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Analog Input Comparison	Do-more BRX Analog Input <sub>BX-08AD-3</sub>	AB Micro850 VS. 2085-IF8	Siemens S7-1200 6ES7231-4HF32-0XB0
Resolution	16-bit	14-bit (unipolar) 13-bit (bipolar)	13-bit
Range	±10V; ±5V; 05V; 010V; ±20mA; 420mA	±10V; 010V; 020mA; 420mA (default)	±10V; ±5V; ±2.5V; or 020mA; 420mA
Update Time	1.2ms all channels	2ms per channel	625µs
Accuracy	±20mA: 0.61μA 420mA: 0.49μA 010V: 305μV 05V: 153μV ±10V: 305μV ±5V: 153μV	1.28 mV/cnt unipolar 1.28 mV/cnt bipolar 1.28 µA/cnt	N/A
Hardware Price	\$179.00 😁	\$421.00 🌍	\$445.00 🔮

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BY BARNES

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# AUGUST 2020



### **A NOTE ON THIS ISSUE:**

Thank you for joining us for the August issue of MPT. This month's Trade Show Profile (pg. 12) explores the changes and challenges facing our industry as several well-known industry events respond to the COVID-19 pandemic. Both globally and domestically, many exhibitions are going online—including a new Virtual Expo offered exclusively by our team here at MPT! See how these innovative solutions can help expand your business.



Modern Pumping Today

Plant operators constantly look for ways to increase the efficiency and data collection from drives and motion control. With an eye toward ease of access and

versatility, Siemens launches its Sinamics V20 Smart Access web server module. Designed to mount directly onto the drive, the module transforms any mobile device or laptop into a virtual operator panel for drive control. Siemens's John Meyer shares the details in this month's Motor Solutions section (pg. 38).

Also, in our Sealing Solutions section, Ericka Richardson of Greene, Tweed explains how they were able to collaborate with Houston-based AccessESP to improve the reliability of high-voltage electrical submersible pumps thanks to Greene, Tweed's Seal-Connect solution (pg. 40). If you're a pump owner looking to improving reliability, you'll want to check this one out. Enjoy!

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### **Modern Pumping Today**®

www.mptmag.com P.O. Box 660197 | Birmingham, Alabama 35266



J. CAMPBELL Editor

jay@mptmag.com

TONYA BROWNING Vice President

tonya@mptmag.com

JEFF FLETCHER National Sales Manager

jeff@mptmag.com

LISA AVERY Art Director

**CRISTELA TSCHUMY** Graphic Designer

SETH SAUNDERS Digital Media Specialist

INGRID BERKY Office Manager

### subscription inquiries or changes: 205.380.2048



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### INDUSTRY NEWS



### MFG CHEMICAL ACHIEVES ISO 9001: 2015 CERTIFICATION ON TEXAS PLANT

MFG Chemical has successfully achieved ISO 9001:2015 Certification

on its 26.7 acre plant in Pasadena, Texas. This is one of four MFG Chemical plants, the other three being in Dalton, Georgia, and having already received their ISO 9001: 2015 Certifications. MFG was one of the first chemical companies to achieve ISO 9001:2015 Certification, beginning in October 2016, and has now been audited and certified four times.

ISO 9001 is the international standard that specifies requirements for a quality management system (QMS). Organizations use the standard to demonstrate the ability to consistently provide products and services that meet customer and regulatory requirements. ISO 9001 is based on the plan-to-check-act methodology and provides a process-oriented approach to documentation and reviewing the activities.

As part of the ISO9001:2015 certification process, MFG Chemical engaged in a rigorous audit of its business processes, as well as its product quality environments. By maintaining this level of certification, MFG Chemical demonstrates a quality management system and continuous improvement of its products and services.



MetOx Technologies adds two executives to its senior management team: Nagaraja Shashidhar, senior vice president strategy, and Richard Booher, senior vice president operations. These additions complete a worldclass team that's bringing large scale commercial high temperature superconducting wire (HTS) manufacturing to Houston

Nagaraja Shashidhar, PhD joins MetOx after nineteen years at Corning where he was involved in the development of materials-based business and products. He was instrumental in the development and early growth of the Gorilla glass business for Corning, helping global customers solve adoption issues, and design Gorilla glass into their smart phones.

Richard Booher has more than thirty years' experience leading manufacturing organizations in all phases of development. Prior to joining MetOx, Booher led manufacturing operations for petroleum refining catalysts, silane, and polysilicon. Working as the project manager for technology development, deployment and optimization, he has led execution of large scale domestic and international projects with most recent assignments in South Korea and China. He employs a focused approach to drive daily improvements in safety, quality, delivery, and cost.



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### SPX FLOW NAMES DYNAPUMPS PTY. LTD. AS ITS AUSTRALIAN CHANNEL PARTNER

SPX Flow has announced the appointment of Dynapumps Pty. Ltd. as its channel partner for Bran and Luebbe pumps to cover customers across Australia. Founded in 1981, Dynapumps is a growing company with extensive experience in pumping solutions across key oil and gas, industrial, and food and beverage markets.

Its reputation for on-time supply of highly specialized engineered solutions with excellent after sales service and genuine spare parts is seen as an important strategic addition to the SPX Flow customer support network in the region.

Dynapumps offers an extensive portfolio of pumping packages. With the addition of the Bran and Luebbe product lines, it will be offering complete metering, chemical dosing, and high-pressure injection solutions, to customers ranging from oil and gas and power generation to pharmaceutical and food and beverage applications. Its services include project development, manufacturing, and commissioning to meet specific installation needs.

The current strong presence in Queensland, Victoria, and West Australia, will be bolstered by adding sales and application engineers to extend its customer reach in support of this new partnership. Customers within New South Wales will be serviced via Superior Pump Technologies. David Watt, national sales director at Dynapumps, adds, "This is an exciting new partnership and one that complements our existing pumping and vacuum solutions. We have a strong focus on customer support and meeting our project commitments. I believe, our companies are well aligned for a long and prosperous relationship."

### JWC ENVIRONMENTAL ADDS FIVE-YEAR WARRANTY TO MONSTER METAL GRINDERS

JWC Environmental relaunches its Monster Metal grinders featuring a trade secret alloy and industry-leading fiveyear warranty. Monster Metal grinders feature cutters that last twice as long as typical industry cutters and work in both abrasive and corrosive environments commonly found in wastewater treatment plants. JWC conducted intensive in-house and field testing to validate that the proprietary material and design outperformed other cutters in wear resistance and corrosion.

"We're excited to bring back Monster Metal to the wastewater treatment market. Previously, operators had to choose between corrosion resistance or abrasion resistance. With Monster Metal, they no longer have to compromise," says Greg Queen, president of JWC Environmental. "And they can rely on a five-year warranty to increase the longevity of their grinder cutters."

Monster Metal is available on select Muffin Monster, Channel Monster, and Channel Monster FLEX units.



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Try before you buy! Request your free sample! Or visit our website. A five-year warranty covering the cartridge and wear components is included on Muffin Monster units while a three-year warranty is available for Channel Monster and Channel Monster FLEX units.

### OPTIMAS SOLUTIONS STRENGTHENS SUPPLY CHAIN WITH PERSONNEL CHANGES

Optimas Solutions announces the promotion of Randy Nelson, vice president of supply chain and strategic sourcing, and Matt Kubbinga, director of supply chain. These seasoned supply chain veterans are responsible for strategic planning, procurement, supplier performance management, process optimization and automation, demand planning and forecasting, and inventory optimization.

