

FEBRUARY 2020

THE JOURNAL

From Rockwell Automation and Our PartnerNetwork™

Transforming Your Business

Digital transformation isn't just about new technologies — it's about using those technologies to change how business is done.

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MACHINE DESIGN

UNDERSTANDING
SQL DATABASES &
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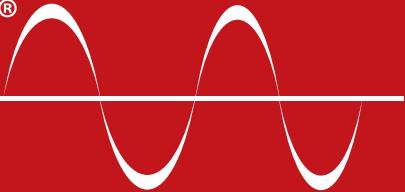
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People for Process Automation

Transforming Your Business

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From Rockwell Automation and Our PartnerNetwork™

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2019 Automation Industry Trends eBook

This eBook explains 10 key trends propelling industrial firms' efforts to implement and optimize smart manufacturing. It also provides a preview of the 2019 Automation Fair® event so you can see technologies on display from industry leaders supporting those key trends.

VIDEO: Endress+Hauser Expands Engineering, Product Development

Ryan Williams from Endress+Hauser, provider of process measurement instrumentation, services and solutions and Rockwell Automation Strategic Alliance Partner, explains how both companies are expanding engineering alliances and integrated product lines.

FREE White Paper: Best Practices for Fire Protection in Hazardous Locations

The danger of fire in processing and manufacturing facilities often stems from the very production processes taking place, which often involve volatile and potentially flammable materials. Learn 10 best practices for developing and maintaining effective fire and gas detection in hazardous locations to help protect workers and facilities.

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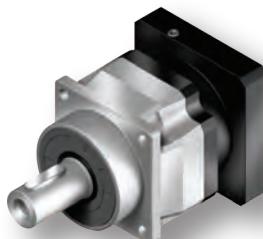


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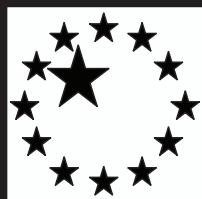
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FEBRUARY 2020, VOLUME 27, NO. 1

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Vice President 1984-2012

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WHAT IS DIGITAL TRANSFORMATION ABOUT?



We hear a lot of talk about smart devices and digital transformation. It's everywhere. Not just in the pages of our own magazine, webinars, eBooks and videos, but throughout our industry. And it applies to small- and medium-sized companies as well as huge firms.

Digital transformation doesn't have to mean implementing a system with capital expenditures that could put you out of business. It means installing devices and systems in steps that make sense for your operations to boost productivity and provide a beneficial ROI. That's the magic of smart manufacturing — ranging from smart sensors to multi-facility systems that use the cloud to gather information from thousands of data points.

And as you'll learn in our issue this month, digital transformation isn't just about technology; it changes how business is done. It's about using smart technology to change business outcomes — delivering information from operations data to help you improve efficiency and quality, and having the flexibility to meet customer needs and boost profitability.

I bet you never looked at digital transformation this way before. Changing business outcomes. Guess that's why it's called "transformation." Until next time....



Theresa Houck, Executive Editor



ROCKWELL AUTOMATION LAUNCHES DIGITAL PARTNER PROGRAM

New program streamlines Industrial Internet of Things implementations by connecting customers to digital expertise and solutions from market leaders.

>> Businesses that are digitally transforming their operations need an ecosystem of partners that can help them simplify technology deployments and quickly achieve goals such as higher productivity. The new Rockwell Automation Digital Partner Program connects companies to expertise and solutions from market leaders like Accenture, Microsoft, PTC, ANSYS and EPLAN Software & Service to streamline implementation and enhance quality of digital initiatives.

Through the Digital Partner Program, businesses can consult with industry advisors to create roadmaps for their digital initiatives and learn how Industrial Internet of Things concepts like digital twins, the factory of the future and a connected workforce can improve their uptime and efficiency. During implementation, businesses will have access to integrated hardware, software and turnkey systems from industry leaders. That helps improve business performance leveraging their existing assets.

“Seamlessly connecting all levels of a business and turning raw data into powerful insights happens when devices are integrated and data is standardized,” said Blake Moret, CEO and chairman of Rockwell Automation.

“No one vendor can do this alone. Instead, companies need an ecosystem of proven partners with the right mix of expertise and technologies to expand what’s humanly possible. We’re proud to expand our work with existing strategic alliance partners like Microsoft and PTC, and add new partners like Accenture, ANSYS, and EPLAN in this effort.”

Digital Program partners each bring a unique expertise that collectively creates an ecosystem enabled to deliver a unified, integrated experience. For example, Accenture can work with companies to create a business plan, develop use cases with ROI and maximize the value of

those use cases across the enterprise. Microsoft can help companies access high-quality data from intelligent edge to intelligent cloud to drive better decision-making company-wide.

PTC can help companies connect devices and systems from the edge to the cloud, and use augmented reality (AR) technology to see systems and solve problems in new ways. ANSYS and EPLAN can help solve complex challenges and become part of the digital thread which helps companies be more productive in their design, operation and maintenance activities.

The Digital Partner Program is part of the Rockwell Automation PartnerNetwork™ program.

>> PartnerNetwork Brief

ROSS Controls Acquires Pneumatrol. Encompass™ Product Partner ROSS Controls has acquired Pneumatrol Limited. ROSS designs and manufactures pneumatic valves, control systems, fluid power safety solutions and poppet valve technology. Pneumatrol designs and manufactures hazardous and safe-area pneumatic solenoid valves, and has a range of pneumatic cylinders, linear valve actuators and control systems to operate various types of rising stem valves. The Pneumatrol acquisition expands ROSS’ product portfolio and presence in the U.K.



ROCKWELL AUTOMATION EARNs CERTIFICATIONS

Rockwell Automation recently received ISA/IEC 62443-2-4 certification, which defines security requirements for service providers. This helps industrial companies worry less about potential cybersecurity risks. ISA/IEC 62443 is a consensus-based cybersecurity standard for industrial control applications.

Certification, independently performed by TÜV Rheinland, shows that the security capabilities Rockwell Automation uses when quoting, designing, integrating and maintaining automation systems meet the standard's requirements.

The company also received a maturity-level increase in ISA/IEC 62443-4-1 certification for its Security Development Lifecycle, showing that it meets the standard's security requirements in the way products are produced and supported. It also shows the company has mature



processes to handle vulnerability disclosures and work transparently with customers to help manage their risk.

Rockwell Automation also is working to expand the use of the ODVA CIP Security™ protocol, which helps make sure only authorized devices are connected in industrial operations. It also helps prevent tampering or interference with communications between those devices.

DENSO SUPPORTS STEM PROGRAMS

Encompass™ Product Partner DENSO's philanthropic arm, DENSO North America Foundation (DNAF), has awarded more than \$1 million in science, technology, engineering, and math (STEM) education grants to 26 colleges and universities across North America. These donations deliver funds to programs that help expose stu-

>> PartnerNetwork Brief

Brian Romansky Named CTO of Owl Cyber Defense.

Encompass™ Product Partner Owl Cyber Defense Solutions, LLC, provider of data diode network cybersecurity solutions, has appointed Brian Romansky to chief technology officer (CTO). He will lead the strategic development of advanced technology and track customer insights and new applications to achieve business growth and product differentiation in various markets. Romansky joined Owl in 2017 as director of business development, bringing more than 25 years of experience in security technology and innovation in automotive security, payment systems, healthcare and logistics.



dents to the careers available in automotive and manufacturing and prepare them to lead in fast-evolving fields.

Grants will be used for programs focused on design, materials management, mechanical and electrical engineering principles, thermodynamics, robotics and more. DENSO hopes these funds will help cultivate and encourage a new generation of engineers and skilled workers.

DNAF has supported STEM education through grants at colleges and universities since 2001, enabling students to access tools, technology and experiences that better prepare them for technical careers after graduation.

ROCKWELL AUTOMATION, SCHLUMBERGER FINALIZE JOINT VENTURE

Rockwell Automation and Schlumberger have completed their joint venture, Sensia, a digitally integrated automation solutions provider for the oil and gas industry.

"Sensia will make industrial-scale digitalization and seamless automation available to every oil and gas company so their assets can operate more productively and profitably," said Allan Rentcome, CEO of Sensia. "It will make oil and gas production, transportation and processing simpler, safer and more secure."

Headquartered in Houston, Sensia is projected to generate initial annual revenue of \$400 million and employ about 1,000 people. It will operate as an independent entity, with Rockwell Automation owning 53% and Schlumberger owning 47% of the joint venture.

ROCKWELL AUTOMATION, ACCENTURE PARTNER

Rockwell Automation, Inc. and Accenture's Industry X.0 have teamed up to capitalize on the expertise of both companies to deliver new capabilities for greater industrial supply chain optimization. The collaboration will help clients more effectively leverage the Industrial Internet of Things (IIoT) and drive measurable growth outcomes.

