DECEMBER 2021

MPT

MODERN PUMPING TODAY®

PROVIDING SOLUTIONS FOR THE WORLDWIDE PUMP INDUSTRY

2021 Top Products SHOWCASE

SEWER MAINTENANCE

HANDLING TOUGH BLOCKAGES EFFICIENTLY

VARIABLE FREQUENCY DRIVES

TO SUCCEED, CONTROL YOUR SPEED

FOG SOLUTIONS FOR PROCESSING

NEW TECHNOLOGY INCREASES PRODUCT RECOVERY

WWW.MPTMAG.COM

Call for a quote!
Financing options available.

The parts you need... When you need them.

Thelco supplies all of the turned parts, gaskets, shims, investment cast impeller lock washers, mechanical seals, and many cast parts for Worthington® and Flowserve® pumps. Our expertise paired with a vast inventory of thousands of available parts, and quick turnaround time shipping domestically and internationally (usually within twenty-four hours of order) helps support production across a wide variety of industries. Thelco also removes barriers to getting the job done quickly without the worry of an unexpected expense with pain-free financing options.

303-761-7616

thelco.parts@thelco.com

www.thelco.com

2390 West Dartmouth Avenue • Englewood, Colorado 80110

Making it easy to get what you want

Let's face it, there's never a good time for failed equipment, especially when it's preventable. Clogged pumps lead to downtime and downtime leads to frustration, to say the least. With thousands of installations solving clogging issues, the XFP submersible pumps, utilizing the Contrablock Plus system, have proven themselves to prevent problems before they even start. With superior solids and rag handling and lower maintenance costs for long-term reliability, the choice is easy when it comes to replacing your failing equipment.

And to make it even easier, the XFP is available with a wide range of competitor retrofitting solutions for drop-in replacements, saving time and costly rehabilitation of a pump station. From retrofit brackets to controls to custom solutions, Sulzer makes it easy to get what you want. Don't you think it's time for change?

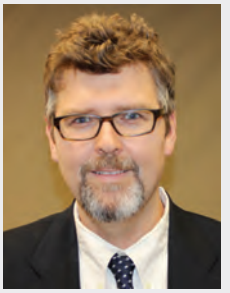
Time for Change

www.sulzer.com

SULZER

Cover image courtesy of Thelco.

A NOTE ON THIS ISSUE:



J. Campbell, Editor
Modern Pumping Today

Happy holidays, and thank you for closing out 2021 with MPT. In our Case Studies section, Brett Robison of Kurita America shares how a large beef processing facility located in the upper Midwest implemented his company's feed-forward approach using S.sensing CS technology that significantly increased incremental revenue and production capacity (pg. 18).

When you think of steam, perhaps an image comes to mind of an outdated and unused technology; however, the use of steam for a variety of industries is more common than many people realize. In "Condensate Return Pumps: Design Considerations" (pg. 38), Eric Sengheiser of Control Products Inc. illustrates how condensate pumps in steam systems have a valuable contribution for today and the future.

Lastly, each December, the staff at MPT looks back on the year that was and presents our choices for the Top Products of the year (pg. 49). Our selections span the industrial pump and rotary equipment markets and speak to the sector's needs for efficiency, reliability, and innovation. The products range from large multinationals you're likely familiar with to smaller, regional suppliers worthy of your attention—all offering value you can take into the new year. Enjoy!

MPT
Modern Pumping Today®

WWW.MPTMAG.COM
P.O. Box 660197 | Birmingham, Alabama 35266

J. CAMPBELL *Editor*
jay@mptmag.com

TONYA BROWNING *Vice President*
tonya@mptmag.com

JEFF FLETCHER *National Sales Manager*
jeff@mptmag.com

LISA AVERY *Art Director*

SETH SAUNDERS *Digital Media Specialist*

INGRID BERKY *Office Manager*

SUBSCRIPTIONS
For all changes, go to:
WWW.MPTMAG.COM
Click the SUBSCRIPTIONS button in the main menu

HIGHLANDS PUBLICATIONS

WWW.HIGHLANDSPUBLICATIONS.COM
312 Lorna Square | Birmingham, Alabama 35216
866.251.1777

TIM GARMON
CEO

RUSSELL HADDOCK
President

CHRIS GARMON
CFO

DONNA CAMPBELL
Vice President, Editorial

TONYA BROWNING
Vice President

FLUID SEALING ASSOCIATION FSA

@modpumpmag

CLOGS?

NOT ON OUR WATCH.

Chopper

When the going gets tough, turn to the toughest pump on the planet. Since 1960, the unrivaled Vaughan Chopper Pump has been on the cutting edge. This original chopper pump was built first and made to last.

Choose the unmatched reliability of Vaughan. Ask about our free trial program and on-site demos.

Vaughan
Unmatched Reliability

MADE IN AMERICA

888-249-CHOP | **ChopperPumps.com**

EXPEDITED DELIVERY | SIX CHOPPING FEATURES | FLUSHLESS MECHANICAL SEAL

DECEMBER 2021

CONTENTS

INDUSTRY NEWS

What's Happening in the Industry 6

TRADE SHOW PROFILE

PowerGen International 12

Bold plans invigorate the power industry's standard-bearer event

CASE STUDIES

Ease of Use Key to Replacing Aging Substation RTUS 14

Electric utility successfully navigates challenges of replacing legacy equipment

Improving Efficiency and Profitability Through Recovery 18

Kurita's S.sensing® CS technology increases lost product recovery for meat processing plant

WATER & WASTEWATER FOCUS

The Right Equipment Won't Chicken Out 22

Across the myriad obstacles in poultry processing, Landia pumps and mixers deliver

MAINTENANCE & RELIABILITY

Sewer Maintenance: Handling the Toughest Blockages—Efficiently 26

Using a camera nozzle and chain cutter together can free up even total obstructions

The Network Infrastructure for Industry 4.0 30

As smart technologies take over plant operation, SPE's stability shines Part 1 of 2

PUMP SOLUTIONS

Hydra-Cell Innovation Has a New Home 34

Introducing Wanner's Technical Center of Excellence for industrial pump development

Condensate Return Pumps: Design Considerations 38

Determining the right selection for the application depends on many factors

MOTOR SOLUTIONS

To Succeed, Control Your Speed 42

Using medium voltage VFDs to eliminate waste and promote efficiency, reliability, and quality Part 2 of 2

SEALING SOLUTIONS

Effective and Efficient Processing Technology for Quality Control 46

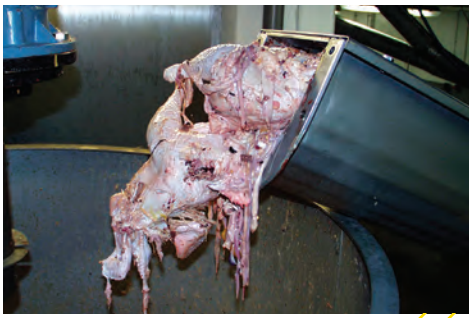
Exploring the growth of plant-base milk offers a case study in sterilation

SPECIAL SECTION

2021 Top Products Showcase 49

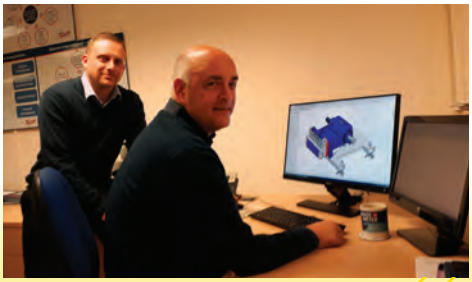
14

18



22

26



34

PEDROLLO®
the spring of life

ITALIAN PREMIUM QUALITY WATER PUMPS SINCE 1974

- **Manufacturer of a Complete Range of Electric Water Pumps, Motors, Electronic Controls including VSD and Pressure Systems**
- **Family-Owned and Managed Company**
- **100% Made in Italy**
- **Excellent Reliability**
- **Innovative Designs**
- **High Quality, Efficiency and Performance**

PEDROLLO USA
2301 Traffic Street NE - Minneapolis, MN 55413
Email: Info@Pedrollo-USA.com - Phone: 877-PEDROLLO / 877-733-7655 - Website: www.pedrollo.com

WATSON-MARLOW ANNOUNCES NEW U.S. MANUFACTURING FACILITY

Watson-Marlow announces that construction on a new state-of-the-art manufacturing facility in the United States, with first production due in late 2022. Following an announcement made earlier this year, the company states the new facility which will be dedicated to its range of industry leading products, including peristaltic pumps, tubing, fluid path solutions, and BioPure components.

Part of Spirax-Sarco Engineering plc, a FTSE100 Company, Watson-Marlow specializes in high-quality fluid management solutions for the life sciences and process industries. This significant investment in the expansion of its manufacturing capacity will support the company's future growth in the Americas.

Located in Devens, Massachusetts, the 150,000-square-foot facility will be close to the life sciences hub in the Cambridge/Boston area. The site will incorporate a suite of eight ISO14644-1 Class 7 cleanrooms, warehousing, and offices, with space for two further cleanrooms within the initial footprint. With segregated cleanroom and non-cleanroom production capabilities, Watson-Marlow's new U.S. facility will strengthen the support the company provides to customers in the region across its core sectors of pharmaceutical and biotechnology, medical diagnostics, and process industries.

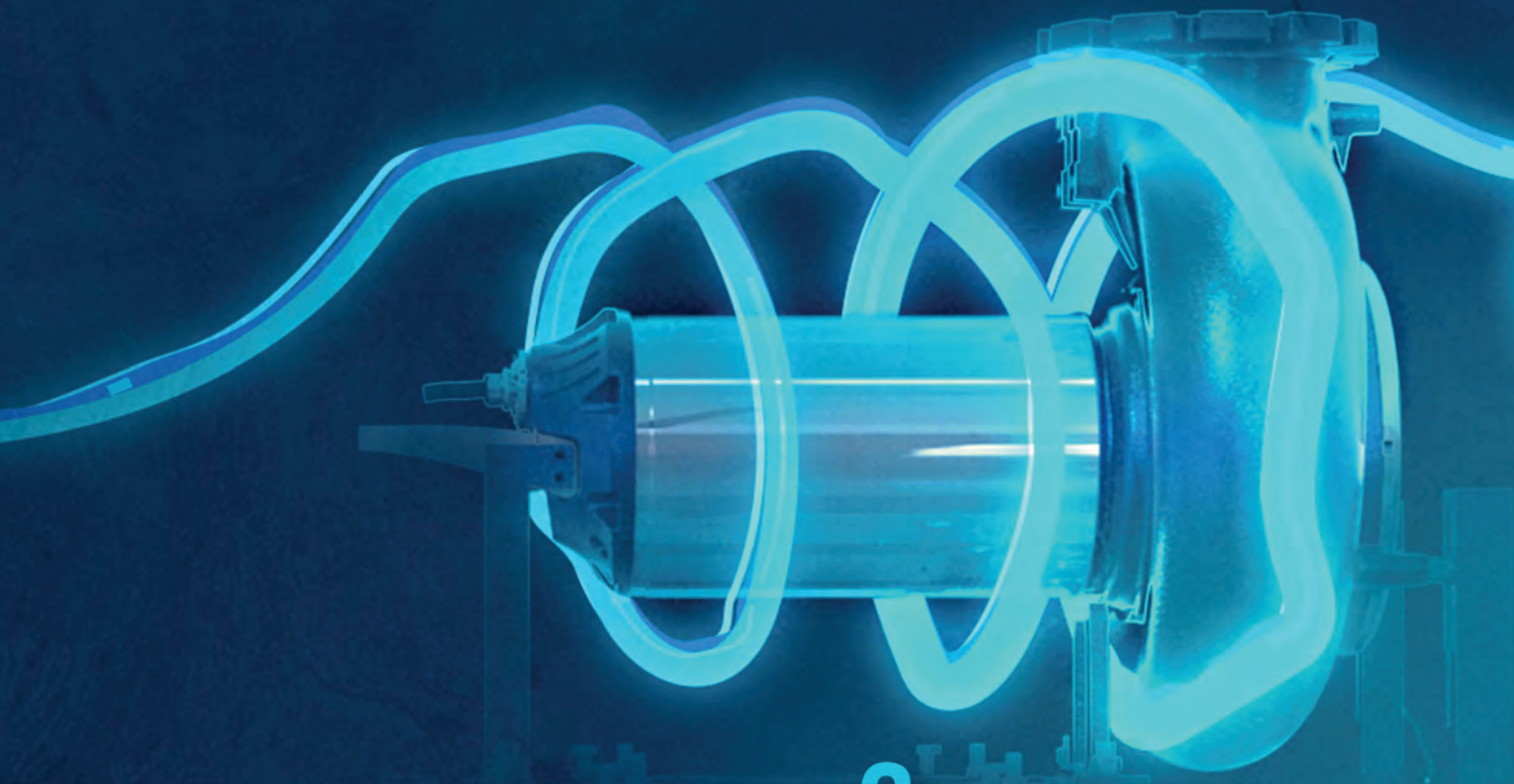
SULZER ANNOUNCES BATON ROUGE SERVICE CENTER EXPANSION

To widen support for operators of rotating equipment in the U.S. Gulf Coast area, Sulzer announces the expansion of its Baton Rouge Service Center in Louisiana. The new purpose-built addition to the existing facility will enhance the service capabilities of the center–which specializes in repairs and reengineering for all types of rotating machinery including pumps and small steam turbines.

The expansion will add 7,200 square feet of floor space to the existing 10,500-square-foot service center. New cranage will double the current lifting capacity from 10 to 20 tons, with a large blasting and paint booth to be added. Additional machining capacity will also further increase the number of repair and reengineering projects that can be carried out at the same time. As well as adding equipment and space, Sulzer plans to hire new mechanics, machinists, office staff, sales teams, and apprentices from the local area.

Glenn Doerksen, president pump services North America at Sulzer, adds, "We are already the premier provider of maintenance and overhaul services for rotating equipment including pumps and small steam turbines. However, we are always looking to further strengthen our capabilities to increase our offering to customers."

ARE YOU ENVIEOUS YET?



envie^3 AIR FILLED MOTORS

FOR SUBMERSIBLE & DRY PIT APPLICATIONS

envie3.cranepumps.com

CRANE PUMPS & SYSTEMS | BARNES DEMING

XYLEM REPORTS THIRD QUARTER 2021 RESULTS

Xylem Inc. reports its third quarter 2021 revenue of $1.27 billion. Revenues grew 4 percent on a reported basis, and 2 percent organically. Strong global demand was moderated by supply constraints slowing order-to-revenue conversion.

Third quarter adjusted earnings before interest, tax, depreciation, and amortization (EBITDA) margin decreased 30 basis points to 17.9 percent. Inflation and strategic investments were partially offset by productivity, price realization and cost containment. Xylem generated net income of $114 million, or $0.63 per share, and adjusted net income of $116 million, or $0.63 per share, which excludes the impact of restructuring, realignment and special charges.

"Global demand for water solutions continues to be robust, across our business," says Patrick Decker, Xylem's president and CEO. "The team capitalized on that broad-based underlying demand, delivering strong growth in new orders and backlog in all segments. This positions us well to achieve our 2025 growth and strategic milestones, which we outlined at our investor day, last month."

"The team has done an outstanding job managing inflationary effects with productivity and cost discipline, delivering solid margin and earnings performance," continues Decker.

IMUBIT NAMES NEW GLOBAL SALES TEAM MEMBERS

Imubit, a leader of artificial intelligence (AI) process optimization for refiners and chemical operators, appoints Kelly Harred as vice president of customer success and Roland Schneefuss as vice president and head of global sales.

Bringing thirty years of industry and software experience serving customers, building high-performance teams, and fostering operational excellence, Harred will be responsible for leading her team to ensure clients are successful in accelerating, maximizing, and sustaining value through Imubit's end-to-end technology and services solutions.

Schneefuss will be responsible for revenue growth and go-to-market strategies. He has more than fifteen years of experience in leading presales, solution delivery, and consultancy for enterprise-level software solutions and professional digitalization consulting services to companies in the oil and gas, power, utilities, chemical, pulp and paper, and other process manufacturing industries.

