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JUNE 2020



A NOTE ON THIS ISSUE:

Thank you for joining us for the June issue of MPT. As businesses head into the final fiscal quarter of 2020, they are setting their purchasing budgets for the year ahead. In this month's SWPA Insight (pg. 12), Executive Director Adam Stolberg and John Wilson, president of Industrial Flow Solutions, lay out some important keys to consider if you plan on entering the market for a new submersible wastewater pump. Be sure to check out our "Submersible Wastewater Pump Buyers Guide" and keep it handy.



J. Campbell, Editor Modern Pumping Today

Pumps, fans, and compressors account for about 60 to 70 percent of total electrical energy usage by

U.S. manufacturers. However, goals to improve pump efficiency and reduce energy costs may not carry a high priority to owners and operators when their primary focus is to keep operation running smoothly. In our Maintenance & Reliability section (pg. 26), Ben Keiser of Applied Flow Technology argues that the time has come for "Going Beyond Efficiency Standards."

Lastly, we love to share outside-the-box technology with our readers, and in this month's Pump Solutions section, you can get a closer look at how the all electric diaphragm pump is changing the game in double diaphragm pumping (pg. 34). It is a positive displacement pump for municipal sludge, slurries, pastes, or anything that an air operated diaphragm pump can pump.

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



J. CAMPBELL Editor

jay@mptmag.com

TONYA BROWNING Vice President

tonya@mptmag.com

JEFF FLETCHER National Sales Manager

jeff@mptmag.com

LISA AVERY Art Director

CRISTELA TSCHUMY Graphic Designer

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subscription inquiries or changes: 205.380.2048



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CUI GLOBAL CHANGES NAME TO ORBITAL ENERGY GROUP

CUI Global, Inc. announces it will change its name to Orbital Energy Group, Inc., effective immediately. The new name reflects the company's strategic

repositioning to become a diversified energy infrastructure services company. Orbital Energy's common shares will continue to be listed for trading on the Nasdaq under the new ticker symbol OEG. In conjunction with the name change, the company will be launching a new corporate website at

www.orbitalenergygroup.com

The name change follows the company's platform acquisition of Reach Construction Group, completed on April 1, 2020. Headquartered in Apex, North Carolina, Reach is an engineering, procurement and construction company with expertise in the renewable energy industry. The company believes the name Orbital Energy Group more accurately depicts its extensive capabilities and innovative products, evolving business and new brand—a brand that provides a wide range of energy infrastructure solutions. "We are excited to change our name to Orbital Energy Group as part of our company-wide transformation," says Jim O'Neil, vice chairman and CEO of Orbital Energy. "This rebranding marks a key milestone as we leverage our engineering and construction capabilities."

SWETYE ADDED TO BOARD OF HYDRAULIC INSTITUTE

Jim Swetye, Grundfos technical training manager, has been named to serve on the board of the Hydraulic Institute for 2020-2021 as vice president of education.

"It is really an honor to be entrusted with this role as an educator," says Swetye. "For me, the great thing about this organization is that we at the Hydraulic Institute can continue to develop training based on the knowledge and skill sets needed to assure that sound technical decisions are made concerning the world's pumping systems. And these systems are a critical part of global infrastructure."

As vice president of education, Swetye is responsible for leading educational initiatives within HI. The position ensures educational content is in alignment with HI's technical standards and guidelines, while also remaining accessible and addressing user needs.

In addition to serving on the board of HI, Swetye serves on the board of HI's educational subsidiary



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INDUSTRY NEWS

Pump Systems Matter (PSM) as vice chairman. PSM, the primary focal point for HI's pump systems education and outreach, helps the pump industry and users gain a more competitive business advantage through strategic, broad-based energy management, and pump system performance optimization.

WATSON-MARLOW FLUID TECHNOLOGY GROUP ACQUIRES FIRST NSF/ANSI/CAN 61 ACCREDITATION

Watson-Marlow Fluid Technology Group announces that it received the first NSF/ANSI/CAN 61 accreditation in the world for its chemical metering hose pumps for drinking water supply. Companies manufacturing, selling, or distributing water treatment or distribution products in North America must ensure their products comply with NSF/ANSI/CAN 61: Drinking Water System Components— Health Effects.

This global performance-based standard evaluates the quantity of contaminants that leach from equipment and the components and materials that come into contact with drinking water. These indirect additives can occur at any point in the journey from source to tap, including production, treatment, and distribution.

"In a critical sector like drinking water supply, utilities, and municipalities need to know that the equipment they are using is safe and fit-for-purpose," says Rick Balek, sales manager, Watson-Marlow Inc. "The NSF mark provides assurance that our products have been tested by one of the most respected independent certification organizations in existence. Our commitment to quality, compliance, and safety is company-wide and we share our customers' priority in ensuring that safe supply goes beyond treatment and disinfection and right up to the tap."



FRANKLIN ELECTRIC ACQUIRES CPS PUMPS

Franklin Electric Co., Inc. has finalized a strategic acquisition of CPS Pumps to expand its product offerings focused in the large submersible and industrial pump business seqments. Franklin

Electric has acquired the product lines and assets of CPS Pumps, along with its current manufacturing process in Rossville, Tennessee.

The acquisition brings Franklin Electric a deep and diverse set of key products and expertise, including a full portfolio of line shaft turbines, split case, end suction, fire protection, and ANSI-style pumps, allowing the company to better serve global customers in the agriculture







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DSC DREDGE LAUNCHES DREDGE PRODUCTION SMARTPHONE APP

DSC Dredge launches its new app for iOS mobile devices-the DredgeMaster Suite. This addition to DSC's technology suite illustrates the company's initiative in building the most comprehensive experience for dredge owners and operators.

"We get dozens of requests to do dredge evaluations on a weekly basis," says William "Bill" J. Wetta, senior vice president and chief technology officer of DSC Dredge, "For years we have tried to figure out a way to allow customers to have access to this information themselves without giving away all of our trade secrets. From this desire to better serve our customers, the concept of the DSC DredgeMaster Suite app was born."

The first comprehensive solution of its kind, the DSC DredgeMaster Suite app has been developed entirely in-house as a collaborative father-son effort, as Wetta's youngest son, Nick Wetta, has spent the past two years working tirelessly to bring this concept to life.

ARMSTRONG SPONSORS POST-COVID VIRTUAL SUMMIT EVENT

Armstrong Fluid Technology is sponsoring a virtual summit June 10, designed to help building owners and operators create and maintain healthy indoor spaces in today's challenging environment. Entitled "Healthier Buildings for a Greener Future: Improving Air Quality in Buildings Post-COVID," the discussions will focus on indoor air quality, sustainability, energy savings, and occupant comfort.

The first session of the virtual summit, "Risk Reduction in the MUSH Sector," will feature a panel of industry experts from the municipal, university, school, and hospital (MUSH) sectors and will address health challenges in indoor spaces. Part of the session will focus on government's role in providing further incentives to upgrade and retrofit buildings.

The second session, "Going Green: How Technology Can Improve Employee Health and Reduce Emissions," will focus on what solutions exist to help building owners and operators improve the health and sustainability of buildings. Healthy building advocates and technology providers will discuss building technologies hurdles, obstacles to building upgrade projects. and how building owners can overcome them.

The virtual summit is free and registration is available at **www.armstrongfluidtechnology.com**.

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Submersible Wastewater Pump Buyers Guide

By SWPA Executive Director Adam Stolberg and John Wilson, Industrial Flow Solutions

s businesses head into the final fiscal quarter of 2020, they are setting their purchasing budgets for the year ahead. Below, SWPA Executive Director Adam Stolberg and John Wilson, president of Industrial Flow Solutions, lay out some important keys to consider if you plan on entering the market for a new submersible wastewater pump.

When choosing a submersible wastewater pump, what is the basic checklist a potential end-user should start with?

