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April 2026

Beverage & Breweries

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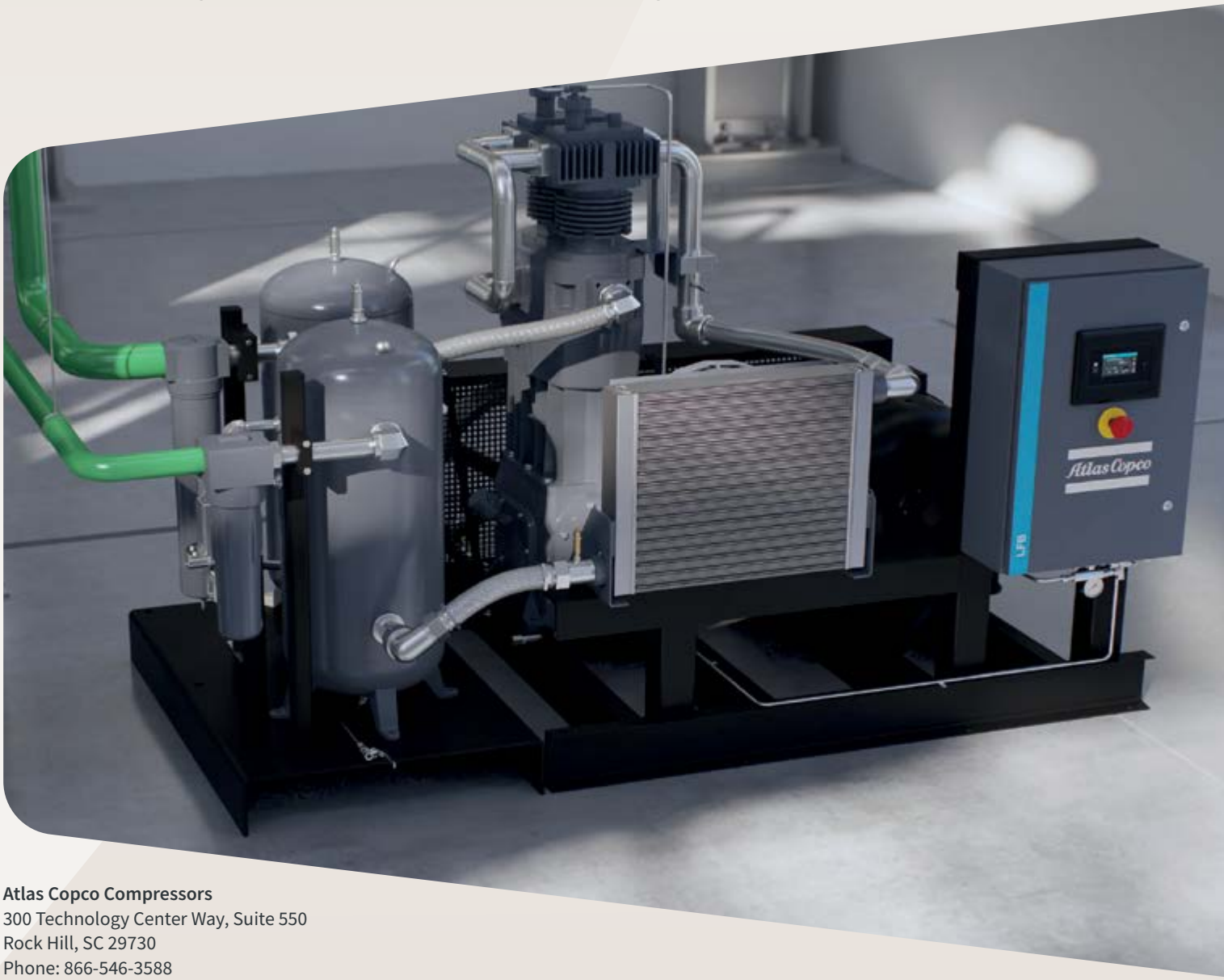

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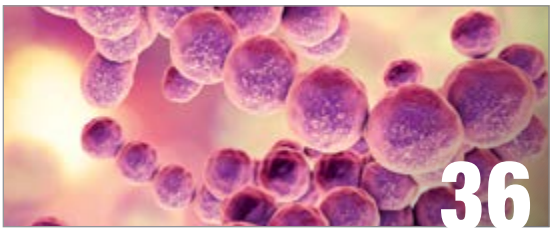
COMPRESSED AIR SYSTEM FEATURES



COOLING SYSTEM FEATURES

LATEST NEWS

EVERY ISSUE

Cover Image: Courtesy of New Belgium Brewing.

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FROM THE EDITOR

Companies Bring Nitrogen Gas Generation In-House

This month is our annual Beverage & Breweries issue, which we considered calling the Nitrogen issue. Three features explore the savings and reliable purity of in-house nitrogen generation.

The first comes from North Carolina, where Leland Brewing received the opportunity to beta test a modular nitrogen generation system. The brewery saved $200 per month on CO_2 fees, and chose to purchase the nitrogen generator under a lease-to-own model. Not many small breweries generate their own nitrogen, but a modular system brings initial purchase costs down.

Electronics corporation Morey switched from bulk nitrogen delivery to in-house generation, saving $270,000 per year. Michael Dolan, Director of Sales and Marketing, South-Tek Systems, shows how his company designed a system with two nitrogen generators delivering over 5,000 scfh of 99.999% ultra-pure nitrogen gas.

New Belgium Brewing of Oregon takes sustainability seriously, which is why it contacted G&D Chillers to engineer a chiller using a refrigerant with a near-zero global warming potential (GWP) for its CO_2 reclamation system. The result uses propane (R-290). Engineers reduced the charge level to six pounds per circuit, reducing the risk of flammability while maintaining capacity and efficiency.

Dave Henning, Sales Manager, MCE Diversified Air, explored how research and development laboratories for a plastics manufacturer and an advanced materials company transitioned to in-house nitrogen generation. The plastics manufacturer achieved a steady 16.8 cfm, 68°F (20°C) nitrogen stream, while consistently attaining nitrogen purity levels of 99.8–99.9%.

CAGI Technical Editor Chad Larrabee provided an introduction to CAGI's newly released Compressed Air Purity Guide. Developed by a subcommittee of the Air Drying and Filtration Section, the guide explains the ISO 8573-1 standard, which defines three types of contaminants and creates quality classes to specify desired purity levels of each.

Nick McCall, Senior Project Engineer, E4E Solutions, created a detailed overview of water-saving dry cooling technologies. He explains how dry coolers and evaporative cooling towers compare in water consumption, energy consumption, footprint, operating expenditure and capital expenditure, and provides equations for sizing dry coolers.

Finally, our Regional Sales Manager, Bill Smith, captured the highlights of the 2026 CTI Annual Conference in Houston, Texas.

TROY DREIER
Senior Editor
tel: 412-409-9151
troy@airbestpractices.com

SMC

Automation - Controls - Process

Tired of downtime & scrap as a result of poor compressed air quality?

Moisture is found in compressed air lines & exhausting from valves & actuators on equipment, thereby reducing component life and machine efficiency.

Tired of draining water & oil from your compressed air lines every spring , as well as cleaning or replacing pneumatic components well before their lifespan?

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The SMC Dryer Advantage

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SMC Dryers provide low energy consumption & efficient operation in sizes to work with air compressors from 1/3 to 100 horsepower (0.24kW to 75kW) & flow ranges from 10 scfm to 400 scfm.

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Subscribers From Around the World

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

Our sales team has been busy making the rounds, and again sent photos from their travels. First up is the team at Ozen Air Technology, which makes rotary screw air compressors; compressed air boosters; refrigerated, thermal mass and desiccant compressed air dryers and nitrogen generators. Pictured at the company's Charlotte, NC, headquarters are Camilo Villalobos, Vice President and General Manager; Ibrahim Özen, President; Mehmet Özen, Engineering Lead, and Tolga Küçükyilmaz, Nitrogen and Oxygen Projects Lead (left to right). Visit https://ozenairtech.com.

FNA Compressors began over 75 years ago in Italy, when three air compressor companies merged and integrated. It includes the brands Nuair, Power System, Fini, Shamal, Dari and Medicair, and has production plants around the world. Visiting the FNA America headquarters near Charlotte, NC, we met with Terry Gobble, President. Visit https://www.fnacompressors.com.

The motto for Flow Control Group is "Many companies, one team." At the company's Charlotte, NC, headquarters, we met with Mike Batchelor, General Manager, Lewis Systems, and Mike Cranford, Senior Vice President, IFC Air, Flow Control Group (left to right). With over 115 brands, FCG provides products and services for flow control and industrial automation at over 170 locations throughout North America. Visit https://flowcontrolgroup.com.

Submission Guidelines

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

Started in 1960 and based in Charlotte, NC, Engineering Sales Associates is a family-run, veteran-owned business providing compressed air and liquid filtration systems for industrial clients. It distributes Gardner Denver air compressors, compressed air dryers and nitrogen generators. We met with Brandon Pue, Solutions Manager, and Arthur Pue, President (left to right). Visit https://engineeringsales.com.

The Best Practices 2025 EXPO & Conference in Kansas City was a must-attend for manufacturers. "I'm looking to establish a strong network of some of the world's best compressed air experts, because we need some assistance writing best practices and refinery engineering practices. It all starts with first getting the right network of people," said Raymond Hooks, Utilities and Chemical Transfer Engineer, Phillips 66. Visit https://www.phillips66.com.

NEWS Compressed Air Industry & Technology

Industrial Piping Systems Opens in Phoenix, Arizona

Industrial Piping Systems, based in Phoenix, AZ, is now open and providing compressed air system design and installation services. The company follows industry best practices, and is focused on delivering optimal efficiency, air quality and flow.

The company provides compressed air system installation, including piping, air compressors, compressed air dryers, nitrogen generators and condensate management. Additionally, the company offers consultation for system design and development, as well as sales of new equipment. It provides services and installations in and beyond the greater Phoenix area.

Industrial Piping Systems partners with a variety of compressed air OEM brands. It serves a range of industries, including food and beverage, manufacturing, CNC machining and automotive.

Brenden Roscoe, Owner, Industrial Piping Systems

The company's owner, Brenden Roscoe, is a pipefitter by trade and hails from a piping family – his father is a master plumber and his mother a piping salesperson. Roscoe began his career almost 20 years ago with a five-year program at a union-credited trade school through the Associated Builders and Contractors in San Diego, CA. He's held a variety of roles across different companies, starting in the service and installation side of the industry, and later transitioning into project management, system design and equipment sales.

"At Industrial Piping Systems, we have a focus on creating long-standing relationships with people, our clients. We provide our experience, with solutions and dedication to keep operations running efficiently for all," said Roscoe. For more information, visit https://ipipesystems.com.

Tri-State Air Compressor Expands Ohio Headquarters

Tri-State Air Compressor completed an expansion at its New Middletown, OH, headquarters. The approximately 10,000-square-foot facility features three buildings and a fabrication shop. This step allows the company to offer a more robust range of services for its customers, including customized solutions. The fabrication shop will support its development of containerized compressed air system packages.

As it developed the new property, Tri-State Air Compressor has spent a lot of time and resources creating a rental fleet from 5 to 200 horsepower (hp) air compressors with associated accessories, as well as a diesel line from 185 to 1,600 hp units.

Tri-State Air Compressor provides industrial compressed air systems, air compressor parts, compressed air system audits and repair and maintenance services to Central and Northeast Ohio, as well as Northern West Virginia and Western Pennsylvania. It's an authorized distributor of Sullivan-Palatek and Great Lakes Air, and services air compressor parts from other major brands.

Greg DeBucci, Owner, Tri-State Air Compressor

"At Tri-State Air Compressor, compressed air is our passion. Our experienced technicians are available 24 hours a day to ensure your equipment is performing at its best," said Greg DeBucci, Owner, Tri-State Air Compressor. "This facility expansion and new fabrication shop will allow us to better meet our customers' needs and offer a full range of services, helping us compete with larger operations." For more information, visit https://tristateaircompressor.com.

Trident Pneumatics Launches in North America Under New Ownership

Trident Pneumatics was acquired by Air & Gas Solutions, joining nano-purification solutions under its management. Since the transition, the company has completed operational upgrades and is expanding its operations and offerings in North America.

Trident Pneumatics designs and produces high-quality compressed air and gas treatment products, including water separators, compressed air filters, refrigerated compressed air dryers, heatless compressed air dryers, oil-water separators and condensate drains. Compressed air dryer product lines include Dryspell modular desiccant dryers, TH series twin tower desiccant dryers, TC series non-cycling refrigerated dryers and THT Series high-temperature refrigerated dryers.

Trident Pneumatics' Dryspell modular desiccant dryer

Founded in India in 1988, Trident Pneumatics provides essential solutions for air purification and gas generation in over 25 countries across the globe. The company's core belief is that reliable air treatment should be simple, accessible and built on integrity. Its products are crafted with simplicity at their core, offering clear choices while providing essential functionality and reliable performance.

"The acquisition of Trident Pneumatics allows us to expand our network and reach in the North American market, providing high-quality solutions that support multiple distributor levels," said Ryan Dorant, Business Line Manager North America, Air & Gas Solutions. "No matter a distributor's needs – whether they specialize in fully engineered breathing air and gas generation or fluid, motion and controls – we have products to support their applications and deliver reliable performance across the board." For more information, visit https://www.tridentpneumatics.com/us.

Tsunami Introduces High Temperature Regenerative Dryer for Mobile Compressed Air Applications

Tsunami Compressed Air Solutions launched its High Temperature Regenerative Dryer, a complete drying system designed to address humidity challenges in mobile compressed air applications where high ambient temperatures and confined equipment spaces are common.

The High Temperature Regenerative Dryer combines a wall-mounted aftercooler with Tsunami's Pure 5, Pure 7 or Pure 10 regenerative desiccant dryers to create a single, integrated solution. The system is engineered to handle compressed air inlet temperatures up to 300°F (149°C), pre-treating hot air before final drying to improve system reliability and performance. The maximum flow rate is 15, 25 or 40 cfm and the maximum inlet pressure is 175 psi (12 bar).

Tsunami Compressed Air Solutions' High Temperature Regenerative Dryer

In mobile environments such as spray foam rigs, mobile coating systems and refinishing trailers, air compressors frequently operate in confined spaces, causing compressed air temperatures to rise well above normal operating conditions. Combined with high ambient temperatures inside trailers and service vehicles, these conditions often overwhelm traditional drying technologies. By cooling compressed air first and removing bulk moisture upstream, the High Temperature Regenerative Dryer allows the desiccant dryer to operate more effectively while reducing moisture-related issues downstream.

"Merging two simple technologies into a complete package is extremely beneficial for the consumer," said Troy Robins, Product Manager, Tsunami Compressed Air Solutions. "Too often, customers are expected to know how to maximize their compressed air system. At Tsunami, we believe it's our responsibility to do our part to get them there."

Key features of the High Temperature Regenerative Dryer include a wall-mounted aftercooler with less than 1 psi (.07 bar) pressure drop, multiple drying capacity options to match system airflow requirements and a compact footprint designed to conserve space in mobile installations. The system is designed for easy installation and low maintenance, helping reduce downtime and operating costs. For more information, visit https://www.gosuburban.com/tsunami/compressed-air-solutions.

NEWS Compressed Air Industry & Technology

Atlas Copco Group to Acquire Brazilian Air Compressor Distributor Centroar

Centro do Ar Comprimido do Recife (Centroar), an air compressor distributor in Brazil, will become part of Atlas Copco Group.

Centroar is located in Recife, Pernambuco, and provides sales and services of air compressors and power equipment. The company has customers in general industry, mining, pulp and paper, construction and infrastructure. Centroar has 28 employees who will join Atlas Copco Group as part of the acquisition.

"With this acquisition, we enhance our market presence and strengthen our direct relations with end customers in the Northeast region of Brazil," said Philippe Ernens, Business Area President Compressor Technique.

Centroar will become part of the service division within the Compressor Technique Business Area. For more information, visit https://www.atlascopcogroup.com.

Tim Wasmer, CEO, Wasmer, speaking at the Best Practices 2025 EXPO & Conference.

