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September 2023

Sustainable Manufacturing

Best Practices 2023 EXPO & Conference
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FROM THE EDITOR



Sustainable Compressed Air and Cooling Systems

A recent meeting with two subscribers, involved in facilities engineering and maintenance at a major manufacturing plant, brought to light two interesting numbers. Compressed air systems represented 11% and centralized chilled-water cooling systems 13% of over-all energy consumption. De-centralized process chiller numbers were thrown into the energy cost numbers for production.

The reason I share these numbers is they illustrate why we are focusing on both centralized (vs. decentralized) systems. Centralized plant chiller, pump, cooling tower and compressed air systems are where the numbers are, for those striving to drive energy and water conservation projects.

Doosan Bobcat Inc. recently announced their Doosan Industrial Air Division would go to market, with their lubricated rotary screw air compressors, under the Bobcat brand. The Doosan portable air compressor division will also re-brand to Bobcat. Suddenly, I'm noticing Bobcat compact tractors, generators, light towers and mini track loaders everywhere! We visited Doosan Bobcat leadership at their growing 150-acre manufacturing campus in Statesville, North Carolina to learn more. I hope you enjoy Mike Grennier's article resulting from our visit.

Heat recovery and cooling strategies can have a tremendous impact on sustainability metrics. Veteran compressed air auditor, Hank Van Ormer, has sent us Part 2 of his series on "Evaluating Air Compressor Cooling and Heat Recovery." Sophisticated subscribers tell me this subject is not an area of technical strength of most of their compressed air vendors.

How much data do you receive to measure the performance of your cooling system? If you're in the trade, how strong are you in recommending measurement solutions? We thank Clayton Penhalegon Jr. for sending us his article titled, "Vital Signs: Critical Instrumentation for Cooling System Health."

Please take a moment to examine the center spread of the magazine where you'll find the EVENT PROGRAM for the Best Practices 2023 EXPO & Conference. Sponsored by the Compressed Air & Gas Institute and the Cooling Technology Institute, we are pleased to provide you with an unprecedented gathering of technical experts and manufacturers from both industries. We hope you'll consider registering today at <https://cabpexpo.com/>.

Thank you for investing your time and efforts into *Compressed Air and Chiller & Cooling Best Practices*.

RODERICK M. SMITH

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Discover Innovations at the New Technology EXPO Classroom!

Located on the EXPO Floor, the New Technology EXPO Classroom presents new technologies from around the world directly to EXPO floor visitors.

While the Best Practices Conference program upholds brand neutrality guidelines, this separate classroom on the EXPO Floor is reserved for exhibitors to present their latest technologies for compressed air, pneumatics, vacuum, chiller and cooling tower systems.

New technology presentations will feature oil-free and lubricated, fixed drive and VSD rotary screw, centrifugal, high-pressure and low-pressure rental air compressors, air compressor heat recovery modules, desiccant and refrigerated air dryers, compressed air filters, nitrogen gas generators, aluminum piping systems, ultrasonic leak detectors, compressed air measurement instruments and pneumatics.



MONDAY, OCTOBER 23 1:00PM – 4:00PM

- 1:00-1:25 **Aluminum Compressed Air Pipe Sizing & Installation**
Chad Hills, Director, AIRpipe USA

- 1:30-1:55 **We are Bobcat... Now in Industrial Air**
Patrick Jakeway, General Manager, Doosan Bobcat North America

- 2:00-2:25 **Air Management System**
Jon Jensen, Energy Efficiency Manager, SMC Corporation of America

- 2:30-2:55 **From Compressed Air to Power Generation: Kaishan's Vision for Building a Better, More Efficient Future**
Dave George, President, Kaishan USA

- 3:00-3:25 **Deoxo Nitrogen/Hydrogen Purifier and MDX Gas Dryer**
Mike Kinnucane, Nitrogen Business Development Manager, Mikropor

- 3:30-3:55 **Kaeser Measurement Technology (KMT), a New Suite of Compressed Air Sensors**
Neil Mehitretter, Technical Director, Kaeser Compressors

TUESDAY, OCTOBER 24 1:00PM – 4:00PM

- 1:00-1:25 **Oil Carryover: Prevention is Better Than the Cure**
Cody Leatherman, Product Manager – Consumable Products, Hitachi Global Air Power US/Sullair

- 1:30-1:55 **The Future of Compressed Air Instrumentation**
Martin Zeller, General Manager, CS Instruments USA

- 2:00-2:25 **Application of Rental Blowers in Industrial Wastewater and Pneumatic Conveying**
Meghan Babineaux, Regional Sales Manager, Aerzen Rental

- 2:30-2:55 **Clean Energy. Clean Air. Clean Food.**
Tilo Fruth, President, BEKO Technologies

- 3:00-3:25 **Applications Vary by Pressure; Selecting the Right Technology**
Mert Alpagut, Country Manager, Hertz Kompressoren

- 3:30-3:55 **Seeing the Unseen: Illuminating Energy Conservation & Electrical Safety with Ultrasonic Imaging**
Dean Wolever, Regional Manager, UE Systems

WEDNESDAY, OCTOBER 25 1:00PM – 4:00PM

- 1:00-1:25 **Upcoming Department of Energy 2025 Regulation of Rotary Air Compressor Isentropic Efficiency**
Bruce McFee, President, Sullivan-Palatek

- 1:30-1:55 **Remote Monitoring on Rental Compressors**
Jim Riley, Business Development Rental Manager Sauer Compressors USA

- 2:00-2:25 **Energy Recovery Solutions to Lower Your Carbon Footprint**
Luc Linart, Global Product Manager Energy Recovery & Measurements, Atlas Copco Compressors

- 2:30-2:55 **Why Compressor Direct Output Flow Rate is Important, and How to Measure**
Ray Fang, International Sales Director, Comate Intelligent Sensor

- 3:00-3:25 **Centrifugal Air Compressor Sizing & Fundamentals**
JD Schroeder, Applications Engineering Manager, FS-Elliott

- 3:30-3:55 **Oil Free Air**
Wolfgang Strobel, Sales Manager Plant Engineering – CEP, Boge America Inc.

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Compressed Air Technology & Industry News

Leslie Enright Selected as WVCV Networking Group Executive Council Member

Best Practices Magazines & EXPO is excited to announce the selection of Leslie Enright as an Executive Council Member of the Women in Compressed Air, Vacuum & Cooling (WVCV) Networking Group. Leslie is a Principal with Canuck Industrial Group located in Toronto, Canada. As a forward-thinking operations executive, Leslie's career encompasses over 25 years of expertise in strategic planning, IT, and operations. Having worked at several of Canada's large corporations, she developed a strong understanding of the business and financial world. Leslie ventured into the compressed air industry nine years ago as an entrepreneur, utilizing her corporate experience and skillset to bring a unique perspective to her new business. She continues to leverage her skills to bring new vision and new growth strategies to Canuck Industrial. You can often find her at conferences and trade shows reminding people that "Air is free... Until you compress it!"

When accepting this role, Ms. Enright commented, "I am thrilled and honored to have been selected for this position. The compressed air industry is constantly evolving, and I



Leslie Enright, Owner at Canuck Industrial, was selected as Executive Council Member, WVCV Networking Group.

look forward to contributing my insights and expertise to help women grow and succeed. I am very excited to see this Executive Council form and highlight the growing importance of access for women in the industry. I am proud to represent women in the compressed air, vacuum and cooling industry and help create more opportunities for women to excel in this field. One of the keys to success in this field is creating strong connections with colleagues and partners and I look forward to collaborating and building relationships with other industry leaders to help move our industry forward."

Ms. Enright will chair the conference session **Maintenance & Food Hygiene Collaboration for SQF-Compliant Compressed Air Quality** at the upcoming Best Practices 2023 EXPO & Conference. The lineup of presentations and speakers is the following:

- **Verifying Compressed Air Purity Compliance with SQF and BRC Food Safety & Quality Requirements System** – *Maria Sandoval, Laboratory Director, Trace Analytics*
- **Compressed Air and Cooling Water Systems: The Forgotten Additives/Ingredients in Dairy Products** – *Alex O'Brien – CGA, Food Safety / Quality Coordinator, Center for Dairy Research, University of Wisconsin-Madison*
- **Microbiological Issues in Food & Beverage Compressed & High Risk Ambient Air Systems** – *Charles Giambone, Food Safety Programs Coordinator, Rochester Midland Corp.*
- **Preventative vs. Proactive Compressed Air System Maintenance for Consistency and Quality** – *Leslie Enright, Owner, Canuck Industrial Group*



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Compressed Air Technology & Industry News

She also contributed to the organization of the The Women in Compressed Air, Vacuum & Cooling Networking Group Luncheon at the Best Practices 2023 EXPO & Conference. The Luncheon will feature the keynote presentation, **The Story of Jody & Jill: A True Story of Women Working Together** presented by *Jokima L. Hiller, Ph.D., MBA, CHE, Assistant Professor in Management, School of Business and Economics, Indiana University Northwest.*

Join us in our mission to provide women with personal and professional development opportunities including the ability to establish meaningful connections with their peers, gain valuable industry insight to further their careers and improve their leadership and communication skills. Apply for your free

membership today at <https://cabpexpo.com/womens-group/join-us/>. Join our LinkedIn group at <https://www.linkedin.com/groups/14183074/>. If you are interested in a leadership role within the group and would like to become a member of the WCVV Executive Council, please send an email to Kimberly Vickman, WCVV Secretary at kimberly@airbestpractices.com.

About WCVV Networking Group

The Women in Compressed Air, Vacuum and Cooling (WCVV) Networking Group provides support to women who have chosen or are thinking of choosing a career in the compressed air, vacuum or cooling industries and welcomes individuals from every job function – engineering, marketing, sales, human resources, finance, production and every job in between. The WCVV Networking Group offers quarterly virtual meetings and networking

opportunities in the hopes of empowering women in the compressed air, vacuum and cooling sectors. The group will meet in-person annually at the Best Practices EXPO & Conference. For more information, visit <https://cabpexpo.com/womens-group/>.

Quincy Compressor Launches QGV 350-400 Air Compressors

Quincy Compressor, a leading designer and manufacturer of reciprocating and rotary screw air compressors, announced the expansion of its QGV Rotary Screw Air Compressor range to include 350 and 400 HP models. The QGV 40-400 HP Series Variable Speed Rotary Screw Air Compressor range is available in 26 models achieving flows from 65-2113 cfm and pressures ranging from 75-150 PSIG.

The Quincy QGV variable speed rotary screw air compressor is equipped with a specially designed drive that controls and adjusts operating speed delivering more constant pressure (up to 85% turndown), protecting against power surges and lowering energy consumption.

Available at the heart of all our QGV compressors is a flex-drive airend with 100,000 hour design, providing low cost of ownership, easy maintenance and reliable operation. Enjoy real-time performance monitoring with graphical analysis and full-color, touch-screen control. These amazing features (and others) give Quincy the confidence to back the machines with our impressive Royal Blue 10-year warranty.



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About Quincy Compressor

Headquartered in Bay Minette, Alabama, Quincy Compressor is a leading designer and manufacturer of reciprocating and rotary screw air compressors, from one-third to 400 horsepower; vacuum pumps and a full line of air treatment components. Quincy has more than 600 employees worldwide, and its products are sold through multiple channels, including a network of distributors, commercial retailers, online and company-owned stores. For more information, visit www.quincycompressor.com.

Kaeser Introduces i.Comp Oilless Reciprocating Compressors

Introducing the new i.Comp 8 and 9 oilless compressor series. Available in two sizes and three configurations (G, Tower and Tower T), the i.Comp units deliver oil free air up to 160 psi and 20 cfm. These innovative units are compact, quiet and energy efficient. Further, the direct drive motor and oilless design eliminate nearly all routine service.

i.Comp series compressors feature a reliable two-cylinder, single-stage oilless compressor with an integrated direct drive motor. Pressures can be precisely adjusted to each application's specific needs with the proven SIGMA CONTROL 2 controller. i.Comp compressors are also available as TOWER configurations which include a receiver and drain trap, while TOWER T configurations include a refrigerated dryer.

A small footprint and low noise make i.Comp ideal for small shops with tight spaces. The roto-molded, corrosion and impact-resistant polyethylene enclosure provides easy access to maintenance points, protects internal components, and limits sound levels to 65 dBA.

For more information visit <https://us.kaeser.com/icomp>, or to be connected with your local authorized Kaeser representative, please call (877) 417-3527.



New Kaeser i.Comp variable speed reciprocating compressors are compact, quiet, and low maintenance.

About Kaeser Compressors

Kaeser Compressors is a leader in reliable, energy efficient compressed air equipment and system design. We offer a complete line of superior quality industrial air compressors as well as dryers, filters, SmartPipe™, master controls, and other system accessories. Kaeser also offers blowers, vacuum pumps, and portable gasoline and diesel screw compressors. Our national service network provides installation, rentals, maintenance, repair, and system audits. Kaeser is an ENERGY STAR Partner. For more information, visit <https://us.kaeser.com>.

ZEKS Expands Non-Cycling Refrigerated Dryer Range

ZEKS Compressed Air Solutions, a leading manufacturer and provider of compressed air treatment products, introduced its new NCG and NCGM Series non-cycling refrigerated dryers with 13 new models from 1,800 – 24,000 scfm. Large scale compressed air users can now experience greater operating efficiency, and greater scfm per footprint with low GWP refrigerant.



The new NCG and NCGM Series non-cycling refrigerated dryers from ZEKS Compressed Air Solutions.



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Compressed Air Technology & Industry News

“We recognize compressed air users demand increasingly energy efficient products. Our new NCG / NCGM Series dryers satisfy this need while also supporting the end-user’s sustainability initiatives,” said Christopher Ursillo, Commercial Leader, ZEKS Compressed Air Solutions.

About ZEKS Compressed Air Solutions

Founded in 1959, ZEKS Compressed Air Solutions (ZEKS) has grown to become a leading manufacturer and provider of compressed air treatment products including refrigerated and desiccant air dryers, filters, mist eliminators, flow controllers, and air system accessories. ZEKS dryers and filters efficiently and reliably remove water and contaminants from compressed air while our flow controllers and accessories optimize the efficiency of compressed air systems. Our products are used to minimize product

waste and maximize productivity in virtually every industry, in a broad range of applications. For more information, visit www.zeks.com.

Atlas Copco Expands R&D and Manufacturing Facilities in China

Atlas Copco’s Compressor Technique business area is relocating and expanding its R&D and manufacturing base in Wuxi, near Shanghai in China. On June 26, a groundbreaking ceremony was held in Wuxi.

“The expansion and relocation of our production in Wuxi will bring improvements for our employees in terms of work environment, and also increased automation,” said Vagner Rego, Business Area President, Compressor Technique.

Atlas Copco started production in Wuxi High-Tech Zone already in 1994, and this was the first production base in China. The facilities will be expanded by around 20,000 square meters and are expected to be in full use by the end of 2025.

About Atlas Copco Group

Great ideas accelerate innovation. At Atlas Copco we have been turning industrial ideas into business-critical benefits since 1873. By listening to our customers and knowing their needs, we deliver value and innovate with the future in mind. In 2022, Atlas Copco Group had revenues of BSEK 141 and at year end about 49,000 employees. For more information, visit: www.atlascopcogroup.com.

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Hitachi Global Air Power Releases Climate Action Performance Update

Hitachi Global Air Power US, an industry leader in innovative compressed air solutions since 1965, announced a climate action performance update for fiscal year 2022. Notably the company achieved carbon neutrality throughout its global operations as part of the company’s Long-Term Climate Action Strategy.

This strategy comes in line with Hitachi’s long-term environmental targets, titled “Hitachi Environmental Innovation 2050.” The Hitachi Group has set a target of becoming carbon neutral in all its global factories and offices by fiscal 2030 and achieving carbon neutrality throughout its entire value chain by fiscal 2050. The Hitachi Global Air Power Michigan City

campus achieved carbon neutral status in fiscal 2021 (ending March 31, 2022) and globally in fiscal 2022 (ending March 31, 2023).

