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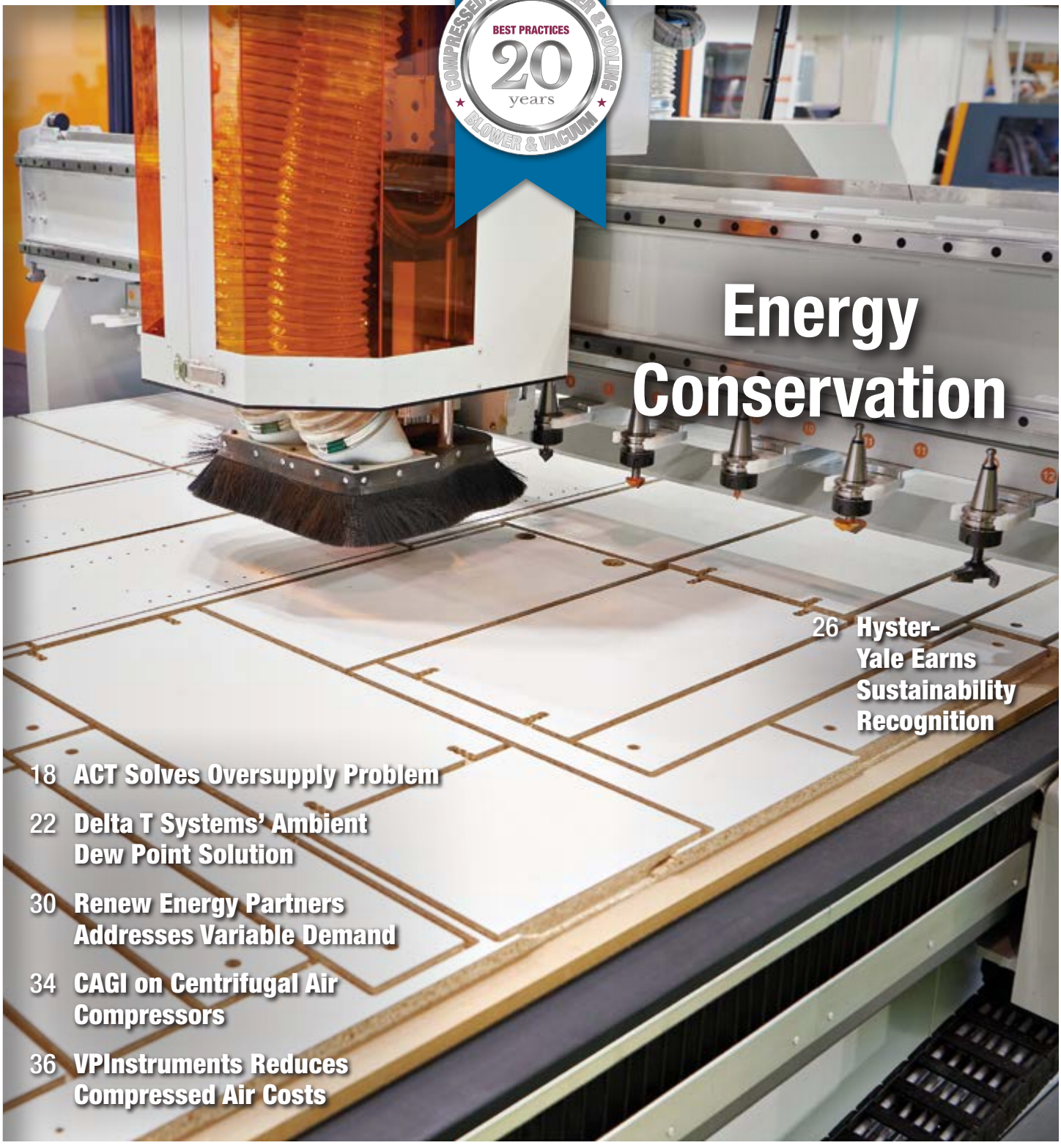
January/February 2026



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COMPRESSED AIR SYSTEM FEATURES

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LATEST NEWS

EVERY ISSUE

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FROM THE EDITOR

Get Smart about Energy Use

Energy efficiency gains to compressed air and chilled water systems quickly turn into six-figure savings. This month, we look at companies making intelligent adjustments.

Hyster-Yale's Greenville, NC, plant creates industrial lift trucks. Stephen Kelly, Senior EHS Manager, details how his company created a compressed air leak detection program, saving $107,000 in yearly energy costs. Addressing leaks allowed the maintenance team to lower the compressed air system's operating pressure from 116 psig to 105 psig. These efforts earned the company the Environmental Steward designation through the North Carolina Department of Environmental Quality's Environmental Stewardship Initiative.

Rick Holzhauer, Director of Engineering, and Jochen Naujokat, President, Delta T Systems, a chiller manufacturer in Richfield, WI, discuss work they did with a building materials company that wanted dew to form on the outside of its equipment. Having a custom ambient dew point chiller solution reduced cleanup for the customer's cement board and siding equipment from a full shift to only an hour.

Todd Riley, Owner, Advanced Compressor Technologies of Evansville, IN, explained how a furniture manufacturer's variable speed drive air compressor was unable to turndown enough to meet demand, so it repeatedly shut down. To avoid shutdowns, the plant opened a ¾-inch pipe to blow out compressed air. ACT's audit discovered replacing the air compressor with smaller VSD and fixed-speed air compressors would save the plant $400 per day in energy costs.

Steve Pritchard is the Managing Principal for Renew Energy Partners, which helps industrial and commercial companies install efficient equipment to meet sustainability goals. It saved an aeronautics manufacturer 125,500 kWh per year with compressed air system leak repairs and 113,000 kWh per year by adding a VSD air compressor to its compressed air system.

The Compressed Air and Gas Institute provided a myth-busting article on centrifugal air compressors. Discover the truth about centrifugal air compressors and varying compressed air loads.

We received a case study from VPInstruments, explaining how a furniture manufacturer replaced its air compressors and added real-time monitoring to use 20% less energy per year. Finally, the Hydraulic Institute shares the story of a municipal pumping station saving $50,000 annually with efficient pumps providing 30% more flow while using 10% less energy.

By the way, registration is already open for the Best Practices 2026 EXPO & Conference. You can sign up at https://cabpexpo.com. I hope to see you there.

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BEST PRACTICES

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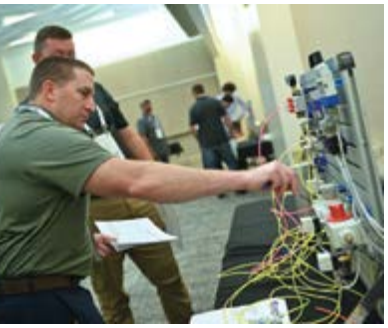
Registration Open for Best Practices 2026 EXPO & Conference

Facility maintenance, plant engineers, energy managers and distributor sales engineers can discover how to save energy and water, increase uptime and reduce product rejects by learning best practices for compressed air, nitrogen, HVAC/process cooling and blower/vacuum systems. Participate in educational sessions led by industry experts, hands-on workshops, certification opportunities and networking.



"I like that the instructor involved us in the Sales Engineering Workshop, asking the audience questions and having us role-play. I learned about asking higher-quality, open-ended questions. This was better than any conference I went to last year." ***– Bonnie Nichols, Sales Specialist, ADG Concepts***

"I'm looking to establish a strong network of some of the world's best compressed air experts, because we need some assistance writing best practices and refinery engineering practices. It all starts with first getting the right network of people." ***– Raymond Hooks, Utilities and Chemical Transfer Engineer, Phillips 66***

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Subscribers From Around the World

We salute all Best Practices Magazine subscribers from around the world who own, operate, maintain, engineer and provide expertise for the on-site utilities (compressed air, nitrogen generation, vacuum, blowers, chillers, cooling towers and pumps) powering modern plant automation. This subscriber-driven monthly column hopes to build community and recognize all subscribers!

Brandon & Clark is a distributor for Atlas Copco and FS-Curtis, celebrating 75 years of service. Its headquarters is in Lubbock, TX, with six additional locations in Hereford, Odessa, Fort Worth, Dallas and Lubbock. It has experience in oil and gas, pulp and paper, mining and aggregate and cement. Pictured here are Brandon Goodwin, Chad Carpenter, Israel Rodriguez, Nick Escobar and John Curtis (top row, left to right), and Samuel Tamplen, Danny Montelongo and Tanner Haire (bottom row, left to right).

We were thrilled Ball Corporation chose to visit the Best Practices EXPO & Conference once again, this time with a five-person team. Ball Corporation supplies sustainable aluminum packaging solutions and was founded in 1880. Pictured here are Amy Rueter, Bill Mellott, Dani Johnson, Paul Traxler and Steven Hanks (left to right).

Another major manufacturer at the 2025 Best Practices EXPO & Conference was Plastipak Packaging, maker of sustainable packaging solutions, represented by Steve Leining, Engineering Department Manager. "Today, I've gone to a couple of the conferences and the Maintenance Pavilion," he said. "I got to learn a lot more about air filtration and microbial contamination that could be in the compressed air system that I didn't think to look for before."

Submission Guidelines

We invite our subscribers to send in pictures so we can see the people who read our Best Practices magazines! Those holding a recent magazine issue will receive first consideration. Please send a high-resolution picture as a JPG with a note describing the team and company to Troy Dreier at troy@airbestpractices.com.

The Women In Compressed Air, Vacuum & Cooling (WCVC) Networking Group hosted its third annual in-person meeting during the 2025 Best Practices EXPO & Conference, and once again saw a strong turnout. Rachel Leins, C.E.M., Program Manager, TRC Companies, and a member of the WCVC Executive Council, welcomed attendees and explained the group's mission. The next day, she chaired a conference track on "Maintenance Monitoring Tools to Eliminate Leaks and Pressure Loss."

The WCVC is called a networking group for a reason: It gives women from all parts of our industry a chance to come together for learning and fellowship. Pictured here are Julia Ferrell, Bay State Milling Company; Lisa Lewis, Tamsan-USA Compressors; Sarah Becker, Cast Compressor; and Liz Hamersma, ELGi Compressor USA (left to right).

NEWS Compressed Air Industry & Technology

John Bouchard & Sons Celebrates 125th Anniversary and Its Imprint on the Mid-South's Essential Infrastructure

John Bouchard & Sons (JBS) is celebrating its 125th year of building and sustaining hardworking infrastructure.

From the first refrigeration systems in the Hermitage Hotel and Vanderbilt Hospital to advanced manufacturing infrastructure across the modern Mid-South, the JBS tradition of innovation and excellence has helped create and maintain the systems that facilitate flourishing communities. Headquartered in its original location near Nashville's Capitol Hill, with its foundry facility only a few blocks away, JBS operates branch offices in Knoxville, TN, Elizabethtown, KY and Evansville, IN.

"We're still here because we hold ourselves to high standards – get it right the first time, treat customers as we hope to be treated, tell the truth and be like family to each other," said fifth-generation Owner, Lisa Bouchard Morgan. "These values organically grew through the mentoring and camaraderie of our great people. The genuine diversity of our capabilities in 10 unique trades evolved to meet customer needs. The agility this brings to our clients is unique."

The John Bouchard & Sons team gathered for a group photo in 2025.

Begun as a forge metal works shop on Harrison St. and adapting as industry and technologies have changed, JBS now provides equipment sales and service, iron construction castings, construction and machine services to thousands of commercial, institutional, industrial and municipal customers. Over 12 decades, the diversified business has equipped places like Churchill Downs, Oak Ridge National Laboratory, Eastman Chemical, See Rock City, Redstone Arsenal, Vanderbilt Hospital, Metro Water, Bridgestone Americas, Coca-Cola Bottling, the Schermerhorn Symphony Center, Starbucks stores, Memphis International Airport and thousands in between, each receiving customized solutions. For more information, visit https://jbouchard.com.

Texas Compression Services Launches Lafayette Compression Services to Expand Reach Across Louisiana

Texas Compression Services announced the launch of Lafayette Compression Services (LCS) – a new branch dedicated to serving customers across southern Louisiana.

The new operation, based in the greater Lafayette area, allows the company to deliver faster response times and localized support for customers from Lake Charles to New Orleans. The expansion represents a major step forward in Texas Compression Services' regional growth strategy, ensuring Louisiana customers receive the same high-quality service and equipment reliability TCS is known for throughout Texas.

"Our Louisiana customers have always been an important part of our business," said Robert Casey, General Manager, Texas Compression Services. "By opening Lafayette Compression Services, we're doubling down on our commitment to quick response times, dependable service and long-term support. It's about being close enough to act when our customers need us most."

Lafayette Compression Services will specialize in the sales, service and maintenance of industrial air compressors, dryers, nitrogen generators and related equipment, including preventive maintenance programs, emergency repairs and turnkey installations. The Lafayette location strengthens the company's ability to provide on-site support for a growing number of facilities in the petrochemical, manufacturing and construction industries throughout the Gulf Coast corridor.

While the branch is newly launched, customers will recognize familiar faces behind the name. The Lafayette team is composed of seasoned service technicians and coordinators with extensive experience in compressed air systems and customer care. Rebranding is already underway, with LCS-branded service trucks rolling out across Louisiana in the coming weeks.

The Lafayette branch will also provide a logistical advantage for inventory and parts distribution, reducing downtime and improving service efficiency across state lines. For more information, visit https://texascompressionservices.com.

The Texas Compression Services team is growing its reach across Louisiana with the new Lafayette Compression Services branch.

Atlas Copco Launches the ZGH 100-200 VSD+ Oil-free, Rotary Screw Air Compressor Series

Atlas Copco introduced the ZGH 100-200 VSD+ Series, marking a significant milestone in its high-pressure compressed air portfolio.

The ZGH is a high-pressure, oil-free, rotary screw booster engineered to deliver pressures up to 435 psi (30 bar). This solution offers a screw technology for high-pressure applications, such as PET blowing, food and beverage, pharmaceuticals, semiconductors and various other industrial processes, with minimal operating costs and higher uptime.

Atlas Copco's ZGH VSD+ Series

The Atlas Copco ZGH 100-200 VSD+ air compressor series is focused on effectively saving energy, ensuring product safety and guaranteeing the utmost reliability around the clock. The ZGH's superior oil-free rotary screw elements provide the optimum combination of high free air delivery (FAD) with the lowest energy consumption. Ample-sized cooling, low-pressure drops and an extremely efficient drive train result in the highest air compressor package efficiency.

The ZGH is powered by a class-leading IE5 (97%) permanent magnet motor with an IP66 rating, making it suitable in challenging environmental conditions with efficient performance. It features a built-in NEOS drive and can operate from 20-100% load without wasting energy from unloaded operation, resulting in huge energy savings during periods of low to medium air demand.

This series offers a compact footprint with the highest flow/footprint. The totally integrated, ready-to-use package includes internal piping, coolers, motor, lubrication and control system. Components are built for longer lifetime and grouped together for ease of access, minimizing service time.

The ZGH is equipped with an Elektronikon® Touch controller to optimize system performance and maximize efficiency. Smartlink feature enables remote monitoring of the system and preventive service notifications for higher uptime. For more information, visit https://www.atlascopcogroup.com.

Gardner Denver Unveils Gardner Denver Payment Solutions Financing Program

Gardner Denver launched Gardner Denver Payment Solutions, a powerful new financing program designed to help businesses invest in compressed air systems without the burden of large upfront costs.

This customer-first initiative offers flexible, budget-friendly payment plans that make it easier than ever to acquire essential equipment like air compressors and compressed air treatment systems, including refrigerated and desiccant compressed air dryers.

"We understand capital investment decisions can be challenging, especially in today's economic climate," said Nathan Blasingame, Vice President of Distribution Sales, Gardner Denver. "This program removes financial barriers and gives our customers the flexibility to invest in the equipment they need to grow and succeed."

The program offers flexible financing options so customers can choose payment terms aligning with their cash flow and business goals. Customers can get the systems they need now, without waiting for budget cycles. They can preserve capital, keeping liquidity available for other strategic investments.

Gardner Denver Payment Solutions is available now through authorized Gardner Denver distributors and sales representatives. For more information, visit https://www.gardnerdenver.com.

NEWS Compressed Air Industry & Technology

BEKO TECHNOLOGIES Acquires Majority Stake in CALMS

Global compressed air specialist BEKO TECHNOLOGIES announced its majority stake in Slovenian company CALMS. With this strategic partnership, BEKO TECHNOLOGIES is specifically strengthening its digital portfolio and further expanding its position as a provider of integrated solutions for compressed air treatment and compressed air system management.

CALMS specializes in the development of innovative hardware and software solutions for the digital networking of the various components of a compressed air system. The company's cloud platform combines data-based analysis and evaluation with user-friendly visualization, thus delivering added value for plant operators, auditors and service technicians.