To date, the collaboration has yielded, among other early-stage successes, a prototype for supply-chain management designed to deliver supplier cost optimization and an improved ability to track the exact movements of products.

Rockwell Automation provides industrial automation technology and domain expertise, including FactoryTalk® InnovationSuite IIoT software, and analytics solutions.

Accenture provides enterprise business and technical capabilities, including consulting, analytics, application development, systems integration, change management and support.

ROCKWELL AUTOMATION TEAMS UP WITH ANSYS

A new strategic partnership between Rockwell Automation and ANSYS aims to help give industrial companies access to a streamlined, holistic, end-to-end solution for design, automation, production and life-cycle management.

The two firms will help customers design simulation-based digital twins of products, processes or manufacturing. Users can design and test through simulation to accelerate development and analysis, improving product quality and reducing testing time across their organization.

Rockwell Automation will accelerate its own internal new product and process development using ANSYS' engineering simulation software. Rockwell Automation expects improved product quality and reduced testing time across the organization. □



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TRANSFORMING YOUR BUSINESS

Digital transformation isn't just about technology; it changes how business is done. Learn how to develop a strategy to implement smart systems.

»» A lot of people are talking about digital transformation and the smart systems and technologies that enable it. Much of the discussion centers around the technology and cost, as if it's simply another technology purchase.

But digital transformation isn't just about new technologies. It's about using those technologies to change how business is done.

That means digital transformation is really about business outcomes — improving productivity, quality and efficiency while helping to reduce safety and security risks. It's about using manufacturing flexibility to meet customer needs and delivering information and insights that improve overall performance and profitability.

Smart Systems

At the heart of digital transformation are smart systems that provide manufacturing efficiency, safety and security, and which provide data to information systems that ultimately provide the insights that help leaders make decisions and plot the right course for the organization.

It begins with smart devices — devices and sensors that provide essential information about asset operation. Smart devices might also provide information about their own operation that, for example, tell maintenance when they're getting dirty or otherwise

compromised, so that they can be cleaned and reduce unscheduled downtime.

Smart controllers provide for logical operation of machinery or processes to optimize productivity, quality and safety. Contemporary controllers might include integrated safety that, for example, can reduce downtime by identifying more precisely what triggers a safety shutdown so that it can be addressed quickly, or use alternative measures like safe speed monitoring that can reduce the need to shut down and lock out equipment to address minor servicing issues.

Human-machine interfaces (HMIs) have moved beyond the basics. They now improve insights so operators can address issues faster.

Analytics and augmented reality (AR) are emerging areas that can transform operations and improve manufacturing flexibility. These are new ways to manage and transform data, provide context and insights supporting quality, compliance and efficiencies.

How this “stack” of smart devices, controllers, interfaces and analytics is designed and integrated to help you achieve your objectives is key. This usually requires *evolution* more than *revolution*. As systems are updated, intelligence and connectivity are added to continuously improve operations.

Even without implementing the broad connectivity sometimes associated with digital transformation, using smart systems



on your plant floor will help to increase productivity and reduce risks when compared to traditional industrial control systems.

Plan the Implementation

Digital transformation isn't simply buying technology. It's a process of:

1. Determining objectives/business goals.
2. Assessing system, safety and security needs to achieve those objectives.
3. Planning the transformation to achieve them.

Begin by asking several questions:

- What does digital transformation mean for your company?
- How much of a transformation do you want to make?
- What does the target state look like?
- What are the business objectives?
- How will your organization change?
- What decisions will workers make, and what information will they need to do so?

With answer to these questions, you can devise a strategy for achieving objectives:

- What is the timeline?
- What is essential to your success? What are the priorities?
- What are the key activities to success?
- What are the milestones?

Assessments also are a key part of the process, especially for safety and security. It's critical to understand your level of acceptable risk, what risks exist and how to mitigate them. Implementing programs that increase connectivity without addressing security can place your information, intellectual property, physical assets and even workers at risk.

Organizational Considerations

As you adopt and deploy new technologies, your workers will be exposed to new information and insights. Decision-making processes and even your organization may be affected and will need to adapt to take advantage of your new capabilities.

Your relationships with supply chain partners also might be affected. Your machinery may be monitored by

>> Rockwell Automation Encompass Partners Support Digital Operations

Encompass™ Product Partner companies in the Rockwell Automation PartnerNetwork™ program provide capabilities that support digital transformation. Visit <http://bit.ly/ROKEncompass> to learn more about how they can help you.



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Smart systems that generate meaningful data to unlocking valuable insights about what's going on in your facility are at the heart of digital transformation. Devices, controllers, HMIs, analytics, networks and more.

It can seem overwhelming and expensive, but a well-planned and executed strategy can set up your company for success. □



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AUTOMATION FAIR EVENT

EXPANDS HUMAN POSSIBILITIES

Largest-ever gathering of industrial automation professionals shines light on new technologies and solutions designed to help connect and improve industrial processes.

By Amanda Joshi, Managing Editor



The spirit of collaboration and innovation. New, exciting partnerships. Technology designed to disrupt, improve and connect industrial automation in new ways. Bright-eyed innovators. All were present at the 2019 Automation Fair® event held Nov. 20-21 in Chicago, where expanding human possibilities — a message Rockwell Automation has embraced as its driving force in this next industrial evolution — took center stage.

In what Rockwell Automation CEO Blake Moret called its “biggest and best Automation Fair,” a record-setting 19,000 industrial automation professionals from across the globe converged at McCormick Place West to attend industry forums and networking events and to learn about the newest innovations in automation.



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Automation Fair®

Attendees had the chance to share information about the latest control system network infrastructure using IP-based networks such as EtherNet/IP™, safety, power and information technologies that support The Connected Enterprise.

Event goers visited more than 150 exhibits displaying the latest automation products and solutions from Rockwell Automation and its PartnerNetwork™ program members, including Encompass™ Product Partners, Solution Partners (system integrators), OEM Partners and Strategic Alliance Partners. Many booths showcased companies' digital technologies and IT/OT capabilities that help deliver improved connectivity, safety, security, and equipment and process performance.

In addition to the hands-on exhibits, Rockwell Automation provided free educational offerings with 98 technical sessions and 29 hands-on labs, covering the latest control, power and information technologies to help enhance customers' innovation, productivity and collaboration.

In nine industry forums, Rockwell Automation specialists, partners, customers and other industry professionals shared what they've learned about industrial solutions that help address common challenges.

Further education took place just prior to the Automation Fair® event during the popular Process Solutions User Group (PSUG) held Nov. 18-19 at McCormick Place West.

Key Collaborations

Rockwell Automation kicked off the 2019 Automation Fair® event with its Perspectives global media forum on Tuesday, Nov. 17, where Moret announced the company's new partnership with **Accenture**. Rockwell Automation



"At the heart of Automation Fair is the special, unmatched relationship we have with our partners." — Blake Moret, CEO, Rockwell Automation

>> Automation Expands the Art of Craft Brewing

At one exciting PSUG customer application session, Jim McCabe, founder of Milwaukee Brewing Co. and a former Rockwell Automation system integrator, explained how automating his brewing processes increased the human possibilities and expanded capacity.

The automation system runs Rockwell Automation FactoryTalk Craft Brew. With the software, "Brewers can focus on the product, not running around turning valves off and on. Automation expands what people can do. State-of-the-art automation gives them the ability to focus on the art," explained McCabe.

In numbers, the brewery's new facility and automated processes has reduced its average brew time from 6.5 to 2.5 hours. Malt consumption per batch, typically 3,000 to 5,000 lbs., has been reduced by as much as 500 lbs. And average yield has increased from 70% to more than 90%, McCabe said. "Lately, 93%, because you're not flipping things by hand."

Read more about the craft brewing plant's operations at <http://bit.ly/2M1OYJq>.

and Accenture's Industry X.0 will team up to develop a digital offering designed to help industrial clients move beyond existing manufacturing solutions to transform their entire connected enterprises. This will help capitalize on the expertise of both companies to deliver new capabilities for greater industrial supply-chain optimization.

"We love the open innovation approach," explained Mike Sutcliff, group chief executive, Accenture Digital, who joined Moret on stage. "The collaboration will allow companies to look across supply chains in addition to in the plant. It enables optimization across the factory, the supply chain and the enterprise."

The partnership will allow clients to leverage the Industrial Internet of Things (IIoT) and has already yielded, among other early-stage successes, a prototype for supply-chain management designed to deliver supplier cost optimization and an improved ability to track the exact movements of products.