It is important to understand the type of lift station involved, the source of the wastewater, any solids the pump will be exposed to, along with a number of other criteria. A highlevel check list includes understanding the:

- Make-up of the wastewater, potential solids size and materials. Critical to pump selection, confirm if the pump will be used for sewage water including size of solids or a combination of stormwater and sewage with potentially larger solids.
- Origin of the wastewater (i.e., residential, industrial, hospitality, hospitals, or prisons). This helps determine the type of effluent and potential for additional entrained foreign material.
- Need for pumps suited for explosive environment or chemical exposure.
- Application—whether the pump is for a new installation or a replacement.
- Space allowed for pump. Ensure there are no space restrictions that could affect the selection.
- Control scheme and if a back-up pump is available.
- Monitoring requirements for pump performance. Understanding the desired control approach and location of the lift station, i.e. a remote location with minimal regular inspections, will dictate the type of control and monitoring approaches needed.
- Technical requirements such as flow, total dynamic head, voltage, basin sizing, and other special needs.



A complete understanding of the above will allow you to select the correct type of pump used in a given application. In most cases, a shredder or chopper pump will hold an advantage to traditional "non-clog" pump designs. Shredder or chopper pumps reduce solid matter to a size, allowing these to pass through the pump to the bar screen at a municipal treatment plant; whereas a traditional nonclogging pump builds up solids in the eye of the pump impeller causing the pump to fail.

What characteristics should a purchaser look for in a manufacturer or distributor's reliability? Where could one find resources to best assess a product's reputation?

The goal of any application is to maximize uptime while minimizing total life-cycle costs. To help ensure your system operates to full performance, consider these key factors:

- **Quality:** Manufacturer's proven track record of pump performance in a given application. Understand the installed base of a current manufacturer, including years of successful performance.
- **Technical Expertise:** Both manufacturers and distributors should have in-depth product and application knowledge in industries that they serve. A solid understanding of proper pump selection, pump operation, and application needs is essential for long term performance. These skill sets also help diagnose and address possible issues after installation.

• **Responsiveness:** Manufacturers and distributors should not only have components on hand to support the need for new pumps or spare parts to minimize disruption to facility operation, they should also offer proper service capabilities. Since periodic maintenance is required for submersible pumps, be sure to find a partner with local support and adequate inventory.

Also, be sure to validate past performance and capabilities of both the manufacturer and distribution. This can be done by requesting reference lists, contacts, and case studies while also reviewing technical capabilities online via company websites, social media posts, and online reviews.

Who should be involved in the decision-making process? Does it vary depending on if this is a private or municipal purchase?

Engage all key stakeholders. This could include the building owner, facility manager, engineer, operator, and service technicians. These individuals influence the final purchase to ensure long term performance and minimal cost of ownership. Be it a private or municipal purchase, all influencers should be consulted in the process. While the weighting of each input may vary, the immediate need and long-term performance will be taken into consideration.

At a minimum, the engineer, whether contracted or inhouse, along with the service technician(s) should work together in the analysis and selection process. While an engineer determines lift station design and compliant pumps for a respective application, the service technician provides the knowledge required for future maintenance and repairs. Combining these subject matter expert's opinions during the decision-making process will greatly improve the longevity of a system.

When is the best time in the life-cycle of an old pump to start shopping for its replacement?

A spare pump should always be on hand for emergency repairs. Typically, the search for a replacement should start once the spare has been installed. In cases where it is not feasible to have an inventory of spare pumps, it is important to implement preventative or predictive maintenance strategies to minimize unexpected down time and prevent unexpected costs due to emergency repairs or replacements. It is recommended to monitor performance such as:

- Preventative maintenance—implement a program to regularly inspect and service pump systems.
 Document the findings to provide better insight to parts or replacement purchasing strategies.
- · Monitoring the system for frequent high-water alarm

occurrences. This could signal a pump is unable to keep up with demand due to the possibility of an undersized pump or damage to an impeller.

- Also monitor a pattern of frequent clogging. In these cases, an upgrade to a shredder or chopper pump is in order.
- Pump performance monitoring—this could include monitoring seal chambers to determine if water has entered an oil filled mechanical seal chamber.

After the submersible is installed and running, when is the best time to assess the purchase and what performance factors should the pump user consider?

This process should start immediately after choosing a partner to work with, be it the manufacturer, distributor, or system installer. It is important to confirm the following:

- Proper equipment specified.
- On-time delivery of equipment and documentation.
- Necessary documentation such as instruction manuals, drawings and recommend spare parts listings were provided.
- Installer's technical expertise regarding proper installation and performance validation.
- Availability of on-site support.

After installation, the assessment approach is an ongoing process. Key considerations include:

- A comprehensive start-up procedure, along with a follow-up report.
- Product meets the technical characteristics represented by electrical and hydraulic performance checks.
- Performance matches engineering specifications and manufacturer's supplied documentation.
- Service contract options.
- Availability of customer and technical support from the manufacturer/distribution.

Given the impact submersible pumps have on a facility, be sure to continually assess the performance of the product, the manufacturer, and the distributor. \blacklozenge

The Submersible Wastewater Pump Association (SWPA) is a national trade association representing and serving the manufacturers of submersible pumps for municipal and industrial wastewater applications. Founded in 1976, the association's primary focus is on industry guidelines, education, and promotion. SWPA's Summer Meeting and Plant Tour is scheduled for August 2020. For more information, visit **www.swpa.org**.

When It Comes to Clean Water Compliance, Linko Cleans Up

Integrated regulation updates ensure compliance, and streamlined reporting save times while maintaining consistency across all industries

By Rich Prinster, Aquatic Informatics



Anitation District No. 1 (SD1) has managed Northern Kentucky's wastewater and stormwater for more than seventy years and is committed to keeping its rivers clean. Every day, SD1 cleans thirty-seven million gallons of water, serving a population of 115,000 customer accounts with a network of over 2,000 miles of pipe below ground.

Sarah Griffith, laboratory and industrial pretreatment manager, oversees the laboratory and manages the industrial pretreatment and FOG (or fat, oils, and grease) programs at SD1. In the lab, the team performs 40,000 analyses per year, seven days a week. On the pretreatment side, the team oversees, inspects, and samples fifty-five industrial users in the service area, and also permits and inspects 200 food service establishments (FSEs) under the FOG program. SD1 has the second largest pretreatment program in Kentucky.

THE CHALLENGE

After using Linko, a compliance management software by Aquatic Informatics for several years, a newly developed environmental compliance module was released by the computerized maintenance management system (CMMS) that many departments within SD1 used for the scheduling and tracking of work. As an exercise in due diligence, the industrial pretreatment and FOG program teams attempted to move to this new module, as it seemed like a practical decision for the organization.

Although the CMMS was a very robust and comprehensive program for other teams within the organization, it quickly became apparent that the CMMS' compliance capabilities were not advanced enough to manage SD1's pretreatment and FOG programs.

"The CMMS worked to the extent that you can handle industries as assets and track utilization of time," explains Griffith. "However, it was just not able to handle compliance and compliance is a big part of what we do."

ORGANIZING THE DATA

In order to not lose Linko's purpose-built compliance capabilities, SD1 decided not to fully move away from it for their pretreatment and FOG program management so it was not hard to switch back to full functionality.

"To be honest, it was easy to stay with Linko, and it wasn't hard to justify to our executives," says Griffith. "Staff members were still naturally wanting to use the programs and it was already much easier to perform the functions we needed in Linko versus in our CMMS."

Pretreatment programs involve a lot of data, compliance is complex, and regulations do change. In many ways, temporarily moving to a CMMS helped SD1 realize the value of purpose-built software. "We spent a lot of energy trying to make the CMMS work for something it wasn't made for, especially when we already had a solution that worked," says Griffith. "In some sense, it was good for us to become familiar with the limitations of our CMMS, but at the end of the day, Linko's compliance capabilities aren't to be found anywhere else."



Now that SD1 had confirmed that their old software solution had the best capabilities, they moved over to cloud hosted environment.

"From my experience with different types of software, I've found that hosted environments generally work better for specialty software," says Griffith. The transition from on premise to hosted is simple with no training required and allows for better access to the program and an added level of security.



REGULATIONS AND COMPLIANCE

SD1 also uses the LabSync function that allows for the automated transfer of results from the lab. They run LabSync nightly, so each morning new data is ready to review from LIMS. The program alerts SD1 to possible compliance issues, giving them a preliminary check on compliance.

