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COMPRESSED AIR SYSTEM FEATURES

COOLING SYSTEM FEATURES

EVERY ISSUE

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FROM THE EDITOR

The Convergence of Compressed Air and Cooling Systems

Manufacturing plants operate on-site utilities like compressed air and chilled water systems simultaneously. Water-cooled air compressors are often placed in the same powerhouse as large chillers. Both are supported by cooling towers. Experts from the compressed air industry audit and service the air compressors while mechanical contractors and chiller industry experts support the cooling towers and chillers.

We are noticing the very beginning phases of expert auditors, engineering firms and some manufacturing energy managers and/or facilities engineers viewing their on-site utilities as one system. When they add steam and boilers to the equation, things get very interesting. Questions are being asked; "If we do a compressed air audit and as a result turn off one water-cooled air compressor, what's the reduction impact on cooling water make-up water and water treatment chemicals required in the cooling tower?" Another major question is; "In order to support our electrification strategy, how can we take heat from the air compressors and chillers and use it to heat water – thereby reducing the natural gas use of the boilers?"

For these reasons, we are very pleased to announce the agreement we've reached with the Cooling Technology Institute (CTI), to have them join the Compressed Air & Gas Institute, as an over-all Event Sponsor of the Best Practices 2023 EXPO & Conference. The technical expertise CTI will bring to the event is important.

This issue is loaded with evidence of the exciting work being done to make on-site utilities more sustainable, reliable and safe. Mike Grennier's article features the work Logoplaste and ABC Compressors are doing to deploy embedded wall-to-wall sustainable manufacturing. Bill Smith provides two excellent show reports on the 2023 installations of the CTI Annual Meeting and AHR Expo. Chilled water system auditing receives coverage with Clayton Penhallegon's second article on tank applications.

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

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CAGI Compressed Air & Gas Institute

COOLING TECHNOLOGY INSTITUTE

mikropor

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Meet the family

- Mikropor manufactures a full range of compressed air treatment packages, filtration and gas generation systems.
- Mikropor's family of products ensure the highest quality compressed air and nitrogen from compressor to process.

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MK DS Series

MK HP Series

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ELM Series

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Compressed Air Technology & Industry News

Kaeser Introduces MOBILAIR Electric Portable Compressors

The M250E/M255E fully electric compressors are designed for outdoor operation without the need for additional weather protection. Providing 565-990 cfm with pressures from 87-200 psig, these skid-mounted units are perfect for either short-term or long-term rentals, back-up for industrial applications, or as a permanent installation even in the most challenging environments.

The M250E/M255E skid-mounted compressor is fully electric and is designed for outdoor use in nearly any environment.

The M250E/M255E compressors feature a compact design with lashing and lifting eyes as well as forklift pockets for easy transport and placement on site. Standard equipment includes the new SIGMA CONTROL SMART offering intuitive control with maintenance reminders and real time operational data from a lockable, protected control panel. Pressure is adjustable to suit the application's specific requirements. Additional features include Super Premium IE4 efficiency drive motor, standard modulation control, as well as a built-in aftercooler with condensate separator. Internal heaters extend standard operating temperature range from 14 to 104°F

Whether you need quality compressed air for construction, road and bridge repair, mining, tunneling, shipyards, or if there's just no room inside of the plant, the M250E/M255E units offer rugged reliability, without refueling or emissions.

About Kaeser Compressors

Kaeser Compressors is a leader in reliable, energy efficient compressed air equipment and system design. We offer a complete line of superior quality industrial air compressors as well as dryers, filters, SmartPipe™, master controls, and other system accessories. Kaeser also offers blowers, vacuum pumps, and portable gasoline and diesel screw compressors. Our national service network provides installation, rentals, maintenance, repair, and system audits. Kaeser is an ENERGY STAR Partner. For more information on these new units or our wide range of flexible compressed air options, visit us.kaeser.com/mobilair. To be connected with your local authorized Kaeser representative, please call (877) 417-3527.

Quincy Compressor Partners with Front Row Motorsports

Quincy Compressor, a Bay Minette, Alabama-based compressor manufacturer, will make their NASCAR Cup Series debut in 2023 in a partnership with Front Row Motorsports (FRM). The program is highlighted by a three-race primary race schedule with Todd Gilliland and the No. 38 Ford Mustang team. In addition, Quincy Compressor will partner with Michael McDowell and the No. 34 Ford Mustang team in one event. With a legacy spanning over one hundred years, they are excited to bring their "True Blue" brand to NASCAR's premiere series and to its millions of passionate fans.

"Our relationship with Front Row Motorsports will allow us to continue to grow the Quincy brand and showcase our products and capabilities," said Ashley Gates, Marketing and Communications Manager, Quincy Compressor.

Quincy Compressor will make their NASCAR Cup Series debut in 2023 in a partnership with Front Row Motorsports.

"The team at Front Row Motorsports and its drivers Todd Gilliland and Michael McDowell will be great ambassadors for our company and we want to be a part of the continued success of the team. We are looking forward to the 2023 NASCAR Cup Series season and this new partnership."

Gilliland will carry the Quincy Compressor colors three times throughout the year beginning at the Richmond (Va.) Raceway in April, the Darlington (S.C.) Raceway in September, and finishing at the Martinsville (Va.) Speedway in October.

"It is really cool to have a multiple-race partnership with a new partner such as Quincy Compressor," said Gilliland. "We're growing in my second season with FRM, evident by our partnership announcements, and it's just going to make our whole program better. I'm ready to start this season."

For McDowell, Quincy will be the primary partner at the Las Vegas (Nev.) Motor Speedway in March.

"It is always great to welcome new partners to FRM," said McDowell. "I echo what Todd says about all these partnership announcements and having a new company like Quincy Compressor join the team, it just proves that we're growing and getting better. Now, we want to get the fans excited about Quincy Compressor and see everything they have to offer."

About Quincy Compressor

Founded in 1920, Quincy Compressor is a leading designer and manufacturer of reciprocating and rotary screw air compressors, vacuum pumps and a full line of air treatment components. Headquartered in Bay Minette, Alabama, Quincy has built its reputation on quality and rugged reliability, building tough air compressors for the most demanding applications. To learn more about Quincy Compressor, fans are encouraged to visit their website at www.quincycompressor.com.

Industrial Compressor Solutions Partners with DoD for Training Program

Industrial Compressor Solutions (ICS) is proud to announce its partnership with the Department of Defense (DoD) SkillBridge training program, which pairs active-duty service members who are preparing to separate from the military with career opportunities. SkillBridge is designed to give service members a practical way to transition to the civilian professional world. ICS' SkillBridge program, which has been approved for members from all four branches of the military, offers compressed air technician training to service members in the final 180 days of their service.

Josh Wamser, President of ICS and former Marine Corps Infantryman (0351) and Navy Machinist's Mate Nuclear (MMN), said, "Transitioning isn't easy; I know from personal experience. Military culture, ranks, and respect become so ingrained that it can be a strange experience to suddenly find yourself in a place where that

Compressed Air Technology & Industry News

doesn't really exist. My hope is that anyone headed into our work environment at ICS can rest easy knowing that there are people here who inherently understand where they come from. We love working with fellow veterans and we look forward to welcoming more onto our team."

ICS' SkillBridge program offers compressed air technician training to service members in the final 180 days of their service.

The compressed air technician training program will provide service members with hands-on experience and training in preventive and corrective maintenance, troubleshooting, and installation of piping and compressed air systems. Participants will also receive classroom instruction on compressed air theory, electrical theory, safety procedures, and industry best practices.

Upon completion, service members will receive a certificate reflecting their training hours and proficiencies. The goal of the program is to equip technicians with the knowledge and skills they need to pursue a career in the compressed air industry.

The DoD SkillBridge program is designed to help service members find employment after they separate from the military, and Industrial Compressor Solutions is committed to working with program participants to provide job opportunities and support their transition to civilian life.

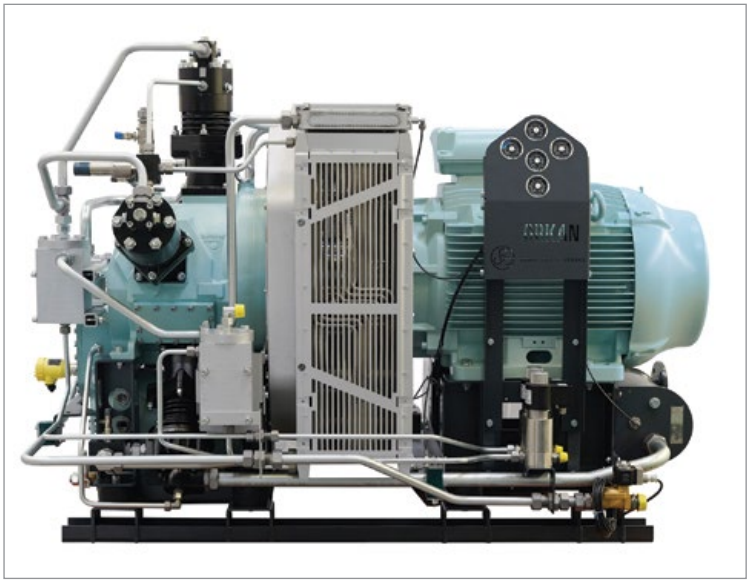
About Industrial Compressor Solutions

Industrial Compressor Solutions is an industry-leading trainer in compressed air solutions in the manufacturing and industrial sectors. Our team of experts are experienced, licensed, and certified, and we are dedicated to providing our customers with the services they need and the support they deserve. We look forward to offering veterans a soft place to land as they transition to civilian life and jobs. For more information about the program or to apply, please visit www.ics-resource.com.

Sauer Compressors Introduces Orkan WP5173 Helium Booster

Sauer Compressors is pleased to introduce the Orkan WP5173 Helium Booster. The Helium Booster is ideal for a variety of industrial applications. This 5-cylinder compressor offers five compression stages that allow the ratios to be minor and is coupled with an efficient radial cooling system. This allows the WP5173 to compress Helium gas to 5,000 psi. In addition, the completely sealed crankcase and magnetic coupling ensure no leakage and no valuable gas loss during operation.

Sauer Helium Compressors are specially designed for helium compression. They represent the most efficient and safe solution for various helium applications such as tube trailer filling and unfill, cylinder fill, and the reclamation of helium post application.



The Sauer Orkan WP5173 Helium Booster is ideal for a variety of industrial applications.

About Sauer Compressors

Sauer Compressors is a medium-sized German group of companies with 14 international subsidiaries. The company was founded more than 135 years ago, and has over 85 years' experience in compressed air technology. Today, it focuses on the development, production and sale of medium and high-pressure compressors for applications in commercial shipping, industry, offshore and the defense sector. Besides standard products, it offers customized solutions for individual customers, OEMs and companies that operate on a global stage. With a global network of agents and representatives, Sauer maintains proximity to its customers. By supplementing the compressor range with high-quality accessories, engineering services, assembly and service concepts, Sauer offers system solutions right up to complete turnkey installations. For more information, visit www.sauerusa.com.

Compressed Air Technology & Industry News

Filter Element Store Increases Filter Sales Over 80%

Filter Element Store, a leading provider of top-quality aftermarket filter elements and air compressor parts, is proud to announce a record increase in filter sales of over 80% in both 2021 and 2022. Filter Element Store President, Kevin Hood, attributes the company's success to their extreme attention to customer service and their commitment to try and ship every order the same day.

