

The background is a light blue technical drawing of a complex industrial machine, possibly a pump or engine. It features various components like gears, shafts, and housing parts, all rendered in white line art. A large, wireframe sphere is visible in the upper right corner.

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A NOTE ON THIS ISSUE:

Welcome to the MPT for the month of March.

Whether made from almonds or oats, plant-based drinks are more popular than ever, which has placed a need for increased sanitization and efficiency on a growing scale. In this month's Case Studies section (pg. 14), Yenni Maelianawati of HRS Heat Exchangers shares how one dairy producer has expanded its production capacity for plant-based drinks with the installation of an HRS DSI Series pasteurizer.

In this month's Water & Wastewater Focus, we see how the burden of water treatment is moving away from the centralized treatment plants and further upstream to the production facilities, which means innovative, localized solutions are a growing sector of the market. Kurita America's Daryl Mandoza explains why developing a holistic roadmap for your water treatment matters (pg. 16).

Also in this issue, Merritt Gurley and Chandrakant Isi of Hubs kick off an exciting three-part series on supply chain resilience—what it is and why it matters (pg. 20). Supply networks drive the world's economies. Not only that, we are dependent on global supply chains for access to everything from food, to medical equipment, to energy. As this series will demonstrate, a resilient supply chain is prepared for unforeseen disruptions, able to react and recover fast, and emerge stronger after the event.



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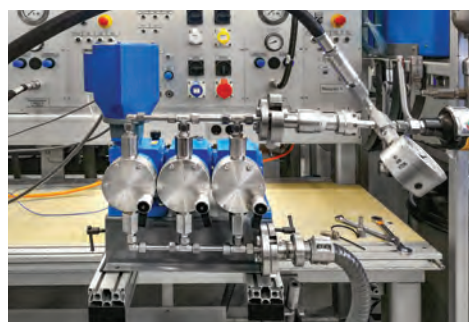
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SORCIA MINERALS AND SINOLITHIUM MATERIALS JOIN FORCES FOR NEW PLANT CONSTRUCTION

Sorcja Minerals, a specialist in the extraction and transformation of high purity lithium, announces a strategic partnership with Sinolithium Materials, a Chemphys Group affiliate specialized in the design and engineering of a state-of-the-art patented lithium hydroxide processing technology, with a customer approved product quality.

Sorcja Minerals who recently announced a \$350 million investment toward the development and construction of battery grade lithium hydroxide processing plants in Europe and South America, is further expanding its projects thanks to this key alliance. Sinolithium is set to provide the chemical technology necessary to the transformation of "battery-grade" lithium hydroxide within conversion plants in Europe, Chile, and Argentina.

Daniel T. Layton, CEO of Sorcia Minerals, says, "We could not be more excited to have a technology partner with decades' long history of producing battery-grade lithium carbonate and hydroxide. This is a partnership that has come to fruition after several years of discussions and work together."

Alison Dai, director of Sinolithium Materials, says, "We are very much looking forward to working with Sorcia to support the development of Europe's battery-grade lithium hydroxide supply chain."

AESOLUTIONS ANNOUNCES ACHIEVEMENTS FOR 2022 AND PLANS FOR 2023

Consulting, engineering, and systems integration company, aeSolutions announces company milestones achieved and overall performance for 2022. The company's achievements included the launch of two new lines of business, a year-over-year growth of 12 percent, several key hires and promotions, and an increased focus on employee recruitment and development.

"In 2022, aeSolutions continued to position itself to better serve our clients and partners," says Ken O'Malley, president of aeSolutions.

The new Plant Protection Systems business was created by combining several existing service lines under one senior leader. The new Migrations and Upgrades business was established. This team guides clients to develop phased project road maps that minimize or eliminate the interruption to production and deliver upgraded, future-capable systems.

In 2023, aeSolutions will continue to strive to be an employee-centric company with a primary purpose of supporting each stakeholder in the pursuit of their fullest potential. As a company, aeSolutions believes that client success can only come from a supported, valued workforce.



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ABB AND HYNAMICS COLLABORATE TO LOWER HYDROGEN PRODUCTION COST

Hynamics has signed an agreement to collaborate with ABB and test the ABB Ability OPTIMAX for green hydrogen energy management system (EMS), which was launched to market in November 2022, across Hynamics' plants to help optimize electrical costs of hydrogen production by up to 16 percent, according to ABB modelling.

In order to optimize production costs for low carbon and renewable hydrogen, the performance of the electrolyser process, which uses electricity from renewable sources to split water molecules into hydrogen and oxygen, can be improved.

ABB Ability OPTIMAX supports this by serving every aspect of a hydrogen plant lifecycle, from simulation at design and engineering phases to real-time monitoring of energy consumption when in operation. ABB Ability OPTIMAX is already available for five other industrial applications.

"With complementary areas of expertise, the cooperation between ABB and Hynamics will enable us to accelerate the deployment of hydrogen projects on an industrial scale," says Christelle Rouillé, general manager of Hynamics. "The integration of ABB's world-class power management system is a necessary step to improve the performance of the water electrolysis process."

DANFOSS SEEKING NOMINATIONS FOR ENVISIONEER OF THE YEAR AWARD

Danfoss is now accepting entries for its fourteenth annual EnVisioneer of the Year award competition. Launched in 2010, the competition recognizes North American original equipment manufacturers (OEMs), building owners, municipalities, contractors, consulting engineers, system integrators, and end users that 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, 2023. 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 Pro Refrigeration, Inc.; 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, read about previous winners, or find information on how to submit a nomination, visit the Danfoss website.

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LOAD CONTROLS ANNOUNCE NEW PUMPING CENTER OF ENERGY EXCELLENCE

Load Controls, Incorporated announce that they have implemented a state-of-the-art pumping research environment at their Sturbridge, Massachusetts, headquarters. As part of a commitment to extend their leadership in motor and pump power sensing, Load Controls is teaming up with the UMass Water and Energy Technology Center to research the roles of energy, power, and motor quality in industrial pumping. This research center will augment an ongoing project the two teams have implemented to monitor and track energy usage of the pumps and wastewater treatment mixers deployed at the WET center and Town of Amherst Wastewater Treatment facility.

The pumping environment includes dedicated research personnel as well as the installation of a fully instrumented pumping system that includes sensors to monitor motor power, pressure, flow and vibration, as well as gateways to send power, quality metrics, local and cloud-based software for analysis.

"Our customers consider us the subject experts in the intersection of industrial pumping and motor power. This research environment will allow us to develop new insights into pumping efficiency, motor and pump failure prediction and power quality analysis," says Mike McClurg, president of Load Controls.

SOUTHWESTERN SCALE ANNOUNCES EXPANSION INTO TEXAS

Southwestern Scale Company Inc. announces it has opened a new office in the Dallas-Fort Worth metroplex to boost efficiency and services to the Lone Star State. The Phoenix-born business is in its seventy-fifth year and has been a major player in the American Southwest scale industry for decades.

Mark Murdza, chief business development officer, says that the expansion is a significant step for the company: "Opening operations in Texas is a momentous occasion for Southwestern Scale. We have invested tremendous time and effort into strengthening our business model, culture, and presence in the markets and it was time to share that with the great state of Texas."

The Fort Worth-based office will be managed by Shane Irvin, one of the operation's newest employees. On joining the business in this new capacity, Irvin remarks, "I couldn't be more excited to be part of the Southwestern Scale team as we open our new location in Fort Worth, Texas." He adds, "We look forward to providing people in the Lone Star State with solutions to their weighing applications for decades to come."

Last year, the company was recognized as SHARP (Safety and Health Achievement Recognition Program) certified. ■



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2023 WQA CONVENTION AND EXPOSITION

Seize the momentum of the water treatment industry

The Water Quality Association is the leading voice of the residential, commercial, industrial, and small community water treatment industry, representing more than 2,500 manufacturers, suppliers, and dealers worldwide. The 2023 version of its annual gathering, the WQA Convention and Exposition, is being held April 18 through 20 in a brand-new venue, the Caesars Forum in Las Vegas, Nevada. In addition to the traditional event programming, this year's convention will include the sixth annual WQA Business Boot Camp, the new PFAS Symposium, and the RO Sizing Workshop—all events of unique interest to water treatment professionals.

KEEPING UP WITH THE TIMES

The WQA Convention and Exposition provides valuable education sessions,

from the latest updates on lead and PFAS to instructive business operations training sessions on how to manage through chaotic times. Network with industry peers, learn from the pros.

The WQA Convention and Exposition brings together the people who matter—dealers, manufacturers, suppliers, consultants, and others who want to meet people at all levels of water treatment. The expansive exhibit floor features companies from across the nation and around the globe. This is attendees' chance to share their stories and learn from those whose experience and expertise will prove invaluable to success.

CONNECT AND LEARN FROM THE BEST

At the WQA Convention and Exposition, attendees can choose from

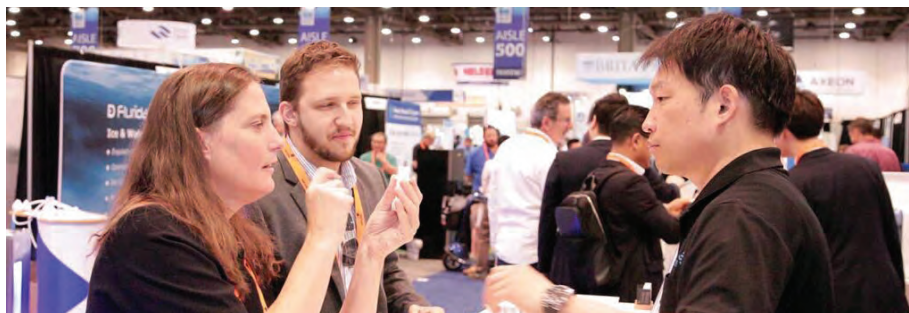
more than thirty hours of education sessions and an exhibit floor filled with the latest technology as they rub shoulders with the best minds in the water treatment industry, meet new friends, and renew old acquaintances.

Also, WQA's Business Boot Camp gives attendee's exclusive, intensive, personal training to help seize the momentum with new marketing and financial tools. WQA's Business Boot Camp is a day set aside for dealers to step away from working in their business to work on their business. Attendees will have access to rich interactive content focused on marketing and finance, learn critical business skills they can use upon their return to work, and hear from experts in the field while learning from those in the trenches.

BUSINESS BOOT CAMP: UP CLOSE

The WQA Convention and Exposition offers four different courses, each zeroed in on a specific aspect of business success.

- **Boosting Your Business with High Standards:** Want to take your business to the next level without purchasing any new equipment, hiring additional staff, or launching a new marketing campaign? Develop high ethical standards that customers can trust. By learning, applying, and promoting WQA's Code of Ethics, member companies stand out from the competition simply by always doing the right thing.
- **Comprehensive Marketing:** Are you missing the big picture? Don't let the array of social media



AT A GLANCE

WHEN: April 18–20, 2023

WHERE: Caesars Forum, Las Vegas, Nevada

WEBSITE: www.convention.wqa.org



tools and advanced marketing technology distract you from the tried and true: A fundamental approach to marketing drives impact and aligns your team. This session will detail how owners, sales representatives, and everyone in between can work together to build a marketing plan that informs your community that you are their resource for better water.

