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JANUARY 2023

A NOTE ON THIS ISSUE:

Welcome to the latest issue of MPT—and let's start the new year off right! In our Case Studies section, we take a closer look at a grimy problem (pg. 12). For Los Angeles and other metropolitan areas, the number of restaurants, event venues, institutions, and multitude of other facilities with commercial kitchens create a significant waste stream, heavily laden with FOG (fats, oils, and grease). However,



J. Campbell, Editor Modern Pumping Today

Greasezilla's Lori Sylvia explains how her company provides a resourceful, effective, and affordable solution.

In this month's Water & Wastewater Solutions section, we explore scenarios when a building's water system needs to be shut down or placed in an isolation condition, such as temporary closures or renovations (pg. 16). As Kurita America's Paul Sharpe demonstrates, for both regulatory and efficiency concerns, there's a right way and a wrong way to handle low flow.

Also, Luca Rizzo of ABB shares how the water industry is striving for greater efficiency amid a growing demand for desalination (pg. 26). Desalination is one of the most energy intensive areas of the water and wastewater industry—accounting for five times the amount of electricity for the percentage of potable water it produces. ABB's optimized motor control can help shrink this gap.

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Nidec's Dominique Llonch says ambitious projects are just the first step











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BANNER ENGINEERING RECEIVES GOLD LEAP AWARD

Industrial automation manufacturer Banner Engineering announces its DXMR90-X1 smart industrial controller has received Gold in the Industrial Automation category at the 2022 Leadership in Engineering Achievement Program (LEAP) Awards.

The DXMR90-X1 is a primary component of Banner Engineering's Snap Signal product series, an overlay system that harvests data from legacy products and other devices, regardless of signal type or manufacturer. Data is processed at the edge, converted to common Industrial Ethernet protocols, and sent where it's needed.

The DXMR90-X1 provides a simple and cost-effective way to connect existing sensors and devices without requiring expensive retrofits, overhauls, or equipment replacement. It also avoids switching everything over to the same ecosystem at great cost. With data provided by the DXMR90-X1, production line efficiency can be boosted by discovering and remedying choke points and other areas that hamper the line's effectiveness. Real-time alerts allow better decision making and remote asset management.

"The DXMR90-X1 Industrial Controller ... simplifies the integration of mature Modbus networked sensors into industrial networks such as Modbus TCP, EtherNet/IP, and PROFINET," adds the competition judges.

CIRCOR EXTENDS PARTNERSHIP WITH PROFLOW PUMPING SOLUTIONS FOR PUMP REPAIR

Circor International, Inc. announces a renewed service partnership with ProFlow Pumping Solutions. The ProFlow service centers will continue to provide service for IMO, Allweiler, and Warren brand pumps at their Midwest facilities.

For more than two decades, ProFlow Pumping Solutions has been a leading distributor for Circor fluid handling products. Headquartered in Blue Island, Illinois, its main service center underwent an extensive audit review before being granted certification as an authorized service center. With their certification, ProFlow's service and repair center is authorized to perform repairs, rebuilds, and service whether minor or major on a diverse array of Circor's pump brands.

"We are extremely proud to present our long-time and valued partner ProFlow Pumping Solutions with their Authorized Service Center Certification," says Jamie Mekus, program manager of aftermarket sales at Circor. "We strive to provide our customers with the highest level of aftermarket support and this certification signifies our commitment to fulfilling that objective."

As part of Circor's Global Service Network, ProFlow Pumping Solutions works closely with the factory to deliver meaningful solutions to meet the needs of our customers.



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WOOSTER PRODUCTS ADDS WEBSTAURANTSTORE.COM AS DISTRIBUTOR

Wooster Products, the industry leader in anti-slip safety stair treads and walkway products, has added **Webstaurantstore.com** as a new distributor. For nearly twenty years the company has created and fostered an innovative and easy to use website to serve the purchasing needs of foodservice professionals, and now they are branching out to serve industrial users as well.

They will offer the FlexMaster and Stairmaster brands of Wooster Products safety stair treads, as well as Flex-Tred anti-slip tapes, and Safe Stride anti slip paint. These products are ideal for new construction, renovation, and industrial safety. In addition to restaurants and foodservice facilities, Wooster Products are installed in schools and universities, public buildings, multi-family environments, sports stadiums and arenas of all sizes, transportation venues, retail stores, shopping centers, and more.

In addition to Wooster Products, **Webstaurantstore.com** offers products from leading manufacturers such as Ballymore Safety Ladders, Wesco Industrial Products, Magliner hand trucks, BenchPro worktables, Regency Space Solutions, Lavex Industrial Supplies, and more.

"**Webstaurantstore.com** has been making a name for themselves as a go-to supplier within the industry," adds Wooster Products' Tim Brennan.

APTIM OPENS NEW HEADQUARTERS ON THE WATER CAMPUS

Aptim celebrates the grand opening of its new headquarters on the Water Campus in Baton Rouge, Louisiana, the international company's hometown. With the office's proximity to the Mississippi River, downtown Baton Rouge, and its new neighbors—who share Aptim's priority of making the Gulf Coast more resilient—the move symbolizes Aptim's growing relationship with the community and state.

"We are excited to be moving to a corporate headquarters that offers our people a beautiful and state-of-the-art facility to collaborate and innovate, that strengthens the relationship with our home city, and that connects our headquarters to the river and the levee. This location speaks directly to Aptim's purpose and leadership in resilience and sustainability," says Aptim Chair and CEO Mark Fallon.

"The architecture of Aptim's new headquarters represents our commitments. With floor-to-ceiling windows overlooking the Water Campus, we are inviting guests, partners, and clients into our new space to explore our first-class capabilities. With collaborative spaces, our experts will work side-by-side with them on projects for our state and communities around the world. I am proud to have been part of this milestone for Aptim," adds Aptim Director of Facilities Management Max Curtner.







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TRADE SHOW PROFILE



AHR EXPO 2023 Forging ahead in the HVACR industry

he international AHR Expo, or Air Conditioning, Heating, Refrigerating Exposition, is held concurrently with the ASHRAE Winter Conference in Atlanta—home of the new ASHRAE Global Headquarters. The event will be held February 6 through 8, 2023, at the Omni Hotel at CNN Center and Building A of the Georgia World Congress Center.

