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The Millennial Connection

BY MICHAEL BOWNE
Director of technology marketing, PI North America

To succeed with the Internet of Things, it’s important to think like a Millennial—even if you aren’t one.

During a panel discussion at a recent automation industry event, the moderator asked for all of the Millennials in the audience to please stand up. In a room with hundreds of people, about a dozen of us stood up, which meant that Millennials made up less than 5 percent of the crowd. The moderator found this number low, and the usual gloom about the state of the industrial workforce and the Millennial generation ensued.

As a Millennial, I don’t believe the picture is that bleak. Of course, I recognize that “high optimism” is a trait often associated with my generation. So, on behalf of Millennials everywhere, I offer
my generation’s thoughts on workforce development. Yes, “high confidence” is another trait often associated with Millennials.

**Meaningful work**

The moderator at the conference posed this question: “What do Millennials want when it comes to jobs in manufacturing and automation?” The answer is “meaningful work,” which also happens to be the same answer for Baby Boomers and Gen Xers. What’s more important is to understand the three characteristics that constitute meaningful work:

- A link between effort and reward
- Complexity
- Autonomy

Each of these will mean different things even to similar people. And each person will assign varying degrees of value to these characteristics depending on their disposition and situation. However, if you provide any person from any generation these three things, you’ll likely have a happy employee. It’s important to recognize this fact as it relates to Millennials because, though we currently make up just 36 percent of the U.S. workforce, in less than 10 years that number will be 75 percent, according to the Business and Professional Women’s Foundation.
**Effort and reward**

Linking effort to reward can be as simple as a paycheck. For many people, this is often enough. For others, a more important reward is constructive feedback from a superior. For many Millennials, feedback is often the most effective reward. And since Millennials tend to be more task-oriented (getting the job done) vs. time-oriented (putting in the hours), a paycheck alone might not do the trick. Millennials often prefer a bonus that correlates with success.
The Millennial Connection

Complexity
Scaling up the complexity of an employee’s job responsibilities is something many corporate cultures excel at already. What’s different for Millennials is that we tend to be excellent multitaskers. So instead of just increasing the depth of responsibility, the breadth of responsibility can be widened, too. One reason for this is that, as digital natives, we’re very tech-savvy. In fact, 65 percent of Millennials say losing their phone or computer would have a greater negative impact on their lives than losing their car (according to Zipcar) or even their sense of smell (according to McCann Worldgroup).

Autonomy
Autonomy can be difficult to provide in entry-level positions. However, recognizing the need to nurture autonomy—even in entry-level positions—is essential for any company that wants to innovate. Autonomy and innovation are positively correlated, but for different reasons across generations. Baby Boomers are known for their individualistic tendencies, whereas Millennials are more likely to be team players. This means that Millennials tend to express autonomy differently. For example, 29 percent of Millennials think work meetings to decide on a course of action are very efficient, compared with 45 percent of Boomers, according to Iconoculture. For Millennials, teamwork is an attitude, not a job function.
The automation connection

The changes we’re seeing today across the automation industry are a result of the flattening of network architectures. The classic ISA-95 hierarchical pyramid is evolving into a mesh network of connected systems. It is no coincidence this flattening of networks is coinciding with the flattening of corporate hierarchies. The same technology that emboldens an entry-level Millennial to email the CEO also enables a sensor on the factory floor to connect with the corporate office. This flattening, courtesy of the Internet, created the Internet of People and their social networks and underlies the Internet of Things and related production networks.

That’s why, as the automation industry transitions into its next phase, an inquisitive nature is more important than ever—whether it comes from Millennials or not. After all, scrutiny is the seed from which innovation grows. Equally important is openness to change, because innovation is a mindset.
Easier Wireless Data Acquisition

In a smarter and more connected world, the data from your sensors and equipment is collected and analyzed in real-time to automate your operations and make them smarter. However, it can be difficult and expensive, especially when dealing with remote locations or harsh environmental and operating conditions. Fortunately, new communications solutions like Moxa's iLogik 3G00 Series are addressing these challenges by bringing open wireless communication standards to data acquisition technology in a single, ruggedized unit. With options for wired Ethernet, Wi-Fi, 2G GSM, and 3G HSPA connectivity, it's easier than ever to get more connected. Find out more at www.moxa.com.

