

The background is a complex technical drawing in white lines on a blue gradient. It features various mechanical components such as pipes, valves, flanges, and a large globe in the upper right corner. The lines are thin and precise, typical of engineering blueprints.

MPT

Modern Pumping Today®

DIGITAL EDITION



www.hornerindustrial.com

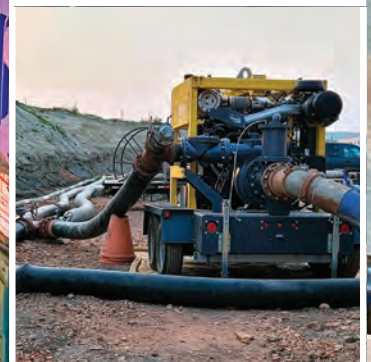
NOVEMBER 2021

MPT

2022 BUYERS GUIDE

MODERN PUMPING TODAY®

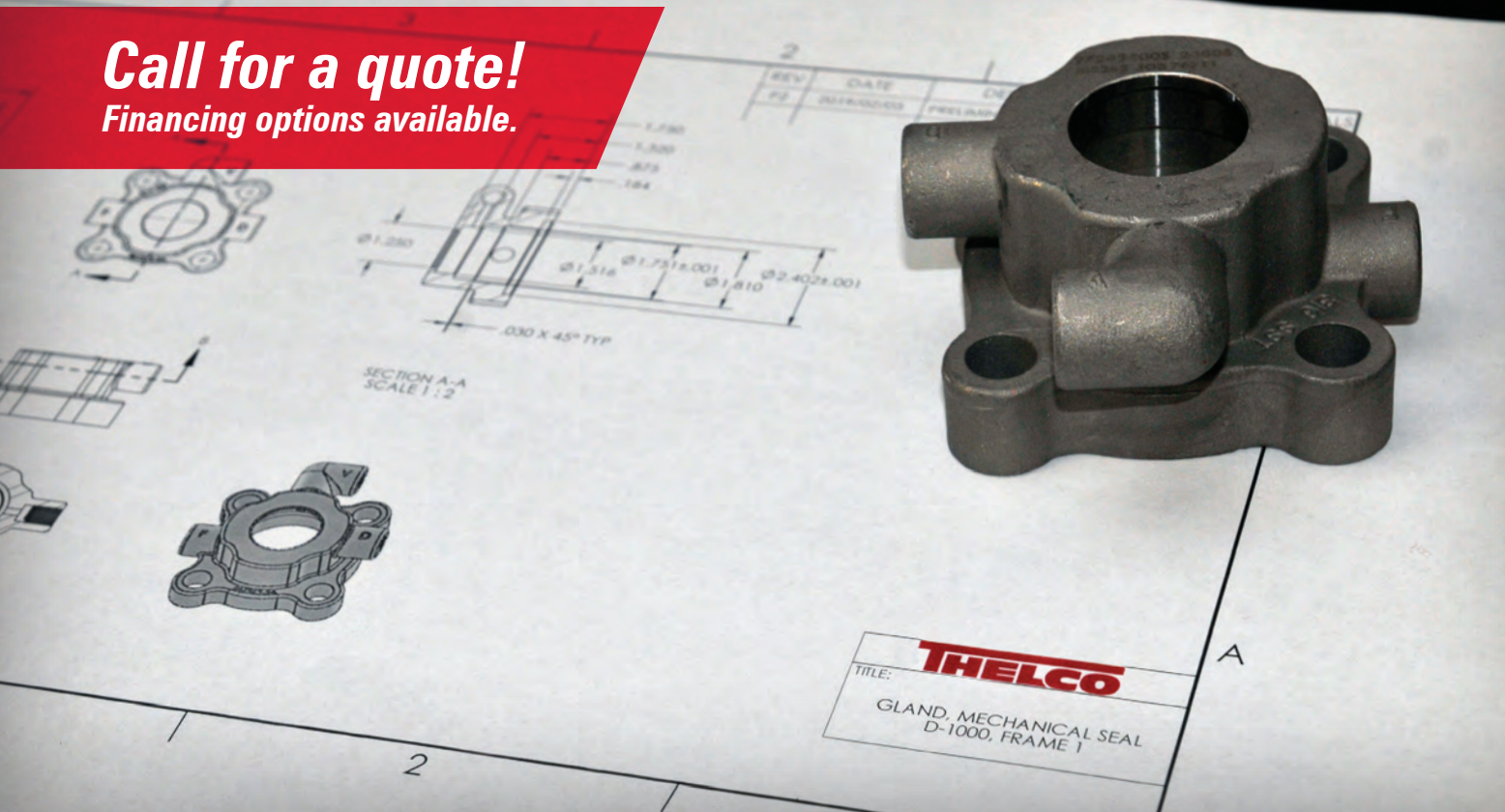
PROVIDING SOLUTIONS FOR THE WORLDWIDE PUMP INDUSTRY



WWW.MPTMAG.COM

THELCO
See our ad on inside front cover.
www.thelco.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



**WE STIR UP
EVERYTHING
BUT TROUBLE.**

Rotamix

For hydraulic mixing without headaches, choose the reliable Vaughan Rotamix System. Blend lower operating and maintenance costs with a more efficient breakdown of solids. Your digester's, sludge storage tanks, and equalization basins won't know what hit them.

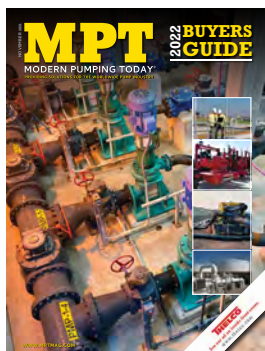
Choose the unmatched reliability of Vaughan. Free sample CFD's upon request.



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

GUARANTEED PERFORMANCE | NO MOVING PARTS IN THE TANK | FOCUSED MIXING

Vaughan
Unmatched Reliability



Cover photo courtesy of Vaughan Company

NOVEMBER 2021

A NOTE ON THIS ISSUE:

As the holidays fast approach and we begin to close out 2021, it's a perfect time to gear up for the coming year! And what better gift could there be than MPT's 2022 Buyers Guide (pg. 39)? Each year, we select a robust sampling from the industrial pump and rotary equipment markets to keep our readers informed, educated, and excited. In this section, you'll learn more about some companies you're familiar with and pick up some new leads for what's to come.

Also in this issue, frequent MPT contributor Thomas Renner shares an entry in our Case Studies section on how one treatment facility in California is taking aim at higher efficiency (pg. 10). See how after years of neglect, a \$38.5 million project will help keep the Robert Diemer Water Treatment Plant running.

Additionally, Xylem's Rocio Echeverria illustrates how his company and Esri have partnered to analyze pipe segment risk and reduce planning time (pg. 18). Unleashing the power of analytics, this project has helped the City of Raleigh Public Utilities Department get a clearer picture of its 2,340 miles of pipes, some of which have been in use for over a century. Enjoy!



J. Campbell, Editor
Modern Pumping Today

EDITORIAL ADVISORY BOARD:

TERRY BELL Product Manager, ABB

HEINZ P. BLOCH, P.E. Consulting Engineer, Process Machinery Consulting

ROBERT G. HAVRIN Director of Technology, Centrisys Corporation

MICHAEL MANCINI Consultant and Trainer, Mancini Consulting Services

JOHN M. ROACH Engineering Manager for New Product Development, Trebor International, Inc.: A Unit of IDEX

LISA RILES Business Development Manager, Wastewater Pumps, Xylem Inc.: Flygt

FRANK KNOWLES SMITH III Executive Vice President, Blacoh Surge Control

GREG TOWSLEY Director of Regulatory and Technical Affairs, Grundfos

TREY WALTERS, P.E. President, Applied Flow Technology

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



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

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage-and-retrieval system without permission in writing from the publisher. The views expressed by those not on the staff of Modern Pumping Today, or who are not specifically employed by Highlands Publications, Inc., are purely their own. All Industry News material has either been submitted by the subject company or pulled directly from their corporate website, which is assumed to be cleared for release. Comments and submissions are welcome, and can be submitted to jay@mptmag.com.



@modpumpmag



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?



CONTENTS

INDUSTRY NEWS

What's Happening in the Industry 6

CASE STUDIES

California Project Takes Aim at Efficiency 10

After years of neglect, a \$38.5 million project will help keep the Robert Diemer Water Treatment Plant running

WATER & WASTEWATER FOCUS

How to Avoid Wastewater Pump Failures 14

Identifying key causes of failure helps prevent costly consequences

Data Science Helps Raleigh Water Avoid Digging Up the Streets 18

Xylem and Esri partner to analyze pipe segment risk and reduce planning time

MAINTENANCE & RELIABILITY

Improve Environmental Remediation Operations with Remote Monitoring 20

Today's monitoring systems are robust enough to handle remediation site demands

PUMP SOLUTIONS

One Pump for (Almost) Everything 24

The versatile application possibilities of air-operated double-diaphragm pumps

MOTOR SOLUTIONS

Finding Reliability at High Altitude 28

Gold Fields orders ABB integrated power and automation system for Andes project

To Succeed, Control Your Speed 30

Using medium voltage VFDs to eliminate waste and promote efficiency, reliability, and quality Part 1 of 2

SEALING SOLUTIONS

The Mechanical Seal Industry's Contribution to Energy Efficiency in Pumping Systems 34

Part 2 of 2

SPECIAL SECTION

2022 Buyers Guide 39



10



14



20



24



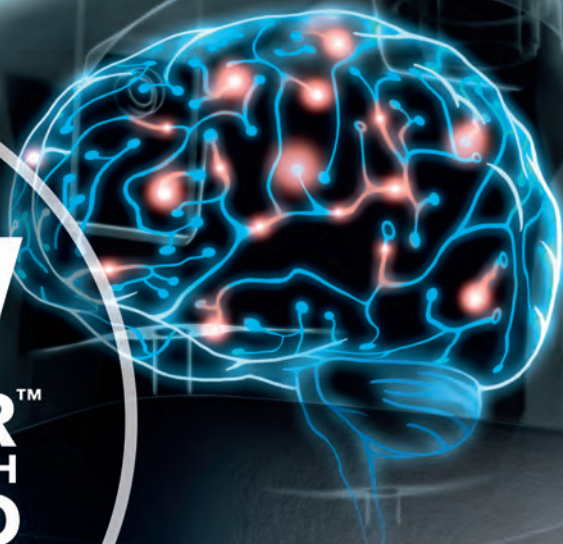
39



NEW

CONCERTOR™

PUMPING SYSTEM WITH
INTEGRATED
INTELLIGENCE



FLYGT

WORLD'S FIRST WASTEWATER PUMPING SYSTEM WITH INTEGRATED INTELLIGENCE

This revolutionary system delivers optimal performance while reducing your total cost of ownership. It also offers unparalleled flexibility and simplicity on a whole new level. You might even say it thinks for itself. We invite you to enter a new era in wastewater pumping with Flygt Concertor.

One powerful solution. Unlimited possibilities.

www.xylem.com

xylem
Let's Solve Water

SGS EXPANDS FILTRATION PERFORMANCE TESTING CAPABILITY IN CHINA

SGS has gained accreditation from the American Association for Laboratory Accreditation (A2LA) for the mechanical testing of filters, filter materials, vacuum cleaners, and air purifiers at its new filtration laboratory in Suzhou, China.

The A2LA accreditation broadens SGS China's capability to deliver a wide range of industries with a single focus on filtration testing for compressed air, HEPA/ULPA, HVAC, and industrial air and residential air purification.

Ben Lv, director of SGS China automotive and North and East China electrical and electronic consumer, adds, "This news will be welcomed by our clients who will benefit from a locally available, single lab dedicated to air filtration services. It's also great news for the wider industry as we seek to build our reputation in this field and support the healthy and sustainable development of the national filtration sector."

The new certification confirms that the lab has management, quality, and technical systems in place to deliver accurate and reliable analyses; and appropriate administrative processes to ensure that all aspects related to the sample, the analysis, and the reporting are standardized, measured, and monitored.

CENTRISYS/CNP'S EXPANDS SALES TEAM WITH THREE NEW REPRESENTATIVES

Centrisys Corporation announces the growth of its sales team and the addition of three new representatives. After eight years with EU-based manufacturers, John "Mickey" Balash re-joins the U.S.-based Centrisys/CNP team as industrial sales manager. Additionally, Steve Brown joins as sales manager for the Southeast region, and Drew Johnston joins as aftermarket sales for the central region.

"As Centrisys/CNP continues to develop innovative centrifuge solutions and advanced biosolids treatments, demand for our products and services has grown worldwide, and particularly in North America," says Josh Gable, director of sales for Centrisys/CNP. "We are thrilled to welcome Mickey, Steve, and Drew to our dedicated team. I know their commitment to providing the highest level of customer support will allow us to further advance offerings in both the municipal and industrial markets." Balash will focus on identifying areas for growth and advancements in industrial markets, establishing streamlined processes, and educating prospects and customers about current technologies and future trends. Brown's position will target customer acquisition and support for newly designed and manufactured equipment in the Southeast. Johnston will focus on aftermarket sales, including equipment repair, service, and parts support.

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
- 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



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



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

AQUA PENNSYLVANIA APPOINTS NEW WESTERN AREA MANAGER

Aqua Pennsylvania announces the promotion of Zach Martin to area manager for its western Pennsylvania service area. In his new role, Martin will oversee all operational and administrative duties in Aqua's western division. This region includes fifteen treatment facilities and serves about 70,000 people across nine counties.

"Zach's extensive utility experience and his proficiency in water and wastewater operations make him an ideal choice for this position," says Steve Clark, Aqua's director of operations for greater Pennsylvania. "He brings to his new role a breadth of knowledge and an unfailing commitment to protect and provide Earth's most essential resource for the families we serve."

Martin is a seventeen-year utility industry veteran. He joined Aqua Pennsylvania in 2013 as plant manager for its Shenango Division water treatment plant, where he managed all of Aqua's western area regional water and wastewater systems. Martin began his Aqua career in 2010 as production manager for Aqua Ohio's water treatment facility in Struthers, where he directed operations. Earlier, he served as regional water superintendent at Portage County Water Resources in Ohio and as water plant operator for the city of North Canton.




RUSCO DEBUTS SMART AUTOMATED BALL VALVE

Water filtration company Rusco unveils the Rusco Smart Ball Valve, expanding its smart product line. Compatible with leading smart hubs, including

Amazon Alexa and Google Home, the Rusco Smart Ball Valve is app-driven and pairs easily with Apple and Android devices. Its connectivity allows for program automation, simplifying two primary functions: sediment flushing and flow shut-off. The product can be used in home filtration, well water, commercial, and municipal applications.

"It's a very exciting time for our near forty-year-old company," says Michael Klump, president of Rusco. "When I joined the team last year, right in the heart of the pandemic, one of my first priorities was to energize our staff, as well as our strong distributor and customer base. Updating our product line to improve quality of life felt like the perfect solution. We look forward to delivering Rusco's promise with the smart ball valve, as well as additional developments in the pipeline for next year."


Although the smart ball valve can serve as a standalone shut-off valve, it can also be combined with a Rusco Spin-Down Filter, Sediment Trapper, or similar product from a competing brand for optimum use. ■



CARBON GRAPHITE

PUMP COMPONENTS VANES & ROTORS BEARINGS & BUSHINGS

- Long life and self-lubricating
- Resistant to chemicals, corrosion, & oxidation
- Food & pharmaceutical compatible
- Custom engineered



1-800-962-4851
helwigcarbon.com



CUSTOMIZED SUBMERSIBLE MOTORS

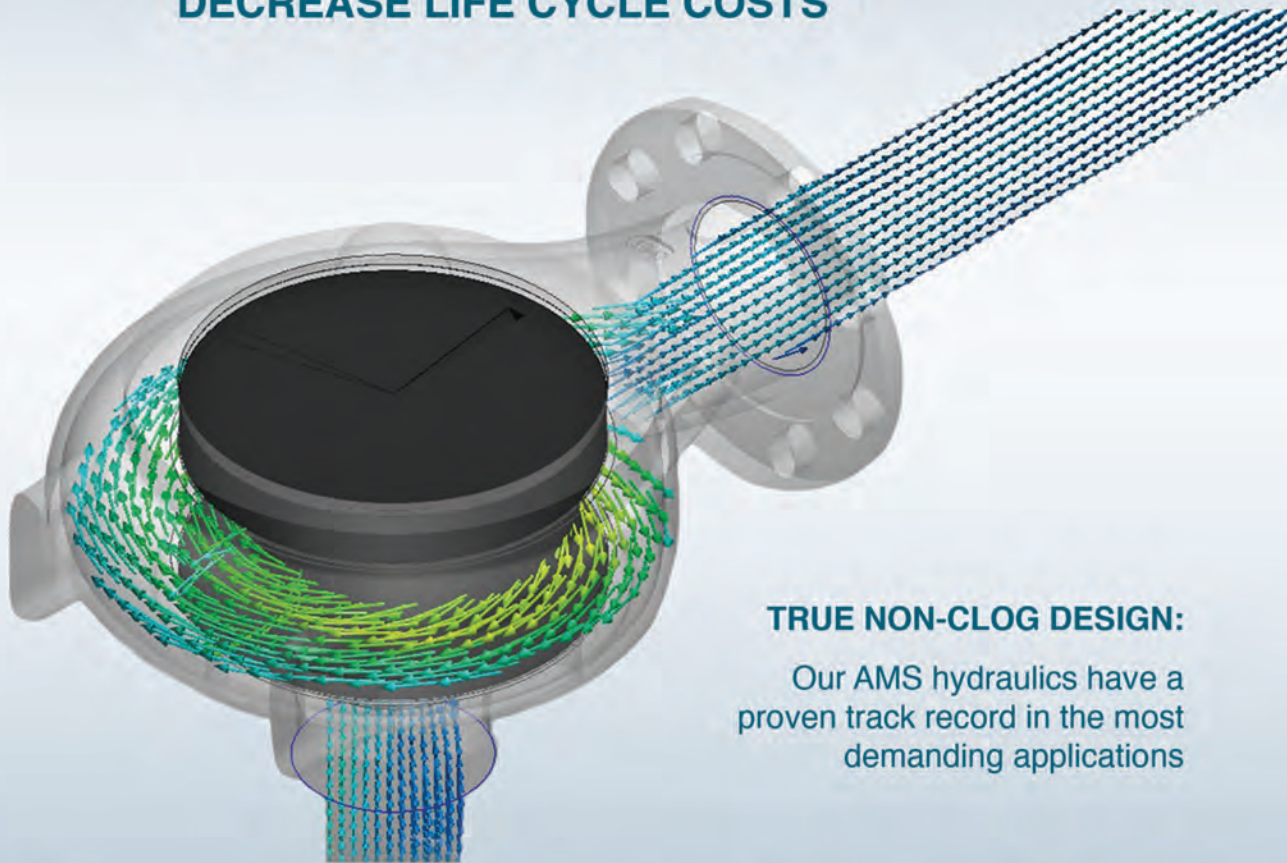
Sun-Star Electric, Inc.

is the worldwide distributor for Hitachi submersible motors. We are also fully equipped to design and manufacture a custom submersible motor for your specific project. Sun-Star's signature line of oil and water filled motors are built to meet your exact requirements. Put our 40+ years of experience to work on your next submersible motor project.

Sun-Star Electric, Inc. 888-SUN-STAR/800-782-9675
sales@sunstarusa.com www.sunstarusa.com

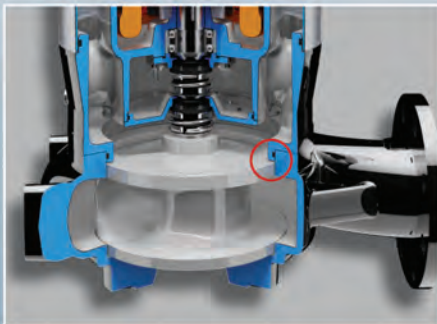


INCREASE PUMP STATION EFFICIENCY DECREASE LIFE CYCLE COSTS

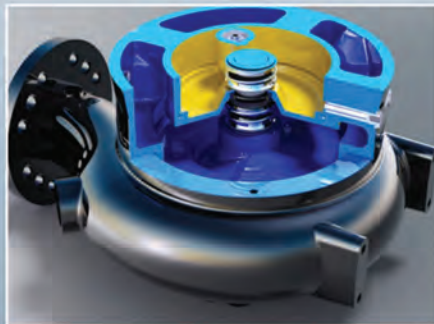


TRUE NON-CLOG DESIGN:

Our AMS hydraulics have a proven track record in the most demanding applications



CONTROLLED RADIAL TOLERANCE: No frequent, expensive maintenance or adjustments required



PERMACOOL™: Our patented cooling system design eliminates jacket clogs



AVAILABILITY: Our over \$15 Million inventory means lead times in days, not weeks or months

The Robert B. Diemer Water Treatment Plant in Yorba Linda, California, recently saw a \$38.5 million project to upgrade the plant's infrastructure.