"By teaming up, we reduce complexity, reduce risk and achieve better results with comprehensive, enterprise-wide expertise," explained Moret. "Our approach is to bring

YOU MAKE IT CHALLENGE



You Make It Challenge Met With Vigor

While partnerships and technology designed to boost operations certainly took the spotlight, young innovators and the finalists of the You Make It Challenge sponsored by Rockwell Automation provided some stiff competition and attracted the attention of Automation Fair attendees.

Back in early June, the You Make It Challenge contest invited young inventors to submit their big ideas to solve big problems. Three finalists were selected and paired with Rockwell Automation mentors who helped the kids fine-tune their ideas. The finalists then presented their projects at the Perspectives global media forum. Judges were Tessa Myers, Rockwell Automation president, North America; Pam Murphy, COO of Imperva and a Rockwell Automation board member; and Rockwell Automation chairman and CEO Blake Moret.

The three finalists were Louisa Wood, Bayside, Wisconsin, mentored by Tracy Swartzendruber, manager of the Rockwell Automation global website portfolio; Makai Samuels-Paige, Atlanta, mentored by Dave Vasko, Rockwell Automation director of advanced technology and strategic development; and Michael Wilborne, Roanoke, Virginia, mentored by Mike Pantaleano, director of business development architecture and software for Rockwell Automation.

16-year old Wood designed a smart pump usage monitor and predictor that empowers home and business owners to protect themselves from potential flooding and other forces of nature. Her system employs machine-learning algorithms partnered with local weather data to enable

The three finalists of the You Make it Challenge contest pose with their mentors and the judges.

the program to adapt to each installation and predict when a pump will overflow or when parts are likely to fail.

“My goal is to end bullying,” said 11-year-old Samuels-Paige as he described his invention, an anti-bullying backpack. He upgraded a standard school backpack with a pair of WiFi cameras to provide livestream monitoring of bullying behavior, a mobile hotspot to enable constant communication with administrators and parents, and a battery pack to ensure that cell phones are always charged. The science fair project has been turning heads and recently was approved for a patent.

Wilborne, inspired by his parents’ missionary work in third-world countries, developed an upgraded microflush toilet that can provide the benefits of modern sanitation with less reliance on the raw materials traditionally used to construct them. In short, Wilborne’s toilet minimizes the need for concrete and simplifies the waste-processing steps. The mature 12-year old said of his project, “I feel really encouraged to do more in the world.”

The judges, along with attendees at the media event, voted Wood’s smart sump-pump system as the grand prize winner, earning her a package of prizes that includes a grant to a FIRST robotics program, a 3D printer, a computer and a STEM workstation.

For more about the finalists and their presentations, visit <http://bit.ly/2YLZIGD>.

the Connected Enterprise to life by understanding our customers. We're combining technology and domain expertise to deliver the best possible outcomes. We're applying technology to save time and money in industrial company processes. Simplification drives productivity.

In addition to the venture with Accenture, Rockwell Automation also capped off the first month of its joint venture with Schlumberger, called **Sensia**, combining process control and petro-technical expertise with digital transformation to drive more efficiency from operations.

The company also announced a new strategic partnership with **ANSYS** to help customers design simulation-based digital twins of products, processes or manufacturing. Historically, manufacturers would dedicate an unimaginable amount of time and money to develop and test physical product prototypes. Now users can design and test through simulation to accelerate development and analysis, improving product quality and reducing testing time across their organization.

Rockwell Automation also celebrated the first anniversary of its partnership with **PTC**. This collaboration's inaugural year has yielded advances in OT/IT integration, and received broad industry recognition for the joint FactoryTalk InnovationSuite™ platform.

Rockwell Automation lives on innovation, unlocking the creative spirit in existing employees, new people and its partners, explained Moret. "At the heart of Automation Fair is the special, unmatched relationship we have with our partners," he said.

PSUG Addresses Industry Challenges

At the PSUG meeting held Nov. 18



Dave Rapini, PlantPAx business manager, shares details with PSUG attendees on the company's new purpose-built process controllers and PlantPAx v.5 scheduled to launch this summer.

in Chicago, Rockwell Automation presented attendees with a "sneak peek" of the new PlantPAx® v.5 distributed control system (DCS), expected to launch this summer. The latest release drives a modern approach to solving industry challenges throughout each phase of the plant life cycle.

Timed to coincide with the 10th anniversary of PlantPAx's introduction, version 5 is designed to simplify operations, optimize production and support life-cycle needs, according to Jim Winter, director of the Rockwell Automation global process business.

"Industry 4.0 is upon us, and things are really happening," Winter said, addressing the more than 1,000 PSUG attendees from 16 countries. "But challenges remain, many arising from how process control has been done in the past."

Much process data remains segregated in silos, making it difficult, expensive and sometimes impossible to pull together, he added.

To address these issues, David Rapini, PlantPAx business manager, showcased several key features of the new version, including native objects, reduced footprint, automatic diagnostics and integrated HART communications. The system also comes analytics-enabled and is increasingly cybersecurity.

In addition, PlantPAx v.5 will be introduced concurrently with two new purpose-built process controllers: the CompactLogix™ 5380 for skid applications and the ControlLogix™ 5585 for DCS applications.

These two new "superset" process controllers are specifically designed for process applications, but "they're part of the family, they preserve your investment in our tools and training," Rapini said.

For more details, see <http://bit.ly/36wg03u>.

PSUG attendees also learned of other process improvement capabilities in technical and customer application sessions. Designed to



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Min. 250 ms For wireless slave

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Signal response time: **5 ms**

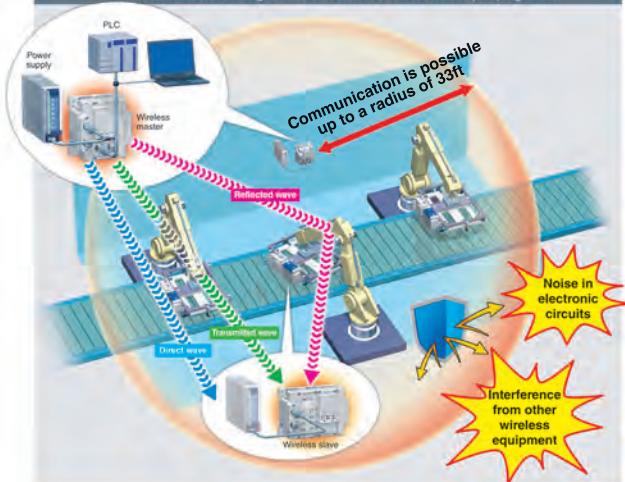
Communication cables not required

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help users improve their processes and create new revenue streams, the sessions showcased real results using the process solutions available from Rockwell Automation.

For instance, Kevin Seaver, general manager, Bioprocess Automation and Bioprocess Digital, GE Healthcare, shared how his company collaborated with Rockwell Automation to streamline the process controls and automation of its bioreactors, FlexFactory production lines, and shipping container-based, clean-room units it operates worldwide. To learn more about this project, visit <http://bit.ly/2S20DvC>.

Chevron divulged its challenges in commissioning facilities in the Permian Basin to separate and store oil and water, about one per year, each with three separators and six tanks. It's also doing property swaps with other companies in the basin to take advantage of common infrastructure. As a result, it's integrating about one system per week, each with similar equipment but often, different control systems.

"There are at least five things to integrate — PLC, local touchscreen, control room graphics, PI historian, and decision support center graphics — that must be done in series," said Todd Anslinger, Industrial IoT Center of Excellence lead, Chevron. "Then, we have to verify every step to rule out human error. At the same time, human resources says we must double the number of facilities with just a 30% increase in head count."

Learn how Anslinger used a unique publish/subscribe protocol to save time and bandwidth at <http://bit.ly/38DGTnN>.

Partners Bridge Connections

Members of the Rockwell Automation PartnerNetwork program helped visitors learn more about many connectivity and industrial automation solutions. Some of those can be found in the "Product Focus" section starting on page 37 of this issue. In addition, here are few technologies that created buzz at the show.

The Amadeus modular machine vision platform by Encompass™ Product Partner **Hermery**, uses a unique modular architecture, incorporating industry standards to enable easier integration with both Hermery and other automation components.

Configuration and control of all machine vision components, including cameras, lasers and illuminators, are easily performed from a centralized computer. A high level of synchronization within the platform enables machine vision devices to work together in a collaborative manner.

