

An Optimist's Guide to Manufacturing Innovation

written by Lauri Moon | December 1, 2016

Once largely focused on large manufacturers, EWI is broadening the scope of its research and engineering efforts to also help small-to-mid size manufacturing firms put advanced technologies on the shop floor.

(IW - Steve Minter: 10-30-16) "We're all optimists here," says Henry Cialone, the president and CEO of engineering and technology organization EWI, referring to his team of more than 160 engineers, technicians and other experts.

One would expect optimism from the leader of any company but it may be especially valuable at EWI, which is dedicated to helping manufacturers benefit from innovative technologies. That pursuit of innovation necessarily involves failure and that can be a tough concept for any group of highly trained professionals to accept.

"That is probably the biggest challenge because we have an expert culture. People don't want to be wrong," Cialone observes. "They don't want to have to say they need help."

But since joining EWI in 2005, one of Cialone's objectives has been to mold a culture of smart people who are willing to take risks and accept failure as a step toward success.

"What I encourage my people to do is be troublemakers. People find that odd - how do you run a business if it's okay to cause trouble. But if they're not unruly, they're not going to change the world and I want my people to change the world, at least the world of manufacturing," he says. "I'm not saying be obnoxious or be abusive. Come up with the occasional crazy idea. Try it out. It might work."

That combination of expertise in a broad range of disciplines and the willingness to try new things has helped fuel EWI's growth over the past decade. *EWI began in 1984 as the Edison Welding Institute* in Columbus, Ohio, one of a group of state-funded technology centers. Today, the non-profit company no longer receives state funding and, unlike many R&D organizations, is focused on helping commercial customers, a part of the business that is growing at a 15% annual rate.

EWI also has expanded its footprint with two other laboratories in Buffalo, N.Y. and Loveland, Colo. EWI is considering adding another site in Phoenix. Cialone said these new facilities allow it to be closer to more customers, an important consideration in a custom business where it is critical to understand what a manufacturer is trying to accomplish.

“We hone in on an idea and then put together a proposal,” says Cialone. “The closer you are, the more feasible it is to do that more often.”

The direction of EWI Colorado illustrates how far EWI has come from its roots in welding. The new facility, which will have its opening on November 9, is focused on advanced quality measurement technologies. The lab will have capabilities in real-time manufacturing process monitoring and analysis, advanced nondestructive (NDE) evaluation, computer vision inspection, non-contact metrology and structural health monitoring.

Over the years, says Cialone, “We’ve added a lot of other technologies. We still do welding but we do machining and forming and robotics and inspection and 3D printing. Anything that a manufacturer does, we are probably involved in it.”

For example, the paint on airplanes periodically has to be stripped in order for the plane to be inspected. The paint stripping traditionally was done with either a solvent, which is environmentally toxic, or with plastic pellets or with sanding. EWI developed a high-power laser scanner for paint stripping applications. The laser system is precise enough that it can stop at the primer or strip the paint down to the substrate.

“We take a laser and raster it across the surface. When it hits the atmosphere, the paint combusts and all you have is a little ash to dispose of,” Cialone explains.

To keep at the forefront of technology, EWI needs to hire and retain talented technologists. Doing so is a challenge, Cialone admits. He says the company offers competitive pay but that is not a primary motivator for the people EWI wants to attract.

“People want autonomy. They want a sense of purpose,” says Cialone. “We think our mission has a sense of purpose to it – to shape the future of manufacturing.”

The diversity of the work is also attractive to employees, Cialone posits.

“They like the fact that they have so many different activities going on at any given time. We

have customers in every manufacturing sector from snack foods on up to commercial spaceships. Talk about diversity - you have to have a certain amount of ADD to work in our place," he quips.

Help for Smaller Manufacturers

EWI traditionally has worked with larger manufacturers, whose technical experts would seek them out for help with a problem where EWI's expertise was recognized. Cialone said he once thought small-to-mid-size firms could not afford EWI's services but came to recognize that was not the case. As a result, EWI recently set up a service for smaller firms called Advanced Manufacturing Implementation Strategy.

"It is a consultative advisory service - a little bit of management consulting and a little bit of technology coming together," Cialone explains. "We'll walk into a small to medium manufacturer, understand their business, understand their product set, understand their customers and the demands of the customers, and suggest places where technology could differentiate them, either by making them more efficient or providing faster turnaround or better product quality or all of the above."

Cialone says smaller manufacturers need more help with new technologies because of the increasing dynamism in the industrial sector. Large OEMs are facing demands for faster product development in the market. Since many of them largely assemble products from supply chains of smaller manufacturers, they are passing those pressures down the line and, says Cialone, often leaving smaller firms to figure out how to cope on their own.

