

The background of the entire image is a technical line drawing of industrial machinery, including various pipes, valves, and a large spherical component with a grid pattern. The drawing is rendered in white lines on a blue background.

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**COVER PHOTO**

Cover image courtesy of Industrial Flow Solutions: eliminating the wet well with the OverWatch Direct In-Line Pump.

A NOTE ON THIS ISSUE:

Welcome to another issue of MPT! In our Case Studies section, Landia's Soren Rasmussen explains how a chopper pump made by his company has now completed eight years of continuous robust service at Michigan State University's campus AD/biogas plant, despite the very tough environment of being in a food waste and FOG (fats, oils, and greases) reception pit (pg. 18).

Over the years, the use of positive displacement (PD) air-operated double-diaphragm (AODD) pumps in high-volume transfer operations with hazardous or corrosive high-value fluids has grown in popularity. In this month's Pump Solutions section, Sam Gilbert of All-Flo illustrates how AODD pumps, the workhorses for diverse industries, only perform properly if compatible diaphragms are used (pg. 34), and this article lays out the right way to choose the most effective materials.

Lastly, Emma Ardley-Batt of Advanced Valve Technologies shows how the installation of her company's EZ Valve ensured a fire and police station maintained their water supply during vital repair works to a fire hydrant (pg. 50). When critical infrastructure needs repair or upgrade, time is of the essence. See how this insertion took the pressure off city managers while taking the pressure from a municipal water system.



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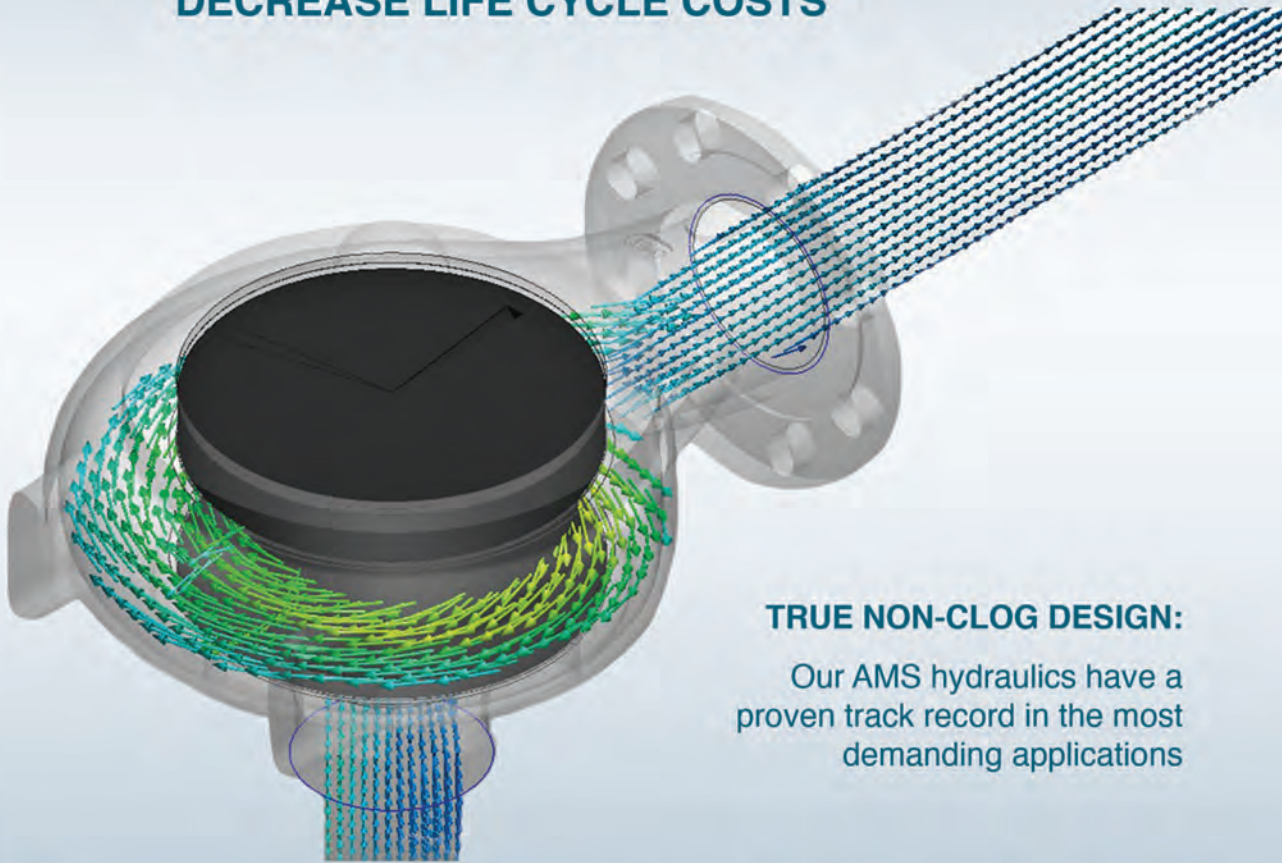
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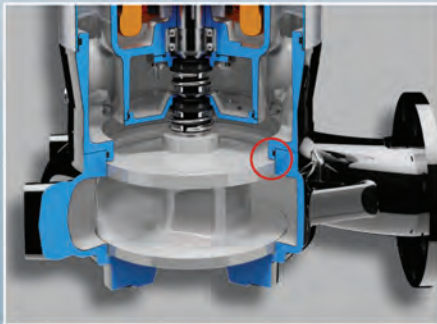


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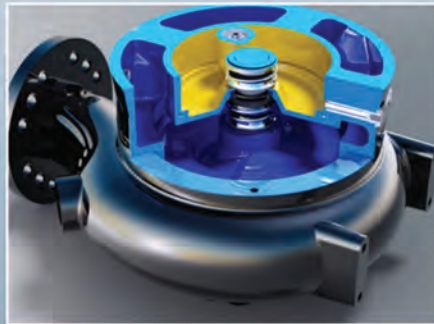


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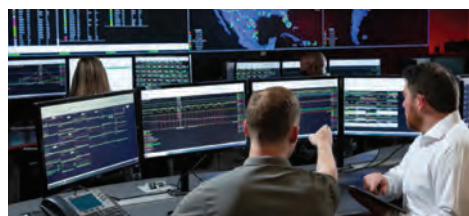
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For large-scale dredging, go big or go home 56

Custom-built dual pump dredge will be the largest of its kind



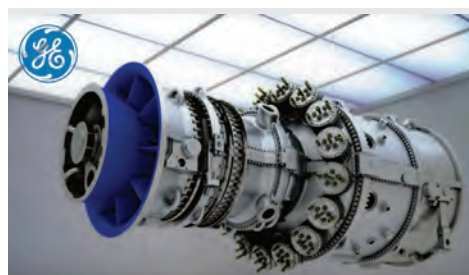
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OverWatchTM
Direct In-Line Pump System



Before



After

Changing the world one wet well at a time

CASE STUDY AUSTIN, TX a 23-story, 320-unit high rise residence building with a grocery store and restaurant was plagued by frequent pump station clogs, 6 faults in 2 months! The culprit – not so “flushable” wipes! With no control over what the occupants flush, clogs persisted, and pump service charges were piling up. The building management team needed a solution.

OverWatchTM pump system saved the day by eliminating the wet well. Wipes are no longer a problem because influent is lifted directly from the gravity invert, contained, and ejected from the system before solidifying. This game-changing technology not only eliminates the wet well, but also eliminates clogs odors, gases & maintenance. The result saves the team time and money!



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XYLEM AGAIN EARNS TOP SCORE FOR WORKPLACE EQUALITY

Xylem announces that it received a score of 100 on the Human Rights Campaign Foundation's 2022 Corporate Equality Index. This is the third year in a row that Xylem has earned top marks on the U.S. benchmarking survey, which measures corporate policies and practices related to LGBTQ+ workplace equality.

"At Xylem, we view diversity, equity, and inclusion as powerful enablers in our mission to solve water," says Claudia Toussaint, Xylem's senior vice president, chief human resources and sustainability officer, and general counsel. "Embracing different perspectives not only strengthens and unites our global team, but it also fuels our company's culture of innovation and shared purpose. That's why as we work towards Xylem's 2025 Sustainability Goals, we continue to sharpen our focus on diversity recruiting, building inclusion into the fabric of how we operate, and increasing data transparency. We are honored that our efforts to advance workplace equality have been recognized."

The results of the 2022 Corporate Equality Index (CEI) showcase how 1,271 U.S.-based companies are promoting LGBTQ+-friendly workplace policies in the United States. The full report is available online at the Human Rights Campaign's website.

INDUSTRIAL FLOW SOLUTIONS TO ACQUIRE DRENO POMPE

Global fluid management solutions provider Industrial Flow Solutions, based in New Haven, Connecticut, announces an agreement to acquire Dreno Pompe, an Italian designer and manufacturer of high quality, electrical submersible pumps for wastewater applications, based in Monselice, Italy. This news follows the October 2021 acquisition of Scotland-based Clearwater Controls, further expanding Industrial Flow Solutions' growing European presence.

Since its founding in 1990, Dreno has provided a comprehensive portfolio of pumps and accessories for residential, civil, industrial, and construction applications, offering versatile and wide-ranging solutions for the home, as well as the most demanding environments. Dreno is an industry leader, recognized for its Compatta and GRIX product lines, for domestic and residential wastewater needs. The company recently expanded its offering with the Kappa line, a series of construction pumps for abrasive materials built with high quality components to guarantee excellent wear resistance over time.

Emiliano Conforto and Fabiana Conforto will continue to serve in their leadership roles as operating leader and commercial and administrative leader, respectively. Dreno's name is unchanged and its plant facility will remain in the Veneto region of Italy.

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BCCK Holding Company, a leader in engineering, procurement, fabrication, and field construction services, has been awarded an EPC contract to improve overall project economics at a cryogenic gas facility in the Marcellus-Utica Basin in southeastern Ohio.

Brian Petko, senior vice president of engineering, BCCK, adds, "BCCK is further expanding our portfolio in natural gas cryogenic processing with the addition of this patent-pending technology that enhances recoveries at existing GSP cryogenic facilities. We are excited to be working with one of the premier midstream groups in the Marcellus-Utica Basin, who is our latest client desiring higher realized revenue from their product. We were ultimately selected due to our overall process design and flexibility."

Sloan Zupan to lead Mitsubishi Electric Automation, Inc.'s marketing efforts through strategic marketing, product management, and product marketing. In his role of senior director of corporate marketing, Sloan Zupan will lead a transformed marketing department at Mitsubishi Electric Automation. He will oversee marketing efforts in several spaces, including strategic marketing, product management, and product marketing.

In his sixteen years at Mitsubishi Electric Automation, Zupan has held titles such as product manager for software, programmable automation controllers (PACs), controllers and human-machine interfaces (HMIs), senior marketing manager, and director of corporate marketing. Since his start the organization has grown significantly not only in revenue but also in process improvements, marketing technology adoption, and capabilities. Before joining Mitsubishi Electric Automation, Zupan held positions at Schneider Electric and EESCO, a division of WESCO Distribution.

"I have asked Sloan Zupan to lead the marketing department as the senior director of corporate marketing," says Milton Coleman, senior vice president of sales and marketing at Mitsubishi Electric Automation, Inc. "Sloan has

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been with the organization for sixteen years and has held many positions within marketing, which makes him the ideal person to drive marketing's innovation and transformation."

EXPONENT INCREASES QUARTERLY DIVIDEND PAYMENT

Exponent, Inc. announces that its Board of Directors has raised its quarterly dividend by 20 percent from \$0.20 to \$0.24 per share of common stock. The quarterly cash dividend of \$0.24 per share of common stock is to be paid on March 25, 2022 to all common stockholders of record as of March 11, 2022.

"Exponent is deeply committed to delivering long-term value for our shareholders. In 2021, we returned \$50.2 million to shareholders in the form of \$43.2 million in dividends and \$7.0 million in common stock repurchases, and ended the year with \$297.7 million in cash, cash equivalents, and short-term investments," says Dr. Catherine Corrigan, president and chief executive officer. "We believe that the increase in our regular cash dividend not only demonstrates the strength of our balance sheet, but the resiliency of our business model amid a challenging economic environment."

Exponent has paid, and expects to continue to pay, quarterly dividends each year in March, June, September, and December. Future declarations of quarterly dividends and the establishment of future record and payment dates are subject to the final determination of Exponent's board of directors.

EDGEENERGY ANNOUNCES NEW CFO

EdgeEnergy announces that Jon Holland, the former CFO/COO for Laureti Mobility Group, will join EdgeEnergy as its new chief financial officer effective immediately. Holland has been working closely with the company's leadership team since December to ensure a smooth transition and establish strategies for the company's growth in 2022.

Holland is an innovative, strategic, and operational finance executive with thirty years of senior level experience in the banking, technology, and e-mobility sectors. He has launched new divisions for Wells Fargo and Chase generating over \$300 million in sales along with numerous private companies. Prior to joining EdgeEnergy, Holland was the CFO and COO for Laureti Mobility Group, headquartered in London and has scaled several early-stage EV charging companies through hyper-growth periods over the past five years.

"I am excited to be joining the EdgeEnergy team. Deploying charging infrastructure to support EV adoption is going to be one of the fastest growing industries over the next ten years," says Holland. "We need solutions that make the deployment of this infrastructure fast and cost effective. EdgeEnergy has that solution with the EdgeEV power source." ■

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being the annual SME Annual Conference and Expo, also known as MINEXCHANGE—a showcase for the organization's members to focus on sharing best practices for safety, environmental stewardship, and moving mining forward, inspiring mining professionals worldwide.



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MINEXCHANGE 2022, the SME Annual Conference and Expo, is the only conference dedicated to all disciplines of mining engineering. Featuring a wide variety of technical sessions and speakers combined with our expansive exhibit hall, MINEXCHANGE attracts thousands of mining professionals from around the world.

At the SME Annual Conference and Expo, professional development moves beyond the expected to the vital insights you need to evolve with the industry. Expand your base of knowledge and learn about upcoming advances in innovation, the critical role that rare earth elements play in shaping mining for the next decade, and managing water usage and waste throughout the project life-cycle.

Attendees can immerse themselves in this four-day interdisciplinary educational experience and find new perspectives and connections at MINEXCHANGE.

MINING INDUSTRY, GET READY

MINEXCHANGE 2022, the SME Annual Conference and Expo, features some of the biggest names in the mining industry today. Attendees will explore the new products, comprehensive services, and integrated solutions that make their jobs smarter, easier, and safer—all from industry vendors who understand what drives their needs today is the solution for tomorrow.

SME is assembling some of the brightest minds in the mining industry today. The MINEXCHANGE technical sessions place a driving focus on the topics and trends that matter most to mine professionals. Offering a complete educational experience, attendees will find an array of professional development opportunities including short courses, workshops, and technical sessions—plus, earn PDH credit for attending.

MINEXCHANGE attendees will also share a one-of-a-kind opportunity

to mix and mingle with some of the leading educators, innovators, and experts in the mining industry today—expanding their professional network to make new, lasting impressions during a variety of fun and engaging networking functions.

FIND YOUR NEXT PARTNER ON THE EXHIBIT FLOOR

All attendees of MINEXCHANGE will get a firsthand look at new products, comprehensive services, and integrated solutions—all from industry vendors who understand their needs. On the exhibit floor of the 2022 SME Annual Expo all of the exhibitors mining professionals are looking for can be found and are ready to begin the next step in expanding their business today.

Each day of MINEXCHANGE 2022, the SME Annual Conference and Expo, offers a hosted event to explore the exhibit floor, ensuring attendees get the most interaction in the time

available. The festivities kick off the conference's first day with drinks and hors-d'oeuvres for the grand opening of the exhibit hall. With more than 600 exhibitors, this reception is a great time for attendees to start networking and learning what the exhibitors have to offer.

