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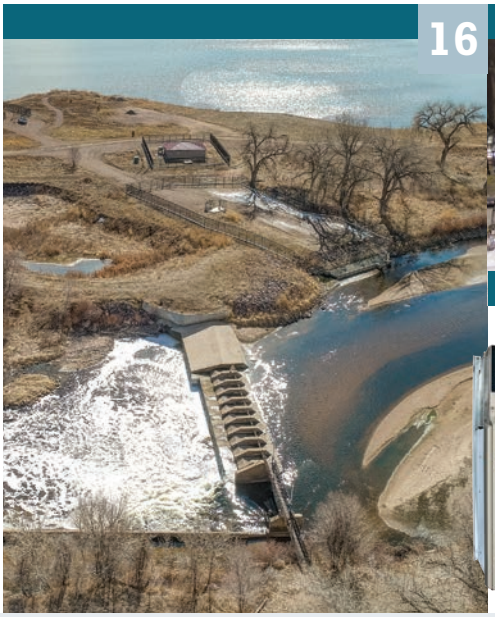

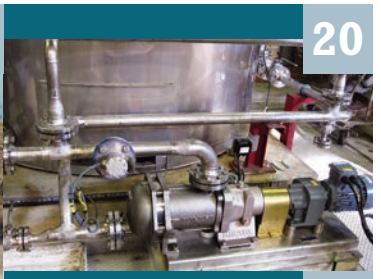

A NOTE ON THIS ISSUE:

J. Campbell, Editor
Modern Pumping Today

Welcome to the MPT for September! On many fronts, 2020 is a year of adaptation and refinement. This is especially true for utilities, like oil and gas producers, who are working to develop critical remote operations during this challenging time. Not only has the global Coronavirus pandemic come with enormous health and economic consequences, but other factors have forced utilities to adjust their approaches. Bill Moore, founder and CEO of XONA, explains how remote user access is supporting utilities, energy producers, and pumping stations in his article "An Industry in Transition" (pg. 26).

In our Water & Wastewater Solutions section, Thomas Renner shares the success story of the Erger's Pond Augmentation Station, a $5.4 million project that was completed last year (pg. 16). With an average annual rainfall of only 15 inches per year, and a population growth of more than 19 percent since 2010, the community of Brighton, Colorado, depends on this station's efficiency and output to meet their water needs.

Lastly, on a recent episode of MPT's podcast, The Efficiency Point, Ben Keiser, Applied Flow Technology's technical sales consultant, stopped by to discuss the critical importance of proper pump selection and offer his insight on selecting the right sized pump for your application. An excerpt of that conversation appears in this issue (pg. 48).

MPT
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AVT RELIABILITY ACHIEVES RoSPA GOLD AWARD FOR THIRD CONSECUTIVE YEAR

AVT Reliability has achieved a RoSPA Gold Award—the toughest health and safety award in the world—for the third year in succession. The UK-based plant reliability specialist was recognized for its exemplary health and safety management systems, including practices such as leadership and workforce involvement, which help to ensure a safe environment for its colleagues and clients.

Managing director of AVT Reliability, Frederic Thomas, adds: "We pride ourselves on ensuring that our clients' critical assets are maintained to the highest standards so manufacturing environments remain safe and hazard-free. This ethos of excellence runs throughout the company, from colleagues in our offices to operatives out on site. We're delighted that this has been recognized once again with this award from RoSPA."

Julia Small, RoSPA's head of qualifications, awards, and events, says, "The RoSPA Awards scheme is the longest-running of its kind in the United Kingdom, but it receives entries from organizations around the world, making it one of the most sought-after global accolades in health and safety."

Due to COVID-19 restrictions, AVT Reliability will receive its Gold Award at a virtual ceremony.

MFG CHEMICAL RELOCATES HEADQUARTERS TO CHATTANOOGA

MFG Chemical, a global leader in specialty and custom chemical manufacturing, has moved its corporate headquarters from the original location in Dalton, Georgia, to nearby Chattanooga, Tennessee.

According to President and CEO Paul Turgeon, "MFG Chemical has outgrown its original headquarters in Dalton, Georgia. The company began its operations in Dalton in 1980, with focus on specialty chemicals for the carpet/textile industry. MFG subsequently diversified into many other markets including agriculture, asphalt, fuel additives, graphic arts, hand sanitizer thickeners, lubricants, mining, oilfield, paints and coatings, personal care, pulp and paper, and water treatment."

The new MFG Chemical headquarters is conveniently located in downtown Chattanooga's Liberty Tower. This new headquarters will provide the needed work space,

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and closer proximity to the Chattanooga airport, making it more efficient for visitors and the MFG Chemical staff to travel and meet.

MOTION INDUSTRIES ANNOUNCES TWO ACQUISITIONS

Motion Industries, Inc., a leading distributor of maintenance, repair, and operation replacement parts and a wholly owned subsidiary of Genuine Parts Company (GPC), announced two acquisitions. Motion has entered into agreements to acquire TRC Hydraulics, a Canadian-based supplier of hydraulic products and services, and F&L Industrial Solutions, Inc., a distributor of T-slotted aluminum extrusion components. Both transactions closed with an effective date of August 1, 2020.

In business since 1986, TRC Hydraulics has served the Atlantic Canada region with several full-service sales and repair facilities in Canada. In 2019, TRC Hydraulics expanded by opening a facility near Spartanburg, South Carolina.

Based near San Diego, California, F&L Industrial Solutions has served the southwest United States with full-service aluminum extrusion components since 2002. F&L offers local inventory including the 80/20 brand of aluminum, an experienced staff of CAD designers, in-house machining, digital panel cutting, full assembly/manufacturing, on-site delivery, and installation.

FLOMATIC CORPORATION APPOINTS NEW NATIONAL SALES MANAGER

Flomatic Corporation, a global valve manufacturer and leader in the water and wastewater industry, announces the promotion of Jim Tucci to national sales manager. Promoted by Executive Vice President Nick Farrara, Tucci will continue to lead the expansion of Flomatic Valve Products nationally and internationally. In addition, Tucci will now oversee Flomatic's Customer Service Department.

Nick Farrara states, "Jim has done an outstanding job, consistently growing Flomatic's sales on our municipal and industrial valves. His extensive background and knowledge of water and wastewater systems make Jim an excellent choice for this position. I am looking forward to continuing to work closely with Jim in the years to come."

Tucci joined Flomatic Valves in August of 2014 as the industrial and municipal sales engineer after a long career as a driller both as an owner/operator of a water well and geothermal drilling company in Upstate New York and several positions with environmental firms performing sonic drilling and direct-push sampling. Tucci is a graduate of the

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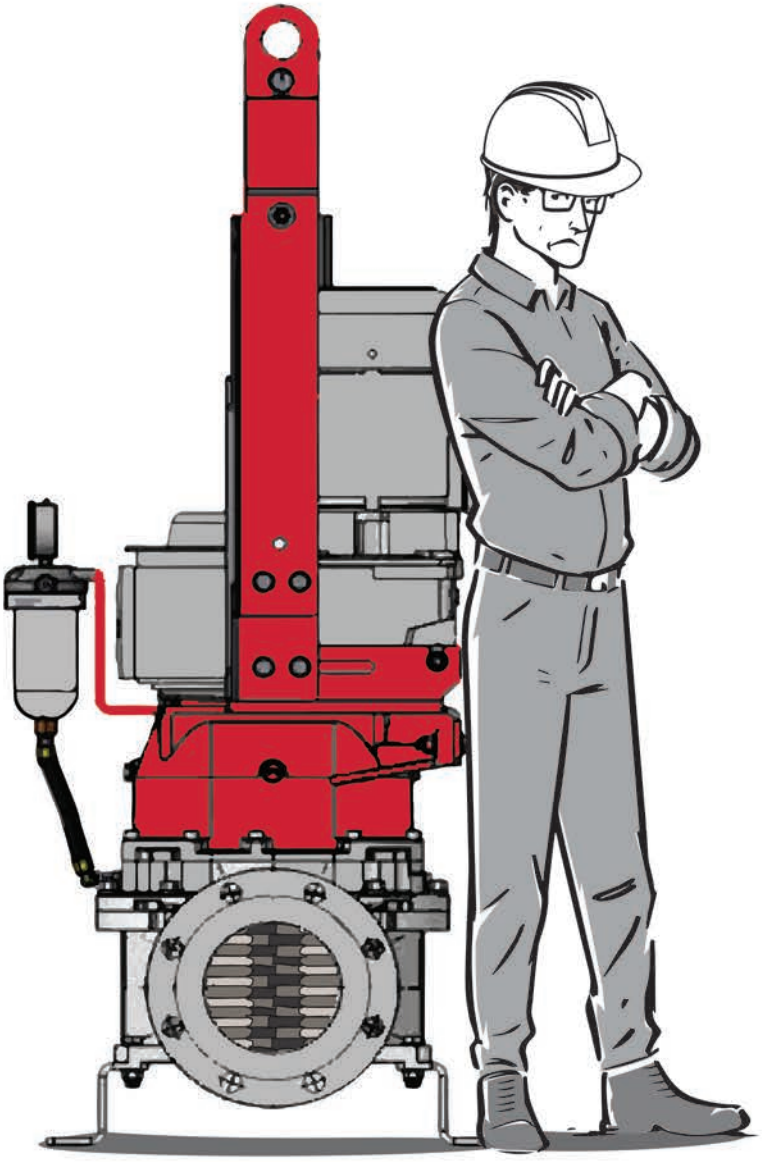

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Thai Pham, P.E.

BCCK HOLDING COMPANY APPOINTS NEW SENIOR PROCESS ENGINEER

BCCK Holding Company (BCCK), a leader in engineering, procurement, fabrication, and field construction services, has appointed Thai Pham, P.E. as senior process engineer. Pham will be located in BCCK's office in The Woodlands, Texas, and will be responsible for supporting proposals and technology developments across the company. He brings to the role more than twenty years of experience in gas processing and upstream/midstream oil and gas processes, joining BCCK from UOP-Ortloff where he served as lead chemical engineer.

Don Tyler, director of engineering and proposals, BCCK, says, "Thai will serve an important role in BCCK's successful EPC projects and technological advances and will help us grow our footprint across the industry. He is skilled in nitrogen rejection processes, cryogenic ethylene recovery processes and developing improvements on NGL/LPG recovery processes. We welcome him to the team."

FERGUSON WATERWORKS NAMED AVT DISTRIBUTOR FOR ARIZONA AND NEW MEXICO

Advanced Valve Technologies (AVT) has strengthened its established relationship with Ferguson Waterworks, the nation's largest waterworks company. The company has entered into a distributor and installer agreement covering the Arizona and New Mexico regions of the United States.

As part of the agreement, three technicians, who were already experienced in the install of the smaller AVT EZ Valve, were trained to install the valve which is designed to last for decades. This enhanced partnership means Ferguson Waterworks now has highly experienced teams trained to install the full range of AVT EZ Valves across the region. They will have increased access to valves and install kits meaning they can respond to the need of the cities they service even quicker.

AVT President Harry Gray says, "This strategic partnership is great news for the residents and businesses of Arizona and New Mexico. Ferguson already has established and trusted relationships with local water utility operators and will now be able to ensure they can deliver even more reliable water networks via faster access to the innovative AVT EZ Valve and highly experienced installers."◆

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WEFTEC Connect

Connecting the world to clean water

As the COVID-19 pandemic has placed travel and public gathering restrictions throughout the nation, the Water Environment Federation announced its annual conference and exhibition, WEFTEC, for 2020 will be a fully virtual event on the WEFTEC Connect online learning platform that offers attendees interactive education, an exhibitor showcase, and networking experiences.

