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MARCH 2022



#### A NOTE ON THIS ISSUE:

It's Mardi Gras season, and we're letting the good times roll in the March issue! First up, Kevin Koenitzer of Helwig Carbon explains how his company's Bearing Protection Kit can be the



J. Campbell, Editor Modern Pumping Today

first step to avoiding costly downtime (pg. 14). Thanks to their decades of experience, the engineers at Helwig Carbon have proven their skill at risk analysis when it comes to the most effective way prevent current discharge through bearings, expensive repairs, and unnecessary shutdowns.

Next, German biogas plant specialist Weltec Biopower has been expanding its plant technology in Greece. Ann Börries illustrates how her company set up the most efficient biogas plant in the region, a true example of circular economy thinking and the consistent use of existing waste to ignite a new age of energy efficiency (pg. 16).

Also, Michael Kopper of Centrisys shares his company's plans to provide maintenance and repairs for eighty-three decanter centrifuges located in eight New York City wastewater treatment facility locations. Learn how this massive project will succeed in ''Cleaning Up the Big Apple'' in this month's Water & Wastewater Focus (pg. 18). Enjoy!



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#### DANFOSS SEEKING NOMINATIONS FOR ANNUAL ENVISIONEER OF THE YEAR COMPETITION

EnVisioneer of the Year - 2022 - Danfoss is now accepting entries for its thirteenth annual EnVisioneer of the Year award competition. Launched

in 2010, the competition recognizes North American original equipment manufacturers (OEMs), building owners, municipalities, contractors, and end users who have introduced a new product, opened a new facility, or invested in a building or system upgrade in the past eighteen months using Danfoss products or solutions to realize significant energy and environmental savings. Interested participants may enter the competition by submitting a nomination by June 30, 2022. Applications will be reviewed and selected by a panel of third-party judges representing various disciplines.

Recent winners of the EnVisioneer of the Year program include Towson Courthouse (Baltimore, Maryland); Sheridan College (Oakville, Ontario); Arctic Cool; Multistack and Escambia County School District (Pensacola, Florida); Delfield; Smardt Chiller Group; and EMCOR Services Mesa Energy Systems (Irvine, California). For more about the EnVisioneer of the Year award competition, learn about previous winners, or find information on how to submit a nomination, visit the Danfoss website.

#### BEL REPORTS FOURTH QUARTER AND FULL YEAR 2021 RESULTS

Bel Fuse Inc. announces preliminary financial results for the fourth quarter and full year of 2021.

"We closed out 2021 with a fourth consecutive quarter of year-over-year sales growth and strong revenue for the quarter," says Daniel Bernstein, president and CEO. "Net sales are up with solid performance across all three business units. Additionally, our backlog continues to build as the demand for eMobility, commercial air, and industrials remain strong. Net earnings more than doubled over last year's fourth quarter and almost doubled for the year as well. Recent acquisitions have been strong contributors to our growth and were highly accretive in 2021. Our CUI power and Circuit Protection products that address a broad array of markets and products that support eMobility and commercial air applications continue to be the growth drivers for revenue.

"Bel will further execute on our strategic initiatives that our CFO Farouq Tuweiq has, and will continue to, put in place and oversee. These initiatives are designed to

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#### INDUSTRY NEWS

enhance Bel's margins and drive continued improvement in operational excellence," concludes Bernstein.

#### ELFA RELEASES FIRST MONTHLY SURVEY OF ECONOMIC ACTIVITY FOR 2022

The Equipment Leasing and Finance Association's (ELFA) Monthly Leasing and Finance Index (MLFI-25), which reports economic activity from twenty-five companies representing a cross section of the \$900 billion equipment finance sector, shows their overall new business volume for January was \$8.3 billion, up 2 percent year-over-year from new business volume in January 2021. Volume was down 30 percent month-to-month from \$11.8 billion in December following the typical end-of-quarter, end-ofyear spike in new business activity.

Receivables over thirty days were 1.8 percent, down from 2.0 percent the previous month and down from 2.2 percent in the same period in 2021. Charge-offs were 0.17 percent, down from 0.25 percent the previous month and down from 0.47 percent in the year-earlier period.

ELFA President and CEO Ralph Petta adds, "Despite persistent supply chain disruptions in several collateral categories and nagging inflation, the equipment finance industry picks up in January where it left off last year: new business volume is robust and portfolios continue to perform. The impact of impending higher interest rates on industry performance in the coming weeks and months bears watching, however."

#### SIXTEEN TRIBAL WATER SETTLEMENTS TO RECEIVE \$1.7 BILLION

The Biden administration will use \$1.7 billion from the recently enacted federal infrastructure bill to fund sixteen tribal water rights settlements, according to U.S. Interior Secretary Deb Haaland. The money will ensure that tribes get access to water they've been promised but have been unable to use because of a lack of funding for infrastructure to store and move it.

"I am grateful that tribes, some of whom have been waiting for this funding for decades, are finally getting the resources they are owed," Haaland said in a statement during a trip to Arizona, where she announced the funding.

Access to reliable, clean water and basic sanitation facilities on tribal lands remains a challenge for hundreds of thousands of people. The funding for settlements is part of about \$11 billion from the infrastructure law headed to Indian Country to expand broadband coverage, fix roads, and provide basic needs like running water.

The U.S. Supreme Court ruled in 1908 that tribes have rights to as much water as they need to establish a permanent homeland, and those rights stretch back at least as long as any given reservation has existed.



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#### AMPLITECH GROUP ANNOUNCES NEW CHIEF OPERATING OFFICER

AmpliTech Group, Inc., a designer, developer, and manufacturer of state-of-the-art signal-processing components for satellite, 5G, and other communications networks and a worldwide distributor of packages and lids for integrated circuit assembly, announces the promotion of Jorge Flores to the newly created position of chief operating officer.

As COO, Flores will lead critical initiatives to further streamline operations, drive growth, and take ownership of creating an enhanced experience for AmpliTech's valued customers. He will continue to report directly to Fawad Maqbool, CEO and chairman of the board of the AmpliTech Group and work out of the Hauppauge, New York, location.

"Jorge joined AmpliTech Group as Executive Director of Operations at end of Q1 2021 and in a short period of time, has proven to be an effective and imaginative leader, implementing change and driving us forward," says Maqbool. "Jorge truly gets the vision we have for AmpliTech and has been monumental in materializing this vision. We are confident his operational background and business experience strongly position him to help lead the next phase of the company's growth and success."

#### VOITH BECOMES SOLE OWNER OF ELIN MOTOREN

Since May 1, 2020, a 70 percent of ELIN Motoren has been owned by Voith Group. The other 30 percent of the company remained with the long-standing Managing Director Franz Hrachowitz. As of the end of last year, the two parties agreed on the acquisition of the remaining stake.

"For Voith, this is a further step in strengthening our core business and consistently expanding it in the direction of sustainable technologies," says Dr. Toralf Haag, CEO of the Voith Group.

ELIN Motoren GmbH has a total of about 1,000 employees and generates a turnover of about 120 million euros. The company manufactures electric motors and generators in small series as well as individualized solutions for industrial applications. In this area, the company focuses on electric machines, motors in the low-voltage, medium-voltage and high-voltage range, and generators, in particular for wind energy and decentralized energy generation. With its product portfolio, ELIN Motoren serves the target markets wind energy, plastics, tunnels and mining, oil and gas, plant construction, as well as power plants.

"Voith Turbo is regarded worldwide as a leading technology-independent supplier of drive systems," adds Cornelius Weitzmann, CEO of Voith Turbo.



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TRADE SHOW PROFILE



# WQA CONVENTION & EXPOSITION

Water professionals look to make an impact in Orlando



#### WQA CONVENTION & EXPOSITION AT A GLANCE

WHEN: April 6-8, 2022

WHERE: Orlando, Florida

WEBSITE: www.wqa.org/convention





he Water Quality Association's Convention and Exposition is the premier water treatment industry education, sales, and networking event. The convention helps dealers, manufacturers, and consultants make an impact in the water treatment industry. At the 2022 WQA Convention and Exposition, attendees can visit with manufacturers, suppliers, and developers on the busy trade show floor, find out what the organization is doing to represent water treatment professionals in Washington, and learn about the latest research in water quality.

Add to this, the WQA Convention and Exposition is the ideal place for education—where treatment technicians and water quality professionals come to pick up some Continuing Professional Development credits toward recertification, develop new skills for managing their business operations, and take professional certification exams.

#### NETWORKING, KNOWLEDGE, AND MORE

The 2022 WQA Convention and Exposition provides ample opportunity for treatment professionals to get to know their WQA peers at networking events. Attendees can get inspired at the Opening General Session. Held the afternoon of the convention's first day, the Opening General Session is a great overview of the water treatment



industry and of WQA's role in it. Attendees will hear from WQA and industry leaders, learn about issues affecting the industry, vote for WQA officers, and see colleagues honored with WQA Leadership Awards.

The convention also offers dozens of education sessions and other learning opportunities for water quality professionals to boost their skills, on topics ranging from water contaminants to chloride discharge to technical techniques to business operations topics. For professionals who are certified, many of the sessions offer Continuing Professional Development toward recertification, meaning these highly skilled professionals can earn most of it at this one event!