"The expertise and knowledge of Randy and Matt enables Optimas to embrace continuous growth and future innovation," comments Marc Strandquist, president of the Americas at Optimas Solutions. "These promotions reflect the incredible leadership and hard work of the supply chain team to fulfill on Optimas's commitment to being a best-in-class industrial distribution and service provider."

Nelson has an extensive background in the Fastener Industry, with over eighteen years at the executive level in sourcing/supply chain with Supply Technologies and Brighton Best. Nelson's responsibilities are centered around the enhancement of worldwide sourcing, building an agile team, and process optimization that places intense focus on customers' needs to secure their supply chain and elevate competitiveness.

Kubbinga moves into a new position leading demand planning, forecasting, and inventory optimization initiatives for the Optimas Americas. Kubbinga will use his broad knowledge of supply chain management to ensure customer inventory needs, optimization, and efficiency with Optimas solutions.

### ASAHI/AMERICA ISO CERTIFICATE RENEWED

Asahi/America, Inc., a leader in thermoplastic fluid flow solutions, announces the reissuance of its ISO 9001:2015 certificate. The Massachusetts-based company has received continuous ISO certification since 1996. The company maintains machine and assembly shops, as well as an extensive custom fabrication department in its Lawrence, Massachusetts, headquarters and provides customers with on-site consultation, supervision, and training.

The thermoplastic valve and pipe manufacturer's management system was audited by Bureau Veritas and was found to be in compliance with the standards required to earn ISO 9001:2015 certification. Asahi/America's new certificate was issued May 22, 2020, and expires on May 22, 2023.

The standards outlined in ISO 9001:2015 help companies deliver consistent products and services; measure, analyze, and improve all aspects of their business; and ensure customer satisfaction.





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# The Pump Industry Stays Connected

Amid travel restrictions and social distancing, trade shows go virtual to meet demand

I n response to the continuing global COVID-19 pandemic and the restrictions that have accompanied it, numerous industries have found themselves facing the challenge of providing their traditional services while also observing the need for precautionary guidelines to impede viral transmission. The exhibitions and conferences serving myriad aspects of the industrial pump sector are no different, and organizations have responded with their own approaches to the "new normal."

### TURBOMACHINERY & PUMP SYMPOSIA

Texas A&M's TurboLab announced that it will postpone the 49th Turbomachinery and 36th Pump Symposia (TPS), originally slated for September of this year, with tentative plans for it to be held virtually in lieu of a face-to-face event. The event is traditionally held in Houston, Texas, which is currently experiencing an uptick in coronavirus cases. TPS may skip 2020 altogether to host a hybrid event in 2021.

The TurboLab's international exhibit, the third biennial Asia Turbomachinery and Pump Symposium (ATPS) will be postponed to February 22 through 25, 2021, at the Kuala Lumpur Convention Centre (KLCC). The technical sessions and exhibition will be held February 23 through 25 and short courses will be held on that Monday, the 22nd.

### WEFTEC CONNECT

The Water Environment Federation (WEF) has announced that WEFTEC, its annual conference and exhibition, for 2020 will be a fully virtual event rebranded as WEFTEC Connect via the organization's online learning platform WEFTEC Connect will offer attendees interactive education, an exhibitor showcase, and networking experiences and will take place October 5 through 9 from 11:00 am to 4:00 pm Eastern.

With a mixture of real-time, interactive learning events, more than 400 on-demand technical sessions, networking, live product demos, solution sessions, exhibitor showcase, and more, WEFTEC Connect provides a dynamic, safe space for the world of water to learn and network.

WEFTEC also expects to announce a revised format and schedule for the Operations Challenge, the annual team competition presenting maintenance personnel with the chance to show off their hands-on skills.

### THE WATER EXPO

Traditionally held in Miami, the Water Expo has built its reputation on bridging the gap between domestic and Latin American and Caribbean water utilities and industries. However, with pandemic travel restrictions expected to continue into the fall, the ninth edition of the Water Expo will be a hybrid event combining both physical and virtual exhibits and meetings. Now postponed to October 28 and 29, the physical show will take place amid new health and safety guidelines established by the venue and local authorities.

A new virtual pavilion will be added for international and domestic exhibitors willing to participate without having to travel. For both scenarios, the Water Expo will feature what it has dubbed the Matchmaking Business Showroom, empowering exhibitors and attendees to do business in real time both at the event and around the world.

### MPT VIRTUAL EXPO

With meeting times and exhibit hours now becoming a premium, MPT has stepped up to provide the inaugural MPT Virtual Expo next month, Tuesday, September 15, from 11:00 am to 5:00 pm Eastern. The MPT Virtual Expo will feature Online Showrooms including manufacturers, suppliers, and maintenance and reliability specialists from every corner of the industrial pump market.

Exhibitors in the MPT Virtual Expo will be displaying their latest innovations with downloadable and interactive product guides as well as maximizing their networking avenues with live chat and video conferencing options. Attendees of the MPT Virtual Expo can also sign up for Online Technical Sessions offering Continuing Education Units (CEUs) to keep our industry's professionals up to date, even in the midst of these challenging times. ◆

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# An Investment in Quality of Life

### Automated meter reading makes life easy in Yonkers

By Steve Brewer, Mueller Water Products

Department of Public Works faced an impossible task in keeping track of each individual meter.

Under their legacy metering system, Yonkers residents received a bill twice per year. Due to the sheer size of the city's water system, the Department of Public Works could typically read only 5,000 out of the total 30,000 in each billing cycle. The city relied on estimated bills to maintain a regular billing cycle; however, this led to uncertainty when determining whether the city's water service was profitable. In some worst-case scenarios where a meter was read for the first time in years, homeowners could be left with a bill in the thousands of dollars.

With the development of automated meter reading technology, Yonkers had the opportunity to take control of their metering and develop a clear picture of their water system. In partnership with Keystone Utility Systems, the city elected to install the Mi.Net advanced metering infrastructure (AMI) system from Mueller Systems.

### ALL IN

When implementing an AMI system, many utilities will conduct a small end-to-end trial to test the system's performance before committing to a full implementation. However, Yonkers' Department of Public Works began with an immediate deployment of 30,000 meters. According to Anthony Landi, project facilitator at Yonkers' Department of Parks, Recreation, and Conservation, this all-in approach required good faith and trust on all sides. "The project required a lot of work and coordination," says Landi. "Mueller supplied the meters through Keystone, while Keystone did the work to make appointments for installation."

One of the key challenges of the installation project was the variety of homes within the system. While a majority of the meters required a simple, straightforward replacement process, some of the city's houses were over 100 years old with metering systems that have long since been rendered obsolete. The city worked together with Keystone to find a solution for these unique situations, identifying approximately 1,000 of Yonkers' 30,000 meters as "non-conforming." In some cases, the city was able to help the customers with simple repairs which allowed them to install the new automated meters; in other cases, customers invested in updates to their homes to bring them into compliance with local regulations.

### COOPERATION, TRUST, COMMUNICATION

To efficiently and safely install 30,000 water meters, Keystone needed to establish its presence in the city and



communicate with its residents. As part of the agreement between Keystone, Mueller, and the City of Yonkers, installation was required to be performed by local union labor. Keystone invested in the necessary uniforms and vehicle markings to ensure that contractors could be easily identified as part of the meter installation project. As Keystone quickly built up its reputation in the city and began to schedule appointments with residents, the company came to be known as a reliable service provider trusted to deliver a significant improvement to the city's water service.

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The adjustment to a new AMI system also required preparation to collect and analyze a tremendous amount of new data. Representatives from Mueller Systems worked together with water and information technology employees at the City of Yonkers, ensuring that they had the necessary knowledge to convert their detailed meter readings into the required data sets.

