic aluminum oxide conversion coating that is 0.000060 in. thick, silver-black in color, and tightly adherent to the metal surface.

The patented coating imparts corrosion resistance and antigalling properties to iron and steel tooling and machine components; automotive parts including tie-rods, ball joints, and clutch and brake components; and large components such as oilfield drilling equipment.

The process does not use EPA-regulated chemicals. Rinse water generally is disposable as nonhazardous discharge and requires no waste treatment.

Birchwood Casey | 952-937-7931 | www.birchwoodcasey.com

Gas springs

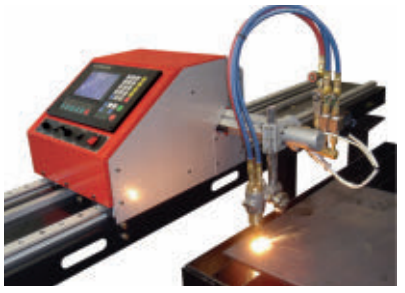
Dadco offers the UH series high-tonnage nitrogen gas springs.

Eight models are available from 1.26 to 4.72 in. in diameter with contact forces from 810 to 14,894 lbs. All models come standard with a G 1/8 port for linked operation using common hoses and fittings.

Stroke lengths up to 4.92 in. are available.

Dadco | 800-323-2687 | www.dadco.net

Oxyfuel, plasma cutting machine



Koike Aronson has introduced the PNC-10 Elite portable cutting machine.

The compact machine provides both oxyfuel and plasma cutting and drawing-to-part capability. Features include a 45-shape library, kerf compensation, and timed piercing sequences.

The machine can be used as a stand-alone machine, or it can be purchased as a complete package that includes the machine and a table.

Koike Aronson Inc./Ransome | 800-252-5232 | www.koike.com

YOUNG PROFESSIONALS TEAMING UP TO DRIVE MANUFACTURING FORWARD

Meet the leaders of FMA's new Young Professional's Council (YPC) in an atmosphere where you can relax, refresh and connect. This new group of 18-35 year-old industry members is dedicated to relating with the next generation, squashing perceptions of outdated manufacturing concepts, and driving industry forward.

"Our message is to debunk the myth of the old manufacturing plant and replace it with the new reality that can attract the next generation."

YPC Chairman
Jack Pennuto, Jr.
Formtek, Sales Manager

"YPC will reach out to middle school and high school students as well as young, rising stars working in manufacturing to communicate the possibilities in manufacturing as a career path to their own business."

YPC Vice Chairman
Anthony Contaldo
Corporate Finance Associates, Vice President, Middle Market Investment Banking

The screen will be big,
the beverages will be cold, and
the discussion will be inspiring.

Join the pre-game festivities following FABTECH

Monday, Nov. 14
Hyatt Regency Chicago (FMA Headquarters Hotel)
151 East Wacker Drive
Truffles Room
6:30 p.m.

Call 888-394-4362 to RSVP & be entered in the raffle for a team jersey of your choosing!

$10 donation suggested to support the youth activities of FMA's Foundation, Nuts, Bolts and Thingamajigs (NBT)*

*NBT inspires the next generation of manufacturers, inventors and entrepreneurs through manufacturing summer camps and scholarships.

FMA Fabricators & Manufacturers Association, International®
www.fmanet.org
Connect on:

Burt's Bees and Green Manufacturer Network Partner to Help Manufacturers Reduce Waste!

If it's not already an important mantra in your manufacturing facility, "reduce, reuse, recycle" will become one as more and more landfills reach capacity. To learn how you can manage waste better without hurting your bottom line, plan to attend the Green Manufacturer Network's Zero-Waste-to-Landfill Workshop Dec. 7 in Durham, N.C. The event will focus on approaches manufacturers can implement to achieve zero waste to landfill.

A plant tour of Burt's Bees will give participants the opportunity to see a zero-waste-to-landfill program in action! Burt's Bees produces earth-friendly, natural skin care, beauty, and personal care products. In October 2009 Burt's Bees' manufacturing site reached zero landfill; in January 2007 it was generating 30 tons per month. Presentations and discussions with industry experts will get you started on how to do the same in your own company!