Best Practices 2026 EXPO & Conference in Indianapolis Announces Call for Industry Expert Speakers

The Best Practices 2026 EXPO & Conference is seeking practical, real-world presentations on compressed air, nitrogen, blower, vacuum and HVAC/process cooling systems that help industrial teams improve performance and efficiency. The event takes place at the Indiana Convention Center in Indianapolis, Oct. 13-15.

Suggested topics include:

- Maintenance and predictive strategies
- System auditing, data and monitoring
- Piping, layouts and system design
- Heat recovery and cooling strategies for decarbonization
- Energy and water efficiency strategies
- Compressed air quality and nitrogen system applications
- Case studies and field examples

Presentations must be educational in nature and may not promote or sell specific products or services. To apply, submit an abstract with the presentation title, a short description and a professional bio. Abstracts must be submitted by May 29 for consideration.

The 2025 event featured speakers from Pactiv Evergreen, 3M, St. Jude Children's Research Hospital, Wasmer and ALPLA North America.

Speakers participating in the conference program will receive a complimentary full-conference pass (valued at $675).

For more information, visit https://cabpexpo.com/us/conference/speaker-submission. For questions, reach out to Brooke Jones at brooke@airbestpractices.com.

Tavoron Adds Senior Vice President of Compressed Air Leadership Role, Appoints Trey Donze

Trey Donze, Senior Vice President of Compressed Air, Tavoron

Tavoron appointed Trey Donze as Senior Vice President of Compressed Air. He will report directly to Nicholas Martino, CEO, Tavoron.

In this newly established leadership role, Donze oversees all aspects of Tavoron's compressed air business operations. His responsibilities include driving growth across the segment, optimizing operational performance and ensuring strategic alignment among Tavoron's compressed air divisions. Donze will also work closely with division presidents and the executive team to enhance shared capabilities, scale best practices and strengthen the company's leadership position in the compressed air industry.

Donze joins Tavoron with more than 20 years of progressive leadership experience in the industrial equipment and compressed air industry. Most recently, he served as Vice President of Sales and Operations at Airmatic Compressor Systems, where he led growth initiatives across multiple states, managed key integrations and expanded service offerings. Prior to that, he held several senior roles at OTC Industrial Technologies, including Director of Sales – Air Supply Group and District Manager, where he successfully advanced regional performance and profitability.

A Qualified Air Master+ Specialist with certifications in Lean Six Sigma Foundations and Vistage Leadership Development, Donze has been recognized with multiple industry awards for sales excellence and operational achievement.

"Trey brings extensive industry knowledge and proven leadership in the compressed air sector," said Martino. "His experience leading multi-state operations, integrating acquisitions and developing high-performing teams will be instrumental as we continue to expand our capabilities and deliver exceptional value to our customers."

Donze's appointment represents a key step in Tavoron's continued investment in leadership, operational excellence and scalable growth across its core business segments. For more information, visit https://tavoron.com.

Michael Zacharko Joins Van Air Systems as Strategic Business Development Manager

Van Air Systems appointed Michael J. Zacharko as the Strategic Business Development Manager. With more than 20 years of experience in the compressed air industry, as well as experience managing growth and customer satisfaction, the company is confident Zacharko will be an asset to its team. He's part of Van Air Systems' succession plan for future retirements and, in a few years, Zacharko will adopt the role of Regional Manager.

In his most recent role, Zacharko successfully developed and implemented training programs for a distribution network to help his company meet its condensate management sales objectives. He expanded the OEM client base and introduced new go-to-market strategies driving strong year-over-year sales growth. This reinforces his focus on excellence and partner development. Zacharko did this by focusing his attention on the needs of his customer base. His secret was to educate his customers and help them grow their sales.

Michael J. Zacharko, Strategic Business Development Manager, Van Air Systems

At Van Air Systems, Zacharko will work with existing OEM accounts to strengthen those relationships and help them grow. He will also look for new OEMs that could benefit from adding filters and deliquescent drying equipment to their product offerings.

Zacharko's personality and customer-centric mindset fall perfectly in line with Van Air's own ideology, and the company is excited to see what the future will hold by bringing him onto the team. For more information, visit https://www.vanairsystems.com.

NEWS Chiller & Cooling Industry & Technology

Mokon Expands Western U.S. Sales Network with Pro West Machinery Partnership

Mokon announced Pro West Machinery as its new representative agency serving Southern California and Clark County, Nevada.

Pro West Machinery, founded in 2020, has rapidly grown to meet the diverse needs of manufacturers. Led by Lorenzo and Cris Bodica, and backed by more than 20 years of plastics industry expertise, the Pro West Machinery team understands the unique challenges of modern manufacturing. The company delivers end-to-end services – from procurement to installation – partnering with world-class manufacturers of plastic forming, recycling, metal-cutting machinery and auxiliary equipment.

Pro West Machinery provides specialized solutions in plastics material processing, handling and automation, industrial process cooling and heating systems, plastics recycling machinery and total waste solutions and material handling solutions for all industries.

The company works closely with top global equipment manufacturers to ensure access to cutting-edge technology and reliable machinery. The Pro West Machinery mission is simple: to help clients boost productivity, minimize waste and optimize efficiency – ultimately saving time and money. For more information, visit https://www.mokon.com.

Johnson Controls Announces YORK YK-HT High-density, Two-Stage Economized Centrifugal Chiller

Johnson Controls announced the high-density, compact YORK YK-HT two-stage economized centrifugal chiller. Engineered for large industrial, pharmaceutical and healthcare campuses, the YK-HT delivers a wide operating range from a single driveline, operating with condenser leaving fluid temperatures up to 165°F (75°C) and up to 110°F (43°C) of lift. The product will be available for sale beginning fall 2026.

The extended operating range supports efficient closed-loop heat rejection with dry coolers and enables heat-pump and heat-recovery applications. By reusing thermal energy that would otherwise be wasted, these systems can offset more than 35 MMBtu per hour, while lowering carbon emissions and reducing energy costs.

Beyond advanced heat-rejection performance, the YK-HT delivers expanded functionality in a single, packaged unit. As a unified heating and cooling platform for large buildings, it can produce 44°F (7°C) chilled water and 140°F (60°C) hot water at the same time, a normal operating condition for heat pumps, while delivering efficiency levels that exceed ASHRAE requirements. This unified feature eliminates the need for cascaded systems, extra electrical infrastructure or major mechanical room redesigns.

Johnson Controls' YORK YK-HT two-stage economized centrifugal chiller

Other efficiency and performance features include an integrated lubrication system and dual variable geometry diffuser control, flash tank economizer, optional variable speed drives and BESS compatibility. The YK-HT chillers use low-GWP refrigerants R-1234ze and R-515B, and are factory-equipped with Smart Ready connectivity for seamless integration.

"The YK-HT expands what is possible by enabling high-temperature operation in a compact and efficient platform, helping customers move beyond traditional water-intensive heat rejection and unlock new opportunities for efficient electrified heating. With its expanded operating range, mission-critical facilities can scale with confidence while advancing sustainability, performance and long-term operating efficiency," said Aaron Lewis, Vice President and General Manager, Applied Equipment, Johnson Controls. For more information, visit https://www.johnsoncontrols.com.

Carrier Introduces Next-Generation Chiller and Heat Pump: AquaForce® 23XW and 23XQ

Carrier introduced the latest additions to its line of water-cooled rotary screw chillers and water-sourced heat pumps, the AquaForce® 23XW and 23XQ.

The 23XW chiller is optimized for cooling applications, with nominal capacities ranging from 75 to 200 tons (264 to 703 kW), while the 23XQ heat pump delivers heating capacities between 960 and 2,900 MBH (281 and 850 kW). They are designed to meet the evolving demands of modern buildings, with a focus on energy efficiency. The 23XQ also provides 140°F (60°C) heating capability in support of decarbonization efforts.

The 23XW and 23XQ were designed for ultra-low GWP PUREtec™ R-1234ze(E) or A-1 rated R-515B refrigerants and a refrigerant economizer for enhanced efficiency.

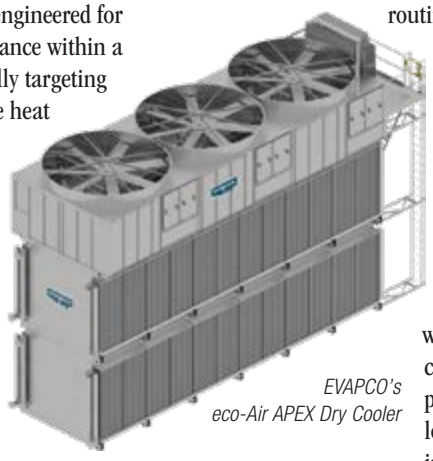
Both feature robust designs with next-generation rotary screw refrigerant compressors optimized for part-load performance and liquid motor cooling for a wide operating envelope. A Greenspeed® intelligence VFD enables enhanced performance at off-design conditions.

The 23XW/XQ has the ability to react to changes in the system at a rate of 70% per minute. This allows more flexibility within the system and can also result in a smaller loop volume requirement.

"With the launch of the 23XW and 23XQ, Carrier continues to lead the way in delivering high-performance, sustainable HVAC solutions that meet customer needs for their buildings today and their sustainability goals for tomorrow," said Tom Franaszek, Director, Product Management, Carrier. For more information, visit https://www.carrier.com.

EVAPCO's eco-Air APEX Dry Cooler Offers 100% Water-free Cooling with High-density, CTI-certified Performance

EVAPCO introduced the eco-Air APEX Dry Cooler, the newest evolution in its eco-Air Series, designed for large-scale, mission-critical heat rejection with zero water consumption. This innovative solution is engineered for maximum thermal performance within a compact footprint, specifically targeting applications requiring dense heat rejection coupled with simplified installation and commissioning. The eco-Air APEX balances the need for high-density heat rejection on water-constrained projects with urgent deployment timelines.



EVAPCO's eco-Air APEX Dry Cooler

All units are CTI-certified to Standard STD-201, backed by EVAPCO's exclusive 100% thermal performance guarantee. They are constructed with high-grade Type 304L stainless steel tubing and heavy-gauge aluminum fins as standard components, and coils are built in-house for quality assurance. The units ship in three segments with factory-mounted controls and service platforms. They feature a single-point PLC/VFD control panel factory-wired for plug-and-play benefits and expedited commissioning. The eco-Air APEX requires zero water-related maintenance or water treatment, and is designed with oversized access doors and standard platforms for routine maintenance.

The eco-Air APEX is available for immediate specification and ordering through authorized EVAPCO representatives.

"The demand for water and space-efficient cooling in large-scale projects with dense heat loads, commonly seen in the mission-critical sector, continues to accelerate," said Mihir Kalyani, Data Center Business Unit Manager, EVAPCO. "The eco-Air APEX represents our commitment to anticipating and solving for future market needs with continued innovation, and providing customers with a robust, high-capacity, CTI-certified dry-cooling system that delivers mission-critical performance with minimal maintenance." For more information, visit https://www.evapco.com.

Gary Guo Joins Trane Technologies as Chief Integrated Supply Chain Officer

Trane Technologies appointed Gary Guo as Chief Integrated Supply Chain Officer. Guo reports to Chair and CEO Dave Regnery as part of the executive leadership team and oversees Trane Technologies' global integrated supply chain, including manufacturing, procurement, logistics, environmental health and safety, advanced manufacturing technology and operational excellence.

Gary Guo, Chief Integrated Supply Chain Officer, Trane Technologies

Guo is a distinguished professional with a proven track record of driving operational improvement, digital advancements and strategic impact across multiple Fortune 500 organizations. He joins Trane Technologies from The Coca-Cola Company, where he served as President of Global Supply Chain, leading the company's worldwide supply chain strategies, including a network of more than 200 bottling partners and 900 manufacturing sites. Prior to his tenure at Coca-Cola, Guo held global supply chain and operations leadership roles at 3M, Amazon and Alibaba.

Guo holds a Lean Six Sigma Master Black Belt. He succeeds Ray Pittard, who retired from Trane Technologies after 36 years of dedicated service.

"We are excited to welcome Gary as our new Chief Integrated Supply Chain Officer," said Regnery. "Gary is a highly accomplished supply chain leader with deep expertise in manufacturing, logistics and global operations. His talents and leadership will strengthen our world-class lean organization, uphold our commitment to quality and safety and keep our customers at the heart of all we do." For more information, visit https://www.tranetechnologies.com.

NEWS Chiller & Cooling Industry & Technology

Daikin Applied Announces the Magnitude® WME-C Quad Chiller, Pathfinder® AWV-C Fan Deck and AWM Chiller

Daikin Applied introduced new solutions engineered to provide energy efficiency, ensure reliability and advance sustainability across mission-critical applications.

The Magnitude® WME-C Quad Chiller features magnetic-bearing technology and an industry-leading capacity range of 2,000 to 3,000 tons. This chiller is designed for high-density, always-on environments. It incorporates ultra-low global warming potential (GWP) refrigerants and advanced recovery technologies, including RapidRestore® and RideThrough®, which help ensure seamless operation during power disruptions.

Daikin Applied's Magnitude® WME-C Quad Chiller

The Pathfinder® AWV-C Fan Deck features low-GWP R-515B refrigerant and a compressor-integrated variable frequency drive for strong high-ambient performance, supported by an enhanced 28-fan deck for greater cooling capacity and optimized airflow.

The AWM Chiller delivers premium efficiency in a fully-packaged, air-cooled chiller engineered with oil-free, magnetic-bearing refrigerant compressors. Its advanced compressor design, paired with next-generation fan technology, provides high-performance cooling even in extreme conditions, operating in environments up to 131°F (55°C).

These innovations build on Daikin Applied's $163 million investment in a state-of-the-art R&D test lab at its Plymouth, MN, headquarters. The facility is designed to accelerate the development of advanced cooling technologies and next-generation airside solutions. Together, with strategic acquisitions in liquid cooling and custom air-handling, Daikin Applied is positioned to help solve the industry's toughest cooling challenges and meet the evolving demands of AI-driven operations.

"Cooling demands are growing increasingly complex," said Yu Nishiwaki, Chief Operating Officer, Daikin Applied. "Operators need solutions that deliver reliability, scalability and efficiency without compromise. These launches reflect our commitment to equipping customers with technologies that perform under the most demanding conditions, both now and as workloads evolve in the future."

The WME-C Quad Chiller and AWV-C are available to customers now, with the AWM Chiller following in early 2026. For more information, visit https://www.daikinapplied.com.

A Tower Tech StormStrong 100-ton cooling tower installed at a school

Tower Tech Coils and Fill Media Now Use XchangeTech™ Technology

Tower Tech announced all cooling tower models will now incorporate proprietary XchangeTech™ technology. This lightweight, corrosion-resistant design maximizes service life and prioritizes maintenance worker safety. XchangeTech fill media is standard in all Tower Tech modular cooling towers. XchangeTech polymer coils are standard in all closed-circuit towers.

XchangeTech materials are significantly lighter than stainless steel, a common material for industrial-grade cooling tower fill media and coils. Stainless steel weighs approximately one pound per 3.5 cubic inches; it takes nearly 20 cubic inches to equal a pound of most polymers. XchangeTech's lighter weight makes it safer for installers and maintenance professionals to handle. It also eliminates the need for cranes and other heavy machinery for replacements. The lighter parts' weight can also minimize or eliminate total tower replacements, common when extremely heavy metal parts corrode.

Polymer XchangeTech coils deliver the same weight benefits to closed-loop towers. The coils have similar heat transfer capabilities to metal at a fraction of the weight. They have a low internal pressure drop and do not corrode when exposed to the water, glycols, brine, chlorides and other chemicals that may be present inside the cooling tower.

"XchangeTech helps continue Tower Tech's mission to never take convention as a given," said Mathu Solo, President, Tower Tech. "We were founded on the belief towers could be both sustainable and efficient and could be safer to maintain. XchangeTech is the next evolution of this process."

XchangeTech fill media is also compatible with legacy Tower Tech towers. For more information, visit https://towertechusa.com.

