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FEATURES

How to Boost Efficiency During Power System Upgrades
As oil and gas facilities deal with aging power-distribution systems, intelligent packaged power can provide insight-rich data for performance improvement.

How an Oil & Gas Company Achieves 99% Uptime
A modern distributed control system helped an offshore exploration and production firm achieve its first deepwater-field extraction in just 36 months.

Get Ready for Automation Fair in Chicago
The 2019 event offers a feast of technology and information covering the latest control, power and IT/OT best practices for industrial automation.

Why Smart Factories Need End-to-End Traceability
With a traceability infrastructure, you can gather insight-rich data that helps improve manufacturing processes, compliance and supply chain management.

5 Common Mistakes When Purging and Pressurizing Enclosures
The technique is simple if done properly, but users often implement it incorrectly if they don’t know the standards or system’s characteristic gas flow.

Is Your Connected Device Secure?
Some IIoT devices are still playing catch-up with security, but technology advances now help protect connected devices from sophisticated cyberthreats.

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I’ve always appreciated the folks who work in the oil, gas and chemical industries — the skills and intelligence it takes to safely explore, produce and get those resources to us consumers. Hazardous conditions, engineering talent, critical technology, dedicated field workers, critical safety practices, locations all over the world and so many more essential operations.

After all, the oil and gas industry is the global economy’s lifeblood. This issue of The Journal helps process operators by explaining how to implement a strategy to migrate from a legacy control platform to a modern DCS with minimal downtime, and why it doesn’t have to be complicated — pretty amazing. And we provide a couple case studies showing how some companies like yours did it.

In addition, to help process automation and manufacturing pros in these industries, we recently published our free 2019 Oil & Gas eBook. Learn how to prepare for the new IEC gas safety standards; to develop safer, more efficient chemical operations; and to optimize well pads.

Also see how reliability-centered maintenance (RCM) uses data to slash downtime; how analytics can help you benefit from the digital oilfield; 5 common mistakes when purging and pressurizing enclosures; and more. Visit http://bit.ly/2UbETeV to download the eBook now.

In addition to the useful information for process automation pros, you’ll also find the 2019 Automation Fair event preview in this issue. It’s a keeper! Until next time …. 

Theresa Houck, Executive Editor

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ROCKWELL AUTOMATION OPENS ELECTRIC VEHICLE INNOVATION CENTER

Live manufacturing demonstrations and hands-on trials help automotive companies learn new technologies, standards and best practices to meet rising demand for electric vehicles.

On June 18, Rockwell Automation opened a new 8,000 sq.-ft. Electric Vehicle (EV) Innovation Center in San Jose, California, within its Information Solutions development facility. The center at 111 North Market Street provides live manufacturing demonstrations, hands-on trials using new technology, and events showcasing collaboration with industry experts and Rockwell Automation partners.

Using augmented and virtual reality modeling, the center offers automotive start-ups and established manufacturers an environment to learn new technologies and standards, helping them deliver electric vehicles to market faster, with less risk and at lower cost.

The center combines solutions from Rockwell Automation and its PartnerNetwork™ program members. Specifically, FactoryTalk® InnovationSuite, powered by PTC, combines software from PTC and Rockwell Automation. In addition, Rockwell Automation OEM partner Eagle Technologies provides the battery pack assembly machine, and Rockwell Automation Encompass™ Partner FANUC furnishes robot technologies, both integrated with Rockwell Automation technology.

Hirata, a turnkey assembly line builder, provides an assembly cell that demonstrates electric-drive unit assembly and testing. Emulate 3D by Rockwell Automation provides simulation software to prototype and test machines before they’re built. Teamtechnik performs functional testing to confirm performance before building the drive into the electric vehicle.

“With growing global consumer demand, electric vehicle companies are challenged to meet aggressive production timelines,” said John Kacsur, vice president, Automotive and Tire Industries, Rockwell Automation. “We established the Electric Vehicle Innovation Center to expand their possibilities and get their products to consumers quickly and at the lowest possible cost, while operating more efficiently.”

Kacsur noted that the EV Center supports digitalization efforts not only for auto and tire customers, but for customers in all industries. Customers are welcome to visit the EV Center and consult with industry experts.

By 2040, it’s expected that 54% of new vehicle sales will be electric vehicles, according to Bloomberg New Energy Finance.
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Converting a legacy platform to a modern DCS may look complex, but using these best practices provides opportunities for significant process improvements.

By Chris King, PlantPAx migration business development manager, Rockwell Automation
Here’s the good news. If you think your distributed control system (DCS) has run its course, you’re not alone. The global DCS installed base nearing end of life totals about US$65 billion. And many of these systems are more than 25 years old and in dire need of updating.

Why is there such a backlog of outdated systems? The simple truth is many still are keeping a plant running, albeit not running as well as it could. Often, organizations would rather live with the significant pain an obsolete system inflicts than be subjected to the perceived risks and costs of migrating to a modern system.

Another truth is for many plants and organizations: Insufficient in-house staff and expertise exist to manage large capital projects internally, particularly for specialized tasks performed infrequently, such as a DCS conversion.

Let’s face the facts: Automation projects can be difficult to manage and difficult to justify financially. Every day, we work with companies who have made the case for modernization successfully based on both existing system shortcomings and the significant improvements of a new, state-of-the-art modern DCS.

Reasons to replace a DCS can include:
• An increased failure rate.
• Higher incidence of off-spec product.
• Accelerating maintenance costs.
• Lack of legacy DCS expertise.
• Capacity limitations.
• Inability to interface with contemporary systems.

On the flip side, many industrial firms also come to recognize that a DCS modernization is a rare opportunity for significant process improvements and innovation.

What’s the Plan?
Converting a legacy control platform to a modern DCS may be complex, and it’s not a one size fits all endeavor. To help mitigate risk — and spread costs over time — many companies choose a phased approach to migration. On the other hand, a “rip-and-replace” conversion strategy is appropriate for others.

Simply put, each modernization project is unique. And the most successful projects require proper planning.

Define the Strategy
In most cases, it’s essential to perform the conversion with very little downtime and minimal risk, and these requirements determine much of the upgrade strategy.