- **Marketing Benchmarks:**

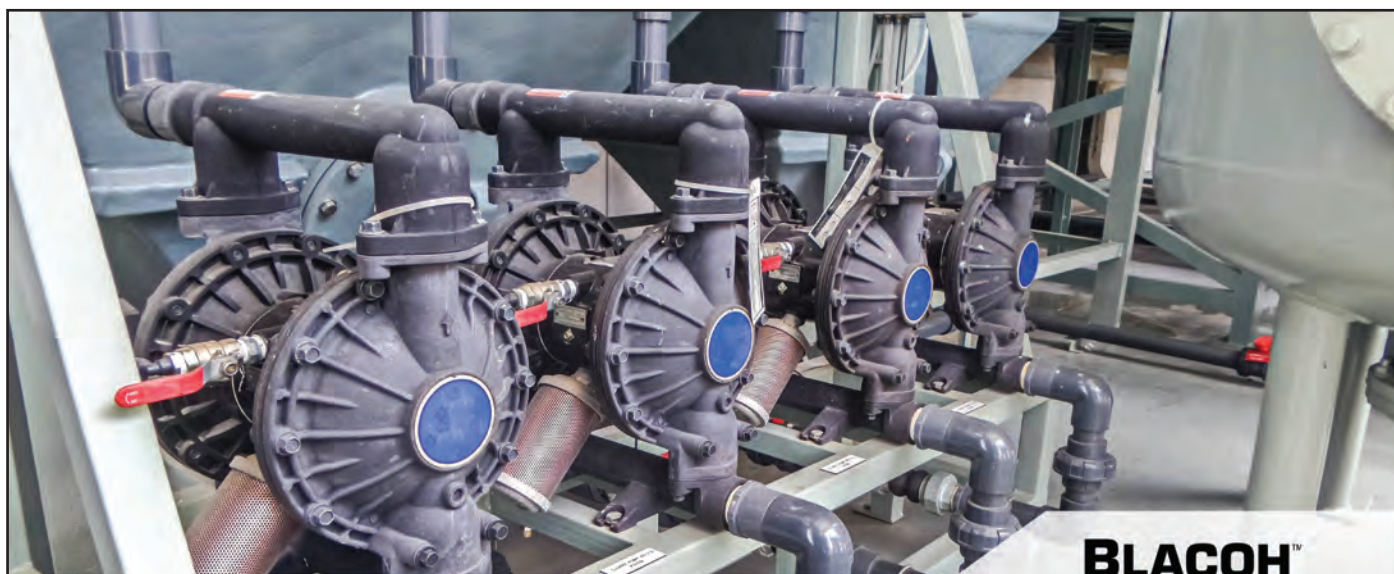
When companies set and track marketing benchmarks, they too often focus on symptoms instead

of underlying challenges. This session will teach you what to measure, how to measure, and how to use that information to make strategic decisions to maximize your return on investment. Do you know how many leads are coming in, where they are coming from and what happens to them? What is your cost per lead? The answers may surprise you.

- **Financial Data Points:** Is your money working for you? The measure of a company's health is found in its financial data. This session will detail the top

financial data points that every business should use to guide the profitability and future of their business. Whether you are the owner or office manager or even if you outsource your accounting needs, you must understand how the process works. No one should be in the dark regarding the finances of their business.

These intensive sessions could be the first step to launching the next wave of water treatment pioneers. Attendees will want to make the most of each. ■



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An HRS MI Series heat exchanger is used to cool the processed material after direct steam injection.



DIRECT STEAM TECHNOLOGY EXPANDS PRODUCTION CAPACITY

As demand for plant-based drinks rise, so does the need for reliability

BY YENNI MAELIANAWATI, HRS HEAT EXCHANGERS

A leading Israeli dairy producer has expanded its production capacity for plant-based drinks with the installation of an HRS DSI Series pasteurizer as part of a new production facility to process raw ingredients. Before this the company had to import part-processed products from an associated facility in Europe.

The client is one of the largest dairy and food companies in Israel

and having previously brought in plant-based drinks in bulk from an associated European company for bottling, in 2021 they invested in a new production line to allow them to process raw materials (such as oats, soybeans, coconut, and hazelnut) in-house as part of an expansion of their dairy alternatives business. Consequently, the new production facility includes many elements

including grinding, extraction, and bulk supply for bottling elsewhere. The HRS DSI (Direct Steam Injection) forms part of a complete UHT (ultra-heat treatment) system supplied by HRS for integration into the new production facility.

FITTING INTO THE FOOTPRINT

One of the challenges was the space available for the UHT portion of the

production facility. HRS was able to design a complete, cost-competitive heat treatment solution based around the HRS DSI and other heating and cooling technologies which was skid-mounted to facilitate installation and commissioning in the available space.

Direct steam injection provides a number of advantages over traditional UHT systems based on heat exchangers, particularly when it comes to the viscous nature of plant-based “milk” drinks. The biggest advantage is in terms of speed, with direct injection taking a fraction of the time to heat (and then cool) the product compared to other methods of pasteurization such as indirect heating using heat exchangers. This matters as the faster the product is heated and cooled, the less impact the heat has on the product—in the case of plant-based drinks this can include discoloration, caramelization, and the introduction of off-tastes.

HANDLING SUDDEN, HIGH TEMPERATURES

“With direct steam injection you get a sudden and immediate increase in temperature,” explains Francisco Hernández Ortiz, food business development director at HRS Heat Exchangers. “We have standard pre-heating phase using an HRS MI Series heat exchanger which takes the product to 176 degrees Fahrenheit



Direct steam injection provides a number of advantages over traditional UHT systems.

(80 degrees Celsius), and we then inject the steam which immediately increases the product temperature to 284 degrees Fahrenheit (140 degrees Celsius). A flash cooler is then used to return the product to 176 degrees Fahrenheit (80 degrees Celsius) within a few seconds, so the heat has time to pasteurize the product, but other heat effects, such as caramelization, do not have time to occur.”

After this chilled water and a glycol solution are used to cool the product to the final temperature of 39 degrees Fahrenheit (4 degrees Celsius).

A second major advantage of using steam injection rather than traditional

heat exchanger technology is that it avoids issues with fouling of the heat exchanger, which can be a problem with the viscous nature of some plant-based drink products.

“As there is no heat exchanger, there is no surface and so there is no fouling,” says Francisco.

MEETING NEW CHALLENGES AS THEY ARISE

The HRS equipment was delivered in early September 2021, although delays with other parts of the line meant that it was not installed immediately. HRS pre-commissioned the unit on site from late November, but before final commissioning using actual product could take place, a COVID-19 outbreak closed the Israeli border to all travellers.

“The way the HRS DSI Series and associated equipment is designed meant that we could undertake the necessary commissioning work remotely, so that the unit was operational by January 2022,” explains Francisco. “I then visited in person in March to carry out a few final pieces of commissioning and since then the unit has been running without any issues.” ■



The UHT system supplied by HRS includes Direct Steam Injection (DSI) and a MI Series heat exchanger.

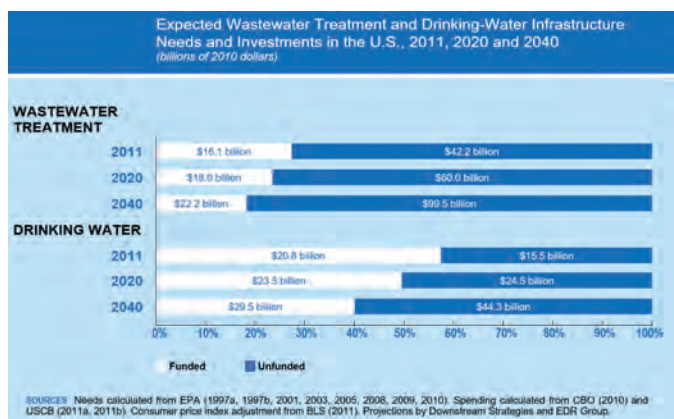
Located in Atlanta, Georgia, HRS Heat Exchangers is part of the EIL Group (Exchanger Industries Limited), which operates at the forefront of thermal technology. HRS offers innovative heat transfer solutions worldwide across a diverse range of industries. With forty years' experience in the food and beverage sector, specializing in the design and manufacture of an extensive range of turnkey systems and components, incorporating its corrugated tubular, and scraped surface heat exchanger technology, HRS products are compliant with global design and industry standards. For more information, visit www.hrs-heatexchangers.com.



WHY DEVELOPING A HOLISTIC ROADMAP FOR YOUR WATER TREATMENT MATTERS

A comprehensive approach brings benefits in the long (and short) term

BY DARYL MANDOZA, KURITA AMERICA



Source: American Society of Civil Engineers (ASCE).

An act that provided incentives, penalties, as well as funding for communities to clean their water, the Clean Water Act (CWA) was passed in 1972. The Environmental Protection Agency (EPA) at the time estimated that over two-thirds of the waters in America were unfit for fishing or swimming; a number that was cut in half after the CWA was established. Almost fifty years later the early success of the program has declined. A combination of funding cuts, aging infrastructure, and new pollutants has pushed the responsibility for water treatment back upstream to the facilities that produce the wastewater.

Historically, large centralized publicly owned treatment works (POTW) were the beneficiaries of the CWA. Funding

and regulatory changes made investment in these POTWs beneficial for the communities and production facilities that used their services. The American Society of Civil Engineers issued a D+ grade to our nation's POTWs in 2017. Our POTWs throughout the country continue to fail. Production facilities will be required to manage their water use and discharge more efficiently and effectively because the local POTW cannot handle the water flow and/or the contaminant loading.

FACILITY DRIVERS

The reality is that the burden of water treatment is moving away from the centralized POTW and further upstream to the production facilities. While production facilities have always focused on optimizing their operations to maximize profits, they have now added a water treatment cost center. This adds operational costs; it does not improve profits.

More importantly, water treatment is not typically a facility's core competency. Yet, the same business considerations that a facility considers for their operations and stakeholders are the same considerations that impact their water treatment:

- Quality and brand protection
- Food safety and regulatory compliance
- Environmental compliance
- Sustainable development goals



- Profitability and productivity
- Asset protection
- Worker safety and liability

DEVELOPING YOUR HOLISTIC ROADMAP

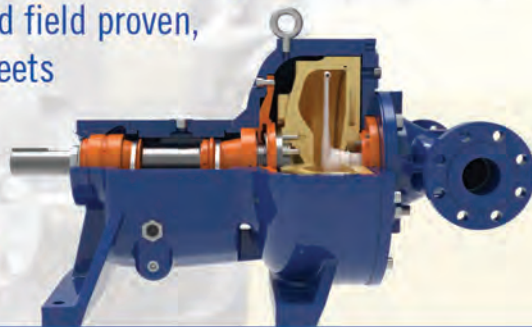
Commoditized water treatment chemicals and services is no longer a model that works effectively. Gone are the days where a buyer at a facility makes decisions based on cost per pound or cost per month for water treatment. Corporations are looking for an experienced business partner in their water treatment approach. An approach



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that includes working with on-site engineering, EHS, maintenance, management, procurement, and executives.

The development of the roadmap starts with a comprehensive site assessment (CSA). This includes discussion with your company's stakeholders to determine local and corporate key performance indicators (KPI's), a facility assessment, evaluation, and ways to implement. The assessment results in sharing sustainable best practices and opportunities for integrated solutions; specific to your facility and generally applicable to your organization. The assessment combines local facility expertise and insight

with the assessment team's water business expertise. In many instances, the CSA improves communication between departments and organizationally—effectively breaking down operational silos. For example, when the sanitation manager can be shown the impact a change in the cleaning and sanitation process has on the liquid solids separation operation, it helps facilitate change.

The CSA establishes the roadmap. The recommendations and implementation of items from the CSA become specific directions to achieve operational excellence. That is why developing a holistic roadmap to your water treatment matters. It results in the following:

1. A comprehensive facility approach to water treatment versus department by department. For organizations with multiple facilities, it allows the facility to meet corporate goals and key performance indicators (KPIs) and prioritize capital funding and operational budgets.
2. Specific solutions to meet desired goals that can be adjusted to meet production, scheduling, or business changes at your facility.
3. A standardized approach that improves internal communication and goal setting.

CONCLUSION

POTWs will continue to struggle to meet their community needs and will require additional household funding to make necessary upgrades and repairs to their infrastructure. This will likely increase the financial burden on industrial users (production facilities). Getting a head start on establishing a holistic roadmap to your water treatment is the prudent thing to do. ■

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DARYL MANDOZA is a product manager for wastewater treatment solutions at Kurita America, specializing in liquid solids separation. As part of the Kurita Group, a leading industrial water solutions provider in the world, Kurita America brings innovations to market through a unique, customized water management approach called the Kurita Way. The Kurita Way embodies complete water harmonization through a consultative engineering engagement. By incorporating all aspects of our customers' facility, including chemical, mechanical, and operational components, Kurita America gets to the root cause of customers' most complex challenges to deliver optimal results and overall lower cost of ownership for a better, more sustainable world. For more information, visit www.kuritaamerica.com.

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SUPPLY CHAIN RESILIENCE

What it means and why it matters Part 1 of 3

BY MERRITT GURLEY AND CHANDRAKANT ISI, HUBS

Supply networks drive the world's economies. Not only that, we are dependent on global supply chains for access to everything from food, to medical equipment, to energy. This is why it is more important than ever for organizations to shore up their supply chains and make them more resilient to both predictable and unpredictable disruptions.

Traditionally, profit incentives have favored lean manufacturing models, or just-in-time manufacturing (JIT). While this approach has proven to reduce costs in the short term and boost efficiency, its vulnerabilities have become increasingly evident in the face of global crises, such as the pandemic and war in Ukraine. Where lean supply chains fail, resilient supply chains can adapt, ultimately decreasing the impacts of disruptions and keeping things up and running.