### THE SYSTEM WORKS

The Mi.Net system and automated meters were installed over the course of two years. In addition to the meters, collectors and repeaters were installed by an electronics company throughout the city to transfer information from the meters to a central location. The Mi.Net system then allowed the city to collect accurate, detailed readings from each of its 30,000 meters.

The accuracy of the AMI system enabled the Department of Public Works to identify customers experiencing leaks or other issues with their water service. This added value helped to cut down on customer complaints and service calls, as the city could engage proactively with customers to repair the problem. "In the past, sending out 5,000 bills could lead to 1,000 phone calls with customers disputing their bills," says Landi. "Now Yonkers doesn't get those calls anymore because the AMI system is so accurate."

According to Landi, the first meter readings validated the estimates the city had been conducting in the previous decades. "What we found out after the meters were installed was that, although some estimates were low and some were high, in the end we came out even," says Landi. However, the AMI system now provides the city with the confidence of knowing that their water service is being accurately accounted for and billed in a timely manner.

For Landi, th return on investment came in providing better service to the city's residents and improving their quality of life. And following an installation process on the scale delivered by Keystone and Mueller Systems, Landi is able to pay the highest compliment: "The system works. It's working perfectly!"

Landi credits the mayor of Yonkers, Mike Spano, as well as the Yonkers City Council for investing in a major upgrade to the city's infrastructure. "It took substantial support from the local government and has really improved Yonkers' water accountability and citizen relations," says Landi.

Steve Brewer is focus district manager for Mueller Water Products. Mueller Water Products is a leading manufacturer and marketer of products and services used in the transmission, distribution, and measurement of water in North America. The company's broad product and service portfolio includes engineered valves, fire hydrants, metering products and systems, leak detection, and pipe condition assessment. It helps municipalities increase operational efficiencies, improve customer service, and prioritize capital spending, demonstrating why Mueller Water Products is "Where Intelligence Meets Infrastructure." For more information, visit www.muellerwaterproducts.com.

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# Atlas Copco Delivers Water for All

Providing fresh drinking water to Navajo Nation through Can'd Aid

By Paul Humphreys, Atlas Copco Compressors LLC



tlas Copco USA's employeedriven Water for All program launches its second round of COVID-19 relief, supporting the distribution of fresh drinking water to Navajo Nation. Atlas Copco will provide \$25,000 to Can'd Aid, enabling the organization to deliver more than 50,000 cans of fresh drinking water to the area.

The committee also provides funding to support water-focused programs during times of local and regional crises—such as the COVID-19 outbreak.

### MEETING THE NEEDS OF NAVAJO NATION

Navajo Nation is an Native American territory covering approximately 17,544,500 acres, occupying portions of northeastern Arizona, southeastern Utah, and northwestern New Mexico. With more than 180,000 people living in the land, and with fewer than a dozen grocery stores, Navajo Nation continues to struggle to find ways to supply residents with water.

The June fulfillment will be distributed to the White Mountain Apache Tribe in Whiteriver, Arizona. In April 2020, Atlas Copco also supported Can'd Aid with a \$25,000 donation to Food Bank of the Rockies with canned water as part of their community outreach.

Supporting this project bears testament to the generosity of Atlas Copco's employees and the support they have given to Water for All over the last decade. The great work our partner Can'd Aid is doing in the United States does not go unnoticed, and the speed and agility in which they can move to support projects is truly inspiring.

### WATER FOR ALL

This year marks the ten-year anniversary of the Water for All

organization in the United States. The program originally started in Sweden in 1984. Through the dedicated and passionate work of volunteering employees at Atlas Copco, Water for All funds projects all around the world, providing access to clean drinking water, sanitation, and



### CASE STUDIES

hygiene. For every dollar an employee donates, the company adds another two dollars, making a double match.

Many projects are supported to bring access to clean drinking water to parts of the world where people and communities have never been afforded that luxury. The committee also provides funding to support water-focused programs during times of local and regional crises—such as the COVID-19 outbreak.

A HISTORY OF GOOD WORK Atlas Copco's Water for All

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the self-sustainability of Navajo Nation. In April 2017, they supported a program to build a new water treatment plant. Water for All was founded in Sweden in 1984 by Atlas Copco employees Peter Hakansson and Torgny Rogert and has continued to spread across the world ever since. At the center lies the strong belief that clean water is a human right.

Through Water for All, the money is used to support projects that give people in need access to clean drinking water and improved facilities for sanitation and hygiene. In addition to the Navajo Nation project, women and young girls are particularly affected by the lack of water and sanitation, and all projects supported by Water for All thus aim to positively impact the lives of especially women and girls. ◆

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# Managing Your Potable Water System During the Pandemic

By Paul Sharpe, Kurita America



he government mandated business closures and travel restrictions, due to the COVID-19 virus, have caused many businesses to reduce water flow in various complex building water systems. While the COVID-19 virus is not associated with building water systems, there are other pathogens and water quality issues that can potentially develop due to stagnant or reduced water flow in buildings.

There 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.

### WATER FLOW AND BACTERIAL GROWTH

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. The following is an exaggerated graphic of the development process:

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 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 (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 fewer than 500 colony forming units. Local certified water testing laboratories will be able to perform these cultures and the interpretation of the results.

### REDUCING BACTERIA AMPLIFICATION

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 U.S. EPA on restoring water quality in buildings.  $\blacklozenge$ 

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# Audible and Visible Signals Reduce Risk of Dangerous, Costly Accidents

Signaling technology is critically important to maintaining safety in crane hoist applications

By Jacob Vernon, Pfannenberg



his past June was #NationalSafetyMonth, an opportunity to raise awareness about significant dangers to technicians, operators, and other workers on the floor related to the use of crane hoists. To avoid accidents, it is imperative that everyone around knows that a crane and its load are nearby.

Audible and visible signals help to protect from these dangers, notifying those underneath or near a moving load so that they can take necessary precautions to avoid harm. Proper signals are thus critically important; inferior signals that are inaudible on the shop floor or not sufficiently visible can lead to dangerous and costly accidents.

In particular, dual sounder and strobe combination signaling devices are recommended for overhead cranes for an added safety benefit. There is little cost difference between combination and individual signaling devices; the added benefit to the user is immense, however, since shop conditions may prevent workers from either hearing or seeing a signal, but rarely prevent both.

### ADVANTAGES OF AUDIBLE AND VISUAL SIGNALING IN OVERHEAD CRANE USE

Combination signaling devices in overhead crane settings can offer cost savings through two different avenues: reduced risk of harm to personnel, and increased throughput of the factory floor. Signaling devices reduce risk to personnel by warning them of impending danger so that there are no deaths, injuries, or even lost time. This reduced risk, however, depends on the efficacy of a signaling device in a given application, based on its decibel and joules level.

In terms of increased throughput, signals can reduce the likelihood of crane downtime. Cutting-edge combination signaling devices are capable not only of warning personnel of a moving load, but also of using separate tones or lights to warn the operator of conditions that can cause downtime. This can include collision avoidance, overspeed alarms, hoist break failure alarms, overload alarms, and overtemp of VHD alarms. These, in turn, save on costs, as businesses that use cranes to facilitate production rely on them to make them for revenue. If the crane is down, there is a high likelihood of significant revenue loss, so signaling the need to change conditions or perform maintenance reduces the risk of that revenue loss.

### SELECTING AND INSTALLING THE CORRECT AUDIBLE SIGNAL

When choosing an audible signal for an overhead crane application, it is important to ensure that the signal is the correct decibel level for the given application—able to be heard over machinery, but not so loud as to pose a risk to workers. Determining the correct audible signal decibel level is based on the application and area that the device will be used. Signals should be set at no less than +5dB above the application's maximum sound pressure level; however, the ideal set point is +10dB above this sound pressure level for added safety.

