Innovation Roundtable

Winners of the MACNY Innovator of the Year award discuss their companies’ pursuit of innovation and growth.

Corning Inc.

A commitment to innovation marks this manufacturer’s past and defines its future.

Innovation in Workforce Education

P-TECH trains for tomorrow.

Membership Directory

LEADERSHIP PROFILES

Peter Maier of INFICON, Kirk Wardell of Marquardt Switches, and Mike Wetzel of Air Innovations on their approaches to innovation.
Innovation Driven by Experience!

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From the President’s Desk
Welcome to The Innovation Issue.

Legislation to Protect Innovation
American manufacturers thrive on innovations in product, process, and technology. They need the help of government to curtail the theft of their intellectual property.

Innovation in Workforce Education
The P-TECH program—a partnership between schools, community, and industry—is designed to prepare the next generation of skilled workers.

Corning’s History of Continuous Innovation
Sustained investment in R&D, a combination of material and process innovation, and collaboration with its customers has yielded 165 years of success.

The National Network for Manufacturing Innovation
A new resource to support collaboration between industry, academia, and government in the pursuit of innovation.

Leading the Way to Innovation
The best leaders must be capable of embracing constant change while maintaining and creating outstanding products and services. Three CNY manufacturing leaders discuss what’s involved in meeting the challenge.

Roundtable: Innovation in Action
Past winners of MACNY’s Innovator of the Year Award examine the environment, culture, and qualities needed to foster innovation.

Greenlighting Innovation
Sometimes the best thing a leader can do is stay out of the way.

Autonomous Vehicles Hit the Road
The technology is well-underway, now it’s a matter of safety.

Membership Directory
A listing of MACNY’s current members.

Advertiser Index
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The entire MACNY staff and our Board of Directors are pleased to provide you with the third issue of Central Upstate Mfg. magazine, and its insights into the vital topic of innovation. As we have all come to recognize, innovation is the life-blood of the manufacturing sector and the key to its on-going success. In this issue of Central Upstate Mfg. magazine we examine the theory and practice of innovation from numerous directions.

Our Company Profile feature looks at a century of innovation at Corning, Inc., arguably one of the most cutting-edge corporations in the world. Our Leadership Profiles reveal a C-level view of the role of innovation in today’s manufacturing world and the styles of leadership that can make it happen. And this issue’s roundtable discussion, “Innovation in Action,” focuses on the day-to-day challenges of encouraging an innovative environment and culture as seen by recipients of MACNY’s Innovator of the Year Award.

We believe that government has a role to play in strengthening innovation in the manufacturing sector. In these pages you’ll learn about an innovative educational program designed to prepare the manufacturing workers of tomorrow and get an introduction to The National Network for Manufacturing Innovation, an ambitious coalition of government, private, and academic institutions. How can we protect American innovations from theft and questionable exploitation? Our Legislative Update looks at a welcome new protection, The Defend Trade Secrets Act of 2016.

Finally, I thank each of you for supporting MACNY and manufacturing. Our success for over one hundred years comes from the great relationships with you, our membership. We cannot possibly thank you enough for your support and participation in our hundreds of offerings and opportunities as we continue serving the region’s manufacturing community. We hope you enjoy this issue as much as we have enjoyed providing it.

And, as always, we remain willing to help each of our members find ways to become innovative in solving their most difficult challenges.

Sincerely,

Randy Wolken, President and CEO
Celebrating over 50 years in CNY

For more than 10 years, Novelis has been a proud member of the Central New York community. Novelis is the world’s premier producer of rolled aluminum and the global leader in aluminum recycling, producing more than a billion pounds of high-quality aluminum sheet each year. Novelis Oswego is an important part of a global network of aluminum recycling and rolling facilities, producing aluminum for products like the all-new Ford F-150 and Super Duty trucks, beverage cans and architecture. We enable our customers to make their ideas real, and we help consumers to enjoy the products they want today while knowing they are contributing to a better world tomorrow.

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Legislation to Protect Innovation

As American manufacturers competing in today’s global economy, you understand that innovation and economic growth are inextricably connected. Innovation, technological advancement, and investment in capital goods surrounding technology and research have driven the U.S. economy for the last 200 years.

The federal government has been heavily involved in the global market and innovation debate for decades; its sound and strong policies have helped the U.S. remain a major player in manufacturing and business.

Today, however, the research and innovation of U.S. manufacturing is at a critical juncture. Currently, intellectual property (IP) comprises more than half of all U.S. exports and drives 40 percent of the country’s economic growth. However, IP fraud costs us significant further growth: counterfeiting and piracy deprives the U.S. of nearly $250 billion a year and results in the loss of more than 750,000 jobs. Stronger enforcement practices, stiffer penalties, and government coordination and legislation to bring foreign countries into line with our standards and practices are needed to stem the losses.

Intellectual property is one of the most valued business assets for manufacturers of all sizes. IP constitutes patents, trademarks, copyrights, and the somewhat less clear-cut category of trade secrets. Trade secrets consist of information and can include a formula, pattern, compilation (such as a customer list), program, device, method, technique, or process. According to the Uniform Trade Secrets Act, “a trade secret derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use and is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.”

In the unfortunate instances when trade secrets are compromised, our industry needs tools to act quickly, before a secret is disclosed and its value lost. The current system has long needed an update to provide the owners of trade secrets the ability to pursue IP thieves aggressively and efficiently, and with the clout of the United States Government.

The Defend Trade Secrets Act of 2016

The Defend Trade Secrets Act of 2016 (S. 1890, H.R. 3326)—a piece of legislation we have been tracking and supporting—which was signed into law on May 11, 2016, promises to fill the bill. It creates a federal civil right of action to protect trade secrets, eliminating the difficult, time-consuming, and costly process previously in place when manufacturers had to contend with multiple state jurisdictions. The bill will also give trade secret owners the same legal options as owners of other forms of IP.

Specifically, the Defend Trade Secrets Act of 2016 amends the Economic Espionage Act of 1996 to create a federal civil remedy for trade secret misappropriation. The Act’s definition of misappropriation is modeled on the Uniform Trade Secrets Act and includes: “disclosure or use of a trade secret by a person who (1) had reason to know the trade secret was acquired by improper means or under circumstances giving rise to a duty of secrecy, or (2) before a material change in position, had reason to know that the trade secret was disclosed by accident or mistake.”

The Act further provides, in extraordinary circumstances, for expedited individual relief in the form of a seizure of property from the party accused of misappropriation, if necessary to prevent destruction of evidence or the propagation or dissemination of the trade secret.

To ensure the continued vitality of American innovation, the federal government needs to focus on strengthening IP rights, starting with an efficient and effective patent system. Ideas that cannot be protected by patents need to be protected by strong copyright and trademark law that guards against infringement both online and offline. Bills such as the Defend Trade Secrets Act provide exactly what our country and sector needs: the ability to freely create innovative products and develop them in the U.S., secured by legislation ensuring that IP fraud from competing countries is not only forbidden, but will be addressed according to U.S. law.*

*Source: National Association of Manufacturers
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The statistics about the need for skilled workers in advanced manufacturing are sobering: two million jobs are expected to go unfilled over the next 10 years due to the skills gap. The majority of employers believe the problem is only going to get worse. The need for significant policy changes along with educational programs designed to place exponentially greater numbers of qualified candidates in the manufacturing pipeline is greater than ever.

This makes the unique and promising educational program designed to address skills gap challenges now underway in Syracuse and in Auburn of great significance to the manufacturers of our region. Pathways in Technology Early College High School (P-TECH) offers a six-year integrated high school and college curriculum that focuses on providing students in grades 9 through 14 with advanced manufacturing pathways in mechanical or electrical technologies. The program will help them acquire the essential workplace skills needed to compete and excel in the 21st century workforce.

Upon completion of a rigorous academic course load, P-TECH students will have earned not only a Regents diploma, but also a two-year technical degree from either Onondaga or Cayuga Community College, the program’s higher education partners.

Started with funding from the P-TECH New York grant, the program is a revolutionary partnership of school, community, and industry. MACNY and Partners for Education & Business (PEB) are leading the partnership, coordinating program support from dozens of regional employers—including Welch Allyn, National Grid, Bo-Mer Plastics, Eaton-Crouse Hinds, Liftech, G.A. Braun, and WestRock—to allow the students to achieve their work-based learning requirements. Employers are opening their doors for informational tours and job shadowing and will eventually offer internships. Perhaps most importantly, successful graduates will receive preferential hiring for entry-level positions at partnering area businesses.

“MACNY and its membership, are pleased to be part of this exciting partnership,” says MACNY President and CEO Randy Wolken. “The P-TECH partnership will enable us to unite our collective areas of expertise and audiences, and elevate the future workforce by connecting them to the exciting opportunities and careers that await them within our region’s robust manufacturing sector. I know I speak on behalf of the region’s manufacturing community when I say we are ready and looking forward to helping shape tomorrow’s workforce today.”

