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COOLING TOWERS & CHILLERS

WATER TREATMENT & COOLING SYSTEM ASSESSMENTS

COOLING TOWER & CHILLER FEATURES

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INDUSTRY & TECHNOLOGY NEWS

EVERY ISSUE

COVER PHOTO. This month's cover features rPlanet Earth, located in Vernon, California. As our lead article, this image is of their uniquely vertically integrated facility able to convert polyethylene terephthalate (PET) packaging waste into recycled PET (rPET) packaging for the food and beverage industry.

FROM THE EDITOR

How reliable are the chilled water systems at your plant? Are they reliable *and* optimized for efficiency?

Cooling Tower & Chiller Features

Senior Principal and Industrial Plant Engineering Practice Leader Bert Wesley, from the engineering firm Woodard & Curran. allowed us an interview to learn about their work designing a cooling system for plastics recycler rPlant Earth. The process started with truly helping rPlanet Earth understand demand. Then they worked with Evapco and Trane to recommend the best solution. The resulting precise temperature control ensures quality and reliability while reducing production cycle times.

Atlas Copco has entered the process cooling chiller market. We interviewed them to understand the strategic reasons behind this big step.

Water Treatment & Cooling System Assessment Features

StudioJAED is an architectural, engineering and facilities consulting group who designed an advanced-efficiency cooling and heating system for an elementary school in Maryland. Our article provides the details on how they worked with Building Systems & Services, Inc. and with mechanical contractor Ralph G. Degli Obizzi & Sons to make it happen.

HGA is a major engineering firm and we are very pleased they sent us a technical article titled, "Full Heat Recovery Engagement: Using Current Technology to Electrify Heating Loads."

Last but not least, long-time subscriber Tom Pagliuco, from AbbVie, has sent us a great article titled, "Sustainable Chilled Water Systems in Pharmaceutical Plants."

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

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COOLING TOWERS AND CHILLERS

Process Cooling System Helps rPlanet Earth "Close the Loop" on Recycling Post-consumer Plastics

By Mike Grennier, Chiller & Cooling Best Practices Magazine

rPlanet Earth in Vernon, California, is the only vertically integrated facility able to convert polyethylene terephthalate (PET) packaging waste into recycled PET (rPET) packaging for food and beverage industries such as bottle preforms, strawberry containers, and drinking cups. The plant's process cooling system delivers chilled water at precise temperatures at all times.

rPlanet Earth is a rarity in the plastics recycling and manufacturing industry. After all, its operation in Vernon, California, is the world's only vertically integrated facility able to convert polyethylene terephthalate (PET) packaging waste into recycled PET (rPET) packaging for food and beverage industries. Yet, rPlanet Earth is much like any other plastics company in one key aspect: it must maintain production efficiencies to meet growing demand for its high-quality products.

With a unique business model in place and clear goals for production, rPlanet Earth (www.rplanetearth.com) partnered with engineering firm Woodard & Curran to design and build its state-of-the-art facility in 2018. The plant features a host of advanced technologies including a process cooling system designed to deliver chilled water at the precise temperatures at all times. "The cooling system," said rPlanet Earth Vice President of Engineering Andrew Lopez, "plays a pivotal role in allowing our company to meet its production goals – and plans for growth."

"Cooling is a really huge factor in our overall efficiency. It also allows us to ensure consistency in our product, " Lopez said, adding the company is on track for strong growth. "Our long-term plan is to double our capacity at this plant by 2023 and also establish more high-volume plants around the United States."

High-quality Packaging with Lowest Carbon Footprint

Turning recycled plastics into containers and packages for the food and beverage industries traditionally involves separate facilities to perform the work. However, rPlanet Earth combined these disparate operations into one as it strives to "close the loop" for the recycling and reuse of post-consumer plastics.

"Everything we're doing at rPlanet Earth is typically done at three to five different facilities, depending on how you cut it. Our vertical integration and the use of post-consumer plastics as feedstock allows us to produce high-quality packaging with the lowest carbon footprint," Lopez said.

rPlanet Earth's 302,000-square-foot facility, which grew from ten employees in 2017 to 180 employees today, acts as a recycling

rPlanet Earth's 302,000-square-foot facility acts as a recycling operation and separate manufacturing facility under one roof.

operation and separate manufacturing facility under one roof. The plant operates 24 hours per day, seven days a week, and is capable of processing over 80-plus million pounds of post-consumer PET annually.

The recycling operation receives bales of post-consumer plastics from various curbside collection programs throughout California. It then sorts and grinds the material into flake, which is stored in silos until needed. The flake is subsequently washed and routed through a decontamination and solid stating process to convert the non-food grade material into flake that meets rPlanet Earth's own quality standards, which exceeds the Food and Drug Administration's requirements for direct food contact applications.

The manufacturing component of the facility is comprised of three primary production streams – injection molding machines produce bottle preforms; sheet extrusion machines produce rolled extruded sheet; and thermoforming equipment manufactures thermoformed containers, including rPlanet Earth's own brand of drink cups and deli containers.

"What's also unique about us is our ability to process B-grade, curbside bales," Lopez said. "Other companies in California recycle PET containers but they're only able to use bales supplied by deposit centers. If it wasn't for us, those B-grade plastics would be downcycled into lower quality applications and potentially end up in landfills. Our goal is to close the loop and have zero plastic waste on the planet."

Precise Temperature Control a Must

rPlanet Earth turned to Woodard & Curran to design and build its facility from start to finish, which included everything from site selection, utility and permitting considerations, to equipment selection.

The process cooling system at the plant is designed to ensure precise temperature control given its impact on cycle times, said Bert Wesley, Senior Principal and Industrial Plant Engineering Practice Leader at Woodard & Curran.

"The temperature of chilled water delivered to the machines needs to be exact to ensure uptime as the machines cycle from one process to the next," Wesley said. "For example, an injection molding machine will turn out 96 preforms every eight seconds. If that water is one-half degree out of spec it's going to make 96 defective preforms in eight seconds. It's easy to see how it adds up."

Lopez, like Wesley, said accurate temperature control of chilled water is crucial, especially when cycle times are decreased to meet production and quality goals.

"Precise temperature control is going to drive that cycle time down and give us consistent product," Lopez said. "If you speed up cycle times without precise temperature control then you can have quality defects in your product and you can lose valuable line time to troubleshoot an issue."

Working with a Limited Footprint and Varied Flow Rates

When designing the plant, rPlanet's desire to maximize the area for manufacturing meant there was limited room for utilities. Additionally, Woodward & Curran needed to prioritize storage for PET flake and process equipment versus utilities, such as the cooling system.

"As needs for production processes evolved in the planning phase, we began to explore how we could save space by not having both a hot tank and a cold tank for the cooling system in addition to the pumping systems that goes with it," Wesley said.

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Woodard & Curran

Founded in 1979 and headquartered in Portland, Maine, Woodard & Curran is an integrated engineering, science, and operations firm born to address needs arising out of the Clean Water Act. Privately held and steadily growing, the firm specializes in water and environmental-related projects. It has more than 1,100 employees in offices and utility facilities who serve public and private clients across the country.

Woodard & Curran is a nationwide firm specializing in water and environmental-related projects.

The company's mission is to create a healthy work environment, deliver high-quality services, and promote environmental stewardship. These concepts guide the services it provides and the work it delivers across a range of sectors. In working with industrial clients, Woodard & Curran helps them do more with less, conserve resources, and minimize waste and emissions. The firm clearly understands that the more efficient and productive a company is, the more competitive it can be.

Utility systems essential to the manufacturing process are often a frequent source of inefficiency and avoidable expense. Woodward & Curran experts have decades of experience identifying opportunities to save energy, reduce waste, implement efficient generation technologies, and reuse heat or water to save money. The company helps clients in a wide range of manufacturing setting reassess utility systems and design infrastructure to get their best return on investment. To learn more, visit www.woodardcurran.com.

Woodard & Curran also wanted to guarantee delivery of chilled water at the proper temperatures, even with a wide range of demand for chilled water at the plant. Flow requirements at the plant range from as low as 100 gallons per minute (gpm) to 960 gpm based on the status of varied production process.

"We need the system to deliver a thermal sink that's always ready and always within spec as different machines come online," Wesley said. "When a line operator hits the start button on the machine, they expect chilled water at the proper temperature to be available in whatever volume they need to circulate through their machine and they need it immediately."

System Features Chillers with Enhanced-flow Management Technology

The cooling system at rPlanet includes a single, two-cell 1,380-ton EVAPCO open cooling tower, as well as two water-cooled Trane centrifugal chillers rated at 600 tons each. The chillers are arranged in a variable primary chiller plant design, using supply pumps with Variable Frequency Drives (VFDs) to adjust flow rate to meet production demand. Other key components include a 2,500-gallon surge tank, pump system and master Programmable Logic Controller (PLC). A single surge tank eliminated the need for a hot and a cold tank, as well as additional pumps.

The tower supplies cooling water at 80˚F (26.6˚C) to the two water-cooled Trane centrifugal chillers that lower the water temperature to 44˚F (6.6˚C) for delivery to process machines. The towers also supply water through a separate cooling circuit directly to the plant's compressed air system and manufacturing equipment since they do not require 44˚F (6.6˚C) water.

The chilled water loop uses solenoid valves to tie together the chilled water supply line with the hot water return line. At all times, temperature sensors keep tabs on the water temperature in the loop. When seeing an increase in temperature, the PLC opens the valves to allow chilled water from the supply line to flow to the return line until the proper temperature is reached, resulting in constant and proper water temperature regardless of demand.