The following day, lunch on the exhibit hall floor allows attendees to grab a bite to eat and connect with MINEXCHANGE exhibitors before the technical program begins at that afternoon. On Tuesday, attendees can take some time to relax and walk the exhibit hall on during the Afternoon Social. All attendees are welcome to come and walk the hall during the social while enjoying a drink and light snacks.

Finally, and new for 2022, SME has extended the last official event in the exhibit hall for MINEXCHANGE to include lunch for all attendees on the events closing day. All attendees can take advantage of this last chance to connect with exhibitors. ■



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THE SUBMERSIBLE WASTEWATER PUMP INDUSTRY PREPARES FOR THE BIG PICTURE

Conditions have changed around the world, but the mission has not

BY SWPA EXECUTIVE DIRECTOR ADAM STOLBERG

As I kicked off SWPA's Annual Meeting in Chicago last December, my first thought—and the first thought of many of our members—was what a crazy two years it has been. However, that being said, we at the Submersible Wastewater Pump Association believe it has been a successful time for our members and the industry as a whole, despite the challenges. This has been in no small part due to the innovative, creative, and flexible thinking found throughout this sector as well as the shared commitment submersible pump professionals have for pushing the industry forward. For example, for the 2021 Annual Meeting, SWPA held a hybrid meeting, partially in person and partially virtual, so that the valuable information was available to all of our members, regardless of travel restrictions, COVID, and so on.

DRAWING ON SHARED EXPERIENCE, LOOKING TO THE FUTURE

Long recognized as the industry leader in educating and training the submersible wastewater pump industry, the SWPA also announced its 2022 Training and Educational programming at the Annual Meeting in Chicago. SWPA's Annual Meeting is the highlight of the year for its members, and the association proudly awarded two \$1,000 Charles G. Stolberg Memorial Scholarships to

young engineering professionals.

In addition to presenting the SWPA Membership Industry Outlook for 2022, an annual inside look at SWPA members' insights and predictions for the coming year (a summary of which appeared in last month's SWPA Insight column), SWPA's Annual Meeting also celebrated the association's ties with thought leaders from all corners of the pump manufacturing and water sectors. Industry veteran Tom Decker of Thomas Decker Consulting didn't disappoint with his always informative and entertaining presentation on the "State of the Industry and Year in Review." Vanessa Leiby, executive director of the Water and Wastewater Equipment Manufacturers Association (WWEMA), presented a legislative update that is crucial to understanding funding and legislation that will affect the water and wastewater industry in 2022 and beyond.

Current SWPA President Jessie Hinthier also addressed the attendees, stating, "During a very challenging last eighteen months, SWPA was able to continue to educate the submersible wastewater pump industry by adapting and offering its industry leading training programs through non-traditional training methods (like on-demand and virtual classroom), while still providing the opportunity for much needed PDH/CEU credits."

OUR MISSION REMAINS THE SAME

In 2021, SWPA successfully expanded its renowned live training to virtual training in response to COVID-19 and the industry's need for training despite travel restrictions that practically eliminated live training. The mission of the Submersible Wastewater Pump Association—to enhance the global wastewater environment by informing, educating, and providing leadership in the design, procurement, and operation of submersible wastewater pumping stations—moved forward in this "new normal" by adapting our educational training.

For example, SWPA University was launched and included a fall and spring ten-week virtual classroom. Taught by industry experts and SWPA members, classes were held one hour per week on a host of topics that included training on both pumping and controls systems, as well as addressing today's industry issues, like managing major storm events to non-flushable consumer products and how to eliminate clogging. SWPA University also offered an on-demand program, where industry professionals can train online, on their own timeline. As part of the coursework, participants received both the *Submersible Pumping Systems Handbook* (4th Edition) as well as SWPA's *Start Up and Tuning Manual*. Best of all, certificates of

completion were issued by SWPA that allowed participants to earn up to ten hours of CEU credits.

Looking ahead, SWPA will continue with a broad-based educational platform in 2022. SWPA University's spring session will begin March 1 and will run for ten weeks. SWPA's on-demand training will expand in 2022, with new programs set to launch on the March 1 date as well. The fall semester will begin September 6, and both individual and corporate rates will again be available.

A RETURN TO FACE-TO-FACE TRAINING

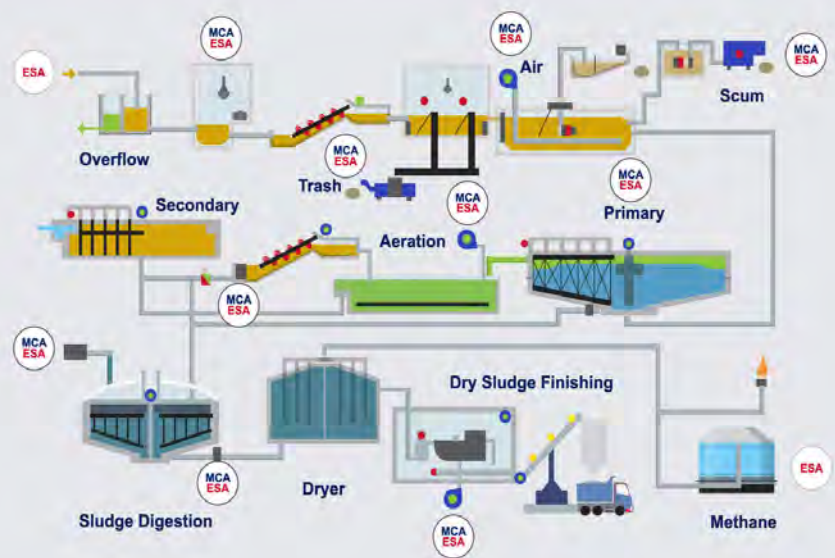
For the upcoming year, we also expect a return to traditional, in-person education as well as our streamlined hybrid sessions. SWPA's industry leading Pumping Systems and Controls Training two-day live program will be offered in Chicago in December, in conjunction with the next SWPA Annual Meeting. We were unable to hold our live annual training for the first time in over twenty-five years due to COVID-19, and we received lots of inquiries about when the SWPA training will be back. There is no better place to train and interact with industry professionals than SWPA's live two-day training. We are finalizing dates now for December.

Finally, in SWPA's effort to bring top-level education and training, as well as timely and updated programming to the wastewater industry, we will expand our live training program by partnering with the Hydraulic Institute (HI) in the

summer of 2022. SWPA and HI will hold a joint training event on June 23 and 24 in Columbus, Ohio. This live industry event will be a collaboration of two great organizations that we are very excited about and a great boon to the industry as a whole. ■

For information on SWPA training, meeting schedules, or membership information, contact SWPA Executive Director **ADAM STOLBERG** at swpaexdir@sbcglobal.net or visit www.swpa.org.

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BY YENNI MAELIANAWATI, HRS HEAT EXCHANGERS

The unit had to connect to plate heat exchangers in a tight physical space.

Burra Foods is a leading Australian dairy ingredient processor, producing value-added dairy products for the global food manufacturing market. An upgrade at their processing plant in Korumburra in the state of Victoria necessitated the use of a heat exchanger to warm frozen milk products, but existing building and infrastructure meant that the available space was severely limited.

TOUGH DEMANDS

The line in question produces skimmed milk concentrate and cream from frozen concentrates that are then thermalized and cooled to ambient processing temperatures. The required heat exchangers needed to raise the temperature of the product from 23 to 65 degrees Fahrenheit (-5 to 18 degrees Celsius) prior to the final heater, which includes melting the frozen product. After this the product is then cooled from 50 to 41 degrees Fahrenheit (10 to 5 degrees Celsius) in the final cooler.

Due to the consistency of the skimmed milk concentrate and cream the product is quite viscous, so the heat exchanger needed to resist fouling and provide good heat transfer performance, while also integrating with the plate heat exchangers used in the process in a very limited footprint.

FINDING A SOLUTION

The solution was an HRS MI Series corrugated tube heat exchanger, which provided the necessary heating and cooling requirements in the tight space available and also resulting in a small pressure drop, another important consideration for this installation. Following an initial enquiry at the end of 2019, the unit was installed in mid-2020, and has exceeded performance expectations since final commissioning, with a production capacity of 11,000 pounds of product per hour.

Stuart Shattock, process engineering manager at Burra Foods,



The completed thermalizer raises the temperature of the product prior to the final heater.

comments, "Other suppliers couldn't match HRS's offering in terms of tubular heat exchangers and the level of detail provided. Once we placed the order, there was a slight delay due to Covid, but HRS managed to produce it as a rush order and the installation and commissioning was really smooth. In fact, they were able to accommodate a change to the process design partway through installation and make some improvements on the fly, which is great for a nimble and flexible food and beverage business like ourselves.

"There are two parts to the unit: the heater and the cooler. The heater has performed well and done exactly what we expected, while the cooler has actually done more than we expected. Overall, we are very happy with the product and the output from it."

SMALL FOOTPRINT, BIG PERFORMANCE

Chris Little, HRS Heat Exchangers' Australian director, adds, "HRS's corrugated tube heat exchanger technology was required in order

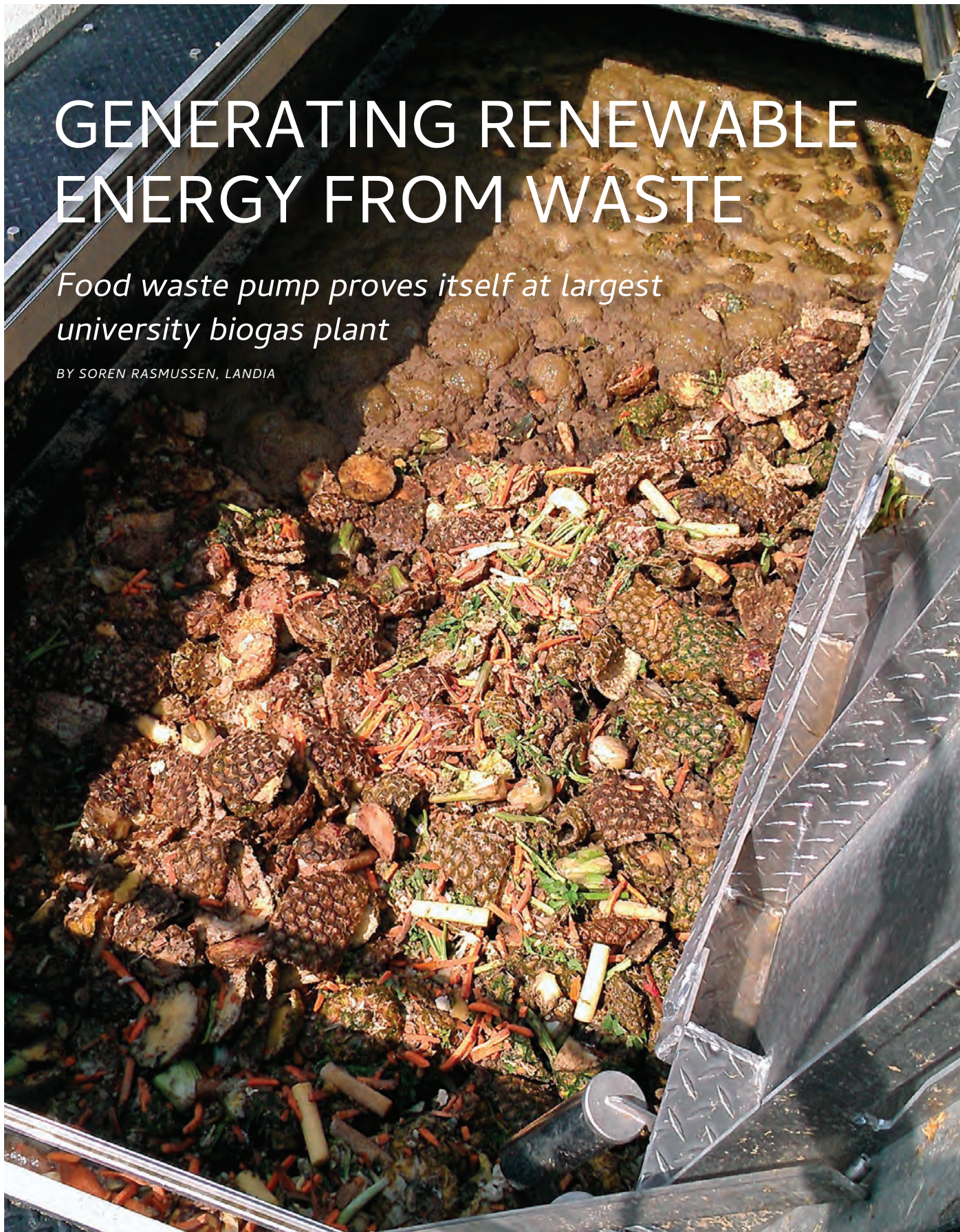
to prevent fouling from the thick cream element of the product. The requirement for a heat exchanger with a small physical footprint meant that coming up with the final design was a challenge, but our engineering team rose to the occasion and provided a reliable solution which meets all of Burra Foods' needs." ■

Located in Atlanta, Georgia, the company is part of the HRS Group, which operates at the forefront of thermal technology, offering innovative heat transfer solutions worldwide across a diverse range of industries. With forty years' experience in the food and beverage sector, specializing in the design and manufacture of an extensive range of turnkey systems and components, incorporating its corrugated tubular and scraped surface heat exchanger technology, HRS units are compliant with global design and industry standards. For more information, visit www.hrs-heatexchangers.com.

GENERATING RENEWABLE ENERGY FROM WASTE

Food waste pump proves itself at largest university biogas plant

BY SOREN RASMUSSEN, LANDIA



Food waste feedstock is always susceptible to debris.

At the largest university campus AD/biogas plant in the United States, a chopper pump made by Landia has now completed eight years of continuous robust service, despite the very tough environment of being in a food waste and FOG (fats, oils, and greases) reception pit.

The facility at Michigan State University, which converts over 22,000 tons of food waste annually—from campus dining halls and local food processors, plus manure from Michigan State's dairy farm—into renewable energy, opened in 2013, complete with the same Landia Chopper Pump (model DG-I 105).

Contributing toward the process of generating 2.8 million kilowatt-hours of electricity per year from the organic waste, the chopper pump, which was invented by Landia in 1950, reduces particle sizes as it transfers approximately 5,000 to 10,000 gallons per day into the digester mix tank.

DURABLE AND LOW ON MAINTENANCE

Louis Faivor, farm assistant manager at Michigan State and south campus anaerobic digester operator, says, "Considering the amount of delivered food waste we receive that is contaminated with gloves, bags, dishes, and various other debris, the Landia chopper pump continues to prove reliable. In fact, it has only received its second rebuild just recently in the whole of the eight years since it was installed when the AD plant first opened back in 2013, which proves just how durable and low on maintenance it is."

Designed with a unique knife system at its inlet that continually reduces solids in size and ensures no

clogging or blockages, the Landia chopper pump is easy to service and also low on energy consumption.

VERY TOUGH INDEED

Dana Kirk, an associate professor from Michigan State's Department of Biosystems and Agricultural Engineering, who oversees the AD operation, adds, "Since the plant opened eight years ago, we have managed to reduce contamination levels, but food waste is always susceptible to debris that can damage equipment. The more we can keep the trash out, the longer time period we can go without replacing wear parts. The second rebuild was common wear parts, including the impeller and seals. It is very tough indeed."

A separate reception pit contains cow manure from the Michigan State Dairy Teaching and Research Center, while the food waste transferred by the Landia chopper pump is sourced from several campus dining halls, food processing, and manufacturing facilities in southern Michigan—plus fat, oils, and grease from local restaurants. The feedstocks from both the manure and food waste reception pits are pumped into the 10,000-gallon mix tank, where they are blended.