“We want to be an industry leader in how to sustainably build real world compressed air and service solutions,” said Hitachi Global Air Power President and CEO, John Randall. “Operating sustainably is not only the right thing to do but more and more it is becoming an expectation of our customers. To truly be a leader in this area, we are evolving our culture to think and act differently and we’re making significant investments in our people and facilities to get there.”

To achieve the on-going targets, in fiscal year 2022 the company added a dedicated, cross

functional sustainability team led by Luis Torres, Vice President, Global Sustainability. Torres has added oversight over all Hitachi Industrial Equipment Systems sustainability efforts to drive alignment and facilitate change. The team is charged with establishing sustainable business practices and with installing a sustainability mindset throughout the company’s culture. This includes ensuring product development teams are designing compressed air solutions that are both durable and able to be remanufactured for a second and third life.

Torres and his team manage the company’s active whole good remanufacturing program, which disassembles, recycles, reuses, and ultimately re-manufacturers air compressors



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Compressed Air Technology & Industry News

to 'better than when new' condition. Now in its 10th year, the program has helped offset more than 5,000 metric tons of CO₂ production through salvage and reclaim of components.

"We are accelerating our sustainability efforts and doing so in a way that keeps the customer front of mind," said Torres. "We have built a lofty goal – to be carbon neutral throughout our value chain by 2050. We can't accomplish that by thinking small. The products we manufacture, the way we manufacture and how we go to market all need to be focused on our customer – and the preservation of our planet. We are making great progress and our business is better for it."

The recent introduction of the E1035H electric portable air compressor is an example of

the company's more sustainable approach to design. The E1035H was engineered to provide the same power and performance as its diesel counterparts, but with zero emissions. Intended for the construction and rental markets, including for use as back-up plant air, the E1035H marks a new era of innovation for Hitachi Global Air Power and is the first of many planned products to help customers meet both their business and sustainability goals.

About Hitachi Global Air Power US

We build the machines that power industry. We are Hitachi Global Air Power, a leading global industrial compressed air manufacturer. Headquartered in Michigan City, Indiana, our compressed air solutions power manufacturing operations all around the globe; from food and beverage, to pharmaceuticals and computer chips. Our portable compressors

provide the air power to build roads and bridges, lay pipelines and aid in oil and gas mining and production. As part of Hitachi Industrial Equipment Systems Co., Ltd., Hitachi Global Air Power operates ISO 9001 certified factories in Michigan City, Indiana and Suzhou, China, and sales offices strategically located in Europe, Australia, Southeast Asia, and South and Latin America. For more information, visit www.sullair.com.

Sauer Compressors Launches the SAUER Orkan Series

Sauer Compressors offers a new series of high-pressure compressors for industrial applications. The SAUER Orkan series is now available in the first four standard types. They are suitable for the compression of many gases and a wide variety of applications. A newly developed magnetic coupling makes the compressors hermetically gas-tight.

When developing the SAUER Orkan high-pressure series, Sauer Compressors focused precisely on the requirements of the gas industry. The basic feature of the series is a flexible modular system. It includes air-cooled,



The new high-pressure compressors of the SAUER Orkan series are suitable for the compression of many gases and a wide range of applications.

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oil-lubricated piston compressors with an output of up to 110 kW for final pressures of up to 500 barg as well as booster types with suction pressures of up to 16 barg. Special features are the hermetic gas-tightness due to the maintenance-free and wear-free magnetic coupling, and regarding the high-power class its extremely compact dimensions and the clearly arranged design.

The standard types now introduced include two high-pressure compressors for air with maximum final pressures of 350 and 500 barg respectively, a high-pressure helium compressor with a maximum final pressure of 350 barg and a high-pressure nitrogen booster with a maximum final pressure of 350 barg and a suction pressure of 4 to 8 barg. In each case easy operation is ensured with the intelligent Sauer ecc 4.0 control system. Other standard types, for example CNG and hydrogen, will follow in the future. This series' flexible modular system provides the possibility of individual ETO (engineered-to-order) machines that are precisely tailored to customer requirements.

The SAUER Orkan series features an innovative cooling concept and enables pure air cooling, which is unique on the market in the power class up to 110 kW drive power. The CubeCooler achieves re-cooling temperatures that are more than 30% lower than conventional configurations. This high performance results from the radial arrangement of the coolers around the combined fan and flywheel.

“The practical suitability of the SAUER Orkan series has been impressively confirmed by long-term field tests at internationally operating gas companies. Since then, dozens of installations have already been carried out,” said Gregor Bruhn, Head of Global Product

Management at Sauer Compressors. With the new series, the Kiel-based compressor manufacturer completes its portfolio of high-pressure compressors up to 500 barg and now covers the entire range from 4 to 230 kW.

About Sauer Compressors

Sauer Compressors is a medium-sized German group of companies with 14 international subsidiaries. The company looks back on more than 135 years of history and over 85 years of experience in compressed air and gas technology. These days, the focus is on the development, manufacture and sale of oil-lubricated, and oil-free medium- and high-pressure compressors for applications in commercial shipping, industry and navy. The four product lines SAUER, HAUG, GIRODIN and EK focus on specific fields of application. The SAUER line comprises oil-

lubricated high-pressure compressors for a wide variety of applications, while HAUG stands for oil-free, dry-running and hermetically gas-tight compressors. The GIRODIN and EK lines offer special compressors for the naval market. The modern reciprocating compressors for the compression of air and various gases reach pressures of 20 to 500 barg. In addition to standard products, customized solutions are offered for every type of application for individual customers, OEMs and globally active companies. With a worldwide network of representatives and partners, Sauer is always close to its customers. By supplementing the compressor range with high-quality accessories, engineering services, assembly, and service concepts, Sauer provides complete system solutions right up to complete turnkey installations. For further information please visit www.sauerusa.com

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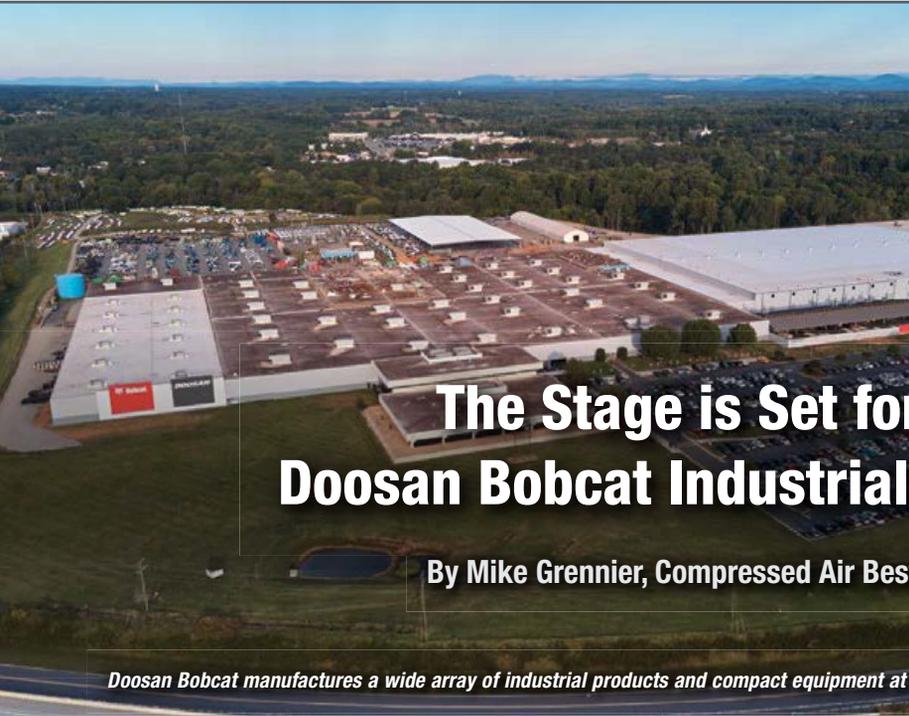
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The Stage is Set for Growth of Doosan Bobcat Industrial Air Compressors

By Mike Grennier, Compressed Air Best Practices® Magazine

Doosan Bobcat manufactures a wide array of industrial products and compact equipment at its 150-acre manufacturing campus in Statesville, North Carolina.

▶ Doosan Bobcat, Inc., is well on its way to ensuring the name “Bobcat” earns its place as a well-known and trusted brand of air compressors in North America. That’s because the company has set the stage for strong growth given a strategic approach that combines world-class manufacturing capabilities and best business practices with a well-rounded product portfolio built on a legacy of reliability.

Branding and Manufacturing for Success

Doosan Bobcat, which has its North American headquarters in West Fargo, North Dakota, is comprised of a number of companies, two of which design and manufacture air compressors. One is Doosan Portable Power (DPP); the other is Doosan Industrial Air (DIA), which is responsible for the company’s suite of industrial compressed air products. Doosan Bobcat itself is part of the Doosan Group multinational corporation based in Seoul, South Korea.

Earlier this year, Doosan Bobcat announced it will manufacture and market industrial and portable air compressors under the Bobcat trade name in North America and other markets worldwide in 2024. With this change the portable power and industrial air product

suites will undergo design and aesthetic changes in alignment with current Bobcat branding. While the branding strategy is new, the history of products that will soon go by the name “Bobcat” is far from it.

In 2007, DPP acquired Ingersoll Rand’s high quality portable air compressor models and business, which were first manufactured nearly 100 years ago. This made DPP a leader in market share of portable air compressors in the United States.

To continue meeting demand for air compressors, Doosan Bobcat invested heavily in U.S. manufacturing facilities including its one-million-square-foot manufacturing operation in Statesville, North Carolina. The \$70 million expansion of the facility amplified its operations, where it now employs 930 people in office and factory positions and manufactures its line of portable air compressors from 185 cfm to 1,600 cfm, in addition to other Bobcat products like compact tractors, generators, light towers and mini track loaders. It also assembles



Doosan Bobcat rotary screw air compressors, with the recently announced Bobcat trade dress, in the finished product testing area at the Statesville, NC manufacturing campus.

and stocks the expanding line of Doosan Bobcat industrial air compressors.

Among its many attributes, the state-of-the-art Statesville plant boasts robust air compressor air end design and manufacturing capabilities. Air ends, which start as a bar stock at the plant and end up as finished products, are thoroughly tested with an array of technologies including advanced Zeiss Coordinate Measurement Machines (CMMs). A team of lab technicians, in the operation's fully climate-controlled dynamometer room, also test finished air compressors for performance.

“The lab has long been set up to test according to ISO 1217 and can test up to 1100 horsepower,” said Doosan Bobcat Senior Director of Global Engineering, Jamie Wilson. “We redesigned the entire portable line in 2008 and that experience has been valuable in designing the industrial air compressor product line. Outlet air flow tests, for example, use the specified test procedure using Circular Arc Venturis.”

Some of the other facility highlights of the operation include a full metal fabrication shop with laser cutting and metal punching machines, a newly installed Trumpf panel bending machine to reduce setup times from 30 minutes to 30 seconds, a welding shop with robotic welders, a four- to five-stage powder coating and baking line, a full electrical panel shop to support a wide variety of machines, and a pick-to-light parts warehousing system to ensure efficiency and accuracy in production and aftermarket support.

Building on the Bobcat Brand

The story of Doosan Bobcat is incomplete without mention of the company's history in the construction equipment industry, which dates to 1958 and its invention of the world's



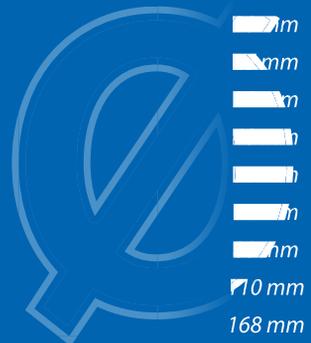
Jamie Wilson, Patrick Jakeway, Roderick Smith (Compressed Air Best Practices® Magazine) and Lance Mathern in the rotor machining production area (left to right).



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The Stage is Set for Growth of Doosan Bobcat Industrial Air Compressors

first compact loader. The compact machine evolved into the original skid-steer loader, later branded as a “Bobcat” skid-steer loader. Mimicked by construction manufacturers worldwide, skid-steer loaders are widely recognized as one of the most popular machines on construction job sites today.

The Bobcat skid-steer loader has been traditionally recognized as one of the industry’s most dependable and well supported skid-steer loaders in the industry. It’s a tradition that continues with the Bobcat brand of air compressors, said Patrick Jakeway, Doosan Bobcat General Manager of Industrial Air.

“There’s an instant recognition of what it means,” Jakeway said of the Bobcat brand in North America. “We build durable products, we offer great support of our products, and we have great dealer relationships that date to over 80 years with certain product lines. All of our products follow that same philosophy.”

The company’s investment in the design, manufacturing and testing of airends is an example of Doosan Bobcat’s commitment to reliability. In addition to redesigning its airends in 2008 to enhance their reliability, the company formed a team of engineers committed to the ongoing development of airends that deliver ongoing durability and performance.

“You can’t go into this market and not exceed expectations from the customers’ perspective,” Jakeway said. “We have to provide that peace of mind and customer service focus. That capability is crucial.”

Industrial Air Compressors in Expansion Mode

Meeting customer needs also requires a full selection of quality air compressors, said Jakeway, which is why Doosan Bobcat is beefing up its line of industrial machines to complement its extensive portable air compressor offering.

The Doosan Bobcat oil-flooded, rotary screw air compressors consist of fixed-speed and variable speed machines in the D30, D30vsd, D50, D50vsd, D75, D75vsd, D125, D125vsd, D150, D1250vsd, D200 and D200vsd models. The number found in the nomenclature of Doosan Bobcat’s industrial air machines matches each unit’s horsepower rating. Later this year, the company will add skid-mounted, D10, D15 and D20 fixed-speed rotary screw machines to the lineup. Tank-mounted units are also in the



Lance Mathern, Doosan Bobcat Vice President of Industrial Products, Patrick Jakeway, Doosan Bobcat General Manager of Industrial Air, and Jamie Wilson, Doosan Bobcat Senior Director of Global Engineering (left to right).



Doosan Bobcat manufactured airends use three stacked bearings and operate at a maximum of 1800 RPMs (50 hp and above).

planning stage. Later this year and into early next year, plans also call for the introduction of D250, D250vsd, D300, D300vsd, D400 and D400vsd fixed- and variable-speed models.

All Doosan Bobcat industrial air compressors are designed for ruggedness in keeping with the theme established long ago with the Bobcat compact equipment lineup and the company’s line of portable air compressors, said Jakeway. As an example, he said all fixed-speed air compressors ≥ 50 HP are rated to operate at a maximum of 1,800 RPMs.

“There’s less wear and tear on the units,” he said of the relatively low RPM rating. He also noted the use of premium, ie3 TEFC electric motors rated for long life, as well as a commitment to using more bearings in airends. “Ours use three stacked bearings,” he said. “A lot of companies only use two.”

Ease of use also takes precedence with Doosan Bobcat industrial air compressors, Jakeway said, pointing to the company’s highly intuitive Intelligent Control System (ICS) Controller found on fixed-speed and VSD air compressors. The controller features a seven-inch, color graphic display to readily monitor and adjust all key machine operating parameters, which can be viewed in English or Spanish. The unique test mode feature allows an operator to actuate, among other functions, the load solenoid, main motor contactor, wye motor contact and delta motor contactor straight from the controller without having to open the control panel. The auto-power-loss restart feature of the controller turns a machine back on in the event of a power outage.

Serviceability of air compressors is equally important, said Jakeway. Just some examples cited include a spacious design for ease of access to machine components, easily accessible



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High Levels of Service and Support

Designing and manufacturing reliable and easily serviced air compressors is one thing, but supporting the machines takes yet another level of commitment, said Lance Mathern, Doosan Bobcat Vice President of Industrial Products. Again, the company is taking its cue from the Bobcat tradition.

“We’re treating our air compressors just like we would with any Bobcat product,” said. “We offer great product support, and we have strong dealer relationships.”

Jakeway said support is delivered in the form of a robust team of engineers and technicians

dedicated to helping customers with any and all issues associated with air compressors.



The highly intuitive Intelligent Control System features a 7-inch color graphic display to monitor and adjust all key machine operating parameters in English or Spanish.