"It's comparable to having a second set of eyes check for compliance, but on the front end. We then can review those possible issues and move forward with enforcement as needed, resulting in amazing time savings," says Griffith. "I'd say that it saves us thirty minutes per event, per industry. This is the module that we use the most, and with everything so automated, it eliminates redundancy and a lot of manual work."

Regulations, and how regulations are interpreted, change over time. By automatically integrating change of regulations in the cloud environment, SD1 is able to keep on top of regulations without involving IT for software updates. Compliance Assistant and LabSync are preloaded with nearly all weekly definitions, making compliance easier to determine. The Compliance Assistant can determine compliance against rolling quarters and can identify significant non-compliance issues. "Other programs we've tried cannot do this well or at all," says Griffith.

SAVING TIME IN A CHANGING WORLD

SD1 does all reporting through Linko. Having the ability to extract all of the events, site visits, sampling events, etc. from one location saves a lot of time. In addition, state reports often change slightly every year, so a key time saving feature is the ability to query data to answer the questions required for the reports as opposed to having to spend hours combing through results manually. Permitting is another function that falls on Griffith's team. Standardized permit templates with Permit Writer allows SD1 to establish standard permits and easily tweak when needed. Violations can be issued and tracked along with an enforcement response plan that automates compliance.

"This is a great tool for keeping permits standard, especially when changes occur and we have to reissue all fifty-five industry permits at the same time. It's really nice to be able to pull all the pieces together and create all of the permits at once," says Griffith.

"At the end of the day, if you aren't familiar with pretreatment, you would think that it's just comparing a number against the limit. If that were the case, Excel would work. But, regulations change, interpretations change, and having a software platform that keeps up with that saves time and improves compliance." \blacklozenge

Rich Prinster is Linko strategic business development manager for Aquatic Informatics. Prinster has been with Aquatic Informatics for more than eight years where he has helped hundreds of municipal pretreatment programs address their data management issues with Linko software. He focuses on bridging data silos within water utilities to enable better, more timely decisions. Aquatic Informatics provides software solutions that address critical water data management, analytics, and compliance challenges for the rapidly growing water industry. Water monitoring agencies worldwide trust Aquatic Informatics to acquire, process, model, and publish water information in real time. For more information, visit **www.aquaticinformatics.com**.



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A World in Crisis Needs Safe Water

International Code Council calls attention to the need for water conservation and efficiency

By Dominic Sims, International Code Council



Ithough 70 percent of our planet is covered with water, less than one percent is drinkable. Clean water is the world's most precious commodity and accessing it is still a challenge for many populations around the globe. To ensure populations have access to clean water as they grow, the International Code Council, in addition

to many jurisdictions, manufacturers, and organizations, are working to improve water conservation, label new homes and structures as more water efficient, and spread the word about the need for smart water use.

According to the World Economic Forum, 2.2 billion people currently do not have access to clean drinking water. And the World Health Organization (WHO) estimates that by 2025, half of the world's population will be living in water-stressed areas. The Flint, Michigan, water emergency and drought in South Africa are just two examples that shine a spotlight on a growing global issue. Not only is water vital to our communities and economy, it is also important for public health. Now is the time to band together to create solutions to provide greater accessibility to safe and clean water. Here are a few ways to help promote water conservation and efficiency:

HARVEST RAINWATER

One significant way to conserve water and use it more efficiently is through rainwater harvesting. This method captures, diverts, and stores rainwater from a structure or surface in order to store it for later use. However, while modern rainwater harvesting systems have not yet become commonplace in North America, in many locations with constrained or contaminated sources, interest in the use of rainwater harvesting systems for both potable and non-potable use has grown in recent years.

With the recent publication and release of the 2021 International Plumbing Code[®] (IPC[®]), the CSA B805/ICC 805 standard was included as an alternative for collection and distribution systems using rainwater. Furthermore, this same standard will be part of the 2021 International Residential Code® (IRC®), which is slated to be published later this year. This CSA B805/ICC 805 standard addresses roof surface rainwater and stormwater being used as source water for single-family, multi-residential, and non-residential environments. It also addresses non-potable applications

like irrigation, fire protection, toilet and urinal flushing, and vehicle washing. In addition, potable applications such as food preparation, dishwashing, and bathing are also included where permitted by the applicable jurisdiction.

APPLY THE MOST MODERN BUILDING CODES

Another way to ensure water is being used efficiently is to implement the most modern, up-to-date plumbing codes. Modern building codes lead to resilient communities, safe plumbing and efficient technologies. Plumbing professionals and welltrained code officials maintain these systems and ensure our communities have safe, accessible water.

Plumbing codes help ensure the proper performance of plumbing systems in residential and commercial buildings. For example, the International Plumbing Code incorporates innovative technologies and detailed engineered designs that permit the installation of smaller, more precise water usage and water drainage systems, resulting in the savings of millions of gallons of water. Most recently, the Code Council and the Residential Energy Service Network (RESNET) partnered to develop a joint standard accredited by the American National Standards Institute—ANSI/RESNET/ ICC 850-2020 Standard Calculation and Labeling of the Water Use



ABOUT WATERSENSE

WaterSense, a voluntary partnership program sponsored by the U.S. Environmental Protection Agency (EPA), is both a label for water-efficient products and a resource for helping you save water.

The WaterSense label makes it simple to find water-efficient products, new homes, and programs that meet EPA's criteria for efficiency and performance. WaterSense-labeled products and services are certified to use at least 20 percent less water, save energy, and perform as well as or better than regular models.



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Performance of One-and Two-Family Dwellings Using the Water Rating Index. This standard helps communities with water conservation efforts by setting technical specifications for inspections, testing and ratings of home water efficiency.

Plumbing codes are also critical for emergency situations like the current pandemic. For example, code officials ensure that healthcare infrastructure, including temporary structures and occupancies, are built and maintained to ensure safety. From adequate facilities to ensure handwashing to safe and sanitary plumbing systems that mitigate the spread of contagions and much more, the role of code officials and inspectors remains vital.

LOOK FOR THE WATERSENSE LABEL

In partnership with the U.S. Environmental Protection Agency's (EPA's) WaterSense Program, the ICC Evaluation Service, LLC[®] (ICC-ES[®]) PMG Listing Program aims to help identify water efficient products that meet EPA's criteria for efficiency and performance. To receive WaterSense certification, products undergo rigorous testing for efficiency and performance.

Since its inception in 2006 through 2018, WaterSense has helped

"Now is the time to band together to create solutions to provide greater accessibility to safe and clean water."

Americans save a cumulative 3.4 trillion gallons of water and more than \$84.2 billion in water and energy bills, according to the EPA. Additionally, the use of WaterSense labeled products saved 462.5 billion kilowatt-hours of electricity.

PROMOTE WATER SAFETY

In an effort to increase awareness, this past Building Safety Month an educational, interactive campaign that takes place each May presented by the Code Council to help promote the importance of building safety devoted an entire week to bringing awareness to the importance of water safety and urging action to ensure clean water through proper construction, conservation and safe disposal.

No matter the time of year, it's important for us to implement water conservation and efficiency methods to ensure the health and well-being of all.

Dominic Sims is chief executive officer of the International Code Council. The International Code Council is a nonprofit association that provides a wide range of building safety solutions including product evaluation, accreditation, certification, codification, and training. It develops model codes and standards used worldwide to construct safe, sustainable, affordable and resilient structures. For more information, visit **www.iccsafe.org**.



I/O for the IIOT

Edge I/O creates a simpler way to meet the needs of today's IIoT applications Part 1 of 2

By Benson Hougland, Opto 22

I n an era of increasing connectivity and technical capabilities, it seems like simple ideas should be, well, simple to achieve. Suppose you need to do something like:

- Log temperature data from a refrigeration unit into a database.
- Receive a text message if a warehouse door is opened after hours.
- Publish process flow and pressure data into a SCADA system.
- Send an air compressor's total running time to a cloud analytics system Control a security light with your smartphone.

Simple ideas, right? But, in fact, while we can do all of this with current technology, it's expensive, demands special skills, and involves many steps—all of which make any IIoT project far from simple.

IIOT PROJECTS ARE TOO COMPLEX

The majority of signals in the real world are basic wired switches, sensors, and transmitters, despite advances in smart wireless devices. Getting signal data where you want it to go is complicated. Take temperature data, for example. First, you or someone you hire—needs to have the skills required to specify and procure all the numerous components of an I/O or PLC system that will work with a temperature sensor.