Photo credit: Revvix



CALIFORNIA PROJECT TAKES AIM AT EFFICIENCY

After years of neglect, a \$38.5 million project will help keep the Robert Diemer Water Treatment Plant running

BY THOMAS RENNER

Established in 1928 by the California legislature, with the goal to bring water from the Colorado River to southern sections of the enormous state, the Metropolitan Water District of Southern California has come a long way since it began operation in 1941. Work began in 1931 after voters approved a \$220 million bond issue for construction. After decades of wrangling with water issues, leaders in the region believed the new agency could offer a long-term solution towards solving those challenges.

The project was enormous—35,000 workers laboring 24/7 in desert heat,

constructing four dams, five pumping plants, blasting 90-plus miles of tunnels and establishing 150 miles of canals, siphons, and pipelines. Workers at the Weymouth Treatment Plant turned the first valve to deliver water to Pasadena on June 17, 1941. Water flowed to Beverly Hills, Burbank, Compton, and Santa Monica the following month, as they were among the thirteen original cities included in the original district.

Now, more than nineteen million people rely on water from the district. Its facilities serve residents that reach across 5,200 square miles, including

parts of Los Angeles and San Diego. It is the largest supplier of treated water in the United States, and taps into fourteen cities, eleven municipal water districts, and one county water authority.

The region's population relies on district water, and a recently completed \$38.5 million project at its Robert W. Diemer Water Treatment Plant in Yorba Linda will help ensure continuity of service.

HUGE OUTPUT

The Diemer treatment plant began operations in 1963 but has not made any significant upgrade in

improvement since that time. It is one of five water treatment plants in the extensive Metropolitan Water District Network, and has a treatment capacity of 520 million gallons per day, and delivers water via gravity flow to Los Angeles and Orange counties.

The facility is one of the largest in the nation, and has the capability to meet the needs of approximately three million people that live in the region. Water entering the 212-acre plant comes from two sources, a 440-mile aqueduct that is part of the California state water project and a 242-mile aqueduct that funnels water from the Colorado River.

Water is treated to meet or exceed federal and state drinking water regulations. Using advanced treatment technologies, increased monitoring and adhering to the stringent laws and guidelines, the process ensures the water quality meets government standards. The Met performs about 250,000 water quality tests each year.



Photo credit: Revealix

The project included the installation of ten stainless steel floor doors manufactured by BILCO.

"Water was not being wasted," says Eber Luquin, project engineer for Environmental Construction, which dismantled the existing equipment and installed new components. "The equipment simply was not as efficient as it once was and water quality could be improved. The old, submerged mechanical

equipment was coated in tar and some sealants used contained PCB properties."

The project started in November 2018 and was completed in March 2021. Due to COVID-19 and other weather delays, the project took about four months longer than anticipated to complete.



Onyx Duckbill Valves
Available with NSF
certification 30-July-2021

ONYX VALVE CO

www.onyxvalve.com

tel: 856-829-2888

The plant is part of the Metropolitan Water District of Southern California and helps meet water needs of nearly three million people who live in the region.



Photo credit: Revepix

PROJECT AT A GLANCE

WHAT:	A \$38.5 million renovation of the Robert B. Diemer Water Treatment Plant in Yorba Linda, California. The treatment plant is part of the Metropolitan Water District of Southern California.
WHY:	The treatment plant began operation in 1963, but many components had not been upgraded or replaced. The treatment plant, which has a capacity of 520 million gallons per day, is one of the largest in the nation and helps meet the water needs of nearly three million people.
PROJECT SCOPE:	Replaced flocculators, baffle walls, clarifier, effluent launders, drop gates, Weir gates, inlet gates, pipes of various sizes and material, sludge pumps, valves ranging from 1/2 to 42 inches, Smith Blair couplings, Victaulic couplings, and manual and electric actuators. Teams also stabilized a filter control building, including reinforcement of interior concrete frames and filter decks, and constructed new concrete shear walls.
FLOCCULATOR ACCESS:	Ten single- and double-leaf floor doors from BILCO were included in the project. The corrosion-resistant doors allow access to flocculator equipment. Flocculators are key of equipment that help determine the amount of treatment water needs and the sequence in which chemical agents should be added.
DID YOU KNOW?	The Metropolitan Water District of Southern California is the largest suppliers of treated water in the United States. Approximately nineteen million people rely on water from the "The Met."

REPLACING COMPONENTS

Due to the age of the facility and minimal replacement over the years, nearly every component needed to be replaced. That included flocculators, baffle walls, clarifier, effluent launders, drop gates, Weir gates, inlet gates, pipes of various sizes and material, sludge pumps, valves ranging from one-half inch to 42 inches, Smith Blair couplings, Victaulic couplings, and manual and electric actuators.

Workers also strengthened a filter control building, including reinforcement of interior concrete frames and filter decks, and construction of new concrete shear walls. Teams also replaced 128 high-performance, rubber-lined butterfly valves and actuators, and replaced or modified structural support components, piping, mechanical equipment, handrails, and lights. Some hazardous material abatement was also required.

The expansive project scope and size of the facility posed some unique challenges for engineers. One task confronting Luquin's team was installing effluent launders, where workers needed to solve issues regarding access and load restrictions at certain areas of the plant. Launders are an important part of the treatment process, as they help prevent waste materials from ending up in the water.

"We designed large crane pads that would not exceed 1,500 psi (ground bearing pressure) with our given loads so that we could install launders," Luquin says.

Teams also faced access issues in constructing concrete shear walls. "The shear walls were constructed in four quadrants underneath the filter beds and access was very restricted to each location," Luquin says. "There was only ingress and egress. We had to get all of our materials through a small opening, 5-feet by 6-feet, and then had a 15-foot drop. This was considered a confined space, so we had many OSHA regulations to comply with."



Photo credit: Revvix

Almost every part of the plant was upgraded with new equipment. The plant opened in 1963 but most equipment had not been upgraded or replaced.

ACCESSING FLOCCULATORS

In any water treatment plant, flocculators are key pieces of equipment that help determine the amount of treatment the water needs and the sequence in which chemical agents should be added. Readings from the flocculators can help water treatment plants operate efficiently. Flocculation is also essential in keeping the water supply clean.

Treatment plant workers will access this important equipment through floor access doors manufactured by The BILCO Company. BILCO products are frequently used at water treatment plants due to their corrosion resistance and safe, reliable operation.

"BILCO hatches were selected due to their dependability and reputation with the plant," Luquin says. "The fact that these hatches are made with quality stainless steel material to the dimensions we required and have a drain port built in were important features."

Corrosion, especially at water treatment plants, can dramatically reduce the life of floor doors and other equipment. The ten BILCO floor doors used on this project feature stainless steel construction and hardware to withstand the corrosive environment at the facility. The doors also feature BILCO'S engineered lift-assistance to ensure safe and easy one-hand operation, automatic hold open arms, and positive latching mechanisms for security.

CONTINUAL CONCERNS

Water in California is a treasured resource. Efficiency and resourcefulness are paramount for the five treatment plants and the three major water reservoirs of the district. The massive renovations at the Diemer facility will help ensure that.

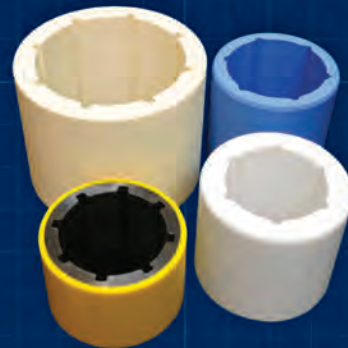
"I think it's an essential lifeline for the people in Southern California," Luquin says. "The supply from the Metropolitan Water District is a vital resource for smaller districts in the region. This project will help the system maintain peak efficiency." ■

THOMAS RENNER writes on building, construction, engineering and other trade industry topics for publications throughout the United States.

**Replace your bearings
less often with
Thordon's long wear life,
abrasive resistant
pump bearings.**



**IMPROVED RELIABILITY.
LOWER OPERATIONAL COSTS.
PROVEN PERFORMANCE.**



THORDON
THORDON BEARINGS INC.





HOW TO AVOID WASTEWATER PUMP FAILURES

Identifying key causes of failure helps prevent costly consequences

BY EMILY NEWTON

When pumps fail, site managers have to manage consequences like downtime, maintenance, and damage—as well as sewage overflow in the case of wastewater pump failures. Knowing the most common causes of pump failure can help you avoid these consequences. By implementing maintenance plans that mitigate these failure causes, it's possible to keep pumps running for as long as possible.

COMMON CAUSES OF FAILURE IN WASTEWATER PUMPS

While pumps can fail in a wide variety of ways, there are a few common manners in which pumps tend to malfunction. Cavitation in pumps is the rapid creation and collapse of air bubbles in pumped fluid. This occurs when the net-positive suction head available (NPSHa) is lower than the net-positive suction head required (NPSHr), meaning the pressure on the pump fluid has dipped below its vapor pressure. Air bubbles form in low-pressure areas of the pump, typically near the eye of the impeller, then collapse as they move to higher-pressure areas, often at some point along the impeller vane.

Pump cavitation causes damage—primarily to mechanical seals and bearings—and a reduction in pump performance. The NPSH margin

needed to prevent cavitation varies depending on the particular pump and how it's being used. On average, NPSHa will need to be around four times greater than the NPSHr—but the needed NPSHa can be anywhere between 2 and 20 times greater than NPSHr.

Fouling is another common pump issue for wastewater facilities. Over time, particulate matter from pumped fluid can accumulate to water pump flow path surfaces. Hard water tends to cause scaling, or the buildup of minerals, while wastewater and seawater may cause the creation of biofilms. Fouling may begin soft and then harden over time, meaning early detection and proactive monitoring of pumps may make fouling easier to fix.

PREVENTING CORROSION OR WEAR AND TEAR

Corrosion of pipes and pump materials will occur over time due to chemical reactions between the pumped fluid and exposed metal surfaces. While some corrosion is inevitable, pumping fluid and system management can sometimes accelerate the pace of corrosion, resulting in earlier-than-expected pump failure or other problems.

Choice of pipe material can also help to slow the rate of corrosion. Cast iron, for example, is a popular choice of pump material but may corrode readily

when exposed to low-pH pumping fluid. Stainless steel is more expensive than other materials but is resistant to corrosion under a wide range of operating conditions. Depending on the composition of wastewater and pump fluid, cast iron may be an acceptable choice. Knowing the conditions your pumps will be under and choosing a material to match will help reduce the speed of corrosion.

Natural wear and tear can also eventually lead to pump failure. Regular maintenance checks and scheduled repairs can help you or your team identify when parts need to be replaced due to wear, helping avoid premature pump failure. Maintenance methods that take advantage of real-time conditions monitoring technology, like networked sensors monitoring pump pressure and similar variables, may help workers identify excessive wear and tear before it causes failure.

Certain operating conditions can increase wear on pumps, accelerating the failure of pump components.

For example, particulate matter in pumped water can both cause fouling and speed up the pace of wear on a pump. Pumps exposed to especially corrosive or fouling pump fluids may need more frequent maintenance than other pumps.

LOOKING BEYOND THE PUMP

Because pumps are so critical to wastewater systems, post-incident reviews and repairs often focus directly on the pump, sometimes at the expense of other system components. Often, pump failure isn't a result of issues with the pump itself—instead, other equipment like power supplies or piping. For example, voltage unbalance and excessive head pressure are two common causes of failure or malfunction in pumps, leading to mechanical stress and cavitation respectively.

Working backwards from pump failures, identifying how the pump failed and how the system's operation may have caused the failure, is a good way to prevent future malfunction. Simple measurements, like power and flow meter readings, can provide key information—like voltage and the actual flow rate of a given pump—that can reveal potential pump issues. Information from equipment like pump relays can be similarly helpful.

A maintenance plan that includes regular monitoring of pump and system conditions will offer more chances for catching issues like voltage imbalances and excessive or insufficient pressure.

BEST PRACTICES FOR AVOIDING PUMP FAILURE

Regular maintenance and knowledge of common pump failure causes will go a long way in helping you prevent pump failure. If you already have an effective maintenance plan in place, condition monitoring and system audits are a good next step. A variety of condition monitoring platforms are available. Many manufacturers of pumps and pump control systems offer proprietary SCADA systems that monitor wastewater levels, providing

early notice on malfunctions or failures.

Some wastewater treatment facilities also use networked sensors to provide real-time operational monitoring. These sensors continuously gather and report information on pump conditions, providing a remotely accessible window into a pump's current performance and health. System audits should investigate operating conditions and components that commonly cause pump failure.

For example, re-evaluating a pump performance curve during an audit can provide valuable information that may help prevent future pump failures. As system conditions change—sediment builds up, scaling occurs, and air is trapped in pipe corners—the pump performance and system curves can change. Repairs, retrofits, and regular maintenance based on pre-existing or legacy pump curves can cause trouble down the line, like oversized replacement pumps.

These oversized pumps can cause serious noise and vibration, jostling flanged pipes and connections loose or fatiguing pipe welds over time. Ensuring that data on pumps and site systems are up-to-date and accurate will help you avoid problems like these.

TECHNIQUES FOR AVOIDING WASTEWATER PUMP FAILURE

Wastewater pump failure can have serious consequences for a facility—including unplanned downtime, high maintenance costs, and sewage backup. Avoiding pump failure can be simple—regular maintenance and condition monitoring are good ways to detect issues like corrosion or severe wear and tear before they cause problems. System audits and reviews can help catch more complex problems—like an oversized pump that is starting to cause pipe damage. ■

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

**VESCONITE HILUBE
PUMP WEAR RINGS**

**Achieve better pump
efficiencies by applying
closer clearances**

- ⚙️ **NO GALLING**
- ⚙️ **LOWER BY-PASS**

**NSF 61
& WRAS
APPROVED**

**FOOD
CONTACT
APPROVED**

**VESCONITE
BEARINGS**

+1 713 574 7255
vesconite@vesconite.com
vesconite.com



2021

50TH TURBOMACHINERY & 37TH PUMP SYMPOSIA

DECEMBER 13
SHORT COURSES

DECEMBER 14-16
SYMPOSIA & EXHIBITION

**REGISTER
NOW!**

"The TPS is an excellent opportunity to network with a large cross section of industry leaders in the turbomachinery and pump fields. The wide variety of learning and networking opportunities are second to none for this type of equipment. If you did not get a net positive experience out of the TPS, you weren't trying..."

*Robert Benton, Rotoflow
- An Air Products Business*



4,750
ATTENDEES



365
EXHIBITING COMPANIES



45
COUNTRIES



**FOR THE INDUSTRY,
BY THE INDUSTRY.**

TPS.TAMU.EDU



#TPS2021

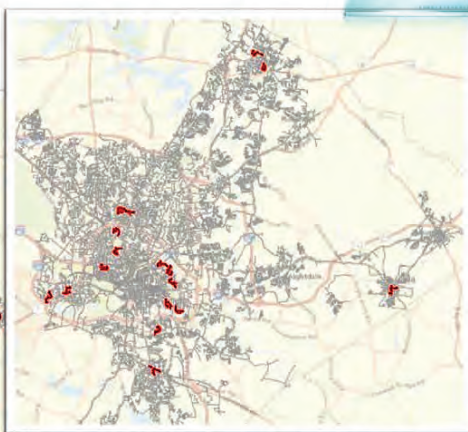
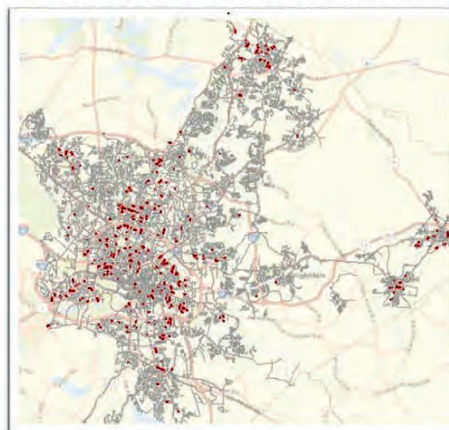


DATA SCIENCE HELPS RALEIGH WATER AVOID DIGGING UP THE STREETS

Xylem and Esri partner to analyze pipe segment risk and reduce planning time

BY ROCIO ECHEVERRIA, XYLEM

BELOW: Xylem's solution identified the top one percent of at-risk pipeline segments based on their probability of failure. These assets are scattered throughout the city.



ABOVE: Further analysis refined the probability of failure results, identifying clusters of similar high-risk pipe segments to help Raleigh Water build more efficient asset management plans now and in the future.

Global water technology company Xylem has helped the City of Raleigh Public Utilities Department (Raleigh Water) get a clearer picture of its 2,340 miles of pipes, some of which are more than one hundred years old. Accurately predicting which parts of the pipe network might fail helps Raleigh Water pinpoint maintenance, avoid unnecessary digs, and reduce water main breaks.

Combining Xylem sensors and advanced risk analytics with Esri location intelligence software, Raleigh Water achieved a far more accurate,

predictive, and targeted view of its potential trouble spots. Deciding which water mains to replace took 75 percent less time than in the past, while also reducing unnecessary capital costs and water loss from pipe failures.

A HUGE CHALLENGE

“Based on what we’ve seen with Xylem’s predictive modeling services, we are confident that replacing these mains is the best bang for the buck,” says Adam Haggerty, asset manager for Raleigh Water. “This is a game changer for us, and it is something we will be able to use for a wide variety of applications.”

It’s a huge challenge to manage risk in a big pipe network. You have to predict failure in an asset you can’t see, knowing the pieces were built at different times in different ways. Get it wrong and you replace some pipes prematurely, while leaving higher-risk parts of the network in place. So, getting it right with advanced risk analytics gives the utility more confidence, saves the community money, and enables you to dig only when you have to.

“This is a great result for Raleigh Water, demonstrating the power in combining geographic information system data with insight into the water network, says Christa Campbell, director industry solutions: water, Esri. “We’re so pleased that, together, Esri and Xylem are bringing actionable new decision intelligence that delivers real savings by targeting work in the city where the need is greatest.”

USING HISTORICAL DATA FOR FUTURE SUCCESS

Xylem’s Asset Performance Optimization solution analyzed the utility’s entire network, combining historical pipeline break data with information from Raleigh Water using Esri ArcGIS Enterprise. The resulting assessment identified the top 1 percent of at-risk pipeline segments, scattered throughout the city, based on their probability of failure. The



PROJECT AT A GLANCE

CLIENT:	The City of Raleigh Public Utilities Department
CHALLENGE:	Prioritize capital works using analysis to determine pipeline risk.
PARTNERSHIP:	Xylem Inc. and Esri
SOLUTION:	Raleigh Water partnered with Xylem to conduct a probability of failure analysis using historical data in their GIS and Xylem’s Asset Performance Optimization solution.
RESULTS:	Reduced project planning time by 75 percent and developed a more efficient asset management program.

team then clustered groups of at-risk pipes to be prioritized for more targeted preventative maintenance.

The data-driven risk model also supports a city-wide initiative to increase racial equity by eliminating bias from selection of infrastructure projects. To date, Raleigh Water has

planned six projects using the results of Xylem’s analyses. It estimates the work with Xylem has already saved the utility 75 percent of planning time while reducing risk to the network, decreasing response times, and lessening community impact of breaks that might occur. ■

ROCIO ECHEVERRIA is vice president and general manager at Xylem Vue—Xylem’s digital solutions platform that combines smart and connected technologies, intelligent systems and services, and over 100 years of problem-solving expertise. Xylem’s Asset Performance Optimization solution helps identify, prioritize, and quantify potential challenges in water pipeline networks before they negatively impact the community. Developed, supported and delivered by industry and technical experts, Asset Performance Optimization features in-depth pipe failure risk analytics and an Esri-based web application. For more information, visit www.xylem.com.



IMPROVE ENVIRONMENTAL REMEDIATION OPERATIONS WITH REMOTE MONITORING

Today's monitoring systems are robust enough to handle remediation site demands

BY ROB FUSCO, SENSAPHONE

Environmental remediation projects can take months to years of around-the-clock extraction of pollutants to clear water and soil of contaminants from accidents such as storage tank leaks, chemical spills and waste discharge. Remediation site managers face many challenges, such as meeting project goals, controlling costs, keeping the site running, and protecting the environment. At the top of the list of responsibilities is meeting regulatory requirements. Federal, state or local regulators can fine operators if the site becomes nonoperational for a period of time during an unplanned shutdown.

Incorporating remote monitoring technology into the process can increase efficiency because managers are alerted immediately of potential equipment malfunction and environmental changes that can halt the operation. These monitoring

systems provide an easy, affordable way to receive actionable information to keep equipment running, reduce downtime, and avoid costly fines.

With a monitoring system, managers can keep 24/7 watch on the performance of key equipment components and receive instant notification if sensor readings move outside of the required parameters. They can also access real-time and historical data, log information, look for trends that could indicate a problem and generate records for regulatory reports.

