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New Water Treatment System Boosts Compliance While Saving Millions

Automated plant delivers cleaner, better-tasting water to Cape Cod vacation town and meets fluctuating water demand with one staff shift.

FEATURES

How Water Utilities Can Incorporate Cybersecurity
Utilities can mitigate cybersecurity risks by using a proactive approach that extends beyond regulatory compliance and integrating security controls.

DCS Upgrade Helps Wastewater Plant Boost Efficiency
See how migration to a modern distributed control system helps a municipality increase wastewater capacity, streamline control and minimize overtime.

Hunting Downtime: A Submariner’s Perspective on Predictive Maintenance
A U.S. Navy veteran explains what PM practices on a nuclear submarine can teach manufacturers about preventing failures to help avoid costly downtime.

How a Batch Management System Cut Downtime by 25%
Snack company also improves dough quality by 30% and opens access to code after installing new batch management and control solution.

How an Energy Firm Applied IIoT for Plant Maintenance
The company’s asset management and historian software perform better predictive and preventive maintenance by analyzing historical and real-time data.

How to Use Robots for Nonrepetitive Tasks
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TIMES, THEY ARE A CHANGIN’ — THANKFULLY

Things are changing fast. When I was a kid, grownups always told me that, but I didn’t know what they meant. I mean, time was so sloooooww wwww.

But now that I’m a grownup (though some of my friends might debate that), I get it. How is it almost 2020 already? Seems like I was just cooing over my niece in the hospital nursery after she was born, and now she has her own babies. How can Cher be 73? Why are they phasing out teaching cursive in school? Why is the phrase “OK Boomer” an insult? Get off my lawn!

The old saying is, “The only constant is change.” One way that’s true, and is a good thing, is in the continuous evolution of technology propelling smart manufacturing. To help you keep up, our new “2019 Industrial Automation Trends eBook” provides a comprehensive look at the changing methods and digital technologies impacting every industrial operation, large or small.

It examines the top 10 trends in our industry, including virtual commissioning, IT/OT convergence, use of smart analytics, optimizing the cloud, mobile devices, edge computing and more. Download it free at http://bit.ly/tj19trends.

And if you serve the food and beverage industry, download our “2019 Food & Beverage eBook” at http://bit.ly/tj1908foodebook to learn how to use real-time data to optimize food safety and productivity. Also see how edge computing is transforming food and beverage operations, how a brewery increased production capacity 50% in 2 weeks, how CPG OEMs are helping end users keep up with consumer demands, and more.

I’m not complaining about changing times, just amazed by it. Frankly, I find it exciting. I hope you do too. Until next time…

Theresa Houck, Executive Editor
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ROCKWELL AUTOMATION ANNOUNCES SENIOR LEADERSHIP TRANSITION

Nicolas leads Operations & Engineering Services division.

Rockwell Automation announced a senior leadership transition effective November 1, reporting to Blake Moret, chairman and CEO. Ernest Nicolas, currently vice president, global supply chain, has been promoted to senior vice president, Operations & Engineering Services (OES).

Nicolas will have global leadership accountability for the six functions in OES that include global supply chain (strategic sourcing, materials, logistics and customer care), quality and continuous improvement, engineering services, manufacturing operations, manufacturing services and workplace services.

Nicolas will lead more than 9,500 OES employees and contractors and 19 manufacturing plants globally.

He joined Rockwell Automation in 2006 as a Lean, Six Sigma project manager and has held several roles within the OES functions, including vice president, Global Supply Chain and vice president Strategic Sourcing and Supply Management, director Asia Pacific Manufacturing Operations and plant manager of Twinsburg Operations.

Before Rockwell Automation, he spent 9 years in various roles of increasing responsibility at General Motors Corp. He is a member of the Executive Leadership Council (ELC), the advisory board for the Grainger Center of Supply Chain Management at the University of Wisconsin-Madison, and the board of directors for the Milwaukee Urban League.

Mike Laszkiewicz, senior vice president, Operations & Engineering Services, will retire effective January 31, 2020. He will continue to report to Moret until his retirement and will work to ensure a successful transition.

JMP SOLUTIONS NAMED A TOP WORKPLACE

For the seventh year in a row, Rockwell Automation Solution Partner JMP Solutions, London, Ontario, has been named one of the 50 Best Workplaces in Canada. The 2019 Best Workplaces in Canada list is compiled by the Great Place to Work Institute.

The competition process is based on two criteria: two-thirds of the total score comes from confidential employee survey results, and the remaining one-third comes from an in-depth review of the organization’s culture. This offers a rigorous representation of the organization from an employee perspective, and an overall portrait of the workplace culture.

Together, they provide crucial data relative to five trust-building dimensions: credibility, respect, fairness, pride and camaraderie.

This year’s list received more than 400 registrations, and 80,000 employees participated in the survey. For more information visit www.greatplacetowork.ca.
ROCKWELL AUTOMATION ACQUIRES MESTECH

Rockwell Automation has acquired MESTECH Services, a global provider of manufacturing execution systems/manufacturing operations management, digital solutions consulting and systems integration services.

MESTECH is a Rockwell Automation Recognized Systems Integrator with experience applying Rockwell Automation software-based solutions within the manufacturing technology space. The company offers technology consulting services, solutions design and deployment, support, plant asset management and staffing solutions for discrete, hybrid and process applications across multiple industries including life sciences and automotive.

>> PartnerNetwork Brief

Rockwell Automation Adds icotek to Encompass™ Program. icotek North America, manufacturer of smart cable entry systems, has been accepted into the Rockwell Automation PartnerNetwork™ program as an Encompass Product Partner. The company, located in Chicago, provides multicable entry solutions that allow for pre-terminated cables, require less footprint on the side of machines for cable entry, and reduce the labor time for running cables and tubing into machines. www.icotek.com

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NEW WATER TREATMENT SYSTEM BOOSTS COMPLIANCE WHILE SAVING MILLIONS

Automated plant delivers cleaner, better-tasting water to Cape Cod vacation town and meets fluctuating water demand with one staff shift.

When the summer arrives in Falmouth, Massachusetts, so do the tourists. Beaches, boating, biking, fresh seafood, a ferry to Martha’s Vinyard and other activities make it an ideal destination. And the water department for this small coastal town in the idyllic Cape Cod region suddenly needs to increase its output to service from about 25,000 permanent residents to a summer population of up to 120,000 people.

This influx of out-of-towners can multiply the town’s water demand by as much as five times.

Until recently, a pump station that had been in use since 1898 provided most of Falmouth’s water supply throughout the year. While the water that the station provided was safe, it wasn’t filtered. This could give the water an unpleasant taste, smell and cloudy appearance, making it less than ideal for both residents and summer visitors.