Then you must install an appropriate enclosure for the PLC and I/O, assemble them, and supply them with power. Next, you install a temperature sensor in the refrigeration unit, and connect it to a suitable input channel on a temperature input module mounted on the PLC rack. Then you



program that PLC, using the vendor's proprietary software, to configure the input channel for the correct signal type and to acquire and log the I/O data.



Next, you'll likely need a PC with a software application that can read the PLC's memory for the logged data, and translate the data into a format the database can understand. Finally, some software will need to log into the database and post, or insert, the logged, translated data. And if the database isn't on premises, or in the cloud somewhere that's accessible, good luck!

CONTROL SECURITY LIGHT

Turning on a security light from your phone sounds easy, but it still involves many steps. Once you have the light contact wired to an output on a PLC or PAC and the output configured, you'll program the PLC to turn the light on or off based on an input from an HMI, which is usually running on a separate PC.

But if your HMI software program isn't mobile-ready, you'll need to find a different HMI package, buy it, and build new interface screens.

SEND COMPRESSOR ON-TIME

What about sending the compressor on-time to a cloud analytics platform? Again, first you must specify, buy, and install the right equipment. Then you wire a status contact on the compressor to a digital input module on the PLC, PAC, or controller to sense its on/off status. After that, you program the PLC to configure the input and write ladder diagram or a function block to totalize how long the input is on, which will keep track of how long the compressor has been running. Next, you'll need a gateway or other suitable computer that can read the PLC's memory for the totalized data and provide that data to the cloud analytics package of your choice in a format it can understand.

Not simple.

A COMPLICATED, COSTLY PROCESS

As we can see in just these few examples, meeting seemingly simple needs today is a complicated process. In many cases, you already have sensors, contacts, and transmitters in place with the data you need, but that data is locked in proprietary PLC systems behind someone's control program. To access that data, typically you have to:

- Change the program in the PLC, PAC, or other controller to acquire the data you need.
- Purchase and activate necessary middleware (hardware and software, including licenses) with the protocols, languages, and translators required for your application.







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- Configure and program middleware as necessary to move data where it's needed.
- Understand and configure internet gateways and network connections, including server firewalls, security certificates, and user accounts.
- Establish communications between the PLC, PAC, or controller and the data's destination.

MOVING TOWARD SIMPLICITY

The goal we're trying to reach with the IIoT is a simpler process of gathering



real-world signal data, communicating it, and making it available where it needs to be used. Whether you're monitoring remote assets, acquiring data for analysis or regulatory purposes, controlling equipment and processes, or bringing visualization to operators and supervisors, you want to avoid complexity and the time and money costs that go with it. Fortunately, automation manufacturers are introducing newer kinds of I/O—called edge I/O—with features designed to help streamline IIoT projects.

KEY SIMPLIFIERS

These new edge I/O products do not require a PLC or industrial PC. Instead, they are designed as intelligent, distributed I/O devices to meet the needs of IIoT applications, especially those that require data acquisition or communications.

What are some of the key features of new edge I/O products that help simplify IIoT projects?

- Easy to spec and buy. A single part number includes everything you need: I/O, networking, processor, power, and embedded software. Edge I/O units don't necessarily require a power supply, instead using power over Ethernet (PoE) for the unit's processor as well as excitation for outputs and self-wetting discrete inputs. Typically, the cost is within many maintenance budgets.
- **Compact and sturdy.** Edge I/O products are small industrial units that can be placed almost anywhere. They operate within a wide range of ambient temperatures and comply with environmental requirements, including UL Hazardous Locations and ATEX approvals. Edge I/O is available in small form factors and may be DIN-rail or panel mounted.
- Web-based configuration. For maximum flexibility in diverse applications, edge I/O

MAINTENANCE & RELIABILITY

may include various kinds of multifunction or multi-signal (DI/DO/AI/AO) channels, all configurable via web-based software. It may also include intelligent features like counting, thermocouple linearization, minimum/maximum values, and digital totalizing, which run independently on the unit.

- Embedded software and protocol support. A secure, authenticated, web-based interface simplifies commissioning and troubleshooting with edge I/O. Additional software is embedded as well, typically for creating simple data flows to connect edge I/O with local or cloud-based software and services. IT protocols and OT protocols are both supported, and efficient data communication methods like MQTT add flexibility, performance, and security.
- Built-in security. To help you maintain cybersecurity, edge I/O includes a number of features to protect the unit and your data, for example, user authentication, data encryption, VPN support, security certificates, and a device firewall you can configure from the webbased interface.

By reducing the cost and complexity of IIoT projects, edge I/O makes your simple ideas much easier to achieve.

A LOOK AHEAD

One example of new edge I/O products is the *groov* RIO[®] family from automation manufacturer Opto 22. The first product released in the family is a compact remote unit with a communications processor and ten built-in I/O channels: eight software-configurable multifunction, multi-signal I/O channels and two Form C relays. In next month's installment of this article, we'll see how an edge I/O product like *groov* RIO could help with some of the simple applications we mentioned earlier. ◆



Opto 22 was started in 1974 by a co-inventor of the solid-state relay (SSR), who discovered a way to make SSRs more reliable. Opto 22 has consistently built products on open standards rather than on proprietary technologies. The company's latest product line, groov RIO[®], provides compact, autonomous remote I/O that is ideal for communicating field data in IIoT applications. All Opto 22 products are manufactured and supported in the USA. Most solid-state SSRs and I/O modules are guaranteed for life. The company is especially trusted for its continuing policy of providing free product support and free pre-sales engineering assistance. For more information, visit **www.opto22.com**.



Part number GRV-R7-MM1001-10 includes eight software-configurable multifunction, multi-signal channels (inputs or outputs, discrete DC or analog, switch, voltage, current, ICTD, or thermocouple) and two Form C relays.



Going Beyond Efficiency Standards

Partlof2

By Ben Keiser, Applied Flow Technology

Pumps, fans, and compressors account for about 60 to 70 percent of total electrical energy usage by US manufacturers. Inefficient operation leads to higher energy costs. However, goals to improve pump efficiency and reduce energy costs may not carry a high priority to owners and operators when their primary focus is to keep operation running smoothly. Owner/operators are more interested in improving reliability, minimizing repair costs and downtime, and increasing profits. A systemwide approach to an efficient and reliable design and operation of a piping systems is much more effective than a component by component approach (i.e., only addressing the pump itself).

A quality flow analysis software tool provides engineers and operators a better understanding of their system. This empowers them to make more well-informed decisions on how they could concurrently improve efficiency and reliability while reducing energy, repair, and maintenance costs, minimize downtime, and increase profits. Before we get into the benefits of flow analysis software, let's discuss efficiency. In this article, we are going to focus on liquid piping systems and pumps.

In 2016 the US Department of Energy (DOE) launched the first Energy Conservation Standard for Clean Water Pumps. 10 CFR Part 431 is the new standard that increases the importance of energy efficiency for pump systems.

WHAT IMPACT IS THIS STANDARD GOING TO HAVE?

In short, pump manufacturers will need to ensure their pumps meet a Pump Energy Index (PEI) which complies with a minimum allowable efficiency based on the DOE pump energy conservation standards. When plant end users are looking to purchase a pump, they will need to consider the PEI for the pump as well as standard operating values such as flow rate, required total dynamic head (TDH) at the operating point, best efficiency point (BEP), etc.

The details regarding the energy conservation standard or how the PEI is calculated is outside the scope of this article. Rather, it is important to bring awareness to the existence of the standard and that it is a big step forward in the efforts of using more energy efficient pumps.

Unfortunately, purchasing a pump with a compliant PEI does not guarantee it will operate efficiently. There are many ways pumps become inefficient.

Outside of the new Energy Conservation Standard, there are not many standards for designing pump systems. Often, system components are designed independently, and time may not be spent to evaluate how components will interact with each other. This can lead to inefficient pump operation if the system causes the pump to operate away from its BEP.