“Customer responsiveness is built in our DNA,” he said. “Folks running our service teams are 30- to 40-year veterans in the compressed air industry. They’re laser focused on customer satisfaction.”

Mathern said DIA goes beyond taking pride in its product support team as seen through a number of measures, such as tracking metrics to gauge the company’s responsiveness to customers’ needs.

“Our parts team answers 90 percent of calls in a minute or less, and we strive for an abandoned service call rate of less than five percent,” Mathern said. “If you call our 800-number, you’d press the button for the right department, and you’ll talk with a person.”

The people taking the calls, said Jakeway, are part of a dedicated air service and support team experienced in air compressor technologies and applications.

“It’s filled with industrial compressed air techs,” Jakeway said of the team. “They have their own cell numbers you can call. After



Spacious design provides service technicians with easy access to all key components of the rotary screw air compressor.

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Product support for DIA also includes a five-year, bumper-to-bumper warranty on industrial air compressors and a commitment to offering extensive training services.

“Doosan Bobcat has long placed a big value on training,” Jakeway said. “Folks on our training staff used to work for some of the biggest industrial air compressor manufacturers, and they put together a really good training program.”

Sticking to the Game Plan

Mathern and Jakeway said excitement for the Bobcat line of industrial air compressors is beginning to build, especially since the name

means something special to many equipment decision-makers in North America.

“It’s durable, it’s innovative and it’s versatile,” said Mathern regarding the Bobcat brand. “It just resonates with customers and what it means in terms of capability.”

The strategy moving forward, said Jakeway and Mathern is to continue to put the company’s plan into action.

“We’re going to keep growing. We’re going to keep doing the right thing by building a good durable product and providing great support,” Mathern said. “We know if we do that, then the rest will come.” **BP**

Images courtesy of Doosan Bobcat.

For more information on Doosan Bobcat’s industrial air compressors, visit <https://doosanportablepower.com/na/en/equipment/industrial-air> or email industrialairsales@doosan.com

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Evaluating Air Compressor Cooling and Heat Recovery Part 2 – Centralized Systems

By Hank Van Ormer, Technical Director, APenergy

► This is a two-part article looking at factors impacting decisions on whether to use air or water-cooled air compressors. It also provides heat recovery guidelines for both situations. Part 2 will provide a review of alternative cooling water system options and their approximate operating costs.

Most air compressors are designed to receive cooling water at the required flow with a maximum inlet temperature of 100°F (38°C). Some air compressors may accept up to 110°F (43°C) and expect maximum discharge water temperature of 120-130°F (49-54°C). These values should be kept in mind when evaluating any air compressor cooling system.

Compressed air dryers, in the U.S., their flow capacity rating (scfm) at inlet compressed air conditions of 100 psig (7 bar) and 100°F (38°C). If inlet air temperatures to the dryer rise above 100°F, the moisture load per scfm to the dryer will increase significantly,

reducing the amount of flow the dryer can handle, if it's to maintain dew point.

When evaluating the cooling system for the air compressor, the aftercooler performance must be considered. For proper application and sizing of the dryer, one must be aware of the compressed air inlet temperature to the dryer and its design approach temperature to the incoming cooling media temperature – air or water.

Alternative Cooling Water Options and Auxiliary Trim Cooling for Air Cooled Systems

Recirculation cooling water ponds were and still are an option for a locally controlled cooling water system supply. As long as the pond is large enough to handle the heat load under the worst condition and maintain an acceptable temperature, it can be very effective, particularly in large installations. They do have some inherent limitations:

- Significant water loss due to ambient evaporation
- Continued buildup of silt in the pond may significantly reduce its heat absorption capability and not remain usable
- Water treatment is still necessary
- Makeup water is usually with some kind of expense – i.e. well pump, etc.
- A pumping station is still required to circulate the cooling water

If analysis indicates a problem in hot weather, then appropriate action must be taken. One solution is a trim cooler. Generally speaking, cooling air or water flow is set up counter flow to the hot air flow whenever possible. Note it is important that cooling water enters the bottom of a horizontally mounted tube-in-shell water

Evaluating Air Compressor Cooling and Heat Recovery Part 2 – Centralized Systems

cooler; be sure to keep a full water charge under all flows and as shown, the cooling water flow is counter to the air flow.

Unless the cooling pond or a trim cooler works, the next alternative is to some type of a centralized cooling water system.

Centralized Cooling Water System: Open Evaporative Cooling Tower

The lowest capital cost centralized cooling water system is the open tower type evaporative cooling tower. In this type, the heated return water flows down a controlled open path where it is cooled by the continual evaporation by moving ambient air from a fan and pulling an evaporating water percentage into the ambient air. These towers will have a smaller circulating pump to move the water through the cooling area and a large horsepower electric motor fan to move ambient air over and through the cooling water to optimize the evaporation cooling. There is also a flushing or blow out system using water.

The primary benefit of this type of system is that as the ambient temperatures increase, generally so does the evaporation rate which means, in most North American locations, they will deliver about 85°F (29°C) temperature cooling water when operating properly within their design limits.

Open cooling towers are very prevalent throughout industry and are often known affectionately as very effective “air washers” meaning they remove the dirt and impurities

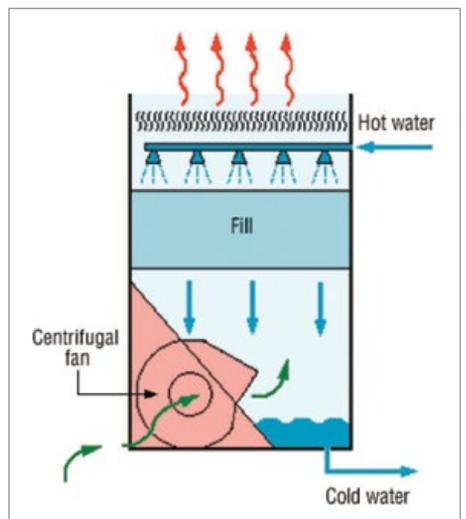


Figure 2. A forced draft, evaporative, counter-flow, cooling tower.

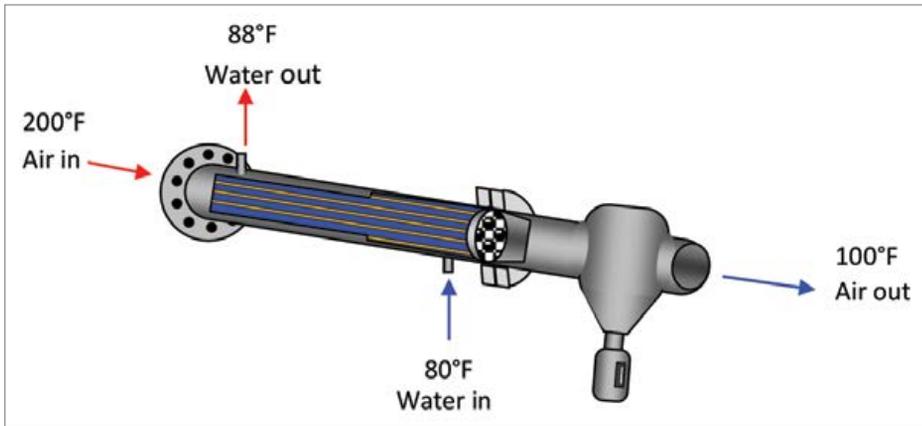


Figure 1. Typical water to air trim cooler. Note: proper piping involves water inlet at bottom so water flow is counter to compressed air flow.



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from the ambient air, generating a continual cleaning of the tower maintenance issue, the frequency of which is dependent on the ambient conditions and after the season of the year.

The contamination factor along with the high level of make-up water required makes proper and diligent water treatment and condition monitoring a prerequisite for a successful installation. Open towers also inject oxygen into the process water system which may or may not create corrosion or other maintenance issues.

**Centralized Cooling Water System:
Closed Cooling System with Auxiliary
Evaporation Cooling Assist for
Hot Weather**

In this type of system, the primary coolant is sealed in a closed loop system and unexposed to ambient air. The coolant may be water, but it is more often a glycol water mix appropriate to the local ambient cold temperature limitations. This is very good for the equipment being cooled since it runs for a significantly long time without significant water treatment requirement or replenishment.

The cooling system is equipped with a motor driven spray pump and spray header which delivers a spray over the air cooled heat exchangers during hot weather and creates evaporation auxiliary cooling similar to the open tower described earlier.

**Centralized Cooling Water System:
Closed Loop Cooling with Evaporation**

Obviously there is additional water use, the magnitude very much dictated by the ambient conditions. There is also a motor driven coolant circulation pump and motor drive main cooling air fan similar to the open tower. The standard pumping station is also required. Some flushing or blow may also be required.

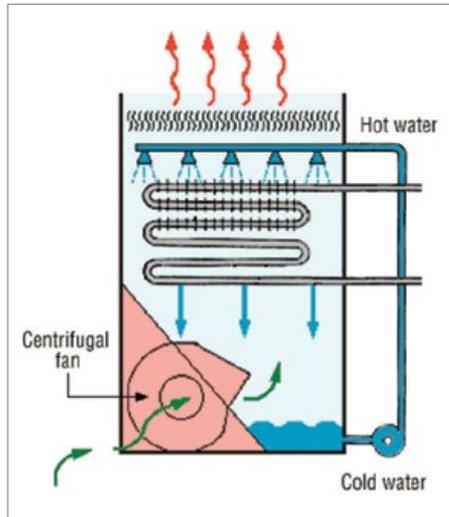


Figure 3. Typical closed circuit fluid cooler with evaporator.

Depending on design and operating conditions, this type of cooling towers use parallel flow or cross flow or counter flow. Compared to an open tower with evaporative cooling, the closed circuit cooling system has a higher initial cost but also some advantages which may be significant when the operating conditions dictate.

In a compressed air system, the process water must be capable of full capacity throughout the year. This means maintaining a clean, reliable cooling fluid loop is critical. To do this in an open tower requires proper and diligent water treatment and maintenance. The closed loop system is basically isolating the compressor cooling fluid from all air ambient out borne contaminants:

- This reduces the frequency of the need to shut down the cooling system for cleaning.
- This type cooler has a lower volume of recirculating water requiring water treatment filtration.
- The compressor cooling fluid usually requires minimal treatment.

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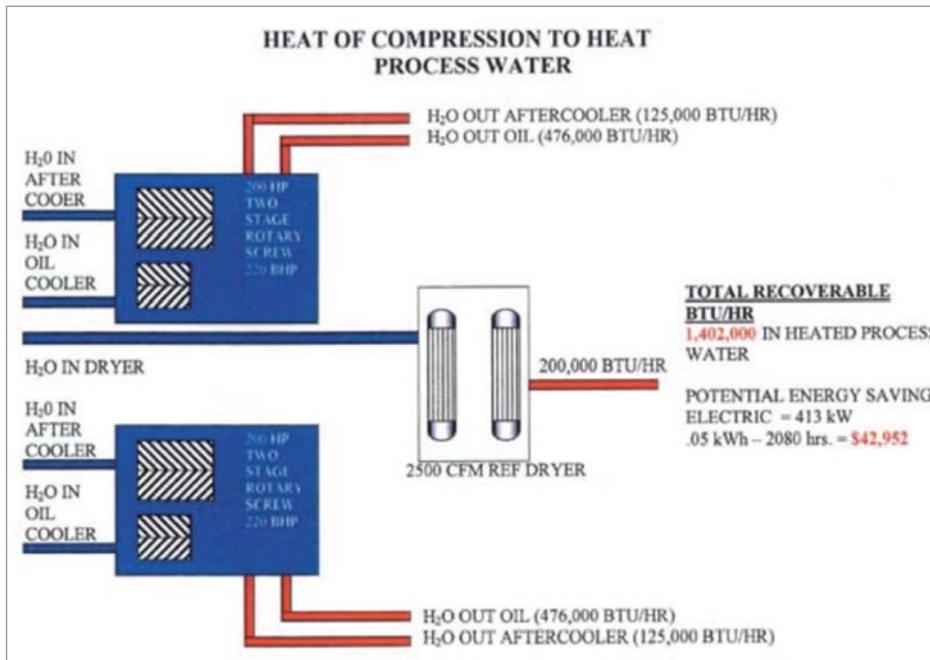


Figure 4. Heated cooling water always has some heat recovery opportunities.

- During periods of dry operation (cooler weather) the need for spray evaporation and therefore makeup water is eliminated.
- These units, like many central cooling water systems, are set up with either another cooling water source or chiller cooler. These trim coolers cool the fluid from the primary cooler when required by too high a temperature.

Centralized Cooling Water System: Dry Air Cooling System – No Water Required

These coolers are also a closed loop cooling system usually using an appropriate water glycol mix passing through finned tubes. The coolers are in modules each with a small fan for air cooling. As the heat load is reduced the fans are shut off individually as required and brought back on when needed. This type of closed cooling systems are usually available from 160,000 btu/hour rating at 250 cfm class to 4,000,000 btu/hr rating at 6,000 cfm class with specials to other levels.

These air-cooled heat exchangers can be manufactured to deliver a 2°F approach temperature but economics usually dictate a 5°F approach. This means in parts of the country they may be able to handle a reciprocating compressor's cooling needs with little or no trim cooling.

Rotary screw, vanes and centrifugals are usually limited to 100°F or at the most 110°F inlet cooling water temperature when properly equipped and because of this an effective trim cooler is almost always recommended. The trim cooler also creates a situation where heat recovery in the form of heated fluid or water can create direct energy savings.



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Receive actionable project ideas on how to reduce the water and energy consumption of your plant. Learn the latest system assessment techniques from world-class auditors. Learn technology deployment strategies from leaders of associations like the Compressed Air & Gas Institute. Meet experts who can answer questions regarding system automation, measurement and monitoring to verify energy savings.

Track 2: On-Site Utility Reliability, Safety and Quality

Learn techniques to improve production up-time with high-quality and reliable on-site utilities. Discuss the establishment of compressed air specifications and compliance verification for the safe production of food, beverage and drug products – and to reduce production spoilage/reject rates. Receive maintenance checklists and training to maintain required pressures and flows. Learn technology deployment strategies from leaders of associations like the Cooling Technology Institute.

*Presenter and presentation titles may change without notice.

