



WEDNESDAY
NOVEMBER 8, 2017

DAY 3

McCORMICK PLACE



THE OFFICIAL SHOW NEWS SHOW DAILY

NORTH AMERICA'S LARGEST METAL FORMING, FABRICATING, WELDING AND FINISHING EVENT

TODAY'S EVENTS

WOMEN OF FABTECH BREAKFAST WITH TECH TOUR

7:30 – 10:30 AM, S100 Ballroom
Purchase Tickets in Registration

KEYNOTE: INSPIRING CREATIVITY IN THE WORKPLACE

Matthew Luhn, Original Storyteller, Pixar
8:30 – 9:30 AM, S100 Ballroom

ACCELERATING INNOVATION IN 3D PRINTING, PRACTICAL TOOLS YOU CAN APPLY TODAY

10:00 – 11:00 AM, 3D/Additive Manufacturing
Theater, Grand Concourse

INNOVATIVE APPROACHES FOR WORKFORCE DEVELOPMENT & RECRUITING TALENT

12:30 – 1:30 PM, S100 Ballroom

OPTIMIZATION, PREPARATION AND SIMULATION SOFTWARE FOR ADDITIVE MANUFACTURING

2:00 – 3:00 PM, 3D/Additive Manufacturing
Theater, Grand Concourse

PROFESSIONAL WELDING COMPETITION

Show Hours, North Hall, Booths B32110 & B33109

SPIN TO WIN

11:00 AM – 4:00 PM, Hall C, Booth C41344
Chance to Win Prizes!

Trio of Experts Assess State of the Industry

Today, manufacturing organizations are managing frequent changes in customer needs, handling changing competitive landscapes, and focusing on profit margins and revenue growth. As they approach these serious tasks, manufacturers are constantly looking to take the pulse of the sector. Is it growing or declining? What are the major issues at hand and on the horizon? What can be expected in the near and long term?

To provide some useful context in considering these and other questions, FABTECH held its annual State of the Industry panel discussion yesterday. The large number

of show attendees who gathered for the discussion were rewarded with thought-provoking ideas and insights from three nationally renowned experts who track the economy and manufacturing in particular:

- **Michelle Drew Rodriguez, Manufacturing Leader, Deloitte Center for Industry Insights**

In her current role, Rodriguez is developing the Deloitte Center for Industry Insights to reinforce Deloitte's thought leadership on the top-of-mind issues of business leaders. In addition to her role as the manufacturing leader for the Center, she serves as the center operations leader of the

consumer and industrial products industry. Here, she works with the firm's sector and functional leadership within the consumer and industrial products industry to set and manage the strategic agenda for research and eminence, create the overall governance and engagement models, as well as develop deployment strategies and vehicles to support the innovation and development of new services.

- **Dr. Chris Kuehl, Managing Director, Armada Corporate Intelligence**

Armada's mission is to combine the traditions of corporate and competitive intelligence with strategic and tactical planning to provide clients with a clear

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FABTECH — a Bigger, Better Matchmaker



If you've looked closely at industry data lately, you've probably noticed that many industrial sectors have done well over the last several months. Automobile production? Setting new records. Residential construction? It increased 5.5 percent in 2016. Nonresidential construction peaked some time ago, but some subsectors did really well last year:

Commercial construction increased 11 percent, lodging increased 22 percent, and office construction went up a whopping 29 percent. Domestic oil isn't at a peak, but it's still quite healthy—more than 8 million barrels per day—mainly because the crude oil price stabilized around \$50 per barrel. Dig a little deeper and you'll find that consumer spending on dura-

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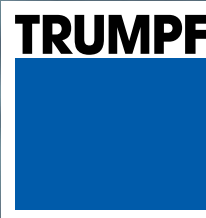
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FABTECH Booths A2601, B11013, B103 / www.trumpf.com

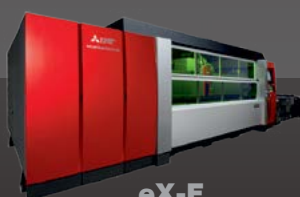


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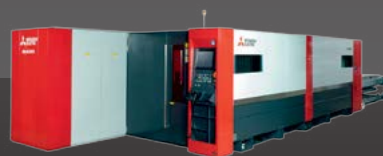
FABTECH BOOTH **A2619**



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Building the Future of Finishing

Ask any manufacturer their biggest obstacles to doing business and no doubt attracting qualified personnel is at the top of their list. Getting young people interested in manufacturing and filling the pipeline with qualified employment candidates is a challenge we all share. It is also an area in which every manufacturer and industry association can make a difference. The key to developing today's young people into tomorrow's talent is awareness. The more of us that open our doors to the community, work with local press, and invite schools to see firsthand what we do and the opportunities we offer, the more we will pique the interest of young people and attract them to manufacturing.

In an effort to increase awareness of manufacturing - the finishing industry in particular - and the quality careers it offers, the Chemical Coaters Association International (CCAI) offers a number of vehicles to engage students. Through

its website, www.ccaiweb.com, CCAI offers a variety of student focused content. These resources offer general career information, education information, networking opportunities, and more. A Student Membership is available for any individual 16 years of age or older who is currently enrolled in high school, college, technical school or community college. Student Membership benefits include unlimited access to CCAI TV training videos, participation in group and community forums, discounts on CCAI sponsored seminars, conferences and events, Chapter membership, the ability to post a resume in the online Career Center, and much more. Many Student Members are active in their local Chapter, which opens doors to networking, internship and scholarship opportunities. This year, CCAI National and Chapter scholarships totaled more than \$30,000 and encourage education in finishing and coating technology.



CCAI has two new initiatives related to workforce development. One is its Student Outreach Program. CCAI participated in the American School Counselor Association Conference this past July, which drew school counselors from across the United States. As attendees stopped by the CCAI booth, it was clear the counselors wanted to learn more about the association, the finishing industry and what it could offer their students. As a result, immediately following the conference, CCAI began developing the Student Outreach Program. Targeting students of all ages from elementary school to college, the program includes age-appropriate presentations conducted by CCAI staff as well as industry experts from its membership. During the presentation, students learn about coating technologies, and have the opportunity to touch and feel sample parts, primary materials including powder coatings, and industry tools such as spray guns. To further enhance the program, a field trip to an area facility can be added, enabling students to see finishing technologies in action and envision themselves in a finishing-related career. CCAI is proactively promoting their Student Outreach Program throughout the United States through its Chapters, members, career oriented events, and direct contact with schools of all levels.

The other new initiative is a partnership with Workshop for Warriors, www.workshopsforwarriors.org, based in San Diego. CCAI will be adding a finishing component to the already-successful welding program that provides training, certification and job placement for veterans. "We are so excited about our partnership with Workshops for Warriors," states CCAI Executive Director Anne Goyer. "Providing education and job placement opportunities for those who have served our country is both good for our veterans and our finishing industry."

It is important to point out that you don't have to have a formal program to make a difference. There are many things that can be done within your community to increase awareness of manufacturing and its benefits. Build relationships with local schools and community colleges to develop internship programs and facility tours. Take advantage of opportunities like Manufacturing Day. This national program is widely publicized and provides tools to help manufacturers open their doors. Together we can make a difference - one facility at a time.

For more information on all of CCAI's education and training programs, visit booth # A6135. ■

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"Manufacturing Universities" Critical to the Metal-AM Cause

Brad Kuvin, Publisher and Editorial Director, 3D Metal Printing Magazine

Groundbreaking additive-manufacturing (AM) training is underway at the Underwriters Laboratories' Additive Manufacturing Competency Center (AMCC). There, AM-machine operators are being trained on the ins and outs of 3D metal-printer setup, operation, troubleshooting and maintenance.

Training of qualified operators is a huge hurdle standing in the way of AM's widespread move into mainstream manufacturing; it was exciting to see the AMCC working to remove that hurdle. However, other considerable hurdles remain, including the ability to:

- Develop the build process concurrently with design;
- Implement feedback-based control systems; and
- Expand the process-parameter variable sets used to manufacture acceptable parts.

Well, have no fear—those hurdles and others are under careful review at the recently launched NextManufacturing Center, on the campus of Carnegie Mellon University in Pittsburgh, PA.

As many continue to survey the R&D landscape for innovative work underway in the 3D metal-printing arena, it's clear that collaboration between universities and industry will lead the charge. And, most of these R&D projects promise to deliver results within a few years.

This uptick in collaborative efforts stems, at least in part, from the introduction of the Manufacturing Universities Act of 2015, a bipartisan piece of legislation that sought to designate 25 schools as "manufacturing universities." Those designated as such would receive \$5 million annually for 4 yr. to develop engineering programs on manufacturing; create university-industry partnerships; and increase training opportunities.