POWER TO SPARE

From the power created, only about 20 percent is needed to sustain the AD process; the rest offsets energy consumption in ten Michigan State south campus buildings; equivalent to generating enough energy to



The chopper pump, invented by Landia in 1950.

power about 250 to 300 homes. The nutrient-rich fertilizer created through the biogas operation is used on agricultural land. ■

SOREN RASMUSSEN is the director of Landia, Inc. Landia uses its nearly ninety years of experience to continue to develop new and efficient products and solutions. Together with its customers, Landia is aiming for new heights. Customers get a partner with a strong team of happy employees who focus on what matters most to them: good solutions that solve the task at the lowest possible cost. For more information, call 919.466.0603, email info@landiainc.com, or visit www.landiainc.com.



The digester at Michigan State University's biogas plant.

RESTORING WHAT MATTERS MOST

7 reasons you should get professional water damage cleanup

BY TIM FAGAN, 1-800 WATER DAMAGE

In this article, we're going to talk about something fairly common in today's society: large-scale water damage. About 1 in 50 properties have a water damage claim of some variety, each year. Many people don't understand the seriousness of getting professional water damage cleanup right away; some people think it's no big deal, and others think that they have plenty of time to clean up water damage. But, as you'll see below, we're committed to dispelling these myths and informing you. That's why we've prepared a list of seven reasons you should get professional water damage cleanup.

1 PROFESSIONAL WATER DAMAGE CLEANUP PREVENTS MOLD GROWTH

This is a huge one. What some people don't know is that dark, moist areas are perfect locations for mold colonies. This means that if your

basement floods and you don't clean up the water right away, you'll soon be looking at mold growth.

We probably don't have to tell you why you should avoid mold growth at all costs, but we'll mention a couple of reasons anyway. Mold colonies can be incredibly dangerous. They can have a negative impact on your quality of life and can even make you sick. Some types of mold can even lead to serious diseases. For a workplace, it can mean long shutdowns and costly missed opportunities. It's not something that you should attempt to deal with on your own.

2 UNTREATED WATER DAMAGE IS A FIRE HAZARD

This seems counterintuitive, doesn't it? But though it might seem strange that water damage can lead to a fire hazard, it is an unfortunate truth.

The problem with leaving standing water in any structure is that that

water can go everywhere. And when the standing water seeps into the wrong places, it can become a fire hazard. If water seeps into your circuit breaker or electrical machinery, for example, it can cause it to short-circuit, which can in turn start a fire.

3 WATER DAMAGE HARMS STRUCTURAL INTEGRITY

Though a small puddle of water might not seem overly serious now, it can have huge consequences in the near future. When water soaks into wooden structures, it can cause the wood to rot. If, for example, a support beam or part of your wall starts to rot, then your structure can become an incredibly dangerous place to stay.

To avoid having a wall cave-in or part of your building collapse, it's a much better idea to get professional water damage cleanup from the beginning. It's often the long-term



effects of—even small amounts of water—that cause the worst damage.

4 WATER DAMAGE DECREASES VALUE

Let's say, for example, that one of your gutters got backed up and water spilled onto your roof. Let's also say that this water soaked into your ceiling, leaving a huge water stain. If, like most businesses that own their buildings, your depreciation is on a set schedule, that water spot can have an impact.

That's just one superficial way that letting water damage go untreated can hurt the value of your long-term assets. Structural damage, which we talked about before, is not only dangerous to anyone inside. It also means that this property has a lower value if you decide later on that you want to sell it.

5 WATER DAMAGE IS A HEALTH HAZARD

In a short amount of time, standing water that is left untreated can become incredibly dangerous. In the same way that it encourages mold growth, untreated water damage can be a breeding ground for harmful microbes and bacteria. These can be dangerous for you and your workers, and you should avoid this at all costs. Even when that standing water finally dries, the toxins it spreads don't go away. They can soak into different parts of your building (like your furniture and equipment) and can linger for a long period of time.

6 PROFESSIONAL CLEANUP CAN PREVENT INSECT INFESTATION

As if bacteria and toxins weren't enough, standing water is perfect for insects like mosquitoes. Nobody likes dealing with bugs, but if you

leave water damage untreated, you'll likely have to deal with them inside your building. It's much better to get professional water damage cleanup than it is to deal with a flea or tick infestation, which can both be caused by untreated water damage.

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Electrical bearing damage causes unplanned downtime

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7

WATER DAMAGE CAN CREATE A COSTLY DOMINO EFFECT

The longer you leave water damage untreated, the more it will destroy. Water damage can destroy important items like documents and electronics as well as structural concerns. Don't give standing water the time it needs to destroy your valuable assets or

property. Calling a disaster restoration company like 1-800 Water Damage can help you make sure that floodwaters and other types of water damage don't get to steal your peace of mind.

PEACE OF MIND IS WORTH THE PRICE

This list, though not exhaustive, can give you the basic information

you need to help you avoid leaving standing water in your structure. Your peace of mind is our number one priority; giving you information like this is one way of helping you maintain it. Don't let your water damage problem get worse because you don't want to clean it up. Take the time and effort now to save yourself a major headache down the road. ■

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TIM FAGAN is the president of 1-800 Water Damage, a trusted property restoration company serving across the nation. With locations spanning from coast-to-coast, 1-800 Water Damage helps home and business owners return their property to its original condition while restoring what truly matters—health and safety. The 1-800 Water Damage team is fully vetted, IICRC-certified, and insured for your safety. For more information, visit www.1800waterdamage.com.

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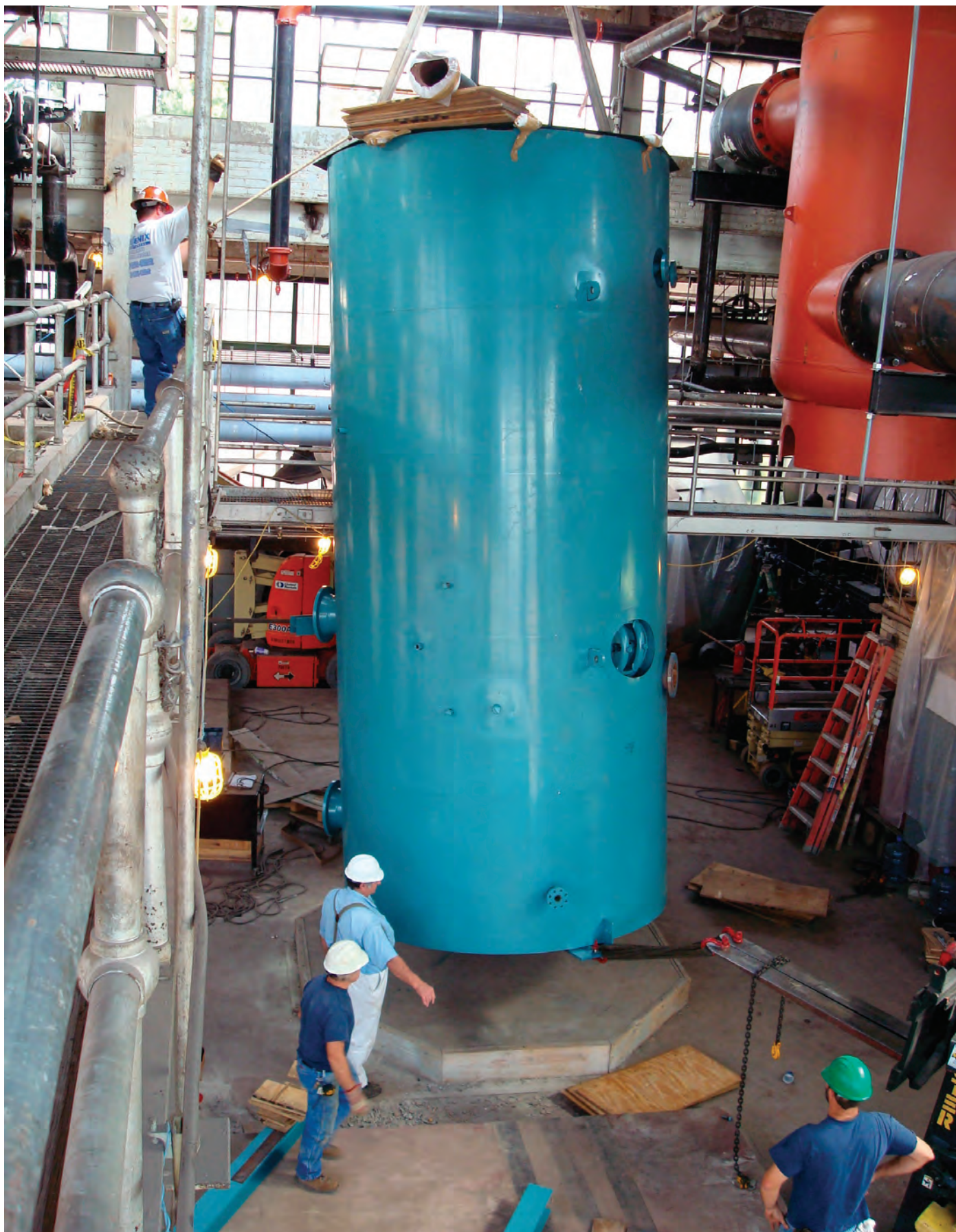
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RISING GAS PRICES, CORPORATE CSRs DRIVE TRANSITION TO ELECTRIC BOILERS

Companies are adopting economical, zero emission electric steam and hot water boilers

BY DEL WILLIAMS

Industrial facilities and utilities have long relied on large gas or oil-fired boilers for steam, process heating, or energy production. Today, however, two significant factors are changing the equation: higher gas prices and a need to accomplish a high-priority corporate social responsibility (CSR) initiative—reducing the corporate carbon footprint to combat global warming. The combination is finally spurring many managers and boards to adopt cost-effective, zero emission electric steam and hot water boilers in plants.

DODGING THE SPIKE, AIDING THE ENVIRONMENT

Recently, the price of NYMEX Henry Hub gas surged to almost \$6/MMBtu on supply concerns and is expected to stay high into 2022. With the cost of gas spiking, the economic argument for transitioning to electric boilers is growing stronger.

However, economics alone is not the only argument in favor of electric power over gas. With the effects of climate change more apparent, companies are also taking seriously their commitments to practice good corporate citizenship. Many firms are implementing CSR initiatives to limit their environmental impact and fight

climate change by reducing their fossil fuel emissions.

By practicing corporate social responsibility as a business model, specifically in terms of being a good environmental steward, companies elevate their brand. In many cases, this can be a factor in motivating environmentally conscious consumers to do more business with them. Practicing ethical behavior can also help to attract and retain employees.

"More companies in the industrial sector are starting to look at where they are burning fossil fuels and considering if there is an economical, more sustainable replacement. For many, utilizing an electric boiler is an easy answer," says Robert Presser, vice president of Acme Engineering, a manufacturer of industrial and commercial boilers with operations in the United States, Canada, and Europe.

Presser adds, "The move toward using industrial electric boilers is more than just an economic argument today. It is a significant, concrete way to meet corporate CSR commitments that move the company toward becoming carbon neutral in alignment with COP26 UN Climate Change Conference targets. Global finance's commitment to fund green

initiatives from alternative energy to consumption will ease financing this transition."

According to a recent article in *The Economist*, at COP26 "Countries committed themselves to further accelerating their decarbonization plans and, specifically, to strengthening their emissions-reduction targets for 2030 by next year. ... Rules to create a framework for a global carbon market were approved. ... The need to reduce global greenhouse-gas emissions by a whopping 45 percent by 2030 was formally recognized."

A COST-EFFECTIVE ALTERNATIVE TO FOSSIL FUEL BURNING BOILERS

Natural gas-fired boilers and furnaces emit not only the notorious greenhouse gasses carbon dioxide and methane, but also dangerous nitrogen oxides, carbon monoxide, and nitrous oxide, as well as volatile organic compounds (VOCs), sulfur dioxide, and particulate matter (PM).

Still, many facility engineers opt for familiar gas-fired boilers out of the mistaken belief that electric boilers cannot match the output of the conventional, fossil fuel burning units. Due to considerable advances in



Acme Boilers CEJS high voltage electrode steam boiler.

electric boiler technology, that is far from the case. Today, such technology can match the capacity of large gas or oil-fired boilers in a much smaller footprint.

ELECTRIC BOILERS UP CLOSE

Electric boilers utilize the conductive and resistive properties of water to carry electric current and generate steam. An AC current flows from an electrode of one phase to ground using the water as a conductor. Since chemicals in the water provide conductivity, the current flow generates heat directly in the water itself. The more current (amps) that flows, the more heat (BTUs) is generated, and the more steam produced. Crucially, almost 100 percent of the electrical energy is converted into heat with no stack or heat transfer losses.

With this design, for instance, the CEJS High Voltage Electrode Steam Boiler by Acme produces maximum amounts of steam in minimal floor space, with boiler capacity from 6MW to 52MW. The boiler operates at existing distribution voltages, 4.16 to 25 KV with up to 99.9 percent efficiency, and can produce up to 170,000 pounds of steam per hour. With pressure ratings from 105 psig to 500 psig, the boilers are designed to ASME Section 1, and are certified, registered pressure vessels at the location of the boiler.

"A generation or two of facility engineers grew up with oil and gas-fired boilers almost exclusively," says Presser. "As a result of preconceived notions, most view electric boilers as small underpowered units, like a hot water heater. So, we frequently explain to engineers that there is electric boiler technology that can replace large gas or oil-fired boilers in a very small footprint."

He notes that high-capacity electric boilers are well suited to supply auxiliary power virtually on demand. Auxiliary boilers also are used to supply turbines with steam when high output is required quickly, and to heat process water.

BENEFITS ACROSS THE BOARD

Furthermore, industrial electric boilers have several advantages compared to oil or gas-fired boilers, including superior safety, ease of installation, faster start-up and shut down time, and quiet operation. Electric boilers do not have a high minimum operating level to make them immediately available.

"Electric boilers do not need an operator because if anything goes wrong, the breaker trips, preventing further escalation of the issue," says Presser. "With gas burning boilers, however, any gas leak can increase the risk of an explosion. So, gas units must usually be continually monitored or periodically inspected." He notes that state and municipal safety guidelines vary depending on boiler type and the expected frequency of inspection.

With electric boilers, the energy input as well as adjustment is also precise and virtually immediate. In contrast, increasing or decreasing the temperature in a gas fired boiler is a slower process because it takes time for the heat in the boiler to rise or dissipate before reaching the targeted output.

Electric units are also exceptionally quiet compared to fuel fired boilers. "Unlike gas-powered burners that throttle like turbine engines almost continually, electric boilers keep operational noise levels down," says Presser. "The loudest noise you are going to hear from an electric boiler is the circulating pump."

MYRIAD APPLICATIONS

Besides industrial applications, electric boiler technology is also used for residential and commercial district heating, which is increasing in demand, particularly within urban centers. With district heating, distributed heat is generated in a central location through an insulated pipe system, and utilized for high-efficiency, low-pollution, space, and water heating.

For central heating applications, electric boiler technology quietly supplies ample power for its compact size. This approach is currently being

considered to install several 50MW steam boilers in the center of Manhattan, replacing gas-fired boilers to provide centralized steam to a number of buildings.

"There is increasing interest in the United States for district heating. We have spoken with utilities with massive boiler plants still feeding steam lines throughout major city cores like NYC. Many want to curb emissions associated with that in urban centers," says Presser.

He points out that electric boilers can replace a battery of huge gas fired boilers. "Today, with a number of 52 MW boilers we can produce 300 MW of steam power in the city core with no emissions," he says.

THE ALTERNATIVE FOR THE FUTURE

As industrial facilities and utilities consider alternatives to boilers burning more costly gas, one of the most cost-effective options will increasingly be zero emission, electric steam and hot water boilers.

The sustainable choice not only helps companies fulfill their environmentally friendly CSR initiatives with clean electric power, but also can help to position their brand as one that is serious about fighting climate change and honoring their public commitments. ■

Acme Engineering Products offers a wide range of standard product boilers but distinguishes itself by providing custom solutions with ease and minimal additional cost. Acme has always produced packaged solutions that include controls and instrumentation. This required the development expertise in pressure vessel design, on which its boilers' technology is based, to complement the electrical engineering for its heating and control systems. For more information, contact Robert Presser at Acme Engineering via email at rpresser@acmeprod.com, calling 518.236.5659, or visit www.acmeprod.com.



