

electroindustry

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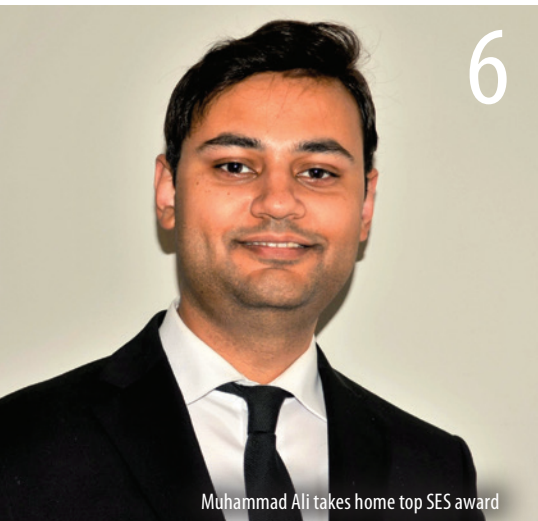
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FROM THE CHAIRMAN

Each year, the NEMA Board of Governors meets to review the successes and challenges of the past year and map out the next. One of the activities I look forward to the most is the update on the current year's Strategic Initiatives and the projects to be undertaken the following year. The Strategic Initiatives research issues that manufacturers are facing and give NEMA manufacturers insights unique to our industry—insights not always available more broadly.

One of the topics covered extensively at our meeting was the continued growth and importance of the Industrial Internet of Things (IIoT). IIoT affects nearly every business—either by adding new functionality to products or by improving the processes for manufacturing and delivery. And in the IIoT era, the physical product isn't the only deliverable for your business. In some instances, the data and information derived from the data may have worth beyond obvious uses of data, such as productivity enhancements. For example, by using a digital twin, system operators could predict *when* a piece of equipment needs to be replaced—potentially preventing the unexpected shutdown of the production line.

At its core, IIoT is about communication. Over the past century, there were many changes in how we communicate. From the development of the telephone and fax, to email, to text, and more recently to social media, we can communicate faster, which enables us to be more productive personally and professionally. In a similar way, with IIoT we are moving from taking months collecting subjective, and often contradictory, feedback for products to the ability to monitor real-time usage and performance of the product. In some settings, systems can be adjusted remotely to improve efficiency and reliability.

By analyzing the data provided by new sensors and networks, manufacturers can make improvements to their production lines, and even modify features within existing products to account for changes based on that heretofore unavailable data. For instance, they can shift machinery within a plant to minimize impact while performing preventive maintenance based upon predictive modeling. Others can use data to adjust where parts are sourced based on inferred supply chain issues. In short, by gathering and then analyzing data, it is now possible for manufacturers to gain important insights and spot trends in near real time. As time goes on, it gives adopters of IIoT the right tools to adjust to future events, which turns general market ebbs and flows into opportunities to grow their business.

As the systems and predictive analytics become more accurate, those with information from the IIoT are positioned to lead the electroindustry. Many businesses can analyze customer tendencies to forecast future trends. With artificial intelligence, big data, and other analytics, we may soon be able to predict—*accurately predict*—where customers are moving based on purchases, social media commentaries, and other factors we were never able to track previously.

As manufacturers, we've all been challenged balancing a speed-quality-cost triangle. With IIoT we have a powerful capability to make the myriad decisions that constitute a business operation more efficiently and effectively. Customer expectations will continue to rise, so prudent manufacturers will make the effort necessary to put IIoT to work in a far more integrated, data-informed fashion. ☯

Mark J. Gliebe
Chairman, NEMA Board of Governors

NEMA-Supported, Bipartisan Efficiency and Competitiveness Legislation Introduced in House, Senate

Just prior to the August Congressional Recess, U.S. Senators Rob Portman (R-OH), Jeanne Shaheen (D-NH), and Maggie Hassan (D-NH) introduced the Energy Savings and Industrial Competitiveness Act of 2019 (ESIC). This bill is the latest version of the legacy energy-efficiency proposal that Senators Portman and Shaheen have introduced over the past several Congresses. The primary goal of the bill is to improve energy efficiency in three key sectors—commercial buildings, industrial settings, and the federal government.

Only days later, U.S. Representatives Peter Welch (D-VT), David McKinley (R-WV), and Brian Fitzpatrick (R-PA) introduced the companion bill in the House. NEMA is particularly pleased that this year's House bill includes several NEMA priorities for the first time.

According to the U.S. Energy Information Administration, residential and commercial buildings accounted for about 40 percent of total U.S. energy consumption in 2018. In addition, reports from the U.S. Department of Energy (DOE) have found that the federal government is the largest single energy consumer in the country.

In reaction to the new bills, NEMA President and CEO Kevin Cosgriff said, "American homes, buildings, and industrial facilities are electrifying, and doing so efficiently. Using energy wisely allows our economy to produce more value at a lower cost with fewer emissions." He continued, "The 21st-century future will be digital, connected, and electric, as the sponsors wisely surmise. These bills will promote important energy programs and activities to ensure that U.S. buildings and infrastructure are safe, reliable, and efficient in this modernized future."

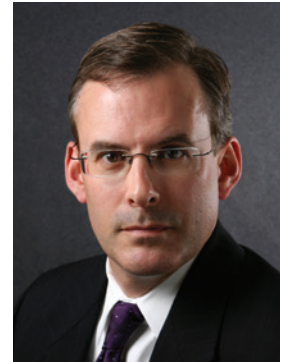
NEMA has played an active role in assisting policymakers with drafting the legislation over the years, ensuring several provisions benefit NEMA Members directly. Our top two priorities can be found in Title II of the legislation. The first provision is the extended product rebate program, which incentivizes industrial facilities to upgrade their systems including new motors and controls, helping the customer reduce its energy use by up to 50 percent per application. In addition, the provision allows the DOE to collect information on the projects, so that it can create a list of best practices and case studies to share with the public.

The second NEMA priority is the transformer rebate program, which authorizes a two-year, performance-based pilot program to demonstrate that replacing old transformers with new efficient transformers makes good financial sense for electric utilities and business owners. There are over 40 million distribution transformers in service today, and some of them are 30, 40, or even 50 years old. New energy-efficient transformers are 98–99 percent efficient, so replacing and decommissioning old inefficient transformers before the end of their useful life with new efficient transformers has the potential to significantly reduce energy waste on the electrical grid, in buildings, and in industrial facilities.

Additional provisions contained in the bill that NEMA supports would:

- Strengthen national model building codes to make new homes and commercial buildings more energy efficient while working with states and private industry to make the code-writing process more transparent
- Create a new grant program to assist homebuilders, trades, and contractors with cost-effectively implementing updated building energy codes
- Train the next generation of workers in energy-efficient commercial building design and operation through university-based Building Training and Research Assessment Centers
- Streamline available federal energy-efficiency programs and financing to help improve efficiency and lower energy costs for our nation's schools
- Expand DOE Industrial Assessment Centers to include community colleges and trade schools and create an internship and apprenticeship program within the initiative
- Allow federal agencies to use existing funds to update plans for new federal buildings using the most current building efficiency Standards
- Establish long-term energy- and water-efficiency goals for the federal government, which will help save taxpayers millions of dollars

For more information on the status and provisions of the bill, please contact Phil Squair, NEMA Vice President for Government Relations, at philip.squair@nema.org. ☎



Phil Squair, NEMA Vice President
for Government Relations

Circular Exuberance in Minneapolis



Mark Kohorst
Director, Environment,
Health, and Safety, NEMA

Young, smart, enterprising, committed, “Woke!”—these descriptors come to mind when I recall the crowd that surrounded me at Circularity 19, which took place in June in Minneapolis. Billed as the “largest circularity event in North America,” this three-day conference was all about what the organizers and attendees are promoting as the 21st-century model for conducting business on the global level—namely, the circular economy (CE).

Readers of these pages will be familiar with the CE concept and also know that a NEMA 2019 Strategic Initiative is aimed at assessing the potential value proposition of circularity for manufacturers of electrical products and systems.