BEST PRACTICES

2026 EXPO OCTOBER 13-15 INDIANAPOLIS, IN

COMPRESSED AIR / VACUUM / COOLING

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

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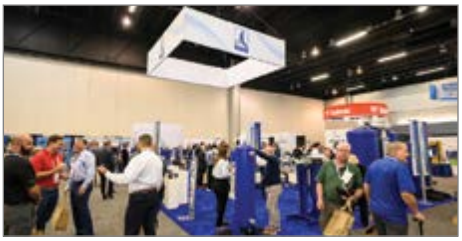

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NEWS Industrial Energy & Water Conservation

Gildan Maintains A- CDP Score, Marking Sixth Leadership Recognition for Climate Disclosure

Staying true to its vision of Making Apparel Better®, Gildan has been included in CDP's Leadership level for the sixth time, reflecting the company's environmental and climate data performance. Additionally, HanesBrands, recently acquired by Gildan, has been placed on CDP's A List.*

Gildan received a score of A- for its climate change disclosures and was specifically recognized for its performance on Scope 3 emissions, emissions reduction initiatives, risk and opportunity disclosures and processes and governance.

Gildan knitting operations in Honduras

CDP is a global non-profit that runs the world's only independent environmental disclosure system, which partners with leaders in enterprise, capital, policy and science. Over 24,800 companies around the world disclosed data through CDP. Aligned with the ISSB's climate standard, IFRS S2, as its foundational baseline, CDP integrates best practice reporting standards and frameworks in one place.

"I am proud of our continued progress on climate transparency," said Claudia Sandoval, Vice President of Global Social Compliance and Environmental Affairs, Gildan. "This recognition from CDP is a testament to Gildan's longstanding commitment to operating with respect for the environment and its continuous efforts to embed ESG across the supply chain. With the ongoing integration of HanesBrands, we are confident the environmental expertise of the two entities will allow us to scale our sustainability efforts to even newer heights."

*Gildan's 2025 CDP score reflects its ESG efforts prior to its acquisition of HanesBrands in December 2025. HanesBrands was also recognized by CDP for its environmental data, receiving a score of A.

Universal Corporation Publishes FY2025 Sustainability Report

Universal Corporation, a global business-to-business agriproducts company, released its 2025 sustainability report.

During fiscal year 2025, Universal achieved significant progress toward its sustainability goals. The company increased renewable electricity consumption by nearly sixfold, with 17.8% of global electricity sourced from renewables, advancing toward net-zero emissions by 2050. It reduced combined Scope 1 and 2 greenhouse gas emissions by 7.7% year-over-year, and secured Science Based Targets initiative (SBTi) approval for near-term, long-term and net-zero targets.

"Building on decades of commitment, sustainability remains central to Universal's strategy and long-term success," said Preston D. Wigner, Chairman, President and CEO, Universal Corporation. "By integrating sustainability into our global business, we are better positioned to serve customers, support farmers, strengthen our supply chain and protect the environment."

Universal's 2025 sustainability report details the company's performance from April 1, 2024, to March 31, 2025, and was prepared in alignment with the Global Reporting Initiative and Sustainability Accounting Standards Board, with consideration of the EU CSRD and guidance from the United Nations Sustainable Development Goals. For more information, visit https://www.universalcorp.com.

KONE Corporation Recognized as a Sustainability Leader with CDP Climate Change A-List Position

KONE Corporation, a global leader in the elevator and escalator industry, was recognized for leadership in corporate transparency and climate change performance, securing a place on CDP's annual A List. KONE is among a small group of companies to earn an A rating, out of more than 22,000 companies assessed. KONE has disclosed through CDP since 2009, and has achieved a CDP leadership score of A or A- for the 13th consecutive year.

"This recognition reflects our systematic efforts to integrate sustainability into everything we do – from our products and services to our operations and partnerships. In 2025, the share of regenerative drives in KONE elevators increased significantly, improving product energy efficiency and reducing both KONE's and its customers' carbon emissions. Collaboration across the value chain plays a key role in mitigating climate change. We are actively collaborating with suppliers to identify opportunities to reduce emissions from the materials used in our products," said Kirsi Simola-Laaksonen, Senior Vice President, Sustainability & Environment, KONE.

At the heart of KONE's strategy lies sustainability and innovation. For KONE, leading its industry also means leading in sustainability. As an industry pioneer, KONE was one of the first to set ambitious, science-based climate targets for 2030 and is on track to achieve these targets.

KONE reports to selected third-party sustainability rating providers to get independent assessments on its sustainability performance. For more information, visit https://www.kone.com.

KONE's I series

Toshiba Corporation Named in CDP's Climate Change A List for the Second Consecutive Year

Toshiba's headquarters in Kawasaki, Japan

Toshiba Corporation, a major Japanese multinational conglomerate known for its diverse technology, from energy and infrastructure solutions to electronic devices and IT solutions, was recognized as a Climate Change A List company by CDP, a globally influential non-profit organization driving environmental disclosure. This marks the second consecutive year Toshiba has received the highest score in the climate change category.

Toshiba Group identifies "Response to Climate Change" as a material issue and is accelerating initiatives to help realize a carbon-neutral society. The group aims to achieve carbon neutrality at its offices and factories by FY2030, and throughout its entire value chain by FY2050. These targets were approved in 2024 as net-zero targets by the Science Based Targets initiative (SBTi), an international body that validates science-based emissions reduction targets.

In working to meet these goals, Toshiba Group is investing in energy-saving equipment and expanding the use of renewable energy across its sites. The group also provides products, technologies and services helping reduce greenhouse gas (GHG) emissions throughout society. In addition, Toshiba Group is strengthening engagement with suppliers to reduce upstream GHG emissions across the value chain. Selection for the 2025 A List reflects CDP's strong positive evaluation of these comprehensive initiatives.

Carbon neutrality at Toshiba Group sites includes the purchase of carbon credits for hard-to-abate emissions such as process gases. Excluding carbon credits, the group targets a 70% emissions reduction by FY2030, against FY2019 levels. Net-zero targets require a 90% reduction of gross emissions by 2050 in line with a 2.7°F (1.5°C) pathway, with any remaining emissions removed from the atmosphere and permanently stored. For more information, visit https://toshiba.com.

McCain Foods Releases 2025 Global Sustainability Report

McCain Foods, one of the world's largest manufacturers of frozen potato products and a global leader in prepared appetizers and snacks, published its 2025 global sustainability report, sharing progress toward its sustainability commitments with the completion of a key pledge and outlining refreshed sustainability targets to 2030.

McCain continues to deepen its focus on climate resilience, resource-efficient operations and community impact. With the culmination of a subset of targets set for 2025; the report outlines strengthened 2030 commitments reinforcing the company's future-focused ambitions. This includes updated SBTi (Science Based Targets initiative) targets, which align with the latest climate science.

The report highlights a 28% absolute reduction in Scope 1 and Scope 2 emissions since 2017, and states 60% of total electrical energy consumption was from renewable electricity.

"We are pleased with our progress, with nearly 70% of our global acreage onboarded to McCain's Regenerative Agriculture Framework, reducing our absolute Scope 1 and Scope 2 emissions by 28% since 2017 and supporting over 18,000 vulnerable farmers and families through community development programs since 2018," said Charlie Angelakos, Vice President, External Affairs and Sustainability, McCain Foods. "As we look to 2030 and beyond, we recognize the years ahead will bring challenges and the journey will not be easy. We must build on our lessons learned as well as deep partnership and collaboration with our partners across the value chain to ensure we deliver sustainable progress and create a resilient business." For more information, visit https://www.mccain.com.

Leland Brewing Adopts Modular Nitrogen Generation

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

Leland Brewing is based in Leland, NC, just outside Wilmington. It offers 10 beers year-round, as well as seasonal specials and draft-only options. The brewery specializes in what it calls approachable beer, meaning traditional styles using quality ingredients. Production is 60 barrels per week in the winter and twice that in the summer tourist season.

The brewery began three years ago, and has expanded from self-distribution with one driver to 20 drivers and 15 sales representatives. It's distributed in the Wilmington and Raleigh-Durham areas, but will soon expand to Charlotte. Besides the brewing area, its headquarters include a taproom and a full-service kitchen.

Brian Quade has been Head Brewer since the brewery opened. He appreciates the support his company has gotten from the community, as establishing a new brewery can be challenging. One unexpected bit of support came from a nitrogen gas generator manufacturer that just happened to be in the neighborhood.

Rotary Screw Air Compressor Powers Pneumatic Processes

The brewery uses compressed air and nitrogen gas in multiple ways. Compressed air powers its canning line, grain hopper and keg washer, and feeds into its nitrogen generator. Compressed air is supplied by an oil-injected, air-cooled, rotary screw air compressor, which is located outside the brewery under an awning. Backyard Enterprises, based in Spindale, NC, is the brewery's compressed air distributor, but the brewery handles maintenance. The only problem Quade has with the air compressor is occasional overheating on summer days when the temperature reaches 100°F (38°C). When that happens, he powers it down for 10 to 15 minutes, then starts it up again.

"We thought about putting some sort of fan next to it," Quade said. "We looked at putting it inside the brewery, but it's hotter inside the brewery than it is outside. We come in at 5:00 AM in the summertime to try and beat the heat."

The air compressor feeds into a non-cycling refrigerated compressed air dryer, then a dry storage tank. The brewery's air compressor outputs at 60 psi, but a regulator on the compressed air storage tank lowers that to 25 psi. The brewery's tanks are rated for 15 psi, so it tries not to go much above that. While the ambient air is humid in Leland, the brewery hasn't had any problem with moisture getting into the pneumatics. The brewery uses ¾-inch semi-flexible compressed air tubing.

The brewery's oil-injected, air-cooled, rotary screw air compressor is located outside under an awning. Compressed air feeds into a noncycling refrigerated compressed air dryer, then a dry storage tank.

Above: Leland Brewing in Leland, NC

An Opportunity to Beta Test a Modular Nitrogen Generator

Until recently, Leland Brewing used carbon dioxide (CO_2) for all operations where beer needed to be kept away from oxygen to maintain freshness, as well as for carbonating the beer. But the brewery is located near the North Wilmington, NC, headquarters of South-Tek Systems, and that led to an opportunity with a product the company was developing.

"A couple of their sales reps would come in here and do some work and get a couple beers. We ended up forming a good relationship with them, from them hanging out at the brewery, and they'd come back and look at what we were doing in the brewing area," Quade said. "One day, they approached us and said, 'We're looking for someone to beta test a new unit for the next three months. It'd be no cost to you. If you like it, we'll give you a good deal on it. If you don't like it, we'll put it back on our truck and take it back with us.'"

The beta test was for South-Tek's N_2GEN-FLEX system, and the test began in September 2024. As the company's first multi-bed, modular, nitrogen gas generation system, it was designed as a cost-effective offering for smaller companies.

'When we launched this product, we knew that it was going to be popular in brewing, food processing and electronics manufacturing," said Mike Dolan, Director of Sales and Marketing, South-Tek Systems. "Being based in Wilmington, North Carolina, we had a relationship with the contact. We offered to place the system in for a 90-day test that allowed Brian to test our concept, test the application and see if it could work. It allowed us to look at service intervals, preventative maintenance and what we would need to do to support systems like this in the field. As part of the beta test, they had the option to either decline or purchase the system, which they did."

"South-Tek showed us how to adjust the user interface," Quade said. "When we used it for the first time, the company came in and made sure it worked as it should and kept the purity up. They come out every six months to swap out our HEPA filters and do any sort of maintenance. It's nice with them being right there. They train new service techs on the units." Maintenance is included in the lease.

The brewery was able to beta test a new modular nitrogen generation system while it was still in development.

Leland Brewing Adopts Modular Nitrogen Generation

Experimenting with Nitrogen Gas Purity

The brewery first set the nitrogen generator for 99.999% purity. A screen on the front shows the nitrogen purity produced. If the purity level drops, the generator stops output until it reaches the desired purity again. Experimenting with the output, the brewery dropped the purity level to 99.99%, where the generator was better able to match demand, and didn't experience any problems due to the oxygen content.

"Five nines was the highest it would let us go," Quade said. "When we first used the nitrogen generator, we wanted to make sure we were getting the purest nitrogen, but then we realized four nines is still a higher purity of nitrogen than it is of CO_2 coming in from our bulk tank, and it was able to keep up a lot better. We had a little bit of an issue with some of our bigger tanks when we moved beer from one of our 40-barrel tanks to one of our brite tanks. It wasn't able to keep up quite as fast. When we switched to four nines, we didn't see any pickup in oxygen, but a much higher flow rate."

The brewery's canning line is powered by compressed air.

Quade might experiment with three-nines purity in the future, but only if the nitrogen generator isn't able to meet the brewery's demand.

Nitrogen Starter Tips for Breweries

"The biggest challenge is figuring out the right size you need," Quade said. "We began this beta test with South-Tek Systems, and neither of us really knew what size unit we needed to keep up and have a little bit of room for growth. We didn't want to oversize the system and pay too much money or undersize it and not be able to use it as much as necessary.

"Rather than looking at the size of the brewhouse, look at the size of the tanks you're going to be pushing nitrogen into. We're a 15-barrel brewhouse with 15 and 30-barrel tanks. Other brewers I worked with had 60-barrel tanks. Those are four times the size of our smallest and twice as large as our biggest. They would probably need to add a couple more beds on the back of their nitrogen generation system.

"Train your staff to use it. Sometimes they forget because a lot of breweries have worked with CO_2 and CO_2 regulators, and disconnects are right by the tank. It's easy to forget and plug in the CO_2 instead of the nitrogen.

"Finally, experiment with it. The process is the same with nitrogen as it is for CO_2, but we're just substituting one gas for another gas. I've had some people say, 'We're going to purge our cans with it.' You can purge your cans with it if you've got a certain type of filler, which would be a counterpressure filler. Then, your can is sealed onto the fill head as you're purging and as you fill up with beer. Ours is open to the atmosphere, so we don't use nitrogen for purging our cans because we want a blanket of CO_2 to protect from the oxygen. I've heard some people say, 'We're going to use it on our canning line.' I warn them to check all the oxygen levels because they're probably going to be a little bit higher with the nitrogen than with CO_2."

"Before this, nobody had made a modular nitrogen unit for our size," Quade said. "For bigger facilities, they do make modular units, but nothing for the smaller guys to be able to grow with."

N_2 Production Leads to Lower CO_2 Costs for Brewery

The first thing Quade noticed after starting the beta test was how the brewery's CO_2 costs declined. Even when the brewery increased production, its costs stayed low. The brewery has two 750 pound storage tanks for CO_2, which it has delivered. Supplementing with generated N_2 means it's able to keep CO_2 costs stable even as its output grows.

"Not many people in the industry have a nitrogen generator," Quade said. "Big breweries have them, but they have units that aren't even close to our size. They're a lot bigger. We're the only one I know using a nitrogen generator for this purpose. There are a few breweries in town that have smaller nitrogen generators for draft purposes, using it to blend in with CO_2 to push beer from the kegs to the taps, but we're the only ones I know of in this area with a nitrogen generator for other uses."

While the brewery's air compressor has to supply the nitrogen generator, Quade doesn't see any difference in performance. The nitrogen generator includes a storage tank. Once the storage tank is full, the demand on the air compressor is minimal.

Compressed air also powers the brewery's keg washer.

The beta test ended in January 2025. Quade saw a significant decrease in CO_2 use during testing, leading to a $200 per month savings. The brewery chose to purchase the nitrogen generator under a lease-to-own model. If output grows during the lease period, the brewery can request additional nitrogen generation beds be added, with that cost added to the lease-to-own price. He estimates the brewery will break even in three-and-a-half years.

"South-Tek gave us a pretty good deal because of the beta testing," Quade said. "They're right down the road, so there have been times when they brought a customer over to see the unit and hear how we're using it. It's always nice when you're buying something to see it out in the wild and talk to people who are actually using it."

Not only did the brewery gain a cost-effective way of working from this beta test, but South-Tek gained valuable lessons before its commercial launch.

"During the beta test, we learned the service interval on the filter change-out is optimum at six months," Dolan said. "Also, we were able to make a couple of improvements to the system, allowing for service personnel or the customer to service the unit in a small way without having to break the whole unit down." The product was commercially released in November 2024. BP

For more information, visit https://www.lelandbrewing.com and https://www.southteksystems.com.