<https://cabpexpo.com/conference/conference-schedule/>

10:15AM – 12:15PM — CONFERENCE ATTENDEES ONLY

Best Practices Conference Session #1

TRACK 1 SESSION: CAGI EDUCATION SEMINAR – CASE STUDIES IN MAXIMIZING COMPRESSED AIR EFFICIENCY

Chair: Chad Larrabee, Product Management Leader, Oil Free Compressors, Ingersoll Rand

Compressed Air as a Utility and Centralizing a System

Neil Mehlretter, Technical Director, Kaeser Compressors

Calculating the Impact of Artificial Demand and Pneumatic Cylinders

Mark Krisa, Strategic Account Manager, Ingersoll Rand

Dryer Purge Air and Tuning Heat of Compression Dryers

Jarett Lieser, AIRScan Audit Specialist, Atlas Copco Compressors

Compressed Air Purity Requirements for Plant and Process Air

Ryan Remington, National Sales Manager, Pneumatic Products, Hankison

TRACK 2 SESSION: ADVANCED COOLING WATER SYSTEM DESIGN FOR RELIABILITY AND PERFORMANCE

Chair: Clayton Penhallengon Jr., Principal, Integrated Services Group

Mystery of Industrial Chiller Failures Solved, With Creative Testing

Brian Justice, Director of Sales, Hudson Technologies

Presentation TBD

Speaker TBD

Cooling Towers/Well Water Isolation with a Liquid-to-Liquid System to Protect the Compressors

Michael Wlodarski, Regional Sales Manager, HydroThrift Corporation

Cooling System Control Designs for High Efficiency and Reliability

Clayton Penhallengon Jr., Principal, Integrated Services Group

12:15PM – 1:45PM — ALL ATTENDEES WITH WVCV REGISTRATION

Women in Compressed Air, Vacuum & Cooling (WVCV) Networking Group Luncheon – Sponsored by



12:15-12:25 **Welcome and the WVCV's Mission**
Ashley Gates, Co-Chair, Marketing and Communications Vice President, Quincy Compressor

12:25-12:55 **Buffet Lunch and Open Networking Time**

12:55-1:00 **Introduction of Keynote Speaker**
Heather Mitchell, Senior Product Manager Air Treatment-Compressor Brands at Ingersoll Rand

1:00-1:35 **Keynote Presentation: The Story of Jody & Jill: A True Story of Women Working Together**
Jokima Hiller Ph.D., MBA, CHE, Assistant Professor in Management School of Business and Economics Indiana University Northwest

1:35-1:45 **2024 Planning and Activity Brainstorm**
Jennifer Ramirez, Co-Chair

Opening Session Keynote Presentations Monday, October 23, 8:00AM – 10:00AM



Sustainable & Efficient On-Site Utilities
Roderick M. Smith, Publisher, Best Practices Magazines & EXPO



Maximizing Energy Efficiency and Productivity with Compressed Air & Gas Institute's Resources
Frank Mueller, President, Compressed Air & Gas Institute



Ageless Insights for Compressed Air, Cooling, and Sustainability Success
Doug Barndt, Senior Manager – Engineering, The Campbell Soup Company



Pharmaceutical Compressed Air: The Good Practice Guide for Process Gases
Chad Larrabee, Product Management Leader, Oil Free Compressors, Ingersoll Rand



CTI Engineering Resources & Cooling Tower Thermal Performance Certification
Frank Foster, Membership Committee Chair, Cooling Technology Institute

1:00PM – 4:00PM ALL ATTENDEES

New Technology EXPO Classroom (EXPO Floor)

- 1:00-1:25 **Aluminum Compressed Air Pipe Sizing & Installation**
Chad Hills, Director, AIRpipe USA

- 1:30-1:55 **We are Bobcat... Now in Industrial Air**
Patrick Jakeway, General Manager, Doosan Bobcat North America

- 2:00-2:25 **Air Management System**
Jon Jensen, Energy Efficiency Manager, SMC Corporation of America

- 2:30-2:55 **Clean Energy. Clean Air. Clean Food.**
Tilo Fruth, President, BEKO Technologies

- 3:00-3:25 **Deoxo Nitrogen/Hydrogen Purifier and MDX Gas Dryer**
Mike Kinnucane, Nitrogen Business Development Manager, Mikropor

- 3:30-3:55 **Kaeser Measurement Technology (KMT), a New Suite of Compressed Air Sensors**
Neil Mehitretter, Technical Director, Kaeser Compressors

2:00PM – 3:30PM ALL ATTENDEES WITH CAGI REGISTRATION

Compressed Air & Gas Institute (CAGI) Certified Compressed Air System Specialist (CCASS) Exam

Women in Compressed Air, Vacuum & Cooling (WVCV) Networking Group Luncheon

The WVCV Networking Group provides support to women who have chosen or are thinking of choosing a career in the compressed air, vacuum or cooling industries. The WVCV Networking Group welcomes individuals from every job function – production, human resources, finance, and every job in between. The free membership is available to women within the compressed air, vacuum & cooling sectors or those who might be thinking of a career in the industry.



Jokima L. Hiller, Ph.D., MBA, CHE
Assistant Professor in Management School of Business and Economics
Indiana University Northwest

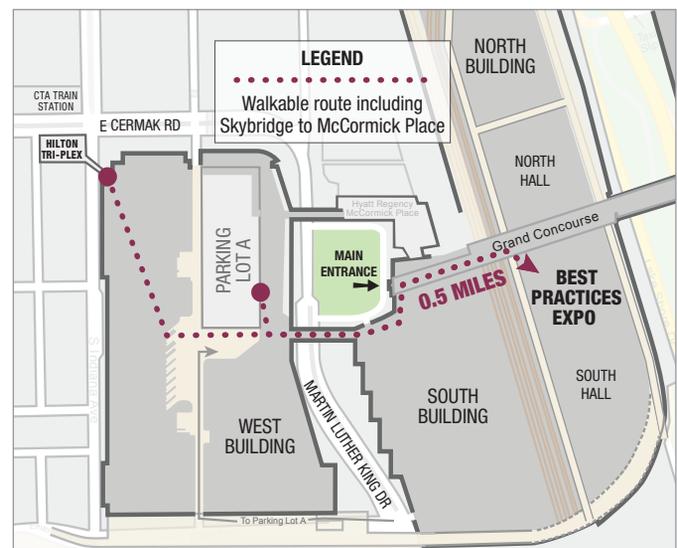
<https://cabpexpo.com/womens-group/>

4:30PM – 5:00PM ALL ATTENDEES

The Daily EXPO \$1,000 Energy Treasure Hunt RAFFLE!

6:00PM – 9:00PM ALL ATTENDEES

Networking Event at VU Rooftop at Hilton Tri-Plex connected to McCormick Hall – Sponsored by



The Hilton Tri-Plex is our Host Hotel.
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2023 EXPO OCTOBER 23-25 CHICAGO
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TUESDAY, OCTOBER 24

8:00AM – 10:00AM ————— ALL ATTENDEES
Plenary Session

10:00AM – 5:00PM ————— ALL ATTENDEES
EXPO Floor Open

Compressed Air & Gas Institute (CAGI) Certified Compressed Air System Specialist (CCASS) Exam

CAGI's personnel certification program for compressed air system specialists provides a means of verifying the capabilities of professionals in the compressed air systems industry. The program will allow customers, utilities, employers, and others to have confidence in the skills and abilities of the professionals in the industry who design, service, sell, and install compressed air systems and compressed air systems equipment. The program has been designed to comply with the ISO 17024 standard, Conformity Assessment – General Requirements for Bodies Operating Certification of Persons.



<https://cabpexpo.com/cagi-ccass/>

10:15AM – 12:15PM ————— CONFERENCE ATTENDEES ONLY
Best Practices Conference Session #2

TRACK 1 SESSION #2: BIG-IMPACT ENERGY & WATER CONSERVATION PROJECTS IN COMPRESSED AIR AND COOLING WATER SYSTEMS

Chair: James Bristow, North American Sales Manager, Hanwha Power Systems

Centrifugal Air Compressor Cooling Water Mitigation
 James Bristow, North American Sales Manager, Hanwha Power Systems

Energy Efficient Compressed Air Drying for "Air Over the Fence" Applications
 Chuck Henderson, Vice President, Henderson Engineering

Hybrid Instrument Air Dryer System Technology Deployment
 Abdulaziz Dulajjan, Senior Engineer, Saudi Aramco

Demand Side Design Effects on VSD Air Compressor Efficiency
 Josh Wamsler, President, Industrial Compressor Solutions

TRACK 2 SESSION #2: CTI SEMINAR: FUNDAMENTALS OF COOLING TOWERS, ADIABATIC FLUID COOLERS & WATER TREATMENT

Fundamentals of Cooling Towers
 Mark Pfeifer, Manager, Technical Services, SPX Cooling Tech

Fundamentals of Adiabatic Fluid Coolers
 Andrew Sickler, Industrial Business Development Manager, Baltimore Aircoil Company

12:15PM – 1:00PM: BREAK

Fundamentals of Water Treatment
 Jon Cohen, Digital Innovation Fellow, Buckman Chemical

10:15AM – 12:15PM ————— FULL CONFERENCE ATTENDEES WITH CAC REGISTRATION

Compressed Air Challenge Level 1 Workshop: Fundamentals of Compressed Air Systems (Part 1)

Plenary Session Keynote Presentations Tuesday, October 24, 8:00AM – 10:00AM



Compressed Air Energy Savings and Quality Gains at a Commercial Bakery
 Brian Mann, PE, Product Manager, Hitachi Global Air Power US/Sullair



Energy & Water Best Practices at Givaudan
 Bing Cheng, Director of Global Utilities, Givaudan



Engineering Cooling Systems for Maximum Production Output
 Bert Wesley, Senior Principal Industrial Practice, Woodard & Curran



Compressed Air Condensate Removal and Drain Monitoring Procedures to Ensure Production Quality
 John Bilsky, Facilities Specialist Compressed Air – Purified Water – Nitrogen, Gentex Corporation

1:00PM – 4:00PM

ALL ATTENDEES

New Technology EXPO Classroom (EXPO Floor)

1:00-1:25	Oil Carryover: Prevention is Better Than the Cure Cody Leatherman, Product Manager – Consumable Products, Hitachi Global Air Power US/Sullair
1:30-1:55	The Future of Compressed Air Instrumentation Martin Zeller, General Manager, CS Instruments USA
2:00-2:25	Application of Rental Blowers in Industrial Wastewater and Pneumatic Conveying Meghan Babineaux, Regional Sales Manager, Aerzen Rental
2:30-2:55	From Compressed Air to Power Generation: Kaishan's Vision for Building a Better, More Efficient Future Dave George, President, Kaishan USA
3:00-3:25	Applications Vary by Pressure; Selecting the Right Technology Mert Alpagut, Country Manager, Hertz Kompressoren
3:30-3:55	Seeing the Unseen: Illuminating Energy Conservation & Electrical Safety with Ultrasonic Imaging Dean Wolever, Regional Manager, UE Systems

2:00PM – 4:00PM

FULL CONFERENCE ATTENDEES WITH CAC REGISTRATION

Compressed Air Challenge Level 1 Workshop: Fundamentals of Compressed Air Systems (Part 2)

2:00PM – 3:30PM

ALL ATTENDEES WITH CAGI REGISTRATION

Compressed Air & Gas Institute (CAGI) Certified Compressed Air System Specialist (CCASS) Exam

4:30PM – 5:00PM

ALL ATTENDEES

The Daily EXPO \$1,000 Energy Treasure Hunt RAFFLE!



The Daily EXPO \$1,000 Energy Treasure Hunt RAFFLE!

The Daily EXPO \$1,000 Energy Treasure Hunt Raffle is designed to reward the people who make Energy Treasure Hunts in manufacturing plants happen! We want to recognize equipment distributor sales engineers

and service technicians, auditors/consultants/engineers and manufacturing plant personnel who are eligible. BE THERE, on both October 23 and 24, to WIN cash or cash equivalent prizes of:

1st Place (\$500) • 2nd Place (\$250) • 3rd Place (\$250)

Step 1: Check Eligibility*

Step 2: Grab your Energy Treasure Hunt Raffle Card and collect a stamp from a minimum of ten (10) Energy Treasure Hunt SPONSOR BOOTHS.

Step 3: Bring your raffle card, before 4:30PM, to the TREASURE HUNT RAFFLE STAGE and submit.

Step 4: BE THERE IN PERSON when names are called at 4:30PM from the EXPO FLOOR RAFFLE STAGE at Booth #1245 on October 23 and 24.*



A 2022 Treasure Hunt Winner!

* Eligible to equipment distributor sales engineers/service technicians, auditors/consultants/engineers and manufacturing plant personnel who are registered attendees of the Best Practices EXPO or Conference. Contest organizer (BEST PRACTICES EXPO) reserves the right to determine contest eligibility. Winners must be physically present to claim prize.

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COMPRESSED AIR
CHALLENGE



Ron Marshall
Chief Auditor, Marshall Compressed Air Consulting

Compressed Air Challenge Level 1: Fundamentals of Compressed Air Systems*

This is a two-day introductory course designed to teach facility engineers, operators and maintenance staff how to achieve 15-25% cost savings through more effective production and use of compressed air.



Frank Moskowitz
Consultant, Draw Professional Services

*Compressed Air Challenge workshop only open to distributors, engineering firms/consultants and manufacturing personnel who are paid registrants of the full conference package. Not available to single-day registrants.

<https://cabpexpo.com/cac-fundamentals-of-compressed-air-systems/>

WEDNESDAY, OCTOBER 25

8:00AM – 10:00AM

CONFERENCE ATTENDEES ONLY

Best Practices Conference Session #3

TRACK 1 SESSION #3: COOLING WATER AND COMPRESSED AIR DEMAND REDUCTION STRATEGIES

Chair: Jon Jensen, Energy Efficiency Manager, SMC Corporation of America

Sustainable Development Goals: Energy Efficiency in Pneumatic Systems
Jon Jensen, Energy Efficiency Manager, SMC Corporation of America

Most Chillers Are Operating Above Their Design Efficiency!
Dan Mizesko, President, Dalkia U.S. Chiller Services

Water Consumption and Environmental Impact: How to Reduce Water Usage While Maintaining Production Goals
Rebecca Moore, Strategic Account Manager, Aggreko

Next-Level Food-Industry Automation Using Edge Computing on Pneumatics
Tom Taranto, Owner, Data Power Services

TRACK 2 SESSION #3: FOOD PRODUCTION QUALITY & SAFETY: REMOVING MOISTURE, OIL, AND MICROORGANISMS FROM COMPRESSED AIR & VACUUM SYSTEMS

Chair: Leslie Marshall, National Account Manager, Atlas Copco Compressors

The Best Way to Remove Moisture from the Compressed Air System
Leslie Marshall, National Account Manager, Atlas Copco Compressors

From Fresh to Soggy – Quality Monitoring: How Compressed Air Condensate Affects Food Quality
Simon Gleissner, Managing Director, SUTO ITEC

Ensuring Vacuum Quality in Food Packaging and Freeze Drying
Bryan A. Jensen, Engineered System Solutions Manager, Rogers Machinery Company

Process and Sterile Filtration – Key to Minimizing Contamination and Protecting Brand Reputation
Michael Lewis, Business Development Manager, Atlas Copco Compressors

8:00AM – 12:00PM

FULL CONFERENCE ATTENDEES WITH CAC REGISTRATION

Compressed Air Challenge Level 1 Workshop: Fundamentals of Compressed Air Systems (Part 3)

BEST PRACTICES

2023 EXPO OCTOBER 23-25 CHICAGO
COMPRESSED AIR / VACUUM / COOLING



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WEDNESDAY, OCTOBER 25

8:30AM – 10:00AM ALL ATTENDEES WITH CAGI REGISTRATION

Compressed Air & Gas Institute (CAGI) Certified Compressed Air System Specialist (CCASS) Exam

10:00AM – 5:00PM ALL ATTENDEES

EXPO Floor Open

10:15AM – 12:15PM CONFERENCE ATTENDEES ONLY

Best Practices Conference Session #4

TRACK 1 SESSION #4: ADVANCED COMPRESSED AIR ENERGY EFFICIENCY MEASURES

Chair: Tim Dugan, President, Compression Engineering Corporation

Compressed Air System Measurement and Data-Collection in all Project Phases
Tim Dugan, President, Compression Engineering Corporation

Keeping Energy Improvement Projects on Track with Measurement
Pascal van Putten, CEO, VPIstruments

Compressed Air Demand: The Final Frontier
Paul Edwards, Principal, Compressed Air Consultants

Compressed Air Leak Detection: Acoustic Cameras vs. Traditional Leak Detectors
Brian Kavanagh, Sales Director, Sonotec

TRACK 2 SESSION #4: MAINTENANCE & FOOD HYGIENE COLLABORATION FOR SQF-COMPLIANT COMPRESSED AIR QUALITY

Chair: Leslie Enright, Owner, Canuck Industrial Group

**Verifying Compressed Air Purity Compliance with SQF and BRC Food Safety
& Quality Requirements System**
Maria Sandoval, Laboratory Director, Trace Analytics

**Compressed Air and Cooling Water Systems: The Forgotten Additives/Ingredients
in Dairy Products**
Alex O'Brien – CGA, Food Safety / Quality Coordinator, Center for Dairy Research,
University of Wisconsin-Madison

**Microbiological Issues in Food & Beverage Compressed & High Risk
Ambient Air Systems**
Charles Giambone, Food Safety Programs Coordinator, Rochester Midland Corp.

**Preventative vs. Proactive Compressed Air System Maintenance
for Consistency and Quality**
Leslie Enright, Owner, Canuck Industrial Group

Discover Innovations at the New Technology EXPO Classroom!