STATE OF THE INDUSTRY

In 2022, the AHR Expo launched a panel discussion among leaders representing every sector of the

industry. As the first large event following the pandemic, the panel served as a recalibration of all that was happening across the industry as a result. The response was overwhelmingly positive and the benefit to the industry led to open communication throughout the remainder of the year. In 2023, Bryan Orr returns to moderate a state-ofthe-industry update with leaders from ASHRAE, AHRI, HARDI, PHCC, NCI, and other organizations regarding the current challenges, opportunities, and forecasts for the year ahead in HVACR.



Expected topics include changing regulations, the economic forecast including inflation and tariffs, the green transition, the supply chain, and more.

LOOKING TO THE FUTURE

The keynote speaker will be Peter Leyden, a leading expert on new technologies and future trends. Leyden will give the big picture story of our times and the next thirty years focusing on a dozen new technologies and massive trends that will inexorably happen under almost any future scenario. These include technological revolutions in infotech like AI, in biotech like genetic engineering, and in energy tech like electric transportation. His message will include inexorable changes in demographics, both in generational shifts and increasing diversity, as well as other historic trends.

Attendees are also encouraged to sit in on exhibitor presentations in the New Product and Technology Theater. More than 145 presentations lasting approximately twenty minutes each are planned across all three days of the show. These free seminars are meant to provide attendees with brief overviews of new product announcements and technologies that can be found in exhibitor booths on the show floor.





Attendees are invited to follow up presentations with a visit to the booth for a more in-depth explanation and one-on-one interaction with products and representatives.

EDUCATION STILL MATTERS The full schedule for the 2023 AHR Expo Education Program will feature more than 200 free seminars, including a robust panel series, new product and technology presentations, professional certifications, and continuing education courses. Additionally, in response to the industry's call for more training via shared knowledge and opportunities for open discussion, the program has been extended to include Wednesday sessions.

The AHR Expo aims to complement the attendee experience on the show floor with application knowledge and technology found in manufacturers' booths. Education sessions provide an understanding of real-world application and practice in areas of niche discipline, as well as broader discussion topics relating to trends happening currently and on the horizon within the industry.

The 2023 show will also feature more than eighty-five free sessions led by industry experts put forth by industry organizations. Sessions will range from one to two hours and will aim to deliver solutions to some of the industry's most pressing challenges and exciting opportunities. Attendees are invited to attend general HVAC-related sessions, as well as those specific to professional practice areas.



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END-TO-END SOLUTION PROVIDES RETURN ON INVESTMENT

LEND Environmental tackles Los Angeles fats, oils, and grease waste

BY LORI SYLVIA, GREASEZILLA

END Environmental is a commercial grease and oil recycling company servicing the Los Angeles area. Founded by Louis Downey in 2021, the company's mission is to alleviate the nation's problem of over-burdened landfills by recycling millions of pounds of animal byproducts and used cooking oil that would otherwise be disposed of as waste.

THE CHALLENGE

The food service industry generates massive amounts of grease trap waste (GTW) and used cooking oil (UCO). For Los Angeles and other metropolitan areas, the number of restaurants, event venues, institutions, and multitude of other facilities with commercial kitchens create a significant waste stream. The EPA estimates that a typical restaurant produces between 800 and 17,000 pounds of GTW per year, and the North American Rendering Association estimates that 4.4 billion pounds of UCO is collected annually.

To say the least, for grease haulers, there is no shortage of business. However, a shortage of facilities that accept and process this particular waste stream is creating serious challenges. Louis Downey's years in the liquid waste industry have made him acutely aware of the rising costs of doing business. Limited disposal locations force haulers to regularly travel longer distances to empty their trucks. This means more time spent on the road, higher fuel costs, competition at disposal sites, and steeper tipping fees.

Downey researched ways to turn this waste into a renewable resource himself. After all, fats, oils, and grease can be repurposed for a variety of products, including biofuels. Used cooking oil, in particular, is a desirable biodiesel feedstock. Downey believed that if he found the right technology, LEND Environmental could help turn LA's oil and grease waste stream into a sustainable—and potentially lucrative—business.

That's when Downey discovered Greasezilla™. The system's ecological separation process appeared to fit LEND Environmental's needs perfectly. Energized about the prospect, Downey reached out for more information.

THE SYSTEM

Greasezilla is a turnkey standalone system that ecologically separates and processes grease trap waste. The end-to-end solution heats and removes fats, oils, and grease (FOG) from the waste stream without polymers, flocculants or other chemicals and leaves nothing to be landfilled.



Greasezilla separates grease trap waste into three distinct layers. At the top is a high-quality, lowmoisture brown grease advanced biofuel (ABF) ready for sale on the commodities exchange. The middle layer is a BOD-rich batter that can be composted or used as feedstock for anaerobic digestion. At the bottom is pasteurized water that can be used in composting or sent to wastewater treatment plants. Greasezilla provided Downey with a complete and ecological solution to his recycling problem.

Representatives from Greasezilla answered Downey's questions about the system's operation, maintenance, and processing capacity, and offered insights and case studies from other installations. The system's scalability, small footprint and SCADA-integrated capabilities offered flexibility for both Downey's immediate and long-term needs.

After reviewing the projected revenue and rapid ROI, Downey



decided to give it a try. He believed that Greasezilla could help fill a critical industry need and envisioned the impact that multiple systems could have on the region's waste stream.

INSTALLATION AND START-UP

LEND Environmental installed Greasezilla at its Sylmar, California, facility in the fall of 2021. Downey selected Greasezilla's fully-enclosed, self-contained modular configuration that could be placed in an exterior location, eliminating the need for building space. The Greasezilla team assisted with setup and testing of the system, and worked with Downey to familiarize him with system features.



CASE STUDIES

Shortly after the system came online, LEND Environmental opened the Sylmar facility to area haulers. Accepting both grease trap waste and used cooking oil, LEND Environmental offered a convenient location and reasonable tipping fees. News quickly spread, attracting business from across the region.