DEFINING SUPPLY CHAIN RESILIENCE

A resilient supply chain is prepared for unforeseen disruptions, able to react and recover fast, and emerge stronger after the event. Though many companies believe supply chain resilience merely implies the ability to manage risk, true resilience enables you to deal with and even benefit from disruptions.

Supply chain resilience does not develop passively, as it's impossible to plan for every potential risk. Instead, it demands a dedicated, deliberate strategy to strengthen your organization in the face of the unexpected.

Resilience is crucial to the manufacturing industry, as generating revenue relies on adding value at each link of the supply chain, from the raw materials to the finished product. If one of these links becomes broken, or disrupted, value can no longer

be added, making a resilient supply chain essential to bringing products to market.

THE RISING NEED FOR RESILIENCE

Supply chain resilience has always been important and necessary in a world driven by global trade, but the need for it has been magnified in recent years by a combination of public health, environmental, and geopolitical concerns. The COVID-19 pandemic showed us how fragile global trade networks and supply chains were in 2020, causing massive disruptions and shortages across various industries as cities locked down and the supply of labor was dramatically impacted.

Today, some of the most pressing stresses on supply chains can be traced to geopolitical events, particularly the ongoing war in

Ukraine and escalating tensions between China and Taiwan.

These conflicts pose serious threats to global supply chains due to trade route blockades, economic sanctions, and raw material shortages. Already, we are seeing the early ramifications of trade sanctions with Russia with an energy crisis across Europe. Fuel shortages caused by growing demand in the region are driving up costs. In emerging markets particularly, manufacturing facilities and factories are at risk of increased blackouts, and the higher cost of transport will drive up the cost of commodities.

Other supply chain risks, such as natural disasters, cyberattacks, labor shortages, and inflation, continue to be a concern, further emphasizing the need to think about and plan for a more resilient supply chain. Going by our latest survey, 70 percent of respondents have implemented measures in the past year to improve supply chain resilience, which—while a

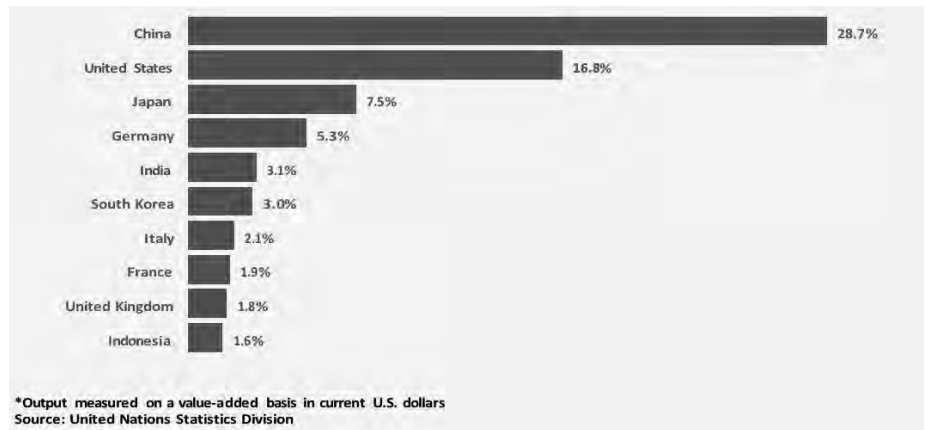


FIGURE 1: China is the world's manufacturing superpower. Top 10 countries by share of global manufacturing output in 2019.*

majority—still leaves many companies more vulnerable to disruptions.

In 2022, businesses small and large succumbed to supply chain troubles. A series of disruptions—including a fire, the pandemic, and a winter storm—led Texas petrochemical producer TCP Group to file for bankruptcy. Logistics challenges, labor shortages, and rising cost

of ingredients forced cosmetics company Revlon to file for Chapter 11 bankruptcy. And shortages in wire harnesses, previously manufactured in Ukraine, have led to slowdowns in European automotive production.

There are ample long-term benefits to pursuing a resilient supply chain in lieu of more short-term lean manufacturing. A resilient

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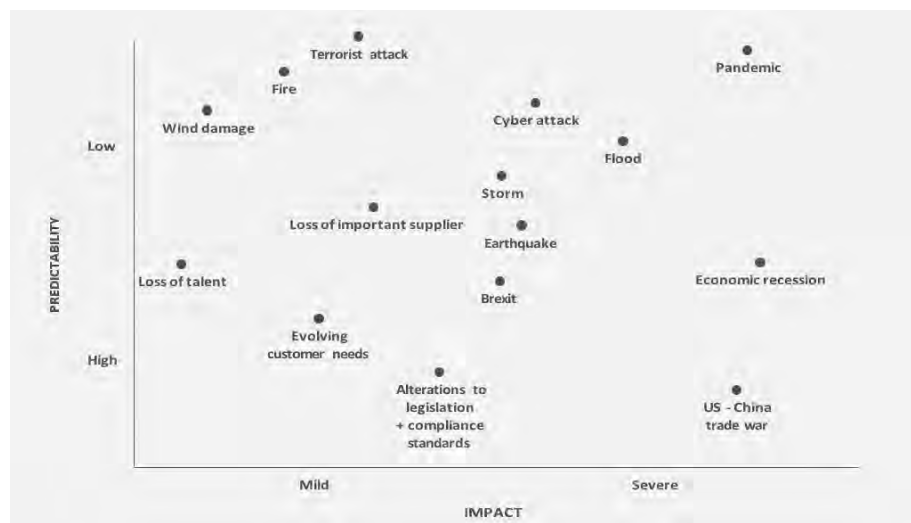


FIGURE 2: Supply chain disruptions categorized by level of predictability and impact.

supply chain anticipates disruptions and mitigates the effects of both predictable and unpredictable events through a combination of strategies. Diverse supply networks, robust cybersecurity, and automated processes are just some of the steps organizations can take to reinforce their supply chain and ensure reliable performance over the long term.

BUILDING SUPPLY CHAIN RESILIENCE IN YOUR ORGANIZATION

Developing a clear strategy is a crucial step in mitigating supply chain disruptions. This series will examine the reasons behind the growing number of supply chain disruptions and discuss approaches for strengthening your organization's supply chain. The final section will provide a detailed analysis of these approaches and their potential benefits.

- Automation
- Reserve inventory
- Geographical diversification
- Agile internal processes
- Supply chain monitoring

These actions are designed to help you manage risk during the increasing number of supply chain disruptions. After all, it's not a matter of whether your organization will

experience disruption, but rather how often and for how long.

THE GROWTH OF SUPPLY CHAIN DISRUPTIONS, A RISING RISK

Supply chains have become more complex and brittle as a result of globalization.[06] The more complex businesses become, the broader the spectrum of threats. This increased complexity has exposed them to a wider range of threats. In this section, we will explore the level of damage and predictability associated with different types of disruptive events. We will then look at how some supply chain disruptions have become more common, and examine the causes of this increase.

Not all disruptions are created equal. With the rising number of supply chain disruptions, it's common for businesses to focus their attention on events that are easier to anticipate and control. However, developing supply chain resilience involves examining all variations of risk and tackling each disruption type deliberately and strategically, rather than concentrating on the most predictable risk.

Generally, disruptions can be assessed on the basis of two factors: their predictability, as companies seek to plan long term, and how impactful they are, in terms of the magnitude of the disruption they

cause to manufacturing supply chains. Figure 2 summarizes the most common and relevant disruptions that currently threaten supply chains, categorized by their level of predictability and impact.

A robust supply chain strategy should aim to mitigate disruption in each quadrant. It is the most difficult to anticipate the fallout of events that have low predictability and severe impact.

These disruptions are sometimes referred to as "unknown unknowns" or "Black Swans." They are difficult to foresee and strategize against, and the coronavirus pandemic has shown that these Black Swans demand sufficient attention in order to avoid their devastating aftermath. A resilient supply chain will allow your organization to cope better with a range of different disruptions, both known and unknown.

TOP SUPPLY CHAIN CONCERNS

A survey conducted by Hubs in November 2022 with 334 respondents found that 76.6 percent of companies experienced some form of external disruption to their supply chain over the past year. This represents a rise in disruptions compared to the results of surveys conducted in 2020 and 2021. In the 2022 survey, material shortages were the top challenge, affecting 60.9 percent of participants. Likewise, 49.4 percent of respondents reported facing material shortages more often in 2022 compared to 2021.

COVID-19 was the second biggest cause of disruptions, affecting 57 percent of companies in 2022. China's strict lockdowns, driven by its zero COVID policy, have severely affected the manufacturing output in the world's manufacturing powerhouse. For example, the output of Apple iPhones is likely to drop by 30 percent due to COVID-related curbs at Foxconn's factory in Zhengzhou. Other significant concerns among survey respondents included rising energy costs, logistics issues, container shortages, port congestion, natural disasters, and trade wars.

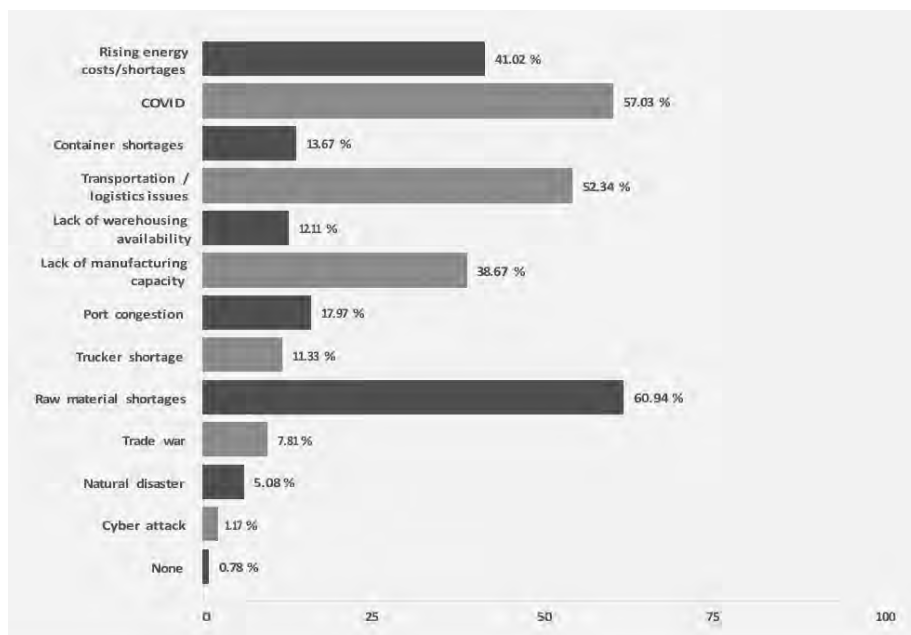


FIGURE 3: Top supply chain disruptions that have impacted businesses in 2022.

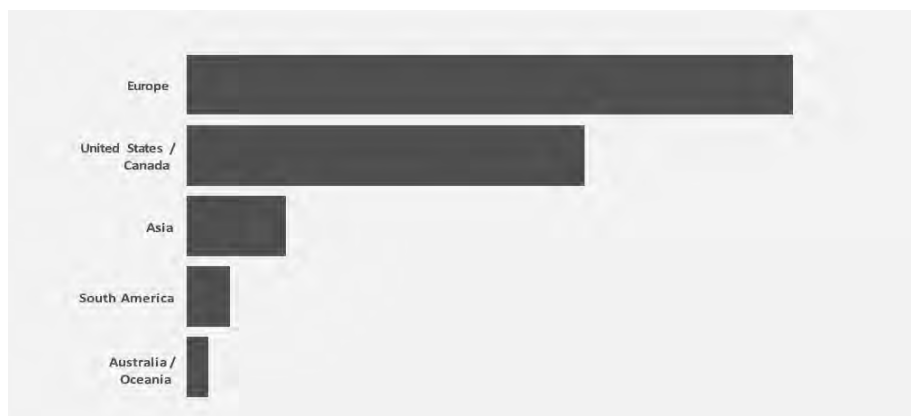


FIGURE 4: Regions affected by supply chain disruptions in 2022.

With a military conflict at its door, businesses in Europe experienced widespread supply chain disruptions. In contrast, Asia, home to manufacturing hubs such as China and India, fared better, as shown in figure 4. The automation and robotics industry was the most affected by supply chain disruptions, followed by the electronics and medical corporations.