Syracuse P-TECH is housed at the Institute of Technology (ITC) in downtown Syracuse, formerly known as Central Tech. Starting this summer, there will be 138 students in grades 9-11, with the goal of including about 300 students when the program reaches full capacity in the 2019-2020 school year.
GLOBAL REACH
LOCAL ROOTS

Founded in 1949, The Fulton Companies is a multi-national group of companies headquartered in Pulaski, New York. From humble beginnings in an Oswego County garage, Fulton has grown to include ten manufacturing facilities across three continents. Fulton manufactures complex industrial and commercial heat transfer equipment all around the world, but our commitment to Central New York remains strong. With a recent multi-million dollar facility expansion in Pulaski, Fulton continues to grow and hire locally.

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The Fulton Companies, 972 Centerville Road, Pulaski, NY, 13142 | www.fulton.com
Auburn P-TECH is located at Auburn High School and has approximately 45 students enrolled in grades 9 and 10. The program will eventually have about 150 students in all grades. P-TECH students will be dually enrolled in high school and college courses as early as 11th grade. In addition, the program provides many new opportunities and experiences that will increase their awareness of the range of jobs available in manufacturing. The students get to see manufacturing and technology in action and have access to laser engravers and cutters, 3D printing, and much more. The program year is extended, as well, prior to the start of the regular school year, these young men and women participate in a one to two week summer enrichment program.

A critical component of the P-TECH program is mentoring, with a focus on supporting student learning, helping students understand the link between school and work, providing students with role models, and providing an opportunity for businesses to have a direct impact on future members of the workforce. Typically, mentors participate in regularly scheduled sessions at the schools, with a defined activity in which the students and their mentors can interact. As the year unfolds, the students meet with local business mentors and are tasked with completing “real-world” activities that translate directly into usable skills in today’s society.

MACNY and PEB are continuously recruiting companies to join them in making the PTECH program successful. For more information, contact Joe Vargo at 315-448-1012 or joev@macny.org.

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- Always value-added
Corning Incorporated is one of the world’s leading innovators in materials science. For 165 years, Corning has applied its unparalleled expertise in specialty glass, ceramics, and optical physics to develop products that have created new industries and transformed people's lives.

The company that was to become Corning Glass Works was founded in 1851 by Amory Houghton, in Somerville, Massachusetts, as the Bay State Glass Co. It later moved to Williamsburg, in Brooklyn, New York and operated as Brooklyn Flint Glass Works. In 1868, under the leadership of the founder’s son, Amory Houghton, Jr., the company moved to its ultimate home and namesake, the city of Corning, New York, where, nearly 150 years later, it continues to maintain its world headquarters.

Corning’s businesses and markets are constantly evolving. Today, Corning’s products enable diverse industries, such as consumer electronics, telecommunications, transportation, and life sciences. Their products include damage-resistant cover glass for smartphones and tablets; precision glass for advanced displays; optical fiber, wireless technologies, and connectivity solutions for high-speed communications networks; trusted products that accelerate drug discovery and manufacturing; and emissions-control products for cars, trucks, and off-road vehicles.

Corning’s products are sold worldwide and produced revenues of $9.1 billion in 2015. Corning is listed No. 313 on the Fortune 500 list.

“Corning succeeds through sustained investment in R&D, a unique combination of material and process innovation, and close collaboration with customers to solve tough technology challenges,” says Corning’s Chief Administrative Officer Lisa Ferrero. “The core of what Corning does is invent, make, and sell. We create value by inventing category-defining products, using transformative manufacturing platforms, and building strong, trust-based relationships with customers who are leaders in their industries. That process has served us well for more than 160 years.”

In the course of its long history, Corning has reinvented itself several times. Perhaps the most notable transformation came after the telecom crash of 2001. At that time, Corning was, as it is today, a leader in the growing telecom industry but sustained significant revenue losses when the market declined. As Ferrero explains it, “Corning’s newly formed Management Committee formulated a plan to guide the company back to prosperity based on protecting the company’s financial health, returning to profitability, investing in the future, and living our values.”

In the following years, Corning’s commitment to other business segments, particularly Display Technologies, drove recovery and enabled the creation of a bigger,
stronger company. Display Technologies has since remained a revenue, profit, and cash-generation powerhouse for Corning.

One stellar innovation is Corning® Gorilla® Glass. This ultralight, ultrathin, ultrastrong product was first introduced in the consumer market in 2007 as a cover material for electronic devices. Since then Gorilla® Glass has gone through numerous iterations and is featured in approximately 4.5 billion devices worldwide, on more than 1,550 product models across 40 major brands.

Gorilla® Glass has also made its debut in the automotive industry. Automakers around the world are working to reduce the weight of their vehicles to meet strict mobile emissions regulations. “Corning® Gorilla® Glass for Automotive enables a weight reduction in glazing of more than 30% versus conventional soda lime glass,” says Ferrero. “It can be used in all openings of a vehicle including windshields, sidelites, sunroofs and backlites as well as in automotive touch/control panels.”

Indeed, innovation is a constant across all of Corning’s product lines. In Display Technologies, the company is leveraging its fusion assets to drive the next round of display innovations, including thinner devices and more lifelike images.

In Optical Communications, Corning is delivering new connectivity solutions that lower customers’ cost, improve network performance, and meet the unique needs of cloud data centers.

In Specialty Materials, Corning is building on its leadership position in cover glass by increasing scratch resistance, improving drop performance, enhancing optical clarity, and enabling new form factors for mobile devices.

In Environmental Technologies, the company is continuing its track record of making the air cleaner by developing particulate filters for gasoline direct-injection engines.

In Life Sciences, Corning is creating new tools for drug development, production, storage, and delivery.

Of course, such continuous improvement does not come without a cost. “Every year, the company reinvests between eight to 10 percent of its revenues in R&D,” says Ferrero. “Currently, we have more than 2,000 scientists working across the globe, focused on everything from telecommunications enhancement to cleaner air.”

Furthermore, inside Sullivan Park and in Corning’s research and development facilities around the globe, “We strongly believe that innovation is still about a lot more than discovering a new material. Innovation also means finding practical uses for a material and then devising more efficient ways for producing that product,” Ferrero says.

**Highlights from Corning's History of Innovation**

1879 Corning develops the bulb-shaped glass envelope of Thomas Edison's incandescent lamp.

1915 Creation of heat resistant PYREX®, which becomes synonymous with a line of highly durable cookware and laboratory glass products still available today.

1926 William J. Woods, a former glassblower, and his colleague David E. Gray, an engineer, invent the high-speed ribbon machine which creates 400,000 bulb blanks in a 24-hour period, about five times the output of earlier machines.

1935 Dr. George McCauley, a Corning physicist, designs and directs Corning’s production of a 200-inch mirror blank for the Hale Telescope at Mount Palomar, the world’s largest piece of glass at that time.

1939 Corning’s 9-inch circular cathode ray tube goes on display at RCA’s futuristic demonstration of television at the World’s Fair in New York City. By 1948, Corning would begin its journey into the television market by manufacturing television glass.

1952 Corning creates CorningWare®, a new glass-ceramic material.

1961 The Mercury spacecraft makes the first successful American manned flight, equipped with heat-resistant windows manufactured by Corning. Corning would go on to create the window glass for every manned American spacecraft—from Gemini and Apollo flights to the space shuttle—and would continue to produce glass for numerous applications within the space industry.

1964 Corning scientists Stuart Dockerty and Clint Shay develop the fusion overflow process to produce flat glass. The process is used today to make liquid crystal display glass and numerous other products in Corning’s advanced glass portfolio.

1970 Drs. Robert Maurer, Donald Keck, and Peter Schultz develop the first optical fiber capable of maintaining the strength of laser light signals over significant distances. This innovation paves the way for the commercialization of fiber optics for telecommunications.

1972 The company invents the ceramic substrates used in catalytic converters that remove harmful pollutants from a car’s exhaust system and then invents a similar process to reduce the pollution emitted by diesel engines.

1982 Corning’s fusion process creates pristine and durable glass that goes on to be used in a wide range of technological marvels, from high-definition flat-screen TVs to tablets and the latest smart phones.

2007 Corning® Gorilla® Glass — thin and light, but still tough enough to resist the scratches, bumps, and drops of everyday use—is developed to become the cover glass of choice for the consumer electronics sector.

2012 The ultra-slim, flexible Corning® Willow® Glass is developed for thin and lightweight applications.

2013 ONE Solution becomes the first all-optical converged cellular and WiFi solution.

2013 Corning develops Antimicrobial Gorilla® Glass, the first EPA-approved antimicrobial cover glass.
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One of the objectives of this issue’s focus on innovation is to provide new resources for manufacturers to incorporate in their operations. For several years, the federal government has been developing a variety of initiatives focused on manufacturing. In June 2011, President Barack Obama launched the Advanced Manufacturing Partnership (AMP) on the recommendation of the President’s Council of Advisors on Science and Technology (PCAST). In the accompanying report, AMP was charged with “identifying collaborative opportunities between industry, academia, and government to catalyze development and investment in emerging technologies, policies, and partnerships with the potential to transform and reinvigorate advanced manufacturing.”