Gil Cohen, Imubit's CEO, adds,, "Roland has extensive experience of leading the growth of direct and indirect sales in a wide variety of industries. Kelly brings a wealth of strategic management experience, and also led the development of products and services as a senior manager at Accenture."

SIMPLE, INTELLIGENT, EFFICIENT!

ADXL... SERIES

- two phase control
- UL rated current 30A...320A
- UL rated motor power 20HP...250HP (480VAC)
- rated operational voltage 208...600VAC
- torque control (included)

- conformal coating on the boards
- backlit LCD display
- reduced voltage starter with torque control and built-in bypass relay
- maximum starting current
- optical port for programming, data downloads and diagnostics
- NFC technology for parameter programming
- remote control via supervision software
- Modbus-ASCII and Modbus-RTU communication protocols
- RS485 communication with optional card
- quick installation with AUTO SETUP.

Lovato electric
ENERGY AND AUTOMATION

www.LovatoUsa.com

Google play
Download on the App Store

LOVATO ELECTRIC INC. - 2017 Georgetown Blvd. - CHESAPEAKE, VA 23325 UNITED STATES - Tel. +1 757 545-4700 - Fax +1 757 545-2900 - info@LovatoUsa.com

INTELLIHOT ANNOUNCES FINANCING TO ADVANCE INNOVATIVE GREEN TECHNOLOGIES

Intellihot announces that it has raised $50 million in growth financing led by investors Aegon Asset Management and the Avenue Sustainable Solutions Fund. Intellihot is focused on creating breakthrough technologies to disrupt the $81 billion global HVAC market and plans to expand internationally.

Intellihot's innovative, AI-enabled green technologies are used around the country by large facilities including hotels, restaurants, stadiums, hospitals, and more. Current Intellihot customers include Hilton, Marriott, Hyatt, Benihana, the New York City Housing Authority, and Levi's Stadium, home of the NFL's San Francisco 49ers.

The growth financing will be used to expand Intellihot's sales, marketing, and operations capabilities, propel the company's research and development of advanced sustainable technologies, and increase production and scaling of existing products. As part of the planned expansion, Intellihot will add fifty new positions over the next two years, a 50 percent increase in company headcount. A significant portion of the expanded team will be based in Intellihot's new Chicago headquarters slated to open in 2022.

"If we as a society have learned anything from COP26, it's that we can't wait to implement climate solutions and cut emissions," says Sridhar Deivasigamani, founder and CEO of Intellihot.

KSB WELCOMES BARNEY'S PUMPS, INC. AS NEW SALES REPRESENTATIVE

KSB, Inc. announced Barney's Pumps, Inc. as its exclusive sales representative throughout most of Florida. Barney's Pumps, with locations in Lakeland, Coral Springs, and Jacksonville, has been in business for seventy years and has more than eighty industry experts and professional engineers.

KSB is a leading international manufacturer of pumps and valves for water and wastewater, general industry, amusement parks, and power generation markets. KSB began operations in 1871 in Frankenthal, Germany. Today, KSB has 15,600 employees worldwide and generates annual consolidated sales revenue exceeding $2.8 billion. KSB's Southeast Water Market Regional Manager Nick Abbatiello states, ''We are excited to partner with Barney's Pumps and doing our part to further reinforce Barney's outstanding reputation and build upon the relationships they hold with their customers.''

Barney's Pumps joins KSB, Inc.'s network of twenty-nine authorized representatives serving the water and wastewater industry in United States with pumps, mixers, and engineering expertise.

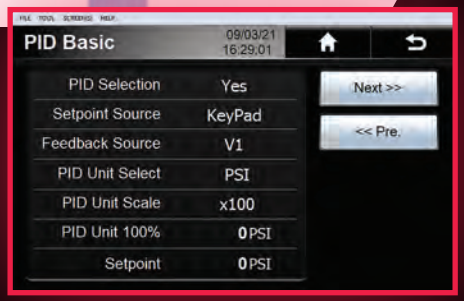
LS ELECTRIC

PLAY VIDEO

THE H100+ game CHANGER

Most sizes in stock and ready to ship!

Contact us today to try yours soon!



EASY PID setup with LS HMI and free PUMP program! Get up and running FAST!

POWER: 1 HP to 800 HP

PERFORMANCE: Best in Class Pumping VFD

EASE-OF-USE: Macros w/Keypad – GOOD!

HMI with FREE Program – BEST!

STOCK: Chicago, IL U.S.A.

www.LSelectricAmerica.com

1-800-891-2941 | sales.us@lselectricamerica.com

POWERGEN INTERNATIONAL

Bold plans invigorate the power industry's standard-bearer event

PowerGen is the largest network and business hub for electricity generators and solution providers engaged in power generation. Power producers, utilities, EPCs, consultants, OEMs, and large-scale energy users gather at PowerGen International to discover new solutions as large centralized power generation business models evolve into cleaner and more sustainable energy sources. The year-round platform of digital education, current and breaking industry news, thought leadership articles, quality matched meetings, and industry-leading live events provide a hub for power generation professionals to learn and network.

SETTING THE STANDARD, AGAIN

PowerGen is the industry standard and resources for electricity professionals to collaborate, connect, and meet with solution providers supporting the clean energy transition through digitalization, decarbonization, and efficiency while continuing to feature unparalleled opportunities in equipment and manufacturing. PowerGen creates a progressive environment for its core audience looking to evolve while attracting new energy professionals embracing the clean movement towards "Destination 2050."

PowerGen International is committed to helping find a path from where the industry is now and the current challenges it is facing to new emerging areas and future-leading trends. The event engages new and

POWERGEN INTERNATIONAL AT A GLANCE

WHEN: January 26-28, 2022

WHERE: Kay Bailey Hutchison Convention Center, Dallas, Texas

WEBSITE: www.powergen.com

repeat attendees in an emotional, innovative experience that facilitates valuable connections and meetings and helps participants find more of what they are looking for.

CONFERENCE SESSIONS

The PowerGen International Conference Sessions consist of technical deep dives on sector critical topics, with each stream focusing on a vertical discipline. Presentations may include case studies and/or technical papers, providing subject matter experts and thought leaders with the opportunity to share knowledge and engage in meaningful discussions with counterparts. Sessions will cover topics that are important to personnel tasked with building, operating, and maintaining power plants.

These sessions are vetted and curated by an advisory committee and in-house content team for excellence and thought leadership. The content is presented in a variety of formats including sixty- and ninety-minute technical workshops and seminars, panel discussions, presentations, and case studies.

The seven-track conference brings industry thought-leaders from all over the world to network, share knowledge, and problem solve with utilities and product and service providers. The topics covered are relevant and timely, answering the current call of the market each year.

WHERE THE BUSINESS HAPPENS

Hundreds of companies fill the exhibit hall with products, technologies, and knowledge providing solutions for the generation industry. Attendees benefit from PowerGen International's unrivaled access to the industry's decision-makers, innovators, and next generation of entrepreneurs.

PowerGen International continually focuses on bringing it all back to one-on-one engagement and relationship building. That is one of the defining characteristics for the event. From the breakfast roundtables to start attendees' day to exciting joint networking parties, attendees will walk away with a slew of new business contacts.

THE FIRST STEP TOWARD DESTINATION 2050

PowerGen International guides energy professionals along that pathway toward transformation; technology experts, utilities, engineers, suppliers, decision-makers, and thought leaders are invited to attend and learn valuable lessons from current and historical projects, as well as cast a forward-thinking eye toward the opportunities and possibilities that lie ahead over the next thirty years.

NovaTech Automation provides training to engineers.

EASE OF USE KEY TO REPLACING AGING SUBSTATION RTUS

Electric utility successfully navigates challenges of replacing legacy equipment

BY BRYAN GEHRINGER, NOVATECH

Support challenges associated with aging and obsolete remote terminal units (RTUs), combined with built-in cybersecurity and expanded functionality in modern RTU designs, are accelerating utility efforts to replace legacy hardware. The increasingly critical role of the substation RTU, notably in bulk and transmission substations, underscores the importance of ease of use, high performance, interoperability and scalability. The experience of a major U.S. utility in upgrading their legacy RTUs is described in this article.

"When we began to look at replacing our RTUs, our oldest terminals had been in use for more than twenty years," reports an engineer at a major U.S. utility in the Southwest.

"Because of all that is involved in replacing our RTUs, we had been hesitant to initiate a search for a replacement system but when our vendor discontinued the type of platform that we utilize, we had to make a change and it became an opportunity to really consider our long-term needs."

KEY IMPLEMENTATION CONSIDERATIONS

The utility initiated their RTU replacement search by issuing a request for information (RFI), followed by a request for proposal (RFP) to the top five vendors that most closely matched their requirements. "Ease of use" was heavily weighted.

For this utility, ease of use meant five things: 1) how easily the new RTUs could be configured to meet specific utility needs, 2) the ease of installation and integration with existing hardware and systems, 3) how easily field engineering and support staff could be trained, 4) quality of supporting documentation, and 5) how easily the system could be maintained.

"In a RTU replacement project, you are not just replacing terminals but impacting everything around it too," says the engineer. "It's the RTU, the chassis components, the power supply, the I/O and the cabling. You

have to know all of it and so there's a lot of training that is required with a project of this scope."

As a result, ease of use and training were key factors in overall vendor selection. Because of the complexity of the legacy platform (due to the number of connections, amount of hardware, as well as software and logic-building nuances), the utility was concerned it would require extensive training for any new engineer or designer. They did not want to risk having team members unprepared because they were overwhelmed by a new system.

"Historically, it can take a new technician or engineer two to three years to truly learn a platform well enough to go out on site on their own," says the engineer. "Since we have a six-month rotational engineering program, we really needed the ability to effectively and quickly train our team in RTU set up and configuration with all the necessary documentation and customer support to be successful going forward."

Because this utility has a large RTU fleet, ease of maintenance, particularly for its software and firmware, was also rated highly. "Live firmware updates, security patches for new vulnerabilities and feature upgrades to a live system are extremely important, but these can be cumbersome to execute," says the engineer. As a result, the utility reviewed each vendor's firmware history as part of their RTU evaluation process to gauge what they could expect in the future.

Form factor also played a role in assessing overall ease of use. Older substations may not have been built with the capacity to expand in the future. Older legacy RTUs are also heavily hardwired, sometimes requiring a half to a full day in cutover time.

"Everybody is trying to look for a form factor that is similar to what they already have," says the engineer, "The reality is that what you are switching over to will likely not need as much wiring as your legacy RTUs. What is desirable is to be as plug-and-play as possible so you can reduce the amount of cutover time to the new RTUs. Our goal was to get operations back up and running as soon as possible."

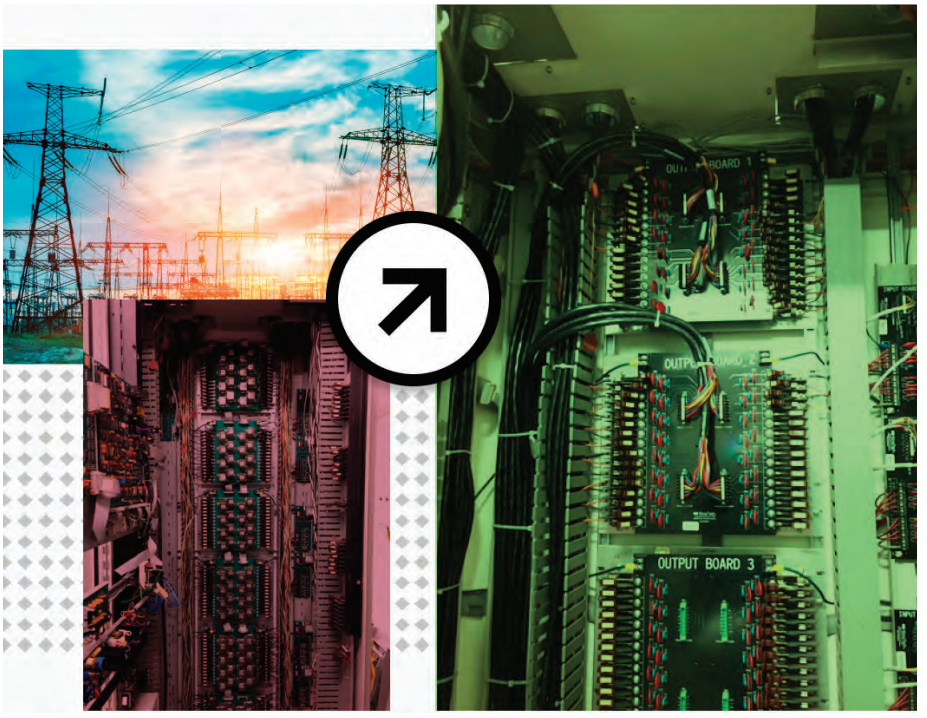
SELECTION OF A REPLACEMENT RTU SYSTEM

From the five vendors participating in the RFP and evaluation process, the utility chose the NovaTech OrionLX automation platform for the RTU and HMI replacement portion of the RFP. NovaTech is a leading provider of substation automation solutions for new and retrofit installations.

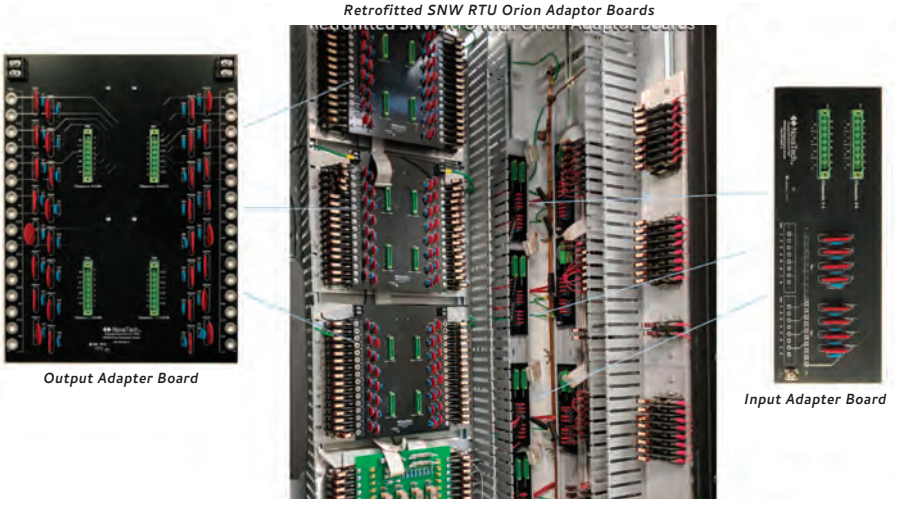
Prior to the upgrade, the utility legacy configuration included a customized HMI in every transmission and distribution substation. While the Alarm pages made it easy for technicians to identify events in real time, the annunciator graphics program was cumbersome to edit, and to build new pages. Furthermore, the legacy HMI used a database separate from the RTU database, increasing overall configuration efforts. A better design was needed.

"One of the features that we like about the OrionLX RTU is the ability to build a page in minutes and then test and get the page working extremely quickly—usually within an hour," says the engineer. "Even our most experienced engineers were pretty impressed."

Configuration of the NovaTech OrionLX-based RTU—including the I/O system, the alarm tile annunciator,



NovaTech Automation provides retrofitting of legacy RTUs for customers.



NovaTech Automation adapter board for legacy systems northwest input and output cards.

math and logic routines, and IED data access—is accomplished through NovaTech Configuration Director (NCD), a license-free tool used for Orion models. NCD eliminates most configuration efforts by providing pre-configured pick lists for over 250 commonly applied intelligent electronic devices (IEDs).

The utility need for future operability and scalability are also addressed by the Orion platform, which is offered in a range of models for pole top applications, distribution substation applications and transmission substation applications. All models are provided with identical firmware and configured with the same NCD tool. Moving to a larger or smaller platform is a matter of transferring the configuration and editing a few hardware-specific parameters. In addition, new protocols (e.g., IEC 61850, ICCP, etc.) and software options (email, IEC 61131, etc.) are modular, and can be added easily, in many instances, without requiring a firmware upgrade.