Visit greenmanufacturer.net/event/zero-waste-to-landfill-workshop or call 888-394-4362 to learn more. ■

FABTECH Features Welding Competition

FABTECH 2011, running Nov. 14-17, 2011, at McCormick Place, Chicago, Ill. is expected to draw 32,000 attendees and 1,200 exhibiting companies covering more than 500,000 net square feet of floor space. Buyers and sellers from around the world will come together at this exhibition to exchange products and services, network with peers, problem-solve, and discover new products and vendors. If you haven't done so already, you can register to attend this exciting industry event at **fabtechexpo.com**. Show admission is free with advance registration before Nov 11, 2011.

While you're at FABTECH, make sure you take in the **Professional Welders Competition** happening on the show floor in the North Hall, Booth #7162. Watch professional welders compete to make a ¼-inch fillet weld using ⅛-inch E7018 electrode on low-carbon steel in five minutes or less. The Professional Welders Competition is sponsored by the American Welding Society (AWS), a co-sponsor of FABTECH, and will be judged by a team of AWS certified welding inspectors. The grand-prize winner will walk away with $2,500 and the title of "Best Welder in America." In addition to the grand prize, $1,000 will be awarded to the second-place finisher and $500 will be awarded to the third-place finisher. The top 12 competitors will win an AWS duffel bag. Each participant will receive an AWS competition T-shirt.

Interested in Competing?

The competition is open to those who are proficient in using shielded metal arc welding (SMAW) on steel. Welders — union and nonunion alike — are welcome. To compete, you must be at least 19 years of age. Those interested can pre-register online at **aws.org/3VPVIY**, or **register on-site at Booth #7162** Monday through Wednesday during show hours by filling out a form stating that you are a professional welder, and pay the $15 entry fee. You may bring your own helmet, protective clothing, earplugs, etc., or use those provided at the competition site.

FABTECH is co-sponsored by the Fabricators & Manufacturers Association International (FMA), Society of Manufacturing Engineers (SME), American Welding Society (AWS), Precision Metalforming Association (PMA), and the Chemical Coaters Association International (CCAI). ■

FMA TPA TRAINING ALERT

Conferences & Workshops

Outside Processors Event & BMW Plant Tour
Oct. 18-19, 2011
Geer, S.C.

Demand Response Workshop
Oct. 27, 2011
Palatine (Chicago), Ill.

FABTECH Conference
Nov. 14-17, 2011
Chicago, Ill.

Joining and Automation Solutions for Fabricators Conference
December 2011
Bolingbrook, Ill.

LeanFab Workshop & Tours
Dec. 5-6, 2011
Charlotte, N.C.

Zero-Waste-to-Landfill Workshop
Dec. 7, 2011
Durham, N.C.

Wind Energy Conference: Opportunities for Suppliers
Dec.12-13, 2011
Grand Rapids, Mich.

Toll Processing '12: FMA's 16th Annual Conference
Feb. 29-March 2, 2012
Scottsdale (Phoenix), Ariz.

***The FABRICATOR*®'s Leadership Summit: 7th Annual Metal Matters**
Feb. 29-March 2, 2012
Scottsdale (Phoenix), Ariz.

details at fmanet.org/training
or call 888-394-4362

Calling All College and Trade School Educators Concerned With Training the Next Generation of Manufacturers!

Attend FMA's
Meet & Greet Reception
at FABTECH

Monday, Nov. 14, 5-6 p.m.

- Meet fellow instructors and school administrators.
- Share your experiences and learn about industry certifications essential to a manufacturing curriculum.

Who should attend?
Faculty and staff from any educational institution offering fabricating and/or welding technology coursework.

Why attend?
Because it's fun and a chance to share challenges and solutions with your peers from all across the country.

Stop by FMA Booth 6000 in the Grand Concourse between the North and South Halls to share food, beverages, and your ideas on curriculum development. Please RSVP; contact D'Ann Hamilton at 815-227-8274 to say YES to this event. ■

Save the Date – Annual FMA Conferences Head West!

the fabricator's Leadership Summit
7th Annual Metal Matters

16th Annual FMA Conference

Toll Processing '12

a world-class gathering of industry leaders

Feb. 29 – March 2, 2012 • Talking Stick Resort • Scottsdale (Phoenix), Ariz. • www.fmanet.org

