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July 2025

46 Coca-Cola Beverages Northeast

16 Cardinal Glass Increases Throughput

22 Thermal Energy Storage

28 Pneumatics and Vacuum Generators for Robotics

32 Detecting Legionella

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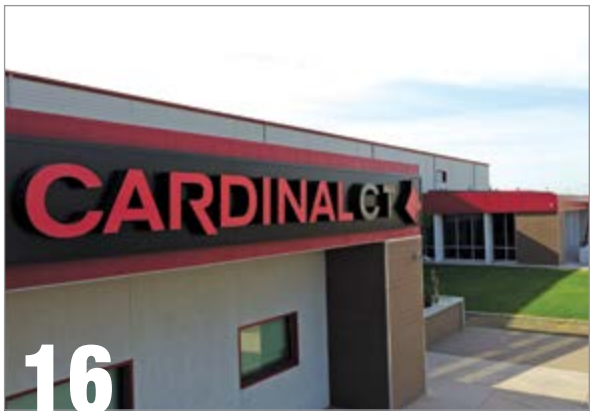
COMPRESSED AIR SYSTEM FEATURES

16 **Cardinal Glass Increases Throughput with Dry Compressed Air**
By Troy Dreier, *Compressed Air Best Practices® Magazine*

28 **Pneumatics and Vacuum Generators Power Robotics at Automate 2025**
By Troy Dreier, *Compressed Air Best Practices® Magazine*

38 **The 2025 AICD Show Report**
By Bill Smith, *Compressed Air Best Practices® Magazine*



COOLING SYSTEM FEATURES

22 **Addressing Energy Challenges with Thermal Energy Storage**
By Paul Valenta, Trane

32 **Early Detection of Legionella in Recirculating Water Systems**
By Loraine Huchler, MarTech Systems

LATEST NEWS

10 **Compressed Air Industry & Technology**

12 **Chiller & Cooling Industry & Technology**

14 **Industrial Energy & Water Conservation**

EVERY ISSUE

6 **From the Editor**
8 **Subscribers From Around the World**
45 **Column** | Sales Engineering Skills
46 **Column** | Better Plants Insights
48 **Real-World Installations & Maintenance**
49 **Advertiser Index**
50 **The Marketplace** | Jobs and Technology

Cover image: Courtesy of Coca-Cola Beverages Northeast

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FROM THE EDITOR

Building Productive and Safe Facilities

This issue is about achieving a high degree of quality and safety in industrial operations. Our lead story focuses on quality. In Arizona, heat overwhelmed a glass producer's refrigerated compressed air dryers, leading to water playing havoc with the plant's pneumatics. According to Cardinal Glass Plant Manager Logen Kelly, summer temperatures routinely reached 130°F (54°C). Replacing the existing equipment with properly sized refrigerated compressed air dryers solved the issue and increased production throughput.

Loraine Huchler of MarTech Systems has written an excellent feature on cooling system safety explaining how biofilm leads to Legionella production. Plant operators relying on reclaimed water for cooling should know that while the cost of reclaimed water is 10% that of potable water, non-potable makeup water has a greater concentration of bacteria and nutrients, increasing the risk of biofilm proliferation.

Thermal Energy Storage (TES) helps facilities stay cool while avoiding peak electrical charges. TES systems create chilled water or ice in massive insulated tanks during off-peak hours, then use that water or ice during the day to provide cooling. Our feature on this emerging technology, written by Paul Valenta, Thermal Storage Product Manager, Trane, should stir interest. Facilities can save tens of thousands of dollars each year with TES, with only a half-year return on investment, it says.

This issue brings reports from two shows – the Association of Independent Compressor Distributors (AICD) annual show, which took place April 27-29 in Louisville, KY, and Automate, which ran from May 12-15 in Detroit, MI. In each, we found exhibitors displaying solutions to improve industrial productivity.

Finally, we close with two columns. In our new Sales Engineering Skills column, professional trainer and coach Mark Allen Roberts explains how sales engineers can adopt consultative selling, asking the right questions to help customers improve operations. Then, our Better Plants Insights column returns with a hands-on INPLT training session at Coca-Cola Beverages Northeast. Attendees discovered optimizing the air compressor controls and reducing the leak load by 25 acfm would result in a 14% reduction in system energy consumption.

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BEST PRACTICES

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Group discounts are available! Reach out to Kimberly Hill at kimberly@airbestpractices.com for more information.

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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!

We were pleased to see many subscribers at the AICD show in Louisville, KY. Representing Maddox Air Compressor of Ogden, UT, here are Erika Maddox, Office Manager; Trey Maddox, Parts Sales; Robin Speelman and Kent Tolman, Owner (left to right). Maddox distributes Quincy air compressors throughout Utah, servicing food processing, food packaging and auto parts facilities, as well as a variety of hospitals and schools. Visit https://www.maddoxair.com.

Climate Technologies is based in Farmington Hills, MI, and provides heating and cooling solutions for industry and commerce. It partners with Geoclima and M&M Refrigeration, among others, and regularly works with automotive, food, pharmaceutical and electronics facilities. Pictured here is Office Manager Kris Stevens. Visit https://climatetechnologies.com.

A family-owned company since 1953, Brehob has nine locations in Indiana, Ohio, Kentucky and Michigan. It distributes Quincy air compressors and vacuum pumps. Shown here are Rick Lamb, Operations Manager; Daryl Graham, Customer Care Specialist; Alexa Chastain, Assistant Regional Operations Manager and Troy Roth, Service Manager. Visit https://www.brehob.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.

It's no surprise we found plenty of automotive engineers checking out the pneumatic and vacuum generation solutions at Automate 2025, since this year's show was held in Detroit, MI. Antonio López Arredondo is a Controls Automation Cells Staff Engineer for General Motors. GM has over 90,00 employees and 150 facilities in the U.S. Visit https://www.gm.com.

Located in Portland, OR, and founded in 1994, Portland Compressor distributes Ingersoll Rand and Chicago Pneumatic air compressors. Shortly after opening, it expanded into paint sprayers, as well, where it carries the Graco line. We caught up with General Manager Matt Fleskes at the AICD show. Visit https://www.portlandcompressor.com.

NEWS Compressed Air Industry & Technology

Kaeser Compressors Breaks Ground on 80,000-Square-Foot Expansion of US Headquarters in Virginia

Kaeser Compressors, the U.S. headquarters of global compressor manufacturer Kaeser Kompressoren, is expanding its facility in the Fredericksburg, VA, area. The company broke ground on the 80,000-square-foot expansion.

"With this small shovel we're going to seed Kaeser's future growth," said Frank Mueller, President, Kaeser Compressors. "This project expands our capacity to build more of our custom-engineered solutions and KASE units right here in Fredericksburg."

The new space will primarily support the assembly of Kaeser's custom air systems – complete compressed air, low-pressure blower and vacuum systems engineered for high-performance installations. These systems are built for reliability, easy maintenance and exceptional energy efficiency. Housed in rugged, weatherproof enclosures and mounted on custom skids, they significantly reduce installation time and costs by arriving fully assembled and ready to connect. While well-suited for mobile and temporary applications, they are also an ideal long-term solution for facilities with space, environmental or installation constraints.

Cedric Harrison, Matt Chilton and Frank Mueller of Kaeser Compressors; Tyler Jennelle of Harlan Construction and Michael Stevenson of McKinney & Co. (left to right)

Kaeser currently employs nearly 300 people in the Fredericksburg area. This expansion is expected to create approximately 30 additional jobs across warehouse operations and the mechanical, electrical and plumbing trades. For more information, visit https://us.kaeser.com.

Airmatic Becomes Distributor of Rogers KNW Series Oil-Free Air Compressors

Airmatic announced it is an official distributor of the Rogers KNW Series oil-free rotary screw air compressors, powered by Kobelco. These air compressors deliver 100% oil-free air for demanding industrial environments. Known as the crown jewel of the Rogers Machinery product line, the KNW Series combines precision engineering, unmatched durability and energy efficiency, making it the go-to choice for applications where air purity is non-negotiable.

Rogers KNW Series oil-free rotary screw air compressor

The Rogers KNW Series air compressors are designed, manufactured, assembled and tested in the U.S. to be among the longest-lasting and most energy-efficient oil-free rotary screw air compressors available. Key features include oil-free operation, a two-stage compression module, coated rotors, an advanced sealing system and comprehensive monitoring.

Rogers Machinery emphasizes service and support, high-performance products that stand the test of time and the right solutions tailored to specific applications. For more information, visit https://www.airmaticcompressor.com.

BOGE Announces Dr. Björn Six as Managing Director Market

Compressed air specialist BOGE has added to its management. Dr. Björn Six is now responsible for commercial and market-related management, forming a new management partnership with Managing Director Technology Dr. Sebastian Göbel. With over 10 years of managerial experience in automation and mechanical engineering, Six will add new strategic and operational momentum.

Six studied industrial engineering, specializing in mechanical engineering in Darmstadt, then completed a PhD in Innovation Management. From 2011, he worked at the Weidmüller Group, where he took charge of various divisions, specializing in business development, digitization and automation. Six also served as Managing Director of software developer AWCP in Nürtingen, near Stuttgart, from 2017.

While Göbel is responsible for the technical management, Six looks after the market-oriented sections of the Bielefeld-based family business. The clear division of responsibilities paired with close collaboration between the two departments will allow BOGE to specifically combine technological developments for the compressed air industry with market-oriented strategies and further boost competitiveness.

"I'm looking forward to being able to actively help shape the future of BOGE. I see huge potential that we can further develop together, especially in digital transformation. At the same time, we need to make targeted use of sales opportunities in a dynamic and currently challenging market environment and thus set a new course with our strong portfolio," said Six.

At the same time, BOGE is also consolidating its sales department. Marc Heht has held the position of Sales Manager since the start of March 2025. With his comprehensive sales experience in the compressed air business as well as in mechanical and plant engineering, he will help further expand BOGE's market position and network. For more information, visit https://www.boge.com/en-us.

Dr. Björn Six (left) is responsible for commercial and market-related management, forming a new management partnership with Managing Director Technology Dr. Sebastian Göbel (right).

Hard Hat Compressed Air Maintenance Workshop Returns to Best Practices 2025 EXPO & Conference in Kansas City

After its popular debut last year, the Hard Hat Compressed Air Maintenance Workshop will return for the Best Practices 2025 EXPO & Conference in Kansas City, Oct. 21-23. This four-hour, interactive workshop designed for facility engineers and maintenance technicians focuses on how to ensure a reliable compressed air supply, achieve substantial energy savings and meet carbon emission reduction targets. It'll be led by expert panelists from SMC Corporation of America, Ardagh Glass Packaging, The Analysts, UE Systems and Gentex.

The workshop provides hands-on experience with fully operational tabletop compressed air labs with pneumatic circuits. Participants will observe the impacts caused by pressure loss and flow variation, as well as identify the locations, causes, repairs and quantification of compressed air leaks. Each participant will receive a project list to take back to their facility to enhance uptime and achieve carbon reduction with minimal downtime and low capital cost.

The Hard Hat Compressed Air Maintenance Workshop is designed to teach facility engineers and maintenance technicians to maximize uptime, save energy and hit carbon emission reduction targets.

The Hard Hat Compressed Air Maintenance Workshop includes four sessions: Meet Your Compressor Room, Meet Your Distribution Piping, Meet Your Processes and the "Dirty 30" and Master Your Compressed Air System.

Five industry experts will lead the workshop:

- Jon Jensen, Energy Efficiency Group Manager, SMC Corporation of America
- Joshua M. Taylor, Asset Reliability Manager, Ardagh Glass Packaging
- Josh Wamser, Auditor and Co-Founder, The Analysts
- Kyle Bitter, Regional Manager – Upper Midwest, UE Systems
- Chris DenBesten, Facilities Specialist for Water Quality, Compressed Air and Nitrogen, Gentex

The Hard Hat Compressed Air Maintenance Workshop is sponsored by SMC Corporation of America.

Only plant maintenance and engineering personnel are eligible. Pre-registration required. Learn more: https://cabpexpo.com/hard-hat-compressed-air-workshop. For more information, visit https://cabpexpo.com/attend.

Comairco USA Expands Into Pennsylvania and West Virginia, Distributing Sullair Product Line

Comairco USA is extending its footprint with two new territories. A new branch in Pittsburgh, PA, is officially open. The company will now distribute the Sullair product line in Pennsylvania and West Virginia.

This expansion enhances Comairco USA's ability to bring premier compressed air equipment and unmatched on-site service directly to its customers. Its new locations will focus on delivering advanced compressed air solutions to industries critical to American progress – especially oil, gas and mining.

Comairco USA remains committed to delivering innovative, high-quality products, shortening response times, strengthening on-site support and building lasting partnerships in each region. This expansion represents the company's ongoing dedication to driving excellence and helping businesses in these dynamic markets reach new heights. For more information, visit https://comairco.com.

NEWS Chiller & Cooling Industry & Technology

Baltimore Aircoil Company Announces Morin Process Equipment as an Industrial Power and Process Representative

Baltimore Aircoil Company (BAC), a global leader in cooling solutions for industrial, manufacturing, commercial and refrigeration markets, announced the appointment of Morin Process Equipment as its new representative for industrial, power and process in Alabama, Georgia, Mississippi, Tennessee, Kentucky and Arkansas.

Morin Process Equipment is now a Baltimore Aircoil Company representative in six states.

Morin Process Equipment, with its headquarters in Pelham, AL, boasts a team of over 100 professionals dedicated to providing best-in-class products and support to its customers.

"This strategic partnership aims to enhance BAC's presence in these states and commitment to working with the best representatives to provide an unparalleled customer experience," said Shaun Papperman, Director of Business Development for the Americas, BAC.

Morin Process Equipment has built a strong reputation as an equipment sales, distribution, repair and service organization. Its creative and proactive approach to serving customers in the process industry makes the company an ideal partner for BAC.

BAC and Morin Process Equipment look forward to a strong partnership and continued commitment to providing the best cooling solutions with unmatched excellence to customers in the industrial, power and process sectors. For more information, visit https://morinprocess.com and https://baltimoreaircoil.com.