MEET YOUR PEERS WITHOUT LEAVING YOUR HOME

WEFTEC Connect allows water professionals to schedule meetings with other attendees or exhibitors using the WEFTEC Connect video enabled meeting room feature. All an attendee has to do is start the meeting and send out the link, whether it be by email, chat, or on social media. In WEFTEC Connect's virtual meeting rooms, attendees have the tools to see one another on screen, share their screens, live chat, and invite additional meeting participants.

In addition to one-on-one meetings, more than twenty topic-based text chat channels will remain open for the whole week allowing WEFTEC Connect attendees to foster casual networking and talks around various topics important to the water sector. Interested attendees can join a text chat at any time and see the conversation history. Attendees can also connect with someone within the chat and invite them to join a virtual meeting room.

For attendees looking for the real-time technical interactions of past WEFTEC events, join colleagues and friends for live, on-camera roundtable discussions organized by topics relevant to current events in the world of water. Up to fifty attendees can participate in each discussion room, with topics including the following:

- Balancing work during a pandemic, including parenting during COVID-19, successfully working remotely, and perspectives from young professionals on bridging the generational gap
- Lessons learned from COVID and how to prepare for the next disruption
- Bid ideas—what does water look like 50 to 100 years from now?
- How leaders can promote diversity and inclusion

OPERATIONS CHALLENGE CONTINUES

WEFTEC's Operations Challenge, the annual skills-based competition between teams of the world's most elite wastewater professionals, will adapt to a fully virtual format for 2020.

WEFTEC CONNECT AT A GLANCE

October 5–9, 11:00 am - 4:00 pm EDT | Dedicated Exhibitor Hours: 12:30 pm - 2:30 pm EDT | www.weftec.org

The competition will be available via WEFTEC Connect with competitors live streaming their performances. However, despite the distance, Operations Challenge 2020 will not compromise on the camaraderie and excellence that define this can't-miss WEFTEC mainstay.

The remote version of Operations Challenge will involve three public video streams accessible by spectators, each featuring a team completing one of the competition's events in real-time. The competition will consist of abridged versions of three events: Process Control, Laboratory, and Collections Systems.

For each of these events, only two members of each team will participate at a time. Competitors will provide at least two video perspectives as they complete each event, enabling spectators and judges to experience the wastewater operations community's best talent through their screens as clearly as in person. Pairs of judges, who are Operations Challenge volunteers, will watch the livestreams closely and calculate scores using a system consistent with previous competitions.

EXCLUSIVE VIRTUAL KEYNOTE ADDRESSES

In an exclusive to WEFTEC Connect, United States Environmental Protection Agency Administrator Andrew Wheeler will provide keynote remarks on the administration's priorities and activities for the water sector. Wheeler began his career during the George H. W. Bush administration as a special assistant in EPA's Pollution Prevention and Toxics office and is currently in his second year as the EPA's administrator.

In another exciting session, WEFTEC Connect presents a "Water-side Chat on Health Issues in the Water Sector," an opportunity to listen and participate in a conversation about health issues with Dr. Andrew Sanderson, WEF chief medical officer, and Walt Marlowe, WEF executive director. The past year has shown in stark reality the importance of health in all forms. WEF has long dealt with human and environmental health in the water sector. Now people face important issues of physical, mental, occupational, organizational, and all other forms of health.

In his role as chief medical officer, Dr. Sanderson coordinates with WEF's new advisory group and WEF's technical committees on biological hazards and safety precautions. The group is comprised of a diverse array of leading experts involved in water operations, science, health, and safety. This wide-ranging conversation will touch on these key topics and shed light on some common insights and lessons learned.◆

Finding the Sweet Spot in Food Processing

How the FLOWave flowmeter excelled in a marzipan factory

By Blair Miller

Bürkert Type 8077

Bürkert's FLOWave flowmeters continue to lead the way when it comes to coping with utmost hygienic demands. With stainless steel materials, outer hygienic design, flexibility, and ease of cleaning, FLOWave type flowmeters handle high viscosity liquids effectively, thus perfectly suited for food manufacturing.

In this article we delve into looking at instrumentation products, in-particular the Bürkert's FLOWwave 8077 flowmeter with oval rotors. BM Engineering continues to push for new discoveries and new uses for the Bürkert FLOWave range; therefore, we talk about their decision to install the 8077 oval gear flowmeter for a leading marzipan factory, and a leading producer of caramels and marshmallows.

FLOWAVE FLOWMETER BY BÜRKERT

BM Engineering is always on the lookout for instrumentation solutions that are suitable for even the most challenging environments. The team at BM Engineering has a skill for discovering new and innovative instrumentation solutions and products with potential uses in highly explosive environments. This includes solutions like the Burkert FLOWave Flowmeter Type 8077, which pushes the boundaries of instrumentation equipment capabilities across a wide range of applications.

The product and application experts at Burkert have a proven track record for designing and developing solutions that deliver both accuracy and reliability. When BM Engineering were called upon to assist with the fluid control and pumping process within a marzipan factory, the Burkert FLOWave Flowmeter Type 8077 was the obvious choice for the job.

THE APPLICATION: BÜRKERT FLOWAVE FLOWMETER IN THE FOOD INDUSTRY

As we know, in the food manufacturing sector, hygiene is of strict importance. BM Engineering recently supplied a leading marzipan supplier with a stainless steel oval flowmeter. This was the S077 and SE30 transmitter with pulse output. As one of the biggest issues with flowmeter applications has been the long-standing opinion that the FLOWave flowmeter model is only suitable for use on water, using the FLOWave flowmeter for sugar syrup, a viscous substance, caused the team at BM Engineering to put their heads together and think of the perfect solution.

Due to the sheer range of flowmeters out there, including paddlewheel, magnetic, mass flowmeters, and

more, the team at BM Engineering initially thought the FLOWave, flowmeter type would be most suited to this application due to its promise of delivering efficient results in hygienic conditions due to the absence of sensor elements, being lightweight and having energy-saving properties.

As paddlewheel flowmeters are also a popular choice among food and beverage manufacturers, due to their cost effectiveness, BM Engineering was faced with many conflicting thoughts about which Flowmeter would be the best for the marzipan factory.

THE PROBLEM: WHY DID BM ENGINEERING CHOOSE THE BÜRKERT TYPE 8077?

Bürkert flowmeters feature hollow measuring tubing and have SAW technology, removing the need for sensor elements in the measuring tube. Bürkert Flowmeters also offer the following advantages making them well suited for the food and beverage industry:

- Efficient device integration platform (EDIP) technology, which translates to easy-to-use devices and integrating them into a system
- Hygiene standards and high durability
- Effectively handling thick, viscous liquids

THE SOLUTION: BÜRKERT TYPE 8077 AND SE30 TRANSMITTER INSTALLED

As the marzipan factory required a highly accurate flow measurement method and connection to Burkert devices in remote versions, the Burkert FLOWave flowmeter was perfect for the job. The Bürkert Type 8077 has a proven track record of being able to measure and handle fluids like honey, and glue, meaning that this FLOWave flowmeter is based on the oval rotor principle.

The Bürkert 8077 model in particular offers many advantages for the marzipan factory. As this model type is designed for measurement and batch control, its oval rotor is perfectly designed for low flow. As in the marzipan factory, consistency with food output is key. This Bürkert 8077 model offers exceptional repeatability and accuracy with a wide range of viscosities. As the marzipan factory operates on a batch production basis, swapping to different viscosity types, 8077 positive displacement flowmeter enabled connection with other Bürkert devices, just what the client required.◆

BM Engineering can effectively analyze your current application and use their vast product and application knowledge and expertise to decide which Bürkert model type is best suited for your application. For more information, visit **www.bmengineering.co.uk**.

Sharing a Scarce Resource

Colorado community invests in a unique water allocation plan

By Thomas Renner

A new $5.4 million water augmentation station became operational last year in Brighton, Colorado, that helps assure water is available to communities along the South Platte River. The community has an annual rainfall average of just 15 inches. (Photo credit: Matthew Puckett)

Water is a treasured resource in the community of Brighton, Colorado. With an average annual rainfall of only 15 inches per year, and a population growth of more than 19 percent since 2010, government officials searched for a solution to meet current and future water needs in the fast-growing town just twenty-three miles east of Denver.

The solution, the Erger's Pond Augmentation Station, is a $5.4 million project that was completed last year. Aslan Construction built two raw water pump stations near a city-owned reservoir that is used for water storage. The reservoir is located adjacent to the South Platte River. One pump station is used to fill the reservoir by pumping river water into the reservoir. The other reservoir is used to pump water back into the river.

The pumps work at cross purposes, but that is to ensure that other communities along the South Platte River—which is the main water resource for Eastern Colorado—have an ample supply of water. Water augmentation plans were established in Colorado in the 1969 Water Rights Determination and Administration Act. One part of the plan requires junior water users on over-appropriated streams to obtain sufficient replacement water to offset depletions to senior water rights. Colorado is one of only a handful of states to adopt augmentation legislation.

"Water in the West," says Dawn Hessheimer, water resource specialist for the City of Brighton, "is very different from water rights in the Eastern United States."

PROJECT GLANCE

The project developed out of the city's need to expand its ability to meet augmentation requirements. "Historically, Brighton had been using temporary pumps that were costly and inefficient," says Jake Hebert, a civil engineer who worked on the project. "Construction of permanent infrastructure to facilitate pumping operations was necessary and beneficial to the city."

Teams installed nine submersible pumps in underground wet wells to move the water, along with a gravity line. The improvements also included new spillways to direct water flow and "riprap" slope protections to protect the pond's banks from erosion.

"Improving the slopes and spillways are vital to keeping the pond from being washed out," says Curt Bauers, then the city's utilities director. "There was a town that lost one of its reservoirs back in 2015 because of an unprotected spillway. The river poured in, undercut an embankment until it didn't exist anymore, and all the water in the pond went down the river."

The primary purpose of the reservoir is to capture and store water during times of high flows and free river. "During times when the river is typically lower and the city has augmentation requirements, water can be pumped back into the river to maintain healthy river flows," Brighton officials wrote in a description for the American Public Works Association. The Colorado APWA awarded the city an award for the project in 2019.

The augmentation station includes wet wells that are accessed by floor floor doors manufactured by the BILCO Company. Access to the wells is required to pull the pumps for maintenance or future replacement. (Photo credit: Matthew Puckett)

SOLVING CHALLENGES

Hebert said a key challenge was placing the reservoir filling pump and wet well on a narrow strip of land between the river and the reservoir. "This was the most optimal place to have it. However, due to the reservoir slurry wall, it posed challenges to design and construct the wet well where the slurry wall is located and still maintain function of the slurry wall," Hebert adds.

Some of the slurry wall—a clay bentonite wall usually built around reservoirs to prevent water leakage in and out of the reservoir—had to be removed to build the wet well and pump station. "Much care was taken to rebuild the slurry wall, and it resulted in no leaks," Hebert says.

The wet wells are accessed by fourteen floor doors manufactured by The BILCO Company. The doors are manufactured from aluminum and feature type 316 hardware for corrosion resistance and many years of dependable service. They feature engineered lift assistance for easy, one hand operation, automatic hold open arms, and an industry-leading twenty-five-year warranty. Tim Bosworth of Dalco Industries procured the doors for Aslan Construction.