A LOOK AHEAD

In the coming sections of this series, we'll examine some of the key differences between the finding of 2021 and 2022 surveys with regard to how manufacturers view their supply

chain risk. Also, we'll deep dive into some of the more pressing factors threatening supply chain reliability—geopolitical issues, rising shipping costs, natural disasters, and cyber security. Our series will conclude by shifting focus from the here and now toward the future, naming the top five supply chains risks to watch out for in 2023 as well as six industries that will face supply chain disruptions.

Fortunately, it is not all doom and gloom. We will highlight many tools and strategies for building a resilient supply chain that organizations can use. As you'll see, resilience is essential if you want your organization to adapt to the future. ■

Hubs empowers engineers to create revolutionary products by making custom manufacturing more accessible. The company leverages automation to allow fast and affordable access to manufacturing capabilities from all over the world. Hubs started life as the world's largest peer-to-peer network of 3D printing services, but as it grew with its customers it needed to offer a broader range of capabilities to help their businesses succeed. Today hundreds of manufacturers in the Hubs global network and their customers can order parts in a broad range of materials using multiple manufacturing technologies, and with many secondary processes as well. For more information, visit www.hubs.com.



IDENTIFYING THE BEST PUMPS FOR USE IN CORRUGATED-BOX MANUFACTURING

For the handling and transfer of cornstarch glue, PSG offers two strong solutions

BY TOM ZUCKETT AND JEFF PETERSON, PSG

Historically, the breadth and depth of a person's shopping experience was defined by a combination of easily found brick-and-mortar storefronts, along with catalogs that would show up in the mailbox. That changed dramatically

twenty to thirty years ago when computers started becoming standard appliances in most homes and businesses. Soon after, web-enabled smartphones found their way into nearly every pocket. These revolutionary innovations

turned the entire globe into a local department store, supermarket, or pharmacy. Requiring only a reliable Internet connection, consumers now have access to any company's products and services at the touch of a few buttons.

The increased ability to shop from a desktop or phone was eventually given a name: electronic commerce or, as it is more commonly known now, eCommerce. If eCommerce had become popular before, the COVID-19 global pandemic kicked it into overdrive in 2020. With many brick-and-mortar businesses locked down and the people who frequent them confined to their residences via stay-at-home orders, eCommerce shopping surged, to the point that rare is the day now that an online-ordered package does not arrive at someone's front door.

What all of these deliveries have in common—whether they contain thumbtacks or diamond earrings, French wine, or pharmaceuticals—is that the items arrive in some type of packaging, most commonly a corrugated cardboard box. In fact, corrugated cardboard boxes are recognized today as the world's most widely used packaging material.

This status is reflected in the fact that, according to various marketing-research companies, the global corrugated-box market had a value of around \$67.5 billion in 2021 with expectations that that value will grow to between \$80.8 and \$82.8 billion by 2028 (which is a 3.5 percent CAGR).

What that also means is that corrugated-box manufacturers will need to increase their production capabilities to keep up with the growing demand. Like all manufacturing processes, the one for corrugated boxes is a precise operation, with specific steps needing to be performed error-free, each and every time. Industrial pumps play a starring role in one of these manufacturing stages—the transfer of cornstarch glue that holds the cardboard sheets in a corrugated box together—and this article will illustrate how air-operated double diaphragm (AODD) and internal gear pumps can be the best option for use in this critical application.

THE CHALLENGE

Ironically, while the demand for corrugated boxes has exploded due



Blackmer® G Series internal gear pumps feature a jacketed cast-iron body, ANSI flanges, bronze or carbon-graphite bushings, and carbon-graphite packing or Buna-N mechanical seal.

to a series of technological advances in product ordering, the roots for the corrugated-box manufacturing process stretch all the way back to the less high-tech era of the 1880s. That's when a Swedish chemist named Carl F. Dahl developed a method that took the raw wood from harvested tree trunks, such as fast-growing pines, and turned it into wood pulp consisting mainly of cellulose fibers, which are the foundational component in a piece of paper. He called his invention the "kraft" process, with the word "kraft" meaning "strength" in German, which acknowledges the strength of the paper that is produced through the kraft process.

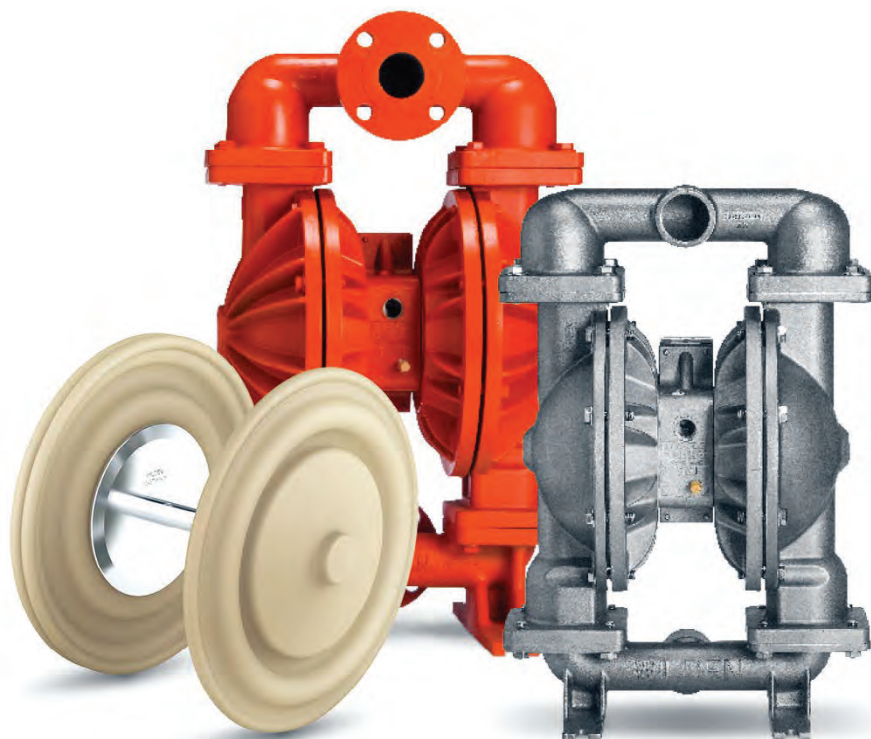
In the kraft process, raw wood chips are treated with a mixture of hot water, sodium sulfide (also known as "white liquor") and sodium hydroxide in order to break down the cellulose (the main structural component in the cell wall of green plants), hemicellulose, and lignin (organic polymers that support plant tissues) in the wood. This treatment turns the wood chips into soft and pliable wood pulp, which is then ready to be manufactured into paper.

Once the kraft paper is produced, it is sent to the corrugating plant where it will be turned into a finished

corrugated cardboard box. In reality, only a few materials and stages of production are needed to complete the manufacturing process. As mentioned, one of the most critical is the application of the glue to the various sheets of cardboard that are used to construct the box.

Most larger corrugating plants feature a facility that is unique to box manufacturing: the "starch kitchen." It is in the starch kitchen that corrugated-box glue is created in a process that involves the mixing of cornstarch, some chemicals and boiling water, resulting in the formation of a thick, pasty liquid. The benefits of using starch-based adhesives in the construction of corrugated boxes are many: good adhesion to wood-based papers, ready availability, easy to apply, inexpensive, resistant to heat, slow curing, non-toxic, and insoluble when used with fats and oils.

Because a large amount of cornstarch is needed at a corrugating plant, it is typically shipped in the form of a dry powder to the plant via railcar. At the plant, it is stored in silos before being transferred to the mixing vessels where the glue is produced. It is at the conclusion



All Wilden® AODD Pumps are portable, self-priming, dry-run capable and feature no mechanical seals, which makes them virtually leak-free and the perfect choice for handling cornstarch glue.

of the cornstarch-glue production process that industrial pumps enter the picture.

Specifically, pumps are used to transfer the finished glue into the corrugating machine, from which it will be spread over the layers of corrugated medium that will be pressed together to form the completed corrugated cardboard sheet and, eventually, the cardboard shipping or storage box.

The challenge in this process that the pump must overcome is found in the fact that cornstarch glue can be difficult to pump because of its adhesive nature, along with its high viscosity. In addition to being sticky and thick, any liquid cornstarch glue that remains within the pump's internals when it is not operating will harden. In this case, this hardened glue can cause premature wear that will adversely affect the ability of the pump's mechanical seals/faces and bushings to operate properly. Even worse, when seals and bushings fail, the pump will be prone to leaks, which not only results in lost product,

the cost of which can't be recouped, but increases safety concerns as well as the need for costly cleanup procedures.

If a pump should have failed seals or bushings that can lead to leaks, the choice for the facility operator then comes down to whether the seals should simply be replaced or if the pump should be scrapped and exchanged for a new model. Replacing seals can be easy if spare inventory is on hand at the plant, but a pump that has additional performance dampening damage may need to incur extensive labor and repair costs to get it back to its expected level of performance. In this case, the best option may be to purchase a new pump, though that can lead to longer periods of downtime, which compromises the manufacturer's ability to meet strict production schedules. In both instances, there may also be a lack of skilled labor readily available to perform repairs or installation, which will lengthen downtime.

Therefore, it is imperative that the corrugating-plant operator identify

and deploy a pumping technology that has been designed to confront and overcome the various challenges that are ever-present in the handling of cornstarch glue.

THE SOLUTION

As noted above, two of the best of these pumping technologies are AODD and internal gear. Specifically, two PSC® product brands offer AODD and internal gear pumps that can be used in cornstarch-glue applications.

First, Wilden®, whose founder, Jim Wilden, invented the AODD-pumping principle more than sixty-five years ago, offers both clamped and bolted AODD pumps in 1-1/2-, 2-, and 3-inch outlet sizes. Wilden clamped metal AODD pumps feature Jim Wilden's original design, which allows them to be easily installed and serviced with only a single tool. The Wilden bolted metal AODD pump features an enhanced flow path design that can produce flow rates up to 34 percent higher than competitive models while offering maximum product containment. For both the clamped and bolted models (PS4, PS8, and PS15 for clamped; PS420/PS430, PS820/PS830, and PS1520/PS1530 for bolted) Wilden recommends a ductile-iron wetted path when handling cornstarch glue, though aluminum and stainless-steel models are also available.

Operationally, all of the Wilden clamped and bolted pumps are portable, self-priming, dry-run capable, and feature no mechanical seals, which reduces the chance that leaks will occur, resulting in superior product containment. They are also easy to operate, install, and maintain.

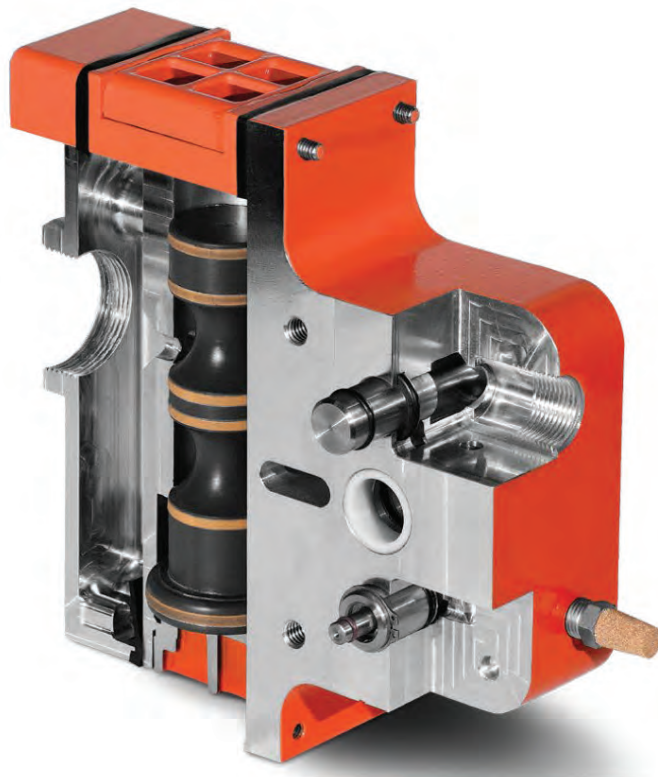
The pumps are also able to be outfitted with Wilden's revolutionary Pro-Flo® Shift Air-Distribution System (ADS). The innovative, yet simple, design of the Pro-Flo Shift ADS features an air-control spool that automatically optimizes and eliminates the overcharging of the air chamber with no reduction in flow rate. This reduction in air consumption helps Pro-Flo Shift

pumps achieve up to a 60 percent reduction in air consumption while simultaneously producing up to 34 percent greater flow rates compared to other AODD-pump models.