This legislation eventually wound up as a component of the Manufacturing Engineering Education Grant Program, included in the 2017 National Defense Authorization Act. Universities will be selected for the grant program on a case-by-case basis.

Most recently, another university-industry partnership has just borne fruit to fortify forward-thinking manufacturers. At the end of January, a collaborative effort by the University of Buffalo and The Center for Industrial Effectiveness resulted in the launching of an online course, Digital Manufacturing and Design Technology. The curriculum, designed with industry partners including Siemens and Buffalo Manufacturing Works, comprises 40 hr. of instruction, assessments, peer interactions and a final project. And, most importantly, it strives to be immediately of use in industry. For example, one module explains how to upgrade legacy machines to be compatible with Industry 4.0 technology.

University-industry collaborative R&D is on a roll. Let's keep it going—the future of U.S. manufacturing depends on it. ■

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Manufacturing Talk Radio

Manufacturing Talk Radio salutes the AWS, FMA, SME, PMA and CCAI in 2017 for the premiere metal fabricating, forming, welding, machining, metal coating and industry trade show that attracts over 50,000 attendees to visit some of 1,700 exhibits across more than three-quarters of a million square feet at McCormick Place in Chicago, Illinois, where we have been privileged to participate for several years. While we won't be at the show this year, we will have been reporting on it since well before you read this article.

Manufacturing Talk Radio can be heard at mfgtalkradio.com, downloaded from iTunes or accessed at YouTube.com. Each show contains useful information and with over 230 shows available, there is a topic or two for almost every potential listener in the manufacturing industry, from the C-Suite to the shop floor and the great teams that get goods out the loading dock door. Total show downloads in the last 24 months exceed 500,000.

If you are in the legal department, don't miss *A Global Perspective* with Dr. Adriana Sanford, executive producer and host of this in-depth discussion with legal experts and government officials in the USA and many other countries. Dr. Sanford was previously a senior international correspondent with Manufacturing Talk Radio and is a respected commentator on CNN, as well as a keynote and conference speaker, and a former professor of law

who holds law degrees in three specialties.

Also in the line-up is Women And Manufacturing (WAM), a new show that will launch November 8, 2017 at 1:00 p.m. with Anna Hess as the guest. Ms. Hess was one of the original Rosie the Riveters during World War II and shares her story with Manufacturing Talk Radio co-hosts Lew Weiss and Tim Grady. Then, each Wednesday thereafter, a new WAM podcast will be posted and hosted by women in the industry interviewing women about their careers and experiences in manufacturing.

Women And Manufacturing hosts include Alison Grealis, Founder and President of WiM (womeninmanufacturing.org), Nicole Wolter, President of HM Manufacturing (hmmanufacturing.com), M.L. Peck, Chief Content and Engagement Officer at the Institute for Supply Management (instituteforsupplymanagement.org) co-hosting with Linda Rigano, an independent consultant formerly with The Thomas Register and ThomasNet, Christina McKenna, President of Bluestone Executive Communications (bluestoneexec.com), Barbara Trautlein, Principal at Change Catalysts LLC (changecatalysts.com), Jennifer McNeely, President of 180 Skills (180skills.com), and Andrea Olson, CEO of Pragmadik (pragmadik.com) and a contributing writer to *Metals & Manufacturing Outlook* – a publication of the Manufacturing Broadcasting Corporation and

parent company to Manufacturing Talk Radio, A Global Perspective, and Women And Manufacturing.

Each of these exceptional individuals brings a special perspective to the conversation about women and manufacturing, and the exciting careers available to women in the fast-paced, evolving and challenging manufacturing industry that makes up one-third of the U.S. economy. Individually or as co-hosts they will be interviewing women at all levels within manufacturing from the shop floor to the C-Suites with some of America's largest corporations or mid-sized companies, organizations, educational institutions or government agencies that make the sector one of the most exciting career areas in the world.

All the intriguing content from these informative broadcasts and podcasts can be found at mfgtalkradio.com, iTunes and other RSS resources. Stay tuned for new interviews each week and contact us if you want a radio spot on these network shows, plus a display add in the latest issue of the Metals & Manufacturing Outlook ezine. Podcasting is one of the most targeted forms of advertising and episodes of just Manufacturing Talk Radio have been downloaded or listened to online more than 500,000 times in just the last two years. Coupled with banner ads on the mfgtalkradio.com website, your message can be conveyed online, in print

and on the air. No other single ad buy gives you national exposure across multiple media platforms for maximum exposure to the industry.



Hosts Tim Grady and Lew Weiss

Congratulations for attending FABTECH 2017 from co-hosts Lew Weiss and Tim Grady, Dr. Adriana Sanford, all of our Senior International Correspondents and the upcoming hosts of Women And Manufacturing – it is a smart business decision in an industry that is evolving almost at the speed of thought.

For additional information about any of the MBC podcasts, websites, or publications, please contact us at info@mfgtalkradio.com. We would also love to hear from our listeners – email us at info@mfgtalkradio.com and share your comments, thoughts, suggestions – even your criticisms. And if you have a story to tell, be a guest on one of our three platforms. We love to listen to our listeners! ■

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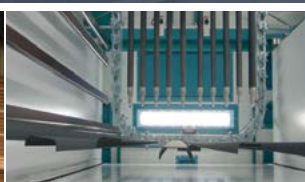
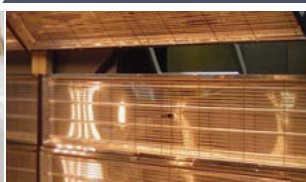
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Purchasing Conundrum #1- Getting The Best Cost On Your Purchase

Pricing parts and services competitively is imperative to building a successful business. Estimators and salesmen are constantly weighing the current market rates against the demand to remain competitive. But are they taking into con-

sideration such things as: How long will that part last? Can it be reconditioned or refurbished? If so, how many times? Are there value-added services such as troubleshooting or engineering support? Do I need to understand the function a part will perform? What are the critical areas of the part? Can I produce it prof-



itably and competitively? Often, they are forced to look at substandard materials and components in order to price items in a manner that will allow them a decent profit margin at a price the customer thinks is good.

The competitive nature of today's market has every purchasing agent looking at multiple quotes in search of the lowest price on nearly every purchase. This is particularly prevalent where precision parts with tight tolerances and specifications are required and thousands of dollars are budgeted and spent. Typically,

the dollars spent on precision spare and replacement parts is only one aspect of the total investment in these parts.

Quality is a key factor often overlooked. The pressure is on both sides to keep the overall costs as low as possible. How do you quantify the cost of quality? It takes a bit more effort to look at factors relating to quality and then tie those factors back to a purchase price. Is it worth the extra leg work? Master Roll Manufacturing thinks it is.

Master Roll Manufacturing products are manufactured from certified, premium U.S. made alloy steel sourced from suppliers who have proven their quality time after time. Personal experience has taught the company that paying the best price does not usually mean buying the cheapest product. Scrap, rework, downtime and a tarnished reputation are much more expensive than paying a bit extra for material and services that meet or exceed requirements.

Master Roll Manufacturing has been producing and reconditioning a variety of precision steel rolls, backup bearings, arbors, and mandrels for the coil and toll processing industries for nearly 20 years. The Master Roll Manufacturing team of metal working professionals has over 100 years of combined industry experience and strives to incorporate that into each part that is made. The company counts on the professional workmanship of high-

ly skilled tradesmen to ensure the quality that they are known for. Master Roll Manufacturing's mission has always been to produce a high-quality part that provides customers with peace of mind knowing they are getting what they pay for. Experience has shown that even the most elite machinist cannot make a top-quality part out of substandard material. The company's reputation depends on producing quality parts at the best price, not necessarily the lowest price. So, do you know the actual cost of that purchase? It may very well be worth looking into.

Learn more about Master Roll Manufacturing products at booth C40710. ■

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THE PALEY-JAMES PROJECT.

ESAB is a proud sponsor of the Paley-James Project, a collaboration between sculpture artist Albert Paley and motorcycle builder Jesse James. The final product of their collaboration will be on display at the entrance of the North Hall, so make sure to check it out.

Don't miss your chance to do all this and more. Get in on the action at booth B17074.

Secular Stagnation - Still an Issue?

Dr. Chris Kuehl, FMA's economic analyst and founder of Armada Corporate Intelligence.

The phrase was brought from the depths of the Great Depression by Larry Summers in a speech over three years ago. A former Treasury Secretary, Summers was considered for the head of the Federal Reserve at one time. The Harvard economist has carved out

a reputation as something of a gloom merchant, and the secular stagnation comment is one of the reasons why. There have been assertions that his prognosis has been off the mark as there have been some palpable improvements in the economy's performance

in the last year. He doesn't share that opinion and asserts that the issues he was concerned about three years ago are still threats.