You must decide on three main strategic choices before conversions take place.
1. **Determine if the upgrade will be vertical or horizontal.** In a vertical upgrade, just one process area is upgraded at a time. In a horizontal upgrade, multiple similar process units are upgraded simultaneously. For example, if a site has eight boilers, all would be upgraded at once in a horizontal upgrade, as opposed to upgrading only the boiler(s) in the vertical process unit.

2. **Determine if the upgrade will be done by replacing all automation system components simultaneously (rip-and-replace) or with a phased migration approach.** With a phased approach, replacing the automation system takes longer, but will require less downtime and entail less risk.

   Breaking the planned downtime into multiple short phases is often a great advantage for maintaining production, and it spreads out migration costs over a longer period.

3. **The final strategic decision made is “hot versus cold” cutover.** With hot cutover, the old DCS and the new automation system operate simultaneously, with one control loop at a time migrated from the old DCS to the new automation system at the I/O level. With cold cutover, the old DCS is replaced by the new automation system, with the entire process being restarted at once (see table below).

   The hot cutover option is more expensive in terms of upgrade costs, but with an overall lower cost in most cases when downtime is considered. Risk is also lower with hot cutover because only one loop is converted at a time, with the old DCS still available in case of any unforeseen difficulties with the new automation system (see table).

### Five Best Practices

So what is the best way to develop your conversion and implementation strategy?

Based on experiences working with hundreds of companies, we’ve identified five best practices that lead to modernization success.

### Hot Cutover versus Cold Cutover

<table>
<thead>
<tr>
<th><strong>BENEFITS OF HOT</strong></th>
<th><strong>DRAWBACKS OF HOT</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less downtime</td>
<td>More expensive</td>
</tr>
<tr>
<td>Reduced risk</td>
<td>Takes up more space</td>
</tr>
<tr>
<td>Easier to troubleshoot potential issues</td>
<td>Takes longer</td>
</tr>
<tr>
<td>Simpler to implement on-the-job training on the new automation system</td>
<td>Requires simultaneous operation of old and new automation systems</td>
</tr>
</tbody>
</table>

The third major strategic decision to make before converting to a modern DCS is whether to use a hot or cold cutover.
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1. Early Planning. A successful modernization begins long before any detailed engineering — with an up-front, comprehensive evaluation of the legacy system. Initial objectives at the front end include aligning automation outcomes with business goals, determining the preferred options, obtaining capital funding, and finalizing the scope, cost and schedule.

Through these activities, you establish justification for the project, define it — and align all stakeholders. Keep in mind, the most cost-effective time to define the scope is at the beginning. Costs escalate considerably if basic decisions such as which areas of the plant to include or what interface to apply are revisited later.

2. Engage Experts. Chances are, you already know who to call when faced with a perplexing application challenge. It could be a system integrator or automation supplier. This same network of support can also provide critical assistance throughout your conversion process. In the end, calling on experts when needed saves both time and money.

3. Establish Standards. Establishing — and following — standards is as critical as early planning. If appropriate company standards don’t exist, they’ll need to be developed using internal expertise or with help from a system integrator or automation supplier.

The more thoroughly you specify and document network protocol, security requirements, I/O and HMI criteria, interface requirements and controller configuration, the easier it will be to maintain and improve your system. Take our word for it. Your company’s future employees will thank you.

4. Execution Discipline. A DCS conversion is complex. And like any extensive undertaking, it requires sound project management. Without execution discipline, any large project runs the risk of spiraling out of control.

To keep your conversion on time and on budget, be sure to follow a consistent execution strategy based on accepted industry best practices.
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If you don’t have resources on staff, consider engaging a certified project management professional (PMP) to help guide your project.

5. **Expect Innovation.** Don’t be content with merely duplicating the content in your old control system. Remember, 25-year-old legacy systems are unlikely to deliver the same advantages that a state-of-the-art modern DCS can.

Your migration project is an extraordinary opportunity to leverage new technologies to control your process optimally. Don’t replicate. Innovate.

With innovative thinking, each upgrade area is examined for opportunities to enhance how the system performs. Return on investment (ROI) from these improvements over legacy systems is often quick; improved operations, better quality, more throughput, few safety-related incidents, augmented cyber-security and less unplanned downtime are the main benefits of converting to a modern DCS.
## Wireless Serial Communications

<table>
<thead>
<tr>
<th>Noise resistance</th>
<th>High-speed connection</th>
<th>Communication response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses the 2.4 GHz ISM frequency band</td>
<td>From power supply ON to start of communication: Min. 250 ms</td>
<td>Signal response time: 5 ms</td>
</tr>
<tr>
<td>Frequency hopping: Every 5 ms</td>
<td>For wireless slave</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication cables not required</th>
<th>Number of I/O points</th>
<th>Compatible protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced wiring work, space, and cost</td>
<td>Max. 1280 inputs/1280 outputs</td>
<td>Ethenet/IP</td>
</tr>
<tr>
<td>Minimized disconnection risk</td>
<td>(Registration and communication of up to 127 slave units is possible.)</td>
<td></td>
</tr>
<tr>
<td>Effective communication range up to a radius of 33 Ft.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Provide stable communication

Communications using various forms of radio wave propagation

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### High security using encryption

Unauthorized access from outside is prevented by using data encryption.

---

### Point-to-Multipoint communication

Registration and communication of up to 127 wireless slave units is possible.

- 1 to 15 units are recommended for simultaneous operation
- It is possible to install multiple wireless masters in the same area

---

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As oil and gas facilities deal with aging power-distribution systems, intelligent packaged power can provide insight-rich data for performance improvement.

By Dan Pender, Rockwell Automation
Oil and gas processing facility resources around the world are feeling the pain of relying on aging power-distribution systems. The effects of outmoded electrical infrastructures include:

- Reduced productivity caused by unplanned downtime.
- Safety risks posed by faltering equipment.
- Workers stressed and stretched by the perpetual need for troubleshooting.

The conventional solution has been to replace old equipment with essentially newer versions of the same components and controls. However, because we’re in the digital age, relying on a replacement-in-kind strategy is a big missed opportunity for oil and gas companies.