Since then, three more reports—Report to the President on Capturing Domestic Competitive Advantage in Advanced Manufacturing (July 2012), The National Network for Manufacturing Innovation: A Preliminary Design (January 2013), and Advanced Manufacturing Partnership Steering Committee 2.0 (October 2014)—have been issued. These reports established a framework and plan for manufacturing policy and guided a number of federal undertakings.

In Obama’s 2013 and 2014 State of the Union addresses, he proposed the creation of a Nationwide Network for Manufacturing Innovation (NNMI) to scale up advanced manufacturing technologies and processes. The creation of 15 publicly and privately funded institutes was proposed as part of the implementation of the first stage of the initiative. Over the course of 10 years, the creation of a total of 45 institutes is planned. As of this writing, eight institutes have already been funded and solicitations for several more are in some stage of development.

The NNMI Program is guided by the Advanced Manufacturing National Program Office (AMNPO), headquartered in the National Institute of Standards and Technology, part of the Department of Commerce. AMNPO operates in partnership with the Department of Defense, the Department of Energy, NASA, the National Institute of Standards and Technology, the Department of Transportation, the Department of Labor, and the National Science Foundation.
Science Foundation, the Department of Education and the Department of Agriculture. The mission of the agency is: To convene and enable industry-led, private-public partnerships focused on manufacturing innovation and engaging U.S. universities; and to design and implement an integrated whole-of-government advanced manufacturing initiative to facilitate collaboration and information sharing across federal agencies.

AMNPO is further charged with coordinating federal efforts, encouraging technology transfer, and helping American manufacturers by connecting them with new technologies.

The goals of working collaboratively include improving production of intellectual property, research and development; and providing small and medium manufacturers access to new technologies, technology transfer, and new workforce solutions. Each Institute will have a unique technological focus and be affiliated with one or more federal agencies or initiatives.

Eight of these Institutes are in various stages of development. A brief description of the eight institutes that have already been funded appears below. Although only one of these Institutes is located in New York, many of them have connections to or “nodes” within the state. Where there is a direct connection, it is noted in the description.

**America Makes: The National Additive Manufacturing Innovation Institute**

**MISSION:** Innovate and accelerate additive manufacturing and 3D printing to increase our nation’s global manufacturing competitiveness. America Makes is further tasked to:

- Foster a collaborative infrastructure for the open exchange of additive manufacturing information and research.
- Facilitate the development, evaluation, and deployment of efficient and flexible additive manufacturing technologies.
- Engage with educational institutions and companies to supply education and training in additive manufacturing.
- Link and integrate U.S. companies with existing public, private, and not-for-profit industrial and economic development resources and business incubators, with an emphasis on assisting small- and medium-sized enterprises and start-ups.

**Digital Manufacturing and Design Innovation Institute (DMDII)**

**MISSION:** To provide U.S. factories with the tools, software, and expertise they need to build things more efficiently, less expensively, and more quickly. The DMDII is the nation’s flagship research institute for applying and commercializing cutting-edge digital technologies across key manufacturing industries. Its work has three main thrusts:

- Advanced Analysis, which is the collection of data over long periods of time to enable manufacturing design that takes future possibilities into consideration.
- Intelligent Machining, which integrates smart sensors and controls to enable equipment to automatically sense and understand the current production environment in order to conduct self-aware manufacturing.
- Advanced Manufacturing Enterprise which aggregates and integrates data throughout the manufacturing supply chain product life-cycle.

MACNY member RIT is a partner in this Institute and is in the process of conducting workshops on Digital Manufacturing. Contact MACNY for more information.
The goals of working collaboratively include improving production of intellectual property, research and development; and providing small and medium manufacturers access to new technologies, technology transfer, and new workforce solutions.

**LIFT – Lightweight Innovations For Tomorrow**

**www.lift.technology**

**MISSION:** To serve U.S. manufacturing by acting as the bridge between basic research and final product commercialization of new, advanced lightweight materials and innovative manufacturing technologies and practices. This enables the development of cost effective light weight components for the defense, aerospace, automotive, sea, and over-the-road truck industries. LIFT’s efforts encompass the entire transportation supply chain, nurturing innovations from conception through design, development, and production.

An equally important mission is to facilitate the training of the workers who will use these new processes in factories and maintenance facilities around the country.

The LIFT consortia currently involves more than 200 companies, universities, non-profit research institutions, and workforce development intermediaries nationwide.

MACNY maintains a close relationship with the LIFT Education & Workforce Director, Emily DeRocco.

**PowerAmerica**

**www.poweramericainstitute.org**

**MISSION:** To develop advanced manufacturing processes that will enable large-scale production of wide bandgap (WBG) semiconductors, which allow electronic components to be smaller, faster, and more efficient than semiconductors made from silicon. WBG semiconductor technology has the potential to reshape the American energy economy by increasing efficiency in everything that uses a semiconductor, from industrial motors and household appliances to military satellites.

In New York’s Mohawk Valley, GE Global Research and SUNY Poly are developing a Power Electronics packaging facility in parallel with this effort that is expected to create nearly 500 jobs in the initial phase, and double that over 10 years.

**The Institute for Advanced Composites Manufacturing Innovation (IACMI)**

**www.iacmi.org**

**MISSION:** To develop lower-cost, higher-speed, and more efficient manufacturing and recycling processes for composites. The Institute will focus on lowering the overall manufacturing costs of advanced composites by 50 percent, reducing the energy used to make composites by 75 percent and increasing the recyclability of composites to over 95 percent within the next decade.

Bringing these materials down the cost curve can enable their use for a broader range of products, including lightweight vehicles with record-breaking fuel economy; lighter and longer wind turbine blades; high pressure tanks for natural gas-fueled cars; and lighter, more efficient industrial equipment.

IACMI provides open access to five shared research, development, and demonstration facilities that leverage extensive existing capabilities and build new capabilities. It has established a collaborative arrangement with the Long Island-based Composite Prototyping Center (CPC) to bring advanced composite materials and technologies to the marketplace. Contact MACNY to be connected to our Long Island partner.

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Employers are seeking alternate methods for providing health care coverage, and the research shows many anticipate that the private exchange model is the answer they are looking for. According to JD Power & Associates, 47% of businesses are likely to adopt a defined contribution model with a private exchange.

MACNY is pleased to introduce to you this new approach.

We invite you to learn more about our private marketplace offering and how it can be a solution for offering employee benefits to your employees.

If you are interested in learning more please contact Patty Clark at (315) 474-4201, Ext. 10 or pclark@macny.org.
American Institute for Manufacturing Integrated Photonics (AIM Photonics)  
www.aimphotronics.com

MISSION: To advance integrated photonic circuit manufacturing technology development while simultaneously providing access to state-of-the-art fabrication, packaging, and testing capabilities for small-to-medium enterprises, academia, and the government; create an adaptive integrated photonic circuit workforce capable of meeting industry needs and thus further increase domestic competitiveness; and meet participating commercial, defense, and civilian agency needs in this burgeoning technology area.

The Institute’s goal is to emulate the dramatic successes experienced by the electronics industry over the past 40 years and transition key lessons, processes, and approaches to the photonic integrated circuit (PIC) industry. AIM is creating a National PIC manufacturing infrastructure, widely accessible and inherently flexible, to meet the challenges of the marketplace with practical, innovative solutions.

The University of Rochester and SUNY Poly are key partners in this consortium to advance U.S. photonics manufacturing capability. AIM Photonics is headquartered in Rochester, New York.

NextFlex, the Flexible Hybrid Electronics Manufacturing Innovation Institute  
www.nextflex.us

MISSION: To advance manufacturing maturity for flexible hybrid electronics, a set of technologies that bring together printed electronics manufactured on flexible substrates with semiconductor devices. These technologies yield forms that can be attached to skin, vehicles, or other structures, or can be bent, rolled, folded, and integrated physically in ways that traditional rigid electronics cannot.

NextFlex is focused on launching a new era in flexible hybrid electronics manufacturing by catalyzing the U.S. FHE ecosystem to commercialize technology through investments in FHE materials scale-up, thinned device processing, device/sensor integrated printing and packaging, system design tools, and reliability testing and modeling.

Binghamton University and NYS Industry Partners—including GE Global Research, Comming, Inc., Lockheed Martin, and i3 Electronics, Inc.—will lead the New York node in the Department of Defense’s $75 million, five-year national “NextFlex” initiative to advance flexible hybrid electronics manufacturing.

Advanced Functional Fabrics of America (AFFOA)  
www.joinAFFOA.org

MISSION: To enable a manufacturing-based revolution by transforming traditional fibers, yarns, and fabrics into highly sophisticated, integrated, and networked devices and systems.