"We are dedicated to providing the best possible service to our customers," said Hood. "By offering same-day shipping and going above and beyond to ensure customer satisfaction, we have been able to build a loyal customer base and drive significant growth for our company."

According to Vice President Lani Williams, the company's customer-centric approach is a key part of their success. "We try to pretend that all of our customers have an emergency with every order. And we are very thankful that our industry has some of the nicest people you can meet. We consider a lot of our customers good friends and value our long-term relationships."

FILTER ELEMENT STORE

Big filter savings the big brands trust since 1976.

"We are constantly looking for ways to improve and expand our product offerings to meet the needs of our customers," said Hood. "By offering a wide range of high-quality filter elements, compressor oil, and compressor parts, we are able to provide a one-stop-shop for all of our customers' filtration and compressor needs."

The company plans to continue expanding in 2023, hiring several more employees and increasing their product offerings.

"We are excited to continue growing and serving our loyal customers in the future," said Hood. "In 2023, Filter Element Store celebrates 15 years of selling filter elements online and 48 years of helping with filtration in person. As we continue to grow and expand, we plan to hire several more employees and increase our product offerings to meet the needs of our customers. We will still have the same friendly family-owned business personality, but with even more support for our customers."

About Filter Element Store

Founded in 1976 as a manufacturer's representative agency representing filtration and separation equipment, Filter Element Store has grown to become a trusted online source for top quality aftermarket filter elements and air compressor parts. The three-generation family-owned business offers a wide range of filter elements including adsorber, coalescing, particulate, air/oil separators, panel filters, and hydraulic filters. In addition to these products, the company also offers compressor oil and air compressor parts to meet the needs of their customers. For more information about Filter Element Store and their products, visit https://filterelementstore.com/.

Canuck Industrial Group Partners with ELGi USA

Canuck Industrial Group is pleased to introduce ELGi as their partner to enhance their compressed air offering. ELGi North America offers customers a diverse range of compressed air solutions with the lowest ownership cost experience, energy efficiency, and strong distributor partnerships.

Canuck Industrial Group partners with ELGi USA to bring more options to the Canadian marketplace.

"Canadian customers spoke and we listened! We are excited to partner with ELGi," said Bayley Gammon, Owner. "ELGi has a wide range of compressor options and offers greater uptime at lower cost of ownership. With ELGi's best-in-class products and Canuck Industrial's expertise, we believe we will be able to offer unparalleled customer service to the Canadian market."

With a portfolio of over 400 products, ELGi's product offering includes oil-lubricated and oil-free rotary screw and reciprocating compressors, dryers, filters, and ancillary accessories. ELGi serves multiple industry verticals spanning medical applications, pharmaceuticals, food and

Compressed Air Technology & Industry News

beverage, construction, manufacturing, and infrastructure. Canuck Industrial is confident this new partnership will bring high-quality and reliable compressed air solutions with an industry-leading warranty to the Canadian marketplace.

About Canuck Industrial

Established in early 2020, Canuck Industrial jumped into the Canadian Market offering compressed air piping. Noting a need for an end-to-end turnkey approach to keep plants running smoothly and efficiently, Canuck Industrial quickly branched out to offer a complete scope of sales and service for compressed air systems inclusive of air compressors, downstream equipment, air receivers, industrial piping, and consumables. In early 2021, Canuck Industrial added leak detection and consulting services to round out the turnkey approach. With a local approach, Canuck Industrial supports the Greater Toronto area east to Kingston, Ontario with Canada wide sales. For more information, visit www.canuckinc.ca.

OTC Industrial Technologies Held Open House at New Las Vegas Location

OTC Industrial Technologies' Henderson, Nevada branch held an Open House for customers, local leaders, and businesses at 7585 Commercial Way, Suite A, Henderson, NV 89011. All were invited to visit the newly expanded location. OTC Industrial Technologies (OTC) is an industrial equipment service provider and distributor headquartered in Columbus, Ohio which partnered with Quincy Compressor in 2022 in the expansion of two OTC locations in Phoenix, AZ, and Las Vegas, NV. Quincy Compressor is a leading manufacturer of reciprocating and rotary screw air compressors headquartered in Bay Minette, AL.

The continuing success between OTC and Quincy has presented an opportunity to align strategic focus and deepen the partnership. With expansion into the Southwest United States, OTC's geographic presence in the region will continue to amplify. With this newest collaboration, OTC, and Quincy, both leaders in

the Compressed Air Industry, will be poised to deliver superior solutions to customers in the southwest United States.

"I was very excited to welcome people to our Open House as we gain a footprint in the Southwest compressed air market," said OTC Vice President of Sales Daniel Knapp. "We're excited to not only expand our compressed air distribution business, but leverage resources to grow our DIRECTAIR solution in the Western portion of the US."

The President of Air Supply at OTC, Adam Gibbs, echoed the positive impact the expansion will have. "As OTC continues to expand west, partnering with Quincy provides opportunities to offer best-in-class support for compressed air services for Arizona and Nevada."

About OTC Industrial Technologies

Established in 1963, OTC Industrial Technologies (OTC) is one of the largest industrial distributors and service providers in the United States. OTC provides expert solutions for industrial motion control, factory automation, fluid power, pumping systems, spray finishing, power transmission, and compressed air systems. OTC operates a broad geographical footprint and delivers value to customers through its primary operating brands and divisions including OTP Industrial Solutions, AAP Automation, Air Technologies, Advanced Industrial Products, American Industrial Corporation, Buckeye Pumps, C&C Industrial Sales, Compressed Air Systems, Contrast Equipment, Crimson Electric, Critical Rental Solutions, Diversified Pump, Filter and Coating Technology, Furey Filter and Pump, IDG Compressor, Industrial Process Equipment Group, Keller Electrical, Laron, Midway Industrial Supply, Ohlheiser, PK Controls, Pumps, Parts & Service (PP&S), PumpTek, PSI Engineering, Tape Industrial Sales, TP Pump, and Tri-Power MPT. For more information, visit https://otcindustrial.com.

OTC Industrial Technologies' Henderson, Nevada branch held an Open House for customers, local leaders, and businesses.

ABC Compressors Supports Logoplaste Embedded Wall-to-Wall Sustainable Manufacturing

By Mike Grennier, Compressed Air Best Practices® Magazine

Logoplaste, based in Cascais, Portugal, introduced its embedded wall-to-wall manufacturing model to reduce waste and increase efficiency. The model also results in a more economically and environmentally sustainable method of production of rigid plastic packaging since it eliminates the need for a separate secondary packaging plant and the logistics associated with transporting empty bottles. Logoplaste (www.logoplaste.com) operates embedded production lines throughout the world, 70% of which use the wall-to-wall concept. The remaining operations are traditional production facilities.

Known as "wall-to-wall manufacturing," the concept of producing containers within a customer's facility leaves a very small margin for error, said Leandro Sponchiado, Technical Director USA, Logoplaste.

"The room for mistakes is zero," Sponchiado said, noting Logoplaste was among the first to introduce wall-to-wall manufacturing. "We need to deliver containers just in time at all times. If my machines stop, or quality isn't 100%, the customer doesn't have containers to fill."

Designing World-Class Production Lines – Compressed Air Included

Pivotal to reliability and quality is the compressed air used to power Logoplaste imbedded wall-to-wall manufacturing production lines.

"Everything in these plants is the best you can have," Sponchiado said. "They are showcase facilities with best-in-class machines. The compressed air systems used were born in the correct way."

Much of the success for the wall-to-wall concept stems from the ability to design the

Five Ways Embedded Wall-to-Wall Packaging Plants Cut Carbon Footprints*

1. **Eliminate Freight –** an embedded plant delivers bottles directly into filling lines, no trucking, no shipping of empty bottles.
2. **Eliminate Secondary Packaging –** If you don't need to ship empty bottles, you don't need to pack them. This eliminates boxes, totes, gaylords, tape, stickers, bags and shrink-wrap.
3. **Lightweight Packages –** Filling and capping bottles within minutes of manufacturing them provides structural support to the bottles, allowing the use of less plastic. Bottles made off-site require thicker plastic to survive loading, transportation and unloading.
4. **Just-In-Time Supply** – With wall-to-wall, packaging production ramps up and down in sync with operations, eliminating packaging inventory requiring warehousing space.
5. **Smaller Manufacturing Footprint –** Wall-to-wall means two manufacturing plants in one facility for less duplication and lighter impact. Results in lower total power, water and sewage infrastructure.

*Source: https://www.logoplaste.com/sustainability/co2-revolution/

ABC Compressors Supports Logoplaste Embedded Wall-to-Wall Sustainable Manufacturing

ABC COMPRESSORS USA

ABC Compressors, an air and gas compressor manufacturer based in Eibar, Spain since 1943, has opened its first North American subsidiary in Miami, Florida. After entering the North American market in 2017, and completing many installations across 22 states and Canada, ABC Compressors opened the Miami location to stock critical parts to optimize machine maintenance cycles, while further assuring rapid response in the field. The company has been supplying its range of PET air compressors, in North America, through the name of an American OEM since 2000.

Although ABC Compressors has a presence in many sectors such as biogas, water treatment, natural gas, and petrochemical, the Miami location was set up to service the beverage and packaging industries.

ABC Compressors manufactures the HORIZON high- and low-pressure PET air compressor ranges, designed to supply 100% oil-free air flow to PET blowing lines in the packaging industry.

The HORIZON range is developed in a horizontal configuration, providing stability, and avoiding the use of anti-vibratory pads and double acting cylinders on all stages. This allows the system to operate efficiently and reliably. The variable speed drive, installed for 85% of North American customers, plays an active role in the reduction of the total cost of ownership. For more information, visit https://www.abc-compressors.com/en/

ABC Compressors USA exhibited at the Best Practices 2022 Expo & Conference. Pictured are Gonzalo Gabarain, Nacho Urbistondo de Leiva and Carlos Martín Andrés (left to right).

operation from scratch based on long-term plans. The opportunity to build the compressed air system from the ground up is no exception Sponchiado said.

"We design everything around a specific number of plastic product production machines with room for two or three open positions. We have the correct air flows and clean air with stable pressure because the design concept was correct from the start," he said.

Two Compressed Air Systems Matched to Processes

A typical wall-to-wall manufacturing system can feature Extrusion Blow Molding (EBM) machines and Stretch Blow Molding (SBM) machines. Blow molding operations are supported by injection molding machines.

Different plastic container designs, as well as machines and materials used in production, can dictate the use of two separate compressed air systems, at different pressures, for the EBM and SBM production lines.

The Logoplaste team will opt for the compressed air technology best suited to the unique requirements of each distinct blow-molding production process, Sponchiado said. This normally means two separate compressed air systems are part of the system design. A low-pressure system supplying approximately 100 psig (7 bar) compressed air will support the injection molding machines and EBM machines. A separate high-pressure system providing up to 580 psi (40 bar) will support the SBM machines.

Start-up of an oil-free, reciprocating, high-pressure air compressor (photo courtesy ABC Compressors).