In a nutshell, a circular economy seeks to move beyond the traditional “take, make, dispose” approach that characterizes most economic systems. Instead, the aim becomes buying less and reusing more—keeping products, components, and materials at their highest utility and value at all times.

While the core principles underlying circularity may not be new, the macro-level aspirations of circular economy adherents are hard to overstate. The GreenBiz Group (which presented the conference) predicts the CE will be “transformational, disruptive, regenerative and will create opportunities at every part of the economic spectrum”—with the potential to unlock a \$4.5 trillion economic opportunity.

Underlying the CE movement is a communal consensus that climate change is real, is existentially threatening, and can only be rectified through drastic action. References to the impending “climate crisis” are not uncommon among circularity fans, with the circular economy put forth as a necessary part of the solution.

That would explain the level of passionate engagement on display throughout the conference in Minneapolis, which registered more than 800 thought leaders and practitioners in the CE space. The goal of the event was to spread awareness about the circular economy and address myths and misperceptions about how to finance it, the impact on the policy environment, and the value proposition that circularity represents to companies and cities.

If the CE advocates are correct, the payoff from widespread integration of circular principles is a better economy, one that produces fairer, environmentally preferable outcomes while generating profits and conserving resources across the globe. Industry buy-in is crucial, with manufacturing playing a lead role.

I attended Circularity 19 with an open mind and a desire to find out which elements of circular thinking make sense for electrical products and systems—and which do not. It’s not a simple determination, given the enormous diversity of our industry and the somewhat revolutionary vision of CE advocates. Simply put, NEMA Member companies will embrace circularity if it provides a competitive edge, increases their bottom line, and requires no compromise to product safety and performance. They will also do so if regulation forces the issue, but it’s always preferable for industry to find its own innovative path in response to societal trends and priorities.

First, there is ample evidence that markets will reward companies that openly emphasize circularity in their business model and investment strategy. It likely will involve a staged process guided by nontraditional notions about the nature of products and relationships with customers, but the potential returns could be substantial.

Second, it's vital that companies identify where circularity makes the most sense in their product scope and concentrate efforts there. Remanufacturing, for example, was touted at the conference as an extraordinarily high-return venture but is not a viable option for many products. Perhaps the value proposition lies instead in circular supply chains or seeking out next-generation packaging materials.

Truly circular thinking is rapidly expanding the boundaries of what it means to be sustainable. "Cradle to grave" thinking, for instance, has been displaced by "cradle to cradle," and designers are now advised to design products for their initial use and future uses, as opposed to end of life.

Finally, I'm convinced that large-scale integration of circular principles will require a major "system shift" in some companies, and change like this can be driven only from the top. A rising tide of talented young engineers, designers, planners, MBAs, and "corporate strategists" is ready to provide the brainpower and enthusiasm, but the fundamental transformation they seek must be blessed and promoted by the C-suite. If that happens, circularity may very well move beyond incremental tweaks to a revolution that upends products, services, and systems of commerce.

NEMA Members who attend the 2019 Annual Meeting in Naples, Florida, are encouraged to participate in the Circular Economy Workshop on Wednesday, Nov. 6. NEMA staff and outside experts will present the findings of the ongoing Strategic Initiative and discuss the implications of circularity for the electro-product industry.

To register, go to www.nema.org/AnnualMeeting. 📍

Mark Kohorst, Director, Environment, Health, and Safety, NEMA



Field Rep Gives NFPA Talk

NEMA Field Representative Bryan Holland speaks at the National Fire Protection Association's 2019 Conference & Expo in San Antonio, where he gave a presentation on NEMA GD 1-2016 Evaluating Water-Damaged Electrical Equipment to about 300 attendees. 📍

Griffith Appointed to IEC CMC



NEMA Industry Director Steve Griffith was recently appointed as a U.S. Member of the IEC Certification Management Committee Working Group 31 "Cyber Security" and Working Group 32 "Functional Safety" for the IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components.

Working Group 31 focuses on developing a unique approach for conformity assessment to the IEC 62443 series of international Standards while Working Group 32 defines market-relevant solutions and services related to functional safety in the IEC Certification Body Scheme. The IEC Certification Body Scheme is a multilateral agreement to allow international certification of electrical and electronic products so that a single certification allows worldwide market access. As NEMA Member companies sell their products and systems worldwide, a single certification program is extremely advantageous to maintaining market relevance. More information on the IEC System of Conformity Assessment Schemes can be found at www.iecee.org. 📍


Muhammad Ali Earns Top SES Award



The Society for Standards Professionals (SES) presented its Emerging Professional Award to Muhammad Ali, AStd, Technical Program Manager for the NEMA Building Infrastructure Division. SES honored Ali for his distinguished contributions to the Standards profession and for demonstrating leadership qualities among colleagues in the field.

“This is a much-deserved award for Ali, recognizing the hard work and dedication he has put forth to advance Standards on behalf of NEMA Members and to promote the Standards development community generally,” said NEMA Vice President of Operations and Strategy Patrick Hughes. “We are all proud of Ali for accomplishing so much already, and we look forward to his future accomplishments in what promises to be a very productive and meaningful career as a Standards professional.”

Ali led the NEMA IoTNOW Strategic Initiative to educate NEMA Members on emerging trends that will help electrical manufacturers in their transition into the era of digitization and electrification. He is currently co-leading a Strategic Initiative to modernize and accelerate the development process for NEMA Standards and other technical documents. Ali also coordinates an initiative to maintain the Association’s status as a world-leading Standards developing organization by training and credentialing all NEMA technical staff.

Ali is a 2018 recipient of the American National Standards Institute Next Generation Award. Ali manages the technical work of the Conduit Fittings, Cable Ties, Outlet and Switch Box, Polymer Raceway Products, Enclosures, Surge Protective Devices, Fuse, and Steel Conduit and Electrical Metallic Tubing Sections. He is the International Electrotechnical Commission (IEC) Secretary of IEC SC 37A, Surge Protective Devices, and IEC SC 37B, Surge Protective Components, and actively participates in U.S. National Committee activities. Ali is currently serving on the SES Board and is an active participant in several SES initiatives. 



Above: John Caskey, Former NEMA VP of operations, presents Mark Gliebe with the EIC Golden Omega Award for his contributions to the electroindustry.

Gliebe Honored

For 60 years, NEMA and the IEEE Electrical Insulation Conference have celebrated people who have contributed significantly to the field of science and technology. This year, NEMA had the honor of presenting the Golden Omega Award to NEMA Board of Governors Chair Mark Gliebe.

Gliebe has spent nearly 20 years in the motor industry. During this time, Gliebe, as CEO of Regal Beloit, has helped usher in the future of motor-driven systems, including motors with integrated drives for air conditioning, pumps, and many other applications. These motors use the latest technologies for significantly improved power densities and improved form factors, allowing their clients to continue to innovate and bring new performance features to customers.

For a list of previous NEMA Member award winners, visit ieeedeis.org/about/awards. 



How Smart Technology Is Transforming the Industrial World

Whether you call it Industry 4.0, the Industrial Internet of Things (IIoT), or Smart Manufacturing, the power of technology is being felt throughout the industrial world and fundamentally changing value chains and production methods. Indeed, so great is the change that Capgemini's Digital Transformation Institute predicts that smart factories could add as much as \$1.5 trillion to the overall output of the industrial sector in the next five years. This is because of the turbo-charge effect of smart technology, which is enabling factories to produce more while lowering costs. According to Capgemini, some industries may almost double their operating profit and margin.

The National Institute of Standards and Technology (NIST) defines this new landscape as “fully-integrated, collaborative manufacturing systems that respond in real time to meet changing demands and conditions in the factory, in the supply network, and in customer needs.” Converged and connected is another way of saying integrated and collaborative. This is where manufacturing benefits from a multiplier effect as operating and information technologies achieve strength in combination and improve efficiency at all levels.