That’s why the Massachusetts Department of Environmental Protection mandate to improve certain water-quality measures may have been a blessing in disguise. The mandate led to the town building a new $42 million water treatment and filtration plant that has
significantly improved both the water supply’s taste and quality. And using the latest control and information technologies, the state-of-the-art plant can be minimal-
ly staffed to help keep operating costs and hiring de-
mands down.

Quality and Staffing Challenges
Chlorine is essential to providing safe drinking wa-
ter. But when it mixes with organic material like al-
gae, it creates chemical-compound byproducts known
as trihalomethanes.

The EPA’s maximum allowable annual average level for
total trihalomethanes (TTHMs) is 80 parts per billion
(ppb). Most sampling sites in Falmouth regularly mea-
sured below this level, but in some instances, tests did
exceed 80 ppb.

These findings spurred the need for a new treatment
and filtration plant that would remove algae from water
prior to treating it. Removing the algae would lower the
water’s TTHM levels and reduce the use of chlorine to
provide more pristine, better-tasting water to the town’s
homes and businesses.

However, state laws regarding water treatment plants
created concerns about staffing it.

“According to state regulations, you must staff these
plants whenever they’re running, unless you get a waiver
for it to run unmanned in certain hours,” says Steve Raff-
ferty, water superintendent for Falmouth.

Staffing the plant 24/7 simply wasn’t feasible. For eight
months out of the year, the plant would only need to be
staffed one shift per day to meet the public’s water-supply
demands of about 75 to 90 million gallons per month.
But during the busy summer, it would need to run and
be staffed 24 hours a day to meet demand that can exceed
250 million gallons per month.

“I would have needed a minimum of eight more highly
skilled operators if the new plant were manned 24/7
instead of just a single shift,” Rafferty says. “You have
to consider the town’s cost of staffing those highly paid
positions. Also, it’s extremely difficult to find, attract and
retain that many skilled workers.”

The only option was to meet the state’s waiver require-
ments by building a highly automated, highly resilient and
remotely connected plant that could meet any month’s
water demands with just a single staffed shift.

Creating a Reliable Control and
Information Architecture
The new plant would draw water from the town’s prima-
ry water source, Long Pond, and treat it in four separate
processes: algae removal, ozonation to improve taste and
odor, activated carbon filtration and sodium-hypochlo-
rite disinfection.

Rafferty worked with R.E. Erickson, a systems integra-
tor that specializes in water and wastewater treatment, and
consultant Tata & Howard, to develop the plant’s control
and information architecture. During this process, main-
taining the plant’s availability was paramount.

“We started with a good, conventional SCADA
system design for the new plant,” Rafferty says. “But it
was only 99% reliable, meaning that we could have a
downtime event about three times per year. That wasn’t
good enough.”

To boost that number to 99.99%, R.E. Erickson incor-
porated Stratus virtual servers with VMware software into
the system design. The servers are fault tolerant with no failover time and are continuously monitored by Stratus Technologies, an Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program.

The plant’s two Allen-Bradley ControlLogix® controllers from Rockwell Automation provide redundant control and are connected on an EtherNet/IP™ network architecture that uses a fault-tolerant device-level-ring (DLR) topology. NorthEast Electrical, a Rockwell Automation Authorized Distributor, provided local support and installation.

R.E. Erickson chose FactoryTalk® Historian software for logging and analyzing plant data and generating on-demand reports. XLReporter software from Encompass Product Partner SyTech helps with on-demand reporting, and alarms-and-event software from Encompass Product Partner WIN-911 provides critical information to operators.

The FactoryTalk View human-machine interface (HMI) software and ThinManager thin-client software were chosen to give operators in the plant access to information on both HMI thin clients and mobile tablets. The ThinManager technology also is used to provide remote access to the plant over an encrypted VPN connection. This allows on-call operators working remotely to monitor operations and address issues that arise outside normal plant hours.

“In our old pumping station, on-call operators had to come in about six times a week to resolve some kind of abnormality,” Rafferty says. “Now, probably 19 out of 20 times they can address the issue from home, on their computer, in about five minutes.”

Reliable, Pristine Water

The new water treatment and filtration plant became operational in October of 2017. It met the state’s requirements for an automated treatment plant and today is running on a single shift, even in the busy summer months. Rafferty estimates these improvements are saving the town about $1.3 million per year.

The highly reliable plant also hasn’t experienced a single interruption to date — even following a severe storm that took down one of the plant’s servers.

The plant’s TTHM levels are in the low 20s and dropping. And that decline has coincided with cheers from the community about the town’s improved water quality.

“Many people have commented on the quality,” Rafferty says “In fact, I got a call from a scientist who has always used water filters in his home. He changed his filter this spring and accidentally left it in bypass mode. He says he couldn’t believe the great water he was getting was from our plant.”

The plant’s modern control and information architecture has helped reduce the demands that the much more sophisticated operations have put on operators. This reduces the demands on operators and improves system performance through real-time visibility into the production process.

“The historian software has allowed us to automate our reporting to the state, which previously was paper-based,” Rafferty explains. “We’re also using the historian for more advanced trending to help operators make better decisions. For example, they can monitor ozone demand by tracking the rate of change on the plant’s oxidation reduction potential (ORP) analyzers. As values trend one way or another, operators can increase or decrease the ozone dosage as necessary.”

Rafferty says he’s encouraging operators to simply explore what’s possible with analytics.

The new plant has won multiple local awards, including an ENR New England Best Project award in 2017 and an Associated Builders & Contractors of Massachusetts Eagle award.
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.
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Utilities can mitigate cybersecurity risks by using a proactive approach that extends beyond regulatory compliance and integrating security controls.

By Umair T. Masud, sr. consultant, Network & Security Services business, Rockwell Automation

A hacker, set on wreaking havoc, gains access to the local water supplies by manipulating critical equipment and contaminating drinking water. This isn’t the latest action movie, it’s a serious threat that water utilities work to protect against every day. Massive cybersecurity breaches make news headlines on a regular basis. These constant reminders of potential system vulnerability can be particularly troublesome to those charged with safeguarding the public’s water supply.

With limited staffs and budgets, utilities must often postpone comprehensive upgrades, evolve their industrial control systems (ICS) and IT infrastructure slowly, and rely on external expertise. Still, water utilities can take steps to better mitigate risk through a proactive approach that extends beyond regulatory compliance and makes ICS security part of its master plan.

Change the Mindset
Utilities tend to view any initiative related to ICS and IT as a “project” and implement passive cyber defenses, such as firewalls and email filters. But when it comes to cybersecurity, a “set-it-and-forget-it” project mentality can be dangerously limiting.

Cyberthreats are continually evolving and escalating. To be truly effective, cybersecurity must be based on an agile and active defense strategy that extends through every project in parallel with all business operations.

It’s time to change the mindset: Cybersecurity is an ongoing process, not a project.

