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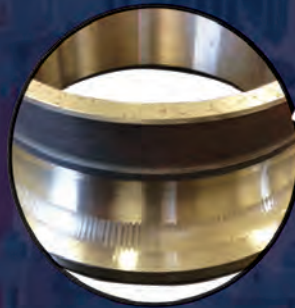
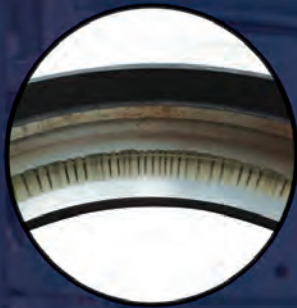


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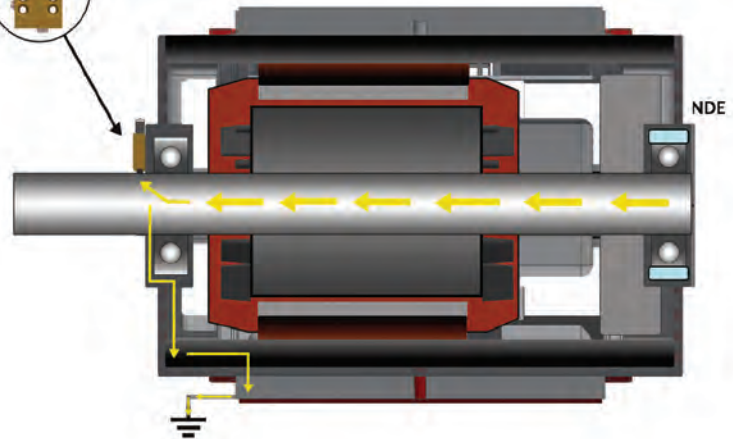
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A NOTE ON THIS ISSUE:

Welcome to the May issue of MPT! Scott Dorner from Aquatic Informatics leads off our Case Studies section this issue with a blow-by-blow account of one wastewater treatment facility's move toward a modern centralized data-monitoring platform (pg. 12). As you'll see, having all this information live in one platform gives operators a much better understanding of the facility's performance.



J. Campbell, Editor
Modern Pumping Today

Next up, sewer maintenance is an ongoing challenge for cities and municipalities. Moreover, gaps in best practice training can cost public works departments unnecessary time and expense in labor, water, and energy costs when cleaning sewer lines. However, you can be put yourself in a better position by moving beyond some commonly held misperceptions, which we highlight in "Busting Sewer Maintenance Myths" by KEG Technologies (pg. 16).

Also, Sulzer's Mattias Feldthusen pulls us out of the sewer to view the water supply as a whole, and the dangers facing it (pg. 20). Removing pharmaceuticals from the water supply is one of the major challenges for today's wastewater treatment industry, and to prepare for the future, national water municipalities need to start planning their strategy as soon as possible. Enjoy!

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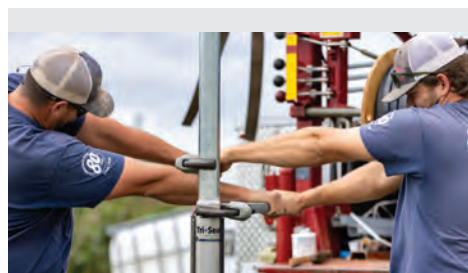
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DUPERON RECEIVES EXPORT ACHIEVEMENT CERTIFICATE

Duperon Corporation has been awarded an Export Achievement Certificate from the U.S. Commercial Service, a division of the U.S. Department of Commerce. The award was presented by James Golson, deputy director general of the U.S. and Foreign Commercial Service at the International Trade Administration.

The Export Achievement Certificate recognizes American companies that have begun exporting overseas or have expanded international sales with the assistance of the U.S. Commercial Service. Last year, Duperon reported a 363 percent year-over-year increase in international sales.

"We are deeply honored to be recognized for our impact on American exports," says Mike Olvera, international market development manager at Duperon. "Last year, we saw significant growth in international business, highlighting just how critical our work is in areas beyond our borders. We are grateful for the hard work our Saginaw team has put into contributing to the global marketplace. Equally, we express our gratitude to our partners across borders whose trust and collaboration have been instrumental in our success."

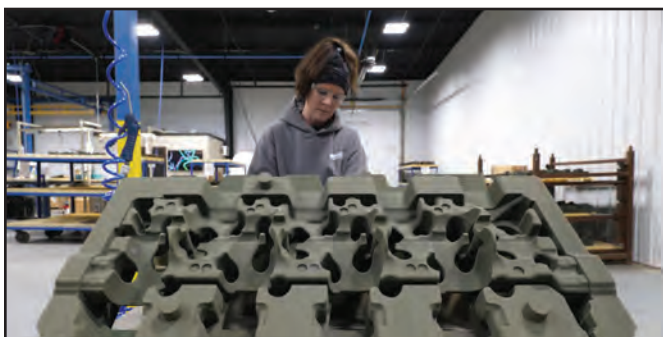
In addition to certificate presentations, the event featured a week-long itinerary of educational programming where local leaders shared knowledge and resources.

FIELDCOMM AND FDT EXPLORE STRATEGIC BUSINESS COLLABORATION

After years of close collaboration, FieldComm Group and FDT Group have executed a term sheet to combine resources into a single business focused on creating device integration technology standards and products serving the user and vendor communities of industrial process, hybrid, and factory automation.

Subject to the completion of a definitive agreement, the new business will continue to support all existing FieldComm and FDT technologies, including Field Device Integration (FDI), Field Device Tool / Device Type Manager (FDT/DTM), Process Automation Device Information Model (PA-DIM), HART, and FOUNDATION Fieldbus. FieldComm will acquire all FDT technology and resources, and an independent strategic integration committee will be formed to guide future directions for protocol-independent device integration technologies.

This strengthened relationship represents a significant step forward in streamlining process automation and factory manufacturing device management, enhancing interoperability throughout the industry. The unified organization's goal is to provide industrial device management that seamlessly bridges the present and future, ensuring support for the current installed base while facilitating evolution towards harmonized technologies.



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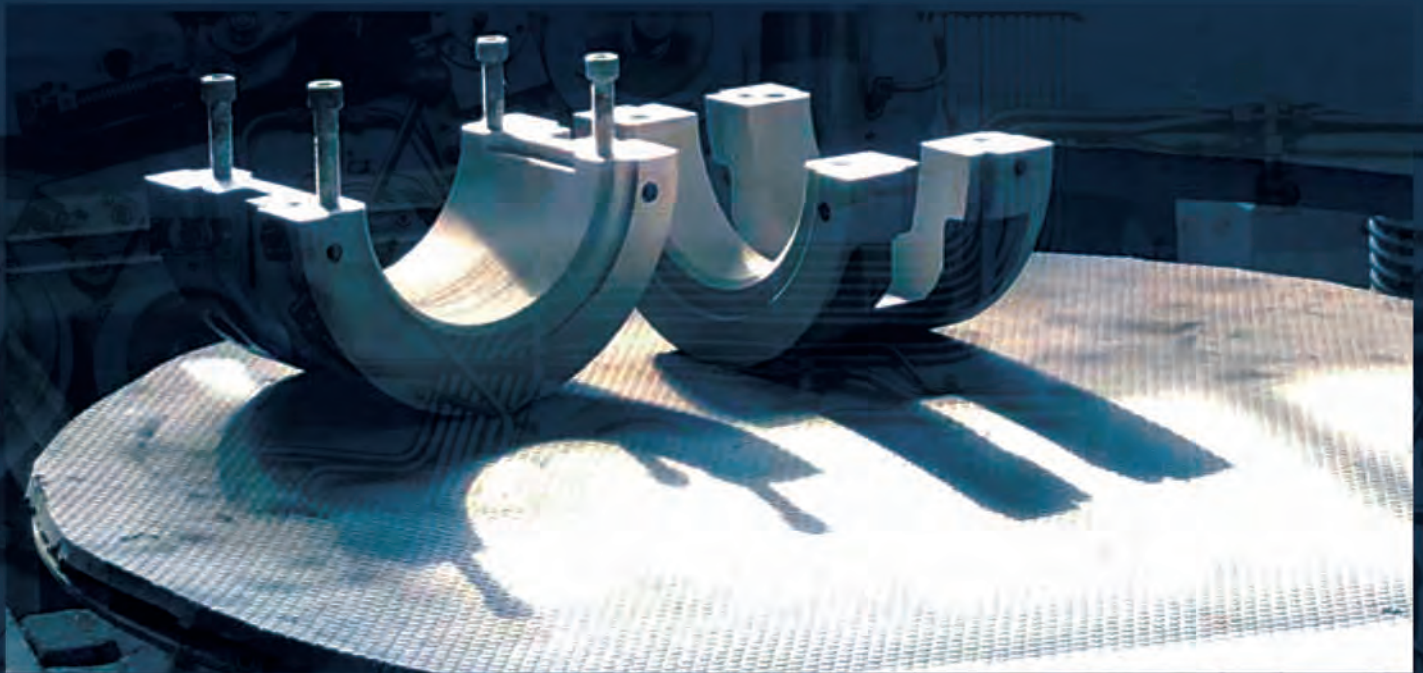
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The new arrangement will significantly empower end users and manufacturers in their quest to achieve out-of-the-box IIoT capabilities across their systems.

TRADEBE AND VEOLIA PARTNER TO SECURE HAZARDOUS WASTE TREATMENT

A new three-year agreement ensures guaranteed access to high-temperature thermal treatment for Tradebe Environmental Services at Veolia North America's new state-of-the-art facility in Gum Springs, Arkansas, which will open in 2025 to meet the growing needs of the market. The agreement ensures reliable, predictable, safe, and efficient material management for Tradebe customers using customized high-temperature thermal treatment technology.

Veolia's new facility will help the company stay ahead of the curve with the most advanced technology in the industry, offering thermal treatment for environmental, household, and industrial waste.

This pioneering move in the sector illustrates the aligned strategy of Tradebe and Veolia to provide cutting edge solutions to support sustainable growth for industrial players in the U.S. hazardous waste market. Already a leading company in the hazardous waste treatment sector in the United States, Veolia has an ambition to continue to expand its footprint in order to address growing demand.