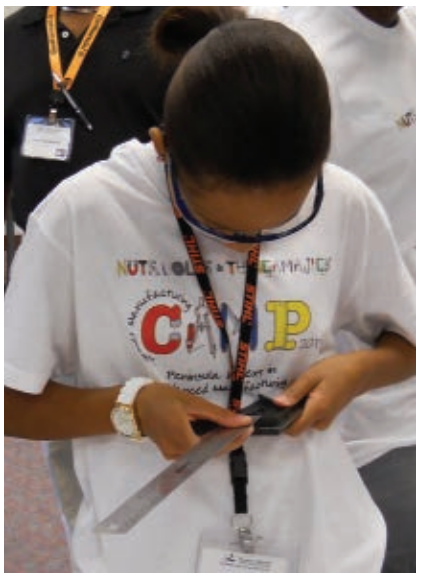
Today, Kids in a Summer Manufacturing Camp

Tomorrow, Your New Employees?

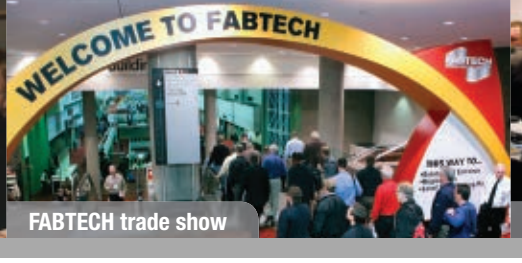
There's only one sure way to get our youth excited about careers in manufacturing: Give them a taste of the industry and its opportunities before they're too old and too cynical to give manufacturing a second glance.

Nuts, Bolts & Thingamajigs, the Foundation of the Fabricators & Manufacturers Association (FMA), has funded summer manufacturing camps since 2004 with the help of industry professionals just like you. As a result of corporate and individual gifts, more than 2,000 young people in 27 states have experienced 21st century manufacturing opportunities in an NBT camp and have taken home a product that they made — start to finish — using real manufacturing equipment. These are mementos they'll never forget, and for many the passion for a career has been ignited.

The skilled-labor shortage isn't going away! In a few years, it will be harder to hire motivated, skilled employees than it is today unless we expand programs to inspire today's youth to try careers they don't get access to in school. Please visit nutsandboltsfoundation.org/support to pledge your year-end, tax-deductible gift. Call 888-394-4362 to inquire about a camp for your town. ■




Summer Mfg. Camps



FABTECH trade show


Continuing Education


Networking Events

Dr. Kuehl recently spoke at *The FABRICATOR en Español* Leadership Summit, held in San Luis Potosí, Mexico. With reshoring a hot topic today, it appears that Mexican manufacturing is experiencing a renaissance. Here are a few thoughts regarding Mexico's future in the global economy.

A More Independent Mexico?

The old assumption was that Mexico would always reflect the economic realities of the U.S. and would never be able to break free of that connection — for better or worse. That is no longer as true as it once was. Today Mexico is showing that it is not entirely in the orbit of the U.S. Growth in Mexico is expected to hit close to 4 percent this year, while the U.S. will be lucky to break 1 percent. The Mexican economy now has an opportunity to engage with fast-growing neighbors like Brazil, as well as with the U.S. NAFTA has opened opportunities in Canada as well.

Over the past few years Mexico has started to recapture the manufacturing it lost to the Chinese and other Asian nations. While the U.S. has been struggling to answer the needs of industry by graduating only 30,000 engineers annually, the Mexican universities are turning out 90,000. The population of the U.S. is rapidly aging, and that makes retirement and care for the elderly top concerns. In Mexico half the population is under 30.

The most likely candidate for the Mexican presidency in 2012 is just 45 years old and presents himself as a reformer with the drive to make Mexico one of the hottest markets in the world. Enrique Peña Nieto is the new face of an old party as the PRI has been a dominant player since Mexican independence in 1910. The expectations are high in Mexico; many see economic growth as the key weapon to be used against the rise of the drug gangs who prey on the unemployed and disaffected.