AFFOA is built on a simple premise: functional fabrics necessitate deep fiber innovation and predictive manufacturing. AFFOA has America’s leading IP cache in semiconductor fibers and assemblies and is strategically positioned to deliver revolutionary advances across the entire fabric supply chain, from multifunctional fibers to advanced nonwovens and yarn production, sophisticated weaving and knitting capabilities and, end-product fabrication for first-to-market manufacturing opportunities.

Cornell University has joined a consortium of 32 universities in AFFOA that are working on a $317 million project geared toward creating 50,000 jobs in the U.S. within 10 years by restarting the nation’s textile manufacturing industry.

CONTACT MACNY TO LEARN MORE ABOUT ANY OF THESE INSTITUTES.
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Leading the Way to Innovation

It has never been more difficult to be a leader within and of an organization. The pace of change is breathtaking, and it will only accelerate. Leaders are now asked to be successful today and to also prepare for tomorrow. They are asked to produce results while building an environment that will enable their companies to continue to thrive when today’s products and services are no longer profitable. This is where innovation becomes critical. Leaders must create an environment that is both innovative and productive.

Innovation is clearly the key to long-term manufacturing success. However, in my experience, it is a difficult activity for companies to excel at. Brian Heckler is a national sector leader of Industrial Manufacturing at KPMG LLP. In his work with hundreds of industrial companies, he gets to see what works for innovative manufacturers. Several of his insights seem especially important. According to Brian, there are five key areas that the more innovative manufacturers recognize as being fundamental to success: running at multiple speeds, recognizing the inflection point of innovative change, creating today’s innovative organizational culture, adapting the business model, and having a long-term vision. You will see each of these methods used in some way by our featured innovative leaders and in play within their companies.

To be innovators we, and our teams, must be extremely good at changing our daily behaviors. Behaviors are at the heart of this effort. What we do in the next minute is what will determine whether we are changing and innovating. As is often said, to do the same thing over and over and still expect a different result is a definition of insanity. And yet, if we are honest with ourselves, this is exactly what we do. Therefore, the question is, how do we determine and then adopt a different set of behaviors that will help our teams and our companies be innovative?

By definition, innovation requires change. Thus, the best leaders must be capable of embracing constant change while maintaining and creating outstanding products and services… no small task for anyone. If change is necessary, how does a leader bring about change and innovation? In a nutshell, that is the Leader’s Challenge. In this issue of our magazine, we are profiling three leaders who have met the Leader’s Challenge and have created innovative organizational cultures and outcomes.

At the heart of innovation is the ability to change, be it an existing product, business model, process, investment, method, organizational chart, or any of the countless other aspects of our lives and businesses.

In the following profiles, we focus on the role of innovation and how it is encouraged at three of MACNY’s member companies. After reading it, I hope that you will share your insights and questions about innovation with the MACNY team and with your co-workers. If you do, it will be quite likely that these three leader profiles will contribute to even more innovation and inspiration.

We have all heard it said that innovation is the key to long-term success. However, in my experience, most of us find it a very difficult enterprise to excel at.
INFICON is the leading provider of products for gas analysis, measurement, and control for a broad range of specialized markets, with special emphasis on companies involved in the making of high-tech products like microchips and flat panel displays. Our advanced products add value to our customers by enabling them to achieve and maintain very stringent product and process quality requirements while also helping maximize equipment uptime and product yield. Our products are essential for gas leak detection in air conditioning/refrigeration and automotive manufacturing. They are vital to equipment manufacturers and end-users in the complex fabrication of semiconductors, thin film coatings for optics, flat panel displays, solar cells, and industrial vacuum coating applications. Other users of our vacuum-based products include the life sciences, research, aerospace, packaging, heat treatment, laser cutting, and many other industrial processes. We also leverage our expertise in vacuum technology to provide unique toxic chemical analysis products for emergency response, security, and environmental health and safety.

INFICON is headquartered in Switzerland and has world-class manufacturing facilities in the United States, Europe, and China, as well as sales and service offices in 12 countries. We have over 1,000 employees, of which over 400 are in the U.S., with 260 in East Syracuse. We were founded in Syracuse over 46 years ago and have grown steadily over that time, due in large part to growth in exports. Most recently, we expanded with a brand new high-tech facility with 70,000 square feet of state of the art advanced manufacturing space. We also added to our highly educated workforce with a strong emphasis on STEM degrees. To meet the needs of our customers, we have been registered under ISO 9001 since 1993 and ISO 14001 since 2000; most of our products are CE and RoHS compliant.

How does your company define innovation? What are some of the key perspectives that help to shape a culture of innovation at INFICON?

In my view there is no single recipe for innovation; it is a natural development if the right environment exists. Innovation requires a passionate and curious workforce focused on positive change, imbued with the attitude that we can always improve further. This extends to products, processes, organization, and, of course, to ourselves. In today’s world, innovations require open collaboration and a willingness to challenge the status quo across multiple disciplines, large geographic distances, and multiple cultures. Creating and sustaining such an environment is both challenging and exciting.

How does INFICON’s legacy affect your ability to lead innovation?

We have a very successful history that gives our customers, our shareholders, and ourselves confidence in our ability to innovate, while also enabling us to make the necessary investments in our future. The best and most visible example of leveraging past success is the way we approached our need for additional space here in Syracuse. We considered many different options and decided to focus on creating the best possible environment to build our market leading products, both now and far into the future. This focus led us to totally reimagine our manufacturing space, resulting in significant improvements in key areas such as cleanliness, flexibility, efficiency, and automation.

What mindsets, qualities, or talents characterize top innovators? How does a business become a leader of innovation in its industry?

The most innovative companies have employees with open minds, passion, and curiosity bundled together with a sense of urgency – along with a strong belief in “the Scientific Method.” To sustain leadership in innovation over time requires not just incremental innovation, but also the willingness to consider disrupting your own business model and product offering. As a company grows and ages, this often becomes more difficult and sustaining innovation requires increased leadership attention.
What does the process of innovation look like at INFICON?

What are some of the key indicators you look to in deciding whether you have been successful?

Innovation can come from any area within INFICON. On the product side, we use our research talent and feasibility studies to strengthen our core competencies and then protect this work with patents. We execute on these new ideas with a combination of strategic planning, project prioritization, product roadmap review, and market opportunity exploration, coupled with fast product prototyping and application development. Done well, the result will be an increased share of revenue coming from fundamentally new as well as improved products.

Has a commitment to innovation affected the way you hire team members?

Talent is a critical factor for us and we have high expectations of our employees. For new hires, we look for strong academic performance coupled with key behavioral competencies. We believe only “A” players hire other “A” players.

How would you describe your style of innovation leadership?

I believe in authentic leadership where you aim to win the heart to win the mind. So, as much as possible, I prefer to inspire initiative and action rather than request it. In a fulfilling work environment, with curious and passionate minds, the best ideas often do not come from the leader but from the great people around him or her. I see leadership as a dynamic skill adjusted appropriately to each situation and requiring constant development.

What is the most important thing an innovative leader should do to stay effective and fresh in his or her work?

My view on what is important has evolved over my career. I now try to take time to recharge my mind, work on the relationships that are important to me, and also be deliberate about physical health and exercise. In and outside the workplace, I intentionally engage with others that think differently and I challenge myself to periodically try something new.

What is the most important thing an innovative company could or should do to stay effective in its industry?

Know why customers are buying your product and what value it generates for them. Do not lose sight of the need to look for new and better ways to solve your customers’ problems. Not every new product feature or specification improvement creates additional customer value.

Tell us about your business.

Marquardt designs and builds products for customers in several industries, including automotive, power tool, and home appliances. Most of our products are electronic-based, with microprocessors that control the functionality of the product. Examples would be key fobs that start cars, dash controls that manage the functionality within the cabin of the vehicle, power tool switches that manage batteries, speed, and on/off controls.

What is the role of innovation at Marquardt?

Marquardt is focused on innovation in several areas of our business, not just product design. To remain competitive, we have to be innovative in our organizational structures, processes, products, and services. One of the key drivers of innovation is the fact that we are an engineering and manufacturing company operating in a high-labor-cost country. Most of our competitors, if not all, operate in countries with low labor costs for people in both production and engineering disciplines. Global connectivity, enabled by the internet, makes it easier to manage global teams of people in ways never before available. Marquardt also utilizes resources in
low-labor-cost countries. The trick is to figure out how to truly function as a team across time zones, language differences, and cultural norms in ways that result in faster project turnaround with lower total costs—those challenges have become our innovation opportunities.

**How does the legacy of Marquardt affect your approach to innovation?**

Understanding which legacy pieces to keep, those that are strengths you can leverage in the future, is a key consideration that never ends. Deciding which legacy pieces are either obsolete or will become obsolete is, again, the challenge/opportunity for innovation that is unique to each company.