For example, a steel mill might have hundreds of overhead cranes used for production and throughput of raw steel. It does not make sense to use the same signal on a crane in the blast furnace as the one that is used in a coil stacking yard, as having an audible signal with the kind of low decibel level that would suffice in the coil stacking yard would add even more risk to the already dangerous blast furnace area. Companies specializing in audible and visual signaling technology like Pfannenberg maintain extensive data to helps determine appropriate volume levels for signaling sounders in a wide range of different applications.

Once the decibel level of a sounder is determined, where to install the sounder is of next concern. Most often, signaling devices are mounted on the moving trolley or the bridge of the crane. Additionally, it is important to mount

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the cone of the sounder in the direction of the load the crane is carrying so the sound travels to those in the risk path.

### SELECTING AND INSTALLING THE CORRECT VISIBLE SIGNAL

Next, of course, is determining the correct joules level for the combination signaling device's visual signal. Sound decreases significantly over distance, and significantly louder-thannecessary audible signals can be startling or even dangerous to workers. Light, on the other hand, does not undergo the same kind of decrease in intensity over distance, and is not as obtrusive if overly intense in a given environment. Visible signaling devices are thus rated by distance, but adding power (and thus intensity and brightness) can only add to the signal's safety factor and reduce personnel risk without causing inconvenience. As with the audible signal, once the brightness level of a visible signal is determined, where to install the signal is the next important choice. Visible signaling devices are also usually mounted on the moving trolley or the bridge of the crane, and the pyramid shape of the strobe light should also be mounted in the direction of the load the crane is carrying to minimize risk.

### EXTREME ENVIRONMENTS DEMAND SPECIALIZED SIGNALING EQUIPMENT

Applications with extreme environments demand specialized signaling technology. Some signaling products, like the PATROL and PYRA series signaling devices from Pfannenberg, are designed for extreme high and low temperatures; these feature electronic board, digital sound capsule, and polycarbonate housing designs that enable them to be rated for use in -40 to 131 degrees Fahrenheit (-40 to 55 degrees Celsius) environments. Meanwhile, the company's DS series sounders feature aluminum die-cast housings for use in areas up to 160 degrees Fahrenheit (71 degrees Celsius). In loud environments, these same PATROL and DS series devices offer exceptionally high sound pressure outputs of and the capacity to be volume controlled up to -12dB to fit each exact application.

Jacob Vernon is signaling specialist for audible and visual signaling at Pfannenberg. Pfannenberg, Inc. is a global manufacturer of thermal management, liquid cooling solutions, and signaling technologies. Many of our products are found within the same facility providing critical protection for manufacturing, processes, and personnel. Our business philosophy: protecting man, machine, and the environment. For more information, visit www.pfannenbergusa.com.



# Learning About Elusive Pump Failure Causes

### Partlof2

By Heinz P. Bloch

he recent book "Optimized Lubrication, Oil Mist Technology, and Storage Preservation'' (see reference 1) delves into issues that were recognized and corrected by best-in-class companies decades ago. Elsewhere, regrettably, certain old pump issues are still not receiving the attention they deserve. Perceptive reliability managers can address the problem by placing reference 1 and similar books in the hands of reliability and technical workforce members. Managers can then ask the staffers to read these texts between today and the employee's next performance appraisal. An employee could be instructed to point out, and in some cases defend, the differences between "us" and "them." As the top reliability professional, a reliability manager would thus help staffers understand that reading is one of the essential steps towards professional growth. In the same vein, the staffers' acquisition of knowledge would enhance the company's profitability and reliability performance in good times and in bad times.

### WHY IS THIS IMPORTANT?

Design improvements to the power end of most types and sizes of process pumps have been primarily neglected in the many years since pump selection largely emphasized initial cost and hydraulic efficiency. However, published hydraulic efficiencies rarely include the additional power demand of bearings, mechanical seals, and shaft couplings. Experience shows that low initial pump cost often comes at the expense of increased maintenance requirements.

Best-in-class pump users specify above-average quality pumps, which often include canned motor pumps from highly experienced manufacturers. While these facts are thoroughly explained in reference 2, the purpose of this two-part article is to outline, in a thumbnail sketch, a few elusive failure causes; each will focus on cost-justified upgrading of API-style pumps. Optimized Equipment Lubrication, Oil Mist Technology and Storage Preservation

Heinz P. Bloch, Don Ehlert and Fred K. Geitne

### GREASE VERSUS OIL

Oil has advantages over grease because it removes much more heat than grease. Grease may be better suited to applications where it is desired to confine the lubricant to the bearing. Both oil and grease can be applied in different ways. Grease is normally used in electric motor drivers ranging from fractional horsepower to approximately 500 kW. This is because grease can be readily introduced in small to medium electric motor sizes where motor end caps readily accommodate grease. Here, the end cap acts as an external grease replenishment reservoir. Lifetime lubricated bearings are used in pump sizes up to perhaps 10 kW. In lifetime lubrication the bearings are pre-filled with grease and this grease is confined within seals that are press-fitted in the bearing's outer ring. Lifetime lubrication implies that grease cannot be replenished and that the bearing operates with this self-contained miniature reservoir until the grease is spent.

However, as pump bearing size and shaft speed reach higher values, oil often represents an overall cost advantage when contrasted against the total cost of frequent grease replenishment and its typically higher failure frequencies.

### THE CASE FOR OIL MIST LUBRICATION OF PUMP AND MOTOR BEARINGS

The merits of plant-wide oil mist lubrication for process pumps and their electric motor drivers have been documented in dozens of books and over one hundred articles since 1960. Oil mist is an aerosol; it is applied as a thin film and causes bearings to operate cooler that those operating with conventional liquid oil application. The newer oil mist systems are fully self-contained; little, if any oil escapes from a closed system into the surrounding atmosphere.

While plant-wide oil mist systems lubricate running pumps and fully protect standby machines at best-in-class (BiC) facilities, the electric motor drivers at BiCs are also connected to the oil mist supply headers. Substantial cost savings are realized when periodic re-greasing is thus eliminated. Payback for plantwide oil mist systems often ranges from one to slightly over two years.

### WHY OIL RINGS ARE NOT BEST-AVAILABLE TECHNOLOGY

An oil ring is shown in figure 1. As it meanders back-and-forth on the shaft, it inevitably bounces off the surrounding stationary parts. An oil ring then leaves behind miniscule slivers of brass or bronze, which render the oil unserviceable and cause bearings to fail prematurely (see reference 2).

Whenever a plant uses outdated oil ring technology, these oil rings should at least be custom designed for the viscosity of the lubricant. Allowing deviations from acceptable lubricating oil viscosity, operating with shaft alignment other than perfectly horizontal, or installing oil rings with out-of-range dimensional



Figure 1: An unrestrained oil ring touches inside portions of the bearing's housing and suffers abrasive damage.

concentricity (i.e., slightly oval instead of perfectly round) will reduce satisfactory operating times. When three or four seemingly minor deviations combine, serious failure events will become frequent. Frequent pump fires have been documented for decades, and the next one may be the one a plant will come to regret. Moreover, we have been observers in court proceedings where a plaintiff's lawyer explained to the jury that defendant(s) did not use best-available technology. Whichever party neglected to specify or procure best available technology will find it difficult to prevail in court.