Automated Logic and Laurel Institutes Team to Build Next Generation of HVAC and Building Automation Experts

Automated Logic and the Laurel Institutes are partnering to build a new generation of HVAC technicians while outfitting campuses in three states with the latest building automation systems.

The partnership is part of Carrier's TechVantage Initiative, which involves hiring 1,000 service technicians in the United States and providing additional training to over 100,000 Carrier and Carrier partner HVAC technicians within five years. Carrier is forming strategic alliances with vocational and technical institutes across the country to support the initiative and prepare technicians for cutting-edge HVAC solutions.

Founded in 1985, the Laurel family of schools, including Laurel College of Technology, Laurel Business Institute and Laurel Technical Institute, is a well-known post-secondary technical school organization that offers hands-on training and small class sizes, taught by highly skilled and experienced instructors. In addition to multiple locations in Pennsylvania, Laurel also has campuses in Morgantown, WV, and Fort Mill, SC.

"The cutting-edge technology Automated Logic will be equipping our schools, teachers and students with will allow our graduates to be among the most well-prepared automation graduates not only in this region, but throughout the country," said Douglas Decker, Chief Operating Officer, Laurel Institutes.

Laurel campuses will be outfitted with Automated Logic control systems to efficiently regulate commercial HVAC, electrical and other large facility mechanical systems. Automated Logic experts will provide training to Laurel faculty, donating direct-training hours and offering field trips to students to Automated Logic facilities as they learn to install, build and troubleshoot the latest building automation systems. There will also be exclusive employment opportunities for Laurel students.

"With the Automated Logic–Laurel partnership, students can go from their campus to anywhere in the world with the global reach of Carrier and Automated Logic," said Andy Bierer, Managing Director, Automated Logic Field. "With the foundational knowledge gained from Laurel programs, coupled with the access to Carrier's world-class equipment, training and facilities, these students will be well-prepared for an exciting career in some fast-growing industries." For more information, visit https://www.laurel.edu, https://www.automatedlogic.com and https://www.carrier.com.

Andy Bierer, Managing Director, Automated Logic Field (left), and Douglas Decker, Chief Operating Officer, Laurel Institutes (right), signed an agreement detailing a partnership that will help build a new generation of technicians under Carrier's TechVantage Initiative. Also pictured is Justin Caldwell, Regional Director of Trades, Laurel Institutes (center).

Daikin Applied Opens 12th Parts Store in Phoenix, Arizona

Daikin Applied has opened its 12th parts store. The new store, located in Phoenix, AZ, reflects the company's commitment to supporting customers in the region with access to high-quality HVAC parts and supplies. The store also builds on the technology and services offered by Varitec Solutions, a Phoenix-based engineered HVAC solutions firm that Daikin acquired in October 2024.

Together, Daikin and Varitec can address a broad range of heating and cooling needs – from system design and installation to the parts customers and contractors need to keep equipment running at peak performance.

Daikin Applied's 12th parts store has opened in Phoenix, AZ.

"The Phoenix parts store is another way we're able to help customers maximize the value and longevity of their HVAC systems," said Jack Engel, Senior Director of Aftermarket Solutions, Daikin Applied. "But we're not just increasing access to parts. We're investing in the people, relationships and resources that allow our customers to operate more efficiently."

The store is fully stocked with a comprehensive inventory of parts and components, and staffed by experienced professionals dedicated to providing an unrivaled customer experience. Designed to ensure rapid response to customer needs, this facility will help minimize equipment downtime and enhance system reliability.

Several additional parts stores – one each in Manchester, NH, Philadelphia, PA, and Charleston, SC – are slated to open in summer 2025, further expanding Daikin's reach and support capabilities. For more information, visit https://www.daikinapplied.com.

Trane Technologies Recognized for Environmental Leadership on CDP's A List

Trane Technologies, a global climate innovator, has been recognized for its leadership in corporate transparency and performance on climate by CDP, earning a place on its annual A List for the third consecutive year.

Of the record 22,400 companies that received a climate score this year, Trane Technologies is distinguished as part of the 2% of scored companies earning an A rating. CDP's rigorous scoring process assesses the comprehensiveness of disclosure, awareness and management of environmental risks, plus the demonstration of best practices in environmental leadership, including setting ambitious and meaningful targets.

"Achieving CDP's prestigious A List recognition underscores Trane Technologies' climate leadership and our commitment to meaningful, transparent action for a more sustainable world," said Mauro Atalla, Senior Vice President, Chief Technology and Sustainability Officer, Trane Technologies. "Sustainability is at the center of our strategy and continued success. We are proud to lead by example, proving that climate accountability, customer innovation, an uplifting culture and a strong bottom line go hand in hand."

Trane Technologies is at the forefront of decarbonizing buildings, industry and the cold chain through pioneering actions and innovations. The company is making significant progress toward its 2030 Sustainability Commitments, including the Gigaton Challenge, and its pledge to be net-zero by 2050. For more information, visit https://www.tranetechnologies.com.

NEWS Industrial Energy & Water Conservation

Lubrizol Releases 2024 Sustainability Report Update, Reduces Scope 1 and 2 GHG Emissions by 16%

Lubrizol, a science-based company delivering sustainable solutions to advance mobility, improve well-being and enhance modern life, released its latest Sustainability Report Update. This year's report update, "Imagined for Life. Enabled by Science.™", highlights Lubrizol's continued 2024 progress at the intersection of life and science across its global sustainability priorities: innovation for sustainable impact, empowering responsible citizenship and engaging teams and communities.

Lubrizol's 2024 sustainability report showed a 16% reduction in combined Scope 1 and 2 GHG emissions in 2024.

The report showed the company was driving progress with a 16% reduction in combined Scope 1 and 2 GHG emissions in 2024 (over the 2018 baseline).

"Sustainability is embedded in every stage of our innovation process, from our science-based innovators creating products that reduce climate impact and enhance resource conservation to championing circularity," said Elizabeth Grove, Chief Sustainability Officer and VP, Public Affairs, Lubrizol. "I am proud of our unparalleled innovation progress and expertise, which continues to deliver breakthrough solutions and creates value and impact for our customers with global reach and local presence." For more information, visit https://www.lubrizol.com.

PepsiCo Announces Refined Sustainability Goals to Position Business for the Long-Term

PepsiCo announced refined climate, packaging, agriculture and water goals to continue to build a stronger, more resilient business that aims to drive scalable positive impact. The updated goals build on nearly four years of progress and learnings since the launch of the PepsiCo Positive (pep+) business strategy, which embeds sustainability into the company's core to deliver long-term success.

The company has updated its Scope 1, 2 and 3 targets and fully aligned them to a 2.7°F (1.5°C) trajectory by 2050, reflecting SBTi sectoral guidance on Forests, Land and Agriculture (FLAG) and Energy and Industry (E&I) emissions, and now aims to achieve net-zero emissions by 2050. PepsiCo's revised climate goals, validated by SBTi, were shaped by its own learnings and the latest science. PepsiCo's previous Scope 3 target was aligned to well-below 3.6°F (2°C) by 2030, and its net-zero ambition was aligned to 2040.

After meeting the goal of a 25% improvement in operational water-use efficiency in high-risk watersheds and exceeding the goal of 15% improvement in agricultural water-use efficiency two years early, PepsiCo has refreshed its water goals based on progress and learnings to date. The company is also refining its focus on high-risk areas and maintaining its goal to become net water positive by 2030.

"As circumstances evolve, PepsiCo continually adapts how we source ingredients; make, move and sell our products and inspire people through our brands," said Ramon Laguarta, Chairman and Chief Executive Officer, PepsiCo. "This journey is underpinned by pep+, which is an investment in building a stronger and more resilient business – today and in the future – and guides our actions to help create a more resilient, more sustainable food system. Our goals must evolve with us to keep our ambition and to deliver on our long-term vision."

For more information, visit https://www.pepsico.com.

PepsiCo built a 2-hectare solar panel farm in Poland last year to serve its nearby Copernicus facility. The new solar field will power approximately 24% of the facility's total electricity needs and aim to generate 100% of the electricity required during sunny hours to power the plant's electric oven.

MAHLE Group Recognized for Environmental and Climate Protection Leadership by CDP

The non-profit CDP has honored the MAHLE Group, an automotive parts manufacturer, for its continuous efforts and good results in the areas of environmental and climate protection. In the 2024 CDP rating, MAHLE received a grade A in the area of climate protection. In the area of water supply, the rating improved from the previous year to A-.

"This excellent rating is clear evidence of the successful implementation of our sustainability strategy and an important signal to our customers, business partners, investors and employees," said Georg Dietz, Member of the Management Board, MAHLE Group, and responsible for sustainability, health, occupational safety and environmental management.

Compared to the base year of 2019, MAHLE has reduced CO_2 emissions from the energy consumption of its plants (Scope 1 and 2 emissions) by 47% and from the upstream chain and product usage phase (Scope 3) by 17%.

"Our great progress in climate protection was made possible by integrating the latest technologies, optimizing internal processes to save energy, using renewable energies and replacing fossil fuels with electricity," said Kathrin Apel, Director Corporate Sustainability and Occupational Health, Safety and Environment, MAHLE. "We are also working with our suppliers to continuously reduce emissions from our products. In product design, we focus on the use of more recycled and bio-based materials."

MAHLE wants to achieve climate neutrality for its plants by 2040. The technology group has also set itself the goal of reducing emissions from purchased goods and services, as well as from the use phase of the products (Scope 3) by 28% by 2030. For more information, visit https://www.mahle.com.

MAHLE Group's plant in Schorndorf, Germany

Cardinal Glass Increases Throughput with Dry Compressed Air

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

Cardinal Glass began when it was spun off from its parent company in 1962. Today, it's grown to become one of the leaders in residential glass manufacturing with over 49 locations and 10,000 employees. The company's Casa Grande, AZ, plant specializes in tempering, taking annealed or raw glass, cutting it to size, running it through a 1,250°F (677°C) oven and then using a pressurized air system to quench the glass and turn it into safety glass. Tempered glass breaks into small, safe pieces, rather than jagged shards. The 120,000-square-foot plant employs 62 people. It produces 5,000 pieces per day, or 30,000 to 40,000 square feet of glass.

The plant uses compressed air in a variety of ways, including powering its pneumatic cylinders. Compressed air powers the plant's belt systems that transfer materials, the seaming system that rounds the corners and the washer system that cleans particulates off glass before it goes into the furnace.

Above: The Casa Grande, AZ, Cardinal Glass plant increased production by upgrading its refrigerated compressed air dryers.

The 120,000-square-foot plant produces 5,000 sheets of glass each day.

Overloading the Refrigerated Compressed Air Dryer

Logen Kelly was hired as the plant's Maintenance Manager in January 2016. He describes the compressed air system he inherited as old and out of date. It consisted of one 30 hp rotary screw air compressor powering the plant, two poorly functioning 50 hp and 100 hp rotary screw air compressors held as backups and one refrigerated compressed air dryer rated for 100 cfm. The 30 hp air compressor gave out from motor failure in 2017, so he replaced it with another 30 hp air compressor.

The plant's compressed air machinery is located outside under an awning. It's shaded on its west side, but by mid-afternoon every day it experiences direct sunlight. Ambient temperatures are cool in the winter – sometimes around 30°F or 40°F (-1°C or 4°C) – but in the summer routinely rise to over 100°F (38°C). With added heat from nearby machinery, some summer temperatures reach 122°F (50°C). Under those conditions, the refrigerated compressed air dryer couldn't keep up and often worked at reduced capacity due to the high heat. The compressed air system also lacked an oil-water separator, and drained directly into the soil.

Cardinal Glass purchased the plant in 2004, and ran a single production line for 20 years, until it added a second. The compressed air system includes 120,000 feet of 1½-inch piping with drops every 50 to 70 feet.

Ambient temperatures are cool in the winter – sometimes around 30°F or 40°F (-1°C or 4°C) – but in the summer routinely rise to over 100°F (38°C).

"Just counting the pipes alone, that's a lot of volume. The compressed air piping runs everywhere," Kelly said. "When I got here, there was a lot of water in a lot of pipes. The refrigerated compressed air dryer was an issue."

Water in the Compressed Air System Causes Inconsistent Operation

In his first month at the plant, Kelly saw how water in the compressed air system caused a variety of problems. Pneumatic cylinders would operate sporadically, causing

The plant's tempering furnace reaches 1,250°F (677°C).

the conveying system or CNC machines to mishandle and even damage the glass. Diagnosing the problems was challenging since the machinery seemed to work when physically actuated, but produced errors when in use. Pockets of air and water in the fine

Cardinal Glass Increases Throughput with Dry Compressed Air

Quality and Performance

Logen Kelly has gotten an on-the-job education in compressed air system quality since signing on with Cardinal Glass. After rebuilding much of his plant's compressed air system and learning to keep it clean through proactive maintenance, he discovered these tips for maintaining quality.

1. Buy Good Quality Parts: "Buy a good product or buy two good products so you have redundancy. Put money into it at the beginning, and develop a preventative maintenance schedule and make sure your maintenance techs service every piece of equipment. The quality of material you purchase is the quality you're going to have long-term. When it came to the quality of our air compressor parts, we valued top-quality equipment. Buy something you know is going to last. Use the right valves and solder the copper in or compress the copper, whichever works best. You don't want a low-quality system because it's going to fail on you. Have the right amount of filters, so by the time the compressed air gets to the point of application it's clean with the right level of quality.

2. Plan for Redundancy: "Components in the compressed air system aren't going to run 100% of the time. Maintenance technicians can't always perform checks when something is operating. Without built-in redundancy, you're setting yourself up to fail because you're going to be reactive to the piece of equipment failing. Then, you're not going to repair it well because you're either going to do it fast or you're going to cut corners to get the equipment running quickly. If you're running 24/7 and you have no redundancy, how do you expect to perform the maintenance that needs to be done? How can you check anything?"