HOW REMOTE MONITORING WORKS

Remote monitoring systems are installed at both staffed and unattended sites to monitor conditions around the clock. This reduces the need for constant staffing and helps to avoid unnecessary or time-consuming

visits to the site to check the status of the remediation equipment.

A monitoring system consists of a base unit that constantly collects data from existing equipment or sensors placed at key points at the site. The number of external sensors used depends on the number of inputs on the base unit. Users program the devices to specify the desired high or low parameters on the monitored sensors. The base unit contacts designated personnel when a sensor reading moves out of the preset limits. Managers can receive these notifications via phone, email, or text.

Most remediation sites have a SCADA, PLC, or control panel locally monitoring and controlling the operation of the site. Advanced remote monitoring systems can seamlessly integrate into a panel or SCADA system that supports Modbus RS485 and TCP IP. This enables site



Soil remediation site.

IMPORTANT EQUIPMENT AND CONDITIONS TO MONITOR

EQUIPMENT	CONDITIONS
Soil vapor extraction vacuum blowers and pumps	Float level, pump alarm, airflow, vibration, power
Carbon units	Differential pressure to detect clogging, temperature to prevent carbon from igniting
Groundwater treatment equipment	Float level, pump alarm, power, pressure
Leachate liquid control systems	Float level, pump alarm, power, pneumatic pressures
Landfill gas collection and control systems	Airflow, pressure, power, temperature
Volatile organic compounds monitors	Airflow, power
Air sparge compressor	Temperature, airflow, pressure
Vacuum blower	Pressure, vibration, power
Air strippers	Pressure on/off, power
Power sources	Power
Generators	Power, automatic transfer switch relay, fuel level

managers to see the panel reading right from their phone via an app or the website. They can integrate the monitoring system into floats, pump alarm outputs, level transducers, and other equipment. They can also connect external sensors to monitor temperature fluctuations, flow rate, power failure, and security breaches.

CONNECTIVITY

Monitoring systems that are robust enough to handle the demands of a remediation site require an internet or wi-fi connection and access to an electrical outlet to power them. But for areas that do not have an internet or cellular connection, satellite systems are available. Cellular systems need to be registered on a wireless network like Verizon or AT&T in order to send or receive messages. If cellular signal strength is spotty or nonexistent at the site, consider the satellite option.

REPLACEMENT • REPAIR • RECOVERING



Aftermarket pump parts for most models of Börger®, Vogelsang®, Lobeline®, Lobeflo®, and Muniflo® Pumps
Repair of Rotary Lobe Pumps
Manufacturer of the Muniflo Rotary Lobe Pump (originally manufactured by Wemco since 1985)



Equipump

info@equipump.com
www.equipump.com

Are you looking for obsolete Lobeflo® Pump parts? We are the answer!

• 800-783-5623 • fax 800-693-5623



Satellite-based monitoring base unit.

Satellite-based monitoring systems are convenient, powerful devices suitable for even the most remote locations. The systems use satellite technology to provide virtually unlimited coverage throughout the United States and many other countries without relying on telephone lines, Ethernet connections, or cellular networks. They can operate in a wide range of temperatures without any effect on battery life. Site managers can access information and make programming changes via the system's dedicated website.

Cloud-based monitoring systems can monitor, deliver alarms and log input/output point data from third-party Modbus sensors, transducers, and PLCs. This enables site managers to remotely access the values pulled from Modbus equipment or external sensors at all their remediation sites

from a user-friendly dashboard using an app or website.

A cloud-based unit monitors itself by constantly sending a signal to the cloud to confirm the system is online. If the internet connection is lost or there is a cellular communications problem, the system sends an alert to designated users via phone, text, or email. Managers do not have to worry about losing data if the cloud connection is interrupted because all information gathered during this time is stored in the device and will be uploaded to the cloud when the connection is restored.

DATA LOGGING AND REPORTING

In addition to providing remote monitoring of remediation equipment, these systems automatically log the data required for compliance reports



Cellular cloud-based monitoring base unit.

because they are equipped with data acquisition functionality that provides real-time and historical information on equipment performance. They collect and record precise data, including flow rates, run times, and operational standards required for environmental remediation reporting. Essential data to log includes blower runtimes, pilot and flare temperatures, liquid or air flow totals, shutdown and startup events, and VOC levels.

ADDING IT UP

Site remediation is complex, and any unexpected stoppage of the process can have serious environmental and regulatory consequences. However, constant monitoring of equipment and conditions is not complicated or expensive. Using the right remote monitoring system for the scope and specs of the remediation site gives site managers early warning of a potential problem, so they can respond quickly to avert a significant malfunction. ■

ROB FUSCO is director of business development with Sensaphone, a developer and manufacturer of remote monitoring and alerting systems. He can be reached at rfusco@sensaphone.com or 877.373.2700. For more information, visit www.sensaphone.com.

TUF-LOK®
PIPE & TUBE COUPLINGS

- Self-aligning
- Self-grounding
- Stainless or mild steel
- Low cost
- Reusable
- Externally leakproof
- High pressure rated
- Full vacuum rated

Tuf-Lok International
Phone: +1 608.270.9478
Email: info@tufflok.com • www.tufflok.com

QUICK
Usually Ships In 1/2 The Lead Time
Vertical and Horizontal Pumps

42 YEARS
1979 2021

Free Pump Selection Software On-line

VERIFLO pump.com
513-530-0888



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

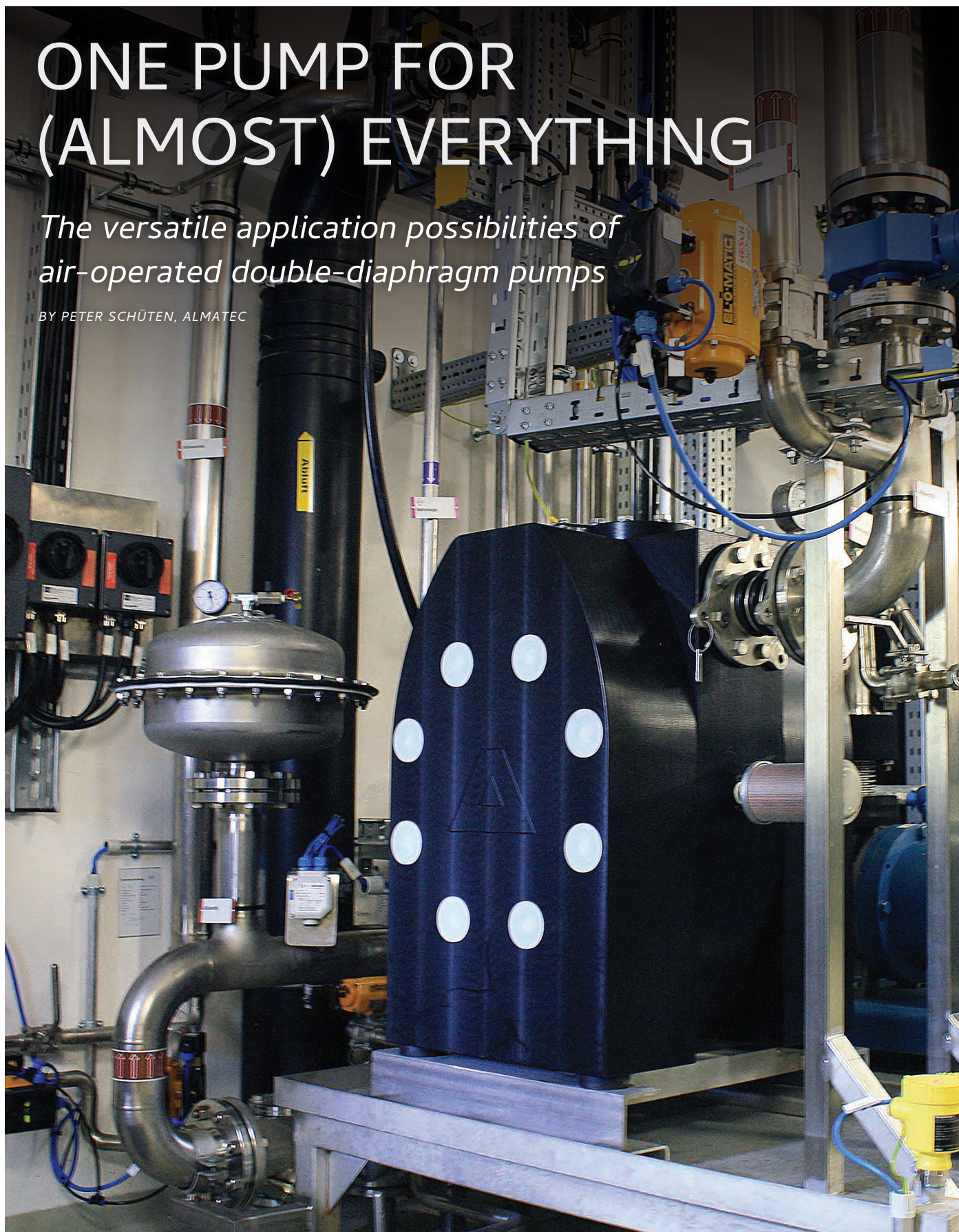
FREE DOWNLOAD >
Scan barcode



ONE PUMP FOR (ALMOST) EVERYTHING

*The versatile application possibilities of
air-operated double-diaphragm pumps*

BY PETER SCHÜTEN, ALMATEC



When first learning about air-operated double-diaphragm (AODD) pumps, many people are left asking how they are able to excel in so many diverse applications. The success in this enormous application range, and consequently the popularity of AODD pumps, lies in the pump's design characteristics. These characteristics include:

- Simple startup
- Self-priming capability
- Resistant to dry running and runs smoothly with solids
- Gentle displacement pumping
- Continuously adjustable via controllable air volumes
- Self-adjusting when the medium changes
- No drives or rotating parts in the pumped medium
- No shaft seals
- Overload-proof—if the counter-pressure equals the drive-air pressure, the pump stops and restarts when the pressure drops—without regulation or monitoring via mean supply response time (MSRT) devices
- Easy to use in ATEX areas
- Current-less drive via compressed air

The first two characteristics—simple startup and self-priming—help explain why AODD pumps are so flexible. Part of this flexibility includes easy installation. Since there is no need to align the pump when changing locations, installation can be performed by simply standing the pump upright and connecting the fluid lines and air supply. And unlike other types of pumps, there is no need to prime an AODD pump. Therefore, rather than the laborious and, depending on the liquid, dangerous process of bringing the medium into the pump manually, the pump simply fills itself during operation by sucking the medium out of the receiver.

SIMPLICITY IN ACTION

Once in operation, an AODD pump is not only easy and simple to control,



it also does not require any control electronics and/or expensive frequency converters, which might cause the motor temperature to rise during slow running without a forced cooling fan (critical for ATEX). Instead, the air volume and the pump flow rate are simply regulated with a needle valve. In addition, if, for example, the density or viscosity changes due to the temperature, the pump will automatically run slower or faster without damage to the pump or without the loss of liquid, as is the case with internal pump slip or a magnetic coupling that can tear during operation. And if the liquid fails to flow, for example, because the tank is empty, it simply continues to run dry.



REDUCING RISKS THROUGH GENTLE HANDLING

Another important design characteristic of the AODD pump is gentle displacement pumping. This characteristic stems from the fact that these pumps allow solids of considerable size to pass through them, resulting in very gentle pumping and low shear. And because AODD pumps do not contain any drive parts or other rotating parts within the fluid, there is no need to worry about damaging the shaft seal. Operational risks and the need to maintain mechanical seals (including the use of additives for flushing, etc.) are also eliminated.

Instead, a purely static seal takes effect, which is "hermetically sealed" according to guidelines from the German Technical Guidelines on Air Pollution.

It's also important to mention that an AODD pump is overload-proof. This means that the pump can only build up as much pressure as you give it via the drive air pressure, which, for example, can be the maximum permissible pressure of your filter. If the outlet pressure reaches the drive air pressure, the pump simply stops, meaning that there is no danger of the pump or the line bursting if the pressure line is blocked. This results in overload protection for lines/filters and a simple on-off operation via valves in the medium.

There is not a risk of sparks from an electric drive, also self-heating is not an issue, and static charges can be dissipated via the pump's conductive materials (as well as plastic). This also makes AODD pumps ideally suited for use in hazardous areas (ATEX) and mobile applications. Light and compact, these pumps are also simple to install in hazardous



areas and can even operate with stored air in the case of an emergency.

HIGH PERFORMANCE AND HIGHLY ADAPTABLE

Another key characteristic of an AODD pump is its enormous range of pump materials and their possible combinations. The interior of an AODD pump can be manufactured in a large number of elastomers and thermoplastics, from "black rubbers" such as neoprene or Buna-N to PTFE. The pump's housing can be manufactured in various metals, ranging from cast iron and aluminum to high-grade stainless steels. The housing can also be manufactured in a variety of plastics, including high-performance plastics such as PTFE or PEEK.

Therefore, depending on the mechanical/chemical properties or the temperature of the medium, the pump can almost always adapt to the application. And the fact that

the pump is constructed in a solid-block design also provides additional design advantages when it comes to safety, including high stability and rigidity, static weight, and smooth and highly chemical-resistant surfaces.

MAKING THE AODD CHOICE

In conclusion, if you're looking for a pump that is flexible; simple to start up, control and maintain; that is overload-proof and self-adjusting without regulation; that can handle highly aggressive and/or solids-laden media without damage (even in hazardous areas); that can suck in medium when it is dry and also run dry; and that is also comparatively cheap to purchase and maintain; then an AODD pump is the perfect choice for you. ■

PETER SCHÜTEN is the product management director for Almatec®, a leading manufacturer of air-operated double-diaphragm (AODD) pumps. He can be reached at peter.schuten@psgdover.com. Almatec is a product brand of PSG®, a Dover company. PSG is comprised of leading pump brands, including Abaque™, All-Flo, Almatec®, Blackmer®, Ebsray®, em-tec, EnviroGear®, Griswold®, Hydro Systems, Mouves®, Neptune™, Quantex™, Quattroflow™, RedScrew™, and Wilden®. For more information, visit www.almatec.de or www.psgdover.com.

5 Decades of experience

in Hose Engineering

Field Tested for durability and service life

Highest Quality, Precision Machined

PERISTALTIC PUMP HOSE

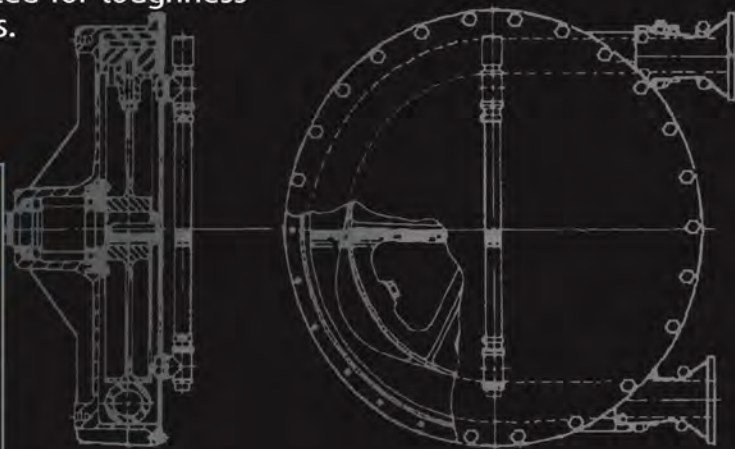
TUBE Choice of natural rubber, EPDM, or nitrile (Buna-N).

CARCASS Multiple plies of high tensile polyester cord.

COVER Elastomeric compound formulated for toughness and resistance to pump lubricating fluids.

ENDS Plain cut.

SIZE (mm)	U.S. EQUIVALENT	OVERALL LENGTH
25	.98"	39.5"
32	1.26"	44.0"
40	1.57"	58.7"
50	1.97"	71.6"
65	2.56"	92.0"
80	3.15"	109.4"
100	3.94"	128.7"



salem-republic rubber company

1-800-686-4199

www.salem-republic.com • srr@salem-republic.com

475 West California Avenue • P.O. Box 339 • Sebring, Ohio 44672 • USA



FINDING RELIABILITY AT HIGH ALTITUDE

Gold Fields orders ABB integrated power and automation system for Andes project

BY CHRIS BRAND, ABB

The open-pit gold-silver mine project by the South African mining company Gold Fields is located in the Atacama Desert among the highest peaks of the Andes mountain range. It is over 800 miles from the Chilean capital Santiago and has elevations between 13,000 and 16,000 feet. Equipment in this remote region of northern Chile needs to be dependable, and global technology leader ABB will provide six electrical rooms plus an integrated digital system solution based on ABB Ability™ 800xA distributed control system (DCS) to Gold

Fields' Salares Norte mining project to meet their needs.

SMART TOOLS FOR A BIG JOB

ABB will deliver a common platform for process and power control using ABB Ability System 800xA, Power and Process Control Library, and Camera Connect (the ABB video system embedded in the control platform for optimized process monitoring). ABB Ability Knowledge Manager will be used to manage information production through Plant Information Management

System (PIMS), alongside ABB Ability Asset Vista Condition Monitoring (integrated with SAP), an Extended Operator Workplace (EOW) as an integrated control room at the site, a collaboration table, and 800xA Smart Client stations to enable read-only access to displays via a web browser.

As a common platform for the monitoring of productive, operation, and support areas, ABB's system will reduce technical risks and the number of interfaces to enable Gold Fields to unify processes at the highest level. The

PROJECT AT A GLANCE

- ABB digital solution overcome remote location and climatic instability challenges at the \$834 million Salares Norte mining project in the Atacama Desert.
- Suite of process and power controls, all under ABB Ability System 800xA, modernize mining and showcase the benefits of digital transformation.
- Dynamic process simulator enables realistic operator training.

electrical system is fully integrated via the International Electrotechnical Commission (IEC) standard 61850, which ensures total control and visibility for the plant operations. ABB is also providing engineering and project management.

"The digital aspect is critical to this project due to its remote location—the nearest town being Diego de Almagro, over 100 miles away, the altitude of the project, and adverse weather conditions that make site access and fieldwork difficult especially during the winter," says Max Combes, project director of Gold Fields. "Gold Fields has developed digital infrastructure through initiatives at operations around the world. ABB's complete solution, integrated engineering, and remote operations technology will enable us to build on this digital capability and overcome the particular challenges at Salares Norte."

TRAINING AND OPERATIONS SUPPORT

The scope also includes a dynamic process simulator to allow checks on all control logics and for operator training purposes.

"The simulator will allow for shorter and more efficient start-ups on site," says Iván Villegas, solutions



manager at ABB in Chile. "It will also support the training requirements, meaning Gold Fields will have several accredited operators with the right skills for high-quality operations."

"Together with Gold Fields we can demonstrate over the long-term that ABB's control systems connect and perform their functions in totally isolated areas, within satellite range, and with minimal latency," says Cristian Gallegos, mining account manager for ABB in Chile.

"It is an opportunity to modernize mining and showcase the benefits that digital transformation brings by controlling and supporting the mining plant and equipment at Salares Norte from over 800 miles away."

SATELLITE TELEMATICS TEST

In parallel to this project ABB proposed and was part of an initiative together with Gold Fields to successfully connect different ABB technologies between Santiago and the Salares Norte project. Using satellite telematics they carried out remote control and monitoring of smart electric motors and a simulation of telemedicine care between the two locations. The tests were carried out in isolated areas, but within reach of the satellite and through a connection controlled by ABB Ability System 800xA and conventional mobile equipment with minimal latency. Through mixed reality lenses, both virtual reality and augmented reality, two authorities of the Ministry of Mining in Chile (the

minister and the regional secretary) each at one end, were witnesses and protagonists of the successful test, where the two held a conversation that flowed in real time, each "seeing" the avatar of the other, as if they were together in a physical environment.

Salares Norte is expected to produce 3.7 million ounces of gold over an initial mine life of eleven years and is estimated to be a \$834 million expenditure project. The operation involves drilling, blasting, loading, and hauling methods for ore extraction. It has a production capacity of two million tons per annum and the life-of-mine average recovery of gold and silver will be 92.7 percent and 67.5 percent, respectively. ■

ABB's Process Automation business is a leader in automation, electrification, and digitalization for the process and hybrid industries—serving customers with a broad portfolio of products, systems, and end-to-end solutions, including a top distributed control system, software, and lifecycle services, industry-specific products as well as measurement and analytics, marine, and turbocharging offerings. As a global leader in the market, ABB builds on its deep domain expertise, diverse team, and global footprint and is dedicated to helping customers increase competitiveness, improve their return on investment, and run safe, smart, and sustainable operations. For more information, visit www.abb.com.

TO SUCCEED, CONTROL YOUR SPEED

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

Part 1 of 2

BY MARK HARSHMAN, SIEMENS

Medium voltage variable frequency drives (VFDs) are often the best choice to capitalize on opportunities to significantly reduce the operating and maintenance costs associated with relatively large rotating equipment. And because even a seemingly modest energy savings of a few percent of the operating load can translate into significant energy savings, there are many potential applications for medium voltage VFDs.