Acme Boilers CEJS high voltage electrode steam boiler diagram.

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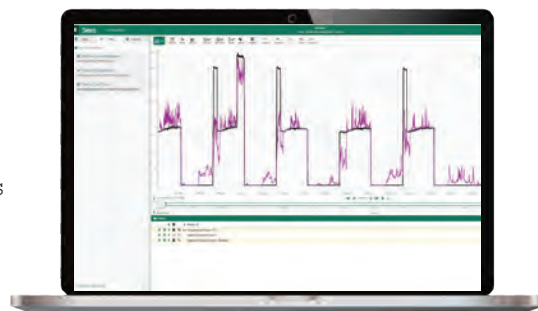
BY SYDNEY DELOSH, SEEQ

From hybrid vehicles on the highways to wind turbines plugged into the power grid, there is evidence everywhere of technology working toward the goal of increasing the industrial world's energy efficiency. However, there are some less visible technologies also making a contribution, especially those that help energy organizations to cleanse, contextualize, and investigate process data. With Seeq's advanced analytics, energy companies can significantly improve production outcomes, lower carbon footprints, and empower their human talent. A recent designation illustrates this success.

JOINING THE ENERGY COMPETENCY NETWORK

Seeq Corporation, whose focus lies in manufacturing and the Industrial Internet of Things (IIoT) advanced analytics software, has achieved Amazon Web Services (AWS) Energy Competency status. This designation recognizes that Seeq has demonstrated deep expertise helping customers leverage AWS cloud technology to transform complex systems and accelerate the transition to a sustainable energy future.

Achieving the AWS Energy Competency differentiates Seeq as an AWS Partner with extensive knowledge and technical proficiency



within this unique industry, including proven customer success developing solutions across the value chain from production operations and optimization to commodities trading, new energy solutions, and more. To receive the designation, AWS Partners undergo a rigorous technical validation process, including a customer reference audit.

MATCHING THE RIGHT SKILLS TO EACH CHALLENGE

The AWS Energy Competency provides energy customers with the ability to more easily select skilled Partners to help accelerate their digital transformations with confidence.

"Seeq is proud to be among the first AWS Partners to achieve the AWS Energy Competency status," says Dr. Lisa Graham, CEO at Seeq. "Seeq and AWS are complementary solutions for the advancement of the energy industry. By choosing Seeq on AWS, energy companies can leverage the big data, machine learning, and computer science innovations they need to improve production and business outcomes."

AWS is enabling scalable, flexible, and cost-effective solutions from startups to global enterprises. To support the seamless integration and deployment of these solutions, AWS established the AWS Competency Program to help customers identify AWS Partners with deep industry experience and expertise. To receive the designation, AWS Partners undergo a rigorous technical validation process, including a customer reference audit. Seeq also achieved the AWS Industrial Software Competency in 2019.

BRIDGING THE GAPS, CASE BY CASE

Seeq's advanced analytics application is a preferred solution for upstream production optimization in AWS

By choosing Seeq on AWS, energy companies can leverage the big data, machine learning, and computer science innovations they need to improve production and business outcomes.

—DR. LISA GRAHAM | SEEQ CEO

Marketplace, enabling customers to rapidly investigate and share insights from process data stored on premise or in the cloud. Energy industry customers can also use Seeq to improve sustainability efforts, including carbon recapture, greenhouse gas detection and mitigation, and more.

Examples of use cases for energy customers using Seeq on AWS include one company deploying a real-time event detection model for analyzing well production performance across its asset base. A second company is reducing unplanned downtime and unifying data to optimize asset uptime by using Seeq to connect to Amazon Simple Storage Service (Amazon S3) and its on-premises historic data.

Seeq on AWS can be procured in AWS Marketplace, which simplifies the procurement process and provides incentives for enterprise

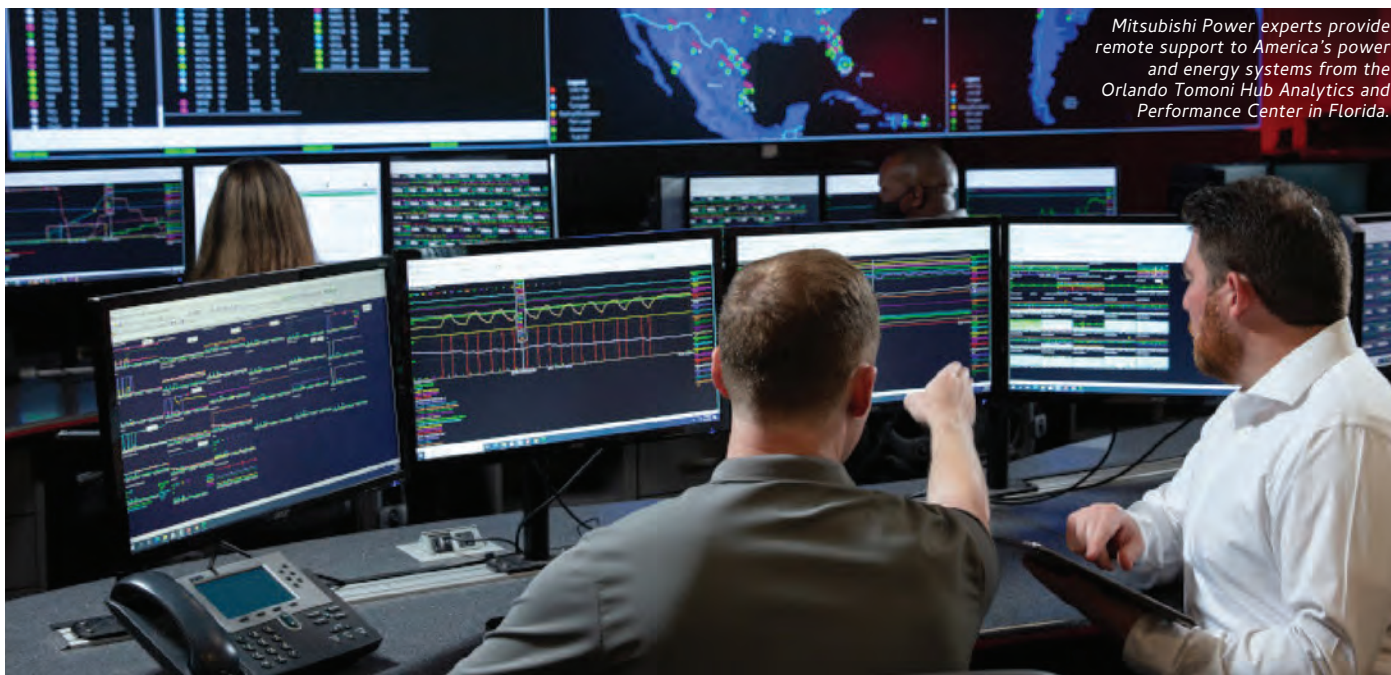
customers through the AWS Enterprise Discount Program. In addition, all AWS Marketplace sellers are verified as "ready-to-run" on AWS, expediting the purchase process. This streamlined approach to technology deployment enables companies using Seeq to quickly and easily realize the benefits of advanced analytics.

BUILDING INTO THE FUTURE

In addition to AWS data services, Seeq connects to an extensive set of data storage platforms from vendors including OSIsoft, Siemens, GE, Honeywell, Inductive Automation, AVEVA, AspenTech, Yokogawa, InfluxDB, Snowflake, and others. Seeq is available worldwide through a global partner network of system integrators, which provides training and resale support for Seeq in over forty countries, in addition to its direct sales organization in North America and Europe. ■



Founded in 2013, Seeq publishes software applications for manufacturing organizations to rapidly find and share insights. Oil and gas, pharmaceutical, specialty chemical, utility, renewable energy, and numerous other vertical industries rely on Seeq to improve production outcomes, including yield, margins, quality, and safety. Headquartered in Seattle, Seeq is a privately held virtual company with employees across the United States and sales representation in Asia, Canada, Europe, and South America. For more information, visit www.seeq.com.



Mitsubishi Power experts provide remote support to America's power and energy systems from the Orlando Tomoni Hub Analytics and Performance Center in Florida.

GOING BEYOND MONITORING WITH REMOTE OPERATION AND SUPPORT

A look inside the evolving demand for remote technology

BY BILL NEWSOM, MITSUBISHI POWER

Although operating and maintaining a power plant remotely is an emerging challenge, remote operations support is not a new concept. Power plants have implemented evolving remote monitoring and diagnostics technologies over the past twenty-five years as they fight to stay reliable and competitive. The focus was on executing early-warning diagnostics using advanced analytics and enabling access to off-site technical expertise for troubleshooting and response.

While some peaking or renewable-energy plants with relatively simple systems are already operated

remotely today, the COVID-19 pandemic and recent weather emergencies in the United States created challenges for many more sophisticated power plants. They exposed vulnerabilities that spurred a demand for more comprehensive remote O&M solutions. Now, in addition to improving reliability and competitiveness, there is added focus on safety and quality decision-making.

In a pandemic, plants want to minimize the number of people on site, including operators, but especially external staff required for executing inspections and maintenance. And, in some instances,

it may not be possible for external staff to reach the plant. This exposed the importance of having more digital connectivity and accelerated the need to perform some level of remote operation and maintenance support, allowing reduced presence at the plant. In addition to safer operation during emergency situations, reducing the number of people coming on and off the site can provide cost savings, reduce delays and allow plants more flexibility as they cope with workforce challenges and budget concerns.

A pandemic may be the most dramatic example of an event that can

cause disruption, but history contains other examples of severe weather events or civil and social unrest which gave rise to similar concerns.

ADVANCED ANALYTICS: THE FOUNDATION

In 1999, Mitsubishi Power built the company's first Remote Monitoring Center (RMC) in Takasago, Japan, and several others have followed. The RMCs allowed for the centralized collection and analysis of fleetwide data from power plants around the world and established the foundation for increasingly digitalized power plants. The RMC was the first step in the routine utilization of advanced analytics for power plants. Since then, digital solutions, like the growing Tomoni suite of intelligent solutions, allow plants to leverage the massive amounts of data from the thousands of sensors in the plant to provide insights, solve complex problems, and maximize overall power plant performance. Decades of experience gained from data analytics since 1999, throughout the fleet and on site at plants, have provided valuable lessons that lay the foundation for remote operation and increasingly automated maintenance, planning, and support, while facilitating the training and supervision of automated digital operations support solutions that utilize artificial intelligence (AI) and machine learning.

Mitsubishi Power's Takasago Tomoni Hub and Orlando Tomoni Hub use integrated analytics to expand the O&M staff "virtually" by supporting the power plant with a team of experts on demand 24/7, 365 days a year. Additional support is provided by the Nagasaki Tomoni Hub in Japan, the Alabang Tomoni Hub in the Philippines, and the Duisburg Tomoni Hub in Germany. This allows for Mitsubishi Power engineers to troubleshoot and provide recommendations for operation and maintenance by utilizing the data from the plants to analyze, diagnose, and predict operational issues based on their expertise. Power plants

around the world have benefited from remote monitoring and diagnostics for many years. Due to the nature of having a remote connection, an expert team can support multiple plants without ever going on site, especially during an emergency that complicates site access. In a crisis like the COVID-19 pandemic, the Tomoni Hub engineers can send settings updates to power plants by providing instructions and procedures for the on-site staff to implement. And, when a plant experiences unexpected issues, the Tomoni Hub can support it remotely. The team can also use the real-time data streaming from the plant to determine if there is the flexibility to move maintenance schedules to a better time by working with equipment and system designers co-located with the Tomoni Hubs to provide component-level risk assessments of maintenance deferral.

VALIDATION AT GRID-CONNECTED PLANTS

In addition to the progress in supporting remote O&M made through the Tomoni Hubs, significant advancement in the development of remote O&M technologies has been made and continues at the grid-connected power plants that Mitsubishi Power owns and operates. Located in Takasago, Japan, T-Point laid the groundwork for many of the Tomoni intelligent digital solutions of today, including remote operation. The new, digitally enhanced T-Point 2, which entered full commercial operation in July 2020, already incorporates technologies for remote operation and backup control rooms on its journey to becoming the first autonomous power plant. T-Point 2 will utilize a control room at the Takasago Tomoni Hub to validate the use of remote operation on an advanced-class gas turbine combined-cycle plant (GTCC) and its control systems through long-term remote operation. It is also validating several innovative concepts that automate plant operation tasks and leverage remote asset performance

management technology throughout the plant and its balance of plant (BOP) to more effectively manage plant maintenance.

During the construction of T-Point 2, augmented reality was utilized for site walkthroughs and equipment placement via mixed-reality headsets. This new approach was used to validate the technology to qualify it for the ongoing maintenance of the plant. Being able to observe equipment condition and have real-time access to design documentation and remote expert assistance would enable inspections and outage scope definition with fewer people in person, while still providing abundant subject-matter expertise. This technology has subsequently been used to support outages at several customer-owned power plants, accelerating the use of these remote support technologies, and further refining them for broader adoption at plants around the world. This allows the best experts to support multiple issues at geographically separated plants without the lost productivity and potential schedule impacts associated with travel to one plant at a time.

Mitsubishi Power is providing total plant O&M for its own power plant at T-Point 2 and continues to gain invaluable experience in applying remote operation and maintenance technologies that are minimizing the need for on-site manpower and leveraging remote technical expertise on this fully integrated GTCC.

ADVANCEMENT THROUGH DIGITALIZATION

The key role of digitalization is to enable data visibility, data analytics, and automation that improve reliability and productivity, making power plants more profitable and resilient. Remote operation and maintenance support cannot exist without proper digital support tools in place. Digitalization is pivotal to advancing remote technology by reducing the need for a fully staffed, on-site workforce through automation

and remote access to expert technical support. This will assist with a diminishing or less experienced workforce and managing crises that affect the workforce, while improving efficiency, increasing power plant competitiveness, and boosting income.

The first and foremost priority of any digitalization initiative is cybersecure communications and the protection of data flow. Power plants need a system that protects their ability to continue to reliably produce power and keep hackers out while automating the monthly maintenance of the control systems as much as humanly possible. For example, DIASYS Netmation is the Mitsubishi Power control system platform, and features such as the Netmation Secure Gateway and the Netmation Protect Pack, as well as the latest operating system upgrades, provide compliance with North America's NERC-CIP, NIST Cybersecurity Framework, and other global requirements by providing server-level and client-level security. A global crisis like the COVID-19 pandemic can magnify cybersecurity and controls updating issues. Controls upgrades become even more important to keep a power plant protected at all times.

Once cybersecure connectivity is in place, the data flow enabled by digitalization makes data-driven condition-based maintenance

and risk assessment of planned maintenance deferral possible. Such advanced maintenance planning is always valuable but is vital during emergencies. The option to safely postpone or eliminate a planned outage wouldn't be possible without data-driven risk assessment and decision-making. Data from the plant allows engineers to predict when issues may occur and adjust to a revised condition-based maintenance schedule that can often accommodate outside factors like a global pandemic, weather disruption, or social unrest.

Enabling the automation of repetitive activities and record-keeping through digital solutions is an important step to shifting an operator's focus to more imperative tasks that are more difficult to automate. Understanding the operator's regular activities and the amount of time needed for execution will set the priorities for automated tasks. Combining automation with more focused on-site operators and remote support technology allows for a more effective on-site team to operate and maintain the plant.

Additional support to help on-site operators focus on things that only they can do effectively comes from the latest advances in digital control systems, such as the latest version of the Mitsubishi Power control platform, Netmation 4S. Among other advancements, "4S" self-performs

continuous system diagnostics and adds capabilities for online logic simulation and loading, making on-site operators more productive and increasing opportunities for remote support.