Marquardt has a long tradition of utilizing toolmakers (developed through internal apprenticeship) in our in-house machine shops to support production, develop prototypes, repair molds, etc. While we’ve invested heavily in traditional machining and foresee a continuing need for this in the future, we also recognize the need to engage in rapidly evolving technologies like additive manufacturing. We’ve recently begun to purchase equipment and buy services to grow our understanding of the processes, equipment, and skill sets necessary to blend our legacy machining capabilities with state of the art laser sintering and 3D printing and are already seeing and realizing the benefits.

**How does a business become a leader of innovation in its industry?**

Listen to your customers or potential customers and then deliver. This requires building strong relationships with your customers and that requires dedicated time and consistent performance.

**What does the process of innovation look like in your company? How do you measure the input, workflow, and output of innovation?**

We use our five-year strategic plan to identify where we want to go; we then assess our current state and we build our tactical plan to bridge the people skills, equipment needs, and new product gaps. Marquardt uses MIP (Marquardt Idea Process), MEP (Marquardt Efficiency Process), MVP (Marquardt Continuous Improvement Process) structures to monitor and track our progress. Each process is aimed at a different focal area to help us ensure that each of the necessary innovative elements is showing results.

**What are some of the key indicators that you have been successful?**

Being named as one of only three techno-centers out of the fourteen Marquardt locations.

**Has your interest in innovation affected the way you hire team members? How is innovation integrated into your expectations during the hiring process?**

To support more innovative efforts, we’ve done a fair amount of analysis on both functional and cross-functional skills vs. business needs (current and future). From this, Marquardt has determined what we feel to be an appropriate balance of young/fresh energy with experienced/lessons-learned energy. New employees are encouraged to question what and how Marquardt does things and to raise a flag if they feel there are more innovative or productive ways to accomplish the same thing (standout ideas are rewarded through the MIP process previously mentioned). The people that execute on their ideas are our most admired innovative employees.

One key point we’ve learned is that innovation has to be developed like muscle memory, that is, it needs to be viewed as a daily way of life. When innovation is woven into the cultural fabric, it doesn’t seem so mystical or daunting or as needing such a big effort, which leads to smaller day-to-day innovation wins. The company structure and culture has to not only encourage this but expect it.

**How would you describe your style of innovation leadership? Does it change in response to circumstances?**

Innovation doesn’t have to be a mythical beast—use your current tools, structure, and process in new, and therefore, creative ways. We frequently need to question ourselves and not rest on today’s successes. Our passion is to learn from others and also to really focus on executing what we’ve learned. Our culture is built around expecting, from ALL of our employees, those ideas that make us better each and every day and to be able to point to the effect of those improvements on our bottom line.

At least once per year, and sometimes a couple of times per year, we change job titles, roles and responsibilities, and/or reporting structures to better support new customer directions, labor cost pressures, and employee career path alignment needs. This is done at all levels and requires trust and understanding from our employees to flex with those changes. If you’re not tied to an identity of job title or job duties, you’re better positioned for a job at Marquardt.

**What are the most important things innovative leaders could or should do to stay effective and fresh in their work?**

One approach is frequent, objective, data-based mirror checks. A second approach that Marquardt uses is “quiet time,” a block of two hours per day built into everyone’s busy schedules—free from emails, phone calls, or meetings—to focus on specific areas. This is aimed at unplugging and protecting a chunk of work time to be used however the person chooses, as long as it isn’t used for one of the above-mentioned categories.

**What is the most important thing an innovative company should do to stay effective in its industry?**

Hire and retain people that can and will share the vision we’ve talked about and who are flexible enough to course-correct with the company.
Tell us about your business.

Air Innovations designs and builds environmental control systems for applications that can’t be addressed with standard HVAC equipment. Our systems control temperature, humidity, and filtration to protect our client’s processes or products.

Air Innovations serves a broad range of industries, including wine cellars (under the Wine Guardian brand name), aerospace, homeland security, semiconductor (under the Cleanroom Systems brand name), R&D, and pharmaceutical. Our systems are sold to clients all over the globe; to date we have sold systems to 37 different countries on five continents.

All Air Innovations products are designed, tested and manufactured at the company’s 40,000 sq. ft. headquarters in Syracuse, NY. The company has been the recipient of many awards and has been included in Inc. Magazine’s 5000 list of the fastest growing, privately held companies in America.

Top innovators are risk takers, vision driven, and possess the ability to see deeply into a process or situation, always searching for a better solution.

How does your company define innovation?

Air Innovations does not innovate core technologies; we are not inventors per se. Air Innovations solves customers’ problems by pulling together existing technologies and applying them to meet each customer’s specific needs. Our innovation comes from the ability to bring these systems together in a customer- or application-specific orientation to solve unique challenges.

What are some of the key perspectives that help to shape a culture of innovation at Air Innovations?

We believe in sharing the details of each customer challenge we face. When employees know they are working on a project that might prevent a bomb from passing through airport security, or that will improve medical diagnostics, or that is part of the world’s largest Ferris wheel, they have a deeper engagement in the problems we are solving. This leads to better innovation and employees suggesting solutions that they might not have suggested without knowledge of the end application. Often we can recognize potential problems or issues that the customer might face down the road, leading to better up-front designs to avoid those issues.

How has the company’s legacy affected its approach to innovation?

Air Innovations has had to continually change throughout its history; adapting to changing customer needs and seeking out new opportunities has been in our “DNA” for a long time. In the beginning, we only built floral display cases for supermarkets. Thirty years later, that product represents less than one percent of what we do! This opportunistic attitude takes away the fear of trying something new—we are never afraid of tackling new challenges that we haven’t faced before.

What mindsets, qualities, or talents characterize top innovators?

Top innovators are risk takers, vision driven and possess the ability to see deeply into a process or situation, always searching for a better solution. They are not only creative; they also have the talent to foster creativity and the implementation of ideas in their team. And most importantly, they have the resilience to withstand the tough times.

How does a company become a leader of innovation in its industry?

By constantly challenging the status quo.
There’s a better way to buy energy.

Buy less of it.

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Direct Energy Business delivers smarter energy strategies that help our manufacturing customers buy less of what we sell. For more information, contact your dedicated Direct Energy Business Representative.

directenergybusiness.com
How do you measure the input, workflow, and output of innovation in your company?

As our innovation is directly tied to solving our client’s unique problems, their repeat purchase of our solution(s) is affirmation of the work we’ve done.

Has innovation affected the way you hire team members? How is it integrated into your expectations during the hiring process?

We make it very clear during the hiring process that we work with a broad array of customers, industries, and challenges. We also do not have a vertically integrated philosophy, which means everyone is expected to perform a broad range of tasks. Our employees like the diversity of the work we do and their range of responsibility, but that’s not for everyone, which is important to decipher at the time of hire.

What is a key element in your approach to innovation leadership?

I believe consistency—so that your employees know how you handle various situations—is very important to building a stable work environment. All companies face a variety of situations, extreme highs to extreme lows; how you deal with those is important to the employees and their confidence in the long-term success of an organization.

What is the most important thing an innovative leader should do to stay effective and fresh in his or her work?

Networking with other company leaders to gain new and different perspectives is vital. Always challenge the status quo and consistently encourage the management and employees to think of new ideas and understand how his or her work affects company performance.

What is the most important thing an innovative company should do to stay effective in its industry?

A company cannot stay in the present, but must always look to the future. What products or processes could make the company obsolete? What changes could be put in place to improve the company or its products tomorrow? What is the competition up to? All are questions that should be pondered throughout the year to drive ideas for continuous improvement and innovation.
Successful manufacturing recruitment requires balancing a firm grasp of the ever-evolving industry with a keen eye for talent and potential. With CPS Recruitment’s 25+ years of experience in the industry we have a proven record in building winning teams for our MACNY partners.

Learn how we can ensure you achieve your goals—whether you have an immediate need for manufacturing expertise or a desire to develop a long term strategic plan to attract the talent you need -- CPS can assist!
The MACNY Innovator of the Year Award, sponsored by Corning, Inc., was created as a way to recognize individuals within a company who, although they may not be at the executive level, consistently demonstrate forward thinking ideas in the areas of technology, innovation, and advancement of products and production. Three past winners of the Award were kind enough to get together with us for an off-the-cuff discussion about how innovation is pursued and achieved in the day-to-day world of manufacturing.

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The Innovators

Kyle Brown
Director of Engineering, Feldmeier Equipment, a national company with facilities in four states and headquarters in Syracuse.
“We manufacture stainless steel vessels, mixers, heat exchangers and other processing equipment for the food, beverage, dairy, and pharmaceutical industries. Pretty much any liquid product that you see in the supermarket could have been manufactured in one of our vessels or produced in one of our heat exchangers.”

Gary Stevens
Assistant Vice President of Operations, SRCTec, a wholly owned subsidiary of SRC. “SRC is primarily a research and development company. They produce radar and electronic warfare systems primarily for the military. At SRCTec, we manufacture the systems that SRC designs. We are also a subcontractor for larger Department of Defense manufacturers — Northrop Grumman and Lockheed Martin.”