The basic idea behind the notion of secular stagnation is that there is a chronic shortage of demand worldwide along with a

paucity of investment opportunities. There is no interest rate level capable of turning this situation around to allow for healthy and consistent growth. Given the number of years of very, very low rates, it has become obvious that interest rates alone are unable to stimulate growth. He expects an extended period of low rates, slow growth, and very low inflation. This is a situation that could persist for years and create an economy that is suffering from what one could compare to a chronic disease. There is unlikely be another severe recession – no economic version of a heart attack. Instead, the economy will be sick and weak for years – always falling short of potential.

He blames much of this stagnation on policies pursued by central banks around the world as well as by the governments of most of the industrial countries. They are far too preoccupied with keeping debt and deficit levels down, and the banks continue to be focused on inflation. Not that these are unimportant issues, but timing is everything. Summers has repeatedly called for increased investment at both the public and private levels. Most everything that has been tried as far as public investment has been anemic – just enough to help make the debt burden worse but not enough to really stimulate growth.

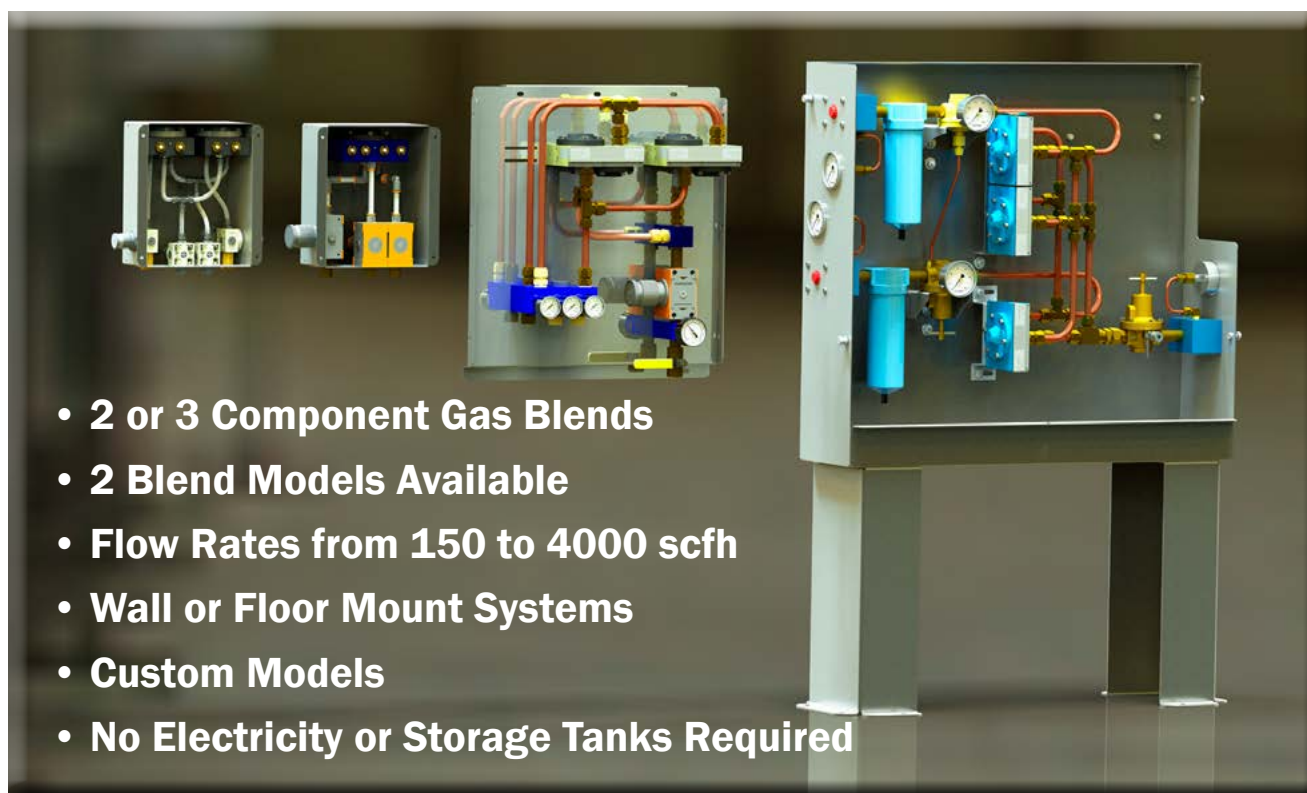
It is obvious that low interest rates alone are not enough to boost growth, so the fiscal side must bear more of the burden. The thinking is that extensive public-sector activity will bolster the private sector investors as well. The key is ending the period of weak recovery that was described in the 1930s by economist Alvin Hansen as "secular stagnation."

There are lots of variations on the theme, but the essence of the idea is that 1) the economy is growing far too slow; 2) interest rates are very low, but they have not created additional private-sector demand; 3) governments can take advantage of the low rates to push public sector projects; and 4) these projects stimulate additional private-sector investment.

The fear that runs through the opposition to additional debt loads is that obligations are already very substantial, and paying these off will be increasingly difficult. There is an argument made regarding government spending that is similar to that made with an individual and their debt. If a person goes into debt to buy a house or pursue education and training, this would be a good use of debt as it means that they will stand to gain later. If they go into debt to gamble in Las Vegas, it is a poor use of debt. ■

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Trio of Experts Assess State of the Industry

continued from page 1

view of the world they exist in and what they can do to advance their goals. Kuehl also serves as economic analyst for the Fabricators & Manufacturers Association International® (FMA). One of his major roles at FMA is writing an economic e-newsletter titled “Fabrinomics®,” specifically designed to aid business decision-making by management and shop owners in the metal forming and fabricating industry. He also conducts workshops at major conferences and trade shows.

• **Chad Syverson, J. Baum Harris**
Professor of Economics, University of Chicago, Booth School of Business

Syverson's research spans several topics, with a particular focus on the interactions of firm structure, market structure, and productivity. His research has been published in several top journals and has earned multiple National Science Foundation Awards. He also coauthored (with Austan Goolsbee and Steve Levitt) an intermediate-level text, *Microeconomics*. Syverson also serves as an editor of the *RAND Journal of Economics* and is on the editorial board of several other journals. He is a research associate of the National Bureau of Economic Research and has recently served on National Academies committees and as the chair of the Chicago Census Research Data Center Board. Prior to his appointment at the University of Chicago, Syverson was a mechanical engineer co-op for Loral Defense Systems and Unisys Corporation.

Busting Myths, Breaking Out Numbers

One of the first points made by the panel was that the image of manufacturing promulgated in many parts of the mass media does not correspond to reality. “There is a perception within parts of the fourth estate that manufacturing is dead, that we’re not good anymore,” said Kuehl. “That’s never been true—and it’s certainly isn’t true now.”

The panel concurred that manufacturing is healthy in 2017, and barring any unforeseen developments, it should stay so. The sector has shown growth of more than 3 percent in the third quarter; although there is a traditional drop in the fourth, the growth for the year should remain respectable if not encouraging, somewhere in 2.5 to 2.6 percent range. This is good news, as the manufacturing sector continues to have a large footprint in the U.S. economy, and its competitive position is improving in a global manufacturing market in the midst of a digital revolution.

Rodriguez noted results from last year’s Deloitte’s Global Manufacturing Competitiveness Index showed the U.S. positioned to take the number one spot by the end of the decade. “As the U.S. invests heavily in talent and technology, it ranks highest as an advanced manufacturing economy,” she noted. This bodes well as Industry 4.0 progresses.

“Even without looking to the technological curve, the outlook is optimistic,” concurred Kuehl. “Industrial numbers are better, and the purchasing manager’s index was up.” So much for the doom and gloom.

Lingering Issues Dominate the Discussion

Questions from the audience reflected that the top-of-mind issues from last year’s FABTECH continue to be at the forefront. Three in particular were brought up:

- Labor issues
- Export issues
- Customer motivation

Labor Issues

One of the unfortunate effects of the mass media presentation of manufacturing has been a smokestack perception of the sector among young people that doesn’t correspond to its increasingly high-tech foundation. As a result, even though this group sees manufacturing as important to the nation’s economy, they don’t see it as an attractive career path. This remains problematic as manufacturing’s demand for skilled workers continues to exceed the supply.

“The reality of the labor shortage is multi-faceted,” said Kuehl. “The sector has a persistent image problem among the younger demographic it is trying to draw upon. At the same time, demands on the manufacturing worker are higher than before. The level of necessary expertise has risen, as today’s worker has to be adept at interacting with technology. It requires a higher-level individual than the industry has traditionally hired, which has implications for recruitment, training, and retention.”