In addition to processing grease trap waste, Downey also decided to process his used cooking oil with Greasezilla. Although best known for FOG separation, Greasezilla's process offers the same benefit to UCO—it removes water and residual organic particles to generate a high-quality advanced biofuel.

The results exceeded Downey's expectations. Greasezilla polished the UCO into a premium, lowmoisture yellow grease advanced biofuel, reactor-ready for biodiesel conversion. By simply removing the moisture, Downey was able to quickly increase both the quality and market value of his UCO.

THE RESULT

With Greasezilla, LEND Environmental completely recycles and repurposes grease trap waste and used cooking oil from local restaurants, hotels, schools, hospitals, casinos, and other industrial kitchens across the region. Greasezilla processes the waste into renewable resources:

- Low-moisture (< l percent) brown grease advanced biofuel, a RINqualified feedstock for biodiesel, renewable diesel, sustainable aviation fuel, and heating oil.
- Low-moisture (< l percent) yellow grease advanced biofuel, a reactor-ready biodiesel feedstock.
- Batter that can be composted or used in anaerobic digesters.
- Pasteurized water to supplement water application needs in drought-affected areas, or sent to

wastewater treatment plants, compost sites, digesters, and some industrial applications.

In only a few months, LEND Environmental reached full processing capacity, affirming Downey's belief that Greasezilla systems needed to be placed in multiple locations. The critical need to address the region's overwhelming FOG waste could not be ignored.

Downey discussed adding other sites with Greasezilla representatives. The companies' shared desire to reduce waste, promote clean energy, and foster a healthier environment resulted in a joint venture targeting UCO and GTW recycling and repurposing. Together, Downey and Greasezilla will open processing facilities across southern California.

Downey's next facility is slated for LEND Environmental's Lancaster, California, location, with more locations in the planning process.





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WATER & WASTEWATER FOCUS

THE RIGHT WAY TO HANDLE LOW FLOW

Managing your potable water system during temporary closures

BY PAUL SHARPE, KURITA AMERICA



here may be instances when a building water system needs to be shut down or placed in an isolation condition, including temporary closures of the building, building renovations, or isolation of a section of a larger distribution system. A water system that is in a low flow condition is slightly different but presents a similar potential for the development of biofilm and the amplification of potentially harmful bacteria.

Under normal building operation, chlorinated or chloraminated water is supplied to a building from the local municipality and the disinfectant is evenly distributed throughout the building water distribution system. However, loss of disinfectant residuals may occur due to a number of factors, including disinfectant demand, temperature, nutrient loading, and water flow. In situations described above, if the water flow stops or is significantly reduced, bacterial growth and biofilm development can increase rapidly as the disinfectant in the water is depleted.

In cases where a building's water flow has been reduced (but not valved off) it is important to develop a protocol or management plan for consistently flushing as many of the distal (away from the main header) faucets, fixtures, and outlets as possible. Each of the water lines off the supply main has the potential for concentrating bacteria and biofilm. Flushing these lines will help exchange the stagnated water with fresh water containing a disinfectant.

For building water systems that have been completely isolated for an extended period, a potable water disinfection (using chlorine) will be the process for any new or older piping. This will be part of





Cross section of potable water piping. This diagram depicts an exaggerated graphic of the bacterial growth and biofilm development process.

the commissioning protocol and is typically mandated by the local health department prior to occupancy or human consumption. In this condition a total coliform test (positive/ negative) is performed and must be tested within twenty-four hours of sampling. Check with the local health department for specific guidelines.

STEPS TO BE CONSIDERED

The following are some simple actions that should be considered while a building is under low-flow conditions:

- Flow and exchange 3 to 7 percent of the water based on estimated total water volume for the building.
- Flow water at each distal outlet until there is a chlorine residual (free or total) based on the type of disinfectant. This will require a free or total chlorine test kit. Additionally, a specific test for monochloramine can be used for chloraminated systems.
- For hot water potable systems, flush the water to the point where either the water temperature is the same as the hot water main or above 120 degrees Fahrenheit, or 49 degrees Celsius, (where allowed). This will require a thermometer.

Once the building water system is scheduled to return to normal service, flushing should be increased, and additional testing is advised.

- Disinfectant levels should be at or near the supplied water levels at all locations in the building.
- Samples for total heterotrophic plate count should be collected and cultured. Total heterotrophic plate counts should be less than 500 colony forming units.
- Local certified water testing laboratories will be able to perform these cultures and the interpretation of the results.

One of the most effective means of reducing bacteria amplification and biofilm development is simply exchanging the old water with new. Waterborne pathogens can concentrate in stagnant water if the building distribution system is not flushing regularly. It is important to develop and follow a written plan for both low flow and idle water systems. Documenting the process and procedures followed will help if a shutdown is required in the future.

Further details, including proactive steps to minimize water stagnation during building closures and actions items to address water quality prior to reopening, can be collected from a recently published document from the United States Environmental Protection Agency on restoring water quality in buildings.

RESTORING YOUR WATER QUALITY, THE RIGHT WAY

Per the EPA guidelines, facility owners are advised to contact their water

utility about local water quality and to coordinate maintenance activities prior to flushing the building. Additionally, check information from the local public health department for any local requirements for reopening and follow appropriate regulations and policies for worker safety and health.

Once the facility is ready to begin the flushing process, the EPA advises owners review how water moves through their building, from the street to each point of use—this includes inspecting the plumbing, maintaining any water treatment systems (e.g., filters, water-softeners) following manufacturer's instructions, and ensuring the hot water system is operating as specified.

The process for the flush itself should follow a straightforward procedure: First, flush the service line that runs from the water main to the building. Next, flush the cold water lines. With that step completed, it is time to drain and clean water storage facilities and hot water heaters. Now, flush the hot water lines. Finally, flush, clean, and maintain devices connected to the plumbing system following manufacturer's instructions.