Tom Szumloz
Senior Manager of Current Product Engineering, Welch Allyn, which last year celebrated its centennial in the medical device industry. “Welch Allyn was acquired by Hill-Rom Corporation last year, and together we provide a broad array of medical devices and instruments to the industry. There are many opportunities, going forward, as a result of the marriage of these two companies.”

The Moderator

Karyn Burns
VP, Communications and Government Relations, MACNY
MACNY — Kyle, you are the most recent recipient of MACNY’s Innovator of the Year Award, so let’s begin with you. The motto of your company, Feldmeier Equipment, is, “innovation is a family tradition.” Feldmeier owns many patents, and you were recently awarded one yourself. The public probably imagines such inventions to be the product of a “Eureka!” moment or the proverbial light bulb going on. How does that view jibe with reality?

Kyle Brown — My experience has been quite the opposite, though certainly there are some light bulb moments. Most of what I’ve seen within our organization has been very methodical, and often slow, development in getting to a solution. We’ll identify an issue in our industry or a deficiency in a current offering, be it by us or by our competitors. And then, often through many trials and errors, teamwork and joint ventures, we’ll explore the avenues to solve that problem and, in some instances, come up with solutions that warrant us seeking a patent. Robert Feldmeier, who founded Feldmeier Equipment, had 19 patents and really created an environment and culture of innovation within our company. Today, more than ever, the Feldmeier family continues to encourage and value innovation.

Gary Stevens — Within the SRC enterprise, innovation is very broadly defined. What SRC, as an engineering research and development company, would define as innovation might be different than how a manufacturing company defines innovation. We’re more about process innovation while they’re more about solution-driven innovation. At SRCTec, our innovation might be a little less tangible - the redeployment of an existing process, or the combination of creating a lean culture while implementing the Shingo principles. For us, innovation tends to be the result of a methodical thought process rather than that idea of a light bulb in the head.

Tom Szumloz — I think of it as culturally ingrained. You have a workforce that is never satisfied with the status quo. If something new comes along, or a problem arises, we immediately wonder how can we do that better, more effectively, to satisfy the customer even more. But I also think some of it is driven by the leadership of the company. An example of that might be in needing to return a five percent productivity increase on an annual basis. That impetus also drives you to constantly strive for the smallest incremental improvement, in any way you can achieve.

Kyle Brown — At Feldmeier, that spirit runs through our entire organization. We constantly see our laborers and fabricators wanting to contribute to an idea and come up with new ideas. Certainly when we bring in new engineers, they’re encouraged to do the same. I think it’s crucial in our environment—because everything we build is custom—that everyone is always trying to do something new.

When you bring in new engineers, they want to be innovative; no one wants to do the same thing over and over. I think it’s critical that we don’t handcuff them, and despite the everyday trials of making deadlines and achieving profitability, it’s still part of the picture that we encourage new product development or enhancement to existing designs. It’s a big part of what I’ve been doing.
Gary Stevens — It should be noted that it is the support of the entire organization that creates the lean culture; it’s not something that exists only within manufacturing. Within the lean culture there are specific tools. One of them is called leader standard work, which flows throughout the organizational hierarchy. Whereas I might be concerned with revenue and cash flow, how does that tie to the next level and what is their focus – and you continue that linkage throughout the hierarchy. The operators on the floor know what their day-to-day, minute-to-minute contributions are that will roll-up to a measurement for cash flow or on-time delivery. Leader standard work is, “What are the five things I have to do every day. If I only get those five things done, then my day was successful.” It’s communicated in many different ways – a whiteboard on the wall or an hour-by-hour chart on the production floor so any person can trace their value through the value-chain to another person.

MACNY — What is nice about the innovator’s award is that you’re nominated by leadership within the company. Each of you were singled out for certain things. Gary, you were singled out for your ability to empower your employees and help them develop in a way that encourages a culture of continuous improvement. Tell us a little about that.

Gary Stevens — I want to point out that a lean culture focuses not on the output but on the process of creating the output. It’s very easy to become focused on the output and the targets, but you have to transcend that and leaders throughout the organization have to focus on the process. If people are measured solely on the output of the process, they’re going to be risk averse, they’re not going to be willing to take on new challenges and try new ways to continually improve for fear that they may make a mistake. Certainly you want to achieve the target, but we also need to keep in mind that it’s not just a mistake, it’s an opportunity to learn.

So we focus on the process, on working with the people to help them learn. Say I took a risk, I implemented a new process, I tried something different and it didn’t work, I didn’t meet the target. I focus on what part of that new process I want to keep because it’s right, what part do I want to continue to refine. You have to take some amount of risk. It has to be measured and calculated risk, but the only way you achieve capacity gains and innovations is through learning from the process.

Tom Szumloz — Ten years ago at Welch Allyn, the lean or continuous improvement culture was immature. We embarked on a journey in the manufacturing area first, like everybody else does, saw the fruits of that labor and said, now let’s apply these learnings to the back office.

We implement these lean management systems whereby we create standard work for the processes that are key to the success of a particular project or function. And I’m speaking of engineering here, not manufacturing. We actually have visual management systems for projects in key functional areas. It becomes quickly evident if something is going off-track. We call it a flow defect; if something stops us from continuing it earns our laser-focus, much like you’d do in manufacturing if the line was stopped.

This visual system has helped enable a more innovative culture. We are willing to take those risks because we have gone through a standard work process; we’ve scoped the effort out and we know what we have to do, we know where the risks are. We then monitor closely through this lean management system. That in itself drives our culture of continuous improvement innovation.

The key thing about it is, it’s not really managed by me or other managers. It’s the folks that are executing the work that are monitoring, that are challenging, that are addressing the flow defects when they arise. We started out with one group in the back office, and that process is now proliferating out to other functional areas. It’s been extremely powerful and it really took leadership of the company to step up and say, we’ve seen all the great benefits that have been happening in the manufacturing area, how do we export that to the rest of the company and realize the same benefits? We assigned a lean guru to help proliferate that, and that was key to early success.

Kyle Brown — I think it’s important for the management team at Feldmeier that we’re not just saddled with engineering metrics and keeping track of our “day-to-day.” Our pursuit of new design and innovation and what’s going to differentiate us from our competitors stays a major focus in the company. It is in our culture, in the DNA of our company that came from our founder, that everyone is constantly striving for improvement.

I think it’s awfully easy for organizations to look at some of the metrics that are being discussed today and to stop looking at the fundamental values that built the company. We built our company because our founder invented new products non-stop.
MACNY — Tom, you were the first recipient of our Innovator of the Year award. You were nominated in recognition of exceptional innovation in idea generation and team growth while simultaneously delivering new products to the marketplace. You’ve been praised for innovating through and with people. Can you comment on how that resonates with you?

Tom Szumloz — By degree I’m an electrical engineer and I started off my career doing design work. It wasn’t exciting for me, it wasn’t challenging for me. What did resonate for me was, if a particular design of mine was in the lab or the assembly area getting put together, I liked to be down there. I liked to listen to the technicians; they always had great ideas, feedback that wasn’t being heard, nobody was seeing the challenges they faced.…

I realized that there are different sources of information, of experience, of innovation and know-how in an untapped pool of resources. My observation was that there were functional areas throughout the organization that needed to have a say in how a product gets designed.

A lot of what we’re talking about here is design for manufacturability, design for testability. So what I was championing in my role at Welch Allyn at the time was complete total involvement from a development team. Ten years ago at Welch Allyn, it wasn’t the proverbial “throw it over the wall to manufacturing....” But it was pretty close.

A lot of what we did during that time was break down those barriers, get a seat at the table, work as a team; get operations deliverables related to safety, quality, delivery, and cost on the table.

You can’t just throw a bunch of people together, turn a crank and expect to get high yield production. There has to be a target and there are tradeoffs every step of the way.

Gary Stevens — If we consider what Tom was talking about—design for manufacturability, design for testability and serviceability—the answer is no. I say this because the people who are assembling the products, testing the products, repairing the products, need to be involved from the very beginning. When the white paper is on the wall and we’re innovating the design, we’re also innovating how that design goes together.

We need to ask questions like “how am I going to service that, if I’m a radar technician?” Our radars are used all over the world and where they’re used there isn’t always a tool shop. If I’m in the desert and I have to repair this radar, I’m not going to be able to run to Lowe’s to get a tool. We want to consider, at the earliest design phase, when the ink hits the paper, how we’re going to manufacture, assemble, and test. For those reasons, if I follow that thought process through the product realization process, launch into production, and then through the product life cycle into retirement, when done correctly, it doesn’t change and remains relatively constant. It only changes when the appropriate functional areas are not included up-front.