Lay the Foundation
Water utilities often have a high volume of critical assets plus complicated governance, making the scope of an ICS security program seem daunting. Regardless of infrastructure size, all utilities face similar challenges, and can deploy a common methodology to mitigate risk. It must:

• Begin with an assessment of business needs and the specific operational requirements of the process control system.
• Identify critical assets and data that are essential to operation.
• Support asynchronous technology and business change.
• Recognize that no single product or technology will
fully secure industrial networks — the most secure posture will always require people (analysts).

- Utilize a Defense-in-Depth (DiD) strategy based on multiple countermeasures that disseminate risk over an aggregate of security mitigation techniques.

Get Executive Buy-In

Identifying the right team to support and execute this methodology is critical. To be effective, this team must be endorsed at the executive level, and include expertise encompassing both the ICS and business level networks.

Ideally, this team will be charged with formalizing and executing the policies and procedures that will guide the utility on cybersecurity issues for years to come.

Set Strategic Priorities

Assessments are the starting point for any cybersecurity program. They let a utility determine what’s “normal” from the standpoint of data entering and leaving the system. It’s a crucial first step to identifying abnormalities and potential security events. In addition, an assessment evaluates a utility’s security practice architecture and its ability to protect ICS assets.

Effective security assessments also extend beyond the technology deployed and take into account existing policies, procedures and typical behavior.

At minimum, an assessment should include:

- An inventory of authorized and unauthorized devices and software.
- Detailed observation and documentation of system performance.
- Identification of tolerance thresholds and risk/vulnerability indicators.
- Prioritization of each vulnerability, based on impact and exploitation potential.

The outcome of any assessment is a prioritized list of mitigation activities.

Push for Proper Investment

With prioritized mitigation steps in hand, a utility is ready to implement a cybersecurity program. However, justifying funding is often fraught with challenges.

Why? First, the benefits of a cybersecurity program are usually invisible and can only be tracked through metrics. It’s easier to justify additional costs or divert funds for improvements that directly impact water delivery or quality.

In addition, cybersecurity is not a one-time expenditure. It’s a commitment that commands vigilance and an ongoing investment in people, process and technology.

Because of these factors, aligning critical security controls investment closely with the utility master plan is the most effective, publicly palatable and fiscally responsible approach.

Ways to Align

While not an exhaustive list, here are some specific ways a utility can implement a strategic, life-cycle approach to cybersecurity investments:

- **Biggest impact first.** Follow the initial assessment prioritization and allot funds first to investments deemed most critical.
- **Assess all cyber investments for risk.** Most utilities include risk assessments as part of the selection process for physical infrastructure investments. Extend this mindset to investments that affect the IT infrastructure and ICS.
- **Invest for a more secure future.** Make future-ready ICS and IT investments at every level of the enterprise. Select technology that incorporates cybersecurity features — even if those features can’t be activated immediately.
- **Scrutinize and limit system proliferation.** Narrow the scope of system suppliers and service level agreements (SLAs). The fewer disparate systems within an environment, the easier it is to secure them.
- **Consider quality based selection (QBS).** This pre-selection procurement system focuses on the long-term lifecycle costs of a solution — not only upfront capital costs. QBS helps set a technology direction for the future that prioritizes an integrated secure environment.
- **Recognize the value of ongoing and annual assessment.** A successful cybersecurity strategy requires an ongoing audit of what exactly is occurring in the system, and an annual assessment to restate or realign priorities.

Positioned for the Future

On the surface, water systems may not appear very different from the day they were commissioned. But chances are, the internetworking of these systems has changed radically. Often, there is a tremendous intermixing of old and new products and various creative methods to exchange information.

Within this environment, understanding even the current system security baseline can be a challenge. However, the need to address cybersecurity issues has never been greater.

By aligning critical security controls investment with the master plan, utilities are well positioned to identify system vulnerabilities and undertake essential mitigation steps — both now and in the future.
See how migration to a modern distributed control system helps a municipality increase wastewater capacity, streamline control and minimize overtime.
with Commerce Controls, Inc., a Solution Partner in the Rockwell Automation PartnerNetwork™ program, to migrate to a PlantPAx® distributed control system (DCS) from Rockwell Automation.

The modern DCS provides a single, plant-wide solution to increase productivity of all processes and operations at the facility. And leveraging EtherNet/IP™, the PlantPAx system is based on open communication standards to streamline control and information flow across the plant.

The network upgrade also included new Stratix® 5400 and 5700 industrial managed switches for better data collection and network monitoring. The switches help monitor panel temperatures across the various buildings and provide a quick view into the health of the network.

The new DCS uses a standardized design, predefined code and faceplates with an intuitive interface, providing the same look and feel across the entire plant and various processes. This eliminated the custom coding of the old system, allowing quicker programming and easier scalability for future expansions. It also eased onboarding and training of new operators.

Integrated historian and production intelligence software provides operators a window into system performance data. The historian collects and archives years of valuable process data on all equipment and instrumentation. The system now provides automated reporting and direct visualization of historical and real-time process trends, such as overflow counts, pumping metrics, dissolved oxygen numbers and more.

“In the past, extracting historian data was a nightmare. And once extracted, it needed to be reformatted to make it usable by administration,” says Fiedler.

The new DCS also has remote access capabilities for system troubleshooting.
and maintenance. “Commerce Controls can now remote into the system and address issues offsite, saving hours of travel time each month and minimizing system downtime,” he adds.

In addition, the city implemented servers from Rockwell Automation’s Product Partner Stratus Technologies to help maintain uptime and production. The servers added a new level of redundancy to make sure the facility stays up and running.

**Flowing Smoothly**

The PlantPAx DCS has made the control system consistent plant-wide, easing training, simplifying maintenance through remote capabilities, improving plant performance and assisting in EPA approval.

The standardized solution has simplified coding across facility systems. “The PlantPAx DCS helped us solve inconsistencies in our processes and streamline control, offering operators a better understanding and similar look and feel across plant facilities for a consistent and more streamlined training process,” explained Fiedler.

The plant also has realized significant decreases in downtime since the system upgrade. The city saved about 50 hours of overtime with an average cost savings of $2,000 in the first three months of operation.

The production intelligence software provides the city with pumping metrics and allows plant operators to set up templates that can calculate overflows. And historian software provides historical trending in real-time, whereas the plant previously only had trend analysis once per day.

“The PlantPAx DCS helped meet all of our goals and more,” says Fiedler. “We not only met our production increase from 53 to 70 MGD and minimized river discharges but also gained important data visibility and eased flexibility for future plant expansions. This is our new control standard across the city, and we look forward to implementing into every new water wastewater project in the future.”

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SIGN UP TODAY!
A U.S. Navy veteran explains what PM practices on a nuclear submarine can teach manufacturers about preventing failures to help avoid costly downtime.