"The BILCO hatches were preferred by the operations department and are used to access the wet wells," Hebert says. "They were installed directly above all of the submersible pumps to provide a way to pull the pumps from the wet wells for maintenance and future replacement."

UNDERSTANDING AUGMENTATION

Water allocation is one Colorado's, and Brighton's, most pressing issues and has been so for centuries. Zebulon Pike, one of America's earliest western explorers, referred to Brighton in his diary as the "Great American Desert." The Colorado Encyclopedia states that before Colorado achieved statehood in 1876, "water scarcity drove the territory to adopt the Colorado doctrine," a water allocation system whose basic premise was "first in time, first in right." Just a decade after statehood, "the Platte was already over-appropriated," according to the Encyclopedia article.

Colorado's water crisis is exacerbated by its unique topography. The state's Western Slope, defined as being west of the

Continental Divide, receives about 80 percent of the state's water supply. About 80 percent of the state's population, however, resides on the much drier eastern side of the divide.

Augmentation is a relatively new concept that has allowed people to manage allocation. "The concept came around as an opportunity to augment supplies so that they are not adversely impacting senior water right holders," says Scott Williams, education and outreach coordinator for Water Education Colorado. "Augmentation plans have been developed so that folks using wells can mitigate that impact on senior water rights holders."

Under Colorado law, court-decreed rights, or "senior rights," have priority to divert water in times of short supply before later-acquired rights, or "junior rights." The policy dates back to the "first in time, first in right" law from the late 1800s.

Brighton's primary water supply comes from alluvial groundwater wells, Hessheimer says, which have junior water rights. Therefore, the town must augment water so as not to impact senior water rights downstream.

"Brighton water storage reservoirs are a vital component to our municipal water system and our ability to supply water to our citizens," Hessheimer adds. "Think of the chicken and the egg. Which came first? You cannot legally draw water from wells for treatment without the ability to augment the well pumping."

STRAINED SERVICES

Brighton's population has grown significantly since 2000. The population rose by more than 56 percent from 2000 to 2010, to more than 33,000 residents. It is expected to surpass 41,000 in 2020, nearly double its population in 2000.

The growth has strained community resources. Several schools are over capacity, and more are needed. The school district expects a nearly 40 percent increase in student enrollment by 2028. The surge in population has also affected its water supply. Due to the creative solution identified by city leaders, Brighton can be sure its residents will have enough water for its residents and meet its augmentation requirements. The augmentation station helps solve a water challenge that had been encountered by its earliest settlers.

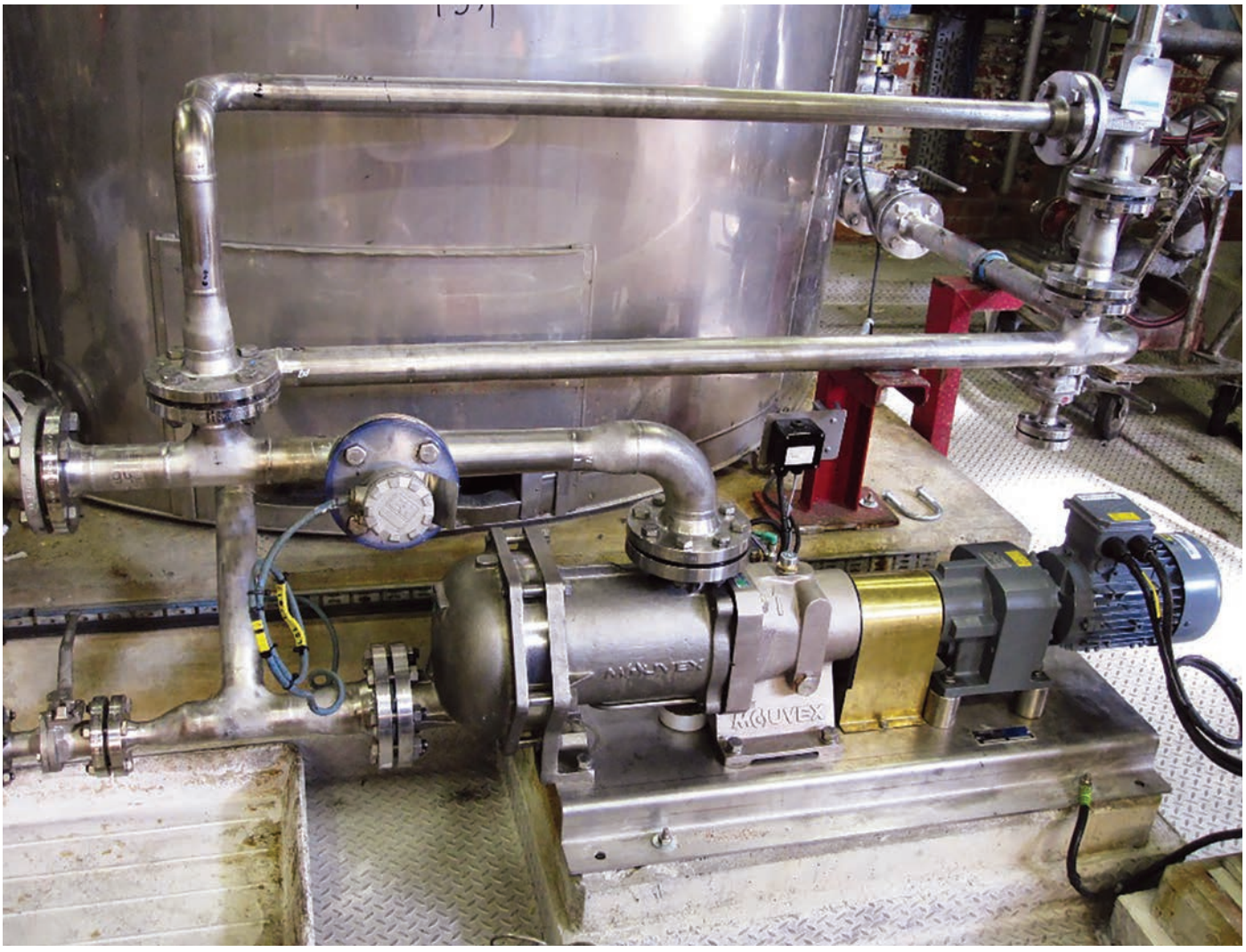
"By completing the project as designed, the city has achieved the set goal because Erger's Pond is now equipped with permanent pump station infrastructure to transfer water between it and the South Platte River," the city wrote in its submission to the APWA.◆

Thomas Renner writes on building, construction and other trade industry topics for publications throughout the United States.

Identifying the Best Pump for Handling Dilatant Isocyanates

Seal-less eccentric disc pumps provide the strong suction, wear compensation, and product containment needed for transferring dangerous dilatant isocyanates

By Johann Fourrat-Besson



It's a fact of life that industrial manufacturers will need to create or work with liquid components that are sensitive or hazardous. One of the most notable of this class of hard-to-handle liquids is dilatant isocyanates. They possess strict product-handling requirements that must be adhered to, making choosing the proper pumping technology highly critical in ensuring a safe, reliable and efficient dilatant isocyanate-handling operation.

In that vein, eccentric disc pump technology has risen to the fore as a go-to choice for the production and handling of isocyanates and other classes of dilatant fluids.

THE CHALLENGE

First, though, let's take a closer look at these types of liquids and see how their product-handling characteristics and requirements can create numerous challenges for industrial-manufacturing plant operators:

Dilatants

By definition, dilatants are materials that "increase in viscosity and set to a solid as a result of deformation by expansion, pressure or agitation." As such, they are also commonly known as "shear thickening fluids," or STFs. In other words, the viscosity of dilatants increases in proportion to the amount of shear stress/strain that is being put on them during their movement through fluid-transfer applications.

For example, when force (or shear) is applied to a precise 1:1.25 mixture of water and corn starch, the mixture will act as a solid rather than a liquid. Another real-world example can be found that while walking on a patch of wet sand, a dry footprint will appear.

The dilatant characteristics of these materials makes their proper handling paramount in fluid-transfer applications. If the shear rate is too high during their transfer, they can revert to a high-viscosity state that will compromise a pump's ability to push them through the process piping. In this case, as a dilatant material begins to thicken, the pump's operation will need to adjust to the changing properties of the liquid. Therefore, dilatants require a pump technology that produces little to no shear when operating, lest the material transform into a high-viscosity liquid and fall outside the pump's reliable operational range.

Isocyanates

Isocyanates, which are classified as dilatants, are a family of highly reactive, low molecular weight chemicals that have been featured in a wide range of industrial manufacturing and processing applications since the 1950s. The most widely used isocyanate compounds are diisocyanates and polyisocyanates. Within the diisocyanates family, methylenebis (phenyl isocyanate), known as MDI, and toluene diisocyanate (TDI), are the most regularly used.

MDI and TDI are required components in polyurethane, which is used in the manufacture of flexible and rigid foams, fibers, elastomers, and coatings, such as paints and varnishes. Isocyanates are also used in the automobile industry, as well as in auto body repair and building insulation materials. Spray-on polyurethane products containing isocyanates have been developed for a wide range of retail, commercial, and industrial uses to protect cement, wood, fiberglass, steel, and aluminum, and, more specifically, protective coatings for truck beds, trailers, boats, foundations, and decks.

The benefits (and need) of isocyanates as a component in the

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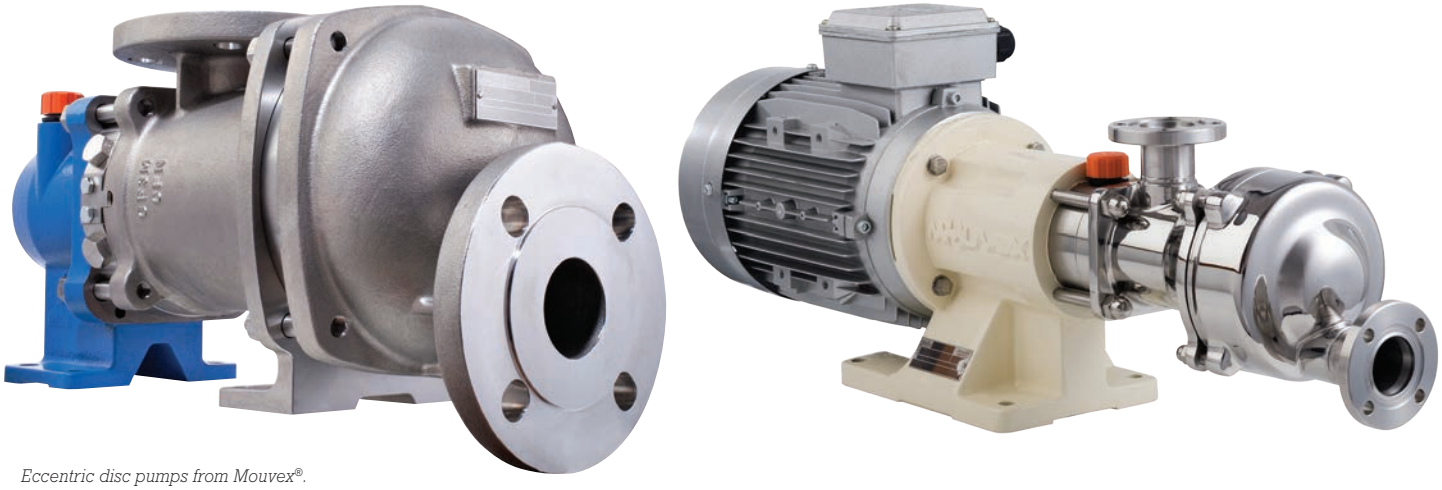

Eccentric disc pumps from Mouvex®.

manufacture of many important products is unquestioned. Also unquestioned is the fact that isocyanates can be extremely dangerous for the user, surrounding populations, and the environment if they are not handled properly and with great care throughout their entire production and supply chain.

