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A NOTE ON THIS ISSUE:

Welcome to this month's issue of MPT! In our Case Studies section this month, Mike Uthe of Mueller Water Products, sounds the alarm for choosing the right valves for municipal water flow fluctuations. (pg. 10). Without proper pressure management, high-pressure incidents can occur when pumps are turning on or off or when a valve suddenly closes, causing costly damage by sending water hammer back through the entire system.

In our Maintenance & Reliability section, Sensaphone's Rob Fusco lays out five benefits of wireless temperature monitoring systems (pg. 20). Ensuring optimal temperatures is paramount for many industries, so a wireless temperature monitoring system offers an efficient and advanced solution.

Lastly, in our Sealing Solutions section, Chandrakant Isi, of Protolabs Network, counts down seven tips to help you reduce the cost of your injection molding projects (pg. 32). As you'll see, the old adage of not "cutting corners" may not apply when it comes to this technology. Enjoy!



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Modern Pumping Today®

WWW.MPTMAG.COM

3100 Lorna Rd., Ste 101
Birmingham, AL 35216

J. CAMPBELL VP of Editorial

jay@mptmag.com

JEFF FLETCHER Publisher

jeff@mptmag.com

TIM O'HARA Associate Publisher

tim@mwsamag.com

KEVIN McCLARAN Media Consultant

kevin@mptmag.com

MIKE BARKER Media Consultant

mike@mcsamag.com

LISA AVERY Art Director

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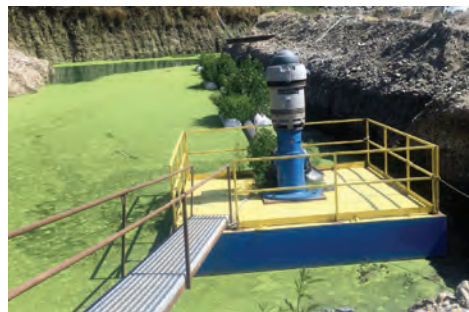
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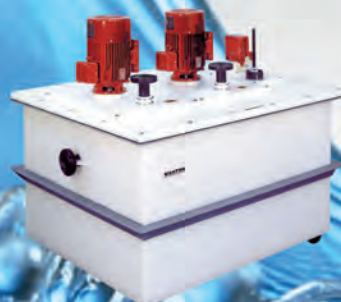


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SKF SECURES 100 PERCENT RENEWABLE ELECTRICITY

SKF has reached a significant sustainability milestone by entering two Renewable Energy Certificate (REC) purchase agreements in North America. This will enable SKF factories and facilities in the United States and Canada to achieve 100 percent renewable electricity. The first agreement focuses on investing in Green-e certified wind energy. This partnership will span through 2025, reinforcing SKF's commitment to supporting renewable energy sources. The second is a twelve-year agreement, starting in 2026, signed with Clearway Energy Group (Clearway) for a portion of the RECs generated from a 452 MW solar farm currently under construction in Kent County, Texas.

The agreement with Clearway is SKF's first long-term REC procurement at scale in the United States. This will enable SKF to effectively address 100 percent of its annual electricity consumption in its U.S. and Canadian facilities with renewable electricity. It will also help SKF make significant strides towards its aim to decarbonize the group's operations by 2030 and become net zero throughout the value chain by 2050. The agreements are part of SKF's broader sustainability agenda to reduce energy consumption, increase renewable energy use, and minimize environmental impact.

ALTITUDE AND NUE COMBINE ON RENEWABLE ENERGY PLAN

Altitude Water, a privately owned U.S.-based manufacturer of atmospheric water generators (AWGs), and New Use Energy Solutions (NUE), a Phoenix-based manufacturer of mobile solar solutions, have partnered to provide integrated, mobile solar-plus-water generation systems producing sustainable electricity and clean drinking water anytime, anywhere.

"Since entering the water space fourteen years ago, it's been Altitude's goal to utilize solar power to provide a quiet, clean, fume free, low carbon emissions solution to meet growing needs for clean water in communities affected by disasters or in remote locations," states Altitude Water's COO Jeffrey Szur.

Both Altitude Water and NUE have a deep track record supporting community resilience projects in remote development and disaster response scenarios across the U.S. Gulf Coast, Sub-Saharan Africa, and in post-wildfire Maui. Their relationship grew from an initial connection when Altitude Water visited Maui in fall of 2023 to build a disaster relief trailer for Noah's Arc Foundation.

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IT'S PERSONAL

SEWER AND STORM SURVEILLANCE BRINGS IN AI TECHNOLOGY

Infinitii AI Inc. has signed a technology professional services and go-to-market agreement with TREKK Design Group to integrate PreView, TREKK's patented sewer and storm surveillance monitoring system with Infinitii Flowworks, a powerful predictive analytics software suite that performs real-time analysis, checks flow monitoring status and sets alarms through a single interface.

"TREKK's reputation is rooted in a commitment to innovation, and we are delighted that more municipal and industrial infrastructure customers in the United States will be using Infinitii Flowworks through this partnership," says Jean Charles Phaneuf, CEO of Infinitii AI.

This strategic integration with Infinitii AI will allow TREKK's customers to see PreView images as they are produced in near real time alongside sensor data in the Infinitii Flowworks time-series viewer. The combination of images and sensor data allows users to better understand the impact of storm events on wastewater infrastructure.

"Infinitii AI's leadership in predictive analytics, demonstrated success with Infinitii Flowworks in major U.S. cities and counties, and its robust data services platform were key points in our decision," says Kimberly Robinett, TREKK's CEO and managing partner.

CENTREX RECEIVES \$3.8 MILLION FOR INDUSTRIAL SERVICES PROJECTS

Centrex Inc., an advanced security technology and industrial services company, announces it has received \$3.8 million in new orders through its Advanced Industrial Services (AIS) subsidiary for two projects, including a \$2.2 million order for a geothermal system update for a Northeastern school district, and a \$1.6 million order for the fabrication of a key component for a motion control technologies company.

The school district project includes, but is not limited to, replacing the geothermal loop system pump and drives, geothermal heat pumps, geothermal piping and valves, heat recovery units, exhaust fans, ductwork, and control systems. Work will be completed in August 2024.

For the motion control technologies company fabrication order, AIS will manufacture a key component to the system that the company is delivering. The project is the second installment of this work and will commence in the first quarter of 2024, with production ending by October 2024.

"With its expanded capabilities, AIS continues to build profitable revenue growth with additional wins in new government and industrial verticals," says Saagar Govil, chair and CEO of Centrex. ■

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THE RIGHT VALVE MAKES ALL THE DIFFERENCE

Water utility manages flow fluctuations with single rolling diaphragm valves

BY MIKE UTHE, MUELLER WATER PRODUCTS

It's not unusual for water utilities to expand infrastructure to address predictable population growth, but there are more factors today that are causing unexpected population changes. Many people have moved as a result of switching to working from home due to the global pandemic, and with more extreme weather events, communities can quickly shrink and conversely, rapidly expand.

When this happens, water operators are often faced with new peak and off-peak periods, and demand for water can change quickly, making it more challenging to control a water distribution system's pressure.

Without proper pressure management, high-pressure incidents can occur when pumps are turning on or off or when a valve suddenly closes, sending water hammer back

through a piping system. Having the right valves to manage large fluctuations in water flow is one way that utilities can balance erratic flows and stay ahead of evolving community demands.

UPGRADING PRV STATIONS TO BALANCE SYSTEM PRESSURE

A West Coast utility decided to change all the pressure reducing valves (PRVs) in their water distribution system that was predominantly monitored and controlled based on flow demands. With numerous line connections and pressure zones, coupled with a growing population, the fluctuating demand was putting unnecessary over pressure on the distribution system. One of the problems that needed addressing was when a downstream high-pressure event occurred, the seat of the main valve of the old flat diaphragm valves would chatter. This wear and tear resulted in the need for more maintenance to monitor and replace the valve seats in order to avoid a valve failure.

The five-year PRV upgrade was designed to address the fluctuations and ensure redundant pressure and flow control through SCADA automation. By moving to Singer® PRVs with redundant pressure control (PR-SM) and single rolling diaphragm technology, the new system was designed to provide smooth, steady, and precise pressure control from



maximum to virtually zero flow, without the need for low-flow bypass valves.

The effective area of the single rolling diaphragm remains constant, so the bonnet is much smaller and lighter than a flat diaphragm version. A measured quantity of water in the bonnet control chamber always gives the same smooth movement of the inner valve (diaphragm assembly) through the entire stroke. By eliminating the seat chatter at low flows, the SRD avoids injecting small pressure pulses into the piping, which, over time, may increase leakage, losses, or pipe bursts. Eliminating the seat chatter with the single rolling diaphragm technology means the new Singer valves are much quieter.

