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OCTOBER 2022

A NOTE ON THIS ISSUE:

Welcome to this month's issue of MPT. Many of you may already be aware of the passing this past August of frequent MPT contributor and member of our editorial board, Heinz Bloch. He had enormous influence and longevity in the pump industry. Among his many accolades, Heinz was a prolific

writer, a pioneer in the field, a stalwart advocate of



J. Campbell, Editor Modern Pumping Today

best practices, but most importantly, a friend. A decade ago, when we were launching this magazine, Heinz was among the first voices we turned to for insight. If you've enjoyed and found the information in these pages valuable, then you owe a bit of gratitude to him, his high standards, and his vision. His outlook on the industry and set of values influenced our premier issue and continues to this day. He was never too busy to offer advice, encouragement, and support to those around him. We are especially honored to share one of Heinz's last pieces of writing in this issue, an exhortation for the next generation of pump engineers, who would do well to follow in his footsteps. Heinz left a legacy of wisdom in his writing and in the way he lived his life; he will be missed.

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DUPONT AND SEAMAN JOIN ON NEW PRODUCT LAUNCH

DuPont and Seaman Corporation announce the launch of a new Shelter-Rite High Light Transmission architectural fabric using transparent Tedlar PVF film. This new architectural fabric is ideal for structures that require natural light such as sports arenas, event venues, and greenhouses.

"We are thrilled to continue our long-standing history of collaboration with Seaman Corporation and know their latest innovative offering will meet an important need for the building industry," says Matt Urfali, vice president of sales and marketing, DuPont Tedlar.

Transparent UV-blocking Tedlar film is an ideal high-performance material that provides decades of durable protection. With excellent weatherability and dirt-shedding properties, Tedlar preserves the life and aesthetics of architectural fabric structures even in extremely harsh environments. It provides high level of protection against ultraviolet (UV) light, moisture, rain, and pollution. Shelter-Rite architectural fabrics with Tedlar have a proven track record of long-lasting performance and aesthetics.

"Our new Shelter-Rite High Light Transmission fabric is just the latest in a long history of providing best-in-class architectural fabric," says Frank Bradenburg, business director of architectural fabrics, Seaman Corporation.

CALIFORNIA BIOMANUFACTURING CENTER CREATES NATIONWIDE NETWORK

The California Biomanufacturing Center (CBC) launches the BioProcess to Product (BioP2P) Network, a program to accelerate the transformation of manufacturing in the United States for the growing bioeconomy.

CBC recognizes the challenges facing this growing sector in bringing products from the lab to commercial scale. Its BioP2P Network will engage the industry broadly to work together to tackle these challenges.

CBC was established in 2020 as a public-private partnership of companies, workforce, and government agencies supporting the growth of biomanufacturing as a high-value, strategic sector. The leadership at CBC has been engaged in the bioeconomy for more than two decades dating back to first-generation industrial enzymes to the current new generation of precision fermentation.

Schmidt Futures, a philanthropic initiative founded by Eric and Wendy Schmidt that bets early on exceptional people solving hard problems in science and society, is supporting the BioP2P Network. CBC is using the Schmidt Futures grant to bring together stakeholders across the United States to foster scale-up for non-biomedical technology developers across the country to move from pilot to commercial production.



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INDUSTRY NEWS



ATLAS COPCO COMPRESSORS ACQUIRES GEORGIA-BASED COMPRESSED AIR PRODUCTS Atlas Copco has

acquired the operating assets of

Compressed Air Products, Inc. (CAP). CAP sells to a broad range of industrial customer segments and has a strong service business.

CAP is located in Newnan, Georgia, southwest of Atlanta and will become a direct branch of Atlas Copco Compressors. Twenty people will join Atlas Copco as a result of this acquisition. CAP has been an Atlas Copco Compressors distributor for many years.

"We are very proud to announce that Compressed Air Products (CAP), and its great team, have joined the Atlas Copco family. This acquisition was made in line with our strategy of working with the best local teams and ensuring the very best customer support. We are very happy to be making this move to formalize our relationship and ultimately act as one company," says Robert Eshelman, president of Atlas Copco Compressors LLC.

The purchase price is not disclosed.

EMERSON RELEASES NEW I/O INTERFACE SOFTWARE FOR MANUFACTURERS

Emerson releases DeltaV IO.CONNECT, a new subscription software service designed to help plants simplify modernization with an open architecture pathway that makes it possible to transition to more efficient control schemes without the need to completely overhaul existing infrastructure.

In a traditional plant with tens of thousands of I/O points and many controllers, this can save hundreds or thousands of hours of labor and up to 40 percent of the capital required for a total rip-and-replace upgrade.

Many plants still using control systems from 20 or 30 years ago are unable to reap the benefits of modern, digital technologies that optimize operations and improve sustainability. Modernizing those systems is complicated by the extensive time, labor and capital expense required to convert the old wiring, terminations and other infrastructure they are built upon, leaving plants "locked in" to legacy control technologies and expensive service contracts.

DeltaV IO.CONNECT provides a faster, easier, more cost-effective path to replacing any legacy system with a new DeltaV distributed control system while leaving existing I/O infrastructure in place. The new service is open for subscriptions to customers immediately.









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CIRCOR ANNOUNCES RENEWAL OF AUTHORIZED PUMP REPAIR AGREEMENT

Circor announces a renewed service partnership with PumpsPlus. The PumpsPlus service center in Dartmouth, Nova Scotia, will continue to work closely with the factory to provide service for IMO, Allweiler, and Warren brand pumps.

In a joint effort, CIRCOR and PumpsPlus recently completed the recertification of the PumpsPlus service and repair center. The PumpsPlus, Dartmouth service operation underwent an extensive audit review before being granted full certification as an Circor Authorized Service Center. With their certification comes the factory authorization to perform both minor and major repairs, rebuilds, and service on a diverse array of Circor's pump brands and models.

"We are extremely excited to award this renewed certification and to have them as an integral member of our global service network. Their level of commitment to providing exceptional service and support to our growing base of customers is indicative of the service network we are building," says Jamie Mekus, program manager of aftermarket sales at Circor.

"The renewal is extremely important as it ensures that high-quality products can be locally serviced and repaired," adds Matthew Harley, director of sales at PumpsPlus.

GD ENERGY PRODUCTS PARTNERS WITH TEXAS PUMP SYSTEMS TO PROVIDE INNOVATIVE FPSO PUMPS

GD Energy Products (GDEP) is partnering with Texas Pump Systems (TPS) to develop innovative pumps for a large offshore floating production storage and offloading (FPSO) facility.

TPS has worked closely with GDEP for more than twenty years. Together, the two companies have developed highly regulated, certified pump packaged solutions that are tailored to customer specifications. TPS packages GDEP pumps that are certified to operate in potentially highly explosive atmospheres, on FPSOs that can produce up to 180,000 BPD and can store up to 2,000,000 bbls of crude oil. The pump packages are housed within one of fifteen or more process equipment modules, weighing in excess of 5,000 tons each, mounted to the topsides.

Ernst Vanderlaan, senior product manager, TPS, explains, "FPSOs require a reliable network of commissioning, maintenance, and support. They are generally located at fixed locations in deep waters, hundreds of miles offshore Africa, Brazil, the Gulf of Mexico, and Malaysia, tied to several deep sea wells. A very strategic, strong partnership that draws on engineering innovation was required to meet these requirements."









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INTERNATIONAL WATER CONFERENCE

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AT A GLANCE

WhEN: November 6-10, 2022

WHERE: Orlando, Florida

WEBSITE: www.eswp.com/water

Presented by long-time sponsor, the Engineers' Society of Western Pennsylvania, the International Water Conference is a strong educational conference, founded with an emphasis on commercialfree discussions on technology. The International Water Conference presents the latest in scientific advances and practical applications in this field, cutting across a wide range of industries, technologies, and functional areas.

A TECHNICAL PROGRAM FOCUSED ON SCIENCE, NOT SALES GOALS

The International Water Conference has always been a strong educational conference. The International Water Conference strives to present timely, relevant, non-commercial scientific information to help further educate an already-educated audience.

Attendees come to learn about the latest applications available in the industrial water treatment industry, educate themselves in current technology and applications through attendance in International Water Conference workshops, and network heavily with their peers active in water treatment.



All papers presented at the International Water Conference are carefully peer reviewed for quality and to ensure no commercial aspect is evident. Each paper presentation at the International Water Conference is followed by a prepared discussion—a thoroughly considered, different perspective on the topic, followed by an open floor discussion when all audience members and presenters can fully interact—ask questions, seek clarification, and raise alternative viewpoints. In essence– learn more!