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Reliable Networks • Sincere Service
More than 40 percent of organizations expect the Internet of Things (IoT) to transform their business or offer significant new revenue or cost-savings opportunities over the next three years, according to industry analyst firm Gartner. Though IoT is still in the early adoption stage, manufacturers have been integrating data from sensors and instrumentation on the shop floor via manufacturing operations management (MOM) systems for many years. This makes it all the more important that manufacturers have a solid understanding of the differences between MOM systems and industrial IoT platforms. Both have their strengths and play a role in delivering key insights to improve real-time performance and operational visibility to enable the smart, connected manufacturing enterprise.
At first glance, robust MOM solutions provide some of the key functionalities associated with IoT platforms. However, most MOM systems fall short on four components: connectivity, cloud, Big Data analytics and application development. And it is these capabilities that define an industry IoT platform, according to research firm LNS Research in its report, “The Impact of the IoT on MOM Solutions” (this research was sponsored by Epicor Software).

Manufacturers have traditionally procured production devices that have then been gradually integrated via controllers and/or MOM systems. As IoT platforms and enabled devices are implemented, however, manufacturers will experience faster integration and application development. Access to all the device’s data and functionality from the IoT platform will allow uses that cannot yet be imagined.

What is vital is that these device functions and information will be available to apps at the IoT platform level rather than just in the plant. Of course, this does not mean that plant controllers and MOM systems will give up control authority, but it will open up a different approach to the functionality that today runs almost exclusively on MOM systems.
The general consensus today is that MOM systems are not going away anytime soon. It is expected that they will continue to act as components of a hybrid traditional/IoT solution. To this end, manufacturers should consider IoT strategies alongside continued MOM investment. This approach allows manufacturers more flexibility, better performance and reduced cost in running their plants. And it is also safe to assume that changes will continue to be made to legacy platforms, leading to ever-increasing agility and integration, thereby providing manufacturers direct access to data to make better and more informed decisions.

“Some typical plant functionality, such as manufacturing intelligence and quality, will be some of the first to move onto the IoT platform as they will then be able to integrate with their enterprise counterparts and provide a far higher level of functionality and business benefit,” LNS Research says. As the need to apply traditional control hierarchies to the flow of non-control-related information erodes, the IoT platform will increasingly provide direct access to information on the shop floor. However, control and other time-critical applications will remain firmly in the plant for the foreseeable future.
This understanding of how MOM and IoT complement one another can benefit manufacturers greatly. Manufacturers that support their MOM solution with an industrial IoT platform will gain a key competitive advantage—improved operational efficiency, productivity and the agility to support current and future manufacturing needs.
Red Lion has been connecting devices and moving data for years, enabling customers to easily advance to the Industrial Internet of Things (IIoT). Our IIoT-ready industrial automation and networking products:

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A Race Car and the Industrial Internet of Things

BY JEFF LUND
Senior director, product line management, Belden’s Industrial IT Division

An industrial facility is like a race car in that hundreds of sensors are generating massive amounts of data. Are you using your data as effectively as a Formula 1 team?

As you watch a Formula 1 car race around a track at speeds of more than 200 mph, have you ever considered who actually makes decisions about things, like when to change a tire or pass another car?

You might assume this falls on the driver, but what you might not realize is that the driver’s pit crew—and a team of engineers located hundreds of miles away—are monitoring the car’s every move by analyzing data from dozens of sensors. With the real-time insights the sensors provide, the support team helps the driver decide on the next pit stop, what adjustments to make, and how to enhance performance at future races. This two-way communication and data
A Race Car and the Industrial Internet of Things

The key thing to remember is that—just like in a Formula 1 race car—data can provide a competitive advantage. But having access to all of that data is only useful if it can be made actionable. The promise of the IIoT is already beginning to allow that.

analysis happens simultaneously to create a competitive edge that can turn a losing car into a winner.

What could you do with your operations if you were to collect and analyze more information than you do today?

In many ways, your factory floor or industrial facility is like a race car. Hundreds of sensors and machines are generating more and more data. If that data is fed to the right decision-makers in an easily digestible way, you can transform your business and operate more efficiently, reliably and safely.

The Industrial Internet of Things (IIoT) enables the connectivity to allow businesses to gather greater insights and make data-driven decisions to achieve better business results. Though we don’t know all the applications that our businesses will build on the IIoT, there are two things we do know for certain: There will be more and more devices connecting to our industrial networks and there will be more and more data crossing the network to feed business applications and provide finer-grained control.

To get a handle on this fast-approaching reality, you need to build an infrastructure that is designed for reliability and growth to handle
A Race Car and the Industrial Internet of Things

The increased data flows, and that can provide end-to-end security to ensure reliable operation and protect against the increased risk of threats that greater interconnectivity brings. The following five steps will help you get the most out of your IIoT initiatives:
A Race Car and the Industrial Internet of Things

1. Start by assessing what you have, where it lives, what it does, who owns and manages it and, ultimately, where you want to be.
2. Migrate and/or update your technology to Ethernet and move away from older legacy fieldbus systems or proprietary technologies.
3. Take a look at your network design and ensure you’re following best practices, such as segmenting into zones and conduits or employing wireless solutions.
4. Protect your network through a layered approach, with security measures built into each level of the network.
5. Establish ongoing monitoring and troubleshooting to keep up as technology and security threats evolve.