#### THE LEARNING CONTINUES AFTER ORLANDO

Recognizing that water quality professionals can't possibly attend every single education session they would like to, the Water Quality Association has made these offerings available online for all attendees. Even if someone is not currently a WQA member, the full package of recordings is free with convention registration and will be available online shortly after convention ends on demand.

#### WQA CENTRAL: YOUR GUIDE TO THE TRADE SHOW FLOOR

Once the trade show opens, attendees will see the traditional



WQA Central booth right in the middle of all the action—a point of reference and respite for the entire show. At WQA Central, all attendees can have their questions answered about Gold Seal product certification, professional certification and training, WQA membership, or the Water Quality Research Foundation. As the hub of the trade show floor, WQA Central staff can also give attendees direction and demonstrate how to use the Convention App.

As attendees check out the 2022 WQA Convention and Exposition trade show, they will meet vendors and suppliers, check out new technology, take a quick class, and make important connections. The interactive trade show map on the Convention App allows attendees to search for vendors by company name or type of business so they can plan in advance which booths are not to be missed.

#### WHAT WQA DOES FOR YOU

Throughout the 2022 WQA Convention and Exposition, most committee, advisory councils, and membership sections meet to address the organization's focus, direction, and initiatives. As most sessions are open to all water quality professionals during the event, attendees looking to check out areas of particular interest have the perfect opportunity to learn and shape how the WQA can best represent the water quality industry, its companies, and its people.



CASE STUDIES

### SHAFT GROUNDING FOR SUBMERSIBLE PUMP MANUFACTURING

Bearing Protection Kit can be the first step to avoiding costly downtime

BY KEVIN KOENITZER, HELWIG CARBON

he following case study presents both the costly impact of bearing failure and the value of bearing protection. In the past few years, a pump manufacturer has been experiencing a growth in warranty claims due to failed bearings in their pump motors. This pump manufacturer has half of a century of experience in the submersible pump industry. The roots of this company started in 1957 and they have grown ever since serving the dewatering, industrial, wastewater, and sewage pumps industries.



The cost to take apart and repair a pump with new bearings can be north of \$7,000 for each pump, leading to tens of thousands of dollars in warranty claims. The owner made it a priority to find out what was causing the bearing failure in order to reduce their warranty costs and save their customers from unexpected downtime.

After some research, the engineers at the pump company suspected that the failed bearings might be caused by electrical discharge machining from induced shaft currents. Many of their pump applications will utilize a variable frequency drive (VFD) to increase the pump motor efficiency. While VFDs lower power consumption, they also induce currents onto the motor shaft. These shaft currents will often discharge through the motor bearings causing fluting, burnt grease, and eventual bearing failure.



#### RISK ANALYSIS: THE FIRST STEP

The first step to solving the problem was to verify if the bearing failure was being caused by VFD-induced currents. Helwig Carbon engineers were invited to come out to the pump manufacturing facility in California. A new submersible pump was hooked up to a VFD. Helwig's BPK-Probe: Shaft Voltage Detection Device was used to determine if there was voltage present on the motor shaft. The BPK-Probe uses a silver graphite tip to test if the induced shaft currents put the bearings at risk for electrostatic discharge (ESD) machining. These discharges will lead to fluting and frosting of the bearings and bearing raceway, burnt grease, and eventual bearing failure.

If risk is detected, the BPK-Probe can then use an embedded Bearing Protection Kit to depict the reduction of risk level or voltage if a Helwig BPK is installed. Testing concluded that there were over 12 volts present on the shaft. Industry standards say that anything above 2 volts presents a significant risk for bearing discharge. This testing reaffirmed the original suspicion that the bearing failures in the field were likely being caused by discharges from common-mode current.

#### AN EFFECTIVE AND SIMPLE SOLUTION

From decades of experience, the engineers at Helwig Carbon knew the most effective way to prevent common-mode current from discharging through the bearings is to provide an alternative, least resistance path to ground. The BPK-SB featuring silver graphite technology was selected. This kit features a constant force spring, which puts positive force on top of a silver graphite brush. This allows for uninterrupted electrical contact between the brush and rotating shaft ensuring superior grounding. The material provides effective grounding at high and low frequencies and is very low friction to allow for extra-long life.

It was also of great importance to the pump manufacturer to find a solution that required no additional maintenance from the end-user. The BPK-SB is sealed from contaminants and the silver graphite grade provides cleaning action to the motor shaft surface ensuring years of performance with no extra maintenance required.

Finally, installation costs needed to be considered. A custom bracket was designed for easy installation on the assembly line or in the field. Overall, the BPK-SB package will provide economical and effective insurance against bearing failure due to electrical discharges for many years.

#### THE PROOF IS IN THE SAVINGS

Helwig tested the pump motors at the customer's facility with and without the BPK on the shaft to ensure the solution is working. Various pump motors were hooked up to a VFD and ran using typical field operating conditions. The motors were then tested with and without the BPK solution using the BPK-Probe. Results showed that the motors without the BPK engaged showed shaft voltages of over 12 volts, which is well above the 2 volts threshold for bearing damage. When the BPK solution was engaged, the shaft voltage dropped to under 1 volt. This showed the Helwig solution was providing the appropriate protection of the pump motors and will eliminate bearing failures from electrical discharge machining.

The pump manufacturer will save tens of thousands of dollars in yearly repairs and warranty replacements while saving their customers from unwanted downtime. Helwig Bearing Protection Kits have now been implemented on new pump motors in the United States, Europe, and India, as well as being retrofitted to pumps already in the field. No issues of electrical bearing failure have



been reported since the BPK-SB was added to the pump motors. The pump manufacturer and its customers are more than happy with the result.

Helwig Carbon Products, Inc. has been producing a full-line of precisionmachined carbon brushes, brush holders, and mechanical carbons since 1928. Headquartered in Milwaukee, Wisconsin, Helwig Carbon is the largest American owned carbon brush manufacturer. Helwig's customer service team, engineering group, and field service representatives are eager to lead customers to effective solutions that maximize product performance and minimize maintenance and downtime. For more information visit, www.helwigcarbon.com.





In the past year, WELTEC expanded this biogas plant and since March 2021 the plant is in operation with a doubled output of one megawatt. Around a year after the expansion, the operators' resume is consistently positive.

### GREEK POULTRY FARMERS INVEST IN BIOGAS PLANTS

Efficient operation through a variety of raw materials and proven technologies

BY ANN BÖRRIES, WELTEC BIOPOWER

The German biogas plant specialist Weltec Biopower registers keen interest in its plant technology in Greece. In the past year, Weltec expanded its market leadership in the southern European country by building four further projects and expanding three existing plants. Due to the great potential of organic residues to produce biogas and biomethane, especially in the north of the country, the climate-friendly energy source is playing an increasingly important role in the Greek energy transition.

Weltec Biopower has so far been significantly involved in seventeen of a total of thirty Greek agricultural and waste biogas plants. This is no coincidence, because Weltec is an established technology and market leader there. One of these AD plants has been built in Megara, less than 20 miles west of Athens, in 2015. In the past year, Weltec expanded this biogas plant and since March 2021 the plant is in operation with a doubled output of one megawatt. Around a year after the expansion, the operators' resume is consistently positive.

#### THE RIGHT DECISION

"The plant was already running very successfully before the expansion," says John Tetoros, the Greek Weltec sales partner. "An above-average plant availability of 97 percent confirms that the extension with Weltec was the right decision."

It was also crucial for the extension that a sufficient amount of substrates were available. The area around Megara is known for keeping chickens and the biogas plant is also on the site of a chicken farm with 20,000 laying hens. As a result, some of the input materials are permanently secured. In addition to the chicken droppings, roughly equal amounts of olive oil pomace, cattle and pig manure, as well as whey are used for energy production. Since the plant was enlarged, the daily



amount of the substrate mix has risen to 190 tons.

Originally the plant comprised a digester made of stainless steel with a volume of over a million gallons, a 530-kilowatt CHP, and a storage unit. For the increased input volume, Weltec Biopower built another one-million-gallon stainless steel digester with a height of 20 feet and a diameter of 93 feet. In addition, another pre-storage unit, a second 530 kilowatt CHP and an unpacking system for cheese and vegetables were installed. However, this unpacking system is only used in case of irregular deliveries of expired food. A solids feeder is not required since the pumpable substrates are brought into the storage units via a central pump block and then conveyed into the digesters.

#### THE MOST EFFICIENT BIOGAS PROJECT IN THE REGION

John Tetoros is proud of this special energy plant: "The plant in Megara is one of the most efficient biogas projects in Greece. Our many years of experience and knowledge as well as the highly developed biogas technology from Weltec are two decisive reasons. And the icing on the cake for the success of this plant is the strategically favorable location, the care of the operators and the use of the heat for stables and offices."

So, it is hardly surprising that one of the two operators decided to build another biogas plant in Ritsona, 25 miles north of Athens. This is about to be completed and will go into operation in spring. Just like in Megara, only organic residues are used to generate energy in Ritsona.

#### A NEW AGE BEGINS

These plant projects are examples of circular economy thinking and the consistent use of existing waste.

