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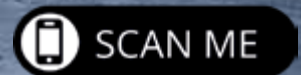
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Cover image: Iron casting at Kirsh Foundry (photo: Paula Hare)

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» FROM THE EDITOR



Big Plants, Big Air, Big Cooling

Welcome to our Heavy Industry issue, where we show our love for giant industrial facilities and the air compressors, chillers and cooling towers that make them operate. Our lead story comes from Beaver Dam, WI, where engineering firm The Wasmer Company sorted out a tangle of compressed air piping for Kirsh Foundry.

The firm's work eliminated compressed air inefficiencies and over 300 feet of piping, leading to a 47% drop in power consumption.

It was a pleasure to interview Pedro Secada, former owner of Sullair del Pacifico in Peru, about his work with high-altitude mining and steel foundries. A pioneer in compressed air, he saw early on that air compressors need specially constructed cooling fans to move enough air at 17,000 feet. He outfitted his air compressors with specially-made Toshiba motors with bigger frames and bigger fans. It's why many of his air compressors are still running after 25 years.

When the compressed air system energy audit is over, does it become a dusty binder sitting on a shelf, or does it lead to real improvements? For anyone having trouble turning energy audits into action, Michael Younis's article is a must-read. He explains the difference between capital and expense investments, and tells why you should never break a larger repair into smaller pieces just to stay below your authorization limit.

On the chiller and cooling side, we present a case study from Engineered Thermal Solutions, a manufacturer's rep firm in Texas. Hired to bring a steel plant's disused austenitizing line back into service, it revamped both the open loop and closed loop cooling systems. The plant's steel tubes reach 2,000°F (1,093°C) so effective cooling required cold water and lots of it. That's why the open loop has a flow rate of 10,000 gpm.

Finally, a feature from Daikin Applied explains the aerodynamic differences between single-stage and two-stage centrifugal chillers. The move to electrification means chillers need to become more efficient. Two-stage designs offer greater unloading capability and higher part-load efficiency.

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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!

FOCUS on SPAIN

In preparation for our upcoming June 16-17, 2025, event in Barcelona, the Industrial Sustainability Best Practices Conference, our Publisher Roderick Smith traveled to his old stomping grounds in Spain, where he worked from 1992-1997. "It's wonderful to come full circle, over 30 years later, reconnecting with old friends and seeing how they've prospered. These people helped me start my career in compressed air and I'll always be grateful," he said. Visit <https://cabpexpo.com/eu/>.



↑ The Penedes region of Catalonia, Spain, is world-renowned for its premium wine and Cava. CAN FEIXES is one of the best vineyards in the region and, of course, it uses compressed air and nitrogen onsite. Pictured are Bernat Huguet, Joan Huguet, Xavier Huguet and Josep Maria Huguet (left to right). Our publisher, Patricia Smith, is proud to call them cousins. Visit <https://www.canfeixes.com/en>.

→ GRUPAIR has provided compressed air, gas and industrial cooling expertise to Catalonia for over 45 years. Pictured are Núria Felip, Founder Ramon Felip and Sandra Felip (left to right) at its headquarters near Igualada, Spain. Visit <https://grupair.com>.



→ COMPRESORES MADRID is based outside Toledo and provides compressed air system expertise to industry in central Spain. Pictured are Emilio Rodriguez and Carlos Correa (left to right). Visit <https://www.compresoresmadrid.com>.



↑ AirJMB Compresores provides compressed air system expertise to clients from its Fuenlabrada (Madrid) and Valladolid branches. Pictured here is Rebeca Martín (whom Publisher Roderick Smith first met when she was 12 years old!) who said, "After all these years, we are still living well because of air!" Visit <https://airjmb.com>.

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.



↓ Harris Equipment services and repairs compressed air, blower and vacuum systems from its Melrose Park, IL, headquarters. Led by Vice President and General Manager Phil Kruger (far right), it provides everything from minor repairs to turnkey engineered solutions for a variety of industries. Visit <https://harrisequipment.com>.

↑ FS-Elliott is a leading name in centrifugal air compressors, which it sells to a variety of industries including electronics, plastics and food and beverage. Based in Export, PA, it's been innovating for over 60 years. Visit <https://www.fs-elliott.com>.



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NEWS / Compressed Air Industry & Technology

FS-Elliott Names Everson De Campos as CEO to Drive Innovation and Growth in the Compressed Air Industry

FS-Elliott announced the appointment of Everson De Campos as its new Chief Executive Officer, marking the beginning of an exciting new chapter in the company's evolution. With over 25 years of experience in the compressed air industry, including 15 years in leadership roles in the Fusheng Industrial Group, De Campos brings a dynamic blend of strategic vision, operational expertise and a deep commitment to innovation.

"I am honored to lead FS-Elliott at such a significant moment in our company's journey. Building on the strong foundation established

by Paul Brown and the dedication of our world-class team, we will drive innovation, enhance sustainability and leverage digital advancements to create even greater value for our global customers," said De Campos.

As the company welcomes new leadership, Paul Brown will transition from daily operations and continue supporting FS-Elliott as an Executive Advisor to its parent company, Fusheng Industrial. His ongoing guidance will ensure continuity in strategic direction and a steadfast commitment to customer success. For more information, visit <https://www.fs-elliott.com>.



Everson De Campos, CEO, FS-Elliott

Atlas Machine & Supply's Compressed Air Division Expands to Northeast Ohio

Atlas Machine & Supply announced the opening of its newest Compressed Air Division branch in Northeast Ohio. This marks the eighth compressed air location for Atlas and the 10th location overall, reinforcing the company's status as a leader in the industrial space.

"Our growth is fueled by our people and our customers," said Dave Sullivan, President, Industrial Products Group, Atlas Machine & Supply. "We have the best technicians, the best service and the best expertise in the business, and that's why we continue to thrive. The Northeast Ohio branch is another step in our commitment to bringing top-tier compressed air solutions closer to our customers while expanding opportunities for skilled professionals to join our team."

Atlas Machine & Supply's Industrial Products Group has been setting the bar in compressed air services for years. As an official Sullair distributor, Atlas delivers a full range of solutions, including compressed air products, parts, rentals and servicing for all compressed air systems – regardless of manufacturer. For more information, visit <https://www.atlasmachine.com>.



Members of Atlas Machine & Supply's compressed air team working on a Sullair air compressor.

Atlas Copco Group Acquires Maquinarias y Tecnologías, a Compressed Air Distributor

The air compressor distributor business of Maquinarias y Tecnologías (Maq&Tec) has become part of Atlas Copco Group.

The Maq&Tec business is located in Cali, Colombia. As a part of the acquisition, 13 employees will join Atlas Copco Group. The business provides air compressor products and services for a diversified customer base across Colombia.

"With this addition to our business, we can further expand our market presence in Colombia, which will benefit our customers," said Philippe Ernens, Business Area President Compressor Technique.

During 2023, revenues amounted to approximately 5,5 bn COP (13,8 MSEK*). The company has become part of the service division within the Compressor Technique Business Area. For more information, visit <https://www.atlascopcogroup.com>.

*Average exchange rate during 2023.

BEKO TECHNOLOGIES Acquires Majority Stake in Wuxi Gas Purification Solutions, Strengthening R&D Potential

BEKO TECHNOLOGIES has significantly strengthened its position in the field of compressed air drying by acquiring a majority stake in Wuxi Gas Purification Solutions (GPS).

Yannick Koch, Managing Director, BEKO TECHNOLOGIES, said, “We warmly welcome the GPS team to the BEKO TECHNOLOGIES family. GPS pursues similar concepts and ideally complements our product portfolio. With the drum dryers developed by GPS, we can now offer a full range of drying solutions and serve customers worldwide. This acquisition allows us to leverage our brand advantages and technological strength globally, while benefiting from GPS’ expertise and innovation in the Chinese market. Our aim is to further increase the competitiveness of our products and services and to provide our customers with efficient and reliable gas treatment solutions. This cooperation is invaluable.”

GPS has an experienced R&D team that specializes in the development of adsorption dryers for compressed air treatment. GPS researches new products and technologies in collaboration with leading Chinese universities. The company is certified to ISO



The BEKO TECHNOLOGIES and GPS teams at the 2025 strategic cooperation signing ceremony

quality management standards and has established itself as an innovative player in the industry.

With the acquisition, GPS officially becomes the eighth production site of BEKO TECHNOLOGIES. Under the guiding principle of “German Quality, Made in China,” GPS is committed to supplying high-quality and globally competitive products. For more information, visit <https://www.beko-technologies.com>.

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NEWS / Compressed Air Industry & Technology

OTC Industrial Technologies Expands Sales, Service and Rental Facilities in Columbus, OH

The Central Ohio industrial and manufacturing market is growing, and OTC Industrial Technologies expanded its facilities to meet customer needs. Recently, it invited customers, vendors, local leaders and businesses to visit the new 20,000-square-foot office, warehouse and service and repair center for OTC's industrial compressed air sales and service business.



Mike DelRegno, CFO, OTC; Daniel Knapp, President, Air Supply Group; Adam Gibbs, CEO, OTC; Derrick Clay, President, Columbus Chamber; Matt Marthinson, COO, OTC; and Tony Witter, DIRECTAIR VP, OTC (left to right)

OTC is an industrial equipment service provider and distributor headquartered in Columbus, OH. It is a market leader in OEM distribution from top-tier manufacturers and provides custom-engineered and technical solutions. The Columbus branch focuses on compressed air solutions, one of which is DIRECTAIR®, the number one air-as-a-utility service solution for customers in North America.

This new facility combines OTC's Central Ohio compressed air sales, service and rental associates who range from customer service, OEM product experts and warehouse associates to skilled, factory-trained technicians. Additionally, the facility houses OTC's control team, which provides customers with turnkey control panel integration systems.

“Our new location puts us in the heart of our industrial customer base. It allows us to oversee our customers by stocking common repair parts – combined with our onsite 24-hour repair capabilities. We're proud to be able to respond quickly to our customers,” said Daniel Knapp, President, Air Supply Group, OTC. “We've provided customers with compressed air solutions, services and preventative maintenance for nearly 50 years. The longevity of our relationships says a lot about our partnership with customers. Our technical expertise and superior customer service is the backbone of our business.” For more information, visit <https://otcindustrial.com>.

All Type Compressors Is Now a Platinum Level Distributor for FS-Curtis in Illinois and Missouri

FS-Curtis announced All Type Compressor has joined its team as a Platinum Level Distributor. Conveniently located just across the river from FS-Curtis's factory in St. Louis, All Type Compressor is a trusted provider of air compressor sales and services in St. Louis, Southern Illinois, Carbondale, Marion, Murphysboro and the surrounding areas. All Type Compressor has recently opened a location in Kansas City, MO.

Established in 1948, All Type Compressor has a history of serving the region's industrial needs. The company was purchased in 2022 by the Snover family, marking a new chapter in its legacy. Warren Snover, who has seven years of experience as a former FS-Curtis employee, is the proud owner of All Type Compressor. His son, Joe Snover, a Marine Corps veteran, serves as the General Manager, solidifying the company's reputation as a family-operated business dedicated to excellence.

“I'm honored to welcome All Type to the FS-Curtis Platinum team! I look forward to achieving continued growth and success together,” said DeAnna Rosaa, Channel Partner Manager.

The partnership between FS-Curtis and All Type Compressor represents a shared commitment to delivering high-quality compressed air solutions and exceptional customer service. FS-Curtis is proud to collaborate with a distributor that embodies the values and expertise that it stands for. For more information, visit <https://us.fscurtis.com>.



Warren and Joe Snover of All Type Compressor (left to right)

ELGi Unveils the STABILISOR System, Compressed Air Stabilization Technology

Designed to revolutionize the way air compressors operate in plants with dynamic air demand, the STABILISOR system aims to address the longstanding challenges of unstable air compressor performance, inefficiency and excessive wear caused by frequent load/unload cycles.



ELGi announced new compressed air stabilization technology.

In industrial settings, the gap between air compressor capacity and plant air demand is inherently dynamic. This variability leads to frequent cut-in and cut-out operations, which destabilize the air compressor and impair critical flow and kinematic components. Traditional solutions, such as increasing reservoir volume, altering cut-in/cut-out pressures or adding variable frequency drives, often fall short, introducing new inefficiencies or higher operational costs.

“The STABILISOR system employs a first of its kind ‘Recirculate and Recover’ principle, seamlessly aligning air compressor capacity with plant air demand through controlled recirculation and recovery techniques. With its energy-efficient design and potential to reduce wear and tear, the STABILISOR aligns with global sustainability goals. Its implementation in industrial plants represents a shift towards greener, more cost-effective manufacturing processes,” said Dr. Jairam Varadaraj, Managing Director, Elgi Equipments. For more information, visit <http://www.elgi.com>.

Tsunami Compressed Air Solutions Introduces the Tsunami Aftercooler

Tsunami Compressed Air Solutions, a division of Suburban Manufacturing Group, launched the Tsunami Aftercooler, a high-performance solution designed to pre-cool compressed air before it reaches downstream equipment, maximizing moisture removal and improving system efficiency.



The Tsunami Aftercooler

With six versatile mounting configurations, a space-saving wall-mounted design and a powerful cooling system featuring a high-volume fan and finned copper coil, the Tsunami Aftercooler enhances air quality, reduces maintenance costs and extends equipment life. This innovative solution ensures reliable compressed air performance while minimizing downtime and operational disruptions.

“Our goal with the Tsunami Aftercooler was to provide a solution that prevents moisture-related issues right from the start of the compressed air system,” said Troy Robins, Product Manager, Tsunami. “In mobile equipment applications, where air can get extremely hot due to air compressors being in enclosed spaces, cooling the air before it reaches the compressed air dryer is critical. By efficiently lowering the air temperature, we’re enhancing compressed air dryer performance, reducing energy costs and extending the life of critical equipment, all while minimizing maintenance and downtime for our customers.” For more information, visit <https://www.gosuburban.com/tsunami/compressed-air-solutions>.

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NEWS / Compressed Air Industry & Technology

Emerson's AVENTICS™ DS1 Dew Point Sensor Monitors Humidity and Air Quality Changes in Real Time

Emerson launched its AVENTICS™ DS1 dew point sensor, the only industrial sensor to monitor dew point, temperature, humidity levels and quality of compressed air and other non-corrosive gases in real time from one device. The DS1 can help operators detect and mitigate excess moisture in its early stages and prevent moisture-related equipment damage. By optimizing compressed air quality in this way, operators can better control processes, extend pneumatic component life, ensure regulatory compliance and reduce maintenance and unplanned downtime.



While most industrial sensors only monitor humidity, the DS1 provides precise dew point monitoring that makes it possible for manufacturers to continuously track critical values, address excess moisture and prevent its negative effects.

For instance, moisture can affect process reliability by corroding components, washing the lubrication out of moving parts, and extending switching and reaction times.

Emerson's new AVENTICS™ DS, Dew Point Sensor provides real-time monitoring of dew point, temperature, humidity and air quality, ensuring enhanced reliability and preventing condensate-related issues in gas processes.

“By having greater certainty about compressed air quality and control over moisture levels in compressed air lines, manufacturers of all kinds can prevent a number of common condensate-related issues and their associated costs,” said Manuel Goerbert, Product Marketing Manager, Discrete Sensors, Emerson. “The new AVENTICS DS1 dew point sensor allows operators to detect changes in compressed air quality in real time with a single device, so they can quickly make necessary adjustments to optimize production and increase overall process reliability.” For more information, visit <https://www.emerson.com>.

Industrial Sustainability Best Practices Conference 2025 Announces Presentation on Compressed Air Quality

The Industrial Sustainability Best Practices Conference, taking place June 17-18 in Castelldefels, Barcelona, Spain, announced the presentation “Compressed Air Quality for the Food & Beverage Industry,” led by Sara Deckers, Focus Industry Manager, BEKO TECHNOLOGIES.

This presentation will explore the importance of compressed air quality for the food and beverage industry by pinpointing the risks, discussing regulations and translating these regulations into hard figures to enable transparency and traceability for the user, using the ISO 8573.1:2010 table.



Sara Deckers, Focus Industry Manager, BEKO TECHNOLOGIES

The Conference will be led by 24 industrial experts with presentations covering the event's main focus topics including energy/water conservation and food-safe system design and quality verification.

Deckers has over 15 years of experience in compressed air at BEKO TECHNOLOGIES and specializes in advice for the F&B industry. Deckers's marketing background provides her with an ability to make the F&B guidelines understandable and actionable, and enable users to adapt their compressed air system to meet the guidelines, ensuring process reliability and food safety. For more information, visit <https://cabpexpo.com/eu>.

CS INSTRUMENTS Announces FA 510 Dew Point Sensor with IO-Link Interface

CS INSTRUMENTS' proven FA 510 dew point sensor is now available with IO-Link interface. The IO-Link interface enables easy integration of the dew point measurement in front of machines and systems. Optionally available with integrated pressure sensors.

The FA 510 - IO-Link protects the high-quality pneumatic components in your machine/system from humidity/condensate in the compressed air. It ensures process reliability by continuously monitoring the residual humidity in the compressed air.

It can be used for all compressed air quality classes (e.g. compressed air with refrigeration dryers or compressed air with adsorption dryers) and is also suitable for measuring the residual humidity/dew point in gases such as oxygen, nitrogen, argon, etc. For more information, visit <https://www.cs-instruments.com>.