3. Include Plenty of Shut-Off Valves: "This goes along with redundancy. When you create your compressed air system, make sure you have enough shut-off valves. For maintenance safety, you need to have enough shut-off valves so employees don't need to perform maintenance on active compressed air systems. Without valves, you can't do preventative maintenance on a piece of machinery and then bring it back up. That can't be done because you're going to lose the air pressure you need in the plant."

tubing caused the machinery to malfunction, but never on a consistent basis.

"It was bad when I got here. I'd pull a cylinder out and see drips of water coming out of it," Kelly said.

The solution was to replace much of the plant's compressed air system and actuating cylinders, but that solution was costly. Unable to get the funds necessary, he first turned to desiccant filters to dry his compressed air.

"Inconsistent compressed air pressure because of the water will cause these errors," Kelly said. "Before long, the cylinders corrode. You'll start getting rust and corrosion on all the components that touch compressed air, and you get material in there that shouldn't be there. We tried to combat it by adding a desiccant bowl in the compressed air system before the compressed air reached the production machines. We were fighting the symptoms instead of going to the source."

Calling in a Specialist to Diagnose Compressed Air Problems

Logen Kelly didn't have to do all the work himself. He got assistance from Arizona Pneumatic Systems, a Gardner Denver distributor. Account Manager David Robertson cold-called him in early 2016 and found a potential customer in need. The partnership started with a plant tour. Kelly doesn't have a background in compressed air systems, so Robertson not only pointed out the compressed air system's problems, but also explained why they were problems. The two worked through the plant's equipment piece by piece.

"When I first inspected Cardinal Glass's compressed air system, I immediately noticed several significant concerns that

The quench system uses pressurized air to cool the glass.

needed addressing," Robertson said. "The air compressor in operation was clearly oversized for the actual demand, which was causing energy inefficiency and unnecessary operational costs. This was particularly problematic given that the refrigerated air dryers were undersized for the higher-than-necessary flow rate and high ambient temperature desert conditions, making them unable to properly condition and maintain a year-round stable dew point of ISO 8573-1-2010 Class 4-5."

Arizona Pneumatic replaced the undersized refrigerated compressed air dryer with one sized for high ambient temperature desert conditions.

During peak temperature periods, the refrigerated compressed air dryer couldn't remove moisture effectively from the compressed air stream, allowing water vapor to travel downstream into the system. Also, a malfunctioning electric timed drain on the coalescing filter after the dryer compounded the problem. The moisture successfully captured by the filter couldn't be properly discharged due to the malfunctioning drain, causing accumulated condensate to be pushed back into the compressed air system during pressure fluctuations.

Logen Kelly started as the Maintenance Manager and is now the Plant Manager.

To remedy these problems, a comprehensive approach was implemented. Arizona Pneumatic Systems replaced the undersized refrigerated compressed air dryer with a cycling refrigerated compressed air dryer sized for high ambient temperature desert conditions, ensuring it had sufficient capacity to handle peak summer temperatures. Additionally, it replaced the

The plant's compressed air equipment is housed outside under an awning.

Cardinal Glass Increases Throughput with Dry Compressed Air

Arizona Pneumatic Systems worked with Cardinal Glass to deliver clean, dry compressed air.

malfunctioning electric timed drain with a zero-loss condensate drain, ensuring consistent and automatic removal of collected moisture. This two-pronged approach effectively eliminated water intrusion into the compressed air system, protecting downstream equipment and improving overall system reliability and efficiency.

Right-Sizing the Refrigerated Compressed Air Dyers

To dry the compressed air, Arizona Pneumatic Systems recommended two cycling refrigerated compressed air dryers capable of 400 scfm and 800 scfm.

"I have them all piped together. They line up nicely," Kelly said. "The cycling refrigerated compressed air dryers are redundant and the air compressors are redundant. We cycle them to exercise them and make sure they're good to go."

"Refrigerated compressed air dryers are rated for the three 100s: ambient and inlet temperature and inlet pressure (psi)," Robertson said. "Moisture in compressed air systems is common in Arizona and Nevada. Once I explain it in the simplest terms, clients quickly realize the source of their moisture issue."

Since Kelly improved his compressed air system in 2018, it's run without incident.

A Drainage Concern Leads to Oily Soil

The problem of the refrigerated compressed air dryer draining directly to the soil was not immediately obvious to Kelly, but once the

Two properly-sized refrigerated compressed air dryers keep moisture out of the compressed air stream.

Compressed air condensate now drains into oil-water separators.

environmental concerns were made clear he helped with remediation. The runoff contained oil, which slowly built up in the soil.

"At first, I thought, 'Well, it's only water; run it into the dirt.' Then days turned into years, and we had oil-saturated soil. A new Plant Manager said, 'This doesn't look right. We're draining this right to the earth. That's not okay.' So we changed it. We removed the dirt and it went to hazmat. We backfilled the hole. Now, our refrigerated compressed air dryers all use oil-water separators connected to a French drain, completely clean."

Adding a Second Production Line to Meet Demand

In 2024, the plant added a second production line able to produce two-and-a-half times more product than the first line. Thanks to the second line, Kelly needed more compressed air flow than he got from the 30 hp air compressor. He upgraded to a 50 hp rotary screw air compressor with an output of 235 cfm. It's set for 100 psi. When pressure drops below 95 psi, a second 50 hp air compressor starts up, but that rarely happens.

Robertson helped with the second production line. "This process included identifying the specific compressed air flow and pressure requirements of each piece of process equipment, pinpointing any inappropriate uses of compressed air and implementing an annual leak inspection program," Robertson said. "These steps were crucial in reducing demand and right-sizing the original system. Datalogging kilowatt usage further validated the accuracy of our system calculations and the impact of these improvements on the demand profile. As the Cardinal Glass compressed air system was developed, decisions regarding capital equipment were based on objective data, taking into account potential growth and the need for system redundancy."

The plant's compressed air needs are met by a single 50 hp rotary screw air compressor.

Since the compressed air system's replacements and expansion, all plant equipment has been well maintained. Pneumatic failures are a thing of the past. With the compressed air system stable, Kelly – now the Plant Manager – has been able to turn his attention to preventative maintenance. He enrolled in the Platinum Trust Complete Package coverage program with Arizona Pneumatic Systems so his technicians can focus on something besides keeping the compressed air system running. BP

About Arizona Pneumatic Systems

Arizona Pneumatic Systems, established in 1977 by Jeannette and Gordon Gunning, has become a leading compressed air distributor in Arizona and Nevada. Starting from its headquarters in Tempe, AZ, the company has expanded its footprint to include 14,000 square feet of facilities in Arizona and an additional 4,500 square feet in Las Vegas, NV. For more, visit https://arizonapneumatic.com.

To read similar ***Compressed Air Treatment*** articles, visit https://www.airbestpractices.com/technology/air-treatment.

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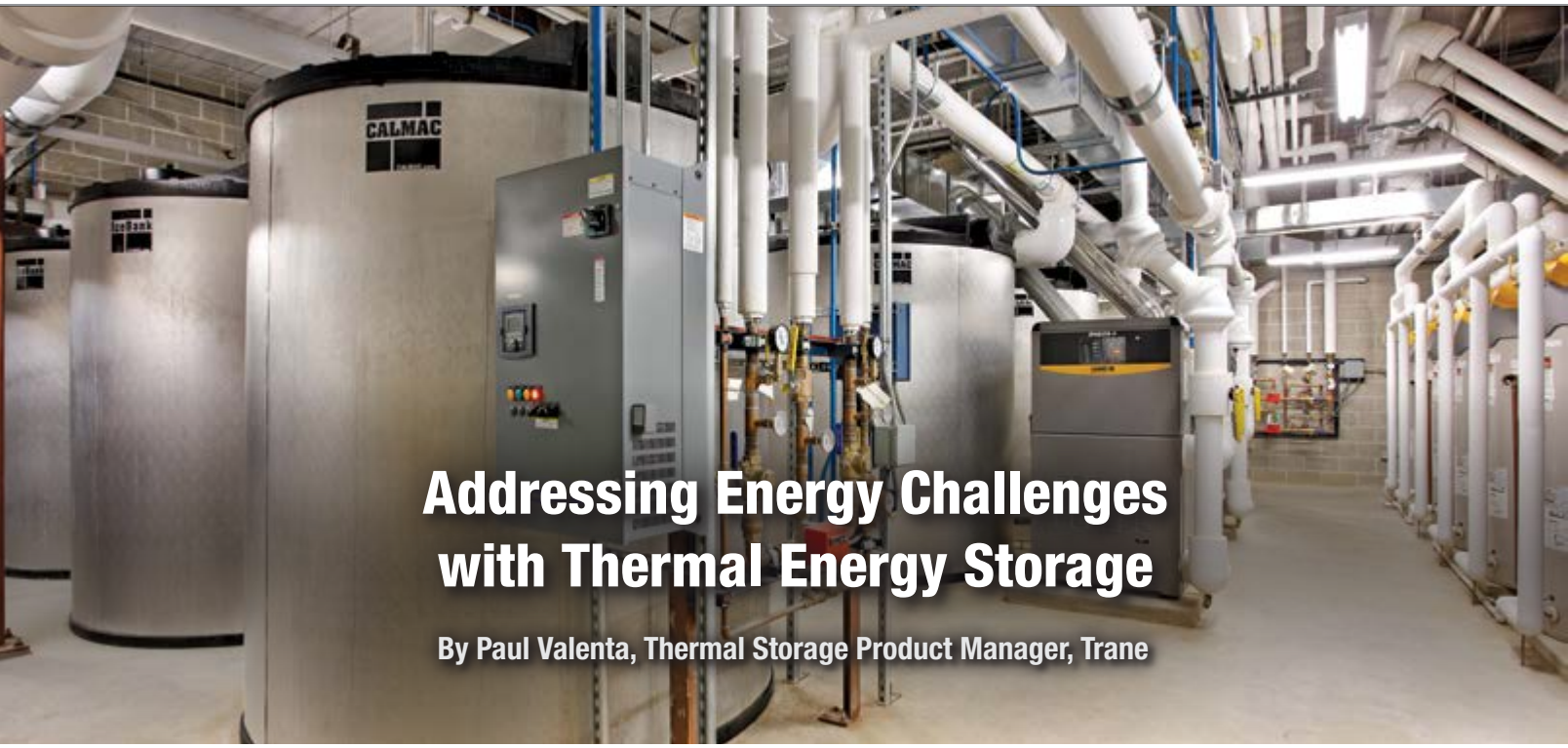


Addressing Energy Challenges with Thermal Energy Storage

By Paul Valenta, Thermal Storage Product Manager, Trane

Thermal energy storage (TES) is a vital tool for managing energy consumption. By storing thermal energy for later use, TES systems help reduce peak demand on the power grid, lower energy costs and contribute to sustainability goals. This article explores how TES systems work, their economic benefits and their role in supporting a more resilient and sustainable energy infrastructure.

According to the U.S Department of Energy, commercial buildings consume an estimated 35% of the electricity in the United States.[1] This significant demand places immense pressure on the power grid, especially during peak periods. Transitioning to renewable and lower-carbon energy is essential for a sustainable future, but it introduces variability. Energy storage technologies, including TES, are proving to be vital tools for both grid resilience and building management.

How Thermal Energy Storage Systems Work

TES systems primarily store thermal energy in the form of chilled water, ice or heated fluids, which can be used later to cool or heat buildings. Here's a closer look at how ice-based systems operate:

Chillers and Ice Storage for Cooling: The essential element of the TES system is a modular, insulated, polyethylene tank containing a spiral-wound plastic tube heat exchanger surrounded with water. These tanks are available in many sizes ranging from 45 to over 500 ton-hours. At night, water containing 25% ethylene glycol is cooled by a chiller and circulated through the heat exchanger, extracting heat until about 95% of the water in the tank is frozen solid. The ice is built uniformly throughout the tank by closely spaced heat exchanger tubes.

Above: Thermal energy storage tanks installed in an equipment room.

Illustration of a TES ice tank, showing its components and structure.

Illustration showing the integration of TES tanks within a thermal battery system.

Charge Cycle: At night, the water-glycol solution circulates through the chiller and the tank's heat exchanger, bypassing the air handler coil. The fluid is cooled to 25°F (-4°C) and freezes the water surrounding the heat exchanger.

Storing excess energy not only enhances efficiency but also increases renewable energy usage by up to 50%

Discharge Cycle: The following day, the stored ice cools the solution from 52°F to 34°F (11°C to 1°C). A temperature-modulating valve set at 44°F (7°C) in a bypass loop around the tank permits enough 52°F (11°C) fluid to bypass the tank, mix with 34°F (1°C) fluid, and achieve the desired 44°F (7°C) temperature. The 44°F (7°C) fluid enters the coil, where it cools air typically from 75°F (24°C) to 55°F (13°C). The fluid leaves the coil at 60°F (15°C), enters the chiller and is cooled to 52°F (11°C).

Heating with Ice

The electrification of heat requires the use of heat pumps. One limiting factor of heat pumps is their performance is reduced or even halted as ambient temperatures decrease. If there are thermal storage tanks full of water, the heat pump can source heat from the water rather than the ambient air by making ice. Later in the day, when cooling is required, the excess heat in the building melts the ice in the ice tanks, storing energy to provide a source of heat for the heat pumps the next day. Additionally, an air-to-water heat pump, which is part of the system, can add heat to the building, if necessary, warming just enough to melt the ice during the day when ambient temperatures have increased.

Combining TES with a heat pump system allows the recapture and storage of much more waste energy (heat) for later use. Storing excess energy not only enhances efficiency but can also help increase renewable energy usage by up to 50%.[2] By storing excess heat generated during periods of low demand or high renewable energy production, TES systems make this energy available when it is needed most, reducing reliance on fossil fuel boilers and enabling the use of low-carbon alternatives. As electrified heating gains traction, the added electric demand can put additional stress on the grid, especially during peak times. However, TES systems can mitigate this impact by shifting the electric load associated with heating to off-peak periods. This load shifting helps balance the grid, making it easier to integrate a higher share of renewable energy sources. By doing so, TES systems not only support the transition to electrified heating but also contribute to a more resilient and sustainable energy infrastructure.