As part of the Kurita Group, a leading industrial water solutions provider in the world, Kurita America brings innovations to market through a unique, customized water management approach called the Kurita Way. The Kurita Way embodies complete water harmonization through a consultive engineering engagement. By incorporating all aspects of our customers' facility, including chemical, mechanical, and operational components, Kurita America gets to the root cause of customers' most complex challenges to deliver optimal results and overall lower cost of ownership for a better, more sustainable world. For more information, visit www.kuritaamerica.com.



MAINTENANCE & RELIABILITY



Key insights on integrating innovative digital solutions for industrial needs Part 1 of 2

BY TED MASTERS, FIELDCOMM GROUP



In the industrial and manufacturing sector, it's important to make the most of the information provided by intelligent measurement devices. The usefulness of this information depends on access to and use of realtime, reliable data, allowing smart choices to be made. Integrating the data so that effective action gets taken depends on a network infrastructure that breaks down traditional "silos of information."

Current developments such as the Industrial Internet of Things (IIoT) and Industry 4.0 are focused on digital transformation of the field device network. This will help industrial organizations transition from reactive to predictive maintenance and optimize asset management strategies to improve operations and reduce costs. The goal is to use digitally available information from existing, installed field instruments to improve safety, operations, and reliability. Plant floor to executive office real-time access is key to delivering value to the enterprise.

FieldComm Group technologies provide the means to connect and integrate digital information—and have for over twenty years. Foundation™ Fieldbus, HART®, and WirelessHART® devices can be the basis for digitization supporting IIoT initiatives. At the same time, the Field Device Integration (FDI™) standard greatly simplifies device integration and takes account of the various tasks over the entire lifecycle for both simple and the most complex devices, including configuration, commissioning, diagnosis, and calibration.

TODAY'S INDUSTRY OUTLOOK

In a highly competitive global marketplace, industrial organizations are dealing with the evolution of their businesses and operations, where the virtual world of information systems, the physical world of machines and the Internet have become one.

The convergence of operational technology (OT) and information technology (IT) is driving new methodologies for monitoring production processes to improve performance, lower costs, and minimize risk. Mere connectivity of devices already allows valuable enhancements such as remote service and predictive maintenance, but, ultimately, the goal is to analyze data and gain detailed and comprehensive insights from assets, processes, and products.

For modern manufacturers, data needs to become an integral part of the control and operating system. They require technology providing an optimum interface for planning and maintenance programs running in the plant. Manufacturers seek "digital intelligence" to manage hundreds or even thousands of assets from a single site or across an enterprise to address crucial operating demands. This includes effective tools to transform process data into real-time knowledge regarding process performance, equipment health, energy consumption, and emissions monitoring.

Now, more than ever, industrial firms need to make sense of vast quantities of data having a critical impact on their performance. To support the variety of applications necessary within a manufacturing facility, information must be delivered with context so it can be understood and used in various ways by a variety of people.

CHANGING USER REQUIREMENTS

Management of industrial operations has become increasingly demanding. It's a case of navigating through the tangle of new data to find the needle in the haystack. Manufacturers need to create reliable production plans to meet market demands, and synchronize maintenance plans and operations execution—with the mandate to be more productive. In other words, do more, do it better, do it with more agility and with fewer resources.

Just as important, plant owner/ operators need to understand how well they are able to mature and improve the process of managing the performance of these tasks, and continuously deliver improved productivity and effectiveness.

For process industry firms, there is a real need to transform operations, with real-time instrumentation delivering better information and allowing faster implementation of decisions. An essential requirement for every company is to ensure the safety of people, assets, and the environment, while optimizing the performance of processes and facilities (e.g., uptime, reliability, safety, and compliance).

GROWTH OF AUTOMATION

Technological advances have been the impetus for dramatic increases in industrial productivity since the dawn of the Industrial Revolution in the sixteenth century. The first industrial revolution was the mechanization of production using water and steam power. The second industrial revolution then introduced mass production with the help of assembly lines and electric power, followed by the third industrial revolution with the use of electronics and information systems to further automate production.

The fourth industrial revolution encompasses the technologies and concepts of the value chain organization. Originally known as Industry 4.0 and comprising a set of technology principles set down by the German government, the globally adopted term Industry 4.0

INSIGHT #1

For industrial organizations, the IIoT is the basis for digital transformation—creating new ways to better collect and analyze the tremendous amount of data created in their operations and turn that data into solutions to solve challenging problems.



MAINTENANCE & RELIABILITY

INSIGHT #2

Industry 4.0 employs the technological concepts of cyberphysical systems, the Internet of Things (IoT), and the Internet of Services to facilitate the vision of the smart plant or factory.

relates to the previous three industrial revolutions, each of which heralded a turning point in production and manufacturing strategies. Industry 4.0 employs the concept of cyber-physical systems (i.e., linking real objects with information-processing and virtual objects and processes via information networks—including the internet).

DIGITAL TRANSFORMATION IN THE AGE OF IIoT

The aim of Industry 4.0 is to deliver greater flexibility to production and manufacturing processes by integrating the processes, data, and organizational services of an enterprise. Industry 4.0 will make it possible to gather and analyze data across machines, enabling faster, more flexible, and more efficient processes to produce higher-quality goods at reduced costs. This, in turn, will increase manufacturing productivity, shift economics, foster industrial growth, and modify the profile of the workforce—ultimately impacting the competitiveness of companies and regions.

UNDERSTANDING THE IIoT

During the past twenty years, the growth and diversification of the internet has redefined businessto-consumer industries. In the next ten years, it will dramatically alter manufacturing, energy, and other industrial sectors of the economy.

Dubbed the Industrial Internet of Things (IIoT), and in tandem with Industry 4.0 practices, the latest wave of technological change will bring unprecedented opportunities to business and society. It combines the global reach of the Internet with a new ability to directly control the physical world, including the machines, facilities and infrastructure that define the modern landscape. The adoption of the IIoT is being enabled by the improved availability and affordability of sensors, processors and other technologies that have helped facilitate capture of and access to real-time information.