When you instead replace hard-wired equipment with digital solutions, and integrate the electrical equipment into the plant control system, you gain access to critical operations intelligence that can help contain costs and get the most from your assets. You can identify equipment patterns that help improve maintenance plans. And most important, earlier visibility into potential failure events helps reduce the need to send employees on-site to address issues.

With the availability of intelligent devices, replacing old hard-wired electrical systems with a state-of-the-art digital platform integrated with your process-control solution can provide many business benefits. New intelligent packaged power capabilities can provide unprecedented functionality.

One of the biggest features is real-time visibility into performance of electrical assets. Replacing hard-wired equipment with digitally enabled devices can help speed decision-making and issue resolution. Even before an alarm sounds, plant personnel can be alerted to a potential motor failure and begin performing repairs — prior to the failure impacting productivity, worker safety or equipment performance.

Also, when you connect your intelligent electrical devices (IEDs), you can support remote monitoring — meaning your subject matter expertise can be located anywhere.

Remote monitoring also improves worker safety. For example, high-voltage substations pose serious hazards to personnel. But with an intelligent, integrated electrical system, technicians working at a safe distance could quickly determine the source of an event or alarm, even from a smart phone, and take corrective action.

Power of Unification

Unified data, available in real time, also positions you to better understand and manage energy consumption.

These benefits are altering the electrical landscape in heavy industries. In fact, according to an ARC Advisory Group study, 67% of new plants implemented intelligent devices as part of their overall electrical system. The more smart devices in your electrical system, the more informed you can become.

To take it a step further, you can combine electrical and process systems, which unifies information to provide a more powerful, integrated power and process control solution. This gives you even greater visibility into systems to help identify any issues in your process that may have been caused by an electrical system event. You can see all aspects of operations in real-time to better understand and manage energy consumption.

Intelligent Savings

With these intelligent solutions, plant personnel can access data from any IED, from any plant operator control station, with a solution that’s easier to deploy, maintain and optimize.

The upfront costs of implementing an intelligent packaged power solution are dramatically lower than a conventional, non-intelligent solution. Traditional hard-wired systems can require five times more engineering time and installation labor. And the more suppliers involved in the project, the bigger the risk to timelines and budgets.

Digitally integrating the electrical and process control systems and using an intelligent packaged power solution creates a single platform for accessing and analyzing all operational data from across operations. That means unified visualization, archiving and reporting capabilities, pulling from synchronized, time-stamped data from a single source.

An oil refinery, for example, tapped unified data to cut downtime related to equipment failures by 27%, and reduced costs related to maintenance troubleshooting by 35%.

When your electrical equipment ages out, it’s not enough to replace it with the latest version. The need to upgrade is a chance to tap your existing infrastructure and grow your digital capabilities. By integrating power and process control and digitizing, you can add functionality and productivity.
Oil and gas exploration company LLOG, based in Covington, Louisiana, operates in the depths of the Gulf of Mexico off the Louisiana border. Despite the company’s relatively small size among oil and gas industry giants, LLOG is the fifth largest operator in the Gulf. The company’s success rate of drilling exploratory wells is 70%, compared to an industry average of approximately 35%.

In 2012, LLOG wanted to achieve production from multiple discoveries in the Gulf of Mexico’s Mississippi Canyon protraction area as quickly as possible. The company developed an unheard of timeline of just three years to build a new, automated floating production system (FPS) in the deep water off the Gulf of Mexico.

At this time, the company had one successful FPS, called “Who Dat,” producing from nine wells. LLOG studied the underwater landscape, negotiated a final agreement, and began construction of a new FPS, known as the Delta House FPS, to act as a hub in the Mississippi Canyon.

Short Timeline, Unique Challenges
With just 36 months to complete design, implementation and drill, LLOG required an accelerated build schedule. Beginning engineering work prior to oil discovery in the area facilitated the fast schedule.

This early engineering was a bold endeavor, but a leap LLOG was willing to take given the company’s higher-than-average success rate and large prospect inventory. LLOG also was comfortable that the new design could accommodate a range of possible oil characteristics.

A typical deepwater approach for new-drill FPSs includes oil discovery, identification of well locations, a front-end engineering and design (FEED) study, a bid for production FPS types, then detail design and, only then, can construction begin. This traditional approach typically takes several years before the first drop of oil is produced from a well. The unique timeline for the new Delta House FPS was far more compressed.
LLOG also wanted to commission, design and implement a completely different process control system than the existing proprietary system deployed on Who Dat.

“The controls system on Who Dat wasn’t easily scalable,” says Rick Fowler, vice president deepwater projects, LLOG. “With our new Delta House FPS, we knew we needed a process control system that would be scalable to meet future needs, and help us recover return on investment quickly.”

To achieve speedy ROI, LLOG required a highly reliable, secure, flexible distributed control system (DCS) that could be easily duplicated for future projects.

Far from Shore

Working with a system integrator, LLOG designed and implemented the new Delta House offshore FPS using a one-size-fits-most approach. Because of the accelerated timeline, the company decided to design an FPS that would fit most offshore Gulf of Mexico locations, versus building it specific to one location. This decision helped speed design and implementation time, and also allowed for a flexible FPS design that could be repeated easily elsewhere.

The company chose to implement a modern, virtualized PlantPAx® DCS from Rockwell Automation. The virtualized system improved reliability and expandability with built-in disaster recovery and the ease of provisioning new hardware when needed, in hours versus days or weeks.

Also, because the PlantPAx system is built on open communication protocols, it provided LLOG with a scalable approach that could easily integrate with various OEM process skids deployed across the topsides processing equipment.

“Our existing Who Dat FPS is running on physical servers,” Fowler says. “In order to expand, we need to add and integrate another full physical server, a costly and time-consuming process. With a virtualized PlantPAx system on the Delta House FPS, we can easily expand and add another virtual server in minutes, and at no cost.”

As part of the PlantPAx system, LLOG expanded visualization into its process control operations. Using the software suite for production intelligence, the system allows operators to easily capture historical data for tracking trends, monitor the process, and collect and report key data, alarms and events. This helps LLOG personnel make more informed operational and business decisions. The system also uses updated grayscale graphics, making it easier for operators to see issues and rationalize alarms.

LLOG can centralize authentication and access control by verifying the identity of each user who attempts to access it. The software allows the system to either grant or deny user requests for increased, built-in security.