Konstantinos Nikakis, board member of the Greek biogas operator association HABIO,



The German biogas plant specialist Weltec Biopower registers keen interest in its plant technology in Greece. In the past year, Weltec expanded its market leadership in the southern European country by building four further projects and expanding three existing plants.

emphasizes the importance of such projects: "Waste-to-energy plants are urgently required in the new energyage in order to minimize harmful carbon emissions and to achieve climate neutrality. In any case, the supply situation with substrates of animal and vegetable origin is very good; the potential in Greece is enormous. In addition. there is also vegetable and other recyclable waste. In view of this amount of raw materials, agriculture has very good prerequisites to make its contribution so that Greece can achieve its climate goals."

It is now up to the individual players to bring Greece into the new energy age.

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 twentyfive 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.

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

#### *Centrisys secures maintenance contract for New York City wastewater treatment plants*

BY MICHAEL KOPPER, CENTRISYS

entrisys Corporation, a leading North American manufacturer of decanter and thickening centrifuges and dewatering systems, announced in February that it has secured a contract with the New York City (NYC) Department of Environmental Protection to provide maintenance and repairs for eighty-three existing decanter centrifuges located in eight New York City wastewater treatment facility locations. Centrisys's contract was bid in partnership with Jett Industries, Inc.; a leading general contractor focused on constructing and modifying water and wastewater treatment facilities.

#### A WINNING ALLIANCE

"Aligning with Centrisys in the contract bidding process to support New York City's wastewater treatment facilities allowed us to bring all of our collaborative strengths to the table to ensure we provided recommendations that offer facility efficiencies and an innovative problem-solving approach," says



Kevin Miedreich, project manager with Jett Industries, Inc. "The cooperative arrangement allows our team to lean on our in-depth knowledge of facility processes and expedite lead times."

The NYC wastewater treatment facility locations included in Centrisys's maintenance and repair contract are as follows:

- Bowery Bay, Upper East River, Queens: four CP4-1 centrifuges
- Newton Creek, East River, Brooklyn: twenty-four BSC3114 thickeners
- Oakwood Beach, NYC Bay, Staten Island: four CP4-1.1 centrifuges
- Red Hook, East River, Brooklyn: two SC3-3 centrifuges
- North River, Hudson, New York: one BSC5-2 centrifuge
- 26th Ward, Jamaica Bay, Brooklyn: sixteen CP4-1 centrifuges
- Wards Island, Upper East River, New York: sixteen CS26-4 2PH centrifuges

• Hunts Point, Upper East River, Bronx: sixteen CS26-4 2PH centrifuges

#### A TALL ORDER

New York City manages fourteen wastewater resource recovery facilities that treat 1.3 billion gallons of wastewater daily. The treatment system consists of over 6,000 miles of sewer pipes, 135,000 sewer catch basins, over 495 permitted outfalls for the discharge of combined sewer overflows, and ninety-five wastewater pumping stations that transport to the wastewater resource recovery facilities located throughout the five boroughs. New York City's sludge is digested and transformed to biogas. After digestion, the leftover solids are then dewatered.

#### LOOKING TO THE FUTURE

Centrisys has built a remarkable relationship with the New York City Department of Environmental Protection as we have collaborated on significant projects together in recent years. In 2020, we announced the installation of thirty-two Americanmade CS26-4 Centrisys decanter centrifuges at New York City's largest wastewater treatment plants. We appreciate their trust in our team and look forward to further supporting New York City with our maintenance and repair expertise in the years ahead.

MICHAEL KOPPER is president and chief executive officer of Centrisys. Centrisys is a USA manufacturer of dewatering centrifuges, sludge thickeners, and provides global centrifuge service, repair, and parts for all decanter centrifuge brands. CNP, a division of Centrisys, supplies nutrient recovery and advanced biosolids treatment systems for phosphorus recovery and thermal hydrolysis processes For more information, visit www.centrisys-cnp.com.





WATER & WASTEWATER EOCUS

Photo courtesy of igus



Huber has developed an innovate wastewater treatment system that uses solar power to reduce sludge disposal costs and protects the environment.

### SOLVING SLUDGE WITH THE SUN

#### Wastewater treatment plants use solar process to trim costs

BY THOMAS RENNER

newly-designed wastewater treatment plant is using an age-old source in a unique application for wastewater treatment. The plant in Sanford, Florida, and several other installations throughout the United States, is using a "solar drying" process to reduce sludge disposal costs and support the environment. The process, which is increasingly used by operators of medium-sized and large wastewater treatment plants, includes solar dryers manufactured by Huber. The process extracts water from sewage sludge and significantly increases the percentage of solids.

"We had a very basic dewatering system where we were getting about 16 percent solids," says Anne Nelson, the lead plant operator at the Sanford plant. "With the Huber system we get about 75 percent solids, and it's very dry. The 16 percent that we got from the other system was not as dry, kind of like a gelatin mold. The solids from the Huber system are not quite soil, but it's very dry, it reduces the number of trucks we have to send out and is more easily used."

The Florida facility has a treatment capacity of 8.5 million gallons per day. It is similar in construction to a plant in Egypt that has been officially awarded by Guinness World Records as the largest water treatment plant in the world and the largest sludge treatment plant in the world with a capacity of 1.4 billion gallons per day.

While using energy from the sun is not a revolutionary idea, the largescale capacity is a recent technique that is gaining appeal in the wastewater treatment industry.

#### THE GREENHOUSE EFFECT

The Huber Sludge Turner Solstice<sup>®</sup> units work in greenhouses. The turner travels on rails and repeatedly rearranges the sludge on the ground. During the movement, the sludge is



dried by solar energy. At the end of the drying lane, the sludge turner picks up the dry granules in the tool that repositions the sludge during its forward movement. The dry material is relocated to a recess in the ground, then collected and transported to a container.

There are several benefits. Disposal costs are significantly reduced when sludge volume is reduced through drying. Depending on the size of the plant, costs in dealing with sludge can range anywhere from 40 to 60 percent of total plant costs.

Also, costs keep rising. A report in 2019 found a 5.2 percent rise in the cost of tipping fees, which is the charge levied upon a given quantity of waste received at a waste processing facility. Sludge is accepted at some municipal landfills, but many of them have reached capacity and are closing. More strict disposal regulations and escalating fuel and hauling costs can be curbed by solar drying.

The other significant benefit to solar drying is helping the environment by using solar energy. Solar drying provides the lowest energy demand of any type of sludge dryer. Fewer trucks transporting sludge also reduces carbon emissions.

The facility in Sanford includes a 410-foot-long drying field, which is 39 feet wide. The greenhouse is slightly larger, to accommodate loading, unloading, and maintenance areas. The dryer can accept 4,790 wet tons per year.

The system takes a solid mixture that is 78 percent moisture and water and 22 percent dry solids and converts it to 75 percent dry solids. Evaporation reduces the amount of wet tons that need to be hauled offsite to 1,405 tons per year.

The plant in Egypt along the Bahr El-Baqar drainage canal is similar to the Florida plant, but with much larger capacity. The canal is considered as one of the most polluted tributaries in the world. Industrial waste and sewage from Cairo and agricultural runoff, pesticides and fertilizers end up flowing into the drain. Water quality index scores range between 37 and 48, on the edge between poor and marginal.

#### POWERED BY ENERGY CHAINS

An important component to the Huber Sludge Turner Solstice units are energy chains manufactured by igus<sup>®</sup>. The company, based in Germany, runs its North American operations out of Providence, Rhode Island. The energy chains include the company's chainflex<sup>®</sup> cables, which provide reliable data transfer and energy supply for the sludge turners. The energy chains in the application in Egypt travel approximately 100 meters, while the Sanford system e-chain is nearly 140 yards, about 1.5 football fields.

"Energy chains are the best solution for cable guidance on long travels," says André Großer, Huber SE product manager. "It requires little room, protects the cable, and is easy to install and maintain."



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The Huber Sludge Turner Solstice® units work in greenhouses, and the turner travels on rails and repeatedly rearranges the sludge on the ground. During the movement, the sludge is dried by solar energy. The system takes a solid mixture that is 78 percent moisture and water and 22 percent dry solids and converts it to 75 percent dry solids.



our reliance on electric energy. We are developing the process and we are on the right track. In any project, we are concerned about the environmental impact and look for the best practices to protect our environment."

An important component of the Huber Sludge Turner Solstice® units are energy chains manufactured by igus. The energy chains include the company's chainflex® cables, which provide reliable data transfer and energy supply for the sludge turners.

The chainflex cables are also critical to the sludge turner. Three individual cores and a CFPE cable, all with a TPE outer jacket, ensure connection to the cable. Data exchange is with an igus CFBUS cable with a PUR outer jacket and those cables are designed specifically for use in energy chains. They also include an abrasion-resistant outer jacket and special interior stranding.

#### SAVIOR IN SANFORD

The solution with Huber's units helped Sanford solve a sticky situation. The

city near Orlando had been using a company that was using a gasification process to turn biosolids into an ash by-products.

When the company unexpectedly closed, it forced Sanford to find a new system and to pay \$10,000 per month to haul sewage biosolids offsite. The Huber system proved a more reliable and cost-effective operation.

"As a company that is working in the environment, we are always looking for solutions," says Großer. "We not only want to make water clean, but we also want to reduce

THOMAS RENNER writes on building, construction, engineering, and other trade industry topics for publications throughout the United States and Canada. Huber Technology provides state-of-the-art equipment for municipal and industrial water and wastewater treatment. The company's main focus is liquid/solid separation in general and headworks equipment in particular, offering a comprehensive line of stainless-steel equipment. For more informationn, visit www.huber-technology.com.