The next few years favor Mexican growth if all goes well. High fuel costs benefit a nation that exports oil, but they also favor Mexico as a platform for manufacturing because the cost of getting goods to the U.S. is far less from Mexico than from across the Pacific Ocean. The young population can either be the ticket to expanded economic growth or it can be a drain on an already sagging social structure. Much will depend on the decisions that Mexico makes in the months and years ahead. ■


Dr. Chris Kuehl
FMA Global Economist

Would you like more economic insights twice a month, delivered straight to your e-mail? FMA members get Dr. Kuehl's Fabrinomics® *e-news as one of their benefits. Join as an individual or a company member at fmanet.org/join or call 888-394-4362. If you want to ask a question to be answered in this column, send it to Fabrinomics@fmanet.org.*

The Transition Mission


President Emeritus Jerry Shankel reflects on his FMA tenure; President Ed Youdell looks ahead

The Fabricators & Manufacturers Association (FMA) International doesn't have a leadership change that often. In the slightly more than 40 years of its existence, the organization has had only three presidents. A leadership change is a big deal.

With that in mind, the FMA's board of directors wrapped up a yearlong search process and named the association's new leader in June. Ed Youdell, hired as group publisher for FMA's publishing affiliate, FMA Communications Inc., in 2007, was selected to succeed Jerry Shankel, FMA's president and CEO since 2002. Youdell assumed the role of FMA president and CEO on Oct. 1. Shankel is now president emeritus, working to ensure a smooth transition until he departs at the end of the year.

Before the formal changing of titles and relocating of offices, Shankel and Youdell were asked to sit down and chat about their experiences that prepared them for their jobs at FMA and what their plans are for the future.

How did your background prepare you for your position at FMA?

Jerry Shankel: After graduate school my first job was with a public accounting firm, Ernst & Ernst, in Detroit. An audit client needed an accounting manager, so I joined the Society of Manufacturing Engineers (SME) in March 1968. I was there for almost 20 years and was the chief financial administrative staff officer.

Based on the financial systems and reporting mechanisms I put in place at SME, I was hired to do the same for the American Society of Mechanical Engineers in New York City. I was its chief financial administrative staff person for 4.5 years when I received an offer to interview for the chief staff position of the National Association of Corrosive Engineers [now NACE Intl.] in Houston. The organization was in financial difficulty and needed a chief staff person with a strong financial background. I was there 10 years.

FMA felt it was in a similar situation and hired me over several other candidates because of my background.

It's been interesting. There were some tough times in the early 2000s, a nice expansion in the mid-2000s, and since 2008 tough times again. FMA will have a positive bottom line this year for the first time in three years.

After 8 ½ years at FMA, what memories will you take with you when you leave?

Shankel: The principal memories will be the people involved with FMA, the volunteer leaders and especially the staff. FMA had almost 100 employees in 2000; it went down to 74 in 2003. Slowly it increased to 82 by the end of 2008. Then we had to downsize to 68 in 2009 and have basically remained at that level.

The staff morale and their efforts to meet member needs—whether in print, on the show floor, or in the classroom setting—have been inspiring to behold. I feel fortunate to have worked with such a bright and hard-working group.

Likewise, our members who have joined the board of directors or our technical councils, volunteered to present a paper, or opened their facility for a plant tour have all come together to help one another to survive and thrive.

I will remember the people.

Looking back, did you accomplish what you set out to do at FMA?

Shankel: As with many questions, there are things that went well and things that I wish had gone better. The expansion of FABTECH to add the American Welding Society, the Precision Metalforming Association, and the Chemical Coaters Association International to the original partners—the Society of Manufacturing Engineers and FMA—has truly produced a great event for attendees and exhibitors.

We were able to double the number of FMA members from about 900 to a little more than 2,000, but I think FMA can do better. The technical councils and staff have worked hard to provide good training programs.

The need for training is recognized in that we have many jobs in manufacturing going unfilled because of a lack of qualified workers, yet as we offer programs the attendance is not what I think it should be. We can do better.

Looking forward, what do you see for FMA's future?

Shankel: Looking ahead, I see more opportunities than big challenges. Both of the big challenges are behind us. We survived a very severe economic downturn, and while battling that, we purchased a magazine in Canada, *CIM-Canadian Industrial Machinery*, and launched a new publication, *Green Manufacturer*. Much of the credit for these two actions should go to my successor, Ed Youdell.

Perhaps the challenge will be in determining the right distribution mix—between print and online—for information from FMA's family of publications.

Additionally, we were able to strengthen FABTECH even as the show shrunk in size. In November, in conjunction with our show partners, we will present the largest FABTECH ever—and it still has room to grow in the future.