As the next big step in industrial performance and operations, the IIoT offers a wide range of potential uses and benefits:

- Enabling businesses to leverage the vast amounts of data provided by modern automation and control systems to make strategic decisions
- Providing trained personnel with improved remote monitoring, diagnostic and asset management capabilities
- Enhancing data collection even in the most dispersed enterprises
- Improving decisions about the actual health of assets
- Reducing the time and effort for configuration and commissioning
- Minimizing the need to troubleshoot device issues in the field
- Bringing production fields online faster

Communication protocols and standards form the backbone of the IIoT in that they enable the secure integration and interoperability of devices and software applications. This results in an always-connected framework with applications such as machine health, predictive analytics, performance monitoring, and asset monitoring readily layering on top of this infrastructure.

In the world of process automation, the IIoT started with smart connected devices with unique identifiers communicating using a real-time digital network. This led to: having more sensors using fewer wires; more measurements in every instrument, with real- time status; the ability to freely add devices to a junction box without having to run cables all the way to the input/output (I/O) cards or add the I/O cards themselves; the ability to monitor self diagnostics in an instrument from an office on the other side of the world; and the ability to put an indicator on the network to display values from transmitters and valves in inconvenient locations, or compute tank inventory or compensated flow from multiple sensors.

Without question, the possibilities of smart connected devices within an industrial plant are endless, and once a connection across the Internet is also provided this value can be extracted to varying levels within the organization.

A REVOLUTION OR EVOLUTION?

The IIoT is often presented as a revolution that is changing the face of industry in a profound manner. In reality, it is an evolution that has its origins in technologies and functionalities developed decades ago. This technology has been evolving under different names, but there is now a wider acceptance on the market under the common umbrella IIoT.

Many manufacturers that have invested in smart instrumentation and control systems (i.e., HART and Foundation Fieldbus) are now looking to leverage existing assets with the IIoT, rather than abandon or change them. There are also a

INSIGHT #3

The internet started in the 1960s, but it was not until the introduction of the world wide web in the mid-nineties that most businesses could start realizing the broad possibilities of the technology. Be prepared for the "next" big step.



INSIGHT #4

The Industrial Internet has major implications for process automation, but it is not something entirely new. Indeed, the basics of IIoT have been in the industry for a long time. End users have been moving digital information around their plants and to various hosts for years.

number of organizations that have a long history in the advancement of automation products, driving innovation in open architectures and digital communication technologies that have been helping to guide companies through the IIoT transformation.

Since the introduction of the first smart transmitter in the 1980s, the market has seen continual growth of intelligent field devices that are now referred to as "things" with the IIoT. While the adoption of these "things" has increased, the approach to developing a more efficient, profitable, and intelligent automation system is something that many stakeholders have been championing for decades.

Field level data can provide huge amounts of information, which, if mined, routed to higher levels and put into perspective is indispensable for the success of the IIoT. If the data can be presented in the proper context to a variety of different users, it can add real value to plant operations.

In the process industries, end user consortiums like the German chemical industry association NAMUR have put forth their vision for the IIoT, Industry 4.0, and the digital future. They acknowledge that while the large installed bases of legacy 4-20 mA devices are going to continue to exist, there is a strong justification for commercial-off-theshelf (COTS) Ethernet to be used with field devices along with a common, deterministic network above the field level, and a management layer providing integration technology and functioning as a gateway to serve data to various enterprise applications via the OPC unified architecture (UA).

Other stakeholders view industrial wireless technology as the answer to retaining large numbers of 4-20 mA HART-enabled instruments and still moving digital information into plant networks. Depending upon an organization's role in the automation eco-system, its outlook on digital advancement is likely to be very product specific, very architectural, or totally aspirational.

VALUE OF DIGITAL TRANSFORMATION

Digital transformation—the use of technology to radically improve performance or reach of enterprises is becoming a hot topic for companies around the world. Manufacturers are using digital advances such as analytics and smart embedded devices—and improving their use of traditional technologies—to change customer relationships, internal processes, and value propositions.

If manufacturers can fully leverage the benefits of digitization, all the way from core manufacturing out



MAINTENANCE & RELIABILITY

to the end-user experience, the opportunities are exponential because they can better use all of the available data in the enterprise.

Industrial systems that interface the digital world to the physical world through sensors and actuators that solve complex control problems are commonly known as cyber-physical systems. These systems are being combined with "big data" solutions to gain deeper insight through data and analytics.

Successful digital transformation comes not from implementing new technologies but from transforming industrial organizations to take advantage of the possibilities that new technologies provide. It also results from reshaping operational strategies to leverage valuable existing assets in new ways.

To get the most out of IIoT and Industry 4.0 technologies, and to get past square one with a digital business model, companies will have



to adopt a new way of thinking. It starts with recognition that in-place analog solutions are sub-optimal and not provide the information needed to run complex industries facilities, coupled with the belief that networking and software technologies underpinning the Internet have a place in process automation. Finally, there is the act of leveraging global manufacturing technology initiatives by deploying disruptive new technologies to improve safety and performance.

A LOOK AHEAD

The IIoT is enabling digital transformation by making use of the information contained in installed smart measurement devices. Simultaneously, industrial wireless continues to be a valuable, costeffective solution for quickly adding more measurements to systems. Contributing to digital transformation of measurement data, wireless is







FOR MORE INFORMATION: J. Campbell (jay@mptmag.com) visit our website mptmag.com

being used for monitoring local and remote assets, safety, environmental, and many different mobile and rotating measurements.

With a larger, consolidated data set, manufacturers can apply higher analytics for more detailed insight, scale the data as needed to meet the varied needs of single-site or enterprise-wide operations and leverage a wider pool of data experts for monitoring and analysis. Ultimately, digital transformation will help manufacturers eliminate unplanned shutdowns, maximize output, minimize safety risk, and optimize supply chain strategies. In next month's conclusion to this article, we'll examine how some of these innovations are being implemented already and project where they may lead.

TED MASTERS is president and CEO of FieldComm Group. The FieldComm Group is a global standards-based organization consisting of leading process end users, manufacturers, universities, and research organizations that work together to direct the development, incorporation, and implementation of new and overlapping technologies and serves as the source for FDI technology. FieldComm Group's mission is to develop, manage, and promote global standards for integrating digital devices to on-site, mobile, and cloud-based systems; provide services for standards conformance and implementation of process automation devices and systems that enable and improve reliability and multivendor interoperability; lead the development of a unified information model of process automation field devices while building upon industry investment in the HART[®], Foundation[™] Fieldbus, and FDI[®] standards. Membership is open to anyone interested in the use of the technologies. For more information, visit www.fieldcommgroup.org.