By Bryan P. Van Itallie, chief operations officer, Grace Engineered Products
“Dive! Dive!” Two simple words, punctuated with the familiar “ah-OOG-ah” alarm, were the signal throughout the ship that we were about to embark on for another adventure under the sea. For many sailors, this quickly became routine, but in reality, nothing is routine about submerging an 18,000-ton, 560-ft. vessel like the USS Nevada (SSBN 733) with 165 people on board hundreds of feet below the water’s surface.

One small defect or fault in any of dozens of systems or one valve out of position, and our crew would find itself on a one-way trip to the bottom of the ocean. Remarkably, since the U.S. Navy’s nuclear submarine program began, only two subs have been lost at sea, the last being USS Scorpion (SSN 589) that sank in 1968, more than 50 years ago. This kind of uptime record is worth investigating. Let’s see what a nuclear submarine can teach today’s manufacturers in their quest to avoid costly downtime.

Technology Improves Maintenance Practices…

In the mid-1990s, before my career in manufacturing, I served as an officer onboard the Ohio-class nuclear submarine USS Nevada. In recent years, preventing downtime has spurred an interest in using technology to make better maintenance decisions.

At the heart of this technology are the fundamental principles of predictive maintenance: gathering data, analyzing it, predicting failures and taking proactive measures to prevent downtime. These fundamental principles are unchanged from how we operated the Nevada 20 years ago.

A crew of 165 people living in an underwater vessel for months at a time amplifies the meaning of hazardous conditions. Consider for a moment a transmission bearing failure causing a loss of propulsion, or a reactor coolant pump malfunction causing a meltdown, or a valve failure flooding the vessel with seawater. Clearly, nuclear submarine downtime costs lives, not just profits!

The U.S. Navy never has had a death onboard a U.S. submarine because of a radiation accident. With all the complexities of multiple systems crammed into a tiny space, operating in harsh environments, how have we maintained such an amazing safety record?

…and Safety Records

The two submarine tragedies in the 1960s resulted in the U.S. Navy’s SUBSAFE (Submarine Safety) program,
which covers all systems exposed to sea pressure or that are critical to flooding recovery. SUBSAFE and the Navy’s Nuclear Power program are based on a foundation of quality in design, material, fabrication and testing. They span the submarine’s life, from initial design and construction, through ongoing maintenance and updates. Strict adherence to these programs has resulted in safe and successful missions for half a century.

But, for the most part, sailors don’t think about all the factors that went into the submarine’s design and construction. We are more focused on keeping it operating safely and efficiently.

Navy submarines always are in a hostile environment. In addition to facing the threat of attack, the ships also are completely surrounded by saltwater, and storms at sea can be extremely hazardous. Not to mention the explosive ordnance being carried onboard. When you depend on every system running smoothly to harvest your oxygen and freshwater and generally keep water out of the “people tank,” downtime must be hunted down and eliminated.

Fine-Tuning Maintenance Habits

We used a variety of maintenance practices to make sure everything worked at peak performance, including weekly and monthly preventive maintenance (PM) inspections and check-off sheets for routine items such as oil filter changes or motor-generator brush repair.

The principle here was to do maintenance at a specific interval, whether or not it really needed to be done. When set up properly, this can be an effective, though conservative (and potentially wasteful) approach to doing maintenance.

However, there was no guarantee that doing the weekly or monthly PM would prevent something from going wrong between the cycles, resulting in a system failure. So, we added another feature into our daily operations — ongoing data collection and trend analysis. This essentially is how predictive maintenance works in industry today — continuously evaluating how your equipment is working so you know when and how to maintain it optimally.

We had a team of 10 trained personnel who were responsible for operating the reactor plant, electrical and propulsion systems, 24 hours a day while we were underway. This team worked together in six-hour shifts (watches). When an issue or complex process arose, this team was there to address it, often with the help of another team of 10 people that were “off-duty.”

This team would record the readings of all of the hundreds of gauges, dials and indicators throughout the engine room at least every hour, and, in some cases, every 15 minutes. The watch team supervisors were expected to review these log readings every three hours, and the Division Officer (DO) and Engineering Officer (ENG) would review them daily. At first, this vast collection of numbers was overwhelming, but with experience, the team gained a sense of what was normal and quickly could identify readings that signaled something amiss.

A key example of this is the bearing temperatures and oil flow bubblers of the main reduction gears. The reduction gears take the power generated by steam turbines turning at thousands of RPM and use it to drive the propulsion shaft at much slower speeds, which turns the screw and propels the submarine through the water.

These gears are machined to precise measurements and carry a lot of power. They are massive and only can be replaced in an extended dry-dock period, requiring cutting open the hull of the submarine. They are lubricated and cooled in a continuous flow of purified oil. If something were to happen to contaminate or stop the oil flow, the gears could break or seize together, effectively shutting down the submarine’s propulsion system and rendering us “dead in the water.”

Dozens of bubbler sight glasses on the reduction gears visually show the oil flow and its condition. They’re recorded every hour, along with bearing temperatures, to see that the reduction gears are being lubricated properly. Using trend analysis to find a problem in this system before it becomes downtime could determine whether or not we make it back home.

Diligence Pays Off

What was the point of writing down and reviewing all these numbers? Multiple things came about through this practice:

1. The operator writing the numbers down has to look at the gauges every hour (or 15 minutes). This means that someone is paying attention. If the numbers are way out of their expected positions, the operator would see that something is wrong before a long period of time passes, enabling a quick response.
2. The supervisors are verifying that this is being done, but, more important, they are looking at trends. What is changing over the course of the six-hour watch period or even the past day? Is a bearing temperature rising slowly? Is something changing with the electrical system? Is pressure in the reactor coolant system changing? Is the temperature in the condenser rising? Do these changes match what is expected based on changing plant conditions?

3. The DO and ENG are looking at longer trends to see that the plant is operating normally. Additionally, regular analysis is done on the chemistry of the reactor coolant and radiation readings throughout the ship to verify that nothing unusual is happening in the reactor vessel.

4. We used this data collection as a training tool, as well. Occasionally, the ENG would replace normal log sets with artificial ones (for a drill or test) that had anomalies or other indications that something was happening, and then the watch team would be evaluated on their ability to detect the problem and respond in the correct way.

Predictive Maintenance Continues to Get Smarter

While this was a very manual process for collecting and analyzing data, it’s a rigorous and detailed system to evaluate what is going on in the entire engine room. While some of this labor-intensive version of predictive maintenance is being replaced with digital technology, the core principles remain unchanged.

Just as a case can be made for predictive maintenance on life-critical systems such as those on a nuclear submarine, modern manufacturing facilities also need this capability. For decades, companies have introduced process improvements like Lean Six Sigma and Just-in-Time manufacturing to streamline their operations, improve quality and minimize expenses, thus becoming more efficient and profitable.