Each chiller is equipped with Trane's exclusive Flow Management Package, which uses a variable water-flow compensation algorithm, to deliver chilled water at targeted temperatures even during an increase or decrease in flow of up to 50% per minute. Other chiller manufacturers are limited to a maximum of 10% per minute rate of change of flow and increases beyond that will send those chillers into alarm, knock them offline, or produce off-target temperatures. By using the enhanced-flow management technology, the chillers can quickly ramp up when called upon and deliver water at the specified temperature without faltering, Wesley said.

"If every machine turns on immediately and starts calling for chilled water, the chillers are able to easily compensate for that rate of rise in flow and ensure water in the system stays at the set temperature," he said.

At the plant, cooling water is routed from the surge tank to the chillers and throughout the pipeline network for delivery directly to process machines. Pipeline valving allows the system to reroute additional chilled water generated by the chillers from time to time back to the surge tank. The surge tank, which contains hot water previously routed to it from the return line, serves as a way for the plant to pre-chill the water before it's routed to the chillers for further cooling as part of the continuous loop. The result is energy efficiency, Wesley said.

"We're able to send 100% water at the specified temperature to the manufacturing process while also having a reserve capacity in the surge tank available at all times," Wesley said. "It also means the chillers have to do less work with that same molecule of water when the water comes back around from the surge tank and flows through them before being sent to the process."

Getting It Right On the Front End

Wesley said the design of the process cooling system involved close collaboration to ensure the design and installation of an optimized system. The system also aligns with rPlanet Earth's goals tied to energy efficiency.

"We sat with Trane and EVAPCO to work through how to optimize the size of the equipment across the board and also ensure everything works together seamlessly," Wesley said, adding the system installed goes beyond the traditional system.

"What most would've done is to not have a chiller with a flow-management package, and instead, pump the water needed and let the chiller trim it every once and awhile and move on with it. But we didn't need to pump 960 gpm a minute, 24 hours a day, seven days a week," he said. "The plant only needs to pump the chilled water based on what's actually running, and therefore, it's very energy efficient from an electrical and refrigeration standpoint."

Trane's centrifugal chillers at rPlanet Earth's plant use an enhanced-flow management package, which allows them to deliver chilled water at targeted temperatures at an increase in flow of up to 50% per minute.

A 1,380-ton EVAPCO open cooling tower supplies cooling water to two water-cooled Trane centrifugal chillers, which further cool tower water for delivery to process machines at rPlanet Earth. The tower also supplies cooling water directly to the facility's compressed air system and equipment that doesn't need chilled water at a lower temperature than that provided by the chillers.

Wesley said Woodard & Curran specified chillers with an enhanced-flow management package to match its goals for ensuring chilled water at all times.

"Chilled water usage is not constant. It all depends on what complement of machines they're running," he said. "Without the package, the chillers wouldn't give us the guarantee we could deliver water at spec 100% of the time."

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The cooling system overall satisfies the plant's process cooling goals and business objectives, Wesley said.

"It's a combination of giving the manufacturing process what they need all the time, while being energy efficient. And it gives them a lower lifecycle cost, which is worth spending the time and effort up front to get it right."

Another Step Closer to Zero Plastic Waste

Lopez said rPlanet Earth made the right choice in partnering with the Woodard & Curran, citing the cooling system as one example.

"We've had a very positive experience with temperature control with our entire cooling system for the plant," he said, adding rPlanet Earth anticipates a bright future.

"We're continuing to make significant progress in using previously landfilled post-consumer plastics streams in our process. We're now looking at re-using and recycling thermoformed containers, which is important because a lot of it ends up in the landfill, "Lopez said. "We've always worked toward a circular economy in plastics. We're very excited about our goal, which is to have zero plastic waste on the planet." BP

Chiller & Cooling Best Practices Magazine wishes to thank Bert J. Wesley, P.E. of Woodard & Curran for sharing invaluable insights for this article. All photos courtesy of rPlanet Earth.

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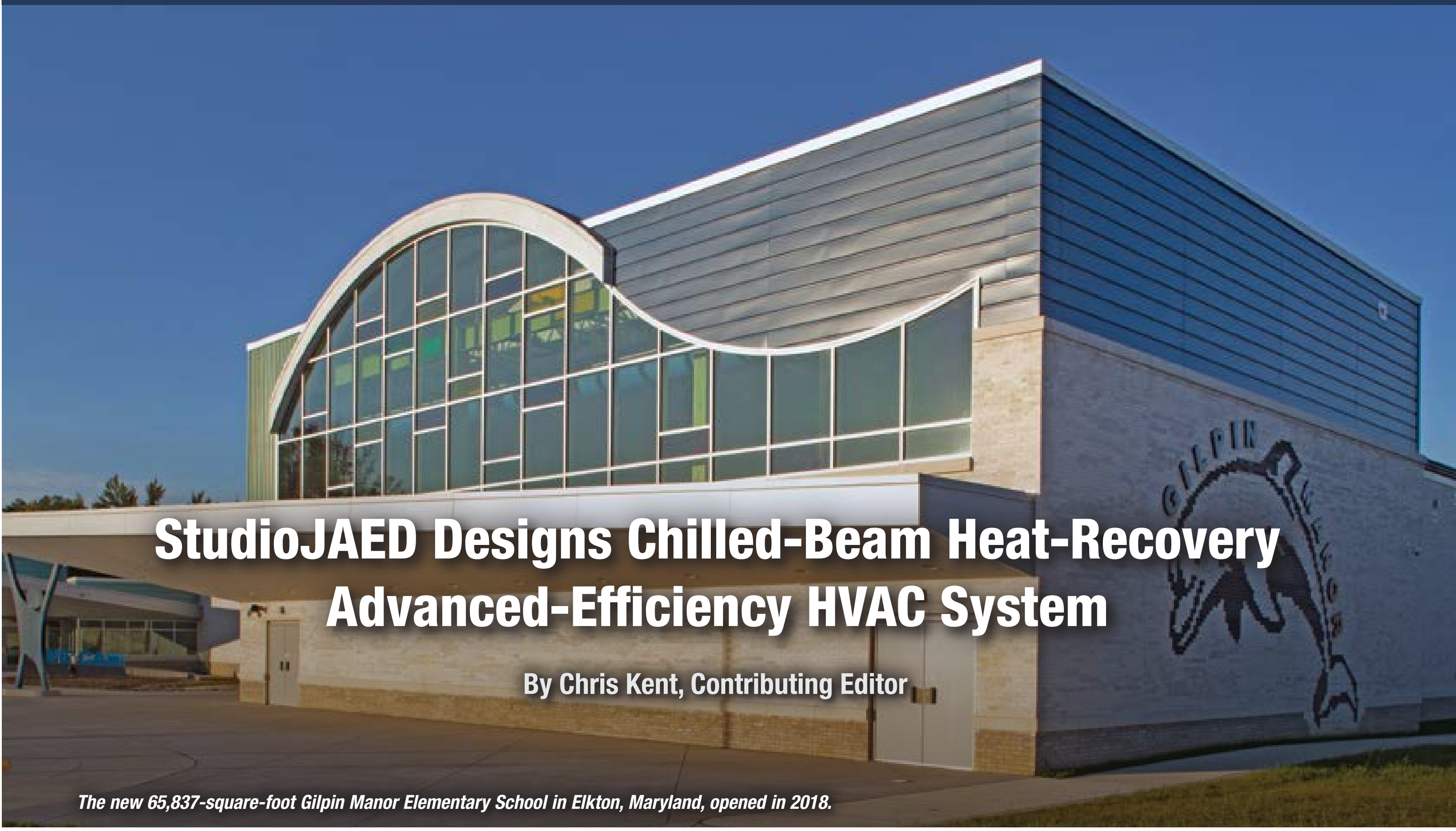
COOLING TOWERS AND CHILLERS



StudioJAED Designs Chilled-Beam Heat-Recovery Advanced-Efficiency HVAC System

By Chris Kent, Contributing Editor

The new 65,837-square-foot Gilpin Manor Elementary School in Elkton, Maryland, opened in 2018.

Gilpin Manor Elementary School in Elkton, Maryland, was nearing the end of its useful life. Building infrastructure was failing and existing spaces had fallen behind in supporting 21st century teaching and learning.

Cecil County Public Schools (CCPS) commissioned StudioJAED of Bear, Delaware, to design and engineer a new school, which features a HVAC system that combines several advanced technologies – all of which enhance the new school's learning environment, while at the same time, exceeding energy-savings goals.

State-of-the-Art Facility for Learning

The original Gilpin Manor building had been in operation since 1952. Aged infrastructure, cramped learning spaces and a host of mechanical improvement needs all contributed to the decision to rebuild the school.

Opened in fall 2018, the new $19.3 million school building spans 65,837 square feet with a capacity to serve 500 students. The building serves students of pre-school age through Grade Five and is also designed to host groups of various sizes during summer months. It also serves as the campus gateway to the adjacent Elkton Public Library and the Elkton Middle and High Schools.

Gilpin Manor features the latest in design to support the best possible learning environment. Highlights include an integrated art studio with mirrors and rubber floors for activities and performances, hand-washing stations, extra space for community groups to use, motion-activated lighting, and many other aspects. In accordance with State of Maryland guidelines, it also meets Leadership in Energy and Environmental Design (LEED™) Silver certification.

Designing for Comfort and Energy Savings

Brian Zigmond, Vice-President with StudioJAED and the lead Mechanical Engineer on the project, said a number of factors contributed to the overall HVAC design. "School district officials were looking for a high-performance HVAC system that would deliver high efficiencies, good temperature and humidity control, and a low acoustical impact on the learning environment."