In addition, using embedded Cisco® technology, Allen-Bradley® Stratix® switches helped LLOG ease network configuration, management and support. Enhanced security features of the switches support system-wide security as part of a defense-in-depth (DiD) approach.

Optimistic Future

LLOG completed the full Delta House construction on time in just three years, including the DCS design and implementation and the first oil extraction.

“In the first year using the system, we averaged an industry-leading 99% uptime on the new Delta House FPS,” Fowler notes.

Since the first oil extraction in April 2015, the facility already has produced over 60 million barrels of oil equivalents. From inception, the breakeven price for the development was $27 per barrel of oil. Going forward, the breakeven price is below $20.

The features of the PlantPAx system also have helped the company save valuable time and money. “When the FPS has an issue, the system is designed to safely shut down operations,” explains Fowler. “Recently following a nuisance shut-in, with improved reporting and insight into system trends, we were able to get production back up and running in hours, minimizing downtime.”

The controls system easily can be expanded. The Delta House FPS began operations with just a few wells. After a year and a half in production, LLOG has been able to simply add new wells as needed. Wells are typically miles away from the FPS, but through PlantPAx standardization, ease of integration and virtualization, incorporating new wells into the controls system is a painless process.

At the 2017 Offshore Technology Conference, LLOG was awarded the Distinguished Achievement Award for Companies, Organizations and Institutions in recognition of the Delta House project. The project also was named one of the top five projects in the world according to Offshore magazine.

The Delta House FPS now processes five fields versus just three at the time of construction, and in late 2018, began processing an additional three fields.

>> New Oil & Gas eBook Helps with Efficiency, Safety

The new 2019 Oil & Gas eBook from The Journal magazine provides how-to tutorials and case studies to help you prepare for the new gas safety standards; develop safer, more efficient chemical operations; optimize well pads; create a digital oilfield; leverage a data-based RCM strategy to prevent failures; avoid 5 common mistakes when purging and pressurizing enclosures; and more. Download it free at http://bit.ly/2UbETeV.
Teledyne DALSA Industrial Products is committed to helping manufacturers improve product quality, lower costs and increase production with easy-to-deploy, cost-effective machine vision solutions for factory floor deployment.

“Our BOA products offer customers a compact industrial solution with diverse applicability across all manufacturing segments. We designed these products for quick set-up and easy integration to existing lines, such as attaching to the end of a robot arm,” says Steve Geraghty, vice president, Industrial Vision Solutions at Teledyne DALSA.

Headquartered in Billerica, Massachusetts, Teledyne DALSA Industrial Products is a participating Rockwell Automation Encompass™ Product Partner and manufacturer of highly integrated vision systems, simple and affordable vision sensors and innovative machine vision software for industrial applications. Products are used across industries including automotive, food and beverage, electronics, health and beauty, medical devices, packaging, pharmaceutical and semiconductor manufacturing.

A participating Encompass Partner since 2007, Teledyne DALSA’s vision solutions are designed to integrate seamlessly with Rockwell Automation devices. In the Encompass program, the company offers BOA products, highly integrated vision systems specifically designed for industrial use.

“Teledyne DALSA is committed to providing Rockwell Automation customers with best-in-industry product solutions, application expertise and global support,” notes Geraghty.

BOA vision systems are packaged as an industrial smart camera in a small, rugged enclosure that fits easily into existing production lines. Unlike traditional smart cameras, BOA incorporates multiple processing technologies — DSP, CPU and FPGA — for algorithm, communication and control optimization. BOA products are available in a range of resolution for monochrome and color applications and are configured through a web browser via a standard Ethernet interface.

They’re EtherNet/IP™ conformance tested and include protocols for interfacing with Rockwell Automation PLCs and HMIs. Physical interfaces include Gigabit Ethernet, RS-232 serial, and opto-isolated inputs and outputs, all of which can be connected using standard M12 factory cables. A DIN-mountable breakout module simplifies control-panel wiring.

“We continue to develop products to satisfy the broad variety of customer requirements. These include single 640 x 480 standard camera configurations to high performance multi-camera models with 4,096 x 3,072 color resolution. Our BOA products are offered in small, rugged enclosures making them easy to integrate into tight-fitting applications or harsh factory environments knowing the heat, vibration or moisture will not affect performance.” Geraghty concludes.

Teledyne DALSA supplies digital imaging components for the machine vision market. Its image sensors, cameras, smart cameras, vision systems, frame grabbers, and software are used in automated inspection systems across many industries and applications. For more information, visit www.rockwellautomation.com/go/p-teledyne-dalsa.
PROVEN Vision Solutions for the Automotive Industry

Teledyne DALSA’s industrial vision solutions help automotive manufacturers, suppliers and integrators ensure that the stringent quality requirements of the industry are being met. From panel stamping to final inspection, every part, assembly and process in automotive manufacturing can be assured, verified and improved using machine vision.

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» Verify stamped part features are present and correct
» Powertrain assembly
» Guide and verify assembly of exterior components such as doors, handles, mirrors, glass, wheels and trim
» Verify installed wiring, instrumentation, electronics and safety systems

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**November 20-21**
McCormick Place • Chicago

**8 a.m. - 5:30 p.m.**
Wednesday, Nov. 20

**8 a.m. - 4 p.m.**
Thursday, Nov. 21

Register FREE at www.automationfair.com or contact your local Rockwell Automation representative.
Chicago is no stranger to visitors, and the Windy City certainly doesn’t let its guests go hungry. Walk any direction and you’ll find opportunities to gorge on Chicago style hot dogs, deep-dish pizza, and other cuisines from all around the world. Once you’ve filled up on Chicago’s fare, head over to McCormick Place where on November 20-21 you’ll have a chance to feed your knowledge with a feast of presentations on the newest technology, critical industry topics, and best practices all designed to help industrial automation professionals improve their skillsets.

Hosted by Rockwell Automation, the 2019 Automation Fair® event is the premier industrial automation event offering unmeasurable knowledge and skill-building opportunities in just two days. With more than 150 exhibits and 400 hours of education opportunities, the Automation Fair® event lets you experience innovative technologies and trends, accelerate your expertise and transform your business with the Connected Enterprise.