TES tanks installed as part of a thermal battery system outside a manufacturing facility in Pueblo, CO.

Addressing Energy Challenges with Thermal Energy Storage

TES tanks integrated with solar panels, supporting renewable energy.

Control Strategies to Reduce Energy Loads

There are various control strategies to take advantage of TES, but two basic approaches define the common limits of system design:

Full Storage: When electric rates justify a complete shifting of air-conditioning loads, a conventionally-sized chiller can be used with enough energy storage to shift the entire load into off-peak hours. The chiller stores ice in tanks during off-peak hours, and the stored ice provides the required cooling during peak hours. Chillers can be shut off during peak hours, resulting in significantly reduced demand charges.

Partial Storage: A partial storage system is usually the most practical and cost-effective load management strategy. With ice storage systems, a right-sized chiller runs any hour of the day, charging the ice storage tanks at night and cooling the load during the day with help from stored cooling. This strategy extends the hours of operation of the chillers, resulting in the lowest possible average load and chiller size, as well as reduced demand charges and initial costs.

An Economic Analysis of Right-Sizing Partial Storage Design

Here is an example of how incorporating TES into your system and right-sizing with partial storage can help reduce annual energy costs, contributing to a faster payback period:

For this example, assume a 400-ton peak cooling load, 10-hour cooling day, 75% diversity factor, $13.00/kW/month utility demand charge and a seven-month cooling season. This building requires 3,000 ton-hours (400 tons x 10 hours/day x 75% diversity factor).

Two chillers are installed, as is common practice, to provide redundancy should one chiller or chiller ancillary be offline. The total installed capacity is typically 20% higher than peak cooling design loads to provide a safety factor for unexpected loads and higher cooling capacity should one chiller be offline.

Conventional chilled water air conditioning system sizing and installed costs:

Two 240-ton air-cooled chillers at $1,500/ton, installed*:	$720,000
Air Distribution system:	$800,000
Total System Cost for Conventional Cooling:	$1,520,000

With partial storage sizing, the facility has more time to prepare cooling for the next day. Chillers store cooling at night, then augment the stored cooling during the day. The cooling load remains at 3,000 ton-hours, with one chiller providing 1,600 ton-hours during daytime hours and stored cooling providing the balance, or 1,400 ton-hours.

TES tanks installed as part of a thermal battery system outside a commercial building.

Therefore, partial storage right-sizing uses:

Two 160-ton air-cooled chillers at $1,500/ton, installed*:	$480,000
Stored cooling ice tank at $180/ton hour, installed**:	$252,000
Air distribution system:	$800,000
Total:	$1,532,000
Purchase premium for TES:	$12,000

Annual savings (400-160) tons x 1.2 kW/ton x 7 months x $13/kW = $26,208

Return on investment = 0.5 years

Partial TES and right-sizing chiller capacity provides operational flexibility. It allows one or both chillers to make ice and requires only one chiller to augment stored cooling during daytime operation. The storage design offers a peak capacity of 580 tons with both chillers and ice storage compared to 480 tons for a non-storage system, as well as greater redundancy in the event of a component failure. The storage system can be tailored to meet a range of redundancy requirements, even with a small chiller plant.

Future Implications of Renewable Energy on Electric Rates

As the production of renewable energy increases, electric rates will rise and fall with demand daily. This variability poses a challenge for both the power grid and consumers. TES systems offer a strategic solution. By storing inexpensive energy when it's available, TES provides cooling or heating during periods of high demand and elevated prices. This capability makes TES beneficial even for facilities with flat electric load profiles, as they can leverage stored cooling to manage costs more effectively.

Thermal Energy Storage Applications

TES is well-suited for a range of applications, including larger building footprints that require efficient and reliable cooling systems. To fully capitalize on the benefits, certain factors should be considered. TES is effective in environments where cooling loads fluctuate throughout the day, including office buildings, arenas, museums, courthouses, schools, colleges, mixed-use buildings and hotels with meeting spaces. By shifting energy consumption to off-peak hours, TES helps manage peak cooling loads and reduces energy costs.

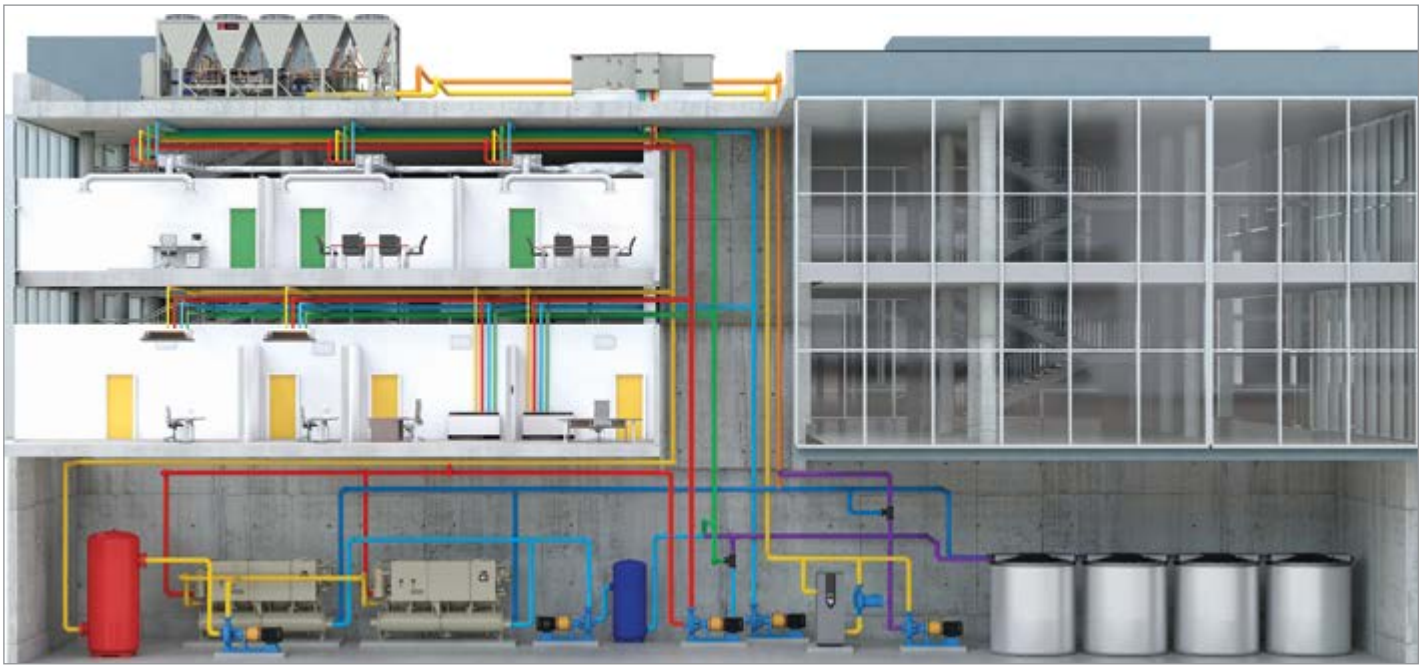
A TES tank installation in the basement of a large commercial building.

* The $1,500/ton for air-cooled chillers includes all accessories including pumps, piping and controls

** The $180/ton-hour for the ice tank installation is intended to include a concrete pad outside, with glycol, piping and controls

*** The new construction cost estimates provided are approximate and for example purposes only. Actual costs will vary based on market conditions, location and specific project requirements.

Addressing Energy Challenges with Thermal Energy Storage



An illustration demonstrating how TES can be incorporated into a heat pump system.

For industrial applications, facilities with 24/7 operations tend to have flat electrical load profiles which reduce the benefits of using TES. But some suitable industrial applications for TES include climate-controlled warehousing and the thermal management of office spaces located within manufacturing facilities.

Benefits of Thermal Energy Storage

The main benefits of thermal energy storage systems include grid and building resiliency, energy and operational cost savings, sustainability and decarbonization and potential for reduced installation costs:

Grid and building resiliency: TES systems provide greater protection against grid outages and enable participation in utility programs such as grid capacity and demand limit revenue programs. This enhances both grid and building resiliency. According to a case study by the Western Cooling Efficiency Center at UC Davis, the grid impact of TES systems is significant because they offset the electric demand that would have been required by primary cooling systems during peak times. This is particularly valuable as the efficiency of vapor-compression cooling systems decreases with higher outdoor temperatures, leading to elevated electrical demand.[3]

Energy and operating cost savings: With over 4,000 installations across 60 countries,

TES tanks installed as part of a thermal battery system outside a manufacturing facility in Pueblo, CO.

TES systems have proven to be an effective component in reducing energy costs. By consuming energy at the most cost-effective times of day, TES systems help lower demand charges, which can account for a substantial portion of the total charges on a monthly electric bill. In combination with other energy conservation measures, such as high-efficiency chiller replacements and building automation system improvements, some customers have seen a summer peak demand reduction of up to 2.1 MW and building operational cost savings of up to $2.5 million/year.[4]

Sustainability and decarbonization: By supporting renewable integration, reducing the need for additional power generation from peaker plants (which are often less efficient and more polluting) and supporting building electrification, TES systems can contribute to a reduction in overall carbon emissions. Some customers have integrated TES into their HVAC system as a component of a comprehensive thermal management solution that has helped decrease carbon emissions by an estimated 1.4 million pounds, equivalent to removing 130 cars from the road.[5]

Installation Costs: TES systems can avoid the need for electrical infrastructure updates and qualify for federal incentives and utility rebates, making them a cost-effective solution for both new and existing buildings.

The Future of Energy Storage

As we move towards a future dominated by renewable energy, the challenges faced by the power grid will continue to evolve. Energy storage technologies like TES offer practical and cost-effective solutions to these challenges. By addressing the issues of peak demand and renewable energy intermittency, energy storage helps create a more efficient, reliable and sustainable power grid.

The integration of energy storage is not just a technological advancement; it is a strategic approach to modernizing our energy infrastructure. By embracing these technologies, we can enhance grid resiliency, reduce operational costs and support the global transition to a cleaner, more sustainable energy future.

Conclusion

The power grid is at a crossroads. The increasing demand for electricity, coupled with the integration of renewable energy sources, presents both challenges and opportunities. TES stands out as a viable solution to enhance grid resiliency, reduce costs and support environmental goals. TES provides load flexibility, allowing buildings to adapt to the ever-changing grid demands. By investing in and adopting these innovative technologies, we pave the way for a more sustainable and reliable energy future. BP

All photos and illustrations courtesy of Trane Technologies.

About the Author

Paul Valenta, Thermal Storage Product Manager at Trane, holds a BSEE from the University of Nebraska and brings over 30 years of experience in TES systems.

About Trane Technologies

Trane Technologies is a global climate innovator. Through its strategic brands – Trane and Thermo King – and environmentally responsible portfolio of products and services, it brings efficient and sustainable climate solutions to buildings, homes and transportation. For more information, visit https://www.tranetechologies.com.

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Pneumatics and Vacuum Generators Power Robotics at Automate 2025

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

Automate 2025, held in Detroit, MI, from May 12-15, showed attendees how to make their industrial plants more efficient with robotics. Throughout the conference, robotic arms shuttled packages, burgers and even macarons with speed and accuracy. Driving this new technology was a complex network of pneumatic cylinders and pick-and-place automation powered by pneumatic vacuum generation. Innovation makes these proven technologies more efficient than ever.

The show drew over 800 exhibitors and spanned 320,000 square feet. Over 200 speakers led conference sessions.

Pneumatics

Companies looking to lower compressed air use in their pneumatic systems should head to SMC's online ETech configurator to specify components and get customized advice, said Jesse DeSanto, National Product Manager. Engineers can select components based on the product series, see them in 3D models and download SOLIDWORKS IGES files. "We can even consult with customers to say, 'Do these tubing lines need to be this long or this big?' A lot of systems are oversized for what the application does. Even without sitting down with customers, we can see what they want and reduce the amount of compressed air they use."

Festo also emphasized a software solution for reducing compressed air use in pneumatic systems. Using its Pneumatic Simulation tool, engineers can input application parameters and get three different options for specifying a system: exact, economical and performance. It also shows tradeoffs in performance. "Designers can see the analysis of what it's recommending," said Darren O'Driscoll, Product Manager. "At the end of the day, if you need to produce a certain force, if you need a certain area and you need a certain volume of air, you can't do much about that. But if you're looking for a more economical approach, at lower air consumption your positioning time might be slightly longer than you want."

In the automotive industry, pneumatics power the actuators and slides behind clamping systems, noted William Pizzimenti, Senior Account Manager, Fori Automation (part of Lincoln Electric), and that's been true for decades. Electric clamps go for double the price and so the large facilities Fori works with – including Caterpillar, John Deere, Ford, GM, Chrysler, Nissan and Hyundai – are sticking with the massive compressed air systems they have in place. "You go into any major automotive facility in metropolitan Detroit, each automotive plant is made up of three different centers: body shop, paint shop and general assembly. I've spent quite a bit of time in body shops and assembly shops, and these days those shops are almost a million square

Above: Many of the booths at Automate 2025 featured pick-and-place vacuum generation applications using compressed air.

Jesse DeSanto of SMC

Daniella Gonzalez and Darren O'Driscoll (left to right) of Festo

feet each. You're talking about a thousand workstations. There are a lot of pneumatic tools. Actuators, clamps, a lot of safety devices are all run off compressed air these days," Pizzimenti said. "In two years of quoting quite a bit of automation – a couple billion dollars' worth – we've only had one small supplier ask us if we could go to electric."

Parker Hannifin had safety in mind, as its booth included information on its P33 family of safety exhaust valves, which rapidly exhaust compressed air should a fault condition occur. "We're concerned about exhaust time. Because some environments don't want exhaust in the air, we've made a new safety valve. It's the only one on the market," explained Linda Caron, Global Product Manager, Parker Hannifin. "We're selling these into control cabinets where people will hard pipe away the exhaust air, and they're using these in freezers where the controls are heated, in dirty environments and even super-clean environments like a food plant where they don't want contamination. This filters to 40 microns. We're not trying to pull big particles out of the compressed air with this. We don't use filters because they're prone to plugging and this is a safety product."