But maintenance always has lagged behind operations in receiving improvements. Many major manufacturers still rely on scheduled maintenance or run-to-failure approaches to managing maintenance. This strategy can result in wasting maintenance resources doing unnecessary repairs or in significant costly downtime when unexpected failures occur.

Only recently have companies started to consider smarter ways of doing predictive maintenance. The strongest trend in this area is to use data to develop indications and predictions of failure before they occur, which is exactly what we were doing with the data logs on the submarine.

Today this is done with sensors linked to an analytics platform, which often resides in the cloud or local servers. This data then can be evaluated and used to identify changes or anomalies that could be precursors to failures. This linking of data and machines is what is being referred to as the Industrial Internet of Things (IIoT) or Industry 4.0.

Technology now has reached a point at which remote condition monitoring and analysis can be done affordably and reliably. Rather than having an army of personnel recording gauge readings manually every hour and taking the time to study the data looking for trends, now this can be done with sensors, machine learning and analytics.

More advanced sensors exist that detect changes in vibration, indicating early symptoms of a future problem. These devices also can communicate their findings directly to anyone who needs to know and can take appropriate actions. Computing power continues to grow by leaps and bounds, resulting in better and faster analysis and decision-making.

It’s been more than 20 years since I deployed on a nuclear submarine, but I imagine the U.S. Navy is taking advantage of this new technology and data to make smarter, timelier decisions in maintaining and operating their equipment. The same benefits can be applied to manufacturing plants. Predictive maintenance will bring huge dividends for everyone, even those who don’t live on a submarine.

Encompass™ Product Partner Grace Engineered Products, Inc., Davenport, Iowa, provides personnel safety products including programming interface ports for controllers, SafeSide permanent electrical safety devices and IR viewing windows.
A large global brand snack baker suffered excessive production losses and inferior financials at one plant for far too long. Low yield, poor dough quality and unplanned downtime all were created by the problematic batch control system for its 12 mixing stations and ingredient delivery systems.

To complicate things, the existing code was inaccessible and “locked-down” as a precaution of the proprietary software. Frustration mounted daily as everyone knew what the problem was, but recognized the implications of untangling it while maintaining the business’ pace. Undue stress, worry and weak performance eventually brought management to its knees.

Do Nothing or Do Something?
They seemed to have only two options.

One, do nothing and continue to suffer the ills of the aging system, poor production, inefficiency “tax” and lack of flexibility to upgrade.

Two, shut down each of the 12 mixing stations one by one over a long and drawn-out transition period, replacing and testing code in each of the 14 individual programmable automation controllers (PACs) and hope, after several months of change, that production for the entire plant would improve.

The Third Option
But what if there were a third option? What if all the code for the 14 PACs, all the human-machine interface (HMI) stations and a new batch management solution could be written and tested on a running system — offline?

This could shorten downtime significantly, create confidence in the new code and reduce the risks to the business. This would mitigate unpredictable results, escalating costs and an indefinite shutdown.

The snack company asked Rockwell Automation Solution Partner Polytron to emulate the mixing systems before installation to operate them virtually and try “what-if” situations. This gave the manufacturer confidence in the new batch management and control system so the company could shut down the entire mixing area — effectively, the entire plant.

The company then could replace all of the mixing station and ingredient delivery system programming knowing production would start back up just a few days later.

Unlocking the Code: A New Approach
The existing batch control system had been installed several years earlier and contained locked-down,
proprietary code that still had bugs; the plant couldn’t support or modify the system on its own. The snack baker had to rely on a supplier who was tough to schedule, was hundreds of miles away and came at a high cost.

This snack maker required an open, standard approach to provide the ability to operate and maintain its own systems with its own staff.

Replacing locked code presented its own challenges:

1. With no documentation for the existing system, Polytron and the snack baker had to redefine how the system was operating and reverse engineer all the code before starting on the new code.
2. The system integrator’s team of engineers and the plant's batching systems experts worked side by side, tapping into the operations supervisors’ expertise and knowledge to verify the appropriate technology transfer was applied so the new code definition captured critical information.
3. Creating a detailed description of how the new FactoryTalk® Batch system from Rockwell Automation would operate was essential to making sure the snack baker wouldn’t lose time retraining its operators on a completely new system.
4. Using the detailed description, the existing ControlLogix® processors were reprogrammed using PlantPAx® Library of Objects for standardization of code.
5. The FactoryTalk View HMI screens had to look and operate the same. To accomplish this, existing HMIs were replaced with thin clients using ACP ThinManager and FactoryTalk View. Sequences had to work just as they did previously. And all the batch recipes had to be followed precisely to meet strict food quality standards.
6. The existing Windows PCs in the facility were replaced with thin clients using ACP ThinManager.
7. Integration with each of the subsystems had to be rewritten to flawlessly integrate each critical system into the entire solution.

Another Polytron team created a simulation model of the plant’s entire mixing system: 12 mix stations and almost two dozen dry and liquid ingredient delivery subsystems. All in all, more than 700 devices were modeled. When connected to the PACs, HMIs and new batch management solution, the baking company had a fully operational batch system that could be tested offline.

Polytron used simulation software with PlantPAx to simulate IO drivers using EtherNet/IP™ and OPC specifically made for the Rockwell Automation Logix and RSLogix™ Emulate automation platforms. The team could test the new control system with a dynamic, realistic simulation of their plant.

The team spent days verifying recipes and operating scenarios, manual and automated sequences and even potential faults and recovery steps. After participating in some of this extensive testing, the plant manager felt confident in shutting down the plant with little risk of missing the start production date.

**Moment of Truth**

Will it work without hitch or glitch on Monday morning? That was the question and the buzz around the plant. The baking company extended its already planned Thanksgiving shutdown by just one day. Polytron had to deliver and have the plant back in production Monday morning.

The planning, modeling and testing paid off. According to a representative from the baking company, “The ability to run a full precheck was invaluable and eliminated the guess work and uncertainty at start-up. The new code was introduced into the system in a seamless fashion, which resulted in an on-time start-up.”

By nine o’clock Monday morning, only five days later, all the systems had been cleaned, and new dough was flowing.

**The Real Payoff**

The completely new batch management and control solution met all expectations: no unplanned downtime, technicians now had access to examine code at will, and quality specifications were on target.

Even better, downtime decreased by 25% and dough quality improved 30%, meaning no bad batches.

Operators were up and running in no time. One even asked a week after the programs had been switched, “So, when are we going to make the changes to the system?”