Comfort cooling was a priority given high temperatures and humidity levels in the spring and summer. The firm's goal for the HVAC system was to consistently regulate the air at a neutral 75°F (23.9°C), with 48% relative humidity (RH).

StudioJAED also took aim at energy usage, which is calculated using energy usage index (EUI) criteria. The firm specifically

StudioJAED Designs Chilled-Beam Heat-Recovery Advanced-Efficiency HVAC System

set out to meet or exceed CCPS's ambitious energy target of 25 kBTU/SF/Year, which is significantly lower compared to the national baseline average of 48 kBTU/SF/Year for similar public facilities.

The overall design also needed to account for partial or segmented building use when school was not in regular session for things like hosting large groups in the gymnasium or library, limited after-hours uses, or office-only operation during the summer.

Advanced Technologies Key to Project Goals

When designing the school's HVAC system, StudioJAED worked with Building Systems & Services, Inc. (BSS) to specify a variety of advanced technologies to best address the overall cooling and heating goals of the building.

About StudioJAED

StudioJAED is an award-winning architectural, engineering and facilities consulting group founded in 1978 to provide state-of-the-art planning, architecture and engineering services for educational, industrial, commercial and governmental clients.

For over 40 years in its offices in Maryland, Delaware and Rhode Island, its staff of 26 employees specialize in working extensively with agencies regionally and nationwide to modernize existing buildings and construct new facilities, with a focus on meeting project goals, timelines and budgets.

StudioJAED is also a leader in the utilization of technology and green design. It's in-house architecture, engineering and facilities group allows clients enhanced control of their project budgets and schedules. Its integrated design services use an in-house architectural/engineering team concept with active principal involvement. Its work plan allows for compact scheduling and maximizes face-to-face services provided to its clients. Its designs bring responsible innovation to buildings, which provides the highest quality, most creative state of the art concepts, solutions and engineered designs that are affordable within the project budget.

Services include:

- Architecture
- Facility condition assessment
- MEP engineering
- Master planning
- Educational planning
- Sustainable and high-performance design
- Community and staff management
- Interior architecture

By emphasizing quality, responsiveness and timelines, StudioJAED provides architectural and engineering solutions, personalized for its project. Its focus is saving its clients time and money while meeting the intent of all applicable codes. For more information, visit www.studiojaed.com.

Located in Wilmington, Delaware, BSS (www.bssinc.net) is a leading provider of commercial and industrial HVAC equipment, service and building automation systems. Mechanical contractor, Ralph G. Degli Obizzi & Sons, Inc. (www.degli.com) installed the system and is also based in Wilmington, Delaware. Primary components of the HVAC system include:

- YORK/JCI Model YLAA Air-cooled scroll chiller: A single, multi-circuited 120-ton, air-cooled scroll chiller includes an integral heat recovery condenser with a heating capacity of 260 kW.
- YORK/JCI active chilled beams: 136 active, two-pipe chilled beams all in 24-inch width units, with varying lengths of 48, 72 and 96 inches.
- YORK/JCI Rooftop Solution Air Handling Units (AHUs): Three semi-custom AHUs condition 100% outside air and come with energy recovery capability.
- Johnson Controls Metasys® Building Automation System: A fully customizable programmable control system for automatically controlling the HVAC system.
- Pumps and valves: A series of water supply pumps with variable frequency drives (VFDs), as well as two-way Automatic Temperature Control (ATC) mixing valves.

At the school, the central cooling system runs during shorter months in fall and spring. The system defaults to cooling mode when the school is in session and the outside air temperature is above 55˚F (12.8˚C). It typically does not run in summer when school is out of session to save on energy costs.

If cooling is needed in summer for groups, a separate system of high-efficiency stand-alone direct expansion air conditioning units cool the gymnasium and cafeteria, eliminating the need for the chiller to operate. In cooler months, the chiller is de-energized, and the central heating plant is in operation.

The cooling system uses a constant flow primary/variable flow secondary chilled-water-piping configuration. The primary loop pump circulates chilled water through the chiller at a constant flow rate and the chiller is controlled to maintain a leaving chilled water temperature setpoint of 42˚F (5.5˚C). The secondary loop uses a water pump with a VFD to modulate the chilled water flow rate to the AHUs at a constant temperature of 42˚F (5.5˚C). The secondary loop is designed to supply only enough flow of chilled water needed to meet the building's cooling load as an energy-saving technique.

The system also uses a control valve to connect the secondary heating and cooling loops to a tertiary loop, which is used to supply tempered chilled and heated water to the chilled beams located in key areas throughout the school. Before the chilled water reaches the chilled beams, a three-way ATC mixing valve allows the system to combine warmer return water from the tertiary loop with cooler supply water from the secondary loop in order to supply water to the chilled beams at a setpoint of 57˚F (13.9˚C). A dual temperature water pump with a VFD is also used in the process.

The AHUs, chilled beams, and chiller work together to satisfy all cooling goals with each contributing to energy savings along the way. The AHUs provide primary air to the chilled beams as 100% conditioned outside air with full temperature and humidity control, while the chilled beams regulate the air temperature within each classroom or designated space. The chiller – in addition to supplying chilled water to the system – incorporates the use of a heat recovery module to provide hot water to the AHUs for the purpose of reheating the outside air in dehumidification mode.

Shown are three air handling units on the roof at Gilpin Manor Elementary School.

AHUs Deliver Neutral Air Supply

At the school, the AHUs are used to bring in 100% outside air to meet building code ventilation requirements and handle the associated latent cooling load. This latent load control prevents condensation from occurring at the chilled beams which are designed to handle the space sensible cooling load.

The AHUs are specifically engineered to supply a neutral air supply at a setpoint of 75˚F (23.9˚C) dry bulb and 48% RH to the chilled beams and directly to other areas of the school. They also use energy recovery technology that utilizes outgoing building exhaust air to precondition the incoming outside air. This heat recovery preconditions the outside air with the cooler exhaust air in warmer months, which lessens the load on the chiller. Conversely, the preconditioned warmer air reduces the load on the central heating system during cooler months.

The AHUs, in combination with chilled beams, also save energy given the efficiencies of moving energy with water versus air, said Zigmond. "Using air handlers to only supply the required ventilation air at the desired setpoint to the rooms and allowing the chilled beams to handle temperature control is much more energy efficient when compared to the energy required for traditional airside systems, such as Variable Air Volume, that rely on air as the primary heat transfer medium, which is a key energy-saving feature of the system."

Chilled Beams Support the Learning Environment

The StudioJAED team decided to install chilled beams in the ceilings throughout the school because they best met HVAC energy-efficiency goals while also providing maximum comfort – all with minimal maintenance requirements.

StudioJAED Designs Chilled-Beam Heat-Recovery Advanced-Efficiency HVAC System

An active chilled beam is an air distribution device with a primary air intake and an integral coil. The primary air, which in this case is 100% conditioned outside air from the AHUs, is injected into a diffuser at a high velocity via nozzles. This creates a pressure differential which induces air from the space across the chilled beam coil.

At the school, the chiller, through the tertiary loop, provides the chilled water to the chilled beams. The AHUs, in turn, provide 100% outside air for ventilation. Active chilled beams eliminate terminal unit fans, reducing noise and eliminating parts to replace or maintain. In addition, since the coils provide sensible cooling only, there are no filters or drain pans.

In all, 136 chilled beams are located in the classrooms and the library, as well as ancillary spaces. The chilled beams are specifically used to manage the space sensible cooling load, which consists of the building envelope, as well as lights, computers and people occupying any given space.

Zigmond said, "We introduced school district personnel to a previously completed facility our team had done with chilled beams, and they were exceedingly impressed with the quietness – in addition to the humidity control, and overall operational envelope – and wanted it for the educational spaces at Gilpin Manor."

Comfort Cooling with Heat Recovery Savings

Given the importance of energy conservation, StudioJAED specified the air-cooled chiller with a heat recovery module given its ability to reduce the school's overall energy consumption.

To do so, the chiller uses an integral heat recovery condenser as a separate heat exchanger to reject heat energy to the building's heated water loop.

"We selected this particular chiller with the heat recovery module installed to minimize the runtime the boilers would need to operate in the cooling season," said Zigmond. "The heat recovery module provides the bulk of the load needed by the air handlers to manage the dehumidification cycle and associated reheat for the supply air to the chilled beams."

Courtney Bauer, Sales Engineer with BSS, explained that an air-cooled chiller typically rejects all its heat to the ambient air. However, with this unique chiller design, the chiller first rejects heat to the heated water loop via the integral refrigerant-to-water heat recovery condenser and then rejects any remaining heat to the ambient air via the standard air-cooled condenser.

Zigmond added, "The heat recovery module can recapture up to 85% of the total heat rejection of the chiller, which offsets the need for the boiler system to simultaneously generate hot water."

Design Saves Energy and Becomes Prototype

Since it began operation, the HVAC system at the new Gilpin Manor school has addressed the needs for comfort cooling – and at the same time – helps CCPS more than meet its energy-savings goals.

Zigmond said CCPS officials are delighted with the performance of the HVAC system in helping teachers and students stay comfortable so they're able to focus on schoolwork. In the meantime, the HVAC system is projecting to deliver cooling and heating at approximately 17 kBTU/SF/Year – exceeding the established goals by over 30% and national average by 65%.

"The system met not only the client's expectations, but ours as well," Zigmond said. "This is one of the more sophisticated systems we've designed with the variety of equipment features interdependently working together to save on energy goals and provide a superior learning space."

Zigmond said the HVAC system at Gilpin Manor served as the design prototype for another CCPS elementary school in Chesapeake City, Maryland.