Oil-Free, Reciprocating, High-Pressure Air Compressor Packages for Stretch Blow Molding

The stretch blow molding (SBM) process begins when preforms, created by injection molding machines, are supplied to a multi-level rotary wheel blow-molding system. In the first of a two-stage process, compressed air is injected into each preform through a stretch rod at between 101-203 psi as the stretch rod itself simultaneously pushes the material into a closed mold chamber. The blow stem then stops before it reaches the end of the mold. The second stage begins when compressed air is injected into the mold at between 377-522 psi so it fully forms into the shape of the container. After each container is fully formed, high-pressure air is routed back through a feedback loop to be reused as low-pressure air for the first stage.

Logoplaste wall-to-wall manufacturing designs often see the plastic product production equipment powered by HORIZON 3000 oil-free, reciprocating high-pressure air compressor packages designed and manufactured by ABC Compressors. The two firms have worked together to install compressed air systems at multiple locations within the United States. The HORIZON 3000 air compressor package features a variable speed drive (VSD) 610-horsepower (hp) air compressor rated to deliver up to 1,715 scfm of air at 580 psi (40 bar). Each package includes refrigerated dryers rated at 37°F (3°C) pressure dew point, as well as an electronic condensate drain and filters.

"Unlike other high-pressure reciprocating air compressors, ABC Compressors' HORIZON air compressors feature horizontally configured

ABC Compressors Supports Logoplaste Embedded Wall-to-Wall Sustainable Manufacturing

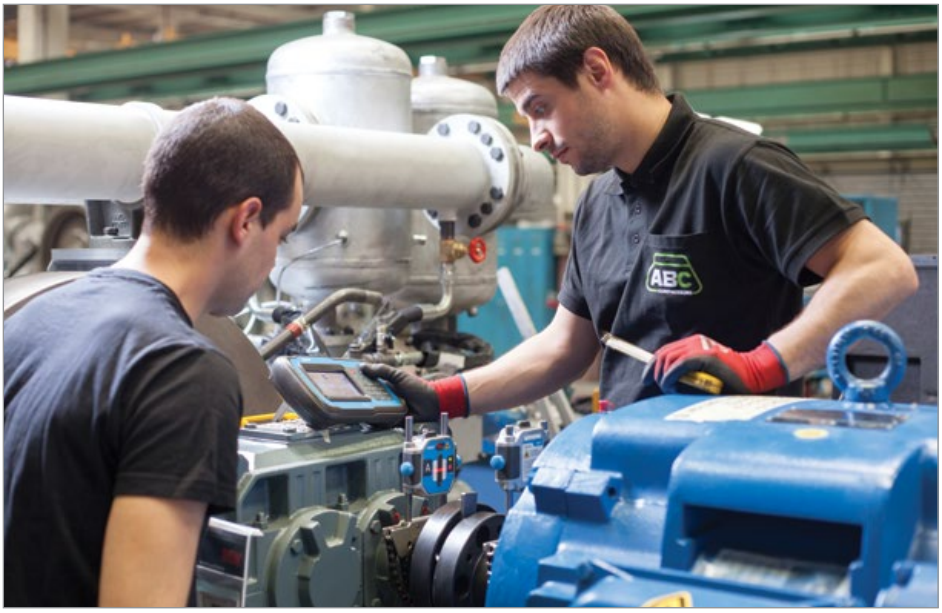
pistons on both sides of the crankcase for added stability, while at the same time, virtually eliminating vibration," said Nacho Urbistondo de Leiva, Sales Area Manager, ABC COMPRESSORS USA, LLC. "Also unique to the air compressors are double-acting cylinders, allowing both sides of the piston to compress air for optimal efficiency. The double-acting design also results in lower operating temperatures, further enhancing efficiencies and energy savings."

With the SBM process, the output of each VSD machines is automatically adjusted to ensure the necessary volume of stable air with a variation of 0.01 to 3.0 psi. The VSD air compressors also automatically avoid idling scenarios and wasted air production with open valves when the SBM process requires less air than a given air compressor is able to deliver. The compressed air system master controller automatically starts and stops units that aren't needed and rotates run-times of all installed air compressors to ensure even wear and tear as part of ABC Compressor's overall intelligent compressor room design.

Redundancy and Compressed Air Quality

Routine preventive maintenance is regularly performed on offline low-pressure and high-pressure air compressors to ensure 100% availability of air.

"We'll always have the capability to have one high-pressure air compressor and one low-pressure air compressor down for routine maintenance," Sponchiado said. "That way we will always have compressed air for production."



Compressed air system designs including redundancy allow for routine air compressor maintenance to occur without interrupting production (photo courtesy ABC Compressors).

Each compressed air system is also configured to deliver clean dry air that conforms to ISO 8573-1 air quality standards specifying compressed air dew point, oil content and particulate purity levels.

"We simply cannot have contamination in the containers," said Sponchiado. "It's also essential to have clean, dry air for the pneumatic system to avoid damage that could potentially harm production."

"Building a huge manufacturing line is never easy, and operating systems for such complex production processes is even harder," he said. "But the systems we have allow us to meet the demands of the customer with 100% quality. It's a good recipe for long-term success." BP

For more information about Logoplaste visit www.logoplaste.com or about ABC Compressors visit https://www.abc-compressors.com/en/

For more information on ***Compressed Air for Plastic Blow Molding*** visit https://www.airbestpractices.com/industries/plastics

To read similar ***Air Compressor Technology*** articles visit https://airbestpractices.com/technology/air-compressors

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Chiller & Cooling Tower Innovation at 2023 AHR Expo

By Bill Smith, Associate Content Manager,
Chiller & Cooling Best Practices Magazine

The 2023 AHR Expo co-sponsored by ASHRAE and AHRI was held Feb. 6-9 at the Georgia World Congress Center in Atlanta, GA. A total of 1,779 exhibitors (425 international) spread across 487,000 square feet, and several dozen free educational sessions drew 42,794 total attendees. HVACR equipment manufacturers and suppliers displayed their latest innovations engineered to address the megatrends in the HVACR industry and market. This report will highlight the cooling tower, chiller/heat pump and associated technology innovation centered around electrification, decarbonization and water conservation.

Heat Rejection Equipment – Cooling Towers, Adiabatic Coolers, Dry Coolers

The Cooling Technology Institute's (CTI) four educational sessions drew standing-room-only crowds. Representatives from BPEARSON Consulting,

Frank Foster and Jalene Fritz at the Cooling Technology Institute booth (left to right).

Quan Wang and Ben Seidel at the Baltimore Aircoil Company booth (left to right).

SPX Cooling Tech, Eurovent and Baltimore Aircoil Company presented *Fundamentals of Water Treatment; Cooling Tower Fundamentals; System Sustainability? Prove it with Certified Performance; and Fundamentals of Adiabatic Heat Rejection.* Owners and operators of heat rejection equipment can join the CTI and attend its annual conference to meet the several dozens of technical experts with hundreds of years of combined experience capable of assisting with your next project.

Baltimore Aircoil displayed a model of its TrilliumSeries Adiabatic Cooler for demanding applications where energy efficiency is critical, but water must be used sparingly. Available in seven factory assembled models (17 – 77 total fan HP) the TrilliumSeries features automated reversing EC fans, eight application-specific control strategies, oversized adiabatic pads with a special coating, and a partitioned water distribution design to ensure complete, consistent wetting of pads.

Delta Cooling Towers displayed its Anti-Microbial (AM) Cooling Tower with anti-microbial HDPE resin tower shell, anti-microbial tower fill and drift eliminators. "According to the Center for Disease Control, nearly 70% of existing cooling towers in a random sampling contain the legionella bacteria, and about 6,000 cases of Legionnaires' disease are now reported each year in the U.S.," said John Flaherty, CEO, Delta Cooling Towers. Aside from the anti-microbial material, the AM Cooling Tower basins are engineered with side-to-side and back-to-outlet slopes to prevent stagnant water promoting legionella growth.

Tony McCauslin and Spencer Ward at the Moore Fans booth (left to right).

Troy Reineck displaying the eco-Air Series Adiabatic Cooler at the EVAPCO booth.

Martin Previtera, Dave Blodgett, Jay Flaherty and John Flaherty at the Delta Cooling Towers booth (left to right).

Tony Ring, Kevin Dwyer, Marco Marquez, Andrew Rogers and Carolina Lebron at the SPX Cooling Tech booth (left to right).

Chiller & Cooling Tower Innovation at 2023 AHR Expo

The REYMSA Cooling Towers team.

Robert Curtis, Kyle Amos and Brian Hobbs at the Tower Tech booth (left to right).

Since 1940, Moore Fans has been manufacturing axial flow fans in Missouri, U.S. Over 400,000 Moore fans operate across the globe in air-cooled heat exchangers, cooling towers and more. Its team displayed the Class 10000 Extended Cord fans for low noise applications. Its airfoil blade design increases efficiency while achieving considerable noise level reduction.

EVAPCO displayed the eco-Air Series Adiabatic Cooler, now CTI certified for thermal performance per Standard 201. The adiabatic pre-cooling and spray assist systems pre-cool the entering air resulting in energy savings and minimal water use. Adiabatic pads can act as air filters, limiting the exposure of dirt and debris to the tube and fin heat transfer surface. This technology is well suited for high dry bulb climates and high temperature applications. Both NEMA and EC motor options require zero routine maintenance.

SPX Cooling Tech introduced the Marley WaterGard, a water usage optimizer and filtration system for evaporative cooling products. Using membrane technology, WaterGard pre-conditions cooling tower water and limits chlorides and calcium bicarbonate introduction into the tower, thus reducing necessary blowdown water. Features include an integrated pump, system bypass, and optional carbon system for chlorine filtration. "Based on our models, WaterGard could help reduce water usage up to 59% for some locations, and reduce wastewater discharge up to 88%," said SPX Cooling's Senior Global Product Manager, Marshal Zabel.

Jerry Orahood, Ryan Loeffler, Bill Smith (Chiller & Cooling Best Practices), Evren Yazici, Jeff Crutchfield and Jeff Thibodeau at the Mikropor booth (left to right).

Wayne Garrett, Managing Director – North America Applied, Carrier, and Mark Jones, Associate Director – Carrier Controls at the Automated Logic booth (left to right).

REYMSA Cooling Towers expanded the cooling capacity of its all-fiberglass RT Series induced draft, counterflow evaporative cooling towers by up to 15% with new RTGTC and RTGMTC models. New models use a thermoformed PVC fill with MicroBoost designed to maximize heat transfer performance. The RT Series now ranges in capacity from 668 up to 7,790 GPM.

Tower Tech displayed a BabyTech demo tower, a fully functioning mini tower showcasing the functionality of Tower Tech's TTXR/TTXL 4-fan factory-assembled, counterflow mechanical draft cooling towers. Tower Tech units come standard with a fully enclosed Flow-Thru basin, variable-flow spray nozzles, bottom mounted fans and more.

Edward George alongside the Isobutane (R600A) Simultaneous Chiller/Heat Pump at the BUDZAR Industries booth.

Chillers and Heat Pumps

Mikropor displayed its MCHILL Water Process Chiller and its atmospheric air filtration solutions. Available in 18 sizes, the MCHILL cooling capacity ranges from 1.7 – 55.3 tons (evaporator water inlet/outlet temperature 45/55°F, ambient air temperature 75°F). Its standard components include hermetic scroll compressor (R-410A), aluminum microchannel

Chiller & Cooling Tower Innovation at 2023 AHR Expo

Rob Tanner alongside the YORK YMAE Modular Inverter Scroll Heat Pump at the Johnson Controls booth.