In other cases, systems may be designed to meet future requirements with increased capacity but must operate to meet current market needs. Pumps may often be oversized, but not just for meeting future requirements. Sometimes, pumps get significantly oversized when design factor upon design factor is applied from the engineer, to the supervisor, the client, and finally the manufacturer. In either case, control valves may be installed to meet current demands. Energy is added from the pump, and then excess energy is removed as pressure loss across a control valve. This is one of the most common ways that energy is wasted, leading to high energy costs.

DRIVES TO MAINTAIN HIGHER EFFICIENCY

It is like driving your car with your foot on the gas pedal and the brake at the same time. If possible, it is better to incorporate a variable speed drive (VSD) or variable frequency drive (VFD), which can adjust the pump curve via the affinity laws to operate at different flow demands. This will maintain higher efficiency as well as help the pump continue to operate closer to the BEP more so than a control valve would. Flow analysis software can be used to help determine what speed the pump should operate at to achieve these goals. There are a few other factors leading to inefficient pump operation. System aging and equipment wear take their toll on reducing system efficiency. As corrosion, fouling, and internal pipe scaling become prevalent, the system pressure loss increases. Also, as pumps wear out, the performance can deviate to a degraded pump curve. Overall, the pump and system would not be operating where they were originally designed to operate which leads to decreased efficiency and higher energy costs.

Calculating the efficiency for a pump is a simple task and is even easier with flow analysis software. When modeling a piping system with flow analysis software, a pump curve can easily be specified for a pump component. If an efficiency or power curve is entered as well, then the resulting efficiency based upon how the system is operating is simply an output parameter that requires no additional calculation. The resulting pump efficiency has a direct impact on energy costs. Improved efficiency can have a dramatic effect in lowering energy costs.

OPERATING AT THE BEST EFFICIENCY POINT

Although pump efficiency is important, the proximity of operation of the pump to its BEP is more critical. The BEP is the operating flow rate at which the pump's efficiency is at its maximum. Operating closer to the BEP can increase the efficiency of the pump itself. But it will have a much bigger impact on the overall reliability of the pump and that may be more important to focus on rather than the efficiency value itself.

Figure 1 is known as the Barringer Curve and it provides a graphical relationship between pump efficiency and reliability. Plotted is a typical pump curve and its associated efficiency curve. The BEP flow rate is represented by the vertical dotted line which identifies the maximum value of the efficiency curve. The bellshaped curve is a reliability curve which represents the mean time between failure (MTBF). If a pump is operating

"Flow analysis software can be used to help determine what speed the pump should operate at to achieve these goals."

at the BEP, this would represent an MTBF value of 1.0. This means that when operating consistently at the BEP, the pump will operate most reliability and will last the longest period from failure to failure. For some pumps, an acceptable range of flow rates to operate at could be from 80 to 110 percent of BEP. When operating in that zone, the reliability curve shows a significant decrease to 0.5

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Figure 1: Barringer Curve that demonstrates the relationship between efficiency and reliability for a pump.

MTBF. This means more failures, more repairs, more often. As the pump operates at flow rates further to the left and right of the BEP, there are some common problems that can occur in different areas where the pump is operating on its curve. Obviously, the pump is less efficient and will result in higher energy costs. But the real problem is the constant reliability issues that will be present such as cavitation, recirculation within the pump, seals and bearings wearing out faster, etc. Higher energy costs are easy to deal with in comparison to the significant repair and maintenance costs, downtime, and lost production and profits.

A LOOK AHEAD

Although it is good that there are more efforts now for vendors to provide more efficient and energy compliant pumps, it is easy to see from Figure 1 that it is not just about efficiency. With more focus on improving reliability, not only will this minimize repair costs, increase profits, etc., it will naturally improve pump efficiencies as well. In next month's conclusion to this article, we'll look into how to improve reliability as well as efficiency.

Ben Keiser is technical sales consultant at Applied Flow Technology. Keiser holds a bachelor's of science in chemical engineering (2009) from the Colorado School of Mines. He can be found teaching many of AFT's technical seminars and stopping over for lunch and learns with AFT customers. Founded in 1993, Applied Flow Technology has grown to be a leader in the pipe flow modeling software market. With a primary focus on developing high quality fluid flow analysis software, AFT has a comprehensive line of products for the analysis and design of piping and ducting systems. For more information, visit **www.aft.com**.

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Analysis of Peristaltic Pumping Technology in the Mining Industry

Adding value, minimizing costs Part 2 of 2

By Rob Martindale, Watson-Marlow Fluid Technology Group



ast month, we stressed that the importance of water and the impact of mining on local and regional water quantity and quality cannot be underestimated, and consequently all mines must carefully choose the pump equipment and systems they will use. In a peristaltic pump, such as a Bredel hose pump, nothing but the hose touches the fluid, eliminating the fluid contaminating the pump. The hose is at the heart of peristaltic operations, and in the following conclusion to this article, we'll highlight its benefits as well as calculate savings of using a peristaltic hose pump over a rubber lined centrifugal pump.

THE HEART OF PERISTALTIC OPERATIONS

Fluid is drawn in and trapped between two shoes before being expelled. The complete closure of the hose, which is squeezed between a shoe and the track, gives the pump its positive displacement action. The result is a pump ideally suited for the transport of typical mining slurries including pyrite, copper, zinc, uranium, nickel, cobalt, silver, platinum, lime, and gold concentrate.

Pumps like the Bredel range are virtually maintenancefree as there are no impellers, liners, or mechanical seals to replace, no check valves to clog, and no rotors or stators to wear out. The only wear-part is the hose, which can be replaced in a matter of minutes with no special tools.

The hose is the secret at the center of peristaltic technology. This is the part in direct contact with the slurry—so it needs to be both flexible and tough. At the heart of all Bredel hose pumps is a composite hose constructed from compounded rubbers reinforced with four individual layers of braided nylon, and finished by precision machining for enhanced suction, pressure and flow performance over its expected lifetime.

Design features such as these are important because over-occlusion of the hose stresses both the pump and hose, reduces hose life, and places unplanned loads on the pump bearings. Similarly, under-occlusion results in loss of pump efficiency and damaging back-flow, which also reduces hose life.

CALCULATING THE BENEFITS

In a thickener underflow application, consider an example of copper extraction based on froth flotation. Using a hose pump, higher slurry densities can be achieved compared to centrifugal alternatives. This ultimately introduces savings against process water and filtration equipment.

A typical slurry density goes up to a maximum of 194 pounds per cubic foot: Based on 35 cubic feet of slurry, and assuming that the ore is chalcopyrite ($CuFeS_2$) at a density of 268 pounds per cubic foot, it is possible to calculate volumetric solid content of 63 percent.

Based on published data for centrifugal pumps, it is known that the maximum dry solid content (by weight) will be 27 to 29 percent before efficiency begins to drop. Thus, assuming a maximum dry solid content of 30 percent by weight for a centrifugal pump, it can be shown that for the transfer of 70 tons of ore per hour (for example), a centrifugal pump will require a flow rate capacity of 6,390 cubic feet per hour, some seven times greater than that of a Bredel 100 to perform the same task, which offers 918 cubic feet per hour.

ANNUAL WATER USAGE: PERISTALTIC COMPARED TO CENTRIFUGAL PUMP

30%	60%
21%	47%
30%	80%
793 gpm	357 gpm
342 million gallons	98 million gallons
	244 million gallons per year (71%)
	30% 21% 30% 793 gpm 342 million gallons

Criteria: Transferring slurry containing 70 tons of solids per hour, operating 24/7, 365 days per year; specific gravity of solids: 1.65; specific gravity of slurry 1.13.

EVIDENCE OF GROWING UPTAKE

More and more mining industry customers are turning to peristaltic technology to provide solutions to specific problems. This is because peristaltic pumps can help mine operators face up to key challenges, which include:

- Reducing downtime
- Reducing operating costs
- Meeting environmental regulations
- Managing and reducing water inventories
- Reducing chemical usage
- Lowering maintenance costs

One beneficiary of peristaltic technology is a large copper and gold mining company in Arizona that had to frequently replace components on hard chrome iron centrifugal pumps used in a difficult tailings slurry application. The pump impellers were wearing out every two weeks, causing significant downtime and costly repairs. The mine considered several different pump technologies, finally selecting Bredel 100 hose pumps. In this application, the hose pumps transfer tailings slurry almost 2,200 feet to a separate plant. With no seals to flush and the ability to pump tailings with a high solids concentration (80 percent) the mine uses much less water with Bredel hose pumps, achieving considerable savings in both maintenance costs and water usage. Another example can be seen at Jaguar Mining Inc., which operates four gold mines in Brazil. The company first adopted Bredel hose pumps at its Turmalina mine when it was faced with pumping paste backfill comprising 4 percent cement and 69 percent solids. No centrifugal pump could handle the task.