Vacuum Generators

Vacuum generators – also called Venturi vacuums or vacuum ejectors – produce suction using the Venturi effect: Compressed air velocity increases as it flows through a constricted section of pipe, then slows as the pipe expands. This produces a low pressure area, creating a vacuum. This vacuum is used in pick-and-place applications with no moving parts.

Schmalz had an impressive display showing its mGrip Finger Gripper, a food-safe gripper it acquired from Soft Robots last year. The company is moving into direct food handling to complement its other vacuum generator-based packaged food grippers. Intended for protein foods, the gripper uses both vacuum generation and silicone grippers to pick up food. Schmalz added the vacuum generator to the middle of the gripper after it purchased the technology. The product is fully enclosed, so air from the system never directly touches the food. "We integrate a lot of air savings into our vacuum generator systems, which give the best bang-for-your-buck in non-porous applications," said Mike King, Applications Engineering Manager. "We have digital air savings functions in most of our compact ejector lines. Once the system reaches vacuum, a controller on the vacuum generator shuts off compressed air. You're not using compressed air while you're picking up the product. Also, non-return valves are built in to help prevent leakage through the system. Once the vacuum leaks a certain amount, the vacuum generator kicks on the valve, the vacuum rises to the safe handling level, and compressed air shuts off again."

SMC is focused on making its vacuum generators as efficient as possible, so plants can save on compressed air use and energy consumption while reducing emissions. Its current nozzle designs reduce compressed air use 30-40% over previous generations. It sees many plants switching from older vacuum generators to newer, more efficient models. "Vacuum generators are efficient because you can put them point-of-use. It comes down to the kind of application," said Jesse DeSanto, National Product Manager. "We sell primarily vacuum generators and see our vacuum segment growing. The big thing is the electrical consumption. Our valves use 0.1 watt of power, so they're almost insignificant from an electrical standpoint. Our products are so light and compact, you can put them at the point-of-use. If you're creating a robot where payload is crucial, you have to look at that."

Piab held a news conference during Automate to unveil its piCLASSIC Neo, the newest version of its vacuum generator. Intended for the packaging, electronics and automotive industries, the pump comes in two versions with room for up to six COAX ejectors. Each ejector (or cartridge) can represent a different flow and vacuum level. Depending on the porousness of the material handled, plants can decide if they need higher or lower flow. "With our previous generation, you could only have two cartridges per module. Now, you can have three because we reduced the size of the cartridge but maintained the same footprint," said Madeleine Sheikh, Senior Product Manager. "It's much easier to do maintenance on this version, and because you're able to have more cartridges within the same footprint, you can have more flow because you're able to add three vacuums instead of two. The new cartridges are more efficient, requiring less compressed air to generate the vacuum."

Festo displayed its newly released VTUX valve terminal. Sensors built into the terminal's PCB shut down vacuum generators when not

Pneumatics and Vacuum Generators Power Robotics at Automate 2025

needed and maintain the vacuum level already in use. Operators set their threshold levels and the terminal turns valves on and off as needed, saving both energy and air. "Depending on the application, more than 30% of the air can be saved when using the vacuum," said Daniella Gonzalez, Product Marketing Manager. "For the next generation product, having all of your controls and pneumatics integrated makes a big difference. The footprint and weight matter. A lot of times, the vacuum has to be mounted where it's needed. You see that in end-of-arm tools. With this solution, you have a compact solution that eliminates a lot of the footprint."

SDC (Stephen Douglas Corporation) specializes in the custom creation of factory automation machinery, especially assembly and inspection equipment. It often works with the automotive, medical and solar industries. Across the board, it sees plants concerned with optimizing compressed air use. Writing software to control

Linda Caron of Parker Hannifin

Mike King and Avery Fisk (left to right) of Schmalz, with the company's newly acquired food gripper

Madeleine Sheikh and Jaime Bohorquez (left to right) of Piab with versions of the company's new vacuum generator

Dan Belliveau, Greg Merrill and Brady Foley (left to right) of SDC

Josh Lancaster, McKenzie Flick, Greg Marciniak, Lars Heckersbruch and Laurel Praeter (left to right) of Becker

Adam Alvarado, Rob Yarhmarkt, Dylan Work and Plaz Garcia (left to right) of Fluid-Aire Dynamics

when vacuum generator systems start and stop is one way to save energy. "A lot of our work is in programming our machines," Dan Belliveau, Project Director, said. "If you're going to use a vacuum system, programming determines how the system reacts to machine faults. Instead of just sitting there sucking vacuum and using compressed air, we add a staging area where you can shut the vacuum off and not continue to run the compressed air. You can also use energy-efficient valves. There are lots of ways to approach it, but it mostly means limiting compressed air."

Machine Concepts builds custom vacuum clamping and pick-and-place solutions for robotic arms and other industrial systems. The companies it supplies demand lower energy consumption, especially in Europe, where energy costs are higher. Much of its work uses closed vacuum systems with automated shutoffs to save energy. Adam Allansson, Sales, praised the intelligent systems controlling these solutions. "It's telling engineers how many kilowatts they're using, how many amps they're using. If you're a good engineer, you know how to reprogram the system and make it better," he said.

VacMotion was at Automate to explain the benefits of its vacuum generators. Vice President Jeff VanEtta highlighted the company's DSV line, which can range from 0.5 to 80 scfm of compressed air consumption. He showed one model that used 1.8 scfm of compressed air and generated 2.55 scfm of vacuum. It includes one inlet port, a vacuum generator port and a second port for blowoff air to reverse the suction. It's able to cycle 25 times per second, between vacuum and blowoff. "A lot of times in the vacuum world, when you're picking something, if you've got a really good vacuum hold, releasing the part is a challenge. So that's why they do the blowoff," he said. "If you're picking up parts off a conveyor and you want to put them in a box, you want to be able to release them before bringing the robot arm back. Having that blowoff helps." An included silencer keeps the vacuum generator's noise level down. The company is targeting the packaged food industry.

Vacuum Pumps and Other Technologies

Becker Pumps was on hand promoting dry rotary vane vacuum pumps and side-channel blowers for the pick-and-place market, with dry rotary vane pumps better suited to lighter materials and side-channel blowers to heavier uses. According to Lars Heckersbruch, Business Development Manager, customers like the low noise level of vacuum solutions. Maintenance is simple, with maintenance for the company's popular VT line taking only 10-15 minutes. Many of the booth's visitors asked about variable frequency drives. "That's a big trend," Heckersbruch said. "We have options to retrofit our pumps or, of course, we can offer a new system. We do a lot of replacement business. Based on the application, the energy savings can be significant. In some cases, we're talking about 70-80% compared to a standard pump."

This was Fluid-Aire Dynamic's third year at Automate, and as the only piping supplier on the show floor (Unipipe has the same owners), it received a lot of attention from companies interested in saving money on their compressed air or nitrogen generation systems. "We've had a lot of success with nitrogen during the last 12 months," said Rob Yarhmarkt, Sales Engineer. "Nitrogen systems require a compressed air system to go along with them, so we can explain the ROI of getting away from liquid nitrogen and bulk tank storage, then show how they can tie into their existing compressed air system or we can provide them with a compressed air system. At that point, they own their nitrogen and it's all in-house. Then, they don't have to worry about deliveries and rentals and all of the extra fees that go with liquid nitrogen."

Automate will return in 2026, taking place in Chicago, IL, from June 22-25. BP

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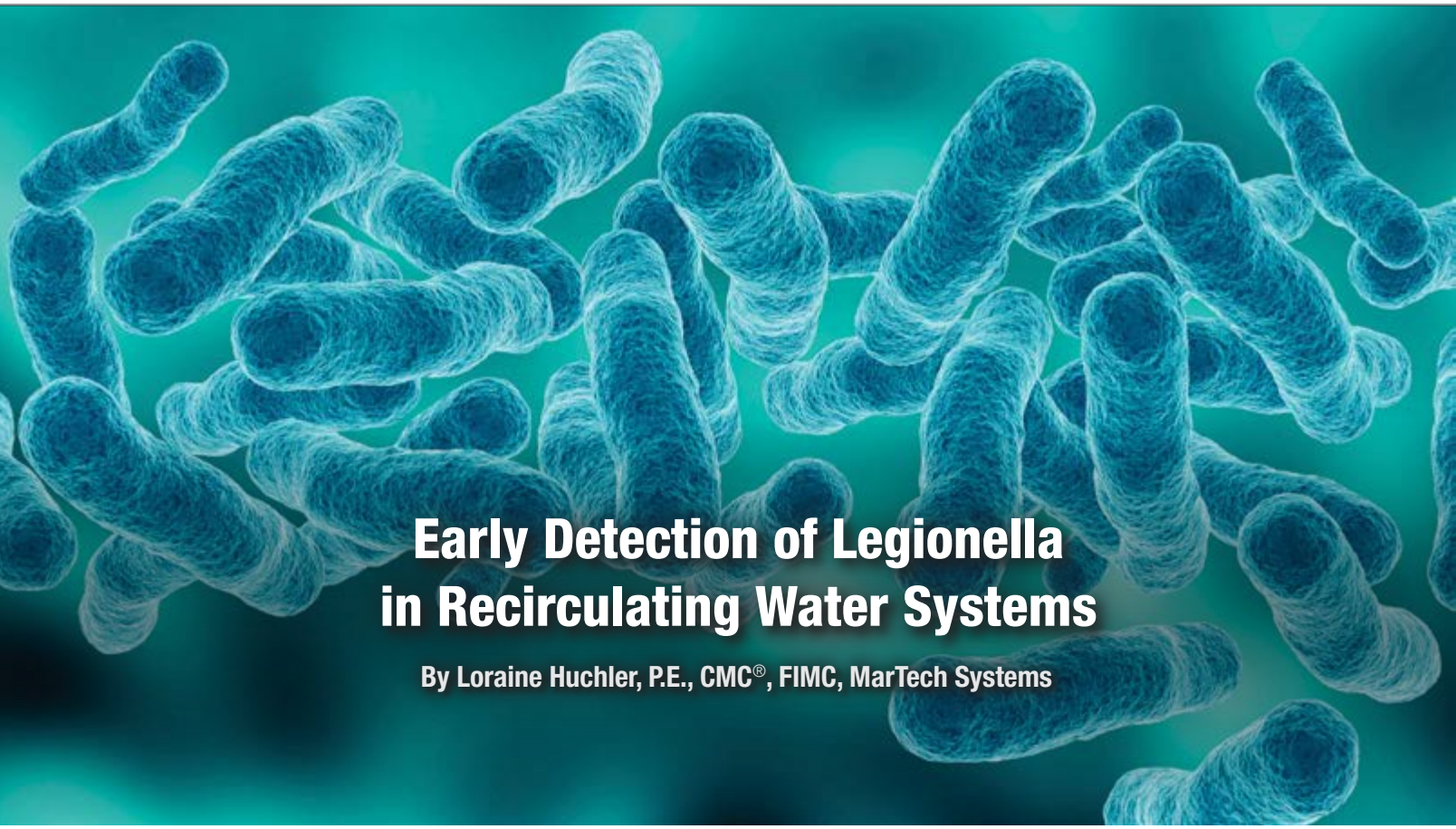

Early Detection of Legionella in Recirculating Water Systems

By Loraine Huchler, P.E., CMC®, FIMC, MarTech Systems

Above: A microscopic view of Legionella pneumophila

➤ *Legionella pneumophila,* an aerobic, planktonic (free-floating) bacterium, is a parasite that reproduces by entering biofilm containing higher life forms such as a protozoan or an amoeba. Detecting *L. pneumophila* in recirculating water systems is a challenge due to the high cost of timely test methods and the lack of an inline sensor for detection.

A simpler method to measure the risk of proliferation of *L. pneumophila* bacteria is tracking the development of biofilm secreted by higher life forms. Continuous detection of biofilm using an innovative inline sensor and immediate chemical treatment to kill the organisms in the biofilm, including *L. pneumophila* and other pathogens, dramatically reduces the risk of Legionellosis infections.

Consistently controlling biofilm also increases heat transfer efficiency in heat exchangers. Surprisingly, few professionals are aware of this loss of heat transfer efficiency and most water treatment suppliers are not aware of biofilm sensors. Plant operators need to estimate the biocide feed rate because they have incomplete information about the concentration of bacteria, the presence of biofilm or the impact on heat transfer efficiency.

Figure 1. A Hach bacteria paddle tester

Figure 2. An ATP test device, the Hygiena SystemSURE Plus

Measuring the Development of Biofilm

Recirculating water in open cooling systems typically has concentrations of naturally occurring, soluble inorganic, and soluble organic contaminants, as well as suspended particles such as pollen, bacteria, plant material and dust. These contaminants may cause corrosion and deposits and can serve as nutrients for the bacteria in the cooling water. In addition, some water treatment chemicals that control deposits and corrosion also serve as nutrients for bacteria.

During the last decade, there have been few novel biocides or feedback control systems for biofilms. The rudimentary biofilm test is a stainless steel mesh test specimen installed in the first location of an inline test rack. Recently, an on-site, inline biofilm sensor was developed that provides real-time information about the development of biofilm, allowing the control system to feed a non-oxidizing biocide to kill

Figure 3. Legionella growing on a plate culture (courtesy CDC/James Gathany – CDC Public Health Image Library)

the organisms in the biofilm layer, including *L. pneumophila*. This sensor provides real-time operating data to improve the heat transfer efficiency of heat exchangers. Plant staff should note the magnitude of heat transfer loss for biofilm as compared to calcium carbonate scale: At the same deposit thickness, biofilm is three-and-a-half to four times as insulating as calcium carbonate scale.