John Michael displaying the Inverter Scroll Heat Pump Chiller at the LG Air Conditioning Technologies booth.

refrigerant condenser with variable speed EC fan motor, thermostatic expansion valves, brazed plate stainless steel evaporator, integrated cold storage tank, 3 bar integrated centrifugal water pump and electronic control with mobile app support.

Automated Logic, a Carrier company, introduced its latest WebCTRL v8.5 building automation system, delivering message queuing telemetry transport integration capabilities and efficient staged controller downloads. Its commissioning tools continue to be enhanced so system designers and technicians can deliver an optimized system and the most efficient customer service possible from the design phase through to customized operation. Operators can expect predictive maintenance, condition monitoring, predictive insights and more. With end users under significant ESG commitments, a user friendly, customizable dashboard for efficient asset performance reporting to the company C-suite and top energy/water management teams is required.

BUDZAR Industries, a division of Multistack, displayed its Isobutane (R600A) Chiller/Heat Pump for applications requiring simultaneous heating and cooling. Its capabilities include a cooling temperature range from 20°F to 70°F, a heating temperature range from 70°F to 225°F, with 1 – 740+ tons of capacity.

Johnson Controls displayed the YORK YMAE Air-Cooled Inverter Scroll Modular Heat Pump, coming to North America in 2023. "Application

Scott DeGier displaying the Water-to-Water MagLev Flooded 6-Pipe DHRC at the Multistack booth.

Jim Kovacs, Helen Kovacs and Matt Rooke at the Superior Signal booth (left to right).

of heat pumps is the low hanging fruit for decarbonization of plants and buildings," said Rob Tanner, Marketing Director – Applied Equipment for Johnson Controls. The YMAE can provide simultaneous heating and cooling. YORK's air-to-water heat pump technology can heat water up to 140°F (60°C). Water-to-water units will achieve even higher water temperatures.

At the LG Air Conditioning Technologies booth, John Michael, U.S. Chiller Product Manager, displayed the LG Inverter Scroll Heat Pump Chiller capable of providing both hot and chilled water for process and comfort applications. LG's inverter technology allows the unit to match changing loads while providing efficient electrical consumption compared to compressor staging systems. Variable speed condenser fan motors and compressors help achieve 51-60 db(A)3 rated sound pressure at 30' (tested per ANSI/AHRI Standard 370-2015).

Multistack displayed its capabilities with three units on display; a 650-ton MS6 Water-to-Water MagLev Flooded 6-pipe Dedicated Heat Recovery

Elliot Rogers, Dalton Allaben, Stephen Lafaille and Jeffrey Glick at the Tecogen booth (left to right).

Chiller & Cooling Tower Innovation at 2023 AHR Expo

Jackie Sopko, Chiller Commercialization Leader at the Trane booth.

Max Kobelski with the Danfoss Turbocor TTH oil-free centrifugal compressor.

Chiller (DHRC); a 180-ton ACF Air-Cooled MagLev Flooded Integral DHRC, and an 85-ton ARA Air-to-Water Modular DHRC Heat Pump. Multistack's MagLev centrifugal chillers offer R-1234ze, R-513A and R-515B refrigerant choices. Its scroll chiller line operates with R454-B, rather than R-410A. R-454B has a GWP of 466, which is 78% lower than R-410A. One of many features offered is the available MagLift refrigerant pump capable of expanding the operational envelope enabling lower pressure ratios, increasing efficiency, and eliminating the need for a water-side economizer.

At the Superior Signal booth, attendees were able to do live leak detection demos with its patented Superior AccuTrak Ultrasonic Leak Detector. Extremely sensitive to the ultrasonic sound of a refrigerant gas leak, this leak detector uses a technique called "heterodyning" to translate ultrasound to a lower frequency your ear can interpret. This product has been trusted by HVAC and chiller technicians for decades.

Tecogen unveiled its Tecochill Hybrid-Drive Air-Cooled Chiller (R-513A) powered by low-pressure natural gas fueled TecoDrive 7400 engines – industrial versions of the General Motors V 7.4L V8 modified to Tecogen specifications. Also equipped with an electric permanent magnet motor, the Tecochill can blend both power sources (electric and natural gas) to optimize savings. The Tecochill uses dual semi-hermetic variable speed single screw compressor technology, microchannel air-cooled condensers with direct DC-powered fan motors, and DS shell and

Dale Basso, Emerson Hamerschmitt and Valone Gomes at the WEG booth (left to right).

Ben Hickson, Karen Sulzinski and Mark Stone at the Hydratech booth (left to right).

tube evaporators to achieve 100 tons of cooling capacity at AHRI standard conditions (44°F/55°F CHW and 95°F ambient).

Trane highlighted its Ascend ACX Air-to-Water Heat Pump, capable of 140 – 230 ton cooling capacity, and 1,500 – 2,500 MBh of heating (up to 140°F hot water temperatures and operation down to 0 degrees). Equipped with variable speed fans, intermediate discharge valves on the compressor, EC fan motors and brazed plate evaporators, the ACX is built on Trane's Ascend chiller platform and controls knowledge to provide consistent quality and reliability.

Refrigeration Compressors, Drives and Motors

Danfoss North America reported 20% growth in 2022, provided regulatory updates impacting the HVAC industry, and shared its latest heat pump and data center efforts and discussed its current ESG areas of focus – diversity & inclusion, decarbonization and cyclability (how products will be recycled at end of use) during its press conference. "Only 9% of manufactured goods are recycled globally. If amount of recycled goods doubled to just 18%, this would have an exponentially beneficial impact on carbon footprint," said Kim Fausing, CEO, Danfoss, citing the World Economic Forum.

On display at the Danfoss booth was its latest Turbocor oil-free centrifugal refrigeration compressors, an S22 gasketed plate and frame heat exchanger (1 – 26" connection, up to 30,000 GPM), its MicroChannel heat exchanger (MCHE), variable frequency drive offerings, and much more.

WEG is introducing its Cooling Tower Direct Drive System to replace conventional cooling tower ventilation systems – formed by a motor, driving shaft and gearbox – reducing mechanical losses, enabling higher performance. Currently offered exclusively as a custom-build, this system features permanent magnets in the rotor, ensuring high performance levels with high torque, even at low speeds.

Hydratech offers a non-toxic glycol hybrid, Coolflow DTX, for process cooling and HVACR systems. Although based on ethylene glycol, the product is tested and classified as non-toxic by an EPA certified laboratory. The alternative, propylene glycol, is historically known as the non-toxic choice. Coolflow DTX has a patented additive, DeTox, preventing its ethylene glycol base from metabolizing in our bodies and causing harm. This solution allows an operator to benefit from improved heat transfer characters of an ethylene glycol such as lower dynamic viscosity and higher thermal conductivity. Hydratech introduced DTX Technology in the UK in 2010, and introduced it to North America at AHR following its September 2022 opening of its first U.S. site and production facility in East Granby, Connecticut.

Honeywell served refreshments chilled from a refrigerator that previously ran with R-404A, retrofitted with Honeywell's Solstice N71 (R-471A). N71 is a non-ozone depleting, non-flammable HFO based refrigerant. For centrifugal chillers, Honeywell offers an R-1233zd (HFO), a nonflammable replacement

Chiller & Cooling Tower Innovation at 2023 AHR Expo

Michael Sweeney, Platform Lead for Commercial Refrigeration at the Honeywell booth.

Nigel Evans and Wayne Morris at the Invertek Drives booth (left to right).

Nolan Foran and Joe Luthman at the Manchester Tank & Equipment booth (left to right).

for R-123 with a global warming potential (GWP) of 1. For screw chillers, Honeywell offers an R-513A (HFO), an R-515B (HFO blend) and an R-1234ze (HFO blend). Lastly, for scroll chillers, Honeywell again offers three Solstice refrigerants – an R-454B (HFO blend), an R-515B and an R-1234ze.

Invertek Drives displayed its Optidrive Eco Pump AC variable speed drives (0.75 – 250 kW / 1 HP – 400 HP) for energy efficient pump control with AC induction, AC permanent magnet, brushless DC and synchronous reluctance motors. Features include reduced harmonic current distortion, noise reduction, dry run protection, motor preheat function and Optiflow multi-pump control technology. It also displayed its general purpose, easy-to-use Optidrive E3 VSD (0.37kW – 37kW / 0.5 – 50 HP).

GF Piping Systems displayed its COOL-FIT PE Plus pre-insulated piping system for refrigeration and chilled water. This fully plastic (HDPE) pipe is insulated by a foam layer and protected with a UV-resistant jacket layer, enabling low thermal conductivity compared to metal. Its custom valve insulation kits, pre-insulated pipes and electrofusion fittings, and light weight design enable quicker installation and minimal maintenance. Custom adapter fittings and flange connections permit simple connection into existing metal systems.

Manchester Tank offers refrigerant recovery cylinders manufactured in the U.S. to DOT specifications. Available in sizes from 30 – 1,000 lbs. (13.6 – 453.6 kg), refrigerant recovery cylinders are refillable, have a powder coated paint finish for maximum rust protection and much more.

The 2024 AHR Expo will be held January 22-24 at McCormick Place in Chicago, IL. For more information visit www.ahrexpo.com. BP

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Presenter Tim Dugan, P.E., President and Principal Engineer, Compression Engineering Corporation – *Sponsored by VPInstruments and FS-Curtis/FS-Elliott*
Thursday, January 19, 2023 – 2:00PM EST

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Presenter Ron Marshall, Chief Auditor, Marshall Compressed Air Consulting – *Sponsored by Kaishan*
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Presenter Mike Lenti, Principal, Compressed Air Consultants – *Sponsored by Kaeser Compressors*
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Presenter Tom Taranto, Owner, Data Power Services – *Sponsored by Kaishan*
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MAY 11 — **Vacuum System Fundamentals: Depth of Vacuum vs. Absolute Pressure**
Presenter Andy Smiltneek, President, Growth Solutions Consultants – *Sponsored by Rogers Machinery*
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MAY 18 — **CTI STD-201RS Thermal Certification for Cooling System Heat Rejection Equipment Part 1: Performance Ratings**
Presenter Mike Womack, Thermal Certification Administrator, Cooling Technology Institute – *Sponsored by EVAPCO*
Thursday, May 18, 2023 – 2:00PM EST

JUN 08 — **Vacuum Pump Maintenance**
Presenter Tie Duan, Solutions Engineer, E.W. Klein & Co. – *Sponsored by Kaishan*
Thursday, June 8, 2023 – 2:00PM EST

JUN 22 — **Greener Compressed Air Systems-Reducing the Environmental Impact**
Presenter Paul Edwards, Principal, Compressed Air Consultants – *Sponsored by VPInstruments and Kaeser Compressors*
Thursday, June 22, 2023 – 2:00PM EST

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Presenter Tom Jenkins, P.E., President, JenTech Inc. – *Sponsored by APG-Neuros*
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Presenter Roderick Smith, Publisher, Compressed Air Best Practices Magazine – *Sponsored by Trace Analytics and BEKO Technologies*
Thursday, August 17, 2023 – 2:00PM EST

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Presenter Clayton Penhallegon, Jr., P.E., Integrated Services Group – *Sponsored by Carrier*
Thursday, September 14, 2023 – 2:00PM EST

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Presenter Loran Circle, Senior Consultant, Circle Training & Consulting – *Sponsored by Vaisala*
Thursday, September 21, 2023 – 2:00PM EST

OCT 05 — **Compressed Air Systems for Cheese Manufacturing**
Presenter Frank Melch, Vice President, Zorn Compressor & Equipment – *Sponsored by Quincy Compressor*
Thursday, October 5, 2023 – 2:00PM EST

NOV 30 — **Vacuum System Efficiency**
Presenter Andy Smiltneek, President, Growth Solutions Consultants – *Sponsored by Rogers Machinery*
Thursday, November 30, 2023 – 2:00PM EST

DEC 07 — **Compressed Air Dryer Maintenance and Monitoring**
Presenter Loran Circle, Senior Consultant, Circle Training & Consulting – *Sponsored by BEKO Technologies*
Thursday, December 7, 2023 – 2:00PM EST

Loran Circle
Senior Consultant, Circle Training & Consulting

Mike Lenti
Principal, Compressed Air Consultants

Paul Edwards
Principal, Compressed Air Consultants

Tie Duan
Solutions Engineer, E.W. Klein & Co.