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MAINTENANCE & RELIABILITY



Oerlikon ta-C coatings are an excellent choice for components that are exposed to extreme operating forces over the long-term.

### UNIQUE COATING REDUCES FRICTION OF SLIDING CERAMIC, METALLIC, AND POLYMER COMPONENTS

Diamond-like carbon coating decreases the coefficient of friction of components to nearly zero

BY GAYE JACOBS

omponents used in water, lubricated, or submersed environments, face considerable tribological challenges that can ultimately affect performance and reduce the life of the larger system—particularly those that come in contact or slide against other parts. This process includes pump parts, mechanical seals, and highpressure valves manufactured often using ceramic substrates designed to survive wet, corrosive environments. Unfortunately, these substrates are also easily damaged due to high friction of sliding/mated parts due to a consistently high coefficient of friction (COF) when uncoated.

With that in mind, the goal is to keep the COF of sliding parts as close to zero as possible. The COF is the measure of the amount of friction existing between two surfaces. A low value of COF indicates that the force required for sliding to occur is less than the force required when the COF is high. Typical values for the COF when sliding is occurring between polished oiled metal surfaces, for example, is 0.1.

Fortunately, there are industrial thin film coatings available that can reduce friction to dramatically improve the life and performance of critical components. Such coatings, so called diamond-like carbon (DLC) coatings,



can increase the surface hardness of even hard, ceramic substrates while significantly decreasing their COF.

One coating in the DLC family, tetrahedral amorphous carbon (ta-C), has unique tribological properties for water environments that testing demonstrates can reduce the COF to levels that consistently approach 0.1 to 0.2, even in wet or dry running conditions. Best of all, the coating can be applied through experienced toll processors at a very low cost per part, increasing the performance and life of critical parts.

#### REDUCING FRICTION WITH SPECIALIZED COATINGS

Within the universe of wear resistant thin films, DLC coatings have emerged as the ideal solution for demanding physical applications where components are under high loads or subject to extreme friction, wear, and contact with other parts. In these types of environments, the high hardness of a DLC coating—along with a corresponding low COF—can prevent parts from pitting, galling, seizing, and ultimately failing in the field.

For many, DLC Coatings are hydrogenated amorphous carbon (a-C:H) coatings, but this is a misconception. Coatings within the DLC family can be highly engineered based on factors such as hydrogen content (hydrogenated or hydrogen-free), the selection of



For manufacturers of components often in contact with other parts and/ or submersed in water, innovative coatings are changing what is possible in the industry.

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#### MAINTENANCE & RELIABILITY



Oerlikon's industrial thin film coatings can reduce friction to dramatically improve the life and performance of critical components.

additional metallic and non-metallic doping elements, the presence of sub-layers, and the choice of deposition and bonding methods.

Together, these factors can be precisely controlled to create a broad range of thinly applied (typically 1 to  $5 \ \mu m$ ) DLC coatings with a hardness of 8 to 80 GPa.

Within the DLC coating category, the hydrogen-free formulations do not only provide very high hardness but also an extremely low COF in water environments. Reducing friction when components are sliding against each other is critical, particularly in boundary lubrication.

According to Dr. Oliver Jarry of Oerlikon Balzers, a company that produces specialized DLC coatings for components globally, the advanced ta-C coating Balinit Milubia has the best tribological properties for reducing COF in water environments.

With a typical hardness of 40 to 60 GPa, ta-C coatings are an excellent choice for components that are exposed to extreme operating forces over the long-term, such as shafts and seals, where friction can cause components to overheat or fail.

The ta-C coating is typically applied in a thickness of only 0.5

to 2µm using a method of physical vapor deposition (PVD) by arc evaporation. This produces ta-C, which has substantially higher abrasive wear resistance than a-C:H alternatives.

Because the coating can be applied at a temperature below 150 degrees Fahrenheit (65 degrees Celsius) unique even within the DLC family, it can be applied to thermally sensitive substrates such as polymers and elastomers that before now have been difficult to coat.

"Among all DLC coatings, Balinit Milubia provides the lowest friction coefficient possible compared to other materials and uncoated metals, ceramics, polymers, and elastomers in water environments. Even under dry running conditions, the ta-C coating can deliver a very low COF that approaches zero," says Dr. Jarry.

#### RESOLVING COATING CHALLENGES

The unique properties of ta-C coatings allow manufacturers to resolve some of the challenging issues for components made of ceramics, polymers, and elastomers including hydraulic pump parts, mechanical seals, and high-pressure valve components.

#### CERAMIC COMPONENTS

Pump, valve, and faucet components are often made of ceramics such as alumina and silicon carbide due to relatively low cost and superior corrosion resistance over metals in wet environments.

Since ceramics are already very hard, wear is not typically a major concern. Although the ta-C coating can increase the hardness of an alumina component from 2,000 Vickers to approximately 4,000, that is not the primary objective. Ceramics can still be affected by high friction, however, which wears down parts quickly and can increase internal operating temperatures to levels that can damage nearby components. In these cases, a ta-C coating can dramatically reduce the COF and associated thermal rise.

The coating also out-performed typical PVD coatings such as chromium nitride—another option designed to create an extremely hard, corrosion resistant surface—which averaged between 0.5 and 0.7 COF in the SRV test when applied to alumina.

According to Dr. Jarry, one potential application is coating ceramic seal discs used in most faucets and shower heads. During installation, grease is applied to facilitate faucet activation. Over time, the grease can gradually wash away, increasing friction during faucet activation and affecting precise flow and temperature control. This can affect customer reviews, given that smooth control and operation is considered a sign of quality for high end faucets.

In addition, faucet activation forces remain low even if assembly grease is washed out. The coating reduces lime deposition as well, which exacerbates wear and friction and can shorten the life of the product.

Another potential application is ceramic pump shafts and bearings, which are expected to perform reliably over the long term in corrosive conditions. When coated with ta-C, these parts approach a COF of 0.1, compared to nearly 0.5 uncoated.



Perhaps even more importantly, the COF is nearly the same under dry running conditions. This protects pump components like ceramic seals or O-rings from friction, thermal rise, and damage if an operator runs the equipment "dry."

Mechanical seals for centrifugal water pumps, for example, are often made of SiC. Typically, dry running mechanical seals or O-rings can "burn" them, causing failure and requiring premature replacement. Lowering the COF reduces the heat generation and allows longer dry running times without failures.

"In this type of situation, the coating essentially allows the pump to survive despite some misuse," explains Dr. Jarry. Less friction lowers the energy consumption as well, he adds.

#### POLYMER COMPONENTS

Unlike ceramics, polymers are relatively soft and quickly wear or are damaged in high contact, high friction applications. When the ta-C DLC coating is applied over a polymer substrate, it can provide a coating hardness of up to 50 GPa to increase component durability and lifespan. However, polymers are traditionally difficult to coat with DLC coatings.

"Polymer substrates have low thermal stability so can melt or deform at the higher temperatures that most PVD coatings require," says Dr. Jarry. "Fortunately, the ta-C coating can be applied at a temperature below 150 degrees Fahrenheit (65 degrees Celsius), which is low enough to avoid thermal deformation of most polymers."

Traditional coatings are also difficult to apply over an insulating substrate. With excessive friction, polymers tend to accumulate an electrostatic load that could cause severe damage if not safely discharged. As a solution, the ta-C DLC coating can attenuate or evacuate electrostatic discharge (ESD) on polymer substrates and also modifying its surface energy. The same process can be used to increase or decrease the wettability of polymers as required.



Oerlikon's unique coating reduces friction of sliding ceramic, metallic, and polymer components.

#### ELASTOMER COMPONENTS

Like polymers, elastomers are inexpensive substrates that are typically left uncoated because few technologies are suited for the task. Elastomer substrates generate high friction, which leads to energy and efficiency losses.

Tribology tests of an NBR elastomer coated with ta-C conducted by Oerlikon Balzers demonstrated that the COF remained near 0.1, despite altering the speed and load of the sliding/contacting parts. In contrast, the uncoated NBR exhibits COF values 10x higher, approaching 1.0.

One potential application is for sealing rings in motorbike fork tubes. Decreasing the COF can substantially reduce seal wear, while reducing stick/ slip conditions. The result for the rider would be superior performance and a smoother, more comfortable ride.

#### EXPLORING NEW OPPORTUNITIES

Dr. Jarry adds that manufacturers are increasingly directing intriguing applications during the testing phase of a coating in partnership with expert partners.

"During testing, a customer often develops an awareness of what the coating is capable of—we integrate that into next generation designs. This can involve modifying part shape, base materials, and other design elements," says Dr Jarry.

The bottom line for manufacturers of components often in contact with other parts and/or submersed in water is that innovative coatings are changing what is possible in the industry.

When a lower COF is required for mated or sliding parts, specialized PVD coatings can be applied in thicknesses of only a few micrometers at low temperature to further harden the surface and dramatically lower the coefficient of friction. Given the advances in hydrogen-free DLC coatings, ta-C is showing great promise in delivering the best tribological properties in boundary lubrication and water environments.

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, www.oerlikon.com/balzers/us/en/ portfolio/balzers-surface-solutions.