The panel noted that although this is a concern for manufacturing organizations, it’s not a challenge without benefits. One was cited as particularly important: the workers’ role in leveraging manufacturing assets. “Companies are acquiring new technologies, and their skilled workers are helping them understand how to use these in new ways,” Kuehl noted. “By see-

ing a new application for a capital asset, they may lead an organization into new markets. That can be huge.”

Export Issues

A number of people queried the group on export markets, specifically, the re-introduction of American-made goods into export markets. The United States had a global current account deficit (the broadest measure of all trade in goods, services, and income) of \$470 billion (2.5 percent of GDP) and a goods trade deficit of \$750 billion (4 percent of GDP) in 2016. Current market conditions may put American manufacturers in a better position to address this situation.

effort, and Trump seems unwilling to take that step,” answered Kuehl. “Those who do not want to see major shortages of steel and price hikes are pushing hard for exemptions, and they have gotten some already. The steel-using sectors are making their case aggressively and suggesting they will lose jobs. The best estimate is that a final decision will not come for months, and the end result will be far less comprehensive than was originally outlined, with perhaps a sliding scale of tariffs.”

Customer Motivation

Manufacturers typically are at a distance from the end consumer. They may supply a major automaker, but more likely provide to a company that is supplying an automaker,



While much has been made about exports in relation to the relative strength of the dollar, depressed export markets have had much to do with sluggish exports. Now that we’re seeing growth in these markets—in Europe, Asia Pacific—manufacturing organizations are refocusing efforts to address them. What needs to be done to get back into these markets was a prominent concern discussed at the session.

Tariffs were also on the table, with an eye towards steel. The motivation for the tariffs is a belated attempt to rescue the domestic steel business. Over the last few decades, the U.S. steel industry has been fading and steel consumers have been buying cheaper imported steel. Even if the foreign steel was not always cheaper, it was available, and the U.S. producers could not always keep pace.

What is likely to happen now? “It would be an embarrassment to abandon the whole

and so are far down the chain from the ultimate buyer. The audience showed a great curiosity about end-user motivation.

“How do you figure out the millennials?” asked one audience member. “Now that there’s Uber, are they going to stop buying cars? What about the way they live? Are they less likely to build large family houses? These aren’t people we deal with directly, yet the choices they make will affect us directly. It would be good to have a handle on what’s going on in their minds.”

There seemed to be a collective nod when he finished. ■

FABTECH — a Bigger, Better Matchmaker

continued from page 1

ble goods rose during the last three financial quarters of 2016.

If you thought these trends looked good in 2016, most have been even better since the election. The staff members at The Tube & Pipe Journal® and its sister publications have heard good news for months now—it seems that every company in the metal fabrication industry is running at full throttle since the election brought that dreadful, divisive campaign to an end.

Big-picture indicators show similar trends that started before the election. The PMI®, tallied and reported by the Institute for Supply Management, has been on an upward trend for six months and hit 57.7 in February (the latest data available at press time). One of the forward-looking components of the PMI, the New Orders Index, was at 65.1 in February. This bodes well for 2017 and beyond, as does recent action taken by the Federal Reserve Board's Open Market Committee. Citing increasing signs of a strengthening economy, it voted on March 15 to raise the target range for the federal funds rate for the second time in two months.

Meanwhile, during the last several years, the annual FABTECH® expo likewise has been doing well. The exposition's found-

ers, the Fabricators & Manufacturers Association Intl.® (FMA) and SME were joined by the American Welding Society (AWS), the Precision Metalforming Association (PMA), and the Chemical Coaters Association International (CCAI), adding more emphasis in welding, stamping, and finishing, respectively. For any metal fabricator, FABTECH continues to be the best way to see the latest technologies for forming, fabricating, joining, and coating technology.

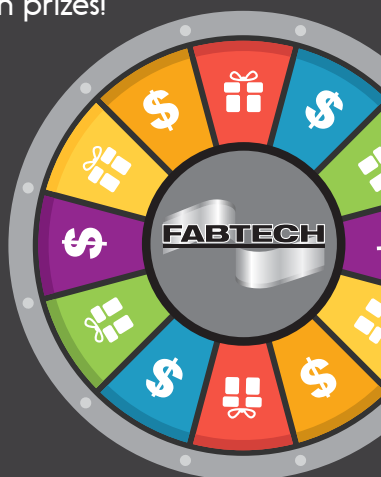
Additional strides have been made to meet industry demands. The organizers realized that tube and pipe suppliers and their customers didn't have a place to meet, and this year they created one. Joining forces this year with Messe Düsseldorf, the company that organizes Tube®, the biennial tube and pipe expo in Germany, and created a pavilion dedicated to tube and pipe producers and suppliers. With an estimated 40,000+ people attending FABTECH it is the ideal opportunity to explore equipment side-by-side and network with professionals and peers involved in the Tube and Pipe industry. Make sure to visit the Tube and Pipe pavilion to explore all the technology on display, network and find the best solutions to take your company to the next level. ■



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Still Building America—A Recipe for Success

Josh Welton, Owner Brown Dog Welding

From pushing brooms to fabricating “experiential environments,” Cullen Osborne has kept his focus on rising to the top. He has plans to open his own business and is working toward that end.

Cullen Osborne, Fascinate LLC, fabricates experiential environments for live events,

tradeshows, television, and other industries in demand of sets, stages, props, and sculptures. ***

I’ve never been a big fan of working on exhausts, but there’s no denying the instant gratification you get by taking a muffler off of a truck and replacing it with a straight pipe.

Unrefined, loud, and oh-so-sweet when you go wide-open throttle. And trust me, your neighbors will love you.

For Cullen Osborne it was that simple—16 years old with a 110 Lincoln flux-core machine in his dad’s garage; making it happen with his own two hands. He

chopped out the muffler of his buddy’s ’89 Jimmy. “I just did that!” turned into looking for the next project, and the next, and the next.

Now 20 years old, Cullen loved how making metal bend to his will made him feel. And he quickly learned that everything we’ve been told about how to make a living is wrong.

“I decided to pursue this career when I felt the sense of accomplishment and pride I was able to take in my work. I loved that the career pathway was against the grain of what society had been telling me my whole life about college and business, etc.”

Fronius - Touchless torch cleaning? You betcha.

While still in high school Cullen got his foot in the door by pushing brooms at a unique fabrication company called Fascinate LLC. He stuck by his foreman’s hip and picked up everything he could.

“Luckily, I have been able to learn everything I know by working alongside my foreman since I was 17 years old.”

Now he does more than sweep floors.

“I work as a metal fabricator to create custom experiential environments for live events, tradeshows, television, and other industries in demand of sets, stages, props, and sculptures.

“The best part of my entire job is the camaraderie amongst my fellow associates. We all function as a single unit and are one big family. Everyone is on the same page, with the same goal. As the trade goes, the end product is the best part. I enjoy being able to see my product in real life, and I take pride in having had a part in building it.”

As many of the young fabricators I interview do, Cullen hopes to bring his own visions to life one day. With some flavor to boot:

A Fascinate LLC fabrication.

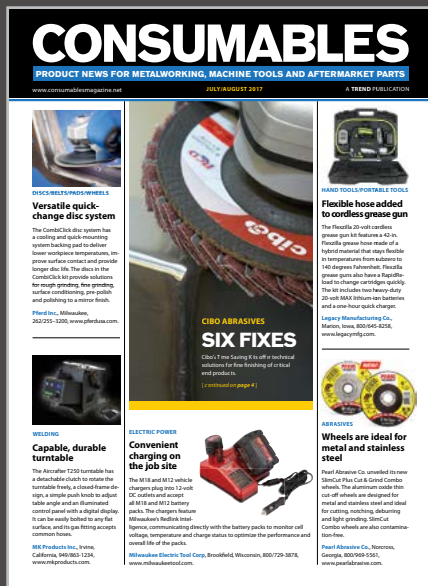
“My future goal is to possess enough of my own tools to produce my own custom furniture and barbecue smokers. I plan on owning my own barbecue joint where I can build and sell my creations.

“I believe that it is important to remain teachable, work hard, and always be on the lookout for opportunity. Skills can be learned; work ethic is universal. Start anywhere in the industry that you wish to be in. Through perseverance and efficiency you can become the most skilled person in that industry by working your way up.”