FA 510 - IO-Link

Ingersoll Rand Recognized with A List Rating from CDP

Ingersoll Rand continues to demonstrate meaningful progress against its ambitious sustainability strategy and goals with new recognition from CDP, the Science Based Targets initiative (SBTi) and TIME.

Ingersoll Rand has been recognized with an A List rating by CDP for its effective climate change actions and environmental leadership. The company stands out among over 22,000 evaluated for its greenhouse gas reduction, sustainable product design and climate management strategies.

In addition, Ingersoll Rand was included on TIME’s inaugural list of the World’s Best Companies in Sustainable Growth, and its near-term and net-zero targets have been validated for Scope 1, 2 and 3 by the



Ingersoll Rand earned an A List rating from CDP in the environmental stewardship category for the second year in a row.

SBTi. The TIME award and approval of targets by SBTi reinforce Ingersoll Rand’s commitment to both financial growth and sustainable leadership.

“Being recognized as an industry leader demonstrates how Ingersoll Rand is living our purpose of Making Life Better,” said Vicente

Reynal, Chairman and Chief Executive Officer, Ingersoll Rand. “From our new product development process to our revenue growth strategy and our commitment to employee safety, we are setting the standard for what it means to leverage sustainability to drive long-term shareholder value.” For more information, visit <https://www.irco.com>.

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NEWS Chiller & Cooling Industry & Technology

Danfoss Turbocor® Celebrates 30 Years of Innovation for Refrigerant Compressor Technology

Danfoss Turbocor® is celebrating three decades of operation in 2025. Founded in 1995 in Australia by a group of engineers and later acquired by Danfoss as a wholly owned company, the organization has grown to 350 employees with operation centers in the U.S., Denmark and China. Over 140,000 Turbocor

refrigerant compressors have been installed globally as more customers seek to lower their carbon emissions and energy consumption.

The company is the pioneer in the development of oil-free, magnetic-bearing refrigerant compressor technology. By eliminating oil in

their design, Turbocor refrigerant compressors provide a low-carbon and exceptionally reliable cooling option for commercial air conditioning and heat pump applications, enabling commercial buildings such as office buildings, hotels, hospitals, airports and data centers to meet decarbonization and energy efficiency goals.

“Turbocor was founded by professionals outside the field of HVAC,” said Rogerio Federici, Vice President and Head, Danfoss Turbocor. “This allowed for the free thinking and creativity needed to develop this disruptive technology. They created something new that changed the industry and set a new standard for sustainability in HVAC.” For more information, visit <https://www.danfoss.com>.



Danfoss Turbocor's expanded production facility, which doubled manufacturing capacity with the ability to expand even further, opened in May 2024.

Vertiv Acquires Centrifugal Chiller Technology

Vertiv announced the acquisition by its Chinese subsidiary of certain assets and technologies of BiXin Energy Technology (Suzhou) Co. (BSE), a manufacturer of chillers, heat pumps, heat-recovery solutions and air-handling units. Focused on expanding the Vertiv chiller family, the acquisition strengthens Vertiv's portfolio of critical technologies and solutions in support of high-performance compute and AI applications globally.

BSE's core product offerings include oil-free, magnetic-bearing centrifugal water-cooled and air-cooled chillers incorporating pumped-refrigerant-economization technology, with cooling capacities of up to 5.5 MW.

Giordano Albertazzi, Chief Executive Officer, Vertiv, said, “BSE's solutions and technologies complement and reinforce Vertiv's existing chiller portfolio and will assist us in addressing growing air and liquid cooling demand to support high-performance compute and AI. Vertiv has the most complete critical digital infrastructure portfolio and BSE further strengthens our technology offerings that we can provide to customers globally.” For more information, visit <https://www.vertiv.com>.



Vertiv water-cooled chiller

E.H. Price and Enviroair Industries Announce Strategic Partnership, Establishing E.H. Price Solutions

E.H. Price and Enviroair Industries announced they have signed a letter of intent to enter into a new partnership agreement.

This partnership will bring together two companies that have the same customer-first approach to business, are both growth-centric and share the same corporate cultures. By combining their complementary line cards in Eastern Canada, they will be able to provide a complete air-side and mechanical offering to their valued customers in this region.

The two companies are currently working through the due-diligence process to finalize the partnership agreement, which they aim to complete by June 1, 2025. After that time, the structure of this partnership will be a new legal entity – E.H. Price Solutions – incorporating all national E.H. Price and Enviroair offices and employees.

This new partnership ensures they will continue to lead in an ever-changing market by best positioning all their stakeholders – engineers, contractors and manufacturing partners – for the long term. For more information, visit <https://ehpricesales.com> and <https://enviroair.ca>.

Matthew Pine Joins Trane Technologies Board of Directors

Trane Technologies announced the appointment of Matthew Pine, President and CEO, Xylem, to its Board of Directors.

“Matthew will be a strong addition to our Board of Directors given his global leadership experience and proven track record of transformation in large industrial companies,” said Dave Regnery, Chair and CEO, Trane Technologies. “His passion for sustainability, innovation and culture will

benefit Trane Technologies as we continue to drive long-term value for shareholders and create a more sustainable future.”

Pine has served as President and CEO of Xylem, a leading global water solutions company, since January 2024. He also serves on the Xylem Board of Directors. Previously, Pine served as Xylem’s Chief Operating Officer and also



Matthew Pine, President and Chief Executive Officer, Xylem

Senior Vice President and President of Xylem’s Applied Water and Measurement and Control Solutions segments and the Americas region.

Prior to Xylem, Pine held leadership roles at United Technologies Corporation, Vestas Wind Systems and Lennox International. Pine has more than 25 years of experience in general management, sales, marketing, digital and product management.

Pine is a member of the U.S. Business Roundtable and the Alliance of CEO Climate Leaders, a CEO-led community facilitated by the World Economic Forum. He holds a Master of Business Administration degree in finance from Northeastern University and a Bachelor of Arts degree in marketing from the University of Alabama. For more information, visit <https://www.tranetechnologies.com>.

Güntner Appoints New Executive Director of Sales Europe and Central Asia

Güntner announced the promotion of Andrea Belloni to Executive Director of Sales Europe and Central Asia. Belloni has been an integral part of the organization, previously serving as Head of Sales Europe, where he demonstrated outstanding leadership, strategic vision and a strong commitment to driving growth.

With a wealth of 20 years’ experience in sales and business development, Belloni has played a key role in expanding Güntner’s market presence and strengthening relationships with partners and customers. His ability to identify new opportunities and drive strategic initiatives has been instrumental in the company’s success.

In his new role, Belloni will take on broader responsibilities, overseeing sales operations in both Europe and Central Asia. He will focus on further enhancing customer engagement, optimizing sales strategies and driving sustainable growth. With his deep industry knowledge and leadership skills, Belloni is well-positioned to lead Güntner’s sales organization into an exciting future.

“On my 10th year at Güntner, I am honored to take on this new role and excited by the opportunities that lie ahead. I look forward to working with our talented teams to drive growth and strengthen our presence across Europe and Central Asia,” Belloni said. For more information, visit <https://guntner.com>.



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NEWS / Chiller & Cooling Industry & Technology

Daikin Applied Continues Growth, Acquiring Majority Stake in New York-Based Modular Comfort Systems

Daikin Applied Americas announced it has made a majority investment in Modular Comfort Systems, a leading provider of customized HVAC solutions that supports consulting engineers, contractors and building owners and operators in upstate New York.

Yu Nishiwaki, Chief Operating Officer, Daikin Applied Americas, said, “Modular Comfort Systems has been a leading sales engineering firm in upstate New York for over 50 years, and their expertise has resulted in top-tier performance and efficiency for their customers. Their continued

success is a testament to their abilities, and we’re pleased to welcome the team to the Daikin Group.”

“We know the regulatory landscape in upstate New York better than anyone, and we’re thrilled that joining Daikin will allow us to build out our HVAC technology and solutions to further support our customers,” said Chris Miller, President, Modular Comfort Systems.



This acquisition will offer customers expanded access to customized decarbonization and energy-efficient solutions to help meet evolving regulatory requirements.

Modular Comfort Systems has almost 75 employees across offices in Buffalo, Rochester and Syracuse, NY. The firm provides specialized solutions for heating, ventilation and air-conditioning systems for commercial, institutional and industrial applications. As part of the acquisition, the Daikin Applied service technicians in the region will join the company. As Modular Comfort Systems, a member of Daikin Group, the combined team will work together to deliver a full range of HVAC solutions, including engineering services, equipment selection and startup, and systems maintenance and repair. For more information, visit <https://www.daikinapplied.com>.

CAREL Deutschland Appoints Björn Donners as Managing Director, Succeeding Frank Lauer

CAREL Deutschland announced a key change within its leadership team – Björn Donners has taken on the role of Managing Director. With over 12 years of experience in the company, Donners has played a significant role in the success of the group’s German subsidiary as HVAC Sales Manager. His expertise and dedication will continue to drive the

company’s development with competence and determination.

Frank Lauer, the outgoing Managing Director and one of the first employees of the subsidiary, which was founded in 1996, will remain with the company, contributing his extensive experience and in-depth industry

knowledge. He will support the optimization of commercial functions and actively participate in the transition process to ensure the long-term continuity and sustainability of the company’s strategy. His focus will be on enhancing existing structures while also introducing new initiatives for the future success of CAREL Deutschland.



Björn Donners and Frank Lauer of CAREL Deutschland (left to right)

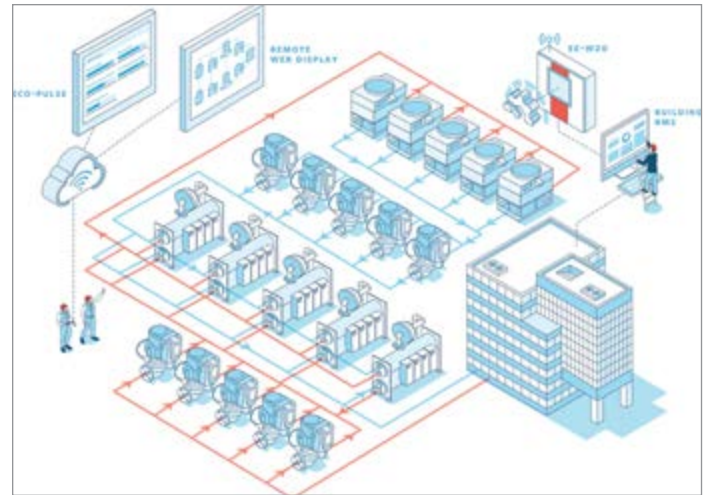
“It has been a great pleasure and an honor to work with our customers, partners and colleagues. The trust-based and successful collaboration of recent years has been of immense personal importance to me. I would like to thank everyone for their trust and commitment. The long-standing partnerships with our customers remain a key priority for both me and the entire team, and I am confident that under Björn Donners’s new leadership, these relationships will be further strengthened and successfully developed,” said Lauer. For more information, visit <https://www.carel.com>.

Armstrong Fluid Technology Launches Envelope™ Platform for Continuous Optimization of Mechanical Systems

Armstrong Fluid Technology has introduced a new integrated digital platform, named Envelope™, that connects components in a mechanical system. Envelope unites Armstrong and partner solutions, delivering optimization through performance mapping, cutting-edge analytics and lifecycle services.

A core element of the Envelope platform is the ability to create detailed performance profiles of components in a system, and to leverage that knowledge for optimal sizing and modulation of output.

Pratik Sharma, Global Director, Building Services & Performance Management, Armstrong, said “The true power of the Envelope Platform is in how it enables system optimization through performance coupling with partner products or solutions. Working within this platform, Armstrong, and digitally controlled solutions of all types, can connect and coordinate operations for improved performance and efficiency. Components that can be connected to the Envelope platform include



Armstrong launched the Envelope™ platform, providing significant cost and energy savings.

chillers, cooling towers, boilers and heat pumps, made by a wide range of well-known industry manufacturers.” For more information, visit <https://armstrongfluidtechnology.com>.

SPX Cooling Unveils Marley® Parts Mobile Training Experience Trailer, Set to Travel Around the U.S. in 2025

SPX Cooling Tech announced the completion of a newly built Marley Parts Mobile Training Experience Trailer – a mobile product showcase and training center designed to help customers see, touch and learn about the various upgrades and aftermarket options available for factory-assembled cooling towers.

The Marley Parts Mobile Training Experience is a 20-foot, tow-behind trailer with side stage, generator and AV system. It's filled with genuine

OEM Marley components, including the 2250 Geareducer® gearbox, Ultra Quiet fan blades, MBX EZ Pack film fill and other crossflow and counterflow fill options, plus a functional controls wall complete with basin heater packages and water level management options.

According to Emily Rose Giunta, Aftermarket Product Manager with SPX Cooling, the trailer is the first of its kind to focus on cooling tower parts for factory-assembled towers used

in HVAC systems and light industrial process cooling applications.

“We’re excited about the educational opportunity this presents to our customers,” said Giunta. “We have a variety of products onboard that customers may not know about, and we’ll also be able to show visitors how to perform simple maintenance on more familiar products to help them extend the life of their components and, ultimately, their cooling towers.”



Customers explore the Marley Parts Mobile Training Experience Trailer.

The trailer started its tour around the nation after a formal introduction at the AHR Expo in Orlando, FL, with planned events in cities all around the U.S., including Houston, San Diego, Boston, Philadelphia, Indianapolis, Memphis and more.

“Marley components have been around for over 100 years, and we hope this traveling showcase gives us a chance to inform our long-time customers of new products and introduce those unfamiliar with Marley to our product suite along the way,” said Giunta. For more information, visit <https://spxcooling.com>.

NEWS / Industrial Energy & Water Conservation

Honda Motor Co. Selected as a CDP Climate Change A List Company for Second Consecutive Year

Honda Motor Co. announced it has been selected for the CDP's 2024 Climate Change A List for the second consecutive year. The CDP is an international non-profit organization that facilitates environmental information disclosure. Honda was selected based on its initiatives in the areas of climate change and environmental transparency.

In 2024, more than 24,800 companies, including listed companies that account for more than 66% of global market capitalization, disclosed their environmental information. The CDP assesses the disclosed information on a score of A to D-, and companies with outstanding initiatives are named to the A List. Among more than 24,800 companies which disclosed environmental information for 2024, Honda was included in the short list of companies making the A List.



The Honda Civic model

Honda is aiming to realize carbon neutrality for all products and corporate activities Honda is involved in by 2050. To this end, Honda has been pursuing electrification of its products by setting and disclosing 2030 milestone targets for both the sales ratio of electrified products and the reduction rate of CO₂ emissions intensity during product use for motorcycles, automobiles and power products, respectively.

In the area of corporate activities, Honda has set and disclosed a target to reduce the total amount of CO₂ emissions by 46% from its corporate activities by 2030 compared to the FY2020 level. Working toward this target, Honda has improved production efficiency, introduced various energy-saving measures, shifted toward the use of low-carbon energy and facilitated the use of renewable energy. Honda views these initiatives as leading to the selection of Honda to the Climate Change A list. For more information, visit <https://www.honda.com>.

Mitsubishi Electric Named to CDP's Climate and Water A List, Shares Climate and Water Initiatives

Mitsubishi Electric announced the international nonprofit CDP has given Mitsubishi Electric its highest A List rankings for both climate change and water security activities. The top ratings recognize the environmental focus of Mitsubishi Electric's commercial activities and goals, as well as the company's timely and appropriate information disclosure.

Mitsubishi Electric has been named to the A List seven different times in both categories since 2016, and it has achieved the highest rating in each category for two consecutive years. The company aims to achieve net-zero greenhouse gas emissions at its factories and offices by the fiscal year ending March 31, 2031, and throughout its entire value chain by the fiscal year ending March 31, 2051.

Mitsubishi Electric's climate change initiatives include updating its greenhouse gas emissions-reduction targets through 2030, which have been certified by the Science Based Targets Initiative for conformance with the Paris Agreement's 2.7°F (1.5°C) trajectory. Another initiative is reduction of emissions in production by introducing high-efficiency and IoT equipment, increasing the rate of adopting renewable energy and upgrading equipment operation, as well as developing energy-saving models.

As part of its water security initiatives, Mitsubishi Electric set a target for reducing water usage at high-risk sites by the fiscal year ending March 31, 2026. The company also plans to develop water purification technology using ozone, and supply of water purification systems to water and sewage treatment sites, factories and public facilities. For more information visit, <https://www.mitsubishielectric.com>.

Rockline Industries Releases 2024 Sustainability Report

Rockline Industries, a leading manufacturer of coffee filters and consumer, medical and commercial wet wipes, has released its 14th annual sustainability report. This year's report highlights major milestones in the company's commitment to reducing carbon emissions and increasing green power usage.

"As part of our long-term sustainability vision, we continue to take bold steps toward reducing our environmental impact," said Randy Rudolph, President, Rockline Industries. "In the past year, we have made significant strides in increasing our use of renewable energy, further reducing our greenhouse gas emissions and cutting down waste across our facilities. I'm incredibly proud of the dedication of our team to making these sustainability commitments a reality."

A key highlight of this year's report is Rockline's continued investment in green power. Through its participation in the U.S. Environmental Protection Agency's Green Power Partnership, Rockline now sources nearly 21 million kilowatt-hours of green power annually, covering 55% of the company's total electricity use. Three major Rockline facilities – including its Springdale, AR; Booneville, AR and Morrystown,



Rockline Industries' facility in Russellville, AR

TN (Iatric subsidiary) sites – now operate on 100% or near-100% renewable electricity.