In terms of diaphragms, Wilden suggests its Chem-Fuse Integral Piston Diaphragm (IPD). Chem-Fuse diaphragms are available in Wil-Flex™ (Santoprene®) and are capable of delivering 100 percent increased flow rates and suction-lift capabilities when compared to PTFE-laminate diaphragms. The IPD design eliminates a notorious leak point at the outer piston in traditional diaphragms. This elimination of outer piston abrasion, and product trap areas, results in longer flex life and increased product containment.

In the realm of internal gear pumps, PSG offers the G Series internal gear pump from Blackmer. The G Series pumps are designed to deliver the durability, flexibility, and efficiency needed when handling challenging liquids, such as cornstarch glue. Best designed for cornstarch-glue-handling applications are cast-iron G Series versions with ANSI flanges, bronze, or carbon-graphite bushings, with either carbon-graphite packing or a Buna-N mechanical seal. They are available in 2- and 3-inch outlet sizes (models G2-55 and G2-69) and can feature an optional internal-bypass relief valve.

Standard features of the G Series pump include the ability to create and maintain turbulence-free laminar flow; a triple-lip seal that, in instances of the stuffing box



Outfitting a Wilden® AODD Pump with the Pro-Flo® Shift Air Distribution System (ADS) will reduce air consumption by up to 60 percent while creating flow rates that can be 34 percent greater than other AODD-pump models.

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becoming compromised, prevents product leakage; direct replacement part interchangeability with a wide range of competitive pump models; and a universally designed seal chamber with an oversized heavy-duty bearing housing that can accommodate different sealing technologies. G Series pumps are standard in many “starch kitchens.” This is because the stuffing-box area on internal gear pumps allow the starch to settle out by displacing the liquid needed to lubricate the seal. The triple lip seal also provides “dry-run” capabilities that help prevent early failure of the seal. Another design alternative is the “behind the rotor” design that positions the seal in fresher product, thus enhancing seal life.

Other optional accessories for G Series pumps include an enlarged bearing housing at the rear end of the pump that provides easy drive-end access to the shaft seal and the ability for single-point end-clearance

adjustment. Finally, the pump casing also revolves to allow for multiple inlet and outlet positions.

CONCLUSION

A corrugated box without cornstarch glue is just a pile of cardboard sheets, making the adhesive an indispensable piece of the corrugated-box manufacturing puzzle. However, the glue’s sticky properties, along with its high viscosity, make transferring it a challenge, which requires a specific type of pumping technology. As it turns out, PSG offers a pair of reliable, safe, and efficient solutions: Wilden AODD pumps and Blackmer internal gear pumps. Both technologies deliver the design and operational attributes that make them ideal for use with cornstarch glue in corrugated-box manufacturing, with all signs indicating that the market—and the resulting opportunities—will only continue to expand in the coming years. ■

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JEFF PETERSON is the PSG® rotating business development manager, Americas. He can be reached at jeff.peterson@psgdover.com. Headquartered in Oakbrook Terrace, Illinois, PSG is a global pump and dispensing solution expert and leading brand of pumps, systems, and related flow-control technology for the safe and efficient transfer of critical and valuable fluids and materials. PSG is comprised of several world-class brands, including Abaque®, All-Flo™, Almatec®, Blackmer®, Ebsray®, em-tec®, Griswold®, Hydro™, Malema, Mouvex®, Neptune®, Quantex™, Quattroflow®, RedScrew™, and Wilden®. For more information, visit www.psgdover.com.



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PARTNERSHIP PROVIDES RESERVE POWER TO THE EMERALD ISLE

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BY LAURA ARESI, GE GAS POWER

GE Gas Power and Mytilineos have secured an order from the Electricity Supply Board of Ireland for the construction of a new gas-fired power plant in Dublin, within ESB's existing North Wall Power Plant.

The new temporary reserve power plant will be powered by six GE LM2500XPRESS gas turbines delivering a combined capacity of up to approximately 200 megawatts

(MW) to help meet the electricity demand and help ensure stability of electricity supply in Ireland. Under the terms of the agreement, GE and Mytilineos will work together for the construction, and operation and maintenance (O&M) of the plant.

The temporary reserve power plant installed in Dublin will have natural gas fuel capability and can operate on blends of hydrogen fuel

in the future with relatively small modifications to further reduce carbon emissions and lead to lower-emitting footprint for the plant. The dry low emissions (DLE) combustor configuration allows up to 35 to 50 percent by volume of hydrogen when blended with natural gas.

The additional temporary emergency generation will not be available to the open electricity marketplace; instead, it will only be operated in the case of shortage of capacity, reaching power plant full production capacity in just minutes.

"We're excited to bring temporary power to ESB's North Wall site before the 2023-24 winter peak demand season to help provide a reliable source of reserve power that will be a major contributor to mitigating the risk of power supply shortages," says Joe Anis, president and CEO, Europe, Middle East, and Africa, GE Gas Power.

PARTNER PROFILE

Mytilineos, founded in Greece in 1990, is an industrial and energy multinational company, listed on the Athens Exchange, that employs directly or indirectly more than 4,820 people in Greece and abroad. Focused on sustainability, the company set targets to minimize its CO2 emissions by at least 30 percent until 2030, and until 2050 to achieve net zero carbon footprint in all its operations in accordance with ESG criteria for Environment, Society and Governance.

For more information, visit www.mytilineos.gr



PROJECT AT A GLANCE

- GE LM2500XPRESS aeroderivative gas turbines are expected to provide nearly 200 megawatts of fast emergency power.
- The temporary reserve power plant will be installed at ESB's existing North Wall Power Plant in Dublin, expected to provide backup power for the next three years' winter seasons (2023-26).
- GE's LM2500XPRESS power plant, built using GE's proven LM2500 aeroderivative gas turbine technology, is 95 percent factory assembled into simplified modules for fast and easy site installation

"We're pleased to work on this project with Mytilineos, an internationally recognized leading constructor of large-scale energy projects with whom we have executed over sixty projects that provide grids in various countries with more than 1.5GW of fast power using GE aeroderivative gas turbines. With them, we will provide a source of emergency power for the Irish electricity grid, and one whose emission levels can be reduced using blends of hydrogen fuel in the future."

"It is a great pleasure to work yet again in cooperation with our longtime business associate GE Gas Power for the construction of an efficient gas fired power plant that will counteract the risk of power shortages in Ireland. With Mytilineos's long expertise and GE's cutting-edge technology, we are

confident that together we will deliver this emergency power plant on-time," says Evangelos Mytilineos, chair and CEO of Mytilineos, and adds, "Mytilineos's long term commitment to efficient energy production, towards an effective energy transition is evident in every new project, especially now that Europe is undergoing an unprecedented crisis that affects both households and business."

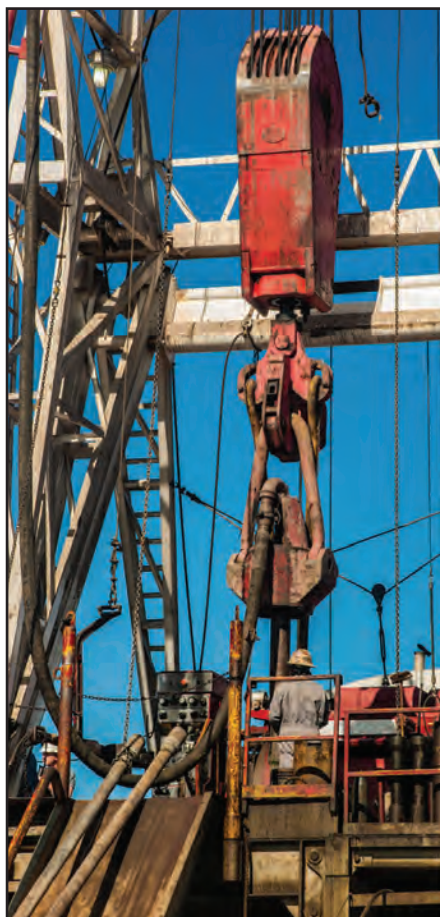
FASTER AND EASIER

GE's LM2500XPRESS power plant is built on GE's proven LM2500 aeroderivative gas turbine technology. The LM2500XPRESS is 95 percent factory assembled into simplified modules for faster and easier site installation. For plant operators who need power in just days, the LM2500XPRESS can be installed in as little as two weeks with a relatively small crew.

The compact LM2500XPRESS units for this project will be

manufactured at GE Gas Power's Manufacturing Excellence Center in Veresegyhaz, Hungary. ■

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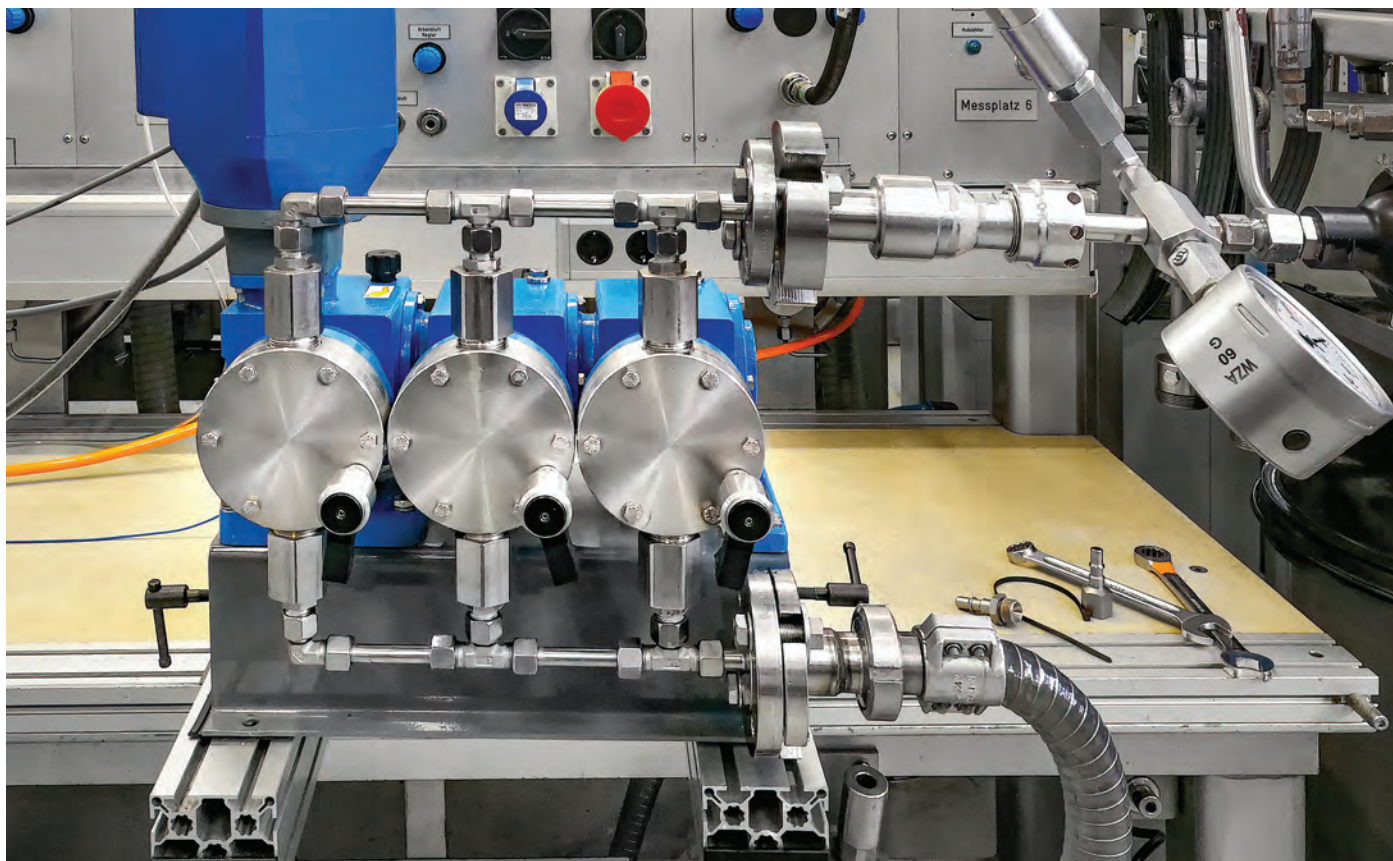
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As early as 2020, Lewa carried out initial functional testing with the NORD PMSM prototype and an ecodos pump on the pump test bench. In the lower speed range above all, the PMSM successfully demonstrated the advantages of constant torque: the ecodos test pump could be driven in a range of 1:480 up to 5 bar.