Prolonged exposure to, or even simple contact with, isocyanates can result in many adverse health effects. Among them are acute "isocyanate asthma" attacks that can include coughing, tightness of the chest, and shortness of breath; skin irritation that can lead to rash, itching, hives, and swelling; irritation to the mucous membranes, eyes, nose, and throat; gastrointestinal irritation; and pneumonitis, or swelling of the lung walls.

The most common occupational exposure to isocyanates is inhalation of a vapor or aerosol, although exposure may occur through skin contact during the handling of liquid isocyanates. Exposure typically occurs during the production and use of isocyanates, particularly during the manufacturing process in the polyurethane foam industry. Additionally, isocyanates are toxics and pollutants, and can be flammable. While their flammability is low, specific concentrations or the presence of explosive vapors or other flammable liquids in the same facility where isocyanates are being used or manufactured can create an explosive atmosphere for plant personnel and the surrounding community.

As mentioned, to safely, reliably, and efficiently handle dilatants and isocyanates, operators must choose the correct pumping solution for this application, one that handles product gently (low shearing), has strong suction capability and offers a low-maintenance wear-compensation design. Various technologies can be used to transfer dilatants and isocyanates, but the safest, most reliable, and most efficient pumping solution that meets all of the above criteria is the eccentric disc pump.

THE SOLUTION

Eccentric disc technology provides less risk and more efficiency than other pumps. The advantages of using eccentric disc pumps are numerous:

Design

Eccentric disc pumps consist of a stationary cylinder and mobile disc, with the disc moved by an eccentric shaft that is housed inside a bellows end, which holds the disc. As the eccentric shaft is rotated, the disc forms chambers within the cylinder, increasing at the suction port and decreasing at the discharge port. During operation, the discharge pressure exerts itself against the eccentric disc, preventing it from slipping.

The low slip between the disc and cylinder gives eccentric disc pumps their ability to strip or clear lines of product. Isocyanates are toxic by nature so they require seal-less pumps to eliminate leaks and provide maximum product containment. Eccentric disc pumps have no magnetic couplings, packing, or mechanical seals, which eliminates a potential leak point that can lead to failure.

Strong Suction

When transferring any hazardous or hard-to-handle liquids, it's important to have a pump capable of clearing lines. Since isocyanates are a highly toxic pollutant, it makes loading and unloading much safer and cleaner as hoses and pipes are emptied prior to disconnection at the end of the transfer process. Eccentric disc pumps also feature superior suction at low speeds, ensuring that a minimum amount of product is left in the piping at the end of product runs.

Low Shear

When dilatants materials such as isocyanates are subjected to high shear and agitation, their viscosity tends to rise. When this happens, the end result

In today's manufacturing environments, dilatant isocyanates are among the most important compounds within the production process.

is often pump failure and resulting maintenance, repair, replacement, and downtime. Experiencing excessive shear is a problem that cannot happen with eccentric disc pumps due to their low shear rate.

Wear Compensation

Most positive displacement pumps do not have wear-compensation systems, which means normal pump wear will lead to progressive flow rate degradation. Operators can try to compensate for wear by accelerating the pump, but that will begin a dangerous cycle of running the pump faster, which, in turn, results in the pump components wearing faster, all while consuming more energy. The unique design of eccentric disc pumps allows them to self-compensate for mechanical wear, giving the pumps the ability to maintain consistent flow rates over time. Eccentric disc pumps have a built-in wear-compensation system that keeps them running like new despite wear and without the need for speed increases.

CONCLUSION

French eccentric disc pump manufacturer Mouvex® offers two pumps series that are ideally suited for dilatant and isocyanate transfer: the SLC Series and C Series Eccentric Disc Pumps. Both models require no magnets, mechanical seals, or packing, and are ATEX-rated and TA Luft-certified to handle the most dangerous properties in the most explosive manufacturing environments. Both pumps are self-priming, have line-stripping capabilities, can run dry for up to five minutes, produce low shear rates, and can create high vacuum and compression effects. Both also have a reduced number of components, which leads to reduced maintenance. SLC models are available in stainless steel, while C Series pumps are available in ductile iron. All models are suitable for handling any type of dilatant and isocyanate liquid.

In today's manufacturing environments, dilatant isocyanates are among the most important compounds within the production process. Many short- and long-term risks are involved with handling them. Therefore, operators need the peace-of-mind that only eccentric disc pumps can deliver. Eccentric disc pumps are low-maintenance and deliver the superior wear compensation, strong suction, and low shear that is mandatory when handling these unique materials. In that realm, Mouvex® is leading the way in safe dilatant isocyanate transfer with its SLC Series and C Series Eccentric Disc Pumps.◆

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An Industry in Transition

How remote user access is supporting utilities, energy producers, and pumping stations

By Bill Moore, XONA

On many fronts, 2020 is a year of adaptation and refinement. This is especially true for utilities, like oil and gas producers, who are working to develop critical remote operations during this challenging time. Not only has the global Coronavirus pandemic come with enormous health and economic consequences, but other factors have forced the oil and gas sector to adjust their approaches. Declining prices and an increasingly competitive marketplace are compelling companies to do more with less. Even traditionally more stable utilities, like water and electricity, are struggling.

Although utilities can't control external forces, they can ensure that their internal protocols are prepared to meet the moment. As an assessment by PwC concludes, "even the best thought-out and thoroughly tested business continuity plans should be adaptable to fully address the fast-moving and unknown variables of an outbreak like COVID-19." In other words, COVID-19 has illuminated existing shortcomings that companies will need to address both to survive now and to thrive in the future.

For utilities, oil and gas producers, and pumping facilities, this means adopting remote operations capabilities that facilitate business continuity, workplace flexibility, and operational efficiency. When doing so, here are three priorities to consider.

#1 OPTIMIZE YOUR WORKFORCE

The COVID-19 pandemic underscored the importance of remotely operating pumping stations and other production-level facilities. Worker safety protocols, employee preferences, and social distancing guidelines are forcing companies to keep fewer people on-site, subsequently reducing productivity if these critical systems cannot be remotely operated.

Of course, even before the pandemic, oil and gas producers were struggling to find enough workers. While the pandemic has forced many companies to make cuts, temporarily inflating the talent pool, many producers can't find enough employees to compensate for an otherwise aging workforce.

> Remote operations is the future, and it's the tool that we need to excel during these difficult days.

As a result, utilities across many industries should optimize their workforce by enabling remote operations. Not only does this allow on-site employees to operate pumping equipment without exposing themselves to other, potentially ill, employees, but it also expands the available talent pool, enabling companies to pull from the global workforce that can help them meet demand.

In reality, the pandemic has only accelerated an inevitable industry shift. As Daniel Yergin, vice chairman at IHS Markit, a London-based informational analysis provider, concludes, "It's really like a forced march to digitalization. Manual labor will probably shift to maintenance rather than actually working on the rig floor and handling pipe."

Especially for offshore drilling and pumping stations, the number of on-site workers is expected to drop by 75 percent, something that will both reduce costs and improve worker safety. By embracing this shift, utilities can plan to thrive in the present while preparing for the future.

#2 ACCOUNT FOR CYBERSECURITY

Today's cybersecurity threat landscape is expansive, and the rapid digitization of utilities and producers has created an immediate need for secure access platforms that are resilient and compliance-ready.

Cybersecurity concerns at pumping facilities are often associated with water suppliers. For example, in April, Israel endured a major cyberattack to its water infrastructure, as bad actors attempted to infiltrate control systems, plants, and pumping stations.

However, the implementation of smart pumps and remote access capabilities can increase the cybersecurity risks for utilities, energy producers, and pumping facilities. In this environment, companies adopting a remote operations capability need to include:

1. Multi-factor authentication
2. Protocol isolation
3. Unidirectional mediated secure file transfer
4. Full user access logging and recording
5. System and/or application access control
6. Compliance-readystandardization

#3 MAXIMIZE EFFICIENCY

In May, Rystad Energy, an independent energy research and business intelligence company, found that growth in the oil and gas sector was primarily driven by remote work and "cost-saving remote work technologies." As companies struggle to maintain operations in a difficult economy, maximizing efficiency will be a key component of their success.

Notably, remote operations capabilities can help contain spending by reducing facilities management and acquisition expenses and other costs associated with securing on-site employees during a pandemic.

In addition to the technical benefits of remote operations capability, these features have shown to increase employee happiness and well-being, while driving down attrition so that companies can best maintain employee continuity during an already-disruptive time.

BONUS: PRIORITIZE SIMPLICITY AND ADAPTABILITY

Remote operations capability for critical industrial control is the future, but it's a novel feature for workers right now. Therefore, when deploying

remote operations, opt for easy-to-use and simple-to-install software that can reduce the learning curve, ensuring continuity at a critical time.

Of course, there is considerable uncertainty about the pandemic moving forward, and companies will need to continue to be adaptable and able to quickly shift employees off-site if necessary.

In an extensive assessment of the post-COVID-19 environment for utilities, producers, and pumping facilities, Mckinsey and Co. notes that "Leading companies will use the crisis to redefine their reasons for being and their basis for distinctiveness."

This conclusion is both aspirational and possible. When it comes to supporting employees and consumers, remote user access capabilities will play a prominent role in its fulfillment. Like any significant shift, utilities, energy producers, and pumping stations will need to adapt to meet the moment. Remote operations is the future, and it's the tool that we need to excel during these difficult days.◆

Bill Moore is CEO and founder of Xona, providers of a unique "zero trust" user access platform especially tailored for remote operational technology (OT) sites. He is currently working with global power generation and distribution customers to reduce their remote operations costs and cyber risks. Moore brings more than twenty years' experience in security and the high-tech industry, including positions in sales, marketing, engineering, and operations For more information, visit **www.xonasystems.com**.

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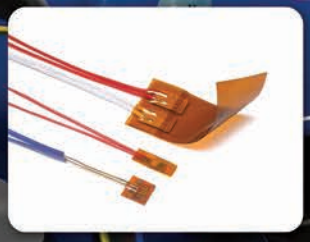

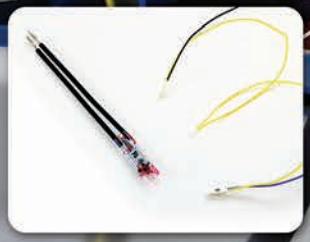

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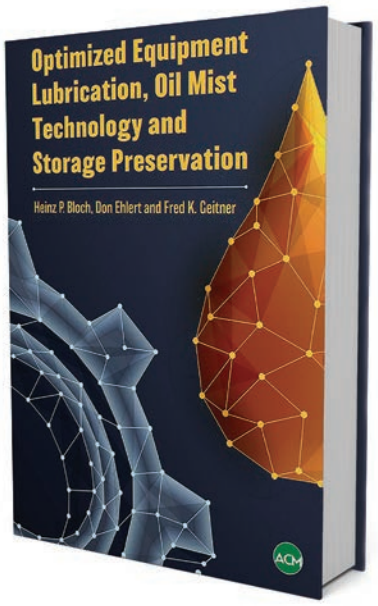

By Heinz P. Bloch

For many years, the author maintained that results-oriented managers will put good technical texts in the hands of his reliability engineers and ask them to read these texts between today and the staffer's next performance appraisal. In time periods when many must work at or from home, these reading assignments may take on added importance. As senior professionals, managers would impress on staffers that reading is better than "re-inventing the wheel" through experimentation. Reading is essential to professional growth. Please consider the following brief excerpts from reference 1 and then ask: Did I know that? Do my employees know it? Why aren't we upgrading our pumps?