Digital solutions to support on-site staffing, such as remote combustion tuning, have already proven beneficial during the COVID-19 pandemic. These solutions work through a secure gateway to access computers at the plant to see the logic, manipulate fuel fractions, move load, access the diagnostic monitoring system, and monitor emissions changes. Remote rotor balancing is also being performed at distant sites that are difficult to get to, through balancing monitoring software that enables expert balancing assessments to be made remotely. Critical activities like combustion tuning and balance weight calculations can now be accomplished by specialized subject-matter experts without requiring them to travel to the plant. It is also important to be able to remotely introduce control settings changes, software patches, logic modifications and other crucial updates. During the COVID-19 pandemic, which limited personnel on site to only those who are essential, the Tomoni Hubs were able to give procedures for controls updates to the on-site staff to manage the update and support any issues remotely.



Takasago Tomoni Hub in Japan.

Aerial view of T-Point 2 in Takasago, Japan.



The biggest advantage of providing remote O&M support is timing, even if there is not a major disruption taking place. With the travel component eliminated, technical experts can work with more plants in the same amount of time. Because of the importance of doing more O&M support remotely and expanding the reach of its technical expertise, Mitsubishi Power is focusing on additional technology development in this area.

One such development activity is the creation of a digital ecosystem that allows rapid digital access to the mass of important data related to the plant such as manuals, procedures, root cause analyses, key maintenance, and operational experience, as well as fleet experience of similar plants. This will provide further support to on-site O&M activities and help to fully leverage the benefits from remote operation and maintenance. This ecosystem includes an off-site data historian, cloud-based data, digital manuals, and inspection reports, in addition to the ability to quickly search for the appropriate document. Every day, all of these different data sources, many currently paper-based, are being accessed to make decisions. Not only will creating this digital ecosystem benefit remote technology, but it will also make the information more readily available on mobile devices, which could transform how business is done today. Without the digital ecosystem, full automation is not possible, as humans are relied on to seek out and manually input the information. Eliminating this repetitive task could

Enhanced inspection and troubleshooting using mixed reality.



free up a plant operator's time and give them the right information to make better decisions on plant operation and maintenance.

FUTURE DIRECTION FOR TOTAL PLANT REMOTE OPERATION AND MAINTENANCE

While technology is well on its way to enabling remote operation and maintenance, some important steps are needed. Robust communications need to be in place beforehand, so off-site operators and subject-matter experts can help, making cybersecurity a prerequisite. Cybersecurity is an ever-changing issue that will need constant support and maintenance to ensure data and communication channels remain safe. A secure and stable connection will be critical as well. A loss in connectivity during remote support could cause major issues at the plant. Operating procedures will need to be implemented to ensure the best balance of remote and local operation, including backup strategies, as well as the best balance of automation and human intervention.

The biggest step needed is a real-time integration of all systems, including integrating and automating documentation and remote record searching. There needs to be an updated, centralized resource to document everything done in the past and the current settings throughout the power plant. This all-encompassing record of plant status and history will fuel AI-based O&M strategies and is critical to total

plant automation. It can be used to build a virtual model of the plant. By documenting all changes in a virtual model, a plant can connect simulation tools to understand the result of changes before they are made at the plant. When there is an issue, like a trip, a virtual model reflecting total plant performance will allow subject-matter experts to determine and support rapid resolution without going on site.

The future holds a wealth of opportunities for making power plants smarter, better supported, and more resilient to disruptions such as global health emergencies, major weather events and social conflicts. Mitsubishi Power is committed to steadily applying the latest technological advances to make those opportunities a reality. At T-Point 2, Mitsubishi Power is validating the building blocks of the smarter power plant of the future, which will be capable of various levels of remote support and autonomy, and applying those building blocks to make existing and new power plants resilient and sustainable. ■

Mitsubishi Power is leading the development of the smart power plant of the future with Tomoni, a suite of intelligent solutions enabled by decades of O&M and plant knowledge. Our solutions use advanced analytics and are driven by customer collaboration to deliver powerful financial and environmental advantages. For more information, visit www.changeinpower.com/tomoni.



HOW TO SELECT PROPER DIAPHRAGM MATERIALS

AODD pumps, the workhorses for diverse industries, only perform properly if compatible diaphragms are used

BY SAM GILBERT, ALL-FLO

Compatibility in any relationship, from marriage to roommate and rock group to dance troupe, is essential if that relationship has any chance of flourishing. A relationship that is not “compatible”—defined as “the ability to exist or occur together without conflict”—will soon reach its end as the parties learn that they are unable to co-exist effectively with each other.

The same principle holds true for the equipment and raw materials and finished end products that are used and produced in industrial-

manufacturing applications. In this case, achieving compatibility is paramount when the fluids that are involved in the production process may be hazardous, corrosive, caustic, viscous, or particulate-laden. Specifically, industrial pumps—along with their wetted components—that are used for fluid-transfer processes must be fully compatible with the fluids being moved. Any incompatibility between the pump and the medium that it is tasked with transferring can potentially result in leaks or breakdowns that can

compromise the production process, while also creating an unsafe working atmosphere for site personnel and the environment.

THE CASE FOR AODD PUMPS

Over the years, the use of positive displacement (PD) air-operated double-diaphragm (AODD) pumps in high-volume transfer operations with hazardous or corrosive high-value fluids has grown in popularity. The reasons are obvious: because of their utilitarian design, AODD pumps are highly flexible, reliable, durable,

and resilient when used in even the toughest pumping environments. This is due to the fact their method of operation gives them the ability to self-prime, deadhead, and run dry with low shear, which allows them to immediately begin pumping when turned on and handle sensitive materials. Their seal-less design also virtually eliminates the risk of leaks developing, which makes them ideal for handling hazardous materials. As PD pumps, they are also able to quickly reach and maintain desired flow rates throughout the entire duration of the product run.

All of these features are making AODD pumps a first-choice option for general loading, unloading, and transfer operations in a wide range of industries, such as chemical processing, paints and coatings, food and beverage (including hygienic or sanitary applications), mining and dewatering, oil and gas, plating, lubrication and machinery, and semiconductor.

The true genius that makes AODD pumps perfect for use in such a wide array of industries and fluid-handling applications is in their simple design and highly repeatable method of operation. Operation begins when compressed air enters the pump through its air distribution system (ADS), which moves one of two diaphragms away from the center of the pump. Simultaneously, the second

diaphragm is pulled toward the center by the shaft that connects both diaphragms. This creates a vacuum that forces the fluid into the inlet manifold, which lifts a valve ball off its seat. This enables the fluid to travel to the outlet where it is discharged into the piping. At this time, the ball valve reseats and the piston (diaphragm plate) pulls the diaphragm away from the center of the pump, allowing the other diaphragm to enable fluid to enter its half of the pump, from where it is discharged.

Knowing how AODD pumps function, it becomes obvious that the twin diaphragms play an indispensable role in ensuring proper operation. In other words, the diaphragms can be considered the "heart" of the AODD pump.

DOING DUE DIAPHRAGM DILIGENCE

So, facility operators cannot consider diaphragms as nothing more than throwaway parts for their AODD pumps. They must perform their due diligence in order to ensure that the diaphragms they outfit their pumps with are compatible (there's that word again) with the fluids that will be handled. Not having accurate application information—most notably fluid properties and operational temperature—before outfitting an

AODD pump makes selecting the proper diaphragm a challenge.

Since 1986, All-Flo has developed both metal and plastic AODD-pump models that have been engineered to provide reliable, trouble-free service in even the harshest pumping conditions. Regarding diaphragms, all All-Flo diaphragms are constructed of high-quality materials and their design, along with that of the diaphragm plates that hold them in place, enables them to produce reliable and repeatable performance.

All-Flo offers seven elastomer materials for its diaphragms, which gives the user a full range of options that can meet the specific needs of the liquid-transfer application. G series (right) and D series (left) pumps are available with single piece diaphragms (diaphragm and plate).

In general, the factors to consider when selecting a diaphragm include product characteristics, process temperature, application-specific requirements (i.e., FDA material of construction) and the diaphragm's flex life. Another element to consider when selecting the diaphragm is the length of the stroke; some application/diaphragm combinations require a short-stroke pump configuration to ensure proper operation.

To aid its customers in finding the right diaphragm, All-Flo offers a complete seven-diaphragm portfolio that is available in rubber, thermoplastic elastomer



G series (right) and D series (left) pumps are available with single piece diaphragms (diaphragm and plate).

(TPE), and polytetrafluoroethylene (PTFE) materials of construction. All have been engineered to be used in specific fluid-transfer applications based on the type of fluid that is being moved:

- **BUNA-N®**: Buna-N, which is also referred to as “nitrile,” is a rubber compound that provides excellent performance in applications that involve petroleum-based fluids such as leaded gasoline, fuel oils, kerosene, and turpentine. Buna-N provides low to moderate flex life and moderate abrasion resistance.
- **ETHYLENE PROPYLENE DIENE MONOMER (EPDM)**: EPDM rubber is an excellent choice for use in extremely cold temperatures or when pumping dilute acids or caustics. EPDM diaphragms are most commonly used in the manufacturing, food, pharmaceutical, and paint and coatings industries. Their flex life is lower than many other diaphragm materials, but they do exhibit good abrasion resistance.
- **FLUOROELASTOMER (FKM)**: FKM is a rubber compound that uses vinylidene fluoride as its monomer, which allows it to be used with a wide variety of acids and bases. It does have very low flexibility, but can be the best choice in applications where fluid temperatures can reach upwards of 350 degrees Fahrenheit (177 degrees Celsius).
- **GEOLAST®**: Geolast is a TPE that exhibits enhanced oil-resistance and low oil swell, which makes it perfect for the handling of petroleum products. While equivalent to Buna-N in most of its characteristics, Geolast does offer a higher level of flexibility and good abrasion resistance, all at a lower cost than fabric-reinforced Buna-N.
- **HYTREL®**: Also a TPE, Hytrel delivers high flex life and excellent abrasion resistance. It also offers superior sealing or

seal energizing due to its low compression set.

- **SANTOPRENE®**: Another member of the TPE family, Santoprene is constructed of cured EPDM rubber, which helps make it ideal for use in various applications, including the transfer of acidic and caustic liquids. It also has excellent flex life, abrasion-resistance properties and a wide temperature range that makes it the go-to diaphragm in many chemical and industrial applications. Some Santoprene formulations can also be used in sanitary fluid-handling applications.
- **PTFE**: As an almost entirely chemically inert compound, PTFE can be used with a wide range of fluids. It is especially compatible with corrosive fluids such as aromatic or chlorinated hydrocarbons, acids, caustics, ketones, and acetates.

To further assist its end-user clients, All-Flo has created a Chemical

PRODUCT PORTFOLIO: Elastomer Properties

	LOWER TEMPERATURE LIMIT	UPPER TEMPERATURE LIMIT	FLEX LIFE	GENERAL USE	STRENGTH	WEAKNESS
BUNA-N	10°F (-12°C)	180°F (82°C)	low	Water and Oils	Petroleum Products	Chemicals
GEOLAST®	10°F (-12°C)	180°F (82°C)	high		Petroleum Products & Abrasives	Chemical
HYTREL®	10°F (-12°C)	180°F (82°C)	high		Petroleum Products & Abrasives	Chemical
EPDM	-40°F (-40°C)	280°F (138°C)	low	Some Acids and Bases	Mild Chemicals	Petroleum Products
SANTOPRENE®	-40°F (-40°C)	225°F (107°C)	high		Mild Chemicals & Abrasives	Petroleum Products
PTFE	40°F (4°C)	220°F (104°C)	medium	Insert to Most Chemicals	Chemical Resistance	Abrasives
FKM	-40°F (-40°C)	350°F (177°C)	very low	Wide Variety of Acids and Bases	Temperature	Flex Life

All-Flo offers seven elastomer materials for its diaphragms, which gives the user a full range of options that can meet the specific needs of the liquid-transfer application.

Compatibility Chart that lists 907 materials that can be handled by an AODD pump and rates the level of compatibility (most compatible, minor effect, severe effect, and not compatible) with the seven different diaphragm materials.

CONCLUSION

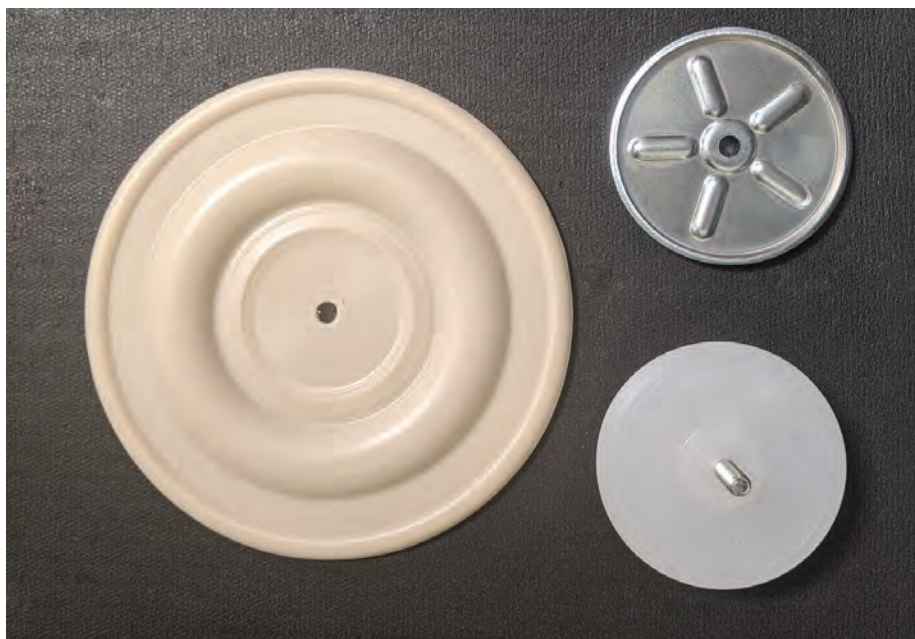
Whether pumping water, aggressive acids, food products, or solid-laden slurries, an AODD pump's diaphragms must meet the needs of very specific handling characteristics as they relate to product compatibility. The challenge, in this case, is identifying and implementing the optimum diaphragm, one that will ensure safe, efficient, cost-effective, and trouble-free operation.

Choosing the correct diaphragm requires knowing and considering all of the process parameters. Because all of the parameters must work in perfect harmony in order to produce the best pumping solution, it is imperative that the user considers all options before settling on the diaphragm that will best optimize performance. This can be a daunting task for the uninitiated, so All-Flo offers assistance through its Chemical Compatibility Chart, which gives the user all of the information necessary to ensure that a chemically compatible diaphragm is chosen for the application in all instances. ■

SAM GILBERT is a product manager for All-Flo, a leading manufacturer of air-operated double-diaphragm (AODD) pumps and fluid-handling solutions for industrial markets. He can be reached at samuel.gilbert@psgdover.com or 909.222.1319. All-Flo is a product brand of PSG®, a Dover company. PSG is comprised of several leading pump companies, including Abaque™, All-Flo, Almatec®, Blackmer®, Ebsray®, em-tec, Griswold®, Hydro Systems, Mouves®, Neptune™, Quattroflow™, RedScrew™ and Wilden®. For more information, visit www.all-flo.com or www.psgdover.com.



PTFE (left) and Santoprene (right) diaphragms.



A Santoprene diaphragm with metal inner plate and outer plastic plate.



Front and back view of a single piece PTFE diaphragm (diaphragm and plate).



BUILDING A MORE EFFICIENT SUMP PUMP SYSTEM

Planning ahead can be the key to achieving peak performance

BY EMILY NEWTON

A sump pump can be a lifesaver for helping your clients avoid costly flooding damage. However, creating an efficient sump pump requires taking numerous factors into account. Here are some tips to keep in mind when helping customers get the best performance from their sump pumps.