PLIMP SOLUTIONS



### LOWERING YOUR CARBON FOOTPRINT WITHOUT SACRIFICING EFFICIENCY

Hydra-Cell pumps reduce energy usage up to 50 percent for industrial sectors

BY PAUL DAVIS, WANNER INTERNATIONAL



o mark the new year, Wanner International has announced that it can reduce the total energy usage by up to a half for some industries that rely heavily on pumps for their processes. The company is focusing on the importance of reducing energy consumption in the wake of COP26, and wants to highlight that it is playing its part in making a more sustainable future a reality.

Wanner provides pumps for a range of industries across the globe, from oil and gas, through to food production, chemical, and pharmaceutical production. Of course, it can't on its own solve the carbon crisis, but what it is doing is examining every pump it manufactures, helping customers reduce energy usage by careful placement of Hydra-Cell<sup>®</sup> pumps, and squeezing carbon out of the system.

#### THE RIGHT PUMP FOR ENERGY EFFICIENCY

Choosing the right pump technology can have an effect on energy usage. The Hydra-Cell pump's true positive displacement action and minimal internal losses achieve high efficiencies from pump shaft to hydraulic power; this combined with the wide range of flow rate controllability ensures optimum energy usage. Alternative pump technologies with inherent internal losses, which get larger as internal parts wear, start to become lower in efficiency as the discharge pressure goes above 10 bar and only gets worse with increasing pressure.

Some of Wanner's Hydra-Cell pumps have been reliably operating in the field for a quarter of a century plus, which again frees resources that can be devoted into improving sustainability. Considering that some industries in which Wanner operates, such as oil and gas, are shifting heavily into renewables, the flexibility of the Hydra-Cell pump to handle many different liquids coupled with its high energy efficiency and reliability has a large role to play in reducing the carbon footprint.

Switch on your TV and you will see climate disasters around the world taking lives, homes, livelihoods, and destroying ecosystems. From soaring temperatures causing wildfires that ravaged Greece and Australia to unprecedented levels of rainfall that led to severe flooding in Germany and South Asia—around the world, everyone is being affected by climate change.

And everyone needs to be part of the solution. We are dedicated to enabling our customers to save energy, to save resources and we hope that with our leadership, they will follow this example across the whole of their supply chains.

#### LOW ENERGY CONSUMPTION FOR LOW CARBON FOOTPRINT

Globally pumps in the industrial sector represent approximately 25 percent of the energy usage, and in pump intensive industries as much as 50 percent. Choosing the right pump technology to optimize energy usage is critical. The environmental issue is now very important to all; optimizing energy usage has never been as important.

Compared to other technologies, the Hydra-Cell pumps true positive displacement pumping action and minimal internal losses achieve high efficiencies as measured from pump shaft to hydraulic output power. This combined with the wide range of flow rate controllability ensures optimum energy usage.

#### CONSTANT FLOW RATE INDEPENDENT OF DISCHARGE PRESSURE

The Hydra-Cell pumps minimal internal losses ensure a consistent flow rate. With no dynamic seals or packing these internal losses stay minimal during use, unlike pumps with internal dynamic seals. This is especially important when pumping liquids with suspended micron size solids.





Many industrial processes require a consistent and controllable flow rate to ensure the quality of the product produced and to optimize cost of production, especially with expensive chemicals. The steady state accuracy of the chosen pump must be very good and be consistent from day 1 to day 100.

#### PAUL DAVIS is Wanner

International's managing director. Wanner International prides itself in supporting customers, personally. With many years of pump and application experience, there is extensive knowledge available in the Wanner technical pump engineers and support network here to help customers at the end of the phone, no matter where they are in the world. For more information, visit **www.hydra-cell.co.uk**.



#### PUMP SOLUTIONS

### AT THE HEART OF THE LARGEST SMOLT FACILITY IN NORWAY

Recirculation pumps take on heavy-duty work

Five AHLSTAR A43-500 recirculation pumping units for brackish water.

#### **PROJECT DATA**

Fifty AHLSTAR and BE recirculation pumps (continuous duty) in water treatment loops. The dry-installed single-stage overhung pumps are equipped with semi-open impellers and single mechanical seals.

PUMPS	QTY	MATERIAL (DUPLEX)	FLOW (GPH)	HEAD (FT)	EFFICIENCY (%)
A43-500	30	A890 3A	285,305	15	88
BE325-2532	20	A890 4A	113,594	17	85

Five VUPX-0402 (602,312 gallons per hour at 10 feet of head) submersible propeller pumps (intermittent duty) for the emptying of fish tanks.

ordlaks is a Norwegian fully integrated company that produces, processes, and sells Atlantic salmon and rainbow trout worldwide. It has recently completed the building of a new smolt facility for fish up to 1 pound at Innhavet in Hamarøy municipality. This RAS (recirculating aquaculture system) fish farm is the biggest of its kind in Norway, with a special focus on smolt welfare. The landbased facility has state-of-the-art equipment for optimal biosecurity and sustainability. At the heart of the RAS process, all recirculation pumps were supplied by Sulzer.



#### THE CHALLENGE

The Innhavet RAS plant has thirtyfour fish tanks of different capacities (92,000 to 264,000 gallons) in five separate main sections. Each section is independent from the others and includes its own complete water treatment system in a semi-closed loop (98 percent recirculation plus 2 percent make-up water). The brackish water from the fish tanks first flows by gravity to a rotating drum filter for the removal of the main suspended solid particles. It then falls into an MBBR (moving bed biofilm reactor) for TAN (total ammonium nitrogen) reduction. After passing through a countercurrent degasser for the stripping of nitrogen and carbon dioxide, the treated water is finally pumped to some head tanks, prior to oxygenation and return to the fish tanks.

In each fish tank, the water is fully renewed every half an hour. The well-being of the smolts is highly dependent on a constant flow of water through the facility. The reliability of the recirculation pumps is, therefore, of paramount importance.

High overall energy performance of the RAS plant means a better environmental footprint and reduced operating costs. Consequently, the main components of the water treatment loops must have top-class efficiencies, particularly the recirculation pumps.

#### THE SOLUTION

As a long-term supplier of equipment (pumps and turbines) to other Nordlaks plants, Sulzer was involved at an early stage of the new project. In collaboration with the Momek Group, a large industrial service provider in Scandinavia, the pumps were carefully selected, not only to fulfil the requirements during the warranty period, but to run optimally and economically during the whole lifetime of the site. For the recirculation of the brackish water, fifty AHLSTAR and BE process pumps in duplex material have now been installed and are operating continuously. In addition, five VUPX submersible propeller pumps are used on intermittent duty when the fish

tanks are emptied during the transfer of smolts.

#### **CUSTOMER BENEFIT**

By choosing to work with a trusted partner, the client made sure to get fast and permanent technical support, in addition to the best products. The recirculation pumps have the following major advantages:

Extremely high hydraulic efficiencies that by far exceed the strictest energy regulations for water pumps. This means huge energy savings over time

### Wastewater motors are dependent on MCA and ESA technology



#### PUMP SOLUTIONS







Water treatment system process chart.

and smaller total cost of ownership, duty points close to BEP (best efficiency points), low rotation speeds, and rigid baseplates grouted in concrete. The pump units are working smoothly with minimized vibration levels. Superior-grade material is used for all wetted parts. For the choice of pump material in contact with brackish water, the long-term perspective favored duplex stainless steel rather



than 316SS. Duplex steels have better design strength than austenitic stainless steels, as well as higher corrosion, abrasion, and pitting resistance. In the end, maintenance costs and the risk of downtime are reduced.

Sulzer is a recognized supplier in the fish farm market, with innovative and proven pumping, mixing, and aeration solutions, and provides highly energy-efficient products with low life-cycle costs and the smallest possible environmental footprint. As a material specialist in a wide range of fresh water, brackish water, seawater, and brine applications, we can offer pumps in cast iron, 316 stainless steel, duplex, super duplex, SMO, etc.

Sulzer is a global leader in fluid engineering. The company specializes in pumping, agitation, mixing, and separation technologies for fluids of all types. Sulzer customers benefit from a commitment to innovation, performance, and quality and from a responsive network of 180 world-class production facilities and service centers across the globe. The Flow Equipment division specializes in pumping solutions specifically engineered for the processes of Sulzer customers. Sulzer is a market leader in pumping solutions for water, oil and gas, power, chemicals, and most industrial segments. For more information, visit www.sulzer.com.



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### RELIABLE, DURABLE ASEPTIC PROCESS PUMP MAKES KEY CONTRIBUTION TO SUCCESS

Ensuring maximum hygienic standards at DSM Nutritional Products

BY PIETRO PETTORUTO, LEWA NIKKISO



he Swiss subsidiary of Dutch company DSM Nutritional Products AG uses the spray drying method when producing vitamin and carotenoid powders for the pharmaceutical and food industries. The procedure uses pump technology to convey various emulsions into a spray tower, where they are dried into powder. But the feed and booster pump that was being used proved to be an uncertainty factor because the diaphragm required for the pumping process tended to tear when the pump was started up. Generally, such production interruptions can be corrected through immediate maintenance and repair work.

However, it is very expensive to replace a diaphragm or an entire system. DSM was in search of an alternative and finally made a find when they talked to the pump experts at Lewa Nikkiso Switzerland, who recommended a Lewa triplex process diaphragm pump for the spray tower application. The drive unit features a safe start-up mode that keeps the diaphragm located in the neutral position, and continuous regulation using an integrated monitoring system. Since the hermetically tight pumps are electropolished and CIP-approved, it is easy to fulfill the food industry's stringent hygienic provisions.