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Tank Applications in Central Cooling Systems Part 2 – Tankless Systems

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

A 400 ton closed chilled water system.

➤ The pros and cons of using open tanks[1] in central cooling systems was discussed in a previous article along with questions to determine if tanks were needed in any particular system. It is strongly recommended to review the Part 1 article if the reader is not familiar with the concepts presented on using or not using tanks including their capital and operating costs, efficiency impacts, and other system effects.

This Part 2 article will be of particular interest to industrial system operators unfamiliar with tankless (primarily closed) systems who may be considering either installing new systems without tanks or removing existing open tanks. The topics covered step through an understanding of tankless systems while also including tank system pointers and insights on converting systems with tanks into tankless systems.

If tanks are needed, the challenge is to use them effectively while minimizing the total associated costs. System operators should ensure they are not using them strictly out of custom or lack of understanding of closed systems.

Can Cooling Systems Even Work without Tanks?

For many system operators whose cooling systems have always included tanks, these concepts may seem unconventional or even dangerous and unsound. For them, it is worth noting that the vast majority of cooling water systems in the world do not have tanks.

Water is extraordinarily useful for cooling and is widely used in buildings ranging from commercial applications like hotels and offices to very large, multi-building facilities such as airports, hospitals, and expansive

manufacturing complexes. Formal study of cooling systems in technical schools and universities focuses almost exclusively on closed systems as they easily make up over 90% of the systems in existence and all very large systems[2].

In reality, central cooling systems using tanks are fairly narrowly limited to manufacturing and even then mostly to smaller systems and/or those in particular industries such as plastics converting or textile mills employing direct contact air washers for temperature and humidity control. In many cases, their use is as much a matter of habit and culture as it is technical requirements.

Cooling System Designs Without Tanks

Tankless systems can be closed or open systems in central cooling plants. Closed systems are typically chilled water operating in a pressurized system with makeup water and an expansion vessel to accommodate volume changes in the system while maintaining adequately stable system pressure and good circulating performance.

In conventional HVAC applications, closed systems are the default design because they easily work with air handler coils and other comfort cooling devices that are not normally removed and reconnected as would periodically happen with plastic molds or other processing lines. They also readily accommodate significant elevation changes such as multistory buildings and sprawling systems such as college campuses without issues like draining down into a tank or loss of elevation head.

Typical HVAC systems rarely have meaningful water volume changes except from thermal expansion of the water due to the system being off for weekends or maintenance. While water specific volume only changes very slightly with the temperature ranges encountered in cooling systems, the resulting pressure changes could be catastrophic if not controlled. These requirements can be met with a quite small (relatively speaking) closed and pressurized expansion tank.

Outside of manufacturing, open tankless systems are almost always cooling tower systems where the towers are open to atmosphere at the water collection basin but otherwise have no tank. Manufacturing examples include open, direct contact cooling systems where the water is sprayed onto a product and collects in a return sump or else the product passes through a cooling bath through which the water flows constantly (e.g. via an overflow or other level control) to maintain the bath temperature as the product heat is absorbed.

Closed System Design Recap

Closed systems have important design features characterizing their use. The following are some of the hallmarks of closed systems relevant to their consideration versus open tank systems[3]:

- Completely closed piping system with no open vessels or other atmospheric pressure-referenced elements in the normally sealed circulating system (see air vent item below).
- Operating pressure referenced to a controlled set point via the make-up water supply pressure reduction valve adjustment.
- Appropriately-sized expansion tank using an air cushion to provide the pressure-referenced volume adjustment (either plus or minus) to avoid either system leaks from high pressure or loss of pumping ability from too low pressure. These often have rubber bladders to separate the air from the water and allow the tank to be installed at ground level.
- Piping design to provide flow through chillers[4] and on to the cooling loads under intentional control for pressure, supply temperature, and other control set points; closed system designs may follow several standard designs such as primary – secondary systems or variable primary flow systems, or other situation-specific designs.
- Air and sediment separation equipment to remove air that enters the system (e.g. from newly installed molds or dissolved air in the make-up water) as well as undesirable matter like particulate debris in reconnected hoses, seal wear material, etc.

Most closed system components are generally identical to the components used in open systems including pumps, valves, piping, etc. The key differences are around the make-up,

Tank Applications in Central Cooling Systems Part 2 – Tankless Systems

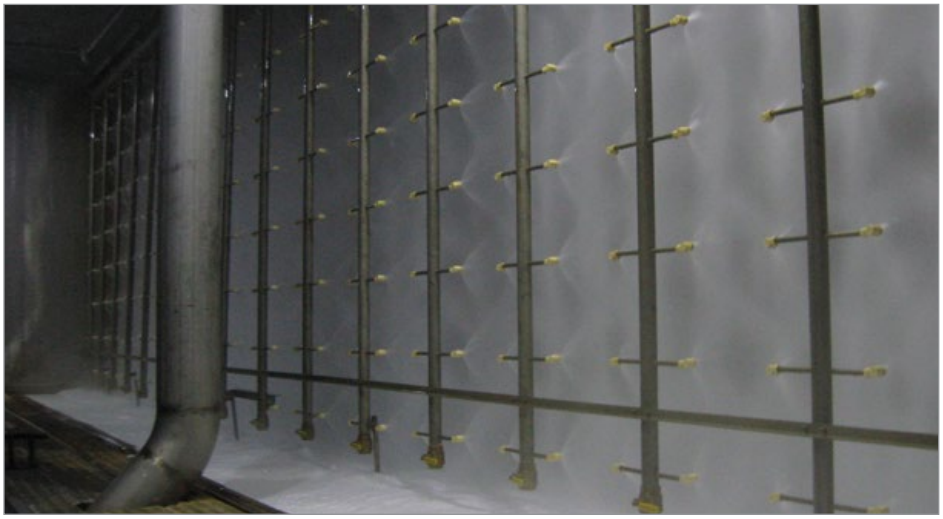
pressure control, and air removal, and these contrast with the typical open system issues such as management of greater air presence and potential draindown / overflow concerns.

Closed vs. Open System Flow Design Features

A variety of flow designs can be implemented in closed systems such as single loop, secondary and tertiary subloops, and series pumping to meet differing cooling requirements such as low delta T applications, special pressures, etc. with the configurations only limited by hydraulic considerations and practical necessities.

Open systems are generally limited to a single open point per loop such that a recirc and process loop system can have separate open tank hot and cold wells, but not two open tanks in the same loop. This can in fact be done but it requires very careful execution to avoid draining the system through the lower tank (if they're not at equal heights) or overflowing one by overpumping one direction or another.

The most common series open design concept is gravity flow from a cooling tower lower collection basin draining into an indoor tank for freeze protection; unfortunately the periodic freeze protection costs the loss of the pump suction elevation head from the tower height the entire time the system is operating. Air washer systems in textile facilities are the most common series tank systems with multiple open air washer unit basins, sometimes at different elevations, returning back to a chilled water sump in the mechanical room.



Open direct contact cooling in an industrial air washer

Make-up water valves and expansion tanks for two separate closed systems.

Closed System Design Tips / Application Notes

Closed systems require particular design and operation practices to ensure reliable operation. These include needed components as well as the methods of installation and operation listed below:

- Ensure the make-up water supply pressure reduction valve is readily accessible and checked periodically. Systems that should be at 15 – 20 psi at the pump suctions are often at 35 to 40 psi or above due to poorly calibrated or malfunctioning pressure reduction valves, although in some cases the suction pressure may need to be higher for systems with elevated cooling loads like blown film penthouses, etc.

- The make-up water connection is typically made at or near the expansion tank close to the main pump suction. The expansion tank should never be installed on the discharge side of the loop pumps.

- The expansion tank in industrial systems should be sized to meet the particular system requirements for water delivery (e.g. the volume needed to nearly instantly fill a mold being installed) in addition to receiving water from thermal expansion or other sources.

- If separate heat-rejection recirculation and heat-absorbing process cooling loops can't practically be converted to a single flow loop, the next best improvement is carefully managing the flows between the recirc and process loops. This could be either through flow rate matching using flow meters or other control method to calibrate the relationship between the two loops.

- Flows can be deliberately mismatched when needed for specific purposes such as low delta T molds and chillers needing higher delta Ts.

- If many of the cooling loads use process temperature control units with integral pumps (e.g. Mokon, Thermolator, etc.), the main loop flow conditions will be greatly improved by using TCUs with modulating control valves instead of the on / off solenoid valves.

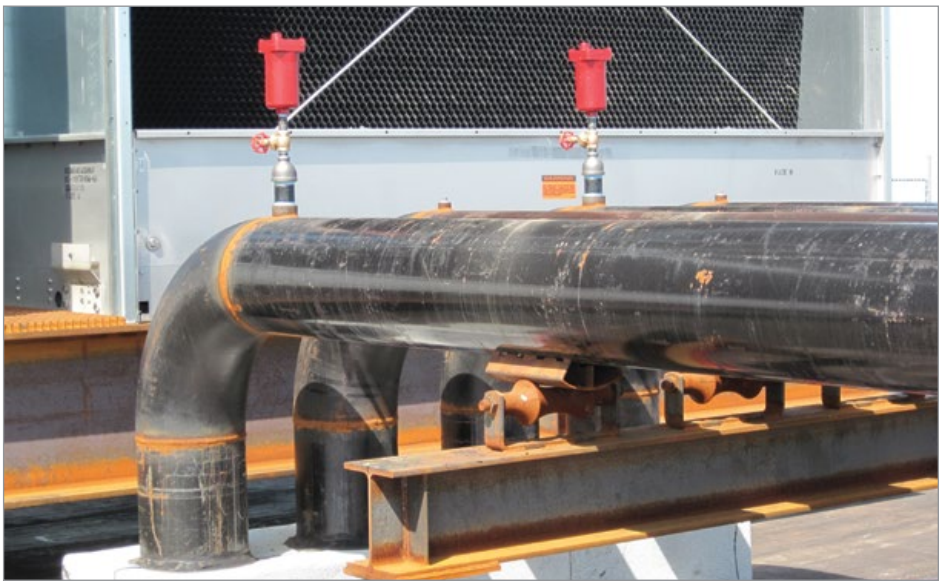
- Air removal equipment should include an in-line, full flow, vented, separator (usually a combined air and sediment device) at or near the system low pressure point (hydraulically near the expansion tank) as well as air vents in system high points.