"Think about the businesses that no longer exist that were rocking and rolling 5 years ago. While manufacturing is not quite that crazy, it is moving in that direction," Cialone observes. "Shorter product cycles, increasing demand for typically quality but also performance as well so they are now having to deal with different design approaches, different materials and different manufacturing methods."

What are manufacturers looking for help with? While that differs somewhat by industry, Cialone said there is a broad interest in automation. That is being spurred by robots that can be used in close proximity with workers. While smaller firms want to incorporate these "cobots," Cialone says they don't necessarily have the expertise to evaluate them or the ability to shut down production while they test out a new robot.

“So for them, we have set up a factory automation pilot – come to our lab, we have a gazillion robots and different types of automation equipment. We’ll lay it out with you in our shop,” Cialone explains. “You can do the one-off here and then we’ll rapidly implement it in your shop without any false steps.”

With its expertise in joining and forming materials, EWI has been helping automotive manufacturers cope with the twin challenges of lightweighting vehicles – reducing their weight to comply with higher CAFÉ mileage standards while also maintaining structural safety. Cialone notes that automakers have been experimenting with a variety of new materials – high-strength steels, aluminum, magnesium and combinations of these materials. Working with these new materials presents challenges from stamping them to joining different materials.

When EWI surveyed its customers about technical challenges facing them, automotive firms mentioned nondestructive testing as their top issue. That concern was prompted by the move to high-strength steels.

Automakers used to be able to test a spot weld with a screwdriver and hammer, Cialone noted. They would shove the screwdriver between two plates of steel, tap it and if it was a bad weld, it would break. If it was a good weld, it would be fine.

“It doesn’t work that way anymore. With the higher strength steels, they’re so strong you can’t iron the wrinkle back out,” Cialone says. EWI took medical imaging technology, upped the power levels and changed the underlying algorithms to work with the new steels. The result was a nondestructive way to test the welds.

Seeking a Package Deal

While EWI largely works on the basis that customers own any intellectual property arising out of their projects, the company has been moving into some commercialization and seeking to license its IP. That arose, says Cialone, out of customers questioning how they were going to implement new technology solutions.

“Some of our customers said, ‘We like working with you guys but if your project succeeds and you have invented a new way to do something, we’ll need to buy a new machine to do that and we’re dead in the water for 12 months or 18 months. We’re not going to do the project. If you can help us by producing some prototypes, we can test while we’re waiting for our machine.’”

We started doing that.”

EWI has spun out a handful of projects. In 2014, EWI sold a live arc welding training system and the associated IP it had developed, RealWeld Systems Inc., to Lincoln Electric.

At the time, Cialone said “We are thrilled that Lincoln Electric shares our vision for the RealWeld Trainer in its ability to educate and deliver skilled, production-ready welders for the manufacturing workforce.”

The transaction was important for EWI, Cialone says. “We couldn’t get anybody to license it when we first put it together. Nobody took it seriously because we didn’t have a track record of commercializing IP.” But after Lincoln Electric purchased the technology, he says, “It changed our profile in the market. People view us differently now, as more serious developers of technology.”

Packaging is another area where EWI is seeking to profit from its IP. The company has developed an ultrasonic sealing technology it calls SonicSeal. Snack packages typically are filled from a gravity-fed hopper and the bags are heat-sealed. The seal won’t work if there is grease or salt in the way, so the bag is made large enough that the product dropping into it is clear of the sealing area. This leaves a tab of excess material.

EWI set a goal of reducing the material in the tab by 50% to 75% and began experimenting with the ultrasonic technology. EWI tested the technology with a major food manufacturer and produced 5 million packages. The SonicSeal packages used 8% less material and achieved a 40% reduction in the scrap rate. The packages provided 10% more efficient shelf space at retailers and can extend product shelf life by up to 4 weeks.

EWI has been in discussions with packaging machine manufacturers about the new technology and showcased it at the PackExpo show in Chicago last Nov. 6-9.

“I think this is going to revolutionize food packaging,” Cialone predicts.

No-Cost Energy Assessments for Small to Midsized Manufacturers

written by Lauri Moon | December 1, 2016

Save Money Through Pollution Prevention and Energy Efficiency Strategies

IMC, in partnership with PennTAP, is providing free energy assessments for manufacturers to reduce pollution, improve energy efficiency and decrease greenhouse gas emissions that will result in reduced operating costs. Technical advisors will perform these pollution prevention and energy efficiency assessments through onsite visits, provide recommendations for improvements in energy utilization and waste reduction, prepare and deliver site assessment reports and provide assistance completing grant applications for follow-up project implementation.

To take advantage of your no-cost energy assessment email info@imcpa.com or call 570-329-3200 to get in touch with your IMC Business Advisor.