"With CALMS, we are not only gaining a highly innovative technology company, but also a team that shares our vision: to make compressed air systems smarter, more efficient and more sustainable, thereby providing users with real benefits," said Yannick Koch, Managing Director, BEKO TECHNOLOGIES. "CALMS' solutions ideally complement our portfolio and open up new possibilities in the areas of fault detection, energy efficiency and system integration."

With its stake in CALMS, BEKO TECHNOLOGIES adds digital products and services to its range. Particularly noteworthy is the ability of the analysis programs developed by CALMS to precisely identify deficiencies in compressed air systems and derive concrete recommendations for action. For more information, visit https://calms.com and https://www.beko-technologies.com.

CALMS Managing Director Gorazd Bregar and BEKO TECHNOLOGIES Managing Director Yannick Koch (left to right)

FS-Curtis Launches ECO-Pure Oil-Free Rotary Screw Air Compressor Series with Advanced Bearing Design

FS-Curtis announced the launch of the ECO-Pure Oil-Free Rotary Screw Air Compressor Series. Designed for industries where air purity is non-negotiable, the ECO-Pure Series delivers Class 0 certified oil-free air with advanced efficiency, low maintenance and long-term dependability.

FS-Curtis's ECO-Pure Oil-Free Rotary Screw Air Compressor

The ECO-Pure Series features an advanced bearing design that eliminates the need for a balancing piston and diaphragm, reducing maintenance and potential failure points while improving reliability. Its dual-stage jacket cooling ensures stable temperatures for consistent, efficient operation. The ECO-Pure has an integrated oil tank and a simplified design, which reduces service needs and potential leak points. It has built-in moisture separation, and its zero-loss drain provides cleaner, drier air and enhanced system protection.

The ECO-Pure Series provides reliable, oil-free air for industries that demand uncompromising purity and performance, including food and beverage, electronics, pharmaceuticals, power generation, oil and gas, mining and medical manufacturing.

"ECO-Pure represents the next generation of FS-Curtis oil-free technology," said Tony Montalto, Vice President of Oil-Free Sales, FS-Curtis. "It combines the dependable engineering our customers trust with innovative energy-saving features that lower operating costs while maintaining the highest standards of air quality and reliability." For more information, visit https://us.fscurtis.com.

Bobcat Introduces EA Series Variable Speed Air Compressors Featuring a High-Capacity, Two-Stage Airend

Bobcat Company has expanded its industrial air compressor portfolio with the introduction of EA Series variable-speed models. Designed for top-tier flow rates and maximum energy efficiency, the new lineup is built to meet the demanding needs of modern industrial operations.

Each model features an IE5 energy efficiency-class electric motor using permanent magnet synchronous motor (PMSM) technology. Additionally, the variable-speed drive automatically adjusts air output directly to meet demand, which prevents wasteful cycling and maximizes energy savings. At the core of each unit, the high-capacity, two-stage airend is configured in an over-under setup to deliver superior flow rates across horsepower ranges. A variable-speed fan extends component life by maintaining ideal operating temperatures.

The EA Series is equipped with smart operational features and backed by Bobcat's commitment to durability and service. The air compressors feature an advanced controller for intuitive operation. This system allows connection to, and intelligent optimization of, up to three additional air compressors, ensuring the entire compressed air system operates at peak performance based on demand.

"The new EA Series represents a leap forward in industrial air compression technology for Bobcat," said Cody Blythe, Product Manager, Bobcat Company. "These machines offer exceptional flow rates paired with peak energy efficiency, providing our customers with a powerful solution that lowers their total cost of ownership through reduced electricity usage." For more information, visit https://www.bobcat.com.

Bobcat's EA100VS air compressor

Parker Hannifin to Acquire Filtration Group Corporation

Parker Hannifin Corporation has entered into a definitive agreement to acquire Filtration Group Corporation on a cash-free, debt-free basis for a cash purchase price of $9.25 billion. The transaction is expected to close within six to 12 months.

Filtration Group, a U.S.-based private company and affiliate of Madison Industries, adds complementary filtration technologies serving key growth markets with strong product brands that are often validated and specified. The company's highly-engineered products use proprietary media and leverage strong technical and application knowledge and processes. Approximately 85% of sales are generated in the aftermarket, creating strong recurring revenue streams across multiple product platforms. Filtration Group has a strong organic growth profile and serves high value, performance-critical applications. Filtration Group expects calendar year 2025 sales of $2 billion with adjusted EBITDA margin of 23.5% and employs approximately 7,500 team members serving customers around the world.

"This strategic transaction continues our investment in high-quality businesses that continue to transform our portfolio, accelerate sales growth and improve profitability," said Jenny Parmentier, Chairman of the Board and CEO, Parker. "The acquisition will create one of the largest global industrial filtration businesses. Filtration Group's complementary capabilities and strong aftermarket presence enhances our ability to serve customers globally."

By leveraging its business system, The Win Strategy™, Parker estimates pre-tax cost synergies of approximately $220 million by the end of year three following completion of the transaction. The transaction is expected to be accretive to Parker's organic growth, synergized EBITDA margin, adjusted EPS and cash flow, and to achieve a high single-digit cash ROIC by year five.

"Filtration Group is excited to become part of Parker," said Jon Pratt, President and CEO, Filtration Group. "Together, our mission-critical offering of advanced filtration technologies will create a broader portfolio of solutions for customers. Parker is an exceptional company, and we are confident Filtration Group will benefit from Parker's increased scale, technical knowledge and disciplined approach to driving growth." For more information, visit https://www.parker.com.

Midwest Control Introduces Motorized Ball Valve Drain

Midwest Control introduced the Motorized Ball Valve Drain MD Series (MD-100BV, MD-75BV and MD-50BV), an advanced, intelligent solution designed for automated condensate discharge in compressed air systems and other fluid control applications.

Midwest Control's Motorized Ball Valve Drain MD Series

Built with the highest-quality materials and engineered for performance, this product simplifies maintenance while enhancing reliability in demanding environments. Its smart microprocessor control, rugged construction and non-clogging operation make it a dependable choice for protecting compressed air systems from excess condensate and unnecessary downtime.

Housed in a fire-resistant ABS enclosure, the unit is watertight and compact, rated IP65/NEMA 4 for dependable performance in harsh conditions. The durable forged brass valve handles pressures up to 600 psig (41.4 bar), making it suitable for a wide range of industrial applications. It features a microprocessor-based controller with 10 pre-programmed cycle settings for flexible, automated operation. It offers fully adjustable timing with an interval time of 1 second to 999 hours and a discharge time of 1 second to 999 hours, allowing users to customize to their system's exact requirements.

The Motorized Ball Valve Drain MD Series has a user-friendly interface, with a manual test switch and LED status indicators making diagnostics quick and intuitive. The drain can be mounted in any position for ease of setup and integration into existing systems.

The drain comes with a six-foot power cord and supports 115V and 230V systems. It performs reliably in temperatures from 34°F (1°C) to 131°F (55°C), and is UL approved and life-tested for 200,000+ cycles to ensure long-term durability. For more information, visit https://midwest-control.com.

NEWS Compressed Air Industry & Technology

Registration Opens for Best Practices 2026 EXPO & Conference in Indianapolis, IN, Oct. 13-15

Registration is open for the 9th annual Best Practices EXPO & Conference at the Indiana Convention Center in Indianapolis, IN, Oct. 13-15. Designed for facility maintenance, plant engineers, energy managers and distributor sales engineers, this event is devoted to sustainable, safe and reliable on-site industrial plant utilities powering automation – including compressed air, nitrogen, HVAC/process cooling and blower/vacuum systems.

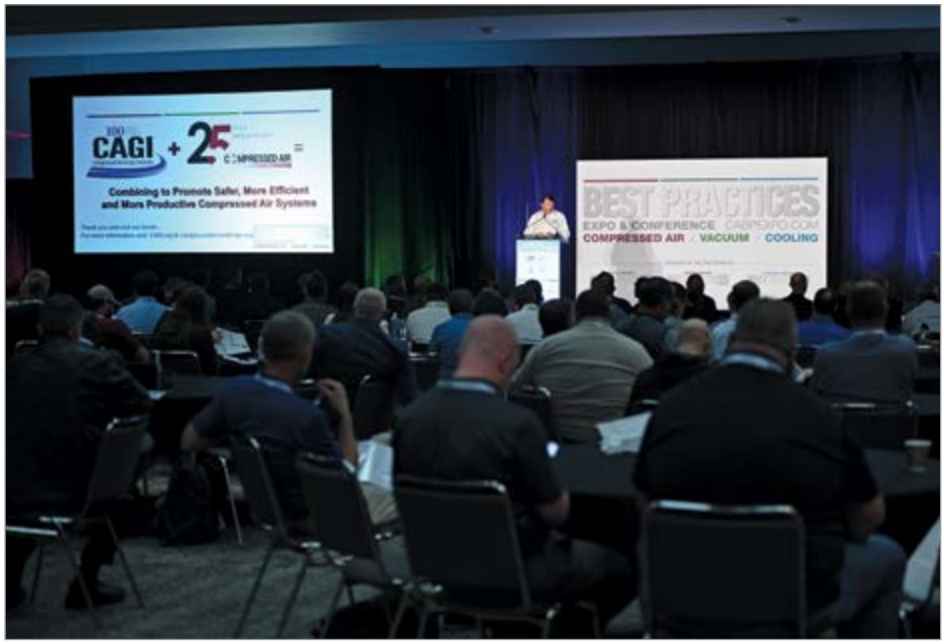
Conference attendees receive access to hands-on workshops with their pass.

Facility maintenance and engineering will discover how to save energy and water, increase uptime and reduce product rejects. Educational sessions are led by industry experts, with hands-on workshops, certification opportunities and networking. Earn up to 12 PDHs.

"Facility engineering and maintenance attend to improve plant profitability," said Roderick M. Smith, Publisher, Best Practices Magazines & EXPO. "Distributor sales engineers improve technical knowledge and territory management skills."

At the 2025 event, Mark Allen Roberts, CEO, OTB Solutions, introduced a sold out Sales Engineering Workshop. Sales Foundations will return for 2026, covering the formal sales process, earning meetings with new prospects, discovery questions, qualifying questions and closing skills. Precision Prospecting will be added, focusing on identifying ideal targets, crafting outreach that earns responses and creating a repeatable process for filling the sales pipeline.

Facility maintenance will interact with fully operational table-top compressed air labs with pneumatic circuits to learn how to reduce the demand of compressed air at Compressed Air Demand Reduction Workshop led by experts from SMC, Gentex and The Analysts.



Best Practices 2026 EXPO & Conference will take place Oct. 13-15 in Indianapolis, IN.

Industrial Chilled Water Workshop designed for facility engineering focuses on chiller and cooling water systems. It's led by experts from 3M, EVAPCO and Integrated Services Group. Pneumatic Conveying Workshop covers dilute and dense phase fundamentals, and the instructor is Jonathan McPherson, Director of Advanced Manufacturing and Bulk Solids Technology Center, Kansas State University.

The Compressed Air & Gas Institute will offer the Certified Compressed Air System Specialist Exam on-site at the event at a reduced price. Compressed Air Challenge will host its Level 1: Fundamentals of Compressed Air Systems course, teaching how to achieve 10-30% cost savings through more effective production and use of compressed air.

More than 80 global compressed air, nitrogen, HVAC/process cooling and blower/vacuum OEMs will be exhibiting on the EXPO floor. There will be further educational opportunities at the New Technology and Leak Detection Pavilions.

Contact Kimberly Hill for group discounts at kimberly@airbestpractices.com. Register at https://cabpexpo.com/registration-2026.

Burckhardt Compression Expands North American Service Footprint

In line with Burckhardt Compression's customer-centric approach, the company announced the opening of two new regional service centers – one in Sarnia, Ontario, and another in Pottstown, PA – alongside the recent acquisition of Advanced Compressor Technology (ACT) in the U.S. These milestones underline the company's ongoing optimization of its North American footprint, enhancing its ability to deliver faster, more efficient and locally responsive support across the continent.

Burckhardt Compression opened a 12,916-square-foot regional service center in Sarnia, Ontario, marking a significant step in expanding its Canadian operations. The new hub offers sales, testing and maintenance support, complementing the company's existing facilities in Drumheller and Edmonton. By adding this site in Eastern Canada, Burckhardt Compression aims to reduce shipping times and costs, improve efficiency and enhance profitability for customers in the region.

In the U.S., Burckhardt Compression opened a 11,000-square-foot service center in Pottstown, PA. The fully equipped and certified facility provides comprehensive maintenance, repair and upgrade solutions for all types and brands of reciprocating gas compressors. The Pottstown facility provides expert shop and field services, installation and commissioning support and emissions management capabilities.

The ACT acquisition adds local manufacturing and service capabilities in the U.S., strengthening parts availability, enhancing turnaround times and broadening Burckhardt Compression's expertise in downstream and industrial gas sectors. For more information, visit https://www.burckhardtcompression.com.

Ananth Srinivasan, Douglas Berkley, Michael Smith and Tim Lillak of Burckhardt Compression (left to right) at the opening of the Pottstown service center.

NEWS Chiller & Cooling Industry & Technology

Diversified Heat Transfer Announces Hoffman Hydronics as a Manufacturer's Representative in Georgia

Diversified Heat Transfer announced a strategic partnership with Hoffman Hydronics. The company has been named as the exclusive manufacturer's representative for DHT in the state of Georgia.

Hoffman Hydronics specializes in providing comprehensive hydronic HVAC and engineered plumbing equipment solutions for the commercial, institutional and industrial sectors. This partnership will bring DHT's full line of products, including Sussman Electric Boilers, as well as its entire line of hot water heaters and heat exchangers, to engineers and facility managers across the state.

"Hoffman Hydronics' deep expertise in hydronic systems, commitment to customer-oriented service and established presence in the Georgia market make them the ideal partner to expand our footprint," said Chris Bove, National Sales Manager, DHT.

Hoffman Hydronics is well-known in the region for offering products from top HVAC manufacturers, covering everything from pumps and pump packages to boilers, water heaters and steam products. The Hoffman Hydronics Atlanta team will now represent the full range of Sussman Electric Boilers, including the compact EWx Series, and the extensive DHT water heater and heat exchanger product lines throughout Georgia.

Diversified Heat Transfer's headquarters in Towaco, New Jersey

Ian Barnard, Georgia Sales Manager, Hoffman Hydronics, said, "Partnering with DHT and Sussman adds significant value to our portfolio. In today's evolving market, our clients are increasingly looking for high-efficiency, zero-emission heating solutions, and the reliability and advanced engineering of DHT's superior products will allow us to better serve our customers' decarbonization and efficiency goals." For more information, visit https://www.hoffmanhydronics.com/atlanta-ga and https://www.dhtnet.com.

Cullum & Brown Named Authorized Distributor of G&D Chillers

Cullum & Brown announced it's now an authorized distributor of G&D Chillers, a trusted leader in process cooling solutions. For decades, G&D has built a reputation for designing and manufacturing reliable, high-performance chillers that serve industries where precision and efficiency are critical. With this addition to its product lineup, Cullum & Brown can now provide customers with even more options to meet their cooling and process needs.

Founded with a focus on quality engineering and customer service, G&D Chillers has grown into one of the most respected names in industrial cooling. The company specializes in designing chillers delivering precise temperature control, energy efficiency and long-term durability. Its equipment supports a wide range of industries, including food and beverage, manufacturing, medical and plastics.

In 2024, G&D became part of Ingersoll Rand, a global leader in industrial technologies. This partnership has strengthened G&D's resources and innovation capacity while maintaining the craftsmanship and service customers have trusted for years. Together, the companies are advancing cooling technology with even greater reliability and performance.

G&D Chillers offers a complete line of process cooling systems, including portable and packaged chillers, central chillers, custom-engineered systems and accessories and controls.

Adding G&D Chillers to its lineup reflects Cullum & Brown's ongoing commitment to deliver the best equipment and service for its customers' operations. Whether customers need a reliable cooling system for food and beverage production, a high-capacity solution for industrial manufacturing or a custom-engineered design for a unique application, Cullum & Brown and G&D Chillers has them covered. For more information, visit https://www.cullumandbrown.com.

The Cooling Technology Institute Board Elects Ian Horne as President for 2026-2028 Term

The Cooling Technology Institute announced its Board of Directors has elected Ian Horne to serve as President for the 2026-2028 term. Horne will begin his term at the conclusion of the 2026 CTI Annual Conference.

Horne currently serves as a Water Technology Specialist for Airgas, where he supports water treatment operations and technical initiatives across North America. With more than 24 years of experience in industrial water treatment, including extensive work in the petrochemical sector, Horne brings a deep understanding of system performance, water chemistry and the technologies that support safe and efficient heat rejection systems.