As more devices are connected to the network, there will be more interconnectivity with the enterprise side of the business and more users with access to the network. This increase in users, whether they are internal or external partners, means more sources of potential infections. Therefore, it’s critical to address security issues and put measures in place to protect your industrial network.
CONTINUED

A Race Car and the Industrial Internet of Things

Even if you still feel uncertain about IIoT in general, or how technology or security threats might evolve, that doesn’t mean you can’t take steps today to be prepared for the future. A scalable and secure infrastructure is the foundation for enabling you to build whatever network application you might need years down the road.

The key thing to remember is that—just like in a Formula 1 race car—data can provide a competitive advantage. But having access to all of that data is only useful if it can be made actionable. The promise of the IIoT is already beginning to allow that. With an integrated and well-designed network infrastructure in place, teams can make more informed and confident business decisions and obtain greater system control through access to real-time data.

For more information about taking advantage of the IIoT and getting your network infrastructure ready, visit Belden’s online resource center at info.belden.com/iiot.
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Prevent Mistakes With the Industrial Internet of Things

ALICIA BOWERS
Senior product marketing manager, automation software, GE Digital

With fourth-generation HMI/SCADA and the digital thread of information, you can guide operators through the right steps and verify their actions to address workforce training issues and the real threat of mistakes that come with a new generation of employees.

You’ve likely heard the old saying: “Insanity is repeating the same mistakes and expecting different results.” This is very true in the industrial environment, where the same mistakes happen over and over, even though improved quality, efficiency and revenue are real expectations.

A big reason for this is that it’s difficult to prevent operator mistakes with a drastically evolving workforce.
Today, 91 percent of Millennials expect to stay in a job less than three years, according to a survey by Future Workplace. A new job every three years or less makes for a lot of jobs in a lifetime, and a lot of employee turnover and inexperienced workers. This creates a real problem for businesses when we have 65,000 people a day reaching retirement age—a trend that is expected to last 10 years.

So what happens when people change jobs as frequently as Millennials are expected to do? It means constant training, higher risk, errors and waste. How can you meet organizational goals and stay in compliance with regulations when your employees don’t know their jobs? How can you prevent the same costly mistakes from happening over and over again?

The bottom line is that you can prevent many mistakes by using today’s Industrial Internet of Things (IIoT) technology. With fourth-generation HMI/SCADA and the digital thread of information, you can guide operators through the right steps and verify their actions. Real-time data, captured across systems, provides the triggers for execution of electronic standard operating procedures, with instructions sent to mobile workers, at the right time and place.
Prevent Mistakes With the Industrial Internet of Things

The Industrial Internet and decision support
Simply put, IIoT helps to enable our workforce. We can use software to capture critical best practices before our most experienced workers retire and guide new workers through the right steps to do their jobs properly. This is a method that works.

Younger operators, who grew up with electronics, easily interact with dynamic task instructions through intuitive screens. Additionally, GPS technology is powerful in the industrial environment, enabling delivery of the right information to the right operator at the right place. This is a natural extension of electronic devices in our operators’ personal lives and helps them be successful at work.

As for all of those mistakes related to alarms, fourth-generation HMI/SCADA based on IIoT technology takes you beyond alarm acknowledgement to drive the right actions by your team. With a guided and consistent real-time event response, you can reduce troubleshooting time and emergency phone calls. Fourth-generation HMI/SCADA provides decision support to operators, technicians and managers, spanning the full operational team.

Additionally, tracking and reporting on work processes allows you to hone your operations for continuous improvement. You can identify
Prevent Mistakes With the Industrial Internet of Things

and eliminate nuisance events, compare operator performance, and evaluate opportunities across people, equipment and systems.

Operations and maintenance systems

Fourth-generation HMI/SCADA also bridges the gap between operations and maintenance to achieve real-time, condition-based asset performance management.

When an out-of-spec event takes place in the SCADA system, you can trigger a work process to interface with the maintenance system, secure a work order number, send specific instructions—including GIS location information—to an operator and facilitate the corrective action to remediate a problem.

Then you can close out the work order with the maintenance system and record the actions taken for historical records and optimization.