"Veolia North America is pleased to enter into this partnership with Tradebe, which is an example of how business can work collaboratively to address environmental waste challenges," adds Veolia North America President and CEO Fred Van Heems.


MINEBEA INTEC OPENS NEW TECHNICAL CENTER

The Minebea Intec Technical Centre Mexico (MITCM), which was officially opened in April 2024, offers a comprehensive insight into Minebea Intec's pioneering products and serves as a platform for regular training courses and product demonstrations. The opening ceremony, which was attended by around 100 participants from various industries and countries, marked a significant milestone for Minebea Intec's presence in Latin America. From checkweighers to metal detectors: the MITCM is bursting with high-tech for increased efficiency and product safety.

At the core of Minebea Intec's offering are high quality solutions ranging from platform scales and load cells to container and silo scales, checkweighers, metal detectors, and state-of-the-art X-ray systems. These technologies are complemented by intuitive software solutions designed to streamline processes and improve operational efficiency. There are exhibits from every segment at MITCM.

These technologies from Minebea Intec encompassing a wide range of applications crucial for various industries

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LHYFE AND UGITECH TEAM TO DECARBONIZE THE STEELMAKING OPERATIONS

Lhyfe, a producer of green and renewable hydrogen, and Ugitech, a subsidiary of Swiss Steel Group, announce the signing of a memorandum of understanding for the creation of a green hydrogen production unit at Ugitech's Ugine site in Savoie, France, to decarbonize part of the steelmaker's industrial operations.

This is the first agreement in Europe to replace fossil fuels with green hydrogen in the stainless-steel sector. The steelmaker, which produces around 200,000 tons of steel per year, has selected Lhyfe to support it in this energy transition. This project could avoid emitting 16,000 tons of carbon dioxide per year.

Lhyfe, which is signing its first memorandum of understanding with a steel manufacturer, already has three production sites and is currently building several sites in Europe. The two partners are now entering the feasibility study phase of the project. Implementation will be subject to the conclusions of this study, the granting of operating licenses and building permits, and financial investment decisions.

This site, which is where the 2030 Winter Olympics will be held, should also contribute to a sustainable model of winter tourism.

GRAND OPENING FOR NETZSCH NOTOS MULTI SCREW PUMP PLANT

In March 2024, Netzsch Pumps & Systems officially opened the new Notos multi screw pump plant in Pomerode, Santa Catarina, Brazil. The new factory in the Ribeirão Souto district marks an important milestone in Netzsch's seventy-year history. The construction work began in August 2021 and was completed in less than three years despite countless challenges.

The new plant will be used to produce and supply the global market with high-quality multi screw pumps specially designed for demanding applications. In addition, the new factory will expand production capacity for other product lines at the existing site in Pomerode. In addition to multi screw pumps, the portfolio also includes progressing cavity pumps, rotary lobe pumps, peristaltic pumps, and grinding systems.

"Thanks to the new Notos multi screw pump plant, we will significantly increase our production capacity in Brazil. Our customers will benefit from even more powerful pumps and shorter delivery times in the future," says Osvaldo Ferreira, managing director of Netzsch do Brasil.



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The Penn Yan operations crew look out over the facility.

MOVING ON FROM MANUAL MONITORING

New York wastewater treatment plant goes all in on modern centralized data platform

BY SCOTT DORNER, AQUATIC INFORMATICS

Located on the north end of Keuka Lake in the state of New York is the village of Penn Yan, which is home to approximately 5,000 people. The Keuka Lake Outlet carries water from the lake's outlet through the Village along with flow from two small creeks to Seneca Lake, the largest lake in the Finger Lakes chain. These waterways and the power they generated were a principal reason for the establishment of the Village on this site in 1799. Today, residents and summer vacationers enjoy many recreational

activities along the lakes and outlet. Protecting these waterways is a top priority for the Penn Yan Wastewater Treatment Plant operations team, and the chief operator, Yvonne Tucker.

The village wastewater treatment plant was built in 1983 with a design flow capacity of 1.8 million gallons per day. For the most part, the plant runs well, however during heavy rain events, flows can increase from the average 1.2 million gallons daily flow to 5.6 million gallons per day in less than thirty minutes causing inflow/infiltration issues. The secondary

treatment process is comprised of 16 rotating biological contactors (RBC), two-stage anaerobic digestion, mechanical screw press dewatering, and biosolids compost production. Nitrification takes place on the last ten RBCs, and polyaluminum chloride is utilized for total phosphate reduction to less than 1 mg/L. While industry accounts for about 10 percent of the plant's flow, periodic dumping can cause overloading that upsets conditions resulting in the need for an increase in phosphorus removal.

Monitoring the treatment of Penn Yan's wastewater from influent to effluent involves the collection of a lot of data as pollutants are removed and water quality is restored. Operators receive some data such as pH, dissolved oxygen, suspended solids, temperature, etc. from instruments, and also receive water quality results from samples sent to laboratories. In addition, plant operators used paper bench sheets that were later entered into an Excel spreadsheet for performance tracking. Prior to continual monitoring, all the lab results, instrument readings, and bench sheets were manually entered into different spreadsheets for different tracking purposes. The problem with entering data manually is that it is very time-consuming and is prone to human error.

Having data stored in different spreadsheets for different reasons is not optimal when it comes to understanding the dynamic performance of a system as a whole.

"We were chasing data all over the place in multiple spreadsheets which made it very hard to troubleshoot issues and difficult to see long-term trends," says Tucker.

MOVING TO AN AUTOMATED CENTRALIZED DATA PLATFORM

Penn Yan moved from paper to digital in 2022 with Rio, a software program by Aquatic Informatics that helps manage treatment plant operations by collecting and organizing data into actionable insights. The new software can integrate with electronic lab transfers, pull data from instruments, and allow personnel to capture field data on-site with a connected mobile device. Alerts can be set to notify operators with in-app notifications and email if a parameter setpoint has been exceeded.

Having all this data securely stored in the cloud improves operational visibility. Preceding and following weekends and holidays, operators

will let their co-workers know if something is amiss or a little unusual, but sometimes circumstances don't allow for the conversation to happen. Having information from the previous shift at the fingertips of the new crew ensures they can have a quick glance at the previous eight hours.

TROUBLESHOOTING WITH DATA

Like most wastewater treatment plants, Penn Yan has redundancy at their pump stations. Equalling out pump run-times is important to ensure maintenance is performed when it should. If there is a deviation in pump run times, it can indicate a problem.

"We recently installed a new pump station and began to notice that one of the pumps was accumulating more hours than the other," says Tucker. "On investigation, our team determined that the T-joint on the pipe had come apart so that when that pump was on, water was coming

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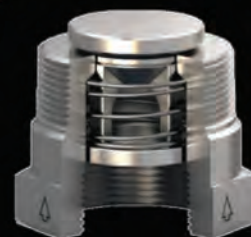
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Yvonne Tucker, chief operator for the Penn Yan Wastewater Treatment Plant.

back into the wet well so it had to pump longer than the other one. By monitoring and trending pump hours in Rio, we were able to identify there was a problem."

Having all this information live in one platform gives operators a much better understanding of performance and if any changes need to be made to the system to keep wastewater flowing through the treatment process efficiently.

For example, if the load cells for the rotating biological contactors (RBCs) on one train indicates a trending

increase in weight, and the other train load cells do not show an increase, this type of one-sided increase would indicate an uneven flow or loading condition. This would require an adjustment to the splitter box ahead of the RBC process to even out, or balance the distribution between the two trains. If left uneven, this could result in reduced treatment efficiency, or possibly increased stress on the mechanical equipment due to an overweight condition which could result in catastrophic failure.

A leading indicator of a healthy digester is the ratio of volatile acids to alkalinity (VFA/TA). The Penn Yan treatment plant operates around 0.12. The anaerobic digestion process can be finicky, if the pH has changed, then it's too late, and the bacteria have stopped functioning. This can result in a sour digester, and possibly foaming issues. "Using Rio we can watch this ratio trend closely and adjust how much we are feeding the digester or add alkalinity to buffer the acid if needed," says Tucker.

Ensuring equipment is operating within its capacity and that operational processes are running efficiently impacts both short-term costs (maintenance and repair) and long-term capital budgets.

GARNERING INSIGHTS WITH VISUAL ANALYSIS

Being a relatively small treatment plant, Penn Yan monitors around 100 parameters from regulatory influent/effluent parameters to process control data. The new platform allows Tucker to select and analyze any number of these parameters, over any period.



Penn Yan wastewater treatment plant.

Prior to using Rio, she had to pull data from multiple spreadsheets to compile reports, which was time-consuming. Now with a few clicks, she can create graphs and dashboards to visualize trends or identify relationships between any number of parameters.

Tucker says, "We can create the graphs we need, on-demand, 10 times faster now—it's a huge time-saving feature."

As summer approaches, Penn Yan population swells resulting in an increase in organic loading, often resulting in an alert that clarifier sludge blanket heights are too high. Operators can now look at historical data to see when this usually happens and what they did to accommodate the change.

"We can now be more predictive—we can avoid some problems and investigate others quickly and easily, so we can improve our response time to fix them in the future."

REPORTING, COMPLIANCE, AND TRANSPARENCY

Tucker uses Rio to produce the monthly NetDMR discharge reports and other quarterly reports for stakeholders. As most data is automatically fed into the system, compliance reporting takes a lot less time, and without additional, repetitive data entry, there is less chance for human error. Having all the derived data in one place adds a layer of defensibility to reporting, but it is also helpful when a permit exceedance occurs.

When a permit violation occurs, the village needs to follow protocols which starts with notifying the Department of Environmental Conservation (DEC). Tucker explains, "The next step is to understand why we had a violation, so we go through the plant looking for problems. We check the operation of chemical metering pumps, make sure we are adding enough chemicals to help with settling, compare the industry flow to see if their contribution is causing a negative impact, look at



Rotating biological contractors used in secondary treatment process.

what is in the influent, and check to ensure that the flow did not exceed the design parameters of the tank, and so on. Having all this data in one place, allows us to easily and visually see the whole process. We can overlap data to compare time periods and determine what happened so we can get back in compliance."

Prior to the new software, if a stakeholder asked to see the last year of flow data, it would involve pulling data from twelve different spreadsheets and copying and pasting it into one. This was time-consuming work that may, or may not, garner any valuable insight. Today, Tucker can select and organize the data she needs for just about any request, providing a new level of transparency for stakeholders and the ability to provide reports that visually showcase pertinent results.