In addition, visitors will see the latest control system network infrastructure based on standard, unmodified EtherNet/IP™, safety, power and information technologies that support The Connected Enterprise.

In more than 95 technical sessions, 20 hands-on labs and 9 forums — all free — Rockwell Automation specialists, partners, customers and other industry professionals will share what they’ve learned industrial solutions that provide working data capital for better collaboration and more profitable decisions across enterprises and supply chains.

See Technology at Partner Exhibits
Visitors can see demonstrations of the latest automation technology at the event’s exposition from more than 100 companies in its PartnerNetwork™ program. Learn how they’re integrating smart technologies with automation control, power and information software and solutions.

With more than 110 exhibits from Rockwell Automation and its Encompass™ Product Partners, OEM Partners, Solution Partners and Strategic Alliance Partners, the Automation Fair® event offers the best chance to connect the imaginations of people with the potential of machines to help solve problems and improve operations.
Educational Opportunities

The Automation Fair® event offers 20 hands-on labs, 95 technical sessions and 9 forums that give you opportunities to learn best practices. After you register for the event, you can sign up for forums, hands-on labs and technical sessions in advance to help plan your day before you get onsite. (Registration for sessions is required.)

The popular hands-on labs, offered up to four times a day, allow you to work directly with Rockwell Automation products. Technical sessions are 60-minute presentations from leading industry and product specialists.

The forums provide real-world examples of how companies have increased their productivity and improved efficiency. Representatives from various companies will share their automation technology experiences and applications in the following forums:

- Automotive and Tire
- Chemical
- Food and Beverage
- Life Sciences
- Material Handling
- Metals and Mining
- OEM
- Oil and Gas
- Water/Wastewater

In addition, the hands-on labs and technical sessions include several tracks that cover a more in-depth look at certain technologies that help deliver improved:

- Control. Learn how the Rockwell Automation Integrated Architecture® system provides a single control platform to streamline the time to design, develop and
deliver equipment. This track will review new technology and tools available for machine builders and end users.

- **Digital Engineering.** Digital engineering allows designers to explore and develop innovative solutions in a virtual environment. Sessions will cover examples of how digital engineering can be applied to automation projects.

- **Information & Analytics.** See how innovative technologies like augmented reality, artificial intelligence and digital twins are being used to improve manufacturing operations, workforce enablement and productivity.

- **Network Infrastructure.** EtherNet/IP™ supports seamless plant-wide information sharing and convergence of industrial and non-industrial network traffic, while maintaining real-time communication for control applications. Get an overview of the EtherNet/IP network and how best to design and deploy them. These sessions focus on practical recommendations for installing, commissioning, and improving the security of the networks within automation systems.

- **Power, Motion & Motor Control.** Learn how AC and servo drives, along with intelligent devices for motor control, feedback and protection, leverage your automation investment to reduce start-up time, save energy and optimize production. Topics include motor control technologies, installation considerations and power-conditioning techniques.

- **Process.** Learn about the range of integrated process solutions, tools and technologies available to help increase production performance, drive plant-wide optimization and ease development and integration. Topics cover legacy DCS migrations, process safety, asset management, production intelligence and other process solutions available for consumer and resource industries, as well as process equipment builders and system integrators.
• Safety & Security. Learn about managing safety and security risks to your organization’s information, intellectual property, productivity, workers and more. This track provides comprehensive, functional approaches to machine, process and arc-flash safety applications. Learn how to develop control systems that safeguard against security threats and protect intellectual property. These sessions focus on practical recommendations for installing, commissioning and improving the security of the networks within automation systems.

• Services & Solutions. Sessions in this track will focus on helping you maximize production throughout your automation life cycle. Learn how we identify, mitigate and then eliminate the risks associated with aging equipment and the importance of modernizing and optimizing your production using hardware and software migration tools.

• Systems. This track demonstrates system-level capabilities found throughout the Rockwell Automation Integrated Architecture system portfolio to produce a smarter, more productive and more secure automation system.

• Visualization & Collaboration. Information is only useful if workers can access, understand and act on it. Learn about Rockwell Automation human-machine interface (HMI) solutions that help you meet production targets, reduce waste and energy usage, improve processes, quickly resolve problems and more.

What to do when analog won’t do?
Get the ReadyLink™ Network LDT

Automation solutions require accurate feedback of continuous position regardless of the application environment. Analog position sensing devices can have shortcomings in automation applications, including limited features, resolution and cable lengths. That’s why the ReadyLink Linear Displacement Transducer is a far better solution. Feature for feature, it lets you do—and measure—so much more.

Learn more about this smart device technology at ametekfactoryautomation.com.
Editor’s Note: This article is adapted from a white paper, “Smarter Factories Use Traceability: Achieving the Benefits of Data with Direct Part Marking.” Download the full white paper at http://bit.ly/tj1908meccowp. It explores modern track-and-trace requirements; explains how to navigate perceived roadblocks such as cost, cybersecurity concerns and ROI and highlights common solutions for implementing end-to-end traceability; provides a step-by-step guide to making the transition; explains how to construct a scalable traceability system; and more.

Welcome to the age of the smart industrial plant. This is where operations technology (OT) and IT converge; digital technology connects people, processes and things into a single, seamless unified infrastructure; and data helps us identify new, exciting opportunities. While more manufacturing companies are adopting new data-enabling technologies, becoming a true smart manufacturing operation requires one essential element: end-to-end traceability.

With a traceability infrastructure in place, you can gather insight-rich data that helps improve manufacturing processes, compliance and supply-chain management.

By Dave Sweet, president, MECCO

With a traceability infrastructure, you can gather insight-rich data that helps improve manufacturing processes, compliance and supply-chain management.

>> Traceability: From Component to Final Assembly

Traceability, the process for locating components and their appropriate history throughout their life, is an essential part of smart manufacturing. By digitally connecting individual components to the subassembly, major assembly and final assembly, manufacturers can:

- Track parts through the manufacturing process.
- Record the history of part’s activities.
- Create a genealogy of part relative to main part number and subassemblies.
- Achieve the benefits of end-to-end traceability.
However, most manufacturers aren’t capitalizing on this data. In a recent study of manufacturing companies, LNS Research found that only 23% had end-to-end traceability processes and software in place. So, let’s look at why smart plants need modern track-and-trace capabilities.