Encompass™ Product Partner **Zebra Technologies** showcased its single-finger RS5100 Bluetooth ring scanner

>> Watch Videos from the 2019 Automation Fair Event

Get highlights from 15 of the top exhibitors in three-minute videos featuring some of the most innovative and reliable technologies featured at the Automation Fair event. Visit <http://bit.ly/2019TJyoutube> to see demonstrations from companies in the Rockwell Automation PartnerNetwork program that include:



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Maplesoft
MTS Systems Corp., Sensors Division
Southwire Company
Spectrum Controls Inc.
Stratus Technologies
Zebra Technologies Corp.

that helps improve worker productivity by freeing up workers' hands for inventory management, picking, packing and sorting applications in industrial environments. Zebra's smallest and lightest ring scanner offers a long battery life and features a single-sided- or double-trigger to enable workers to use gloves or bare hands for all-day comfort.

Emulate 3D software from Rockwell Automation allows users to develop a dynamic digital twin that helps



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reduce risks and costs by allowing them to design, prototype, and test the application before physically commissioning the control system.

Operator training can also happen concurrently in a safe environment without disruption to existing production.

Forums Offer Industry Insight

In addition to checking out technologies on the show floor, visitors gathered at the industry forums to hear case studies and panel presentations offering real-world examples of how companies have increased their productivity and improved efficiency. Representatives from various companies not only shared their automation technology experiences and applications, but also provided insight and trends shaping their respective industries.

For example, in the **Water and Wastewater Industry Forum**, attendees absorbed a presentation on the challenges and successes the City of Fort Myers, Florida, faced when it needed to upgrade controls and electrical equipment at two of its wastewater treatment plants. The municipality discovered novel approaches to project management and system architecture that resulted in cost and time savings, and significantly increased capabilities compared to other modern, but more conventional, approaches.

The Fort Myers Central wastewater plant is rated for 11 million gallons per day (MGD) with 2 MGD nonpotable reclaim water and irrigation facilities. The South plant is wastewater-only, rated 12 MGD without reclaim. Together, they serve the City of Fort Myers and much of Lee County, and are staffed 24/7 with a total of 20-25 certified, trained operators, and an annual budget of \$4.5-5 million.

The project goal was to upgrade or replace obsolete and aging electrical infrastructure as well as the PLCs, which were variations of SLC™ 500s and PLC-5s. “There was no documentation — schematics were drawn on the inner walls of the cabinets,” said Jeff Krawczyk, water infrastruc-

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ture group sales manager, **Commerce Controls**, Novi, Michigan, which served as system integrator for the upgrades. Commerce Controls also is a Rockwell Automation Solution Partner in the PartnerNetwork™ program.

The project contract involved an alternate delivery method called construction manager at risk (CMAR), and included a re-electrification project to upgrade or replace motor control centers (MCCs) and variable-frequency drives (VFDs). “Using a construction manager eased owner management and minimized cost,” Krawczyk said. “By showing the client the advantages, we were able to pull the MCCs and VFDs into the system integrator work.”

The team decided on an all Rockwell Automation system due to ease of programming and deployment. Commerce Controls procured the software, PLCs, MCCs and VFDs, and worked with the owners on the graphical presentations. Throughout the course of the graphical workshops, they used PlantPAX graphics that were modified with color as needed to meet the users’ preferences.

Commerce Controls performed the FAT in Novi, Michigan, where the panels were assembled, the drives were connected and a fiber optic ring was installed. “It involved 140 vertical sections for the two facilities,” Krawczyk said. “Between the two facilities, we built 15 control panels, with one in each facility used for redundancy. There are 21 client SCADA workstations, and a total of about 225 analog points, and 500 digital points.” On the SCADA HMI, users can click on a server to bring up system health, I/O memory in use, primary server status, and which controllers are connected. Dual redundant fiber optic Ether-

net rings run through the plants, as “network segmentation and communication response time are very important,” he added.

Read more about the lessons Commerce Controls learned from the project at <http://bit.ly/2sDLfLa>. □



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DIGITAL TWINS

GO BEYOND IMPROVING MACHINE DESIGN

By enabling pretesting of machines or production lines, virtual operator training and enhanced maintenance, simulation helps improve long-term performance.

By Matt Masarik, marketing manager, Design Software, Rockwell Automation



Digital replicas of real things help us make all kinds of decisions in our daily lives.

Online street maps help us get around and know how traffic will affect our drive time. Virtual tours allow us to explore a new house without stepping inside it. And virtual seating helps us see how close we'll be to the action at games and concerts, and even what view we'll have.

A new kind of digital replica known as a digital twin has recently taken hold in the business world. It's a virtual, model-based recreation of a physical thing — like a product, machine or even an entire production facility. And it

can help you make better design, production and maintenance decisions in some profound ways.

If you're a machine builder, you can design and prototype machines, and test their performance using real-world physics, long before you cut steel. You can also virtually commission machines to avoid last-minute surprises when you're on-site with an end user.

If you're a manufacturer or other industrial firm, a digital twin can help you design and verify a new line or production site before you buy equipment. You can also better prepare operators by using a digital twin for virtual

training. And you can use a digital twin to help inform and guide maintenance activities to reduce downtime.

A Living, Learning Model

Simulation is already used in manufacturing to examine important factors such as the key performance indicators (KPIs) that you want to improve. For example, you might simulate the operation of a car to predict its fuel efficiency.

A digital twin takes that idea and builds on it, because it's a living digital replica that changes over time. So, with a digital twin, not only could you predict the car's fuel efficiency when a buyer takes the keys, but you also could predict how and when that efficiency will degrade.

You could even predict when the buyer should take the car in for maintenance. A digital twin could not only use measurables like mileage driven and time elapsed, along with a model of the car's wear based on other factors such as temperature and driver behavior, to predict maintenance needs.

Reimagine Your Business

When it comes to how a digital twin can improve how workers do their jobs and make decisions, the use cases are endless. But some applications are proving to bring the most value to industrial design, operation and maintenance activities. These applications include:

Virtual Design and Prototyping: A digital twin allows designers to create machines and put them through their paces in the digital world, before building them in the real world.

This could be something as simple as verifying a mechanical fit or clearance in a machine. Or it could be some-

thing more advanced, such as using mathematical models to understand how a machine will behave once it's built.

With these capabilities, designers can build better machines, minimize rework and get to market faster at a lower cost.

Virtual Commissioning: Nobody likes the surprises and changes that spring up during commissioning. But for many, these issues are simply considered a cost of doing business.

With a digital twin, you can get ahead of problems in areas such as controls integration and line sequencing that can disrupt commissioning and delay production start-ups. You can create a virtual machine that uses real operational logic and connects to a control system. Then you can test, debug and verify the machine's performance before you commission it.

Immersive Training: When training is shifted from the real world to the digital space, operators can learn more and make mistakes without consequence.

Using a digital twin, operators can learn and interact with the systems they'll be using in a safe, virtual environment. They can be trained in normal and exceptional scenarios. And they can be required to demonstrate procedures, awareness and effectiveness before they start working in a real production environment.

Virtual training can also reduce training costs. Instead of traveling to a training location or relying on equipment being available, trainees can access everything they need digitally.

>> The Machine Life Cycle Reimagined

In the life of a machine, there are lots of "if only" moments: If only you knew a conveyor or filler was slightly off before you built the machine; if only you knew of controls-integration issues before you brought it on site.

Emulate3D digital twin software from Rockwell Automation can address those real-world issues in a digital format to help build better systems, commission with confidence, sharpen operator skills and improve production. It helps users rethink what's possible in the design process. With virtual design and prototyping, users create the machine and put it through



its paces in the digital world before building it in the real world.

With virtual commissioning, users can connect a machine to a control system earlier, to resolve logical operation or sequencing issues, avoiding last-minute surprises and changes. Train workers

in a virtual environment using realistic conditions by simulating scenarios and introducing faults to your digital system.

Also see what configuration changes are needed to run a new product at optimal throughput, or to help a technician more quickly repair an asset.

Knowledge-Driven Operations: A digital twin can change how you see, run and manage production.

For example, you can use real-time 3D simulations to see how to run products, machines and facilities at optimal throughput. In one case, a food maker used a digital twin to test and validate a facility upgrade prior to implementation. This helped the company achieve 80% less downtime and a more than 10% throughput increase.

Running a digital twin in parallel with a real machine can also help you see where a problem might arise as the machine's performance drifts away from the model. A digital twin can even use internally calculated properties to create virtual sensors, which can temporarily replace a faulty sensor or eliminate the use of a physical sensor altogether.

Guided and Predictive Maintenance: Technicians can use a digital twin in several ways to reduce downtime or even get ahead of it.

For example, technicians can look at a digital twin of a machine within an augmented reality (AR) environment to troubleshoot it before they shut it down. Then, they can use the AR technology to get work instructions digitally overlaid on the physical machine to quickly and accurately repair it.

Creating predictive models from a digital twin can also help technicians see failures before they happen. The required maintenance can then be scheduled during a planned shutdown.