Stop making the same mistakes

With modern technology, we can meet the challenges of our modern workforce. Today’s operators can have the information they need—in their hands or in front of them—letting them know what they need to do and how to do it.
CONTINUED

Prevent Mistakes With the Industrial Internet of Things

It’s time to turn that old quote around to sound much better: “Sanity is repeating the same correct actions and expecting the same results.” That means consistent operations, fewer mistakes, and better business outcomes.
DO MORE WITH YOUR DATA

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Visit us online to learn more about our communications platform that’s enabling the Internet of Things.
Solving the Internet of Things’ Complex Integration Problems

BY DANIEL LIU
Business development manager for embedded computing, Moxa Americas

When it comes to the Industrial Internet of Things, one of the most common stumbling blocks we encounter with our customers is the inability of IT engineers to handle fieldbus protocols and convert them into a database that can be leveraged by an analytics platform.

As computers get smaller and more powerful, engineers have begun exploring the potential of placing computers at the edge of networks, closer to the machinery and equipment being monitored and managed. The theory is that additional computing and data processing at the edge will simplify the integration of industrial equipment data into an Internet of Things (IoT) database.
This approach offers many benefits for the majority of industrial users who are not in a position to replace existing equipment. However, successful execution requires an understanding of the core issues at play. For starters, there are three key integration complexities to address:

1. Differences between fieldbus protocols and IT protocols. The world of computers, IT protocols and databases are all designed around data manipulation and management, and are highly integrated with each other. Fieldbus protocols and the machinery that run on them have completely different purposes and requirements. For a database engineer accustomed to data produced by typical computer applications, it requires a great deal of effort and study to bring data from Modbus, EtherNet/IP and Profinet devices into a common database.

2. Differences between programming languages. The most common programming languages for computer platforms are C/C++, Python, Java, .Net, etc., all of which offer a rich set of tools, software and application programming interfaces to support various database applications and platforms. These programming languages, however, do not have any tools or support for industrial protocols. For the industrial space, IEC 61131-3 is the most common programming language and offers deep integration with industrial
protcols. However, IEC 61131-3 is not designed to integrate with the database platforms used by IT networks and systems.

3. Familiarity with networking technologies used in the IoT and its application in Industrial IoT (IIoT). Most engineers and users are fairly familiar with the networking technologies leveraged in commercial IoT applications, especially wireless. However, the adoption of certain networking and wireless technologies has been limited in the industrial world, partly due to the common perception that wireless networks are inherently unstable.

**Edge computing**

Even when faced with a highly complex integration effort, manufacturers, engineers and users still see vast potential benefits in the Industrial Internet of Things and are looking for ways to resolve complexity.

- Most industrial fieldbus protocols have developed into standard Ethernet-based protocols. A decade ago, it was a given that
Maximize Manufacturing Growth

Manufacturers are under constant pressure to meet demanding timelines with little margin for error. Epicor solutions help you uncover potential production obstacles—as well as new growth opportunities—so you always know how your business stacks up.
equipment communication would be over proprietary, closed fieldbus protocols that required special hardware. Industrial Ethernet has completely changed the landscape, and almost all the modern popular fieldbus protocols are now standard Ethernet-based. That means a computer platform can easily use its Ethernet interface to communicate with most of today's industrial equipment.

- There are many communication equipment providers now catering to the industrial user for communication over different types of media. Edge computing can be used to restructure and store the raw device data into a database-friendly format, and the other pieces of equipment can be used to collect and/or transmit the data as needed.

There is going to be a growing demand for flexible and easy-to-use solutions that are tailor-made for industrial users, rather than commercial products bolted onto industrial equipment. This is one reason we started combining multiple device functions, including 4G LTE connectivity and industrial protocol support, into our edge computing products. This makes it possible for IT engineers to work with the IT programming language and databases that they are most comfortable with to access industrial data, instead of forcing them to work with multiple devices and develop their own protocol.
conversion algorithm. It also reduces the overhead for system integrators and users that are trying to read the industrial protocol data and place it to a computer database.

The illustration accompanying this article shows some of the tools that can be provided on an edge computer to further reduce the complexity of integration for an IIoT system. The idea is to allow engineers to focus their efforts on data analysis and developing applications on the edge computer, instead of also having to develop or acquire additional solutions for 4G connectivity, fieldbus communication, VPN or system diagnosis. The easier you can make it for application developers, the more easily they will be able to deliver the valuable real-time insights that IIoT makes possible.
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Will Artificial Intelligence Give Us the Edge?

BY PHIL MARSHALL
CEO, Hilscher North America

Current applications and research indicate that thinking machines will play a significant role in automation technologies sooner rather than later.

The SPS IPC Drives event—held every November in Nuremberg, Germany—disappointed some attendees this past fall by not showing many steps forward for Industrial Internet of Things (IIoT) technologies. Yes, the marketing noise was loud, but little was actually being delivered. I am proud that Hilscher stood out from the crowd with its new portfolio of IIoT products.