To overcome the challenge presented by paste backfill, the mine operator installed a Bredel 100 on a trial basis and the results were so impressive that it subsequently purchased the pump, which is now transferring the mix with an S.G. of 2.8 at a rate of 1,765 cubic feet per hour over a distance of 1,378 feet. Today, the Turmalina site has installed multiple Bredel hose pumps for applications including backfill operations, flotation processes, leaching processes, and working with reagents. A similar success story at a large mine in New Brunswick, Canada, saw centrifugal slurry pumps replaced with Bredel hose pumps. The 65 percent solids of the zinc and lead thickener underflow slurries was too high to allow the centrifugal pumps to deliver the desired flow rate,





1.) Bredel 2100 hose pump handles paste backfill at 69 percent solids and 4 percent cement at Turmalina Mine, Brazil. 2.) Unlike other pumps, the performance of Bredel hose pumps is not affected by abrasive slurries and chemicals.

while abrasive wear was causing an unacceptable frequency of costly repair. Because the abrasives in the slurry do not affect Bredel pump life, the mine is now able to minimize downtime and achieve reliability at the desired flow rate.

ACCURATE CHEMICAL METERING

Another potential area of saving is through accurate chemical metering. The range of chemicals used in mining processes is vast and includes copper sulphate, xanthate, SIBX/ MIBX, GUAR, cyanide, sulphuric acid, lime, flocculants, zinc sulphate, aerophine, sodium silicate, BIOX, surfactants, and sulphides to name but a few. However, by using microprocessor-controlled brushless DC drive technology, Bredel hose pumps will properly maintain the flotation rates of ore extracts to ensure economical use of expensive chemicals and create significant process efficiencies. Bredel hose pumps have become first choice in mines throughout the world for applications that include dosing process reagents and pumping shear-sensitive polymers for flocculation and coagulation, abrasive lime slurries for pH control,

or corrosive chemicals like cyanide for gold recovery.

Ores, of course, have different mineral contents and pumps must consistently vary their dosing rates to optimize chemical usage and maintain plant throughput. Additionally, process reagents such as cyanides and acids are often highly corrosive but as the chemically resistive hose of a Bredel peristaltic pump is the only part in contact with the pumped product then there are no working parts exposed to the chemical.

The world's largest trona soda ash mine in Wyoming was experiencing problems with its diaphragm metering pumps used for dosing flocculant into the trona processing lines. The diaphragm pumps would last only five to six months due to the highly corrosive nature of the flocculant. Even after trying to add large amounts of water to the flocculants, which subsequently had to be removed from the process, the diaphragm pumps would still fail.

The mine purchased several Bredel hose pumps to address pump maintenance and flocculant wastage problems. The hose pumps' inherent corrosion resistance allows the mine to pump pure flocculant into the discharge lines and holding tanks. With no need to add water, the mine is saving money in water usage, process downtime, and maintenance costs.

CONCLUSION

Moving ores, concentrates, and residues in slurry form are essential parts of industrial mining processes. In an effort to reduce water, energy and chemical consumption, and improve slurry transportation reliability, more and more mining operators are discovering the simplicity and benefits of peristaltic hose pumps. With thousands of Bredel hose pumps already at work around the world, there is little doubt that hose pumps are the solution. \blacklozenge

Watson-Marlow Fluid Technology Group (WMFTG) is the world leader in niche peristaltic pump manufacture and associated fluid path technologies. Founded on nearly sixty years of supplying engineering and process expertise and with over one million pumps installed worldwide, WMFTG pumps are tried, tested, and proven to deliver. For more information, visit **www.watson-marlow.com**.



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All Electric Double Diaphragm Pump Changes the Game

How EODD pumps outperform and outlast air operated double diaphragms

By Chuck Martin, ABEL Pumps

he all electric diaphragm pump is changing the game in double diaphragm pumping. It is a positive displacement pump for municipal sludge, slurries, pastes, or anything that an air operated diaphragm pump can pump, but without the hassle of the usual drawbacks of having air. As air is being obsoleted by more and more customers these days for many reasons, such as cost, efficiency, functionality, safety, and lower energy usage, the EODD (electrically operated double diaphragm) pump can offer the lowest in class operating costs—and superior durability, if it is constructed of nodular

ductile iron and has an efficient motor and pump design. In most cases, this can mean up to 95 percent volumetric efficiency on average compared to any other pump. You no longer need to use electricity to run air to run a pump. A whole other cost center is now removed with only mechanical fluid dynamics to deal with instead of fluid and air.

SIMPLE SOLUTION, MYRIAD BENEFITS

High efficiency electro-mechanical drive and slow stroke rates keep energy bills low and wear parts cost to a minimum. Mechanical simplicity makes seldom needed maintenance a breeze, unlike progressive cavity pumps,

gear, rotary lobe, or peristaltic type pumps. A design that offers a robust construction with integral metal core ball check valves and fabric-reinforced diaphragms that offer a smooth mechanically controlled linear drive would prove the most desirable. Large ports and a diaphragm that is to one side of the fluid column offer passive pumping as well as for better fluid velocity and more room for the fluid, and, therefore, is less prone to plugging. Other pumps require tight



EM Model running in tandem duplex configuration.

PUMP SOLUTIONS

tolerances simply to operate, and that immediately makes them susceptible to plugging by nature. If it will flow, it usually can be pumped with an EODD pump, even to a range of about 40 percent solids, if it is compressible and will freely flow.

Large valve clearances also contribute to this winning equation. True process control is achieved via optional variable frequency drive, technology unavailable in air operated diaphragm pumps. There is no air valve to stick or malfunction in cold and hot weather. Optional discharge dampeners and suction stabilizers are available to minimize flow pulsations under variable or demanding system conditions. A form of flow control would also make this kind of pump a game changer in double diaphragm pumping!

ELECTRICALLY OPERATED DOUBLE DIAPHRAGM PUMPS

The EODD pump also offers the extreme versatility of opertaing in duplex mode with two pumps working at the same timesomething that an air operated double diaphragm pump cannot do. Since an EODD pump operates by working in a 90 degree outof-phase design, you can use two pumps in tandem at the same time and not only the traditional lead/ lag traditional fashion. This means that you only use one motor, one gearbox, one baseplate, and one manifold piping system systemfurther saving on material, time, money, and even weight as compared to two independent pump systems.

CONCLUSION

A truly all electric double diaphragm pump with a superior design will provide the very best return on investment that checks all of the boxes when it comes to pump selection and lasts two to three times longer with better parts wear and less maintenance than air operated double diaphragms. ◆

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Large electric motors controlled by VFDs are prone to high shaft voltages that can damage bearings through electrical discharge machining. Generators can also experience current surges and electrical arcing that destroy bearings.

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Optimizing Asset Performance

Sulzer offers long-term maintenance support for Colombian industries

By Jennifer Cardillo, Sulzer



Sulzer offers pump expertise to the major industries including oil and gas which uses the BB5 pump extensively.

repair solutions to the South American industry. Today, specialist teams offer a wide range of services for rotating equipment to support customers in power generation, oil and gas, mining, and water as well as general industry. In Colombia, the Bogota Service Center provides a comprehensive range of services that includes long-term parts and service contracts, which simplify maintenance projects and reduce lead times for components.

Many industrial operations use rotating equipment for a range of applications. Having in-depth knowledge about pumps, compressors, and steam turbines, no matter who built them, is very valuable. Sulzer's Colombian service center has extensive in-house expertise and can also call on a worldwide network of engineering facilities. This enables repairs and upgrades to be completed efficiently and cost-effectively.



Precision machine tools can optimize pump components from any manufacturer.