Horne has been an active participant in CTI for many years and previously served on the CTI Board of Directors for the 2023-2025 term, including service as the Owner/Operator Chairperson. His leadership, technical insight and commitment to supporting CTI's mission have earned him the respect of colleagues across the industry.

Ian Horne, President, 2026-2028, CTI

"We are pleased to welcome Ian into this leadership role," said the CTI Communications Director. "His industry experience, dedication to collaboration and strong engagement with CTI programs make him an excellent choice to guide the Institute through the coming years." For more information, visit https://www.cti.org.

Trane Technologies Ignites a New Era for Smart Buildings with AI Control and AI Agent

Trane Technologies announced two groundbreaking developments: AI Control and ARIA, leveraging advanced technology to keep customers at the forefront of building optimization and energy management.

"We've conducted hundreds of thousands of energy audits in commercial buildings and most operate about 30% inefficiently," said Holly Paeper, President, Commercial HVAC Americas, Trane Technologies. "Through our purpose-built AI solutions for thermal management systems, we can help building owners dramatically reduce energy waste, lower operating costs and enhance sustainability."

AI Control is a fully integrated, AI-powered solution that continuously analyzes building data – including occupancy, weather forecasts and energy usage – and automatically adjusts HVAC operations for peak efficiency and sustainability. AI Control can reduce heating and cooling energy costs by up to 25% and carbon emissions by up to 40%.

AI Control fully integrates AI into Trane's control architecture, combining Trane's Tracer® SC+ Building Automation System and Trane® Autonomous Control. This eliminates the need for additional equipment or staffing, allowing owners to maximize system performance and realize savings from day one.

Trane's ARIA AI-building agent

ARIA, an AI-building agent, provides facility teams with intuitive, conversational access – via mobile or desktop in over 14 languages – to actionable insights and recommendations, making HVAC and facility management smarter and more proactive.

ARIA and AI Control were developed by the BrainBox AI Lab, Trane Technologies' engine delivering cutting-edge digital and AI innovation for heating and cooling solutions.

"Our vision is to unlock next-generation building performance, delivering both immediate and long-term benefits for our customers and the planet," said Riaz Raihan, Senior Vice President and Chief Digital Officer, Trane Technologies. "AI can provide tremendous value for building owners and facilities managers to achieve their goals and prepare for the future." For more information, visit https://www.tranetechnologies.com.

NEWS Industrial Energy & Water Conservation

CalPortland's Rillito Cement Plant Earns 13th EPA ENERGY STAR Certification

The Rillito Cement Plant owned by CalPortland, a manufacturer of high-quality building materials, has earned the U.S. Environmental Protection Agency's ENERGY STAR certification. This signifies the industrial plant performs in the top 25% of similar facilities nationwide for energy efficiency and meets strict energy efficiency performance levels set by the EPA. This is the 13th year the Rillito Cement Plant has earned the ENERGY STAR, reflecting a legacy of continued energy savings.

CalPortland's Rillito Cement Plant in Arizona

"CalPortland is proud the Rillito Cement Plant has earned the ENERGY STAR certification," said William Jerald, Director of Energy and Sustainability, CalPortland. "It is a testament to our ongoing commitment to energy efficiency and sustainability, and to keeping the plant performing among the top 25% of cement plants in the United States."

ENERGY STAR certified plants use less energy than similar plants, result in fewer emissions and are less expensive to operate than their peers on an energy basis. They also have met strict requirements regarding environmental compliance at the time of the certification.

CalPortland improved its energy performance by managing energy strategically across the entire organization and making cost-effective improvements to its plant.

To earn the ENERGY STAR, CalPortland took six actions. The company installed energy metering at all process areas, replaced a decades-old reciprocating air compressor with a new, more efficient rotary screw air compressor and replaced high-pressure sodium lamps with LED lights. It upgraded housing around a kiln induced draft fan to a more efficient design, replaced a kiln baghouse with a new efficient design, saving over 1 million kWh annually, and increased alternative fuel consumption, which reduced CO_2 emissions by 15,000 tons. For more information, visit https://www.calportland.com.

Envalior Publishes Sustainability Report, Providing Detailed Insights Into Progress Across ESG Topics

Envalior, a global leader in engineering materials, published its first sustainability report. By assessing its first full year of operations through a sustainability lens, the company reinforces its commitment to concrete progress on environmental, social and governance topics, based on a solid foundation of accurate and transparent corporate reporting.

"As a global leader and highly innovative player in sustainable and high-performance engineering materials, Envalior is here to set new standards in the industry and lead the change," said Calum MacLean, CEO, Envalior.

Envalior's climate transition plan sets out the company's practical pathway to an additional 35% reduction in Scope 1 and 2 greenhouse gas emissions by 2030 compared to the new baseline year of 2024. This is on top of the 65% Scope 1 and 2 reductions already achieved between 2016 and 2024 by Envalior's predecessor companies, compared to the former baseline year of 2016.

The plan encompasses 12 key actions, including a pathway to obtain all of the electricity used at its sites from renewable sources by 2030, a low-carbon heat program, electric steam generation and the continued implementation of ISO 50001 and ISO 14001 environmental and energy management systems. In addition, the company will intensify engagement with its value chain partners to further address its Scope 3 GHG emissions.

As the regulatory landscape for manufacturers becomes increasingly complex, the sustainability credentials of material suppliers worldwide are coming under greater scrutiny. By providing detailed insights into its own sustainability strategy, Envalior aims to further increase transparency across the industry and provide additional clarity for customers. For more information, visit https://www.envalior.com.

Envalior's headquarters in Düsseldorf, Germany (Courtesy of Envalior)

Kraton Announces 2032 Climate and Resource-Efficiency Targets

Kraton Corporation, a leading global producer of specialty polymers and high-value biobased chemicals derived from pine wood pulping co-products, announced new long-term sustainability targets for carbon emissions and water use.

Kraton's plant in Sandarne, Sweden, which runs on 100% fossil-free fuel sources.

As part of the goal-setting process, Kraton conducted a comprehensive emissions and resource efficiency assessment covering energy audits, renewable energy planning and site-level water and waste evaluations. The outcome is a robust set of targets that reinforce Kraton's role as a reliable partner in the transition to a low-carbon and resource-efficient economy.

The new targets, which extend through 2032, build on Kraton's strong track record of environmental performance. Between 2014 and 2024, Kraton reduced its Scope 1 and 2 intensity by 35%. This corresponds to an absolute Scope 1 and 2 greenhouse gas emissions reduction of 41%, demonstrating progress well ahead of peers in the industry sector.

The new 2032 sustainable targets (vs. 2022 baseline) include: a 30% absolute reduction in Scope 1 and 2 GHG emissions, 30% intensity reduction in Scope 3.1 (purchased goods and services) GHG emissions and 10% intensity reduction in water consumption.

"Our new targets are designed to meet our customer expectations for transparency, innovation, upstream raw material decarbonization and resource efficiency while maintaining the flexibility needed to support business growth," said Rogier Roelen, Chief Sustainability Officer and General Counsel.

Aligned with its vision to "Create Innovative Solutions for a Sustainable Tomorrow," Kraton is expanding its sustainable product offerings, supported by reliable LCA data and third-party certifications such as ISCC PLUS, to help customers reduce environmental impact across the product lifecycle. For more information, visit https://kraton.com.

Flexsys Validates Science-Based Targets, Including Becoming Net Zero by 2040

Flexsys, a global leader in tire additives and solutions, announced the Science Based Targets initiative (SBTi) has officially validated its near-term and net-zero GHG emissions reduction targets.

These include reducing Scope 1 and 2 emissions 42% by 2030 from a 2022 base year, cutting Scope 3 emissions in key categories 25% by 2030 from a 2023 base year and achieving net-zero across Scopes 1, 2 and 3 by 2040. Flexsys's commitment to 100% sustainable materials by 2040 will play a central role in reducing Scope 3 emissions and positioning the company as a leader in sustainable tire additives.

This milestone builds on Flexsys's broader sustainability strategy, structured around innovation, operational efficiency and local supply for customers. From investing in renewable energy and efficiency at its global sites, to pioneering sustainable additives that extend tire performance and reduce environmental impact, Flexsys is embedding sustainability across the value chain.

"Our focus is on enabling the tire industry's transition to a more sustainable future," said Neil Smith, Chief Technology and Sustainability Officer, Flexsys. "That means not only reducing emissions across our operations and supply chain, but also advancing sustainable materials so every tire has a smaller footprint. This recognition affirms that we're moving in the right direction – and that we must keep pushing further."

The Science Based Targets initiative (SBTi) provides companies with a framework to set greenhouse gas emissions reduction targets in line with the goal of limiting global temperature rise and avoiding the worst impacts of climate change. For more information, visit https://flexsys.com.

Advanced Compressor Technologies Solves Oversupply Problem

By Troy Dreier, Senior Editor, Compressed Air Best Practices® Magazine

When a variable-speed drive (VSD) air compressor can't turn down low enough for process requirements, the motor shuts down to protect itself, producing drive faults. In this case study, a compressed air sales and service company helps a furniture manufacturing plant solve a problem caused by low compressed air demand.

Office Furniture Manufacturer Implements a Costly Solution

Advanced Compressor Technologies is a compressed air distributor based in Evansville, IN. It was started in 2010 by Todd Riley, a longtime veteran of the compressed air industry.

For over a decade, the company has been performing air compressor and nitrogen generator maintenance and repair work for a large office furniture manufacturer based in Southern Indiana. The customer operates multiple manufacturing plants, all of which handle their maintenance needs independently. One plant converted from manufacturing wood office furniture to laser cutting, bending and powder coating metal components. However, its metal manufacturing didn't require as much compressed air as the wood manufacturing it did previously, and that caused problems with its existing air compressor.

Above: The furniture manufacturer's air compressor room is located in a separate building outside the plant.

The plant had a single 280 kw, 377 horsepower (hp) VSD, rotary screw air compressor providing between 438 and 1,810 cfm at 115 psig, along with a 2,600 cfm non-cycling refrigerated compressed air dryer. Even at its lowest turndown, the air compressor produced more compressed air than the plant required. That led to the plant repeatedly experiencing drive faults. The motor couldn't turn down low enough to meet compressed air demand, and would shut down. The plant also owns an older 200 hp, fixed-speed, lubricated, rotary screw air compressor used only as an emergency backup.

To solve the problem, the plant considered replacing the VSD and rebuilding the motor. While it weighed its options, it opened a ¾-inch pipe on the compressed air system and blew out compressed air to create false demand on the compressed air system. This put the compressed air output above the drive fault point. The plant added a muffler to the open pipe to quiet the noise.

In early 2025, Riley got permission to run a full compressed air system audit to measure the plant's flow and pressure over time, with the goal of fixing its performance issues. He learned the blow-off pipe was closed during the plant's first shift, but compressed air needs dropped in the second and third shifts, so the plant would open the pipe. The audit took readings with the pipe open and closed.

Compressed Air Audit Shows $400 of Wasted Energy Per Day

"I told the customer I needed to audit the system to get a picture of what's going on," Riley said. "When I did the audit during the first shift, I put flow and pressure sensors with a data logger on the main airline. Then, I studied the blow-off pipe. They had the pipe open. They were leaving it open sometimes 24/7, because nobody

was disciplined enough to go over and turn it off and on every day. It was in the back of the plant where there weren't people working, so it was often sight unseen. I walked back there at nine o'clock in the morning and the pipe was blowing. I turned it off and left it off for an hour, then turned it back on for an hour so I could get sample air readings with it on and off. Once I did that, I left it off for the rest of that day. I told maintenance, 'If you have any problems on second shift, you may have to open it back up.'"

The audit equipment included a Sage flow meter, a 150 psi Allen Bradley pressure transmitter and a small data logger. Riley took a snapshot of the compressed air system's flow and pressure every five seconds for a week. When he was done, he broke the results down by shift. The audit found the open pipe wasted 300 cfm of compressed air for 16 hours each day, which came to around $400 per day. He presented his findings and recommended a two-phase solution to the company's central engineering group.

"Phase one involved installing a 150 hp fixed-speed and a 150 hp variable-speed air compressor," Riley said. "The fixed-speed air compressor would take care of the base load during the first shift, and the variable-speed would pick up the slack. That way, if we ran the fixed-speed air compressor fully loaded during the first shift, we would trim with the variable-speed air compressor. At 4:30 in the afternoon, production falls off. The air compressor has a scheduler on it. We set to 4:30 in the afternoon. The fixed-speed air compressor would shut itself off and not come back on until 6:30 the next morning. That way, we covered the first shift with a fixed-speed air compressor and a variable-speed air compressor trim. Then, on second and third shifts, we just ran the variable-speed air compressor."

The audit found the open pipe wasted 300 cfm of compressed air for 16 hours each day, which came to around $400 per day. Riley presented his findings and recommended a two-phase solution to the company's central engineering group.

Todd Riley, Owner, and Mackenzie Riley, Business Manager, Advanced Compressor Technologies (left to right)

Advanced Compressor Technologies Solves Oversupply Problem

The VSD air compressor's flow was above the plant's minimum turndown of 558 cfm, so Riley was certain it could meet the needs of the second and third shifts. The control system was built into the air compressor.

> *"One of the big things I look at is lifecycle costs. What do the filters and lubricant cost? That's a major factor for me. I want to know the maintenance costs for the next 10 years. Plants normally change oil filters every 2,000 hours and lubricant every 6,000 to 8,000 hours, depending on the manufacturer."*
>
> — Todd Riley

Riley had previously sold the customer a 200 hp Bobcat air compressor for a different location, so he chose to go with Bobcat air compressors here, as well. He selected a 150 hp, 125 psi, 705 cfm, oil-injected, air-cooled, fixed-speed rotary screw IA150 air compressor, and a 150 hp, 125 psi, 705 cfm, oil-injected, air-cooled, VSD rotary screw IA150 air compressor. "I've represented Bobcat for a couple of years," Riley said. "I selected Bobcat partly for its warranty. Also, one of the big things I look at is lifecycle costs. What do the filters and lubricant cost? That's a major factor for me. I want to know the maintenance costs for the next 10 years. Plants normally change oil filters every 2,000 hours and lubricant every 6,000 to 8,000 hours, depending on the manufacturer. I look at the cost of lubricant and how much service costs to keep the warranty in effect. I put those numbers together to get the overall cost."

Phase one also included adding louvres for outside ducting, which was completed by subcontractors. The project was approved within three weeks, and work was done in early July.

The Plant's Compressed Air Energy Use Is Cut in Half

Since installation was completed, the customer's compressed air energy use has fallen by half, from 8,000 kWh per day to around 4,000 kWh. The customer's costs for maintenance and parts have also decreased. The cycle rate for maintenance decreased slightly, as the fixed-speed air compressor no longer runs on two shifts. The company has a maintenance contract for this customer.

The customer purchased a Fluke acoustic leak detector after the project was completed, and uses it to categorize compressed air leaks as level one, two or three leaks, with level one getting 30 days to fix, level two getting 60 days and level three getting fixed within 90 days, when the plant is down and piping can be replaced.

Remote Monitoring Coming in Phase Two

Riley is excited to start phase two in the first or second quarter of 2026. Phase two involves installing a CAM Technologies sequencing system to network the 150 hp fixed speed air compressor and the older 200 hp emergency backup air compressor as base machines, with the VSD as a trim air compressor with 2,200 gallons of dry storage, a demand expander and its own cycling refrigerated compressed air dryer. The older air compressor will still be a backup, only used when needed, and third in the sequencing hierarchy. Phase two replaces the current refrigerated compressed air dryer, which is 15 years old and oversized for the compressed air system, with two cycling, thermal mass compressed air dryers. The VSD will have its own compressed air dryer and empty into the 2,200-gallon storage tank. A demand expander will throttle air into the plant as needed.

"The pressure in a tank is like a battery," Riley explained. "The demand expander throttles the outgoing pressure. We can control the pressure of the plant more closely. I run the plant right now at 110 psi. We want to drop below 100 psi. We can dial that demand expander in. Once we're using all the base load, we throttle the different pressure in. If you consider the demand expander or intermediate valve to be a regulator, it throttles the pressure in to maintain 98 psi plus or minus one pound. I can hold the pressure more consistently.

"Imagine the plant gets a flow of 500 cfm and the flow lasts for 30 seconds. That will take 1,000 cfm to cover from the air compressor if we don't have the storage tank and a demand expander. If we have a tank, that's our battery. We dump compressed air out of the tank to cover that 30-second load versus trying to use

Riley chose to replace the previous VSD air compressor with smaller VSD and fixed-speed air compressors.

These energy monitoring charts show energy demand in the week before and after two new air compressors were installed. Compressed air energy use dropped by half.

raw horsepower. When the load goes away, we build the tank pressure back up with what we've already got. That's going to be controlled by the sequencer. It has a math function looking at the rate of change on that tank. If that tank drops too far, it knows to grab another air compressor to fill the tank back up before the system gets critical. A lot is going on behind the scenes with the master site controller sequencing system."