With connectivity being our core business, it was clear to us as we initially approached the IIoT concept that some sort of hardware (e.g., gateways) would be needed. After all, IIoT is just another “gateway” challenge, right? Well, perhaps not! During our market research, we realized that we needed to tackle the entire data
pathway challenge—from sensor to the cloud and beyond—to get users involved.

As a result, our approach is based on three levels of engagement: sensor connectivity, edge gateways and services—the applications that actually do stuff. We think this approach delivers the right starting point for the automation market.

Despite the many advances around IIoT that have been made in the past few years, as well as the increasing number of real-world applications, I still hear objections to IIoT. For example, I often hear that IIoT obsoletes existing network structures and systems. What nonsense! It should be clear by now that, although IIoT requires new thinking, the technologies on which it is based are well-proven. They are also readily available and easy to deploy. Examples include the lightweight MQTT protocol for transmitting data to the cloud. This has been in use for years in other industries and has just been formally standardized under ISO. Plus, there’s OPC UA, which has been around for a decade.
IIoT actually operates in parallel with existing equipment, taking the data it needs from real-time Ethernet or fieldbus networks without affecting normal operations. Special software is needed to configure what data to choose and where to send it, but that is pretty straightforward.

The reality is that there are increasing opportunities to get your feet wet with IIoT, particularly if you are a machine builder. Of course,
you’ll have plenty of questions when you do get started: What does my data mean? How can I use it best? What happens to all that data once it’s been used? Who owns the data? What about its security? All of these questions bring me to the magic of algorithms (those computer routines that dig out meaning from raw data), Industry 4.0 and the concept of cyber-physical systems (CPS), and artificial intelligence (AI).

The current batch of projects demonstrating AI’s potential shows how far we’ve come. IBM’s Deep Blue overcame the world’s best human players at chess some time back. And IBM’s Watson continues to make headlines in all sorts of industries today, even in automation. More recently, Google’s AlphaGo faced the world’s best Go player, and won! Go apparently has more possible moves than the number of atoms in the universe, so it poses a challenge many orders of magnitude greater than chess. AlphaGo uses “deep learning” technology and relies on neural networks for its computational power. It seems to have taught itself to win, although its builders cannot fully explain how it does this.

The use of such cognitive products and services will be at the heart of IIoT. I saw a great example of this first-hand at Hannover Fair 2015, where Hilscher was part of an extended demo based on IBM
Will Artificial Intelligence Give Us the Edge?

Bluemix. In this application, messages such as “OK,” “Warning” and “Error” were sent to a predictive maintenance application in the cloud. Intelligent advice was generated by IBM’s Watson and sent to an operator using services like Text to Speech and Dialog.

We’re still very much in the early days of these technologies, but the odds are good that thinking machines will impact automation sooner rather than later. With IIoT, anything is possible!
The Industrial Internet of Things (IIoT) provides organizations the ability to take advantage of existing equipment investments by retrofitting current machinery with industrial automation and networking devices that support advanced capabilities. Connecting one device or thousands can be seamless with today's technologies, but close attention needs to be paid to security to help avoid costly downtime as critical systems are networked. One of the biggest security hurdles for industrial organizations to overcome is balancing strategy with applicable implementation and management costs.

Security should be implemented in layers, starting with physical security and equipment access and moving on to data protection.
Network Security for the Industrial Internet of Things

Physical security represents an organization’s ability to physically separate equipment from non-authorized users. Fences and enclosures represent easy-to-deploy solutions that help keep sensitive equipment safe from theft or tampering. Whether the device or equipment is on a factory floor or at a remote pumping station, it is important to limit access to sensitive data.

The next layer of securing an IIoT network involves user access to control who has digital access to data at specific locations. Security at this level includes password policies, role-based access control and access control lists (ACLs). Simply requiring a passcode for access to touchscreen operator panels, or passwords on terminals, can significantly reduce compromised data by identifying and logging when and who is accessing equipment. For some applications, role-based access control or an ACL can limit user access to sensitive data based on the credentials provided. For example, a technician might require in-depth system access, while an operator might only require a small subset of permissions to operate equipment.
Network Security for the Industrial Internet of Things

CONTINUED

Controlling who has access to equipment at a site is sometimes the easiest part of securing sensitive data. A larger challenge is how to effectively collect data across tens or thousands of locations securely and reliably without requiring a full-time security or IT team. Securing data for transport between sites can be accomplished in a number of ways, but many pose implementation challenges.

IPsec, port forwarding and open VPN technologies are common ways to provide remote device access. Though familiar to IT, these methods are more complicated to set up and maintain on the operations side of the business. This is why the market needs easy-to-use technologies to securely address mass-deployed sites as part of successful IIoT adoption.