To read more ***Nitrogen Generation Technology*** articles, visit https://www.airbestpractices.com/technology/air-treatment.

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Morey Cuts Nitrogen Costs by $270,000 with On-Premises Generation

By Michael Dolan, Director of Sales and Marketing, South-Tek Systems

A partnership between South-Tek Systems and Morey demonstrated the opportunity manufacturing plants have to unlock significant savings and secure production independence through smarter nitrogen management. Morey achieved significant cost savings – a $20,000 monthly margin – after transitioning from delivered gas to on-premises nitrogen generation.

South-Tek Systems provides complete air and gas solutions, including nitrogen gas generators, air compressors, filters and dryers. Morey provides design, manufacturing and integration services for the commercial vehicle space, with operations heavily dependent on a stable, high-purity nitrogen supply. Nitrogen is critical for soldering and pre-test storage of manufactured components.

Before partnering, the customer relied on bulk nitrogen delivery. This arrangement came with high costs, a risk of supply cutoffs and inflexible contracts. Leadership was concerned about potential production interruptions and legal or contractual constraints that could significantly affect its ability to fulfill customer promises.

"Our biggest concern wasn't just cost, it was continuity. Nitrogen is a critical utility for our manufacturing process, and we needed a solution that reduced supply risk and gave us long-term reliability," said Ryan Thomas, Chief Operations Officer, Morey.

Nitrogen Use in Electronic Component Manufacturing

Morey uses ultra-high-purity, 99.999% nitrogen in its surface-mount manufacturing process to produce circuit boards and other electronic components. The customer also uses nitrogen to prevent oxidation within storage cabinets holding finished components. Upon review of its existing bulk nitrogen supply and delivery process, the customer realized it faced a critical challenge: Its production depended heavily on nitrogen, yet the supply was controlled by a third-party delivery provider. The company was locked into a long-term contract with escalating costs and inflexible termination terms, limiting its ability to negotiate competitive pricing. Reliability and continuity of supply also remained ongoing concerns.

The mandate to the company's operations team was clear: Implement a complete, end-to-end nitrogen generation system within five to six weeks, fast enough to ensure a seamless transition away from the existing liquid nitrogen contract, providing ample notice while avoiding operational disruptions, legal complications or additional costs for either the customer or its supplier.

Above: An on-premises nitrogen solution now delivers the ultra-high-purity (99.999%), reliable nitrogen supply Morey depends on for SMT soldering and component storage in its manufacturing operations.

Morey builds connected hardware, enabling customers to receive reliable data from field assets.

"As we evaluated our nitrogen use, it became clear the delivered-gas model wasn't sustainable. We were paying a premium and carrying avoidable risk tied to deliveries and aging infrastructure," said Thomas.

Designing a Nitrogen Solution on an Aggressive Deadline

South-Tek mobilized a multi-disciplinary team to design and install a complete nitrogen gas generation solution tailored to Morey's exact needs. The project included two nitrogen generators delivering 99.999% N_2, supported by an integrated system of an air compressor, a refrigerated compressed air dryer, filtration, storage tanks and control and performance monitoring tools.

To meet an aggressive five to six week timeline, the company provided turnkey engineering and vendor coordination, ensuring every stage – from design to commissioning – was completed seamlessly. The company's engineering team began with a detailed assessment of the existing bulk nitrogen system, followed by an in-depth analysis of both peak and average nitrogen demand to ensure accurate system sizing. The audit included multiple facility visits followed by scheduled cross-functional customer calls with the company's engineering, field sales, service and operations team members, alongside key Morey personnel, to ensure alignment at every stage of the project.

Using these insights, the company configured an optimized set of components designed to reliably meet its customer's required N_2 output and ensure a continuous, uninterrupted supply of mission-critical N_2. In addition, the company implemented ongoing monitoring and service support to sustain optimal performance and long-term reliability.

Working closely with Thomas and the customer's engineering team, the company translated operational objectives into clearly defined technical specifications while ensuring compliance with regulatory standards. Detailed engineering reviews validated system sizing, process integration and compatibility with existing infrastructure, with particular attention to flow requirements, pressure stability and scalability. The system incorporated two nitrogen generators strategically selected to balance peak N_2 demand while maintaining continuous operation during maintenance or unexpected downtime. Together, the units deliver more than 5,000 scfh of ultra-pure nitrogen gas, providing both the capacity and operational resilience Morey needed.

This collaborative engineering process enabled early identification of design constraints and iterative refinements prior to fabrication and installation. To meet the accelerated schedule, the company coordinated multi-vendor procurement of critical components, managing technical submittals, quality verification, installation resources and delivery sequencing to maintain project momentum and ensure seamless integration throughout the system installation, commissioning and long-term operation.

South-Tek Systems configured an optimized set of components designed to reliably meet its customer's required N_2 output.

"South-Tek managed the project's end-to-end design, equipment, installation and commissioning, which allowed our team to stay focused on production," said Thomas.

Solution Results in $270,000 in Annual Savings

The transition from delivered liquid nitrogen to on-premise nitrogen gas generation provided immediate benefits for the customer. What began as an effort to transition away from cumbersome tank maintenance and an increasing cost contract led to a complete redefinition of how the customer sourced and managed mission-critical nitrogen.

With its nitrogen generation system in place, the customer was able to eliminate all risk of supply interruption and ongoing price increases, securing full control over its nitrogen supply and achieving production independence in six weeks, a timeline

Morey Cuts Nitrogen Costs by $270,000 with On-Premises Generation

nearly unheard of for a project of this scale and complexity. The cost impact was substantial: The customer's nitrogen expenses dropped from roughly $350 per 8-hour shift to about $100, resulting in about a 70% cost savings per shift. On an annual basis, this translated into an estimated reduction from over $360,000 to about $90,000, saving the company over $270,000 annually.

The project included two nitrogen generators supported by an integrated system of an air compressor, a refrigerated compressed air dryer, filtration, storage tanks and control and performance monitoring tools.

Reducing CO_2 Dependency with Nitrogen

Nitrogen is increasingly used in breweries and beverage plants both alongside CO_2 and, in certain tasks, as a replacement for CO_2. The two gases behave differently in liquid: CO_2 is quite soluble and is the main tool for carbonating beer, while nitrogen gas is far less soluble and is primarily valued as an inert pressurizing and blanketing gas. That solubility difference is the foundation for why nitrogen can save CO_2, improve dispense performance and help protect flavor.

In combination with CO_2, nitrogen lets beverage plants supply total pressure without unintentionally changing carbonation. Brite tanks, brite-to-packaging transfers, filtration skids and long-draw draft systems all require stable pressure. If plants provide all pressure with CO_2, additional CO_2 can dissolve into the beer, pushing carbonation above the target and increasing foaming risk at the filler or faucet. With mixed gas, plants set the CO_2 composition (its partial pressure) to match the desired carbonation equilibrium and use nitrogen to make up the remaining pressure needed for the process. The result is steadier carbonation, more predictable foam and less CO_2 use for non-carbonation work.

The best-known mixed-gas application is draft dispensing with beer gas, typically a blend of 70/30 or 75/25 N_2/CO_2. These blends are especially useful for nitro-style beers (stouts, porters, cream ales) served through a restrictor faucet. Because nitrogen does not readily dissolve, the beer can be pushed at higher pressures to overcome line resistance and drive the restrictor plate, creating the signature tight, cascading foam and creamy mouthfeel. The CO_2 fraction maintains modest carbonation and prevents the beer from tasting flat, while also limiting the carbonic bite higher-CO_2 beers can have.

Nitrogen also works alongside CO_2 in oxygen control. Many breweries use N_2 to purge tanks, hoses, kegs and filler bowls, and to blanket headspace during holding or transfers. Displacing air with an inert gas reduces oxygen pickup, helping protect hop aroma, color stability and shelf life. In packaging, nitrogen dosing is another hybrid use: Nitrogen is added just before seaming, creating internal can pressure for improved rigidity and a positive internal package pressure.

As a CO_2 replacement, nitrogen is best used where carbonation is not required. N_2 can replace CO_2 for purging, inerting and blanketing, and it can push product during transfers or packaging, as long as plants maintain adequate CO_2 partial pressure when carbonation must be preserved (otherwise the beer can slowly off-gas until it re-equilibrates). Operationally, shifting these tasks to nitrogen can reduce CO_2 consumption, lessen exposure to CO_2 supply volatility and reduce the labor associated with frequent cylinder swaps or bulk deliveries. Many facilities pair this approach with on-premises nitrogen generation, which can provide a continuous supply of clean, dry nitrogen for day-to-day operations.

The customer stabilized production in the long term and eliminated downtime caused by nitrogen supply. It also reduced its operational footprint by eliminating tanker truck deliveries to its location and by cutting waste at the valve during tank refills or measurements. Measurement of nitrogen supply and usage is enhanced going forward, and growth is enabled through capacity planning in the system design.

Last, but not least, the company's facilities staff is warmer this winter, as it isn't checking or tightening tank valves in the snow and ice or checking if gates are closed after a delivery. Moreover, Morey's customers, employees, vendors and neighbors now have a clear view of mature spruce trees near the company's loading dock doors. The liquid nitrogen tank, elevations and fencing are gone.

"This decision wasn't just about reducing cost; it was about strengthening our operational resilience. Bringing nitrogen generation in-house gives us greater control, long-term cost visibility and a more reliable production environment," said Ryne DeBoer, CEO and President, Morey.

The customer realized it faced a critical situation combining financial strain, legal pressure and operational risk.

Morey Cuts Nitrogen Costs by $270,000 with On-Premises Generation

Fine-Tuning to Maximize System Efficiency

South-Tek's role didn't end when the nitrogen system was switched on. The company continues to work with the customer to monitor nitrogen use in real time, ensuring supply consistently aligns with production demand. Regular 90-day facility visits by the company's field service engineers ensure the system delivers nitrogen meeting or exceeding Morey's specifications. The field service engineers perform scheduled preventative maintenance, identify any system performance issues and communicate overall system status and efficiency to the customer. They also fine-tune system operations to maximize efficiency, reducing both energy consumption and operating costs.

The company is helping the customer plan for future scalability and redundancy, ensuring the nitrogen systems can expand as production grows. In addition, the company provides hands-on training, equipping customers with the knowledge to manage and maintain their systems independently.

"South-Tek's field service, customer service and engineering teams are excellent. Its continued commitment to ensuring our nitrogen-generating system delivers the nitrogen we need at the purity we require allows us to focus on our manufacturing

For the customer, switching to on-premises nitrogen generation wasn't about cost savings; it was about having control over and confidence in its nitrogen delivery.

operation with confidence," said Mike Elliott, Director of Facilities, Morey.

"There's a difference between buying equipment and working with a partner," said Thomas. "South-Tek delivered a system meeting our requirements, and it's continued to support that system with strong service and follow-through."

Nitrogen Generation Takeaways for Industrial Leaders

Having a reliable nitrogen supply is as essential as electricity in maintaining uninterrupted operations, and on-premises nitrogen generation delivers both cost savings and long-term dependability. By reducing reliance on third-party vendors, companies can minimize legal and operational risks while gaining greater control over their processes.

Most importantly, partnering with a trusted expert accelerates implementation, ensures a seamless transition and sets the stage for lasting operational resilience. BP

About the Author

Michael Dolan, Director of Sales and Marketing, leads South-Tek System's customer acquisition, growth and retention strategies while overseeing the industrial manufacturing sales team. Mike has been with the company since December 2021.

About South-Tek Systems

South-Tek Systems provides mission-critical air and gas solutions, trusted by organizations across commercial, industrial and military sectors. For more than two decades, the company has focused on delivering reliable, high-performance systems, improving efficiency, reducing costs and giving customers greater control over their operations. Its portfolio includes nitrogen generators, air compressors, filtration systems and compressed air dryers. For more information, visit https://www.southteksystems.com.

About Morey

Morey (The Morey Corporation) is an electronics design and manufacturing company that develops and builds rugged technical hardware and connected systems for industrial and commercial applications. They partner with companies to design, engineer, and manufacture electronic components, including telematics devices, sensors, and embedded systems for vehicles, equipment, and IoT solutions. Rather than selling consumer products, Morey works behind the scenes as a technology partner for OEMs and manufacturers. Their focus is on reliable, high-performance electronics built for demanding environments. For more information, visit https://www.moreycorp.com.

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New Belgium Brewing's Path to Low-GWP Refrigeration

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

G&D Chillers was founded in 1993 in Oregon's Willamette Valley, a region known for wine production and agricultural processing. The company initially focused on building chillers for wineries, where precise temperature control is critical during fermentation and storage. From there, G&D expanded into craft beer, spirits and other beverage applications before moving into broader industrial markets, including dairy, biogas and chemical processing.

Scott Timms, Business Development Manager, G&D Chillers, described the company's growth as both market-driven and intentional. "We've always been forward-thinking, wanting to be first to the market in different spaces," he said. In April 2025, G&D Chiller was acquired by Ingersoll Rand. According to Timms, the acquisition has reinforced the company's technical trajectory. "One of the things Ingersoll Rand liked about us was our willingness to be aggressive and try to grow the industry and make it better. As of right now, it isn't changing our direction. If anything, it's beefing up our research and development, helping us continue to stay ahead of the curve."

That R&D focus became central to a custom refrigeration project developed for New Belgium Brewing, one requiring the company to design a chiller around a natural refrigerant with near-zero global warming potential (GWP).

New Belgium Brewing: Sustainability Goals Driving Engineering Decisions

New Belgium Brewing integrates sustainability into its operations and engineering culture.

Above: New Belgium Brewing in Fort Collins, CO

In addition to energy and water initiatives, the brewery committed to achieving carbon neutrality by 2030. That commitment extends to process equipment selection, including refrigeration systems.

In late 2022, New Belgium began evaluating alternative refrigerants to significantly reduce the environmental impact of its process cooling infrastructure. Andy Backer, Sales Leader, G&D Chillers, explained the move was driven by internal sustainability targets rather than regulatory pressure. "They were looking for an alternative refrigerant solution," he said. "They had plans to be carbon-neutral by 2030 and were investigating natural refrigerant options."

The immediate need was tied to a new CO_2 reclamation system being installed at New Belgium's Fort Collins facility. Brewing operations generate CO_2 during fermentation, and CO_2 is also used extensively for tank blanketing, beer transfer and carbonation. Typically, much of that CO_2 is vented. Reclaiming and reusing it reduces emissions and supply-chain demands.

Andy Backer, Sales Leader (left), and Scott Timms, Business Development Manager (second from right), alongside G&D Chillers President Justin Thomas (second from left) and Paul Johnson, Director of Technology and R&D.

The reclamation system required a dedicated process chiller, creating an opportunity to align refrigeration design with the brewery's sustainability objectives.

The Environmental Impact of Refrigerant Selection

The brewery's refrigerant choice contributes to its lifecycle emissions. Even highly efficient systems can carry a large carbon footprint if they rely on high-GWP refrigerants, due to the leakage risk over decades of operation.

"Any refrigerant you put into a system, there's a chance a leak could develop and be released into the atmosphere," Timms said. "They wanted to be as responsible as they could in minimizing the potential effect."

At the same time, the regulatory landscape is shifting. Starting January 1, 2026, the EPA ruled all industrial process cooling systems with a process temperature above -22°F (-30°C) must use refrigerants with a global warming potential (GWP) of 700 or less. Designing around an interim refrigerant risked creating a system with a limited regulatory lifespan.

The refrigeration load itself was well defined by the CO_2 recovery equipment vendor. "The setpoint was 28°F (-2°C) with a delta T of around 10°F (6°C), which is typical for this application," Backer said.

The CO_2 system vendor provided utility requirements but left refrigerant design to G&D. "The utility sheet essentially said, 'We need this many gpm of 28°F (-2°C) glycol with this many BTUs. We were left to our own devices on the refrigerant side," Timms said.

Screening Natural Refrigerant Options

Ammonia (R-717). Ammonia was considered early on, but eliminated due to toxicity and system complexity. "Ammonia systems are efficient and run well across the world," Timms said. "But it didn't feel like a niche we could fill, and it wasn't in line with what we were trying to do." For a packaged chiller supporting a brewery process, ammonia introduced operational and permitting burdens disproportionate to the scale of the system.