GETTING IT RIGHT

The challenging tasks of keeping the data flowing reliably between the RTU system and the utility enterprise is now complicated with aging and obsolete infrastructure. The engineer concludes, "Planning for our future power needs through the replacement of legacy RTU systems in our utilities enables us to continue to play our part."

BRYAN GEHRINGER is senior application engineer at NovaTech. At NovaTech Automation, we make it easier for electric utilities and process manufacturers to keep the lights on and food, fuels, and other daily essentials flowing. Our technologies and engineering expertise help them simplify tasks, reduce risk, and increase return on assets as their businesses—and the planet—evolve. For more information, call 913.451.1880 or visit **www.novatechautomation.com**.

BRING CALM TO THE STORM

THE U1000 INDUSTRIAL MATRIX DRIVE

Whether it's managing your systems after a big storm, or getting through your chaotic daily schedule, the Yaskawa U1000 Industrial Matrix Drive can bring calm to the commotion.

Make the complex simple. Our U1000 Industrial Matrix Drives are the smallest, fastest to commission low harmonic, regenerative drives on the market.

Want a fast commission? Call Yaskawa at 1-800-YASKAWA today.

FOR MORE INFORMATION:
https://go.yaskawa-america.com/1420

IT'S PERSONAL

YASKAWA

Yaskawa America, Inc. 1-800-YASKAWA
Email: info@yaskawa.com | yaskawa.com

IMPROVING EFFICIENCY AND PROFITABILITY THROUGH RECOVERY

Kurita's S.sensing® CS technology increases lost product recovery for meat processing plant

BY BRETT ROBISON, KURITA AMERICA

A large beef processing facility located in the upper Midwest, operated by a leading global meat producer, implemented Kurita America's feed-forward approach using S.sensing CS technology that significantly increased incremental revenue and production capacity.

PROBLEM

The client's state-of-the-art dissolved air flotation (DAF) system in their flagship beef processing plant could not consistently recover the level of fat, oil, and grease (FOG) possible from the wastewater stream. One to two pounds of oil and grease harvested per animal was escaping the plant uncaptured. Unused oil and grease are viewed by the industry as lagoon contaminants. However, at the same time, it's an opportunity to capture incremental revenue because recovered oil and grease can be sold as inedible tallow for profit.

Prior to working with Kurita America, the client injected coagulant and flocculant into their wastewater stream in hopes of achieving better FOG recovery at the DAF. However, without an effective method to fluctuate chemical injection volume based on variable wastewater flow and loading, or having the ability to accurately inject the exact volume of chemical necessary to recover all of the oil and grease available in the wastewater, their efforts were unsuccessful. They continued to record higher than desirable levels of FOG contaminants and total Kjeldahl nitrogen (TKN) in their lagoons, which reduced operating capacity.

Recovering FOG contaminants from wastewater for resale and achieving better lagoon health is a common challenge for most meat processing plants. Therefore, it is critical to find the right partner to provide the most effective solutions to optimize capacity and profitability. In this case, it became clear that without more sophisticated automation and control, capturing more lost product would not be achievable.

SOLUTION

Kurita America recommended applying S.sensing CS technology to address the client's challenges. The state-of-the-art approach included injecting chemistry through an intelligent system that continually records wastewater loading and flow. It also adjusts chemical injection volume instantaneously on the front end of the DAF system based on these changing variables. Kurita America demonstrated that while other water treatment providers use turbidity meters with a propensity

to foul, the turbidity probe used in conjunction with S.sensing CS technology does not. As an example, the Kurita team showed plant engineers an S.sensing CS probe completely covered in FOG buildup, however, it was still operating effectively. The plant engineers were interested to see if S.sensing CS technology could recover the additional one to two pounds of oil and grease that they were hoping to.

S.sensing CS automation technology controls fluctuating chemical injection rates based on influent wastewater loading and flow. This is a feed-forward approach to control and does not rely on simple turbidity measurement. While turbidity control can be effective, it does not compare to the precise control of S.sensing CS, where lost product capture gains offset the investment in the system. Coupled with cloud-based technology to allow for easy access to analytics, the S.sensing CS platform allows for fully automated operation with high-value data to support operational and investment decisions.

The Kurita America team determined the exact proportion of coagulant, flocculant, and pH control to achieve the highest recovery of oil and grease possible. Then they programmed the S.sensing CS unit to automatically adjust coagulant and flocculant injection, which allowed the plant to consistently achieve the optimal

proportion of chemistry based on data from the S.sensing CS technology.

The Kurita chemical approach included:

- KURIFLOC 2922 used as the primary coagulant
- KURIFLOC 3269 used as the flocculant
- KURIFLOC 2817 used for pH control

These steps allowed the plant to achieve optimal results, make instantaneous chemical feed changes, waste no chemical, and recover more oil and grease than the client had ever accomplished on a consistent basis. And, when operational upsets occurred or when influent plant water changed dramatically (often seen during a cleaning and sanitization event) the S.sensing CS system automatically adjusted in a way that no manual or turbidity-only based operation can accomplish.

RESULTS

Through this innovative approach, Kurita America was able to increase the client's lost product recovery by more than 30 percent, providing two more pounds of marketable oil and grease per animal, which resulted in a cleaner and healthier wastewater lagoon. The results were achieved in both normal operating conditions and upset scenarios. Interestingly, while gains of 1.2 pounds of FOG per head were noticed during normal operations, the gains during upset conditions proved to be most valuable, with 2-3 pounds of FOG per head captured.

As a result, the client increased their revenue in oil and grease sales and improved the overall health of their wastewater operation. The annualized revenue gains from the Kurita America feed-forward approach and S.sensing CS technology amounted to over $400,000 (assuming $0.20 per pound market price for inedible tallow).

Kurita America's extensive meat industry experience, deep knowledge of wastewater systems, and advanced chemical approach allowed the team to optimize the client's operation, use data to make smart decisions, and view the wastewater operation holistically to minimize treatment costs and maximize revenue generation.

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 consultive 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 **www.kuritamerica.com**.

Protect Large Motors from Bearing Damage with AEGIS® PRO Rings

The larger the motor, the more expensive the repairs and downtime

AEGIS® PRO Rings are specially designed to protect large motors, generators, and turbines against electrical bearing damage. With six rows of conductive microfibers for high current-carrying capacity, AEGIS® PRO Rings reduce shaft voltages to safe levels, protecting both motors and coupled equipment.

For more information, visit **est-aegis.com/pro**, or contact us at 866-738-1857 or at info@est-aegis.com

Electro Static Technology™
An ITW Company

AEGIS®

W.A Cooke & Sons' (Watermark Projects Division) DAF system, which together with Landia's AirJet is helping a poultry producer achieve local discharge consent.

THE RIGHT EQUIPMENT WON'T CHICKEN OUT

Across the myriad obstacles in poultry processing, Landia pumps and mixers deliver

BY SOREN RASMUSSEN, LANDIA

When it comes to industrial wastewater, few industries provide the challenges of poultry processing. Beside the strict regulations that come with this particular aspect of food processing, the content of the stream itself can be difficult to manage without frequent clogs, harsh wear, and flow shutdowns. In the examples below, we'll show how Landia's pumps and mixers answered the call and provide the solutions this global industry relies on.

CHICKEN RUN FOR CHOPPER PUMP

First up, Ferrier Pumps has brought about a successful solution to a tricky wastewater application at a chicken processing plant in Scotland. With washdown water containing feathers, feces, and sawdust, achieving the required flow rate was critical, as was the selection of a pump that could cope with the difficult solids.

As part of its design, which included two screens, pipework,

control panels, and flow meter, Ferrier Pumps (established 1981) brought in a submersible chopper pump from Landia, as Peter Ramsay, sales engineer, explains, ''Critically, we knew that if the minimum self-cleansing velocity could not be not maintained for this packaged pumping station, then the solids in the pumped product would settle out causing blockages.

''We'd also seen from previous experience that the Landia chopper pump is extremely effective and reliable—even when having to deal with very hard-to-handle solids such as feathers. We've had no issues at all. It really is the best pump for these challenging applications''.

Operating at 1,500 rpm, the submersible Landia chopper pump installed by Ferrier Pumps is designed with its classic external knife system that relentlessly chops solids before they get inside the pump's casing—continuously reducing particle sizes for the benefit of the process.

POULTRY WASTEWATER INSTALLATION BY WATERMARK PROJECTS

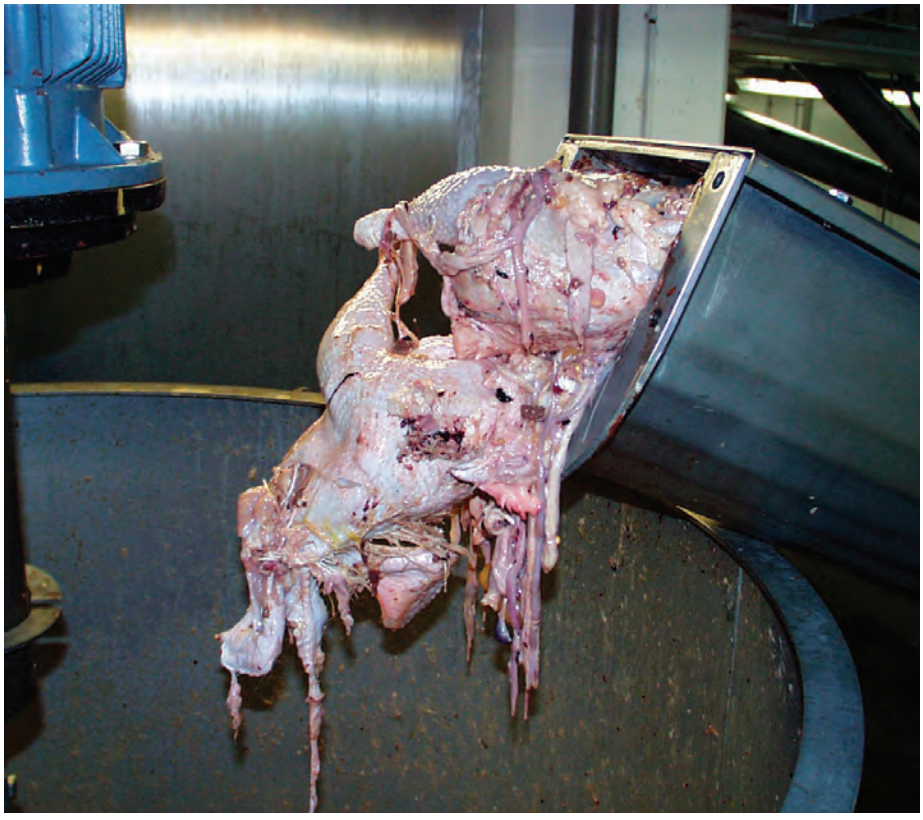
Next, Watermark Projects (part of leading engineering services company, W.A Cooke & Sons) has introduced a Landia mixing system to help handle wastewater at an expanding organic poultry producer in South Wales. Prior to the effluent being treated by Watermark Projects' bespoke DAF (dissolved air flotation) as part of their design and build service, Landia's AirJet will keep the balance tank aerated, ensuring that solids are kept in suspension.

Comprising a Landia chopper pump and a venturi nozzle (ejector) that sucks in air (and, therefore, oxygen) and then mixes the wastewater, the AirJet eliminates the need for compressors, bottom-mounted diffusers, and advanced controls.

Alistair Fielding, water projects manager for Watermark Projects, says, ''Landia equipment is always very reliable, easy to install, and maintain. We know we can depend on it to deal with the peaks and troughs of this application, including after clean-down in the poultry processing plant when the wastewater is more contaminated. Working on the specification with Landia was very straightforward. They are always quick to respond.''

He adds, ''Together with our DAF system, which is built in-house, Landia's AirJet plays an important part in the help we are giving our poultry customer in reducing their environmental impact—

Ferrier Pumps have brought in a Landia chopper pump to deal with wastewater from chicken processing.



The Landia chopper pump has to deal with hard to handle solids such as feathers.

Landia's AirJet (introduced by W.A Cooke & Sons' Watermark Projects Division) aerates a balance tank at a poultry producer in Wales.

Landia mixers simultaneously mix and aerate acidic, screened poultry plant effluent.

Landia's PODBR-I submersible mixer.

Landia's externally-mounted AirJet, which keeps the balance tank at a poultry producer aerated, ensuring that solids are kept in suspension.

significantly reducing their operational costs, as well as ensuring that they achieve local discharge consent."

The Landia MPTKR-I chopper pump for the externally-mounted AirJet, is a soft-start, 1,500 rpm, 7.5kW unit, mixing and aerating screened poultry effluent with a pH of 4 to 8 in an above-ground 79,000-gallon steel balance tank.

MIXING AND AERATION SOLUTION FOR POULTRY PLANT EFFLUENT

Finally, Landia has supplied stainless steel mixers to a large poultry plant in the West Midlands, where previous equipment had failed due to corrosion. For the customer, a major supplier to supermarkets, the installation of the 4kW, 1,500 rpm mixers will also introduce much-needed air into the process to eliminate odors.

Serving 26,000-gallon balance tanks, the Landia PODBR-I submersible mixers/aerators simultaneously mix and aerate the acidic, screened poultry plant effluent and prevent septicity from occurring.

Landia's Paul Davies comments, "For smaller tanks where a little oxygen is required, together with thorough mixing, the Landia direct-drive mixer/aerator provides a one-stop solution, because it performs both jobs in a single operation. For this project, our fully-cast stainless steel units were specified, although we also offer a cast iron variant for less aggressive effluents."

Landia has decades of experience worldwide in supplying mixers, aerators, and pumps for food industry effluent applications, with a growing customer base that extends around the world.

SOREN RASMUSSEN is the director of Landia, Inc. For more information about Landia's range of applications, call 919.466.0603, email info@landiainc.com, or visit **www.landiainc.com**.

When municipal sewer or storm line contractors are faced with impenetrable blockages, pairing chain cutter nozzles with camera nozzles for easy inspection can quickly resolve the issue and get the pipes flowing freely again.

SEWER MAINTENANCE: HANDLING THE TOUGHEST BLOCKAGES—EFFICIENTLY

Using a camera nozzle and chain cutter together can free up even total obstructions

BY DEL WILLIAMS

When municipal sewer or storm lines become blocked, the trouble typically began with a growth of tree roots that eventually stopped the free flow of wastewater in pipe. Blockages can also occur due to accumulated hard mineral deposits, grease, silt, or debris. The resulting blockage can lead to sanitary sewer overflows, which are monitored by federal mandate and can lead to citations.

Although the skillful use of high-powered nozzles with forward penetrating jets can sometimes dislodge partial obstructions in smaller pipe, resolving the worst cases in large pipe requires the use of special heavy-duty chain cutter nozzles that can remove even a "wall of roots."

"For smaller clogs a contractor can use forward-penetrating nozzle jets to clear it. A mini chain cutter might be required for light to medium roots. But any pipe 12 inches or larger with heavy roots or heavy mineral deposits will need a tool with more power and capability," says Dan Story, operations manager at KEG Technologies, a manufacturer of sewer and storm line products including nozzles, chain cutters, and camera nozzle systems.

Contractors must be cautious, however, when placing cutters into sewer lines to avoid severing utility lines.

"Before a root cutter is inserted into the line, it should be inspected by camera first to prevent cutting a gas or power line and inadvertently causing sparking and explosion," says Story. "The most efficient way to inspect the area is with a camera nozzle that takes video while cleaning."

STREAMLINE INSPECTION BEFORE CUTTING

Although a variety of visual inspection options are available, not all are economical in terms of time and labor. Sending a CCTV camera crew to acquire video in sewer line is common. However, this usually involves taking them off other tasks, such as documenting pipe condition to satisfy federal mandates. The sewer cleaning team must also wait for the CCTV crew to arrive and take video before the source and severity of the blockage is identified. Inevitably, this leads to additional production downtime.

Portable video recording contraptions such as a nozzle and camera mounted inside of a carrier exist, but are typically not reliable. Some camera nozzles are specifically designed and integrated for reliable video capture during cleaning. As an example, KEG's KleenSight camera-nozzle system offers operators the ability to clean sewer and storm lines 360 degrees while recording upright image video, as well as quickly assessing the line without having to use a CCTV camera truck.

