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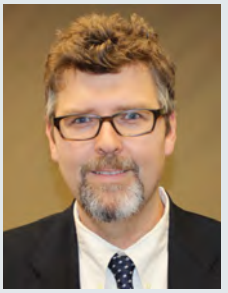

J. Campbell, Editor
Modern Pumping Today

Welcome to the May edition of MPT! Electricity plays a vital role in everyday life, powering industrial and domestic equipment. However, coordinating generating capacity with maintenance requirements is a delicate balancing act, and one that benefits from minimal downtime. In this month's Case Studies section (pg. 14), Alex Edwards shows how Sulzer's combined resources and expertise delivered extended service life of vital pumping assets at a power station.

Specialized physical vapor deposition (PVD) coatings are widely recognized for the critical role they play in enhancing operational performance and extending the life of parts across countless manufacturing and industrial sectors. In our Maintenance & Reliability section (pg. 24), Logan Walz of Oerlikon Balzers shares how some specialized coatings manufacturers make a strong case that coatings can significantly contribute to improving the environment as well.

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ANUE WATER EXPANDS INTO NEW ENGLAND

Anue Water Technologies announces that Russell Resources Inc. is the exclusive new channel partner for the sales and distribution of Anue's eco-friendly product line throughout the six New England states of Connecticut, Massachusetts, Rhode Island, Vermont, New Hampshire, and Maine.

According to Anue Water VP and General Manager Greg Bock, "We are thrilled to have Russell Resources as our exclusive channel partner throughout the six New England states. The Russell team of process technology experts will introduce New England municipalities and industrial customers to eco-friendly systems that pay for themselves in operational savings within a couple of years."

Russell Resources President Jim Russell declares, "We look forward to introducing New England wastewater treatment customers to the FORSe and Phantom oxygen/ozone injection systems with remote digital telemetry, Anue Geomembrane covers with carbon-embedded filters for odor control and the EnviroPrep well-washers for FOG control. During this pandemic, and coming out of it, New England wastewater customers want clean-tech solutions that minimize labor and inputs into the environment."

Anue Water CEO Paul Turgeon adds, "We are very pleased to have the Russell Resources team as our exclusive channel partners for the six New England states."

SPX FLOW TO ACQUIRE PHILADELPHIA MIXING SOLUTIONS FOR CASH

SPX Flow has signed a definitive agreement to acquire mixing solutions provider Philadelphia Mixing Solutions, Ltd. from Thunder Basin Corporation, an affiliate of Wind River Holdings. The all-cash transaction valued at $65 million is expected to close during the second quarter of 2021 and will be paid for with cash on hand.

Upon completion of the transaction, SPX Flow will further bolster its position as an innovative provider of essential products and process solutions that help make the world safer, healthier, and more sustainable. This acquisition is in line with the SPX Flow's focus on strategic alignment combined with clear plans for value creation.

Based in Palmyra, Pennsylvania, Philadelphia Mixing Solutions employs approximately 150 people and generated nearly $50 million in revenue in 2020. The company has more than six decades of industry experience in multi-industry mixing products and service, along with a reputation for world-class innovation, technical support, testing, analysis, and field service, which has led to a high-quality revenue base.

Marc Michael, president and CEO of SPX Flow, adds, "The combination of these two great mixer businesses will create new opportunities for synergy and growth."

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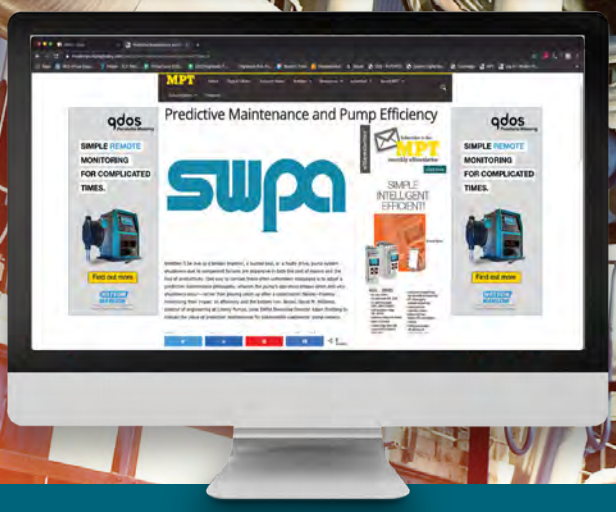

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visit our website **mptmag.com**

WOOLPERT SELECTED TO PROVIDE TOPOGRAPHIC MAP OF NIGERIA

Woolpert has been selected to collect, process, and deliver topographic mapping across more than one-quarter of Nigeria under a $4.4 million contract with the Ministry of Mines and Steel Development (MMSD). The project is part of the Mineral Sector Support for Economic Diversification Project, also known as MinDiver, and is funded by the World Bank.

Woolpert will supply the labor, materials, and equipment needed to develop 340 complete topographic mapping sheets and corresponding Multinational Geospatial Co-production Program (MGCP) data. The firm will provide processed satellite imagery, digital elevation models, ground truthing, feature extraction, and topographic map data.

Additionally, Woolpert has deployed a full-fledged, cloud-based enterprise geospatial data hosting platform coupled with multi-user virtual desktops through Microsoft Azure and Woolpert's raster service, Stream:Raster, to allow for easily managed, cross-continental geospatial production.

Woolpert is coordinating this project through its Johannesburg office and has hired over fifteen additional GIS positions at that site in support. The cloud-based infrastructure allows for a swift ramp up as new team members join. This contract is underway and slated to be complete in April 2022.

PRECIRIX PARTNERS WITH EVERGREEN TO EXPAND NORTH AMERICAN CLINICAL TRIAL SUPPLY

Precirix, a clinical-stage biotechnology company developing novel radiopharmaceuticals in oncology, and Evergreen Theragnostics, Inc., a radiopharmaceutical contract manufacturer, have entered into an agreement whereby Evergreen will provide domestic manufacturing for Precirix's lead product candidate, CAM-H2, which is being evaluated in a Phase I/II clinical trial targeting HER2-positive metastatic breast and gastric cancer.

"Establishing a strong manufacturing footprint in North America is an important step for Precirix to ensure reliable clinical trial supply. We are very pleased to be working with Evergreen, a team with solid expertise and a proven track record in radiopharmaceutical manufacturing," says Ruth Devenyns, chief executive officer of Precirix.

Evergreen will manufacture CAM-H2, an I-131 based radiopharmaceutical, at its new state-of-the-art facility in Springfield, New Jersey. Opening in 2021, the facility is located near Newark Liberty International Airport and within driving distance of John F. Kennedy International Airport.

"CAM-H2 is a very promising product with potential to significantly improve outcomes for patients with HER2-positive cancer," adds James Cook, chief executive officer of Evergreen.◆

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Offshore Technology Conference 2021

Where energy professionals prepare for tomorrow

OTC 2021 AT A GLANCE

When:	August 16-19, 2021
Where:	NRG Park, Houston, Texas
Website:	www.2021.otcnet.org

The Offshore Technology Conference (OTC) is where energy professionals meet to exchange ideas and opinions to advance scientific and technical knowledge for offshore resources and environmental matters. OTC's flagship conference is held annually at NRG Park in Houston, Texas. Though originally slated for earlier in the year, the OTC Board of Directors has chosen to postpone the 2021 event to August 16 through 19 due to the ongoing challenges presented by COVID-19 and out of the greatest care for the health and safety of their partners, attendees, exhibitors, staff, and community.

OTC is sponsored by thirteen industry organizations and societies, who work cooperatively to develop the technical program. OTC also has endorsing and supporting organizations. Also, OTC has expanded technically and globally with the Arctic Technology Conference, OTC Brazil, and OTC Asia. Still, the Houston-based event remains a must-see learning and networking experience for professionals throughout the energy sector.

TECHNICAL PROGRAM

OTC brings together the technical and scientific knowledge from offshore energy game-changers as they share best practices, technical innovations, and emerging trends. The conference has a strong reputation for a world-class technical program. Attendees can take advantage of the opportunity to hear from scientists, engineers, researchers, and executive-level speakers on their progress in revolutionizing the ever-changing environment of offshore projects. No one will want to miss this opportunity to participate in four days of learning, sharing, and networking.

OTC WELCOMES TEACHERS AND STUDENTS

The OTC Energy4me Teachers STEM Workshop welcomes science teachers to this free, one-day workshop. Teachers receive hands-on training by qualified facilitators, listen to a presentation from a prominent energy professional, and tour the OTC exhibit floor. Additionally, teachers receive a variety of free instructional materials to take back to their classrooms. Teacher workshops include the following:

- Oil and gas educational instruction
- Free classroom materials provided
- Qualifies for continuing education credits
- Classroom activities designed by the NEED project
- Substitute teacher reimbursement
- Breakfast and lunch
- Guided tour of OTC exhibit floor

Additionally, the OTC Energy Challenge is a high school competition where teams work to solve a real-world energy challenge. All competing teams submitted a video and e-poster presentation to compete for a scholarship prize. Each team was supported by their teacher, or "coach," and assigned an industry mentor. Through this event, OTC and its sponsorship partners intend to challenge and inspire students by asking them to solve real-world energy challenges, discover new technologies and innovations from the next generation of engineers and scientists, inform students of the wide range of STEM opportunities in the energy industry, and learn more about what drives and motivates young STEM students.

OTC RECOGNIZES EXCELLENCE

OTC is also the traditional time to recognize several award winners for both individuals and institutions. Joe Fowler will be honored with the Distinguished Achievement Award for Individuals for his extraordinary technical leadership in risers and pipelines, industrial leadership and entrepreneurship, significant contributions in higher education, and his substantial contributions to the societies that organize OTC.