Medium voltage VFDs are applied to relatively large motors that can range in size from 200 to 100,000 horsepower. Such medium voltage motors typically operate between 10 and 15,000 rpm, at voltages between 2.3 and 13.8 kilovolts. Locating potential medium voltage VFD applications is relatively straightforward because every medium voltage motor should be considered a potential application—if only because of the significant energy savings associated with large motors.

Medium voltage drives are used for new installations or retrofit installations. In a new installation, the saved cost of not having to



install alternative solutions such as dampers, valves, and mechanical transmissions can be applied to purchasing the medium voltage VFD. In some new applications, the installed cost of a medium voltage VFD can be less expensive than utilizing alternative solutions—especially when the alternative solution is expensive and requires additional plant modifications. In these applications, medium voltage VFDs not only reduce the overall cost of installation but also provide the additional benefit of reducing the total cost of operation.

In retrofit applications, the full costs of purchasing and installing the medium voltage VFD—plus the cost of removing or disabling the existing alternative device—makes justification more challenging. Nonetheless, there are still many viable retrofit applications, especially when averted maintenance, repair and replacement costs for mechanical systems can be applied to purchasing the medium

voltage VFD—along with much lower energy consumption. In many cases, the VFD will provide a payback in less than two years due to these energy savings; this does not include the reduced cost of ownership when compared to some mechanical systems.

For both new and retrofit applications, the utility serving the plant will often offer financial incentives for installing a VFD, which can greatly reduce costs as well as payback time.

Motors in which the hydraulic energy or mechanical energy generated by the motor is throttled are prime applications for medium

voltage VFDs because matching the motor speed to the load conserves the electrical energy associated with generating the throttled energy. For example, it is not uncommon to throttle equipment down to as low as 70 percent of its full load capacity. By matching the motor speed to the reduced capacity of 70 percent, a 50 percent reduction of energy costs is achieved. The affinity laws allow for significant energy savings for even minor reductions in speed, which are realized and saved by using a VFD.

BIG MOTORS, BIGGER SAVINGS

A VFD is an electronic device that electronically alters the frequency and/or voltage fed to a motor to change its speed, and consequently the speed of the attached equipment. Most plant engineers are comfortable with low voltage VFDs and may use them extensively in their processes to control motor (and equipment) speed where necessary or desirable to improve product quality, increase productivity and/or reduce maintenance. Creative plant engineers are constantly finding new VFD applications in their plants.

Medium voltage VFDs accommodate larger motors than their low-voltage equivalents, operating at higher voltages to drive larger equipment. Their applications are often similar in nature to low voltage VFDs—just with bigger sizes and higher voltages and costs. Importantly, the energy savings associated with medium voltage VFDs are typically much higher than for low voltage VFDs because medium-voltage motors use much more electrical power.

For example, the savings associated with a 40 percent energy use reduction in a motor consuming 50 kilowatts is 20 kilowatts. The savings associated with a 20 percent energy use reduction in a motor consuming 1,000 kilowatts is 200 kilowatts—10 times more energy savings. This illustrates how the energy savings associated with one medium voltage motor can dwarf the

energy savings associated with many smaller low-voltage motors.

To put these savings in numerical terms, if power is purchased from the utility at \$0.10 per kilowatt-hour and if the motor operates for 8,000 hours per year, the annual energy savings is approximately \$800 per year per kilowatt. In the above example, applying a VFD to this medium-voltage motor will reduce electrical energy costs by approximately \$160,000 per year.

However, many plant engineers are not aware that medium voltage VFDs are available at reasonable costs, relative to their potential energy savings. They may also not know that they have been using throttle

control for their large mechanical equipment in industrial plants and other facilities for decades—often for months or years without being shut down—and sometimes in applications that require precise speed control. Further, they are often not aware of the magnitude of the potential energy savings associated with medium voltage VFD applications.

Table 1 lists some industries where medium voltage VFDs are commonly applied, along with their typical applications. Naturally, plants with more medium voltage motors tend to have more potential medium voltage VFD applications. However, having only a few medium voltage motors should not discourage consideration;

LEADING MEDIUM VOLTAGE VFD APPLICATIONS IN MAJOR VERTICAL INDUSTRIES	
Building automation	Cooling tower pumps, cooling tower fans, chiller fans, chilled water pumps, refrigeration compressors
Cement	Conveyors, kiln drives and fans
Chemical and petrochemical	Utility pumps, process pumps, fans, blowers, air compressors, process compressors, coolers, cooling tower pumps, cooling tower fans
Food and beverage	Utility pumps, fans, blowers
Marine	Long cable, offloading pumps, topside compressor
Mining	Conveyors, ball mills, grinders, crushers, mobile equipment (haul trucks, draglines, shovels)
Oil and gas	Utility pumps, process pumps, fans, process compressors, air compressors
Power	Induced draft fans, forced draft fans, cooling tower pumps, cooling tower fans, atomization air compressors
Pulp and paper	Chippers, conveyors, debarking, fans, paper machine line shafts, pumps, refiners, shredders
Water / wastewater	Process pumps, fans, blowers, air compressors

Table 1



ADVANTAGES OF MEDIUM VOLTAGE VFDS OVER ALTERNATIVE SOLUTIONS

1. Decreased electrical energy consumption
2. Lower electrical demand charges from utilities
3. Decreased capital cost due to rebates from electric utilities
4. Decreased net electrical energy costs from power regeneration
5. Improved operating efficiency
6. Improved process control due to superior speed control
7. Increased product quality
8. Increased process reliability
9. Increased process throughput
10. Reduced downtime
11. Reduced maintenance
12. Reduced mechanical stress on associated equipment
13. Reduced motor stress through inherent soft-starting

Table 2

the application of just one or two medium voltage VFDS—even in plants dominated by low-voltage motors—can have important economic implications. In the cement industry, for example, a single plant typically has almost thirty medium voltage drives, ranging in power from 500 to 2,000 horsepower in pump, kiln and fan application.

In some plants, even as few as one or two medium voltage VFD applications can reduce overall electrical energy consumption significantly more than dozens of low voltage VFD applications. Therefore, the large economic impact of applying medium voltage VFDS in these plants typically results in considering the largest motors first, as this is where savings are greatest.

MEDIUM VOLTAGE VFDS VS. ALTERNATIVE SOLUTIONS

In many applications, medium voltage VFDS are superior to alternative solutions for controlling motor speed such as direct current drives, soft-starters, two- and three-speed motors, and single-speed motors coupled to various transmission components.

In other applications, medium voltage VFDS can replace mechanically based solutions used to control process parameters, such as the flow of a gas or liquid. For example, the flow of air into a large furnace or boiler can be regulated using a single-speed motor and air vanes. However, controlling the mechanical equipment by using a medium voltage VFD to vary motor speed usually results in a superior process control, increased reliability and improved operational costs.

In either case, medium voltage VFDS offer many advantages over alternative solutions. Some of the advantages are listed in Table 2. Note that these advantages apply to specific applications in varying degrees. This will become evident when the advantages and expected results from various medium voltage VFD applications are discussed below.

Medium Voltage VFDS vs. Direct Current Drives

Direct current (DC) drives vary motor speed by fluctuating the direct current voltage to the motor. VFDS, however, vary motor speed by fluctuating the frequency to the motor. Some of their advantages are similar because both control motor speed electronically.

DC motors are not as common and are typically more expensive than the corresponding alternating current (AC) motors used with VFDS. DC motors also have internal brushes that require periodic maintenance, thus compromising reliability.

As a result, the industry trend has been towards the application of AC motors. The large population of AC motors and numerous variable speed applications has tended to reduce the cost of VFDS as compared to DC drives.

DC drives have historically been used for applications that require precise speed and torque control, but due to improved AC VFD technology and declining costs, few applications still require DC drives and motors with their higher upfront and maintenance costs.

Medium Voltage VFDS vs. Soft-starters

Motors generally exhibit high inrush currents when started. The current falls to normal levels after the motor reaches full speed a few seconds later. Inrush currents can play havoc with plant electrical distribution systems, and can also result in very high demand charges from the electric utility. Demand charges are typically assessed based on the greatest instantaneous power usage—a figure that can be quite high if a large motor is started at full speed.

One method of reducing the magnitude of inrush currents and the resultant stress on the motor is to use a soft-starter that electrically reduces voltage to the motor for a few seconds before switching to line voltage. Soft-starters cannot

vary motor speed, so they are not an alternative to a VFD in most applications.

VFDs are inherently soft-starters because VFDs ramp the voltage to the motor and limit inrush currents. In this regard, VFDs provide even softer starts than traditional soft-starters. VFDs can almost always start a motor and will draw significantly less starting current (usually less than 100 percent rated FLA) than soft-starters that still draw up to 300 percent inrush current.

VFDs are not recommended in applications where precisely controlling motor speed does not provide economic or operational benefit. In these applications, soft-starters may be required to address electrical problems associated with high inrush current, and will be a more economical solution than a VFD.

Medium Voltage VFDs vs. Two-speed Motors

Starters that electrically alter the motor winding connections can allow the same motor to operate at two speeds—typically full speed and 50 percent speed. Operation at the reduced speed when the motor is lightly loaded can reduce the electrical energy consumption of the motor. This can represent significant energy savings under low load conditions. However, when the process load increases, the motor will be switched to full-speed operation and consume much more energy.

In contrast, VFDs can vary the motor speed continuously from zero to full speed, allowing the motor to operate at the precise speed needed to match the load and process requirements. The VFD strategy of matching the speed to the load is much more energy efficient, resulting in significant savings.

To illustrate, consider this VFD application: A medium voltage motor connected to a centrifugal fan consumes 600 kilowatts of electrical energy while operating at 60 percent speed using a VFD.

In contrast, a two-speed motor would have to operate at full speed because 50 percent speed will not satisfy the load. Increasing the motor speed in this manner will increase energy consumption to 1,000 kilowatt at full speed.

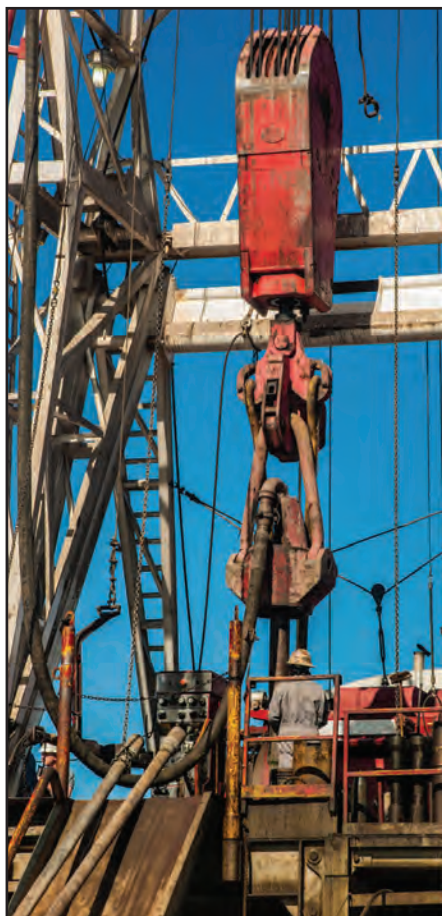
If power is purchased from the utility at \$0.10 per kilowatt-hour and if the motor operates for 8,000 hours per year, the annual energy savings saved is approximately \$800 per year per kilowatt. If this motor can be operated at 60 percent speed, applying a VFD to this motor will reduce electrical energy consumption by approximately 400 kilowatts—or \$320,000 per year.

A LOOK AHEAD

In next month's wrap-up, we'll further 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. All of this bolsters how medium voltage VFDs are typically superior to alternative technologies. ■

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.



RELIABLE POWER

When your engine package powers your business, you need a reliable source of power that you can depend on under the harshest of conditions. That's why we use John Deere PowerTech™ engines which are durable, fuel efficient, and easy to maintain. They are also backed by one of the strongest engine and equipment companies in the World.

At engines, inc., we engineer solutions for pump packages for a variety of industries, including: water/wastewater; chemical; oil/gas; and mining. We stand behind our packages with the most reliable support structure in the business. Our skilled staff is always available to you on our 24-Hour Service Line to give you the support you need, when you need it, wherever you are. We are your power source.



24-HOUR SERVICE LINE
870-268-3799

Jonesboro, AR | 800-562-8049 | www.enginespower.com

THE MECHANICAL SEAL INDUSTRY'S CONTRIBUTION TO ENERGY EFFICIENCY IN PUMPING SYSTEMS

Part 2 of 2

BY RICHARD SMITH AND CHRIS BOOTH, AESSEAL



In last month's beginning to this article, we posited that, although sealing devices account for only a small fraction of the energy consumed by pumps, significant energy conservation can be achieved by elegant sealing practices. In the conclusion that follows, we'll more closely examine the ways energy content can be made lower in a modern context with mechanical seals by looking into real-world examples and case studies.

EVAPORATOR PUMPS CASE STUDY: CONVERSION FROM PLAN 32 TO PLAN 53

In this example, energy efficiency was improved by converting from a single mechanical seal with external flush (Plan 32) to a double seal with barrier system (Plan 53A). The application was at a scotch whiskey distillery where pot ale, a byproduct, is processed in a syrup evaporator to make animal feed.

Efficiency Loss Under API Plan 32

There are three evaporator circulation pumps, which were fitted with single mechanical seals and a simple Plan 32 flush (see figure 8). Clean fluid from an external source is used to flush the seal chamber, to exclude solids or

contaminants, and to reduce the temperature at the seal. It is also used to reduce flashing or air intrusion (in vacuum services) across the seal faces. The main driver for the use of this system is its low initial cost.

A survey of the evaporator system revealed the inefficiency of this flush plan. Syrup was being fed to the evaporator at the rate of 40 gallons per minute, but also being diluted by 0.5 gallons per minute, per pump, of clean flush fluid. The additional 1.5 gallons per minute of liquid into the process meant having to evaporate at least 4 percent more liquid. An analogy is having to walk 26 miles to actually only cover 25.

In addition, the injected flush water came from a mountain stream source at 41 degrees Fahrenheit (5 degrees Celsius), so more heat was being added to the process to maintain evaporation temperature. Heating the cold flush water to the evaporation temperature requires 19 kilowatts, or 460 kilowatt-hours per day. Evaporating the flush water requires over 200 kilowatts or 4,800 kilowatt-hours per day.

Conversion Efficiency Improvement Under API Plan 53A

Conversion to a double seal system with Plan 53A (see figure 9) eliminated the need for seal flush. A small

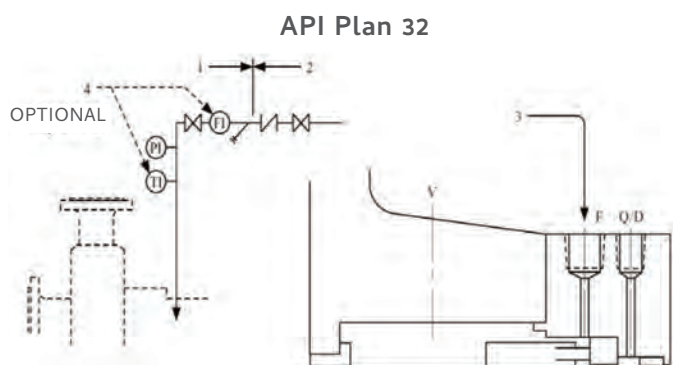


Figure 8: Flush is injected into the seal chamber from an external source.

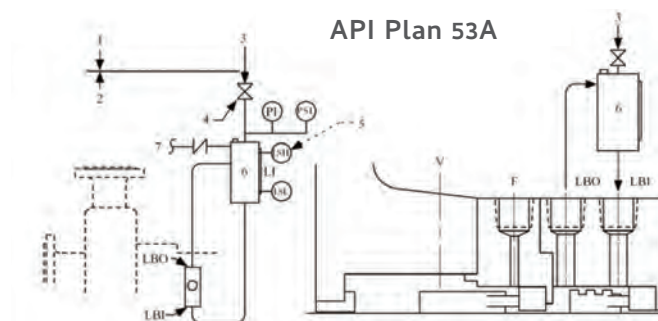


Figure 9: Pressurized external barrier fluid reservoir supplying clean fluid to the seal chamber. Circulation is by an internal pumping ring. Reservoir pressure is greater than the process pressure being sealed.

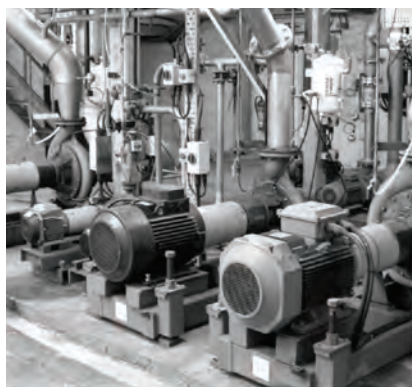


Figure 10



Figure 11

pressurized tank is introduced, containing 2.6 gallons (see figure 11) of barrier fluid. This is circulated either by convection or by a small circulating device built into the seal.

The pressurized barrier fluid provides a clean liquid environment for the inner seal faces and prevents air intrusion to the vacuum. With all three pumps converted (see figure 10), syrup production increased from 97 to 108 tons per hour resulting in a significant reduction in plant running hours. In addition, over 5,000 kilowatt-hours per day was liberated for better use elsewhere.

Evaporator Plant Installations

Any business operating pumps on evaporator systems needs to consider with great care the piping plan used on the pump seals. Plan 32 is often found in many industries, including pulp and paper, sugar production, and chemical process such as nylon manufacturing.

WATER QUENCH CASE STUDY: CONVERSION FROM QUENCH TO PLAN 53

A quench is similar to API Plan 62. Water from an external source is passed between two co-axial seals and away to drain. The water quench is used to prevent solids accumulating on the atmospheric side of the mechanical seal, and can considerably improve seal reliability.

Quench Usage and Effluent

This system (see figure 12) is common in many industries including brewing, distilling, pulp and paper, corn milling, sugar production, dairy processing, and chemical production.

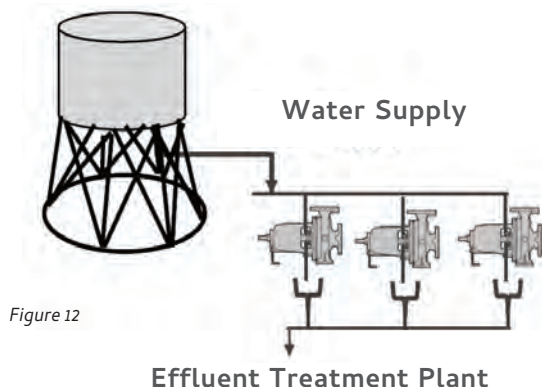


Figure 12

Quench flow rates are typically just under a gallon per minute, per seal installation. In addition to the cost of the water used, the cost and energy consumption of effluent treatment should not be overlooked. The main driver for the use of this system is again its low initial cost

Thermosyphon Alternate Plan 53A Effluent Elimination

An alternative to this system is to use a barrier system (see figure 13), similar to API Plan 53A. Such systems are self-contained, and more importantly they produce no effluent. If the water supply is connected so as to both pressurize and maintain the level in the tank, no manual intervention is required, and maintenance costs are reduced. An air space can serve as an expansion volume, minimizing the effect of temperature changes. In the event of water supply interruption, the air volume and a check valve maintain pressure until supply is resumed.

Alternate Technologies Water Management Systems Based on Plan 53A

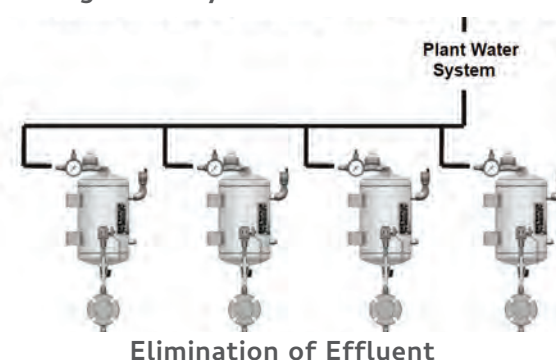


Figure 13

BOILER FEED PUMP CASE STUDY: CONVERSION FROM GLAND PACKING TO MECHANICAL SEALS

This case study involves the conversion of a boiler feed pump from a traditional soft packing gland (see figure 14) to a Plan 23 mechanical seal. To help prevent the rubbing friction damaging the packing, the gland follower would be adjusted to allow a small leakage to flow, typically a slow drip rate. The leakage serves to assist in cooling and lubrication of the gland. As the packing and shaft wear, adjustment will be required to control the leakage rate.