Manufacturing systems are harnessing the full array of new and emerging technologies. The internet is the foundation, linking equipment, sensors,



Simone Gianotti,
Business
Development
Manager,
EcoStruxure
Industry,
Schneider Electric



analytical tools, and people in ever more intricate and resourceful ways. Big data, robotics, machine learning, artificial intelligence, augmented reality, 3D printing, predictive analytics: all these things and more are now converging. And with the heightened level of control and oversight that they bring, we can now build a “digital twin” of an entire manufacturing system, and so optimize business performance by creating a real-time profile of a physical object or process.

The one certainty about smart technology is that it will continue to evolve. We are already talking about Industry 5.0, which will focus on the human element. If Industry 4.0 is about machine and system interconnectivity, Industry 5.0 will see human and machine roles blend and become mutually reinforcing and complementary. This will involve so-called cobots (collaborative robots) working alongside their human counterparts to create combined strengths.

Although machine learning and artificial intelligence are driving smart manufacturing, human input is still essential. While new technologies possess great autonomy, humans must provide direction and control—and apart from overseeing technology, they

Practical Tips for Modernizing into a Smart Factory

Experiment, Test, and Grow

Don't look at modernization as a huge undertaking. Break it into smaller steps addressing one piece of the facility at a time. Start by connecting one machine, then monitor the productivity and really look at the process insights that you gain from that connectivity. Now, connect another piece and grow from there. In our facility, we did exactly that, investing in a new connected technology and testing it to ensure functionality and that it met our business need and that we gained the real business benefits from that investment. Only then, after we achieved that, did we move to modernizing the next process.


Move Fast in Rough Design

Be agile in your design and move fast—there will be plenty of time for Standards and for nailing down the structure. Build a rough design of what you are looking to do, then test it. In Lexington, we passed a few RFID tags through the AVEVA Insight platform in about a day, reading data directly from our programmable logic controllers. We shared that with a few of the managers and executives around the plant and it immediately sparked ideas on how the plant could benefit from the new technology. Now, with their enthusiasm and buy-in, we were able to build our system.

Don't Underestimate Cybersecurity

New technologies will allow you to connect with your operation from anywhere in the plant or from your couch at home. This is a great opportunity to stay connected, be alerted to any potential issues, and take action before they become a problem. That connectivity must be paired with cybersecurity to ensure the safety of your communications and your overall operation. Find a partner that takes cybersecurity seriously—one that understands certifications, encryption, and the steps needed to securely send data back and forth to a machine.

Don't Take Device Acceptance for Granted

Implement modern tools, but understand that, for some tools and some employees, special training is going to be needed. I am of the age now where I can say that! I am older than some on my staff, and I can see how younger colleagues take to these tools more easily than I do. I know that you need to be persistent and relentless in support of your workforce adopting mobile devices. You don't go to an employee who has been doing the job for 20 years, hand them a tablet, and walk away. Their training on that new device/platform is critical to their success. 

Zach Tinkler, U.S. Key Accounts Channel Manager, Schneider Electric



are needed to gather, compare, analyze, and apply data. Technology has a pervasive and growing role, but the key message is that smart factories are empowering the human workforce, not replacing it.

Another important development is the arrival of 5G. It will bring faster downloads and faster responses from applications as a result of lower latency. Sensors will become even more widespread and responsive, and businesses will be able to react to information in real time. A consortium in the UK is now testing 5G technology to assess how it can make smart factories even smarter. Among the possible applications are preventive maintenance and controlling machines remotely.

With Industry 4.0 already here, and Industry 5.0 on the way, it is clear that manufacturers who want to remain competitive must embrace the latest digital technologies. 📡

Despite the proliferation of globalization over the past two decades, one category of products has remained strong: industrial control panels.

With more than 10,000 manufacturers in North America, industrial control panel shops constitute a major force of manufacturing. They are enablers of innovation.

NEMA is seeking manufacturers of industrial control panels to develop a NEMA Council to identify and address the specific needs of smaller, locally owned manufacturers. Please contact Kirk.Anderson@nema.org if you are interested in participating or learning more. 📧

Individualized Production Needs an Automation Solution

Dirk Schulz
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Research, Ladenburg,
Germany
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From automotive to commodity goods, mass customization has become state of the art in discrete manufacturing. In Industry 4.0 (the current trend of automation and data exchange in manufacturing technologies), one of the drivers of mass customization is to manufacture highly customized consumer goods in small batch sizes while also cutting costs. We're literally down to "lot size one."

There are two main challenges to making a perfectly customized product: to contain costs, the production system must self-configure for any individual product design without the need for human involvement; and, as virtually no spares are produced, any single product must be of perfect quality.

However, when designing the corresponding production line, it may turn out that established integration concepts will not provide the flexibility or quality control needed for this endeavor. Instead, manufacturers can achieve that goal using concepts from Industry 4.0 such as the digital twin and machine-to-machine (M2M) protocols such as OPC Unified Architecture, a leading Standard across systems in automation and security technology.



Dirk Schulz

Quality and Perfection in Every Step

Numerous innovations are possible in the context of Industry 4.0, such as autonomous machines that negotiate production schedules with each other, or smart products that steer themselves through the production process. The first challenge, then, is to decide which concepts are useful for a particular production environment.

Considering the design freedom the consumer has, every control element is potentially a unique product. Quality becomes both a top priority and a top challenge because a quality issue requires the complete item to be manufactured again and thus might delay the entire customer order.



Lars Simora

Today, lack of digitalization is a main contributory factor to quality issues: material is procured and transported manually, guided by order data on paper slips. Mix-ups happen but are hard to detect. While design data are available in digital form, they are manually transmitted to the machines on removable media. Should quality inspection of the finished product reveal any flaws, auditors can't review quality-relevant data such as calibration settings because the machine didn't capture that data.

In individualized production, it is imperative to detect flaws in the product as early as possible. Even better, avoid flaws altogether. Individualized production must be highly adaptive and resilient. Human operators and machines need to collaborate seamlessly to close the quality loop.

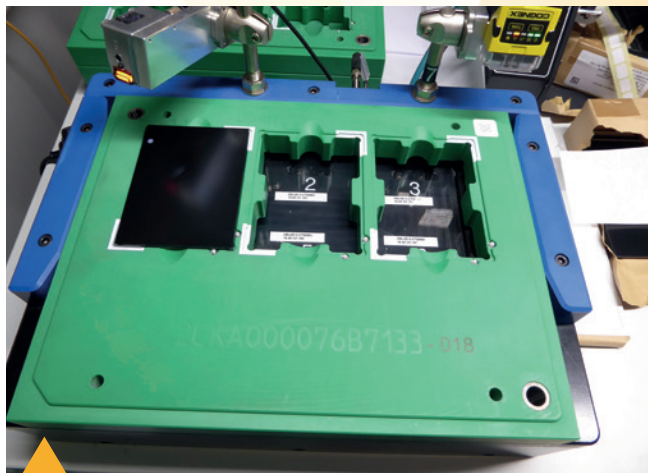
Complete Digitalization Using Digital Twins

Individualized production has two key enablers: adaptive material transformation within machines and digital interoperability between machines. While material technologies like NIR lasers or digital printers already exist, machines still need to be taught how to work together naturally to achieve efficiency and quality.

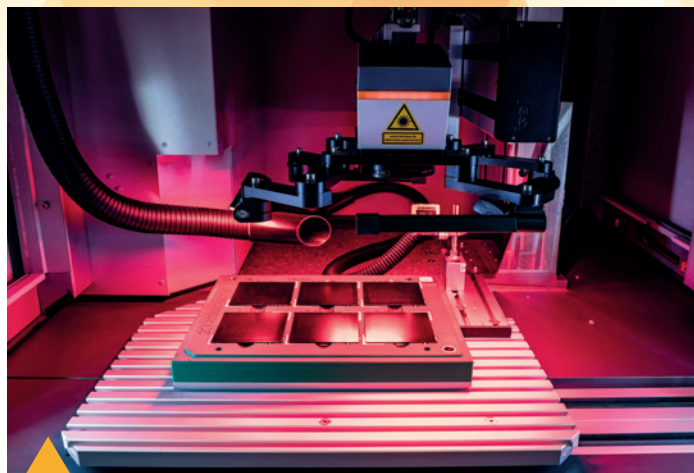
Today, machines are hardwired or coupled through Programmable Logic Controller software. While this arrangement achieves a tight integration, it comes at a significant effort and does not yield much flexibility for new product variants except for the originally designed product. For truly adaptive production, achieve machine integration with a much looser coupling so the entire line can be flexibly reconfigured with minimal effort.