The Abu Dhabi National Oil Company (ADNOC) will be presented the OTC Distinguished Achievement Award in recognition of its cutting-edge Panorama digital command center. Considered the only global platform of its kind in the oil and gas sector, Panorama provides an AI-based analysis with complete visibility of production facilities. As a result, Panorama provides a unique advantage in terms of data integration, speed, and accessibility across operations. Panorama has generated over a billion dollars in business value for the company over its three-year life span.

Finally, the Heritage Award will be presented to Edward Heerema in recognition of his long-term continuous, distinguished service in management and leadership of offshore installation for the deepwater industry and Russell Hoshman for his long-term continuous, distinguished service in safety and environmental stewardship for the offshore industry. ◆

The New Normal

Submersible wastewater pumps and the challenge of "flushables"

By SWPA Executive Director Adam Stolberg and Jeff Boling, Ebara Pumps Americas Corporation

Ragging and clogging are persistent problems in wastewater streams, which can cause backflows, seal leaks, and motor or pump damage, not to mention costly downtime and repair expenses. Consumer cleaning products labeled—or, in many cases, wrongly presumed to be—"flushable" only compound the issue. Since these products have proven so popular and consumer behavior is unlikely to change, the burden falls on wastewater treatment professionals and pump manufacturers to ensure the stream flows steadily, even when wet wipes, disposable mopheads, and the like threaten to bring an entire wastewater system to a halt. Below, SWPA Executive Director Adam Stolberg and Jeff Boling of Ebara Pumps Americas Corporation discuss how to take on this challenge.

Not everything that consumers deem "flushable" is suitable for a wastewater system. What are some of the most common offenders and what dangers do they pose?

Wet wipes are the most common "flushable" offender. Wet wipe advertising has made these products extremely popular. However, many of these wet wipes are not flushable. Product labels for most of these products define the misunderstood or never-read guidelines.

- No more than one wipe per flush.
- Wet wipes should not be flushed if fats, oils, and grease will also be present in your collections system.

Most consumers are unaware of what occurs after they flush, which is the start of an elaborate journey through the collection systems. The definition of "waste" is changing every day including new changes resulting from the COVID-19 pandemic, which brought new waste stream items such as masks, gloves, and other personal protective materials. These items are littered across the landscape and will eventually make their way into a collection system during a future rain event.

Consumers may not think their individual use can harm a wastewater system, but how serious can ragging and clogging become?

It only takes a few wipes or rags to clog a pump. One person can cause the clog that completely shuts down a pump station. Once the clogging starts, it affects the hydraulics of the entire wastewater system. These stoppages cause overflows that spill the waste out into the streets and into the public. These hazards go unnoticed to the general public, who unfortunately do not understand what's really in those flood waters their kids are playing in. The danger to public safety is real.

How widespread is this problem and what can our industry do to combat it?

All wastewater systems are victims to this modern waste or "flushable" mentality. As an industry, we must do our best to educate consumers on the consequences of disposing of trash and wipes into the collection systems. Positive changes start with education. Seeming inconsequential actions by consumers drive up wastewater transfer and treatment costs and negatively impact the environment. The costs often have significant impacts on the budgets of both small and large municipalities. These costs can result in the delay of repairs and upgrades that are needed to maintain everyday operations.

Have "shelter in place" and "work from home" orders placed a new stressor on municipal systems?

Prior to the pandemic, municipalities experienced the highest flow rates after 3pm and on weekends. During the pandemic schedules shifted and municipalities are seeing higher flow rates throughout the day. These municipalities are adding inventory to their pump stock and adding labor support to cover the increased demand for hands-on coverage.

In addition to the changes in the waste stream, these municipalities require skilled operators

to manage the collections systems. Most municipalities rely on trade shows conferences and seminars to gain insights into enhanced and new methods and technologies. This training is crucial to operating efficiently and effectively. The COVID-19 pandemic has delayed or cancelled most of these events in 2020 and early 2021.

What are some of the options municipalities are adopting to face the new normal? This doesn't appear to welcome a one-size-fits-all solution.

Their demands change daily depending on rain events, school schedules, and unscheduled breakdowns or maintenance needs. Some municipalities are choosing to repair and unclog pumps as needed, rather than investing in new pumps or other technologies. In other areas municipalities are planning for the future and choosing to upgrade lift stations with new pump technology, trash baskets, advanced controls, and many other solutions. Each municipality, and really each lift station, requires a tailored approach.

Do you foresee this problem growing? And, if so, where is technology headed to prepare for it?

Unfortunately, with the new flushable products available to the public, the impact on the waste streams will likely never subside. New solids-handling pump technology will continue to be developed to keep up with the stringy waste demand. New controls technologies will continue to be developed to ensure that the systems are being operated as efficiently as possible. Through organizations like SWPA, pump manufacturers can play a vital role in educating municipalities on best practices for operating their wastewater collection systems. ◆

Sulzer removed and installed the pumps as part of the project.

Framework Agreement Minimizes Repair Times

Power station reduces downtime by using pre-approved supplier for maintenance

By Alex Edwards, Sulzer

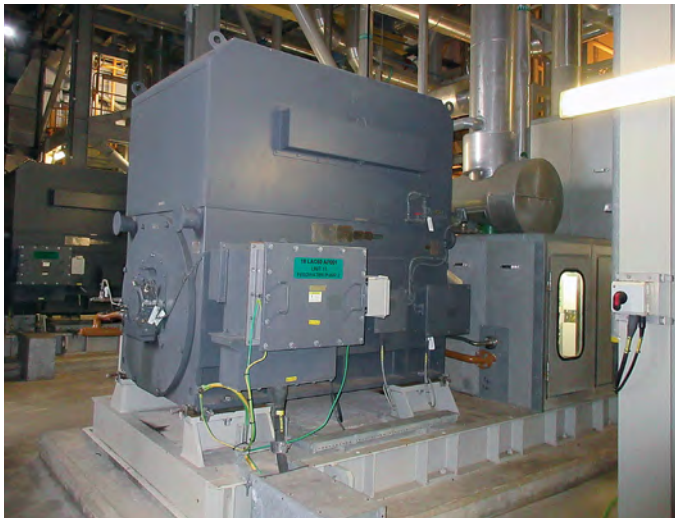
Working through a framework agreement ensured high quality repairs were delivered on time, extending the service life of vital pumping assets at a power station. Sulzer's combined resources and expertise also delivered overhaul projects for high voltage motors at the facility.

Electricity plays a vital role in everyday life, powering industrial and domestic equipment. Meeting this demand requires careful management of the assets involved in producing electrical power. Coordinating generating capacity with maintenance requirements is a delicate balancing act, and one that benefits from minimal downtime.

QUALITY AND TIME OPTIMIZATION

The power generation industry appreciates the advantages of high-quality workmanship in prolonging asset performance and increasing reliability. One of the procedures used to minimize delays and optimize maintenance tasks is the framework agreement. This establishes a short-list of suppliers that have shown they meet the required standards for workmanship, health and safety, as well as management procedures and cost efficiency.

The boiler feed pump motor windings were reconfigured to extend its service life.



Both motors were reinstalled by Sulzer's field technicians before being commissioned.

As an approved supplier Sulzer can be asked to quote for maintenance projects in the knowledge that they have already met the necessary criteria. This can reduce the time to repair important assets and maintains the high standards of the generating plant.

Another example of time optimization is to remove large assets, such as pumps and motors from service and overhaul them as part of a preventative maintenance strategy. Sulzer has been involved in such projects with several power generating sites throughout the United Kingdom and now has a number of framework agreements that are managed by the service centers closest to the customers' sites.

CASE STUDY: HIGH VOLTAGE PUMP MOTOR OVERHAUL

As the initial point of contact, the local service center coordinates all of the assets and personnel required to deliver the project through the comprehensive service

The boiler feed pump motor windings were reconfigured to extend its service life.

Sulzer delivered a turnkey project including removal and installation.

center network. A good example is the recent overhaul of two high-voltage motors, one from a cooling water pump and the other from a boiler feed pump.

Both motors were disconnected and removed from service by engineers from the Avonmouth Service Center, which is located close to the power station. The refurbishment work was completed by the Southampton Service Center with additional expertise provided by engineers in Birmingham, where the motors would be finally tested before being returned to the customer.

In this case, the boiler feed pump motor had a history of high partial discharge readings in the windings and action was required to manage the situation and extend the useful life of the windings. This would allow the power plant to plan for a complete rewind at a later date and improve the reliability of the motor until that time arrived.

EXTENDING SERVICE LIFE

Sulzer suggested reconfiguring the windings by breaking the star point and connecting the original supply leads to create a new star point. This will extend the service life of the stator winding by taking the in-rush current away from the phase coils, reducing the stress on the windings and allows the operator to start planning for a complete rewind in the future.

Having reinsulated and varnished the new windings, the motor was reassembled with new bearings and seals before the remainder of the testing was completed. Both motors were shipped to the power station and reinstalled by Sulzer's field technicians before being commissioned.

Adrian Larmour, U.K. sales manager, large machines at Sulzer, comments, "Our framework agreement with this customer was a great advantage because all the terms and conditions have already been agreed. This saved time when repairs were needed and also provided assurances of the quality and the procedures used to complete the project."

EXPERTISE AND EFFICIENCY

As with any work that Sulzer carries out, customers are invited to visit the service centers to review progress or see firsthand any unforeseen developments that are uncovered during an inspection. Through continuous communication and a transparent repair process, customers receive an efficient and cost-effective solution.