For clear, reliable viewing, the device has a self-leveling camera head and provides its own illumination with eighty LED lights while recording high-definition video. Only a jetter hose connection is required—no cables or wires. The camera captures the video in memory. With Wi-Fi capability, the files are automatically date and time stamped for easy downloading to mobile phones, tablets and computers for viewing.

The unit also allows videos to be emailed or sent to the cloud for sharing with supervisors that may need to provide input before chain cutter nozzles are utilized.

SELECTING A CHAIN CUTTER NOZZLE FOR TOUGH JOBS

When a severe blockage is identified, chain cutter nozzles are used. Perhaps the most common type is hydraulic base cutters that utilize a hydraulic motor, but instead of hydraulic oil use the velocity of the nozzle's water to spin the cutting blade.

While relatively inexpensive, hydraulic base cutters often do not supply sufficient power or torque to cut heavy roots or hard mineral

The SuperNova 4000 Chain Cutter by KEG has a high speed, high torque, water driven design that can eliminate heavy root blockages as well as scale, rust, mineral deposits, hardened grease, and protruding taps such as concrete and cast iron.

KEG's KleenSight camera-nozzle system offers operators the ability to clean sewer and storm lines 360 degrees while recording upright image video, as well as quickly assessing the line without having to use a CCTV camera truck.

deposits. In thick root systems, the units may not get the job done and can also stall or seize up.

For the toughest blockages, chain cutter nozzles that utilize the power of high-efficiency nozzle water pressure provide much more torque to cut through a thick root mass. When high-pressure water enters the chain cutter nozzle chamber, it is directed to spin the cutting chains at high velocity with enough torque to avoid seizing.

As an example, the SuperNova 4000 Chain Cutter by KEG has a high speed, high torque, water driven design that can eliminate heavy root blockages as well as scale, rust, mineral deposits, hardened grease, and even protruding taps such as concrete and cast iron. The chain cutter is designed for use in offsets, pipe rips, and protruding taps. Intended for use with 6- to 16-inch pipe, the cutter can be adapted for use with up to 48-inch pipe and is compatible with all materials (PVC, clay, iron, concrete).

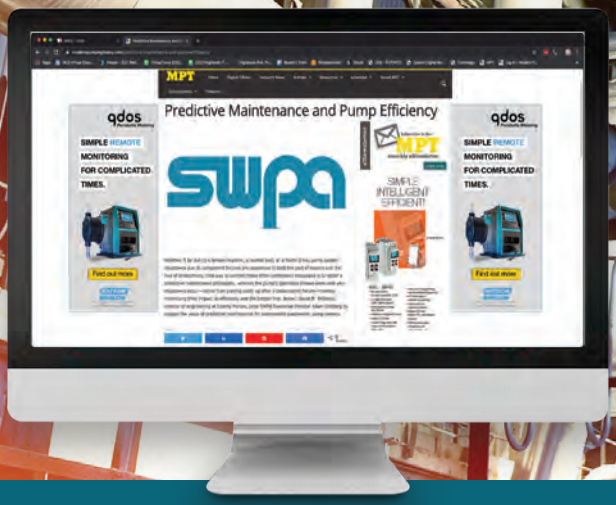
When municipal sewer or storm line contractors are faced with impenetrable blockages and the risk of federal citations for sanitary sewer overflows, pairing the latest, most effective designs of camera nozzles for easy inspection along with chain cutter nozzles can quickly resolve the issue and get the pipes flowing freely again.

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

MPT WEBINARS

LEARNING FOR TODAY'S PUMP INDUSTRY, AT YOUR FINGERTIPS

Whether your work focuses on water and wastewater, chemical processing, or original equipment manufacturing, you need to stay up to date with the latest training. MPT's hosted webinars bring industry experts from leading companies to your computer and offer professional certificates for completion.



FOR MORE INFORMATION:

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

THE NETWORK INFRASTRUCTURE FOR INDUSTRY 4.0

As smart technologies take over plant operation, SPE's stability shines

Part 1 of 2

BY SIMON SEEREINER, WEIDMULLER

Efforts to use Ethernet as a fieldbus alternative first immerged in the late 1990s. Seamless Ethernet networking from the control unit to the IT world offers huge advantages. For instance, the fill level of a tank can be reported directly to both the system control unit and to the purchasing department, without the need for gateways or a duplicate infrastructure for the control unit and IT. The introduction of the Industrial Ethernet and its defined response time conquered the IT standard as well as time-critical applications such as fast-running machines.

However, Ethernet remained a data highway that became increasingly faster and broader. For simple sensors, the technology is too costly and over dimensioned. The current RJ45 connectors and cables are not ideal for industrial use at field level for connecting the sensors. Complex encapsulation up to the sensor is too expensive and is often unfeasible due to lack of space. A further obstacle is the maximum cable length of over 325 feet, as well as the need for two-pair or four-pair cabling. This is insufficient for a widely-networked warehouse or for materials handling. Support comes in the form of an Ethernet standard that does not need to offer the high data transfer rates of the IT world, yet combines long cable lengths with a compact design as well as simple and robust cabling: Single Pair Ethernet, or SPE.

At first glance, it is a "downwards" extension of the existing Ethernet standards. With lower data transfer rates, it conflicts with the constant "faster and shorter" requirements in the IT world. However, many applications are not making full use of the capacities that are now available, in particular sensor technology. Sensors are currently connected via fieldbus gateways, and some are even connected over two levels to an additional sub-bus. In such cases, a continuous Ethernet connection delivers considerable technical and economic benefits. SPE also offers further advantages that are covered in the following sections.

MOTIVATION AND BENEFITS OF SPE TECHNOLOGY

Instead of two or four pairs of wires, SPE requires just one pair of wires. The impetus for this development came from wiring systems in the automotive industry, where cabling currently accounts for a great deal of the vehicle's weight—and this trend is rising rapidly. This requires an infrastructure that can deliver high performance with as few cables as possible. There are similar expectations within industry as the number of intelligent end devices in the plant is increasing; however, the amount of available space is not—in fact, it is quite the opposite. As more and more sensors need to be integrated into machines and systems, the cabling must therefore be designed for industrial use, and be both compact and simple. Moreover, they are installed in extreme places such as robotic arms, where mechanical flexibility and weight play an important role—i.e., lightweight cables with a small outer diameter and low bending radii are essential. This kind of structure will also reduce the costs, as less material needs to be installed. It also makes it easier to extend an existing system than with eight-wire cables. With the thinner and lighter cables, more Ethernet channels can be housed than before in existing cable runs.

The physical properties and transfer rates are defined internationally by different standardization bodies. These new Ethernet versions are also being met with a great deal of interest in automation technology, as SPE

CLASS	10	11	12	13	14	15
VPSE Min/Max (V)	20/30	20/30	20/30	50/58	50/58	50/58
PPD Min (V)	14	14	14	35	35	35
PPD Max (W)	1.23	3.2	8.4	7.7	20	52
dc loop resistance (Ω)	<65	<25	<9.5	<65	<25	9.5
max. length AWG18 (m)	1,000	536	203	1,000	536	203
max. length AWG22 (m)	550	211	80	550	211	80
max. length AWG24 (m)	346	133	50	346	133	50
max. length AWG26 (m)	217	83	31	217	83	31

Table 1: Power classes for PoDL in accordance with IEEE 802.3.

meets the requirements for industrial communication in the digitalization era. The transfer rates of 10 megabits per second with a transfer length of 3,280 feet up to 1 gigabit per second with a transfer length of 131 to 328 feet are completely adequate, even for sophisticated sensors. Scanners and cameras for monitoring or for detecting a component's type and location can also be continuously integrated into the network via Ethernet. The achievable response times even allow TSN (time-sensitive networking) applications. Another major advantage of SPE is the possibility of supplying power to the connected peripherals via PoDL (power over data line).

PoDL makes up to 60 Watts of power available to the PSE (power source equipment). This allows the sensors to be supplied both with energy and with a data interface, even under extremely cramped conditions. An additional, separate supply line is not required. The IEEE has defined a classification into different power classes for this purpose. Since classes 1–9 are already assigned to POE, the power classes for PoDL start at 10. Table 1 describes the resulting outputs for different supply voltages at the end device depending on the length and the cross-section of the cable line.

Additionally, PoDL opens up further applications for SPE. In addition to building infrastructure, this includes particularly demanding applications in potentially explosive environments. This means that SPE is also attractive for process technology. There are therefore virtually no applications for which this standard does not provide new impetus: whether in IT, production or under extreme conditions, the infrastructure is easy to install thanks to the miniaturized connectors and the single pair cables.

SPE thus meets the fundamental requirements of IoT and Industry 4.0 applications—continuous, intelligent networking of an application across all levels, scalable, deterministic, and fully compatible. In a nutshell, each one can communicate with each other.

STANDARDIZATION: THE KEY TO SUCCESS

On the basis of these benefits, renowned experts from the connector industry, automation technology, and the cable industry and have joined forces to develop international standards for this technology. This clearly demonstrates the importance of standardization, as interoperability, and thus the long-term success of SPE, can only be ensured through international standards.

It goes without saying that many bodies are involved in the international standardization of such an important technology. At this point, only the key bodies involved are mentioned: The application and the definition of the transfer channel is being processed by the IEEE 802.3 (Institute of Electrical and Electronics Engineers; Ethernet Working Group). ISO/IEC JTC 1 SC25 WG3 (International Electrotechnical

MERKMALE / NORM	IEC 63171-1	IEC 63171-2	IEC 63171-5	IEC 63171-6
Style	LC-Style	rectangular	M8 / M12	rectangular / D8 / D12
Bandwidth	c	2.500 MHz	2.500 MHz	600 MHz
Transmission Pairs	1	1/4	1/4	1
IP Rating	IP20/IP67	Ic	IP67	IP20/IP67
Mating Compatibility	No	Yes IEC 63171-5	Yes IEC 63171-2	Nos
Impedence	108	108	108	147
Isolation Voltage	1.5 kV	2.25 kV	2.25 kV	1.5 kV
Dimension (plug)		7.6 x 10.5 mm		11.4 x 12.7 mm (IP20)
Inverted mating face possible	No	Yes	Yes	No

Table 2: Overview of the different connectors in accordance with IEC 63171.

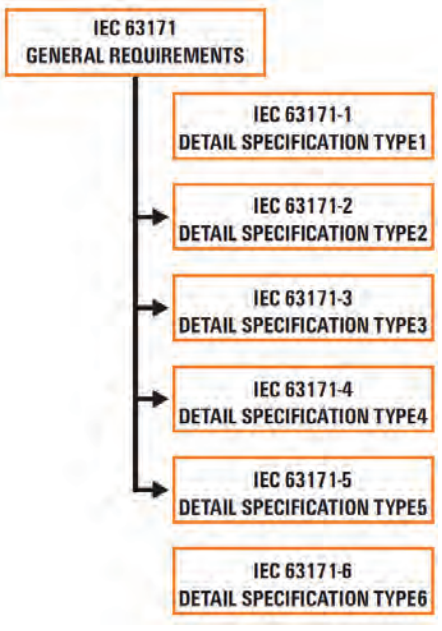


Figure 1: Structure of the IEC 63171 series of standards.

Commission, Interconnection of Information Technology Equipment, Working Group 3: Customer Premises Cabling) describes the transfer requirement and its parameters for passive cabling structures in industry, in buildings, smart homes, and computing centers. The requirements of mechanical and electrical properties are ultimately defined by IEC SC 48B Electrical cap connectors and IEC SC 46C Wires and Symmetric Cables. There are fixed agreements between IEEE 802.3 and ISO/IEC that define the respective tasks.

For the IEEE 802.3cg (SPE 10 megabits per second) project, connectors and their electrical properties were defined for the first time in the IEEE environment. They are explained under the point on MDI (medium dependent interface). The MDI is the interface to the active components. The passive cabling structure is not described here. The technical properties that a connector or contact point must comply with for this application are described there. In a sub-item, the current version of the IEEE document describes possible connectors that can be, but do not have to be, used on the MDI. This is occasionally misrepresented in publications. Though it is crucial for the manufacturer and the user to recognize that this is an option ("may be used") and not a regulation. Other connectors can also be used, if they meet the electrical properties of IEEE 802.3cg.

The connectors for Single Pair Ethernet are defined in the IEC 63171-X series of standards. The general electrical requirements of the interfaces can be found in the basic standard IEC 63171. The design of the mating faces and thus the mechanical requirements of the connectors are

described in the subordinate series of standards. The basic standard could perhaps be likened to the engine and the standard series as the different car bodies.

The connectors defined in the series of standards IEC 63171-1 to -6 have different mating faces, dimensions, and mechanical properties. Currently, neither IEC 63171-1 nor IEC 63171-6 refers to the basic standard of IEC 63171. As a result, there are different mechanical requirements and different electrical requirements. The key differences of the standardized connectors are listed in Table 2.

The connectors in accordance with IEC 63171-2 and IEC 63171-5 even observe stricter values. For example, they have a dielectric strength up to 2.25 kV DC. Finally, it should be mentioned that the use of connectors described as "may be used" in the IEEE 802.3 environment only relate to the 10 megabits per second application. Applications in the range 100 megabits per second, 1,000 megabits per second, and MultiGig are not affected by this. Therefore, the user is obliged to select the right connector for the application.

The ISO/IEC 11801-x series of standards describes the generic cabling structure for different environments. This is also being expanded due to the new SPE applications. It defines the same connectors as in IEEE 802.3cg. A "may be used" connector is defined in the ISO/IEC as a "shall be used" connector at the TO (telecommunication outlet). There is thus a fixed definition of the mating face for the TO.

In figure 2, it is apparent that the TO represents the connection between automation and the factory hall. The specification for the mating face thus refers to applications outside of automation and, therefore, also to the connection of the automation island with generic cabling. The TO is, therefore, only described in the generic cabling in accordance with

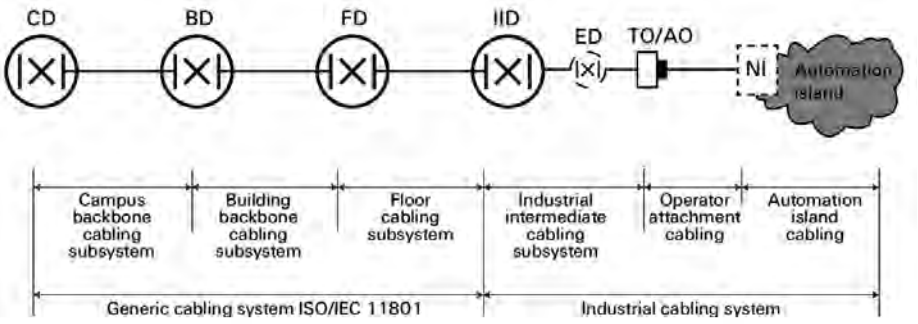


Figure 2: The ISO/IEC 11801-3 AM1 cabling model (source: ISO IEC 11801-3).

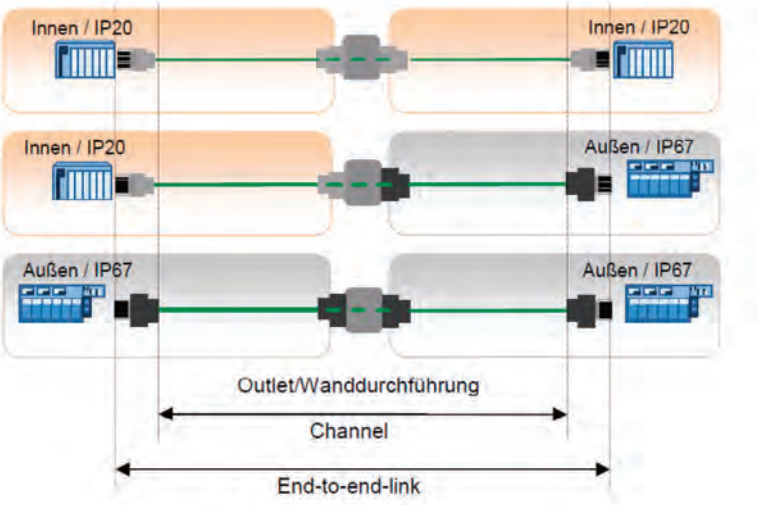


Figure 3: Example variants for the End-to-End link in accordance with the PROFINET guidelines.

