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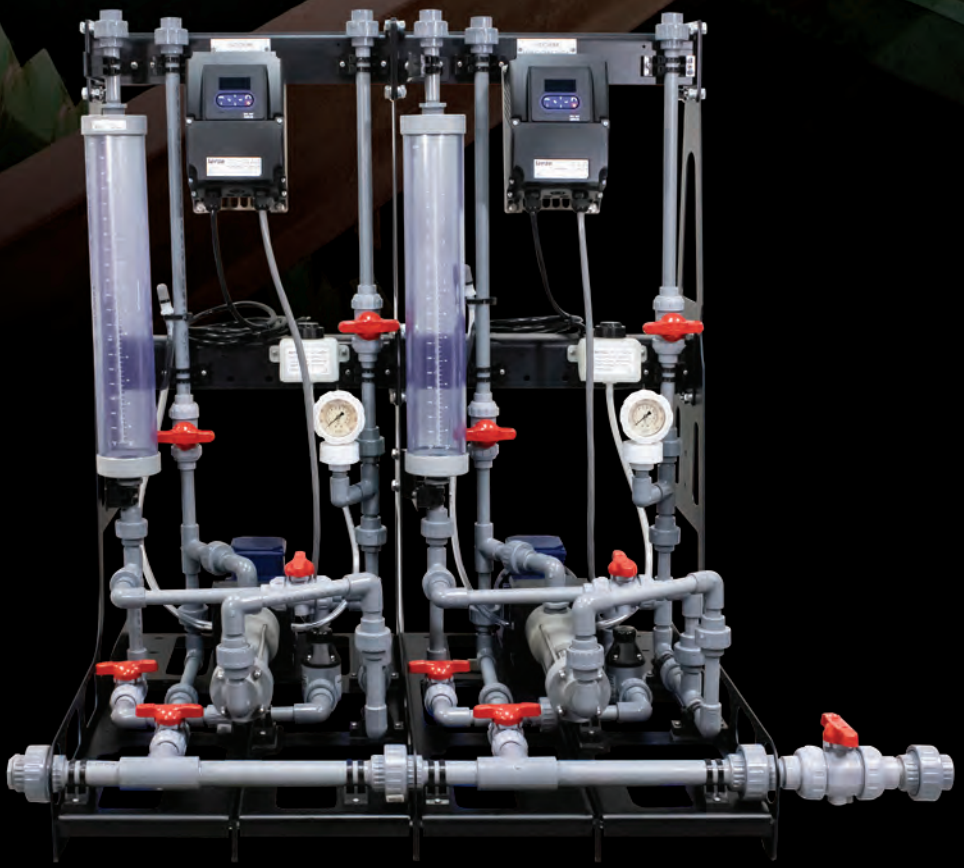

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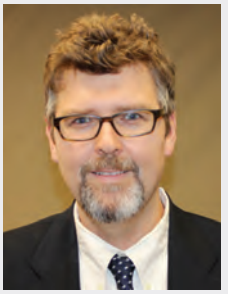
AUGUST 2021

A NOTE ON THIS ISSUE:



J. Campbell, Editor
Modern Pumping Today

The dog days of summer are here and we have a hot issue of MPT! In our Water & Wastewater Focus, Ann Börries of Weltec Biopower shares how her company is planning out a German sewage treatment plant's conversion to anaerobic sludge stabilization (pg. 16). Once completed, this multi-million-dollar project will put the entire plant on track towards economic and ecological success.

Next, understanding the link between pressure, power consumption, and performance is key when choosing the right pump, and one of those factors is the specific gravity of the fluid you intend to move. In this month's Pump Solutions section (pg. 26), Atlas Copco Power Technique's Andreas Neufeld illustrates the connection between "Specific Gravity and Pump Selection."

Lastly, the 94th annual WEF Technical Exhibition and Conference, better known as WEFTEC, will return for an in-person event in Chicago, where water professionals can explore, learn, network, grow professionally, and strengthen their connection to the water community. MPT has selected some standout companies for your attention in this month's Trade Show Profile (pg. 10). Check out these Featured Exhibitors while you're in the Windy City! Enjoy!

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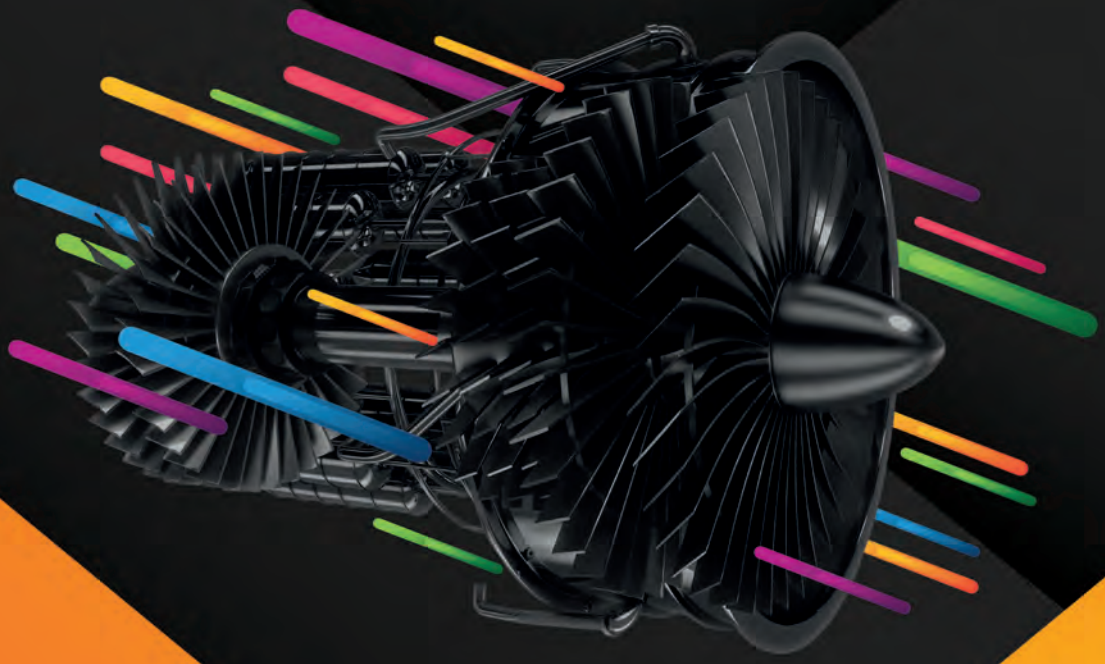

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INDUSTRY VETERANS HONORED BY WQA

A pair of ResinTech veterans were honored with WQA Leadership Awards for their commitment to the water treatment industry at this year's WQA Convention and Expo in Las Vegas. Frank DeSilva and Larry Gottlieb were recognized with the 2021 Key and Ray Cross awards, respectively.

Like receiving the key to a city, the Key Award recognizes a WQA member for demonstrating leadership within his or her organization as well as in local civic and community activities. The Ray Cross Award, named in honor of Ray E. Cross, water specialist emeritus and past president of WCAI, recognizes a current or former WQA member whose has made a notable difference in the water treatment industry.

Jeffrey Gottlieb, ResinTech's CEO, adds, "This recognition by WQA is well-deserved and highlights the energy both Larry and Frank have put toward the WQA and to advancing the interests of our industry—that's always been part of our culture at ResinTech. My dad [ResinTech founder, Michael Gottlieb] always encouraged us to engage with various organizations and with our colleagues from around the industry."

ASCE PRAISES INFRASTRUCTURE BOOST

In a recent statement, the American Society of Civil Engineers (ASCE) applauded the bipartisan group of Senators for coming to an agreement on an infrastructure package, continuing the long tradition of bipartisanship regarding infrastructure investment.

According to an ASCE release, "American voters want Congress to move forward with this plan that will keep roads, bridges, and our drinking water safe, bolster the economy, and help ensure communities are resilient. Our nation's households don't have time to wait while they continue to lose $3,300 a year due to unreliable, aging infrastructure. Businesses know that our nation's infrastructure needs immediate attention if we are to remain competitive in the global marketplace."

The agreed-upon $550 billion in new spending extends beyond transportation and will make a significant impact on improving almost all of the categories featured in ASCE's 2021 Report Card for America's Infrastructure, which assigned the nation's systems a disappointing grade of C-. This proposal will remove dangerous lead service water lines in many communities, safeguard critical assets against severe weather trends, modernize aging transit fleets, and fix structurally deficient bridges.

BANNER ENGINEERING EXPANDS IIoT SOLUTIONS

Industrial automation equipment maker Banner Engineering has launched a partnership with Amazon Web

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Services (AWS) and expanded the range of IoT (Internet of Things) solutions in the AWS marketplace by certifying multiple products to be compatible with AWS IoT Core.

By certifying Banner's sensors and wireless solutions for IoT Core, AWS will make these devices available in the AWS Partner Device Catalog. The catalog listing will provide greater visibility to Banner products in the growing IIoT (Industrial Internet of Things) market and offer wider options to customers looking for sensor-to-cloud solutions. The certified solutions include Banner's DXM series wireless controller and sensors for vibration monitoring on pumps and motors. The solutions can be easily expanded for other monitoring applications like temperature, tank level, current consumption, and many more.

Banner's portfolio of sensors and industrial wireless communication tools will give AWS customers an unprecedented breadth of solutions for their plant floor. Likewise, AWS-certified devices give Banner's existing customers new options for managing their device data using AWS cloud services and rapidly expanding offerings.

ATLAS COPCO POWER TECHNIQUE APPOINTS NEW PRESIDENT, VICE PRESIDENT

Atlas Copco Power Technique names Wouter Vlamynck as president and general manager and Abhijeet Jain as vice president and business line manager of power and flow. The appointments went into effect June 1.

Vlamynck originally joined the Atlas Copco Group twenty years ago after graduating from Katholieke Universiteit Leuven in Leuven, Belgium. He started his career with Atlas Copco as a buyer in Antwerp, Belgium. In 2014, he moved to Pune, India, for three years as a team leader in global sourcing, where he oversaw the procurement of materials for our European factories. Most recently, he was vice president marketing in the specialty rental division in Boom, Belgium.