Low-Quality Water Leads to Biofilm Production

Industrial and manufacturing plants consume large quantities of water for heating, cooling and production. In the near term, the greatest water demand will be for evaporative cooling in data centers, especially for computing power for artificial intelligence (AI) applications.[1] Climate change and sustainability initiatives, such as blue/green ammonia and carbon capture, require large volumes of water for process cooling and recirculating cooling for the process and electrical power generated by nuclear or fossil fuel plants.

This increasing demand for cooling water is forcing plant owners to find alternate sources of water. Lower-quality water sources have higher concentrations of nutrients, increasing the risk of bacteria proliferation and the associated biofilm in evaporative cooling water systems and the associated water treatment units such as reverse osmosis systems, media filters and ion exchange units.

Critical Concepts for Biofilm Reduction

This article starts with the fundamentals: a review of bacteria, bacteria test methods and the mechanism of biofilm formation.

The second part includes operating protocols, biofilm monitoring methods and Legionella risks.

Bacteria. Open recirculating water systems have a variety of bacteria and other higher life forms. The first category is planktonic (free-floating), aerobic bacteria including pathogens such as mature *L. pneumophila*. Interestingly, fluorescing *Pseudomonas* bacteria prefer aerobic conditions; however, under denitrifying conditions, these bacteria may convert to anaerobic respiration and thrive in a biofilm. The second category is anaerobic bacteria (sessile bacteria) that do not require oxygen to thrive; they secrete a polysaccharide material (a biofilm) that adheres to surfaces and shelters other micro-organisms and higher life forms such as amoebae and protozoa. The third category is bacteria that survive in either aerobic or anaerobic respiration, depending on the environmental conditions.

Bacteria Test Methods. The routine field test measures aerobic, planktonic bacteria in the bulk water using a paddle tester, also called a dip slide (**Figure 1**). Another common field test in bulk water is a nucleic acid test that measures total and free ATP[2] (**Figure 2**). *L. pneumophila* is an aerobic bacterium; however, neither the paddle nor ATP field tests can determine the species of bacteria.

Figure 4. Hach bio-detectors

Early Detection of Legionella in Recirculating Water Systems

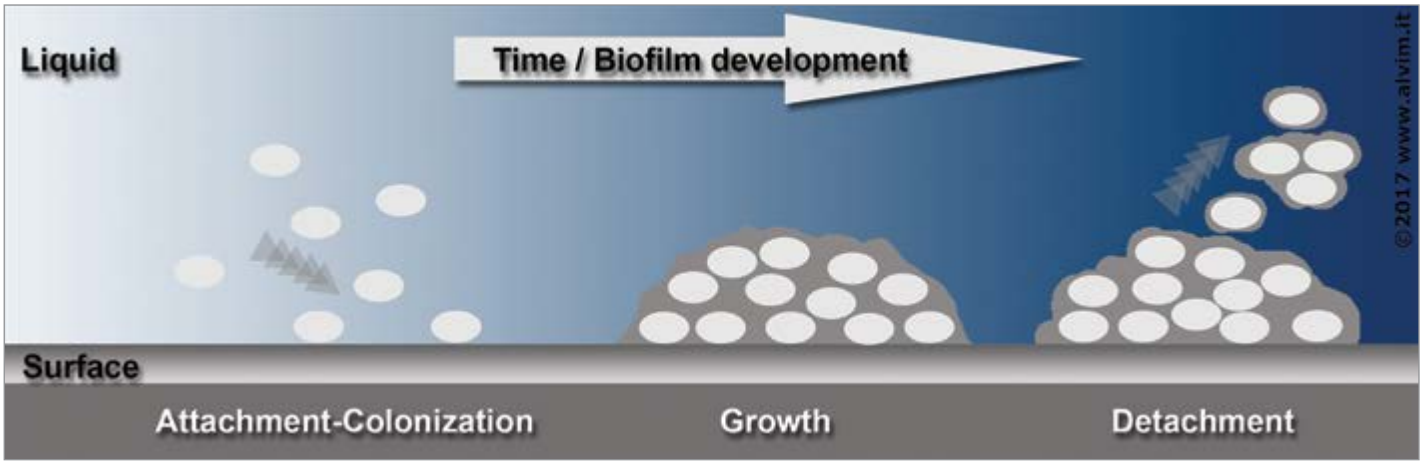

Figure 5. The mechanics of biofilm creation (courtesy of ALVIM Srl)

The classic laboratory test for aerobic bacteria is a plate culture (**Figure 3**) that measures the population of the total aerobic bacteria and, with additional testing, identifies the specific bacterial genus and species (including *L. pneumophila*). Plate cultures can measure the bacteria that create the biofilm (sessile bacteria) by conducting an incubation in an oxygen-free environment. Laboratory analyses can also use a genetic method called q-PCR to identify the genus and species of *L. pneumophila*.

Bio-detectors[3] (**Figure 4**) are field tests that provide estimates of denitrifying bacteria, fluorescing *Pseudomonas,* slime-forming bacteria and sulfate-reducing bacteria. Detection of free-floating gram-negative bacteria in a water sample increases the likelihood of biofilm on the heat transfer surfaces. However, it's not an accurate measurement of sessile bacteria that exist in the biofilm.

Mechanism of Biofilm Formation. As shown in **Figure 5**, the development of biofilm begins with sessile or gram-negative bacteria in the bulk water seeking a suitable surface. These bacteria hover over a submerged surface, such as a tube in a heat exchanger, a process known as quorum sensing. If the surface is suitable, the bacteria settle on the surface. The next step is colonization: The bacteria excrete extracellular material to attach to the surface. This is biofilm. The biofilm creates a low-oxygen environment for sessile bacteria and higher life forms such as amoebae, protozoa and viruses to thrive. Nutrients such as nitrates, sulfates and phosphates will diffuse into the biofilm, allowing the proliferation of microorganisms in the biofilm layer and increasing its thickness.

Figure 6. An online test rack from Nova-Tech

Operating Protocols. Continuous versus intermittent duty cycles and heat flux (including process heat exchangers and surface condensers, refrigeration and air compressor systems, chillers, steam absorption and plate and frame heat exchangers and humidification systems) have a large influence on the development of biofilm.

Process Heat Exchangers and Surface Condensers. These typically operate continuously at high heat transfer rates and high temperatures on the heat transfer surfaces. Most process heat exchangers have a shell and tube design, with process on the shell side, and cooling water on the tube side. In large plants, the typical sources of makeup water for evaporative cooling systems are wells, clarified surface waters or filtered seawater. Bacteria and nutrients in the makeup stream enter the evaporative cooling water system, increasing the risk of biofilm.

Process contaminants that leak into the recirculating cooling water often serve as nutrients for bacteria and the proliferation of biofilm. Detecting process contaminants in the bulk cooling water is difficult due to dilution by return water from other heat exchangers. The warning sign for significant formation of mineral

scale or biofilm is a dramatic increase in the temperature of the cooling water at the exit of the heat exchanger. However, most plants lack temperature sensors on individual heat exchangers for the cooling water.

Plant operators must rely on the intermittent feed of non-oxidizing biocide to reduce the sessile bacteria concentration and control the proliferation of biofilm. Water treatment suppliers use a relatively simplistic approach to determine biocide concentrations and dosing frequency, monitoring the ambient conditions and occasionally conducting semi-quantitative field tests or laboratory cultures for anaerobic bacteria in the bulk water. Consequently, operators cannot consistently detect and/or control biofilm proliferation.

Refrigeration Units and Air Compressors. These systems operate like process cooling applications. Makeup water for refrigeration and air compressor cooling systems may be potable or treated water. For these systems, the level of biofilm increases or decreases based on the effectiveness of the biocide treatment, the amount of nutrients or process contaminants in the cooling water and the Reynolds Number (the factor that limits the thickness of the boundary layer and surface area of biofilm). Similar to process heat exchanger systems, the procedures for biocide feed and biofilm monitoring and control are rudimentary, typically resulting in poor biofilm control.

If the chiller has no biofilm, free-floating L. pneumophila cannot reproduce. However, in most chillers, there is some biofilm.

Humidification Systems. These operate at ambient or chilled temperatures, spraying water into a forced air plenum. At the discharge of the supply duct, the humidified air contains a small concentration of water droplets. If these tiny droplets have pathogenic bacteria, there is a risk of Legionellosis infections in persons with compromised immune systems. This infection mechanism occurred in 1976 at the Bellevue-Stratford Hotel in Philadelphia during an American Legion convention. The contaminated water droplets in the central air conditioning system infected 182 people and resulted in 34 deaths.

Chillers, Steam Absorption Units and Plate and Frame Heat Exchangers. These usually operate intermittently based on seasonal atmospheric conditions and building occupancy. Systems operating continuously have a lower risk of *L. pneumophila* and biofilm. These systems have lower heat transfer rates and lower temperatures on the heat transfer surfaces than other types of heat exchangers. Most comfort cooling systems use potable water for makeup. Industrial sites and data centers typically use non-potable water for makeup. The use of reclaimed water is increasing, especially for data centers and arid locations like the southwest. The cost of reclaimed water is 10% that of potable water. However, non-potable makeup water increases the concentration of bacteria and nutrients as compared to potable water and increases the risk of sessile bacteria and proliferation of biofilm and *L. pneumophila*.

A Day in the Life of a Chiller Plant

Intermittent operation is another factor in cooling systems. Consider a day in the life of a chiller that has cyclical operation and periods of low flow or stagnant water.

If the chiller has no biofilm, free-floating *L. pneumophila* cannot reproduce. However, in most chillers, there is some biofilm on the heat transfer surface during normal operation.

Plant operators match the number of operating chillers to the heat load in the building and current and near-term environmental conditions. Operating chillers run at partial load to rapidly provide excess capacity as the heat load increases. Ideally, operators proactively monitor the amount of excess chiller

Figure 7. A stainless steel mesh test specimen from Pacific Sensor

Early Detection of Legionella in Recirculating Water Systems

capacity and accommodate the lead time to place an idled chiller into service.

As the heat load or outside temperature decreases, the plant operator idles chillers. In a recently idled chiller, the aerobic, planktonic bacteria consume the dissolved oxygen and nutrients and reproduce in the warm, stagnant water. As the concentration of dissolved oxygen decreases, the viability of the aerobic, planktonic bacteria decreases and the anaerobic, sessile bacteria in the biofilm continue to consume nutrients and reproduce, increasing the thickness of the biofilm. If juvenile *L. pneumophila* bacteria are incubating in the biofilm, they will thrive, increasing the thickness of the biofilm.

As the heat load or outside temperature increases, the plant operator re-commissions idled chillers. In a chiller returned to service, the force of water flowing through the condenser tubes shears the top layer of the biofilm, releasing juvenile *L. pneumophila* and anaerobic, sessile bacteria into the bulk water. These bacteria flow through the cooling tower and back into the condenser side of all the chillers, inoculating the entire cooling water system.

This dynamic cycle of idling and returning chillers to service dramatically increases the risk of *L. pneumophila* proliferation and decreases the accuracy of the biocide feed and biofilm control.

Biofilm Monitoring Methods

Measuring free-floating bacteria does not correlate with the concentration of sessile bacteria in biofilm. Routine paddle test and ATP measurements are not suitable for biofilm measurements. As described previously, it's nearly impossible to accurately feed non-oxidizing biocide feed without biofilm measurements.

Figure 8. An electrochemical biofilm sensor (courtesy of ALVIM Srl)

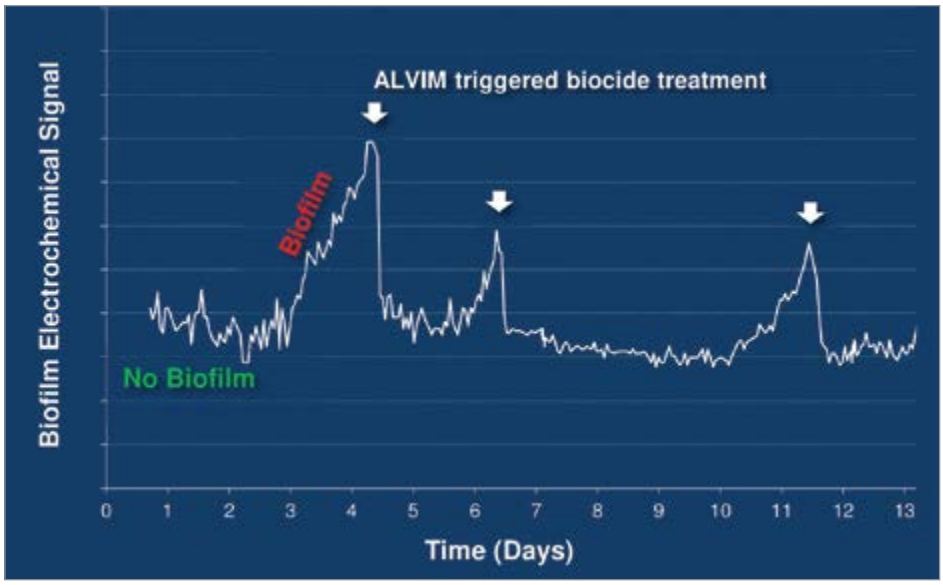

Figure 9. A sample of sensor data (courtesy of ALVIM Srl)

Measuring heat transfer loss from biofilm in an installed heat exchanger or chiller is impractical: the system must have flowmeters and temperature sensors on the inlet and outlet water streams. There are four technologies to monitor biofilm in the field: a model heat exchanger, a mesh coupon in the bypass corrosion coupon rack, a device that models the heat transfer and fluid velocity of a specific heat exchanger and an in situ electrochemical device.

A mesh test specimen in the first location in an online test rack is a low-tech, online, intermittent biofilm test (**Figure 6**). There are two options for the design of the test specimen: stainless steel or stainless steel mesh (**Figure 7**).

This test provides trend information; the duration of the test varies based on experience and current operating conditions. The typical test duration is one month. Heat exchangers operating seasonally or intermittently have a higher rate of biofilm proliferation than those in constant operation. The simplest analysis is to remove the coupon from the bypass rack and touch the surface of the biofilm coupon. The semi-quantitative method places the biofilm coupon in 100 ml of distilled water and uses an ultrasonic device to remove the biofilm from the surface of the coupon followed by one or more tests: ATP, biodetectors and laboratory plate cultures.