ISO/IEC 11801. Except for generic cabling, a TO is not used in PROFINET environments.

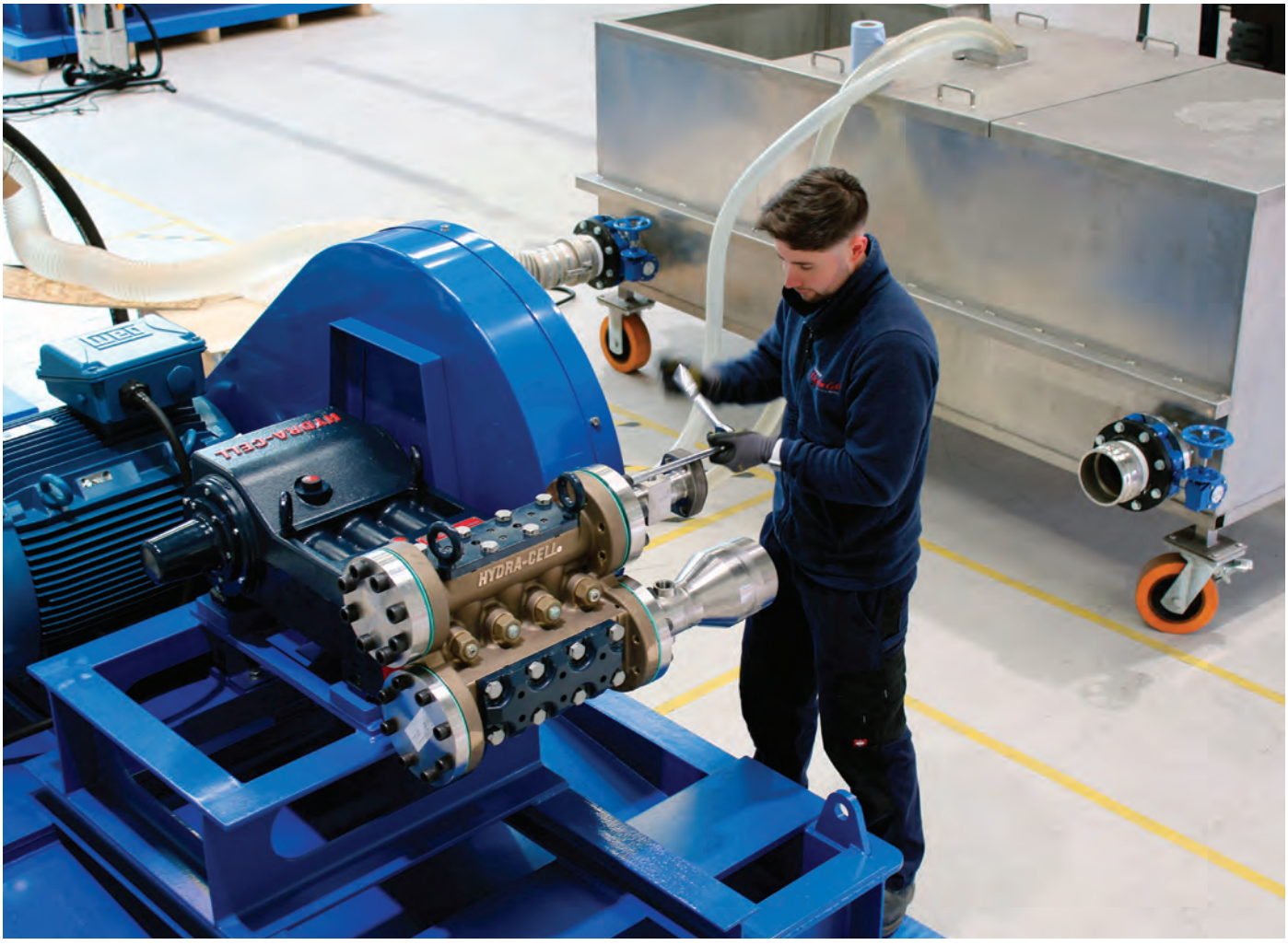
PROFINET and other industrial communication protocols define pure point-to-point cabling in their guidelines. Even the definition of the channel was not taken from generic cabling, instead a channel definition that has been adapted to the industrial environment was derived with the end-to-end link.

The normative process is currently underway but has not yet been completed. The claim that the market had already agreed upon a mating face, as was made by some manufacturers and is often mentioned in the trade press, is categorically incorrect. Important and powerful user organizations, such as PROFINET, are currently forming their own opinion and will deal with this subject area in the future.

A LOOK AHEAD

In next month's conclusion to this article, we'll examine SPE developments specifically introduced by Weidmüller. As you might expect, the connector is the first step. Plus, we'll look at even greater flexibility with a four-chamber solution.

SIMON SEEREINER is head of product management for sensor-actuator interface and industrial ethernet and cable harnessing. Since 2005, he is expanding the range of solutions for the passive, industrial networking of the Weidmüller Group. In addition, Seereiner works in various national and international committees for industrial networking. For more information, visit **www.weidmueller.com**.



HYDRA-CELL INNOVATION HAS A NEW HOME

Introducing Wanner's Technical Center of Excellence for industrial pump development

Wanner International's new Technical Center of Excellence in industrial pump development formally opens today. The purpose-built facility enables the U.K.-based Wanner International operation to deliver enhanced service capabilities which include:

- System design and custom pump builds
- Performance testing
- On-line and on-site witness testing
- Service and maintenance training
- Technology demonstrations

The company has invested in this 5,000-square-foot facility to increase capacity to meet the growing global demand for its services, to take its Hydra-Cell® pump onto the next level of technical innovation. This innovation is a must-have, not a luxury, as the current environment is changing rapidly, with new regulations on sustainability, customers demanding ever greater

levels of effectiveness and more chemically challenging liquids to be moved efficiently.

The center will further strengthen the company's support to its customers and partners in Europe, India, Middle East, Australia, Africa, Russia, and surrounding countries including Kazakhstan, Ukraine, and Azerbaijan.

STABILITY AND INNOVATION

Wanner is leading the way as one of the most progressive manufacturers in the process pump sector. Not only this, but in turbulent times of late, the company places huge emphasis on how this new development helps to both protect and create valuable new jobs.

As well as the main high volume manufacturing plant in the United States, this purpose-built facility enables the company to build small volume customized pumps, pump skids (a set including a driver such as an electric motor or diesel engine mounted on a common steel base), testing to meet customer specifications as well as hosting training workshops—either on-site or via online video.

Wanner enables their customers to run far more environmentally sound pumping processes as part of their overall operations. Hydra-Cell pumps are not only highly energy-efficient but the seal-less design (no dynamic seals) ensures 100 percent leak-free operation when dealing with toxic liquids. This means that unwanted emissions are eliminated from the process as well as protecting the health and safety of engineers and operators.

TECHNICAL AND ECONOMIC BENEFITS

The Technical Center of Excellence is improving both the economic benefit to the customer and reduction of their environmental impact by focusing on developing best-in-class across key capabilities such as custom design, research, training, and testing capabilities. The ultimate goal of boosting Wanner's capabilities is to enable its customers to deliver both economically sound pump operations and ambitious environmental targets.

Paul Davis, Wanner International's managing director, says, "We are very pleased to have seen growth in sales, considering the tough eighteen months we have all experienced. It is great to know that the additional advantages of the Hydra-Cell seal-less pumps over many other pump technologies have made a real difference in improving the processes of our oil and gas customers and other industries.

"In addition, the pumps' unique features create real benefits as the industry faces increased challenges to protect the environment. With hundreds of thousands of pumps in service, the Wanner International team and its global partners have worked incredibly hard, especially through the pandemic crisis, to continue offering support and

solutions to existing clients, whether that be via our online technical support or just having a real human being on the other end of the phone.''

HYDRA-CELL ADVANTAGES

The Hydra-Cell range are highly efficient, heavy-duty pumps for reliable liquid transfer, metering and dosing, injection, and spraying of a wide range of liquids and because of its seal-less design this can include corrosive, abrasive, and non-lubricating liquids. The pumps also have the ability to run dry indefinitely, without damage.

Elimination of seals and packing along with energy efficiencies of greater than 90 percent deliver a lower cost of ownership only possible due to the seal-less design of the Hydra-Cell range; some Wanner Hydra-Cell pumps have been reported to be in operation for over twenty years of service. This reduces unplanned downtime as well as cost savings on maintenance, spare parts and labor which has been a significant factor in reducing costs for customers in critical process manufacturing.

Davis continues, ''We are very proud of our pump technology; we are proud of our people, from application support engineers, customer service staff through to our network of distributors which provide local support quickly and efficiently. So, in opening our new center of excellence we hope to be able to further enhance both the technology and service capabilities we have to offer.

''Continuing to invest strongly in R&D is how we have been able to expand across the globe and attract our specialist technical and sales partners who assist our clients across over seventy different countries. We look forward to the continued upward trend in growth and how the Hydra-Cell family continues to expand.''

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/our-capabilities/technical-centre-of-excellence**.

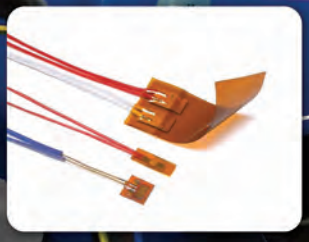
MOD-TRONIC

Stocking distributor of MINCO
Sensors, Heaters and Controls

MOTOR TEMPERATURE SENSORS

RTDs Thermocouples Thermistors Thermostats

FOR STATORS



FOR BEARINGS

ANTI-CONDENSATION SPACE HEATERS

TEMPERATURE MONITORS

Sensors & Instruments 3 Year Warranty

IECEx CE ATEX UL FM APPROVED CSA

MOD-TRONIC

www.RewindSensors.com

1-800-794-5883

CONDENSATE RETURN PUMPS: DESIGN CONSIDERATIONS

Determining the right selection for the application depends on many factors

BY ERIC SENGHEISER, CONTROL PRODUCTS INC.

When we think of steam, perhaps an image comes to mind of the old steam train in a Western movie, hissing and clanking, as it rattles into some long-forgotten dusty town. This may even lead us to the misconception that steam is an outdated and unused technology. However, the use of steam for transporting and transferring thermal energy is more common today than many people realize. Steam is also used to do mechanical work in the generation of electrical power in nearly all large fossil-fueled and nuclear power plants and in industry for making everything from paper to potato chips to pharmaceuticals. In addition, steam is still commonly used for heat and hot water in many large city and college campus buildings, as well as providing humidification and sterilization in healthcare facilities. Steam is by nature non-toxic and sterile. And it is manageable and easy to distribute in a properly designed system, while possessing excellent and predictable heat transfer properties.

In its simplest form, today's steam heating system consists of three major elements: a boiler, a distribution system for the steam and condensate return, and the heat exchange equipment (energy consumers). The distribution system itself includes many different components including the steam and condensate piping, steam traps, manual valves, control valves,

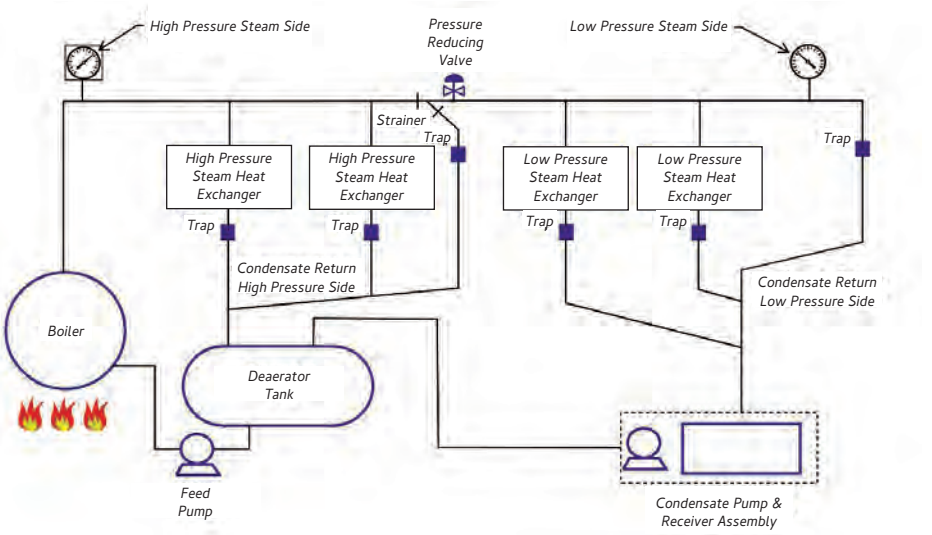


Figure 1: Basic steam system flow diagram.

condensate return pumps, and a boiler feed pump or deaerator. In the case of high-pressure steam systems, pressure reducing valves (PRVs), safety relief valves, and flash tanks are often needed as well. Of the many components in this system, one of the most critical is the condensate return pump. However, determining the optimal design of that pump requires system designers to consider several factors. Figure 1 shows the basic layout of the steam system.

TYPES OF CONDENSATE RETURN PUMPS

There are two basic types of condensate pumps used in steam systems today: electrically-driven and pressure-operated, with each having their own strengths and limitations.

Image credit: Russell Pump & Engineering Inc.

Figure 2: Duplex stainless steel electric condensate pump package

A packaged electric condensate pump essentially consists of a condensate receiver tank (often vented to atmosphere), an electric centrifugal or turbine-style pump, and a float-activated switch. The electric pump is activated whenever the receiver fills with enough condensate to trip the float switch. Once the level in the receiver is suitably pumped down, the float switch senses this and deactivates the pump. Then, the cycle repeats.

Condensate pump packages are commonly offered with one (simplex) or two (duplex) pumps. Duplex pumps are controlled by an alternating float switch to even out usage of the two pumps and also offer the advantage of pump redundancy. Condensate receivers come in different configurations (rectangular or cylindrical, floor-mounted or elevated), various gallon capacities, and in several materials of construction including carbon steel, cast iron, and long-lasting

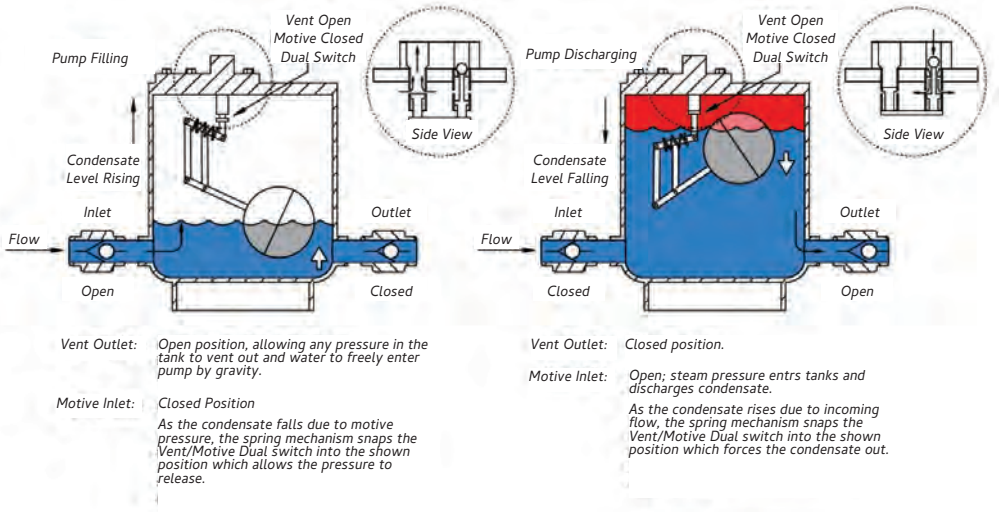


Figure 3: Filling and discharging cycles of pressure-operated condensate pump.

stainless steel. Pumps can be end-suction or tank-mounted and are most often constructed with a cast iron housing and bronze impeller, with even longer life achieved through stainless steel componentry. A myriad of accessories is available, including a level sight glass for the receiver, thermometer, pump discharge pressure gauges, pump isolation valves, and a pre-wired electric control panel. Figure 2 is an example of a duplex electric condensate pump in all stainless-steel construction.