Larmour concludes, "The final result from this project has been very positive. Downtime has been minimized and plans are in place to make further improvements during the next planned outage." ◆

Alex Edwards is marketing and communications manager, rotating equipment services, for Sulzer. Sulzer is a global leader in fluid engineering, specializing in pumping, agitation, mixing, separation, and application technologies for fluids of all types. Sulzer customers benefit from its commitment to innovation, performance and quality and from its responsive network of 180 world-class production facilities and service centers across the globe. For more information, visit **www.sulzer.com**.

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Flood Defense Pumps Need High-quality Bearings

Bedford Pumps and Thordon Bearings work wonders for English pumping station

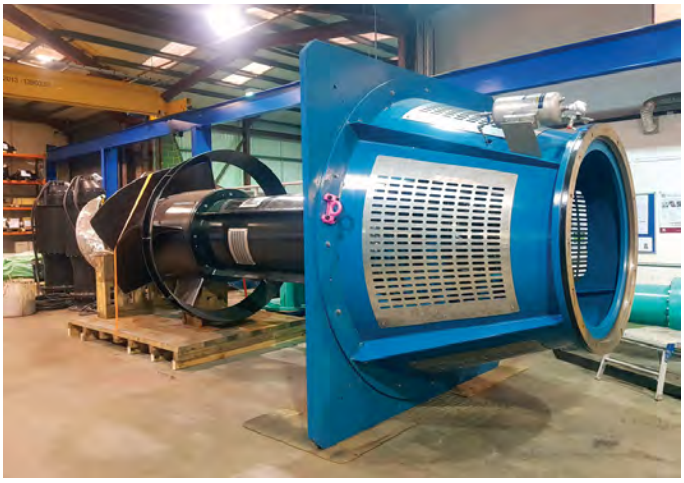
By Emma Gerard, Thordon Bearings Inc.

Pumps for flood defense must handle high-capacity volumes and also be reliable in extreme conditions. Bedford Pumps Ltd., one of the world's leading manufacturers of high-capacity flood defense pumps, has selected Thordon Bearings water lubricated SXL bearings for a new pump design developed for the Islington Pumping Station, in King's Lynn, Norfolk, England.

This important project will see four fish-friendly land drainage and flood control pumps installed at the new 253,605-gallons-per-minute capacity pumping station which, when commissioned, will protect a 6,000-hectare area of low-lying fenland.

ENTER THE NEW PUMPING STATION

The existing pumping station, built in 1959, had reached the end of its service life and will be demolished following the construction of the new pumping station. Canadian based Thordon Bearings, a pioneer in elastomeric polymer materials, supplied eight 7.9 inch inside diameter fully finished water lubricated SXL bearings, in a contract that marked the first application of a Thordon bearing in a Bedford pump.



Alix Macdonald, engineering manager, Bedford Pumps, says, "We have created a brand-new type of axial flow pump to offer better efficiency, better solids handling, and enhanced environmental protection compared to other concrete casing pumps of comparable size.

"We found the Thordon product to be the best solution for large diameter vertical shaft bearings. The water lubricated elastomeric polymer material allows the impeller to run at much tighter tolerances, improving overall efficiency, maintainability, and reliability."

THE SXL BEARING

Macdonald adds that "competitive pricing, high quality material and a long-life expectancy" were also important factors in the procurement decision.

"The material is very easy to use, and easy to machine. And then when it comes to installation, we can freeze fit, press fit, or bond fit, so there are some options there too."

Axel Swanson, business development manager, Thordon Bearings, says, "The SXL bearing is the market

ABOUT BEDFORD PUMPS

Bedford Pumps Ltd. is a flexible, highly experienced British manufacturer of robust pumping plant for the water, wastewater, flood control, and dock industries. With pump ranges from typically 7,925 to 317,007 gallons per minute at heads between 9.8 and 328 feet, the pumps are designed for the most arduous and demanding applications and the brand is synonymous for efficiency, reliability, and longevity.

leader in product lubricated vertical pump bearings due to its durability, resistance to abrasion, shock loading and vibration. Wear life and performance are the biggest advantage to using Thordon materials."

FISH-FRIENDLY PUMPING

To achieve "fish-friendly" status, a key requirement for pump station owner Kings Lynn Internal Drainage Board (IDB), Bedford Pumps designed a 63,401-gallon-per-minute pump capable of allowing fish, migratory eels, and other marine life to pass through unencumbered.

A complementary intake was also designed which offers significant advantages over a standard ANSI type 10 intake, such as allowing the water levels to be drawn down to half the minimum submergence when compared to the type 10 design.

"This intake significantly reduces the pumping station's footprint and the deep excavations typically required," says Macdonald.

A UNIQUE, ECOLOGICALLY SAFE PROJECT

Chris Simmons, sales manager, Duwel Group, Thordon Bearings' U.K. distributor, which also provided front end engineering assistance, says, "As a new customer for Thordon and Duwel, it is a privilege to be involved not only in an important flood defense project but also in the development of a new range of Bedford pumps. We are proud to have supplied Thordon bearings to what is a unique, ecologically safe pump. It is an important project and important piece of kit."

Macdonald adds, "We will definitely look at using Thordon's bearings in the future for similar pumps. The workshop staff gave Thordon SXL bearings a very high rating based on how easy they were to fit with dry ice."

At full capacity, the Islington Pumping Station will be capable of pumping 369 billion gallons of water per day. ◆

Emma Gerard is marketing communications specialist for Thordon Bearings Inc. Thordon Bearings designs and manufactures a complete range of journal bearing and seal systems for marine, clean power generation, pump, and other industrial markets. These products are built using Thordon proprietary non-metallic polymer materials that are lubricated with water eliminating oil or grease usage, meaning zero risk of oil pollution to our rivers, lakes, and oceans. Thordon systems and bearings are available worldwide through over seventy-five agents and distributors. For more information, visit **www.thordonbearings.com**.

Controlling Dangerous Dusts in the Chemical Processing Industry

Part 1 of 2

By David Steil, Camfil Air Pollution Control

Effectively controlling toxic and combustible dust generated in chemical processing facilities is essential to protecting employee health, maintaining product quality, and preventing devastating explosions. This article examines these dangers, applicable regulatory guidelines, and how to use a high-efficiency dust collector to keep workers safe and facilities in compliance.

DUST HAZARDS IN THE CHEMICAL PROCESSING INDUSTRY

Controlling toxic and combustible dust is a common yet serious challenge in the chemical processing industry. Everyday processes like mixing, conveying, and blending create dangerous dusts that become airborne, endanger air quality, and can create fire and explosion hazards.

Although each processing facility has unique dust issues based on the raw materials used, they must all comply with worker exposure limits, environmental regulations, and combustible dust standards.

Chemical processors must comply with Occupational Safety and Health Administration (OSHA) regulations to protect their employees from exposure to airborne dusts, as well as National Fire Protection Association (NFPA) standards to provide a safe working environment.

OCCUPATIONAL EXPOSURE TO TOXIC DUSTS

Regular exposure to certain types of chemical dust particles can be hazardous and irritate the eyes and skin. Such conditions can cause health problems for workers and may require treatment and protective equipment. Other fine chemical dusts can travel deep into the lungs, becoming embedded and causing serious respiratory conditions such as occupational asthma and even lung cancer.

Regular exposure to chemical dust particles can irritate the eyes, skin, and lungs.

OSHA regulations govern employers whose processes generate dust, and the agency will issue citations and fines for lack of compliance. Under OSHA, companies must control toxic chemical dust emissions into the indoor workplace atmosphere to comply with the established permissible exposure limit (PEL) for workers. If no legal limits are applicable, then the company is required to define in writing, implement, and measure its own environmental safety plan to comply with the general duty clause.

OSHA REGULATIONS GOVERNING OCCUPATIONAL EXPOSURE

OSHA 1910 is a broad, general standard that covers most industries. It is a comprehensive and complex standard with twenty subsections. OSHA PELs include limits on airborne concentrations of hazardous chemicals in the air for general industry in 1910.1000–Air

Contaminants. They are listed by chemical name in Tables Z-1, Z-2, and Z-3. Most OSHA PELs are eight-hour time-weighted averages (TWAs), although there are also ceiling and short-term exposure limits (STELs). Many chemicals include a skin designation to warn against skin contact.

- **OSHA 1910.22:** Walking-working surfaces is a housekeeping standard that requires all places of employment, passageways, storerooms, service rooms, and walking-working surfaces to be clean, orderly, dry, sanitary, and free from hazards. This means that manufacturers must prevent dust from accumulating on these surfaces.
- **OSHA 1910.134:** Personal protective equipment (PPE) requirements aim to minimize occupational diseases caused by breathing air contaminated with harmful dusts, fumes, mists, gases, smokes, sprays, or vapors and coming into physical contact with these dusts. It recommends accepted engineering control measures to mitigate these risks as a first step before relying on PPE.
- **OSHA 1910:307:** Hazardous (classified) locations covers the requirements for electric equipment and wiring in locations where there is a risk of fire or explosion because of the presence of flammable vapors, liquids or gases, or combustible dusts or fibers.

Furthermore, the National Electrical Code (NEC) defines hazardous location types, and many chemical processing facilities are Class II, where there is a sufficient amount of combustible dust present in the air to be explosive or ignitable under normal, everyday operating conditions.

Extracted air can be ducted to a dust collector located outside of the processing plant.