MAINTAINING PRESSURE WITH REDUNDANT BACKUP

The new valves were fitted with electronic primary control with a hydraulic pressure reducing back-

up on the loss of power, or failure of the pilot system. Typically, the city pulsed solenoids based on a flow meter to provide a constant flow rate from each PRV. The hydraulic pilot and secondary chamber operate independently of the main electronic control chamber so that if there is a failure, it can override the main valve body and maintain downstream pressures. In the event of a failure, there is now also a limit switch on top of the valve that sends an alarm to the city, so they know that they are running in backup mode. The new backup system was engineered to be used anywhere that valve failure is unacceptable.

ADDING INLINE FLOW METERS TO CONTROL VALVES VIA SCADA

Sites that did not have inline flow meters were fitted with the Singer SPI-MV, a Single Point Insertion electromagnetic flow meter that provides accurate flow data within

2 percent of actual reading. These flow sensors come pre-calibrated from McCrometer's NIST traceable calibration lab, so they require no recalibration in the field. With a single-piece design and no moving parts, the electromagnetic sensor contains nothing to wear or break, and is generally immune to clogging by debris. The SPI-MV can also tie back into the existing SCADA system for complete flow-based valve control.

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SPECIFICATIONS TO MEET INDIVIDUAL NEEDS

Each valve replacement was uniquely specified. Depending on the consequence of failure, the redundant valve body was either selected or not. If power was available in the vault, the city was also able to add transmitters to the pilotry and valve stem so that the percentage open was available through SCADA along with real-time pressures and flows. The redundant valve body was also provided with a limit switch on a battery power supply so that the city can now receive an alarm as soon as there is a main chamber failure.

CONCLUSION

Managing fluctuations in water pressure, regardless of the cause, allows utilities to provide the right amount of water when it is needed. Optimizing the hydraulic integrity of a water distribution system is also one of the most beneficial ways to extend the life of assets. With less maintenance required on the new PRVs and less possibility for failure, the city is confident it can continue to supply a steady flow of water, regardless of fluctuating demand and evolving size of the population. ■

MIKE UTHE is the Northwest manager for Mueller's technology division. Mueller Water Products is a leading manufacturer and marketer of products and services used in the transmission, distribution, and measurement of water in North America. The company's broad product and service portfolio includes engineered valves, fire hydrants, metering products and systems, leak detection, and pipe condition assessment. It helps municipalities increase operational efficiencies, improve customer service, and prioritize capital spending, demonstrating why Mueller Water Products is "Where Intelligence Meets Infrastructure." For more information, visit www.muellerwaterproducts.com.

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HIGH-EFFICIENCY SURFACE WATER PUMPING SYSTEM

Reducing energy consumption by 25 percent for an Oregon aggregates mine

BY JAMES DELOACH, XYLEM



PROJECT SUMMARY

PROJECT HIGHLIGHTS:

- Design and installation of a holistic, turn-key solution including vertical turbine pumps, a floating barge, and a robust suction screen
- Supporting enhanced site safety by removing the need for a crane and crew to perform regular maintenance

SOLUTIONS:

- Goulds Water Technology 18LHC Line Shaft Vertical Turbine Pump
- Equipped with 400-horsepower motor
- Customized robust suction screen
- Xylem engineered and fabricated floating barge for the pumps

CUSTOMER BENEFITS:

- Energy savings of 25 percent
- A flexible, reliable, and high-efficiency pumping solution that is configurable to current and future pit depths
- Enhanced operational efficiency and reliability

Delta Sand and Gravel Co., located in Eugene, Oregon, has been providing quality aggregate materials, service and expertise for almost nine decades. The company offers a full line of aggregate products for year-round, all-weather construction and demolition landfill. Xylem has

in place for many years, were inefficient, and experienced frequent maintenance issues.

The in-rush current at startup was also problematic, adding to maintenance problems and risking surges that could impact the surrounding power grid. Repairs on the pumps were costly and

“Delta needed a robust, efficient, and flexible pumping solution... and they turned to us again to solve this latest challenge.”

—GOULDS WATER TECHNOLOGY REPRESENTATIVE ON-SITE

partnered with Delta Sand and Gravel for over a decade to provide holistic water management solutions.

TAKING ON A CHALLENGE

Delta Sand and Gravel has a central collection pit to handle all surface water from across its operations. The surface water is pumped to a series of five settling ponds before being safely discharged into the environment or re-used on-site. The three permanently-installed pumps, which had been

cumbersome, with a crane required to lift the pumps out of the pit. In addition, parts were becoming difficult to source, due to the age of the pumps.

With plans to increase the depth of the pit by 100 feet in the coming years, Delta needed a robust, efficient and flexible pumping solution. The company had rented Dri-Prime diesel-driven and submersible pumps from Xylem previously, and they turned to us again to solve this latest challenge.



THE GOULDS SOLUTION

Enhancing pumping efficiency and resiliency at this sand and gravel operation was a top priority. One of the permanently-installed pumps in the collection pit runs 24/7, with all three pumps running simultaneously at certain times of the year when rainfall is high. Xylem recommended a turn-key solution, incorporating its Goulds Water Technology vertical turbine pumps as a highly efficient, reliable, and easy-to-operate solution.

The pumps are equipped with variable frequency drives (VFDs) to optimize energy consumption, while a soft start controller facilitates a slow

ramp up and addresses the large in-rush current issue. Add to this the flexibility of the pump model, which means the pumps will continue to operate at best efficiency point (BEP), even when the pit is lowered by 100 feet in the coming years.

A ROBUST RESULT

Xylem's turn-key solution includes pumps, a floating barge, and a robust suction screen—a comprehensive solution from a single provider to support the mine's needs today and tomorrow. In addition to the first pump system, two new pumps are due to be operational ahead of the rainy season in fall. The robust, reliable solution resulted in a savings in energy consumption of 25 percent, compared to the old system.

The low-maintenance pump model will enhance safety at the plant, reducing the need to bring a crane and crew on-site when repairs are required, and will cut costs significantly as a result. The mine

operators also have the peace of mind that the pump can be configured for optimal efficiency when they lower the pit in the future. ■

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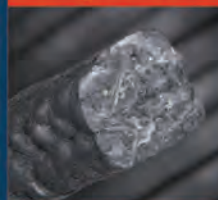


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IMPROVING POWER PLANT PERFORMANCE WITH A MODERN CALIBRATION PROCESS

How to overcome the limits of legacy systems and meet today's challenges Part 2 of 2

BY MONA-LISA GRANNAS, BEAMEX

KEY TAKEAWAY #1

The most important reasons to implement a modern calibration process are to improve calibration efficiency, save costs, obtain higher quality calibrations, and be compliant with related regulations.

Last month, we began this series by describing some of the most common reasons to implement a modern calibration process in power plants and the typical issues of an outdated calibration process. Now, we'd like to go over the most important reasons to implement a modern calibration and address the typical challenges faced by today's power plants as they seek to bring their calibration process into the future.

WHAT IS A MODERN CALIBRATION PROCESS?

If we look at the most modern calibration processes available today, we can find the following key components: First, the management, monitoring and scheduling of all calibrations is automated with the help of dedicated calibration management software. The calibration management software can be linked to the CMMS for a fully automated and paperless flow of work orders.

KEY TAKEAWAY #2

Reducing the measurement uncertainty (with high-accuracy calibrators) in a nuclear power plant can potentially increase electricity production up to nearly 2 percent.

The calibration management software also communicates with portable documenting process calibrators, meaning that the work orders can be downloaded directly into the calibrators with all the required instructions for the technicians to go into the field.

During calibration, an intelligent calibrator performs an automatic pass/fail calculation, complicated calculations do not have to be performed. Also, the results will be stored in the calibrator's memory, and can be directly uploaded to the calibration management software.

Finally, the calibration management software can automatically send an update to the maintenance management software that the work has been completed. As such, the whole process is fully paperless and more can be done with fewer resources as the process is highly automated, thus reducing costs and improving the quality of calibration data. A modern calibration process is also far more efficient, allowing more calibrations to be performed in the limited time during an outage.