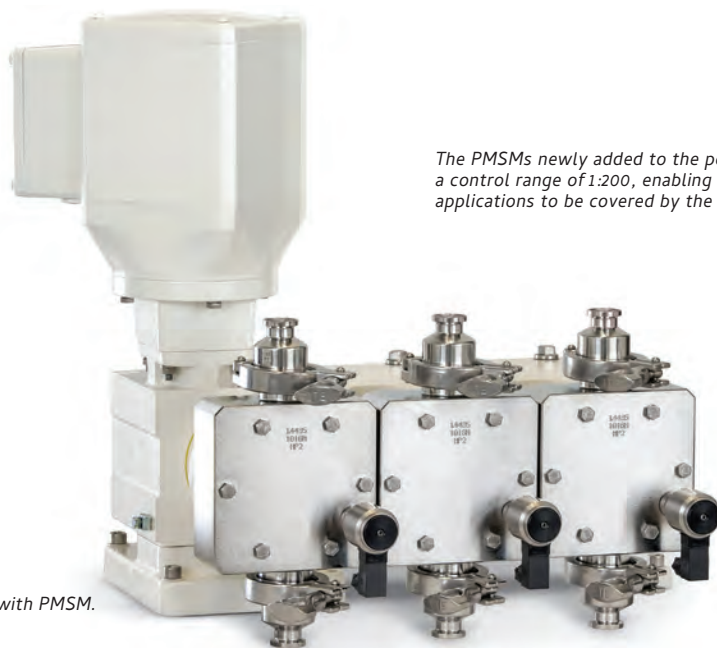
ENERGY EFFICIENT IN ACCORDANCE WITH CLASS IE5+

Compact permanent magnet synchronous motor extends control range and reduces total cost of ownership

BY MAURICE WIRKNER, LEWA GMBH

In many applications, metering ingredients in the pharmaceutical or food industry for example, pumps are required that not only can be precisely controlled in terms of flow rate and dosing time, but also convey the ingredients particularly gently. To enable the proven pump units of the ecodos series from Lewa GmbH to fulfill this demanding task with even more flexibility and energy efficiency in the future, the manufacturer is expanding the portfolio to include a new form of wide-range speed control. Alongside asynchronous motors and servomotors, permanent magnet synchronous motors, or PMSMs for

short, are also used now. They are characterized by high energy efficiency and a control range greater than 1:200. This significantly expands the range of applications. With PMSMs, it is no longer necessary to use several pumps for different flow rates or oversize asynchronous motors for low speeds. Since PMSMs can be designed without a fan, they remain compact and easy to clean. The latter feature predestines them for hygienic applications. High efficiency rating over the complete control range in accordance with energy efficiency class IE5+ also reduces energy costs, thus ensuring a lower total cost of ownership (TCO).



The PMSMs newly added to the portfolio feature a control range of 1:200, enabling a wider range of applications to be covered by the same drive or pump.



Lewa ecodos LED3 with PMSM.

EXPANDING THE HORIZON FOR METERING PUMP PERFORMANCE

The diaphragm metering pumps in the Lewa ecodos series are particularly well suited for applications in the food or pharmaceutical industries. All materials in contact with the fluids

used in the pump units meet the FDA and USP Class VI requirements, and the EU directives for the food industry. In the hygienic version, for example, the pump head is made of PP or electropolished stainless steel with a surface roughness $< 0.5 \mu\text{m}$. This

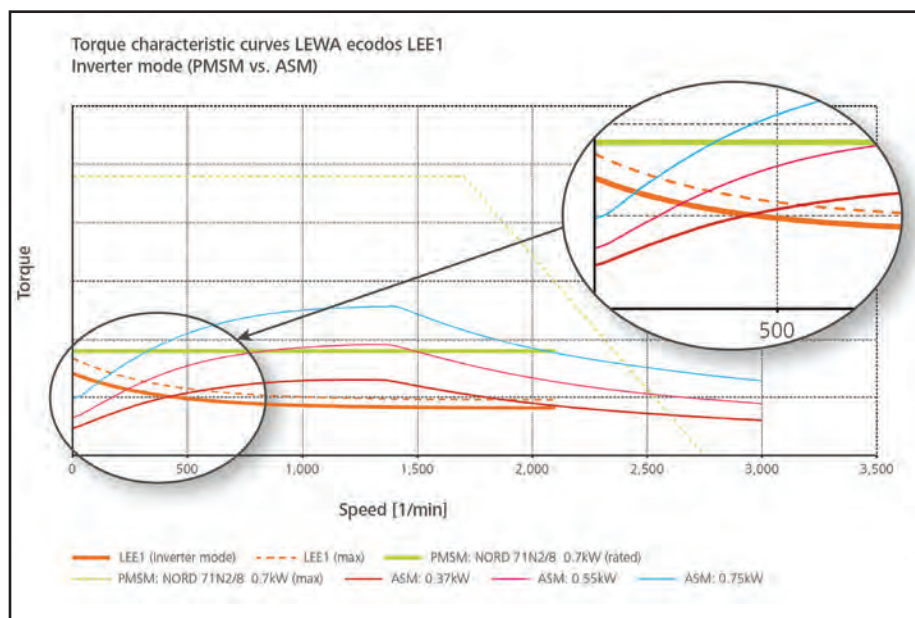
facilitates cleaning of the surfaces in contact with the product.

The motor technologies used to date have had to make sacrifices: for classic asynchronous motors whose rotor is a squirrel-cage rotor, the control range remains limited to

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In contrast to the ASMs shown, the constant torque of the PMSM enables continuous operation at low speeds. Oversizing for the required pump starting torque has become unnecessary due to the high overload capability of the PMSM.

1:10 (1:50 is possible in individual cases). With encoder feedback, significant expansion is possible. In addition, the drive is relatively inefficient outside the rated speed range—especially at low speeds. This requires the drive to be oversized, which increases operating costs. Servomotors are optimized for highly dynamic requirements and also cover the complete control range (1-210 pump strokes); however, they are more expensive to purchase and in addition, require a servo inverter for control.

WIDE-RANGE SPEED EXTENDS THE RANGE OF APPLICATIONS

Lewa has now expanded its own portfolio with a drive technology that does not have these weaknesses. Unlike the asynchronous motor, the rotor of this drive consists of permanent magnets and rotates synchronously, i.e., without load-dependent slip. Among other things, it features an extreme control range, which often makes the use of multiple pumps for different flow rates unnecessary. Particularly in the case of multiple pumps, an additional manual stroke adjustment or electric stroke adjustment can be dispensed with and the required flow rate can

be realized by speed control only. The PMSM also has a constant torque. The complete torque can be applied from engine speed 0 rpm (standstill) up to the rated speed of the motor. This ensures particularly smooth and gentle system start-up, since each process can be started with a pump capacity of 1 percent instead of the usual 10 percent.

It also features a high short-term overload capacity, which enables a drive design without oversizing for the starting torque. As a result, smaller, more cost-efficient sizes can be realized than with classic drives. Like the asynchronous motor, the PMSM can be controlled via a standard frequency converter, so users can rely on common parts. With the servomotor on the contrary, it would be necessary to purchase expensive servo controllers. The compact drive can be easily cleaned due to its fanless design and offers high IP protection. If required an additional conversion process—called nsd tupH—can be applied to the aluminum body for FDA requirements. This makes the surface extremely resistant and even easier to clean—ideal for applications with stringent hygienic

requirements, such as aroma metering in the food industry or additive dosing in the pharmaceutical industry.

IE5+ PMSM ENABLES COST REDUCTION AND DECENTRALIZED SOLUTIONS

The sole limitation of the currently used PMSM is that it is only available for safe areas. Summing up, thanks to wide-range speed control with IE5+ PMSM, we can meet the increasing customer demands for a wider adjustment range and lower energy consumption, as well as overall costs. The topic of energy efficiency in particular is becoming increasingly important for our customers. A decentralized solution in which the frequency converter is installed directly on the PMSM, can now be implemented with Getriebebau NORD GmbH & Co. KG, Lewa's motor partner for PMSM, too. ■

MAURICE WIRKNER is an application manager at Lewa GmbH. Lewa is the world's leading manufacturer of metering pumps and process diaphragm pumps as well as complete metering packages for process engineering. The Leonberg, Germany-based company developed into an international group within a few decades and saw further improvement in its position on the world market as part of integration into Japanese Nikkiso Co. Ltd. in 2009. As a research and production-oriented company, 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 and in refineries and petrochemicals, as well as in the production of plastics, detergents and cleaners. Additional application areas include the chemical industry, the cosmetics industry, pharmaceuticals and biotechnology, food and beverage industry and energy utilities. For more information, visit www.lewa.com.



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MEETING THE CHALLENGE OF TRANSFERRING DANGEROUS LIQUIDS

Moving fluids with Mouvex, without common pitfalls or expenses

BY PAUL CARDON, MOUVEX

Moving industrial fluids from one point to another is essential to the health of the worldwide economy. There are a variety of methods to transfer these fluids, with the most common being by truck and rail. The process of loading and unloading tank trucks and railcars occurs daily thousands of times at industrial sites across the world.

While this is a routine procedure, it also comes with safety and cost challenges. On the safety side, the

primary risks associated with fluid transfer include leakage and spillage, both of which can create catastrophic consequences. Hazards from leaks and spills range from widespread pollution to fires.



Regarding expenses, spills and leaks lead to a loss of product. When you consider the frequency of fluid transfers across the world, a small spill or leak during each of those interactions creates substantial product loss, all of which impacts the bottom line to the tune of millions of dollars. Additionally, if leaks or spills occur, then maintenance also becomes an immediate necessity on the pumping equipment, which adds to those costs. Another costly problem

PROVEN PERFORMANCE

APPLICATION	EQUIPMENT	PROBLEM SOLVED
TRUCK LOADING OF POLYMERS EMULSIONS	G-FLO 50 PUMP	SEAL LEAKAGE BONUS: PRODUCT RECOVERY INSIDE THE HOSE
TRUCK UNLOADING OF CREAM	SLS36 PUMP	LIQUID SHEAR BONUS: PRODUCT RECOVERY INSIDE THE HOSE
TRUCK UNLOADING OF FRUIT CONCENTRATE	SLS36 PUMP	PRODUCT LOSSES
TRUCK UNLOADING OF POLYETHYLENE GLYCOL	SLC36 PUMP	LIQUID SPILLAGE AFTER TRANSFER

Mouvex seal-less eccentric pumps have proven their performances and reliability on many loading and unloading applications.

comes from shearing when using a non-adapted pumping technology.

Complicating fluid transfer is the fluid itself. Each liquid brings its share of unique challenges when it comes to loading and unloading. In the chart above, are a few examples of liquids that are transported by road or rail. If there is at least one "yes" in the product line, an adapted pumping

technology must be used for loading and unloading applications.

HAZARDS

Leaks from pumping equipment typically come from the mechanical seal. A truck uses an unloading pump intermittently, meaning that its intervals are not continuous or steady. Those circumstances can prove

problematic for products that dry or polymerize when static, especially when a mechanical seal has a leak. Those products will leak rapidly from the compromised seal.

Spillage is nearly impossible to avoid. During those thousands of routine transfers, the hose between the truck tank and the pump must be disconnected. Regardless of the



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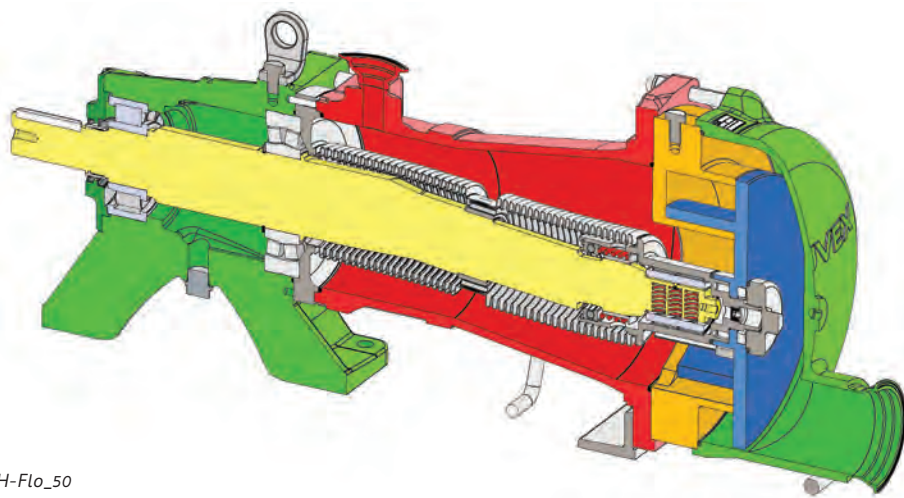
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H-Flo_50

liquid, there will always be some left inside the disconnected segments. This requires recovery protocols and protective measures for staff.