REDUCING WORKER EXPOSURE TO TOXIC DUST

The best way to reduce workers' exposure to hazardous dusts is to install a dust collection system with high-efficiency primary and secondary cartridge-style filters. It is

OSHA: COMBUSTIBLE CHEMICAL DUSTS
Adipic acid
Anthraquinone
Ascorbic acid
Calcium acetate
Calcium stearate
Carboxymethylcellulose
Dextrin
Lactose
Lead stearate
Methylcellulose Paraformaldehyde
Sodium ascorbate
Sodium stearate
Sulfur

preferable to capture chemical fumes and dust at their source to prevent them from expanding throughout the plant. This is accomplished by incorporating a hood or extraction arm into the chemical process machinery. Source capture is extremely effective, and it requires the least energy and capital investment.

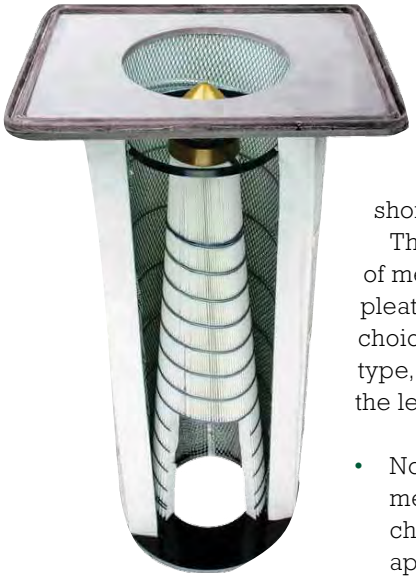
However, once they are captured, dust should be isolated from the rest of the facility and contained in a specific area. For example, a portioned area can be kept under negative pressure. The extracted air is either drawn directly into a local collector or ducted to a dust collector located remotely. In some cases, the filtered air can be safely returned back into the facility to create a push-pull airflow pattern to improve the contaminant control.

A chemical manufacturing facility may also require special options or accessories to improve the safety and reliability of the system. Bag-in/bag-out filters and hopper discharge options can be used to limit exposure and cross-contamination of collected material when performing filter and dust removal maintenance. Additional features such as duct and equipment clean-out doors, stainless steel construction, safety after-filters (HEPA), and FDA-compliant paint are also commonly used with the air filtration unit based on contaminant properties.

TYPES OF FILTERS AND FILTRATION MEDIA

Primary filter media should be selected for each application based on the dust particle size, flow characteristics, quantity, and distribution. If the dust being collected is toxic and the primary filtration system does not use a HEPA filter, it is recommended that a secondary HEPA filter be used downstream. Secondary filters prevent hazardous dusts from discharging to the atmosphere and can be configured to prevent return air ducting contamination and the associated costs of cleaning hazardous dust leakage.

A wide, uniformly pleated filter allows the collected dust to release from the filter, keeping the resistance lower through the filter for a longer period of time. When the pleats of the filter media are tightly packed, the reverse pulse cleaning system of the dust collector will not eject the dust that has settled in between the pleats. Tightly packed pleats increase the resistance of the air through the filters and diminishes airflow, thus shortening filter life.



HemiPleat® Gold Cone™ cartridge filter.

There are two basic categories of media commonly used in pleated cartridge filters. The choice is usually driven by dust type, operating temperatures and the level of moisture in the process:

- Nonwoven cellulosic blend media is the most economical choice for dry dust collection applications at operating temperatures up to 160 degrees Fahrenheit (71 degrees Celsius).

- Synthetic polyester media or polyester-silicon blend is a lightweight, washable media that can handle dry applications with maximum operating temperatures ranging from 180 degrees Fahrenheit (82 degrees Celsius) up to 265 degrees Fahrenheit (129 degrees Celsius). These filters are washable and can recover from a moisture excursion, but they are not intended for wet applications.

Standard and nanotechnology filter media treated with a flame retardant are recommended for applications considered a fire risk. Conductive or anti-static filters may be used where conveyed dusts generate static charges that require dissipation. Cartridge filters with anti-static media can also be used in explosive dust applications, making it possible to conform to NFPA requirements and lessen the risk of ignition sources due to static electricity charges.

High-efficiency dust collection systems also use self-cleaning mechanisms that regularly pulse dust off the filters, allowing units to run longer between filter change-outs. When a layer of nanofibers is applied on top of the base filter media, it promotes surface loading of fine dust and prevents the dust from penetrating deeply into the filter's base media. This translates into better dust release during cleaning cycles and lower pressure drop readings through the life of the filter.

COMBUSTIBLE DUST EXPLOSIONS

A dust explosion occurs when a confined and concentrated combustible dust cloud comes into contact with an ignition source. Many chemical dusts qualify as combustible dusts. These chemical dusts can accumulate on surfaces,

where a spark or flame can ignite them, causing a fire or explosion. Common ignition sources are kilns or a welding flame, but they also can be a lit match or cigarette.

Good housekeeping and installing a well-designed dust collection system can prevent airborne dust from building up in the work environment, on electrical equipment and other areas where dust can accumulate, such as false ceilings.

These measures help to negate the risk of a primary and/or secondary explosion. The primary explosion is the first point where an explosion occurs and is usually an isolated incident. A secondary explosion occurs when the primary explosion pressure disturbs the dust collected in the areas mentioned above, creating a far more extensive and potentially deadly explosion.

Dust collectors minimize the amount of combustible dust that can collect on floors and other surfaces, and they contain chemical dust in one area. But the dust collectors themselves can be a fire or explosion hazard if they are designed incorrectly or not equipped with the proper explosion protection controls.

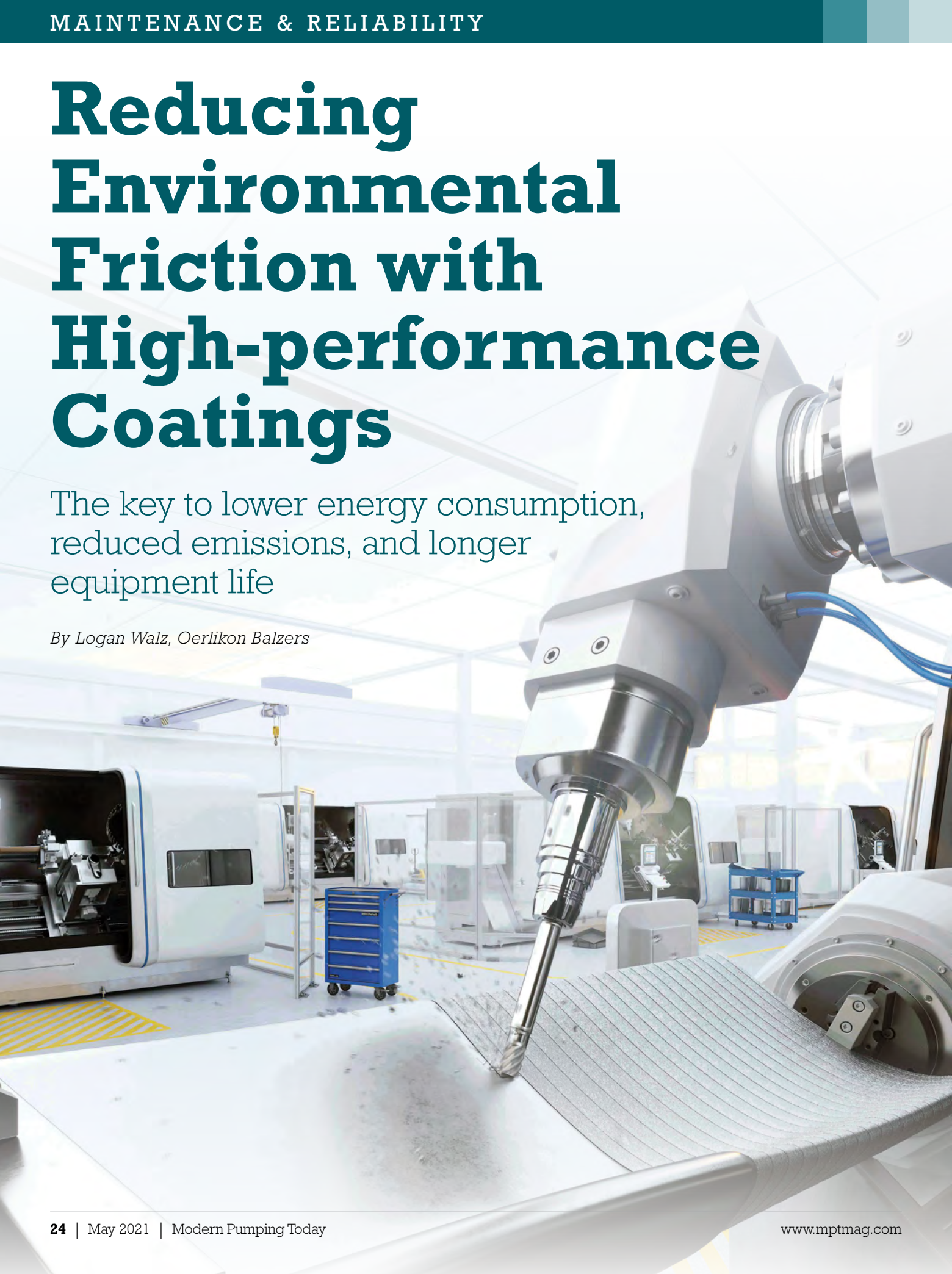
A LOOK AHEAD

In next month's conclusion, we'll review the regulations governing combustible dust—from the NFPA, OSHA, and the U.S. Chemical Safety Board—as well as look over techniques for mitigating combustible dust and its exposure. Effectively controlling the dusts generated in chemical processing facilities is an essential life-saving and legal obligation, so these points will be of interest to anyone mindful of reducing hazardous dust. ◆

Reducing Environmental Friction with High-performance Coatings

The key to lower energy consumption, reduced emissions, and longer equipment life

By Logan Walz, Oerlikon Balzers



Specialized physical vapor deposition (PVD) coatings are widely recognized for the critical role they perform in enhancing operational performance and extending the life of parts across countless manufacturing and industrial sectors. Less understood is the value that these coatings provide in reducing the environmental impact of the industrial processes where they are used.