HOW TO IMPLEMENT A NEW CALIBRATION PROCESS

The most important reasons to implement a modern calibration process are to improve calibration efficiency, save costs, obtain higher quality calibrations and be compliant with related regulations. But how can a new calibration process be implemented? Briefly, here are a few words on implementing a new calibration process:

First, it is vital to remember that implementing a new calibration process is a process itself, with many interrelated tasks that need to be performed in the appropriate sequence. A proven project supply implementation model is recommended, managed

by a dedicated project manager and supported by experts in the subject matter. Without a proven implementation model, typical risks of implementing a new process are usually encountered, such as unclear expectations, budget and schedule overruns,



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THE CLEAR ADVANTAGE

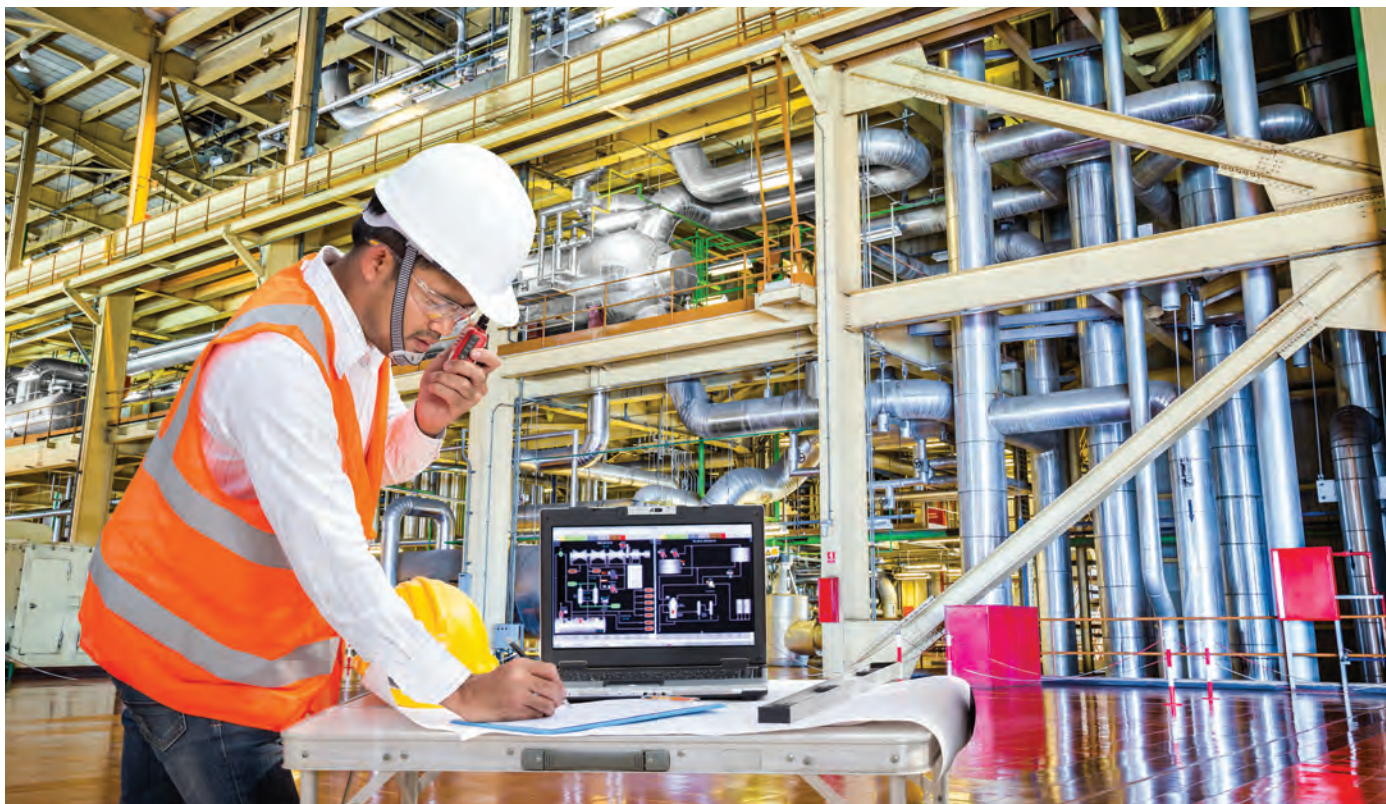
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scope creep, and a lack of expected benefits.

Although implementing a new calibration process is far smaller in scope than implementing, for example, a new ERP system, there are still many similarities. The implementation should start with establishing the project framework in order to have a common understanding of the project targets, specify the roles of the parties in the project team and steering group, establish management rules, determine testing and acceptance criteria.

This blueprinting process is an important phase where the documentation of the current process (as it is) and the target process (how it should be). During specification, you will need to document all the relevant requirements and make sure all parties have a common understanding. If all previous steps have been performed correctly, the next phase is the actual execution according to plans.

Finally, the new process is put to use with secure support when in production use. Using a supplier that

has a proven implementation model and which can take responsibility for the required actions is recommended.

CASE STUDY: INCREASING ANNUAL PRODUCTION WITH HIGH-ACCURACY CALIBRATORS

In the Central Nuclear de Almaraz (CNA) plant in Spain, an enhanced calibration system with high-accuracy calibration equipment makes it possible to perform calibration operations with better uncertainty levels, thus enabling us to improve production results. This was achieved by using the Beamex MC6 high-accuracy multifunction calibrators in the power plant.

By improving the parameter measurement from 2 to 0.4 percent (parameters associated to determining reactor power), enabled power in each unit to be increased by 1.6 percent. This has a very significant effect on annual production.

SUMMARY

In conclusion, modern state-of-the-art calibration process can help a

power plant to improve the plant performance and efficiency, ensure safety and emissions control, and improve accuracy of invoicing related measurements. Making the calibration work more effective, automated, and paperless saves calibration related efforts and costs as well as improves the quality of calibration and regulation compliance. ■

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MONITORING WHERE YOU NEED IT

Five benefits of wireless temperature monitoring systems

BY ROB FUSCO, SENSAPHONE



Ensuring optimal temperatures is paramount for many industries, from healthcare to food processing. It can help companies safeguard employees and comply with regulations. A wireless temperature monitoring system offers an efficient and advanced solution.

KEY TEMPERATURE REGULATIONS ACROSS INDUSTRIES

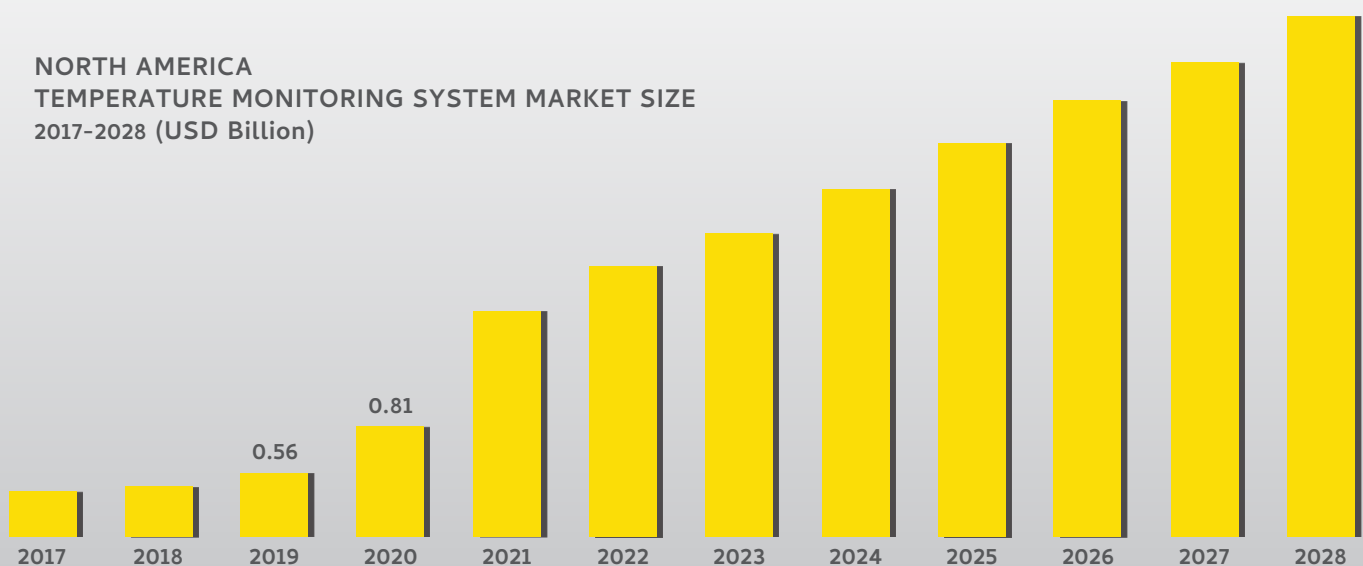
HEALTHCARE

Medications require storage between 59 to 77 degrees Fahrenheit (15 to 25 degrees Celsius). Blood bank storage requires temperatures from 95 to 122 degrees Fahrenheit (35 to 50 degrees Celsius).

PRODUCTION FACILITIES AND COMPUTER ROOMS

Specific areas must be maintained at much cooler temperatures than other parts of a facility to prevent equipment overheating that can damage computer components. ASHRAE recommends 64.4 to 80.6 degrees Fahrenheit (18 to 27 degrees Celsius) or A1 to A4 class hardware.

**NORTH AMERICA
TEMPERATURE MONITORING SYSTEM MARKET SIZE
2017-2028 (USD Billion)**



FOOD PROCESSING

The USDA demands precise temperatures for stored foods. Dry grains should be stored at temperatures of 50 degrees Fahrenheit (10 degrees Celsius), refrigerated foods between 32 to 40 degrees Fahrenheit (0 to 4 degrees Celsius) and frozen foods at 0 degrees Fahrenheit (-17 degrees Celsius)

THE INADEQUACY OF MANUAL TEMPERATURE TRACKING

Manual temperature tracking is not only time-intensive but also error-prone. Temperature discrepancies can result in product corruption or halted operations since they can take hours to identify.