Find a craft you love and start at the bottom if you must. Be willing to learn. Don’t be out-worked. A recipe for success. ■



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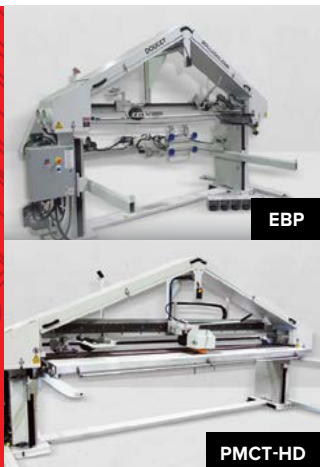


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WEDNESDAY, NOVEMBER 8			SCHEDULE-AT-A-GLANCE*	
TECHNOLOGY	8:00 AM – 10:00 AM	10:30 AM – 12:30 PM	1:30 PM – 3:30 PM	
3D/ADDITIVE MANUFACTURING	F70: NEW 3D Additive for Metals, Tools and Castings B Room 402A	F80: NEW 3D Additive Applications for Fabricators I Room 402A		
AUTOMATION/ SMART MFG	F77: NEW Robotic Joining Cells and Mass Production I Room 401A	F87: NEW Smart Manufacturing Execution System and Continuous Improvement Solutions I Room 401A	F97: NEW Agile Design and Synchronized Manufacturing For Real Time Decision-Making A Room 401A	
CUTTING	F71: NEW New Technology in Plasma Cutting for Fabricators I Room 404A	F81: NEW Advanced Cutting Tools, Applications and Software for Productivity I Room 404A		
FINISHING	C70: NEW Managing Perceptions for Your Finishing Business I Room 404D	C80: NEW Achieving Consistent Quality Finishes I Room 404D	C90: Efficient Curing with Infrared B Room 404D	
	C71: NEW Mastering a Batch Finishing Operation B Room 405A	C81: NEW See It. Touch It. Fix It. Identifying and Solving Finishing Defects I Room 405A	C91: Protecting Your Most Valuable Asset: Your Employees I Room 405A	
	C72: NEW Advancements in Ambient Pretreatment I Room 405B	C82: We've Got the Cure I Room 405B	C92: NEW The Evolving Technology of Powder Coating A Room 405B	
FORMING & FABRICATING	F78: NEW Tube & Pipe Bending 101 I Room 502A	F88: Roll Form Tooling Installation, Troubleshooting and Lubricants I Room 502A	F98: Tube Laser Processing 101 B Room 502A	
	F79: Press Brake Safety: ANSI B11.3 Explained I Room 502B	F89: NEW Best Practices: Machine Tool Field & Installation Service Technician Panel B Room 502B	F99: Effective Safeguarding Risk Assessment B Room 502B	
JOB SHOP	F76: NEW Configurable ERP for Your Job Shop Future I Room 401D	F86: NEW Guide to Getting the Best Out of Your Data I Room 401D	F96: NEW Effective Product Differentiation In Commoditization Based Marketplace B Room 401D	
LASERS	F72: NEW Fiber Laser Technology & Advancements B Room 403B	F82: NEW Laser Joining Advancements I Room 403B	F92: NEW Laser Beams and Material Advancements B Room 403B	
LEAN	F74: NEW Lean Principle: Standardize Work - The Basis for Lean B Room 401BC	F84: Lean Tools: 5S Workplace Organization and Standardization I Room 401BC	F94: NEW Lean Principle: Hoshin Kanri - How to Achieve the Future You See A Room 401BC	
MANAGEMENT	F75: NEW Innovation, The Art of Being Wrong I Room 403A	F85: NEW Succession and Exit Planning for the Next Generation of Metal Fabricators B Room 403A	F95: NEW How to Develop and Manage a Reshoring Project B Room 403A	
STAMPING	S70: NEW Metal Stamping Fundamentals B Room 503A	S80: NEW Manufacturing ROI & Tax Credits I Room 503A	S90: NEW Understanding Metal Stamping Presses I Room 503A	
	S71: Die Sensing Fundamentals B Room 503B	S81: NEW Stamping, Assembly & Error-Proofing I Room 503B	S91: NEW Advance Forming Technologies I Room 503B	
STRUCTURAL STEEL/PLATE	F500: NEW Steel Beam Assembly Technology B Room 501D			
WORKFORCE DEVELOPMENT	F73: NEW Attract, Develop and Build a High Performance Millennial Team B Room 404BC	F83: NEW Six Keys to Team Leadership and Effective Workplace Teams B Room 404BC	F93: NEW Communicate, Build Accountability and Conduct Meaningful Evaluations in Your Organization I Room 404BC	
WELDING				
SEMINARS	W16: Applications of Stainless Steel Welding - Day 2, Room N131		8:30 AM	4:30 PM
	W17: ASME Section IX, B31.1 & B31.3 Code Clinic - Day 2, Room N133		8:30 AM	4:30 PM
	W18: Ethics Seminar for Certified Welding Inspectors - Part A, Room N129		8:00 AM	12:00 PM
	W19: What to Expect as a New Certified Welding Inspector - Part B, Room N129		1:00 PM	5:00 PM
	W20: Ethics Seminar for Certified Welding Inspectors & What to Expect as a New Certified Welding Inspector (Part A & B), Room N129		8:00 AM	5:00 PM
	W21: The Visual Inspection Workshop, Room N137		8:30 AM	4:30 PM
	W22: Fundamentals of Liquid Penetrant Testing for CWI's and Quality Assurance Personnel, Room N128		8:30 AM	4:30 PM
RWMA SCHOOL	W26: RWMA Resistance Welding School - Day 2, Room N227A		8:00 AM	4:15 PM
PROFESSIONAL PROGRAM	W29: Session 10: Plenary Session, Room N138		8:00 AM	9:30 AM
	Session 11: Laser Welding/Additive Manufacturing, Room N138		9:40 AM	12:00 PM
	Session 12: Honorary Symposium for Dr. S. David - Session C, Room N139		9:40 AM	12:00 PM
	Session 13: Honorary Symposium for Prof. T. DebRoy - Session C, Room N140		9:40 AM	12:00 PM
	Session 14: Overlay and Cladding, Room N138		2:00 PM	5:00 PM
	Session 15: Dissimilar Joining, Room N139		2:00 PM	6:00 PM
	Session 16: Honorary Symposia for Dr. S. David and Prof. T. DebRoy - Joint Session D, Room N140		2:00 PM	6:00 PM

* Schedule subject to change.

B = Basic
 I = Intermediate
 A = Advanced

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PFERD's COMBICLICK® quick-change disc system is unlike standard fiber discs or non-woven discs. Its backing pad is designed with special cooling slots that reduce work piece temperatures by up to 30% during operation. This reduction in thermal load has the added benefit of elim-

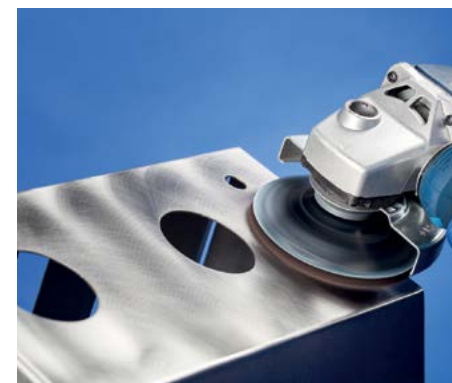
inating the need for a secondary application to remove discoloration when working on poor thermal-conducting materials such as stainless steel. The special cooling slots also allow for a reduction in thermal load on the disc itself, increasing product life by up to 25% over conventional discs.

The premium abrasive material on these discs, coupled with the lack of mounting hardware being exposed to the work piece, means that operators can grind, finish, and polish with higher removal rates and larger surface contact areas, reducing process time and increasing operational

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Operators working with the COMBICLICK® system will notice how easy and comfortable it is to work with. The backing pad provides a soft grinding experience with very little vibration or noise, and is flexible enough to grind effectively on contours and curves. The unusually large surface contact area of the disc allows for a very flat grinding angle, which increases the efficiency of the disc and the process.



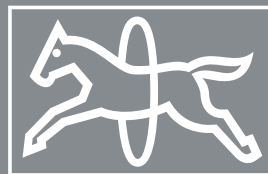
COMBICLICK® discs and backing pads are available in diameters from 4" to 7", and feature a wide variety of discs for grinding, blending, finishing, and polishing on numerous work piece materials. COMBICLICK® is also available in kits (4-1/2" and 5" diameter) with a variety of discs for different applications.