Carbon Dioxide (R-744). CO_2 systems were also evaluated, but presented performance and economic challenges for much of the U.S. climate.

G&D Chillers headquarters in Junction City, OR

"In the U.S., a large portion of the country is warmer than 82°F (28°C) for a good part of the year," Timms said. "Above that, CO_2 systems go transcritical, and the efficiency is almost cut in half."

While CO_2 systems can recover high-grade waste heat, many breweries and industrial plants do not have sufficient demand for 150-160°F (66-71°C) water to justify the added complexity. High operating pressures often

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The Elite 290 propane chiller was installed at New Belgium Brewing.

exceeding 1,500 psi also introduce safety and serviceability considerations.

Propane (R-290). With a GWP of approximately 3, propane offered near-zero climate impact and strong thermodynamic performance.

"Propane was one of the first refrigerants ever used in vapor compression," Timms said. "It's super-efficient. The challenge is flammability, and that's where the engineering comes in."

Backer emphasized the practical advantages. "Not a whole lot changes when we go with R-290," he said. "From a service standpoint, technicians understand it, and the cost premium is relatively small, often around 10% compared to an A2L chiller." A2L is a new category for refrigerants that don't meet A1 requirements, but aren't as flammable as A2 refrigerants.

European experience further reinforced confidence in propane. G&D saw successful R-290 process chillers operated overseas for more than a decade, providing a proven reference base.

Chiller System Architecture and the Demands of Propane

The selected base platform was the company's GD70H, a dual-circuit chiller with two independent 35 horsepower (hp) refrigeration circuits. This architecture provided redundancy and allowed the system to meet the brewery's load requirements while maintaining operational resilience.

Although the vapor-compression fundamentals were unchanged, Timms noted the propane version diverged substantially from G&D's standard designs. "If you look at what the old unit looked like versus the new unit, it's completely different. That's because of the safety and charge-reduction work we did."

In a conventional R-448A configuration, each 35 hp circuit would typically contain approximately 95 pounds of refrigerant. For a flammable refrigerant, that charge level was unacceptable. Charge reduction became the primary safety imperative. Through component selection, piping optimization and volume minimization, the company reduced the propane charge.

"Our first pass got us down to about 15 pounds per circuit," Timms said. "But we kept pushing. The final design landed at six pounds per circuit." That represents roughly a 16:1 reduction compared to the original HFC design. "When you put it in perspective, that's less propane than what's in a backyard barbecue grill," Timms said.

Reducing refrigerant charge isn't trivial; insufficient charge can destabilize system operation, reduce heat transfer and complicate superheat control. Extensive run testing confirmed the reduced-charge system maintained capacity, stability and efficiency.

Mechanical Isolation and Hazardous Location Controls

The refrigeration circuit was physically isolated from the glycol side within its own enclosure. That enclosure operates under continuous negative pressure using a Class I, Division I-rated fan.

"If there's a leak, the only place the propane can go is through that fan," Timms said. "That air is ducted to a safe location."

A propane sensor monitors the enclosure continuously. At 10% of the lower flammability limit, the system alarms and de-energizes the unit. "We're nowhere near a flammable condition before the system shuts down," Timms said.

"R-290 has efficiency similar to R-22," Timms said. "We didn't need to tweak the system to make it efficient; it already is." Compared to many A2L alternatives, propane delivered improved BTU-per-kilowatt performance, supporting the brewery's broader carbon-reduction goals by reducing electrical demand.

The project took roughly 18-24 months, from initial discussions in late 2022 to shipment and installation in early 2025. "A lot of time was spent on engineering, run testing and refining how components behaved with propane. We spent a lot of time changing liquid line routing, expansion valve behavior and running the unit under load," Timms said. "By the time it shipped, there wasn't much we hadn't already seen."

The final configuration was a dual 35 hp chiller, providing redundancy and approximately 440,000 BTU/hr of capacity at the required 28°F (-2°C) setpoint.

Installation, Commissioning and Operation

The chiller was shipped without refrigerant and charged onsite during commissioning. Aside from safety labeling, startup procedures mirrored those of the company's conventional chillers.

"The actual startup was straightforward," Timms said. "We charged the unit, ran it under load and monitored it." Installed in February 2025, the system has operated without alarms or downtime.

The propane GD70H carries an MSRP of approximately $135,000. The company provided the unit at cost as part of a collaborative development effort. Because the chiller supported a new CO_2 reclamation system, there was no

direct ROI tied to replacement economics. Value was measured in emissions reduction, regulatory durability and alignment with sustainability goals.

Design Learnings Applied Across Product Lines

Lessons from the propane project influence the company's broader portfolio. "Our ability to reduce refrigerant charge has carried over into our other systems," Timms said. "That helps with cost, safety and performance."

Reduced system volume has also improved low-ambient operation and superheat control. "Superheat control is way more dialed now," Timms added.

The company's chillers include remote monitoring as a standard offering. Performance data from the brewery's unit is reviewed periodically, though no interventions have been required. "We haven't seen a single alarm," Timms said.

Remote access has transformed support workflows. "The number of times we actually need to send someone onsite has been drastically reduced," Backer said. "Troubleshooting is much faster now."

Regulatory Outlook and Market Adoption

EPA rules that took effect in January 2026 prohibit new equipment using high-GWP refrigerants. While A2Ls fill the immediate compliance gap, G&D Chillers views propane as a longer-term decision.

"We're trying to position ourselves as one of the first in the door, so when this really takes off, people look to us for propane-based refrigeration systems," Timms said.

The remaining hurdle is the lack of a universally adopted UL standard for propane process chillers, requiring case-by-case coordination with local authorities. Once a standard is finalized, adoption should accelerate.

The New Belgium project demonstrates propane-based industrial chillers can deliver high performance and low environmental impact. By prioritizing charge reduction, mechanical isolation and conservative safety design, G&D translated a flammable refrigerant into a practical solution.

"Propane is essentially future-proof," Timms said. For engineers navigating tightening refrigerant regulations and sustainability mandates, this project offers a clear example of how technical design can move industrial refrigeration forward. BP

For more information, visit https://gdchillers.com.

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R&D Labs Shifting to N_2 Generation

By Dave Henning, Sales Manager, MCE Diversified Air

In modern research and development (R&D) labs, reliability, precision and cost control are inseparable from productivity. Behind every successful experiment is an invisible backbone of infrastructure, including temperature control, ventilation and gas supply.

One gas in particular, nitrogen (N_2), is used for purging lines, blanketing reactive materials, preventing oxidation, feeding analytical detectors and supporting cryogenic systems. For laboratories operating under strict quality and compliance requirements, consistent access to high-quality inert gas is non-negotiable.

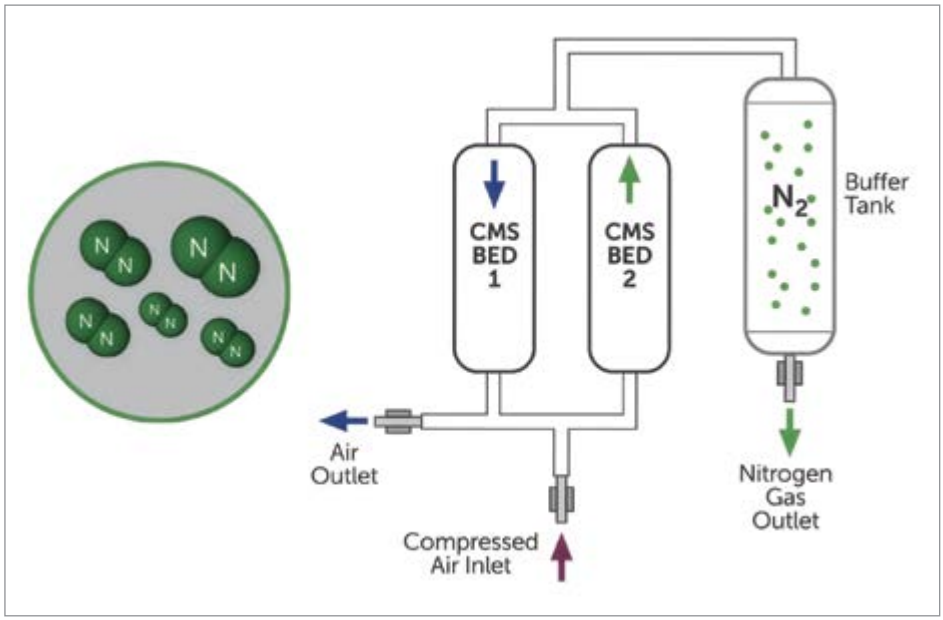
Yet many R&D labs continue to rely on traditional nitrogen supply methods such as cylinders, dewars or bulk liquid deliveries. While familiar, these models introduce hidden costs, supply risks and operational inefficiencies often accepted as the cost of doing business. Increasingly, labs are discovering on-site nitrogen generation offers a more reliable, economical and sustainable alternative. Labs can reduce the total cost of ownership and achieve several operational benefits with on-site nitrogen generation.

Above: Research and development labs can achieve a reliable supply of high-quality nitrogen gas and save money with installed nitrogen generation systems.

How On-Site Nitrogen Generators Work

On-site nitrogen gas generators give users control over their gas pressure, purity and flow rate while reducing downtime events. Return on investment with an on-site nitrogen generator is typically 6-18 months, depending on usage. Once installed, operating expenses are predictable, and the system only generates what is needed. Efficiencies in administrative tasks, procurement and operations follow.

These generation systems produce nitrogen from ambient air, separating it from the surrounding air, turning a lab's compressed air system into a self-replenishing source of inert gas. In many cases, a nitrogen generation system can simply consist of an air compressor to



How a pressure swing adsorption (PSA) nitrogen generator is set up (Image courtesy of Mikropor).

supply compressed air, a filtering system and a separation mechanism.

Currently, there are two separation technologies widely used in on-site nitrogen generation:

Pressure Swing Adsorption (PSA). When high purity is needed, PSA generators use two towers filled with a material called carbon molecular sieve (CMS) that selectively adsorbs oxygen under pressure. One tower focuses on the adsorption phase, where high-pressure, compressed air flows through, trapping oxygen and other gases with CMS, while nitrogen passes through.

The other tower is in a regeneration phase, dropping the pressure so trapped oxygen can be released and vented. The two towers alternate, providing a steady stream of nitrogen up to 99.999% purity, ideal for analytical instruments or high-precision processes. PSA systems can be scaled for higher flow rates or integrated with existing compressed air systems.

Membrane Separation. Membrane separation generators produce on-site nitrogen gas by forcing compressed air through bundles of hollow polymer fibers. Fast gases like oxygen and water vapor pass through the fiber walls, while slow gases like nitrogen stay inside the fiber and are collected at an outlet.

The resulting nitrogen gas is around 95-99% pure and is considered sufficient for inerting, purging and general lab applications. Membrane systems are compact, quiet and ideal for tight spaces or moderate demand.

N_2 Generation Success Stories

Deciding to make the switch from traditional nitrogen supply to on-site generation is not a decision maintenance or operations managers take lightly. Here are two examples of R&D laboratories making the switch to on-site nitrogen generation and their results.

Case Study 1: High-Precision Research, Nitrogen for NMR Operations

Background: A plastics manufacturer's research and development facility required a continuous and reliable nitrogen supply to operate its nuclear magnetic resonance (NMR) equipment used for polymer compositional analysis. One of the lab's NMR machines uses a cryogenic probe operating near -328°F (-200°C), making ultra-dry, oxygen-free nitrogen essential. Any oxygen contamination would compromise test results, and even trace amounts of moisture would freeze and clog the probe.

Challenges: The lab had relied on liquid nitrogen dewar tanks, but this approach presented unsustainable costs. At a flow rate of 16.8 cfm, the lab consumed the usable contents of a dewar in 4-5 hours, requiring two dewar tanks per day to meet demand for an 8-hour shift. This created a substantial logistical burden due to frequent tank changeouts, limited storage space and the labor required to handle heavy cryogenic cylinders weighing 95 pounds when full. The lab's urban location further complicated matters, as there was no room for a permanent bulk tank system, and previous attempts to permit a storage area had been denied.

In addition to operational constraints, liquid nitrogen was inefficient and expensive. Each dewar lost approximately 15% of its nitrogen to boil-off. When combined with delivery fees and rental charges, nitrogen costs averaged $3 per cubic foot. Reliability was also a concern, as the lab experienced supply interruptions caused by delivery truck breakdowns and driver shortages. The lab needed a solution eliminating these risks while guaranteeing consistent purity and dryness for sensitive R&D testing.

Solution: The facility's maintenance team worked with us to design and implement a Mikropor MNG US 150 nitrogen generation system integrating with the lab's existing compressed air system. Using carbon molecular sieve (CMS) media, the PSA system delivers high-purity nitrogen with exceptionally low oxygen and moisture content, ideal for cryogenic NMR probes. This is especially useful for industries requiring the highest levels of nitrogen purity by the most cost-effective means possible.

The system was designed to deliver 16.8 cfm at 68°F (20°C) while consistently achieving nitrogen purity levels of 99.8–99.9%, exceeding the lab's required 97%. Dryness performance surpassed expectations as well, exceeding the required -50°F (-45°C) dew point and frequently achieving -60 to -80°F (-51 to -62°C), ensuring there was no condensation or icing at cryogenic probe temperatures. The generator's compact footprint of approximately 7 sq ft allowed it to fit within the facility, and two 120-gallon buffer tanks were installed to ensure stable PSA operation.

Commissioning was straightforward and required minimal preparation to install. No special permitting, bulk tank infrastructure or complex site modifications were necessary. The

PSA nitrogen generators are the better choice when high-purity nitrogen gas is required.

R&D Labs Shifting to N_2 Generation

system included an integrated dew point monitor providing continuous visibility, along with alarm and logging capabilities. Maintenance requirements are minimal, limited to annual filter changes.

Because the lab already operated three 15 horsepower air compressors with surplus capacity, the nitrogen generator ran without the need for new air compressors or compressed air dryers. This significantly reduced capital costs while providing the lab with a fully self-sufficient nitrogen supply.

Results: Following installation, the nitrogen generator consistently exceeded both purity and dew point specifications, enabling reliable and uninterrupted NMR operation. The lab was no longer dependent on supplier delivery schedules, eliminating risks associated with truck delays or nitrogen shortages. Removing the need for heavy cryogenic tanks improved safety by reducing the risk of employee injuries and eliminating permitting challenges related to bulk storage. Ongoing maintenance requirements remained minimal, consisting only of annual filter changes. MCE handled specification, installation and commissioning, and the system has operated reliably since installation.

Case Study 2: Advanced Materials Research, Nitrogen Gas in Carbon Foam Development

Background: A manufacturer's research and development facility located in coal country focuses on advanced carbon products derived from coal, including carbon foam used as tooling in the aerospace industry. Traditional molds and tooling materials tend to expand and contract when exposed to heat, leading to undesirable dimensional changes in carbon fiber aerospace components. The lab's carbon foam technology provides a thermally stable, machinable mold that expands far less during curing, making it well-suited for producing aero- and outer-space components such as wings, structural parts and booms used on NASA's Advanced Composite Solar Sail System (ACS3).

Beyond aerospace performance improvements, the lab was also driven by a broader mission to pioneer sustainable, higher-value uses for coal. By reimagining coal as a feedstock for advanced carbon products rather than a fuel source, the project aimed to sustain and create jobs in coal mining communities.

For R&D laboratories, nitrogen supply is not just a utility decision but an operational one impacting reliability, data integrity, safety and long-term costs.

As part of a DOE/NETL-funded research project, the lab sought to produce carbon foam at atmospheric pressure using a continuous belt kiln. This manufacturing process required a reliable supply of high-purity nitrogen.

This complete nitrogen generation system includes an air compressor, wet and dry compressed air storage tanks, a refrigerated compressed air dryer, a PSA nitrogen generator and a nitrogen gas storage tank.

Challenges: To produce carbon foam continuously at atmospheric pressure using a kiln, the lab required a reliable source of high-purity nitrogen. Liquid nitrogen delivery was impractical due to limited truck access, permitting constraints, infrastructure costs and long-term logistics.