By comparison, pressure-operated condensate pumps

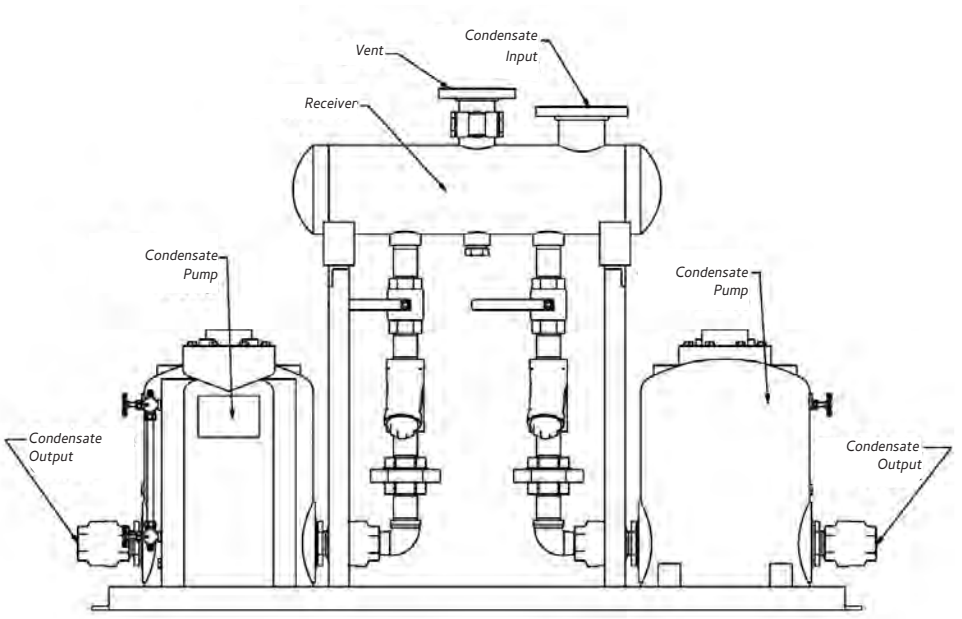


Figure 4: Duplex pressure-operated condensate pump skid package.

(POCP) use no electrical energy for pumping, but instead operate on a two-cycle method of either filling up or pumping out of the pump housing using either steam or air as the motive gas to pump the condensate. The motive pressure for pumping is initiated by either a spring-activated/mechanical or electrical valve (this article focuses on the spring-activated mechanical type only). Figure 3 demonstrates the filling and pumping cycles of the pressure-operated pump with mechanical valves.

Pressure-operated pumps are often assembled as a "skid package," consisting of a condensate receiver (again, often atmospheric), pressure-operated condensate pumps (POCPs), with interconnecting piping, isolation valves, and accessories. Packages are commonly offered in simplex and duplex configurations, although triplex and quadraplex variations are possible. Carbon steel, cast/ductile iron, or sometimes stainless steel are used for the condensate receiver, pump housings, and interconnecting piping, with stainless steel almost universally used for the spring-type pump mechanism internals.

SIZING AND SELECTION

In the United States, steam and condensate flow rates are measured in terms of mass flow rate, in units of pounds-per-hour. Flow rates for electric condensate pumps are typically described in gallons per minute). An approximate conversion from pounds-per-hour condensate to gallons-per-minute is condensate flow (pounds-per-hour) ÷ 500 = condensate flow (gallons-per-minute).

Alternatively, some electric manufacturers rate their pump capacity using a steam heating term called square-feet EDR (equivalent direct radiation). To convert from pounds-per-hour to square-feet EDR, the equation is condensate flow (pounds-per-hour) × 4 = condensate flow (EDR).

In order to minimize pump short-cycling, note that most electric condensate pump manufacturers rate their pumps with a built-in safety factor of gallons-per-minute capacity that is 2 to 3 times the EDR or pounds-per-hour rating.

By contrast, sizing tables for pressure-operated pumps are shown directly in terms of pounds-per-hour. When determining the required head pressure of the pump, we start by calculating the back pressure and lift of the downstream system piping, just like any other pump application. Lift and back pressure for most electric condensate pumps is expressed in terms of feet of head, while the sizing tables of pressure-operated condensate pumps is shown in terms of psig of backpressure. An easy way to convert from feet of head to psig is by using the following formula: backpressure (psig) = lift (feet of water)/2.31.

So how do we decide which pump is best for our application?

IMPORTANT CONSIDERATIONS DURING CONDENSATE PUMP SELECTION

RECEIVER SIZING

Most manufacturers size the minimum net receiver capacity on their electric condensate pump packages for 1 minute's worth of pumping capacity. On pressure-operated pump packages, consult with the manufacturer, as there may be other considerations, such as the amount of flash steam that the receiver must accommodate. On either type of pump, there is no downside to over-sizing the receiver other than higher initial cost and minor system energy losses from added radiation.

INLET HEIGHT OF RECEIVER

The elevation of the condensate pump receiver inlet must never be higher than the outlet of the steam traps it serves. Condensate must flow freely by gravity into the pump receiver without any lifts in between!

HIGH TEMPERATURES

Particularly when using electric condensate pumps, pay attention to the condensate temperature that the pump will see, ensuring that seals and gaskets are compatible. Also on electric pumps, check that the pump will not cavitate with the expected condensate temperature entering the pump. Remember that NPSHa (available to the inlet of the pump) must always be greater than NPSHr (required per the pump manufacturer), for it not to cavitate. If high pressure/

high temperature condensate returns lines are routed to an electric condensate pump, a separate flash tank is recommended upstream of the pump to allow condensate to cool somewhat before entering the electric pump receiver. By contrast, pressure-operated pumps have no cavitation concerns whatsoever.

ACCESSORIES

Good practice is to include (at a minimum) a receiver level gauge glass and thermometer, in order to monitor condensate conditions within the tank. Also, consider adding pump discharge pressure gauges, and isolation valves for ease of servicing pumps without draining the receiver.

MULTIPLEX PUMPS

Specifying a duplex (two pump) system or more (e.g., triplex, etc.) adds redundancy to the system, resulting in higher availability of the system should one pump fail.

ELECTRICAL CHARACTERISTICS

Be aware of any potential corrosive or hazardous environments, in which the pump will be expected to operate. Examples include outdoor applications exposed to rain and freezing temperatures (or even flooding), or areas exposed to explosive gases or dust. In these cases, selection of the correct pump motors, control panels, and other electrical accessories is absolutely critical for safe and reliable operation! In some cases, a pressure-operated pump (which uses no electricity) may be a better choice for these applications.

The steam system designer must consider a number of variables when choosing a condensate return pump for their system. Factors such as inlet height constraints, maximum condensate temperature, availability of utilities, and external environment all play a role in determining the right selection for the application. It's best to work with an industry professional who has experience in guiding these types of decisions.

		
FACTORS FOR CONSIDERATION	ELECTRIC CONDENSATE PUMP	PRESSURE-OPERATED CONDENSATE PUMP
Pump Cavitation Concerns	Can be addressed with elevated received to increase NPSHa* to avoid cavitation.	Does not apply.
Hight Temperature Condensate Concerns	High temp seals and gaskets are available at additional costs.	Does not apply.
Low Headroom or Low Elevation of Condensate Inlet Connection	Very low inlet height receivers are available.	Inlet height is significantly higher than electric pump receivers.
Availability of High-pressure Motive Steam or Air	Does not apply.	If adequate motive pressure is not available, a POCP is not an option.
Availability of Electrical Power	If electric is unavailable such as in a steam tunnel, an electric pump is not an option.	Does not apply.
Hazardous or Wet Location Concerns	Electric pumps can be equipped with explosion-proof or TEFC motors and hardware at additional cost.	Does not apply.
Footprint of Pump Package	More compact.	Skid packages can be much larger for a given capacity.
Initial Cost of Unit for Standard** Application	Usually less than POCP.	Usually more than electric.
Trades Involved for Installation	Mechanical and electrical.	Mechanical only.
Cost of Regular Maintenance	Depends on construction of pumps.	No pump seals or gaskets to wear out or leak.

** NPSHa: Net Positive Suction Head available to the pump inlet.*

*** Comparing pump packages for indoor installation in a non-hazardous location, using typical materials of construction (carbon steel receivers, cast iron/bronze-fitted pumps for electric pumps, steel housings with stainless steel mechanisms for POCPs).*

ERIC SENGHEISER is a mechanical engineer and the president of Control Products Inc., a steam and fluid control specialist providing reliable system solutions for more than sixty years. In addition to in-house expertise, the company's stocked warehouse of control valves, steam traps, and regulators from a variety of brands, assures its customers that they will receive the parts they need quickly. For more information, visit **www.cpinc.com**.

TO SUCCEED, CONTROL YOUR SPEED

Using medium voltage VFDs to eliminate waste and promote efficiency, reliability, and quality

Part 2 of 2

See Part 1 www.mptmag.com

BY MARK HARSHMAN, SIEMENS

In last month's start to this article, we explained how, for several different applications, medium voltage VFDs are typically superior to alternative technologies. In the conclusion that follows, we'll explore how medium voltage VFDs stack up, specifically against mechanical devices, mechanical transmission methods, and mechanical throttling devices. Plus, depending on the particular application, medium voltage VFD installations can exhibit other benefits that may be difficult to quantify.

COMPARISON AGAINST MECHANICAL DEVICES

The common thread of medium voltage VFDs versus mechanical device applications is that with a VFD the motor is operated at the exact speed required to satisfy the actual process flows and load on the motor, and no greater. This is in contrast to solutions that use transmissions, valves, or dampers to throttle excess mechanical or hydraulic energy that is generated by the equipment operating at full speed or a fixed reduced speed.

VFDs inherently generate only the mechanical or hydraulic energy necessary to operate the actual load; therefore, medium voltage VFDs will use less energy in almost any given application. With proper design, operating the motor at slower speeds also tends to reduce motor and equipment maintenance requirements. It can also extend operating life, often by years. Additionally, using a VFD eliminated the starting mechanical stress on the motor, which also increases the motor life. In new applications, a motor designed to operate exclusively with a VFD can be less expensive than a motor designed to allow an across-the-line start, because of the benign nature of VFD starting characteristics. In effect, the additional costs of a VFD are partially offset by the opportunity to use a less-expensive motor.

The electronic nature of medium voltage VFDs can also allow more precise speed control than with mechanical throttling components that can stick or fail. Controlling speed closer to its set point can improve operations by enabling production of better quality products and by increasing plant capacity and reliability.

For example, control valve and fan damper movement can become sluggish over time, moving control further from the set point for longer periods. Installing a medium voltage VFD will move control much closer to the set point, improving operations as well as reliability by eliminating the throttling devices and all of their associated problems and maintenance.

IN CONTRAST TO MECHANICAL TRANSMISSION METHODS

Mechanical transmissions are often installed between a full-speed motor and its associated drive equipment. Adjusting the transmission allows the speed of the outlet shaft of the transmission to vary to match load, but the motor will still operate at full speed, with its effective speed throttled by the transmission to match the load. This causes the motor to expend more electrical energy than if operated at the speed required by the load. The extra energy is dissipated in the transmission, and thus wasted.

Approximately 10 percent energy savings are typically associated when a mechanical transmission is replaced with a VFD. The electrical energy savings associated with a 2,000-kW load is, therefore, $800 per year per kW, or approximately $160,000 per year.

In addition, VFD operation generally reduces the complexity and sophistication of the mechanical transmission, and can actually eliminate the need for a transmission in some applications. Although most applications require operation at lower-than-rated motor speed, some VFDs are capable or operating at

frequencies up to 450 Hz, or a motor speed of up to 22,000 rpm. In these cases, the complex transmission can be completely eliminated; the maintenance costs associated with these devices are also eliminated.

For example, a fan can be throttled between 100 and 400 rpm by using an 1,800-rpm motor with a hydraulic coupling that can adjust the speed of its outlet shaft speed and, hence, fan speed. This mechanical configuration could be simplified by using a reducing coupling and a VFD. In some instances, elimination of the coupling would be possible by directly coupling a motor operated by a VFD.

There are many such pump, blower, and fan applications that use mechanical transmissions to vary equipment speed. However, many major pieces of equipment in the mining industry (see Table 1) deserve special scrutiny because (depending upon application) medium voltage VFDs can improve speed control, allow implementation of torque control, improve product quality, reduce inrush current and smooth motor starts, lengthen maintenance intervals, and lower the energy costs associated with operating the equipment.

In new applications, the cost savings associated with eliminating engineering, purchasing, installation, and maintenance of the mechanical transmission can offset much—or even all—of the cost of the medium voltage VFD, in addition to occupying less space in the plant. In existing applications, energy savings, and operational improvements should be evaluated to justify replacing the existing motor starter and mechanical transmission with a medium voltage VFD.

VERSUS MECHANICAL THROTTLING DEVICES

Perhaps the most common alternative solution to medium voltage VFDs is where mechanical equipment is directly connected to an electric motor operating at full speed, and the load is varied using a throttling device (such as a control valve or damper) to control air or fluid flow in order to satisfy the process demand. Pump, blower, and fan installations are often configured in this manner.

Operating a motor at full speed and then dissipating a portion of that energy across a throttling device is inherently wasteful. Nonetheless, this scenario is common practice in industry. In many cases, this is due to a continuation of past practices that may have made sense many decades ago when medium voltage VFDs were relatively expensive and power was cheap. But in today's world, using a

medium voltage VFD to operate the same equipment at a lower speed such that its energy output exactly matches the load offers a very quick and reasonable payback in nearly all cases.

Because the discharge of pumps, blowers, and fans powered by medium voltage motors is typically throttled, this equipment and associated motors are routinely oversized to account for maximum operating conditions, plus some contingency for abnormally high loads. Oversizing increases initial and operating costs, often by substantial amounts, particularly as the equipment and the motor are often quite large.

For example, a single-speed medium voltage motor with mechanical throttling may need to be sized at 1,200 kW to handle a nominal 1,000 kW load. The motor will, of course, operate at full speed, with the throttling device matching the load to the process requirements and dissipating energy. Applying a VFD in this case could reduce the required motor size to 1,000 kW and allow operation at about 70 percent of load, or 700 kW. The VFD would thus save 500 kW per hour—equating to a savings of $400,000 per year, assuming 8,000 hours of operation and power purchased at $0.10 per kWh.

Mechanical throttling devices are subject to mechanical degradation that tends to increase the hysteresis inherent to their design. For example, a damper mechanism may increasingly stick over time. These degradations further reduce performance and increase costs. Utilizing a medium voltage VFD instead of a throttling device not only decreases the inherent hysteresis to the speed resolution of the VFD, but also eliminates mechanical degradation, reducing required maintenance while improving performance.

ADDITIONAL BENEFITS

Depending on the particular application, medium voltage VFD installations can exhibit other benefits that may be difficult to quantify.

ENERGY-ONLY PAYBACK		
	Option A	Option B
No. of Fans	8	8
Control Method	IVC	VFD
c	$16,590,770	$11,065,883
Delta Energy	BASE	$5,524,887
Delta First Cost	BASE	$5,751,680
Energy-only Payback (Yrs.)	BASE	1.04

Table 3

Although these benefits don't apply in all situations, they can be significant in certain applications.

For example, synchronous transfer allows a single VFD to control the speed of multiple motors, which can not only reduce cost but also simplify operation and maintenance. Savings can be substantial as only one VFD needs to be purchased, installed, and maintained. Of course, these benefits only apply when just one of the multiple motors is needed at any instant in time.

Sinusoidal VFD outputs can reduce the wear and tear on the motor, which can extend its useful life. This benefit becomes more significant as the quality of the VFD output improves, and as the motor's operating hours increase.

Finally, purchasing the VFD and the motor from the same manufacturer can extend warranty life, as some suppliers will extend warranty periods in these cases, and can decrease operating costs due to a closer match between the VFD and the motor.