A good pump specification will contain a clause requiring oil rings to be stress-relieved (annealed) before



### PUMP SOLUTIONS





Figure 3: Oil spray or mist directed into the bearing's

cage. (Source: AESSeal, Inc.)

between the bearings, cannot "walk downhill" on the shaft. Flinger discs avoid issues experienced with oil rings. (Source: AESSeal, Inc.)

finish machining. Bearing housings must incorporate bearings placed in the cartridge shown in figure 2 for the simple reason that this will allow access and insertion of the type of fixed-on-shaft flinger disc shown here. Nevertheless, flinger disc designs must follow sound engineering practices. A particular design usually satisfies only a narrow range of intended duties; discs must be securely fastened to pump shafts. Experienced European manufacturers often offer them as standard components. However, flinger discs will allow pump shafts to deviate considerably from precise horizontality. They either make shallow contact with the oil level or, more often, the flinger discs are partially immersed in the bearing housing's oil sump. The design intent of the former is to avoid a layer of hot oil floating on top of the oil, whereas the latter is supposed to pick up and fling lubricating oil into the bearings (see reference 1).

Advanced lube applications include jet oil spray, also called oil jet lubrication, as seen in figure 3. The same illustration depicts only one of several possible ways of applying oil mist. Either a jet of liquid oil or a whiff of atomized oil (oil mist) introduced about 0.37-0.40 inches (10 millimeters) from the bearing's rotating cage will overcome the fan effect or windage of inclined angular contact cages. It also provides an oil film of optimum thickness for lubrication and heat removal, regardless of bearing orientation (see reference 2).

### CONSTANT LEVEL LUBRICATORS

Usually, the simplest oil application method involves using one of the many constant level lubricators. A widely used version is shown in figure 4. However, side mounted constant level lubricators or oilers are unidirectional. For proper operation, an oiler should be mounted on the up-arrow side of a bearing housing. With the counterclockwise shaft rotation indicated in figure 4, the oiler shown on the left side should be removed to reduce the risk of air being ingested.

Unless the lubricator is properly mounted on the up-arrow side of the shaft's rotation, there will be an increased risk of the oil level lowering as indicated in the pressure versus temperature relationships explained by the laws of physics. If the pressure in a closed bearing housing increases

### Pay attention to installation issues. Place constant level lubricators near the "up arrow" side of the housing.



Figure 4: With the counterclockwise shaft rotation indicated here, the oiler shown on the left side should be removed to reduce the risk of air being sucked in. (Source: Trico Corporation)

### PUMP SOLUTIONS



Figure 5: Constant level lubricator with pressure balancing between bearing housing and lubricator assembly. (Source: Trico Corporation)

When pump bearing size and shaft speed reach higher values, oil often represents an overall cost advantage when contrasted against the total cost of frequent grease replenishment and its typically higher failure frequencies.

due to a slight temperature increase, the resulting pressure increase will lower the oil level. The oil may suddenly no longer flow into the bearing, the top layer of oil in the sump will quickly overheat and black oil will form. At that point, the bearing will start to fail. Pressure balancing lubricators (see figure 5) are much preferred over the two unbalanced types shown in figure 4.

Caulking is used to seal the external contour where the transparent oiler bulbs in figures 4 and 5 join their cast metal support frames. Since the oiler bulb and its caulking are subjected to numerous swings in ambient temperatures, the caulking will develop microcracks. Rainwater runs down on the glass, and capillary action pulls the water into the micro-cracks; water will thus mix with the lube oil in the cast metal support frame. Since we have not seen the resulting contamination described or mentioned in pump manufacturers' manuals, it is possible that pump manufacturers are simply not aware of this elusive water intrusion path.

### WHERE YOUR OWN RELIABILITY ENGINEERS FIT IN

When all is said and done, the owner's engineers must make a choice: They can either follow the indifferent majority which, occasionally, includes some pump manufacturers. Alternatively, the owner's reliability professionals can retrieve material wherein unbiased professionals explain the facts. or treasured truth. Our advice for engineers and reliability technicians is to study the facts, understand the science of lubrication (tribology), and then teach others. Whatever implementation routine they choose,



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it cannot possibly contradict science and must always be backed by common sense. This is a very important admonition for facilities that cling to old anecdotes, misleading anecdotal claims that made the rounds decades ago. Indeed, we occasionally hear out-of-context anecdotes of pump reliability (or unreliability) that should have been discarded thirty or forty years ago.

On the brighter side, we are often pleased when contacted by companies that saw merit in factbased reliability initiatives. Some quickly became known as best-inclass performers and many never gave up their top rating. There are two examples that illustrate how BiCs did it:

First, we look at the example of a large oil refinery in India which re-examined oil mist technology. They convinced themselves that pure oil mist works flawlessly on hundreds of hot service pumps in oil refineries around the World and, since 1980, has excelled over all other possible lube application methods. The Indian experience can be applied at "Refinery X." If someone claims that it does not work at "Refinery X," consider asking what it is that people at "X" are doing different from their best-in-class competitors. In other words, if oil mist works well on hundreds of seemingly identical pumps at ten other refineries elsewhere, the problem at "Refinery X," where it presumably does not work, must be with one or more of its key employees.

Our second example mirrors the first one. Suppose oil mist, although successfully used on 52,000 electric motors, is opposed by a key staffer at "Chemical Plant Y." This is a true store; it relates to company "Y." A staffer at "Y" erroneously claims that oil mist systems cannot provide proper lubrication for the electric motor bearings at "Y," and that oil mist attacks the motor's winding insulation. Well, it is perhaps time

for top managers at "Y" to ask some serious questions. As a last resort, the managers may have to convince key staffers to read reference 1 and report their findings. If staffers at "Y" persist in clinging to anecdotes, consider pushing for cultural changes. Ask the doubters to explain the consequences of not being attentive to avoidable repairs, high maintenance cost outlays, and below-average plant profitability at "Y." If all fails, consider reassigning the unteachable to jobs where they cannot impede progress.

### A LOOK AHEAD

In the second part of this series, we will take a closer look at oil rings, their role in pump optimization with more detailed excerpts from reference 1, as well as timely recommendations for all results-oriented managers looking to keep their reliability engineers on the path of professional growth. ◆

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Heinz P. Bloch resides in Montgomery, Texas. His professional career commenced in 1962 and included longterm assignments as Exxon Chemical's regional machinery specialist for the United States. He holds B.S. and M.S. degrees (cum laude) in mechanical engineering from the New Jersey Institute of Technology's Newark College of Engineering ("NCE") and was honored as one of ten inaugural inductees into NCE's "Top 100 Hall of Fame."



# **VFD** Maintenance Tips

# Restarting your electrical equipment after a long shutdown

By Jason Wellnitz, Yaskawa America, Inc.



Modern VFD in an industrial control cabinet.

any production settings have changed in the midst of social distancing. Employees are spaced six feet apart, assembly lines shut down, and some facilities are wholly left idle. As we prepare to get back to work, engage our customers, and ramp up production, it is important to consider the condition of our machines.

Performing preventive maintenance on your electrical equipment before powering them back up is an important step to a smooth startup and in ensuring machine longevity. Variable frequency drives (VFDs) are commonplace on motor-operated equipment for several reasons. One of the most noteworthy reasons is the reduction of maintenance costs, but VFDs also have a unique maintenance cycle.

### INTRODUCTION TO PREVENTIVE MAINTENANCE

VFD preventive maintenance should be performed by a trained professional, which may be an on-staff electrician, contract electrician, or local electrical distributor. The preventive maintenance process should typically consist of four steps:

- Visual inspection of key components
- Checking power connections
- Verifying component life
- Reforming capacitors

### VISUAL INSPECTION

During the visual inspection there are a few things that should be reviewed. First, look for signs of condensation, corrosion, dust, and foreign objects—think insects. Catching these simple issues can often be corrected onsite and save considerable repair expenses.