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A large Indian water purification company has increased the efficiency and reliability of its water purification plant with twenty hours per day running due to Wanner Hydra-Cell pumps.

The plant, which the company was running for a pharmaceutical organization, previously had to slow or stop operations due to frequent leakages and a lack of reliability in critical pumps. The company quickly spotted the problem and, working with Wanner International, found a solution. The Hydra-Cells (G35s, G12s, and G21s) handled with ease a range of corrosive chemicals and liquids with high solids.

THE NEED FOR SPEED

In the old system, pumps would have to run at lower speeds. Production would frequently stop meaning it was not uncommon to lose a day in downtime. This was caused by solid particles becoming lodged in the packing, which would have to be replaced every couple of days,



typically taking between four to five hours, and the plungers would only last three to four months.

Wanner's Hydra-Cell seal-less pump solved these problems, with high reliability and little on-going maintenance achieving low operating expenses. The pumps are saving the company millions of dollars every year.

EFFICIENCY MEANS MONEY

With the water purification specialist billing its customer per liter of processed fluid, leakage meant the company was effectively pouring money down the drain. Worst still, if the plant was shut down, no money would be generated at all.

The plant now operates twenty hours per day with Wanner's Hydra-Cell pumps running constantly. Working in partnership with this multi-national water purification company, Wanner was able to design and install an efficient and reliable pumping solution, solving in one fellswoop these operational problems.



OPTIONS FOR EVERY INDUSTRY

Wanner's innovative Hydra-Cell pumps are helping businesses save time, money, and resources, and make water processing plants more efficient and profitable. Wanner International supplies the company with over 100 pumps a year for reverse osmosis (RO), handling effluent, and industrial waste.

Wanner has supplied ultra-highpressure reverse osmosis (RO) process pumps to a variety of companies in the water industry, including APATEQ, manufacturers of custom water treatment systems (see attached photograph).

PAUL DAVIS is managing director of Wanner International. With over thirty-five years combined service at Wanner International, our customer services teams are real people at the end of the phone and have passion to deliver the promises they make to all our customers—a loyal and trustworthy team always striving to exceed customers' expectations. For more information, visit

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MOTOR SOLUTIONS



GROWING DEMAND FOR DESALINATION REQUIRES BETTER ENERGY EFFICIENCY

The water industry must focus on striking the right balance

BY LUCA RIZZO, ABB

ater demand is continuing to increase as the global population grows. Clean water is required by people for drinking, cooking, and washing, and by industrial facilities for cooling and other processes. Agriculture in particular is a major consumer of water, with irrigation using about 70 percent of the world's fresh water.

One water industry segment experiencing significant growth is

desalination. Desalination is one of the most energy intensive areas of the water and wastewater industry; although it produces less than 1 percent of the world's fresh water, it accounts for around 5 percent of the industry's electricity use.

During desalination, it is the pumping processes which use the most energy. This includes, for example, raising sea water to the level of the facility, high-pressure desalting with semi-permeable membranes, and high-pressure pumping for reverse osmosis. The energy required to run high pressure pumps accounts for approximately 25 to 40 percent of the overall cost of desalinated water.

Thanks to advances in technology, reliability, and economies of scale, the average capacity of desalination plants has increased from producing 100,000 cubic meters of desalting



water per day to 500,000 cubic meters a day. This is expected to grow even further due to the effects of climate change.

The most widespread desalination method is reverse osmosis (RO), a complex, multi-stage process that forces seawater through the minuscule pores of a membrane. Each stage involves its own applications and technologies—many of them highly energy-intensivesuch as seawater intake pumps, booster pumps, and high-pressure pumps. The process requires vast amounts of electrical energy, making electricity one of the highest running costs in desalination. The greenhouse gas emissions created in generating the required power, especially in the Middle East, where fossil fuels are widely used, significantly contribute to global warming.

The water industry must focus on striking the right balance between energy efficiency, reliability, and cost-effectiveness when choosing the technology to use in the desalination process. As a result, key stakeholders, including desalination process managers and operators, original equipment manufacturers (OEMs), system integrators, and engineering, procurement, and construction companies (EPC) are demanding more energy-efficient solutions.

ENERGY EFFICIENCY THROUGH OPTIMIZED MOTOR CONTROL

The ratings of motors and drives are increasing to meet the demand of larger membranes and higher operating pressures. High pressure pumps are currently rated up to 11 kilovolt (kV) and 7.5 megawatt (MW).

Optimizing the production cost of a large desalination plant requires a focus on the cost of running and the cost of not running a motor (i.e., unscheduled downtime). Running cost is directly linked to the motor's efficiency, therefore pairing variable speed drives (VSDs) with energyefficient motors results in a lower total cost of ownership (TCO). For medium voltage (MV) motors used in desalination applications, it's critical to design the pump and motor together to ensure the complete system runs at its best efficiency point (BEP). This requirement applies to both variable speed control and direct online motor control start-ups. Optimized control systems significantly reduce the energy consumed by motors used to drive pumps and other equipment compared to traditional suction-valve control, while using VSDs with highefficiency motors can lower energy use in clean water, desalination, and

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MOTORSOLUTIONS

wastewater processes by about 25 to 30 percent.

Moreover, VSDs will help save energy in almost any process that requires a change from full-speed operation—especially those using pumps. This is because, rather than running the motor flat-out and adjusting the pump output by throttling, the VSD enables the load on the motor to be adjusted precisely to deliver the required output.

In the case of a VSD, any potential issues with poor power quality related to harmonics (sometimes known as 'electrical pollution') can be mitigated using an ultra-low harmonic (ULH) drive. This type of drive also reduces the risk of disturbance to other sensitive equipment connected to the mains.