Looking ahead, Rockline remains committed to its ambitious goal of reducing absolute Scope 1 and Scope 2 emissions by 50% by 2032 (compared to its 2022 baseline). Additionally, Rockline announced its commitment to be Net Zero by 2050. This effort aligns with its broader vision of achieving fossil fuel independence through clean, low-carbon energy, minimizing waste and environmental impact and developing ecologically sustainable products. For more information, visit <https://www.rocklineind.com>.

McCain Foods Releases 2024 Global Sustainability Report

With the release of the global 2024 sustainability report, McCain Foods continues to make progress towards its goal of providing more sustainably sourced products.

"Agriculture is at the heart of our business, and our commitment to regenerative agriculture is at the core of our sustainability journey," said Max Koeune, President and CEO, McCain Foods. "McCain remains dedicated to working with partners and communities to drive meaningful progress toward its targets to achieve a resilient supply chain and a more sustainable future."

McCain has made good progress across its four sustainability pillars. Notably, strides were made with renewable electricity, accounting for nearly 25% of McCain's total electrical energy use in 2024, a 12% absolute reduction in greenhouse gas emissions (Scope 1 and 2) since 2017 and a 20% improvement in water use efficiency at priority plants since 2017. For more information, visit <https://www.mccain.com>.

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Kirsh Foundry Drives Energy Efficiency with Compressed Air Optimization

By Juan Espindola, CEM, Facilities Optimization Leader, The Wasmer Company

► Kirsh Foundry, a prominent manufacturer of high-quality metal castings based in Beaver Dam, WI, is recognized for its innovation and commitment to operational excellence. The company's operations hinge on a consistent and reliable supply of compressed air that is essential to its manufacturing process, powering critical tools, machinery and production systems from molding and casting to finishing. However, as the foundry's compressed air system aged, inefficiencies began to emerge. Rising energy costs, outdated equipment and an increasingly complex compressed air system layout contributed to higher operating expenses and production bottlenecks. To maintain efficiency and improve system performance, it sought a strategic partner to optimize its compressed air infrastructure.

In addition to compressed air, the foundry relied on externally delivered nitrogen for

its heat treatment process, which is vital for ensuring the strength and durability of its castings. The nitrogen supply played a critical role in displacing oxygen in the holding furnace to prevent oxidation. However, rising nitrogen costs, supply chain disruptions and equipment failures – such as a malfunctioning

blow-off valve that wasted nitrogen – led to increasing operational expenses. Space constraints within the plant made integrating an on-site nitrogen generation system a challenge. These factors highlighted the need for a more efficient, cost-effective and self-sustaining nitrogen supply solution.



Above: Kirsh Foundry in Beaver Dam, WI

Before the redesign, the compressed air piping configuration was unnecessarily complex.

Air compressor brand ID	Air compressor model ID	Power (hp)	Avg kW	Avg CFM	Total hours	% Loaded	% Unloaded	% Stopped	Kw/100 CFM	Total energy consumption kWh/yr	Annual Operating Cost
Ingersoll Rand	SSR EPE 150 2S	200	90.8	313	8760	65.0%	0.0%	35.0%	29.056	517,015.20	\$ 46,531
Ingersoll Rand	R160NE-A135	150	77	346	8760	94.8%	0.0%	5.2%	22.370	643,037.96	\$ 57,873
System Totals:			167.8		8760					1,160,053.16	\$ 104,404.78

Table 1: Equipment summary before the redesign

Recognizing these challenges, it partnered with the Wasmer Company, an engineering firm in Sheboygan, WI, to modernize its compressed air and nitrogen systems. Through a comprehensive assessment and strategic upgrades, Wasmer developed a tailored solution to enhance efficiency, reduce costs and improve overall reliability.

Identifying Compressed Air Inefficiencies

Kirsh Foundry faced significant challenges in maintaining an efficient compressed air system and nitrogen supply, both of which are essential to its production process. To address these issues, the Wasmer team conducted an in-depth evaluation, using advanced diagnostics, pressure mapping and data analysis to identify inefficiencies and develop targeted solutions.

The compressed air system presented several key challenges. The original piping layout was unnecessarily complex, with excessive bends, T-joints, and dead-end connections that created significant pressure drops throughout the facility. These inefficiencies forced air compressors to work harder, increasing energy consumption. Additionally, the air compressor room layout restricted access to critical equipment, making maintenance difficult and creating potential safety hazards. Technicians faced challenges navigating the space, increasing downtime risks and reducing overall compressed air system reliability. The system's storage capacity was another concern, as Kirsh Foundry operated three compressed air storage tanks totaling 3,750 gallons, yet the

system failed to effectively use this storage. As a result, both of its air compressors were required to run continuously, leading to excessive energy consumption and unnecessary wear on the equipment. These inefficiencies translated into high operating costs, with an annual energy expenditure of \$104,405 and an average power consumption of 161.6 kW. The constant operation of both air compressors not only inflated costs but also reduced the lifespan of the equipment.

In addition to compressed air inefficiencies, Kirsh Foundry also faced issues with its nitrogen supply. The company relied on bulk-purchased nitrogen for atmospheric purification in the sintering furnace, an expense that added \$24,960 annually to operational costs. This dependency highlighted the need for a more cost-effective and sustainable solution. Equipment failures, particularly a faulty blow-off valve, led to significant nitrogen losses, requiring frequent



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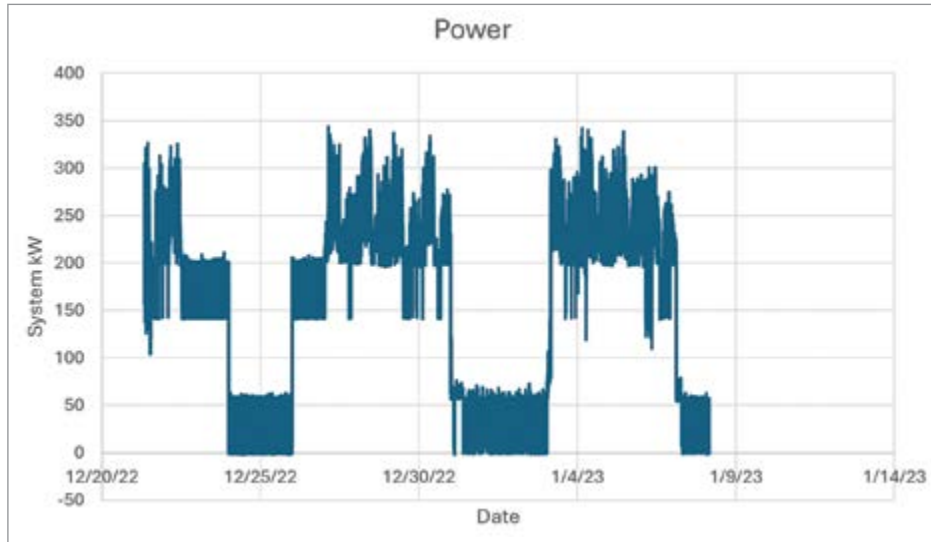
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Compressed air system energy use before the redesign

tank refills and further increasing expenses while compromising production stability. Furthermore, space constraints complicated the integration of an on-site nitrogen generator. The initial plan to place the generator on the plant floor would have required sacrificing 120 square feet of valuable production space. The air compressor room, which was the most practical location, was already overcrowded with compressed air tanks and piping obstructions, making installation a logistical challenge.

An Efficient, Reliable, Cost-Effective Redesign

To address the identified challenges, the Wasmer Company developed a strategic redesign aimed at improving long-term efficiency, reducing operational costs and enhancing safety. The first major improvement focused on optimizing the compressed air piping layout. The existing 400 feet of inefficient steel piping was replaced with just 90 feet of optimized black iron piping, significantly reducing compressed air pressure losses and improving airflow efficiency. Unnecessary bends, T-joints and valves were removed, while 90-degree sweep bends were strategically installed to minimize turbulence

and resistance, ensuring a more streamlined and effective distribution system.

Another critical enhancement involved reconfiguring equipment placement within the air compressor room. The previous layout restricted access to essential components, making routine maintenance challenging and increasing safety risks. The redesign repositioned air compressors,

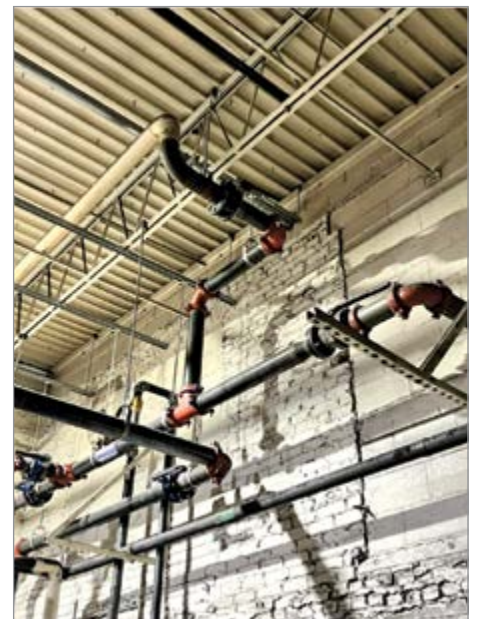
compressed air dryers and compressed air storage tanks to create clear pathways for personnel, facilitating easier maintenance, reducing downtime and improving overall workplace safety.

Additionally, the foundry's air storage system was redesigned to better regulate compressed air distribution. The original setup, which relied on inefficient compressed air storage methods, was upgraded to include one wet tank and two dry tanks. This reconfiguration ensured a consistent supply of high-quality, moisture-free air, optimizing air compressor performance. As a result, the need for continuous air compressor operation was minimized, ultimately extending the lifespan of the equipment and reducing energy consumption.

To further enhance operational efficiency, an on-site nitrogen generation system was implemented. A modular pressure swing adsorption (PSA) nitrogen generator was installed within the air compressor room, eliminating the foundry's reliance on bulk nitrogen deliveries. The system has the capability to produce 2,340 scfh at



Installing the nitrogen generator



After the redesign, the piping setup was far simpler.

Air compressor brand ID	Air compressor model ID	Power (hp)	Avg kW	Avg CFM	Total hours	% Loaded	% Unloaded	% Stopped	Kw/100 CFM	Total energy consumption kWh/yr	Annual Operating Cost
Ingersoll Rand	SSR EPE 150 2S	200	90.8	313	8760	11.3%	0.0%	88.7%	29.1	89,881.10	\$ 8,089
Ingersoll Rand	R160NE-A135	150	77	346	8760	76.6%	0.0%	23.4%	22.4	519,298.58	\$ 46,737
System Totals:			69.5		8760					609,179.68	\$ 54,826.17

Table 2: Equipment summary after the redesign

an initial 99.95% purity, with real-time adjustments available to modify nitrogen levels based on production needs. This flexibility ensures optimal nitrogen usage while significantly lowering procurement and transportation costs.

A Phased Implementation to Minimize Disruptions

The redesign and implementation process was carefully structured into phases to ensure a smooth transition without disrupting production.

In the first phase – the piping system overhaul – the outdated steel piping network was dismantled, while new black iron piping was installed with precise alignment to reduce pressure drops. Engineers conducted rigorous system testing at each stage to ensure optimal airflow and efficiency.

In the second phase – equipment optimization and system reconfiguration – defective compressed air dryers were replaced, and compressed air storage tanks were realigned to support the new piping system. The foundry’s maintenance teams received hands-on training to familiarize themselves with the new setup.

In the third and final phase – nitrogen generator installation and integration – the PSA nitrogen generator was installed within the air compressor room to free up valuable plant space previously used for bulk nitrogen storage. The system was seamlessly integrated into the

foundry’s operations, eliminating logistical delays and nitrogen waste.

Throughout the project, Wasmer worked closely with the foundry’s team, providing regular updates, hands-on training and detailed operational insights. This collaborative approach ensured employees were well-equipped to operate and maintain the upgraded system.

A Transformative Impact on Efficiency and Cost Savings

The redesigned compressed air and nitrogen system delivered significant, measurable improvements across multiple areas. One of the most notable enhancements was in overall efficiency. By streamlining the compressed air piping system and optimizing the compressed air storage tank configuration, pressure drops were significantly reduced, ensuring a

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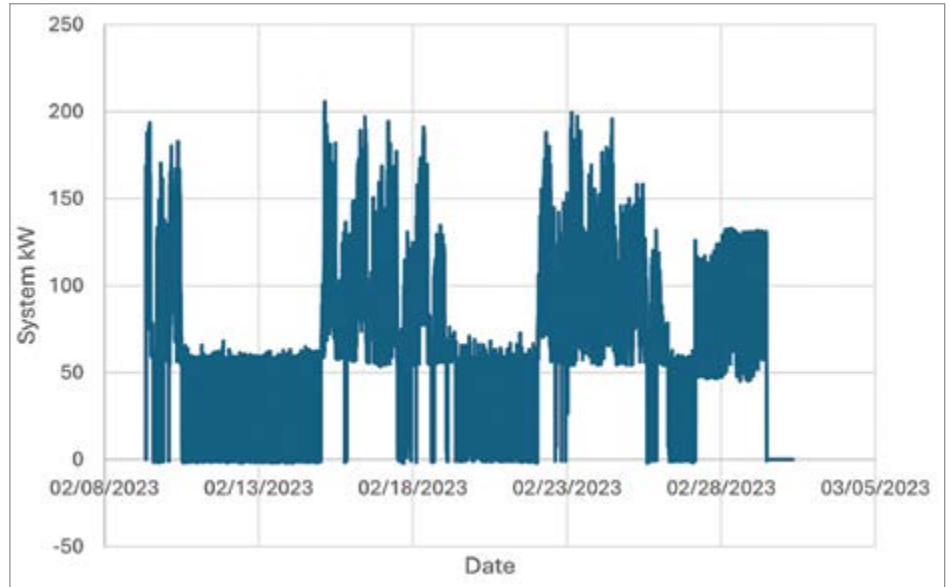
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Compressed air system energy use after the redesign

consistent and reliable supply of high-quality, moisture-free compressed air throughout the facility. This improvement not only enhanced performance but also minimized unnecessary energy consumption.

Safety was another key area of improvement. The reconfigured equipment layout eliminated tripping hazards and improved accessibility, making maintenance tasks safer and more efficient for plant personnel. By creating clear pathways and strategically placing air compressors, compressed air dryers and compressed air storage tanks, the redesign reduced operational risks and improved workflow efficiency.

The most impactful result was in energy savings. With the system operating more efficiently, average power consumption dropped from 161.6 kW to 70.7 kW – a substantial 47% reduction. This decrease in energy use translated to significant financial savings, as the foundry’s annual energy costs were reduced from \$104,405 to \$54,826. These improvements not only enhanced day-to-day operations but also positioned the

company for long-term cost reductions and sustainability gains.

Having on-site nitrogen gas generation reduced the foundry’s annual expense to \$16,358, achieving a 34% savings compared to previous costs. The foundry gained greater control over nitrogen supply and quality, enhancing production reliability.

Measurable Returns on Investment

The project delivered measurable financial and operational improvements. The energy savings amounted to 550,873.5 kWh per year, resulting in a reduction of \$49,579 in energy costs annually. Additionally, nitrogen savings were significant, with annual expenses dropping by \$8,602 due to the installation of the on-site nitrogen generator. Overall, the project achieved total annual savings of \$58,181, with implementation costs of \$74,676 and an impressive payback period of just 1.28 years.

Driving Sustainability and Efficiency

The reduction of 550,874 kWh per year at Kirsh Foundry has a tangible environmental impact, equivalent to planting approximately 8,125

trees, which would absorb the same amount of carbon dioxide annually. Additionally, the energy savings correspond to removing 85 cars from the road for an entire year, significantly reducing greenhouse gas emissions. By eliminating bulk nitrogen deliveries and optimizing energy usage, the foundry has taken a proactive step in reducing its carbon footprint, reinforcing its commitment to sustainability and resource efficiency.

Innovation and Long-Term Impact

The redesign aligns closely with the foundry’s long-term sustainability goals. By cutting energy consumption and eliminating dependence on bulk nitrogen deliveries, it has successfully minimized waste and improved operational efficiency. These enhancements not only drive cost savings but also showcase how innovative engineering solutions can create meaningful environmental and economic benefits.

A key feature of the project was the installation of a modular nitrogen generator, a forward-thinking approach to resource management. This system’s ability to adjust purity levels in real time allows the foundry to fine-tune nitrogen usage based on production demands, ensuring efficiency without compromising quality.

A Model for Industrial Excellence

The collaboration between Kirsh Foundry and the Wasmer Company highlights the power of data-driven energy solutions in industrial settings. By identifying inefficiencies, modernizing equipment and optimizing resource use, the project successfully achieved significant cost savings, improved plant safety, enhanced operational reliability and made a measurable reduction in environmental impact.

For the foundry, this initiative represents a major step forward in sustainable manufacturing, proving that innovative energy solutions can drive both profitability and environmental responsibility. **BP**

About the Author

Juan Espindola, CEM is Facility Optimization Leader at the Wasmer Company, where he champions engineering teams in Wasmer’s Innovation by Observationsm(lbO) and On.Site Optimizationsm (OSo) programs. He earned a Bachelor of Science degree in Mechanical Engineering with an emphasis on mechanical design from the National University of Columbia and a Master of Science in Mechanical Engineering with a research focus in renewable energy, clean energy and energy efficiency.