Tom Szumloz — I would agree 100 percent. As to keeping the lights on, we do have that as a separate function at Welch Allyn. The manufacturing engineering folks that are dedicated to new product development are separate from the folks who are keeping the lights on. That doesn’t mean that there is a barrier. In our new product development space for manufacturing engineers, those tend to be populated with more of a project management type person. So our structure may look different, but at the end of the day, I think you can easily interchange those folks that are involved on either side of the equation. That doesn’t mean there isn’t a continuous exchange and knowledge sharing. The folks that are keeping the lights on and supporting the floor are eventually going to take ownership of that new product. So there may not be collaboration at the early onset, but very much so in the middle of the process and when we’re getting into the qualification phase. Those folks are very engaged and well-equipped to take on ownership of that product when it passes what we call our “Production Start-Up” phase.

Kyle Brown — I have a similar view to Tom’s. Because what we do is extremely customized, there’s new product development every day by each of our designers, which is a wonderful environment to be in, something not every engineer gets to do.

I really relate to Tom’s experience of spending four years as a designer first. That’s exactly what I did. I was in our design group and then spent most of the next 15 years in an operations management type of position. Just recently I started a new position, Director of Engineering, which has pushed me back in the
direction of working intimately with our design group. I also relate well to the idea of using that pool of knowledge in the factory and not just the engineers throwing something over the wall. My father was a gunsmith for 46 years. So I grew up with, “The engineer won’t listen to me. He’s new and I’ve got 46 years of working on this product and yet I don’t have a voice.” I think that’s why he wanted me to become a mechanical engineer. It set me up well, when I first joined the company, that I was the one who would spend the extra couple of hours a day working with the guys in the shop. The things I learned from that really helped the company. Today at Feldmeier, our leadership and the management team is as much production based as it is engineering. Most of our new product development is a 50/50 exchange between production and engineering.

Tom Szumloz — You were talking earlier about the “Ah-ha!” moment. My “Ah-ha!” moment early in my career...the barometer for the culture that existed, was an engineer saying, during development of a particular product, “well, I can build it so of course it can be manufactured.” It just illustrated to me that there was a very narrow perception of what manufacturability is. Certainly, I’m not faulting anyone; it’s not an uncommon definition. Part of that evolution that we started was very much educational. What, really, is manufacturability? It’s not just putting it together. It’s your supply chain, its your flexibility, its everything rolled up into your manufacturing capability. You can come up with the most elegant design and the most high-performing piece of equipment, but if you can’t put that product together and get it into the customers’ hands efficiently and effectively and quickly, it’s a failure.

Kyle Brown — The first “Ah-ha!” moment that comes to mind was early on, when I was a designer and working with one of the guys in the shop. One of the lead men, after I’d said that I’d screwed up on something, said it was the first time he’d ever heard an engineer say he’d screwed up. It was an acknowledgement that our position in engineering surely wasn’t above the people we worked with, the people we designed for. There needs to be some humility and I was received much better by our production people because of that level of humility I expressed.

From the design standpoint, the patent I received was something that was probably gradually designed over a decade. Our engineering supervisor and I kind of had a moment in the last two weeks. We’re in the process of applying for a new patent. It’s much different than the patent I received which, albeit it’s a design that we’re proud of, has relevance and dozens of applications annually. The patent we’re going for now, however, is something that there’s millions of across America that we feel can all benefit from a new design. I think that MACNY awarding me Innovator of the Year and getting my own patent has encouraged our workforce at Feldmeier to start looking for those things. So as we were walking through the shop and started bantering about a problem, we quickly got to the point that not only did we see the solution for Feldmeier, we saw how it might change the way the whole industry does this specific design.

MACNY — Kyle, can you describe the birth of an innovation? You’ve all touched on the things that contribute to the “birth” of an innovation in this discussion. Are there some elements that are typical of the process and are innovations always part of a continuum?

Kyle Brown — I think that most innovation comes from failure, to some degree. Something needs to be fixed, isn’t pleasing a customer, isn’t particularly efficient, so the opportunity exists because of a failure. Our process is to identify those opportunities. I like what Tom said: laser focus on those items, find those big items and dedicate resources. I think that is how our process would occur: identify and then try to find a solution, bring together the right group of different disciplines and come up with a solution.

Gary Stevens — I would say innovation is the result of an insatiable desire to improve and never accepting the status quo. I think if I were to walk through the factory today and point out the most recent innovations, most people would look at them and scratch their heads, because people tend to define innovation...
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“I would say innovation is probably the result of an insatiable desire to improve and never accepting the status quo... People tend to define innovation as the production of something, the design of something. I don't feel that's exactly right, I think it's too constricting.”

Gary Stevens

as the production of something, the design of something. I don't feel that’s exactly right, I think it’s too constricting.

We innovate by redeploying systems that people innovated and deployed after WWII in the plants of Toyota. Our visual management process and our idea generation process (both of them paper-based) are very innovative. Using them, we've generated hundreds of ideas in the last year. Prior to that we generated tens of ideas in a similar timeframe.

Our visual management process lets us communicate almost fluidly, without using any language. We have up to 30 or 40 production associates and just one supervisor. We've created that one-to-many relationship by creating a visual factory that allows each staff member to find his/her job.

We have taken those ideas and determined, for our factory, for the products that we produce, this is a better solution. It may not be a better solution for anyone else.

Tom Szumloz — In my experience, innovation comes from a need. Whether it’s a need by a customer—such as a doctor needs to do a diagnostic on the road, maybe an application in some developing country where they need something portable—or the need to do something innovative in the shipping area—getting products configured quickly and out the door.

Sometimes the solution isn't that evident. It takes getting the right group of folks together. I think that's what is very powerful about the visual factory. It enables people to see that information, it's not held close to the vest, it's out there, and that drives ideas. We see it all the time at our boards. Somebody will point to something and say, well I know a little bit about that, what kind of problem are you having? And before you know it, you've got three or four people offering solutions. And those solutions are driving other ideas, and the problem is solved in a relatively short amount of time.

To me, it's just taking advantage of the pool of resources you already have.... very smart people whose input would go untapped if the problem appeared on a spreadsheet somewhere, or was tucked away on somebody’s laptop. Because it is visual and out there, those needs get satisfied very quickly.

MACNY — Based on what I'm hearing, it sounds as if none of you have room in your innovation-driven organizations for someone who says, “It's not my job.” What sort of things do you keep in mind as you get involved in the hiring process, deciding on the sort of people you're looking for, and how do you go about making sure they understand the culture they're getting into.

Kyle Brown — Due to our growth over the last 15 years, I've interviewed and hired quite a few engineers. The candidates that have jumped out at me are those who are tinkerers. Technical aptitude and having some fabrication type instincts definitely serves well for the type of design work that we do, and I think that goes hand in hand with innovation; it's from the same skill set.

Gary Stevens — I would summarize what I look for in an interview in one phrase: “You can't teach work ethic.” I can teach someone with a strong work ethic almost anything they need to know, but I can't teach work ethic to the best engineer.

Tom Szumloz — To build on that, I look at it as a 50/50 proposition. In any job, 50 percent is knowing what you're doing. If you're hired to be an electrical engineer, you have to know something about electrical engineering. But the other 50 percent is work ethic and all the other traits that you value in your organization, including ability to work as a team and a willingness to take on challenges outside of your core responsibility. If there's one thing that turns me off it's the person that knows more about what their job isn't than what it really is.

We tend to look for a person who has done a lot of different things; it indicates they haven't shied away from a challenge. It's the old adage, “Well, I've got 20 years experience.” Well, it could be just one year of experience, twenty times over. The question I hate the most is, “what do you see yourself doing in five years.” If somebody can paint that picture down to a detail, it's a red flag, because they've got the blinders on, and all the other capabilities that offer experience and benefit to the company, go by the wayside.
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People and culture are the most important drivers of innovation according to 94 percent of the executives responding to a McKinsey Quarterly survey on leadership and innovation. And among the people-focused building blocks needed to foster innovation are trusting employees and creating conditions that allow dynamic innovation networks to emerge and flourish. This sounds simple enough, but we all know that the difficulty is always in the implementation, especially when we are dealing with the human factors. The fact is that we need to establish cultures where our employees feel trusted and are encouraged to be innovative. We need to build an environment where it is okay to fail.

Many years ago when I was working in product design and methods engineering, our company was faced with a major dilemma. A large customer informed us that, due to its high price, they could no longer buy our product. This particular product line was a significant portion of our business, and upper management quickly determined that other customers would soon be calling with the same concerns. Within a few hours, the Vice President of Engineering and Manufacturing called a coworker and myself into his office to share the bad news. If we did not find a solution to the problem, the company as we knew it might be a thing of the past. What could we do? This was a mature product, and many before us had tried to find better ways to produce it, but in reality, it was simply too labor-intensive and slow to make. It was, perhaps, a great product that had run its life cycle and was ready to die or to be replaced by a foreign knock-off.