The advantage of this system is the plant will be able to manage energy use more closely. The system will monitor energy use for each machine, as well as pressure and flow. Demand expanders sit in the main airline downstream of the compressed air storage tank.

Riley has already implemented remote monitoring solutions at four other plants. He monitors their conditions daily to ensure they have the pressure and flow they need.

"I have four demand expanders in use now that I have remote access to," Riley said. "I look at them every morning. I see how the plants are running, how much flow they're using and what their dew point is. I study their efficiency."

Riley has also given the customer input on adding redundancy to its nitrogen generation system, so there might be a phase three in the future. BP

To read articles about ***Air Compressor Technology,*** visit https://www.airbestpractices.com/technology.

For expert presentations on ***Air Compressor Technology,*** visit our webinar archive section at https://www.airbestpractices.com/webinars.

Delta T Systems Creates a Custom Ambient Dew Point Solution

By Troy Dreier, Senior Editor, Compressed Air & Cooling Best Practices Magazine

➤ Many manufacturing plants optimize their chillers' outputs to minimize condensation on production machinery, but in this case study, a manufacturer had a problem with too little condensation. That opportunity gave Delta T Systems a chance to create a custom solution and win over a major manufacturer.

A building materials manufacturer in California had a problem with the dust produced by its manufacturing process. Dust adhered to the production machinery and hardened, and cleaning it was a time-consuming chore. Plant managers had a solution in mind, but the company's existing chiller couldn't support it. After researching options, the company reached out to Delta T Systems of Richfield, WI.

Above: Half the chillers Delta T Systems delivers are customized for the client's process.

Most manufacturers want process chilled water temperatures set so dew won't form on the outside of their production equipment. This plant wanted the opposite: It wanted dew to form. Then, dust would adhere to the dew, and the moist paste it formed would be easier to clean than the hard crust that built up otherwise.

Lowering the Chilled Water Temperature Makes Cleanup Faster

The plant uses a slurry cement mix to create various products, including cement board and cement siding. Finishing equipment rollers pick up heat from the cement, and then need to be cooled with chilled water. The plant's existing chiller supplying process chilled water didn't include an ambient dew point sensor.

"Dust built up in their finishing equipment," said Rick Holzhauer, Director of Engineering, Delta T Systems. "By having the dust adhere to the rollers through the moisture, it was easy to clean. It saves them a lot of time."

Running chillers above the ambient dew point is more common. In injection molding, for example, plants don't want their molds to sweat, because that would introduce moisture into the plastic.

To get dew or condensation to form on the outside of the rollers, the temperature of the chilled water needed to be below the ambient dew point. It's the same principle that makes beads of water form on the outside of a cold soda can. The company was able to supply a chiller with an automatic ambient dew point sensor. It monitors the ambient dew point and automatically adjusts the temperature of the chilled water so it's below the ambient dew point.

The plant set the automatic ambient dew point sensor to 5-15°F (3-8°C) below the ambient dew point, so as not to waste money by chilling water more than was needed.

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Rick Holzhauer, Director of Engineering, Delta T Systems

Jochen Naujokat, President, Delta T Systems

"The chilled water temperature is automatically adjusted because our chiller senses not only the dry-bulb temperature, but also the humidity in the air. The set point adjusts itself based on that. It's all automatic. All the plant does is set the number of degrees below the ambient dew point they want to arrive," Holzhauer said.

"They're making cement board, and when that cement dries on the inside of their finishing equipment, it turns to concrete," added Bob Proudfoot, Sales Manager. "If they can keep their chilled water pipes and rollers sweating, dust doesn't harden. It stays soft. Then, when they clean after several days of production and they pressure wash the inside of their equipment, the layer of dust is soft, more like mud than cement. Cleaning the inside of a machine used to take them a full shift, but now takes about an hour."

Delta T Systems Creates a Custom Ambient Dew Point Solution

Around half of the chillers the company delivers are customized for the client's process. In this case, the requested changes led to customization of the controls.

"They told us we want to be able to run far below the ambient dew point," Holzhauer said. "They told us what they wanted for a setting window, and we changed our program and controller to allow for that. The colder the process water is, the more the process machinery is going to sweat. We experimented a little. Originally, we changed the controller so the customer could go 5 or 10°F (3-6°C) below. Now, it's set up so they can go to 25°F (14°C) below.

VSD Chiller Optimization

"Everything on our chillers is automatic," Holzhauer said. "Our control looks at the most efficient operating point. We're looking at not only the water temperature of the unit, but the refrigerant temperatures and pressures, as well. That adjusts the speed of the refrigerant compressor and the condenser fan to operate at the most efficient point, and also adjusts the electronic expansion valve. We have an algorithm built into the control that always looks at the most efficient operating point and makes adjustments as needed.

"We monitor the ambient temperature, as well, and we can determine where the fan should operate based on the ambient temperature. We also offer, as an option, a variable speed drive on the pump, which gives additional energy savings. If they don't need full flow and pressure on the pump, we can adjust to whatever their needs are.

"Customers can set a specific pressure they need for their process. With most customers, that's what they're looking for. If they're turning machines on and off, closing valves, they want to maintain a constant pressure that gives them the constant flow they need to the process, which is important because the constant flow helps with the quality of their parts. If that flow changes through their molds, you're going to get hot and cold points in the mold. Customers try to maintain flow through the mold cavities. We monitor the pressure and vary the speed of the pump to maintain that pressure."

"One customer rarely runs 24/7 at 100% load of the chiller," Naujokat said. "That's the only example where there's probably no difference between us and a traditional on-off chiller. But the normal circumstances are that the customer runs at various loads during the day, and the chiller ramps up and down, running at different speeds and different capacities. With that comes energy savings. Customers might end up paying a little bit more at the beginning, but if you look at it over a chiller's 10 to 15 year lifespan, the total cost of ownership for a VSD chiller is significantly lower."

"Customers all have different demands. Just like your home air conditioner, you might put a window unit in because you have a lower demand in one room, versus a large central air system. It just depends on the load the customer puts on the chiller."

Energy Savings with Variable Speed Drive Chillers

The automatic ambient dew point sensor wasn't the only reason the plant selected its new chiller. The previous model didn't include a variable speed drive (VSD), and that's the only kind Delta T Systems manufactures. All of its chillers now use R-32 refrigerant, a single refrigerant (not a mixture) with high efficiency and no PFAs, meeting the EPA's new global warming potential limits.

"Anytime you put a VSD on any kind of motor, you're going to increase the efficiency during lower speed operations," said Holzhauer. "It's a cubic function: the horsepower is a cubic function of the speed. It's not like if

Delta T Systems modified the controller on this chiller so the customer can chill water 25°F (14°C) below the ambient dew point.

you ran at half the speed, you use half the horsepower; it's actually less than that. It's beneficial to only run the motor at the speed you need it to run. Most chillers run at full speed when they don't need to run at full speed. The chillers will either cycle the refrigerant compressors on and off or incorporate what's called a hot gas bypass valve to essentially falsely load the evaporator. That's inefficient. You're taking discharge gas from the refrigerant compressor and dumping it right back into the evaporator. At full speed, a 10 horsepower (hp) motor, you're going to have 10 hp of energy used, no matter what the load is.

> *"With variable speed chillers, we can vary the speed to exactly match the precise horsepower the plant needs. That's a huge energy saver because most people don't run at full speed."*
>
> — Rick Holzhauer

"With variable speed chillers, we can vary the speed to exactly match the precise horsepower the plant needs. That's a huge energy saver because most people don't run at full speed. A study by the Air Conditioning, Heating and Refrigeration Institute (AHRI) showed how many hours at each capacity chillers run. The study mostly looked at air conditioning chillers, and found out on average they run at about 50-60% capacity."

The plant had multiple chillers running at fixed speed, even though process demand varied. At times, the process didn't need the full amount of chilled water produced. Switching to a VSD chiller allowed it to better meet demand.

"They were mostly concerned with controlling the chilled water temperature. A VSD refrigerant compressor is going to hone in on the exact speed it needs to run to maintain the temperature, because this particular customer – and a lot of customers – run variable loads for their process. They might run one or two or several production lines, and that changes throughout the day. They want their chiller to consistently give them a constant temperature," Holzhauer said.

Adding a 30-ton Chiller with a 50-micron Water Filtration System

Delta T Systems audited the plant and calculated the load required based on the amount of material flowing in the process, the temperature of the material and the temperature the plant needed to maintain. In the end, the company recommended a 30-ton chiller. The customer selected filtration options appropriate for the dusty nature of the plant: It selected a fine mesh filter to prevent dust from settling on the heat transfer coils, and a 50-micron water filtration system. The ease of access it offered for cleaning was well received by the customer.

"The plant was a very dusty environment. With our chillers, removing the air filter screens around the condenser coils is a matter of seconds," said Jochen Naujokat, President, Delta T Systems. "You pull the release pins and you take it out, wash it off and put it back in. From a maintenance perspective, they really appreciate that simplicity."

About Delta T Systems

Delta T Systems has been in business since 1990. When the original two owners retired in 2012, Jochen Naujokat purchased the business. At the time, the company only made water and oil temperature controllers. When Rick Holzhauer joined in 2017, he designed the company's first chiller. Since then, the company has extended its engineering capacity and product offerings with different sizes and designs.

"We're now going into larger refrigerant compressor sizes that allow us to reach higher capacities," Naujokat said. "It's more cost-efficient because we're reducing the number of circuits in the system. Right now, for a 60-ton cooling capacity, we need four circuits. Soon, we will be able to supply 50-ton chillers with two circuits, which is a massive price reduction for our customers."

The company offers a dry cooler with an air-to-water heat exchanger for customers that have the ambient temperature needed for free cooling, rather than using a vapor compression cycle.

"It's a lot more efficient," Holzhauer said. "You don't have to run a refrigerant compressor at all. You only run fans across coils to cool the water. Especially in Wisconsin here, you can use it much of the year to get cold water without running a refrigerant compressor.

"We're also creating a chiller-dry cooler combo unit where you can run a dry cooler most of the year and then use the chiller when you need it. It's highly energy efficient, as well." That model should be available in the first half of 2026.

The plant also selected a display option that let it add the chiller to its network and see and operate the chiller remotely from a phone or tablet.

The chiller replacement has been so well received that the customer purchased VSD chillers with custom ambient dew point controls for plants in the Midwest and South, as well. When the California plant outgrew its 30-ton chiller, it transferred it to a Midwest location and purchased a 40-ton VSD chiller. In all, the company has sold the customer eight chillers for four locations. BP

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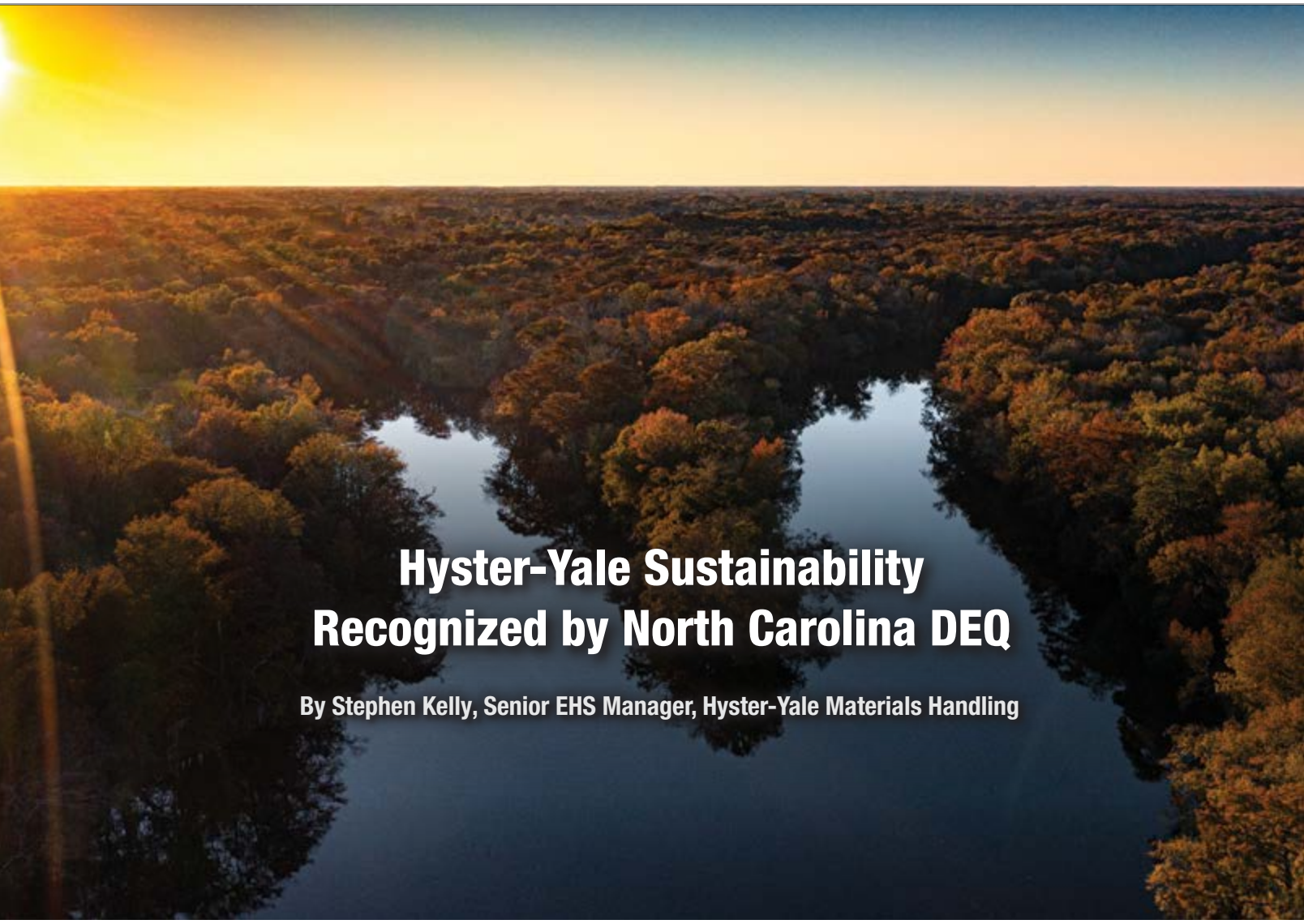

Hyster-Yale Sustainability Recognized by North Carolina DEQ

By Stephen Kelly, Senior EHS Manager, Hyster-Yale Materials Handling

At Hyster-Yale Materials Handling's Greenville, NC, plant, sustainability is a shared responsibility embraced across all levels of the organization. In 2024 and 2025, the facility's Air Compressor Demand Reduction project turned employee engagement into measurable environmental impact, helping earn the company recognition as an Environmental Steward by the North Carolina Department of Environmental Quality.

A Forklift Manufacturer with a Green Mission

Hyster-Yale and its facilities take sustainability seriously. Over the last decade, the company has committed to reducing VOCs, carbon emissions and hazardous waste by 30%, lowering water consumption by 20%, and achieving zero waste to landfill and striving for a worker injury rate of zero. With roughly 800 employees and a monthly output of 1,600 electric forklifts, the Greenville plant has long been a leader in clean manufacturing. It's been part of the NC Environmental Stewardship Initiative (ESI) for over 20 years. But recent efforts to reduce compressed air waste have elevated its sustainability profile even further.

In 2024, the company partnered with two interns from East Carolina University's Center for Sustainable Energy and Environmental Engineering (CSE3 Program). Both students spent their summer working alongside the Environmental Health and Safety team, identifying opportunities to help minimize the company's environmental footprint. Projects such as LED light conversions, programmable thermostats, insulation improvements and chiller water system enhancements were evaluated and implemented at the Greenville plant, based on the interns' research and recommendations, supported by the CSE3 program staff.

The interns were hired for a 12-week project. The plant shuts down for a week over the Fourth of July to allow team members time with family. This provides a window to complete preventative maintenance and other facility projects. With the intern's assistance, we saw an opportunity to focus on a maintenance item that often gets deprioritized in favor of more urgent fixes: air leaks.

Air leaks are one of those issues that can (quite literally) become part of the background noise in a manufacturing environment. They're so familiar they go unnoticed. Once repaired, the plant became noticeably quieter, revealing just how much compressed air had been escaping.

Above: Pictured is the Tar River in Greenville, NC – the home of a Hyster-Yale Materials Handling plant and division headquarters. This plant reduced the energy consumption of their compressed air system earning recognition as an Environmental Steward by the North Carolina DEQ (Department of Environmental Quality).