- The separator should be installed at a height near the system high point in the mechanical room where the total system flow comes through the process return piping.

Air separator in a closed cooling system.

Tank Applications in Central Cooling Systems Part 2 – Tankless Systems

- Any high points that exist should be equipped with air vents as they will be at lower pressure and any entrained and dissolved air will be likely to emerge from the water in these locations.
- In-line sediment removal equipment (whether including an air removal capability or not) should have a blowdown pipe connected between the separator bottom discharge and a drain point.



Air vents on a closed cooling system piping, note at end of run in flow direction

Foam insulation emerging from direct cooling water bath

Open Tankless System Design Tips / Application Notes

Open tankless systems have many closed system design features with a few distinct differences. In particular, the pressure regulation and system volume management are performed by the open location(s) with a common effective water level for multiple open locations. Other considerations for these systems include:

- Open systems need rigorous air management – air vents, air trapping design, etc. – to ensure air removal. Air blended into systems 24/7 can be mitigated by high flows but with higher energy use. Aggressive air capture designs such as full size tees with vertical branches can offset this at lower velocities.
- True counterflow cooling towers have higher air loads from the free fall of water into to the collection basin and the resulting splashing and entrained bubbles. These should be used in very concise systems such as chillers right inside the plant wall or heat exchanger-isolated systems.
- Extra care is needed on pump NPSHA / NPSHR for direct contact cooling return pumps where very low suction heads and potentially high suction piping losses can be expected.
- Direct contact cooling return pumping is not as difficult as it may sound as these are often very succinct

systems. These are typically small vs. the total system loads and can be simplified by isolating each loop behind a heat exchanger and using VFDs for pump control.

Cooling Systems Using Tanks

Systems with tanks will operate more effectively by following these design and integration measures:

- Use tanks only as hot wells with no recirculation between hot and cold wells (i.e., single tank only systems) to reduce the extra pumping and wasted diffusion head losses.
- Size the tank volume for projected lifetime needs as it is typically difficult to expand tanks once installed.
- For normal flow-based sizing, use larger tanks vs. expected flow. Instead of 2 – 3 gal. per GPM, design for 5 – 6 gal. per GPM or more at the expected ultimate flow rates, not just the initial design conditions.
- For thermal-based sizing, larger tanks will also provide more benefits; sizing will require careful calculation of the thermal cycle loads and is beyond the scope of this article.
- There are no benefits to having smaller tank. Long term costs will far exceed the lower initial expense.
- Select tallest possible tank for better operating water level and good pump suction supply pressure.
- Closely verify the required NPSHR for pumps used vs. NPSHA in tank – more cushion is always better.
- Design the piping to prevent draindown of the return by ensuring absolute below surface return and highly effective air removal. Only use

Tank Applications in Central Cooling Systems Part 2 – Tankless Systems

inverted U returns or valve control if unable to resolve otherwise.

- The best returns are made to low level, tank-side, factory installed connections instead of through pipes draining into the tank from above.
- Use water diffusion on the return such as redirection elbows / tees, perforated pipe, etc. to blend return water in the tank without excessive surface turbulence to reduce air entry.
- Leave access room and preinstalled connection valves for future growth.
- Plan pumps for expansion through smart pump sizing (e.g., potential to upsize in place using same volute), additional pump suction outlets, etc. to avoid future crowding.
- Keep the tank as tightly closed as possible to eliminate dirt entry.
- Design for eventual removal of the tank if possible – isolation valves, pumps with curves to support closed operation, etc.

Converting Systems Using Tanks to Tankless Systems

Where it has been decided to remove existing tanks, the following conversion tips will improve the performance of the revised system:

- Most tank pump systems are built with mechanical connections that can be used for revising the piping without field cutting.
- The tank and supporting frame can often be cut away from the pumps for their reuse with minimal revision.
- In some cases, it is better to remove the pumps frame also to recover additional height for the pump discharge components (see next point).
- OEM pump systems often install the check valve directly on the pump outlet as the small diameter enables the use of a smaller check valve resulting in higher check valve pressure loss. The extremely turbulent, high velocity pump discharge flow results in many check valve failures (spring-loaded, dual plate wafer designs frequently fail in this use). Relocating the pumps to short pads provides more vertical room for better designed discharge and check valve installation in the revised system.

Tank with height extended to increase pump suction head (yellow cloud).

Return pipe attached at factory-installed low point connection.

Future pump connection on tank at installation.

Original tank system (one pump out for service).

- A new pump suction manifold to replace the tank connections should be oversized for low velocity / low distribution pressure loss so that there are near uniform suction pressures and suction entry flow conditions across the pumps. Use a large diameter pipe, typically 2X the suction diameter or larger; and the pipe should be larger for more inlet connections and / or pumps.

- Closed loop pump systems must be designed for thermal balancing of the flows, not just hydraulic balancing. If there are multiple returns and / or split piping from the pump discharges, then there must be a common flow pipe section to fully blend the separate returns. Ignoring this can cause poor chiller loading and water temperature control problems in different branches. The thermal balancing concern is especially important when there are different branches intentionally run with higher and lower delta Ts, particularly where tanks were deemed not needed for thermal blending. The oversized suction manifold is not intended to provide meaningful thermal smoothing to the system.

- Include a clean out port on the pump suction manifold. A 3" port with full size valve at the bottom center will allow for periodic cleaning.

Conclusion

Open tanks can serve an important role in central cooling systems but are not required except in select cases. Many more systems can operate better without tanks and their associated costs. Tankless systems, including both closed and open designs, set the stage for higher energy efficiency and other operating benefits if properly implemented and managed.

This article has reviewed key principles of tankless systems and has also provided recommendations for implementing both closed and open tankless systems. Additional suggestions are presented for systems with tanks and for converting tank systems to tankless if not required in a particular system.

Hopefully this and the previous article on tank applications help system operators better understand cooling system design options, leading to improved energy efficiency and system performance with lower capital and maintenance costs. ISG is grateful to Cooling System Best Practices Magazine for the opportunity to present these concepts and looks forward to questions on the material presented. BP

For questions or more information about Integrated Services Group visit https://www.isg-energy.com, email: info@isg-energy.com, tel: 770.823.8235

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Endnotes

1. As before, "tank" here refers to open reservoir tanks at atmospheric pressure as distinguished from closed tanks for pressure control, hydronic applications like thermal storage, or integral processing applications.
2. Since most systems are for HVAC, the few open loops studied in these courses are the cooling tower systems supporting the closed system operation and not open loop process cooling applications.
3. This list is by no means a complete design primer for closed systems. Seek additional information beyond the short list of points provided here if engineering a new closed system.
4. Other cooling sources such as cooling towers or loop isolation heat exchangers can be similarly piped but chillers are the predominant cooling resource in closed systems.

The 2023 Cooling Technology Institute Annual Conference

By Bill Smith, Associate Content Manager,
Chiller & Cooling Best Practices Magazine

The 2023 Cooling Technology Institute Annual Conference was held in Memphis, Tennessee.

COOLING TECHNOLOGY INSTITUTE

The 2023 Cooling Technology Institute (CTI) Annual Conference for manufacturers, owner operators, and suppliers of heat rejection equipment (i.e. cooling towers, adiabatic coolers and dry coolers) was held Jan. 29 – Feb. 2 at the Peabody Hotel in Memphis, Tennessee. This article will synopsize the event's educational curriculum, share perspective from participating businesses and highlight products and services offered by a handful of firms present at the event's trade show.

Conference Sessions and Committee Work

The mission of CTI is to advocate and promote the use of all environmentally responsible commercial cooling technologies. Three committees make up CTI's primary working groups – Engineering, Standards & Maintenance (ESM); Performance & Technology (P&T); and Water Treatment (WT). The conference featured over 35 presentations by recently published technical paper authors from the industry.

To provide a feel for the technical depth covered in the conference, topics ranged all the way from; lightning protection of cooling towers; computer vision assisted condition assessment; condensation modeling of plume from a mechanical draft cooling tower and what went wrong with a mass balance calculation of evaporation. More topics included; footprint influencing factor analysis of polypropylene fill based on literature data; 95% recovery of cooling tower blowdown with advance reverse unit; and sizing of plume abatement coils.

Drew Manser (CTI), Dan Reith (EvapTech), Jamie Bland (Composite Cooling Solutions), Jim Baker (CTI Board of Directors and Treasurer, Galebreaker Industrial), Jack Bland (ChemTreat), Loraine Huchler, PE, CMC (MarTech Systems), Corey Baker (SPX Cooling Tech) and Gabe Ramos (Black & Veatch) on the Ask-the-Expert panel (left to right).

Brandon Rees, Cooling Tower Depot and Jon Bickford, Alliant Energy, receiving the Outstanding Service Award.

Frank Foster, Tower Performance, receiving the Distinguished Leadership Award.

Anthony DePalma receiving the Honorary Life Member Award.

The conference also produced water treatment panel discussions, fundamentals seminars, and the long-standing Ask-the-Expert Seminar. The panel was prompted, "How do you see the industry evolving in the next five years?" Responses ranged from automation, online sensors, better water treatment for lower quality water, faster build times for field-erected towers, to more water usage regulation citing coming regulations in southern Nevada. In the days prior, many attendees expressed how much they look forward to the audience engagement this seminar provides. The panel was even playfully heckled by the audience as this seminar was introducing new mobile application question submittal.

At the introductory luncheon, the CTI Board of Directors provided updates on industry trends and recognized the efforts of long-standing CTI members.

When asked about his experiences with CTI, Jon Bickford, Operating Crew Foreman from Alliant Energy shared, "That's an easy one. I recently rebuilt my cooling tower system and couldn't have done it without all the connections I've made at CTI who make my life easy. I've never been led astray." Jalene Fritz, CTI Membership Committee and representing Tower Performance based in Houston, TX added, "Jon has been invaluable to CTI."

In the technical committee meetings, each committee advances its current efforts in the development of test codes and standards, and updates reopened test codes on five-year cycle reviews. "As an example, dry and adiabatic test codes are in progress, and we have reopened the

Travis Whaley and Billy Childers at the Aggreko booth (left to right).

Frank Morrison, Dave Wall and Hussnain Yaser at the Baltimore Aircoil Company booth (left to right).

The 2023 Cooling Technology Institute Annual Conference

Dylen Ziegler, Ellen Duggan, Jason Zerbe, Vinessa Ferraro, Luis Almonte, Micah Rees, Scott Lucas and Ron Schumacher at the Brentwood Industries booth (left to right).

Ian Butler at the Eurovent booth.

Roger Thomas and Eli Jacobson at the Flender Corporation booth (left to right).

air-cooled steam condenser and the evaporative condenser test codes," said Scott Nevins, Vice Chair, P&T Committee and Director of HVAC, Cooling Tower Group with EVAPCO.

CTI is welcoming new owners/operators, suppliers and equipment manufacturer members. "There are so many easy-access, educational resources at your disposal, as a member of CTI," said Nina Woicke, Vice Chair of ESM, Freelance Engineer based in Cologne, Germany.