This is achieved by providing digital twins that represent the specific skills of each machine in a common format on the network, independent of any wired or programmed connection. To avoid "media breaks," represent product design and order and quality data in the same manner. By orchestrating the machine digital twins based on the ordered product design, any reconfiguration in software seamlessly translates to production steps in the physical world, and quality information is mirrored back into the software domain.

Digital Twin: Production Steps for the ABB-tacteo KNX Sensor



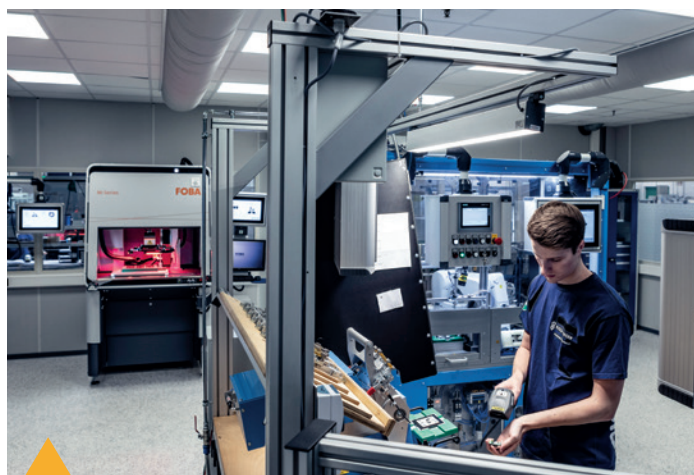
1 Glass panels in tray



2 Laser processing



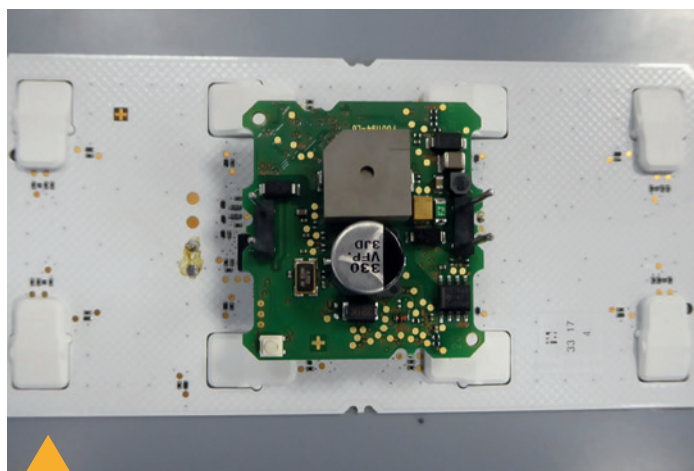
3 Trays in drying rack



4 Manual electronics assembly



5 Mounting the electronics onto the panel



6 Glass with electronics mounted



Part of the production line for the ABB-tacteo KNX control element for smart buildings. Established production line concepts struggle with small lots sizes. However, Industry 4.0 concepts such as the digital twin and M2M protocols allow complete flexibility right down to a lot size of one. All photo courtesy of ABB.

We'll use a capacitive control element for intelligent building automation in high-end luxury hotels, offices, and public and residential buildings as an example of how this works.

The number of functions provided by the control element is variable and determined by the customer's specific needs and wishes. Individually configured according to the customer's desire with an easy-to-use online configurator, each sensor is unique in design and function.

This means that the consumer is given direct control over the design of the end product, while the wholesalers take care of distribution and the expert installers integrate building automation products according to the consumers' needs, as is always done in a traditional network

Back at the factory, using the digital twin concept, the control element passes each production station as follows: Upon arrival, the glass is scanned and its identity is used to get the approval, design data, and process parameters for the next production step. To this end, the machine contacts an orchestration service that automatically replicates the product recipe from the enterprise resource planning (ERP) software and holds the production history of the particular glass.

Once the glass has been processed, this is reported back to the orchestration service along with machine data used for quality tracking. The glass now departs for the next station as indicated by operations management and as shown on the human-machine interface to direct the worker. For normal operating steps, station operators interact with the machine using a standardized automation panel. Manual steps, such as material transport, are electronically guided and supervised.

For example, if a glass is inserted into the printer before it has been lasered, it is rejected, and the human operator is instructed to take it to the laser station instead. If glasses are transported from the laser to the printer out of order, the printer still is guaranteed to receive the correct data matching the lasered icons on the glass. Before leaving the printer, the current calibration data are captured for the particular glass. The same holds true when calibrating the icon brightness on the product itself during automated testing. In this manner, a quality issue with the product can be traced to the potential root causes such as problems with the machines or suboptimal process parameters. Above all, quality issues are raised right when they occur. Any flawed product is automatically removed, and production of the corresponding design is restarted.

Machines and their digital twins are derived from a common design template, which helps support how human operators, machines and services work on them. Machines following this template are also easier to add or replace because they naturally plug into the existing production system.

In this production concept, the control element qualifies as a smart product: The identity of each glass actively drives its own production, and the outlined process steps allow the quality loop to be closed based on the global product memory.

Designing the Digital Twins

The production process described depends on a mix of very different data: some relate to the product design, some to the manufactured product, some to a specific machine—and some describe information common to all products or machines. For example, for each product design, there are machine-independent characteristics such as the layout of the control icons; there are generic machine properties such as the current operating state; and there are properties like the printer calibration data, which are machine-specific but do not depend on the product. Product design is translated into machine-specific artifacts like rasterized icons, and there are test results for each manufactured product.

To create these digital twins, the best practice was to first create a top-down Open Platform Communications Unified Architecture (OPC UA) information model from the perspective of the overall production steps. Only in the next step were the model split and parts allocated to the individual machines and software services. To upgrade existing machines with this model, the best method was to wrap them using an embedded OPC UA gateway. To this end, close collaboration between information designers, the integrator, and the various machine builders were required to ensure the real machines could simply be plugged together in the factory to form the desired production system.

Industry 4.0 for All

Designing a production line provided firsthand insight into the needs of machine builders and production designers on the road to Industry 4.0. Particularly for individualized production, perfect quality control and automated reconfiguration are key challenges to be addressed by an automation solution. These challenges can be met based on Industry 4.0 concepts such as digital twins, smart products, and M2M technologies like OPC UA.

While today, individualized production requires a significant upfront investment, future solutions must be covered by established annual investment budgets to be broadly competitive.

To this end, specialist machines need to be taught how to work together out of the box. This requires automation vendors to supply processes, tools, and Standards that make it easy for production designers, machine builders, and integrators to build their digital twins independently and then run virtual integration testing before physical machines are built and commissioned in the factory. Currently, premium products are welcome catalysts to drive this type of innovation. The vision, however, is to offer Industry 4.0 not as a premium product but as an off-the-shelf solution that can be applied to any type of production, from large factories to small and medium-sized enterprises. @



Practice Good Cyber Hygiene Habits

Steve Griffith,
PMP, Industry
Director, NEMA

The Internet of Things (IoT) is growing rapidly. By 2020 there will be nearly 30 billion IoT devices around the world.¹ The proliferation of these devices could pose a threat to the internet at large if companies have not taken appropriate cybersecurity measures to protect these devices. NEMA Members that manufacture connected products take their role in strengthening the cybersecurity of the products they manufacture very seriously. They are using industry best practices to secure their supply chains, secure their operations, and secure their products, minimizing cybersecurity threats along the way.

In 2018 NEMA published its first *Cyber Hygiene Best Practices* document that identifies a set of industry best practices and guidelines for electrical equipment and medical imaging manufacturers to raise their level of cybersecurity sophistication in their manufacturing facilities and engineering processes.