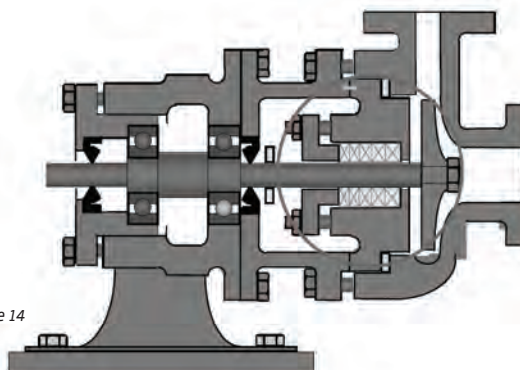


Figure 14

The case study in question is for a boiler feed pump at a petrochemical facility in the northeast of the United Kingdom. The pumps were installed in the late 1970s and furnished with packed glands. The pumps are multi-stage units with glands at both drive and non-drive ends. This arrangement is typical of many applications around the world at chemical works and refineries. Most of the feed water pumps installed in this era were fitted with packed glands and many continue to run today using this technology. Leakage from the packed glands will be a pure loss to the operation.

In this example the feed water in the pump was at 250 degrees Fahrenheit (121 degrees Celsius). Losses through the packed gland would need to be made up with water from the treatment plant. The calculation of the energy loss is based the energy required to take the make up water from 50 degrees Fahrenheit (10 degrees Celsius) to feed water temperature of 250 degrees Fahrenheit (121 degrees Celsius). In this instance the boiler plant is gas fired and the heat energy requirement can be translated into a net CO₂ contribution. Due to a reduction in plant manning, the gland follower adjustment was only made when the leakage was severe. As a result, the average leakage rate from the pumps was about quarter gallon per minute per gland (see figure 15).

With eight pumps (sixteen glands) leaking on average a gallon every four minutes per gland energy loss is calculated at 124 kilowatts. The plant operates 24 hours per day, 365 days per year, giving an annual energy loss of 1,086,240 kilowatt-hours.

The energy savings are purely based on heating requirements and do not include energy costs for water

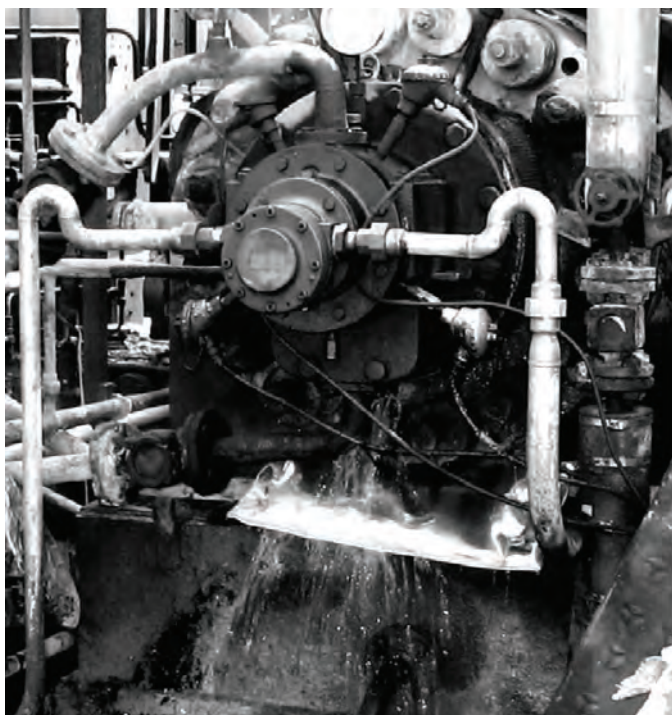


Figure 15: Severe leak on packed gland pump.

Alternate Technologies Double Slurry Seal & Water Circulation System Plan 54

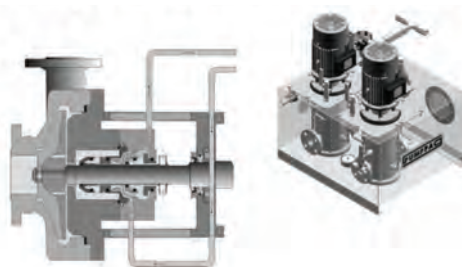


Figure 16

treatment, de-aeration and any pumping. It is worth noting that the reduction in energy does not reduce the power absorbed by the pump but provides for savings in the combustion process and boiler operation costs.

Investigation of the combustion process by site personnel indicated that 4 ounces of CO₂ is emitted per gallon of water heated. With losses of a quarter of a gallon per minute per gland (across sixteen glands), there is a calculated saving of 261 tons of CO₂ per year. By comparison the average European high efficiency diesel car covering over 12,000 miles per year would emit 3.5 tons per year; therefore, the saving is equivalent to nearly eighty cars.

MINERAL EXTRACTION SLURRY PUMP CASE STUDY: CONVERSION FROM GLAND PACKING TO MECHANICAL SEAL

Population growth, economic development, and climate change have led to pressure on the water supply in many parts of the world including the United Kingdom. According to the Organization for Economic Cooperation and Development (OECD), access to reliable and safe water represents one of the greatest challenges facing humanity in the twenty-first century. The use of flush water in pumping applications, sometimes in large quantities, must be questioned. This practice is still widespread around the world.

The final case study is the conversion to mechanical seals of a number of large slurry pumps with packed glands. The Debswana operation consists of various diamond mines at Orapa in Botswana, a dry semi-desert area. Essential to the operation are slurry pumps pumping kimberlite and iron silicate. These applications are amongst most abrasive in the slurry-pumping world.

Gland Water Requirement

The packed glands on the pumps needed flush water injection (Plan 32) into the process media, at a rate of 15 gallons per minute to exclude slurry from the seal chamber. If the water supply failed, damage occurred to the gland within thirty seconds. Only 10 percent of the flush water is recoverable from the process. A typical train of five pumps consumes over 35 million gallons per year of water from underground sources.

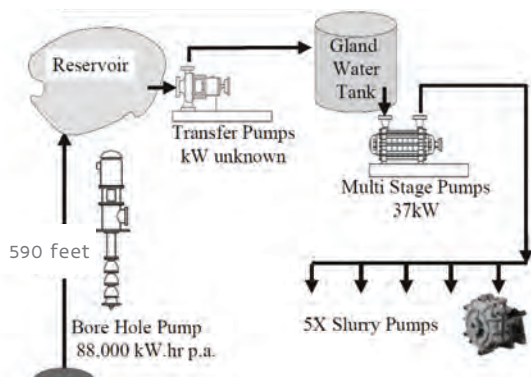


Figure 17

Original Gland Water System

Due to constant extraction over many years, the water table was dropping and the resource was threatened. An official mandate was tabled to reduce water consumption by 10 percent immediately and 15 percent in the medium term. Pipelines from various alternative sources were considered. The most effective, and most extreme, was to build a 372-mile-long pipeline from the Okovango delta to Orapa at a cost of \$30 million. This could have endangered water levels in the delta, a world heritage site.

Double Seal Conversion

Fitting double seals with water circulation systems (see figure 16) to just eighteen pumps reduced gland water consumption by a significant proportion of the 10 percent total savings required across the site. A further fifty seals and systems have now been installed, covering all the pumps using large volumes of gland service water.

Energy Saving

The primary motivation for the conversion was to tackle the issue of aquifer depletion; however, the secondary benefit of energy conservation should not be overlooked. The complete original gland water system needs to be considered. The system illustrated at Damtshaa mine (part of the Debswana operation) is typical of many of the mines in Orapa (see figure 17). Energy saving are made because bore hole pumps are no longer required to lift the volume of gland water to a storage reservoir on the surface.

Typically, a bore hole is drilled to over 800 feet with the water table at approximately just under 600 feet. Bore hole pumps are of the helical rotor type and being belt driven are approximately 75 percent efficient. From the reservoir, a multistage pump increases pressure injecting the gland water into the pump casing. The calculated energy consumption of this system is 394,084 kilowatt-hours per year. African power generation is highly dependent on coal. For every kilowatt saving, there is an equivalent atmospheric saving of over 2 pounds of CO₂. The double seal conversion utilized a simple tank recirculation system, with total energy consumption of less than 30,000 kilowatt-hours per year. Hence, energy savings of over 350,000 kilowatt-hours per year were achieved.

CONCLUSIONS

Consideration of pump seal auxiliary piping systems needs to be given greater priority. The energy indirectly consumed is often ignored, with minimum capital cost being the prime driver when plants are designed. In addition, mature pump installations fitted with traditional high maintenance packing arrangements should be reviewed in terms of plant efficiency. The mechanical seal industry has developed efficient, elegant solutions that provide the operator with higher reliability, lower life-cycle costs, and reduced environmental impact. ■

AESseal is a specialist in the design and manufacture of mechanical seals and support systems. AESseal's mechanical seals are used in a wide range of pumps and rotating equipment worldwide to prevent liquids and gases escaping into the environment. AESseal manufactures mechanical seal types to suit all industries and its investment in modular design means that the company provide the best on-time delivery performance in the industry. The AESseal range of seals, seal support systems, and bearing protectors are all designed to improve pump reliability and reduce maintenance costs. For more information, visit www.aesseal.com.

Reliable Chemical Pump Accessories



- Complete your fluid handling system with robust, high-quality accessories designed to enhance performance and safety.
- Single source for back pressure and pressure relief valves, pulsation dampeners, calibration columns, corporation stops, injection quills, gauge guards, strainers, and more.

Ask about our Quick Turnaround Advantage



Griffco Valve, Inc.
1-800-GRIFFCO
sales@griffcovalve.com
www.GriffcoValve.com

ISO CERTIFIED • MADE IN USA

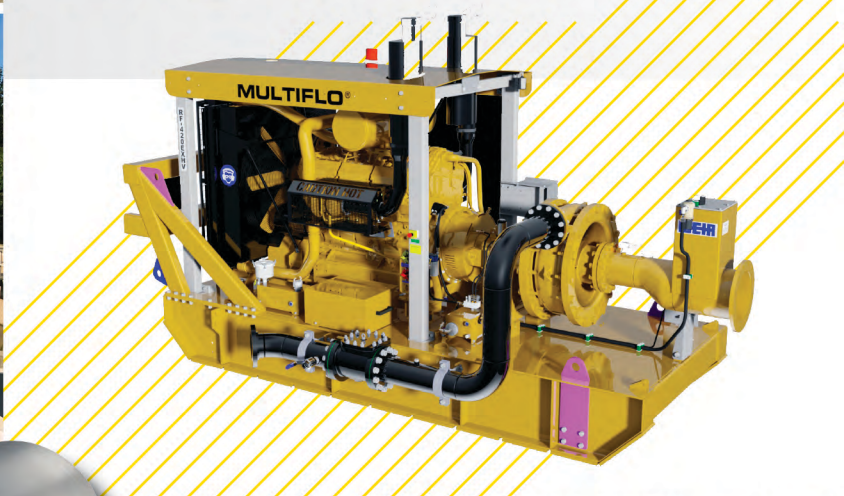
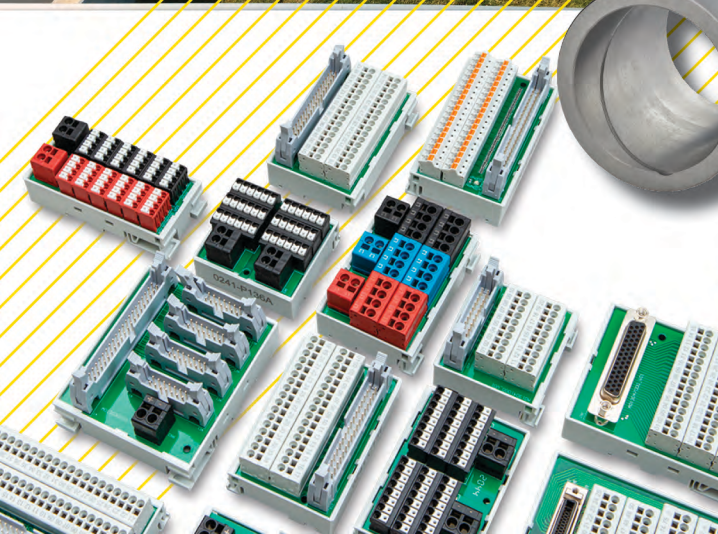


MPT
Modern Pumping Today®



**INCLUDE US
IN YOUR PLANS.**

HAVE FULL ACCESS TO
MPTMAG.COM
FOR ALL YOUR SOLUTIONS
ANYWHERE, ANYTIME.



2022 BUYERS GUIDE



Problems with motor bearing damage creates frustrating and expensive downtime. That's why millions of motors around the world depend on AEGIS® Rings to keep bearings safe from unpredictable currents that result in motor failure. Electro Static Technology's patented design provides the most reliable current diversion technology for extending motor life. Learn more at www.est-aegis.com.



Reduce Your Pump Energy Use

Pumps and pumping systems account for 25% of the energy consumed by electric motors in the United States. In pumping intensive industries, this number is over 50%.

To improve the efficiency of pumping systems and reduce their energy consumption, pump users are turning to variable frequency drives (VFDs). Since most pumping systems are designed for maximum service conditions, running them at partial load can save considerable energy. So, by precisely matching motor speed to pumping requirements, VFDs can reduce energy costs by as much as 30% or more.

But VFDs Can Damage Pump Motor Bearings

VFD-induced voltages on motor shafts can discharge through motor bearings, causing pitting, frosting, fluting, and total bearing failure in as little as 3 months!

Pumping System Reliability is Critical

Pump motor failures can cost hundreds of thousands of dollars in repairs and in this industry, the unplanned downtime from motor failure is even more expensive. To ensure the reliability of VFD-driven pump motors and systems, bearing protection is needed.

Proven Long-Term Bearing Protection

By providing a very-low-impedance path from motor shaft to ground, AEGIS® Shaft Grounding Rings ensure the reliable, long-term operation of VFD-driven pumping systems. Proven in millions of installations worldwide, AEGIS® Rings provide unmatched bearing protection of the full L10 life of the motor bearings.



31 Winterbrook Road
Mechanic Falls, ME 04256
Phone: +1 207-998-5140
Toll Free (U.S.): 1-866-738-1857
ISO 9001:2015 Certified



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



Gas Clip Technologies

Gas Clip Technologies believes that quality and affordability go hand-in-hand, which is why they manufacture top-of-the-line gas detectors and accessories that meet every budget. Each product meets the highest standard of reliability and battery life to ensure that every user's safety remains uncompromised. Gas Clip's multi gas detectors are perfect examples.

MULTI GAS DETECTORS

The Multi Gas Clip was Gas Clip's first multi gas detector, and it was also the first portable gas detector in the industry to utilize infrared technology to detect combustible gases (LEL). The continuous run time of the Multi Gas Clip is two months. However, its sisters—the MGC Simple and the MGC Simple Plus—have continuous run times of two years and three years respectively. Additionally, after being charged and calibrated during manufacturing, neither the MGC Simple nor the MGC Simple Plus require recharging or routine

calibration, although bump testing prior to every use is advised. Also, all three of these detectors are designed to identify the presence and level of hydrogen sulfide (H_2S), carbon monoxide (CO), oxygen (O_2), and combustible gases (LEL).

SINGLE GAS DETECTORS

In turn, on the days that require a single gas detector, Gas Clip Technologies have two to choose from—the Single Gas Clip (SGC) and the Single Gas Clip (SGC) Plus. Both include superior sensor reliability along with adjustable alarm set points, a programmable six-digit detector ID code, and a two-year battery life. However, the SGC Plus also includes a built in “hibernate” mode that allows users to place it in a rested state when not in use. It is available in two models—SGC Plus H_2S for detecting hydrogen sulfide and SGC Plus CO for detecting carbon monoxide. The Single Gas Clip, on the other hand, comes in three different versions—SGC O_2 for testing oxygen



levels, SGC H_2S for testing hydrogen sulfide levels, and SGC CO for testing carbon monoxide levels.

GAS CLIP'S NEWEST ADDITION: THE GCT EXTERNAL PUMP

As for accessories, Gas Clip Technologies released the new GCT External Pump earlier this year. It is a motorized sampling pump that allows any Gas Clip diffusion detector—single gas and multi gas—to take remote samples from up to 75 feet away. It has a forty-hour continuous run time on average, and the battery typically recharges in four to six hours. Audio and visual alerts will inform the user of possible errors including blockages and a low battery charge.

Additionally, the sleek, ergonomic design of the pump allows it to sit comfortably in the user's hand, which helps prevent potential drops. However, an alligator clip allows the user to firmly attach the pump to their belt, jumpsuit, etc. as needed. Either way, if the device takes a tumble, the durable casing can withstand the fall as well as other harsh treatment.

CLOSING THOUGHT

After more than a decade of creating industry-changing products, including their new GCT External Pump, Gas Clip Technologies continues to keep their focus on the future and how to further develop simpler and safer gas detection solutions. However, those two concepts are merely stepping-stones to their ultimate goal—helping workers get home to their families at the end of the day; and in truth, that is what gas detection is all about. ■



ORANGE IS THE NEW YELLOW.



AVAILABLE MODELS:

- Hydrogen Sulfide (H₂S)
- Carbon Monoxide (CO)
- Oxygen (O₂)

NEW YEAR. NEW LOOK. SAME GREAT FEATURES.

2-year battery life • Simple-to-use one-button operation • Adjustable alarm set points
Programmable 6-digit ID • **Compatible with the new GCT External Pump**



Portable Gas Detectors You Can Count On

gascliptech.com +1.972.775.7577 1.877.525.0808

Gorman-Rupp Pumps

For more than eighty-five years, Gorman-Rupp has manufactured the high performance, high quality pumps and pumping systems required for lasting service in the municipal, water, wastewater, sewage, industrial, construction, petroleum, and OEM markets. Our extensive line of pump products include self-priming centrifugal pumps, standard centrifugal pumps, submersible pumps, trash pumps, priming-assisted pumps, and rotary gear pumps. Gorman-Rupp also manufactures a complete line of state-of-the-art packaged lift stations and booster stations that include pumps, motors, controls, piping, accessories, and enclosures.

Through the years, our continued growth has focused on superior pump design, engineering, and customer service. As a result, Gorman-Rupp has become a company known for market innovations and improvements that continue to set standards for the pump industry.

Gorman-Rupp operates two manufacturing plants, producing a full line of pumps and sewage pumping stations with custom-made fiberglass enclosures and electrical control panels.

Gorman-Rupp has over 1,000 distributors throughout the United States and the world that are qualified to give expert advice on pump selection and applications. If you have

a service problem, a factory-trained distributor is only a phone call away. Our distributors are backed by the fastest parts service in the industry. Gorman-Rupp stocks more than 60,000 pumps and parts and ships 99 percent of them within twenty-four hours so your parts will be there when you need them.



The Pump People®

CONSTRUCTION MARKET

Gorman-Rupp is the leading manufacturer of pumps for the construction market. Offering nearly 3,000 models, we have one of the largest selections of fluid-handling products in the world. We have built our reputation on the workhorses of the construction pump market: self-priming centrifugal trash pumps. These dependable, versatile performers help contractors move

large volumes of water quickly. We also manufacture an extensive line of submersible, diaphragm, and priming-assisted pumps that offer maximum reliability and service life.

INDUSTRIAL MARKET

You will find Gorman-Rupp pumps operating in the most hostile industrial environments—down in the sub-basements; in the waste sumps; in the heat, steam, grease, and grime; handling the corrosive and abrasive industrial wastes other pumps cannot. Performing reliably month after month, year after year, in all types of waste control systems, pumping solids and debris that would shut other pumps down, Gorman-Rupp industrial pumps are designed for the people who service them.

MUNICIPAL MARKET

Gorman-Rupp sets the industry standard for sewage pumping systems including pumps, motors, and controls (complete sewage lift stations). Our solids handling self-priming and submersible sewage pumps offer maximum dependability and ease of service. Our commitment to “total system responsibility” means you only have to make one call should you encounter a problem with your system, from pumps and controls to the lights and fans in our enclosure. We simply offer the best sewage pumps and pumping systems in the industry. ■



ERADICATE CLOGGING

CLOG-PRONE SOLIDS ARE NO MATCH FOR GORMAN-RUPP SUPER T SERIES® PUMPS EQUIPPED WITH THE NEW ERADICATOR® SOLIDS MANAGEMENT SYSTEM RETROFIT KIT.



AGGRESSIVE,
SELF-CLEANING
WEARPLATE

REMOVABLE,
LIGHTWEIGHT
INSPECTION COVER

ERADICATOR
Solids Management System



New sewage, poultry waste, plastic bags, hair, stringy material and other clog-prone materials can wreak havoc on pumps. That's why you need a dependable solution for handling solid waste. Gorman-Rupp's innovative Eradicator® Solids Management System upgrade kit for Super T Series® pumps offers just that. The new aggressive self-cleaning wearplate and back cover assembly, incorporating an obstruction-free flow path, are designed to handle clog-prone material, keeping your pump operating at peak efficiency. A lightweight inspection cover allows for easy access to the inside of the pump without affecting wearplate-to-impeller clearance. And, the Eradicator can be easily installed into existing Super T Series pumps in the field. **Trust Gorman-Rupp pumps to keep your operation running smoothly month after month, year after year.**

Hoosier Pattern

For over two decades, Hoosier Pattern has always been on the cutting edge of innovation. We're consistently raising the bar in our industry while maintaining the highest quality for our customers. In 2013, Hoosier Pattern was the first service center to own and operate a 3D sand printer in the United States. As of 2020, we have four 3D sand printers in-house as well as over twenty-five machining centers.