CAPTURING HISTORY FOR FUTURE HIRES

Small communities with small budgets are held to the same standards and regulations as larger water utilities. "It's vital for small teams like us to

use every tool we can to streamline operations and work processes, as our roles and responsibilities often encompass a more diverse spectrum than our colleagues in larger utilities," says Tucker.

As new hires join the team, they need to quickly get up to speed on plant operations. Having all its wastewater treatment information stored in one place will really help with this. As things change over time, operators will have a reliable historical baseline to help with decision-making. ■

SCOTT DORNER is data management product manager for Aquatic Informatics. Aquatic Informatics provide ongoing support and training for newly released features through regular software updates, ensuring that utilities get the most out of their data with the constant evolution of technology. For more information, visit www.aquaticinformatics.com.



A very high-efficiency Tier-3 nozzle running 60 gallons per minute at 2,000 PSI will impact a plate nine feet away with 98 pounds of force.

BUSTING SEWER MAINTENANCE MYTHS

Focus on latest equipment and best practices optimizes cleaning and lowers costs

BY DEL WILLIAMS

Sewer maintenance is an ongoing challenge for cities and municipalities. Moreover, gaps in best practice training can cost public works departments unnecessary time and expense in labor, water, and energy costs when cleaning sewer lines.

Making matters worse, our comprehension of sewer line cleaning has evolved alongside the advancements in hose nozzle

technologies, which in some cases directly contradicts current practices. So, when conducting training classes across North America, Dan Story, an operations manager and national trainer at KEG Technologies, first addresses a common misconception. Many have been trained to quickly run sewer line hoses up the line to effectively remove debris. However, this “hurry up and clean” approach is

counterproductive and can potentially redirect sewage flow into homes, commonly known as “blown toilets.”

“For years, sewer maintenance crews have been taught to shoot a nozzle up a line in a hurry and clean as they come back,” says Story, whose company provides Tier 1 to Tier 3 nozzles, chain cutters, floor cleaners and camera nozzle systems to the industry. “But this is not a race.

If you are not slowing down to cover all the ground, it simply is not going to work very well."

Instead, Story trains sewer crews to "clean as you go in and rinse as you come out," adds Story. "With this approach, 95 percent of the time you will clean a line in one pass instead of making a whole lot of passes."

For Story, who travels across the United States and Canada conducting training on sewer cleaning techniques, misconceptions abound in the industry and often reflect a lack of understanding of the fluid dynamics of high-pressure nozzles. Over time, additional best practices have been developed through a process of trial and error.

As part of his training sessions, Story provides the following additional tips for sewage line cleaning:

"READ" THE RESULTS

Story says you can learn a lot by paying attention to what is happening in the line going in and coming back.

"Crews need to be trained to understand what they are 'reading' coming out of the pipe. The information can tell you whether you are going too fast or too slow, how much debris is in the line, and whether the line is clean after the first pass – or not," says Story.

When going up the line, for example, it is beneficial to observe the amount of debris present.

"If there is minimal debris returning, it indicates that the pipe is in relatively good condition, with a low accumulation of debris. So, I can accelerate my speed. However, an excessive amount of recovered material suggests the need to slow down. In such cases, the flow of water acts as a conveyor belt, effectively carrying the debris out."

When the water flow confirms the pipe has been cleaned at the right speed, the maintenance crew can then lower the pressure in the hose to between 900 to 1,000 PSI and come back through the pipe at the same

speed. This final single "rinsing" pass can leave the line totally clean.

"The trick is paying attention to your hose. Make sure your hose comes back clean, and then you know your pipe is clean. How much debris is in the first pass? This information can tell you whether you're going too fast or too slow. Remember to never outrun your flow because your flow is your conveyor belt. If there is a lot of material on the hose, it is telling me to slow down. If my hose stays clean, I know I am moving at a good pace," says Story.

Another common sewer cleaning misconception is that you don't need to open the upstream manhole when cleaning sewer pipes. This can actually increase pressure in the system and lead to blown toilets, where sewer gases flow up the laterals and cause sewage water to overflow from residential toilets.

According to Story, approximately 95 percent of blown toilets can be attributed to how the operator

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When the water flow confirms the pipe has been cleaned at the right speed, the maintenance crew can lower the pressure in the hose and come back through the pipe at the same speed.

cleans the lines. However, identifying certain signs can help mitigate these issues. For instance, a sudden rush of water during the return flow could indicate the upstream manhole was closed instead of being left open.

PROTECT YOUR INVESTMENT

Slowing down and observing the results allows for cleaning to be performed in a single pass, which helps safeguard the hose from potential damage.

"If you are going into each pipe once, rather than three times, to clean it, you are basically tripling the life of a \$3,000 to \$4,000 hose," says Story.

Beyond the wear and tear on the equipment there are also operational costs to consider such as water, fuel, as well as the productivity of the operators. "Cleaning more efficiently and effectively means lowering the operating costs per pipe and increasing what a city's public works department can do," explains Story. "And today, everybody is trying to figure out how to do more with less."

NOZZLE SELECTION MATTERS

Story cautions departments not to overlook the importance of nozzles even when expensive trucks are purchased for providing a water supply. While a department may have invested a half-million dollars for a truck to clean sewer lines, its impact is only as good as the nozzle at the end of the hose. "If you are using a cheap hundred-dollar nozzle, well now you have a hundred-dollar truck because it is the nozzle that cleans all of the pipe, not the truck," explains Story.



Crews need to be trained to understand what they are "reading" coming out of the pipe.

As is known throughout the industry, there are tiers of nozzles which are rated for water efficiency from Tier 1 (about 30 percent efficient), Tier 2 (50 to 60 percent efficient), to Tier 3 (75 to 98 percent efficient). However, even within the Tier 3 category, there are significant differences in levels of efficiency. Opting for the lower end Tier 3 nozzle with 75 percent efficiency could still lead to additional trips to refill. Also, such units may not remove restrictive sewer buildup or blockage in a timely manner.

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

"When you put the right nozzle on, you can do things that you never thought were possible," says Story. "You will not have to sit there and spend all day doing what you need to do."

What sets the most efficient Tier 3 nozzles apart from others in the category is fluid mechanics engineering on a par with the aerodynamics of race cars or jet fighters.

In the case of KEG's Tier 3 nozzles, the high-performance fluid mechanics design leaves little room for power losses and excessive turbulence. 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. Next, the water is funneled from a short conical



A sewer maintenance expert from a company like KEG Technologies can show operators how to use less water, less fuel, and cause less wear and tear.

shape to a larger, longer cylindrical shape, allowing a tight 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 as efficiently as possible. This results in what is needed for the task: more thrust and power using less water.

OPTIMAL TECHNIQUE IS KEY

Effective cleaning involves more than just using a powerful nozzle. It also entails understanding the proper positioning and placement of the nozzle within the pipe.

"We teach about the difference between laying a nozzle on the bottom of the pipe and centering it into the pipe," says Story. "We teach about the flows and angles based on the size of the pipe and the condition of the pipe based on the last camera footage."

KEG trainers teach how to use a banked turn with the water hose to get more power with less water.

"If there is an issue with roots or heavy grease, you want to use a

controlled rotation nozzle which will cut and chop it up enough to avoid debris going through the manhole and creating blockages downstream," says Story. He recommends using a nozzle capable of breaking up blockages to a particulate size small enough to go all the way to the treatment plant without creating a problem downstream.

THE SCIENCE BEHIND BEST PRACTICES

With the advancement of nozzle technologies, there is a need for municipalities to get everyone on the same page about the proper techniques for cleaning sewer lines.

"What surprises even experienced sewer and storm professionals is the science that is behind the best practices," says Story. "What we teach is based on understanding fluid dynamics. We look at the horsepower of your truck that drives the water pump for a rate of volume at a particular PSI level. We factor in the efficiency of the nozzle. What we want to get to is how to run the truck at a lot lower RPM and PSI that

will clean the line easier, better, and more efficiently."

"We can show operators how to use less water, less fuel, and cause less wear and tear. Bottom-line, it's about how to get more work done while using fewer resources. And of course, this reduces the risk of the worst-case scenario of blowing up toilets in people's homes," adds Story. ■

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.

REMOVING PHARMACEUTICALS FROM WATER SUPPLIES

Tackling a major challenge for the wastewater treatment industry

BY MATTIAS FELDTHUSEN, SULZER



Ozonation and carbon filtration has proven to remove almost all traces of pharmaceutical pollutants.

The current EU Urban Wastewater Treatment Directive is more than thirty years old, and it has made dramatic improvements to the water quality in European rivers, lakes, and seas. However, several pollution challenges remain and are not covered by the current legislation. One of the most prominent is pharmaceutical residues, which are having a detrimental effect on wildlife and human health, leading to a revision of EU Directive 91/271/EEC.

European countries have set up collecting systems and wastewater treatment plants with the help of EU funding. There is a high level of compliance with 91/271/EEC across the EU, with 98 percent of wastewater collected and 92 percent satisfactorily treated, according to the current coverage of the directive.

PAYING FOR POLLUTING

The latest proposals will require producers of pharmaceuticals and

cosmetics to pay for the cost of removing micropollutants that come from their products and end up in wastewater, thus implementing the “polluter pays” principle.

Currently the pharmaceuticals and the cosmetics sectors are jointly responsible for 92 percent of the toxic load in wastewater. For both sectors, there is sufficient evidence regarding the existence of micropollutants from these products in wastewater and there are treatments available to remove their harmful residues.

The EU Commission raised a new proposal for the directive in October 2022. It aims, among other things, to further reduce pollution, energy use and greenhouse gas emissions, to make industry pay for the treatment of micropollutants and ensure EU countries monitor pathogens in wastewater. This last proposal was borne from the COVID-19 pandemic, which showed that viruses can be tracked with high reliability in wastewater.

HARMFUL EFFECTS

Many pharmaceuticals can remain in wastewater throughout the treatment and discharge processes and have been detected in rivers, streams, and lakes around the world. Once in the environment, these chemicals can detrimentally affect aquatic wildlife. Natural and synthetic estrogen compounds are known to cause decreased fertility and other negative reproductive effects in fish. The inhibition of growth and development of secondary sexual characteristics was reported in some species after exposure to a variety of endocrine-active chemicals.