However, addressing cybersecurity risks is a shared responsibility between the manufacturer and their customer.

Recognizing this, the association's second *Cyber Hygiene Best Practices* document identifies industry best practices and guidelines that electrical equipment and medical imaging manufacturers may consider when providing cybersecurity information to their customers. These practices and guidelines are meant to help customers effectively manage their cybersecurity expectations as they use the equipment within the context of their respective markets (e.g., commercial and residential buildings, industrial equipment, the electrical grid, hospitals, and surface transportation). The document also provides suggestions for how customers can work with their respective manufacturers to improve the customer's level of cybersecurity through industry best practices and guidelines. The cyber hygiene guidelines described in this document focus on people, processes, and products.

This document addresses raising a customer's level of cybersecurity by following seven fundamental principles:

1. segmenting networks
2. understanding data types and flows
3. monitoring devices and systems
4. user management
5. hardening devices
6. updating devices
7. providing a recovery plan/escalation process

Example Recommendations—User Management

One typical way that IoT devices have been compromised is through default passwords that customers often do not change and frequently aren't even aware of. Default passwords are typically used to perform initial commissioning of the device because known defaults simplify the process. The document recommends that manufacturers require default passwords be changed before the device becomes capable of communicating operationally. Password complexity requirements vary by industry. Manufacturers are encouraged to prevent the user from using weak passwords.

Typically, a device will have one or more locally stored accounts and/or passwords to perform various functions when central remote user authentication and authorization are not available or enabled. Inevitably, passwords for local authentication will

be lost or forgotten. The NEMA document describes the following best practices for the recovery of such a device:

1. Whenever possible, centrally authenticate a user as a privileged security administrator of the device. Also, permit the privileged user to reset local account passwords to a new value.
2. When central authentication is not possible, manufacturers should provide some mechanism that is not network based—for example, a reset button or special power-on sequence—to reset a device to its default configuration and/or password, thereby allowing customers to restore access to the device. These reset mechanisms should be documented clearly so that customers understand the operational state of the device prior to, during, and after the reset process.
 - a. The user should be required to change the default password as part of the password reset process in much the same way as is required for initial commissioning of the device.
 - b. When a device is reset, it should communicate the reset operation to a logging service or system.
 - c. Safe operation of the device should continue while the user is resetting the password.
 - d. The system should delete any sensitive customer information stored in the device after a password reset has occurred.
 - e. Manufacturers should provide a means to back up a device's configuration and settings and enable the restoration of the configuration and settings after a password reset has occurred in order to bring a device back into a fully operational state with minimal downtime.

Combined with the first NEMA *Cyber Hygiene* document and *Supply Chain Best Practices* document, this suite of industry guidance documents portrays the important role that NEMA and its Member companies play with respect to mitigating IoT cybersecurity risks. These documents will continue to evolve and adapt in the ever-changing cybersecurity landscape. ☞

1. Statista, "Internet of Things (IoT) connected devices installed base worldwide from 2015 to 2025 (in billions)," November 2016. <https://www.statista.com/statistics/471264/iot-number-of-connected-devices-worldwide>

RoHS Exemptions: Buying Time for Innovation

Manufacturers compete. Manufacturers innovate. And, generally speaking, manufacturers are constrained in these efforts by Standards, rules, and regulations.

The enactment in 2005 of the European Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (the RoHS Directive) was a watershed event in terms of one particular area of conformance—that of eco-design.

Accounting for the environmental impacts of materials, resources, and end-of-life scenarios at the front end of product design was not a new concept. But, under RoHS, manufacturers throughout the electro-product sector suddenly faced specific, enforceable limits on substances embodied deep within the components or embedded within surface areas of complex products. Meeting these limits became an “entry ticket” for manufacturers supplying products to the vast, multinational European market.

But what if the substance restricted by RoHS was critical to the safety and performance of the product? What if no substitute material existed that was deemed less hazardous and could meet the required technical specifications?

The remedy for this dilemma is provided by the RoHS exemption process, which allows the substance thresholds to be exceeded for distinct applications cited by the European Union administrative authorities. Lead content, for example, may exceed the RoHS threshold level of 0.1 percent (measured in so-called “homogeneous material”) in “high melting temperature type solders” contained in all products in the scope of the Directive, while mercury levels above the limit are allowed for various energy-efficient lighting products.

Exemptions from RoHS thresholds are temporary and many that were granted when the original RoHS Directive came into force have long since expired. The process allows for renewal, however, and stakeholders can petition for new exemptions to accommodate product changes and

technological advances. The guidelines on how to apply, as well as the criteria that must be satisfied to earn and retain exemptions, are spelled out in the 2011 RoHS “Recast,” which modified and expanded the original Directive.

The current list of RoHS exemptions contains almost 400 entries, segregated along the product categories defined in the Directive. Those that haven’t expired are subject to renewal if stakeholders apply *within 18 months of the designated expiry date*. Thus, an exemption declared to be in effect until July 20, 2021, will be gone forever unless EU authorities receive an application to renew it before January 20, 2020.

Once that happens, the exemption remains active while European officials (and their contractors) conduct a thorough review, solicit public input, make their determination, and issue an official decision.

As NEMA and other industry stakeholders have learned, the RoHS exemption process takes years and involves a complicated, uphill battle for manufacturers. The fact is that European policymakers are predisposed *against* exceptions to their framework for limiting hazardous chemicals in electro-products. They incorporated rigorous, highly technical criteria for justifying exemptions in the Directive that, while difficult to overcome, also provide continual motivation for manufacturers to innovate and pursue environmentally friendly solutions.

NEMA is currently assisting Members from various product Sections in seeking to renew an exemption to the RoHS threshold for cadmium in electrical contacts, used for switching off electrical current. Similar efforts are underway for other exemptions, which ultimately will disappear unless stakeholders can devise a persuasive, scientifically-based argument for keeping them in place.

Members seeking information on the RoHS exemption process or the status of a particular exemption can contact Mark Kohorst of NEMA Government Relations at Mar_Kohorst@nema.org. ☎

Highlights to the Changes in the 2020 NEC

The *National Electrical Code*® is revised every three years and the newest edition, the 2020 NEC, is scheduled to be published in September. The 2020 NEC will reflect the latest advances in electrical safety for both the public and electrical workers, as well as new technologies in the electroindustry.

NEMA and its Member companies are an integral part of this code development process. There are 18 Code-Making Panels (CMPs) that develop the NEC, and stakeholders from throughout the electrical industry participate in these panels. NEMA has representation on each of the 18 CMPs. The NEMA Codes and Standards Committee appoints Members representing NEMA on CMPs. They bring a unique level of subject matter expertise to the process, ensuring that the code addresses safe installation of electrical products and new technologies.

Many factors drive changes to the NEC, including new technologies (e.g., LED lighting, Power over Ethernet, alternative energy, energy storage), energy codes and efficiency, improved code usability, electrical worker safety, and—most importantly—increased safety for the general public.

There were 3,730 proposals (Public Inputs) for the 2020 NEC cycle, so it is impossible to cover all the changes in one short article. But here are highlights of some of the most significant changes in the 2020 NEC edition:

- There are four new Articles: 242—Overvoltage Protection; 311—Medium Voltage Conductors and Cable; 337—Type P Cable; and 800—General Requirements for Communications Systems.
- Expanded requirements for ground-fault circuit interrupter protection in dwelling units for some 250-volt circuits.
- Reduction in lighting load calculation requirements, mainly due to the widespread use of LED lighting, which uses far less power than older lighting technologies such as fluorescent and incandescent.
- Recognition of and rules for the use of Power over Ethernet in cables that previously transmitted only data and not power.

- Surge protection requirements for dwelling unit electrical services to protect against damage to sensitive life safety equipment such as smoke alarms.

- Changes to electrical service disconnect rules, such as requiring a single main disconnect in some circumstances (up to six were previously allowed) and requiring an emergency disconnect on the exterior of one- and two-family dwellings. These new requirements will increase safety for electrical workers and first responders. This will affect the manufacture of electrical service equipment.
- Continued revision to requirements governing solar photovoltaics and energy storage systems to reflect changing technology.