A novel electrochemical device, the ALVIM Biofilm Monitoring System, uses an inline electrode to detect biofilm. This highly sensitive electrochemical sensor detects bacteria immediately after settling on the surface and before the production of a slime layer. The intensity of the signal increases with the extent of biofilm.

The sensor in **Figure 8** has a robust user interface that provides graphical historical data to support troubleshooting and corrective actions. **Figure 9** shows an example of automated biocide treatment based on a specified sensor signal.

Conclusions

Biofilm is an invisible source of lost heat transfer efficiency. Most open recirculating water systems have biofilm and a risk of *L. pneumophila* bacteria. Intermittent dosing of

non-oxidizing biocides is not a robust method to manage the loss of heat transfer efficiency or the risk of proliferation of *L. pneumophila* bacteria in open, recirculating water systems. Monitoring biofilm is critical because it's impossible to accurately feed non-oxidizing biocide or measure the concentration of sessile bacteria.

The use of one or more technologies to monitor biofilm will recover lost heat transfer and reduce the annual cost of expensive non-oxidizing biocides. In addition, promptly feeding biocide based on a real-time biofilm sensor reduces the risk of Legionellosis infections from evaporative cooling towers and other devices that generate aerosols (water droplets). BP

Figure 10. Biofilm on a heat exchanger tube sheet

About the Author

Loraine A. Huchler, P.E., CMC®, FIMC, is the founder and president of MarTech Systems, a consulting firm that assesses and manages risk in water and glycol-related utility systems. Huchler has a Bachelor of Science degree in chemical engineering from the University of Rochester, is licensed as a Professional Engineer and has earned the accreditation of Certified Management Consultant®.

About MarTech Systems

MarTech's technical consulting services optimize water systems in influent, steam and cooling systems in industrial facilities and cooling water systems in large-scale corporate facilities, university campuses, data centers and manufacturing facilities. Other services include technology feasibility studies, water conservation and water reuse studies, technical training and serving as an expert witness in patent infringement and equipment failure litigation. Visit https://www.martechsystems.com.

Endnotes

1. AI requires up to ten times as much energy as a standard web search.
2. ATP – Adenosine Tri-Phosphate
3. https://cdn.hach.com/7FYZVWYB/at/cxv62tqh9rt7rxh37pbkr5j/BART_Test__Procedure_Instructions-Lit8436.pdf

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The 2025 AICD Show Report

By Bill Smith, Regional Sales Manager, Compressed Air Best Practices® Magazine

The Association of Independent Compressor Distributors (AICD) held its annual trade show in Louisville, KY, April 27-29, 2025. Participating distributor members and guests enjoyed the AICD trade show, guest speakers, a golf tournament and a visit to the Louisville Slugger Museum & Factory.

"The AICD is doing well, and membership is growing," said Bart Frush, AICD President, and Owner of B&K Compressors in La Porte City, IA. "Overall, it's been a great show," said Matt Fleskes, General Manager, Portland Compressor. "This is our second year being a member. Both the speakers and vendors have been great in helping us address the challenges we face."

"It's always interesting to see the new vendors here. I'm also able to see how other distributors run their business differently, and at a bigger scale than how we operate in Hawaii," said Jim Griffin, President, Starr and Company.

This report presents a sampling of the trade show exhibits (by technology, alphabetically) to share company and technology news.

Above: The 2025 AICD board includes Dave Nosal, Bob Coppell, Jeff Brennan, Kasey Gould, Brent Pifer, Bart Frush, Chad Gooding, Dan Harrison and Mikella Reed (left to right).

Kiel Locklear of Air Production & Service, Robbie Elting of FieldServio, Chris Leonard of Air Production & Service and James Gillespie of Standpoint Technologies (left to right) at the Finale Party in the Louisville Slugger Museum & Factory

Bret Jackson, Ben Johnson, John Brandenburg, James Goff and Danny Kent (left to right) of Atlas Machine & Supply

Air Compressors

Atlas Machine & Supply is launching Atlas IQ, a brand-agnostic, smart monitoring solution for compressed air. Atlas IQ IoT sensors connect industrial equipment to mobile and web apps to deliver real-time data, historical trends, and service alerts to keep compressed air systems operating at peak efficiency.

Aykom Compressor displayed a 15 horsepower (hp) ATUS Series (7.5-100 hp) direct drive, oil-injected, rotary air compressor. Nitin G. Shanbhag, President, shared how the ATUS air compressor has unique features, including cartridge-type air/oil separation for easy maintenance, and stainless tubing for durability. "In addition, many air compressors are designed to push motors into their service factor range, meaning a 50 hp motor might routinely operate closer to 60 hp. While this can deliver more output temporarily, it also increases heat and power consumption, and can shorten motor lifespan due to stress on the windings," said Shanbhag. "All our air compressors are designed to run at a 1.0 load point. In other words, a 15 hp air compressor only uses 15 hp – no overloading, no hidden energy costs, and longer-term reliability."

The Bauer Compressors team discussed its complete air treatment solutions for medium- and high-pressure air compressors. The SECCANT line of adsorption compressed air dryers includes 37 models from 35-1,097 scfm for pressures ranging from 725-6,000 psig (50-414 barg), with optional integrated pressure vessel with activated carbon for oil removal. Its IHP series of high-pressure refrigerated compressed air dryers are rated for 1,450 psig (100 barg), 5,000 psig (345 barg) and 6,000 psig (414 barg) from 20-275 cfm.

EL-AV Compressors appointed Cortland Privateer as Sales Manager for North America. The company also recently announced its membership in CAGI's Rotary Positive Air Compressor section. On display was a 50 hp EL+ series air compressor with a direct-drive

Ali Ekinci, Nitin G. Shanbhag, Emre Tujumet, Aydin Dereci and Ibo Emirdag (left to right) of Alkin Compressor and Aykom Compressor

Eric Phelps and Jason Pruss (left to right) with Bauer Compressors

Courtland Privateer, Peter Abreu, Amit Mizrahi, Ronit Mizrahi and Yoel Mizrahi (left to right) of EL-AV Compressors

Scott Avey at the ELGi booth

The 2025 AICD Show Report

permanent magnet motor. The series ranges from 15-150 hp and 11-110 kW.

ELGi displayed an oil-lubricated, fixed speed EQ series air compressor (25-60 hp, 18-45 kW) with NC intake valve; an oil-lubricated EG series air compressor (15-300 hp, 11-220 kW) available in variable and fixed-speed configurations and a portable unit. "We're here to show our commitment to the independent distributor network," said Scott Avey, Vice President, ELGi North America. "We're supporting distributors with both portable and stationary units from our Charlotte and Los Angeles locations."

ENERGAIR developed Metacentre Core, a cost-effective, robust master controller with optional cloud connectivity, designed for compressed air systems with one to six air compressors. ENERGAIR's AIRMATICS solution, launched in 2018, is for more advanced system control, offering multi-site management tools, cloud-based monitoring and analytics for systems with more than six air compressors.

FS-Curtis discussed the recent launch of its Toledo Tools rotary screw air compressors. Available in 19 models (5-50 hp), the series is rated for 18.4-212.2 cfm at 125 psi (8.6 barg), and 13.4-160.6 cfm at 175 psi (12.1 barg). Its Ultrapak option includes a tank-mounted air compressor, particulate pre-filter, refrigerated compressed air dryer and coalescing oil-removal filter.

The FS-Elliott team shared updates about the P650, the latest entry in the Polaris centrifugal air compressor series offering customization, cost effectiveness and compactness. The P650 is rated for 700-2,000 hp for 5,000-10,140 cfm up to 145 psig (10.0 barg). It's designed for reliability with AGMA 13 standard gearing and a bull gear shaft-driven main oil pump. The controller includes patented control modes such

Nicolas De Deken of ENERGAIR

Adam Briscoe and Kyle Trandum (left to right) of FS-Curtis

Mark McCarthy and Kevin Walker (left to right) of FS-Elliott

Bob Littman, Brett Looney, Elizabeth Fleming and Scott Ripatrazone (left to right) of GlobalVac & Air

as ambient compensation control, integrated compressor control, pressure band optimization and auto dual.

The GlobalVac & Air team shared its Mobile Engineered Solutions and Lab & Medical Scroll Compressor Systems series. Mobile Engineered Solutions specifications include weather-proof containers (-40°F to 115°F, -40°C to 47°C) with 12-gauge corrugated steel walls, one-inch urethane foam insulation, an ambient temperature sensor and thermostatically controlled dampers.

Hertz Kompressoren displayed its IMPETUS series oil-injected two-stage variable speed drive (VSD) rotary screw air compressors. This line ranges from 30-430 hp and is equipped with IE5 motors in 30-100 hp units, and IE4 motors in 125-430 hp units. Matt Nolte joined Hertz as Sales Director.

Kaishan Compressor USA is nearing completion of an $11 million expansion at its Loxley, AL, facility, aimed at strengthening localized assembly, production and warehousing. The company is also preparing to launch its Kaishan Centrifugal Oil-Free (KCOF) series, while expanding the range of its Kaishan Rotary Oil-Free series (KROF), currently 125–200 hp, with smaller and greater horsepower models. On the personnel front, Rob Grizzle and James Freligh have been appointed as Regional Sales Managers, and Weston Benton marked one year as Vacuum & Low Pressure Channel Manager. Additionally, Shawn Wood joined the team in a sales and marketing role.

Camillo Villalobos, Vice President and General Manager, shared several new products from Ozen Air Technology. Visitors saw OPS+ Series (11-50 hp) direct drive and variable speed air compressors on display. Also displayed was the OMG Series nitrogen generator with integrated desiccant dryer and inlet-outlet filtration. Next, the OPS MP Series (15-60 hp) achieves pressures up to 290 psig (20.0 barg). Ozen is also launching the U Series of fixed speed (50-200 hp, 37-160 kW) air compressors with a lifetime airend warranty.

Matt Nolte of Hertz Kompressoren with a 50 hp IMPETUS air compressor

J Howard, James Freligh, Weston Benton, Shawn Wood, Brandon Dial, Chris Downs and Rob Grizzle (left to right) of Kaishan Compressor USA

Mike Zacharko, Trey Weeks, Bryan Andersen and Camilo Villalobos (left to right) of Ozen Air Technology

Sean Dempsey, Jeff Swearingen, Crystal Wilson, Adam Shoemaker and John Temple (left to right) with Sauer Compressors USA

The 2025 AICD Show Report

Chuck Westhofen and Jeffrey Swearingen have been appointed as Rental Business Development Managers at Sauer Compressors USA. The company recently opened a satellite facility in Cache Valley, UT, to extend its market reach and serve as a rental and engineering hub. The company has several job openings, according to Crystal Wilson, Marketing Manager.

South-Tek Systems is launching a suite of air compressors, dryers and filters. The company now offers single-stage, two-stage, fixed speed, variable speed and direct drive boosters and tank-mounted air compressors.

Sullivan-Palatek integrated new rotor and airend designs into its SP13 series (40-60 hp) and SP25 series (200-350 hp) of rotary screw air compressors for enhanced efficiency. The SP25 inlet valve has a high-flow, low-loss design. Sump ports were redesigned to mitigate pressure drop. Its latest portable air compressor – with a 74 hp diesel engine – was redesigned to achieve 300 cfm (a 40 cfm improvement).

Tamsan-USA displayed its F series rotary screw air compressors and shared that new tank mounted units are launching in the summer of 2025. Aaron Massey, Systems Specialist, said Tamsan-USA units are "Designed by technicians for technicians." The company appointed Lisa Lewis as General Manager in March 2025.

Compressed Air Purification, Piping and Instrumentation

Altec AIR displayed its HBS series single tower heat regenerative compressed air dryer. The company's desiccant compressed air dryer offerings now include heatless dryers up to 5,000 scfm, low dew point heatless compressed air dryers, heat regenerative compressed air dryers and external blower purge compressed air dryers up to 6,000 scfm single tower, as well as point-of-use dryers ranging from 0.4-50 scfm.

Keelan Ails of South-Tek Systems with Brian Quade of Leland Brewing Company

Bruce McFee, Larry Colley, Rob Mitchell, Austin Wilkins, Brice Schultz, Bob Groendyke, Grant Hebert and Scott Seibert (left to right) of Sullivan-Palatek

Nathan Medlin and Aaron Massey (left to right) of Tamsan-USA

Jeff Ewers and Chris Foster (left to right) of Altec AIR

BEKO Technologies launched the METPOINT VFS TI and METPOINT VFS TM volumetric flow meters for compressed air and nitrogen. The TM comes pre-installed in a pipe length, so sensor alignment isn't necessary. The TI is an insertion version with switchable line laser assists for exact sensor alignment. Its two-inch LCD provides volume flow, flow rate, consumption and temperature readings.

CS INSTRUMENTS USA displayed its LeakCam 600, equipped with 64 ultrasonic MEMS microphones, a five-inch HD display and a 13-megapixel camera for clear, detailed visualizations. The company broke ground on its new headquarters for the Americas in South Carolina. The facility will feature an experience and training center, calibration lab and expanded warehouse.

Hankison displayed its industrial process chillers and PHDM series heatless modular desiccant air dryers. PHDM dryers are rated for 3-177 scfm at 100 psi (6.9 barg) and are designed with non-lubricated soft-seated control valves, heavy-duty mufflers and front-mounted control panels. The air-cooled industrial process chillers have options between rotary or scroll refrigerant compressors, copper coaxial or stainless-steel brazed plate evaporators, thermostatic or electronic expansion valves and a standard microchannel condenser.

Kingston Valves announced its CE certification for its check valves in the European market. Regional Sales Manager Theresa Hinkler shared other new offerings, including KHV ASME hard seat safety valves for high temperature applications, and KPU piloted unloader valves (a combination of pilot and discharge valves).

KSI Technologies unveiled KONTREC oil-water separators rated for 75-1,000 cfm for mineral lubricants (Standard type), synthetic lubricants and emulsions (K-Type). Features include a compact space-saving design, a test drain and four condensate inlets.