Jain originally joined the Atlas Copco Group in Pune, India, as a manufacturing engineer in 2006. He was responsible for production planning, material flow, and manpower allocation for the on-time full delivery to customers. A year later, he was promoted to sales engineer for portable air in Delhi, India. He then moved back to Pune, India, to assume the role of factory production manager with Atlas Copco Portable Air in 2011. In late 2018, he moved to the United States and served as vice president and business line manager within Atlas Copco's multiband Chicago Pneumatic and American Pneumatic Tools. He then was promoted to vice president and business line manager for power and flow in July of 2021.

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WEFTEC 2021

Where the water community comes to connect

No matter the obstacles, through changes and challenges, water professionals keep going, learning, and doing what's necessary to provide safe, clean water. The same could be said of WEFTEC, the largest water quality event of the year, as it's time to come together again to celebrate what makes the water sector great. At WEFTEC, the full breadth of the water sector comes together in Chicago for water professionals to explore, learn, network, grow professionally, and strengthen their connection to the water community.

WEFTEC always changes a little from year to year, and the 94th annual WEF Technical Exhibition and Conference will be no different. The focus this year will be reuniting the water sector in person to make purposeful connections, create and discuss ideas with each other, and explore equipment, tools, and solutions with expert guidance.

Learn from the brightest and most innovative minds through WEFTEC's world-class education that delivers everything there is to know about water quality through a variety of learning styles. The educational offerings at this year's WEFTEC include the following:

WEFTEC 2021 AT A GLANCE

WHERE: McCormick Place, Chicago
WHEN: October 16–20, 2021
WEBSITE: www.weftec.org

- **Workshops:** Dive into in-depth learning that is designed to teach you practical skills, techniques, or concepts that attendees can directly apply to their work.
- **Technical Sessions:** Learn from water quality experts. These presentations are selected through a highly rigorous review process and highlight the work of water quality experts. They are grouped in thematic one-hour to ninety-minute sessions.
- **Learning Exchanges:** Attendees can share their expertise and perspectives about trending themes, technologies, and topics in the water sector with a small peer group.
- **Main Stage:** Explore the most important and timely water sector and professional development topics
- **Technology Spotlights:** Learn from curated groups of companies sharing their premier product and service solutions for the industry's current challenges.
- **Company Demonstrations:** Engage with exhibitors in their booths as they show their latest tools and equipment.

WEF works to obtain approval on a national level for WEFTEC participation, so attendees can choose among all workshops and technical sessions, as well as earn contact hours in the exhibition. WEFTEC remains one of the premier events for water professionals to earn PDH and CEUs.

ENVIRONMENT ONE CORPORATION

BOOTH 2021

Are you dealing with failing septic tanks? Is I&I from your existing sewer system eating up your budget? Do you have a sewer project with challenging terrain looming ahead? Get after it. ALL-TERRAIN SEWER™ low pressure systems from E/One give you the freedom to sewer anywhere. Environmentally sensitive, economically sensible™: ALL-TERRAIN SEWER low pressure systems are significantly more affordable than conventional gravity sewers, safer than septic systems, and they're a light touch on the land. Plus, ALL-TERRAIN SEWER low pressure systems carry a proven track record of reliability with the lowest life-cycle costs in the industry. Whether it's dead or dying septic tanks or expensive inflow and infiltration, E/One can help. **WWW.EONE.COM**

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Blacoh offers engineered fluid control products manufactured to exacting standards in a wide variety of sizes, materials, and pressure ratings to suit virtually every application. Blacoh has been improving process system performance, reliability, safety, and productivity for over forty-five years, so find Blacoh products wherever fluid is being pumped. Blacoh products are made in the USA for a reason—nothing gets in the way of providing Blacoh products to customers. **WWW.BLACOH.COM**

BOERGER

BOOTH 1309

Boerger designs, manufactures, and sells rotary lobe pumps, macerating technology, separation technology, and feeding technology to convey low to high viscous and abrasive media. Key applications can be found in wastewater applications including sludge (primary, WAS, RAS, digested, thickened, etc.), biosolids, grease, sewage, scum, lime slurry, alum sludge, permeate, polymers, etc. Boerger products are designed with maintenance-in-place, which allows for all wetted parts to be easily replaced through the front cover without the removal of pipe or drive systems. **WWW.BOERGER.COM**

GRIFFCO VALVE, INC.

BOOTH 4018

Griffco manufactures a comprehensive line of pump accessories to enhance the accuracy, safety, and longevity of chemical feed systems used in water and wastewater treatment facilities. Made in the USA, all products are machined, molded, or cast for high-quality performance. More than 1,000,000 valves and system accessories have been installed in the field since the company was founded in 1992. The product line includes back pressure and pressure relief valves, calibration columns, pulsation dampeners, inlet stabilizers and surge suppressors, injection valves/quills, corporation stops, gauge and instrument guards, fusion dampeners, y-strainers, and other fluid handling accessories. With corporate offices, engineering, and manufacturing facilities in Western New York, Griffco products are sold worldwide through an extensive network of channel partners. Certifications include ISO 9001: 2015, CRN to CS-B51-03, NSF-61, and CE to PED 2014/68/EU Annex III Module D. **WWW.GRIFFCOVALVE.COM**

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ONYX VALVE COMPANY
BOOTH 4223

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CLA-VAL COMPANY
BOOTH 4621

Since 1936, Cla-Val has produced the world's highest quality automatic control valves for diverse industries. Cla-Val has strengthened operations and customer service by enhancing product lines and building state-of-the-art production facilities around the world. With major locations having dedicated training centers, the team provides exceptional industry expertise. Aggressive R&D programs have resulted in advanced electronic and hydraulic control systems that meet the challenges of complex and diverse applications. **WWW.CLA-VAL.COM**

GORMAN-RUPP PUMPS
BOOTH 2012

Gorman-Rupp sets the industry standard for packaged wastewater-handling pumping systems. These stations are equipped with solids-handling self-priming or submersible pumps, valves, controls, and enclosures that are designed for reliability and easy maintenance. Gorman-Rupp's commitment to "total system responsibility" means you only have to make one call if you encounter a problem. This concept simply offers the best sewage-handling solution on the market—guaranteed. **WWW.GRPUMPS.COM**

PLAST-O-MATIC VALVES, INC.
BOOTH 4259

Plast-O-Matic will be introducing its new, all-plastic CAFÉ and NITRO actuators designed for water/wastewater, chemical, RO, ozone treatment, and other corrosive applications. Providing actuation times as fast as one second, CAFÉ and NITRO feature multi-voltage 24-240V AC/DC with automatic voltage sensing. They're suitable for virtually any quarter-turn valve such as ball valves or butterfly valves, metal or plastic material. Standard features include CE Mark, IP67 ingress protection, LED status, remote indicator, and electronic overtorque protection. Options include fail-safe, programmable OLED screen, modulation, MODBUS, and other premium features. CAFÉ and NITRO are engineered and assembled in USA.
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VAUGHAN COMPANY
BOOTH 2379

At its core, a true chopper pump consists of a rotating impeller with cupped and sharpened leading edges, cutting against stationary fingers at the entrance to the volute.The original patent was applied for in 1960 (granted shortly thereafter) by Vaughan Company founder, Jim Vaughan. Vaughan Company has introduced many new chopper pump models covering a broad range of heads and flow, greatly improved efficiencies, all incorporating numerous patented cutting features. Including upper cutters, stationary cutter bars, and other cutting features is fundamental to chopping and clearing problematic materials. This protects downstream components which is vital to the effectiveness of wastewater systems. From the start, and to this day, Vaughan Company remains committed to giving customers outstanding service and the most dependable product solutions in the world.
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HOMA PUMP TECHNOLOGY
BOOTH 2058

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Meltric manufactures a full line of industrial plugs and receptacles, including a signature brand of UL listed switch-rated devices with push-button circuit disconnection. These all-in-one devices combine the safety and functionality of a disconnect switch with the convenience of a plug and receptacle and can be safely connected and disconnected under full load. Meltric also manufactures other safe and reliable industrial plugs and receptacles, including multipin, high amperage, single pole, and hazardous location devices. **WWW.MELTRIC.COM**

WEG ELECTRIC CORP.
BOOTH 3404

WEG is committed to creating quality products and efficient solutions. To achieve this, there is continuous investment in innovation and team work. Helping people reach their goals by living the values of the company is WEG's passion. At WEG, the customer is also part of the team. Working together we can develop the best solutions. There are many approaches to efficiency at WEG. Whether it be energy saving, to reduce costs, or increase productivity, we work to fulfill the needs of our customers. We never stop because a product works well. We always look for a way to make it work even better. This constant search for improvement has led to the creation of some of the most efficient products in energy saving available on the market. **WWW.WEG.NET**

PROTECTING AGRICULTURAL LAND IN A FLOOD PLAIN

Bedford Pumps provide fish-friendly flood protection for Pitt Polder Pumping Station

BY LUCY OGDEN, BEDFORD PUMPS

Bedford Pumps Ltd. have successfully completed the commissioning of two of their fish-friendly pump sets at Pitt Polder Pumping Station in British Columbia, Canada.

Pitt Polder Pumping Station is located within the city of Pitt Meadows, which lies at the confluence of the Fraser and Pitt Rivers. Approximately 86 percent of the city is located within a flood plain and the city relies on a continuous dike system, comprising of a network of ditches, flood boxes, and pumping stations for flood protection. This system was built as a response to the devasting Fraser River Flood of 1948, one of the largest recorded floods in the lower mainland.

The original Pitt Polder Pumping Station was constructed in 1952 and consisted of two vertical pumps with no backup power. The station had since reached an end to its service life and was allocated federal funds towards the $6.9 million cost of a new station as it is an essential piece of infrastructure for the local agricultural industry. The new pumping station will provide protection to 1,650 hectares.

GOING FISH-FRIENDLY

Bedford Pumps, manufacturers of robust pumping plant for the flood control industry, supplied two of their Submersible Axial fish-friendly pump sets for the new Pitt Polder Pumping Station. The pumps are part of Bedford Pumps fish-friendly pump range, which have been rated as ''excellent'' in an independent trial designed to assess their ability to comply with legislation brought into force to tackle the rapid decline in global populations of the European eel.

PITT POLDER PUMPING STATION: UP CLOSE

PITT POLDER PUMP STATION is an essential piece of infrastructure for disaster mitigation and the local agricultural industry of Pitt Meadows. The area is divided into four drainage areas served by six pump stations. In addition, the new station will provide annual energy efficiency and reduce emissions, as well as reduced operating, maintenance, and repair costs.