It starts with one of the primary reasons to use PVD coatings in the first place, which is to reduce friction between mated parts to improve performance. This can result in direct energy savings and, by extension, reduced CO_2 emissions. Because these coatings extend the life of component parts that require frequent replacement, the raw materials, metals and energy that are required to manufacture a replacement part, are also saved.

In fact, some specialized coatings manufacturers are making a strong case that coatings are a significant contributor to improving the environment. They not only point to these environmental benefits but also to the enhancements they have made in their own coating equipment to operate more efficiently. In addition, continued advancements in specialized PVD coatings are also playing an important role in the design of components for new and emerging green technologies.

REDUCING FRICTION WITH SPECIALIZED COATINGS

Reducing friction when mated components are in contact with each other is critical, particularly in punishing environments where there are high loads and high wear. Bearings, gears, rollers, and other precision components suffer from excessive wear, surface fatigue, pitting, galling and corrosion which can also cause failure especially in high-load applications.

To prevent these issues from occurring, specialized PVD coatings are applied in thicknesses of typically only a few micrometers to further harden the surface of these parts and through mechanisms such as altering the surface chemistry they can also lower the coefficient of friction. As a result, less energy is used and less emissions are generated.

Carbon-based coatings such as diamond-like carbon coatings (DLC) from specialized coatings formulators like Oerlikon Balzers, are even more durable. Produced mainly through plasma-assisted chemical vapor deposition (PACVD), these well adhering coatings provide a unique combination of high hardness and low friction coefficients.

Such coated components are utilized for a variety of applications including wind turbine shaft bearings and planetary gears, stainless steel cutting blades and piston pumps, and sliding components across many industries. The coatings are also a proven technique for upgrading critical rotating parts in hydraulic drives, pumps, and valves.

Advanced, hydrogen-free DLC coatings provide even higher hardness along with a very low coefficient of friction. These coatings can be applied in the most demanding environments for high friction, wear, and contact areas such as in hydraulic pump parts, mechanical seals, and high-pressure valve components. Today, they are also playing an increasingly important role in e-mobility applications.

SMALL EFFICIENCIES ADD UP

Even small percentage gains in energy savings can really add up in large scale industrial environments. ''Consider that a single percent gain in efficiency for a 200-megawatt gas turbine represents the equivalent power needed for 1,500 homes,'' says Alessandro Zedda, chief technology officer at Oerlikon Balzers.

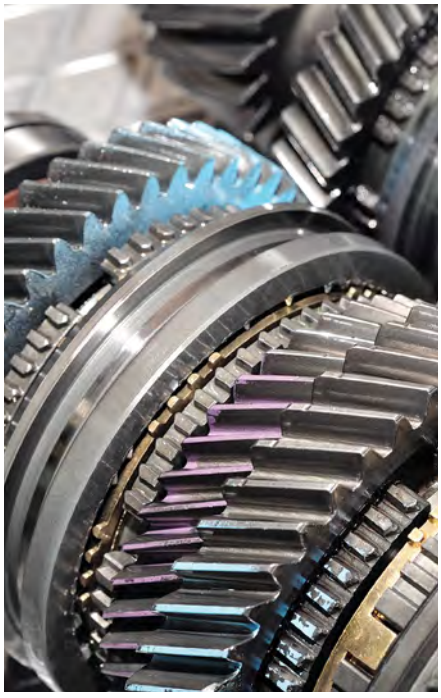
Seemingly minor factors such as a smoother surface finish can improve fuel efficiency. In the aerospace and energy sectors, for example, PVD erosion coatings are applied to compressor blades to protect polished surfaces from degrading over time. This can reduce fuel usage by up to 0.5 percent while promoting component longevity. These fuel reductions translate into comparable CO_2 reductions.

Similarly, in the automotive sector, DLC-coated valve and power train components can reduce the friction mean effective pressure (FMEP) by 10 percent. This translates to a 2 percent reduction in fuel. A 20 percent reduction in FMEP will generate a 5 percent fuel consumption reduction.

More stringent environmental regulations and standards worldwide are also causing industry to focus on reducing their carbon footprint and design greener products.

Take large cargo ships as an example. Today operators need to reduce the sulfur content of their fuel in order to be compliant with current sulfur cap requirements. With a cleaner fuel mandate, marine engine manufacturers required a new fuel injection technology because clean fuels typically do not lubricate as effectively as those with a higher sulfur content.

As a result, the coatings used in diesel marine engines also needed to be redesigned to ensure the new clean fuels will work well. Coatings that meet this new requirement have become an enabler of more efficient, higher performance, cleaner and smoother running machinery.



EXTENDING THE LIFE OF PARTS SAVES ENERGY

The environmental benefit of high-performance coatings is also realized by how they extend the life of parts and tools. When parts last longer they are replaced less frequently which reduces the raw materials, metals, and energy it takes to manufacture them.

In the automotive sector, forming tools are made from multi-ton pieces of steel in the negative shape of a car. Used to make millions of cars, the forming tools will degrade over time and require reworking. To ensure optimal performance and long life, they require polishing and a PVD coating application. In addition to saving energy by keeping the forming tool in optimal condition, additional energy is saved by less frequently moving equipment of this size and weight to a separate location to be repaired.

In the energy sector, applying a DLC coating to roller bearings in wind turbines extends their life and lowers maintenance expenses. Consider that changing one main shaft bearing costs between $200-300,000 in addition to the disruption caused by taking the turbine off of the grid.

ENABLING GREEN TECHNOLOGY DEVELOPMENT

Beyond improving the efficiency and carbon emissions of existing systems, PVD coatings can be an enabler of new green technologies in categories such as fuel cells and high-power energy density batteries.

''Within the fuel cell sector, we are working with a client who manufactures bipolar plates, a key component in fuel cells,'' says Zedda. ''Here the role for a PVD coating will be to promote conductivity while at the same time resisting corrosion. Together these attributes will promote the longevity of the fuel cells extending their environmental benefits.''

Zedda adds, "We are also working with clients to apply PVD coatings on some exciting and highly innovative projects in high power energy density batteries. As industry continues to develop environmentally friendly innovations, there will be more opportunities for coatings to be engineered to support their performance and overall life span."

EFFICIENCIES IN COATING APPLICATION GENERATE AN ENVIRONMENTAL ROI

Further up the specialized coatings supply chain, coatings manufacturers themselves have examined their processes for applying coatings since it consumes both materials and energy.

When the energy consumed to produce coatings is compared to the energy savings they generated in their application, either through the improved efficiency and longevity of an engine or a cutting tool, an "energy payback" or return on investment is generated.

"We are constantly striving to reduce the energy consumption of our coating equipment," says Zedda. "Our new coaters consume 40 percent less energy by using new more efficient plasma sources. Multiply this saving on every batch at all our coating centers around the world and the environmental benefit is huge."

He adds, "While the impetus to explore a new source was environmentally-driven, it is also in our customers' economic best interests because it reduces their coating cost and shortens our manufacturing cycle."

Specialized coatings have an important role to play in reducing our environmental impact. Energy consumption and carbon emissions of manufacturing and operations processes can be reduced significantly. Thus, while industry continues to use specialized coatings for their ability to enhance operating performance, the environmental impact is an important value-add that should not to be overlooked. ◆

Oerlikon Balzers is one of the world's leading suppliers of surface technologies that significantly improve the performance and durability of precision components and tools for the metal and plastics processing industries. For more information, email balzers.components@oerlikon.com or visit **www.oerlikon.com/balzers**.

How Can Predictive Maintenance Improve Pump Operations?

Six points of preparedness for Industry 4.0

By Emily Newton

Today, leaders in many industries are shifting towards predictive maintenance rather than the traditional approach, which typically requires having equipment maintained on a schedule or only once problems result.

Predictive maintenance involves using tools like specialized sensors and data interfaces to show technicians the minor signs of worsened operations that could quickly turn into major problems. Some diagnostic processes also record vibration signatures so technicians can tell when a pump starts vibrating more, possibly signaling its impending malfunction.

Maybe you're in a position to adopt predictive maintenance but are still unsure if you'd see measurable benefits from it. Here are some specific ways predictive

maintenance could directly support better pump operations.

ENSURING INTENDED PERFORMANCE

Keeping pumps running smoothly is important at all facilities that use them. However, it's arguably crucial when failures pose public health threats. Those problems can lead to fines, damaged reputations, and negative media attention while putting people's lives at risk.

A pump failure at a treatment plant led to officials concluding that the problem caused a significant water supply safety risk. It took workers almost eight hours to detect the issue. The matter deposited sludge particles into the water. It also made the liquid have elevated aluminum levels and look cloudy.

If the team at that facility had taken the Industry 4.0 approach of using sensors to get immediate notifications of faults, they could have avoided this situation.

PROVIDING VALUABLE INFORMATION TO RESPONSIBLE PARTIES

As predictive maintenance has become more widely utilized, there has been an increase in tools that help companies capitalize on it. Authorized users can log in to specialized interfaces and see current conditions and historical data. Products that help companies stay on top of maintaining equipment facilitate finding the causes of problems and taking the correct actions to fix them.

This approach can also make equipment last longer. For example, installing a sensor on a progressive cavity pump can prevent issues like premature wear and decreased suction capabilities. When teams can immediately look at data that shows how certain factors change over time, it's easier for them to know when problems might occur or identify inefficient processes that could reduce a pump's lifespan.