And what happens if temperatures rise in a computer room or storage area after hours? Most likely, spoilage or equipment failures that result in thousands of dollars in lost revenue.

The answer? A wireless temperature monitoring system.

HOW WIRELESS TEMPERATURE MONITORING SYSTEMS EXCEL

These systems, compared to outdated manual methods, harness advanced technology to streamline and automate temperature management. They can be utilized in facilities or within transportation fleets holding chilled products.

Their rising popularity is evident in the growth from \$2.19 billion in 2021 to a projected \$4.71 billion by 2028, per Fortune Business Insights.

WHY OPT FOR WIRELESS TEMPERATURE MONITORING SYSTEMS?

More companies are installing wireless temperature monitoring systems based on the many benefits derived from it. Here are five:

REAL-TIME MONITORING

Facilitates 24/7 real-time tracking, regulation, and control, even remotely via smart devices. A remote

temperature monitoring system streamlines operations by enabling operators to easily track, control, and regulate temperatures in different environments simultaneously in real-time on a 24/7 basis without even entering the facility.

Information is accessible from a control room or in the field from smart devices so personnel don't have to be in the immediate vicinity to gather readings.

CONFIGURABLE ALERTS

Instant alerts for specific temperature thresholds to preemptively address changes. Systems are configurable to send an alarm when temperatures reach a specific threshold.

Assigned personnel automatically receive alerts to take immediate action. Even a slight change in temperature will prompt an alert that gives enough time to make corrections or identify any equipment failures that may contribute to varying temperature levels.



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DATA LOGGING

Oversee temperatures over durations for compliance and quality control. Analyze data for system reliability. Companies can monitor temperatures over time for compliance reporting or to gain a better understanding of what temperatures products have experienced over time to make informed decisions about quality control. Analytic reports also

provide information on spikes, anomalies, and failures to evaluate the reliability of a refrigerator, HVAC, or other system that serves to cool the environment.

CONVENIENT INSTALLATION

Compared to hard-wired systems, wireless systems are easier to install and more adaptable. A wireless temperature monitoring system simplifies operations over hard-wired installations as it eliminates the need run cables from sensors and the remote monitoring system. In addition, cables may present tripping hazards in a facility or require building modifications to run them through walls, floors, and ceilings. Hardwired systems also may not be feasible in monitoring different assets in large-scale environments such as greenhouses. Installation of wireless systems also may be cheaper and faster.

WIRELESS TEMPERATURE MONITORING PRODUCTS

The Sensaphone WSG30 is an efficient wireless system, especially tailored for monitoring refrigerators and freezers housing valuable items like vaccines. It can support up to thirty wireless sensors and alert up to thirty individuals about any irregularities.

Also, the Sentinel PRO Monitoring System with Cellular Modem is a cloud-integrated option ideal for locations without a conventional internet connection. It offers cloud

storage for sensor readings, ensuring data protection, and infinite storage capacity.

The cloud-based Sentinel allows you to monitor remote facilities and environments. Users can check the status of critical equipment with the same degree of certainty as if you were at the device.

Sentinel's mobile app offers immediate access to your readings. Monitor your environment from anywhere using a simple, powerful web-based interface and mobile app. If there's a disruption, you'll be the first to know. Alerts can be sent straight to your mobile device—keeping you updated and giving you peace of mind wherever you are. ■

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.

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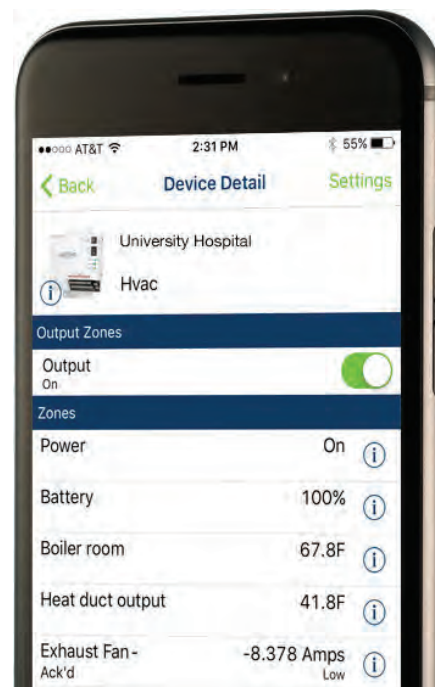
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WHEN TO USE A GEAR PUMP

Positive displacement offers efficient viscous fluid handling

BY CALLE DANIELSSON,
UNIBLOC HYGIENIC
TECHNOLOGIES



Gear pumps, like this pump from Unibloc Hygienic Technologies, use interlocking gears to deliver pulsation-free flow.

Highly viscous substances demand robust equipment up to the task of proper handling during processing. No matter which industry, viscous media from peanut butter to polymers dictate the characteristics required of a pump properly engineered to transfer them from one processing step to the next in a productive and timely manner.

Add to that wish list a pump that supplies durable performance, decreases downtime, minimizes maintenance, and gives a long service life that keeps capital expenditures under control.

A gear pump can fulfill this wish list of specifications and is one viable option among pump styles to transport high-viscosity fluids in manufacturing operations.

Engineered design modifications and simplified disassembly have made gear pumps suitable for hygienic applications, expanding their popularity in the food processing and pharmaceutical industry. A quick examination of the general features of a gear pump can help determine if this style pump can address your fluid handling requirements.

HOW DOES A GEAR PUMP WORK?

A gear pump is a positive displacement pump with a compact design that uses two gears positioned inside a pump housing. As the driving gear rotates, it draws fluid into the inlet port and carries it around the outside of the gear teeth to the outlet port. The gear teeth mesh,

creating a seal between the inlet and outlet ports.

Flow rate is determined by gear speed. Temperature can impact pump performance. Gear pumps are ideal for applications that need consistent or measured fluid flow.

THE ADVANTAGES OF GEAR PUMPS

PRECISE METERING CAPABILITIES

Some gear pumps are compatible with servo motor-driven filling equipment, resulting in a pump that offers flow rates with precise metering. The gears transfer materials mechanically in a smooth, pulse-free flow using interlocking and rotating cogs or gears. This clockwork-style gear action aids

in the accurate metering of a fixed volume of fluids.

The more compact the design and the shorter the shafts, the better the gear pump's ability to eliminate deflection at high pressure. This particular design aids pump efficiency, flow rates and durability. When comparing gear pumps for sanitary purposes, look for close tolerances for the pump's gear clearance.

Tight tolerances allow the pump's intake suction and the interlocking gear action to prevent slippage. The greater the slip, the more likely fluids can leak back into the inlet. Close tolerances promote tightly controlled fluid movement and more precise metering.

PUMP HIGH-VISCOSITY FLUIDS

The gear pump design handles products with high viscosity or centipoise—up to 100,000 centipoises in some cases—and works best with materials that have some degree

of lubricity, such as fats, oils, and glycerin, but also polymers, paints, chemicals, and petroleum products.

MAINTAIN PRODUCT INTEGRITY

Gear pumps mitigate shear stress and degradation by exerting low shear forces on the fluids being transferred. The close tolerances between the gears minimizes agitation to preserve product integrity and quality.

WHEN TO SELECT A GEAR PUMP INSTEAD OF A LOBE STYLE OR AODD PUMP

A scenario that would call for a gear pump instead of an air-operated double diaphragm (AODD) pump is when precise and consistent flow rates are critical. The gear pump design allows for accuracy and uniformity when pumping fluids, such as a filling operation that requires precise volumetric control. Gear pumps are ideal for applications such as precise dosing or metering of fluids.

In contrast, AODD pumps, while extremely versatile and capable of handling a wide range of fluids, may exhibit variations in flow rates due to their reciprocating diaphragm action.

The same reasoning applies to lobe pumps. Lobe pumps feature a different gear configuration and can be classified as a sanitary pump also. However, lobe pumps are equipped with a bigger cavity than gear pumps, leaving them unable to accurately meter process fluid.

In addition, a gear pump presents a more economical choice compared to a similarly sized lobe pump. In filling operations for example, a gear pump might cost approximately half that of a similarly sized lobe pump.

WHEN NOT TO SELECT A GEAR PUMP

Gear pumps are not recommended for abrasive substances, which can damage or wear down the meshing gears within the pump. In addition, while gear pumps work well for





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A gear pump with a clean or simplified design makes maintenance much easier for sanitary operations.

metering and precision filling, their design and primary action does not fit within operations with large bulk flow rates.

When a processing situation requires clean-in-place (CIP) operations, a lobe pump might make a better choice than a gear pump. A gear pump is designed for clean out of place (COP) processes, but the higher temperatures required for CIP can cause swelling of the Teflon-based gear in a 3A sanitary gear pump.