VULNERABILITY OF OIL RINGS

Oil rings are found in many fluid machines and were probably first used in the early nineteenth century. However, they must be installed on a truly horizontal shaft system and not be allowed to contact the housing's internal surfaces. If (or when) an oil ring jumps out of its groove and gets wedged under a limiter screw (see figure 1, blue arrow), it will often take mere seconds to shred the oil ring and thoroughly contaminate the lube oil. Good designs will not use limiter

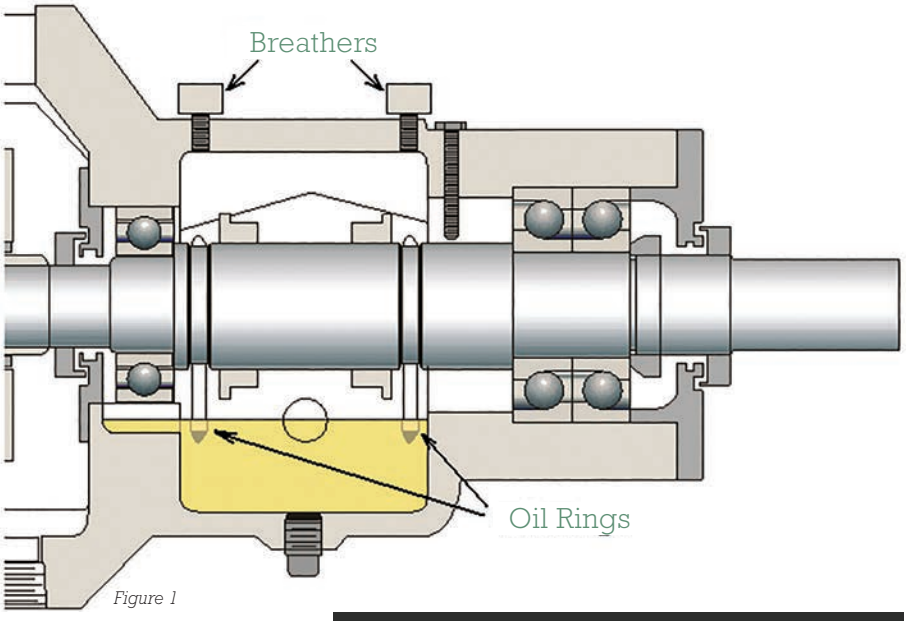

Figure 1

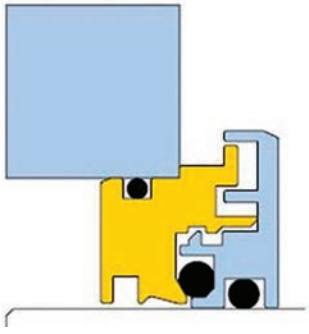

Figure 2

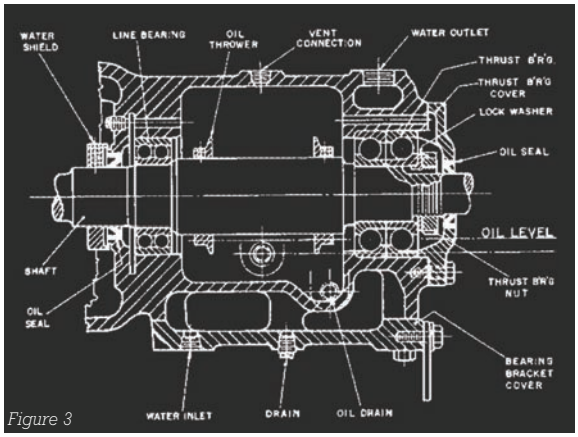

Figure 3

Figure 1: An oil return slot shown below the radial bearing (on left) prevents oil from getting trapped, overheated, and oxidized behind the thrust bearing. There should be a similar drain slot behind the thrust bearing on the right. Figure 2: A modern bearing housing protector seal. At speed, the larger of the two O-rings lifts off and allows a micro-gap to open between the O-ring and the stationary yellow component. (Source: AESSeal, Inc.) Figure 3: A bearing's housing from the 1960s, with pressure equalization holes surrounding the bearing. (Source: Worthington Corporation, Harrison, NJ)

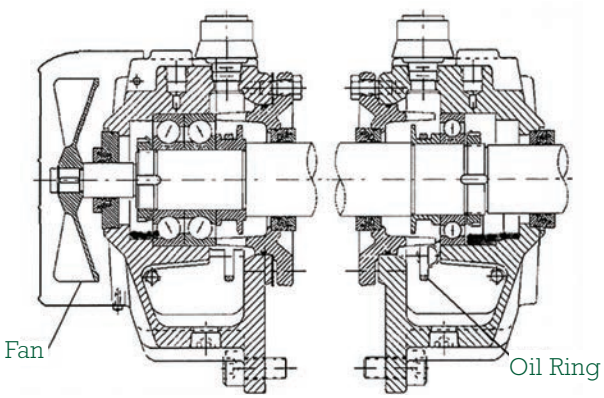

Figure 4: If oil is trapped behind bearings (at blue triangles), it tends to overheat, oxidize, and turn black. Although no oil return or oil equalization holes are shown on this vendor drawing, the vendor asserted they were provided.

screws; they will favor limiter discs, shown later. Whenever oil rings are used, depth of immersion and lube oil viscosity must be maintained within acceptable ranges. Ascertaining that the bore eccentricity stays within 0.002 inches is both achievable and strongly recommended.

With or without oil rings, oil-related lubrication problems result whenever lubricant is trapped in a dead-end. If no oil return passage (i.e., hole or slot) is provided, a small pool of oil forms and soon overheats. In figure 1, only one oil return slot is shown; it is located below the radial bearing. No bearing housing protector seals are shown in figure 1; however, fitting advanced bearing housing protector seals (ones that incorporate an axially moving O-ring; see figure 2) makes economic sense.

In the 1960s, prudent, highly experienced engineers at a now defunct New Jersey pump company wisely placed a series of pressure equalization holes around each bearing, as shown in figure 3. Without equalization, the oil would often leak from under the lip seals.

Yet, the "new" bearing housings of the late 1990s, shown in figure 4, show neither the equalization holes nor oil return slots. Sometimes, these holes and slots may not be needed. However, an issue arises if they are needed and, for some unspecified reason, have not been provided on the design drawings. Lack of oil return slots is a reliability risk.

OIL RING ISSUES

If the effects of oil ring malfunctions are communicated to the manufacturer, the inevitable standard answer is that things go well wherever else identical pumps are being used. An alternative claim is often made; vendors have asserted that this is the first-ever complaint and that the pump user must be doing something wrong. The manufacturer may even resent your insistence on upgraded, lower failure risk pumps because upgrading interferes with the manufacturer's projected spare parts sales or might be viewed as the

manufacturer's admission that better technology is available.

So, who is to be believed? Whose claims represent facts? Is it the recollections of a vendor's technical director/manager who has never once accepted responsibility? What is known as fact is that no oil return holes are shown on the drawing reproduced in figure 4. What is also known is that the author has measured oil rings with an out-of-roundness of 0.061 inches at a facility in Point Comfort, Texas, and 0.017 inches at a refinery in Corpus Christi, Texas. The widely used Wilcock and Booser text (see reference 2) gives 0.002 inches as the maximum allowable out-of-roundness and explains what might happen when this tolerance is exceeded. Oil ring out-of-roundness is often caused by disregard or even ignorance of the importance of stress-relief annealing as an intermediated step in manufacturing oil rings.

Any issues centering on oil ring deficiencies or balance hole provisions have been solved years ago. Problems can be circumvented by what all bearing manufacturers know: An oil jet sprayed directly at the bearing cage (i.e., ball separator) ranks first in yielding maximum trouble-free bearing life. Oil rings and constant level lubricators are discarded with oil jets or oil mist. Oil mist, applied between a bearing's housing protector seal and the bearing, and aimed or "directed" to flow through the bearing before reaching the oil sump, is ranked a close second. Among the strengths of these two highest ranked application methods is the fact that shaft orientation does not, in any way, interfere with getting clean oil into the bearing.

The same cannot be said for oil rings, which, of course, are highly orientation sensitive. Unless the shaft on which they ride is perfectly horizontal, oil rings will travel downhill. Unless the oil rings are immersed in oil to the correct depth and the oil has the right viscosity, they may not perform as intended. Oil rings will not perform properly if roundness and bore concentricity are outside the limits of 0.002 inches called for in reference 2. To maintain acceptable roundness and concentricity, reliable oil rings are fabricated with an intermediate stress relief step after rough machining. Only then are the oil rings machined to an engineered final dimension.

To maintain acceptable roundness and concentricity, reliable oil rings are fabricated with an intermediate stress relief step after rough machining. Only then are the oil rings machined to an engineered final dimension.

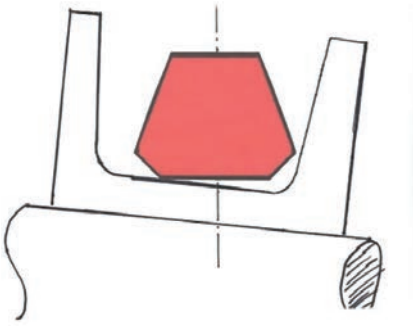

Figure 5: Oil ring in a carrier spool as devised for pumps on shipboard.

Figure 6: New oil ring (left) with chamfers intact; severely abraded oil ring (right) with indications of slippage and overheating on inner diameter

OIL RING CROSS SECTIONS AND OIL GALLERIES

In a series of rigorous tests, a pump manufacturer established that oil rings with cross sections resembling the mirror image trapezoids in figure 5 may better tolerate wave motion on ships. The trapezoidal oil rings should be retained on tapered flank ring carriers from which they (hopefully) will fling oil into oil galleries.

But, again, the user's pumps may incorporate the traditional flat oil rings. If the facility and its reliability engineers are happy with them, they may simply stay the course. If not, it is time to write better specifications for vendors and insist on specification compliance by the various bidders. Meanwhile, user plants might consider putting relevant oil ring dimensional details into their computerized maintenance management system (CMMS). Additionally, personnel should measure and record the oil ring width and oil ring concentricity, as installed. The same two measurements, width and concentricity, should be repeated and documented when doing repairs. At times, the difference between these measurements is evident to the naked eye, as seen in figure 6. Note how the

chamfers are worn on one of the two oil rings. The difference ended up as abrasion product; it contaminated the oil and caused premature failure of the bearings.

To what extent these documented events prompted searching for new oil ring contours is not known. What is known is that considerable research was done by a major pump manufacturer and that:

- Certain plastic materials were proposed for oil rings instead of brass or bronze;
- Plastic oil rings were retrofitted in a pump user's plant, but did not solve the issue of black oil formation;
- A research report recommended ISO VG 46 or ISO VG 52 instead of the customary ISO VG 32 lubricants; however,
- The researchers did not comment on viscosity indices. Industry uses a viscosity index to quantify how much an oil will thicken when it is being cooled and how much easier it will flow when the oil's temperature is being increased over a prevailing standard temperature. Unless the viscosity index is taken into account, it will be pointless to call for tweaking the viscosity of a lubricant.