HELPING COMPANIES REMAIN COMPLIANT

Professionals in numerous industries must follow regulations to satisfy the appropriate regulatory bodies. For example, in the construction sector, the Occupational Safety and Health Administration (OSHA) requires accommodating areas with at least 19 inches difference in elevation by providing ladders or ramps for workers.

It also mandates creating protective systems for trenches of 5 feet or more. OSHA has extensive requirements, so it's no surprise that rules exist for concrete pumps, which construction workers often use.

One stipulation is that there must be pipe supports designed for 100 percent overload on systems with discharge pipes. One advantage of predictive maintenance is that it can help professionals become more aware of equipment as a whole. For example, a technician may notice that a pump system does not comply with OSHA

requirements while addressing an unrelated issue flagged by an Industry 4.0-based maintenance approach.

OPTIMIZING DECISION-MAKING

When technicians identify faults with pumps, they typically recommend how quickly a client should act when getting it fixed. For example, do they need to have it addressed immediately, or is it a minor issue that they could monitor carefully to see if it worsens?

When facility managers use predictive maintenance correctly, it can help them decide when to address known problems. Then, they're better able to make smarter decisions.

Maybe your facility has a pump that transfers slurry between two tanks at a specific rate. In that case, there are total and partial failures to consider when overseeing maintenance. A total failure happens when the pump does not move the slurry, and a partial one occurs if it transfers slurry, but not fast enough.

Thanks to the details provided by predictive maintenance platforms, users can see what factors may combine to cause failures, then decide when to take action.

ENABLING EQUIPMENT TO OPERATE EFFICIENTLY FOR LONGER

Predictive maintenance concerns identifying issues before they cause problems that humans notice. Maybe you've been in situations where a piece of equipment was working correctly to your knowledge but experienced a massive failure a couple of days later. In other cases, there are gradual declines in efficiency that take a while to notice because they are so small.

However, even tiny issues can cause significant problems over time. Applying Industry 4.0 technology to pumps can help professionals avoid circumstances where pumps wear out too quickly or become less efficient. The statistics gathered through predictive maintenance can also teach maintenance professionals how to spot problems.

For example, if a submersible pump experiences longer cycle times, that characteristic could indicate a partial clog or a worn part. Technicians can also let sensors monitor vibrations that could lead to progressively worse inefficiencies if the cause remains unaddressed.

PROMOTING SAFE, PRODUCTIVE WORKING ENVIRONMENTS

Predictive maintenance can also play a crucial role in helping operations occur safely and smoothly. For example, a dashboard may alert you to a previously unidentified leak. Addressing leaks is especially important in certain facilities that use pumps. Many of the substances pumped during chemical processing can corrode equipment or pose hazards to workers. Thus, unknown leaks could introduce preventable complications that hinder a plant's operations.

Inadequate pressure is a warning sign of a leaky pump. If company managers notice the lack of pressure but don't know a leak caused it, they could lose valuable working time. Moreover, a leak could make surrounding surfaces slippery, presenting slip-and-fall risks.

In the worst cases, a leak could interfere with traction so severely that a person gets injured and must take time off. Predictive maintenance alerts people to leaks sooner, helping facilities stay safe and retain high output.

MOVE AHEAD WITH AN INDUSTRY 4.0 FOCUS TODAY

Unexpected pump failures can lead to productivity losses, extra expenses, and displeased stakeholders. There's no single best way to apply predictive maintenance to pump operations. Nor are there specific approaches that guarantee success.

However, these examples show that it's worthwhile to see how it could pay off to become more aware of faults before they cause significant problems.

Start by looking at historical data and seeing if there are certain types of pumps that have broken down prematurely or particular abnormalities associated with those instances. From there, it's easier to see how you might reap the benefits of an Industry 4.0 plan when maintaining pumps.◆

Emily Newton is a technology and industrial journalist. She is the editor-in-chief of Revolutionized, a publication dedicated to exploring the latest industrial innovations.

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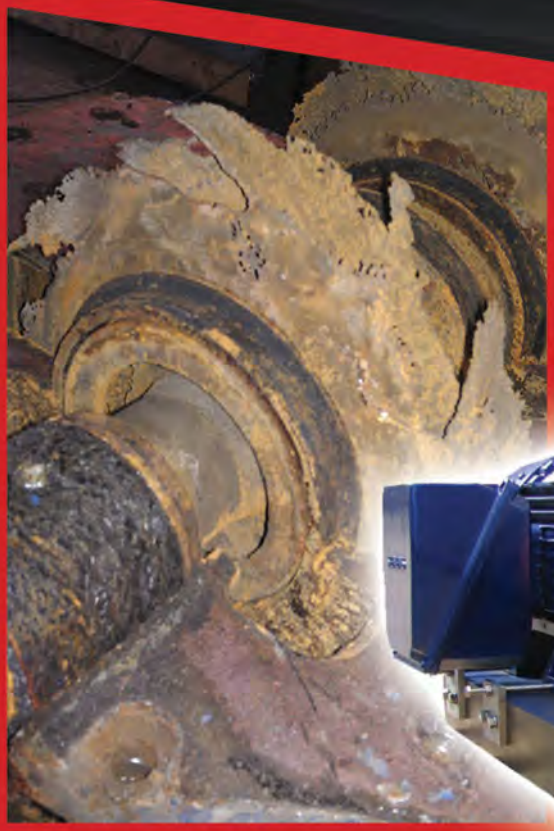

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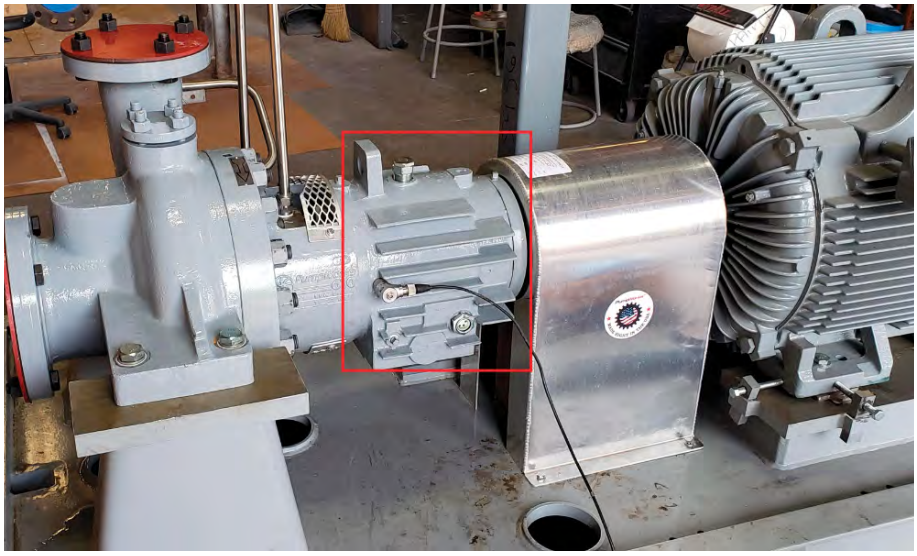
Modal Testing of Pump Bearing Housings

Resonance is more than critical speeds

By Cliff Knight, KnightHawk Engineering

Pumps are subject to many sources of excitation. If you are lucky you can avoid some of them, but some require attention and can lead to serious vibration problems. A chance for resonance should never be underestimated, especially if only critical speeds are considered. Leaving out the individual components such as bearing housings could be problematic.