About the Wasmer Company

The Wasmer Company is a leader in industrial energy optimization, helping manufacturers reduce energy consumption, improve operational efficiency and advance sustainability goals. Its hands-on team specializes in uncovering savings across key systems including compressed air, HVAC and motor controls, as well as assisting in utility management and natural gas procurement. For more information about The Wasmer Company’s compressed air optimization and energy efficiency solutions, visit <https://wasmerco.com>.

To read more **Compressed Air Leak Piping Assessment** articles, visit <https://www.airbestpractices.com/system-assessments/piping-storage>.



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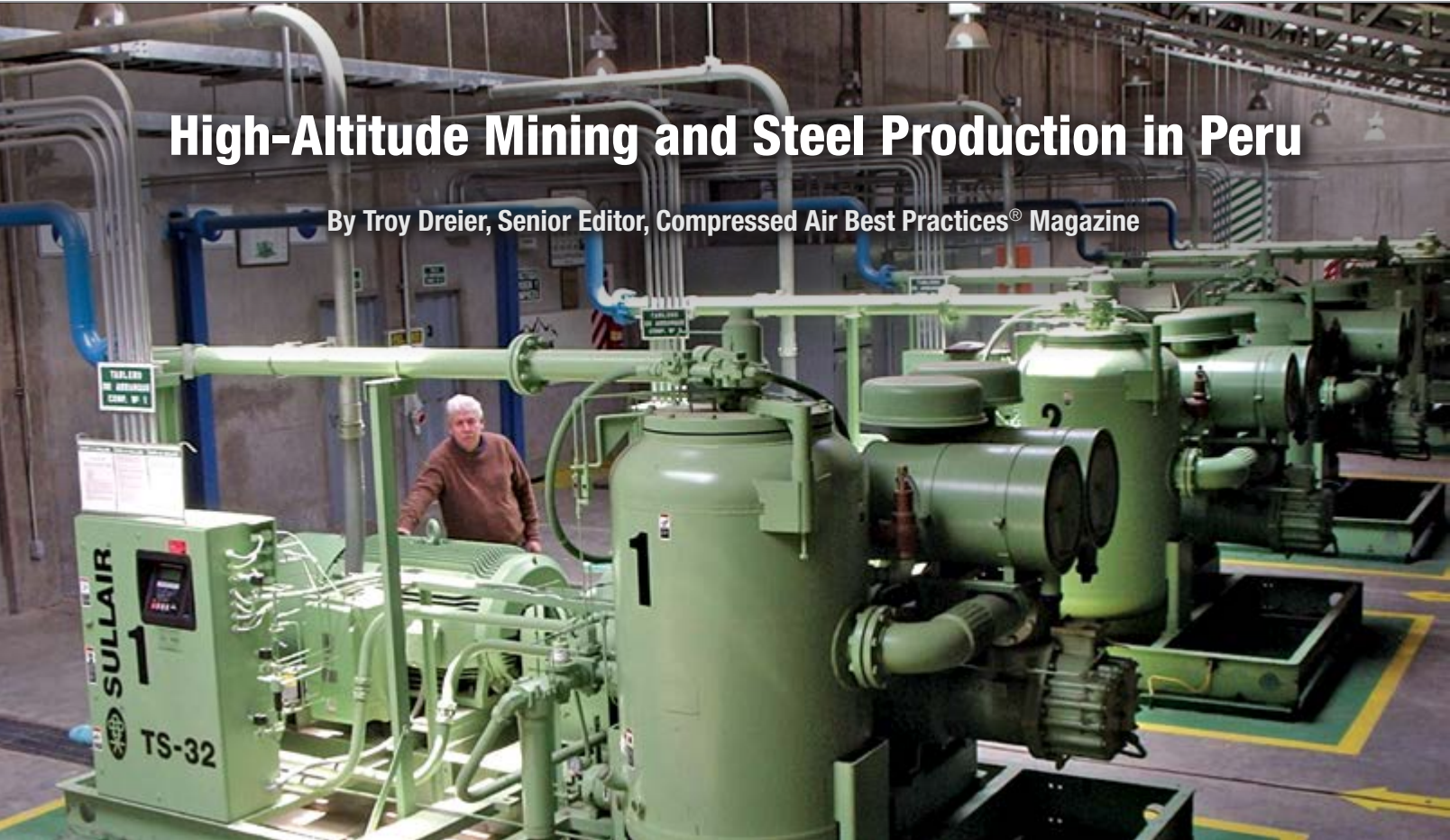
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High-Altitude Mining and Steel Production in Peru

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



► Pedro Secada spent 42 years working in the compressed air industry, much of it as the owner of Sullair del Pacifico in Peru. Driven to help his customers improve efficiency and save money, he challenged himself to keep learning. A large part of his business came from the country's mines, metal foundries and cement plants. Winning loyal customers meant solving problems quickly.

“We’ve partnered with Sullair del Pacifico for more than 45 years. Their experience in the mining industry in particular runs deep,” said Andy Munoz, Area Sales Manager, Hitachi Global Air Power. “They have a profound understanding of the unique challenges that come with high-altitude work and where environmental conditions impact equipment performance. The Sullair del Pacifico team’s passion for excellence and continuous improvement sets them apart as a leader of the industry.”

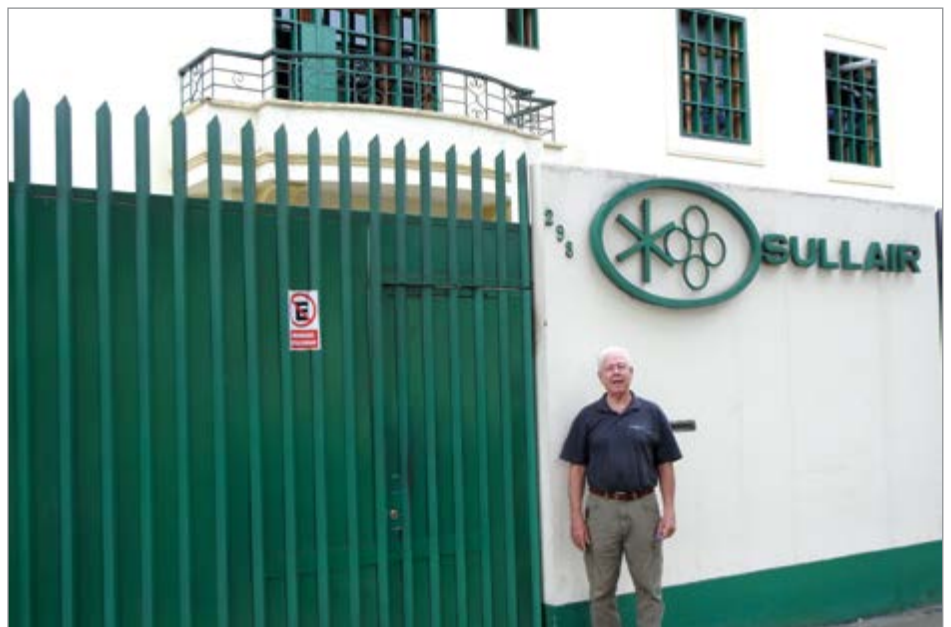
Above: Pedro Secada supported compressed air systems at a high-altitude mine in Peru.

Mining at 17,000 Feet Above Sea Level

The mining industry is a major customer segment for Sullair del Pacifico. Peru’s mines aren’t far down below the earth’s surface, but far up in the mountains at almost 17,000

feet. High-altitude operations provided unique challenges.

When high-altitude mining air compressors failed, Secada saw it wasn’t because the



Secada at Sullair del Pacifico headquarters.

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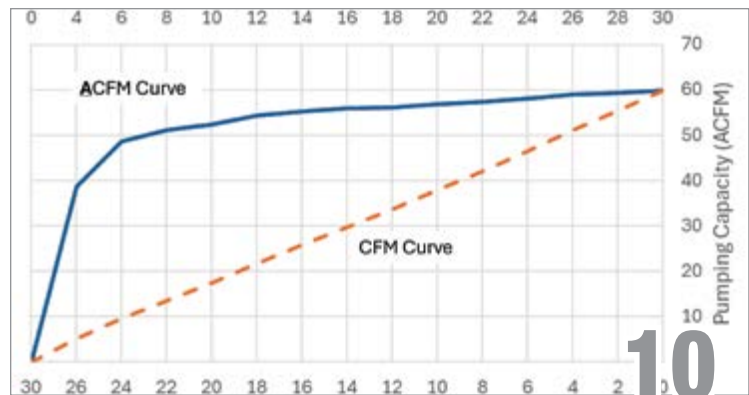
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10 Industrial Vacuum System Basics

By Benjamin Cameron,
Quincy Compressor



10



AERATION BLOWER SYSTEMS

6 Optimizing Wastewater Treatment with a High-Performance Aeration Blower System

By Sam Gooldy, UCA

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NEWS / Blower & Vacuum Industry & Technology

John Ansbro Joins Aerzen USA as President, Bringing Over 30 Years of Industrial Leadership and Expertise

Aerzen announced the appointment of John Ansbro as President of Aerzen USA Corp. With over 30 years of experience in the industrial sector, Ansbro has a strong history of driving growth, operational excellence and cultivating customer-focused cultures.

Ansbro will lead Aerzen USA's strategic direction in his new position, using his executive leadership experience and industry knowledge to advance the company's objectives. He will focus on enhancing Aerzen's

market presence, increasing customer value and improving operational efficiencies to address customers' evolving needs across various sectors.

"I am excited to join Aerzen USA and look forward to working with our talented team to drive innovation and growth," said Ansbro. "Together, we will strengthen our commitment to providing exceptional service and solutions to our customers."



John Ansbro, President,
Aerzen

This appointment is a crucial step for Aerzen USA as the company continues to innovate and expand its product and service offerings to meet the industry's increasing demands. Ansbro's leadership will ensure the company's growth and reinforce its status as a trusted partner in industrial solutions. For more information, visit <https://www.aerzen.com/us>.

Leybold Launches TURBOVAC MAG iS Models for Industrial Applications

With the TURBOVAC MAG 2807 iS and 3207 iS Maglev turbomolecular pumps, Leybold is launching two compact turbomolecular pumps in the pumping speed class of 3,000 l/s. Equipped with magnetic rotor bearings, these highly robust, low-vibration pumps are ideal for clean, hydrocarbon-free, high vacuum conditions. They are well-suited for applications in research and development and industrial fields such as coating, electron beam processes, space simulation chambers and beamline applications.



TURBOVAC MAG 2807 iS

"The exceptional performance of the vacuum pumps is due to their compact design and extended maintenance intervals," said Jinane Haddad, Product Manager, Leybold.

The vacuum pumps have maintenance intervals of up to 80,000 hours or 10,000 cycles. In addition to these attributes, the vacuum specialists at Leybold placed great emphasis on the ratio of maximum pumping speed to footprint during development. The TURBOVAC MAG iS delivers excellent performance values in terms of pumping speed and gas throughput – with speeds of up to 3,200 l/s, at a maximum throughput of 26 and 33 mbar l/s for Ar and N₂ respectively. For more information, visit <https://www.leybold.com/en>.

Busch Group USA Acquires Total Maintenance Solutions

Busch Group USA, headquartered in Virginia Beach, VA, has expanded its market presence by acquiring Total Maintenance Solutions (TMS), in Milan, IL. This strategic acquisition brings together two respected companies in the vacuum and overpressure industry, strengthening Busch's market position.

Turgay Ozan, President, Busch Group USA, said, "TMS has built a strong reputation for exceptional responsiveness, timely delivery and cost-saving solutions for its customers. We welcome TMS and its growing business into the Busch Group family of companies."

Following the acquisition by Busch, TMS will continue to operate as an independent division, keeping all staff unchanged. Customers and distributors will continue working with their established TMS contacts.

Jeff Schmidt, General Manager, TMS, said, "This acquisition provides TMS with enhanced resources, allowing us to offer even more vacuum solutions to our customers while providing expanded growth opportunities for our employees." For more information, visit <https://www.tmsvacuum.com> and <https://www.buschvacuum.com>.



Nick Taiber of St. Martin Holding Company, Rod Schmitt of TMS, Sami Busch and Turgay Ozan of Busch and Jeff Schmitt of TMS (left to right)

NEWS / Blower & Vacuum Industry & Technology

Becker Strengthens Global Presence with Canadian Facility

Becker Pumps announced the opening of Becker Canada Vacuum Technology Corporation, a fully owned subsidiary located in Bolton, ON. This expansion marks a major milestone in the company's commitment to delivering localized, high-quality support to industries across Canada.

Canada's industrial sector continues to grow, and, with it, the demand for high-quality vacuum and pneumatic solutions has increased. Becker has long been a trusted partner to Canadian businesses, but until now, its services were primarily provided through distributors. By establishing a

dedicated presence in Canada, Becker is ensuring customers receive the fastest, most efficient service possible.

The Bolton facility allows Becker to provide faster service and support, expanded inventory, on-site repairs and maintenance and localized expertise.

"Our new facility in Bolton is a significant step forward in enhancing service and accessibility for our Canadian customers," said Jason Rathbun, President and General Manager, Becker Americas. "By positioning ourselves closer to the industries we serve,



Becker Canada Vacuum Technology Corporation in Bolton, Ontario

we're not just improving convenience – we're building stronger relationships, optimizing efficiency and fostering innovation. This investment underscores our long-term commitment to the Canadian market." For more information, visit <https://beckerpumps.com>.



Eurus Blower's
ZCS 824 Vacuum
Truck Blower

Eurus Blower Launches the ZCS 824 Vacuum Truck Blower

Eurus Blower, a wholly owned subsidiary of Shandong Zhangqiu Blower Co., announced the introduction of the ZCS 824 Vacuum Truck Blower to the North American market.

The Eurus ZCS 824 Vacuum Truck Blower is a heavy-duty blower designed with integral shaft, ductile iron impellers. The blower is center-timed for rotation in either direction. The precisely aligned gears and bearings offer consistent and superior performance at an affordable price. It provides up to 4,460 cfm with a 15 psi max delta pressure and 18" Hg max delta vacuum.

Roger Blanton, General Manager, Eurus Blower, said, "This exciting ZCS 824 blower offers our customers a greater selection of high-quality blowers. The ZCS product introduction complements recent ZDL Bulk Truck Blower, EBox Factory Standard Packages, ISB Series Screw Blower, VR Series (steam blower) product introductions and growing success with our multistage centrifugal product. Eurus Blower's customer service focus is unmatched in the North American market as we continue meeting customer needs." For more information, visit <https://eurusblower.com>.

EDWARDS VACUUM Develops Magnetically Levitated Turbomolecular Pumps

EDWARDS VACUUM has developed a new series of magnetically levitated turbomolecular pumps that can withstand the demands of both challenging industrial environments and research processes. The oil-free nEXT2807M and nEXT3207M Maglev pumps are specially designed for areas where a contamination-free vacuum is required for high process quality. The virtually maintenance-free models (up to 80,000 hours) are among the lightest and most space-saving turbopumps in their class.

"In actual use, the nEXT M pumps offer their users a whole range of advantages," said Jinane Haddad, Product Manager, EDWARDS VACUUM. "Besides their low vibrations, which is crucial in many environments, the pumps also feature hydrocarbon-free performance, durability and versatility, with efficient water cooling. This results in an overall extension of the operating and maintenance intervals and ultimately a higher pumping capacity of the nEXT M series." For more information, visit <https://www.edwardsvacuum.com>.



nEXT3207M and nEXT2807M
Maglev pumps

Lone Star Blower Name Changes to Lone Star Turbo

Lone Star Blower announced it has officially changed its name to Lone Star Turbo. This strategic rebranding reflects the company’s commitment to growth, scalability and its expanded product offerings.

The name change to Lone Star Turbo signifies the company’s evolution and its dedication to providing cutting-edge turbo technology solutions to a broader range of industries.

“We are thrilled to unveil our new name, Lone Star Turbo, which better represents our vision for the future,” said Andrew Balberg, President, Lone Star Turbo. “This rebranding aligns with our mission to deliver advanced, scalable solutions that meet the evolving needs of our customers. Our commitment to innovation and excellence remains unwavering.”



The new Lone Star Turbo logo

Lone Star Turbo will continue to operate from its current headquarters in Houston, TX, and all existing contracts and agreements will remain in effect. For more information, visit <https://lonestarturbo.com>.

Festo Introduces the VTEP Proportional Valve Terminal

Festo introduces the VTEP, a proportional valve terminal. The VTEP is an ideal solution for flexible gripping, web tensioning, force-controlled polishing, precision piloting, dispensing, dosing and diaphragm pump control.

The VTEP valve terminal provides closed-loop control of moderate air flow – vacuum up to 35 l/min. It comes in 2-, 3- and 5-valve variants, which can control up to 10 channels. The VTEP features an EtherCAT digital communication interface for real-time communication and full data transparency.



The VTEP provides closed-loop control of moderate air flow on up to 10 channels.

Users set performance parameters per channel and the valves provide closed-loop controls to those presets. Valves deliver highly dynamic response and precise pressure control to achieve “target reached” status for each channel, similar to the “motion complete” function in electric drive technology. For more information, visit <https://www.festo.com>.