Compressed Air Leak Detection: From Contest to Culture

The plant relies on three primary air compressors to support production: two Atlas Copco GA75, 100 hp, fixed-speed, oil-injected, air-cooled, rotary screw air compressors and one Atlas Copco GA132, 175 hp, VSD, lubricated, air-cooled, rotary screw air compressor. The larger air compressor serves as the primary unit, with the two others used as needed. These air compressors rarely shut off, even when the plant isn't operating, to maintain system pressure. Compressed air is used throughout the manufacturing process to power the machining centers, welding robots, shot blast units, paint sprayers, parts conveyors and manipulators. It's also used throughout the assembly process with positioners and torque tools. Compressed air is a critical system for forklift production.

In preparation for the summer shutdown, the interns secured an ultrasonic leak detector from the CSE3 Program and received training on its use. We collaborated with our maintenance team to determine what information would be most helpful for locating and repairing leaks. The interns developed a spreadsheet for documentation and purchased leak tags to mark leak locations throughout the plant.

Over the last decade, Hyster-Yale Materials Handling has committed to reducing VOCs, carbon emissions and hazardous waste by 30%, lowering water consumption by 20% and achieving zero waste to landfill.

By the end of the weeklong 2024 summer shutdown, the interns had traced the majority of the compressed air system and identified 97 leaks, all of which were later repaired by the maintenance team. Their analysis estimated annual energy savings of $107,000 and a reduction of 619 tons of CO_2 emissions. One of the most impacted groups was our maintenance team. It was responsible for repairing the leaks, and appreciated the results, especially the noticeable reduction in air compressor runtime. The air compressor room, located adjacent to the maintenance tool room, became significantly quieter, which was a welcome change.

The compressed air leak detection initiative didn't end with the intern project. Over time, air leaks began to re-emerge as background noise. To re-engage the workforce, we launched an Earth Month compressed air leak identification contest in April 2025, inviting associates to tag leaks and submit entries. The contest was announced during team meetings, with instructions on how to fill out tags, mark leaks and submit the bottom half of the tag for a chance to win a prize. Area managers distributed tags to their teams, and a contest entry box was placed in the cafeteria. The result: 39 additional compressed air leaks fixed and an estimated $42,000 in annual savings.

Many of the compressed air leaks identified by team members were detected simply by listening (no specialized equipment required),

Hyster-Yale Sustainability Recognized by North Carolina DEQ

which suggests they were likely larger leaks. Over the past year, non-maintenance personnel helped identify and resolve 225 compressed air leaks, demonstrating the power of grassroots engagement.

To encourage participation, the tear-off portion of each compressed air leak identification tag served as a raffle entry. Four lucky employees received portable air compressors as prizes for their efforts.

Energy Savings of $177,000 Annually

The amount of compressed air lost through compressed air leaks that aren't addressed is astounding. During normal plant operations, the Greenville Plant uses roughly 580 cfm of compressed air. During the summer shutdown (when all process machinery is turned off), the plant was still using about 360 cfm of compressed air. Over the course of a year, that worked out to 189,000,000 cubic feet of compressed air lost through compressed air leaks. That same compressed air took 1,400,000 kWh of energy to produce, generating 619 tons of carbon emissions in the process.

Maintenance personnel diligently tracked down each identified compressed air leak and completed repairs as scheduling and access allowed…The accumulated energy savings were calculated at $107,000 annually.

Maintenance personnel diligently tracked down each identified compressed air leak and completed repairs as scheduling and access allowed, ensuring minimal disruption to operations. The total supply costs of most repairs were negligible (these included regulators, O-rings and couplings), but the accumulated energy savings were calculated at $107,000 annually.

Addressing compressed air leaks resulted in another spinoff project that has tremendously benefited the company: the ability to lower the operating pressure of the compressed air system. Operating pressure had been set at 116 psig, as that was the level where the maintenance team quit seeing faults in production machinery during peak demand. Actively addressing compressed air leaks allowed the maintenance team to reduce system operating pressure to the needs of the highest consumer, which required 105 psig. Lowering the system operating pressure saved an additional 750,000 kWh of energy per year, providing $70,000 of additional energy savings and another 239 tons of CO_2 emissions avoided.

In total, the savings of the air compressor demand reduction project resulted in energy savings of 2,150,000 kWh, or about $177,000 per year. Importantly, these efforts mean the plant avoided 858 tons of CO_2 emissions – equivalent to the annual electricity use of 558 households or driving 4.29 million miles in a gasoline car.

Leak Detection Leads to Statewide Recognition

These impressive savings helped Hyster-Yale earn the Environmental Steward designation through the North Carolina Department of Environmental Quality's Environmental Stewardship Initiative, becoming one of just 33 businesses statewide with this honor. The plant also holds the Carolina Star safety designation (OSHA Voluntary Protection Programs), making it one of only six facilities in North Carolina to simultaneously hold both titles. The Air Compressor Demand Reduction project was also nominated for the Pollution Prevention Project of the Year award through the NC ESI program.

"This recognition is a tremendous accomplishment for our entire team and underscores our unwavering commitment to responsible corporate citizenship and a positive community impact," said Danny Owens, Plant Manager, Hyster-Yale Materials Handling. "In a state with more than 275,000 businesses eligible for this honor, to be just the 33rd to achieve this designation further demonstrates the strength of our environmental leadership." BP

About the Author

Stephen Kelly is the Senior EHS Manager for Hyster-Yale Materials Handling, where he has worked for five years. He has a Master of Science degree from Eastern Kentucky University and is a licensed Certified Safety Professional by the Board of Certified Safety Professionals.

About Hyster-Yale Materials Handling

Hyster-Yale Materials Handling designs, engineers, manufactures, sells and services a comprehensive line of lift trucks, aftermarket parts and technology and energy solutions marketed globally under the Hyster®, Yale®, Maximal® and Nuvera® brand names. Hyster-Yale Materials Handling's subsidiary, Bolzoni S.p.A., is a leading worldwide producer of attachments, forks and lift tables marketed under the Bolzoni®, Auramo® and Meyer® brand names. Hyster-Yale Materials Handling also has an unconsolidated joint venture in Japan with Sumitomo NACCO Forklift. Hyster-Yale Materials Handling, is a wholly owned subsidiary of Hyster-Yale. For more information, visit https://www.hyster-yale.com.

About the North Carolina Department of Environmental Quality

This is the lead stewardship agency for the protection of North Carolina's environmental resources. The organization administers regulatory programs designed to protect air quality, water quality and the public's health, and works to advance reliable, affordable and clean energy for North Carolinians. It offers technical assistance to businesses, farmers, local governments and the public and encourages responsible behavior with respect to the environment through education programs provided at DEQ facilities and through the state's school system. For more information, visit https://www.deq.nc.gov.

To read more ***Compressed Air Leak System Assessment*** articles, visit https://www.airbestpractices.com/system-assessments/leaks.

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Presenter Clayton Penhallegon, Jr., PE, Integrated Services Group

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– I/E Reliability Engineer, Qemetica US Silica

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Renew Energy Partners Optimizes Variable Demand on a Large Campus

By Troy Dreier, Senior Editor, Compressed Air Best Practices® Magazine

An aerospace manufacturer wanted to reduce the carbon footprint of a 30-building campus by reducing energy use. To do so, it contracted with Renew Energy Partners, which identifies opportunities and implements solutions under its energy-as-a-service model.

Fixed-Speed Air Compressors vs. Varying Compressed Air Demand

Renew Energy Partners helps industrial and commercial companies achieve their decarbonization goals by designing, installing and maintaining new equipment, entering into long-term financial arrangements with those customers to provide the funding.

One recent project started when Steve Pritchard, Managing Principal, met the head of the sustainability corporate council for an aerospace manufacturer at a conference. That chance conversation led to a project at the customer's manufacturing campus in the Southeast. One building on the campus contained the manufacturing line, while other buildings contained preassembly and painting operations. In all, the campus included roughly 30 buildings, with a dozen used for product creation. The project's goals were open-ended: See where the facility was wasting energy and come up with a plan to address those cases.

Above: Renew Energy Partners, based in Boston, MA, helps industrial and commercial companies achieve their decarbonization goals.

The company began with a detailed audit of the full campus's processes. The audit uncovered significant compressed air leaks, so the company brought in Edison Energy (now called Trio) an industrial sustainability service partner with expertise in compressed air system design. The service partner discovered the facility had two aging fixed-speed compressed air systems using load/no load controls, even though compressed air demand varied. The facility's primary compressed air system served five of the buildings, while a distributed compressed air system served the others.

The audit also uncovered problems with the aging heatless desiccant compressed air dryer. It required excess purge air for regeneration, but due to repair issues still wasn't properly drying the air. The moisture issues this created were most pronounced in the painting system.

Planning a Major Industrial Facility Improvement

Before the company began its work, the customer's compressed air systems included three 365 cfm fixed-speed, lubricated, air-cooled, rotary screw air compressors and a heatless desiccant compressed air dryer requiring 60 cfm to operate.

"The audit was a three-day process," Pritchard said. "We brought all of our standard, experienced engineers who cross both the mechanical and electrical sides of industrial operations. We generally start with an interview with key plant personnel as an introduction, and talk about how we're going to go about things. We gather any essential information. The customer dedicated one of its main facilities specialists to work with us. Because this was a defense contractor, we couldn't walk around unescorted, so we had to have escorted access. The customer walked us through all 30 buildings on-site. We did a comprehensive review of the facilities, including all major energy-using equipment."

> *"We completed this project in two phases. Improving the compressed air systems was in phase one. When you do something as big as a campus and identify so many opportunities, you have to figure out how to make it manageable."*
>
> — Steve Pritchard

Steve Pritchard, Managing Principal, Renew Energy Partners

John Luleich, Vice President, Project and Asset Management, Renew Energy Partners

Measurement and verification were completed by installing temporary metering devices and capturing 30 days' worth of data. Measurements captured air compressor energy use, total scfm and system pressure at one-minute intervals.

"We completed a detailed review of its building management system and energy management systems, including looking at control logic for several different components and systems in the buildings," Pritchard said. "We did a comprehensive review of lighting, variable-speed drives and the compressed air system. It was closer to a level two audit, given the time and effort we put into it. We then created a comprehensive audit report. When we presented the results, we looked for opportunities we could tackle under our energy-as-a-service model. We identified the investments we would make in new systems and equipment, as well as the savings that would come with those improvements. Then, we signed an energy service agreement with the customer.

"We completed this project in two phases. Improving the compressed air systems was in phase one. When you do something as big as a campus and identify so many opportunities, you have to figure out how to make it manageable, not because of capital investment, but because of resource investment on the facility side.

The company installed a 75 hp, variable-speed, lubricated, air-cooled, rotary screw air compressor.

Renew Energy Partners Optimizes Variable Demand on a Large Campus

Even now, there are still modifications which have to happen. Customers generally participate in the design review process, so you have to make it manageable for them, as well as for us. We found a natural break after the first phase."

The purpose of the audit is to identify energy-reducing opportunities and determine the size of each opportunity. The company presents recommendations to the customer, and they decide together which opportunities are worth further work. The company then creates a detailed engineering study with design recommendations.

A VSD Air Compressor Manages Varying Demand

After studies were completed, the company solved the problem of varying compressed air demand by replacing one older fixed-speed air compressor with a new variable-speed drive, rotary screw air compressor, adding a sequencer and joining the two compressed air systems. The company recommended a 75 horsepower (hp), variable-speed, lubricated, air-cooled, rotary screw air compressor capable of delivering 345 cfm at 125 psig, to replace one of the three existing air compressors. The two older air compressors would meet the baseload compressed air requirements, while the new VSD air compressor would operate as a trim.

Solving the problem of insufficiently dry air meant replacing the aging heatless compressed air dryer with a new heatless desiccant compressed air dryer. It was capable of providing a -40°F (-40°C) dew point for 275 cfm at 100 psig The new model's purge management controller and improved valve design made it a more energy-efficient choice.

The work done included a compressed air leak survey, then leak repairs. "The typical process for compressed air leak surveys is doing

Renew Energy Partners

"Renew Energy Partners is an onsite energy, clean energy and energy efficiency company formed to remove the twin roadblocks of tapping into energy-efficient technology for the commercial and industrial sector in the United States," explained Steve Pritchard, Managing Principal. "We provide the solution to two problems we've seen primarily with commercial customers. The first one is the complexity of energy efficiency or clean energy projects. It's not a customer's core business, usually, and so we try to bring to the table turnkey sets of solutions. We also address capital needs. We design, build, own and operate assets and improvements, fund those assets and then sign long-term energy-as-a-service contracts – including power purchase agreements and thermal energy purchase agreements – with customers. We do everything from soup to nuts.

"We started in 2013 when this was an evolving, nascent industry. We set out not to be a supplier of a single energy efficiency solution, like lighting-as-a-service, because typically commercial customers don't come to us and say, 'We'd just like you to replace the lights.' They're looking for a broader set of solutions to address energy efficiency and carbon reduction. That's the sweet spot of our mission.

"The company started from a connection I had with my co-founder, Charlie Lord, and our other co-founder, Doug Foy. Doug and I had worked together in state government, but Doug had also done a lot of consulting work on the energy efficiency side for cities. We identified this gap in the uptake of energy efficiency and energy-efficient technologies on the commercial and industrial side.

"How do we address that? How do we get the commercial and industrial industry to tackle what was a robust amount of energy that had the potential to be reduced? The company was formed out of that idea. It was a formation of only three individuals to start with. We had the right disparate backgrounds to create what I think is an interesting, exciting and valuable company.

"We work with commercial and industrial clients. We work in the manufacturing industrial sector, healthcare, hospitals, multifamily, hospitality and even education. We'll look at all sectors on the commercial side. The biggest indicator is how much energy they use and what kind of opportunity there is for us to reduce their energy use, improve their cost structure and reduce their carbon footprint.

"One of our primary focuses has been the automobile industry, but we're also in retail and consumer goods, and that group continues to grow. We support not only the main manufacturers in the auto industry, but also the host of suppliers supplying those facilities. All of those facilities tend to be big and have multiple suppliers, and the suppliers themselves tend to be pretty good-sized companies with manufacturing facilities of their own where they provide components. We've worked with defense contractors as well, and that's a focus of ours.

"We have a team of 15 people. We don't have a team of in-house design engineers; we have a team of project engineers who are the project managers and executors of individual projects, but we rely heavily on a lot of our design-build strategic partners to facilitate getting projects done, and then we rely on partners on the operations and maintenance side.

"We have a robust asset management side, because once we build something, we're in it for the long haul. The contracts we sign with customers tend to be 10 or more years. We own the assets, we maintain the assets and we make sure they deliver on the expectations we started with." For more information, visit https://renewep.com.

A new heatless desiccant compressed air dryer solved the problem of too much moisture in the compressed air stream.

a walk-through of the site with ultrasonic sensing equipment, walking the compressed air piping system and identifying leaks through noise," said John Luleich, Vice President, Project and Asset Management. "Based on the compressed air system pressure and the level of noise, the survey can determine the leak size and the leakage rate. Those are all logged and tagged in the field, and then we're provided a quote for repairs. Depending on the customer, sometimes they'll take on some of the repairs themselves, or we'll coordinate the repairs with a service vendor. Typically, you can monitor the actual compressed air use before the compressed air leak repairs, then compare the measurement with a measurement taken after the repairs are done."

Teaching Customers the Importance of Ongoing Maintenance

One thing the company tried to impress upon this customer was how achieving energy savings isn't a one-time fix. Yes, the company could implement changes and make repairs, but new problems would creep in if regular maintenance was neglected. During its leak detection audit, the company identified 82 compressed air system leaks with 129 cfm of compressed air waste. Compressed air leaks ranged from 1.0 to 3.7 cfm at operating compressed air pressures of 112-115 psig. A successful overhaul meant not only repairing those leaks, but also teaching the maintenance staff how to prevent and repair new ones.

Renew Energy Partners solved the problem of varying compressed air demand by replacing one older fixed-speed air compressor with a new variable-speed drive, rotary screw air compressor, adding a sequencer and joining the two compressed air systems.

"The maintenance staff, as you can imagine, for a facility that big had a lot on its plate. They have a lot in the work order backlog," Pritchard said. "Being able to help them not only identify leaks, but then identify a solution to prevent the leak from happening again was our focus. Whether it meant replacing a failing valve, modifying the compressed air piping system at a particular location or changing the kind of compressed air connection they had, all of those were on the table as we looked at individual leaks and addressed them."

Why would a large and successful manufacturer need to work with an outside company to help with decarbonization and financing? It's a question Pritchard hears often. For big corporations, capital is focused on delivering products for customers. Even when manufacturers identify equipment opportunities for saving energy, the initiatives have trouble getting funding. For many, it's more expedient to work with a third party able to recommend and make improvements, and then finance the upgrade over time. Using outside capital becomes the best way for some to move sustainability and efficiency goals forward.