Emerging technologies are changing the paradigm of how organizations approach the implementation and maintenance of security policies. These technologies provide inherently more secure communications while simplifying the process of deployment and management, which can significantly reduce operational costs. Software-defined networking (SDN) is one example of an emerging technology positively impacting security for IIoT applications. SDN enables dynamic routing of encrypted information through secure nodes without the need for a dedicated IT team to manage it.
CONTINUED

Network Security for the Industrial Internet of Things

Solutions like SDN in an industrial network, where environmental and backhaul variables are constantly changing, can help ensure data stays secure and systems remain operational without IT intervention.

Security strategies will continue to evolve as new threats and technologies emerge. Though a single security solution doesn’t fit every application, there are common measures that should be
Network Security for the Industrial Internet of Things

evaluated to help reduce most threats. Selecting vendors that offer paths to keep equipment updated with current security solutions should be a priority. Industrial networking products from Red Lion Controls help keep data secure both at the edge of a network and in transmission.

Red Lion Controls is a U.S. manufacturer of industrial automation and networking solutions that help organizations connect, monitor and control assets worldwide. Visit www.redlion.net to learn more.
Is your infrastructure ready for the Industrial Internet of Things?

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Faurecia Improves Parts Traceability With the Internet of Things

BY ALEX HERBERT
IoT major account manager, Kepware Technologies

One of the world’s largest automotive equipment suppliers is rolling out Kepware’s IoT Gateway across its operations in 34 countries to provide detailed traceability for its OEM customers.

With 330 sites, including 30 R&D centers in 34 countries around the world, Faurecia is a global manufacturing leader in automotive seating, interior systems, automotive exteriors, and emissions control technologies. Faurecia is recognized as a pioneer in technological innovations—reducing the weight of vehicles, offering customized comfort and style solutions, and mitigating environment impacts.

The challenge

While Faurecia has a long track record of providing its customers with exemplary products, the company faced an increasing need from its customers to provide traceability for the parts it produced. The large automotive OEMs expected Faurecia to track its operations
Faurecia Improves Parts Traceability With the Internet of Things

and production processes and make that information available to them on demand.

Although this traceability data had always been available, Faurecia’s solutions for collecting and distributing it were not on par with the efficiency and scalability of today’s Internet of things (IoT) solutions and supporting architectures.

The approach

Realizing its need for improved connectivity, data access and scalability, Faurecia set out to find a communication solution that could connect the various PLCs on the factory floor to IJ Core, Faurecia’s proprietary parts fabrication and manufacturing execution system (MES). After careful research, Faurecia turned to Kepware’s flagship connectivity platform, KEPServerEX, and began a pilot project in its factory in Porto Real, Brazil.

Faurecia implemented the REST Server Agent in the IoT Gateway for KEPServerEX. The developers working on Faurecia’s MES were already comfortable with REST/HTTP (protocols ubiquitous in IT, on the web, and in IoT platforms) and were excited about the new middleware language that used KEPServerEX connections they already had in place.
Faurecia Improves Parts Traceability With the Internet of Things

Using the IoT Gateway, the company began collecting data from the shop floor and communicating it to a local server in each plant running IJ Core over REST/HTTP. IJ Core was then able to store that information, satisfying customer requests for traceability spanning several years.

The results
By implementing the IoT Gateway as the communications medium between PLCs on the plant floor and IJ Core, Faurecia is able to provide customers with the product traceability they require. With new visibility into the manufacturing data of parts provided by Faurecia, the world’s largest automotive OEMs are able to satisfy regulatory requirements and improve overall product quality for consumers.

Internal Faurecia stakeholders are benefiting as well. Operators on the machine floor note that communications are much faster, and the quality assurance department has the industrial data it needs to analyze production quality.

Furthermore, technology from Kepware is helping bridge the gap between operations technology (OT) and information technology (IT) by enabling executives in Faurecia’s boardroom to access and leverage data to boost efficiencies across the organization.
Faurecia Improves Parts Traceability With the Internet of Things

Since implementing the IoT Gateway for KEPServerEX, Faurecia has decreased its transparency project from a complicated six-month scope to a functioning solution in just a couple of days. This resulted in significant time and revenue savings—and satisfied customers. Given the ease of implementation and overall success of the Porto Real pilot, Faurecia plans to standardize on KEPServerEX in its North American, Asian and European factories in 2016.