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Optimizing Wastewater Treatment with a High-Performance Aeration Blower System

By Sam Gooldy, Senior Manager, Marketing and Product Development, UCA

► In a strategic move to enhance environmental sustainability and operational efficiency, Universal Compressed Air (UCA) partnered with a leading waste services provider in the Southeast to design, build, own, operate and maintain a state-of-the-art blower System for wastewater pond aeration. This innovative solution, part of a five-year agreement, delivers over 20,000 scfm of low-pressure air while guaranteeing uptime, performance and significant cost savings.

“As we look to the future, we remain dedicated to developing solutions that enhance productivity, reduce energy consumption and support a greener planet,” said Rick Kowey, Executive Vice President

Above: Universal Compressed Air’s headquarters in Center Valley, PA

and COO, Universal Compressed Air. “This project is a testament to what’s possible when innovation meets sustainability.”

Project Overview: Overhaul the System

It was clear: The customer’s aeration blower was faltering, and, in turn, its entire aeration system was underperforming. Unfortunately, when a wastewater aeration system is underperforming there’s a risk of a septic condition developing. When that happens, incomplete conversions can take place and you can literally smell the problem.

Major components of the aeration blower system would go offline and it could take days or weeks to bring them back online. Site resources were strained and the ability to manage

system downtime was a major drain on the customer’s resources. A significant system overhaul was needed if the site was going to meet its corporate and community commitments.

The project’s goal was straightforward: Replace the customer’s unreliable and inefficient aeration blower system with a new, highly dependable, energy-optimized solution, all without interrupting production. To achieve this, the provider planned and executed a seamless transition by installing and commissioning the new aeration blowers one by one. This included the engagement of the provider’s Project Management team with the customer’s Operations team to ensure that as new aeration blowers were brought online they performed as needed in a stable condition for a best practices

prove-out period prior to the shutdown of legacy blowers.

The modular Blower System, owned and operated by UCA, produces between 15,000 and 25,000 scfm of low-pressure air supporting wastewater pond aeration. This precision delivery of low-pressure air ensures critical biological processes continue uninterrupted, breaking down organic matter efficiently.

To meet the customer's high-reliability expectations, the provider deployed an N+1 blower system. If N equals the amount of normal or typical capacity needed to support demand, N+1 indicates an additional component – an aeration blower unit, in this case, added to support a single failure or required maintenance on a given component. During normal operation, one of the installed aeration blowers is always waiting in reserve as a backup. This redundancy philosophy plays a crucial role in the system's design. Each piece of equipment and instrument has a backup, meaning no single point of failure can cause the aeration blower system to miss meeting the demand requirement. This level of redundancy provides a high level of certainty and confidence the plant can maintain operational flow rates throughout the life of the contract.

Technical Breakdown: Inside the Blower System

The Blower System includes seven positive displacement rotary screw aeration blowers, each rated over 400 hp, with a total delivered flow capacity in excess of 30,000 scfm at an operating pressure of 10-12 psig. These aeration blowers were chosen for their ability to provide consistent, oil-free air across varying flow rates, a crucial



The completed installation of an aeration blower system



The installation of a high-performance aeration Blower System on a concrete pad

» Optimizing Wastewater Treatment with a High-Performance Aeration Blower System



The completed installation of an aeration blower system

feature for wastewater aeration where demand fluctuates throughout the day. This selection marks a significant upgrade from the site's legacy aeration blowers, offering significantly improved efficiency and game-changing reliability.

The Blower System is paired with an advanced auxiliary support system, including variable frequency drives (VFDs) and an advanced control system.

The VFDs allow the unit to automatically adjust the aeration blower motor speed in real time which in turn modulates the aeration blowers' discharge airflow production to closely match the aeration system's demand. This ability to match airflow production with aeration demand is core to designing a highly efficient system.

The advanced control system manages dissolved oxygen based on the customer

defined setpoint. UCA's monitoring systems typically include integrated pressure sensors, flow meters and smart control algorithms deployed to optimize aeration blower performance, reduce energy use and prevent pressure surges.

Waste heat or excess heat is often an unused byproduct in the blower/compression cycle. Depending on the project economics, a heat recovery option may be included in the product design. Heat recovery allows for the recapture of excess heat from aeration blower operation, repurposing it for on-site processes or facility heating, contributing to the plant's overall energy savings.

Cost Savings and Environmental Impact

The new aeration blower system is projected to save the customer over \$1 million during the five-year contract. These savings stem from improved energy efficiency and reduced

downtime. The high-performance aeration blowers consume significantly less electricity than the customer's outdated legacy system. Plus, the N+1 modular design with built-in redundancies ensures maximizing uptime while minimizing the likelihood of a costly interruption.

Additional savings come from the optimized system design and maintenance reallocation. Smart controls and real-time monitoring keep airflow and pressure at optimal levels, avoiding wasteful over-aeration. Also, all system monitoring, planned and unplanned maintenance and total system upkeep is managed by a team of operators and maintenance personnel.

Beyond cost savings, the environmental impact is equally impressive. The enhanced aeration process reduces greenhouse gas emissions by lowering energy consumption and supporting better wastewater treatment, ultimately contributing to cleaner water release.

Managed Maintenance for Industrial Customers

This aeration blower project reflects a commitment to delivering sustainable, reliable solutions through the PIPELINE AIR™ plan, which offers a fully managed compressed air (blowers are just low-pressure compressors) utility model tailored to large-scale industrial users. This plan guarantees reliability, as the provider designs, owns and maintains the aeration blower system, eliminating operational risks for customers. It also guarantees performance, since customers gain real-time monitoring of flow, pressure and dewpoint to ensure their aeration blower system

always operates at peak efficiency. Finally, it delivers fixed monthly costs, since the model includes no capital investment or unexpected maintenance fees, only a predictable, transparent payment structure.

When operational burdens are removed, customers are able to focus on their core businesses while reaping the financial and environmental benefits of optimized compressed air systems.

Building a Sustainable Future

The successful installation and startup of this aeration blower system combine innovative technology, thoughtful system design and a steadfast commitment to sustainability. The provider not only delivered immediate results for the waste services customer, but also laid

the groundwork for long-term environmental and economic benefits. **BP**

About the Author

Sam Gooldy is the Senior Manager, Marketing and Product Development for UCA. With over 25 years of experience in the compressed air and blower industries, including more than 15 years in leadership roles at Cameron and Ingersoll Rand, Gooldy brings a blend of applications aptitude, product vision and a commitment to innovation. He holds a BS in Chemical Engineering and an MBA.

About Universal Compressed Air

Universal Compressed Air specializes in developing, designing, building and maintaining cutting-edge compressed air solutions for a wide range of industrial and high-tech applications. Its PIPELINE AIR™ approach removes operational burdens from customers



while guaranteeing reliability, energy savings and reduced environmental impact. For more information, visit <https://ucaair.com>.

For similar articles on **Aeration Blowers**, please visit <https://www.blowervacuumbestpractices.com/technology/aeration-blowers>.



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Industrial Vacuum System Basics

By Benjamin Cameron, Business Line Manager, Vacuum, Quincy Compressor

► The objective of this article is to make vacuum systems a little less confusing by providing some foundational vacuum principles. Naturally, the best place to start is with an examination of air compressors! Air compressors take air from an open system (the atmosphere) and discharge it into a closed system, resulting in a higher pressure. The potential energy of high-pressure air is then used to serve an operational purpose. We're comfortable with air compressors. Many of us own one for household use as they help us paint, operate nail guns, work on cars and tease kids with blasts of cold air on a hot day.

Alternatively, vacuum pumps extract air or gases from a closed system and exhaust to atmosphere. The resulting less-than-atmospheric pressure in the closed system is then used to serve useful functions. Vacuum systems are used in many of our day-to-day

activities and products, including the cruise control in your car, the dentist's office, wastewater infrastructure and packaged meats. Some of us still remember the drive-thru bank canisters flying overhead like torpedoes full of money. The word vacuum, however, can prompt even experienced equipment personnel to seek a change of topic. How can that be? Vacuum is simply a different region of the pressure spectrum. This article will cover vacuum basics, and, where possible, draw on the differences to air compressors as a familiar reference.

Vacuum Units of Measurement

No conversation about vacuum system basics is complete without addressing the often-confusing units of measure. Air compressors provide pressure above and beyond atmospheric pressure. As such, the discharge pressure is almost always expressed using gauge measurement (psig).

Vacuum systems are commonly measured in both absolute and gauge measurements.

On the absolute measurement scale, the smaller the numerical value the deeper the vacuum level. With gauge measurements, the larger the numerical value the deeper the vacuum level. Typically, applications requiring deep vacuum levels will express vacuum in absolute terms like torr or mmHg, while most other industrial applications express vacuum in inches of mercury (gauge).

Flowrate vs. Horsepower

When it comes to sizing an air compressor, the conversation often revolves around "How many horsepower do you need?" The typical range of air compressor discharge pressures is 100-150 psig, a span of 1.5:1. In that range, the delivered flow rate (cfm) per horsepower changes little. Therefore, horsepower can easily be used as a proxy for sizing.

Industrial vacuum applications cover a large range of operating vacuum levels. For example, chemical applications might

Above: Quincy Compressor's manufacturing headquarters in Bay Minette, AL

require deep vacuum of 0.25"HgA, while pick-and-place applications might require a shallower vacuum of 15"HgA. That's a span of 60:1! Across such a wide range of vacuum levels, the flow rate of a vacuum pump can change considerably. Therefore, much more attention is paid to flow rate when sizing a vacuum pump.

SCFM vs. ACFM

Since the inlet to an air compressor is generally atmospheric pressure, the Compressed Air and Gas Institute (CAGI) has adopted a set of conditions for standardizing air compressor performance data published by manufacturers. Therefore, most air compressor technical data sheets reflect scfm at 14.5 psia and 68°F (20°C).

Since the inlet pressure of a vacuum pump can vary depending on the application, the flowrate on most vacuum pump data sheets is commonly adjusted to actual conditions, acfm. It's important that anyone involved in specifying and sizing vacuum pumps is

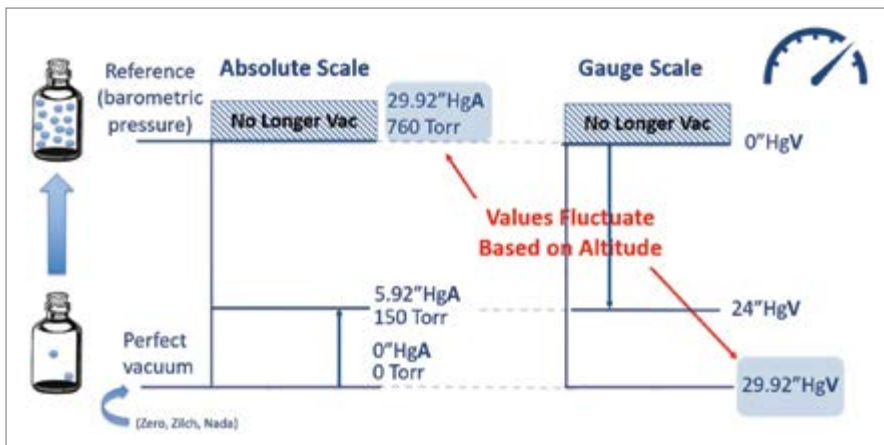


Diagram 1. Vacuum systems are calculated in both absolute and gauge measurements.

aligned with the terminology being used, as misunderstandings can be costly.

Note that vacuum pump manufacturers often publish marketing literature describing a “nominal” flow rate. This is generally the highest acfm at any point along the performance curve. Since the shape of the curve can differ among vacuum pump technologies and

manufacturers, it's best to avoid the comparison of nominal flow rates whenever possible. Instead, look at each curve and compare the actual flow rate at the specific desired vacuum level.

Altitude Adjustments

If your facility uses gauge measurements to evaluate vacuum, extra precaution might be necessary to size a vacuum pump when located at higher altitudes. This is because of two factors. First, the barometric pressure (the reference for gauge measurement) is different at higher altitudes. Second, manufacturer performance curves are typically created with sea-level barometric pressure conditions. A good approach to avoid complications is to convert the gauge measurement to absolute and then compare them to the pump curve. As a rule of thumb, you can estimate the local barometric pressure by subtracting 1"Hg from 29.9"Hg for every 1,000 feet above sea level.

Example: A production facility located 2,500 feet above sea level requires 45 acfm at 23"HgV. If altitude is not considered, a process engineer might reasonably select a pump with the performance shown in

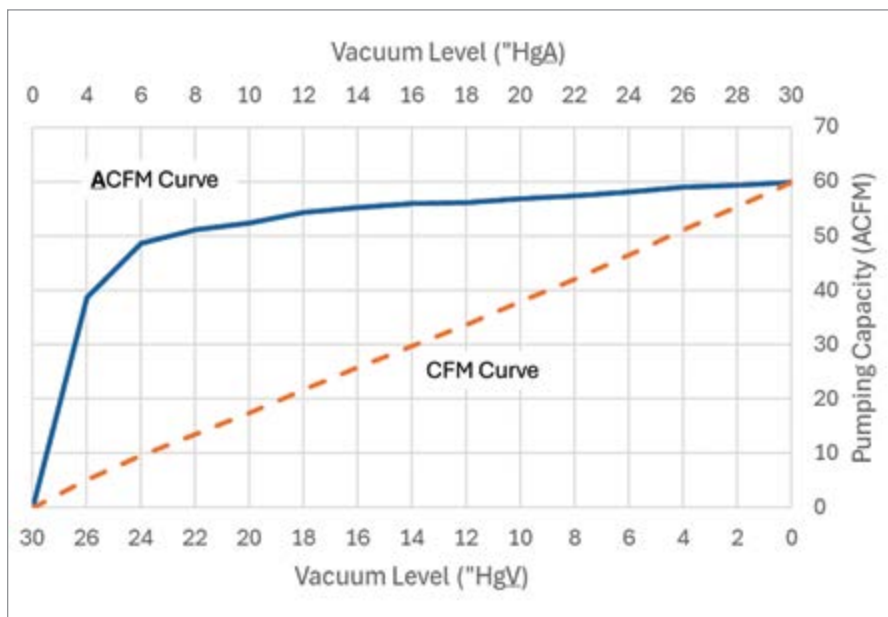


Diagram 2. Vacuum system flow rate is typically adjusted to actual conditions.

>> Industrial Vacuum System Basics

Diagram 3 (the green point). As described previously, the barometric pressure at the facility would be estimated to be as 29.9"Hg – 2.5"Hg = 27.4"HgV. When reviewing the manufacturer's standard performance curve, the engineer needs to ensure the vacuum pump can provide 45 acfm at 4.4"HgA (27.4"Hg – 23"Hg). In this case, the vacuum pump selection is insufficient to meet the need.

When operating at deep vacuum levels or using vacuum pump technologies with limitations to continuous duty end-pressure, it becomes much more critical to consider altitude.

Pressure Drop

Ever tried drinking a thick milkshake through a skinny straw? It takes a lot of work. Sometimes, it doesn't work regardless of how hard you try (spoon to the rescue!). When it comes to flow through a pipe,

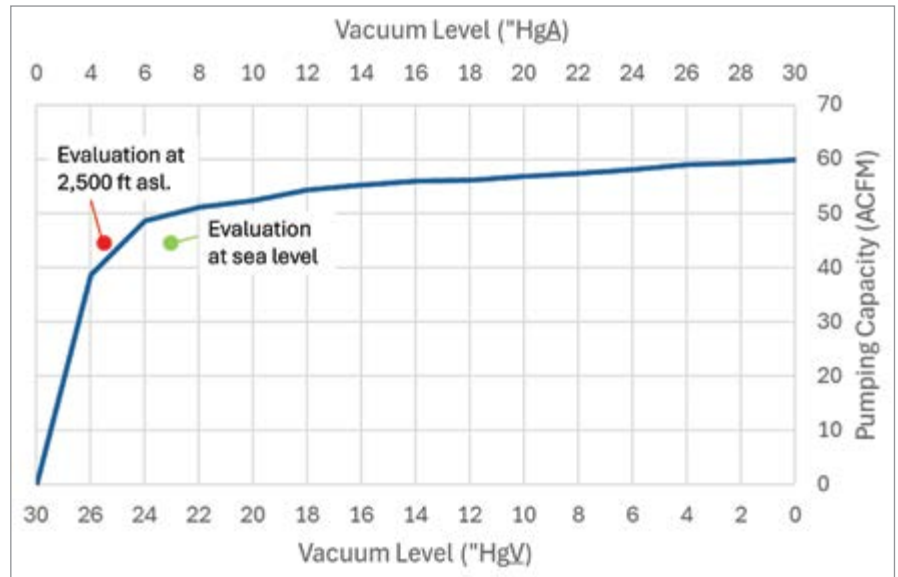


Diagram 3. Engineers need to consider altitude when sizing vacuum pumps.

frictional losses are unavoidable. The more frictional losses through the piping, the greater the pressure drop. Since the performance of a vacuum pump can vary considerably at different vacuum levels, it's

important to consider the influence of piping architecture on pump selection.

If the vacuum pump is located far away from the point-of-use, the pipe size is too small or there are many bends and valve obstructions in the line, then the vacuum requirement at the point-of-use can differ considerably from what's required of the vacuum pump. Diagram 4 illustrates how the vacuum load at the top of a distillation column might differ from the load at the vacuum pump inlet, given the stated pressure drop. If vacuum system piping architecture is not considered, the best-case scenario is the selected vacuum pump has enough capacity to overcome the piping losses. In the worst-case scenario, more pumps, bigger pumps or a different pump technology might be required. Solving that issue after the fact is harder than simply reaching for a spoon!