In a post-project study, the company determined it saved this customer 125,500 kWh per year through compressed air system leak repairs, 113,000 kWh per year by adding a VSD air compressor and 33,600 kWh per year by substituting a more efficient heatless desiccant compressed air dryer. BP

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Demystifying the Myths of Centrifugal Air Compressors

By Centrifugal Compressor Section, Compressed Air and Gas Institute

Centrifugal air compressors are used in many industries to provide clean, dry compressed air for various applications. Despite their wide use and general reliability, several myths and misconceptions about centrifugal air compressors have persisted over the years. In this article, we will demystify some of the most common myths about centrifugal air compressors. Specifically, we explain how centrifugal air compressors can handle varying air demands, debunk the belief that surge causes failures and remove the stigma that centrifugal technology is just too complicated. This article provides manufacturing plants with the facts they need to make informed decisions about using centrifugal air compressors.

Myth #1: Centrifugal Air Compressors Cannot Handle Varying Capacity Loads

A common myth about centrifugal air compressors is they are not suitable for systems with fluctuating demand. Positive displacement air compressors often use variable speed drives (VSDs) to adjust the speed of the air compressor to deliver a variable flow matching the changing demand. VSDs are not typically applied with dynamic (centrifugal) air compressors. Rather, modern centrifugal air compressors are designed with advanced control systems that enable them to handle varying capacity loads and fluctuating system demand. Most centrifugal air compressors use inlet guide vanes (IGV) to efficiently throttle the flow rate of the air entering the first stage of the air compressor.

By adjusting the position of the guide vanes, the air compressor maintains optimal efficiency at different flow rates. To provide additional control of the flow and pressure delivered to the compressed air system, there is typically a bypass or unloading valve.

To optimize these control systems, newer centrifugal air compressors are also equipped with microprocessor controllers that use advanced algorithms enabling the air compressors to adapt to changes in system demand in real time. These algorithms may use a variety of data inputs, including process variables, temperature and pressure, to optimize air compressor performance and meet the needs of the system.

Advanced microprocessor controls (shown at the top left) minimize surge events

By using these sophisticated control systems, centrifugal air compressors provide an effective turndown range that can effectively handle the fluctuating demands of many industrial processes, making them a reliable and versatile option for many applications.

Myth #2: Surges Cause Failures in Centrifugal Air Compressors

The performance of a centrifugal air compressor follows a curve where flow and pressure are inversely related. Whenever the discharge pressure exceeds the pressure on the performance curve for any given flow, the flow through the air compressor will stall and or reverse, resulting in surge. Surge presents as a loud noise, which can be alarming, but the main surge concerns are vibration – due to the turbulence created internally by the flow reversal – and a temperature rise through the machine, which can be significant. Occasional surge events, while not ideal, are not harmful to the air compressor, as this robust equipment is designed to handle such events without damage. However, frequent, prolonged surge events can be detrimental to the long-term reliability of the air compressor, also reducing the air compressor's efficiency and increasing its energy consumption.

The causes of surge are several: operating the air compressor at a pressure higher than it can make for a given flow, high inlet air temperature, high cooling water temperature, attempting to throttle the machine too much or any combination of these. Realizing the

Above: The inlet guide vanes on the first stage inlet are at the top right of this photograph.

many variables precipitating a surge condition, manufacturers designed their air compressors to include sophisticated controls that control and or avoid surge.

One of the biggest causes for surge is operating a centrifugal air compressor in a compressed air system where the air compressor is grossly oversized, leading it to operate deeply throttled. The more it is throttled, the closer the air compressor gets to its surge point. Having a properly sized air compressor and a controlled compressed air system are the most important factors in mitigating any potential conditions precipitating surge. The best way to ensure centrifugal air compressor selection and sizing decisions are based upon real data is to have a trained air compressor specialist perform a compressed air system audit and full system assessment before equipment purchase. Armed with this data, operators can select a properly-sized centrifugal air compressor equipped with advanced control systems to monitor the air compressor's operating conditions and adjust its performance to prevent surge from occurring.

Performance adjustments are accomplished by changing the airflow into the first stage of the air compressor through the use of inlet guide vanes. Blow-off or unloading valves function to alleviate surge whenever system demand is below the turndown range of the inlet guide vanes. These control systems use algorithms taking into account a variety of factors, including inlet flow, discharge pressure, temperature and system demand, to make real-time air compressor adjustments maintaining stable air compressor operation and preventing conditions allowing surge to occur.

Myth #3: Centrifugal Air Compressors Are Complicated

While centrifugal air compressors are highly engineered and robust pieces of equipment, they are not overly complicated. By design, centrifugal air compressors have few moving parts compared to other air compressor technologies. The key centrifugal components consist of a large drive gear, commonly referred to as a bull gear, that powers the bearing-mounted rotor assemblies for each stage. The rotor assemblies include the impellers generating the required flow and pressure.

Centrifugal air compressor components are typically easily disassembled and reassembled for maintenance and repair. With the proper equipment and training, maintenance personnel will find maintaining and operating centrifugal air compressors can be extremely simple. Additionally, centrifugal air compressors are designed with user-friendly microprocessor interfaces that allow operators to easily monitor and control the air compressors.

Conclusion

Centrifugal air compressors are versatile and reliable machines that can handle a wide range of applications. Despite common myths about capacity loads, surge events and complicated equipment, centrifugal air compressors are a great option for many compressed air systems. By understanding the capabilities and limitations of centrifugal air compressors, users can select the right centrifugal air compressor for their compressed air system and realize a low cost of ownership to produce compressed air for their application. BP

About the Centrifugal Compressor Section, Compressed Air and Gas Institute

The Compressed Air and Gas Institute (CAGI) is the united voice of the compressed air industry, serving as the unbiased authority on technical, educational, promotional and other matters that impact compressed air and gas equipment suppliers and their customers. CAGI educational resources include e-learning coursework, selection guides, videos and the Compressed Air & Gas Handbook.

The Centrifugal Compressor Section consists of the following member companies: Atlas Copco Compressors, FS-Elliott, Hanwha Power Systems, Ingersoll Rand and Sullair. For more information, visit http://www.cagi.org.

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Designer Furniture Manufacturer Reduces Compressed Air Costs by 20%

By Cynthia Kuiper, Operations Director, VPInstruments

Manufacturing plants with highly efficient compressed air systems keep diligent records and monitor compressed air pressure and flow at multiple locations. This case study looks at what happened when one manufacturer skipped its usual best practices at one location, and how it got a factory back on track after a sudden air compressor failure.

A Compressed Air Capacity Problem and a Needed Wake-up Call

A well-known Canadian designer furniture manufacturer, whose furniture is even found in museums, has production facilities in Europe and North America. Demand for designer furniture continues to rise globally, and, as a consequence, the company must expand its production capacity year after year. Its compressed air consumption also shows an upward trend, and the manufacturer closely monitors whether the layout and capacity of its compressed air systems still meet changing needs. This requires continuous monitoring of the operation and condition of air compressors, compressed air pipes, compressed air filters, compressed air dryers and compressed air storage tanks.

Above: A compressed air monitoring system is key for maintaining energy savings and optimal compressed air system performance.

Pascal van Putten, CEO, VPInstruments

However, because these procedures weren't followed at one factory, and other essential data was also missing, its compressed air system was essentially a mysterious black box. The exact age of the air compressors and their energy consumption were unknown. Furthermore, it wasn't possible to determine the factory's current compressed air demand. While the black box provided compressed air, technical management lacked critical operational parameters and insight into efficiency and operating costs.

The wake-up call came when one of its five air compressors suddenly failed, causing an acute capacity problem. Rapid and costly emergency measures were needed to temporarily restore capacity, and management realized there might be more to come. In mid-2020, the Canadian service provider Pecheanu Air Compressors was commissioned to meticulously assess the compressed air system and advise on how to proceed. Was replacing the failed air compressor sufficient, or were further measures needed to make the compressed air system more efficient and reliable?

Pecheanu Air Compressors Proceeds with an Extensive Audit

To provide a meaningful answer to this question, it was crucial to first map the current compressed air system and perform both permanent and mobile measurements in the factory. Pecheanu installed flow meters, dew point meters and energy meters from VPInstruments. The service provider also conducted a comprehensive audit to provide a detailed inventory of the entire compressed air system. It used mobile flow and dew point meters to measure the compressed air system at various locations throughout the factory.

VPInstruments manufactures instruments and monitoring systems and specializes in compressed air measurement. It has offices in the U.S. and Europe, and supplies products in North America through multiple dealers, including Airgonomik in Canada, for which Pecheanu Air Compressors is a subdealer.

The compressed air system layout at the factory consists of three air compressor rooms. One room contains three air compressors, and the other two rooms each contain one air compressor. The total power of the five air compressors was theoretically 900 horsepower (hp), but since these air compressors had been in place for decades (no one knew exactly how long), it was assumed that the actual power output was lower than 900 hp due to mechanical wear. Compressed air dryers and filter systems were located in each air compressor room, and compressed air storage tanks were installed in various locations to absorb pressure fluctuations and provide additional peak capacity. The production areas are supplied with compressed air via a ring network, from which separate compressed air pipes run to the individual production machines.

The audit revealed significant inefficiencies. All air compressors showed clear signs of internal wear, and their standard modulating controllers did not function optimally. Combined compressed air pressure and flow measurements revealed a significant pressure drop in several piping systems, along with a high flow rate. This is usually a sign that the pipe diameter has drastically decreased due to contamination or corrosion. This was confirmed by endoscope examination, which showed the compressed air piping was clogged in many places and, therefore, no longer suitable for efficient and reliable compressed air transport.

Selecting the Right Type of Flow Meter for the Audit

"When deciding to start measuring, it's important to carefully consider the type of flow meter used in the compressed air system," said Pascal van Putten, CEO, VPInstruments. "There are unidirectional and bidirectional flow meters, and there are also significant differences in mounting and servicing options. For this project in Canada, the insertion type of the VPFlowScope M was chosen, which offers several advantages. Insertion flow meters allow for installation under pressure using hot tapping, with a ball valve that allows the meter to be installed and removed for maintenance under pressure. If an insertion type is not used, the entire compressed air system (or sections thereof) will have to be shut down before the meter can be installed or removed. This type of flow meter is also easy to maintain, as calibration or recalibration is simply a matter of replacing the cartridge."

The air compressor rooms at this factory are connected by a compressed air ring network. Depending on the load and which air compressor is running, compressed air can flow in two directions. A unidirectional flow meter would add the flows together, creating a distorted picture. A bidirectional flow meter, however, measures the net flow in one direction, providing an accurate representation of the actual flow.

The total power of the five air compressors was theoretically 900 horsepower, but since these air compressors had been in place for decades (no one knew exactly how long), it was assumed that the actual power output was lower than 900 hp due to mechanical wear.

It became clear that this factory's existing compressed air system wasn't ideal, but what constitutes an ideal compressed air system? "That varies from user to user," said Van Putten.

Designer Furniture Manufacturer Reduces Compressed Air Costs by 20%

"To create the ideal compressed air system, you first need to know what's present and what its status is. That's what the service provider did for this factory. An audit often reveals inefficiently controlled air compressors, compressed air leaks and pressures that are too high or too low. Assuming the air compressors and compressed air piping are still in good working order, you can address some issues immediately to reduce costs. For example, too high a pressure is a waste of money. If machines still function well at a pressure that's 22 psig lower, you immediately save 10% on energy costs when using single-stage rotary screw air compressors. On the other hand, too low a pressure is also not good, as it can lead to machine failures. If only one machine or department needs a higher pressure, while the rest of the factory can operate at a lower pressure, a booster might be a better solution."

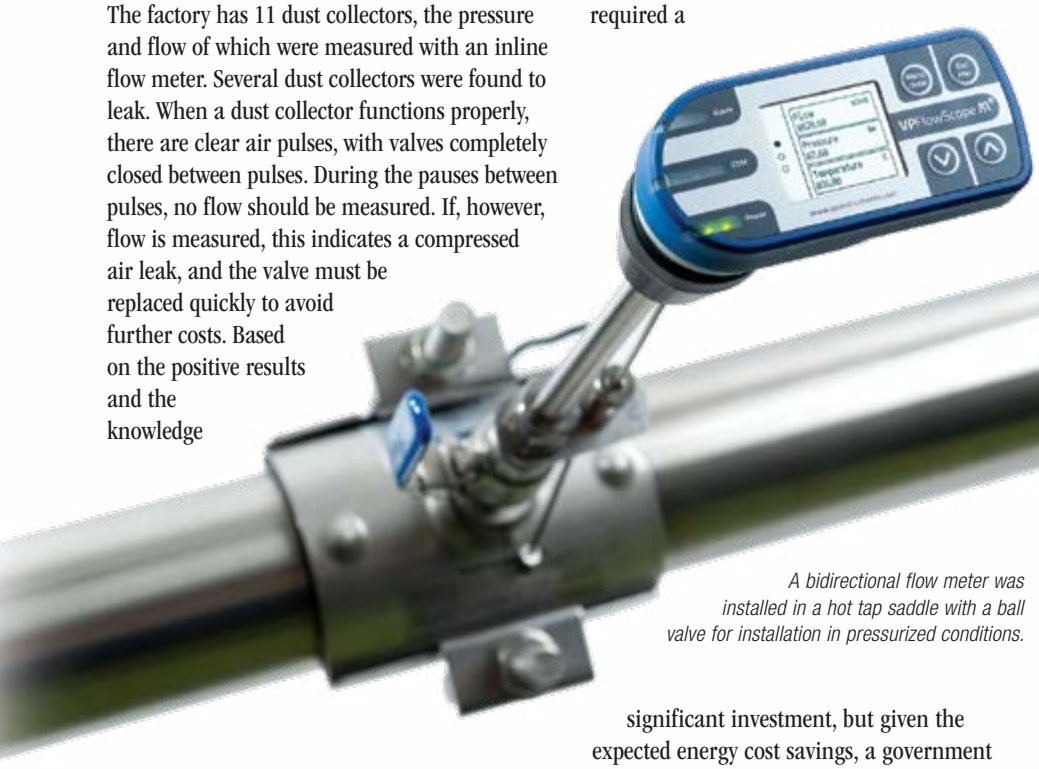
Leakage Measurement in Dust Collectors

Leaks are one of the most expensive and overlooked problems in compressed air systems. The factory has 11 dust collectors, the pressure and flow of which were measured with an inline flow meter. Several dust collectors were found to leak. When a dust collector functions properly, there are clear air pulses, with valves completely closed between pulses. During the pauses between pulses, no flow should be measured. If, however, flow is measured, this indicates a compressed air leak, and the valve must be replaced quickly to avoid further costs. Based on the positive results and the knowledge that air leaks can cost a lot of money, the company is considering permanently equipping all 11 dust collectors with inline flow meters. Besides dust collectors, flow meter information can also be used in factories to detect and repair leaks in compressed air piping, fittings and machinery.

"People often think, 'Oh, it's just a slight hissing sound, so the loss won't be too bad,' but nothing could be further from the truth," Van Putten said. "In a 24/7 factory with an air pressure of 90 psi, a hole with a diameter of just 1 mm, for example, wastes 3 cubic feet per minute (CFM). That's nearly 1.6 million cubic feet per year. In monetary terms, that's a loss of $1,150 per year, which rises to around $28,000 for a 5 mm hole. Compressed air leak management, compressed air demand reductions and 24/7 monitoring normally result in significant savings reaching from 10% to 40%."

Replacement Air Compressors Deliver 20% Energy Savings

The measurements taken over several weeks yielded a surprising outcome. The service provider concluded the most cost-effective option was replacing the entire compressed air system. It also recommended reinstalling all measuring instruments in the new setup to enable optimal real-time monitoring. Replacing the entire compressed air system required a significant investment, but given the expected energy cost savings, a government subsidy was applied for and received. This resulted in lower investment costs and a shorter payback period. In total, the renovation of the compressed air system cost this manufacturer $708,000. However, this amount was fully recouped within two years. The significant savings came from a combination of more efficient air compressors and compressed air dryers, improved compressed air system control and the elimination of a significant number of leaks. Furthermore, thanks to compressed air system measurements and real-time monitoring, predictive maintenance was possible.



A bidirectional flow meter was installed in a hot tap saddle with a ball valve for installation in pressurized conditions.

> *"In a 24/7 factory with an air pressure of 90 psi, a hole with a diameter of just 1 mm, for example, wastes 3 cubic feet per minute (CFM). That's nearly 1.6 million cubic feet per year."*
>
> — Pascal van Putten

When designing the new installation, the service provider based its design on the original layout: three air compressors in the main compressed air room and one air compressor in each of the two smaller rooms. Based on the audit results, the installation of a new compressed air piping system and the higher efficiency of the new equipment, a lower total air compressor capacity would have been an obvious choice. However, it chose a consistent cumulative capacity of 900 hp. This would provide the compressed air system with a certain overcapacity, which improves reliability.