Hoosier Pattern started in 1997 in a 3,500 square foot space with just a couple of machining centers. Today, we operate a 90,000 square foot facility with state-of-the-art technology, allowing us to take on jobs from various customers across multiple industries. Our technology includes:

- Over twenty-five machining centers including vertical and horizontal machining
- CNC lathes
- Five-axis mill
- Plate saws
- Four 3D sand printers for sand molds and cores
- 3D plastic printer
- EDM
- Manual CMM
- Laser scanner

Hoosier Pattern delivers manufacturing capabilities to a wide variety of industrial and commercial pumps. Our customers can request centrifugal pumps, water, sewage pumps, turbine pumps, transfer pumps, fluid flow pumps, and the list doesn't stop there! Our advanced technology allows for pinpoint accuracy and fast turn-around times.

Within two weeks of submitting a product order to Hoosier Pattern, a sand mold of a pump part is made and is ready to ship to the customer's preferred foundry. Hoosier Pattern uses the latest technology from the start, so castings can be made quicker, and products can reach customers sooner.

In addition, Hoosier Pattern has a diverse list of industries we serve, such as consumer appliance, agriculture, and automotive industries.

There is no need to sacrifice design for manufacturability when working with Hoosier Pattern. Complex core designs are 3D printed as one piece, reducing or eliminating assembly errors and foundry casting defects. No internal fins or mismatches. 3D printed foundry molds do not need traditional parting lines and flask sizes. This process gives the foundry the freedom to gate, add risers, and feed the casting in the best possible way to produce the optimal casting.

Complex pump component castings produced quickly and at a known cost are why pump manufacturers turn to 3D printing as the solution to pump casting problems.

Our employees share our vision of excellence in every aspect of their jobs. Our shop reflects that dedication to precision and quality. Our staff is well-trained, well-educated, and stays up-to-date in the latest knowledge of CNC machines, sand printers, plastic printer, laser scanner, accounting software, hardware, and software, allowing us to cater to our customers' needs.

Several of our employees have experience working in foundries—and they are keenly aware of the urgencies that these companies face daily. Our expertise and in-depth knowledge give our team members the advantage of understanding and meeting our customers' needs and expectations. We always strive for excellence in every job. If we promise it, we deliver, no matter what the cost. We know that "every second counts," and we take that seriously as we work on specific deadlines to meet your project's demands.

At Hoosier Pattern, we believe that innovation drives productivity. We have always relied on these practices to deliver on-time and premium-quality products to our customers throughout the United States and worldwide. We understand that industries are evolving, and staying up-to-date with the latest technological advancements is an essential part of our success.

Even though innovation is the driving force behind our product development, our commitment to manufacturing excellence will forever remain our highest priority. ■





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



LS Electric America, Inc.

The H100 VFD features the capability to operate lead-lag pumping applications without the need for external control devices such as a SCADA system or PLC. This feature can reduce pump wear, increase system efficiency, and improve reliability.

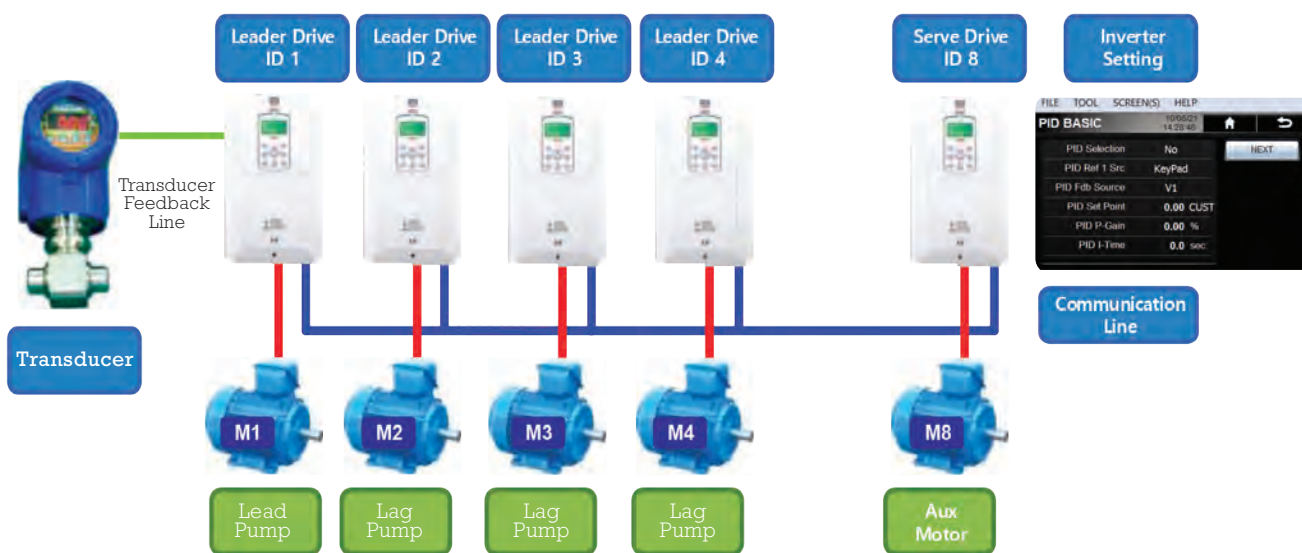
SIMPLE SETUP

- Uses the H100 standard keypad and parameters.
- Dedicated lead-lag macro makes programming easy. Setup in minutes!
- A two-wire RS485 connection is all that is needed between each VFD!
- Setup parameters are shared across the connected VFDs for streamlining and reducing startup time.



FLEXIBILITY

- Redundant setup eliminates downtime!
- New lead VFD automatically continues operation in case of failure or outage.
- Automatic pump alternation based on operation time or sequencing (FILO/FIFO).
- System can use a single transducer (shared of the network) or have multiple for redundancy.
- Supports up to eight H100 VFDs! 🟡



LS ELECTRIC AMERICA, INC.

Vernon Hills, Illinois 60061 • 800.891.2941 • www.lselectricamerica.com

LSELECTRIC



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

Mod-Tronic Instruments

WHEN QUALITY AND PERFORMANCE ARE AS IMPORTANT AS PRICE, YOU CAN COUNT ON OUR PROVEN BRANDS

This has been our company motto since 1972, and forty-nine years later we pride ourselves more than ever on providing our customers with quality products at competitive prices. RewindSensors.com is a market focused website of Mod-Tronic Instruments Limited. Its purpose is to display only the sensors (RTD, thermocouple, current, vibration), anti-condensation heaters, controls, and monitors applicable to the rotating machinery OEM and MRO markets.

Plus, the Mod-Tronic team's technical knowledge is unparalleled. Our sales force has over 114 years of combined experience solving our customers unique and diverse application challenges. We have earned a valued reputation in our industry for working with our customers. We take the time necessary to fully understand your application, analyze your requirements, and offer you the correct products at competitive prices. Not sure what type of temperature sensor you just pulled out of that old motor? Just ask! We have seen almost everything and can help you figure it out.

One of the secrets to Mod-Tronic's success is our team. Customer service is #1 and all of our sales people are friendly, conscientious, and motivated to get answers to our motor industry customers as quickly as possible. They recognize the inherent urgency of the motor repair industry and the need to respond to inquiries promptly with stock part solutions whenever possible.

Every week, we hear from customers calling us, "I can't believe I found someone who will talk to me that actually knows their products!" Our open office environment encourages peer-to-peer support, helping and supporting each other with any challenges or issues. Every

employee's remuneration includes a portion that is a commission on all sales, reinforcing our team approach.

Mod-Tronic is the largest Minco distributor in Canada or the United States for the rotating machinery market. We are located in Brampton, Ontario, Canada, just outside of Toronto, occupying 6,600 square feet of office and warehouse space with an additional warehouse and freight forwarding location in Warren, Michigan.

We have a low \$100 minimum order and we can ship parts the same day from stock to anywhere in Canada, the United States, or around the world. And we ship to Canada and the United States with no cross-border fees! We replenish our stock weekly so if the parts you need are not in our stock, we can still provide them quickly for you. Don't see the exact product you require? Tell us what you need, most of our manufacturers offer custom-built solutions to meet your exact requirements or we can modify stock parts as shown below.

Our emphasis on quality extends to our manufacturers. All of our manufacturers were carefully chosen for the high-quality products they produce. Especially MINCO, whom we have had a business partner relationship with since 1972.

We modify MINCO parts for quick shipment of stock parts including:

- Assembling stock sensors, fittings, connection heads, and thermowells into complete assemblies
 - Programming transmitters to your sensor input type and temperature range
- Ten of our thirteen key manufacturers are located in the United States and are all known for their top quality. Our other three manufacturers are located in Japan, Switzerland, and Germany. We have carefully selected our manufacturers so that their products complement each other so our customers can call us for all of their temperature sensor, thermostat, thermistor, heater, and instrumentation needs for electric motors.
- We have selected manufacturers with products that do not compete with each other. We have maintained a positive long-lasting relationship with all of our manufacturers—some of them for over forty-five years! Our reputation in the market is that we only sell top quality products. Our customers know that their initial cost from us may not be the lowest but their long-term cost and headaches from failures is the absolute lowest. We are so confident in the quality of all of our suppliers that we provide a five-year limited warranty on every product we sell.
- Currently, we have over 500 different part numbers in stock for a total of over 10,000 parts and \$1,000,000 of inventory. We assemble and modify our MINCO stock so that we can quickly ship many more part numbers than what is on our stock list. By modifying and assembling our stock, we can ship thousands of different assemblies next or same day for a small upcharge. ■
- Cutting RTD or thermocouple probes to the exact length you require for your application
 - Cutting Teflon leads to length or stainless steel braid over Teflon lead wires to length
 - Adding stainless steel armor over leads
 - Removing stainless braid
 - Adding bayonet mount hardware
 - Adding PSA adhesive to surface mount sensors or heaters

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**



MOD-TRONIC

www.RewindSensors.com

1-800-794-5883

Mueller Water Products

Mueller is a leading manufacturer and marketer of products and services used in the transmission, distribution, and measurement of water. We help municipalities increase operational efficiencies, improve customer service, and prioritize capital spending.

COMMITTED TO SAFE DRINKING WATER

From life-saving fire protection to data intelligence, we are committed to developing products and solutions that help cities and water utilities deliver clean, safe drinking water. Our broad product and service portfolio includes engineered valves, fire hydrants, pipe connection and repair products, metering products, leak detection, pipe condition assessment, and pressure management products.

SERVING ALL YOUR WATER DISTRIBUTION NEEDS

Mueller is one of the only companies that can fulfill your water system needs from end to end—at the source, at the plant, below the ground, on the street, and in the cloud. Built on a solid legacy of innovation, we have the expertise



and vision to provide advanced infrastructure and technology solutions for monitoring, control, managing, and optimizing water more safely and efficiently than ever before.

WHERE INTELLIGENCE MEETS INFRASTRUCTURE®

The Sentryx™ software enabled Super Centurion® hydrant acts as a communications hub, housing state-of-the-art pressure monitoring and leak monitoring systems that communicate data via a cellular signal to the Sentryx

Water Intelligence Platform to provide a total overview of the health of your water system. Existing super centurion hydrants can be easily retrofitted with this technology with no digging or wiring required.

Mueller Water Products' brands include Mueller®, Echologics®, Hydro Gate®, Hydro-Guard®, HYMAX®, i2O®, Jones®, Krausz®, Mi.Net®, Milliken®, Pratt®, Pratt Industrial®, Singer®, and U.S. Pipe Valve & Hydrant. For more information visit www.muellerwaterproducts.com. 📍

SENTRYX™ WATER INTELLIGENCE PLATFORM

A digital services platform for water utilities to monitor, operate and monetize water distribution networks.



Monitor

Drive insights to inform decision making process



Control Manage

Automatic control of network assets & mobile workforce



Manage

Data from multiple devices feeds machine learning models to create actionable insights



Optimize

Extend asset life. Optimize and prioritize expenditures.



SINGER®

a MUELLER brand

Zero Compromise

The SINGER® Pressure Reducing Valve with integral back up (PR-SM) is two valves in one. With a secondary independent valve chamber and pilot system, it keeps on working without any interruptions if the primary system fails. It's the only control valve that accepts zero compromise.



To discover more advantages, visit us at singervalue.com, or contact us at singer@muellerwp.com or 833-367-6835.

MUELLER

MUELLER® | ECHOLOGICS® | HYDRO GATE® | HYDRO-GUARD® | HYMAX® | i20® | JONES® | KRAUSZ® | MI.NET® | MILLIKEN® | PRATT® | PRATT INDUSTRIAL® | SINGER® | U.S. PIPE VALVE & HYDRANT

Copyright © 2021 Mueller SV, Ltd. All Rights Reserved. The trademarks, logos and service marks displayed in this document herein are the property of Mueller SV, Ltd., its affiliates or other third parties.

Pedrollo



“MADE IN ITALY” PUMPS THAT ARE SYNONYMOUS WITH QUALITY, RELIABILITY, DESIGN, AND INNOVATION

Pedrollo S.p.A., founded in San Bonifacio (Verona) in 1974, is one of the major family-owned industrial companies in Italy and is globally recognized as a benchmark in the electric water pumps industry, with more of 2.5 million pumps manufactured every year.

Pedrollo currently distributes products in more than 160 countries around the world through its ten commercial branches and through its parent company, Pedrollo Group Inc, which is led by Giulio Pedrollo, as chairman, and is now officially present in the North American marketplace through its recent acquisition of Superior Pump. Superior Pump is now part of Pedrollo Group Inc. since the majority acquisition in 4Q2020 and is active in the design, production, and marketing of pumps with a particular focus on the United States and Canada markets. Pedrollo USA is headquartered in Minneapolis, Minnesota, and led by Charlie Michel III as president.

Pedrollo is a leading company in manufacturing and supplying electrical water pumps for residential, commercial, agricultural, and industrial use. Pedrollo is a producer of a complete range of electric water pumps, motors, electronic controls—including VSD and pressure systems. With a focus on innovative products, the wide range of pump includes many diverse types of pump products, such as peripheral, centrifugal, horizontal and vertical multistage, self-priming, pool pumps, deep well submersible pump end as well as electric motors, sump, sewage, effluent, and grinder pumps. Pedrollo will also offer a wide array of accessories, electronic controls, including VSP, and pump systems and packages.

Pedrollo's headquarters occupies a significant area of space and is in

continuous expansion, and currently occupies more than 1.6 million square feet with more than 1,200 employees. Pedrollo's physical size and presence makes it a true and proper industrial district, spread over various specialized plants allowing it to offer practically the entire production and supply chain internally.

Pedrollo's highly automated systems guarantee competitiveness and is constantly investing in innovation, accounting for over 16 percent of revenues, and integrating innovative and original solutions in manufacturing, mechanics, design, electronics, and human intelligence.

The research and development performed at Pedrollo does not only concern the final product, which it holds numerous international patents, but is also applied to machinery and the productive processes employed. The required skills on both the engineering and technological levels are so elevated that, in many cases, they require the direct building of ad hoc dedicated production machinery, designed exclusively by Pedrollo Engineering of the same applied to the numerous registered patents—more than 200 exclusive and original patents—which requires maximum protection through the internal realization of processes, machinery, and safe and ergonomic systems. Such a holistic strategic choice determines a positive position of control and guarantee over both the finished products and the entire production process.

Pedrollo's worldwide success is based on a great innovative capacity sustained by constant research and a strong commitment to development. These efforts are ultimately aimed at the technical improvement of systems and products. Upon ensuring the models' functional priorities, Pedrollo continues with regular design updates: a much-appreciated detail in the market and a

distinctive sign of Italian quality. There is also a constant renewal of products also from an aesthetical point of view, making them more pleasing both to the eye and touch as well as being more efficient—another indicator of the complete attention that Pedrollo promises to its customers. Moreover, Pedrollo uses an advanced prototyping center that enables the invention and realization of new increasingly improved performing products and designed to solve to customers' ever-changing requirements. Pedrollo possesses a tradition of creativity and technology that signifies the excellence of “Made in Italy.”

Pedrollo has committed significant investment aimed at guaranteeing its own companies the capability to produce energy from renewable sources with a positive impact on the environment and society, making it almost entirely autonomous from an energy standpoint. Pedrollo has over 2.5 MW of electricity generated by solar panels and the company recovers rainwater and uses it for industrial and commercial purposes in its plants.

Innovation, quality, service, professionalism, self-reliance, and its innovation-focused business model, along with commitment to sustainability and social responsibility (www.pedrollo4people.com), are the foundations of its long-established reputation.

Pedrollo S.p.A. is a part of Pedrollo Group (www.pedrollogroup.com). ■

PEDROLLO USA

2301 Traffic Street NE,
Minneapolis, Minnesota 55413
877.PEDROLLO (733.7655)
info@pedrollo-usa.com
www.pedrollo.com



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

Schenck USA Corp.

SCHENCK USA CORP. is a subsidiary of SCHENCK CORP. Its parent company is Carl Schenck AG of Darmstadt, Germany; whose shares are ultimately held by Dürr, AG of Bietigheim, Germany.

SCHENCK USA CORP. is the company's new name as a result of the merger of Schenck Trebel Corp. and Schenck RoTec Corporation into one entity that comprises Schenck's Balancing and Diagnostic Systems Group for North America under Schenck RoTec GmbH.

SCHENCK USA CORP. is on four acres in Deer Park, New York, that includes a 22,800-square-foot manufacturing and assembly plant, and 17,000 square feet of office space for sales, service, administration and engineering personnel. The company's Southfield, Michigan, location is also a manufacturing and assembly plant serving the automotive customer base with a local engineering and service support staff.

SCHENCK USA provides a range of balancing and vibration analysis equipment for the production, maintenance and repair of rotating components. The company's engineering staff offers a range of experience for any balancing application and maintains a close presence on the balancing committees of the International Organization for Standardization (ISO) and the Society of Automotive Engineers (SAE), to ensure the latest practices and procedures are applied. The company is ISO 9001:2015 accredited.

The service team is available for the commissioning and calibration of balancing equipment from multiple North American service points, in addition to leveraging a

global service support structure. With the company's recent acquisition of Test Devices Inc., of Hudson, Massachusetts, it has expanded its capacities in the spin testing and balancing services areas.

The company provides production, sales and servicing of balancing, filling, assembly and test systems, vibration and monitoring systems as well as accompanying services for the automotive industry and their suppliers, for the electrical industry, turbomachinery, general industries, and aviation and space.

In order to maintain its current role as a market and innovation leader in these fields, the company is dedicated to the following points:

- Thoroughly understanding customers' needs and exceeding expectations through partnership interactions
- Ensuring high quality by continuously improving the effectiveness of the company's processes, products and services in accordance with its quality management system (QMS)
- Contributing to the global success of SCHENCK by observing and proactively anticipating market developments
- Ensuring a safe workplace for the company's employees and visitors
- Complying with laws and regulations applicable to the company's operations
- Treating vendors fairly in partnership arrangements
- Creating a rewarding and challenging environment of integrity and ethics



- Constitute a positive environment, where the company encourages internal improvement suggestions

HM-SERIES MACHINE ADVANTAGES AT A GLANCE

HM-Series machines are designed to:

- meet most balancing requirements in single-unit or in high volume production
- solve many horizontal, hard-bearing balancing tasks
- be fitted to many individual applications because of its modular design
- be well suited for the industrial work in a repair shop due to their sturdy construction
- make fast and accurate balancing possible due to permanent calibration
- have a measuring sequence with digital measured value processing that makes them stable
- enable balancing of a large spectrum of rotors with variable rotor support and adaptable drive
- offer a comprehensive safety package for the protection classes B and C, which will protect operating personnel ■

SCHENCK USA CORP.

631.242.4010 • sales@schenck-usa.com • www.schenck-usa.com

We are SCHENCK USA

- AUTOMOTIVE FLUID FILL



- SPIN TESTING



- TESTING - END OF LINE



- BALANCING



- APPLIANCE FLUID FILL



SCHENCK
Passion for Balancing

Test Devices
by **SCHENCK**

DÜRR

LEADING IN PRODUCTION EFFICIENCY

AGRAMKOW

schenck-usa.com

1(800) 873-2352

sales@schenck-usa.com

Thelco

The Thelco team provides high-quality pump parts and pumps from our 40,000-square-foot warehouse in Englewood, Colorado. For sixty-five years, Thelco has maintained a massive inventory of parts and pumps ready to ship domestically and internationally within twenty-four hours. Our experienced and knowledgeable team, paired with an inventory of 4,500 items, on-site fabrication, and industry relationships provide our customers faster lead times and higher quality outcomes. While Thelco specializes in replicating Flowserve® and Worthington® parts and pumps, Thelco distinguishes itself with its customer service and willingness to help find solutions.