Why End-to-End Traceability?
Manufacturers big and small are facing mounting challenges. For example, product recalls are on the rise. Stout’s 2017 Automotive Warranty and Recall Report uncovered that U.S.-based automotive OEMs and suppliers paid accruals of more than $10 billion because of the 50 million warranty and recall incidents.

Also, counterfeit and diverted goods costs companies $500 billion in U.S. trade, according to the World Customs Organization. And at the same time, organizations are struggling to continually improve operational efficiencies to stay profitable and competitive.

Without complete end-to-end traceability, it can be tough to stay ahead of the competition, meet deadlines, keep customers happy and comply with regulations.

As an essential part of Industry 4.0, complete traceability still ranks among the technologies industry companies are slow to adopt. However, the trend is pushing toward more companies embracing it.

In a study of manufacturing companies, LNS Research found that while only 23% had the processes and software in place to enable end-to-end traceability, around 60% stated they plan to have these processes and software in the next year. This suggests manufacturers recognize the importance of product traceability.

Basics of Part Marking
There are different ways to approach traceability. Discrete part traceability — the use of individual component-level marks — is typically the most effective at enabling end-to-end traceability, because each part can be linked within a final assembly.

A number of popular methods can create these discrete part-traceability marks. Direct part marking is the best method to ensure readable marks are permanent and durable. Other indirect methods, such as ink jet printing and labeling, are commonly used because they offer low initial costs.

Among direct part-marking equipment, laser and pin (or dot peen) marking systems are the most popular, capable of creating permanent marks quickly on a variety of materials. Direct part marking with laser or dot-peen equipment can create durable barcodes that connect the part to a database, allowing it to be tracked through plant-level operations to final assembly, and then traced for the life of that product.

To succeed at end-to-end traceability with discrete part marking, it’s important to mark components at the soonest possible moment in the manufacturing process. This lets you see the entire life cycle of each part and maximize the value of your data, so you can spot production issues or trends and make proactive improvements.

Room to Grow
Smart manufacturing is here. Traceability isn’t a box to check and can’t be done in a vacuum. It is developing an infrastructure with direct component marking and integrated software to generate the data needed to analyze, make improvements and compete in a global market.

While we as an industry have come a long way in adopting smart technologies and using data to improve manufacturing processes and supply chain management, we still have plenty of room to grow.

MECCO, based in Cranberry Township, Pennsylvania, is an Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program. The company provides industrial product marking and identification systems. Its laser and dot-peen marking solutions range from modular marking systems to fully integrated turnkey traceability solutions.

Download the Full White Paper
Download the complete white paper, “Smarter Factories Use Traceability: Achieving the Benefits of Data with Direct Part Marking,” at http://bit.ly/tj1908meccowp. It explores modern track-and-trace requirements; explains how to navigate perceived roadblocks such as cost, cybersecurity concerns and ROI and highlights common solutions for implementing end-to-end traceability; provides a step-by-step guide to making the transition; explains how to construct a scalable traceability system; and more.
Purge and pressurization is a method of protection that allows nonhazardous enclosures and equipment to be located in hazardous areas. It uses air or an inert gas to keep a positive pressure within the enclosure and prevent hazardous gases or combustible dust from entering.

For hazardous gas environments, air or inert gas is used to purge the inside of the enclosure before it can be energized. For combustible dust environments, dust is physically removed, and the enclosure pressurized before

5 COMMON MISTAKES
WHEN PURGING AND PRESSURIZING ENCLOSURES

The technique is simple if done properly, but users often implement it incorrectly if they don’t know the standards or system’s characteristic gas flow.

By Chris Romano, product portfolio manager for Purge and Pressurization, Pepperl+Fuchs, Inc.
A raw material used during the manufacturing process might not be listed as combustible, but dust formed during the process itself could be combustible.

Purge and pressurization technology helps meet the demand for general-purpose equipment with standard enclosures inside hazardous locations.

it can be energized. As long as the enclosure is pressurized, the equipment within the enclosure can operate normally in those environments.

The purge and pressurization technique is a simple concept if done properly, but too often this method is implemented without knowing the required standards or the system’s characteristic gas flow. Even if the protection components are certified, users might implement them incorrectly. Here are five common mistakes:

1. Failure to Include a Pressure-Relief Vent
Many times, the designer will neglect to include a pressure relief vent in an enclosure. In hazardous gas atmospheres, purging is required, and a pressure relief vent is necessary. The cabinet’s atmosphere must be purged of any hazardous gases and pressurized before the equipment inside can be energized. Without a vent, the enclosure’s internal atmosphere has nowhere to escape; the increasing pressure within the enclosure will prevent proper purging.

In hazardous dust environments, purging isn’t required, but the enclosure must be cleaned before pressurizing. Most users don’t use a pressure relief device, which is acceptable under normal use. However, if the regulator being used to pressurize the enclosure fails, a large increase of flow into the enclosure could damage the enclosure if a pressure-relief vent isn’t present.

2. Forgetting to Purge Before Pressurizing
Often in a hazardous gas atmosphere, purging isn’t required, and the enclosure is just pressurized. Users neglect the fact that the atmosphere inside the enclosure, before pressurizing, may contain hazardous gas. Industrial enclosures rated Type 4x or IP66 are not gas tight, so hazardous gases can still leak into the enclosure.

3. Not Knowing the Required Volume Exchange
To help ensure all hazardous gas is removed when purging an enclosure, standards exist that specify the number of volume changes required before the enclosure is considered safe.

Uninformed users won’t know how much safe gas is entering the enclosure, which means they won’t know the proper volume exchange. A flow measurement is required to determine the necessary time that must pass for a successful purging. Some purging systems will measure the flow for determining purge time.

4. Failure to Address Combustible Dust
Another common and dangerous mistake is not recognizing that dust being produced in the plant is combustible. A raw material used during the manufacturing process might not be listed as combustible, but dust formed during the process itself could be combustible.