Operational Excellence Offers Paths to New Technologies

written by Lauri Moon | December 1, 2016

(IW - Steve Minter: 10-24-16) The Industrial Internet of Things promises more efficient operations, higher quality products and new levels of integration with suppliers and customers. Those promises, though, come at a price. For companies large and small, sluggish demand is reining in capital expenditures and making

many manufacturers hesitate to commit to investments in advanced technologies.

Emerson Process Automation Executive President Mike Train, however, says that *companies that invest in advanced automation and follow industry best practices can realize the kinds of significant savings that will make the investment in new technologies pay off.* In fact, companies can achieve improved earnings of up to 15% through new technology and improved operating practices, Train told the Emerson Global Users Exchange in Austin, Texas.

“After years of running at maximum production, postponing improvements, dealing with an aging workforce and delayed turnarounds, many companies are living on borrowed time,” Train said. “They desperately need to invest in improvements, maintenance and upgrades.”

Emerson and research partners have been studying what separates top-performing companies from their peers in terms of operating performance over the past year, Train said.

“If you look across the broad industrial sector globally, as much as \$1 trillion of company value is lost every year to sub-optimal operating performance,” he said.

Top quartile performers show significant operational performance in four areas that can affect their financial results, Train told attendees. They include:

- Safety - Top performers have three times fewer safety incidents than companies performing at an average level, said Train.
- Reliability - Companies in the top 25% of process firms have 4% higher availability of equipment (an extra 15 days per year) and spend half as much on maintenance.
- Production - Operating costs are 20% lower for top performing companies than their average performing peers, Train said.
- Energy and Emissions - Top performing plants have 30% lower CO2 emissions than their average performing peers and spend a third as much on energy.

Train said this data will help companies which “lacked the confidence in knowing which investment option will move the needle on financial performance.”

IIoT an Evolution, Not a Revolution

While noting that the Industrial Internet of Things is a hot buzzword these days, Train said it did not represent a revolution but rather “a logical evolution of the past 25 years of technology innovation.” He pointed out that process manufacturing companies have long invested in intelligent sensors, digital valve controllers and other technologies. As a result, he said, “Your IoT strategy must take into account the investments you have already made and leverage the infrastructure you already have. It all starts with having the right business case.”

At the user event, Emerson announced an expanded array of products and services it is calling the PlantWeb digital ecosystem. They include PlantWeb architecture to serve the enterprise as well as new sensing technologies, Secure First Mile products and services to securely connect data to the cloud, two suites of analytical software and an AMS ARES platform that allows companies to aggregate assets from multiple business systems and send that data to plant personnel either on desktop or mobile devices. Emerson said these solutions were scalable and would allow companies to begin the IoT journey with “limited effort or investments.”

Emerson is also providing real-time monitoring services where its experts will “constantly monitor and report on asset and operational performance, prioritized repair and asset trending.” Emerson will use Microsoft Azure as the cloud service for its connected services.

Train said that much of the current discussion about IIoT is “visionary” but “kind of hard to act on.” He continued that with the introduction of these products, Emerson will help customers develop a “clear, practical roadmap for how to make Industrial IoT actionable.”

R&D Tax Credit Myths that may be Costing You Money

written by Lauri Moon | December 1, 2016

(RSM - Tom Windram: 9-30-16) The federal research and development (R&D) credit gives companies conducting qualified research the ability to generate a net research tax credit of 13 percent (9.1 percent under an alternative simplified method) of incremental qualified R&D spending* in order to lower their regular tax bill. This credit can result in significant tax savings for manufacturing companies, however studies have shown that it is surprisingly under-claimed. While nearly \$9 billion in R&D credits were claimed in 2010, National Science Foundation¹ statistics indicate that another \$4 billion in R&D credits could have been claimed but were not. Manufacturing companies that develop new products, make improvements to existing products and develop or improve manufacturing processes are likely to qualify for the R&D credit. Middle market companies are among those least likely to take advantage of this beneficial credit.

The Protecting Americans from Tax Hikes Act of 2015, signed into law by President Obama on Dec. 18, 2015, modifies and makes permanent the R&D tax credit. Eligible small businesses may now claim the credit against alternative minimum tax. Additionally, a small business start-up is now able to claim a credit of up to \$250,000 against its FICA payroll tax liability if it had less than \$5 million in gross receipts for the current taxable year and no gross receipts for any taxable year prior to the five-taxable-year period ending with the current taxable year. These modifications are retroactive to Jan. 1, 2015.