"The performance of the system at Gilpin Manor made it clear this type of engineered system would work very well at Chesapeake City Elementary," said Zigmond. "In addition to all of the comfort cooling and energy savings it provides, this also saves the school costs since the bulk of the proven HVAC system has already been designed."

The new school in Chesapeake City is currently completing construction and is set to open for the 2020-2021 school year, setting up another group of students and staff to benefit from an optimal learning environment thanks to the HVAC design at Gilpin Manor. BP

All photos courtesy of Alain Jaramillo© with authorized consent of StudioJAED.

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COOLING TOWERS & CHILLERS

Atlas Copco Enters Process Cooling Chiller Market

By Mike Grennier, Chiller & Cooling Best Practices Magazine

Atlas Copco recently debuted its TCX4-90A chiller range to the U.S. industrial process cooling chiller market.

Atlas Copco made headlines recently after introducing itself to the U.S. industrial process cooling chiller market with the launch of the TCX 4-90A chiller range. Chiller & Cooling Best Practices Magazine interviewed Robert Tucker to learn about Atlas Copco's strategy in the United States. Tucker, a business development manager with more than 30 years of industrial fluid dynamics experience, leads the U.S. process cooling chiller initiative within the Atlas Copco Compressor Oil-free Air Division.

Congratulations on this exciting news! Why has Atlas Copco decided to enter the U.S. process cooling chiller market?

Industrial machine and process cooling is an important market and one where we see a lot of opportunity and synergies with our compressed air business. We have a very strong brand presence in many strategic markets where we will market chillers, including food and beverage, machine cooling, medical pharmaceutical, plastics and printing. We can now add more value to customers as we assist them with engineering proper cooling systems.

Many of these markets use our oil-free air compressor technologies. These oil-free market segment applications tend to be more of an engineered solution, which is very much in alignment with the application and processes of industrial cooling.

> "We want to provide customers with multiple solutions that best suit their needs, while giving them the most efficient cooling possible over the lifespan of the equipment with the lowest possible cost of ownership."
>
> — Robert Tucker, Business Development Manager, Atlas Copco

Atlas Copco Enters Process Cooling Chiller Market

The TCX 4-90A chillers are available in a variety of sizes from one to 28 tons of cooling capacity.

What's driving this highly engineered approach to the industrial cooling market?

The job of an industrial chiller system is to remove waste heat from the production process. An engineered approach helps clients determine the right cooling water temperature and flows to optimize production. Fine-tuning temperature specifications represent a tremendous opportunity to increase production output and reduce chiller operational costs. We see many applications using lower than necessary cooling water temperature specifications.

For this reason, many industrial facilities have existing cooling systems too large for the application. In those instances, the system consumes more energy than needed because it's not thermodynamically balanced to match the production processes. We want to serve the market by providing customers with the experience and expertise needed to address their challenges and help them achieve their goals on an application-by-application basis. That's in addition to providing innovative products, such as the TCX 4-90A range of chillers.

The TCX 4-90A range features an air-cooled refrigerant condenser and an integrated hydro module within the same space-saving canopy.

Tell us about the TCX 4-90A chiller range and some of the innovation behind it.

This is a line of compact, all-in-one chillers initially available in a variety of sizes from one to 28-tons of cooling capacity. The chillers feature an air-cooled refrigerant condenser and an integrated hydro module, which means the refrigeration and water circuit (or module) are contained within the same space-saving canopy. The unit's state-of-the-art microchannel, cycling scroll, R-407C refrigerant condensing module is uniquely engineered with epoxy-coated aluminum, requiring 30% less refrigerant. This allows for maximum energy efficiency, while at the same time, reducing the refrigerant charge to a bare minimum. For the customer, it results in an environmentally friendly, very efficient chiller that saves space given its small footprint.

The chillers also include the Elektronikon® MkV Touch screen controller to provide control and monitoring at the user's fingertips. This controller includes our built-in SMARTLINK 24/7 remote monitoring capability as part of the chiller's total package. SMARTLINK collects operational data from the chiller and provides customer's machine data, in real time, in a clear format to ensure the TCX runs at optimal efficiency.

To further ensure years of reliable performance, the chiller's storage tank and hydraulic parts of the centrifugal pumps are stainless steel and are factory installed and tested. They prevent process water contamination with rust particles. This also provides a higher level of reliability and temperature control.

What process cooling products can we expect to see from Atlas Copco in the future?

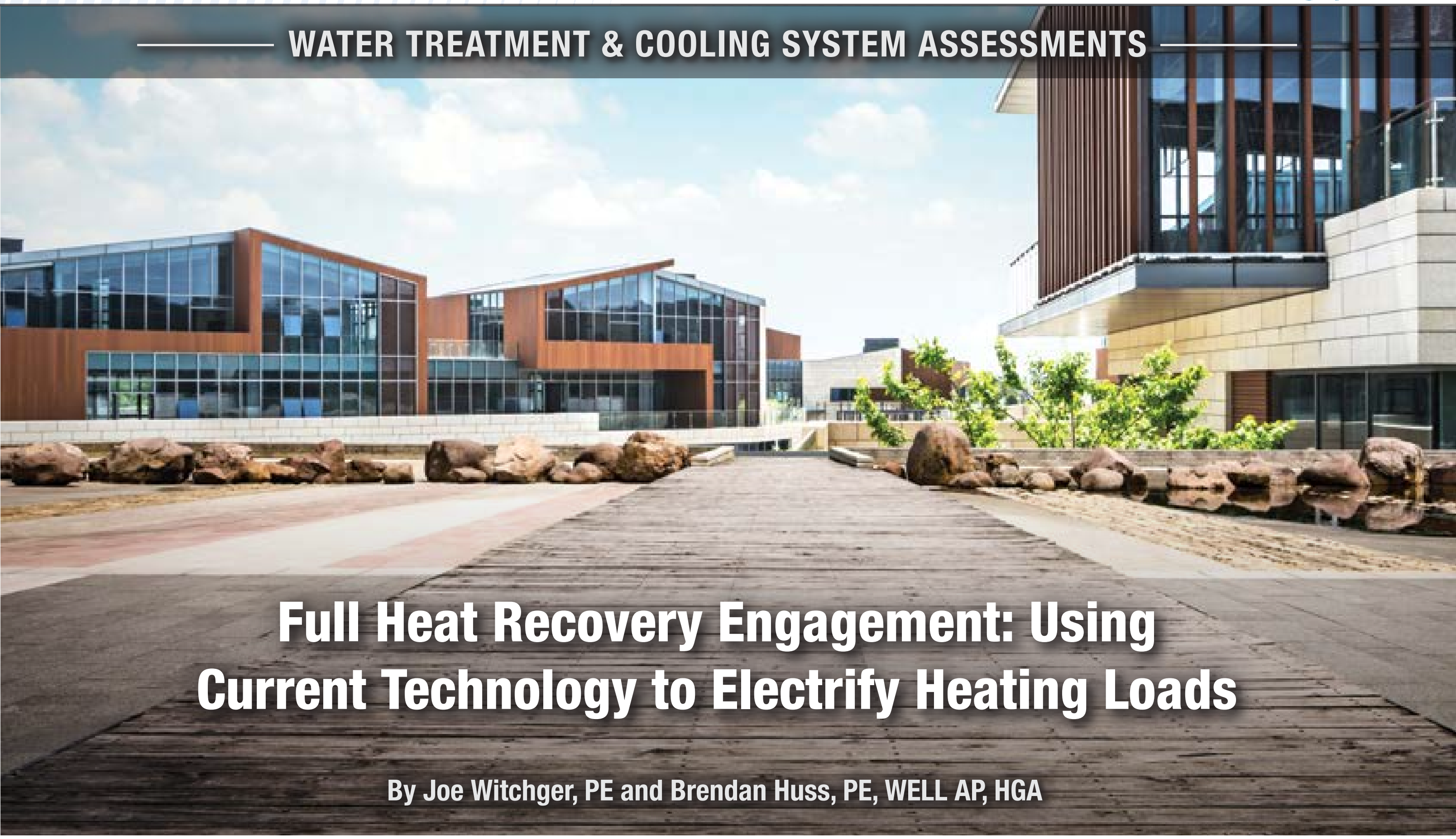
The TCX 4-90A range, which represents the first of many products we're planning to launch, will be expanded to 64 tons of cooling capacity in 2021. Beyond that, our focus is to develop a steady stream of closed-loop process cooling solutions, ranging from multi-circuit process chillers with scroll and screw compressors to evaporative coolers, and more. We want to provide customers with multiple solutions that best suit their needs, while giving them the most efficient cooling possible over the lifespan of the equipment with the lowest possible cost of ownership.

Thank you for your insights. BP

For more information visit https://www.atlascopco.com/en-us/compressors/process-cooling-chillers. All photos courtesy of Atlas Copco.

To read more ***Chiller Technology*** articles, visit https://coolingbestpractices.com/technology/chillers.

WATER TREATMENT & COOLING SYSTEM ASSESSMENTS



Full Heat Recovery Engagement: Using Current Technology to Electrify Heating Loads

By Joe Witchger, PE and Brendan Huss, PE, WELL AP, HGA

Reducing fossil fuel use is key to meeting the dual goal of carbon and energy cost reduction. A Full Heat Recovery Engagement (FHRE) approach can dramatically reduce both, through applying simple principles and using existing technology. Simple measures can help focus the design of both the buildings served and the systems used to achieve these goals.

The Integration of Heating and Cooling Systems

At one time, a common approach to heating systems was to run steam throughout a building and convert locally to hot water. Generating and distributing low-temperature Heating Hot Water (HHW or LTHW) cuts distribution losses by a factor of two or three. Generating at 130˚F (54.4˚C) can change boiler efficiency from 75 to 92 percent, saving more than 20% of gas use.