Listen to presentations on chillers, oil-free and lubricated air compressors, pneumatics, compressed air dryers and instrumentation, compressed air leak detection, nitrogen generators, and vacuum/blowers made by leading global manufacturers like Industrial Water Chiller, Doosan Bobcat, SMC, Kaishan, Mikropor, Kaeser Compressors, Sullair, CS Instruments, Aerzen Rental, BEKO Technologies, Hertz Kompressoren, UE Systems, Sullivan-Palatek, Sauer Compressors, Atlas Copco Compressors, Comate Intelligent Sensor, FS-Elliott and Boge America.

https://cabpexpo.com/exhibit/expo/new_technology_classroom/

1:00PM – 4:00PM ALL ATTENDEES

New Technology EXPO Classroom (EXPO Floor)

1:00- 1:25 **Upcoming Department of Energy 2025 Regulation of Rotary Air Compressor Isentropic Efficiency**
Bruce McFee, President, Sullivan-Palatek

1:30- 1:55 **Remote Monitoring on Rental Compressors**
Jim Riley, Business Development Rental Manager Sauer Compressors USA

2:00- 2:25 **Energy Recovery Solutions to Lower Your Carbon Footprint**
Luc Linart, Global Product Manager Energy Recovery & Measurements,
Atlas Copco Compressors

2:30- 2:55 **Why Compressor Direct Output Flow Rate is Important, and How to Measure**
Ray Fang, International Sales Director, Comate Intelligent Sensor

3:00- 3:25 **Centrifugal Air Compressor Sizing & Fundamentals**
JD Schroeder, Applications Engineering Manager, FS-Elliott

3:30- 3:55 **Oil Free Air**
Wolfgang Strobel, Sales Manager Plant Engineering – CEP, Boge America Inc.

2:00PM – 3:30PM ALL ATTENDEES WITH CAGI REGISTRATION

Compressed Air & Gas Institute (CAGI) Certified Compressed Air System Specialist (CCASS) Exam

5:00PM ALL ATTENDEES

Best Practices EXPO & Conference Adjourns

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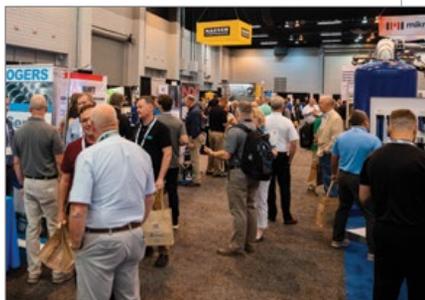
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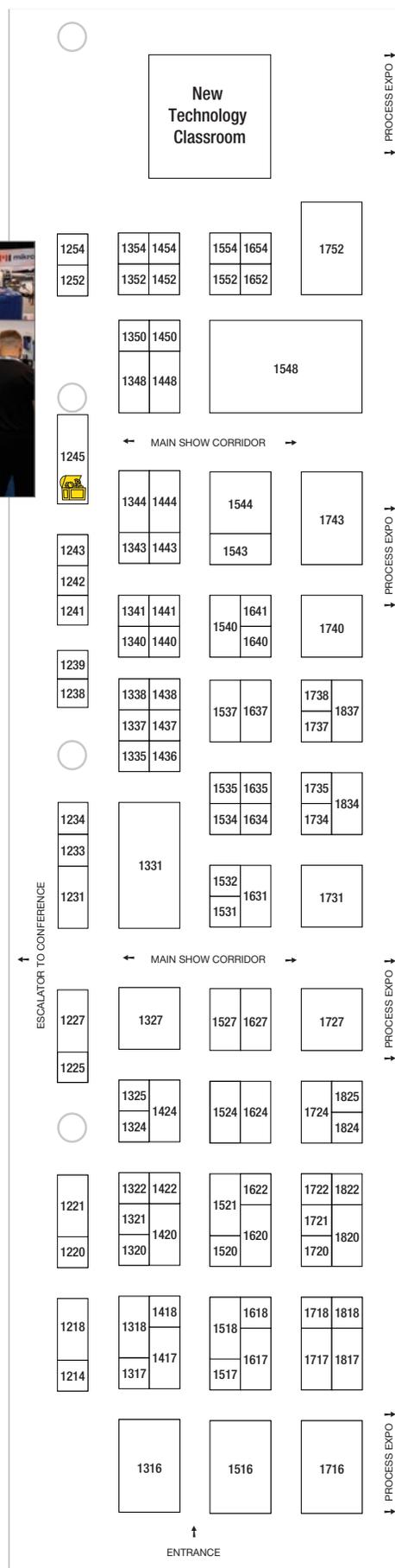


EXPO HOURS

Monday, October 23 10:00AM-5:00PM
 Tuesday, October 24 10:00AM-5:00PM
 Wednesday, October 25 10:00AM-5:00PM

Exhibitors (as of 07/27/23)

1718 ACE Compressor Services	1252 Dryline Technologies	1554 Parker Hannifin
1837 Aerzen Rental	1316 Bobcat Company	1340 Peak Gas Generation
1318 Aignep USA	1324 Edmac Compressor Parts	1210 Peakview Solutions
1641 Air Production & Service	1631 EL-AV Compressors	1214 Powerex
1438 Air System Products	1820 ELGi North America	1231 Prevost
1216 Air Treatment Solutions	1552 EnergAir Solutions	1520 Prostaris
1448 AIRpipe USA	1735 Enerpan Building Systems	1635 Revindus
1327 Alkin Compressors	1418 Eura Drives	1450 SA Performance
1652 All Weather Air	1734 Eurus Blower	1354 Sahara Air Products
1834 Altec AIR	1640 FieldServio/Standpoint Technologies	1424 Sauer Compressors USA
1721 Anest Iwata	1740 Fluid-Aire Dynamics	1532 Schulz of America
1521 Applied System Technologies	1737 Fluke	1352 Shanghai Airpull Industrial
1716 Atlas Copco	1417 FS-Curtis/FS-Elliott	1225 Sicomat
1441 Bauer Compressors	1350 Generon	1444 SMC
1454 Bay Controls	1243 Great Lakes Air Products	1624 Solberg Manufacturing
1548 BEKO Technologies	1620 Hanwha Power Systems America	1822 Sonotec
1245 Best Practices EXPO and Magazines	1727 Hertz Kompressoren	1537 SOTRAS
1220 Blue Storm Air	1818 Hydrothrift	1752 Sullair
1527 BOGE America	1436 Industrial Water Chiller	1524 Sullivan-Palatek
1738 Brentwood Industries	1825 ISEL/Dubois Chemicals	1343 Summit
1534 CAGI	1221 JORC Industrial	1543 SUTO iTEC
1317 CALMS USA	1743 Kaeser Compressors	1344 Tamsan-USA Compressors
1440 ComEd Energy Efficiency Program	1516 Kaishan Compressor	1227 Tamturbo
1634 CaselZ	1321 Kellogg American Air Compressors	1341 Termomeccanica Industrial Compressors
1622 CDI Meters	1724 KSI Technologies Canada	1422 Trace Analytics
1722 Clean Resources	1531 Lone Star Blower and Compressor	1452 Tsunami Compressed Air Solutions
1348 Coltri Compressors	1544 Lupamat	1338 Turbowin
1518 Comate Intelligent Sensor	1717 Masia Group	1322 UE Systems
1335 CompressAir	1331 Mikropor	1520 Ultrachem
1337 Compressed Air Challenge	1824 nano-purification solutions	1325 Van Air Systems
1443 Control Devices	1627 Nardi Americas	1637 VMC USA
1535 Cooling Technology Institute	1420 National Compressor Services	1817 VPIstruments
1731 CS Instruments USA Inc.	1234 NAVAC Vacuum Technology	1540 Walker Filtration
1618 Delta Cooling Towers		1617 WEG
1320 Delta Industries		



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2023 EXPO OCTOBER 23-25 CHICAGO
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Conference Schedule at a Glance

MONDAY, OCTOBER 23, 2023

7:00AM	Registration Open
8:00AM-10:00AM	Opening Session
10:00AM-10:15AM	Coffee Break
10:00AM-5:00PM	EXPO Floor Open
10:15AM-12:15PM	Conference Session #1
12:15-1:45PM	Women in Compressed Air, Vacuum & Cooling Networking Group Luncheon
1:00-4:00PM	New Technology EXPO Classroom
2:00-3:30PM	Compressed Air & Gas Institute (CAGI) CCASS Exam
4:30-5:00PM	Energy Treasure Hunt Raffle
6:00-9:00PM	Networking Event at Hilton Tri-Plex VU Rooftop

TUESDAY, OCTOBER 24, 2023

8:00AM-10:00AM	Plenary Session
10:00AM-5:00PM	EXPO Floor Open
10:15AM-12:15PM	Conference Session #2
10:15AM-12:15PM	Compressed Air Challenge Level 1 Workshop (Part 1)
1:00PM-4:00PM	New Technology EXPO Classroom
2:00PM-4:00PM	Compressed Air Challenge Level 1 Workshop (Part 2)
2:00PM-3:30PM	Compressed Air & Gas Institute (CAGI) CCASS Exam
4:30PM-5:00PM	Energy Treasure Hunt Raffle

WEDNESDAY, OCTOBER 25, 2023

8:00AM-10:00AM	Conference Session #3
8:00AM-12:00PM	Compressed Air Challenge Level 1 Workshop (Part 3)
8:30AM-10:00AM	Compressed Air & Gas Institute (CAGI) CCASS Exam
10:00AM-5:00PM	EXPO Floor Open
10:15AM-12:15PM	Conference Session #4
1:00PM-4:00PM	New Technology EXPO Classroom
2:00PM-3:30PM	Compressed Air & Gas Institute (CAGI) CCASS Exam
5:00PM	Conference Adjourns

Hilton Tri-Plex Host Hotel

The Hilton Tri-Plex Hotel is actually three Hilton properties, under one roof, with a skybridge connection to McCormick Place. The discounted room rate is \$289 per night. It is located 5 minutes walking distance from the Cermak-McCormick Metro Station, which can be accessed from Chicago airports. The Monday evening Networking Reception at VU Rooftop is at this property.



A second option is The Congress Plaza Hotel, with room rates starting at \$235 per night. This property is a 10 minute Expo Shuttle Bus ride away.

These discounted room rates are only available through our authorized hotel booking system at <https://cabpexpo.com/hotel-travel/>.



REGISTER NOW AND SAVE!
 Early-Bird Registration Rate (ends 10/2/23)*

Registration Fees*

Expo Hall	\$50
Full Conference**	\$550
Full Conference + Level 1 Compressed Air Challenge Workshop***	\$550
Single Day Conference	\$295
CAGI CCASS Exam	\$275

Expo Pass Includes Access to:

- Opening & Plenary Sessions
- Networking Events
- EXPO Hall & Treasure Hunt Raffle
- New Technology EXPO Classroom
- Process Expo

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- Plus All Conference Events & Workshops

**Full conference registration includes access to all expo floor functions, networking event, conference sessions. Single Day registration includes access to expo floor functions, networking event, conference sessions.

***This registration is only open to distributor, engineering firm/consultant and manufacturing personnel.

3+ GROUP DISCOUNTS

Contact Kimberly@airbestpractices.com

Register at <https://cabpexpo.com/registration/>



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Figures 4 and 5 sketch an installation of two, water-cooled, 250-hp, two-stage, lubricant cooled, rotary screw air compressors along with a water-cooled, heat sink, cycling, refrigerated compressed air dryer. The plant manufactures dry dog food and used a great deal of hot process water coming from the nearby production lines.

A trim plate and seal cooler was installed with a small 2.5-hp pumping station and the 60°F (16°C) process water was run through the trim cooler and heated to 94°F (34°C) or more.

The calculated savings was 1,402,000 btu/hr which offset \$42,952 of the previous process heating water equipment. At the conclusion of the project the annual measured savings was

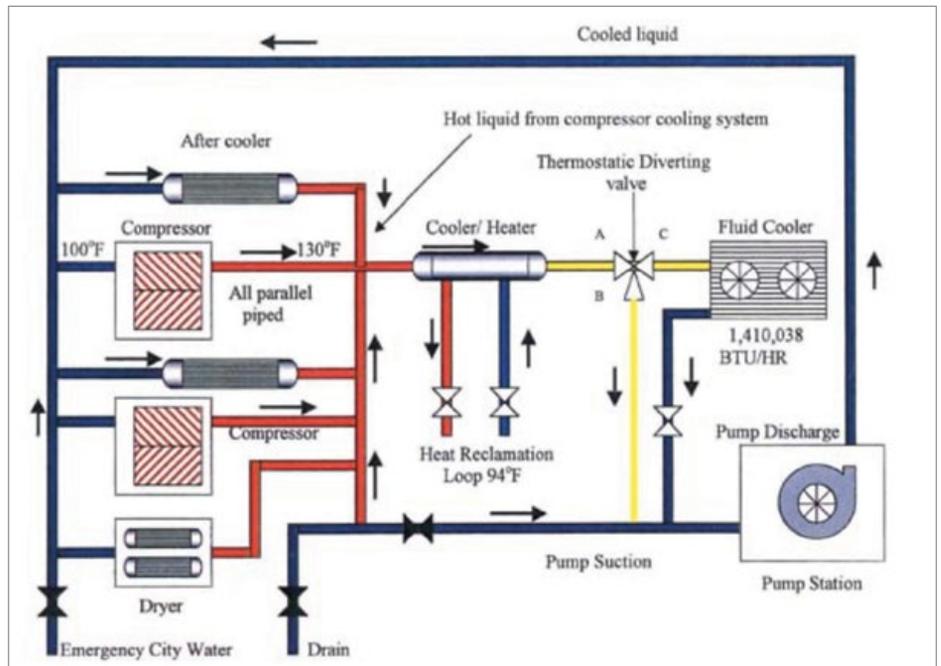


Figure 5. Heat recovery piping schematic of system shown in Figure 4.

PERFORMANCE AND POWER

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Evaluating Air Compressor Cooling and Heat Recovery Part 2 – Centralized Systems

\$61,482 per year due to the pre-cooling of the return heated fluid to the air cooler. For one full year while monitored no more than two of ten fans ever ran, even during the summer. In the winter almost none ran.

In this case, there was a ready supply of cool trim water available which the plant was already using for process water; however, that is not always the case.

Evaluation should always include the cooling method and cost of the trim coolers. Generally, the amount of auxiliary cooling is low except in emergency situations.

A chilled fluid closed cooling system is another excellent selection for this application. Again, a closed loop system with a glycol water system can cool effectively, and well controlled, will only use the required energy to accomplish the goal. Chilled fluid cooling can also be combined with a secondary cooling water backup service.

As you can see, all these options offer a great deal of flexibility and can effectively cool “water-cooled air compressors” using no water.

Table 1. Direct Cooling Water/Fluid Comparison of a 600-hp, 3-Stage Centrifugal Air Compressor rated for 2,750 scfm at 100 psig at 590 bhp.

Compressor Cooling	1000 btu/hr		gpm	
After-cooler	1547		124	
Oil-Cooler	145		29	
Total 1,000 btu/hr/gpm	1692		153	
	Once through Municipal Water	Open Evaporative Water	Closed Loop Evaporative Tower	Dry Cooler with Trim
Water cooled for compressor cooling	153 gpm \$236,844/yr	Recirculated	Recirculated	N/A
Total gallons/year at \$3.00 / 1000 gallons	78,948,000	N/A	N/A	N/A
Spray circulation pump motor at \$.06 kW / 8600 hrs/yr	N/A	KW / 100% \$516	KW / 30% \$155	
Main cooling system fan driver motor kW/ yr at \$.06 / 8600 hrs/yr	N/A	75-hp 60 kW \$30,960/yr	11-hp 10 kW \$5,160/yr	(12) 1.5-hp 18-hp at 50% use 9 kW \$4,644/yr
Evaporative make up water – gpm \$/year gallons/year	N/A	3.4 gpm \$5,264/yr 1,754,400	1.2 gpm \$1,858/yr 619,200	N/A
Flushing blow out water – gpm (\$3.00 / 1000 gallons) \$/year gallons/year	N/A	45.9 \$71,052/yr 23,684,400	1.7 \$2,632/yr 877,200	N/A
Total Gallons of Water for Water Treatment	78,948,000	25,438,400	1,496,400	N/A
Water treatment costs at 42 grains hardness, 10 alkalinity, with biocide treatment at \$1.20 per 1000 gallons	\$94,737	\$30,526	\$1,795	N/A
Trim cooler costs to operate during extreme hot weather; chiller cooler kW/% time at \$.06 kWh/8600 hrs/yr	N/A	N/A	N/A	30% utilization 9 kW \$1,393/yr
Pump station electric motor kW – based on 160 gpm, 100 ft of head specific gravity 1.0 100% of time at \$.06 kWh/8600 hrs/yr	7 kW \$3,612	7 kW \$3,612	7 kW \$3,612	7 kW \$3,612
Total Operating Cost Water \$/yr	\$335,039/yr	\$136,666/yr	\$13,350/yr	\$9,649/yr

Comment on Utilizing Central Cooling Systems – Open or Closed with Air Compressors

With the exception of large water-cooled reciprocating air compressors, most rotaries and centrifugals have relatively high-pressure losses through them compared to many other commonly fluid cooled industrial equipment. Whenever possible, each air compressor or group of compressors should be on its own system to avoid other pressure losses reducing the flow to the air compressors.