MAINTENANCE CONSIDERATIONS FOR GEAR PUMPS

Maintenance is a necessary “evil” that costs companies time and money and often requires skilled labor. Each maintenance cycle represents downtime or lost production. In addition, skilled laborers are scarce in many industries. The less time and complex pump maintenance requires or specialized tools and equipment, the better.

Gear pumps do need to be disassembled to be cleaned.

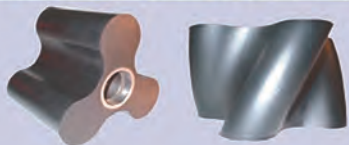
While generally easy to maintain, this process of taking it apart and subsequent reassembly can be challenging. Highly viscous products can cake and collect inside, particularly near the bushings.

A gear pump with a clean or simplified design makes maintenance much easier for sanitary operations. This style will feature:

- One-way assembly to ensure accuracy and mitigate damage
- Easy disassembly in a minimal time period using ordinary tools
- A pump body milled from a single piece of stainless steel
- A design that eliminates front supports for a flush front cover for easier cleaning
- Fully polished TIG welding to eliminate visible welds on the pump

When in doubt, talk to a trusted contact at a reputable pump manufacturing firm to help narrow the possibilities. It helps to find a company that has a diverse product line to pinpoint the pump style that will supply the features required. Optimize efficiencies and recoup initial costs by choosing the best pump style for your operations. ■

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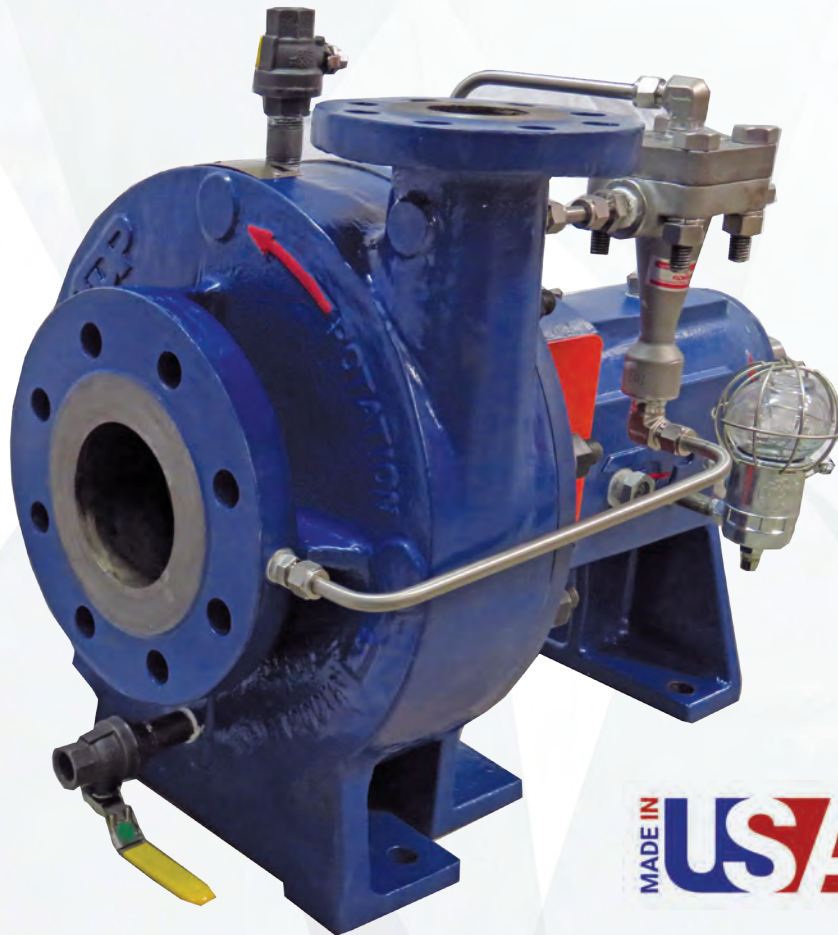


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NEW SUBMERGED HPUS INCREASE RELIABILITY OF ALL HYDRAULIC POWERED MACHINERY

Innovative, patented design places motor and gear pump in the oil reservoir

BY DEL WILLIAMS

For a variety of heavy machinery, Hydraulic Power Units (HPUs) provide the “muscle” behind critical operating machinery used to lift or control articulating arms as well as dig, hammer, pound, and compact. Similarly, HPUs are critical for operating industrial machinery such as tilt trailers, lifts, jacks, lift gates, boat lifts, dock locks, compactors, and cranes. However, frequent exposure to moisture from weather, washdowns, worksites, and roadways as well as humidity and other corrosion-causing factors can wreak havoc on the hydraulic component parts.

IMPROVING THE DESIGN

For decades, there has been little variation in the basic component configuration of HPUs, which convert electrical power to hydraulic energy. Highly complex hydraulic systems consist of many components including manifolds, directional valves, heat exchangers, pressure gauges, and the system's motor and pump, which are mounted to the top of the oil reservoir. Additional components such as filters, pressure gauges, and heat exchangers may also be needed to meet application requirements.

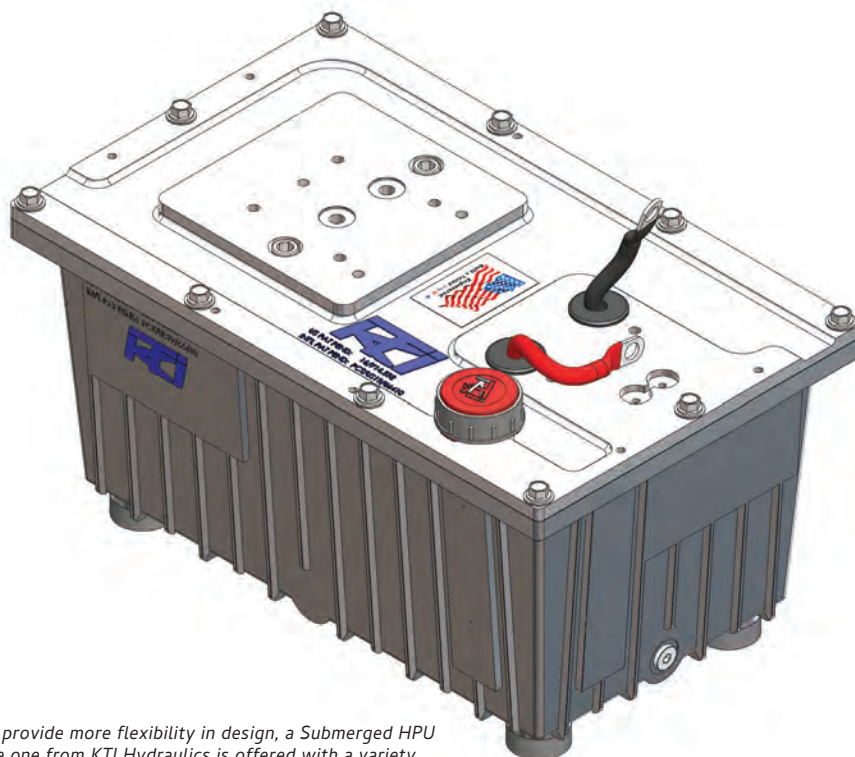
While the design is technically sufficient, OEMs have long sought

ways to improve the overall reliability of hydraulic systems that must operate in inhospitable, moisture-laden environments. One challenge is that high-value components like the motor and pump are also the most likely to require repair or replacement in many cases. Yet current HPU design involves

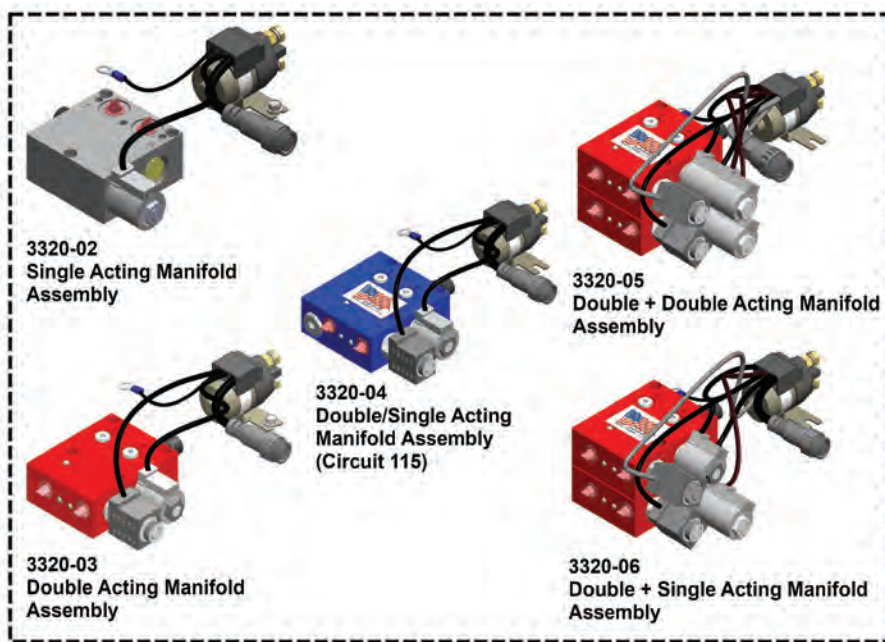
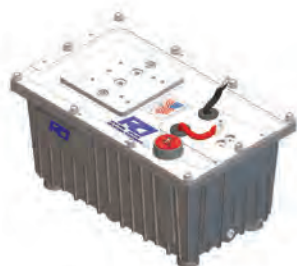
mounting the motor and pump to the reservoir, which exposes the components to the environment and potential corrosion damage.