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.

THELCO CAN SUPPLY MORE THAN PARTS

Thelco can also supply whole pumps and unitized pumps on a fabricated steel base. These are supplied as motor driven with coupling and coupling guards. We offer consulting from our senior engineer for your precision pump builds. Call us and

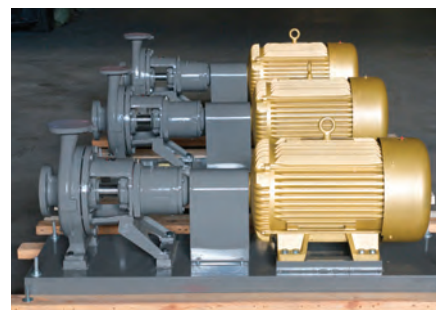
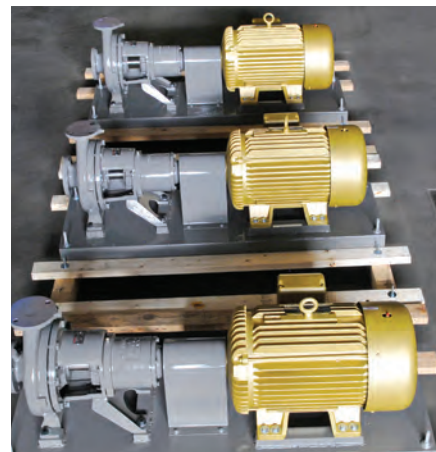
we can help select the pump for your application based on system and fluid conditions. In addition, we have a machining and repair facility on site and would welcome the opportunity to be your repair center.

VETERAN-OWNED AND FAMILY-RUN

Pumps, parts, fabrication, repair, and financing—Thelco delivers exactly what you need, when you need it. Here at Thelco, we believe the key to success lies in the dynamic relationship between the employees of our company and our customers. We've built our business by focusing on the unique needs of each customer to build strong, long-lasting relationships.

The quality of our product line speaks for itself. The Thelco team's commitment and focus on delivering again and again to our customers fuels their business. In fact, our supply of pumps and parts has grown to support a foundation of hundreds of companies we have had repeat business from for over thirty years.

We are proud to be the first call many customers choose to make again and again. Whether it's an overnight parts delivery to a hospital or custom build of an explosion-proof pump: Thelco provides what you need to power your business. ■



THELCO

2390 West Dartmouth Avenue • Englewood, Colorado 80110
303.761.7616 • thelco.parts@thelco.com • www.thelco.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

Vaughan Company

YOUR SOURCE FOR RELIABLE CHOPPER PUMPS AND HYDRAULIC MIXING SYSTEMS

Vaughan Company was started with one simple question, "What could make this better?" In the service bay of the gas station he owned in Elma, Washington, Jim Vaughan spent hours repairing manure pumps for local dairy farmers. He could see a pattern: the pumps were constantly breaking down due to clogs caused by animal bedding or twine. So in 1960, Jim Vaughan invented the world's first chopper pump.

The Chopper Pump met a genuine need that had applications far beyond dairy farms. The original patent for the Chopper Pump was applied for in 1960 and granted shortly thereafter. By 1961, the company purchased its own manufacturing facility in Montesano, Washington. In the decades since, Vaughan Company has expanded operations greatly and now has forty worldwide patents.



Now a third- and fourth-generation family-owned-and-operated company, Vaughan Company manufactures pumping and mixing equipment for agriculture, municipal, and a variety of industrial applications, shipping worldwide. From 1960 to today, our goal is to produce reliable products that perform in the most demanding applications. And as the years have passed, we've implemented new technologies to stay innovative.



We incorporate in-house 3D modeling, which allows us to create precision castings for all components. With computational fluid dynamics (CFD), we analyze flow patterns and velocities within our pumps, looking for ways to maximize performance. And our computer numerically controlled (CNC) automated machining ensures every Vaughan replacement part fits precisely.

With more than half a century of experience, Vaughan Company remains committed to giving customers outstanding service and the most dependable product solutions in the world.

VAUGHAN CHOPPER PUMP

The Vaughan Chopper Pump is a centrifugal pump with the unique ability of chopping all incoming solids prior to pumping. This not only protects the pump from clogging, but also provides added benefit to downstream components, processes, and the environment.

All wear components are cast steel and heat treated for maximum impact and wear resistance. These heavy-duty patented components



create the ultimate pump for handling severe solids.

VAUGHAN ROTAMIX® SYSTEM

The Vaughan Rotamix® System is the world's most reliable cost-effective means of mechanical hydraulic mixing for sludge tanks, digesters, and other high-volume applications.

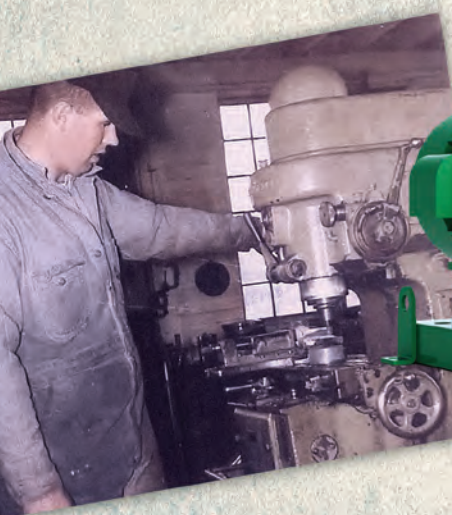
Combining high-velocity mixing nozzles and the Vaughan Chopper Pump, Rotamix® creates a multi-zone mixing pattern while simultaneously chopping all accumulated solids. No more floating mats or solids settled at the bottom of your tank. The Vaughan Rotamix® System produces an easy-to-pump, homogenous mix.

The solutions Vaughan Company offers start here. There are several other product specifications and combinations to consider when approaching a project. The best way to find the right fit for your needs is to contact the pump experts directly.



CONTACT VAUGHAN COMPANY TODAY

Nearly every customer has a unique obstacle to work through. Vaughan Company has provided over sixty years of reliable product solutions, and top-tier customer support. For more information on the pumps and pumping equipment Vaughan Company offers, visit chopperpumps.com to get in touch with the Vaughan team. ■



PROUDLY MADE IN THE USA.

Since 1960, Vaughan Company has been manufacturing the toughest no-clog pumps in the USA. Our 3rd and 4th generation family-owned and operated company builds cutting edge products that are built to last and keep things flowing smoothly.

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

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

EXPEDITED DELIVERY | ELIMINATES COMMUNUTORS | EXTERNALLY ADJUSTABLE CLEARANCES

Vaughan
Unmatched Reliability

Blacoh

Pulsation, vibration, water hammer, surge... Blacoh has been solving pump problems since 1976. Wherever vibration, pressure fluctuation, non-steady flow, noise, or rapidly wearing pump components are a problem or a significant disadvantage in the application, Blacoh can solve those problems to improve both the efficiency of the pump and the longevity of its components. We are the industry standard for dampening pulsations created by positive displacement pumps.

Led by a global team of skilled professionals, Blacoh stands alone as the leader and foremost expert in the manufacture of fluid control products for municipal and industrial process industries, and virtually every application from the harshest chemicals to the most delicate cosmetics. We serve many of the largest oil, pharmaceutical,

food, chemical, and petrochemical companies in the world through our global distribution network. The combination of product quality, efficiency in manufacturing, service excellence, expert knowledge, and rapid delivery times, offers customers a value package that we believe no other company in our market can beat.

We test every pulsation dampener we make before it ships to the customer. We receive an order, process it, acknowledge it, build it, and then test it overnight so it can ship the following morning. Every order. Every dampener. No exceptions. That's what it takes to be the best. We've invested heavily in technology to automate all the mundane, repetitive tasks involved in order processing so that each human interaction is completely focused on the customer and the quality of the product.

Our customer service is incomparable to almost every other

manufacturing company in the United States. When we interact with a customer, we treat them like they're the only customer we have. We give them our full attention company-wide. It doesn't matter who you call or when you call Blacoh, you're going to talk to a real person in three rings or less. We have an amazingly dedicated team working in an environment where they are proud of what they do and truly enjoy coming to work every day. When you have happy people, you can't help but have happy customers.

Since the beginning, our customers have been key in directing our progress and growth. They continue driving product innovations and expanding our market presence. We are committed to expanding and growing globally more than ever. This commitment has resulted in the most rapid growth in our company's history—and we're just getting started. ■



HYBRID VALVE

COMBINATION DAMPENER & BACK PRESSURE VALVE

The All-In-One Smart Choice,
Now Available In New Materials!

- ✓ PVC
- ✓ CPVC
- ✓ POLYPROPYLENE
- ✓ PVDF
- ✓ STAINLESS STEEL

BLACOH
INDUSTRIES

For more information, visit Blacoh.com
Sales@Blacoh.com | 951.342.3100



Check-All Valve Mfg. Co.

Since 1958, Check-All Valve Mfg. Co. has manufactured a complete line of in-line spring-loaded piston-type check valves. With worldwide service, Check-All Valve serves a wide range of industries including the chemical, petrochemical, pharmaceutical, food and beverage, water treatment, OEM, MRO, and many others. Lightweight, efficient, and rugged, every Check-All valve is designed and built to perform to exact needs and specifications. The company is ISO 9001-2008 certified and manufactures product lines compliant with CE/PED requirements, Canadian Registration Number guidelines, 3A Sanitary Standards, and others.

Check-All valves are engineered for silent operation. They close quickly and smoothly to eliminate

hammer noise. They are designed to function equally well in either a vertical or horizontal position, with proper spring selection. They are also designed to reduce installation costs. The insert series check valves easily fit into existing line components, which reduces initial cost and installation time. The seating surfaces are parallel to each other thereby eliminating the excessive wear occurring in plug, cone and ball seats. Check-All valves can also be used as low-pressure relief valves and vacuum breakers.

With many styles available, 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 flange 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. Check-All Valve Mfg. Co. is staffed to supply you with a quality product as well as personal technical services. ■

CHECK-ALL VALVE MFG. CO.

Contact us for a complete
catalog or see us at
www.checkall.com.

More than a Check valve

It's a Check-All®

SILENT OPERATION!
Our check valves close quickly and smoothly to avoid water hammer noise and vibration.

SPRING-LOADED!
Multiple spring settings as well as seat and body materials available to meet your application needs.

UPSTREAM TRIM!
The upstream trim is protected from corrosive media mixing; thereby, extending valve service life.

And most lead times are less than one week. That's what makes our check valves Check-All®

Proudly manufactured in the USA



www.checkall.com
Call us at 515-224-2301 or
email us at sales@checkall.com

Proudly manufactured in the USA



Horner Industrial Group

The Horner Industrial Group, founded in 1949 as Horner Electric, began as an electric motor repair company. Throughout the years they've expanded their repair capabilities to include gearboxes, fans, blowers, pumps, and hydraulic cylinders. In 2013, they created the Horner Thermal Spray and Industrial Coatings division. In 2019, they combined their Pump Repair division with their Thermal Spray and Industrial Coatings division to create a unique offering to their customer base.

By applying the latest spray and coating technology associated with reducing wear and extending life to pump repair, the resulting end product is far superior to any standard pump repair currently in the marketplace.

The Twin-Arc Thermal Spray method used by Horner Industrial has been used by the military, (predominately Navy and Air Force), for over thirty

years and can be used to apply ANY metal on ANY metal without galvanic reaction taking place with a holding force exceeding 9,000 psi, and it never heats up the base material more than 300 degrees Fahrenheit (148 degrees Celsius) unlike welding or other spray metal finishes on the market. The only way to remove the coating is to machine or grind it off. They then use a Loctite coating made for pumps that increases the abrasion resistance of the finished product, resulting in prolonged performance with less maintenance issues and higher efficiencies held for longer period of times.

It is now possible to completely restore an obsolete damaged impeller, shaft, rotating element, or pump case and restore it back to "like new" condition at a fraction of the price of a new unit in a fraction of the time it would take to get a new, replacement part. ■



YOU LINE YOUR PIPES TO PREVENT CORROSION, WHY NOT COAT YOUR PUMPS TO DO THE SAME.

By combining our Industrial Coatings expertise with our Pump Repair Department we're able to restore your pump to "like new" or better condition. Once we coat your pump it will be protected from corrosion and premature wear. Studies have proven that pumps that have been coated last longer and hold efficiencies years longer than pumps that are left untreated. The cost and turnaround time to provide this service is significantly less than buying new.



Contact Terry Thorne

1.877.467.6372 | **HORNER** INDUSTRIAL.COM



KROHNE

KROHNE offers a complete measurement instrumentation product portfolio including industry specific system solutions and complementary services for projects of any size, anywhere in the world. Since starting in 1921, we have amassed an enormous amount of application knowledge that is integrated into our products, solutions, and services.

The resulting innovative technologies are based on our extensive R&D with 10 percent of the work force dedicated that area. While sensor development for flow, level and other variables is the primary focus, we are also very active in advancing device communication and the Internet of Things (IoT) for the process industries including device diagnostics for analysis and process optimization.

If you buy a KROHNE product, you will get a measuring device

that performs most accurate with low uncertainty under real process conditions. To achieve this, we operate more than 120 calibration facilities for volume flow, mass flow, level, temperature, density, and pressure for every device we manufacture. For example, every flowmeter is wet calibrated using water or air as standard before leaving our facilities. We can also provide customer specific calibration such as:

- Multipoint calibrations
- Varying temperatures, viscosities, or pressures
- Specific fluids
- Specific pipe geometries or piping provided by the customer

For calibration we only use direct comparison. For example, we calibrate

our Coriolis mass flowmeters with a gravimetric weighing system. Our calibration rigs are the most accurate for measuring device production with reference accuracies 5 to 10 times better than that of the meter under test.

This goes for small (1 millimeter) or very large meter sizes since Krohne operates precise volumetric calibration rigs up to 120 inches with a certified accuracy of 0.013 percent based on a 144-foot-tall tank containing almost 132,000 gallons of water allowing for a maximum flow rate of 7,925,000 gallons per hour.

In North America, we have a brand-new manufacturing and calibration facility in Beverly, Massachusetts. We serve our markets through a network of representatives, distributors, and direct sales personnel.

Our mission is to provide unparalleled application expertise, on-time delivery, and cost-effective quality products so that we can exceed our valued customers' expectations. We offer a technically proficient, KROHNE-trained sales force that gets involved in all aspects of technical sales and applications support.

Our dedicated technical support, field application, start-up and repair teams are located throughout the regions to provide timely and effective services at your site or at our factory. Our TASC (Technical Application Support Center) is the heart of KROHNE's technical support capability and is available by phone or email every day, at any time, day or night. This group of trained engineers and technicians is at your disposal for product application, installation, operation, or troubleshooting questions. You can reach our support team by calling our toll-free number 800.FLOWING (356.9464) or by email at tasc@krohne.com.

Reach us by email at info@krohne.com or by phone at 800.FLOWING (356.9464). Our website is us.krohne.com. ■



**Continuous flow measurement
with air or gas entrainments**

OPTIMASS series –
Coriolis mass flowmeters with
Entrained Gas Management (EGM™)

us.krohne.com/optimassmeters

products solutions services

KROHNE
measure the facts

KSB SupremeServ

As a global leader in our field, KSB SupremeServ companies in North America offer comprehensive services to help relieve the pressure and reduce the life-cycle cost of your most challenging pump problems. Whether you need support in installing and commissioning your equipment, maintenance, repair, customized service concepts, spare parts, or replacement, rebuild, or exchange, KSB SupremeServ brings knowledge and creative solutions to improve equipment reliability and system performance.

KSB SupremeServ provides service and repair of all rotating equipment for all fields of application. With more than 150 specialists across twelve service centers in North America, our service network is here to serve your needs 24/7 with first-class pump and system maintenance.

SERVICE AND REPAIRS YOU CAN COUNT ON

When pumps are down, fast action is critical. KSB SupremeServ employs professional, original factory trained technicians performing all pump rebuilds and repairs to OEM standards and original documentation using precision measuring equipment and hand tools registered and calibrated annually by an ISO-certified inspection firm.

We provide personalized, one-to-one business relationships for all your RFQs, proposals, expediting, contract fulfillment, technical service support, including field service.

- Fabrication and machining
- Dynamic balancing
- Mechanical seal repairs
- Replacement of parts with genuine KSB OEM spare parts from our inventory

- Welding by MIG, TIG, SMAW (stick), stainless, carbon, and specialized alloys
- Metal fabrication, sheet, plate, structural members, and piping
- Disassembly, inspection/report with evaluation of failure mode, and reassembly to as new condition of all types of pumps

CUSTOM SPARE PARTS WITH REVERSE ENGINEERING

Breakdowns occur daily, resulting in the difficult task of sourcing replacement parts that may not be available or have extended delivery times. In such cases, KSB offers reverse engineering, a process of rapid manufacturing that enables the production of high-quality castings within a very short time frame. This solution lets you keep your existing equipment in operation. ■

KSB SupremeServ



PUMPS

Service | Repair | Spare Parts

12 Networked Service Centers covering North America



pumps911.com

Lovato Electric

WHERE TECHNOLOGY MEETS TRADITION

For nearly 100 years, Lovato Electric has been designing and manufacturing low voltage electrical devices for industrial applications.

Established in 1922 in Bergamo, Italy, Lovato Electric is a private company, managed by the same family of entrepreneurs for four generations.

Among the first companies in Italy to obtain ISO 9001 certification in 1992, Lovato Electric has a range of over 10,000 products complying with the strictest requirements of international standards including UL and CSA.

Manual motor protectors, contactors, overload relays, electro-mechanical starters, softstarters, variable speed drives, pushbuttons and selector switches, signal towers, limit switches, cam switches, disconnect switches, miniature circuit breakers, time relays, protection relays, level control relays, general purpose relays, micro PLCs, power supplies, battery chargers, metering, automatic power factor controllers, automatic transfer switch



controllers, engine and generator controllers, supervision, and energy management software are the types of products and solutions designed and produced by Lovato Electric.

To provide competitive products and services in the industrial automation and energy management fields is our company's mission.

Our thirteen branches abroad and a network of over ninety importers guarantee the availability of Lovato Electric products in more than 100 countries all over the world.

Lovato Electric, Inc. (USA) is headquartered in Chesapeake, Virginia, and supports the U.S. market through authorized distributor partners. ■

LOVATO ELECTRIC, INC. (USA)

757.545.4700

sales@lovatousa.com • www.lovatousa.com

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
- 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



ENERGY AND AUTOMATION

www.LovatoUsa.com



SOFT STARTERS



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

Megator

YOUR BEST SOURCE FOR POSITIVE DISPLACEMENT PUMPS, PUMPING SYSTEMS, AND POLLUTION CONTROL SOLUTIONS

Megator is a leading manufacturer of innovative and unique positive displacement pumps, pumping systems, and pollution control solutions. Our products and systems have continually exceeded our customers' expectations for quality, performance, and reliability. Megator products are the first choice for many demanding applications worldwide in these environments: Megator has built a global reputation for manufacturing innovative and unique positive displacement pumps and pollution control solutions for some of the harshest environments. The performance, quality, and reliability of our products in general industry, marine, mining, and pollution control applications continually exceed our customers' expectations.

Since 1946, we have been helping customers choose the best equipment and solutions for their specific needs. Our pumps and systems are used in thousands of demanding locations, including merchant fleets and in navies such as the U.S. Navy and the British Royal Navy.

Today, Megator Corporation is headquarters for North and South America in Pittsburgh, Pennsylvania. From this location, we support our authorized independent representatives and distributors. Although mining and marine applications are a major focus, our product line has gained wide acceptance in the process industries, oil and gas, petrochemical, general industrial, and municipal sectors.

While always a participant in the oil spill market, in recent years we have increased our presence in that sector. Megator is the North and South American headquarters for Salarollump peristaltic hose pumps and Truxor amphibious vehicles. Both of these products offer capabilities that are unique to the industry and further diversify our offering.

At Megator, our top priority is helping customers solve their pumping and pollution control problems. It's why we've been in business for more than sixty-seven years, and it's what motivates us to achieve excellence in everything we do each and every day. ■



RELIABILITY YOU CAN TRUST



**Rapid Recovery with
Megator System 3**
> Skimmer – Recovery – Separation

The Sliding Shoe Pump – Built to Last, *not to Replace*

- > Single Cover Access
- > Self-Priming
- > Dry Running
- > Self-Compensating for Wear
- > High Suction Lift
- > Reduced Downtime – Maintenance-in-Place
- > Same Pump for Varying Viscosities
- > Clean or Dirty Liquids
- > Low Shear/Emulsification
- > Smooth Non-Pulsating Flow



MEGATOR

INNOVATIVE PUMPS & SYSTEMS SINCE 1946

1721 Main St, Pittsburgh, PA 15215

Tel: 412.963.9200 1.800.245.6211 • Fax: 412.963.9214

www.megator.com

Pumps 2000 America

Pumps 2000 was established in Australia in 1989 to offer pumps capable of handling abrasive, solid-laden, and corrosive fluids in underground mining environments, and to create an alternative to the heavy, maintenance-intensive diaphragm pumps that were used predominantly in mines. These pumps featured low weight as well as improved pump life and performance. Several patented features make it possible for Pumps 2000 to offer market-leading low life-cycle cost, while handling difficult applications.