The NEC is the most widely used code in the world, and NEMA plays a significant role in its development. Our Members' input has once again proven to make a vital difference in the newest edition of the NEC. 🇺🇸



Medical Device Servicing Requires Oversight



Medical imaging devices allow healthcare providers to observe and analyze the anatomy and physiological functioning of patients without invasive surgery. MITA Member companies are responsible for the innovation, original design, manufacture, packaging, labeling, assembling, and upgrading of medical devices. Original equipment manufacturers also often provide servicing activities for installed devices—both their own and those initially manufactured by other companies.

Medical imaging device manufacturers are all heavily regulated by the U.S. Food and Drug Administration (FDA). The FDA has established strict pre- and post-market requirements for medical devices, including registration with the FDA, pre-market review of new devices by the agency, reporting of adverse events, and maintenance of a quality management system.

Non-manufacturer entities—such as independent servicing organizations—have no FDA oversight and do not have to follow FDA regulations. Currently, only servicing activities performed by medical device manufacturers are held to any quality, safety, or regulatory requirements by the FDA. This is an important problem because the performance of servicing activities within a quality system by properly trained personnel using qualified, properly sourced parts reduces the risk

of harm to the patient, healthcare provider, and device operator and reduces the risk of a device performing poorly.

Whether or not the manufacturer is also the entity that services a device, it has a stake in all service activities for its devices. Improper servicing presents significant concerns to the manufacturer and creates challenges such as:

- difficulties in future manufacturer-provided servicing operations and the potential for significant periods of downtime if poorly performed repairs must be remedied
- lack of required regulatory reporting and incomplete device history does not allow for tracking of significant events, root cause investigation, or prevention of adverse events
- voided existing device certifications (e.g., UL certifications)
- difficulties in providing future field upgrades or field corrections to the device if improper parts have been used or if the device has otherwise been altered
- diminished brand value due to unsafe and ineffective operation of the device
- liability concerns for the manufacturer if the device directly or indirectly injures a patient or operator

Because our Member companies and their service departments regularly encounter these and other challenges, we have raised this issue with the FDA several times over the past few years. In raising this issue, our goal has been to ensure the performance of servicing activities results in the safe and effective operation of medical devices.

Safety, quality, and regulatory controls should not be voluntary. All entities that service a medical device should have appropriate oversight and be held to consistent requirements. ☞

New Edition of Magnet Wire Standard Available



ANSI/NEMA MW 1000-2018, *Magnet Wire*, *Magnet Wire* contains specifications for round, rectangular, and square film-insulated and/or fibrous-covered copper and aluminum magnet wire generally used in the winding of coils for electrical apparatus. It includes definitions, type designations, dimensions, constructions, performance, and test methods for magnet wire.

This revised Standard includes updated specifications, test procedures, and requirements, as well as new definitions of terms to harmonize with UL 1446.

Industries covered in *Magnet Wire* include motors, generators, transformers, and electric vehicles.

ANSI/NEMA MW 1000-2018, *Magnet Wire*, is available for \$278 in hard copy and electronic download.


Other recently published Standards and white papers:

ANSI C136.37-2019 *American National Standard for Solid-State Light Sources Used in Roadway and Area Lighting* is available for \$68 in hard copy and electronic download.

ANSI C81.61-2019 *American National Standard for Electrical Lamp Bases—Specifications for Bases (Caps) for Electric Lamps* is available for \$570 in hard copy and electronic download.

ANSI C81.62-2019 *American National Standard for Electric Lampholders* is available for \$419 in hard copy and electronic download.

NEMA NU 1-2018 *Performance Measurements of Gamma Cameras* is available for \$144 in hard copy and electronic download.

NEMA LSD 81-2019 *Controlled Emergency Lighting, a Technical Clarification Bulletin* is available for no cost in electronic download. 

China's Standards Strategy



As U.S. and Chinese trade officials resumed negotiations in July over tariffs, technology, and protection of intellectual property, the U.S. Commerce Department's Office of Standards and Investment Policy brought to light a paper by a unit of the Standardization Administration of China (SAC) on SAC's engagement in and plans for international standardization. Elements of the strategy include adoption and mutual recognition of Standards with countries participating in Beijing's Belt and Road Initiative to build new infrastructure in participating partner countries. Citing successes to date in integration and development of standardization and innovation, including in the area of advanced manufacturing, the paper also calls for international technical exchanges and ascendant Chinese leadership in Standards developing organizations.

China continues to implement a new Standardization Law that establishes a joint government-industry standardization system that defines five levels of Standards: national, industry, local, group, and corporate. ☺

NAFTA 2.0 on Congressional Agenda

As you read this, Congress should be moving forward with approval of legislation to implement the U.S.-Mexico-Canada Agreement (USMCA), negotiated by the Administration with our neighbors and partners in 2018 to modernize the North American Free Trade Agreement (NAFTA). Building on NAFTA, the USMCA contains a series of market access and cost-savings benefits for the U.S. electroindustry. (See page 21 for a related article on USMCA-driven harmonization of energy conservation Standards for electrical products.)

In early summer, NEMA made its long-held position public that Congress should pass USMCA as soon as possible. NEMA Members also received a toolkit to help them understand USMCA and communicate with their elected representatives.

On July 23, NEMA joined more than 600 trade organizations in writing to all Members of Congress urging support. NEMA is meeting with many Capitol Hill offices that represent locations of NEMA Member company facilities and employees.

Following several months of discussions, U.S. Trade Representative Robert Lighthizer and key Members of the House of Representatives may reach compromises in September that will open the door to bipartisan approval of USMCA by October. While Mexico approved USMCA in June, Canada has federal elections in October and is closely watching U.S. developments. Once all three countries have approved USMCA, the agreement could go into force in as few as 60 days. ☺

Energy-Efficiency Regulations to Be Harmonized Under USMCA

As part of the new trade agreement between the United States, Mexico, and Canada, federal agencies will seek to harmonize their energy conservation Standards and test procedures for regulated products. With the goals of increasing energy efficiency and facilitating market access, the three national regulators are to endeavor to harmonize mandatory regulations over the first nine years of the new agreement and promote open and transparent voluntary initiatives.

The United States–Mexico–Canada Agreement (USMCA), signed November 30, 2018, builds on, modernizes, and is meant to replace the North American Free Trade Agreement (NAFTA).

Annex 12-D of Chapter 12 of USMCA commits the governments to seek to harmonize mandatory energy-efficiency Standards and test procedures and to ensure voluntary initiatives, such as the U.S. government’s ENERGY STAR® program, do not create trade barriers.

Specifically, for products that all three countries already regulate for energy conservation, the governments will try to harmonize the test procedures for those products during the first eight years of the USMCA. Similarly, the regulators will seek to harmonize the applicable energy performance Standards within nine years. In addition, when developing or modifying energy performance Standards or test procedures for a product, each regulator must give consideration to Standards and test procedures already in place in the partner countries, including industry Standards.

While encouraging the use of voluntary programs and mechanisms, the agreement specifies such arrangements should be “open, transparent, and designed in a manner that maximizes benefits to consumers and environmental benefits, and avoids the creation of unnecessary barriers to trade.”

Finally, the annex also commits the three countries to facilitate and promote trade and investment in “clean technologies.”