The two pump sets will each provide a duty of 56,427 gallons per minute at 21 feet head. Each submersible pump set includes an integral 465 horsepower, 16-pole motor suitable for operation on a variable speed drive.

BUILT FOR COMMUNITY NEEDS

Bedford Pumps supplied and commissioned the pumps with CSA approval. The canisters, which are configured for below floor discharge, were manufactured in Canada to Bedford Pumps' exact specification.

Bedford Pumps is a leading supplier of fish-friendly pumps not only to the U.K. market but also to a thriving export market which currently comprises 27 percent of all installations. For Canada specifically this is the company's sixth order to date with the very first order being delivered seven years ago to another pumping station in the region, Hatzic Lake, in order to assist with annual winter flooding problems along the Fraser River associated with Freshet.

"Ensuring our community and vital farm land is well-protected against the risk of flooding is an important council priority," says Pitt Meadows Mayor Bill Dingwall. "This new pump station is a critical component of our city's diking and drainage system and we thank all who have worked on this important project. Its reconstruction provides enhanced safety and flood mitigation to over 1,650 hectares of agricultural land."

LUCY OGDEN is marketing manager for Bedford Pumps Ltd., a flexible, highly experienced British manufacturer of robust pumping plant for the water, wastewater, flood control, and dock industries. With pump ranges from typically 7,925 to 317,007 gallons per minute at heads between 9.8 and 328 feet, the pumps are designed for the most arduous and demanding applications and the brand is synonymous for efficiency, reliability, and longevity. For more information, visit **www.bedfordpumps.co.uk**.

Until now, the sewage treatment plant with a capacity of 33,000 PE (population equivalents) has applied aerobic wastewater treatment. The conversion to anaerobic sludge stabilization will put the entire plant on track towards economic and ecological success.

Apart from the earthworks and the electrical installations, the German biogas plant manufacturer will supervise the construction of the new sludge thickener, the engine room for the cogeneration power plant, and the digester with its gas storage roof. Henceforth, the sludge will undergo anaerobic digestion in the stainless-steel digester.

ECO-FRIENDLY COST REDUCTION THROUGH ANAEROBIC SLUDGE STABILIZATION

Weltec Biopower builds energy-efficient wastewater treatment unit for sewage treatment plant

BY ANN BÖRRIES, WELTEC BIOPOWER

Following a public tender procedure, Weltec Biopower was awarded the contract for an anaerobic stage for the municipal sewage treatment plant in Bückeburg, Germany. Apart from the earthworks and the electrical installations, the German biogas plant manufacturer will supervise the construction of the new sludge thickener, the engine room for the cogeneration power plant, and the digester with its gas storage roof. Henceforth, the sludge will undergo anaerobic digestion in the stainless-steel digester. The budget for the various modernization measures on the premises total $4.8 million. The anaerobic stage will be ready to go live in October 2021.

SIGNIFICANTLY HIGHER EFFICIENCY

Until now, the sewage treatment plant with a capacity of 33,000 PE (population equivalents) has applied aerobic wastewater treatment. The conversion to anaerobic sludge stabilization will put the entire plant on track towards economic and ecological success. The new wastewater treatment solution is set to optimize operating processes and deliver significantly higher energy efficiency. Moreover, the new process is expected to reduce the sewage treatment plant's greenhouse gas emissions by 731 tons per year.

Within the framework of the European Regional Development Fund (ERDF), the investment and development bank of Lower Saxony (NBank) rewards

the carbon savings with a subsidy of close to one million dollars. Besides the ecological improvement, Weltec's anaerobic wastewater treatment will result in a significant cost reduction. For instance, the amount of sludge that accumulates every year will go down from 3,000 to 1,900 tons. Additionally, some 5 percent of the power consumption will be saved.

> *"With the anaerobic process, the dewatered sludge has about 35 percent less volume, which saves sludge transportation and disposal costs."*
>
> —THOMAS SEXTRO | WELTEC BIOPOWER

GREAT POTENTIAL SAVINGS

The greatest savings potential, however, lies in the sludge gas. "With the 465,000 kilowatt hours of power that we will gain from the sewage gas every year, we will be able to cover 40 percent of our own power demand," says Rainer Klenke. The technical manager of the wastewater operations of the municipality of Bückeburg calculates that the yearly power bill will drop by two thirds from $230,000 to $76,000.

The expertise for this optimization concept originates from biogas technology. Weltec Biopower will implement the digester as a stainless-steel tank in the tried-and-tested segmental design with a double-paddle mixer. The digester will have a height of 20 feet, a diameter of about 62 feet, and a capacity of 64,375 cubic feet. The sewage gas will be stored in the flexible double-membrane roof with a volume of approximately 21,188 cubic feet. This design stands out with much lower investment costs than a conventional digester and is therefore an optimum solution for smaller wastewater treatment plants. The new static sludge thickener, which is equipped with a submersible mixer and boasts a capacity of 12,000 cubic feet, is also made of stainless steel. A 226-kilowatt CHP unit will ensure efficient utilization of the gas. Both the generated power and the heat will be used on the plant premises. Additionally, a gas boiler with an output of 170 kilowatts will be installed in the engine room in order to ensure the heat supply of the digester even during maintenance work on the cogeneration power plant.

COST-EFFICIENT NOW AND FOR THE FUTURE

The municipal sewage treatment plant will thus experience an efficiency boost thanks to technological and process-related improvements. Apart from the anaerobic stage, a primary clarifier will be newly integrated in the process. In this way, primary sludge will be extracted from the wastewater, reducing the chemical oxygen demand (COD) by a third. The lower this value, the easier the water can be treated. This reduces the aeration period in the aeration tank and thus the energy costs.

Thomas Sextro, sales manager at Weltec Biopower, explains, "Aerobically stabilized sludge contains a higher organics load and is more difficult to dewater. With the anaerobic process, the dewatered sludge has about 35 percent less volume, which saves sludge transportation and disposal costs."

Such smart combinations of wastewater treatment, energy generation, and climate protection make existing sewage treatment plants future-proof. The cost-efficient technologies and proven concepts from the field of biogas are suitable to counteract fluctuating energy prices and increasing sludge utilization costs. In Bückeburg, for example, this enables the municipality to keep its wastewater and surface water drainage costs steady without burdening the citizens with extra fees. plant on track towards economic and ecological success. and the digester with its gas storage roof. Henceforth, the sludge will undergo anaerobic digestion in the stainless-steel digester.

Weltec Biopower GmbH is one of the world's leading enterprises in the field of stainless-steel biogas plant construction. The company has planned, developed and built anaerobic digestion plants since 2001. Today, the medium-sized company has about eighty employees at the headquarters in Vechta, Germany, and has established more than 350 energy plants in twenty-five countries worldwide. The global distribution and service network spans six continents. The range of customers includes businesses from the agriculture, food, waste, and wastewater industries. For more information, visit **www.weltec-biopower.com**.

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City of Hamilton reduces pump costs & energy consumption Part 1 of 2

BY PETER SUCHARDA, DEVINE & ASSOCIATES, AND MARK GIMSON, CLA-VAL COMPANY

On March 27, 2019, the city of Hamilton, Ontario, unanimously declared a climate change emergency that threatens the city, region, province, nation, civilization, humanity, and the natural world. In doing so, Hamilton joined another 490 Canadian municipalities that have joined forces with an international movement to declare that we are in a climate change emergency. As a part of the declaration, the city developed a multi-departmental Corporate Climate Change Task Force with the main directive to investigate and identify actions that need to be taken to achieve net zero carbon emissions before 2050. The city's climate change emergency offers nine climate change goals, which focus on infrastructure, transportation, the environment, and the way the city does business.

Hamilton Water staff connect to the anti-stagnation valve to set the flow schedule.

ELEVATION, PRESSURE, AND POPULATION

Hamilton Water, which is a key stakeholder on the Corporate Climate Change Task Force, is one of the largest energy users in the city. In 2019, Hamilton Water spent more than CDN $13 million on power costs amounting to about 6 percent of the annual budget. The city's water distribution system is one of the oldest and most complex in Canada. It includes six water distribution systems, 1,262 miles of watermains, and 144,691 water service connections. It has an elevation of 298 feet above sea level and is defined by unique geographical features like the Niagara Escarpment and Hamilton Harbor.

Maintaining a consistent operating pressure is a difficult undertaking due to the Niagara Escarpment. This steep rock face that runs through the middle of the city across its entire breadth, bisects the city into "upper" and "lower" sections. This vertical wall ascends an average of 328 feet and presents a unique challenge in the conveyance of water at acceptable flows and pressures. The city's distribution system must maintain a minimum operating pressure of 20 psi at ground level at all points under maximum day demand plus fire flow conditions. The normal operating pressure within the network is 40 to 100 psi. There are 145 pressure district level valves within the city of Hamilton water distribution system.

Due to this elevation change coupled with the sprawling geography of the city, the water distribution system is divided into twenty-four distinct pressure districts, both open and closed. In an open district, continuous pumping is not required to maintain pressure due to the provision of floating storage, such as an elevated tank or reservoir. In a closed district, continuous pumping is required to ensure that the required flows and pressures in that portion of the distribution network are met.

In areas where a facility such as a reservoir or elevated tank is not present, pumping station discharge head must be enough to overcome system losses and to maintain the appropriate hydraulic gradient. The placement of floating storage within the distribution system not only provides sufficient amounts of water to equalize demand, but also translates into energy savings when supplying the network via gravity.

The various pressure district zones are inter-connected via level valves and an open 3/4- or 1-inch bypass line. Typically, bypass lines allow a continuous flow of water from the high to low pressure zones to provide a mixing of water to maintain acceptable residual chlorine levels. These by-passing flows consume significant pumping energy. Dave Alberton, manager of water distribution and wastewater collection for Hamilton Water, says, "Bypass lines are installed to minimize stagnant water issues at dead-ends of the water distribution system and will eliminate customer complaints. By installing the bypass lines, we solved the water quality issue but there was a cost to that continual water flowing through the line and there was no way of measuring it."

Normally-closed zone boundary valve creates two dead ends; stagnant water results.