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- Cody Hofer - Stotz Equipment

Booth: A4092

Hall A, Forming & Fabricating Pavilion

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M-502-Cool Inverter Portable Fan
PE
50"
3 (SMC Blades)
2 HP
2 HP
220 Volt 1-Phase
518 R.P.M.
86.1" H x 71" L
x 34.64" W
6,200
61 Gallons
429 lbs



M-602-FRP

65-75 dB



M-602-Cool

30-80 dB



M-703-Cool

30-70 dB



M-702-Cool

30-70 dB



M-802-Cool

30-70 dB



M-902-Cool

30-70 dB

External Frame	FRP	PE	PE	PE	PE	PE
Blade Size	42"	42"	30"	30"	24"	18"
No. of Blades	6 (Nylon 66+ Fiber Blades)	6 (Nylon Blades)	3 (Nylon Blades)	3 (Nylon Blades)	3 (Nylon Blades)	3 (Nylon Blades)
Motor Power	1 HP	1.5 HP	1.5 HP	1.5 HP	0.5 HP	0.3 HP
Inverter	2 HP	2 HP	1.5 HP	1.5 HP	1 HP	1.5 HP
Variable Speed	520 R.P.M	10-580 R.P.M.	10-1100 R.P.M.	10-990 R.P.M.	10-1200 R.P.M	10-1370 R.P.M.
Cools Up To	N/A	4,800 SQ FT	3,700 SQ FT	3,100 SQ FT	2,500 SQ FT	1,291 SQ FT
Capacity Gallons	N/A	47 Gallons	38 Gallons	33 Gallons	32 Gallons	14 Gallons
Volt	230 Volt 1-Phase	230 Volt 1-Phase	115 Volt 1-Phase	115 Volt 1-Phase	220 Volt 1-Phase	115 Volt 1-Phase
Size	61" H x 45.66" L x 35.43" W	73.22" H x 61" L x 31.89" W	67.71" H x 52" L x 27" W	62.20" H x 49.60" L x 28.34" W	54.33" H x 38.58" L x 26.77" W	51" H x 29" L x 19.68" W
Dry Weight	243 lbs	265 lbs	220 lbs	200 lbs	165 lbs	99 lbs

How to Make Office Work Flow

How to Do More Quoting, Engineering Purchasing and Other Office Tasks – With Less

Rework runs rampant in the office, although few notice it or work to eliminate it. A conversation with Kevin Duggan, president of Duggan Associates, reveals how operational excellence helps eliminate this rework and other inefficiencies, including those long email exchanges and overlooked work buried in email and desktop inboxes. He does this by introducing office workers to the concepts of flow and operational excellence.



Consider a situation in which a machine operator runs an old version of a part on a punch press, then sends a batch of them on to the press brake area for forming. The brake operator notices the discrepancies. Eventually the parts are sent back to the previous processes to be made again or fixed. It's a classic rework scenario that shops bend over backward to avoid.

In the office, the estimator emails a document to an engineer. The engineer doesn't have a chance to look at it for two days, and when he does, he finds that the drawings the estimator attached don't specify tolerances, so he emails them back.

"What is this exactly? This is also rework. We've made rework easy. In the office, rework runs rampant." So said Kevin Duggan of North Kingstown, R.I.-based Duggan Associates.

Rework on the floor gets reported in shop metrics and scrutinized, but rework in the office is viewed as just a typical day. People write emails, copy their managers, and everyone spends the day "replying all." The exchange, Duggan said, may even be encouraged, since it keeps everyone in the loop. Nevertheless, few scrutinize how these days-long email exchanges start and, most important, what information was needed and how and when it should have been presented in the first place.

Duggan teaches an improvement technique called operational excellence, which focuses on flow: flow of customer information in quoting and engineering; flow of work orders from engineering through programming and order release; and flow of those orders through the first operation to the customer's receiving dock. He's also

the founder of the Institute for Operational Excellence, an organization dedicated to educating and spreading the word about the methodology.

Many custom fabricators these days have turned their focus to the office. After all, what good is a lean shop floor if it takes weeks for an order to reach it? Fabricators focus on value streams and reducing the number of signoffs and hand-offs required to get things done.

But as Duggan explained, using a shop floor value stream approach doesn't fit the office environment. That's mainly because of what "flows" in the office versus the shop. In the shop, tangible products flow from one workcell to the next. In the office, it's about the flow of information.

The Shop Versus the Office

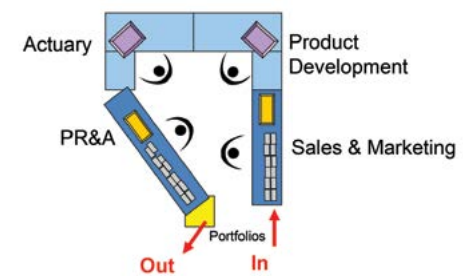
"The difference is huge, and it comes from the way we've designed offices versus the way we've designed operations," Duggan explained. "Ask the people in your office one question: How do they know what to work on next?"

People in the shop should (ideally, at least) give a straightforward answer: They look at the schedule. But how do people in the office know what to work on next? Answers probably vary. The "next job" may come

from an email or phone call they receive, a request from their boss, or action items from a meeting they just left. For sure, people in the office have to-do lists with deadlines. But the truth is, people have so many choices as to what to do next, they ultimately make the choice. It's not dictated by a production schedule.

So again, how do people in the office really know what to work on next? As Duggan put it, "The real answer is, most likely, 'Whatever they feel like.'"

Processing Cell M / W / F 10 – 11 a.m.



*An information processing work team meets in a processing cell that processes work. This diagram shows a product-related task, but cells can be designed around any task in the office that requires input or approvals from multiple parties. ***

When people talk about flow in metal fabrication, they usually opine about the merits of cross-training (so that people can move to where the demand is) and the flow of jobs from cutting to bending, welding, assembly, and shipping. One might think such an arrangement would work for the office too. Why not group the people from different departments in one area, like an office workcell with people collaborating continually and the information always flowing?

But as Duggan explained, this arrangement doesn't work, and it goes back to the fundamental "what to work on next" question. "We would never let machine operators just choose what to work on next," Duggan said, particularly if one process is feeding another process. People in laser cutting know that the bending and assembly processes need their parts by a specific time. Not following a defined schedule (one that aims to move products efficiently through the factory) would wreak obvious havoc.

The reality of the office is quite different. When an engineer receives an email from estimating with a question on a quote, he

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How to Make Office Work Flow

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or she might be working on another large project that needs to be completed. Sure, the engineer can theoretically switch gears and tackle the question from estimating, but in doing so he may lose track of where he was in his design project and so miss some key parameters.

Consider this: If the shop floor is made up of value streams, with sequential flow from one step to the next, the office is a web, with information and knowledge (the “products” of office work) going in multiple directions at irregular intervals. And as Duggan explained, not only is the culture of the office set up for this kind of interaction, demand is just too irregular. The demand doesn’t come from the “upstream process”; it comes from all directions.

“This is why we look at flow [in the office] as vastly different from the flow in manufacturing,” Duggan said. “We cannot use the theory behind value streams and just pick those up and put those into an office.”

What Do People in the Office Do?

How does a company instill flow in the office? It starts by defining what an office does: It provides a service. That service usually consists of information (work orders, job packets, quote packets, reports, as well as a person’s answers and insights when interacting with others) created by knowledge (gained by skills, experience, and communicating with internal and external customers).

As Duggan put it, “The function of the office is to flow information and capture knowledge.”

Defining Service Families

To analyze exactly how this occurs, Duggan suggested breaking down all the services the office provides into service families. In engineering, for instance, services might be broken down into engineering change orders (ECOs), quoting, new product design, and existing product support. With specific services identified, a fabricator next defines the outputs those services provide. Note that these service definitions describe only what the engineering activities are, not who performs them.

Consider the outputs for the service of quoting. The output is a finished quote that the fabricator provides to the customer. However, not all quotes are alike. Some request for quotes (RFQs) take a few minutes or hours to answer, other RFQs take days; some require communication with area suppliers, some don’t; some require a quick supervisor signoff, others require approval from a company owner or executive. A quoting function produces a huge variety of outputs, from the simple to the complex.

Analyzing all these, a fabricator creates a grid and defines what has to happen—the specific quoting activities that occur to create a desired output. It then creates a matrix and defines the process steps and the time each requires. The fabricator

then does the same for every other defined service in the office. So for ECOs, it defines various outputs, from simple material changes to other ECOs that require more legwork.

During certain times of the day, an office worker dedicates time to providing information the processing cell needs.



*During certain times of the day, an office worker dedicates time to providing information the processing cell needs. **

From here a shop identifies similarities among activities, including the time each activity takes. For example, looking at the matrix, the improvement team might find that simple quotes and simple ECOs take the same amount of time and entail similar process steps and level of expertise. (This information can be used for cross-training in the office, as explained in the Cross-Training in the Office sidebar.)

Duggan added that though service families resemble product families on the shop floor at some level, service families are different. Product families often are defined around jobs (from the same or different customers) that happen to share similar

production methods and requirements. Or, as Duggan put it, “Product families are defined around what particular machines do. But in the office, we define service families around activities. One person could perform different activities.”

Product families also have specified demand rates. As anyone who works in custom fabrication or a similar job shop environment knows, demand rates vary from day to day. Regardless, those demand rates can be defined.

For most office work, specific demand rates can be hard to pin down. “In the office, we don’t try to establish a demand rate as much as we try to establish a capability,” Duggan explained. So for quoting, a shop defines how many easy, mildly complex, and complicated RFQs it can answer in a given week, based on available time and resources the company has. (Duggan added that this is a gross oversimplification of this step, but it describes the general idea.)