"With the library of resources here for owner operators on technical standards and guidelines written by groups of experts, there's so much information and so much to learn," echoed Philip Poll, Vice President, OBR Cooling Towers

Many of the member equipment manufacturers, component suppliers and service suppliers exhibited during the trade show. With floor traffic busy, a few firms had an opportunity to share comments with press – shared here alphabetically.

Trade Show Roundup

The Aggreko Cooling Tower Services (ACTS) rental fleet of evaporative, forced draft, counterflow cooling towers are equipped with multiple direct drive fans. ACTS works to help industrial plants recover from cooling tower malfunction, account for sudden variation in demand, and supply flows during planned system projects.

Baltimore Aircoil Company's Nexus Modular Hybrid Cooler eliminates the need for a separate heat exchanger or coil. Its iPilot Control System operates in energy saver, water saver or nexus mode depending on your needs. Advantages include a compact footprint, optional UV system for reducing bacterial growth, no need for permanent ladders or elevated platforms and more.

Brentwood Industries displayed its engineered fill media and components for cooling tower applications. Shockwave, its most recent product introduction, is a thermally engineered advancement to standard vertical-fluted fills. An enhanced vertical flute orientation leverages the fouling resistance of vertical-fluted products with the thermal performance of

high efficiency fills. Dylan Ziegler, Application Engineer, presented on his paper co-authored by Nina Woicke titled *Lab Evaluation of Fill Component Flammability*. This topic was the source of several questions and discussions during the Ask-the-Expert Seminar.

Eurovent offers certification programs for a wide range of heat rejection and air conditioning equipment in Europe, the Middle East and Asia. Eurovent also partners with CTI for select certification programs. A European cooling tower manufacturer could request a CTI certificate for a product line after being certified by Eurovent, for example. Eurovent's corresponding certification to the CTI STD-201RS is titled ECC OM-4-2017.

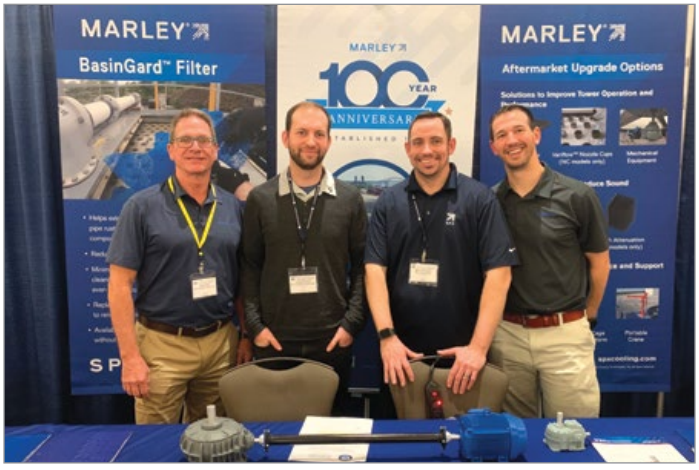
Flender Corporation exhibited its helical and bevel-helical gear units for cooling towers. Flender offers customer- and application-specific gear units for dozens of applications. It also displayed the DX500 monitoring solution for industrial gear units, providing owner/operators with remote temperature and vibration measurements, condition and alarm monitoring, data evaluation and diagnostics through the DS Assist mobile application.

Galebreaker Industrial Solutions offers windscreens, CFD modeling, winterization screens, debris filters, plume abatement, recirculation screens and other solutions for air-cooled condensers, cooling towers, heat exchangers and oil rig platforms. Windscreen protection can help reduce mechanical damage, recover thermal deficiency and improve performance of a cooling tower. Galebreaker windscreens stabilize fan pressure, reduce dynamic fan blade loading, increases fan flow rate, reduces recirculation, and more benefits. Its debris filters stop organic and inorganic airborne matter from entering air inlets, prevents clogging of internal heat exchange components and reduce the bacteria populations and the water chemical treating requirements.

Evaporative cooling towers produce visible white plumes due to the condensation of the water vapor they reject. Infinite Cooling displayed its WaterPanel proprietary technology capable of capturing water from cooling tower plumes. This water gets electrically charged using custom electrodes, then moved to a collection mesh on top of the cooling tower outlet. The plume is abated, and high-purity, recondensed water is

Jeff Ebert and Jim Baker at the Galebreaker Industrial Solutions booth (left to right).

TJ Jones and Maher Damak at the Infinite Cooling booth (left to right).



Keith Smit, Joseph Evans, Mike Partington and Anthony Shank at the SPX Cooling Tech booth (left to right).

The 2023 Cooling Technology Institute Annual Conference

Bob Hall and Thomas Kline at the Structural Technologies booth (left to right).

Bryan Richardson at the WEG booth.

Mike Jalomo and Marcos Reyna at the West Texas Cooling Tower Fabrication & Supplies booth (left to right).

recovered ready to be reused. The system uses little power, can be easily retrofitted into existing cooling towers and doesn't affect plant operations.

SPX Cooling Tech has representation on many CTI committees. Joseph Evans led a few ESM Committee meetings as a Vice Chair. Gary Stauffer with SPX also led the Cooling Tower Fundamentals Seminar.

Structural Technologies offers evaluation and management of civil and structural infrastructure for industrial and power generation facilities, and offers specialized solutions for repair of cooling towers. Its condition assessment services for cooling towers offers a range of testing to identify root causes of problems and damage levels. Structural Technologies also offers specialty products for repairing and upgrading cooling tower basins, cathodic protection systems to stop corrosion, moisture control, concrete mixes and strengthening systems.

WEG displayed its W22 Cooling Tower NEMA Premium Efficiency Motors. The W22 is available from 1-100 HP, at 1,800, 1,200, 1,800/900 and 1200/900 RPM. Designed for operation in 100% humidity, available in totally enclosed fan cooled or totally enclosed air over configurations, and finished with internal and external epoxy paint, the W22 is built to withstand the most corrosive environments.

West Texas Cooling Tower Fabrication & Supplies discussed its huge selection of cooling tower equipment, maintenance and rebuild services. Its offering ranges from motors and gearboxes to pultruded fiberglass, nozzles, flow control valves, lumber, hardware and much more. Based in Plainview and Pearland Texas, West Texas Cooling Tower serves international and nationwide customers. BP

For more information about the Cooling Technology Institute, visit www.cti.org

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Atlas Copco Compressors Announces Agreement with Hoffman & Hoffman on Industrial Process Cooling Solutions Range

Atlas Copco Compressors is pleased to announce a new distributor agreement with Hoffman & Hoffman for Atlas Copco's complete range of industrial process cooling systems. Hoffman & Hoffman will represent the product line exclusively across South Carolina, North Carolina, Virginia and Tennessee. The product and application experts from Hoffman & Hoffman will work with the dedicated Atlas Copco process cooling team to provide an unrivaled experience for customers.

In 2022, Atlas Copco expanded the range with the new four-model TCA55-215 plug-and-play industrial water chiller range, which offers cooling capacities from 55 to 228 kW.

Atlas Copco launched into the industrial cooling space in 2020, bringing their own innovation stamp to the market, particularly when it comes to connected controllers, advanced monitoring and diagnostics, and full-service packages for a range of industrial equipment. The Elektronikon Mk5 Touch controller is one key feature, putting control at the user's fingertips. Additionally, SMARTLINK 24/7 monitoring and diagnostics is available as part of the chiller's total package.

The first product Atlas Copco launched into the U.S. market was the TCX range, featuring a compact, all-in-one water chiller with an air-cooled condenser and integrated hydro module, with units available in a variety of sizes. TCX chillers are specially designed for cooling water (or a mixture of water and glycol) for a wide range of industrial segments. The design of the TCX range's state-of-the-art microchannel condensers requires 30% less refrigerant, making the units more environmentally friendly while lowering potential maintenance charges over the life of the chiller.

In 2022, Atlas Copco expanded the range with the new four-model TCA55-215 plug-and-play industrial water chiller range, which offers cooling capacities from 55 to 228 kW. This new range has many unique features designed for optimum energy efficiency and complete operational safety, as well as for easy and cost-effective installation and maintenance. Reliable and robust, the chillers feature proven scroll compressors in a twin circuit configuration, air-cooled microchannel condensers and an integrated hydraulic module.

"We are proud to be working with Hoffman & Hoffman," said Robert Tucker, National Sales Manager, Atlas Copco Process Cooling Solutions. "Innovative new products and working with a company with such established routes to market, expertise, and customer service will ensure we provide our customers with a total package that's second to none."

Hoffman & Hoffman, Inc. specializes in the selection and application of commercial and industrial heating, ventilation, air conditioning, filtration and direct digital control (DDC) systems. They represent manufacturers of the highest quality HVAC equipment and controls available on the market today.

About Atlas Copco Compressors

Atlas Copco Compressors LLC is part of the Compressor Technique Business Area, headquartered in Rock Hill, South Carolina. Atlas Copco Compressors provides innovative solutions, including world-class compressors, air blowers, industrial coolers, vacuum pumps, quality air products, and gas generation systems, all backed with full service, remote monitoring, and auditing services. With a nationwide service and distribution network, Atlas Copco Compressors is your local, national, and global partner for all your compressed air needs. For more information, visit www.atlascopco.com/air-usa.

Carrier Adds R-515B Option to AquaEdge Oil-Free Water-Cooled Chiller

Carrier has announced the availability of the lower global warming potential (GWP) 515B refrigerant in its award-winning AquaEdge 19MV oil-free water-cooled chiller. Carrier is a part of Carrier Global Corporation, the leading global provider of healthy, safe, sustainable and intelligent building and cold chain solutions.

"The AquaEdge 19MV is leading the industry in reliability, performance and best-in-segment efficiency for sustainable building applications in its category," said Tom Franaszek, Director, Global Product Management, Water-cooled Chillers, Carrier Commercial HVAC. "The AquaEdge 19MV can take full advantage of cold condenser water, chilled water reset and other energy-saving practices to further improve building performance."

First introduced in late 2021, the AquaEdge 19MV can maintain performance in severe, extreme and unexpected operational and weather conditions. Select units provide balanced performance that is up to 10% better than ASHRAE 90.1 2019 path B at both full and part loads. Combined with low-lift operation, quick restart times and low noise levels, the AquaEdge19MV is particularly well suited for 24/7 applications such as hospitals and data centers.

"From the beginning, we wanted to make it easier and more efficient for specifying engineers, contractors, building owners and facility managers," said Franaszek. "The 19MV's compact 72 by 80-inch footprint on select models fit through double doors without disassembly. The movable, intelligent control panel makes it easy to track and analyze operational data, and it can link to a building automation system for remote access to the chiller's running data."

To reduce unplanned downtime, Carrier's BluEdge service platform helps keep the 19MV running efficiently throughout its lifecycle with proactive solutions. By leveraging Carrier's proven EquiDrive two-stage back-to-back compressor technology with magnetic bearings, the AquaEdge 19MV provides expanded operating range while improving chiller energy efficiency and building resiliency.

The compact and versatile Carrier AquaEdge 19MV centrifugal chiller targets whole-building energy efficiency, innovatively pushing beyond optimizing IPLV and providing exceptional sound, reliability and flexible operation to support chilled water plants of today and tomorrow.