WORKSHOPS FOR EVERY ASPECT OF THE WATER INDUSTRY

From introductory classes like "Water Treatment 101" to specialized concerns like "Wet FGD Chemistry and Operational Impacts on Wastewater Quality Discharge," the International Water Conference Continuing Ed Workshop program is designed to provide practical information that includes a basic understanding of the topic as well as detailed case studies.

Workshops are presented by experts in the field and are loaded with technical content, not sales information. Each workshop will provide an opportunity for a technical exchange between the students, the instructor and other workshop participants. International Water Conference workshops provide attendees four professional development hours (PDHs) and a certificate of completion.

WHEN YOU'RE READY TO BOOST BUSINESS

Just because the learning opportunities are free from commercial content doesn't mean business doesn't take place at the International Water Conference. Each year, the International Water Conference's exhibit hall is the place to see the latest products and technologies. It's also prime real estate to meet representatives from the leading companies in the water industry and related fields.

The 2022 edition of the exhibit hall already has over seventy different leading companies lined up to share their products and services with attendees.

BRINGING TOGETHER THE WATER INDUSTRY

As the preeminent international technical forum in the field, the International Water Conference brings together end users, researchers, practicing engineers, managers, educators, suppliers and contractors. It is dedicated to advancing new developments in the treatment, use and reuse of water for industrial and other engineering purposes. Attendees come to learn unbiased details about the latest applications available in the industry, get educated on current technology, and hold wide ranging discussions with their peers active in water treatment. Whether you're a veteran of the water industry or transitioning into the field, the International Water Conference offers the right mix of know-how and can-do.

Problem: Diaphragm seal is so impacted that gauge is stuck at 10 psi even after it is removed from the pipeline. Application: Sewerage Lift Station **Solution:** Onyx Isolator Rings on the same service provide accurate pressure readings year after year and never clog or plug.





SWPA INSIGHT



OPTING INTO THE DRY WELL ADVANTAGE

From lower maintenance costs to robust performance, these pumps prove their worth

BY SWPA EXECUTIVE DIRECTOR ADAM STOLBERG; LAYLA WILHELM, CRANE; AND RANA ELBITTIBSSI, XYLEM FLYGT

ry well submersible pumps are some of the most versatile and reliable products on the market today. They've earned that reputation through years of solid performance in a variety of applications. Below, SWPA Executive Director Adam Stolberg discusses the real-world benefits of this equipment with Crane's Layla Wilhelm and Rana Elbittibssi of Xylem Flygt.

Scouting the details of a pumping application is critical to ensuring the best performance of any pump, so what are some of the installation advantages of dry well submersible pumps?

One of the greatest advantages of a dry well submersible pump is the ability to operate in a variety of installations. A dry well submersible pump can operate un-submerged, partially submerged, or completely submerged due to the motor design. Thus, these pumps can be found in wet wells or dry wells. Because the motor is capable being submerged, the pumps offer protection against flooding in dry wells, and will continue to operate if the dry well does flood.

Dry well submersible motors also typically have a high efficiency motor. These high efficiency motors can lead to energy savings over an older motor design, as they consume less energy over the operational life.

Most people are familiar with the limitations of conventional dry pit installations, but how do dry well submersibles overcome these and what are some benefits unique to their design? The specific advantages of installing pumps directly in the wet pit versus in a separate dry pit are obvious (smaller station footprint, higher NPSH available, lower noise level, optimal motor cooling, etc.).

When a consultant or end user decides that pumps shall be installed in a dry pit, usually for maintenance, hygiene, or environmental reasons, there are still many advantages with using submersible, closecoupled pumps versus traditional dry-pit pumps driven by nonsubmersible motors.

Depending on the pump size and the risk for the dry pit to be flooded, a traditional dry-pit pump can either be of the close-coupled type, the long-coupled type or with intermediate shafting between the pump and the motor.



Dry submersible pumps offer many advantages and benefits as far as impact on the civil work, flexibility, reliability, safety, vibration and noise level, ease of installation and maintenance.

City governments are often pressed for increased performance in their municipal water systems while also facing down an aging infrastructure and budget constraints. How can dry well submersibles help them meet their budgetary needs?

Because a dry well submersible is typically constructed with a high efficiency motor, like an IE3 rated design, they offer energy savings to the customer. While the upfront cost of a dry well submersible is often more expensive than other submersible motor technologies, the energy savings can offset this added cost quite quickly. Some pump designs can recoup this cost in two or three years! These pumps are also designed to be quite robust, and thus can reduce maintenance costs over the pump life as well.

Dry well submersibles were once commonplace only in coastal areas. What impact has the trend of more frequent and more widespread flooding and intense storms had on this market?

Dry well submersibles are still quite common in coastal areas, as flooding in those regions continues to be a major issue. But as the climate changes, we are seeing major flooding in places we have not previously. A great example is the recent storms in St. Louis, Missouri. Recent storms have resulted in unprecedented flooding in the center of the county. Because dry well submersibles can still operate while completely submerged, regardless of the installation type, these pumps are gaining popularity with customers. This is because the pumps are protected against flooding and thus they will not need to be replaced after the flood, but they also can help mitigate the flood in certain installations. This allows the customer to return to normal operation much faster after a flood event than they would with a traditional dry pit pump.

OEMs are releasing bigger and more efficient dry well submersible on an almost annual basis. What needs are these more powerful pumps meeting for their users?

The increased demand for more safe handling, improved working environment, ease to access, ease to service, and fast operation led manufacturers to expand on dry well submersible to reach customers' needs and to provide the balance on optimized pumping applications.



CASE STUDIES

WASHINGTON COMMUNITY BREWS WINNING WATER SOLUTION

Frustrated by temporary delivery stoppages, new pumping station guarantees continuous delivery

BY THOMAS RENNER

t is no secret that craft breweries are big in Washington state. With a total of 437 breweries statewide, only California, Pennsylvania, and New York have more, as counted by Statista.com. The business generates an economic impact of more than \$1.8 million and produces more than 570,000 barrels of craft beer per year, according to the Brewers Association.

The most important ingredient in beer, according to most connoisseurs, is water. Skagit County, which is home to thirteen of Washington's craft breweries, takes pride in its water's award-winning

FACTS & FIGURES

WHAT AND WHERE:

The Judy Reservoir raw water pumping station is a new \$3.2 million, 1,900 square foot facility in Skagit County, Washington.

WHY:

Residents became inconvenienced when workers needed to shut down the pumping station to service equipment. The new pumping station allows the station to continue to operate without shutting down operations and includes pumps with valves that can adjust distribution.

VITAL WATER SUPPLY:

Judy Reservoir is the main water source for Skagit County, which has seen its population grow by 42 percent since 1990.

ROOF ACCESS:

When the pumps need eventual replacement, they will be lifted out and replaced through two motorized roof hatches manufactured by The BILCO Company. The 12-feet by 6-feet hatches were custom made for the project.

DID YOU KNOW?

One of the region's most anticipated events is the annual Skagit Valley Tulip Festival. More than 1 million people visit each year to explore more than 300 acres of colorful flowers. taste. This year, the Judy Reservoir water system took first place in the Best Tasting Water Contest held by the American Water Works Association Northwest subsection. Skagit Valley is home to a Craft Brewing Academy, hosts four brewery festivals, and ranks tenth in the nation on the "Hidden Beer Gems in the USA". Beer and water are inexorably intertwined in Skagit County.

The linchpin to great tasting water, and beer, in Skaqit County is the 148-acre Judy Reservoir, which stores approximately 1.5 billion gallons of water. Earlier this year, Skagit County completed construction of a new \$3.2 million, 1,900-square-foot pumping station. The new structure will help ensure continuous water delivery to residents. The previous system required workers to shut down the treatment plant for maintenance. "When we shut down the plant, some customers would lose water." says Brandt Barnes, Skagit PUD's construction manager.

The new building allows workers to access the pumps and valves for maintenance. The three 200-horsepower pumps can deliver up to 9,000 gallons of water per minute. More importantly, workers do not have to shut off water to customers with the new easy access to the valves.





Two motorized roof hatches manufactured by The BILCO Company will allow the pumps to be removed through the roof when they eventually need replacement.