So, what does heat system efficiency have to do with cooling best practices? While condensing boilers were once the foundations of sustainable conversions, they are increasingly being considered a transition step to a fully renewable energy portfolio.

Integration is one of the most effective ways to achieve the aggressive sustainability goals that have been adopted across the country. In this case, integration means the coordination of heating and cooling production and distribution to reduce overall energy use. And reductions can be very significant. The key is the vapor compression cycle – heat pumps and heat recovery chillers. Many have recognized this for some time. The New York State Energy Research & Development Agency (NYSERDA), for example, has recognized that heat pump technology is the key to achieving their sustainability goals.

"Generating at 130˚F (54.4˚C) can change boiler efficiency from 75 to 92 percent, saving more than 20% of gas use."

— Joe Witchger, PE and Brendan Huss, PE, WELL AP, HGA

Full Heat Recovery Engagement: Using Current Technology to Electrify Heating Loads

A quick note on water source heat pumps and Heat Recovery Chillers (HRCHs). The primary difference between heat pumps and HRCHs is that heat pumps use reversing valves on the refrigerant side and keep the same water connections to a heat sink and source. HRCHs use fixed refrigeration circuit and evaporator while the condenser may reject heat to a HHW system, geothermal wellfield or cooling tower. Heat pumps can be used in many configurations. When the building is large enough, HRCHs provide improved reliability and efficiency. We will focus this discussion on HRCHs.

Conventional HRCH applications offset baseloads. The application of HRCHs requires an instantaneous balance of heating and cooling load, or a source/sink acting as a storage system to handle load mismatches. A geothermal wellfield is an example of long-term storage that can also improve the efficiency of the HRCHs. If we restricted operation to native cooling loads only, few buildings would see significant improvements in energy efficiency and meaningful reductions in gas use.

This may be why so many view HRCHs as a luxury that gets value-engineered out of a project. But we have available opportunities to go well beyond these limitations using FHRE. Two projects HGA recently designed include a Midwestern hospital that will see an 85% reduction in gas use, and a West Coast college with the potential to shift 100% of the heating load away from fossil fuels with little building modification.

$CR = Q_{COND} / Q_{EVAP}$ (Dimensionless)	
$COP_C = Q_{EVAP} / W_{IN}$	$COP_H = Q_{COND} / W_{IN}$
$Q_{COND} = Q_{EVAP} * (1+1/COP_C)$	$Q_{EVAP} = Q_{COND} / (1+1/(COP_H-1))$
$CR = 1+1/COP_C$	$CR = 1+1/(COP_H-1)$
$CR = 1 + (kW/ton) / 3.517$	

Table 1: Basic relationships of terms.

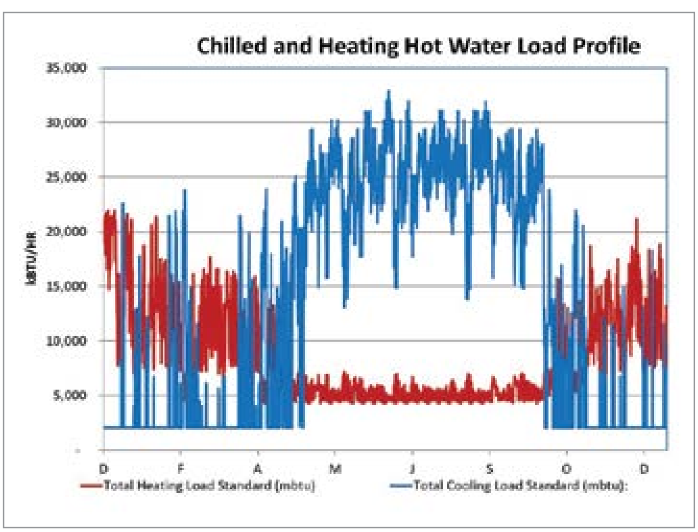


Figure 1: Native chilled water and heating hot water load profiles.

The Principles Behind FHRE

The most fundamental design factor for chillers is the Condenser Ratio (CR). This is the ratio of energy rejected in the condenser to the energy absorbed in the evaporator during the vapor-compression cycle. CR must be understood to effectively design and control the system. It is even more important when working with HRCHs. Table 1 shows the relationships of several key terms.

For a centrifugal chiller at typical design conditions CR is about 1.15, while a HRCH operating at 130˚F (54.4˚C) Leaving Condenser Water Temperature (LCWT) and 42˚F (5.5˚C) Evaporator out temperature (Tchws) with R-134A is about 1.36. Thus, for this HRCH example, a load match means Heating output, Q_H = Cooling output, $Q_C * 1.36$.

To successfully control this match we need to know how much heating we can derive from a given cooling load and vice versa. We call the degree of correspondence between Q_H and Q_C*CR its *coincidentality.* Creating and maintaining this balance between the heating and cooling loads across the HRCH is the means to achieving energy use improvements we are outlining.

On its own, coincidentality is a subjective term, but we can quantify it using the objective measure: Engageable Load Ratio (ELR). This term was developed to explain varying plant performance as we expanded a CUP at the University of Virginia. While defined for cooling and heating performance, we will only show heating ELR.

$$\text{Heating Engageable Load Ratio } ELR_H = \frac{\text{Engageable Heating Load}}{\text{Total Heating Load}}$$

ELR_H is a function of the building envelope and HVAC system. To calculate ELR_H using a peak load, total annual cooling and heating loads or even a bin analysis is meaningless because these energy estimating methods cannot capture the coincidentality of the loads. ELR_H must be calculated in an 8,760-hour analysis for the building or system served. When this is done, it becomes clear that we can manipulate ELR to the advantage of more recovered energy. The example of a hospital load profiles helps describe this concept.

Figure 1 is an 8,760-hour plot of the heating and cooling load profiles in kBtu/hr. The cooling load is reduced to a baseload of about 170 tons in the winter and spikes on warm days. The base cooling load can serve hot water heating loads of about:

170 Tons x 12 kBtu/ton x 1.36 = 2,770 kBtu/hr.

Many would size the HRCH heating capacity as the lesser of the base cooling load * CR, or the summer heating load. This would result in a 170-ton HRCH in the heat recovery mode with 2770 kBtu/hr. heating output. For these profiles, ELR_H = 0.50 and ELR_C = 0.18.

If we stopped here, we would be missing an opportunity to have an even more significant impact on building energy use. Since ELR is a function of the building and HVAC systems, ELR_H can be improved if we reconfigure the systems.

Figure 2 shows a few options at the Air Handling Units (AHUs) that can be used to improve the ELR_H and take the first step toward a Fully Engaged Heat Recovery System. Examples include use of energy recovery at the AHU, adding a cooling coil in the exhaust and/or relief airstream and incorporating Mixed Air Temperature (MAT) reset to shift from airside economizing to water side economizing. Shifting the load from centrifugal chillers to HRCHs reduces plant condenser water pump and cooling tower fan energy and water use. Bypass dampers can be used to eliminate added pressure drop when the coil is not in use.

In Figure 1, we can see at present we are limited by the small cooling load below 50˚F (10˚C). At first, ELR_H looks reasonable and could result in a 30% reduction in heating hot water energy use. The ELR, however, cannot stand on its own. The system is limited by HRCH turndown, capacity, temperature limits and reliability, all reducing the savings that can be achieved. We need to know how the equipment will perform in the system. This leads to the concept of Achievable Load Ratio (ALR).

$$\text{Heating Achievable Load Ratio } (ALR_H) = \frac{\text{Achievable Engaged Heating Load}}{\text{Total Heating Load}}$$

If we take the ratio of the two measures, we get the ELR Efficiency – the ratio of Achievable Load to Engageable Load.

$$\eta ELR_H = ALR_H / ELR_H$$

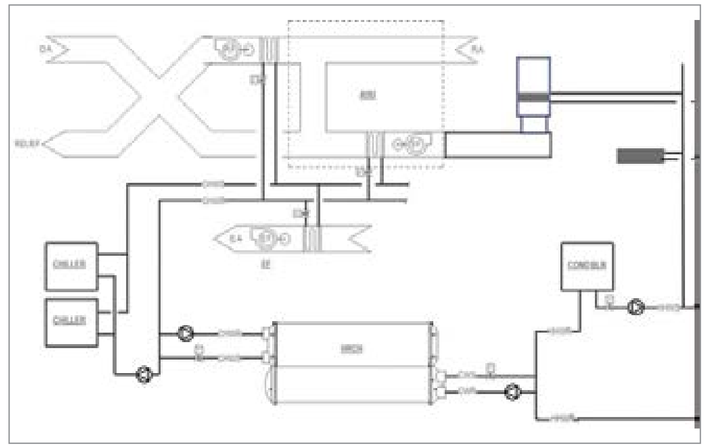


Figure 2: FHRE system configuration.

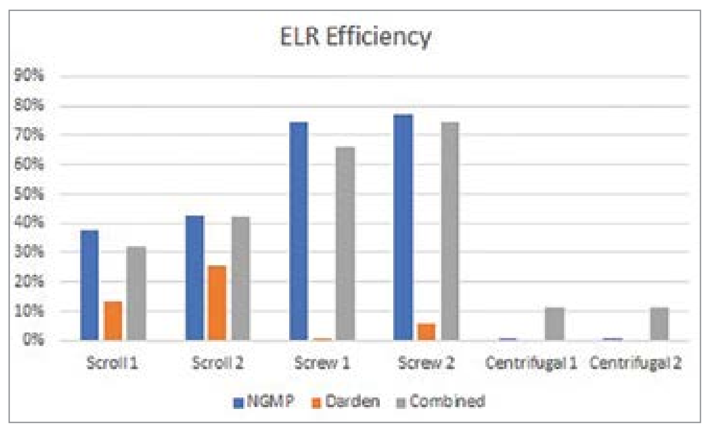


Figure 3: ELR efficiency of various HRCH applications.