Solution: The lab's R&D Director of New Technology worked with us to design and implement an on-site nitrogen generation system tailored to the project's needs. The system supplied continuous high-purity nitrogen at approximately 99.99% for kiln operations, while also allowing operators to adjust purity levels up or down for specific R&D studies, a level of flexibility not possible with bulk liquid nitrogen delivery.

The Mikropor MNG 2050 nitrogen generator and associated equipment deliver 56 scfm of nitrogen at 99.99% purity and 93 psig, allowing the lab to initiate the project without uncertainty, logistical challenges or delivery risks.

Cost savings: With on-site nitrogen generation in place, the lab eliminated the risk of delayed deliveries or supply shortages. To mitigate the impact of potential power outages, a small quantity of nitrogen tanks was kept on hand as a backup. The system's adjustable purity capability enabled operators to conduct experiments at different nitrogen concentrations, reducing operating costs while validating performance across a range of conditions.

The nitrogen generator supported continuous kiln campaigns operating 24/7 for durations ranging from one week to several months without interruption. Research conducted during the project resulted in new patents and applications, marking significant R&D breakthroughs. Most importantly, the project demonstrated a viable pathway for transforming coal into advanced carbon products rather than burning it for energy, offering a sustainable future that could preserve and expand employment opportunities in coal-mining regions.

Nitrogen generation provided substantial cost advantages when compared to estimated delivery-based alternatives. The lab's nitrogen use ranged from 3,200 to 3,600 cubic feet per hour, with a maximum annual operation of 8,000 hours. This translates to a maximum annual nitrogen requirement of 25.6 to 28.8 million cubic feet.

Rethinking Nitrogen Infrastructure in Research Facilities

On-site nitrogen generation systems, especially in research, biotech, pharmaceutical and analytical labs, can transform nitrogen gas supply from a cost center to a productivity-boosting asset.

For R&D laboratories, nitrogen supply is not just a utility decision but an operational one impacting reliability, data integrity, safety and long-term costs. As these examples show, on-site nitrogen generation can address common challenges associated with delivered gas, such as supply interruptions, handling risks and escalating costs. It also offers greater control over purity and availability.

For labs with consistent nitrogen demand and access to compressed air infrastructure, generation systems represent a practical alternative, aligning infrastructure performance more closely with the pace and precision required in modern R&D environments. BP

About the Author

Dave Henning started in the air compressor business in 1986 after working as a machinist for years. After years of learning the business through sales and watching technicians, he now serves as Sales Manager for MCE's Diversified Air.

About MCE

Motion & Control Enterprises (MCE) is a premier solutions provider of automation and compressed air products, engineered systems, fluid power, flow control, lubrication and instrumentation solutions serving the industrial sector. For more information, visit https://mceautomation.com.

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CAGI Releases Compressed Air Purity Guide

By Chad Larrabee, Technical Editor, Compressed Air and Gas Institute

The Compressed Air and Gas Institute (CAGI) released its all-new Compressed Air Purity Guide, a comprehensive resource designed to help industries achieve clean, dry compressed air. This guide addresses the critical importance of air purity in sectors that rely on compressed air as a utility or process gas, excluding specialty applications such as breathing air and sterile air. When manmade or naturally occurring substances become airborne, these chemicals, compounds and matter contaminate the air and affect the reliability and efficiency of any compressed air system. Contaminants can cause catastrophic damage to equipment and costly losses if they contact a sensitive product, such as food or pharmaceuticals. For this reason, compressed air, as used in industrial processes, must be treated to achieve a desired level of purity.

Developed by a subcommittee of CAGI's Air Drying and Filtration (ADF) Section, the guide draws on expert knowledge and information from important sources such as the *Compressed Air and Gas Handbook*; ISO 8573-1, Compressed Air: Part 1: Contaminants and Purity Classes and VDMA 15390-1-2014-12, Compressed Air Purity – Part 1: Typical Application Specific Purity Classes According to ISO 8753-1:2010 and Guidance for Achieving and Monitoring of a Respective Compressed Air Purity for Industrial Applications with modifications.

The subcommittee was formed to develop the guide as part of the library of educational guides, which includes the Air Compressor Selection Guide, Compressed Air and Gas Drying and the Rotary Air Compressor Selection Guide. These guides provide information to help users understand the different air compressor and compressed air dryer technologies, and provide technical guidance for selecting the proper equipment for the application. In addition to subcommittee members, CAGI's Technical Editor and Chair of the Education Committee provided input and direction for the guide. Once the committee completed the draft, the document was reviewed and approved by the ADF Section. Following the review by the ADF Section, comments and proposed edits were addressed by the subcommittee. A final review was completed by the CAGI board of directors to ensure the guide met the institute's objectives. Upon the approval of the guide, it was published and made available on the CAGI website for free download.

Above: The Compressed Air Purity Guide identifies ideal locations within the compressed air piping system to foster microorganism growth.

The guide includes a glossary of terms as well as illustrating concepts with tables and images. As with all CAGI educational resources, the subcommittee ensured a robust process that delivers a reliable, unbiased and science-based document.

Industries Benefitting Most from the Compressed Air Purity Guide

The guide was developed for end users of compressed air, designers of compressed air systems, engineering students, plant engineers, maintenance personnel and those who service the industry, such as consultative salespersons and service personnel.

While any manufacturer may benefit from the air purity guide, the industries which may benefit most is where risk of contamination has greater impact. For example, in cases where the compressed air may come in contact with products for human consumption or vessels that hold products for human consumption, the impact of contamination is greater for the manufacturer. The guide addresses the differences in the risk levels by identifying three well-accepted categories of compressed air purity: 1) Plant air with moderate purity levels for general use, such as tools and actuators, 2) Instrument air with higher purity for sensitive control systems and 3) Process air with highest purity when air becomes an ingredient in the process or product. Process air is an example where the air may have direct contact with the product.

The Compressed Air Purity Guide notes, depending on the type of air compressor and compression temperatures, some air compressor lubricants can create varnish. (Photo courtesy of Hitachi Global Air Power US)

Examples of the types of industries that would likely align with the three categories would be: general manufacturing and assembly for plant air, utilities or power companies for instrument air and food and beverage or pharmaceutical manufacturing for process air. The guide delves into detail on the types of purity levels and cautions to always consult OEM recommendations.

In order to deliver a quantifiable purity level, the guide explains the ISO 8573-1 standard, which provides the types of contaminants and creates classes of purity based on specific quantities of the contaminants.

The guide references the three types of contaminants found in ISO 8573-1: particles, water and oil.

Particles. Particles in compressed air can be viable (microorganisms) or non-viable (dust, dirt, pollen). Natural sources include deserts, agricultural operations and construction activities, while manmade sources include industrial emissions and fossil fuel combustion. These particles can damage pneumatic equipment, clog filters and contaminate products.

Water. Water is present in atmospheric air as vapor, liquid or aerosol. Under average

conditions, water vapor constitutes between 0.25% in drier climates and up to 2% in humid environments. With compression of the air, the concentration of water increases significantly, making drying essential.

Oil. Oil contamination originates from two sources: 1) atmospheric hydrocarbons (exhaust fumes, industrial emissions, petrochemical processes) and 2) air compressor lubrication (oil-lubricated air compressors) can introduce significant oil carryover, measured in gallons per year, depending on air compressor size and type. Even oil-free air compressors can ingest hydrocarbons if placed near sources like loading docks, where truck exhaust introduces compounds such as benzene and toluene.

Key Technologies for Compressed Air Treatment

The ADF Section understood that identifying the types of contaminants and quantifying the air purity requirements would not be enough information. Readers would want guidance on the methods for attaining the required purity levels. Therefore, once the user has determined the level of compressed air purity that is required for the application, the task becomes one of selecting and installing the air treatment equipment that will reliably deliver the required air purity. The guide emphasizes proper system design and equipment selection. Key technologies include:

- **Compressed air dryers:** Refrigerated compressed air dryers for general use; desiccant compressed air dryers for ultra-dry air.
- **Filters:** Particulate filters, coalescing filters for oil aerosols, activated carbon for vapors.
- **Moisture separators and drains:** Prevent liquid water accumulation.

The purity guide provides a table of treatment component technologies and their efficacy to remove contaminants based on type of contaminant.

The guide has much more to offer in designing or correcting a compressed air system for the required purity levels. From assessing the air quality at intake to identifying the right air purity for the user application, to selecting and installing the proper equipment to achieve the desired purity, the guide is comprehensive in its approach.

Don't let untreated compressed air introduce contaminants that compromise equipment reliability, product quality and operational efficiency. Access the free Compressed Air Purity Guide from the CAGI website under Working with Compressed Air, Selection Guides. BP

About the Author

Chad Larrabee is a well-recognized expert in the compressed air industry with a career spanning more than 30 years with Ingersoll Rand and now as a consultant through his company, Profundity LLC.

About the Compressed Air and Gas Institute and the ADF Section

The Compressed Air and Gas Institute (CAGI) is the united voice of the compressed air industry, serving as the unbiased authority on technical, educational, promotional and other matters that impact compressed air and gas equipment suppliers and their customers. CAGI educational resources include e-learning coursework, selection guides, videos and the Compressed Air & Gas Handbook. The ADF Section consists of the following member companies: Altec Air, Atlas Copco Compressors, BEKO Technologies, Donaldson Company, Hankison, Ingersoll Rand, Kaeser Compressors, Lectrodryer, Mikropor America, nano-purification solutions, Parker-Hannifin Corporation, Pentair, Pneumatech, Quincy Compressor, Van Air Systems, Walker Filtration and ZEKS Compressed Air Solutions. For more information, visit http://www.cagi.org.

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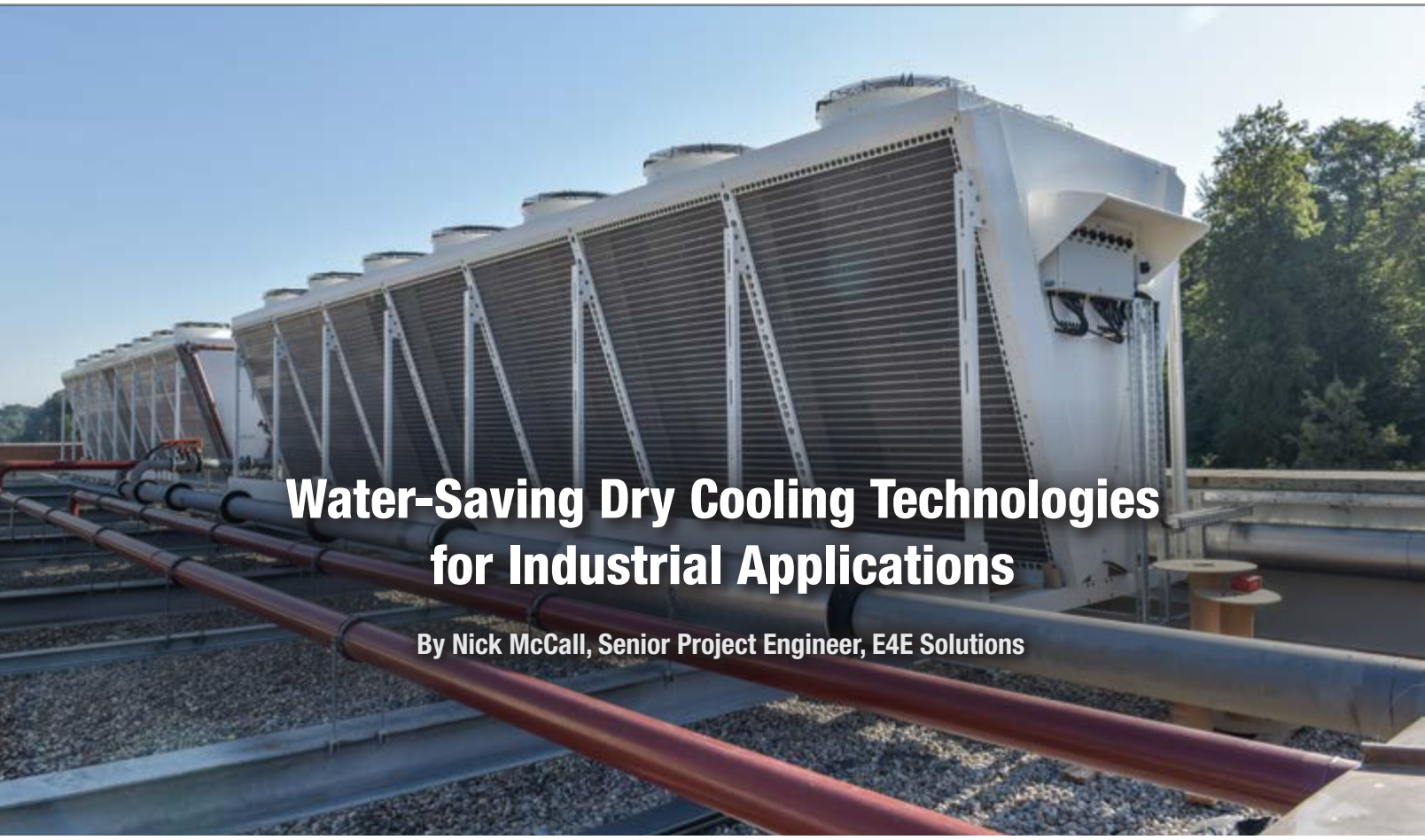

Water-Saving Dry Cooling Technologies for Industrial Applications

By Nick McCall, Senior Project Engineer, E4E Solutions

There are several methods of fluid cooling available for industrial applications. Among them are evaporative fluid cooling (using the evaporation of water), dry fluid cooling (using airflow to cool a fluid stream), and hybrid cooling (a combination of evaporative and dry cooling, in which some water is evaporated during the cooling process). With data center development, dry fluid cooling has recently gained more attention as certain jurisdictions seek to reduce the overall water use by facilities in their area. This article will be a high-level overview of the water-saving capabilities of dry fluid cooling technologies in contrast to more traditional evaporative cooling technologies.

Since dry fluid coolers are less common than evaporative coolers, we should define what we mean by dry fluid cooling. Dry fluid cooling (or dry cooling, for short) is a type of fluid cooling removing heat from a system using ambient air for heat rejection. This is also known as sensible heat transfer. Because evaporative cooling is not taking place, there is no latent heat rejected from the system. While this means dry cooling cannot take advantage of this latent heat transfer (estimated at roughly 85% of the heat transfer present in evaporative systems), it also means no water is consumed or evaporated during the heat rejection process. Some dry coolers (also referred to as towers in certain cases) can operate in two different modes: wet (where some water is evaporated to improve performance) and dry (no water is evaporated) or a combination of the two. These towers would be classified as hybrid or adiabatic depending on the complement of technologies used in the wet mode. For the purposes of this article, we will focus on dry cooling only, but some of the principles discussed will apply to the dry mode operation of other units capable of sensible heat rejection. For those familiar with automotive radiators, the working principle is much the same as a dry cooler, at least when it's not raining out!

Above: Dry fluid cooling (or dry cooling) is a type of fluid cooling removing heat from a system using ambient air for heat rejection.

The Two Main Dry Cooling Configurations

Dry coolers come in several basic configurations. The two main configurations are flat (also called "table coolers") and V-bank (coils oriented in a vertical V shape). **Figures 1 and 2** depict examples of these configurations. The flat cooler has hot fluid entering the unit on the right with cooled fluid exiting to the left; air is pulled across the fluid coil, picking up heat and exiting through the top. The V-bank configuration is similar, but flows from top to bottom. The air flow in the V-bank is also drawn across the coil, but it is drawn from outside in and up rather than from bottom to top, as seen in the flat configuration. In both examples, no water is used during the rejection of heat; only sensible rejection to the atmosphere. The main advantage of the V-bank configuration vs. the

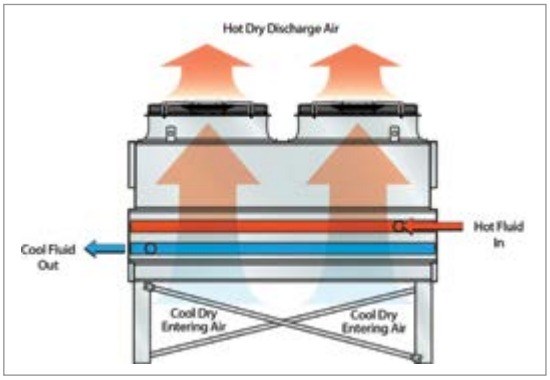

Figure 1: Flat configuration dry cooler (Image courtesy of EVAPCO)

flat configuration is operators can get more heat transfer surface with ambient than with a flat configuration for the same footprint. This is because the coils in the V-bank are oriented in a more vertical arrangement than the flat cooler. V-bank coolers tend to be more expensive, but this can vary depending on manufacturer or application.