For example, in an accident at a pharmaceutical plant that manufactured pill casings, the material for the casings was not combustible. However, the process of making them produced a very fine dust that collected over the support beams and machinery. When a maintenance worker using a torch accidentally ignited the dust, a small explosion suspended the dust into the air. The fire followed the dust path, which then caused a larger explosion.
5. Not Knowing the Standard

Putting a certified purge system onto an enclosure and populating that enclosure with equipment doesn’t necessarily make the complete enclosure a certified system. The applicable standards for purging/pressurization might require further system testing to make sure it complies with the area classification.

Additional testing is normally required for full and complete certification, including heat measurements from the equipment for T-codes, overpressure testing of the enclosure to help ensure it doesn’t break or permanently deform, and flow checks to confirm all points within the enclosure are purged and pressurized properly.

Other standards and requirements might apply to other parts of the system, including wiring, terminations, gas handling elements and alarm management. By using certified purge and pressurization components, the implementation and final certification of the system will be easier, faster, and hopefully less expensive.

Although the area classification is important in identifying the type of purge system required for the application, the above issues apply to both NFPA 496 Type Y, Z, X (North American requirements), and EN/IEC 60079-2, Type pyb, pxp, pzc (European and International requirements) and local codes.

An understanding of the applicable standards and the hazardous area classification is important in applying any hazardous area protection method. Safety is the ultimate goal and should always be the first consideration in operating equipment in hazardous areas.

Pepperl+Fuchs, Inc., based in Twinsburg, Ohio, is participating Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program. The company develops and manufactures hazardous location protection products and components for electronics used in the global process automation market.
Like other technological advances, the Industrial Internet of Things (IIoT) has had significant security growing pains. Myriad breaches and device vulnerabilities have weighed heavily on potential optimization and automation benefits. However, while IIoT systems and devices still have a long way to go before they’re considered highly secure, industrial firms have finally begun elevating connected device security throughout the operations technology (OT) and IT infrastructure.

Mobile technology and connecting the virtual world to the physical world has become the norm. Its growth has continued despite significant security challenges.

As a result, the IIoT devices are playing catch-up while the prospect of still-greater connectivity looms ominously in emerging technologies such as 5G. Let’s examine some of the causes and influences of why IIoT security is sometimes playing catch-up.

**Optimization**

OEMs are incentivized to reduce the cost of goods on their equipment, and that means optimizing them down to only the most necessary — and sometimes cheapest — components. Devices are optimized for factors such as peak productivity, energy efficiency and long lifespan, and security can be last on the list, or left off altogether.

Changing one thing within the device may involve changing many others to accommodate. The entire device...
may need to be redesigned, and it could be months or years before the first iteration that includes security hits the market.

Lack of Investment
Beyond the changes to the equipment itself, adding in security would also mean additional costs in staff, new components and development. While this is a valuable investment for the OEM, the added overhead costs cause a longer time to production and higher cost to the consumer, which can severely hamper competitiveness in a tight market.

OT/IT Convergence
As they were initially developed and adopted, industrial automation systems and controls typically weren’t Internet-connected. Because OT networks were disconnected from the outside world, end users and OEMs focused on productivity and safety. As such, the OT environment never really needed much of a cybersecurity element.

As connectivity and smart devices crept in, however, industrial users began to demand the valuable performance and monitoring data they generated, and OT systems began to converge with IT. The problem, of course, is that while the IT security systems had years of maturity behind them, OT security had gone nowhere.

In addition, the traditional IT security systems were ill-equipped for OT networks and equipment, so they couldn’t simply be extended into the OT space. This left connections into exposed, vulnerable OT infrastructure and inevitably led to successful IT-to-OT malware attacks such as Stuxnet, Shamoon and BlackEnergy.

Maintenance and Reliability
Historically, OT has been designed to last, and because most operators subscribe to the “if it ain’t broke, don’t fix it” mentality, the life cycle its systems and devices may stretch on for decades. Because they probably haven’t been upgraded — or if add-on security isn’t possible — they’ll need to be replaced to be secure. This causes significant disruption to day-to-day operations, requiring months of planning, and any downtime is far more costly and significant than in the IT space.

This longer life cycle also means IT-based security (firewalls, etc.), which are designed to follow the IT replacement cycle, require specialized security skills, and have ongoing maintenance, don’t fit as well in the typical OT space.

Third-Party Technology
Adding connected third-party technology also can create security issues. Additional update schedules, unknown or backend APIs, proprietary services, and configuration limitations are only a few of the potential problems. In some cases, the vendors themselves will require access to their equipment, opening yet another possible attack vector into the OT environment.

More Secure Than Ever
With advancements from OEMs, automation suppliers and security vendors providing a pathway to protection from the perimeter to the edge, the way ahead for IIoT looks much brighter and far more secure.

Owl Cyber Defense, based in Danbury, Connecticut, is an Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program. The company provides next-generation cybersecurity. Its hardware-enforced data diode technology for cybersecurity has been deployed in more than 2,000 solutions across government, military and critical infrastructure networks.

>> Free eBook Helps Secure Networks

The new 2019 Networks & Security eBook explains how to mitigate cyber threats; find hidden cyber threats; understand edge computing; use network segmentation to limit cyberattack access; how a network upgrade helped an oil and gas company slash downtime; and more. Download it at http://bit.ly/tje19networks.

>> Download the Free White Paper

Download the complete white paper, “The ‘S’ in IIoT Stands for ‘Security,’” at http://bit.ly/tj1908owlwp to get in-depth explanations about how and why connected devices evolved without security at top-of-mind and how that affects you now. Also learn the three types of effective security methods now being used by industrial firms.

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Hardy’s new HI 6200 series are ultra-compact, single-channel weight processors featuring EtherNet/IP™, IIoT compatibility, remote diagnostics and a user-friendly, color touch screen interface. Ideal for OEMs and systems integrators, the HI 6200 allows for high-density panel design over traditional weighing instrumentation, reducing both machine cost and control-cabinet footprint. Learn more at http://bit.ly/hardyhi6200.

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Modernizing and simplifying operational technologies, capturing and analyzing new sources of data, and extending equipment life cycles are key drivers of productivity in today’s connected world. For many, the first step will be virtualizing existing applications and building out a high-availability OT environment that’s ready to support new smart connections and IIoT applications. That’s where Stratus comes in. To learn more on how you can bring your computing infrastructure to the edge, visit www.stratus.com/edge.