ACCOUNT FOR THE BUILDING SIZE AND SOIL TYPE

The sump pump's necessary capacity depends on the size of the residence and the type of soil on the property. Every 1,000 square feet of the home requires a capacity of 8 gallons per minute if the house is on clay soil. However, the minimum capacity for best performance rises to 14 gallons if you're dealing with sandy soil.

If you have already made the sump pit, there's a more involved test you can do. Start by seeing how much water fills the empty pit during a heavy rainstorm in one minute. Multiply the number of inches by 60 to get a figure representing gallons of water per hour.

Then, multiply what you get by 1.5 to calculate a buffer that will come in handy if a severe storm hits. This final number is the pump capacity you need. However, don't assume a larger capacity is better. A pump that's too large for the home will turn on and off frequently, making it wear out faster than it should.

Standard sump pumps have 0.33 horsepower motors. However, you can also get larger 0.5 horsepower models that can remove approximately 3,000

gallons of water per hour. If, while building a sump pump for your client, they ask to have a larger capacity than you recommend, take the time to explain your reasoning. Emphasize that too much capacity could compromise efficiency over the long run by triggering the sump pump to turn on and off too frequently.

CONSIDER BUILDING A SUBMERSIBLE PUMP

When you're building a sump pump for a client, one of the first things to determine is whether it should be a submersible or standing type. The standing kind has a vertical design with the pump resting below the water, and the motor at the top of the pump, above the surface. In contrast, submersible pumps are single units that can keep operating when entirely underwater.

The waterproof nature of a submersible sump pump is one of its primary advantages. Discuss the realities that your client may not immediately consider when they choose between a standing or submersible sump pump. For example, during an especially intense flood, there's no guarantee the motor on a standing pump will remain free from water exposure. Relatedly, other issues not related to a storm could get a standing pump's motor wet, too, such as water above it from a burst pipe.

If your client lives in an area that typically gets hit hard during hurricane season, that's even more reason to strongly urge them to go with a submersible pump design.

Most hurricane-related dangers stem from flooding. More specifically, high winds push the ocean's water onto land, leading to a storm surge that's powerful enough to take away vehicles and people.

Talk to your client about how they'll only have an efficient sump pump if it will keep operating reliably in harsh conditions rather than failing at the worst possible moment. Also, mention how many submersible pumps have an internal pressure switch rather than a float ball that activates them. In such cases, the client may be able to have a smaller sump pump under their house.

SELECT AIR-FILLED MOTORS FOR YOUR SUBMERSIBLE PUMP

If you're at the point where your customer has decided to go with a submersible type, the kind of motor used in the build is an aspect worth careful examination. You can either use air- or oil-filled motors in submersible pumps. Begin by teaching your client how each type has associated pros and cons. An air-filled motor is about 1.5 percent more efficient than its counterpart.

However, an oil-filled one will likely last longer. That's because the heat transfer between the motor and its housing is more effective in this type. The result of that characteristic is that oil-filled motors often have longer lifespans.

Think about explaining how it's possible to have several priorities when building an efficient sump pump. How well it performs during operation is certainly one aspect.

However, you must also try to balance out that metric by extending the sump pump's useful life.

INCORPORATE CONNECTIVITY INTO THE SUMP PUMP

The Internet of Things (IoT) has led to a boom in connected products, including many that help people live with more peace of mind. If you build a wi-fi-enabled sump pump, the connectivity feature could improve efficiency. Building owners may assume their sump pumps are working well between scheduled maintenance appointments. That's especially true if there's nothing to tip them off about problems. That can all change with the addition of IoT technology.

A pump's electrical insulation and seals are a couple of the things that can wear out without a user noticing anything amiss. However, one connected sump pump now on the market measures electrical signatures from the pump's components. Besides

alerting consumers to issues, it gives them a specific action to take for a resolution.

In another case, someone built an IoT sump pump that warns people if the water gets above the maximum level. Users get emails or text

messages in that situation, prompting them to get parts replaced, schedule servicing, or otherwise avoid disastrous consequences.

No matter how you make the connectivity function, keep user-friendliness at the forefront of your mind. Consumers might hurriedly tell you they're not tech-savvy and worry that a smart sump pump could bring more trouble than benefits. However, if you make it easy to use and reliable, they'll soon see that an efficient sump pump is also often a connected one since it saves them from unexpected performance failures.

START PLANNING YOUR EFFICIENT SUMP PUMP

This overview shows that factors such as the capacity and type of motor can affect whether a sump pump you build performs as you expect and pleases your clients. Besides applying these suggestions, take the time to determine your customers' expectations. Then, explain how certain factors, including those mentioned here, can contribute to efficiency. ■

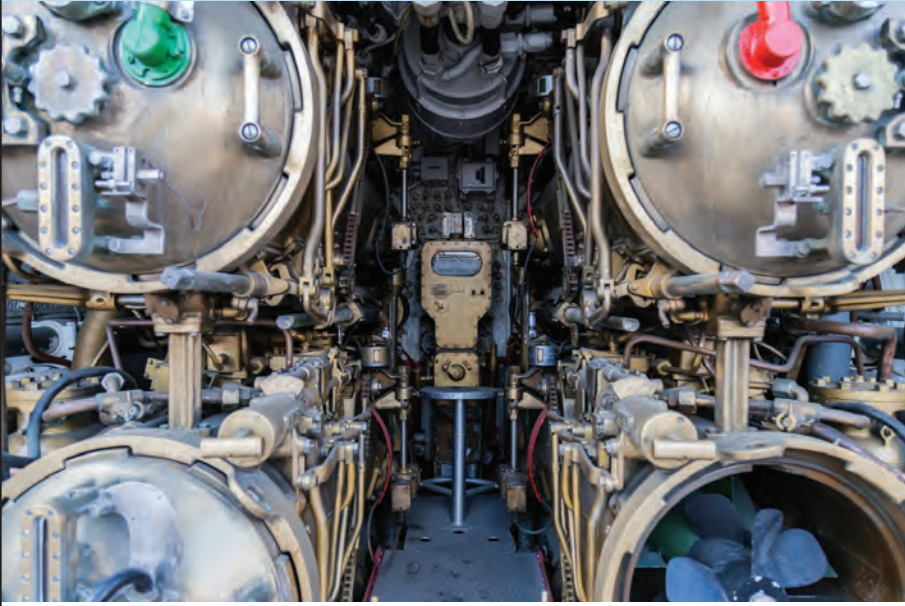
EMILY NEWTON is a technology and industrial journalist. She is the editor in chief of *Revolutionized*, a publication dedicated to exploring the latest industrial innovations.



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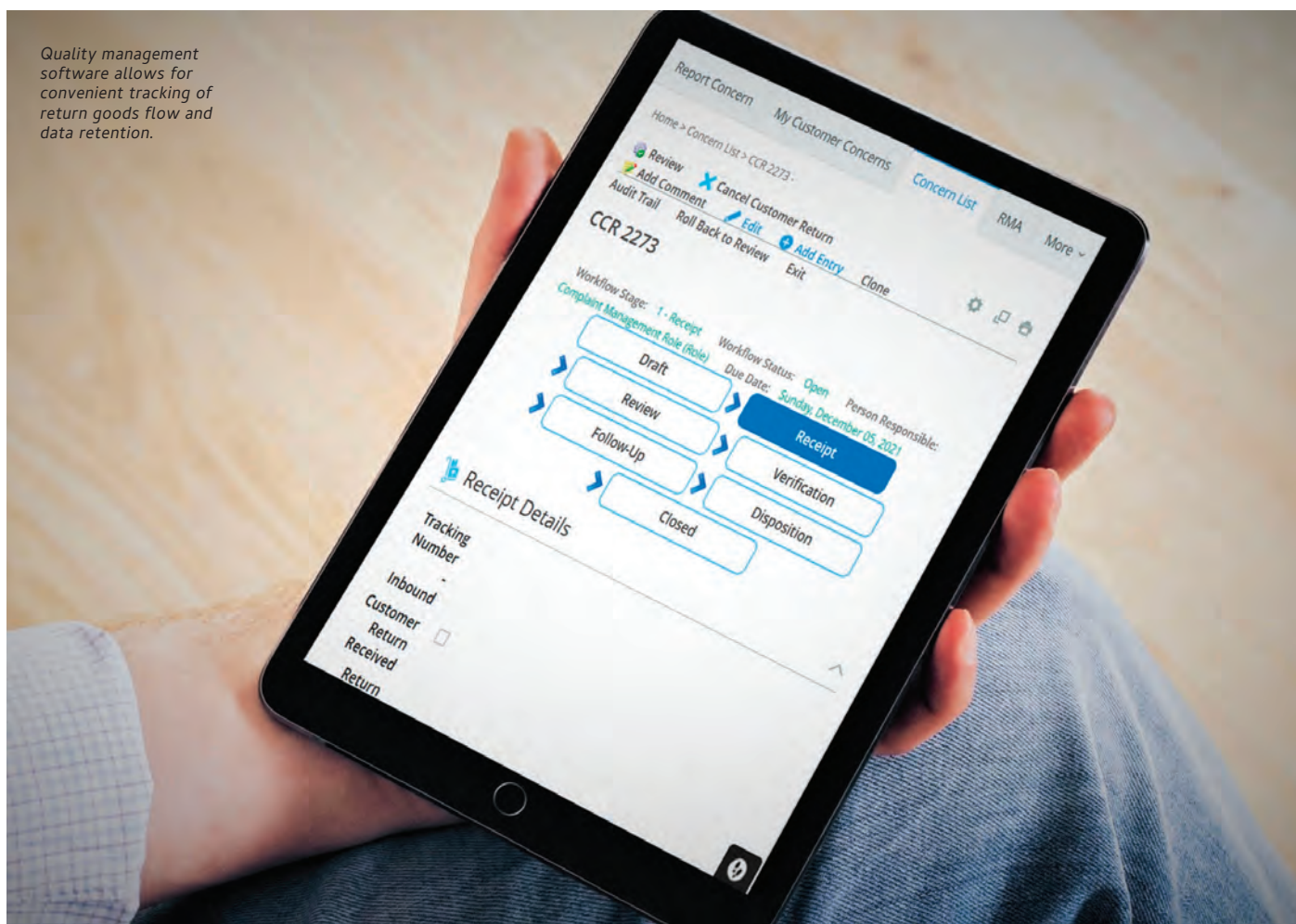


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MAKE THE COMMITMENT TO ENSURE QUALITY

Building a reliable quality assurance program means asking the right questions

BY LINDSEY PADILLA, BISON GEAR AND ENGINEERING

Product quality is a critically important consideration when purchasing electro-mechanical components, such as electric gearmotors. But what does quality mean and how do you evaluate it as a customer?

Obviously, quality involves materials and manufacturing processes that consistently result in high-performing, defect-free products that conform to specifications. That's necessary, but not sufficient in ensuring that the product

performs as needed in the particular application under the particular conditions for the intended lifespan.

HOLISTIC, PROACTIVE, AND CROSS-FUNCTIONAL

Ideally, a quality program should be holistic, integrating all aspects of a company. At Bison Gear and Engineering, for example, we see quality assurance as encompassing every aspect of what we do, not only on the manufacturing

floor but also in every department from sales, application engineering, and product development, through manufacturing, quality control, and customer service.

The key is that quality assurance is comprehensive and integrated. Cross-functional teams bring diverse perspectives and challenge assumptions to proactively anticipate potential problems. And we take advantage of quality management system software to track and analyze data from across the company, in order to identify and correct problems in real time and drive continuous improvement.

GOING BEYOND THE BASICS

The certification program of the International Standards Organization (ISO) provides helpful general guidelines and imposes a degree of discipline to ensure a systematic approach to quality. The ISO 9001:2015 audits and periodic recertification process ensures that we have a carefully-considered, well-documented, and consistently-implemented program. But an effective and comprehensive quality program is unique to each industry and Bison's quality program far exceeds expectations of ISO 9001.

We have also chosen to employ Advanced Product Quality Planning (APQP), the general framework of procedures and techniques developed by the automotive industry and broadly used in other industries. According to the Automotive Industry Action Group (AIAG), the purpose

of APQP is "to produce a product quality plan which will support development of a product or service that will satisfy the customer."

A comprehensive and effective quality program goes beyond these standardized guidelines and frameworks, to include everything from the company philosophy, investment priorities and organizational structure, employee culture and capabilities, to the relationships with suppliers and customers.

REAL TIME DATA DRIVES ACTION

Systematic quality programs like ISO 9001 and APQP represent the skeletal framework, and real time data represents the lifeblood of outstanding quality assurance. At Bison, our implementation of web-based quality management (QMS) software has allowed us to better use data through our company and in our relationships with suppliers and customers, resulting in significant, measurable improvement in quality. Access to reliable, real-time data has enhanced our efforts to be proactive and preventative.

The QMS software allows us to capture and analyze data, grouped by product, feature or process, to identify problems and to drive improvements. Rather than solving issues in isolation, we are able to apply lessons across customers, across products and across processes. Instead of firefighting—expending resources correcting problems



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after they have already caused negative impact—resources can be applied far more effectively and efficiently to prevent problems and drive continuous improvement.

For example, at Bison, we measure quality in terms of defective parts per million (DPM), and have been able to reduce our DPM in our DC motors by 68 percent through analysis of data across multiple products in this category. The manufacturing of these types of motors requires precise pressing of laminations and winding of the wire so that the armature fits exactly in the machine. By analyzing data across varied motor shafts and different lengths of swages, we were able to improve the quality for the entire product category. We were able to standardize the lengths and sizing of the shaft swages to reduce tooling change over in our manufacturing process, thereby improving our cycle time and our ability to respond more quickly to customer orders.

CROSS-FUNCTIONAL TEAMWORK AT EVERY STAGE

Teamwork is also essential to quality assurance. Subjecting concepts and designs to early cross-functional reviews is an investment in time and effort, but it pays off in a smoother process and far better quality. From the beginning of the process of developing new products and features or working with new customers and applications, bringing together multiple viewpoints produces better solutions and prevents future headaches.

Often the process starts with application engineers reaching out to customers, or vice versa, to understand the customer requirements. Design engineers and manufacturing engineers join the cross-functional development and review process to evaluate not only the performance of the design, but also the manufacturability. The teamwork continues through the design, prototyping, manufacturing, and customer support stages, with quality engineers.

QUALITY INVOLVES PARTNERSHIP WITH CUSTOMERS

The teamwork approach also extends to the close working partnership with customers. In one case, a Bison quality engineer helped a manufacturer of commercial ice dispensing machines to identify and correct a problem causing failures in the field, even though it turned out that the root cause was not in the design or manufacture of the gear motor.

The QMS system ensures that any issues that an individual customer may have are analyzed with the benefit of the experience of all customers. Knowledge gained from a problem here, or a solution there, is shared and drives actions internally and throughout the customer base.

AND PARTNERSHIP WITH SUPPLIERS

Suppliers, too, are well-integrated into the overall quality program. Bison's documented Supplier Performance Improvement Process (SPIP) exemplifies our data-driven, team approach to doing business. We recognize that our ability to meet customer expectations is dependent on the quality and reliability of our suppliers, and we are actively engaged in systematically evaluating and supporting them.

We send all of our suppliers quarterly quality and delivery scorecards. Among the data we use to assess quality and identify opportunities for improvement is a self-audit survey that our suppliers complete. We often have one of our quality engineers perform an onsite assessment. We find that it is critically important that we establish a close working relationship with at least one counterpart at the supplier, so that we are prepared to quickly address and correct any issues that may arise.

Our incoming parts inspection process identified problems with the hardness of metal bar stock from a supplier. The hardness of the material must be within specified limits to

ensure that shafts stand up to the torque applied during the life of the motor. The supplier was applying excessive heat treatment, causing areas of the bar stock to be too hard.