Next, check for heatsink and fan obstructions that can prevent the VFD from running cool. Enclosure air filters should also be checked for dust buildup, gaskets checked for deterioration, and replaced as necessary.

### CHECKING POWER CONNECTIONS

Power connections can loosen with heating and cooling cycles. Loose connections can overheat and cause VFD faults, tripped branch circuit protection, or premature failure. The inspection should verify all power connections meet the torque specifications of the electrical equipment OEM(s).

Following proper torque specifications is critical. Some types of terminal blocks are prone to damage if over torqued. The maintenance professional may go the extra mile using a thermal imaging camera to check the power wiring for hot spots and correct accordingly. To perform the thermal imaging step, the equipment will need to be operational and running near capacity.

### MOTOR SOLUTIONS



VFD maintenance monitors.

### VERIFYING COMPONENT LIFE

VFDs are designed to operate maintenance-free for a defined period of time, usually five to ten years of operating time, depending on the manufacturer and model. Larger VFDs are designed to be serviced as specific components age.

During the preventive maintenance process, the VFD should be checked to determine the remaining life of the transistors, capacitors, fans, and pre-charge contactor, much like the remaining oil life readout in a car. This allows operations and maintenance staff to plan for service down time.

### CAPACITOR REFORMING

Most VFDs utilize aluminum electrolytic capacitor technology as a fundamental component of the power structure. When left unpowered for long periods of time the capacitor dielectric breaks down and permanent damage can occur if power is applied in this condition.

Fortunately, aluminum electrolytic capacitors can be self-healed in a process called "capacitor reforming." Capacitor reforming consists of slowly applying voltage to the drive and capacitors using a device known as a variac transformer or a current limited DC power supply. Some newer VFD models do not require capacitor reforming, but completing the process will not hurt the VFD in any way if it is not required.

Capacitor reforming is an important step in recommissioning VFDs and you should always follow the manufacturer's recommendations when powering up a drive idle for more than six months.

VFDs left in storage as spare parts should have their capacitors reformed every one to two years to prolong their shelf life. Protecting VFDs from extreme temperatures, corrosive gases, and moisture will extend their life while they are in storage or longterm shutdown.

### CONCLUSION

VFDs are designed to save energy, improve product and process quality, and reduce maintenance



### Jason Wellnitz is product marketing manager for Yaskawa America, Inc. Yaskawa is the world's largest manufacturer of AC inverter drives, servo and motion control, and robotics automation systems. Products are marketed through direct sales, partners, representatives, dealers, and distributors. Yaskawa America, Inc.—Drives and Motion Division is a wholly-owned corporation of Yaskawa Electric Corporation of Japan. Since 1915, Yaskawa Electric has served the world needs for products to improve global productivity through Automation. This website is designed to support Yaskawa customers in the Americas. For more information, visit www.yaskawa.com.





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Setpoint

By John Meyer, Siemens

lant operators constantly look for ways to increase the efficiency and data collection from drives and motion control. With an eye toward ease of access and versatility, Siemens launches its Sinamics V20 Smart Access web server module. Designed to mount directly onto the drive, the module transforms any mobile device or laptop into a virtual operator panel for drive control. By providing a wi-fi hot spot, the wireless connection on this module facilitates setup, programming, commissioning, production monitoring, and maintenance on a variety of machines and production equipment.

### EASY TO USE, EASY ON THE EYES

A simple, embedded graphical user interface (GUI) enables easy use of the Sinamics V20 in every phase of operation. No separate app is required, nor is a written operator manual needed, making operation of this new server module and subsequent drive control highly intuitive and easy-to-learn.

Smart Access provides convenient access to the Sinamics V20, even when over 100 yards away or even when the drive is located in difficult-toSiemens offers Sinamics V20 Smart access, a web server module that mounts directly onto the V20 drive and transforms a mobile device or laptop into a virtual operator panel. All drive functions can be monitored and manipulated from this secure server module.

NAMICS V20

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INAMICS V20	Inverter ready     SI
	$\equiv$ $\uparrow$ Diagnostics
	Faults/Alarms
0.1831 Hz	85 External Fault
0 Hz	85 External Fault
0 rpim	Casese External Fault triggered via command in 2, bit 13.* Remedy - Onock P2106 Desable comtrol word source - Disable terminal input for taut
0 kW	
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0 A	922 No load applied to inverter
02.7104 V	
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access installations. Utilizing WPA2 security, the web server module offers full flexibility with both iOS and Android operating systems, along with commonly used HTML5-capable web browsers such as Chrome, Safari, Internet Explorer, and others.

A built-in, multi-color LED provides quick communication status readout. Security features enable limit / restrict operator access and control functionality.

### QUICK SET-UP FOR QUICK ACCESS

In use, the Sinamics V20 Smart Access module requires only a few steps to set-up and no installation or download of additional software is needed. The onboard Quick Set-up Wizard provides users a fast and easy commissioning procedure, enabling all the following: motor data can be entered and checked, connection macros for digital inputs/outputs can be activated, application macros can be selected and activated for pumps, fans, compressors and other devices plus the common and frequently used parameters on the drive can be set for motor start, acceleration, deceleration, minimum and maximum speed, and other control options.

### FULL DATA, FULL RANGE OF OPTIONS

Smart Access allows monitoring of the drive status including speed, current, voltage, temperature, and power, as well as drive servicing, with an overview of alarms, faults. and individual values. Fault codes can be transferred via email to a local service provider, while the immediate status of all digital and analog inputs and outputs can be checked at a glance. Parameter adjustment, motor test functions, and full data back-up, storage and sharing with fast firmware downloads can all be accomplished via the web server.

Siemens Digital Factory (DF) offers a comprehensive portfolio of seamlessly integrated hardware, software, and technology-based services in order to support manufacturing companies worldwide in enhancing the flexibility and efficiency of their manufacturing processes and reducing the time to market of their products.

Siemens Corporation is a U.S. subsidiary of Siemens AG, a global powerhouse focusing on the areas of electrification, automation, and digitalization. One of the world's largest producers of energyefficient, resource-saving technologies, Siemens is a leading supplier of systems for power generation and transmission as well as medical diagnosis. For more information, visit **www.usa.siemens.com/sinamics-v20**.

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# **Collaboration Improves Reliability of High-voltage ESPs**

Development of an advanced "power delivery" system to eliminate conventional ESP electrical connectors and cable performance weaknesses

By Ericka Richardson, Greene, Tweed

ccessESP, a Houston-based provider of rigless electrical submersible pump (ESP) conveyance solutions for the global oil industry, developed a retrieval technology that reduces costs by enabling quick and easy ESP installation and retrieval using slickline, wireline, or coiled tubing. The system eliminates the need for a workover rig to pull and reinstall an ESP, lowering intervention costs and minimizing lost production.

AccessESP's unique solution is based on technologies with long-standing use in oilfields and other industries. The company's key innovation has been to integrate these proven technologies into a radically simplified, rigless conveyance solution, differentiated by using a proprietary, high power density, high efficiency, permanent magnet motor.

### THE CHALLENGE

AccessESP's Reliability Management initiative demanded the development of a new advanced "power delivery" system to eliminate conventional ESP electrical connectors and cable performance weaknesses.

As the provider of the most effective solution in the market, AccessESP permanent magnet motors are capable of operating from low horsepower up to 1,300 horsepower, necessitating the engineering of a robust, customized, bulkhead connector system rated up to 8.6 kV phase-phase, and a continuous operating temperature of up to 400 degrees Fahrenheit (204 degrees Celsius).