REDUCING WATER LOSS AND ENERGY CONSUMPTION

Recently Hamilton's water distribution and wastewater collection department completed a pilot project to support the climate change initiative by reducing water loss and electricity consumption. The purpose of the pilot project was to review and investigate the significant increase in flow from two reservoirs (in Pressure Zone District 4 and 8), in comparison to the trends from previous years. This was largely due to bypass lines that were installed around normally closed boundary valves in order to keep the water fresh with a continual flow. This created three issues:

- Over-pressurization of the lower zones during periods of low demand (nighttime).
- Higher pumping costs.
- Difficulty in modelling systems because there was a great deal of water flowing through the bypass lines that was unaccounted for.

Some municipalities have tried to limit the flow through bypass lines by either throttling valves (setting them partially open) or installing a flow-limiting orifice. This inevitably causes problems because valves are not designed for throttling purposes, so it often leads to cavitation and wearing out of the valve seat. Flow limiting orifices frequently wear out for the same reasons. Also, "mini-breaks" occur within the chamber due to cavitation and high flow velocities that wear out the bypass line piping and fittings.

The city put out a tender to engineering firms which was won by Devine & Associates. "Upon further investigation with our engineering firm, we determined that it was possible to significantly reduce water flow through the bypass lines from a 24/7 continuous flow to approximately fifteen minutes per day, and still maintain water quality,

The 3/4-inch bypass line eliminates stagnant water but (1) increases pumping costs, (2) increases main breaks, (3) instigates in-chamber "mini-breaks."

by using a timer controlled anti-stagnation valve. This also significantly reduced the required water flow from pumping stations which lead to a trickle down of many cost savings," adds Alberton.

SILENCING THE NOISE, STOPPING STAGNATION

"One issue we were having with fully-open bypass valves was noise complaints," says Alberton. As water was passing through the bypass piping at high velocity it would create a loud noise, so the city closed the bypass lines to minimize noise complaints. Closing the bypass lines stopped the noise complaints but allowed stagnant water problems to occur.

"By installing anti-stagnation valves, flow through the bypass lines could be limited to short durations at specific times during the day. Typically, our anti-stagnation valves are scheduled to open mid-morning for fifteen minutes. At that time many people are away or busy and there is ambient noise. Previously, noise complaints were often made at night or in the early evening. Anti-stagnation valves provide the flexibility to limit resulting noise to times that are more acceptable to residents," concludes Alberton.

Before the installation of the anti-stagnation valves, the city inspected and cleaned all thirty-seven valve chambers. All bypass lines were closed for forty-eight hours resulting in a 35 percent flow reduction leaving Greenhill Station

in Pressure District 4 (from 5.28 million gallons per day down to 3.43) and 77 percent (0.79 million gallons per day down to 0.158) leaving Dewitt/Ben Nevis station in Pressure District 8. "This shutdown was done to prove that closing the thirty-seven valves decreased the flow out of the two reservoirs. We also had no pressure or water quality complaints and no service interruptions," says Alberton.

A LOOK AHEAD: ANTI-STAGNATION VALVES

The anti-stagnation valve is a simple hydraulic control valve that is opened and closed by actuating a latching solenoid on or off. The solenoid changes state, either putting high pressure water into the valve's control chamber (causing the valve to close) or taking water out of the valve's control chamber (causing the valve to open). The solenoid is a low-powered device that requires only a short pulse of electricity to flip from one state to the other. The valves chosen were a 3/4-inch Cla-Val Model 139-10A, a programmable timer control valve, which is an on/off control valve that can be programmed to operate on a time schedule.

Alberton adds, "It's easy to check-in on the valve and make changes with the interface cable that connects the anti-stagnation valve through a USB port to a computer." Free software downloaded from the Cla-Val website, is used to communicate to the valve. Once connected a person can check the valve's position status (open or closed), test the valve by forcing the valve open or closed, determine the valve's battery level, automatically update the unit's date/time by synching to the computer, and of course set when the valve opens/closes.

"The valve can open up to twice a day, but we normally set it to open once. Like a sprinkler timer, the unit can be programmed to open every day or every other day or specific days of the week," says Alberton. In next month's conclusion, we'll walk through the installation of anti-stagnation valves for the city of Hamilton and the implications this has for other cities.

PETER SUCHARDA, P.Eng., is president of Devine & Associates, which works with end users, consultants, and contractors to design, produce, implement, and support flow solutions for water, wastewater, storm water, slurry, and other fluid applications. He can be reached at psucharda@devineassoc.com. ***MARK GIMSON*** is director of marketing and international sales for Cla-Val Company and can be reached at mgimson@cla-val.com. Cla-Val is a world-leading designer and manufacturer of automatic control valves. From reducing and relief valves to deluge, air valves and more, Cla-Val manufactures and provides a wide variety of solutions for use in some of the world's most demanding applications. For more information, visit **www.cla-val.com**.

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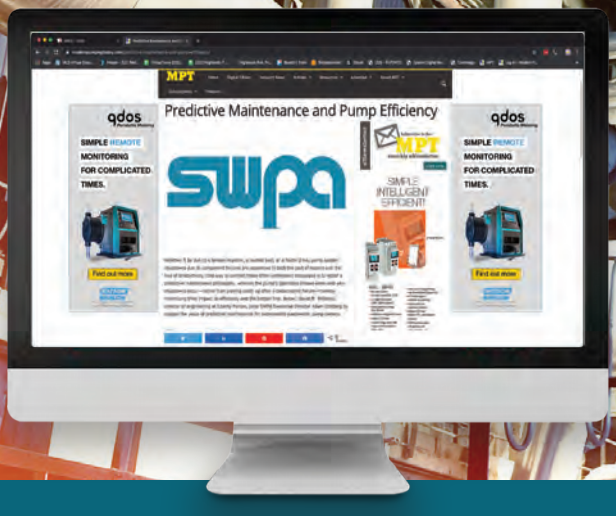

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FIVE WAYS TO USE CMMS TO IMPROVE PLANT SAFETY

BY BRYAN CHRISTIANSEN, LIMBLE CMMS

Within the modern plant setup, the reliability and safety of assets take center stage. As competition soars, organizations seek innovative means to boost productivity, enhance plant safety, streamline workflows, and increase profitability.

Computerized maintenance management systems (CMMS) have taken the lead by simplifying maintenance operations, a key ingredient for establishing safe production environments. Below is how CMMS solutions can be utilized in improving plant safety.

1. TIMELY, PRECISE, AND SUFFICIENT MAINTENANCE

Safety hazards exacerbate when maintenance activities are poorly planned. Delaying or deferring maintenance increases the probability of accidents and failure of equipment occurring. Improving plant reliability demands a shift towards a data-driven proactive maintenance strategy.

Having a CMMS solution opens up a world of possibilities. Plant managers can monitor the health and productivity status of each asset in real-time. It enhances the early identification of defects that may threaten plant safety. CMMS programs

retain centralized historical records of all maintenance activities performed on a wide range of assets. They are vital for scheduling maintenance activities, generating work tickets, allocating work orders to technicians, and reconciling spare parts and tool inventories.

With these capabilities, every piece of equipment is maintained correctly, guaranteeing safe operation. Maintenance activities are well scheduled, with the work orders evenly distributed. This systematic approach reduces maintenance workloads and minimizes confusion brought forth by a sudden spike in maintenance workloads, a factor that escalates safety risks.

2. AUTOMATION OF SAFETY AUDITS

Routine safety audits are necessary for keeping a safe plant environment. They are vital for evaluating compliance to minimum safety standards and procedures set out by the organization or government agencies. Performing safety audits can be strenuous, especially when dealing with a complex plant.

CMMS programs are crucial for speeding up audits and monitoring compliance. They provide tools for creating and updating equipment checklists. It ensures that every safety aspect is logged in during routine inspections and has provisions for recording and communicating developing risks in time.

Maintenance records stored by the CMMS programs are a source of evidence and are used for verifying compliance with statutory requirements. When inevitable equipment failure occurs, plant managers dig up equipment-specific maintenance history and use it to perform a conclusive failure mode and root cause analysis. This informs the execution of the appropriate corrective maintenance to prevent a recurrence.

With CMMS programs installed on mobile devices, it is simpler for managers to schedule safety inspections and send reminders to the responsible technicians. These programs enable maintenance teams to remotely monitor high-risk equipment with dedicated warning systems to generate appropriate alerts.

3. STANDARDIZATION OF OPERATIONAL POLICIES AND SAFETY PROCEDURE

Safety incidents occur due to human errors or violations of laid-out procedures. Given the complex nature of plants, technicians may be overwhelmed, causing them to overlook some operational steps or guidelines.

By implementing a CMMS program, an organization centralizes all the safety and maintenance information. Technicians access this information remotely, helping them make informed and accurate decisions to eliminate operational safety risks.

Maintenance technicians are exposed to a myriad of risks with accidents occurring in their line of duty. Organizations that have a CMMS in place can easily design a standard procedure for reporting such events. For instance, maintenance technicians can access a standard lockout tagout policy hosted by a CMMS program to ensure strict adherence to machine maintenance shutdown and start-up procedures.

4. OPTIMIZING FACILITY LAYOUT

Optimum plant layouts have the potential to minimize safety risks. As production scales up, the organization acquires additional assets. Production equipment must be laid out in an orderly manner to facilitate continuity of processes, ease asset tracking and guarantee the accessibility of safety utilities.

A CMMS solution enables the organization to keep a detailed record of the physical locations of all production equipment. Customized CMMS programs contain layouts of the plant floors that are frequently updated to accommodate newly acquired equipment. A definite plant layout ensures that no equipment is out of place, limiting safety risks due to improper asset arrangement. Plant floor workers use CMMS programs to gain access to information on safety facilities within the plant, making it easy for them to respond promptly during emergencies.

5. CMMS FOR STAFF SAFETY TRAINING

Safety policies and compliance requirements change as the business grows. Employees must be acquainted with these changes in good time. The scheduling of the safety training sessions should not affect routine production.

With a CMMS system, organizations can schedule training and outline key safety topics for specific equipment, operational area or facility. CMMS enables remote safety training for employees in different locations. Those employees who complete safety training receive certifications and their information captured in the CMMS database. With this information, maintenance managers identify the most critical tasks and allocate them to technicians with verifiable safety certifications.