INCREASING RELIABILITY

Even if the HPU is in a toolbox with the vehicle battery, it is regularly exposed to moisture from various



To provide more flexibility in design, a Submerged HPU like one from KTl Hydraulics is offered with a variety of common and customizable hydraulic circuits.



The Submerged HPU allows the OEM to change the manifold to work with a multitude of different standard or custom circuits.

sources. Accelerated corrosion only leads to premature service, repair, and replacement.

Since critical equipment and machinery cannot function without a sound hydraulic system, downtime and lost revenue can result as well. When this occurs, OEMs receive service calls and complaints from customers that are having problems with the unit. This can reflect poorly on the brand, lead to negative online reviews, and even a loss of future sales.

In addition, while not a concern in all applications, smaller, more compact HPUs are generally preferred where space is limited.

To significantly increase HPU reliability and provide greater design flexibility, a leading hydraulic parts manufacturer, KTI Hydraulics Inc., redesigned these vital components to create the industry's first "Submerged DC HPU." Founded in 1998, the Santa Ana, California-based company provides Hydraulic Power Units and components for use in commercial and industrial hydraulic equipment.

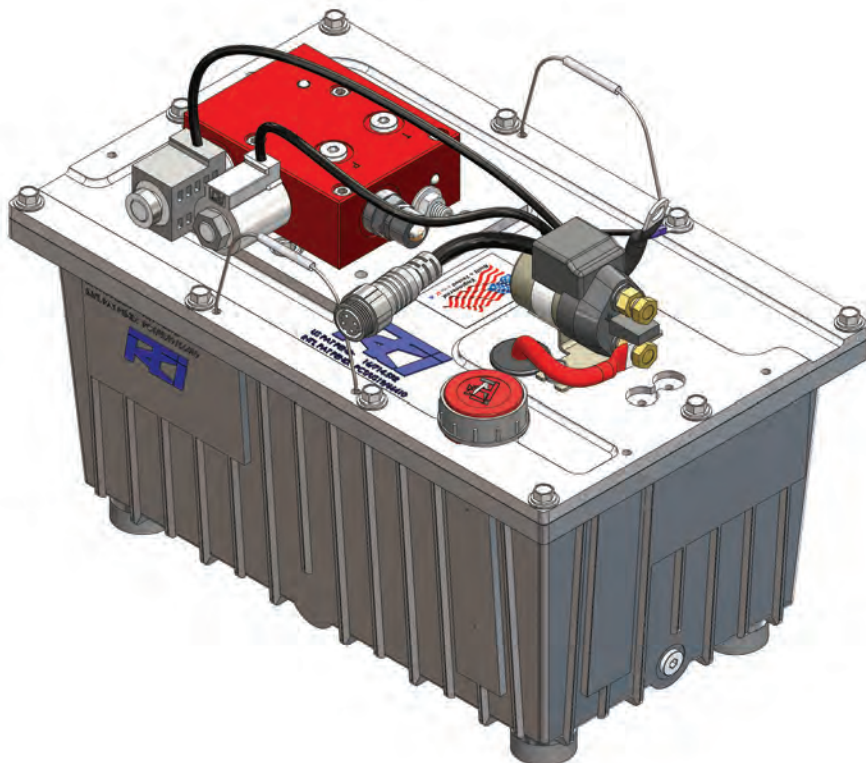
In the patented design, the motor and gear pump are protectively submerged in the reservoir fluid, rather than the typical configuration of

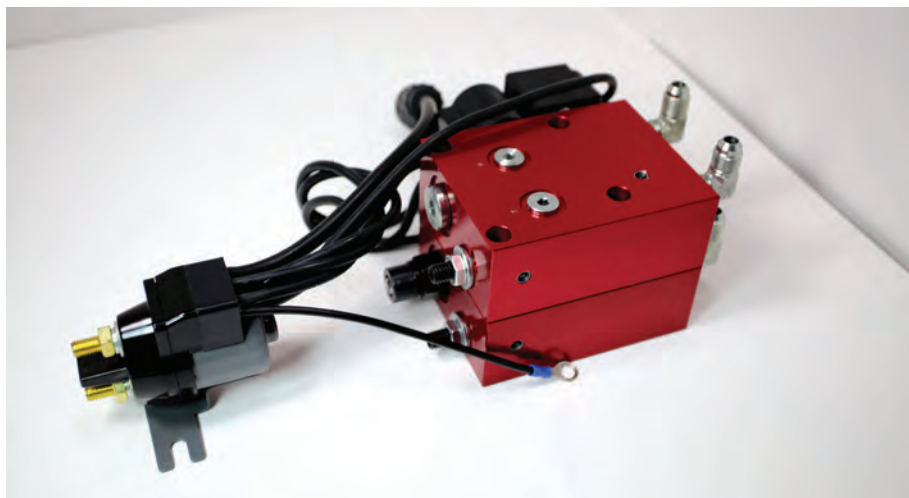
mounting the motor/gear pump and manifold to the top of the reservoir.

PROTECTING CRITICAL COMPONENTS

Protecting the motor and gear pump in this manner has many benefits. When the motor and gear pump are

submerged, the high-value parts require substantially less maintenance and replacement. The new units are particularly ideal for equipment and machinery operated in harsh, wet corrosive environments. The oil also functions as coolant, resulting in a longer duty cycle.





With the Submerged HPU, the distributor can purchase a single SKU item to hold in inventory and then the needed manifolds, like this Double-Single manifold from KTI Hydraulics.

KTI Hydraulics Inc. offers the Submerged HPU with a 1.8 KW 12V and 24V DC motor with superior ingress protection (IP) ratings (a measure of an enclosure's resistance to dust or liquid intrusion). The HPU includes a pressure-loaded gear pump, potted solenoid, and a reservoir with five

quarts of usable volume. Several optional add-ons are available as well.

The new, innovative HPU configuration also enables a more compact design (15.5 x 9.5 x 8 inch), which is ideal for OEMs looking to minimize the space required for hydraulic components.

To provide more flexibility in design for OEMs, the Submerged HPU is offered with a variety of common hydraulic circuits. Custom circuits can be designed upon request. This configurable approach allows for one base unit to utilize multiple circuits.

CUTTING DOWN ON REPAIRS

The Submerged HPU allows the OEM to change the manifold to work with a multitude of different standard or custom circuits. This contrasts with current HPU designs that lock the OEM into either a single-acting or double-acting configuration.

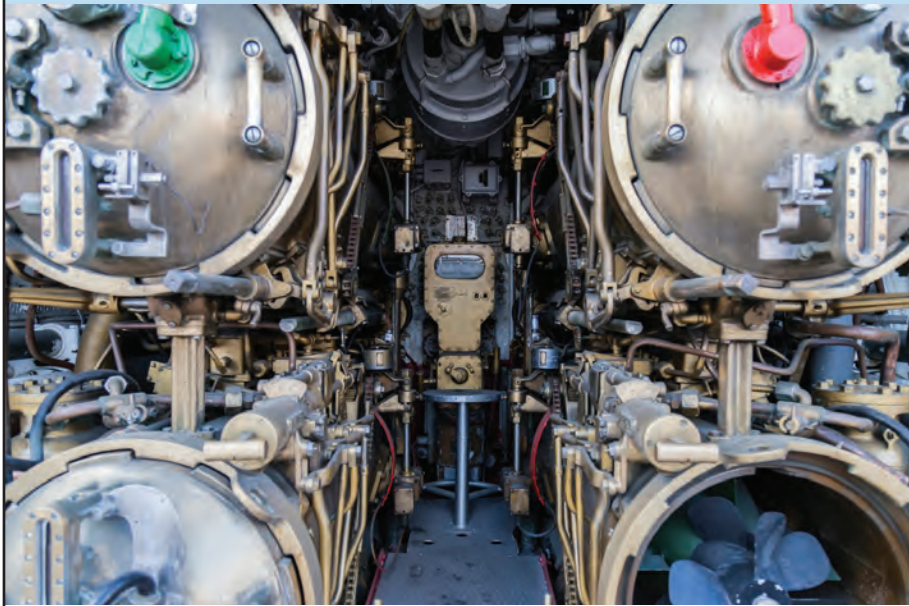
For hydraulic equipment distributors, the capability eliminates the need to stock four different types of HPUs, conserving inventory space and capital. With the Submerged HPU, the distributor can purchase a single SKU item to hold in inventory and then the needed manifolds.