CONSIDER OIL APPLICATION METHODS OTHER THAN OIL RINGS

Earlier in this article we stated that oil sprayed into rolling element bearings is the most desirable application method and that oil mist is a close second. We believe that pump reliability can be improved by either of these two approaches and that reliability-focused users should specify these options. Both are explained in greater detail in reference 1.◆

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Heinz P. Bloch resides in Montgomery, Texas. His professional career commenced in 1962 and included long-term 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."

Finding the Balance, Providing the Power

Pumps perfected for first-of-a-kind plant to have the power to be its best

By David Brown, Börger

Arjun Infrastructures' power plant in London, developed and now managed by 2OC.

Pumps for circulating clean engine oil—a reasonably ordinary application? But then there's nothing ordinary whatsoever about Arjun Infrastructures' remarkable power plant in London, which generates 17 megawatts of renewable energy from food waste and can also utilize fats, oils, and greases (FOG).

"This is a first-of-a-kind plant," says Phil Jones, director at 2OC, who developed the plant and now manage it on behalf of Arjun. "Joining up assets that haven't previously been linked together before has presented many engineering challenges."

Originally specified by Jacobs Engineering, the two 90kW lubrication pumps for the Combined Heat and intelligent Power (CHiP) plant had to be installed by main contractor J. Murphy and Sons in a very tight space, presenting the first in a series of obstacles to be overcome.

RELATIVELY UNCOMPLICATED JOB? NOT SO FAST

At first, we thought that this was going to be a relatively uncomplicated job, but then the small footprint was just one of many hurdles to negotiate—not to mention the fact that the pumps had to go below ground, beneath the plant's engine.

Börger designed a special base frame so that the very robust EL1550 Classic pumps could be mounted vertically into the small footprint (roughly 10 by 13 feet)—and then for easy servicing, lifted out, and put on their side. Over-pressure protection was required too. All a bit tricky, but often the case when there's not much space available.

Producing enough energy for approximately 40,000 homes, Arjun's power station presents no shortage of high temperatures for its assets to cope with. This includes the Börger pumps, which had special cooling radiators for the gearboxes and motors installed.

STARTING OFF RIGHT

So far so good, but with the Börger pumps and the rather demanding need to make all of the new power plant's equipment work together efficiently and economically, came a demanding, non-extendable deadline.

"We were fully aware of this from day one," continues 2OC's Phil Jones, "but I can't deny that the pressure was well and truly on. We had to meet the deadline for all-important government ROCs (Renewables Obligation Certificates) that support large-scale renewable electricity projects in the United Kingdom. To get the plant off on the right operational and financial footing, we had to make things happen to hit that deadline. We could not take our time."

The construction contractors' engineers were initially concerned about the noise and vibration of the two Börger pumps. As everyone in the supply chain knows, this can be a delicate balance when both parties believe they are right!

Börger's pumps at Arjun Infrastructures' power plant in London.

"The pumps were performing fine, but we were a little anxious at first," adds Phil Jones. "Failure wasn't an option."

PASSING THE TEST

For Börger, we believed it was simply down to natural pulsation, but as well going to site, we also brought over our top engineers from Germany. It didn't help us or 2OC that due to the space limitations, the pipework for one pump was straight, while the other one was more complex, so had to cope with some pressure loss. Ultimately, we ran a test in Germany with 2OC in attendance to show that the pumps were performing fine.

As it turned out, the vibration was down to nothing more than extra torque being required. Later, after another 500 hours running time, an inspection confirmed that there were no issues. It has been a bit of journey, but we always knew there was a reason, a solution.

2OC's Phil Jones adds, "Börger were totally professional—taking our concerns very seriously to get to the bottom of this mystery. Through the very positive dialogue between the two companies, it was also decided to change the pump's removable rotor tips from rubber to a fully stainless-steel solid rotor design because of the high temperatures. Together with the stainless-steel pump-head, it now means that there is almost zero maintenance required."

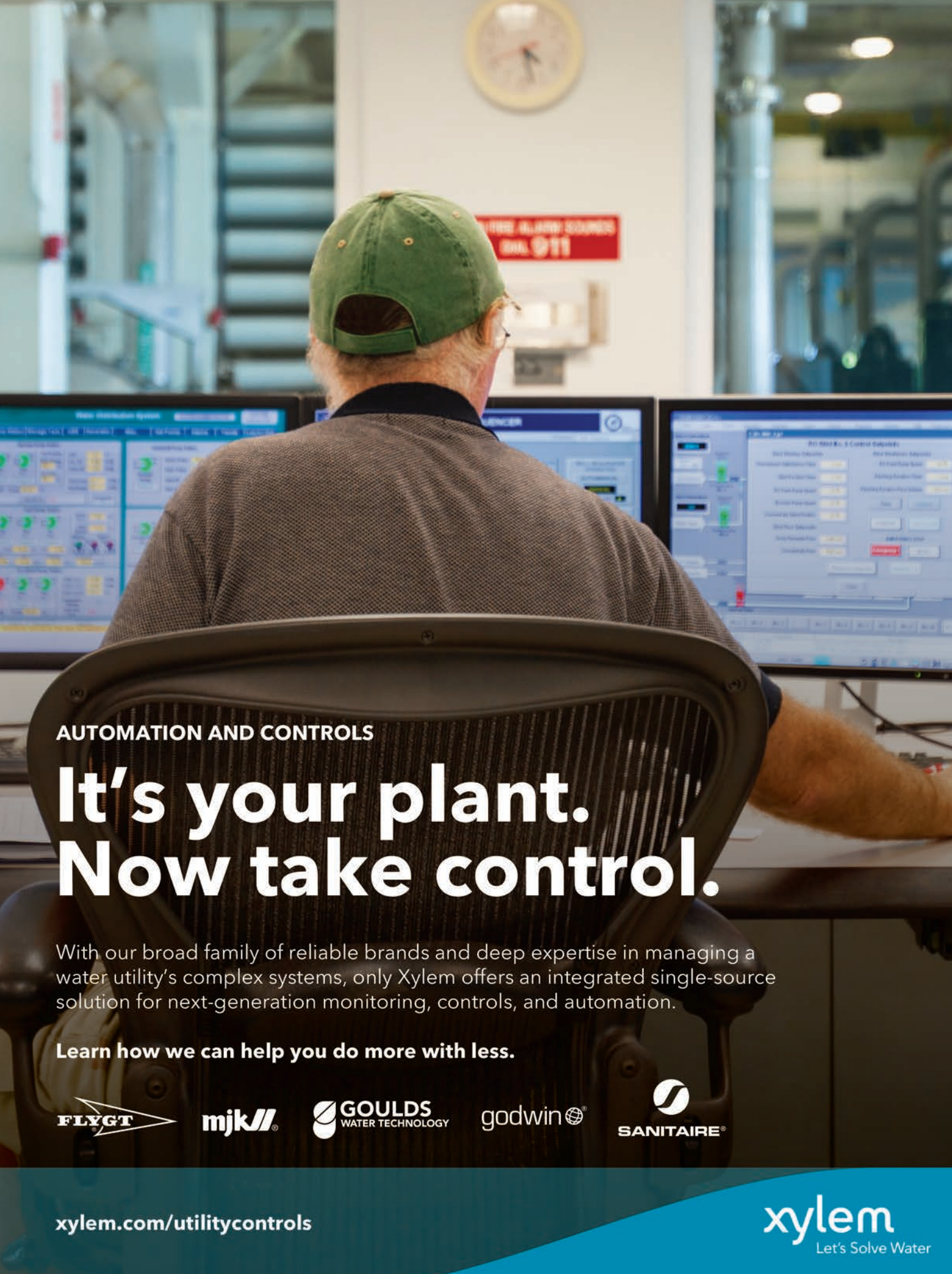
NEAT AND EFFICIENT

Built by J. Murphy and Sons, Arjun's power plant sees 75GWh of the electricity sold to Thames Water for its Beckton sewerage processing plant (home to sixty-four Börger pumps), while the remaining 55GWh is purchased by Centrica.

Heat from the engine is supplied to the adjacent gas pressure reduction station owned by the Cadent (with whom Börger also has pumps in a very important application), largely replacing old gas boilers that used to pre-heat the gas—while heat recovery cycles of the CHiP technology increase the thermal efficiency of the Arjun plant.

Phil Jones from 2OC concludes, "Our pursuit of getting this unique power station where it needs to be has not been easy, but very much in line with what government is promoting, we now have a very neat and efficient plant. This includes the Börger pumps, which are proving very efficient, reliable, and easy to maintain thus far."◆

Börger designs, produces, and sells pumps, chopping units, and entry technology for pumping low to highly viscous and abrasive media—including its core component, the patented Rotary Lobe Pump. Börger's guiding principle has always been to make things better. In the meantime, Börger manufactures many other products. For more information, visit **www.boerger.com**.



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Cutting-edge Technology for Electrical Motor and Transmission Assembly

Tecnomatic

Comau and Tecnomatic join forces to deliver an innovative solution

As a global leader in the development of advanced systems and products for the industrial automation sector, Comau has signed a multi-year partnership with Tecnomatic, an Italian automation provider specialized in advanced hairpin stator technologies. The partnership complements Comau's offer covering the entire production life-cycle from design and validation up to manufacturing systems and aftersales support.

A THOROUGH PARTNERSHIP

Integrating Tecnomatic's expertise and patented hairpin technology—from prototype co-design and development all the way to the insulation of stator slots and the forming, twisting, and welding of hairpins—within Comau's comprehensive electrification portfolio allows for a complete offering which encompasses rotor, stator, inverter, transmission assembly, and testing. This partnership confirms Comau's commitment to cutting-edge solutions that help its customers address emerging market needs through the complete life-cycle, including after-sales support of the production system.

ABOUT TECNOMATIC

Tecnomatic produces winding systems for stators of electric motors, alternators, and generators. Its experience, made of more than forty-seven years of experience, spans from general specifications to the final design and performance evaluations. The company has an internal department with full-time technicians devoted to the construction of prototypes, prototype machines, and testing equipment for the complete winding process and testing of both stators and completed electric motors, as well as the optimization of the final product for the production system.

Headquartered in Abruzzo region, one of the greenest areas of Europe, with four national parks, it counts a workforce of 140 people, with a dedicated R&D department for hairpin stator patented concept's design and production processes.

"We believe it is truly a win/win/win"— Paolo Datore

Combining their respective strengths, the companies offer customers a double benefit: a single source for fully-integrated electrical motor and transmission assembly solutions, as well as access to an engineering approach designed to meet current and future production needs. The jointly-developed systems are modular, scalable, cost effective, and digitally enabled.

"This partnership is part of a strategic long-term vision. It underscores our commitment to spearheading innovation within the electrification field and is based on shared objectives and complementary competencies," explains Ennio Chiatante, global business development—electrification at Comau.

Gian Carlo Tronzano, electrification technical fellow, who is in charge of the project's technological development adds, "By combining Comau's proven know-how and Tecnomatic's patented, best-practice hairpin technologies, we reinforce our ability to provide the market with powerful turnkey solutions for the entire electrical motor and transmission assembly process."