Addressing AccessESP's demanding voltage creep requirements, as well as their high-temperature and highpressure requirements, meant forsaking a typical connector design that used metal load washers. As a conductive



material, metal could introduce a pathway to voltage breakdown. To improve reliability, AccessESP required a thermoplastic load washer that could provide the mechanical support traditionally expected from a metal washer.

Given the customer's highly specific material and technology needs and their desire for a global company with a local presence to foster a collaborative and responsive relationship, AccessESP contacted Greene, Tweed.

### THE SOLUTION

After reviewing the application requirements and understanding AccessESP's concerns regarding voltage and creep distance, Greene, Tweed proposed a Seal-Connect<sup>®</sup> solution for the connector assembly, using a combination of its highperformance materials, including Arlon<sup>®</sup> 1000, Arlon<sup>®</sup> 3000 XT, and Chemraz<sup>®</sup> 629.

Arlon<sup>®</sup> 1000, Greene, Tweed's non-filled PEEK material, a market leader for its combination of mechanical, thermal, chemical, and electrical properties, was chosen for the body of the electrical connector. Chemraz<sup>®</sup> 629, a perfluoroelastomer, was recommended for its hightemperature and electrical insulative properties for the seal between the bulkhead and contact block interface.

The company recommended Arlon® 3000 XT, Greene, Tweed's exclusive, non-filled, cross-linked PEEK, as a solution to address AccessESP's concerns regarding voltage creep and tracking distance. Arlon® 3000 XT, patented by Greene, Tweed, provides improved volume resistivity 30 times that of PEK at 400 degrees Fahrenheit (204 degrees Celsius) and dielectric strength, measured at 730 V/mil in an ASTM D149 testing.

In addition, Arlon<sup>®</sup> 3000 XT has 1.5 to 6 times higher mechanical properties compared to PEEK in tensile, compressive, flexural, and shear tests at a test range of 392 to 500 degrees Fahrenheit (200 to 260 degrees Celsius), which enabled the company to design a load washer offering the support typically provided by a metal element. Arlon® 3000 XT was also used for insulator sleeves on the bulkhead connector.

### THE RESULTS

Arlon® 3000 XT's best-inclass combination of electrical and mechanical properties provided AccessESP with a connector that demonstrated significantly improved performance





over existing PEEK and PEK materials in an over-molded solution.

Greene, Tweed partnering with AccessESP engineering enabled us to share critical information that helped expedite the successful development of this innovative, next-generation product. Greene, Tweed's Seal-Connect® solution passed all acceptance tests under IEC 60502-1 and API 11S6 standards for a 5-kV rated connector. Furthermore, the use of Arlon® 3000 XT lengthened the creepage distance between the pins, enabling the connector to pass the five-minute, 13-kV AC test at 300 degrees Fahrenheit (149 degrees Celsius).

"We continue to be pleased with Greene, Tweed's proposed Seal-Connect® solution for the connector assembly," says David Malone, AccessESP CEO. "This connector provided us with the required performance in order to guarantee a long and safe life with extremely high levels of reliability."

This agile client/customer collaboration, along with Greene, Tweed's proprietary materials portfolio and engineering and design expertise, provided AccessESP a customized connector solution that improved the performance of their innovative ESP system.  $\blacklozenge$ 

For more than 150 years, Greene, Tweed has developed materials and engineered high-performance solutions that have enhanced the safety and performance of critical applications in the aerospace, energy, semiconductor, oil and gas, life sciences, defense, and other industries. For more information, visit **www.gtweed.com**.





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### **JWC ENVIRONMENTAL**

### Monster Metal<sup>®</sup> Grinders

JWC Environmental relaunches its Monster Metal<sup>®</sup> grinders featuring a trade secret alloy and industryleading five-year warranty.

Wastewater is tough on grinder cutters. Damaging abrasion wear and metal corrosion are caused by daily gritty material and acidic conditions in sewage. The combination of an abrasive and corrosive environment accelerates the loss of cutter material, resulting in the loss of cutter thickness and tooth edges.

Traditionally, there is a trade-off between choosing a material for abrasive environments and corrosive environments. Hard alloy steel has been the traditional choice of material for abrasive environments. Unfortunately, alloy steel is not a corrosion-resistant metal. The corrosion-resistant metal choice has been stainless steel but unfortunately, it has low abrasion resistance. Cutter material is typically selected based on the environment to which it will be exposed to optimize its performance and maximize cutter life. Regrettably, choosing a material suitable for one environment but not the other often leads to dissatisfaction with the cutter life.

Monster Metal is JWC's solution to this problem. Monster Metal grinders feature cutters that last twice as long as typical industry cutters and work in both abrasive and corrosive environments commonly found in wastewater treatment plants. JWC conducted intensive in-house and field testing to validate that the proprietary material and design outperformed other cutters in wear resistance and corrosion.

"We're excited to bring back Monster Metal to the wastewater treatment market. Previously, operators had to choose between corrosion resistance or abrasion resistance. With Monster Metal, they no longer have to compromise," says Greg Queen, president of JWC Environmental. "And they can rely on a five-year warranty to increase the longevity of their grinder cutters."

Monster Metal is available on select Muffin Monster<sup>®</sup>, Channel Monster<sup>®</sup>, and Channel Monster<sup>®</sup> FLEX units. A fiveyear warranty covering the cartridge and wear components is included on Muffin Monster units while a three-year warranty is available for Channel Monster and Channel Monster FLEX units.

For more information, visit www.jwce.com/knowledge-center/monster-metal.

### **CIRCOR** Schroedahl TDL Automatic Recirculation Valves

Schroedahl TDL Automatic Recirculation Valves combine a high-quality main line check valve and the automatic bypass control system in an innovative and durable design. The valves' self-actuated integrated bypass control function ensures minimum flow rate, guarding pumps against overheating and cavitation. The systems provide high pump stability for less downtime and lower maintenance costs. TDL ARVs' modulation bypass function also offers savings for operators with reduced energy consumption for frequent partial load operation. For more information, visit www.circor.com/products/valves/pump-protection.





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AutomationDirect NITRA® pneumatic air filters, air regulators, air lubricators, air relief valves, and combination air filters/regulators are now available with larger gauges and a new easy quarter-turn twist off feature. These air preparation units are available in a wide variety of port sizes to meet a broad range of pneumatic air supply filtration, air regulation and compressed air lubrication applications. The modular design allows stand-alone applications and enables easy field assembly for combining NITRA pneumatic filters, pneumatic regulators, air lubricators, and air relief valves using modular assembly brackets (purchased separately). For more information, visit www.automationdirect.com/air-filters.

### **ELECTRO-CHEMICAL DEVICES** CA-6 Colorimetric Ferrozine Analyzer

Iron ores are among the earth's most common elements. Process and plant engineers treating municipal drinking water or industrial wastewater who need to monitor, remediate, or remove harsh iron will find the precision CA-6 Colorimetric Copper Analyzer from Electro-Chemical Devices helps them achieve desired water quality levels and protect valuable water resources. With its adjustable cycle time that minimizes costly reagent use and low maintenance, the CA-6 Colorimetric Analyzer is the ideal solution to iron or other undesirable minerals. For more information, visit www.ecdi.com.





### WARREN CONTROLS Electrically Actuated HVAC/BAC Control Valves

Warren Controls announces its two- and three-way electrically actuated HVAC/BAC control valves, designed for domestic use and to assist in the transport of low-pressure steam or hot/cold water within a building for temperature regulation. The three-way valves are available in both mixing and diverting, with bronze or cast-iron bodies, and bronze or stainless-steel trim. The two-way valves are available in three types: single seated unbalanced, single seated cylinder balanced, and double seated semi-balanced, with the same body and trim options as the three-way valves. For more informaiton, visit www.warrencontrols.com.