Furthermore, additional production growth would avoid the need for immediate expansion of the air compressor capacity. The main compressed air room contains three 150 hp lubricated, air-cooled, rotary screw air compressors, while the other two rooms contain 200 and 250 hp lubricated, air-cooled, rotary screw air compressors. One air compressor in the main room is a variable speed drive (VSD) model; the other air compressors are fixed-speed models. Because the air compressors are equipped with modulation control, the pressure measurement from the flow meter, along with the measured power consumption, is used for more precise control.

Immediately after the new compressed air system was commissioned in 2021, it became clear that the factory used 20% less energy to produce compressed air compared to the old compressed air system, while maintaining the same or even slightly higher production capacity. Continuous compressed air system monitoring helps minimize leaks, which further contributes to increased efficiency. Besides the financial savings, the higher efficiency of the new compressed air system meant one 150 hp air compressor could be shut down. It serves as a backup air compressor. A sequential control system distributes operating hours across the air compressors so they align with the maintenance schedule. The VSD air compressor is always operational. The result is an energy-efficient and reliable compressed air system that can be maintained in optimal condition at low maintenance costs.

A VPFlowScope M monitors the pressure drop across the compressed air system filters and dryers, allowing accurate prediction of filter replacement requirements to maintain a constant system pressure of 90 psig. Permanent dew point sensors have been installed on the demand side to monitor humidity in real time. This revealed the capacity of the adsorption compressed air dryers is likely too high. As became clear during the audit, further research is needed to determine to what extent and at which locations in the factory a less critical dew point is possible. If it is possible to reduce dryer capacity, this will contribute to a further reduction in energy costs.

Increased Operational Reliability with Continuous Monitoring

To optimally use data now and in the future, it is crucial to collect and analyze flow, pressure, temperature, power and dew point measurements. The service provider installed an advanced compressed air monitoring system during the compressed air system upgrade. It collects data and provides direct analysis. Data is automatically stored in the cloud. Thanks to built-in alarm functions, deviations or malfunctions are automatically reported to the appropriate departments, allowing for quick and targeted intervention. Thanks to the measuring instruments installed throughout the plant, compressed air system leaks can be more easily located and resolved. The real-time data overview enables the plant to make informed decisions, improve efficiency and save money. BP

An inline flow meter was used at the Canadian factory.

About Cynthia Kuiper

Cynthia Kuiper brings nearly 20 years of industry experience, including 13 years at VPInstruments in a variety of key roles. She currently serves as Operations Director, ensuring customers receive high-quality instrumentation and monitoring solutions with fast delivery and excellent service.

About VPInstruments

VPInstruments develops, produces and supplies energy management solutions for compressed air and industrial gases. It shows the manufacturing industry where, when and how much it can save. For more information, visit https://vpinstruments.com.

To read articles about ***Compressed Air System Instrumentation***, visit https://www.airbestpractices.com/technology/instrumentation.

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Why Pump System Assessments Matter

By Matthew Derner, Senior Manager, Education, Hydraulic Institute

Pumping systems are foundational to nearly every industrial, commercial and municipal facility. They move water, wastewater, process fluids, chilled and heated media and other liquids that enable critical operations – from manufacturing and chemical processing to HVAC circulation, potable water distribution and fire protection. Despite their importance, these systems often operate in the background, attracting attention only when something goes wrong. As a result, inefficiencies, excessive energy use and avoidable failures can persist for years. In an era of rising energy costs, tight operating budgets and ambitious sustainability goals, this is no longer acceptable. Facilities hoping to remain competitive and resilient must look closely at the performance of their pumping systems.

Above: Assessing pump systems regularly is a valuable investment for any pump professional, facility engineer or building owner.

Assessing pump systems regularly is a valuable investment for any pump professional, facility engineer or building owner. A thorough pump system assessment provides insight into how efficiently the pump system uses energy, how reliably it operates, how well it meets process requirements and where there are opportunities to improve. Unlike a quick inspection or a routine maintenance checklist, a pump system assessment is a structured, data-driven process examining the entire pumping system, from the pump and motor to the controls, piping, valves and instrumentation. The outcome is not only a list of problems, but also a roadmap for optimization delivering measurable savings and long-term performance gains.

The scale of opportunity is significant. Pumping systems are estimated to account for more than 40% of industrial energy use, making them one of the largest categories of energy consumption in many plants. In commercial buildings, pumps drive heating and cooling systems, chilled water loops, condenser water circuits, domestic water boosting, fire suppression and wastewater handling, often consuming more than 35% of a building's total energy. When these systems are not optimized, the extra energy consumption translates directly into higher operating costs. At the same time, energy and maintenance together typically make up around 65% of the total cost of ownership of a medium-sized industrial pumping system. That means the majority of lifecycle costs occur after installation, not at the point of purchase. This reality underscores why it is so important to evaluate systems in operation, not just select efficient equipment on paper.

Fixing Pump System Inefficiencies Requires a Holistic Approach

Many of the issues that limit pumping system performance are subtle and slow-moving. A system may have been designed for conditions that no longer exist, such as higher production

volumes, different process demands or older building occupancy patterns. Over time, the actual duty point shifts, but the pumps and controls are never adjusted to match. In other cases, pumps may have been deliberately oversized during design, with the intention of providing an extra margin of safety. While the intent is understandable, oversizing often forces pumps to operate far from their best efficiency point, leading to throttled valves, excessive recirculation, higher vibration levels and increased heat generation. Operators may not notice these issues day to day, because the system works, but the hidden costs accumulate in the form of wasted energy and premature wear.

To address underlying system issues, a pump system assessment looks at the system as a whole, rather than treating each component in isolation.

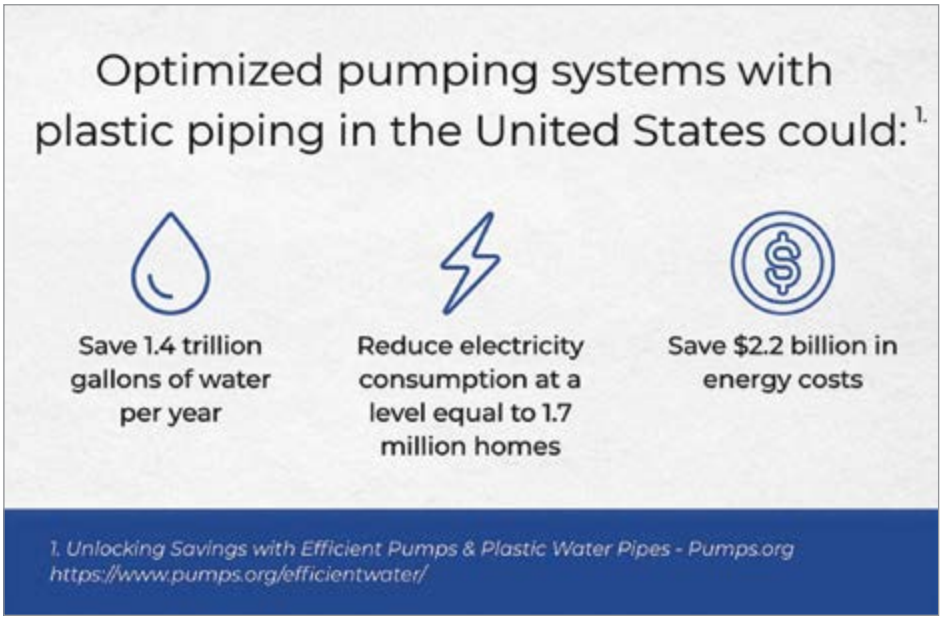
Common inefficiencies in pump systems fall into several categories. Oversizing is one. Another is the use of outdated or inappropriate control strategies. Many pump systems employ constant-speed pumps with throttling valves to control flow. When demand decreases, a valve is partially closed to create artificial resistance, causing the pump to work harder just to overcome its own imposed restriction. This wastes considerable energy compared to a properly applied variable speed drive (VSD) that adjusts pump speed to match system demand. Poor system design can also contribute: Long, convoluted piping runs, unnecessary elbows or fittings, undersized pipes and poorly located valves all increase friction losses. Inadequate or malfunctioning

Pumping systems are estimated to account for more than 40% of industrial energy use, making them one of the largest categories of energy consumption in many plants.

instrumentation can mask these problems by providing incomplete or inaccurate feedback to operators. Maintenance practices focusing solely on repairing visible failures rather than addressing underlying system issues further perpetuate inefficiencies.

Because these problems are often interconnected, fixing them requires a holistic approach. A

Why Pump System Assessments Matter



pump system assessment looks at the system as a whole rather than treating each component in isolation. The assessment process considers how pumps interact with each other and with the system curve, how control logic responds to changing loads, how frequently pumps start and stop, what operating points are most common and where system resistance could be reduced. This broader view makes it possible to identify root causes rather than simply addressing symptoms. For example, a recurring seal failure may be caused not just by a faulty seal design but also by chronic cavitation resulting from a poorly designed suction line. A pump system assessment allows an organization to uncover those deeper issues and correct them in a way that improves reliability as well as efficiency.

The value proposition of pump system assessments can be summarized in three main dimensions: energy savings, reliability improvement and operational performance. On the energy side, assessments routinely uncover opportunities to reduce power consumption by 20-50%, depending on the type of system and its baseline condition. In some extreme cases – particularly in older facilities or poorly designed systems – the savings can be even higher. Even at the lower end of that range, the financial impact can be substantial when pumps run many hours per year. Because energy is a recurring operating expense, reducing it yields benefits year after year. On the reliability side, operating pumps closer to their best efficiency point and reducing cavitation, vibration and heat reduces wear on bearings, seals and impellers. This translates into fewer failures, less downtime and lower maintenance costs.

Operationally, optimized systems typically provide more stable flow and pressure, which improves process control, product quality and occupant comfort in buildings.

Municipal Pumping Station Improvements Save $50,000 Annually

To understand just how powerful assessments can be, it is useful to look at specific examples. One instructive case comes from a municipal water pumping station where a pump system assessment professional (PSAP) led a detailed evaluation after one of several vertical turbine pumps failed catastrophically due to cavitation. The assessment included wire-to-water efficiency testing for the remaining pumps, measuring the actual performance from the electrical input to the hydraulic output. The results were eye-opening: Several pumps were operating with efficiencies in the range of 40-60%, well below what would be expected for properly selected and maintained equipment. One pump retrofitted with a VSD was effectively contributing no useful work at all under the way the system was operated, yielding near-zero effective efficiency.

Rather than simply replacing the failed pump in kind, the assessment team examined how the entire station was controlled and how the

In a high-rise building, converting chilled water pumps to variable speed operation and implementing demand-based control can cut energy use while improving occupant comfort.

pumps were staged. They discovered by adjusting the staging order and control logic – essentially ensuring the most efficient pumps handled the majority of the load – they could improve overall system efficiency without major capital expenditures. This change alone was estimated to save around $12,000 per year in energy costs. Building on that success, the team recommended replacing the least efficient existing pump and the failed pump with two new, properly sized and more efficient units. These new pumps were able to deliver roughly 30% more flow while consuming approximately 10% less energy than the units they replaced. When energy savings and available utility incentives were taken into account, the project was projected to save nearly $50,000 annually, with a payback of around four years. At the same time, the station's reliability and resilience were dramatically improved.

Assessment teams include operations and maintenance staff who are familiar with the pump systems and how they are run, engineers who know the design intent and, ideally, a PSAP-certified professional.

This single example illustrates several important points. First, it shows that meaningful improvements often come from a combination of operational changes and targeted equipment upgrades. Second, it demonstrates the importance of system-level thinking: If the team had focused only on the failed pump, it could easily have missed the opportunity to optimize staging and address broader inefficiencies. Third, it highlights the added value of PSAP-certified professionals, who bring specialized expertise in pump system assessment, energy analysis and optimization strategies. Finally, it underscores that the gains from assessments are not limited to energy savings; improved reliability, reduced maintenance needs and better service to customers or building occupants are equally important results.

How to Carry Out a Pump System Assessment

Large-scale studies confirm the cumulative potential of pump system optimization is enormous. Research sponsored by the Hydraulic Institute has shown in water and wastewater systems across the United States, optimized pumping configurations could save billions of dollars in energy costs each year. By combining more efficient pumps, VSDs, improved piping design and modern control strategies, water utilities could reduce power consumption enough to significantly lower operational budgets while also cutting greenhouse gas emissions. One study estimated widespread adoption of best practices could save on the order of $2.2 billion annually and reduce pumping-related energy use to a degree equivalent to the consumption of more than one million homes. Additionally, by minimizing leakage and reducing friction losses, these improvements can save vast quantities of water that would otherwise be wasted in distribution systems.

Several pumps were operating with efficiencies in the range of 40-60%, well below what would be expected for properly selected and maintained equipment.

Although municipal and utility systems often present the biggest numerical savings because of their scale, similar principles apply in industrial and commercial facilities. In a manufacturing plant, for instance, a system assessment might reveal process pumps are substantially oversized and operating against mostly closed valves. By replacing these pumps with smaller units or installing VSDs, the plant can reduce energy costs, minimize stress on equipment and improve control of flows and pressures throughout the process. In a high-rise office building, an assessment might identify chilled water pumps running at constant speed year-round, even when building loads are low. Converting these pumps to variable speed operation and implementing demand-based control can cut energy use dramatically, while also improving occupant comfort and reducing noise and vibration in mechanical rooms.

To carry out a pump system assessment effectively, facilities should follow a structured methodology. The Hydraulic Institute describes a process that typically includes pre-screening, data collection, analysis, reporting, implementation of improvements and measurement and verification. Pre-screening is particularly important in large plants with many pumps, because it is not practical or cost-effective to conduct in-depth assessments of every system. During pre-screening, assessors gather basic information such as pump descriptions, motor sizes, annual operating hours, control methods, maintenance histories, reported problems and any available instrumentation data. This information is used to identify systems with high energy use, frequent failures or known

Why Pump System Assessments Matter

performance problems – prime candidates for a more detailed assessment.

Once priority systems have been identified, the facility assembles an assessment team. This team typically includes operations personnel who understand how the systems are run day to day, maintenance staff who are familiar with equipment histories and common failure modes, engineers who know the design intent and process requirements and, ideally, a PSAP-certified professional who can lead the technical assessment. Controls specialists, such as building automation or SCADA engineers, also play an important role when pump operation is closely tied to automation systems. Successful assessments depend on open communication among these stakeholders. Operations staff provide practical insights into how systems behave under different conditions, while engineers and assessors interpret those observations in the context of hydraulic and energy performance.

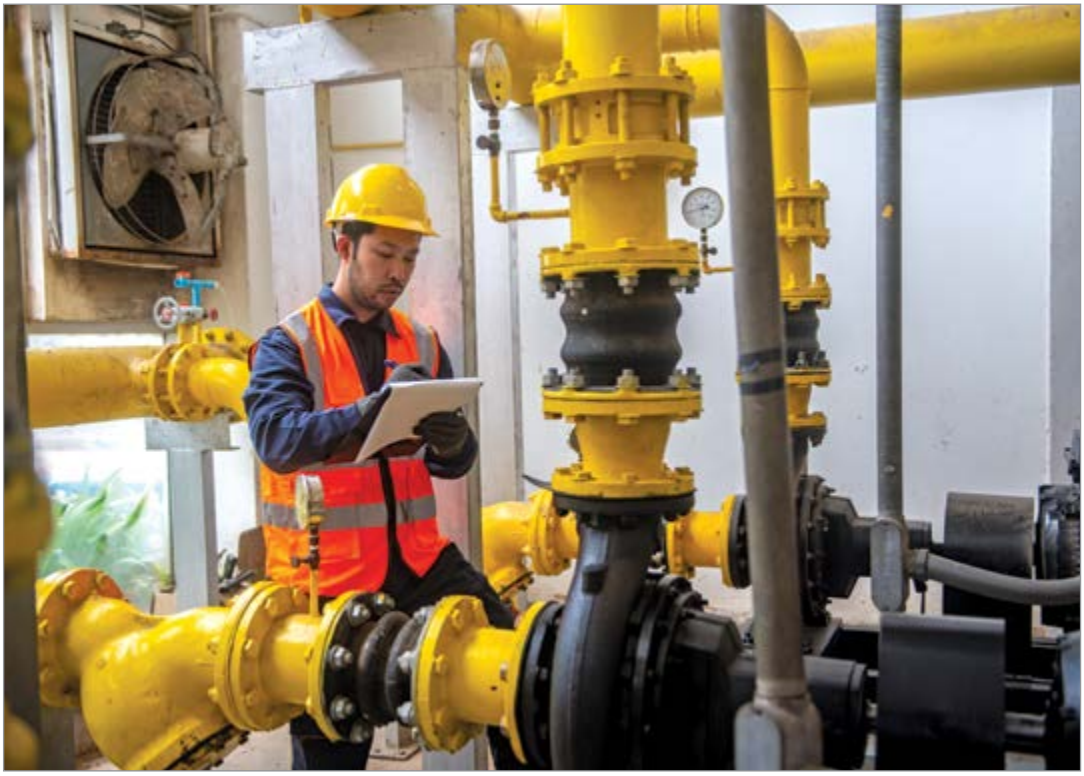
The data collection phase is where the assessment moves from theory to measurement. Assessors may temporarily install flow meters, pressure transducers, power analyzers and data loggers to capture how the pump system operates over time. In some cases, existing instrumentation can be leveraged to collect trends without additional hardware. Measurements might include suction and discharge pressures, flow rates, pump and motor input power, fluid temperatures and system operating states. For variable speed systems, data should capture behavior across a range of speeds and load conditions. In addition to electrical and hydraulic measurements, assessors often perform vibration analysis and check alignment, balance and other mechanical factors influencing reliability.