Pumps 2000 America was established in 2007 to market Pumps 2000 products and solutions throughout North and South America. Today, our pumps continue to be used in coal and hard-rock mining throughout North and South America, as well as in general industry, marine,

building and construction, food processing, chemicals, and pollution control applications.

Pumps 2000 pumps are built and tested at our facility in Pittsburgh, Pennsylvania. From this location, we also provide comprehensive technical support to our distributors, agents, and end-users across North and South America, and operate a service facility and warehouse to ensure fast delivery of pumps and spares.

SUPERIOR VERTICAL INTEGRATION

Our unique combination of in-house R & D and manufacturing enables us to offer pumps and pumping systems which are technically superior and significantly higher quality than our competitors. The use of injection molding has given Pumps 2000 greater freedom in



material composition and has led to the development of lubrication-free pumps and our own plastic blends. A number of products are currently under development.

All Pumps 2000 products are certified in accordance with ATEX. Manufacturing processes are in accordance with ISO 9000 quality management systems standards. Our pumps also comply with ISO/IEC 80079-34 quality standards related to potentially explosive atmospheres.

Pumps 2000's experienced team is always ready to assist you with solving your pumping needs. Please contact us with your inquiry. ■

The Lightweight Dual-Diaphragm Pumps that Outperform and Outlast the Competition

Pumps 2000 Pneumatic Diaphragm Pumps.

Designed for abrasive, solid-laden and corrosive fluids and to create an alternative to heavy, maintenance-intensive diaphragm pumps.

- > Less downtime and maintenance – **Pays for itself**
- > Lower air consumption – **Saves on energy costs**
- > Lightweight – **Results in less injury**
- > Low noise levels

Ask about our
TRIAL PROGRAM

Pumps 2000
Innovation & Excellence

www.pumps2000.com

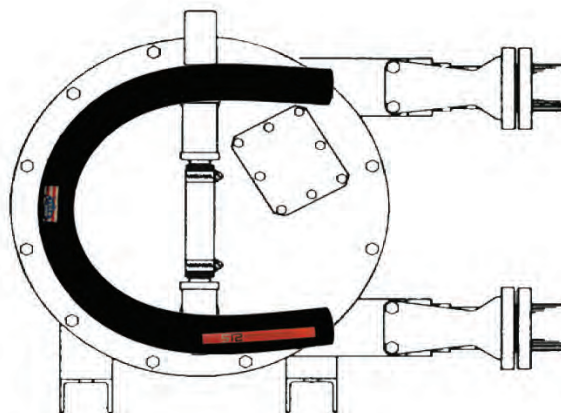
ATEX
Certified

Tel: 412.963.9200, 1.800.245.6211 • Fax: 412.963.9214 • info@pumps2000.com

Salem-Republic Rubber Company

For nearly half a century, Salem-Republic Rubber Company has been manufacturing high quality hand-built hoses. Over ten years ago the company began utilizing the hand-built process to produce ground cover peristaltic pump hoses due to the high demand for alternatives to the OEM supplied replacement hoses. Salem-Republic Rubber Company builds peristaltic pump hoses that are compatible with the requirements for all of the major positive displacements pumps.

The "No Crush" polyester carcass is constructed using multiple plies of high tensile strength corded



reinforcements. The smooth precision ground cover, and concentric wall, ensures optimum performance and consistent flows. Tubes of these hoses can be constructed of Natural Rubber, for abrasion resistant

applications, Nitrile Rubber (Buna-N), for pumping of oily chemicals, EPDM, for pumping of non-oily chemicals, or White FDA safe materials.

Salem-Republic Rubber Company carries stock in Natural Rubber, EPDM and Nitrile tube hoses with sizes ranging between 10 millimeters to 100 millimeters. The ability also exists to produce White FDA safe tube hoses, and larger size hoses, on a made to order basis.

For more information on the peristaltic pump hose products, or any hose products manufactured by Salem-Republic Rubber Company, call 800.686.4199 or visit www.salem-republic.com. ■

4 Decades of experience

in Hose Engineering

Field Tested for durability and service life

Highest Quality, Precision Machined

**PERISTALTIC
PUMP HOSE**

TUBE	Choice of natural rubber, EPDM, or nitrile (Buna - N).
CARCASS	Multiple Plies of high tensile polyester cord.
COVER	Elastomeric compound formulated for toughness and resistance to pump lubricating fluids.
ENDS	Plain cut.

Contact us for a distributor in your area!



salem-republic rubber company

1-800-686-4199

www.salem-republic.com

475 West California Avenue • P.O. Box 339 • Sebring, Ohio 44672 • USA

Scalewatcher

Developed and patented in the Netherlands by Mr. Jan P. de Baat Doelman, Scalewatcher technology

was introduced to the European market in the 1980s. With immediate market success, Mr. Doelman

brought the technology to the United States and applied and received a patent in 1991. From that moment on, Scalewatcher North America has been on the forefront of environmentally-sensitive water treatment. Located in Oxford, Pennsylvania, Scalewatcher North America continues to lead the industry in descaling products that do no harm to the environment.

Scalewatcher North America focuses on the elimination of scale and the problems associated with scale build up. Industries know the costs involved in keeping their capital investments running smooth. Scalewatcher is there to help. Scaled cooling towers, chillers, and associated equipment can negatively impact a company's bottom line, and not just in cash. The caustic chemicals used to remove scale only create more problems with the environment. Your company can "GO GREEN" and stay within your budget.

If our product does not work for your application, we will buy it back! With our "Performance Guarantee," you never have to worry about losing cash on a product that does not work.

Scalewatcher North America Inc. manufactures its products in Oxford, Pennsylvania, so you know they're MADE IN THE USA! We can treat pipe sizes from ½ inch up to and including 120 inches. Cooling towers, chillers, evaporative condensers, and boilers can all benefit from Scalewatcher water treatment. If it scales up, we can break that scale bond and show you cost savings on maintenance. No plumbing required!

Why keep adding chemicals when Scalewatcher can reduce your chemical dependency?

Break the cycle now and save on energy, water, and maintenance costs with Scalewatcher products!

For more information, call 800.504.8577 and visit www.scalewatcher.com. ■



**Be Scalewatcher™
Green**

**eco-friendly hard water conditioning
no salt, no chemicals, no maintenance**

**Easily installed and
truly maintenance free**

- Removes scale from pipe work
- Removes scale from heat exchangers and steam boilers
- Saves energy by keeping heating elements scale free
- Increases life of capital equipment
- Reduces cleaning costs, chemicals & labor
- Saves 50% on cooling tower make up water
- Saves irrigation water
- Provides short term payback

Applications:
Residential • Commercial • Industrial

Dealer territories available.
Scalewatcher North America Inc., Oxford PA
Call Toll Free (800) 504-8577 or by email: sales@scalewatcher.com
www.scalewatcher.com

Patented

Sensaphone

Sensaphone® offers a comprehensive line of remote monitoring products for the water and wastewater industries. These products monitor environmental and equipment status conditions including tank levels, power failures, flow rates, pump status, temperature, humidity, air circulation, vibration, carbon dioxide, water pH, water leaks, smoke, power failure, unauthorized access, and more.

When a Sensaphone device detects that a sensor reading has fallen outside of the present range, it immediately sends alerts via phone, text, or email to designated personnel, enabling them to quickly address the situation. Data logging capabilities provide facility managers proactive information to help keep operations running smoothly.

KEY PRODUCTS FOR THE WATER AND WASTEWATER INDUSTRIES

Sentinel™, Sensaphone's flagship product, is a cloud-based system that remotely monitors up to twelve environmental and equipment status conditions. Operators can access real-time data around the clock from anywhere using a mobile device or computer. They can also check status information, change settings, disable alarms and readjust temperature limits from the Sensaphone app. For remote locations without internet

or Ethernet connectivity, a 4G cellular Sentinel system is available that communicates through cellular networks.

Sentinel™ PRO builds on the power of the Sentinel system and can monitor up to 64 Modbus registers, plus twelve digital or analog inputs. The Sentinel PRO system seamlessly interfaces with any water or wastewater processing equipment that uses a PLC with Modbus sensors. The system supports both Modbus RTU-485 and TCP protocols.

Sensaphone 1800™ is a professional-grade phone notification device with dialer that can accommodate up to eight sensors. It connects to any traditional telephone line and provides 24/7 monitoring. Users can get quick status checks and make easy on-site programming changes using the keypad. It can also switch a local device, such as a light, on or off based on alarm activity. An optional microphone allows users to call in and listen to on-site sounds.

Sensaphone Express II™ monitoring system is ideal for facilities that require many monitoring points or are considering future growth because it is expandable to include up to forty channels. The LCD display shows continuous input status and assists with keypad programming for simple setup.

For information, call 877.373.2700, email contact@sensaphone.com, or visit www.sensaphone.com. ■

HOW LONG BEFORE YOU KNOW SOMETHING IS WRONG?



- Levels
- Vibration
- pH
- Flow
- Temperature
- Dissolved Oxygen
- Turbidity
- Power Failure



MONITORING, DATA LOGGING & ALARMING WITH WIRELESS DATA TRANSMISSION

- **Monitor** up to 64 Modbus registers and 12 digital or analog status conditions
- **Receive** an e-mail, phone call, or text message when an alarm has been detected
- **Program & view** real time status updates online

SENSAPHONE®
REMOTE MONITORING SOLUTIONS

Tel: 877.373.2700
sales@sensaphone.com
www.sensaphone.com

Westerberg & Associates, Corp.

For forty years, W&A has worked to offer quality consulting, training, and products to meet the needs of our customers across the country. Our goal is to provide excellent service—whether through our books, manufactured products, representative products, seminars or speeches, customer satisfaction remains our priority. Nick Westerberg has been in the industrial community for over 40 years teaching, consulting, manufacturing and servicing industrial equipment.

NOW OFFERING

online steam fundamentals at
www.westerbergcourses.com.

DOC'S PUMP JOURNAL

Doc's Pump Journal is the handbook everyone involved with pumping will want to have in their library! This book, with over 700 pages, will make your

pumping life much easier. Doc's Pump Journal includes hydraulic principals, sizing, packing, seals, bearing, foundations, grout, piping, alignments, reliability, pump types, and more... and you don't need a PhD to read it!

DOC'S STEAM JOURNAL

Nothing can replace experience: It is the best, sometimes the hardest, teacher—but the lessons of experience last a lifetime. In Doc's Steam Journal, readers will find over 500 pages of resources to help in a variety of situations, as well as specific information on steam generation, steam traps, manufacturers, installation, assessment, and engineering.

THE ARMADILLO PALM GUIDE™

The W&A Armadillo Palm Guide™ face is one of the toughest "rodents" on the market! They have been known to run over fifteen months with no wear at 6,000

FPM. The Armadillo is so hard that it must be finished with diamond treatments to provide the 16RMS prox. finish.

DATA COLLECTOR POLES

The first Vibration Data Collector Pole that you can safely use to take the vital information you need! Our Data Collector Poles come with a patented spring-loaded pin for quick and easy adjustment, anodized head finish for long lasting service, fiberglass handle for safety, cable management system for easy cable placement, and a bushing kit that allows for the use of different sensor sizes. These poles improve safety and can be fitted for any cable connection. ■

NOW OFFERING

our new triax head assembly option!
www.westerbergassociates.com

W
A

Westerberg & Associates
now offering
STEAM FUNDAMENTALS
ONLINE COURSES!!!

W
A

Westerberg & Associates now offers educational Online Steam Fundamentals training!!!

Steam Basics, Temperature, Velocity, Friction Loss, Cavitation, Steam Traps, Water Hammer and much, much, more!

Course includes a downloadable HANDS-ON WORKBOOK, containing valuable information and charts.
Doc's Steam Journals are also available for purchase, with training.

Contact us for more information!
info@westbergcourses.com



Carver Pump

Since our inception, we've become recognized as one of the leading centrifugal pump companies, building to the most demanding engineering specifications and military standards in the world.

Carver Pump's quality management system is certified by Intertek to conform to ISO 9001:2015. Our commitment to quality includes not only our hardware, but also superior customer service, leading-edge R&D, and continuous improvement in everything we do.

Our specialty is addressing the most challenging performance requirements using advanced design tools: the latest solid modeling software for analyzing structural problems, and exceptional hydraulic design capabilities.

Whether the challenge is pump efficiency, difficult suction conditions, or extreme environments, we'll engineer the best solution to meet your goals for reliability, quality, and performance.

Our product line offers impressive diversity, including horizontal and vertical end suction, multi-stage, axial split case, self-priming, and solids-handling pumps—covering a hydraulic range up to 11,000 gallons per minute and 3,400 feet.

Our pumps are backed by unparalleled support, and our network of stocking distributors, manufacturers' representatives, and certified service centers throughout the world means that no matter where your pump is installed, local sales and service people are ready to support your aftermarket needs. ■

BUILT FOR PURPOSE

We build pumps for handling water, oil, chemicals and slurries for both the public and private sectors. We offer a full industrial product line with horizontal, vertical, single, and multistage pumps. Our pumps are engineered to handle high flows, high pressures, extreme temperatures, aggressive materials and/or entrained solids.



CARVER PUMP™
Built for purpose

LEARN MORE AT
Email: sales@carverpump.com
www.carverpump.com

Cla-Val

Since 1936, Cla-Val has produced the world's highest quality automatic control valves for a diverse array of industries. Cla-Val has continued to strengthen its operational and customer service capabilities around the world by enhancing product lines and building state-of-the-art production facilities and warehouses in Canada, Switzerland, France, the United Kingdom, and New Zealand.

With all our major locations having dedicated training centers, our team of sales personnel and factory authorized sales agents are able to provide exceptional industry expertise throughout the world. Our aggressive research and development programs have resulted in the design and production of technologically advanced electronic and hydraulic control systems that consistently meet the challenges of increasingly complex and diverse applications. ■

CLA-VAL

800.942.6326

info@cla-val.com • www.cla-val.com

Is your database of automatic control valves at your fingertips?



With  **Link2Valves™**
it can be and it's available at no cost!

- Provides valve locations
- Maintenance records
- Important valve information
- Reminders for upcoming service



Check out
the podcast
to learn more

www.cla-val.com



Graphite Metallizing Corporation

GRAPHALLOY® case rings and bushings allow pumps to survive repeated "run-dry" conditions, slow roll operation, and frequent stop/starts—conditions where metal and plastics fail.

GRAPHALLOY can improve the reliability and efficiency of your pumps. In horizontal and vertical pumps, GRAPHALLOY will not seize or gall if run dry or with marginal lubrication. The GRAPHALLOY fitted pump is able to survive upsets, dry running, loss of suction, slow roll on standby, and other transient conditions that would damage a conventionally fitted pump.

GRAPHALLOY can be the solution to the toughest bearing, bushing, thrust washer, cam follower, or pillow block bearing design problem. It is available in over 100 grades with specific properties that meet a wide range of engineering solutions and specifications. FDA acceptable grades of GRAPHALLOY are available for food contact equipment. NSF® International has certified two grades of GRAPHALLOY material for use in municipal well pumps and water treatment plant applications.

Visit us at www.graphalloy.com or call 914.968.8400. ■



Run Dry and Keep on Running

Pumps fitted with GRAPHALLOY® wear parts survive upsets.

- Self-lubricating
- Non-galling
- Won't swell
- Corrosion resistant
- Dimensionally stable
- Improved efficiencies
- -400°F to 1000°F (-240°C to 535°C)




GRAPHITE METALLIZING CORPORATION
Yonkers, NY USA

+1.914.968.8400 • www.GRAPHALLOY.com

P2

Griffco Valve, Inc.

ACCESSORIES FOR HIGH PRESSURE PUMPING SYSTEMS

As part of its comprehensive line of chem-feed accessories, Griffco offers high pressure models including pressure relief valves, pulsation dampeners, inlet (suction) stabilizers, and injection valves and quills.

Pressure relief valves are rated to 4000 psi and have a range of 700 to 1,200 gallons per hour for pulsating flow and 35 to 60 gallons per minute for continuous flow. Pulsation dampeners and inlet stabilizers have a pressure range from 0 to 1250 psi. IVQ injection valves and quills feature a check valve to reach a maximum rating of 3500 psi.

These high-pressure accessories are available in 316L STAINLESS STEEL (316 for valves/quills), Alloy 20, and Hastelloy C materials of construction. Pressure relief valves are also available in Titanium. ■

GRIFFCO VALVE, INC.
800.GRIFFCO (474.3326)
www.griffcovalve.com



Reliable Chemical Pump Accessories



- Complete your fluid handling system with robust, high-quality accessories designed to enhance performance and safety.
- Single source for back pressure and pressure relief valves, pulsation dampeners, calibration columns, corporation stops, injection quills, gauge guards, strainers, and more.

Ask about our Quick Turnaround Advantage



Griffco Valve, Inc.

1-800-GRIFFCO
sales@griffcovalve.com
www.GriffcoValve.com

ISO CERTIFIED • MADE IN USA

Sun-Star Electric, Inc.

Sun-Star Electric, Inc. is a Texas corporation established in 1977 and is the principal worldwide distributor for Hitachi submersible motors.

Sun-Star Electric, Inc. designs and manufactures its own Sun-Star branded oil-filled and wet-wound submersible motors for standard and special applications along with the deep-ocean-capable Aqua Star motor.

Sun-Star Electric is an expert for rapid service and repair of the power generation industry's critical, high-pressure water-filled boiler water circulating pump motors.

Sun-Star Electric, Inc. maintains a 75,000-square-foot manufacturing facility, which is fully equipped for the manufacturing and repair of submersible electric motors and includes full fabrication, machining, winding, and in-house testing capabilities. In 2011, SunStar Electric, Inc. transitioned to an employee-owned company (ESOP). ■



SUN-STAR ELECTRIC, INC.

7722 W. 34TH STREET
LUBBOCK, TEXAS 79407
SUNSTARUSA.COM

PHONE: 806.793.2812
800.782.9675
FAX: 806.793.1989



**CUSTOMIZED
SUBMERSIBLE MOTORS**

Sun-Star Electric, Inc.
is the worldwide distributor for Hitachi submersible motors. We are also fully equipped to design and manufacture a custom submersible motor for your specific project. Sun-Star's signature line of oil and water filled motors are built to meet your exact requirements. Put our 40+ years of experience to work on your next submersible motor project.

Sun-Star Electric, Inc. 888-SUN-STAR/800-782-9675
sales@sunstarusa.com www.sunstarusa.com



Onyx Pinch Valves

Onyx model DEC.
Full Round, Full-Port, Dual Pinch.

Used throughout the world for waste water, sludge, mining, pH control, biogas, dry bulk conveying.

1/2" to 30"
Hand wheel, electric, or pneumatic actuators.

Armadillo Tough



ONYX VALVE CO

www.onyxvalve.com tel: 856-829-2888

Another Vanton AdVantage

Verified Performance

Our thermoplastic pumps have to live up to everything you specify, before they get to become your pumps.

At Vanton, we take pride in our products. That's why every pump that leaves our plant does so only after undergoing rigorous performance testing to ensure they will meet every aspect of your stated requirements. Not every other pump, not every tenth pump, but every single pump we manufacture is subjected to these performance tests to verify it will deliver everything you need and expect.

No small print, no hidden clauses, no excuses...ever!

That's why when you need a pump that performs, think Vanton. You'll sleep better at night.

VANTON

PUMP & EQUIPMENT CORPORATION

vanton.com

**VANTON
VERIFIED**



Sump-Gard®
Vertical Centrifugal
Pumps



Pump/Tank
Non-metallic
Systems



Chem-Gard®
Horizontal Centrifugal
Pumps



Flex-I-Liner®
Rotary Peristaltic
Pumps

SINGER®

a MUELLER brand

Zero Compromise

The **Singer® Pressure Reducing Valve** with integral back up (PR-SM) is two valves in one. With a secondary independent valve chamber and pilot system, it keeps on working without any interruptions if the primary system fails. It's the only control valve that accepts zero compromise.



To discover more advantages, visit us at singervalue.com, or contact us at singer@muellerwp.com or 833-367-6835.

MUELLER

MUELLER® | ECHOLOGICS® | HYDRO GATE® | HYDRO-GUARD® | HYMAX® | i20® | JONES® | KRAUSZ® | MI.NET® | MILLIKEN® | PRATT® | PRATT INDUSTRIAL® | SINGER® | U.S. PIPE VALVE & HYDRANT

Copyright © 2021 Mueller SV, Ltd. All Rights Reserved. The trademarks, logos and service marks displayed in this document herein are the property of Mueller SV, Ltd., its affiliates or other third parties.