“We see huge potential with the IoT Gateway and are excited to deploy it across the 34 countries we operate in,” said Rafael Unruh, competence center manager at Faurecia. “We’re seeing benefits from this implementation from the boardroom down to the shop floor, and only expect them to increase as more locations utilize it. We’re able to be smarter and more nimble in our decision-making, which leads to better products and services for our customers.”
Now Is the Time to Implement the Internet of Things

BY ALBERT HUANG
Vice president, Advantech Industrial Automation Group

When building a new factory or industrial environment, developers are free to choose the most up-to-date technology and will likely choose Internet of Things–ready devices.

In the past, devices and equipment offered minimal connectivity to each other. This was for several reasons, the main one being a lack of compatibility between different manufacturers, which prevented devices from communicating with each other. This lack of compatible standards and programming languages meant that gathering all the data in one program was an expensive challenge. Now, thanks to technological advancements and reduced price points, this can finally change.

Although many devices haven’t yet standardized their programming, technology advances have enabled manufacturers such as Advantech to develop hardware and software that can
Now Is the Time to Implement the Internet of Things

Communicate with and collect data from all manner of devices. That’s why now is an ideal time to implement the Industrial Internet of Things (IIoT).

Since most new devices offer smart connectivity (i.e., the ability to connect to and be controlled from a wide range of Internet-based devices), existing devices can also be made smart by connecting them to gateways, which can process their data before sending it to web-enabled SCADA software via Ethernet or wireless networks.

However, in legacy factories, most machine data is sent to individual servers and monitors, where it is watched and printed out for future use. That situation is far from ideal and factory managers are demanding a more unified approach to data management.

By standardizing networking methods and allowing devices, which use established industrial networking technologies such as DeviceNet, CAN and IO-Link, to communicate via Ethernet, all devices old and new can now be connected to the same network.

Once we have old and new devices connected and talking to each other, the next step in creating a smart factory is to make the information visible to operators and managers so that they
can make informed decisions. That’s where modern human-machine interfaces (HMIs) come in. It is now possible to manage multiple factories across the world in a more organized manner by leveraging cloud services as a cost-effective way to store data anywhere in the world and be able to access it from anywhere on any device in an attractive, easy-to-read format.

But the smart factory is about much more than just dishing out pretty graphics. At the factory level, the proper flow of status and command information is crucial for a manufacturing execution system (MES) to track and record the production of finished goods. At an even higher level, data is required for enterprise resource planning (ERP) and business logistics systems to be effective. Developments in programming languages are helping engineers move beyond a preset series of reporting tools, allowing them to develop tools that meet their specific requirements. As a result, management can more easily identify inefficiencies in production so that machines can be adjusted to improve material, labor and maintenance costs, and energy efficiencies and quality issues.

Advantech has been developing tools and devices to ease the process of connecting both old and new devices to the IIoT. For example, Advantech’s WISE IoT modules provide an HTML5-
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Now Is the Time to Implement the Internet of Things

designed configuration interface, which can be accessed from any modern device or platform. Likewise, Advantech’s WISE-4000 IoT Wireless I/O modules, designed specifically for use in IIoT applications, use RESTful web services and HTML5 to dynamically adjust the display of information based on the device being used to access it.
In addition to web-enabled I/O devices, Advantech also produces a range of industrial computers, such as the UNO-1251G, which acts as an IIoT gateway to process data coming from end devices or PLCs running divergent protocols.

Advantech’s latest WebAccess 8.1 browser-based HMI/SCADA software is a complete cloud-based system that can be designed and constructed using WISE-4000 and other Advantech data acquisition devices. WebAccess provides three types of interfaces: a web service interface for partners to integrate data into their own apps, a pluggable widget interface for programmers to develop their own widgets to run on the WebAccess Dashboard, and a DLL interface for developing Windows applications. These three features enable WebAccess to permit development of IIoT applications for different vertical markets.
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The Hype Is Warranted—Mostly

MATT NEWTON
Director of technical marketing, Opto 22

Enough with the predictions about the Internet of Things and the trillions of dollars it may or may not generate as billions of things come online and transmit their Big Data to the cloud. Let’s get back to the present. What is the IoT really doing for enterprises today and how does it do it?

The Internet of Things (IoT) is all about connecting the unconnected, bridging the gap between information technology (the digital world) and operations technology (the physical world) to rapidly accelerate insight into business operations, so we can reduce costs and increase profitability. Sounds easy enough—sort of. But what’s driving this demand for accelerated insight?

Born through the convergence of the digital and physical worlds, the IoT has created the new data economy. Acquiring and analyzing data assets in real time allows businesses to make the most
profitable decisions possible based on what’s happening now. Real-time visibility into operational data has become one of the modern enterprise’s most valuable tools. And that’s exactly what SCADA Solutions has done for wind farm operators across California.