SUMMING UP

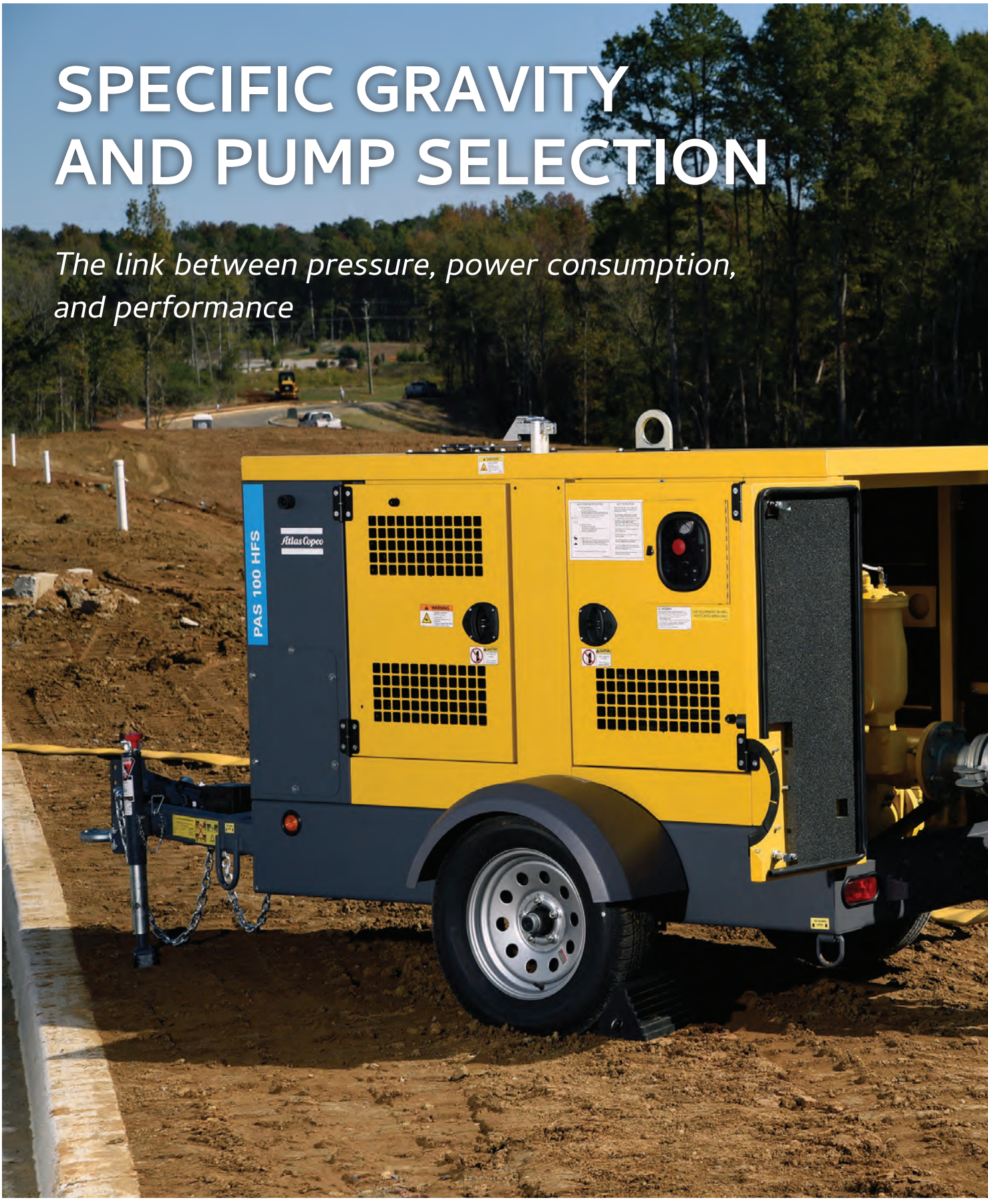
Improving plant safety requires the involvement of all plant employees. The goal of a safety culture is to protect all employees from injuries and prevent the damage of production equipment. CMMS programs have sufficient tools that guarantee the reliability of plant assets and reinforce the safety strategies of any company.

CMMS programs are flexible solutions that can be upgraded and customized with time. These updates are necessary for improving safety compliance and matching technological advancements.

BRYAN CHRISTIANSEN is the founder and CEO of Limble CMMS. Limble is a modern, easy-to-use mobile CMMS software that takes the stress and chaos out of maintenance by helping managers organize, automate, and streamline their maintenance operations. For more information, visit **www.limblecmms.com**.

SPECIFIC GRAVITY AND PUMP SELECTION

The link between pressure, power consumption, and performance



BY ANDREAS NEUFELD, ATLAS COPCO POWER TECHNIQUE

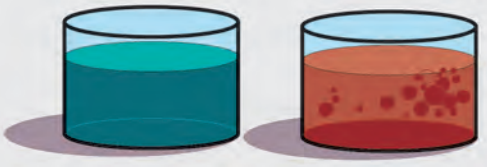
When choosing the right pump, one of those factors is the specific gravity of the fluid you intend to move. If it's water, specific gravity is not a worry. But, if you are working with other types of fluids, you must consider the effect the fluid type will have on your pump's performance and efficiency, and on its ability to provide you with long, maintenance-free service.

SPECIFIC GRAVITY DEFINED

The density of a substance is defined as its mass per unit volume. Water has a density of 62.43 pounds per cubic foot (or 997 kilograms per cubic meter). The term specific gravity refers to the density of a substance, such as another fluid, relative to the density of water.

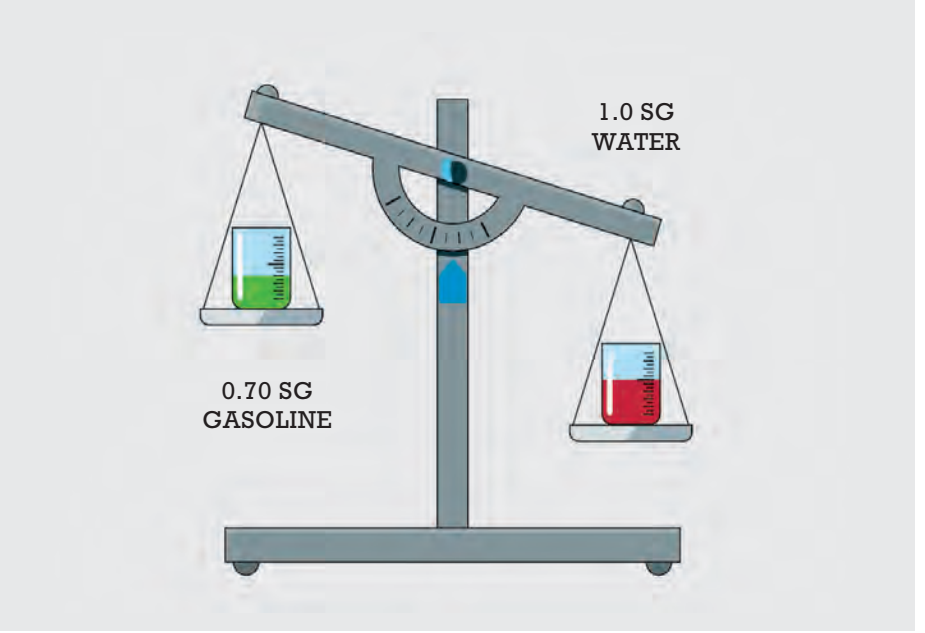
Because water is the standard scientists use to determine specific gravity, it has been assigned a specific gravity of 1. Thus, a liquid having a specific gravity of 0.4 will be 60 percent lighter than water, whereas a liquid having a specific gravity of 1.4 will be 40 percent higher than water.

Specific gravity is important when sizing a centrifugal pump because it's the determining factor in terms of a fluid's weight. Fluid weight has a direct impact on the amount of work that your pump can perform, which will, in turn, determine factors such as the amount of horsepower needed and the pressure that the pump can develop.



1. WATER (Reference Density)

2. SLUDGE (Higher Density vs. Water)



HOW DOES SPECIFIC GRAVITY AFFECT POWER CONSUMPTION AND PRESSURE?

The presence of solids increases the specific gravity and weight of the fluid being moved. The higher the specific gravity, the more motor power is required. For example, wastewater with a specific gravity of 1 will have little impact on motor power, whereas slurries or sludges with a higher specific density and weight will require more motor power. In fact, the increase or decrease in power consumed is directly proportional to the specific gravity of the liquid being moved.

The pump's pressure will change in direct proportion to the specific gravity of the fluid to be moved. While a pump may develop about 50 psi (pounds per square inch) while pumping water, when pumping a fluid with a specific gravity of 1.2, it will only develop pressure of 41.7 psi. We get this figure by dividing 50 by 1.2. Specific gravity is a relevant consideration when you are selecting a pump to develop a given pressure.

WHAT'S THE BEST ADVICE?

Seek professional help when choosing a dewatering pump. That way, you can be certain that the equipment you are using aligns with the needs of your application. For example, the professionals at Atlas Copco are experts in pumps and the myriad number of applications to which they can be assigned. Hopefully, you now have a better idea of what questions you should ask yourself. You can get the answers you need from an Atlas Copco pump equipment expert.

ANDREAS NEUFELD, Atlas Copco Power Technique's pumps product marketing manager, started his pumps career in technical service, working through applications with customers and now manages the pumps portfolio for the North American region. Atlas Copco's Power Technique business area offers a core portfolio of products including portable compressors, generators, light towers, and pumps along with dedicated construction products including handheld pneumatic, electric, and hydraulic tools and compaction and concrete products. In addition, it provides products and customized solutions for drilling, oil and gas, and geothermal exploration applications, among many others. For more information, visit **www.atlascopco.com/en-us/construction-equipment.**

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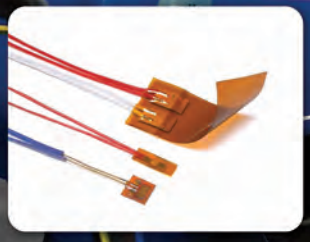

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VIBRATION MONITORING OF AN INTEGRALLY GEARED CENTRIFUGAL AIR COMPRESSOR

How to get the most from these compact, efficient, and reliable machines

BY INDIRA RAJAGOPAL, METRIX

A centrifugal air compressor is a rotating machine that uses centrifugal force to develop pressure for different applications. It accelerates air from the center of the impeller and then slows it down in a diffuser. During the air expansion process, the velocity energy is converted into potential energy and consequently the air is pressurized.