Given the critical importance of Hydraulic Power Units in industries from agriculture to construction, heavy equipment, mobile and recreational vehicles, Submerged HPUs are bound to appeal to OEMs experiencing excessive service calls. By ensuring the motor and gear pump are protected within the oil reservoir from wet or humid environments, the result will be fewer repairs and greater equipment reliability. ■

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DEL WILLIAMS is a technical writer based in Torrance, California. KTI Hydraulics Inc. supplies hydraulic power units, AC and DC motors, manifolds, gear pumps, reservoirs, and remotes. The company's hydraulic power units are ideal for mobile and industrial needs and are trusted for use in industrial machinery including dock lifts, dock locks, and compactors. For more information, visit www.ktihydraulicsinc.com.

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SEVEN THINGS YOU MUST KNOW ABOUT INJECTION MOLDING

Actionable tips to help you reduce the cost of your project

BY CHANDRAKANT ISI, PROTO LABS NETWORK

Injection molding is the preferred method for mass-producing precision plastic parts. However, its upfront costs can be hefty. It's worthwhile to tweak the production process to decrease both the complexity and the overall expense of your project.

Before diving into some tips, let's pinpoint the primary cost factors in injection molding:

- Tooling costs, which encompass the design and machining of the mold.
- Material costs, based on the amount of material and its price per kilogram.
- Production costs, tied to how long the injection molding machine runs.

THERE'S MORE TO LEARN

If you're considering injection molding at any scale, there's more to learn that can be covered here. Protolabs Network's full guide on injection molding can be found at www.hubs.com/guides/injection-molding.

For smaller batches, tooling has the greatest impact, contributing to roughly 50 to 70 percent of the total cost. Therefore, it's essential to plan in advance to accommodate your project's needs.

Most molds are CNC machined from metals like aluminum or steel for durability. These molds can cost anywhere from \$10,000 to \$100,000. If you're producing thousands of parts, that investment is justified. However, for smaller batches, 3D printed molds have become quite popular owing to improvements in additive manufacturing.

Here are some tips to help you optimize the cost of your injection molding project:

1

STICK TO THE STRAIGHT-PULL MOLD

Using side-action cores and other in-mold mechanisms can bump up tooling costs by 15% to 30%. This means you might face an extra tooling expense ranging from \$1,000 to \$1,500. To keep your production on budget, avoid using side-action cores and other mechanisms unless absolutely necessary.

2

REDESIGN THE INJECTION MOLDED PART TO AVOID UNDERCUTS

Undercuts add to costs and complicate things, so it's always worth the effort to get rid of them where possible.

3

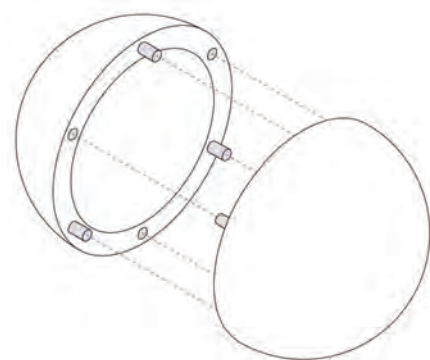
MAKE THE INJECTION MOLDED PART SMALLER

Smaller parts can be molded faster resulting in a higher production output, making the cost per part lower. Smaller parts also result in lower material costs and reduce the price of the mold.

4

FIT MULTIPLE PARTS IN ONE MOLD

Using a single mold for multiple parts is standard practice. Typically, you can fit six to eight small identical parts in one mold, cutting down production time by roughly 80 percent. You can also place parts with varying shapes into the same mold, much like model airplane kits. This strategy significantly trims assembly costs.



Sometimes, two assembly parts share the same main body. With a touch of inventive design, you



can craft interlock points or hinges at symmetrical spots, essentially creating a mirrored part. This lets you use one mold for both parts, halving your tooling expenses.

5

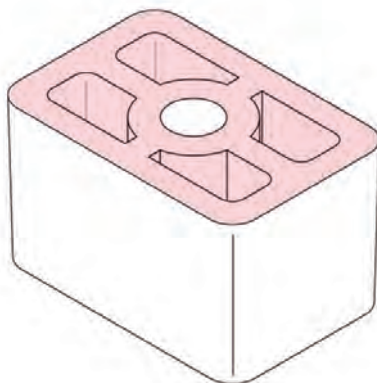
AVOID SMALL DETAILS

Manufacturing a mold with fine details takes longer due to extended machining and finishing times. Text serves as a prime example, often demanding specialized techniques like electrical discharge machining (EDM), which can drive up costs.

6

USE LOWER-GRADE FINISHES

Hand-applying finishes to molds can be pricey, especially for high-grade finishes. If your part isn't meant for



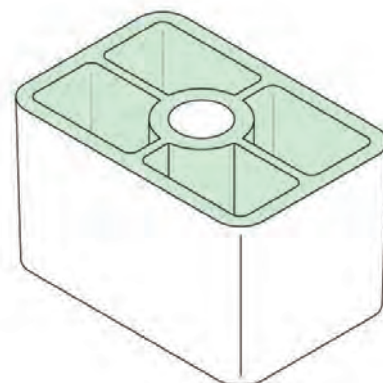
cosmetic purposes, it's best to skip the expensive high-grade finish.

7

MINIMIZE THE PART VOLUME BY REDUCING WALL THICKNESS

Slimming down the wall thickness of your part is a prime strategy to reduce its volume. This not only uses less material but also significantly speeds up the injection molding cycle. For instance, cutting the wall thickness from 3 to 2 millimeters can slash the cycle time by 50 to 75 percent. Why? Thinner walls allow the mold to fill faster.

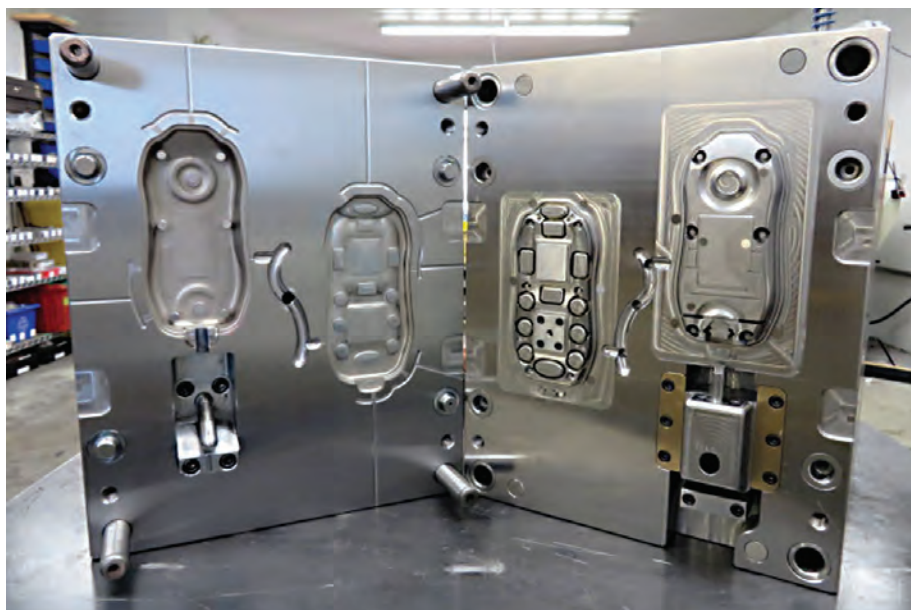
Even more crucial, thinner parts cool and set more rapidly. Consider that nearly half of the injection molding cycle is dedicated to letting the part solidify, with the machine on standby. However,



it's essential to strike a balance. You don't want to compromise the part's rigidity, which could affect its mechanical performance. To maintain stiffness, consider adding ribs in strategic areas.