#### 100 PERCENT INTEGRATION

"Pump technology plays a central role in drying oil-in-water emulsions for the food and pharmaceutical industries. These emulsions contain substances such as vitamins, carotenoids, or polyunsaturated fatty acids as active ingredients," explains Natalie Ibald, plant manager of formulations at DSM Nutritional Products AG. "As part of the process chain, each pump is 100 percent integrated into the closed plant system. The pumps are used for conveying the mixtures into the spray tower."

With the previous system, the risk of unforeseen interruptions to this process couldn't be ruled out. As a result, the different emulsions could not be processed further. In other words, it was not possible to dry them into powder. The pump diaphragm was the reason: it was often too sensitive to withstand the stress placed on it when starting up the pump and would rupture. Replacing the diaphragm reduced the system's service life and sometimes meant that trouble-free operation could not be guaranteed.

#### FINDING THE RIGHT PARTNER

In the course of searching for a reliable alternative, DSM got in touch with the Swiss subsidiary of pump manufacturer Lewa.

"We were already familiar with Lewa Nikkiso Switzerland as a supplier of robust systems with long service lives in the SFP sector. To ensure trouble-free spray drying, we thought it would be smart to join forces with the experts from Lewa and come up with a design to solve the technical problems," says Ibald.

DSM is committed to continually improving its processes and investing in technology. This commitment, along with prior experience with the short service lives of the previous pumps, led DSM to place special focus on reliable function and a robust design during the project planning phase. The list of requirements also included a substantial number of stringent hygienic provisions that had to be fulfilled.

"Certain foods have provisions regarding microbiological purity that are many times more stringent than those for producing other food products," explains Ibald. "This meant that the new feed and booster pump had to meet these more challenging conditions and every type of contamination had to be ruled out to produce the widest possible variety of products on the system."

#### GUARANTEED SAFE START-UP OPERATION

After a visit at the company premises to consider the spatial and technical parameters, Lewa Nikkiso Switzerland recommended a type G3F triplex process diaphragm pump for the spray tower application. This pump features a completely secure start-up operation, since a spring continuously holds the integrated sandwich diaphragm located in a neutral position.

This protects the diaphragm against incorrect positioning and prevents it from being damaged while the pump is starting up, increasing system availability substantially. And the Lewa triplex is controlled using a pressure



#### ROYAL DSM: PARTNER PROFILE

Royal DSM is a global scienceoriented company that is especially active in the areas of nutrition, health, and sustainable living. DSM's mission is to improve the lives of all. Products and solutions from DSM address some of the world's biggest challenges while simultaneously creating economic, environmental, and societal value for all its stakeholders including customers, employees, shareholders, and society at large.

DSM delivers innovative solutions for the nutrition, animal nutrition, personal care and aromatics, medical products, environmentally friendly products and applications, as well as new mobility and interconnectivity.

DSM and its affiliated companies employ more than 23,000 people and generate an annual net turnover of approximately 10 billion euros. The company was founded in 1902 and is listed on the Euronext Amsterdam stock exchange.

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



#### PUMP SOLUTIONS

relief valve that is installed in the hydraulic part and can be configured for the specific situation. Therefore, the pump can be adapted to different operational situations in order to prevent any overloads that may arise. This ensures that the unit has a long service life and smooth regular operation for the entire system.

#### THE POWER OF DESIGN

In addition to the pressure relief valve and the spring control, the design of the diaphragm also plays an important role in ensuring reliable pump operation. The patented sandwich diaphragm consists of two separate PTFE diaphragms that are extremely long-lasting. They are connected to each other through positive interlocking during the discharge stroke and mechanical force-fitting during the suction stroke.

This makes the pump hermetically tight and effectively prevents external contamination. As an additional safety feature, the DPS monitoring system

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#### "Pump technology plays a central role in drying oil-in-water emulsions for the food and pharmaceutical industries."

 NATALIE IBALD | PLANT MANAGER OF FORMULATIONS DSM NUTRITIONAL PRODUCTS AG

from Lewa continuously monitors the condition of the diaphragm. The monitoring unit promptly displays any damage to the device that leads to increased pressure in the diaphragm space.

This makes it possible to carry out preventive maintenance and repair work before the diaphragm even begins to rupture and potentially contaminates the pumped fluid. Thus, it is usually unnecessary to switch the pump off right away, which means that neither the pumping process nor spray drying are negatively impacted to a significant extent. If damage to a diaphragm is detected, production can continue without any problems up to a planned maintenance stop. The components can then be replaced quickly and easily by releasing the cassette for the assembly.

#### ASEPTIC, FDA-COMPLIANT OPERATION

The hermetically tight design of the process diaphragm pump does more than just ensure reliable continuous operation. It is also a central component for fulfilling the stringent hygiene provisions that the spray tower application is subject to. The Lewa triplex maintains a hermetically tight space without dynamic seals, guaranteeing completely clean and aseptic production conditions. All pump heads that come into contact with the product are also electropolished, which makes it possible to ensure FDAcompliant pump operation.

Because the pump can be cleaned in place (CIP) using different alkaline and acidic agents and without prior dismantling, it is possible to meet the special requirements for baby food as well. The provisions for baby food are 1,000 times more stringent than those for other products in the food sector. Thanks to the hermetically tight design, electropolishing, and CIP cleaning, we were able to rule out any contamination of the pumped medium and clearly meet the required hygiene standard.

#### QUICK RESPONSE TIMES AND WELL-FOUNDED EXPERTISE

The first quote was received in June of 2018 and in September of the same year, DSM Nutritional Products AG placed an order for the triplex process diaphragm pump. In operation since April 2019, the pump has become an indispensable part of production at the plant in Sisseln.

"In every phase of the project, Lewa Nikkiso Switzerland demonstrated quick response times and wellfounded expertise, which made a key contribution to implementing the project successfully," says Ibald. "Our specifications with regard to quality, robustness, and hygiene were followed to the letter in this project. As a result, our production has become noticeably more efficient and reliable."

Lewa develops technologies and provides solutions for the vast array of applications among its customers. Its products are used mainly in the oil and gas industry, in gas odorization, in refineries and petrochemicals, as well as in the production of plastics, detergents, and cleaners. Additional application areas include the chemical industry, cosmetics industry, pharmaceuticals and biotechnology, food and beverage industry, and energy utilities. For more information, visit **www.lewa.com**.









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#### MOTOR SOLUTIONS

### GRINDING RELIABILITY FOR ATALAYA MINING IN SPAIN



### ABB's predictive maintenance software supports gearless mill drive on site

BY DIMITRIS FOTIADIS, ABB

Representation of the service agreement (LTSA).

ABB technology has helped Atalaya Mining to optimize mill availability and performance at Project Riotinto, Andalucía. Digital solution ABB Ability™ Predictive Maintenance for grinding is part of the service for the ABB gearless mill drive on site. ABB is following a long-term service agreement with Atalaya Mining, supported by a dedicated life-cycle manager to ensure optimized operations and continuous maintenance improvements.

#### LETTING THE WORKHORSE WORK

The mining company, which produces copper concentrates and silver byproduct at its Project Riotinto site in the Andalucía region of southwest Spain, uses an ABB GMD, the most powerful mill drive system on the market. It is considered as the "workhorse" for grinding operations, providing reliability and availability for processing plants such as Riotinto, which has a processing capacity of up to 15 Mtpa.

After its recent expansion, Riotinto mine increased its annual copper production target to approximately 60,000 tons per year. The ABB longterm service agreement with an ABB Life-cycle Manager has supported a production record at the mine in 2020 and production was approximately the same in 2021.

#### SAY GOODBYE TO UNSCHEDULED DOWNTIME

Through the service program, Atalaya Mining benefits from



life-cycle management to plan, coordinate, and execute services, including corrective, preventive, and predictive system maintenance with rapid response to emergency calls and an adaptive approach to meet modifications in production, maintenance, or shutdown schedules. This means minimizing the risk of costly unscheduled downtime, extending the life of installed systems, and optimizing process performance.

At the same time, ABB Ability Predictive Maintenance for grinding, a digital condition monitoring solution to maintain, assess, and analyze GMD systems and increase safety through continuous checks, has been deployed. It considers past and realtime data to anticipate maintenance requirements and to avoid unplanned production downtime.

WORKING AT HIGH EFFICIENCY Overall, the LTSA maximizes availability, optimizes asset performance, and facilitates safe operation of the equipment through a single-point-ofcontact, ABB's Remote Diagnostic Services, routine maintenance, and upgrades.

The combination of ABB GMD design, the continuous monitoring, and the use of ABB Ability Predictive Maintenance for grinding means that the system is working at its highest efficiency. ABB will continue to support Atalaya Mining through machine operation and routine maintenance over the long term.

ABB has provided more than 150 gearless mill drives to customers around the world over the last fifty years. ABB gearless mill drives draw on the ABB distributed control system, ABB Ability System 800xA and offer advanced mill control functions including frozen charge detection, frozen charge remover, controlled rollback, automatic positioning, and advanced monitoring. ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. ABB's Process Automation business is a leader in automation, electrification, and digitalization for the process and hybrid industries. The company serves customers with a broad portfolio of products, systems, and end-to-end solutions, including a top-rated distributed control system, software, and life-cycle services, industry-specific products as well as measurement and analytics, marine, and turbocharging offerings. ABB builds on its deep domain expertise, diverse team, and global footprint, and is dedicated to helping customers increase competitiveness, improve their return on investment, and run safe, smart, and sustainable operations.. For more information, visit www.abb.com.