Green energy initiatives put in place decades ago in California have substantially improved the state’s air quality today. But managing green sources of electric power generation has complicated the state’s electricity pricing structure. Demand on California’s electrical grid spikes or plummets by the hour. The market price (spot price) of electricity California utilities pay to energy producers can literally change every minute. Based on grid demand, the spot price of electricity can go substantially negative (as low as -$500/kWh) or substantially high ($400/kWh) when demand peaks. The pricing structure is incentive-based so that operators pay close attention to the cost of energy at any given moment. Prices can drop so low that operators actually end up paying the utility for the power they put on the grid. This means that energy producers, like wind farm operators, must spin up or down electrical generation equipment literally at a moment’s notice to maximize profits and avoid negative price drops.
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The Hype Is Warranted—Mostly

This is the Internet of Things. It’s the adding of sensors and control to operational assets that were never designed to communicate with IT assets.

Bridging the OT/IT gap

To accomplish this, SCADA Solutions has leveraged IoT technologies to remotely monitor and automatically control wind turbines based on real-time market pricing data and historical operation costs. SCADA Solutions combines off-the-shelf products from Opto 22 and in-house-developed software to bridge the OT/IT gap and provide real-time monitoring and control of these remote assets—some of which are nearly 30 years old.

Intelligence and communication start with SCADA Solutions’ cloud-based WindCapture software. WindCapture uses a RESTful API to connect over the Internet to California Independent System Operator (CAISO), the electrical authority in the state, and poll the spot price of electricity in real time. Using RESTful APIs is important in IoT applications, since most of the Internet—mobile applications, social media, mashup tools and automated business processes—relies on them for interoperability and communication. Data from CAISO is temporarily stored in a database hosted in the cloud before being sent over the Internet to an Opto 22 SNAP PAC System.

This off-the-shelf SNAP PAC System offered SCADA Solutions a lot of flexibility to bridge the gap between the digital world of the Internet and the physical world of wind turbines. The
The Hype Is Warranted—Mostly

A programmable automation controller (PAC) has a robust set of IoT communication technologies built into it, like HTTP, TCP/IP and a RESTful interface. The PAC also comes with networking and information security features like IP filtering and SSL/TLS data encryption. For interfacing with the physical world, the SNAP PAC System offers over 100 different types of analog and digital SNAP I/O modules featuring channel-to-channel isolation, EMI resistance, and industrial temperature and humidity ratings to survive the harsh environments found at the network edge.

Using Opto 22’s groov mobile operator interface, wind farm operators can monitor the price of electricity through an app on their mobile device and manually ramp up or down electricity generation at the wind turbine with the push of a smartphone button. The groov interface is built using drag-and-drop, point-and-click, web-based software that requires no programming. Resulting groov screens comply with HTML5, the latest-generation markup language designed for today’s web browsers and interoperability between systems. Users can open a groov screen from a browser on their PC, mobile device, or even a big screen TV. Operators literally have their HMI in their pocket, wherever they are.
The Hype Is Warranted—Mostly

Pushing edge intelligence further

SCADA Solutions pushed edge intelligence even further by storing vendor-specific turbine profiles in the Opto 22 PAC file system. The profiles are essentially a small database of information that lists how profitable each turbine is, based on historic operation costs and environmental conditions like wind speed. The PAC uses its built-in logic to calculate real-time profitability using several data points. First the PAC receives the spot price of electricity from the cloud. Then the wind speed is obtained from an anemometer at the turbine site. Finally, the PAC analyzes the turbine profiles stored on its file system to determine if it is a profitable time to start or stop the wind turbines and, for each turbine, what the best rotor pitch is to maximize profit and reduce operating costs.

The wind turbines can also monitor their own physical health. Using vibration sensors connected to the turbine shaft and temperature sensors monitoring the turbine’s oil temperature, the PAC monitors what’s happening in the physical world at the wind turbine. If the vibration of the turbine shaft is approaching a preset unsafe threshold, the PAC automatically takes the turbine offline and notifies an operator via email or text message that the turbine
The Hype Is Warranted—Mostly

needs maintenance. Operators maximize oil life span and schedule pre-planned maintenance outages based on oil temperature data aggregated and analyzed in the cloud.

The PAC converts the analog and digital signals from sensors into protocols and languages the IoT understands, like TCP/IP, RESTful APIs, JSON documents and HTTPS. Moving information directly from the edge and into IT systems using protocols and technologies the IoT natively understands significantly decreases the operators’ time to insight, allowing them to operate their turbines with the lowest cost possible while maximizing revenue generation opportunities. This is the IoT. It’s the adding of sensors and control to operational assets that were never designed to communicate with IT assets. Edge computing with devices like PACs is the key to bridging the gap between the physical world of operations assets and the digital world of information technology.
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