USMCA also contains a separate chapter on environmental issues, including but not limited to cooperation on air quality, litter, and wildlife protection, as well as enforcement of national

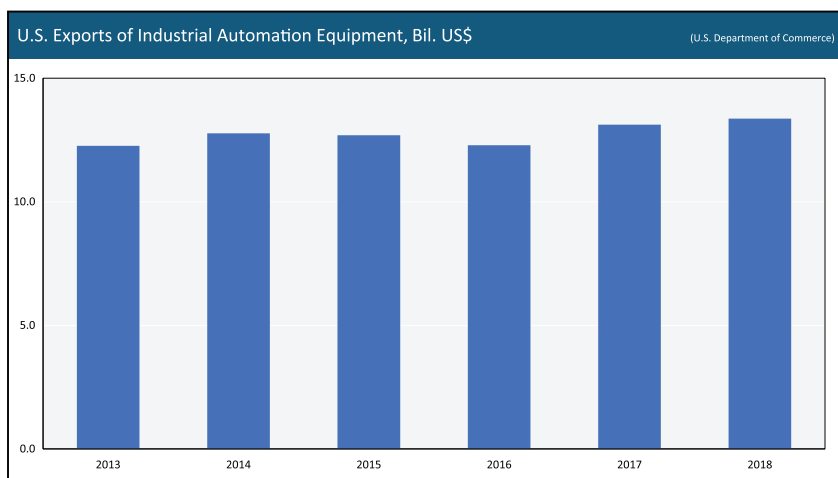
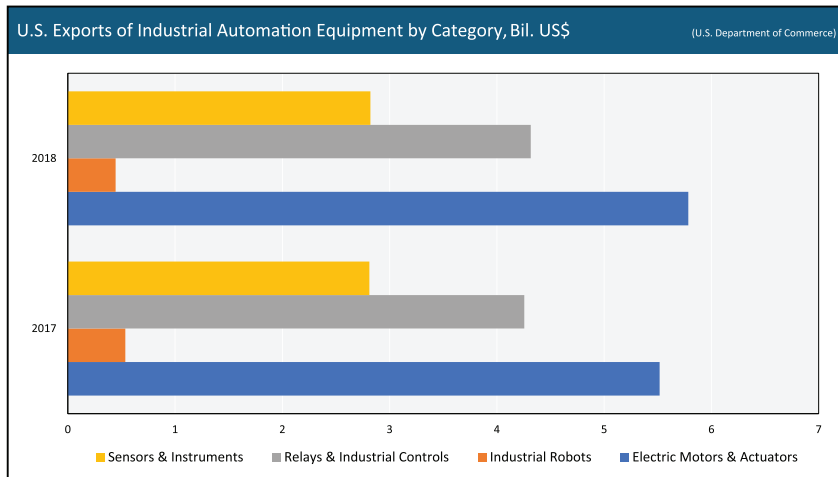


laws. The original NAFTA does not contain any commitments on environmental issues, but in conjunction with the trade agreement the three countries created in 1994 a separate North American Agreement on Environmental Cooperation. In contrast, USMCA commitments on environmental protection, contained in Chapter 24, are fully part of the trade agreement and enforceable.

Mexico’s Congress ratified USMCA on June 19. The U.S. Congress and the Canadian Parliament are expected to act on USMCA legislation as early as September. When USMCA enters into force, Mexico’s Economy Secretary will be responsible for implementation, in coordination with partner federal agencies including the National Commission for the Efficient Use of Energy (CONUEE).

In the meantime, NEMA Mexico is participating in the development of mandatory energy-efficiency regulations under development in several CONUEE technical working groups, including for electric motors and lighting products, in order to promote harmonization with U.S. and NEMA specifications. ☎

Industrial Automation Equipment Manufacturers May Benefit from Global Trade Dispute



The United States is among the top global suppliers of industrial automation equipment, with nearly \$13.4 billion worth of exported equipment in 2018. In 2016, the United States was the third-largest global exporter of such equipment after China and Germany, according to the U.S. International Trade Administration (ITA).

The U.S. ITA defines industrial automation equipment as “the hardware and components used to automate factory floors across a wide variety of sectors. This equipment provides manufacturers the bedrock for developing efficient and cutting-edge production systems.” Industrial automation can be divided into four main categories: electric motors and actuators, sensors and instruments, electrical relays and industrial controls, and industrial robots.

Exports of this equipment slid in both 2015 and 2016 but have since rebounded, climbing 6.8 percent and 1.8 percent in 2017 and 2018, respectively. The sector with the largest gain was electric motors and actuators, increasing 4.8 percent to \$5.8 billion in 2018.

An industry analyst writing for CNBC¹ suggested that the current trade dispute and tariffs on imports could benefit manufacturers of industrial automation equipment. Tariffs raise the cost of inputs for manufacturers. The analyst suggested that manufacturers, needing to lower the costs of production, will turn to automation.

An article published by *Robo Global*² echoes this sentiment. While China is the largest global supplier of automation equipment, the author noted that China is lagging in the global export market for advanced technologies. Because of this, the article concludes that the U.S. is “poised to fulfill [the] increase in demand.”

The trade dispute and tariffs have disrupted supply chains and squeezed profit margins. The most likely and cost-effective way for manufacturers to combat these adverse factors is through increased automation, with U.S. manufacturers set to be the global supplier. ☺

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1. Brian Gahsman, CNBC, “Robotics, automation will thrive under new trade tariffs,” July 16, 2018

2. Jeremie Capron, *Robo Global*, “In today’s trade war, robotics, automation, and AI may be the only winners,” July 13, 2018

Book-a-Speaker



Kirk Anderson, Industry Director, NEMA Industrial Products & Systems Division, will give the keynote address Sept. 17 on changes to the U.S. Department of Energy process rule and how this could be a model for other economies to use as a template at EEMODS 2019 in Tokyo. Learn more at eemods19.org.



NEMA Field Representative **Bryan Holland** will participate in a panel discussion about 2020 NEC changes on October 7 in Chattanooga, Tennessee, at the IAEI Southern Section Meeting. Read more at <https://www.iaei.org/southern>.



Donald R. Leavens, NEMA Vice President and Chief Economist, will give the keynote address at the Coil Winding Insulation and Electrical Manufacturing Exhibition in Chicago on Sept. 17. He will discuss the economic outlook for the electroindustry. For more information, check out www.coilwindingexpo.com. Leavens also will discuss the economic outlook at the Wire and Cable Industry Forum, which is being held at NEMA headquarters in Rosslyn, Virginia, on Sept. 24. Read more at www.nema.org/Events/Wire-and-Cable-Industry-Forum.



Jonathan Stewart, Industry Director, NEMA Utility Products & Systems Division, will talk about California Air Resources Board and SF₆ Emissions Tracking in his keynote speech at the IEEE PES Switchgear Committee Fall Meeting in San Diego on October 8. Details are at <http://www.ewh.ieee.org/soc/pes/switchgear>.



Karen Willis, Industry Director, NEMA Lighting Systems Division, will participate in a panel discussion on the changes and challenges in the lighting industry on October 3 at the CEE 2019 Industry Partners Meeting in Fort Worth, Texas. Learn more at http://www.ewh.ieee.org/soc/pes/switchgear/meetings/next_meeting/next_meeting.html

NEMA electroindustry experts are available to speak at your event. Need a speaker? Book a speaker at www.nema.org/book-a-speaker. ei

I Am NEMA...



Cesar Rodriguez

When I first started as a press operator at The Gund Company 14 years ago, I admit that I didn't completely understand the significance of the work that I was doing every day and how the product I was making helped provide electricity and many other things we take for granted every day. After completing my engineering technology degree and learning more about NEMA, I began to realize the importance of my work.

Design and manufacturing engineers around the

world recognize NEMA for the many excellent Standards available to help improve the safety and quality of products produced in North America. At The Gund Company, NEMA-grade industrial thermoset laminates (NEMA LI 1) are a key part of our product line. These materials are manufactured at the company's Milwaukee location, where the engineering, quality, and operations teams ensure that the product meets the performance requirements called out in the NEMA LI 1 Standard.

NEMA-grade laminates are used in electrical equipment ranging from motors and generators to transformers and switchgear throughout the world. These products are used to generate, deliver, and convert electricity into useful everyday things. We are also helping build the electrical equipment of tomorrow by providing engineers the choices they need for designing new technology. Electrical equipment design engineers know that when they use NEMA-grade materials, they are getting quality and consistency in their electrical insulation.

NEMA Standards provide a wide range of products for engineers to choose from when designing modern electrical equipment to be more robust and capable of today's advancing industry requirements. When an engineer requires electrical insulation materials, NEMA has it covered.