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MOTOR SOLUTIONS



EXPERT MAINTENANCE SUPPORT

Major industries in Colombia can minimize downtime and improve reliability by taking advantage of Sulzer's expert maintenance support. Extensive industry knowledge and expertise in rotating equipment ensures that customers receive a fast response for spare parts and servicing.

As a pump original equipment manufacturer (OEM) and independent maintenance provider for all rotating equipment, Sulzer has decades of experience in maximizing reliability and optimizing costs. In-house designers, manufacturing facilities and testing capabilities ensure a comprehensive service.

David Lora, general manager of Sulzer Colombia, adds, "We offer customers the opportunity to take advantage of Sulzer's expertise in repair technology and to benefit from this knowledge. We are able to organize long-term parts and service contracts for assets, which ensure that maintenance is completed on time and continued reliability is assured."

IN-HOUSE SPECIALISTS

To determine the most opportune time for repairs to be completed, Sulzer can design and install vibration monitoring equipment and analysis tools to implement a preventative maintenance schedule. Using preplanned outages for repairs is the most cost-effective way to deliver improved reliability.

For pump equipment, Sulzer can also design, build and install the electrical control equipment, including drives and accessories. Matching equipment to the application is just the first step, it is important for the controls to be properly integrated with the wider infrastructure.

In addition to these services, Sulzer also provides experienced field service engineers for on-site support of existing machinery as well as the installation and commissioning of new equipment. These skilled engineers receive regular training, for example API 686, 4th edition, to ensure they are up to date with the latest guidelines on the on the recommended practices for machinery installation and design in the petroleum sector.

CUSTOMER TRAINING

To help customers with their in-house maintenance, experts from Bogota can deliver training courses on operational best practice and routine maintenance for a wide range of equipment. This helps to extend reliability and the efficiency of important assets, which in turn, optimizes productivity for the customer. David Lora concludes, "We appreciate the challenges of working in heavy industry and the importance of asset reliability. Our goal is to deliver the most effective and efficient maintenance service for our customers and help them to achieve their objectives."

Sulzer is a global leader in fluid engineering. We specialize in pumping, agitation, mixing, separation, and application technologies for fluids of all types. Our customers benefit from our commitment to innovation, performance, and quality and from our responsive network of 180 world-class production facilities and service centers across the globe. Sulzer has been headquartered in Winterthur, Switzerland, since 1834. In 2019, our 16,500 employees delivered revenues of CHF 3.7 billion. Our shares are traded on the SIX Swiss Exchange. Throughout the Americas, Sulzer provides cutting-edge parts as well as maintenance and repair solutions for pumps, turbines, compressors, motors, and generators. We service our own original equipment as well as third-party rotating equipment operated by our customers. Our technologybased solutions maximize reliability and lifecycle cost effectiveness. For more information, visit www.sulzer.com.



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Quick Payback on Wear Ring

Electricity cost saving on pumps fitted with Vesconite Hilube wear rings

By Phillip de Villiers, Vesconite Bearings

etal-on-metal contact can result in galling and unwanted pump vibration, as well as severe damage to the pump; therefore, wear rings have become a critical component in many pump systems to prolong the life-cycle of a pump. Vesconite Bearings' Hilube polymer wear rings are proving so popular that they are currently the company's most important wear component for the pump industry—furthermore, they additionally save systems on electricity costs to such a great degree that the components offer a fast return on investment.

HOW HILUBE WORKS

The wear rings are used to restrict the pressure leakage of the fluid between the inlet of the impeller and the pump casing in centrifugal pumps. The wear rings are made from the thermoplastic Vesconite Hilube, which is a low-friction, wear-resistant polymer that replaces traditional metals such as bronze and stainless steel as well as other thermopolymers.

Here are the benefits:

- They replace metal components that require large running clearances to avoid metal-on-metal contact.
- They improve efficiency since tighter running clearances can be applied.
- They do not require pump redesigns, since they can fit into the same housings used by metal wear rings and, because they are press fit, do not require mechanical fitment or glue.
- They can be easily machined from a variety of tube stock or they can be machined for use us-ing Vesconite Bearings' machining capability.
- They are impervious to salt-water corrosion and thus are ideal for sea water and reverse osmo-sis pumps where galvanic corrosion may destroy stainless steel wear rings.



• Vesconite Hilube is approved, including by NSF61 and WRAS, for drinking water applications.

ELECTRICITY COST SAVINGS

The installation of Vesconite Hilube polymer wear rings can result in electricity savings that more than pay for the wear ring. This was the result of a study by a large pump original equipment manufacturer (OEM) that compared energy usage on a typical submersible pump when a Vesconite Hilube wear ring was in place and when a bronze wear ring had been installed.

Vesconite Hilube is a low-friction wear-resistant polymer. Wear rings made from the material are designed to seal the pressure leakage of the liquid between the inlet and the impeller and the pump casing, and should result in a higher pumping efficiency due to lower bypass.

VERIFIED PERFORMANCE

The pump OEM's results independently proved Vesconite Hilube's ability to improve pumping efficiency and decrease electricity usage. The study showed a 0.11 kilowatts per hour energy reduction when operation of the pump with a large diameter bronze wear ring was compared with operation of the same pump type with a dimensionallyidentical Vesconite Hilube wear ring.

Assuming the Vesconite Hilube wear ring's use on an industrial pump, operating twenty-four hours a day, 365 days a year, the electricity savings from installing a Vesconite Hilube wear ring add up, particularly when the pump is operated in a jurisdiction in which electricity charges are high.

In the specific pump that was studied by the OEM, the wear ring would have a three-month payback even where a low electricity cost was assumed. Electricity savings for a fiveto-ten stage submersible pump can be significant if the electricity savings of each stage are added together.

HOPE FOR THE FUTURE

With concerns about global CO₂ emissions from electricity generation—which reached 12Gt in 2010—as well as an awareness that pumps account for 10 percent of global electrical energy consumption, technological interventions are valued by pump manufacturers and pump users.

They are also of interest to state and national governments that are interested in reducing carbon emissions to keep global warming under 1.5 degrees Celsius. \blacklozenge

Vesconite Bearings is a world-leading manufacturer of low-friction, low-wear polymer bearing materials for a wide range of industries. Selling to over 100 countries, these include the pump, agriculture, railways, mining, heavy transport, hydro, renewable-energy, earthmoving, marine, and construction industries. For more information, visit **www.vesconite.com**.

Featured Product

LIBERTY PUMPS Model 404 and 405

As regions in the United States and Canada begin to re-open for business, they are doing so with some new requirements and restrictions on how they operate. To provide better sanitization, many are being required to add additional wash station areas for their employees and customers. The Liberty 404 and commercial model 405 are the perfect solution for these additions and remodels!

The opportunities exist in manufacturing facilities, restaurants, schools, health care facilities, and almost all public and commercial buildings!

Liberty's model 405 is one of the few models made here in the U.S. that features hightemperature capability along with higher-head pumping (max head 34 feet). The 2-inch inlet, discharge, and vent allow it to be installed commercially on multicompartment sinks, and it arrives fully assembled saving valuable labor time. Keep in mind we offer new versions with pre-installed alarms and NightEye[®] (Wi-Fi) enabled options for both the 404 and 405!

Our QuickTree® Technology provides a separate access cover for easy switch inspection. For gray wastewater applications, the 405 is perfect for laundry trays, multi-compartment sinks, bar sinks, utility sinks, dishwashers, and allows you the freedom to install fixtures where gravity drain lines are not available. The system arrives fully assembled and ready to install.



For more information, visit www.libertypumps.com.

MODERN PUMPING PRODUCTS

PULSAFEEDER PulsaPro Hypo Valve

The Hypo Valve is the latest innovation for the PulsaPro Pump Series and is designed to manage off-gassing in dosing applications. The Hypo Valve technology allows pressurized process fluid to cyclically flush liquid and vapors through the pump's discharge check system, while maintaining high performance and chemical dosing accuracy. This avoids common issues, such as vaporlock, which lead to reduced capacity and inaccurate chemical dosing, while also preventing unnecessary maintenance work. For more information, email prosales@idexcorp.com or visit www.pulsa.com.