Before being excused from the meeting, the Vice President challenged us to find a better way. He encouraged us to think outside of the box and told us that all possible options were on the table. We left the meeting with a sense of optimism and support from our boss.

After a few hours of discussion, we had developed an idea—an idea that, for all intents and purposes, was insane. Perhaps we were naive or filled with youthful optimism. The “experts” in our industry said it could not be done but, nonetheless, we shared our idea with the Vice President. He asked us only one question: do you really think your idea is worth trying? Notice he did not ask if we were sure it would work, just if we really believed it was worth trying. Of course our answer was yes.

Over the next three months or so, he would look for daily updates. The question was simple: do you see enough progress to keep moving forward? As long as we were learning, he not only gave us a green light, but also encouraged us to keep going. One day the President of the company walked through and said, “I just want to say hi. I know I am not allowed to ask how the project is going.” That is when we realized that the Vice President had politely asked the President to stay out of our department. He was concerned that impatience and frequent visits would cause us stress and inhibit our ability to be truly innovative. In the end, we developed a process that increased production by 600 percent and saved the product line for many years to come.

I have often thought about that boss and what he did to develop a culture of innovation. He trusted us and invested in us with training. He would share his experience but didn’t try to control what we were doing. He insulated us from unnecessary pressures and made our work fun! He was very aware of what would upset the culture and protected it at all cost. Part of that culture was an awareness that it was okay to fail. Not careless failures, but failures that were First Attempts In Learning.

Henry Ford said, “Failure is the opportunity to begin again more intelligently.” Ford went bankrupt twice before founding the Ford Motor Company we know today.

Thomas Edison said, “Just because something does not do what you planned it to do doesn’t mean it is useless.” He also said, “When you think you have exhausted all your possibilities, remember this – you haven’t.” Five of Edison’s inventions were considered failures in their day. In 1899, he started the Edison Portland Cement Co. The problem was that concrete was too expensive and didn’t catch on. In 1895, he created the Kinetophone, a peephole device with ear tubes for people to watch and listen to talking pictures. He abandoned the idea in 1915.

Edison purchased dolls from Germany and installed small phonographs, but people complained about reliability and sound quality. Lastly, he invented the electric pen, a device that punched small holes into the paper as you wrote with it. You could then make multiple copies by rolling ink over it. Unfortunately, it was not very ergonomic and, with a selling price of $30, it was cost prohibitive. At the time, they were all considered failures when, in fact, they were ideas ahead of their time.

How many of us would love to have someone like Edison on our staff? Maybe we do, and our culture or environment is holding them back. Management is transactional; leadership is transformational. Let us all strive to be transformational leaders who build organizations and cultures where employees thrive because they are valued, invested in, and trusted.
Our expectation is that emerging technologies will eventually lead to advances in manufacturing, communication, or some other aspect of daily life. Occasionally one will appear that is transformative of markets, creating new categories of products that are so clearly valuable that they are adopted by customers immediately; think of products like the iPhone, the Internet, and industrial robots. Autonomous vehicles are that kind of emerging technology.

An autonomous vehicle (AV) is one that can sense its environment and control itself accordingly. At this point in their development, it makes sense to think of AVs as existing on a continuum, with more components being identified and added to the concept—and to cars already on the market—almost daily. For example, autonomous vehicles may include driver assist systems that warn you if you are drifting out of your lane or stop the car when an obstacle is present. Cruise control was a precursor of this category. In the adaptive cruise control of AV, the vehicle will slow or stop as you approach an obstacle. Adaptive cruise control is already available as an option on many cars—such as the Chevrolet Impala, Ford Fusion and Jeep Grand Cherokee—and is standard on some luxury vehicles.

Autonomous vehicles will need to keep you in lane, change lanes as needed, and maintain safe driving distances when travelling. Collision avoidance systems, already available on numerous high-end cars, can provide automatic emergency braking, monitor and warn of impending collision, and even tighten your safety belt. Night driving safety can be enhanced with infrared heads-up displays, and shape recognition software that detects pedestrians or bicyclists. The technology has proven itself effective enough at accident prevention that the federal National Highway Traffic Safety Administration is considering making some features mandatory on all new cars.

A further level of autonomy, present or on the near horizon, occurs when the driver can cede control to the vehicle under certain conditions. For example, a vehicle might be able to take on highway driving but would need the driver to take control in congested or city driving conditions. Autonomous vehicles may also park themselves, as with Ford’s Mondeo and Escape, which can steer the car into a parallel space.

The final level of autonomy is a vehicle able to perform all critical functions for the entire trip, not requiring a driver to intervene at any time. This would include the ability of the vehicle to operate without a driver present. In fact, a fully autonomous vehicle would not even need a steering wheel or other driver inputs.

Many Manufacturers Are Onboard

Tesla, with its Autopilot mode, has incorporated a number of self-driving features in its electronic vehicles. This feature allows the car to steer itself, stay in lane, change lanes if directed, slow and stop to avoid an obstacle, and park. However, it is currently intended for relatively simple situations, such as highway driving without much traffic. It also helps if you have good lane lines painted on the road. A driver must remain actively involved in decision-making or the car will stop. Tesla made this update to existing cars via wireless upgrades.

Google’s self-driving car may be the most publicized of the numerous research and development projects underway that attempt to deal with the complexity of real world driving. The software for the Google X car is called Chauffeur. The team has won the DARPA Grand Challenge against competitors from several university and private sector teams. Google unveiled a fully
functioning prototype in December of 2014 and, according to the company, has logged over 1.5 million miles of self-driving. Google plans to make its vehicle available to the public in 2020.

**A Computer on Wheels**

Autonomous vehicles clearly require the integration of a number of technologies. Multiple sensor systems are required to establish the vehicle's location and what else is in its environment. Light detection and ranging technology (LIDAR) gathers a million data points a second to measure intermediate distances using multiple laser lights. Car-mounted cameras detect pedestrians, other vehicles, signs, and traffic lights while radar units positioned around the vehicle calculate speed, following distance and traffic. The vehicles also have GPS sensors and will make use of highly detailed maps to help anticipate what to expect over the route they are travelling. Internal guidance sensors include altimeters, gyroscopes, and tachymeters so the car will have precise data on its position.

All these sensors provide data to the car's software systems for interpretation. Based on the real time data, the vehicle applies its learned rules and probabilistic reasoning to decide on the correct actions to take using actuators to operate steering, acceleration, and brakes.

Google and Tesla are not the only companies investing in autonomous vehicles. Mercedes has developed concept cars that are “hands-free”; Nissan, Delphi (formerly GM), Audi, and Apple are all developing autonomous vehicles; General Motors ranks highly in a study of global leaders in self-driving patents.

**Advantages and Challenges**

There are a number of potential advantages to autonomous vehicles. The Eno Center for Transportation predicts that if 10 percent of the cars on the road were self-driving, there would be over 200,000 fewer accidents annually and $22.7 billion in economic savings. There would also be fuel savings from the more efficient driving provided by AV, such as smoother acceleration and reduced congestion. Other costs could come down as well. A prime example would be lowered transportation costs resulting from driverless freight trucks; the cost of the driver is one of the most significant expenses in truck transportation. And self-driving vehicles could provide transportation options for people who cannot otherwise drive.

There are, of course, serious challenges to be overcome before AVs can take to the highways in large numbers. The most frequently cited is the regulatory framework needed to accommodate this technology. For example, how do we deal with liability when an autonomous vehicle is in an accident? States are addressing these issues slowly and allowing only limited AV testing, with drivers, steering wheels, and brake pedals required.

There are also some remaining technological challenges. Can autonomous vehicles become sensitive and hardy enough to operate in adverse conditions like snow and rain? Can the expensive components be manufactured for less? Less expensive LIDAR and sensitive GPS systems are needed before the vehicles will be affordable: based on a 2015 Boston Consulting report, the additional cost to a vehicle's price for AV will be around $10,000.

Considering the current state of these technologies, predictions vary on when we will have autonomous vehicles available to the general public. Semi-autonomous features, like lane following, are planned for GM's 2017 models. Elon Musk of Tesla has said driverless vehicles are two years away. Google has targeted 2020 for its vehicle's rollout. Ford's CEO Mark Fields predicts that we will have fully autonomous cars by the end of the decade, but that they will only operate in defined areas that have been 3D mapped. In his view, it will be 15 to 20 years before we have an autonomous vehicle that can take you anywhere.
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<td>(315) 477-5237</td>
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<td>(315) 214-5487</td>
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<td>(888) 893-7357</td>
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<td>(315) 792-9759</td>
<td><a href="http://www.excellusbcbs.com">www.excellusbcbs.com</a></td>
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<td>(315) 448-4922</td>
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<td>(315) 463-5193</td>
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<td>(315) 724-5830</td>
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WEB: www.nsaco.com

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Northland Communications
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WEB: www.nucor.com

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WEB: www.onegroupus.net

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WEB: www.oneida-air.com

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WEB: www.openatelier.com

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WEB: www.otistec.com

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