Multiple stage, particularly three-stage, centrifugal air compressors are very common in a plant. Each single stage can render pressure increases of 2:1 to 3:1, and a sequential third stage will end up with about an 8:1 pressure increase. Other advantages of three-stage compressors include the convenient control of temperature and moisture after each stage of compression. A centrifugal air compressor is a complex rotating machine made of many different components. Figure 1 illustrates some of them:

- Motor
- Bull gear with pinion gears to drive air compression stages.
- Inlet throttling valve or inlet guide vanes (IGVs)
- First air compression stage
- Intercooler 1
- Second air compression stage
- Intercooler 2
- Third air compression stage
- Aftercooler
- Blow-off valve
- Check valve
- Control panel

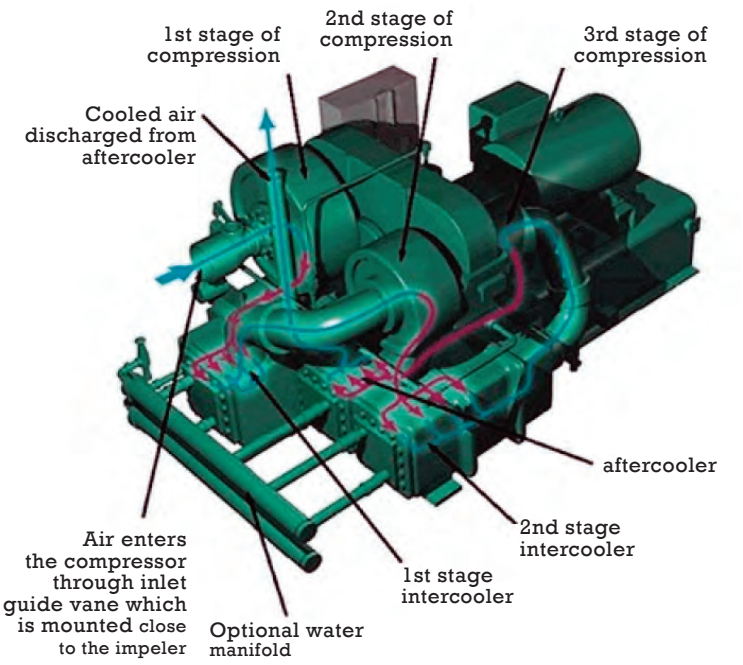


Figure 1: Basic internal parts and processes of a centrifugal air compressor.

APPLICATION

Modern centrifugal air compressors are compact, efficient, and reliable. Typically, they are mounted on a common base with motor, gears, coolers, piping and controls all integrated. A compressor controller is used to manage the air compressor capacity and reliability at a relatively constant outlet pressure. Recent advanced technology of centrifugal air compressor has brought tremendous benefits to users, such as oil-free air delivery, simple installation, low-cost

operation, and easy maintenance. As a result, a centrifugal air compressor is extensively used in various industrious and commercial applications including the following:

- Air separation
- Oil refining
- Power generation
- Chemical processing
- Food and beverage
- Petrochemical
- Plastics
- Electronics
- Pulp and paper plant
- Textiles

One example of applications in a chemical processing plant is shown in figure 2.

Figure 2: One typical application of a centrifugal air compressor.

FAILURES AND CAUSES

Catastrophic failure of the compressor can bring serious consequences to plant operations, such as failure of other equipment, safety hazards, downtime, lost production revenue, expensive repairs, and health issues. Compressor failures can be from different reasons, but the most common one is the mechanical component failure linked to unbalance, misalignment, fatigue or off-design, insufficient or improper lubrication, seal failures, and the build-up of foreign materials. Figure 3 shows a catastrophic compressor failure at a refining facility, which caused significant downtime and production losses.

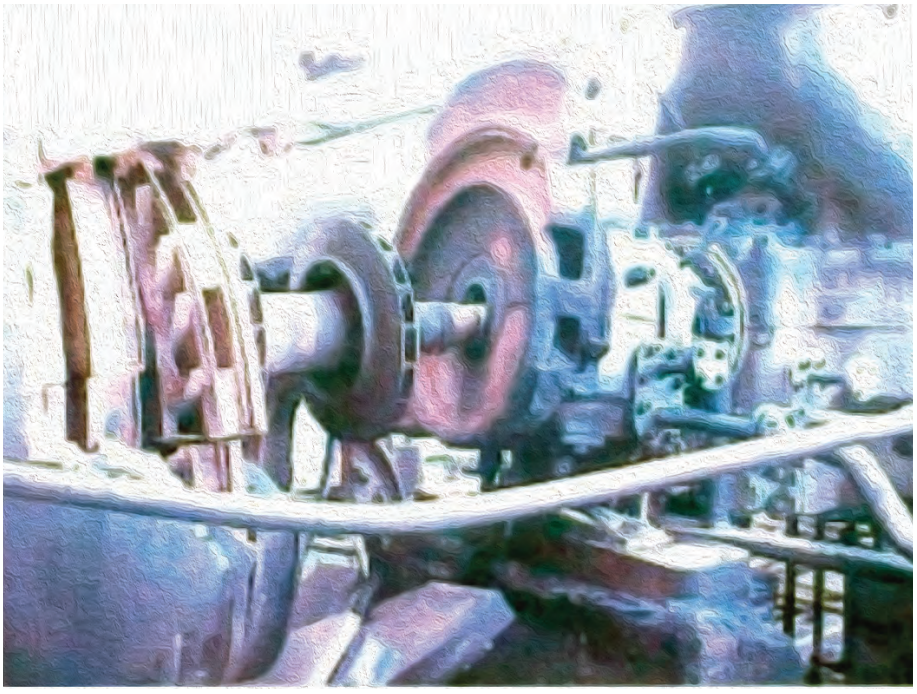


Figure 3: One instance of a centrifugal air compressor failure.

The shaft is the critical rotating part to transmit motion and carry forces within the compressor mechanism. The bearings are attached to the housing to provide both radial and axial support to the shaft. Therefore, vibration in the shaft or bearing housing will be the first symptom and genuine indicator of many problems of the centrifugal air compressor system.

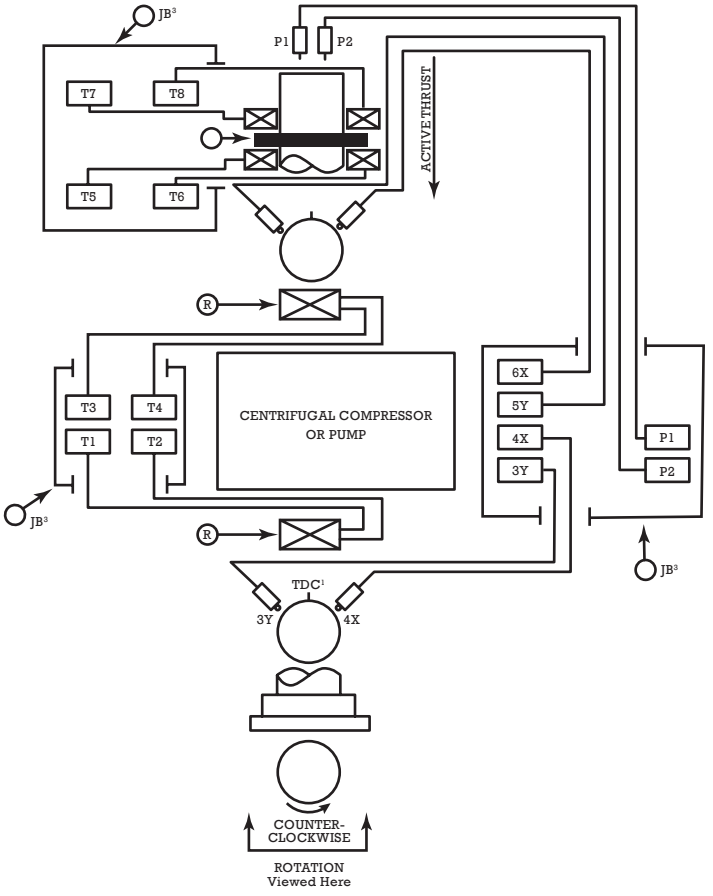
ASSET PROTECTION

Centrifugal compressors are vital assets to many production facilities and plants are relying on them for operation. It is important to have certain machine protection mechanisms to provide healthy status of the compressor and prevent catastrophic failure. Vibration monitoring is one of the most common methods that can detect many faults before they escalate into serious problems. The implementation of vibration monitoring can lead to many other benefits, such as:

- Increase uptime and production output
- Eliminate unexpected repair and unscheduled downtime
- Optimize maintain scheduling and machine performance
- Improve financial performance

The American Petroleum Institute (API) is a big advocate in developing equipment monitoring standards, and the API standards have been widely accepted by many rotary machine users. In 1970, API accepted proximity probes as measurement devices for determining the acceptable shaft vibration during factory acceptance testing. Known as the API 670 standard, it was revised later to add content concerning temperature and material for casing vibration measurements on gearboxes. In 2001, the API 670 standard was revised again and titled Machinery Protection Standard. API 670 has become the most widely applied standard for vibration monitoring in the world as it generally reflects recognized "good engineering practices" for vibration monitoring

Figure 4: API 670 typical system arrangement for a centrifugal compressor with hydrodynamic bearings.



VIBRATION, AXIAL POSITION, AND TEMPERATURE MONITOR

AXIAL POSITION		RADIAL VIBRATION INBOARD		RADIAL VIBRATION OUTBOARD		RADIAL BEARING TEMPERATURE	THRUST BEARING TEMPERATURE
P1	P2	3Y	4X	5Y	6X	T1, T2, T3, T4	T5, T6, T7, T8

KEY

P1 Axial position probe (instrument manufacturer ID data[2])
P2 Axial position probe (instrument manufacturer ID data[2])
3Y Inboard end radial vibration probe, 45° left of TDC[1] (instrument manufacturer ID data[2])
4X Inboard end radial vibration probe, 45° right of TDC[1] (instrument manufacturer ID data[2])
5Y Outboard end radial vibration probe, 45° left of TDC[1] (instrument manufacturer ID data[2])
6X Outboard end radial vibration probe, 45° right of TDC[1] (instrument manufacturer ID data[2])
R Radial bearing (description)
T Thrust bearing (description)

NOTE 1 TDC indicated top dead center (6.1.5.2).
NOTE 2 Instrument manufacturer ID data includes vendor's model and part numbers.
NOTE 3 Labels inside the junction box represent the signal conditioning interface modules to which the sensors should interface.