This is a machine-dependent measure of how effective the selected equipment will be in capturing the potential for thermal energy recovery for a given building.

When presented with lifecycle costs, the ηELR_H provides a full picture of the cost to achieve a given degree of energy recovery. It also reveals the incremental costs of drawing closer to the site goals.

Figure 3 compares ηELR_H for several equipment options that were considered for the University of Virginia. The scroll chillers showed poorly because of reliability problems experienced by the University. The centrifugal options were too large for the application.

Full Heat Recovery Engagement: Using Current Technology to Electrify Heating Loads

Calculating ηELR_H allows the engineer to compare equipment and understand the source and magnitude of different load components. Taking short cuts reduces the potential for the system and blinds the designer to the insight needed to find potential innovations presented by the project.

In calculating the ηELR_H, we can envision the interactions between many different energy savings strategies and see how they would work in aggregate – we can see the impact on the whole system expressed as one factor. Calculating ηELR_H will reveal the benefit of a fully sized airside economizer, while providing for waterside economizing at the same time. It will show that adding a cooling coil and bypass to a centralized exhaust system has economic benefit. And we now have a tool to analyze the energy impact of decreasing outside air while increasing minimum volumetric airflow rate or increasing ventilation in response to COVID or the next concern, which could be an external threat.

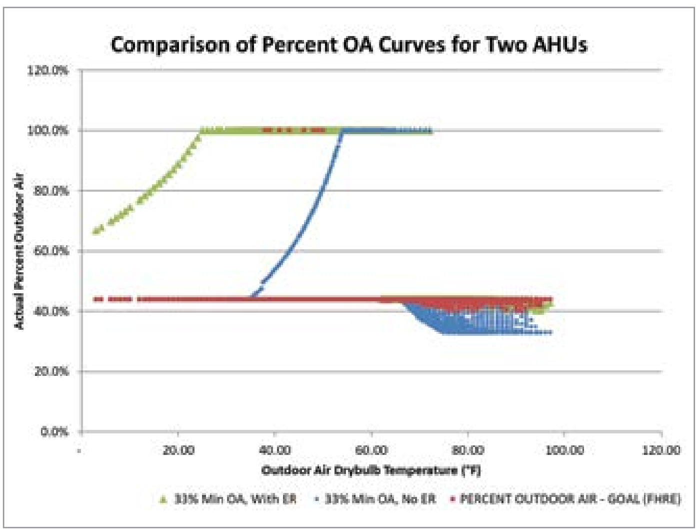


Figure 4: Outside air control strategies.

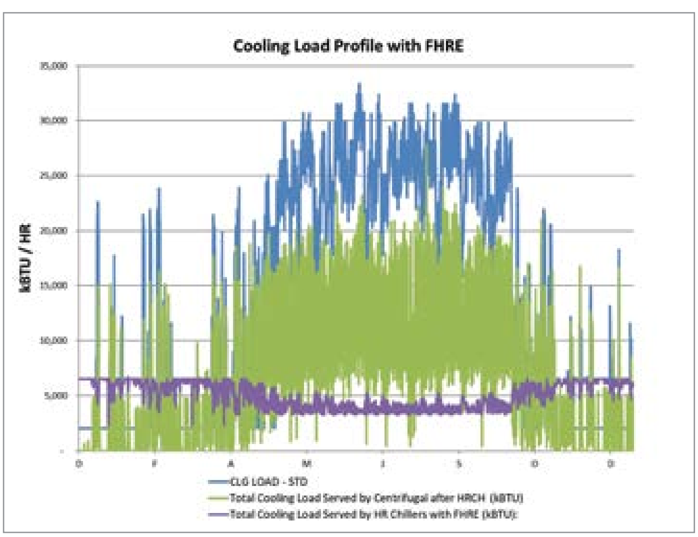


Figure 5: Cooling load profile manipulation.

The steps taken to calculate ηELR_H may reveal that driving one factor to its minimum energy use may result in an overall higher energy use. This may be counter-intuitive and seems to violate both energy code and a principle of net zero buildings. When presenting this concept, an objection often raised is that energy code says we cannot use mechanical cooling where we could airside economize. So, why use energy (waterside economizing) when we can do it for free (airside economizing)?

The response is "environmental prudence." If the right thing to do is to reduce overall energy use, then judiciously creating a cooling load where there was none is the right thing. Using the relationships defined above, the HRCH CR corresponds to a COP_H of 3.78 and COP_C of 2.78. When serving native loads, the net COP is 6.56. When using waterside economizing instead of airside, the benefit is 3.78/0.92, the COP_H/ the boiler efficiency. This results in a 75% reduction in energy use, including parasitic losses.

To obtain this benefit, AHU MATs must be coordinated with plant operations. When called for by the control system, a measured amount of Energy Recovery (ER) can be added to the chilled water system load by adjusting the MAT, enabling a response in heating output.

Figure 4 shows two AHUs, both with 33% OA at rated airflow. Outdoor air in the AHU without ER (blue diamonds) ramps down between 55˚F (12.7˚C)and 35˚F (1.6˚C)dry bulb. Because the supply airflow is reduced as load drops off, this unit requires 44% OA at reduced airflows and this limits our ability to recover energy from the installed cooling coil when outdoor air temperature is below about 35˚F (1.6˚C). The AHU with ER (green triangles) will have higher MATs if we don't bypass the ER device. This allows waterside economizing through the entire heating range. This cooling load can be engaged with native heating loads and this improves the ELR_H, ALR_H and ηELR_H. Reducing the OA recirculates humidified air back into the space, reducing humidification steam requirements.

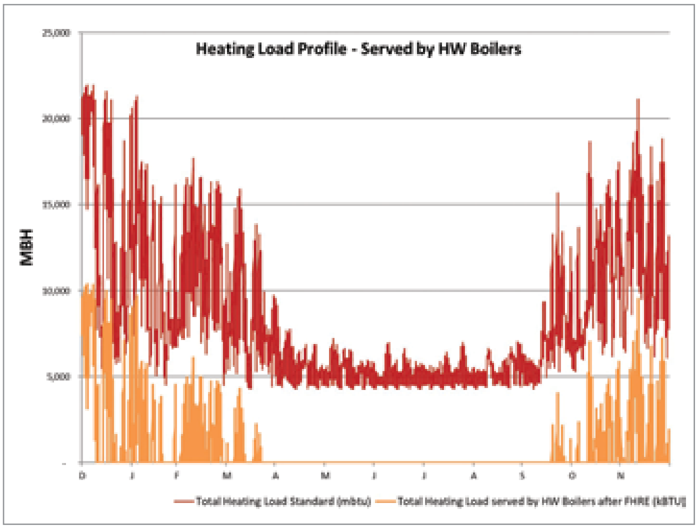


Figure 6: Boiler load profile after FHRE.

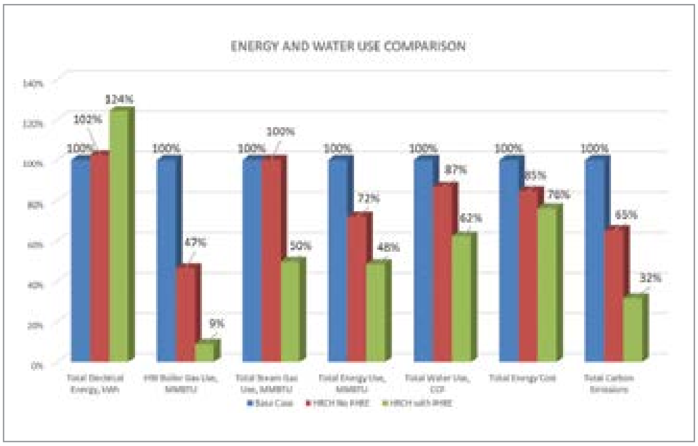


Figure 7: Energy and water use reduction.

One final comment on the implementation: many sites charge buildings for the heating and cooling energy used. Allowances or incentives may be needed to encourage building operators to provide the cooling load as a means of energy recovery when airside economizing is available.

When all opportunities incorporated into the design are modeled, we can see the impact of FHRE on the cooling loads served by the centrifugal chillers and the heating loads served by boilers.

Figure 5 is the Midwestern hospital example showing the peak cooling loads dropping and base and winter loads increasing (due to FHRE).

Notice the increase in winter cooling loads with FHRE that become the sizing criteria for the HRCHs. Modeling will reveal the benefit of adding HRCHs that can be weighed against goals and added cost.

Figure 6 is the heating loads corresponding to Figure 5. It shows the dramatic drop in heating load served by the boilers that can be achieved.

Figure 7 shows the resultant energy savings and electrical energy increase for the FHRE. Each energy category is compared using the base case as the 100% value.

Simple Measures Generate Results

On your next project, when considering HRCH and heat pumps, show the team what you can accomplish for FHRE by taking simple measures that can help focus the building and system design to reduce carbon and energy costs. BP

About the Authors

Joe Witchger, PE, is a Senior Mechanical Engineer at HGA, where he specializes in high-efficiency central plants, energy management systems, and mechanical systems optimization.

Brendan Huss, PE, WELL AP, is a mechanical engineer at HGA, where he specializes in analysis and design of central boiler and chiller plants and district heating and cooling distribution systems.