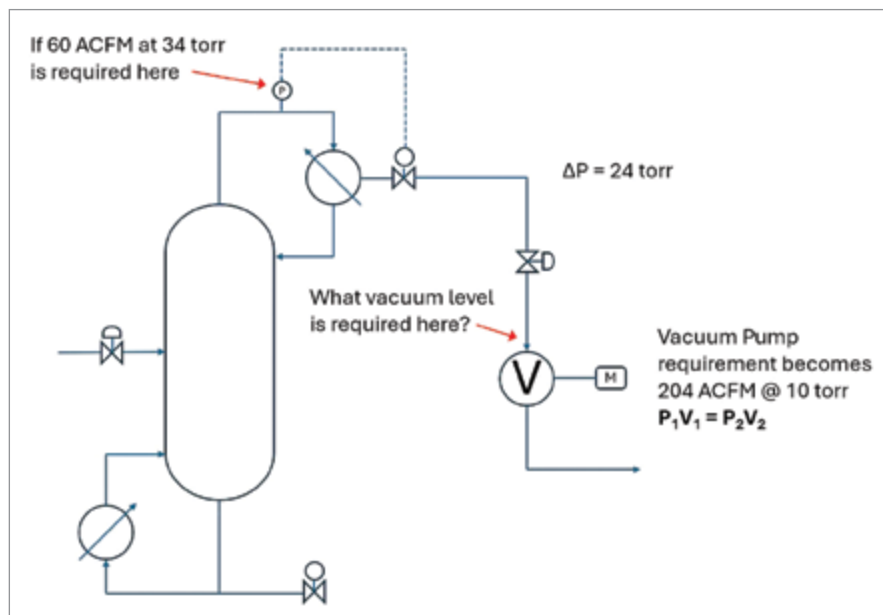


Diagram 4. The vacuum piping system can lead to significant pressure loss.

A few best practices to consider for vacuum system pipework:

- Aim for less than 10% pressure drop from point-of-use in design.
- For single vacuum pump installations, size vacuum system piping to match the inlet size of the vacuum pump.
- For multiple pump installations, have the vacuum pump manufacturer use software to model the vacuum system piping layout of the facility and mathematically confirm piping size and pump selection.

into a waste container under the fume hood. That means walking all the way to the other side of the lab when the vacuum outlet is within arm’s reach. What would you do?

Vacuum points-of-use are upstream of the vacuum pump. Therefore, anything drawn into the vacuum system and left unobstructed will enter the pump. Many vacuum pumps have been crashed by ingesting solid items, liquid slugs and everything in between (such as greases and pastes). Good design practice is to include mitigation measures such as particulate filters and liquid collection tanks ahead of the pump.

However, one must also consider the compatibility of the process gases with the

pump. If the process gas is incompatible with the lubricating or sealing oils, vacuum pump technologies that use oil in the compression chamber (referred to as wet technologies) would be unsuitable. These are technologies such as oil-lubricated rotary vane, oil-lubricated rotary screw and liquid ring vacuum pumps. Instead, a technology that does not use a lubricating or sealing fluid in the pumping chamber (referred to as dry technologies) would be needed. These technologies include rotary claw, dry screw and rotary lobe blowers.

When the correct pump technology is paired with upstream protections, the long-term reliability of equipment is ensured. After all, not everyone makes the same choice in the chemistry lab.

Wet vs. Dry Pump Technologies

It’s been a long day in the chemistry lab, and nobody else is around. Proper procedure is to pour residual solvents from the experiment

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Conclusion

Many products use both compressed air and vacuum systems at some point in their manufacturing and packaging process. With an understanding of the vacuum principles covered here, you can approach your next vacuum project with the same confidence as you approach air compressor projects. **BP**

About the Author

Benjamin Cameron is Quincy Compressor's Business Line Manager for Vacuum. He's worked in the vacuum business for nearly 18 years in application engineering, systems building, product management and sales and marketing. He holds a BS in Chemical Engineering from Virginia Tech and an MBA from Old Dominion University.

About Quincy Compressor

Founded in 1920, Quincy Compressor is a leading designer and manufacturer of reciprocating and rotary screw air compressors, vacuum pumps and a full line of air treatment components. Headquartered in Bay Minette, AL, the company has built its reputation on quality and rugged reliability, building tough air compressors and vacuum pumps for the most demanding applications. For more information, visit <https://www.quincycompressor.com>.

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motor lost power, but because the thin air presented cooling issues. A standard electric motor can get by with a small fan at sea level, but the same fan doesn't move enough air at 17,000 feet. To solve the issue, he visited Toshiba in Houston to order electric motors with bigger frames and bigger fans. He also spoke with engineers at Sullair to change the gear ratio of the airends to compensate for lost capacity.

"Their experience in the mining industry in particular runs deep,"

Andy Munoz, Area Sales Manager,
Hitachi Global Air Power

"A lot of miners in Peru continue to purchase Sullair tandem air compressors because they can show you machines that have been working for 20, 25 years. Shutdowns are uncommon," he said.

One mining customer insisted on purchasing two 350 horsepower (hp) VSD two-stage rotary screw air compressors against Secada's wishes. After one year, one of them burned out due to voltage variations brought on by electric storms and other issues found at high altitudes. He replaced them with two two-stage 350 hp rotary screw air compressors with components optimized for high altitudes.

"I sold so many two-stage air compressors I was the only one to celebrate the 30th anniversary of the tandems," he said.

Metal Foundries and Cement Plants

Secada's industrial customers also included a steel foundry producing building construction material. Due to the length of the steel beams created, the foundry was two miles long. That meant two miles of compressed air piping. Despite multiple air compressors supplying the system, it occasionally ran out of air. After installing meters to measure pressure throughout the compressed air system, Secada discovered an application at one end that

produced a huge demand for several hours one or more times per month. The plant

operators didn't see their problem until the system audit showed them. He told them



Secada preferred installing air compressors without cabinets, as it made maintenance easier.



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» High-Altitude Mining and Steel Production in Peru

A Lifetime Learning about Compressed Air

Pedro Secada's career started in September 1980 when he took a Service Manager position with Sullair del Pacifico's Peruvian branch, at the time a fully-owned Sullair subsidiary.

An avid reader of Sullair's maintenance manuals, he began studying all he could about maintenance schedules, lifetime hours of operation, valves, capacity control systems and lubrication. He studied electric motors, motor bearings, starters and maintenance schedules. He saw the importance of ambient temperature and oil temperature to air compressor performance. He learned how the design of different capacity control systems impacted the reliability of bearings and gears.

A decade later, he had worked up to General Manager, and was given the chance to be his own boss. In July 1990, Sullair sold him the subsidiary's assets and let him keep the name. Sullair del Pacifico was now his. In 1991, he invested in a FoxPro database to track the hours of operation for every air compressor, refrigeration compressor and vacuum pump



Five tandem air compressors at a Peruvian high-altitude mine.

his company installed. It grew to include over 4,000 machines. He created weekly service reports for each air compressor, giving his customers reliable information on preventative maintenance. He was also able to work with his wife, who became the company's Spare Parts and Logistics Manager and excelled at selling customers supplies for preventative maintenance.

The benefits of his system were immediate. His database gave him an asset his

customers greatly valued. Thanks to the reliability of his information, his company earned a reputation for having air compressors that never failed, and Sullair del Pacifico became a market leader. The company grew to include three locations, with one in Lima and two others in the north and south of Peru.

Besides insuring uptime, Secada was also concerned with his customer's energy costs. Before CAGI data sheets were created, air compressor distributors and their customers could only go by the manufacturers' claims. He found there wasn't any uniformity to the numbers manufacturers put out, so making comparisons was challenging. Some compressed air manufacturers measured capacity from the bare airend, while others measured from the air compressor's outlet. Specs might provide acfm or scfm.

"It was difficult understanding how everybody was speaking, but I learned a lot searching through all the published results," he said. "I had to learn about and compare a variety of specifications. It was confusing, but it was a good learning process."



Secada at a tire plant with one of the last Sullair 20-100L air compressors produced.



Two tandem air compressors used to make preforms at a plastic bottling plant in Peru.



Pedro Secada visiting a textile plant, a longtime customer.

they couldn't have one compressor room for a system like theirs, but needed three air compressor areas: one at each end and one in the middle.

One smaller steel mill moved to Peru from Switzerland and brought with them European-built Sullair air compressors, models Secada

didn't know. It set up 150 miles south of Lima at sea level, 12 miles from the Pacific Ocean, a hot and humid environment. The mill started with two 220 hp European Sullair air compressors, then grew with two U.S.-built 300 hp two-stage air compressors, three 450 hp two-stage air compressors plus additional smaller one- and two-stage air compressors,

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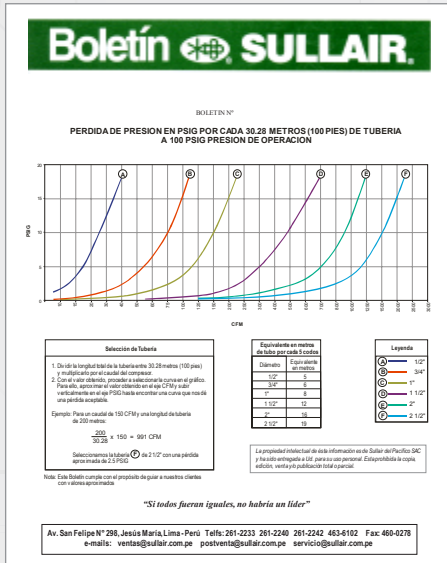
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Creating a Preventative Maintenance Library

To pass his learnings on to his customers, Secada started writing and distributing his own bulletins. By the end of his career, he had created over 200 of them. His bulletins gave specific and useful information. He told customers what oil to use and the part numbers for the filters they should order. Many of his bulletins were about architecting compressed air systems. He showed how to add lower areas to piping so water would drain out and not get passed along to the point-of-use.

could be easily avoided if the compressed air pipeline was well-designed,” he said. “We learned if you began to go up from the air compressor and then down with a drain, water will fall to the drain. It will not climb.”

“Then, you go to the line and do the same again with a hook, so water drops will continue until the end of the line where you again add a drain. If you create three altitudes in your design, almost certainly you will not have a drop of water at the point-of-use.”

“If the compressed air pipeline is not well-designed, when the dryer fails you will have a point-of-use with a lot of water. That

When customers called with a technical question Secada simply mailed them a few bulletins.

A Sullair del Pacifico bulletin showed an early version of air compressor performance curves.

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His emphasis on preventative maintenance gave a boost to his replacement part sales. Because he tracked air compressor performance, he knew which were approaching 15,000 hours of service and needed replacement parts. He stocked those items so customers didn't have to wait.

"People always told me the way I speak was so reassuring they realized I was giving them good information, and they believed me," he said. "It's rewarding to realize the reason you had an economic success was because you did a lot of things the right way."

Compressed air also solved the problem of black smoke coming from the chimneys of cement plants and steel foundries. The smoke was a mix of ash and hot air. Adding compressed air piping and a water vapor system inside the chimneys cleaned the soot from the exhaust so only hot air was expelled.

These days, Secada is happily retired. He sold his company to Acero Comercial Ecuatoriana in January 2015, and stayed on for another

five years at the new owners' request. He's still available for consultations when his lifetime of compressed air knowledge is in demand.

"I have a good relationship with them," he said. "I don't work, but I cooperate with them, especially when they have nice, big projects involving mining or high altitudes." **BP**

For more information, visit <https://www.sullair.com.pe>.

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compressed air dryers, filters and storage tanks. The air compressors were all equipped with variable capacity control (VCC). He taught the mill's personnel how to use the VCC performance curve to align specific load with specific power. He also taught them how to measure the energy savings from wet and dry storage tanks.

A cement plant presented multiple problems in need of solutions. Since it was located at a high altitude, it needed air compressors optimized for thin air, with the same specially constructed Toshiba motors the high-altitude mining customers used. But because the environment was especially dusty, it required heavy-duty three-stage cyclone inlet filters with primary and secondary air filter elements to fully protect the air compressor airends. He supplied multiple low-pressure oil-lubricated rotary screw air compressors delivering 2,000 acfm of 50 psig compressed air, and a backup 400 hp air compressor that could supply 50 psig or 115 psig. All are still working after more than 120,000 hours without an overhaul, he noted proudly.



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A large blue and white sign for PTC Liberty Tubulars is the central focus of the image. The sign features the letters 'ptc' in a bold, lowercase, sans-serif font. Above the 't' is a stylized blue and white logo consisting of two overlapping circles. The sign is set against a background of an industrial facility with various pipes, tanks, and buildings under a cloudy sky.

ETS Cools Extreme Temperatures at PTC Liberty Tubulars

By Troy Dreier, Senior Editor, Chiller & Cooling Best Practices Magazine

► Engineered Thermal Solutions began in 2016, formed by engineers Charles Marchetta, PE, and Christopher Imiola. At the time, both worked for a multinational company that produced specialized equipment for heavy industry. The two decided to form their own manufacturer's rep firm working closely with Baltimore Aircoil Company. BAC was looking to grow its industrial market share, and was interested in supporting companies working within that area. ETS is based out of Houston and the firm's geography includes Texas, Oklahoma and Louisiana. The company employs two additional associates based in Houston and Dallas who help with sales and project management.

"We don't have a brick and mortar office. We don't have a warehouse," Marchetta said. "If projects take us to Amarillo, to Tulsa, to New Orleans, we get on a plane or spend

some windshield time. Our overhead is the travel costs."

The firm also represents air-cooled heat exchangers from North American Air Exchanger, specialty heat exchangers from JD Cousins and pumps from Grundfos and Peerless Pump.

Putting Unused Cooling Systems Back Into Service

In November 2022, ETS got a call from PTC Liberty Tubulars. Based in Liberty, TX, the plant produces steel tubes and pipes for the oil and gas market. It uses a process called austenitizing and tempering to heat steel tube, pipe and bar to a critical point and then cools it to increase durability. One of the plant's austenitizing lines had been sitting idle for several years and was in need of an overhaul. The plant wanted to bring the line back up to specification and get it producing again due in part to strong market demand. The line

included both an open loop and a closed loop cooling system. "It's uncommon to see both types of cooling systems operating together in one location. Most of the time, it's one or the other," Marchetta said.

The two visited the site with project manager David Ramirez to get a better understanding of what was needed, and won the bid thanks to their attention to detail. They started by examining the specifications from nearly 15 years back, when the cooling loops were first built to understand the heat load, flow rate, heat rejection, pressures and pump sizes. It was a piecemeal process spent scratching rust off nameplates to understand what was already in place, Marchetta said. Once the firm got specs and prices for new equipment, the plant's owners asked, What if we increased the capacity a little bit? How do we improve on what we had? Another company was brought in to upgrade the power supply and furnaces, while ETS worked on the cooling systems.

Above: PTC Liberty Tubulars of Liberty, TX

“As the pipes come down the line, they’re heated with induction boxes. All those induction boxes have cooling jackets on them, and those jackets are included in the closed loop system. After heating, they have to quench the pipe quickly and efficiently. The open loop system has a conventional open loop crossflow cooling tower on it with large circulation pumps. We upgraded the open loop circulation pump, the quench water pumps, the open loop cooling tower system and a closed loop cooling tower system. Then, after working alongside several operators, we put in a water control PLC system to centrally control the new equipment. We had a main control station in the pulpit and a local remote control panel out by the units so they could have manual control for the operators,” Marchetta said.

The open and closed loop systems manage roughly 15 million BTUs per hour, with a

90°F to 95°F (32°C to 35°C) target for the cold water sides. The owners not only wanted functionality, but also a clean appearance and durability. That’s why all new equipment was constructed from 304 stainless steel. Corrosion is a concern anywhere in the Gulf Coast region, even though this facility is more than 100 miles from the shoreline.

The Open Loop Cooling System

The plant’s open loop cooling system originally had a counterflow cooling tower. Counterflow cooling towers are compact and slightly less expensive, but crossflow cooling towers are easier to maintain, Marchetta believes. It’s easier for customers to access the internal components, inspect the fill, grease motors, reach gearboxes and check fans and belts. For those reasons, the firm decided to replace the old cooling tower with a stainless steel crossflow model. It needed to match the original flow rate of 10,000 gpm



ETS Project Manager David Ramirez with the installed cooling towers

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and fit the original 12-foot by 22-foot plot space using a two-cell configuration.

The open loop cooling system makes use of an outdoor water storage area called a hot well/

cold well pit and is common in this type of industrial application. The pit has three parts to it – a settling area, a hot side and a cold side.

Hot water drains into the settling area from the quench area, which is where cool water

quenches the 2,000°F (1,093°C) steel. Sections of the pit are separated by weir dams. In the settling area, debris coming from the quench settles to the bottom and can be shoveled out. From there, hot water overflows into the middle section, where it's pumped into the cooling tower and then drains to the cold side. The cooling tower pumps operate independently of the quench water system, working to keep the cold side as cold as possible. If the ambient air temperature is 100° F (38°C), the cold side will still be around 90°F (32°C).

“The plant is taking pipe and making it very hard because sometimes it’s used for drilling well casing. They heat it up and then quench it real fast like you would with a sword or a knife,” Marchetta said. “There’s a balance: They don’t want it too hard because it becomes brittle. They don’t want it too soft because then it’s too pliable. There’s a science to it.”