CONCLUSION

The economic and operational advantages achieved by applying VFDs to medium voltage motors is overwhelming in many cases, particularly when utility rebates are taken into account. For example, a project with motors totaling 10,000 kW can result in a one-time rebate of almost $500,000. To further quantify, consider this application where a utility in Texas needed to choose between two options for the operation of eight 10,500-horsepower, induced draft (ID) fans, four per each for two new 850 MW power plants.

Option A would run each fan and its associated motor at full speed, and control the air flow output with vanes. Option B would use a VFD on each motor to control fan speed as required to deliver the precise required air flow. Each fan would be driven by a medium voltage motor: 13.8 kV in the case of Option A and 6.6 kV for Option B.

Option B would cost $5,751,680 more to implement, but would result in annual energy savings of $5,524,887, equating to an energy-only payback period of just 1.04 years (see Table 3). These savings don't take into account utility rebates, which vary significantly but are generally quite substantial. They also don't take into account the other benefits delivered by VFDs as detailed in this article.

Applying VFDs to medium voltage motors provides the ability to do the same amount of work with less energy while increasing operational flexibility. Even modest speed reductions can result in large energy savings due to the relatively large motor sizes involved—especially when applied to centrifugal equipment. In addition to energy savings, medium voltage VFDs allow control closer to set point, which improves quality, reduces raw material usage and increases throughput.

Finally, reliability is improved because the motor and its associated equipment is controlled to a speed that closely matches the load, which minimizes wear and tear as opposed to other solutions. Achieving these significant gains is a multifaceted activity that can involve people knowledgeable in the electrical, mechanical, instrumentation, utility, chemical, and hydraulic disciplines as well as plant operations and management. Medium voltage VFDs are typically superior to alternative technologies. They should be considered for every medium voltage motor because even modest energy and operational savings can cost-justify VFD purchase and installation. ■

MARK HARSHMAN is principal engineer at Siemens. Siemens Corporation is a U.S. subsidiary of Siemens AG, a global technology powerhouse that has stood for engineering excellence, innovation, quality, reliability, and internationality for more than 170 years. Active around the world, the company focuses on intelligent infrastructure for buildings and distributed energy systems and on automation and digitalization in the process and manufacturing industries. Siemens brings together the digital and physical worlds to benefit customers and society. For more information, visit **www.siemens.com**.

EFFECTIVE AND EFFICIENT PROCESSING TECHNOLOGY FOR QUALITY CONTROL

Exploring the growth of plant-based milk offers a case study in sterilization

BY MATT HALE, HRS HEAT EXCHANGERS

Plant-based milk products, such as oat milk, are increasing in popularity.

Plant-based milk is the largest plant-based category in North America, and grew 5 percent last year, with sales of plant-based dairy products approaching two billion dollars. In fact, the plant-based milk market now accounts for around 10 percent of the global milk market, and the growing number of consumers of plant-based milks have more choice than ever before. The most popular plant-based milk in North America is currently almond milk (which occupies almost two-thirds of the market), followed by oat milk (the fastest growing product type), and soymilk. However, the sector is full of innovation, with new developments and products plant-based milk alternatives, or "alt-milks" as they are sometimes known, are being made from more raw ingredients than ever before, with pea- and barley-based drinks being among the most recent newcomers to the market.

GROWTH OF PLANT-BASED MILK

There are many reasons for the popularity of plant-based milks. As well as a rise in the adoption of vegan and plant-based diets due to health and moral grounds, environmental concerns are also driving uptake with proponents claiming that plant milk has a lower greenhouse gas (GHG) footprint than dairy production—although the overall picture is highly complex, and the figures are disputed by the dairy industry. An apparent increase in the level of lactose intolerance in developed countries is also helping to increase demand.

The range of plant-based milks also allows for consumers to express their tastes and identities as cafes and restaurants open-up after lockdown. As one industry analyst said earlier this year, "To choose your specific type of plant-based milk in Starbucks seems to be a way of identifying yourself."

While dairy milk has long been seen as a drink or a meal accompaniment—for example, being used as an ingredient or with cereal—there are increasing signs that plant-based drinks, particularly those with a thicker more yoghurt-like texture or those sold in individual portions, are being seen as a healthy snack. Research by the Brisan Group suggests that up to a third of these products are viewed as a snack, and 61 percent are viewed as "a treat."

Globally, soymilk products remain the most popular (although the demand for oat-based products is growing) and they accounted for 29.5 percent of revenue globally in 2019. Coconut-based beverages are one of the fastest growing segments, predicted to increase 8.6 percent between 2020 and 2027. Across all types of plant-milk, plain flavors dominate sales, accounting to 71.1 percent of the total value.

PRODUCTION OF PLANT-BASED MILK

Contrary to public perception, the idea of plant-based milks is not new. ''Milk'' made from soybeans has a long history in China (where recorded production dates to 1365), while almond milk was recorded in the Middle East in the thirteenth century. A commercial soymilk factory was established near Paris in 1910 and demand for soymilk rose through the 1970s and 80s due to increasing awareness of lactose intolerance.

These days there is a wide range of plant-based milks made from nuts, grains, and legumes, as well as other seeds (such as sunflower and hemp) or coconut. There are two main methods for processing plant-based milk: wet or dry. The wet process involves soaking and grinding the raw material in large volumes of water for up to twelve hours. In some cases, enzymes are added to hydrolyze starches (for example in oat milk production). The dry process involves milling the raw material into a flour or powder which is then processed to separate the starch, protein, and fiber as desired, before being hydrated. As a result, dry production processes can result in a higher protein content in the finished product.

The production method means that, if the soaked product is not ground to sufficiently fine a size, the number of particles removed when the mixture is strained creates high levels of waste. It is also important to mix products well, particularly those containing oils or thickening or stabilizing agents. Therefore, maintaining product consistency is a key goal for the manufacturing process, and will determine the choice of processing equipment including pumps, heat exchangers, etc.

DISADVANTAGES OF PLANT-BASED MILK

Plant-based milks cannot match the natural nutrition profile of dairy milk in terms of protein levels and essential amino acids. However, as well as being free of lactose, they are lower in saturated fat and cholesterol than non-skimmed milk. Plant-based milks are not immune from criticism, and in some countries and regions, including the European Union, such products cannot be sold or marketed as ''milk'' or ''yogurt.'' In addition, supporters of dairy milk say plant-based drinks are highly processed and full of additives, while diary milk is simply homogenized and pasteurized.

Despite this, such is the interest in the sector than many of the world's largest dairy companies, including Lactalis, Nestlé, and Danone, are investing into dairy-alternatives, either through product development or company acquisition. Several market analysts believe the market is ready for rationalization, with several brands falling by the wayside or being acquired by larger food producers.

The new HRS DSI Series uses direct steam injection to increase the speed of sterilizing products such as oat milk.

MAINTAINING QUALITY AND DEMAND

The quality of the product is very important, and monitoring of key parameters includes viscosity, particle size, protein content, digestibility, nutrient content, and flavor analysis. Maintaining these important quality characteristics requires the minimal amount of processing—and making sure that processes such as pasteurization cause as little disruption to the product as possible can help alleviate criticisms about the highly processed nature of plant milks.

Where possible, combining processes such as dilution and sterilization, for example by using the HRS DSI Series, can provide benefits and reduce overall processing of the product. The benefit of sterilizing using direct steam injection is the speed of the process, with sterilization temperatures of 212 to 293 degrees Fahrenheit (100 to 145 degrees Celsius) being reached in around a second; much quicker than the fastest heat exchanger systems. For products such as plant milks, this rapid heating prevents cooking of the product and formation of caramel-type compounds which can darken the product or produce unwanted flavors.

It is also useful for grain-based products, such as oat milk, which benefit from the additional dilution with water which the food-grade steam provides, but the type and model of heat exchanger chosen will depend on many different factors, such as the nature of the process to be carried out (pasteurization, sterilization, dehydration, etc.) and the viscosity of the drink being processed. HRS has a complete range of products from simple tube-in-tube designs to rotating or reciprocating scraped-surface designs, all of which combine efficient heat transfer with delicate product handling; ensuring that products remain in emulsion and that the product does not foul the equipment.

Whatever plant-based milk product you are producing, it is important to remember that plant-based milks have the same requirements for pasteurization, sterilization, cooking, or cooling as other beverages that contain specific ingredients. It is, therefore, crucial to invest in the most effective and efficient processing technology for all stages of production.

MATT HALE is the international sales and marketing director for HRS Heat Exchangers. Located in Atlanta, Georgia, HRS Heat Exchangers is part of the HRS Group, which operates at the forefront of thermal technology, offering 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 our corrugated tubular, and scraped surface heat exchanger technology, HRS units are compliant with global design and industry standards. For more information, email info@us.hrs-he.com or visit **www.hrs-heatexchangers.com**.

2021 Top Products

Whether it's at product launches, factory tours, or trade shows, the staff at MPT is afforded an up-close look at the newest offerings for our industry, and each December, we look back on the year that was and present our choices for the Top Products spanning the industrial pump and rotary equipment markets.

In the pages that follow, MPT shares its selections for the products that speak to the industry's needs for efficiency, reliability, and innovation. Each of our Top Products was chosen through submissions from our staff, advertisers, and readers like you. The products range from large multinationals you're likely familiar with to smaller, regional suppliers worthy of your attention.

Regardless of their size or reputation, they all offer value you can take into the new year. Enjoy!

AW-LAKE

EDGE Flow Electronics

Built upon a foundation of scalability, flexibility, and stability, the EDGE family of flow meter electronics provides you better access, understanding, and control of your process. The innovative signal processing, increased accuracy from linearization, flexibility to choose the output you need (pulse, analog, or Modbus), and incredible ease of use make AW-Lake's EDGE products the smart choice to use on your positive displacement or turbine flow meters.

Operators can remotely configure, set parameters, fine-tune adjustments, and troubleshoot the flow meter remotely using a mobile device. The mobile application also supports basic scaling and advanced functions, allowing for remote correction of non-linear flow meters to keep a linear analog output. Using the mobile application, users can turn a smartphone or tablet into a wireless flow monitor that works in the palm of their hands!

EDGE Local Mount Sensor:

- Single user interface and tools with Bluetooth app and PC Toolkit for easy setup
- Modbus outputs for faster, higher resolution data transfer to HMI's or smart controllers for data recording
- Data storage with MicroSD card or pull through mobile or toolkit app
- Linearization allowing wider flow range for all meters

RT-50 Battery, Loop, or DC Powered Transmitter:

- Rugged, weather-tight enclosure and easy-to-read LCD display
- Bluetooth for easy setup and monitoring via mobile app
- List style menu and quick access buttons for easy programming
- Multiple power options include battery, loop, and DC

FAC-R DIN Panel Mount Converter:

- Bluetooth for easy troubleshooting and setup via mobile app
- This device acts as an economical high-speed PLC counter or multimeter
- Ten-point linearization table improves the output accuracy
- Excellent linearity and temperature stability

The EDGE family of sensors can be used with AW-Lake's Next-Generation Gear Meter Series that offers greater efficiencies in operation with tighter tolerances, higher resolutions, higher standard pressure ratings (6,000 psi), improved accuracy, and wider turndowns (100:1). These meters were designed with high-performance materials that offer high chemical resistance to operate safely in abrasive or filled fluids while providing a long service life of more than thirty years in the field, ±0.1 percent repeatability, and ±0.5 percent standard accuracy.

For more information, visit **www.aw-lake.com**.

ATLAS COPCO

PAC Flow Series Pumps

At Atlas Copco, we are driven by innovation. Our new PAC Flow Series pumps are designed with three key features in mind: performance, technology, and serviceability that bring you best-in-class performance.

The PAC F66 and F88 feature an enclosed impeller that can pass a 3-inch spherical solid, meaning when it comes to flow and performance, it can get the job done. Our carefully thought-out design brings you up to 82 percent efficiency. Our priming system is powered by a diaphragm vacuum pump that delivers 50 cfm, meaning you get a faster prime and can start pumping quicker.

When crafting our Flow Series, we kept the same design components as other Atlas Copco pumps. Our polyethylene fuel tanks have a massive advantage against steel fuel tanks that prevent any oxidation within the tank, thus increasing the lifetime of the fuel system.

Another technological advantage within the PAC Flow range is our QR code. Scan the QR code on your mobile device to take you to Power Connect, connecting you with relevant machine information and documents, all in the palm of your hand.

One of the greatest features of the PAC Flow pumps is the ease of serviceability. We designed these units with our patented swing-door solutions that give you access to the impeller and the heart of the pump within minutes. Two additional features that enhance serviceability are our semi-cartridge seal design and link belt. Both actively reduce your mean time to repair, so you can continue your operations quicker and more efficiently.

With flows up to 3,950 gallons per minute and heads to 200 feet, you can easily transfer and dewater in quarry and mining applications, complete sewer bypasses, and provide diesel backup systems for sewer lift stations. No matter the application, the Atlas Copco Flow Series can get the job done.

For more information, visit **www.atlascopco.com/en-us/construction-equipment.**

SIGNALFIRE WIRELESS TELEMETRY

Ranger Wireless Telemetry System

Measuring and monitoring when you need it, how you need it, and where you need it has never been this easy. No matter your industry, if you need to monitor parameters like pressure, flow, temperature, and level, or equipment like compressors, pumps, generators, and more, the SignalFire Ranger wireless transmitter provides flexible, secure, real-time connection in a user-friendly package. Once the Ranger transmitters are connected to your measurements, you can immediately track conditions, troubleshoot problems, change monitoring parameters, receive alerts and alarms, and take action from any web browser. No software installation is required.

The Ranger's inputs are suitable for current, voltage, HART, Modbus, SDI12, frequency, and even relay output. Battery-, solar-, or DC-powered, the Ranger transmitter powers a variety of IoT sensors to transmit their measurements using the latest LTE-M CAT M1 cellular networks, providing real-time data that empowers you to optimize your operations and ensure compliance with environmental and industry regulations—or simply to have peace of mind, knowing you have insight on what you need to monitor.

Modular and scalable, the SignalFire Ranger platform can meet all your IoT sensor data transmission needs. SignalFire engineers will work with you to develop a solution specific to your systems and environment, powering and connecting sensors in any location to your existing private cloud or the SignalFire cloud. The modular, plug-and-play nature of the system provides flexibility as well as time and cost savings, allowing room for your network to grow and change as you add or change sensors and as wireless technology advances. The Ranger firmware can also be updated over-the-air to support new features or sensor types creating a future-proof solution—so you spend less time in the field and more time in control.

This IoT industrial monitoring solution utilizes the latest MQTT/Sparkplug technology available so it can easily be integrated into our cloud or your cloud application. Because it is cloud-based, you have 24/7 access to your data which provides complete awareness and enables you to make timely decisions for your operations.

SignalFire Wireless Telemetry: We make things easy for you.

For more information, visit **www.signal-fire.com**.

SUNDYNE

ANSIMAG Seal-less Magnetic Drive Pumps

ANSIMAG seal-less magnetic drive pumps are specifically designed for chemical processing applications. All wetted parts are molded ETFE components that can safely handle a wide range of corrosives and solvents without corrosion. A patented, fully encapsulated mag drive hermetically seals the inner magnets to isolate them from process fluid and maintain magnet integrity for the life of the unit. A Kevlar-fiber reinforced vinyl ester shell delivers unprecedented reliability.

During the last several months, ANSIMAG pumps have been used in a wide range of prominent applications. They're used to pump the harsh chemical polymers that coat the electrodes for electric vehicle lithium-ion batteries. ANSIMAG pumps are used by COVID-19 vaccine manufacturers to pump the coolants used in freeze driers. And ANSIMAG pumps are used by Hydrogen Fuel Cell producers to pump caustic chemicals into electrolyzers to adjust the pH of water used to generate green hydrogen.

ANSIMAG pumps are more energy-efficient than mechanically sealed pumps. An innovative rear casing generates no eddy currents, thus eliminating heat generation and reducing energy costs. Because ANSIMAG pumps do not have seals—there are no leaks, no emissions, and no costs related to seal maintenance.