As the Process Engineering Technician for The Gund Company, I am proud to know that the products we produce to NEMA Standards have a significant impact on our everyday lives and continue to help advance the electrification of our world as we know it. ☺

Cesar Rodriguez
Process Engineering Technician
The Gund Company, Milwaukee



At NEMA, our primary function is to develop Standards that help manufacturers and their customers readily adopt technologies while assuring safety, efficiency, reliability, and usability and anticipating future technology evolution.

For instance, the Industrial Internet of Things contains many different forms of technology that touch every manufacturer and nearly all of their products. Not only can producers better oversee factory processes, but they can gain valuable insights through data collection and analysis.

According to Accenture, using IIoT technologies, products, and services in industrial settings may add \$14.2 trillion to the global economy by 2030.

Through the Strategic Initiatives program as well as discrete Section work, NEMA promotes IIoT adoption through North American and international technical Standards and best practices. This ranges across smart manufacturing, augmented reality, digital twin, and additive manufacturing to name a few applications.

Just as IIoT allows manufacturers to see and respond to information more quickly, NEMA is rethinking and modernizing how Standards are developed to make the process more agile and responsive to industry trends.

Under the current process, technical experts pool their experiences to identify a consensus approach to determine the need for a Standard. Once a Standard is developed, minor changes are made to fine-tune the specifications over time. Typically only after a significant event is the need to update the Standard apparent. Consequently, the process tends to be reactive and slow-moving.

What if Standards committees regularly looked beyond the immediate product for ideas in adjacent industries? In an IIoT-enabled system, remote sensors gather data which is used to improve an existing manufacturing process. Could Standards committees use other sector Standards as “sensors,” incorporating the learnings from them to make changes to NEMA-relevant Standards more proactively?

Consider the airline industry.

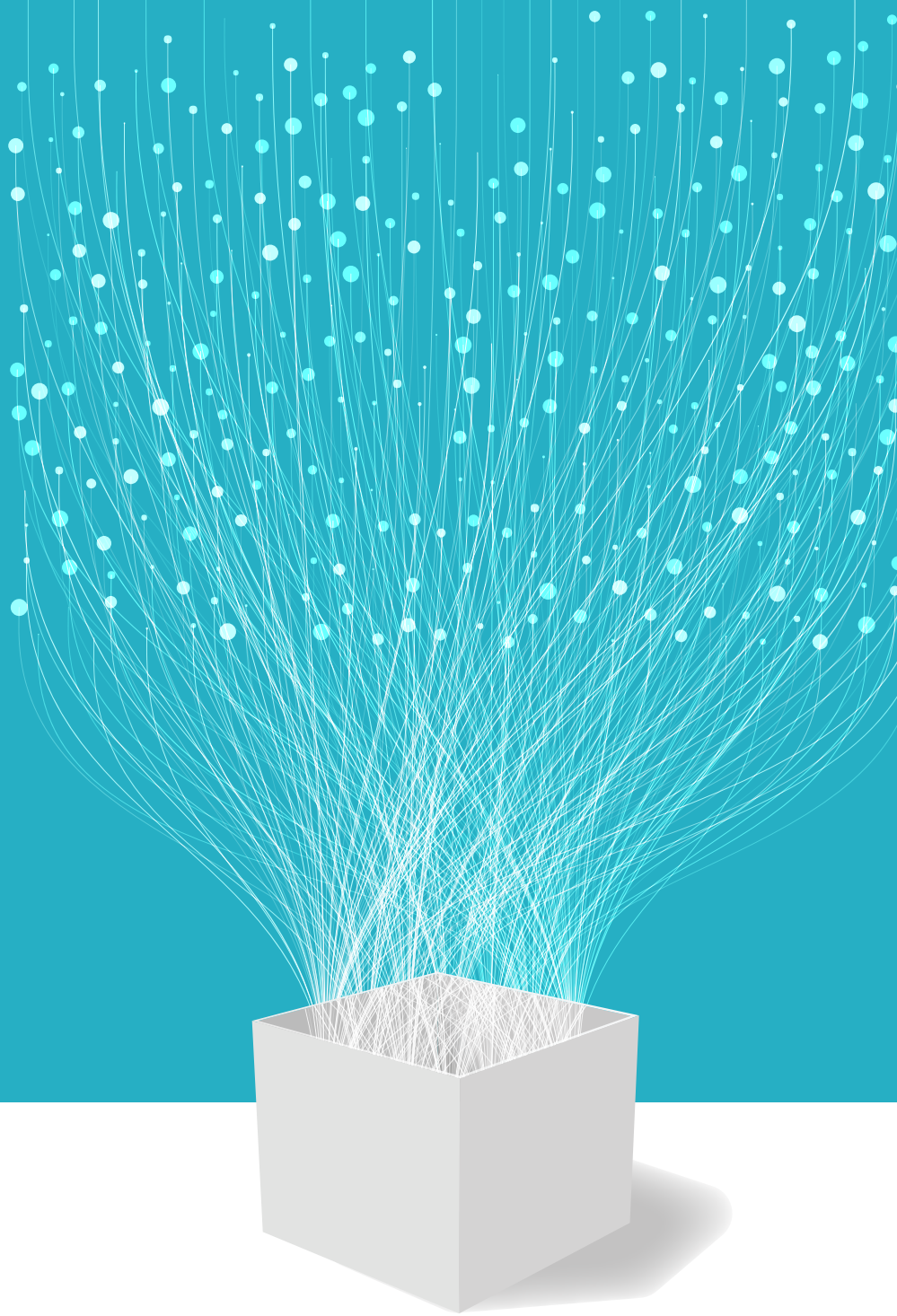
Today, nearly every major plane uses computer-controlled autopilot. Without the benefit of millions of lines of code, a complex array of sensors and other monitoring equipment, these planes would not function at the high degree of safety and efficacy they do.

The airline industry invests significant time and effort to both embrace modern technology and to assure its usability across the widest spectrum of circumstances. Cars move slower than planes, but like aircraft they are increasingly possessed of high degrees of automation. Thus, industry Standards have to be more anticipatory and quicker from conception to delivery. One might ask rhetorically how is a modern manufacturing plant and the products it produces any different? What can NEMA Members learn from the challenges the airline and automobile industries face?

Our companies pride themselves in making products that are safe, reliable, and efficient. As systems become more complicated—not the least owing to becoming more connected—creating Standards in the traditional manner seems no longer to be an option. Just as the Internet of Things has changed our lives—and the Industrial Internet of Things is uprooting traditional manufacturing—Standards development needs to evolve by integrating relevant data from new sources proactively and quickly.

Considering cross-industry learning seems an attractive place to start. ☺

Coming up: The next issue of electroindustry will focus on how manufacturers are facilitating more dynamic systems using essential devices like surge protection, cable trays/ties, conduit, and more.



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2019 NEMA Annual Meeting Securing Our Connected Future

Join NEMA **November 6-7, 2019**, at the Naples Grande Beach Resort hotel in Naples, Florida, for the 2019 Annual Meeting.

This premier electroindustry event brings together U.S. electrical and medical imaging manufacturing C-suite executives and select industry suppliers to network with thought leaders, learn about the latest megatrends, and honor the best and brightest in the industry.

The program lineup will focus on **Securing Our Connected Future** where you'll learn:

- How this new connected and systemized environment in manufacturing will impact the supply chain
- What market drivers manufacturers are following in today's connected environment
- How to legally access and use customer and device data
- What requirements are being imposed on manufacturers by new state-level cybersecurity and data privacy laws
- What new controls on international trade for advanced technologies will affect where and how you do business
- How leading telecom companies and end-users in the utility sector are addressing wireless communication security to enable advanced functionality without sacrificing safety
- What impact monetary policy, investments, productivity, and trade will have on the industry

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Daniel Foster, Distinguished Architect,
IoT Smart Communities and Venues,
Verizon Connected Solutions



Jason Handley, P.E.
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Donald R. Leavens, PhD
Vice President and Chief Economist,
NEMA



Michael G. Morgan
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