CLOSING CONCERNS

Also, note that opting for 3D printed molds can drastically reduce mold expenses, bringing them down from thousands to just a few hundred dollars. However, this choice is most suitable for short runs where wear resistance isn't a primary concern. For high-volume production runs (10,000 to over 100,000 units), material and production costs eclipse the impact of tooling costs on the overall expense. In such scenarios, your focus should be to reduce both the volume of the part and the duration of the molding cycle. ■

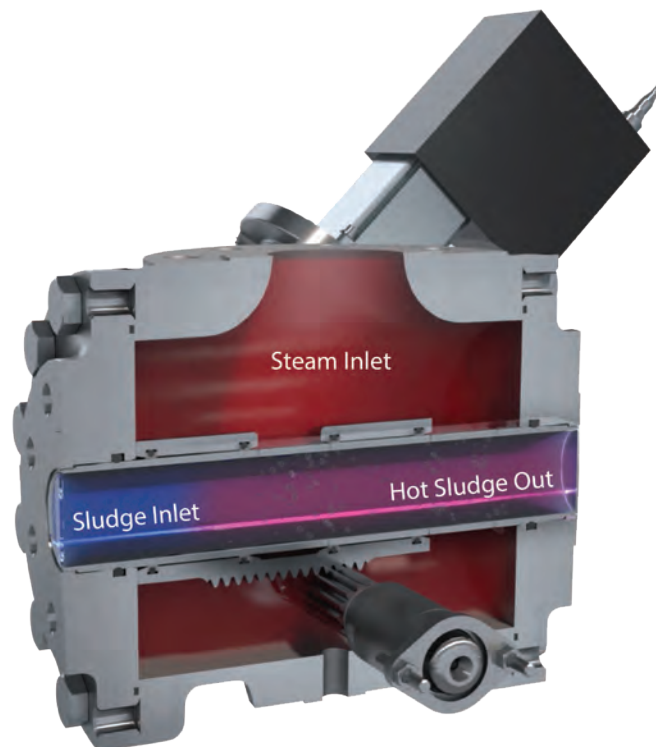


Protolabs Network, part of Protolabs' global manufacturing services, specializing in 3D printing, CNC machining, injection molding, and sheet metal fabrication, offering a wide variety of materials and surface finishes. We have some of the broadest capabilities in the industry, so we can accommodate almost any manufacturing request. When parts with intricate geometries or highly cosmetic finishes, there's a partner in the Protolabs Network that can produce it. For more information, visit www.hubs.com/protolabs-network.

FEATURED PRODUCT

HYDRO-THERMAL

NON-OBSTRUCTING HEATERS



Hydro-Thermal Non-Obstructing Heaters (NOH) are emerging as a superior alternative to traditional heat exchangers for sludge heating in anaerobic digestion. By maintaining optimal digester temperatures, these heaters increase biogas production, shorten detention times, and improve process efficiency, contributing to cost savings and sustainability. As industries prioritize efficient resource utilization and environmental responsibility, innovation and progress in wastewater treatment are paramount.

OPTIMIZING MICROBIAL PERFORMANCE

Precise temperature control isn't just about microorganism survival; it's about maximizing their performance. It's about converting waste into valuable resources like biogas, reducing the environmental impact of waste

disposal, and contributing to a more sustainable future. Hydro-Thermal NOH heaters are specifically designed to maintain the required temperature range for mesophilic and thermophilic digestion, facilitating optimal biogas generation and reducing the detention time in the digester.

COMPARING NOH HEATERS WITH TRADITIONAL HEAT EXCHANGERS:

Traditional methods like heat exchangers have long been the go-to solution in sludge heating. However, they bring challenges, including energy inefficiencies and maintenance complexities. This has paved the way for innovative alternatives like Hydro-Thermal NOH Heaters, presenting a direct and highly efficient method to address the shortcomings of traditional heat exchangers. ■

For more information, visit

WWW.HYDRO-THERMAL.COM

EMERSON

FISHER EASY-DRIVE 200R ELECTRIC ACTUATOR

The Fisher easy-Drive 200R Electric Actuator is for use on Fisher butterfly and ball valves. When paired with these valves, the new actuator performs accurately and reliably under the extreme conditions found in many heavy industries, particularly oil and gas installations in cold remote locations. These actuator/valve assemblies increase uptime, improve performance, and reduce the risk of emissions posed by gas-operated systems locations. For more information, visit www.emerson.com/fisher200r.



FORCE CONTROL INDUSTRIES

POSIDYNE X-CLASS CLUTCH BRAKES

Ideal for incline conveyor applications because they provide precise positioning each cycle, Posidyne X-Class Clutch Brakes act as a holding brake so that materials never slide backward on the incline. They are oil filled and sealed so they do not rust, and they do so without maintenance or adjustment. Posidyne X-Class Clutch Brakes allow higher cycle rates (as high as 300 cycles per minute), and unparalleled service life (20 to 40 million cycles) to increase production rates with lower downtime. For more information, visit www.forcecontrol.com.

WAGO

PRO2 POWER SUPPLY COMMUNICATION MODULES

WAGO Pro2 communication modules easily snap into place as an add-on to WAGO Pro2 power supplies. These modules are available with various communication protocols and their respective communication ports. With this added connectivity, remote access to features, settings, and real-time data monitored by the power supplies is possible. The new WAGO Pro2 communication modules come with a two-year warranty. For more information, visit www.wago.com.



WATSON-MARLOW FLUID TECHNOLOGY SOLUTIONS

QDOS H-FLO CHEMICAL METERING AND DOSING PUMP

Qdos H-FLO delivers the same outstanding accuracy and reliability as other Qdos pumps but for higher flow rates with a variety of pump heads and a range of different tube material to ensure chemical compatibility with the process fluid. The Qdos H-FLO high-precision pump offers flexibility to be scalable with a customer's process, whether it is in water and wastewater treatment, mining and mineral processing, chemical applications in food and beverage, or pulp and paper. For more information, visit www.wmfts.com.

NOTHING LASTS FOREVER

Xylem's Snehal Desai on PFAS treatment technologies to safeguard drinking water



Snehal Desai

As U.S. and European lawmakers tighten restrictions on toxic PFAS contaminants in water, utilities and businesses are working to safeguard drinking water supplies for communities. Often referred to as “forever chemicals,” PFAS are widely used, long lasting chemicals whose components break down slowly over time. Below, Snehal Desai, senior vice president and

chief growth and innovation officer at Xylem, discusses how to address this challenge.

MPT: *Before we discuss potential solutions, let's lay out the problem. What are PFAS and why are they a problem?*

SNEHAL DESAI: PFAS chemicals are human-made but have become widespread in some water sources across the country and can have potentially harmful effects on human and animal health. Estimates from the U.S. Environmental Protection Agency (EPA) show that one in eight public drinking water systems contain PFAS concentrations that exceed the maximum contaminant levels set out in their 2023 National Primary Drinking Water Regulation proposal.

MPT: *How can PFAS concentrations be addressed? Where are these plans being put into action?*

SNEHAL DESAI: Xylem is working with municipal and industrial customers to address this challenge, with more than eighty PFAS mitigation installations in the U.S. alone.

For example, Stratmoor Hills Water District (SHWD), which oversees a combination of surface and groundwater sources in the foothills of Cheyenne Mountain in Southern Colorado Springs, has deployed selective ion exchange treatment aimed at countering the threat of PFOA and PFOS—two of the most commonly identifiable PFAS compounds of concern. Using selective single-use ion exchange technology, the utility has reduced contaminants to levels below compliance limits and mitigated water quality issues for its customers.

MPT: *Is there a way to tackle PFAS concentrations before they reach heightened levels?*

SNEHAL DESAI: In Maine, the Kennebunkport, Kennebunkport & Wells Water District (KKWWD) took a proactive approach when it detected PFAS in one of its system's supply wells. KKWWD worked with Xylem to deploy a granular activated carbon system that has treated more than 200 million gallons of water to meet the utility's drinking water treatment goals.

Elsewhere in California, the Orange County Water District (OCWD) deployed over thirty liquid-phase media adsorption vessel systems to treat for PFAS, following a change in California law in 2020. The vessels were connected to existing drinking water wells to allow individual water districts to continue delivering drinking water in compliance for its more than 2.5 million customers.

MPT: *What have these different cases taught you about taking on these “forever chemicals”?*

SNEHAL DESAI: The experience of these early adopters demonstrates that with the right technology and expertise, utilities can meet treatment and compliance goals cost-effectively for their communities. ■

Xylem is a global water technology provider helping our customers solve the world's toughest water challenges across utility, industrial, commercial, and residential markets worldwide. Over the last 100-plus years, Xylem's unique combination of innovative products and services, proven expertise, and unmatched customer support have been helping to create a more water-secure and resilient world. Across the water cycle, Xylem's innovative solutions use less energy, reduce operating expenses, and support sustainability efforts. By working together, Xylem ensures water is accessible, affordable, and safe for all. For more information, visit www.xylem.com.

The background of the advertisement is a technical drawing of a piping system. It features various brass fittings, including elbows, tees, and couplings, scattered across the page. Some fittings are connected to white plastic pipes. The technical drawing includes lines, arrows, and labels such as "Ø50x3.5", "24", "25", "26", "27", "28", "29", "30", "31", "32", "33", "34", "35", "36", "37", "38", "39", "40", "41", "42", "43", "44", "45", "46", "47", "48", "49", "50", "51", "52", "53", "54", "55", "56", "57", "58", "59", "60", "61", "62", "63", "64", "65", "66", "67", "68", "69", "70", "71", "72", "73", "74", "75", "76", "77", "78", "79", "80", "81", "82", "83", "84", "85", "86", "87", "88", "89", "90", "91", "92", "93", "94", "95", "96", "97", "98", "99", "100".

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