A positive challenge and an opportunity would be how best to attract readers of our publications and attendees of FABTECH and entice them to join FMA as members.

How has your background prepared you for your new job as FMA's president and CEO?

Ed Youdell: In some odd way, the fact that I grew up in Michigan in the middle of the auto industry is important. My dad was a tool- and diemaker for General Motors, and his experiences had me immersed in manufacturing and helped me to understand the value of manufacturing from an early age. You begin to see what manufacturing means to communities and to families.

That's where I started. Later I went to work for Reed Exhibition Companies, which is the largest producer of tradeshows, and various publishing companies. Working in those different markets, understanding how customer relationships are built, realizing the importance of market knowledge, and delivering information to customers—all of that has prepared me for this job.

What are your goals as you assume leadership of FMA?

Youdell: We need to keep things simple. If we consistently answer one question—How does this event, publication, or service improve a company's business?—for our members, for our readers, and for our show attendees, we'll always be in a good place. As long as we have a good answer to that question, we will always bring value to our customers and users of our services.

Like all businesses, growing revenue will be a major focus. We also need to diversify our portfolio so that we can better survive the next economic downturn.

I also would like to work to ensure that respect for the metal fabricating industry grows on a national level.

How do you plan to accomplish those goals?

Youdell: One way is that we will connect with partners in foreign markets. We have expanded our NAFTA coverage with *The FABRICATOR en Español* and *CIM-Canadian Industrial Machinery*. We have found opportunities to deliver on our mission in different markets, and we will continue to look for those. If we see an opportunity somewhere globally, we need to take the FMA brand there.

To encourage more attention be focused on metal fabricating, we need to reach out to our elected officials and industry leaders. Listening tours might be one way to do that.

How would you describe your mood as you tackle this new role?

Youdell: I am optimistic by nature. I believe manufacturing—and in particular, the metal fabricating market—is going to grow over the next five years.

That's great for the U.S. because manufacturing is a platform that can grow the middle class and create wealth for all of those involved.

What are your plans upon leaving FMA and entering the new year?

Shankel: Everyone asks me that. I don't have a specific plan at this moment. There are some things that my wife and I would like to do. There are some spots in the U.S. that we would like to visit. There are friends from work and school that we would like to get in touch with.

About all that is pretty definite is that we will move to Dallas where two of our three children live. After we get settled, we'll start to think more seriously about the next adventure. ■

USED MACHINERY FOR SALE

AMADA

Vipros 255, 50" x 50" (50" x 100"), brush, 31 Sta. 3 A/I, Fanuc 18P, 2001
Octo 334, 30" x 40", 8 Sta. 1 A/I, 1984
33 Ton Amada Pega 345 King, 58 Sta. 2 A/I, 04PC control, 1995
Pega 345 Queen, 40" x 50", 58 Sta. 2 A/I, 04PC, 1995
Pega 357, 50" x 72", 58 Sta. 2 A/I, 04PC, 1997
Vipros 358 King, 50" x 80", Brush table, 58 Sta. 4 A/I, 04PC control, 1995
Vipros 358 King II, 50" x 80", Brush table, 58 Sta. 4 A/I, Fanuc 18P, 1999
Vipros 368, 60" x 80" King II, 58 Sta. 4 A/I, Fanuc 18P, 2000
Vipros 568, 60" x 80", 62 Sta. 2A/I, 04PC, 1995
Coma 567, 60" x 72", 44 Sta. 2 A/I, 04PC, 1992
MP1225 NJ load/unload, 1999

STRIPPIT

33 Ton FC1250M, 42 Sta. 4 A/I, 50" x 80" (50" x 160"), Fanuc 0P, 1993

TRUMPF

Trumpf TC500R, 50" x 100", Bosch cnt, 18 Sta. Tool changer, Carts, 2000

PRESS BRAKES

Amada RG35S, 4' O.A, NC9EXII, 1989
Amada RG50, Auto 99 Control & BG, 1988
Finn Power Servo Electric E65-2550 HS TS 1, 5 Axis BG, extra stroke & open height, 2006
Amada RG80, 8' O.A., NC9EXII, 1997
Accurpress Advantage 71008, 100 ton x 10' O.A.
ETS 3000 Control & BG 2 Axis, 2007
Amada RG100, 10' O.A., NC9EXII, 1995
Amada HFE1003, 110 ton x 10', 7-Axis Operateur control, 5-Axis BG, 2006
Guifil HCS 35-160, 176 Ton x 10' O.A., Automec Autogauge 2 Axis BG, 1995
Amada HFB1704, 187 ton x 14', 8 Axis Operateur control, 5-Axis BG, 1999
Amada HFE2204, 240 ton x 14', 7-Axis Operateur control, 5-Axis BG, 2006