In our experience, many companies that have eligible activity erroneously disqualify themselves from claiming the R&D tax credit because of one or more of the following assumptions:

Myth #1:	The R&D tax credit is only for companies that invent something revolutionary.
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Reality:	The R&D tax credit is designed to encourage innovation. As such, it is equally available to companies that attempt evolutionary improvements to existing products or processes and companies that undertake revolutionary activities. The development or improvement effort does not have to equate to a moon shot. The regulations define research as activities constituting a process of experimentation “intended to eliminate uncertainty” based on information available to the taxpayer at the outset of the project. An experienced R&D tax professional can help you understand what types of activities meet the qualifying criteria.
Myth #2:	The R&D tax credit is only for companies engaged in basic research.
Reality:	The R&D tax credit also extends to applied science, something that many companies perform on a daily basis as they try to improve their business and production processes through the use of technology and science.
Myth #3:	The R&D tax credit is not available for companies that fail in their research.
Reality:	You do not have to be successful to claim the credit. The R&D tax credit is an efforts-based credit. In fact, the regulations specifically state that success is not required in order to be eligible.
Myth #4:	The R&D tax credit won’t help my company because my company is not profitable.
Reality:	It is true that the federal R&D tax credit is a credit against taxes, meaning you must be profitable to utilize the credit. However, the credit carries forward 20 years and back one year. Thus, it could be of immediate benefit if your company was profitable in the prior year and can be banked for use in future profitable years. Also, small start-up companies may now be able claim a credit against their payroll tax even if they pay no income tax. In addition, some state R&D credit programs provide for refundable credits.
Myth #5:	The R&D tax credit is only for big companies.

Reality:	<p>While large companies may claim the biggest and most headline-grabbing credits, the program is open to all companies. There are no company size requirements; the credit is only based on engaging in qualified activities. The credit, however, must be actively claimed; it is not automatically granted. In 2010, more than 12,900 companies claimed the credit. Eleven percent, or 1,441, of these companies had business revenues below \$25,000, and 39 percent, or 5,015, companies had revenues below \$5 million.² In other words, approximately half of the companies that claim the federal research tax credit are considered middle market companies or small businesses.</p>
Myth #6:	<p>The R&D tax credit is not available to my company because our research is funded by the government.</p>
Reality:	<p>This is an understandable misconception that invites deeper consideration. The R&D tax credit requires both technical uncertainty and financial risk. If a contract between the government (or other party) and the taxpayer requires the taxpayer to succeed or return funds, or to incur costs beyond what the government is paying, the taxpayer is at financial risk and thus eligible for the R&D tax credit. A determination can only be made by reviewing all of the contractual payment provisions. Taking the time for a thorough review usually proves rewarding.</p>
Myth #7:	<p>The R&D tax credit doesn't reduce state taxes.</p>
Reality:	<p>About two-thirds of states have an R&D credit program. As mentioned previously, some of these offer refundable credits, while others offer credits that can be carried forward. Most state eligibility requirements mimic federal eligibility requirements, though some may restrict, include or provide for enhanced credits for specific types of research. The most common differences between federal and state R&D credit computations relate to the credit rate and base amount computations.</p>
Myth #8:	<p>The R&D tax credit is not a big deal since my company is already getting a deduction.</p>

Reality:	Smart tax planning includes taking advantage of all available benefits. An election under section 280C(c)(3) allows a taxpayer to take a reduced credit without disallowing the deduction for R&D expenses. Thus, a taxpayer may take a deduction for qualified R&D expenses in addition to a reduced credit at the tax-effected rate of 65 percent. The reduced credit is in addition to the deduction and represents a dollar-for-dollar reduction in regular income tax liability. Why leave money on the table and potentially put your business at a competitive disadvantage?
Myth #9:	The R&D tax credit is for increasing research; since my spending is flat, my company is not eligible.
Reality:	This is another tricky area full of misconceptions. The R&D credit does require an increase in research spending. However, current-year spending is compared to a base, which is 50 percent of the average spend for the prior three years, calculated under the ASC method*. In reality, your company's research spending could actually be decreasing, and your company could still be eligible for the credit.

If any of these nine assumptions have discouraged your business from claiming the benefits of the R&D tax credit, think again. It is not too late. Key owners of pass-through entities should be consulted, as this would require extending their individual return filings as well. Under some situations, businesses may also be able to amend prior-year tax returns and retroactively claim the credit. Amended returns will invite IRS scrutiny, and a well-documented study is essential to sustain the refund claim. Additionally, many state claim periods are also open, including some that offer refundable credits—meaning you don't even have to wait until you are profitable to see the dollars enhance your bottom line.

We recommend you work with your tax team and tax advisors and enlist them to take a look at your various business activities to see whether you qualify. By uncovering the truth behind a frequently misunderstood credit program, you may bring substantial dollars to your bottom line.

*Credit calculation note: The standard credit is 20 percent (13 percent under the reduced credit election) of the current-year qualified research expenses (QREs) over

a historical base amount computed by applying a fixed-base percentage to the average of the prior four years' gross receipts. The fixed-base percentage is a function of aggregate QREs divided by gross receipts for the 1984 through 1988 base period. Companies that do not have QREs in at least three of the five base years use a start-up method based on a complex, five-year sliding scale formula. Under an alternative simplified credit (ASC) method, the credit is 14 percent (9.1 percent under the reduced credit election) of current-year qualified research expenses over 50 percent of the prior three years' QREs. Because the regular method can penalize companies whose R&D spending grows more slowly than revenues and the difficulties associated with documenting QREs in the base years, the ASC is often the more favorable approach.