Analyzing the Results of a Pump System Assessment

With the data in hand, the analysis phase begins. Assessors compare measured pump performance to manufacturer curves, identify where pumps operate relative to their best efficiency points and determine how much energy is being used to deliver a given amount of fluid. They construct system curves to understand how piping and valves influence operating points and examine control logic to see how pumps respond to changes in demand. Patterns often emerge: Pumps may spend most of their time operating at a fraction of their rated flow, or they may cycle on and off frequently due to control setpoints that are too narrow. Throttling losses may be apparent in significant pressure drops across control valves. In multi-pump systems, staging logic may cause pumps to operate in regions where none of them are efficient. The goal of the analysis is to identify where the largest improvements can be made with the least disruption and cost.

The assessment culminates in a comprehensive report. This document should clearly describe the baseline condition of the pump system, including energy use, operating characteristics and reliability issues. It should then present a series of recommended improvements, each accompanied by an estimate of energy savings, maintenance savings and implementation cost. Common recommendations include installing VSDs, resizing impellers, replacing pumps with more efficient models, modifying piping to reduce unnecessary restrictions, upgrading or adding instrumentation and revising control strategies. To help decision-makers prioritize actions, the report should rank opportunities by payback period or net present value and distinguish between low-cost operational changes and capital projects that require more planning and investment.

Of course, the real value of a pump system assessment is only realized when recommendations are implemented. Facilities viewing the assessment as a one-time exercise and leaving the report on the shelf miss out on its full potential. Implementation may be phased over time, focusing first on no-cost and low-cost measures such as reprogramming controls, adjusting setpoints or changing pump staging. These early wins can generate savings that help fund more substantial improvements, such as pump replacements or major piping modifications. Throughout implementation, it is important to keep stakeholders informed and involved; when operators understand why changes are being made and see the results,



By quantifying energy consumption and performance issues, pump system assessments reveal hidden opportunities for cost savings.

they are more likely to support and sustain new practices.

Measurement and verification close the loop. By repeating key measurements after improvements are installed – such as input power at given flow rates, system pressures and pump operating points – facilities can confirm the expected savings have been achieved. Measurement and verification also help detect unintended consequences of changes, allowing fine-tuning to ensure optimal performance. Documented savings can support internal justification for future projects and may be required to secure utility rebates or incentives. Over time, facilities can build a track record of successful optimization projects, strengthening the business case for continued investment in energy efficiency and reliability initiatives.

Pump System Professionals Put Assessments into Action

Within this framework, the role of a pump system optimization advocate is invaluable. This internal champion, often a senior engineer or energy manager, is responsible for keeping pump system performance on the organization's agenda. The advocate identifies candidate systems for assessment, secures funding and management buy-in, coordinates with external experts and tracks progress over time. Without such leadership, assessments risk becoming isolated events rather than part of a continuous improvement strategy. The advocate can also help integrate pump system optimization into broader initiatives such as ISO 50001 energy management systems, corporate sustainability programs and asset management frameworks.

PSAPs complement this internal leadership by providing depth of technical expertise. PSAP certification, offered by the Hydraulic Institute, verifies an individual has demonstrated knowledge and experience in areas such as hydraulic principles, pump and system interaction, energy analysis and assessment methodologies. PSAPs understand not only how to evaluate a system, but also how to communicate findings effectively to diverse stakeholders, from technicians on the plant floor to executives in the boardroom. For organizations, working with PSAP-certified professionals reduces the risk of incorrect diagnoses or misguided investments and increases confidence that projects will deliver their promised benefits.

In summary, pump system assessments matter because they reveal what is otherwise hidden. They make the invisible visible by quantifying how much energy is being consumed, where it is being wasted and how reliability and performance can be improved. They turn intuition and anecdote into data and analysis. Most importantly, they provide a structured path toward optimization that aligns technical improvements with financial and operational goals. For pump professionals, facility managers, building owners and utility leaders alike, embracing pump system assessments is a practical and powerful way to achieve cost savings, reduce risk and support long-term sustainability.

In multi-pump systems, staging logic may cause pumps to operate in regions where none of them are efficient. The goal of the analysis is to identify where the largest improvements can be made with the least disruption and cost.

There is an important workforce and knowledge dimension to pump system assessments. Many facilities face the simultaneous challenges of an aging workforce and increasingly complex systems. As experienced operators and engineers retire, they take with them invaluable institutional knowledge about how pump systems behave and how problems have been solved in the past. Formalizing pump system assessment practices and training new professionals, including those pursuing PSAP certification, helps bridge this gap. It ensures system understanding is not solely dependent on a few individuals, but is embedded in documented procedures, data and analysis. This institutionalization of knowledge supports continuity and resilience, even as personnel change over time.

Pump system assessments are about making informed decisions. In the absence of data, it is easy to assume systems are good enough or that upgrading them would be too costly or disruptive. Assessments replace assumptions with evidence. They highlight which systems perform well and which fall short. They quantify the trade-offs between leaving a system as-is and investing in improvements. They provide the technical and financial justification managers need to allocate resources wisely. In this way, assessments help reconcile competing priorities: energy efficiency and reliability, short-term budgets and long-term savings, operational demands and sustainability goals.

Regardless of the size or type of facility, pump system assessments offer a practical, proven way to unlock significant value. They reveal hidden inefficiencies, reduce operating costs and enhance reliability. They support environmental and regulatory compliance. They strengthen organizational knowledge and capability. Most importantly, they turn the abstract goal of optimization into a concrete, achievable process grounded in data and engineering soundness. Facilities embracing this process position themselves not only to save money today, but to thrive in a future where efficient, reliable and sustainable operation is more important than ever. BP

About the Author

Matthew Derner is the Senior Manager of Education for the Hydraulic Institute.

About the Hydraulic Institute

Founded in 1917, the Hydraulic Institute is the largest association of pump manufacturers in North America. As the global authority on pumps and pump systems, it develops standards and technical resources including application guidebooks, online tools and calculators. For more information, visit https://www.pumps.org.

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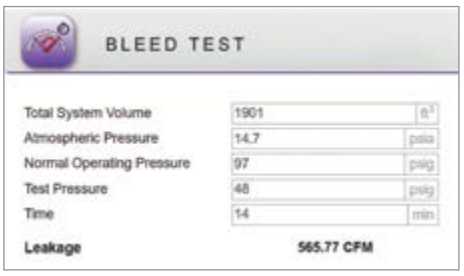
BETTER PLANTS INSIGHTS

Calculate Leak Rate with MEASUR's Bleed Down Test

By Alex Botts, Research Associate, Oak Ridge National Laboratory

Through the Better Plants program, I travel nationwide to assist with trainings, learning from diverse facilities and experts along the way. At these trainings, we use MEASUR, the free software tool from the Department of Energy created to help industrial facilities model systems, calculate savings and guide improvements. Normally, we use the compressed air assessment module, which is the longer system-level simulation, but from time to time, we use one of the quick calculators built into MEASUR. This column shares a practical application of MEASUR calculators in the field.

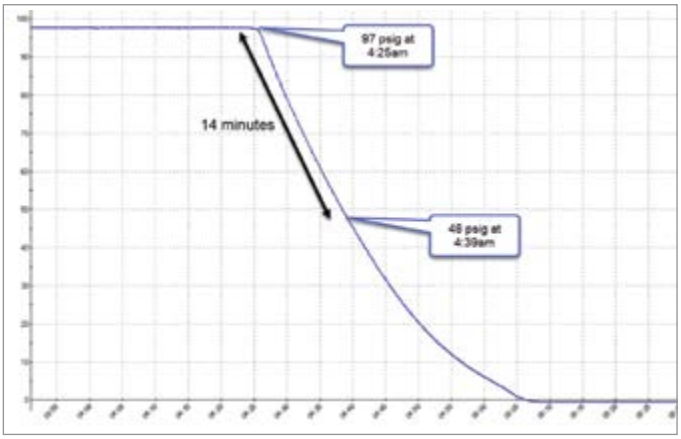
During the planning phase of a training with an aerospace company, it was revealed that the site would undergo a planned maintenance shutdown in the coming weeks. Initially, the team planned to deploy loggers after the shutdown to capture the most representative baseline.



The MEASUR Bleed Down Calculator determines a compressed air system's leak rate.

With a little convincing, we installed loggers before the shutdown to capture a bleed down profile. We extended the logging frequency by two seconds, allowing the logger's memory to last through the shutdown and still record the full two weeks' worth of representative baseline data.

A bleed down test measures the decay of pressure in a compressed air system with no demand, allowing the estimation of leakage, a challenge for 24/7 operations. The test requires knowing the system's volume, which can be difficult for some sites. This aerospace company, however, had something I have only seen once: a full compressed air piping diagram down to ½" piping, including lengths, type of pipe and piping age. Normally, we're lucky to get a hand-drawn sketch.



This pressure data was logged on site during the bleed down test.

Step 1: System Capacity Calculator

Using MEASUR's System Capacity Calculator, we determined the system's total volume. Normally, we advise users to ignore piping under 3", as smaller piping has little impact unless it's an extreme case. But, with a full diagram, we included every pipe 1¼" and above, as well as three compressed air storage tanks. In total, the system measured 1,901 cubic feet.

Step 2: Bleed Down Calculator

The second calculator needed was the bleed down test. This company had one of the tightest systems I've seen. The pressure variation from one side of the plant to the other was within 2 psi. This helped produce a perfect bleed down profile. The data showed the starting pressure (97 psig), the halfway test pressure (48 psig) and the time it took between the two (14 minutes). With this information, we used the Bleed Down Calculator to estimate the system's leak rate at 565 cfm, or 17% – excellent by industry standards.

In the end, with a little planning, we used MEASUR in the field to calculate the system's leak rate. This gave us a better idea of realistic recommendations that could be made at this site.

How to Access MEASUR

Explore the Bleed Down Calculator and more at measur.ornl.gov or download MEASUR for free from https://industrialresources.ornl.gov. BP

About the Author

Alex Botts, CEM, is a Research Associate at Oak Ridge National Laboratory, serving as a Technical Account Manager for the DOE's Better Plants Program. She supports industry partners with data analysis, Energy Treasure Hunts and software, guiding them to achieve energy savings and developing training programs.

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SALES ENGINEERING SKILLS

Learn Sales Urgency Skills to Sway Customers and Close Deals

By Mark Allen Roberts, CEO, OTB Solutions

In B2B industrial sales, one of the sales engineer's biggest challenges isn't overcoming the competition – it's overcoming customer indecision. Buyers often see your solution as helpful, but not urgent enough to make a priority. Sales engineers who fail to create urgency risk stalled deals, delayed decisions and lost opportunities. Sales teams need to be trained in sales urgency skills.

Business Acumen. Customers move faster when they understand how your solution impacts their bottom line. Salespeople must connect the dots between features and financial outcomes. Demonstrate how your products lead to cost savings, greater efficiency, revenue growth, improved customer retention and risk reduction.

Problem Diagnosis. Instead of pitching too soon, sales engineers need to dig deep into the customer's current challenges. Demonstrate the cost of inaction and highlight the risks of delaying a decision. If sales engineers are transactional and too quick to quote, they fail to understand their customers' desired outcomes and the financial impact that helping them will deliver.

ROI Storytelling. Numbers matter, but stories make those numbers stick. Salespeople need to present ROI numbers wrapped in stories that demonstrate how real customers acted quickly and reaped the rewards. Once you have a customer interested in your product, it's time to build trust and demonstrate competence. You need to share proof that your product will deliver the solutions you claim. Follow this framework with your sales story: Discover the problem needing to be solved, explain what you did and learned with previous clients, describe the custom solution you delivered and show the financial impact of that solution.

Consultative Questioning Skills. Urgency comes from asking powerful discovery questions that surface pain points your customers may not have fully acknowledged. These discovery questions should reveal the gap between the customer's current state and their desired future state. Avoid using sales scripts. These conversations need to be authentic and not scripted.

Mark Allen Roberts conducted a Sales Engineering Workshop at the Best Practices 2025 EXPO & Conference in Kansas City.

Competitive Positioning. Buyers often delay decisions because they don't see a meaningful difference between two options. Sales engineers must clearly differentiate the options, showing why waiting or choosing a competitor comes with higher costs and business risks. Sales engineers need to answer the questions: "Why you?" and "Why your company?" If you can't clearly and succinctly articulate the benefits and value of working with your team, you've become your competitor's best salesperson. It's not enough to ask great questions and teach your customers points to consider that weren't already on their list. Show them why your company's expertise needs to be part of their solution.

Final Thoughts on Sales Urgency Skills

Creating urgency isn't about creating pressure – it's about creating clarity. When salespeople master sales urgency skills, they help buyers see why acting now is smarter, safer and more profitable than waiting. BP

About the Author

Mark Allen Roberts is the CEO of OTB Solutions, which provides professional training and coaching. Visit https://www.nosmokeandmirrors.com.

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Real-World Installations & Maintenance

Edited by Troy Dreier, Senior Editor, Compressed Air Best Practices® Magazine

There's much we can learn from real-world compressed air, blower, vacuum, chiller and cooling tower installations. This column asks readers to share lessons learned from system installations and maintenance practices they encounter in the real world.

This Air Compressor Serves Up Suds

Sauer Compressors USA specializes in the manufacturing of medium and high-pressure air and gas compressors for naval, commercial maritime, offshore, research and development and demanding industrial applications. Its German parent company was founded over 140 years ago and has more than 90 years of experience in compressed air technology. Visit https://www.sauerusa.com.

Here's an innovative air compressor we can all get behind. Sauer Compressors USA repurposed a two-stage, air-cooled WP22L Mistral air compressor damaged in delivery to create the world's first beer-dispensing air compressor. It made its surprise debut at the company's annual Crab Party this summer. Its latest appearance was the Best Practices 2025 EXPO & Conference, where it found plenty of takers.

A custom-designed tap handle is the perfect finishing touch for this beer-dispensing air compressor.

Repair and Organize Tubing for this Condensate Management System

A.W. Chesterton is a 140-year-old company based in Groveland, Massachusetts. It helps customers increase reliability and optimize energy efficiency through engineered solutions. It's known for its mechanical seals, packings and gaskets, engineered polymer seals, industrial lubricants, industrial coatings and equipment condition monitoring. It has six service and repair centers nationwide and a network of 500 distributors in 113 countries. Visit https://chesterton.com.

Edwin Rodriguez, Equipment Reliability Specialist, A.W. Chesterton, spotted this installation at an oil and gas company in Houston, Texas. The condensate management system for this compressed air system is in poor shape, he says, as improper drain connectors impair condensate flow, and disorganized drain lines present trip hazards. "The first thing I would do is cut and throw away all drain lines, especially the ones that are brittle, and replace them with new tubing. Then, I would properly run and plumb all condensate lines so they're neat, organized and out of the way, and test for proper condensate flow."

Not only is the tubing in this compressed air system's condensate management system a trip hazard, but many of the tubes are in poor condition.

Submission Guidelines

We invite subscribers to share stories and photos of remarkable system installations they've come across. Email Troy Dreier at troy@airbestpractices.com. Please send a high-resolution image as a JPG or GIF file and a note describing the installation.

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Clayton Penhallegon, Jr., PE
Integrated Services Group

February 12, 2026

Integrating Free-Cooling into Your Chiller System

Presenter Clayton Penhallegon, Jr., PE, Integrated Services Group

"This was very practical and beneficial. Our plant can implement some of these simple solutions to see immediate improvement."

– I/E Reliability Engineer, Qemetica US Silica

Ivan Suslaev
President, ADG Concepts

February 19, 2026

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Presenter Ivan Suslaev, President, ADG Concepts – *Sponsored by CS Instrumets*

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Presenter Peter Vinck, Senior Engineering Consultant, Inflow Corporation – *Sponsored by FS-Elliott*

"Thank you, I learn from every one of these seminars. Staying in touch with the industry as I design."

– Engineer, ISG Engineers

Peter Vinck
Senior Engineering Consultant, Inflow Corporation

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Presenter Tom Jenkins P.E., President, JenTech Inc

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