Increasingly Essential Tool

Digital twins are transforming industrial operations. They're elevating how people interact with machines and processes, while expanding the potential of future workforces. And as digital twins become further ingrained in today's rapidly changing, more technology-driven industrial environments, their value will only grow. □

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HOW ECOMMERCE IS IMPACTING PACKAGING EQUIPMENT DESIGN

Systems such as independent cart technology can help OEMs guide manufacturers in managing the high-mix, agile packaging that consumers demand.

By Justin Garski, solution architect, Mechatronics, Rockwell Automation

>> How do you automate the packaging process in a made-to-order world? Consumer demand for different sizes, shapes and flavors has completely changed the way consumer packaged goods (CPG) brand owners and manufacturers produce and package their goods. And for OEMs, this trend means that packaging equipment needs to perform differently than ever before.

The reality is, most packaging lines aren't equipped for rapidly changing demand. Conventional conveyance just can't keep up. Producers are finding themselves in a highly manual conundrum of delivering in this high-mix environment without the proper automated packaging solutions to make it cost-effective.

The Amazon Effect

The Amazon effect has an unquestionable impact on how retailers go to market. However, the underlying movement of changing consumer demands and expectations goes

far beyond brick or click shopping habits. Manufacturers are equally pressured to produce and package high-mix, low-volume products as demand for specialization and variety packs is increasing fast.

Imagine a dozen products running through the same packaging line. A product might run for a few days, then the hours-long changeover process takes place, causing all work-in-progress to stop before the next product has its turn. This practice can mean building up a month's worth of inventory for each product because it could be that long before it gets time back on the line again.

This scenario isn't uncommon. Living with lengthy changeovers is something producers do because, given budget constraints and legacy systems, they have no choice.

Through an army of delta robots, a variable-pitch infeed and a couple of smart valves, most machines in operation can expand pack sizes, from six to 12 to 24. It

Operations leadership needs to know how advances like ICT can help solve not only production challenges but also business challenges.

takes a while for the changeover, hurting productivity, but it's possible.

With the Amazon effect however, you might need a variety of flavors in each of those six, 12 or 24 packs. From here, things get manual, really fast. Top CPG companies and local producers alike are finding themselves unpacking single-product packs and manually repacking into rainbow packs. Picture the packaging waste. The money lost. The already critical challenge of finding workers, compounded by needing even more manual labor.

OEMs have an opportunity to solve these challenges for customers using efficient, agile and intelligent automated packaging solutions.

Think Beyond Current Needs

Independent cart technology (ICT) and other systems can be a useful alternative to the throughput and physical limitations of existing mechanics. But you have to go beyond the specs.

The typical equipment order process goes something like this: Purchasing or engineering is charged with buying a machine for a certain application and send out a request for quotation (RFQ). OEMs quote the machine without too much deviation, or risk losing the sale.

Now, fast forward to after the job is won, machine is built and the executive team shows up for the factory acceptance test. The machine they see isn't built for a more flexible future. It doesn't offer one-button changeovers, different pack patterns or solve their greatest business challenges. With this audience, the added upfront costs for the right packaging equipment becomes secondary as they see an inevitable future of costly modifications and retrofits down the road.

Operations leaders can examine how technology such as ICT can help solve production and business challenges. And, this process all starts before there's a project on the table. Before the RFQ goes out. Before there's a directive to buy for X, when everything from A through Z is still possible.

Case in Point

Aagard, a maker of custom automation equipment and a Machine Builder Partner within the Rockwell Automation PartnerNetwork™ program, recently saw this scenario play out with a customer.

Aagard learned of its customer's business challenge, to automate packaging of variety packs in various configurations — 4,000 configurations to be exact. These ranged from one to six flavors and 12 to 96 products per case. And, with stand-up display trays, divider sheets, tight floor space, fast changeover and high-end line rates (100 cases per minute), it became clear that traditional packaging technology wouldn't offer the agile solution the customer really needed.

Competitive proposals involved dozens of delta robots over a conveyor, adding up to thousands of components including rotary motors, gearboxes, grippers and other complexities. With the agility and ease of operation needed, an automated packaging solution built around iTRAK® technology from Rockwell Automation became a simple answer.

This project didn't start with an RFQ, or a call from purchasing. Representatives from Aagard, Rockwell Automation and the end user sat in the same room and envisioned a machine that could do something never done before.

"The key to success in this situation was to focus in on the business need and evaluate available technology," says Jason Norlien, vice president of technical sales at Aagard. "We created a solution built for future market demand and business growth."

Rockwell Automation-controlled gantry robots will pick the product for staging, building the pattern needed for each carton. From there, iTRAK components adjust to accommodate the height, width and overall pack configuration and select the right-sized cardboard blank to fit the product. This is done without tooling changes. Only the single push of a button on the human-machine interface (HMI).

That same instruction from the HMI could also come from a supervisory or ecommerce system. So, as the Amazon effect takes a deeper hold in CPG, custom orders can be easily accommodated without manual intervention.

A Smarter Way

Whatever the solution, manufacturers need to stop unpacking just to repack. To stop modifying and retrofitting for each change in consumer behavior. There is a smarter way, and it starts with packaging equipment manufacturers thinking ahead, educating up front and being business enablers. □



UNDERSTANDING SQL DATABASES & TRANSACTION MANAGERS

Learn about relational databases and how transactional managers download production parameters to a PLC to help streamline the OT/IT convergence process.

By Deane Horn, director of marketing, Softing Inc.



Imagine you're manufacturing an automotive part, such as a wheel.

Let's say the wheel is type "premium mag wheel." Thousands of parameters describe how that wheel will be made, such as size, color, where to drill holes, size of holes, wheel spokes and more. This is called the **recipe**.

The recipe is different if the customer orders "black premium mag wheel" vs. "gray premium mag wheel." Because the data is a collection of parameters and is dependent on the production line or customer order, we say the data has context. Data that can be changed in real time in context with production needs is much more complex than typical programmable logic controller (PLC) static data used to carry out repetitive tasks.

A recipe is a great example of complex data; it's a collection of parameters. And, if you manufacture 10 different wheels, you need 10 different recipes. What does a recipe look like to a PLC? The answer: a table (see **Figure 1**). A

table has rows and columns. For this wheel example, you'll have one recipe per row, and each column will have the parameters of the recipe — paint type, paint level, etc.

PLCs have challenges with tables. Why? The memory and performance of a PLC is optimized and dedicated to production, moving machines, moving product, making product — simple data. Complex data requires more memory. In PLCs, memory is expensive.

What platform would be good with handling complex data and tables and relieving the burden and risk from the PLC? An SQL database.

Function of an SQL Database

What's an SQL database? You can visualize it as a table, and most likely, you have one! Your IT manager probably is already using an enterprise SQL database across your company to share information throughout your organization. Why? Because businesses need to share information

across the company, and an SQL database is designed for this.

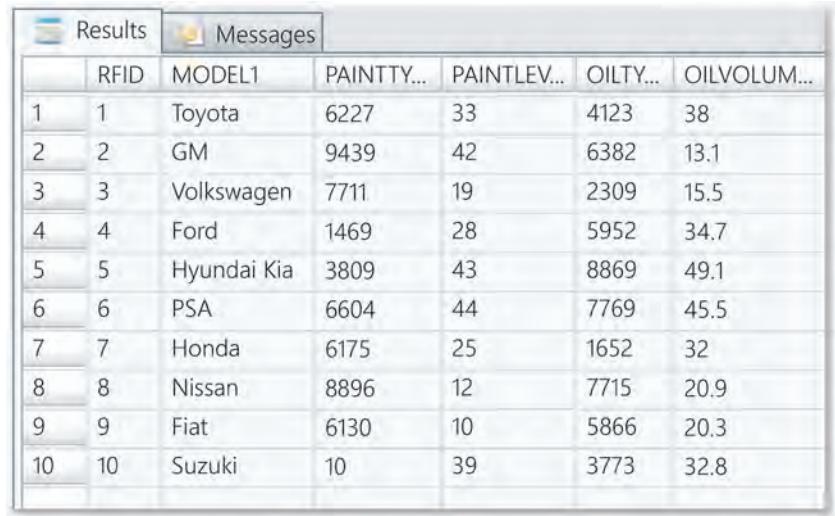
If an order comes in, the order is placed in an SQL database. If a sales manager wants a report on sales, she pulls this from the SQL database. If production needs to build the product that was just ordered, guess where the production department gets the order details? The SQL database. After the part is built, the performance, quality, and metrics can be stored in the SQL database. Reports can be generated, and processes improved, by pulling these metrics out of the SQL database and analyzing relations across data sets.

SQL databases are optimized for storing data with tight control so only *approved* users get access to *certain* data. The SQL database runs on powerful PC servers, with tons of memory, tons of storage, with redundancy, with failovers, in multiple locations to help ensure the whole company is always online.