DATA-DRIVEN SOLUTIONS TO REDUCE PLANT DOWNTIME

Desalination plants are usually located close to the sea with high humidity and variable temperatures, which affect the lifecycle of motors and drives. When specifying motors, plant operators must ensure they are suitable for such harsh, corrosive environments, including taking into account a thermal safety limit for insulation and bearings. This helps to extend the lifetime of the motors and reduce their overall maintenance requirements.

It is also important to take a continuous approach to energy optimization—something that can be achieved, for example, through digitally connected motors and pumps with the capability to track energy usage. In fact, the entire system architecture of a desalination plant can be optimized through continuous condition monitoring.

Data insights coming from this connected equipment can be used to identify opportunities for potential energy savings and carbon dioxide equivalent emissions reductions, as well as to track and trace rotating equipment to improve operational efficiency, reduce waste, and maintain compliance with regulations.

TO THE CLOUD AND BEYOND

Data gathered from VSDs' built-in sensors and loggers, together with that collected from sensors fitted to motors, bearings, and pumps, can be aggregated, stored, and further accessed via the cloud. Gathering and analyzing this data can reveal information on the status and condition of equipment so that operators can service activities more logically and effectively over the course of its lifetime.

Digital services, such as remote condition monitoring, provide alerts and information to enable the prediction and mitigation of issues before failure can occur. In turn, these solutions enable improved control, efficiency, and safety of water distribution networks. They can also be integrated with water leakage and quality management systems, and are scalable to any network size.

MODERN DESALINATION IN ACTION IN SINGAPORE

Having enough clean water has always been a challenge for the island state of Singapore, even though it's surrounded by water. The Keppel Marina Desalination Plant (KMEDP) is the latest step for Singapore in its use of advanced technology to meet its current demand of up to 430 million gallons a day. It is one of the first in the world with a dual-mode facility—capable of treating rainwater or seawater, depending on prevailing weather conditions. This makes the plant weather-resilient to provide a stable water supply to the community and meet 7 percent of Singapore's daily water demand.

The plant utilizes various cuttingedge ABB technologies, including automation and control systems, as well as instrumentation and water analyzers. With ABB's supply of energy efficient motors, VSDs and switchgear, together with process optimization aimed at increasing efficiency, the potential gains could help reduce electricity consumption by up to 40 percent. A range of sensors and water-monitoring equipment is also being used in the plant.

An ABB distributed control system—a user-friendly digital platform that gives engineers wide visibility and precise control from a central command center—unifies plantwide control systems. The plant's operations can be extended from device to edge to cloud with the control system. The intelligent and integrated solution allows uniformity of procedures and helps improve the quality of operational processes.

SOLVING THE WATER SCARCITY CHALLENGE

High-efficiency motor-drive packages can lower costs and boost energy efficiency, making desalted water more affordable and accessible to more people for not only safe consumption, but also use in many critical agriculture and industrial processes.

By using the latest technology, we can bring modern desalination processes to the regions that most need them—creating a safe, secure, cost-effective, and high-quality water supply for future generations.

LUCA RIZZO is industry manager of water and power MV motors and generators for ABB. ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. By connecting software to its electrification, robotics, automation, and motion portfolio, ABB pushes the boundaries of technology to drive performance to new levels. With a history of excellence stretching back more than 130 years, ABB's success is driven by about 105,000 talented employees in over 100 countries. For more information, visit www.abb.com.





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SEALING SOLUTIONS





MORE DEMAND FOR COMPLETE SYSTEM SOLUTIONS

Whether off-the-shelf or custom-made, Industry 4.0 answers are here

BY MATT HALE, HRS HEAT EXCHANGERS

Trrespective of industry or sector, manufacturers and plant operators are increasingly choosing to invest in complete system solutions which can easily be integrated into existing operations, rather than sourcing components or equipment for inclusion in lines which are designed and installed in-house or by thirdparty contractors.

COMMON TRENDS ACROSS THE INDUSTRIAL LANDSCAPE

The reasons for choosing complete solutions will vary according to client, but industry observers have noticed some common trends in recent years, which we have also seen in our own experience. For example, the data collection and utilization trends encapsulated by Industry 4.0 and the industrial internet of things (IIoT) mean that many clients are looking for machinery and systems that are connected to their data systems, something that is often outside the scope of their own in-house engineering and IT functions.

Complete systems, whether off-the-shelf or designed to meet client's bespoke needs, also reflect an overall trend towards complete line integration which is increasingly seen in manufacturing environments. In 2019, just before the Covid pandemic, it was reported that 35 percent of food manufacturers had fully integrated processing and packaging lines and that the trend was not limited to larger companies. Data collection and the IIoT enable manufacturers to plan and operate more efficiently, and this trend is increasing all the time.

PLUG-AND-PLAY SOLUTIONS

Against this backdrop it is natural that manufacturers are looking for "plugand-play" solutions. Rather than inhouse fabrication of production lines, manufacturers want standalone systems and equipment than can easily be integrated with other components. This is an acceleration of a trend which began many years ago, but which has really come to the fore since the pandemic.

HRS has produced complete systems for the food and environmental sectors for many years and is continuing to develop new products and solutions as demand



The HRS Thermblock Series is a self-contained pasteurizer/sterilizer.



SEALING SOLUTIONS



HRS systems are connected to the industrial internet of things (IIoT) via ethernet or 4G SIM.

increases. Some of these implement existing technologies—such as the HRS DSI (Direct Steam Injection) Series—while others provide a prepackaged combination of proven heat exchanger technologies, like the HRS Thermblock & Asepticblock series of pasteurizers/sterilizers. In the environmental and energy sectors HRS systems provide convenient and economical solutions for the problems faced by developers and operators of anaerobic digestion plants, including digestate concentration and/or pasteurization and biogas dehumidification.



A complete HRS UHT system containing DSI and MI Series components.

Elsewhere HRS concentration and evaporation systems are used for manufacturing and waste management, with the ultimate waste solution being the HRS ZLD (zero liquid discharge) System.

CONNECTED AND COMPREHENSIVE

All of these HRS systems offer monitoring and telemetry systems with connectivity via ethernet or integrated 4G data SIM. This enables the systems to integrate with the rest of your business both physically and in terms of data, control and the IIoT.