GROWING REGION

Skagit County, which extends across 1,920 square miles, has seen its population increase dramatically since the Skagit Public Utility District first purchased private water systems in 1936. At that time, the county's population stood at slightly more than 35,000. By 1990, it had more than doubled, reaching almost 80,000 people. The following two decades brought further growth, with residents numbering more than 130,000 by 2021.

Skagit purchased private water systems that served the cities of Mount Vernon, Burlington and Sedro-Woolley and consolidated them into an extensive water system serving the entire valley. Initially, each city maintained its water filtration facility. Over time, the PUD replaced the aging filter plants with new wells near the Skagit River and eventually with the Judy Reservoir. In 1947, the PUD began diverting water from streams in the Cultus Mountain watershed to the reservoir, which quickly became the region's primary water supply. The PUD also constructed a storage and treatment facility to deliver chlorinated water through 11 miles of transmission lines.

In 1990, the PUD built a new filtration plant that supplies 10 million gallons per day of safe, clean, reliable water to customers. The plant features direct filtration and chlorine dioxide treatment followed by chlorination before distribution.

VALVE DILEMMA

In the fall of 2020, Skagit PUD's commissioners authorized the construction of the new raw water pump station at Judy Reservoir to help solve maintenance issues that impacted customer service. The new building allows workers easier access to the pumps and valves for maintenance. The three 200-horsepower pumps can deliver up to 9,000 gallons of water per minute. More importantly, workers do not have to shut off water to customers with the new easy access to the valves.

"It's a much more effective and efficient solution," Barnes says. "The raw water pumps need to be maintained regularly. We can extend the service life of the valves and not interrupt customers every time we need to work on a pump."

The ability to adjust valves and water delivery was the project's cornerstone. The variable frequency drive (VFD) allows the pumps to run at different revolutions per minute, reducing energy usage and enhancing efficiency.

"We're not wasting energy throttling back on the discharge valve," Barnes adds. "A lot of pumps are constantspeed. When they operate, they supply whatever the pump can generate. Now we can dial the VFDs up and down to get the necessary flows."



CASE STUDIES

ACCESSING EQUIPMENT

Roof hatches manufactured by The BILCO Company allow workers to remove the pumps when they need replacement.

Two motorized roof hatches, 12 feet by 6 feet 5 inches, were custom-made by BILCO for the project. Anderson Specialties procured the hatches for McClure and Sons, which built the pumping station.

"Because of the unique size and the distance between pumps, it was challenging to get the hatches installed," Barnes says. "At first, we couldn't meet the truss opening. We had to double up the opening size. Installing motorized hatches instead of a hand crank was a good solution."

BILCO, the manufacturer of specialty access products, makes hatches of various sizes to allow for equipment access. "We looked at other manufacturers, but we all worked hard at coming up with a good solution," Barnes says.





The Skagit Public Utility district completed a new 1,900 square foot pumping station that will allow works to maintain pumps without having to shut off water to customers.

Delays in water access frustrated residents for years. With the new pumping station, Skagit County residents served by the PUD won't face that issue any longer. "The major component to this project was being able to service pumps without having to shut down the treatment plant," Barnes says. "The pump station we have now is much more



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efficient and maintenance-friendly. And that was the primary objective."

GREAT TASTING WATER

The Skagit PUD proudly celebrates its great-tasting water in a variety of ways. The department takes a water trailer to community events, encourages water conservation, gives tours to help students learn how raw water is turned into safe drinking water and more.

The proof, however, might just come in the pints served by the local brew masters. Skagit PUD partners with ocal breweries to sponsor the Farm to Pint Ale Trail. Participants collect "passport" stamps at the breweries and win a souvenir pint glass and prizes.

The event raised \$129,000 to help Viva Farms in Skagit empower aspiring and limited-resource farmers by providing bilingual training in organic farming practices and access to land, infrastructure, equipment, and marketing services. That's a strong testament to the great taste of the water from Judy Reservoir, and portends steady growth for the years ahead.

THOMAS RENNER writes on building, construction, engineering, and other trade industry topics for publications throughout the United States.



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CASE STUDIES



The HRS Digestate Concentration System (DCS) reduces volume, increases nutrient content and controls ammonia.

HARNESSING THE POTENTIAL OF BIOGAS

The American Biogas Council highlights this resource as more than an afterthought

BY MATT HALE, HRS HEAT EXCHANGERS

Recent comments by the American Biogas Council (ABC) on the first Renewable Volume Obligations (RVOs) for the Renewable Fuel Standard (RFS) for 2020, 2021, and 2022 show that the Unites States is finally recognizing the huge potential that anaerobic digestion and biogas has to contribute to a renewable, low carbon economy.

Although the final fuel volumes set out by the Environmental Protection Agency (EPA) may be disappointing and lower than the industry was expecting, the ABC statement contains much to be positive about, not least the high levels of investment and growth in the American biogas sector.

INVESTING IN RENEWABLES IS AS EASY AS ABC

According to the ABC, "new renewable natural gas (RNG) projects have increased by 47 percent in the last year, on—farm projects have increased by 21 percent; and major companies have announced investments in new RNG projects totaling over two billion dollars, twice the industry's total investment in 2020."

This level of investment provides a clear message about the technology and its potential. However, it is important with the focus on the production of RNG not to forget about the other output of anaerobic digestion—the production of digestate.

MORE THAN AN AFTERTHOUGHT

Frequently in the United States digestate has been viewed as an afterthought and frequently used as

The HRS Digestate Pasteurization System (DPS) prevents prevent the spread of pathogens, weed seeds, and crop diseases.

livestock bedding. However, such an approach greatly underestimates the environmental and financial benefits that digestate has when used as a high-quality biofertilizer and soil conditioner for crop production.

The use of digestate as a sustainable biological fertilizer can be improved with pasteurization to prevent the spread of pathogens, weed seeds, and crop diseases. One of the most energy-and cost-efficient methods to pasteurize digestate is the HRS Digestate Pasteurization System (DPS), which is based on heat exchangers rather than tanks with heating jackets. Using heat exchangers means that effective digestate pasteurization is possible using surplus heat while allowing additional thermal regeneration levels of up to 60 percent.

The standard three-tank DPS provides continuous pasteurization, with one tank being pasteurized while one is filling, and another being emptied. The DPS uses a double-tube heat exchanger to heat the digestate to 167 degrees Fahrenheit (75 degrees Celsius) above the required pasteurization temperature. This allows for variation in the sludge consistency and its incoming temperature, making sure that the digestate is always properly pasteurized. The tanks can also be used individually, for example to allow for routine maintenance.

TIME TO CONCENTRATE

Another system to improve the management and handling of digestate is the HRS Digestate Concentration System (DCS), which uses patented technology to reduce the volume of liquid digestate up to 90 percent, raising the concentration of total solids to 20 percent solids while also maximizing the nutrient content, using heat from the AD plant's CHP engine. Lower water content also means reduced transport costs and field traffic, bringing further benefits in terms of reduced compaction caused by the application of the digestate to land.

Another benefit of the DCS is odor and ammonia control, which helps increase the nutrient content of the digestate. The high temperatures and vacuum conditions needed to concentrate digestate can cause the release of ammonia, largely responsible for the odors associated with digestate. The DCS overcomes this by acid-dosing the digestate with sulfuric acid, thereby decreasing the pH levels. This turns the ammonia into ammonium sulfate, which is not only less odorous, but is also an ideal crop nutrient.

MATT HALE is international sales and marketing director for HRS Heat Exchangers. He began his career in the food and dairy processing sectors in the late 1980s before moving into sales in the mid 90s. He has been involved with heat exchanger systems since 1997 and has held a number of sales roles at senior management level. Hale joined HRS in 2013 as international sales manager, where he utilized his expertise in key account management and distribution. Since 2015 he has had responsibility for the HRS Group's global marketing. For more information, visit www.hrs-heatexchangers.com

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THE VALLEY CENTER WAY

Combining current energy savings with total cost of ownership

BY SOREN RASMUSSEN, LANDIA

On just one Landia mixer, Valley Center in Kansas State is saving \$3,000 per annum.

t Valley Center Wastewater Treatment Plant, and at an increasing number of facilities across Kansas, the decision to buy the more expensive equipment at the outset is proving to be the most economic. Savings in long-term maintenance are important, but in the shorter term, energy savings are fundamental.

"Total cost of ownership is what we at the plant and our city council are interested in," says Valley Center Utility Manager Wade Gaylord. "There's always a cheap, short-term solution, but it is our duty to act in the best interests of the city and our residents to spend our budget as wisely as we can, which to me it just plain common sense." After being laid off from the aerospace industry during the pandemic, Gaylord sought employment in the wastewater sector, where he could put his university degrees in chemistry and geology to good use.