From here a shop is ready to start designing a system that will help avoid the common hindrances to the flow of office work. This includes minimizing the wait times as people pass on work to others for input or approvals—the classic “got buried in my inbox” scenario.

Designing Information Flow

When tackling office work flow, it’s natural for people to target things like eliminating signatures, purchasing new software, and modifying internal databases. However, Duggan said fabricators should resist quick fixes and instead focus on the underlying causes of poor information flow. (See 9 Guidelines of Flow in the Office sidebar.)

Consider quoting again. The improvement team establishes service families for quoting and then defines how many quotes in each service family can be done within a given time frame, usually within a day or week. Cross-functional processing cells also could be created to meet at preset times to process the quotes.

For instance, a fabricator may decide to designate between 10 and 11 a.m. every Monday, Wednesday, and Friday as the time to process certain quotes that require expert input and approvals. The team can get together in the same room or, if people are traveling, simply make themselves available to talk on the phone and answer emails.

Improvement teams define how exactly work arrives and leaves the processing

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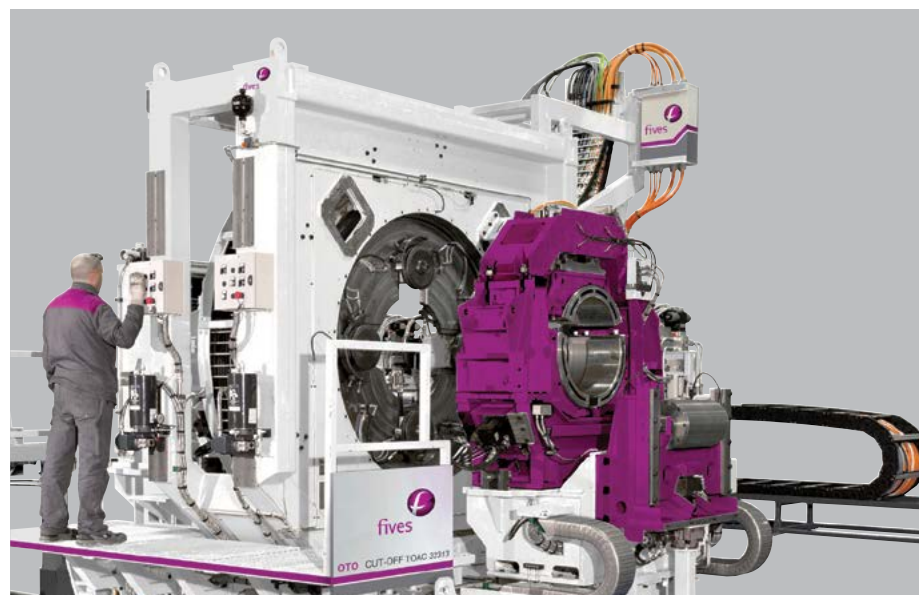
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How to Make Office Work Flow

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cell using first-in, first-out (FIFO) lanes. Duggan used a pump metaphor to describe how this works. Information needs to flow into the processing cell session (the pump) by a certain time. For instance, a quote needs to have various questions answered by the external customer or by an internal resource before the people in the processing cell can complete the quote.

To get this done, a fabricator creates work flow cycles to prepare the information necessary to process quotes at preset times. The people prepping the information post a “do not disturb” sign by their cubicle at a set time—say, between 8:30 a.m. and 9:30 a.m.—and dedicate this time to gather the information that the pump (processing cell) needs. This takes precedence over virtually everything else: no meetings, no answering unrelated emails.



Kevin Duggan is president of **Duggan Associates** and founder of the **Institute for Operational Excellence**.

If people don't have the information by a certain time for, say, the Monday work flow cycle, the job misses the window and the “pump” won't process

it until the next processing-cell work flow cycle on Wednesday (unless, of course, the needed information still isn't available).

Once all the information is collected, it's put in a FIFO lane ahead of the processing cell, so people in the cell know exactly what to work on next. If the processing-cell work flow cycle occurs in a designated room, all the information may be put in envelopes and, say, placed in a vertical file on the wall, with each slot numerically labeled and the slot labeled “1” processed first. This also could occur virtually, with all needed information available on a server, or by using work flow office software.

A processing cell may seem like an elegant solution for all types of office work. But Duggan emphasized that these cells work only for certain tasks, such as quotes above a certain dollar value or level of complexity, approval cycles for work orders, or signing off on capital appropriations.

Guaranteed Turnaround Time

Implementing the nine guidelines for office flow (as described in the 9 Guidelines sidebar) creates what Duggan called a guaranteed turnaround time for information. “This concept is the true game-changer in the office.”

For guaranteed turnaround time to work, the pump (processing cell) needs information at a certain time. If it doesn't have

all the information, the pump can't function. And if certain activities continually miss the window to feed information to the pump, something's amiss. This problem usually occurs because one or more people simply receive too many distractions during the day.

For instance, say the person assigned to feed the pump at a designated time can't get engineering to respond. Why don't they respond? It turns out that the engineers are answering so many questions from all over the company that they don't have time to perform their principal job duties. So instead of staff engineers continually being interrupted, the company dedicates people to handle questions at specified times of the day. This makes interruptions less frequent and random. An engineer can safely dedicate hours to a large project, knowing that he is not on call until the specified time that afternoon (say, between 2 and 4 p.m.).

Duggan added that dedicating several hours for people to research and answer questions is a great way to train and cross-train personnel on various aspects of the office operation.

“This is a great training tool for engineering,” Duggan said. “Giving new engineers a formal question-answering rotation, along with giving them access to a mentor, helps them learn a lot very quickly.”

Of course, a common challenge among

custom fabricators is external communication. If a supplier doesn't communicate well, a fabricator can eventually find another if nothing changes. But what if a major customer doesn't provide information when needed? The fabricator is the supplier, and it obviously can't lecture or demand that its customer be available to answer questions.

In these cases, Duggan said, education is key. A fabricator can work with the customer to, say, set up a call at a specific time every week to answer questions. If the fabricator has no questions, he can cancel the call. Duggan said this works especially well with highly complex projects.

Ultimately, the fabricator needs to describe to the customer how it does business, and how these practices separate the fabricator from competitors.

“Having the right attitude here is important,” Duggan said. “The customer is the one giving us money.”

Instead of complaining about the problem and preaching potential solutions, a fabricator needs to educate and sell the concept of flow to customers. It does this by showing just how quickly it can turn around quotes, order changes, and anything else if the customer can supply the right information by a certain time. Duggan added that all this can be framed as a marketing presentation, with the focus on “look at what we can do for your business.”

No More Meetings

The office is full of variation, and a lot of it just can't be avoided. But as Duggan explained, a system can be designed to reduce the variation in the information flow for critical tasks, like quoting, order entry, and scheduling. All of it—defining activities, dedicating times for specific tasks, cross-training—acts as a pressure regulator that stabilizes the information flow before the processing cell pumps through the activities that need to happen for the business to sustain itself.

He added that the guaranteed turnaround time takes managers out of the day-to-day operations of the business, which starts to work like a well-oiled machine. In the past managers might have held drawn-out meetings mostly devoted to solving operational problems; in other words, flow was broken. With guaranteed turnaround time implemented, managers may still hold quick status meetings or team huddles, but eventually even those go by the wayside.

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In effect, the concept allows managers to work on the business, not in it. Meetings focus on revenue growth, long-term market outlooks, and other strategic topics, but they don't focus on the operation. The operation, ideally, runs on its own.

Will all this require more resources, like a larger office staff? According to Duggan, not at all. In fact, fewer people in the office will accomplish more. "The reason why is this: Think about how much time people spend chasing information. With guaranteed turnaround time, you know when you are going to get your information, so you can stop chasing it."

When people aren't chasing down information, they have more time to be productive. That costly, time-consuming "rework" in the front office—like lengthy email exchanges or meetings—doesn't happen in the first place.



9 Guidelines for Flow in the Office

1. Define a takt capability. Establish the volume of services that can be done within a given time frame.
2. Create continuous flow. Create part-time processing cells where cross-functional teams meet at a preset time and process work, one job after another. These processing cells can be done live or virtually through email.
3. Establish first-in, first-out lanes. Use the FIFO method to complete work that feeds the processing cells.
4. Define the work flow cycles. Establish a preset time at which work flows through the office, as well as the physical pathways on which the work flows. The work flow cycles establish a guaranteed turnaround time for the com-

pletion of the work throughout the office. A work flow cycle usually consists of a combination of FIFO lanes and processing cells.