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Electric Actuator Press Model

Encompass™ Product Partner Tolomatic’s RSX press model (RSX096P) electric linear actuator increases the force range of the existing RSX product family to 40,000 lbf (178 kN) and is designed to be optimized for force in the extend direction. The RSX press-model electric actuator is suited for metal forming and assembly including pressing, punching, stamping, riveting, fastening and joining.

The press model includes larger tie-rods, an optimized bearing system, and a high-strength front-mounting flange. The RSX actuator family’s heavy-duty construction includes tie-rods and Type III hard-coat anodized aluminum or zinc-plated steel. A standard anti-rotate feature prevents the rod from rotating without external guidance. Rated IP67, the actuator resists ingress from splashing water and dusty environments. An extended temperature range option is designed for outdoor applications.

Expanded Kinetix 5700 Servo System

The Kinetix® 5700 regenerative bus supply from Rockwell Automation provides direct energy savings by regenerating excess energy and putting it back on the facility’s grid or making it available for plantwide use. It also allows plant workers to monitor energy usage over EtherCAT™, so they can make better energy-related decisions.

The bus supply also can help companies achieve consistent machine performance anywhere in the world. It performs common DC bus voltage regulation across the entire voltage input range, which helps protect connected assets from voltage dips and inconsistent power.

The Kinetix 5700 large frame drive is designed for machines with large axis counts and higher power requirements. An added large-frame inverter extends the power capability up to 112 kW. The drive is available in single- and dual-axis servos with advanced safety capabilities that allow workers to put a machine into a safe state. Workers then can access the machine and perform maintenance without completely stopping production.

Embedded runtime adaptive tuning and load observer technologies help cut the time required for manual adjustments during commissioning. A smaller overall system footprint reduces cabinet space requirements by up to 70%, and single-cable technology can trim wiring by up to 60%. The bus supply’s built-in LC filter reduces the need for additional components, installation time and associated costs.

PRODUCT SPOTLIGHT

Machine Safety I/O Modules

To help machine designers more easily design and meet application requirements, Rockwell Automation offers seven new safety modules across three I/O platforms. Each module is TÜV certified for use in safety applications up to SIL 3 and IEC, Cat. 4, with conformal coating options for added protection against environmental stresses.

The modules include the following:

- The Allen-Bradley® Compact 5000™ safety I/O modules provide local and distributed safety I/O for the Compact GuardLogix® 5380 safety controller and distributed safety I/O for the GuardLogix 5580 safety controller. Their faster safety reaction times help lower costs and create smaller, simpler machines. Additional diagnostics help users more easily identify faults.

- The Allen-Bradley ControlLogix® CIP Safety™ I/O modules provide local safety I/O for the GuardLogix 5580 controllers in larger applications that require a high-density I/O solution. Using these in-chassis modules simplifies configuration and reduces panel space by eliminating the need for an adapter. These modules also can be used for distributed safety I/O.

- The Allen-Bradley FLEX 5000™ safety I/O modules are designed for applications requiring fixed field-wiring terminations and both vertical or horizontal mounting. The distributed I/O modules can operate in extreme environments and can directly connect to copper and fiber networks. They also support a range of network topologies, including a redundant star network via Parallel Redundancy Protocol, and enhance communications with 1-gigabit EtherCAT™ connectivity. The platform provides distributed safety I/O for the Compact GuardLogix 5380 and GuardLogix 5580 controllers.
Updated Edge Computing Solution

Encompass™ Product Partner Stratus Technologies introduces the Stratus Redundant Linux 2.0, the virtualization and availability software layer that powers ztC Edge, and a new hardware model, the 110i. The rugged, secure, highly automated ztC Edge industrial computing system protects and delivers business-critical applications quickly, reliably and efficiently in distributed, under-resourced locations.

This newest version includes new features that address and solve the biggest threat to an industrial control system — adding devices to the network that don’t protect themselves. This new solution offers a host-based firewall, restricted USB ports, improved authentication, updated secure communications protocols and secure trusted boot.

Enhanced monitoring capabilities provide better visibility and more fine-grained control. Additional hardware sensors, application and VM performance monitoring, and OPC UA support helps users easily incorporate system health information into their existing industrial monitoring tools and dashboards.

Global Threat Detection Services

Rockwell Automation Threat Detection Services powered by the Claroty threat detection platform help prevent cybersecurity breaches and combat the unpredictable threats that cause them. Claroty is a Rockwell Automation Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program.

To help more companies combat evolving industrial cybersecurity threats, Rockwell Automation recently expanded the services globally.

The Threat Detection Services help safeguard connected operations by identifying all industrial control networked assets, and their vulnerabilities, to help companies know what to protect and monitoring networks for not only known threats but also anomalous traffic or behaviors to alert companies of a security incident — possibly before it even happens.

The services also help with developing plans for containing, eradicating and recovering from attacks to keep operations running or more quickly return to a fully operational state.

The Claroty threat detection platform creates an inventory of a user’s industrial network assets, monitors traffic between them and analyzes communications at their deepest level. Detected anomalies are reported to plant and security personnel with actionable insights.
Plug & Play Arc-Flash Protection

Triple Protection From Arc Flash

The Littelfuse Arc-Flash Relays make it simple to design arc-flash safety into your control panel. Littelfuse Arc-Flash Relays deliver industry-leading technology that detects and stops an arc-flash in milliseconds.

Don’t rely on PPE alone to protect workers from the hazards of an arc-flash. Littelfuse Arc-Flash Relays are easily installed without changes to your existing layout.

- Lower the incident energy of your equipment and the required PPE category
- Safeguard personnel from potential injury
- Protect equipment from catastrophic damage
- Flexible light sensor configuration with unique Heartbeat™ technology
- No additional software is required
- Failsafe redundant internal trip path

Watch the video to learn why arc-flash protection is so important and how Littelfuse Arc-Flash Relays can improve plant safety.
www.littelfuse.com/arcflash
Southwire is the Smart Solution for Your Automation Needs

From Power and VFD cables to Control and Communication Cables, Southwire provides a variety of cables to fill your factory automation needs.

For more information contact your Southwire Sales Representative, email factoryautomation@southwire.com, or visit factoryautomation.southwire.com.