ADVANCED FEATURES OF MX2034 PROXIMITY TRANSMITTER

CROSS TALK ELIMINATION: Cross talk elimination is used when proximity probes are close together, typically less than 25 millimeters. This feature is used on one of the probes that could interfere electrically with another probe close by. One can shift the transmitter oscillation frequency making it different from the adjacent probe, thereby, preventing cross talk interference.

SPIKE SUPPRESSION: This feature is used to inhibit high amplitude electrical noise from outside the vibration monitoring system from impacting the performance of the vibration transmitter system. It temporarily suppresses high amplitude, short duration, typically less than 50 millisecond vibration spikes—like those induced possibly by a portable radio when keying the RF device.

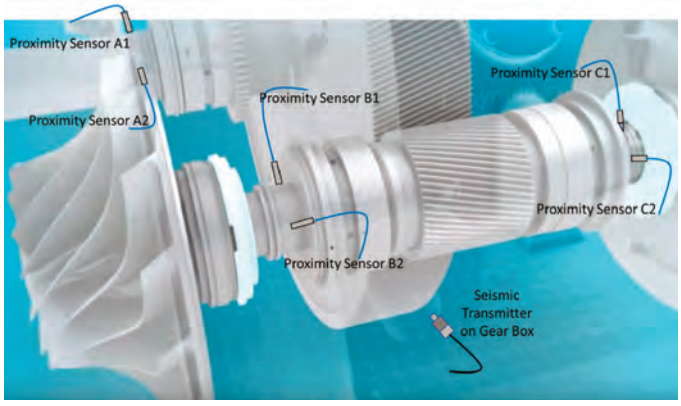


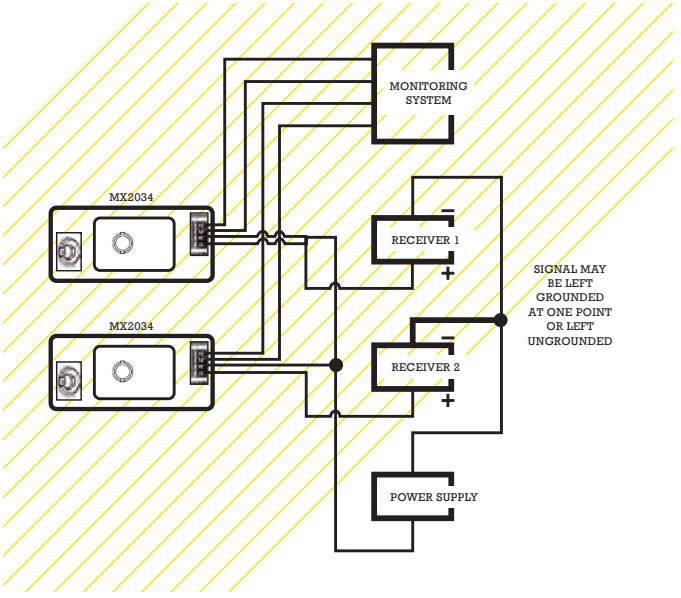
Figure 5: Metrix vibration monitoring products used on centrifugal air compressor.

systems. In figure 4, API suggests that a minimum of two axial position and two pairs of radial vibration probes (X and Y) shall be installed for a centrifugal compressor with fluid film bearings for shaft vibration monitoring. Experience also recommends a minimum of one set of seismic vibration sensors to be mounted on the bearing case to monitor the overall housing vibration.

PROTECTING COMPRESSORS AS THEY WORK

Metrix pioneered the concept of technology innovation and affordable machinery protection to its customers. Metrix supplies a complete vibration solution with both proximity and seismic product lines to meet different requirements from a variety of applications. The combination of the digital proximity system products MX2033 driver and MX2034 transmitter, as well as the SA6200A Accelerometer

Figure 6: Wiring diagram of MX2034 in centrifugal air compressor application.



or seismic transmitter ST5484E can protect your compressor and provide many benefits to your business.

To protect a three-stage centrifugal air compressor, it is recommended to install at least one MX2034 probe system per impeller to measure radial vibration and at least one seismic transmitter ST5484E for gear box vibration. The 4-20mA signal can be routed to a PLC/DCS Control System and the buffered raw signal can be available for diagnostic analysis. An improved system would use a pair of XY transducers at each bearing/seal. The typical installation and wiring are shown in figures 5 and 6.

EASY ADAPTABILITY AND USE

To protect the centrifugal air compressor in a greater degree, it is recommended to monitor the axial position and the speed of motor/impeller shaft as well. This can be achieved through configuration and utility software, such as the Metrix DPS system shown in figure 7.

Metrix MX2034 proximity transmitters have the capability to measure these parameters. The digital configurability of the MX2034 makes it easier for users to use any mode in the field to meet different requirements in your machine protection system.

Metrix pioneered the concept of simple, affordable machinery protection with its mechanical vibration switch offerings, revolutionary 4-20mA vibration transmitters, robust high-temperature velocity sensors, and innovative impact transmitter technology for reciprocating machinery. Metrix has been ISO-9001 certified for more than twenty years, which ensures that it never loses sight of quality and continuous improvement of its manufacturing processes. For more information, visit **www.metrixvibration.com**.

Figure 7: User interface of Metrix DPS configuration and utility software.

HOW TO DETECT LEAKS IN YOUR COMPRESSED AIR SYSTEM

BY EMILY NEWTON

Unaddressed compressed air leaks can lead to increased costs, equipment malfunctions, and other issues that cause headaches in industrial settings. However, you can't fix air compressor leaks before knowing they exist. Here are some steps you can take to identify such issues and prepare to address them.

LOOK FOR UNUSUAL CHANGES IN OPERATING METRICS OR EQUIPMENT BEHAVIOR

Even hidden air leaks can cause issues that people eventually notice before pinpointing the problem. For example, unfixed problems can add thousands of dollars to a company's operating expenses. Thus, if a plant manager sees creeping increases in energy usage without explanation, that's a signal to start looking for leaks.

Similarly, leaks can negatively affect the equipment that depends on compressed air to work. For example, a leaky system frequently experiences pressure drops. Those could hurt the performance and lifespan of pneumatic systems, leading to operational disruptions and more maintenance costs.

Increased equipment cycling can also occur due to leaks. Since that characteristic raises the air compressor's overall operating time, the machine could need replacing sooner than expected. Moreover, leaks may make compressors occasionally switch to loaded running modes outside of operating hours. That issue could cause as much as 25 percent more energy consumption when it happens over prolonged periods.

LISTEN AND FEEL FOR LEAKS

A leak doesn't produce a noxious odor or puddle on the floor, so it's not always easy to detect. However, the most straightforward way to spot one is to use your ears. Walk around the air compressor, paying close attention to it and any attached lines. You may hear a telltale hissing sound. However, if you're in a loud manufacturing environment, hearing that noise will probably become virtually impossible.

Using an auditory identification system can become more effective if every person who works with a company's air compressors takes responsibility by listening for leaks. Make sure everyone understands that some leaks are significant to feel, even when they're too quiet to hear.

Implement a system whereby every compressor with an identified leak has an associated tag. That approach makes it easier to quantify a leak problem and estimate the extra costs it causes. It's also useful for team members to know which components most often have leaks. Those include:

- Air hoses
- Hose connections
- Hose fittings
- Metal tubes (particularly if rusty)
- Air cylinders (around rod seals and piston packing)
- Piston-packing leaks (around the cylinder control valve's exhaust port)
- Flanges (often due to missing welds)
- Control and shut-off valves (because of worn packing)

- Filters, regulators, and lubricators (when improperly installed)

Teach people to try the simplest solution first after finding a leak. More specifically, have them check the connection and see if it needs tightening. If that check doesn't address the problem, more extensive troubleshooting becomes necessary.

USE SOAP TO ASSESS AIR HOSES

Another easy-to-implement leak-detection method involves something you can find in the nearest bathroom—soap. This method works on air hoses. Begin by unplugging the air compressor and covering the air compressor hoses with hand soap and a bit of water. Then, turn the system back on and examine the hoses. If you see bubbles form, escaping air is the culprit.

This method works well for catching tiny leaks. However, contrary to what many people think, a small leak needs prompt repair as much as a larger one. You should ideally treat each leak as a repair priority regardless of its size. That's not always realistic, though. Perhaps you're in a situation where your compressed air system has several problem areas of various sizes.

In that case, you can see significant cost savings even before fixing all of them. The best approach is then to tackle the largest leaks first to see the most noticeable outcomes. For example, fixing ten 1/4-inch leaks saves more money than fifty leaks 1/16-inch in diameter.

RELY ON AN ULTRASONIC LEAK DETECTOR

An ultrasonic leak detector is an often-preferred leak detection method. That's especially true if it's impossible or exceptionally challenging to find an air compressor leak with touch or hearing methods. Also, some leaks occur in hard-to-access places. In such instances, an ultrasonic leak detector can get the desired results.

Several types of ultrasonic technology exist. Airborne ultrasonic is the most common type utilized to find compressed air system leaks. Most tools used for this task allow an operator to tune the ultrasonic waves to various frequencies. The suggested frequency for leak detection is 40 kilohertz. However, some airborne ultrasonic equipment has a fixed frequency of 38 kilohertz.

As a person begins using an ultrasonic leak detector, they'll scan the area in all directions and may adjust the instrument's sensitivity. That's because the high-frequency sound waves coming from the ultrasound are low-energy. Thus, they'll bounce and reflect off solid surfaces instead of traveling through them.

After finding a leak's general area, the detector operator will usually slide a focusing probe on to the tip

of the airborne scanning module. Doing that helps pinpoint the leak's location by narrowing the field of view. If you already have a tagging system in place for logging leaks found through other methods, apply it to a walkthrough with an ultrasonic detector, too. The ultrasonic system will indicate the leak's decibel level. It's useful to include that information on the tag.

ESTABLISH A LEAK PREVENTION PROGRAM

Becoming more proactive about addressing leaks takes time and resources. However, creating a thorough plan to meet that goal can save you money and labor when fixing future leaks. One aspect to consider is whether you'll use in-house resources to find air compressor leaks or hire professionals from external companies. Manufacturing company AFG Flat Glass America opted for the former approach, and leaders sent some of its workers to receive ultrasonic certifications for leak detection.