An effective trim cooler should be well controlled to effectively modulate the flow and manage the power use. Often these trim coolers are sized to be able to handle 100% of the load and keep the equipment running in the case of an emergency.

The energy use of the circulation pumps is a function of the flow volume and the head. Poor fluid piping, sizing and configuration, can add pressure loss and head. Installing the cooler farther away from the air compressors, or on the building roof, will also usually increase the cooling fluid “head” and require larger pumps.

Summary

Table 1 provides a comparison of cooling system operating costs between; water-cooled full flow; open evaporative tower; closed system evaporative; and dry air system with trim.

These are very conservative numbers and we caution again to be sure to gather your equipment and site specific data. There are also other options that can be added or mixed in with these basic technologies to offset some of the inherent inefficiencies such as:

- Chilled water or alternate cool water to trim the cooling and reduce the “top end” heat load on the primary central cooler.

- VSD drives on the large cooling fans particularly utilizing the new, permanent magnet, VSD drives.
- Automatic level control and heaters on the pan fill.
- Automatic drain in the pans.

It is evident that any of these options are preferable to “once through” municipal water.

The ever-growing regulations and controls will just further increase this differential in cost.

The true cost of the open evaporative tower and the closed loop evaporative tower can be driven much higher with more significant water treatment costs, water disposal regulations, sewer costs and surcharges. The cost of the dryer cooler with trim is very predictable. **BP**

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Vital Signs: Critical Instrumentation for Cooling System Health

By Clayton Penhallegon, Jr., P.E., Integrated Services Group

► In any medical situation, the very first steps include taking the patient's vital signs – temperature, pulse, blood pressure, etc. These and other measurements are critical to knowing the health of the patient, hence their universal observation and notation. Two key questions are addressed in these readings: is the patient healthy and are they getting better or worse than before?

Cooling water and other plant utility systems have similar metrics that help us know if our systems are healthy and if they're getting better or worse. Similar to the body, these include various temperatures and pressures as well as other factors such as energy input

and directly measured or calculated output values enabling the assessment of the system's operating level and efficiency¹. Moreover, with plant utilities, a frequent question asked is how much more can be added to the existing systems, and good operating data can be essential to making this determination.

Unfortunately, we often forget the importance of the measurement tools and systems to the quality and usefulness of the readings, and consequently we are forced to analyze systems while using incomplete and / or inaccurate measurements. In many cases, it may not even be recognized that the data is not good, which is perhaps the worst situation. Unsurprisingly, this

can lead to an incorrect understanding of system operations with resulting suboptimal decisions of appropriate actions and potential changes. In other words, "garbage in, garbage out".

This article will discuss the instrumentation typically found in cooling systems and other plant utility systems, what other instruments and gauges should be used, how the instrumentation should be used, and good maintenance practices for instrumentation.

Typical Utilities Instrumentation

Cooling systems have the most instruments among typical plant utilities due to their relative complexity. Important readings

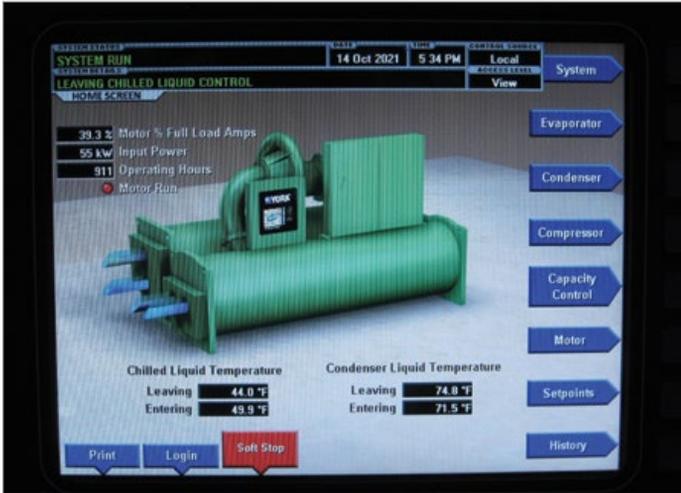


Examples of typical cooling system instrumentation: chiller gauges and line cooling gauges.

can be taken on multiple loops and devices and in several key categories including temperature, pressure, power, and others

such as flow or other supporting details like water treatment chemical concentrations, make-up water use, etc.

Other plant utilities similarly have vital readings although the range of types may be more limited. Compressed air and vacuum both have



Multiple readings displayed on device control screens: a chiller panel display and an Advantage TCU with displays.

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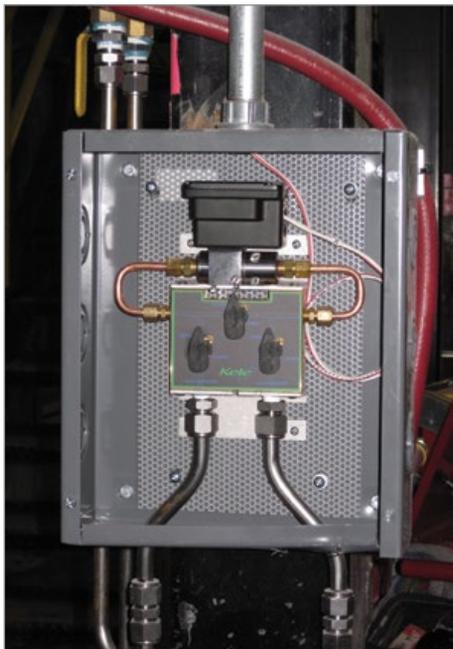


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pressure (vacuum simply being an absolute pressure below atmospheric) and power. Compressed air may also have a flow meter and moisture level indication usually measured in dew point. Steam systems would most frequently have pressure as a combined indication of both pressure and temperature for saturated steam but may also have temperature independently for superheated applications, and condensate return would have temperature to reflect efficiency of heat retention in the return system.

The form of instruments may vary, ranging from discrete physical instruments such as individual thermometers and pressure gauges



Cooling water differential pressure sensor and inline flow meters add greater depth to typical instrumentation

to electronic sensing & display devices, whether integral to equipment (such as those read on chiller or air compressor control screens) or stand-alone like temperature controllers often used on tower fans.

Returning to cooling systems, they will very frequently be instrumented at the in and out connections for major components such as pumps, chillers, heat exchangers, and process equipment. Critically missing in most cases are system-level sensors reflecting the overall cooling system conditions. These could include blended supply temperatures, where multiple devices (e.g. cooling towers, chillers, etc.) feed into common supply headers, and supply – return differential pressures, which provide the driving force for water flow through the various system cooling loads in the same way that voltage provides the impetus for electrical current flow.

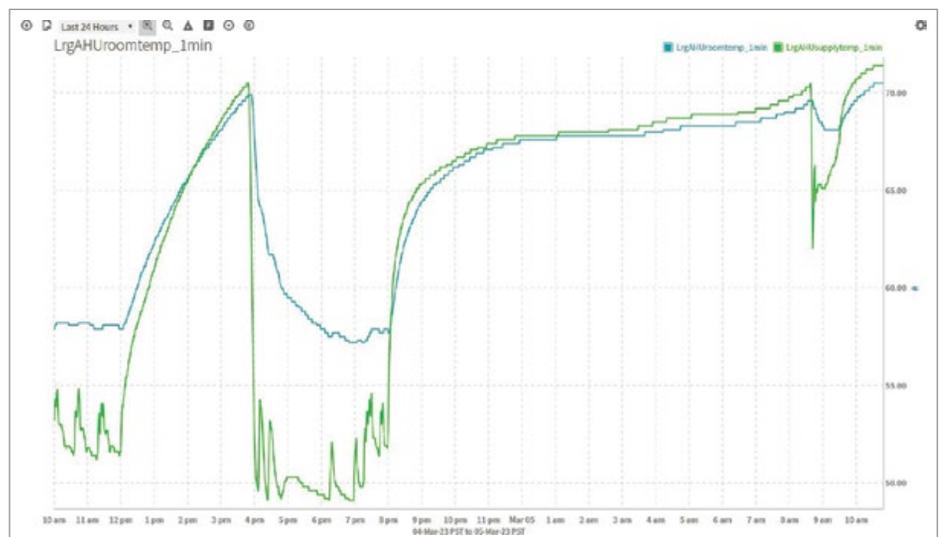
It is important to remember that cooling in a given application is a function of two variables – both temperature and flow – and flow is only rarely measured. This is a major oversight because in addition to being a key component of the heat removal process, the pumping power to

provide flow is typically the 2nd largest energy use in a cooling system besides the chillers. In fact, in around 20 – 25% of systems surveyed, the annual pumping energy exceeds the chiller energy due to the constancy of the pumping vs. the seasonal and production variations in chiller loading. Measuring flow can provide the basis for appropriate flow control, which is a significant opportunity for reduced equipment wear and great energy savings.

Utilities Instrumentation Applications

Obviously, the primary use for instrumentation is to observe the operating status of equipment and systems. Is the chilled water cold enough? Are the pumps running within their amp limits? Is the supply pressure at or above the target for the compressed air system? Besides these primary and immediate uses, there are many advanced applications for instrumentation. Examples include:

- Benchmarking initial conditions of equipment operation for comparison with design performance expectations and future readings after service or repairs



Example trends extracted from system controls and a chiller control panel

- Assessing system loading and available capacity for expansion
- Correlating system conditions to production equipment performance for process optimization (e.g., quality troubleshooting and / or process improvement studies)
- Triggering preventive maintenance activities

For many uses, the data must be recorded over time and with sufficient reading quality for the data to be reliable for analysis. Operators tasked with collecting the data should be trained so that they understand both the meaning of the readings and the importance of ensuring that

the readings are accurate. A knowledgeable technician will know when a reading is unusual or out of range and will either recheck the reading or flag the off normal condition for further review, both of which help ensure the quality and usefulness of the logged data.

One of the most powerful uses of instrument readings is through continuous data trends over time. When captured in a suitable datalogging system (whether temporary or permanent), trends support advanced purposes such as diagnosing changes in performance, identifying contributing factors to events, and flagging maintenance needs. The ability to trend readings is a key benefit to using electronic sensors vs. simply having individual physical sensors (gauges, thermometers, etc.),

however it must be acknowledged that not all sensed points in a system can be cost effectively instrumented in this way.

Instrumentation Woes

While most plants have instruments installed as part of the facility construction or embedded in equipment, often very little attention is paid to the equipment installed or to maintaining it after the fact. And as noted above, it is usually only installed in the most typical locations leaving many key indications unavailable.

Further aggravating the relative lack of metering is the poor quality of most thermometers and pressure gauges installed in industrial systems. These are typically installed by a mechanical contractor as part of their

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system construction work scope, and unless there are clear quality standards included in the project specifications, the least expensive instruments available are used with the result that the initial readings are not particularly accurate and the long-term indications are almost certainly wrong by some degree.

Best Practices for Instrumentation

With a good understanding of the importance of instrumentation in cooling and other plant utility systems, the following Best Practices are recommended to provide the greatest benefits possible for system operations:

Best Practice Tip #1: Ensure operators are trained on the meaning of the instrument readings they record and on the importance

of properly logging the data. No one likes doing meaningless tasks and untrained operators can't identify off normal conditions, whether it's a real equipment issue or simply an instrument error. The worst situation is having poorly recorded data such that important analysis and decisions are made while relying on bad information that is believed to be correct; this can lead to significantly costly errors in equipment purchases, system changes, etc.

Best Practice Tip #2: Install instruments to support specific, intentional uses above the basic default capabilities usually found. This means choosing to install additional gauges and/or sensors and either logging them manually on a consistent, regular basis (as with all the

other monitored points) or else tying them into monitoring and logging systems.

Examples of these would be differential pressures at different points, flows on separate loops, blended branch header temperatures, and other indications that give insight into system conditions beyond specific device readings. The locations and types of readings for these would come from a clear understanding of the underlying system, and it may be worth consulting with a systems specialist to identify what points and instruments would be most helpful.

Best Practice Tip #3: Consider setting different reading frequencies for various points to reduce the operator data logging

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workload. Certain values need to be read every time logging is done while others may be reasonably read on a less frequent basis. For example, the in and out water temperatures and the average amps or kW power² should be recorded every time a chiller is read, (potentially daily or even multiple times each day) while the individual phase amp readings, refrigerant conditions (either temperature or pressure), phase voltages, etc. could be read two or three times each week and still be very useful.

Of course, automated monitoring systems would perform the readings with no meaningful penalty for consistent, complete logging each time.

Best Practice Tip #4: Project specifications should include specific quality and accuracy requirements for pressure gauges and thermometers such that “better” quality instruments are used, typically a +/- 1% or better accuracy rating. There is no need for the expense of NIST-calibrated metering for general industrial applications, although boiler pressure or other safety-related metering may appropriately be of this quality and have periodic calibration performed to ensure long-term accuracy.

Typical light-duty pressure gauges with a 2 – 3% initial accuracy may list for \$20 – 25 while a higher quality, liquid-filled HVAC / light industrial gauge with 1% accuracy may list for \$50 – 70. For a mechanical room with thirty

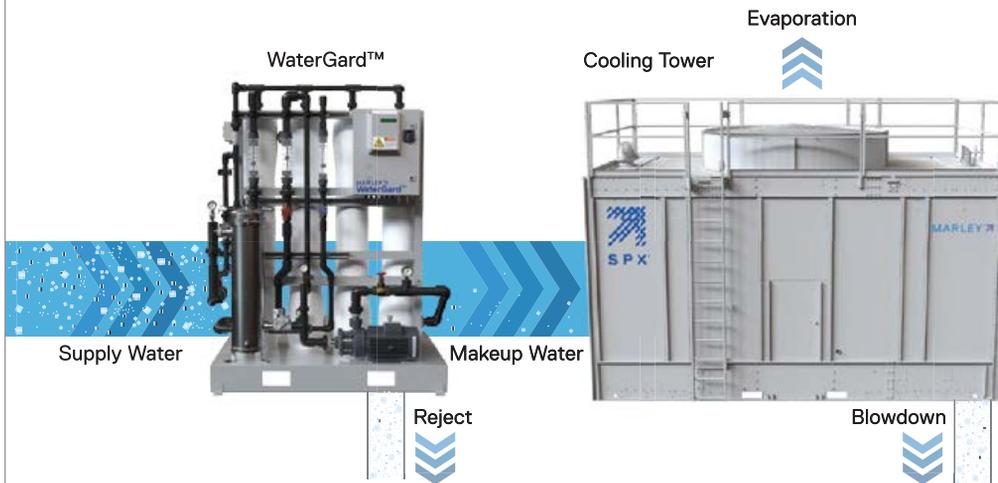
gauges, the initial cost premium might be \$1500 but the readings will be more accurate and the gauges will last longer.

Note that the total range of the device must be considered in addition to the accuracy. A +/- 1% accuracy thermometer with a 0 – 300°F range will have a +/- 3°F allowable error band while still meeting spec. This means that a plate heat exchanger providing 6°F of cooling could show zero temperature change if the inlet thermometer was reading 3°F low and the outlet thermometer was reading 3°F high. If 0 – 100°F range thermometers with the same +/- 1% accuracy were being used, at least 4°F of cooling would be shown. (See BP Tip #6 below on cross checking.)