[1]National Science Foundation, National Center for Science and Engineering Statistics; U.S. R&D Resumes Growth in 2011 and 2012, Ahead of the Pace of the Gross Domestic Product, Arlington, VA (NSF 14-307, December 2013). <http://www.nsf.gov/statistics/infbrief/nsf14307/>

[2] Statistics of Income Division: 2001 - 2010 Corporate Returns Data; Figure B. Corporations Claiming a Credit for Increasing Research Activities; Number of Credit Claimants by Size of Business Receipts; Tax Years 1990-2010

(Tom Windram is a partner at RSM LLP)

Communities Save \$250K in Annual Energy Costs

written by Lauri Moon | December 1, 2016

Millheim and Selinsgrove boroughs are starting to save \$250,000 in annual energy costs, reaching an anticipated \$1 million in savings within five years. This concludes a two-year effort by SEDA-COG's Energy Resource Center.

This project, similar to the successful community-wide project completed in New Berlin in 2013, was primarily funded by the Appalachian Regional Commission.

Many partnering organizations contributed to the project via funding and/or technical assistance, including SEDA-COG's Weatherization Program, Selinsgrove Area School District, Innovative Manufacturers Center (IMC), PennTAP, Selinsgrove and Union County Area Agency on Aging, Selinsgrove Area School District, PPL Electric Utilities, Central PA Community Action Agency, Snyder County Planning Department, Centre County Planning Department, Selinsgrove Borough Council, and Millheim Borough Council.

Commissioners Proclaim October 7th Lycoming County Manufacturing Day

written by Lauri Moon | December 1, 2016

IMC's Lauri Moon accepts a proclamation from Commissioners claiming October 7th Lycoming County Manufacturing Day.

Thank you Commissioners R. Jack McKernan, Tony R. Mussare and Richard Mirabito for recognizing the importance of manufacturing in Lycoming County.



Research and Development Tax Credit Myths that May be Costing You Money

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This credit can result in significant tax savings for manufacturing companies. However, *studies have shown that it is surprisingly under-claimed*. While nearly \$9

billion in R&D credits were claimed in 2010, National Science Foundation (1) statistics indicate that another \$4 billion in R&D credits could have been claimed but were not.

Manufacturing companies that develop new products, make improvements to existing products and develop or improve manufacturing processes are likely to qualify for the R&D credit. Middle market companies are among those least likely to take advantage of this beneficial credit.

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MFG Day: How Manufacturing Drives the Economy

written by Lauri Moon | December 1, 2016

Expert panel discusses value of Manufacturing Day, including the downstream sales chain, and how manufacturing accounts for an estimated 33% of GDP and 33% of employment.

(Supply Chain 24/7 - Staff: 10-7-16) To kick off the nationwide celebration of Manufacturing Day today, October 7, an expert panel hosted by the Fabricators & Manufacturers Association, International (FMA) has highlighted the significant role manufacturing plays in bolstering America's economy and the critical need to ensure

that the sector remains a positive force.

Sharing insights at the “How Manufacturing Drives the Economy” program are;

- *Stephen Gold*, president and CEO of the Manufacturers Alliance for Productivity and Innovation;
- *Scott Mayer*, chairman and CEO of QPS Employment Group;
- *Chris Kuehl*, managing partner at Armada Corporate Intelligence and FMA economic analyst; and
- *Kenneth Voytek*, chief economist for the Hollings Manufacturing Extension Partnership Program (MEP).
- Panel Moderator is *Eric Lundin*, Editor of The Fabricator magazine and Tube & Pipe Journal.

“Manufacturing is a much more significant factor in our economy than official government statistics show, as those numbers only measure the value of the upstream supply chain and only include goods sold to ‘final demand’,” Gold said. As an example, he cited motor vehicle manufacturing, which includes production and transport of materials, R&D and corporate services in the upstream chain.

“When you include the downstream sales chain, the impact is magnified and multiplied,” he said. In his example, this encompasses retail auto dealers, transport and import of the finished vehicles, wholesale operations and aftermarket services.”

Using the traditional upstream supply formula across all segments, manufacturing represents 11% of GDP and 9% of employment, Gold said. The downstream sales chain analysis provides a more complete picture at 33% of GDP and 33% of employment.”

Chris Kuehl looked at the significance of U.S. manufacturing from a global perspective. “The manufacturing sector is the dominant player in U.S. exports, particularly with heavy machinery and other capital goods,” he said.