Douglas Bowker, plant maintenance superintendent at an AFG facility in Greenland, Tennessee, explains, "Compressed air is not free. It costs Greenland approximately $137,000 per year to supply compressed air to the plant. Air leaks, therefore, cost us money. A small leak that is undetected by the human ear can typically contribute to $3,000 of cost per year. The ultrasonic equipment can now be utilized in a cost-saving manner to detect such leaks and fix them proactively."

You'll also need to decide how often to screen for air compressor leaks. Experts suggest inspections occur every four to six weeks and be carried out by plant maintenance personnel. Ensure that those workers scrutinize the compressed air equipment in every primary section of a facility. Set a firm timeline for when your company will have the written report of the findings, too. Making it available no more than a week after an analysis occurs is a best practice because it allows people to take efficient action to target any issues.

GET SERIOUS ABOUT AIR COMPRESSOR LEAKS

You may initially think air compressor leaks aren't significant issues. However, this overview emphasizes why they can become costly problems that affect operations throughout your company. Use the steps here to develop an action plan for dealing with leaks quickly and minimizing unwanted consequences.

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.

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FEATURED PRODUCT

VAUGHAN COMPANY

THE VAUGHAN CONDITIONING PUMP

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

APPLICATIONS

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

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

REDUCE VACUUM TRUCK VISITS

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

EXISTING NON-CLOGGING PUMPS EXPERIENCE CLOGGING

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

FLOATING LAYER OF GREASE AND DEBRIS ACCUMULATED

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

SETTLING SOLIDS ON THE FLOOR OF THE WET WELL OR SUMP

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

For more information, visit

WWW.CHOPPERPUMPS.COM.

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Researchers and manufacturers in the chemical, polymer, pharmaceutical, biopharmaceutical, and food and beverage industries require highly accurate chemical composition measurements. In the past, Raman spectrometers required the use of separate stand-alone computers hosting the software needed to convert raw measurements into usable data. Because of installation and system limitations, measurements often took place offline in a controlled laboratory setting, limiting accuracy and lab-to-process scalability. In contrast, the Kaiser Raman embedded analyzer collects in situ process measurements, enabling real-time process monitoring, optimization, and control. For more information, visit **www.us.endress.com**.

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SIMOTICS SD200 AC MOTOR

Providing high productivity and energy-efficient operation in all torque ranges, these new cast-iron NEMA motors are built to power pumps, fans, compressors, hoists, winders, and similar equipment in harsh environments. With a three-year warranty, the SD200 motors offer 75-800 horsepower output and feature 444-5013 cast-iron frames for operation in 460V and 575V ranges. They meet or exceed NEMA Premium MG1 Table 12-12 efficiencies. A wide selection of options is offered, including IP56 ingress protection, encoders, brakes, and blowers plus others to suit the applications presented. For more information, visit **www.usa.siemens.com/simotics-sd200**.

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SIM DRIVE COUPLINGS

SIM drive couplings are power transmission components used to couple the shafts of various mechanical devices, often of different sizes, and compensate for shaft misalignment. Four different styles of couplings are available: jaw/spider couplings provide a wide range of fitment and higher torque, Oldham couplings provide a higher speed rating and allow for a higher misalignment of mated shafts, servo beam style couplings add a significant increase to speed rating and have zero backlash, while high-gain couplings offer the highest speed ratings, excellent vibration absorption as well as zero backlash. For more information, visit **www.automationdirect.com/drive-coupling.com**.

SENSAPHONE

1400 AND 1800 EARLY WARNING SYSTEMS

The Sensaphone 1400 and 1800 systems let users remotely keep tabs on sensor reading fluctuations of pump status, tank level, and pump alarm outputs. The Sensaphone 1800 system can accommodate up to eight sensors to monitor conditions such as temperature, humidity, air circulation, carbon dioxide, water pH, water leaks, fire, smoke, power failure, and unauthorized access. The Sensaphone 1400 system can accommodate up to four sensors. Both systems connect to any traditional telephone line and provide 24/7 monitoring. For more information, visit **www.sensaphone.com**.

IMPROVING OUTDATED INFRASTRUCTURE DEMANDS NEW IDEAS

KloudGin's Vikram Takru on the pressures facing utilities

KloudGin's Vikram Takru

MPT: ***Could you explain some of the dangers posed by America's out-of-date utilities infrastructure?***

VIKRAM TAKRU: I look to classify that into four big things. The first thing is health and safety of our population—think about what happened in Flint when we had an aging infrastructure. Or what happened in California when we couldn't maintain our infrastructure? Well, we burn down cities. Or look at what happened in Texas. We had a big freeze and people die basically right there in their homes.

The second big thing is operational efficiency, which is directly linked to something we all can relate to, our monthly bills. Our utility bills always keep going up and up and up. We have never seen our bills go down. Why the heck are utilities so inefficient, which is causing our bills to go up? Also, it is affecting national economic well-being or GDP to stay competitive around the globe.

The third thing is around climate change and sustainability. Water is running scarce, and for the first time, water is trading as a commodity on Wall Street. Unfortunately, compared to oil where we have other options, there is no option to no water. So I think if we look at that situation, we need to become smart and fast. Otherwise, we all are screwed basically.

And the fourth area I look at, which is tied to aging, out-of-date utilities, is our ability to fight wars of the future. We are right now on the tip of the spear. Our future wars are not going to be fought with, you know, guns and fighter jets. These wars will be on our infrastructure. They will be cyber attacks on our critical utility infrastructure.

MPT: ***You've mentioned that the new Drinking Water and Wastewater Infrastructure Act provides resources for improvements, but what are some of the obstacles we'll need to overcome?***

VIKRAM TAKRU: The biggest problem that this act or any business runs into is the adage, "execution eats strategy for lunch," right? To address some of the big problems, right at a high level, it's easy to pass acts. It's also easy to get the money there, right? But the problem is that once you go into the details, then you realize that the national infrastructure is not one straight line.

The infrastructure for water and wastewater is owned jointly between cities, between investor-owned utilities, between residential and commercial owners, and various other people who own the property rights on where this infrastructure is. Basically, around where you own the water that comes to your home, it's not just coming from that utility. It has probably shared utility infrastructure from different cities and municipalities. Along with that, water is traveling basically in your home through an infrastructure that you actually own as a residential customer.

Keeping that in mind, to improve some of the key aspects of infrastructure—like, for example, removing lead and improving water quality—it is going to be a massive, just massive effort across communities, across people, and across utilities to execute on it.

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

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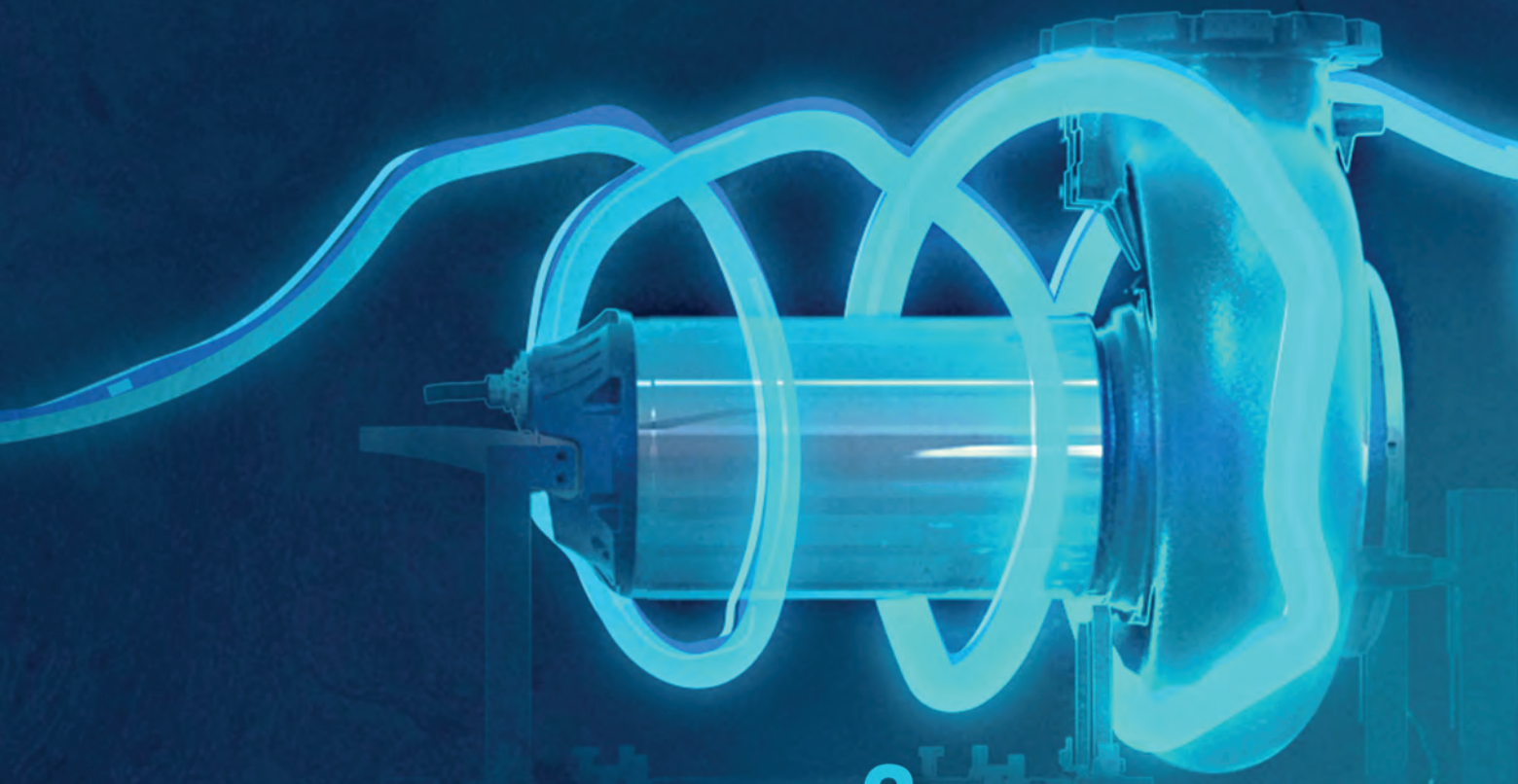

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