"I grew up here and later used to drive past the plant on South Sheridan and wonder what was

going on in there," he says. "After aerospace, I was prepared to travel to wherever a good career opportunity became available in the wastewater industry. But as it turned out, there just happened to be a vacancy for an operator, right here in Valley Center."

VALLEY CENTER: A LOOK INSIDE

Situated about twelve miles north of Wichita, the 0.5 million gallon-per-day wastewater treatment plant (built in 1979) serves 2,700 homes. It includes an extended aeration treatment plant, plus ultraviolet disinfection treatment. Solids removal prior to discharge into the Little Arkansas River typically ranges from an impressive 97.5 to 99 percent.

The recent failure of a mixer at Valley Center demonstrated the firm commitment that now prevails when the true cost of ownership is mapped out, only top quality, longlasting equipment represents the best value for money. "To be honest," says Gaylord, "I didn't really understand why the design of the existing mixer's impeller was the way it was, but what I knew for sure was that it wasn't very reliable—and that the cost of having it assessed and repaired was prohibitive. The 7.5-horsepower mixer had been in use for ten years, but had a seal-system that was just not user-friendly."

LOOK FOR LONGEVITY, AS WELL AS BEST EFFICIENCY

Gaylod spoke with multiple equipment representatives, including Fluid Equipment of Wichita, who has been evaluating and repairing wastewater systems for over half a century. After listening to how Valley Center approached its purchasing, Jeff Ubben at Fluid Equipment recommended a Landia submersible mixer from its portfolio that sat at the top of their price bracket, but one that is set to last for twenty to twenty-five years.

"I immediately liked the Landia design," adds Gaylord, "especially the sealing system, which protects the most important part of the mixer. We have great cohesion in our team here at Valley Center, including our infrastructure manager, Ron Ekstrom, who has worked here for over twenty years. When we thoroughly weighed out all the pros and cons, we saw that Landia was the most expensive purchase. However, when I presented the total cost of ownership to the city, they could see that it made by far the most sense. Our administration definitely looks for longevity, as well as best efficiency, and in ten years' time or less, I don't want an operator to have to deal with the same problems that I've had."

A BETTER JOB, EVEN THOUGH IT USES MUCH LESS ENERGY

Ubben adds, "For the wastewater industry, it is very encouraging to see a young utility manager and a city push hard for better quality equipment that

"When the Landia mixer was installed, we turned it on and hadn't seen the basin ever mixed like that before!" says Valley Center Utility Manager Wade Gaylord

will stand the test of time. With a Landia mixer, Valley Center can see that they won't have the annoying maintenance issues that lesser designed mixers will create. And as well as lasting much longer, the mixer we recommended will also do a better job, even though it uses much less energy."

With its backward sweeping propellers, the design of the Landia mixer ensures that rags can't cling on and damage the seals. The protective grease hub in the propeller guards the seals, and is hard to wash away. It acts as an important first line of defense against all types of debris. The Landia seal system is well proven and eliminates immediate and expensive seal fail condition.

Ubben pointed out that Landia can very often reuse an existing mixer manufacturer's guiderail, so that installation can proceed without the tank having to be emptied. So again, despite Landia appearing to initially be at the high end of the price list, a retrofit doesn't incur anywhere near the additional costs of other designs.

MIX DIFFERENCE YOU CAN SEE

"Previously," says Gaylord, "we knew that the old 7.5-horsepower mixer was working and mixing—to some extent—but when the Landia mixer was installed, we turned it on and hadn't seen the basin ever mixed like that before! The volume that the Landia mixer put through, mixing the basin from the bottom up, was pleasantly surprising; changing the dynamics for a much better process all round. All of this, too, with just a 4.9-horpower motor! The amp draw of the Landia gear-driven mixer is lower than what we saw with other manufacturers (7 amps compared to the 10 and 12 amps of the others). On just this one mixer, running two hours on, two hours off, we are making an energy saving of \$58 per week, which is over \$3,000 per year. The return on investment is a no brainer."

Valley Center Utility Manager Wade Gaylord (right), with Art Savage from mixer and pump manufacturer, Landia.

The backward sweeping propellers of the Landia mixer means that rags can't cling on and damage the seals.

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, visit wwww.landiainc.com.

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CONSERVING VALUABLE FUEL AND WATER RESOURCES DURING SEWER CLEANING

Rising costs and resource scarcity drives municipalities to utilize more efficient nozzles

BY DEL WILLIAMS

or municipalities responsible to keep sewer lines free from debris and blockages, there is the additional challenge of maintaining these lines during a time of rising fuel prices as well as water scarcity resulting from increasing population and drought conditions throughout much of the United States. To reduce costs and conserve these valuable resources, cleaning crews are being compelled to adopt more efficient cleaning equipment, tools, and techniques to implement waterintensive cleaning that can involve a hundred gallons of water per minute. Fuel is also consumed to operate the sewer truck, vacuum system, water pump, operating platform, and pressure/flow compensation hydraulic system.

Fortunately, utilizing more effective tools and methods can significantly cut the industry's fuel and water usage. Inefficient sewer cleaning tools, such as nozzles, as well as poor cleaning techniques can cause

crews to make many passes to clear a line—a tremendous waste of fuel and water. When crews inefficiently utilize water, additional fuel, time, and labor are required to drive to the nearest fire hydrant to refill the tank.

"For years, sewer crews didn't pay much attention to water conservation. Today they must pay attention, or they can't do their jobs. With sky high fuel prices and a scarce water supply, municipalities are looking to stretch their resources, including labor, with better tools and training," says Dan Story, an experienced trainer and operations manager at KEG Technologies, a manufacturer of sewer and storm line products including Tier 1 to Tier 3 nozzles, chain cutters, floor cleaners and camera nozzle systems.

INCREASING FUEL AND WATER EFFICIENCY

To clean sewer lines more efficiently in the face of the challenges, municipalities should consider using more effective tools and methods. Normally, sewer crews utilize jetting and/or vacuuming systems to remove debris and blockages.

With jetting, a high-pressure water hose with a high-performance nozzle is placed into the line. Operators release high-pressure water from the sewer jet truck to dislodge debris and flush it into a manhole. As debris is removed, the hose is pushed deeper into the sewer. Jetting typically involves using between 50 to 85 gallons of water per minute with ³/₄-1 inch hose from the truck to flush out debris such as grease, grime, sludge, stones, and other items lodged in the pipe. A vacuum may also be used to remove dislodged debris and transfer it to disposal bins.

HIGH EFFICIENCY TOOLS

One of the most effective ways to decrease water and fuel use while improving cleaning efficiency of sewer vacuum trucks is by utilizing a high-performance, Tier 3 nozzle. With improved fluid dynamics, these optimize the cleaning process while utilizing less water, revolutions per minute and pressure. The highperformance nozzles cost more, but dramatically reduce fuel and water costs, and enable faster job completion.

Although nozzles with many configurations are used in the industry, nozzles are classified in three tiers, based on efficiency: Tier 1 (approximately 30 percent efficient), Tier 2 (50 to 60 percent efficient), and Tier 3 (75 to 98 percent efficient).

According to Story, however, a surprising number of municipalities and third-party contractors still do not use Tier 3 nozzles for sewer cleaning, despite the benefits.

What sets the most efficient Tier 3 nozzles apart is the fluid mechanics engineering on a par with the aerodynamics of race cars. After exiting the jetter hose, water travels into the body of the nozzle before moving through smooth, curved channels. This design enables the water to maintain its power and speed before entering the nozzle's replaceable titanium ceramic inserts, which help to straighten the water stream. Next, the water is further funneled to enable an even tighter water pattern to emerge.

The internal workings of the nozzle (including the way the water gets turned) redirect the energy of the high-pressure water entering the nozzle so it performs as efficiently as possible. This results in what is needed for the task: more thrust and power using less water.

"If there is turbulence in the water as it exits the nozzle, it dramatically reduces the overall cleaning power," says Story. "The most effective Tier 3 nozzles create tight water patterns that efficiently clean the pipe wall and produce a powerful water stream to move debris long distances while propelling the nozzle through the lines."

In the case of KEG's Tier 3 nozzles, such as the Torpedo and OMG models, the high-performance design of the fluid mechanics leaves little room for power losses and excessive turbulence and so can achieve 98 percent efficiency. A properly designed Tier 3 nozzle can also be used at lower operating pressure (PSI) and RPMs.