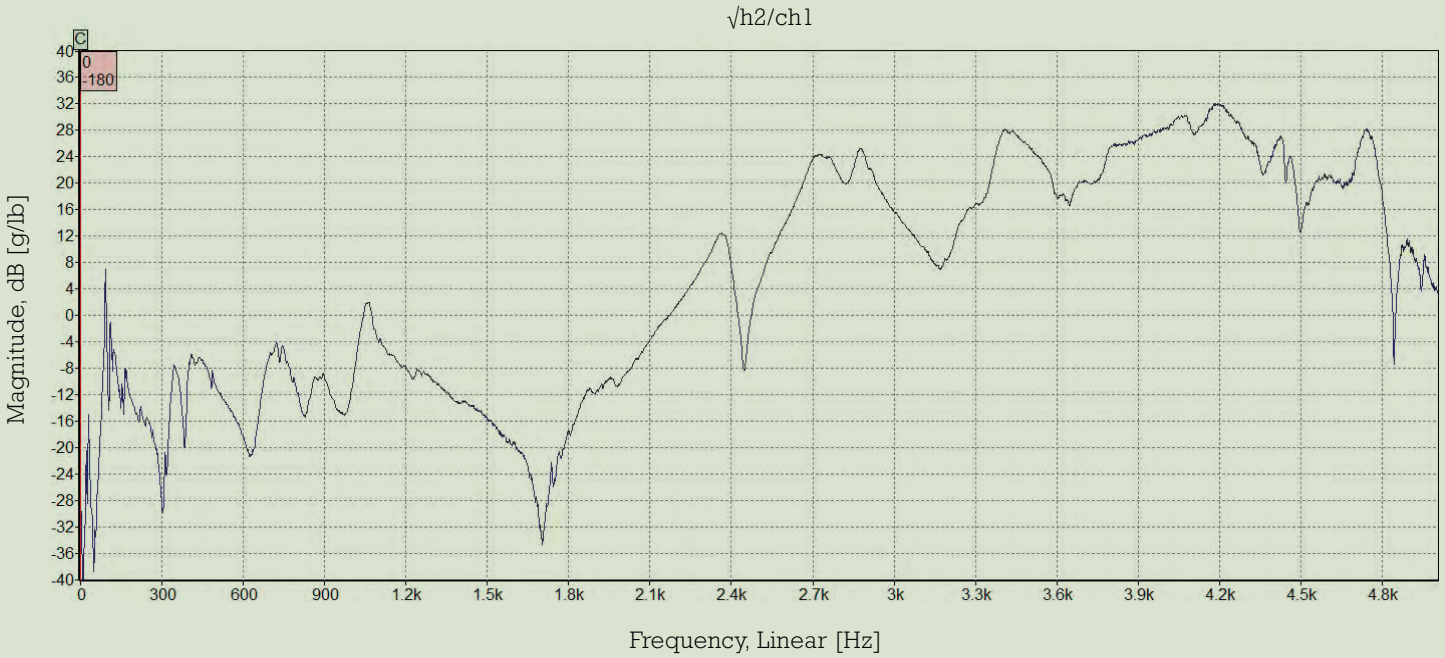


IMPACT TESTING OF PUMP BEARING HOUSINGS

API 610 requires maximum allowable vibration levels, which will not be met under resonance conditions of bearing housings. API stipulates that the bearing housing natural frequencies should be tested by means of methods such as impact hammer testing. The natural frequencies should ideally have a 15 to 20 percent margin away from excitation sources including multiples of running speed and vane pass frequencies. Usually bearing housings have stiff designs, but pumps with flexible couplings and with high vane pass frequencies may trigger a resonance of their fundamental modes.

OEMs should take a note of this early on in the design stage by performing 3D FEA modal simulations of the bearing housing, including the full casing and the baseplate in the model to avoid costly issues down the road. However, the uncertainties regarding the boundary conditions and the unknown damping can lead to deviations up to 20 percent from measurements.

Accordingly, KHE was called to perform modal impact testing on a centrifugal pump bearing housing.



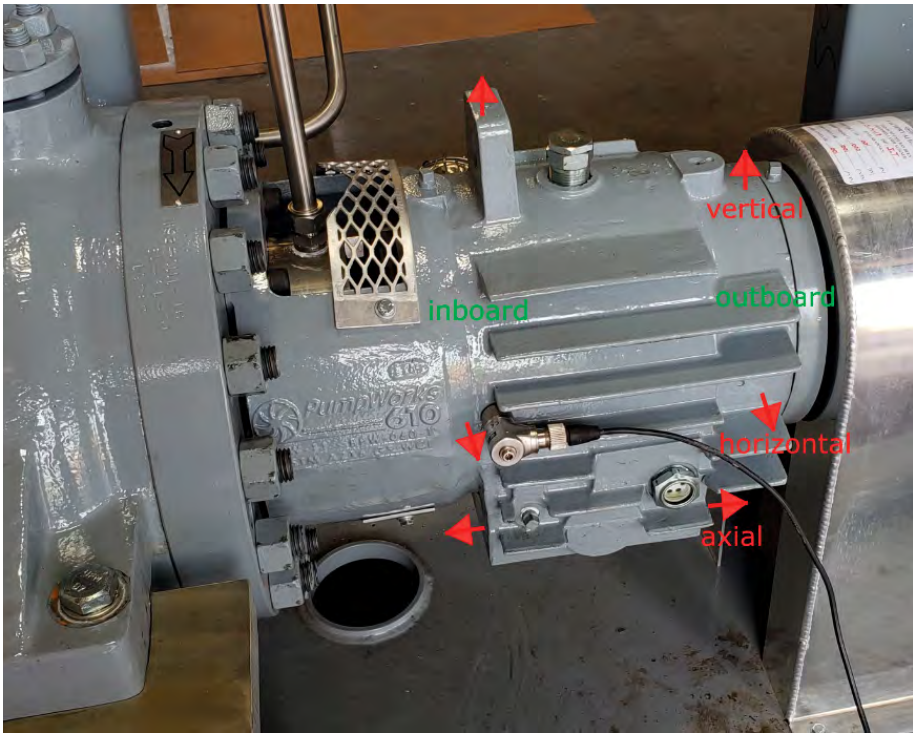
FRF in DB scale is a good measure to identify the housing natural frequencies.

KHE performed the measurement per API instructions with the bearing housing mounted on the assembly and the pump not piped up.

FREQUENCY RESPONSE FUNCTION ANALYSIS

The outcome of the impact test was analyzed for frequency response functions (FRFs) to identify the natural frequencies. KHE, in its experience with such modal testing, has identified several pitfalls to be avoided. Impact tests have a low repeatability, so one needs to make sure to take multiple readings and discard results with cohesion values below 95 percent. Know your vibration instruments and the interest range of measurement to excite all the applicable modes and capture at high enough resolution. Supplement your measurements with simulations to discard unrelated natural frequencies excited in nearby components.

In this case, the bearing housing had sufficient margin from the excitations due to its stiff design. Supplementary FEA results implied that the few low frequency modes related to the baseplate would shift considerably after installation with grouting.◆



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Smart Moisture Measurement Technology Continually Optimizes Product and Process Quality

By Del Williams

Smart moisture measurement devices off the opportunity for corrective adjustments to be made to enhance production.

In a world full of "smart" devices (i.e., smartphones, smart watches, and smart appliances), such technology is increasingly entering manufacturing and processing in forms like condition monitoring, advanced robotics, and Industrial IoT.

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.

"Whether manufacturers are mixing, blending, homogenizing, or drying, non-contact, smart inline technology enables the rapid, automatic measuring of moisture in 100 percent of product or inputs, along with the ability to instantly fine-tune the process. This can optimize quality as well as minimize waste and corrective re-processing," says John Bogart, managing director of Kett US, a manufacturer of a full range of moisture and organic composition analyzers.

According to Bogart, the technology is smart because all 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 connected. If desired, these instruments can prompt operators and managers with alerts as needed. He notes that smart technology enables taking multiple precise moisture measurements each second, sorted within integrated software. This enables not only real-time analysis and error detection, but also more accurate results in products subject to variable, fast-changing conditions and processes.

Continuous moisture monitoring by such smart technology, which is cost-effectively available for about $10 per month when leased, also allow the tracking of historical performance trends, cyclical rhythms, and periodic failures, so corrective adjustments can be made to enhance production. Such capability also provides product quality and compliance documentation when required.

REALLY REAL-TIME

Instant measurement and production line correction is enabled since calculations are performed in real-time inside the sensor and data is analyzed multiple times per second with integrated software.

BREAKING FROM CONVENTIONAL LIMITATIONS

Unleashing the full potential of smart manufacturing and process technology

Continuous moisture monitoring by smart technology allows for the tracking of historical performance trends.

in terms of moisture measurement, however, is not possible using traditional techniques. Conventional testing methods that require time-consuming weighing and drying are often too time and labor-intensive to be practical, and laboratory testing faces the same drawbacks.

"With typical testing, by the time results come back from the lab, any off-spec product can already be processed, packaged, and shipped. If manufacturers are not measuring in real-time, inevitably there will be some variation in inputs, process, and quality," says Bogart.

Traditional data collection, in fact, is usually too slow, cumbersome, and chained to cords and cables. Manufacturing floors are already crowded with equipment. So, dealing with bulky cords and connections to PCs, keypads and external switches to transfer data can be too restrictive.

"Fitting inline testing equipment into space-restricted production lines can be difficult when wires, cables, etc. must be run to a variety of peripheral instruments. In such cases, the cost of labor, installation, and system integration can be as much as the device itself," says Bogart.

In response, industry innovation has developed smart inline technology that can rapidly measure moisture in samples multiple times per second. The approach utilizes near-infrared (NIR) light in a highly accurate, non-contact secondary measurement method that can deliver immediate, laboratory quality moisture readings without the labor, cost, or delay of conventional techniques.

According to Bogart, NIR moisture meters allow very accurate instant measurement of solids, liquids, and slurries without contact or sample preparation, so there is no contamination. Once the meter has been calibrated against the lab or production standard, the calibration is stored in the device so no additional calibration work is required, and measurements are fully traceable to the original measurement method. Because the process is non-destructive, samples remain unaltered so they can be used for additional tests or put back into the product stream.

"NIR moisture and organic composition meters follow the principle that water and other organics absorb certain wavelengths of light," says Bogart. "The meter reflects light off the sample, measures how much light has been absorbed, and the result is automatically converted into a moisture (or organic component) content reading."

SMART SENSOR DESIGN IN A SMALL PACKAGE

One example of such smart technology is the Kett KB30 in-line NIR

moisture meter system. The device, which utilizes smart sensor design and is approximately the size of a car battery, enables measurement without connection to controllers, PCs, or other cumbersome I/O devices. Its connections enable local process control and remote integration, and converters are available for wireless, IP, DeviceNet, and other interconnection and communications protocols.

Such connectivity not only cost-effectively eases installation, integration, and maintenance, but also enables moisture monitoring and necessary corrective action on 24/7 basis. The corrective action, according to Bogart, can be set up to be accomplished either automatically or via alert and action taken by plant operators, managers, or engineers.

With a response time of 0.2 seconds, +/- 0.01 percent accuracy, and a moisture measurement range of 0 to 100 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.

When its monitoring capabilities are integrated with accompanying Kett Tracker™ data collection and analysis software, improved error detection, defect analysis, and product quality result.

SMART MOISTURE MEASUREMENT TECHNOLOGY AT WORK

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.

Because moisture control and temperature are closely linked, such smart moisture meters also have a temperature compensation loop on the instrument, and provide local temperature as part of the data output, according to Bogart.