The open loop system's crossflow cooling tower

Cooling Tower Maintenance Concerns

“The biggest maintenance item for cooling towers is water treatment. It’s not necessarily looked at by the manufacturers. They’ll say, ‘You need to go talk to your local water treatment guy.’ But it’s similar to a swimming pool,” Marchetta explained. “If you don’t do your own chemicals, then you need to have a company come out and do it for you. Otherwise, your pool’s going to turn green in two weeks. It’s the same thing with a cooling tower. If you don’t have the right chemical injection, the right monitoring, the right blowdown, your cooling tower is going to turn into a brick within the first six months. Trust me, it happens more times than you think.”

“A lot of plants have the cooling system set up, but they don’t want to pay a company to come back out and monitor it,” Imiola added. “They say, ‘Here’s my plan, I’m going to keep going with it.’ But water quality changes over time, and your tower changes. You can have an upset condition, and now you’re having problems because you’re not keeping up with it. To me, it’s worth every penny. We’ve seen too many clients that have a chemical injection system, but nobody monitors it, nobody takes care of it.”

“We don’t sell chemicals or water treatment service, but we can set you up with the right equipment for that person to come in and treat your tower. What we’ve designed and specified through our own experience are what we call water control cabinets. These water control cabinets have a pH probe and injection pumps for various chemicals. Typically, that includes a biocide, a dispersant and an acid injection for pH control. It’s a plug-and-play control system for controlling your blowdown and chemical injection. It’s important to have as part of your cooling tower,” Marchetta said.

When Texas Froze Over

Making hot things cold isn’t the only obstacle for an outdoor cooling system in Texas. ETS has found freezing is the new worry for the Gulf Coast. Houston experienced a well-publicized hard freeze in 2021, which created a multi-day power outage. Following that freeze and several others, the firm found many facilities didn’t have the proper tools in place for quick preparations in case of cold weather. It’s been educating customers about the threat of freezing and how a few easy procedures can prevent thousands of dollars of damage.

The Purpose of the Pit

The open loop’s pit is essential because there’s not enough room inside the building for the cooled water waiting to be used. The company recirculates around 10,000 gpm through its quench system, which would require a sizable tank. Storing cooled water outdoors open to atmosphere makes the most sense, and still keeps water at the right temperature to cool pipe coming down the tempering line.

“We wanted to make sure the turnover of the pit was quick enough to handle the heat the customer wanted to reject. They had an idea of the overall heat load from when the line had previously been in service. We wanted to add to that and improve the capacity. For them, colder is better. We wanted to make that pit as cold as possible for as long as possible. We added a little bit of height and airflow to the cooling tower, which equates to more capacity.

The cooling tower went up in horsepower compared to the old one, however we improved efficiency while still providing redundancy. The previous tower had two cells with four fans per cell. We combined that into two larger fans,” Marchetta said.

The cooling tower is more efficient with a higher delta T. If the pit had only one section, the system would be less efficient. Separating the hot water and sending it directly to the cooling tower offers a larger delta T and lets the cooling tower operate more effectively.



Prior to starting work, the pit was overgrown with algae.



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“It’s almost counterintuitive,” Marchetta said. “Hotter temperature is easier to cool farther away from your approach temperature, which is 80°F (27°C). If it’s coming at 120°F (49°C), that 120°F to 100°F (49°C to 38°C) is easier to cool than 100°F to 90°F (38°C to 32°C). If the whole tank was mixed at 95°F (35°C), cooling 8,000 gpm, 95°F to 90°F (35°C to 32°C) is a

much harder duty than 120°F to 90°F (49°C to 38°C). This was set up before we got here, but it’s a common practice. We see this all the time. As a matter of fact, often when plants don’t have a pit, we recommend adding one because they’re dealing with a hot process and there’s a limit to how hot the cooling tower can take. We want to limit the incoming hot water

temperature to about 130°F (54°C) on the inlet side. They can go to around 150°F (66°C). Above that, it becomes more efficient to cool with an air-cooled heat exchanger.”

The firm also corrected issues with how its customer treated and recirculated its cooled water, adding chemical treatment equipment the plant could use in the future. Treating water is an important part of maintaining a healthy cooling system. During the firm’s initial evaluation, it was evident the existing equipment had seen the effects of a lack of water treatment while the production line was not in use.

Efficient Permanent Magnet, Direct Drive Fan Systems

The firm selected Baltimore Aircoil ENDURADRIVE fans for the cooling towers. These are direct-drive permanent magnet fan systems



A fisheye view of the pit and its three sections

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A BAC FXV combined flow cooling tower anchors the closed loop cooling system.

often used with industrial clients. Marchetta likes that they can run for long periods without much maintenance, which is a plus for customers with small maintenance crews.

“Fundamentally, what it’s doing is replacing a conventional gear drive system. Typically, you have an 1,800 rpm motor feeding a speed reduction gearbox because the fan needs to spin at around 300 rpm, where a standard motor spins at 1,800 rpm,” Marchetta said. “The ENDURADrive, however, includes a permanent magnet, direct drive motor. It’s mounted in the airstream. Since it needs a variable frequency drive it’s easy to incorporate temperature feedback for automatic ramping up and down.”

The system includes a seven-year warranty on the motor and a five-year warranty on the drive. While this option costs more, the firm finds it pays for itself in two or three years due to reduced maintenance requirements. It also increases tower performance by 2.5%.

The Closed Loop Cooling System

The closed loop cooling system the firm installed features two 14-foot by 24-foot FXV wet surface fluid cooling towers. This system cools PTC’s induction boxes. BAC calls the FXV a combined flow model, as it sprays water over carbon steel galvanized coils for sensible and latent heat transfer, but some heat rejection is due to the crossflow wet deck underneath. The cooling tower has two air intakes – one upper and one lower – to accommodate maximum airflow through the unit.

“It’s awesome if the customer has poor quality water and a tight approach,” Marchetta said. “You can put these in and they work fantastic. If you didn’t have the secondary wet deck section underneath, you have to go to multiple stages of cooling. If you have a tight approach and you want 85°F (29°C) on an 80°F wet bulb (27°C web bulb) day, then without it you’d need to go through two or three stages of cooling. The FXV can usually do it in one. That’s huge because it keeps your pressure drops low, your process clean and simplifies water treatment.”

The firm also designed and installed a multi-monitor programmable logic control station, allowing operators to view induction box pressures, cooling tower operating parameters and quench box data all at once. The control system needed to integrate new technology with the plant’s existing 20-year-old system, a challenge the firm enjoyed.

“This whole project was fun from start to finish,” Marchetta said. **BP**

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Evaluating Single-Stage and Two-Stage Centrifugal Chillers

By Ryan Huthmacher, Senior Aerodynamics Engineer; Jeff Morgan, Mechanical Engineer and Art Rizoli, Senior Director of Global Product Strategy for Chillers, Daikin Applied

► In recent years, electrification and decarbonization initiatives have significantly shaped the centrifugal chiller market, which has traditionally focused on comfort cooling applications. There is a growing demand for electric heating solutions, such as centrifugal water-to-water heat pumps and air-cooled chillers that use centrifugal refrigeration compressors.

At the same time, water conservation legislation, particularly on the West Coast of the United States, is driving changes in centrifugal chiller installations, with new projects employing cooling towers that either reduce or eliminate water consumption. A notable example is recent legislation passed by the Las Vegas Water District (Clark County, NV), which prohibits any new construction in Clark County (including Las Vegas) from installing evaporative cooling towers if the permit was applied for after September 1, 2023, and issued after February 1, 2024.

These two changes – higher demand for electric heating and stricter water regulations – require chillers to operate at higher lift and become more efficient, leading to an industry shift from single-stage to two-stage centrifugal refrigeration compressors in their design. This

article explores the aerodynamic differences between these designs and the mechanical challenges they present.

Aerodynamics Development

Single-stage centrifugal refrigeration compressors are generally well-suited to traditional comfort cooling applications and have the benefits of relative durability, simplicity and low cost. However, new applications requiring higher lift push refrigeration compressor designers to reassess design concepts to balance the benefits and trade-offs of different refrigeration compressor

architectures. As the lift requirement for chiller centrifugal refrigeration compressors increases, the stable operating range of the refrigeration compressors decreases. This relationship can be seen in Image 1, comparing single-stage pressure ratio to operating range.

To mitigate the decrease in stable operating range, designers can split the compression across two stages instead of a single stage. Generally, two well-matched refrigeration compressor stages with relatively low stage loading (compared to a single stage) will

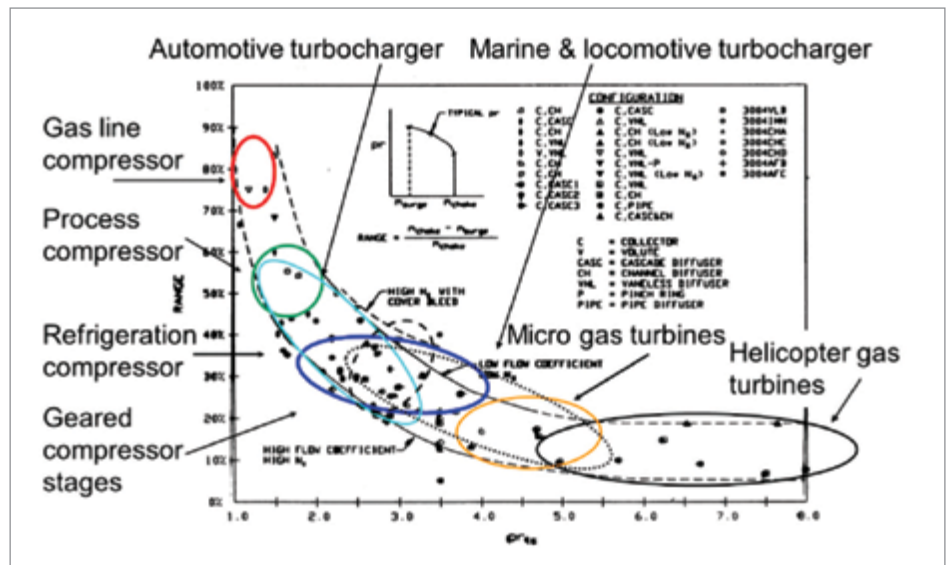


Image 1. From *Advances and Breakthroughs in Diffusers for Compressors and Pumps: A Short History of Diffusers for Centrifugal Machines*

Above: Daikin Applied headquarters in Plymouth, MN

	Single Stage	In-line Two Stage	Back-to-Back Two Stage
	<p>(Gear Drive) (Direct Drive)</p>	<p>(Gear Drive) (Direct Drive)</p>	<p>(Gear Drive) (Direct Drive)</p>
Pros	Simple structure Higher manufacturability and serviceability	Higher lift capability with better efficiency and operation range compared to single stage. Allows economizer cycle resulting in higher chiller system efficiency.	Easy to get better thrust balance Small, light and higher reliability of bearings
		Compact size Higher manufacturability and serviceability	
Cons	Limited lift capability Larger noise due to higher impeller speed compared to two stage	Larger thrust force compared to back-to-back layout, which requires higher rotordynamics technology	Higher cost than in-line layout (requires external interstage pipe, 2 volute/discharge housings)

Image 2. Pros and cons of refrigeration compressor architectures

offer greater unloading capability and higher part-load efficiency. However, this comes with trade-offs, including increased material costs and added design complexity. Using simulation throughout the design process helps manage these challenges and mitigate risk.

There are multiple options for refrigeration compressor architecture for two-stage refrigeration compressors. Back-to-back two-stage designs can offer efficiency at off-design conditions. The efficiency of these designs can be highly influenced by the losses incurred in the interstage pipe that connects the outlet of the first stage to the inlet of the second stage. Designing this pipe requires balancing compact packaging with minimizing flow losses.

In-line two-stage designs are more compact than back-to-back designs. Off-design performance may be slightly reduced relative to back-to-back designs but is still generally superior to single-stage designs. Overall, two-stage systems will have increased lift and improved range but increased cost and complexity compared to single-stage systems.

A benefit of two-stage refrigeration compressor architecture is the ability to incorporate the economized chiller cycle. While this has minimal impact on the refrigeration compressor design, it can significantly impact chiller design and performance, especially close to design rating.

Mechanical Development

From a refrigeration compressor architecture perspective, the two-stage in-line design adds the least material cost since the two stages can be packed nearest to each other. However, this configuration presents a challenge in bearing and rotordynamic design due to the longer shaft.

The added rotordynamic challenge can be managed through careful simulation and testing to confirm sufficiently high shaft natural frequency over maximum operating speed (Separation margin, SM) needed from the aerodynamics.

Magnetic bearings are a natural choice for chillers due to their numerous system benefits, including high reliability, negligible friction

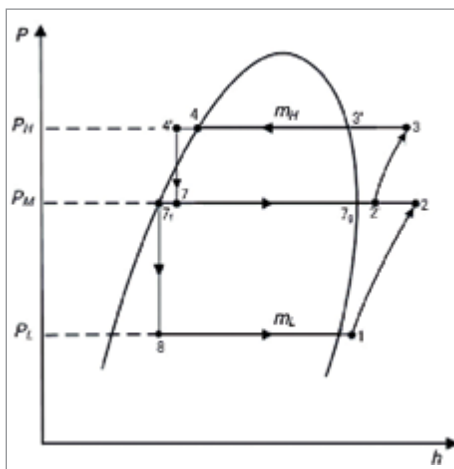


Image 3. From Performance Analysis of High-temperature Two-stage Compression Heat Pump with Vapor Injection Dynamic Control

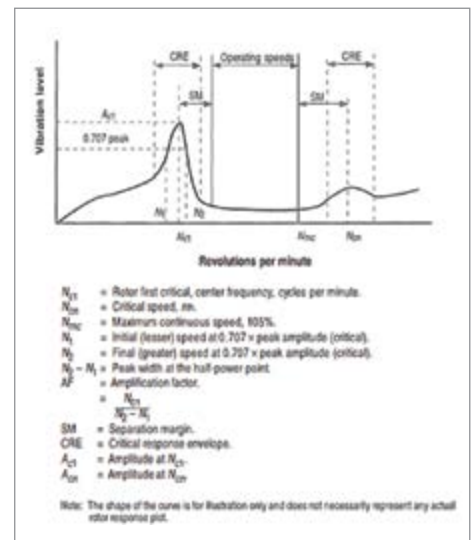


Image 4. Separation margin definition from API 617

and removal of oil from heat transfer surfaces. However, from a refrigeration compressor architecture perspective, the longer overhang in a two-stage in-line causes higher loads on the front radial bearing, resulting in larger bearing surfaces. This challenge can be mitigated through careful simulation and testing.

Radial magnetic bearing sizing can be estimated using a simple magnetic pressure equation, as seen in Image 5.

Conclusion

Developing centrifugal refrigeration compressors, whether they have one stage or two, involves considering several factors. From a cost perspective, a single-stage

» Evaluating Single-Stage and Two-Stage Centrifugal Chillers



An engineer measures the natural frequency of a shaft by imparting impact with a tuned hammer and measuring rotor response.

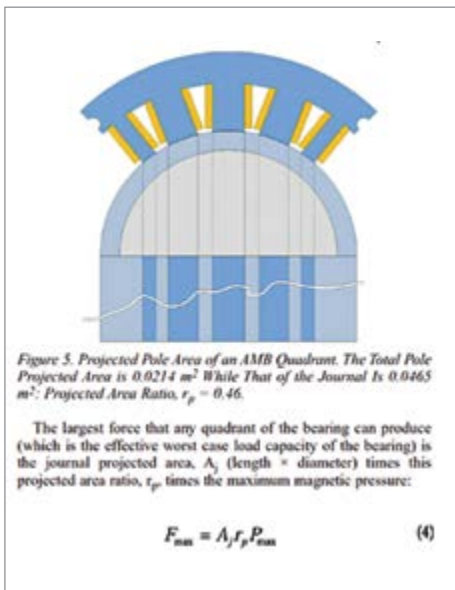


Image 5. From Rotordynamic Design Audits, 37th Turbo-Pump Symposium by Erik Swanson

refrigeration compressor is an ideal option. It's simpler to design and has fewer parts, which generally makes it cheaper. However, single-stage refrigeration compressors have their limitations. They struggle with high-pressure tasks and are not as efficient when used outside typical cooling situations, like those specified by AHRI standards.

On the other hand, two-stage refrigeration compressors are more complex to develop and tend to be more expensive due to the inclusion of an additional stage, a longer shaft and more robust bearings to support the extra weight. Two-stage refrigeration compressors offer enhanced performance in situations that require capabilities beyond typical AHRI comfort cooling, making them suitable for high lift applications demanded by electrification, decarbonization and water conservation regulations.

Furthermore, one of the advantages of two-stage refrigeration compressors is their ability to withstand greater dirt accumulation on the condenser when used with evaporative cooling towers (open cooling towers), thanks to their higher lift capabilities. In conclusion, choosing between a single-stage and a two-stage centrifugal refrigeration compressor ultimately

depends on balancing cost considerations with the specific performance requirements of your application, ensuring optimal efficiency and functionality for your cooling needs. **BP**

About the Authors

Ryan Huthmacher is a Senior Aerodynamics Engineer at Daikin Applied. He has worked in turbomachinery for 17 years and joined Daikin in 2018.



Jeff Morgan is a Mechanical Engineer and has been working in the HVAC industry for 22 years. He's spent the last 12 years at Daikin developing centrifugal refrigeration compressors to expand Daikin's chiller lineup.