We visited the supplier and met with the quality manager and some of the operators and determined that the type of inspection they were doing was too cumbersome and time consuming. Either they would continue to run products, while the inspection was happening or they would skip the inspection altogether. We identified an easier and quicker method of inspecting, using cylindrical ring gauges that slip on to the bars, which we purchased for the supplier. The ring gauges were effective because an oversized condition is a byproduct of overheating.

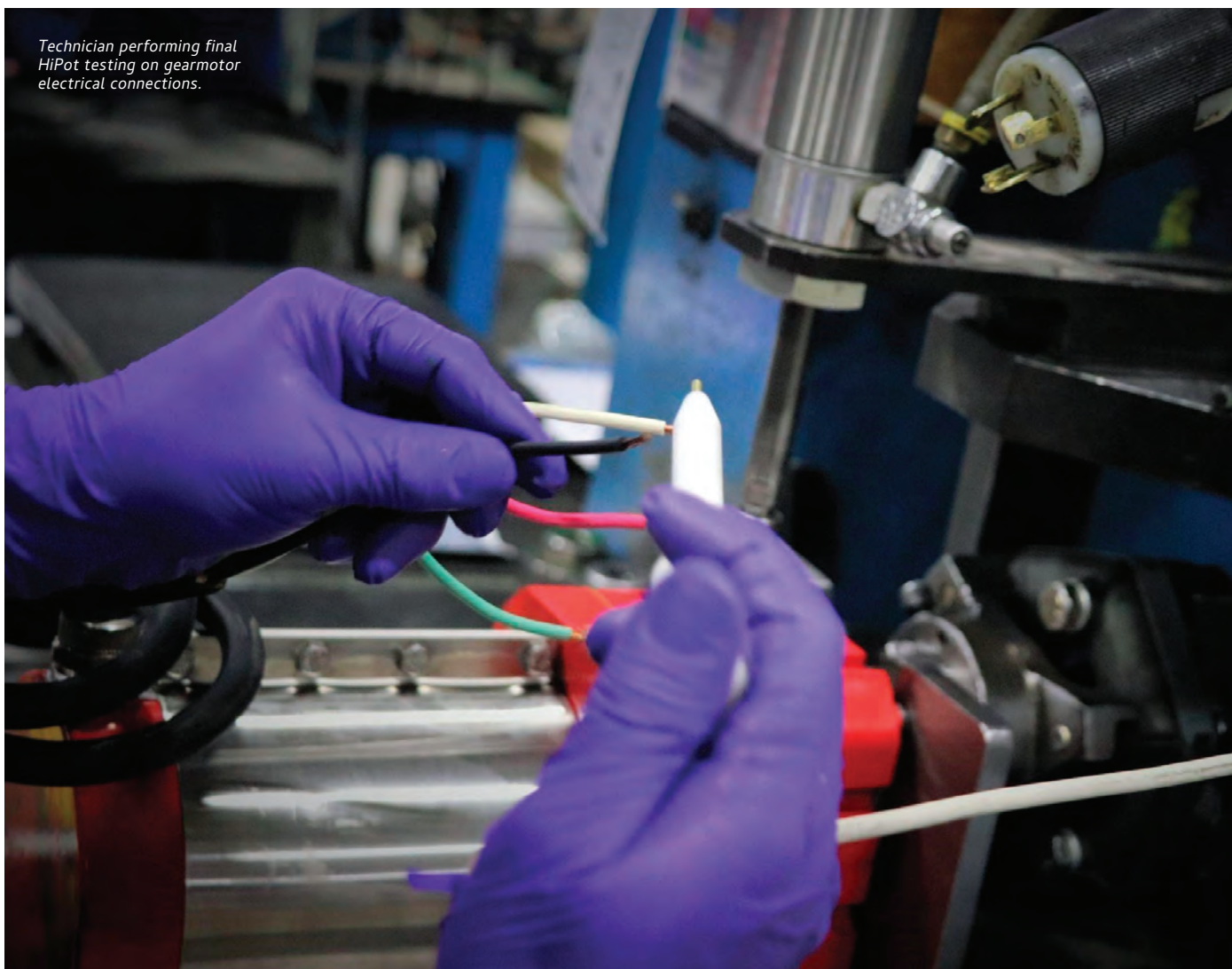
BEING SMART ABOUT INSPECTIONS

Inspections are obviously critical. But you can't test everything. We do perform final assembly testing for every item prior to delivery—including testing for air leaks, torque, and RPM—but incoming parts inspections and in process inspections must be selective and strategic. There are an average of about 50 parts that go into each gear motor, and each product has up to 500 specifications on the print.

Strategic testing means that we do not just test at random. Our QMS software allows us to use data to drive the inspection process. Data analysis is used to identify parts and processes that are especially critical or have a history of failing and points. For example, specific testing protocols are implemented after retooling or other operations that present identified risks.

We will sometimes perform the same tests at multiple points in the process. For instance, we repeat a HiPot test (High Potential Test) at various stages because protection against electrical shock is a particularly important safety requirement for electrical motors.

Technician performing final HiPot testing on gearmotor electrical connections.



INVESTING IN QUALITY

Quality assurance requires significant investment in people and equipment. Investing resources in cross-functional teamwork results in an excellent payback in terms of quality and of faster and more reliable delivery, as well as in overall customer satisfaction. Investing in staffing and expertise is also important for ensuring that applications engineers, design engineers, manufacturing engineers, and quality engineers are available to work together as a team and develop long term relationships with customers and suppliers.

Bison also chooses to invest heavily in new equipment that elicits faster production and better quality. Analysis of data derived from the

QMS software provides a systematic process for looking out to the future and anticipating investment needs in new equipment and technology, to maintain capabilities and continually improve in both machining and in inspection.

MEETING CUSTOMER REQUIREMENTS

Every company measures quality differently. For us, it is all about meeting customer requirements, specifically defined as delivering more dependable performance, fewer field failures and longer service life. We have found that to achieve this goal requires high commitment and investment and a data-driven, proactive, team-based approach. ■

LINDSEY PADILLA is director of quality for Bison Gear and Engineering. The company has been in operation since 1960, designing and manufacturing long-lasting and robust fractional horsepower AC motors, DC Motors, and PMDC motors, gearboxes, gear reducers, as well as a full selection of AC and DC parallel shaft gearmotors, right-angle gearmotors, and brushless DC gearmotors. Some newer technology includes hypoid gearmotors and IP69K wash-down gearmotors. For more information, visit www.bisongear.com.

REDUCING CARBON EMISSIONS FROM GAS TURBINES

ADNOC and GE develop decarbonization roadmap for power generation

BY ABEER MASOOD, GE GAS POWER

ADNOC UP CLOSE:

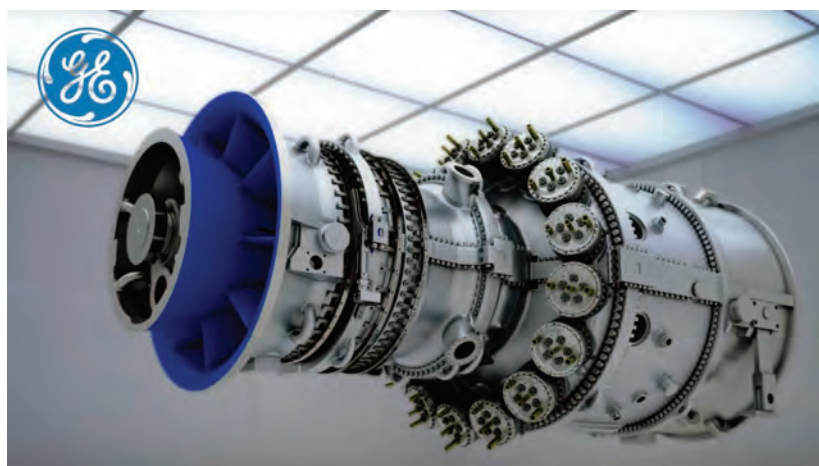
ADNOC is a leading diversified energy and petrochemicals group wholly owned by the Emirate of Abu Dhabi. ADNOC's objective is to maximize the value of the Emirate's vast hydrocarbon reserves through responsible and sustainable exploration and production to support the United Arab Emirates' economic growth and diversification. For more information, visit www.adnoc.ae.

Gas turbines are one of the most common methods to provide power for oil-and-gas downstream, processing, and myriad other industry operations, which makes them an ideal target for sustainability advocates looking to reduce carbon emissions. One such roadmap laid out by two industry leaders is set to take a multi-valent approach to the challenge, which will include the potential use of hydrogen, ammonia, and carbon capture solutions to reduce carbon emissions from power generation with a goal of achieving net zero by 2050.

A STRATEGIC PARTNERSHIP TAKES SHAPE

Abu Dhabi National Oil Company (ADNOC) and GE Gas Power are entering into a joint cooperation initiative to develop a decarbonization roadmap that includes reducing carbon emissions from gas turbines used to power ADNOC's downstream and industry operations, including at the world-scale Ruwais Industrial Complex, in Abu Dhabi in the United Arab Emirates (UAE).

Ahmed Omar Abdulla, senior vice president, refining and petrochemical asset management,



ADNOC says, "ADNOC's initiative with GE reinforces our commitment to support the UAE's goal to achieve net zero carbon emissions by 2050 and our ongoing commitment to decarbonizing our operations."

This initiative further supports the UAE Net Zero by 2050 Strategic Initiative and strengthens ADNOC's position as one of the world's least carbon-intensive oil and gas producers. The announcement follows the recent clean power agreement between ADNOC and Emirates Water and Electricity Company (EWEC) and enhances ADNOC's pathway to decarbonization while enabling sustainable future growth.

"This agreement is in line with our energy transition strategy and underscores our commitment to sound environmental stewardship while meeting the needs of the world's growing energy demands," adds Abdulla. "Working together with GE to develop sustainable solutions

for power generation also furthers our ambitions to progress hydrogen as a future fuel and will leverage our industry-leading capabilities in carbon capture and storage."

REAL-WORLD INNOVATION AT WORK

Joseph Anis, president and CEO of GE Gas Power Europe, Middle East, and Africa, says, "Energy-intensive industries such as oil and gas, smelters, petrochemicals, aviation, and others, will play an important role in the UAE's energy transition."

Under the terms of the initiative, ADNOC and GE will explore using hydrogen and hydrogen-blended fuels for lower-carbon power generation; evaluating introducing ammonia as a fuel to power ADNOC's GE gas turbines; integrating carbon capture solutions at ADNOC's power generation facilities; and joint research and development (R&D) programs to develop innovative

solutions to reduce carbon emissions from gas-based power generation.

"Hydrogen and hydrogen-blended fuels, ammonia, and carbon capture solutions offer pathways to near-zero carbon emissions from gas power generation, without compromising on the reliability of electricity supplies," Anis adds. "This is critical for industrial growth. We are honored to work with ADNOC to explore solutions to decarbonize their gas turbines and thank them for their trust in us."

ONE PART OF A LARGER SUSTAINABILITY GOAL

The roadmap is a continuation of ADNOC and GE's cooperation to enhance the performance and sustainability of ADNOC's operations. ADNOC and GE recently enhanced the efficiency and performance of ADNOC Refining's General Utilities Plant (GUP) in Ruwais, with upgrades to installed GE gas turbines



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increasing power output while utilizing the same amount of fuel.

Dr. Dalya Al Muthanna, president of UAE and global chief of strategy and operations, GE international markets, adds, "Through the MOU with ADNOC, we are delighted to bring our industry-leading hydrogen experience to this collaboration. There are more than a hundred GE gas turbines globally that have operated on fuels that contain hydrogen, accumulating over eight million operating hours, and we look forward to working toward our shared energy transition vision with the UAE."

The GUP provides electricity and water to the entire Ruwais Industrial Complex. ADNOC is also enhancing the performance and sustainability of the GUP with the development of a waste heat recovery facility. Upon completion of this facility in 2023, the innovation will increase the thermal efficiency of the site by nearly 30 percent.



LOOKING AHEAD

For its part, GE has contributed to the development of the energy

sector in the Gulf Cooperation Council (GCC) for over eighty years. Today, GE-built power generation technologies are installed in up to 350 sites across the region, generating up to half of the GCC's power. This partnered roadmap is the next step in expanding the company's sustainability goals. ■

MPT

WEBINARS

LEARNING FOR TODAY'S PUMP INDUSTRY, AT YOUR FINGERTIPS

Whether your work focuses on water and wastewater, chemical processing, or original equipment manufacturing, you need to stay up to date with the latest training. MPT's hosted webinars bring industry experts from leading companies to your computer and offer professional certificates for completion.

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

ABEER MASOOD is communications director for GE Gas Power (MENA) and can be reached at abeer.masood@ge.com. GE Gas Power is a world leader in natural gas power technology, services, and solutions. Through relentless innovation and continuous partnership with our customers, the company is providing more advanced, cleaner, and efficient power that people depend on today and building the energy technologies of the future. With the world's largest installed base of gas turbines and more than 670 million operating hours across its installed fleet, GE offers advanced technology and a level of experience that's unmatched in the industry to build, operate, and maintain leading gas power plants. For more information, visit www.ge.com/power/gas.

Another Vanton AdVantage

VANTON's Engineered Pump Solutions Mean Never Settling for a Square Peg in a Round Hole

At VANTON PUMP, there are no off-the-shelf solutions when it comes to properly addressing your pump needs. With the broadest line of thermoplastic pumps in the industry, we've learned that every application can benefit from a little extra scrutiny. It's our way of ensuring that the pump we deliver is the pump your situation demands - and not an attempt to thwart geometry by forcing a square peg into a round hole.

From selecting the optimal construction materials, to assessing the proper configuration, VANTON engineers every pump we ship to our customer's specific application. It's your assurance that a VANTON pump will interface perfectly with your operation's requirements and perform the task it's intended for year after year.

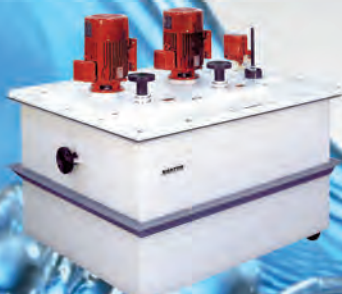
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HIGH-PRESSURE SHUTOFF MADE “EZ”

Vital infrastructure remains operational while fire hydrant is repaired

BY EMMA ARDLEY-BATT, ADVANCED VALVE TECHNOLOGIES

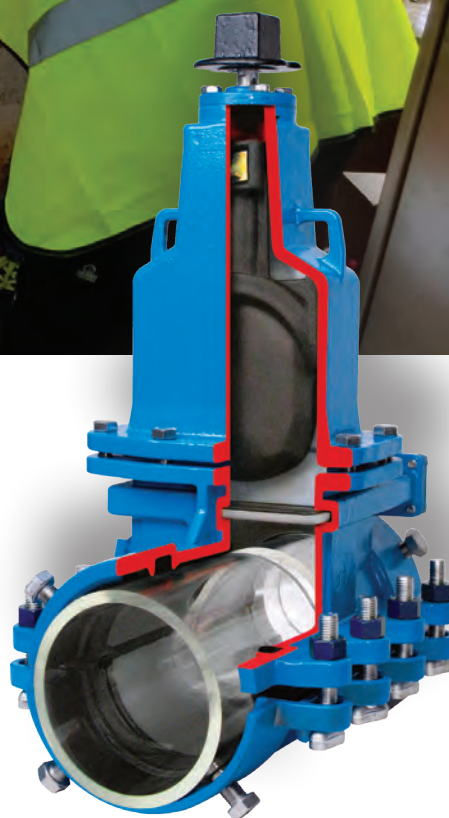
The installation of an Advanced Valve Technologies EZ Valve ensured a fire and police station maintained their water supply during vital repair works to a fire hydrant. Hydratec Services, a trusted long-term partner of AVT, was called on to assist with the repair of a leaking fire hydrant in an East Texas location.