Cooling System Definitions

Before we get into examples illustrating the differences between equivalent capacity dry and evaporative cooling systems, we should define a few terms relevant to the discussion. These terms are used for both dry and evaporative systems, but are defined in slightly different ways for both. **Figure 3** shows a graphical representation of these definitions. Note the figure depicts wet bulb temperature as the basis for the tower approach. This would be dry bulb temperature for dry cooling applications and wet bulb temperature for evaporative applications.

Approach: The difference in temperature between cooled fluid and entering air dry bulb temperature (for evaporative cooling, this would be air wet bulb temperature). The typical approach for a dry cooling application is 10-18°F (6-10°C), contrasted with 7-12°F (4-7°C) for evaporative applications. Approach can go down as low as 5°F (3°C) with certain types of equipment in certain types of applications.

Range: The difference in temperature between entering and exiting fluid. The typical range for a dry cooling application is 9-15°F (5-8°C); similarly, 10-15°F (6-8°C) is common for evaporative applications.

Typical Dry Cooling System Applications

In general, dry cooling can be used any place typical evaporative cooling is also used (with the caveat that the required fluid temperature can be reached, given the installation location). Here are a few areas where dry cooling might be an option, given the previous limitations.

Heating, ventilation and air conditioning (HVAC) is present in nearly every building today to some extent, and a widespread application of fluid cooling in these systems is the chiller/cooling tower combination, especially on larger systems. Water-cooled chillers are connected to cooling towers, and these towers are traditionally evaporative. While this is the standard, dry cooling is also an option for these applications. In this case, the dry cooler can be installed in lieu of or in supplement to a traditional evaporative cooling tower to save on raw water costs, as well as associated water treatment costs and chemicals for evaporative systems. However, simply replacing an evaporative tower with a dry cooler is rarely a recipe for success, as there are limitations on what temperature water can be delivered to the chiller. This is due to the approach for a dry cooler being based on the dry bulb temperature rather than the wet bulb temperature for an evaporative system. Since the dry bulb temperature is always higher, the water delivery temperature will be higher as a consequence. This higher cooling water temperature to the chiller can impact performance, so pay careful attention when matching a dry cooler to a water-cooled chiller.

Refrigeration is another potential application for dry cooling. The majority of condensers in industrial refrigeration use evaporative cooling, but this is not always the case. The same limitations around dry bulb vs. wet bulb temperature in the HVAC example apply to refrigeration applications, but the properties of the refrigerant should be considered directly, as condensing at the dry bulb temperature may not be acceptable depending on system refrigerant properties.

Finally, process cooling is a potential application for dry cooling. Some applications (including the car radiator example stated earlier) include closed-loop processes requiring heat rejection at higher temperatures. Examples in industry

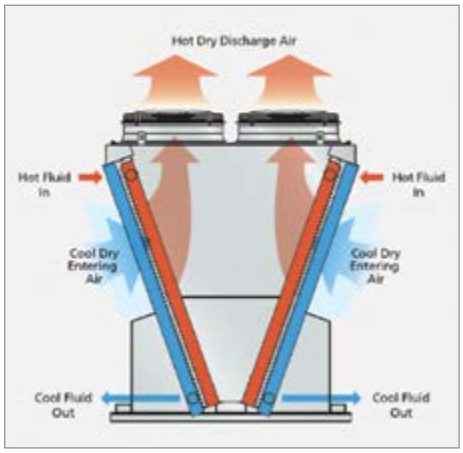

Figure 2: V-Bank configuration dry cooler (Image courtesy of EVAPCO)

Water-Saving Dry Cooling Technologies for Industrial Applications

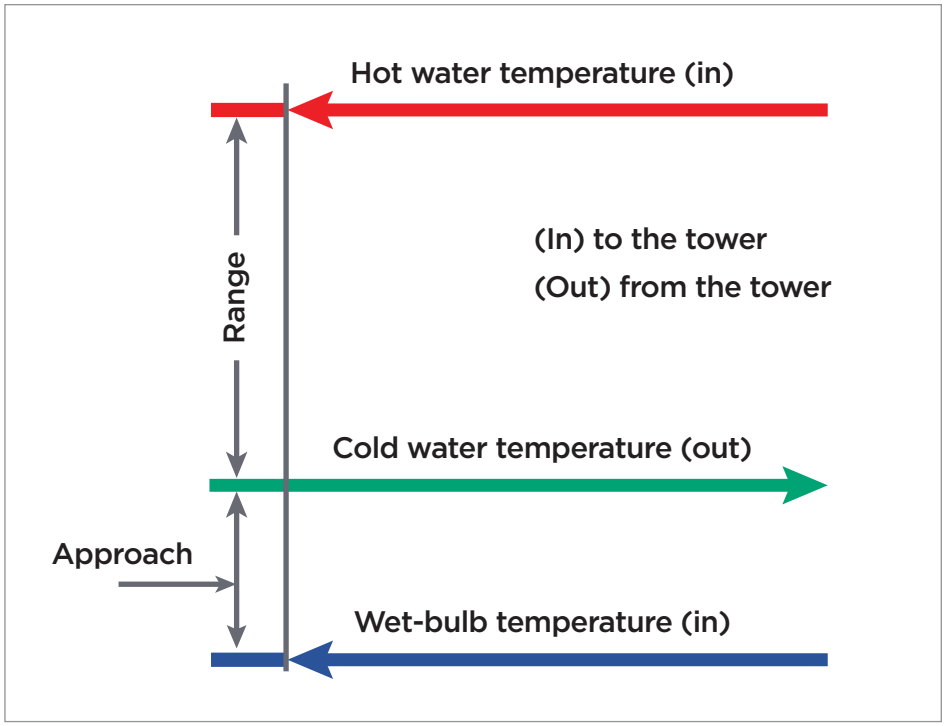

Figure 3: Approach and range definitions (note wet-bulb temperature is dry-bulb temperature in dry cooling)

include cooling for engine water jackets and oil cooling in power-generating systems, water-cooled air compressors and water-cooled compressed air dryers. All these systems typically operate at higher temperatures than the typical water-cooled chiller, and can be a great application for dry cooling where evaporative cooling is either not currently present or not feasible due to water restrictions or water quality issues. These are just a few examples, but, in general, higher temperature processes can do well with dry cooling due to the large approach temperatures involved.

The Pros and Cons of Dry Cooling

As with everything in life, there are pros and cons to dry cooling. The biggest upside to dry cooling is that it turns the process fluid loop into a closed system (evaporative systems are typically open loops). This means dust, debris and microbiological growth (all associated with evaporative systems) are not a factor for completely dry cooling systems, so no filtration or treatment is required to deal with these issues.

This has enormous benefits to maintenance, as water treatment becomes much less of a critical factor in cooling system performance. While the process fluid loop still requires basic water treatment and monitoring, this pales in comparison to the ongoing maintenance and treatment of a typical open loop evaporative system.

Another (obvious) upside of dry cooling is there are no raw water costs associated with its operation. While raw water costs are not typically high in most areas, they can be quite expensive in dry or water-stressed areas of the country. These water savings are in addition to the chemical and maintenance savings mentioned previously.

However, some drawbacks to dry cooling must be taken into account. One we have already alluded to is the exiting fluid temperature is limited by the approach to the ambient dry bulb temperature. This can be mitigated by careful design, but if lower temperatures are critical to the application, dry cooling may not be the best option.

Additionally, the overall heat rejection capacity compared with an equivalent footprint evaporative system is lower. This is due to the latent heat transfer capability available in an evaporative system, whereas the dry cooling system is limited to sensible heat rejection only.

Dry cooling is associated with higher power consumption than an equivalent capacity evaporative system. Heat transfer between the cooler and the ambient atmosphere is primarily driven by fans moving air across the cooler, and these fans consume a lot of power to move the required amount of air. Evaporative cooling systems also use fans, but these are typically lower horsepower and less critical to the process than in dry cooling.

Finally, dry cooling tends to have a higher capital installed cost than an equivalent capacity evaporative system. This is usually due to the cost of materials and labor to assemble the coils, fans, motors and other associated materials present in dry coolers vs. those used by evaporative cooling towers. Greater electrical capacity to drive the additional, larger fans present on dry coolers also increases capital installed cost.

	Dry Cooling	Evaporative Cooling
Water Consumption	0X	1X
Energy Consumption	2X	1X
Footprint Required	4X	1X
Operating Expenditure	1X	1X
Capital Expenditure	4-5X	1X

Table 1: Comparing dry cooling and evaporative cooling

Table 1 summarizes some of the differences between dry cooling and evaporative cooling. Given that evaporative cooling tends to be the standard, the figure shows typical magnitudes for dry cooling vs. an equivalent capacity evaporative cooling system, hence why the Evaporative Cooling column is all 1X. The big benefits of dry cooling are no water consumption and relatively similar operating expenditure, while energy consumption, required footprint and capital expenditure are all higher for dry cooling. Operating expenditure is relatively even between the two because of the tradeoff between water consumption, treatment and maintenance associated with evaporative systems vs. the electrical operating cost for dry cooling.

Specifying Dry and Evaporative Cooling Systems: An Example

To show practical differences between a dry cooler and an evaporative type, we'll go over a sizing example. The basic process for sizing either a dry cooler or evaporative cooling tower is much the same: verify installation weather data against process fluid temperature requirements, establish the required heat transfer rate and select a cooler to match.

In our example, we will look at an installation location with peak weather conditions, indicating a 95°F (35°C) dry bulb temperature and an 80°F (27°C) wet bulb temperature. The heat rejection required by the process is 100 tons (1,200,000 BTU/hr). The approach in both instances will be 10°F (6°C), and the range will be 10°F (6°C). Since the range in both cases is 10°F (6°C), that means the delta across the cooler is also 10°F (6°C), and we can determine the flow rate required is 240 gpm (Q = 500*dT*Flow). The only variable in this example is the dry bulb vs. wet bulb temperature (95°F/35°C vs. 80°F/27°C).

Figure 4: EAW-VD15S2ZB dry cooler (Image courtesy of EVAPCO)

Water-Saving Dry Cooling Technologies for Industrial Applications

	Dry Cooling	Evaporative Cooling
Dry/Wet Bulb Temperature (°F)	95	80
Heat Rejection (tons)	100	100
Approach (°F)	10	10
Range (°F)	10	10
Outlet Temperature (°F)	105	90
Inlet Temperature (°F)	115	100
Required Flow Rate (gal/min, water)	240	240
Equipment Selection	EAW-VD15S$_2$ZB	AT 14-2G6
Approximate Dimensions (L x W x H)	11' 10" x 7' 3" x 9' 7"	6' x 4' 1" x 9' 7"

Table 2: A comparison between two specified cooling systems

Using our definitions of approach and range, we can determine the outlet and inlet temperatures of the coolers and see how dry vs. wet operation affects them.

For the dry cooler, the approach (A) can be used to find the outlet temperature (OT) using the dry bulb temperature (DBT).

OT= (DBT + A) = (95 + 10) = 105° F

The inlet temperature (IT) can be found by using the OT and the range (R):

IT= (OT + R) = (105 + 10) = 115° F

The same procedure can be used for the evaporative cooling tower, with the main difference being the wet bulb temperature (WBT) is used in place of the DBT. Outlet/inlet temperatures for the evaporative cooler are as shown here.

OT= (WBT + A) = (80 + 10) = 90° F

IT= (OT + R) = (90 + 10) = 100° F

If we use these parameters and use EVAPCO's catalogs to select both a dry and evaporative cooler matching these criteria, we find an EAW-VD15S$_2$ZB (dry cooler) and an AT 14-2G6 (evaporative cooling tower) meet the requirements. Their approximate dimensions (L x W x H) are 11' 10" x 7' 3" x 9' 7" and 6' x 4' 1" x 9' 7" respectively, indicating the evaporative unit is smaller overall than the equivalent dry cooler (roughly 86 sq ft required for the dry cooler vs. 24.5 sq ft for the evaporative cooling tower). This works out to a 3.5X footprint requirement, which tracks with our earlier estimation of a 4X impact. Figures 4 and 5 depict the selected dry and evaporative coolers, and **Table 2** shows a comparison summary between the two. The dry cooler has two fans, whereas the evaporative cooling tower has only one, which is in line with the previously discussed increased electrical and capital cost requirements of dry cooling.

In this example, we've deliberately controlled for all variables (load, approach, range and flow rate) with the exception of the ambient temperatures involved to illustrate the main difference due to dry vs. evaporative cooling. The dry cooler cannot produce water as cool as the evaporative system, but this may not be an issue depending on the system being served. Additionally, the dry cooler must be larger to serve the same heat rejection load. However, the estimated peak evaporation rate for the evaporative cooler at a 10°F (6°C) delta and 240 gpm of flow is around 2.4 gpm (1% of circulating flow), so this should be taken into

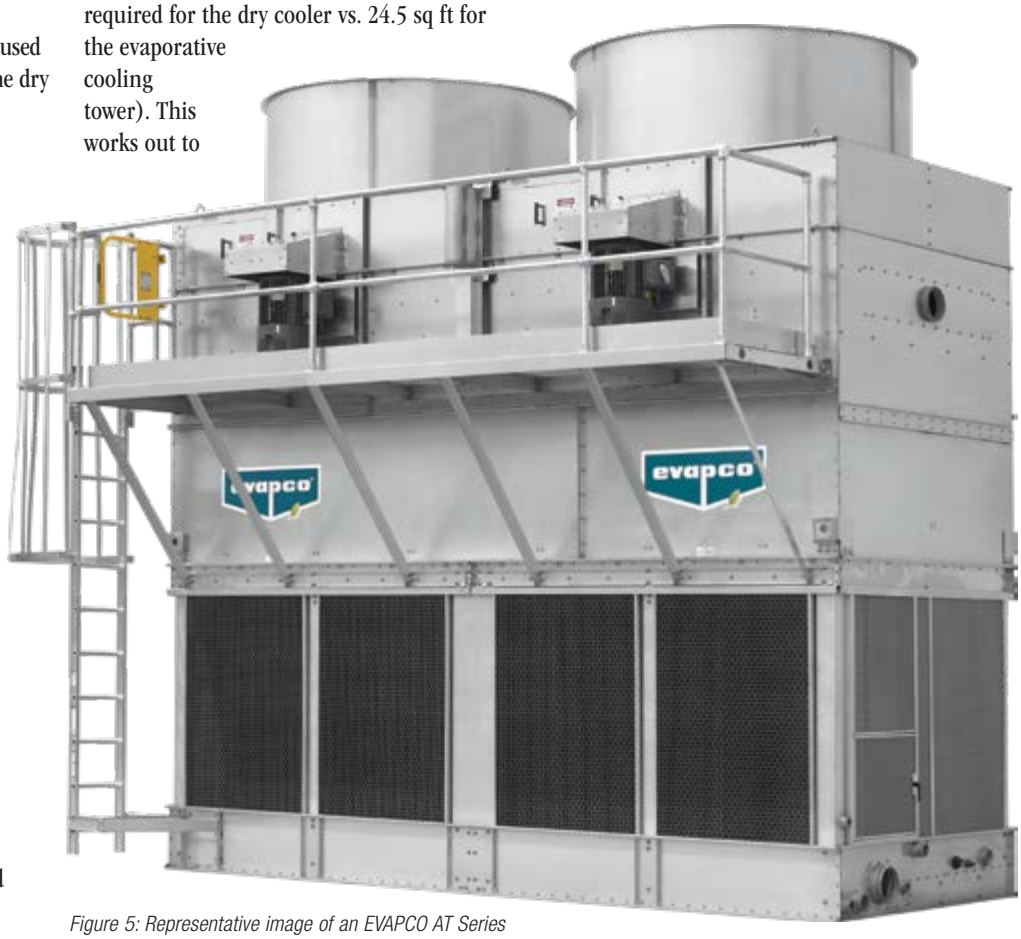

Figure 5: Representative image of an EVAPCO AT Series cooling tower; actual model not shown (image courtesy of EVAPCO)

account. This evaporation rate varies depending on system delta, flow rate and time of year, but this is a fair estimate at peak. The dry cooler avoids this raw water and associated treatment cost.