Other commonly used compounds that are persistent in wastewater treatment effluent are nonsteroidal anti-inflammatory drugs. These compounds, including ibuprofen and naproxen, have been discovered in the environment at concentrations of 300 ng/L in surface waters, and they elicit negative reproductive effects

on aquatic organisms at low, but potentially environmentally relevant, concentrations. Furthermore, commonly used antidepressant drugs can elicit behavioral changes in fish. Antibiotics in the environment lead to the development and propagation of antibiotic resistance. Concentrations exceeding 100 ng/L have been reported to influence the proliferation of antibiotic-resistant bacteria and thus present potential public health concerns.

INTRODUCING THE SOLUTIONS

For antimicrobial active pharmaceutical ingredients (APIs), there is also concern that environmental exposures could select for antimicrobial resistance (AMR) in microorganisms and thus contribute to the global AMR crisis. It is therefore crucial that a much greater emphasis is put on removing these residues, which are not covered by the current legislation; naturally this will require additional treatment processes to be installed.

Filtration technology that has been developed in recent years has the capabilities to remove pharmaceutical residues, however there is no single solution for every treatment plant. There are several factors that need to be considered to ensure an optimized filtration process is achieved.

Granular activated carbon filters are among some of the best options, especially for treatment plants that employ sludge digesters, where they are the simplest and most cost-effective solution, even with short retention times. At the other end of the scale, reverse osmosis (RO) and nano filtration (NF) are very effective. However, there are high operating costs to be considered, as well as more complicated cleaning processes.

INTEGRATING FILTRATION PROCESSES

Some treatment works, mainly in southern Europe, use incinerators to dispose of processed sludge and

these can handle powdered activated carbon in the sludge. In northern Europe, most treatment works have a digestion process to produce biogas, which is used by an engine and generator to reduce the energy bill for the plant. In this case, powdered activated carbon (PAC) would reduce the efficiency of the process and eventually needs to be removed from the digester.

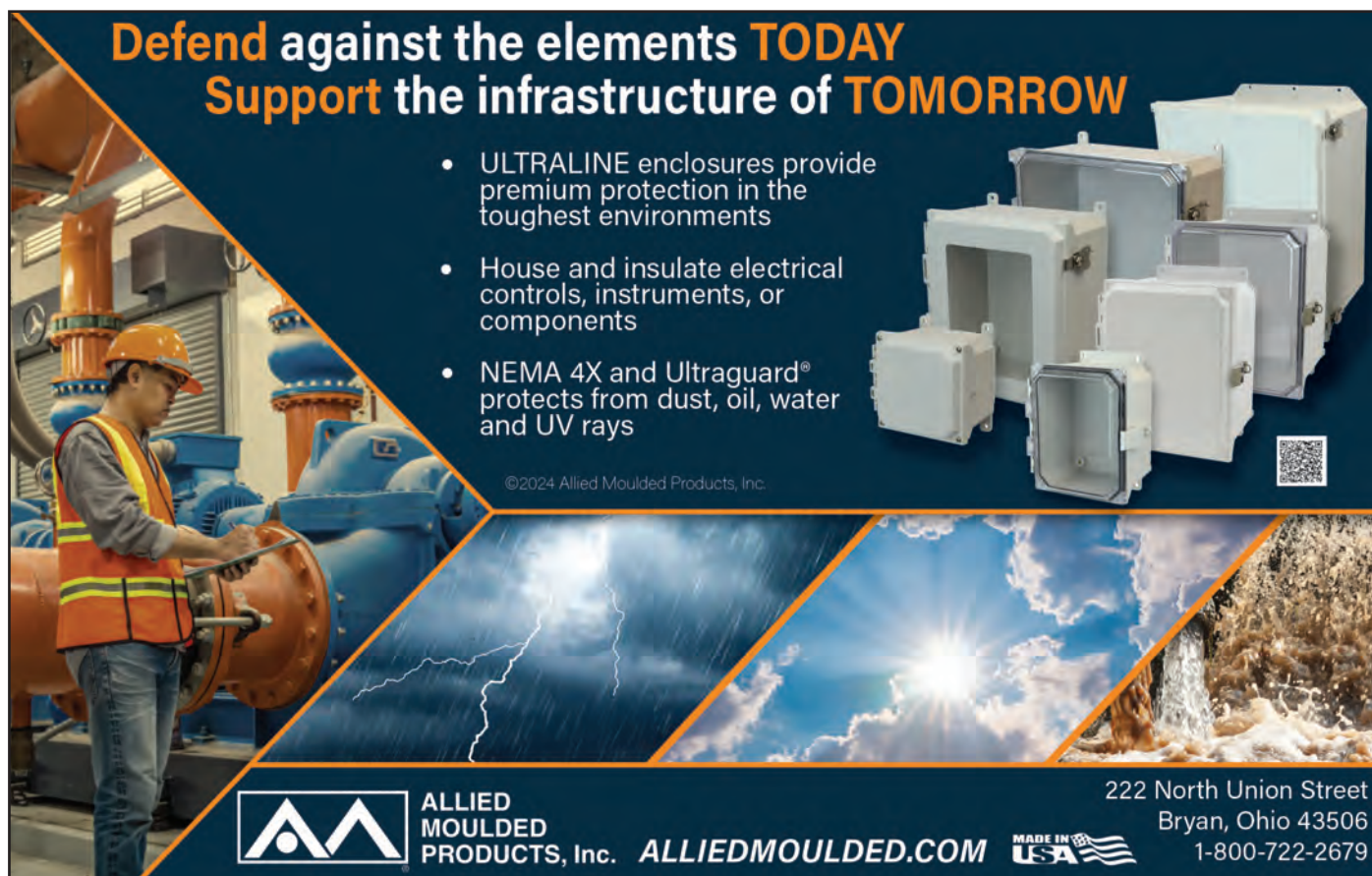
Many treatment plants will already use a sand filter as a tertiary process and these offer an opportunity to introduce granular activated carbon (GAC) filters. Sulzer's Nordic Water has been running large-scale trials of GAC filters that can be installed in the sand filter basins and operated continuously, without the need for backwashing. On other sites, GAC filters have been installed in several silos, which keep the footprint of the new process to a minimum.


Following a pilot in Germany, Nordic Water has been contracted to install a brand-new GAC system

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that will involve the construction of concrete basins that will house 120 DynaSand carbon filters.

CUSTOMIZED SOLUTIONS

Pilot plants and full-scale trials of these filtration processes have been going on for several years, enabling manufacturers such as Nordic Water, to gain more experience of how different treatment processes interact. In one trial, three different process streams were installed, a sand filter after ozonation, a GAC filter after ozonation, and a stream with only GAC. The trial results demonstrated the most effective process for this site and the plant has since made plans to redesign the final process area to achieve the best effluent standards.

In one case, a treatment plant had high chloride levels and they initially caused rapid corrosion of the stainless-steel filter tanks, whereas the adjacent sand filters suffered no such problems. The combination

of carbon and high chloride levels created an environment conducive to corrosion.

For this site, the materials were reassessed and a fiber reinforced plastic (FRP) was used instead. The plant, which is in Sweden, uses a three-stage process of a DynaSand filter, ozonation treatment and a DynaSand carbon filter.

This solution continues to give excellent results for the final effluent. In fact, all effluent samples taken during the initial two-month sampling period showed concentrations below the detection limit and could not be quantified. That included all twenty-four analyzed pharmaceuticals, meaning the filters deliver almost complete removal of the substances.

WORKING FOR A BETTER FUTURE

As the new EU legislation is revised to tackle the challenges of micro-pollutants and pharmaceuticals,

pressure will increase on wastewater treatment plants to adopt new filtration technologies. Achieving the most effective solution will depend on many factors and it is important that each site understands its own unique set of circumstances.

Under Article 8, by December 31, 2030, member states will have to ensure that 50 percent of discharges from urban wastewater treatment plants treating a load of 100,000 population equivalent (p.e.) and above are subject to a fourth stage of treatment. This will cover all treatment plants by the end of 2035.

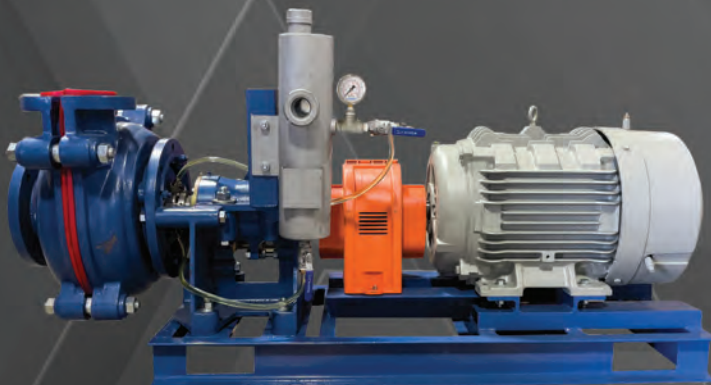
To fulfil these requirements, national water municipalities need to start planning their strategy as soon as possible. Working with experts in this field who can identify the most effective solution that fits within the available footprint, ensures operators will achieve the proposed standards. In this way, Europe will make a very significant contribution to reducing pharmaceuticals and other micro-pollutants in its water supplies. ■

MATTIAS FELDTHUSEN is director of process and product development for Nordic Water, a Sulzer brand. Sulzer is a global leader in fluid engineering and chemical processing applications. Sulzer specializes in energy-efficient pumping, agitation, mixing, separation, purification, crystallization, and polymerization technologies for fluids of all types. These solutions enable carbon emission reductions, development of polymers from biological sources, recycling of plastic waste and textiles, and efficient power storage. Sulzer customers benefit from a commitment to innovation, performance, and quality through our responsive network of 180 world-class manufacturing facilities and service centers across the globe. For more information, visit www.sulzer.com.