"With less efficient Tier 1 or 2 nozzles, operators may run at 2,000 psi to provide more power. Because of the superior fluid mechanics of a Tier 3 nozzle, ample power is generated at 1,200 PSI, which saves water and fuel," says Story.

He explains that when water hits the nozzle wall of Tier 1 and 2 nozzles, they stop the flow of water and change its direction, which creates considerable turbulence. In contrast, Tier 3 nozzles are designed not to impede or stop the water flow. The result essentially eliminates water turbulence and produces a much more powerful flow of water directed from the nozzle.

"The most efficient Tier 3 nozzles are designed to move water like it is on a curved race track or roller coaster. The water never stops

WATER & WASTEWATER FOCUS

moving so it retains more power," says Story.

According to Story, a Tier-1, 30-degree drilled nozzle running 72 gallons a minute at 2,200 psi will only exert 13 pounds of force to move debris nine feet away from the nozzle. In contrast, a high-efficiency Tier-3 nozzle running 60 gallons a minute at 2,000 psi will exert 98 pounds of force nine feet away.

He adds that efficient Tier 3 nozzles also allow a lower water pressure to be used from the truck, which saves water.

"When the nozzles are set at a certain rate of pressure in gallons per minute, if you lower the pressure, you lower the gallons of water being used per minute. This results in water savings. With the Tier 3 nozzles, you can lower the required water pressure in PSI without compromising power," says Story.

BETTER CLEANING TECHNIQUES

In addition to water savings, superior cleaning techniques can also dramatically reduce fuel, time, and labor. To improve sewer cleaning performance, KEG offers onsite or online training customized to the needs of the municipality or contractor. The Spartanburg, South Carolina-based company is a member of NASSCO, the National Association of Sewer Service Companies.

According to Story, the main mistake most operators make is when they do not understand how their cleaning speed affects their performance.

> "The hardest thing to overcome is that for years operators were taught to quickly spray

water on the way up the sewer line and then clean as they return – but that wastes water because it does not move the debris or clean the walls sufficiently." he says.

With poor techniques, operators often are forced to make several passes to remove the material, which wastes a tremendous amount of water. "Even after that, I have been in situations where after a cleaning the CCTV camera operator radios back to ask if the line was even cleaned."

"Most operators want to run up the line in a hurry and clean as they come back because it is how they were taught, but it is impossible to 'dig a hole from the bottom up.' When they shoot past all the debris going in, they are trying to bring it all out at once, which is more difficult," he adds.

Instead, Story advises operators to go slow when cleaning lines. "You want to go in slow, between 30 feet and 60 feet per minute. Remember, at 60 feet per minute, you are traveling one foot per second. However, at one foot a second, you are wetting the pipe, not cleaning it."

He advises operators to pull the nozzle down as they go into a line, observe how dirty it is, and then adjust their cleaning speed accordingly.

"The first 50 feet of a line will tell you how dirty it is and how you should adjust your speed. If you are not getting a lot of debris back in the first 50 feet, then you can increase your cleaning speed," says Story.

When the operator reaches a manhole in the line, he advises dialing down the water pressure to 900 to 1,000 psi as they return.

"You clean the line, remove all the organic materials going in, and some of the rocks in it will fall out of the flow. By cleaning as you go in, however, you're able to get the dirt and debris out of the line, so on

the return the rocks will move much easier inside the pipe," he says.

He points out that operators often compensate for a lack of power cleaning with Tier 1 or 2 nozzles by increasing the pressure to 2,000 psi, and the water flow to 50 to 60 gallons per minute or higher on the way back through the line.

With a Tier 3 nozzle, however, a lower pressure is possible because it provides more cleaning power due to its efficiency in directing water flow without turbulence.

"A Tier 3 nozzle can generate the same amount of cleaning power as a Tier 1 or 2 using 40 gallons and 1,200 psi, saving time, water, and fuel. But the trick to that is cleaning as you go in. Chop the debris up and let the flow work like a conveyor belt, carrying the debris out," says Story.

"If you clean correctly, the water is going to carry the debris off and out of the way, so slow the nozzle down and let it do its job. You are not in a race," he says. "When you get to the end of the line, just dial your pressure back down and rinse the pipe as you come out. When you come back, the job is done," says Story. "You don't have to send it back in a second time."

With 6- to 15-inch diameter sewer lines, it should be possible 95 percent of the time to go from manhole to manhole and clean in a single pass, says Story. "This takes a fraction of the time and resources to make one pass versus making several passes to remove the same material."

It also eliminates extra trips to a nearby fire hydrant to refill the water tank, which can cost crews an hour or more to put all equipment back on the truck and set it up again when they return. With a combination of the right tools and techniques, Story estimates that sewer crews can save approximately 9 to 17 percent in vehicle fuel costs, including travel to refill water tanks.

As municipalities and contractors seek to reduce the use of costly fuel and

scarce water, using the most efficient Tier 3 nozzles and cleaning methods will go a long way to stretch their funds and conserve valuable resources. Just as important, adopting industry-proven cleaning techniques will help to protect against future increases in the cost of fuel and water.

DEL WILLIAMS is a technical writer based in Torrance, California. KEG Technologies Inc. is headquartered in Spartanburg, South Carolina. KEG's patented fluid mechanics directs high pressure water from a truck or jetter hose in a manner so efficiently they were granted a United States patent, meaning operators can usually clean pipes using less pressure, less fuel consumption, and less time than other less efficient nozzles. For more information, call 866.595.0515 or visit www.kegtechnologies.net.

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MAINTENANCE & RELIABILITY

TRAINING RELIABILITY PROFESSIONALS AND SUBJECT MATTER EXPERTS

For the next generation of engineers, education starts after graduation

PART 2 OF 2

Before we elaborate on the specific steps in the training and learning processes, it's best to just reemphasize an important fact: Accepting that the most important learning process begins at graduation should be the first and perhaps most important realization in an engineer's training. While training plans will, of course, differ for different areas of specialization, it might surprise that the principles embodied in the specifics we chose to list here for ''reliability improvement of fluid machinery''

apply to every aspect of engineering specialization. The author's experience fully supports the belief that meaningful training should progress in four or more distinct phases.

PHASE 1: READING TRADE JOURNALS In the interest of continually obtaining workspecific technology updates and related training, the value-adding engineer must peruse trade journals.

He or she should scan and retain (file electronically) articles on topics of potential interest. We might use our imagination to interpret scanning as viewing information on paper or by way of electronic scanning, preserving, and retrieving. One could also make copies of, or read, or tear out pages, from relevant trade journals. As mentioned, material of potential interest would be organized, filed, and electronically catalogued for rapid retrieval.

Companies with well-defined training plans would involve all employees that can benefit from the way these plans are implemented. The manager or supervisor would arrange for applicable Trade Journal 1 to be given to employee "A". In reviewing this trade journal, "A" notices an article dealing with shaft couplings and sends copies to colleagues/co-workers "B", "C", "D", etc. Applicable Trade Journal 2 starts on the desk of employee "B", who notices articles on pivoted shoe bearings and wear-resistant V-belts. "B" makes copies of these two articles and sends them to "A", "C", "D", etc.; likewise "C" sends articles of interest to "A", "B", "D", "E", and so on.

The once-per-month task of culling and reviewing suitable articles or conference proceedings may typically take ten to fifteen minutes and allow each participant to acquire a data bank of relevant cross-references. This author recalls an experience when, decades ago, he looked for a reference article and then called its writer. He or she asked for—and cheerfully received—priceless guidance on a subject matter related to the writer's topic. That kind of networking proved of great value and became the anchor point for other communications.

PHASE 2: TECHNICAL BOOKS (ONE PAGE PER DAY, OR 200 PAGES PER YEAR)

Relatively few engineers purchase, or thoroughly read, technical texts after completing their formal education. Fortunately, however, there are trainingoriented employers who encourage their staff to read and absorb relevant technical texts. For example, one such employer explained that his responsible professional employees are encouraged to purchase as many books as they can reasonably assimilate or digest in a year's time.

During subsequent performance appraisals, the effectiveness of this policy was validated and reaffirmed on many occasions. Another company purchases pertinent technical texts and requires each technical employee to read a page per day. To the extent feasible and reasonable, these professionals are then asked to jot down what they discern as differences between their guidelines, work processes, hardware details, failure frequencies, maintenance intervals, etc., versus what others (and, in particular, competitors) are doing in these fields of endeavor.