So why are you putting recipes in your PLC? Why are you storing production key performance indicators (KPIs) and quality parameters in your PLC? You could be using these towers of servers and databases you already have in your plant, and you could relieve a huge burden from your PLC.

You're probably doing this because you are in control of the entire process, and you're good at getting things done yourself. At some point, however, the PLC will reach its limit, and the process will get a little risky. Now it's time to step back and architect this solution in a different way.

How can you ease this burden from your PLC and tap into this massive resource, your enterprise SQL databases, or other databases that you already have in your facility? It's pretty easy, and we're going to



	RFID	MODEL1	PAINTTY...	PAINTLEV...	OILTY...	OILVOLUM...
1	1	Toyota	6227	33	4123	38
2	2	GM	9439	42	6382	13.1
3	3	Volkswagen	7711	19	2309	15.5
4	4	Ford	1469	28	5952	34.7
5	5	Hyundai Kia	3809	43	8869	49.1
6	6	PSA	6604	44	7769	45.5
7	7	Honda	6175	25	1652	32
8	8	Nissan	8896	12	7715	20.9
9	9	Fiat	6130	10	5866	20.3
10	10	Suzuki	10	39	3773	32.8

Figure 1. A recipe is a great example of complex data; it's a collection of parameters in the form of a table. PLCs have challenges with tables, so an SQL database can handle this complex data.

cover these three aspects: prep the PLC, prep the SQL database, and implement a transaction manager between the PLC and SQL database.

Prep the PLC

You have to do some prep work in your PLC. You'll no longer need hard-coded recipes, 1,000 constants x 10 different wheel types, in your PLC. Instead, change these constants to tags, or UDTs, in your PLC. Why? You'll have one logic code base, now using variables, and you'll be able to update the variables each time you have a different part to manufacture — each time there's a new recipe to download from the SQL database to the PLC.

How will you update these variables in the PLC for any of the 10 wheels you want to manufacture? That's where the SQL database enters the picture. You are going to store the 1,000 constants x 10 wheels in an SQL database table. The data in the SQL database will only be downloaded to the PLC when needed; your facility servers and transaction manager will carry the burden of

storing and responding to requests for information.

How do you prep your SQL enterprise database? You, the control engineer, need to be prepared to guide your IT manager who owns the SQL database. Next, we'll cover what your IT manager needs to know.

Creating an SQL Relational Database

Your recipe will be stored in what's called a **relational database**. If you've never worked with an SQL relational database, that's OK. Your IT manager is an expert in SQL. If you're a control engineer or systems integrator, here is your crash course on communicating to the IT manager your project requirements.

For your IT manager to create the table in the SQL database, you'll need to provide him/her with three pieces of information: 1) headers 2) recipe names, and 3) recipe data (see **Figure 2**).

The **headers** are at the top of each **column**. Headers are just a short description, or a column title, for your data. If you use Microsoft Excel

as your tool to build a template, you can start by defining headers in the spreadsheet and placing those at the top of each column.

In an SQL database, each **row** is called a **record**. Recipe names are placed in the first cell of each row, as shown in Figure 2. If you have 10 recipes, you will have 10 rows, or records.

Why is it called a record? In a relational database, there are 4 main tasks that we do: **insert** records, **select** records, **update** records, and **delete** records.

You'll use the "Select" command for our example since we are getting recipes from the database and downloading recipes to the PLC. In your recipe spreadsheet, put the recipe name in the first cell of each row.

And finally, you need to fill your recipe spreadsheet with **data**. This means for each recipe, fill in the data values, which will be constants, for each column. For example, for *header* "color" and *recipe* "premium mag wheel" the data value will be "black," as shown in Figure 2. Now your spreadsheet has recipe names, column descriptions and data. This is all the IT manager needs to build the SQL table.

Now, we've just walked you through building the SQL database template for the hardest example – recipe downloads.

Another extremely useful application for the SQL database is the "insert" command. This also happens to be the easiest command to use, because absolutely no PLC logic is required to change. In this case, we're inserting values into the database from the PLC. "Inserts" are used when we're monitoring and storing PLC tags in the SQL database. For example, when we monitor KPIs or product quality, we insert these tags into the SQL database.

After the PLC tags are created and SQL table is created, how does data move between the PLC and the SQL database? How does a recipe get downloaded from an SQL database to a PLC? To get data moving between the PLC and the SQL database, you need a transaction manager.

What is a Transaction Manager?

What does a **transaction manager** do? Let's say your goal is to download a recipe. We'll use the "Select" command, because we're getting a recipe

from the SQL database. Now that your tags are set up in your PLC, and tables are set up in your SQL database, the transaction manager will log into the PLC, log into the SQL database, and browse both tags (**destination**) and tables (**source**).

The transaction manager contains the connections between PLC tags "whl colr" and table records (wheel color) known as a **map**. What initiates data movement? The transaction manager handles triggers, which initiates data movement.

Perhaps you want a barcode scan to be the trigger for a transaction. If the barcode scan read equals "prem mag wheel," the transaction manager recognizes this trigger and uses the barcode scan value as the trigger and lookup value to select "prem mag wheel" from the SQL table (first recipe in our example), which will return all of the data in that row, for that recipe, and load it into the PLC.

The transaction manager controls the world between the PLC and the SQL database, and it's unique because it completely understands both PLCs and databases so that we don't have to. The transaction manager contains the data maps, data sources, data destinations, triggers to initiate

Figure 2. For your IT manager to create the SQL database, you'll need to provide him/her with three pieces of information: headers, recipe names and recipe data.

Recipe name	Color	Size	Speed	Dry time	Hole size	Thread size	Hole spacing
Premium mag wheel	Black	20"	1000rpm	20 min	13/16"	20	3"
Gray mag wheel	Gray	19"	1000rpm	20 min	13/16"	20	2.5"

Businesses need to share information across the company, and an SQL database is designed for this.

a transaction, and SQL commands (such as “selects” or “inserts”).

The transaction manager also handles failover scenarios such as redundant paths, failover servers, or store and forward when the network goes down. It provides email alerts upon successful transactions or status tags when it's critical to confirm that transactions completed.

Transaction managers come in many forms:

- Software that runs on a PC with protocol conversion.
- Industrial gateway DIN rail devices.
- In-chassis PLC modules.
- Software code you write yourself on a PC.

Final considerations might include failover scenarios. Consider what you want to do if the network goes down, if an SQL database goes offline, or if the PLC goes down. Also consider how you want to receive status of transactions. The transaction manager can handle all of these scenarios to help ensure easy setup, maximum production uptime, simplified tuning, and predictable deployment, support and scalability.

Another burden that is lifted from you in this operations technology (OT) to IT convergence is that your facility servers now will take care of nightly backups and safeguard your data. When you need a new recipe or need



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to monitor a new production parameter, in some cases, you can make upgrades on the SQL database side and not have to touch the logic in the PLC. That reduces a lot of risk.

Use This Practical Information

Before you get started, what are the project considerations in addition to connectivity you should be thinking about? Speed of transactions, network outage scenarios, database outage scenarios, security, are there other PLC's you need to connect as data sources, transaction notifications (successful or failures). These are easy tasks that a good transaction manager will handle for you. You just need to think these through and discuss them with your project team.

Use this article, make notes, create a team, identify work processes, data, sources, transaction manager, and create an action plan. With a team approach, you'll save a lot of time, have fewer roadblocks, and end up with a more successful project. □

Softing Inc., based in Knoxville, Tennessee, is an Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program. Softing develops products for connectivity and for monitoring and troubleshooting network communication health, including its tManager solution that performs bidirectional data transactions between SQL databases and ControlLogix™ PLCs or CompactLogix™ PLCs.

>> eBook Explains Trends Affecting Industrial Automation

Want to know what's going on? The 2019 Industrial Automation Trends eBook explains 10 dominant trends impelling industrial firms' efforts to implement smart manufacturing strategies, including digital twins, IT/OT convergence, edge computing and more. Download it free at <http://bit.ly/tj19trends>.



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For organizations embarking on digital transformation through Edge Computing platforms, the continuous availability of mission-critical applications is paramount to them. Organizations are adopting Edge Computing to ensure peak performance and drive real, pragmatic business value.