5. Move large quantities of information all at once. When closing the books for the fiscal quarter or other tasks that require a large amount of information, move that information in a predictable and repeatable manner from one area of the office to another on a one-time basis.
6. Document standard work. The office has two types of standard work. Activity-level work describes the best method for performing each task; flow-level work describes how each process is connected to the next.
7. Identify a single-point initialization process. Define one process at which work is introduced into the flow from outside the value stream. This process should be as far upstream as possible.
8. Make the status of flow visual. Establish a visual method that lets every one know the status of flow, whether it is on time or behind, within a preset time frame.
9. Adapt to changes in demand. Have a plan B that can be enacted when demand shifts up or down. This usually involves switching to a different takt capability.

Source: Kevin Duggan and Tim Healey, *Operational Excellence in Your Office: A Guide to Achieving Autonomous Value Stream Flow with Lean Techniques* (New York: Productivity Press, 2016).

Cross-Training in the Office

According to Kevin Duggan of Duggan Associates, North Kingstown, R.I., cross-training is essential for balanced flow in the office. Nowhere is this more apparent than in the cross-functional information processing teams (or an office's processing cells) that meet periodically to complete certain tasks, such as quoting. If only a handful of people on the team know how to perform certain activities, then those few people may be burdened with the most work and hinder flow. This goes against the entire reason for implementing a processing cell in the first place.

So how does a fabricator go about cross-training people? It starts, Duggan said, by identifying which activities can be cross-trained and which cannot. He calls this a balance chart. In it, Duggan defines the core necessities, activities that require advanced training or many years of experience, such as certain engineering or finance tasks.

The key, he said, is to break these tasks into individual steps. Some steps may require an expert, but not all. For instance, a materials analysis might require a senior

engineer to perform it, "but it doesn't take an engineer to give the job a reference number or get the database set up," Duggan said. "Those could be done by a junior engineer or other personnel."

The same cross-training could apply to purchasing, accounting, and other office departments. The more people know how to perform those simpler tasks that need to get done, the more time technical or highly experienced personnel can spend actually performing activities that use their knowledge.

Duggan emphasized that this doesn't mean technical people can avoid mundane tasks at the expense of flow. But overall, cross-training does help balance work flow in the office. After all, why should a job that requires a few simple changes in CAD sit in the senior engineer's inbox for days? With a few clicks, someone else could make the change. That senior engineer still may sign off on the changes, but he need not spend hours of his day making one small file change after another. ■

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TECHNOLOGY AND ROBOTICS

Training and Education is Key for Man and Machine to Co-Exist

Dr. Chris Kuehl, FMA's economic analyst and founder of Armada Corporate Intelligence.

The story of the day has been the impact of technology and robotics on jobs. There are those that decry the advance of automation as the ultimate job killer – replacing tens of thousands of workers with machines. There are those that look at the advance of technology and automation as a job creator that improves productivity. In truth, it is both. There have been job losses and job gains, and what makes the issue vexing is that those who are losing their jobs are not generally the ones who are getting the new ones. There have always been technological advances that shape the economy – this has been the story for decades. The manufacturing community has been undergoing radical change for the better part of a century as every new year brought new machines and new techniques. Everyone can remember back to days when labor was more common, and we all watched as automation and technology changed our habit. Just thinking back to my own childhood, the changes have been substantial as I once worked as a gas

station attendant as nobody filled their own car, and everybody got jelly glasses with each fill. We had cashiers at the grocery store that rang things up on a cash register, and clerks were everywhere in every store. Those days are gone, and some people like the change and others don't. Is it possible to assert the advance of technology and robotics is an unqualified good or bad thing? It seems not, as it will all depend on one's perspective. The motivation for a business to embrace technology is complex, but is generally rooted in productivity. The machine or robot allows greater output and efficiency. It is also generally more expensive in the short run but cheaper in the long run – depending on how long the machine lasts and the maintenance costs. The impact on jobs is both obvious and subtle. The people who were doing the job the machine now does will lose their position and will either be dismissed altogether or will get reassigned to some other job. The jobs that get added are those that involve operating the new machine or system, but it doesn't stop there. The presumption is that the business will prosper with this technology and the growth will mean more hiring for everything from sales to design to back-office management. The more productive and efficient a business becomes,



role of salesman or receivables manager. There will be retraining opportunities in some cases but not enough to handle all of those who have been rendered redundant. One of the primary factors in the dramatic loss of manufacturing jobs has been the development of material handling systems that replaced the legions of men and women whose job it was to move things around the factory. They lost out to conveyor systems and machines, and there was no place for them to go.

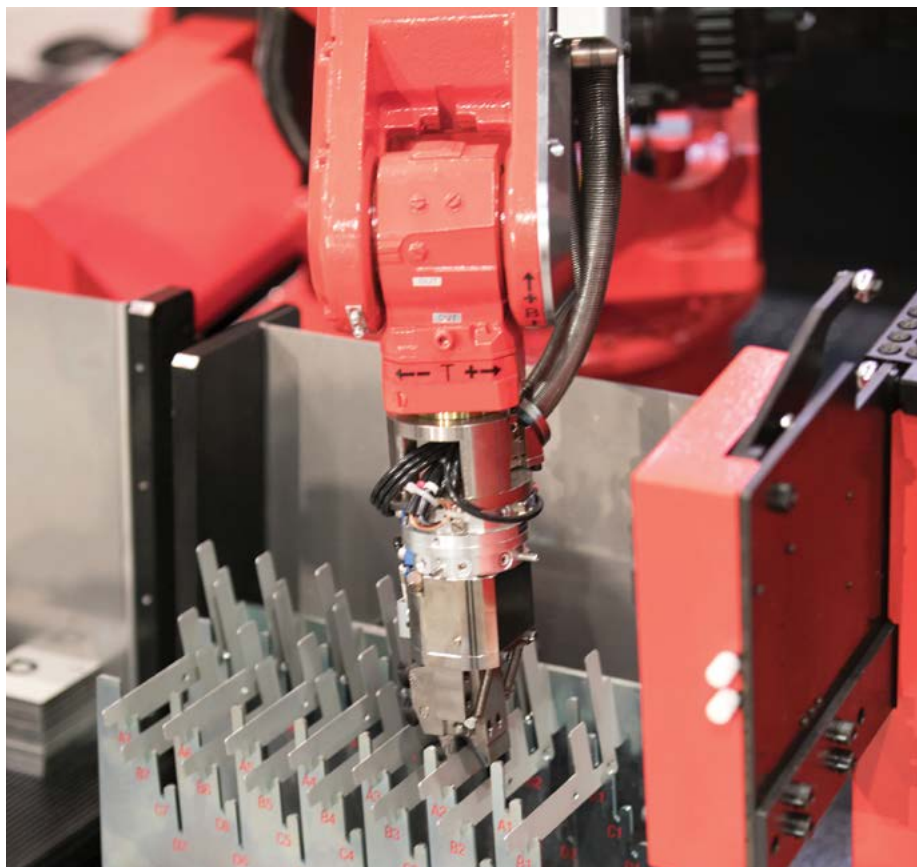
The dilemma is this: It makes no sense whatsoever to hold back technological advance. It would simply mean that companies would start a slide toward irrelevance, soon to be driven out of business by a competitor that did embrace technology. Even a country with a massive workforce paid at very low rates—China—has embraced robotics in order to stay competitive. By the same token, a society can't ignore the fact that millions of once productive workers are now off the employment roles.

As always, the simplistic answer is training. Those who have seen their jobs replaced by a machine have to adapt and develop new skills relevant to the new employment world. This is often much easier said than done. There is however a new urgency, as robotics and technology have been making rapid inroads into sectors that were thought to be immune from this change just a few years ago.

For example, a study done just 10 years ago stated that one of the professions that

would be impervious to the advance of robotics was truck driving. Today the advance of driverless trucks and cars seems imminent, and the truck driver is considered highly vulnerable. The white-collar jobs that were considered protected have been subject to replacement by sophisticated new analytical programs and artificial intelligence. It would be overstating the case to assert that every job is subject to replacement by a robot, but far more is being accomplished by technology every passing year. The barriers to re-training will have to be dealt with far more aggressively in the future, and that conversation has just started.

This is not a matter of stopping tech advances. This would not be a good idea and it would be next to impossible to do this in any case. The issue is compatibility. How do workers and machines cooperate and coexist? How do people gravitate to the jobs created and away from the ones being lost? The fact is that the people involved will not be able to do that transition without training and education. ■



station attendant as nobody filled their own car, and everybody got jelly glasses with each fill. We had cashiers at the grocery store that rang things up on a cash register, and clerks were everywhere in every store. Those days are gone, and some people like the change and others don't.

the more competitive it becomes and the more market share it can command.

The crux of the issue is about who gets the jobs and who loses them. The people who have been replaced by the robot or technology will not slide easily into the



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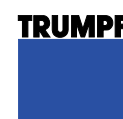


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