In summary, dry cooling can be a great way to eliminate one of the largest water points-of-use in an industrial setting, and can be applied in a variety of applications. Matching process suitability is a key factor in implementation success and should not be underestimated. In addition, system performance should be evaluated across an entire operational year to understand the full impact of using a dry cooling system vs. an evaporative cooling system, as dry cooling may be lower cost in off-peak months (the installation location will affect this heavily). Finally, hybrid or adiabatic coolers can give the best of both worlds, using some water at peak loading and operating in dry modes the rest of the year. Again, evaluation across an entire year's worth of weather data is helpful in matching needs with equipment. For more on adiabatic cooling, read "Adiabatic Coolers: An Evolution in Sustainable Process Cooling," *Compressed Air Best Practices*, March, 2026. BP

About the Author

Nick McCall, PE, is a Senior Project Engineer for E4E Solutions. He has a B.S. in Mechanical Engineering from the Georgia Institute of Technology. He has 16 years of experience as a mechanical engineer performing design for clients in the food and beverage, power generation and general manufacturing sectors. Project experience includes design and build installation, construction management and start-up and commissioning of new utility, process and packaging lines. His areas of expertise include designing and engineering process, utility and power generation designs, engineering bid packages, utility specifications and commissioning utility systems.

About E4E Solutions

E4E Solutions is an EPC (engineer, procure, construct) supplier specializing in the development, design engineering, implementation and financing of innovative solutions meeting decarbonization goals, reducing operating costs and modernizing and renewing utility system infrastructure. It has a successful track record developing high ROI, sustainable, cost-saving projects for industrial, manufacturing and large commercial clients around North America. For more, visit https://e4esolutions.com.

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The 2026 Cooling Technology Institute Annual Conference

By Bill Smith, Regional Sales Manager – Eastern U.S. & EMEA, Compressed Air & Cooling Best Practices Magazine

The 2026 Cooling Technology Institute (CTI) Annual Conference for manufacturers, owner-operators and suppliers of heat rejection equipment was held Feb. 8-11, 2026, at the Westin Galleria in Houston, TX. This show report shares updates to CTI standards and acceptance test codes, synopsizes the event's educational curriculum, shares perspectives and highlights firms attending this year's conference. Due to space constraints, not all exhibitors, authors and presenters could be included.

CTI Leadership Updates

At the conference luncheon, outgoing CTI President Jim Baker introduced incoming CTI President Ian Horne, Water Technology Specialist, Airgas, to kick off his 2026-2028 term.

"Without the people in this room, I would never have been successful in my job. It's my intent to honor the founding members who have been pillars of CTI. I'd like to thank Jim Baker, who has served as a delegate of CTI for 44 years," said Horne.

The cabinet members now include Vice President Nick Macarenas (Baltimore Aircoil), Treasurer Brandon Rees (Cooling Tower Depot) and Secretary Mark Williams (Walter P. Moore). Outgoing CTI Board of Directors members Billy Childers (Aggreko) and Miguel Gutierrez (Albemarle) were thanked by the collective.

Members newly appointed to the Board of Directors include Kimberly Ashcraft with Arizona Public Services, David Staat with OBR Cooling Towers and Bob Hendel with Veolia Water Technologies.

Educational Seminar & Technical Papers

The Educational Seminar, chaired by Frank Morrison, Technical Director, Global Marketing, Baltimore Aircoil, focused on heat rejection for "new economy markets" including semiconductor manufacturing, data centers, battery energy storage systems, hydrogen electrolysis and co-located power generation facilities.

The seminar brought awareness to an updated standard (ASCE 74-23) from the American Society of Civil Engineers that may classify an FRP field-erected cooling tower as a building, not equipment, threatening substantially increased costs. According to presenters, cooling tower knowledge provided to the ASCE committee by CTI was not used. CTI's FRP documentation can be found in STD-137, ESG-152, Chapter 9 and 13, TP-137 and a guideline in development called ESG 175.

The full Educational Seminar agenda featured:

1. *Cooling the New Economy: Strategies for Hydrogen, Energy Storage, AI Infrastructure & More* by Mihir Kalyani, EVAPCO
2. *Sustainable Cooling of Mega Facilities* by Stephen Kline and Jan Tysebaert, Baltimore Aircoil
3. *Benefits of FRP Construction for New Economy Facilities* by Rebecca Schwab, Cooling Tower Depot; Joe Gende, Kelvion; Kevin Leon-Tang, International Cooling Tower, and Dan Reith, EvapTech
4. *Water Treatment Challenges with Direct-to-Chip Thermal Management in Data Centers* by Pete Elliott, ChemTreat, and Loraine Huchler P.E., CEM., MarTech Systems

The conference featured around 30 technical paper presentations, an owner/operator session, a water treatment panel discussion and the longstanding ask-the-expert seminar.

"I learned a lot from both David Staat's presentation, *Post-Failure Evaluation of Wood-to-FRP Conversion of a Crossflow Cooling Tower*, and Tom Kline's presentation, *Protective Surface Coating & Lining for Reinforced Concrete Cooling Tower*," said Brady Kratzer, Baytown Area Cooling Tower First Line Supervisor, ExxonMobil. Kratzer's colleague Cameron Gore, FECC Inspection FLS and RECON Team Officer, said he learned from Joe Gende at Kelvion during *Field Erected Stainless Steel Towers*.

Codes and Standards Updates

CTI's three standing committees – Engineering, Standards & Maintenance (ESM); Performance & Technology (P&T) and Water Treatment (WT) – gather at the conference to review, draft and update CTI's existing and developing acceptance test codes (ATC) and standards (STD) covering thermal performance, sound, drift, water treatment, materials, plume abatement, vibration and fire resistance. Committee chairpersons include Jamie Bland with Composite Cooling Solutions for ESM, Scott Nevins with EVAPCO for P&T, and Loraine Huchler with MarTech Systems for WT.

CTI announced its new Sound Certification program (STD-204), so operators have assurance heat rejection devices will comply with manufacturers' published sound ratings. To be eligible for sound certification, the equipment must first be thermal performance-certified per STD-201. The Sound Measurement Test Code ATC-128 was updated with measurement methodology for small towers for this program.

Above: Two six-cell, induced draft, field-erected, crossflow cooling towers at a manufacturing facility (image courtesy of EVAPCO).

The ESM committee discussed updates to both ESG-173 Field Erection Practices and ESG-177 Provisions of Cooling Tower Access and Walking Surfaces in a committee meeting led by David Staat. Nine P&T Committee task groups met during the conference, according to Nevins. Voting member Jacob Faulkner, Black & Veatch, said the ATC-150 Plume Abatement code is undergoing a major overhaul, and the ATC-105 Thermal Performance code is being revised with adjusted requirements for acceptable deviation of fan power.

In August 2025, CTI published a general guideline (WTG-126) titled *The Use of Non-Oxidizing Biocides in Cooling Water Systems*. Other updated guidelines include WTG-129 and WTG-141.

As of December 2025, CTI reports a total of 113 cooling tower manufacturers active in the STD-201 Thermal Certification Program. In addition, 34 of the manufacturers also market products as private brands through other companies. In total, participants have 252 certified product lines, plus 53 product lines marketed as private brands, resulting in approximately 93,000 CTI-certified models.

CTI Expo

At Baltimore Aircoil's presentation in the Educational Seminar, Stephen Kline and Jan Tysebaert shared how evaporative, hybrid, dry and adiabatic technologies are used in mega facility heat rejection, citing case studies with heat loads up to 100 megawatts. An example of a 1.136 power usage effectiveness (PUE) immersion plus evaporative-cooled, chillerless data center system was also shared.

Brentwood Industries invested in its manufacturing capabilities in Redding, PA, according to Jason Hill, Marketing Specialist. The company celebrated its 60th anniversary in 2025. It manufactures cooling tower fills, nozzles, drift eliminators and inlet louvres.

EvapTech opened EvapTech Gulf Services, a new office in the Houston area, to support the energy, petrochemical, industrial and power generation markets concentrated along the Gulf Coast. The local presence enhances its ability to deliver faster response times, closer collaboration and

Tim Currie, Benjamin Guo and Frank Morrison with Baltimore Aircoil (left to right).

The Brentwood Industries team: back row: Tom Scozzari, Dylen Ziegler, Joshua Wentzel, Kori Boyle, Sophia Hawthorne, Olivia Paules, Jacob Blystone, Clint McCorkle; front row: Angela Zaorski, Sarah Holland, Kim Nguyen, Peter Rye (left to right).

Jean-Pierre Libert and Shannon Kanierim with EVAPCO and EvapTech (left to right).

Troy Lyden and Vamsi Mokkapati with Nimbus Advanced Process Cooling (left to right).

The 2026 Cooling Technology Institute Annual Conference

Sam Poweleit and Scott Levy with Regal Rexnord (left to right).

Anthony Shank, Mike Partington, Gary Stauffer, Jeremy Wilson and Kaleigh-Ane Kugel with SPX Cooling Tech (left to right).

more efficient execution of new construction and retrofit projects. Angie Montes is the location's office manager.

Nimbus Advanced Process Cooling displayed Virga hybrid adiabatic coolers, as Nimbus explores participation in the STD-201 certification, according to Vamsi Mokkapati, Technical Director. Mokkapati presented *How Adiabatic Technology Delivers Performance Savings* during the conference.

Regal Rexnord showed its range of cooling tower accessories and power transmission products, including Falk CT-Series gear drives, composite disk couplings, Cambridge water screen systems and Addax cooling tower brakes.

RWI industrial liquid cooling towers are built to provide the small footprint portability needed for auxiliary cooling of process fluids. Available in 6-30 ton capacities, the floating base cooling towers allow auxiliary cooling to be added to any liquid pond.

SPX Cooling Tech recently introduced its OlympusMAX dry and adiabatic fluid cooler lines. Its 60 hp model is rated for 9,553 MBH in dry configuration and 10,900 MBH in adiabatic configuration in CTI-standard rating conditions for dry and adiabatic coolers. According to Aftermarket Key Account Manager Gary Stauffer, SPX Cooling maintains a strong inventory of gearboxes and aftermarket parts.

Robert Ballantyne with RWI Enhanced Evaporation.

Brandon Johnson with WEG Electric.

WEG discussed its latest cooling tower motor solutions, W80 AXgen motors with axial flux technology, a direct-drive cooling tower motor and W23 SYNC+ IE5 foot-mounted motors.

The CTI 2027 Annual Conference will take place February 7-10, 2027, at The Peabody Memphis. For more information about the Cooling Technology Institute, visit www.cti.org. BP

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SALES ENGINEERING SKILLS

Creating Urgency in B2B Sales Is Critical for Driving Revenue

By Mark Allen Roberts, CEO, OTB Solutions

In industrial B2B sales, executives want their salespeople to create urgency. Sales urgency isn't created by pressure, discounts or aggressive closing techniques. It isn't created with repeated calls and voicemails.

We find 60% to 70% of sales teams in compressed air, cooling and vacuum systems can generate leads and identify issues, but fail to convert leads into revenue because they don't create urgency.

There are two types of buyers: approach-oriented and avoidance-oriented. Approach-oriented buyers want to be the first to buy and be ahead of their industry. They account for 30% of buyers. Avoidance-oriented buyers want to avoid risk. They don't want something preventable to occur that could negatively impact their company or career. Avoidance-oriented buyers represent 70% of buyers.

Mark Allen Roberts will conduct a Sales Engineering Workshop at the Best Practices 2026 EXPO & Conference in Indianapolis, IN.

Urgency is created when buyers perceive risk, consequence and immediacy. Before a threat to their manufacturing throughput occurs, buyers experience three psychological triggers:

Visible Threat. The concern is real, specific and credible. Most sales engineers fail here. They talk about features, benefits and improvements, but not threats if the buyer doesn't act.

Tangible Consequences. Buyers imagine concrete outcomes, including lost production, orders shipping late, quality concerns or uncomfortable conversations with their managers about how this could have occurred. The consequences feel personal and immediate.

Time Compression. Perceived threats have a deadline. In B2B sales, most deals lack a clear timeline. Salespeople ask, "When would you like to move forward?" and buyers respond, "Let's revisit next quarter." Without a deadline, urgency dies.

3 Ways B2B Salespeople Create Urgency

Make the Risk of Inaction Visible. Salespeople must expose hidden risks. Instead of saying, "Our solution improves productivity and is better than the competition," say, "Here's what the data tells us will happen if your current process continues for 12 months." Examples might include lost revenue, rising costs, a competitive disadvantage, customer churn, regulatory risk, lack of inventory, shutting down production or explaining to executives why they can't ship orders.

Quantify the Consequences. Translate risk into numbers. Instead of saying, "You're losing efficiency," say, "You're losing $2.4 million annually due to this process. Every month we don't fix this issue, it costs your company $200,000." Instead of saying, "This slows your team down," say, "This adds 19 days to your sales cycle," or "If left unchecked, this reduces throughput by 23%." Urgency increases when consequences become measurable.

Create a Real Clock. When will the product or service need to be ordered and installed to solve the issue? Urgency requires a credible timeline. Examples include budget cycles, contract renewals, market shifts, regulatory deadlines, competitive moves, product launches, plant expansions and increased production targets. Instead of asking, "When would you like to decide?" say, "Based on your growth targets, you have 90 days before this becomes materially expensive to fix."

When sales engineers master the skill of creating urgency, their sales grow, close rates increase and compensation increases significantly. BP

About the Author

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

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Real-World Installations & Maintenance

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

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

EMCOR Services Shambaugh used this water-cooled chiller to train its newer technicians.

Aged Chiller Looks New Again

Based in Indianapolis, IN, EMCOR Service Shambaugh is a division of EMCOR, which includes over 80 companies. Its Chiller Group focuses on helping customers save money by keeping older chillers running well. Visit https://esshambaugh.com.

This chiller performed reliably for a plastic bag manufacturing plant for many years, but the time had come for a professional overhaul. These before-and-after pictures were taken by Jody Selvage, Account Manager. Age and a lack of experienced technicians led to its condition, he said. His team even found an old hammer at the bottom of the suction cover, half dissolved by refrigerant. The company updated the chiller's controls, replaced the purge unit and motor starter, removed the rust and re-insulated the unit.

Nondestructive Testing Reveals Cracks in Centrifugal Air Compressor

Fluid Flow Products has been in business in Texas for over 50 years. It specializes in compressed air system sales, with a focus on centrifugal air compressors, desiccant compressed air dryers and compressed air system audits. Its parent company is Flow Control Group. Visit https://flowcontrolgroup.com.

This 450 horsepower, 125 psig, 2,000 cfm JOY centrifugal air compressor belongs to a packaging company in Texas, and was due for regular servicing. Fluid Flow Products spotted cracks in the bull gear shaft using nondestructive testing – cracks that weren't visible to the naked eye. "If we had not discovered the cracks, it's likely the machine would have failed on startup after our repair, or at least had a vibration issue from the shaft instability," said Hunter Neblett, Vice President, IFC.

The customer saved $20,000 by replacing the shaft, rather than buying a new bull gear.

Submission Guidelines

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

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Advertising/Editorial Rod Smith • rod@airbestpractices.com • Tel: 412-980-9901
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Nathan Payne, P.E.
Senior Project Engineer, E4E Solutions, LLC

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>
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Andrew Smith, P.E.
Co-Founder, SMARTCAir

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>
> – I/E Reliability Engineer, Qemetica US Silica

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>
> – Civil Works Supervisor, Magna

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