ANSIMAG benefits include:

- **Zero leakage:** Seal-less design and a single, fully-contained O-ring eliminates possible leakage.
- **Chemically resistant lining:** Carbon fiber reinforced ETFE is resistant to most chemicals.
- **Secondary containment:** Lined Kevlar fiber/epoxy offers unsurpassed pressure handling capability.
- **Corrosion protection:** Powder coat exterior is more durable and resistant than epoxy-based paints.
- **Durable construction:** Ductile iron exterior is designed for heavy-duty chemical applications.
- **Magnetic drive:** Hermetically seals the inner magnets, isolating them from the process fluid.
- **Fully-encapsulated inner drive:** Provides unsurpassed resistance to chemical attack.
- **Easy service:** Nine wetted parts and a back pull-out design enables service without breaking the wet end.
- **Small footprint:** Close-coupled design offers quiet operation.

For more information, visit
www.sundyne.com/products/ansimag-pumps.

VAUGHAN COMPANY

THE VAUGHAN CONDITIONING PUMP

The Vaughan Conditioning Pump is a Vaughan submersible chopper pump mounted on a portable stand and fitted with a high-velocity mixing nozzle. The Conditioning Pump recirculates the contents of the wet well, chopping and mixing to produce a homogeneous mixture that is more easily pumped out. Floating mats are removed and solids that have accumulated on the floor are re-suspended. As the pump is mounted on a portable stand it can easily be used in multiple applications at a single job-site, facility, or municipality.

APPLICATIONS

- Lift station conditioning
- Influent station/channel conditioning
- Basin conditioning
- Holding tank conditioning
- Digester cleanout/homogenization

When Vaughan created the Conditioning Pump, they designed it to be used in several different scenarios to save you from costly clean out cycles and maintenance.

REDUCE VACUUM TRUCK VISITS

By re-suspending and removing floating solids that have accumulated on the floor, the Vaughan Conditioning Pump reduces—and in most cases eliminates—the need for costly vacuum trucks, saving thousands of dollars each year.

EXISTING NON-CLOGGING PUMPS EXPERIENCE CLOGGING

If the large pumps you are currently using in the station (wet well or dry well) are clogging on solid filled liquid they are trying to pump, it can be a costly endeavor to replace the pumps. Vaughan created the Conditioning Pump to solve this problem at a fraction of the cost. You can put the conditioning pump into the wet well and chew up all of the rags and solids so that the existing pump won't get clogged.

FLOATING LAYER OF GREASE AND DEBRIS ACCUMULATED

Lift stations/collection pits tend to form floating mats that standard lift station pumps cannot pump out. If left unattended, the layer will continue to thicken until you eventually need to call in a vacuum truck to suck off the thick layer. This results in thousands of dollars in maintenance and dumping fees. The Vaughan Conditioning Pump can get rid of unnecessary third-party cleaning cycles, and the unwanted costs that come along with them, by recirculating/conditioning the pit until the mat disappears.

SETTLING SOLIDS ON THE FLOOR OF THE WET WELL OR SUMP

When solids fall out of suspension, they create a "settling layer" at the bottom of the tank, resulting in costly third-party cleanout cycles. The Vaughan Conditioning Pump re-suspends these solids so the duty pumps can actually pump out and remove the solids, and also save you from those costly clean out cycles.

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

BLACOH SURGE CONTROL

SurgeWave™ Transient Monitoring System

Blacoh's patented SurgeWave™ Transient Monitoring System solves the need for industrial and municipal plant operators to detect and record transient pressure events occurring in water, wastewater, oil and gas, and industrial fluid applications. The system is unique in that it employs a system of dynamic pressure transducers and digital technology to monitor piping systems for indefinite periods of time. When a transient such as a pressure surge, pressure spike, or water hammer event is detected, the system activates a high-speed data recorder to record the event 100 times per second. Use SurgeWave to prevent pipe fatigue, breakage, cavitation, and assist in the modeling of corrective actions.

Often, plant operators do not find out about these dangerous abnormalities until much later when it is too late. With this Blacoh SurgeWave™ Transient Monitoring System installed, it will notify designers, engineers, manufacturers, and operators immediately within a few minutes of the event. They can assess pipeline performance, pressure, flow, and pump speed and perform the necessary corrections and maintenance.

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

CHECK-ALL VALVE MFG. CO.

Precision Check Valves

Check-All Valve Mfg. Co. manufacturers a complete line of spring-loaded poppet style check valves. With worldwide service, Check-All Valve serves a wide range of industries including the chemical, petrochemical, biofuels, pharmaceutical, food and beverage, water treatment, and many others. Every Check-All valve is designed and built to perform to exact needs and specifications.

Check-All valves are engineered for silent operation. They close quickly and smoothly to eliminate hammer noise. They function equally well in either a vertical or horizontal position, with proper spring selection. Our space saving design easily fits into existing line components, which reduces initial cost and installation time. Check-All valves can also be used as low-pressure relief valves and vacuum breakers.

Check-All Valve provides check valves for practically every service application. Valves are offered with metal-to-metal or soft seats in sizes ranging from 1/8-inch NPT to 20-inch flanged connections. Pressure ratings are available from full vacuum to 10,000 PSI. Standard or exotic materials are available, and you can choose from a wide variety of spring settings and seat materials for any valve. Most options are available with fast delivery. Specially designed valves are another option that Check-All Valve performs on a regular basis.

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

CLA-VAL

Model XP2F

The new Cla-Val Model XP2F is an all-encompassing, data acquisition instrumentation package option available now for any Cla-Val control valve. This also has flow calculation data and is a differential pressure-based solution and comes complete with pressure transmitters, a valve position transmitter and flow calculation module. IP 68 rated, 12-24V DC input, four analog inputs, and four analog outputs with the ability to accept additional field instrumentation and retransmit measurements to PLC/SCADA via 4-20mA signals. This will also be supported by a nationwide staff of field and factory personnel to provide trouble-free implementation.

Additionally, the Cla-Val Model XP2F Metering Package is comprised of the X35 Flow Calculation Module, the X117H Valve Position Transmitter, and two X141-PT Pressure Transmitter assemblies. The calculated flow through the main valve can be used for flow indication or flow control, and the flow signal and transmitter signals can be retransmitted as 4-20mA signals.

The Cla-Val Model XP2F is easily retrofitted onto existing valves, has minimal upstream/downstream straight pipe requirements, has a local display with five buttons, easy field calibration and commissioning with no software needed, low maintenance/minimal fluid contact, as well as forward and reverse metering capabilities.

For more information, visit **www.cla-val.com**.

CRANE PUMPS & SYSTEMS

Envie^3 Pump Motor

Envie^3 high efficiency air-filled motors come without application limitations. These premium efficient motors are designed to run both submerged and dry run and are available with our Barnes and Deming product lines. The envie^3 pump motors are available as both Barnes or Deming chopper and non-clog pumps, which feature superior hydraulic performance that is proven by our existing SH product platform. The patent pending closed loop glycol cooling systems allows for stress-free easy maintenance and installation. The envie^3 motor platform is engineered to be installed into dry pit and submersible applications. This makes the envie^3 a superior pump solution to all existing and new installations, including coastal regions that experience frequent flooding in dry pit applications.

The envie^3 motor platform features numerous accessories and installation options including horizontal and vertical configurations. The horizontal installation options include a cart system, which creates a back pull-out option allowing for easy maintenance, as well as a fixed bracket configuration. When installed horizontally, the envie^3 footprint is 35 percent smaller than competitors' frame mounted end suction pumps. This allows for space savings which helps when installing into locations where space is limited. The envie^3 vertical installation configurations include a metal and concrete stand. Each of these vertical stands allow for 360-degree rotation which makes adapting to existing piping convenient, including tangential discharge pumps.

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

GAS CLIP TECHNOLOGIES

MGC Simple and MGC Simple Plus

Keeping employees safe while at a worksite is always a priority. Therefore, they need the most reliable protective equipment possible, especially when it comes to gas detection. Without it, tragedy can strike simply by walking into the space. That thought of keeping others safe has been the driving force behind Gas Clip Technologies' efforts to provide dependable, compliance-based, affordable gas detection solutions—like the MGC Simple and MGC Simple Plus.

The MGC Simple and MGC Simple Plus have continuous run times of two years and three years respectively. After being charged and calibrated during manufacturing, neither detector requires recharging or routine calibration, although bump testing before every use is advised. They both identify the presence and level of hydrogen sulfide, carbon monoxide, oxygen, and combustible gases (LEL).

These detectors also provide detailed data logging. Valuable information is documented in one-second increments, which in turn creates a "black box" of critical details that map out the development of gas exposure from the moment of detection. Additionally, both devices are compatible with a variety of accessories, like the new GCT External Pump (which is perfect for working in confined spaces).

Innovative gas detection solutions, like the MGC Simple and MGC Simple Plus, are always within easy reach since Gas Clip Technologies' products are available through distributors worldwide.

For more information, call 972.775.7577 or visit **www.gascliptech.com**.

GRAPHITE METALLIZING CORPORATION

GRAPHALLOY® Wear Parts

GRAPHALLOY wear parts work where others won't—including run dry, flashing, and low lubricity service.

Plastic and metal wear parts may enable a pump to run dry briefly without a catastrophic crash, but generally a major rebuild of the pump will be required. GRAPHALLOY case rings and bushings enable pumps to run dry and survive, often without loss of performance or the need to replace the GRAPHALLOY parts. This is due to GRAPHALLOY's unique features.

GRAPHALLOY, a graphite-metal alloy, is non-galling, self-lubricating, and dimensionally stable. GRAPHALLOY has a wide temperature range with pump applications from cryogenic to 1,000 degrees Fahrenheit (540 degrees Celsius). It has a low coefficient of thermal expansion across a wide temperature range, allowing very tight clearances without risking pump seizure.

Pumping low lubricity fluids, hydrocarbons, liquid gases, or hot water can be especially difficult for a metal-on-metal pump; GRAPHALLOY solves the problem. Using GRAPHALLOY also allows closer running clearances often resulting in pump efficiency improvements.

For over 100 years, Graphite Metallizing Corporation has supplied GRAPHALLOY wear parts for light hydrocarbon pumps, food pumps, chemical pumps, boiler feed pumps, molten sulfur pumps, wastewater pumps, drinking water pumps, and more. NSF/WRAS grades are also available.

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

GREASEZILLA

FOG Separation Process

By separating FOG into its basic elements, Greasezilla® generates an advanced biofuel and pasteurized effluent water ready for your wastewater treatment facility.

No chemicals. No landfilling. No waste.

Greasezilla's® two-reactor tank system heats the FOG to create separation, requiring no additives, additional processing, blending, or fossil fuels. After separation, the brown grease is pumped into holding tanks and has now become an advanced biofuel that is a cleaner substitute for high-sulfur fuel. The remaining water content, which is pasteurized and nearly free of all suspended solids, is now safe for discharge into the treatment facility.

Greasezilla® separates FOG into its basic elements, sending the water back to the wastewater treatment center headworks and recovering highly profitable Brown Grease Advanced Biofuel (ABF). This end-to-end process is the most ecologically advanced system available. Greasezilla® is unique in that it is powered by the same clean ABF it produces and leaves nothing to be landfilled or disposed of.

Customers range from small municipalities to large commercial operations. Recently, Hampton Roads Sanitation District (HRSD) selected Greasezilla® to provide FOG separations for its Nansemond Treatment Plant.

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

HELWIG CARBON

BPK-Probe: Shaft Voltage Detection Device

As variable frequency motor drives (VFDs) become more widely introduced as an effective method to increase motor efficiency, bearing failure and related downtime have also increased. VFDs induce a current on the electric motor shaft that often discharges through the motor's bearings causing pitting, fluting, and eventual failure.

Helwig Carbon developed the BPK-Probe to be an easy-to-use field instrument that helps a user identify the risk of premature bearing failure in an electric motor due to induced shaft currents. The device measures the voltage on the motor shaft and gives real-time results to the user. This unique, patented technology is perfect for any field service or plant maintenance personnel that care for motors run by variable speed drives. The BPK-Probe will give a pass/fail result that tells the technician whether the motor should be outfitted with a shaft grounding/bearing protection system. In fact, the probe has a built-in silver graphite grounding brush that can be activated to show the shaft voltage if a Helwig Carbon Bearing Protection Kit was installed. The probe can also be hooked up to an optional oscilloscope to show graphical data of the voltage changes over time.

The BPK-Probe makes for a great addition to any motor diagnostic and preventive maintenance toolkit. A new mobile app that pairs with the probe is also available, allowing for easy data collection and report creation.

For more information, visit **www.helwigcarbon.com/shaft-voltage-detection-device**.

SULZER

Johnston Pump

A Sulzer Brand

SULZER

As a recognized leader in the municipal water industry, as well as irrigation and flood control, the Johnston Pump name is familiar to several generations of operators. Sulzer is equally well-known for its quality and extensive product range in the oil and gas and power generation sectors; so, with both benefitting from extensive service and manufacturing facilities in North America the brands sit well together.

The Sulzer management and operational teams are confident to provide reassurance that the attributes of high-quality engineering and reliability associated with Johnston pumps have been retained and refined over the past sixteen years. Manufacturing standards within the current production facilities remain extremely high with extensive testing capabilities within Sulzer to ensure that every product is delivered to the exact specification required.

The Johnston product range, which has been adopted by Sulzer globally, is renowned for its reliability and versatility. For the water and wastewater industries, the ability to engineer a base pump design to suit individual applications is very important. It ensures the essential design features are retained while the specifications match the operation, delivering an efficient and cost-effective solution.

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

HOOSIER PATTERN INC.

INTEGRATED FOUNDRY TOOLING SOLUTIONS

3D PRINTING AND TOOLING FOR THE FOUNDRY INDUSTRY

WHY CHOOSE HOOSIER PATTERN?

STATE-OF-THE-ART FACILITY

- 90,000 Sq. Ft. Facility
- Over 25 In-House Machining Centers
- Laser Scanner
- CNC Lathes

MANUFACTURING CAPABILITIES

- Rapid Prototyping
- Production Printed Cores
- Prototyped Printed Cores
- No Tooling Needed
- Complex Geometric Sand Cores & Molds

INDUSTRIES SERVED

- Automotive
- Agriculture
- Consumer Appliances
- Military & More

260.724.9430 | **hoosierpattern.com**

Hoosier Pattern • 906 N 10th St. • Decatur, IN

FREE DOWNLOAD ›
Scan barcode

Another Vanton AdVantage

VANTON's Engineered Pump Solutions Mean Never Settling for a Square Peg in a Round Hole

At VANTON PUMP, there are no off-the-shelf solutions when it comes to properly addressing your pump needs. With the broadest line of thermoplastic pumps in the industry, we've learned that every application can benefit from a little extra scrutiny. It's our way of ensuring that the pump we deliver is the pump your situation demands - and not an attempt to thwart geometry by forcing a square peg into a round hole.

From selecting the optimal construction materials, to assessing the proper configuration, VANTON engineers every pump we ship to our customer's specific application. It's your assurance that a VANTON pump will interface perfectly with your operation's requirements and perform the task it's intended for year after year.

VANTON PUMP…Engineered Solutions for Trouble-free Performance.

VANTON

PUMP & EQUIPMENT CORPORATION

vanton.com

Sump-Gard® Vertical Centrifugal Pumps

Pump/Tank Non-metallic Systems

Chem-Gard® Horizontal Centrifugal Pumps

Flex-I-Liner® Rotary Peristaltic Pumps

GOING THE EXTRA MILE

Model: PAH10B60-6135H FT4

SUPPLY MORE WATER TO YOUR SITE, FROM FURTHER AWAY. GUARANTEED.

Our distributors are authorized to put a new Gorman-Rupp engine-driven contractors' pump alongside any other make pump of the same size, type and horsepower, anytime, anywhere. The Gorman-Rupp pump will pump more dirty water, more hours, using less fuel and prime quicker. If within 30 days of purchase it isn't the best all-around pump, our distributor will accept the return of the Gorman-Rupp pump and offer a full refund.

For more information, call Gorman-Rupp at 419-755-1011 or visit GRpumps.com to find a distributor near you.

GORMAN-RUPP PUMPS

The Pump People®