“And the U.S. is more export dependent than people realize; it accounts for 14% of GDP, almost matching export-driven Japan at its 14.7% of GDP. What most people don’t recognize is that the U.S. accounts for 30% of all global manufacturing by value. China accounts for only 10%.”

According to Gold, it is important for policymakers to understand the dramatic impact manufacturing brings to the economy and to develop public policy to ensure a dynamic manufacturing base is ever-present. Such developments can help manufacturers themselves gain greater confidence to spend more capital and invest in new productivity techniques.

Smaller Manufacturers as Catalysts While acknowledging the sector's rebound over the past several years, Voytek said manufacturing performance has leveled off and slowed, the result of several broad macro trends that include a stronger dollar, declining commodity prices (particularly oil) and weaker demand globally for manufactured goods.

Voytek sees smaller firms as the key to combating these trends. The fact that 99% of manufacturers fall in this category (less than 500 employees) reflects the increasing share smaller establishments bring to the manufacturing landscape.

"It must be recognized that small firms do face a different set of challenges when compared to larger firms," Voytek said. "They don't have the deep pockets and deep resources like those competitors. But opportunities are available for them to improve in the areas of operational excellence, strategies, new product development and entering new markets."

A new study of the greatest challenges manufacturers face revealed that employee recruitment concerns have increased the most in recent years, cited by 45% of respondents in 2015, but only 19% in 2009. Voytek shared another chart highlighting how job openings are outpacing hiring in manufacturing. Scott Mayer focused on the reasons for such numbers.

"Every day the baby boomers are retiring at a high rate and a new generation of workers in this sector is needed," Mayer said. However, filling this gap continues to be an issue. According to Mayer, high school teachers and counselors continue to direct too many students to attend college for traditional four-year degrees when a large number of young people may be better suited to focus on the skilled trades.

"You can't put everyone in the same bucket," he said. "There is not enough recognition that manufacturing today offers many good, well-paid middle-class jobs."

Sadly, such jobs are usually not considered an ‘in’ thing.”

Mayer points to a need for more “grass roots” efforts that involve parents and educators alike. “Parents need to steer their kids in the right direction when it comes to career choices,” he said. “Kids are impressionable and will listen to their teachers. Words mean a lot.”

Manufacturing Day Shines Spotlight on Needs, Opportunities Each panelist asserted that Manufacturing Day - marking its fifth year anniversary today, October 7 - exemplifies this comprehensive grass roots approach and delivers effective, educational programs. Thousands of manufacturers will again host students, teachers, parents, job seekers and community leaders at open houses, plant tours and educational sessions to showcase modern manufacturing technology and the attractive jobs that are available. It is a chance for students to see diverse career options that are innovative, impactful and durable, and understand how to apply their studies in math and science to those careers.

“Manufacturing Day truly dispels old, negative myths about manufacturing and highlights the shift from a labor-intense environment to one of high-tech, robotics and computers,” said Kuehl. “It also provides opportunities to communicate how manufacturing is a big part of GDP and our economy.

Both Gold and Mayer note the 3,000 events to be held throughout the country raise the profile of the industry. In addition to the program’s ability to “put manufacturing on the map,” Voytek views Manufacturing Day as a way to highlight a distinctive personal benefit for those who select the industry as a career.

“Manufacturing enables workers to show their accomplishments in a very tangible way,” he said. “They can say, ‘I made this piece of machinery, equipment or product.’ It’s another way to position manufacturing in a positive light.”

The Buzz on Manufacturing Technology from IMTS 2016

written by Lauri Moon | December 1, 2016

(American Machinist - Robert Brooks: 9-20-16) IMTS 2016 is in the books now, and having spent the better of the past week browsing, listening, and noting to myself, here is a quick analysis of manufacturing and machining industry developments based on ideas promoted by the experts and developers there.

We have spent the past five months previewing new machinery and devices, preparing to see and learn more on-site: there is still plenty of time to review the details of all that was exhibited at McCormick Place, and some of what was new there will become the basis of future developments in precision manufacturing. But first, ...

Manufacturing technology has four general platforms for product development, which IMTS mostly recognizes via its floor plan: machining and cutting equipment; tooling and materials; programming and networking technologies; and automation and handling processes. There is more, of course — ancillary supplies, shop organization and management systems, consumable products and supplies, etc. — but this is all for classification purposes.

What follows here is a summary of ideas, themes — buzz words, if you will — with relevant (but not exclusive) examples from IMTS 2016 that are shaping the current and future understanding of manufacturing technology.

Automation

“Automation” has long been a synonym for “robotics” in manufacturing, but robotics are coming into their own (read on...) and the term automation is growing to encompass much more: networked machines and shared databases, actuators and performance models, all the connected devices and packages that are helping machine shops and other manufacturers realize the high-concept vision of the Industrial Internet of Things / Industry 4.0. IMTS 2016 had numerous examples of such broad-based automation technology — such as the Siemens Digital Enterprise Showcase.