Typically fire hydrants are supplied by a T-line. This is a small section of water line that is fed by the main line running along a street. Conventional water valves require a large section of pipe to be available when installed due

to the need for at least two excavations for the fitting of line stops and a valve, but the AVT EZ Valve requires just one small excavation allowing them to be fit on this small T-line and isolate the hydrant without affecting the rest of the local water supply.

RELIABLE VALVES FOR CRITICAL NEEDS

Hydratec owns the kit required to install AVT EZ Valves so when they learned about the issue, they knew the installation of an insertion valve was the best option.



The leaking fire hydrant could not be repaired under pressure so had to be shut off. This highlighted several issues. The closest isolation point was a good distance from the hydrant so up to three city blocks which included a hotel, several restaurants and retail properties, a police station, and a fire station, would also need to lose their water supply for the repair to be completed.

Hydratec Services sent a team of three water industry professionals to fit the EZ Valve. They took just one-and-a-half-hours to install the EZ Valve on the 6-inch cast iron pipe.



"Many times fire hydrants sit at the end of short pipes leading from water mains so installing traditional line stops is out of the question," notes Shawn Petty, AVT's vice-president of global sales. "The AVT EZ Valve can be installed on relatively short pieces of pipe and has time and time again proved itself to be the ideal solution when fire hydrant repairs are required."

THE PERFECT SOLUTION TO AVOID COSTLY DOWNTIME

Advanced Valve Technologies is part of ClockSpring NRI, the high-

performance critical infrastructure solutions company that provides innovative, tested, safe, and environmentally-conscious asset integrity solutions for construction, maintenance, and rehabilitation of infrastructure assets.

On the EZ Valve's use in East Texas, AVT President Harry Gray says, "This is a great example of how the compact, yet robust AVT EZ Valve delivered the perfect solution to a potentially costly and highly disruptive issue. We are seeing more and more water system operators opt

for the EZ Valve when they need to shut off fire hydrants for repair and this is a perfect example why."

The AVT EZ Valve insertion valve, can be installed on water pipelines sized from 1.5 to 24 inches without shutting off the water and in many cases, in under an hour. AVT designs are innovative, minimize risk to the environment, and reduce costly downtime.

EXPERIENCE YOU CAN TRUST FOR RANGE OF APPLICATIONS

"Our primary focus is on disruptions in water service that cost providers money and leave end users without service," adds Gray. "Our products are supported by experienced sales, engineering, and manufacturing professionals alongside a robust and all-encompassing training curriculum which means water professionals can become fully certified to install the EZ Valve in just one day."

The insertion valve can be used in a range of industries such as water and wastewater utilities, onshore, petrochemical and refinery, pipeline and distribution, and tanks and terminals. In addition to fire hydrants, the valve also serves a range of specific applications such valve exercising and the addition of control points. ■

EMMA ARDLEY-BATT can be reached ebatt@cs-nri.com. Advanced Valve Technologies (AVT) manufactures comprehensive solutions for the safe and sustainable repair and rehabilitation of critical water and gas infrastructure. The company is best known for the AVT EZ Valve, an award-winning inline insertion valve designed for quick and easy installation for emergency water line repair and planned pipeline maintenance, requiring no disruption in service. AVT is shaping the future of critical infrastructure by delivering valves, composites, and concrete products designed to minimize downtime and environmental hazards while maximizing cost-effectiveness and safety. For more information, visit www.avtfittings.com or www.cs-nri.com.

FEATURED PRODUCT

CRANE PUMPS & SYSTEMS

BARNES EXPEL SUMP PUMP

How are you protecting your house from changing weather conditions? During high water events, like spring thaws or heavy storm conditions, water can flood your home or basement. Not only does this put your valuables at risk, but it can also compromise the integrity of your foundation, costing thousands of dollars for repair. Our new Expel sump pump can help you tackle what Mother Nature throws your way! Get prepared now, so you don't have to face the consequences later.

The all-new Expel 1/3-horsepower sump pump from Barnes is robustly designed for long operational life and dependable service. Expel features a top suction volute, which prevents air-lock and debris buildup around the pump, keeping it running. The built-in strainer also prevents solids from entering the pump, which helps avoid clogging. The pump comes equipped with Type II mechanical seals that protect the submersible, oil-filled motor. The permanent split capacitor, low amperage motor uses less energy making it a more affordable, energy-efficient offering. Oil lubricated ball bearings are also included, which extended the operational life of the motor while offering a quieter operation. Regardless of where the pump is installed, you can still enjoy the space while the pump is running. Expel is the optimal sump pump for an array of applications including basement sump pumps, laundry rooms, slop sinks, wet bars, and more.

The Expel is available in 1/3 horsepower, 120V 1 Phase, with a 3,450 RPM motor. The discharge is 1.25-inch FNPT. The maximum flow is 42 gallons per minute, and the maximum head is 20 feet. The pump comes with a 9-foot power cord as standard.

Expel is also available in the Barnes Laundry Tray System. The Laundry Tray System is a packaged system that comes with the pump, tank, discharge pipe, and check valve, and is designed for use wherever water needs to be moved and gravity flow is not available, or breaking concrete is not possible. The package is partially assembled for easy installation on site. The Laundry Tray can be used for laundry rooms, wet bars, water softeners, air conditioner condensation, and many other residential applications. The Laundry Tray has a capacity of 6 gallons, and is about 15 x 15 x 14 inches. If you're interested in an Expel sump pump or Barnes



Laundry Tray system, you can purchase one from one of our many wholesale distributors across the country. Contact the Barnes Customer Service team at Crane Pumps & Systems or use the Distributor Locator on the Crane Pumps & Systems website to find the Barnes Pumps distributor nearest you! ■

For more information, visit

www.cranepumps.com.

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Contrinex metal M12 and M18 photoelectric sensors offer complete overload protection, are IP67 rated, and are available in diffuse, diffuse with adjustable background suppression, retroreflective, and through-beam models. Select models are IO-Link compatible, providing continuous diagnostic data and easy sensor mode selection. All sensor outputs are complementary, allowing them to be used as a light-on or dark-on sensor. The Contrinex photoelectric sensors are made in the United States and are UL listed, CE marked, and RoHs compliant. For more information, visit www.contrinex.com.



DENIOS

FIRE RATED NON-OCCUPANCY RFP CHEMICAL STORAGE BUILDINGS

New Rack Fire Protect (RFP) buildings from DENIOS US are fire rated for two hours at 2,192 degrees Fahrenheit (1,000 degrees Celsius), minimizing the risk of fire spreading within the workplace. Designed in Germany and proven in hundreds of installations worldwide, they are now manufactured in the United States for North American installations. RFP fire-rated buildings provide safe and legally compliant storage of flammable and corrosive chemicals. Adjustable racking provides the flexibility to store up to forty-eight drums or twelve IBCs. For more information, visit www.denios-us.com.

RENEWABLE LUBRICANTS

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Renewable Lubricants presents patented Bio-Ultimax 1000, readily biodegradable biosynthetic formulas that perform like mineral oil based hydraulic fluids, but are environmentally friendly. With oxidation performance comparable to full synthetics, this is one of the safest hydraulic fluids for the environment. Ideal for stationary or mobile environments, Bio-Ultimax super high viscosity index (VI) fluids are proven in systems up to 10,000 psi and in systems with ultra-fine filtration. For more information, contact Benjamin Garmier at 330.877.9982, email info@renewablelube.com, or visit www.renewablelube.com.



ZOLLERN

EQUIAX (EQX) INVESTMENT CASTING

Zollern is expanding its Equiax (EQX) Investment casting production up to 220 kilograms and introducing directional solidified (DS) and single crystal (SX) Investment Casting up to 100 kilograms to its manufacturing site in Lauchenthal, Germany. The new equipment will enable Zollern to produce large EQX components as well as DS/SX components for industrial gas turbine and aerospace markets. The Zollern team is already working together with its existing customer base on the initial components and is looking forward to further exciting opportunities. For more information, visit www.zollern.com.

CDI ENERGY PRODUCTS, INC.

TUFF BREED WELL SERVICE PACKING

CDI Energy Products, Inc. announces the launch of a new product line in its Tuff Breed product family of Well Service Packing (also known as WSP) used to seal reciprocating pumps in the downhole pressure pumping market. The new WSP Extreme Series features the next generation of packing utilizing fiber-reinforced elastomers to provide best-in-class packing life, as well as superior safety and environmental performance. The WSP Extreme Series includes four different pressure ring options: Bronze, Silver, Gold, and Platinum—to provide the end-user with the optimal product for their production application. For more information, visit www.tuffbreed.com.



WIEGMANN

ENCLOSURE COMPONENTS

Wiegmann enclosure options are the latest option from one of the largest enclosure manufacturers in North America, manufacturing a wide variety of carbon steel, galvanized steel, stainless steel, and aluminum enclosures. New additions include NEMA 4/4X/12/13 rated stainless steel 22-millimeter push-button enclosures, NEMA 4 rated carbon steel wiring troughs with hinged cover, and NEMA 1 rated carbon steel corner-mount wiring troughs, including models with knockouts. For more information, visit www.hubbell.com/wiegmann/en.

ENDRESS+HAUSER

PROLINE PROSONIC FLOW W 400

Prosonic Flow W 400 brings the modern technology of Endress+Hauser's Proline device series to clamp-on ultrasonic flowmeters. The W 400 clamp-on and I 400 insertion units provide comprehensive process monitoring with long-term cost efficiency and extensive diagnostics. These sensors pair with Endress+Hauser's Proline 400 transmitter to provide a complete flow metering solution. For decades, users in many process industries have turned to ultrasonic clamp-on instruments for convenient flow measurement. For more information, visit www.endress.com.



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Constructed of 316-L Stainless Steel, these food grade strainers work continuously in a sealed environment. There are no bags or elements to replace, so there is no inherent downtime for filter changes. With no filter disposable elements to dispose of, Spencer Strainers are an environmentally friendly option which helps companies meet their sustainability goals. Wedgewire or perforated screens of various openings are available and interchangeable, allowing one strainer to be used for multiple applications. For more information, visit www.spencerstrainer.com.

TRUMETER

ADM SERIES GRAPHICAL PANEL METERS

These panel meters feature a programmable forty-segment curved bar graph display that provides an instant visual representation of an analog meter. In addition, they have a large four-digit readout, dynamic backlight color, customizable messages, and alarms to alert operators when a parameter is out of range. The updated free configuration software includes ten alarm points, a twenty-point non-linear conversion table, and better scaling. These panel meters come with a three-year warranty and are UL listed, CE marked, and RoHS compliant. For more information, visit www.trumeter.com.



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Regal BFP Type High Conductivity Core Pins are made from C-18000 beryllium free copper-based alloy featuring 95-98 Rockwell B (20-25 Rockwell C) hardness. Providing ten-times better heat conductivity than steel and two-times better conductivity than beryllium copper pins, they resist thermal stress, wear, and abrasion—making them ideal for high volume plastics injection molding. For more information, visit www.regalcomps.com.

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PROCLEAN FOAM SAFE

Madison Chemical introduces ProClean Foam Safe, a chlorinated, alkaline, general purpose foaming cleaner that performs well in most water conditions. When used in a “foam generator” as a one-package cleaner, it produces thick, stable, wet foam necessary for cleaning without dry-out or run-off. It cleans all stainless, aluminum, and zinc alloys, particularly vertical and overhead surfaces, and those not easily cleaned by other methods. It is ideal as a general cleaner (A1) on all surfaces in and around food and beverage processing areas, or for use with steam or mechanical cleaning devices in all departments. For additional information, visit www.madchem.com.



LUTZE

24VDC FLEXIBLE CONTROL CABLE

Lutze Silflex 24VDC flexible control cable is an industrial-rated low voltage cable ideal for both stationary and flexible applications. Constructed with a rugged outer jacket, these cables provide resistance to sunlight, oil, and moisture penetration, making them suitable for wet and dry locations. With its UL Type MTW machine tool wire rating, this cable meets the NFPA 79, electrical standard for industrial machinery with additional ratings and approvals, including Class 1 Division 2 Hazardous Locations and Direct Burial. For more information, visit www.lutze.com.

FOR LARGE-SCALE DREDGING, GO BIG OR GO HOME

Custom-built dual pump dredge will be the largest of its kind

In the fall of 2021, Muddy Water Dredging and DSC Dredge launched a project to build a custom 24-inch dual pump Marlin Class dredge. Combining Muddy Water Dredging's over forty years of experience in the maritime transportation industry with DSC Dredge's customized engineering and dredging solutions expertise, the project is one of the largest of its kind in the United States to maintain U.S. navigable waterways. Below, Muddy Water Dredging co-owners Michael Kerns and Matthew Devall and Bob Wetta, president and CEO of DSC Dredge, discuss the ambitious project.

MPT: *What would you say are the guiding principles of keeping such a large project on task?*

MICHAEL KERNS: Muddy Water Dredging will engage a first principles approach by employing the latest technological advancements to the machinery and employees allowing for a truly unique and forward-thinking organization. We are incredibly excited to join a dynamic industry that is vitally important in sustaining U.S. navigable waterways.

MPT: *What brought Muddy Waters Dredging and DSC Dredge together? How'd you find the right choice?*

MATTHEW DEVAL: Over the years DSC has made its name in the industry for helping clients make "the right choice" when it comes to their dredging needs and MWD is a continuation of that client partnership. This custom Marlin Class dredge will have an overall length of 371 feet making it one of, if not the longest 24-inch dredge in the United States with the capability of dredging a 400-foot wide cut utilizing an 80-degree swing arc, thus increasing the dredge's swing/advance efficiency by 5.9 percent. At a duty point of 28,236 gallons per minute slurry volume, this new dredge will have the ability of filling an Olympic size swimming pool with dredge slurry in only twenty-three minutes and can completely fill an area the size of the New Orleans Superdome in only twenty-three days.

BOB WETTA: Notwithstanding the massiveness and strength this dredge embodies, its customization not only includes a detachable carriage barge that

allows the dredge to quickly convert from a wide cut format configuration to a shorter conventional dredge configuration for work in areas with limited space but also has lay-down carriage barge spuds to facilitate transit under low clearance structures. This custom 24-inch diesel-electric design, with total installed horsepower of 9,621 delivering 6,830 kW of electrical power, is expected to be completed October 2023. The perfect balance of elegant design and outstanding function—this is the essence of design meets function.

MPT: *Spirits seem very high for this project. What's the feeling as manufacturing begins?*

MATTHEW DEVAL: I am extremely grateful to everyone involved for all the hard work over the last few months to make this a reality.

MICHAEL KERNS: I am extremely proud to re-enter the U.S. dredging industry as co-owner and president of Muddy Water Dredging, and fortunate to have an opportunity to incorporate my many years of dredging experience into the design of our new 24-inch cutter-suction dredge.

BOB WETTA: DSC is extremely excited to partner with Muddy Water Dredging on this new dredge build. The specifications and overall design of the dredge will lend itself to the future of efficient dredge designs while still providing a beast of a dredge. Muddy Water Dredging has taken steps to bring a new dredge to the industry that will be designed for high production capacity, the latest in dredging technology and an efficient and practical design. It doesn't get much better than partnering with clients that share the same vision and that's exactly what we have with Muddy Water Dredging. This is going to be fun. ■

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



THE UPDATED BIRD GETS THE WORM!



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Making it easy to get what you want

Let's face it, there's never a good time for failed equipment, especially when it's preventable. Clogged pumps lead to downtime and downtime leads to frustration, to say the least. With thousands of installations solving clogging issues, the XFP submersible pumps, utilizing the Contrablock Plus system, have proven themselves to prevent problems before they even start. With superior solids and rag handling and lower maintenance costs for long-term reliability, the choice is easy when it comes to replacing your failing equipment.

And to make it even easier, the XFP is available with a wide range of competitor retrofitting solutions for drop-in replacements, saving time and costly rehabilitation of a pump station. From retrofit brackets to controls to custom solutions, Sulzer makes it easy to get what you want. Don't you think it's time for change?