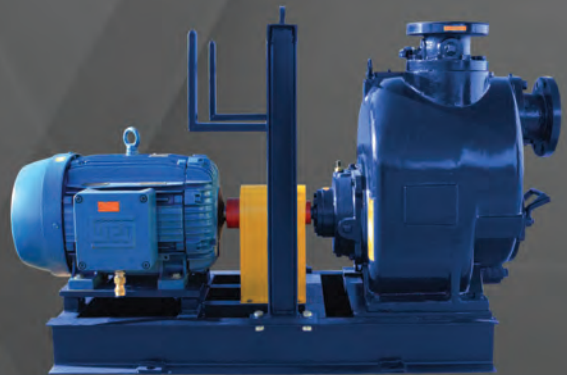


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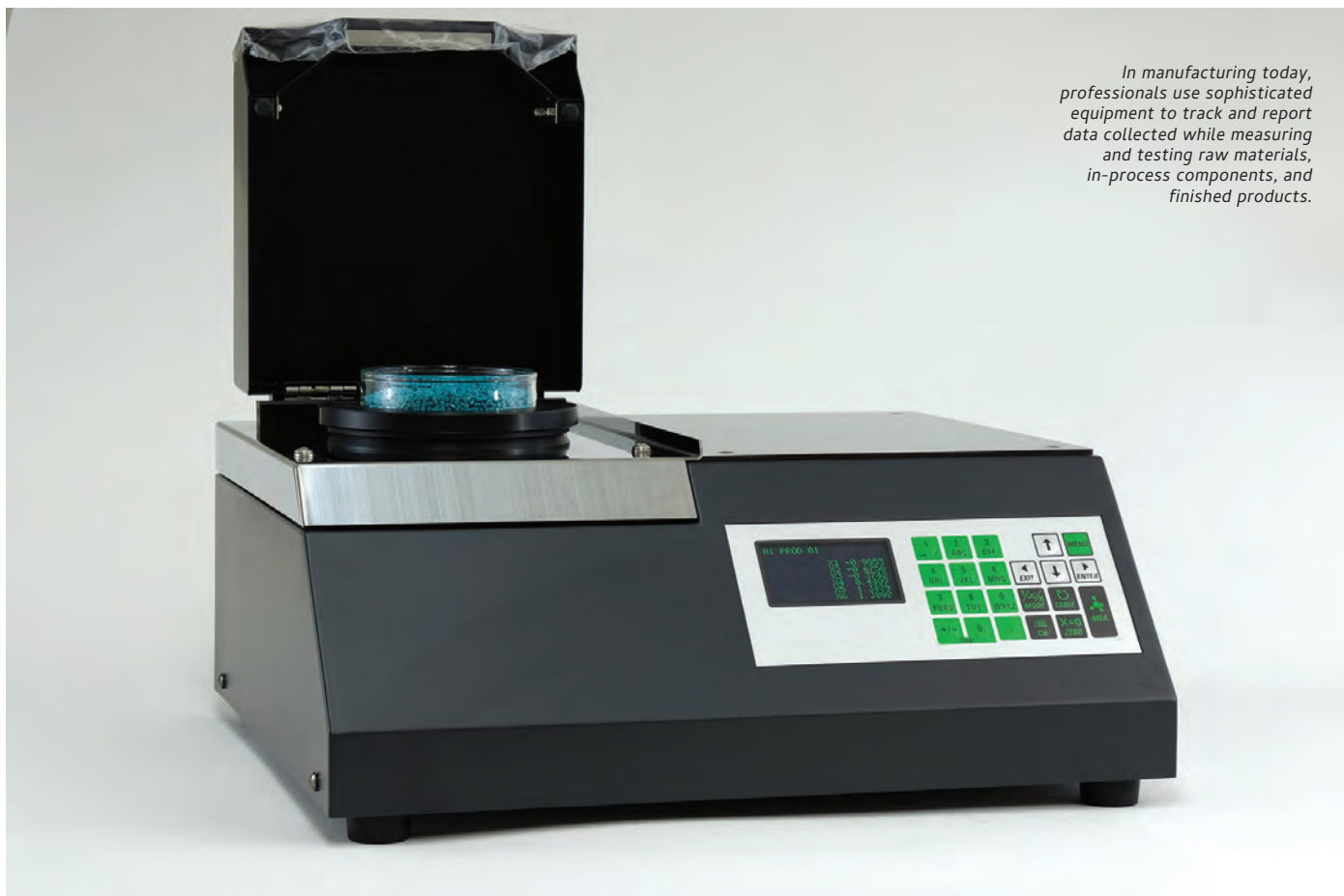


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In manufacturing today, professionals use sophisticated equipment to track and report data collected while measuring and testing raw materials, in-process components, and finished products.



EXTRAORDINARY INSIGHTS MINED BY ANALYZING MASS OF MEASUREMENT DATA

Specialized software helps manufacturers unlock the full value of analytics

BY DEL WILLIAMS

In essentially every field of manufacturing today, professionals use sophisticated equipment to track and report data collected while measuring and testing raw materials, in-process components, and finished products. However, many organizations struggle

to efficiently gather, monitor, and analyze the vast amount of information they accumulate. This lack of comprehensive and global approach hinders the effective utilization of data analytics to derive valuable insights from raw data. The result is often missed opportunities

to make strategic decisions, enhance performance, increase productivity, and ultimately improve profitability.

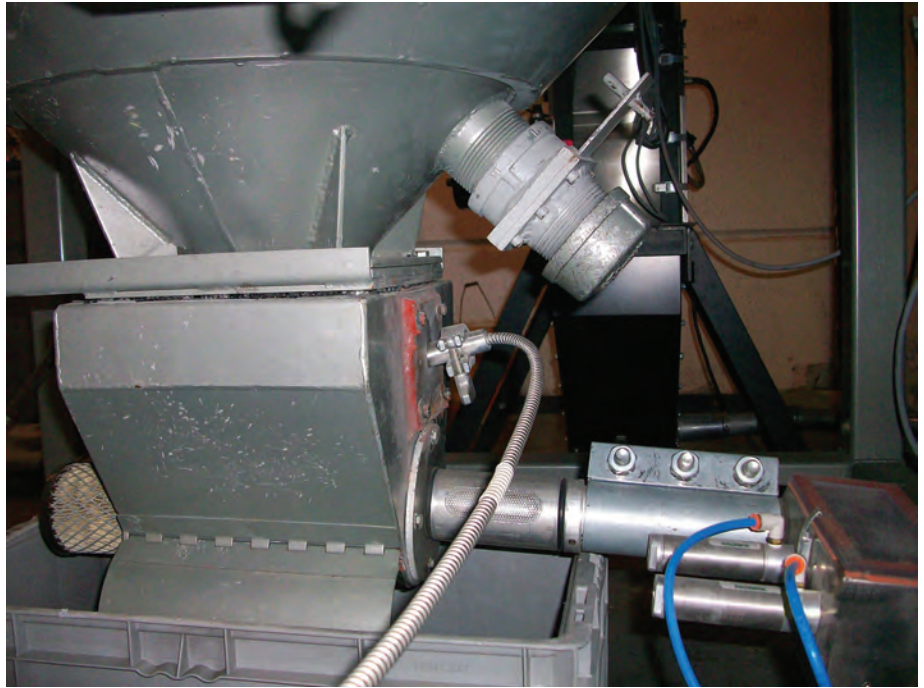
As Peter Sondergaard, senior vice president and global head of research at Gartner, Inc. shares, "Information is the oil of the

21st century, and analytics is the combustion engine.” Just like oil, data has tremendous potential value but only when it is effectively gathered and utilized.

However, with all the materials, instruments, and applications involved in modern manufacturing, it can be challenging to capture, track, assess, and effectively use the flood of data that is generated on a timely basis. According to the Forbes article “Big Data: 20 Mind-Boggling Facts Everyone Must Read,” “At the moment less than 0.5 percent of all data is ever analyzed and used.”

Now industry innovation is helping manufacturers to gain key insights into their products and processes by enabling them to effectively interpret data from every test given even at mass volumes.

“Having access to tools that allow you to automatically store, track, and analyze the information gathered [from test instruments] can help processors unlock the greatest potential value from their ideas, processes, and products. This kind of analysis means users can take logs of test results and let the data “speak for itself” to help engineers



Effective utilization of data analytics can derive valuable insights from raw data for key decision making in the manufacturing process.

and management recognize patterns and draw accurate conclusions. In some cases, the data analysis may help them make accurate predictions to drive future growth,” says John Bogart, managing director of Kett US, a manufacturer of a full range of moisture and organic composition analyzers.

According to Bogart, effective data tracking and analysis offers significant benefits to many areas within manufacturing from R&D, process engineering, and plant management to quality assurance, maintenance, corporate management, and even regulatory compliance.

THE MANY BENEFITS OF DATA TRACKING

For manufacturers, implementing an effective data tracking system can be crucial to maintaining quality assurance and ensuring optimal results for a product or process.

For example, it can reduce or eliminate measurement or labeling errors at every phase of the process. This can help to ensure safety, which is particularly important in fields where precision is key such as medicine, construction, and engineering.

Logging and analyzing data can provide much needed transparency for quality assurance. Data tracking streamlines auditing by providing a definitive means to examine quality and workflow analysis. Ongoing tracking can help to pinpoint exactly where an issue arises, making it easier to investigate and address any manufacturing problems.



The right equipment can efficiently gather, monitor, and analyze the vast amount of information accumulated while measuring and testing materials.



The right measuring device can help manufacturers make strategic decisions, enhance performance, increase productivity, and ultimately improve profitability.

Tracking and analyzing data can also identify important patterns and trends in testing.

"Being able to automatically and effortlessly log data not only means you can review information from previous tests, but also analyze the data, draw conclusions, and make informed decisions for the future rather than merely reacting to problems as they occur," says Bogart.

DATA TRACKING AND ANALYSIS SIMPLIFIED

To help manufacturers attain the utmost value from their data, OEMs have developed a new generation of software to streamline the collection and analysis of production measurement data.

As an example, Kett has introduced its Tracker™ System, a data collection and analysis software solution that gives organizations the ability to monitor, synthesize, display, and report information from manufacturing related measurement devices over time. This can include, for instance, factors such as the moisture measurement or organic composition analysis of everything from raw inputs to finished products.

The system is comprised of a collection of software programs that allow processors to log and analyze data they collect on each device. The single analyzer version is a database with display and output functions for a single Kett measurement device.

Using multiple analyzers gives users the ability to simultaneously collect, display, monitor, and send out data from several devices all in one place.