LASERS

Amada Pulsar LC1212AIII, 2kW, 4' x 8', 2001
Amada Pulsar LC2415NT, 2kW, 4' x 8', 2005
Amada Gemini FO3015 NT, 5' x 10' Dual, 4kW, Ball transfer load shuttle table, 2004
Amada Gemini FO4020NT, 6' x 12' Dual, 4kW, NT control, 2005
Bystronic ByStar 2800 Watt, 5' x 10' Dual, 1995
Cincinnati CL-6, 3kW Fanuc, 6' x 12' Dual, 1999
Mazak NTX 510 Champion 1500 watt, 1999
Mazak 510 Flexiblemanufacturing system, 1999
Mazak Spacegear 510Mark II 4 kW, 5' x 10' Dual, 6 axis laser with Rotary, 2005
Trumpf L3030, 4000 Watt, 5' x 10' Dual, Siemens control, 2007
Trumpf L4030, 4000 Watt, 6' x 12' Dual, Siemens control, 2001

MISC.

Amada MP1225 NJ load/unload, 1999
1/4" x 4' Amada M1260 shear
Haeger 824 OT, 8 Ton x 24" Throat, 4 Bowl feed, 2001
Haeger 2015WT-2H, 20 Ton x 15" Throat, 2004

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AMADA PUNCHES

VIPROS 568, 04PC, 1995
VIPROS 368KII, 04PC, 2001
APELIO III 367V, 2kW, 1999
PEGA 367, 04PC, 1990
VIPROS 367, Fanuc 18P, 2001
VIPROS 358 King II, 18P, 1999
VIPROS 358 King, 04PC, 1995
VIPROS 357Q, 04PC, 18P, 1999
PEGA 345Q, 04PC, 1995
PEGA 357, 04PC, 1995, 1998 (2) Avail.
OCTO 334, 6M, Thick A/I (2) Avail.
APELIO III 2510V, 2kW, 2004
VIPROS 255, 18P, 2000
AMADA MP1225NJ, 1999 (3) Avail.

TRUMPF PUNCHES

TC 600L, 2.4kW, 2000
TC 500R, 1993, 2000 (2) Avail.
TC 2020R, FMC, 2004
TC 1000R, 2007

LASERS

TRUMPF L4030, 4kW, 2001
TRUMPF L3030, 4kW, 2003
STRIPPIT/LVD ORION 4020, 4.5kW, 2007
BYSTRONIC BYSPEED 3015, 5.2kW, 1998
AMADA PULSAR LC2415NT3, 2005
BYSTRONIC 3015-2, 2.8kW, 1996
AMADA FO4020NT, 4kW, 2005 (2) Avail.
MAZAK SPACEGEAR MK510, 4kW, 2005 (2) Avail.
AMADA GEMINI FO3015NT, 2004, 2007
CINCINNATI CL6, 3kW, 1999
AMADA PULSAR 1212A3, 2kW, 2001
MAZAK NTX510, 1.5kW, 1999 (2) Avail.

CNC PRESS BRAKES

AMADA HFE2204, 2006
TRUMPF V170, 1997
AMADA HFE1303S, 2005
AMADA FBD1253NT, 2001
AMADA HFE1003S/7, 2006
AMADA RG100, NC9EXII, 1996
AMADA FBDIII 8025NT, 2000
AMADA RG80, NC9EXII, 1995
AMADA RG35S, NC9EX, 1988

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14 Stand x 1-1/2" (38.1mm) x 12" (304.8mm) TISHKEN #2574
14 Stand x 3-1/2" (88.9mm) x 24" (609.6mm) YODER #2731
12 Stand x 2" (50.8mm) x 24" (609.6mm) BRADBURY #2610
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Finding patience in the process

One metal artist's journey to create motion in metal

FIGURE 1 *The "U-Wind" sculpture is on display at the Water Street Gallery in Douglas, Mich. It incorporates the elements of simplicity, clean lines, and motion—all recurring themes in Londrigan's work.*

When it comes to metal art, Greg Londrigan is as much of a believer in the process as he is in the finished product. It's a lesson the marketing coordinator from Grand Blanc, Mich., has learned gradually, but one that has paid dividends.