SEALING SOLVITIONS



### THE SUITABLE SOLUTION FOR EVERY TESTING TASK

Wide range of leak and flow testers for various applications

BY DR. JOACHIM LAPSIEN, CETA TESTSYSTEME

Finding the right test instrument for a defined application requires specific expertise. CETA Testsysteme, as a manufacturer of leak and flow testing devices, has more than thirty years of experience in industrial testing technology. Compressed air and hydrogen are used as test media. Several thousand CETA test devices are used worldwide by well-known industrial customers in production lines of serial products.

#### EVEN THE SMALLEST LEAKS MATTER

Leak testing with compressed air can be used to test tightness against

liquids, as the viscosity of air is lower compared to liquids. Here the differential pressure test method is often used, in which the pressure drop due to leakage is measured as a pressure difference against a sealed reference volume. The minimum leakage rates detectable with this method are in the range of 10-3 mbar per liter per second. Would the leak only consist of a single hole, it would have a diameter of approximately 20 micrometers at a test pressure of 1 bar.

The size of the products tested for tightness ranges from smallvolume microswitches with a volume of 0.1 milliliter up to tanks of 1,000 liters capacity. Depending on the application, CETA leak testers with gauge pressure or differential pressure sensors are used. Available pressure ranges are between -1 and 30 bar up to 400 bar with the pressure rise method (for example, testing of injection valves).

#### THE NEW FRONTIER IN LEAK TESTING

Typical leak testing applications are testing on oil and water tightness. By using suitable methods, a wide variety of products can be tested: directly fillable products (for



#### THE VALUE OF PRECISION TESTING

Due to different test device technologies and a wide scope of pressure and measurement ranges, nearly every test requirement can be fulfilled by modern testing technology like those provided by CETA. An integrated control of the correct test device function guarantees a high standard of process reliability.

The test devices are used by the customers for quality assurance, quality control, and production assurance. The customers mostly come from the fields of automotive industry, medical technology, heating and air-conditioning industry, fittings, and household appliances industry. The scope of products also includes semi-automatic test stands.

example, housings, gear covers, containers, and lights), objects whose internal and external tightness must be ensured (for example, ball valves and gears), components with pressure compensation elements (membranes), as well as sealed test parts (for example, sensors, micro assemblies, and watches).

For the detection of smallest leakages in large-volume test parts, leak testing devices with calorimetric mass flow sensor and various measuring ranges (up to 600 millimeters per minute) are used. Here, the mass flow caused by the leakage is measured directly.

Very low leakage rates down to 10 mbar per liter per second (equivalent to a hole diameter of approximately 0.1 micrometer at 1 bar test pressure) can be detected with hydrogen leak testers. The patented and highly sensitive method is based on the detection of gases or vapors escaping from the test part in the case of leakage. This method detects forming gas (5 percent hydrogen and 95 percent nitrogen), alcohols, solvents, and generally volatile organic gas or vapor mixtures. These are either present in the test part itself or are supplied beforehand as tracer gas.

#### TODAY'S TECHNOLOGY CAN HELP

In addition to leak testing, there are products that are tested for flow.

With the CETA flow testers, a range from 3 milliliters per minute to 200 liters per minute can be measured with different laminar flow elements. Typical products of which the flow rate is tested are pipes, cooling channels, valves, exhaust systems, and membranes.

The CETA testers are usually integrated into automated series production lines. A large number of



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



SEALING SOLUTIONS



common industrial interfaces are available for the connectivity. Wellknown customers from the automotive industry, e-mobility, fittings, heating and air conditioning, medical technology, packaging, and appliance industries use the CETA test devices for quality assurance and to secure production.

#### THE LEARNING NEVER STOPS

But there's more to today's leak detection and prevention than just the equipment. Valuable insight can be shared from peers in the industry. For example, beginning this year, the CETA test device program, which includes leak test devices and flow test devices, has gone online with virtual seminars free to the public.

In order to be of the most benefit to the largest number of end users, the introductory online seminar will give an overview of the leak detector series and some application examples will be presented:

- CETA leak detectors
- Measuring principles (overpressure, differential pressure, mass flow)
- Schematic structure
- Leak tester series CETATEST XS and CETATEST 715 with overpressure sensor
- Leak tester series CETATEST 515 and CETATEST 815 with differential pressure sensor
- Leak tester series CETATEST 615 with mass flow sensor applications

During the introductory seminar, the test medium compressed air is mainly used, but there are different measuring methods for leak testing, which are covered by different product series.

#### INNOVATION BUILT ON EXPERIENCE

CETA customers appreciate the longevity and the high quality of

the test equipment, they honor the on-time delivery, the many years of experience and the high level of competence in solving test tasks and handling projects. Due to the high level of customer orientation, it is increasingly evident that CETA is involved at a very early stage of product development.

The company is certified according to DIN ISO 9001 and the calibration laboratory (D-K-19566) is accredited as a DAkkS calibration laboratory (according to DIN EN ISO/IEC 17025) for the measurand pressure up to 60 bar (also for on-site calibrations). The CETA test instruments are quality products and are delivered with a warranty of three years, with the optional extension to five years. The decision as to which test method is suitable depends on many factors, such as the special properties of the test part, the test parameters, the production cycle, and the specifications for measuring equipment capability.

Due to many years of experience in the implementation of testing tasks, combined with own product development, CETA advises its customers comprehensively in finding the optimal solution. These added values distinguish CETA as a solution partner for industrial testing tasks.

DR. JOACHIM LAPSIEN is sales manager for CETA Testsysteme GmbH. CETA Testsysteme sees itself as a solution partner for industrial leak measurement technology and has been manufacturing physical measuring devices for industrial leak testing and flow testing applications for more than thirty years. CETA customers come mainly from the automotive industry; medical technology; the fittings, air conditioning, and household appliance industry; the packaging industry; and e-mobility. CETA measuring devices are used by customers for quality assurance, quality control, and production safeguarding, even in larger production plants. For more information, visit www.cetatest.com.



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-Shamsul Nahar Awang, Principal Engineer, ATPS 2018 Delegate



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#### FEATURED PRODUCT

MODERN PUMPING PRODUCTS

### SEEPEX

BRAVO H

he SEEPEX BRAVO H is a skid mounted metering pump solution. It is suitable for all industries in applications where low pulsating and accurate metering of chemicals is a priority. The design utilizes SEEPEX's Intelligent Metering progressive cavity pumps on a plugand-play skid mounted system that includes piping, drives, and system control and calibration equipment, all in one compact unit.

#### SUPERIOR PROCESS CONTROL

The progressive cavity pump technology provides laminar flow and a high degree of accuracy in chemical dosing applications. These key characteristics help reduce chemical usage, provide accurate dosing for line injection, and maintain necessary chemical levels without over or under feeding.

#### FEATURES AND BENEFITS

- Less chemical use due to minimal pulsation
- Accurate, repeatable flow
- No vapor locking
- NSF/ANSI 61 certified progressive cavity pumps
- Single source for pumps and controls
- Quenchless seal design
- Low total cost of ownership
- Simplified design reduces installation and operating costs

The BRAVO H is the horizontal version of the SEEPEX BRAVO V. The horizontal orientation of the pumps reduces the required static head for



operation, lowers the total unit center of gravity, and allows for a variety of seal options, including a quenchless design. This new design streamlines the pipework and provides a robust skid base to simplify installation and provide additional mounting options.

The BRAVO H is available in simplex, duplex, and triplex configurations with any SEEPEX metering pumps with variable frequency drives. Standard voltage is single phase 1/60/115. Additional options include touch control, lead/follow protocols, flow meters, pressure gauges, and

For more information, visit

www.seepex.com

available transformers for 480 or 600 VAC supply.

#### Simplified System Design

• Reduces initial and operating costs while increasing process dependability

#### Modular

• Scalable, standardized modules for easy future expansion

#### **Reduced Chemical Usage**

 Minimal pulsation and accurate, repeatable flow



#### ASHCROFT

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Ashcroft introduces a new safety feature to one of its popular and trusted high-purity pressure gauges. The Ashcroft 50-millimeter HPS high-purity pressure gauge with Reed Switch is ultrasonically cleaned to provide exceptional quality and reliability in ultrahigh purity gas delivery systems. The Reed Switch capability provides an additional safety feature through actuating an internal switch that triggers an alarm or a process condition change. It's an ideal choice for reducing installation costs and providing an added space reduction benefit. For more information, call 800.328.8258 or visit **www.ashcroft.com** 





#### **KYOCERA AVX**

9155-020 SERIES BOARD-TO-BOARD BATTERY CONNECTORS

Like the rest of the 9155 Series product family, the new 9155-020 Series 1.27-millimeter-pitch battery connectors feature ultra-robust and -reliable gold-plated beryllium copper (BeCu) contacts proven to establish and maintain high-integrity electrical connections in harsh application environments. The new 9155-020 Series is currently available in two-, three-, four-, and five-way variants. Two- and three-way variants are rated for a full 3A per contact, while four- and five-way variants are rated for 2A per contact, and all four immediately available part numbers are rated for 400VAC. For more information, visit **www.kyocera-avx.com**.