A positioning module allows users to add location data for instrument readings and other measurements. This enables integration of the information with linear actuators and/or robotics, which can facilitate making real-time adjustments in production equipment as required to improve quality or efficiency.

The Tracker Software allows integrating data collection tables and graphs as needed from non-Kett devices, making the system a one-stop-shop for manufacturing data collection and analysis. The system provides modules for distributed data management so multiple authorized users can view, analyze, manage, and send out process control management data simultaneously.

"The Tracker System is designed to serve as a single collection point for data and analysis that can be applied across all sectors and industries," says Bogart.

The data tracking and analysis system delivers even more value



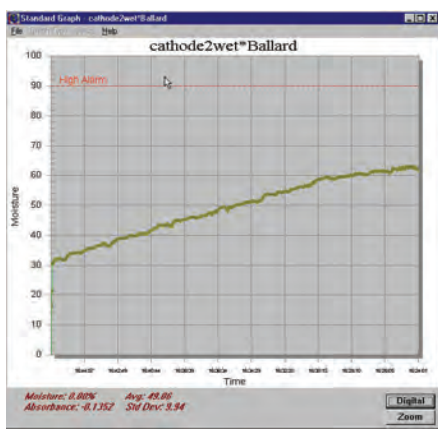
Measurement tools allow manufacturers to automatically store, track, and analyze the information gathered [from test instruments] to help processors unlock the greatest potential value from their ideas, processes, and products.

for manufacturers when used in conjunction with smart measurement devices. On the production floor, “smart” equates with the ability to continually monitor conditions such as product and input moisture content in real-time to optimize quality. Assessing proper moisture level in products and processes is essential for many reasons such as meeting regulatory standards, ensuring proper chemical reactions and drying, maximizing shelf life and deterring mold, as well as increasing selling price and decreasing shipping cost.

One example is Kett’s KB30 in-line NIR moisture meter system. With a response time of 0.2 seconds, +/- 0.01 percent accuracy, and a moisture measurement range of 0.00 to 100.0 percent, the device can be used to assess extremely variable and rapidly changing products, as well as processes where quality is critical. The quick response time enables faster production line rates with superior moisture measurement. It has been used in various industrial production lines to test pharmaceuticals, chemicals, foods, textiles, minerals, lubricants, pulp/paper goods, and personal care products.

THE SMART FUTURE

According to Bogart, the technology is “smart” because all of the calculations are performed inside the sensor and measurements are sent on a 24/7 basis to smartphones, PCs, and other devices without having to be directly connected. If desired, these



Specialized software is aiding manufacturers in efficiently collecting, tracking, and monitoring data for enhanced analytics.

instruments can prompt operators and managers with alerts as needed.

When the smart device’s monitoring capabilities are integrated with accompanying Kett Tracker data collection and analysis software, improved error detection, defect analysis, and product quality result.

“With all these meticulous readings and with every instrument geared toward accuracy in every moment, comes a great deal of data,” explains Bogart. “It only makes sense to provide a place to store, track, and analyze all this information. This is a wealth of information that’s right at their fingertips, and the right lens can unlock this information.”

As an example, when two smart sensors were used to run different

production lines at a manufacturer, the devices’ real-time capability detected periodic, wildly fluctuating moisture values that caused their extrusion process to go out of control. After investigation, it was determined that the manufacturer’s electrical circuits had not been adequately isolated from the effects of a nearby power plant’s operation on shared power lines.

As more industries and sectors look to improve their processes and inform their decisions, effectively collecting and analyzing data will become even more critical. Manufacturers that take advantage of the latest tools to track and analyze their data will not only improve their production quality and efficiency but also position themselves for growth in the future. ■

DEL WILLIAMS is a technical writer based in Torrance, California. Kett provides instant moisture meters, organic composition analyzers (fat/oil, protein, ash, BTU, bulk density, coatweight) instant coating thickness testing, and unsurpassed friction measurement, wear testing, peel tests, adhesion tests, and other physical property testing—with simple, elegant, durable instruments. For more information, call 800.438.5388, email support@kett.com, or visit www.kett.com.

INTUITIVE USER INTERFACE PUTS “CONTROL” AT YOUR FINGERTIPS

Comprehensive monitoring of the entire biogas plant for optimum performance

BY LENA HARMS, WELTEC BIOPOWER

THE ADVANTAGES OF WB CONTROL AT A GLANCE:

- Easier feeding processes thanks to FellowFeed and GuidoFill
- Clear display of processes for the entire system
- Short click paths, thus saving time in day-to-day work
- Wide range of business evaluation options
- Exportable reports as proof for authorities, banks and experts
- Energy planning and avoidance of peak loads thanks to a graphical overview of the stirring intervals
- Alerting according to prioritization
- Intuitive user interface, tooltips
- Integrable into other systems
- Web-based use on mobile devices
- User management with rights assignment and simultaneous access

Staying atop industry needs is of prime concern across the biogas sector. As such, the biogas plant control system from Weltec Biopower is receiving a general update. This includes new functionalities for process optimization as well as a user interface that provides a quick and comprehensive overview of the entire plant thanks to a symbolism designed according to the latest findings and clarity in the display. The control system sections previously

known as LoMos and CeMos will also merge under the new name WB Control in future. WB Control can be used for both small and complex industrial systems.

The web-based software gives operators complete and fast access to all important system parameters. A customizable dashboard provides a quick overview of the most important process data at any time. Several users can access WB Control simultaneously.



The updated biogas plant control system from Weltec Biopower includes new functionalities for process optimization as well as a user interface that provides a quick and comprehensive overview of the entire plant.

INNOVATION THAT'S ALSO INTUITIVE

The intuitive, logical navigation through the software offers maximum transparency and security for an efficient workflow.

"The increased requirements of plant operators and investors for comprehensive and clear monitoring of plant data, especially for continuous process optimization, were the guiding principle for us when designing the modern control system," emphasizes Wolfgang Bokern, head of technology at Weltec Biopower.

Diagrams and reports can be created individually according to defined values and summarized into daily, monthly, or annual overviews at the click of a mouse. Optimum energy planning to avoid peak loads is achieved, for example, through overviews of the agitator intervals. This allows agitators to be controlled individually.

The new user interface enables a wide range of business evaluation options, such as trend analyses and other graphical evaluations of individually defined values such as consumption data or production figures. Thanks to the archiving and export functions, all data is available at any time as proof for authorities, banks, and external experts.

FOCUSED ON RESULTS

Newly integrated functions such as FellowFeed and GuidoFill simplify the feeding process and make everyday work easier. FellowFeed measures the target filling level of the gas and automatically adjusts the feeding quantities if required. GuidoFill provides operators with a tool that supports the correct filling of their solid matter feeders with a mixture of input materials. On the basis of job lists, pumping and feeding processes can be precisely timed and displayed using the filter function. Overviews of gas management and water distribution allow other material flows in the system to be monitored.

Individually configurable alarm management informs users



WB Control: Comprehensive monitoring of the entire biogas plant for optimum performance, as here at a plant in the Czech Republic.

immediately in the event of system malfunctions. This allows the operator to react quickly and the Weltec Biopower service team can connect to the control system at any time via remote control to resolve any malfunctions that arise.

BUILDING FOR THE FUTURE

One of Weltec Biopower's strengths is the construction of individual, technically sophisticated solutions up to a plant size of ten megawatts. A central element here is the high proportion of components developed in-house. Stainless steel technologies also ensure flexible substrate use, fast assembly with low effort, and a consistently high-quality standard regardless of location. After commissioning, Weltec's mechanical and biological service significantly ensures economic efficiency.

The company has just as much experience in the field of biogas production and utilization. At ten of its sites the plants produce biogas. Some of this is processed into biomethane and made available to energy suppliers and filling station operators throughout Germany via

the public gas network. Furthermore, at sixteen locations, municipalities and companies, such as those in the gardening, housing, and healthcare sectors, are supplied with decentralized heat as part of Weltec's energy contracting. ■

Weltec Biopower GmbH is one of the world's leading enterprises in the field of stainless-steel biogas plant construction. The company has planned, developed, and built anaerobic digestion plants since 2001. Today, the medium-sized company has about eighty employees at the headquarters in Vechta, Germany, and has established more than 350 energy plants in twenty-five countries worldwide. The global distribution and service network spans six continents. The range of customers includes businesses from the agriculture, food, waste, and wastewater industries. For more information visit, www.weltec-biopower.com.

HOW TO SELECT THE MOST EFFICIENT AODD PUMP DIAPHRAGM

Multiple factors play a role in determining which works best for your application

BY TOM ZUCKETT, WILDEN

Pumps are a vital technology that helps operators complete essential processing and transfer functions in many industrial applications across multiple markets. Without this technology, these applications wouldn't function as optimally as they do today.

When it comes to these industrial applications, making the right pump technology choice is paramount. While many different technologies exist, air-operated double-diaphragm (AODD) pumps tend to be a common choice for a diverse range of fluids, such as chemicals, food, oil, paint, and adhesives, among many others.

AODD pumps work well with these fluids because of their design characteristics. These pumps, which rely on compressed air to function, can self-prime, run dry, process fluids with solids up to 3-inch diameter, achieve suction lift up to 30 feet, resist deadhead pumping conditions and even operate while submerged. AODD pumps also feature a sealless design, which keeps valuable fluids in the pump.

Even with all these perks, another careful

consideration must be made to enjoy all the benefits of AODD pumps. Operators must also pick the right diaphragm from a verified supplier when selecting this pump technology for an application. This decision is critical to the safety and efficiency of the AODD pump and helps ensure—with the right diaphragm—the pump's long-term integrity and functionality.

PRE-SELECTION

Before selecting the proper diaphragm, operators should ensure they are making that selection from a verified supplier or one recommended by the pump manufacturer. Operators who neglect this pre-selection step run the risk of obtaining a diaphragm that is not up to the standards set by the manufacturer.

In some cases, operators could be purchasing a pirated diaphragm. In either case, these unverified parts can negatively impact the performance of the AODD pumps. Detrimental effects include performance downgrades in the pump's operation, pump damage, and the lack of a warranty and manufacturer support.

DIAPHRAGM MATERIALS

AODD pumps have been around since 1955, giving operators plenty of time to test and review the impact of different diaphragms on this technology. Three main material families are used to categorize AODD pump diaphragms—rubber, thermoplastic elastomer (TPE), and polytetrafluoroethylene (PTFE).