COSTS ISSUES

Outside of the high expenses that come from safety issues, the main costs associated with loading and unloading pumps are maintenance, downtime, and product loss.

Regarding maintenance, it's almost inevitable that a mechanical seal will eventually leak. Complications arise even further when considering some applications feature pumps that run continuously, such as with isocyanates. These low-molecular weight chemicals cannot be left

in a static state. When they are not moving during loading and unloading functions, they are kept active through continuously running pumps.

Under this scenario, a failed mechanical seal will cause a serious leak, resulting in severe costs, including lost product, maintenance on the seal, product cleanup, and halted production. All of these costs accumulate to create an unnecessary and harmful financial burden.

Downtime results from these complications. If liquids cannot be transferred, it amounts to lost time on both ends and also affects the downstream process. The longer the downtime, the more detrimental the costs.

Product loss affects costs because of the expensive nature of the transferred liquids. Whether it be through a major spill or a slow mechanical seal leak, any loss of product will impact expenses. Over time, those expenses become more pronounced and harmful. Additionally, the loss of the product isn't the only issue. That lost product, especially during spills, needs to be cleaned up, which raises costs.



zh-Flo series



MVX Flow

ADDRESSING THE CHALLENGE

Mouvex eccentric disc pumps can mitigate all of the challenges that come from liquid transfers. This technology consists of a cylinder and pumping element mounted on an eccentric shaft. As the shaft rotates, the pumping element forms chambers within the cylinder. This increases the size of the cylinder at the intake port and draws fluid into the pumping chamber. The fluid moves to the discharge port, where the pumping chamber size decreases, squeezing out the fluid.

During loading and unloading, this unique design provides the following:

- Line stripping that leaves a minimum amount of product inside the hoses on the suction and discharge sides after transfer, which ensures cleaner and safer operation and reduces the opportunity for product spillage. This is crucial, especially when transferring a dangerous chemical.
- Self-priming from underground tanks. This is necessary to start the pump and creates a strong vacuum to lift the liquid.
- No mechanical seal, which ensures no maintenance and no leaks, and thus no downtime.
- Limited regular maintenance. The only maintenance needed is a transmission oil change every 24,000 hours, which equates to every 2.7 years. This is for a pump that runs continuously year-round.
- Constant flow rate vs. variable viscosity: Loading and unloading applications are generally located outside with significant ambient temperature variations between winter and summer.
- Constant flow rate vs. variable pressure: When filling a tank from the bottom, the discharge pressure will increase while the level rises.
- Low shear on fragile products.
- Can run dry for up to five minutes even in ATEX zones.
- Up to 300 gallons per minute.



G-Flo power emulsion

PROVEN PERFORMANCE

Mouvex seal-less eccentric pumps have proven their performances and reliability on many loading and unloading applications. 📍

PAUL CARDON is the business development manager for Mouvex®, Auxerre, France, a leading manufacturer of positive displacement pumps, screw compressors and hydraulic coolers for use in the refined-fuels, oilfield, energy, food/sanitary, military, transport, and chemical process industries worldwide. He can be reached at paul.cardon@psgdover.com. Mouvex is a product brand of PSG®, a Dover company. PSG is comprised of several leading brands, including Abaque™, All-Flo, Almatec®, Blackmer®, Ebsray®, emtec, EnviroGear®, Griswold®, Hydro Systems, Mouvex®, Neptune™, Quantex™, Quattroflow™, RedScrew™, and Wilden®. For more information, visit www.mouvex.com or www.psgdover.com.

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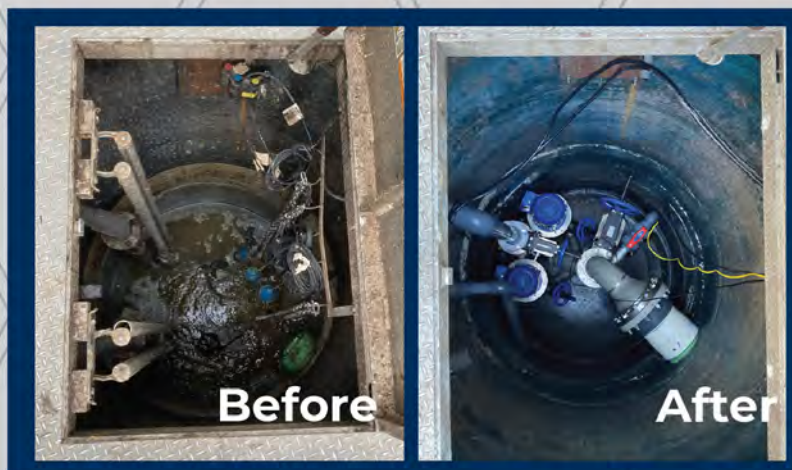
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PUMPING



SHREDDING



Industrial Flow Solutions™ (IFS) OverWatch® direct in-line pump system offers a revolutionary solution for the municipal wastewater and stormwater industry. The OverWatch patented system is designed to eliminate the wet well by lifting influent directly from the inlet to the discharge while detecting and responding to solids, eliminating potential clogs. Operation is based on continuous pumping, decreasing backups by lifting influent directly at the entry point, without water loading. Because the system handles influent as it arrives, rags, fats, oils, and greases (FOG) have no chance to solidify and collect near the pump's inlet.

APPLICATIONS

- Sewage and solids handling
- Stormwater management
- Wastewater
- Lift / pump stations

ELIMINATE THE WET WELL AND IMPROVE SAFETY

The OverWatch system creates safer working conditions for maintenance crews and reduces environmental impact. Because influent is contained within the system, it never becomes atmospheric. As a result, there is no buildup or exposure to hazardous odors, bacteria, or hydrogen sulfide (H_2S) gases; work safety is optimized.

NO DOWNTIME FROM A CLOGGED PUMP

Redundant dual pump design maximizes reliability to reduce maintenance and extend the life expectancy of the system. Simplified installation and maintenance means no more screen cleaning and cost savings!

SELF MONITORING SAVES TIME AND MONEY

The OverWatch smart sensing system is designed to improve operational efficiencies as it adjusts in real time to manage flow, detecting and removing clogs without human intervention.

PATENTED DIP CUT® IMPELLER

Variable vane, vortex impeller design features hinged vanes that fold flat exposing shredding blades when operated in reverse rotation. When an elevated torque level above the threshold value is detected, the smart, self-monitoring variable frequency drive reverses the direction of the impeller rotation, changing its function to shred and remove the clog without human intervention, all without losing its high hydraulic pumping efficiency.

CASE STUDY: SHERMAN, NEW YORK

This rural community is home to 730 residents and a lift station that caused twenty-six hours of maintenance each year to remedy frequent pump clogging and weekly bar screen cleaning. The 36-inch silo access descending 20 feet into the ground compromised worker safety.

Solution: One OverWatch® System replaced two submersible pumps previously used to lift influent to the plant headworks, converting the pit into a dry well. Total annual cost reduction is nearly \$8,500 in vacuum truck rental, removing clogs, manual bar screen cleaning/raking, and preventative maintenance, reducing total overall maintenance to twenty minutes over four years. ■

For more information, visit

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In Hamilton's latest line of new industrial wheels, U-Grooved Track Wheels are designed for easy rolling along straight or curvy tracks or pipes. With a capacity range of 1,000 to 7,000 pounds, U-Groove Wheels are a great solution when working with crane cables or pulleys, or using rolling gates and doors. They're also common in food services, washdown, and other industries where tubed tracks are commonplace. For more information, visit www.hamiltoncaster.com.



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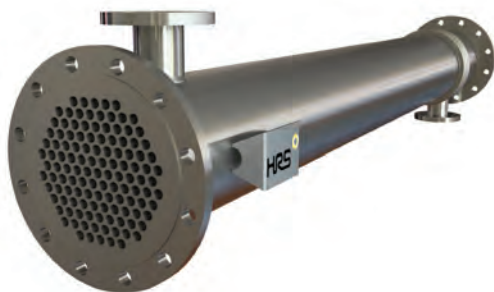
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The RuptureSeal family of leak stopping devices are easily deployed in seconds to form a secure mechanical seal that stops leaks for hours. This unique technology is fully functional in just twenty seconds, far faster and cleaner than any other method, including wooden bungs or screw plugs. This fast deployment time is crucial to reduce environmental impact and cleanup costs. RuptureSeal products are available in four sizes and are compatible with over 40,000 substances. For more information, visit www.denios-us.com.

ATLAS COPCO

CPC PUMPS INTERNATIONAL BB5 PUMP

Already well known for its wide range of niche pumps, the Canadian-headquartered CPC Pumps International extends its product range by launching its first-ever BB5 pump. Applications for CPC centrifugal pumps are traditionally in the wider refining and petrochemical industries. The addition of the BB5 is particularly timely, primarily because one of its major applications will be in helping to sustainably lower environmental impacts. It will be used in processes central to lowering carbon emissions. For more information, visit www.bb5.cpcpumps.com.



HRS HEAT EXCHANGERS

C SERIES COMPACT MULTITUBE HEAT EXCHANGERS

Sometimes the biggest constraint on the choice of heat exchanger is the space available for its installation. However, in such situations it is important to ensure that the thermal performance is still suitable for the chosen use. This is exactly the rationale for the introduction of the HRS C Series of compact multitube heat exchangers. The smaller tube diameter means that more tubes can be fitted into each unit, meaning that heat transfer is more efficient. For more information, visit www.hrs-heatexchangers.com.

HRS HEAT EXCHANGERS

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Currently at work for Houston, Texas's largest wastewater treatment facility, the 69th Street Wastewater Treatment Plant, Centrisys/CNP CS21-4HC decanter centrifuges include Rotodiff hydraulic scroll drive, the highest G-volume and torque capacity, a feed capacity up to 225 gallons per minute, the lowest installed combined horsepower (90) in its size specification, and increased solids handling and reduced polymer consumption. Centrisys/CNP CS21-4HC decanter centrifuges also feature an auto lube system and are American designed and built. For more information, visit www.centrisys-cnp.com.



GREENE TWEED

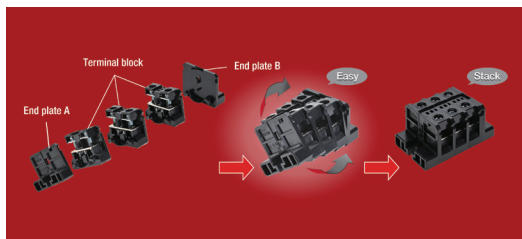
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Boasting superior strength and good compression set resistance, Chemraz® 541 is ideal for demanding applications such as those found in the chemical processing and oil and gas industries. Additionally, it offers remarkable chemical resistance, particularly in the presence of acids, amines, aromatics, distilled water, and steam. Chemraz 541 can operate at low temperatures of 3 degrees Fahrenheit (-16 degrees Celsius) and maximum temperatures up to 446 degrees Fahrenheit (-230 degrees Celsius). For more information, visit www.gtweed.com/materials/chemraz-541/.

GF PIPING SYSTEMS

9950 TRANSMITTERS

GF Piping Systems has added a six-channel option to its line of 9950 Transmitters with enhanced functionality and intuitive design. The 9950-10/11 provides sophisticated features to support a variety of functions for complete flexibility. The transmitter is easy to set up, and you can quickly adjust parameters and save time with its automatic sensor recognition. The modular design is fully configurable to fit any system's needs. For more information, visit www.gfps.com/9950.



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BTBH-H blocks are available in four different amp ratings—10A, 15A, 30A, and 50A—and can be ordered as individual components, or as complete assemblies by amp rating for two to thirty poles. The terminal blocks are assembled in a twist-and-snap-together fashion, without the need for special tools, connecting rods, or DIN rails, resulting in a very low installation height. Users can easily add or remove terminals at any time. For more information, visit www.idec.com/usa.