The training value of this approach is immense. Certainly, the return on the investment of the time it takes to read a page a day and to make a two-sentence notation each week is huge. There can be no doubt that this wellfocused training is priceless and benefits all parties for decades to come.

BHASE 3, PART A: TRAINING THROUGH 3a "SHIRT-SLEEVE SEMINARS"

In the 1970s and in pursuit of Phase 3 Training, one highly profitable multi-national company arranged for its equipment reliability technicians and engineers to share the responsibility of making seven- to tenminute presentations at the conclusion of each routinely scheduled and mandatory safety meeting. The presenters would educate themselves on such topics as "how to properly install a centrifugal pump," or "why steam turbines must be thoroughly pre-heated before full-speed operation." Following the presentation, the presenter would distribute written copies of these one or two-page guidelines laminated in plastic. Plant management made sure that reasonable expectations were met. Therefore, enlightened managers made it clear that they wanted these guidelines to be read, consistently used, and fully adhered to. Reliability engineers, mechanical work force, and operating personnel were told that compliance was mandatory, not optional.

In this manner, the "shirt sleeve seminar" presenters taught themselves by networking and communicating with knowledgeable people inside and outside the facility. As they made their presentations, they transferred their

MAINTENANCE & RELIABILITY

findings to the entire plant. At this location, equipment failures due to human error and other causes were minimized, and everyone profited from the well-tested approach. There should be no reason for not adopting it elsewhere with equal success. Minor modifications may accommodate many different needs.

PHASE 3, PART B: PRESENTING TO THE **PLANT STEERING** COMMITTEE

The most successful process plants often have three division managers report to the plant manager. The division managers oversee and manage the disciplines manufacturing, human relations, and process-technical. Under the manufacturing division manager, we have seen two department managers, one for operations and one for maintenance. These two managers are appointed with the understanding that they will be asked to switch their respective positions when asked to do so by the plant manager. This "hatswitching" may be ordered in random intervals of three to fifteen months. and with at most eight hours advance notice. The effect has always been of staggering importance and benefit.

Hat-switching resulted in both department managers rapidly achieving full competency in each other's original discipline of choice. They strengthened their bonds of cooperation and never practiced the destructive game of "one-upsmanship," that is, the dangerous finger pointing that so often undermines trust and progress. Reporting to the technical manager are department heads for new projects, reliability engineering, and others. Section Heads report to department heads. Similar organizational arrangements report under the HR division manager.

The plant manager is supported by a steering committee whose membership includes the three division managers and several department heads. This steering committee invites staffers below the level of section head to make ten- to

fifteen-minute presentations on how they do their job, what they would do different if it were within their power, what they would do if they were given \$10 million and would have to spend the money for improvements, and how they personally have added value to the enterprise. These presentations monitor the pulse of an organization. They inform and even teach managers, enhance the sense of selfworth of the employee, and give high visibility to the presenter.

PHASE 4: OFF-SITE **MEETINGS AND TECHNICAL** CONFERENCES

It may be noted that Phases 1 through 3 cost the employer next to nothing. The degree with which employees carry their load should determine the extent to which they will be involved in plans that include the next phase: Phase 4, offsite training. By mutual agreement between employer and employee, the person may now progress to receiving Phase 4 training. He or she would attend

conferences and workshops that require fees, travel expenses, and accommodations paid for by the employer. After an employee returns from such offsite training, she or he will have to compose a 300-word report on things learned. The report must explain how these learnings could be used at his or her place of employment. One facility found that it was best to link or combine handing in this brief report together with the employee's expense statement.

The report is later disseminated throughout the company. Report writers benefit from refreshing their recollections, as will the various technical employee-recipients and their managers. Name recognition is established, and the contributor's sense of accomplishment is certainly enhanced in the process. Everyone benefits from the experience. The greatest hazard is that managers or supervisors are lax in their enforcement of having these onepage-maximum reports written and issued. Non-enforcement sends the message that nobody cares, and

that the employer is happy with maintaining a below-average peer rating. It seems the employer's claim to optimizing the development of technical employees should not have been taken seriously.

ROLE STATEMENTS AND FUTURE TRAINING PLANS

Already during a job interview engineers about to graduate from college would be wise to explore the role they expect to fulfill. Very soon after starting work the engineer should express strong interest in receiving a written role statement from his or her superior. Role statements define expectations. If no such statement is forthcoming, engineers are encouraged to put their understanding on paper and ask the responsible manager for review, input, recommended changes or concurrence. Unless there is agreement on the engineer's role, "performance exceeding expectation" is as improbable as the same person simultaneously dancing at two wedding receptions located

7,000 miles distant from each other.

Likewise, during the job interview, an engineer about to graduate should ask about the training opportunities made available or endorsed by the prospective employer. The interviewee must have a goal in mind and this goal must involve professional growth and learning. Learning is obviously a twocomponent process. While one party offers it and the other absorbs it. the ultimate benefits are shared by both. That being the case, each has a commitment to make and to honor. Serious forethought and cooperation are needed to achieve optimized professional training.

And one more thing: Many opportunities will present themselves to the motivated technician whose formal schooling did not go beyond High School or past a two-year college. No worry, though, because a good non-degreed technical person will add far more value to an enterprise than an indifferent, often disruptive, or highly opinionated engineer. Role statements are helpful

MAINTENANCE & RELIABILITY

to all. Again, role statements define expectations.

As an example, a company could identify a self-motivated employee and ask this employee if he or she would be willing to be the custodian of an electronically stored and searchable engineering library. In the case of

reliability professionals dealing with turbomachinery, pumps, gears, shaft couplings, etc., they would then be asked to identify useful Technical Conference Proceedings, published articles, and related information on the chosen range of topics. As mentioned before, the material needs to be

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indexed and, in one form or another. made accessible to one's peers and other individuals that would be helped by the reference material.

During performance appraisals, the employee and the manager, reviewer or performance appraiser would make an objective assessment of accomplishments by way of comparison with the previously agreed-upon role statement. Such an assessment would comprise all pertinent training issues and would obviously include measuring the employee's progress regarding reading and disseminating technical material.

FAVORABLE RESULTS ANTICIPATED FROM ACQUIRING A MARKETABLE SKILL

By accepting help and by being willing to help others succeed, engineers will prosper. Moreover, they will gain an enhanced sense of selfworth if they truly pursue training that adds value. Engineers who succeed in acquiring a marketable skill both during formal studies and after graduating from engineering school can face the future with considerable confidence. Be sure to catch the two key words: Marketable skill.

Self-motivated engineers who implement and stick to the approaches briefly described here are very likely becoming employees who offer solutions to problems. Instead of becoming folks expressing "concern" over potential problems, they will delineate the discrete steps needed to address these "concerns" by actions that will avoid problems.

In conclusion, here are a few more things to ponder:

- Certainly not all that is labeled education is beneficial. Some education can be so academic as to lack substance; it would not pass a balanced person's definition of a marketable skill. Training is a form of education. Take charge and make it relevant.
- Solving problems is more valuable

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than merely voicing concerns. Having a balanced approach allows us to see how far to go with an investigation, specification, or implementation.

- Don't just wait for skill-enhancing training opportunities to present themselves. Instead, take the lead in creating some of these opportunities. Virtually all marketable skills are acquired through proper response to meaningful training. True focus and the acquisition of marketable skills will get us through life better than a mere education or a smattering of unfocused flavors of the year.
- Selecting a profession, craft, trade, or job simply because it is paying well is generally a mistake. Developing a passion for a job is equally inappropriate because spirituality and family should rank higher.
- Your work need not be of the style and substance that the company will go out of business when you

leave. It should, however, cause fellow employees to take note that you are no longer there. Yes, you carried your fair share of the burden and you had been adding much value.

- As a new employee and while on your way to work every day, make it your goal to add value. Think ahead, dwell on the specifics of adding value on that day. Then, on the way home from work, ask how successful you've been in adding value to the enterprise. If you have not met your mark or personal goal, resolve to adjust on the following day.
- And finally, remember that in your job you will encounter designated leaders who either cannot or will not lead. When this happens, don't give up. Only dead fish will always swim downstream. Where the flow is in only one direction and where there is nostalgia for a mis-remembered past, the future is murky.