As a Global Encompass™ Program Partner, Stratus simplifies, protects and automates 24/7 availability and remote management for Rockwell Automation customers running a variety of plant applications — all within a converging OT and IT environment. <http://bit.ly/ROKStratus>

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AMCI's new SV160E2 integrated servo motors reduce system costs by eliminating the need for a separate servo drive, controller, motor and cabling; they're all built-in. Additional software is not needed because move commands are programmed through Studio 5000®, and the SV160E2's EDS files and sample programs help to streamline the product's initial set-up and programming. Features include dual port EtherNet/IP™ networking with Device Level Ring (DLR), built-in web server, absolute encoder and virtual axis follower. Call AMCI today at 860-516-8771 to learn more. <http://bit.ly/2mvdjuf>



ADVANCED MICRO CONTROLS INC. (AMCI)

>> FactoryTalk Batch Release

Industrial producers with batch applications can now create more flexible, reliable and productive operations with the latest release of **FactoryTalk® Batch** software from Rockwell Automation. The software is designed to improve productivity of design teams and will assist operations with improved system reliability and enhanced mobility features.

A key feature of the release is the ability to make online edits for plant areas that require a high degree of control and flexibility while remaining in production. As needs change or as custom recipes are introduced, operators can make changes without having to take portions of the system offline or placing the batches on hold.

Additionally, more complex operations will be able to create dynamic flows and recipes with the introduction of formulations to provide options to improve throughput and yield.

Additional improvements focused on mobility, secured architectures and data integration tools will help ensure system adoption for changing workforces and the ongoing needs for enterprise intelligence.



>> Load Cell Input Module

The Helm HM-SCM4-WM load cell input module from Encompass™ Product Partner **Helm Instrument Co., Inc.** features four independent channels of analog input designed for users requiring load cell or weigh scale input. Connectivity is via dual EtherNet/IP™ ports.

The module features DIN rail mount and with dual EtherNet/IP ports, enables seamless integration to any PLC process weigh solution. An onboard microprocessor provides an RPI data transfer of 1 ms for all channels. Resolution is up to .0025% of full scale with accuracy at .01%.

Calibration, vibration filtering, auto tare and process parameters are software selectable.

The module is compatible with industry standard weigh scales and load cells, including the Helm product line of standard and custom designed load cells. Mounting dimensions: 4.65H x 1.77W x 5.67D.



>> PRODUCT SPOTLIGHT

Sonic Imager for Leak Detection

The Fluke ii900 sonic industrial imager from Encompass™ Product Partner **Fluke Corp.** enables maintenance teams to quickly and visually pinpoint the location of compressed air, gas, and vacuum system leaks even during peak production periods. Leaks can be detected in a matter of minutes.

With minimal training, technicians can identify compressed air leaks considerably faster than using traditional diagnostic methods. Now checking for air leaks can be performed during the typical maintenance routine.

An array of microphones combined with the new SoundSight technology allow the hand-held imager to filter out background noise so maintenance teams can accurately locate leaks in compressed air systems, even in the noisiest environments.

The seven-inch LCD touchscreen overlays a SoundMap on a visual image for quick leak location

identification. The straightforward interface allows technicians to isolate the sound frequency of the leak to filter out loud background noise. Images can be saved and exported for reporting purposes.



>> ArmorBlock I/O Modules

The new **Allen-Bradley® ArmorBlock® I/O modules** can operate in a range of temperatures and offer up to IP69K protection in applications such as automotive, material handling, packaging and welding.

The ArmorBlock I/O options can be mounted anywhere on a machine for shorter cable runs and lower wiring costs. They use nickel-plated zinc die-cast housing, have QuickConnect functionality, and offer diagnostics in an EtherNet/IP™ universal digital I/O block to reduce commissioning and troubleshooting times.

Three IO-Link hub blocks help reduce design complexity by allowing more devices through the IO-Link master. And an M12 I-coded power connector on selected blocks supports higher current, allowing more blocks to be daisy-chained and resulting in lower wiring and installation costs.

For companies with separate I/O blocks for digital input and output, the I/O modules are an ideal choice. They provide 16-channel self-configurable digital I/O with flexibility to be used as the digital input or output depending on the application needs.



>> Updated Cube Encoders

Cube encoders from Encompass™ Product Partner **POSITAL FRABA** now include a programmable magnetic measurement module inside the cube that provides high levels of accuracy and dynamic response. The rugged housing is tolerant of shock and vibration loading, dust and moisture.

Resolution can be set anywhere from 1 to 16,384 PPR by simply updating the devices' software, with no changes to mechanical components. Similarly, pulse direction and the output driver — either Push-Pull (HTL), RS422 (TTL) or Open Collector (NPN) — are defined through software. Device programmability can help distributors, system integrators or machine builders control inventories.

The cube encoders are designed as drop-in replacements for traditional cube designs, with identical mechanical dimensions and interfaces. This makes them a cost-effective replacement for older units that have failed or become unreliable.

They are also a versatile choice for new machines, retaining the easy-to-install characteristics of the original design, while introducing up-to-date levels of performance and durability.



>> PRODUCT SPOTLIGHT

Hands-Free Head-Mounted Display

Designed to improve productivity and task accuracy, the HD4000 enterprise head-mounted display from Encompass™ Product Partner **Zebra Technologies Corp.** overlays contextual information within a worker's field of view.

This enables hands-free directed action workflows that increase order processing, repair and production volumes without adding staff or expanding production lines. The see-through wearable display built for the enterprise is compatible with WT6000, TC7X and TC5X products from Zebra.

The accessory architecture eliminates the need for an integrated battery, processor and wireless radios. The display, camera, head tracker and microphone are all built in to deliver augmented reality (AR) functionality.

It includes ready-to-use warehouse templates that support warehouse management systems and application programming interfaces, plus an Android HDK that supports many standard interfaces, making it easy to integrate into new and existing apps and workflows.



The lightweight display tethers via USB, providing all-day power and increased productivity to warehouse, manufacturing and field service workers.

>> Intrinsically Safe Digital Weight Indicator

Encompass™ Product Partner **Rice Lake Weighing Systems'** 882IS/882IS Plus intrinsically safe digital weight indicator is protected from potentially explosive, hazardous environments. With FM, IECEx and ATEX approvals, the unit suits flammable and combustible applications such as fuel refineries, chemical plants, distilleries and textile manufacturing.

The weight indicator allows for increased flexibility with an optional remote I/O module featuring a serial port, EtherNet/IP™, DeviceNet™, Ethernet TCP/IP and optional analog output. This configuration facilitates communication with printers and computers. The 882IS also has both local and remote capabilities.

The 882IS features extended battery life, capable of up to 60 hours of use with four 350-ohm load cells. An auto-ranging, dual-output AC power supply allows operators to power two units using one power supply. A backlit LCD display helps optimize visibility in all light conditions, while a stainless steel NEMA IP66 enclosure provides protection from the elements.



>> Linear Motor for Hygienic Applications

Encompass™ Product Partner **LinMot** offers the P10x70 3x400VAC stainless steel motor. These fully protected motors are ideal for use in food processing and beverage machines and in pharmaceutical and medical applications requiring extensive cleaning processes.

The housing, made completely of stainless steel EN 1.4404/AISI 316L, is designed for demanding environmental conditions. The completely welded housing encapsulates the motor from the outside, providing IP69K protection.

To prevent condensation in the motor, the motor housing is poured out under vacuum. This frees the housing of air inclusions, which could form condensation at changing temperatures. In addition, the motors are equipped with water cooling integrated into the housing.

The motors' modular design means the bearing can be replaced easily. Mounting flanges allow simple system and machine installation.

The 3x400VAC technology coupled with servo drives with direct mains supply permit the motors to fit into new and existing machine concepts. They also can be controlled via external third-party drives.



>> PRODUCT SPOTLIGHT

Smartphone for Hazardous Areas

Encompass™ Product Partner **Pepperl+Fuchs'** brand ecom introduces the latest generation of its intrinsically safe 4G/LTE Android smartphone, Smart-Ex 02. It features a 12.7-cm (5-in.) display, good ergonomics and an optimized accessory concept. The explosion-proof smartphone can be used for Zones 1/21 and Div. 1.

Equipped with an Android 9 operating system, the smartphone works quickly and securely, simplifying communication among employees, the control center and backend systems. It supports 21 LTE frequency bands and is delivered simlock-free. Global Ex and approval certifications allow for worldwide use and global rollouts.

Designed for an extended temperature range from -20° to 60°C, the phone can be operated under extreme conditions. For maximum durability, its display is protected by shock- and scratch-resistant gorilla glass. Even in direct light, users can read the display, forward data and share it in the corporate network.

A strong, easily replaceable battery with 4,400 mAh power offers 24-hour operation. A magnetic USB port protects

against wear and tear and damage to PINs and unsecure USB connections.

Push-to-talk and alarm buttons, volume control and the camera release button are intuitive and easy to use, even while wearing gloves.