For manufacturers, the value of such platforms that they encourage the operations to develop a

strategy for growing into an IoT-compatible enterprise, rather than having that standard imposed on them from some invisible “partner.” IMTS 2016 offered visitors numerous examples of technologies and programs for connecting with suppliers, customers, and data partners, to make manufacturing automation more intuitive and “automatic.”

Robotics

Robots have had a place in machine shops and manufacturing for decades now, though it’s been a grudging acceptance by the operators. Whether the objections are based on technical complexity, plant safety, or some intangible feeling about human involvement, IMTS 2016 made clear how the future of machine-shop productivity is premised on robotics.

ABB Robotics introduced the FlexMT™, a pre-engineered system designed to load and unload machine tools using vision guided robotics. Designed for both small batch and high volume production, its developers promise to boost spindle utilization by up to 60% over manual machine tending. The system can handle most any size and type of part, and is compatible with a wide range of machine tools, including horizontal and vertical lathes, machining centers, 5-axis machines and grinders.

Robotics are quickly evolving into a separate discipline, with auxiliary devices for gripping, conveying; intuitive interfaces and customized programming software; and variations in reach and payload standards that mean robots will find their functions in a growing number of machining and manufacturing applications.

Multi-tasking

Five-axis machining is widely understood as giving machine shops the flexibility to perform complex tasks with fewer set-ups ... but is it widely applied? In other words, shops that have invested in five-axis machining may not need to operate with all those features, and in fact may over-invest to establish the capability. Finding ways to make two- and three-axis machines gain the flexibility of five-axis machining is gaining influence with machine shops — and thus with machine tool developers.

Haas Automation exhibited its new TR200Y dual-axis trunnion rotary table, which it explained “puts five-axis capabilities well within reach of the average job shop, and its compact size provides greater mounting flexibility.”

The TR200Y mounts in the Y direction (front to back on the table) of a mid-size VMC. At less than 27 in. (686 mm) wide and 20 in. (508 mm) deep, it fits on one end of the machine's table, freeing up the remainder for additional fixtures or vises. The TR200Y has a 7.87 in. (200-mm) T-slot platter, and will swing parts up to 8.1-in. (206-mm) diameter. The maximum platter capacity is 80 lb (36 kg). The trunnion provides ± 120 degrees of tilt and 360 degrees of rotation for full simultaneous 5-axis motion, or to position parts to almost any angle for machining. Still, it can easily be removed when not needed.

They may not need more spindles, but maximizing "spindle time" is an idea that is gaining priority with machine shops.

Precision

Precision is not a hard idea to understand — but it's hard to achieve and maintain. Unfortunately, it's an idea that underpins an increasing number of product designs in high-value industries like aerospace, electronics, and medical/surgical parts, sectors that can be very rewarding to qualified and capable suppliers. Achieving precision invariably depends on the selection of the right machinery, the right controls, the right programming — all of which were emphasized by IMTS 2016 exhibitors. Precision is also the consistent theme from tooling developers.

Switzerland-based Mikron Tool introduced its new CrazyDrill SST-Inox 12 x d for drilling stainless materials in diameters as small as 0.3 mm (0.012 in.) — which is possible thanks to highly advanced and specially developed tool geometry for the drill, and an efficient cooling concept for the drill shank.

Precision is not an idea that can be put aside once it has been raised and defined: suppliers of tooling who can maintain their reputation for precision designs and precision performance will have a bright future after IMTS 2016.

Solutions

Machine tool developers (among others) have been promising "solutions" to their customers for a long time now, and there is a sense from IMTS 2016 that customers are turning the idea around on them — demanding better application of design principles to save production time, energy, system flexibility, reliability, and more.

For example, Makino displayed its a40 horizontal machining center, which it emphasized is the first system purpose-built for machining aluminum and nonferrous diecastings. Previous machine tools have been “over-designed” for diecasting producers, who need to maintain high-throughput of near-net-shape parts, with the right parameters for power, energy consumption, and cycle times that will address their productivity and “per-piece costs.” The a40 HMC is a solution to over-designed systems.

“Diecast manufacturers are under intense pricing pressure with mandatory cost reductions from OEMs and increasing global competition. The keys to overcoming these challenges lie in the reduction of machining cycle time and elimination of unplanned down time,” explained Makino’s horizontal product line manager David Ward. “To address the cycle time issue, Makino has re-evaluated each of the major castings using an Intelligent ‘Reduction of Inertia’ (ROI) design philosophy. The new design provides superior linear and radial agility and acceleration.”

The a40 is a customized solution for the diecasting sector, providing those manufacturers with productivity improvements as well as savings in capital investment, labor, floor space, utility consumption, and tooling. It’s an example of manufacturing technology buzzword being realized and demonstrated at IMTS 2016.