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Best Practice Tip #5: Manifold pressure gauges to share a single gauge per device such as a pump, chiller, or heat exchanger. This improves the accuracy of differential readings while reducing cost and part count of gauges since the gauge error will be proportionally consistent across all the measured points. For example, a single gauge manifolded across a chiller evaporator will give a better indication of the true pressure difference between the inlet and outlet than two separate gauges, each with their own possible error.

Best Practice Tip #6: Cross check thermometers periodically to minimize temperature reading errors. While manifolding pressure gauges is helpful to minimizing error in pressure readings, temperatures can't be connected in the same way to a common instrument. Also it would not be time efficient to move a single thermometer from place to place. Accordingly, the best solution for thermometers is to periodically cross check them and note the differences.

This can be done in place, for example by flowing water through just one side of a heat exchanger or off-line chiller and noting the differences in the readings (in theory they



Pump pressures manifolded to a single gauge.

should be identical if there is no heat load being transferred). Removable thermometers (See BP Tip #8 below) can be read while inserted into a water container and the respective readings noted. Some thermometers have scale adjustment capability and these should be adjusted either to match a reference thermometer (if available) or at least to consistency among the group.

Best Practice Tip #7: Install blowdown piping for gauge ports, particularly on open loop tower water connections. An easily used blowdown makes regular purging of the sensing leg easy such that it will be done routinely. Water systems are frequently subject to particulate loading, for example through open tanks or direct contact cooling applications, and even water that looks clean will foul and plug gauge taps if not periodically cleaned.

Best Practice Tip #8: Install sensors with isolation capability between the system and measurement devices (gauges, etc.) so they can be serviced without interruption of the system operation. This means thermometers with thermowells, isolation valves on pressure monitoring locations, etc.

Insertion flow meters can often be installed using valves where they can be removed while the line stays in service or they can be selected as through the pipe wall technology (e.g. ultrasonic); in either case, they can be serviced if needed without affecting the line operation.

For pressure sensing on tower water piping, in particular, it is important that the isolation valve be in the sensing leg directly



Pressure sensors showing both manual and solenoid operated blowdowns.



perpendicular to the main pipe – unfortunately this is seldom done and many pressure gauges we’ve seen on tower systems are essentially useless as they have been plugged for years. When combined with the blowdown piping recommendations in Tip #5 or #7, the pressure readings should be good for the long term.

Conclusion

Proper instrumentation is critical to understanding how plant utilities are operating and evolving over time. Taking steps to insure the readings are accurate and consistent dramatically increases the reliability and usefulness of the collected data.

One key distinction of the industrial utilities environment (versus commercial or other

applications which may employ the same systems) is that they change over time. Plants are expanded, new lines or processes are brought in, etc., and these changes make understanding the support utilities critical, not only to daily operations and equipment maintenance, but also to accurately understanding the utilities usage

relative to production and for reliably forecasting the needs for additional utility capacity as these changes occur. **BP**

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Endnotes

- 1 There are of course numerous similar and more detailed measurements taken when needed on a patient, many of which also essentially indicate the person’s physical performance and efficiency.
- 2 Power is a much better indicator than amps given that the amps will run above 35 – 40% of full load on a completely unloaded motor while the real power (kW or HP) will be 5% or less of the rated shaft output. Real power tells the actual input work into a system making it immediately obvious if a coupling has failed, etc. and much more insightful when evaluating the operation of a device or system.

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Mark Pfeifer

LEED AP BD+C, Technical Services
Manager, SPX Cooling Tech.

Fundamentals of Cooling Towers

Mr. Pfeifer has done numerous presentations to engineers, architects and contractors on the subject of cooling towers and their application to HVAC and Industrial projects. The presentation will provide attendees with a review of the fundamentals of cooling towers.

Mark holds a BSME in Mechanical Engineering from Kansas State University, is a registered Professional Engineer in the State of Kansas and is a LEED accredited professional. His cooling tower career spans over 30 years in various roles including materials engineering, proposal management and applications engineering. In his current role, Mark manages the Technical Services department providing technical support for sales representatives and customers. Mark is currently secretary of ASHRAE's Technical Committee for Cooling Towers and Evaporative Condensers (TC8.6) and a member of USGBC.

Fundamentals of Adiabatic Coolers

Mr. Sickler will review how adiabatic heat rejection has become more widely available, saving energy and water without the need for water treatment. Engineers and owners are now challenged with comparing the benefits and tradeoffs of air-cooled, water-cooled, and adiabatic systems. After attending this seminar, you will know how to compare different cooling systems, when adiabatic units are right for your projects, and the different types of adiabatic coolers and condensers available.

Andrew has seen many facets of mechanical systems in his career. He has held various positions including service technician (while finishing his engineering degree), service manager, construction project management, and project engineering. This background shapes his approach and allows him to deliver his clients thoughtful and responsible solutions to their engineering and design challenges.



Andrew Sickler

Industrial Business Development
Manager, Baltimore Aircoil Company



Jon Cohen

Digital Innovation
Fellow, Buckman Chemical

Fundamentals of Water Treatment

Mr. Cohen will provide an overview of the basics of water treatment for evaporative heat rejection equipment, including open and closed circuit cooling towers as well as evaporative condensers. Topics include common water treatment terms, methods for control of scale, corrosion, and biological contamination, water management plans, and best practices for minimizing water use while maximizing system efficiency.

Jon has been involved in water treatment for over 30 years, covering laboratory, R&D, Sales, Equipment, technical consulting, and management. He has been the Technical Director for regional water treatment companies and led large teams in biocides and equipment for a larger company. He is an active participant in trade organizations, serving as a past BOD member at the CTI and participating in the drafting and subsequent adoption of numerous standards and guidelines, including ASHRAE/ANSI 188. Jon holds a Bachelors degree in Biology, Masters in Chemical Engineering, and an MBA. He is also accredited with LEED AP. Jon is currently a Digital Innovation Fellow at Buckman Chemical.

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Maintaining the Mechanical Integrity of Evaporative Condensers

By Steve Kline, P.E., M.B.A., Product Applications Manager, Baltimore Aircoil Company

▶ Evaporative condensers are an efficient and cost-effective heat rejection solution for various applications – food and beverage refrigeration, industrial machinery cooling, and HVAC. The units work by condensing superheated refrigerant vapor inside a coil that is continually sprayed with water. As the water evaporates, fans reject the heated water vapor to the atmosphere. By lowering system condensing temperatures, evaporative condensers reduce compressor horsepower requirements, resulting in energy savings of up to 15% when compared to air-cooled systems.

A comprehensive program of routine preventive maintenance will keep refrigeration systems performing at peak efficiency, maximize system operating life, and reduce unplanned downtime due to equipment failure. It also helps to ensure reliable and safe operation, which is critically important to avoid leakage of ammonia and other refrigerants. Regular inspections are, of course, key and should be done in accordance with the manufacturer's recommendations and plant preventative maintenance schedule. Below are general guidelines for the areas of inspection that should be part of any effective evaporative condenser preventive maintenance program. These guidelines cover inspections in 10 areas. Although maintenance frequency will depend on a variety of factors – e.g., condition of circulating water, cleanliness of ambient air, and the unit's operating environment – each area of inspection should be performed at least annually and more frequently as recommended by the manufacturer for a particular component or as circumstances warrant.

For each inspection, it is important to document the inspection process and all findings, the date of the inspection, the name of the person performing the inspection, any actions taken. If any additional future actions or repairs are necessary perform per manufactures recommendations or industry standards. Digital images are a useful method for documenting present conditions and demonstrating changes over time.

To ensure worker safety, all proper lock out-tag out procedures for the unit and any site safety procedures must be followed prior to beginning inspection or maintenance work. Additionally, measures must be taken to confirm there is no refrigerant left in the coil. This is usually done by employing a vacuum system prior to entering or servicing the condenser. Always follow industry best practices regarding the use of proper PPE and “one in-one out” procedures.

Recommended Inspection Tools

Most people carry a smartphone with a good digital camera, which is a useful tool for photographing or recording inspection findings. Other recommended tools include an infrared thermometer, an infrared camera, an ultrasonic metal thickness meter, a vibration meter (ultrasonic or accelerometer), a laser alignment tool, a multimeter for voltage and amperage, a micrometer depth gauge, and a dye penetrant test kit to detect cracks. Importantly, a complete inspection kit will also include the manufacturer's installation, operation, and maintenance manuals and lock-out / tag out forms.

1. Adequate anchors and supports for unit

A comprehensive maintenance program begins with a visual inspection of the fundamental structural integrity of the system. This step includes inspecting the condensing unit's



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Maintaining the Mechanical Integrity of Evaporative Condensers

supports and anchors to ensure that it is securely installed. An inspection should also be made of any improperly supported piping, which could over stress coil connections and cause a leak. Each support should be visually examined, looking for cracks, missing or loose fasteners, and any corrosion.

2. Corrosion of enclosure, tubes, piping and supports

Condensers should be inspected for corrosion at least annually and more often as conditions require. If left untreated, pitting can degrade the wall thickness of a tube or pipe, possibly leading to leaks and burst pipes. Excessive tube scale causes lost condensing capacity and reduced performance. Visually inspect all visible coil surfaces with a flashlight or digital camera. When further examination is necessary, especially of areas that may not be readily visible, a flexible, lighted borescope can be helpful. Wherever possible, measure the depth of large pits with a micrometer depth gauge.

3. Scale build-up on tube bundle

Guarding against scale is critically important to maintaining the capacity of the condenser,

which is why condensers should be regularly inspected for scale build-up. Infrared cameras are effective for measuring thermal degradation due to scale.

4. Cracks in fan assemblies

As a mechanical component, fan assemblies need to be inspected at least annually. Fan blades can break off and cause damage to surrounding areas. A loosened motor mount can cause a fan assembly to fall, which may result in extensive damage to the condenser. During inspection, look and listen for any vibrating parts – larger sheet metal parts will usually be the most noticeable. Watch the fan in operation, looking for any vibration as it rotates. Listen for sudden changes in noise levels or tones, and visually inspect the fan assemblies for cracks.

5. Shafts, bearings, motor mounts, belts, and fasteners

A comprehensive inspection includes detection of overheated bearings, belts, or motors using an infrared camera and conducting a visual search for cracked or frayed belts and missing fasteners. A rotating component may



fail so follow recommended maintenance procedures in the manufacturer's operations and maintenance manual to avoid injury and mechanical issues.

6. Scale or dirt build up in drift eliminators and the water sump

Visually inspect the mist eliminators and basin for biological growth, scale build-up, or dirt accumulation. These conditions cause reduced airflow, resulting in increased operating temperature and pressure, which may cause the spray water pump to clog and thereby restrict or stop the flow of water over the coil bundle. If necessary, drain the basin, remove any foreign material and either clean or replace mist eliminators as needed.

7. Safety devices

Check that any safety devices, such as vibration switches, are functioning properly. Follow the manufacturer's instructions for the frequency of, and procedure for, testing each device. Malfunctioning or missing safety devices could result in unsafe operation of the unit. For example, a disconnected vibration switch could fail to detect a vibrating fan assembly, which could result in catastrophic fan failure and mechanical damage.

8. Electrical connections

Wiring also needs to be inspected for loose connectors or signs of electrical overheating (black marks) as well as for melting or cracking wire insulation. Visually inspect electrical connectors and use an infrared camera to identify overheating electrical components that could fail or catch fire. Contact an electrician to repair or replace defective electrical components that show signs of wear.

9. Spray nozzles

Visually check that spray nozzles are not plugged and are delivering a uniform spray pattern. Poor water spray to the coil surface

could result in higher operating temperature and condensing pressure and compromise performance. Always use spray nozzles from the original equipment manufacturer to ensure optimal water coverage.

10. All isolation valves and purge valves

Isolation valves should be checked to ensure that they are functioning and in good condition. Visually inspect the valves to make sure they are free from signs of major corrosion and test the valves to make sure they operate correctly – opening and closing

properly without leaks. Replace valves that are malfunctioning or showing excessive corrosion.

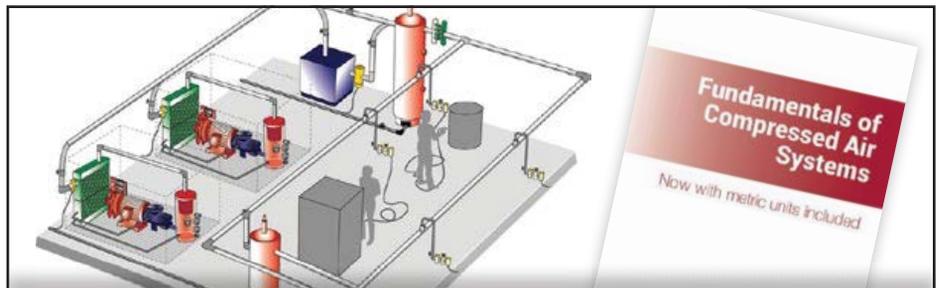
Remember, do not wait until the condenser fails to perform maintenance. To maximize the operating life of your system, preventative maintenance is key. Well-maintained equipment will maximize uptime and efficiency and help to keep your system hygienic and safe. **BP**

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Chiller & Cooling System Technology & Industry News

ASHRAE Installs 2023-24 Officers and Directors

ASHRAE is pleased to introduce its 2023-24 Society president, officers and directors.

Ginger Scoggins, P.E., Fellow ASHRAE, will serve as the 2023-24 Society president. During her inaugural presidential address, Scoggins introduced the theme for the 2023-43 Society Year, “Challenge Accepted: Tackling the Climate Crisis.” The theme explores integrated solutions to address the effects of the climate crisis through meaningful building decarbonization strategies.

“We are living in a climate emergency,” said Scoggins. “Our desire to be more comfortable has brought us to a place where we need to make uncomfortable decisions. We can accept the challenge of our day regarding the impact of our buildings on the climate crises by equipping our members with the knowledge they need to design and renovate buildings to address the greenhouse gas emissions of our industry.”

Scoggins is president and owner of Engineered Designs, Inc., a consulting engineering firm in Cary, North Carolina.

Elected officers who will serve one-year terms are as follows:

- President-Elect: Dennis Knight, P.E., BEMP, Fellow ASHRAE, Principal, Whole Building Systems, LLC., Mount Pleasant, S.C.
- Treasurer: Bill McQuade, P.E., Fellow ASHRAE, LEED AP, Vice President, Regulatory Affairs, Baltimore Aircoil Company, Jessup, Md.
- Vice President: Billy Austin, P.E., BCxP, BEAP, BEMP, CHD, HBDP, HFDP, OPMP, Member ASHRAE, Principal, Shultz Engineering Group, Charlotte, N.C.
- Vice President: Ashish Rakheja, Member ASHRAE, Director/Chief Operating Officer, Aeon, Noida, India.

In Society Year 2021-22, ASHRAE membership voted to amend Section 5.1 of the ASHRAE Bylaws so that Society Vice Presidents will serve one, two-year term instead of two consecutive one-year terms. This approved amendment was implemented on the ballot for Society Year 2023-24 candidates. The following officers will serve one, two-year term:

- Vice President: Wade H. Conlan, P.E., BCxP, Member ASHRAE, CxA, LEED AP BD+C, Principal, Hanson Professional Services, Maitland, Fla.
- Vice President: Chandra Sekhar, CPEng., Ph.D., Fellow ASHRAE, Professor, National University of Singapore, Singapore.

ASHRAE introduced its newest Directors and Regional Chairs who will serve three-year terms from 2022–25:

- Region VII Director and Regional Chair: Scott Peach, P.E., FPE, Member ASHRAE, President, SP Engineering, Mobile, Ala.
- Region VIII Director and Regional Chair: Joseph Sanders, Member ASHRAE, Mechanical Sales Engineer, R.B. Akins Company, Oklahoma City, Okla.
- Region IX Director and Regional Chair: Jonathan Smith, P.E., Member ASHRAE, CEM, LEED AP, Business Development Manager, Siemens, Lenexa, Kan.
- Region X Director and Regional Chair: Buzz Wright, P.E., Member ASHRAE, CEM, LEED AP, Mechanical Engineer, Kelly Wright and Associates PC, Tucson, Ariz.
- Region XIV Director and Regional Chair: Mahroo Eftekhari, C.Eng., CDPPhil, Member ASHRAE, SFHEA, Professor of Building Services Engineering, Loughborough University, Loughborough, England.