A WIN ALL AROUND

"We believe it is truly a win/win/win agreement, not only in joining our respective expertise, but also in giving great support to our present and potential customer needs. Tecnomatic, thanks to more than twenty years of experience in hairpin stator technology, is convinced that our offer is a 100 percent match with Comau's competencies and global presence, allowing us to support both OEMs and Tier1s in the automotive environment and more," emphasizes Paolo Datore, business development manager for Tecnomatic.◆

Comau, a member of the FCA Group, is a worldwide leader in delivering advanced industrial automation products and systems. Its portfolio includes technology and systems for electric, hybrid, and traditional vehicle manufacturing, industrial robots, collaborative and wearable robotics, autonomous logistics, dedicated machining centers and interconnected digital services, and products able to transmit, elaborate, and analyze machine and process data. With over forty-five years of experience and a strong presence within every major industrial country, Comau is helping manufacturers of all sizes in almost any industry experience higher quality, increased productivity, faster time-to-market, and lower overall costs. For more information, visit **www.comau.com.**

By Land and By Sea, Special Offshore Painting Prevents Corrosion

Transportable odorizing system adds odorants to LPG without using any electrical components

By Walter Richter, Lewa

Oil and natural gas are extracted under increasingly extreme conditions: for example, on the high seas or in the frozen polar sea. (Photo credit: Mohamed Aly)

For safety reasons, odorants must be added to gases that are basically odorless, such as LPG (liquefied petroleum gas), in refineries and at loading terminals in order to detect leaks in pipes and equipment by smell. This task is performed by odorizing systems. When substances that contain sulfur are added, gases immediately become clearly perceptible to the human sense of smell. For its loading terminal on the southeast African coast in Mozambique, an international corporation required an odorizing system that can be used both on land and at sea. Since electricity is not available on the ships at the odorizing system's installation site, a solution without electrical components had to be found. Spray water from strong waves and condensed seawater in the air also make systems corrode quickly, so that special protection was required. In order to avoid complicated dismantling and assembly work when changing location, the solution also had to be portable.

Due to the customer's requirement for using the system both at sea and alternately in a terminal on land, a lifting cage was also installed around the odorizing system.

Lewa was commissioned with this task. The company is a long-standing expert for pumps and pump systems, that manufactures a wide variety of customized odorizing systems. For off-coast use, an offshore paint finish was added to the system to protect it against corrosion and at the same time, the current-free PKH compressed air pump was installed. Lewa also integrated the system into a cage so that it could be easily transported by crane.

EXPANDING THE LIMITS OF EXTRACTION

Worldwide more and more oil and natural gas is being extracted under conditions that are becoming increasingly extreme: for example, on the high seas or in the frozen polar sea. All plants and systems involved in their extraction must therefore be specially designed for adverse on-site conditions. This also applies to odorizing systems that add odorants to LPG, which consists of virtually odorless butane and propane. An international group that transships LPG at a loading terminal in Beira, Mozambique, wanted a suitable system for this purpose. The system needed to be usable both at sea and at the terminal itself.

After receiving the special order to supply an odorizing system for operation on land and at sea, the first

The PKH compressed air pump, a purely pneumatic unit designed for the gas flow of 17,000 cubic feet per hour at 30 bar required on site, was installed.

task was to consider the different factors that are relevant for such an application. The main focus was resistance to seawater, the option to transport the system easily, and current-free system operation.

Since the system would also be used on board a ship, it first had to be integrated into a stainless steel cabinet to protect it from splash water and waves hitting the deck. To increase its corrosion resistance, it was also coated with offshore paint. Since the plant needed to be protected against salt water even when its doors are open, the integrated pump and drip pan were also coated with this paint.

PKH COMPRESSED AIR PUMP ALSO WORKS WITHOUT CURRENT

Due to the fact that there is no electrical power available at the installation site on the ship's deck, a system without current-dependent components had to be worked out. This was mainly reflected in the choice of pump and the type of metering.

The PKH compressed air pump, a purely pneumatic unit which is designed for the gas flow of over 17,000 cubic feet per hour at 30 bar required on site, was installed. The odorant added to the LPG as it flows through is metered via a mechanically pre-set throttle valve with a fixed dosing rate, so that no electronic control is necessary.

The common additive ethyl mercaptan is used for odorization in this system. In the case of LPG, this chemical compound is preferable to the alternative THT (tetrahydrothiophene), as the latter mixes inadequately with the liquid gas. The odorant tank has a capacity of over 50 gallons. An additional lifting device can lift it out of the cabinet for filling.

LIFTING CAGE ENABLES CHANGE OF OPERATING LOCATION

Due to the customer's requirement for using the system both at sea and alternately in a terminal on land, a lifting cage was also installed around the odorizing system. It enormously facilitates system transport, since neither dismantling nor cumbersome packaging is required for movement by crane.

All in all, the system can be used flexibly and is independent. At the same time, it is protected against adverse influences such as seawater. In addition, the plant was certified in accordance with the current international ASME standard. The odorizing system is to be installed by the middle of this year.◆

Lewa GmbH was founded as a family company by Herbert Ott and Rudolf Schestag in 1952. Today, as a research and production-oriented company, Lewa develops technologies and provides solutions for the vast array of applications among its customers. Its products are used mainly in the oil and gas industry, in gas odorization, in refineries and petrochemicals, as well as in the production of plastics, detergents, and cleaners. Additional application areas include the chemical industry, cosmetics industry, pharmaceuticals and biotechnology, food and beverage industry, and energy utilities. For more information, visit **www.lewa.com**.

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Shimadzu Scientific Instruments (SSI) introduces the AOC-6000 Plus Multifunctional Autosampler to enable multiple GC/MS sample injection methods in one device. The AOC-6000 Plus Autosampler improves GC/MS analysis productivity because operators can perform liquid sample, headspace solid-phase microextraction (SPME) injection, and many more techniques, all in one device. It also features a tool-switching function that enables users to automatically swap all syringe tools for various injection methods installed on the park station. For more information, visit www.ssi.shimadzu.com.

MEGGITT

SpeedSys300 ODS301

This is a new electronic product designed to prevent overspeed failures on critical machinery in power plants, which in the case of large steam, gas, or hydro turbines, can lead to a catastrophic industrial accident. In the past, failures have resulted in loss of life or serious injury and serious material damage, incurring huge monetary costs, consequential downtime, and other significant liabilities. An overspeed detection system (ODS) provides an isolated layer of protection that will automatically and immediately initiate a shutdown of the machine should this become necessary. For more information, www.meggittsensing.com/energy/overspeed.

IDEC

MicroSmart FC6A Plus

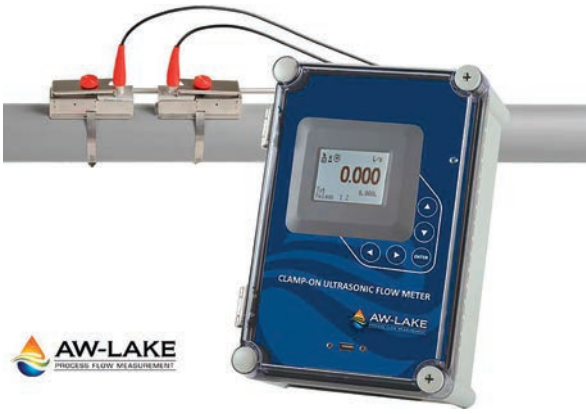
The FC6A Plus is already expandable to support up to 2,060 I/O, making it ideal for controlling machines or small-scale manufacturing operations. With the addition of industry-standard EtherNet/IP scanner capabilities, the FC6A Plus can now connect with, monitor, and control any I/O, variable speed drive, motor controls, or other intelligent automation device using this popular industrial protocol. In addition, the FC6A Plus can be configured as an EtherNet/IP adapter, allowing it to interact with other peer and supervisory systems, such as PLCs and HMIs. For more information, visit www.fc6a.idec.com.

AUTOMATIONDIRECT

STEGO Enclosure Products

Forty-four new STEGO part numbers have been added to AutomationDirect's enclosure thermal management and enclosure lighting product lines. New STEGO enclosure products include a "Smart Sensor" temperature/humidity sensor, a unique flat form factor heater, enclosure door switches, and new Varioline series LED enclosure lights. For more information, visit www.automationdirect.com.

AW-LAKE
Clamp-on Ultrasonic Flow Meters



AW-Lake introduces a new series of Clamp-on Ultrasonic Flow Meters that fasten on the outside of vertical or horizontal pipes ranging. Housed in a water- and dust-tight NEMA 4X polycarbonate enclosure, the Clamp-on Ultrasonic Flow Meters are compatible with a range of metal and plastic pipe materials and "difficult liquids" such as chemicals, viscous liquids, and abrasives that would damage standard flow meters. The sensors feature enhanced flow measurement with no pressure drop in a range of applications such as food or chemical processing plants, oil refineries, and more. For more information, visit www.aw-lake.com.

ALMATEC
ADX Series Stainless-Steel AODD Pumps

The new ADX Series incorporates an array of design enhancements that provide simplified maintenance, improved cleaning, and increased safety. When combined with the ADX Series' standard features—including easy start-up, rotating suction and discharge ports, gentle displacement, dry-running and self-priming operation, no diaphragm discs, and Almatec's patented maintenance-free Perswing P air control system—these pumps set an industry-leading standard in industrial applications enhanced by the availability of flange options (DIN and ANSI) as well as additional connection options (sanitary threads, open butt welding). For more information, visit www.psgdover.com/almatec.

CORTEC
CX-RV2.6 Pneumatic Pressure Relief System

The API 6A PSL 3 monogrammable system is comprised of SIL 3 rated components and designed to provide rapid pressure relief within high-pressure systems, including mud pumps, managed pressure drilling manifolds and frac relief systems. Designed as a replacement to purely mechanical devices that are significantly less reliable, the CX-RV2.6 is a unique, rugged, all-pneumatic system that requires only 80 PSI minimum air supply to function. For more information, visit www.uscortec.com.

BRÜEL & KJÆR VIBRO
VibroPort 8000 (VP-8000) Portable Vibration Analyzer

The new VP-8000 is a specially configured and packaged version of Brüel & Kjær Vibro's VC-8000, which is an internationally renowned machinery protection system. The VP-8000 features the same universal measurement modules (UMMs) and the rugged and field-proven design as the VC-8000, but is optimized for portable dynamic data collection and diagnostics. There is a wide range of applications for VP-8000 for both plant operators and service providers. It is ideal for verifying the condition of machines after a turnaround and those repaired prior to service start-up. For more information, visit www.bkvibro.com/en.html.

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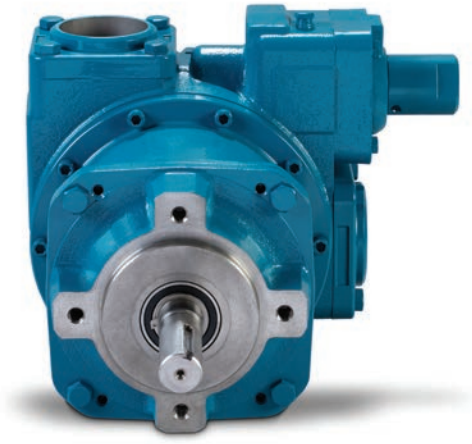

BLACKMER

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Blackmer Magnes Series pumps are positive displacement rotary vane pumps that use a magnetic drive without dynamic seals, providing a leak-free pumping solution for difficult-to-seal, expensive, valuable, dangerous, and hazardous liquids. With this rotary vane magnetic drive pump design, these pumps combine the leak-free benefits of a magnetic drive pump with the numerous advantages of sliding vane technology—including self-priming, line-stripping, product recovery, indefinite dry-run capability, solids handling, thin/thick viscosity flexibility, easy maintenance, low to zero NPSHr, 70 to 90 percent pump efficiencies, and full-curve operational flexibility. For more information, visit **www.blackmer.com**.