Where ambient temperatures change dramatically, this allows simultaneously monitoring of temperature and moisture content to see if process modifications are necessary, depending on daily (i.e., day/night) or seasonal changes (i.e., summer/winter).

"Ultimately, smart moisture measurement technology translates into superior process control, quality, and production without the inherent drawbacks of slower, labor-intensive lab or batch testing," says Bogart.

BENEFITS FOR THE FUTURE

Smart devices already dominate the consumer market for good reason and have begun to gain prominence in manufacturing and processing.

So, it is now time for industry professionals to look into the significant benefits of smart moisture measurement technology on the production line—and gain the advantage—before their competitors do. ◆

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**.

Featured Product

CRANE PUMPS & SYSTEMS

Envie³ Pump Motor

Envie³ high efficiency air-filled motors come without application limitations. These premium efficient motors are designed to run both submerged and dry run and are available with our Barnes and Deming product lines. The envie³ pump motors are available as both Barnes or Deming chopper and non-clog pumps, which feature superior hydraulic performance that is proven by our existing SH product platform. The patent pending closed loop glycol cooling systems allows for stress-free easy maintenance and installation. The envie³ motor platform is engineered to be installed into dry pit and submersible applications. This makes the envie³ a superior pump solution to all existing and new installations, including coastal regions that experience frequent flooding in dry pit applications.

The envie³ motor platform features numerous accessories and installation options including horizontal and vertical configurations. The horizontal installation options include a cart system, which creates a back pull-out option allowing for easy maintenance, as well as a fixed bracket configuration. When installed horizontally, the envie³ footprint is 35 percent smaller than competitors' frame mounted end suction pumps. This allows for space savings which helps when installing into locations where space is limited. The envie³ vertical installation configurations include a metal and concrete stand. Each of these vertical stands allow for 360-degree rotation which makes adapting to existing piping convenient, including tangential discharge pumps.

The new envie³ product offering has an IE3 premium efficient rated motor. This is an achieved motor efficiency of 94 percent which results in annual energy savings ranging from $200-$900. The envie³'s ability to run continuously in air making its minimum required submergence 35 percent lower than the comparable pumps. This results in less expensive lift stations, less FOG build up, reduced chance for the station to become septic, and the ability to pump out floating debris. The plug-and-play cord that is standard on the Barnes and Deming solids handling product line allows for quick voltage changes reducing downtime on pumps when performing maintenance.

The application capabilities of the envie³ motor platform are unmatched. The modern, rugged design features a large stainless steel handle, plug-and-play quick connect cord, stainless steel outer shell and hardware, and an IE3 premium efficient motor. Envie³ motors are where versatility meets high performance. Be on the lookout for the all new e nvie³ Barnes and Deming motor platforms coming June 2021.

For more information, visit **www.cranepumps.com**.

WANNER ENGINEERING
Hydra-Cell LACT Unit Pumps

Lease Automatic Custody Transfer (LACT) units measure the quantity and quality of oil and gas transferred from the production field to the pipeline and can also be used to process produced water. The seal-less design of Hydra-Cell separates the hydraulic end from the fluid end, so there are no seals or packing to leak, wear, adjust, or replace. This results in less downtime, less environmental containment costs, and less annual maintenance compared to other pumping technologies. In addition, Hydra-Cell can handle sand or other solids up to 800 microns in size without fine filtration. For more information, visit www.hydra-cell.com/applications/lact-units.html.

MUELLER WATER PRODUCTS
EZ-Tap Drilling Machine

Mueller expands its small drilling machine product line with the launch of the EZ-Tap drilling machine. The compact, lightweight EZ-Tap drilling machine is designed specifically for water taps and use with service saddles and corporation stops up to 300 psig working pressure. The new design makes service connections easier on mains with or without pressure. It can be hand operated using a standard socket or off the shelf cordless drill. The EZ-Tap drilling machine is available in two kit options: the Machine Kit, designed for 3/4- and 1-inch corporation stops, and the Large Diameter Kit, designed for 1-1/4-, 1-1/2-, and 2-inch corporation stops. For more information, visit www.muellercompany.com.

GRAPHITE METALLIZING CORPORATION
Graphalloy Type 453 Bushing

Graphalloy bushings offer solutions in places where traditional bearing lubricants will not work, including high temperature applications, clean environments, submerged operation applications, and more. The Graphalloy material is self-lubricating, non-galling, can handle low lubricity service, and can withstand temperatures from -400 degrees Fahrenheit (-240 degrees Celsius) to 1,000 degrees Fahrenheit (535 degrees Celsius). The Graphalloy material is used in many low lubricity pumps due to its self-lubricating and non-galling features. For more information, call 914.968.8400 or visit www.graphalloy.com.

LEWA
Nikkiso Non-seal Pumps with E-monitor

Tried and tested Nikkiso centrifugal canned motor pumps are mainly used for transfer and circulation tasks involving highly flammable, explosive, or toxic fluids in the chemical and petrochemical industry. To further improve their operational safety and reliability while carrying out these demanding tasks, all non-seal models are equipped with an E-monitor that indicates the wear condition of the slide bearings during pump operation, thus enabling predictive maintenance. The control unit is the most advanced monitoring system of its kind for pumps in high pressure and high temperature service. For more information, visit www.lewa.com/en/pumps/centrifugal-pumps/nikkiso-centrifugal-canned-motor-pump.

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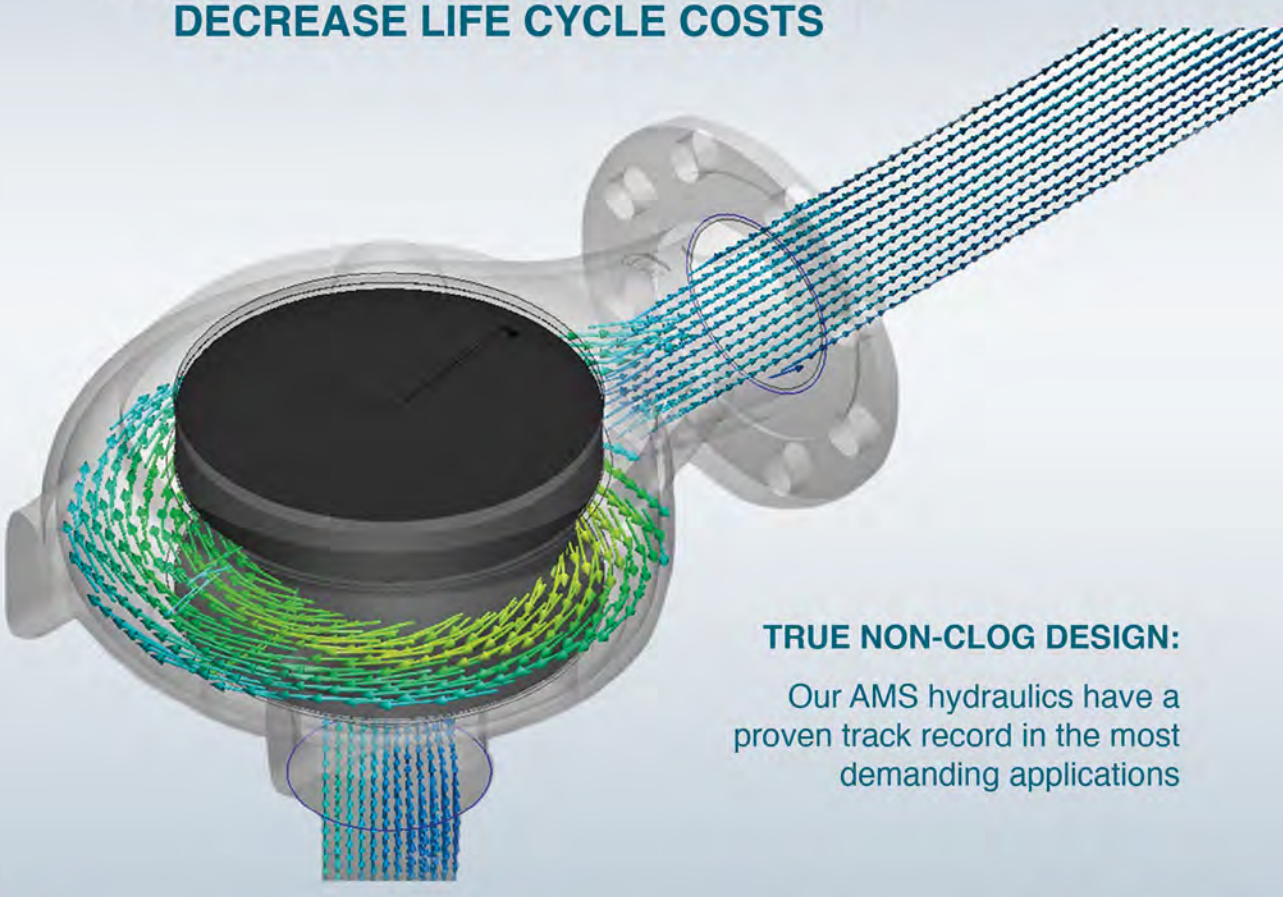

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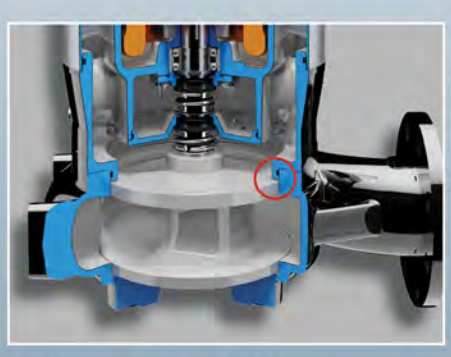

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