ASHRAE also introduced its newest Directors-at-Large (DALs):

- Doug C. Cochrane, P.Eng., Member ASHRAE, LEED AP, Independent Consultant, Mississauga, Ontario, Canada.
- Corey B. Metzger, P.E., Member ASHRAE, Principal, Resource Consulting Engineers, LLC, Ames, Iowa.
- Heather Schopplein-Anderson, P.E., Member ASHRAE, CM-LEAN, DBIA, Engineer, UMEC, Santee, Calif.

About ASHRAE

Founded in 1894, ASHRAE is a global professional society committed to serve humanity by advancing the arts and sciences of heating ventilation, air conditioning, refrigeration and their allied fields. For more information, visit www.ashrae.org.

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Modine Invests in Expanded Service Offerings for U.S. Data Center Customers

A 5MW, state-of-the-art testing laboratory was recently commissioned at the Modine Rockbridge facility in Virginia, further expanding the services that Airedale by Modine can offer data center customers and meet increasing demand from the data center industry for validated, sustainable cooling solutions.



Newly built Airedale by Modine chiller being prepared for customer delivery.

Airedale, the critical cooling specialists, is a trusted brand of Modine, a diversified global leader in innovative thermal management solutions, and provides complete cooling solutions to industries where removing heat is mission critical. Modine's Rockbridge facility opened in 2022 to manufacture chillers to meet the growing demand from U.S. data center customers.

The new lab can test a complete range of air conditioning equipment, accommodating air-cooled chillers up to 2.1MW and water-cooled chillers up to 5MW. Crucially for data center applications, the ambient temperature inside the chamber can be reduced to prove chiller free cooling performance. Free cooling is the process of using external ambient temperature to reject heat, rather than using the refrigeration process. If used within an optimized system, free cooling can help a data center significantly reduce its energy consumption and carbon footprint. The lab also can facilitate quality witness tests for customers to validate chiller performance in person.

In addition, the first U.S.-based service team has been launched, to provide ongoing support to data center customers in the field. The team offers coverage for spare parts, planned maintenance and emergency response, providing reassurance to customers when every second counts.

Demonstrating further commitment to developing the local workforce, the Rockbridge facility is working with colleges in Northern Virginia to recruit and train service engineers, either as new graduates who will receive fast-tracked training or through apprenticeships. Apprentices will have a mix of college classes and on-site training, after which they will graduate with an associate's degree in engineering.

"Our ongoing investment in our people in the U.S. and the launch of the service team and apprenticeship program – along with the opening of our 5MW chiller test center – allow us to better serve our U.S. customers and cement our continuing commitment to the U.S. data center industry," said Rob Bedard, General Manager of Modine's North America Data Center business.

These investments coincide with deliveries of the first Airedale chillers and fan walls to key customer Corscale. Twenty-eight OptiChill Free Cool chillers and 64 fan walls have so far been transported from Modine's Rockbridge and Grenada, Mississippi, facilities to Corscale's 130-acre Gainesville Crossing Data Campus in Northern Virginia, with further deliveries planned to complete the order announced last year. Once complete, the chillers will provide cooling to 8 x 9MW data halls in what is eventually planned to be a 300MW development. Corscale selected the chillers due to their market-leading free cooling performance.

"We selected Airedale by Modine because we wanted something that mirrors our dedication to deliver sustainability at scale. We wanted to work with an established brand that our customers can trust. Airedale by Modine products are renowned for their innovative approach and commitment to efficiency, which in turn reduces waste, and we were impressed by the work they have done across the world with other data centers," said Nic Bustamante, Chief Technology Officer at Corscale at the launch of the partnership.

"We are delighted to celebrate more milestones at our Rockbridge facility by seeing the first chillers leave the plant and start their life in service at Corscale's new data center," continued Rob Bedard. "The whole team turned out to see the trucks leave, and that is testament to how proud we are of what we have achieved together here."

About Modine

At Modine, we are Engineering a Cleaner, Healthier World. Building on more than 100 years of excellence in thermal management, we provide trusted systems and solutions that improve air quality and conserve natural resources. More than 11,000 employees are at work in every corner of the

globe, delivering the solutions our customers need, where they need them. Our Climate Solutions and Performance Technologies segments support our purpose by improving air quality, reducing energy and water consumption, lowering harmful emissions and enabling cleaner running vehicles and environmentally-friendly refrigerants. Modine is a global company headquartered in Racine, Wisconsin (U.S.), with operations in North America, South America, Europe and Asia. For more information, visit www.modine.com.

Crete Mechanical Expands Utilities and Plumbing Services

Crete Mechanical Group (CMG) has acquired a majority stake in Loellke Plumbing, a leading provider of plumbing services for the utilities sector across Illinois and Missouri. The partnership adds over 70 technicians and plumbers to the CMG family. Loellke Plumbing expands CMG’s presence across Illinois and Missouri, while also incorporating crucial expertise servicing utility companies across multiple states.



Crete Mechanical Group, a leading national building solutions provider, expands its utilities and plumbing services by partnering with Loellke Plumbing.

“Our partnership with the Loellke Plumbing team not only allows Crete to expand its reach in the Midwest, but it also broadens our expertise within the utilities sector. We are excited to add Loellke to the CMG family,” said Mike Cox, Chief Executive Officer at CMG.

Loellke Plumbing was established in 1992 as a mechanical contractor. The company grew by specializing in plumbing services and is a regional leader in utilities. Based out of Jerseyville, IL, the company operates across Illinois and Missouri. “We are enthusiastic about our partnership with CMG as this partnership plays a pivotal role in our next phase of regional expansion,” said David Loellke, President at Loellke Plumbing.

About Crete Mechanical Group

Crete Mechanical Group is a national provider of essential building services to commercial, industrial and government markets. Crete offers customers a high-quality, multi-service solution for HVAC, mechanical, electrical, network cabling, plumbing and automation services to support safe, energy-efficient and productive facilities. For our partners, Crete provides the resources of a large organization while maintaining the freedom to continue operating their successful businesses. Partners in the Crete network are united in delivering superior service, advanced expertise, stringent safety standards and a relentless commitment to operational excellence, innovation and integrity. For more information, visit www.cretemechanical.com.

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Tecogen Announces Sale of Chillers to Newark Penn Station

Tecogen Inc., a leading provider of clean energy products and services, is pleased to announce the sale of two STx Chillers to NJ Transit for its historic Newark Penn Station. These chillers will replace the existing Tecogen chillers that have reliably served NJ Transit for over 25 years making the decision to upgrade an easy one. The new chillers will continue to be serviced by our Piscataway, NJ service center.

The sale of the STx Chillers to NJ Transit was made possible through Tecogen's long standing manufacturer's representative, D&B Building Solutions located in Bloomfield, New Jersey. D&B Building Solutions' expertise and deep industry knowledge played a crucial role in facilitating this sale and ensuring that NJ Transit received the most suitable and efficient cooling solution based on its needs. The project is part of NJ Transit's commitment to provide a clean and comfortable world class travel experience by keeping the air temperature at a comfortable level so customers can look forward to a pleasant experience during the summer months.

"We are thrilled to continue our relationship with NJ Transit by providing cooling for Newark Penn Station," said Jeff Glick, VP of Sales at Tecogen. "The new chillers provide enhanced



A Tecogen STx Chiller installation.

energy efficiency, improved cooling capacity, and reliability, making them an ideal choice for customers looking for a high-quality and environmentally friendly cooling solution."

About Tecogen

Tecogen Inc. designs, manufactures, sells, installs, and maintains high efficiency, ultraclean, cogeneration products including combined heat and power, air conditioning systems and high-efficiency water heaters for residential, commercial, recreational and industrial use. The company's cost efficient, reliable, and environmentally friendly products for energy production nearly eliminate criteria pollutants and significantly reduce a customer's carbon footprint. In business for over 35 years, Tecogen has shipped more than 3,150 units, supported by an established network of engineering, sales and service personnel throughout North America. Aggregate run hours on Tecogen's InVerde cogeneration systems exceed 5 million hours. For more information, visit www.tecogen.com.

HTS Acquires Oslin Nation

HTS Eng. announced it has entered into an agreement with the owners of Arlington, Texas-based Oslin Nation to acquire the 80-year-old hydronics company. The strategic move enhances HTS' HVAC and Building Automation Controls offerings and strengthens the fast-growing independent manufacturers rep firm's Texas footprint with sought-after pump and plumbing capabilities. Financial details of the transaction are not disclosed.

"HTS is already entrenched in the hydronic marketplace in the province of Ontario, so the addition of the Oslin Nation family naturally fits into our Texas business and overall strategy and vision," said Mike Donovan, President of Houston-based HTS Texas. "This is an opportunity to significantly grow our business with leading suppliers of hydronic products and systems to the commercial and industrial building space."



Mike Donovan, President, HTS Texas.

Oslin Nation's 80 employees will join 255 HTS Texas employees on the payroll, though no staffing, branding or operational changes are planned.

"We weren't looking to be acquired, but we are extremely excited to join the HTS team," said Mike Barnett, co-owner of Oslin Nation, who along with co-owner Steven Lipe, will continue to run the Oslin Nation business and join as Directors on the HTS Texas board. "The HTS local leadership team has the same strong shared values and principles we prioritize to build a great work environment, great culture, and strong and loyal teams."

HTS Texas and Oslin Nation already have solid reputations as technical teams representing highly engineered and predictable systems and solutions to the Texas industrial, institutional and commercial building marketplace.

"We've contemplated this acquisition for over a year, and we believe this acquisition will catapult our presence and unique offerings within the Texas marketplace and allow Oslin Nation's employees and our main supplier partners to continue to flourish in the Texas marketplace," added HTS Texas Principal Stephen Poles, who heads the

commercial HVAC distributor's Dallas-Fort Worth operation.

With the acquisition, HTS Texas and Oslin Nation are poised to set a new standard for comprehensive HVAC, hydronics and controls offerings, full-scope project management capabilities, and client services.

"HTS Texas has a proven history of Delivering Real Success to its HVAC and Controls clients, suppliers and employees," Donovan added. "This acquisition allows us to continue to deliver an even more comprehensive bundle of equipment and controls to each project, stakeholder and client."

About HTS

HTS, the largest independent commercial HVAC distributor in North America, represents more than 100 HVAC suppliers and has approximately 1500 employees in 24 cities across Canada and the United States. HTS Texas employs 255 people with offices and service centers in Houston, Dallas, Austin and San Antonio. Delivering Real Success® to all involved in its projects, HTS provides HVAC and refrigeration solutions to commercial, institutional, and industrial markets from leading manufacturers such as Daikin, Epsilon, AcoustiFLO, and Haakon Industries. For more information visit www.hts.com.

Scott West of HFA Engineering Receives ASHRAE Distinguished Service Award

ASHRAE has saluted Scott West, Commissioning + Energy Team Lead for HFA Architecture & Engineering, with a Distinguished Service Award. The Fort Worth-based mechanical engineer received the nod at the professional society's 2023 annual conference in Tampa, along with 26 other volunteers hailing from companies and institutions such as Siemens, Trane Technologies, Johnson Controls International, Lawrence Berkeley National Laboratory, and the National Institute of Standards and Technology.

As noted by ASHRAE, the Distinguished Service Award salutes members "who have served the Society faithfully and with distinction and who have given freely of their time and talent in chapter, regional and Society activities."

West has volunteered at the local and society level for more than 12 years. He was president of ASHRAE's Fort Worth chapter, which boasts more than 300 active members, during the height of the pandemic in 2020 and 2021. The HFA engineer has been active on committees charged with developing standards for high-performance buildings/green construction as well as energy simulation-aided design, modeling, and performance measurement/verification. He also sits on technical committees related to building energy performance and smart building systems.

"I have found it greatly rewarding to promote a healthy and sustainable built environment for all by volunteering alongside my ASHRAE colleagues," said West. "I'm honored to receive this recognition, and I look forward to future collaborations that advance comfort, safety, energy-efficiency and decarbonization in the industry."

At HFA Architecture & Engineering, West (P.E., PMP, LEED AP BD+C, ASHRAE BCXP, BEAP & BEMP) serves as an energy-efficiency specialist, design lead and project manager. He brings more than 17 years of experience involving a wide array of building types and HVAC and renewable-energy systems. In addition to energy modeling, his work includes assisting convenience and other retailers with financial, regulatory, technical and engineering questions related to EV charging infrastructure.

West holds a Master of Business Administration and a Bachelor of Science in Mechanical Engineering from the University of Arkansas.



Scott West, Commissioning + Energy Team Lead, HFA Architecture & Engineering.

About HFA Architecture + Engineering

HFA is a nationwide architecture and engineering firm with offices in Bentonville, AR, Fort Worth, TX, Franklin, MA, and Mexico City. With over 30 years of experience, HFA has become a trusted partner for a diverse range of clients, providing comprehensive services that combine design innovation and project delivery excellence. The studio's portfolio includes commercial projects in retail, industrial, mixed-use/office, restaurants, hospitality and entertainment spaces. To learn more about HFA and their work, visit www.hfa-ae.com.

Johnson Controls Acquires M&M Carnot

Johnson Controls, the global leader for smart, healthy and sustainable buildings, today announced the acquisition of M&M Carnot, a leading provider of natural refrigeration solutions with ultra-low global warming potential (GWP), which can help customers meet their sustainability goals while meeting and exceeding environmental regulations.

"It's an exciting time in our industry as we continuously seek new opportunities to accelerate the deployment and adoption of safe and sustainable solutions and services," said Claude Allain, president, Johnson Controls

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HVAC/R and data centers. “M&M Carnot is well-positioned in its ability to deliver ultra-sustainable industrial refrigeration solutions and will allow us to better serve our growing customer base in this vertical.”

M&M Carnot designs and manufactures industrial refrigeration equipment and controls that use carbon dioxide (CO₂), which has a GWP of 1. By contrast, traditional refrigerants can have GWPs in the thousands, magnifying rather than solving the global warming problem.

“We’re excited to join global leader Johnson Controls to accelerate our passion for providing sustainable, natural refrigeration solutions that are safe for people and the planet,” said David Sholtis, CEO, M&M Carnot. “The support and resources of Johnson Controls will allow

us to scale the business faster by bringing our innovative, environmentally friendly refrigeration and cooling technologies to a growing market in search of energy efficient, green technology. We believe that together, we’ll bring exciting new opportunities for our customers and employees alike.”

Based in Annapolis, Maryland and in Trois Rivières, Quebec, Canada, M&M Carnot will add to the growing portfolio of Johnson Controls industrial refrigeration equipment operating on ultra-low GWP refrigerant CO₂. M&M Carnot is one of North America’s largest providers of transcritical CO₂ solutions, including heat pumps and tailored solutions for data centers, positioning Johnson Controls to capture growing demand for this technology. Their combined engineering

expertise and ultra-low-GWP technologies also will help Johnson Controls advance its commitment to cut customer emissions and support customers on their net zero journey.

About Johnson Controls

At Johnson Controls, we transform the environments where people live, work, learn and play. As the global leader in smart, healthy and sustainable buildings, our mission is to reimagine the performance of buildings to serve people, places and the planet. Building on a proud history of nearly 140 years of innovation, we deliver the blueprint of the future for industries such as healthcare, schools, data centers, airports, stadiums, manufacturing and beyond through OpenBlue, our comprehensive digital offering. For more information, visit www.johnsoncontrols.com.

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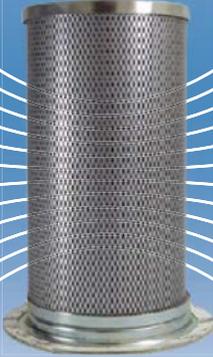
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