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Seifert SoliTherm[®] Thermoelectric Coolers use the Peltier Effect for closed-loop cooling. The only moving parts are axial fans so there is virtually no maintenance. The Seifert Peltier thermoelectric cooling units can be mounted in nearly every position (except roof mounting) because they don't have a compressor or any moving parts aside from the fans. These thermoelectric cooling units are resistant to extreme ambient conditions and can operate effectively in dusty and oily environments and both indoor and outdoor applications. For more information, visit www.automationdirect.com/thermoelectric-coolers.

MITSUBISHI ELECTRIC AUTOMATION, INC. FR-E800 Series Variable Frequency Drive

The FR-E800 is built upon Mitsubishi Electric's proven variable speed control technology through years of reliable operation across various applications. It incorporates advanced capabilities in a compact footprint allowing for bookshelf style mounting. Additional features include extended programming functions, advanced fault detection features, and auto-tuning of PM motors for applications where energy efficiency is extremely important. The auto-tuning function includes configurable parameters to reach optimum performance, higher torque, faster acceleration, and lower noise level for quiet operation. For more information, visit https://us.mitsubishielectric.com/fa/en/products/drive-products/inverters-freqrol/fre/fre800/fre800/verview.





LYCO WAUSAU Stainless Steel Vacuum Pump

Lyco Wausau introduces a new stainless steel liquid ring vacuum pump with a close-coupled stainless steel wash down motor (Model 101-40-3SSM or Model 102-40-3SSM). It's ideal for food processing, pharmaceutical, medical, and chemical plants where frequent washdowns are required. The compact pump can provide vacuum up to 28 inches of mercury or move up to 52 cubic feet of volume per minute. Lyco Wausau offers a wide selection of reliable pumps, replacement parts, and accessories. For more information, call 715.845.7867 or visit **www.lycowausau.com**.

MODERN PUMPING PRODUCTS

FLOMATIC Sylax 3 Butterfly Valves

The Sylax 3 has a strong ductile iron valve body, 316SS disc standard, EPDM seat, and stainless steel stem. The valve is rated for 250 PSI bi-directional and dead end rating and has a 230 degrees Fahrenheit (110 degrees Celsius) maximum temperature rating. The valve is NSF/ANSI 61 and 372 certified for use with ANSI 125/150# flanges with standard curved and ergonomic handle for easy operation and standard ISO 5211 top flange for easy actuation. For more information, visit www.flomatic.com.





ASSURED AUTOMATION MAG Series Magnetic Inductive Flow Meters

The Assured Automation MAG series are volumetric magnetic induction flow meters that measure flow rate and totals at rates up to 160 gallons per minute, and also measure temperature. The rugged meter body includes electronics, display, user interface, and output signal generation in one compact unit. In addition to being more compact it is also less expensive than comparable meters and sensors. Analog, binary, pulse, and frequency outputs offer various options to process the measured data. For more information, visit www.assuredautomation.com/MAG-meter.

ENDRESS+HAUSER Micropilot FWR30 Radar Level Sensor

Endress+Hauser launches the Micropilot FWR30, its first cloud-connected radar, to provide full transparency in the storage and transport of liquids. As the world's first 80 GHz wireless IIoT sensor, it combines high-end technology and user-friendly digital services in one cost-effective device. The instrument's continuously recorded measurement data can be accessed at any time, from anywhere due to the device's cloud connection, with communication made possible by an integrated SIM card. Installation is easy and can be done in less than three minutes. For more information, visit eh.digital/fwr30_micropilot_us.





SENSOR TECHNOLOGY LTD. TorqSense Torque Sensors

Equipment rentals are increasingly helping companies overcome the hurdle of finding investment capital to fund development and verification projects. Having survived more than one downturn and recovery, Sensor Technology has a rental option in place for its TorqSense range of torque sensors. Potential users can choose to rent the equipment, rather than purchase it, thus circumventing the bottleneck of raising capital purchase approval. And to help companies along, if they decide that they want to hold onto their TorqSense for longer than they had anticipated, Sensor Technology is happy to convert the rental to a sale. For more information, visit **www.sensors.co.uk**.

MODERN PUMPING PRODUCTS

CIRCOR RTK Discharge and Pump Protection Control Valve

The RTK Discharge and Pump Protection Control Valve works as two valves in one: it brings together a pump protection recirculation valve and a control valve. In this capacity, the valve not only cut costs but also increases the life span of pumps by both regulating the main flow and the recirculation flow with a single valve. In industrial processes that use boiler feedwater and condensate pumps, the water is circulated in a closed loop by a pump. These pumps require a minimum amount of water flow to avoid problems that can stem from overheating and cavitation. For more information, visit www.circor.com.





MSA SAFETY TG5000 Gas Monitor

Facilities and plant engineers will find the next-generation TG5000 Gas Monitor from MSA Safety offers them a safe, reliable, and effective solution to the detection of oxygen, combustible, and toxic gases in a wide range of light industrial applications, including wastewater treatment, industrial plants, and commercial buildings. The feature-rich yet affordable TG5000 Gas Monitor helps personnel work safely with confidence in an extensive number of environments, offering a variety of gas sensor options and installation configurations. For more information, visit www.msasafety.com.

ASSMANN CORPORATION Small Conical Bottom Storage Tanks

These new small conical tanks are available with an all-plastic stand virtually eliminating points for corrosion due to steel components. These new conical tanks include polyethylene stands that raise the base off the floor, allowing room for drainage. The tanks feature a 45-degree molded-in slope bottom for complete drainage and are designed for stationary use indoors or out. If special stand elevations are required, Assmann Corporation has the ability to construct steel tank stands to accommodate your needs. The conical tanks are seamless molded one-piece units. Both the tank and the stand are corrosion resistant. For more information, visit www.assmann-usa.com.





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Pushing the Limits of a Microdrive

Yaskawa's Edward Tom says there's no reason to fear new drive tech



Edward Tom, Yaskawa

Trive technology is always changing to meet the industry's greater need for efficiency and control. Edward Tom, the drives product manager for Yaskawa America's drives and motion division, stopped by a recent episode of MPT's podcast, The Efficiency Point, to discuss his company's recently released GA500

Industrial Microdrive and why users need not be intimidated by high-tech drives.

MPT: What's the history of the GA500 design and where does it branch off from earlier Yaskawa products?

Edward Tom: The GA500 actually has a pretty long lineage going back. But just starting more with the recent one, it does replace our current product, and what it does is take its main core items, the ones that we feel are great benefits, great design points for it. But where it really branches off is by adding to it, making it easier to use for customers and more user friendly. Also when it comes to just the operation of a habit so that if a person needs to interface with it later on and do any troubleshooting, it makes that easy for them as well. So the biggest thing with it is that, when compared to its predecessor, it's something we like to say is easier to use, it has more capabilities built into it in terms of its control portion, and also an expanded horsepower range. So the GA500 is pushing the limits of what would be considered a microdrive.

MPT: Who would be the target audiences for the GA500?

Edward Tom: The target audience for the GA500 is any industrial application, so industrial pumping applications of that sort as well. And what it's really intended to do is to help make it easier for people to interface with it. The first thing we want to do is make sure the drive relieves some

of the tension that some people might have—even if it's their first time interfacing with the device. A lot of times, some people may look at that black box and kind of freeze up a little bit. And we want to make sure that when they do take a look at it, they have the information and they feel comfortable with it. So that's one of the main things we wanted to try to address with it.

What we've learned is that, a lot of times, users kind of look at it and if it's completely new, they really are just scared. I think that's not uncommon, and you don't know how to start or you're afraid of breaking it, we'll say. So eliminating that fear was one of the big things we wanted to do.

MPT: Which industries present the problems this product will solve?

Edward Tom: I mean, in VFDs and just drives in general, one of the two of the things that we offer is the energy savings aspect of it, being able to run at whatever speed that an application needs to as well as also lower the maintenance portion. When you are able to vary the speed much more on electrical standpoint versus mechanical, what you now do is also eliminate some of the maintenance that's associated with having the mechanical components in there.

So a lot of it really is intended to make daily use easier—simplify a lot of the systems that are out there so that there's not that higher complexity and there's less to worry about, whether it be from the beginning of the design phase with someone creating the machine all the way to the end user having it installed at their at their facility.

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



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