>> Integrated Servo Motor

Encompass™ Product Partner **Advanced Micro Controls Inc. (AMCI)** offers the SV160E2 integrated servo motor incorporating a servo motor, drive and controller in a single unit. The servo motor's compact design eliminates the need to purchase multiple components because they are all built-in. The unit suits both new machinery and retrofit applications.

The SV160E2 includes an integrated dual port switch with EtherNet/IP™ and Modbus™-TCP connectivity, simple performance tuning, dynamic torque control with 0.5Nm continuous torque and 1.3Nm peak torque, safe torque off (optional), virtual axis follower, absolute encoder feedback, built-in web server and compatible cord sets.

Additional software is not needed because everything is programmed from the PLC, using the controller's native software (Studio 5000®), and EDS files and sample programs help to streamline the product's initial set-up and programming.



>> Compact Servo System

To provide a more cost-effective option for OEMs building smaller machines, Rockwell Automation introduces a new Kinetix® 5100 servo drive, Kinetix TLP motor and cable that can function as a system without a controller.

The **Allen-Bradley® Kinetix 5100 servo drive** has multi-control modes available to support a wider range of high-speed, low-power motion control applications. The drive can be used with a Micro800™ controller, a Logix controller or even by itself, allowing OEMs to choose how the product best functions in their applications.

The system can also help OEMs make customers more productive. Using the servo drive, OEMs can create a motorized, or automated, system that can help speed up changeovers.

Additionally, with built-in safe torque off, users can remove motor torque without removing power from an entire machine, allowing a machine to restart faster after it has reached a safe state. Dual-port EtherNet/IP™ also supports device-level ring topologies.

The servo drive provides an easy migration option for users of the Allen-Bradley Ultra™ 3000 digital servo drive. That system will soon be phased out in favor of the Kinetix 5100 servo drive.



>> PRODUCT SPOTLIGHT

Automated Reports and Dashboards

Encompass™ Product Partner **SyTech, Inc.** offers XLReporter v. 14.0 that expands the software's capability for web reporting, 21CFR Part 11 features and ISA18.2 alarm management. With v. 14.0, any device with a web browser can view automated reports on the server and produce custom reports on demand. Reports also are responsive to the device size to provide the best view of the report content.



Users can design and produce reports in workbook, PDF and web formats without needing Excel. Using their existing workbook skills, users can solve reporting needs and save time and money by avoiding the steep learning curves associated with new software.

Develop templates in the Design Studio with the same look and feel of Excel, and include features such as formulas, statistics, formatting, sorting, filtering, images and charts. Other features include connectivity to data sources, analytics, wizards, scheduling, emailing and more.

Various 21CFR Part 11 features enhance security and include restricted user access, audit tracking, eSignature capability to sign reports electronically for compliance, and version control with functionality to roll back to previous versions.

The software also provides timely measurements of KPIs defined in the "Monitoring and Assessment" stage of ISA18.2 alarm management with dashboards that readily identify process equipment needing operator attention.

>> IP67 PoE Cameras

The Cheetah IP67 Power over Ethernet (PoE) models from Encompass™ Product Partner **Imperx, Inc.** feature IP67 housing for protection against solid particles including dust, dirt and sand. The cameras also provide water ingress protection for 30 minutes in levels up to 1m in depth.

Robust M12 Ethernet connectors provide increased resistance to shock and vibration, providing long-term camera durability along with exceptional imaging performance in harsh, demanding industrial environments without the need for additional enclosures. For added protection, lens tubes can be used for dust proof and water-resistant functionality.

The cameras feature GigE Vision with PoE interface and are 100% compliant with the GigE Vision standard. This reduces the need for extra cables by enabling the camera to get its power over the data cable which can reach 100m in length for simplified installation/maintenance.



>> Remote I/O System

The remote I/O system CPX-API from Encompass™ Product Partner **Festo** is designed to improve the performance of mixed valve terminals and I/O systems. It is compatible with most communication protocols, including EtherNet/IP™.

An integrated L5X export feature provides for easy commissioning and programming by Logix users. The rugged, compact and light-weight modules can be mounted directly on machines in IP65/IP67 rated environments.



The system enables valve terminals to be moved closer to pneumatic cylinders, which reduces pressurization time and increases the machine's overall performance. Process data in and out of each bus module is as much as 2 kb.

Scan cycles for a mix of both valve terminals and I/O are

below 1 ms and are expected to approach microseconds. Latency is virtually nonexistent. This remote I/O system has the capacity of up to 80 I/O modules, which can be a mix of digital I/O, analog I/O or I/O-link. The distance between modules can be up to 49 ft. (15m), 50m theoretically.

>> Position Sensor with SSI

Encompass™ Product Partner **MTS Systems Corp., Sensors Division**, released the SSI version of its Temposonics® R-Series V position sensors for industrial applications. SSI is designed to provide high accuracy with a stable position signal and a minimum resolution of 0.1 μm for precise position management.

TempoLink and TempoGate smart assistants support the sensors. Both are optional accessories that connect via the power connection to the sensor. The smart assistants help transmit detailed information about the condition of the application, such as sensor status, internal temperature, total operating hours, distance traveled by position magnets, all while the system is running.



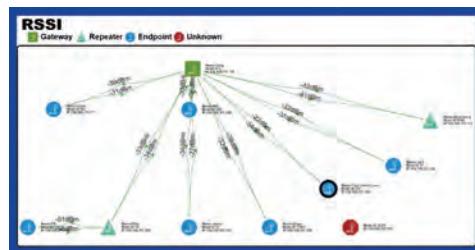
Due to the fixed data structure and unidirectional transmission of SSI, communication with a smart device generally is restricted. Using the smart assistants circumvents this restriction, because data can now be transmitted in parallel via the power connection and independently of the actual position data.

The SSI versions, available in two styles, rod (RH5) and profile (RP5), support an extended operating temperature range reaching from -40° up to +85°C.

>> RF Network Diagnostics Software

NetworkNow from Encompass™ Product Partner **Data-Linc Group** is the latest software tool for configuring its adaptive technology SRM8200 modem.

Users can configure, troubleshoot and view RF-network statistics, all accessible via web interface and viewed live on a single page.



The unit helps monitor the health of RF performance for any modem on the network, from any modem on the network. This means users don't need to spend time in the field on-site to troubleshoot, reconfigure or update firmware. It can be done on the fly from any node in the network.

The Network Diagnostics menu option shows a live map and RF statistics for all the nodes. Users can zoom in/out and move nodes to see each one clearly on the network map and access details for any node. Clicking directly on the node opens its browser interface page for inspection.

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>> IP69K Rated Plugs and Connectors

Wetguard plugs and connectors from Encompass™ Product Partner **Leviton Mfg Co.** are now recognized and approved as IP69K rated. These devices protect connections against high-temperature, high-pressure washdown when caps are attached. The IP69K rating is ideal for food processing facilities that require daily washdown procedures or any application or harsh environment.

These devices are engineered to withstand abuse in indoor and outdoor wet and corrosive environments and are equipped with a strain relief system to facilitate a true watertight design. All Wetguard devices also are IP66 and IP67 rated.



>> Reporting with FactoryTalk Connectivity

Encompass™ Product Partner **Ocean Data Systems (ODS)** now provides connectivity to FactoryTalk® from Rockwell Automation in its Dream Report product. Version 5 R19.3 of the software includes connectivity to FactoryTalk Historian Data, FactoryTalk Live Data, FactoryTalk Alarm & Events, and the FactoryTalk View SE Alarm & Events database.

In addition to new data source connectivity, the Dream Report Portal has been enhanced to host external content in the form of URLs and documents. It can become one view into many automation systems, manuals and operational documents, delivering them within the Dream Report user-based security framework.



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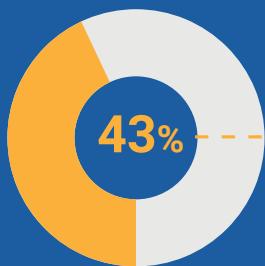
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The Future of Edge Computing is Here!

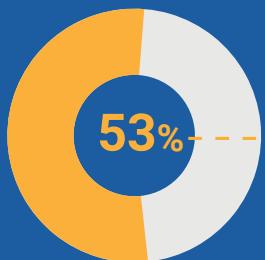
New research from Stratus Technologies and CFE Media shows that we are approaching the tipping point for Edge adoption. The introduction of Edge Computing is the most significant plant-floor advancement since the introduction of SCADA 30 years ago.

Our new report can help you understand:

- The barriers to implementing Edge Computing
- The skills your teams need to optimize for Edge Computing
- The top 5 Edge Computing applications



43% see Edge as a great leap forward



53% are actively planning Edge implementations



What you're doing now are the early steps in a journey to get to where you're ultimately going, which is Edge Computing.

- Jason Andersen,
vice president, strategy
and business line management
Stratus Technologies



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