Eve of Disruption: How the Auto Industry Is Remaking Itself

written by Lauri Moon | December 1, 2016

Automakers are trying out all kinds of new business models, from rebranding themselves as mobility companies to partnering with obscure start-ups. Can they take it to the bank?

(IW - Laura Putre: 9-27-16) Although the U.S. automotive industry saw record sales in 2016, the mood of its leaders right now is low-key, even a bit anguished. Gains that OEMs made after the Great Recession have slowed to a near-halt, with predicted sales for 2016 hovering around

last year's numbers, then dipping slightly in 2017.

Wall Street wants growth, and automotive manufacturers, realizing that they can't rest on their SUV and pickup-truck laurels, are looking for it in uncharacteristic places. Nissan is partnering with an electric scooter company in San Francisco. Volkswagen wants to focus more on car-sharing and introduce up to 30 new electric vehicle models. General Motors has a vice president of urban mobility who recently told an auditorium full of automotive executives that in New York City, where she lives, "the whole idea of owning a car, parking it for \$1,000 a month, and not using it 95% of the time is ludicrous."

"Everything about our business is changing," Bill Ford, avuncular executive chairman of Ford Motor Co. and great-grandson of Henry, told a potpourri of Detroit automotive beat reporters, soccer-mom and fashion bloggers, radio hosts and foreign journalists at his company's trend conference in September. "It's been a tough time for the auto industry because Wall Street doesn't have a whole lot of faith in [us]."

Ford said some investment firms see auto companies as flatlining now that they've ridden a crest of post-recession growth. Or, they adopt the attitude that "with all this disruption, it's not clear to us who's going to win—what any [automotive companies] are going to look like in five years—so we're just going to take a step back."

More disruption is going on in automotive now than at any time since cars replaced horses as the dominant mode of long-distance transportation: After a long incubation period limited to annual DARPA challenges and whatever Google was doing in Mountain View, self-driving cars are on the fast track. Tech companies are muscling in on the traditional auto space. New mobility services like ride-hailing and microtransit are challenging the individual car ownership model.

Meanwhile, the price of cars is outpacing wages in the United States, and political uncertainty and economic stagnancy are slowing growth in some emerging markets. Electric and fuel-cell vehicles are gaining traction as their price tags come down and range goes up (along with fuel economy standards).

The auto industry has to think about all this and the Volkswagen emissions cheating scandal and finding tech-savvy people to run the factories and software engineers to design algorithms to tell a driverless car how to behave when a herd of cattle is crossing the road.

“It’s not clear where some of these business opportunities really are,” Bill Ford said. “We are going to try a lot of different things, and obviously we have to build business models around them that work, and I’m very confident that that will happen.”

Until then: stay tuned for a considerable bit of rooting around in the dark.

Taking the Slow Road

Automakers looking for meaningful growth aren’t likely to find it in the United States. Vehicle prices have been growing faster than wages, observes Patrick Manzi, senior economist for the National Automobile Dealers Association. Consumers are stretched: car payments made up 12% of personal income in 2014—higher than the previous nine years. And the loans take longer to pay off: 67 months in 2015, compared to an average 54 months two decades ago.

Paul Traub, senior business economist for the Federal Reserve of Chicago, says that automotive sales likely peaked in 2015. Some of the reasons he sees include a trend since 2010 of Americans saving more of their income; a depletion of pent-up demand for new vehicles after the Great Recession; shortened commutes for more people working remotely from home; and a shift in population from smaller cities and suburbs to “megacities” where mass transportation is convenient. People are also holding onto their new vehicles longer: from an average 50 months in 2005 to 77.8 months in 2015.

Even in the richest metro area in the country, San Jose, Calif., a median-income household cannot afford the average new vehicle, says Bankrate’s 2016 Car Affordability Study.

Worldwide, car ownership climbs when average incomes hit the range of \$5,000 to \$20,000, says Gary Silberg, lead automotive industry partner for KPMG. Within that range, ownership leaps from one car per 10 people to one per two.

China is in that sweet spot for growth, but hurdles include car quotas in pollution-wracked major cities and regulations that require foreign automotive companies to partner with Chinese companies (and share their research).

India has huge potential, with about one car for every 30 people. But wages aren’t high enough.

“If you talk to the auto guys, every 10 years they say India will be 10 years away,” says Silberg.

“It’s a low-end, \$10,000 vehicle market—kind of a nuts and bolts market,” with the modest profit margins to match.

So where will the growth come from? If you subscribe to the iPhone theory that new features = people dashing to turn in their old products and buy new products quickly, then leaps in technology could benefit automakers. And if the self-driving, living-room-on-wheels models cost way too much for all but the wealthiest consumers, then replacing individual ownership with fleet-owned vehicles to share, hail and rent looks better and better.