About HGA

HGA is a national multidisciplinary design firm rooted in architecture and engineering. Ranked in the top ten healthcare firms in the country, HGA strives to deliver innovative, value-based solutions that meet the triple aim of quality in healthcare planning and design: operational efficiency, human experience, and clinical outcomes. More than 850 people in 11 offices from coast-to-coast work to make a positive, lasting impact for clients in healthcare, arts and culture, community, corporate, education, government, science and technology, and energy markets. For more information, visit www.hga.com. All images courtesy of HGA.

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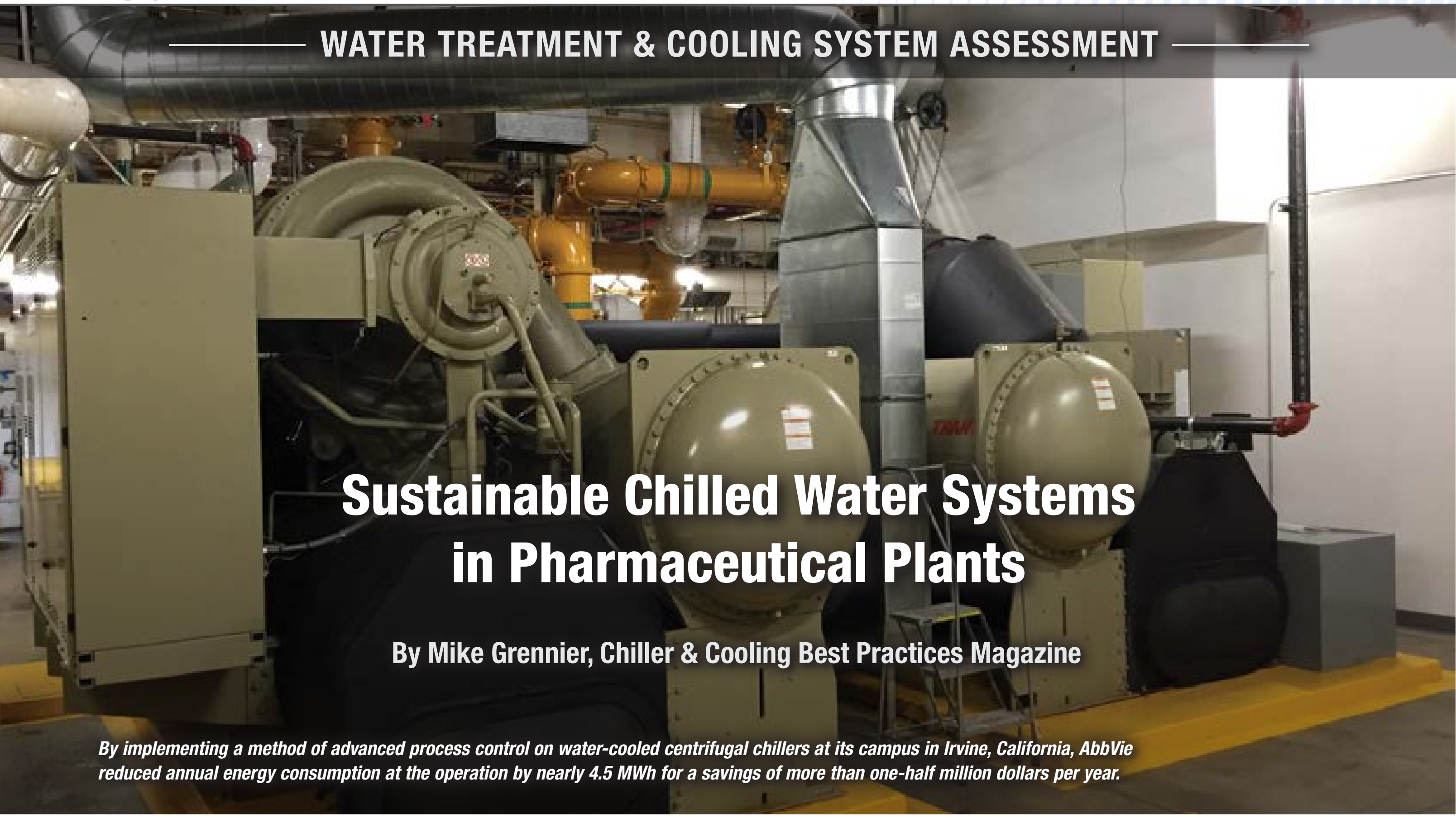

WATER TREATMENT & COOLING SYSTEM ASSESSMENT

Sustainable Chilled Water Systems in Pharmaceutical Plants

By Mike Grennier, Chiller & Cooling Best Practices Magazine

By implementing a method of advanced process control on water-cooled centrifugal chillers at its campus in Irvine, California, AbbVie reduced annual energy consumption at the operation by nearly 4.5 MWh for a savings of more than one-half million dollars per year.

➤ Chiller & Cooling Best Practices Magazine spoke with Tom Pagliuco, Executive Director Global Energy Engineering at AbbVie, Inc. about best practices for optimizing chilled water systems in today's pharmaceutical operations.

Pagliuco has a wealth of experience in energy management having served in energy leadership roles at leading pharmaceutical companies such as Schering-Plough Corporation and Merck, as well as Allergan, which AbbVie recently acquired. He spearheaded numerous energy-initiatives that gained wide-spread recognition for several companies from the U.S. Environmental Protection Agency's ENERGY STAR® program – including earning eleven ENERGY STAR Partner of the Year Sustained Excellence awards since 2009.

Tom Pagliuco, Executive Director Global Energy Engineering, AbbVie, Inc.

Good morning! Please describe AbbVie.

We're a global biopharmaceutical company focused on discovering and developing innovative medicines that solve serious health issues. Our areas of focus include immunology, oncology, neuroscience, eye care, virology, women's health, gastroenterology, and Allergen Aesthetics. We're headquartered in Lake Bluff, Illinois, and we have manufacturing and research facilities in 14 countries. This includes eight research centers. We employ a total of 47,000 people.

Where are the biggest opportunities for sustainability at pharmaceutical manufacturing plants?

Electrical energy reductions are often the primary focus for conserving resources for a number of reasons. For one, they result in a reduction in greenhouse gas emissions. Second, energy is typically way more expensive than water. Pharmaceutical plants also tend to be located in areas where water is abundant, which is important since water is a significant raw material used for cooling processes and often the product itself.

When it comes to energy consumption, Heating Ventilation and Air Conditioning (HVAC) represents 65% of a typical pharmaceutical facility's total energy usage. There are a number of opportunities for optimization of HVAC systems and the components involved, such as chillers.

The Holy Grail for electrical energy savings with HVAC is to reduce the room air change rate, which is determined by the classification of a particular room. But you can't change the process without proving those same changes won't affect the product. It gets very complicated, and in some cases, the easy answer is to say, "Don't mess with it."

So another excellent way to achieve energy savings is by producing chilled water more efficiently. Of course, you're still going to get some pushback as you would in any industry when it comes to making these changes, but there isn't the same level of reluctance as there is with room air change rates. It's why HVAC systems are a good target for energy efficiency.

How would you describe the challenges engineers face with HVAC systems?

The ideal is to get it right the first time and design the system to be as efficient as possible from scratch. That doesn't always happen, because if you're a process engineer, you're incentivized to meet the project budget and deadline and have the thing work. As an example, if the budgeting decision comes down to a super-efficient chiller, or a standard chiller, guess what's going to get installed? The standard chiller.

Another reason a highly efficient system doesn't always get installed has to do with the design process. Typically, design engineers don't want to take risks. That means things tend to get over designed because they want to build in a safety factor and make sure it works. That said, I've been on that side of the business so I get it. It's not easy. What should really drive decisions is total cost of ownership, but it takes a lot of engineering time to come up with that stuff, and even then, it's far from perfect.

What chilled water optimization control strategies have worked for you?

I've had a lot of success with advanced process control to achieve chilled water optimization. It essentially involves various levels of control for chillers.

On the first level you have instrumentation, such as temperature and pressure sensors and flow meters. That is all important stuff, of course, but it's a bunch of data and it doesn't deliver any savings, or very little savings, unless you do something with it.

The next level is what I refer to as distributed control. This is where you're taking all the data from instrumentation and controlling your process with a master control system, or a Building Management System (BMS). Now, you're able to achieve some energy and costs savings by using the data to control equipment like chillers. However, you're not really optimizing the system; you're only controlling it.

Pagliuco of AbbVie checks the status of equipment at one of the pharmaceutical company's many manufacturing and research facilities.

The top level of this control hierarchy is using advanced process control for optimization of things like chiller systems. This involves the integration of software that uses algorithms with a master control system to better control what's happening. So rather than just making chilled water, advanced control methodology generates the right amount of chilled water and pumps just enough of it to meet the cooling load, and no more and no less.

This is something we've decided to address and we've had success with it at our operations, including a very successful project at our research and development campus in Irvine, California.

What was involved with the Irvine chiller system optimization project?

The Irvine campus is one of the largest sites and energy users in the AbbVie portfolio with over one million square feet of laboratory, office and manufacturing space. At that time, the site used about 55,000 MWh per year of electricity.

The issue we wanted to tackle is not uncommon with many chiller installations. Many are operated as traditional constant primary loop, variable secondary loop systems. This creates a low operating delta T, resulting in over pumping of water in the primary and secondary loops.

It also decreases chiller efficiencies and makes it seem like there is a lack of chilled water capacity.

The Irvine campus generates chilled water with cooling towers, along with five Variable Frequency Drive (VFD) water-cooled centrifugal chillers with a total installed capacity of 4,000 tons. The system is normally operated as a constant primary, variable secondary system. Most of the condensers, as well as the primary and secondary pumps and cooling tower fans, use VFDs.