Better Than a Rule of Thumb

Applied Flow Technology's Ben Keiser lays down the law on pump sizing

Founded in 1993, Applied Flow Technology (AFT) is a leader in the pipe flow modeling software market and offers a comprehensive line of products for the analysis and design of piping and ducting systems. On a recent episode of MPT's podcast, The Efficiency Point, Ben Keiser, AFT's technical sales consultant, stopped by to discuss the critical importance of proper pump selection and offer his insight on selecting the right sized pump for your application. An excerpt of that conversation appears below.

MPT: Before we talk about how to find the right pump, what are some of the dangers that can occur from mismatching a pump for a job?

Ben Keiser: There are a number of ways that you can have mismatching. And typically, you can have pumps that might be undersized for a particular application. That might be where the plant's operation has expanded beyond the capacity of what the original pipes were initially sized to be able to meet. Or you can have oversized pumps that are able to provide too much at full capacity, and the flow may need to be throttled down somehow. And both of those situations can cause issues.

If a pump is undersized for a particular application, then it's not going to provide the required head for the system needs. The system will be starved for flow, and the pump may not be operating close to its best efficiency point and that can cause vibration issues, recirculation issues, or cavitation. You'll start to see various problems that begin to creep into the pump as well as the system.

MPT: That's the domino effect that can happen from a mismatched pump to throughout the whole system?

Ben Keiser: Absolutely! And a similar type of problem occurs where people oversize the pump for future expansion, where more flow would be necessary, but—for the time being—they would have to control the flow for current needs. And with having a control valve, it's like driving your car with your foot on the gas and the brake pad. And that can cause the same type of vibration issues and other problems, in addition to just wasted energy going right out the door. So it's really important to make sure that the right pump is selected for the right application.

MPT: And you recommend using flow analysis software instead of just sizing the pump by hand. Is that right?

Ben Keiser: Yes, and the reason why is because when you use a full analysis software tool, it really expands your ability to understand your system—much further than a simple hand calculation. Maybe a hand calculation, you know, it wouldn't be too difficult to determine what discharge pressure you need on the pump in order to meet a certain flow demand. That's a pretty straightforward calculation.

But when you start asking things about other types of operating scenarios, what if you need to have multiple pumps operating at the same time?

Or situations where the flow's not needed as much?

Or how does the system interact when flow changes throughout the day?

There are so many other operating scenarios that can occur that, when you're just calculating one thing by hand, you're not getting much out of that. But with full analysis tools, you can do so much more than just looking at the pump itself. You can see how it's going to actually perform in the system.◆

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

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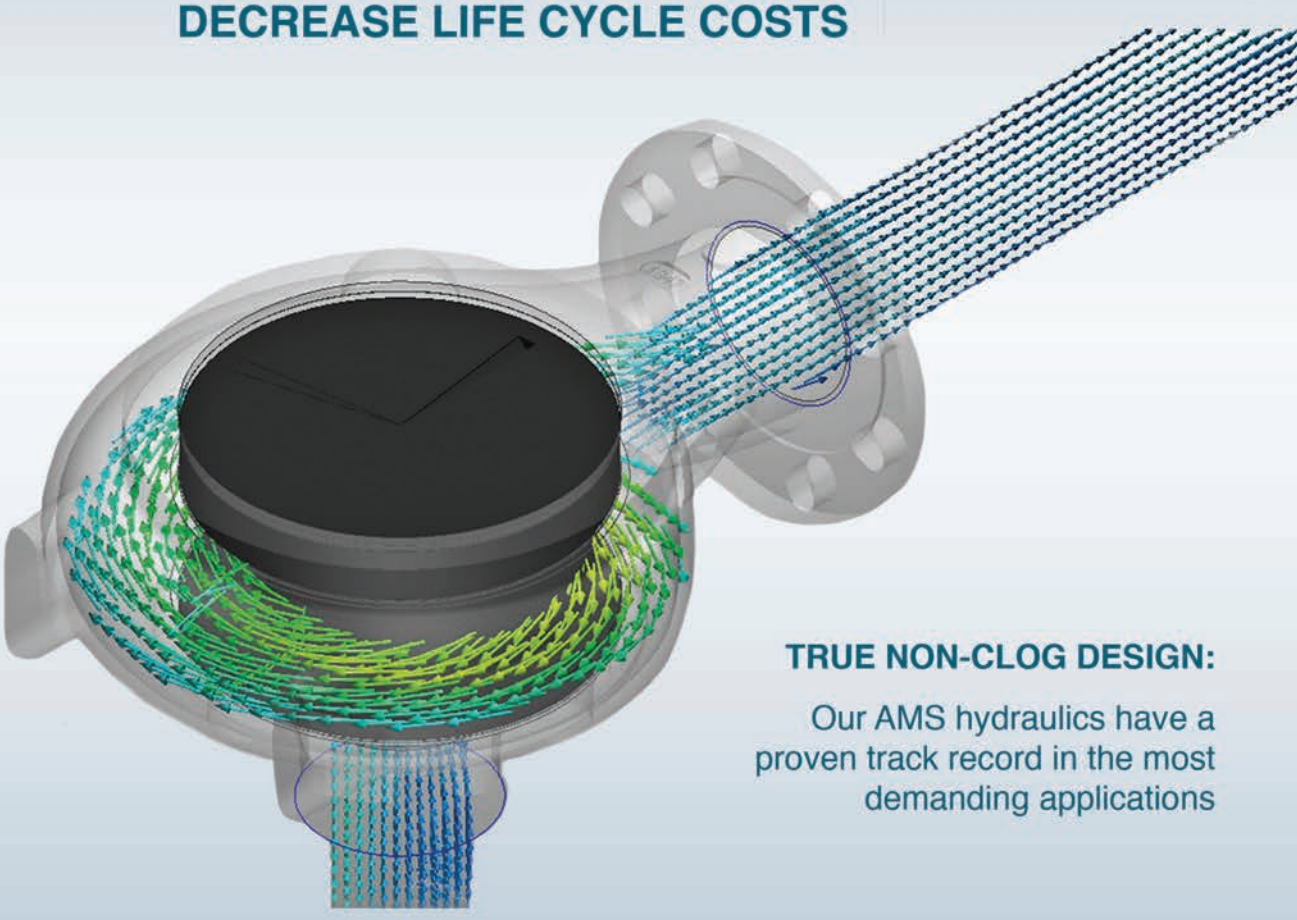

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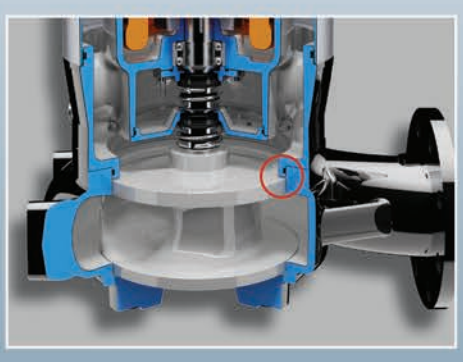

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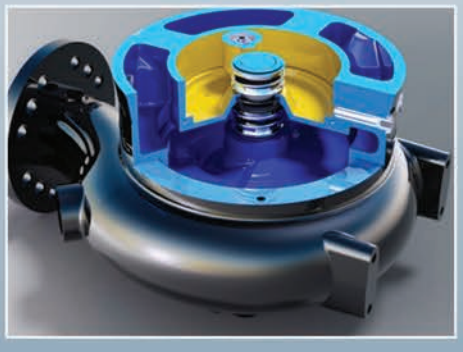

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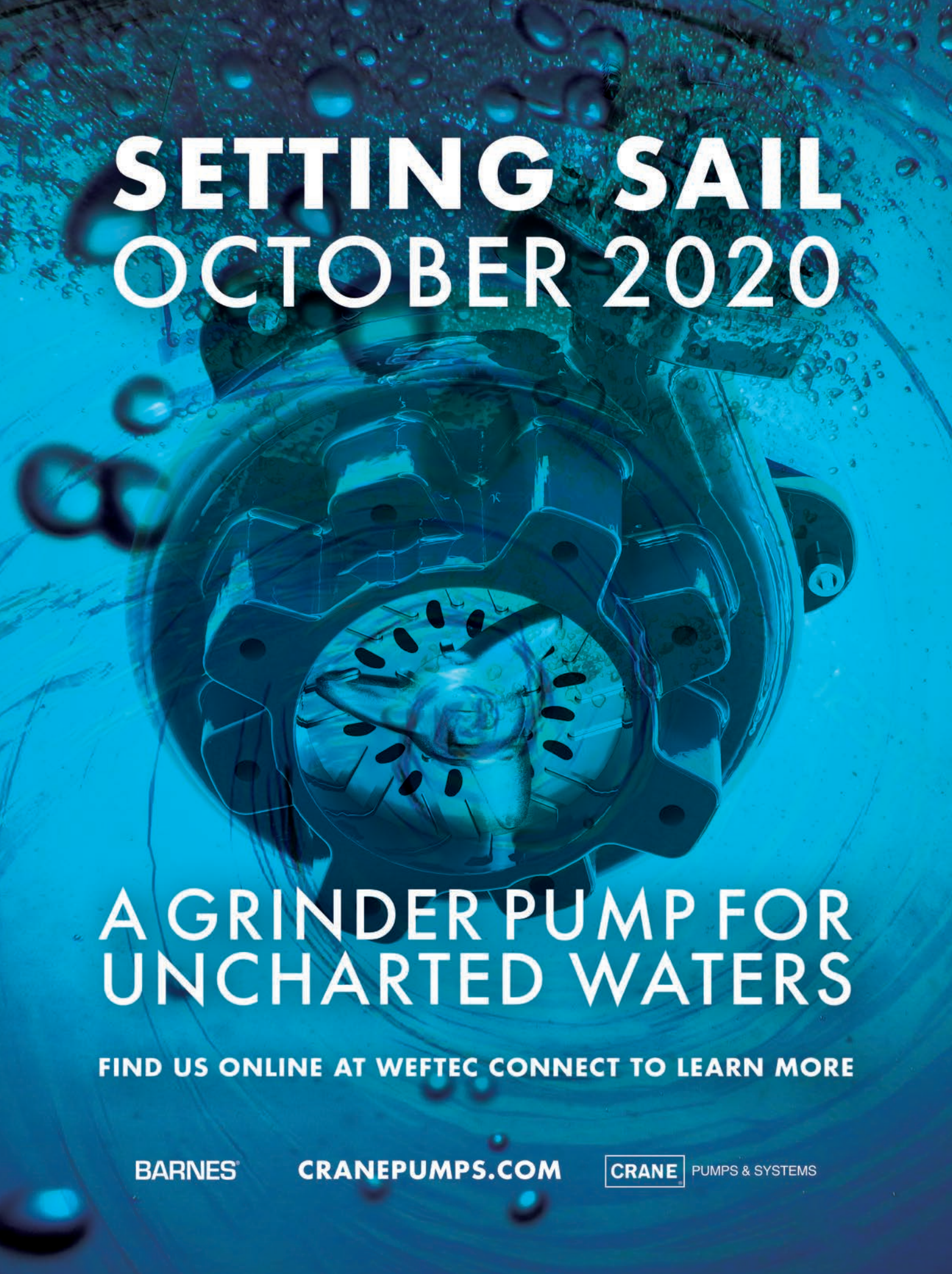
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