#### **DENIOS US**

#### POP UP FLOOD BARRIERS

New passive Pop Up Flood Barriers from Denios US automatically engage at the first flow of water, protecting buildings and their contents from damaging floods and spills. This unique FM-approved design is fully automatic and requires no external power source or compressed air supply. Flexible design allows installation on inside or outside of exterior doors, with widths available up to 12 feet. Constructed of solid welded stainless steel for chemical resistance and long service life, this self-contained one-piece design is factory adjusted and lubricated, and easily installs in existing doorways. For more information, visit **www.denios-us.com**.





#### MADISON CHEMICAL

PROCLEAN CIP ACID

Madison Chemical ProClean CIP Acid is a concentrated, low-to-moderate foaming blend of acids and surfactants which penetrates and removes films, oxide, milkstone, and other soil from dairy and food processing equipment. This NSF registered product is ideal as an acid cleaner (A3) on all surfaces in and around food and beverage processing areas and is not intended for direct food contact. It can be used in most circulation systems to clean tanks, pipes, and equipment-in-place. Pro-Clean CIP Acid is used periodically to remove films, oxide, and scale by manual application. For more information, visit **www.madchem.com**.



#### MODERN PUMPING PRODUCTS

#### **BELL & GOSSETT**

ECOCIRC VARIABLE SPEED ECM SMART CIRCULATOR

Bell & Gossett, a Xylem brand, launches its new ecocirc 20-18/ecocirc+ 20-18 Variable Speed ECM Smart Circulator. The newest generation variable speed ECM smart circulator, ecocirc 20-18, provides a highly efficient product for both heating and cooling as well as potable water. The ecocirc+ 20-18 model comes with additional premium features such as Bluetooth communication, allowing wireless connectivity directly to a smartphone or tablet for remote access control. The ecocirc 20-18 works for most residential systems and potable water systems, including heating and cooling systems, residential buildings, and domestic hot water systems. For more information, visit **www.bellgossett.com/ecocirc2018**.





#### MURRELEKTRONIK

M12 DATA CABLES, POWER CABLES, AND FIELD WIREABLE CONNECTORS

New Murrelektronik data cables are high-flex shielded Ethernet Cat5e cables offering various connector styles, including D-coded M12 to M12, M12 to RJ45, RJ45 to RJ45, and M12 to pigtail. These cables are flame-retardant and chemical resistant with a tough TPE (thermoplastic elastomer) jacket for typical industrial applications. A selection of RJ45 IDC field wireable connectors and adapters have also been added to provide custom terminations for specific applications. Supporting Cat5e and Cat6a Ethernet with a variety of cable outlet options, these connectors and adapters are an easy solution for complex field-wiring needs. For more information, visit **www.murrinc.com**.

#### INTELLITECH

#### I-FILL MICRO PUMP

When pharmaceutical manufacturers or specialty chemical processers need to automate R&D, lab, or production filling of small volumes of high-value product with exceptional accuracy, Intellitech's i-FILL Micro pump is designed for the job. It is the latest addition to the company's i-FILL family of precision liquid dispensing pump technology and single-use systems. To avoid wasting any highvalue product, which can take months to formulate and be worth thousands of dollars per ml, the device is designed to pump dry and does not drip between dispensing batches. This eliminates product loss at the end of a batch run. For more information, visit **www.intellitech-inc.com**.





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These panel meters feature a programmable 40-segment curved bar graph display that provides an instant visual representation of an analog meter. In addition, they have a large four-digit readout, dynamic backlight color, customizable messages, and alarms to alert operators when a parameter is out of range. The updated free configuration software includes ten alarm points, a twentypoint non-linear conversion table, and better scaling. These panel meters come with a three-year warranty and are UL listed, CE marked, and RoHS compliant. For more information, **www.trumeter.com** 



#### **REGAL REXNORD**

MARATHON GLOBETROTTER AC MOTORS

The new Marathon Globetrotter motors are high-quality three-phase general-purpose motors that can be controlled by an inverter and are rated up to 200 horsepower. Globetrotter motors are offered in open-drip-proof enclosures and rolled steel TEFC enclosures, as well as models in a cast-iron enclosure rated for areas classified as hazardous locations. A new series of three-phase permanent magnet AC (PMAC) motors, the Marathon SYMAX, can only be powered and controlled by a VFD but provide improved efficiency even at lower speeds and partial loads. For more information, visit **www.regalrexnord.com**.





#### LS ELECTRIC AMERICA

L7S BRUSHLESS SERVO SYSTEMS

LS Electric servos systems provide extremely accurate motion control and include the most requested features—setup wizards, auto-tuning, built-in indexer, and more—in an extremely cost-effective package. The L7S family of brushless servo systems is fully digital and capable of covering a broad range of motion control applications. There are five standard servo motors that can be operated in combination with one of two standard servo drives. Setup is easy using the built-in keypad/display or the free DriveCM PC-based software. For more information, visit **www.lselectricamerica.com**.

#### DINKLE INTERNATIONAL

#### 0229 SERIES CONNECTORS

These connectors are compactly designed for installation in constrained spaces, and they are available in mating plug designs with various pin counts of up to forty poles. They are suitable for making high density connections, and I/O wiring connections to controllers. The standard configuration is for inline splicing, while other configurations allow affixing the connector to a surface with screw flanges, self-locking tabs, or lock-and-release levers. Easily operated flange latch designs ensure user-friendly and reliable connector mating. For more information, visit **www.dinkle.com**.





#### ELECTRO STATIC TECHNOLOGY

AEGIS SHAFT GROUNDING RINGS

AEGIS Shaft Grounding Rings have been made standard equipment on the Baldor-Reliance Food Safe line of motors. These rings protect motors by channeling VFDinduced bearing current safely to ground. Continuous circumferential rows of conductive microfibers, embedded securely in the ring's patented AEGIS FiberLock channel, completely surround the motor shaft and provide millions of discharge points for harmful shaft voltage. This unique design creates the path of least resistance that effectively diverts current away from the bearings to ground. The microfibers themselves are specially engineered for exceptional conductivity and flexibility to minimize wear and prevent breakage. For more information, visit **www.est-aegis.com**.



### LOOKING TO THE SKY FOR A MORE SUSTAINABLE EARTH

Satellite and AI-powered platform seeks to supercharge land surveying



EFFICIENCY POINT



Abhishek Singh

iDash, a leading provider of satellite and AI-powered operations, maintenance, and sustainability platforms, has recently launched its Intelligent Sustainability

snek Singn Stephe

Management System (ISMS) to enable customers to meet biodiversity net gain standards (BNG) and increase cost savings by eliminating frequent land surveys that are currently performed manually. Below, Abhishek Singh, CEO of AiDash, and Stephen Marland, director of innovation at AiDash client National Grid Partners, discuss what this means for the future.

#### **MPT**: How did the Intelligent Sustainability Management System, or ISMS, come about?

**ABHISHEK SINGH:** AiDash developed ISMS over a nine-month period, working closely with the National Grid Partners Innovation team. Organizations with large landholdings, as National Grid and other utilities, energy, water, and wastewater companies, face the challenge of using traditional on the ground surveying methods to accurately map the land type and understand and measure the biodiversity level of each habitat. The cost and process complexities of using these methods can often hinder the implementation of natural capital enhancement plans for progressive, environmentally conscious organizations.

#### MPT: What need do you see ISMS fulfilling in this market?

**STEPHEN MARLAND:** At National Grid, we are committed to improving the environmental value across our sites in the United Kingdom by 10 percent by 2026, from a natural capital and biodiversity baseline. It's a crucial step in helping us achieve our regulatory obligations and enabling us to make our contribution towards addressing the biodiversity crisis and climate change.

**ABHISHEK SINGH:** The United Kingdom's Environment Bill legislating the BNG, when approved, would further

strengthen the planning powers in England mandating at least the 10 percent net gain in biodiversity for all new developments and raise the imperative of land sustainability across many sectors. However, in a recent survey, 50 percent of utility and energy executives said increased process complexity is a hindrance to meeting sustainability goals.

#### MPT: How does ISMS fit into larger sustainability goals?

**ABHISHEK SINGH:** Sustainably responsible organizations are struggling to find integrated operations platforms that can help them stay on top of their goals and meet the regulations within their sectors. Existing tools and techniques lack the ability to analyze historical data and make data-driven environmental improvements. Our new platform solves this problem.

The ISMS "Land" module would help customers reduce laborious fieldwork through the AI-backed image analysis for systematic mapping, planning, and assessing land enhancements, and quantify biodiversity to plan sustainable land development and restoration initiatives based on the environmental value of varying habitats. The GHG emissions are measured across sources like well pads and gas pipelines through the ISMS "Air" module.

**STEPHEN MARLAND:** Collaborating with AiDash's satellite-powered Intelligent Sustainability Management System could enable us to make environmental surveys and audits, relatively seamless, while saving weeks of manual in the field work. This means we could efficiently leverage repeatable and transparent satellite data to design optimal strategies for enhancing the biodiversity across large areas of non-operational National Grid land in

the United Kingdom and regularly monitor improvements while reallocating internal resources.

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









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