This fall, Unipipe Solutions will launch UnipipeSS 316L stainless steel piping with nine

Jason Hobbs of BEKO Technologies

RJ Bennett, Martin Zeller and Enrico Capetanis (left to right) of CS INSTRUMENTS USA

David Strogis, Andrew Kubrich, Terry Skiba and James Lewek (left to right) of Hankison

Theresa Hinkler and Madison Lester (left to right) of Kingston Valves

The 2025 AICD Show Report

Holger and Mirko Krebs (left to right) of KSI Technologies

Joe Koerig and Joe Burke (left to right) of Unipipe

Thorstein Holt of Holtec Gas Systems with Mark Beauchamp, Al Gallo, Chris Ursillo and Chris Nelen (left to right) of ZEKS Compressed Air Solutions

diameters from ¾-inch (18mm)–4-inch (108mm). Operating temperatures range from -40°F to 284°F (-40°C to 140°C) and maximum operating pressures are -29.5 inHg for vacuum and 232 psi for compressed air. Sales Manager Joe Burke said Unipipe offers guaranteed 48-hour lead times.

ZEKS is launching products to accommodate lower-GWP refrigerant requirements. According to ZEKS Commercial Leader Chris Ursillo, ZEKS launched 10-250 cfm HeatSink cycling refrigerated compressed air dryers with R-513A. Next, HeatSink cycling refrigerated compressed air dryers from 300-800 cfm will be introduced with additional features.

Thorstein Holt with Holtec Gas Systems in Saint Charles, MO, shared it is conducting tests on different carbon molecular sieve types and butterfly valves to maximize the life of the unit. Holtec celebrated 25 years in December 2024.

Conference

The AICD conference had an engaging agenda aimed at helping independent air compressor sales and service companies improve their businesses. Presentations and speakers included:

- "The AI Gameplan: Practical Strategies and Game-Changing Tools," by consultant and ex-Google executive Steve Lerch
- "The Pause & Pivot Method" by entrepreneur and "The Apprentice" winner Bill Rancic
- "Complacency Kills: Combat's Most Important Lessons Applied to the Business World," by former Navy SEAL Kevin Lacz
- "Create Sales. Be Order Makers, Not Order Takers," by CEO and motivational speaker Jeremiah Wilson.

"I'm so grateful for our members and vendors that support the AICD. Every year gets better and better," said Kasey Gould, AICD Administrator.

Mark your calendars for next year's show, April 19-21, 2026 at the Rosen Center in Orlando, FL. BP

For more information, contact Kasey Gould, AICD Administrator, at admin@aicd.org or visit https://www.aicd.org.

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SALES ENGINEERING SKILLS

The Skill Industrial Product Sales Teams Lack – and How to Get It

By Mark Allen Roberts, CEO, OTB Solutions

In industrial product sales, deals are complex, cycles are long, and buyers are technical. Success requires more than product knowledge or persistence. One critical skill separates high-performing industrial sales teams from the rest: consultative selling.

Consultative selling is the ability to shift from pushing products to solving problems. It means positioning yourself as a trusted advisor, not just a vendor. This skill is essential in industrial sectors where customers buy mission-critical components, systems or materials.

I have worked with several distributors, reps and OEM manufacturers in the compressed air, nitrogen generation and cooling markets. I have worked with salespeople who have an engineering degree or started in a tech service role. They can design a solution if they're presented with a problem. Their challenge, however, is creating conversations where customers share their goals and constraints.

Mark Allen Roberts will be conducting a Sales Engineering Workshop at the Best Practices 2025 EXPO & Conference in Kansas City. Visit https://cabpexpo.com/sales-engineering-workshop/.

Why Most Industrial Sales Teams Lack this Skill

Many salespeople are trained to memorize product specs and recite features. However, technical knowledge alone doesn't close deals today. Buyers care less about what your product does or how it is made, and more about how it solves their problems.

In industries built on repeat orders, it's easy to fall into order-taking rather than value creation. We see this often with service contracts and aftermarket parts. It leads to missed upsell opportunities and lower margins. It's an outcome of the pandemic, where salespeople became transactional and foundational sales skills grew weak.

Reps often rush to pitch instead of asking smart questions. This short-circuits the sales process and prevents deeper insights into buyers' needs. If your team aims to improve its average close rate by 15% or more, I suggest you ensure it has strong discovery skills.

Build a Consultative Sales Culture

The heart of consultative selling is discovery. Reps should be trained to ask open-ended, business-focused questions like:

- "What's the impact of this problem on your production goals?"
- "What are you looking to improve – speed, cost, safety or something else?"
- "What happens if this issue isn't resolved in the next six months?"

These questions shift the conversation from specs and prices to business outcomes.

Consultative selling requires context. Sales reps must understand the industries they serve. The better they understand the customer's world, the more valuable their advice becomes. Create industry-specific sales playbooks that include common problems, industry terminology, regulations, trends, success stories and talking points.

In industrial markets, your biggest competitive advantage isn't your product – it's your team's ability to understand customer problems better than anyone else. When your salespeople stop pitching and start diagnosing, you stop competing on price and start winning on value. 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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BETTER PLANTS INSIGHTS

Compressed Air Training at Coca-Cola Beverages Northeast

By Alex Botts, Research Associate, Oak Ridge National Laboratory

Workforce development is a key pillar of the U.S. Department of Energy's Better Plants program. We offer a wide range of opportunities for our partners. This column discusses our experience at a compressed air In-Plant Training (INPLT) at the East Hartford, CT, Coca-Cola Beverages Northeast production center.

Better Plants In-Plant Training

An INPLT is a hands-on workshop hosted at a partner facility and led by a systems expert. The expert trains participants to identify, implement and replicate energy-optimizing projects. Through a competitive semiannual process, Better Plants partners apply to host an INPLT in one of the offered topic areas including compressed air, steam systems, process heating systems, 50001 Ready and water efficiency, with some hosting multisystem events. Trainings run from two to four days depending on the chosen system type, size and complexity.

The typical process for an INPLT includes pre-event analysis, the training event and a follow-up report summarizing the findings. Partners are encouraged to invite participants from other facilities and open their trainings to other Better Plants partners. In the first round of 2025 applications, 17 INPLT events were awarded to partner organizations across the country.

Coca-Cola Beverages Northeast Hosts an INPLT

Coca-Cola Beverages Northeast applied for a compressed air INPLT in the 2024 round and hosted the training in January 2025. The partner opened the training to other Coca-Cola business units across the U.S., with approximately a dozen participants in attendance.

The partner has two main industrial processes: a canning and bottling process and a bottle-blowing process. During the pre-event analysis, the partner participated in several planning calls. The Better Plants expert guided the partner in mapping its compressed air system – a crucial step for understanding the industrial system, process and necessary data collection points.

INPLT participants represented seven Coca-Cola business units.

For most INPLTs, partners borrow an array of data loggers through the Better Plant's free diagnostic equipment loan program. The time, the pre-event analysis revealed data had been logged within the past few weeks. The expert obtained the CAGI data sheets for the air compressors in the partner's low-pressure system – a key step for compressed air system modeling in the Department of Energy's (DOE's) free MEASUR software. After the initial meeting, data loggers were shipped to the facility and installed by the partner's team.

Coca-Cola Beverages Northeast Training Highlights

This training was unique because the partner has two separate compressed air systems operating at different set points: a low-pressure compressed air system operating around 100 psi (6.9 barg) and a high-pressure compressed air system at around 500 psi (34.5 barg). Data was not logged for the high-pressure compressed air system. Instead, the team conducted a cycle-timing study and load evaluation on the high-pressure system to determine average flow. However, given its critical role in production and isolated function serving only the bottle-blowing equipment, it presented a limited opportunity for the scope of this training. Therefore, training focused on the low-pressure compressed air system.

The partner's low-pressure compressed air system is comprised of three 75 hp water-cooled, lubricated rotary screw air compressors. Two are fixed speed with variable displacement lift valve controls. The third, located outside of the air compressor room, is also rated at 75 hp, but uses a variable speed drive (VSD).

During the training, participants reviewed historical data and analyzed insights from the data profiles. The expert discussed compressed air fundamentals, focusing on specific components in the host's system, such as mist eliminators, VSD controls and wet tanks. This provided participants with an opportunity to ask questions about their own facility systems.

This group was particularly active and involved in the training, a beneficial characteristic for a successful event. After the initial training, the group toured the facility and observed best practices, as well as opportunities for improvement. Participants were taught to use an acoustic imager and enthusiastically volunteered to detect compressed air leaks during the tour.

Participants observed several best practices at the plant. These included the use of low-pressure blowers to move product, a pressure/flow controller paired with over 5,000 gallons of compressed air storage and a system setpoint of 95 psig (6.6 barg) to reduce artificial demand. Other best practices included the use of zero air loss drains, the availability of reliability and energy funding for projects and ongoing leak detection using an acoustic imager. The plant also uses blower-driven air knives instead of compressed air for drying product. Finally, cleanliness in each air compressor room was well maintained.

On the second day, participants learned to use the DOE's MEASUR tool suite to model their systems, quantify opportunities and draft presentations for facility management. The third and final day focused on refining calculations and presenting findings to management.

Key Findings of the Coca-Cola Beverages Northeast INPLT

The most significant energy-saving opportunity discovered during the INPLT involved optimizing air compressor controls. The air compressors in the air compressor room were variable displacement with unloading, thus inefficient at part-load operation. The VSD air compressor wasn't communicating with the air compressors in the air compressor room, so the three fought against each other. The VSD air compressor was base-loaded and unable to trim the compressed air demand effectively.

Using MEASUR, the participants identified that optimizing the air compressor controls and reducing the leak load by 25 acfm would result in a 14% reduction in system energy consumption.

Next Steps for Coca-Cola Beverages Northeast

The Coca-Cola Beverages Northeast INPLT demonstrated how strategic adjustments in air compressor control strategies can significantly improve energy efficiency. By leveraging the DOE's free software and equipment programs, Better Plants partners can gain valuable insights into their compressed air systems and discover cost-saving measures. Coca-Cola Beverages Northeast's proactive approach demonstrates its culture of continuous improvement and focus on sustainability.

"The compressed air INPLT was a phenomenal collaborative and educational experience," said Kyle King, Operations Sustainability Manager, Coca-Cola Beverages Northeast. "We gained valuable insights into our compressed air system, enabling us to correct inefficiencies and continually monitor the compressed air system to maintain peak performance. We look forward to continued collaboration with the Better Plants program and thank everyone involved."

For program partners interested in hosting an INPLT, reach out to your technical account manager. For anyone who would like to learn more about compressed air but can't attend or host a training, Better Plants offers virtual trainings on a wide array of topics at https://bptraining.ornl.gov. To learn more about energy efficiency opportunities, explore the Better Plants program at https://Energy.gov/BetterPlants. BP

About the Author

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

Coca-Cola Beverages Northeast is located in South Windsor, CT.

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Real-World Installations & Maintenance

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

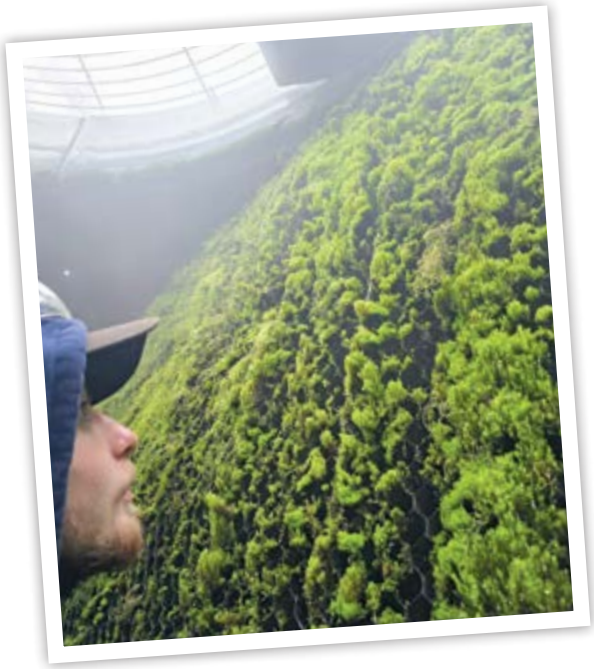
There's much we can learn from real-world compressed air, blower, vacuum, chiller and cooling tower installations. This column asks readers to share lessons learned from system installations and maintenance practices they encounter in the real world.

A Compressed Air Storage Tank Becomes a Billboard

Fluid-Aire Dynamics is a PneuTech distributor with locations in Illinois, Wisconsin, Minnesota, Michigan and Pennsylvania. It regularly services the food and beverage, automotive and oil and gas industries. Visit https://fluidairedynamics.com.

Fluid-Aire Dynamics designed a compressed air and nitrogen system for Wehrli Custom Fabrication, a central Illinois-based company that makes aftermarket parts for diesel trucks. As Sales Director Jeremy Gaitsch noted, "They're also experts at marketing and saw a blank canvas in the 1,060-gallon compressed air storage tank we installed next to a blast booth."

The broad expanse of this 1,060-gallon compressed air storage tank was an irresistible display space for Wehrli Custom Fabrication.



A Cooling Tower Goes Green

Northeast HVAC Solutions is a manufacturer's representative and service provider specializing in heat transfer systems. It partners with SPX, carrying Marley and Recold cooling towers and fluid coolers. In business since 1938, it has four locations serving upstate New York, Vermont and Massachusetts. Visit https://nehvacsolutions.com.

It's a jungle in there! Northeast HVAC Solutions discovered severe biological growth during a cooling tower rebuild at a glass manufacturing plant. "The growth in the eliminator area of this cooling tower poses a health and performance concern," said Dillon Barbeito, Vice President of Service. "The solution is to clean your tower regularly, use a filtration system and have proper water treatment in place."

The abundant flora in this cooling tower is a detriment to health and performance.

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. If we publish your submission, we'll thank you with a $25 Amazon gift card.

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