*Rockwell Automation Solution Partner Polytron Inc., Duluth, Georgia, is a Charter Member of the Rockwell Solution Partner Program in Controls (including Machinery Safety), Process, and Information; CSIA Certified System Integrator; Cisco Digital System Integrator; and 2019 System Integrator of the Year. The firm provides full system services and solutions deploying smart manufacturing technologies for the food and beverage, household and personal care, and life sciences industries.*
Imagine flying over the alpine forest of the Rockies to the red mesas of the Southern Ute Reservation in southwestern Colorado. There you will find Red Cedar Gathering’s Arkansas Loop natural gas treating plant in the San Juan basin.

Red Cedar Gathering is a midstream energy company, one of the largest in the region, with treating capacity of about 250,000 MCF, or 250,000,000 cubic feet per day. The company “gathers” the gas from more than 1,200 wells at 25 sites over 895 miles of pipeline using 150,000+ horsepower of compression to deliver gas to the plant, where the gas then is treated and delivered to various interstate transportation pipelines.

Phil Velasquez, systems manager, Instrumentation, and electrical engineer for the company, manages and monitors this entire process beginning to end on his computer or work tablet. Velasquez and his team monitor the incoming and outgoing gas flows, temperatures, levels, pressures and equipment, which make up a growing 10,000 live and 8,300 historical data points.

“What prompted us to seek other solutions,” says Coy Bryant, director of operations at Red Cedar Gathering, “was that our former configuration was labor intensive.

“We sat down as a team to look at how to streamline our entire companywide control system,” he continues. “We then decided to eliminate most of the third-party controllers and historian software.”

They now use the FactoryTalk® View human-machine interface (HMI) graphical interface from Rockwell Automation with a custom-configured HTML5-based Asset Performance Management home page screen created with ReadyAsset CMMS software by LLumin Inc., an Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program.

“Before we changed out the third-party software, updating and maintaining data on operations in the...
old system was clunky, and the data was limited,” agrees Velasquez.

“We already used FactoryTalk Historian ME from Rockwell Automation, and 85% of our controllers are still the Allen-Bradley® CompactLogix™, the SLC™ 500 controllers and a few from the ControlLogix® 55 series of controllers. It was easy to expand and integrate LLumin software from there,” he says.

Red Cedar Gathering uses RSLogix 500® and Studio 5000® to support licenses for the LLumin software and Allen-Bradley controllers.

“We converted to LLumin software, FactoryTalk View SE and ME, and FactoryTalk Historian SE and ME to provide the operators more historical and real-time data and better diagnostics,” explains Velasquez. “We designed a reliable control network where we use DH+, ControlNet®, Modbus® TCP and EtherNet/IP™ protocols. We standardized the PLC control communication to EtherNet/IP.”

Natural Gas Treatment Primer

Let’s review what happens in the natural gas treatment process. Natural gas streams out of the ground containing CO₂, water and other contaminants, all of which must be removed. The carbonic acid — created by the combination of CO₂ and water — corrodes pipelines.

CO₂ also reduces the British Thermal Unit (Btu) value of the gas, which is unmarketable in concentrations of more than 2% or 3%. The treating facility removes the “rich” gas containing CO₂ and water to create “lean” or pipeline-quality gas.

Red Cedar Gathering uses amine heaters to increase the temperature of an amine media liquid, made of MEA (monoethanolamine), MDEA (methyldiethanolamine), DEA (diethanolamine) and other solvents. The amine liquid moves through the heater to make contact with the natural gas. A chemical reaction binds the amine liquid to the CO₂, and the CO₂ is ushered out of the system.
Using a similar chemical absorption process, the energy firm uses triethylene glycol (TEG) as the dehydrating agent. The TEG binds with water molecules and removes the water. Now the gas is pipeline-ready.

Improved Throughput
The energy firm deployed the IIoT-enabled asset management software 3-1/2 years ago. With the additional data it’s gained with the software, it has increased its run time above 99%, resulting in plant throughput of 100% per year.

“We require less labor hours due to fewer callouts with equipment going down,” Bryant explains. There is less downtime due to alerts on the equipment condition and operations. We paid for our investment of integrating LLumin within 3 years.”

“Our labor hours are reduced due to a quicker start time with dehydration equipment and amine heaters,” Velasquez adds. “Now we can start and stop quickly from our control system. It is automated where we did it manually before. It reduces the time to bring up the system.”

Before the software integration, if the TEG or dehydration equipment went down, the team would repair and diagnose the equipment manually. If a pump was malfunctioning, a team member would go to the pump, examine the issue and provide the required data over a radio to the control room and thus allow a system restart.

The operations team members monitor the dehydration equipment and BMS pumps from the control room. They run through their checklist to start or restart the system, and they can see whether moisture or CO₂ levels are increasing. They receive alarms in the control room, analyze what’s happening and decide on the best course of action.

Velasquez uses the PLC and HMI to view the location and condition of equipment that provides color-coded and symbol alerts on the need for inspections, maintenance or repair.

“We set the alarms higher than the pipeline industry standards,” explains Velasquez. “We then ensure that only pipeline-quality gas continues beyond the plant.”

“Interlocks” and “permissives” on the system prevent valves from opening or pumps from starting. On the interface, the directions will be to check specific equipment and identify any problem. If everything checks out and fits the parameters, they will start again from the control room.

If there’s trouble with a piece of equipment, it will be locked out of service so no accidental starts occur. In other words, the system won’t allow a restart on that equipment to proceed until the necessary repairs or replacements are made.

Predictive and Preventive Maintenance
Red Cedar Gathering uses the asset management and historian software to do predictive and preventive maintenance by monitoring and analyzing historical and real-time data such as temperatures and pressures.

“The additional data helps us keep a close eye on the condition of the equipment,” says Velasquez. “We now proactively measure the condition of our equipment and set historical and condition-based rules. We record machine data to see the condition of our equipment and use preset rules to identify out-of-spec conditions.”

The energy company stipulated what it needed to measure and observe based on historical and real-time data. It does regular inspections and preshift machinery checks. It also can view trends in machine condition, look for potential problems and set alerts for follow-up.

“We can also now analyze the data and optimize the treating capabilities. We keep tighter thresholds on temperatures now and have a more efficient burner management system,” affirms Velasquez. “Our pumps are designed to maintain a consistent pressure and run efficiently. With the data, we can monitor the pumps 24/7 and identify any irregularities.”

If the repair will take more than a few minutes to address, they leave that equipment down and start up another.

What is the Downtime Cost Equation?
Downtime happens in real-time production and incurs significant costs. Multiple factors are involved in the downtime cost equation — employees are idle or working overtime, and reduced production causes lost revenue and loss of customer confidence. Damaged equipment may need repairs, and specialized technical support may be required. To this, add stress to the entire operation and a loss of time and brain power for innovation.

An Enterprise Strategy Group (ESG) study estimates the average downtime in manufacturing is about 1-1/2 hours, and other studies show an average of 3 to 4 hours per day.