HEINZ P. BLOCH resides in Montgomery, Texas. His professional career commenced in 1962 and included long-term assignments as Exxon Chemical's Regional Machinery Specialist for the United States. He has authored or co-written over 800 publications, among them twentyfour comprehensive books on practical machinery management, failure analysis, failure avoidance, compressors, steam turbines. pumps, oil mist lubrication, and optimized lubrication for industry. Bloch holds a B.S. and an M.S. degree (cum laude) in mechanical engineering from Newark College of Engineering (NCE). He is an ASME Life Fellow and was awarded lifetime registration as a professional engineer in New Jersey. He is one of ten inaugural inductees into NCE's Hall of Fame, which honors its most distinguished alumni.

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MAINTENANCE & RELIABILITY

UNPRECEDENTED INNOVATION FOR WASTEWATER CONTAMINANT TESTING

New alternative test procedure to EPA Method 1613B

BY WILLIAM C. LIPPS, SHIMADZU SCIENTIFIC INSTRUMENTS, INC.

S himadzu Scientific Instruments and PACE Analytical Services have developed an alternate test procedure (ATP) to EPA Method 1613B—PAM-16130-SSI: Determination of 2,3,7,8-substituted tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans (CDDs/CDFs) using Shimadzu gas chromatography mass spectrometry (GC-MS/MS).

This ATP allows the use of GC-MS/ MS in place of high-resolution mass spectrometry (GC/HRMS) for the determination of 2,3,7,8 tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans in wastewater, fish tissue, and soils. PAM-16130-SSI uses a Shimadzu GCMS-TQ8050NX triple quadrupole GC-MS/MS with a boosted efficiency ion source (BEIS) and multiple reaction monitoring (MRM) in place of the GC/HRMS used in EPA Method 1613B to identify the target analytes in the presence of other organic contaminants. This new procedure addresses the challenge of using GC/HRMS instruments, including the high cost to purchase and maintain and difficulty in obtaining parts from manufacturers.

ENHANCED SENSITIVITY ENABLES ULTRA-TRACE LEVEL ANALYSIS

The Shimadzu triple-quad GCMS-TQ8050 NX is capable of performing unprecedented quantitative GC-MS/ MS analyses of ultra-trace amounts, down to the femtogram level. Equipped with a new, highly efficient detector and three forms of noisereduction technologies, the GCMS-TQ8050 NX has never been more important in industries such as food safety, cannabis testing, forensics, and more.

To maximize the benefits of the off-axis ion optics, the system features three noise-reduction technologies and a detector with improved amplification performance. Due to these state-of-the-art technologies, the system can reliably detect ultratrace femtogram-level quantities of ions. The resulting exceptional analytical sensitivity and robustness increase the value of solutions and open the door to new applications.

HIGH-EFFICIENCY DETECTION

The GCMS-TQ8050 NX detects peaks more reliably than the GCMS-TQ8040 NX, even for substances with fewer ions reaching the detector. That means it can reliably analyze femtogram-level concentrations with fewer ions.

Installing two lenses (overdrive lenses) in front of the electron multiplier reduces random noise from helium or argon and improves S/N. Applying voltage to the lenses improves S/N levels by reducing noise near the lenses and helping to focus the ions that pass through the mass filter (Patent No. US6737644).

A NEW LEVEL OF DATA STABILITY

The superior data stability with the GCMS-TQ8050 NX provides

sensitivity that rivals high-resolution GC-MS analysis. This powerful new analytical instrument reliably identifies peaks even for trace quantities of dioxins and other substances previously considered difficult to analyze using a quadrupole GC-MS system.

Due to their tendency to resist degradation and remain inside organisms, the use of PFOS, PFOA, and other long-chain perfluorinated chemicals (PFCs) is increasingly being restricted. Because perfluorooctanesulfonamide and telomer alcohol have been identified as potentially breaking down to PFOS or PFOA, they have attracted attention as compounds that should be monitored in the environment, which involves monitoring trace concentrations.

GOING BEYOND EXISTING STANDARDS

All the sample preparation, extraction, and clean-up steps in Method 1613B are included in the ATP, which means the matrix-specific extraction procedures in both methods are the same. In both methods, each sample is spiked with the same suite of carbon-labeled standards prior to extraction, and those standards are used for isotope dilution quantitation in the same way. All the relevant quality control acceptance criteria are the same in both methods as well.

PAM-16130-SSI is slated to be proposed for nationwide approval. In the interim, laboratories may obtain approval to use this method instead of EPA Method 1613B from their regulatory authority or regional ATP coordinator.

IMPROVING PERFORMANCE WHILE LOWERING COSTS

Approval of this GC-MS/MS method for measurement of PCDDs/ PCDFs has the potential to lower laboratory costs and expand the pool of available laboratories, while not compromising method performance. Other advantages of PAM-16130-SSI include:

- No verification of mass accuracy required every twelve hours. Instead, a passing continuing calibration verification (CCV) at the end of the run is acceptable.
- The GCMS-TQ8050NX enables a slow bleed of PFTBA into the system throughout the entire run without any additional hardware.
- During validation, no recalibration was needed, even after instrument maintenance was performed or after running out of carrier gas.

Furthermore, use of Shimadzu's automatic adjustment of retention time (AART) function for accelerating the retention time adjustments in acquisition and processing methods after significant column maintenance. This proprietary algorithm, which calculates linear retention indices based on constant linear velocity during the run, enables accurate, reproducible chromatographic separation with proper resolution of dioxins and furans after every column maintenance and with your original method.

> Shimadzu Scientific Instruments (SSI) is the North American subsidiary of Shimadzu Corporation's Analytical and Measuring Division. Headquartered in Columbia, Marvland, SSI offers a comprehensive portfolio of analytical and testing solutions for a broad range of applications in science and industry. SSI maintains a network of ten regional offices strategically located across the United States, with experienced technical specialists, service providers and sales engineers situated throughout the country. For more information, visit www.ssi.shimadzu.com.

BRINGING NEW BENEFITS TO ISO MARKETS

Expanding the capabilities of chemical service pumps

BY COLIN GUPPY, SUNDYNE

PUMP SOLUTIONS

NSIMAG pumps are specifically designed to handle aggressive corrosive or acidic liquids in chemical processing applications, including chlor-alkali, isocyanates, plastics and polymers, battery manufacturing, agro-chemicals, and a wide range of water and wastewater applications. To fill this need, Sundyne is expanding its ANSIMAG ALI (aggressive liquid ISO) family of ETFE-lined sealless magnetic drive pumps.

For those in the know, all ANSIMAG wetted parts are molded ETFE (ethylene tetrafluoro ethylene) components that can safely handle a wide range of corrosives and solvents. A patented, fully encapsulated magnetic drive hermetically seals the inner magnets

to isolate them from process fluid and maintain magnet integrity for the life of the unit. An aramid fiber reinforced containment shell delivers unprecedented reliability and protection against water hammer.

WHAT'S NEW? EXPANDED CAPABILITY

The new ALI family brings all of the ANSIMAG benefits to ISO markets, supporting the dimensional requirements of ISO 2858 with specification conformity to ISO 15783. Eleven different ISO-compliant pump sizes provide flows up to nearly 37,000 gallons per hour, heads to 295 feet; temperatures from -22 to 248 degrees Fahrenheit (-30 to 120 degrees Celsius); and working pressures up to 19 bar.

The new ANSIMAG ALI line complements the extensive HMD CSI line of metallic sealless mag drive pumps. HMD CSI pumps support all ISO standards and feature various frame sizes to accommodate an even wider range of flow and pressure requirements at higher temperatures. The combination of CSI and ALI offers customers the widest range of reliable, sealless mag-drive options, in ETFE or metallic materials of construction, to address any chemical processing application.

UPDATED DESIGN

All ALI and HMD CSI pumps come with the worldwide backing of Sundyne's global support network. Plus, ANSIMAG design features brought to ISO markets via the new ALI line include:

- ZERO LEAKAGE: Sealless design completely eliminates possible leakage with only a single fullycontained O-ring.
- CHEMICALLY RESISTANT MATERIALS: Carbon fiber reinforced ETFE is resistant to virtually all chemicals.
- SECONDARY CONTAINMENT: Especially beneficial for applications requiring an additional layer of protection.
- **CORROSION PROTECTION:** Powdercoated metallic parts provide

excellent chemical resistance and superior impact/scratch resistance to maintain coating integrity.