About Carrier

Founded by the inventor of modern air conditioning, Carrier is a world leader in high technology heating, air-conditioning and refrigeration solutions. Carrier experts provide sustainable solutions, integrating energy-efficient products, building controls and energy services for residential, commercial, retail, transport and food service customers. Carrier is a part of Carrier Global Corporation, the leading global provider of healthy, safe, sustainable and intelligent building and cold chain solutions. For more information, visit www.carrier.com.

Danfoss to Build New Compressor and Sensor Factory

Danfoss is witnessing tremendous growth in demand for cooling technology from the United States market and is announcing the construction of a new compressor and sensor manufacturing facility in Apodaca, Mexico. The new expansion will produce medium and large scroll compressors, pressure sensors for HVAC/R, and A2L leak detection sensors for residential and commercial air conditioning and refrigeration. The facility is expected to be ready by the end of 2024, starting with a capacity for 100,000 compressor units, 1.6 million pressure sensors, and 1 million A2L leak detection sensors.

This move is a part of the Danfoss ESG (Environmental, Social, Governance) strategy to offer localized production for customers.

Chiller & Cooling System Technology & Industry News

By expanding the global footprint of production, Danfoss is also securing supply chain flexibility and security for the future.

"We are really proud to launch production in Mexico to increase our support to the market," said Fabio Klein, Senior VP Scrolls and Reciprocating Compressors, "Our Commercial Compressors unit is a significant growth journey, and this move will take us one step closer."

"It is exciting to get even closer to our American customers and support them helping improve efficiency and safety of their cooling systems with a regionalized supply chain," said Bert Labots, Vice President Sensing Solutions.

Danfoss Commercial Compressors is a leading compressor manufacturer of fixed-speed scrolls, inverter scroll solutions with prequalified drives, reciprocating compressors, condensing units, and centrifugal oil-free Turbocor compressors. These technologies are used in a variety of applications in the air conditioning, refrigeration, and heat pump markets globally.

Danfoss Sensing Solutions offers an extensive portfolio of advanced sensor technologies and application expertise, to help the industries and people we serve to embrace a digital-focused future with industry-leading know-how, world-class support, and sensors that enable a connected and sustainable future.

About Danfoss

Danfoss engineers solutions that increase machine productivity, reduce emissions, lower energy consumption, and enable electrification. Our solutions are used in such areas as refrigeration, air conditioning, heating, power conversion, motor control, industrial machinery, automotive, marine, and off- and on-highway equipment. We also provide solutions for renewable energy, such as solar and wind power, as well as district-energy infrastructure for cities. Our innovative engineering dates back to 1933. Danfoss is family-owned, employing more than 40,000 people, serving customers in more than 100 countries through a global footprint of 95 factories. For more information, visit www.danfoss.com.

Mexico facility: Danfoss' current facility in Apodaca, Mexico will be expanded with the construction of a new compressor manufacturing facility.

SPX Cooling Introduces Marley WaterGard Water-Saving Optimizer System

SPX Cooling Tech, LLC, a full-line, full-service industry leader in the design and manufacture of evaporative cooling towers and air-cooled heat exchangers, has introduced the Marley WaterGard, a water usage optimizer and filtration system that helps reduce wastewater and overall water usage on packaged evaporative cooling products. WaterGard uses membrane technology to pre-condition cooling tower water and limits salt (i.e. chlorides, calcium carbonate) introduction into the tower, therefore reducing necessary blowdown (outgoing) water.

"Based on our models, WaterGard could help reduce water usage up to 59% for some locations, and reduce wastewater discharge up to 88%," said SPX Cooling's Senior Global Product Manager, Marshal Zabel. "Some areas could see payback with this product in as little as three years, or even faster in locations with high-hardness source water."

The salt concentration of makeup (supply) water typically controls how much water needs to be blown down, or drained from the system, to limit corrosion and scale tendencies of the cooling water. Reducing this concentration with WaterGard allows safe cooling tower system operation at higher cycles of concentration (less blowdown).

WaterGard is available in North American markets and offered in a variety of sizes based on the capacity of the cooling towers. Features

The water-saving, optimizer system Marley WaterGard.

include an integral pump, bypass function and an optional carbon system for chlorine filtration. Plus, WaterGard is designed for easy maintenance and filter replacement at regular service intervals.

"WaterGard will help many operators use less water without sacrificing cooling equipment longevity, especially for those with a safe operating cycle of concentration around 3.5 or lower before WaterGard," added Zabel. "This product will offer the best results in areas with especially hard water, like the Southwest and in many Midwestern states."

Customers who utilize WaterGard for water savings should still employ the appropriate water treatment, and implement chlorine removal pre-treatment to protect the membrane filters. WaterGard also must be used in conjunction with an electronic liquid level control and conductivity-controlled blowdown system to achieve the expected benefits.

About SPX Cooling Tech, LLC

SPX Cooling Tech is a leading global manufacturer of cooling towers, evaporative fluid coolers, evaporative condensers, industrial evaporators and air-cooled heat exchangers. Since 1922, its cooling systems and components, coupled with technical services, have supported applications in heating, ventilation and air conditioning (HVAC), refrigeration, and industrial process cooling. SPX Cooling Tech and its product brands are part of SPX Technologies, Inc. For more information, visit www.spxcooling.com.

ASHRAE Releases Building Performance Standards Guide

ASHRAE announced its unwavering commitment to reducing greenhouse gas (GHG) emissions with the launch of its redesigned building decarbonization webpage and the release of a new Building Performance Standards Technical Resource Guide.

The ASHRAE Task Force For Building Decarbonization (TFBD) webpage includes technical resources, information, videos and publications to expedite the adoption of climate change mitigation policies and reaffirms the Society's goals stated in the ASHRAE Vision 2022 Report, approved by ASHRAE's board of directors, as well as the ASHRAE Position Document on Building Decarbonization, to achieve net zero GHG emissions in operation for all new buildings by 2030.

"Over the years, ASHRAE has demonstrated its leadership in reducing GHG emissions by addressing energy efficiency and sustainability, as articulated in some of our most notable technical guidance such as Standards 90.1 and 189.1," said ASHRAE TFBD chair Kent Peterson. "The TFBD is working to provide vital technical guidance in new guidebooks and the redesigned webpage. ASHRAE is helping accelerate the transition from commitment to action in reducing global built environment GHG emissions."

Additional features of the redesigned Building Decarbonization webpage include:

- Descriptions of seven new guidebooks focused on building decarbonization.
- A list of related outside decarbonization resources.
- A list of key decarbonization terminology.

The newly released *Building Performance Standards (BPS): A Technical Resource Guide* was created to provide a technical basis for policymakers, building owners, practitioners and other stakeholders interested in developing and implementing a BPS policy. The first in a series of seven guidebooks by ASHRAE on building decarbonization, this guide focuses on reducing building operating energy use and resulting emissions in existing commercial and multifamily buildings, as established by leading U.S. cities and states. Jointly developed by ASHRAE, the U.S. Department of Energy (DOE) and its national laboratories, the BPS guide is meant to provide the information needed to make informed policy design decisions that

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drive deeper existing building decarbonization and provide equitable outcomes for all involved.

Highlighted topics covered in the guide include:

- BPS Metrics and Terminology
- Performance Targets
- Major Policy Considerations
- Analysis Methods for BPS Policy Design

"So much collaboration brought this guide to fruition, which we hope will establish some much-needed consistency across the buildings industry to set these types of goals and targets – and then work toward meeting them," said DOE's Harry Bergmann, who led DOE's involvement in the collaborative effort. "These methodologies and approaches are a critical starting point for moving our building stock toward a high-performance, decarbonized future, and we're intentionally doing everything we can to reduce the barriers stakeholders have to engage with this content wherever possible."

"The BPS Guide provides policymakers with a technical foundation upon which to build better policies, which play a key role in decarbonizing existing buildings," said BPS working group initiator and ASHRAE TFBD member Bing Liu. "This guidebook is a testimony to the collaborations and commitments of 21 working group members who provided expertise and recommendations from a wide swath of stakeholders across the buildings sector, from policymakers and building industry experts, to utilities, researchers and more. In less than 12 months, the working group completed this guide after countless hours of volunteered time under the stellar leadership of Adam Hinge and Andrea Mengual as chair and co-chair, for which I am so grateful."

Members of the ASHRAE TFBD are as follows:

- Kent W. Peterson, P.E., Presidential Fellow ASHRAE, chair
- Donald G. Colliver, Ph.D., P.E., Presidential Fellow ASHRAE, vice chair
- Blake E. Ellis, P.E., Fellow ASHRAE
- Luke Leung, P.E., P.Eng., BEMP, Fellow ASHRAE
- Bing Liu, P.E., Fellow ASHRAE
- Clay Nesler
- Stet A. Sanborn
- Ginger Scoggins, P.E., Fellow ASHRAE, 2022-23 ASHRAE President-Elect

ASHRAE is furthering its commitment to reducing GHG emissions by strengthening the building decarbonization components of ASHRAE standards, including in ANSI/ASHRAE/IES Standard 90.1-2022, *Energy Efficiency Standard for Sites and Buildings Except Low-Rise Residential Buildings* and to reach net-zero-energy by 2031.

About ASHRAE

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

Hall County Government Center Completes Upgrades with Trane

Trane, a global climate innovator – and Hall County, Georgia, have completed a comprehensive energy and infrastructure upgrade on the Hall County Government Center. Working consultatively with the Hall County construction and facilities teams, Trane identified and implemented energy efficiency and indoor environmental quality improvements in the Government Center to meet the requirements of a modern office space in the Southeast and support the County's energy reduction goals.

The five-floor 131,000-square-foot building, built in 1982, underwent significant renovations over 18 months. Building upgrades included a heating and cooling plant conversion to help improve system performance, efficiency, reliability, and serviceability; air distribution reconfiguration for improved comfort and indoor air quality throughout the building; and an advanced building automation controls platform to replace the building's outdated technology.

The County also took advantage of the opportunity to upgrade the building's decades-old interior fluorescent lighting system to high-efficiency LED fixtures. In addition to improving light levels and overall aesthetics, the new system included important energy-saving features such as sensors that turn lights on and off as rooms are occupied, dimmers in key areas, and daylight sensors that automatically adjust interior light levels near windows.

"This was a significant, much-needed renovation project that will serve our County well for many years to come," said Hall County Assistant County Administrator Katie Crumley. "Working with Trane, we now have a Government Center facility that operates more efficiently and sustainably, while creating

The Hall County Government Center has undergone a comprehensive energy and infrastructure upgrade through a collaboration with Trane.

a more comfortable, welcoming and productive environment for employees and citizens alike."

The County is expected to realize an approximately 35% reduction in energy usage annually, or roughly 950,000 kWh in electricity as a result of the improvements. This equals nearly 675 metric tons of reduced carbon emissions, the equivalent of more than 1.6 million miles driven by an average passenger vehicle or more than 130 homes' electricity use each year.

"On behalf of the entire Trane project team, it has been a privilege to work with Hall County on this innovative project," said Thomas Brown, account manager, Comprehensive Solutions, Trane. "Together, we have implemented a highly-efficient building solution that creates a more comfortable indoor environment for employees and visitors; reduces the County's energy consumption and operational costs and, importantly, yields a positive impact for the community for decades to come."

About Trane

Trane, a global climate innovator, creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, visit www.trane.com.

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