Londrigan has an extensive artistic and creative background that includes graphic design, freelance illustration, Web site design, and other visual media. But much of that artistic focus over the last few years has been dedicated to metalworking.

It was only a matter of time before it happened. Pair his artistic ability with his welding experience, passion for construction, and add in an affinity for metal, and you've got a recipe for a metal artist. He's always had a knack for building and fixing things—a quality he now sees in his son. But his interest in metal art surfaced when his wife, an art teacher, needed a lamp welded together for an art project of her own. From there he moved to welding together pipe pieces he found around his house into what he called a crude and functional sculpture.

The aspect that separates metalworking from other art mediums is its forgiving nature, said Londrigan. He has sketchbooks filled with designs. Some, he said, are masterpieces waiting to be made, while others might not be. It doesn't matter. Having an outlet to make his sketches a reality is a joy.

He excels in both functional and abstract metal art. Both are equally rewarding to him; however, abstract art is where he truly shines.

"I kind of lean more toward the abstract work because I feel I have more freedom to try more techniques. With functional art, there are more preconceived notions as to what something should look like," Londrigan explained.

"Motion in a Motionless State"

Movement, a recurring theme in Londrigan's abstract pieces, stems from his life motto of always moving forward. Once he feels he has captured motion in a motionless state, the piece is complete.

"I always like to be moving forward. I always like to be doing something, and I've always been drawn to movement. To be able to capture that in a sculpture, like it's frozen in time, I'm really drawn to that."

Simplicity and clean lines also are trademark elements in his work, as are organic shapes blended with hints of the human form. It's important to Londrigan that viewers focus on how the piece makes them feel and not be distracted by how it was constructed. Achieving aesthetics requires hard work, a steady hand, and lots of patience. In other words, he must make a commitment to the process.

"U-Wind," for example, is assembled using gas tungsten arc welding (GTAW), and the edges are laboriously ground away to perfection (see **Figures 1** and **2**). An orange ribbon at the top of the sculpture gives the appearance that it is blowing briskly in the breeze.

Londrigan does most of the fabrication himself, outsourcing work only if the metal thickness requires or if he needs a plate rolled. He uses everything from blacksmithing tools to modern-day plasma cutting machines, benders, and welding equipment.

The sculpture "Unfurl," made from a solid, flat piece of steel, was bent entirely by hand, another testament to Londrigan's commitment to the process (see **Figure 3**).

"I love the process and the creativity that goes along with it. When I first started out I wasn't very patient. I just wanted to see the end product—just get to the end. But when I got more into it, I realized that art and creativity is a process, at least for me. It's a journey from the inception of the idea to when you're fabricating it, to when you're finishing it, to when you finally get to see the end result."

FIGURE 2 *Here's a closer look at the ribbon blowing in the wind on "U-Wind."*

FIGURE 3 *Each bend and twist in Londrigan's "Unfurl" was performed by hand.*

Sometimes the end result isn't obvious. Londrigan, in an effort to make sure the piece does not come across forced or hurried, will take his time when he is unsure which direction to go.

"I'll almost let the piece speak to me. Sometimes I've had stuff sit for months, even over a year, while I figure out where I should go next with it. I want it to be right."

Pursuing art more seriously has taught Londrigan lessons that reach beyond patience and enjoying the process. He has realized that art is problem-solving, and it has challenged his knowledge of creativity, which has required him to pursue the unlimited possibilities of the imagination.

"It opens the mind. The idea is only one small part of it. It's really about how you bring that idea to fruition and all the challenges that you face making it a reality. If more people knew about art and understood it, maybe it wouldn't get such a bad rap in the world and schools." FAB

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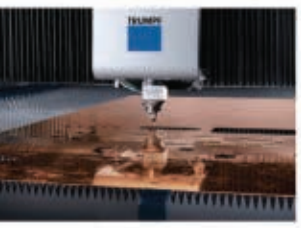

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