Each material provides characteristics that make them well suited for varying applications.

RUBBER

Rubber diaphragms are made from synthetic rubber with a nylon fabric mesh to assist with the diaphragm's flexibility. There are four available rubber diaphragm materials, which are neoprene, Buna-N, EPDM, and Viton. Each of these materials aids the AODD pump in different applications and conditions.

For example, neoprene is a general-purpose, low-cost diaphragm designed for nonaggressive chemical applications, such as water-based slurries and seawater. It is known for its longevity and abrasion resistance. Buna-N works best with petroleum and oil-based fluids, ranging from gasoline to turpentine. Also referred to as nitrile, this diaphragm provides moderate longevity and abrasion resistance. It also functions well in food and beverage applications.

EPDM is a low-cost alternative diaphragm for pumping dilute acids or caustics. Typically found in the food, pharmaceutical, manufacturing, and paint and coating industries, EPDM diaphragms are known for having good longevity and moderate abrasion resistance. On the flip side, Viton diaphragms are designed to handle extremely hot temperatures and harsh chemicals. It features exceptional performance with aggressive fluids, such as aromatic and chlorinated hydrocarbons, and has moderate longevity and abrasion resistance.

TPE

TPE diaphragms are made through injection molding, meaning they don't require a fabric reinforcement like their rubber counterparts. These diaphragms also have four material options, which are polyurethane, Wil-Flex®, Saniflex™ and Geolast®.

Polyurethane functions as the general-purpose diaphragm, designed for nonaggressive chemical

applications such as water and wastewater. Its longevity and abrasion resistance are exceptional. Wil-Flex serves as a more affordable version of PTFE. Made of Santoprene®, this diaphragm is best suited for handling acidic and caustic fluids, such as sodium hydroxide and hydrochloric acid. Because it has excellent longevity and abrasion resistance, this diaphragm is used in the chemical, pharmaceutical, wastewater, and chemical industries.

Saniflex provides good longevity and excellent abrasion resistance. Made of Hytrel®, this diaphragm is ideal for food processing applications and offers low compression set characteristics. Geolast, similar to nitrile (Buna-N), is commonly used in petroleum applications due to its enhanced oil resistance and low oil swell. It offers moderate longevity and good abrasion resistance.

PTFE

Due to its chemical makeup, PTFE can be used with a wide range



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			Ketones & Aldehydes	Acetates	Aromatic Hydrocarbons	Chlorinated Hydrocarbons	Oil & Gas	Water/Wastewater	(Min/Max)	(\$)
Thermoplastic (TPE)	Polyurethane	A	A					✓	-12° to 66°C [10° to 150°F]	\$
	Wil-Flex™	A	A	✓	✓			✓	-40° to 107°C [-40° to 225°F]	\$
	Saniflex™	B	A			✓			-29° to 104°C [-20° to 220°F]	\$\$
	Geolast®	C	B				✓		-40° to 82°C [-40° to 180°F]	\$\$
PTFE	PTFE	A	B	✓	✓	✓	✓	✓	4° to 104°C [40° to 220°F]	\$\$\$
Rubber	Neoprene	B	C					✓	-18° to 93°C [0° to 200°F]	\$
	Buna-N	C	C				✓		-12° to 82°C [10° to 180°F]	\$\$
	EPDM	B	C	✓	✓				-51° to 138°C [-60° to 280°F]	\$\$
	Viton®	C	C			✓	✓		-40° to 177°C [-40° to 350°F]	\$\$\$\$

of fluids, even highly aggressive variations, such as hydrocarbons, acids, caustics, ketones, and acetates. Featuring excellent longevity and moderate abrasion resistance, PTFE works best in food and beverage and pharmaceutical applications. PTFE, however, is non-elastic, so a backup diaphragm of a different material is required for flexibility and memory. Options for backup diaphragms are Neoprene, Saniflex, and high-temperature Buna-N.

SEVERAL CONSIDERATIONS

Operator knowledge and experience with diaphragms serve as one option for diaphragm selection. But even the most experienced operator should still look at several factors before choosing their diaphragm. As we've seen with the materials and their distinct properties and features, there isn't a universal diaphragm for every application.

To determine the best diaphragm for a given application, there are seven primary factors to consider—abrasion resistance, chemical resistance, temperature ranges, sanitary standards, inlet condition, longevity, and cost.

Abrasion resistance is the diaphragm's ability to withstand wear and friction when encountering solids and particles in the processed

fluid. Chemical resistance measures the compatibility of the diaphragm's material with the processed fluid. Temperature ranges indicate the flexibility and performance of the diaphragm at varying temperatures, as well as its capabilities in extremely high and low temperatures.

Sanitary standards come into play primarily in diaphragms used in food and beverage applications. These standards help ensure that the diaphragm complies with hygienic or sanitary standards. The inlet condition looks at a diaphragm's capacity to move fluid from one place to another. Longevity, also known as flex life, is the expected lifecycle of the diaphragm before replacement. Cost involves multiple factors, such as initial price, rated longevity of the application, downtime expenses, and diaphragm replacement labor.

COMPATIBILITY CHEAT SHEET

With material capabilities and performance factors identified, operators can make an informed decision about what diaphragm will work best with their AODD pumps in a given application. But there is also an expedited way to guide operators to the type of diaphragms that will best suit their respective applications.

Wilden®, part of PSG®, developed a Diaphragm Selection Guide that shows which materials work best in each common AODD pump application. The guide compares and rates the longevity, abrasion resistance, chemical resistance, temperature limits, and relative cost of each material type. Operators can use the guide, along with additional research and expert advice, as a snapshot into each diaphragm's capabilities and performance in different applications.

The guide uses ratings from A to C to help operators determine which diaphragms keep the application's maximum fluid temperature as close to the center of the operating temperature limits as possible. Wilden recommends using diaphragms with "A" or "B" ratings for the best diaphragm performance.

Additionally, Wilden has a more extensive guide for diaphragm materials and their performance when processing different chemicals. Known as the Wilden AODD Pump Chemical Compatibility Guide, this resource provides a rating system for more than 700 chemicals on different diaphragm materials.

The rating system runs from A to D, with "A" being the best rating and "D" being the least favorable. The

diaphragm materials are rated against each chemical, with “A” meaning the chemical has a minor effect on the diaphragm; “B” meaning the effect is minor to moderate; “C” meaning the effect is moderate to severe; and “D” meaning that diaphragm material is not recommended for use with that chemical.

For example, EPDM and PTFE have an “A” rating when handling acetic acid, while polyurethane and Saniflex pull “D” ratings. Meanwhile, all diaphragm materials perform well when handling aluminum chloride, with each one earning “A” ratings except for polyurethane and Saniflex, which both earned “B” ratings for that chemical.

The guide also provides ratings for metal housings and plastics. The metal housings included in the guide are alloy C, aluminum, cast iron, Halar ECTFE-coated, and stainless steel. The plastics category includes acetal, nylon, polyethylene, polypropylene, PVC, and PVDF.

CONCLUSION

Whether an operator needs to pump water, wastewater, paints, slurries, food products, or acids, AODD pumps are designed to process all of them effectively and efficiently. To get the best performance out of an AODD pump, operators must select the best diaphragm for their application. The optimum diaphragm will help ensure safe, efficient, and cost-effective functionality while contributing to the pump's longevity.

Choosing the right diaphragm means carefully identifying and considering multiple factors, processes, and application parameters into the equation. Considering only one or two factors isn't adequate and can adversely impact the performance of the pump and diaphragm. Fortunately, operators have a wealth of information and guides to assist them in this process, ensuring they find the right diaphragm that functions best with their application. ■



TOM ZUCKETT is the AODD business development manager, Americas for PSG® and Wilden® and can be reached at tom.zuckett@psgdover.com. Wilden is a product brand of PSG, a Dover company. PSG® is comprised of several world-class brands, including Abaque®, All-Flo™, Almatec®, Blackmer®, Ebsray®, em-tec®, Griswold®, Hydro™, Malema™, Mouvex®, Neptune®, PSG® Biotech, Quantex™, Quattroflow®, and Wilden®. For more information, visit www.psgdover.com.



PUMPING LIFE BACK INTO FLORIDA LAKE

Partnerships flow into revitalization project

BY KEITH TOMASZEWSKI, FRANKLIN ELECTRIC

When Florida's Lake County Water Authority (LCWA)—in cooperation with the St. Johns Water Management District and the Florida Department of Environmental Protection—made a plan for removing phosphorous from the waters flowing out of Lake Apopka into the rest of the Harris Chain of Lakes, they needed equipment that was up to challenge.

The cleanup efforts would include removing years of buildup from agriculture and fertilizer runoff, which contributed to algae buildup that was harming native aquatic life. "It's a tough project, and I am grateful to our stakeholders for being invaluable partners and for their desire to mitigate the harmful impacts to our precious waterways," says LCWA Chairman Robert Hendrick.

PUMP UP THE POWER

As part of that effort, installer Wiggins Brothers Well Drilling identified a Franklin Electric pumping system optimized with SubDrive Connect Plus™ that could handle flow rates up to 60 gallons per minute. The system would increase the efficiency of centrifuge operations, reduce energy demand, and increase productivity to allow cleaner, more transparent



water for generations to come. Greg Wiggins and his company have been actively involved in many of these critical cleanup projects in Central Florida, and Franklin Electric is thrilled to play a role. Wiggins's understanding of how pumping systems can aid in environmental efforts is a great example of the important work water industry professionals do every day.

PUTTING THE PIECES TOGETHER

An important part of the process was ensuring the right equipment was chosen for the application. The system included a Franklin Electric 4-inch high-capacity submersible pump capable of moving 60 gallons per minute. Built with stainless steel components and a ceramic shaft sleeve and a rubber discharge



bearing that can withstand sand wear, the high-capacity well pump offers long-term performance, even with the lake's challenging water conditions.

Also selected was a Franklin Electric 4-inch, three-phase, 3 horsepower submersible motor that features a corrosion-resistant construction and proven durability. A SubDrive Connect Plus variable frequency drive (VFD) was added

to help optimize the operation, providing a simple yet powerful constant pressure solution for the water pumping system.

The unit's soft start capabilities will also help maximize the life of the system.