Calculations from different sources show costs to industrial manufacturers between $30,000 to $50,000 per hour, with increased costs of 5 to 10% according to Mark Stevens of the Manufacturing Tomorrow blog.

According to Aberdeen Research, 82% of companies have experienced unplanned downtime over the past 3 years at a cost up to $260,000 per hour. In studies, articles and blogs discussing downtime and how to reduce it, all roads lead to predictive analytics with IIoT technology.
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With the Asset Facility View module, Velasquez and his team can view, locate and manage critical equipment. They can also upload interior photos and architectural drawings.

The company uses the data gathered through the asset management software to track equipment and facility conditions. The software looks at assets essential to the operation, which ones are nearing the end of their life cycles and forecasts how soon they need to be repaired and replaced as well as the costs.

All of this information improves equipment life span of and helps the energy company in purchasing equipment, Velasquez explains. From the historical data, leaders can see what equipment was used, how many run hours it had and how it performed.

Smooth Integration
With minimal training and using the services of a local system integrator, it was a smooth process to incorporate the asset management software and make all the changes to the system, agree Bryant and Velasquez.

In upgrading the system, Red Cedar Gathering required flexibility to interact with the existing in-house PLC standard logic, various types of vendor PLC logic, and the legacy PLC systems by Rockwell Automation. It also needed the software to be compatible and scalable for use in both the FactoryTalk View SE and ME environments.

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“We standardized HMI FactoryTalk SE and FactoryTalk ME to help operators with their daily routine. The upgraded HMI is a more detailed and intuitive graphical interface between our personnel and the PLC. It allows for better monitoring, controlling and diagnosing of the real-time field data to improve the process at the plant. The software is designed to mimic the employees’ workflow,” he said.

For parameter file handling, the team determined that each I/O Type and Point would need a separate parameter to provide better diagnostic tools for operations and to historize the data points on the control network.

The Red Cedar Gathering control system currently has about 2,250 parameter files in service and about 1,475 parameter files in testing phase. This design allows for secure isolation between the corporate and the control system network. The control network pushes the read-only data to the corporate network for monitoring, diagnosing and viewing.

This integration continues with ongoing migration of the existing and new systems into the control system. There is ongoing standardization of the HMI layout and graphics using FactoryTalk View SE and ME and ongoing standardization of the PLC hardware and programming style.

“We changed the manual gauges to transmitters, and we now have more transmitters in our facility,” says Velasquez. “We monitor plant-wide through LLumin View SE and ME and FactoryTalk Historian SE and ME. Together, they collect all the information from the controllers. The process makes the data readily available for decision-making.”

LLumin, Inc. is an Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program. The firm provides high-performance enterprise asset management (EAM) and materials tracking software solutions.

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HOW TO USE ROBOTS FOR NONREPEETITIVE TASKS

Vision guided robotics help industrial applications where robot fingers need to maneuver objects of different shapes and sizes or that touch or overlap.

From Teledyne DALSA
Editor’s Note: This article is adapted from the white paper, “A Close Look at Vision Guided Robotics (VGR).” Visit http://bit.ly/tj19teledyne to download the full white paper that describes ideal manufacturing environments and applications for VGR in industries such as medical device, pharmaceutical, food packaging and agriculture; explains how machine vision and robotics combine using hardware and algorithms to create VGR; and provides a real-world case study.

We’ve all seen videos of robots rapidly assembling cars with little or no human intervention. Industrial robots like these have increased productivity in almost every manufacturing sector, but they have one shortcoming: they can’t “see.”

Programmed to repeat exactly the same motions over and over again, they can’t detect and maneuver objects of different shapes, sizes and colors, or objects that touch and overlap. So, if a product changes or is added to the production line, the robots must be reprogrammed. And if product components are delivered to the line by traditional hoppers and shake tables, bowl feeders must be retooled.

Beyond Repetitive Tasks
A new generation of robots guided by advanced machine vision is taking robots beyond repetitive tasks. Fueled by smaller, more powerful and less expensive machine vision cameras and other vision sensors, increasingly sophisticated robotic algorithms and processors with machine vision-specific hardware accelerators, these vision guided robot (VGR) systems are transforming manufacturing and fulfillment processes.

VGR makes robots highly adaptable and easier to implement for industries in which new products are introduced frequently and production runs are short, including medical device and pharmaceutical manufacturing, food packaging, agricultural applications, life sciences and more.

What About 3D Vision?
Often, VGR systems use more than one type of sensor to build 3D images. For example, a robot with a 3D area sensor locates and picks randomly positioned parts in a bin. Then a 2D camera detects the orientation of each part on the fly, so that the robot can correctly place them on a conveyor.

By combining laser 3D Time-of-Flight (ToF) scanning and snapshot 3D image capture, some VGR systems gain the resolution to work with a wider spectrum of objects than with a scanning system alone, but without needing to move the camera as with traditional snapshot camera systems.

ToF scanning, which measures the time it takes light from a laser to travel between the camera and an object’s surfaces to determine its depth, has the advantage of working in any lighting condition.

Robust Hardware and Algorithms
These advanced vision systems can process large amounts of data by using hardware accelerators such as field-programmable gate arrays (FPGAs) and application-specific integrated circuits (ASICs). This gives them the capability to handle thousands of SKUs on production lines and in order fulfillment applications.

A critical component of advanced VGR systems is algorithms that prevent the robot and its end-of-arm gripping tool from colliding with the sides of the bin or other objects. This interference avoidance software must be exceptionally robust because every pick from the bin requires a different path plan, and parts are often intertwined.

VGR use is now approaching 50% of robotics in consumer electronics (above the circuit-board level) and other light assembly in Asia. And as random bin-picking technology fast becomes a flexible, easy-to-understand and interchangeable commodity, it’s within the reach of small and medium-sized companies looking to reduce manual intervention, improve safety and quality and increase productivity.

Teledyne DALSA, based in Billerica, Massachusetts, is a participating Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program. The company provides machine vision components and solutions including image sensors, cameras, acquisition boards, sophisticated vision software and intelligent vision systems.

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Download the Free White Paper
Visit http://bit.ly/tj19teledyne to download the complete white paper “A Close Look at Vision Guided Robotics (VGR)” from Teledyne DALSA. It describes ideal manufacturing environments and applications for VGR in industries such as medical device, pharmaceutical, food packaging and agriculture; explains how machine vision and robotics combine using hardware and algorithms to create VGR; and provides a real-world case study.
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CONTROL STATION, INC.