- **DURABLE CONSTRUCTION:** Ductile iron exterior is designed for heavy-duty chemical applications.
- FULLY-ENCAPSULATED INNER DRIVE: Provides unsurpassed resistance to chemical attack by hermetically sealing the inner magnets and isolating them from the process fluid.
- EASY SERVICE: Nine wetted parts and a back pull-out design enables service without disconnecting the casing from piping and without requiring special tools.
- CLOSE COUPLED: Completely eliminates the need for shaft alignment and bearing frame related maintenance in a smaller footprint.
- ENERGY EFFICIENCIENY: Nonmetallic materials completely eliminate eddy current generation allowing for greater efficiency.

BENEFITS YOU CAN TRUST

ANSIMAG ALI sealless magdrive pumps provide affordable replacement options for aging ISO-sized pumps and the newlyexpanded line covers a wide range of sizes and external dimensions to facilitate easy replacements without changing piping or baseplates

More than seventy years ago, HMD Kontro invented the magnetic drive pump, and today, the HMD CSI sealless pump line sets the standard for metallic magnetic drive ISO pumps. Since 1985, more than 50,000 ANSIMAG sealless, nonmetallic mag-drive pumps have been deployed to handle harsh and corrosive chemicals in a variety of industries.

The introduction of the ANSIMAG ALI line brings a rich heritage to ISO markets, and the combination of ALI and CSI offers customers a one-stop-shop for sealless pumps to address any harsh and aggressive pumping application. COLIN GUPPY is Sundyne's global vice president of chemical and industrial. Headquartered in Arvada, Colorado, with operations and presence in Europe, the Middle East, India, Asia, Japan, and China, Sundyne is a global manufacturer of precision-engineered, highly reliable, safe, and efficient centrifugal pumps and compressors for use in chemical, petrochemical, hydrocarbon, hydrogen, pharmaceutical, power generation, and industrial applications. Sundyne is the world leader in delivering low-flow, highhead integrally geared centrifugal pumps and compressors, safe and leakage-free sealless magnetic drive centrifugal pumps, and diaphragm compressors. Sundyne pumps and compressors are also available in API, ANSI/ASME, ISO, and other industry compliant designs. For more information, visit www.sundyne.com.

MOTOR SOLUTIONS

NEW DIGITAL APPRAISAL SERVICE REVEALS THE POWER OF DATA

Industrial energy saving opportunities are on the rise as emissions drop

ABB is enabling industrial operators to maximize energy efficiency and boost sustainability by identifying motor-driven equipment in their facilities with the best energysaving potential. The ABB AbilityTM

BY BO LIU, ABB

Digital Powertrain Energy Appraisal service draws on data measured from fleets of digitally connected electric motors and variable frequency drives (VFDs) to show where and how much energy can be saved by upgrading to the latest high-efficiency technologies. Industrial operators can then make data-driven decisions when prioritizing investments.

ENERGY EFFICIENCY: THE PATH FORWARD

Upgrading to energy efficient technology is one of the simplest and most cost-effective ways to lower energy consumption and associated greenhouse gas emissions. Across the world's 300 million industrial motor-

Using the new Digital Powertrain Energy Appraisal service, Waggeryd Cell reduced energy consumption while lowering emissions.

driven systems, there is potential to reduce global electricity demand by up to 10 percent by switching to highefficiency systems.

"The challenge for an industrial operator is knowing where to start in a fleet of hundreds of electrical motors," says Adrian Guggisberg, division president of ABB Motion Services. "ABB developed the new Digital Powertrain Energy Appraisal service to provide clarity by analyzing motor data and identifying where businesses should focus investment to maximize energy efficiency gains that reduce operating costs and carbon emissions."

CASE STUDY: WAGGERYD CELL

One operator reaping the benefits is Waggeryd Cell, a pulp mill in southern Sweden with industryleading energy efficiency. In an effort to further improve the efficiency of its energy-intensive process, Waggeryd is building its ABB Ability Condition Monitoring system. This draws data from digitally connected motors in refiners, process pumps, fans and conveyor belts. Under the new Digital Powertrain Energy Appraisal service, ABB's experts used data

"Harvesting digital data from fleets of motors help industry minimize carbon emissions and energy costs by identifying and prioritizing energy savings"

-ADRIAN GUGGISBERG, | DIVISION PRESIDENT OF ABB MOTION SERVICES

from the same sources to identify the ten motors with the most potential for improving energy efficiency. Waggeryd has now prioritized replacement of six of these motors to reduce energy consumption, as well as greenhouse gas emissions.

Traditionally, an energy efficiency appraisal requires time-consuming manual collection and evaluation of data and covers only the largest motor-driven systems on a site as these are typically seen as

ABOUT ABB MOTION

ABB Motion keeps the world turning – while saving energy every day. We innovate and push the boundaries of technology to enable the lowcarbon future for customers, industries and societies. With our digitally enabled drives, motors and services our customers and partners achieve better performance, safety and reliability. We offer a combination of domain expertise and technology to deliver the optimum drive and motor solution for a wide range of applications in all industrial segments. Through our global presence we are always close to serve our customers. Building on over 130 years of cumulative experience in electric powertrains, we learn and improve every day.

having the most potential for saving energy. However, this could overlook significant energy-saving opportunities for electric powertrains that are smaller, less accessible or where energy-saving potential is not obvious.

DEEPER INSIGHTS FOR BETTER RESULTS

The new digital appraisal service uses a plug and play approach to simplify energy efficiency assessments by pulling operational data remotely from across an entire fleet of digitally connected motors. This provides much deeper insight into the business case and carbon footprint benefits of upgrading to high-efficiency motor-driven systems, while being much safer and faster.

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

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EFFICIENCY POINT

CHEMICAL METERING CHALLENGES DEMAND INNOVATION

Watson-Marlow's Rick Balek on the past, present, and future of peristaltic pumping technology

For twenty-seven years of his near four decades in the peristaltic pumping market, Rick Balek has been working at Watson-Marlow Fluid Technology Solutions to bring new products and innovation to customers with exacting standards. Who better, then, to jump into a discussion on MPT's podcast, The Efficiency Point, to provide a history lesson on these reliable machines and how his company is meeting market demands into the future. An excerpt of that conversation follows.

MPT: Have there been any new pumping technologies developed recently for the challenges of chemical metering in water and wastewater treatment?

RICK BALEK: There sure has. Recently is sort of an ambiguous term, but over the last decade or so, there's a technology in peristaltic chemical metering pumps. They use what's called a cartridge head, and that's very, very different than what is found in traditional peristaltic tubing pumps that have been around for twenty, thirty, or forty years even.

Really, 1996 is when peristaltic tubing pumps came to fruition in the municipal and industrial water and wastewater space, and back then they used what was called a continuous tube—and, to some extent, continuous tubing is still used today. Continuous tubing is a long piece of tube generally found on a spool of many, many feet. An operator might cut a section off and then put the tubing through the pump, hit the peristaltic pump head, and then connect the suction and discharge.

And the nice thing about it being continuous is that, you could actually just shift the section of the tubing while still remaining in the pump head, and when doing that you essentially sort of rebuild the pump. Therefore, a 7- or 8-foot-long piece of tube can easily last a year to two years. But the negative about continuous tubing is this pressure limitation, which is just about 30 psi.

Skip into the early 2000s, now element tubes were created—a piece of tubing of the same material but a much shorter length, where the fittings are generally on the suction discharge side of a short piece of tube, and then that short piece of tube is inserted into the pump head, and then the piping is generally attached via an intermediary external piece of interconnecting tubing. And this is still used today.

The advantage is that it can achieve pressures of 100 psi or more, but one of the disadvantages is that when a tubing failed, there was a chance that some of the chemical being pumped out and exposed to the operator or maintenance person.

MPT: What advancements have been made in safety for chemical pumps?

RICK BALEK: This is where over the last decade cartridge heads have really come into focus. And the cartridge head is a style of pump technology where the tubing, the rotor, and so on are sort of built into a single use pump head. And the advantage of that is that you can get into even higher pressures and achieve more accurate flow, but should the tube break or if there is a leak, it stays contained inside the pump head.

Now, there is an optional drain port that can be used to control a leakage path to a safe location, but I'd say 99 percent of the customers out of the tens of thousands that use this cartridge head technology don't do that. They actually dispose of this relatively small, baseballsized pump head and then put a new head on. Cartridge heads are sort of the standard now when it comes to peristaltic tubing pumps in municipal and industrial water, wastewater, and chemical metering applications.

Also, as far as safety, certainly the HMI—the humanmachine interface—allows for safer use and, from a logic

perspective, safer operation, as well as the increased use of chemical metering skids. •

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

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