BIG RESULTS

The pumping system is part of LCWA's long-term Nutrient Reduction

Facility (NuRF) plan. Since 2009, the NuRF has treated over 97 billion gallons of water, removing over 50,000 pounds of phosphorus from the Harris Chain of Lakes. This effort has resulted in substantial water quality improvement from Central Florida to the Eastern Seaboard. ■

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THE FUTURE OF REMOTE TANK MONITORING

How wireless connectivity is driving new efficiencies Part 1 of 2

BY NORBERT MUHRER, QUECTEL

Tanks and the substances they hold are a critical part of many business processes with downtime an unacceptable risk if levels run low or, in the case of waste tanks, capacity is filled. Traditionally, tank monitoring has been an inefficient process involving sending a person to check the level of a tank by visually inspecting the level. Alternatively, loose estimates have been used so trucks have been sent to refill tanks that do not need filling or to empty tanks that are not yet full. This is highly inefficient leading to wasted truck

journeys, repeated trips, and keeping money tied up in excess inventory.

SEEKING NEW TECHNOLOGIES

For organizations that utilize tanks for fuel, water, waste liquids, and sector-specific substances such as both fresh and used cooking oil, this inefficiency is being eradicated thanks to Internet of Things enabled tanks that can be monitored remotely. The relatively simple addition of a sensor or multiple sensors for different inputs and a gateway to a tank can allow it to communicate its status in real-

time, thereby enabling far greater precision to be applied to refilling and emptying schedules. In addition, the need for physical checks is removed and anxiety about the amount left in a tank is taken away by the ability to provide exact, current data.

These benefits enable organizations to optimize their tank operations to ensure maximized uptime, minimized cost, efficient inventory management, enhanced environmental sustainability, and enhanced safety thanks to minimized supply journeys and manual inspections. In addition, the gateway can be utilized to enable other activities such as sensors that monitor the conditions of the tank both inside and outside to ensure the substance it contains is not being affected by extreme cold, heat or moisture. This is a critical consideration for tanks that store volatile substances such as chemicals or gases and for sensitive materials such as grain or fertilizer.

It's therefore no surprise that remote tank monitoring is a growing and substantial global market. Research firm, Berg Insight, estimates that the global installed base of active remote tanking monitoring systems exceeded 6.2 million units at the end of 2021 and is growing at a compound annual growth rate of 29.9 percent with the firm expecting the active installed base to hit 23 million units in 2026. The North American market leads current adoption with more than 2.6 million active remote tank monitoring units deployed. It is followed by Europe with 1.5 million



and the APAC region which has 1.4 million units deployed.

These figures demonstrate a market that is at a relatively early stage. If you consider the sheer number of tanks in the world, a vast volume still need to be connected across industries as diverse as water and wastewater, fuel oil storage, residential oil tanks, propane gas tanks, chemical distribution, liquid fertilizer, groundwater and septic tanks, welding gas distribution, and beverage carbonation. Now, organizations are seeing the value of enabling remote tank monitoring and deploying a variety of solutions to power their systems.

MAKE THE CONNECTION

Although the technology involved in remote tank monitoring is well-established and relatively simple, there are several choices for organizations to make concerning the technologies they adopt. A baseline requirement is to select the sensors



that each use case needs to deliver value. Basic examples include a liquid level sensor to report and monitor the amount of the substance left in the tank and these can be augmented with additional sensors to report

on heat or moisture and potentially shock or vibration as a means to secure tanks and prevent thefts.

The critical enabler of the “remote” part of remote tank monitoring is the network connection that enables the



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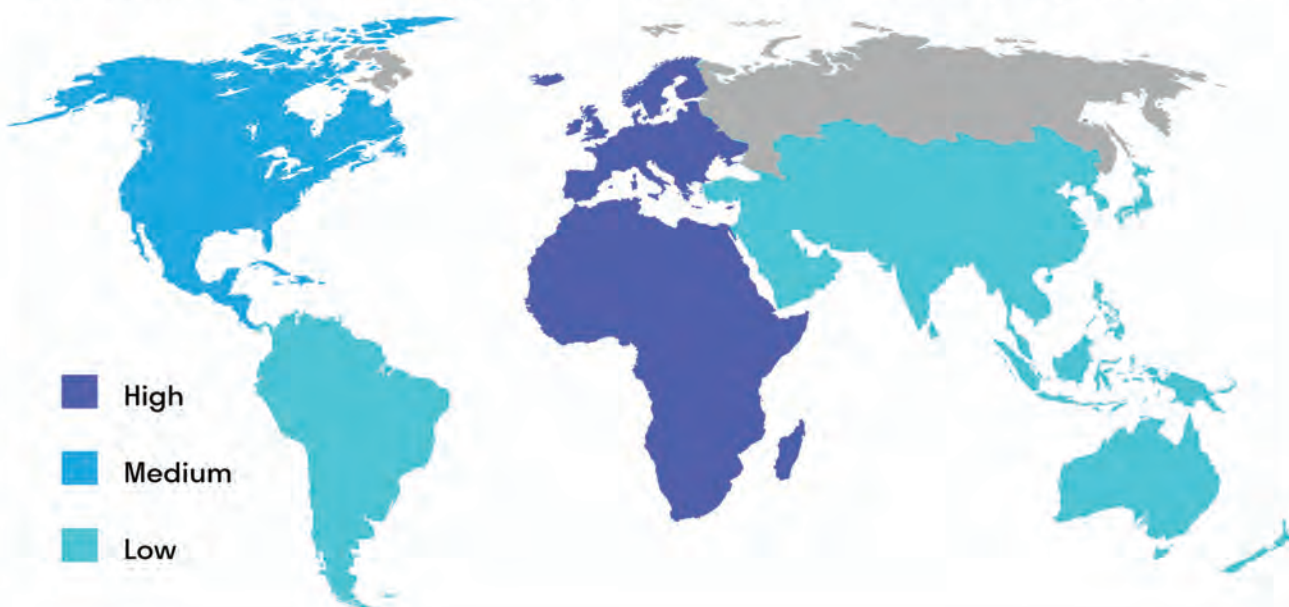
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Global remote tank monitoring system market - growth rate by region (2022-2027)



sensor data to be communicated to the back office. This typically involves installation of a gateway device that contains a wireless module at the tank. Tanks typically utilize cellular networks for wireless communications because they are cost effective, have wide coverage and offer low set up costs. Connecting to a 4G network, for example, requires no wiring and can be a very cost-effective method of delivering the low bandwidth connectivity that tank monitors require. With the ongoing retirements of 2G and 3G networks across the globe, 4G in the form of LTE Cat 1/LTE Cat 1 bis is expected to be the most popular network selection for tank monitoring.

Alternatives include other low power wide area (LPWA) networks, such as narrowband-IoT (NB-IoT).

These are dependent on network coverage increasing but they will easily be able to cope with the demands of common remote tank monitoring applications.

The mainstream of the tank monitoring market is well-covered with connectivity options but, away from population centers, further options are needed. Remote mining sites that have large fuel tanks for excavators and other equipment are often in remote locations that are not served by terrestrial cellular networks, for example. Organizations in markets that face coverage issues will need to consider satellite connectivity in the form of non-terrestrial networks (NTN) or other proprietary satellite communications services.

A LOOK AHEAD

In the conclusion of this series, we'll examine some of the device requirements for bringing accurate data through the gateway as well as the cost benefits remote tank monitoring can provide. To help flesh this idea out, we'll also look at use case examples reaping these benefits today. ■

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WHY EMPLOYERS ARE STRUGGLING TO HIRE TECHNICIANS



Dr. Parminder Jassal on the technician talent gap and how to close it

America is experiencing a critical shortage of skilled technicians due to insufficient training and educational misalignment with industry needs. Dr. Parminder Jassal, CEO of Unmudl, a marketplace for developing skills through hands-on training, recently released a report on technician jobs revealing alarming metrics, including a forecasted shortage of millions of manufacturing jobs in the next six years despite the need for these jobs rising. Below, Dr. Jassal shares her findings as well as how employers can close this gap.

MPT: *What does the technician job market look like currently?*

DR. PARMINDER JASSAL: The demand for technicians is surging across the United States and is being fueled by a tech-driven economy that increasingly relies on automation and digital infrastructure. As sectors from manufacturing to healthcare integrate more advanced technologies, the need for skilled technicians to operate, maintain, and repair advanced systems is at an all-time high. The supply of such skilled professionals is not keeping pace with demand, however, leading to significant gaps in the labor market. While the overall labor market shows robust growth, deeper analysis reveals significant challenges in specific sectors. This is particularly evident in manufacturing and semiconductors, where the gaps between available skilled workers and job vacancies are becoming increasingly stark.

MPT: *How big of a gap are we talking?*

DR. PARMINDER JASSAL: In the manufacturing sector, a critical shortage of technicians is emerging, with figures estimating anywhere from 2.1 to 3.8 million manufacturing jobs expected to remain unfilled during the next decade. Among those expected to grow at the quickest pace are roles like industrial maintenance technicians, statisticians, data scientists, engineers, and logisticians.

This gap stems mainly from a scarcity of workers with the advanced technical skills required for increasingly sophisticated manufacturing processes. As the industry integrates more automation and digital technologies, this shortage could curb the growth of individual companies and the global competitiveness of the entire U.S. manufacturing sector.

MPT: *How did we end up here?*

DR. PARMINDER JASSAL: The complex terrain of today's labor market conceals a series of obstacles that hinder the acquisition of technician talent. They range from educational deficiencies to insufficient specialized training, along with cultural misconceptions about technical careers. Each of these elements plays a significant role in the ongoing struggle to fill technical positions with competent personnel.

MPT: *What tools can employers use to close the gap?*

DR. PARMINDER JASSAL: Several strategies have proven effective in tackling the challenges of acquiring skilled technician talent. They include workforce development programs, upskilling efforts, and collaborations with educational institutions—each strategy offering unique solutions to cultivate a robust labor pool.

The long-term outlook for technicians is largely positive, with increased technological roles likely enhancing the prominence and necessity of these positions. Companies will need to invest in ongoing education and training to keep their technician workforce adept at handling the latest technologies. ■

To read Dr. Jassal's full jobs report on the technician gap in the domestic manufacturing sector, visit her company's website at www.unmudl.com.



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