While it's well designed and operated, a low delta T suggested the system was a candidate for optimization. So we partnered with tekWorx to improve the overall efficiency by using a more advanced method for controlling the chilled water plant. The company integrated its supervisory Control Engine Optimization system with the existing BMS, which converted the chilled water system to a full variable flow operation. It also improved efficiency through a better method of chiller sequencing and by operating the chillers based on updated setpoints, such as chilled water supply temperatures.

How would you rate the success of the project?

The initiative has reduced annual energy consumption by nearly 4.5 MWh, resulting in a yearly savings of more than one-half million dollars. Looking at it another way, it will lower the total electric power usage at the campus by 8%. We also received a utility incentive for the project, which resulted in a payback of just under six months.

This ties back to what I mentioned earlier with regard to capital costs associated with something like a highly efficient chiller. The campus chilled water system had almost everything it needed; we just needed to make it a little more efficient. The cost of replacing chillers that are not at the end of their life is going to be more expensive than implementing a more advanced method of process control.

This project was a homerun. We've since adopted it as a best practice methodology for optimizing chillers at other sites in our facility portfolio. We eventually did similar projects at operations in Westport, Ireland, and Waco Texas, as well as a smaller version at our Cincinnati, Ohio, plant. Our effort at the Irvine campus was a runner up for an ENERGY STAR Project of the Year award.

Congratulations on your success! What motivates you to be involved with the ENERGY STAR program?

I get a lot of value out of the comradery that goes along with being an ENERGY STAR partner because it gives me the opportunity to talk with my counterparts at other major pharmaceutical companies and swap stories and learn from others about ways to operate systems efficiently in order to reduce energy use.

The other thing I really like about the ENERGY STAR program is all of the benchmarking tools available, which is especially great since anyone can access them. You don't have to be an ENERGY STAR partner to take advantage of the tools. I also have to say the recognition an ENERGY STAR Partner of the Year award affords you is priceless.

Why is being named an ENERGY STAR Partner of the Year so beneficial?

I think the struggle of an energy manager in general is getting attention, getting people to put a priority on energy savings. It might not be as much of an issue with an energy-intensive industry like glass manufacturing where energy is a significant percentage of the costs of goods sold, but I think it's an issue with other industries like pharmaceuticals where energy is around two to three percent of the costs of goods sold.

As an energy manager I've learned that finding energy opportunities is easy when you've been in the business for a while. It's getting them implemented; that's the hard part. It's about trying to build a program, cutting through the clutter of day-to-day corporate life, having goals, and making things visible.

When I was at another company earlier in my career and we received an Energy Star Partner of the Year Award, all of the sudden it was like, "Wow. We just got this major award. Maybe this program is really good." It was kind of like, "Tom must know what he's talking about."

Getting an ENERGY STAR Partner of the Year Award stamps your program as a quality program and it helps you take things to the next level.

Thank you for these insights. BP

For more information, please contact Tom Pagliuco, email: Thomas.Pagliuco@Allergan.com. All photos courtesy of AbbVie, Inc.

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CHILLER & COOLING INDUSTRY & TECHNOLOGY NEWS

TCX4-90A Process Cooling Chillers

Atlas Copco is launching its first process cooling chiller range in the U.S. The TCX 4-90A range features 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) with state-of-the-art microchannel condensers requiring 30% less refrigerant. Atlas Copco entered the industrial cooling market through the May 2019 acquisition of Eurochiller S.r.l., an Italian manufacturer and distributor of industrial cooling equipment and related products. The TCX range is Atlas Copco's first range of industrial cooling equipment in the U.S. There is a plan to introduce more new products to the market in 2021, extending the portfolio to 500 tons of cooling capacity.

Atlas Copco, www.atlascopco.com

AquaEdge 19DV Chiller Line Expanded to 350 Tons

Carrier announced it has expanded its AquaEdge 19DV water-cooled centrifugal chiller capacity range in North America by an additional 150 tons. With the capacity range now starting at 350 tons – previously 500 tons – the 19DV can accommodate customer requirements of smaller applications. The top of the range remains at 800 tons. The 19DV's unique EquiDrive two-stage back-to-back compression allows for effective heat recovery, which enables its excellent cooling efficiency at standard conditions to flex up to 120˚F (49˚C) for energy-saving hot water production. The 19DV also provides free cooling, a strategy for leveraging natural air temperatures and includes a Variable Frequency Drive (VFD) protecting the chiller against abnormalities in power quality. Carrier SMART Service, a wireless technology allows for remote diagnostics, long-term performance trending and benchmarking.

Carrier, www.carrier.com

SPX Appoints Executive Officer and President – Global Cooling

SPX Corporation announced that Ankush Kumar, who joined the company in 2018 as President of the company's HVAC Cooling business, has been appointed as an Executive Officer of the company. Mr. Kumar will also now assume leadership for SPX's Process Cooling organization, giving him responsibility for all Cooling operations globally. "Ankush is an excellent addition to our strong team of executive leaders," said Gene Lowe, President and CEO of SPX Corporation. "He has been instrumental in driving substantial operational improvements across our global HVAC cooling businesses through his expertise in strategy development, operations, channel management, and strategic pricing. His demonstrated ability to implement process discipline and build organizational capabilities make him a tremendous asset to our culture of continuous improvement and value creation for shareholders."

SPX Cooling Technologies, www.spxcooling.com

Metasys Building Automation System

Johnson Controls, the global leader for smart and sustainable buildings, has released its latest version of the Metasys Building Automation System (BAS), Metasys Release 11.0, which delivers enhanced system performance and new cyber security capabilities. The system's new and updated features help owners and operators identify and solve issues to avoid equipment failure and energy waste, while also providing a flexible modernization path for aging system components. Metasys Release 11.0 introduces a new, licensable Fault Detection and Fault Triage feature suite. By identifying building system-related faults, in order of severity, and providing suggested possible causes and corrective actions, it helps operators of varying experience levels quickly and easily identify and troubleshoot issues to keep systems running optimally and building occupants comfortable.

Johnson Controls, www.johnsoncontrols.com

CHILLER & COOLING INDUSTRY & TECHNOLOGY NEWS

Compact Air Handlers

Daikin added a vertical configuration to its PreciseLine air handlers, which are designed to improve indoor air quality (IAQ) and comfort, and deliver energy savings – all in the most compact footprint available. The new vertical configuration gives engineers and contractors additional application flexibility, ideal for retrofits and applications such as individual classroom conditioning. Compliant with ASHRAE 62.1-2019 standards for high IAQ, PreciseLine air handlers include up to MERV 13 filters, which capture particles as small as .3 to 1 micron, such as legionella and spores. Its double-wall panel construction also keeps conditioned air in the cabinet until it's delivered to the intended space, reducing the potential for contact with contaminants. Direct-drive fan technology eliminates the possibility of rubber particles from entering the airstream as well, a common occurrence with belt-driven fans. Plus, an easy-to-clean cabinet and stainless-steel drain pan mitigate the risk of mold and mildew growth.

Daikin Applied Americas, www.daikinapplied.com

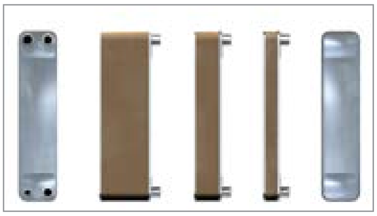
Humidity & Temperature Probe

Vaisala, a global leader in weather, environmental, and industrial measurements, has introduced a new HUMICAP Humidity and Temperature Probe HMP1. With its top-of-the-line accuracy and sensor purge functionality ensuring excellent stability over time, the HMP1 is an ideal choice for demanding humidity measurements in environments such as pharmaceutical facilities, data centers, cleanrooms, or any other environments that require strict humidity monitoring and control. The product features the recognized and space-proof HUMICAP sensor technology. The probe is compatible with any Vaisala Indigo series transmitter. The possibility to detach the probe from the transmitter allows efficient maintenance and calibration. With the Indigo200 series transmitter the HMP1 probe forms a single wall-mounted unit with no probe cable or probe holder needed.

Vaisala, www.vaisala.com

Micro Plate Heat Exchanger

Danfoss has extended its highly efficient range of Micro Plate heat exchangers – enabling more manufacturers of chillers and heat pumps to benefit from its efficient Z-design technology and address refrigerant and design changes. The new, R32-optimized range complements existing multi-refrigerant heat exchangers for R410A, R452B, and R454B, widening chiller manufacturers' options when reducing GWP. New single and dual-circuit versions are available to complete the existing range for chillers. The portfolio can now cover the entire range of light commercial and commercial chiller ranges. HDW44 is perfect for sanitary water heating, with a double-wall and a built-in interspace preventing water contamination in the event of a refrigerant leak. The Suction Gas Heat Exchanger (SGHX) can enhance efficiency in heat pump condensers and evaporators, counteracting the impact of high-glide refrigerant blends like R455A and R454C.



Danfoss, www.danfoss.com

Bacharach Names Matthew Toone as CEO

Bacharach has announced the appointment of Matthew Toone as Chief Executive Officer. Toone joins Bacharach from Emerson, where he served as Vice President of Sales, Service and Solutions for Emerson's Cold Chain Platform. The company said Toone will be responsible for the further integration of the Parasense and Neutronics brands and setting the company's strategy as it moves into its next chapter of market expansion and growth. "The board of directors selected Matt because of his leadership qualities, proven track record leading an international business and extensive knowledge of refrigeration and IOT solutions for the HVAC-R, food retail and healthcare markets," said Martin Carter, Chairman of Bacharach and CEO at Laurel Solutions.

Bacharach, www.mybacharach.com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