### **WATSON-MARLOW FLUID TECHNOLOGY GROUP** EtherNet/IP<sup>™</sup> for Peristaltic Pumps

The industry-leading range of 530, 630, and 730 peristaltic pumps from Watson-Marlow Fluid Technology Group (WMFTG) is now available with EtherNet/IP<sup>™</sup> control. The availability of this increasingly popular, non-proprietary industrial network protocol provides pump users with access to fast, accurate performance data, and seamless connectivity to modern PLC control systems and the IoT (Internet of Things). EtherNet/IP<sup>™</sup> is supported by a wide range of automation and industrial process solution providers. For more information, visit www.wmftg.com.





### HMD KONTRO CSA Range of Sealless Pumps

HMD Kontro Sealless Pumps are specifically designed for handling high temperature, toxic, flammable, corrosive, carcinogenic, and aggressive fluids. As a proven alternative to traditional sealed pumps, HMD Kontro sealless magnetic drive designs eliminate emissions and leaks, which can harm productivity, personnel, and the environment. HMD Kontro pioneered the sealless magnetic drive pump more than seventy years ago and their team of engineers have now designed and developed a modular range of chemical service pumps in accordance with the ASME B73.3-2015 standard. For more information, visit www.hmdkontro.com.

### **EXACT METROLOGY** Artec LEO 3D Scanner

Artec LEO is the first scanner to offer onboard automatic processing with an integrated touch panel viewer and frees users from being tied to a computer for data capture. The scanner has a 3D reconstruction rate of 80 frames per second, making it the fastest professional scanner on the market. With its large field of view, Artec LEO can scan and process large objects and scenes quickly and accurately. This handheld scanner is equipped with a 4-inch LCD screen to capture images of the data. The 3D light source is provided by state-of-the-art VCSEL (Vertical-Cavity Surface-Emitting Laser) technology. For more information, visit www.exactmetrology.com.





### **EDDYFI TECHNOLOGIES** M2M Mantis

Mantis is a robust and lightweight flaw detector offering UT, PAUT, TOFD, and TFM through the streamlined user interface called Capture. Based on a 16:64PR architecture with three different models, Mantis addresses both general and advanced applications without compromising productivity. The Mantis is one of the most robust and reliable industrial phased array instruments ever produced by Eddyfi Technologies, thanks to careful consideration of the highly durable materials chosen. Its rugged casing and bright resistive touch screen enable outdoor use even in harsh conditions. For more information, visit www.eddyfitechnologies.com/mantis.

### **GRAPHITE METALLIZING CORPORATION** Graphalloy Iron Grade Bushings for Molten Sulfur Pumps

Molten sulfur pumps require a high temperature bushing material. A major refinery was using nickel chromium bearings. To avoid bearing contact with the shaft, they opened up the bearing clearances to 0.02 to 0.025 inches but this caused high vibration issues approaching 1.0 inches/second peak. However, by replacing the bushings with Iron Grac Graphalloy bushings, the refinery was able to rebuild the pumps with a running clearance of 0.006 to 0007 inches. The vibration level decreased to a maximum of 0.21 inches/ second peak. The refinery has since rebuilt three additional pumps using Graphalloy bushings. For more information, visit www.graphalloy.com/html/molten\_sulfur\_pumps.html.





### SUNDYNE LMV 803Lr Pump

The API-compliant LMV 803Lr is a direct-drive, heavy duty vertical inline centrifugal pump that shares technology with Sundyne's 800-series pumps, which are widely used in the oil and gas, refining, and hydrocarbon processing industries. The design of the LMV 803Lr features Sundyne's innovative inducer technology and backswept impeller, which allows the pump to reach unparalleled NPSHr performance without the risk of cavitation. For more information, contact helene.balligand@sundyne.com or visit web.sundyne.com/cn/aukif/sundyne-lmv803Lr-lan.

### **GEMS SENSORS & CONTROLS** 1100 Pressure Transducers

The 1100 Series is a low cost, high quality all stainless steel media isolated pressure sensor for measuring gases and liquids compatible with stainless steel. Suitable for industrial, refrigeration, hydraulics, off-road, construction, and agriculture applications, the 1100 Series has been designed specifically for those applications with demanding price and performance requirements. For more information, visit www.gemssensors.com.





### **KROHNE** Optisonic 6300 V2 Ultrasonic Flowmeter

The Optisonic 6300 V2 ultrasonic clamp-on flowmeter is a flexible solution, with a quick and easy installation requiring no process shutdown and no flow interruptions or downtime. It is also cost-effective, since its price is independent of diameter, material, and pressure class. Finally, it offers greater safety for operators and plants themselves, thanks to a reduction in potential leakage points and its suitability for toxic and corrosive fluids. For more information, visit www.krohne.com.

# **Expanding the Horizons** of Predictive Industrial Maintenance

# EMA's Edward Armstrong on where digital twin technology can lead



he Energy Management Association was founded by its affiliate, the AABC Commissioning Group (ACG), one of the world's leading associations of certified commissioning authorities, and became a free-standing organization in 2014. EMA advances the quality of energy management products and services for building owners in various industries. On a recent episode of MPT's podcast, The Efficiency Point, EMA's executive director, Edward Armstrong, discussed some of the organization's online training opportunities on digital twin technology and EMA's approach to energy management planning during a pandemic. An excerpt of that conversation appears below.

### MPT: For the uninitiated, how would you best describe digital twin technology and some of its applications?

Edward Armstrong: The first answer I would add to that is I think we're all uninitiated. We're just on the cusp of where this technology is really going to take off. In its simplest form, what is a digital twin? It's a virtual replica of a thing or an asset or a typically physical entity, but there could be exceptions to that rule. And what it does is it enables you to basically play around with all of the data that that thing or asset or building or facility or whatever else it may be, is producing. You can do a lot of analytics on it. You don't have to worry about breaking the thing, if you will. You can experiment with it. It is the advent of the Internet of Things and has really expanded the possibilities.

### MPT: What are some examples of digital twin technology? Will you be discussing some of the different industries where they are in play in your upcoming webinar?

**Edward Armstrong:** In this webinar, we will mostly be talking about the context of building analytics. And that would encompass things like predictive maintenance,

which is huge, and fault detection, which is also huge. These things have the ability to not only keep the building running at a more optimal level, it can reduce disruption and it can keep processes up and running

Goodness knows, if it's mission critical, such as over in the civil engineering sector, you don't want to have a water treatment plant overflowing its banks as that can have huge implications on the community. There are so many of those things that would otherwise be prohibitive, just a budgetary thing.

It's said that 40 percent of the energy that is used by the big buildings in this country is wasted. And by being able to perform the analytics real time—right there, right now where there is a simultaneous air conditioning and heat event running: Why is it running? Who's on the premises? What processes are being undertaken at that exact moment? I'd like to say your imagination is the limit, but the twin is actually like putting your imagination on steroids. Because it's probably opening up new kinds of ways of looking at things that you hadn't necessarily thought of.

I just don't think this nation has the money to completely rebuild its grid. But there's a lot of general concurrence among the energy engineers I talk to that rebuilding the grid is something that is really key for the future. So to, to the extent that we can, at least delay, maybe obviate, the need to do it altogether through energy efficiency, you know, that would be a terrific thing. And to the extent that machine learning and artificial intelligence apply different scenarios, they can do a deeper dive on your analytics than has ever been thought possible.

To listen to an extended version of this interview, be sure to subscribe to MPT's podcast, The Efficiency Point.



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