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With the Type 3360/3361 electromotive seat valves, Burkert offers a complete process control valve that sets new standards with respect to performance, reliability and cost-effectiveness. Potential uses for the new valves include applications with stringent requirements for control accuracy and process stability, as well as applications in which operation without a compressed air system is advantageous. http://bit.ly/2LZMi0U

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STRATUS TECHNOLOGIES
>> Weigh Process Instrument Mount with Display
Encompass™ Product Partner Vishay Precision Group, Inc.
— BLH Nobel introduces the G5 DIN rail mount with display (G5-RMD) for enhanced visibility of process data such as weight and status. The advanced display and functional keypad allow easy navigation through parameters, menus and settings.

Features include a web interface with diagnostics, process data and setup capabilities, full weighing functionality, simple backup and restore, and the ability to provide more precise theoretical calibration in reality. A built-in web server facilitates quick and easy operation and simplifies parameter changes through any web-supporting device.

The monochrome advanced OLED display provides visibility of process data such as weight and status, parameters and diagnostics information. Users can configure digital inputs and outputs according to their specific needs.

With its flexible fieldbus interface, several industrial communication interfaces such as Ethernet, RS485 and optional fieldbuses are available, each complying with industry standard protocols.

>> Modular Adapter System
Encompass™ Product Partner icotek Corp’s IMAS-CONNECT adapter system is a modular-designed grommet system for mounting metric connectors, keystone couplers, hose fittings and pressure compensation elements.

By using the modular adapter system, the cable entry becomes a hybrid system. Pre-terminated and standard cables or hoses can be routed. The grommets let users integrate various types of connectivity ports into the frame system. Additional knock-outs no longer are required.

The adapter system’s elastomer-made grommets fit perfectly into existing icotek cable entry frames, such as KEL-U, KEL-ER and KEL-FG and meet IP54 or IP65 protection levels.

Available metric threads of the AT-KM series are M5 x 0.5, M8 x 1.0, M12 x 1.0 and M12 x 1.5. The AT-M is M12 x 1.0, M16 x 1.5, M20 x 1.5 or M25 x 1.5. The AT-KS grommet is suitable for Keystone modules such as USB, RJ45, HDMI and approximately 70 other Keystone modules.

>> PRODUCT SPOTLIGHT
Motor Controller with Integrated Safety
The Allen-Bradley® ArmorStart® ST distributed motor controllers with integrated safety can be mounted directly on a machine, allowing users to implement functional safety with fewer components.

It is the first networked safety-enabled on-machine solution designed to integrate into Allen-Bradley Logix controllers and programmed using Studio 5000® software. Using one network via EtherNet/IP™ and one software tool helps to streamline light and heavy industry applications.

The motor controllers offer safety ratings of up to PLe/SIL 3 and Cat 4. They also have built-in safe torque-off, which removes rotational power to the motor but not the drive. This can help keep workers safe and improve uptime by allowing for faster start-ups after safety demands are made. It also can reduce wear caused by repetitive start-ups.

ArmorStart products are well-suited for food and beverage and automotive applications such as conveying and material handling, in which minimizing downtime is critical. The motor controllers offer automatic device configuration to help maximize uptime and lower mean time to repair. They require no additional enclosure near the motor or machine, allowing for shorter cable runs. When combined with other machine-mounted products, they can reduce design, commissioning and installation costs compared to more traditional solutions.

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Industrial Cable Termination
Encompass™ Product Partner Belden, Inc., introduces DataTuff Industrial REVConnect. The RJ45 connectors facilitate field termination in harsh industrial environments, especially for bonded-pair Ethernet cabling. The universal cable management solution helps save critical installation time in the field, without compromising network reliability. The flexible design allows the connector core to adapt to various outer jacket options, removing the need for twisted pair separation during termination. System integrators can identify and troubleshoot signal transmission issues by sliding the core into a new outer jack to narrow down the root cause. Other features include network reliability and uptime with an insulation-piercing mechanism that supports 23-24 AWG Cat 5E, 6 and 6A Ethernet cables, as well as time saved in the field with easier cable termination and synergy through bonded-pair technology.

Cabinet-Free HMI Terminal
The fully enclosed Allen-Bradley® ArmorView Plus 7 graphic terminal from Rockwell Automation is a prepackaged solution that can be ordered with integrated I/O and push buttons. Whether an on-machine, cabinet-free HMI is being deployed to save space on the shop floor or to help operators work better by having line of sight from the HMI to the machine, the terminal provides mounting options to meet users’ needs. It can be attached in a range of orientations to a swing arm, pedestal or fixed surface, and it uses Ethernet I/O communication to minimize wiring. The terminal has an IP66 rating, providing ingress protection against dust and high-volume pressurized water. It is available in several configurations, allowing push buttons and multiposition selector switches on the terminal to be customized.

PRODUCT SPOTLIGHT
Integrated Motor/Actuator
Encompass™ Product Partner Curtiss-Wright offers the Exlar GTX100 integrated motor/actuator. It is the second frame size in the integrated motor/actuator series. Incorporating the company’s inverted roller screw technology, the device’s high-power density and compact form factor make it a suitable replacement for hydraulic cylinders. The actuators offer the power, precision and programmability of a servo system while minimizing the maintenance issues associated with hydraulics. With continuous force ratings up to 15,392 N (3,460 lbf), speeds up to 953 mm/sec (37.5 in/sec) and standard stroke lengths from 150 to 300 mm (5.9 to 11.8 in.), the actuator can be applied across a range of factory automation applications. High-capacity planetary roller screws offer up to 15 times the life and higher shock load resistance than a comparably sized ball screw. Other features include IP65S (min.) environmental protection; seamless integration into most motion control architectures; and smooth, quieter operation.
**Passive Harmonic Filter with Bluetooth Compatibility**

Encompass™ Product Partner TCI has enhanced its passive harmonic filter to include Bluetooth compatibility. The addition of Bluetooth allows users to monitor power quality and control the passive filter using an Android device.

The HGP with PQconnect filter is a drive-applied 5% passive filter that limits current harmonic distortion to less than 5% over a wide load range. Adding a passive harmonic filter to an electrical system helps to improve power quality and overall system uptime.

The Bluetooth wireless connection makes installation and monitoring simple, and gives users the ability to access system performance data. In addition, TCI’s software, the PQvision app, is available as a free download for use with Android versions 5.0 or higher.

**Mobile App for Industrial Alarm Notifications**

Encompass™ Product Partner WIN-911 has launched a mobile app for industrial alarm notifications. It can be used with the latest generation of Android and iOS mobile devices.

Features include encrypted communications using outbound HTTPS and Azure-based login authentication; Chat, which gives users a way to converse, brainstorm and share solutions in real time; Team Viewer, which shows who has seen an alarm and who has acknowledged it; push notifications, so users can send alerts to a smartwatch, choose ringtones and acknowledge alarms; and alarm reports detailing alarm states, changes, history and comment threads.

The app has a simple user interface and install process. The previous mobile app, Mobile-911, will continue to be available to users of the legacy software platform V7 Pro, but it no longer will be updated.
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