Art Rizoli is the Senior Director of Global Product Strategy for Chillers at Daikin Applied. He has worked with centrifugal refrigeration compressor technology for 27 years and joined Daikin in 2017.



About Daikin Applied

Daikin Applied, a member of Daikin Industries, designs and manufactures advanced commercial and industrial HVAC systems for customers around the world. The company's technology and services play a vital role in creating comfortable, efficient and sustainable spaces to work and live – and in delivering quality air to workers, tenants and building owners. For more information, visit <https://www.daikinapplied.com>.

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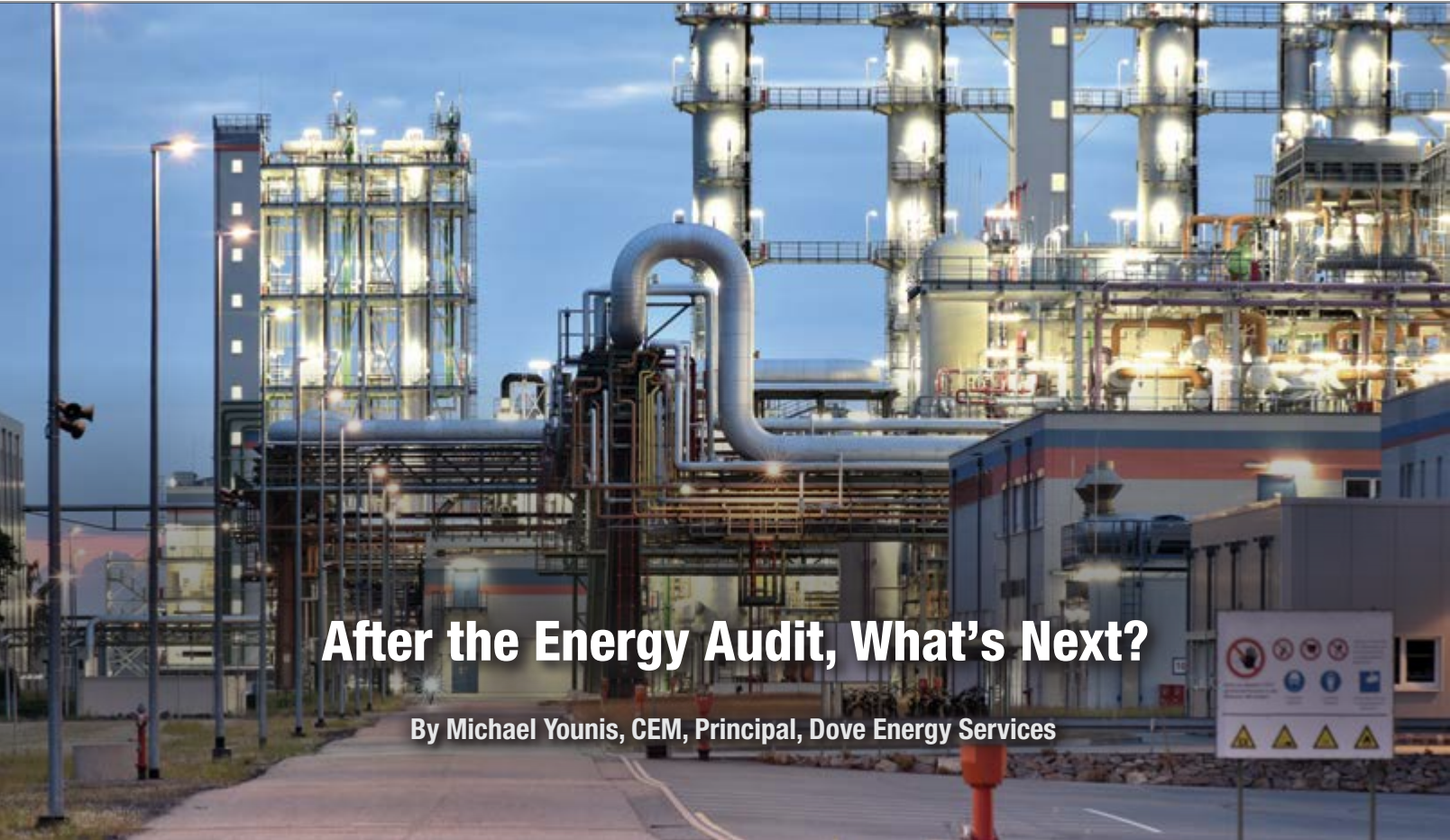
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After the Energy Audit, What's Next?

By Michael Younis, CEM, Principal, Dove Energy Services

► After an energy audit is performed, how much value has been created? The answer is zero. Value has been identified but not created until the recommended energy conservation measures have been completed. Execution requires funding. What do you do to get funding?

Before you answer the funding question as an energy manager, you need to understand your company's priorities. For many companies, priorities include safety, conserving energy, cost savings, reliability and emissions reductions.

Reducing industrial greenhouse gas emissions drives multiple conversations these days. Some industrial customers require manufacturers to disclose emissions via companies such as CDP. Based on a 2022 study in the Journal of Cleaner Production, "Bottom-up estimates of deep decarbonization of U.S. manufacturing in 2050," the most cost-effective and single largest contributor to industrial carbon emissions reductions is energy efficiency.

To determine how to enhance energy efficiency, many people have performed system audits on air compressors, vacuums, chillers and cooling systems, but an audit only identifies possibilities. Nothing has been accomplished by an audit alone. After the audit, funds must be approved and spent to capture those opportunities. Therefore, it is important to understand the funding process to capture the identified savings. I would like to spend a few minutes discussing funding approval.

As an energy or facilities manager, after the audit, your goal is to get the necessary funding and resources to execute your project. One of the best ways to do that is to understand what is required to get people to act. Ludwig von Mises, an Austrian economist, developed the Human Action Model. Based on this model, there are three requirements to get someone to act. They must be uncomfortable with the current situation, see a way to address that

discomfort and believe their action will address that discomfort.

Maintenance Cost vs. Maintenance Investment

The easiest way to make a business leader uncomfortable is to show them how the current situation hurts financial performance. Be sure to point out both the benefits and the cost of energy conservation measures in financial terms. I also recommend the cost of inaction be included. If a project's approval has been delayed, point out the lost opportunity.

For example, if a compressed air leak audit identified savings of \$10,000 per month and approval has been in process for six months, highlight the \$60,000 of lost savings.

Don't break up larger repairs into smaller pieces for the sole purpose of staying below the authorization limit.

At one point in my career, I was a maintenance manager at a paper mill. Maintenance managers continuously prioritize various required repairs. If a choice must be made to

either repair a pump or eliminate compressed air leaks, the thought process goes something like this: “We can run with a compressed air leak, but not without a pump.” As a result, the mill had a significant compressed air leak problem. We had meters showing compressed air flow to major areas. Many of the compressed air leaks could not be repaired while the plant was operating. I unilaterally decided to invest some overtime in compressed air leak repairs over the Thanksgiving holiday. We repaired nearly all the leaks, noted the reduction in the flow trended on the system and calculated the savings. After the holiday, the plant manager called me into his office to question the overtime. When I showed him what we spent versus what we saved, he thanked me for making a good investment but chastised me for flying solo instead of getting permission first.

Capturing the benefits of an audit requires maintenance, facilities and energy leaders to understand the way funding decisions are made at their companies. There are two basic types of funding mechanisms: expense and capital. Expense spending directly results in an income tax reduction by offsetting some gross profit. Capital spending also results in an income tax reduction, but not for the full amount of the expenditure in the current year. Capital expenditures are typically depreciated over multiple years, reducing income tax liabilities over those years. Therefore, operations managers prefer to spend capital funds and financial analysts prefer to spend expense funds.

Capital is always evaluated as an investment with the discipline to perform financial calculations, but expense is typically evaluated solely as an expenditure without any consideration of potential financial benefits. Companies should seek a financial return on both their capital and expense portfolios.

As mentioned, depending on their role in the company different leaders may have different preferences for capital and expense spending.



Demonstrate how putting off repairs – such as fixing compressed air leaks – hurts financial performance.

The chief financial officer is likely to prefer expense spending to get the same year’s income tax benefits, while the plant manager is likely to prefer capital expense because it doesn’t

have an impact on the operating budget. Your goal is understanding the rules for capital and expense investments well enough to defend the investment to both groups.



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>> After the Energy Audit, What's Next?



Understanding Fixed and Variable Expenses

Most people understand expense spending: Something breaks and money is spent to get it repaired, or energy is delivered to the plant and the bill is paid at the end of the month. Repairs are considered fixed expenses.

Energy is a variable expense. Fixed expenses are typically evaluated by simply comparing the current year's spending to the prior year's on the budget. Spending less money repairing plant assets typically implies good performance. Spending more drives scrutiny. Energy as a variable expense requires more in-depth evaluation to determine year-over-year performance. Several drivers impact energy spending including pricing, production volume and weather, as well as changes in overall energy efficiency.

Neglecting insulation repairs, such as on this uninsulated steam line, can cost more than it saves.

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The difficulty evaluating the variable expense for energy makes it difficult to evaluate the profitability of fixed expense investments. For example, the expense impact of replacing missing piping insulation is easy to see, but the energy cost savings are difficult to measure and verify. This separation between spending and savings makes expense investments with energy returns difficult to justify.

Over the years, I have seen several instances where a manager cut insulation repairs out of the maintenance budget to save money without realizing energy costs went up more than the savings. This resulted in the company spending more, not less, money. For example, in a plant that operates year-round, insulating 100 feet of uninsulated 3-inch compressed air piping will save \$3,000 worth of energy. Depending on the complexity of the compressed air piping, the line could cost \$4,000. Nearly all businesses will approve an investment with a simple payback of 16 months.

You will need to do enough analysis to quantify the impacts of production volume, energy pricing and weather to justify the potential benefit. As stated, energy managers should define the return on their expense investments, then investments in energy saving opportunities such as insulation will be more likely to be approved.

Gaining Funding Approval

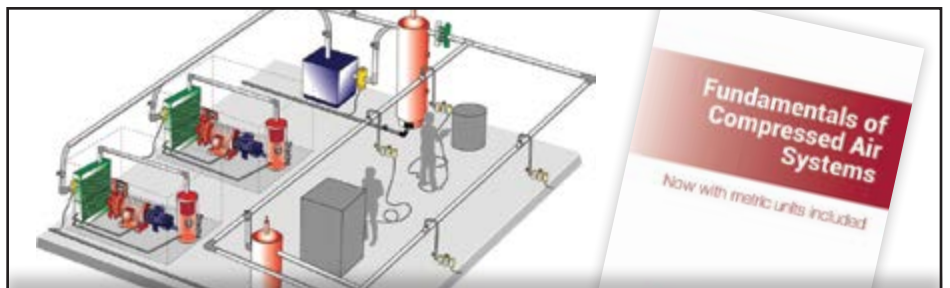
Once it has been determined an energy conservation measure requires expense spending, the next task is getting funding approved to capture the savings. The plant manager typically has a delegation of authority to authorize expenditures up to a certain amount. When expense spending is below the local delegation of authority, the approval process is less time-consuming. However, that does not mean money should be spent without consideration of the quality of the investment. For example, if I had requested the funds to repair compressed air leaks in the paper mill and (following an audit) provided both the cost of the repair and the projected electrical

power savings or the improved reliability of the compressed air system due to reducing the compressed air flow, the funds would have been approved and I would not had had to meet with the plant manager after the fact.

One word of caution: Don't break up larger repairs into smaller pieces for the sole purpose of staying below the authorization limit. If repairs are going to be broken up into smaller pieces of work, it should be for a valid business



Understand your audience. You might have better luck getting approval for a heat recovery project by demonstrating money saved, not energy saved.



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» After the Energy Audit, What's Next?

reason, such as charging repairs by area to reflect the cost in the appropriate cost center or spreading work over a longer period to align with available resources. Breaking larger repairs into smaller pieces for the sole purpose of circumventing a company's funding approval processes is unethical and erodes the trust required when spending company funds.

If the energy conservation measure, such as installing a variable frequency drive on a cooling tower pump, requires the purchase of a new or a significantly upgraded piece of equipment, then the investment is most likely going to require capital approval. Local plant management may have authorization for some level of capital spending, but larger capital projects typically require approval from corporate officers and go through a more rigorous and time-consuming approval process. This delegation of authority to approve capital projects grows with increasing levels of responsibility. Depending on the size of the projects, the approvers and their concerns will vary.

While expense and capital spending may go through slightly different processes, the basic tenants of approval remain the same. Your goal is understanding who the approver is, where do their interests intersect with yours and how the business will benefit from the investment.

First, determine whether the energy conservation measure is capital or expense. Then, based on a thorough understanding of the approval process, tailor the project justification to the approver's interests, and express the benefits in financial terms. Do not try to justify your project based on natural gas MMBtu savings. Justify your investment in financial terms.

If, for example, waste heat from an air compressor were used to preheat boiler feedwater based on a reduction in natural gas consumption and presented to a financial

manager as reduction of 10,000 MMBtus, approval is less likely than if it were presented as \$40,000 annual savings.

Align with Company Goals

To deliver a convincing justification, I recommend that you understand the strategic goals of the company.

If reliability drives future profits, emphasize how your project could impact reliability. For example, a recent compressed air audit at a plant revealed that every single air compressor was operating at maximum. Compressed air system pressure fluctuated based on flow. Pressure variations like that can easily lead to inconsistent pneumatic valve operation and process reliability issues. Study the downtime associated with pressure fluctuations and lead with that benefit when presenting the project. Incorporate the financial benefits of energy use reductions in the justification, but lead with what they care about.

If process stability causes production or product quality issues, leverage the process stability aspects of the energy conservation measure to drive approval. Bath tissue converting operations require a temperature and humidity-controlled environment to allow the paper to predictably move through the tissue winder at high speeds. A chiller upgrade allowing the converting equipment to operate at full speed is more likely to be approved than one only reducing electrical power consumption.

Once you have a good idea of how to align the benefits of the energy conservation measure with the strategic goals of the company and

the financial benefits, you are much closer to getting approval. Many companies have an easier time approving the investment of funds than they have locating the internal resources to execute the project. Company engineering staff are frequently stretched to their limits and reluctant to hire contractors who require a significant on-boarding process before they provide supplemental capability. If you know your company's engineers are stretched thin, work to lessen the number of engineering hours to execute your project. Use turn-key vendors to do the bulk of the work, such as having an air compressor distributor design and install the compressed air system.

It's the work done after the audit that makes the difference between a binder on a shelf gathering dust and an executed energy conservation measure creating value. Your management wants results, not reports. **BP**



About the Author

Michael Younis has 34 years of energy management experience in breweries, fertilizer plants, pulp and paper mills, refineries, flat glass plants and chemical plants. He currently supports the ENERGY STAR®'s refinery and asphalt focus groups.

About Dove Energy Services

Dove Energy Services provides energy management program support to companies developing an internal energy management capability based on ENERGY STAR's energy management process. For more information, visit <https://www.linkedin.com/in/michael-younis-293a623>.

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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.

Frost on the Compressed Air Line

Jayden Mackinnon is a Sales Engineer at Fluid-Aire Dynamics, working in its Minneapolis branch. The company services air compressor systems in and around Chicago, IL; Milwaukee, WI; Minneapolis, MN; Detroit, MI and Philadelphia, PA. Visit <https://fluidairedynamics.com>.

This winter, Mackinnon paid a call to a local company that manufactures dyes to discuss revamping its compressed air system. The next day, he got a call from the company saying it needed a service call. Its 10 hp reciprocating air compressor wouldn't deliver over 50 psi, instead of its normal 125 psi. He instructed the company to shut off the compressed air tank

valve and see if the air compressor built pressure in the standard amount of time. It did; the air compressor wasn't the problem. He then said to go outside and see if they could identify a leak in the compressed air line running to a second building. A few minutes later, he received this photo.

The temperature had reached -15°F (-26°C) the night before, and the manufacturer was using a refrigerated dryer with a dew point of 37°F (3°C). Condensate developed inside the line and froze. Also, the line was strung over a furnace exhaust, causing moisture-rich air to condense on the outside, as well.



A 37°F (3°C) pressure dew point isn't low enough when the ambient temperature reaches -15°F (-26°C).

Mackinnon had known just what to look for. "It's something we see quite often," he said.



A Compressed Air Leak You Can See

Albert Williams is a Freelance Energy Auditor and Energy Engineering Training Instructor based in South Africa. Visit <https://www.linkedin.com/in/albertedwardwilliams/>.

No ultrasonic leak detector is needed to spot this compressed air leak. Williams found this while auditing a food and beverage plant in South Africa. This one-inch drain valve was cracked, and about 30% of the compressed air stream

escaped. The leak seemed to act as a condensate collection point, making it especially visible. In a follow-up visit the next month, he saw it still hadn't been fixed.

Williams used the U.S. Department of Energy's free MEASUR tool to estimate how much the plant lost by not fixing this compressed air leak. Running for a year (8,760 hours) at \$0.15/kWh, this 7.5mm opening would cost \$24,000.

The time to repair compressed air piping leaks is before they become so large you can see them.

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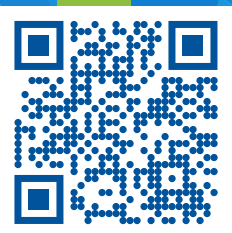
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