Whether you are looking for a completely standalone thermal system, or equipment that can be integrated as part of a large production or processing unit, HRS has a comprehensive range of systems and heat exchangers to meet your needs.

MATT HALE is international sales and marketing director for HRS Heat Exchangers. Located in Atlanta, Georgia, HRS Heat Exchangers is part of the EIL Group (Exchanger Industries Limited) which operates at the forefront of thermal technology. HRS offers innovative heat transfer solutions worldwide across a diverse range of industries. With forty years' experience in the environmental, energy, food, pharma, and industrial sectors, specializing in the design and manufacture of an extensive range of turnkey systems and components, incorporating our corrugated tubular, and scraped surface heat exchanger technology, HRS products are compliant with global design and industry standards. HRS has a network of offices throughout the world: Australia, Canada, New Zealand, the United Kingdom, Spain, the United States, Malaysia, and India; with manufacturing plants in the United Kingdom, India, Spain, and Canada. For more information, visit www.hrs-heatexchangers.com.



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Where backpressure is present, spring-loaded PRVs often utilize bellows to ensure balanced operation. Data analysis from 30,000 PRV service records across different industries and valve brands shows a bellows failure rate between 2 to 6 percent. In other words, a plant with 1,000 bellows PRVs may have between 20 to 60 PRVs continuously operating with damaged bellows. The most common causes of bellows failures are excessive backpressure and rapid cycling. Ruptured bellows will cause fugitive emissions and may prevent valve operation at the designed set pressure, with the risk of catastrophic overpressure events.

The Crosby Balanced Diaphragm can replace bellows in PRV applications to address these and other issues. The second technology, Bellows Leak Detection, addresses the problem of bellows failures, which are challenging to detect and often remain unnoticed for years until removal of the valve for periodic service.

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The 1852N Seawater Deballasting Valve is ideal for deballasting seawater from welldecks. The 8-inch size 1852N model is used by the U.S. Navy on its LHA, LHD, and LPD class amphibious assault ships, which have welldecks that require seawater to be rapidly raised and lowered. Seawater is notably corrosive, and the special materials of construction allow these valves to survive decades of use. Part of Warren Controls Series 1800 line of heavyduty globe valves, the 1852N valve can be supplied in conformance with MIL-V-18030 service applications. For more information, **www.warrencontrols.com**.





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REDUCING THE ENVIRONMENTAL IMPACT OF PORT ACTIVITIES

Nidec's Dominique Llonch says ambitious projects are just the first step



EFFICIENCY POINT

ominique Llonch is the chair of Nidec Industrial Solutions and CEO of Nidec ASI, the multinational leader in the Nidec Group's Industrial Solutions sector. The company was recently awarded two turnkey projects for electrification of the quays (cold ironing)

of Italy's passenger ports in Genoa and Savona—two multi-million-dollar projects for emission-free logistics. Below, Lllonch lays out how Nidec's technology will make it possible to improve air quality and to mitigate the acoustic impact of large sea-faring vessels, benefiting the local communities and relaunching the area's vital tourist economu from a greener perspective

MPT: How did this project come about? What can you tell us of its background?

DOMINIQUE LLONCH: Nidec ASI, which is part of the energy and infrastructure division of the Nidec Group, has had plans to continue its growth path in Europe and in Italy under the banner of sustainability, consolidating its leadership in the ecological transition sector. In particular, as far as Genoa is concerned, four years after the first shore-to-ship project carried out by Nidec ASI for the port of Genoa Prà, the Western Ligurian Sea Port Authority signed a contract worth tens of millions of dollars, assigning the executive design and works to a temporary joint venture of which Nidec ASI is the leading company, and in which Ceisis, leader in the design, construction, and management of port facilities, and the Molfino and Longo civil engineering firm are consortium partners. This partnership should allow us to complete the project within two to three years.

MPT: How will Nidec's technology create more environmentally sustainable ports?

DOMINIQUE LLONCH: Thanks to the innovative electric power supply systems for ships developed by Nidec

ASI in Genoa and Savona, it will be possible to reduce emissions and noise pollution with positive impacts on inhabitants and tourists in the areas bordering the two Ligurian ports, which are both located inside the cities, while at the same time having minimal impact on the operation of the ports.

In Genoa, the project envisages Nidec ASI building six berths, which will allow the cruise ships and ferries docked at the port to switch off their on-board generators, connecting to the electricity grid to meet their operational needs. In order to adapt the voltage and frequency of the power supply network to what the ships require, a conversion system consisting of distribution panels, transformers, and converters that will allow the ships to be powered simultaneously will be implemented.

In Savona, a cold ironing system similar to that of Genoa will be developed for the cruise port, with a converter that will allow one ship to be powered at a time. For both projects, an automation, monitoring, and control system will allow meeting all safety regulations.

MPT: What were some of the external or regulatory concerns that went into these designs?

DOMINIQUE LLONCH: The two orders comply with the necessity of following European Union directives, which, since 2003, encourage ports to adopt quays electrification systems (shore-to-ship) to reduce polluting emissions of vessels in the port, while maintaining heating and air conditioning running, as well as the necessary vessel auxiliary systems.

By 2025 this recommendation will become binding for all European ports. The planned investments for modernizing the ports of Genoa and Savona are co-financed by the EIB (European Investment Bank) and include various interventions such as moving the breakwater in the capital port, access to the railway terminals, cold ironing (electrification of the quays), restructuring the port moorings, and IT security.







WHAT'S YOUR PREVENTATIVE **MAINTENANCE PLAN?**

At Pentair, we want to help you get the most out of your pump. That's why we have built a robust Authorized Distributor network outfitted with high-quality OEM Parts designed to keep your pump running strong for as long as possible.

By conducting a routine pump check, you can spot issues before they lead to an expensive problem. Our experts have compiled a checklist to show you what to look for, so you'll know when to schedule a service call with a Pentair Authorized Distributor.

Let our team of experts help you get the most from your pump.

Learn how to spot your pump's warning signs at pentair.com/pumpcheck.

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HOMA



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- Manny Furtado: District Superintendent 46 Years Industry Experience