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Murrelektronik surge suppression devices help protect and lengthen the life of motors, contactors, relays, solenoids, and PLC outputs. These new surge suppression devices support a variety of applications and provide protection from voltage spikes and electromagnetic noise caused by inductive loads. New additions include universal surge suppressors that reduce high voltage spikes created when contactor coils are de-energized. For more information, visit www.murrelektronik.com.



KROHNE

OPTISWITCH 6700

The Optiswitch 6700 is Krohne's newest capacitance level switch. The Optiswitch 6700 offers the same point-level detection of liquids and solids as their previous models, now with 10-Link communication. Offering high- and low-level detection, the Optiswitch 6700 is ideal for overfill and dry-level protection. The Optiswitch 6700's double output can be individually programmed to monitor different processes or media, making it an ideal solution for adhesives and difficult products. For more information, visit www.us.krohne.com.

SCHMERSAL

COMPACT LIMIT SWITCHES

New Schmersal compact limit switches provide an affordable solution for a variety of object detection applications. Their small size allows easy installation in confined spaces. These rugged limit switches offer a 45-degree adjustable, die-cast zinc head, and a thermoplastic housing. Several actuator styles are available, including plunger, plunger with roller, side rotary lever with roller, and adjustable rod. Schmersal compact limit switches are available with N.O. and N.C. contacts and snap or slow break-before-make action. For more information, visit www.schmersalusa.com.



TRUMETER

ADM200 ADVANCED GRAPHICAL PANEL METERS

The easy-to-read Trumeter ADM series of graphical panel meters display critical parameters as well as provide a user-programmable scale and custom alarm messages, which will immediately alert operators when a parameter is out of range. Trumeter ADM200 advanced graphical panel meters feature a large 4-inch display with a color-changing, full-color RGB backlight for instant alerts. Select models offer digital and analog outputs, Modbus RTU/TCP communication, and an IP65 protection rating. For more information, visit www.trumeter.com.

WHO WILL SPARK AMERICA'S NEXT MANUFACTURING BOOM?

Shale Crescent USA's Greg Kozera on which regions show potential



Greg Kozera is a professional engineer and an environmentalist with more than forty years of experience in the natural gas and oil industry. He is also director of marketing for Shale Crescent USA, a non-profit economic development, marketing, and research organization focused on creating jobs by promoting the abundant natural resources available in Ohio, Pennsylvania, and West Virginia. Below, Kozera lays out the case for a return to domestic manufacturing of plastic-based goods.

MPT: *What are some of the big changes you see for U.S.-based manufacturing?*

GREG KOZERA: There's been a long-held belief that plastic-based goods are cheaper to import than manufacture locally. But a recent study from Shale Crescent USA dispels that. It revealed that the low-cost gas and natural gas liquids flowing from the U.S. shale gas revolution have the potential to turn the \$53 billion U.S. plastics importing industry on its head.

MPT: *Which regions appear best positioned to take advantage of this future?*

GREG KOZERA: The Midwest and Northeast are uniquely positioned to fuel further growth in U.S. manufacturing. Of the \$53 billion in imports, nearly half originate in Asia, with China alone accounting for \$25 billion.

The pandemic showed how dependent we were on China for essential products. U.S. companies responded. Companies aren't coming here just to be patriotic or to help consumers. We are seeing reshoring of manufacturing.

MPT: *What advantages are located to these regions?*

GREG KOZERA: No longer known as the Rust Belt, the Ohio River Valley states of Ohio, Pennsylvania, and West Virginia form a region that is unique for manufacturers. It is the only

place in the world at scale where a company can build on top of its energy and feedstock and in the middle of its customers, thus eliminating unnecessary transportation.

Ohio businesses and manufacturing facilities are located within a day's drive of 50 percent of the U.S. population and over 70 percent of the end-to-end plastics industry supply chain. That same radius also captures over one-third of the country's natural gas production, creating substantial environmental advantages by eliminating the need for lengthy, fragile global supply chains, and their associated greenhouse gas emissions.

MPT: *What other insights did your study reveal?*

GREG KOZERA: The Shale Crescent USA study also found that forces of supply and demand are positioned to positively impact U.S. resin prices. The United States is a net exporter of polyethylene and China is a net importer. The United States uses low-cost natural gas to produce resin while China uses more expensive oil-based naphtha.

Ohio, West Virginia, and Pennsylvania combined now produce over one-third of U.S. natural gas supply and over one and a half times more natural gas and natural gas liquids than the entire country of China.

MPT: *In addition to natural resources, what other benefits can the domestic market provide?*

GREG KOZERA: Another revealing aspect of the study is Ohio's advantage in the realm of workforce demands and labor rates. There has been a tenfold increase in China's manufacturing wages over the past twenty-five years as well as ongoing annual wage increases. ■

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



PUMP PACKING 2.0

INTRODUCING THE

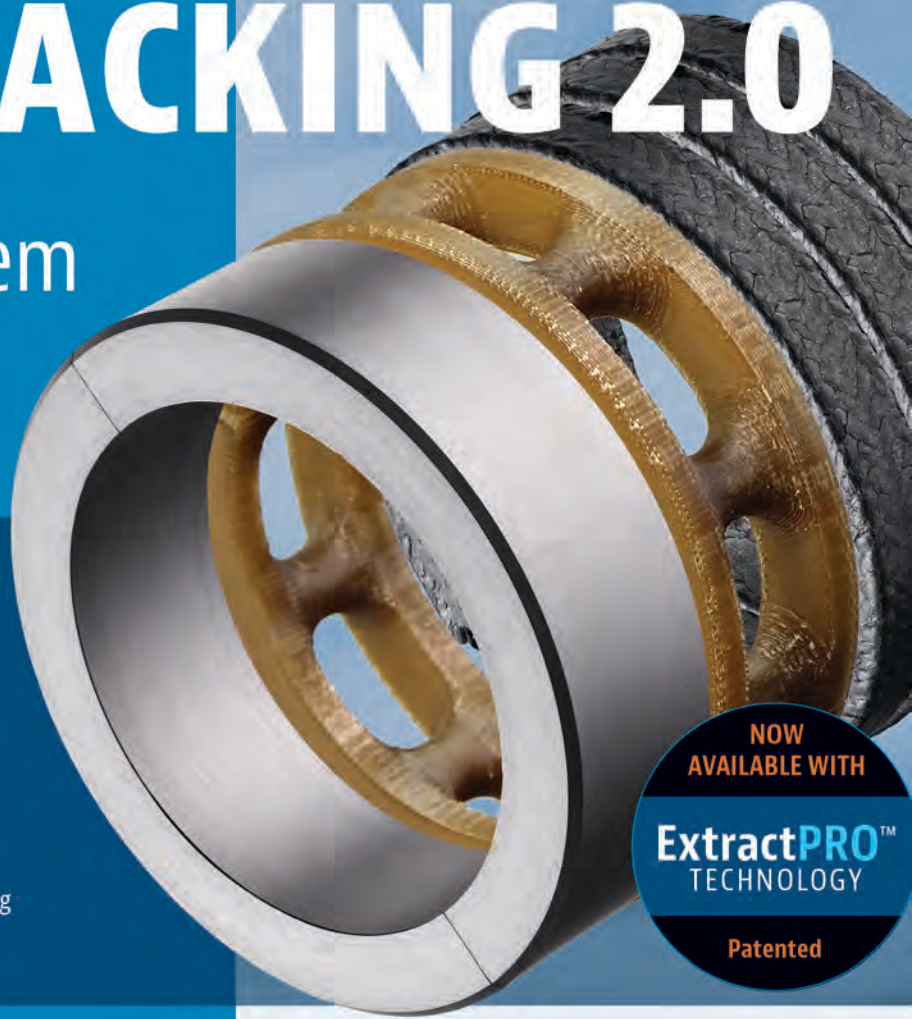
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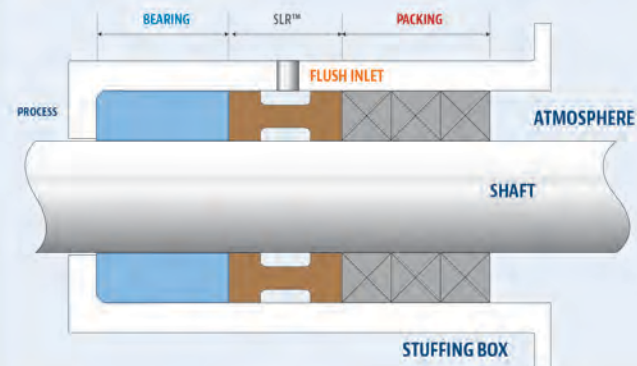
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Components for the Pump Industries.



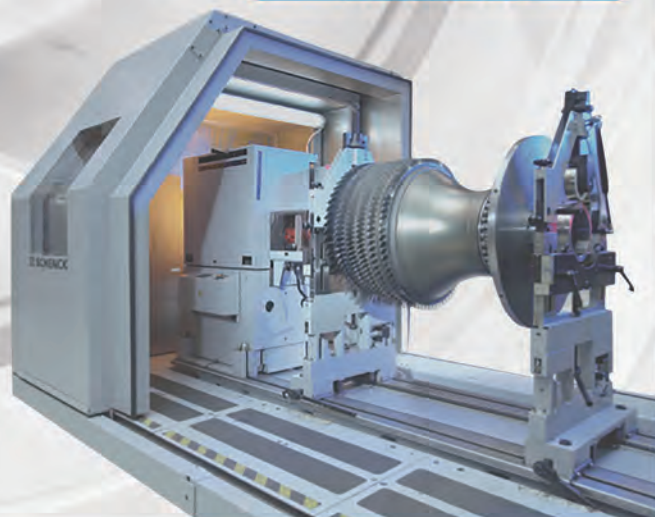
- Field Balancing
- Machine Diagnosis
- Condition Monitoring
- Predictive Maintenance



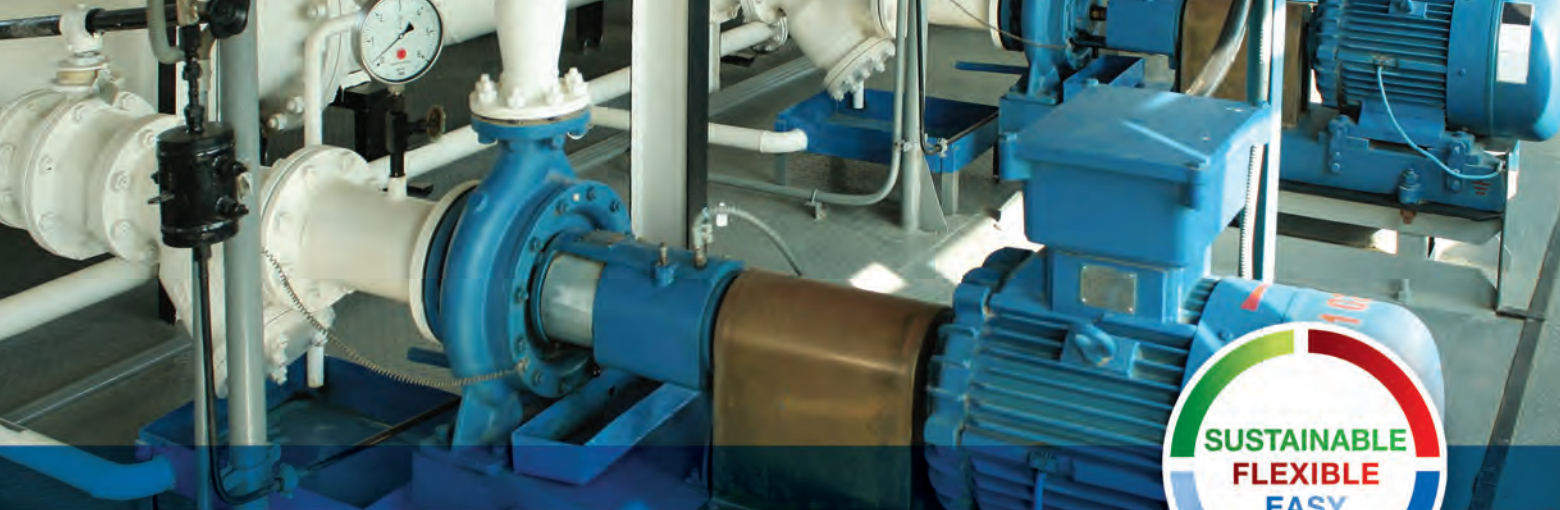
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BALANCING



SPIN TESTING



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